

Client: Technical Demolition Services Ltd

Task Number: AEC-32094-15

Project Title: Port Talbot Jetty

Task Title: Northern Access Route

Design Risk Category: Cat 2

Report Reference: 32094-15-TDS-PTJ-NAR-REPORT-01 R0

Reviewed By: James Dunlop
BEng (Hons) IEng MICE

Document Revision History

Revision	Description	Author	Revision Date	Reviewed By
R0	Initial Issue	David Stevens	20-08-2025	James Dunlop

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Design and Check Certificate

Project: Port Talbot Jetty

Client: Technical Demolition Services Ltd

Design Brief Issued: Yes

Design Brief Reference: Email

Does the design comply with the brief: Yes

Name	David Stevens
Title	Technical Director
Signature	
Date	20-08-2025
	To be signed by the person authorised to sign as Designer.

*See company intranet for authority

<https://sites.google.com/andun.co.uk/aecltd/home/hr-section/design-authority?authuser=0>

Drawings produced

32094-15-TDS-PTJ-NAR-DRW-01-001

Loading Constraints

The constraints on the use of the proposed temporary works are best explained by referring to the drawings. Please see scheme drawings.

Proposed Category of Check

Cat 2

Current Design Standards used

BS5975-1:2024 Temporary works - Management procedures for the control of temporary works - Code of practice

BS5975-2:2024 Temporary works - Falsework: Design and implementation - Code of practice

EN1990: (Eurocode 0) Basis of structural design

EN1991: (Eurocode 1) Actions on structures

EN1992: (Eurocode 2) Design of concrete structures

Historical Design Standards used

N/A

Other literature referred to

Structural Engineer's Pocket Book

Design Philosophy

Project Title: Port Talbot Jetty

Task Title: Northern Access Route

Calculation Reference: 32094-15-TDS-PTJ-NAR-CAL-01

Design By: David Stevens

Date: 20-08-2025

Documents and Drawings utilised

22046.pdf

22047.pdf

22048.pdf

22049.pdf

22050.pdf

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22039.pdf

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22042.pdf

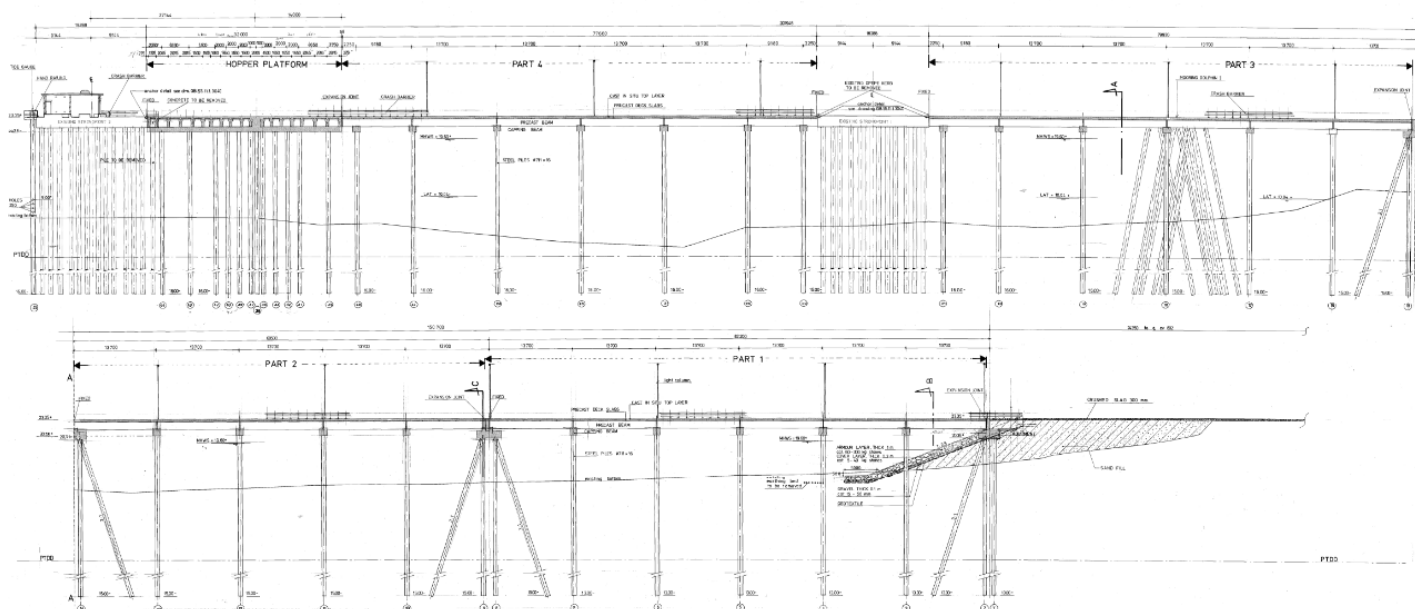
22043.pdf

22045.pdf

Brief

Carry out an assessment on the northern approach route onto the jetty at Port Talbot. This forms part of a larger package of works involving the dismantling of 3 No Iron ore unloaders on the jetty. The approach route is to be assessed for HGV loadings to remove elements from the jetty and to enable a crane weight 60 tonne to access the jetty.

The jetty runs from the shore over Strongpoint 1 and connects to Strongpoint 2



Jetty Elevation

Stability

Stability is provided by a combinations of the moment capacity of the piles, raking piles and connections to the existing strongpoints.

Geotechnical Parameters

N/A

Design Life

Less than 6 months during demolition.

Sustainability

Assessing the approach route avoids the requirement for temporary works.

Assumptions

A visual condition survey has been undertaken from the water which showed the approach ramp to be in a serviceable conditions. Should the jetty be impacted by any boats, this should be reviewed.

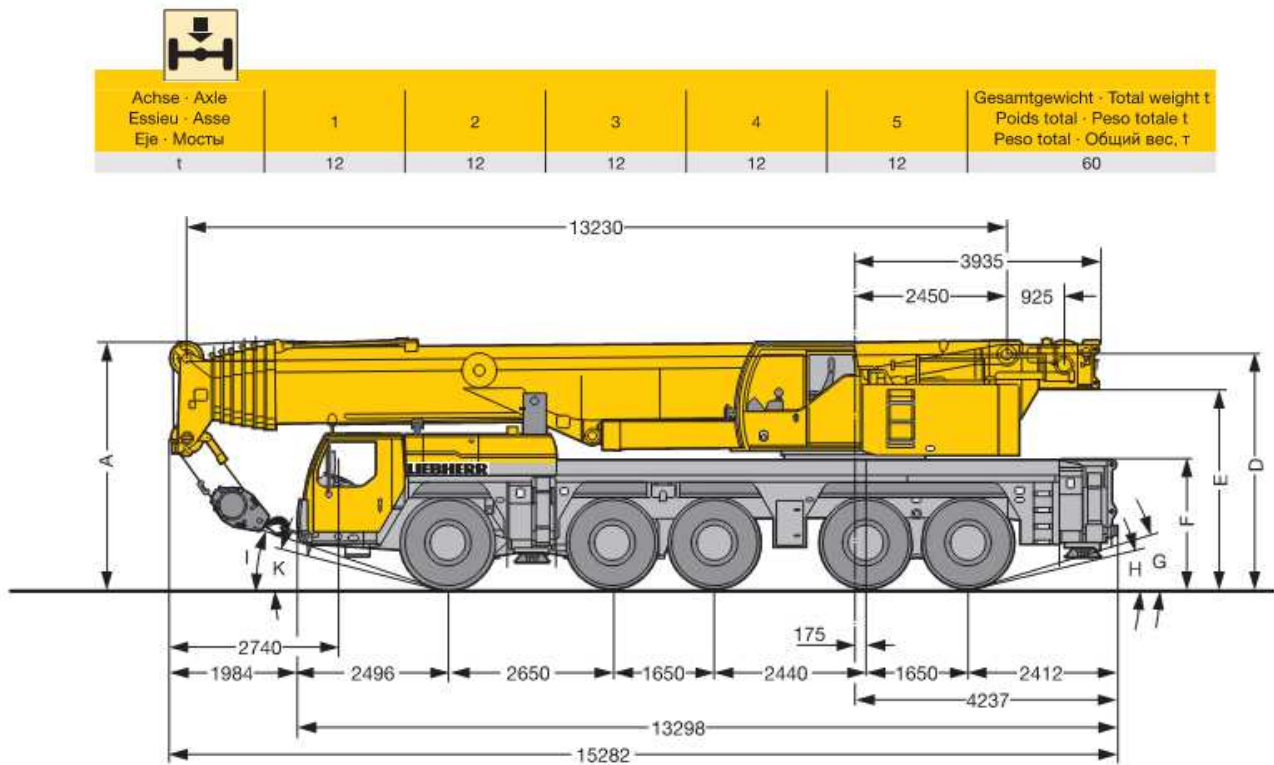
Exclusions

The capacity relates to the temporary loadings only and does not validate the jetty for continued use.

Calculations

1.0 - 200 Tonne Mobile Crane Loads

Check a 200 tonne mobile crane which is required.



Axle Load

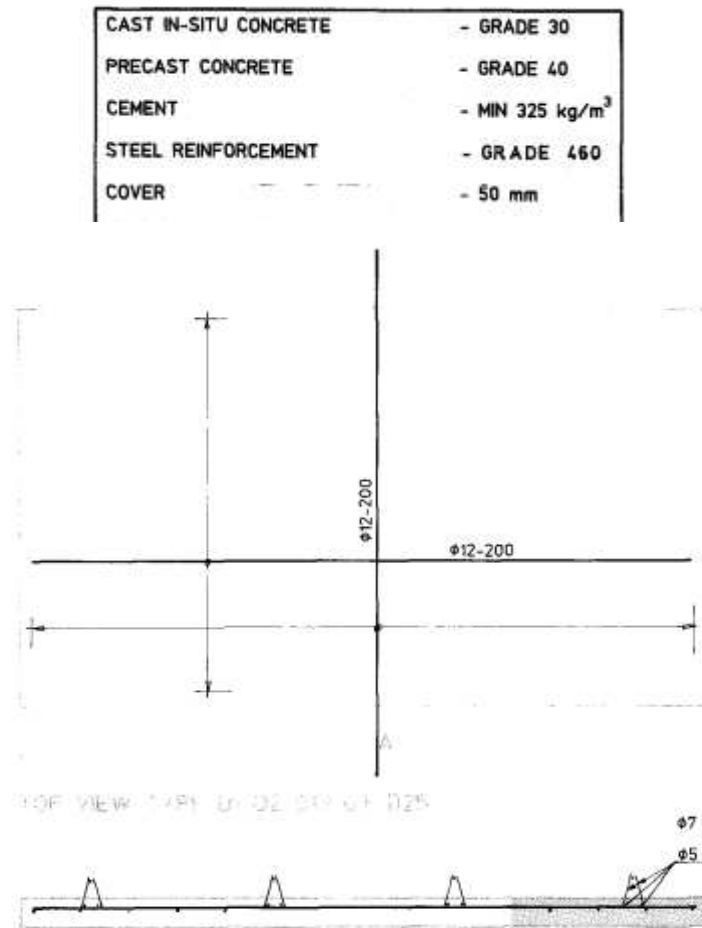
$$L_{ax} := 12 \text{ tonne} \cdot g = 117.68 \text{ kN}$$

Partial factors

$$\gamma_Q := 1.5$$

$$\gamma_G := 1.35$$

The deck consists of a precast ribbed slab with a structural topping on top. Reinforcement details for the precast slab are available and will be used in the assessment. The following materials are noted on the drawing.



The precast deck is 120mm thick with 12mm bars at 200mm centres with additional 5mm and 7mm bars within the ribs tying the precast units to the topping. We will therefore take the full effective depth. Ignore the bending capacity of the ribs.

Cylinder strength - In situ

$$f_{ck.in} := 30 \frac{N}{mm^2} \cdot 0.8 = 24 \cdot \frac{N}{mm^2}$$

Cylinder strength - precast

$$f_{ck.2} := 40 \frac{N}{mm^2} \cdot 0.8 = 32 \cdot \frac{N}{mm^2}$$

Reinforcement strength

$$f_{y.pc} := 460 \frac{N}{mm^2}$$

Design strength

$$f_{yd.pc} := \frac{f_{y.pc}}{1.15} = 400 \cdot \frac{N}{mm^2}$$

Cover	$c_1 := 50\text{mm}$
Depth precast	$d_{pc} := 120\text{mm}$
Depth in situ	$d_{in} := 150\text{mm}$
Diameter of bars	$\phi_{pc} := 12\text{mm}$
Area of steel	$A_{s,pc} := \frac{\phi_{pc}^2 \cdot \pi}{4 \cdot 200\text{mm}} = 565.49 \cdot \frac{\text{mm}^2}{\text{m}}$

Conservatively treat the slabs as simply support with an individual wheel load. Take load spread as per BS 8110 as Eurocode 2 does not have an equivalent way of considering point loads on simply supported slabs

Effective width	$w_{eff} := s_{sl} \cdot 0.6 + 300\text{mm} = 1.62 \text{ m}$
Weight of slab	$w_{sl} := 24 \frac{\text{kN}}{\text{m}^3} \cdot (d_{in} + d_{pc}) = 6.48 \cdot \frac{\text{kN}}{\text{m}^2}$
Design Moment	$M_{Ed.6} := \frac{\frac{L_{ax}}{2} \cdot \gamma_Q \cdot s_{sl}}{4 \cdot w_{eff}} + w_{sl} \cdot \frac{s_{sl}^2}{8} \cdot \gamma_G = 35.29 \cdot \frac{\text{kN} \cdot \text{m}}{\text{m}}$

Less than wheel spacing, so no overlap of utilisations

Effective depth	$d_{ef.sl} := d_{in} + d_{pc} - c_1 - \phi_{pc} \cdot 0.5 = 214 \cdot \text{mm}$
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$$K := \frac{M_{Ed.6}}{d_{ef.sl}^2 \cdot f_{ck.in}} = 0.03$$

Lever arm	$z := \min \left[d_{ef.sl} \cdot \left(0.5 + \sqrt{0.25 - \frac{K}{0.9}} \right), 0.95 \cdot d_{ef.sl} \right] = 0.2 \text{ m}$
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Area of steel required	$A_{s.6} := \frac{M_{Ed.6}}{f_{yd,pc} \cdot z} = 434 \cdot \frac{\text{mm}^2}{\text{m}}$
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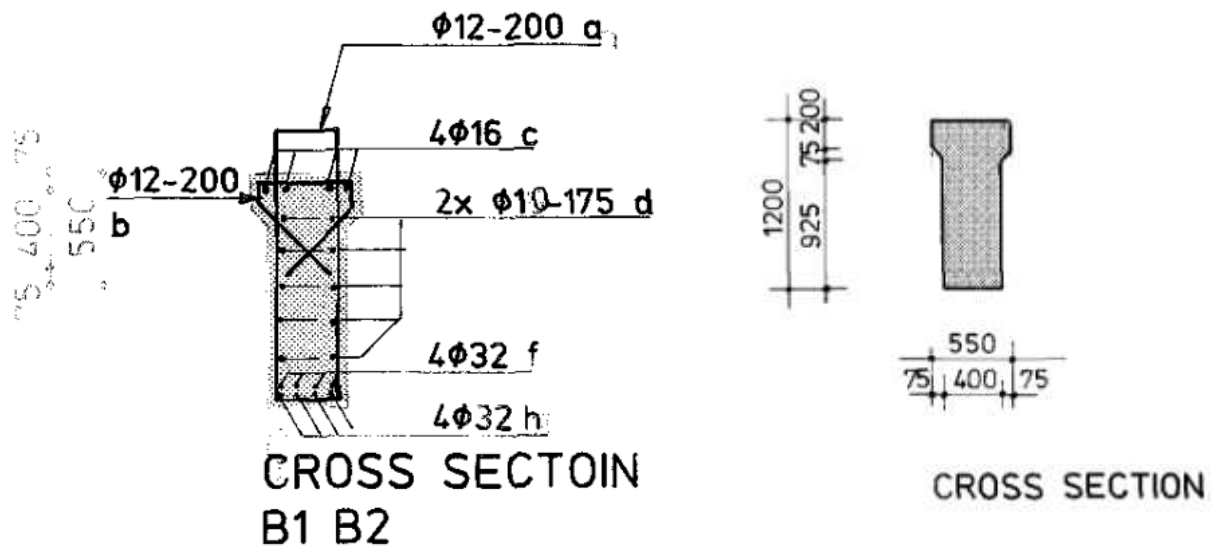
$$\frac{A_{s.6}}{A_{s,pc}} = 76.75\%$$

Given the slab thickness, punching shear will not be critical.

Beams

Bending Check

The majority of the beams were noted as B1 and had 8No. 32mm bars in the base.



Beam depth $d_{be} := 1200\text{mm}$

Bar diameter $\phi_{be} := 32\text{mm}$

Area of steel. $A_{s.be} := \frac{\phi_{be}^2 \cdot \pi}{4} \cdot 8 = 6433.98 \cdot \text{mm}^2$

The crane is approximately the same length as the beam span, conservatively consider 2/3rds of the crane weight on a single beam as a UDL.

Weight of beam $w_{be} := (400\text{mm} \cdot 925\text{mm} + 200\text{mm} \cdot 550\text{mm} + 75\text{mm} \cdot 75\text{mm}) \cdot 24 \frac{\text{kN}}{\text{m}^3} = 11.65 \cdot \frac{\text{kN}}{\text{m}}$

Design Moment $M_{Ed.7} := \frac{L_{ax} \cdot 5 \cdot \gamma_Q \cdot s_{be}}{8} \cdot \frac{2}{3} + \frac{(w_{be} \cdot \gamma_G + w_{sl} \cdot 2.62\text{m} \cdot \gamma_G) \cdot s_{be}^2}{8} = 1893.96 \cdot \text{kN} \cdot \text{m}$

Effective depth $d_{ef.be} := d_{be} - c_1 - 10\text{mm} - \phi_{be} = 1.11 \text{ m}$

$K := \frac{M_{Ed.7}}{d_{ef.be}^2 \cdot f_{ck.in} \cdot 550\text{mm}} = 0.12$

Lever arm

$$z := \min \left[d_{ef.be} \cdot \left(0.5 + \sqrt{0.25 - \frac{K}{0.9}} \right), 0.95 \cdot d_{ef.be} \right] = 0.94 \text{ m}$$

Area of steel required

$$A_{s.7} := \frac{M_{Ed.7}}{f_{yd.pc} \cdot z} = 5048 \cdot \text{mm}^2$$

$$\frac{A_{s.7}}{A_{s.be}} = 78.45\%$$

Shear Check

Assume 2/3rds of the weight goes to one end of the beam, conservative

Design shear force

$$V_{Ed.7} := L_{ax} \cdot 5 \cdot \gamma_Q \cdot \frac{2}{3} \cdot \frac{2}{3} + \frac{(w_{be} \cdot \gamma_G + w_{sl} \cdot 2.62 \text{ m} \cdot \gamma_G) \cdot s_{be}}{2} = 655.11 \text{ kN}$$

Design shear stress

$$v_{Ed.7} := \frac{V_{Ed.7}}{(400 \text{ mm} \cdot 925 \text{ mm} + 200 \text{ mm} \cdot 550 \text{ mm} + 75 \text{ mm} \cdot 75 \text{ mm})} = 1.35 \cdot \frac{\text{N}}{\text{mm}^2}$$

Shear links consists of 12mm bars at 200mm centres

$$k := \min \left[1 + \left(\sqrt{\frac{200 \text{ mm}}{d_{ef.be}}} \right), 2 \right] = 1.42$$

$$\gamma_c := 1.5$$

$$C_{Rd.c} := \frac{0.18}{\gamma_c} = 0.12 \quad \text{Table NA.1}$$

$$v_{min} := 0.035 \cdot k^{\frac{3}{2}} \cdot \left(\frac{f_{ck.2}}{\frac{\text{N}}{\text{mm}^2}} \right)^{\frac{1}{2}} \cdot \frac{\text{N}}{\text{mm}^2} = 0.34 \cdot \frac{\text{N}}{\text{mm}^2} \quad \text{Table NA.1}$$

$$k_1 := 0.15 \quad \text{Table NA.1}$$

Bonded tension steel in y & z directions

$$\rho_1 := \min \left(0.02, \frac{A_{s.be}}{d_{ef.be} \cdot 400 \text{ mm}} \right) = 0.0145$$

Normal concrete stress in slab

$$\sigma_{cp} := 0 \frac{N}{mm^2}$$

No compressive stress in slab - Conservative

Design punching shear resistance

$$v_{Rd,c} := \left[C_{Rd,c} \cdot k \cdot \left(100 \rho_1 \cdot \frac{f_{ck,2}}{\frac{N}{mm^2}} \right)^{\frac{1}{3}} + k_1 \cdot \sigma_{cp} \right] \cdot \frac{N}{mm^2} = 0.61 \cdot \frac{N}{mm^2}$$

$$\frac{v_{Ed,7}}{\max[v_{Rd,c}, (v_{min} + k_1 \cdot \sigma_{cp})]} = 219.48\%$$

Not satisfactory, consider shear reinforcement

Strut angle

$$\theta_{be} := 0.5 \operatorname{asin} \left[\frac{v_{Ed,7}}{0.153 \cdot f_{ck,in} \cdot \left(1 - \frac{f_{ck,in}}{250 \frac{N}{mm^2}} \right)} \right] = 11.99 \cdot \text{deg}$$

Shear capacity allowing for shear links

$$V_{Rd,s} := \frac{\phi_{pc}^2 \cdot \pi}{4 \cdot 200mm} \cdot 2 \cdot z \cdot f_{yd,pc} \cdot (\cot(21.8 \text{deg})) = 1060.98 \text{ kN}$$

$$\frac{V_{Ed,7}}{V_{Rd,s}} = 61.75\%$$

The cross heads and piles will be acceptable by inspection given the 2 spans of the bridge will have been designed for lorry loadings and the loadings will be limited to a single vehicle at a time. A speed limit should be in place to minimise longitudinal braking and dynamic loading onto the structure.

3.0 - Conclusion

The northern approach has been assessed for the 5 axles 60 tonne mobile crane and has been found to be acceptable.

Designers Risk Assessment

Designers Risk Assessment

Designer: David Stevens		Project: Port Talbot Jetty			
Job Number: 32094-15-TDS-PTJ-NAR-DRA R0		Date: 20-08-2025			
Activity Element / Potential Hazards	Infrastructure / People at Risk	Risk Rating			Action at Design Stage/Residual Risk & Possible Control Options (Contractors)
		L	S	R	
Structural Failure	Contractor, Structure	M	H	H	Action at Design Stage The jetty has been assessed for the proposed loads and the critical elements have been found to be acceptable. A visual condition survey has been undertaken.to verify the condition of the elements. Residual Risk N/A
Lateral Stability	Contractor, Structure	L	H	M	Action at Design Stage A qualitative review of the lateral stability mechanism has been undertaken and the jetty has been shown to be acceptable. It is likely that environmental loadings would considerably exceed and lateral loadings due to the proposed vehicles. A speed limit has been noted to minimise horizontal loadings due to vehicle braking. Residual Risk Speed limit should be enforced.

Normal Hazards:

Are hazards inherent in site work such as injury from falling, tripping, lifting materials, working at height, contact with substances hazardous to health etc. Any competent contractor will address these without a specific designers risk assessment. This is inline with HSE guidance which is to focus on the unusual hazards not obvious to a competent contractor.

Infrastructure/People at Risk Key:

ST	=	Site Team
NR	=	Network Rail
PU	=	Public
FI	=	Financial Risk
AO	=	Asset Owner

Risk Rating Key:

Likelihood (Low, Medium, High)

Severity (Low, Medium, High)

Risk (Likelihood x Severity)

Risk (R) Rating Matrix		Severity (S)		
		Low	Medium	High
Likelihood (L)	Low	Low	Med	Med
	Medium	Med	Med	High
	High	Med	High	High



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