Marine Scotland

BAE Systems Deep Water Berth Scostsoun Shipyard

Additional Information Section 5 (h) Method Statement

The works are to deepen the existing berth and pits at BAE Systems Deep Water Berth, Scotstoun Shipyard on the River Clyde. The works are required to facilitate the fit out of the new T26 Frigates currently being constructed on the Clyde.

The prosed methodology of works is anticipated to be undertaken in the following sequence and phases.

Phase 1 Initial Dredging

The existing three pits will be dredged to their current maintenance dredge level by marine plant using tried and tested dredging methods, which although not finalised will be a combination of using a suction dredger or grab dredger or marine based plant working in conjunction with a hopper barge.

Phase 2 Removal of Reinforced Section of Pits

On completion of the initial dredging the existing sections of the pits constructed in reinforced concrete will be broken out and removed to land. The works will use a mixture land and marine based plant. Although not completely finalised will be a jack up barge with a long reach excavator with land based support plant such as craneage to remove the reinforced concrete to land.

Phase 3 Excavation of Pits

Once all the reinforced concrete has been removed the three pits will be excavated to the required design depth. The excavation generally will be by marine plant which although not completely finalised will be a jack up barge with a long reach excavator in conjunction with a hopper barge.

We would note that due to sections of the existing strata being rock namely dolerite that prior to excavation the rock will require to be blasted as it has proved too hard for mechanical excavation in the past. General Method Statement for Drilling and Blasting using Marine Plant is attached below Appendix 5 (h) Section 1 for further detail.

Phase 5 Construction of Pits

On completion of the pit excavations the construction of the reinforced section of the pits will commence with the installation of the precast concrete units to form the perimeter of each pit. Once these have been installed the centre section of the pit will be constructed with insitu reinforced concrete. General Method Statement for Construction of Pits is attached below Appendix 5 (h) Section 2 for further detail.

Phase 6 Excavation of Berth

The final works will be to excavate the remainder of the berth to the new designed dredge levels including side slopes as per drawing 205034 – 103. The works will following the methodology noted in phase 3, however we expect the need to blast rock will be minimum.

Appendix 5 (h) Section 1

General Method Statement for Drilling and Blasting using Marine Plant

BAE SCOTSTOUN

METHOD STATEMENT FOR DRILLING AND BLASTING ROCK FROM BARGE/PONTOON

Outline Proposal

This Method Statement defines the work to be performed for the drilling and blasting of rock on the seabed from a marine plant.

Excavation requires the removal of rock (dolerite) which has proved too hard for mechanical excavation and therefore requires blasting

The major points we have considered are:
a) Proximity of quay wall
b) Need for stable excavated faces
c) Safety of personnel
d) Safety of wildlife.
e) Safety of BAE operatives and others in the area

It is proposed to mount our drilling rig on a barge (pontoon) and drill down the side of the barge. A safety boat as well as a crane and manbasket will be on hand in the event of a fall into water.

The precision location of the barge required to ensure that blast holes are drilled to the design pattern and boundaries will be achieved by the setting out engineer and maintained by fixing the distance from the quay using special made –for – purpose spacers welded to the barge or by "butting" the barge up tight against the quay wall. Turfors will be used to keep the barge/pontoon tight against the wall always and the pontoon will be moved using a Crane on the quay side as and when required.

After presplitting has been carried out on both sides of the excavation, bulk blasting will commence using standard marine blasting techniques. The charges will be fired individually using in-hole and surface delays and initiation will be by the Exel shock tube system. This non electric detonation system eliminates concerns with stray electric currents or radio signal interference causing premature initiation.

The depth of water overlying the area to be blasted will ensure that no blasted rock will break the surface.
An audible warning system will be used prior to blasting(see attached details) and we will liaise with others working in the vicinity to ensure that all diving activities cease and divers leave the water prior to firing. An exclusion zone around the blast area, determined by the shotfirer, will be sealed off and sentries posted to prevent unauthorised access during blasts.

Prior to firing any blast a detonator will be lowered below the water and initiated. This will be sufficient to clear any fish or other aquatic animals from the blast area to avoid them being caught up in the main blast. The initiation of the detonator will not harm the wildlife. It is also worth noting that the disturbance in the water caused by the drilling process generally discourages seals etc from approaching the work area.

The quay wall will be monitored during blasting by a series of reference points which will be established on the wall by Farrans and checked by the engineer on a daily basis to monitor any movement.

We consider that the above proposals will allow the safe blasting of the rock for subsequent excavation while safeguarding the integrity of the quay wall, minimising disturbance to the adjacent rock, and ensuring the safety of all personnel and wildlife.

Type of Drilling System
Rotary percussion and simultaneous drilling and casing system.

Type of Blasting
Controlled

Environment
Plant to be sited on spill mats to prevent oil, diesel and other spillages reaching the sea or waterways.

Operational noise will be minimised by using silenced compressors and keeping acoustic covers closed during operation.

ADS Infrastructure
The following resources shall be used to effect an efficient operation onsite –

- Routine planned maintenance of ADS site equipment to the manufacturers recommendations by the ADS fitter using ADS workshop facilities.
- Pre-mobilisation check of site equipment by ADS fitter or by hire company to ensure equipment is safe to operate and fully functional.
- Competent and suitable transport of men, equipment and material to/from site.
- On site breakdown/repair service by ADS fitter for ADS equipment and by hirer for hired equipment.
- Supply of casing, hammers, bits, drill steels, on site consumables, spares and tools as specified in mobilisation list.
- Communication method normally by mobile phone between site and Stirling office.
- All necessary information on work to be done methods to be used and records to be kept.

Site Arrangements

The following arrangements are normally agreed:

Resource	Supplied By ADS	Supplied by Farrans
Suitable stable platform/barge	No	Yes
Welfare facilities	No	Yes
Setting Out	No	Yes
Fuel	No	Yes
Water for cleaning down	No	Yes
Skip	No	Yes

Platform Barge/Pontoon

1. The barge/pontoon personnel will be competent and will have had previous experience of this type of work i.e. pontoons, barge work etc, as well as work over water.

2. Responsibility for the movement of barge from one area to another shall be that of Farrans

3. All decisions concerning tides, weather and the mechanical works of the barge will be taken by Farrans.

Resources

Plant

1. Drilling rig – Atlas Copco ROC 460
2. Drilling System – Rotary percussion and simultaneous drilling and casing
3. Down the hole hammer with drill bit
4. Flush System – Air
5. Compressor 750 cubic feet/min @ 170 PSL

Drilling Method

1. Main contractor will make a drilling platform available.

2. The platform shall be set up over the area to be drilled and blasted.

3. Check the vertical by using the inclinometer.

4. Drill through overburden using simultaneous drilling and casing system.

5. When casing is firmly sealed into rock head reverse eccentric bit and retract through casing leaving casing socketed in rock.

6. Introduce down the hole hammer into casing and drill into rock head.

7. Prior to drilling, a determination of drill pattern shall be made based on, depth of rock to be removed, head of water at the excavation location, and size of material/breakage required as per the contract, and also the type of rock encountered. All these factors shall be taken into consideration when initiating a trial blast to establish safe and productive parameters. Presplit will be drilled at 1.0 metre centres.

8. Subdrilling underwater in all cases must exceed 60% of the burden length. Greater subdrilling is however recommended as this facilitates the use of larger burden and spacings.

Formula for Calculating Subdrill
U = V

Where U = Subdrilling (M)

V = Burden (M)

9. Hole to be thoroughly flushed out and checked that it is free from obstructions and at required depth.

Presplit Blasting Method

The limits of the excavation will be formed using presplit blasting. This is a blasting technique in which fracture surfaces are developed along the design slope by drilling holes in the plane and simultaneously detonating light charges in these holes prior to bulk blasting in the main area to be excavated" (TRRL Report 1094.) and the objective is to minimise disturbance of rock in the design slope caused by nearby bulk blasting. Stability of the design face is thus optimised. Disturbance of rock in the design face is minimal.

Use of this technique will therefore prevent any disturbance of the rock on which the existing quay wall is founded.

Bulk Blasting Method

1. Explosives to be delivered to site by authorised supplier in a one off delivery on the first day of blasting.

2. When on the barge – explosives will be kept in an approved explosives store until required. At no time will the explosives store or the explosives be left unattended while there are explosives on site.

3. Only Albion's QPTC certified shotfirers shall handle explosives and accessories during blasting operations.

4. Prior to charging the hole, the casing and rock socket will be checked for depth and freedom from obstructions.

5. Bulk Blasting – An Nonel Unidet U475 will be used to prime the first cartridge of explosive. The primer cartridge will be lowered carefully to the base of the hole and checked to confirm that it has gone to the full depth.

6. Subsequent charges will be introduced into the hole as has been determined in the blasting specification/design.

   Care shall be taken to ensure each cartridge is in contact with the one below by dipping, if stuck it can be recovered by pigtail screw.

7. The final cartridge in the hole will be primed using a second – Nonel Unidet U475 and this will be lowered to the last charge in the hole.

8. The ends of both detonators shall be securely held while stemming (10mm chips) is introduced carefully into the hole. This will be done before the casing is removed.

9. A retrieving ring will be then dropped over the casing and onto the sea bed.

10. The Nonel Unidet leads will then be placed inside the casing.

11. The casing will be withdrawn and the retrieving ring pulled back on to the barge with the two detonator leads.

12. The leads will be taped together and secured to the side of the barge.

13. This method applies to all holes and will continue until the amount of holes prescribed in the blast design have been charged and completed.

14. The Nonel Unidets will then be connected together using Nonel Unidet UB delayed connectors as required to ensure that vibration levels are controlled.

15. On completion of the agreed audible warning sequence, the shot will be initiated using an approved Nonel firing device. All connectors will be placed in the water prior to connection to the nonel firing device.

16. The shotfirer shall have a spare Nonel firing device on the barge in case of failure of the first one.

17. These firing devices shall be kept on the shotfirers person at all times while there are detonators and explosives on the barge.

18. The firing device will not be connected to the initiating connector until the shotfirer has ascertained that all personnel are in a position of safety and sentries have been posted.

19. System of notification with harbour authorities will be implemented.

20. The blast will then take place.

Misfire Procedure

1. Immediately after each blast the shotfirer will check for a misfire by pulling the detonator leads back onto the barge and examining each lead.

2. If the lead is not visibly discoloured and if the detonating connector has not been activated then the connector will be replaced.

3. The lead and the new connector will be lowered into the water and the remainder of the holes initiated using the Nonel firing device.

4. A standard misfire flow chart is appended to method statement.

General

Explosive Type

OPEX GOLD 1 up to 70mm

Emulsion Nitram 9 up to 50mm

Explosive Diameters

25 mm up to and including 70mm

Nonel Unidet U Detonators

Up to 30m leads 475m/s and 500m/s delays

Nonel Unidet UB Connectors

6m leads 17m/s 25m/s 42m/s delays

Appendix 5 (h) Section 2

General Method Statement for Construction of Pits

Placement of pre-cast units

Placement of pre-cast units The pre-cast units will be delivered to the quayside from storage by Farrans. The call off of these will be relayed by Site Manager in advance of requirements.

The pre-cast units will be lifted using their lifting points into position on top of the blinding pour.

The line of each unit can be accurately checked against the steel shutter which is still in place. This will ensure that the units sit straight against each other.

The heights of each unit cannot change as long as they are sitting on a clean blinding pour. (It may be a requirement to pressure clean the blinding pour immediately prior to placing the pre-cast if silt ingress is an issue).

The diver will check at all four corners of the pre-cast unit that they are sitting down hard against the blinding pour. Should any significant height differences be apparent, then the unit will be lifted back out.

See lift plan for lifting method statement, but in brief each unit will have tether lines in place to assist with handling while being lowered.

Once in the water the tether lines are of little use and rotation of the unit could occur. We have prepared temporary back stops on the shutter to assist with placing of the pre-cast unit so there is a defined position for the pre-cast unit to sit. (Diver will check this).

All units will be placed side by side until they are in position prior to filling of the connections with grout.

Placement of steel reinforcement

Placement of rebar cages The rebar cages will come in sections, which can be lifted by the crane and positioned within the area to be poured with concrete.

Finish Concrete Pour

Finish Concrete Pour The final pour of concrete to fill the void with the rebar cages in place will be the final task.

Actual volume of concrete will be estimated and an order placed with the concrete supplier.

A concrete placement boom will be used to deliver the concrete to the diver. The boom operator will be in radio contact with the Dive Supervisor who will control all directions to the boom operator and the divers. One diver will manipulate the placement boom to place the concrete.

Guide wires will be in place from the steel frame at the new toe to the precast units along the quay side to allowing the diver to know his position within the pour and act as level indicators.

The concrete is self-levelling and should simply fill the void that is left once the pre-cast units are placed.