Sentry Barrier TL-4 Thrie-Beam System

Longitudinal MASH TL-4 Barrier

Updated September 2022

Trusted infrastructure products

Table of contents

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Introduction

The Sentry Barrier TL-4 Thrie-Beam System is a roadside Thrie-beam guardrail system suitable for containing, redirecting and shielding vehicles from roadside obstacles. The barrier has been designed and tested to meet the evaluation criteria of MASH Test Level 4 for a longitudinal barrier. This is the current state of the art performance criteria, exceeding the requirements of NCHRP 350 Test Level 4.

The Sentry Barrier TL-4 Thrie-Beam System has an initial installation height of 1050 mm to the top of the rail, providing the system with the ability to withstand numerous road surface overlays without the need to relevel of lifting of the barrier. The Sentry Barrier TL-4 Thrie-Beam System can be installed with an approved energy absorbing terminal end on the approach end, however it is recommended that an approved tangential or flared MAX-Tension terminal end be used for optimal performance.

The rounded edges to the Sentry Barrier Post TL-4 and closed shape on the approach direction provide increased protection for vulnerable road users. The compact Sentry Barrier Post TL-4 are easy to drive into all soil types and provide increased resistance to rotation in the soil when impacted. Unlike other systems on the market, any damage caused to the top of the posts or to the rail mounting points during installation will not affect the performance of the system.

The connection system between the rail and posts is formed using conventional fasteners providing it with the greatest tolerance of any system on the market. If the connection is damaged in any way it can be easily replaced without replacing the posts allowing for simpler installations and repairs. The Sentry Barrier TL-4 Thrie-Beam System is installed quickly using conventional installation tools and equipment.

System Overview

The Sentry Barrier TL-4 Thrie-Beam System is designed to provide acceptable structural adequacy, minimal occupant risk and safe vehicle trajectory as required by the latest in safety standards, AASHTO MASH 16 Test Level 4 (TL4). This standard requires the system to be independently evaluated with full scaling testing using 1,100kg and 2,270kg vehicles traveling at speeds of 100km/hr and impacting the system at an angle of 25 degrees, as well as a 10,000 kg truck travelling at 90km/hr impacting the system at an angle of 15 degrees. The requirements of MASH 16 TL4 are so stringent that the system is required to absorb more energy during the impact than the out-dated NCHRP 350 standard Test Level 4 (TL4).

When impacted by an errant vehicle, the Sentry Barrier TL-4 Thrie-Beam System will redirect the vehicle along the face of the barrier system, bringing it to a controlled stop. The system has been developed to produce no debris during an impact, with all posts designed to remain firmly located in the soil and the connection details to remain attached to the rail. Repair of the system is completed by removing and replacing any bent or damaged Thrie-Beam and posts impacted accordingly.

Any posts with damaged connections can be repaired by replacing the connection hardware only, reducing the need to remove posts and repair damaged ground.

Key specifications for the Sentry Barrier TL-4 Thrie-Beam System are:

System width	200mm
Height to top of rail	1050mm
Height to top of post	1040mm
Post weight	20.5kg
Post length	2.00m
Post spacing	2.00m
MASH TL4.10 dynamic deflection (1,100kg vehicle)	1.06m
MASH TL4.11 dynamic deflection (2,270kg vehicle)	1.45m
MASH TL4.12 dynamic deflection (10,000kg vehicle)	1.53m

The minimum Length of Need (LoN) of the Sentry Barrier TL-4 Thrie-Beam System is dependent on the posted speed limit. Please refer to state roading authority approval letters for local minimum length requirements. However, a minimum length of need for a two-way road with a posted speed limit of 100km/hr with a clear zone of approaching traffic is recommend as 86m, excluding terminal ends.

The Sentry Barrier TL-4 Thrie-Beam System systems rails and posts are manufactured from hot-rolled steel flat products in accordance with AS/NZS 1594 and hot-dip galvanised in accordance with AS/NZS 4680 with an average minimum coating thickness of 35 microns. All galvanising is undertaken after fabrication is completed to ensure no surfaces are left untreated.

Limitations and Warnings

The Sentry Barrier TL-4 Thrie-Beam System forms part of an approved roadside protection system and it must be installed in conjunction with an approved terminal end system on both the approach and trailing ends. When installed in accordance with the manufacturer's instruction the barrier system allows an impacting vehicle to be re-directed in a safe and predictable manner under the MASH impact conditions.

Vehicle impacts that vary from the MASH impact conditions for longitudinal barriers may result in significantly different outcomes from those obtained in the experimental testing and may not meet the MASH evaluation criteria.

The selection and placement of the Sentry Barrier TL-4 Thrie-Beam System must be in accordance with the Roading Controlling Authorities guidelines and the details shown in the construction drawings. Installation must be within strict accordance with the installation instructions for the product. Alternative installation techniques will be required if the soil conditions on site do not meet the minimum requirements stated in this manual.

Training

Installers may choose to undergo formal training on the installation of the Sentry Barrier TL-4 Thrie-Beam System if they have no prior experience with Sentry Barrier. This includes the correct identification of each Sentry Barrier TL-4 Thrie-Beam System components and installing it as per the product specification and Installation Manual.

By the end of the training installers will be able to identify each component of the Sentry Barrier TL-4 Thrie-Beam System and have the knowledge to safely install the barrier as per the Installation Manual and Specifications required.

The training will cover and include the correct Personal Protective Equipment (PPE) required to be worn during installation and maintenance. Additionally, by the end of the training workers will know the correct methods required to handle and install all components of the Sentry Barrier TL-4 Thrie-Beam System.

Health and Safety

Installers should comply with all necessary health and safety legislation in the local jurisdiction, including all safe work and lifting practices.

All appropriate traffic safety precautions must be adopted. All workers must wear the required safety clothing, including but not limited to, high visibility vests, steel capped footwear, gloves and protective glasses etc.

Before undertaking any earth works, including drilling or driving of posts, always check with the appropriate service providers that the area is clear of underground services.

All installers must be well clear of machinery when posts are being driven.

Before Installation

Design, selection and placement of the Sentry Barrier TL-4 Thrie-Beam System shall be in accordance with the local Road Controlling Authority's guidelines and as per the details shown in the construction drawings. Installation shall be in accordance with the installation instructions supplied for this product.

The Sentry Barrier TL-4 Thrie-Beam System is an engineered safety device. Before starting installation ensure familiarity with the makeup of the system.

Note: Soil conditions may require a local geotechnical engineer to confirm the soil condition on site met the required condition described in the manual.

Safety statements

General Safety

- All required traffic safety precautions should be complied with. All workers should wear required safety clothing (examples, but not limited to, include: high visibility vests, steel capped footwear, gloves etc).
- Only authorised trained personnel should operate any machinery. Where overhead machinery is used, care must be taken to avoid any overhead hazards.
- Before drilling or excavation always ensure that the area is clear of underground services. The appropriate service providers may need to be contacted.

Sentry Barrier TL-4 Thrie-Beam Safety Statements

- All installers must be a safe distance from all drilling or excavating machinery operating.
- The components are not heavy enough to require specialised lifting equipment, but due to the dimensions and bulky nature, care should be taken when lifting the larger components into position.
- Avoid placing hands or fingers in and around moving machine parts when components are being lifted and manoeuvred into place.

Limited Warranty

CSP® has tested the impact performance of its barrier systems and crash cushion systems, and other highway safety hardware under controlled conditions, however, CSP does not represent nor warrant that the results of those controlled conditions would necessarily avoid injury to persons or property.

TO THE MAXIMUM EXTENT PERMITTED BY LAW, CSP EXPRESSLY DISCLAIMS ANY WARRANTY OR LIABILITY FOR CLAIMS ARISING BY REASONS OF DEATH OR PERSONAL INJURY OR DAMAGE TO PROPERTY RESULTING FROM ANY IMPACT, COLLISION OR HARMFUL CONTACT WITH THE PRODUCTS OR NEARBY HAZARDS OR OBJECTS BY ANY VEHICLE, OBJECTS OR PERSONS.

CSP warrants that any product or component part manufactured by CSP will be free from defects in material or workmanship. CSP will replace free of cost any product or component part manufactured by CSP that contains such a defect.

TO THE MAXIMUM EXTENT PERMITTED BY LAW, CSP EXPRESSLY DISCLAIMS THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES NOT EXPRESSLY SET FORTH HEREIN, WHETHER EXPRESS OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. CSP'S LIABILITY UNDER THIS WARRANTY IS EXPRESSLY LIMITED TO REPLACEMENT FREE OF COST OF PARTS SUPPLIED BY CSP ONLY (IN THE FORM AND UNDER THE TERMS ORIGINALLY SHIPPED), OR TO REPAIR OR TO MANUFACTURE BY CSP, PRODUCTS OR PARTS NOT COMPLYING WITH CSP SPECIFICATIONS, OR, AT CSP'S ELECTION, TO THE REPAYMENT OF AN AMOUNT EQUAL TO THE PURCHASE PRICE OF SUCH PRODUCTS OR PARTS, WHETHER SUCH CLAIMS ARE FOR BREACH OF WARRANTY OR NEGLIGENCE. CSP SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL LOSSES, DAMAGES OR EXPENSES OF ANY KIND, INCLUDING, WITHOUT LIMITATION, ANY SUCH LOSSES, DAMAGES OR EXPENSES ARISING DIRECTLY OR INDIRECTLY FROM THE SALE, HANDLING OR USE OF THE PRODUCTS FROM ANY OTHER CAUSE RELATING THERETO, OR FROM PERSONAL INJURY OR LOSS OF PROFIT.

Any claim by the Buyer with reference to Products sold hereunder for any cause shall be deemed waived by the Buyer unless CSP is notified in writing, in the case of defects apparent on visual inspection, within ninety (90) days from the delivery date, or, in the case of defects not apparent on visual inspection, within twelve (12) months from the said delivery date. Products claimed to be defective may be returned prepaid to CSP's plant for inspection in accordance with return shipping instructions that CSP shall furnish to the Buyer forthwith upon receipt of the Buyer's notice of claim. If the claim is established, CSP will reimburse that Buyer for all carriage costs incurred hereunder.

The forgoing warranty benefits shall not apply to (i) any Products that have been subject to improper storage, accident, misuse or unauthorised alterations, or that have not been installed, operated and maintained in accordance with approved procedures and (ii) any components manufactured by the Buyer.

The customer acknowledges that it has acquired the Goods for the purposes of a business and that the Consumer Guarantees Act 1993 will not apply to the supply of the Goods by CSP to it.

System Design and Design Considerations

Kerbs

As with all road side safety hardware, the Sentry Barrier TL-4 Thrie-Beam System has been designed and tested so that the centre of gravity of the impacting vehicle is at a constant height in relation to the system. For this reason, it is preferred that kerbs or channels are not in front or directly behind the Sentry Barrier TL-4 Thrie-Beam System as they may result in altering the height of the vehicle at impact.

If interaction with a kerb cannot be avoided consult the local Road Controlling Authority guidelines regarding allowable kerb- heights, kerb shapes, and barrier offset distance.

Slopes

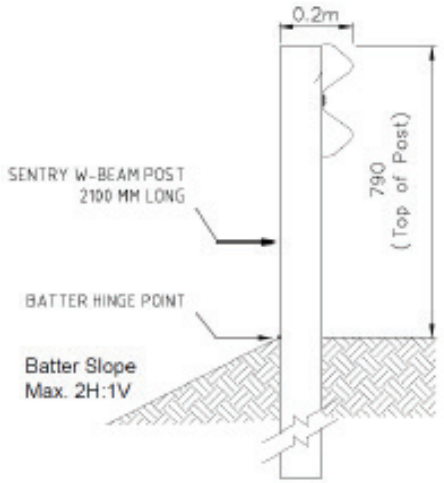
The Sentry Barrier TL-4 Thrie-Beam System can be installed on ground with a maximum cross fall of 6H:1V. For steeper slopes it is recommended that the system is installed no closer than 400mm to the batter hinge point of the slope, please refer to below for guidance. If installations with less clearance are required, please contact your CSP.

Batter Hinge Proximity

The offset proximity of the Sentry Barrier TL-4 Thrie-Beam System to the batter hinge point of a slope is dependent upon the design containment level of the road. For a TL-3 containment level, the minimum proximity to the hinge point shall be minimum 400mm from the back edge of the post to the Batter Hinge Point as shown in the figure below. For a TL-4 containment level, the minimum proximity to the hinge point measured from the face of the rail, shall be equal to the expected deflection at TL-4, which is 1530mm.

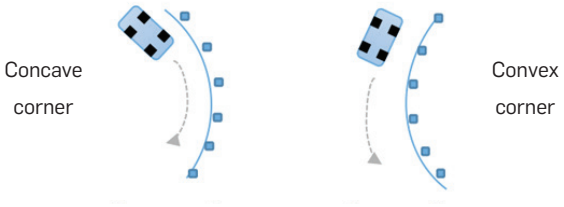
Refer to below figure for guidance.

Installations in proximity to a batter hinge point should also be considered within the requirements of the road controlling authority Extended Design Domain requirements, where applicable.



Horizontal and Vertical Curves

The Sentry Barrier TL-4 Thrie-Beam System can accommodate both horizontally and vertically curved guardrail panels if required by site conditions. For radii less than 25m the system must be anchored with an approved intermediate anchor or terminal end. Please refer to approved details of the local Road Controlling Authority where necessary.



Undulating Ground Conditions

Site specific grading may be necessary to ensure that there are no 'humps' or 'hollows' that may significantly alter the impacting vehicles stability or substantially alter the Thrie-Beam heights in relation to the ground. The Sentry Barrier TL-4 Thrie-Beam System is required to be installed level and centred on the barrier line as stated in the Installation Procedure.

Care must be taken to ensure all posts in the Sentry Barrier TL-4 Thrie-Beam System are installed to the correct height, alignment and orientation. It is strongly recommended that smoothing of uneven ground conditions be completed along the length of the Sentry Barrier TL-4 Thrie-Beam System.

Clear Zone / Hazard Free Zone

Clear Zones are areas adjacent to traffic lanes that provide errant vehicles the opportunity to slow down or recover. The clear zone must be kept clear from roadside features that could be hazardous to errant vehicles, such as but not limited to trees, poles and culverts. Although it is desirable to maximize the available clear zone, please refer to your local Road Controlling Authority for confirmation of the minimum width requirements.

Terminal Ends

The Sentry Barrier TL-4 Thrie-Beam System is designed to be compatible with a range of guardrail terminals ends or crash cushions available, in accordance with designated transition details. It is recommended that MAX-Tension Terminal End be used with the Sentry Barrier TL-4 Thrie-Beam System for optimal performance. The X-350 Terminal End can also be utilised if required. Refer to the Appendices section for detailed drawings.

The purpose of the guardrail terminals ends, or crash cushions is to provide a soft impact and to prevent the end rail from spearing or impacting the errant vehicle. The terminal ends and crash cushions also provide tensile and deflection strength necessary to ensure the errant vehicle is redirected for the length-of-need required.

- Care must be taken to ensure the correct post spacing is ALWAYS used during the installation.
- Care must be taken to ensure the posts are orientated correctly during installation and to ensure all Thrie-Beam bolts are inserted and tightened accordingly.
- Care must be taken to ensure the line posts are installed at the correct height.

Soil Condition

The Sentry Barrier TL-4 Thrie-Beam System is a soil-mounted system driven directly into the soil. To meet the barrier's performance, the soil is required to meet AASHTO Standard Soil (Grade B) and requirements set out by AS/NZS 3845 and (if applicable) TNZ Specification M/4 2006.

Additionally, you should refer to the local Roading Controlling Authorities guidelines for minimum soil requirements for road safety barrier installation.

Soil conditions on site that do not meet these requirements will require alternative installation or further investigation. Contact CSP for guidance.

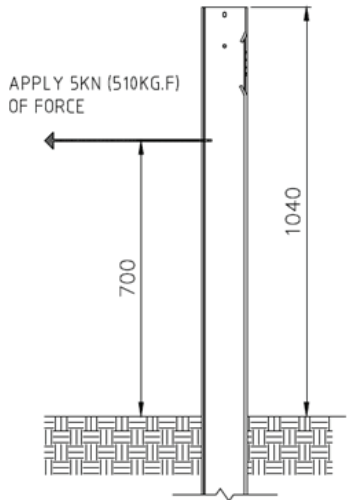
It is strongly recommended that soil tests be completed at the location where the Sentry Barrier TL-4 Thrie-Beam System is to be installed.

Post Load Testing

To ensure soil conditions on site meet the required resistance in the ground for the system to perform adequately. A Sentry Barrier TL-4 post should be installed at the required site location and pull tested.

The method involves applying a 5KN (510kg.f) force at 700mm above ground level using a soft strop or similar, capable of sustaining such force. The maximum permanent post deflection allowable onsite is 5mm (+5mm) horizontally at the ground level. Therefore, the tolerance allowable is 0-10mm.

Note: All technical information required to assist in designing a site-specific foundation is available from CSP.



IF SOIL CONDITIONS ON SITE DO NOT MEET OR EXCEED THE REQUIRED STRENGTH, SITE SPECIFIC CONDITIONS, REFER TO A LOCAL GEOTECHNICAL ENGINEER FOR FURTHER ADVICE.

Length of Need

The minimum Length of Need (LoN) of the Sentry Barrier TL-4 Thrie-Beam System is dependent on the specific hazard being protected and the posted speed limit. The default Length of Need (LoN) determined through crash testing is 86.0m excluding transitions and terminal ends, however, refer to state roading authority approval letters for local minimum length requirements where applicable. Designers should also refer to the Austroads Guide to Road Design – Part 6, Section 6.3, for detailed design process of barrier length run required.

For sites where geometric constraints exist, designers may require shorter length of need, in such instances, a 12m* length of need for TL-3 containment design can be utilised plus the length of the transition and terminal end regions on either end of the barrier system. For TL-4 containment design, a 20m* length of need can be utilised plus transition and terminal end regions. We recommend designers or Installers contact their local Roading Control Authority for further information or guidance if required.

*These lengths have been calculated based upon the actual vehicle contact lengths from the respective Test 4-11 and Test 4-12 crash test articles noted in the crash test report.

Deflection

The transverse deflection of a barrier during a crash is dependent upon the mass, speed, and impact angle of the errant vehicle. The maximum levels of dynamic deflections measured during impact testing are presented below.

	Test 4-10	Test 4-11	Test 4-12
Vehicle type	Car	Pick up	Truck
Vehicle mass	1,100kg	2,270kg	10,000kg
Vehicle speed	100km/h	100km/h	90km/h
Impact angle	25°	25°	15°
Dynamic deflection	1.06m	1.45m	1.53m

Crash testing typically represents the extremes impact parameters. A review of the proposed barrier location can be undertaken to assess the following variables influence on the likely maximum system deflection;

- Maximum attainable impact angle;
- Design speed; and
- Design vehicle.

Note:

The TL-3 containment level is measured in Test 4-11 i.e. Dynamic Deflection of 1.45m.

The TL-4 containment level is measured in Test 4-12 i.e. Dynamic Deflection of 1.53m.

Transitions

A transition zone may be required to connect the Sentry Barrier TL-4 Thrie-Beam System to other types of barriers or non-approved terminal ends. Refer to the Appendices section for guidance. Please contact CSP for guidance on acceptable transition systems if required.

The Sentry Barrier TL-4 Thrie-Beam System can be connected to approved proprietary or public domain terminal ends through a transition zone. Refer to the Appendices section for designated transition drawings.

Parts Identification

Sentry Barrier™ TL-4 Thrie-Beam System Post (2 views)

Sentry Barrier Bolt, Washer & Nut

Thrie-Beam

Splice, Bolt and Nut

ALL STEEL COMPONENTS USED IN THE SENTRY BARRIER TL-4 THRIE-BEAM SYSTEM ARE HOT DIPPED GALVANISED IN ACCORDANCE WITH AS/NZS 4680.

Bill of Materials

Checklist per panel (4m of barrier) installed	Y
2x Sentry Barrier TL-4 Thrie-Beam System Posts (per Thrie-Beam)	
2x Sentry Barrier Bolt, Washer and Nut (one per post connection)	
1x4m Thrie-Beam	
12x Splice Bolts and Nuts (at the end of Thrie-Beam and overlapping the prior Thrie-Beam)	
Drilling or compactor suitable for foundation	
String line and pegs	
Measuring tape	
Level	
32mm Wrench	
32mm Ring Spanner	
Suitable driving head with machined Sentry post profile	

Installation

Getting Started

The Sentry Barrier TL-4 Thrie-Beam System is a Thrie-Beam barrier designed to run the length of need required and is attached to a compatible terminal end or crash cushion through a designated transition, refer to the Appendices section. For guidance on minimum Length of Need (LoN), refer to the Length of Need section earlier in the manual.

Preparation

Before installing an Sentry Barrier TL-4 Thrie-Beam System, ensure that all components required for the system are on site and have been identified. The Sentry Barrier TL-4 Thrie-Beam System is an engineered safety device. Before starting installation ensure familiarity with the makeup of the system. Refer to the Bill of Materials and Parts Identification sections in this manual for more information.

Ensure that the area where the Sentry Barrier TL-4 Thrie-Beam System is to be installed is sufficiently flat so that the posts and Thrie-Beam can be installed within the allowable tolerance and aligned to the terminal ends or crash cushions. Minor site grading may be required.

Soil Conditions

The Sentry Barrier TL-4 Thrie-Beam System has been designed to withstand a constant static load, thermal loading, and dynamic impact load that can be applied from the impact of an errant vehicle. To perform, the Sentry Barrier TL-4 Thrie-Beam System must be attached to either a semi rigid or rigid terminal end or crash cushion after a designated transition region to provide the necessary safety benefits. It is recommended that the soil tests are carried out at the location the Sentry Barrier TL-4 Thrie-Beam System prior to being installed.

IF SOIL CONDITIONS ON SITE DO NOT MEET OR EXCEED THE REQUIRED STRENGTH DETAILED IN THIS MANUAL, SITE SPECIFIC FOUNDATIONS MUST BE DESIGNED BY A LOCAL GEOTECHNICAL ENGINEER.

Tools Required

The tools required to install the Sentry Barrier TL-4 Thrie-Beam System are similar to other Thrie-Beam barriers. It requires:

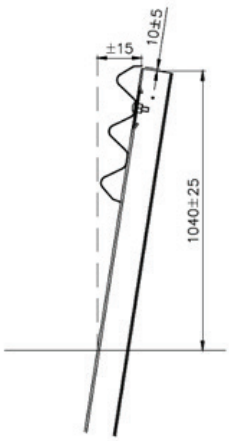
- Appropriate personal protective equipment
- Drilling or compactor machinery (suitable for soil conditions and with a driving head to avoid damage to posts during installation)
- String line
- Measuring tape
- Level
- 32mm Socket wrench or Ratchet
- 32mm Ring spanner

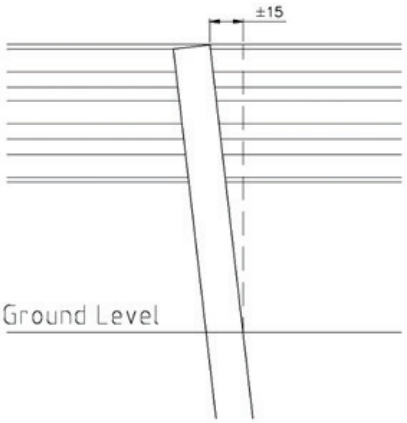
Installation Tolerances

The Sentry Barrier TL-4 Thrie--Beam System is an engineered safety device. To obtain optimal performance is it important to install all components of the system to within the allowable tolerances stated below (also in Appendix C). Particular care must be taken to ensure;

- Suitable horizontal alignment and verticality of the line posts.
- Consistency in the vertical height of the line posts.
- Orientation and height of the terminal end or crash cushion.

Sentry Barrier TL-4 Thrie-Beam System has to be installed at 1040mm to the top of the post. A vertical height tolerance of ±25mm is acceptable for both the Sentry Barrier Post TL-4. The top of the Thrie-Beam is to be positioned 10mm above the top of the Sentry Barrier Post TL-4 with a tolerance of ±5mm. The Sentry Barrier Post TL-4 laterally is constrained to ±15mm tolerance. It is of upmost importance for these tolerances to be adhered to in order to ensure safe function of the Sentry Barrier TL-4 Thrie-Beam System.





Installation Instructions

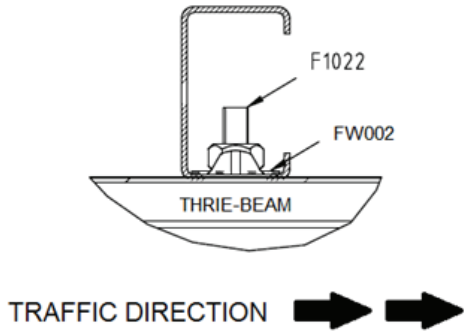
Before installing the Sentry Barrier TL-4 Thrie-Beam System, ensure that all components required for the system are on site and have been identified. The Sentry Barrier TL-4 Thrie-Beam System is an engineered safety device made up of relatively small number of parts. Please ensure familiarity with the makeup of the system and the installation process prior to commencing. If required, refer to the Bill of Materials and Parts Identification sections in this manual for more information.

Site Preparation

It is preferred that the Sentry Barrier™ TL-4 Thrie-Beam System be installed on flat, level ground and tethered to an approved terminal end or crash cushion. The positioning of the Sentry Barrier TL-4 Thrie-Beam System commences from the last post connected to the asymmetric transition rail (on Thrie-Beam end), working upstream to the prior asymmetric transition rail. It is recommended that a string line be used to obtain the correct orientation and placement of the posts.

Post Orientation with traffic flow direction

Ensure posts are correctly orientated in relation to traffic flow direction by positioning the closed side of the post towards oncoming traffic. Refer to below.



BEFORE DRILLING OR EXCAVATION ALWAYS ENSURE THAT THE AREA IS CLEAR OF UNDERGROUND SERVICES.

Construction of Terminal End or Crash Cushion

The Sentry Barrier TL-4 Thrie-Beam System is compatible with a variety of terminal ends and crash cushions depending upon the availability of designated transition details and Local Road Controlling Authority approval specifications. Refer to the Appendices section and Local Road Controlling Authority approval specifications for details. The selection of a suitable design will depend primarily upon the soil type, and geometric constraints of the site. Please refer to the relevant terminal end or crash cushion Installation Manual for guidance to the construction and installation procedure of that specific device.

Installation Procedure (Posts and W-Beam)

Step 1

Review the site location and identify possible hazards prior to commencing the installation of the Sentry Barrier TL-4 Thrie-Beam System. Any concerns, please refer to the local Roading Authority.

Step 2

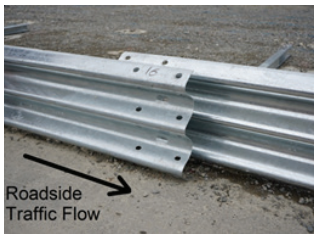
Place a string line from the centre of the downstream asymmetric rail to required location of the upstream asymmetric rail. The string line should pass over the centre of each post location and be marked accordingly as the required location for drilling or driving each post.

Step 3

Identify the correct orientation of the post (refer to Appendix A - SENTRY BARRIER TL-4 THRIE-BEAM SYS) and drive post to the predetermined depth of 960mm (1040mm protruding above ground) as stipulated in Appendix A. The post must be vertically aligned and within the tolerance level stated in the Installation Tolerances section. The driving of the post should not incur any damage to the post. If a post is damaged it must be inspected and removed if considered that the damage will affect the performance.

Step 4

Supporting the W-Beam in the desired location, install the Sentry Barrier Bolt, Washer and Nut. Once supported, the 8 Splice Bolts and Nuts can be inserted into the W-Beam splice joint. It is vital that each W-Beam must overlap the prior W-Beam positioned downstream. Failure to correctly overlap the W-Beam may cause snagging, poor barrier performance or risk injury or death to the driver of the errant vehicle. Snug tighten all bolts once installed.



Splice joint location

Thrie-Beam Ends

Intermediary Post (middle section)

Step 5

Continue working along the barrier from the first installed W-Beam to the terminal end or crash cushion positioned at the other end of the barrier system. Once the barrier is installed a detailed visual inspection should be completed to ensure all components are correctly installed. All bolts should be confirmed to be installed snug tight.

Inspection and Maintenance Frequency

The Sentry Barrier TL-4 Thrie-Beam System is maintenance free. However, it is recommended that all Thrie-Beam barrier systems are checked after being impacted to ensure that the appropriate strength is maintained. Refer to Installation Procedure in this manual for more information.

Maintenance requirement for repair after a fire

Following a severe bushfire, a detailed inspection of the Sentry Barrier TL-4 Thrie-Beam System should be undertaken. If heat damage is noted, it is recommended the Thrie-Beam and posts are replaced immediately.

A detailed inspection should also be completed on the post footings and the transition between the Thrie-Beam barrier and terminal end or crash cushion. Any concerns, please refer to the Sentry Barrier TL-4 Thrie-Beam System Product Manual or contact CSP for recommendations or inspections of the Sentry Barrier TL-4 Thrie-Beam System itself.

Installation Checklist

Item	Y	N
Ensure the posts are orientated in the correct direction and consistent with the terminal ends or crash cushions.		
The height of the finished rail should be 1050mm (±25mm) above the finished ground level.		
The height to the top of the posts should be 1040mm (±25mm) above finished ground level.		
The posts are free from damage.		
The correct Sentry Barrier Washer is installed and seated correctly in the back of the post.		
All bolts are tightened snug. Ensure only one post bolt is installed in the top slot per post.		
The Thrie-Beam must be level and aligned in accordance with the general assembly drawing and transition drawings where applicable. Refer to Appendix A for guidance.		
Ensure posts are free of debris prior to installing the Thrie-Beam.		
Connected to a Terminal End or Crash Cushion		
The Sentry Barrier TL-4 Thrie-Beam System must transition to the nominated terminal end in accordance with transition drawings. Refer to Appendices for details.		

Job Number:			
Location:			
Client/Asset Owner:			
Principal Contractor:			
Installer:			
Installed by:		Date:	
Inspected by:		Date:	

Contact CSP for more information on this or other road safety products.

Frequently Asked Questions

1. What type of equipment is required to install the Sentry Barrier TL-4 Thrie-Beam System?

   Standard tools required include a wrench, measuring tape, string line and machinery suitable for drilling or compacting the post into soil.

2. Does your company provide spare parts? What is the lead-time for supply?

   It is important to fix a damaged Thrie-Beam barrier as soon possible because it most probably won't perform as designed when damaged. For this reason it is recommended that spares are held by Maintenance Contractors. The lead time for parts will generally be next day delivery or collection from one of our distribution centres.

3. On average, how long does it take to install the Sentry Barrier TL-4 Thrie-Beam System?

   Depending on circumstances at the site, installation and assembly of the system should take a three person crew less than 15 mins per Thrie-Beam panel (4.0m length) when using automatic post driving equipment. Installation time will vary depending on ground conditions when hand digging and re-compacting posts.

4. What about vandalism, can the Sentry Barrier TL-4 Thrie-Beam System be damaged easily?

   No, once the system has been fully installed it becomes a rigid system unlikely to be damaged or weaken the performance of the system.

5. How easily can the Sentry Barrier TL-4 Thrie-Beam System be restored after impact?

   Sentry Barrier TL-4 Thrie-Beam System is easily repaired following an impact. Damaged posts can be removed using a crowbar (or other appropriate equipment) and new posts installed before replacement Thrie-Beams and splice bolts are positioned.

   The connection detail used between the post and the rail of the Sentry Barrier TL-4 Thrie-Beam System is designed to limit damage to the post outside of the immediate zone of impact. When the connection is damaged, the washer detail can be easily replaced without needing to replace the post (provided post is not damaged from an impact).

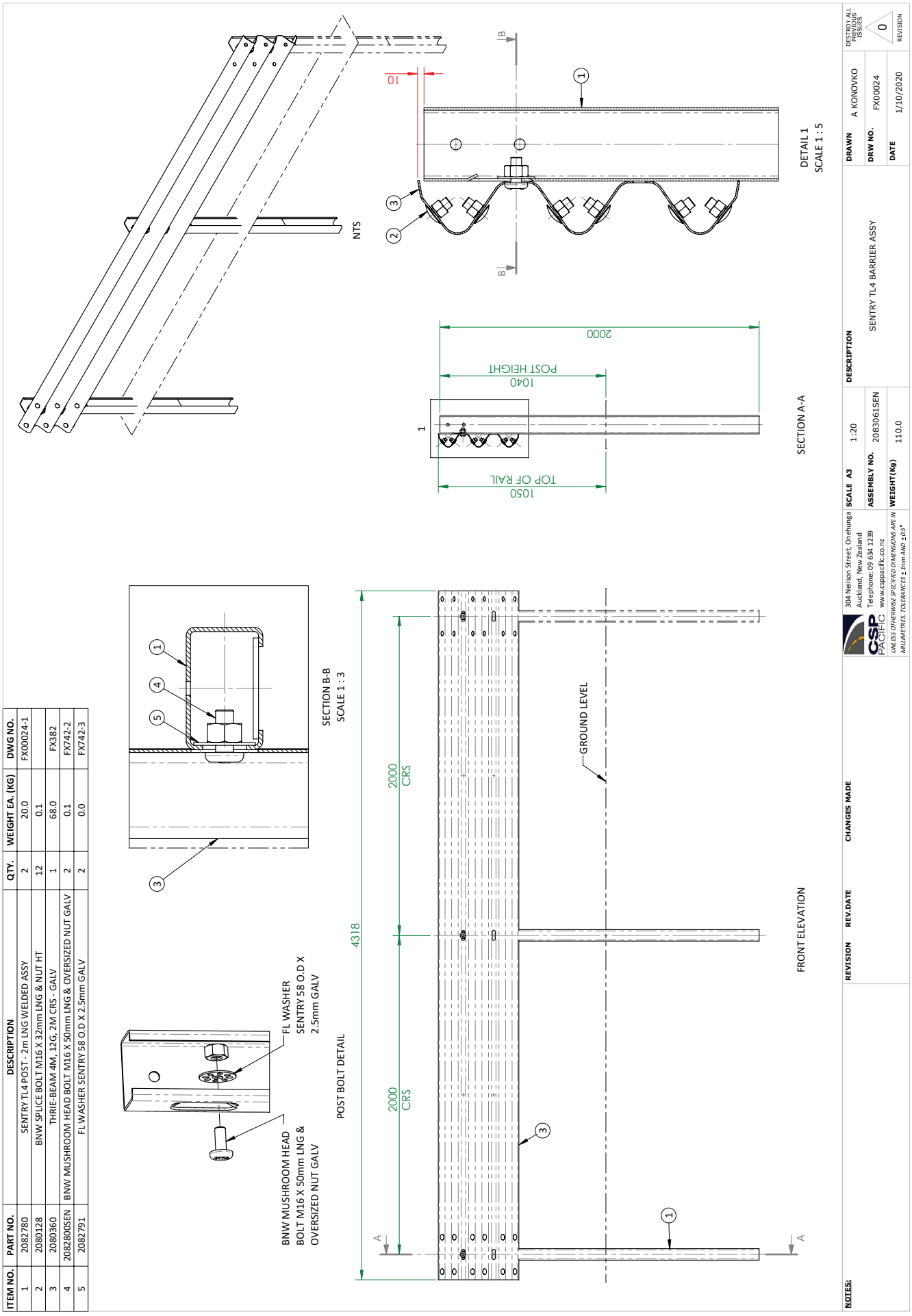
6. What maintenance does the Sentry Barrier TL-4 Thrie-Beam System require?

   The Sentry Barrier TL-4 Thrie-Beam System is maintenance free. However, it is recommended that all Thrie-Beam barrier systems are checked after impacts to ensure that the integrity of the barrier is maintained.

Appendix

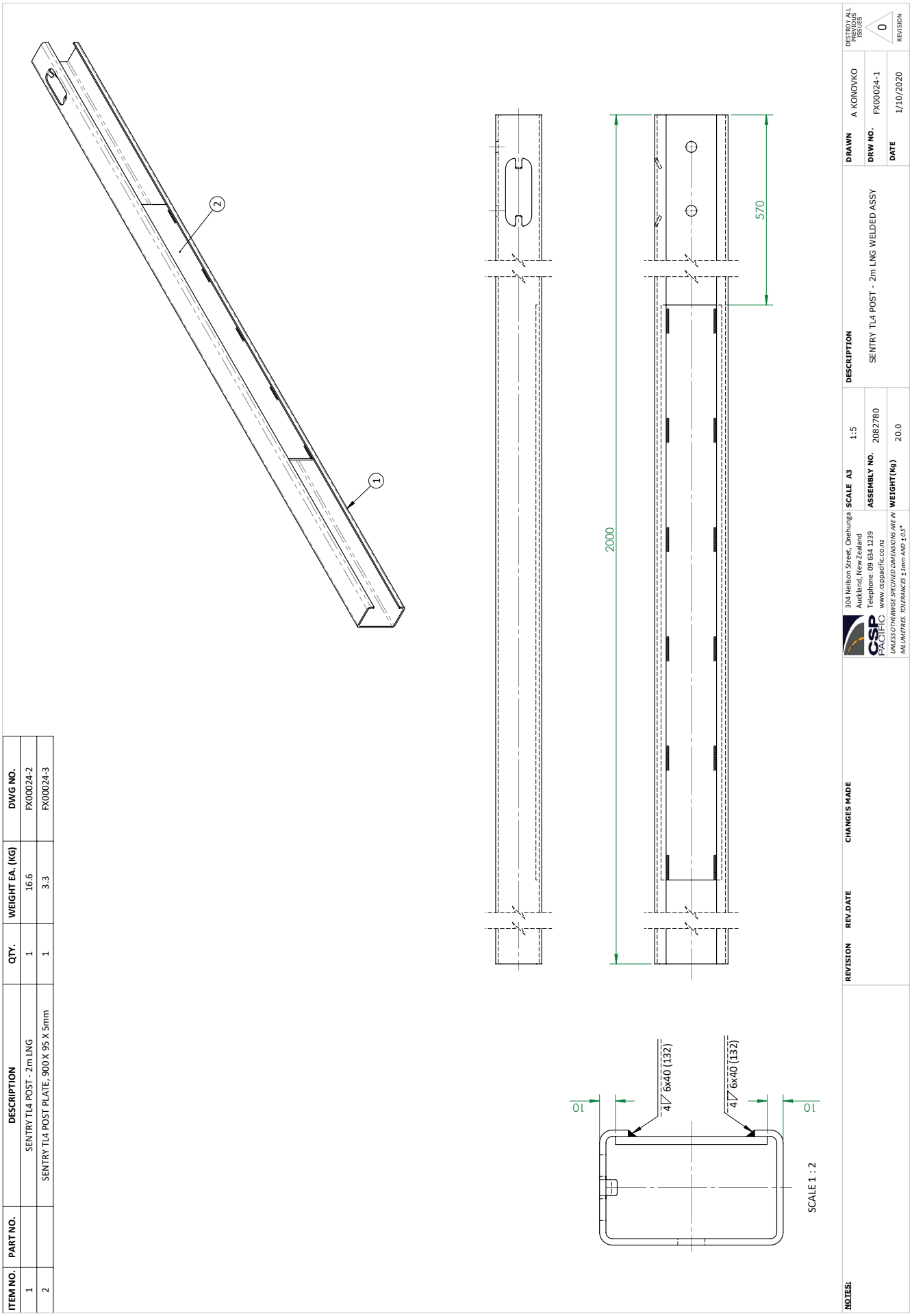
Technical Drawings

Appendix A – Sentry Barrier TL-4 Thrie-Beam System



ITEM NO.	PART NO.	DESCRIPTION	QTY.	WEIGHT EA. (KG)	DWG NO.
1	2082780	SENTRY TL4 POST - 2m LNG WELDED ASSY	2	20.0	FX00024-1
2	2080128	BNW SPLICE BOLT M16 X 32mm LNG & NUT HT	12	0.1	
3	2080360	THRIE-BEAM 4M, 12G, 2M CRS - GALV	1	68.0	FX382
4	20828005EN	BNW MUSHROOM HEAD BOLT M16 X 50mm LNG & OVERSIZED NUT GALV	2	0.1	FX742-2
5	2082791	FL WASHER SENTRY 58 O.D X 2.5mm GALV	2	0.0	FX742-3

Appendix B – Sentry Barrier Post TL-4



ITEM NO.	PART NO.	DESCRIPTION	QTY.	WEIGHT EA. (KG)	DWG NO.
1		SENTRY TL4 POST - 2m LNG	1	16.6	FX00024-2
2		SENTRY TL4 POST PLATE, 900 X 95 X 5mm	1	3.3	FX00024-3

NOTES:

REVISION	REV.DATE	CHANGES MADE

304 Nelson Street, Onehunga
Auckland, New Zealand
Telephone: 09 634 1239
www.csppacific.co.nz

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETRES. TOLERANCES ±1mm AND ±0.5°

SCALE A3	1:5
ASSEMBLY NO.	2082780
WEIGHT(kg)	20.0

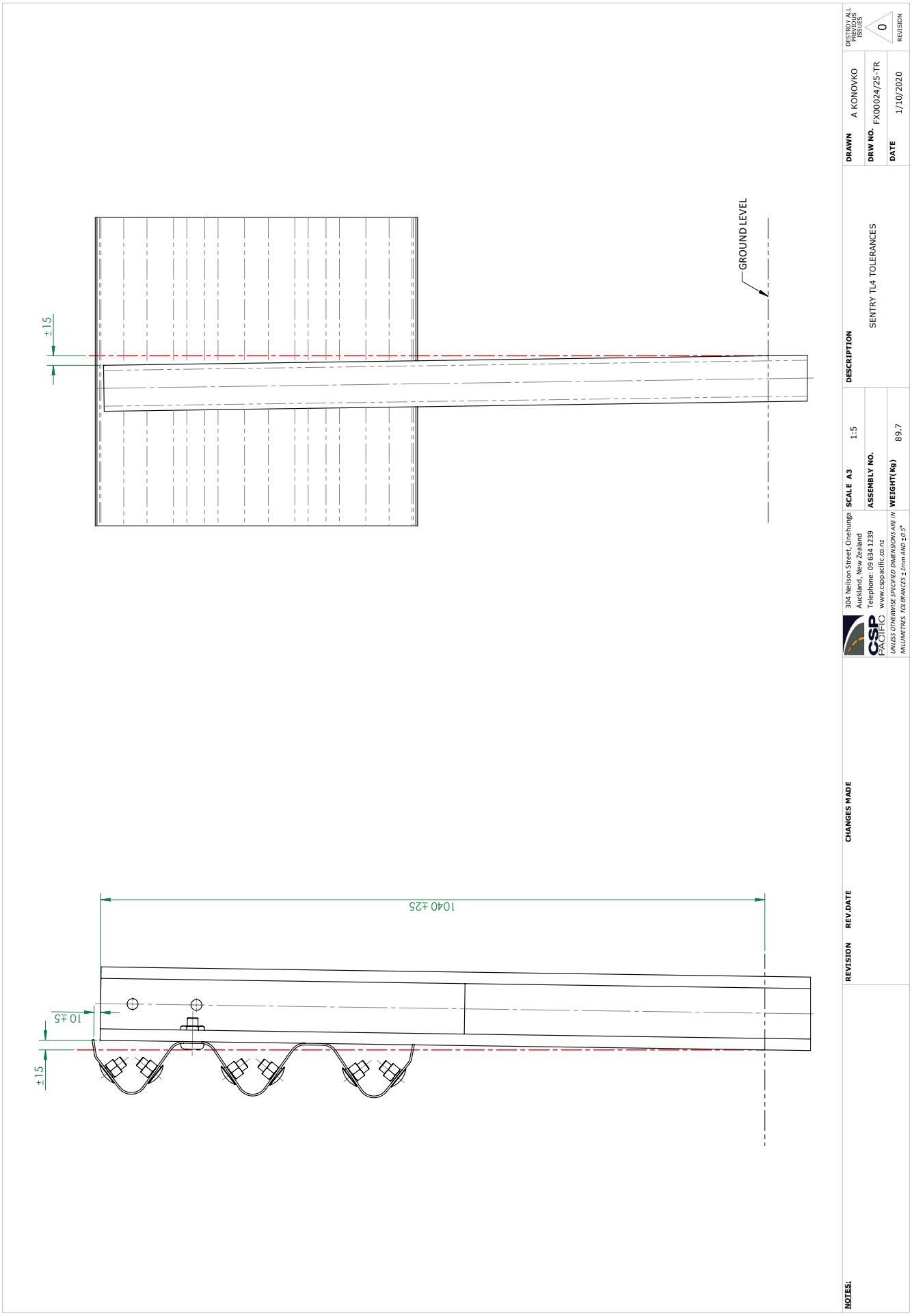
DESCRIPTION: SENTRY TL4 POST - 2m LNG WELDED ASSY

DRAWN	A KONOVKO
DRW NO.	FX00024-1
DATE	1/10/2020

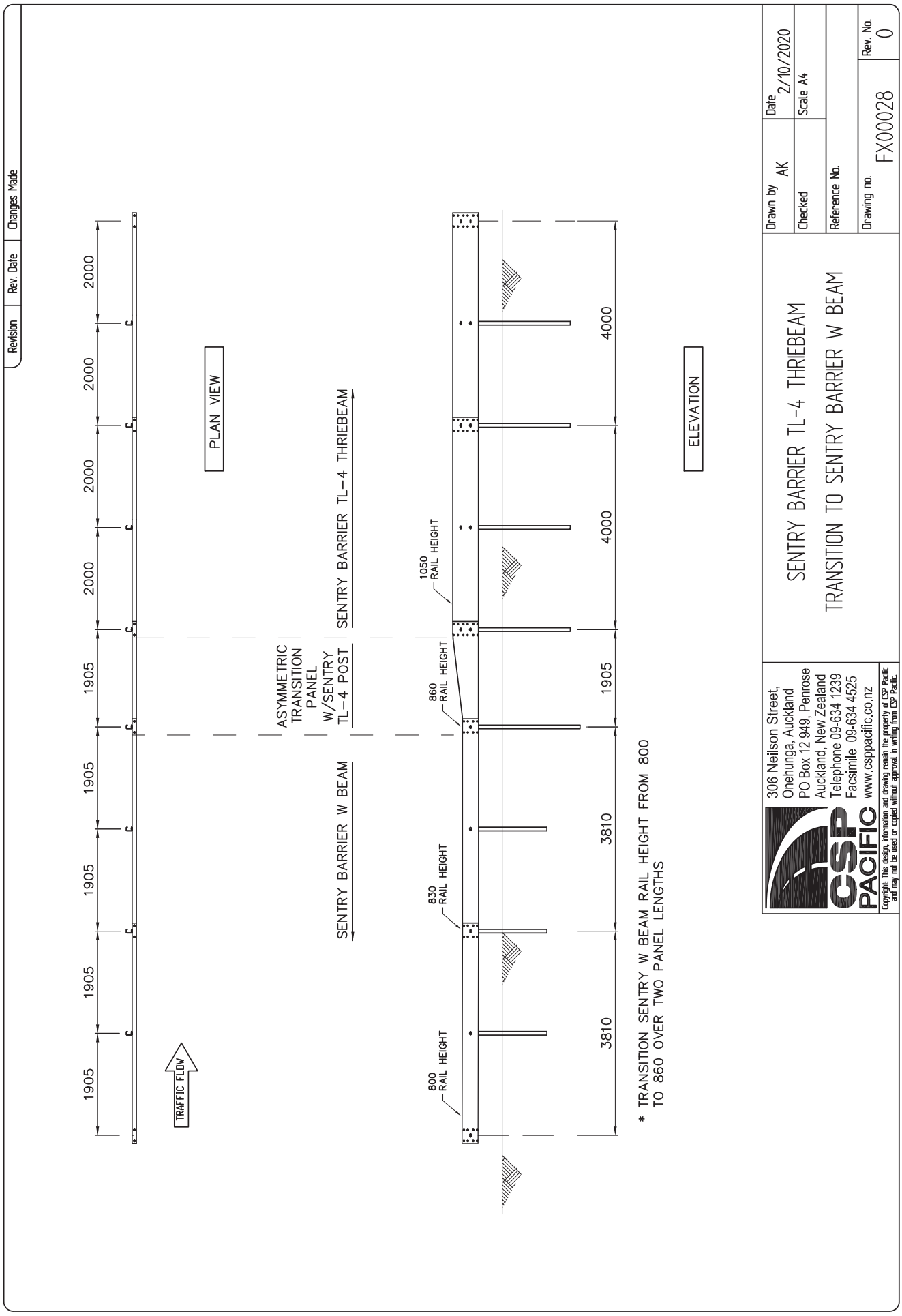
DESTROY ALL PREVIOUS ISSUES

0 REVISION

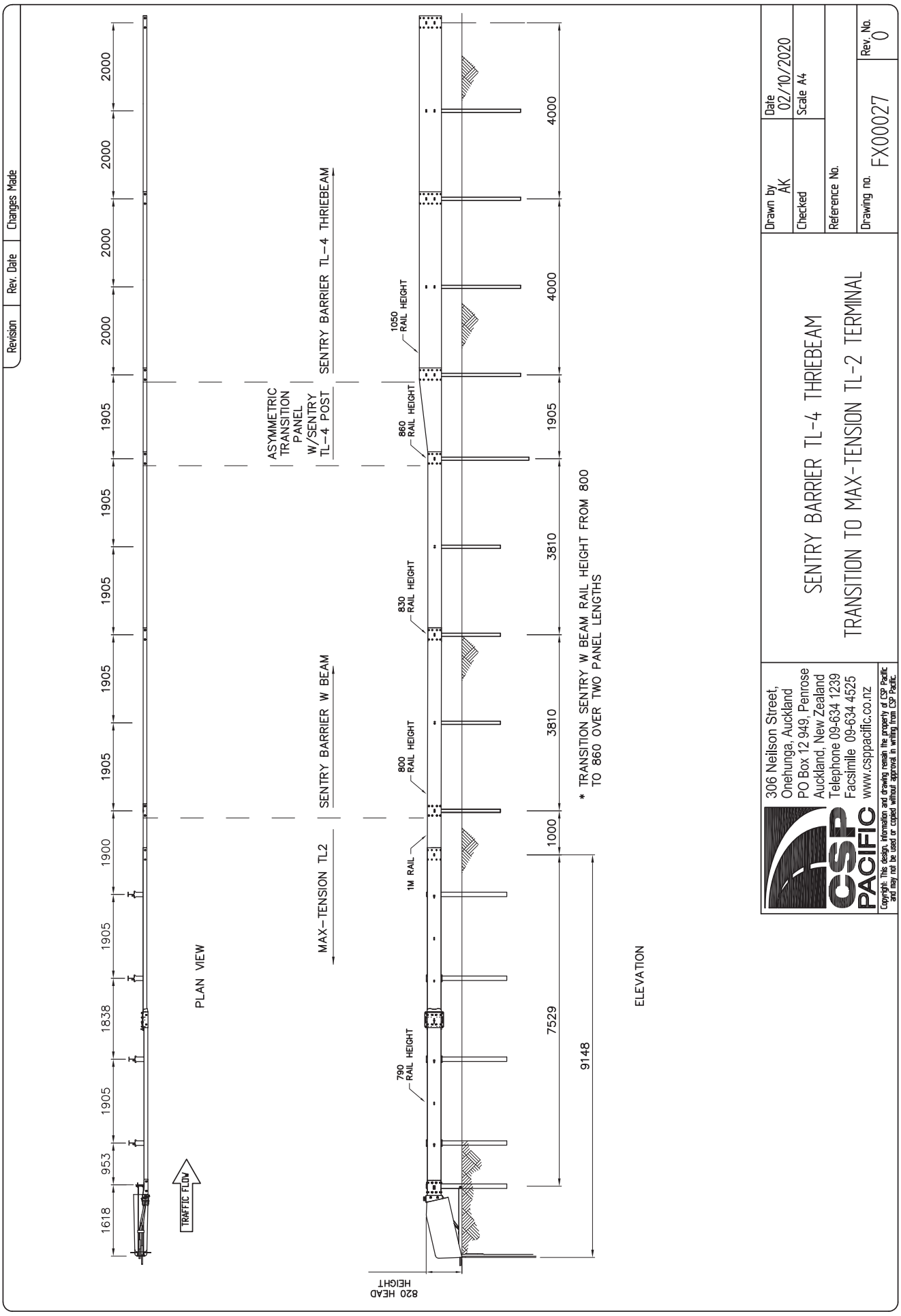
Appendix C – Installation Tolerance



Appendix D – Sentry Barrier TL-4 Thrie-Beam Transition to Sentry Barrier W-Beam



Appendix E – Sentry Barrier TL-4 Thrie-Beam Transition to MAX-Tenstion TL-2 Terminal



Appendix F – Sentry Barrier TL-4 Thrie-Beam Transition to MAX-Tenstion TL-3 Terminal