

TAUNG SKULL HERITAGE SITE

PROTECTION OF THE CORE AREA DESIGN AND ANALYSIS

05 DECEMBER 2013

TAUNG SKULL HERITAGE SITE

1. Protection of the core area:

The Taung skull heritage site perimeters will be protected by a fence to restrain access of human and large animal traffic. Many sensitive site are currently being damaged by uncontrolled access. Currently a plastic fence protects a small protection of the site. The client has urged the consultant to find a solution to protect the remaining perimeter.

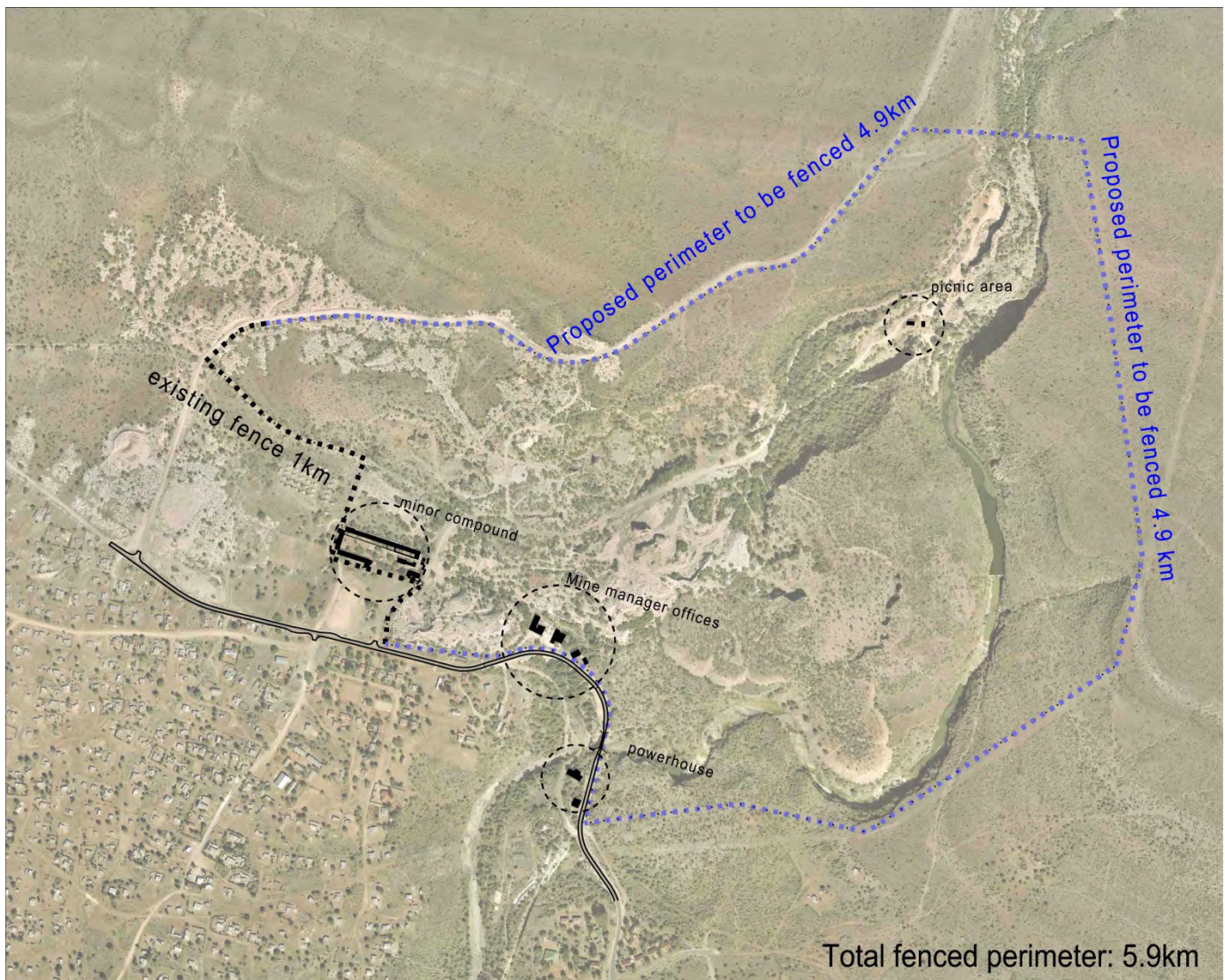


Fig 01: fence perimeter

2. Existing fence:

The existing fence is composed of tubular plastic poles. The plastic poles were used as shutter to create concrete poles. A plastic connector connects the poles to each other.

A site assessment was conducted on the 12th November 2013 with the client representatives and the professional consultant team.

The following was observed:

1. Fence constructed on a small portion of the entire site: +/- 1 km on 5km
2. Extensive damages of the existing fence
3. Misalignment of poles
4. Poor execution of foundation work
5. Poor execution on assembling the components
6. Very weak connection between poles
7. Instability
8. No concrete poured in most of the poles
9. Bad concrete mixture
10. No steel reinforcement leading to breakage.

The images below illustrates the extent of the damages:



Fig 02 : damages and poles missing on long sections of fencing



Fig 3 : weak connector between fence



Fig 4: urgent fix due to instability



Fig 5: poor execution of concrete mixture – no reinforcement



Fig 6: surface damage

3. Proposed fence

It was suggested that a similar design aspect be kept. The new fence has to resemble to the existing but offer strength and durability.

The fence proposal takes into consideration the following conditions:

- Provide adequate security
- Not require regular maintenance
- Be easily repairable
- Not have inherent value if pilfered (timber, steel)
- Be aesthetically pleasing, compatible with landscape
- Be adaptable to variable topographic and founding conditions
- Be transportable by hand to installation site
- Provide local employment and skills development

4. Alternative solutions

Other alternative solutions were explored and they showed the following weaknesses:

Steel fence solution

- Easily pilfered
- High scrap value

Timber fence solution

- Easily broken through
- Value as fuel
- High maintenance

Brickwork fence solution

- Relatively easy to break through (may be strengthened with a reinforced core)
- In-compatible with local environment
- Labour intensive and time consuming

The concrete pole solution:

- Provides effective security
- Does not require maintenance
- Has little to no scrap value
- Can be coloured to integrate with local environment. Is a hard material, as is the landscape whilst having a smooth finish providing contrast
- Can be installed on slopes in soft or hard material
- Can be installed by hand in-situ
- Has the potential to provide local employment and skills development

5. Construction methodology

The construction methodology assumes that aggregate will be sourced locally and used in an on-site casting yard. Local people would run the casting yard and carry out the in-situ concreting and installation. This process has the potential to be developed as a business and similar installations carried out elsewhere post-project.

Construction process:

1. A number of re-useable steel shutter forms are fabricated, the number required a function of the expected construction rate.
2. Reinforcement cages incorporating a base plate are fabricated
3. The shutters are prepared and held vertically inverted in a gig
4. The reinforcing cages are installed
5. Concrete is prepared , coloured appropriately
6. Concrete is introduced into the open end and compacted by means of a vibrator inserted through the base plate.
7. Once the concrete is sufficiently strong the shutters are removed for re-use and the concrete allowed to develop full strength before the poles are transported to site
8. The foundations are prepared either by excavating or, in the case of rock, shuttering
9. In both cases a level layer of blinding concrete is placed
10. The Foundation reinforcement cage is introduced.
11. Poles are placed in position and levelled by shimming. Poles are stabilised and aligned at the top by means of a secured alignment rod
12. Concrete is placed.
13. When sufficient strength is developed the alignment rods are removed

The fence concept design was presented to SAHRA representative on the 25th November 2013
At the Taung Skull Heritage Site.

1: Column construction



Step 1
Steel re-bar and base plate construction



Step 2
column mould wrapped around steel



Step 3 The shutters are prepared and held vertically inverted and left to cure

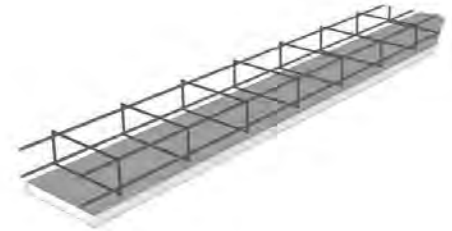


Step 4
mould removed from concrete

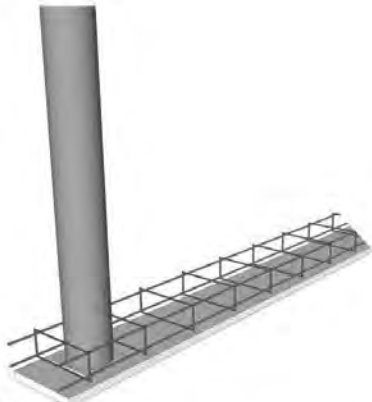
2: Preparation of Foundation



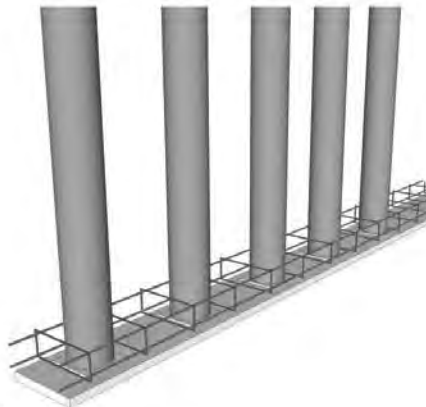
Step 5
Level of blinding



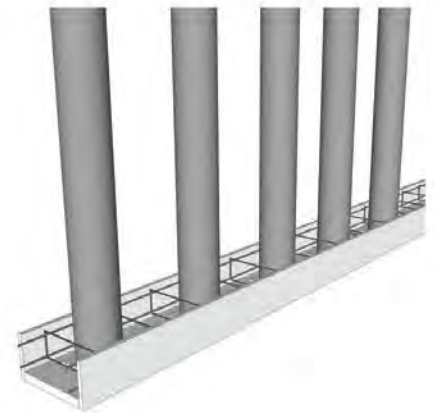
Step 6
Reinforcing placed for foundation



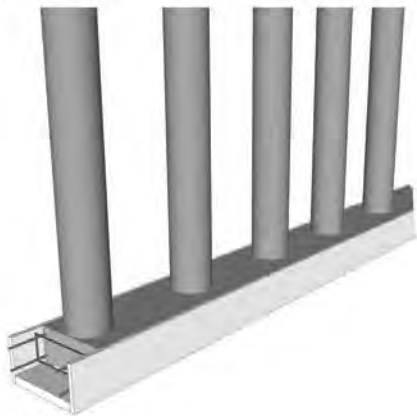
Step 7
Precast slab placed



Step 7
Spaced at 150mm centres



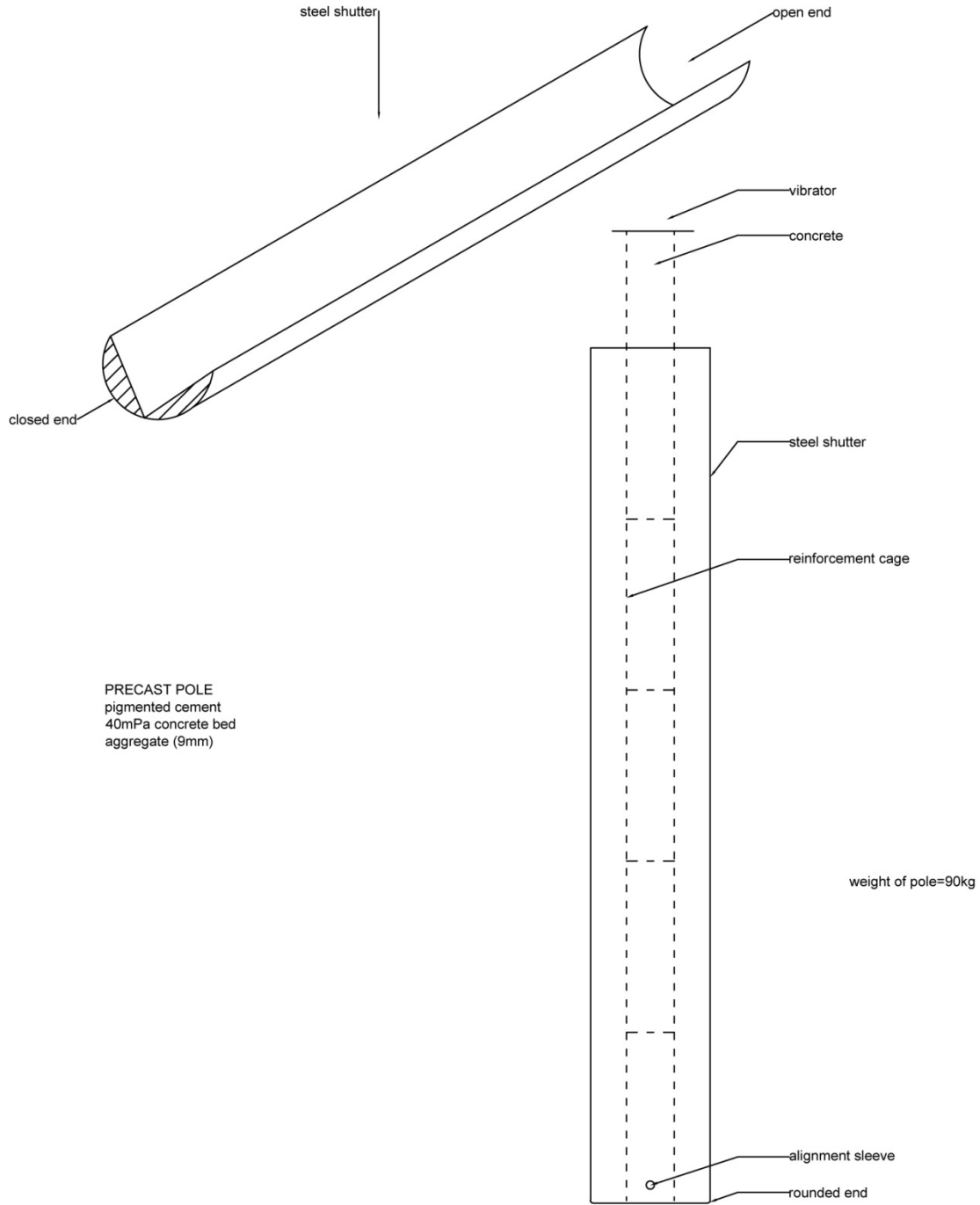
Step 8
Shuttering for foundation



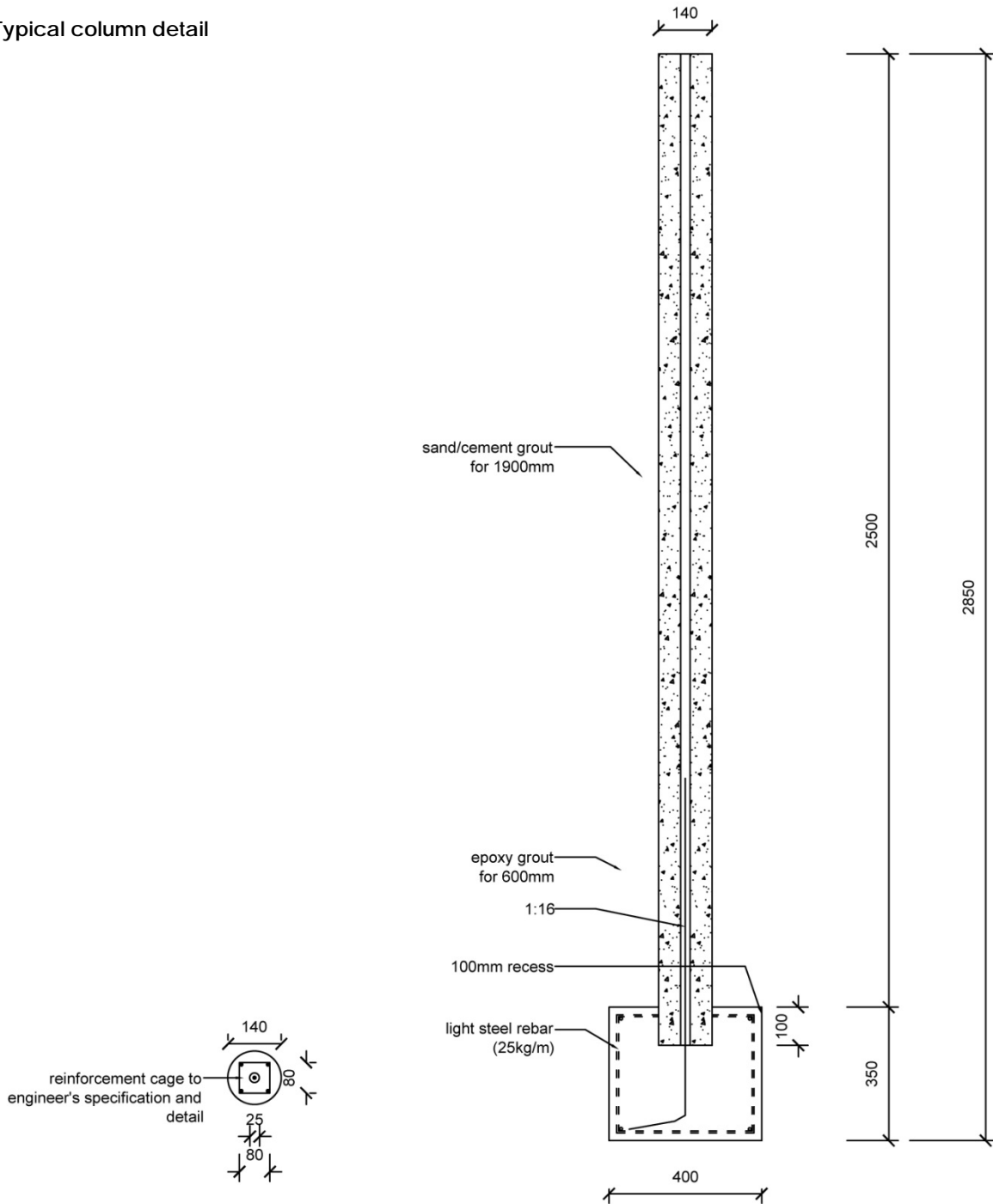
Step 9
Foundation poured



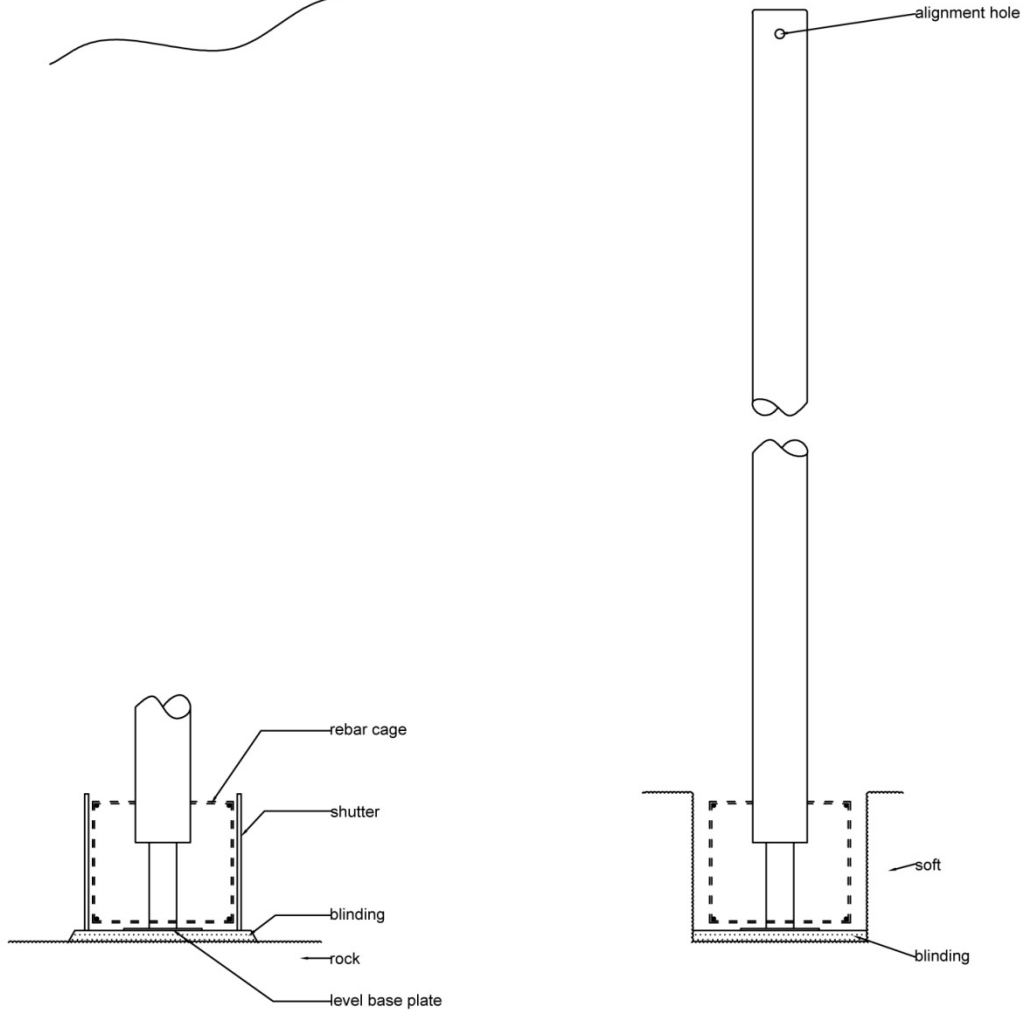
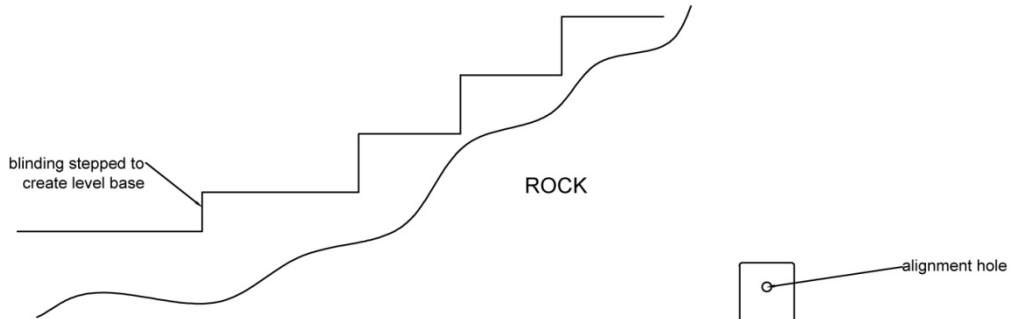
Shutter concept drawings



Typical column detail



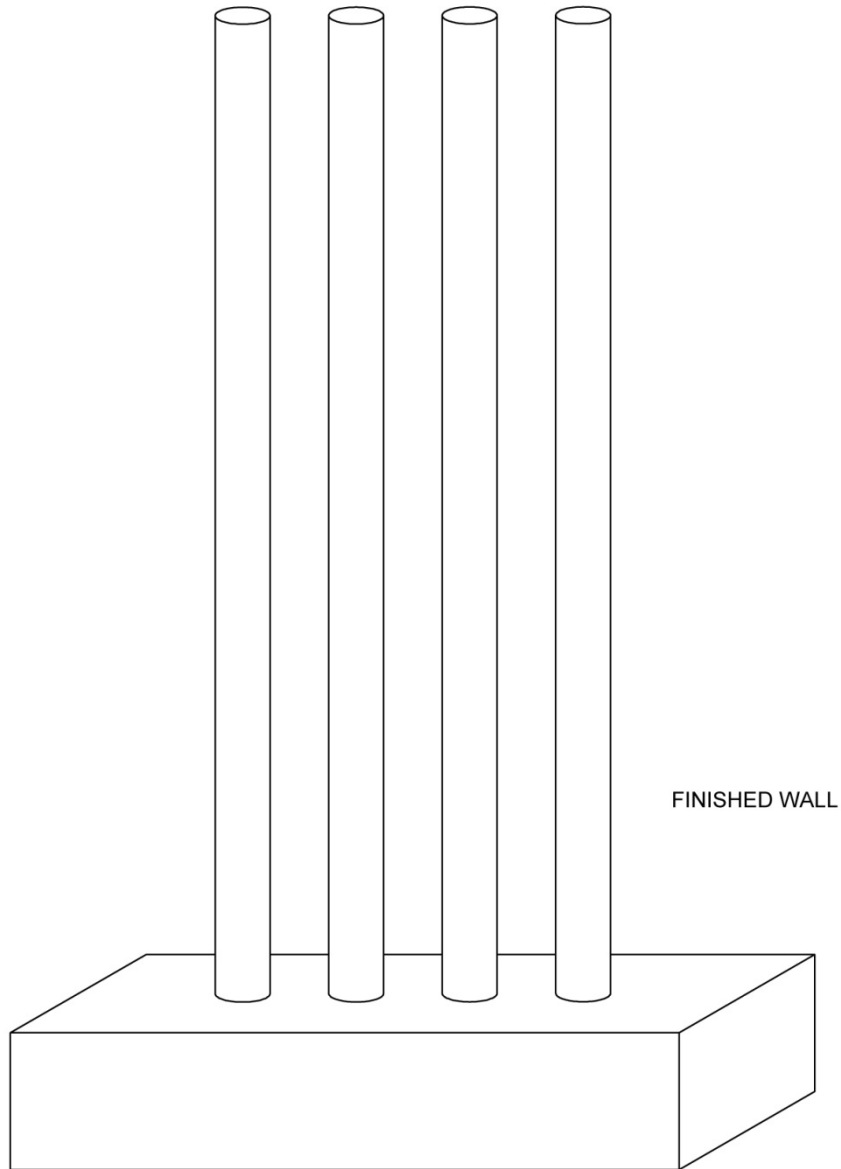
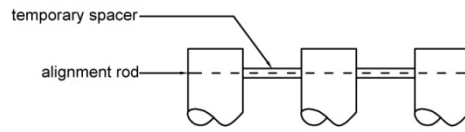
Connection to ground detail



HARD ROCK GROUND

SOFT GROUND

Final assembling



6. Visualizations

With the use of local aggregate and colouring agent , the concrete columns offers a various range of colours to blend in the landscape.



Fig 7: light grey option



Fig 8: charcoal option



Fig 9: rusty brown option



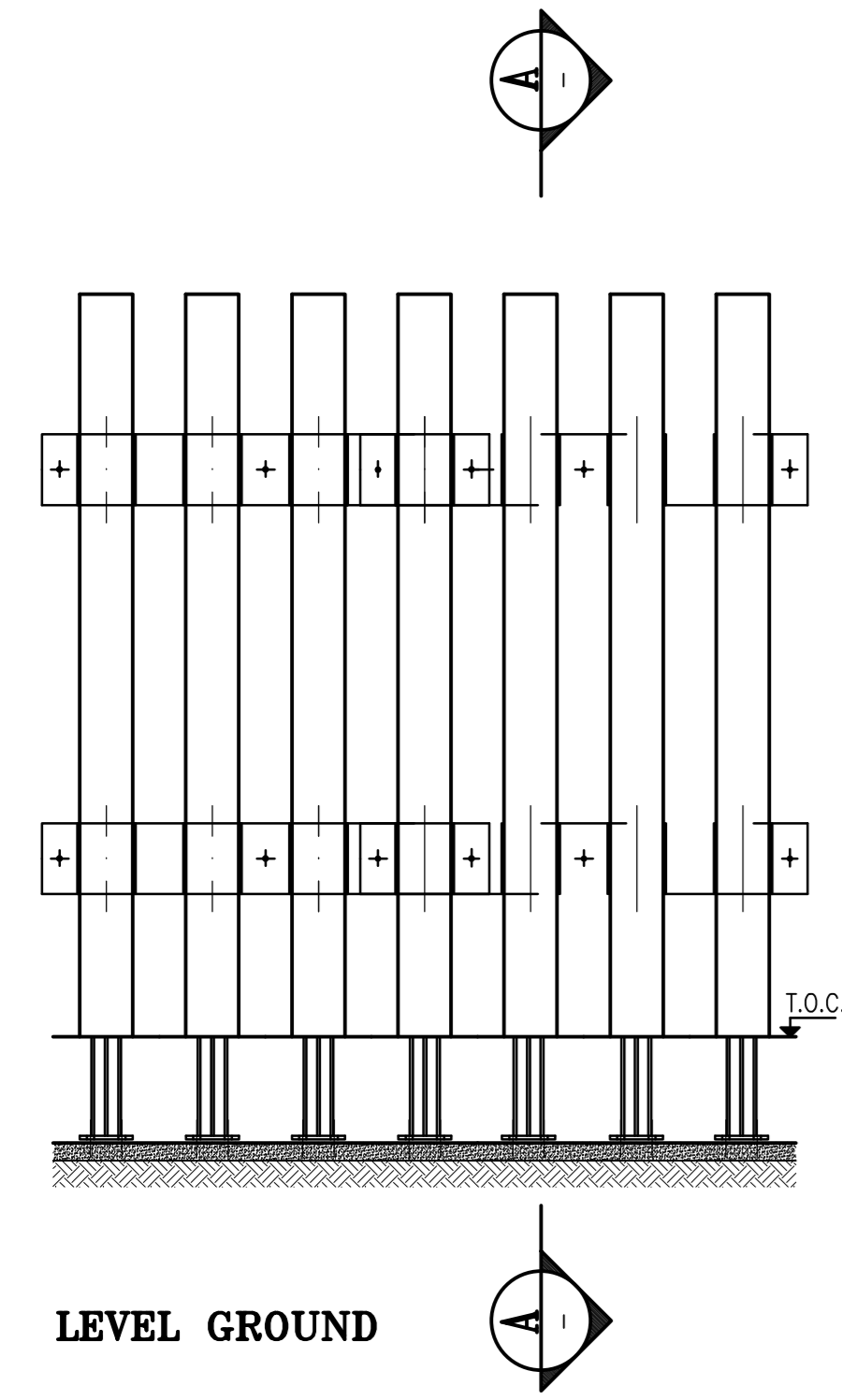
Fig 10: dark grey option



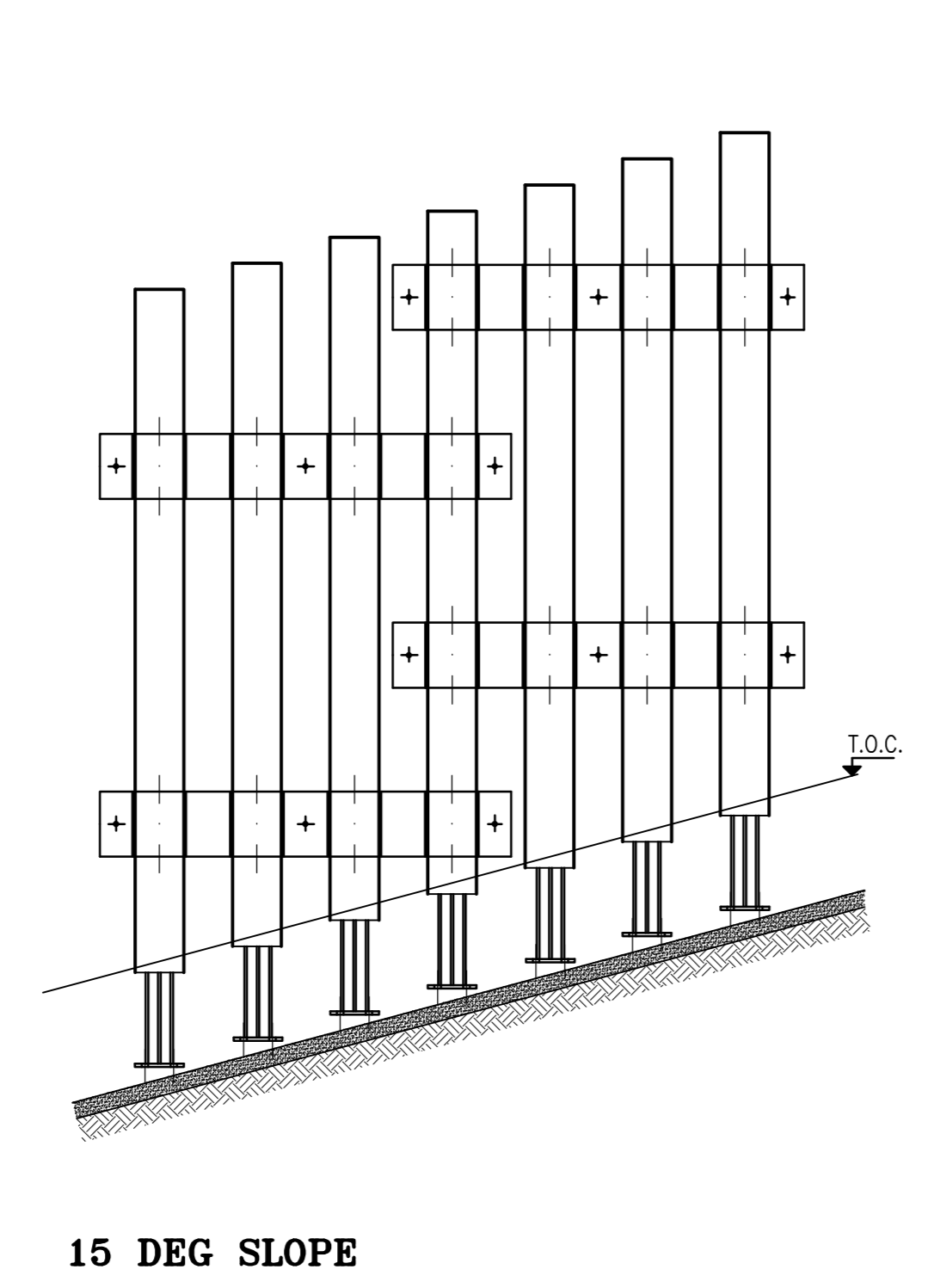
Fig 11: charcoal option



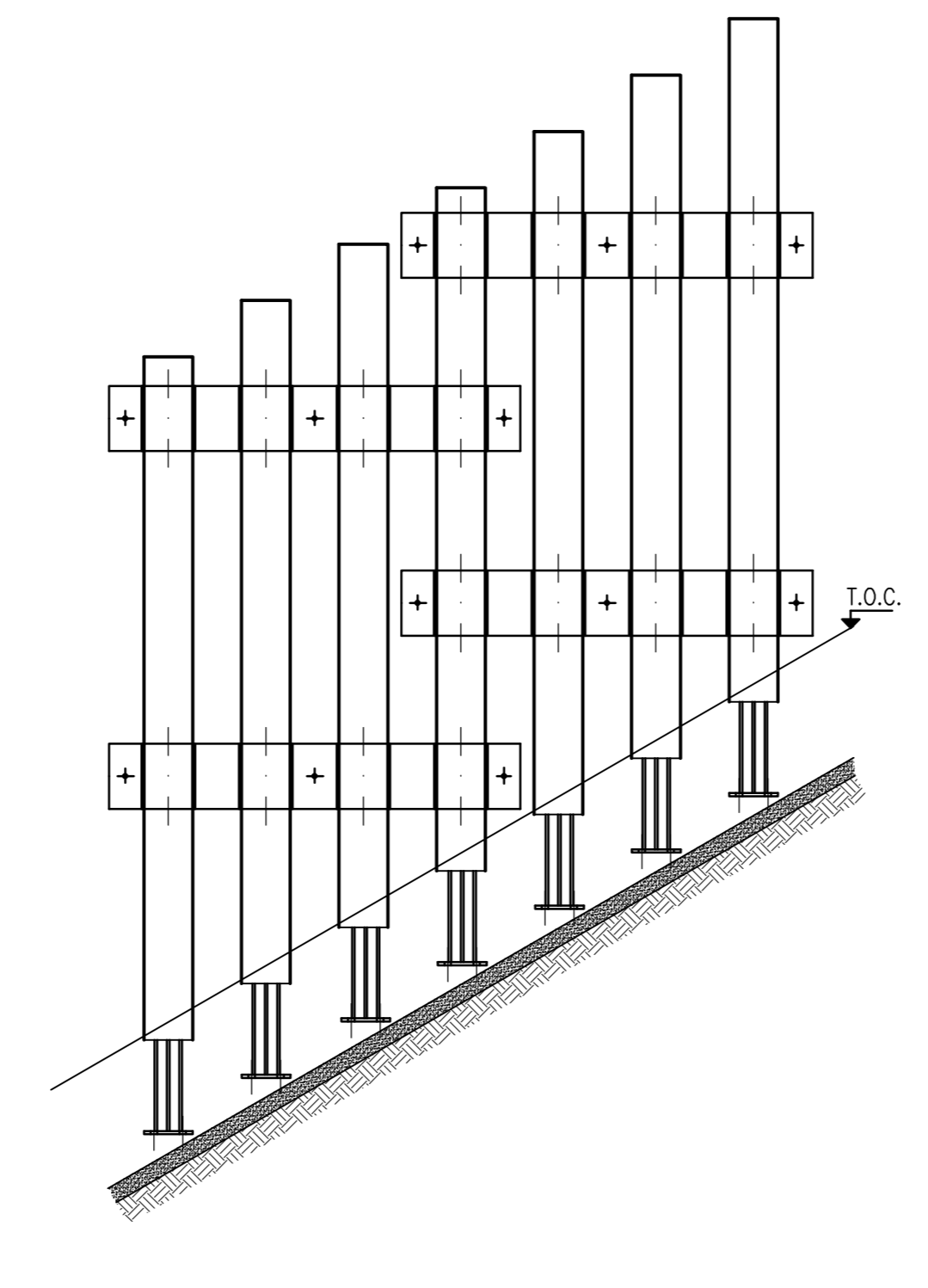
Fig 11: medium grey option



LEVEL GROUND

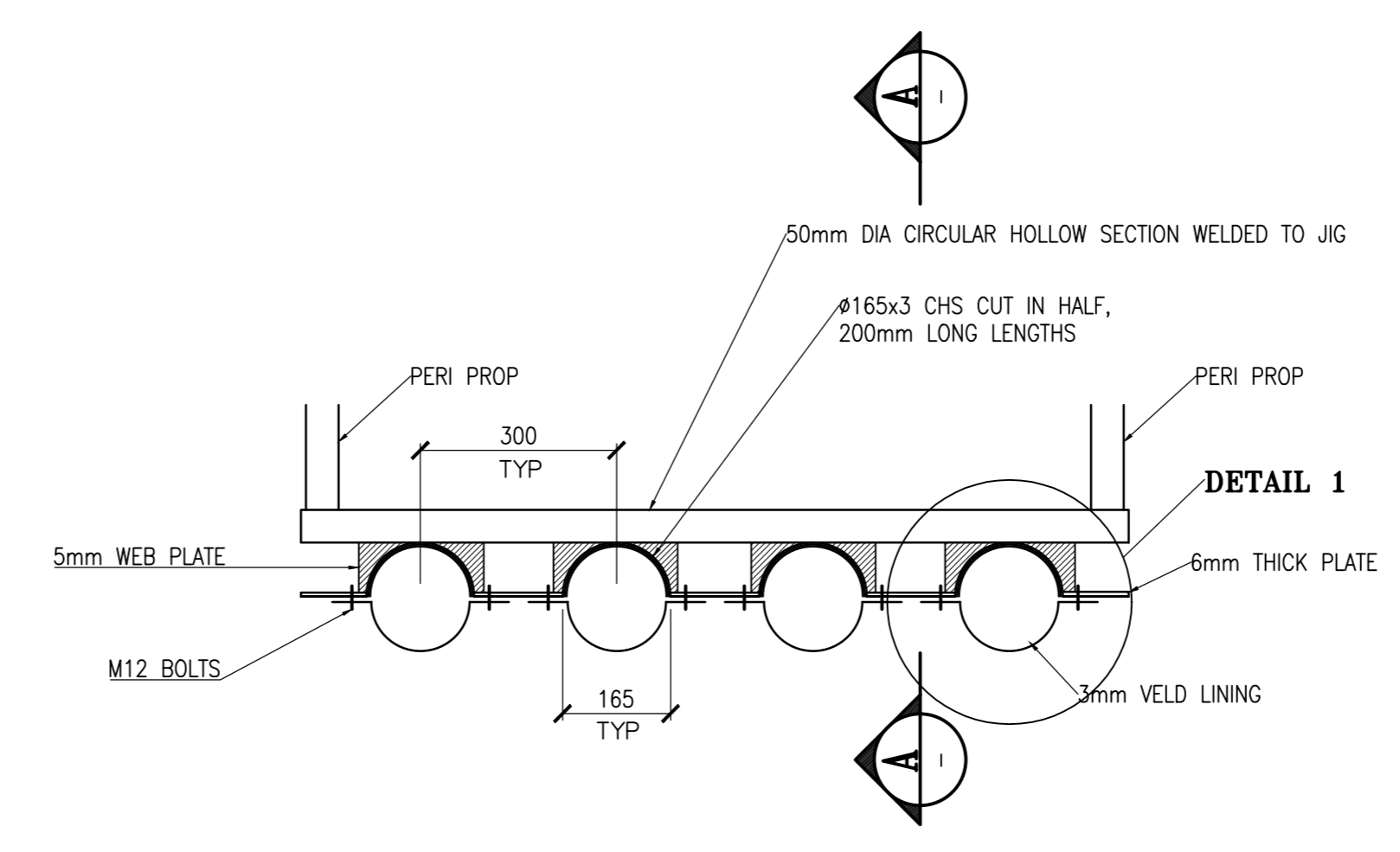


15 DEG SLOPE

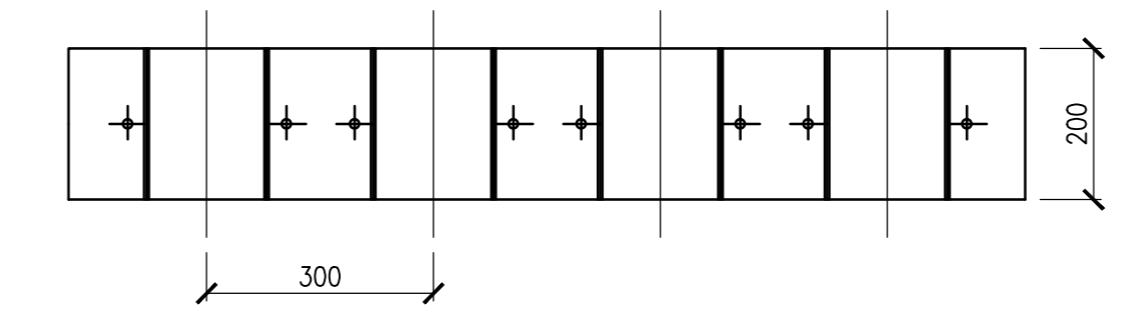


30 DEG SLOPE

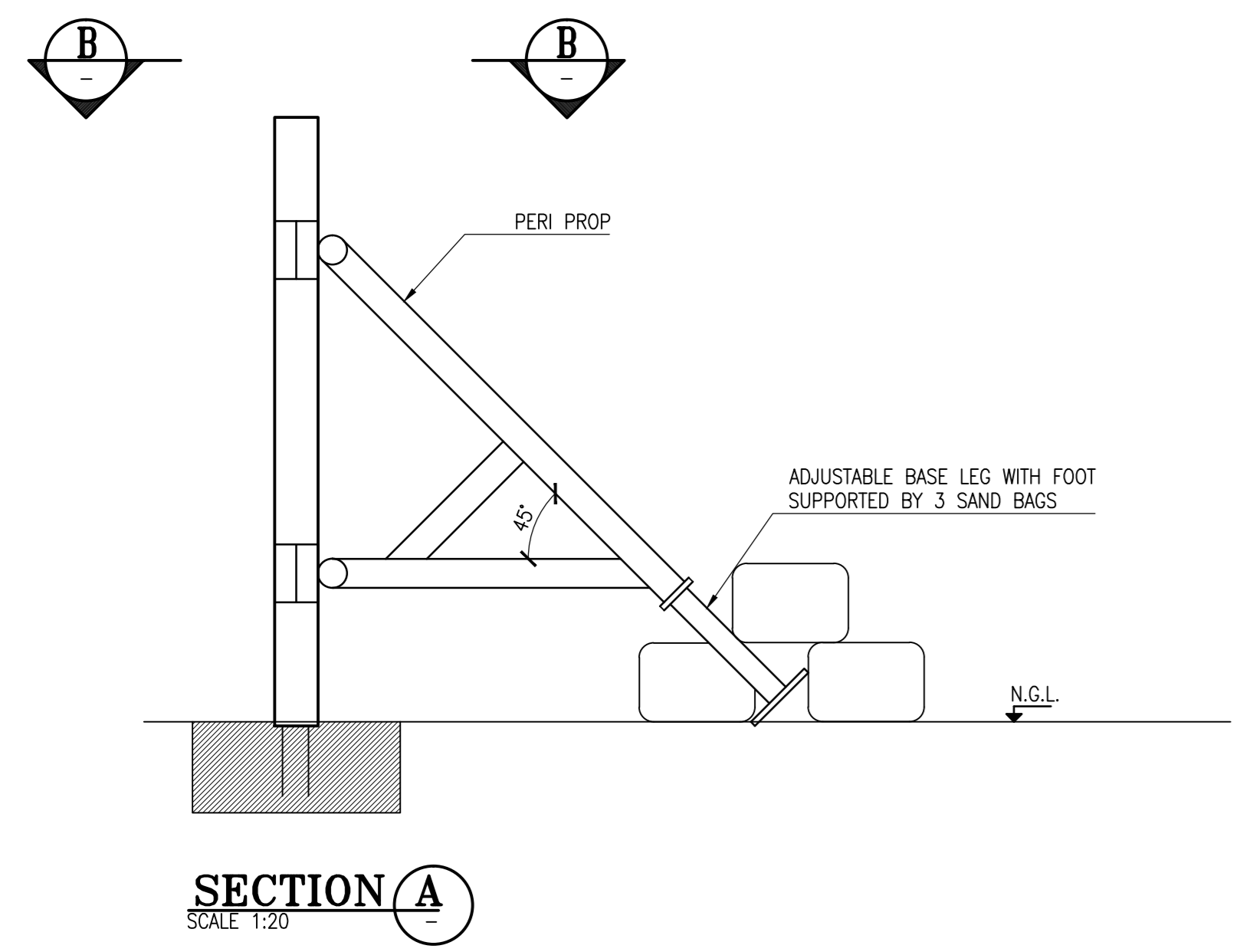
TYPICAL EXCAVATION ON WALL
SCALE 1:20



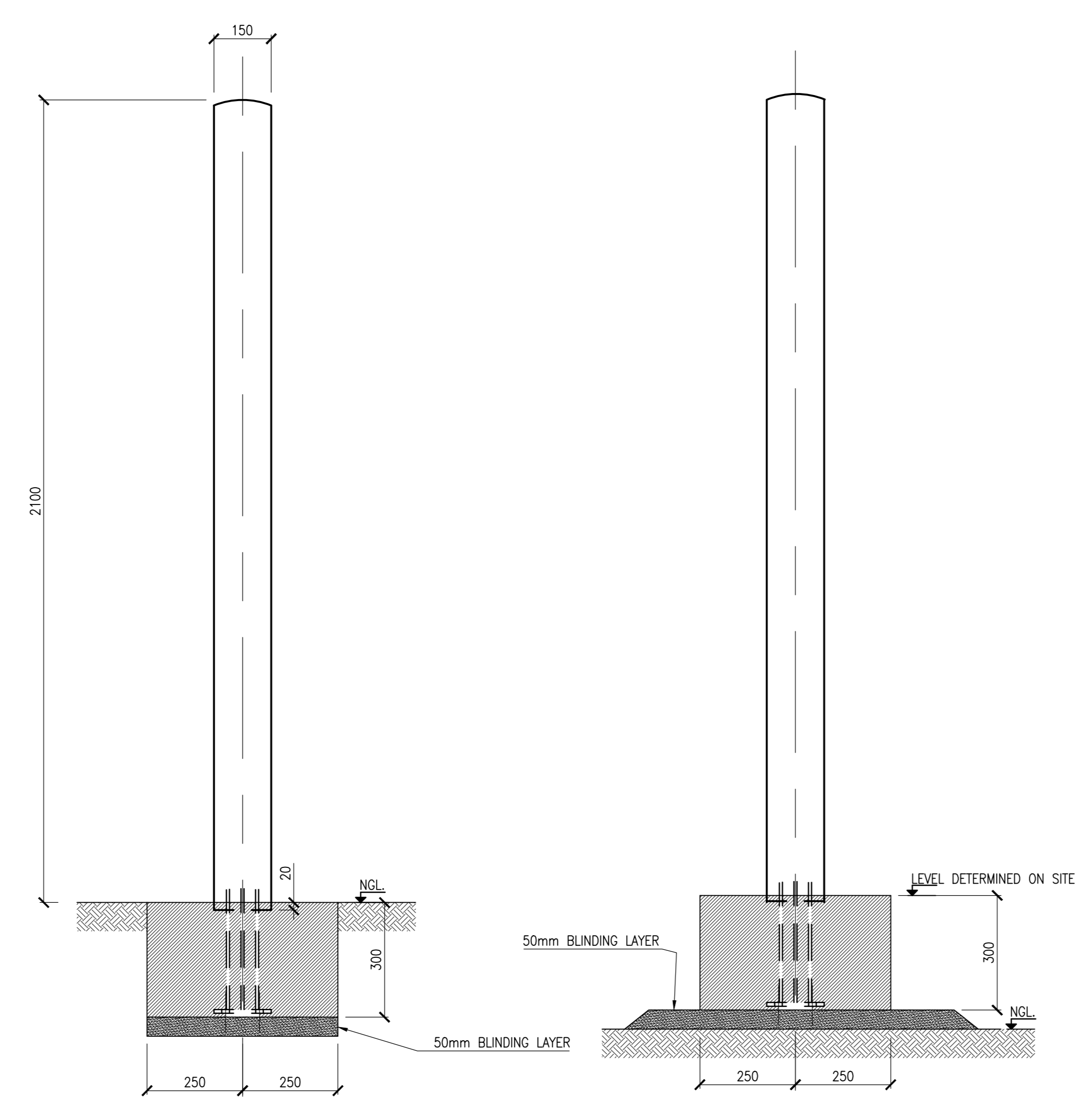
TYPICAL JIG SECTION
SCALE 1:10



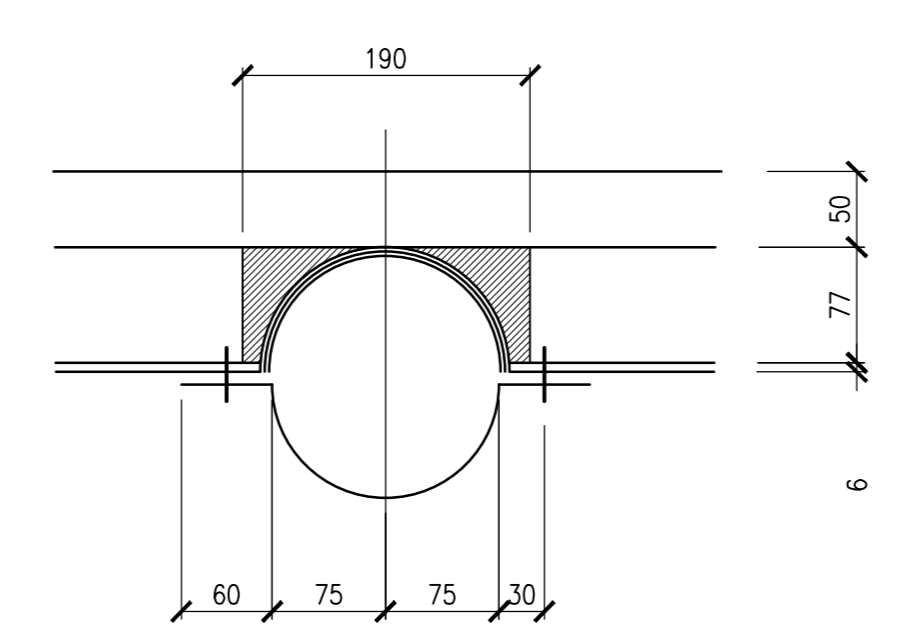
JIG SYSTEM
SCALE 1:10



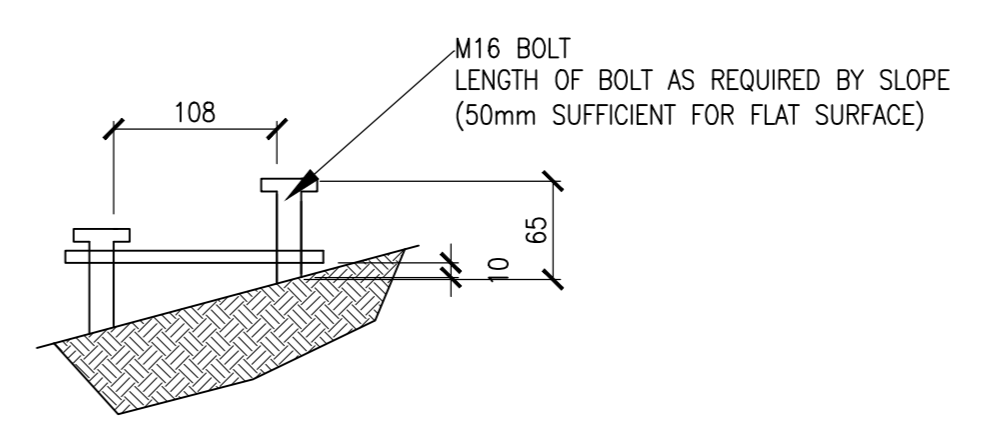
SECTION A
SCALE 1:20



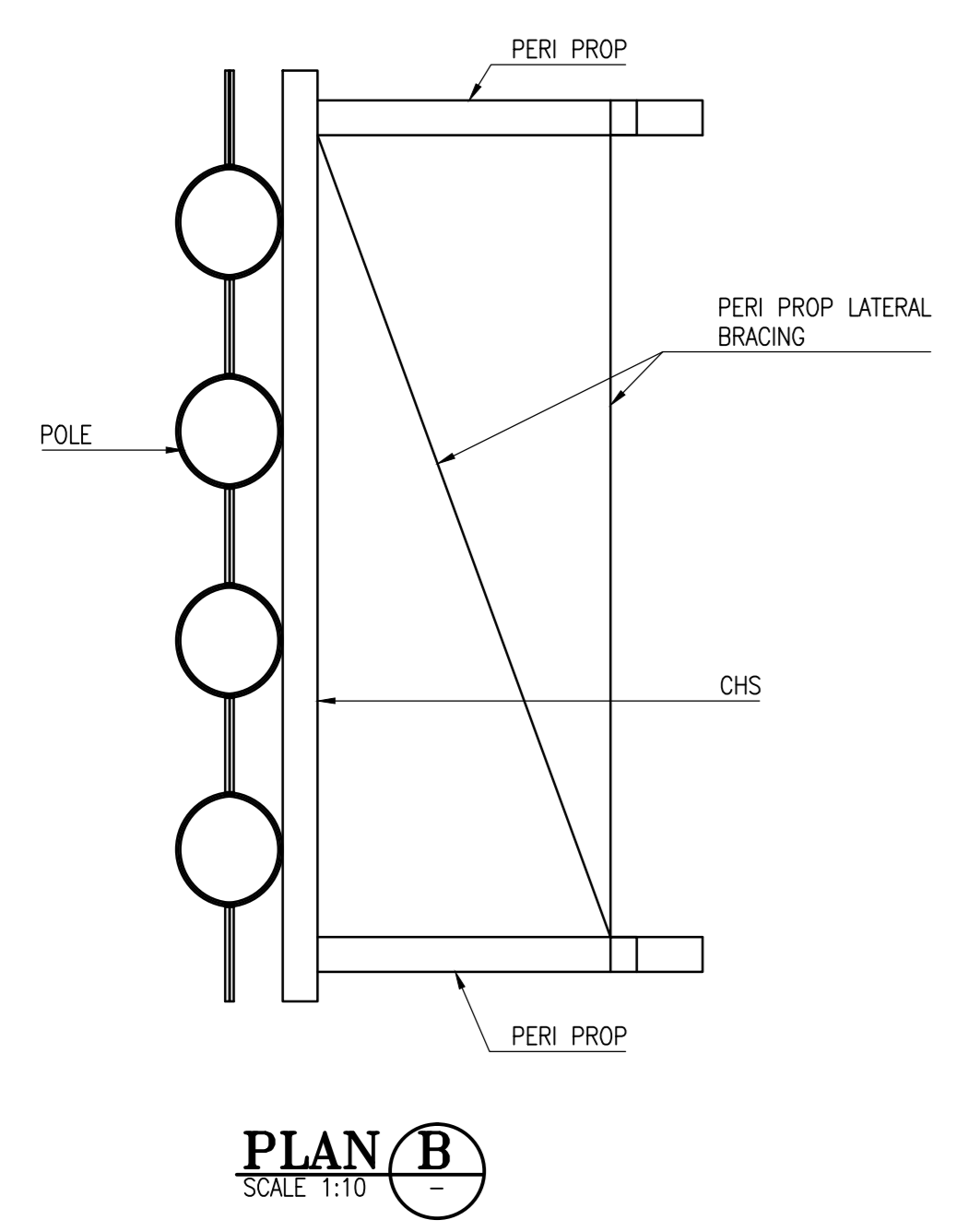
TYPICAL SECTION THROUGH WALL
(SOLUTION TO MEET EXCAVATION CONDITIONS)
SCALE 1:10



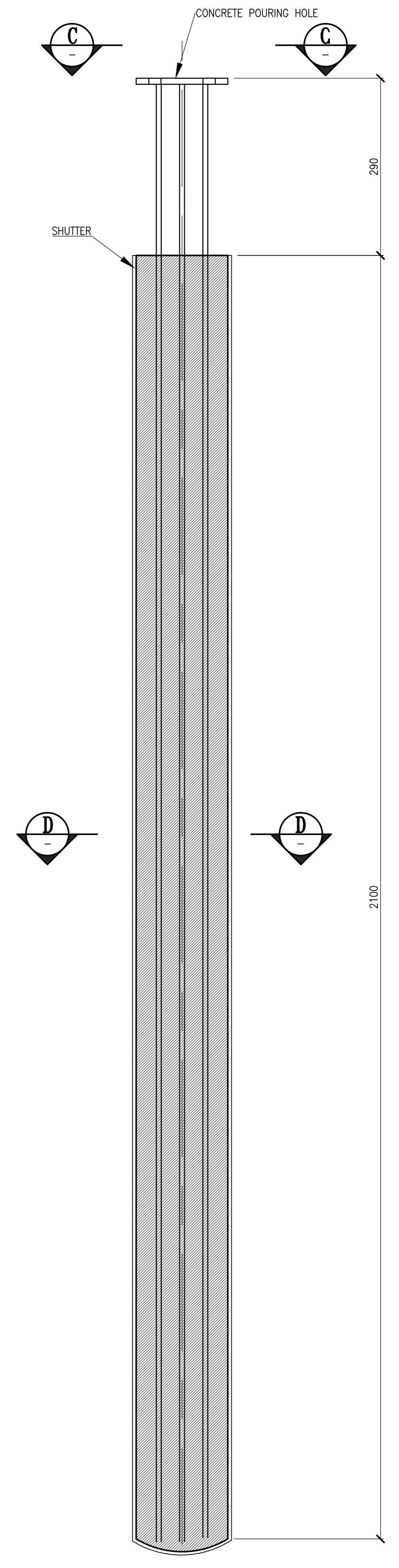
DETAIL 1
SCALE 1:5



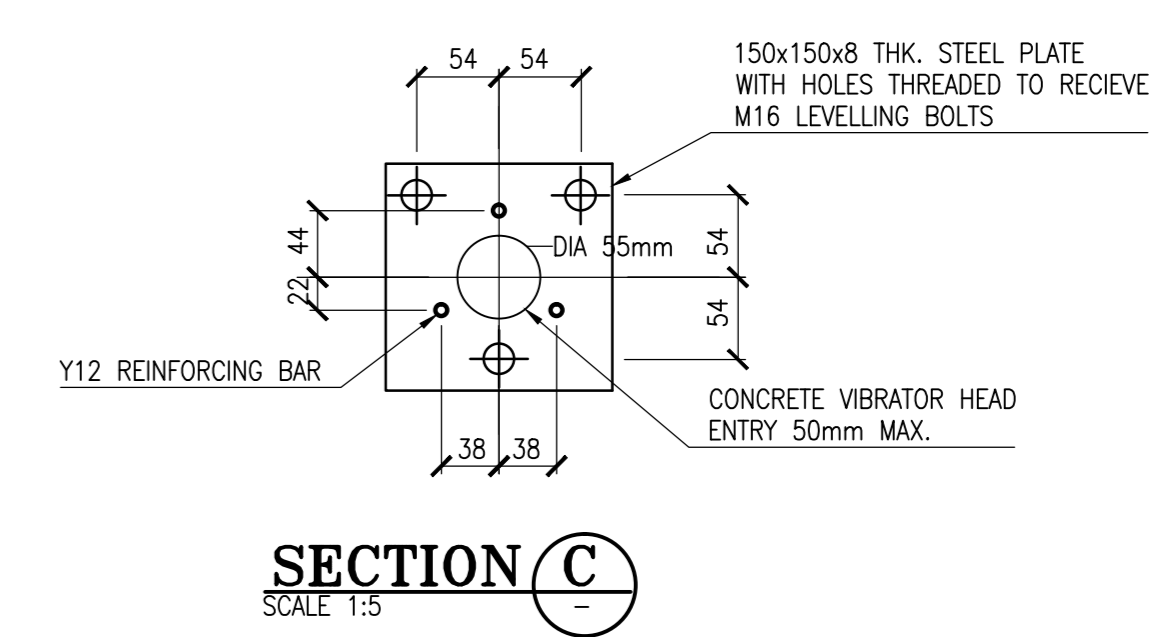
BOLT CONNECTION
SCALE 1:5



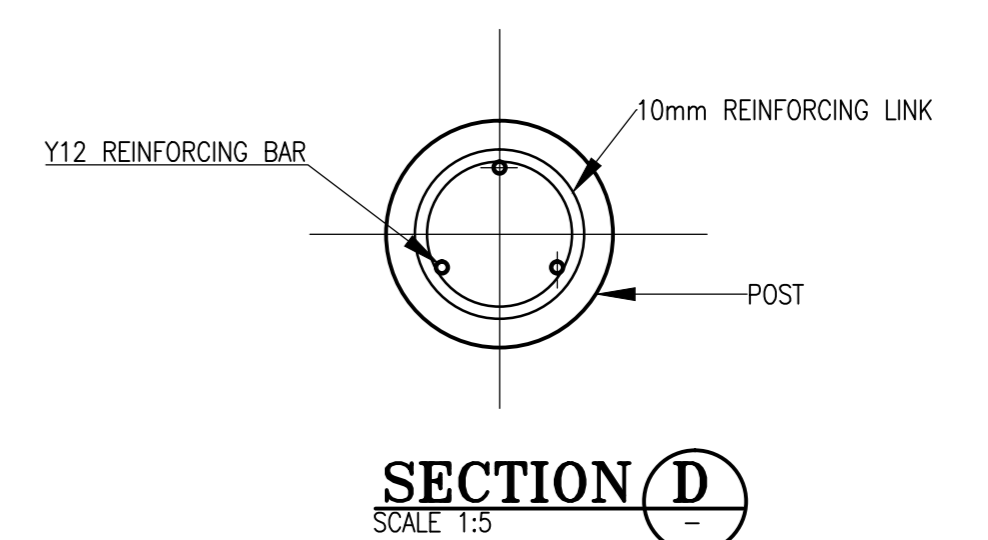
PLAN B
SCALE 1:10



PRECAST POLE
SCALE 1:5



SECTION C
SCALE 1:5



SECTION D
SCALE 1:5

NOTES GENERAL

- THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL ARCHITECT'S, ENGINEERS AND SPECIALIST'S DRAWINGS WITH THE RELEVANT SPECIFICATIONS.
- DESIGN MATERIALS USED AND METHOD OF CONSTRUCTION TO BE IN ACCORDANCE WITH: SANS 0100, 0137, 0160 - 0164, AS APPLICABLE.
- THIS DRAWING NOT TO BE SCALED.

REINFORCED CONCRETE

- THE APPLICABLE STANDARD SPECIFICATION IS SANS 1200 G - 1982, WHICH SHOULD BE READ IN CONJUNCTION WITH THE VARIATIONS AND ADDITIONS CONTAINED IN THE THEMBA PROJECT SPECIFICATION FOR CONCRETE (STRUCTURAL).
- CONCRETE COVER TO REINFORCEMENT AND CONCRETE STRENGTH TO BE AS INDICATED BELOW. COVER IS GIVEN TO THE NEAREST FACE. MINIMUM BAR COVER TO BE MAXIMUM OF BAR DIAMETER AND AS SHOWN BELOW. SPECIFIED COVER TO BE MAINTAINED USING CEMENT MORTAR COVER BLOCKS OR APPROVED PLASTIC SPACERS

ELEMENT	CONCRETE STRENGTH AT 28 DAYS (MPa)	COVER mm
FOUNDATIONS	25	40
COLUMNS	40	30
BEAMS	-	-
SLABS	-	-
WALLS	-	-

- ALL AGGREGATE TO BE 19mm UNLESS OTHERWISE SPECIFIED.
- CONCRETE DESIGN MIXES TO BE SUBMITTED FOR APPROVAL PRIOR TO CONSTRUCTION.
- CUBE TESTS TO BE CARRIED OUT ON SITE AND LOGGED WITH POSITION AND DATE. CUBES TO BE TAKEN FOR EACH TYPE OF ELEMENT, AT LEAST ONE DAILY AND AT LEAST ONE EVERY 50m³.
- REINFORCEMENT TO BE IN ACCORDANCE WITH SANS 920 AND SHALL BE BENT IN ACCORDANCE WITH SANS 82.
- ALL CAST IN ITEMS SHALL BE FREE OF OIL, GREASE, DIRT OR ANY OTHER MATERIAL WHICH MAY IMPAIR THE BOND WITH THE CONCRETE. CONTRACTOR TO REFER TO ARCHITECT/SPECIALIST DRAWINGS FOR DETAILS/POSITIONS OF OPENINGS, SLEEVES, CONDUITING, ETC. FOR STORMWATER, SEWERAGE AND OTHER SERVICES.
- FOUNDATIONS HAVE BEEN DESIGNED FOR AN ALLOWABLE GROUND BEARING CAPACITY OF 100 kPa.
- ALL FOUNDATION EXCAVATIONS TO BE INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO CONCRETING.
- REMOVAL OF FORMWORK TO BE IN ACCORDANCE WITH THE PROJECT SPECIFICATION. IT IS THE CONTRACTOR'S RESPONSIBILITY FOR BACK-PROPPING ON MULTI-STORY SLAB CONSTRUCTION.

- SURFACE BEDS:** ATTENTION IS DRAWN TO THE USE OF LAPPED, TAPED SLIP-MEMBRANE AND THE CONTRACTOR'S RESPONSIBILITY TO ENSURE ADEQUATE CURING OF THE TOP SURFACE. MESH TO BE LAPPED 400mm. CONTRACTOR TO ENSURE CORRECT TIMING OF SAW CUTS TO AVOID RANDOM CRACKING AND RAVELLING OF JOINT EDGES.
- FINISHES:** FOUNDATIONS TO BE DEGREE OF ACCURACY 2. CONCRETE SURFACES TO BE DEGREE OF ACCURACY 1.

NO	DATE	ISSUED FOR APPROVAL	DETAILS	CHK	APPD
A	04/02/14	ISSUED FOR APPROVAL	-	-	-
REVISIONS					

THEMBA
Consulting Engineers

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CLIENT: .

PROJECT: **TAUNG HERITAGE SITE**

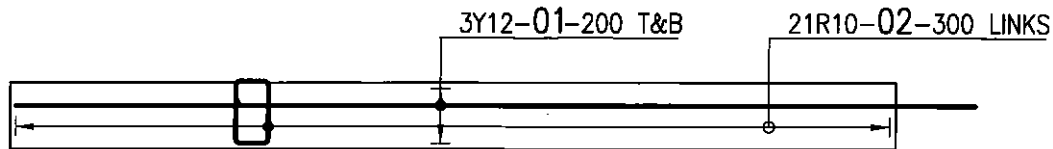
DRAWING DESCRIPTION: **FENCE LAYOUT AND DETAILS**

SCALE AS SHOWN	DRAWN W/S	CHECKED K.B	DESIGNED
APPROVED	DATE	02/04/13	

PROJECT NO: 13215/S/001/A

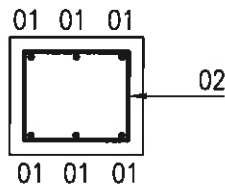
STATUS:

Members	No. of Mbrs	Type & Size	No. of Bars	Cutting Length	Total Bars	Mark	Shape Code	A	B	C	D	E/R
FOUNDATION	1	Y12	6	6500	6	01	20	6500				
	1	R10	21	1420	21	02	60	220	420			



PLAN
SCALE 1:50

NOTE: LINKS TO BE CENTERED BETWEEN POSTS



TYP. SECTION
SCALE 1:25

	6	8	10	12	16	20	25	32	40	TOTAL
R	0	0	18	0	0	0	0	0	0	18
Y	0	0	0	35	0	0	0	0	0	35
TOT	0	0	18	35	0	0	0	0	0	53

PROJECT TAUNG HERITAGE SITE
BOUNDARY FENCE

DETAIL FOUNDATION REBAR -6m LENGTH

THEMBA
Consulting Engineers

Consulting Civil & Structural Engineers Tel: (011) 234 9380
e-mail: tc@themba.co.za

Designed WR	Drawn WR	Checked ..	Date 06/02/2014	Project No. 13215	Ref. Drawing No. S001	Schedule Number BS/001	Rev A
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