Appendix I(b)

Route Study

REX J ANDREWS
ENGINEERED TRANSPORTATION

ROUTE STUDY

CLIENT: NEOEN

PROJECT: GREAT WESTERN BATTERY PROJECT

PORT OF IMPORT: NEWCASTLE AND PORT KEMBLA

DESTINATION: WALLERAWANG

15/02/2022 REV 03

Rev.	Date	Change	Responsible	Checked
00	15/10/21	Route Assessed	W Andrews	
00	15/10/21	Report compiled	W Andrews	
00	19/10/21	Report completed	W Andrews	
01	15/11/21	Brays Lane comments added.	W Andrews	✓
02	15/11/21	Power line comments added.	W Andrews	✓
03	15/02/22	Client comments addressed	W Andrews	✓

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1.0 Introduction

This document describes observations and previous experience on sections of these routes and explains the transport of transformers, switch rooms and various OSOM loads from Newcastle and Port Kembla to Wallerawang.

This desktop route survey took place on 15-10-21.

Rex J Andrews Engineered Transportation has over 40 years experience in providing transportation of heavy loads across Australia, from standard semi trailers to large and heavy loads requiring complex multi articulated equipment across both rural and urban environments.

Relevant to Neoen's Great Western Battery Project, recently, Rex J Andrews Engineered Transportation facilitated the movement of oversized and overmass loads comprising decommissioned transformers from the nearby Wallerawang Power Station.

2.0 Project data.

Date of latest Route Assessment. 15/10/2021
Survey undertaken by. (Rex J Andrews P/L)
Project name. NSW Battery project
Port of Import. Newcastle and/or Port Kembla (NSW)
Site location: Wallerawang (NSW)
Possible items to be transported.
375 MVA Transformer at 180T
375 MVA Transformer at 140T
Switchroom/Control room at 23l x 4.5w x 4.1h x 60T
500T crane at 22l x 3.6w x 4.2h x 96T

Up to eight (8) oversized vehicles would be required to transport the over dimensional and over mass elements to the Site, including transformers, switch rooms, crane and control room. The largest Prime Mover required would be to transport the 180T 375 MVA Transformer and crane. The dimensions of this vehicle are provided in the following section.

3.0 Transport dimensions examples.

375 MVA Transformer (10.0l x 4.0 w x 5.0h x 180.0T)
Configuration. Prime mover with 10x8-10x8 Beamset.
Overall dimensions: 120.0l x 6.0w x 5.3h x 422.5T (+ 4 x push/pull trucks)

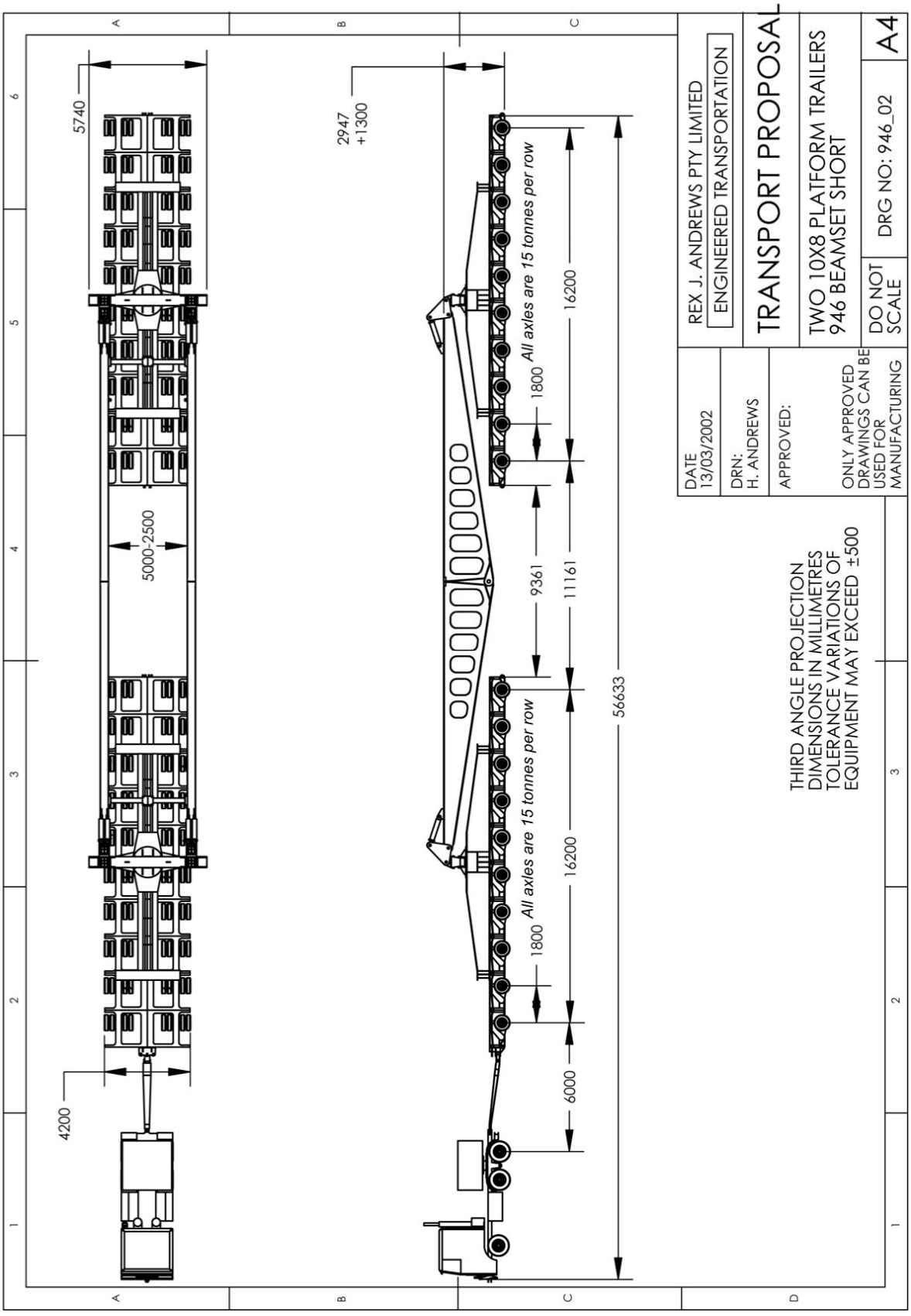
375 MVA Transformer (10.0l x 4.0 w x 4.0h x 140.0T)
Configuration. Prime mover with 14x8 Platform trailer.
Overall dimensions: 68.0l x 5.0w x 5.2h x 269.5T (+ 2 x push/pull trucks)

Control room (22.0l x 4.5 w x 4.2h x 60.0T)
Configuration. Prime mover with 12x8 Platform trailer.
Overall dimensions: 35.0l x 4.5w x 5.2h x 127.5T

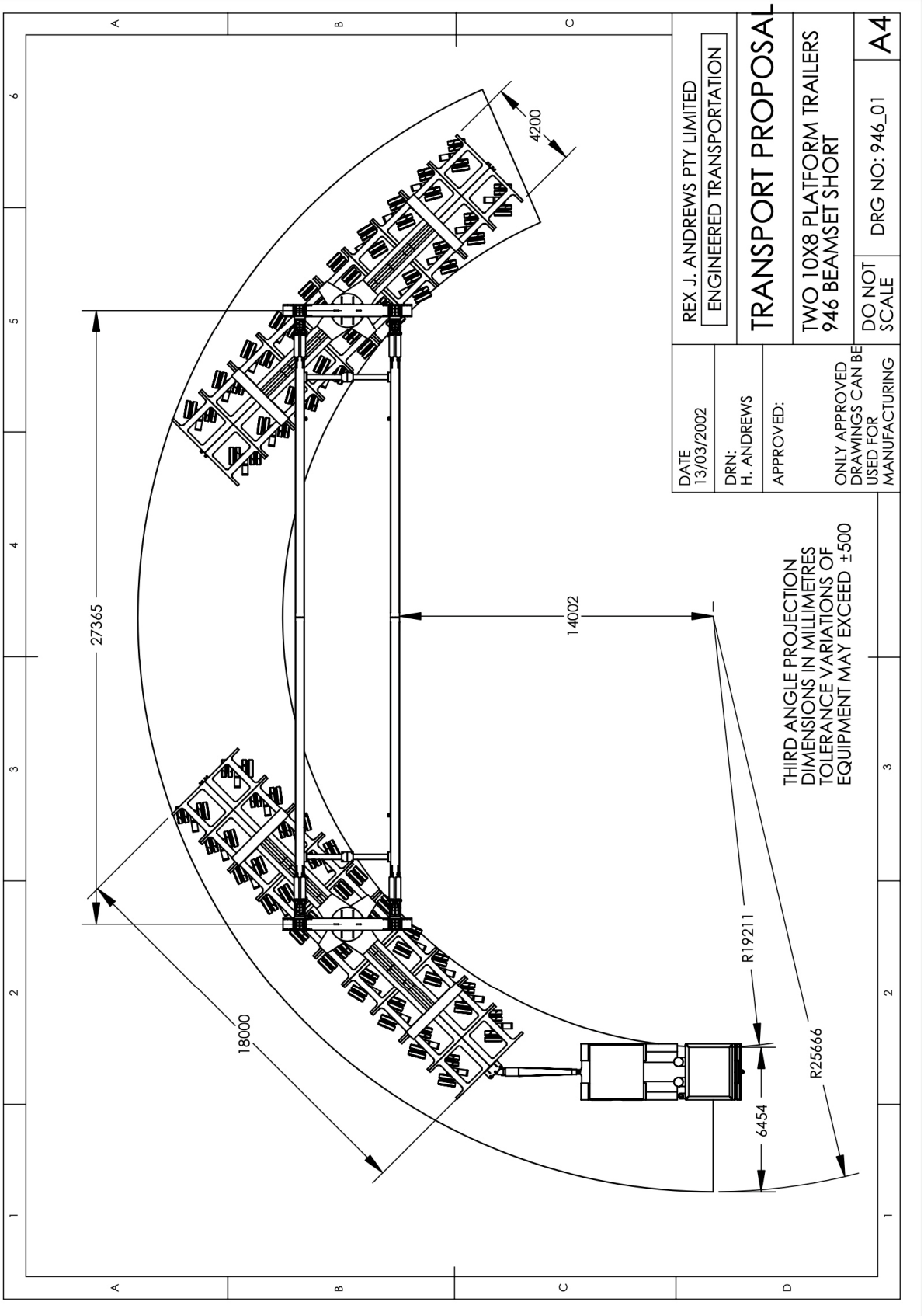
500T crane (22l x 3.6w x 4.2h x 96T)
Configuration. Prime mover with 10x8 Platform trailer.
Overall dimensions: 68.0l x 5.0w x 5.2h x 269.5T (1 x push/pull trucks)

4.0 Transport drawings. Examples

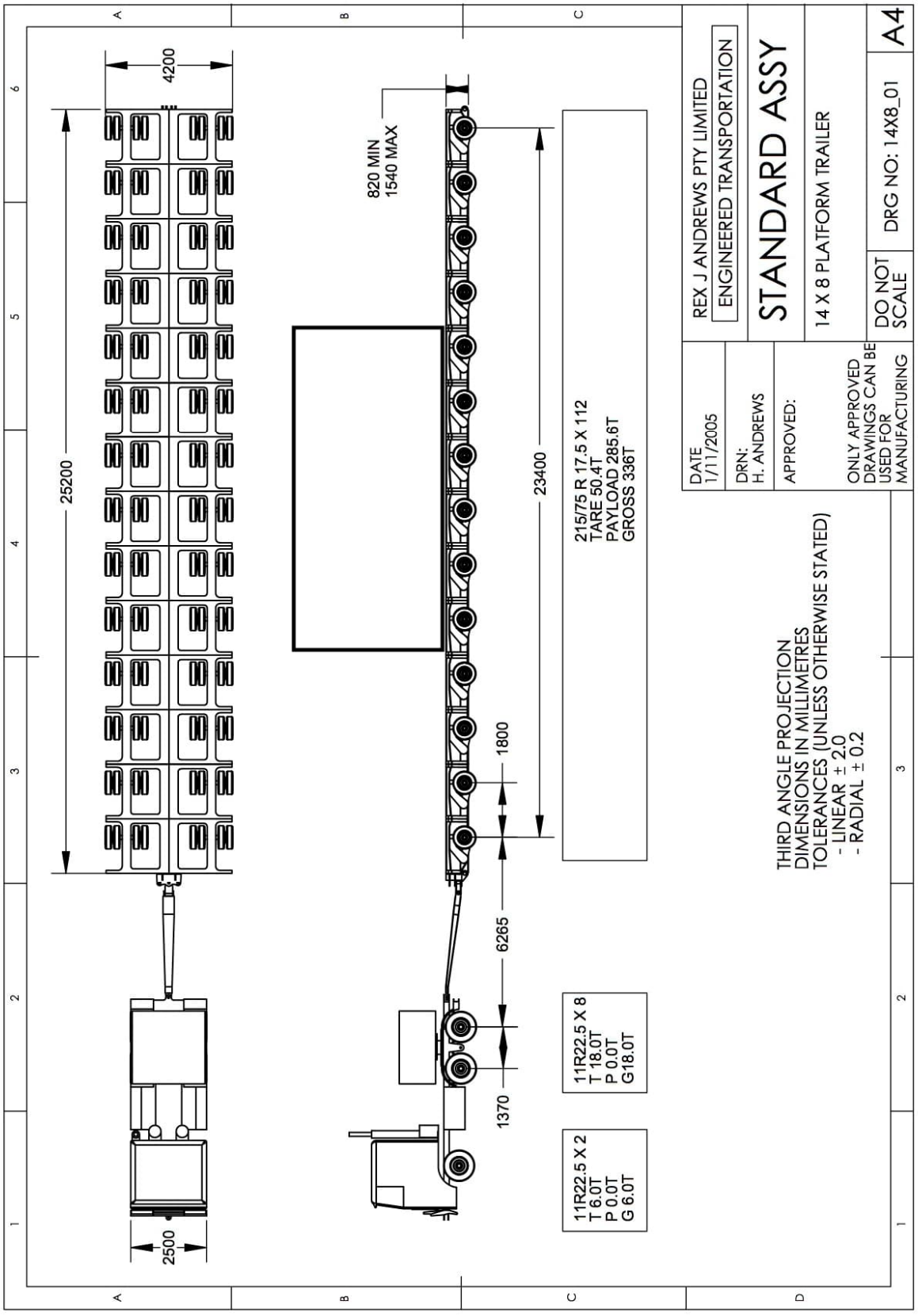
375 MVA Transformer: 180T profile view



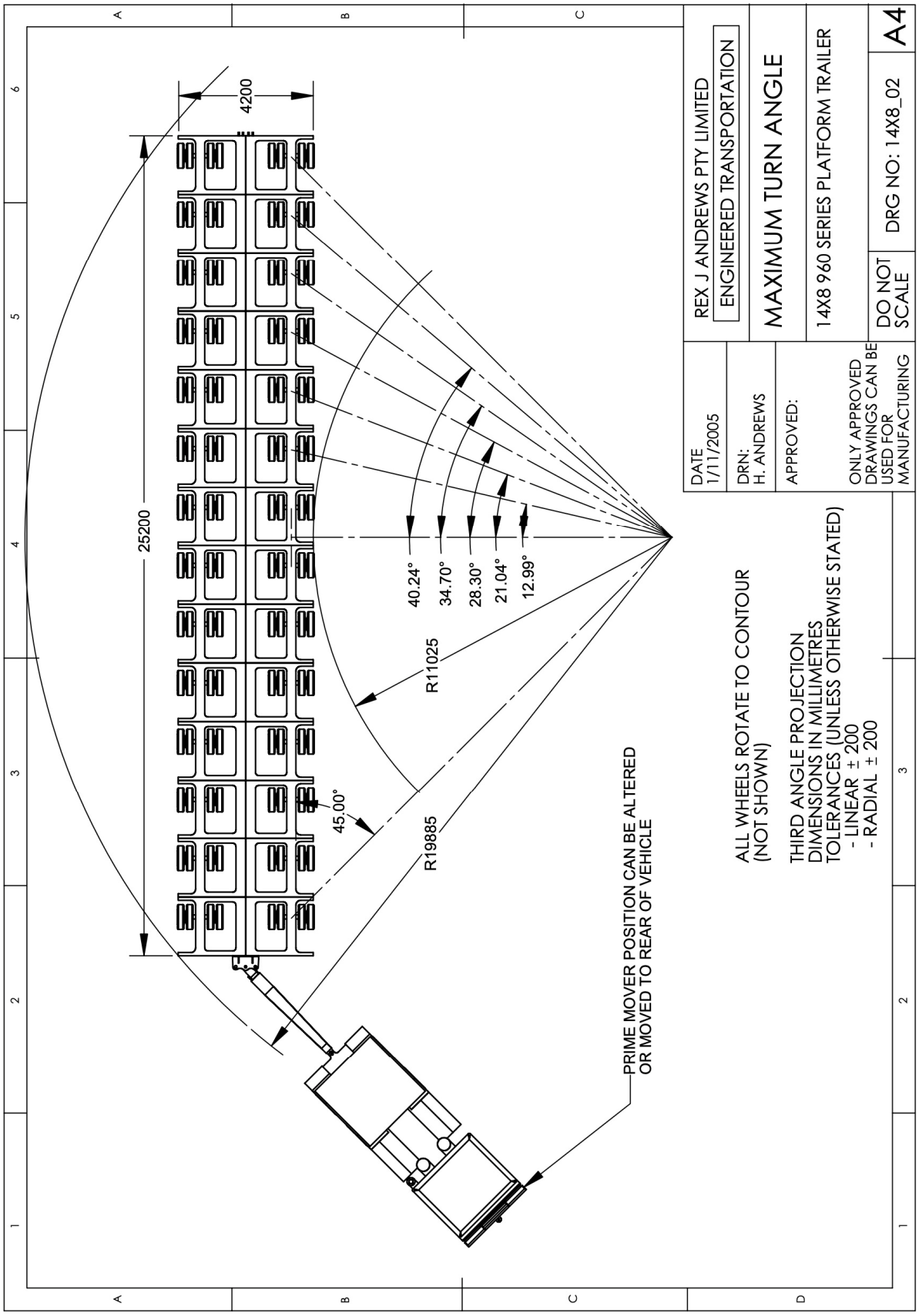
375 MVA Transformer: 180T swept path view



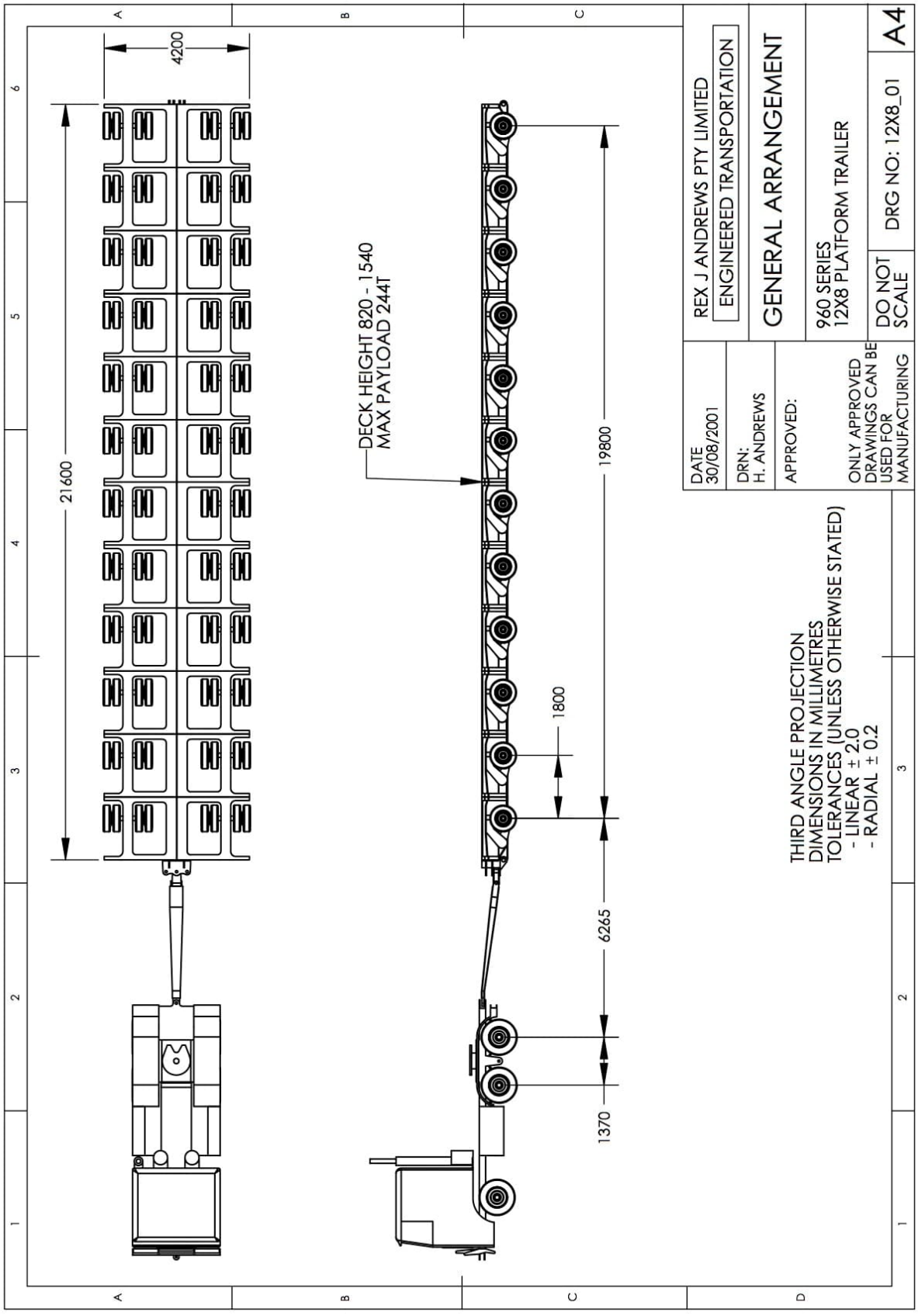
375 MVA Transformer: 140T profile view



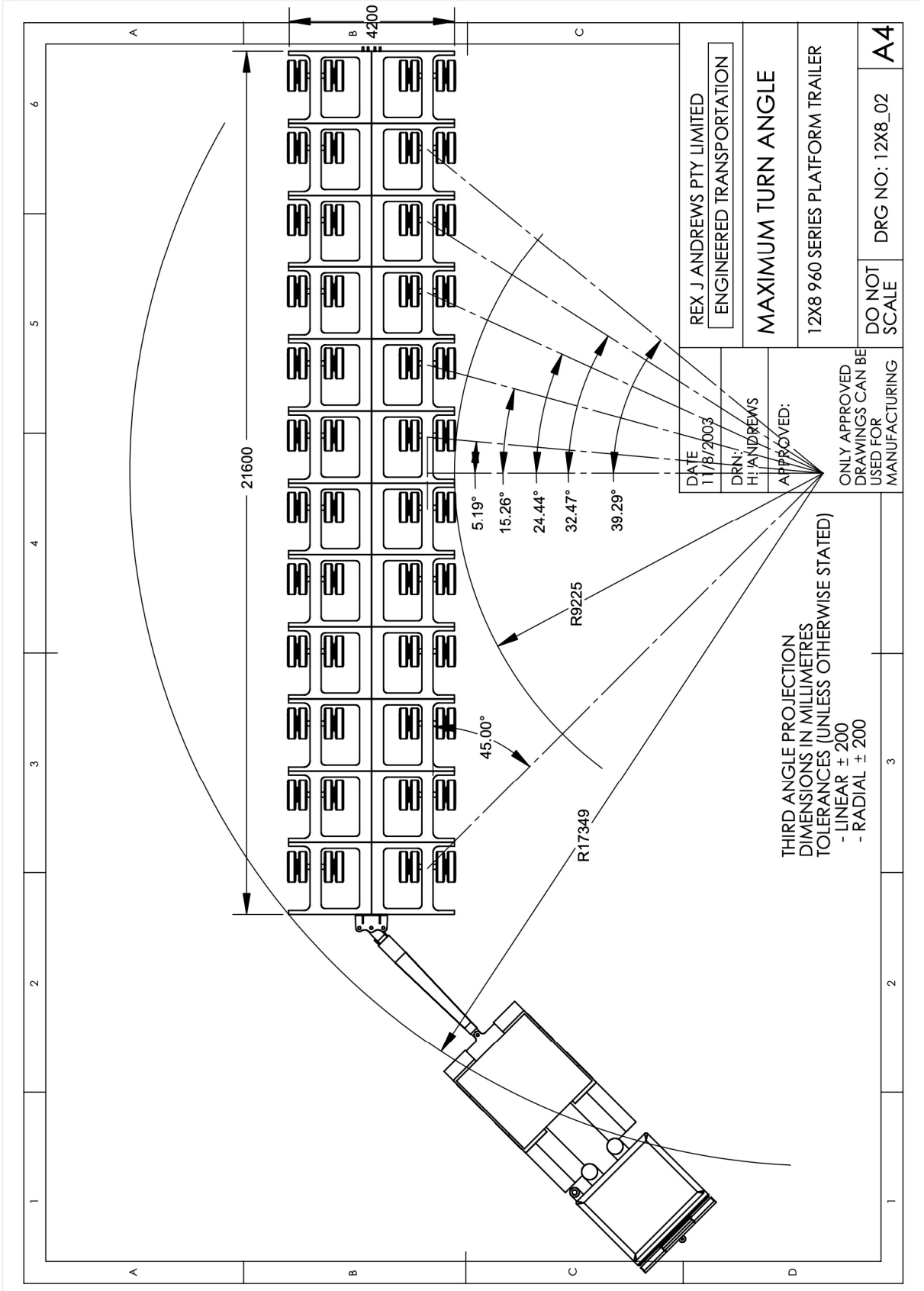
375 MVA Transformer: 140T swept path view



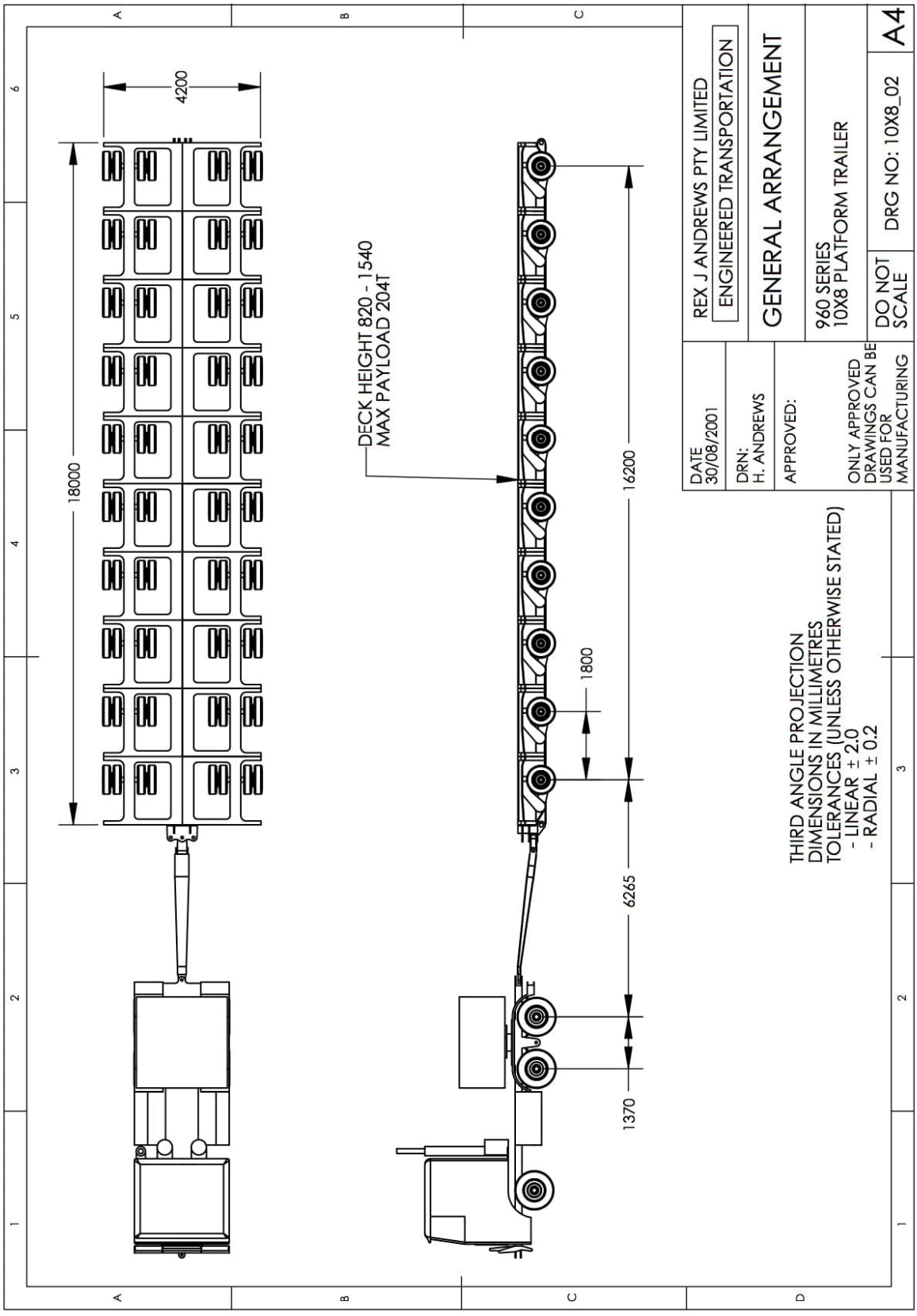
Switchroom: 12x8 Platform trailer



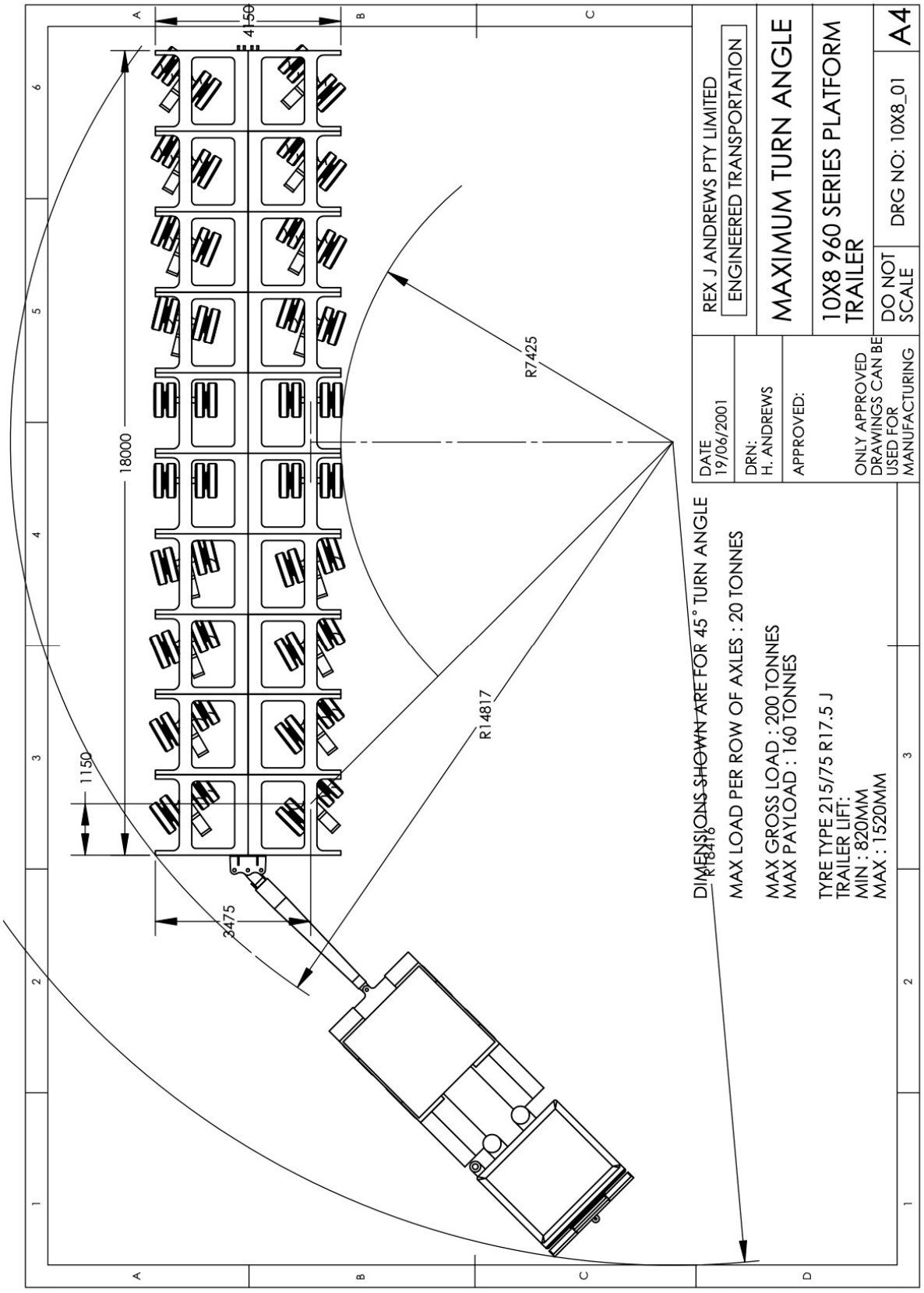
Switchroom: 12x8 Platform trailer swept path



Crane: 10x8 Platform trailer



Crane: 10x8 Platform trailer swept path



5.0 Port of Import. Newcastle

The transformers will be imported from various countries and will arrive on ships into the Port of Newcastle. The ideal berth for these shipments is the Mayfield #4 Berth. This facility has a hardstand storage area of roughly 100,000 s/q meters, adjacent to the berth.

Access from the storage to the Public roads, is via a port operated road onto Selwyn Street.

Image 1: Port overview.

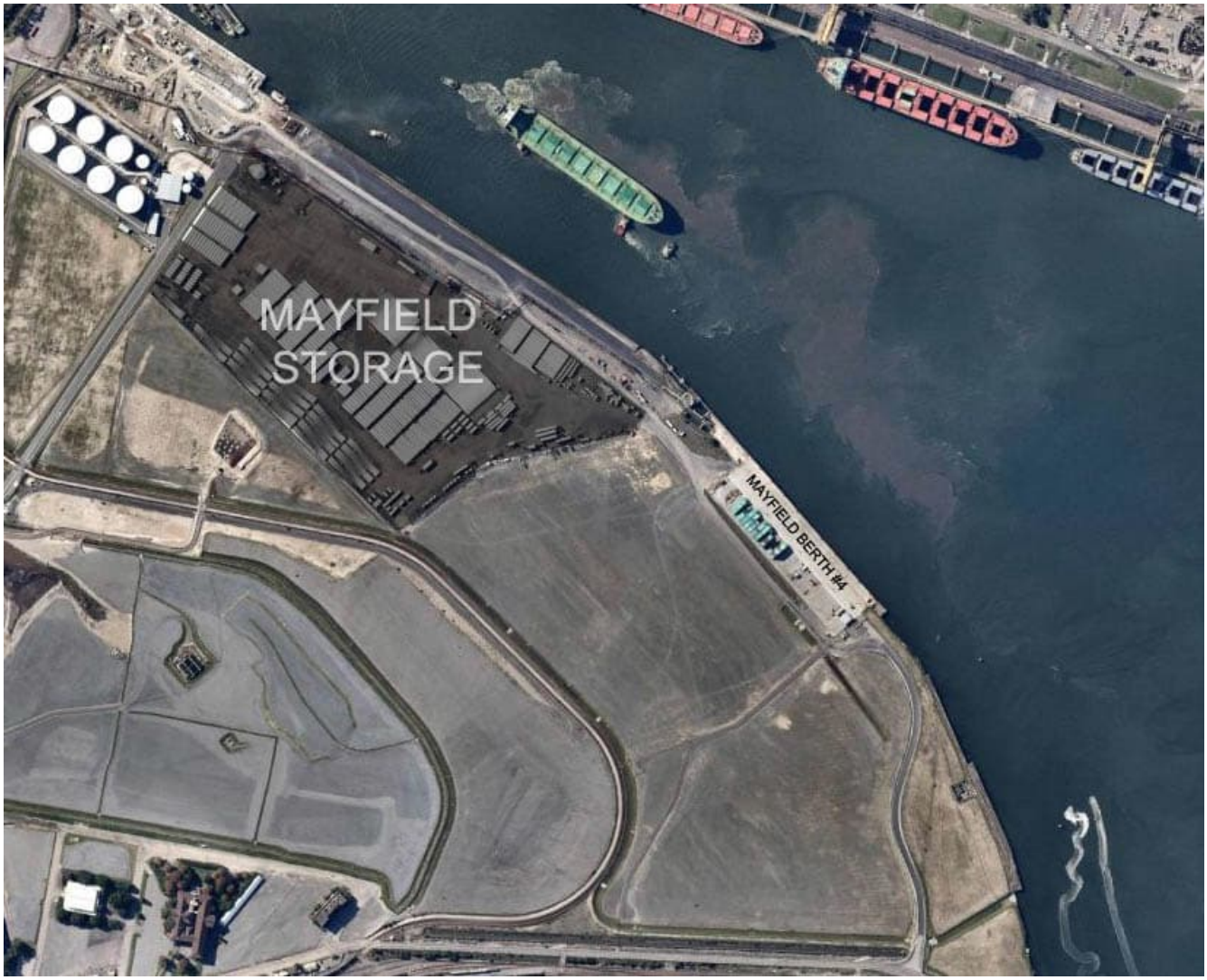
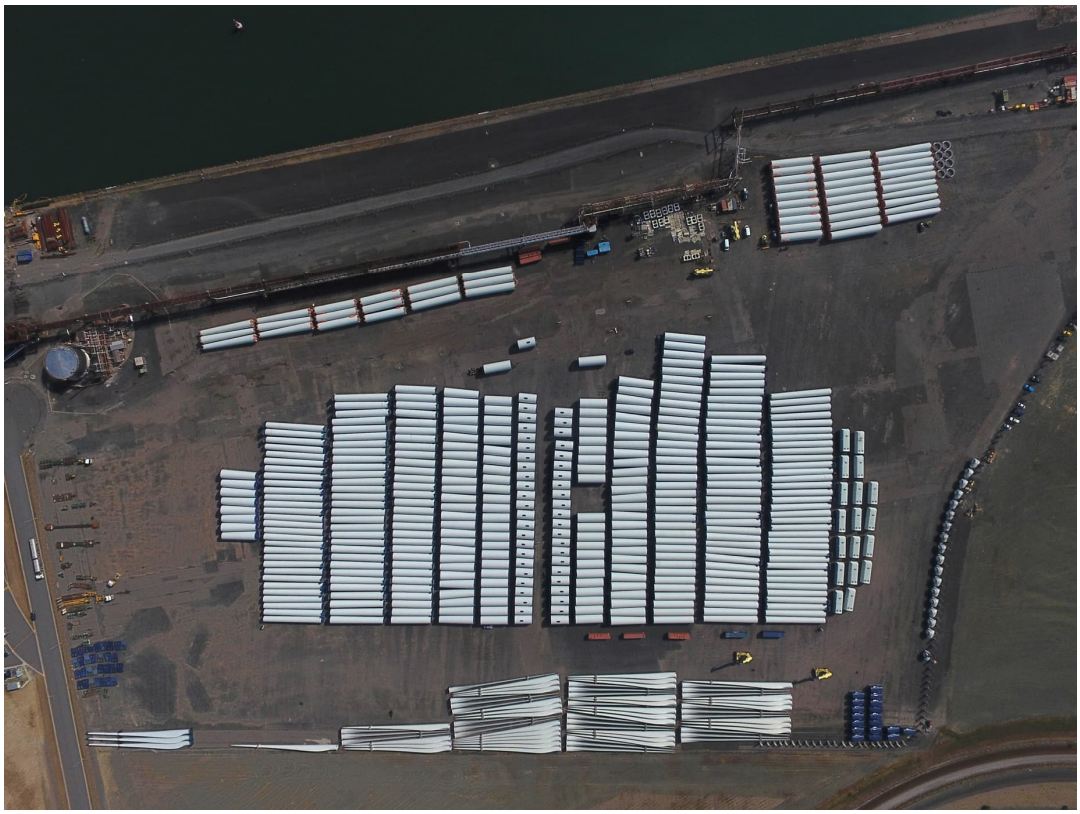


Image 2 & 3: Mayfield #4 Port storage area.

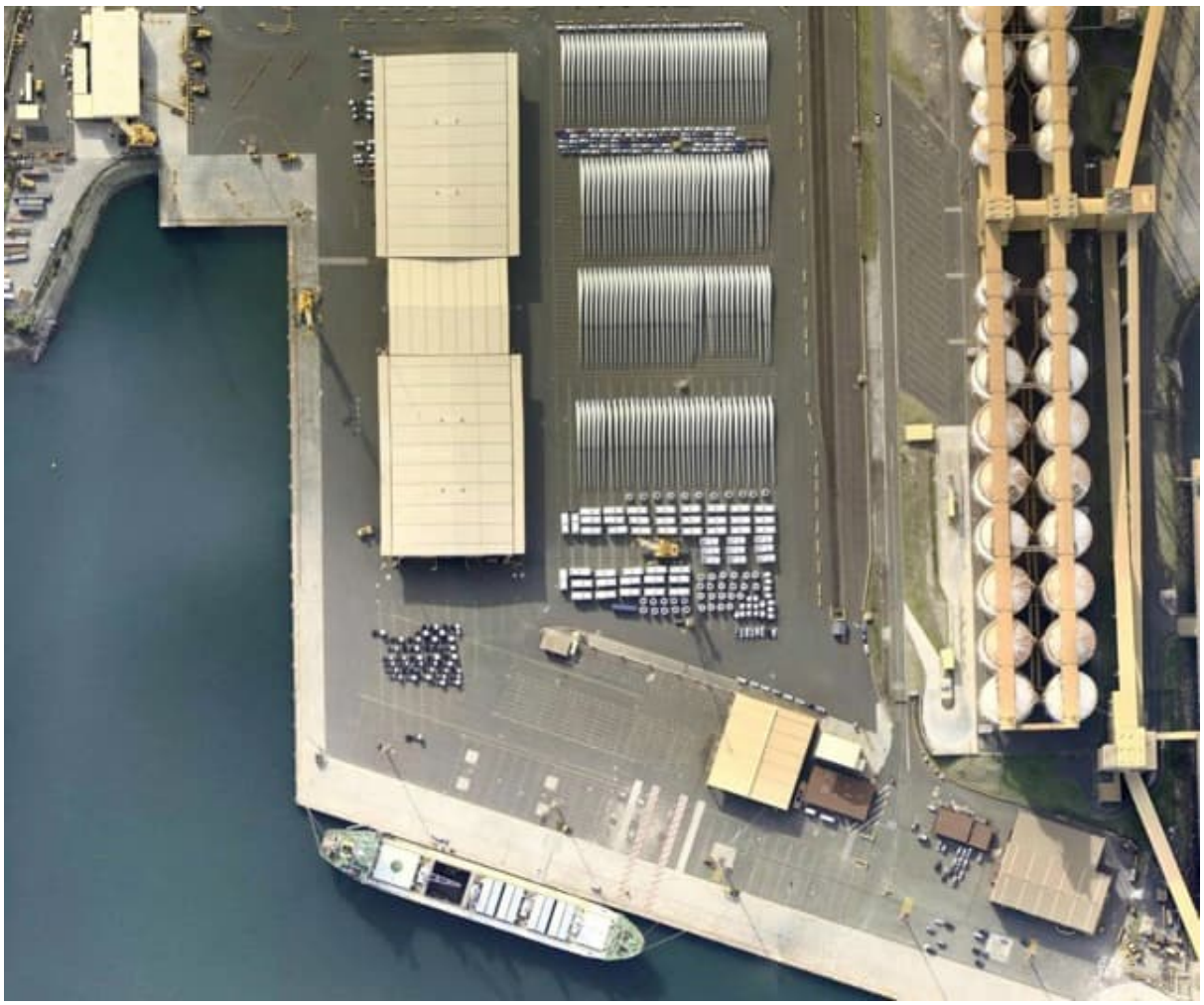


6.0 Port of Import. Port Kembla

Port Kembla is an option for the smaller OSOM loads. The ideal berth for these shipments is the AAT Terminal. This facility has a hardstand storage area of roughly 40,000 s/q meters, adjacent to the berth.

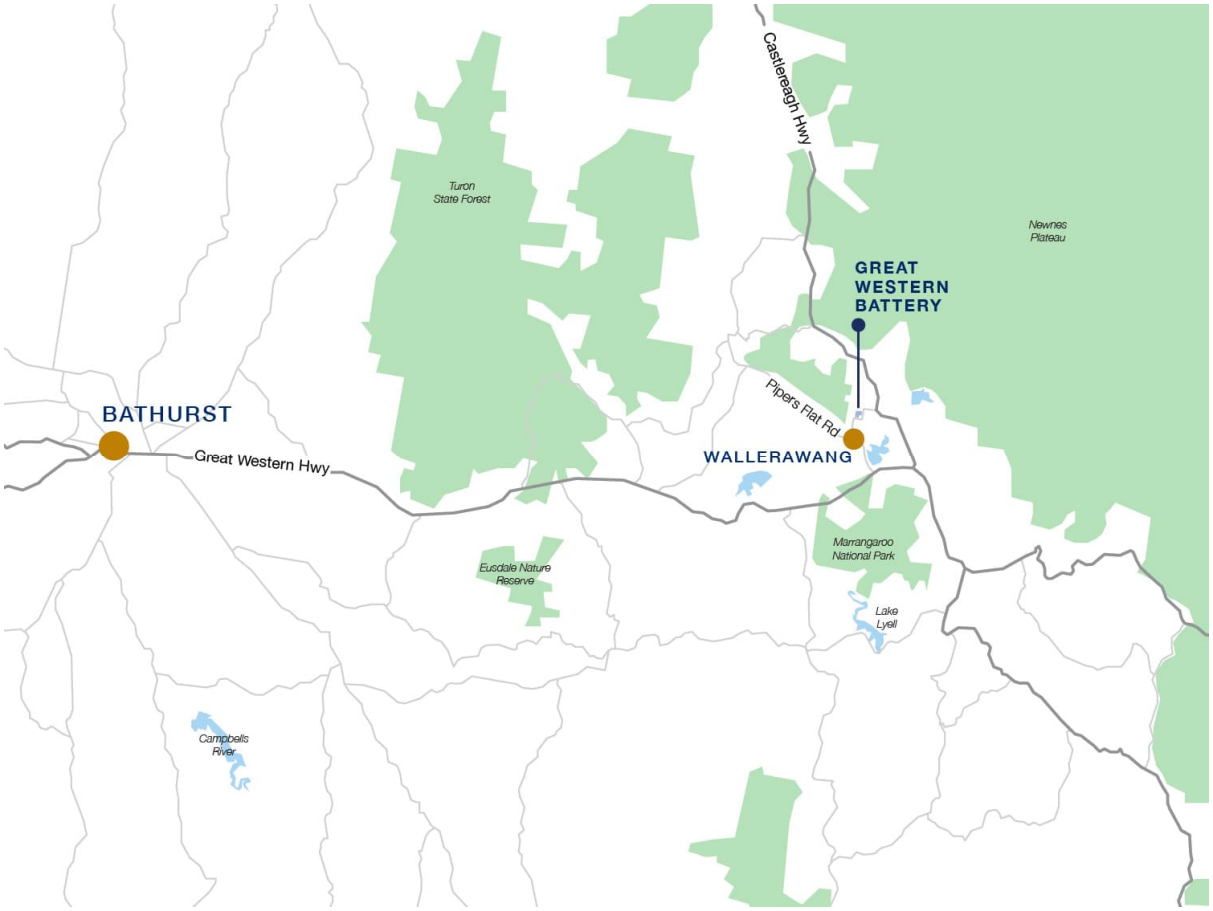
Access from the storage to the Public roads, is via a port operated road onto Tom Thumb Road.

Image 1: Port overview.



7.0 Site Location and layout.

The Great Western Battery is a proposed 500MW stand-alone battery in NSW.
The name was chosen due to the project's proximity to the Great Western Highway, one of Australia's earliest inland roads.
The battery will be able to provide a variety of services to the grid including frequency control and load shifting, which are both necessary for the development of more renewable energy.
The Great Western Battery will be located in the Lithgow region of NSW, just north of Wallerawang and about a 40-minute drive from Bathurst.
It will be linked to Transgrid's transmission network via a substation. See below map demonstrating the location of the Project in Wallerawang relative to Bathurst.



8.0 Route studies: Newcastle and Port Kembla to Great Western battery project.

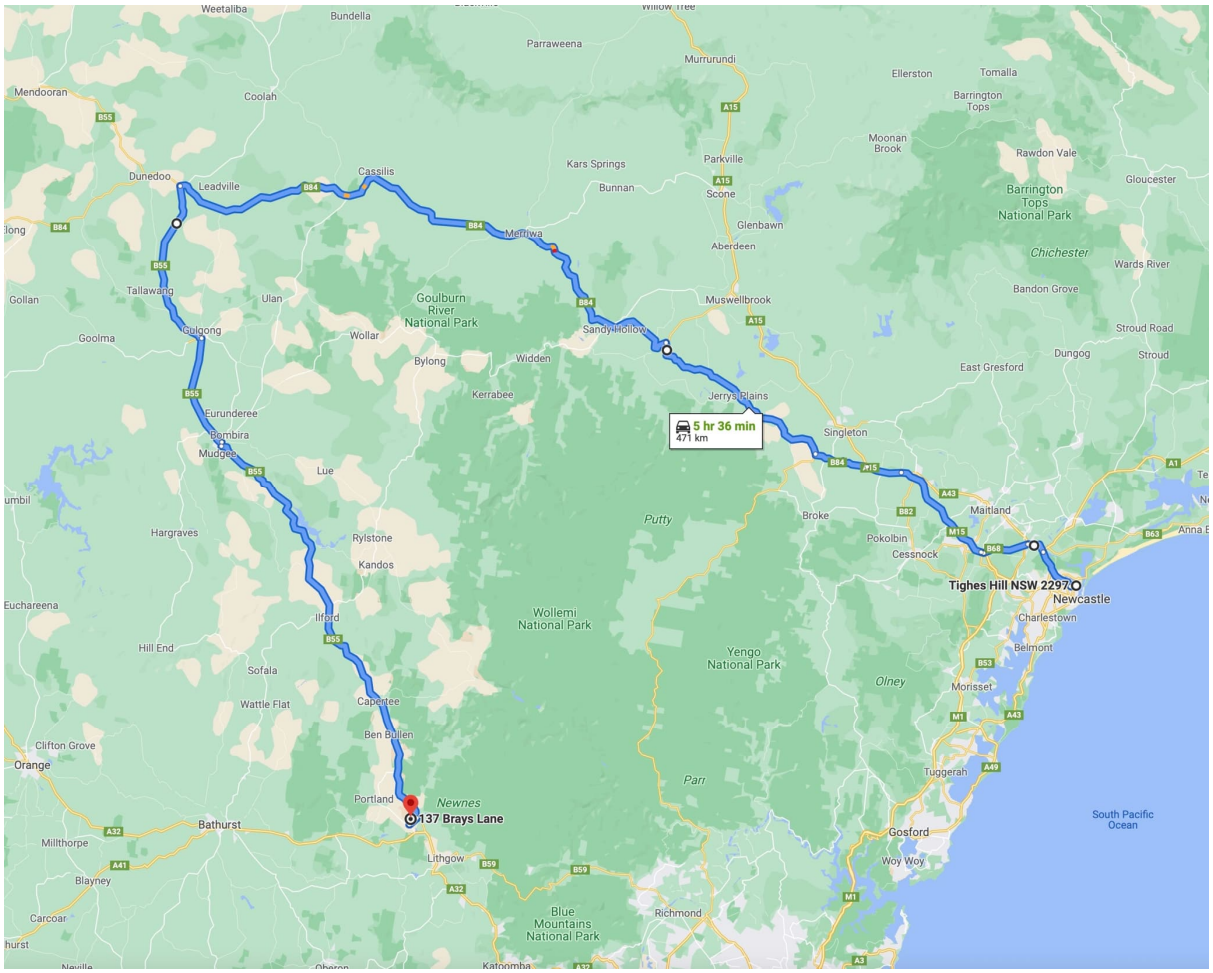
We have based this study on the Transformers been transported from the Port of Newcastle and the smaller OSOM out of either Newcastle and/or Port Kembla. After reviewing the possible transport routes, we believe the following 2 routes are the best option for these components

ROUTE SURVEY 1: Newcastle to Wallerawang
DISTANCE: 471.0 kilometres:
COMPONENTS: All components.
VIA: Selwyn Street, George Street, Industrial Drive, Maitland Road, New England Highway, John Renshaw Drive, Hunter Expressway, Golden Highway, Castlereagh Highway, Main Street, Pipers Flat Road, Brays Lane.
GPS LINK: https://goo.gl/maps/e2c19jiYDrHQiRHK9

ROUTE SURVEY 1: Port Kembla to Wallerawang
DISTANCE: 217.0 kilometres:
COMPONENTS: Smaller OSOM loads, that don't exceed 5.0 metres in overall height.
VIA: Tom Thumb Road, Springhill Road, Masters Road, Southern Freeway, Mt Ousley Road, Picton-Wilton Road, Hume Highway, M5, M7, M4, Great Western Highway, Castlereagh Highway, Main Street, Pipers Flat Road, Brays Lane.
GPS LINK: https://goo.gl/maps/tBaxzsUEYqfRinfn7

9.0 Route Survey 1: Newcastle to Wallerawang.

DISTANCE: 471.0 kilometres:
COMPONENTS: All components.
VIA: Selwyn Street, George Street, Industrial Drive, Maitland Road, New England Highway, John Renshaw Drive, Hunter Expressway, Golden Highway, Castlereagh Highway, Main Street, Pipers Flat Road, Brays Lane.
GPS LINK: https://goo.gl/maps/e2c19jiYDrHQiRHK9



Rex J Andrews Engineered Transportation have experience transporting loads of similar weight and dimension as proposed by the Project up to the Castlereagh Highway onto Main Street, Wallerawang where decommissioned and demolished materials were transported from the former Wallerawang Power Station.

Route 1 is about 471 kilometres in length. A review of the proposed route has confirmed that the proposed oversized / overmassed vehicles would be able to travel from the Port of Newcastle to Main Street, Wallerawang (at 467 km from the Port of Newcastle).

Where over dimensional and overmassed vehicles would turn from the Castlereagh Highway onto and down Main Street, Wallerawang (at 467km) the roadway is wide and would readily accommodate the vehicles required for the Project. Where the route moves from Main Street to Pipers Flat Road, this section of roadway is wide and only slightly veers on to the Pipers Flat Road, meaning that the turning of oversized / overmass vehicles is limited and this intersection is considered able to accommodate the vehicles required for the Project.

The following assessment provided for Route 1 focusses on the final portion of this route that would be located within the township of Wallerawang and potentially more subject to route constraints as follows:

- 469.0km - Pipers Flat Road onto Brays Lane Wallerawang
- 470.8km - Brays Lane, Wallerawang
- 471.0 km - Brays Lane into the Site, Wallerawang

469.0 Km's: Pipers Flat Road onto Brays Lane at Wallerawang.
(375MVA transformer at 180T)

PROCEDURE: Right hand turn from Pipers Flat Road onto Brays Lane.
GPS LINK FOR SECTION OF ROAD: https://goo.gl/maps/b9W8YK2DbgtxuKyPA
COMMENTS: Loads to turn right from Pipers Flat Road onto Brays Lane. This corner will be tight for the Transformers, Switchroom and Crane. The trailers may require steering to traverse this corner.
A spotter will need to guide the loads through this section of road.
No vegetation removal or trimming is proposed to be required.
ROAD MODIFICATIONS: No road modifications required.

469.0 Km's: Pipers Flat Road onto Brays Lane at Wallerawang.
(375MVA transformer at 140T)

PROCEDURE: Right hand turn from Pipers Flat Road onto Brays Lane.
GPS LINK FOR SECTION OF ROAD: https://goo.gl/maps/b9W8YK2DbgtxuKyPA
COMMENTS: Loads to turn right from Pipers Flat Road onto Brays Lane. This corner will be tight for the Transformers, Switchroom and Crane. The trailers may require steering to traverse this corner.
A spotter will need to guide the loads through this section of road.
No vegetation removal or trimming is proposed to be required.
ROAD MODIFICATIONS: No road modifications required.

470.8 Km's: Brays Lane at Wallerawang.
(375MVA transformer at 180T)

PROCEDURE: Right hand turn on Brays Lane.
GPS LINK FOR SECTION OF ROAD: https://goo.gl/maps/eCJKBpUDamwCEzW68
COMMENTS: Loads to travel right on Brays Lane. This corner will be tight for the Transformers, Switchroom and Crane. The trailers may require steering to traverse this corner.
A spotter will need to guide the loads through this section of road.
A small shrub at the outside lane of the right turn, and a small mature tree near the entrance to the Site may require trimming or removal to allow for the movement of vehicles. These two items are highlighted on the image above by a red circle.
The overmassed / oversized vehicles are likely to need to leave the sealed part of the road corridor and traverse the unsealed part of the road corridor on the outside edge of the corner. The unsealed area that could be required is up to to 240 sq meters. This area comprises compacted gravel and sandy substrate (highlighted in yellow in the image above). In the instance that this area is in a degraded condition, additional compacted gravel or road base may need to be installed to provide adequate stability for the passage of loads.
ROAD MODIFICATIONS: Yes, the addition of compacted gravel or road base may be required.

470.8 Km's: Brays Lane at Wallerawang.
(375MVA transformer at 140T)

PROCEDURE: Right hand turn on Brays Lane.
GPS LINK FOR SECTION OF ROAD: https://goo.gl/maps/eCJKBpUDamwCEzW68
COMMENTS: Loads to travel right on Brays Lane. This corner will be tight for the Transformers, Switchroom and Crane. The trailers may require steering to traverse this corner.
A spotter will need to guide the loads through this section of road.
A small shrub at the outside lane of the right turn, and a small mature tree near the entrance to the Site may require trimming or removal to allow for the egress of vehicles. These two items are highlighted on the image above by a red circle.
The overmassed / oversized vehicles are likely to need to leave the sealed part of the road corridor and traverse the unsealed part of the road corridor on the outside edge of the corner. The unsealed area that could be required is up to to 240 sq meters. This area comprises compacted gravel and sandy substrate (highlighted in yellow in the image above). In the instance that this area is in a degraded condition, additional compacted gravel or road base may need to be installed to provide adequate stability for the passage of loads.
ROAD MODIFICATIONS: The addition of compacted gravel or road base may be required

10.0 Route 1 Conclusion:

After studying all options and undertaking a route survey, this route in its current condition may require an upgrade at the right hand corner on Brays Lane before it could be deemed suitable for transporting the proposed components.
The following are the key points that need to be taken into consideration, if the project moves forward with this route.

BRIDGES:

- There are a large number of bridges on route that will require bridge assessments for the capacity of the listed loads. Loads of this weight have traversed this route in the past up until the Wallerawang Power Station.
- Brays Lane has 2 culverts that will need to be checked for capacity on the heavier loads. If these culverts cannot support the axle loads of the heavier loads, than temporary bridging beams could be used to cross the culverts. An example of a temporary bridging beam is shown in section 14.0.
- The temporary bridging beams would be laid over the top of the existing road surface. No earthworks or roadworks would be required. At the completion of vehicle movements the temporary bridging beams would removed as soon as practicable to do so.

VEGETATION:

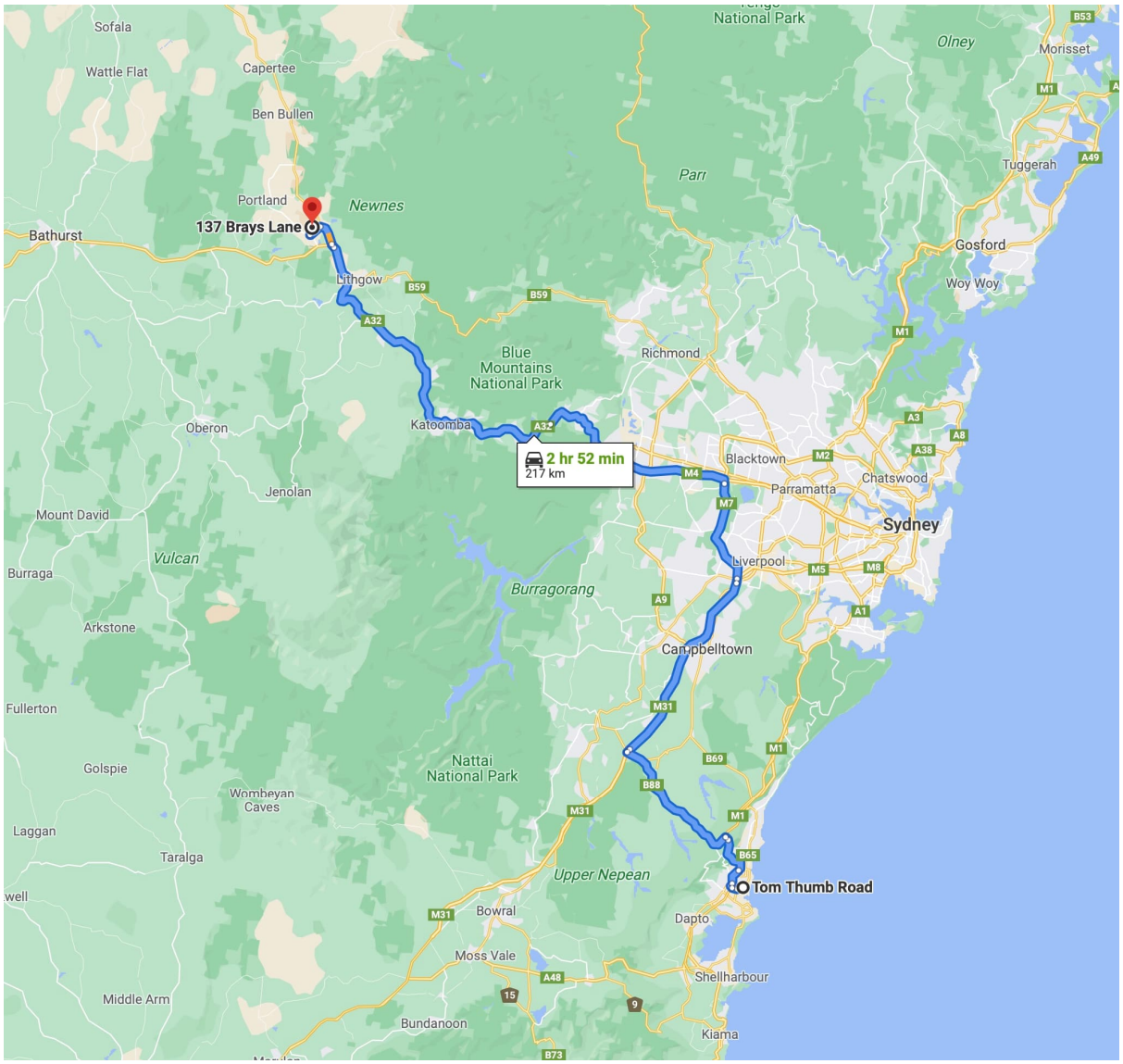
- The state highways have suitable clearance from vegetation; however, Brays Lane may require some pruning and possible removal of vegetation at the right hand corner on Brays Lane.

WIDTH and PAVEMENT:

- The route has suitable clearance other than Brays Lane which may require some vegetation pruning. The width and quality of the pavement would be suitable for the majority of the route; however, several council roads would need to be checked for capacity, these include Main Street, Pipers Flat Road and Brays Lane.
- Up to 240 sq meters of the unsealed section of road corridor adjacent to the outside edge of the right-hand turn is likely to require additional support through the placement of compacted gravel or road base to be suitable for transporting the proposed components.

11.0 Route Survey 2: Port Kembla to Wallerawang.

DISTANCE: 217.0 kilometres:
COMPONENTS: Smaller OSOM loads, that do not exceed 5.0 metres in overall height.
VIA: Tom Thumb Road, Springhill Road, Masters Road, Southern Freeway, Mt Ousley Road, Picton-Wilton Road, Hume Highway, M5, M7, M4, Great Western Highway, Castlereagh Highway, Main Street, Pipers Flat Road, Brays Lane.
GPS LINK: https://goo.gl/maps/tBaxzsUEYqfRinfn7



Route 2 is about 217 kilometres in length. A review of the proposed route has confirmed that oversized / overmassed vehicles less than 5 m in height and 80 T in weight would be able to travel from Port Kembla to Main Street, Wallerawang (at 467 km from the Port of Newcastle).

The route would traverse the township of Wallerawang at the following distances.

- 213.0km - Castlereagh Highway onto Main Street, Wallerawang
- 215.8 - Main Street onto Pipers Flat Road, Wallerawang
- 216.0km - Pipers Flat Road onto Brays Lane Wallerawang
- 216.8km - Brays Lane, Wallerawang
- 217.0 km - Brays Lane into the Site, Wallerawang

From the Castlereagh Highway / Main Street, intersection to the site, Route 2 would be subject to the same conditions as Route 1. As such the route analysis assessment and swept path figures provided in Section 9 above are also applicable to Route 2.

A summary of the conclusion of the Route 2 assessment is provided in the following section.

12.0 Route 2 Conclusion:

After studying all options and undertaking a route survey, this route in its current condition may require an upgrade at the right-hand corner on Brays Lane before it could be deemed suitable for transporting the proposed components.
The following are the key points that need to be taken into consideration, if the project moves forward with this route.

BRIDGES:

- There are a large number of bridges on route that will require bridge assessments for the capacity of the listed loads. It is advised that an item weight of 80T is not exceeded on this route.
- Brays Lane has 2 culverts that will need to be checked for capacity on the heavier loads. If these culverts cannot support the axle loads of the heavier loads, than temporary bridging beams could be used to cross the culverts. An example of a temporary bridging beam is shown in section 14.0.
- The temporary bridging beams would be laid over the top of the existing road surface. No earthworks or roadworks would be required. At the completion of vehicle movements the temporary bridging beams would removed as soon as practicable to do so.

VEGETATION:

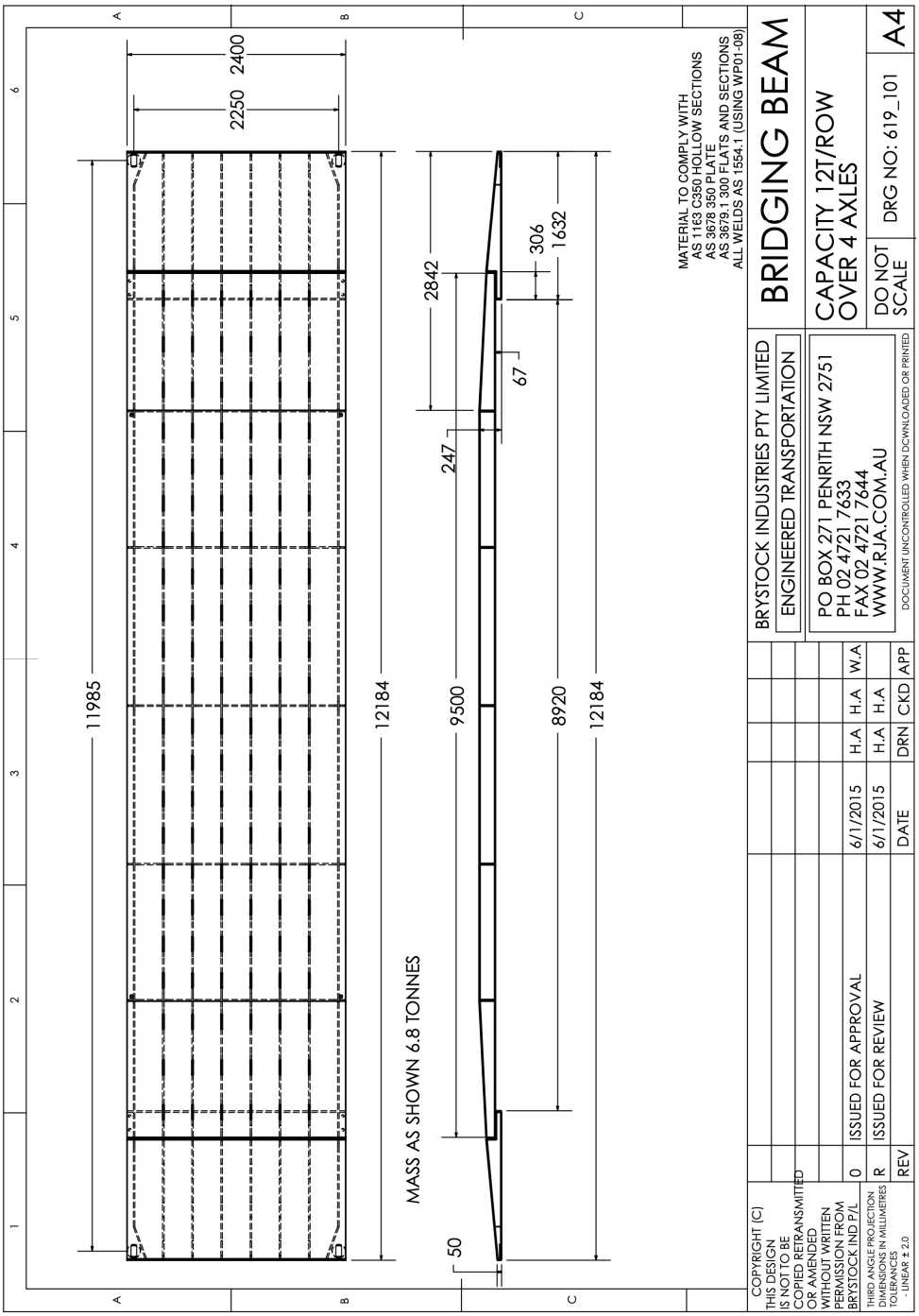
- The state highways have suitable clearance from vegetation; however, Brays Lane may require some pruning and possible removal of vegetation at the right hand corner on Brays Lane.

WIDTH and PAVEMENT:

- The route has suitable clearance other than Brays Lane which may require some vegetation pruning. The width and quality of the pavement would be suitable for the majority of the route; however, several council roads would need to be checked for capacity, these include Main Street, Pipers Flat Road and Brays Lane.
- Up to 240 sq meters of the unsealed section of road corridor adjacent to the outside edge of the right-hand turn is likely to require additional support through the placement of compacted gravel or road base to be suitable for transporting the proposed components.

13.0 Temporary bridging beams:

To cross culverts on Brays Lane temporary bridging beam structures would be installed to secure the safe passage of over dimensional and overmass vehicles and to mitigate risks of culvert damage. Two of these sections would need to be placed side by side. A drawing of a typical bridging beam is provided below.



14.0 References:

Australian Load Restraint Guide
Rex J Andrews P/L Drawings
Rex J Andrews route survey # 360 REV00
Neoen
Google Earth/Maps
Nearmaps
NHVR (OSOM)
NHVAS Maintenance Management (NHVAS21193)
NHVAS Basic Fatigue Management (NHVAS21193)

Disclaimer: This route study is a guide only; government approvals would be required before these routes could be deemed suitable for transporting the components over the listed routes.

This study was undertaken using data supplied by Rex J Andrews P/L. Equipment and swept paths might vary if using transport methodology other than the data supplied by Rex J Andrews.