General

During the initial setting up of the site, the approved pedestrian and other vehicular traffic routes will be established. In order to maintain a tidy site all materials will be delivered on a "just in time" basis and where possible avoiding the peak hours for traffic movements on roads adjacent to the site. This method of working will ensure that the maximum amount of working room is available on site for construction works.

Welfare and office facilities will be provided in compact form of Portakabin type units and will be connected to super-silenced generators. Steel containers will also be delivered to the site compound for material storage.

Significant sized floating construction plant will be utilised adjacent to a live ferry terminal and an emergency plan for rescue of such plant following a breakdown or environmental incident will be in place. All plant working on or near the foreshore will be operate with bio-degradable hydraulic oil.

Storage and transport of material

Materials for the works will be offloaded directly from delivery trailers onto the site compound / pier deck using proposed 20t telescopic crawler crane. Traffic management will be in place during this unloading activity to ensure adequate access for lorries and other vehicles working on or near the site.

Access

Our floating plant will either be towed directly to site from mainland UK using appropriately sized tugs or delivered to Lerwick on articulated lorries via the Northlink ferry service. Once in Lerwick, dockside cranes will unload lorries of floating plant directly into the sea, where they will be towed to Toft.

Most land based plant requirements are readily available on Shetland and will be delivered to site by lorry.

It is recognised that the existing pier is in an unstable condition and not suitable for plant access in its current form. The working methodology and programme are formulated such that dredging works take place initially, including around the perimeter of the existing pier, followed by new piling work. Only once the new piles have been installed and back filled, will the existing pier structure be contained and sufficiently stable to access for people and plant.

Dredging Works

The dredging works will be undertaken using a 30t long reach excavator on a modular dumb spud leg barge. The excavator will have a 3D dig system fitted to it to enable accurate level and positional control in accordance with the dredge drawing. The dump barge will be manoeuvred into position using harbour tugs and workboats. Throughout all marine operations there will be safety boat(s) permanently on standby to attend to any emergency including man overboard scenarios.

Dredged arisings will be deposited into awaiting barges taking it to an offshore disposal site. The approximate volume of dredging is anticipated to be 5000m^3.

This rock volume to be dredging is approximately 500m^3 and will be dredging using the same dredging plant described above, with the exception that the dredging excavator will be fitted with an interchangeable rotating rock wheel and underwater hydraulic hammer (aided by compressed air).

Piling Works

The steel sheet piles will be shot blasted off-site and painted with Sigmashield marine paint system.

The proposed piles are intended to be driven using a combination of crane suspended vibro and impact hammers.

The piling works will principally take place from afloat using an 80t offshore specification crane barge manoeuvred by harbour tug. The crane barge will be supported by a carry barge for pile storage. Piling hammers will be mounted on the deck of the crane barge together with the piling gates when not in use. The piles will be delivered to Lerwick by ship before being transferred to road transport to Toft where they will be unloaded into the site compound by mobile crane. Periodically, our carry barge will be loaded with piles from the compound to suit our programme. The anchor wall piles on the shore will also be driven using the floating plant.

Soft start piling techniques will be adopted when using pile hammers and will also use a variable moment high frequency vibrator to reduce impact on the marine mammals.

The piles are to be driven through the existing rock armour revetment on the shore side. The revetment will be carefully dismantled allowing piling to progress, before being re-assembled using the same stone layering arrangement as originally constructed. These excavation works will principally be undertaken by a 30t long reach excavator working from the shore and piles installed from afloat. As soon as these works are complete, the stone revetment will be reinstated.

Filing, Tie Bar and Waling Works

Upon completion of the dredging and piling works, the bituminous surfacing of the existing pier can be carefully removed and appropriately disposed of off site. CBR testing of the existing fill material will then take place to ensure that it complies with the design. Filling works with imported stone can then commence from the shore working out towards to the end of the proposed pier. The self-compacting backfill material will be placed using a 20t excavator in the void space between the new piles and existing pier. Filling will continue until the level reaches the underside of the proposed tie bar level. At this point the fabricated and painted walings will be installed onto temporary brackets welded to the sheet piles. Bolt holes through the newly installed piles will be formed by burning and bolts passed through the piles and tightened using air powered tools. Access to the water side of the piles will be via small work boat. Once the waling beams are in position and fully bolted, the sectional tie bars can be installed. Much like the waling beams, these will be lifted into position using the 20t excavator working from the existing fill surrounded pier. It will be necessary to burn holes through existing sheet piles to aid the feeding of the new tie bars into their permanent positions. Once in position and appropriately supported, the connections and nuts on the tie bars will be hand tightened.

Filling of the pier surface will then continue with the remainder of the self-compacting 6N, compacted well-graded 6N and type 1 sub-base with Terram and polythene membranes installed where detailed. Once the tie bar and walling beams have been installed backing filling will continue

to top of surface level. Compaction will then be undertaken using plate compactors (in between pile pans) and ride on rollers.

Capping Beam and Slab Construction including Dowel and Reinforcement Installation

Prior to any capping beam construction works commencing, a suitable and sufficient working platform and edge protection system will be installed onto the newly installed steel sheet piles. This will be created using Dawson Construction Plant's bespoke capping beam falsework construction system. This system will be installed and later removed using a 20t excavator and operatives working from the partially infilled pier structure.

Once the falsework system is in place the dowels and reinforcement can be installed in the traditional manner. Traditional system formwork will be used to provide edge formwork fixed and braced from the Dawson capping beam system. The reinforcement will then be fixed in the traditional manner with an 20t excavator used to assist with the lifting of bundled reinforcement.

The capping beam will be poured in 12m long pours and once finished this will be left gain adequate strength prior to striking the falsework system.

Ready mixed concrete will be delivered by road to the site and pumped using a line pump directly into the awaiting forms or concrete skips. These skips will be transported to the individual forms with the aid of the excavator and poured to the required level.

Installation of Fendering, Anodes and other Quayside Furniture

Fenders, bollards and ladders will be lowered into place from the deck of the pier using an 20t excavator and welded onto the piles where required. Access for welding would be provided by a small work boat. In some instances, it is necessary to weld beneath the water and these works will be completed by diver.

Demobilisation

Upon completion of the works the site will be thoroughly cleaned and tidied with all waste removed from site.