Baltic Sea Region Programme 2007-2013
Part-financed by the European Union (European Regional Development Fund and European Neighbourhood and Partnership Instrument)

East West Transport Corridor Project – Work package 5, Task 5C "New port facilities in Klaipeda – RoRo ramp specifications"

- Full information available upon request from State Enterprise Klaipeda Seaport Authority

1. General Explanatory Note

1.1. Name of the Building. Land Plot and Designed Building Data.

Name of the building: Reconstruction of Quays No. 151 and 152 by Installing a Hydraulic Ramp on their Junction;
Location of the building: territory of Klaipeda State Seaport, quays No. 151 and 152.
Type of construction: Reconstruction.
Purpose of the building: Loading and unloading of Ro-Ro ships.
Category of the building: Special building.
Builder: State Enterprise Klaipeda State Seaport Authority. Company code 132090925. Address: J. Janonio g. 24, LT-92251 Klaipeda. Tel. 846 499 799.
Designer: Hidrosfera, JSC. Company code 114070031. Address – J. Zauerveino g. 13-2, LT-92122 Klaipeda. Tel. 846 482 099.

1.2. Basis for Project Development

Mandatory documents:

1. Detailed Plan Approved by Decision No. 1-247 of Klaipeda Municipal Council on 23 April 2004.
2. Summary of Design Conditions of 23 April 2008.
3. Approved Design Task of 25 August 2008.
4. Design Works Contract of 25 February 2010.

1.3. Brief Description of the Land Plot.

Quays No. 151 and 152 are located in the southern part of Klaipeda State Seaport. Site altitude of quay No. 151 is +3.80 m, design depth is -9.0 m. Site altitude of quay No. 152 is +1.52 - +1.58 m, depth near the quay is from -0.20 to -1.40 m.

Currently quay No. 151 is equipped with a ramp, which is used for cargo operations.

1.4. Assessment of Current Position

The following buildings are located next to the ramp:

- Quay No. 151 whose structure consists of an AZ 38 bevel face wall with a reinforced concrete superstructure. The superstructure's top altitude is +3.80 m. The quay is paved with concrete.

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- Side exit ramp whose structure consists of an AZ 38 bevel wall with a reinforced concrete superstructure. The superstructure's top altitude is +2.00 ÷ 2.15 m, concrete pavement.
- RO-RO ramp whose structure consists of an AZ 38 bevel wall anchored by anchor ties to an anchor wall of PU 25 bevels. Reinforced concrete superstructure, top altitude +3.80 m, concrete pavement.
- Quay No. 152 (coast reinforcement) whose structure consists of a line of ⌀ 1.20 m reinforced concrete piles. The piles are filled with sand. 30 x 30 cm reinforced piles (cover strips) of 4.5 m in length are driven in at pile junctions.

It is necessary to dismantle the existing ramp before commencing construction works.

Technical design envisages construction of a RO-RO ramp and reconstruction of the quay located next to it. The steel part of the mobile ramp with hydraulic drive will be erected on the stationary part of the quay. Due to construction of a new ramp the length of quay No. 151 will increase enabling mooring of longer (up to 200 m in length) ships.

According to the design task a prospective design depth of minus 10.00 m is envisaged near the ramp.

The mechanical part of the ramp consists of three main elements:

— Lift ramp;
— Ramp positioning mechanism (raising - lowering);
— A system of operational positioning cross-beams.

The lifting part of the ramp is a welded steel structure attached to the ramp with the help of hinges of the reinforced concrete superstructure. Sockets of the hinges are covered with sheet steel at the level of the driveway. Sheet steel covers will be anchored to the lift ramp in a way that allows raising them for inspection and cleaning of the hinges.

The project envisages giving all steel elements an anticorrosion coating: epoxy coating – two layers of 150 μm and one 50 μm thick polyurethane paint layer.

The ramp's driveway will be covered with an epoxy mixture with addition of corundum sand. Grain-size composition of the sand will be chosen considering that transport will move in a straight line (without changing the direction of motion on the ramp driveway coated with anti-slip material).

The 4.50 m wide edge of the lift ramp on the ferry side will be covered with TRELLEBORG-type plates coated with an artificial material reducing the friction coefficient of the ship's access ramp.

Part of the lift ramp on the ferry side is layered with plates inclining at a 6.5% angle downwards from the driveway plane. This solution ensures positioning of the ship's access ramp in this spot.

In order to allow changing the height of the lift ramp's lifting part a raising and lowering mechanism is designed (one on each side of the ramp). Each lifting mechanism has two hydraulic cylinders attached by swivels to the foundation of the reinforced concrete superstructure. The eyelet of the piston cylinder is connected at the top by a swivel joint with two rods attached to the lift ramp. With the piston moving upwards the ramp will rise, while downwards, it will descend. Hydraulic lifting mechanisms will be protected from effects of atmospheric factors by special covers made of sheet steel, which will ensure safe operation of the mechanisms and

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extend their service life. Access to the mechanisms for their inspection and maintenance is also envisaged.

Cross-beam systems are designed on both sides of the ramp. Cross-beams are raised and lowered with the help of hydraulic lifting mechanisms.

To protect the system of cross-beams against atmospheric effects it is planned to use special sheet steel enclosures that will ensure safe operation and extend service life of the cross-beam systems.

1.5. List of Designed Buildings.

Stationary part of the ramp is intended for the RO-RO ramp structure designed to be built at the junction of quays No. 151 and 152 and part of the quay bordering a ramp in Klaipeda seaport. The project envisages the following:

- Dismantling of the existing ramp.
- Construction of the new ramp.
- Construction of the quay bordering the ramp.
- Dredging and bed reinforcement works.

1.6. Technological Processes.

1.6.1. Dismantling Works.

It is planned to perform the following works:

- Dismantling of the existing ramp equipment (ship mooring posts, rescue ladders, safety fencing)
- Dismantling of concrete pavement
- Dismantling of the reinforced concrete superstructure
- Excavation of the ramp's filled up soil
- Dismantling of the ramp's anchor ties and anchor wall
- Dismantling of the bevel wall
- Dismantling of road pavement and excavation of soil.

1.6.2. Ro-Ro Ramp.

Technical parameters:

Ramp's top altitude	+3.80 m
Design depth (stage I)	- 9.00 m
Design depth (stage II)	-10.00 m
Calculated depth	-11.00 m
Safe load	50 kN/m^2
Layout dimensions	31.0x83.0 m
Lift part dimensions	29.6x18.6 m.

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The stationary ramp consists of a reinforced concrete superstructure, which rests on open-end steel piles – some of the piles are designed to be vertical, others are inclined 10:1.

16 lines of ⌀813/12.5 mm 23.0 m long steel piles have been designed. Distances between the lines of piles are 4.5 m. The piles are spaced 3 m apart within the same line. ⌀813/12.5 mm 21.6 m long steel piles are driven in 3.0 m apart under the niche of the moving ramp. After the piles have been driven in they are filled with sand to the altitude of 3.0 m. Concrete plugs are installed into the piles with reinforcement intended for connection with the reinforced concrete superstructure.

The ramp's superstructure is a 60 cm thick reinforced concrete slab with its top's altitude at +3.80 m. The slab rests upon the framework of foundation piles. The cross-section of supports is in the shape of a right angle (1.5x1.7 m). The superstructure is erected using C30/37 class hydrotechnical concrete and reinforced with B500B class reinforcement. Reinforcement of 1.74%.

The ramp's superstructure will have foundations for the moving ramp and its equipment.

The reinforced concrete superstructure will be divided into sections by expansion joints. To prevent vertical drifting of sections it is planned to install steel pipes of ⌀114.3/4.5 and ⌀101.6/12.5. Joint surfaces will be preserved by two layers of bitumen mixture or similar material.

1.6.3. Lift Ramp

1.6.3.1. General Data on the Hydraulic Ramp Structure.

The mechanical part of the lift ramp consists of two main elements:

— Lift ramp,

— Ramp positioning mechanism (raising - lowering).

The mobile ramp part is a welded steel structure attached to the ramp's reinforced concrete superstructure by means of hinges. Sockets of the hinges are covered with sheet steel at the level of driveway, see drawing HM/553-281-1. Sheet steel covers will be anchored to the lift ramp in a way that allows raising them for inspection and cleaning of the hinges.

The project envisages giving all steel elements an anticorrosion coating: epoxy coating – two layers of 150 μm and one 50 μm thick polyurethane paint layer.

The ramp's driveway will be covered with an epoxy mixture with addition of corundum sand. Grain-size composition of the sand will be chosen considering that transport will move in a straight line (without changing the direction of motion on the ramp driveway coated with anti-slip material). The 4.50 m wide edge of the mobile ramp on the ferry side will be covered with TRELLEBORG-type plates coated with an artificial material reducing the friction coefficient of the ship's access ramp.

Part of the lift ramp on the ferry side is layered with plates inclining at a 6.5% angle downwards from the driveway plane. This solution ensures positioning of the ship's access ramp in this spot.

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In order to allow changing and maintaining the height of the lift ramp's lifting part a raising and lowering mechanism is designed (one on each side of the ramp). Each lifting mechanism has two hydraulic cylinders attached by swivels to the foundation of the reinforced concrete superstructure. The eyelet of the piston cylinder is connected at the top by a swivel joint with two rods attached to the lift ramp. With the piston moving upwards the ramp will rise, while downwards, it will descend. Apart from performing the lifting function the drive mechanisms will maintain the ramp in a given position both without load and when operating under design loads. For this reason each mechanism consists of two hydraulic cylinders and two rods whose strength would allow other elements to support the entire load without causing negative impact upon the ramp if one of the cylinders fails or a rod sustains mechanical damage. The system backing up the main bearing elements guaranties safety should one of the elements fail. Damage to any of the driving or structural elements shall be regarded as an emergency. In this case the ramp cannot be operated until its initial technical state is restored.

Hydraulic lifting mechanisms will be protected from effects of atmospheric factors by special covers made of sheet steel, which will ensure safe operation of the mechanisms and extend their service life. Access to the mechanisms for their inspection and maintenance is also envisaged.

Lubrication spots are indicated on drawing HM/553-281-2A.

The ramp is protected with two anchor barrels on the ferry mooring side.

1.6.3.2. Description of the Functional Scheme.

The height of the lift part of the ramp will be regulated from a control panel installed in a cabin. Description of the control panel is provided in section 3.4.

The difference in height between end positions is 3.60 m.

The operator at the hydraulic ramp control panel will be able to see the process of ferry loading and unloading through two opening windows.

Having prepared equipment for work (having connected to a power supply, turned on the hydraulic pump, and received the ready light signal on the control panel) the operator can raise the moving part of the ramp to the necessary height.

The ramp's lift part can be raised to any height (within limits of the highest and lowest positions). To extend service life of hydraulic drives it is recommended for the ramp to rest on anchors when in its idle position (lowest point). With the ramp in this position the structure's own weight will not affect mechanical and hydraulic raising/lowering mechanism elements.

When the ramp's lift part is at its highest point it will rise above the water to the following height:

— At minimum water level – 5.27 m,
— At average water level – 4.77 m,
— At highest water level – 3.37 m.

When the ramp's lift part is at its lowest point it will rise above the water to the following height:

— At minimum water level – 2.27 m,

— At average water level – 1.77 m,
— At highest water level – 0.37 m.

To ensure safe operation of the ramp the project envisages erecting the following:
— Steel rescue ladders.
— Safety fencing on the wheel stopping bar.
— Anchor barrels.

1.6.4. Quay.

Technical parameters:

Ramp's top altitude	+3.80 m
Design depth (stage I)	- 9.00 m
Design depth (stage II)	-10.00 m
Calculated depth	-11.00 m
Safe load	50 kN/m^2
Length (together with the 83.0 m long strip over the ramp's length)	143.0 m

Designed quay length – extension of quay No. 151 intended for dismantling of the existing ramp and erected along the RO-RO ramp.

Quay structure – reinforced concrete superstructure, which rests on walls of steel bevels and a line of pipe piles driven in between them.

The project envisages a bevel wall (Wx = 2500 cm3, steel S355P), length L 17.5 m. Steel piles of ⌀813/12.5 mm, l = 22.0 m, spaced 3.0 m apart.

The bevel wall will be covered by a reinforced concrete superstructure 1.50 x 1.70 m, which will support the reinforced concrete slab. The superstructure will be erected using C30/37 class hydrotechnical concrete and reinforced with B500B class reinforcement, reinforcement of 1.74%.

The slab will be covered with compacted ($\varphi \geq 30°$, EVD ≥ 40 MPa) sand above which it is planned to arrange concrete pavelemnt:

- Compacted crushed dolomite rock layer thickness of 18 cm;
- Level concrete layer (10 cm thick) C8/10;
- Hydrotechnical concrete pavement (22 cm thick) C30/37.

The gap between the designed and existing quay No. 152 is filled with sand and compacted ($\varphi \geq 30°$, Evd ≥ 40 MPa). A 22 cm thick concrete pavement is built.

The reinforced concrete superstructure will be divided into sections by expansion joints. Distribution of joints is indicated on a drawing. To prevent vertical drifting in expansion joints it is planned to install steel pipes of ⌀114.3/4.5 and ⌀101.6/12.5. Joint and concrete surfaces at the points of contact with the soil will be preserved by two layers of bitumen mixture or similar material. Expansion joints are arranged using polyurethane bands.

1.6.5. Quay Equipment.

The following safe operation equipment is installed on the designed quay:

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- 600 kN and 800 kN ship mooring posts.
- Anchor barrels. To determine estimated price we assume two MV 1000 x 1000 B elements whose energy absorption is equal to 344.0 kNm.

1.7. Utility Networks

Waste water collection.

Reconstruction of quay No. 151 and construction of a ramp next to it envisage removal of waste water by means of installation of waste water collection (Qmax type) grates connected to a KLASCO rain water runoff well.

Inclination of the ramp's cover will ensure that no waste water will enter the Curonian Lagoon.

Power supply.

It planned to power the site from the existing 10/0.4 kV transformer substation TR-396. A spare room in the 9th cell of the 0.4 kV distribution facility of the TS (transformer substation) will house 400/5A 0.5S precision class current transformers with electric power control meters installed in a cubicle in a comfortable location of the same room within the distribution facility. After connection of the designed cable 250 A rated fuses are installed into available fuse brackets. Reconstruction of the 10 kV part of the TS is not envisaged within the design. Designed JS-1 board is intended for powering of the hydraulic quay of quays 151 and 152.

Installed electric power of the designed site: Pin=55 kW Iin=125A, required electrical power Pp=55 kW Ip=125 A, electric power supply category: III – third.

The power supply wiring diagram is provided on drawing 1002-XX-TP-LE-2.

Grounding of equipment is envisaged through natural grounding conductors. Designed 0.4 kV JS-1 board is grounded through closest naturally grounded metal structures using a zinced grounding strip. Grounding resistance shall be measured and shall be below 10 Ω. Designed cable racks shall be grounded inside process channels.

All boards, instruments, and metal parts of electrical equipment envisaged by the project that are not under voltage during operation but can become live with electrical voltage have to be grounded using a yellow-green grounding wire. The grounding wire is selected when mounting equipment in accordance with clause 2.7 of Republican Construction Norms (RSN) 139-92; according to RSN 139-92 the cross-section of a grounding wire shall be no less than 10 mm^2. b). The project complies with current norms and rules and observation of all measures envisaged by the project ensures safe operation in terms of explosion and fire hazards. All electrical networks shall be installed in accordance with current requirements of the Electrical Equipment Installation Rules ("EĮĮT").

1.8. Environmental Impact of the Construction Works

Metal structures dismantled in the course of reconstruction of quays No. 151 and 152 will be taken to metal scrap station while waste from the concrete superstructure will be sent

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for reprocessing. Part of the excavated soil will be used for territory formation; the rest will be used at the client's discretion.

No waste water will enter the Curonian Lagoon as covers are inclined away from the Curonian Lagoon and towards the coast. A wheel stopping bar is envisaged along the perimeter of the ramp preventing surface runoff from entering the Curonian Lagoon.

It is not recommended to perform construction works during the period of fish migration and spawning.

1.9. Safety Requirements for the Protected Territory.

There are no cultural heritage and architectural monuments, natural and historical properties in the zone of quays No. 151 and 152. Soil excavated from water in the course of construction of the quay shall be managed in accordance with specifications of LAND 46 – 2002 "Soil Excavation in Seas and Seaport Water Zones and Management of Excavated Soil".

In case of fire or explosion the ramp can be accessed by available hard-surface pavement access routes. It will be possible to use water from the Curonian Lagoon to fight the fire.

Ship mooring posts, barrels, rescue ladders, wheel stop, and safety fencing are envisaged for safe operation of the Ro-Ro ramp and quays. Available territory lightning will be used for lighting of rescue areas. The operator is responsible for the rest of rescue equipment (Klaipeda State Seaport Rules for Operation of Hydrotechnical Buildings).

1.10. Safety Measures against Violence and Vandalism.

The territory leased by KLASCO, JSC is delimited by a security fence, the territory is equipped with surveillance cameras, accesses to the territory are protected by a security service, which is why no additional measures against violence and vandalism are required.

Project Manager **(signature)** Walery Lycznarovski