# GEOTECHNICAL MEMORANDUM

**Date:** 15 August 2022

**Project:** Grey Gully Bridge – Geotechnical Reassessment and Redesign

**Client/Contact:** David Guy, Aspect Studios

**Proposal No:** ADL2022-0229AC Rev0

## 1 INTRODUCTION

In response to the provision of revised loads, CMW Geosciences (East Coast) provide the following geotechnical reassessment and redesign for the Grey Gully Bridge, as part of the Walkway Upgrade Project.

CMW has previously undertaken geotechnical assessments for the location to assess the stability of the bridge footings within the reference report ADL2022-0050AD Rev1 18/3/22. This memorandum provides an update of this report given the revised bridge loadings provided on the 7/7/22.

## 2 PROJECT UNDERSTANDING

It is understood there has been changed to the design loading since the issue of the 90% design report for the project. These changes are of a large magnitude (especially in a lateral load case) and therefore redesign has been required.

## 3 REVISED DESIGN

Upon review, it is understood there is no change to the geometry of the bridge foundations, location of the bridge structures (portal, landing and anchor footing) and the size of the footings for these structures. The only change is the design loadings.

These changes have been table below.

Previous:

| Mark | Description | X (kN) | Y (kN) | Z (kN) |
|---|---|---|---|---|
| KP-S-E | Grey Gully South Portal - East | 2 | 23.3 | 415.04 |
| KP-S-W | Grey Gully South Portal - West | 2 | 23.3 | 415.04 |
| KA-S-E | Grey Gully South Anchor - East | 446.78 | 0 | 257.95 |
| KA-S-W | Grey Gully South Anchor - West | 446.78 | 0 | 257.95 |
| KE-S-E | Grey Gully South Extension - East | 0 | 2.14 | 16.34 |
| KE-S-W | Grey Gully South Extension - West | 0 | 2.14 | -11.07 |

Revised as of 7/7/22:

| MARK | DESCRIPTION | X (kN) Longitudinal | Y (kN) Lateral | Z(kN) Vertical |
|---|---|---|---|---|
| GP-S-E | GREY ROAD GULLY SOUTH PORTAL (EAST) | 64.5 | 35 | 514.2 |
| GP-S-W | GREY ROAD GULLY SOUTH PORTAL (WEST) | 64.5 | 35 | 514.2 |
| GA-S-E | GREY ROAD GULLY SOUTH ANCHOR (EAST) | 571 | 28 | 330 |
| GA-S-W | GREY ROAD GULLY SOUTH ANCHOR (WEST) | 571 | 28 | 330 |
| GE-S-E | GREY ROAD GULLY SOUTH EXTENSION (EAST) | 0.19 | 5.08 | 18.81 |
| GE-S-W | GREY ROAD GULLY SOUTH EXTENSION (WEST) | 0.19 | 5.08 | 18.81 |

CMW note we have assumed the lateral loads(Y kN) can be applied in both positive and negative directions.

## 4 SCOPE OF WORKS

Based on Aspect Studio provision of revised loadings, CMW are proposing the following scope of works

- Undertaken rock anchor design based on provided revised loads from Bridge Designer.
- A design report detailing the outcomes of the redesign.
- Drawings to be drafted and integrated into the 100% design by others.

## 5 DESIGN RECOMMENDATIONS

Given a redesign assessment the following recommendations provide an update of the existing design report:

Figure 1 and Figure 2 provide section views of the revised reinforcement for each bridge abutment. **Appendix A** has a revision of the existing design drawings with the revised details annotated therein.

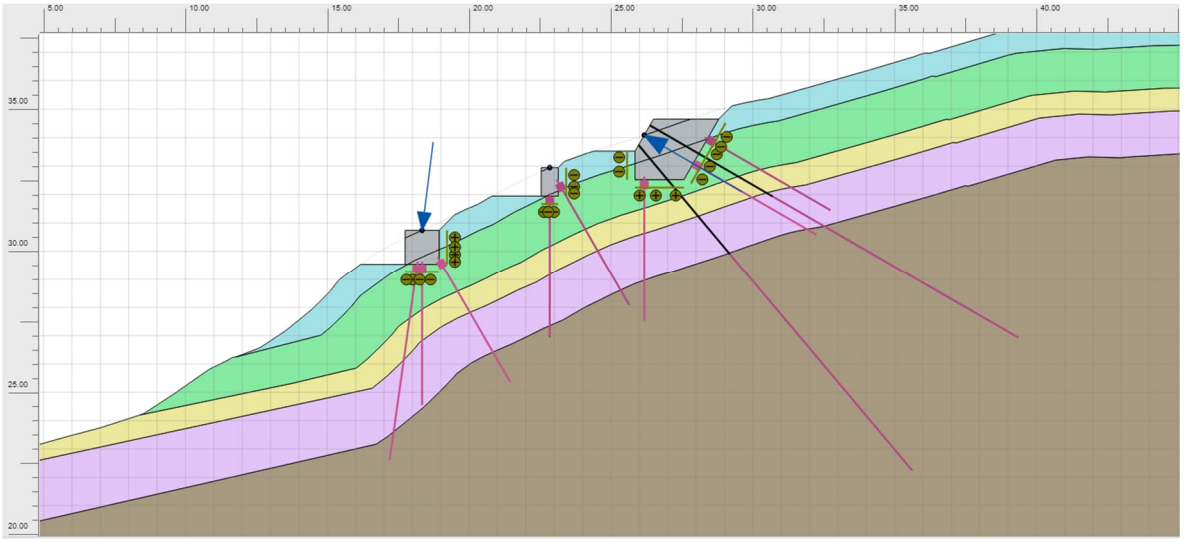



**Figure 1: Section view of revised reinforcement – Grey Gully South.**

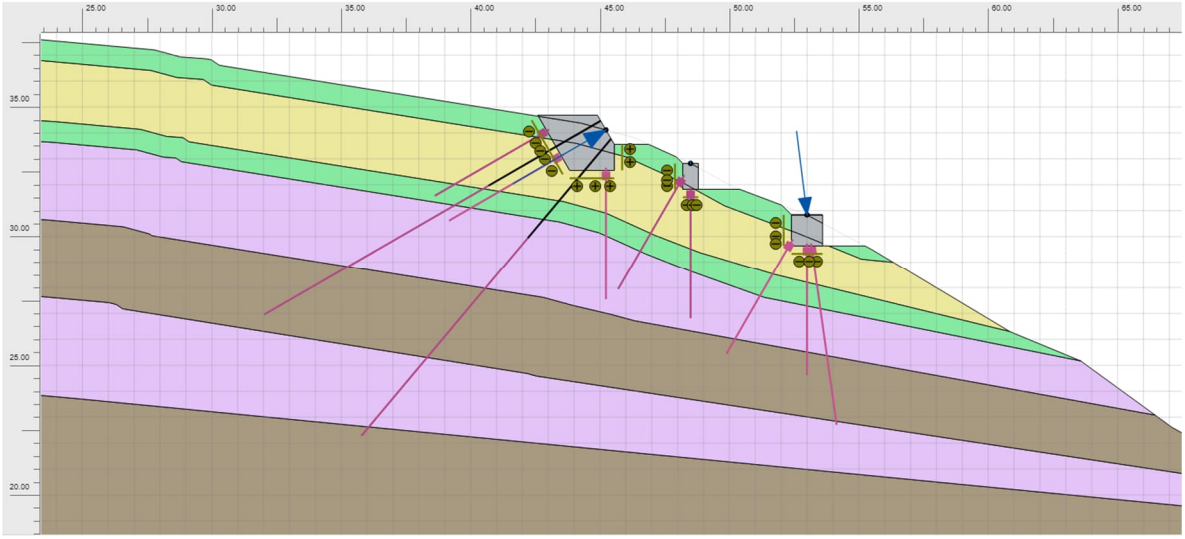



**Figure 2: Section view of revised reinforcement – Grey Gully North.**

The following Tables are a direct extract from the CMW design report ADL2022-0050AD Rev1 18/3/22 but are updated for the additional elements given the revised bridge loads.

Table 3, Table 4 and Table 5 apply to both Grey Gully South and North Anchors, Landing and Portal footings.

Table 3 below refers to the number of elements with a single anchor block (either North or South of Grey Gully anchor blocks per cable strand). So the number of elements apply to 4 separate anchor blocks.

**Anchors: (elements in red are in addition to the previous design)**

**Table 3: Threaded Bar Details for Anchor Reinforcement per anchor block**

| Number | Borehole Depth (m) | Borehole Diameter (m) | Bar length (m) | Bar Diameter (mm) | Free Length (m) | Bond Length (m) | Bearing plate (mm) | Hex Nut | Anticorrosion Compound |
|---|---|---|---|---|---|---|---|---|---|
| ~~4~~ | ~~15~~ | ~~0.12~~ | ~~15.6~~ | ~~40~~ | ~~5~~ | ~~10~~ | ~~240 x 55~~ | ~~Yes~~ | ~~Yes~~ |
| 2 | 7 | 0.12 | 7 | 40 | 0 | 7 | 240 x 55 | Yes | No |
| 4 | 5 | 0.12 | 5 | 40 | 0 | 5 | 240 x 55 | Yes | No |

Note:
Strike through items are deleted from the design (~~Strike through~~)
~~600mm extra length required to be protruding above the anchor block to allow for future lift off testing~~
~~Multiple pretension phases are expected during the 12-month construction period to ensure pretension loading (50kN).~~
~~All bars to be pretensioned to 50kN and lift tested periodically (every 5 years).~~
~~The design of fittings to secure cable stays to be undertaken by Innovis. Structural engineer's design for cable stay fastening to not impact on the ground anchor design.~~
~~Protective caps are required. Protective caps are to be replaced at every testing or pre-tensioning of the bar.~~
Bar to be embedded in the anchor block. All bars to be pretensioned to 100kN
Refer to manufacturer's specifications for installation.
Refer to manufacturer's specifications for testing.

**Table 3: Cable Details for Anchor Reinforcement per anchor block (continued)**

| Number | Borehole Depth (m) | Borehole Diameter (m) | Cable length (m) | Cable Strands | Free Length (m) | Bond Length (m) | Bearing plate (mm) | Wedge Plate | Anticorrosion Compound |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 15 (50°) | 0.12 | 15.6 | 6 x 15.2mm | 5 | 10 | 290 x 36 | Yes | Yes |
| 2 | 17 (30°) | 0.12 | 15.6 | 6 x 15.2mm | 7 | 10 | 290 x 36 | Yes | Yes |

Note:
1000mm extra length required to be protruding above the anchor block to allow for future lift off testing
Multiple pretension phases are expected during the 12-month construction period to ensure pretension loading (100kN). Noting a re-stressable strand anchor requires wedge blocks with an external thread and a customer built jack to screw over the wedge block
All bars to be pretensioned to 100kN and lift tested periodically (every 5 years).
The design of fittings to secure cable stays to be undertaken by Innovis. Structural engineer's design for cable stay fastening to not impact on the ground anchor design.
Protective caps are required. Protective caps are to be replaced at every testing or pre-tensioning of the bar.
Refer to manufacturer's specifications for installation.
Refer to manufacturer's specifications for testing.

See Appendix B for specifications for the cable.

**Portal: (elements in red are in addition to the previous design)**

| Table 4: Bar Details for Portal Reinforcement | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Number** | **Inclination** | **Borehole Depth (bottom of strip footing) (m)** | **Borehole Diameter (m)** | **Bar length (m)** | **Bar Diameter (mm)** | **Bond Length (m)** | **Bearing plate (mm) and Hex Nut** | **Anticorrosion Compound** |
| 6 | Vertical | 7 | 0.12 | 7 | 40 | 7 | yes | no |
| 4 | Vertical | 5 | 0.12 | 5 | 40 | 5 | yes | no |
| 5 | Vertical | 7 | 0.12 | 7 | 40 | 7 | yes | no |
| 7 | Vertical | 5 | 0.12 | 5 | 40 | 5 | yes | no |
| 12 | Raked | 7 | 0.12 | 7 | 40 | 7 | yes | no |
| Note: Refer to manufacturer's specifications for installation. | | | | | | | | |

**Landing: (elements in red are in addition to the previous design)**

| Table 5: Bar Details for Landing Reinforcement | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Number** | **Inclination** | **Borehole Depth (bottom of strip footing) (m)** | **Borehole Diameter (m)** | **Bar length (m)** | **Bar Diameter (mm)** | **Bond Length (m)** | **Bearing plate (mm) and Hex Nut** | **Anticorrosion Compound** |
| 2 | Vertical | 6 | 0.12 | 6 | 40 | 6 | Yes | no |
| 2 | Vertical | 6 | 0.12 | 6 | 40 | 6 | yes | no |
| 4 | Raked | 6 | 0.12 | 6 | 40 | 6 | Yes | no |
| Note: Refer to manufacturer's specifications for installation. | | | | | | | | |

## 6 LIMITATIONS

The findings contained within this report are the result of limited discrete investigations conducted in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, can it be considered that these findings represent the actual state of the ground conditions away from our investigation locations.

If the ground conditions encountered during construction are significantly different from those described in this report and on which the conclusions and recommendations were based, then we must be notified immediately.

Additional important information regarding the use of your CMW report is provided in the 'Using your CMW Report' document attached to this report.

This report has been prepared for use by Aspect Studio in relation to the Coastal Walkway Upgrade Project and in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

Where a party other than Aspect Studio seeks to rely upon or otherwise use this report, the consent of CMW should be sought prior to any such use. CMW can then advise whether the report and its contents are suitable for the intended use by the other party

## 7 CLOSURE

Should there be any questions in relation to this report, please contact the undersigned.

***For CMW Geosciences***

Yan Wang
**Project Geotechnical Engineer**

John Slade
**Principal Geotechnical Engineer, CPEng**

Distribution: 1 copy to Aspect Studio (electronic)
Original held by CMW Geosciences

Attachments: Appendix A: Design Drawings Revised
Appendix B: Cable Specifications
Appendix C: Modelling Analysis

## USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

**Preparation of your report**

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report.

In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

**Your geotechnical report is based on your project's requirements**

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing.

The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

**Interpretation of geotechnical data**

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

**Subsurface conditions can change**

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

**Interpretation and use by other design professionals**

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

**Your report's recommendations require confirmation during construction**

Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site.

A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

**Environmental Matters Are Not Covered**

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation.

The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.

# Design Drawings Revised

Edits 15/08/22 J Slade

This area is assumed to be removed during construction

Green line is the new block perimter. This is to embedd the 40mm bar and ensure cover.

DEPTH TO BE CONFIRMED BY GEOTECHNICAL ENGINEER FOR EACH SITE.

2.0m

40mm threaded DCP bar, 5m length plate and nut embedded in the block

30°

CABLE AND CABLE CONNECTION BY OTHERS.

CABLE ANCHOR PLATE SHOWN DASHED FOR CLARITY

1.3m

BEARING PLATE

N24-100 EW

6 strand cable configuration

2

1

LOAD TRANSFER BLOCK

30°

CABLE EMBEDMENT PLATE

N12 LIGS AT 150 CRS

6 strand cable configuration

4XN16 BENT TRANSFER BLOCK REINFORCEMENT. WITH N10 LIGATURES AT 100 CRS

0.2MM VAPOUR BARRIER. FORTECON OR EQUIVALENT.

N24-100 EW

40mm threaded DCP bar, 5m length plate and nut embedded in the block

EXCAVATION AND BEARING SURFACE TO BE INSPECTED BY GEOTECHNICAL ENGINEER AND DESIGNER TO CONFIRM IN ACCORDANCE WITH ASSUMED SOIL PROFILE AND DESIGN MODEL ASSUMPTIONS..

4xDYWIDAG WR DCP ACHOR 01 DOUBLE CORROSION PROCECTED (DCP) PERMANENT GROUND ANCHOR GRADE WR (950/1050)
ANCHOR LENGTH: 15.6m MIN. FREE LENGTH 5M
BOND LENGTH 10m
ANCHOR DIAMETER: 47mm
BOREHOLE DIAMETER 0.12m

above text to adjusted to reference the 6 starnd multistrand configuration

50°

**NOTE**: ALL REINFORCEMENT AND STEEL TO BE HOT DIP GALVANISED.
NOTE: COVER TO BE MINIMUM 50MM.
REINFORCEMENT TO BE 3D SHOP DRAWN.

ALL CONCRETE TO BE f'c = 50MPa AND COLOURED IN ACCORDANCE WITH LANDSCAPE ARCHITECT REQUIREMENTS

**ANCHOR BLOCK SECTION**

| DIMENSIONS (mm) | | |
|---|---|---|
| STRAND CONFIGURATIONS | 2 – 5 | 6 – 7 |
| BEARING PLATE (AxT) | 250x32 | 290x36 |
| PROTECTIVE CAP (DcxLc) | 161x85 | 205x95 |
| PIPE SLEEVE (LpxODxTp) | 350x114.3x6.0 | 400x114.3x6.0 |
| CORRUGATED SHEATH (ODxID) | 92x78 | 92x78 |
| STRESSING LENGTH (Ls) | 750 | 1000 |

CMW have assessed the live and dead design loads and a temporary loading of 0.05g horizontal loading.

Design is predicated on the pull testing of the cable and thread bar anchors at regular intervals to confirm design capacity is meet.

All temporary works excavations and Temporary Anchors are not to interact with these permanent anchor elements

Drawing is to also include the DWG-PermStrand01 - Permanent Strand Anchor Details as attached in this report.

new 40mm threaded DCP bar.

ANCHOR BEARING PLATE 260 SQ X 50 THK.

CABLE ANCHOR PLATE 4-M36 4.6/S ANCHOR BOLTS 420XSQX50 THK

800 mm

1300mm

CABLE ANCHORAGE POINT

new 40mm threaded DCP bar.

800 mm

1300mm

**ANCHOR BLOCK ELEVATION**

PRELIMINARY

| CLIENT: | REV: | DATE: | DESCRIPTION: | IVR: | APR'D: | TITLE: | NAME: |
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| ASPECT Studios™ | A | 11/03/2022 | PRELIMINARY FOR PRICING | XXX | XXX | DRAFTER | JCA |
| | B | 11/03/2022 | PRELIMINARY FOR PRICING | | | DRAFTING CHECK | XXX |
| | C | 11/03/2022 | PRELIMINARY FOR PRICING | | | DESIGNER | JCA/CMW |
| | | | | | | DESIGN CHECK | XXX |
| PRINT IN COLOUR: | | | | | | PROJECT MANAGER | XXX |

MARION COASTAL WALKWAY UPGRADE

HALLET COVE, SA 5158

CELL 5/6

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REVISION: C

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**Physical Properties**

| Grade | (Mpa) | WR (950 / 1050) | | | | | E (835 / 1035) | | |
|---|---|---|---|---|---|---|---|---|---|
| Diameter | (mm) | 26.5 | 32 | 36 | 40 | 47 | 57 | 65 | 75 |
| Ultimate | (kN) | 579 | 844 | 1069 | 1319 | 1820 | 2671 | 3447 | 4572 |
| Yield | (kN) | 524 | 764 | 967 | 1194 | 1652 | 2155 | 2780 | 3690 |
| Area | (mm2) | 552 | 804 | 1018 | 1257 | 1735 | 2581 | 3331 | 4418 |

**Dimensions (mm)**

| Bar Diameter | | 26.5 | 32 | 36 | 40 | 47 | 57 | 65 | 75 |
|---|---|---|---|---|---|---|---|---|---|
| Bearing plate | A x T | 180x40 | 20x45 | 220x50 | 240x55 | 260x50 | 330x70 | 370x75 | 420x85 |
| Pipe OD | Dp | 64 | 70 | 76 | 76 | 114 | 127 | 127 | 168.3 |
| Nut Length | Ln | 60 | 72 | 75 | 83 | 105 | 120* | 130* | 145* |
| Stressing Length | Ls | 90 | 100 | 110 | 130 | 135 | 120 | 130 | 145 |
| Capped Length | Lsc | 210 | 210 | 210 | 240 | 280 | 280 | 280 | 280 |
| Smooth Sheat OD | Ds | 58 | 63 | 73 | 76 | 85 | 110 | 110 | 125 |
| Corrugated Sheath OD | Dc | 50 | 56 | 65 | 65 | 80 | 100 | 100 | 114 |

* Hex Nut

**CHARACTERISTICS**

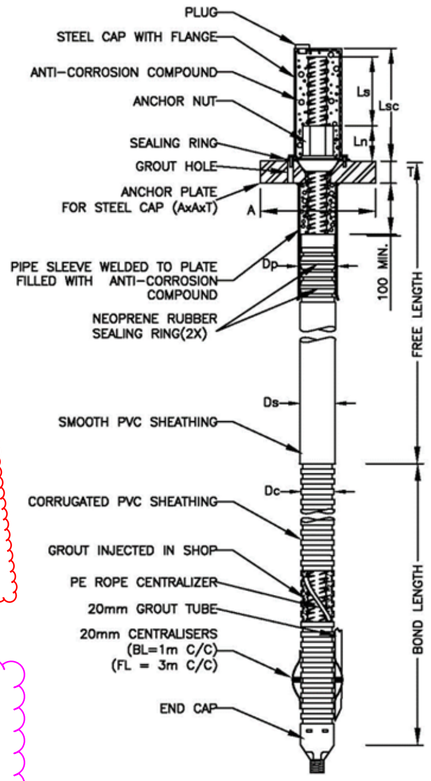
1) POST–TENSIONING TENDONS ARE DSI THREADBAR, DOUBLE CORROSION PROTECTED SYSTEM, SHOP ASSEMBLED AND GROUTED.
2) THREADBARS ARE PROOF STRESSED AND STRESS RELEIVED.
3) SHOP GROUT: CEMENTITIOUS NEAT LEAN GROUT W/O AGGREGATES,
   MAXIMUM WATER CEMENT RATIO=0.36 (BY WEIGHT),
   CEMENT: GENERAL PURPOSE TYPE GP
   ADDITIVE: VISCOCRETE 10, 0.25% (BY WEIGHT).
4) DURING TENSIONING, DRAW IN AT NUT=1mm & COUPLER SLIP=1.5mm.

**INSTALLATION PROCEDURE**

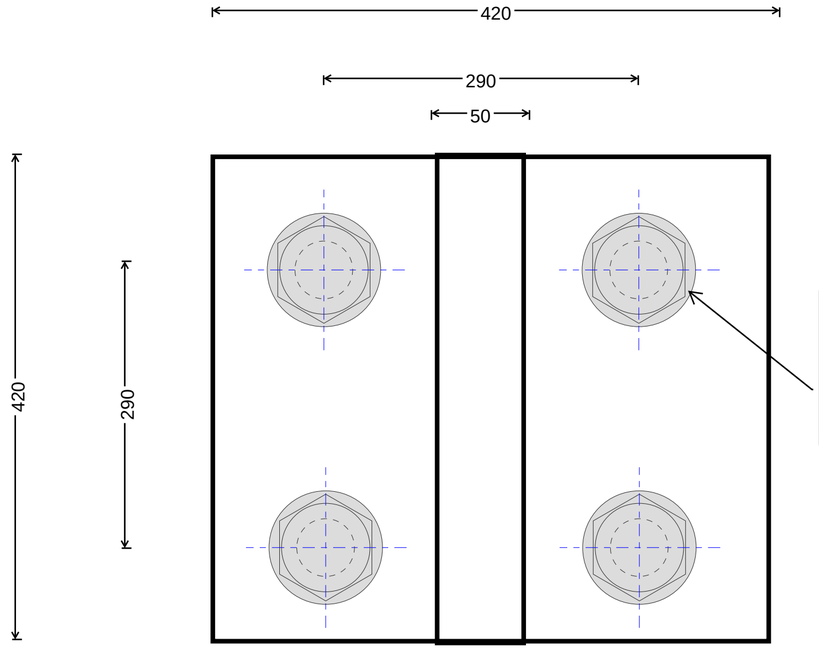
1) DRILL HOLE; GROUT AND RE–DRILL IF REQUIRED.
2) ASSEMBLE PRE–GROUTED BARS WITH PLATES, NUTS, GROUT TUBES, CENTRALISERS AND COUPLERS (IF APPLICABLE) AND INSERT ANCHOR IN HOLE.
3) TREMIE GROUT ALONG ENTIRE ANCHOR LENGTH.
4) ONCE GROUT REACHES REQUIRED STRENGTH, TEST ACCORDING TO SPECIFICATIONS.
5) INSTALL PROTECTIVE CAPS (IF REQUIRED).

Text to be removed as it also written below.

**NOTE**:
1. Protective caps are required. Protective caps are to be replaced at every testing of the anchor.
2. All bars to be pretensioned (to 50kN) and load tested periodically. Multiple retention phases are expected during the 12 month construction period to ensure pretension loading due to the poor ground near the surface of the anchor block. Periodic lift tests will be required per 5 years of installation.
3. Refer to manufacturers specifications for installation.
4. Refer to manufacturers specifications for testing.
5. Load transfer block to be constructed to allow for testing of each anchor bar at specific inclinations and orientations.




ANCHOR–DETAILS

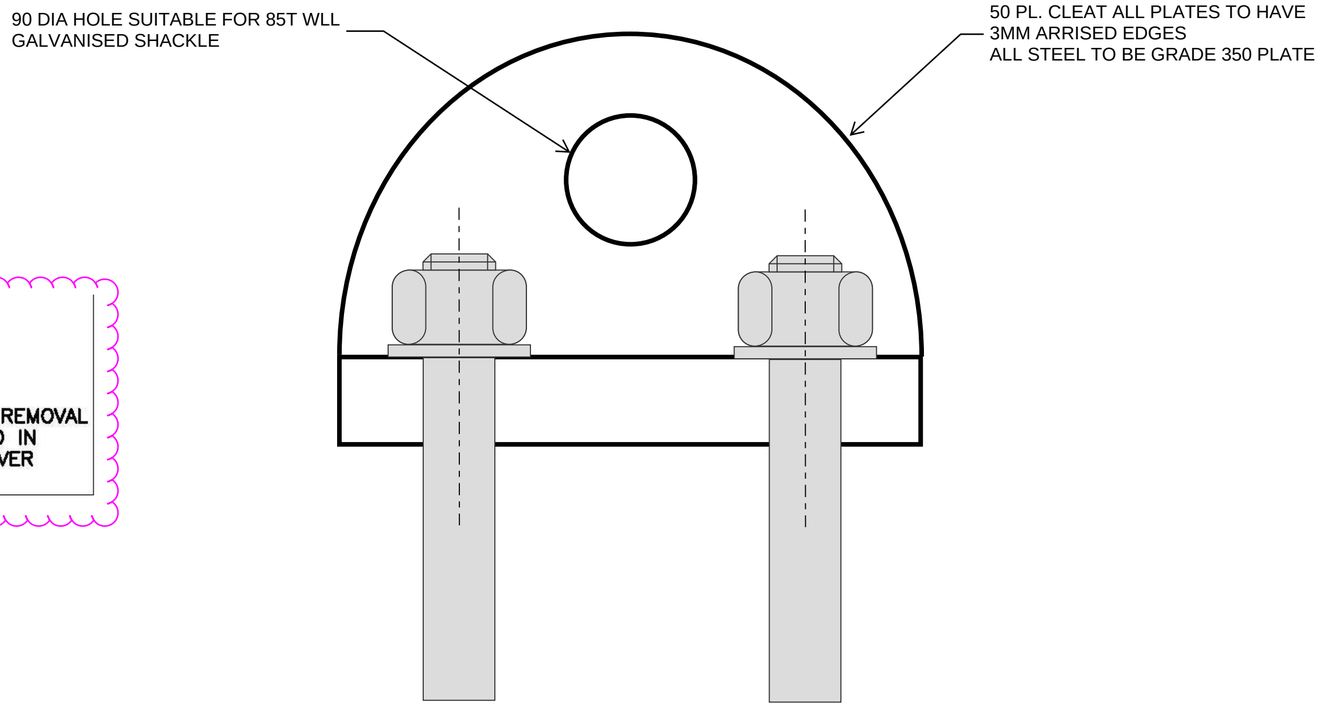



**ANCHOR PLATE**

Edits 15/08/22 J Slade

Drawing is to also include the DWG-PermStrand01 - Permanent Strand Anchor Details as attached in this report.

| DIMENSIONS (mm) | | | |
|---|---|---|---|
| STRAND CONFIGURATIONS | 2 – 5 | 6 – 7 | |
| BEARING PLATE (AxT) | 250x32 | 290x36 | |
| PROTECTIVE CAP (DcxLc) | 161x85 | 205x95 | |
| PIPE SLEEVE (LpxODxTp) | 350x114.3x6.0 | 400x114.3x6.0 | 5 |
| CORRUGATED SHEATH (ODxID) | 92x78 | 92x78 | |
| STRESSING LENGTH (Ls) | 750 | 1000 | |




**ANCHOR BLOCK ELEVATION**

## CAUTION

DO NOT WELD TO BAR
DO NOT USE BAR AS GROUND FOR WELDING
DO NOT ALLOW HOT SLAG OR SPARKS TO TOUCH BAR
DO NOT DAMAGE BAR SURFACE
DO NOT USE BARS WITH KINKS OR SHARP BENDS
FAILURE TO HEED THIS WARNING COULD CAUSE BAR TO BREAK RESULTING IN INJURY OR DAMAGE.

## WARNING

AT NO TIME DURING STRESSING AND REMOVAL OF THE JACK, SHALL PERSONS STAND IN LINE WITH THE TENDONS OR BEND OVER ALREADY STRESSED TENDONS.

**INSTALLATION PROCEDURE**

1) DRILL HOLE; GROUT AND RE–DRILL IF REQUIRED.
2) ASSEMBLE PRE–GROUTED BARS WITH PLATES, NUTS, GROUT TUBES, CENTRALISERS AND COUPLERS (IF APPLICABLE) AND INSERT ANCHOR IN HOLE.
3) TREMIE GROUT ALONG ENTIRE ANCHOR LENGTH.
4) ONCE GROUT REACHES REQUIRED STRENGTH, TEST ACCORDING TO SPECIFICATIONS.
5) INSTALL PROTECTIVE CAPS (IF REQUIRED).

PRELIMINARY

| CLIENT: | REV: | DATE: | DESCRIPTION: | IVR: | APR'D: | TITLE: | NAME: |
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| | C | 11/03/2022 | PRELIMINARY FOR PRICING | | | DESIGNER | JCA/CMW |
| | | | | | | DESIGN CHECK | XXX |
| PRINT IN COLOUR: | | | | | | PROJECT MANAGER | XXX |

MARION COASTAL WALKWAY UPGRADE

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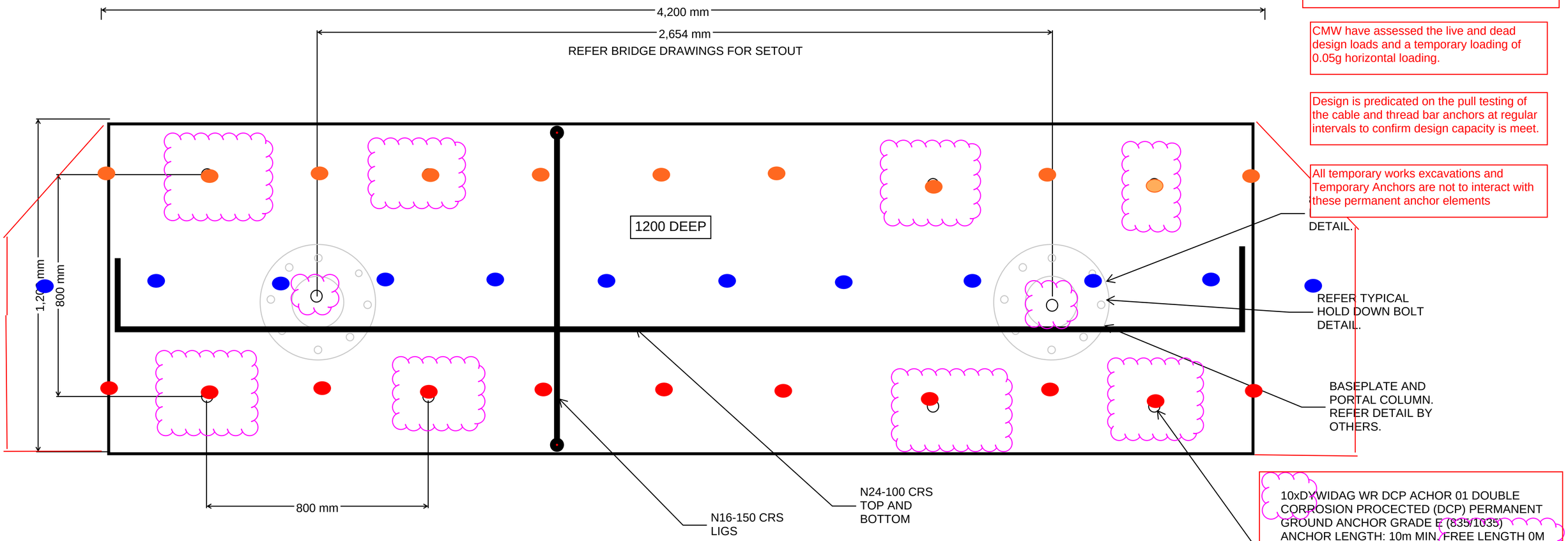
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Edits 15/08/22 J Slade

CMW have assessed the live and dead design loads and a temporary loading of 0.05g horizontal loading.

Design is predicated on the pull testing of the cable and thread bar anchors at regular intervals to confirm design capacity is meet.

All temporary works excavations and Temporary Anchors are not to interact with these permanent anchor elements




**PORTAL FOOTING - PLAN**

Raked DCP 40mm threaded bar, inclined 60 degree from the horizontal into the slope. Embedded into the strip footing. 7mL.

DCP 40mm threaded bar, inclined 90 degree. Embedded into the strip footing. 5mL.

DCP 40mm threaded bar, inclined 90 degree. Embedded into the strip footing. 7mL.

text to revised to 40mm threaded DCP bar.

**NOTE**: ALL REINFORCEMENT AND STEEL TO BE HOT DIP GALVANISED.
NOTE: COVER TO BE MINIMUM 50MM.
REINFORCEMENT TO BE 3D SHOP DRAWN.

ALL CONCRETE TO BE f'c = 50MPa AND COLOURED IN ACCORDANCE WITH LANDSCAPE ARCHITECT REQUIREMENTS

PRELIMINARY

CLIENT: ASPECT Studios™

PRINT IN COLOUR:

| REV: | DATE: | DESCRIPTION: | IVR: | APR'D: |
|---|---|---|---|---|
| A | 11/03/2022 | PRELIMINARY FOR PRICING | XXX | XXX |
| B | 11/03/2022 | PRELIMINARY FOR PRICING | | |
| C | 11/03/2022 | PRELIMINARY FOR PRICING | | |
| | | | | |
| | | | | |

| TITLE: | NAME: |
|---|---|
| DRAFTER | JCA |
| DRAFTING CHECK | XXX |
| DESIGNER | JCA/CMW |
| DESIGN CHECK | XXX |
| PROJECT MANAGER | XXX |

MARION COASTAL WALKWAY UPGRADE

HALLET COVE, SA 5158

CELL 5/6

INNOVIS Agile Outcomes

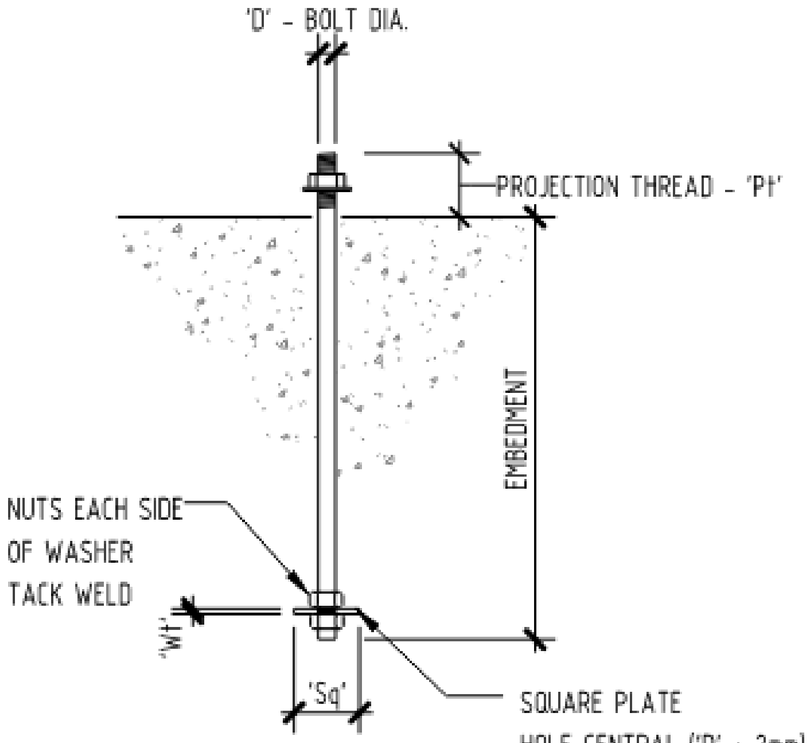
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| N.T.S. | 11/03/2022 | | A2 |

DRAWING NUMBER: J0439-STR-SKT-0112

REVISION: C

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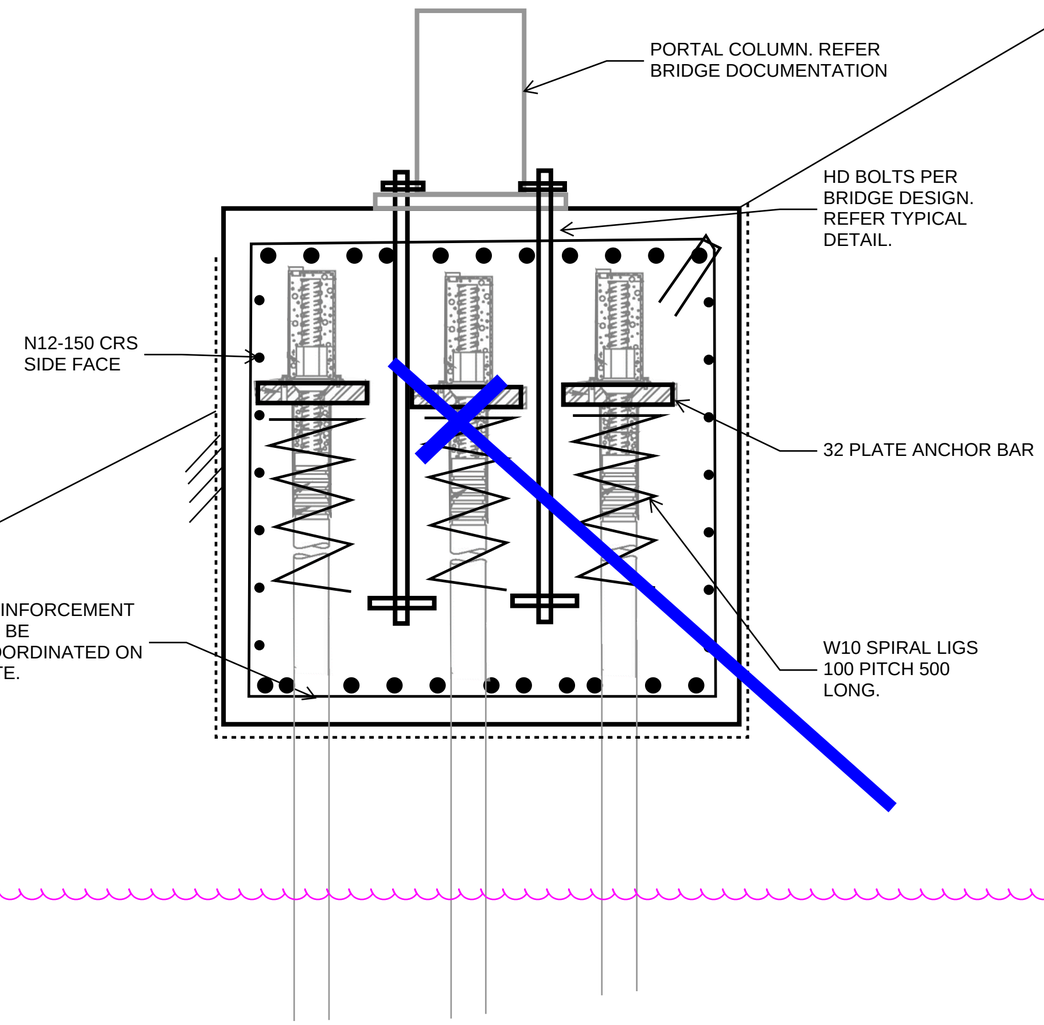
Edits 15/08/22 J Slade




NOTE:
THREADED ROD SHALL BE HOT DIPPED GALVANISED. A MATERIAL CERTIFICATE MUST BE PROVIDED TO THE DESIGN ENGINEER BEFORE USE.

| TYPE | 'D' | EMBEDMENT | 'Pt' | 'Wt' | 'Sq' |
|---|---|---|---|---|---|
| HD1 | 20DIA 4.6/S | 650 | 100 | 32 | 150 |

**TYPICAL HOLD DOWN BOLT DETAIL**




**PORTAL FOOTING - SECTION**

**NOTE**: ALL REINFORCEMENT AND STEEL TO BE HOT DIP GALVANISED.
NOTE: COVER TO BE MINIMUM 50MM.
REINFORCEMENT TO BE 3D SHOP DRAWN.

ALL CONCRETE TO BE f'c = 50MPa AND COLOURED IN ACCORDANCE WITH LANDSCAPE ARCHITECT REQUIREMENTS

In above section - central 40mm DCP threaded bar is inclined / raked into slope (see blue line)

PRELIMINARY

| CLIENT: | REV: | DATE: | DESCRIPTION: | IVR: | APR'D: | TITLE: | NAME: |
|---|---|---|---|---|---|---|---|
| ASPECT Studios™ | A | 11/03/2022 | PRELIMINARY FOR PRICING | XXX | XXX | DRAFTER | JCA |
| | B | 11/03/2022 | PRELIMINARY FOR PRICING | | | DRAFTING CHECK | XXX |
| | C | 11/03/2022 | PRELIMINARY FOR PRICING | | | DESIGNER | JCA |
| PRINT IN COLOUR: | | | | | | DESIGN CHECK | XXX |
| | | | | | | PROJECT MANAGER | XXX |

MARION COASTAL WALKWAY UPGRADE

HALLET COVE, SA 5158

CELL 5/6

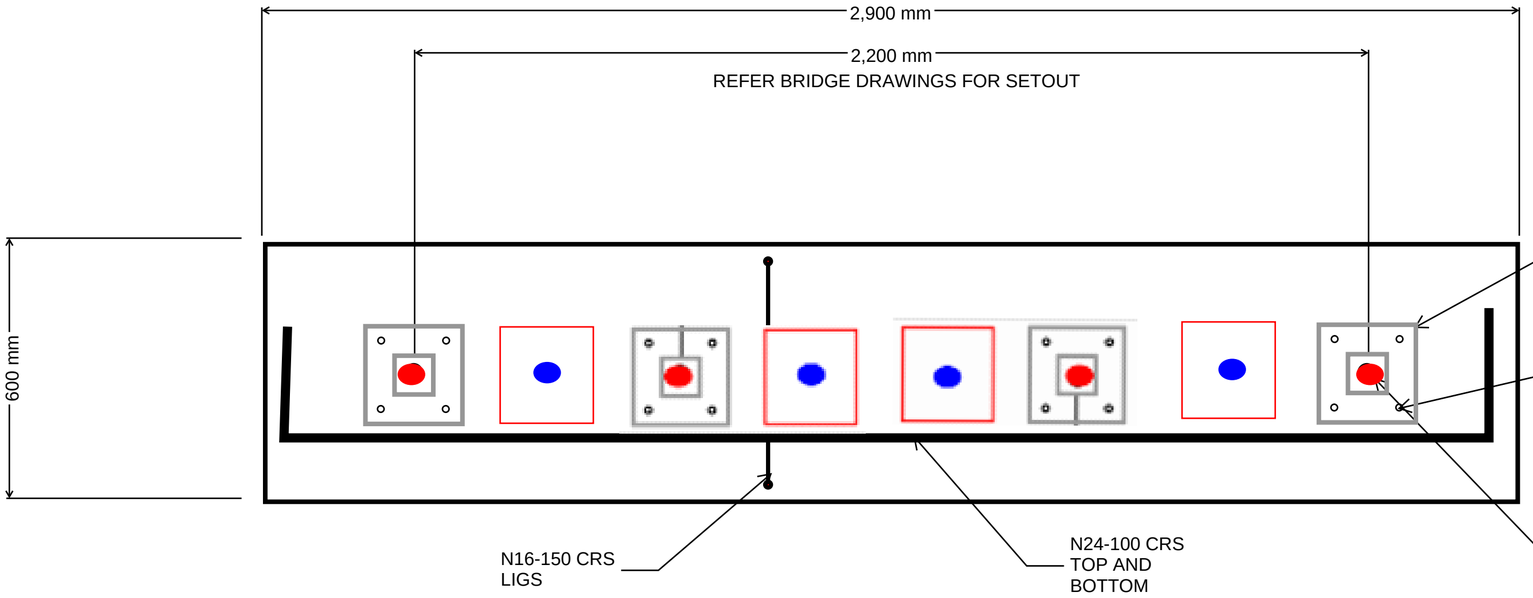
INNOVIS Agile Outcomes

| SCALE: | DATE: | PHASE: | SHT SIZE: |
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| N.T.S. | 11/03/2022 | | A2 |

DRAWING NUMBER: J0439-STR-SKT-0113

REVISION: C

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**BRIDGE LANDING FOOTING - PLAN**

Raked DCP 40mm threaded bar, inclined 60 degree from the horizontal into the slope. Embedded into the strip footing. 6mL.

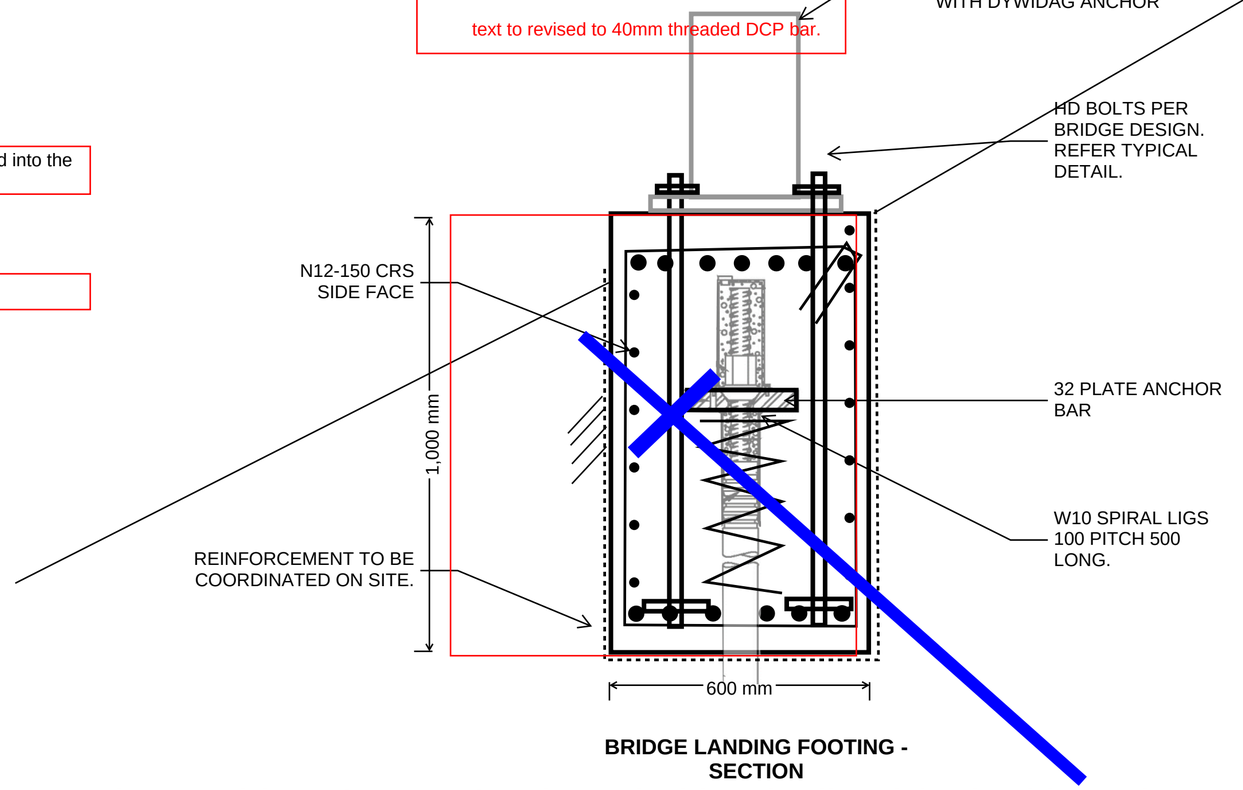
DCP 40mm threaded bar, inclined 90 degree. Embedded into the strip footing. 6mL.

Edits 15/08/22 J Slade

CMW have assessed the live and dead design loads and a temporary loading of 0.05g horizontal loading.

Design is predicated on the pull testing of the cable and thread bar anchors at regular intervals to confirm design capacity is meet.

All temporary works excavations and Temporary Anchors are not to interact with these permanent anchor elements




**BRIDGE LANDING FOOTING - SECTION**

In above section - add a 40mm DCP threaded bar inclined / raked into slope (see above blue line). This is likely to change the dimensions of the block

**NOTE**: ALL REINFORCEMENT AND STEEL TO BE HOT DIP GALVANISED.
NOTE: COVER TO BE MINIMUM 50MM.
REINFORCEMENT TO BE 3D SHOP DRAWN.

ALL CONCRETE TO BE f'c = 50MPa AND COLOURED IN ACCORDANCE WITH LANDSCAPE ARCHITECT REQUIREMENTS

PRELIMINARY

| CLIENT: | REV: | DATE: | DESCRIPTION: | IVR: | APR'D: | TITLE: | NAME: |
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| | B | 11/03/2022 | PRELIMINARY FOR PRICING | | | DRAFTING CHECK | XXX |
| | C | 11/03/2022 | PRELIMINARY FOR PRICING | | | DESIGNER | JCA/CMW |
| | | | | | | DESIGN CHECK | XXX |
| PRINT IN COLOUR: | | | | | | PROJECT MANAGER | XXX |

MARION COASTAL WALKWAY UPGRADE

HALLET COVE, SA 5158

CELL 5/6

INNOVIS Agile Outcomes

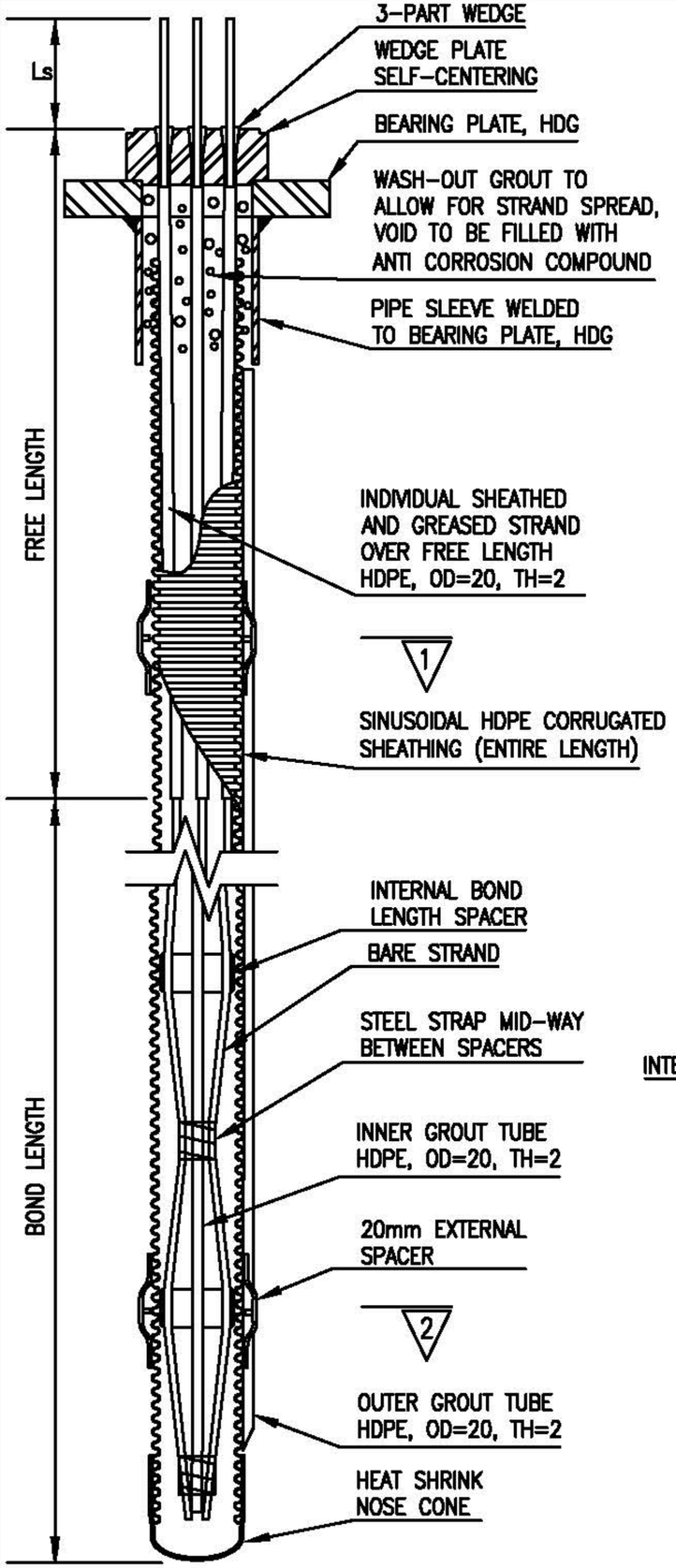
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| N.T.S. | 11/03/2022 | | A2 |

DRAWING NUMBER: J0439-STR-SKT-0114

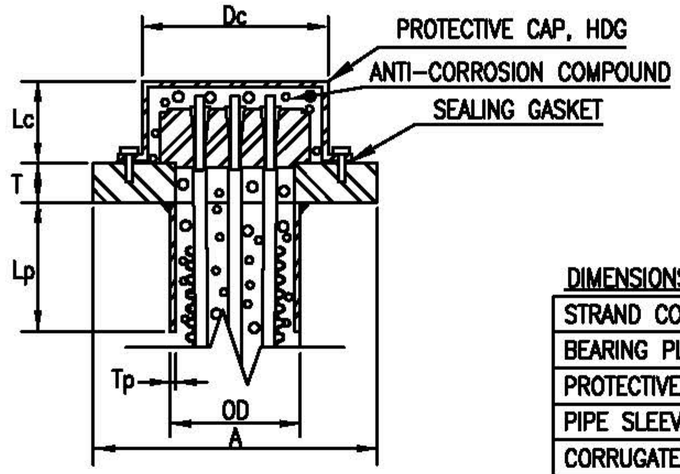
REVISION: C

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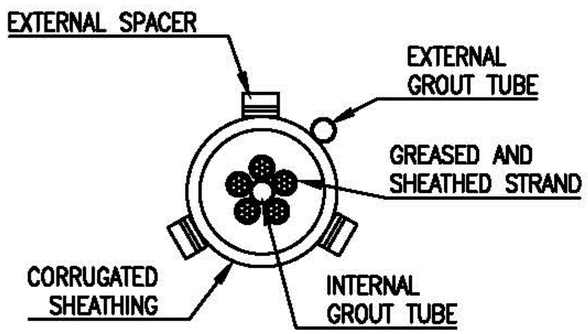
# Cable Specifications



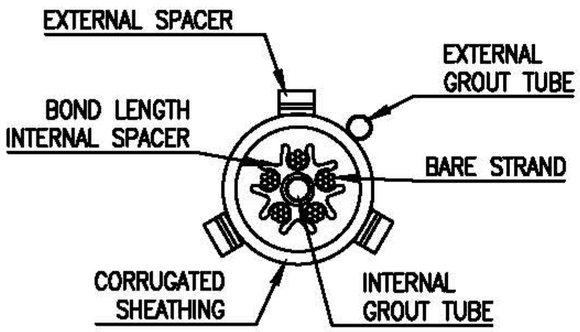

ANCHOR DETAILS




ANCHOR HEAD PROTECTION




SECTION 1 – FREE LENGTH




SECTION 2 – BOND LENGTH

| No. | REVISION | DATE | ECN |
|---|---|---|---|
| A | PIPE & CAP CHANGES | OCT' 12 | 000 |
| B | CORRUGATED SHEATHING UPDATED | AUG' 14 | 020 |
| C | 31 & 37 ADDED | JUL' 15 | 025 |

15.2mm STRAND PROPERTIES

EXTRA HIGH TENSILE STRENGTH LOW RELAXATION STRAND
A=143mm2 MBL=261kN

DIMENSIONS (mm)

| STRAND CONFIGURATIONS | 2 – 5 | 6 – 7 | 8 – 9 | 10 – 12 | 13 – 15 |
|---|---|---|---|---|---|
| BEARING PLATE (AxT) | 250x32 | 290x36 | 330x40 | 380x45 | 420x50 |
| PROTECTIVE CAP (DcxLc) | 161x85 | 205x95 | 205x95 | 212x170 | 256.4x120 |
| PIPE SLEEVE (LpxODxTp) | 350x114.3x6.0 | 400x114.3x6.0 | 500x168.3x6.4 | 550x168.3x6.4 | 650x168.3x6.4 |
| CORRUGATED SHEATH (ODxID) | 92x78 | 92x78 | 92x78 | 117x101 | 117x101 |
| STRESSING LENGTH (Ls) | 750 | 1000 | 1500 | 1500 | 1500 |

DIMENSIONS (mm)

| STRAND CONFIGURATIONS | 16 – 19 | 20 – 22 | 23 – 31 | 32 – 37 |
|---|---|---|---|---|
| BEARING PLATE (AxT) | 470x60 | 500x70 | 600x80 | 650x100 |
| PROTECTIVE CAP (DcxLc) | 256.4x120 | 256.4x120 | 323.8x150 | 323.8x150 |
| PIPE SLEEVE (LpxODxTp) | 700x219.1x6.4 | 800x219.1x6.4 | 1000x273.1x6.4 | 1000x273.1x6.4 |
| CORRUGATED SHEATH (ODxID) | 145x127 | 145x127 | 241x203 | 241x203 |
| STRESSING LENGTH (Ls) | 1500 | 1500 | 2000 | 2000 |

CAUTION

DO NOT WELD TO STRAND
DO NOT USE STRAND AS GROUND FOR WELDING
DO NOT ALLOW HOT SLAG OR SPARKS TO TOUCH STRAND
DO NOT DAMAGE STRAND SURFACE
DO NOT USE STRAND WITH KINKS OR SHARP BENDS
FAILURE TO HEED THIS WARNING COULD CAUSE STRAND TO BREAK RESULTING IN INJURY OR DAMAGE.

INSTALLATION PROCEDURE

1) DRILL REQUIRED HOLES. IF APPLICABLE, GROUT AND RE-DRILL UNTIL WATER TIGHT.
2) INSERT CORRUGATE SHEATHING WITH PRE-ASSEMBLED OUTER GROUT TUBE & SPACERS.
3) INSERT STRAND ANCHORS PRE-ASSEMBLED WITH INNER SPACERS AND GROUT TUBE.
4) WATER TEST SHEATHING.
5) SIMULTANEOUSLY GROUT THE INNER AND OUTER ANNULUS OF THE ENTIRE ANCHOR.
6) 4 HOURS AFTER GROUTING, WASHOUT 0.5m BELOW PLATE.
7) INSTALL BEARING PLATE WITH PIPE.
8) FILL ANCHOR HEAD WITH GREASE.
9) INSTALL WEDGE PLATE AND WEDGES.
10) ONCE GROUT REACHES MIN. 32MPa AND 7-DAYS, PERFORM TESTING AND LOCKING-OFF.
11) ONCE TESTING & LOCKING-OFF ARE APPROVED, CUT STRANDS AND CAP.

DYWIDAG-Systems International Construction P/L
ABN: 23 630 281 615
PO Box 2034
Gateshead, NSW, 2290
P: +61 2 4081 5501
E: civilenquiries@dywidag-systems.com.au
Office Address:
24 Groves Road
Bennetts Green, NSW, 2290
Australia

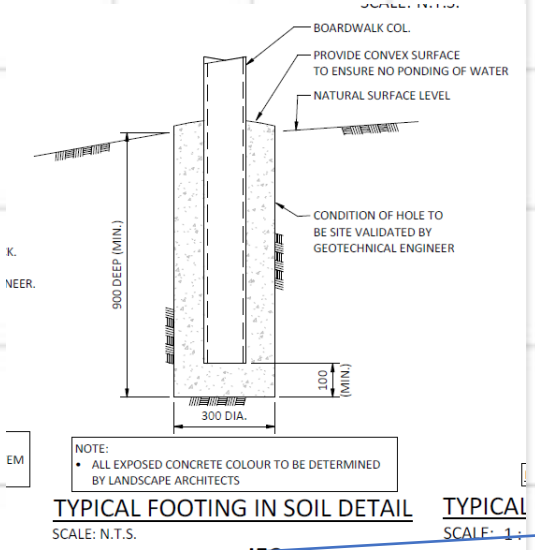
DYWIDAG

| PROJECT | | | |
|---|---|---|---|
| | A4 | DATE DEC '11 | DRAWN MV |
| | | SCALE NTS | CHECKED AUTH |
| TITLE PERMANENT MULTISTRAND ANCHOR DETAILS | DWG No. PermStrand01 | | REV. C |

# Modelling Analysis

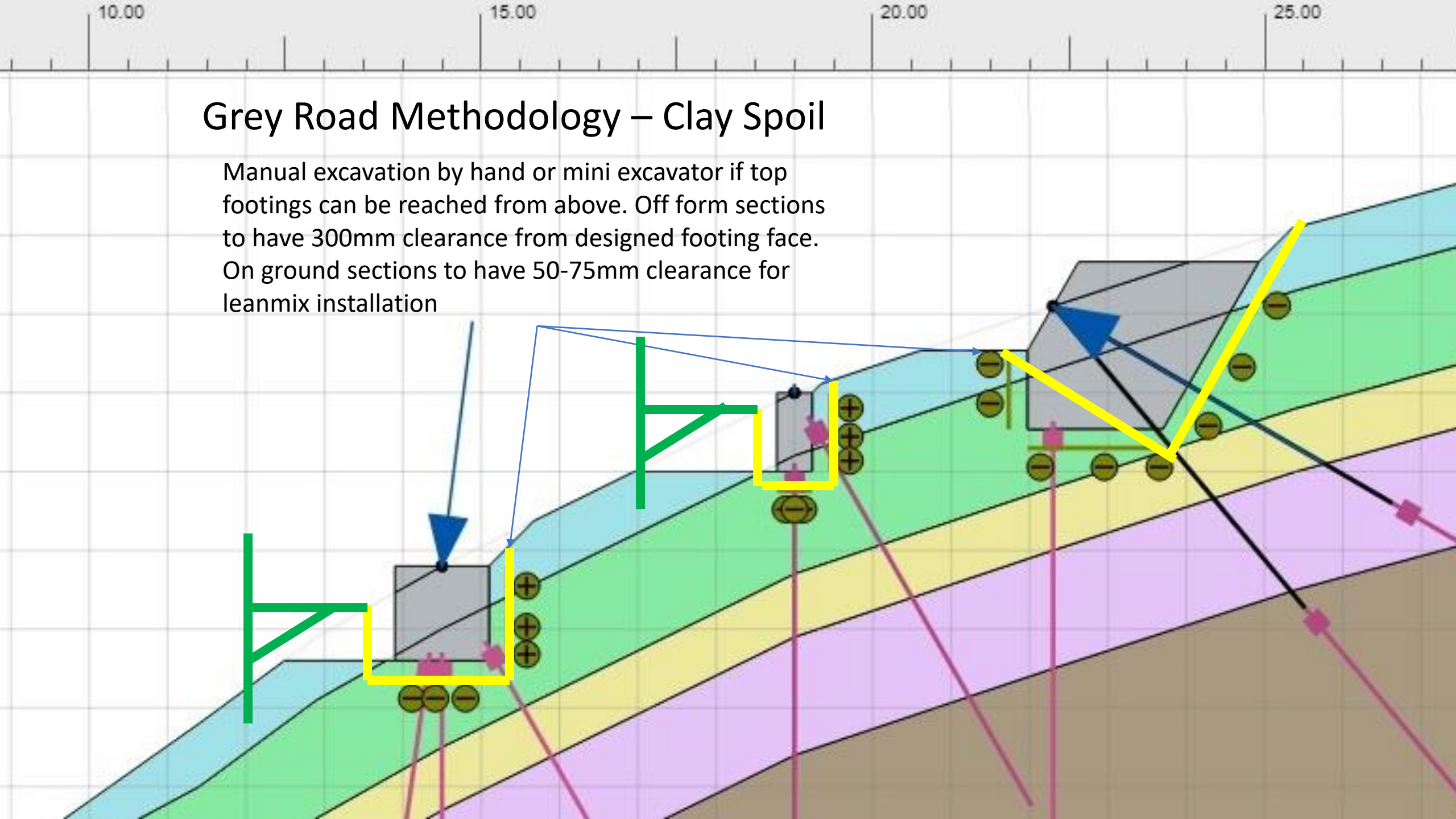
# Grey Road Methodology – Temporary access Platforms

Build temporary access platforms – personnel only

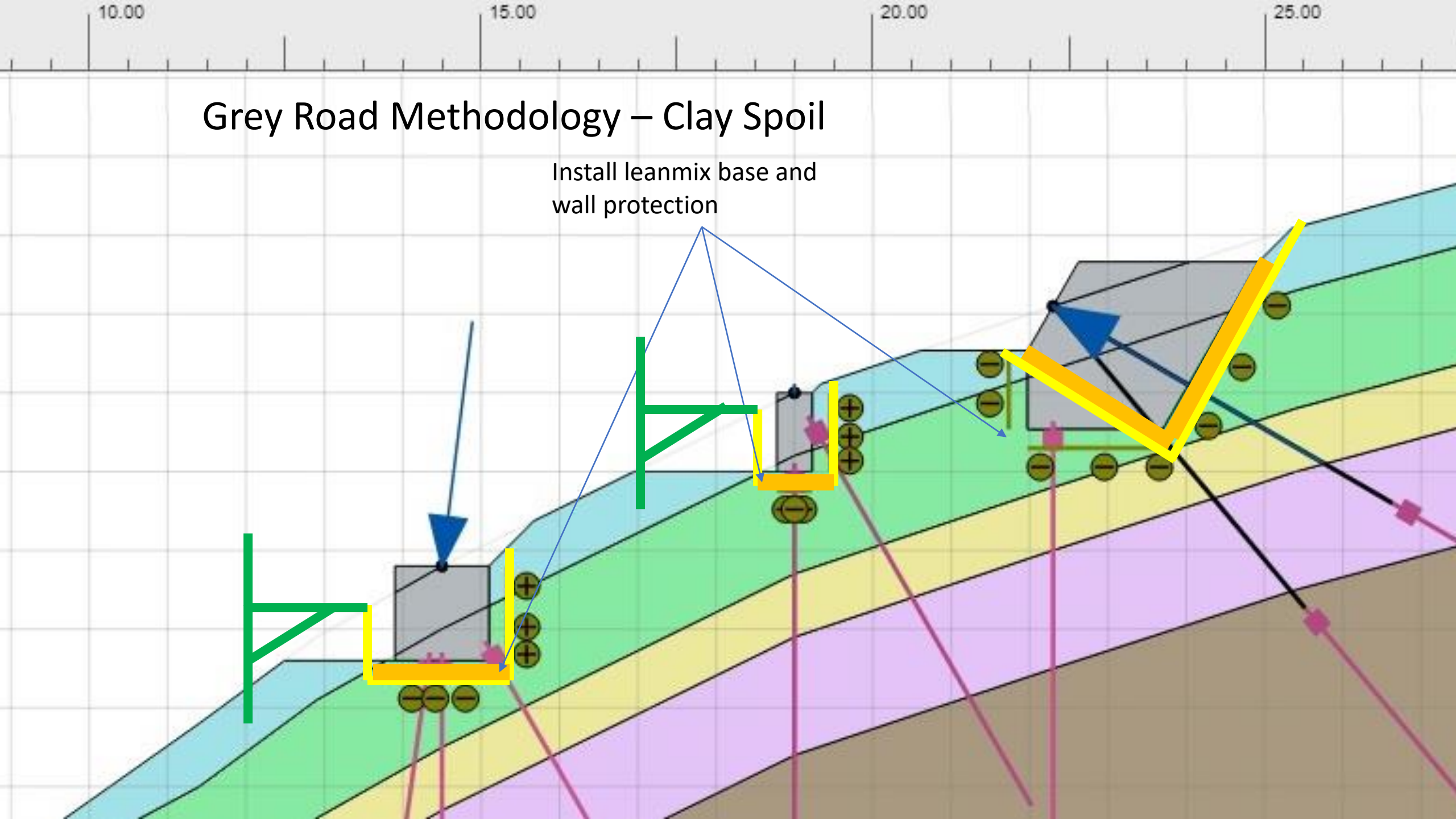


# Grey Road Methodology – Clay Spoil

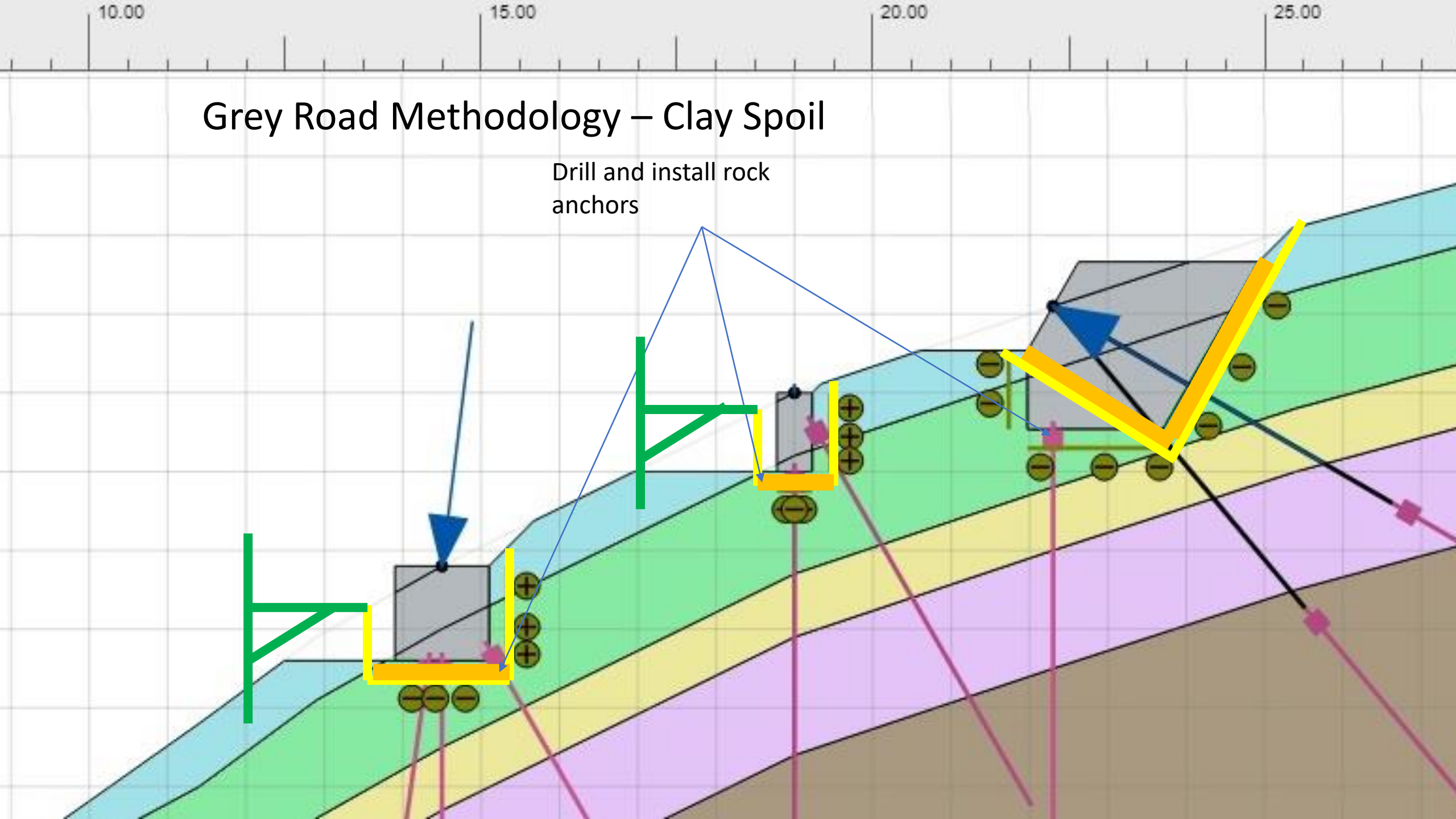
Manual excavation by hand or mini excavator if top footings can be reached from above. Off form sections to have 300mm clearance from designed footing face. On ground sections to have 50-75mm clearance for leanmix installation



# Grey Road Methodology – Clay Spoil

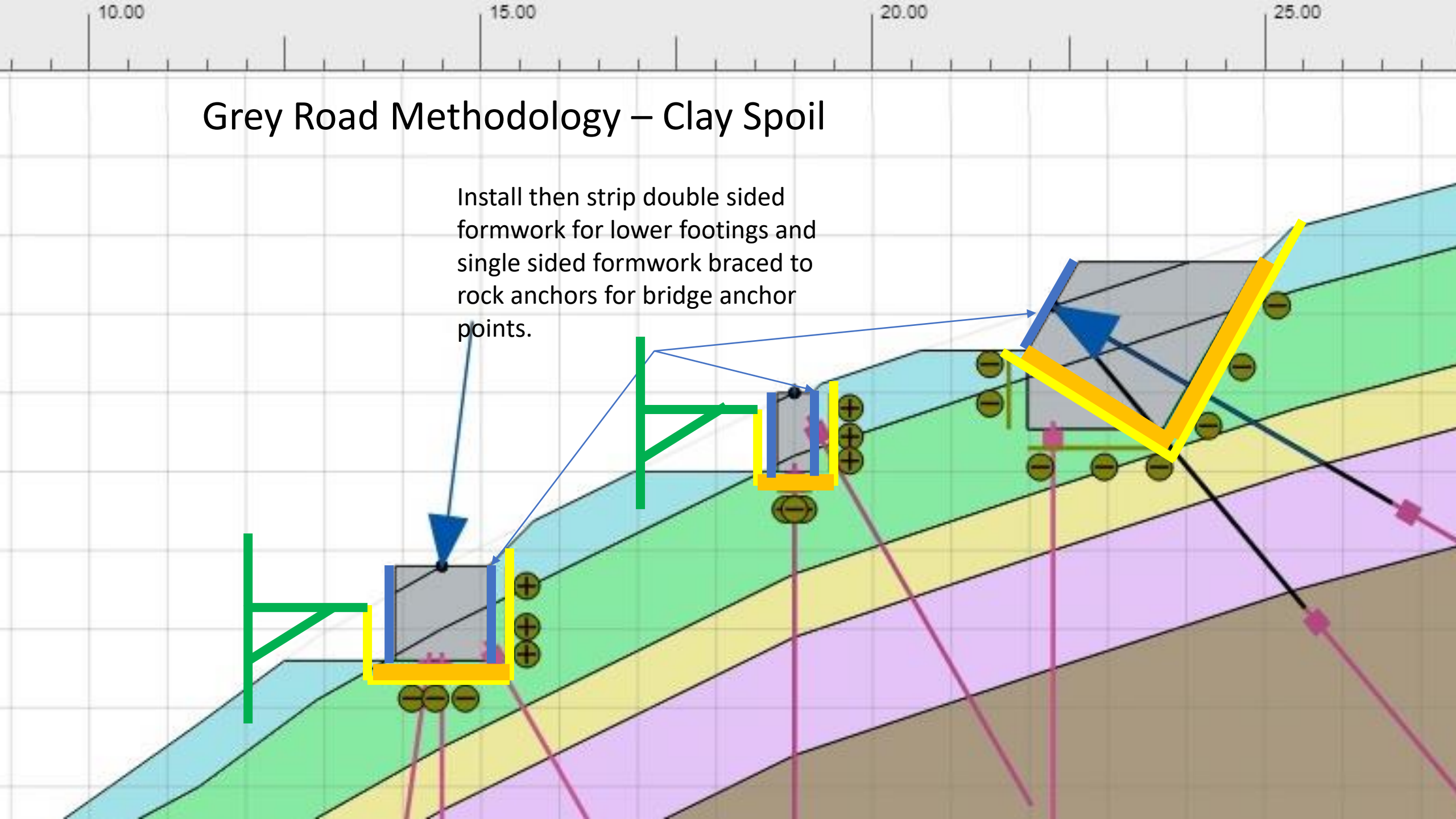


# Grey Road Methodology – Clay Spoil



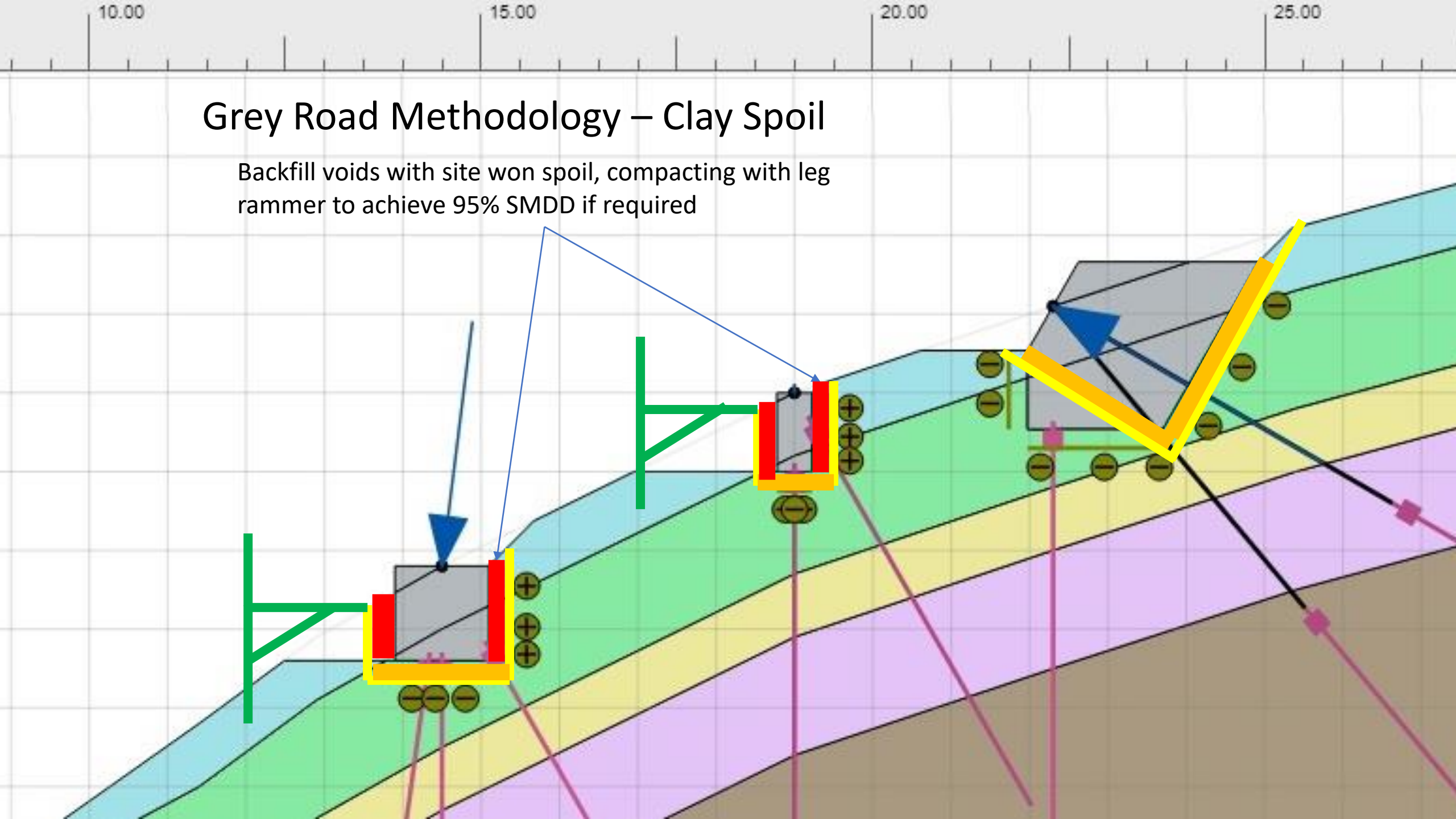
# Grey Road Methodology – Clay Spoil

Install then strip double sided formwork for lower footings and single sided formwork braced to rock anchors for bridge anchor points.



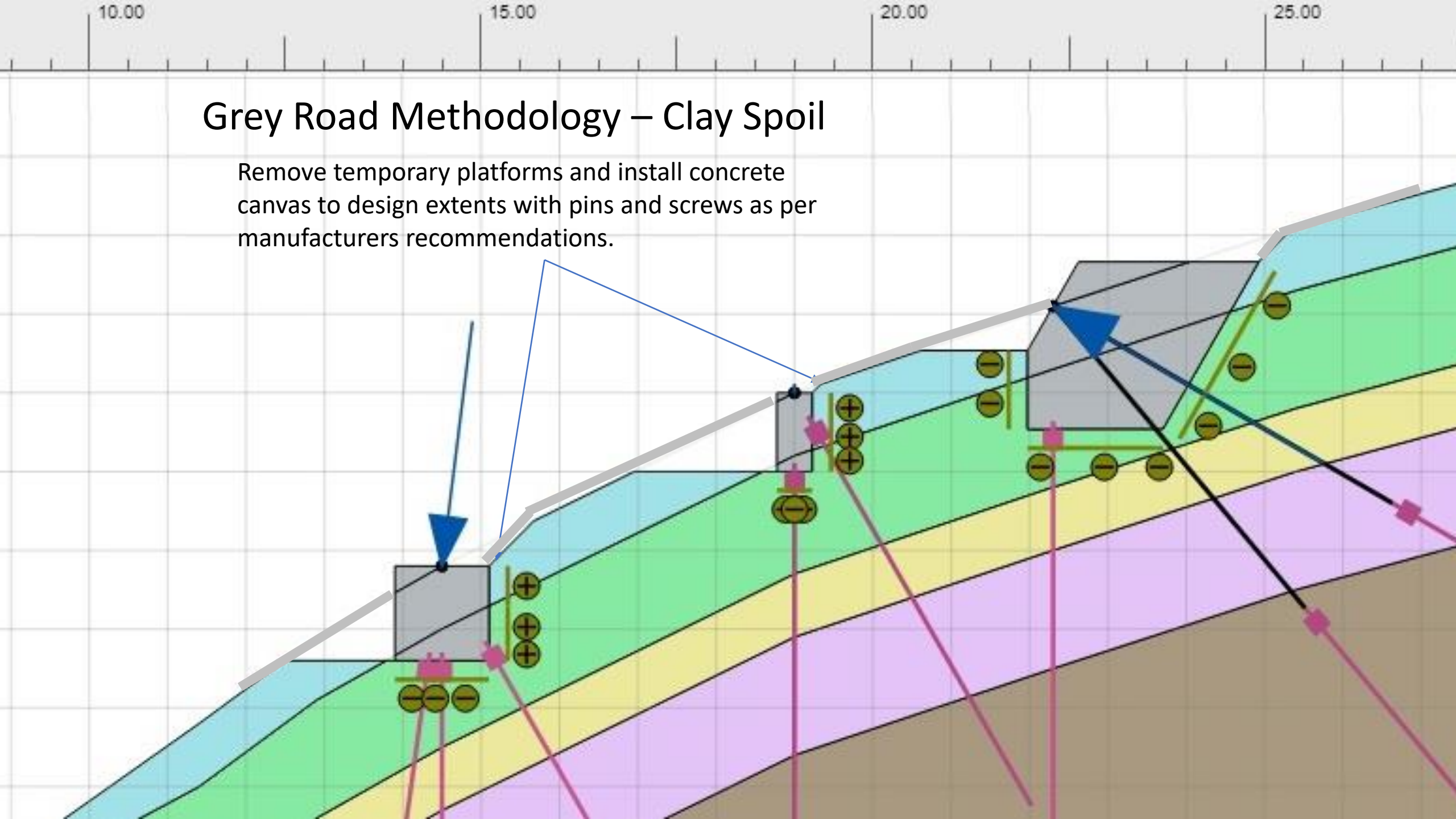
# Grey Road Methodology – Clay Spoil

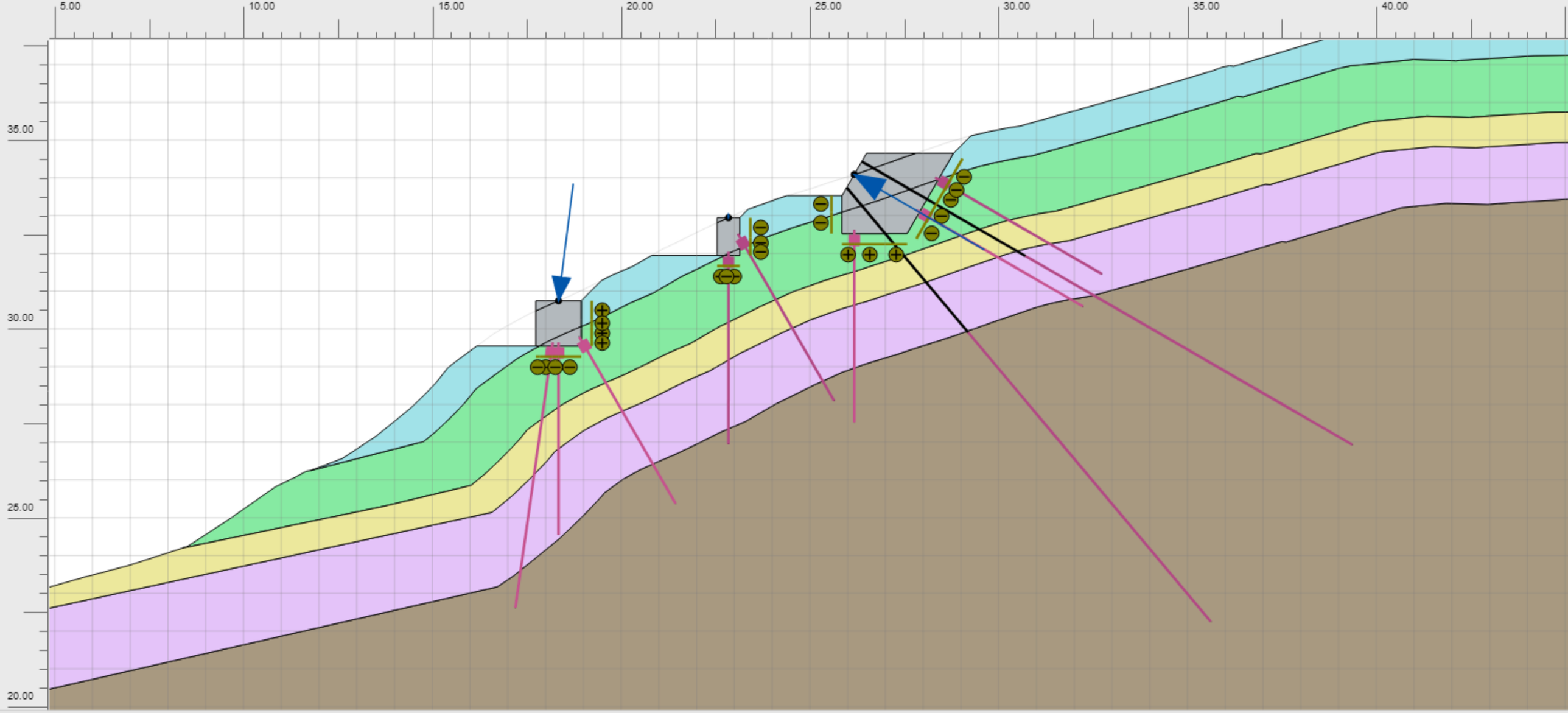
Backfill voids with site won spoil, compacting with leg rammer to achieve 95% SMDD if required

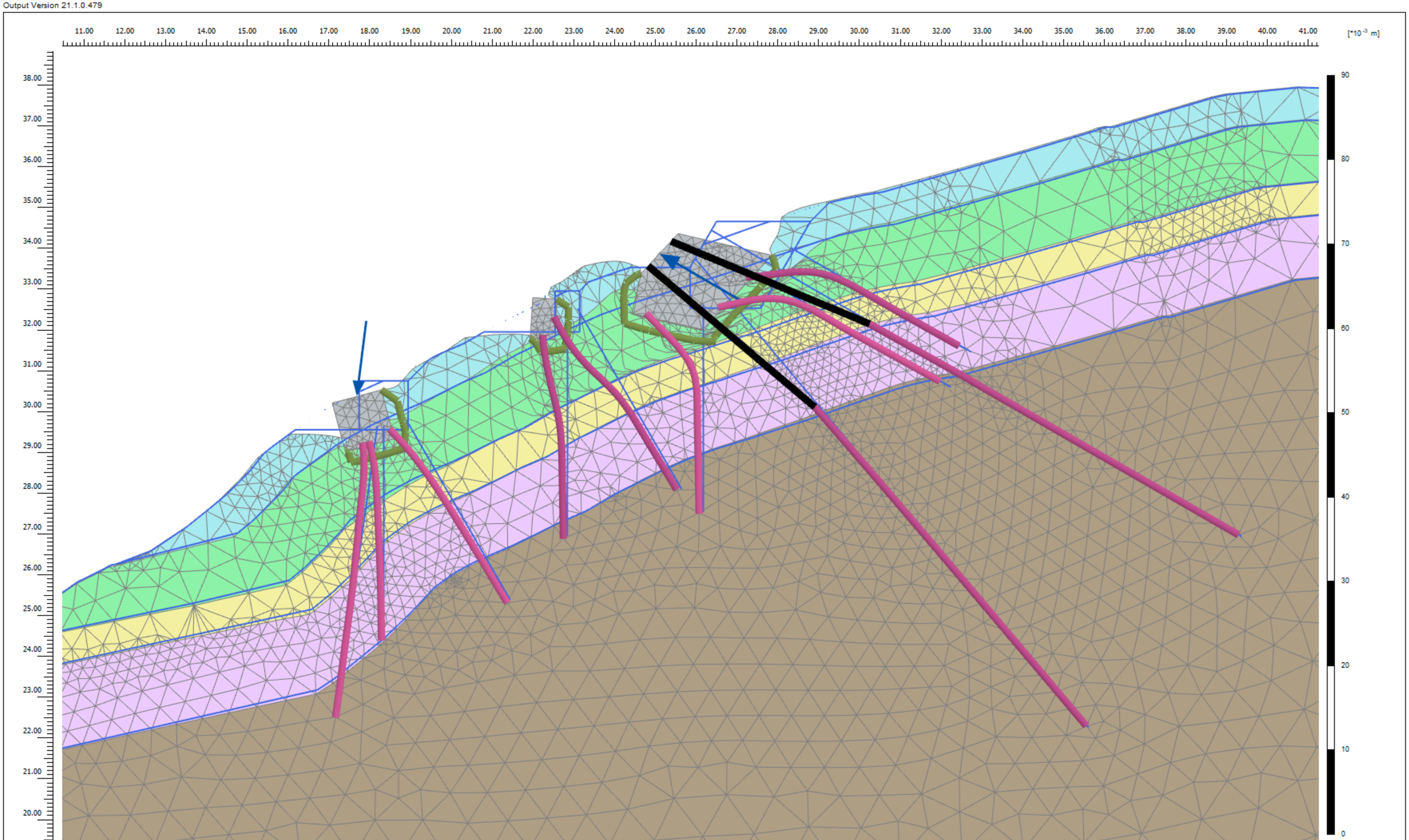


# Grey Road Methodology – Clay Spoil

Remove temporary platforms and install concrete canvas to design extents with pins and screws as per manufacturers recommendations.



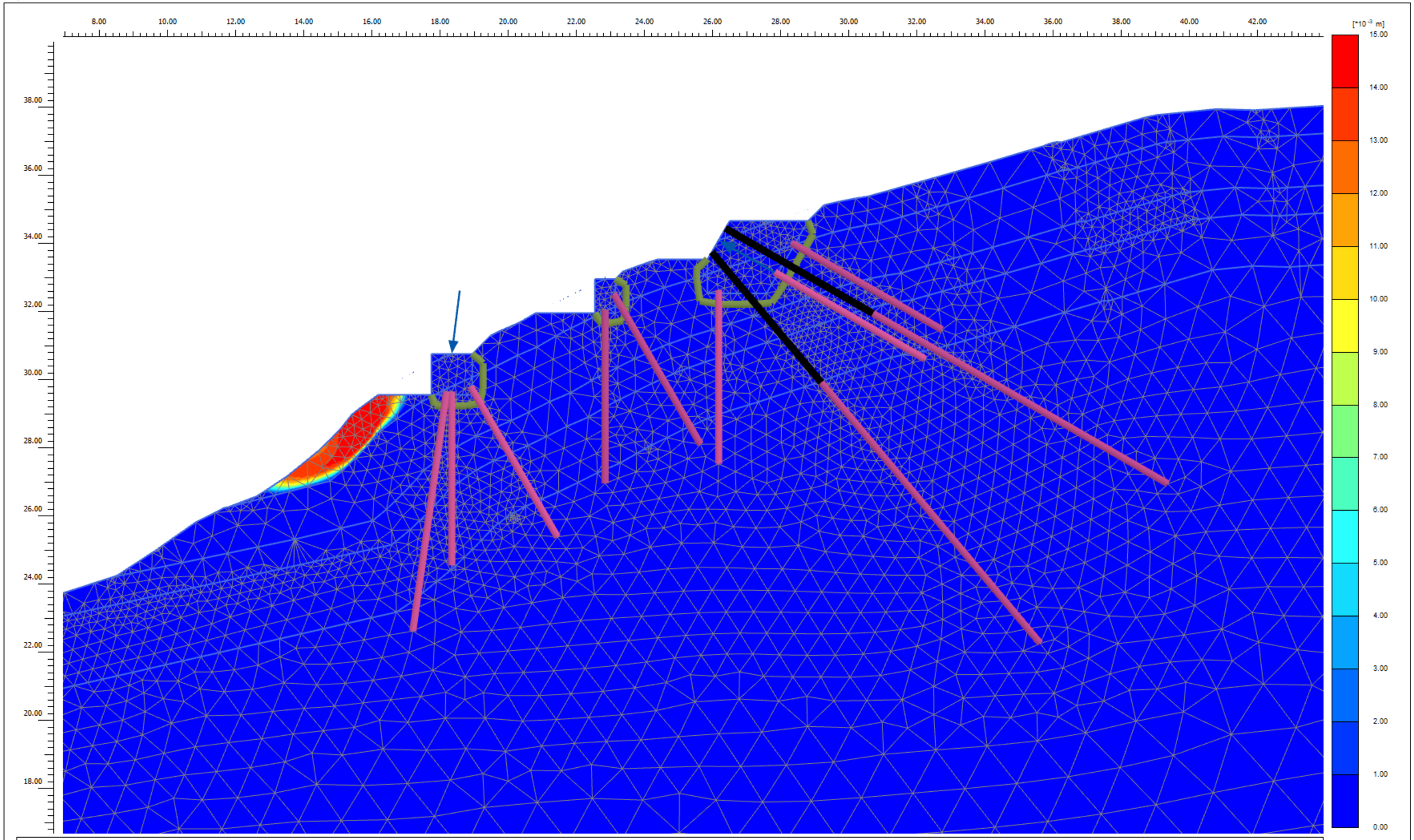

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**Deformed mesh |u| (scaled up 200 times)**

Maximum value = $7.661*10^{-3}$ m (Element 1658 at Node 57700)

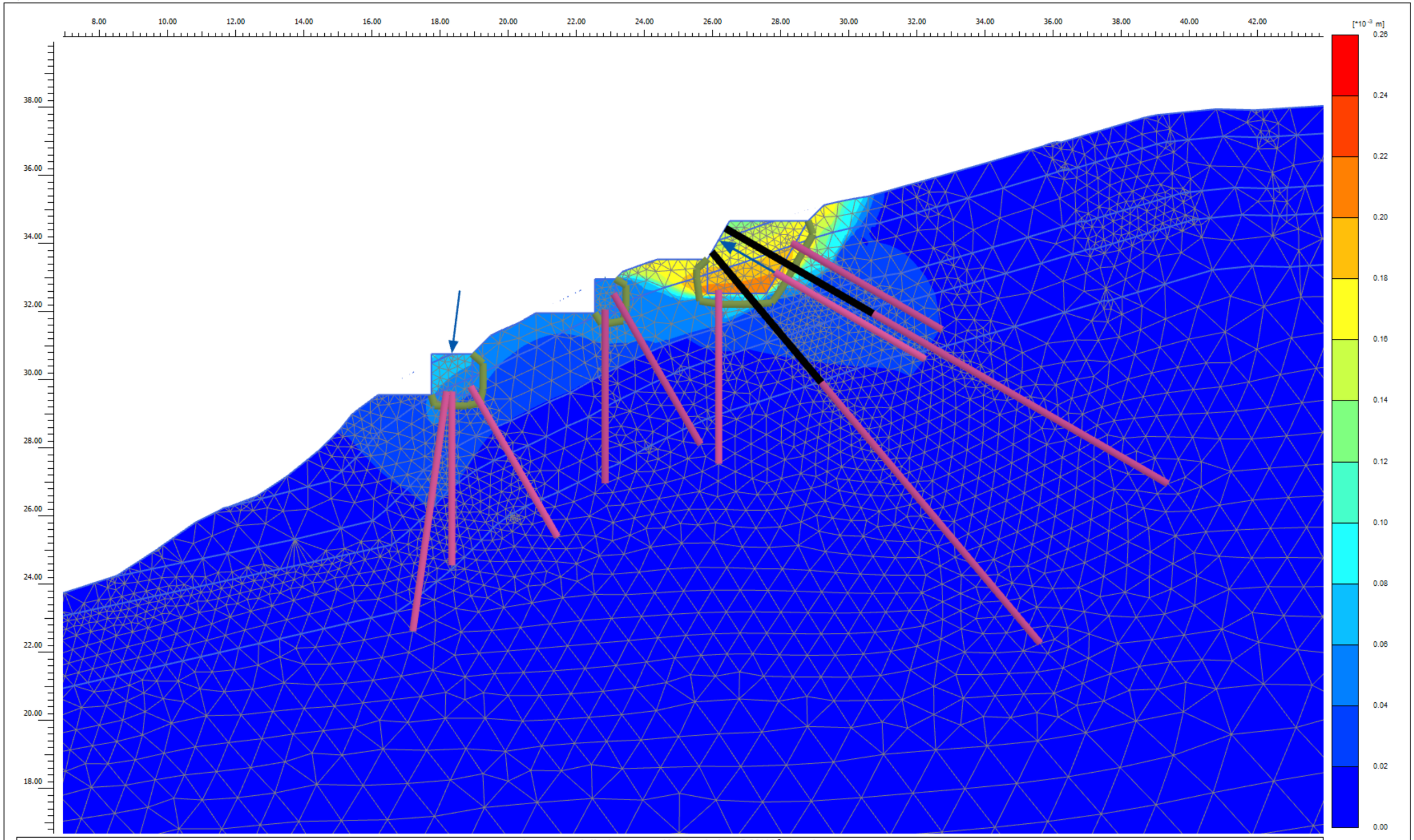
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|---|---|---|---|
| Project description: Marion Costal Walkway Upgrade | | | Date: 12/08/2022 |
| Project filename: Grey Gully N, B01, trial 2 | Step: 258 | Company: CMW Geosciences Pty Ltd | |




**Incremental displacements |Δu| (scaled up 200 times)**

Maximum value = 0.01467 m (Element 3122 at Node 43728)

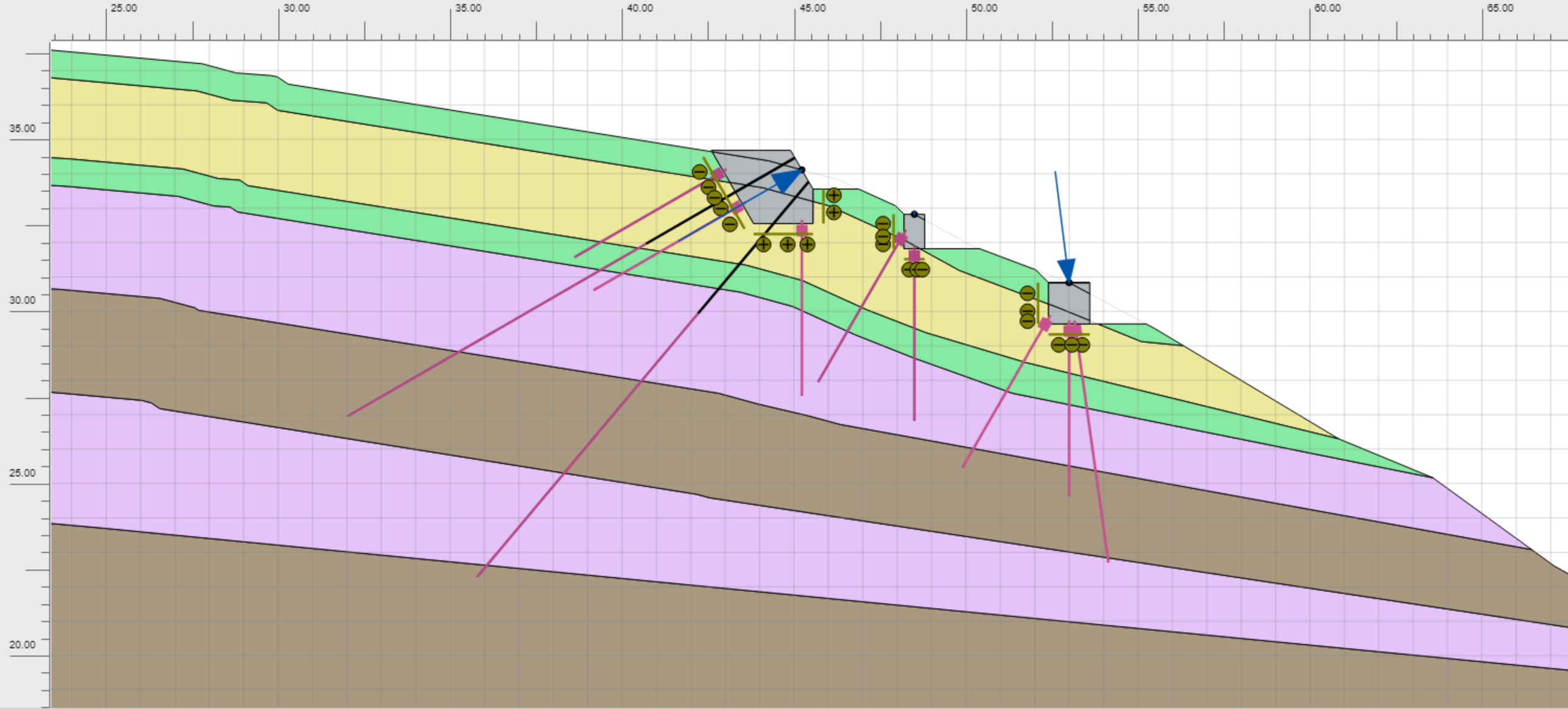
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|---|---|---|---|
| Project description: Marion Costal Walkway Upgrade | | | Date: 13/08/2022 |
| Project filename: Grey Gully N, B01, trial 2 | Step: 358 | Company: CMW Geosciences Pty Ltd | |

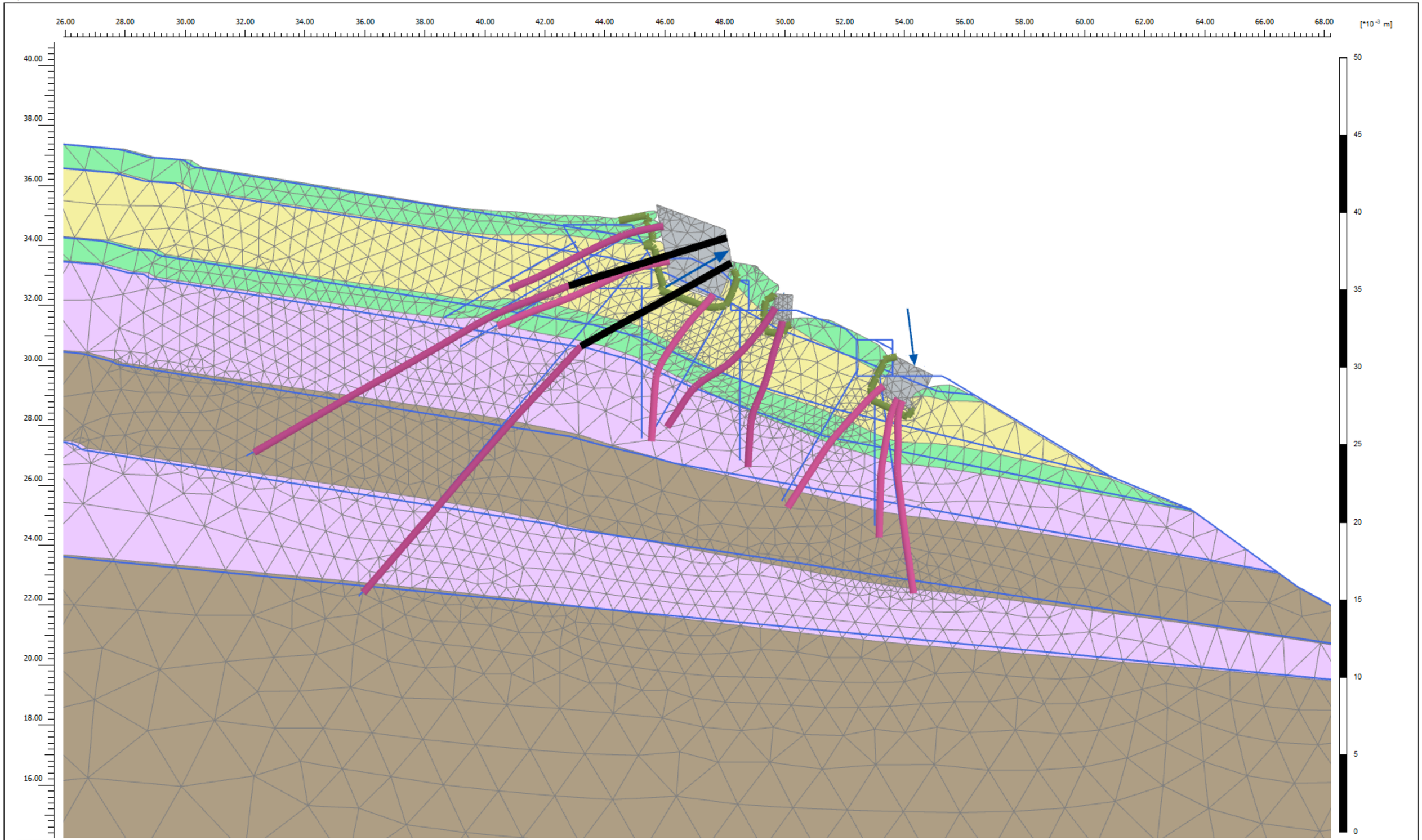



**Incremental displacements |Δu| (scaled up 5.00*10 3 times)**

Maximum value = 0.2424*10$^{-3}$ m (Element 2022 at Node 60818)

| | | | |
|---|---|---|---|
| Project description: Marion Costal Walkway Upgrade | | | Date: 13/08/2022 |
| Project filename: Grey Gully N, B01, trial 2 | Step: 258 | Company: CMW Geosciences Pty Ltd | |


25.00
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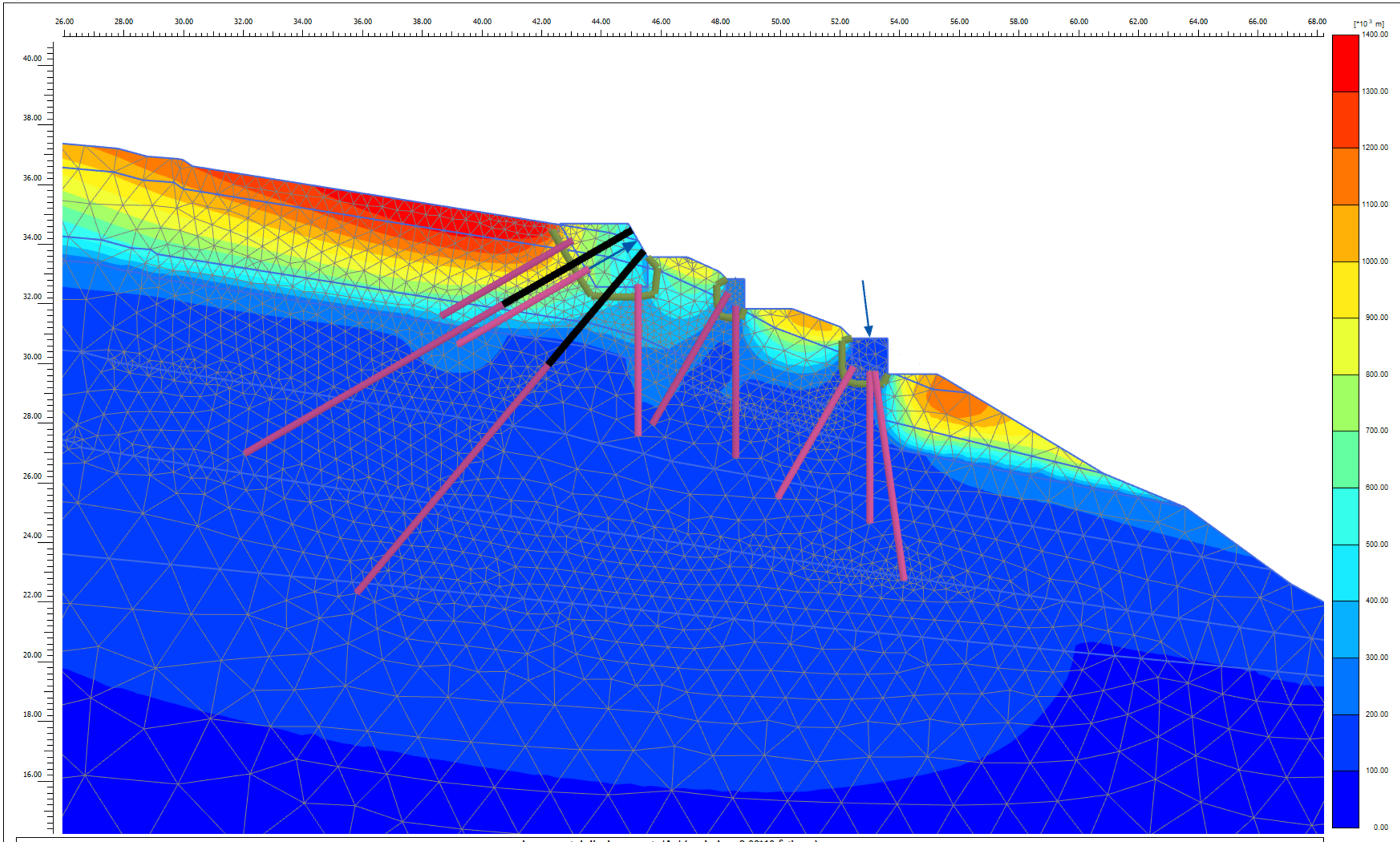

**Deformed mesh |u| (scaled up 500 times)**

Maximum value = $6.384*10^{-3}$ m (Element 616 at Node 30826)

| | | | |
|---|---|---|---|
| Project description: Marion Costal Walkway Upgrade | | | Date: 13/08/2022 |
| Project filename: Grey Gully S, B01, trial 1 | Step: 157 | Company: CMW Geosciences Pty Ltd | |

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Output Version 21.1.0.479

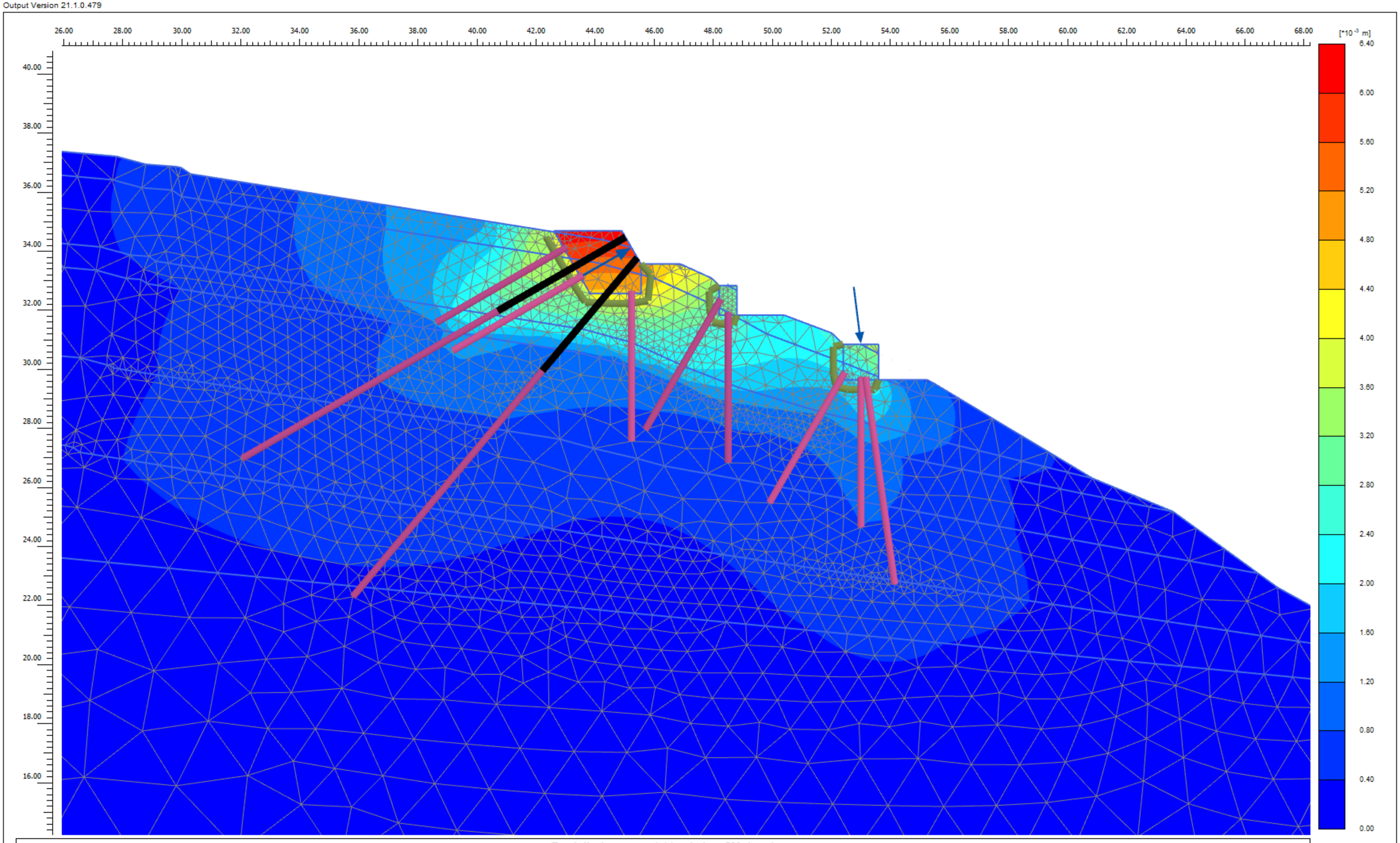



**Incremental displacements |Δu| (scaled up 2.00*10$^{-6}$ times)**

Maximum value = 1.369*10$^{-6}$ m (Element 178 at Node 22471)

| | | | |
|---|---|---|---|
| Project description: Marion Costal Walkway Upgrade | | | Date: 13/08/2022 |
| Project filename: Grey Gully S, B01, trial 1 | Step: 397 | Company: CMW Geosciences Pty Ltd | |

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**Total displacements |u| (scaled up 500 times)**

Maximum value = $6.384*10^{-3}$ m (Element 616 at Node 30826)

| | | | |
|---|---|---|---|
| Project description: Marion Costal Walkway Upgrade | | | Date: 13/08/2022 |
| Project filename: Grey Gully S, B01, trial 1 | Step: 157 | Company: CMW Geosciences Pty Ltd | |

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