

GUIDANCE NOTES FOR THE USE OF THE FPS RIG TRACK PRESSURE CALCULATION TOOL

This document describes the FPS Rig Track Pressure Calculation Tool which calculates the track bearing pressures for a crane or piling rig for use in the working platform design process set out in the BRE Report BR470, Working Platforms for Tracked Plant: good practice guide to the design, installation, maintenance and repair of ground-supported working platforms.

It should be noted that the track bearing pressures calculated by an appropriate method for use in the BRE design method are commonly much higher than given by a simple calculation of the total rig weight divided by the total track area.

The calculation of the track bearing pressures in an appropriate manner consistent with the BRE design method is a fundamental requirement of its use.

All of the figures below are general examples. Platform designs must be based on the actual rig loadings supplied by the piling contractor and the FPS can take no responsibility for any use made of the example information shown.

1.0 Introduction

The FPS Rig Track Bearing Pressure Tool undertakes a theoretical calculation of the mass and position of the rig components and the winch forces applied during the operation of a piling rig to compute the bearing pressures under the tracks.

The Tool is run as an Excel spreadsheet and has three main components:-

- i. The **Input** worksheet, where the main input data are entered;
- ii. Six track pressure calculation worksheets (labelled **Standing, Travelling, Handling, Penetrating, Extraction** and **Other**), where the track pressures are calculated for the various modes of rig operation;
- iii. A **Summary** sheet, which summarises both the input data and the design values from the six track pressure calculation worksheets.

The BRE design method requires 2 loading cases which consider various modes of operation, e.g. travelling, lifting, drilling, extracting casing etc. The BRE process considers the various loading conditions under two headings.

Case 1 Loading

These loading conditions may apply when the rig or crane operator is unlikely to be able to aid recovery from an imminent platform failure. Operations in which this type of loading condition applies could include:

- Standing
- Travelling
- Handling (in crane mode, e.g. lifting a precast concrete pile into the leader, handling casings and reinforcement cages)

Case 2 Loading

These loading conditions may apply when the rig or crane operator can control the load safely, for example by releasing the line load, or by reducing power, to aid recovery from an imminent platform failure. Operations in which this type of loading condition applies could include:

- Installing casing
- Drilling
- Extracting an auger
- Extracting casing
- Rig travelling or slewing with a fixed mast which has a foot or fixed load (e.g. pile held in the leader) close to the platform surface.

Also, as the rig / crane may be able to operate with the direction of its mast ranging between parallel and perpendicular to the axis of the tracks, all possible orientations must be considered.

The process of calculating the theoretical pressure under the tracks considers the net moment due to the various weights and forces involved applied to the area of the tracks in order to calculate the maximum and minimum pressures on each of the tracks. These pressure distributions may be either rectangular, triangular or trapezoidal, and not necessarily the same pressure will be present under each track. It may be found that for some loading conditions, the loaded length for each track may be smaller than the full track length that could be in contact with the ground. The Tool flags this situation if it arises.

2.0 Assumptions

The following assumptions apply to the use of the Tool:-

- The rig is operating on a flat, horizontal surface with the mast in vertical orientation (only);
- The mass and position of the various rig components are known and input as required into the spreadsheet;
- The point of rotation of the slewing component lies in the middle of the tracks;
- The Tool is restricted to uses where all loads and forces are vertical;
- The rig behaves as a rigid body such that Meyerhof pressure distributions may be used;
- Foot pad resistance (where used) is entered as an input parameter to make resolution of the forces statically determinate;
- The Tool is operated by a competent person.

3.0 Operation of the Spreadsheet Tool

3.1 Input Page

Input data are inserted in the yellow boxes. Other cells are locked.

Input Page:-

- The rig is considered to comprise SLEWING and NON-SLEWING components;
- Add data on the rig component masses (in kg) and position on the specified x-y coordinate system taking a slew angle of 0 degrees;
- Facility is provided to add non-slewing track and undercarriage works. The previous spreadsheet did not allow this;
- Add data for foot pads. Foot pads may be considered as either slewing or non-slewing;
- Add limiting data for Penetrating, Extracting and Auxiliary line forces; these are the maximum forces that can be applied in later calculations. Penetrating and extracting forces must align with the suspended equipment (Section 6 below provides a detailed explanation of the treatment of winch forces). The Auxiliary line force can be located elsewhere;
- Add data for the track dimensions;

- A check box is provided for rigs that cannot/do not slew. Selecting 'NO' calculates only for the body of the rig facing forward.
- The coordinate system is as shown in Figure 1. Slew is defined as the angle in degrees clockwise from the line of the Y axis.

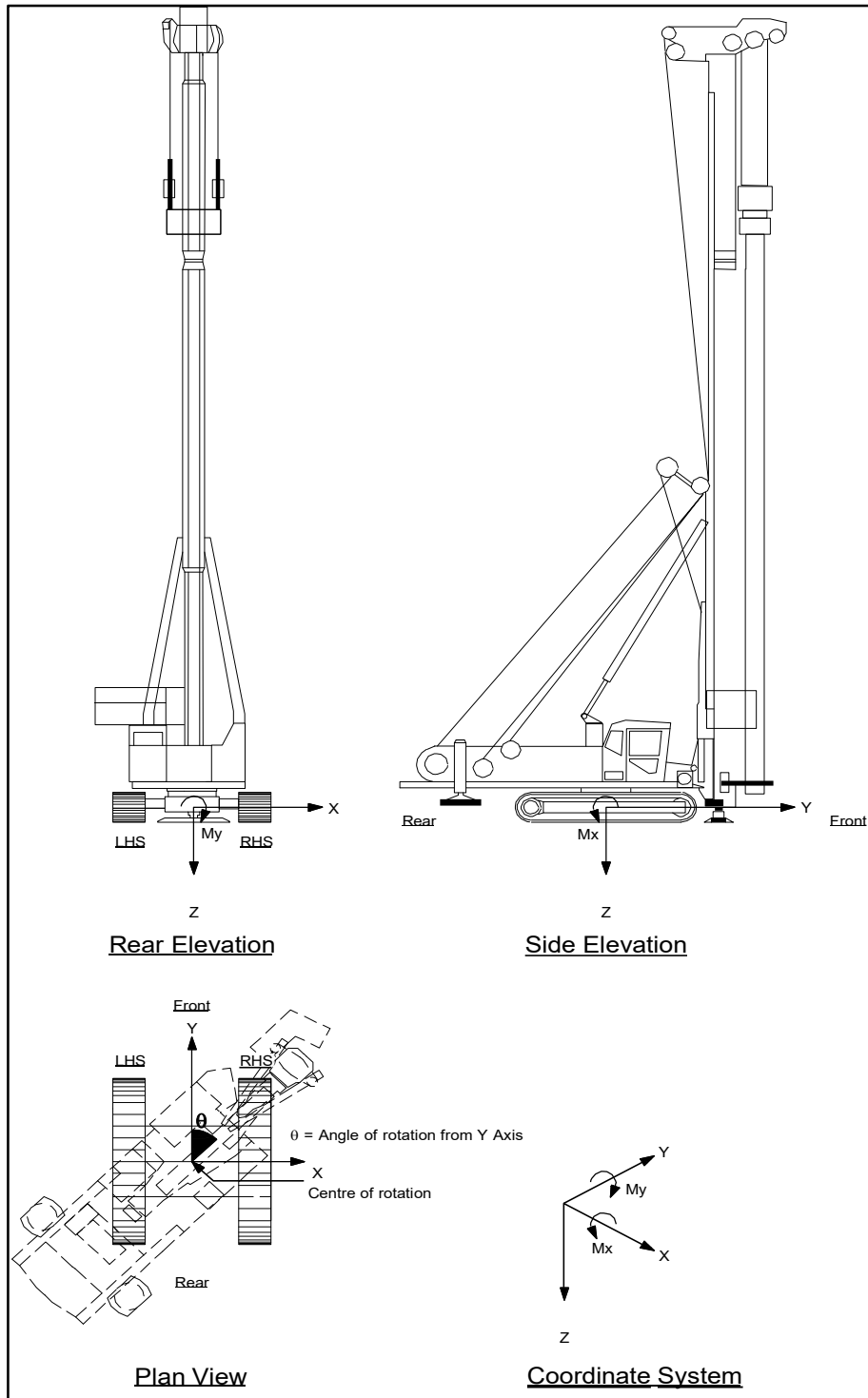


Figure 1 Coordinate system

3.2 Calculation Sheets

(Standing, Tracking, Handling, Penetrating, Extracting, Other)

- Calculation sheets for different modes of operation are provided. Data input for line forces and foot pad forces are required as shown the yellow boxes. For the Standing Mode, no winch forces can be applied, and for the Travelling Mode neither winch or footpad forces can be applied;
- Where foot pads are used their pressure should normally be balanced with the maximum track pressure. An error message is displayed if the pad pressure exceeds the maximum track pressure. Care must be exercised to ensure the worst combination of track pressure for a given equivalent track length and foot pad bearing pressure and geometry are selected for the design of the working platform. Only the maximum of the track or footpad pressure is taken to the summary sheet, other more onerous combinations of pressure and effective bearing area/length may apply and the platform designer should consider these;
- A Eccentricity Index, I_e is introduced to indicate the how far away from the centre of the rig the point of action of the net force is with respect to the x and y axes. An Eccentricity Index between 0 and 0.33 indicates that the resultant force is within the middle third of the rig foot print. An Eccentricity Index approaching 1.0 indicates that the point of action of the resultant force is close to the outer boundary of the track foot print and may warrant a review of the input parameters and/or operation of the rig;
- A warning is given where a track starts to lose contact with the ground (i.e. 0kPa bearing pressure at one end);
- A number of illustrative graphs are provided (not for the printed output) to assist the operator in visualising the lines of action of the net forces. These are for information only, are not printed.

3.3 Summary Sheet

The summary sheet gives a summary of input data, a summary of output data and a series of warning and error messages.

4.0 Technical Notes

4.1 Description of Rig Components

Figure 2 shows the rig components

Non-Slewing Components

The non-slewing components may comprise the tracks and undercarriage. A rig may also have non-slewing footpads.

Slewing Components

Slewing components may comprise the main body of the rig, counterweight, mast and associated components. On some rigs the foot pads are slewing components. Often there is a single footpad which is at the base of the mast.

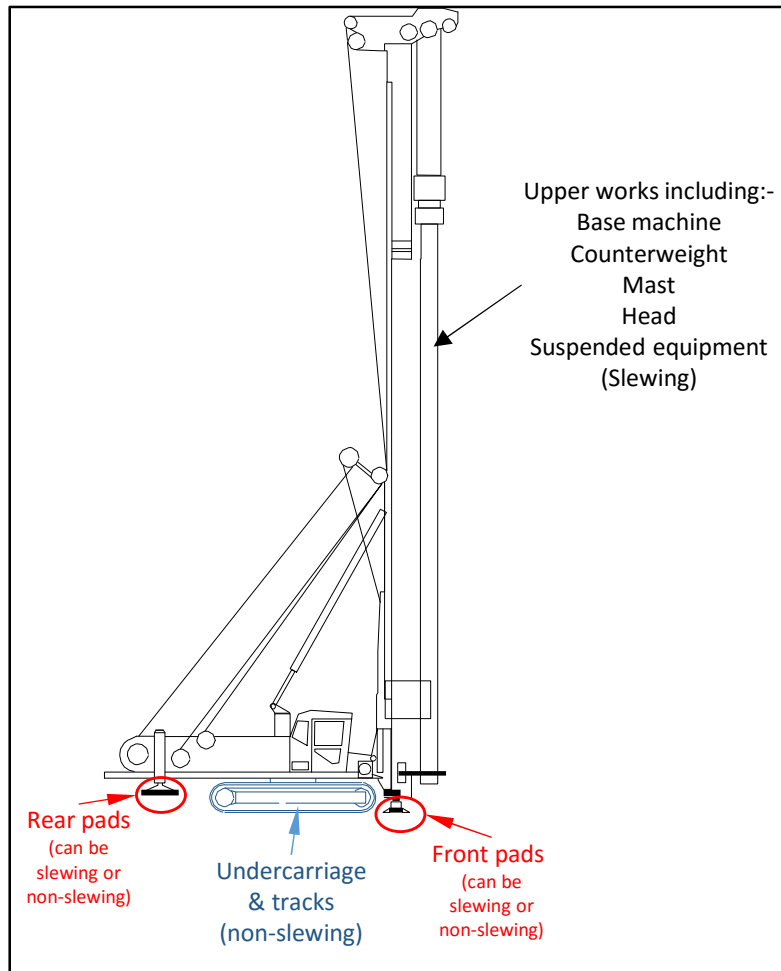


Figure 2 Rig components

5.0 Calculation Steps

The calculation steps used within the Tool are summarised below.

- 1) Input data, including winch loads and footpad resistances as appropriate to the mode of operation.
- 2) Calculate the net downward force applied through the rig tracks and its point of action. Rig weight, winch forces and foot pad resistances are considered as appropriate. Note - the foot pad resistances are imposed by the user as an input parameter to make resolution of forces statically determinate.
- 3) Take moments in the Y direction to give the force applied through the tracks and their point of action in the Y direction.
- 4) Take moments in the X direction to give the force under each track (which may not be equal).
- 5) Calculate the pressure distribution under each track and equate, using the Meyerhof equivalent pressure and bearing area formulation, to a rectangular pressure distribution.
- 6) Summarise the output on the Summary page.

6.0 Dealing with Penetration & Extraction Forces

The application of winch forces requires careful consideration in Case 2 modes of Penetrating or Extracting the digging tool, auger or casing.

The Tool makes the following assumptions:-

- The line of action of the penetration and extraction forces (also termed the crowd system) is coincident with the line of the centroid of the suspended equipment. [On the input page this is termed SUSPENDED EQUIPMENT CONNECTED TO CROWD SYSTEM (Slewing).]
- In Standing and Travelling Modes the suspended equipment is held above the ground and contributes to the overall weight of the rig. The winch force cells (G9 – G11) are disabled in these modes of operation.

The penetration and extraction forces applied during operation are dealt with in a specific way within the spreadsheet Tool. The method used is described below, firstly with no crowd force applied, then with a crowd force applied.

6.1 Penetrating

Penetrating with no Crowd Force Applied

When in Penetrating Mode the suspended equipment (e.g. drilling tool or casing) is in the ground and it is assumed that its weight is transferred to the ground and no longer contributes to the gross weight of the rig. The net penetration force $P_{Pen,net}$ is then equivalent to the weight of the suspended equipment, W_{Sus} .

$$P_{Pen} = -W_{Sus}$$

For reasons of safety the spreadsheet Tool takes the worst case situation of the suspended equipment contributing to the weight of the rig unless a penetration force is inputted. In cases where it no crowd force is applied to avoid over conservatism a very small crowd force of -0.01kN should be inputted, as shown in Figure 3.

Penetrating with a Crowd Force Applied

When penetrating with a crowd force, P_{Pen} , applied both the weight of the suspended equipment and the crowd force is transferred to the ground. As before the suspended equipment does not contribute to the weight of the rig. Thus the net penetration force, $P_{Pen,net}$ is given by:-

$$P_{Pen,net} = -W_{Sus} + P_{Pen} \quad (\text{Noting that } P_{Pen} \text{ is negative}).$$

JUNTTAN		Weight / Force Applied (kN)	X - Coordinate	Y - Coordinate	Moment Mx	Moment My				
PM26										
SLEWING ACTIONS										
Upper Works (slewing)	55	0.00	2.74	-151	0					
Suspended Eqpt. on Crowd	49	0.00	3.41	-167	0					
Counterweight (slewing)	35	0.00	-2.45	96	0					
Other (slewing)	0	0.00	0.00	0	0					
Lower Works (Slewing)	213	0.00	-0.55	117	0					
Net Extraction Force	0	0.00	3.41	0	0	0	392			
Net Penetration Force	-49	0.00	3.41	167	0	-0.01	-29			
Applied Auxiliary Force	0	0.00	4.00	0	0	0	10	Applied Pressure (kPa)	Foot Pad Area (m2)	
Front Pad 1	0	0.00	2.74	0	0	0	-450	0	1.50	
Front Pad 2	0	0.00	0.00	0	0	0	0	0	0.00	
Rear Pad 1	0	0.00	0.00	0	0	0	0	0	0.00	
Rear Pad 2	0	0.00	0.00	0	0	0	0	0	0.00	
Summary of Slewing Action	307	0.00	-0.20	63	-0			Max. Pad Pressure	0	

Where crowd = 0kN net penetration force = weight of suspended equipment.

Penetrating winch force/crowd force. Where there is no crowd force enter -0.01kN

Figure 3 Dealing with penetration and no crowd force applied.

JUNTTAN		Weight / Force Applied (kN)	X - Coordinate	Y - Coordinate	Moment Mx	Moment My				
PM26										
SLEWING ACTIONS										
Upper Works (slewing)	55	0.00	2.74	-151	0					
Suspended Eqpt. on Crowd	49	0.00	3.41	-167	0					
Counterweight (slewing)	35	0.00	-2.45	96	0					
Other (slewing)	0	0.00	0.00	0	0					
Lower Works (Slewing)	213	0.00	-0.55	117	0					
Net Extraction Force	0	0.00	3.41	0	0	0	392			
Net Penetration Force	-78	0.00	3.41	268	0	-29	-29			
Applied Auxiliary Force	0	0.00	4.00	0	0	0	10	Applied Pressure (kPa)	Foot Pad Area (m2)	
Front Pad 1	0	0.00	2.74	0	0	0	-450	0	1.50	
Front Pad 2	0	0.00	0.00	0	0	0	0	0	0.00	
Rear Pad 1	0	0.00	0.00	0	0	0	0	0	0.00	
Rear Pad 2	0	0.00	0.00	0	0	0	0	0	0.00	
Summary of Slewing Action	278	0.00	-0.59	163	-0			Max. Pad Pressure	0	

Net penetration force = crowd force + (-weight of suspended) equipment

Penetrating winch force/crowd force. Where there is a crowd force input here.

Figure 4 Dealing with penetration and a crowd force applied.

6.2 Extracting

When extracting the force on extraction winch, P_{Ext} , is made up of the weight of the suspended equipment plus any resistance due to friction between the suspended equipment and the ground. Since the weight of the suspended equipment is already accounted for in cell B5, the net extraction force, $P_{Ext,net}$, is given by:-

$$P_{Pext,net} = P_{Ext} - W_{Sus}$$

JUNTTAN									
PM26									
Weight / Force Applied (kN)	X - Coordinate	Y - Coordinate	Moment Mx	Moment My					
SLEWING ACTIONS									
Upper Works (slewing)	55	0.00	2.74	-151	0				
Suspended Eqpt. on Crowd	49	0.00	3.41	-167	0				
Counterweight (slewing)	39	0.00	-2.45	96	0				
Other (slewing)	0	0.00	0.00	0	0	Applied Force (kN)	Max. Allowable (kN)		
Lower Works (Slewing)	213	0.00	-0.55	117	0				
Net Extraction Force	343	0.00	3.41	-1,169	0	392	392		
Net Penetration Force	0	0.00	3.41	0	0	0	-29	Applied Pressure (kPa)	Foot Pad Area (m2)
Applied Auxiliary Force	0	0.00	4.00	0	0	0	10		
Front Pad 1	-303	0.00	2.74	830	0	-303	-450	202	1.50
Front Pad 2	0	0.00	0.00	0	0	0	0	0	0.00
Rear Pad 1	0	0.00	0.00	0	0	0	0	0	0.00
Rear Pad 2	0	0.00	0.00	0	0	0	0	0	0.00
Summary of Slewing Action	396	0.00	1.12	-444	0	Max. Pad Pressure	202		

Net extraction force = winch force - weight of suspended equipment.

Extraction winch force input here.

Figure 5 Dealing with extraction forces.

6.3 Positioning of Rotary Head and Suspended Equipment

In some situations the rotary head may not be situated co-axially with the suspended equipment supported by the crowd system. The facility exists to provide different co-ordinates for the different items of suspended equipment. In calculating the track pressures the total crowd force is taken to act at the centroid of gravity of the different suspended items. Other suspended equipment not connected to the crowd system can be accommodated by inputting suspended equipment data (eg a rotary head) in the OTHER cells (B29) on the Input page, as shown in Figure 6. If this is done the corrections explained in Sections 6.1 and 6.1 above are not applied. It is essential that the Tool user ensures the most adverse combination of equipment and winch forces are accounted for in deriving the most adverse rig bearing pressure.

Main Components - Slewing:							
Item	Mass (kg)	Weight (kN)	X - Coordinate	Y - Coordinate	Moment Mx (kNm)	Moment My (kNm)	
UPPER WORKS (Slewing)	Mast Assembly	5,600	55	0.00	2.74	-151	0
						0	0
						0	0
						0	0
LOWER WORKS (Slewing)	Base Machine	21,700	213	0.00	-0.55	117	0
						0	0
						0	0
						0	0
SUSPENDED EQUIPMENT CONNECTED TO CROWD SYSTEM (Slewing)	Auger/Kelly Bar	5,000	49	0.00	3.41	-167	0
						0	0
						0	0
						0	0
COUNTER-WEIGHT (Slewing)	Counterweight	4,000	39	0.00	-2.45	96	0
						0	0
OTHER/OTHER SUSPENDED EQUIPMENT (Slewing)	Rotary Head	2,150	0	0.00	3.00	0	0
						0	0
UPPER WORKS		5,600	55	0.00	2.74	-151	0
LOWER WORKS		21,700	213	0.00	-0.55	117	0
SUSPENDED EQUIPMENT CONNECTED TO CROWD SYSTEM		5,000	49	0.00	3.41	-167	0
COUNTERWEIGHT		4,000	39	0.00	-2.45	96	0
OTHER		2,150	0	0.00	0.00	0	0
SLEWING TOTAL/RESULTANT (with θ=0)		38,450	356	0.00	0.29	-105	0

Figure 6 Dealing with non-aligned head and suspended equipment.

7.0 Example Calculation

An example calculation using the Tool is presented in Appendix A. The input parameters are shown on the Input page in Appendix A and graphically in Figure 7, which shows the mass and coordinates of the different rig components.

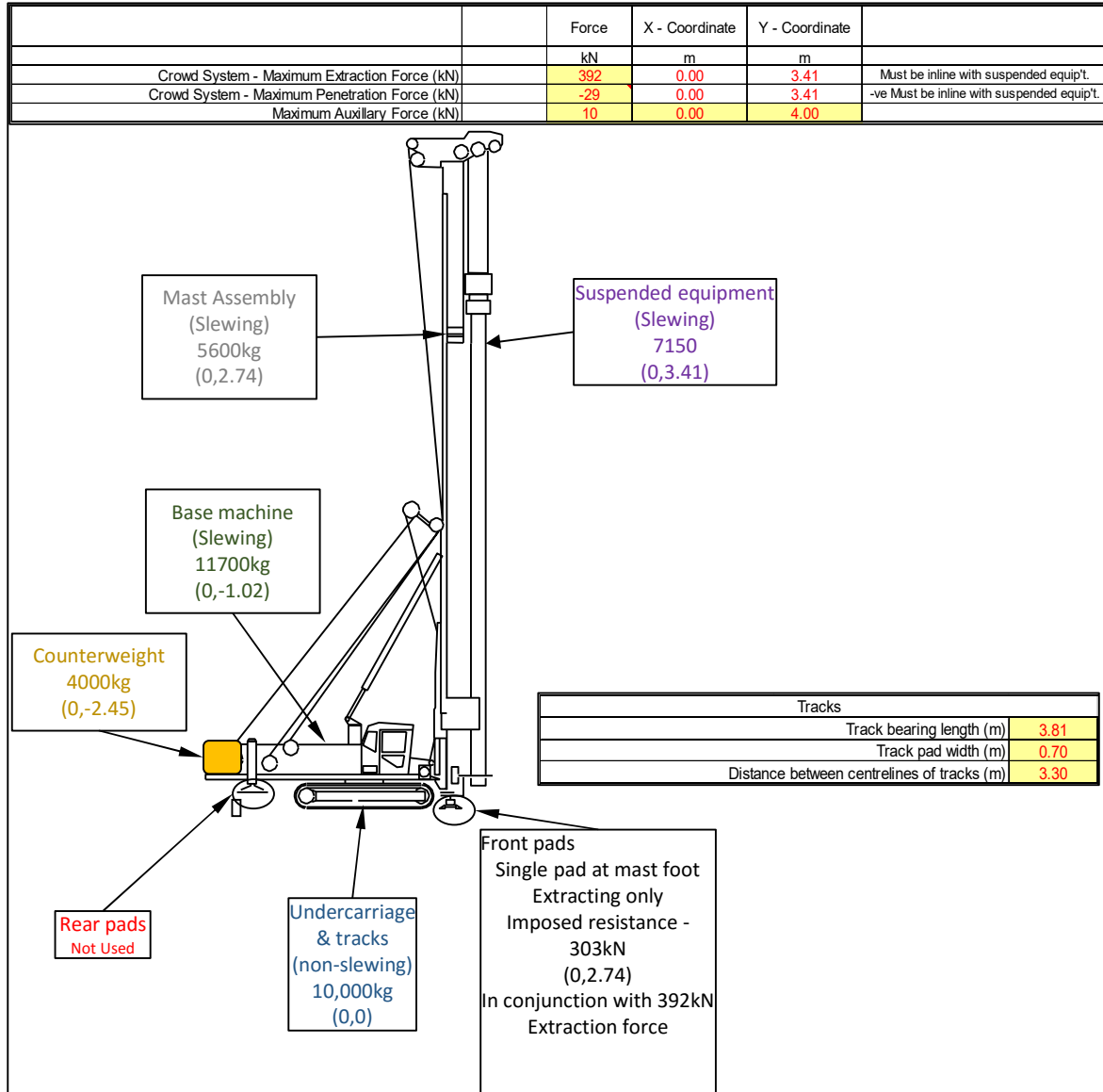


Figure 7 Input parameters for calculation example

APPENDIX A

Example Calculation.

**Federation of Piling Specialists (the “FPS”)
Rig Loadings Spreadsheet (the “Spreadsheet”)
Disclaimer**

The Spreadsheet has been designed without liability with the intention of assisting in the calculation of track bearing pressures for use in the BRE Design Method[1]. The Spreadsheet contains sample data, which are intended only to illustrate how the Spreadsheet may be operated, and do not represent any specific rig .

The Spreadsheet is intended for use only by a competent person. It is intended to assist in calculating the track loadings that occur with the rig working on a flat horizontal surface with a vertical mast it makes no allowance for the effects on track loadings caused by raking the mast in any direction, or non-vertical suspended loads.

Whilst we have taken steps to check the accuracy of the Spreadsheet, the FPS and the authors of the Spreadsheet do not give any warranty, guarantee, representation or other assurance as to: the operation, quality or functionality of the Spreadsheet; the accuracy or completeness of the Spreadsheet; or its fitness for any particular purpose.

To the fullest extent permissible by law, the FPS and the authors of the Spreadsheet each disclaim all responsibility for any damages or losses (including, without limitation, financial loss, damages for loss in business projects, loss of profits or other consequential losses) arising in contract, tort or otherwise from the use of or inability to use the Spreadsheet, or from any action or decision taken as a result of using the Spreadsheet.

[1] BRE Report 470, Working Platforms for Tracked Plant, 2004

The user of this spreadsheet shall input data into the relevant yellow boxes on this worksheet and on all of the other relevant worksheets

Note: The disclaimer on the first worksheet applies to all tables in this workbook

Rig Manufacturer :	EXAMPLE	Rig Type & Serial No.	ZX1000	DE2001.2
Operation mode:	Example	Date:	09/06/2016	
Completed by:	Blank	Checked by:	Blank	

Main Components - Slewing:							
Item	Mass (kg)	Weight (kN)	X - Coordinate	Y - Coordinate	Moment Mx (kNm)	Moment My (kNm)	
UPPER WORKS (Slewing)	Mast Assembly	5,600	55	0.00	2.74	-151	0
						0	0
						0	0
						0	0
LOWER WORKS (Slewing)	Base Machine	11,700	115	0.00	-1.02	118	0
						0	0
						0	0
						0	0
SUSPENDED EQUIPMENT CONNECTED TO CROWD SYSTEM (Slewing)	Auger	5,000	49	0.00	3.41	-167	0
	Rotary Head	2,150	21	-1.00	3.60	-76	-21
				0.00	0.00	0	0
				0.00	0.00	0	0
COUNTER-WEIGHT (Slewing)	Counterweight	4,000	39	0.00	-2.45	96	0
						0	0
OTHER/OTHER SUSPENDED EQUIPMENT (Slewing)			0	0.00	3.41	0	0
						0	0
UPPER WORKS	5,600	55	0.00	2.74	-151	0	
LOWER WORKS	11,700	115	0.00	-1.02	118	0	
SUSPENDED EQUIPMENT CONNECTED TO CROWD SYSTEM	7,150	70	-0.30	3.47	-243	-21	
COUNTERWEIGHT	4,000	39	0.00	-2.45	96	0	
OTHER	0	0	0.00	0.00	0	0	
SLEWING TOTAL/RESULTANT (with $\theta=0$)	28,450	279	-0.08	0.64	-180	-21	

Foot Pads - Slewing :							
Description	Bearing Area	Max. Pad Loading	X - Coordinate	Y - Coordinate	Actual Shape	Actual Dimension	
	m ²	kN	m	m			
Front Pad 1	1.50	-450	0.00	2.74	1.2x1.25m	Rectangular	
Front Pad 2					None	None	
Rear Pad 1					None	None	
Rear Pad 2					None	None	


Forces - Slewing					
	Force	X - Coordinate	Y - Coordinate		
	kN	m	m		
Crowd System - Maximum Extraction Force (kN)	392	-0.30	3.47	Must be inline with suspended equip't.	
Crowd System - Maximum Penetration Force (kN)	-29	-0.30	3.47	-ve Must be inline with suspended equip't.	
Maximum Auxillary Force (kN)	10	0.00	4.00		

Main Components - Non-Slewing:							
Item	Mass (kg)	Weight (kN)	X - Coordinate	Y - Coordinate	Moment Mx (kNm)	Moment My (kNm)	
Lower Works Non-Slewing (undercarriage/tracks etc)	Tracks & Undercarriage	10,000	98	0.00	0.00	0	0
				0.00	0.00	0	0
				0.00	0.00	0	0
NON-SLEWING TOTAL/RESULTANT (with $\theta=0$)	10,000	98	0.00	0.00	0	0	
TOTAL RIG MASS	38,450						

Foot Pads - Non-Slewing							
Description	Bearing Area	Max. Pad Loading	X - Coordinate	Y - Coordinate	Actual Shape	Actual Dimension	
	m ²	kN	m	m			
Front Pad 1							
Front Pad 2							
Rear Pad 1							
Rear Pad 2							

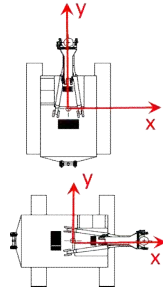
Tracks		Slewing	
Track bearing length (m)	3.81	Can the rig slew?	YES
Track pad width (m)	0.70		
Distance between centrelines of tracks (m)	3.30		

Note: The disclaimer on the first worksheet applies to all tables in this workbook



Notes
Blank

EXAMPLE	Weight / Force Applied (kN)	X - Coordinate	Y - Coordinate	Moment Mx	Moment My
ZX1000					
SLEWING ACTIONS					
Upper Works (slewing)	55	0.00	2.74	-151	0
Suspended Eqpt. on Crowd	70	-0.30	3.47	-243	-21
Counterweight (slewing)	39	0.00	-2.45	96	0
Other (slewing)	0	0.00	0.00	0	0
Lower Works (Slewing)	115	0.00	-1.02	118	0
Net Extraction Force	0	-0.30	3.47	0	0
Net Penetration Force	0	-0.30	3.47	0	0
Applied Auxillary Force	0	0.00	4.00	0	0
Front Pad 1	0	0.00	2.74	0	0
Front Pad 2	0	0.00	0.00	0	0
Rear Pad 1	0	0.00	0.00	0	0
Rear Pad 2	0	0.00	0.00	0	0
Summary of Slewing Actions	279	-0.08	0.64	-180	-21



Applied Force (kN)	Max. Allowable (kN)	Applied Pressure (kPa)	Foot Pad Area (m ²)
0	392	0	1.50
0	-29	0	0.00
0	10	0	0.00
0	-450	0	1.50
0	0	0	0.00
0	0	0	0.00
0	0	0	0.00
0	0	0	0.00
Summary of Slewing Actions	279	-0.08	0.64
Max. Pad Pressure		0	

NON-SLEWING ACTIONS						Applied Force (kN)	Max. Allowable (kN)	Applied Pressure (kPa)	Foot Pad Area (m ²)	
Lower Works Non-Slewing	98	0.00	0.00	0	0	0	0	0	0.00	
Front Pad 1	0	0.00	0.00	0	0	0	0	0	0.00	
Front Pad 2	0	0.00	0.00	0	0	0	0	0	0.00	
Rear Pad 1	0	0.00	0.00	0	0	0	0	0	0.00	
Rear Pad 2	0	0.00	0.00	0	0	0	0	0	0.00	
Summary of Non-slewing Actions	98	0.00	0.00	0	0	Max. Pad Pressure 0				
Total Rig Weight (kN)	377					Track Bearing Length (m)		3.81		
Resultant of all Actions (kN)	377	-0.06	0.48	-180	-21	Track pad width (m)		0.70		
						Track Centerline Dist. (m)		3.30		

Input Data Warning Messages	Notes
Auxiliary Line Force OK	
Extraction Force OK	
Penetration Force OK	
Slewing Footpad Forces OK	
Non-Slewing Footpad Forces OK	

Notes on Using this Table

Auxiliary Line Pull +ve Z direction. Enter applied force (kN) in appropriate yellow box (G11). Note the maximum design force in the adjacent box (H11).
 Extraction Line Pull +ve Z direction. Enter applied force (kN) in appropriate yellow box (G9). Note the maximum design force in the adjacent box (FH9).
 Penetration Force -ve Z direction. Enter applied force (kN) in appropriate yellow box (G10) - must be negative as it imposes an upwards resultant force. Note the maximum design force in the adjacent box (H10).
 Slewing Foot Pad Forces +ve Z direction. Enter applied total force (kN) in appropriate yellow boxes (G12 to G15). Note the maximum the machine can develop is given in the adjacent boxes.
 Non-Slewing Foot Pad Forces -ve Z direction. Enter applied total force (kN) in appropriate yellow boxes (G20 to G23). Note the maximum the machine can develop is given in the adjacent boxes.

Fill in values in all yellow boxes appropriate for this mode -

Net extraction or penetration force is the applied value minus the weight of any rope / kelly / chain suspended equipment.
 By trial and error, adjust Foot Pad Forces to eliminate "error" messages and equalise bearing pressures on both tracks and foot pads (highlighted in red boxes).
 When applying Auxillary or Extraction Line Pull, ensure that Penetration Force is zero.

ONLY A COMPETENT PERSON MAY USE THIS TABLE !

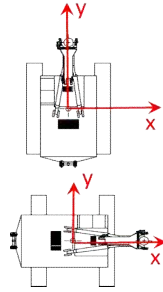
Note: The disclaimer on the first worksheet applies to all tables in this workbook

Mode : Travelling							Transformation from triangular or trapezoidal to an equivalent rectangular pressure distribution under track maintaining the load centroid		
Relative Angle - Upper Body and Tracks (degrees)	Max bearing pressure L.H. track (kN/m ²)	Min pressure L.H. track (kN/m ²)	Max bearing pressure R.H. track (kN/m ²)	Min bearing pressure R.H. track (kN/m ²)	Max Track loading dimensions		Equivalent Bearing		
					ecc (m)	Bearing Len. (m)	L (m)	Q (kPa)	
0	128	18	119	17	0.477	3.814	2.860	97	
15	118	17	129	19	0.475	3.814	2.863	98	
30	106	19	133	24	0.441	3.814	2.932	102	
45	92	24	133	34	0.377	3.814	3.060	104	
60	79	30	126	48	0.287	3.814	3.240	103	
75	66	37	115	65	0.177	3.814	3.459	99	
90	55	46	99	83	0.056	3.814	3.702	94	
105	56	45	101	81	-0.069	3.814	3.675	94	
120	67	36	116	63	-0.190	3.814	3.434	99	
135	80	29	127	46	-0.298	3.814	3.218	103	
150	94	23	133	33	-0.385	3.814	3.044	104	
165	107	19	133	23	-0.446	3.814	2.921	102	
180	119	17	128	18	-0.477	3.814	2.860	97	
195	129	19	118	17	-0.475	3.814	2.863	98	
210	133	24	106	19	-0.441	3.814	2.932	102	
225	133	34	92	24	-0.377	3.814	3.060	104	
240	126	48	79	30	-0.287	3.814	3.240	103	
255	115	65	66	37	-0.177	3.814	3.459	99	
270	99	83	55	46	-0.056	3.814	3.702	94	
285	101	81	56	45	0.069	3.814	3.675	94	
300	116	63	67	36	0.190	3.814	3.434	99	
315	127	46	80	29	0.298	3.814	3.218	103	
330	133	33	94	23	0.385	3.814	3.044	104	
345	133	23	107	19	0.446	3.814	2.921	102	
Maximum Track Values							3.060	104	
							Pad Area (m ²)		
Max. Slewing Foot Pads Bearing Pressure (kPa) & Equivalent Bearing Length							1.500	2.143	0
Max. Non-Slewing Foot Pads Bearing Pressure (kPa) & Equivalent Bearing Length							0.000	0.000	0
Maximum Equivalent Design Values							3.060	104	
Eccentricity index - X direction (sideways)							0.29		
Eccentricity index - Y direction (forwards/backwards)							0.25		
Track pressure distribution warning							None		
Slewing foot pad message							Slewing Foot Pad Pressure OK		
Non-Slewing foot pad message							Non-Slewing Foot Pad Pressure OK		
BRE LOAD CASE (1 or 2)							1		



EXAMPLE	Weight / Force Applied (kN)	X - Coordinate	Y - Coordinate	Moment Mx	Moment My
ZX1000					

SLEWING ACTIONS					
Upper Works (slewing)	55	0.00	2.74	-151	0
Suspended Eqpt. on Crowd	70	-0.30	3.47	-243	-21
Counterweight (slewing)	39	0.00	-2.45	96	0
Other (slewing)	0	0.00	0.00	0	0
Lower Works (Slewing)	115	0.00	-1.02	118	0
Net Extraction Force	0	-0.30	3.47	0	0
Net Penetration Force	0	-0.30	3.47	0	0
Applied Auxillary Force	10	0.00	4.00	-40	0
Front Pad 1	0	0.00	2.74	0	0
Front Pad 2	0	0.00	0.00	0	0
Rear Pad 1	0	0.00	0.00	0	0
Rear Pad 2	0	0.00	0.00	0	0
Summary of Slewing Actions	289	-0.07	0.76	-220	-21



Applied Force (kN)	Max. Allowable (kN)	Applied Pressure (kPa)	Foot Pad Area (m2)
0	392	0	1.50
0	-29	0	0.00
10	10	0	0.00
0	-450	0	1.50
0	0	0	0.00
0	0	0	0.00
0	0	0	0.00
0	0	0	0.00
Max. Pad Pressure	0		

NON-SLEWING ACTIONS						Applied Force (kN)	Max. Allowable (kN)	Applied Pressure (kPa)	Foot Pad Area (m2)
Lower Works Non-Slewing	98	0.00	0.00	0	0	0	0	0	0.00
Front Pad 1	0	0.00	0.00	0	0	0	0	0	0.00
Front Pad 2	0	0.00	0.00	0	0	0	0	0	0.00
Rear Pad 1	0	0.00	0.00	0	0	0	0	0	0.00
Rear Pad 2	0	0.00	0.00	0	0	0	0	0	0.00
Summary of Non-slewing Actions	98	0.00	0.00	0	0	Max. Pad Pressure	0		

Total Rig Weight (kN)	377					Track Bearing Length (m)	3.81
Resultant of all Actions (kN)	387	-0.05	0.57	-220	-21	Track pad width (m)	0.70
						Track Centerline Dist. (m)	3.30

Input Data Warning Messages	Notes
Auxiliary Line Force OK	
Extraction Force OK	
Penetration Force OK	
Slewing Footpad Forces OK	
Non-Slewing Footpad Forces OK	

Notes on Using this Table

Auxiliary Line Pull +ve Z direction. Enter applied force (kN) in appropriate yellow box (G11). Note the maximum design force in the adjacent box (H11).
 Extraction Line Pull +ve Z direction. Enter applied force (kN) in appropriate yellow box (G9). Note the maximum design force in the adjacent box (FH9).
 Penetration Force -ve Z direction. Enter applied force (kN) in appropriate yellow box (G10) - must be negative as it imposes an upwards resultant force. Note the maximum design force in the adjacent box (H10).
 Slewing Foot Pad Forces +ve Z direction. Enter applied total force (kN) in appropriate yellow boxes (G12 to G15). Note the maximum the machine can develop is given in the adjacent boxes.
 Non-Slewing Foot Pad Forces -ve Z direction. Enter applied total force (kN) in appropriate yellow boxes (G20 to G23). Note the maximum the machine can develop is given in the adjacent boxes.

Fill in values in all yellow boxes appropriate for this mode -

Net extraction or penetration force is the applied value minus the weight of any rope / kelly / chain suspended equipment.
 By trial and error, adjust Foot Pad Forces to eliminate "error" messages and equalise bearing pressures on both tracks and foot pads (highlighted in red boxes).
 When applying Auxillary or Extraction Line Pull, ensure that Penetration Force is zero.

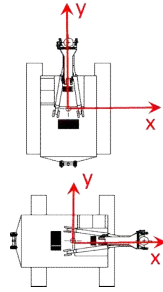
ONLY A COMPETENT PERSON MAY USE THIS TABLE !

Note: The disclaimer on the first worksheet applies to all tables in this workbook

Mode : Handling							Transformation from triangular or trapezoidal to an equivalent rectangular pressure distribution under track maintaining the load centroid		
Relative Angle - Upper Body and Tracks (degrees)	Max bearing pressure L.H. track (kN/m ²)	Min pressure L.H. track (kN/m ²)	Max bearing pressure R.H. track (kN/m ²)	Min bearing pressure R.H. track (kN/m ²)	Max Track loading dimensions		Equivalent Bearing		
					ecc (m)	Bearing Len. (m)	L (m)	Q (kPa)	
0	142	8	133	7	0.568	3.814	2.678	107	
15	129	8	145	9	0.563	3.814	2.688	109	
30	113	11	151	15	0.519	3.814	2.776	114	
45	96	17	150	27	0.440	3.814	2.934	115	
60	79	25	141	45	0.331	3.814	3.152	112	
75	64	34	126	66	0.200	3.814	3.415	107	
90	52	43	106	89	0.054	3.814	3.705	100	
105	55	41	112	83	-0.094	3.814	3.625	102	
120	68	31	131	60	-0.237	3.814	3.340	109	
135	84	23	144	39	-0.363	3.814	3.088	113	
150	100	16	151	23	-0.465	3.814	2.885	115	
165	117	10	150	13	-0.535	3.814	2.745	113	
180	133	7	142	8	-0.568	3.814	2.678	107	
195	145	9	129	8	-0.563	3.814	2.688	109	
210	151	15	113	11	-0.519	3.814	2.776	114	
225	150	27	96	17	-0.440	3.814	2.934	115	
240	141	45	79	25	-0.331	3.814	3.152	112	
255	126	66	64	34	-0.200	3.814	3.415	107	
270	106	89	52	43	-0.054	3.814	3.705	100	
285	112	83	55	41	0.094	3.814	3.625	102	
300	131	60	68	31	0.237	3.814	3.340	109	
315	144	39	84	23	0.363	3.814	3.088	113	
330	151	23	100	16	0.465	3.814	2.885	115	
345	150	13	117	10	0.535	3.814	2.745	113	
Maximum Track Values							2.885	115	
							Pad Area (m ²)		
Max. Slewing Foot Pads Bearing Pressure (kPa) & Equivalent Bearing Length							1.500	2.143	0
Max. Non-Slewing Foot Pads Bearing Pressure (kPa) & Equivalent Bearing Length							0.000	0.000	0
Maximum Equivalent Design Values							2.885	115	
Eccentricity index - X direction (sideways)							0.34		
Eccentricity index - Y direction (forwards/backwards)							0.30		
Track pressure distribution warning							None		
Slewing foot pad message							Slewing Foot Pad Pressure OK		
Non-Slewing foot pad message							Non-Slewing Foot Pad Pressure OK		
BRE LOAD CASE (1 or 2)								1	



EXAMPLE	Weight / Force Applied (kN)	X - Coordinate	Y - Coordinate	Moment Mx	Moment My
ZX1000					
SLEWING ACTIONS					
Upper Works (slewing)	55	0.00	2.74	-151	0
Suspended Eqpt. on Crowd	70	-0.30	3.47	-243	-21
Counterweight (slewing)	39	0.00	-2.45	96	0
Other (slewing)	0	0.00	0.00	0	0
Lower Works (Slewing)	115	0.00	-1.02	118	0
Net Extraction Force	0	-0.30	3.47	0	0
Net Penetration Force	-100	-0.30	3.47	345	30
Applied Auxillary Force	0	0.00	4.00	0	0
Front Pad 1	0	0.00	2.74	0	0
Front Pad 2	0	0.00	0.00	0	0
Rear Pad 1	0	0.00	0.00	0	0
Rear Pad 2	0	0.00	0.00	0	0
Summary of Slewing Actions	180	0.05	-0.92	165	9



Applied Force (kN)	Max. Allowable (kN)	Applied Pressure (kPa)	Foot Pad Area (m2)
0.00	392	0	1.50
-29.40	-29	0	0.00
0.00	10	0	0.00
0	-450	0	1.50
0	0	0	0.00
0	0	0	0.00
0	0	0	0.00
0	0	0	0.00
Max. Pad Pressure	0		

NON-SLEWING ACTIONS						Applied Force (kN)	Max. Allowable (kN)	Applied Pressure (kPa)	Foot Pad Area (m2)
Lower Works Non-Slewing	98	0.00	0.00	0	0	0	0	0	0.00
Front Pad 1	0	0.00	0.00	0	0	0	0	0	0.00
Front Pad 2	0	0.00	0.00	0	0	0	0	0	0.00
Rear Pad 1	0	0.00	0.00	0	0	0	0	0	0.00
Rear Pad 2	0	0.00	0.00	0	0	0	0	0	0.00
Summary of Non-slewing Actions	98	0.00	0.00	0	0	Max. Pad Pressure	0		
Total Rig Weight (kN)	377					Track Bearing Length (m)		3.81	
Resultant of all Actions (kN)	278	0.03	-0.59	165	9	Track pad width (m)		0.70	
						Track Centerline Dist. (m)		3.30	

Input Data Warning Messages	Notes
Auxiliary Line Force OK	
Extraction Force OK	
Penetration Force OK	
Slewing Footpad Forces OK	
Non-Slewing Footpad Forces OK	

Notes on Using this Table

Auxiliary Line Pull +ve Z direction. Enter applied force (kN) in appropriate yellow box (G11). Note the maximum design force in the adjacent box (H11).
 Extraction Line Pull +ve Z direction. Enter applied force (kN) in appropriate yellow box (G9). Note the maximum design force in the adjacent box (FH9).
 Penetration Force -ve Z direction. Enter applied force (kN) in appropriate yellow box (G10) - must be negative as it imposes an upwards resultant force. Note the maximum design force in the adjacent box (H10).
 Slewing Foot Pad Forces +ve Z direction. Enter applied total force (kN) in appropriate yellow boxes (G12 to G15). Note the maximum the machine can develop is given in the adjacent boxes.
 Non-Slewing Foot Pad Forces -ve Z direction. Enter applied total force (kN) in appropriate yellow boxes (G20 to G23). Note the maximum the machine can develop is given in the adjacent boxes.

Fill in values in all yellow boxes appropriate for this mode -

Net extraction or penetration force is the applied value minus the weight of any rope / kelly / chain suspended equipment.
 By trial and error, adjust Foot Pad Forces to eliminate "error" messages and equalise bearing pressures on both tracks and foot pads (highlighted in red boxes).
 When applying Auxillary or Extraction Line Pull, ensure that Penetration Force is zero.

ONLY A COMPETENT PERSON MAY USE THIS TABLE !

Note: The disclaimer on the first worksheet applies to all tables in this workbook

Mode : Penetrating							Transformation from triangular or trapezoidal to an equivalent rectangular pressure distribution under track maintaining the load centroid		
Relative Angle - Upper Body and Tracks (degrees)	Max bearing pressure L.H. track (kN/m ²)	Min pressure L.H. track (kN/m ²)	Max bearing pressure R.H. track (kN/m ²)	Min bearing pressure R.H. track (kN/m ²)	Max Track loading dimensions		Equivalent Bearing		
					ecc (m)	Bearing Len. (m)	L (m)	Q (kPa)	
0	103	3	99	3	0.595	3.814	2.624	77	
15	92	4	107	5	0.583	3.814	2.648	80	
30	80	7	111	10	0.531	3.814	2.752	84	
45	67	12	110	20	0.443	3.814	2.928	84	
60	55	18	102	33	0.325	3.814	3.164	82	
75	44	24	90	50	0.185	3.814	3.445	77	
90	35	32	74	67	0.032	3.814	3.750	72	
105	40	27	84	57	-0.123	3.814	3.568	75	
120	50	20	98	40	-0.270	3.814	3.274	80	
135	62	14	107	25	-0.398	3.814	3.018	83	
150	75	9	111	13	-0.499	3.814	2.816	84	
165	87	5	109	6	-0.566	3.814	2.681	82	
180	99	3	103	3	-0.595	3.814	2.624	77	
195	107	5	92	4	-0.583	3.814	2.648	80	
210	111	10	80	7	-0.531	3.814	2.752	84	
225	110	20	67	12	-0.443	3.814	2.928	84	
240	102	33	55	18	-0.325	3.814	3.164	82	
255	90	50	44	24	-0.185	3.814	3.445	77	
270	74	67	35	32	-0.032	3.814	3.750	72	
285	84	57	40	27	0.123	3.814	3.568	75	
300	98	40	50	20	0.270	3.814	3.274	80	
315	107	25	62	14	0.398	3.814	3.018	83	
330	111	13	75	9	0.499	3.814	2.816	84	
345	109	6	87	5	0.566	3.814	2.681	82	
Maximum Track Values							2.816	84	
Max. Slewing Foot Pads Bearing Pressure (kPa) & Equivalent Bearing Length							1.500	2.143	0
Max. Non-Slewing Foot Pads Bearing Pressure (kPa) & Equivalent Bearing Length							0.000	0.000	0
Maximum Equivalent Design Values							2.816	84	
Eccentricity index - X direction (sideways)							0.36		
Eccentricity index - Y direction (forwards/backwards)							0.31		
Track pressure distribution warning							None		
Slewing foot pad message							Slewing Foot Pad Pressure OK		
Non-Slewing foot pad message							Non-Slewing Foot Pad Pressure OK		
BRE LOAD CASE (1 or 2)								2	



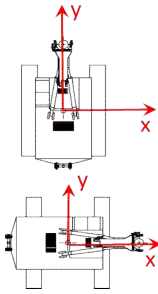
EXAMPLE	Weight / Force Applied (kN)	X - Coordinate	Y - Coordinate	Moment Mx	Moment My
ZX1000					

SLEWING ACTIONS					
Upper Works (slewing)	55	0.00	2.74	-151	0
Suspended Eqpt. on Crowd	70	-0.30	3.47	-243	-21
Counterweight (slewing)	39	0.00	-2.45	96	0
Other (slewing)	0	0.00	0.00	0	0
Lower Works (Slewing)	115	0.00	-1.02	118	0
Net Extraction Force	322	-0.30	3.47	-1,116	-97
Net Penetration Force	0	-0.30	3.47	0	0
Applied Auxillary Force	0	0.00	4.00	0	0
Front Pad 1	-303	0.00	2.74	830	0
Front Pad 2	0	0.00	0.00	0	0
Rear Pad 1	0	0.00	0.00	0	0
Rear Pad 2	0	0.00	0.00	0	0
Summary of Slewing Actions	298	-0.40	1.56	-466	-118

Applied Force (kN)	Max. Allowable (kN)
392.00	392

Applied Pressure (kPa)	Foot Pad Area (m ²)
0.00	10
202	1.50
0	0.00
0	0.00
0	0.00
0	0.00

Max. Pad Pressure 202



NON-SLEWING ACTIONS						Applied Force (kN)	Max. Allowable (kN)	Applied Pressure (kPa)	Foot Pad Area (m ²)
Lower Works Non-Slewing	98	0.00	0.00	0	0	0	0	0	0.00
Front Pad 1	0	0.00	0.00	0	0	0	0	0	0.00
Front Pad 2	0	0.00	0.00	0	0	0	0	0	0.00
Rear Pad 1	0	0.00	0.00	0	0	0	0	0	0.00
Rear Pad 2	0	0.00	0.00	0	0	0	0	0	0.00

Summary of Non-slewing Actions: Applied Force 98, Max. Allowable 0, Applied Pressure 0, Foot Pad Area 0. Max. Pad Pressure 0.

Total Rig Weight (kN)	377	Track Bearing Length (m)		3.81
Resultant of all Actions (kN)	396	-0.30	1.18	-466
				-118
				0.70
				3.30

Input Data Warning Messages	Notes
Auxiliary Line Force OK	
Extraction Force OK	
Penetration Force OK	
Slewing Footpad Forces OK	
Non-Slewing Footpad Forces OK	

Notes on Using this Table

Auxiliary Line Pull +ve Z direction. Enter applied force (kN) in appropriate yellow box (G11). Note the maximum design force in the adjacent box (H11).
 Extraction Line Pull +ve Z direction. Enter applied force (kN) in appropriate yellow box (G9). Note the maximum design force in the adjacent box (FH9).
 Penetration Force -ve Z direction. Enter applied force (kN) in appropriate yellow box (G10) - must be negative as it imposes an upwards resultant force. Note the maximum design force in the adjacent box (H10).
 Slewing Foot Pad Forces +ve Z direction. Enter applied total force (kN) in appropriate yellow boxes (G12 to G15). Note the maximum the machine can develop is given in the adjacent boxes.
 Non-Slewing Foot Pad Forces -ve Z direction. Enter applied total force (kN) in appropriate yellow boxes (G20 to G23). Note the maximum the machine can develop is given in the adjacent boxes.

Fill in values in all yellow boxes appropriate for this mode -

Net extraction or penetration force is the applied value minus the weight of any rope / kelly / chain suspended equipment.
 By trial and error, adjust Foot Pad Forces to eliminate "error" messages and equalise bearing pressures on both tracks and foot pads (highlighted in red boxes).
 When applying Auxillary or Extraction Line Pull, ensure that Penetration Force is zero.

ONLY A COMPETENT PERSON MAY USE THIS TABLE !

Note: The disclaimer on the first worksheet applies to all tables in this workbook

Mode : Extracting								Transformation from triangular or trapezoidal to an equivalent rectangular pressure distribution under track maintaining the load centroid	
Relative Angle - Upper Body and Tracks (degrees)	Max bearing pressure L.H. track (kN/m ²)	Min pressure L.H. track (kN/m ²)	Max bearing pressure R.H. track (kN/m ²)	Min bearing pressure R.H. track (kN/m ²)	Max Track loading dimensions		Equivalent Bearing		
					ecc (m)	Bearing Len. (m)	L (m)	Q (kPa)	
0	304	0	211	0	1.176	2.194	1.462	228	
15	269	0	274	0	1.213	2.083	1.389	206	
30	204	0	306	0	1.167	2.220	1.480	229	
45	136	0	300	0	1.042	2.595	1.730	225	
60	84	0	271	0	0.846	3.184	2.123	203	
75	51	2	235	8	0.592	3.814	2.630	177	
90	31	11	187	68	0.298	3.814	3.219	151	
105	20	19	132	125	-0.017	3.814	3.780	130	
120	33	10	192	61	-0.330	3.814	3.154	153	
135	54	1	239	3	-0.621	3.814	2.572	179	
150	89	0	275	0	-0.869	3.113	2.075	206	
165	143	0	302	0	-1.059	2.545	1.697	227	
180	211	0	304	0	-1.176	2.194	1.462	228	
195	274	0	269	0	-1.213	2.083	1.389	206	
210	306	0	204	0	-1.167	2.220	1.480	229	
225	300	0	136	0	-1.042	2.595	1.730	225	
240	271	0	84	0	-0.846	3.184	2.123	203	
255	235	8	51	2	-0.592	3.814	2.630	177	
270	187	68	31	11	-0.298	3.814	3.219	151	
285	132	125	20	19	0.017	3.814	3.780	130	
300	192	61	33	10	0.330	3.814	3.154	153	
315	239	3	54	1	0.621	3.814	2.572	179	
330	275	0	89	0	0.869	3.113	2.075	206	
345	302	0	143	0	1.059	2.545	1.697	227	
Maximum Track Values							1.480	229	
Max. Slewing Foot Pads Bearing Pressure (kPa) & Equivalent Bearing Length							1.500	2.143	202
Max. Non-Slewing Foot Pads Bearing Pressure (kPa) & Equivalent Bearing Length							0.000	0.000	0
Maximum Equivalent Design Values							1.480	229	
Eccentricity index - X direction (sideways)				0.73					
Eccentricity index - Y direction (forwards/backwards)				0.64					
Track pressure distribution warning				Track(s) lifting					
Slewing foot pad message				Slewing Foot Pad Pressure OK					
Non-Slewing foot pad message				Non-Slewing Foot Pad Pressure OK					
BRE LOAD CASE (1 or 2)							2		



Schedule of Piling Rig Component Weights, Dimensions, Forces and Pressures

Note: The disclaimer on the first worksheet applies to all tables in this workbook

Rig Manufacturer :	EXAMPLE	Rig Type & Serial No.:	ZX1000 DE2001.2
Operation mode:	Example	Date:	09/06/2016
Completed by:	Blank	Checked by:	Blank

Main Components - Slewing:							
Item	Mass (kg)	Weight (kN)	X - Coordinate	Y - Coordinate	Moment Mx (kNm)	Moment My (kNm)	
Slewing Components Totals/Resultant (with θ=0)							
UPPER WORKS	5,600	55	0.00	2.74	-151	0	
LOWER WORKS	11,700	115	0.00	-1.02	118	0	
SUSPENDED EQUIPMENT CONNECTED TO CROWD SYSTEM	7,150	70	-0.30	3.47	-243	-21	
COUNTERWEIGHT	4,000	39	0.00	-2.45	96	0	
OTHER	0	0	0.00	0.00	0	0	
TOTAL/RESULTANT (with θ=0)	28,450	279	-0.08	0.64	-180	-21	
Foot Pads - Slewing :							
Description (Forces must be -ve)	Bearing Area	Max. Pad Loading	X - Coordinate	Y - Coordinate	Actual Shape	Actual Dimension	
	m ²	kN	m	m			
Front Pad 1	1.50	-450	0.00	2.74	1.2x1.25m	Rectangular	
Front Pad 2	0.00	0.00	0.00	0.00	None	None	
Rear Pad 1	0.00	0.00	0.00	0.00	None	None	
Rear Pad 2	0.00	0.00	0.00	0.00	None	None	
Forces - Slewing							
		Force	X - Coordinate	Y - Coordinate			
		kN	m	m			
Maximum Extraction Force (kN)		392	-0.30	3.47	Must be inline with suspended equip't.		
Maximum Penetration Force (kN)		-29	-0.30	3.47	-ve Must be inline with suspended equip't.		
Maximum Auxillary Force (kN)		10	0.00	4.00			

Main Components - Non-Slewing:							
Item	Mass (kg)	Weight (kN)	X - Coordinate	Y - Coordinate	Moment Mx (kNm)	Moment My (kNm)	
Lower Works Non-Slewing (undercarriage/tracks etc)	Tracks & Undercarriage	10000	98	0.00	0.00		
				0.00	0.00		
				0.00	0.00		
TOTAL/RESULTANT (with θ=0)	10,000	98	0.00	0.00	0	0	
TOTAL RIG MASS	38,450						
Front Foot Pads - Non-Slewing							
Description	Bearing Area	Max. Pad Loading	X - Coordinate	Y - Coordinate	Actual Shape	Actual Dimension	
	m ²	kN	m	m			
Front Pad 1							
Front Pad 2							
Rear Pad 1							
Rear Pad 2							
Tracks							
Track bearing length (m)	3.81						
Track pad width (m)	0.70						
Distance between centrelines of tracks (m)	3.30						
Slewing				Can the Rig Slew?	YES		

MODE	Pressure Summary for Platform Design (unfactored)			BRE LOAD CASE (1 or 2)	Eccentricity Index		Winch Forces
	Equiv. Track Length (m)	Equiv. Track Width (m)	Equiv. Uniform Bearing Pressure, q _{req} (kPa)		Eccentricity index - X direction (sideways)	Eccentricity index - Y direction (forwards/backwards)	
Standing	3.06	0.70	104	1	0.29	0.25	0
Travelling	3.06	0.70	104	1	0.29	0.25	0
Handling	2.88	0.70	115	1	0.34	0.30	10
Penetrating	2.82	0.70	84	2	0.36	0.31	-29
Extracting	1.48	0.70	229	2	0.73	0.64	392
Other	Not Used	-	-	0	-	-	0

MODE	ERROR FOR TRACK	Auxillary Line	ERROR MESSAGES FOR LINE FORCES	
	Zero Pressure		Extraction Force	Penetration Force
Standing	None	Auxillary Line Force OK	Extraction Force OK	Penetration Force OK
Travelling	None	Auxillary Line Force OK	Extraction Force OK	Penetration Force OK
Handling	None	Auxillary Line Force OK	Extraction Force OK	Penetration Force OK
Penetrating	None	Auxillary Line Force OK	Extraction Force OK	Penetration Force OK
Extracting	Track(s) lifting	Auxillary Line Force OK	Extraction Force OK	Penetration Force OK
Other	None	Auxillary Line Force OK	Extraction Force OK	Penetration Force OK

MODE	ERROR MESSAGES FOR FOOT PAD FORCES		ERROR MESSAGES FOR FOOT PAD PRESSURES	
	INPUT DATA		OUTPUT DATA	
Standing	Slewing Footpad Forces OK	Non-Slewing Footpad Forces OK	Slewing Foot Pad Pressure OK	Non-Slewing Foot Pad Pressure OK
Travelling	Slewing Footpad Forces OK	Non-Slewing Footpad Forces OK	Slewing Foot Pad Pressure OK	Non-Slewing Foot Pad Pressure OK
Handling	Slewing Footpad Forces OK	Non-Slewing Footpad Forces OK	Slewing Foot Pad Pressure OK	Non-Slewing Foot Pad Pressure OK
Penetrating	Slewing Footpad Forces OK	Non-Slewing Footpad Forces OK	Slewing Foot Pad Pressure OK	Non-Slewing Foot Pad Pressure OK
Extracting	Slewing Footpad Forces OK	Non-Slewing Footpad Forces OK	Slewing Foot Pad Pressure OK	Non-Slewing Foot Pad Pressure OK
Other	Slewing Footpad Forces OK	Non-Slewing Footpad Forces OK	Slewing Foot Pad Pressure OK	Non-Slewing Foot Pad Pressure OK

Note: The disclaimer on the first worksheet applies to all tables in this workbook



Notes
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