

Underwater Blasting Execution Plan



1. General Plan

1.1 Drilling and Blasting Sequence

Drilling and Blasting will be carried out in four stages.

- I. Drilling
- II. Charging
- III. Blasting
- IV. Dredging

1.2 Execution Method

A. Background.

- * Volume of rock and explosive materials will be determined by Blasting Technical Manager.
- * Execution period will be depending on blasting area.

B. Preparation Work

- * Preparation must be completed before executing the underwater blasting.
- * The Blasting Technical Manager carries out the calculation of the exact volume of rock to be blasted

C. Preparation of Equipment and Materials

- * Prospected drilling equipments to be operated are as follows;

Drilling barge: 120FT Flat Barge
Drill machine: Drilling Rig
Compressor (300psi)
Generator (125KVA)
Welding machine (600mA)
Global positioning system
Other sufficient equipment and spare parts for drilling and materials.

- * Prospected explosives and blasting accessories to be used are as follows:

~~Explosive: Powergel - Magnum 3151;~~
Primer: Anzomex -- 175 gr, Anzomex -- 400 gr,
Detonator down the hole: Exel 400 mS.
Surface detonator: CSD - 125
Detonator cord LIL - 150 m and LIL - 300 m
Electric delay detonator: 25 mS, No. 8
PVC pipe
Boat (Security and Guard)
Temporary explosives store on Land (Capacity of 5 tones) - ? where

D. Manpower

- * Prospected manpower for the work is as follows;
Barge Manager
Assistant Barge Manager

Exhibit 2
Underwater Blasting Execution Plan
PEA-019-06 Peleliu Port Expansion
& Channel Dredging Project
(Amendment to PEA-082-00)

Drilling workers: Driller , Assistant driller , Mechanics, Deck man
 Blasting Technical Manager
 Blasting Specialist
 Charging worker
 Diver (If necessary)
 Enough workers to operate the other equipment
 Enough security workers (to co-operate with blasting workers)

E. Working Time (Country Depends)

- * Prospected working time of the work is as follows;
- Drilling: 2 shift/day (each shift 9 hours including 1 hour handover)
- Blasting: 1 or 2days/blast

F. Prospected Hard Rock Seabed Area in the Access Channel of North Dock in Peleliu State

- * 110m between Navigation Pole No.16R and 18R ✓
- * 80m between Navigation Pole No.20R and 22R ✓

1.3 Drilling and Blasting Underwater Technology.

1.3.1 Drilling Sequence

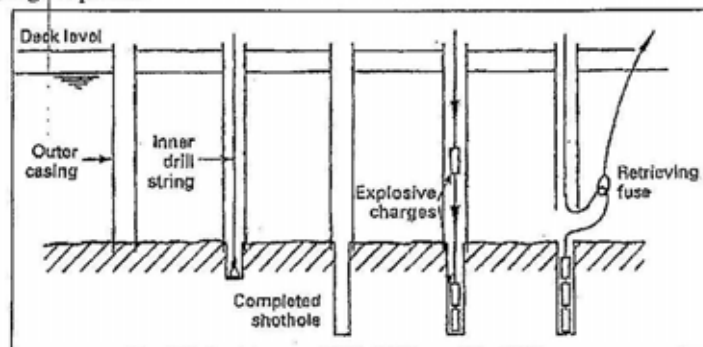


Figure 1.3.1-1 Drilling Sequence

- * Move the drill barge to the proposed drilling position.
- * Positioning of drill barge by GPS
- * Move the drilling rig on the rail to the drilling positions.
- * Start the drilling operations: Install the steel casing and begin the drilling by the down hole hammer from drilling barge, Install PVC pipe for charging.
- * Move the drill barge to the next position.

1.3.2 Blasting Technology

A. Blasting at Drilling Area

- * Method: Use Delay Non-electric Blasting between the blasting holes with the medium dimension of the borehole (Ø76mm, Ø91mm, Ø110mm)
- * Blasting frequency: 1-2days
- * Charging volume: see Table 1.3.2-1

- * Generally, maximum explosive volume for a blast is 2,000 kg (depends on the Country)
- * Handling and charging by Blasting Specialist and charging worker.
- * Non-electric Delay Blasting Chart: use the delay time across the rows.
- * The surface detonators have the delay time of 2.5 mses (millisecond), in parallel pattern.
- * The detonators down the hole have the delay time of 400 mses (millisecond), in parallel pattern.

Table 1.3.2-1 Typical Blast Ratios for Charging Volume of Explosive

Description	Type of Rock	Type of Dredger			
		Bucket kg/m ³	Cutter kg/m ³	Backhoe kg/m ³	Grab kg/m ³
Easy to blast	Corals, medium limestone, mudstones, shale, siltstones	0.60	0.60	0.55	0.80
Moderate to blast	Hard lime stones, sandstones, marls	0.80	0.90	0.75	1.00
Difficult to blast	Granites, dolerites, gneisses, basalts	1.00	1.20	0.90	1.20

1.3.3 The Execution of Blasting

A. Preparation

- * Establish the blasting document: based on the drilling document and the drilling Log Book in order to establish the blasting document, which must be in compliance with the country/state regulations, if necessary.
- * Preparations of explosives and blasting accessories.
- * Weight and pack blasting materials at temporary store for each blasting hole. This must be in compliance with the blasting document.
- * Transport of the explosives and blasting accessories to the drill barge.
- * Prepare adequately the necessary equipment ensuring the transport at sea and safety for all operations.
- * Put together the blasting charge frame to the drill barge.
- * Connect the plastic casing from top of borehole to the blasting charge frame.
- * Based on blasting document, charge explosives and blasting accessories into blasting hole
- * Blockade at radius 300 m during charging (from the blasting area).
- * Distribute the blasting materials for each blasting hole.
- * Charge explosives, blasting accessories and stem into each blasting hole.
- * Withdraw the plastic casing out of connectors and take the detonators on the

drill barge.

- * Connect and check the blasting network.
- * Submerge all the detonators under sea surface about 3m.
- * Move the drill barge to the safety area.
- * The perforated tubes, through which compressed air is fed, will be laid on the seabed.
- * Switch on the air compressor

B. Blasting Sequence

- * Set the blockade security team
- * Issue a blasting blockade order, and request anyone and any types of transport to move out of the blockade area.
- * Control and check necessary problems and issue shooting order of blast.
- * Join the lead – in – line (LIL) to the blasting network and shoot the blast.
- * Check the blast after blasting. If any technical trouble occurs, resolve immediately.
- * Issue clear sound after perfecting blasting.
- * Collect the redundant and spare explosives and blasting accessories and remove to the temporary store.
- * Remove blasted material.
- * Demobilize Blast Equipment
- * Complete.
- * Survey and inspect.

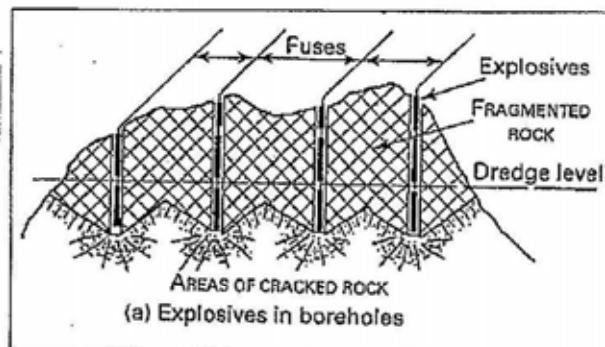


Figure 1.3.3-1 Cross-section of Seabed to be blasted (Arrangement of Explosive Holes)

2. Safety and Environmental Plan

2.1 Safety Assurance

- * Blasting documentation shall be established in accordance with the Country / State Regulations, if necessary
- * All blasting executions shall follow the standard and other current State regulations regarding "storage, transport, and safe industrial use of explosives materials", if necessary.
- * For the security and safety of operations during each blast, the blasting area shall be blockaded at a radius of 300m radial distance from the blast location.

- * The equipment for security and guard operations is as follows :
 - Mobile boat: 2 units, (always moving at sea).
 - Motor boat: 4 units for guard station at sea.
 - Each station will be equipped with walkie-talkie, binocular, flag, armband, horn, loudspeaker, and lifebuoys.
 - Sufficient and suitable personal protection equipment shall be provided for operating manpower.
- * The daily blasting time shall be according to the state regulations.
- * The order to execute a blast shall be signaled by the following steps:
 - Blockade order: 3 long tone sounds and by walkie-talkie to the sub-stations.
 - Start boosting: 9 smart beating sound + loudspeaker (and by walkie-talkie to the sub-stations).
 - All-Clear signal: 1 long sound signal = loudspeaker.

2.2 Environmental Assurance

- * Throughout the whole of blasting work we shall prepare the air curtain system to avoid that the coral reef will be damaged.
- * The air escaping through the small perforations produces a curtain of bubbles from bed to water surface. When the shockwave hits the bubble curtain it is absorbed by the bubbles and transmitted in an altered form.
- * The bubble curtain will reduce the diffusion of muddiness.
- * The perforated tube will be laid on the seabed by about 50-100 meters square, are dependent on the blasting volume, around blasting area.



Republic of Palau
Environmental Quality Protection Board

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PERMIT CONDITIONS

PEQPB EARTHMOVING PERMIT NO. PEA-82-00

MINISTRY OF RESOURCES AND DEVELOPMENT

THIS PERMIT EXPIRES ON DECEMBER 31, 2001

GENERAL CONDITIONS

1. Earthmoving operations and construction will be conducted in accordance with Palau National Code (PNC), Title 24, and Earthmoving Regulations, Chapter 2401-1 promulgated thereunder, and in a manner that erosion and sedimentation, siltation of surrounding reefs or pollution to fresh water lens, surface and marine waters will not exceed that which would occur under natural conditions.
2. This permit is issued only to the Ministry of Resources and Development and its agents, as the permittees to perform the work specified herein: To place dredged coral taken from the *Peleliu Channel Dredging* as fill material to enlarge the *Bkulngerbekall* Dock in Peleliu State. The maximum size of the fill area shall be 300 feet by 300 feet. This permit is not transferable to other projects, firms or agencies. All work shall be completed in accordance with the EQPB regulations, permit application, project plans and specifications, erosion and sedimentation control plan and environmental assessment on file with the Palau Environmental Quality Protection Board (EQPB). Other facilities and activities not described in the permit application, project description, plans and specifications are prohibited.
3. This permit does not give any property rights, either in land or materials, or any exclusive privileges to permittees, and does not authorize injury to private property or invasion of private rights. This permit does not represent any opinions or representations by EQPB regarding the validity or nature of permittee's land use rights
4. Issuance of this permit confers no responsibility on EQPB, and EQPB assumes no liability now or later for any events associated with the planning, design, construction or performance of the permitted facilities for their intended purposes.
5. Permittee will obey and conform to all laws, regulations and rules of the Republic of Palau in performing the earthmoving activity and construction of the project facilities.

Exhibit 3
Original Permit Conditions
PEA-019-06 Peleliu Port Expansion
& Channel Dredging Project
(Amendment to PEA-082-00)

6. Conditions of this permit require the permittee to submit various designs and plans for EQPB approval. These designs, plans, and any conditions of EQPB's approvals are hereby incorporated by reference and shall be considered fully enforceable conditions of this permit.
7. The permittee shall conduct these earthmoving activities in a manner so as to minimize any adverse impact of the work on fish, wildlife and the natural environmental.
8. No debris, petroleum products, or other deleterious materials shall be allowed to fall, flow, leach or otherwise enter any nearby body of water.
9. All activities shall be conducted in accordance with the plans, specifications, terms, representations, and depictions of the approved application as modified by the terms and conditions of this permit
10. The Palau EQPB staff has the right to enter, photograph, inspect, review records and collect samples at the project site at any reasonable time
11. EQPB shall be notified 48 hours prior to beginning the construction. A copy of this earthmoving permit and its conditions shall be posted at the site or in the office for public display.

SPECIAL CONDITIONS

1. Prior to placement of any fill materials, the boundaries of the fill area shall be staked out and inspected by EQPB Staff. The fill area shall be limited to the 300 feet by 300 feet area as shown in the project plans.
2. Prior to the placement of any fill materials, the permittee shall enclose the entire perimeter of the proposed reclamation site with commercial grade silt/turbidity curtains equipped with skirt, floats, ballast and proper anchorage. Specifications and drawings describing the silt curtain design shall be submitted to EQPB for approval prior to their deployment. Silt curtains shall be of sufficient length to extend from the water's surface to the bottom, regardless of tide, and shall be anchored properly to withstand the effects of tides and current. Silt curtains shall be installed for inspection by EQPB at least one week prior to commencement of the filling operations, and must be approved prior to beginning the filling operations.
3. Silt curtains shall be inspected daily for damage and flow of silt outside the curtain to ensure that the curtains are properly installed and maintained in good working conditions during the work.

4. Permittees shall use only clean dredged coral as fill and shall not discharge chemicals, oil, grease, or any other deleterious substances that may affect or alter the quality of the surrounding water.
5. Any temporarily stockpiled materials stored on dry land shall be stabilized to prevent runoff and sedimentation of the nearby waters. Stockpiles shall be stabilized with geo-textile fabric, tarps, sandbags and/or other suitable means approved by EQPB. If sandbags are used, they shall be placed at the base of stockpiles at the height of two feet until the stockpiles are removed. No stockpiles shall be stored in wetland areas, such as mangroves and the like.
8. Oil containment booms and absorbent pads will be available at the site in case of any spills of construction fuels or lubricants.
9. Fueling of equipment during construction shall be contained and as far away from the shoreline as practicable. There shall be no fueling of equipment on any temporary berms.
10. The permittees shall notify the EQPB at least 48 hours prior to beginning the construction of the project.

MODIFICATION, CHANGE OR REVOCATION OF PERMIT

The Palau Environmental Quality Protection Board may, after taking into account any significant detrimental environmental degradation resulting from the permitted activity, change or modify the conditions of the permit to minimize such degradation, or partially, or in whole revoke the permit should the Board determine such action to be justified and appropriate for environmental protection.

In issuing this permit, the Board has relied on the information and data which the permittee has provided in connection with his permit application. If, subsequent to the issuance of this permit, such information and data prove to be false, incomplete or inaccurate, this permit may be modified, suspended or revoke, in whole or in part.

Violation or failure to comply with the conditions of this permit may result in imposition of a civil penalty in an amount not to exceed \$10,000 per day, and/or an enforcement action to cease, desist and abate all violations.

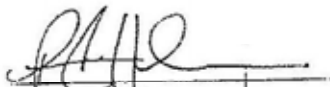
I have read and understand this permit and its conditions, and by my signature below agree to comply with them



Marcelino Melairei

Minister, Ministry of Resources and Development

01-10-00
Date



Paula R. Holm

Chairperson, Palau EQPB

12/29/99
Date

Appendix 6-6. Relevant Information of Management and Maintenance Plan
 Appendix 6-6-1. Example of Monitoring Bathymetric Survey

(1) Survey Frequency

Dredged areas in the Access Channel (length 5,500 m) will be divided into 11 sites (each 500 m in length). Survey lines will be set at intervals of 20m in cross-section of the sites.

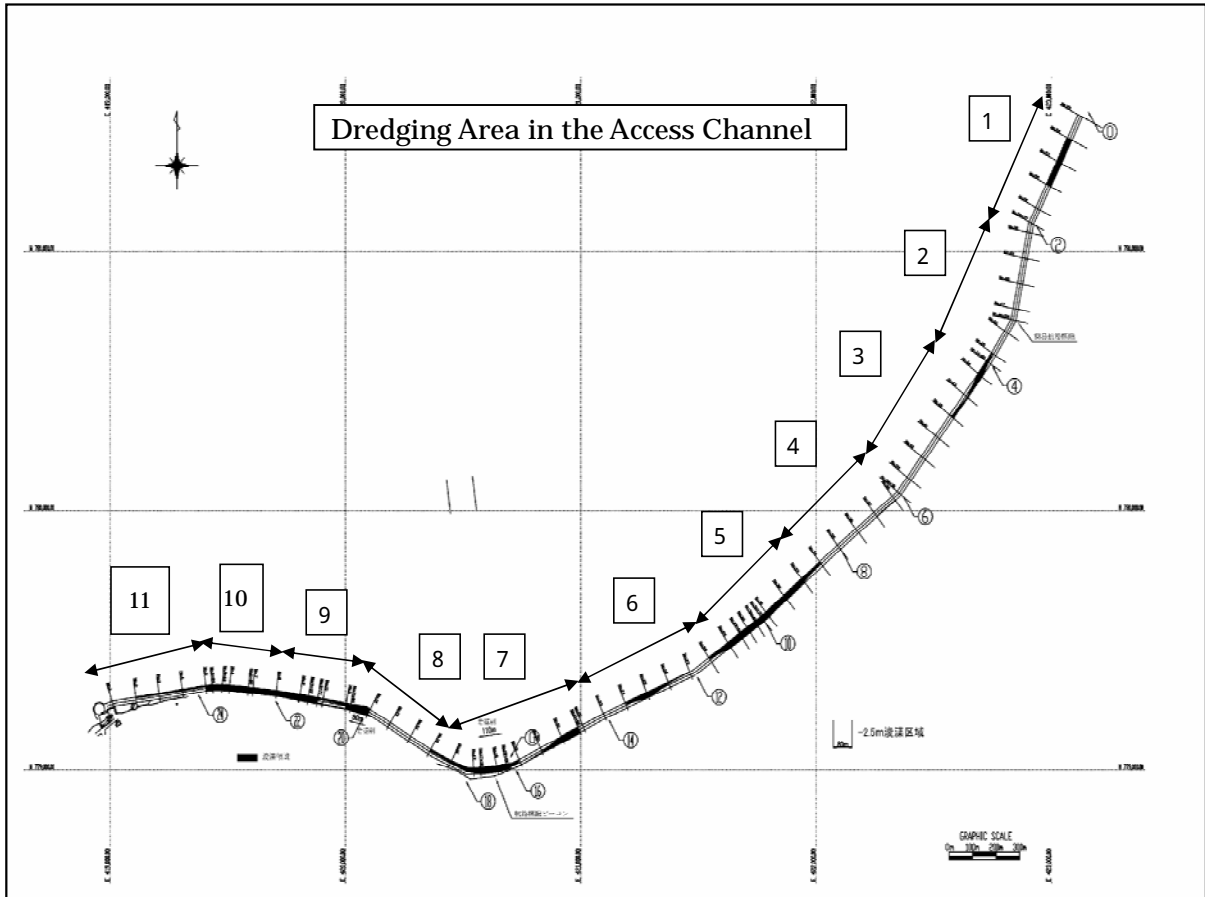


Figure A6.6.1(1)-1 Survey Sites in the Access Channel

(2) Measuring Points

Measuring points in the survey line will be at more than 7 points such as both edges, both dredged sloping ends quarter points of cross-section and center of the Access Channel.

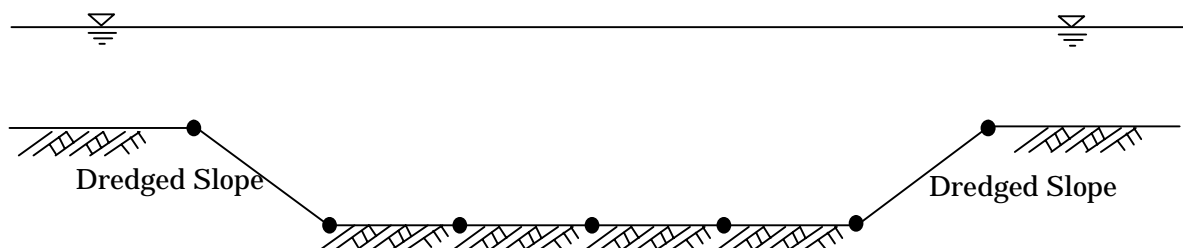


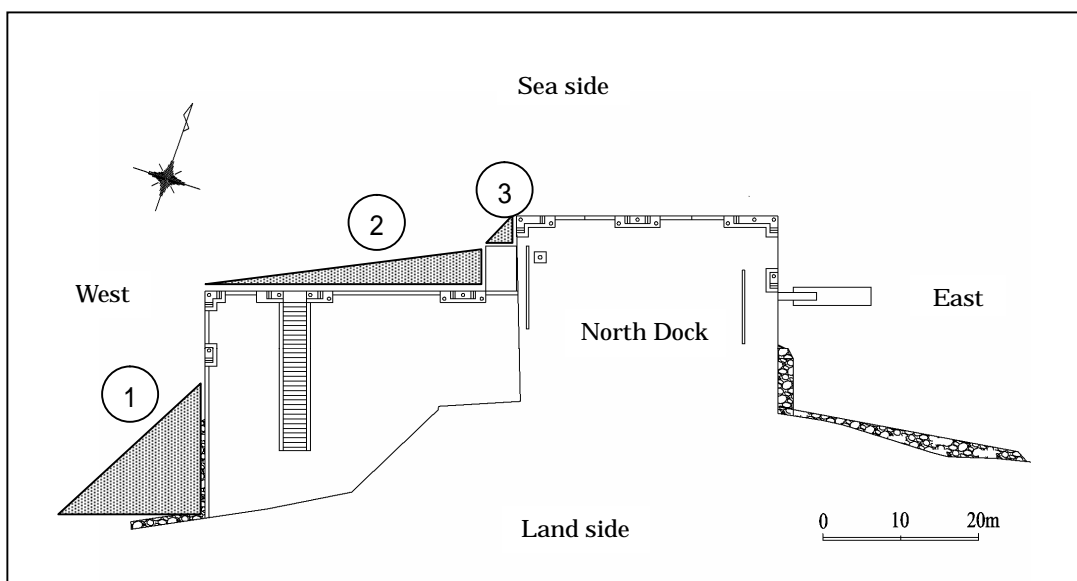
Figure A6.6.1(2)-1 Measuring Point (Cross Section)

Appendix 6-6-2. Example of Maintenance Dredging Plan

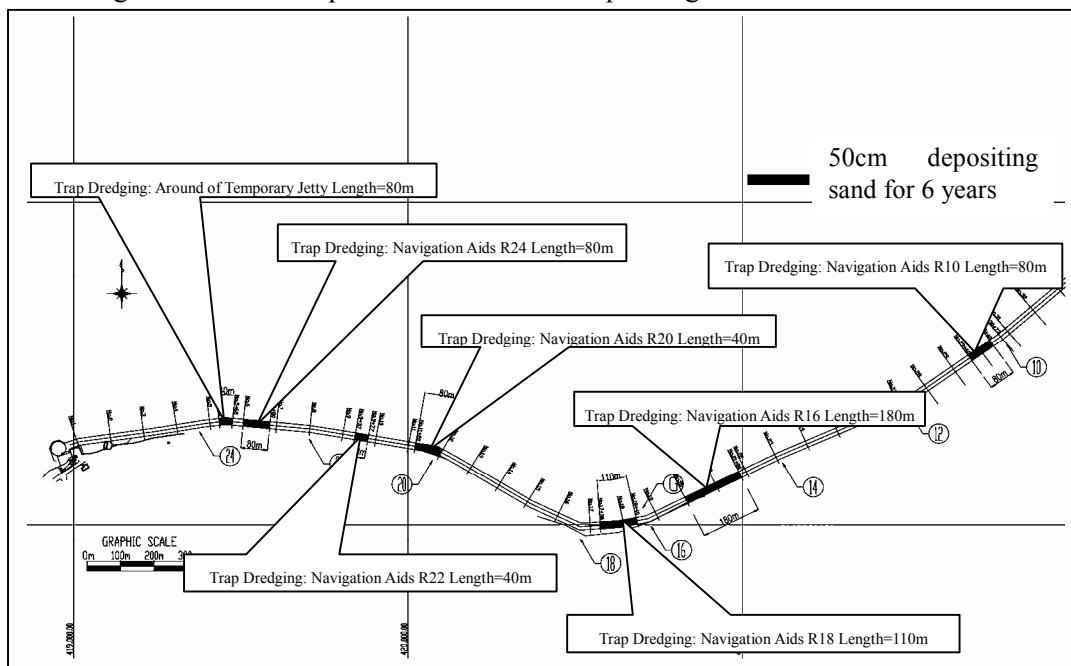
Prospect for depositing sand by comparison of survey results between 1999 and 2005 are shown in FigureA6.6.2-1 and-2. Location of deposited sand will be prospected below.

- (1) Beside the western revetment of extended pier of North Dock
- (2) In front of the ramp-way of the pier of North Dock
- (3) Beside the western side of pier of North Dock
- (4) Sand trapping area in the channel

However, exact prospect of depositing speed and scale is difficult to be maintained because the data of continuous survey results has not been existed. Japan side recommends that the Government of Palau shall execute the continuous bathymetric survey in the basin and access channel.



FigureA6.6.2-1 Prospected Area of Sand Depositing in the Basin of North Dock



FigureA6.6.2-2 Prospected Area of Sand Depositing in the Access Channel (: Sand Trapping Area)