The Republic of Indonesia
Ministry of Transportation
Directorate General of Sea Transportation

The Republic of Indonesia
The Project for Review of the Study
For
Maritime Traffic Safety System Development Plan

Report (Phase-2)

April, 2023

Japan International Cooperation Agency (JICA)

Japan Aids to Navigation Association (JANA)

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Contents

Preface・Summary

Preface

The project, which is called “the Project for Review of the Study for Maritime Traffic Safety System Development Plan”, signed on March 22nd, 2017, was amended on October 13th, 2021, and the additional activities were added to the project.

This additional activity is that as NAVIGASI and DISNAV collects and analysis data, the experts of a consultant are to advice those works. The details are provided in the MOM and in “TOR for the additional work” attached as Appendix-1 and as Appendix-2, respectively.

Summary

Support was provided in the preparation of an establishment plan that could serve as the basis for the Master Plan in the following three components.

Component 1 : Aids to Navigation and VTS, including Ship Routing

Component 2 : Coastal Radio Station

Component 3 : Vessels for Aids to Navigation

The timeframe of the work was 1 year from its commencement.

For the implementation of this work, a counterpart was appointed for each component from NAVIGASI and the consultant.

The work was carried out in the following steps ;

✧ Preparation of necessary documents by NAVIGASI,

✧ Guidance to DISNAV by NAVIGASI,

✧ Data collection, analysis and compilation by DISNAV, and

✧ Formulation of an establishment plan with DISNAV’s reports.

Chapter 1

Background of the additional activities

Chapter 1 Background of the additional activities

The scope of the additional activities mentioned in the TOR is categorized into three components. The first one is “Aids to Navigation and VTS”, and Ships Routing is included in this component. The second is “Coastal Radio Station”, and the third is “Vessels for Aids to Navigation”.

1.1 Aids to Navigation and VTS, including Ship-routing

The development of GPS has revolutionized coastal navigation for vessels, and as a result, the role of coastal aids to navigation, like a lighthouse installed as a landfall, has changed significantly.

According to the results of the 2019-2020 survey, it can be said that the establishment of coastal aids to navigation, such as a lighthouse installed at the tip of a peninsula and in an important sea area for coastal navigation, has been almost proceeded (the adequacy is about 90%.), and it was found that the establishment of aids to navigation at an individual port will be subject in the future.

Therefore, since it is necessary to develop an establishment plan for each port rather than a comprehensive plan for the entire area as in the past, so the establishment procedure for undeveloped and existing ports has been described in the report.

An approach to the establishment plan for VTS and Ship-routing are the same as those for aids to navigation, and should be considered in the establishment plan of each port for aids to navigation. Therefore, they have been to be included in the establishment plan for aids to navigation.

1.2 Coastal Radio Stations

Regarding coastal radio stations mainly composed of GMDSS, the system has been completed, but it has been found that there are issues related to their operation and aging equipment.

It is easy to propose a replacement plan for the equipment, but now the system-modernization of GMDSS is being studied worldwide, and it was suggested that it would be beneficial and effective to make a plan while observing the movement of future maritime radio system.

In order to consider the establishment plan for new radio stations or innovated stations to accommodate the modernized system, it is necessary to understand first the existing furnished radio facilities on board and actual usage of maritime radio of vessels navigating in Indonesian waters. And, based on these realities, the policy for stations and operation including personnel affairs would be determined, and the new establishment plan would be considered.

1.3 Vessels for Aids to Navigation

25 vessels of ones belonging to NAVIGASI, which are 35% of all the vessels engaged in the maintenance work for aids to navigation, are aging over 35 years old, and the replacement plan for all of these vessels should be immediately made from the viewpoint of vessels' safety.

However, today, the way of maintenance work conducted by using these vessels has changed significantly due to the adoption of LED lights and solar cells for aids to navigation. For example, the periodic replacement of a light bulb and battery installed at a lighted beacon and a lighted buoy at sea has been no longer necessary.

The vessels that are truly needed for the maintenance of aids to navigation must be selected and the replacement plan of the vessel would be considered.

In order to take this process the overall workload that the vessels must carry out is calculated and an overall plan is considered that incorporates the remaining relatively young vessels.

Chapter 2

Contents of Work

Chapter 2 Contents of Work

The outline of the work, the assignment of a counterpart and the schedule of the work are noted below.

2.1 Outline of activities with support

This work was accomplished through the following three processes to be carried out by NAVIGASI and DISNAVs with the support of the consultant.

✧ Preparation of documents and Reporting forms

✧ Collection and Summarization of data and information

✧ Compilation of summarized plan

The facilities of aids to navigation should be established and operated appropriately in order to promote the safe and efficient navigation of vessels, that leads to the encouragement of marine traffic and the prosperity of an archipelago nation.

Therefore, these establishment plans should be developed under specific policies that are common to throughout the country, and the central authority will be responsible for their formulation.

The one, who is NAVIGASI in charge of aids to navigation, shall prepare documents, such as a policy or a guideline, guidance notes and reporting forms.

Then, DISNAV, which is in charge of practical work of administration, shall collect data and information on maritime traffic in accordance with the policy and summarize those resources according with the guidance, and shall prepare the reporting forms.

These activities will be carried out with the cooperation of the consultant.

The flow of these works is shown in Figure 2.1 -1.

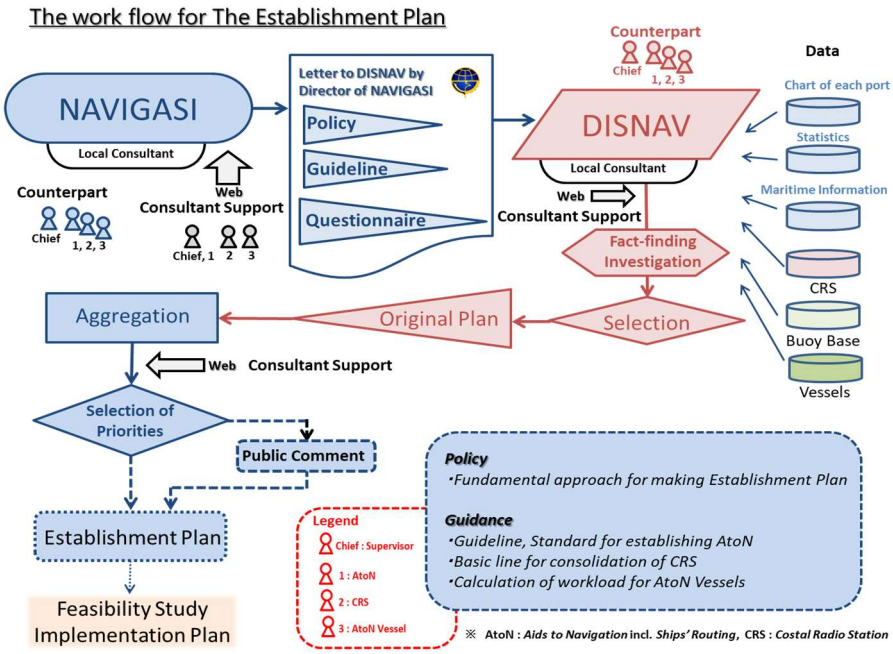


Fig. 2.1 -1 : Flow of Works

2.2 Counterpart and Web-meeting

As noted in "Pre-requisite in the TOR", persons in charge of each component in NAVIGASI and the consultant was assigned for having a Web-meeting to ensure that the work would be done smoothly under Covid-19. The counterparts held the Web-meetings as necessary to share information and check the progress of work as they carried out their tasks.

The Web-meetings were conducted using the Zoom-conferencing system and were implemented in several styles as shown in Figure 2.2 -1.

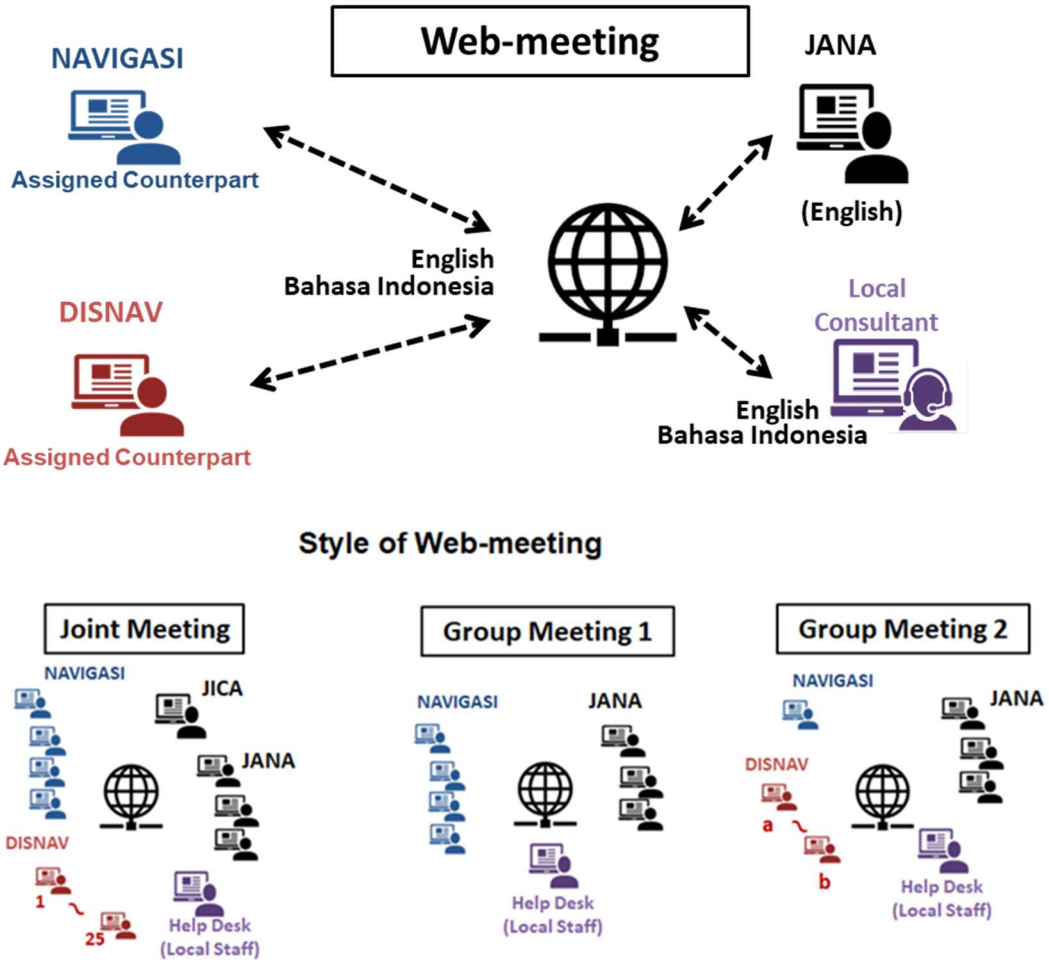


Fig. 2.2 -1 : Style of Web-meeting

2.3 Schedule and Activities

Since there were restrictions on the consultant's overseas activities under the Covid-19, the support and the assistance would be provided mainly through Web-meeting. The first on-site work in Jakarta was conducted in May 2022, when the travel restrictions were eased.

The on-site work was initially planned to be carried out three times because of the uncertainty regarding travel restrictions due to the Covid-19, but the plan was changed midway, and the overseas work was scheduled four times.

In mid-February 2022, the consultant and NAVIGASI had several Web-meetings to prepare for the kick-off of the work and the 5the JCC was held on March 14th, 2022, by the Web-meeting, and the work started officially.

Subsequently, individual Web-meetings were conducted for each component, and the first on-site work in Jakarta was performed in May, 2022 to share information on the current situation and discuss how to proceed with future work.

In June 2022, the second on-site work was carried out and representatives from some of DISNAVs were called to Jakarta for a workshop where this project works were explained to them, which was also distributed to DISNAVs' offices on the web.

The plan was changed regarding the implementation of the on-site work in consideration of the progress of the work, and an additional third on-site work was carried out in October 2022.

This on-site work included the plan of visits to several DISNAVs, but due to the progress of DISNAVs' works and the situations of Covid-19, individual Web-meetings were conducted in Jakarta for all DISNAVs instead of the visits. As a result, the replies to questionnaires were organized for each component with the deadline for the reply at the end of November 2022.

The fourth on-site work was implemented in March 2023, and the briefing session on the compilation for the assistance and support works was held in Jakarta.

The progress of the works is shown in Figure 2.3-1.

Figure 2.3-2 shows a series of workflow in a time-order.

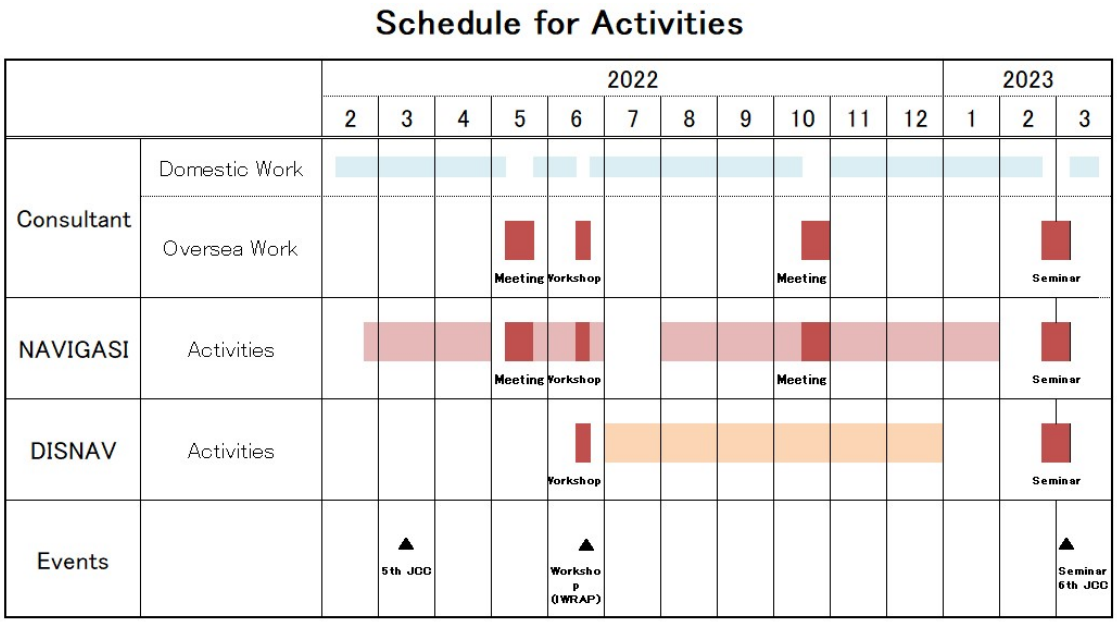
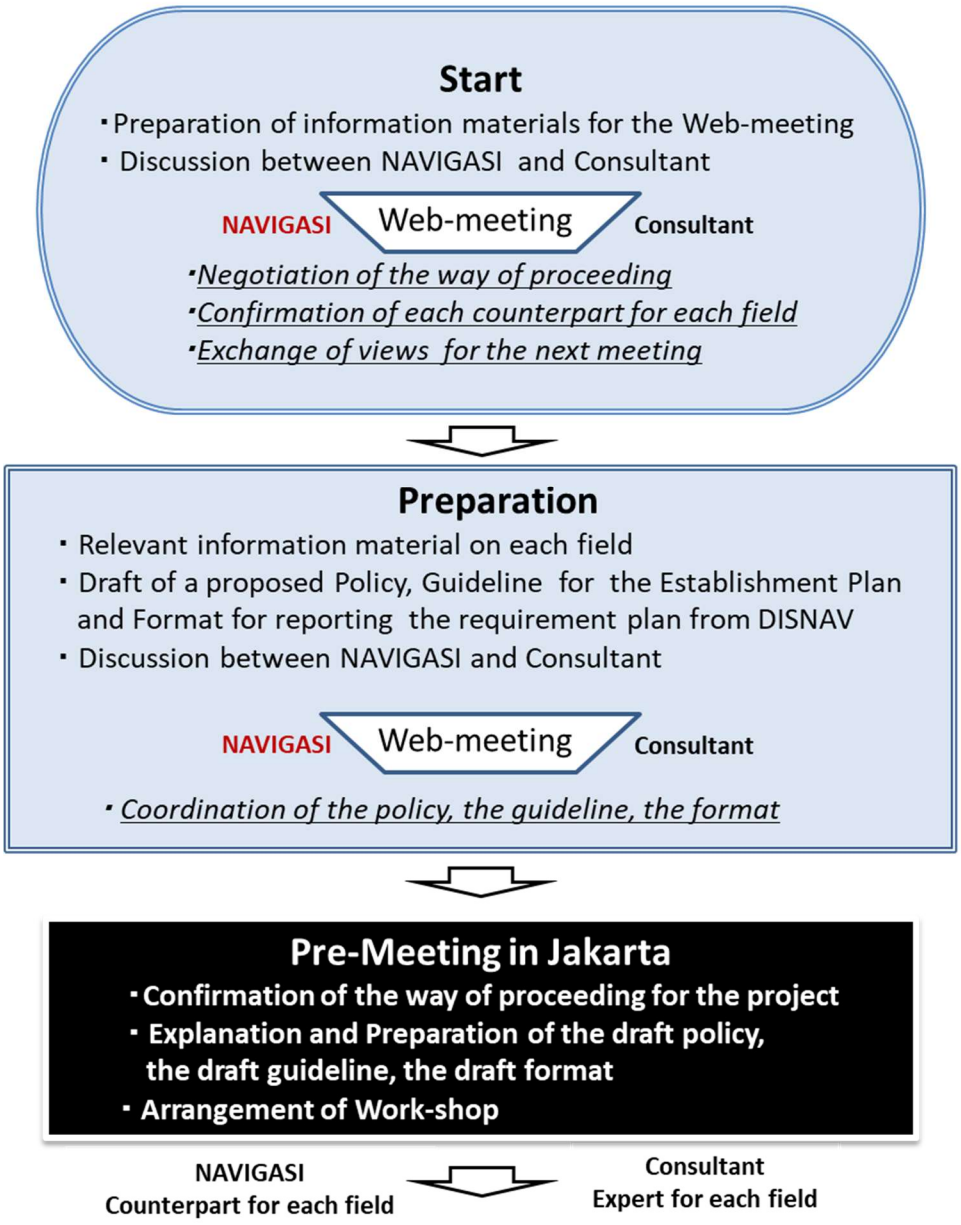


Fig. 2.3 -1 : Progress of the works

1/4

Flowchart
of
How to procced with the additional support project
on
the Establishment Plan of Aids to Navigation



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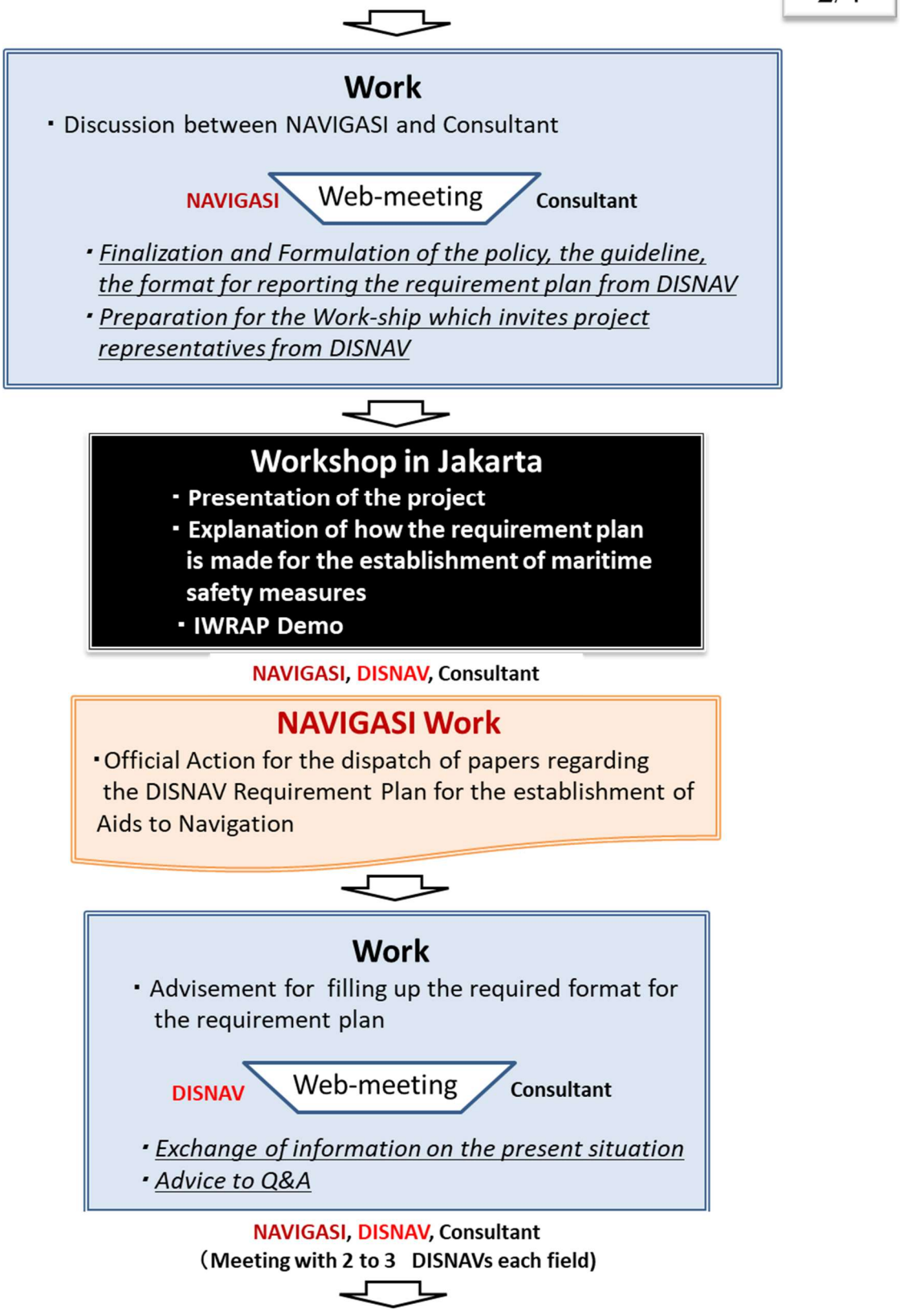
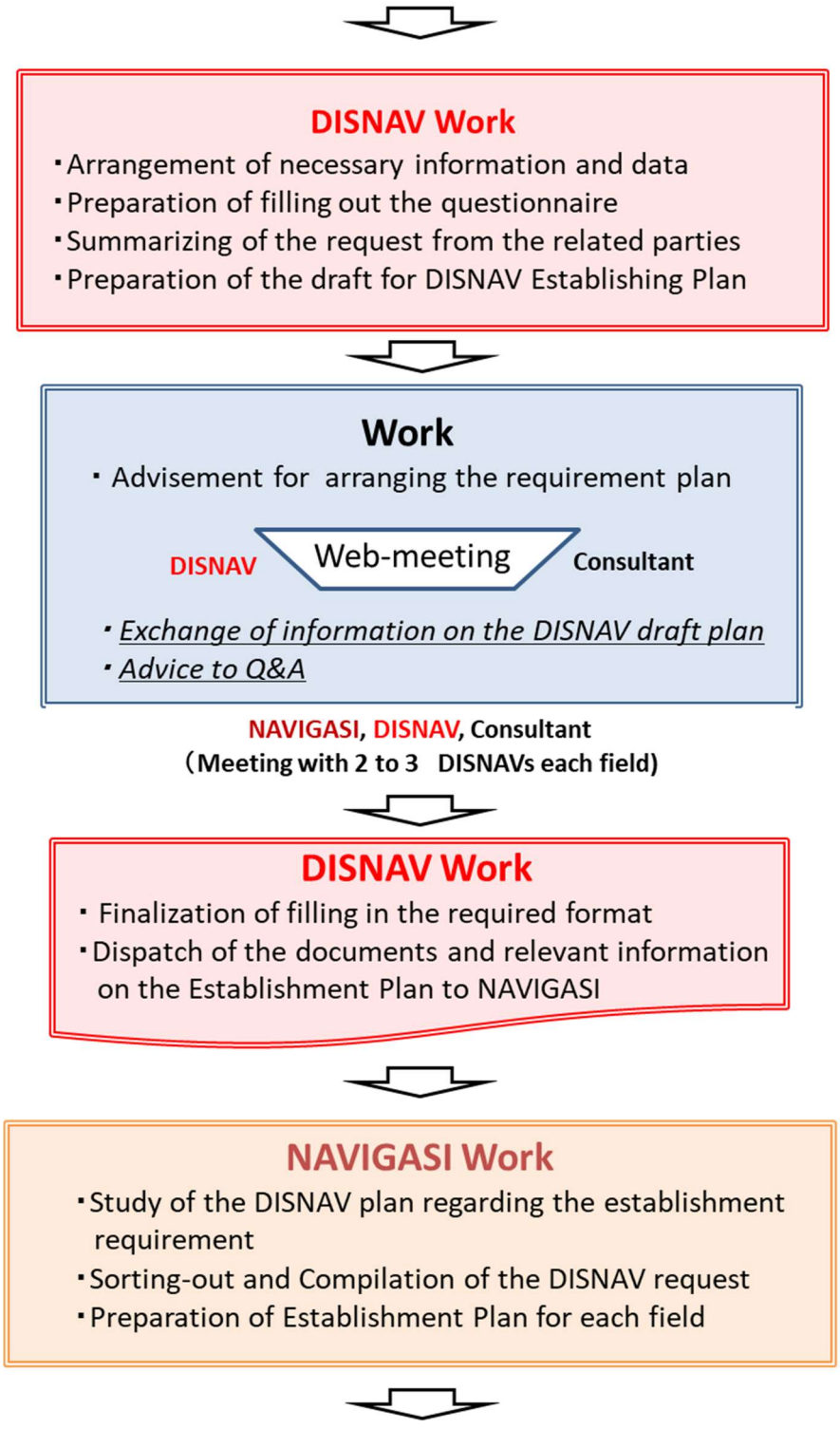

Work
・Discussion between NAVIGASI and Consultant
NAVIGASI
Web-meeting
Consultant
・Finalization and Formulation of the policy, the guideline, the format for reporting the requirement plan from DISNAV
・Preparation for the Work-ship which invites project representatives from DISNAV
Workshop in Jakarta
・Presentation of the project
・Explanation of how the requirement plan is made for the establishment of maritime safety measures
・IWRAP Demo
NAVIGASI, DISNAV, Consultant
NAVIGASI Work
・Official Action for the dispatch of papers regarding the DISNAV Requirement Plan for the establishment of Aids to Navigation
Work
・Advisement for filling up the required format for the requirement plan
DISNAV
Web-meeting
Consultant
・Exchange of information on the present situation
・Advice to Q&A
NAVIGASI, DISNAV, Consultant
(Meeting with 2 to 3 DISNAVs each field)

3/4


DISNAV Work
・Arrangement of necessary information and data
・Preparation of filling out the questionnaire
・Summarizing of the request from the related parties
・Preparation of the draft for DISNAV Establishing Plan
Work
・Advisement for arranging the requirement plan
DISNAV
Web-meeting
Consultant
・Exchange of information on the DISNAV draft plan
・Advice to Q&A
NAVIGASI, DISNAV, Consultant
（Meeting with 2 to 3 DISNAVs each field)
DISNAV Work
・Finalization of filling in the required format
・Dispatch of the documents and relevant information on the Establishment Plan to NAVIGASI
NAVIGASI Work
・Study of the DISNAV plan regarding the establishment requirement
・Sorting-out and Compilation of the DISNAV request
・Preparation of Establishment Plan for each field

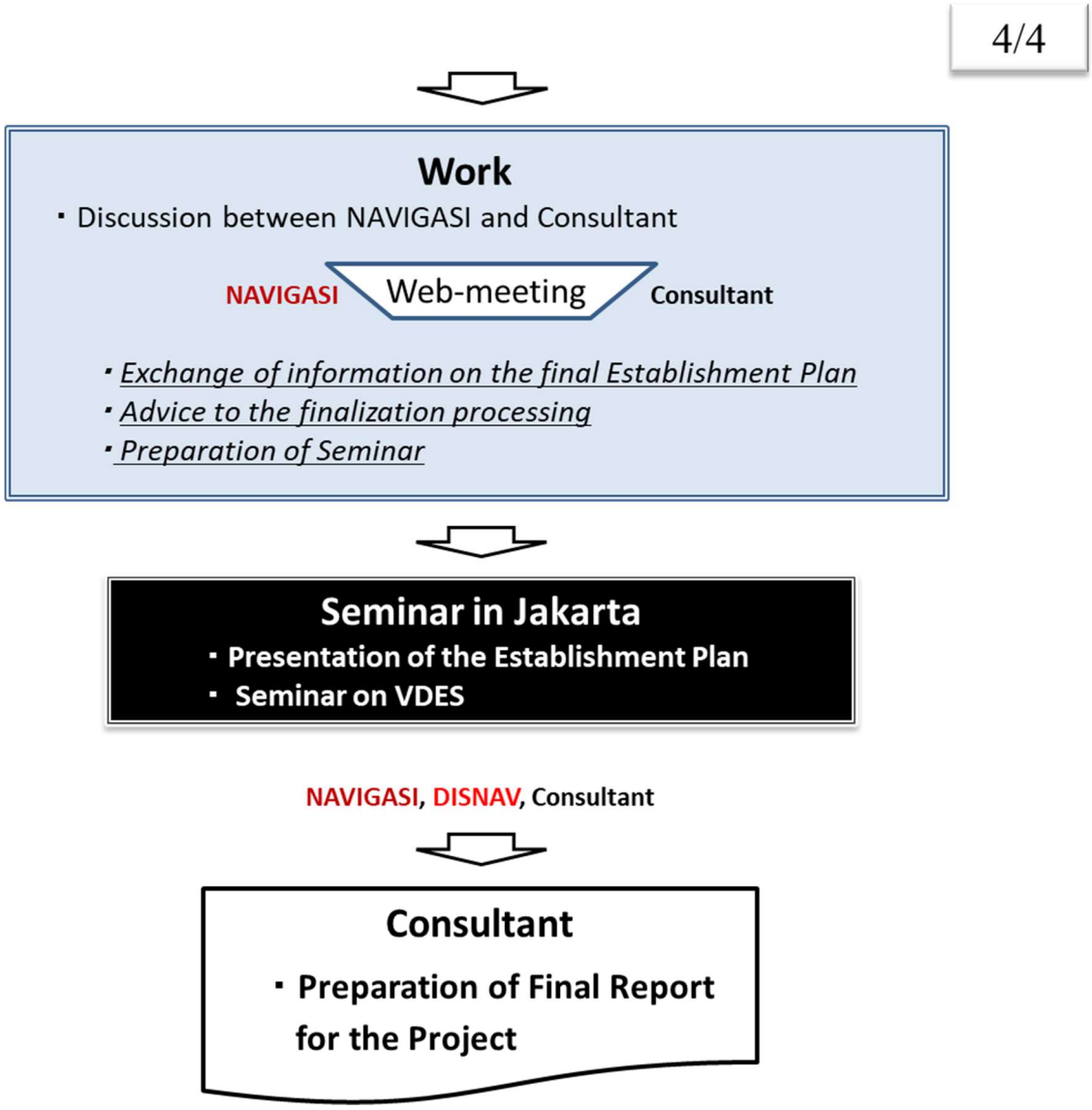


Fig. 2.3 -2 : Workflow of the works

Chapter 3

Progress of the Work

Chapter 3 Progress of the Work

Although additional activities were formalized on October 13, 2021, there was no subsequent improvement in the COVID-19 infection situation in the both countries and there was no prospect for the implementation of the on-site work, and the overall schedule could not be drawn up. Although preliminary preparations were underway, practical works, however, did not start.

In February 2022, as Indonesia immigration restrictions related to quarantine began to ease and prospects for the on-site work became to be seen, the overall plan was approved, and the works were begun.

3.1 Confirmation of Procedures for the Work

Since there would be a lot of restrictions on the on-site work at the stage when COVID-19 is not completely cleared, it was decided to introduce a Web-meeting to complement the on-site work and communicate between the related parties.

The procedures of works were discussed and confirmed with the person in charge of NAVIGASI. In addition, the local staff was assigned to arrange and prepare for the Web-meeting with counterparts appointed in each component.

3.2 Web-meeting

The Web-meeting was conducted with the Zoom system, and its schedule was adjusted as necessary based on the form of a plenary meeting and each component meeting.

The form of the Web-meeting is shown in Figure 3.2 -1.

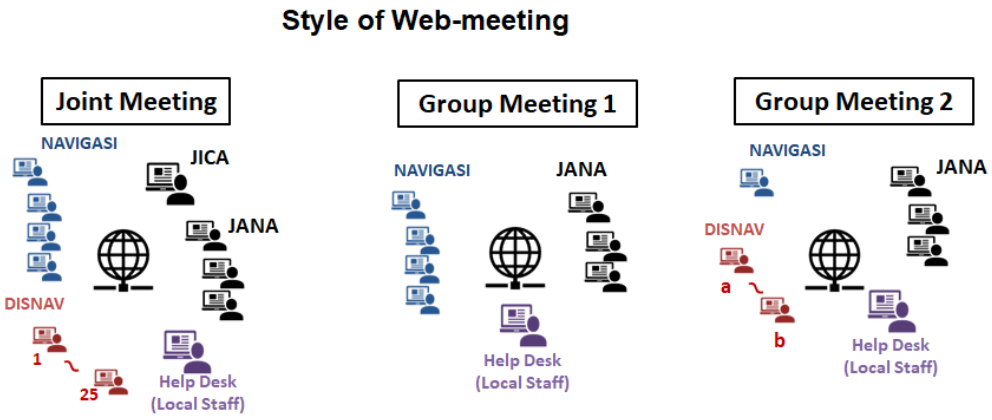


Fig. 3.2 -1 : Form of Web-meeting

3.3 The 5th JCC

The consultant and NAVIGASI held several Web-meetings from mid-February 2022 to prepare the kick-off for the works, and the 5th JCC was conducted on March 14, 2022 with the Zoom system, and the works started officially.

The meeting agenda, the list of participants for the Web-meeting and the meeting minutes are shown in Appendix 3.3 -1, Appendix 3.3 -2 and Appendix 3.3 -3, respectively.

The documents related to the outline of the work and to the taskforce are attached as Appendix 3.3 -4 and as Appendix 3.3 -5.

3.4 The 1st On-site Work

With the considerable easing of restrictions on entry into Indonesia which is derived from Covid-19, the first on-site work was carried out from May 15 to May 27, 2022.

An overall explanation of the work was made at the office of NAVIGASI, Directorate General Shipping Transportation in Jakarta, and then the meetings, separated into each component, were held daily, in which the policy for the establishment plan, its guideline and its questionnaires were discussed and the draft of each of them were prepared.

Besides, in order to support the work at a local side, the contract with a local consultant has been made and they also joined in the meetings.

In addition, the holding of a briefing session for DISNAV, which collects information, has been coordinated, and a face-to-face meeting and a workshop on the risk assessment software (IWRAP), including the broadcast of them by the Web, was fixed to hold in Jakarta on June 16th, 2022.

3.5 The 2nd On-site Work

The second on-site work was conducted from June 12th to June 19th, 2022, and the meeting was held and the workshop in which the IWRAP operation was demonstrated was done on June 16th in Jakarta.

In the first half of the works on-site, the policy and the guideline for an establishment plan were discussed and confirmed, and then also the preparations for holding the workshop were made.

3.6 Meeting and Workshop on IWRAP

On June 16th, 2022, representatives from NAVIGASI and DISNAVs met at the Millennium Hotel in Jakarta, and then the meeting and the workshop were performed. And their events were simultaneously distributed to all DISNAVs with the Zoom system.

The morning session began with the opening remarks by the director of NAVIGASI, followed by an explanation on the policy and the guideline for the establishment plan in each component, and subsequently Q&A was done.

In the afternoon session, an operational demonstration was conducted on the use of AIS data with a risk assessment tool (software) called “IWRAP”.

The agenda and the summary of the proceedings (including a list of participants) of the meeting are attached as Appendix 3.6 -1 and Appendix 3.6 -2, and the presentation documents are attached as Appendix 3.6 -3, 3.6 -4, 3.6 -5, and 3.6 -6.

3.7 The 3rd On-site Work

Due to the unsatisfactory replies to the questionnaires from DISNAVs, the third on-site work was scheduled from October 15th to 30th, 2022, and the meeting with NAVIGASI were conducted in Jakarta, and consequently an individual Web-meeting with all DISNAVs were held to explain again the works DISNAV has to do and to urge them to reply to the questionnaires.

The status of the Web-meeting with DISNAVs is shown in Table 3.7 -1.

Table 3.7 -1 : Individual Web-meeting

NO	Hari/Tgl	DISTRIK NAVIGASI	WAKTU	KOMPONEN		
				ATON	C R S	VESSEL
				1	2	3
1	Jumat, 21 Okt 2022	1. Disnav Kelas I Sorong	09.30 – 10.30	√	x	√
		2. Disnav Kelas I Tanjung Priok	10.30 – 11.30	√	x	√
		3. Disnav Kelas II Kupang	13.00 – 14.00	√	√	√
		4. Disnav Kelas III Tual	14.00 – 15.00	√	x	√
2	Senin, 24 Okt 2022	5. Disnav Kelas III Merauke	09.30 – 10.30	√	x	√
		6. Disnav Kelas II Teluk Bayur	10.30 – 11.30	√	x	√
		7. Disnav Kelas III Bitung	13.00 – 14.00	√	x	√
		8. Disnav Kelas III Kendari	14.00 – 15.00	√	x	√
3	Selasa, 25 Okt 2022	9. Disnav Kelas II Jayapura	09.30 – 10.30	√	√	√
		10. Disnav Kelas I Makassar	10.30 – 11.30	√	x	√
		11. Disnav Kelas I Samarinda	13.00 – 14.00	√	x	√
		12. Disnav Kelas I Tanjung Perak	14.00 – 15.00	√	x	√
4	Rabu, 26 Okt 2022	13. Disnav Kelas I Ambon	09.30 – 10.30	√	x	√
		14. Disnav Kelas II Banjarmasin	10.30 – 11.30	√	x	√
		15. Disnav Kelas II Sabang	13.00 – 14.00	√	x	√
		16. Disnav Kelas III Tanjung Intan	14.00 – 15.00	√	x	√
5	Kamis, 27 Okt 2022	17. Disnav Kelas III Tarakan	09.30 – 10.30	√	x	√
		18. Disnav Kelas III Pontianak	10.30 – 11.30	√	x	√
		19. Disnav Kelas I Belawan	13.00 – 14.00	√	x	√
		20. Disnav Kelas I Dumai	14.00 – 15.00	√	x	√
6	Jum'at, 28 Okt 2022	21. Disnav Kelas I Tanjung Pinang	09.30 – 10.30	√	x	√
		22. Disnav Kelas I Palembang	10.30 – 11.30	√	x	√
		23. Disnav Kelas II Tanjung Emas	13.30 – 14.30	√	x	√
		24. Disnav Kelas II Benoa	14.30 – 15.30	√	x	√
		25. Disnav Kelas III Sibolga	15.30 – 16.30	√	x	√

Catatan :
- √ : UPT Distrik Navigasi harap masuk *Breakroom* sesuai pada *ceklist* Komponen 1, 2 dan 3;
- **x** : UPT Distrik Navigasi tidak diperkenankan masuk *Breakroom*;
- *Breakroom* akan di infokan di *chat message zoom meeting*.

3.8 The 4th On-site Work

The 4th On-site Work was conducted from February 26th to March 4th, 2023, and the final JCC (The 6th JCC) was held on March 2nd in Jakarta, where the summary of the compiling the questionnaires of each component was reported and the outline of the establishment plan was explained. After that, a presentation on VDES, which will be referred to a future development of the establishment plan, was done in the Seminar.

3.9 6th JCC

The 6th JCC was held on March 2, 2023 at the Millennium Hotel in Jakarta. The meeting started with a greeting by Director of NAVIGASI, followed by a report on the summary of the additional activities and a Q&A session to summarize the project.

After lunch, a presentation titled “Maritime Communication Platform for VDES and Next Generation AIS”, which can be said to be the information exchange system for vessels in the future, was given.

The minutes of the JCC including Participants’ List and Program on the 6th JCC is attached as Appendix 3.9 -1 and the report documents summarizing the establishment plan for each component are attached as Appendix 3.9 -2, 3.9 -3 and 3.9 -4.

In addition, the presentation papers of the seminar are attached as Appendix 3.9 -5.

Chapter 4

Component

Chapter 4 Component

As described in "Chapter 1 Background of the additional activities" of this Report, the work was conducted in three components : Aids to Navigation and VTS, including Ship-routing (hereinafter referred to as AtoN.), Coastal Radio Stations and Vessels for Aids to Navigation.

4.1 AtoN

When following the establishing-process for Maritime Traffic Safety Measures as described in Chapter 7, "7.1 General" of the Report (Phase-1) as an example of making the establishment plan for AtoN, requests or demands from the users are first collected and then the priority would be decided for implementation according to the establishment policy and the situation of each DISNAV.

Therefore, the establishment policy is to be showed and the guideline is also to be provided indicating the scope of AtoN to be established based on the policy.

The following policy, guidelines and questionnaires were prepared for this work.

4.1.1 Policy of Establishment Plan for providing Aids to Navigation

1. Preface

For the country, which is an archipelago nation, the oceans are a place for transporting goods and fishing, where are essential to the prosperity of the country, and vessels that engage in entering and leaving ports there safely are responsible for the development of the region.

In promoting the safe and efficient movement of vessels and encouraging the marine traffic, the installation of a marine aid to navigation which guides mariners to harbors and ports, the setting of waterways related to it and the provision of maritime information play an important role.

In order to do that, the facilities of aids to navigation should be arranged and operated appropriately and their establishment plan must be made according to the policy.

2. Specific Initiatives

a. Eliminating unlit bays and harbors

Navigation at night is very dangerous to approach a coastal area and / or a harbor without marine lighted aids to navigation, even though with the advantage of local knowledge.

b. Transformation into a port where vessels can enter more safely

Regional ports are expected to increase in vessel traffic progressively, and further safety of their navigation must be ensured.

In order to mitigate navigation risks caused by in traffic volume, it is necessary to properly and more effectively arrange marine aids to assist navigators with determining their position, a safe course and to warn them of dangers and obstructions.

c. A goal is the port that vessels can navigate safely and efficiently at any time

For the prosperity of the region and the nation, it goes without saying that safe and stable marine traffic is secured, but for further prosperity a port that is always open is required.

To achieve this goal, it is indispensable to establish aids to navigation suitable for the purpose and to provide appropriate and reliable maritime information.

4.1.2 Guideline

1. Basic Concept

The configuration of Aids to Navigation shall be arranged in terms of phases of navigation in order to appropriately respond to the situation surrounding marine traffic, such as changes in traffic patterns due to the development of navigational instruments and the increase in the size and speed of vessels in recent years, and the installed aids shall be selected and arranged so as to be effective and efficient so as to minimize the duplication of functions.

2. Phases of Navigation (Waters)

a. Coastal Navigation

Vessels navigating in the coastal waters select safe and economical navigation routes according to the performance of their own vessels, taking into account weather and sea conditions, and then use their nautical instruments to check their position, and reconfirm their position with aids to navigation installed at prominent landmarks and altering course points.

Therefore, keeping in mind that aids to navigation installed in coastal waters need to provide information over a wide area, aids to navigation for coastal waters and obstacle aids should be installed effectively and efficiently so that prominent landmarks and major altering course points can be identified.

b. Harbor Approach

This phase represents the transition from coastal to harbor navigation. In this phase, vessels are in a severe maneuvering environment where they have to constantly check their exact position to navigate.

Therefore, keeping in mind that visual confirmation of aids to navigation is an important factor for guiding vessels safely; visual aids and short-range radio aids should be installed effectively and efficiently.

c. Restricted Waters (Port and Inland Waterways)

This phase refers to the waters where vessel traffic is concentrated, such as port areas, and where the freedom of maneuvering is restricted due to narrow waterways and the proximity to dangers.

Therefore, the installation of aids to navigation is required to support navigation systems which needs following factors;

- accurate verification of position almost continuously,
- information depicting any tendency for the vessel to deviate from its intended track;
- instantaneous indication of the direction in which the ship should be steered to maintain the intended course.

3. Category of sea area for aids to navigation
   a. Offshore waters
   b. Coastal waters
      (Middle/Long range of Radio aid, Notable point of land, Waypoint, Obstacles)
   c. Congested area
      (Short range of Radio aid, Regulated traffic, Circumstances required precisely maneuvering, Edge of narrow waterways, traffic routes)
   d. Harbor / Port (Restricted waters)
      (Indication of entrance of harbor/port, of traffic route, of water depth, of obstacles, of guided route)
   e. Inland water (River)
4. Category of aids to navigation
   a. Visual Aids to Navigation
      (Coastal aid, Danger marks, Fairway marks, Aid for a harbor/port, Indication markings for the entrance into a port)
      ※Reference : Recommended visible range
      - Coastal aid : 12 NM or more
      - Danger/Fairway marks, Indication markings
        Area where vessels of 50m or more navigate : 5.0 NM
        of 12m or more : 3.5 NM
        of 12m or less : 2.0 NM
   b. Radio Aids to Navigation (including Information provision system)
      (VTS, AtoN AIS, Radar-beacon, Signal station)
5. Classification of significance for the installation
   Category 1 – Vital navigational significance
   (Landfalls, Primary routes, Channels, Waterways, Dangers, The protection of the marine environment)
   Category 2 – Important navigational significance
   (Secondary routes, Supplemental marks of primary routes)
   Category 3 – Necessary navigational significance

6. Other related documents

Refer to IALA Recommendation 1001 (R1001 THE IALA MARITIME BUOYAGE SYSTEM) especially and IALA NAVGUIDE 2018 (Marine Aids to Navigation Manual) for other matters.

Explanatory Figure for Classification of significance for the installation

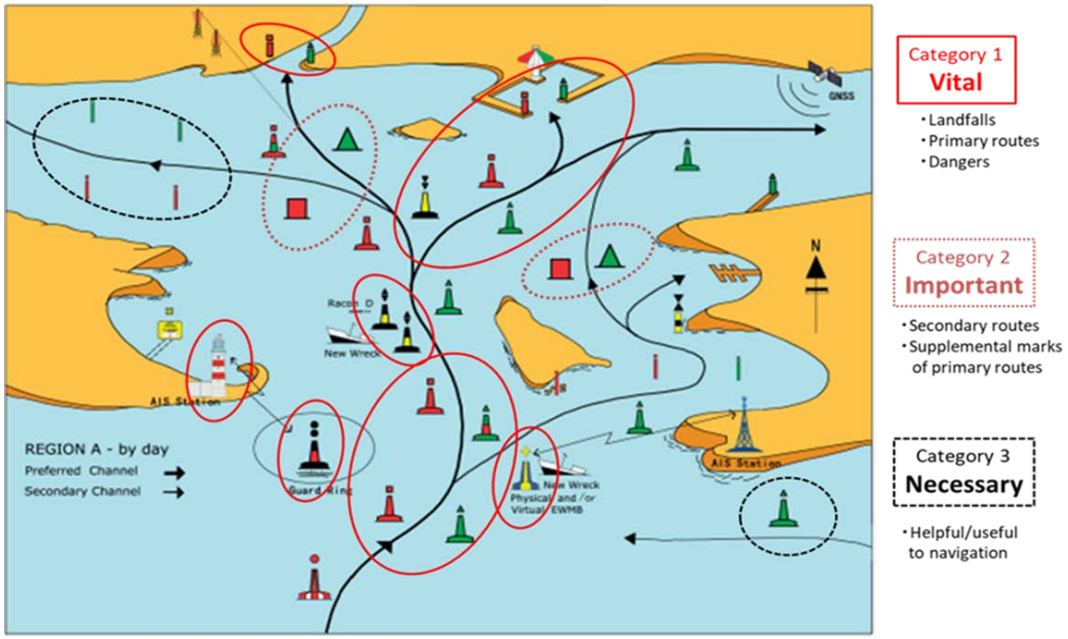


Fig. 4.1.2 -1 : IALA Maritime Buoyage System Region A

4.1.3 Questionnaires

After the policy of the establishment plan and the guideline are prepared, DISNAVs are to make their own establishment ideas for AtoN and VTS, which are reported to NAVIGASI, based on the users' wants and needs for installation of AtoN, the existing AtoN in the jurisdiction and the current status of marine accidents.

The formats of the questionnaires were prepared as below for AtoN as Sheet-1 (Fig. 4.1.3-1), Sheet-2 (Fig. 4.1.3-2), Sheet-3 (Fig. 4.1.3-3) and for VTS as Sheet-1/Sheet-2 (Fig. 4.1.3 -4), and were notified to DISNAVs.

Sheet ① Reporting Format for Nominated Area of Establishing AtoN

District

Priority	Name (Area/Port) (Fill out)	1. Specific Initiative	2. Category of sea area	Necessary Data/Information				Reference (Fill out)		Note
				3. Nautical Chart	4. AIS Data	5. Conventional Route	6. Stakeholder Demands	National Strategy	Special Situation	
Example	Tanjung OOO	b Transformation	c Congested Area	b General Scale	a Independent	a Existing	c Sailor, Marine Perso	Inovation of Port	Increased traffic flow	
1										
2										
3										

Drop Down List

1. Specific Initiative

1	a Elimunating Unlit	Eliminating unlit bays and harbors
2	b Transformation	Transformation into a port where vessels can enter more safely
3	c The Goal	A goal is the port that vessels can navigate

2. Category of sea area

1	a Offshore Waters	
2	b Coastal Waters	(Middle/Long range of Radio aid, Notable poir
3	c Congested Area	(Short range of Radio aid, Regulated traffic, (maneuvering, Edge of narrow waterways, traf
3	d Harbor/Port	(Indication of entrance of harbor/port, of tra obstacles, of guided route)
4	e Inland Water (River)	

3. Nautical Chart

1	a Big Scale	Scale : 1/15000、1/50,000
2	b General Scale	Scale : 1 / 250000
3	c None	Ocean Seamap, Google Map

4. AIS Data

1	a Independent	Stand-alone, VTS
2	b Internet	Marinetraffic.com
3	c None	

5. Conventional Route

1	a Existing	Regulated route, Traditional lane, Habitual course
2	b None	

6. Stakeholder Demands

1	a Sailor	Navigator, Seaman, Pilot
2	b Fisherman	
2	c Marine Person	People who is engaged in marine activities, business.
3	d Sailor, Fisherman	
4	e Sailor, Marine Person	
5	f None	

Fig. 4.1.3 -1 : Sheet-1

Sheet ② Reporting Format for List of Exisiting AtoN

Name of Sea Area / Port : (Fill out)
District
Chart No (Name) : (Fill out)

Reference Number	Location (Fill out)			Aid		Catetory		Type of Marks				Remarks
	Name of AtoN	Position		Type (*1)	Specification (*2)	Sea Area (*3)	Significance (*4)	Lateral (*5)	Cardinal (*6)	Special (*7)	Light Color (*8)	Popular name (Fill out)
		Longitude	Latitude									
Example	Cantic Lighthouse	S 05-45.400	E 107-03.850	Lighted Beacon	Landfall Light	Offshore waters	Category 1 (Important)	Not Applicable (n/a)	Not Applicable (n/a)	Not Applicable (n/a)	White	
1												
2												
3												
4												

Drop Down List

No	Name of Aid	Items
1	Type (*1)	Liththouse
		Breakwater Light
		Harbor Light
		Lighted Beacon
		Lighted Buoy
		Leading Lihgts
		Sector Lihgt
		Beacon (Unlighted)
		Buoy (Unlighted)
		Landmark
		AtoN AIS

No	Name of Aid	Items
2	Specification (*2)	Landfall Light
		Long-range Light
		Medium-range Light
		Short-range Light
		Channel Light
		Leading Lihgts
		Radio Aids (Medium-range)

No	Category	Items
3	Sea Area (*3)	Offshore waters
		Coastal waters
		Congested area
		Harbor/Port (Restricted area)
		Inland waters (River)

No	Category	Items
4	Significance	Category 1 (Vital)
		Category 2 (Important)
		Category 3 (Necessary)

No	Type of Marks	Items
5	Lateral (*5)	Starboard
		Port
		Preferred Channel of Starboard
		Preferred Channel of Port
		Not Applicable (n/a)

No	Type of Marks	Items
6	Cardinal (*6)	North
		East
		South
		West
		Not Applicable (n/a)

No	Type of Marks	Items
7	Special (*7)	Special Marks (Work Zone)
		Special Marks (Quarantine Area)
		Special Marks (Anchorage)
		Special Marks (Wreck Marking)
		Transition Mark
		Safe Water Mark
		Approach Mark
		Not Applicable (n/a)

No	Type of Marks	Items
8	Light Color (*8)	White
		Red
		Yellow
		Green

Fig. 4.1.3 -2 : Sheet-2

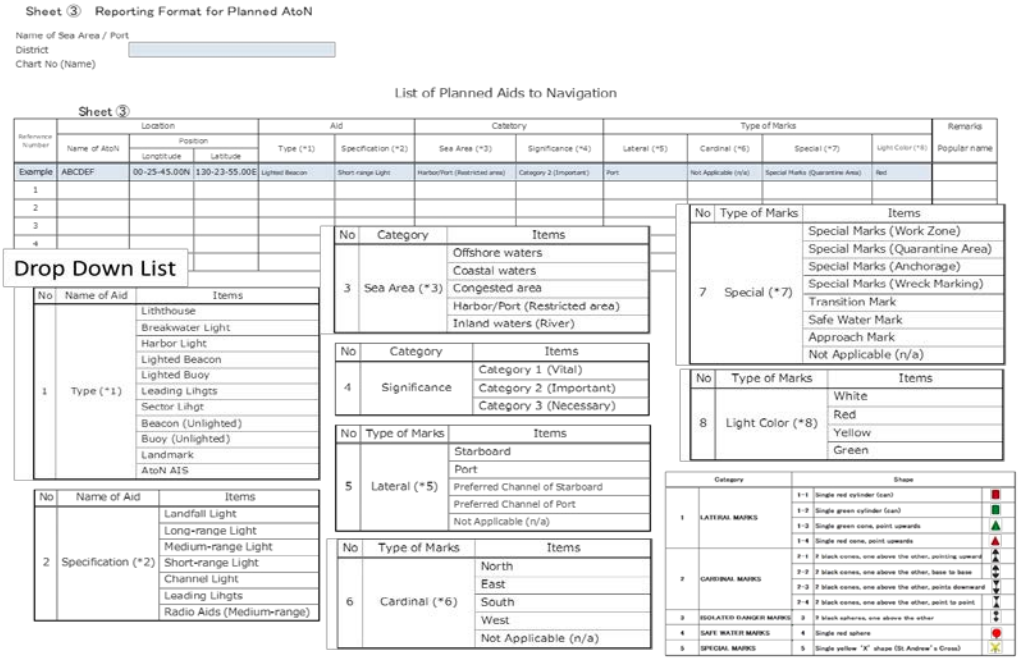


Fig. 4.1.3 -3 : Sheet-3

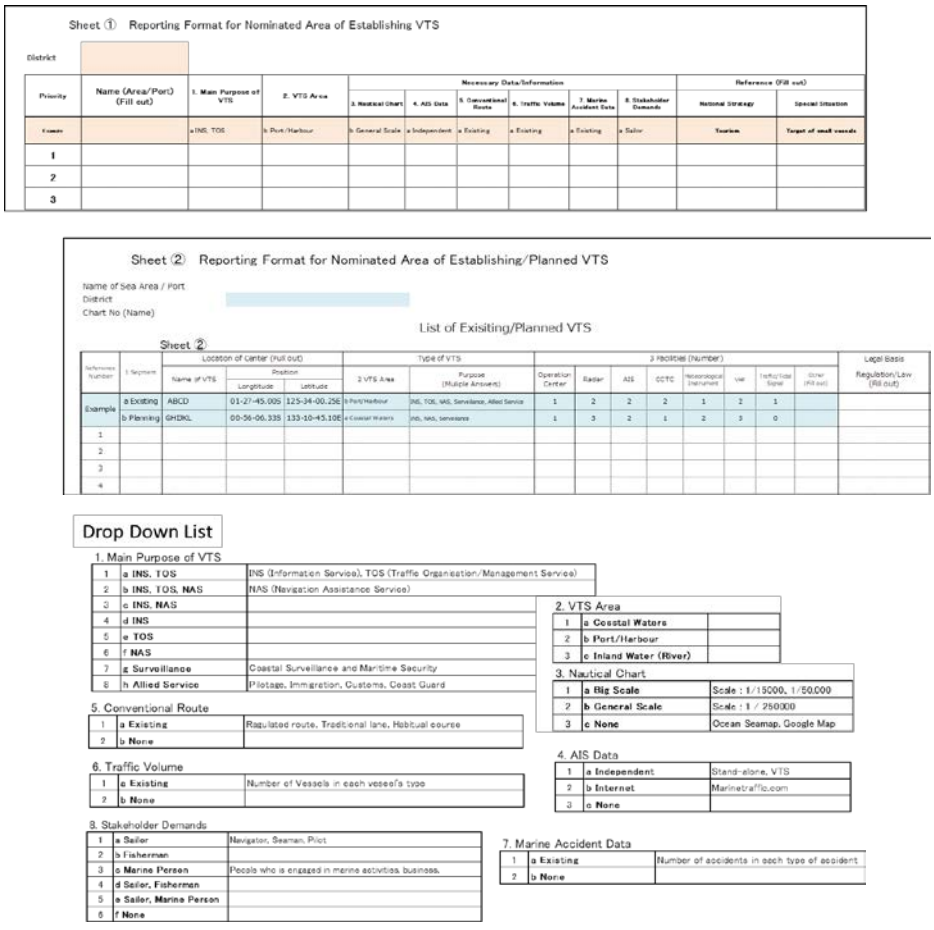


Fig. 4.1.3 -4 : Sheet-1/Sheet-2

4.1.4 Status of reply to the questionnaires

The purpose of the questionnaires and the method of filling them out were explained directly by the consultant to DISNAV participants at the seminar in Jakarta in June, and this presentation was also simultaneously distributed to DISNAVs on the Web.

On the other hand, since the reply from DISNAV to the questionnaires based on the collection of information at DISNAVs was not so good, a Web meeting was had with all DISNAVs individually in October, and DISNAVs that had replied were asked to confirm the questionnaires contents, and those that had not done were asked to prepare the questionnaires and reply again.

The compilation of the questionnaires requires the entire data from DISNAVs in place, so the DISNAV was urged to reply to the questionnaires through the local consultant and the deadline was set at the end of November. Even after the deadline, a couple of replies were received from the DISNAV, and the status of reply as of December 12, 2022, is shown in Table 4.1.4 -1 as below.

Table 4.1.4 -1 : Reply to the Questionnaires

Status of Reply to Questionnaire for Aton

As of December 12, 2022

NO	AREA	CLASS	SHEET 1	SHEET 2	SHEET 3	DATA
1	Sabang (1)	Class Ⅱ	Nominated Area VTS * (31/10)	Existing Planned VTS *(31/10)	Planned AtoN *(31/10)	Ship Routing Report
2	Belawan (2)	Class Ⅰ	-	Existing Planned VTS	-	-
3	Sibolga (3)	Class Ⅲ	-	-	-	Report of existing AtoN (01/11) Master Plan Navigasi Sibolga (01/11)
4	Teluk Bayur (4)	Class Ⅰ	-	Existing AtoN *(21/11)	Planned AtoN *(21/11)	-
5	Tg. Pinang (5)	Class Ⅰ	Nominated Area VTS	Existing Planned VTS & Existing AtoN * Existing AtoN (18/11)	Planned AtoN	-
6	Dumai (6)	Class Ⅰ	Nominated Area AtoN & Nominated Area VTS	Existing AtoN & Existing Planned VTS	Planned AtoN	-
7	Palembang (7)	Class Ⅰ	-	Existing Planned VTS	-	-
8	Pontianak (8)	Class Ⅲ	Nominated Area AtoN & Nominated Area VTS	Existing Planned VTS	-	-
9	Tg. Priok (9)	Class Ⅰ	Nominated Area AtoN & Nominated Area VTS	Existing AtoN & Existing Planned VTS	Planned AtoN	-
10	Cilacap (10)	Class Ⅲ	Nominated Area AtoN	Existing AtoN * Existing AtoN (27/10)	Planned AtoN (NIL) Planned AtoN (27/10)	-
11	Semarang (11)	Class Ⅱ	-	Existing Planned VTS	-	Ship Routing (Karimun Crossing Route, Lagon Bajak Shading Route, Karimun Jawa Route, Batang Route. Thematic Chart (Jepara, Kendal, Pekalongan, Rembang, Semarang) (21/11)
12	Surabaya (12)	Class Ⅰ	Nominated Area AtoN (27/10)	Existing Planned VTS	-	(Chart) 7.Tematik Penetapan Alur Tg. Pakis 2021 8.Tematik Penetapan Alur Taddan 2021 9.Penetapan ALur Boom 2022 standar RKM 10.Penetapan ALur Kalbut 2022 standar RKM
13	Benoa (13)	Class Ⅱ	Nominated Area AtoN * (08/11)	Existing AtoN & Existing Planned VTS	Planned AtoN * (08/11)	(Chart) Alur Labuhan Lombok Alur Pantai Jeman dan Sekeh Alur Pemenang Alur Sampalan Nautical Chart (Existing AtoN & Planned AtoN) (08/11)
14	Kupang (14)	Class Ⅱ	-	Existing AtoN * (08/11)	-	-
15	Banjarmashin (15)	Class Ⅱ	Nominated Area VTS	Existing AtoN & Existing Planned VTS	-	-
16	Tarakan (16)	Class Ⅲ	Nominated Area VTS * (29/10)	Existing Planned VTS * (29/10)	-	Chart / Data - Traffic Lane to enter Port of Tarakan (27/10) - Establishment Plan VTS Center Tarakan & Sensor Site Tg. Batu, Pulau Bunyu (27/10) - Traffic Volume 2022 (27/10) - List of Marine Accident (28/10)
17	Samarinda (17)	Class Ⅰ	Nominated Area AtoN & Nominated Area VTS * (25/10)	Existing AtoN Existing & Planned VTS	Planned AtoN	Chart / Data - Nautical Chart (29/10)
18	Makassar (18)	Class Ⅰ	Nominated Area AtoN	Existing VTS * (25/10)	Planned AtoN * Planned AtoN (25/10)	-
19	Kendari (19)	Class Ⅲ	-	Existing Planned VTS	-	-
20	Bitung (20)	Class Ⅰ	-	Existing AtoN * (12/12)	-	-
21	Ambon (21)	Class Ⅰ	Nominated Area VTS	Existing Planned VTS & Existing AtoN * (25/10)	-	-
22	Sorong (22)	Class Ⅰ	-	Existing Planned VTS	-	-
23	Jayapura (23)	Class Ⅱ	-	Existing AtoN * (16/11)	Planned AtoN * (16/11)	Nautical Chart (09/11) Nautical Chart with AtoN position (16/11)
24	Merauke (24)	Class Ⅲ	-	-	-	-
25	Tual (25)	Class Ⅲ	Nominated Area AtoN	Planned VTS	-	-

With the above, the questionnaires' sheets were compiled, and the data was used to prepare an establishment plan.

All of them replied by DISNAVs are shown in Appendix 4.1.4 -1.

4.1.5 Summary of Questionnaires

1. AtoN

In this questionnaire, there were 14 DISNAVs that are planning to establish AtoN, of which 11 DISNAVs have specific plans, with a total 89 units including 7 Lighthouses, 55 Lighted Beacons, and 27 Lighted Buoys.

The number of AtoN planned by DISNAV is shown in Table 4.1.5 -1 as below.

Table 4.1.5 -1 : Number of Planned AtoN

Summary Table for Planned AtoN requested by DISNAV

December 12, 2022

No	DISNAV	Number of Nominated Area	Number of Planned AtoN	Planned AtoN		
				Lighthouse	*Lighted Beacon*	*Lighted Buoy*
1	Sabang	**2**	**4**	*2*	*2*	
2	Belawan	**0**	**0**			
3	Sibolga	**0**	**0**			
4	Teluk Bayur	**2**	**3**		*3*	
5	Tg. Pinang	**3**	**-----**	---	---	---
6	Dumai	**3**	**7**		*7*	
7	Palembang	**0**	**0**			
8	Pontianak	**1**	**-----**	---	---	---
9	Tg. Priok	**2**	**7**		*7*	
10	Cilacap	**2**	**2**		*2*	
11	Semarang	**2**	**8**		*4*	*4*
12	Surabaya	**1**	**-----**	---	---	---
13	Benoa	**6**	**15**		*15*	
14	Kupang	**0**	**0**			
15	Banjarmashin	**0**	**0**			
16	Tarakan	**0**	**0**			
17	Samarinda	**2**	**10**		*3*	*7*
18	Makassar	**3**	**8**			*8*
19	Kendari	**0**	**0**			
20	Bitung	**0**	**0**			
21	Ambon	**2**	**4**	*4*		
22	Sorong	**0**	**0**			
23	Jayapura	**5**	**21**	*1*	*12*	*8*
24	Merauke	**0**	**0**			
25	Tual	**0**	**0**			
Total		**36**	**89**	*7*	*55*	*27*

The planned location map for each DISNAV is shown in Fig. 4.1.5 -1 ~ Fig.4.1.5 -12 as below.

Detailed maps of each location are shown in Appendix 4.1.5 -1.

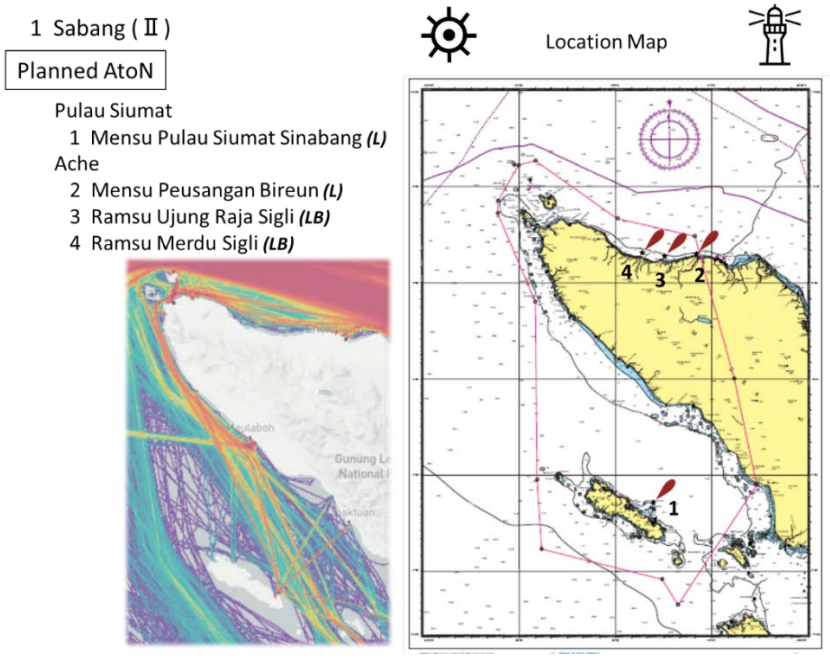


Fig. 4.1.5 -1 : Location Map (Sabang)

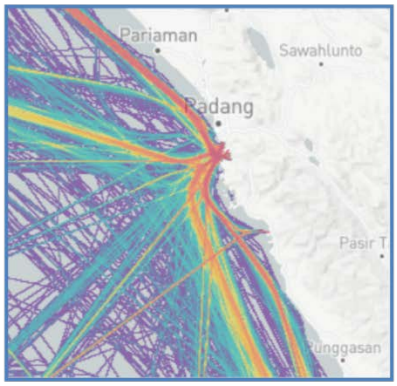
4 Teluk Bayur (Ⅰ)

Planned AtoN

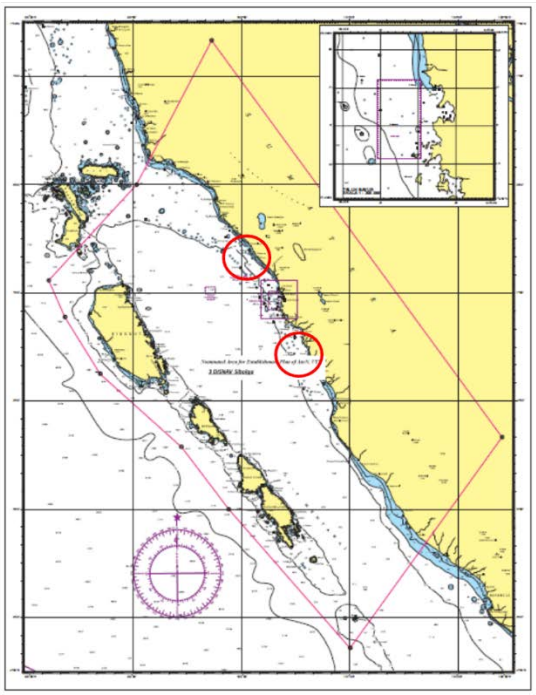
1 Rs. Ma. Karsik Pariaman
(Lighted Beacon -- White)

2 Rs. Ma. Kambang Hijau I
(Lighted Beacon -- Green)

3 Rs. Ma. Kambang Merah II
(Lighted Beacon -- Red)



Planned AtoN

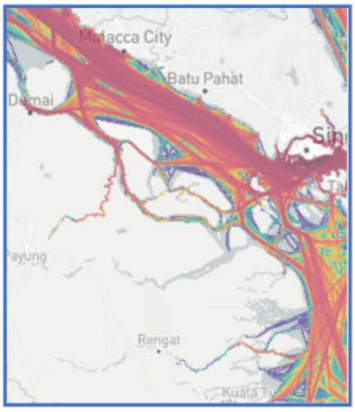


Fig, 4.1.5 -2 : Location Map (Teluk Bayur)

6 Dumai (Ⅰ)

Planned AtoN

1 Ramsu Selat Panjang
2 Ramsu Selat Panjang
3 Ramsu Tg. Buton
4 Ramsu Sungai Guntung
5 Ramsu Sungai Indagiri
6 Ramsu Sungai Indagiri
7 Ramsu Selat Padang



Location Map

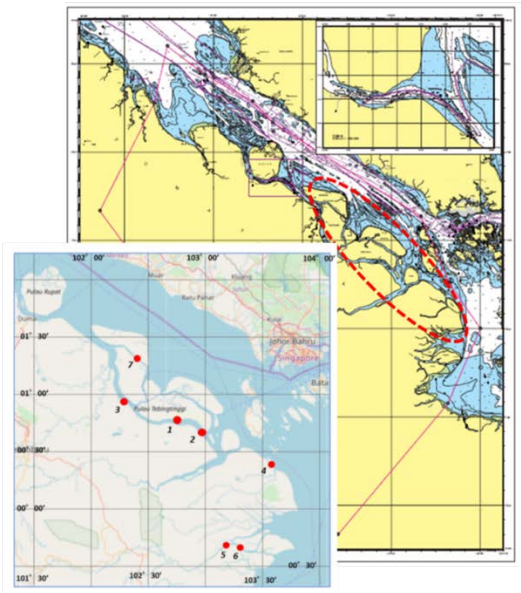
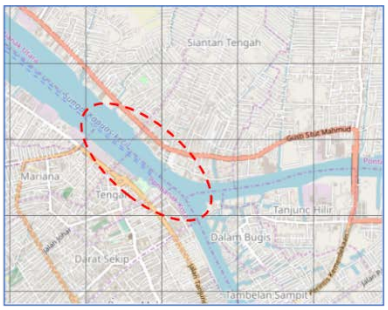


Fig. 4.1.5 -3 : Location Map (Dumai)

8 Pontianak (Ⅲ)

Planned AtoN (Nominated Area)

1 Dwikora ***(Inland Water : River)***



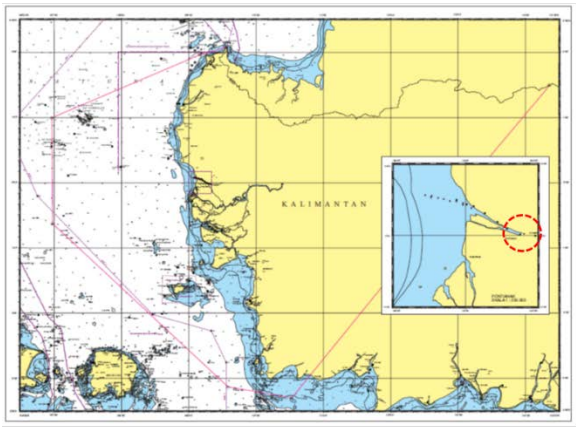


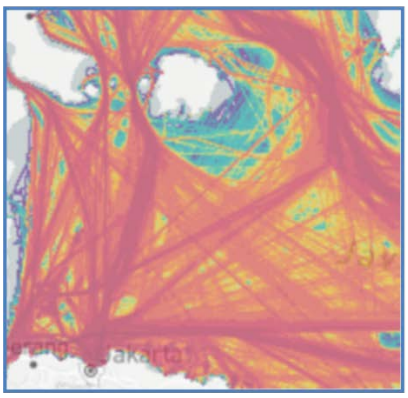
Fig. 4.1.5 -4 : Location Map (Pontianak)

9 Tg. Priok (Ⅰ)

Planned AtoN

1 KARANG BATUAN ***(L.B)***
2 ABADI REEF ***(L.B)***
3 KARANG F. ADELEIDE ***(L.B)***
4 KARANG JONG ***(L.B)***
5 BETING EKA ***(L.B)***
6 BETING RAJA ***(L.B)***
7 PULAU PUTRI REEF ***(L.B)***

(L.B : Lighted Beacon)



Planned AtoN

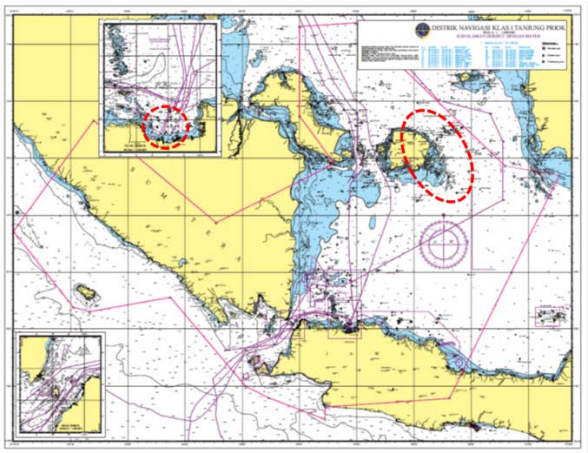


Fig. 4.1.5 -5 : Location Map (Tg. Priok)

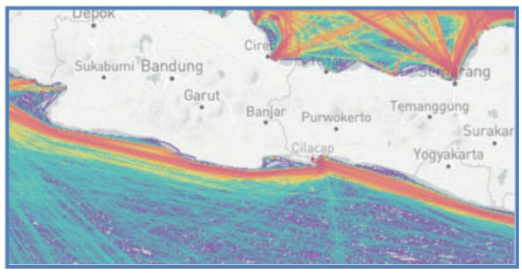
10 Cilacap (Ⅲ)

Planned AtoN

(L.B : Lighted Beacon)

1 Sentolo Pamengpeuk ***(L.B)***
2 Babadan ***(L.B)***

1 (07° 39‘44.00“S 107° 40‘53.10“E)
2 (07° 25‘22.12“S 106° 39‘36.78“E)



Planned AtoN

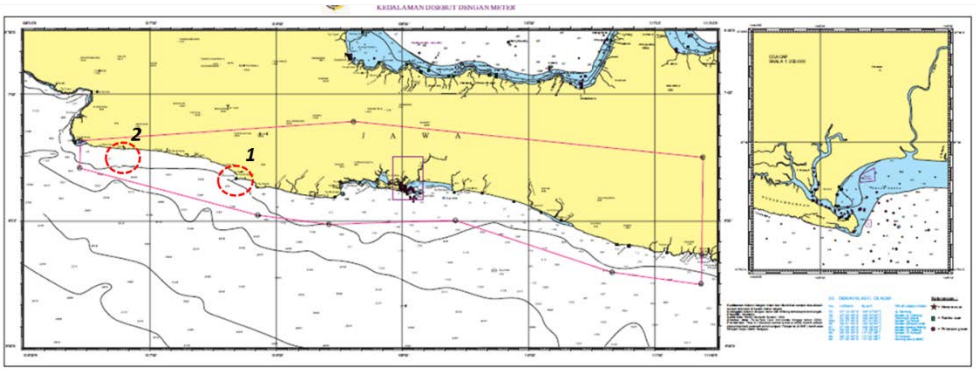
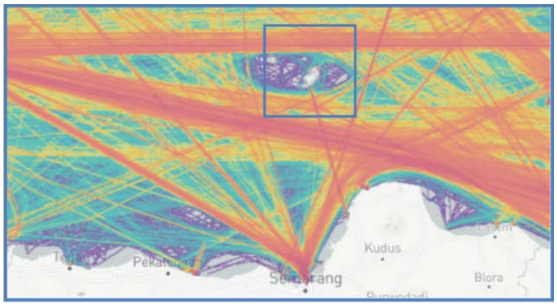


Fig. 4.1.5 -6 : Location Map (Cilacap)

11 Semarang (Ⅱ)

Planned AtoN

Pulau Karimunjawa
1 Logon Bajak ***(Lighted Buoy x 4)***
2 Kalimunjawa ***(Lighted Beacon x 4)***



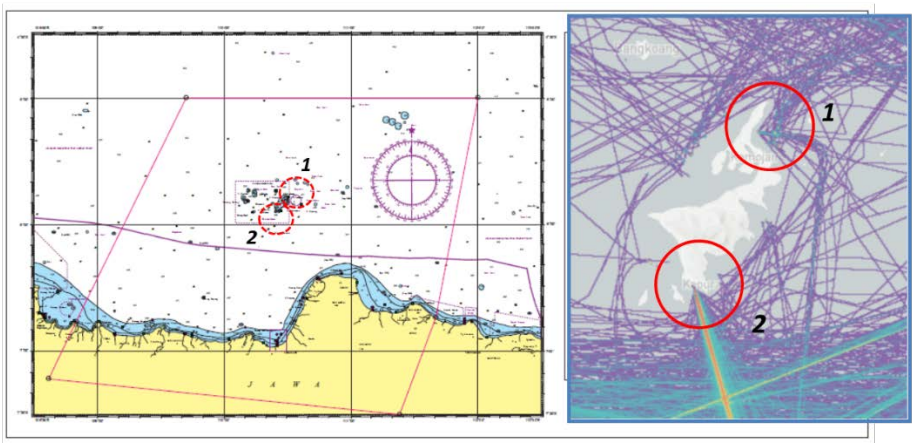


Fig. 4.1.5 -7 : Location Map (Semarang)

13 Benoa (Ⅱ)

Planned AtoN *(LB x15)*

1 Rambu suar Bahaya terpencil
2 Rambu suar Hijau Labuahan lombok
3 Rambu Suar Percabangan Warna Merah Hijau Merah
4 Rambu suar Merah Labuahan lombok
5 Rambu suar Hijau Labuahan lombok
6 Rambu suar Merah Labuhan lombok
7 Rambu Suar Pulau Pasir
8 Rambu Suar Pelabuhan Carik
9 Rambu Suar Ujung Karang Lembar
10 Rambu suar. Pelabuhan Sampalan
11 Rambu Suar Hijau Pelabuhan Sampalan
12 Rambu Suar Merah Pelabuhan Sampalan
13 Rambu Suar Pelabuhan Pantai Matahari Terbit Sanur
14 Rambu suar hijau Pelabuhan Pantai Matahari Terbit Sanur
15 Rambu suar Merah Pelabuhan Pantai Matahari Terbit Sanur

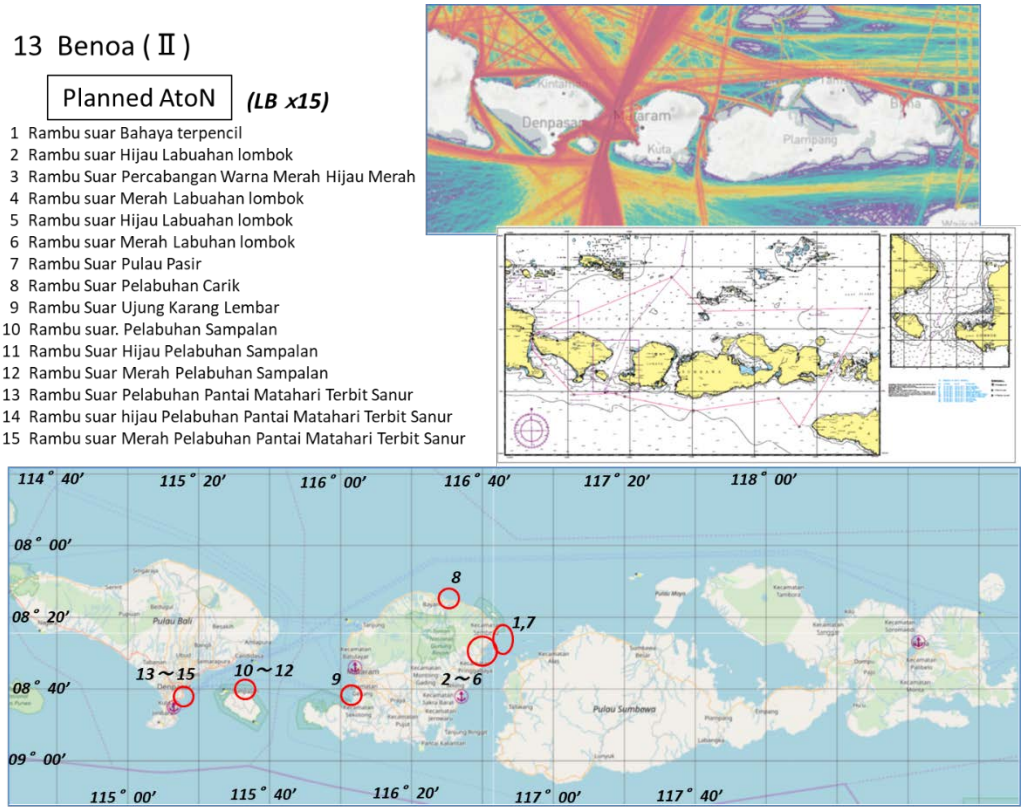


Fig. 4.1.5 -8 : Location Map (Benoa)

17 Samarinda (Ⅰ)

Planned AtoN (Nominated Area)

1 Alur IKN *(Lighted Beacon x 3)*
2 Pelabuhan PPI Manggar *(Lighted Buoy x 7)*

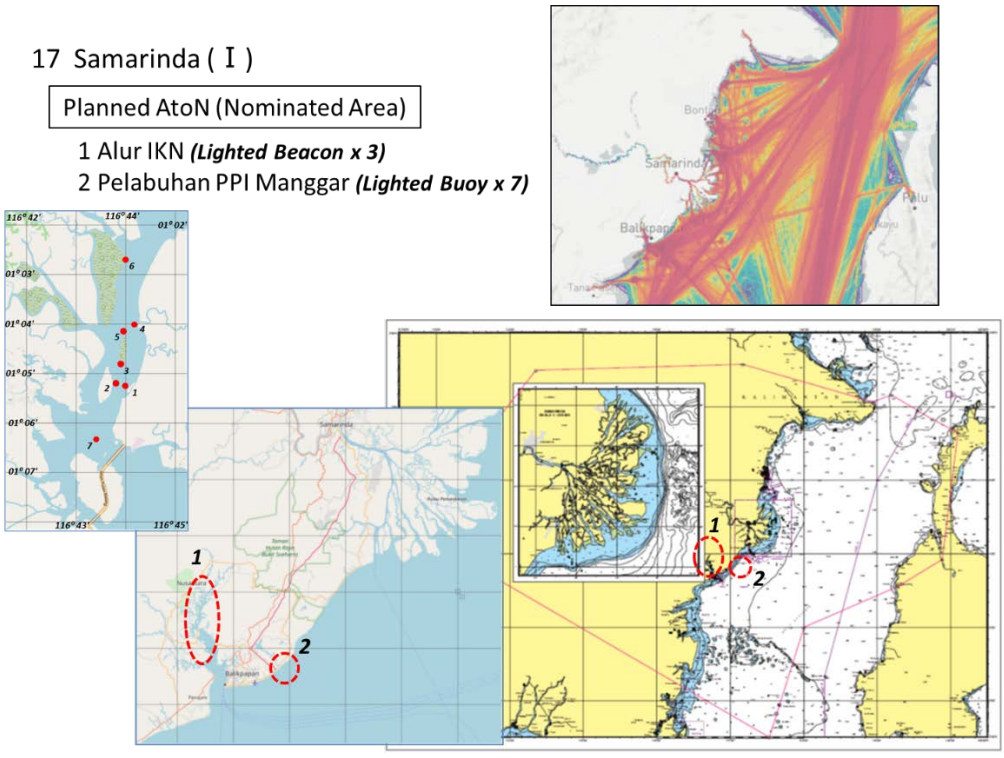


Fig. 4.1.5 -9 : Location Map (Samarinda)

18 Makassar (Ⅰ)

Location Map

Planned AtoN (Lighted Buoy)

1 Buoy Pengenal
2 Buoy No. 2
3 Bone Pamakeke
4 Buoy No. 4
5 Buoy No. 5
6 Buoy No. 9
7 Buoy No. 8
8 Kardinal Timur

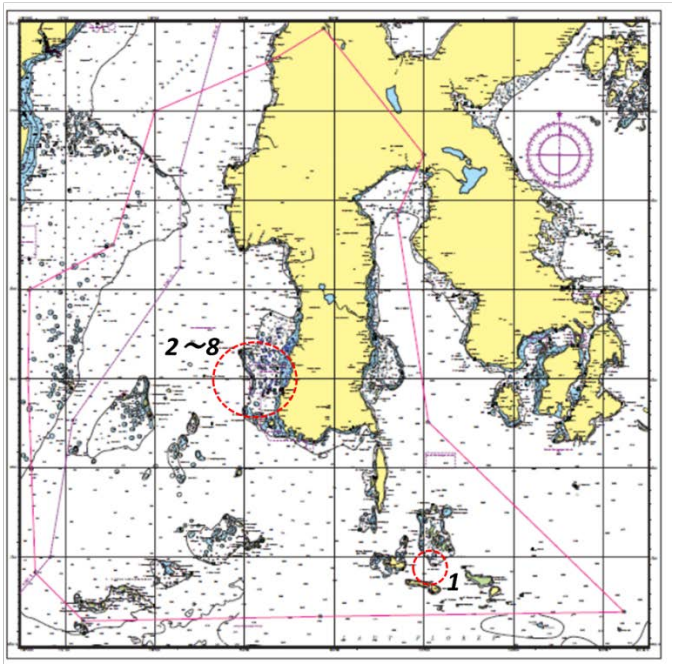


Fig. 4.1.5 -10 : Location Map (Makassar)

21 Ambon (Ⅰ)

Planned AtoN (Lighthouse)

a ～ d : Planned AtoN

a	**Mensu Tg. Galala**	**02°45'24.6" S /**	**129°30'56.8" E**
f	Pelsu Teluk Dalam 2 (Pangkalan TNI Al)	02°45'24.6" S /	129°30'56.8" E
j	Ramsu Pelabuhan Perikanan Nusantara	02°45'24.6" S /	129°30'56.8" E
b	**Ramsu Tg. Marthafons**	**03°53'24.0" S /**	**130°53'12.0" E**
g	Tanda Siang W. Batu Gajah Estury	03°53'24.0" S /	130°53'12.0" E
k		03°53'24.0" S /	130°53'12.0" E
c	**Ramsu Wainitu/Benteng**	**03°51'58.0" S /**	**130°53'54.0" E**
l	Ramsu Pelabuhan Yos Soedarso (Pelindo)	03°51'58.0" S /	130°53'54.0" E
d	**Ramsu Waisikula**	**02°53'40.6" S /**	**129°48'35.0" E**
e	Pelsu Teluk Dalam 1 (Pangkalan TNI Al)	02°53'40.6" S /	129°48'35.0" E
i	Ramsu Pelabuhan Pertamina Wayame (Pe	02°53'40.6" S /	129°48'35.0" E
m	Ramsu Pelabuhan Pertamina Wayame (Pe	02°53'40.6" S /	129°48'35.0" E

1 ～ 12 : Existing AtoN (Lighthouse)

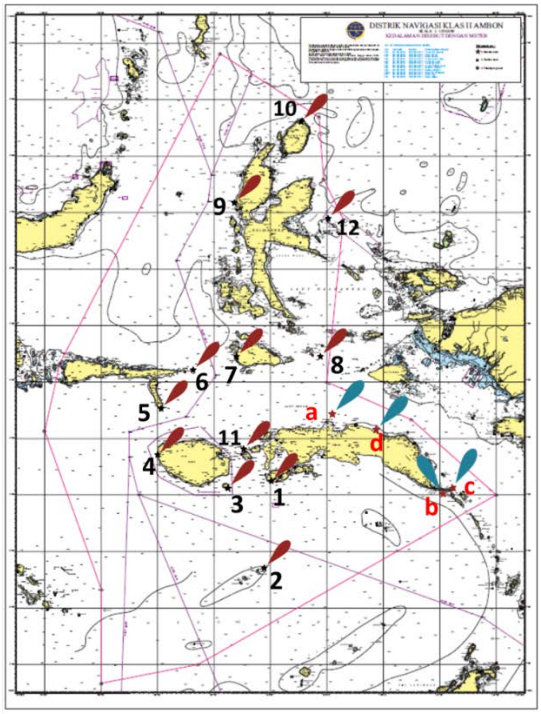


Fig. 4.1.5 -11 : Location Map (Ambon)

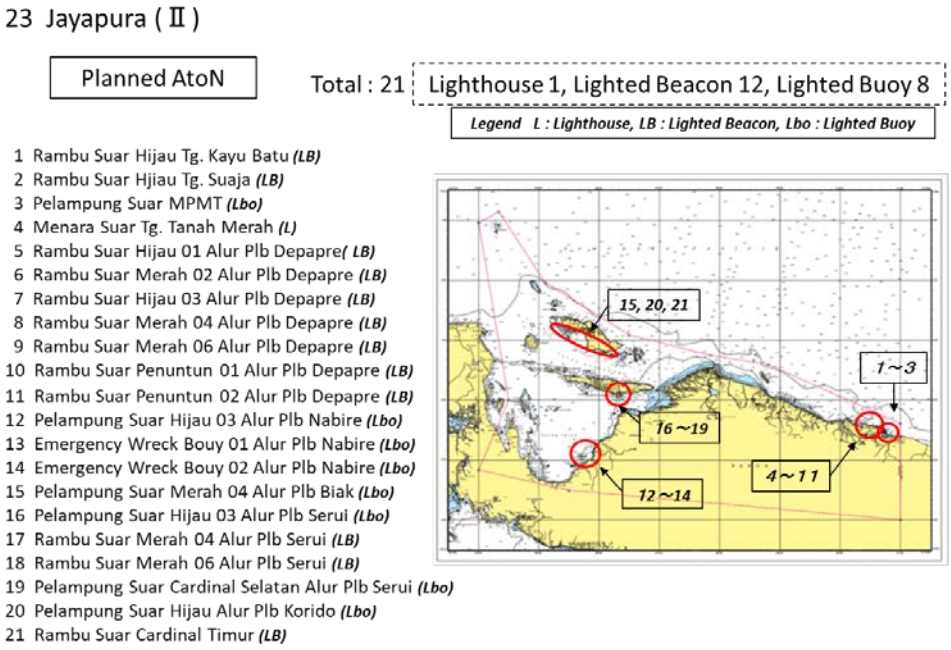


Fig. 4.1.5 -12 : Location Map (Jayapura)

2. VTS

In this questionnaire, there were 9 DISNAVs that are considering the establishment of VTS, of which 8 DISNAVs have raised possible ports and harbors, for a total 14 locations.

The breakdown of ports and harbors by DISNAVs is shown in Table 4.1.5 -2 as below.

Table 4.1.5 -2 : Number of Planned VTS

Summary Table for Planned VTS requested by DISNAV

As of December 12, 2022

No	DISNAV	Number of Nominated Area	Number of Planned VTS
1	Sabang	**1**	**1**
2	Belawan	**0**	**0**
3	Sibolga	**0**	**0**
4	Teluk Bayur	**0**	**0**
5	Tg. Pinang	**13**	**3**
6	Dumai	**0**	**0**
7	Palembang	**0**	**0**
8	Pontianak	**2**	**-----**
9	Tg. Priok	**1**	**1**
10	Cilacap	**0**	**0**
11	Semarang	**0**	**0**
12	Surabaya	**0**	**0**

No	DISNAV	Number of Nominated Area	Number of Planned VTS
13	Benoa	**0**	**0**
14	Kupang	**0**	**0**
15	Banjarmashin	**0**	**0**
16	Tarakan	**1**	**1**
17	Samarinda	**2**	**3**
18	Makassar	**0**	**0**
19	Kendari	**1**	**1**
20	Bitung	**0**	**0**
21	Ambon	**1**	**1**
22	Sorong	**0**	**0**
23	Jayapura	**0**	**0**
24	Merauke	**0**	**0**
25	Tual	**3**	**3**
Total		**25**	**14**

The planned location map for each DISNAV is shown in Fig. 4.1.5 -13 ~ Fig. 4.1.5 -20 as below.

Detailed maps of each location are shown in Appendix 4.1.5 -2.

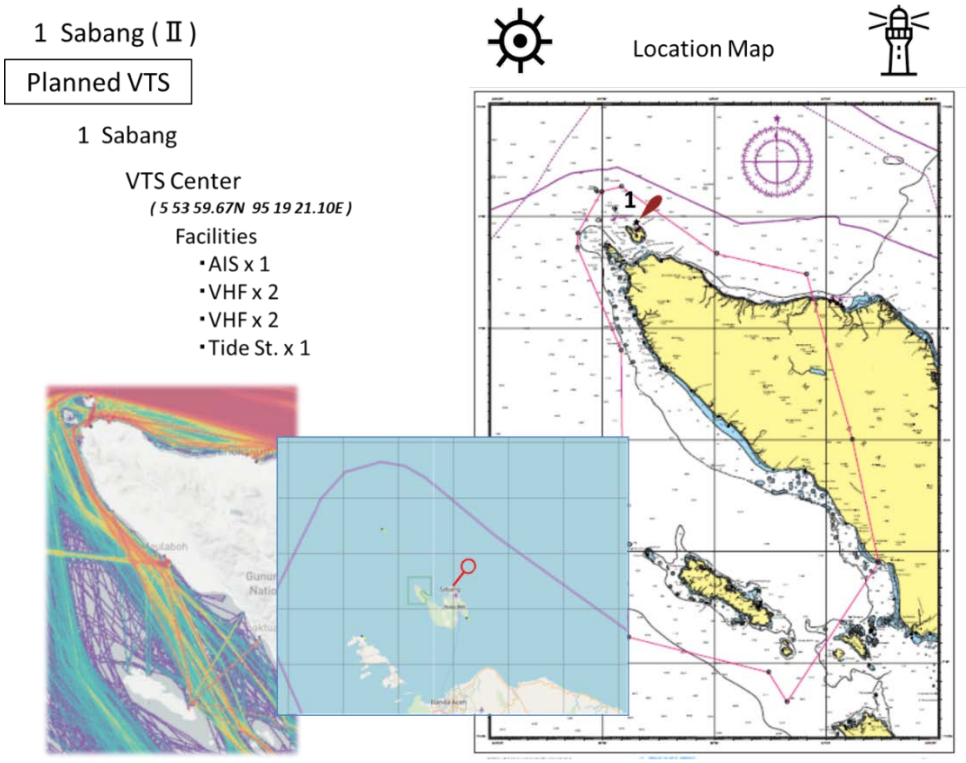


Fig. 4.1.5 -13 : Location Map (Sabang)

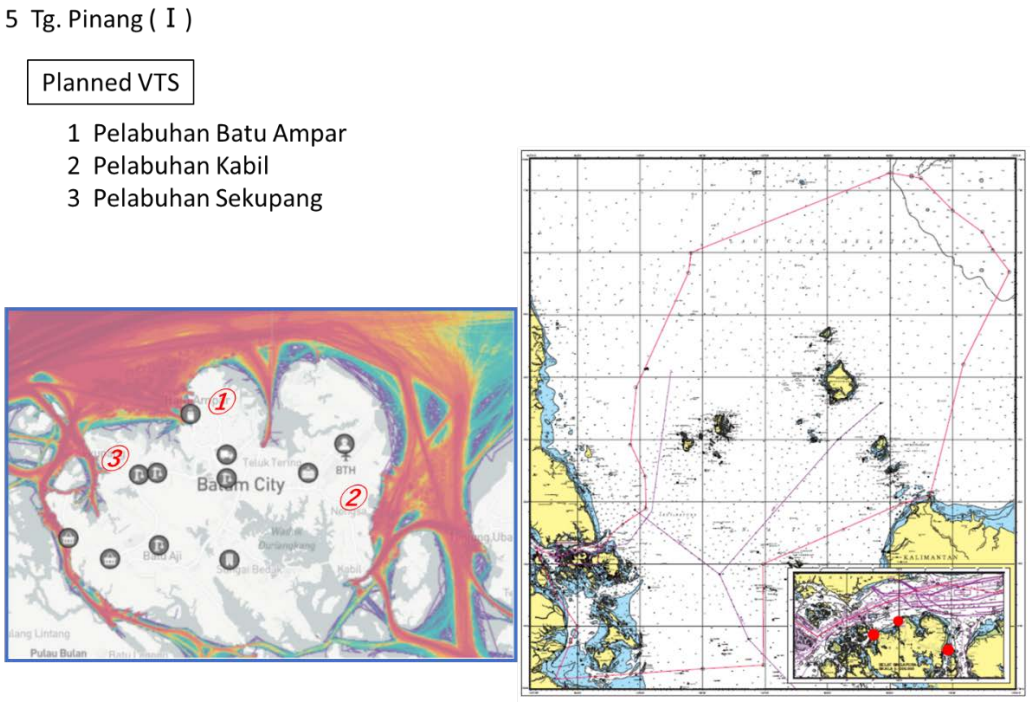


Fig. 4.1.5 -14 : Location Map (Tg. Pinang)

8 Pontianak (Ⅲ)

Planned VTS (Nominated Area)

1 Pelabuhan Soekarno ***(Port/Harbour)***
2 Dwikora ***(Inland Water : River)***

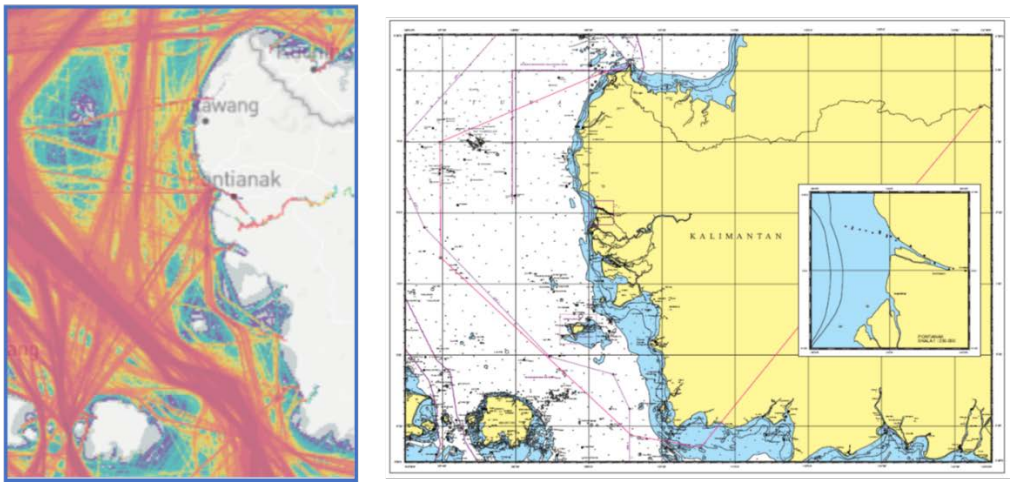


Fig. 4.1.5 -15 : Location Map (Pontianak)

9 Tg. Priok (Ⅰ)

Planned VTS

1 Patimban VTS

(06° 13‘52.59“S 107° 54‘20.12“E)

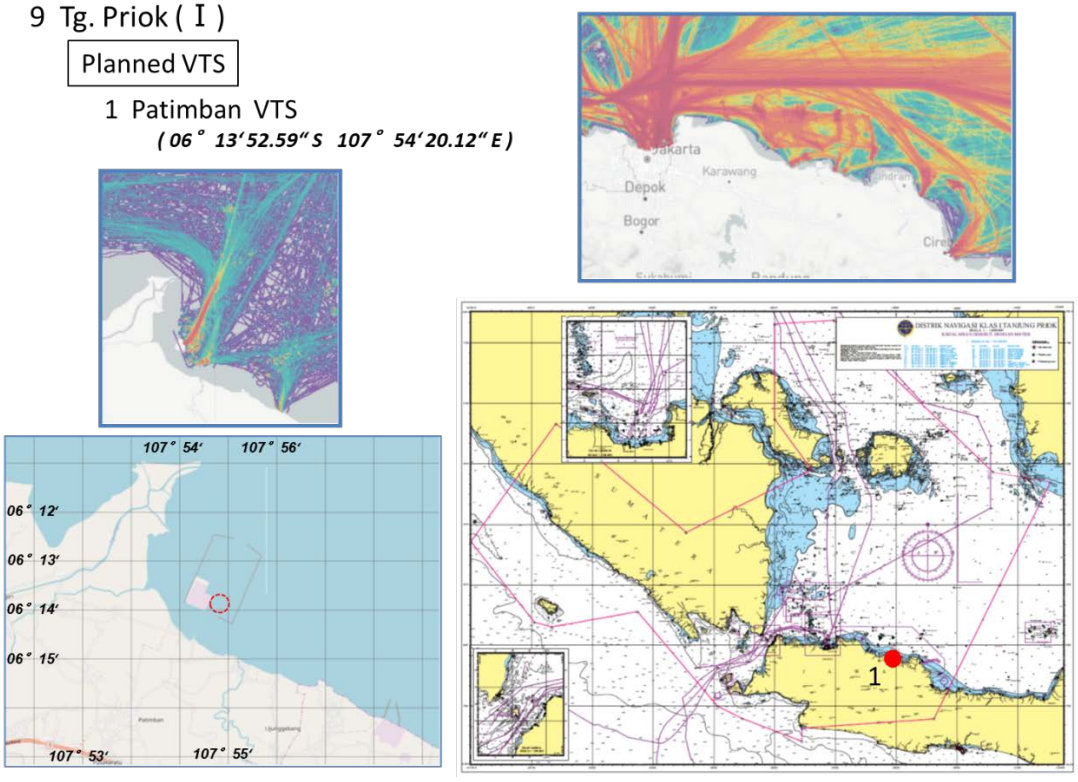


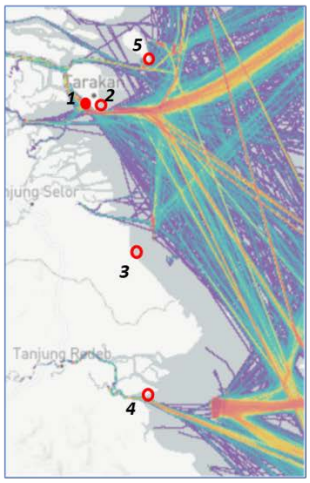
Fig. 4.1.5 -16 : Location Map (Tg. Priok)

16 Tarakan (Ⅲ)

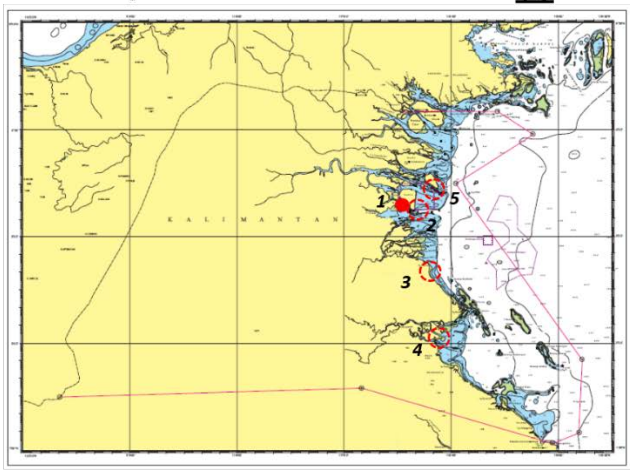
Planned VTS Sensor

1 Tarakan VTS ***(existing : 1xCe, 1xR, 1xA, 2xC, 1xM, 2xV)***
2 Tanjung Batu *(1xA, 1xC, 1xM, 2xV)*
3 Tanah Kuning *(1xA, 1xC, 1xM, 2xV)*
4 Berau,Tanjung Redeb *(1xCe, 1xR, 1xA, 2xC, 1xM, 2xV)*
5 Bunyu *(1xA, 1xC, 1xM, 2xV)*

1 (03° 17' 20" N 117° 35' 25" E)
2 (03° 14' 29" N 117° 38' 41" E)
3 (02° 35' 50" N 117° 49' 38" E)
4 (02° 03' 13" N 117° 50' 11" E)
5 (03° 27' 42" N 117° 50' 13" E)



Location Map



※ **Ce:** VTS Center、**R :** Radar、**A :** AIS、**C :** CCTV、**M :** Meteorological Instrument、**V:** VHF

Fig. 4.1.5 -17 : Location Map (Tarakan)

17 Samarinda (Ⅰ)

Planned VTS

1 Bontang (Port/Habor)
2 Sangatta (Coastal Water)
3 Tana Grogot Paser (Sensor for Balikpapan)

1 (00° 06' 50.70" N 117° 29' 33.90" E)
2 (00° 31' 26.30" N 117° 36' 23.50" E)
3 (01° 48' 25.02" S 116° 15' 02.59" E)

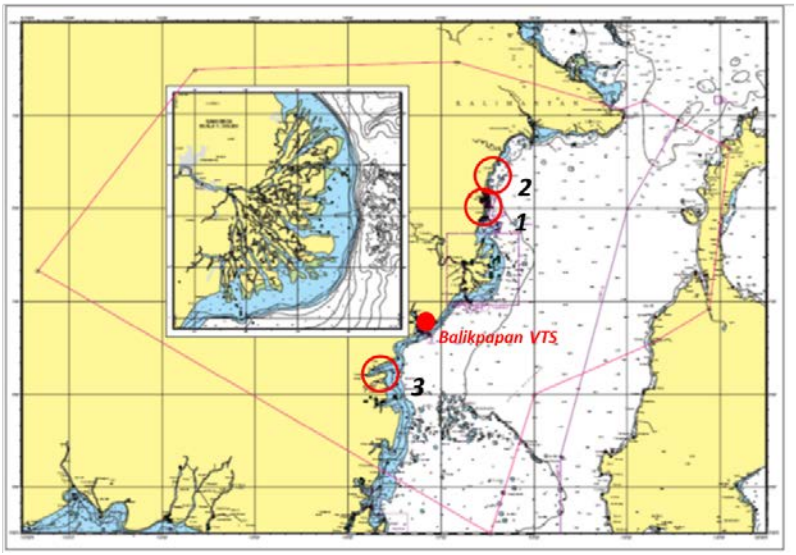
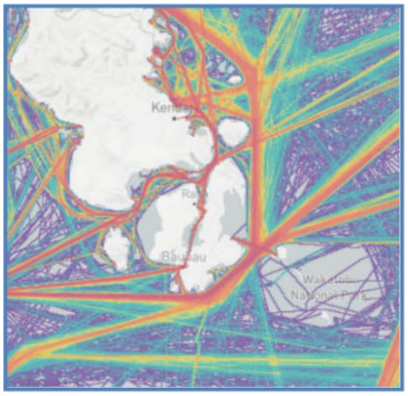


Fig. 4.1.5 -18 : Location Map (Samarinda)

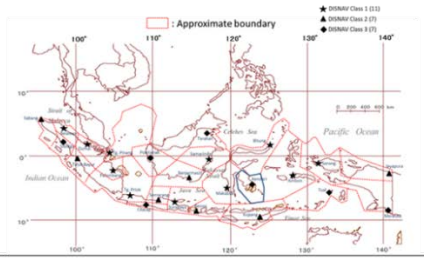
19 Kendari (Ⅲ)

Planned VTS (Port/Harbour)

Kendari VTS



Outline of DISNAV Service Area



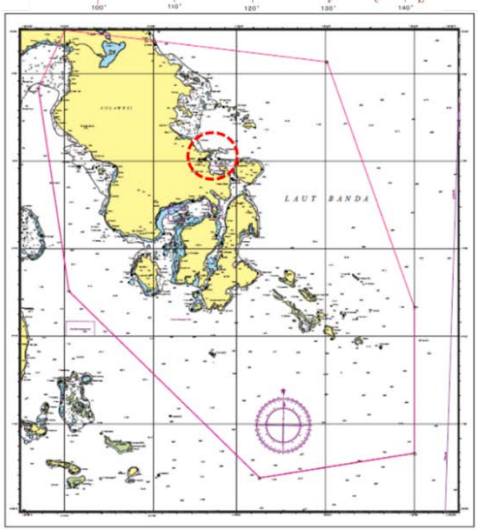


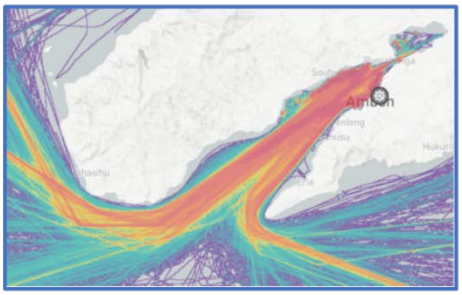
Fig. 4.1.5 -19 : Location Map (Kendari)

21 Ambon (Ⅰ)

Planned VTS

Ambon VTS (Port/Harbor)

3 Facilities (Jumlah Fasilitas)							
Operation Center / Pusat Operasi	Radar	AIS	CCTC	Meteorological Instrument (Instrumen Meteorologi)	VHF	Traffic/Tidal Signal (Lalu Lintas/ Sinyal Pasang Surut)	Other (Fill out) (Lainnya (Diisi))
1	2	1	2	1	2	0	Tide Station (stasiun pasang-surut)



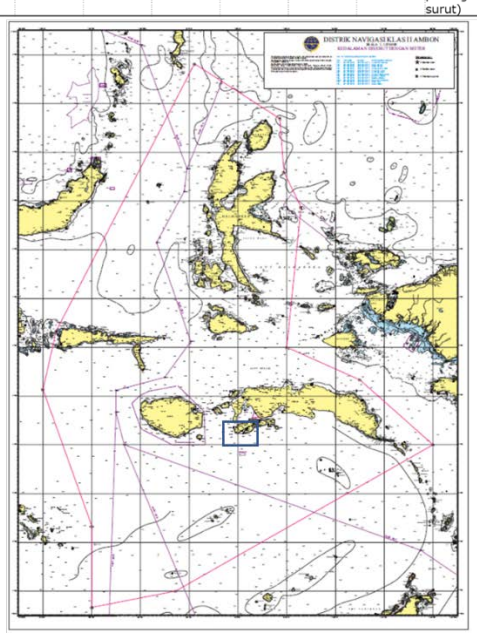


Fig. 4.1.5 -20 : Location Map (Ambon)

4.1.6 Preparation of Establishment Plan

1. The Process of the preparation

The following is an item of considerations in preparing the establishment plan based on the reply to the questionnaires from DISNAVs.

a. Implementation of Hearing Survey

In establishing the AtoN, it is necessary to reflect the wants and needs of users, and as well as the occurrence of marine accidents and the development of ports and harbors.

Therefore, for DISNAVs that did not currently have a plan to establish the AtoN in the questionnaires, they are to conduct the hearing survey first within their jurisdiction and collect information on maritime safety, traffic volume, port development plans, and so on.

Hearing Survey on the Wants and Needs for AtoN

1 Preparation
- a Collection of information
- b Planning of Survey

2 Prior consultations
- a Contact with stakeholders

3 Hearing Survey
- a Stakeholder Hearing held in sites
- b Site Investigation
- c Collection of data

4 Compilation of Hearing results
- a Wants and Needs
- b Data

5 Preparation of Report

Since the marine environment surrounding ports and harbors, and remote islands under development changes from year to year, the hearing survey is to be conducted annually for all DISNAVs for the time being.

However, DISNAVs, which already have the plan to establish AtoN, will be to conduct first a feasibility study for its establishment, so it will also serve as the hearing survey.

b. Feasibility Study

This is to determine the specifications (Type, Standard) of the AtoN to be installed and to collect the information and data necessary for the implementation design for AtoN.

The situation of navigating vessels (type, size, traffic way), the natural environment of the planned installation site (ground condition, weather, waves, background lights), and matters related to the installation work will be investigated, and appropriate AtoN will be selected in accordance with the guideline.

Feasibility Study

1 Preparation
  a Collection of information
  b Planning of Investigation
2 Prior consultation
  a Contact with related parties
3 Site survey
  a Hearing of user's opinion
  b Collection of data
  c Selection of AtoN
  d Field validation
4 Preparation of Report

c. Feasibility Study & Implementation Design

If the type and the location of AtoN have been studied to some extent, an implementation design, in which the detailed design of AtoN and its effectiveness are studied, and a feasibility study would be conducted at the same time in order to promote the establishment of AtoN.

Feasibility Study & Implementation Design

1 Preparation
  a Collection of information
  b Planning of Investigation
2 Prior consultation
  a Contact with related parties
3 Site survey
  a Hearing of user's opinion
  b Collection of data
  c Selection of AtoN
  d Field validation
4 Designing
  a Decide on specification
  b Risk Management
    (Identification, Analysis, Assessment)
5 Estimation of Cost
6 Preparation of Report

d. Implementation Design

If the type and the standard of AtoN would be determined based on the results of the feasibility study, an implementation design will be carried out after the study.

Implementation Design

1 Preparation
- a Collection of information
- b Planning of Design

2 Prior consultation
- a Contact with related parties

3 Designing
- a Decide on specification
- b Risk Management (Identification, Analysis, Assessment)

4 Estimation of Cost

5 Preparation of Report

2. Approximate unit cost on accumulation for this Establishment Plan

In preparing the establishment plan, Table 4.1.6 -1 for the unit price for Survey, Table 4.1.6 -2 for Unit Price of AtoN and Table 4.1.6 -3 for Unit Price of VTS were referred to for estimating the budget.

It is estimated on the assumption that the hearing survey will be conducted by local staff, and the feasibility study will be done by personnel dispatched from Japan.

The unit cost of AtoN is a relative reference price based on the type and size. Installation costs are not included. (The unit cost includes the lantern with solar batteries and the tower (the body).

The VTS configuration and the equipment cost are reference unit prices with fundamental functions.

Table 4.1.6 -1 : Unit Price of Survey

Standard Unit Price of Survey

Item		Type	Price	Reference
1	Hearing Survey		IDR 245M	by Local Staff
2	Feasibility Study (a)	including Implementation Design	IDR 830M	
3	Feasibility Study (b)	only Feasibility Study	IDR 670M	
4	Implementation Design		IDR 180M	

Table 4.1.6 -2 : Unit Price for AtoN

Standard Unit Price of Visual Aids for Budget Estimation

Item		Type	Price	Reference
1	Lighthouse	20m Aluminum Tower	IDR 3,000M	
		10m Aluminum Tower	IDR 1,200M	
2	Lighted Beacon	10m Pole Type Aluminum	IDR 1,000M	LED Lantern Solar Battery
		3m Pole Type Aluminum	IDR 750M	
3	Lighted Buoy	High-wave	IDR 1,000M	LED Lantern Solar Battery Mooring Chain
		Standard	IDR 750M	
Reference (Structure for Lighthouse)		*20m Steel Tower*	*IDR 1,800M*	*Hot-dip galvanizing*

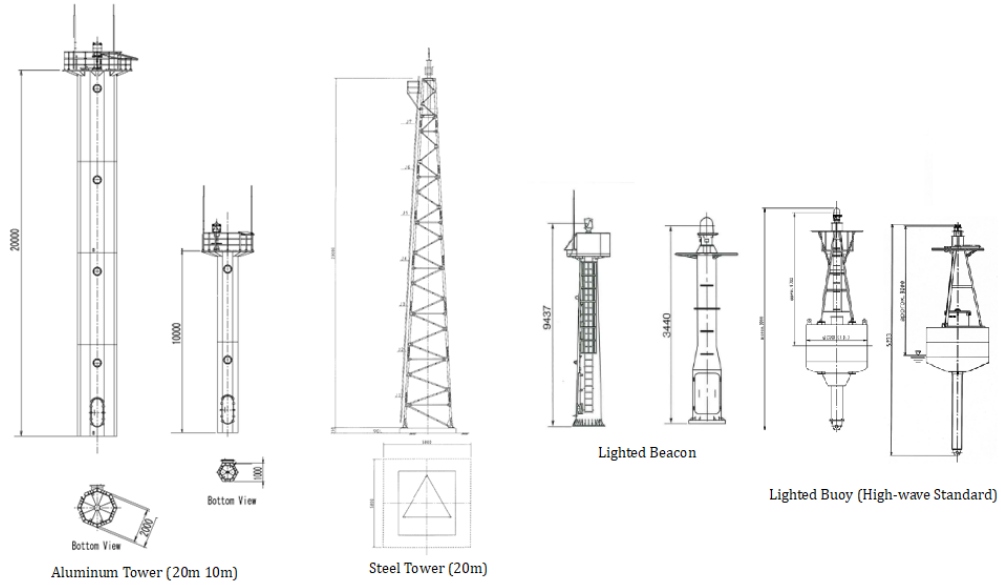
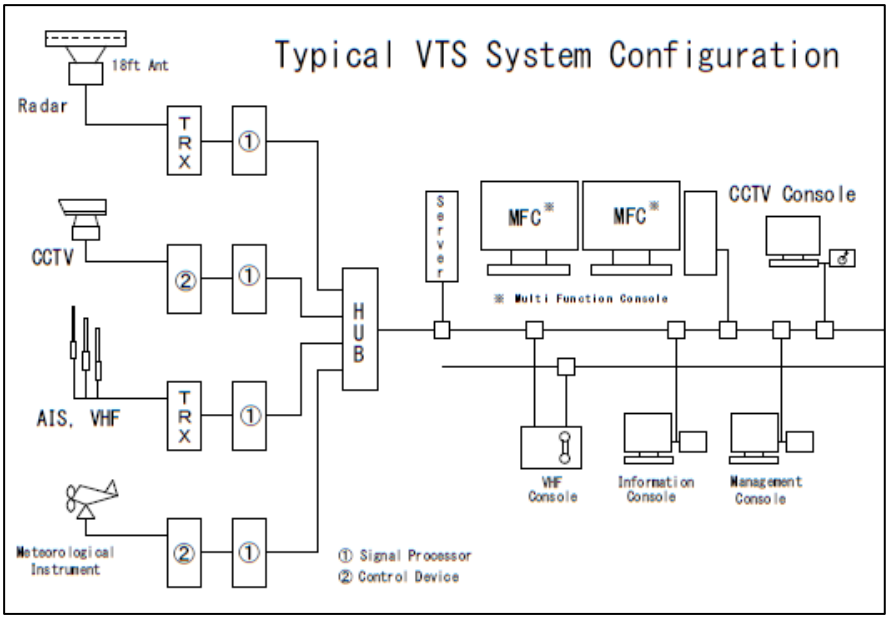


Table 4.1.6 -3 : Unit Price for VTS

Standard Unit Price of VTS for Budget Estimation
(excluding Power Supply System and Facilities)

Item		Type	Price	Reference
1	Radar System	Antenna (18 Feet Type)	IDR 5,000M	13GHz (Solid state)
		TRX (13GHz)		
		Signal Processor System		
2	AIS Base Station	AIS Transponder & Processor	IDR 1,000M	
		VHF/GPS Antenna		
3	CCTV	Camera	IDR 2,000M	High-resolution Cooperative system with Radar
		Encoder/Stabilizer		
4	Meteorological Sensor	AIS Transponder & Processor	IDR 300M	Sensor, Data Logger
5	MFC System	Operation Console	IDR 14,000M	Multi Function Console
		Server system		
6	VTS Training	SOP, OJT	IDR 710M	



4.1.7 Establishment Plan

1. AtoN

For those DISNAVs that have specific establishment plans for the location and the type of AtoN, a feasibility study shall be conducted immediately, and an implementation design will follow afterwards. In this case, if several (multiple) AtoN are to be installed in a same area, it is desirable to conduct a feasibility study on an area-by-area basis, since AtoN in an area are related to each other.

If only the establishment area has been determined, a feasibility study will be conducted to obtain the necessary information and data, after which the specific location and type of AtoN will be decided and an implementation design will be performed.

After the implementation design is completed, the installation of AtoN will be planned in order of urgency, but the establishment policy and administrative policies will be also related to the priority order for the establishment.

In addition, the amount of DISNAV's work involved in the establishment and the overall budget allocation must be also considered.

Table 4.1.7 -1 ~ Table 4.1.7 -9 for each DISNAV are the establishment plan prepared based on the questionnaires.

Table 4.1.7 -1 : DISNAV (1 - 3)

Table of Establishment Plan for AtoN (1/9)

No.	DISNAV	Nominated Area	Planned AtoN	Item	Implementation (AtoN)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
1	Sabang (Ⅱ)	2	4	Hearing Survey						○x2	
				Feasibly Study	○a		○a				Pulau Slumat Ache
				Implementation Design							
				Construction		○L		○L	○LB x2		
				Budget	IDR 830.M	IDR 3,000.M	IDR 830.M	IDR 3,000.M	IDR 1,750.M	IDR 490.M	*IDR 9,900.M*
2	Belawan (Ⅰ)	0	0	Hearing Survey	○		○		○	○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget	IDR 245.M		IDR 245.M		IDR 245.M	IDR 490.M	*IDR 1,225.M*
3	Sibolga (Ⅲ)	0	0	Hearing Survey	○		○		○	○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget	IDR 245.M		IDR 245.M		IDR 245.M	IDR 490.M	*IDR 1,225.M*

Table 4.1.7 -2 : DISNAV (4 - 6)

Table of Establishment Plan for AtoN (2/9)

No.	DISNAV	Nominated Area	Planned AtoN	Item	Implementation (AtoN)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
4	Teluk Bayur (Ⅰ)	2	3	Hearing Survey				○		○x2	
				Feasibly Study	○a						
				Implementation Design							
				Construction		○LB	○LB x2				
				Budget	IDR 830.M	IDR 1,000.M	IDR 1,500.M	IDR 245.M		IDR 490.M	*IDR 4,065.M*
5	Tg. Pinang (Ⅰ)	3	-----	Hearing Survey	○		○		○	○x2	
				Feasibly Study	○b						
				Implementation Design							
				Construction							
				Budget	IDR 915.M		IDR 245.M		IDR 245.M	IDR 490.M	*IDR 1,895.M*
6	Dumai (Ⅰ)	3	7	Hearing Survey			○		○	○x2	
				Feasibly Study	○a						
				Implementation Design							
				Construction		○LB x2	○LB x2	○LB x2	○LB		
				Budget	IDR 830.M	IDR 1,500.M	IDR 1,745.M	IDR 1,500.M	IDR 1,245.M	IDR 490.M	*IDR 7,310.M*

Table 4.1.7 -3 : DISNAV (7 - 9)

Table of Establishment Plan for AtoN (3/9)

No.	DISNAV	Nominated Area	Planned AtoN	Item	Implementation (AtoN)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
7	Palembang (Ⅰ)	0	0	Hearing Survey	○		○		○	○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget	IDR 245.M		IDR 245.M		IDR 245.M	IDR 490.M	*IDR 1,225.M*
8	Pontianak (Ⅲ)	1	-----	Hearing Survey			○		○	○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget			IDR 245.M		IDR 245.M	IDR 490.M	*IDR 980.M*
9	Tg. Priok (Ⅰ)	2	7	Hearing Survey			○		○	○x2	
				Feasibly Study	○a	○b					
				Implementation Design			○				
				Construction		○LB x4	○LB x2	○LB			
				Budget	IDR 830.M	IDR 3,670.M	IDR 2,425.M	IDR 1,000.M	IDR 245.M	IDR 490.M	*IDR 8,660.M*

Table 4.1.7 -4 : DISNAV (10 - 12)

Table of Establishment Plan for AtoN (4/9)

No.	DISNAV	Nominated Area	Planned AtoN	Item	Implementation (AtoN)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
10	Cilacap (Ⅲ)	2	2	Hearing Survey			○		○	○x2	
				Feasibly Study	○a						
				Implementation Design							
				Construction		○LB	○LB				
				Budget	IDR 830.M	IDR 1,000.M	IDR 1,245.M		IDR 245.M	IDR 490.M	*IDR 3,810.M*
11	Semarang (Ⅱ)	2	8	Hearing Survey			○		○	○x2	
				Feasibly Study	○a	○a					
				Implementation Design							
				Construction		○Lbo x4	○Lbo x4				
				Budget	IDR 830.M	IDR 4,830.M	IDR 3,245.M		IDR 245.M	IDR 490.M	*IDR 9,640.M*
12	Surabaya (Ⅰ)	1	-----	Hearing Survey			○		○	○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget			IDR 245.M		IDR 245.M	IDR 490.M	*IDR 980.M*

Table 4.1.7 -5 : DISNAV (13 - 15)

Table of Establishment Plan for AtoN (5/9)

No.	DISNAV	Nominated Area	Planned AtoN	Item	Implementation (AtoN)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
13	Benoa (Ⅱ)	6	15	Hearing Survey				O		Ox2	
				Feasibly Study	Oa	Oa	Oa				
				Implementation Design							
				Construction		OLB x3	OLB x5	OLB x4	OLB x3		
				Budget	IDR 830.M	IDR 3,830.M	IDR 4,580.M	IDR 3,245.M	IDR 2,250.M	IDR 490.M	*IDR 15,225.M*
14	Kupang (Ⅱ)	0	0	Hearing Survey	O		O		O	Ox2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget	IDR 245.M		IDR 245.M		IDR 245.M	IDR 490.M	*IDR 1,225.M*
15	Banjarmashin (Ⅱ)	0	0	Hearing Survey	O		O		O	Ox2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget	IDR 245.M		IDR 245.M		IDR 245.M	IDR 490.M	*IDR 1,225.M*

Table 4.1.7 -6 : DISNAV (16 - 18)

Table of Establishment Plan for AtoN (6/9)

No.	DISNAV	Nominated Area	Planned AtoN	Item	Implementation (AtoN)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
16	Tarakan (Ⅲ)	0	0	Hearing Survey		O	O		O	Ox2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget		IDR 245.M	IDR 245.M		IDR 245.M	IDR 490.M	*IDR 1,225.M*
17	Samarinda (Ⅰ)	2	10	Hearing Survey				O		Ox2	
				Feasibly Study	Oa		Oa				
				Implementation Design							
				Construction		OLbo x3	OLbo x4	OLB x3			
				Budget	IDR 830.M	IDR 2,250.M	IDR 3,000.M	IDR 2,495.M		IDR 490.M	*IDR 9,065.M*
18	Makassar (Ⅰ)	3	8	Hearing Survey					O	Ox2	
				Feasibly Study	Oa	Oa	Oa				
				Implementation Design							
				Construction		OLbo	OLbo x4	OLbo x3			
				Budget	IDR 830.M	IDR 1,830.M	IDR 4,830.M	IDR 2,250.M	IDR 245.M	IDR 490.M	*IDR 10,475.M*

Table 4.1.7 -7 : DISNAV (19 - 21)

Table of Establishment Plan for AtoN (7/9)

No.	DISNAV	Nominated Area	Planned AtoN	Item	Implementation (AtoN)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
19	Kendari (Ⅲ)	0	0	Hearing Survey			○		○	○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget			IDR 245.M		IDR 245.M	IDR 490.M	*IDR 980.M*
20	Bitung (Ⅰ)	0	0	Hearing Survey	○		○		○	○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget	IDR 245.M		IDR 245.M		IDR 245.M	IDR 490.M	*IDR 1,225.M*
21	Ambon (Ⅰ)	2	4	Hearing Survey		○		○		○x2	
				Feasibly Study	○b		○b				
				Implementation Design		○		○			
				Construction			○L	○L x2	○L		
				Budget	IDR 670.M	IDR 425.M	IDR 3,670.M	IDR 2,645.M	IDR 3,000.M	IDR 490.M	*IDR 10,900.M*

Table 4.1.7 -8 : DISNAV (22 - 24)

Table of Establishment Plan for AtoN (8/9)

No.	DISNAV	Nominated Area	Planned AtoN	Item	Implementation (AtoN)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
22	Sorong (Ⅰ)	0	0	Hearing Survey	○		○		○	○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget	IDR 245.M		IDR 245.M		IDR 245.M	IDR 490.M	*IDR 1,225.M*
23	Jayapura (Ⅱ)	5	21	Hearing Survey					○	○x2	
				Feasibly Study	○a	○a	○a				
				Implementation Design							
				Construction		○LB x2, Lbo	○L	○LB, Lbo	○LB, Lbo		
				Budget		IDR 3,330.M	IDR 3,830.M	IDR 3,000.M	IDR 3,000.M	IDR 490.M	*IDR 13,650.M*
24	Merauke (Ⅲ)	0	0	Hearing Survey	○		○		○	○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget	IDR 245.M		IDR 245.M		IDR 245.M	IDR 490.M	*IDR 1,225.M*

Table 4.1.7 -9 : DISNAV (25)

Table of Establishment Plan for AtoN (9/9)

No.	DISNAV	Nominated Area	Planned AtoN	Item	Implementation (AtoN)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
25	Tual (Ⅲ)	0	0	Hearing Survey			○		○	○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget			IDR 245.M		IDR 245.M	IDR 490.M	IDR 980.M

2. VTS

The hearing survey for the establishment plan of VTS should be conducted annually in conjunction with the one for AtoN to ask about users' claim, though the establishment of VTS is often determined by the policy on measures of safety navigation based on the marine accidents and maritime traffic rather than by users' wants and needs.

For those DISNAVs that have listed the locations (areas) for the establishment of VTS, the operational contents to determine the system and equipment configurations must be clarified, so a feasibility study shall be conducted immediately to obtain the necessary information and data, and then the equipment for the operation shall be fixed on and an implementation design will be done.

After the implementation design is completed, it will take at least a few years to manufacture the equipment and to install them, so the establishment plan will be prepared taking these factors into account.

For VTS that will be established newly, it is essential to prepare an operational manual (SOP) for its own VTS, and VTS training including preparation of SOP and OJT should be planned.

The establishment of Sabang VTS (tentative name), the innovation of the existing Samarinda VTS and the establishment of Labuan Bajo (tentative name), which are taken up in Chapter 7 of Report (Phase-1), should be considered from the perspective of collecting information on vessel's movements, traffic safety in the narrow passage of the river and the maritime safety associated with the promotion of tourism respectively, and an feasibility study for these facilities should be also included in this establishment plan.

Based on the above and the questionnaires, the establishment plan for each DISNAV is shown in Table 4.1.7 10 ~ Table 4.1.7 -18 as below.

Table 4.1.7 -10 : DISNAV (1-3)

Table of Establishment Plan for VTS (1/9)

No.	DISNAV	Nominated Area	Planned VTS	Item	Implementation (VTS)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
1	Sabang (Ⅱ)	1	1	Hearing Survey				○		○x2	
				Feasibly Study	○b						
				Implementation Design		○					
				Construction			○ 1, 2	○ 3, 4, 5	◎		◎ : Training
				Budget	IDR 670.00M	IDR 180.00M	IDR 6,000.00M	IDR 16,545.00M	IDR 710.00M	IDR 490.00M	***IDR 24,595.00M***
2	Belawan (Ⅰ)	0	0	Hearing Survey		○		○		○x2	*Existing 1*
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***
3	Sibolga (Ⅲ)	0	0	Hearing Survey		○		○		○x2	*No VTS*
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***

Table 4.1.7 -11 : DISNAV (4 - 6)

Table of Establishment Plan for VTS (2/9)

No.	DISNAV	Nominated Area	Planned VTS	Item	Implementation (VTS)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
4	Teluk Bayur (Ⅰ)	0	0	Hearing Survey		○			○	○x2	*Existing 1*
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget		IDR 245.00M			IDR 245.00M	IDR 490.00M	***IDR 980.00M***
5	Tg. Pinang (Ⅰ)	13	3	Hearing Survey	○					○x2	*Existing 1*
				Feasibly Study	○b						
				Implementation Design		○					
				Construction			○2, 3	○5, ◎			◎Training
				Budget	IDR 915.00M	IDR 180.00M	IDR 6,000.00M	IDR 14,710.00M		IDR 490.00M	***IDR 22,295.00M***
6	Dumai (Ⅰ)	0	0	Hearing Survey		○			○	○x2	*Existing 1*
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget		IDR 245.00M			IDR 245.00M	IDR 490.00M	***IDR 980.00M***

Table 4.1.7 -12 : DISNAV (7 - 9)

Table of Establishment Plan for VTS (3/9)

No.	DISNAV	Nominated Area	Planned VTS	Item	Implementation (VTS)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
7	Palembang (Ⅰ)	0	0	Hearing Survey		○		○		○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***
8	Pontianak (Ⅲ)	2	-----	Hearing Survey	○					○x2	*Existing 1*
				Feasibly Study		○b					
				Implementation Design							
				Construction							
				Budget	IDR 245.00M	IDR 670.00M				IDR 490.00M	***IDR 1,405.00M***
9	Tg. Priok (Ⅰ)	1	1	Hearing Survey	○					○x2	*Existing 4*
				Feasibly Study	○a						
				Implementation Design							
				Construction		○1,2,3	○4,5	◎			
				Budget	IDR 1,075.00M	IDR 8,000.00M	IDR 14,300.00M	IDR 710.00M		IDR 490.00M	***IDR 24,575.00M***

Table 4.1.7 -13 : DISNAV (10 - 12)

Table of Establishment Plan for VTS (4/9)

No.	DISNAV	Nominated Area	Planned VTS	Item	Implementation (VTS)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
10	Cilacap (Ⅲ)	0	0	Hearing Survey		○		○		○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***
11	Semarang (Ⅱ)	0	0	Hearing Survey	○			○		○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget	IDR 245.00M			IDR 245.00M		IDR 490.00M	***IDR 980.00M***
12	Surabaya (Ⅰ)	0	0	Hearing Survey	○					○x2	*Existing 1*
				Feasibly Study		○b					
				Implementation Design							
				Construction							
				Budget	IDR 245.00M	IDR 670.00M				IDR 490.00M	***IDR 1,405.00M***

Table 4.1.7 -14 : DISNAV (13 - 15)

Table of Establishment Plan for VTS (5/9)

No.	DISNAV	Nominated Area	Planned VTS	Item	Implementation (VTS)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
13	Benoa (Ⅱ)	0	0	Hearing Survey					○	○x2	*Existing 2*
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget					IDR 245.00M	IDR 490.00M	***IDR 735.00M***
14	Kupang (Ⅱ)	0	0	Hearing Survey	○			○		○x2	
				Feasibly Study		○b					*Labuan Bajo*
				Implementation Design			○				
				Construction				○1,2	○3,4,5	◎	
				Budget	IDR 245.00M	IDR 670.00M	IDR 180.00M	IDR 6,245.00M	IDR 16,300.00M	IDR 1,200.00M	***IDR 24,840.00M***
15	Banjarmashin (Ⅱ)	0	0	Hearing Survey		○		○		○x2	*Existing 2*
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***

Table 4.1.7 -15 : DISNAV (16 - 18)

Table of Establishment Plan for VTS (6/9)

No.	DISNAV	Nominated Area	Planned VTS	Item	Implementation (VTS)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
16	Tarakan (Ⅲ)	1	1	Hearing Survey	○					○x2	
				Feasibly Study	○b						
				Implementation Design		○					
				Construction			○1, 2	○3, 4, 5	◎		
				Budget	IDR 915.00M	IDR 180.00M	IDR 6,000.00M	IDR 16,300.00M	IDR 710.00M	IDR 490.00M	***IDR 24,595.00M***
17	Samarinda (Ⅰ)	2	3	Hearing Survey	○				○	○x2	*Existing 2*
				Feasibly Study		○b					
				Implementation Design							
				Construction							
				Budget	IDR 245.00M	IDR 670.00M			IDR 245.00M	IDR 490.00M	***IDR 1,650.00M***
18	Makassar (Ⅰ)	0	0	Hearing Survey				○		○x2	*Existing 1*
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget				IDR 245.00M		IDR 490.00M	***IDR 735.00M***

Table 4.1.7 -16 : DISNAV (19 - 21)

Table of Establishment Plan for VTS (7/9)

No.	DISNAV	Nominated Area	Planned VTS	Item	Implementation (VTS)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
19	Kendari (Ⅲ)	1	1	Hearing Survey	○			○		○x2	
				Feasibly Study		○b					
				Implementation Design							
				Construction							
				Budget	IDR 245.00M	IDR 670.00M		IDR 245.00M		IDR 490.00M	***IDR 1,650.00M***
20	Bitung (Ⅰ)	0	0	Hearing Survey		○		○		○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***
21	Ambon (Ⅰ)	1	1	Hearing Survey	○				○	○x2	
				Feasibly Study		○b					
				Implementation Design							
				Construction							
				Budget	IDR 245.00M	IDR 670.00M			IDR 245.00M	IDR 490.00M	***IDR 1,650.00M***

Table 4.1.7 -17 : DISNAV (22 - 24)

Table of Establishment Plan for VTS (8/9)

No.	DISNAV	Nominated Area	Planned VTS	Item	Implementation (VTS)						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
22	Sorong (Ⅰ)	0	0	Hearing Survey		○		○		○x2	*Existing 1*
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***
23	Jayapura (Ⅱ)	0	0	Hearing Survey		○			○	○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget		IDR 245.00M			IDR 245.00M	IDR 490.00M	***IDR 980.00M***
24	Merauke (Ⅲ)	0	0	Hearing Survey	○			○		○x2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget	IDR 245.00M			IDR 245.00M		IDR 245.00M	***IDR 735.00M***

Table 4.1.7 -18 : DISNAV (25)

Table of Establishment Plan for VTS (9/9)

No.	DISNAV	Nominated Area	Planned VTS	Item	Implementation						Reference
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
25	Tual (Ⅲ)	3	3	Hearing Survey	Ox2			O		Ox2	
				Feasibly Study							
				Implementation Design							
				Construction							
				Budget	IDR 490.00M			IDR 245.00M		IDR 490.00M	***IDR 1,225.00M***

c. Budget Table according to the Items of works and to all DISNAVs

Table 4.1.7 -19 for AtoN and Table 4.1.7 -20 for VTS are a summary of the total amount for each item of works respectively, and Table 4.1.7 -21 for AtoN and Table 4.1.7 -22 for VTS are a summary of the total amount for each DISNAV respectively.

In addition, these above tables are organized in Summary Table-1 and Summary Table-2 as Tables 4.1.7 -23 and 4.1.7 -24, respectively.

Detailed tables of each DISNAV are shown in Appendix 4.1.7 -1.

Table 4.1.7 -19 : Total Amount for Works of AtoN

Table of Establishment Plan for AtoN

No.	DISNAV	Nominated Area	Planned AtoN	Item	Implementation Cost (AtoN)						Total
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
1	DISNAV (1-25)	36	89	Hearing Survey	IDR 2,205M	IDR 490M	IDR 4,410M	IDR 980M	IDR 4,900M	IDR 12,250M	IDR 25,235M
				Feasibly Study	IDR 9,640M	IDR 3,990M	IDR 4,820M				IDR 18,450M
				Implementation Design		IDR 180M	IDR 180M	IDR 180M			IDR 540M
				Construction		IDR 22,250M	IDR 25,750M	IDR 18,400M	IDR 11,000M		IDR 77,400M
				Budget	IDR 11,845M	IDR 26,910M	IDR 35,160M	IDR 19,560M	IDR 15,900M	IDR 12,250M	IDR 121,625M

Table 4.1.7 -20 : Total Amount for Works of VTS

Table of Establishment Plan for VTS

No.	DISNAV	Nominated Area	Planned VTS	Item	Implementation (VTS)						Total
					2024	2025	2026	2027	2028	Subsequent Year til 2040	
1	DISNAV (1-25)	25	14	Hearing Survey	IDR 2,940.00M	IDR 2,695.00M		IDR 3,920.00M	IDR 1,470.00M	IDR 12,250.00M	IDR 23,275.00M
				Feasibly Study	IDR 2,840.00M	IDR 4,690.00M					IDR 7,530.00M
				Implementation Design		IDR 540.00M					IDR 540.00M
				Construction		IDR 8,000.00M	IDR 32,300.00M	IDR 48,020.00M	IDR 1,420.00M		IDR 89,740.00M
				Budget	IDR 5,780.00M	IDR 15,925.00M	IDR 32,300.00M	IDR 51,940.00M	IDR 2,890.00M	IDR 12,250.00M	IDR 121,085.00M

Table 4.1.7 -21 : Total Amount for DISNAV of AtoN

Table of Budget Plan for AtoN

No.	DISNAV	Nominated Area	Planned AtoN	Implementation Cost (AtoN)						Total
				2024	2025	2026	2027	2028	Subsequent Year til 2040	
1	Sabang (Ⅱ)	2	4	IDR 830.00M	IDR 3,000.00M	IDR 830.00M	IDR 3,000.00M	IDR 1,750.00M	IDR 490.00M	***IDR 9,900.00M***
2	Belawan (Ⅰ)	0	0	IDR 245.00M		IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 1,225.00M***
3	Sibolga (Ⅲ)	0	0	IDR 245.00M		IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 1,225.00M***
4	Teluk Bayur (Ⅰ)	2	3	IDR 830.00M	IDR 1,000.00M	IDR 1,500.00M	IDR 245.00M		IDR 490.00M	***IDR 4,065.00M***
5	Tg. Pinang (Ⅰ)	3	-----	IDR 915.00M		IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 1,895.00M***
6	Dumai (Ⅰ)	3	7	IDR 830.00M	IDR 1,500.00M	IDR 1,745.00M	IDR 1,500.00M	IDR 1,245.00M	IDR 490.00M	***IDR 7,310.00M***
7	Palembang (Ⅰ)	0	0	IDR 245.00M		IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 1,225.00M***
8	Pontianak (Ⅲ)	1	-----			IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 980.00M***
9	Tg. Priok (Ⅰ)	2	7	IDR 830.00M	IDR 3,670.00M	IDR 2,425.00M	IDR 1,000.00M	IDR 245.00M	IDR 490.00M	***IDR 8,660.00M***
10	Cilacap (Ⅲ)	2	2	IDR 830.00M	IDR 1,000.00M	IDR 1,245.00M		IDR 245.00M	IDR 490.00M	***IDR 3,810.00M***
11	Semarang (Ⅱ)	2	8	IDR 830.00M	IDR 4,830.00M	IDR 3,245.00M		IDR 245.00M	IDR 490.00M	***IDR 9,640.00M***
12	Surabaya (Ⅰ)	1	-----			IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 980.00M***
13	Benoa (Ⅱ)	6	15	IDR 830.00M	IDR 3,830.00M	IDR 4,580.00M	IDR 3,245.00M	IDR 2,250.00M	IDR 490.00M	***IDR 15,225.00M***
14	Kupang (Ⅱ)	0	0	IDR 245.00M		IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 1,225.00M***
15	Banjarmashin (Ⅱ)	0	0	IDR 245.00M		IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 1,225.00M***
16	Tarakan (Ⅲ)	0	0		IDR 245.00M	IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 1,225.00M***
17	Samarinda (Ⅰ)	2	10	IDR 830.00M	IDR 2,250.00M	IDR 3,830.00M	IDR 2,495.00M		IDR 490.00M	***IDR 9,895.00M***
18	Makassar (Ⅰ)	3	8	IDR 830.00M	IDR 1,830.00M	IDR 4,830.00M	IDR 2,250.00M	IDR 245.00M	IDR 490.00M	***IDR 10,475.00M***
19	Kendari (Ⅲ)	0	0			IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 980.00M***
20	Bitung (Ⅰ)	0	0	IDR 245.00M		IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 1,225.00M***
21	Ambon (Ⅰ)	2	4	IDR 670.00M	IDR 425.00M	IDR 3,670.00M	IDR 2,825.00M	IDR 3,000.00M	IDR 490.00M	***IDR 11,080.00M***
22	Sorong (Ⅰ)	0	0	IDR 245.00M		IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 1,225.00M***
23	Jayapura (Ⅱ)	5	21	IDR 830.00M	IDR 3,330.00M	IDR 3,830.00M	IDR 3,000.00M	IDR 3,245.00M	IDR 490.00M	***IDR 14,725.00M***
24	Merauke (Ⅲ)	0	0	IDR 245.00M		IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 1,225.00M***
25	Tual (Ⅲ)	0	0			IDR 245.00M		IDR 245.00M	IDR 490.00M	***IDR 980.00M***
	Total	36	89	***IDR 11,845.00M***	***IDR 26,910.00M***	***IDR 35,160.00M***	***IDR 19,560.00M***	***IDR 15,900.00M***	***IDR 12,250.00M***	***IDR 121,625.00M***

Table 4.1.7 -22 : Total Amount for DISNAV of VTS

Table of Budget Plan for VTS

No.	DISNAV	Nominated Area	Planned VTS	Implementation Cost (VTS)						Total
				2024	2025	2026	2027	2028	Subsequent Year til 2040	
1	Sabang (Ⅱ)	1	1	IDR 670.00M	IDR 180.00M	IDR 6,000.00M	IDR 16,545.00M	IDR 710.00M	IDR 490.00M	***IDR 24,595.00M***
2	Belawan (Ⅰ)	0	0		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***
3	Sibolga (Ⅲ)	0	0		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***
4	Teluk Bayur (Ⅰ)	0	0		IDR 245.00M			IDR 245.00M	IDR 490.00M	***IDR 980.00M***
5	Tg. Pinang (Ⅰ)	13	3	IDR 915.00M	IDR 180.00M	IDR 6,000.00M	IDR 14,710.00M		IDR 490.00M	***IDR 22,295.00M***
6	Dumai (Ⅰ)	0	0		IDR 245.00M			IDR 245.00M	IDR 490.00M	***IDR 980.00M***
7	Palembang (Ⅰ)	0	0		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***
8	Pontianak (Ⅲ)	2	-----	IDR 245.00M	IDR 670.00M		IDR 245.00M		IDR 490.00M	***IDR 1,650.00M***
9	Tg. Priok (Ⅰ)	1	1	IDR 1,075.00M	IDR 8,000.00M	IDR 14,300.00M	IDR 710.00M		IDR 490.00M	***IDR 24,575.00M***
10	Cilacap (Ⅲ)	0	0		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***
11	Semarang (Ⅱ)	0	0	IDR 245.00M			IDR 245.00M		IDR 490.00M	***IDR 980.00M***
12	Surabaya (Ⅰ)	0	0	IDR 245.00M	IDR 670.00M		IDR 245.00M		IDR 490.00M	***IDR 1,650.00M***
13	Benoa (Ⅱ)	0	0					IDR 245.00M	IDR 490.00M	***IDR 735.00M***
14	Kupang (Ⅱ)	0	0	IDR 245.00M	IDR 670.00M		IDR 245.00M		IDR 490.00M	***IDR 1,650.00M***
15	Banjarmashin (Ⅱ)	0	0		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***
16	Tarakan (Ⅲ)	1	1	IDR 915.00M	IDR 180.00M	IDR 6,000.00M	IDR 16,300.00M	IDR 710.00M	IDR 490.00M	***IDR 24,595.00M***
17	Samarinda (Ⅰ)	2	3	IDR 245.00M	IDR 670.00M			IDR 245.00M	IDR 490.00M	***IDR 1,650.00M***
18	Makassar (Ⅰ)	0	0				IDR 245.00M		IDR 490.00M	***IDR 735.00M***
19	Kendari (Ⅲ)	1	1	IDR 245.00M	IDR 670.00M		IDR 245.00M		IDR 490.00M	***IDR 1,650.00M***
20	Bitung (Ⅰ)	0	0		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***
21	Ambon (Ⅰ)	1	1	IDR 245.00M	IDR 670.00M			IDR 245.00M	IDR 490.00M	***IDR 1,650.00M***
22	Sorong (Ⅰ)	0	0		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***
23	Jayapura (Ⅱ)	0	0		IDR 245.00M			IDR 245.00M	IDR 490.00M	***IDR 980.00M***
24	Merauke (Ⅲ)	0	0		IDR 245.00M		IDR 245.00M		IDR 490.00M	***IDR 980.00M***
25	Tual (Ⅲ)	3	3	IDR 490.00M	IDR 670.00M		IDR 245.00M		IDR 490.00M	***IDR 1,895.00M***
	Total	25	14	***IDR 5,780.00M***	***IDR 15,925.00M***	***IDR 32,300.00M***	***IDR 51,940.00M***	***IDR 2,890.00M***	***IDR 12,250.00M***	***IDR 121,085.00M***

Overall Budget Table

Table 4.1.7 -23 : Summary Table-1

Budget Table of Establishment Plan for AtoN/VTS (Unit : IDR M)

No.	DISNAV		Nominated Area	Planned Number	Implementation Cost						Total
					2024	2025	2026	2027	2028	Subsequent Year til	
1	Sabang (II)	AtoN	2	4	830	3,000	830	3,000	1,750	490	9,900
		VTS	1	1	670	180	6,000	16,545	710	490	24,595
		Total	----	----	1,500	3,180	6,830	19,545	2,460	980	34,495
2	Belawan (I)	AtoN	0	0	245		245		245	490	1,225
		VTS	0	0		245		245		490	980
		Total			245	245	245	245	245	980	2,205
3	Sibolga (III)	AtoN	0	0	245		245		245	490	1,225
		VTS	0	0		245		245		490	980
		Total	----	----	245	245	245	245	245	980	2,205
4	Teluk Bayur (I)	AtoN	2	3	830	1,000	1,500	245		490	4,065
		VTS	0	0		245			245	490	*980*
		Total	----	----	830	1,245	1,500	245	245	980	5,045
5	Tg. Pinang (I)	AtoN	3	----	915		245		245	490	1,895
		VTS	13	3	915	180	6,000	14,710		490	22,295
		Total	----	----	1,830	180	6,245	14,710	245	980	24,190
6	Dumai (I)	AtoN	3	7	830	1,500	1,745	1,500	1,245	490	7,310
		VTS	0	0		245			245	490	980
		Total	----	----	830	1,745	1,745	1,500	1,490	980	8,290
7	Palembang (I)	AtoN	0	0	245		245		245	490	1,225
		VTS	0	0		245		245		490	980
		Total	----	----	245	245	245	245	245	980	2,205
8	Pontianak (III)	AtoN	1	----			245		245	490	980
		VTS	2	----	245	670		245		490	1,650
		Total	----	----	245	670	245	245	245	980	2,630
9	Tg. Priok (I)	AtoN	2	7	830	3,670	2,425	1,000	245	490	8,660
		VTS	1	1	1,075	8,000	14,300	710		490	24,575
		Total	----	----	1,905	11,670	16,725	1,710	245	980	33,235
10	Cilacap (III)	AtoN	2	2	830	1,000	1,245		245	490	3,810
		VTS	0	0		245		245		490	980
		Total	----	----	830	1,245	1,245	245	245	980	4,790
11	Semarang (II)	AtoN	2	8	830	4,830	3,245		245	490	9,640
		VTS	0	0	245			245		490	980
		Total	----	----	1,075	4,830	3,245	245	245	980	10,620
12	Surabaya (I)	AtoN	1	----			245		245	490	980
		VTS	0	0	245	670		245		490	1,650
		Total	----	----	245	670	245	245	245	980	2,630
13	Benoa (II)	AtoN	6	15	830	3,830	4,580	3,245	2,250	490	15,225
		VTS	0	0					245	490	735
		Total	----	----	830	3,830	4,580	3,245	2,495	980	15,960

No.	DISNAV		Nominated Area	Planned Number	Implementation Cost						Total
					2024	2025	2026	2027	2028	Subsequent Year til	
14	Kupang (II)	AtoN	0	0	245		245		245	490	1,225
		VTS	0	0	245	670	180	6,245	16,300	1,200	24,840
		Total	----	----	490	670	425	6,245	16,545	1,690	26,065
15	Banjarmashin (II	AtoN	0	0	245		245		245	490	1,225
		VTS	0	0		245		245		490	980
		Total	----	----	245	245	245	245	245	980	2,205
16	Tarakan (III)	AtoN	0	0		245	245		245	490	1,225
		VTS	1	1	915	180	6,000	16,300	710	490	24,595
		Total	----	----	915	425	6,245	16,300	955	980	25,820
17	Samarinda (I)	AtoN	2	10	830	2,250	3,830	2,495		490	9,895
		VTS	2	3	245	670			245	490	1,650
		Total	----	----	1,075	2,920	3,830	2,495	245	980	11,545
18	Makassar (I)	AtoN	3	8	830	1,830	4,830	2,250	245	490	10,475
		VTS	0	0				245		490	735
		Total	----	----	830	1,830	4,830	2,495	245	980	11,210
19	Kendari (III)	AtoN	0	0			245		245	490	980
		VTS	1	1	245	670		245		490	1,650
		Total	----	----	245	670	245	245	245	980	2,630
20	Bitung (I)	AtoN	0	0	245		245		245	490	1,225
		VTS	0	0		245		245		490	980
		Total	----	----	245	245	245	245	245	980	2,205
21	Ambon (I)	AtoN	2	4	670	425	3,670	2,825	3,000	490	11,080
		VTS	1	1	245	670			245	490	1,650
		Total	----	----	915	1,095	3,670	2,825	3,245	980	12,730
22	Sorong (I)	AtoN	0	0	245		245		245	490	1,225
		VTS	0	0		245		245		490	980
		Total	----	----	245	245	245	245	245	980	2,205
23	Jayapura (II)	AtoN	5	21	830	3,330	3,830	3,000	3,245	490	14,725
		VTS	0	0		245			245	490	980
		Total	----	----	830	3,575	3,830	3,000	3,490	980	15,705
24	Merauke (III)	AtoN	0	0	245		245		245	490	1,225
		VTS	0	0		245		245		490	980
		Total	----	----	245	245	245	245	245	980	2,205
25	Tual (III)	AtoN	0	0			245		245	490	980
		VTS	3	3	490	670		245		490	1,895
		Total	----	----	490	670	245	245	245	980	2,875
	Total				17,625	42,835	67,640	77,500	35,090	25,210	265,900

Table 4.1.7 -24 : Summary Table-2

Budget Table of Establishment Plan for AtoN including VTS (Unit : IDR M)

No.	DISNAV	Implementaiotn Cost						Total
		2024	2025	2026	2027	2028	Subsequent Year til 2040	
1	Sabang (II)	1,500.00M	3,180.00M	6,830.00M	19,545.00M	2,460.00M	980.00M	34,495.00M
2	Belawan (I)	245.00M	245.00M	245.00M	245.00M	245.00M	980.00M	2,205.00M
3	Sibolga (III)	245.00M	245.00M	245.00M	245.00M	245.00M	980.00M	2,205.00M
4	Teluk Bayur (I)	830.00M	1,245.00M	1,500.00M	245.00M	245.00M	980.00M	5,045.00M
5	Tg. Pinang (I)	1,830.00M	180.00M	6,245.00M	14,710.00M	245.00M	980.00M	24,190.00M
6	Dumai (I)	830.00M	1,745.00M	1,745.00M	1,500.00M	1,490.00M	980.00M	8,290.00M
7	Palembang (I)	245.00M	245.00M	245.00M	245.00M	245.00M	980.00M	2,205.00M
8	Pontianak (III)	245.00M	670.00M	245.00M	245.00M	245.00M	980.00M	2,630.00M
9	Tg. Priok (I)	1,905.00M	11,670.00M	16,725.00M	1,710.00M	245.00M	980.00M	33,235.00M
10	Cilacap (III)	830.00M	1,245.00M	1,245.00M	245.00M	245.00M	980.00M	4,790.00M
11	Semarang (II)	1,075.00M	4,830.00M	3,245.00M	245.00M	245.00M	980.00M	10,620.00M
12	Surabaya (I)	245.00M	670.00M	245.00M	245.00M	245.00M	980.00M	2,630.00M
13	Benoa (II)	830.00M	3,830.00M	4,580.00M	3,245.00M	2,495.00M	980.00M	15,960.00M
14	Kupang (II)	490.00M	670.00M	425.00M	6,245.00M	16,545.00M	1,690.00M	26,065.00M
15	Banjarmashin (II)	245.00M	245.00M	245.00M	245.00M	245.00M	980.00M	2,205.00M
16	Tarakan (III)	915.00M	425.00M	6,245.00M	16,300.00M	955.00M	980.00M	25,820.00M
17	Samarinda (I)	1,075.00M	2,920.00M	3,830.00M	2,495.00M	245.00M	980.00M	11,545.00M
18	Makassar (I)	830.00M	1,830.00M	4,830.00M	2,495.00M	245.00M	980.00M	11,210.00M
19	Kendari (III)	245.00M	670.00M	245.00M	245.00M	245.00M	980.00M	2,630.00M
20	Bitung (I)	245.00M	245.00M	245.00M	245.00M	245.00M	980.00M	2,205.00M
21	Ambon (I)	915.00M	1,095.00M	3,670.00M	2,825.00M	3,245.00M	980.00M	12,730.00M
22	Sorong (I)	245.00M	245.00M	245.00M	245.00M	245.00M	980.00M	2,205.00M
23	Jayapura (II)	830.00M	3,575.00M	3,830.00M	3,000.00M	3,490.00M	980.00M	15,705.00M
24	Merauke (III)	245.00M	245.00M	245.00M	245.00M	245.00M	980.00M	2,205.00M
25	Tual (III)	490.00M	670.00M	245.00M	245.00M	245.00M	980.00M	2,875.00M
Total		17,625.00M	42,835.00M	67,640.00M	77,500.00M	35,090.00M	25,210.00M	265,900.00M

4.2 Coastal Radio Station

4.2.1 General back ground of CRS in Indonesia

Previous report "The Project for Review of the Study for Maritime Traffic Safety System Development Plan (Phase 1)" has introduced summary of "Consolidation of CRS" in Chapter 7 7.3.2. Here this report on "Phase 2" is to describe more about the purpose and necessity of Consolidation of CRS from many aspects to study and analyze including current situation of CRS operation which each DISNAV are facing currently. Through "quantitative" analysis of each situation, targeted consolidation plan will be more realized clearly.

First of all, CRS is found historically developed since more than 100 years ago in Indonesia (first station built at Sabang, but not existing and different from current Sabang CRS).

Concept of " Coastal radio" means radio station to locate in each coastal line of country to cover the maximum range under the best condition to communicate with off shore vessels via L/F or M/F initially. After the mode and the method of communication changed globally, basic concept of coastal radio station is changed in many countries to shift other mode of radio communication. However, this conventional communication way is still remaining in Indonesia until now without any review or revise of concept of basic purpose of communication but just to carry on watching/monitoring any incoming signal (distress/emergency) and/or periodical broadcasting of marine related information to any off shore vessels who may be monitoring in common channel that is the major purpose.

Majority of operation purpose in CRS in Indonesia is as following.

A. Monitoring in particular multi different frequencies channels in each band of MF/HF/VHF for incoming any emergency or distress call
B. Routing communication with any vessels who is approaching or passing near CRS mostly in VHF
C. Broadcasting every particular hour to call CQ to identify transmitting station in MF/HF/VHF to any offshore vessel who may be monitoring in common channel
D. Broadcasting any weather report periodically or traffic report randomly
E. Any other chargeable public service such as telegram transfer to third party requested from vessel in VHF (non-tax revenue service)

In general view of current global standard of coastal radio station, mainly this kind of marine traffic service has been merged with VTS already in many ASEAN countries who has only VTS to operate this purpose via VHF. However, Indonesia is still existing VTS and CRS parallelly and operated and managed individually and separately without any consolidation of joint work even though purpose of operation shall be basically similar and even though under same organization of each District office of Navigation.

Firstly, this common work in VTS and CRS shall be recommended and proposed under one umbrella operation which is the one of main objectives of this project.

Secondary, operation content and quantity (frequency of work) have to review here to conduct the solution of efficient and effective work proposal. This "Conventional operational way" of CRS operation has not been reviewed and revised in long time. This project will analyze and conduct what is the current content of operation situation referred and studied from extracted communication record (communication log book) during particular duration in particular numbers of stations to find out estimated actual work of current CRS.

Thirdly, balance between facilities (infrastructure) of radio station and human resources (HR) who is involving of CRS operation shall be analyzed and reviewed via collecting data from each station. This shall be another main objectives and tasks to review and conduct more effective, efficient and economical solution to lead out. It must be the ideal future management figure for comprehensive maritime traffic safety features in maritime radio communication part to contribute in all DISNAV covering whole nation.

4.2.2 Analysis of current CRS definition in Indonesia

Basic definition of CRS is regulated in ministry of transportation No.26 year 2011.

A coastal radio station is an on-shore maritime radio station which may monitor and response for any distress frequencies and relays ship-to-ship and ship-to-land communications. This maritime mobile service in another word, is defined in IMO radio regulation article 1.75.

Under Ministry of Decree No.30 in year 2006 in Indonesia, 222 stations has been planned to implement however currently 158 stations are under service as of Dec 2022. Out of 158 stations, 80% is equipped with GMDSS functions so far however only 7% of total station is satisfied with 24 hours operation under class 1 which rest of 93% of station is not complied with full time GMDSS requirement. 100% of stations are standalone system and none is operatable or monitorable in any other third place consolidated via any means of networking system.

Updated CRS in whole nation as of Dec 2022 is shown in Table 4.2,2 -1.

Table 4.2.2 -1 : Classification of CRS

Class		Station	Function	GMDSS	Service area	Operation hours	Portion
1		11	Maritime Mobile service including public telecom service, Fixed station	O	A1, A2, A3	24	7.0%
2		7		O	A1, A2, A3	16-24	4.4%
3	A	42		O	A1, A2	12-16	31.0%
	B	7		O	A1, A2	12-16	
4	A	65	Maritime Mobile service and/or Fixed station	Δ	A1, A2	8-12	57.6%
	B	26		X	A1		
Total		158					

Remarks; There are several numbers of CRS under class 2-4 declared 24 hours operation in their answer sheet for our questionnaire to each DISNAV which is different from original definition of CRS. This report will work out "real and actual" working situation in each CRS through analysis of provided data.

Name of DISNAV			Name of CRS		Class	Non-GMDSS
1	Sabang	Class II	1	Sabang	II	
			2	Ule lee	IIIA	
			3	Tapak Tuan	IVA	
			4	Meulaboh	IVA	
			5	Sinabang	IVA	
			6	Susoh	IVA	
			7	Sigli	IVB	O
			8	Calang	IVB	O
			9	Singkil	IVB	O
2	Belawan	Class I	10	Belawan	I	
			11	Kuala Tanjung	IIIA	
			12	Tg. Balai Asahan	IIIA	
			13	Lhosemawe	IIIA	
			14	Kuala Langsa	IVA	
			15	Sarang Elang	IVB	O
			16	Pangkalan Susu	IVA	
3	Sibolga	Class III	17	Sibolga	IIIA	
			18	Gunung Sitoli	IVA	
			19	Pulau tello	IVA	
			20	Teluk Dalam	IVA	
			21	Lahewa	IVB	
			22	Sirombu	IVB	O
			23	Sikara Kara	IVB	O
4	Dumai	Class I	24	Dumai	I	
			25	Bengkalis	IIIA	
			26	Pekan Baru	IIIA	
			27	Tembilahan	IVA	
			28	Bagan Siapi-api	IVA	
			29	Selat Panjang	IVA	
			30	Rengat	IVA	
			31	Sungai Gunting	IVA	O
5	Tg Pinang	Class I	32	Batu Ampar	IIIA	
			33	Tanjung Uban	IIIA	
			34	Sei Kolak Kijang	IIIA	
			35	Natuna	IIIA	
			36	Tarempa	IVA	
			37	Pulau Sambu	IVA	
			38	Dabo singkep	IVB	O
			39	Tg. Pinang	IVA	
			40	Tg. Balai Karimun	IVA	

6	Teluk Bayur	Class II	41	Teluk Bayur	II	
			42	Sikakap	IVA	
			43	Sipora	IVA	
			44	Air Bangis	IVA	O
7	Palembang	Class I	45	Palembang	I	
			46	Jambi	IIIA	
			47	Pangkal Balam	IIIB	
			48	Muntok	IIIA	O
			49	Muara Sabak	IIIB	O
			50	Kuala Tungkal	IVB	
			51	Tanjung Pandan	IVB	
8	Tg Priok	Class I	52	Jakarta	I	
			53	Panjang	IIIA	
			54	Cirebon	IIIA	
			55	Bengkulu	IIIA	
			56	Cigading	IIIA	
9	Semarang	Class II	57	Semarang	I	
			58	Tegal	IIIA	O
			59	Pekalongan	IIIA	O
			60	Jepara	IVB	O
			61	Juwana	IVB	O
			62	KarimunJawa	IVB	
			63	Rembang	IVB	O
10	Cilacap	Class III	64	Cilacap	II	
			65	Pacitan	IVB	O
11	Surabaya	Class I	66	Surabaya	I	
			67	Kali Anget	IIIA	
			68	B.wangi (Meneng)	IIIB	
			69	Panarukan	IVA	
			70	Gresik	IVA	
			71	Probolinggo	IVA	
			72	Bawean	IVA	
			73	Pasuruan	IVA	O
			74	Masalembo	IVA	O
			75	Branta	IVB	O
			76	Tuban	IVB	O
12	Benoa	Class II	77	Benoa	II	
			78	Lembar	IIIA	
			79	Bima	IIIA	
			80	Padang Bai	IVA	
			81	Celukan Bawang	IVA	
			82	Badas	IVA	O

			83	Gilimanuk	IVA	
			84	Labuhan Lombok	IVA	
13	Kupang	Class II	85	Kupang	II	
			86	Ende	IIIA	
			87	Maumere	IIIB	
			88	Waingapu	IVA	
			89	Kalabahi	IVA	O
			90	Larantuka	IVA	O
			91	Atapupu	IVA	
			92	Reo	IVA	
			93	Seba	IVA	
14	Pontianak	Class III	94	Pontianak	IIIA	O
			95	Ketapang	IIIA	
			96	Sintete	IVB	
15	Banjarmasin	Class II	97	Banjar Masin	II	
			98	Sampit	IIIA	
			99	Kumai	IIIB	
			100	Batulicin	IIIB	
16	Samarinda	Class I	101	Balik Papan	I	
			102	Samarinda	IIIA	
			103	Tanjung Santan	IIIA	
17	Tarakan	Class III	104	Tarakan	IIIA	O
			105	Nunukan	IVA	O
			106	Tg. Selor	IVB	
			107	Tg Redep	IVB	O
18	Makassar	Class I	108	Makassar	I	
			109	Pare-pare	IIIB	
			120	Mamuju	IVA	O
			111	Palopo	IVA	
			112	Selayar	IVB	
19	Kendari	Class III	113	Kendari	IIIA	
			114	Bau-bau	IIIA	
			115	Pomalaa	IVA	O
			116	Raha	IVA	
			117	Banabungi	IVB	O
			118	Kolaka	IVA	
20	Bitung	Class II	119	Bitung	I	
			120	Poso	IIIA	
			121	Toli-toli	IIIA	
			122	Gorontalo	IVA	
			123	Luwuk	IVA	
			124	Ulu Siau	IVA	O
			125	Manado	IVA	

			126	Tahuna	IVA	
			127	Parigi	IVA	
			128	Kolonedale	IVA	O
			129	Kuandang	IVA	
			130	Ampana	IVB	O
			131	Pantoloan	IVB	O
			132	Banggai	IVB	O
			133	Donggala	IVB	O
21	Ambon	Class I	134	Ambon	I	
			135	Ternate	IIIA	
			136	Sanana	IVA	
			137	Tobelo	IVA	
			138	Banda	IVA	
			139	Namlea	IVA	
			140	Amahai	IVA	O
22	Tual	Class III	141	Tual	IIIA	
			142	Saumlaki	IIIA	
			143	Elat	IIIA	O
			144	Dobo	IVA	
23	Sorong	Class I	145	Sorong	II	
			146	Manokwari	IIIA	
			147	Fak-fak	IIIA	
			148	Kaimana	IVA	
			149	Amamapare	IVA	O
			150	Bintuni	IVA	
24	Jayapura	Class II	151	Jayapura	I	
			152	Biak	IIIA	
			153	Serui	IVA	
			154	Sarmi	IVA	
			155	Nabire	IVA	O
25	Merauke	Class III	156	Merauke	IIIA	
			157	Agats	IIIA	
			158	Bade	IVA	O

Category of frequencies/band

MF (kHz)		490	518	2,182	2,187.5		
HF (MHz)	Various channels band	4	6	8	12	16	18
VHF (MHz)		156-174MHz band					

Coverage area definition (radius)

A1	30-40NM in VHF
A2	150-200NM in MF
A3	Over A2 area covered by HF and mobile satellite communication

MF propagation range chart in ground wave (Around Indonesian latitude) is shown in Figure 4.2.2 -1.

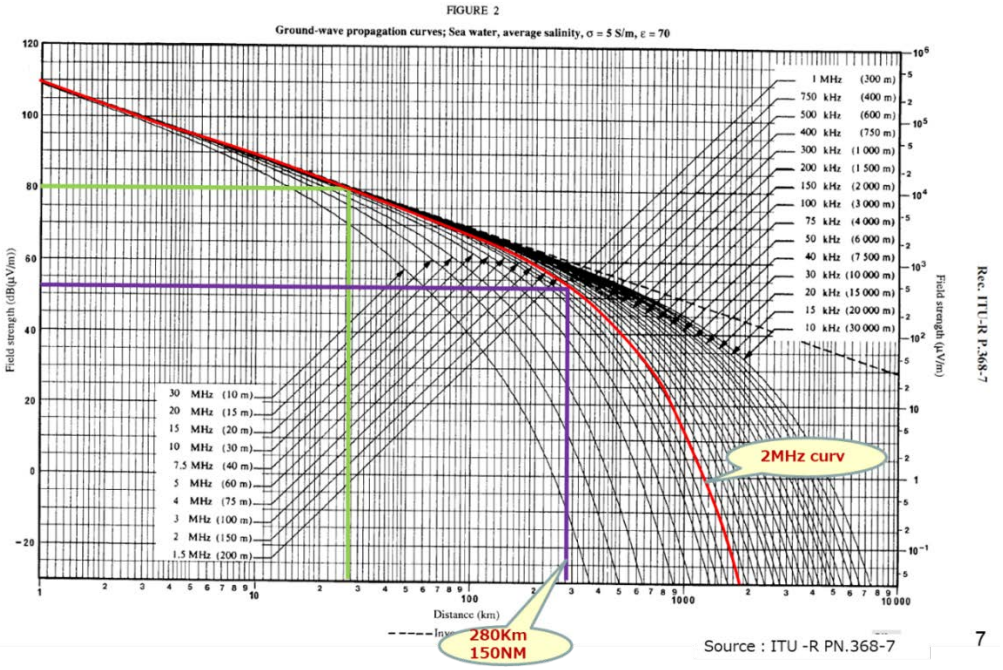


Figure 4.2.2 -1 : MF Propagation Range

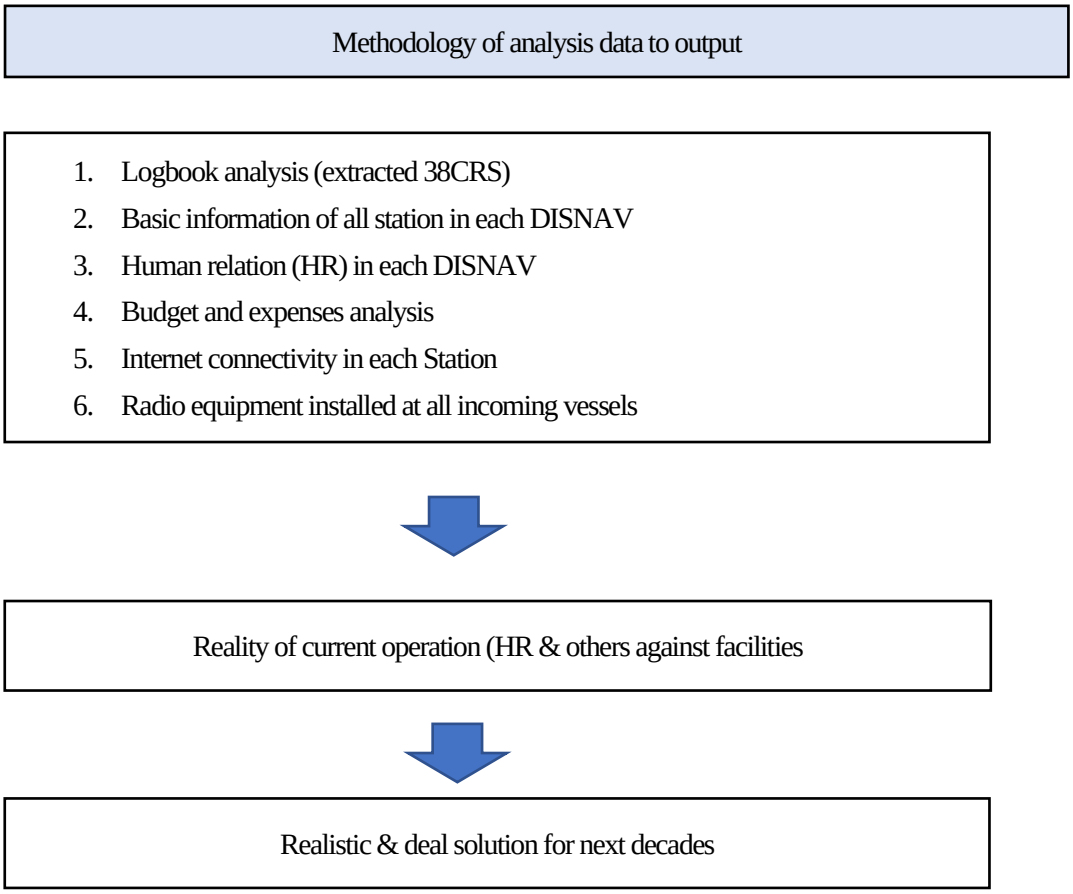
(Concerning about lightning air noise especially in tropical countries, reception signal strength is required more than 50dBμ for stable communicable condition)

- Reachable distance in NM between land station antenna height (H)m and ship antenna height (h)m is indicated in following formula.

Reachable distance (NM)=2.5x (SQRT h +SQRT H)

4.2.3 Methodology of analysis

Flow chart of analysis to output as following.



4.2.4 Analysis of usage in each frequency under CRS operation

A. Mode of frequency usage in VHF

In modernized maritime communication, A1 area between land to ship especially with incoming ship, are implemented in major communication way of VHF analogue simplex/duplex voice. Land station varies with not only CRS in Indonesia, but other stakeholder such as port operator, other authority may share same channel of maritime VHF to communicate. VHF is at higher priority than other band not only for normal routine communication but for emergency distress call between ship to land and ship to ship as well.

VHF maritime communication is at quite stable condition through whole day and whole year 24/7, and it is not easily affected or interfered by any other natural factor such as day and night propagation difference, weather condition, sunspot numbers and artificial factors such as city noises generated by mobile data, plasma TV, solar battery inverter etc. However due to direct propagation on earth surface, reachable distance range has limitation between land to ship and ship to ship.

In Indonesia CRS, 158 stations are all defined at 25NM VHF coverage from coastal line stated in radio station of IMO master plan list, however other countries may take longer reachable range to define which their maritime authority install sensor station on higher ASL such as high land to get more additional radio gain for wider range reachable as more than 50NM or sometimes up to 100NM (it is all up to ASL).

So far 158 stations in Indonesia are all manned standalone which is basically assumed to plan to locate at nearest coastal line under conventional and historical reason without gaining of merit point at higher ASL location especially for VHF at that time.

B. Mode of frequency usage in MF and HF

Due to long wave length in low frequency, station is required to own huge land to install long length of wire antenna (69m 1/2λ in 2,182kHz). This frequency range communication is nowadays recognized in conventional way between land-to-ship since the beginning of maritime communication commenced historically. Due to natural and artificial factors, recently most of off shore communication in A2 is replaced by satellite system for majority of class 1 vessel.

Currently CRS continuously provide service of MF and HF communication however majority of communication is one way transmission/broadcasting only including traffic information or weather report, or calling all ships/CQ to confirm reply (urgent) from any vessels. It is not updated way of modernized communication method however conventional SOP is still continuously carried on in all CRS.

C. Analysis communication activities

Frequency of Radio Communication extracted from the logbooks of 38CRS is shown Table 4.2.4 -1 and Table 4.2.4 -2.

Sampling of whole month of March 2022 (31 days) counting of calls

Table 4.2.4 -1 : Call to all ships (CQ) without two-way communication (QSO)

	DISNAV	CRS	CQ/To all ships							
			VHF	MF	HF	Total	VHF	MF	HF	Total
			Month total count				Daily average			
1	Ambon	Ambon	31	979	31	1,041	1.0	31.6	1.0	33.6
2	Banjarmasi	Banjarmasin	-	-	88	88	-	-	2.8	2.8
3	Banjarmasi	Kumani	-	0	12	12	-	0.0	0.4	0.4
4	Belawan	Pangkalan Susu	26	-	37	63	0.8	-	1.2	2.0
5	Belawan	Tg Balai	-	-	256	256	-	-	8.3	8.3
6	Belawan	Kuala Langsa	1	-	196	197	0.0	-	6.3	6.4
7	Benoa	Benoa		3	147	150	-	0.1	4.7	4.8
8	Bitung	Bitung	5	-	81	86	0.2	-	2.6	2.8
9	Cilacap	Cilacap	311	-	213	524	10.0	-	6.9	16.9
10	Dumai	Dumai	66	66	417	549	2.1	2.1	13.5	17.7
11	Kendari	Kendari	31	121	32	184	1.0	3.9	1.0	5.9
12	Kendari	Kolaka	86	-	106	192	2.8	-	3.4	6.2
13	Kupang	Kupang	-	-	-	-	-	-	-	-
14	Makassar	Selayar	30			30	1.0	-	-	1.0
15	Merauke	Merauke	91	186	372	649	2.9	6.0	12.0	20.9
16	Palembang	Palembang	403			403	13.0	-	-	13.0
17	Palembang	Tg Pandan	202	199		401	6.5	6.4	-	12.9
18	Palembang	Pg Balam	62	62		124	2.0	2.0	-	4.0
19	Pontianak	Pontianak	186	155	248	589	6.0	5.0	8.0	19.0
20	Sagabg	Sagabg		62	310	372	-	2.0	10.0	12.0
21	Samarinda	Balikpapan			32	32	-	-	1.0	1.0
22	Samarinda	Samarinda			115	115	-	-	3.7	3.7
23	Semarang	Jepara	85	-	171	256	2.7	-	5.5	8.3
24	Semarang	Pekalongan	34	-	341	375	1.1	-	11.0	12.1
25	Semarang	Semarang	-	-	500	500	-	-	16.1	16.1
26	Tg Pinang	Batu Ampar	-	-	-	-	-	-	-	-
27	Tg Pinang	Dabo Singkep	-	-	-	-	-	-	-	-
28	Tg Pinang	Sei Kolak Kijang	-	-	-	-	-	-	-	-
29	Tg Pinang	Tarenpa	-	-	-	-	-	-	-	-
30	Tg Pinang	Tg Pinang	-	-	-	-	-	-	-	-
31	Tg Pinang	Tg Uban	-	-	-	-	-	-	-	-
32	Tg Priok	Bengkulu	66		160	226	2.1	-	5.2	7.3
33	Tg Priok	Cirebon	44	27	328	399	1.4	0.9	10.6	12.9
34	Tarakan	Nunukan				-	-	-	-	-
35	Tarakan	Tarakan			29	29	-	-	0.9	0.9
36	Teluk Bayu	Teluk Bayur		62	186	248	-	2.0	6.0	8.0
37	Tual	Saumlaki	-	-	242	242	-	-	7.8	7.8
38	Tual	Tual	-	1	252	253	-	0.0	8.1	8.2
	Monthly average		46.32	50.62	129.00	225.93	1.49	1.63	4.16	7.29
	Daily average		1.49	1.63	4.16	7.29				

Average **daily** call count is 7.29 times (Max 33.6 times)

VHF 1.49, MF 1.63, HF 4.16 times = total 7.29 times

Table 4.2.4 -2 : Two-way communication (QSO) counted

	DISNAV	CRS	QSO					
			VHF	HF	Total	VHF	HF	Total
			Month total count			Daily average		
1	Ambon	Ambon	185	-	185	6.0	-	6.0
2	Banjarmasin	Banjarmasin	-	9	9	-	0.3	0.3
3	Banjarmasin	Kumani	19	-	19	0.6	-	0.6
4	Belawan	Pangkalan Susu	14	-	14	0.5	-	0.5
5	Belawan	Tg Balai	-	58	58	-	1.9	1.9
6	Belawan	Kuala Langsa	-	-	-	-	-	-
7	Benoa	Benoa		13	13	-	0.4	0.4
8	Bitung	Bitung	1	37	38	0.0	1.2	1.2
9	Cilacap	Cilacap	43	4	47	1.4	0.1	1.5
10	Dumai	Dumai	-	6	6	-	0.2	0.2
11	Kendari	Kendari	2	22	24	0.1	0.7	0.8
12	Kendari	Kolaka	39	115	154	1.3	3.7	5.0
13	Kupang	Kupang	136	-	136	4.4	-	4.4
14	Makassar	Selayar	26	43	69	0.8	1.4	2.2
15	Merauke	Merauke			-	-	-	-
16	Palembang	Palembang	-	-	-	-	-	-
17	Palembang	Tg Pandan	48	-	48	1.5	-	1.5
18	Palembang	Pg Balam	178	-	178	5.7	-	5.7
19	Pontianak	Pontianak			-	-	-	-
20	Sagabg	Sagabg			-	-	-	-
21	Samarinda	Balikpapan			-	-	-	-
22	Samarinda	Samarinda		3	3	-	0.1	0.1
23	Semarang	Jepara	52	17	69	1.7	0.5	2.2
24	Semarang	Pekalongan	5	-	5	0.2	-	0.2
25	Semarang	Semarang	12	2	14	0.4	0.1	0.5
26	Tg Pinang	Batu Ampar	54	-	54	1.7	-	1.7
27	Tg Pinang	Dabo Singkep	166	-	166	5.4	-	5.4
28	Tg Pinang	Sei Kolak Kijang	156	-	156	5.0	-	5.0
29	Tg Pinang	Tarenpa	74	-	74	2.4	-	2.4
30	Tg Pinang	Tg Pinang	425	-	425	13.7	-	13.7
31	Tg Pinang	Tg Uban	62	-	62	2.0	-	2.0
32	Tg Priok	Bengkulu	219		219	7.1	-	7.1
33	Tg Priok	Cirebon	247		247	8.0	-	8.0
34	Tarakan	Nunukan	41		41	1.3	-	1.3
35	Tarakan	Tarakan		1	1	-	0.0	0.0
36	Teluk Bayur	Teluk Bayur			-	-	-	-
37	Tual	Saumlaki	-	47	47	-	1.5	1.5
38	Tual	Tual	10	23	33	0.3	0.7	1.1
	Monthly average		**58.26**	**10.53**	**68.79**	**1.88**	**0.34**	**2.22**
	Daily average		**1.88**	**0.34**	**2.22**			

Average **daily** 2 ways communication (QSO) count is 2.22 times (Max 13.7 times)

VHF QSO 1.88 times, HF QSO 0.34 times, MF QSO Nil

Viewing from extracted data analysis, each CRS has daily count of activities up to 33.6 times but average 7.29 times in CQ (broadcasting), and QSO up to 13.7 times but average just only **2.22 times per day**. That may be able to estimate majority of work is monitoring any incoming call in most of day which is attended by multi numbers of operators and multi number of technicians in 158 stations to maintain. It shall be issue to discuss seriously whether efficient figure of work in each station is ongoing or not.

Less communication does not mean less maritime traffic volume around CRS location. It might be due to drastic change of mode of communication way with offshore vessel from conventional operation way on multi decades ago. Also less communication does not mean of lesser distress case happening in waterway of Indonesia. Distress call, distress signal might be easily estimated to change in another mode of radio communication such seamless satellite phone which is able to use especially in emergency case regardless under CRS coverage area or non-coverage area for international vessel. Only very seldom such emergency signal may be reached to CRS but chance might be very little.

In another way, either MF/HF/VHF GMDSS equipped vessel is basically only under SOLAS vessel more than 300GT class A which is just very small portion of total traffic numbers inside territorial water. Other than SOLAS vessel may have distress cases but emergency signal just does not reach to CRS but to any other party for requesting rescue or totally no emergency signal has transmitted out.

Advantage of carrying on MF/HF is for standby mode for any emergency situation such as natural disaster of major earth quake, volcano eruption, tsunami if existing infrastructure may be severely damaged. Those MF/HF mode enables to communicate under any kind of situation so long power supplied.

4.2.5 Analysis of Human Resources (HR or SDM in Bahasa Indonesia) in CRS

There are 2 types of HR consisting in CRS to maintain.

- Licensed radio operator
- Licensed or certified (or not certified) radio technician

A. Analysis of radio operator

In order to maintain fully standalone 158 CRS, huge numbers of HR are required in past several decades. That is a huge burden for each DISNAV to maintain not only HR management but sharing huge budgeting cost also. Previously HR issue has not been highlighted strongly which shall be subjected by the social consensus of “Availability of plenty of manpower in country”. However, especially in current modernized days, specialized skilled HR is the critical shortage in country after following growth of entire economy even though country hold total 280 million population which is ranked at No.4 in the world after China, India, USA (as of 2021). Each CRS is going to face serious situation of shortage of HR of operators and technicians. It is somehow due to retirement of aged staff at age 58, which probably 30% of operator is going to retire in next couple of years without newly assigned or recruited operator to replace.

Not sufficient and efficient technician are provided in whole part in nations as well. Issue to highlight is the senior age portion which is the critical part of CRS to maintain if current operation style to continue. It is very clear that within next few years 30% of senior staff will retire without replacement of junior staff to take over their position. Simply 30% of operation will be affected seriously.

That is no longer functioning of original purpose of CRS to monitor any emergency signals via multi channels **any time**. If operation hours getting shorter and shorter, it is no possible to carry on safe monitoring duty any more.

Simply answer is very clear that only but best solution for this situation is consolidation of operation in centralized place and minimize duty operator without any effect of quality of service. Accordingly, many portions of station especially in class 4 is managed to operate by only limited one or two operators which is unable to watch 24/7 incoming call even though they are equipped with GMDSS/DSC functions.

Indonesian new presidential policy is to limit numbers of fulltime government servant to recruit newly but is to replace by contracted efficient specialist not in life time but limited duration that is going more difficulty for CRS to maintain experienced HR to assign in every district.

Source : Pemerintah Berencana Perbanyak PPPK di Formasi ASN

Artikel ini telah tayang di Kompas.com dengan judul "Pemerintah Berencana Perbanyak PPPK di Formasi ASN", Klik untuk baca: https://nasional.kompas.com/read/2022/01/19/15132511/pemerintah-berencana-perbanyak-pppk-di-formasi-asn?page=all.

This HR issue is the major challenging part for CRS to maintain quality of public service. CRS in every DISNAV has to challenge strict, effective and immediate action to take for nearest future preparation otherwise quality of service is not committed to carry on anymore.

Analysis of human resources (HR=SDM) in each DISNAV CRS consisting of following contents.

Master HR list in 25 DISNAV covering operator and technician including full time servant and contract basis staff.

B-1. Age group analysis (stated staff only)

Study current numbers of operator/technician allocated in each DISNAV to analyze age group future transition in every 5 years from present under condition of no more newly recruiting staff. and extracting only 1-3 operator allocated in DISNAV

B-2 Analysis of allocated technician

B-3 Origin of place for extracted staff

B-4 Wages per DISNAV and age group

B-5 Summary of HR analysis

B-1) Age group analysis (reported staff only)

The results for age groups are shown in Table 4.2.5 -1.

Table 4.2.5 -1 : Age Groups

DISNAV	Age group							Gender		Total staff	Technician	Technician Operator *	Employment	
	21-25	26-30	31-35	36-40	41-45	46-50	51~	M	F	Average age		Nos	Fulltime	Honorer
Sabang	0	0	1	4	3	6	18	31	1	32	8	5	32	0
	0.0%	0.0%	2.9%	11.4%	8.6%	17.1%	51.4%			49.25	46.75		100%	0%
Belawan	0	0	2	14	6	4	9	31	4	35	4	4	35	0
	0.0%	0.0%	5.7%	40.0%	17.1%	11.4%	25.7%			43.59	44.02		100%	0%
Sibolga	0	2	0	5	0	2	10	19	0	19	1	0	17	6
	0.0%	10.5%	0.0%	26.3%	0.0%	10.5%	52.6%			46.45	54.50		74%	26%
Dumai	0	4	4	0	3	0	16	22	5	27	7	7	29	12
	0.0%	14.8%	14.8%	0.0%	11.1%	0.0%	59.3%			45.91	45.61		71%	29%
Tg Pinang	5	4	5	4	2	3	16	35	4	39	1	1	39	15
	12.8%	10.3%	12.8%	10.3%	5.1%	7.7%	41.0%			41.91	54.50		72%	28%
Teluk Bayur	0	0	3	3	12	3	16	37	0	37	7	0	37	6
	0.0%	0.0%	8.1%	8.1%	32.4%	8.1%	43.2%			46.88	50.36		86%	14%
Palenbang	0	0	2	2	1	3	5	10	3	13	1	0	13	0
	0.0%	0.0%	15.4%	15.4%	7.7%	23.1%	38.5%			45.96	54.50		100%	0%
Tg Priok	1	1	4	6	8	8	19	21	26	47	6	0	47	55
	2.1%	2.1%	8.5%	12.8%	17.0%	17.0%	40.4%			45.97	39.50		46%	54%
Semarang	5	11	6	8	6	11	12	54	5	59	6	1	36	24
	8.5%	18.6%	10.2%	13.6%	10.2%	18.6%	20.3%			39.69	47.90		60%	40%
Cilacap	2	2	0	0	6	5	9	24	0	24	4	3	19	5
	8.3%	8.3%	0.0%	0.0%	25.0%	20.8%	37.5%			45.13	48.50		79%	21%
Surabaya	2	3	4	9	2	7	10	31	6	37	3	3	29	8
	5.4%	8.1%	10.8%	24.3%	5.4%	18.9%	27.0%			42.09	50.50		78%	22%
Benoa	2	9	7	3	2	7	15	37	8	45	4	1	28	18
	4.4%	20.0%	15.6%	6.7%	4.4%	15.6%	33.3%			41.50	48.50		61%	39%
Kupang	0	1	1	0	3	4	10	18	1	19	3	1	19	0
	0.0%	5.3%	5.3%	0.0%	15.8%	21.1%	52.6%			48.55	43.17		100%	0%
Pontianak	0	3	1	2	3	5	6	17	3	20	1	0	12	8
	0.0%	15.0%	5.0%	10.0%	15.0%	25.0%	30.0%			44.10	47.50		60%	40%
Banjarmasin	0	0	5	7	2	2	9	22	3	25	3	2	25	0
	0.0%	0.0%	20.0%	28.0%	8.0%	8.0%	36.0%			43.82	50.50		100%	0%
Samarinda	0	1	1	6	2	2	11	17	6	23	2	0	36	12
	0.0%	4.3%	4.3%	26.1%	8.7%	8.7%	47.8%			46.28	46.00		75%	25%
Tarakan	0	1	0	7	3	5	2	17	1	18	3	3	18	8
	0.0%	5.6%	0.0%	38.9%	16.7%	27.8%	11.1%			42.44	45.83		69%	31%
Makassar	0	0	0	5	6	5	13	22	7	29	5	0	29	0
	0.0%	0.0%	0.0%	17.2%	20.7%	17.2%	44.8%			47.88	53.10		100%	0%
Kendari	12	11	2	3	0	10	7	37	8	45	2	2	17	29
	26.7%	24.4%	4.4%	6.7%	0.0%	22.2%	15.6%			35.70	54.50		37%	63%
Bitung	6	11	8	12	7	3	16	56	7	63	2	1	35	28
	14.0%	25.6%	18.6%	27.9%	16.3%	7.0%	37.2%			39.04	30.00		56%	44%
Ambon	0	0	2	7	7	12	6	30	4	34	5	0	36	14
	0.0%	0.0%	5.9%	20.6%	20.6%	35.3%	17.6%			44.76	45.50		72%	28%
Tual	0	0	1	5	6	0	0	12	0	12	1	0	12	0
	0.0%	0.0%	8.3%	41.7%	50.0%	0.0%	0.0%			39.58	42.50		100%	0%
Sorong	4	2	2	4	3	3	5	20	3	23	6	4	15	19
	17.4%	8.7%	8.7%	17.4%	13.0%	13.0%	21.7%			39.24	37.00		44%	56%
Jayapura	0	3	0	10	2	8	9	30	2	32	8	0	21	10
	0.0%	13.0%	0.0%	43.5%	8.7%	34.8%	39.1%			44.16	49.33		68%	32%
Merauke	0	0	2	4	3	3	5	16	1	17	4	4	17	0
	0.0%	0.0%	11.8%	23.5%	17.6%	17.6%	29.4%			44.56	37.50		100%	0%
G.total	39	69	63	130	98	121	254	666	108	774	97	42	653	277
Average	5.0%	8.9%	8.1%	16.8%	12.7%	15.6%	32.8%	86%	14%	43.22	38.92	5.4%	70%	30%

Age group reported worker only to extract answered total 761 from total 900 over staff. Contract basis worker (honorer) may be included in above so long age group reported.

Yellow highlighted is
Over 50% of 51 years above group consisting
Over 51 years old average for allocated technician
Only single technician allocated
Remarks: "Technician Operator" meaning both job scope shared by same personnel in DISNAV

Referring to this analysis, following issue is obviously shown.

High portion of senior operators/technician in age group of 51 above in many DISNAV

Average age of 25 DISNAV total is 43.21 years old and 51 years above group occupied average 32.9% of all workers. This means 1/3 of total workers occupied by 51 above who are confirmed to retire within next 5 years.

More than 50% of 51 above age group consisting in following DISNAV

a. Sabang
b. Sibolga
c. Dumai
d. Teluk Bayur
e. Kupang

HR management within next 5 years for those DISNAV shall be seriously and immediately taken to further action otherwise their operation would be seriously affected or not functionable.

Gender: Female portion is 14.8% among all which is considered still low level compared with other sector, other industries and same sector in other countries.

Concluded again highlighted issue is sudden drop of total numbers of staff especially due to natural retirement. Drop ratio between 2022 and 2027 is shown in Table 4.2.5 -2. Yellow highlighted is the over 40% drop ratio within next 5 years that is not possible to substitute even though immediate recruitment newly. It shows following DISNAV has immediate effect to take drastic action for any measure to maintain current function expected in CRS.

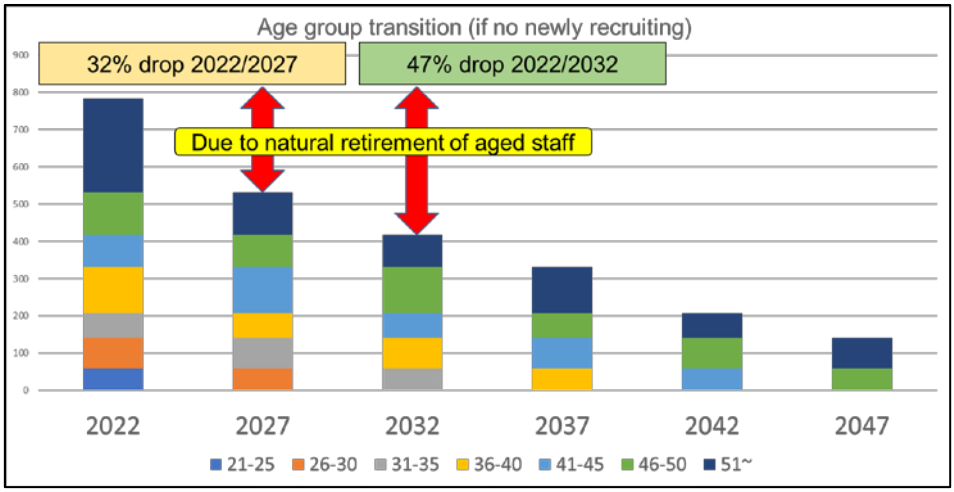
Table 4.2.5 -2 : Drop Ratio of total numbers for Workers

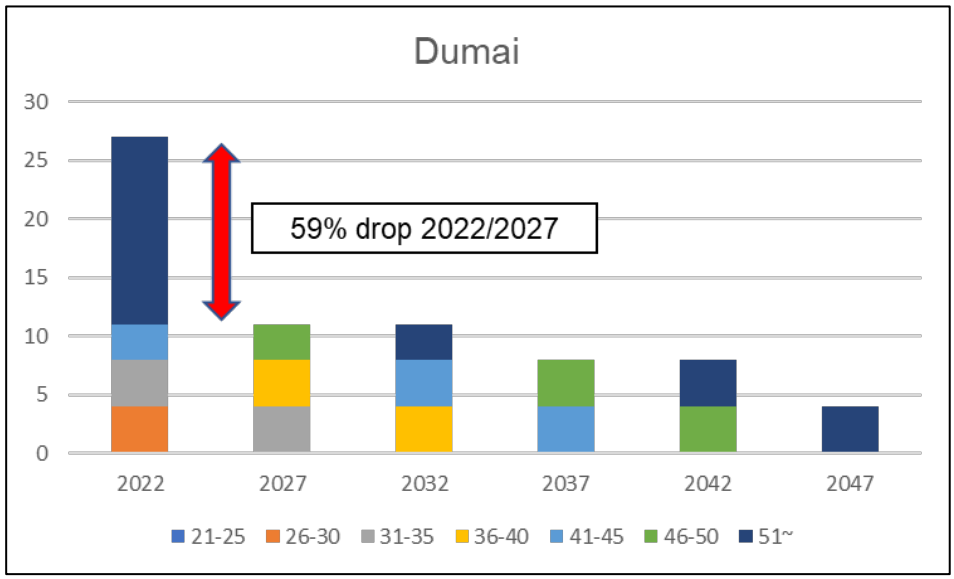
DISNAV	Drop ratio within next 5 years
Sabang	56%
Belawan	26%
Sibolga	53%
Dumai	59%
Tg Pinang	41%
Teluk Bayur	52%
Palembang	38%
Tg Priok	40%
Semarang	20%
Cilacap	38%
Surabaya	27%
Benoa	33%
Pontianak	29%
Banjarmasin	36%
Samarinda	48%
Tarakan	11%
Makassar	45%
Kendari	16%
Bitung	16%
Ambon	18%
Tual	0%
Sorong	22%
Jayapura	28%
Merauke	29%

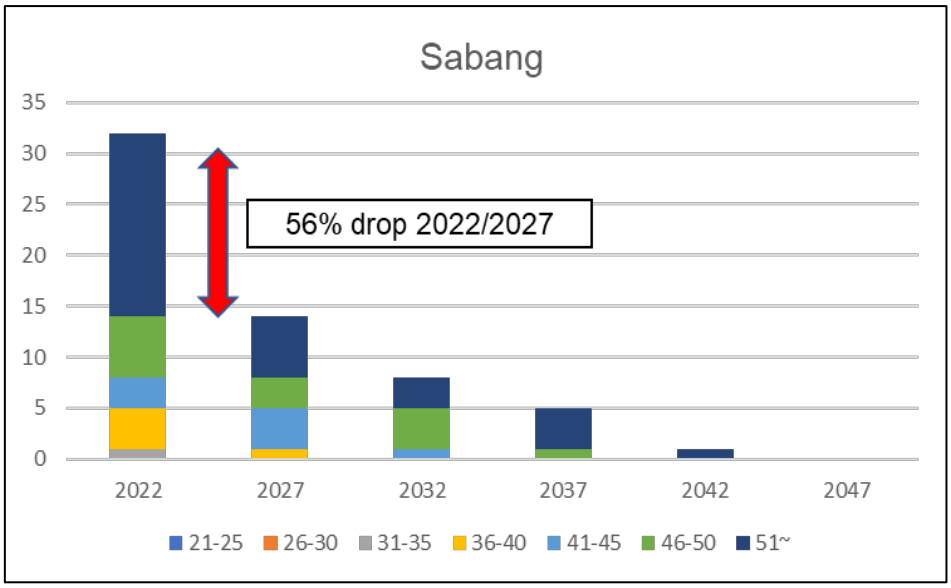
Following is drop ratio of total numbers of workers of all 25 DISNAV in next 25 years **without any newly recruitment** done. Natural drop ratio in every 5 years is around 15-20% however total numbers of workers in 25 DISNAV will be dropped 32% in next 5 years and 47% (almost half) in next 10 years due to natural aged retirement.

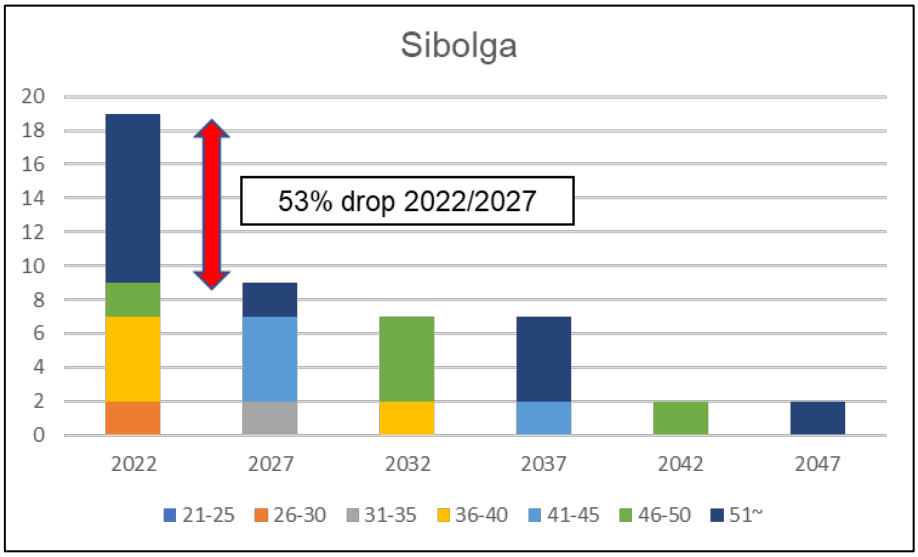
The **worst 6** DISNAVs who will lose total workers seriously in next 5 years are shown in Graph 4.2.5 -1.

Graph 4.2.5 -1 : DISNAV in serious situation








Sibolga
20
18
16
14
12
10
8
6
4
2
0
53% drop 2022/2027
2022
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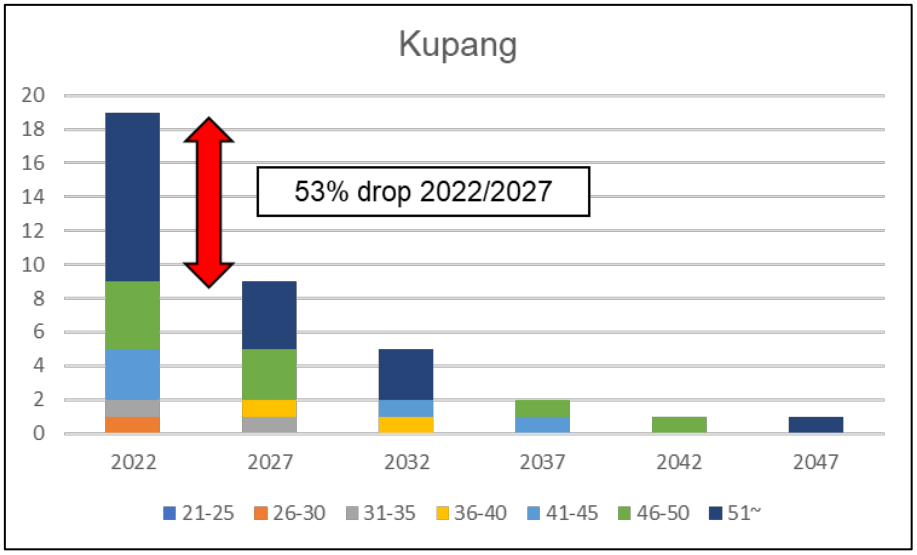
41-45
46-50
51~


Kupang
20
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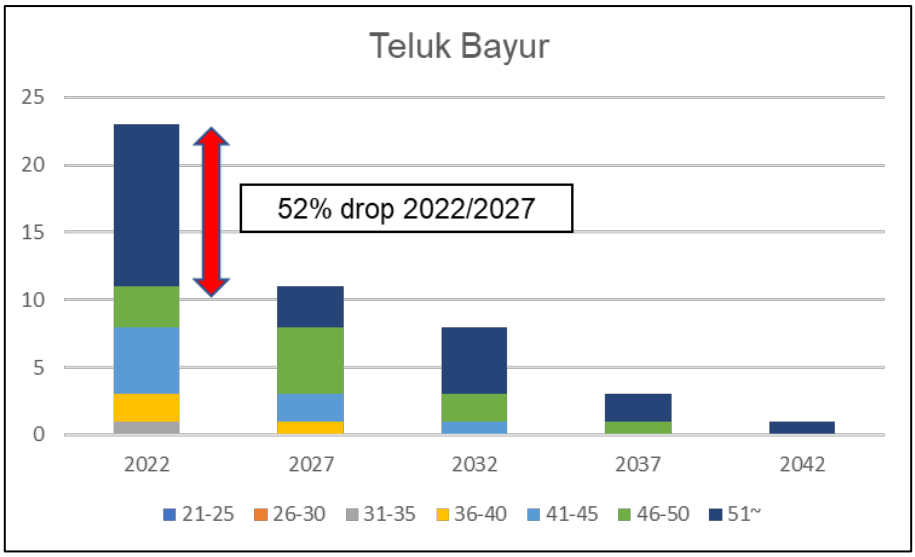
Teluk Bayur
25
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31-35
36-40
41-45
46-50
51~

CRSs which are being operated by only one, two and three person is shown in Figure 4.2.5 -1. Found total 78 station are allocated only one, two or three operators to manage. That is not possible in 24/7/365 operation to take care by fulfilled operators. Following is the stations map which rely on limited staff.

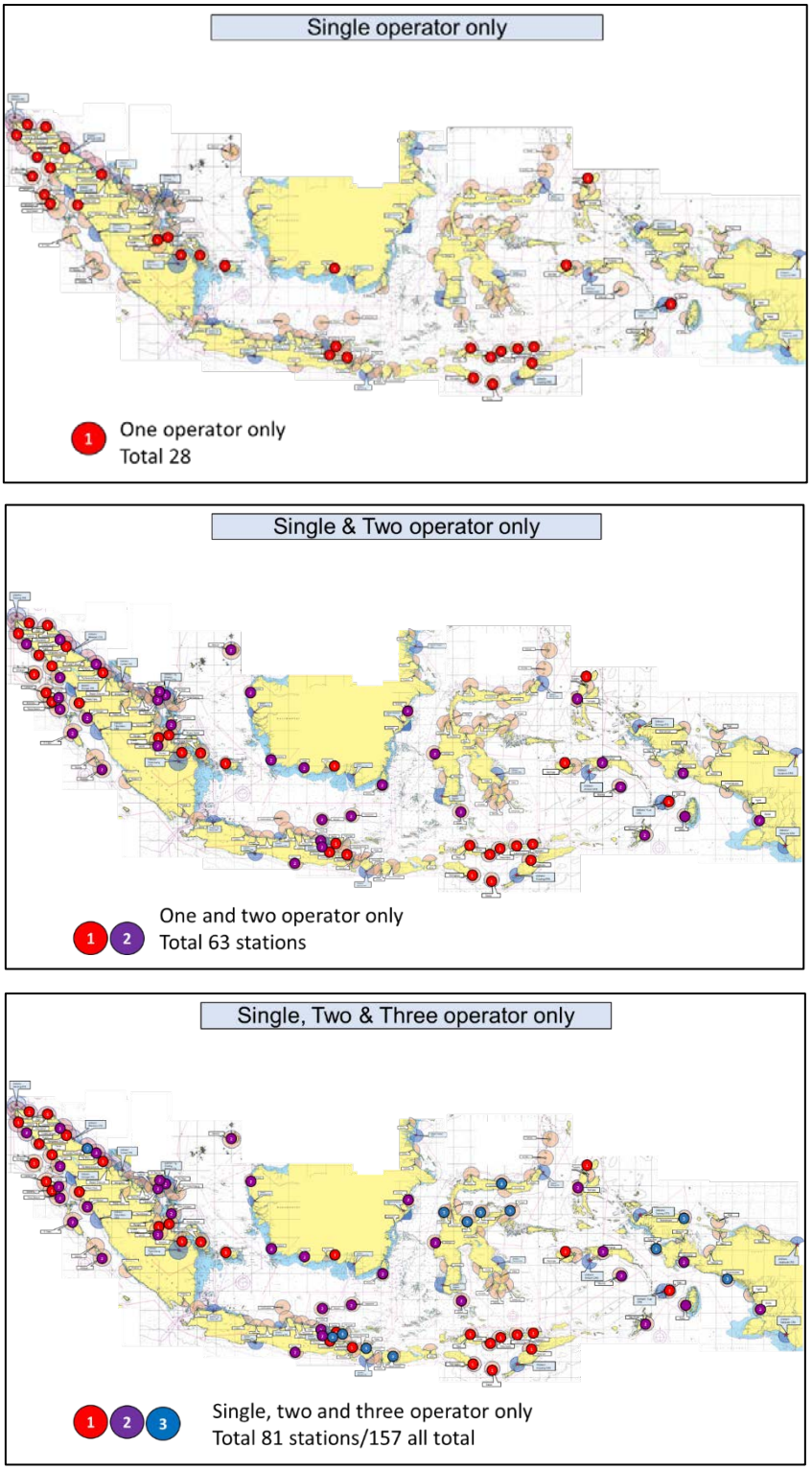


Figure 4.2.5 -1 : CRSs of the Classification by Number of Operators

As seen this allocation map, critical limited station is mostly concentrated in Sumatra, following by East Jawa, Kalimantan. “East” part looks still sufficient staff allocated compare with “West”. Additionally highlighted 24 hours operation station marked on 1,2,3 only operator station. Total 45 stations declared 24 hours operation, showing in Figure 4.2.5 -2, by very limited numbers of operator to depend. This issue has to be state remarkably.

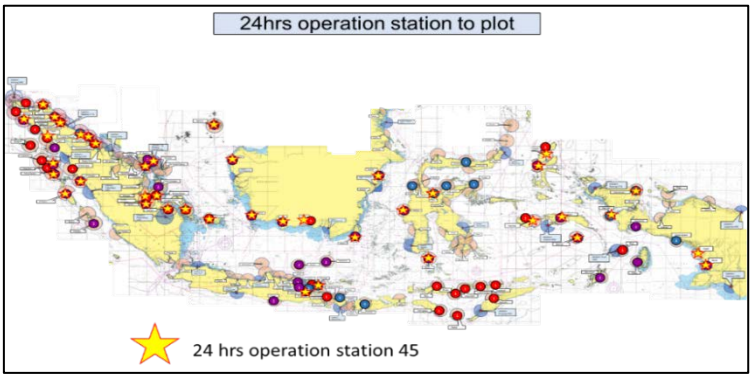


Figure 4.2.5 -2 : CRS operated for 24 hours

B-2) Analysis of allocated technician

Allocated technician numbers and their average age in each DISNAV is showing in Table 4.2.5 -3 below. Yellow highlighted is **only one** allocated and/or their average age **over 50** years old. Technician/Operator means same personnel take care of both jobs.

Table 4.2.5 -3 : Number of Technician and their average age

DISNAV	Technician	Ave age	Both Operator/Technician
Sabang	8	46.8	5
Belawan	4	44	4
Sibolga	1	55	0
Dumai	7	45.6	7
Tg Pinang	1	53	1
Teluk Bayur	7	50.4	0
Palembang	1	55	0
Tg priok	6	39.5	0
Semarang	6	47.9	1
Cilacap	4	48.5	3
Surabaya	3	50.5	3
Benoa	4	48.5	1
Kupang	3	46	2
Pontianak	1	50	0
Banjarmasin	3	51	2
Samarinda	2	46	0
Tarakan	3	45.8	3
Makassar	5	53.1	0
Kendari	2	54	2
Bitung	2	43	1
Ambon	5	45.5	0
Tual	1	43	0
Sorong	6	37	4
Jayapura	4	49.3	0
Merauke	4	37.5	4
Total	93	46	43

Many of DISNAV seems not to pay serious attention to allocate more and sufficient technician to look after their facilities. This issue is quite serious and affected earlier than shortage of operator numbers. After only one-man technician retired especially within next few years, all CRS under particular DISNAV may have no more function to sustain maintenance works. One of solution for all DISNAV is to follow operator to train technician job tother.

B-3) Origin of place for extracted staff

From extracted answered total 328 numbers of HR in 13 DISNAV, their origin of place to analyses. Table 4.2.5 -4 below shows the analyzed in each DISNAV.

Table 4.2.5 -4 : Origin of Place for Staff

DISNAV	CRS staff	Same province origin	Portion
Tg Pinang	11	6	55%
Palembang	13	11	85%
Semarang	42	41	98%
Cilacap	24	19	79%
Surabaya	20	20	100%
Pontianak	20	19	95%
Banjarmasin	25	24	96%
Tarakan	18	18	100%
Bitung	49	45	92%
Ambon	36	28	78%
Sorong	32	31	97%
Jayapura	21	14	67%
Merauke	17	17	100%
Total	328	293	89%

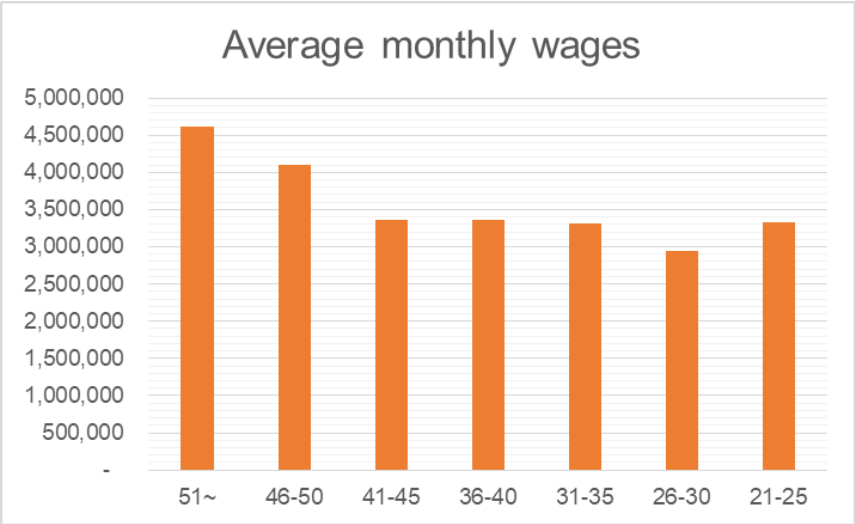
As conclusion, 89% of HR is hired and engaged employment in original place or original province. It shows there is no much flexibility for relocation and re-allocation of staff to other DISNAV. Most of HR arrangement and allocation must be settled by each DISNAV themselves and there is not much possibility to depend on other DISNAV to substitute.

B-4) Wages per DISNAV and age group

Table 4.2.5 -5 below shows the extracted answered DISNAV only to indicate average wages per age group. Total extraction number is 244 staff.

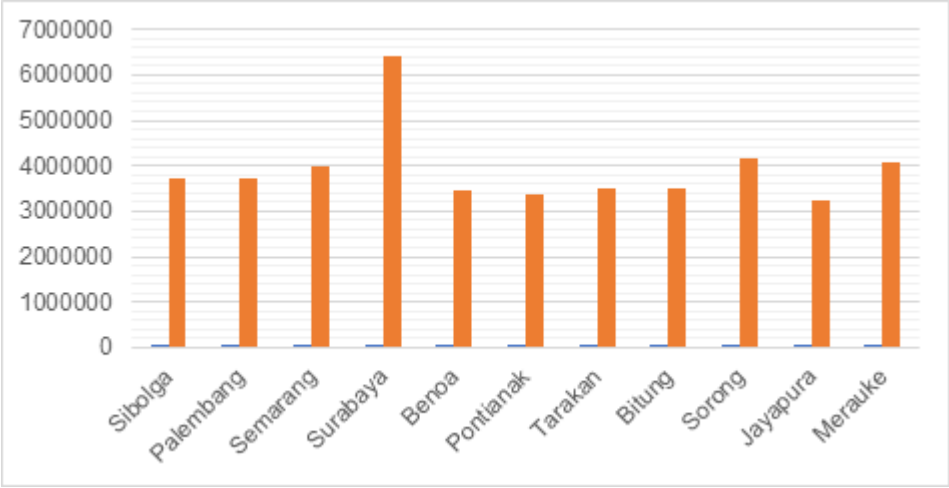
Table 4.2.5 -5 : Wages per DISNAV and Age Groups (Unit=IDR)

Age group	Average	Highest	Lowest
51~	4,610,480	9,718,100	3,450,600
46-50	4,106,626	8,396,050	2,605,800
41-45	3,355,511	4,211,800	2,600,000
36-40	3,359,745	8,000,000	2,518,200
31-35	3,320,606	8,000,000	2,610,000
26-30	2,937,085	4,006,000	2,523,600
21-25	3,323,052	3,715,245	2,774,897

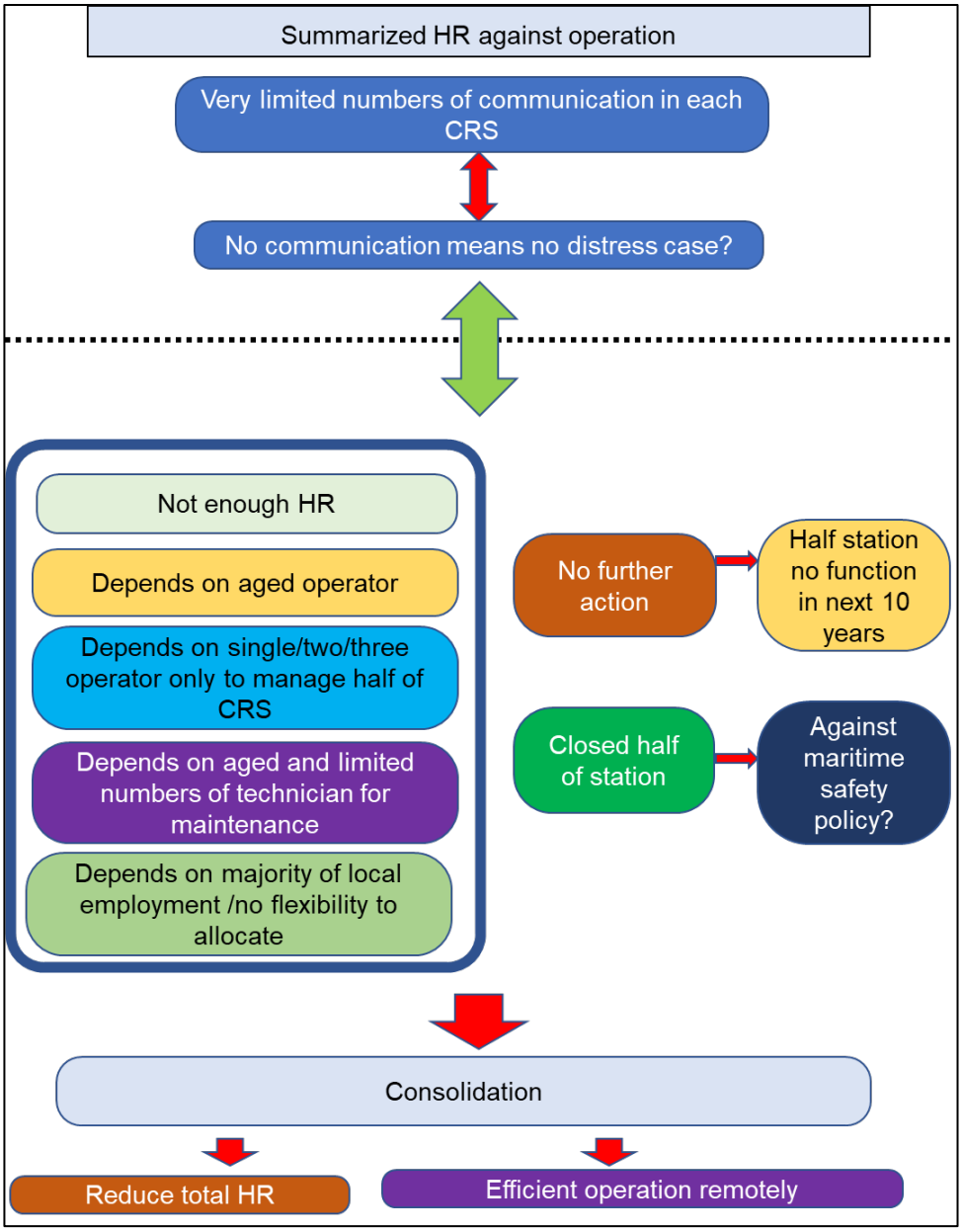


(Unit=IDR)

Disnav	Extract Nos	Average wage	Total wages
Sibolga	17	3,733,394	63,467,700
Palembang	13	3,739,723	48,616,400
Semarang	24	3,983,333	95,600,000
Surabaya	18	6,432,666	115,787,985
Benoa	46	3,466,647	159,465,746
Pontianak	20	3,350,845	67,016,900
Tarakan	18	3,497,283	62,951,088
Bitung	13	3,518,968	45,746,580
Sorong	27	4,182,007	112,914,180
Jayapura	31	3,253,442	100,856,702
Merauke	17	4,083,276	69,415,700



B-5) Summary of HR analysis



4.2.6 Budget and expenses analysis

Table 4.2.6 -1 and Table 4.2.6 -2 show the budget analysis based on extracted answered part from each DISNAV to estimate all over the total CRS portion of budget and expenses.

Budget and actual expenses replied DISNAV data to extract.

Table 4.2.6 -1 : Budget and Expenses Analysis (1/3) Report in 2021 (Unit : IDR)

DISNAV	Nos of station	2021					
		Allocated budget	Breakdown				Non-tax revenue income
		IDR	IDR				IDR
			Staff wages	Maintenance	Purchase	Running expenses	Telegram service or others
Sabang	9	200,000,000					
Belawan	7						
Sibolga	7	1,179,700,000		137,400,000	1,042,300,000		191,854,114
Dumai	7	33,091,183,000		322,352,000	32,768,831,000		2,049,710,720
Tg Pinang	9	244,100,000					2,819,664,498
Teluk Bayur	4						
Tg Priok	5						
Semarang	7	3,188,485,000	2,262,809,000	363,341,000	257,823,000	304,512,000	47,053,642
Cilacap	2	294,850,000		262,997,000		31,853,000	127,869,510
Surabaya	11			341,044,000	144,796,000	529,916,000	1,632,142,382
Benoa	8	5,070,000,000					1,721,334,705
Pontianak	3		1,242,148,800		210,386,000		84,239,910
Banjarmasin	4					200,000,000	
Samarinda	3	700,000,000	6,000,000,000	285,000,000	-	-	2,494,081,879
Tarakan	4	380,404,809	380,404,809	380,404,809	380,404,809	380,404,809	380,404,809
Makassar	5	1,303,435,000					130,412,000
Kendari	6	1,787,640,000		100,000,000	1,594,640,000	93,000,000	771,466,029
Bitung	5						255,281,192
Ambon	7	340,000,000					585,668,129
Tual	4	-		340,523,600	450,000,000	-	-
Sorong	6	8,028,368,000	1,217,427,528	-	-	-	727,240,328
Jayapura	5	283,404,000				283.404.000	
Merauke	3						2,993,440
Total IDR		55,891,569,809	11,102,790,137	2,533,062,409	36,849,180,809	1,539,685,809	14,021,417,287
Average	Per Disnav	4,299,351,524	2,220,558,027	316,632,801	5,264,168,687	219,955,116	934,761,152
Effective station Nos	131	81	23	47	45	39	89
Average per station		690,019,380	482,730,006	53,894,945	818,870,685	39,479,123	157,544,014
Estimated all total		108,253,425,095	65,892,645,813	8,215,610,659	130,492,892,674	5,868,289,686	24,130,491,548

Table 4.2.6 -1 : Budget and Expenses Analysis (2/3)

DISNAV	Nos of station	2020					
		Allocated budget	Breakdown				Non-tax revenue income
		IDR	IDR				IDR
			Staff wages	Maintenance	Purchase	Running expenses	Telegram service or others
Sabang	9	200,000,000					
Belawan	7						
Sibolga	7	1,530,629,000		127,500,000	1,403,129,000		158,259,566
Dumai	7	33,091,183,000					1,888,246,815
Tg Pinang	9	169,150,000					59,700,576
Teluk Bayur	4						
Tg Priok	5						
Semarang	7	2,881,118,000	2,252,809,000	100,000,000	287,128,000	241,181,000	10,872,197
Cilacap	2	136,997,000		106,997,000		30,000,000	107,360,818
Surabaya	11			533,124,000	173,147,000	477,732,000	1,577,867,871
Benoa	8	2,185,500,000					1,606,202,595
Pontianak	3		1,505,607,600		200,000,000		79,401,247
Banjarmasin	4					200,000,000	
Samarinda	3	1,116,000,000	6,000,000,000	200,000,000	916,000,000		2,312,509,395
Tarakan	4	380,404,809	-	-	-	-	-
Makassar	5	2,614,769,000					74,522,892
Kendari	6	1,906,152,000		200,000,000	1,479,610,000	226,542,000	527,930,918
Bitung	5	-	-	-	-	-	182,871,426
Ambon	7	400,000,000			414,739,033		
Tual	4	-	-	136,216,000	199,279,800	-	-
Sorong	6	1,947,270,000	1,125,622,128	-	-	-	-
Jayapura	5	136,800,000				131,384,185	
Merauke	3						11,766,689
Total IDR		48,495,972,809	10,884,038,728	1,403,837,000	5,073,032,833	1,306,839,185	8,597,513,005
Average	Per Disnav	4,849,597,281	2,721,009,682	200,548,143	634,129,104	217,806,531	661,347,154
Effective station Nos	131	72	19	40	48	35	76
Average per station		673,555,178	572,844,144	35,095,925	105,688,184	37,338,262	113,125,171
Estimated all total		113,830,825,066	79,267,308,368	5,279,429,861	16,275,980,339	5,672,304,367	17,203,727,946

Table 4.2.6 -1 : Budget and Expenses Analysis (3/3)

DISNAV	Nos of station	2019					
		Allocated budget	Breakdown				Non-tax revenue income
		IDR	IDR				IDR
			Staff wages	Maintenance	Purchase	Running expenses	Telegram service or others
Sabang	9	200,000,000					
Belawan	7						
Sibolga	7	1,220,000,000		234,000,000	986,000,000		105,750,232
Dumai	7	33,091,183,000					1,730,416,640
Tg Pinang	9	253,395,000					2,827,463,904
Teluk Bayur	4						
Tg Priok	5						
Semarang	7	2,881,118,000	2,252,809,000	100,000,000	287,128,000	241,181,000	10,872,197
Cilacap	2	345,617,000		315,617,000		30,000,000	79,576,347
Surabaya	11			820,870,000	142,930,000	755,039,000	1,444,987,806
Benoa	8	7,116,822,000					2,901,146,250
Pontianak	3		1,505,607,600		75,000,000		76,523,263
Banjarmasin	4					200,000,000	
Samarinda	3	285,000,000	6,000,000,000	285,000,000			1,170,923,600
Tarakan	4	380,404,809	-	-	-	-	-
Makassar	5	2,421,792,000					42.701.450
Kendari	6	200,000,000		200,000,000			427,527,382
Bitung	5	-	-	-	-	-	140,199,936
Ambon	7	400,000,000			523,238,049		
Tual	4	-	-	-	189,215,400	-	-
Sorong	6	1,947,270,000	1,217,427,528	-	-	-	960,056,544
Jayapura	5	86,830,000				86,830,000	
Merauke	3						92,311,311
Total IDR		50,629,431,809	10,975,844,128	1,955,487,000	2,203,511,449	1,313,050,000	11,967,755,412
Average	Per Disnav	4,602,675,619	2,743,961,032	325,914,500	367,251,908	262,610,000	854,839,672
Effective station Nos	131	56	19	36	39	29	82
Average per station		904,096,997	577,676,007	54,319,083	56,500,294	45,277,586	145,948,237
Estimated all total		128,957,107,968	79,935,917,432	8,365,138,833	9,054,172,044	6,859,554,310	22,215,406,605

Table 4.2.6 -2 : Summarized and averaged overall *estimation in 25 DISNAV CRS division total

Unit: Million IDR	2021	2020	2019
Answered DISNAV number	13	10	11
Allocated budget	108,253	113,831	128,957
Wages	65,893	79,267	79,936
Maintenance	8,216	5,279	8,365
Running expenses	5,868	5,672	6,860
Purchase	130,493	16,276	9,054
Sub total	102,216	7,336	24,742

Revenue	24,130	17,204	22,215
Overall	-78,086	24,540	46,958

*Above figures are estimated amount in 25 DISNAV total from limited numbers of answered DISNAV figure, may not tally with actual figures.

Unit: Million IDR

Remarks

1, Remarkable huge amount of purchase in 2021 comparing with previous fiscal year, is mostly belonging to DISNAV Dumai who invested huge amount of equipment newly during the year.

2, Revenue amount is believed not only for CRS telegram or other service, but VTS due may be included.

3, Asset deprecation cost assumed not included inside financial statement. It may be just new equipment purchased during fiscal year stated only.

4, Total amount of wages seems getting smaller due to descending of total staff numbers. It may be due to natural retirement without replacement of full time servant but substituted by “honorer”.

4.2.7 Analysis of internet connectivity

Internet connectivity data is shown in Table 4.2.7 -1, which is summarized for all CRSs of each DISNAV.

Table 4.2.7 -1 : Internet Connectivity Data

DISNAV	Total CRS	Fibber optic	ADSL	4G	LTE	N.A.	
Sabang	9	5		4			
Belawan	7	6		1			
Sibolga	7	3	1	2		1	P Tello
Dumai	8	8					
Tg Pinang	10	10					
Teluk Bayur	4	2		1		1	Sikakap
Palembang	7	6		1			
Tg Priok	5	5					
Semarang	7	6			1		
Cilacap	2	1				1	Pacitan
Surabaya	11	9	1		1		
Benoa	8	8					
Kupang	9	9					
Pontianak	3	3					
Banjarmasin	4	3				1	Kumai
Samarinda	3	3					
Tarakan	4	4					
Makassar	5	5					
Kendari	6	5		1			
Bitung	14	14					
Ambon	7	7					
Tual	4	2		2			
Sorong	6	6					
Jayapura	5	5					
Merauke	3	1			2		
Total	158	136	2	12	4	4	

Possible solution to settle this current and nearest future situation, is only one way of consolidation and integration of 158 standalone station under multi podcast network which enables unmanned station to be connected with other “Master” station remotely with transmission and reception available via IP network in fiber optic line, conventional metallic line (ADSL), LTE/4G data line or micro link. Voice data does not require high bandwidth for data transmission just 150kbps only. Standalone communication is able to networked in multi podcast system to integrate and consolidate in nationwide by possibility of latest IT technology to upgrade.

It seems majority of station being connected by fiber optical line with high bandwidth broadband available. Remaining few stations without internet connectivity for the time being, however it may be assumed connectable by 4G line at least in few years. Following is optional connectivity to prepare for all station. It is subject to confirm after feasibility detailed design covering all over 158 station condition and situation.

- Fiber optical line
- Metal (ADSL)
- 4G/LTE
- VHF to VHF repeater connection with neighboring station covered within A1 range, which is illustrated in Figure 4.2.7 -1.
- V-Sat not accepted by DGST policy due to high communication charges

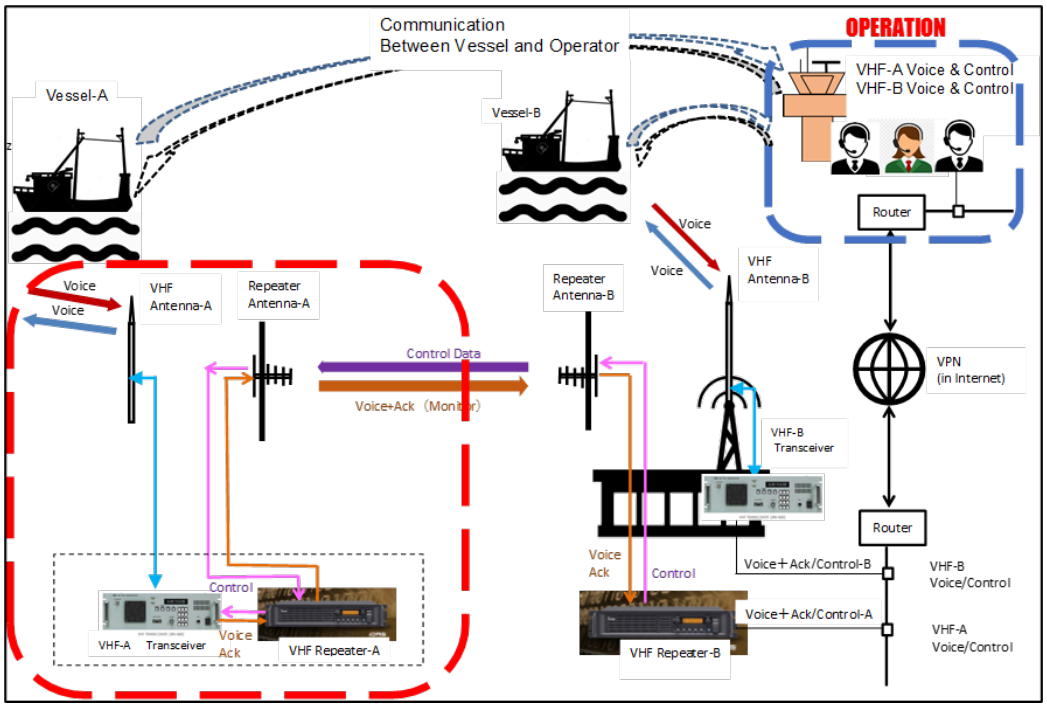


Figure 4.2.7 -1 : VHF to VHF Repeater Connection

4.2.8 Study of future maritime radio communication method (transition)

Replacement or add on new digitalized equipment in especially in VHF range such as VDES (VHF Data Exchange System) and NAVDAT with current analogue wave signal system. Digitalized equipment enables to transmit and receive more various contents such as data of AIS, visual image other than voice data. Furthermore, VDES enable satellite communication to switch automatically outside VHF unreachable range which may be able to replace current GMDSS system with seamless maritime communication available without any blind spot.

After second generation of VDES (VHF Data Exchange with Satellite) being introduced, it enables seamless communication by single device which cover full range of service in A1, A2, A3 globally. Current service of A2, A3 in MF and HF will be replaced by VDES and gradually ceased operation. It is due to stable communication availability in VHF/Satellite more than unstable condition in MF/HF affected and interfered by Ionosphere various conditions due to seasonal factor and day and night difference as well as so much city noises generated by latest electronics devices fulfilled everywhere surrounding CRS station which has not been ever existed in decade ago.

Anticipated transition plan for future maritime radio communications is shown in Figure 4.2.8 -1.

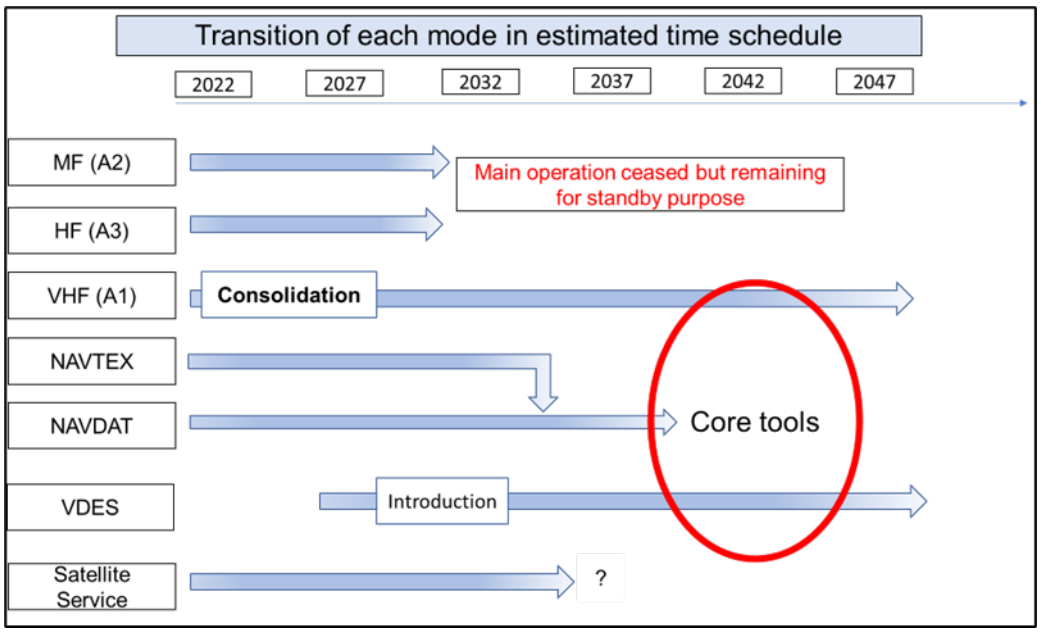
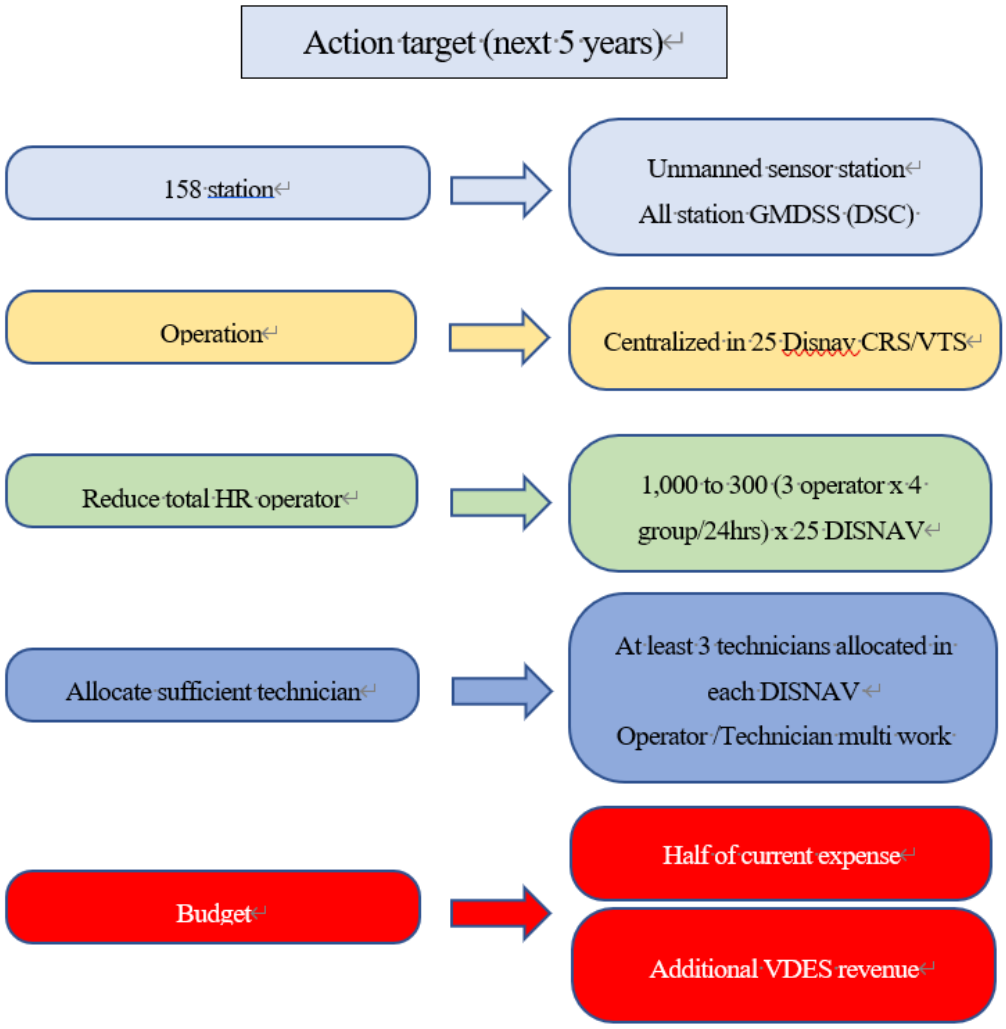


Figure 4.2.8 -1 : Transition Plan for Future Maritime Radio Communications

For preparation of any natural disaster such as earthquake, flooding, tsunami, volcano eruption or any mankind disaster, MH/HF radio communication is still advisable to remain only in key station (DISNAV) or selected station in the event of national internet network down. MH/HF is considerable just for substitute standby communication tools to support for other measures in future.

4.2.9 Main objectives of consolidation of CRS



A) This is the first and last chance to re-organize CRS drastically including actual action to merge with VTS. If not taken this opportunity, at least 30% of station would be non-functionable or non-manageable within next 5 years and 50% would be happened within next 10 years.

B) This is not due to any technical failure in radio communication equipment or not due to any other circumstances around maritime safety communication. It is mostly due to critically shortage of operators and critically shortage of allocated technicians.

C) DGST is the authorized competent agency to own coastal facilities including CRS, AtoN, VTS which are the important and necessary maritime safety infrastructures covering most of Indonesian territorial water. Only DGST is enable to be a Coastal Public Service Provider to follow any kinds of navigational safety service and information on marine environment protection to provide to any stakeholder who is the important beneficiary.

D) It is advisable to show off these existing efficient abilities to more public based on own re-organization and restructuring of itself.

E) Based on consolidation, current 158 stations (future unmanned sensor station) enable fully DSC 24/7 service available covering whole nation with only 25 centralized operation center to activate by limited numbers of operators available compared with current all standalone station requiring full time operator to allocate in every station.

F) 600,000 numbers of shipping service in whole nation (in commercial and non-commercial port ship all counts) and 200,000 in main 25 strategic port per year consisting 90% of domestic and 10% of international vessels must depend on DGST's public service by CRS, VTS, SBNP which qualities and quantities of service contents shall not be downgraded from current level so long DGST is the public service provider.

G) 60% of energy transport vessels including crude oil and petroleum products carrier in the whole world are depending on the main sea traffic lane passing through 3 major channels in Indonesia, Off Sabang, Sunda and Lombok straits. The key role and responsibility belonging to DGST is tremendously huge for the direct contribution of international sea traffic safety and security which enables to achieve the growth of socio-economics and the stability of politics in the whole world in safe, free and open navigation in Indian and Pacific Ocean to commit.

H) Main objectives to maintain and sustain CRS services extended to cover whole Indonesian territorial water, is the kind of "Insurance service" to provide safety and security of navigation to all the beneficiaries who are the sailing vessels. Regardless chargeable or not chargeable, public service provider has to take care of those beneficiaries without any break, without any blind spot, without any downgraded service to provide entire safety and security within territorial waters. Nothing of distress case happened until today does not mean nothing happened on tomorrow. This is the main objectives for navigational safety service to sustain.

I) Current equipment and operational way and method which has been stated in previous masterplan proposed in 20 years ago, shall be revised and upgraded immediately right now. Comparing to 20 years ago, social and technical background is drastically changed and in different situation.

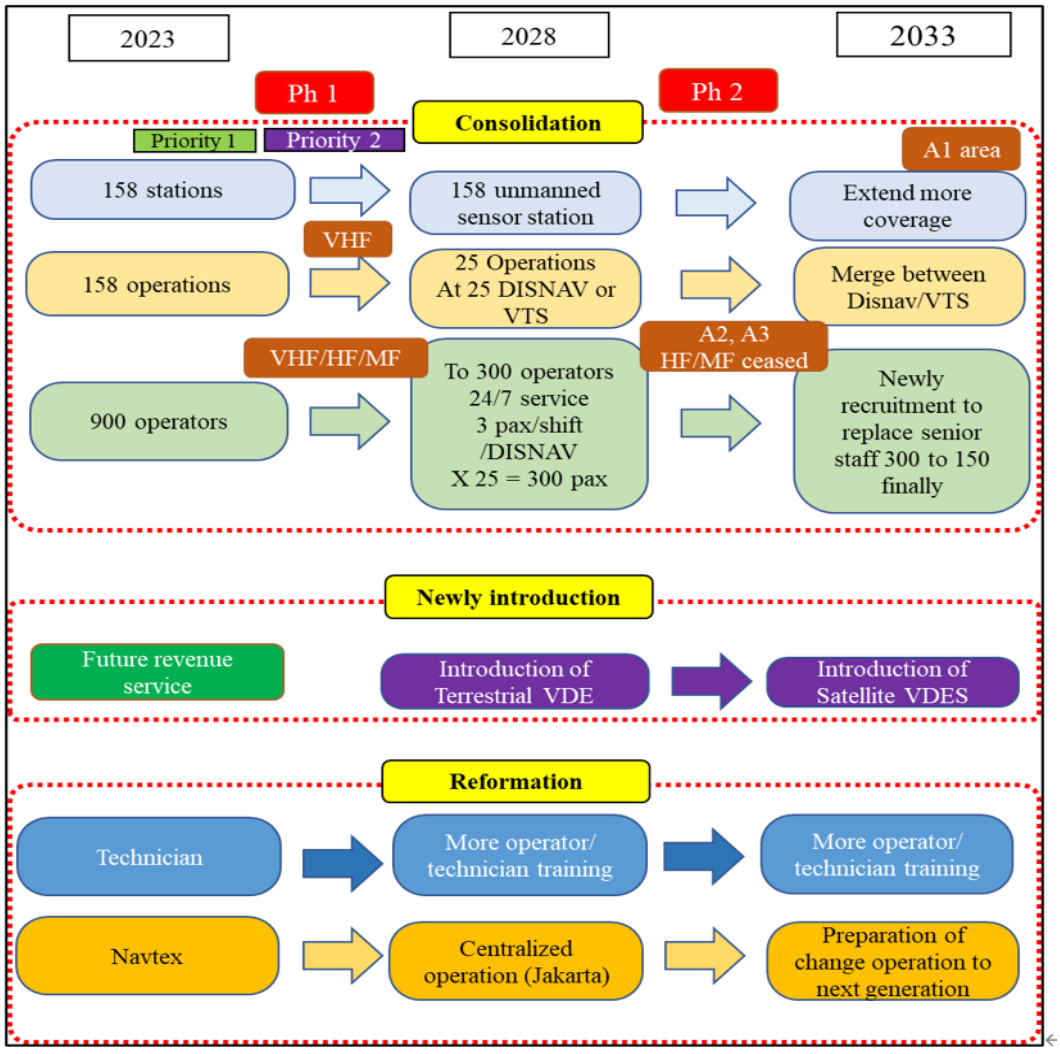
One particular example to highlight is newly appeared and popularized of IT technology development covering whole human life suddenly which has totally not existed in 20 years ago in this world. The basic recommendable content introduced in 20 years ago were totally not referred in IT related field at all and only suggestion of "Quantity" of service facilities to increase, not referred about "Quality of service" and "Quality of human resources" to take care of those facilities. After following previous masterplan, numbers (quantities) of facilities have been satisfied to complete within past 20 years however current CRS system continuously built based on 20 years ago proposed policy, are very much backdated and not flexible design at all, and remarkable issue is all standalone and not extendable designed to any other party that is the main reason created to critical shortage of manpower in every DISNAV.

J) Action is to make new SOP which might be customized in each 25 DISNAV according to their traffic monitoring and control situation. Dit-Nav must create common SOP to distribute to every DISNAV first however it might be customized by DISNAV. Mainly it will be customized based on 3 operational factors in age group, QSO, and job sharing with own located VTS.

K) Consolidation technology of each station is not totally new concept but many other countries are already taken under operation to achieve more efficiency with lower overhead cost, lower maintenance cost and smaller numbers of manpower without any downgraded service quality. This consolidation concept is finally able to achieve due to recent development of internet network technology in whole nation and whole world.

L) This is the best, efficient and only one solution for DGST to replace and upgrade from current system effective immediately to avoid any breaking service period in many of location which may be happened anytime soon from now on.

M) Estimated time schedule of work flow in next 10 years for taking action chart in each content stated as follow.



4.2.10 Suggestion of open social infrastructure of marine VHF network

It is to more public usage without any certificate or licensing, restriction required but registration and briefing required especially to small vessel operator such as small fishing boat and small passenger boat. It is already opened in United States Coast Guard (USCG) to any recreational boat without any license but providing various of service including safety traffic information, weather information as well as 24hours watching on Ch.16 for any emergency case. It is up to authority in Indonesia such as KOMINFO and DGST to work out to open this convenient infrastructure to public more with simplified registration and briefing required only. Not only mandatory of Class B AIS transponder to certain category of vessel, but marine VHF handy or compact transceiver shall be opened to them so that comprehensive safety measurement is finally available regardless for any size of vessel inside A1 service zone.

Usage in United States

CHANNEL 9: The primary calling channel. (Establish contact on this channel and move to a "working channel" as soon as possible.)

CHANNEL 16: Emergency and Distress calls only.

CHANNEL 22A*: Restricted to USCG use only. If you establish contact with the USCG on Channel 9 or 16, they may ask you to switch to Channel 22A*. You may also hear an announcement on Channel 16 to switch to Channel 22A* for important information.
(* Duplex mode communication)

CHANNEL 13: Bridge to Bridge Communications between vessels. Also used to request bridge openings. Ships less than 65ft in length maintain a listening watch on this channel in US waters. This is a good channel to listen to in periods of poor visibility so that you can communicate with ferries, freighters, and other large vessels. (You must use the low power on your radio when broadcasting on Channel 13.)

CHANNELS 68, 69, 71, 72, 78A*: "Working Channels." The only channels available to non-commercial vessels for ship-to-ship and ship-to-shore communications. (Although you may have many other channels on your radio, each of them is restricted to specific uses.)

From this point of view, VHF coverage area shall be more expanded than current 157 stations coverage by the additional sensor installation in multi points such as off shore light house, light beacon belonging to DGST or high altitudes land facility area such as TV station, Microlink station, Mobile phone land station. This is phase 2 project after consolidation in phase 1.

For general information, most of small fishing boat or passenger boat operator may use handheld GPS very commonly now which can help them easily navigate. Even though those user does not access with AIS class B, however they are still make communication via VHF and also may able to identify their own location via handheld GPS in the case of any emergency.

Handheld marine VHF available transceiver (made in China brand) are commonly supplied at very economical price from $50. They have max 5W output with external antenna connectable which can be easily spread to those who needs it. Price range is much lower than ordinary handphone in market. Issue is not the pricing but regulation of those radio equipment defined by authorities. It might be workable rather than user/operator select illegal usage of armature radio equipment to communicate among themselves but not communicable with authority of CRS in case of any emergency situation.

4.2.11 Consolidation basic design

Illustrations to be considered for the consolidation are shown from Figure 4.2.11 -1 to Figure 4.2.11 -11.

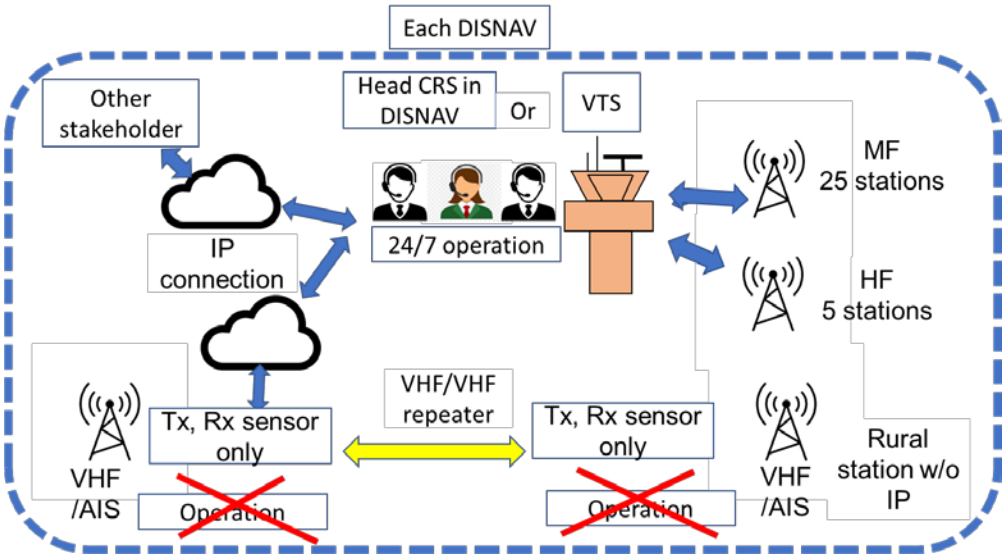


Figure 4.2.11 -1 : Master concept of integration chart

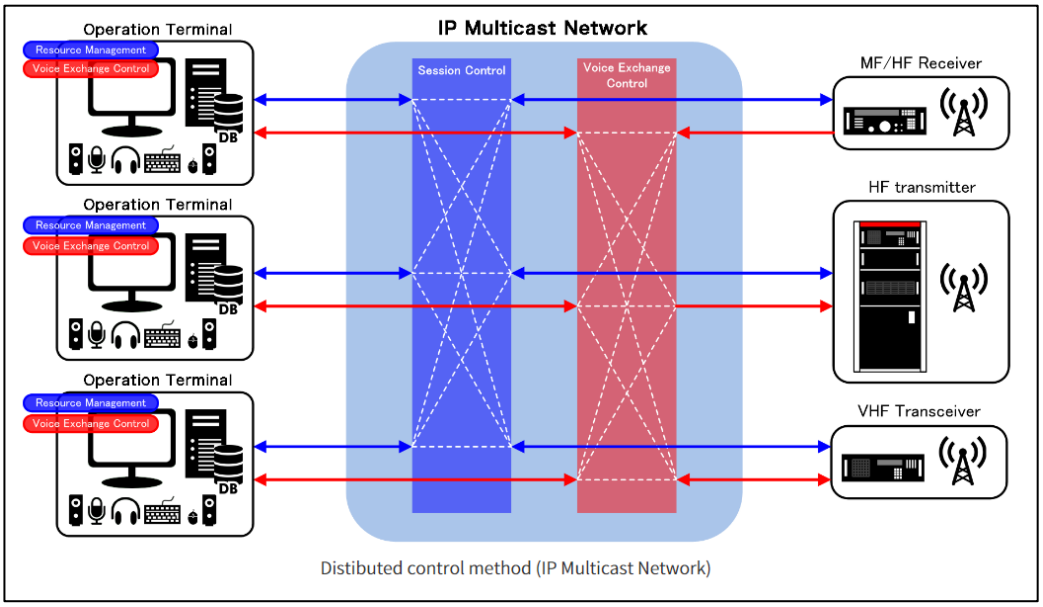


Figure 4,2,11 -2 : IP Multicast network concept

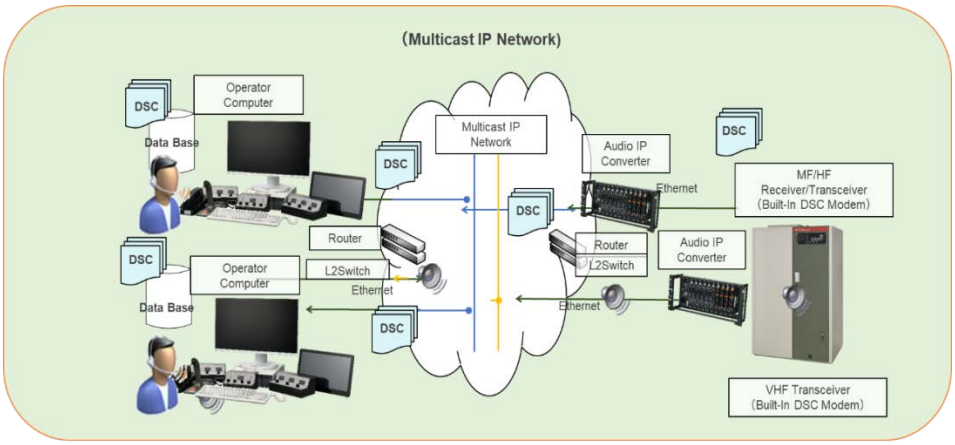


Figure 4.2.11 -3System diagram image of IP Multicast network

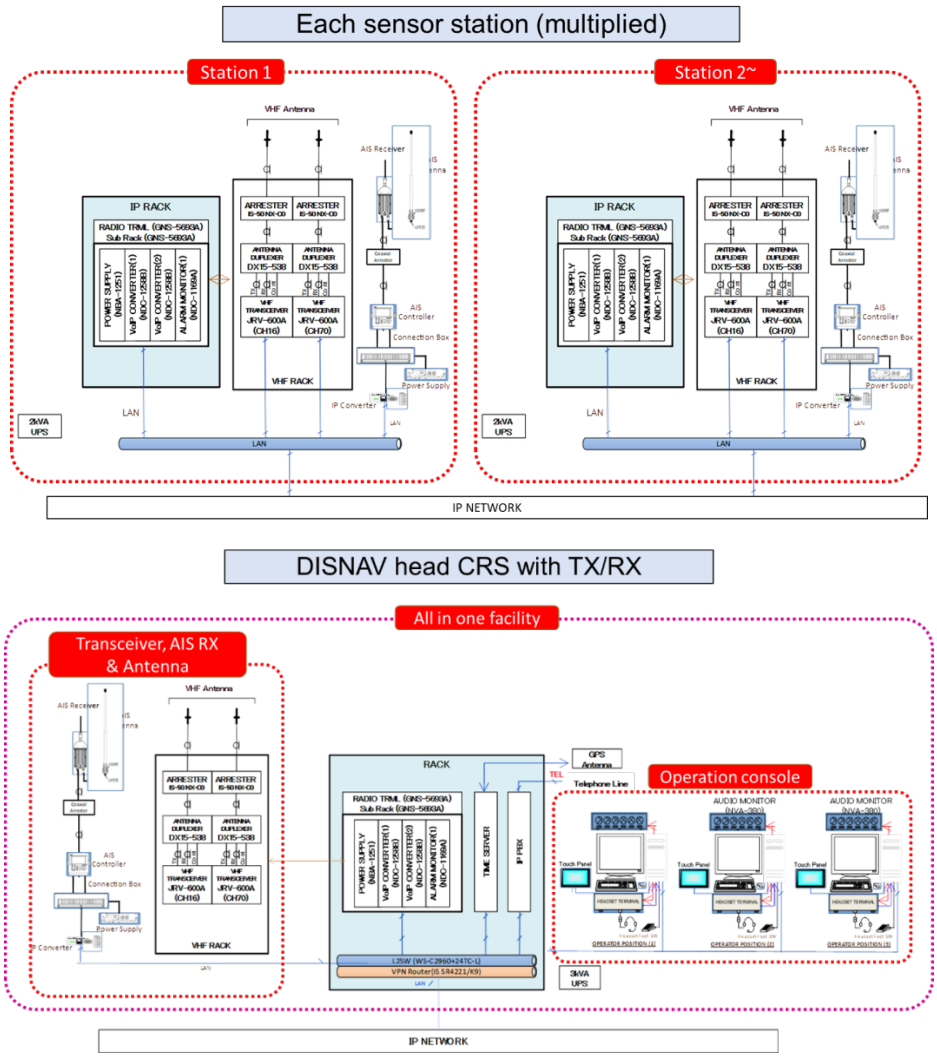
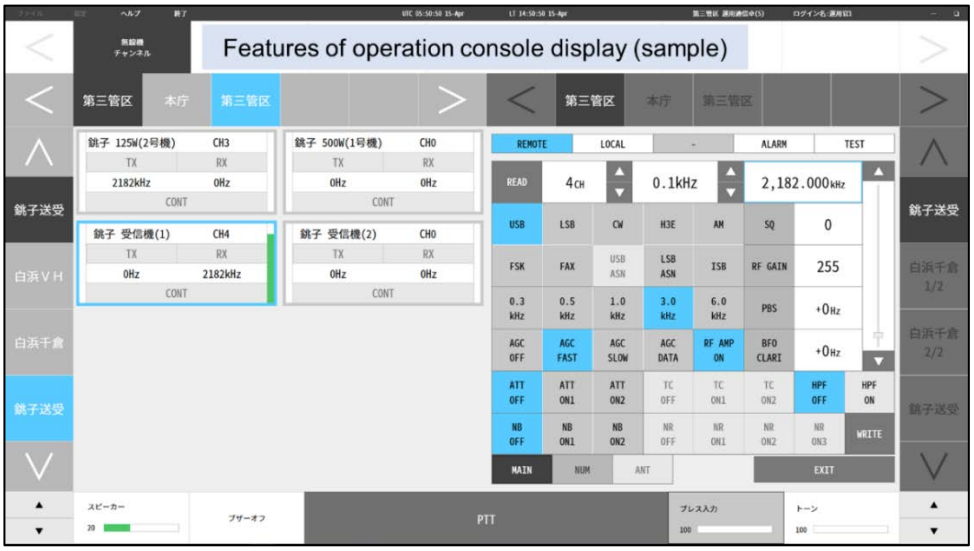
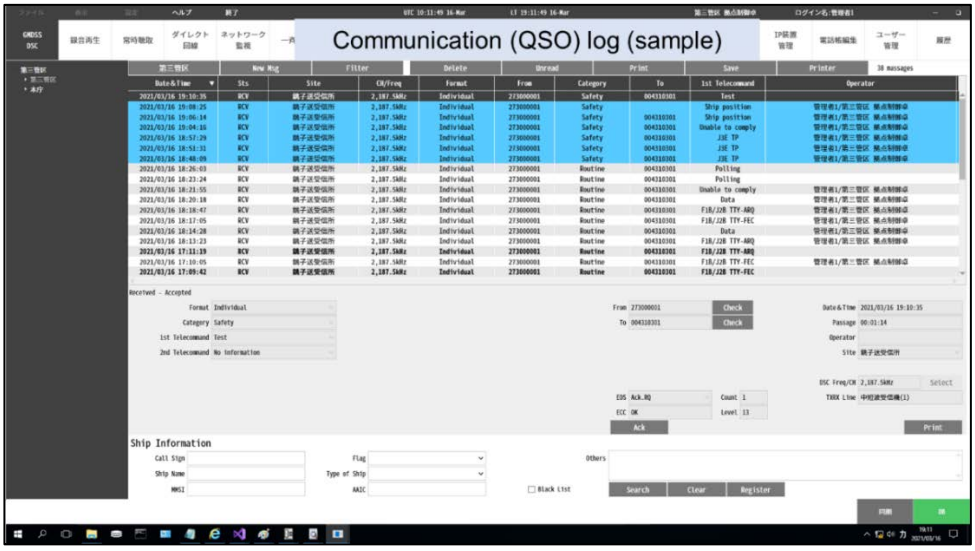


Figure 4.2.11 -4 : System diagram in sensor station, sensor/operator station, operator only station





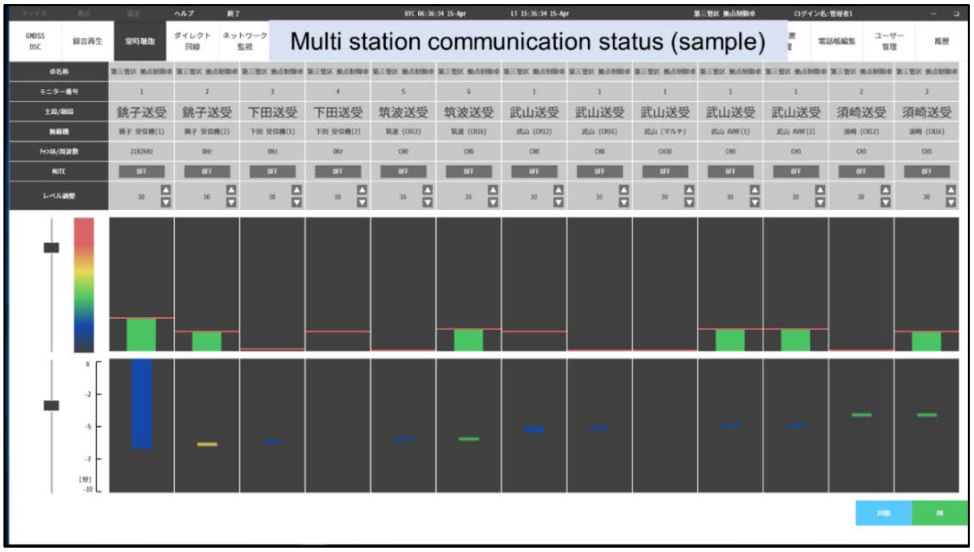
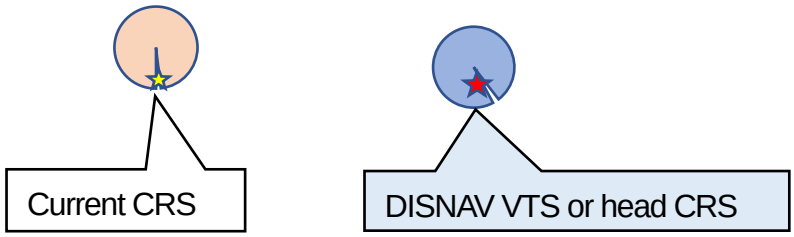


Figure 4.2.11 -5 : Sample image of control screen in operation

Definition and condition of consolidation of each DISNAV

1. Consolidation shall be prioritized to concentrate of operation at each DISNAV own VTS more than head of CRS. This is mainly due to merge operators in VTS and CRS to facilitate as much as possible.
2. Total 16 VTS are proposed to centralize and remote connection with head CRS required if 2 facilities separated and independent.
3. 9 CRS without own VTS in same DISNAV are remaining to continue operation work.
4. Due to poor internet connectivity, this consolidation plan may be changeable especially located in rural area.
5. Necessity of overwrapped multi CRS in geographically shall be reviewed.
6. Location map



Phase one in remaining operation in DISNAV head current facilities however it may be subject to cease operation in phase 2 in next 10 years approximately.

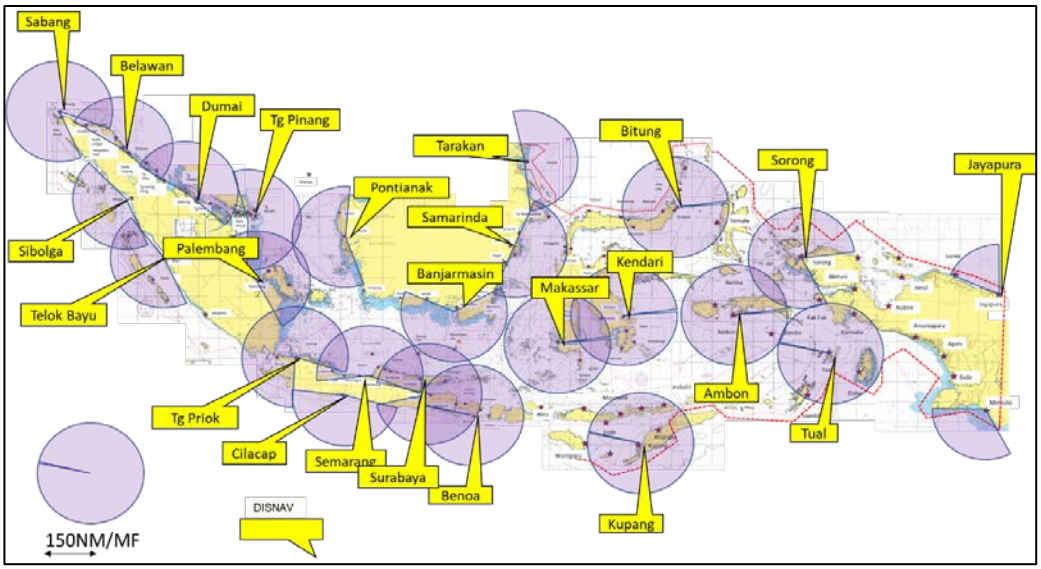


Figure 4.2.11 -6 : MF consolidated minimized operation in DISNAV head only

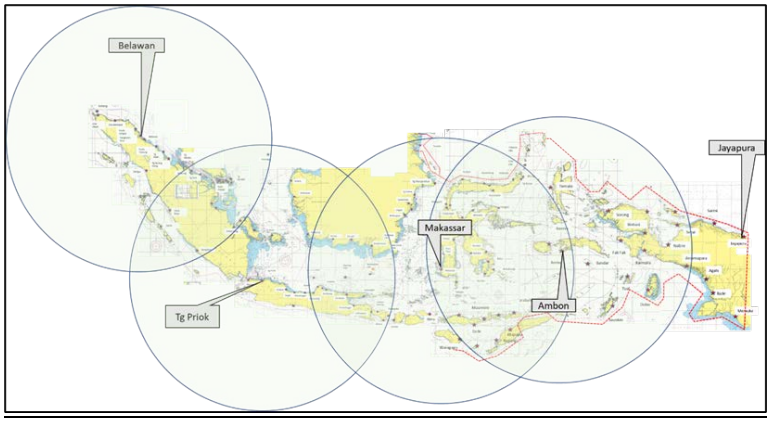


Figure 4.2.11 -7 : Re-organized to only 5 VTS/CRS (Existing HF)
(Belawan, Tg Priok, Makassar, Ambon, Jayapura)

It would be merged operation in Jakarta solely. Other 3 stations in Makassar, Ambon and Jayapura to be modified IP connectable with Jakarta facility and transmission function remaining only without operation. It may be subject to cease operation in phase 2 in next 10 years approximately.

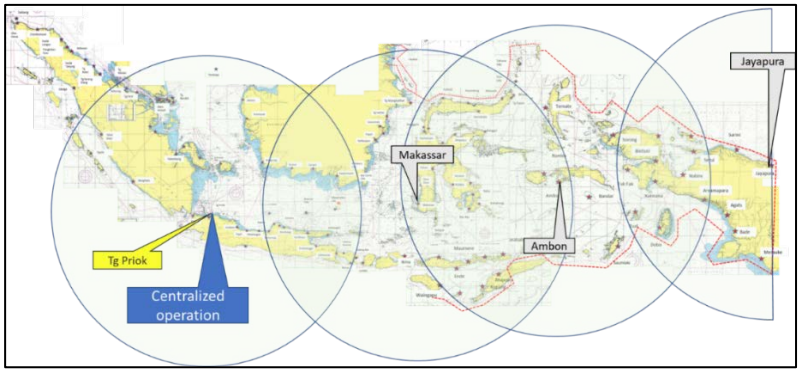


Figure 4.2.11 -8 : NAVTEX

Consolidation of 158 CRS (VHF) operated in 25 DISNAV/VTS only.
Current all station converted to fully automated sensor station only equipped with VHF voice and AIS receiver (no base station). It is subject to confirm the details of content in 158 locations after detailed design consultation (feasibility study) progressed and confirmed.

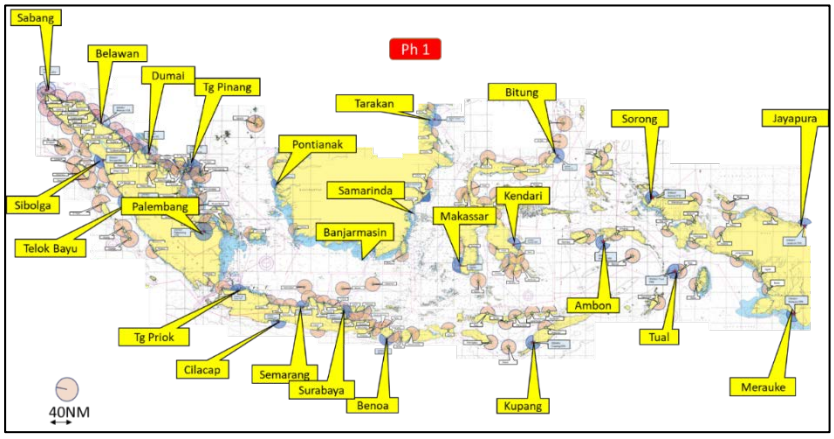


Figure 4.2.11 -9 : VHF

Optional proposal 1

Additional selected lighthouse (SBNP : marked in blue circle range center) to install VHF repeater to extend coverage * (Subject to VHF-VHF repeater availability and covering range)

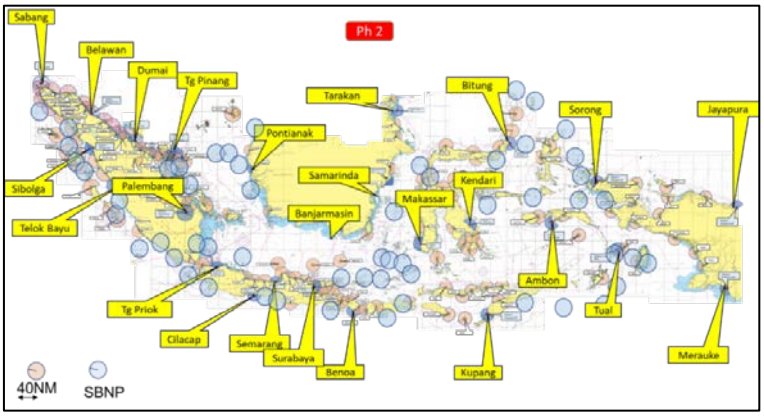


Figure 4.2.11 -10 : SNBP locations as per "Asset Mensu" of SNBP in each DISNAV

Optional Proposal 2

Additional VHF-VHF repeater installed at high altitude land (mountain).

- Reachable range = 2.5x SQRT height (land) + SQRT height (vessel)
- Land repeater station height = 1200m ASL (Above Seal Level), Vessel radio antenna 30m ASL
- Reachable distance = 100NM (existing coastal station coverable range at approx 40NM radius only)

If repeater station can be located more than 1200mASL, repeater can cover within 100NM radius (or more). There are a lot of high-altitude mountains located in nationwide especially volcano mostly. There is some active and some non-active. Here proposal is to state the possibility of installation of repeater station in somewhere half way (not mountain summit required) to install if following conditions are available.

1. Any existing manmade facility (building, house, warehouse, equipment room) to utilize preferrable. Or just container to utilize equipment room available.
2. Fully automated VHF-VHF repeater to set up
3. Fully power supplied by solar panel generator
4. Fully lightning protection system equipped to avoid any lightning strike to damage equipment
5. Fully secured location from any vandalism such as intentional damage or theft against facility
6. Easy access to facility for periodical maintenance available at least by vehicle from mountain foot
7. No newly acquisition of necessary land required unless existing property of government preferred
8. Fully unmanned security available

Advantage of this repeater facility at high altitude is able to gain huge coverage area much more than existing coastal station. Simply compared 100NM radius square against 40NM radius square =2.5 times square = 6.25 times bigger coverable range. Much less numbers of repeater enables to cover huge service area compared with current coastal station. System is fully automatically operated without any man-power required at site but power supplied by solar permanently. No internet access required which is fully standalone from existing internet by third party provider. This is just VHF-VHF repeating system to reach to nearest DISNAV station to access any incoming/outgoing signal so long power supplied.

This system is considerable parallelly to establish with new integration system in coastal station. Main purpose is especially backing up function to substitute during any emergency situation or system failure in coastal station.

The important point to maintain this system is fully depending on "Periodical maintenance work". Following is the sample image of covering range if VHF-VHF repeater to install at high altitude mountains. Listed mountains are more than 2000m ASL except "Baewan "at 600mASL only. However Baewan is strongly recommendable for this idea coverable of mid of Jawa sea where no coastal station reachable. Necessary and realistic locations are subject to decide by detailed feasibility study.

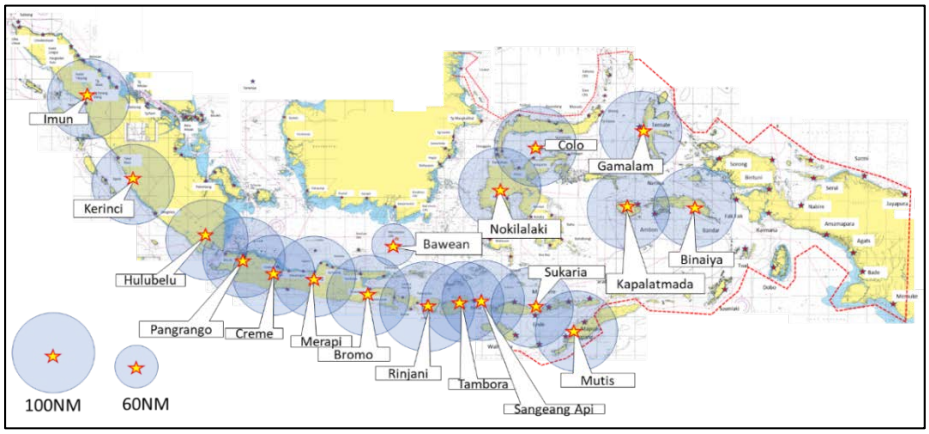


Figure 4.2.11 -11 : Ideal Layout of VHF Station from its Effective Range

Image of VHF repeater installed at mountain

4.2.12 Estimated cost evaluation of consolidation against extracted analysis data of expenses report from DISNAV

Overall estimated cost of consolidation system 158 sensors + 25 operations and its related budgetary tables are shown in below as a Table 4.2.12 -1.

Table 4.2.12 -1 : Estimated Cost for Consolidation System

(Optionally case of financing by Japanese government loan if applicable)

Unit: Million IDR	Unit cost	Qty	Total
Sensor stations	2,500	158	395,000
Operation centre	5,000	25	125,000
System maintenance 5 years			52,000
Gross total			572,000

Annual repayment for 22 years loan 1% interest (Ave)			28,000

Repayment schedule of government loan in 23 years (if available) with 1% interest (average) excluding the factor of ex-rate fluctuation matter

Year	Principal	Repayment	Balance c/f
1	572,000,000,000	28,000,000,000	544,000,000,000
2	549,440,000,000	28,000,000,000	521,440,000,000
3	526,654,400,000	28,000,000,000	498,654,400,000
4	503,640,944,000	28,000,000,000	475,640,944,000
5	480,397,353,440	28,000,000,000	452,397,353,440
6	456,921,326,974	28,000,000,000	428,921,326,974
7	433,210,540,244	28,000,000,000	405,210,540,244
8	409,262,645,647	28,000,000,000	381,262,645,647
9	385,075,272,103	28,000,000,000	357,075,272,103
10	360,646,024,824	28,000,000,000	332,646,024,824
11	335,972,485,072	28,000,000,000	307,972,485,072
12	311,052,209,923	28,000,000,000	283,052,209,923
13	285,882,732,022	28,000,000,000	257,882,732,022
14	260,461,559,342	28,000,000,000	232,461,559,342
15	234,786,174,936	28,000,000,000	206,786,174,936
16	208,854,036,685	28,000,000,000	180,854,036,685
17	182,662,577,052	28,000,000,000	154,662,577,052
18	156,209,202,823	28,000,000,000	128,209,202,823
19	129,491,294,851	28,000,000,000	101,491,294,851
20	102,506,207,799	28,000,000,000	74,506,207,799
21	75,251,269,877	28,000,000,000	47,251,269,877
22	47,723,782,576	28,000,000,000	19,723,782,576
23	19,921,020,402	19,921,020,402	0

Overall expenses in 25 DISNAV total

Unit: Million IDR	2021	2020	2019
Wages	65,893	79,267	79,936
Maintenance	8,216	5,279	8,365
Running expenses	5,868	5,672	6,860
Sub total	79,977	90,219	95,161

Estimated revenue income by VDES newly

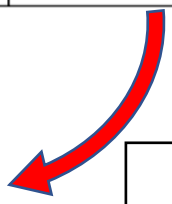
Unit: Million IDR	Current	After
Current revenue	24,130	VTS due suspect to include
Future VDES revenue (after 5 years onward)	60,000	600,000 service x IDR100,000
Expected total	84,130	

Estimated overall expenses after consolidation completed

Unit: Million IDR	Current	After	Difference
Wages	65,893	21,964	67% cut
Maintenance	8,216	2,739	67% cut
Running expenses	5,868	1,956	67% cut
Sub total	79,977	26,659	53,318

Overall balance sheet

Unit: Million IDR	Unit amount
Annual expenses	26,659
Annual repayment	28,000
Sub total	54,659



Enough to cover by cut off expense balance total

Expected revenue	84,130
Positive balance	29,472

Carry forward

To review this financial simulation, DISNAV enables to be commercialized body to independent financially after introduction of VDES to generate expected revenue. This is sustainable resources other than current VTS due. This “Commercialization” is one of future organization sustainability to study seriously after phase 2 scheme. It is all subject to development speed of VDES on board globally other than development of coastal station. Development of VDES will be introduced in later article.

4.2.13 Establishment priority following to the zoning analysis

In consideration of poli-geographical reason and traffic flow, grouping of CRS station in different zone is more effective for further operation efficiency. This is for the further efficient operational action to second step of consolidation to summarize in geographical key station minimized around only 6 covering zone.

Main objective is that there are 158 CRS's under 25 DISNAV in whole nation. It is necessary to analyze the actual demand of CRS which is able to guide from the annual statistics of the traffic volume selected in particular area. In another word there is needs of CRS function locally to provide safety information service against actual numbers of traffic flow.

Based on this concept, grouping of multi number DISNAV in same ship routing is considerable. Proposed priority areas grouped for whole country, in other words, "Zoning", are shown in Table 4.2.13 -1 and Figure 4.2.13 -1.

Table 4.2.13 -1 : Proposed Priority Zone

Zone	Area	DISNAV	
		Nos	Name
A	Sumatra- Riau	5	Sabang, Belawan, Dumai, Tg Pinang, Palembang
B	Sumatra West	2	Sibolga, Teluk Bayur
C	Jawa	4	Jakarta, Semarang, Surabaya, Cilacap
D	Kalimantan East	2	Pontianak, Banjarmasin
E	Bali-Sulawesi West	5	Benoa, Makassar, Samarinda, Tarakan, Bitung
F	Sulawesi East – East Indonesia	7	Kupang, Ambon, Tual, Kendari, Sorong, Merauke, Jayapura

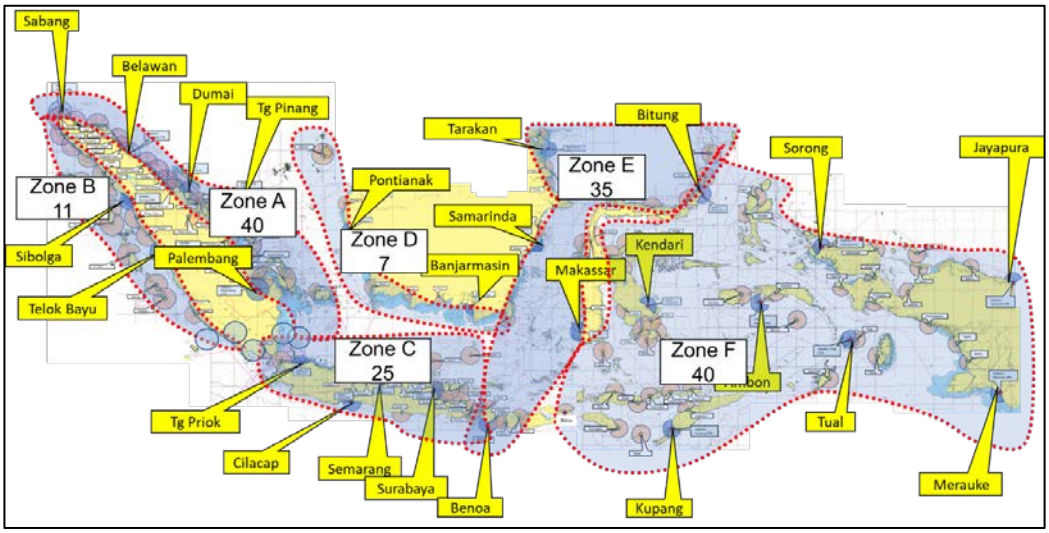


Figure 4.2.13 -1 : Image of Zoning in 6 areas (Total Nos of CRS in each DISNAV)

Summary of 6 zoning

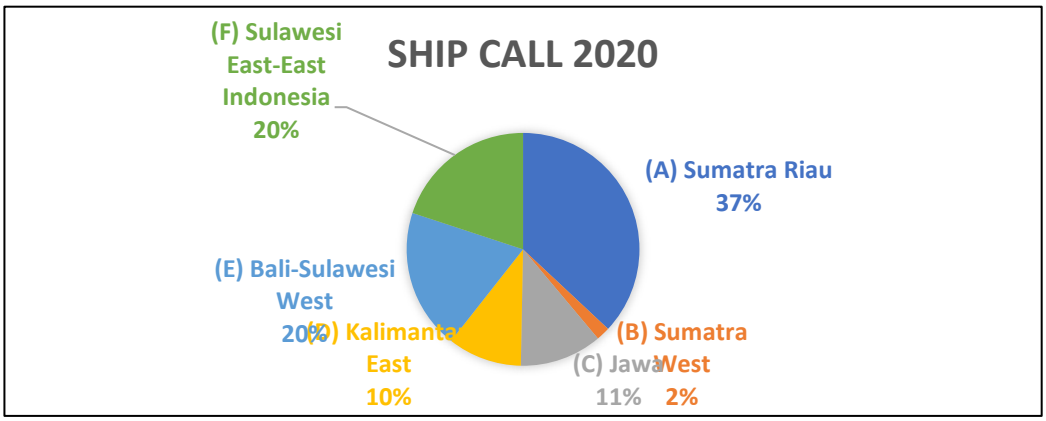
1. Zone A Sumatra North (Sabang) -Sumatra East (Belawan, Dumai, Tg Pinang, Palembang) Main shipping route for Malacca strait and ship routing to Jawa sea from Sumatra
2. Zone B Sumatra West (Sibolga, Teluk Bayur); Main route for west side facing to Indian ocean through Jawa
3. Zone C Jawa (Tg Priok, Semarang, Surabaya, Cilacap); One of most busiest routing especially for domestic traffic
4. Zone D West Kalimantan (Pointianak, Banjarmasin); Only 2 Disnav however many domestic cargo handling in this area
5. Zone E Bali (Benoa) toward north to West Sulawesi (Makassar, Bitung) and East Kalimantan (Samarinda, Tarakan); Important second sea lane in Lombok – Makassar strait up to northbound to Philippines border
6. Zone F Sulawesi East and whole East part of Indonesia (Kendari, Kupang, Ambon, Tual, Merauke, Jayapura, Sorong); Portion of traffic is lesser than other part of country

Based on this 6 grouping, the summary of statistics in 2020 extracted from Statistic Department (Badan Pusat Indonesia) for total 496 commercial and non-commercial port data is shown in Table 4.2.13 -2 and Graph 4.2.13 -1. This figure might be able to show the most of tendency of national marine traffic flow which is quite useful for the establishment plan in prioritized time schedule.

Table 4.2.13 -2 : Ship calls (Domestics and International together)

Zone	Area	2020 statistics total	
		Numbers	Portion
A	Sumatra- Riau	237,023	37.00%
B	Sumatra West	12,247	1.90%
C	Jawa	73,226	11.40%
D	Kalimantan East	66,088	10.30%
E	Bali-Sulawesi West	124,651	19.40%
F	Sulawesi East - East Indonesia	127,852	19.90%
G. total		641,087	100.00%

Remarks: Extra ordinary numbers shown in Zone A consisting in huge numbers of traffic especially in Riau (Batam, Tg Pinang) mostly for Singapore-Batam ferry service (daily more than 100 times x multi ports)

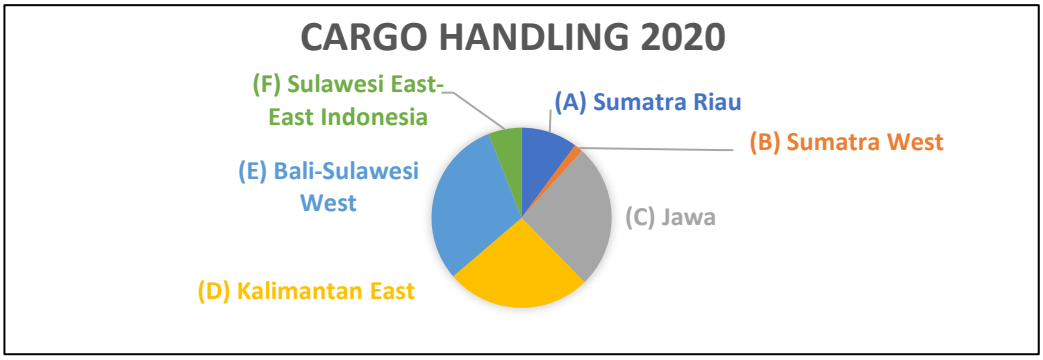


Graph 4.2.13 -1 : Ship calls (Domestics and International together)

Analysis of ship call numbers only is not enough to capture whole marine traffic flow in nation. Especially particular port like Batam, Tg Pinang have huge numbers of ferry serve between Singapore which is not accurate to indicate the tendency. For more realistic and actual situation to handle, total cargo handling volume by GT in each port, which is shown in Table 4.2.13 -3 and Graph 4.2.13 -2, could be advisable. Even though less traffic but more volume of cargo vessels in/out port needs to pay attention necessity of more frequent service of navigational function to provide.

Table 4.2.13 -3 : Total cargo handling (Loading + unloading for domestic and international cargo)

Zone	Area	2020 statistics total	
		Numbers	Portion
A	Sumatra East - Riau	112,832,487	10.10%
B	Sumatra West	17,545,568	1.60%
C	Jawa (all)	289,414,778	26.00%
D	Kalimantan West	290,259,910	26.10%
E	Bali-Sulawesi East, Kalimantan East	337,546,963	30.30%
F	Sulawesi East – Rest of East Indonesia	66,535,233	6.00%
G.total		1,114,134,939	100.00%



Graph 4.2.13 23 : Total cargo handling

Through the ship call and cargo handling, our report would like to propose priority of CRS consolidation establishment plan in Priority 1 and 2, which is shown in Table 4.2.13 -4, Figure 4.2.13 -2, Figure 4.2.13 -3, Table 4.2.13 -5 and Figure 4.2.13 -4. That is mainly due to smooth transition of operation to new scheme of consolidation, and also loose the burden of limited capacity of manufacturing especially due to recent critical shortage of semiconductor supply in worldwide triggered by Covid 19 pandemic.

Priority 1

Zone A (Sabang – Belawan – Dumai – Tg Piang – Palembang)

As stated previously this is the one of most important main sea lane not only for nation but internationally or worldly without any description to state here. Already multi numbers of VTS has been established and functioned for daily VTS service however CRS function is still one of key role for entire safety for this route.

Zone C (Tg Priok – Semarang – Surabaya and Cilacap)

This is the main corridor of national commercial hub route through whole Jawa island generating more than half of national Gross Domestic Product (GDP). Many portions of industries are still concentrated in Jawa island which maritime traffic safety is very much needed to protect and support national economy directly or indirectly as well as covering of Jawa sea traffic route and Sunda strait traffic safety controlled under DISNAV Tg Priok.

Zone E (Benoa – Makassar – Samarinda – Bintung)

This sea lane has main bi-pass function of detour of Malacca strait in any objection occurred for smooth traffic. Due to deep and wide strait between Bali and Lombok, this route has tremendous opportunity of future alternative sea lane to be functioned between Indian and Pacific oceans to connect “Sea Bridge” to take over partially for current Malacca strait function. Under such circumstances, establishment of maritime safety measure in CRS has still quite important portion to contribute world economy and politics other than “current” measurement against Malacca strait.

All the areas have important factors and aspects to prioritize establishment plan of consolidation of CRS at priority. Establishment action shall be planned and implemented spontaneously in those 3 zones.

Priority 2

Zone B (Sibolga – Teluk Bayur)

Comparing with other zones this zone seems not busy area for maritime traffic, however establishment plan work shall be still executed.

Zone D (Pontianak – Banjarmasin)

This area is analysed to find quite big portion of cargo handling especially in Banjarmain and Batulincin. This is estimated large volumes of natural mining handling and loaded in this area. However total numbers of traffic flow through ship call does not show big portion. For safety measurement, this area has priority after action of Priority 1 area first.

Zone F (Kendari, Ambon, Kupang, Sorong, Tual, Merauke, Jayapura)

This area shows less traffic numbers and less handling cargo volume per located each port comparing with other part of country. Besides covering water area are quite huge under each DISNAV. Consolidation of CRS shall be established however it will be after Priority 1 because urgent necessity of demand per each CRS station is lesser than other Priority 1 area.

Table 4.2.13 -4 : Consolidation Plan

Zone	Area	DISNAV		Target CRS
		Nos	Name	Consolidated
Priority 1				
A	Sumatra East - Riau	5	Sabang, Belawan, Dumai, Tg Pinang, Palembang	40
C	Jawa (all)	4	Jakarta, Semarang, Surabaya, Cilacap	25
E	Bali- Sulawesi West, Kalimantan East	5	Benoa, Makassar, Samarinda, Tarakan, Bitung	35
S. total		14		100
Priority 2				
B	Sumatra West	2	Sibolga, Teluk Bayur	11
D	Kalimantan East	2	Pontianak, Banjarmasin	7
F	Sulawesi East – Rest of East Indonesia	7	Kupang, Ambon, Tual, Kendari, Sorong, Merauke, Jayapura	40
S. total		11		58
G. total		25		158

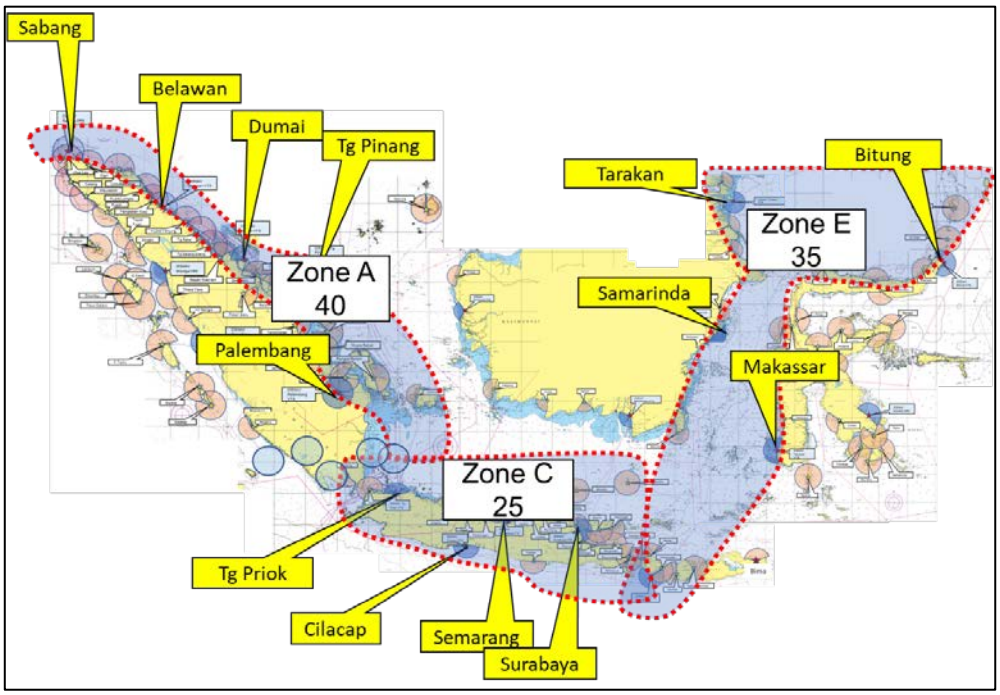


Figure 4.2.13 -2 : Priority 1

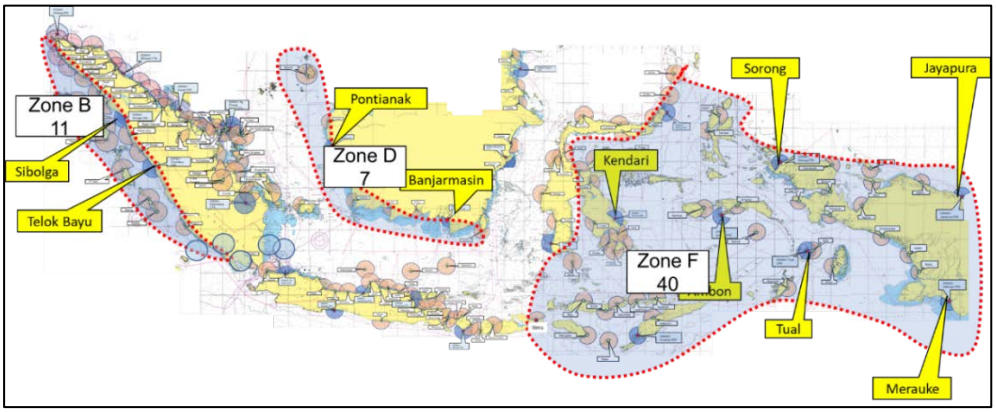


Figure 4.2.13 -3 : Priority 2

Table 4.2.13 -5 : Budget Plan for Priority 1 and Priority 2

Zone	Area	DISNAV	Target CRS	Approx cost
		Nos	Consolidated	Million IDR
Priority 1				
A	Sumatra- Riau	5	40	125,000
C	Jawa	4	25	82,500
E	Bali-Sulawesi West	5	35	112,500
S.Total		14	100	320,000
Priority 2				
B	Sumatra West	2	11	37,500
D	Kalimantan East	2	7	27,500
F	Sulawesi East-East Indonesia	7	40	135,000
S.Total		11	58	200,000
Nex 5 years maintenance cost (10%)			158	52,000
G.Total				**572,000**

(Figures is subject to change due to any aspect of situation)

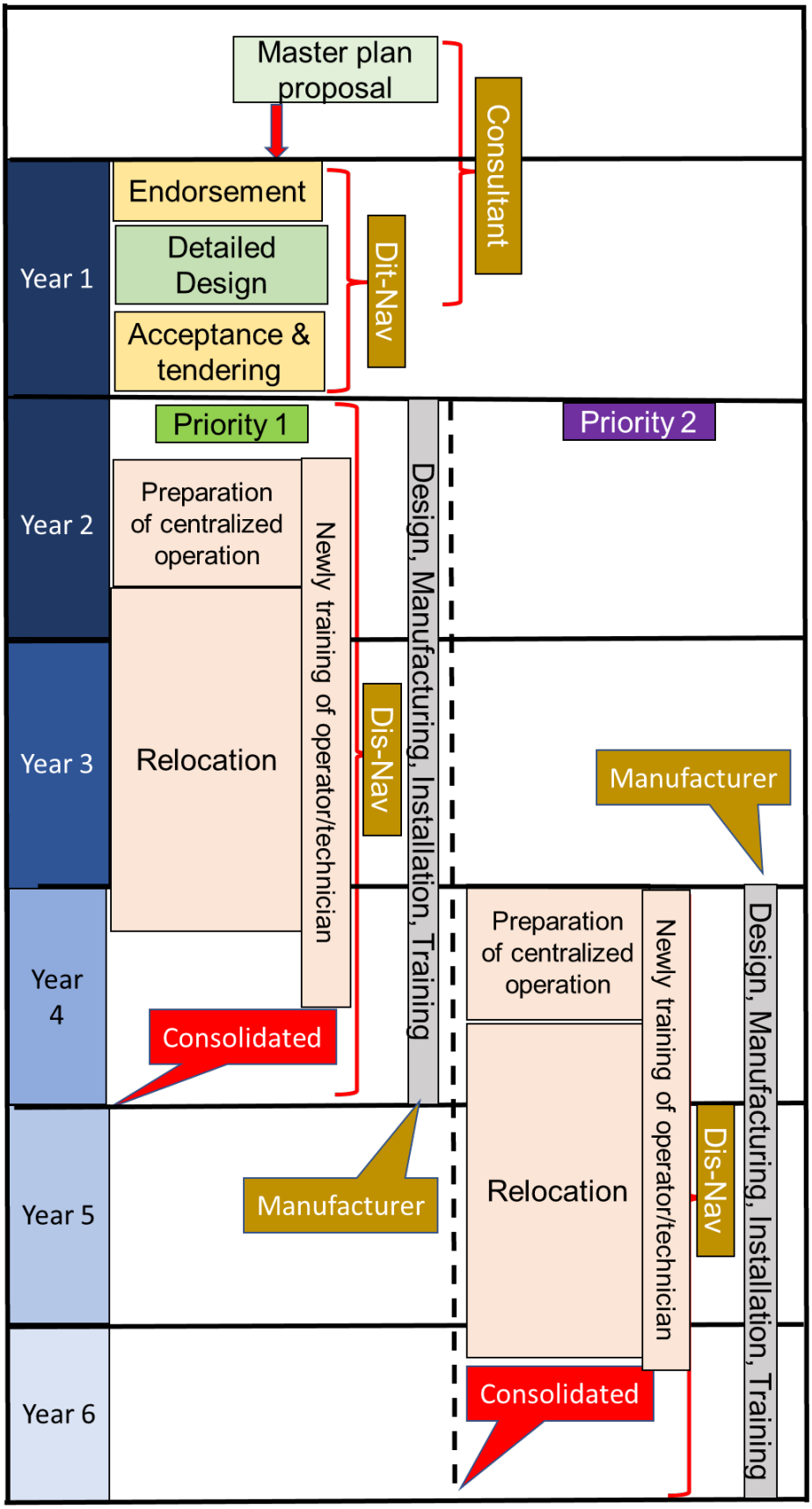


Figure 4.2.13 -4 : Establishment Work Flow Schedule for Priority 1 and 2

4.2.14 Summary of future VDES (VHF Data Exchange System)

VDES is the data communication system which is applicable with same frequency range of AIS and Marine VHF band (156.025-162.025MHz) to utilize satellite VDES standardized. This is effective and available to communicate outside A1 range of ordinary VHF coverage area.

VDES defines to cover current AIS function, ASM function, Satellite VDE function and Land VDES function. Other than current AIS, SMS (Simple and Short Message Service), Navigational information, Port information, Maritime safety information, Rescue information are available via data communicate of VDES between vessels and vessels, between vessels and coastal station and between vessels and satellite.

It is expected for communication availability especially with non-AIS equipped small vessels other than mandatory class A vessels currently if mobile terminal devices of VDES would be equipped. Most obvious highlighted part of VDES differed from AIS, VDES is available for Satellite data communication which is seamless communicability on mid of ocean as well as another availability of land communication usage. IALA informs entire development schedule of VDES as shown in Figure 4.2.14 -1.

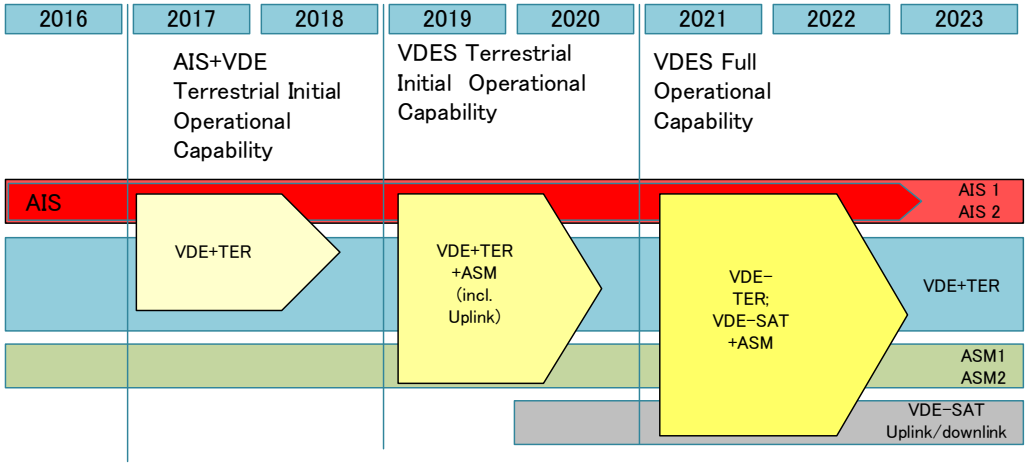


Figure 4.2.14 -1 : Development Schedule of VDES

1. Wide range availability

Current situation

Under different authorities, organizations, association and or private fleet corporation, varies of different frequencies and different mode of communication equipment limit communicable counter party and communicable geographical range on the ocean. User of communication party shall prepare each communication equipment for A1~A4 ranges separately and different frequency, different mode equipment is no possible to communicate with other mode group.

Proposal

Mobile VDES of communication equipment shall be the only one common way to communicate in wide range between land and satellite even though transmitting data is a limited or just little.

Current categorized marine radio communication sectors as follow.

A1; Near coastal area within few miles mobile carrier available by 3G, 4G, LTE data communication

Outside mobile phone carrier, Marine VHF covering A1 area

A2; MF/HF within around 150NM range

A3; Satellite communication

A4, HF in arctic area

Besides area segmentation, different mode of radio communication between fishing vessels and pleasure boat (for example) may not be available to communicate each other even they are within reachable range and they have own communication equipment.

Especially for small vessels covering range, common communication method shall be defined and standardized. VDES has 2 ways of communication mode available in Terrestrial (direct ground wave) and Satellite to cover after Terrestrial range which still enables mobile phone to communicate seamlessly by text message or short message to any party regardless of any range area or regardless of any different category of vessels to communicate each other. And moreover, emergency substitute communication way is available in the event of mobile network down due to any disaster occurred. After VDES terminal developed and introduced into market with more available frequency channels (frequency band) to expand during first generation of VDES, second or third generation VDES will be expected more useful and easiness for end user such as current mobile phone development in globally.

Convenience and effectiveness

A) Current situation

No direct merit point or advantage is directly found in current marine radio communication way in normal daily use unless for emergency or accident prevention only.

B) Proposal

VDES shall provide direct advantage or benefit in communicable function especially for small vessel user (fishing or pleasure). Difficulty of current maritime communication model to promote widely regardless of vessel size or usage is mainly due to operation safety alarm function which is not commonly needed in voluntary not mandatory and it is considered just for insurance purpose, not for daily needed system. Considering ordinary mobile phone as terminal tools of mobile carrier which is very commonly used globally with own expense to purchase, VDES shall be developed with more variable contents which is oriented and targeted to user especially in small vessel for their own benefit or own effectiveness directly contributed.

2. Possibility of VDES usage

VDES main usage is no doubt but for maritime purpose between land and vessel or vessel to vessel. However, it would not possible to be popularized such as ordinary mobile phone huge usage globally.

After VDES utilized and realized in land usage purpose, VDES can be recognized to establish as one of primary infrastructure of data communication network. It is possibly considerable for communication charges at granted in satellite mode if VDES system to promote widely that is the realistic way to reduce terminal equipment cost and wider promotion and creation of entire VDES market needs.

3. e-Navigation

Is the information development of vessel traffic defined by IMO for vessel traffic. Following is the main objectives.

A) Any maritime information such as meteorological data obtained by navigational vessel to be transmitted through land station and sharing with other vessels and other land station.

B) Any maritime information such as obstruction or shallow leaf on the water to share with other vessels to prepare safety route to avoid.

C) Two way communicable between land station and vessels to share any alert, hydrographical notice, distress notice, location information, port related information, pollution information and others.

D) Monitoring other vessels route information to assist own vessel right route or direction to navigate safely to avoid any incident or accent.

E) Monitoring AIS Class-B from small class vessels to capture situation and condition of own location area

F) Monitoring of own vessel condition such as navigation, engineering from land station to diagnosis and simulate the condition of own fleet.

G) Contribution of port management effectiveness and saving unnecessary energy wastage through the measurement of sharing information via radio communication particularly about estimated entry time, location of berthing, other vessel related information, port related information (meteorological, hydrological, navigational, aids to navigation etc),

4. Data exchange with MASS (Maritime Autonomous Surface Ships)

MASS require multi aspect of new development to detect and handle own positioning and locating by multi sensors, self-decision ability of safety avoidance and capturing of meteorological and hydrographical information. In normal navigation, voice communication via radio is common however MASS needs data communication mainly which is stated in previous e-Navigation article. VDES (Satellite, Terrestrial, ASM) is expected to utilize for this method of communication.

5. Data exchange for any facilities on the water (including for fishery)

Current AIS Msg 21 is available to exchange information of Aids to Navigation. It may be used for the any off shore structure such as Floating buoy for oil berth, Offshore oil rig platform, Offshore wind power. However, it must be under competent authority to control of information operation mainly so AIS Msg 21 usage for this purpose is not in common actually. Even offshore wind power facility shall be equipped with AIS which may be obstructed for navigation, however AIS is not commonly used. In Europe, radar function is covering for wind power facility area mainly.

One of main reason why AIS is not commonly used is mainly due to difficulty to set up stable power supply in offshore facility for high consumption of current AIS.

Mobile VDES equipment is required in following conditions.

A) No radio communication equipment in commonly used especially for small size vessel due to the difficulty of stable and high power supply system. Mobile size VDES common tablet terminal to be developed powered by latest small size secondary battery in high efficiency and long life

B) Smart phone to be basic terminal to utilize SMS text message around 100 letters)

C) Open public for the development of software application by any third party with following functions required

- Bluetooth
- Wi-Fi
- USB
- Outsourced power supply (Power Bank) available

Communication with VDES established in Bluetooth function enables handy operation and display indication available in Smartphone which is able to solve the problem of AIS indication difficulty currently. Smart phone is available to upgrade automatically in connection with data carrier or Wi-Fi on the land which has the advantage for user to utilize multi software application as well. Varies of maritime information such as meteorological and hydrographical or surrounding any other vessels locating, are the new information source which may be able to provide more new business opportunity in analysis of precious information resources.

6. Maritime information data terminal

Satellite VDES may be available to collect maritime environmental information such as maritime meteorological and hydrographical information, floating object locating, marine animal condition and situation captured from sailing vessels in those particular area. Information is able to share to any party to utilize effectively.

Currently those information exchange may be implemented from big size vessels to any particular meteoritical agency only, however common VDES data exchange function is expected more widely to utilize in real time to analyze updated maritime environmental situation.

Maritime information is needed to capture by any external sensor which is connected to VDES via USB.

7. System version up

Every Smartphone (terminal) is required version updating periodically. VDES terminal is also required periodical version up which is able to follow us via internet connectivity through terrestrial VDES land station or satellite VDES outside terrestrial range.

Following is the image of updating function available on the water.

4.2.15 Summary of future NAVDAT development

Currently NAVTEX (NAVigational TEleX) is commonly used and takes a role of GMDSS function. This is available within 400NM transmission of distress information, navigational information, meteorological information and any other emergency or safety information to vessel by text message in FSK modulation.

4 stations (Jakarta, Makassar, Ambon, Jayapura) in Indonesia are covering whole part of country (northern part is under Malaysia station). Transmission is made once in every 4 hours.

Comparing with current NAVTEX, NAVDAT (NAVigational DATa)is the Maritime Safety Information (MSI) available system to upgrade from NAVTEX. The coverage of NAVDAT is narrower under same transmission output power of NAVTEX, such as the range of NAVTEX/5kW is 400NM for NAVDAT/5kW's 293NM.

The main items that differ from NAVTEX and NAVDAT are shown in Table 4.2.15 -1.

Table 4.2.15 -1 : Main Point

	NAVTEX	NAVDAT
Frequency	424kHz,490kHz, 518 kHz	500 kHz
Output power	1kW	5 kW
Modulation	FSK	OFDM(4,16,64-QAM)

Advantage of NAVDAT is high speed data transmission compared with NAVTEX.

(Transmission time written in Red is NAVDAT on the other hand in Black is current NAVTEX.)

The comparison of NAVTEX and NAVDAT is shown in Figure 4.2.15 -1.

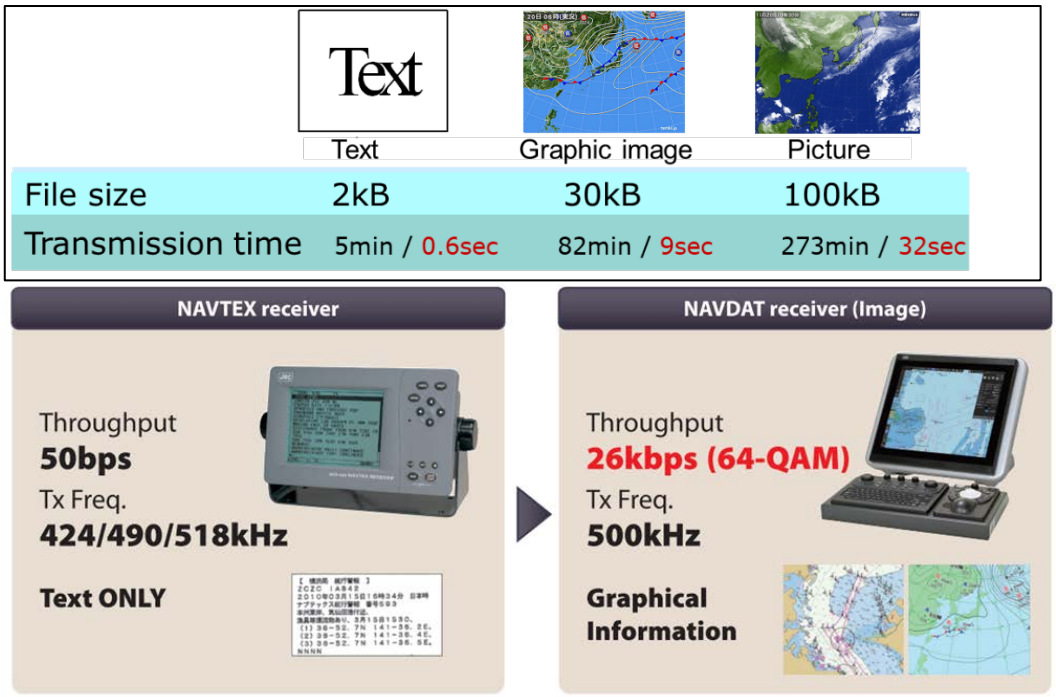


Figure 4.2.15 -1 : NAVTEX and NAVDAT

Both functions to utilize and parallel usage could be advisable in long term.

4.2.16 Overall summary for action plan covering entire future projects (not only CRS)

The items listed below is schematized in Figure 4.2.16 -1.

1. Consolidation project proposal endorsed by DGST (Year 1)

   Upon endorsed, project shall be listed in Bluebook by BAPAPPENAS (National Development Planning Agency) for further prioritized action to take anytime.

2. Detailed design work engaged with consultant (Year 1)

   DGST shall engage with consultant who has specialty of entire Maritime Communication action plan (or VTS specialist) including CRS for the further detailed designing of consolidation to realize 25 DISNAV and 158 CRS station in the point of networking, Radio propagation in VHF, and expected covering range simulation after consolidation.

3. Budgeting (Year 1)

   Based on estimated cost quotation in detailed design work, DGST is to find sourcing of fund internally or externally.

   In the event of external financial source assist requested to Government of Japan, financial project study shall be taken by the study team among DGST, Government of Japan and/or any third party (consultant). This process would take additional time frame other than establishment work flow schedule stated in article 13.

4. Tendering (Year 1 or 2)

   After financial source confirmed, DGST would prepare tendering work of procurement of complete consolidation work according to required specification stated in detailed design. Supervision work of entire project is considerable in two possibilities whether it would be independent & standalone external consultant to engage on behalf of DGST or work scheme included in tenderer.

5. Priority 1 to engage first (Year 2 -Year 4)

   Action area of priority is to be restudied in detailed design according to actual necessity of consolidation which each DISNAV has own situation to rush up in first priority.

6. Priority 2 to follow up (Year 4- Year 6)

   Following to Priority 1 decision.

7. CRS operation merged with VTS (Year 4-6)

   Depending on the actual situation and capacity in each DISNAV and each VTS while consolidation work done, merge and combination of similar but different 2 functions of CRS and VTS shall be implemented in time by time and DISNAV location by location. This merge action of project is under Phase 2 after Phase 1 of consolidation completed.

8. NAVTEX consolidation in one operation at Jakarta (Year 1 -2)

   This project shall be done in Phase 1 together with CRS consolidation.

9. NAVDAT introduction to study (Year 3 onward)

   NAVDAT shall be parallelly established with existing NAVTEX. Those two different facilities shall be studied carefully especially for operational function to established together with current NAVTEX. NAVDAT introduction shall be commencing after NAVTEX consolidation completed.

10. Terrestrial VDES to introduce (Year 3 onward)

To utilize newly developed network platform of CRS consideration in whole nation to cover, VDES land station transponder is designed and installed at same platform without any other necessary investment of networking to establish but just only transponder function to add on. CRS consolidation platform shall be designed for future possibility of extension of VDES function additionally. Shipside VDES terminal shall be prepared in local regulation first to coordinate with KOMINFO for the distribution to national and international registered vessel to install as well as preparation of own software application accessible with VDES. Preparation of billing system for data usage of VDES to each user domestic and international.

11. Satellite VDES to introduce (Year 5 onward after Terrestrial VDES established)

12. Preparation of ceased service of HF/MF (Year 10 onward)

After VDES popularized and VHF consolidation completed, HF/MF service will be automatically terminated, however it is advisable to maintain just for standby emergency case in limited few stations only in whole country especially HF SSB. This is under preparation of event of main networking down due to major disaster such as big scale Tsunami, Earthquake, Volcano eruption, or any kind of natural or manmade disaster.

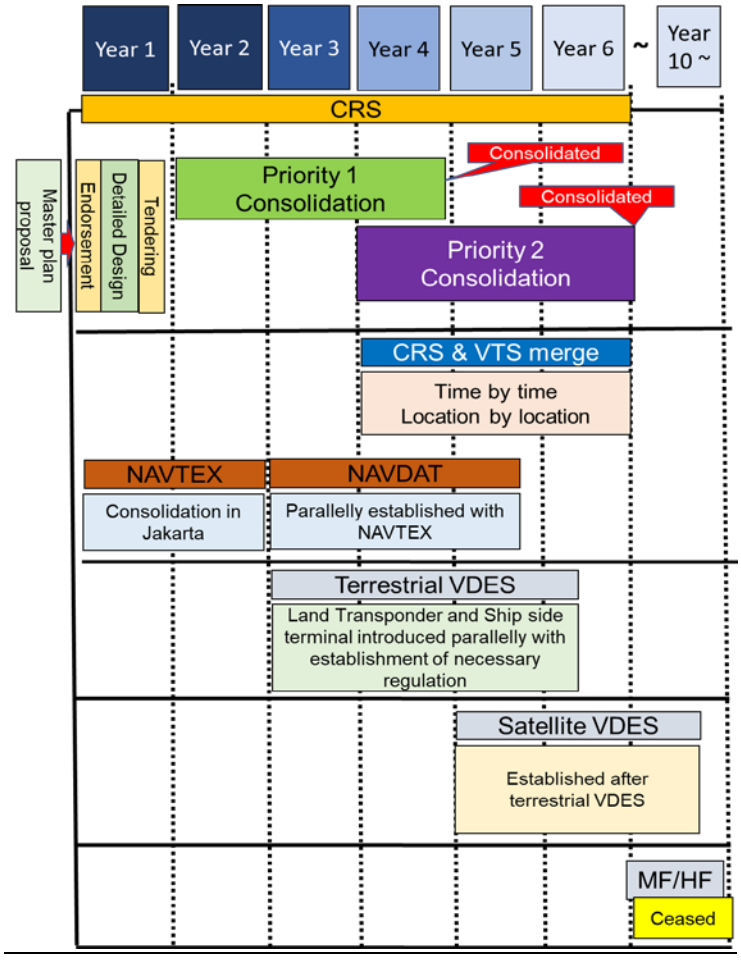


Figure 4.2.16 -1 : Time Flow of Each Project

4.3 Vessels for Aids to Navigation

4.3.1 Policy

Vessels for Aids to Navigation are assigned to the District office of Navigation (DISNAV) to install, operate and maintain Aids to Navigation (AtoN).

The existing Vessels for Aids to Navigation face many challenges, including many aging vessels, a shortage of crew due to the aging of skilled crew, and huge fuel costs.

Therefore, in establishing maintenance policy, we clarify these problems by investigating and examining the details of the operation and matters related to vessels and the crew. In order to establish a plan to allocate appropriate vessels to each DISNAV so that the AtoN managed by each DISNAV can be appropriately managed and operated, it is important to understand the following.

1) Understanding the Actual work and workload of Vessels for Aids to Navigation

   In recent years, in the field of AtoN, the utilization of semiconductors for the light source and solar cells for the power supply has led to changes in the unmanned operation of lighthouses, the transportation of fuel for power generation, the replacement of storage batteries for light buoys and other equipment, and the frequency of maintenance and inspections, resulting in changes in the amount of work conventionally carried out by Vessels for Aids to Navigation.

   Therefore, the amount of work for each vessel shall be calculated to study and analyze content for each managed service sea area.

2) Understanding and studying the operation of Vessels for Aids to Navigation

   Clarify the number of active days for each vessel.

3) Understanding the work that can be performed by each vessel

   Clarify the daily work capacity for each vessel (number of light buoys that can be replaced, number of parts that can be inspected underwater, number of AtoN that can be maintained and inspected)

4) Examination of current issues

   Clarify the issues faced by each DISNAV by listening to requests regarding Vessels for Aids to Navigation.

4.3.2 Guidelines

1) Understand the work of Vessels for Aids to Navigation

   Collect and examine the monthly operations of each vessel and calculate the annual work amount.

2) Collection of basic data

   a. Buoy replacement cycle (complete replacement, partial replacement)

   b. Number of units exchanged in one operation

c. Buoy maintenance site (base, vessels)
d. Types and numbers of AtoN accessed by vessels
e. AtoN patrol Cycle
f. Details of AtoN maintenance and the period required for maintenance
g. AtoN patrol group
h. Distance from ship base and travel time
i. Crew matters
j. Crew training content and training period

3) Examination of annual work results

Prepare a monthly table of operational performance to understand the annual performance.

a. Annual operation days (including operation details)
b. Annual maintenance days (dock)

4) Extraction of issues faced by DISNAV

a. Vessels for Aids to Navigation past repairs and details
b. Vessels for Aids to Navigation defective part
c. Crew technical capabilities
d. Other issues, etc.

5) Creation of personnel composition survey master sheet

a. Years of experience
b. Age Range
c. License eligibility
d. Birthplace

6) Collection of survey results

a. Aggregation of survey results
b. Analysis of survey results

7) Creation of an establishment plan (draft)

Considering the volume of work and issues faced by DISNAV, prepare an establishment plan (draft) for scrapping or replacing old vessels, and refer to opinions of DISNAV.

8) Completion of the establishment plan and notification to DISNAV

Coordinate with DISNAV to complete the establishment plan and notify DISNAV.

4.3.3 Questionnaires

1) Navigation Vessels Questionnaire 1 (Entry example)

Navigation Vessels

	Please select
	Please fill in

English	Bahasa inggris	Japanese										
jurisdiction	yurisdiksi	管区	13									
DISNAV	DISNAV	DISNAV	Benoa									
class	kelas	クラス	I									
Ship name	Nama kapal	船名	KN Nusa Penida									
Ship type	Jenis kapal	船種	KIP									
base	basis	基地	Benoa									
Year of built	Tahun dibangun	建造年	2017									
Ship age	usia kapal	船齢（2022）	5									
Dock interval and duration	Interval dan durasi dok	ドックの間隔及び期間	Interval :	1 year		Period :	25 day					
Power supply while the base is moored	Catu daya saat pangkalan ditambatkan	基地停泊中の電源	Generator Engine									
How to communicate with the base during the voyage	Bagaimana berkomunikasi dengan pangkalan selama perjalanan	航海中の基地との通信方法	Mobile Phone									
Work contents	Isi pekerjaan	業務内容	New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN			
For operations other than the purpose of AtoN (Specifically described)	Untuk operasi selain tujuan AtoN (Secara khusus dijelaskan)	AtoN以外の作業の場合（具体的に記載）	Making of navigation video from Public Relation SMRT Central Ditjenhubla									
Training contents of seafarers	Isi pelatihan pelau	船員の訓練内容	Emergency escape training	Fire extinguishing training								
Training frequency	Frekuensi pelatiha	訓練頻度	Once every six months	Once a year								
Number of AtoN managed using the vessel	Jumlah AtoN yang dikelola menggunakan kapal	船舶により管理するAtoNの数	Light House	Light Beacon	Light Buoy	Unlighted Buoy						
			Mercu Suar	Suar Cahaya	Pelampung Ringan	Pelampung Tanpa Cahaya						
			2	3	10	3						
Please fill in the following items.												
Past repairs	Perbaikan sebelumnya	過去の修繕										
Repair details	Detail perbaikan	修繕内容										
Current failure location	Lokasi kegagalan saat ini	現時点の障害箇所	Engine									
Failure content	Konten kegagalan	障害内容	Vibration occurs when the engine is fully operated.									
Crew technical skills	Keterampilan teknis kru	乗組員の技術力	Those with qualifications (voyage, engine) are scheduled to retire in the next five years. It is necessary to get young people to qualify.									
Other issues	Masalah lain	その他の問題										
opinion	pendapat	意見										

2) Navigation Vessels Questionnaire 2 (Entry example)

Buoy Tender

English	Bahasa inggris	Japanese						
Number of AtoN managed using the vessel	Jumlah AtoN yang dikelola menggunakan kapal	船舶により管理するAtoNの数	Light House Mercu Suar 0	Light Beacon Suar Cahaya 0	Light Buoy Pelampung Ringan 10	Unlighted Buoy Pelampung Tanpa Cahaya 3		
Regular replacement of buoys	Penggantian pelampung secara teratur	ブイの定期交換	Nothing		Yes			
Buoy replacement cycle	Siklus penggantian pelampung	ブイの交換サイクル			4 years			
Criteria for exchange	Kriteria pertukaran	交換の判断基準	Check by pulling it up on the ship once a year.					
process	proses	処理	If there is a problem, replace it. Paint the buoy and put it back.		Replace one set of buoys (including iron chains, sinkers, etc.) Maintain and store the salvaged items			
Number of Buoys that can be loaded on the Vessel (including Mooring chain and Sinker, etc.)	Jumlah Pelampung yang dapat dimuat di Kapal (termasuk rantai Mooring dan Sinker, dll.)	Vesselに積載できるBuoyの数（鉄鎖、沈錘含む）	Light Buoy 1 unit		Light Buoy 1 unit			
Number of buoys to be exchanged in one voyage	Jumlah pelampung yang akan ditukar dalam satu perjalanan	1回の航海で交換するブイの数	1 unit		1 unit			
Buoy maintenance location	Lokasi perawatan pelampung	ブイの整備場所	On board the Vessels		Buoy base			

Aids tender

English	Bahasa inggris	Japanese						
Number of AtoN managed using the vessel	Jumlah AtoN yang dikelola menggunakan kapal	船舶により管理するAtoNの数	Light House Mercu Suar 5	Light Beacon Suar Cahaya 7	Light Buoy Pelampung Ringan 10	Unlighted Buoy Pelampung Tanpa Cahaya 3		
AtoN patrol cycle	Siklus patroli AtoN	AtoNの巡回周期	3 months	3 months	3 months	3 months		
Maintenance details	Detail perawatan	メンテナンス内容	Voltage, current, connection status, device operation, etc.	Voltage, current, connection status, device operation, etc.	Check voltage, current, connection status, device operation, installation location, etc.	Appearance check, installation location, etc.		
Average time required for maintenance	Rata-rata waktu yang dibutuhkan untuk pemeliharaan	メンテナンスに必要な平均時間	1 hour	1 hour	30 minutes	20 minutes		

3) Vessel Voyage Monthly (Entry example)

Note:
Please collect and return data in excel format
Mohon kumpulkan dan kembalikan data dalam format excel

DISNAV	Kelas II Benoa
Vessel Name	Nusa Penida
Vessel Type	KBP
Class	I
GT	1212 M2

PERJALANAN KAPAL NAVIGASI
NAVIGATION VESSEL VOYAGE
MARCH
2019

NO	TOLAK *DEPARTURE*	TIBA *ARRIVED*	WAKTU YANG DIHABISKAN DI TEMPAT TOLAK (Jam) *TIME SPENT IN AREA (hour)*	WAKTU PERJALANAN (Jam) *PATROL TIME (hour)*	JARAK TEMPUH Mil/hour *MILEAGE Mil/hour*	KEGIATAN *ACTIVITY*	PEKERJAAN *ACTIVITY IN AREA* PENUMPANG DINAS *SERVICE* NAIK *BOARD*	PENUMPANG DINAS *SERVICE* TURUN *GET OFF*	MUATAN *LOAD* NAIK *BOARD*	MUATAN *LOAD* TURUN *GET OFF*	KETERANGAN *DESCRIPTION*
	POSISI, TANGGAL, JAM *POSITION, DATE, HOUR*	POSISI, TANGGAL, JAM *POSITION, DATE, HOUR*									
1	Kolam Utara Benoa 2019/3/1 0:00	Kolam Utara Benoa 2019/3/17 10:00	394:00			Vessel standby di pangkalan, Pelabuhan Benoa					Cuaca hujan, angin dari barat sedang, posisi kapal aman
2	Kolam Utara Benoa 2019/3/17 10:00	Alur Port Benoa 2019/3/17 10:30		0:30	1.5	Pembuatan video navigasi dari humas SMRT Ditjenhubla pusat	10 orang				Kapal ngapung-ngapung di alur pelabuhan Benoa
3	Alur Port Benoa 2019/3/17 11:30	Kolam Utara Benoa 2019/3/17 12:00	1:00	0:30	1.5	Kapal kembali ke Pangkalan Kolam Utara Pelabuhan Benoa		10 orang			Kapal letgo jangkar, pasang tali moring, tender di KN Mizan
4	Kolam Utara Benoa 2019/3/17 12:00	Kolam Utara Benoa 2019/3/24 7:30	163:30			Kapal standby di Pangkalan Pelabuhan Benoa					
5	Kolam Utara Benoa 2019/3/24 7:30	Dermaga Timur Benoa 2019/3/24 8:00		0:30	0.6	Kapal tolak tujuan dermaga timur pelabuhan Benoa untuk isi BBM sebanyak 80 ton, air tawar sebanyak 50 ton, dan menaikan air mineral sebanyak 90 galon			Air tawar 50 ton		Kapal sandar dermaga Timur Pelabuhan Benoa
6	Dermaga Timur Benoa 2019/3/24 16:00	Kolam Utara Benoa 2019/3/24 16:30	8:00	0:30	0.6	Kapal kembali ke Pangkalan Kolam Utara Pelabuhan Benoa					Kapal letgo jangkar, pasang tali moring, tender di KN Mizan
7	Kolam Utara Benoa 2019/3/24 16:30	Kolam Utara Benoa 2019/3/28 8:00	87:30			Kapal standby di Pangkalan Pelabuhan Benoa					
8	Kolam Utara Benoa 2019/3/28 8:00	Alur Port Benoa 2019/3/28 8:30		0:30	0.8	KN Mizan sandar dermaga timur Benoa, KN Nusa Penida keluar ngapung-ngapung di alur Pelabuhan Benoa					Kapal ngapung-ngapung di alur pelabuhan Benoa

4) List Vessel Crew (Entry example

Note:
Please collect and return data in excel format

[illegible]	[illegible]
Vessel Name	Nusa Perdana
Vessel Type	KBP
Class	I
GT	1353 MD

LIST EMPLOYEE VESSEL
2019

NO	NAME / NIP	PLACE AND DATE OF BIRTH	RANK	POSITION	EMPLOYEE STATUS	EDUCATION / CERTIFICATE			OTHER TRAINING	RELIGION	MARITAL STATUS	NO. OF CHILD	ADDRESS	REMARKS
						GENERAL	SPECIAL	LEVEL						
1	[illegible]	Denpasar	First Class Junior Superintendent (Ill b)	Captain	Civil Servant	High School	ANT. III	-	BST, MEFA, Surveyor	Islam	Married	2	[illegible]	
2	[illegible]	Mengwi	Junior Superintendent (III a)	Chief Engineer	Civil Servant	Vocational High School	ATT. III	-	BST, AFF, MEFA, SCRB, SAT, SCBO	Hindu	Married	3	Mengwi, Badung	
3	[illegible]	Klaten	Junior Supervisor (II a)	First Officer	Civil Servant	Vocational High School	ANT.II	-	BST, MEFA, SCRB, AFF	Islam	Married	-	Jl.Raya pebuahan Bintan	
4	[illegible]	Pelaw	Junior Supervisor (II a)	Second Officer	Civil Servant	Vocational High School	ANT-D	-	BST	Hindu	Married	1	Br.Gunung Sibu	
5	[illegible]	Mengwi	Supervisor (II c)	Third Officer	Civil Servant	Tsukuba High School	Kadogo Desk	-	BST	Hindu	Married	2	Br.Langon kaja	
6	[illegible]	Lamalok	Junior Superintendent (III a)	First Engineer	Civil Servant	High School	ATT.II	-	BST	Islam	Married	3	Jl.Raya pebuahan Bintan	
7	[illegible]	Denpasar	Supervisor (II c)	Second Engineer	Civil Servant	Vocational High School	ATT.II	-	BST	Hindu	Married	3	Br.Langkung	
8	[illegible]	Bandungan	Junior Supervisor (II a)	Third Engineer	Civil Servant	High School	ATT-D	-	BST, AFF, MEFA, SCRB, SAT, SCBO	Hindu	Married	1	Jl.Raya pebuahan Bintan	
9	[illegible]	Singaraja	First Class Junior Superintendent (III b)	Radio officer	Civil Servant	High School	PRE II, Maritime, English	-	BST	Hindu	Married	3	Br.sesila jati	
10	[illegible]	Denpasar	Junior Superintendent (III a)	Clerk	Civil Servant	High School	-	-	-	Hindu	Married	2	Br.angan	

4.3.4 Compilation of questionnaires

1) Current status of each Vessels

When we sent an inquiry to DISNAV for Questionnaire 1, we received responses from 33 vessels.

The submitted data (for 33 vessels) were aggregated into Questionnaire 1-1 (Table 4.3.4-1) and Questionnaire 1-2 (Table 4.3.4-2).

Table 4.3.4 -1 : Questionnaire 1-1

No.1

DISNAV	Type of Vessel	class	Vessel name	base	Year of built	ship age (2022)	How to communicate with the base during the voyage	Dock interval (years)	Dock duration (days)	Power supply while the base is moored	Work contents											Number of AtoNs managed by Vessel					Remark
																						Light House	Light Beacon	Light Buoy	Unlighted Buoy	Day sign	
Semarang	KP	I	KN Kumba	Semarang	1972	50	HF MF VHF Mobile Phone	3	50	Generator Engine	Installation of new buoys	Replacement of buoys	Repair of buoys	Transport for the lighthouse keepers	Transport of fuel for generators	Replacement of battery	Transport for AtoN maintenance inspectors					3	15	10	0		
Semarang	KPP	III	KN B-126	Semarang	1962	60	HF MF VHF Mobile Phone	2	45	Generator Engine	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN	Transport for the lighthouse keepers	Transport of fuel for generators	Replacement of battery	Transport for AtoN maintenance inspectors						2	10	8	0		
Semarang	KPP	III	KN Karimun Jawa	Semarang	2016	6	HF MF VHF Mobile Phone	1	45	Generator Engine	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN	Transport for the lighthouse keepers	Transport of fuel for generators	Replacement of battery	Transport for AtoN maintenance inspectors						2	10	8	0		
Semarang	KBP	III	KN Suar II	Semarang	1979	43	HF MF VHF Mobile Phone	2	35	Generator Engine	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN	Transport for the lighthouse keepers	Transport of fuel for generators	Replacement of battery	Transport for AtoN maintenance inspectors						0	5	8	0		
Benoa	KP	I	KN MIZAN	Benoa	1998	26	HF MF VHF	1	25	Generator Engine	Installation of new buoys	Replacement of buoys	Underwater survey of buoys	Repair of buoys	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN					16	93	42	1	4	
Benoa	KP	I	KN NUSA PENIDA	Benoa	2017	5	HF MF VHF	1	25	Generator Engine	Installation of new buoys	Replacement of buoys	Underwater survey of buoys	Repair of buoys	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN					16	93	42	1	4	
Sabang	KP	I	KN Antares	Sabang	1998	24	HF MF VHF Mobile Phone	1	60	Generator Engine	Installation of new buoys	Replacement of buoys	Underwater survey of buoys	Repair of buoys	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN					0	0	10	0	0	
Sabang	KPP	III	KN Benggala	Sabang	2015	7	HF MF VHF Mobile Phone	1	30	Generator Engine	Replacement of battery	Maintenance and treatment										0	0	0	0	0	
Belawan			KN Bahtala																								No data entry
Belawan			KN Antlurus																								No data entry
Belawan			KN Suar-508																								No data entry
Sibolga			KN Mandalika																								No data entry
Teluk Bayur			KN Sibaru-																								No data entry
Teluk Bayur			KN Mutt																								No data entry
Tg. Pinang			KN Jadayat																								No data entry
Tg. Pinang			KN Adhara																								No data entry
Tg. Pinang			KN Mitra IV																								No data entry
Tg. Pinang			KN Suar-004																								No data entry
Tg. Pinang			KN Mantang																								No data entry
Tg. Pinang			KN Nongsa																								No data entry
Dumai			KN Pari																								No data entry
Dumai	KP	I	KN Rupat	Dumai	2017	5	HF M VHF Mobile Phone	1	90	Generator Engine	New Installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of AtoN maintenance inspectors	Operations other than the purpose of AtoN					2	3	10	3		
Dumai			KN Macore																								No data entry
Palembang	KP	I	KN Kallan	Palembang	2015	7	Mobile Phone	2	30	Generator Engine	New Installation of buoy	Replacing the buoy	Underwater survey of buoys	Perbaikan buoy	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN					4	89	39			
Palembang	KPP	I	KN Dalk (D-044)	Palembang	1953	69	Mobile Phone	1	40	Generator Engine	New Installation of buoy	Replacing the buoy	Underwater survey of buoys	Perbaikan buoy	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN						32	23			
Palembang			KN Molmer																								No data entry

No.2

DGNAV	Type of Vessel	class	Vessel name	base	Year of built	ship age (2022)	How to communicate with the base during the voyage	Dock Interval (years)	Dock duration (days)	Power supply while the base is moored	Work contents										Number of AtoNs managed by Vessel					Remark
																					Light House	Light Beacon	Light Buoy	Unlighted Buoy	Day sign	
Pontianak	ATN-III	I	KN Amlam	Pontianak	2009	13	Mobile Phone, PLN	7	45	Generator Engine & shore connetion	Buoy repair	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN				2	3	10	3		
Pontianak	KPP	I	KN Pengki	Pontianak	2016	6	Mobile Phone, PLN	5	45	Generator Engine/Shore connection	New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN									
Pontianak			KN AE-017																							No data entry
Tg. Priok			KN Kenakula																							No data entry
Tg. Priok			KN Edam																							No data entry
Tg. Priok			KN																							No data entry
Tg. Priok			KN Enggano																							No data entry
Cilacap	KUP	I	KN Prajapati	Cilacap	1979	43	Mobile Phone, VHF		120	Commercial Power	New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of AtoN maintenance inspectors	Operations other than the purpose of AtoN						10	3		
Cilacap			KN Suar-005																							No data entry
Cilacap			KN Suar-007																							No data entry
Surabaya			KN Wmasakti Utama																							No data entry
Surabaya	KUP	I	KN Masalembo	Surabaya	2017	5	HF MF VHF Mobile Phone	1	60	Generator Engine	New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	Transportation of the lighthouse keeper	Battery replacement	Transportation of fuel for generators	AtoN maintenance	Operations other than the purpose of AtoN		6	18	41	13		
Surabaya			KN Dishidros																							No data entry
Surabaya			KN AE-029																							No data entry
Kupang			KN Nipa																							No data entry
Kupang			KN Mina																							No data entry
Banjarmasin	KUP	I	KN Kuriyit	Banjarmasin	2016	6	Mobile Phone			Generator Engine	New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of AtoN maintenance inspectors	Operations other than the purpose of AtoN									
Banjarmasin	KUP	I	KN Albatir	Banjarmasin	1999	23	Mobile Phone			Generator Engine	New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of AtoN maintenance inspectors	Operations other than the purpose of AtoN									
Banjarmasin	KUP	I	KN Suar-003	Banjarmasin	1971	51	Mobile Phone			Generator Engine	New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of AtoN maintenance inspectors	Operations other than the purpose of AtoN									
Banjarmasin	KUP	I	KN AE-032	Banjarmasin	1971	51	Mobile Phone			Generator Engine	New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	Operations other than the purpose of AtoN	Transportation of AtoN maintenance inspectors	Transportation of AtoN maintenance inspectors									
Tarakan	KUP	III	KN Maratua	Tarakan	2015	7	HF VHF Mobile Phone	1	30	Generator Engine	Buoy repair	AtoN maintenance	Transportation of the lighthouse keeper	Transportation of fuel for generators	Battery replacement	Operations other than the purpose of AtoN					3	53	17			
Tarakan	KUP	III	KN Sarang Alee	Tarakan	2010	12	Mobile Phone	2	25	Generator Engine	New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN					11	12	1		
Samarinda	KUP	I	KN Mithuna	Samarinda	1974	48	HF VHF MF	1	30	Generator Engine	New installation of buoy	Buoy repair	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN				3	22	43	1		
Samarinda	KUP	I	KN Mang Besar	Samarinda	2017	5	HF VHF MF	1	25	Generator Engine	Buoy repair	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN				3	47				

No.3

DGNAV	Type of Vessel	class	Vessel name	base	Year of built	ship age (2022)	How to communicate with the base during the voyage	Dock Interval (years)	Dock duration (days)	Power supply while the base is moored	Work contents										Number of AtoNs managed by Vessel					Remark
																					Light House	Light Beacon	Light Buoy	Unlighted Buoy	Day sign	
Samarinda	KUP	III	KN Suar-010	Samarinda	1976	46	HF VHF MF	1	25	Generator Engine	New installation of buoy	Buoy repair	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN				1	22	23			
Samarinda	Inspection Boat	III	KN Marasas	Samarinda	1996	24	HF VHF MF	1	30		New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of AtoN maintenance inspectors	Operations other than the purpose of AtoN				1	21	17			
Makassar	KUP	I	KN Dk Brit	Makassar	2018	4	HF VHF MF	2	90	Commercial Power	New installation of buoy	Replacing the buoy	AtoN maintenanc e	Transportation of the lighthouse keeper	Transportation of fuel for generators	Battery replacement	Transportation of AtoN maintenance inspectors	Transportation of supervisor maintenance AtoN			16	121	20			
Makassar			KN Mengkara																							No data entry
Makassar			KN # 129																							No data entry
Makassar			KN Alcalano																							No data entry
Kendari			KN Mayang																							No data entry
Kendari			KN																							No data entry
Bitung	KUP	I	KN Mangas	Bitung	2017	5	VHF Mobile Phone		30	Generator Engine	New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of AtoN maintenance Inspectors	Operations other than the purpose of AtoN				24	90	26			
Bitung	KUP	I	KN Merak	Bitung	1996	26	VHF Mobile Phone		30	Generator Engine	New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of AtoN maintenance inspectors	Operations other than the purpose of AtoN				24	90	26			
Bitung		I	KN Suar-006	Bitung	1972	49	VHF Mobile Phone		30	Generator Engine	New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of AtoN maintenance Inspectors	Operations other than the purpose of AtoN				24	90	26			
Ambon	KUP	I	KN Baron	Ambon	2016	6	HF MF VHF Mobile Phone			Commercial Power	New installation of buoy	Replacing the buoy	Buoy repair	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN	Transportation of the lighthouse keeper	Battery replacement	Transportation of fuel for generators	Transportation of supervisor maintenance AtoN	12	172	9	14		
Ambon	KUP	I	KN Alphard	Ambon	2008	14	HF MF VHF Mobile Phone	4	90	Commercial Power	New installation of buoy	Replacing the buoy	Buoy repair	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN	Transportation of the lighthouse keeper	Battery replacement	Transportation of fuel for generators	Transportation of AtoN maintenance supervisors	12	172	9	14	0	
Sorong			KN																							No data entry
Sorong			KN Yefyou																							No data entry
Sorong			KN Kofiau																							No data entry
Jayapura			KN Aldebaran																							No data entry
Jayapura			KN Belomili																							No data entry
Merauke	KUP	III	KN Merpati	Merauke	1997	23	HF MF VHF Mobile Phone	1	25	Generator Engine	Transportation of the lighthouse keeper	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN				2	10				
Merauke		III	KN Wintangur	Merauke	1968	52	HF MF VHF	1	75	Generator Engine	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN	Transportation of the lighthouse keeper	Transportation of fuel for generators	Battery replacement						7	55				Stopped Operation since 2018
Tual	KUP	I	KN Mahkota	Tual	1994	28	Mobile Phone	1	25	Generator Engine	New installation of buoy	Replacing the buoy	Underwater survey of buoys	Buoy repair	AtoN maintenance	Transportation of supplies required for AtoN	Operations other than the purpose of AtoN				11	78	4			

Table 4.3.4 -2 : Questionnaire 1-2

No.1

DISNAV	Type of Vessel	class	Vessel name	Regular replacement of buoys	Buoy replacement decision	Training contents of seafarers／Training frequency				Past repairs	Repair details	Current failure location	Failure content	Crew technical skills	Other issues	opinion	Remark
Semarang	KP	I	KN Kumba	Nothing	Check it by pulling it onto the boat once a year.	Emergency self-rescue training ／Once a year	Firefighting training ／Once a year			crane	Replacement of damaged web and water coolers	Engine	There is a problem if MB 1 and MB 2 are synchronized for the crane engine work	They are not yet fully qualified (sailing, machining) and are scheduled to retire in the next one year. Technical education and training is necessary to get young people to qualify.	The condition of the vessel is old, many equipment is no longer functioning and the underwater ship plate is not standard (porous / thin)	major maintenance (docking) of both decks, engine and radios , addition of ships' crew who are certified , Replacement and Service of Safety Equipment☒	
Semarang	KPP	III	KN B-126	Nothing		Emergency self-rescue training ／Once a year	Firefighting training ／Once a year			Dynamo MB 1	New reels/windings and 2 phase cable replacement	engine	There is an oil leak in the main engine turbo	They are not yet fully qualified (sailing, machining) and are scheduled to retire in the next one year. Technical education and training is necessary to get young people to qualify.	The condition of the vessel is old, many equipment is no longer functioning and the underwater ship plate is not standard (porous / thin)☒	major maintenance (docking) of both decks, engine and radios, addition of ships' crew who are certified, Submission of a proposal to replace KN Class III to replace KN. B 126, Replacement and Service of Safety Equipment☒	
Semarang	KPP	III	KN Karimun Jawa	Nothing		Emergency self-rescue training ／Once a year	Firefighting training ／Once a year			Painting the ship's body from underwater to accommodation (deck accommodation)	Leaking plate painting☒ Bottom leaks☒	Bottom leaks☒	There is a bottop leak so it needs a plate replacement	They do not yet have all the qualifications (sailing, engines) Technical education and training is necessary to get young people to qualify.	Regular maintenance for machine parts ☒	Top MI and ME overhouls and pipe installations, addition of ships' crew who are certified, Replacement and Service of safety equipment and navigation tool,Regular maintenance for engine	
Semarang	KBP	III	KN Suar II	Nothing		Emergency self-rescue training ／Once a year	Firefighting training ／Once a year			MI and ME	Top Overhoul MI & Top Overhoul ME	engine	There is an oil leak and damage to the MI dam ME so it requires a lot of replacement ☒	hey do not yet have all the qualifications (sailing, engines) Technical education and training is necessary to get young people to qualify.	The condition of the ship is old, many equipment is no longer functioning and the underwater ship plate is not standard (porous / thin)☒	KN Suar 11 is no longer viable and has suffered a lot of damage so it can be proposed for a scrapping	
Benoa	KP	I	KN MIZAN	Yes, Light Buoy (every 4 years), Unlighted buoy (every 4 years)	Check it by pulling it onto the boat once a year.	Emergency self-rescue training ／Once a year	Firefighting training ／Once a year			Auxiliary engine and main engine	replaced the engine	Plate Top deck☒	Already porous	Those with qualifications (deck and mesin) account for 30% of the total population of 27 people. Training is necessary to get young people to qualify.			
Benoa	KP	I	KN NUSA PENIDA	Yes, Light Buoy (every 4 years), Unlighted buoy (every 4 years)	Check it by pulling it onto the boat once a year.	Emergency self-rescue training ／Once a year	Firefighting training ／Once a year			Rotoder stock	Replacement of the top and bottom steering seals	In sterling gear room	leaks from the steering axes	Those who have qualifications (deck and machine) 27 people made up 30% of the crew members. Training is necessary to get young people to qualify.	The vessel hull vibrates at the time of sailing with a full-rey engine.	need to add a frame and support pillar to an empty room.	
Sabang	KP	I	KN Antares	Yes, Light buoy (every 4 years)	Check it by pulling it onto the boat once a year.	Emergency self-rescue training ／Once every three (3) months	Firefighting training ／Once a year			Engine Section: - Cleaning of central air conditioning room, replacement of central air conditioning air filter, installation of ME/GB seawater pump oil cooling pipe, opening of ME-PS starting dynamo for repair, replacing ME SB gear box oil.	Main Motor Service and Repair of leaking piping system	engine	Over Heating	Those with qualifications (sailing, machinery) are scheduled to retire in the next five years. Training is needed to get young people to qualify.	Many piping systems in the engine room are thin.	Docking is required	

No.2

DISNAV	Type of Vessel	class	Vessel name	Regular replacement of buoys	Buoy replacement decision	Training contents of seafarers／Training frequency				Past repairs	Repair details	Current failure location	Failure content	Crew technical skills	Other issues	opinion	Remark
Sabang	KPP	III	KN Benggala	Nothing						Main Motor: - Right Dinamo Charge service of main motor, PS☒ main motor ignition key change 2 places. Left: Replacement of 2 circular water sensors Replacement of two monitor screens in the bridge room, Right Generator - Servise Dinamo Charge generator SB. Left - Replacement of AVR with new Left generator, - Replacement of 24 k3 12 volt current converter SB generator, - Service seawage tank pump, - Service central aAC		Engine		certificate			
Belawan			KN Berhala														No data entry
Belawan			KN Arcturus														No data entry
Belawan			KN Suar-008														No data entry
Sibolga			KN Mandalika														No data entry
Teluk Bayur			KN Sibaru-baru														No data entry
Teluk Bayur			KN Muci														No data entry
Tg. Pinang			KN Jadayat														No data entry
Tg. Pinang			KN Adhara														No data entry
Tg. Pinang			KN Mitra-IV														No data entry
Tg. Pinang			KN Suar-004														No data entry
Tg. Pinang			KN Mantang														No data entry
Tg. Pinang			KN Nongsa														No data entry
Dumai			KN Pari														No data entry
Dumai	KP	I	KN Rupat	Yes, Light buoy (4 years)		Emergency self-rescue training/Once every six months	Firefighting training/Once every six months	Training people to fall overboard / Once every six months	Shipwreck training / Once every six months	Repair of excessive ship vibration, repair of torn plate on the lower hull (underwater)	Addition of pillar posts to the steering gear room, addition of a pillar in the ballast tank, and repair of the torn plate	Engine and bow thruster☒	Vibration occurs when the machine is operated at full power, the propeller leaf cracks and curls in the left engine, and the bowthrust cannot function	Engine ship crew rating deficiency	There are no sea chest valves that are impermeable, and the strainer and strainer room are porous, so they are prone to leakage.	To immediately carry out docking for propeller replacement, bow thruster repairs and other repairs according to the maintenance list.	
Dumai			KN Manore														No data entry
Palembang	KP	I	KN Kallan	Yes, Light buoy (2 years)	Check by pulling him aboard once a year.	Emergency self-rescue training/Once every six months	Firefighting training/Once a year			Main Crane	Replacing the wire / main crane sling	Engine	Vibration occurs when the machine is fully operated	Those with qualifications (sailing, machinery) are scheduled to retire in the next five years. Training is needed to get young people to qualify.			
Palembang	KPP	I	KN Dalk (D-044)	Nothing		Emergency self-rescue training/Once every six months	Firefighting training/Once a year			Auxiliary Engine	replace of fuel pump	Engine	Auxiliary engine sudden shutdown	Those with qualifications (sailing, machinery) are scheduled to retire in the next five years. Training is needed to get young people to qualify.			
Palembang			KN Mokner														No data entry

No.3

DGNAV	Type of Vessel	class	Vessel name	Regular replacement of buoys	Buoy replacement decision	Training contents of seafarers./Training frequency				Past repairs	Repair details	Current failure location	Failure content	Crew technical skills	Other issues	opinion	Remark
Pontianak	KBP	I	KN Airlilam	Yes, Light buoy (1 year)		Emergency self-rescue training/Once every six months	Firefighting training/Once a year			Floting Refair	Overhoul AE I and II	Engine, up grade equipment	Vibration occurs when the engine is running at full speed. malfunction of navigation equipment	ANT-II, ANT-III, ANT-D, ATT-III, ATT-IV, ATT-D	docking, up grade navigation equipment	Periodic maintenance	
Pontianak	KPP	I	KN Pengisi	Yes, Light buoy (1 year)		Emergency self-rescue training/Once every six months	Firefighting training/Once a year			Docking on 2020		Propeller on the right engine	When manually rotated, the axles propeller engine right side is heavy.	Those with qualifications (cruises, engines) are scheduled to retire in the next five years. Training is necessary to get young people to qualify.			
Pontianak			KN AE-012														No data entry
Tg. Priok			KN Karakata														No data entry
Tg. Priok			KN Edam														No data entry
Tg. Priok			KN Mapaledius														No data entry
Tg. Priok			KN Enggano														No data entry
Cilacap	KIP	I	KN Prajapati	Nothing		Emergency self-rescue training/Once every six months	Firefighting training/Once every six months			2020	Repair of auxiliary engine no.2	engine	Vibration occurs when the engine is fully operated (engine power reduced by 48%).	Those with qualifications (cruises, engines) are scheduled to retire in the next five years. Training is necessary to get young people to qualify.	suboptimal engine	Due to an insufficient budget, ship repairs are not optimal.	Docking period is long because vessel condition is 48%
Cilacap			KN Suar-005														No data entry
Cilacap			KN Suar-007														No data entry
Surabaya			KN Bimasakti Utama														No data entry
Surabaya	KIP	I	KN Masalembo	Nothing		Life boat & rescue boat descent training/Once every three (3) months	Fire fighting training /Once every three (3) months	Emergency steering operation training/Once every three (3) months				Shore Connection electricity	Navigation equipment off / cannot stand By	Those with qualifications (sailing, mactinery) are scheduled to retire in the next five years. Training is needed to get young people to qualify			
Surabaya			KN Diamara														No data entry
Surabaya			KN AE-029														No data entry
Kupang			KN Nipa														No data entry
Kupang			KN Mina														No data entry
Banjarmasin	KBP	I	KN Kunyit	Yes, Light buoy (4 years)		Emergency self-rescue training/Once every six months	Firefighting training/Once a year										
Banjarmasin	KBP	I	KN Altair	Yes, Light buoy (4 years)		Emergency self-rescue training/Once every six months	Firefighting training/Once a year										
Banjarmasin	KBP	I	KN Suar-003	Yes, Light buoy (4 years)		Emergency self-rescue training/Once every six months	Firefighting training/Once a year										
Banjarmasin	KBP	I	KN AE-032	Yes, Light buoy (4 years)		Emergency self-rescue training/Once every six months	Firefighting training/Once a year										

No.4

DGNAV	Type of Vessel	class	Vessel name	Regular replacement of buoys	Buoy replacement decision	Training contents of seafarers./Training frequency				Past repairs	Repair details	Current failure location	Failure content	Crew technical skills	Other issues	opinion	Remark
Tarakan	KIP	III	KN Maratua	Yes, Light buoy (4 years)		Emergency self-rescue training/Once every six months	Firefighting training/Once a year					Engine	Vibration occurs when the engine is full speed	Those with qualifications (cruises, engines) are scheduled to retire in the next five years. Training is necessary to get young people to qualify☒			
Tarakan	KBP	III	KN Sarang Aloe	Yes, Light buoy (4 years)		Emergency self-rescue training/Once a year	Firefighting training/Once a year			2016	Docking	Engine	Vibration occurs when the engine is fully speed	80% have skills. 20 % requires training☒			
Samarinda	KIP	I	KN Mithuna	Yes, Light Beacon, Light buoy (depend on situation), Unlighted buoy (depend on situation)		None	None			Parallel generator system (electricity)	replacement of the entire electrical installation by using an automated system.	engine room	Some need to be replaced by porous plates.	Those who have qualifications (deck and engine) 30% of the total crew of 29 people Training is needed to get experts in his field to qualify.	It is difficult to find spare parts and experts.	Need to do maintenance / docking regularly ☒	
Samarinda	KIP	I	KN Mlang Besar	Yes, Light buoy (4 years), Unlighted buoy (4 years)		Emergency self-rescue training/Once every six months	Firefighting training/Once a year			Frequent minor and severe damage to central air conditioners and generators	There was once a malfunction in his sync, and the rudder broke. and whole has been fixed.	Thin plates and some engine spare parts are a bit difficult to get.	At certain engine speeds, the vibration above the deck is strongly felt.	Currently, the crew of the ship that meets the criteria is only 10 percent of the total crew that has been determined according to KP.942 and DJPL/2019.	The big problem that occurs is that it is difficult to get materials and/or spare parts for maintenance, such as paint, etc., so that the maintenance of the vessel is not optimal.	As often as possible, maintenance is held on both the engine and the deck.	
Samarinda	KIP	III	KN Suar-010	Nothing		None	None			None	None	Deck	Part of the deck floor is weathered.	Lack of human resources In accordance with the needs of the vessel, class III and up	It is necessary to replace the upper plate (deck)☒	Expected docking routine	
Samarinda	KPP	III	KN Marapas	Nothing		None	None			adjust the main engine valve , and welding of porous parts that are exhaust	adjust the main engine valve	The boundary between the bridges and hull of the ship, which differ in the type of material, is between aluminium and metal, making it difficult to unite	limited ship maintenance budget. Spare parts and Cummins engine technicians are a bit difficult to get. The ship's crew is very lacking.	ship's crew that has certification and quantity is needed to support work on the vessel	The suction pipe is located under the keel. Lack of accommodation for the official crackdown	Because of the wasteful fuel and its location in the River region, its current existence is suboptimal.	
Makassar	KIP	I	KN De Brill	Yes, Light buoy (4 years)		Safety Meeting / 1 to 2 years				once 1-2 years	engine and deck	Engine Room	leaked into the water cooler of the engine	The need for increased qualification for a major marine engineering	Lack of human resources☒	The need to add human resources both in quantity and quality	
Makassar			KN Mengkara														No data entry
Makassar			KN B-129														No data entry
Makassar			KN Alelamo														No data entry
Kendari			KN Mayang														No data entry
Kendari			KN Andromeda														No data entry
Bitung	KIP	I	KN Mangas	Yes, Light buoy (4 years)		Emergency self-rescue training//Once every six months	Firefighting training/Once a year			new deck board replacement,Radar and ECDIS ,GPS replacement,Repair of an exhaust gas chimney ,Installation of waste water pump,Fresh water cooler ME 1 dan 2	Main deck board replacement, maintenance of radar and ECDIS,A new replacement for GPS,ME-1 exhaust chimney repair,*new Installation of waste water pumps,*maintenance of the fresh water cooler of ME 1 and 2	engine	Vibration occurs when the machine is fully operated.	Those with qualifications (cruises, engines) are scheduled to retire in the next five years. Training is necessary to get young people to qualify.	The window of the Bridge deck has been unattached,Upgrade ECDIS,*Sband and Xband radars not working properly,*the bow thrusters are not working, ,*The windlass is not working properly.	In order to carry out maintenance and repairs	

No.5

DISNAV	Type of Vessel	class	Vessel name	Regular replacement of buoys	Buoy replacement decision	Training contents of seafarers／Training frequency				Past repairs	Repair details	Current failure location	Failure content	Crew technical skills	Other issues	opinion	Remark
Belitung	KIP	I	KN Merak	Yes, Light buoy (4 years)		Firefighting training/Once a year				Plate repair and replacement,Sandiable sting,Anchor windlass repair,Top overhaul, Repair and replacement of piping installations,Thordon propeller shaft replacement	replacement the plate of the forward top,Windlass mounting replacement.,Keel plate replacement,Injector replacement,' valve faucet maintenance	engine	the Propeller shaft still vibrates,When the engine is moving backwards, the response is slow.	Those with qualifications (cruises, engines) are scheduled to retire in the next five years. Training is necessary to get young people to qualify.	Automatic Identification System (AIS) is not synchronized with the name of the vessel	Conducting repairs and maintenance	
Belitung	KIP	I	KN Suar-009	Light buoy (4 years)		Emergency self-rescue training/Once every six months	Fivefighting training/Once a year			Hull plate,Navigation tools,Lifeboat	The left and right hull plate of the vessel from the forward to the midship has leaked ,Radar and GPS are damaged,the steering oil pipe leaks, steering oil is frequently added while in motion, The ship's lifeboat has weathered, grown balder, and become more loose and porous.	engine	The axle propeller is not suitable with standard size, so it affects the speed of the vessel	Those with qualifications (cruises, engines) are scheduled to retire in the next five years. Training is necessary to get young people to qualify.	Vibrating of engine,there is a knock on the engine	Held maintenance and care	
Ambon	KIP	I	KN Bacan	Nothing		Emergency self-rescue training/Once a year	Fivefighting training/Once a year			Auxiliary Engine 1 Repair	General Overhaul	No major docking has been implemented since it was handed over to the Ambon Class I Navigation District.	The technical condition of the ship decreased because docking was never carried out.	The manning of Kn. Bacan has not been in accordance with the Decree of the Directorate General of Transportation, both in quality and quantity.	The need for ship repair and docking to be carried out in accordance with the provisions and continuously	Need to increase Budget spare parts, Vessel maintenance	
Ambon	KBP Aids Tender	I	KN Alphard	Nothing		Training for Competency Enhancement ／once a year	Proficiency Certificate Fulfillment Training／any time			Docking 2019	Engine and deck	trouble to the main engine and turbo charger	vessel was not optimal for the operation.	The manning of Kn. Alphard has not been in accordance with the Decree of the Directorate General of Transportation, both in quality and quantity.	Docking dilaksanakan sesuai ketentuan dan berkesinambungan / The need for vessel repair and docking is carried out according to the provisions and continuously.	The budget for spare parts and vessel maintenance must be increased.	
Sorong			KN Pradawana														No data entry
Sorong			KN Yefyus														No data entry
Sorong			KN Kofiau														No data entry
Jayapura			KN Aldebaran														No data entry
Jayapura			KN Bayondi														No data entry
Merauke	KIP	III	KN Merpati	Nothing		Emergency self-rescue training/Once every six months	Fivefighting training/Once a year										
Merauke	KKP	III	KN Bintangur	Nothing		Emergency self-rescue training/Once every six months	Fivefighting training/Once a year										Stopped Operation 2018
Tual	KIP	I	KN Mahkota	Nothing		Emergency self-rescue training/Once every six months	Fivefighting training/Once a year					Crane	Crane strength decreases, Cannot lift loads more than 3 tons	ships crew KN. Mahkota does not yet have an appropriate technical diploma so improvement is needed through education and training to crew			

2) Annual operation days for each Vessels

Initially, it was planned to count the number of operation days for three years (2019-2021) in Questionnaire 2.

However, in 2020 and 2021, operations were restricted due to reduction in the fuel cost budget, and annual operations were not carried out as planned. Also, in a meeting with NAVIGASI, we were advised that it was necessary to consider the geographical situation.

Therefore, when we requested the route patterns of each DISNAV, the route patterns of DISNAV Semarang, DISNAV Tg.Pinang and DISNAV Sabang were presented. We inquired about the number of days of operation in this route pattern, but only DISNAV Semarang could give answer regarding the number of days of operation in their route pattern.

Therefore, we decided to tabulate the “Vessel Voyage Monthly” in 2019, which was not affected by the fuel cost reduction.

It was determined that this data included the geographic situation for which the advice was given, as well as standby due to bad weather during the patrol. Aggregated data is Vessel Operation Aggregation (Table 4.3.4-3).

Table 4.3.4 -3 : Vessel Operation Aggregation

DISNAV	Class	Type of Vessel	Number of Vessels	Class	Name of Vessel	TOTAL FOR THE YEAR				
						TIME SPENT IN AREA (hour)	PATROL TIME (hour)	ACTION DAYS (day)	docking period (day)	MILEAGE (Mile/hour)
Sabang	II	KBP	1	I	KN ANTARES	8056.83	663.92	54	69	6013.39
		KPP	1	III	KN BENGGALA	7870.08	169.75	37	15	2189.1
Belawan	I	KIP	1	I	KN BERHALA	8147.5	612.5	56	53	3771
		KBP	2	I	KN ARCTURUS					
				III	KN SUAR-008					
Sibolga	III	KBP	1	I	KN MANDALIKA					
Teluk Bayur	II	KIP	1	I	KN SIBARU-BARU					
		KBP	1	I	KN MUCI (scrap)					
Tg. Pinang	I	KIP	1	I	KN JADAYAT	6871.67	1166.33	178	53	8937
		KBP	2	I	KN ADHARA	6232.5	1063.5	122	44	6489.5
				III	KN MITRA-IV (scrap)	8417.99	416.42	105	38	2776.07
		KPP	2	III	KN MANTANG	7951	65	28	23	385
Dumai	I	KIP	2	I	KN PARI					
				I	KN RUPAT					
		KPP	1	III	KN MARORE					
Palembang	I	KIP	1	I	KN KALIAN	5055.88	490.54	54	42	3265
		KBP	1	III	KN DAIK(D-044)					
		KPP	1	III	KN MOKMER					
Pontianak	III	KBP	1	I	KN ALNILAM	8375	394	45	0	3266.41
		KPP	1	III	KN PENGIKI	8236	144.5	40	0	1644.44
Tg. Priok	I	KIP	2	I	KN KARAKATA					
				I	KN EDAM	7893.67	846.33	88	48	7844
		KPP	2	III	KN MIAPLACIDUS					
				III	KN ENGGANO	8717	43	10	11	156.6
Cilacap	III	KIP	1	I	KN PRAJAPATI	7294.75	122.25	37	0	648.4
Semarang	II	KIP	1	I	KN KUMBA	1338	605	85	49	1970
		KBP	2	III	KN SUAR 011(scrap)	8042.5	446.5	113	30	1425
				III	KN B-126	8096	634.25	128	30	1918.75
		KPP	1	III	KN KARIMUN JAWA	8492.25	292.25	72	21	1640
Surabaya	I	KIP	2	I	KN BIMASAKTI UTAMA	7671.75	352.25	53	0	2301.4
				I	KN MASALEMBO	8442.75	317.25	59	0	2919.2
		KBP	1	III	KN DAMARA(scrap)	8301.5	458.5	52	0	2248
		KPP	1	III	KN AE-029	8353.5	430.5	68	0	1465.5
Benoa	II	KIP	1	I	KN NUSA PENIDA	8348.5	411.5	68	0	4515.5
		KBP	1	I	KN MIZAN	8607	153	40	0	1049
Kupang	II	KIP	1	I	KN NIPA					
		KBP	1	I	KN MINA					
Banjarmasin	II	KIP	1	I	KN KUNYIT	8520.45	263.55	34	0	2316
		KBP	2	I	KN ALTAIR	8601.18	182.82	22	0	1742
				III	KN SUAR-003(scrap)	8708.42	51.58	5	0	0
		KPP	1	III	KN AE-032(scrap)	8760		0	0	
Tarakan	III	KIP	1	I	KN MARATUA	8287	431.75	76	0	4141.5
		KPP	1	III	KN SARANG ALOE	7861.25	178.75	32	61	1775.25
Samarinda	I	KIP	2	I	KN MITHUNA	8066.5	693.5	76	27	6257.5
				I	KN MIANG BESAR	8183.12	576.88	80	30	4375.5
		KBP	1	III	KN SUAR-010	8091.92	668.08	106	0	3487
		KPP	1	III	KN MARAPAS	8562	198	65	0	1352.5
Makassar	I	KIP	1	I	KN DE BRILL	8281.92	478.08	51	0	5250
		KBP	2	I	KN MENGKARA	8591.77	168.23	16	78	752.7
				III	KN B-120					
		KPP	1	III	KN AKELAMO	8660.58	99.42	36	0	963.25
Kendari	III	KBP	2	I	KN MAYANG					
				I	KN ANDROMEDA					
		KPP	1	IV	KN WANGI-WANGI					
Bitung	I	KIP	1	I	KN MIANGAS					
		KBP	2	I	KN MERAK					
				III	KN SUAR-009					
Ambon	I	KIP	1	I	KN BACAN					
		KBP	1	I	KN ALPHARD					
Sorong	III	KIP	1	I	KN YEFYUS					
		KPP	1	III	KN KOFIAU					
Jayapura	II	KBP	1	I	KN ALDEBARAN					
		KPP	1	III	KN BEPONDI					
Merauke	III	KBP	1	I	KN MERPATI	8386	374	40	0	0
Tual	III	KBP	1	I	KN MAHKOTA					
		KIP	22							
		KBP	27	(scrap 5)						
		KPP	17	(scrap 1)						
	Total		66							

In Table 4.3.4-3, there are 11 DISNAVs with data for all Vessels in the affiliation, as shown in Vessel Operation Aggregation (DISNAV) (Table 4.3.4-4).

Table 4.3.4 -4 : Vessel Operation Aggregation (DISNAV)

DISNAV	Class	Type of Vessel	Number of Vessels	Class	Name of Vessel	TOTAL FOR THE YEAR				
						TIME SPENT IN AREA (hour)	PATROL TIME (hour)	ACTION DAYS (day)	docking period (day)	MILEAGE (Mile/hour)
Sabang	II	KBP	1	I	KN ANTARES	8056.83	663.92	54	69	6013.39
		KPP	1	III	KN BENGGALA	7870.08	169.75	37	15	2189.1
Tg. Pinang	I	KIP	1	I	KN JADAYAT	6871.67	1166.33	178	53	8937
		KBP	2	I	KN ADHARA	6232.5	1063.5	122	44	6489.5
				III	KN MITRA-IV (scrap)	8417.99	416.42	105	38	2776.07
		KPP	2	III	KN MANTANG	7951	65	28	23	385
Pontianak	III	KBP	1	I	KN ALNILAM	8375	394	45	0	3266.41
		KPP	1	III	KN PENGIKI	8236	144.5	40	0	1644.44
Cilacap	III	KIP	1	I	KN PRAJAPATI	7294.75	122.25	37	0	648.4
Semarang	II	KIP	1	I	KN KUMBA	1338	605	85	49	1970
		KBP	2	III	KN SUAR 011(scrap)	8042.5	446.5	113	30	1425
				III	KN B-126	8096	634.25	128	30	1918.75
		KPP	1	III	KN KARIMUN JAWA	8492.25	292.25	72	21	1640
Surabaya	I	KIP	2	I	KN BIMASAKTI UTAMA	7671.75	352.25	53	0	2301.4
				I	KN MASALEMBO	8442.75	317.25	59	0	2919.2
		KBP	1	III	KN DAMARA(scrap)	8301.5	458.5	52	0	2248
		KPP	1	III	KN AE-029	8353.5	430.5	68	0	1465.5
Benoa	II	KIP	1	I	KN NUSA PENIDA	8348.5	411.5	68	0	4515.5
		KBP	1	I	KN MIZAN	8607	153	40	0	1049
Banjarmasin	II	KIP	1	I	KN KUNYIT	8520.45	263.55	34	0	2316
		KBP	2	I	KN ALTAIR	8601.18	182.82	22	0	1742
				III	KN SUAR-003(scrap)	8708.42	51.58	5	0	0
		KPP	1	III	KN AE-032(scrap)	8760	0.00	0	0	0
Tarakan	III	KIP	1	I	KN MARATUA	8287	431.75	76	0	4141.5
		KPP	1	III	KN SARANG ALOE	7861.25	178.75	32	61	1775.25
Samarinda	I	KIP	2	I	KN MITHUNA	8066.5	693.5	76	27	6257.5
				I	KN MIANG BESAR	8183.12	576.88	80	30	4375.5
		KBP	1	III	KN SUAR-010	8091.92	668.08	106	0	3487
		KPP	1	III	KN MARAPAS	8562	198	65	0	1352.5
Merauke	III	KBP	1	I	KN MERPATI	8386	374	40	0	0

3) Vessel operating rate

For these 11 DISNAVs, we calculate the annual operating rate of each Vessel. Annual number of days that vessel able to operate is calculated by subtracting the number of docking days from the annual number of active days (365 days). The annual operating rate is the number of operation days divided by the number of days vessel able to operate per year.

Operating rate = operation days ÷ (365 - docking days)

4) Age composition of crew

Data on the age composition crew are aggregated in the Crew age group (Table 4.3.4-5).

Table 4.3.4 -5 : Crew Age Group

No.1

2023.01.01

NO	DISNAV	Vessel name	Age group										TOTAL	Remaks
			Under 20	20-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	Over 60		
1	Semarang	KN Kumba	0	1	0	0	4	1	4	5	2	1	18	Total 26 persons / 2 person with no data age listed
2	Semarang	KN B-126	0	0	0	0	0	1	2	1	1	0	5	Total Crew are 8 persons / 3 perons with no data age listed
3	Semarang	KN Karimun Jawa	0	0	0	1	0	1	4	3	0	0	9	Total Crew are 12 persons / 3 perons with no data age listed
4	Semarang	KN Suar II	0	0	0	0	1	0	1	5	0	0	7	Total Crew are 9 persons / 2 perons with no data age listed
5	Benoa	KN MIZAN	0	0	3	9	3	1	7	1	1	0	25	No Remarks
6	Benoa	KN NUSA PENIDA	0	2	3	2	2	3	2	12	0	0	26	No Remarks
7	Sabang	KN Antares	0	0	2	1	1	2	4	5	0	0	15	Total Crew are 20 persons / 5 perons with no data age listed
8	Sabang	KN Benggala	0	0	2	1	1	1	2	1	0	0	8	Total Crew are 12 persons / 4 perons with no data age listed
9	Belawan	KN Berhala	0	0	0	0	3	6	2	3	1	0	15	Total Crew are 18 persons / 3 perons with no data age listed
10	Belawan	KN Arcturus	0	0	0	2	4	2	4	4	0	0	16	Total Crew are 18 persons / 2 perons with no data age listed
11	Belawan	KN Suar-008	0	0	0	0	2	3	1	1	1	0	8	No Remarks
12	Sibolga	KN Mandalika	0	1	5	6	4	4	2	4	0	0	26	No Remarks
13	Teluk Bayur	KN Sibaru-baru	0	0	3	2	4	4	5	1	1	0	20	Used data 2019/Total Crew are 22 persons / 2 persons with no data age listed / 4 persons same with crew KN Muci
14	Teluk Bayur	KN Muci	0	0	3	0	7	3	1	4	2	0	20	Used data 2021/4 persons same with crew KN Sibaru-baru
15	Tg. Pinang	KN Jadayat	0	0	0	0	1	10	1	5	1	0	18	No Remarks
16	Tg. Pinang	KN Adhara	0	0	0	0	3	4	6	2	1	0	16	No Remarks
17	Tg. Pinang	KN Mitra-IV	0	0	0	0	3	0	2	4	1	0	10	No Remarks
18	Tg. Pinang	KN Suar-004	0	0	0	0	0	0	0	0	0	0	0	No data entry
19	Tg. Pinang	KN Mantang	0	0	0	0	0	1	1	3	4	0	9	No Remarks
20	Tg. Pinang	KN Nongsa	0	0	0	0	0	0	0	0	0	0	0	No data entry
21	Dumai	KN Pari	0	0	0	0	0	0	0	0	0	0	0	No data entry
22	Dumai	KN Rupat	0	0	0	0	0	0	0	0	0	0	0	No data entry
23	Dumai	KN Marore	0	0	0	0	0	0	0	0	0	0	0	No data entry
24	Palembang	KN Kalkan	0	0	0	0	0	0	0	0	0	0	0	No data entry
25	Palembang	KN Daik (D-044)	0	1	0	0	1	1	3	2	0	0	8	No Remarks

No.2

NO	DISNAV	Vessel name	Age group										TOTAL	Remaks
			Under 20	20-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	Over 60		
26	Palembang	KN Mokmer	0	0	0	0	0	0	0	0	0	0	0	No data entry
27	Pontianak	KN Alnilam	0	0	1	0	2	7	3	5	3	0	21	No Remarks
28	Pontianak	KN Pengiki	0	0	1	1	0	2	3	4	1	0	12	No Remarks
29	Pontianak	KN AE-012	0	0	0	0	0	0	0	0	0	0	0	No data entry
30	Tg. Priok	KN Karakata	0	0	4	1	0	5	6	6	0	0	22	No Remarks
31	Tg. Priok	KN Edam	0	1	2	2	2	0	1	6	3	0	17	Total Crew are 19 persons / 2 perons with no data age listed
32	Tg. Priok	KN Misplacidus	0	0	0	0	1	1	0	3	0	0	5	No Remarks
33	Tg. Priok	KN Enggano	0	0	2	0	2	1	0	0	1	0	6	No Remarks
34	Cilacap	KN Prajapati	0	0	0	2	0	4	6	5	4	0	21	No Remarks
35	Cilacap	KN Suar-005	0	0	0	0	0	0	0	0	0	0	0	No data entry
36	Cilacap	KN Suar-007	0	0	0	0	0	0	0	0	0	0	0	No data entry
37	Surabaya	KN Bimasakti Utama	0	0	0	0	0	0	0	0	0	0	0	No data entry
38	Surabaya	KN Masalembo	0	0	0	0	0	0	0	0	0	0	0	Data only has crew names and no date of birth information.
39	Surabaya	KN Damara	0	0	0	0	0	0	0	0	0	0	0	No data entry
40	Surabaya	KN AE-029	0	0	0	0	0	0	0	0	0	0	0	No data entry
41	Kupang	KN Nipa	0	0	0	0	0	0	0	0	0	0	0	No data entry
42	Kupang	KN Mina	0	0	0	0	0	0	0	0	0	0	0	No data entry
43	Banjarmasin	KN Kunyit	0	1	0	2	1	3	3	1	1	0	12	No Remarks
44	Banjarmasin	KN Altair	0	1	0	1	2	2	5	2	0	0	13	Total Crew are 16 persons / 3 perons with no data age listed
45	Banjarmasin	KN Suar-003	0	0	0	0	0	0	0	2	0	0	2	No Remarks
46	Banjarmasin	KN AE-032	0	0	0	0	0	0	1	1	1	0	3	No Remarks
47	Tarakan	KN Maratua	0	2	1	2	6	4	4	6	0	0	25	No Remarks
48	Tarakan	KN Sarang Aloe	0	0	0	0	1	3	1	3	0	0	8	No Remarks
49	Samarinda	KN Mithuna	0	0	0	0	1	4	2	5	4	0	16	No Remarks
50	Samarinda	KN Miang Besar	0	0	0	1	2	1	1	7	1	0	13	No Remarks
51	Samarinda	KN Suar-010	0	0	0	1	0	0	0	1	3	0	5	No Remarks
52	Samarinda	KN Marapan	0	0	0	0	0	1	1	1	0	0	3	No Remarks

No.3

NO	DISNAV	Vessel name	Age group										TOTAL	Remaks
			Under 20	20-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	Over 60		
53	Makassar	KN De Brill	0	0	0	2	8	5	2	3	0	0	20	No Remarks
54	Makassar	KN Mengkara	0	0	0	1	3	7	1	2	2	0	16	No Remarks
55	Makassar	KN B-129	0	0	0	0	0	0	0	0	0	0	0	No data entry
56	Makassar	KN Akelamo	0	0	0	0	0	0	0	0	0	0	0	No data entry
57	Kendari	KN Mayang	0	0	0	0	0	0	0	0	0	0	0	No data entry
58	Kendari	KN Andromeda	0	0	0	0	0	0	0	0	0	0	0	No data entry
59	Bitung	KN Miangas	0	0	0	0	0	0	0	0	0	0	0	No data entry
60	Bitung	KN Merak	0	0	0	0	0	0	0	0	0	0	0	No data entry
61	Bitung	KN Suar-009	0	0	0	0	0	0	0	0	0	0	0	No data entry
62	Ambon	KN Bacan	0	0	0	1	2	5	4	3	1	0	16	No Remarks
63	Ambon	KN Alphard	0	0	0	0	2	2	12	1	0	0	17	No Remarks
64	Sorong	KN Pradawana	0	0	0	0	0	0	0	0	0	0	0	The data same with KN. YEFYUS
65	Sorong	KN Yefyus	0	0	0	0	1	3	6	7	0	0	17	No Remarks
66	Sorong	KN Kofiau	0	1	0	0	1	2	1	4	1	0	10	No Remarks
67	Jayapura	KN Aldebaran	0	0	0	1	3	0	4	1	0	0	9	No Remarks
68	Jayapura	KN Bepondi	0	0	0	0	0	0	0	0	0	0	0	No data entry
69	Merauke	KN Merpati	0	0	0	0	5	4	5	4	2	0	20	No Remarks
70	Merauke	KN Bintangur	0	0	0	0	0	0	0	0	0	0	0	No data entry
71	Tual	KN Mahkota	0	0	0	6	11	4	0	0	1	0	22	No Remarks

5) Scrapping and transfer plan for Vessels for Aids to Navigation

The scrapping and transfer of Vessels for Aids to Navigation is planned according to the Navigation Vessel Scrap and Transfer Plan (Table 4.3.4-6).

Table 4.3.4 -6 : Navigation Vessel Scrap and Transfer Plan

NO	DISNAV	DISNAV Class	Vessel type	Vessel Class	Name of Vessel	Year of Built	Age as of 2022
5	Tg. Pinang	I	KBP	III	KN MITRA-IV	1975	47
7	Teluk Bayur	II	KBP	I	KN MUCI	1975	47
10	Semarang	II	KBP	III	KN SUAR 011	1980	42
11	Surabaya	I	KBP	III	KN DAMARA	1953	69
			KPP	III	KN AE-029	1969	53
14	Banjarmasin	II	KBP	III	KN SUAR-003	1971	51
			KPP	III	KN AE-032	1971	51
22	Sorong	III	KIP	I	KN PRADAWANA	1979	43
24	Merauke	III	KPP	IV	KN BINTANGUR	1967	55

According to DISNAV Surabaya, KN AE-029 continues to operate.

Plan to move to DISNAV Sorong (replacement of KN PRADAWANA)

19	Kendari	III	KBP	I	KN MAYANG	1996	26

6) Vessels for Aids to Navigation List

The existing Vessels for Aids to Navigations are as shown in the Navigation Vessel List (Table 4.3.4-7).

Table 4.3.4 -7 : Navigation Vessel List

NO	DISNAV	Class	Navigation Vessel						AtoN managed by Vessel			
			Type of Vessel	Number of Vessels	Class	Name of Vessel	Year of Built	Age as of 2023	Light-House	Light-Beacon	Light-Buoy	Unlighted Buoy
1	Sabang	II	KBP	1	I	KN ANTARES	1999	24				
			KPP	1	III	KN BENGGALA	2016	7				
2	Belawan	I	KIP	1	I	KN BERHALA	2017	6				
			KBP	2	I	KN ARCTURUS	1999	24				
					III	KN SUAR-008	1973	50				
3	Sibolga	III	KBP	1	I	KN MANDALIKA	1975	48				
4	Teluk Bayur	II	KIP	1	I	KN SIBARU-BARU	2017	6				
5	Tg. Pinang	I	KIP	1	I	KN JADAYAT	2003	20				
			KBP	1	I	KN ADHARA	1999	24				
			KPP	2	III	KN MANTANG	2000	23				
					V	KN NONGSA	2014	9				
6	Dumai	I	KIP	2	I	KN PARI	1978	45				
					I	KN RUPAT	2017	6	2	3	10	3
			KPP	1	III	KN MARORE	2011	12				
7	Palembang	I	KIP	1	I	KN KALIAN	2017	6	4	89	39	
			KBP	1	III	KN DAIK(D-044)	1953	70		32	23	
			KPP	1	III	KN MOKMER	1999	24				
8	Pontianak	III	KBP	1	I	KN ALNILAM	2008	15	2	3	10	3
			KPP	1	III	KN PENGIKI	2016	7	7		10	
9	Tg. Priok	I	KIP	2	I	KN KARAKATA	1972	51				
					I	KN EDAM	2017	6				
			KPP	2	III	KN MIAPLACIDUS	2008	15				
					III	KN ENGGANO	2016	7				
10	Cilacap	III	KIP	1	I	KN PRAJAPATI	1971	52			10	3
11	Semarang	II	KIP	1	I	KN KUMBA	1972	51	3	15	10	
			KBP	1	III	KN B-126	1961	62	2	10	8	
			KPP	1	III	KN KARIMUN JAWA	2016	7	2	10	8	
12	Surabaya	I	KIP	2	I	KN BIMASAKTI UTAMA	2008	15				
					I	KN MASALEMBO	2017	6	6	18	41	13
			KPP	1	III	KN AE-029	1969	54				
13	Benoa	II	KIP	1	I	KN NUSA PENIDA	2017	6	16	93	42	1
			KBP	1	I	KN MIZAN	1996	27	16	93	42	1
14	Kupang	II	KIP	1	I	KN NIPA	2017	6				
			KBP	1	I	KN MINA	1997	26				
15	Banjarmasin	II	KIP	1	I	KN KUNYIT	2017	6	5	7	10	3
			KBP	1	I	KN ALTAIR	1999	24	5	7	10	3
16	Tarakan	III	KIP	1	I	KN MARATUA	2017	6	3	53	17	
			KPP	1	III	KN SARANG ALOE	2010	13		11	12	1
17	Samarinda	I	KIP	2	I	KN MITHUNA	1975	48	3	22	43	1
					I	KN MIANG BESAR	2017	6	3	47		
			KBP	1	III	KN SUAR-010	1975	48	1	22	23	
			KPP	1	III	KN MARAPAS	1999	24	1	21	17	
18	Makassar	I	KIP	1	I	KN DE BRILL	2017	6	16	121	20	
			KBP	2	I	KN MENGKARA	1996	27				
					III	KN B-120	1961	62				
			KPP	1	III	KN AKELAMO	2012	11				
19	Kendari	III	KBP	2	I	KN MAYANG	1996	27				
					I	KN ANDROMEDA	2017	6				
			KPP	1	IV	KN WANGI-WANGI		2023				
20	Bitung	I	KIP	1	I	KN MIANGAS	2017	6	5	7	10	3
			KBP	2	I	KN MERAK	1996	27	5	7	10	3
					III	KN SUAR-009	1974	49	24	90	26	3
21	Ambon	I	KIP	1	I	KN BACAN	2016	7	12	172	9	14
			KBP	1	I	KN ALPHARD	2008	15	12	172	9	14
22	Sorong	III	KIP	1	I	KN YEFYUS	2017	6				
			KPP	1	III	KN KOFIAU	2012	11				
23	Jayapura	II	KBP	1	I	KN ALDEBARAN	1999	24				
			KPP	1	III	KN BEPONDI	2016	7				
24	Merauke	III	KBP	1	I	KN MERPATI	1997	26	2	55		
25	Tual	III	KBP	1	I	KN MAHKOTA	1997	26	11	78	4	
	Sub-Total		*KIP*	22								
			KBP	22								
			KPP	16								
	Total			60								
									168	1,258	473	

a. Vessels aged over 40 years old 13 vessels

b. Vessels aged 31 to 40 years 0 vessel

c. Vessels aged 21 to 30 years 15 vessels

d. Vessels aged 20 years or less 31 vessels

e. Unknown 1 vessel

4.3.5 Points to consider when creating an establishment plan

When planning the establishment of Vessels for Aids to Navigation, it is necessary to keep the following in mind.

1) Annual operating rate

If there are vessels of the same type among Vessels for Aids to Navigation belonging to DISNAV, consider the sum of the operating rates of the same vessels type.

2) Vessel age

The service life of a vessel is generally said to be 20 years for steel vessels.

3) Status of installed equipment

Condition of cranes and other equipment necessary for operations, as well as engines, radar, and other equipment necessary for navigation, should be ascertained.

4) Technical skills of the crew

In order to acquire the following technical capabilities and skills, education at specialized training institutions is necessary.

a. Engine-related technical capabilities that can respond in the event of an engine failure
b. Ability to navigate safely to the nearest port without navigational instruments if navigational instruments become unavailable.
c. Effective and efficient maintenance capability

5) Special characteristics of sea areas

Selection of Vessel considering the peculiarities of the sea area

4.3.6 Establishment plan

1) Annual operating rate of each Vessel

The annual operating rate of each Vessel is shown in the Annual operating rate (Table 4.3.6 -1)

Table 4.3.6 -1 : Annual Operating Rate

DISNAV	Class	Navigation Vessel						
		Type of Vessel	Class	Name of Vessel	Docking days	Action days per years	day of action	Annual operating rate (%)
Pontianak	Ⅲ	KBP	Ⅰ	KN ALNILAM	30	365	45	14
		KPP	Ⅲ	KN PENGIKI	30	365	40	12
Cilacap	Ⅲ	KIP	Ⅰ	KN PRAJAPATI	30	365	37	11
Semarang	Ⅱ	KIP	Ⅰ	KN KUMBA	49	365	85	27
		KBP	Ⅲ	KN SUAR-011(scrap)	30	365	113	34
		KBP	Ⅲ	KN B-126	30	365	128	39
		KPP	Ⅲ	KN KARIMUN JAWA	30	365	72	22
Surabaya	Ⅰ	KIP	Ⅰ	KN BIMASAKTI UTAMA	30	365	63	16
			Ⅰ	KN MASALEMBO	30	365	59	18
		KBP	Ⅲ	KN SUAR-003	30	365	52	16
		KPP	Ⅲ	KN AE-029(scrap)	30	365	68	21
Benoa	Ⅱ	KIP	Ⅰ	KN NUSA PENIDA	30	365	68	21
		KBP	Ⅰ	KN MIZAN	30	365	40	12
Banjarmasin	Ⅱ	KIP	Ⅰ	KN KUNYIT	30	365	34	11
		KBP	Ⅰ	KN ALTAIR	30	365	22	7
		KBP	Ⅰ	KN SUAR-003(scrap)	30	365	5	2
		KBP	Ⅰ	KN AE-032(scrap)	30	365	0	0
Tarakan	Ⅲ	KIP	Ⅰ	KN MARATUA	30	365	76	23
		KPP	Ⅲ	KN SARANG ALOE	61	365	32	11
Samarinda	Ⅰ	KIP	Ⅰ	KN MITHUNA	30	365	76	23
			Ⅰ	KN MIANG BESAR	30	365	80	24
		KBP	Ⅲ	KN SUAR-010	30	365	106	32
		KPP	Ⅲ	KN MARAPAS	30	365	65	20
Merauke	Ⅲ	KBP	Ⅰ	KN MERPATI	30	365	40	12

※If the number of docking days is not submitted or less than 30 days, it will be calculated as 30 days.

2) Vessels for Aids to Navigation Establishment Plan (From Implementation)

The total operating rates of Navigation Vessels belonging to DISNAV by vessel type are shown in the Navigation Vessel Plan (Table 4.3.6-2).

Table 4.3.6 -2 : Vessels for AtoN Establishment Plan

DISNAV	Class	Navigation Vessel						
		Type of Vessel	Class	Name of Vessel	Year of Built (year)	Age as of 2023 (year)	Annual operating rate (%)	Operating rate total (%)
Pontianak	Ⅲ	KBP	I	KN ALNILAM	2008	15	14	26
		KPP	Ⅲ	KN PENGIKI	2016	7	12	
Cilacap	Ⅲ	KIP	I	KN PRAJAPATI	1971	52	11	11
Semarang	Ⅱ	KIP	I	KN KUMBA	1972	51	27	27
		KBP	Ⅲ	KN SUAR-011	1980	43	34	95
		KBP	Ⅲ	KN B-126	1961	62	39	
		KPP	Ⅲ	KN KARIMUN JAWA	2016	7	22	
Surabaya	I	KIP	I	KN BIMASAKTI UTAMA	2008	15	16	34
			I	KN MASALEMBO	2017	6	18	
		KBP	Ⅲ	KN SUAR-003	1971	52	16	37
		KPP	Ⅲ	KN AE-029	1971	52	21	
Benoa	Ⅱ	KIP	I	KN NUSA PENIDA	2017	6	21	21
		KBP	I	KN MIZAN	1996	27	12	12
Banjarmasin	Ⅱ	KIP	I	KN KUNYIT	2017	6	11	11
		KBP	I	KN ALTAIR	1999	24	7	9
		KBP	I	KN SUAR-003	1971	52	2	
		KBP	I	KN AE-032	1971	52	0	
Tarakan	Ⅲ	KIP	I	KN MARATUA	2017	6	23	23
		KPP	Ⅲ	KN SARANG ALOE	2010	13	11	11
Samarinda	I	KIP	I	KN MITHUNA	1975	48	23	47
			I	KN MIANG BESAR	2017	6	24	
		KBP	Ⅲ	KN SUAR-010	1975	48	32	52
		KPP	Ⅲ	KN MARAPAS	1999	24	20	
Merauke	Ⅲ	KBP	I	KN MERPATI	1997	26	12	12

a. DISNAV Pontianak is considered possible to carry out the work with only one vessel (KN ALNILAM) if we look only at the operating rate.

b. DISNAV Semarang will have two vessels in its fleet due to the scrapping of KN Suar-011, but if we look only at operating rate, the remaining two vessels are considered possible to carry out the work. However, since the KN B-126 is 62 years old, a replacement vessel is urgently needed for safety reasons.

c. DISNAV Surabaya's KIP Buoy Tender has two vessels, but if we look only at the operating rate, two vessels together account for 34%, so it is considered possible to carry out the work with just one vessel.

d. DISNAV Banjarmasin plans to scrap two vessels (KN SUAR-003, KN AE-032), leaving one Buoy Tender and one Aids Tender, but the operating rate indicates that they can adequately carry their work.
However, since there were 3 Aids Tenders in the fleet despite this low operating rate, it seems necessary to reconfirm their operations.

e. DISNAV Samarinda has two vessels for both Buoy Tender and Aids Tender, but since the operating rate of the two vessels is 47% and 52%, it is considered possible to carry out the work with one vessel.

3) Vessels for Aids to Navigation Establishment Plan (from operation plan)
"TABEL PERHITUNGAN HARI PRODUKTIF" of DISNAV Semarang describes the annual operating days of each Vessel.
KN KUMBA 194 days, KN KARIMUN JAWA 118 days, KN SUAR-011 88 days, KN B-126 89 days.
The operating rates of these vessels are shown in the table below.

Tipe of Vessel	Class	Name of Vessel	Docking days (day)	Operation days per years (day)	Day of Operation (day)	Annua operating rate (%)	Operatin grate total (%)
KIP	I	KN KUMBA	49	365	194	62	62
KBP	III	KN SUAR-011	30	365	88	27	90
KBP	III	KN B-126	30	365	89	27	
KPP	III	KN KARIMUN JAWA	30	365	118	36	

The operating rate will be 62% for Buoy Tender KN KUMBA and 90% for the remaining three Vessel.
KN SUAR-011 is scheduled to be scrapped and will be a two-ship system, but the remaining two ships are considered to be able to carry out the work.
However, KN B-126 is 62 years old, so a replacement ship is urgently needed from a safety point of view.
The operating rate was calculated from the annual operation plan, but it is necessary to consider that the number of annual operating days does not include unpredictable operations at the planning stage.

Example: Temporary standby due to bad weather during patrol
Operation of Search & Rescue

4.3.7 Promotion of the Vessels for Aids to Navigation Establishment Plan

1) Early scrapping of aging Vessels

Vessels over 40 years old are scrapped for safety reasons.

At that time, DISNAV, which owns multiple vessels, will consider whether the remaining vessels can carry out the work and determine the necessity of alternative vessels.

The fact that there are many affiliated ships means that the maintenance cost that can be used for one ship is small, and only half-finished maintenance can be performed.

2) Improving technical skills of crew members

According to a report from DISNAV, training of young crew members is necessary as most ships will retire within five years (some within a year).

Acquisition of qualifications is of the utmost importance, and it is necessary to have the crew obtain nautical, engineering or communications qualifications.

In addition to qualifications, reliable maintenance of each facility and equipment by the person in charge of navigation, organization or communication will maintain the function of the ship appropriately.

In order to improve such skills, it is necessary to educate at a specialized institution, and it seems possible by taking turns educating the crew members who will be scrapped.

3) Hybrid Vessels for Aids to Navigation

When building a new Vessel for Aids to Navigation, a hybrid of buoy tender and Aids tender can be used to make a large vessel for navigational aids, so that crew members who will be scrapped can be boarded.

4) Early acquisition of route patterns and action plans for Vessels for Aids to Navigation

It is important to obtain the current route patterns and operation plans of Vessels for Aids to Navigation, and to quickly obtain plans for changes in Vessels for Aids to Navigation operations, such as the establishment of new AtoN.

This will make it possible to deal with large-scale changes.