U.S. Department of Transportation
Federal Highway Administration

January 11, 2021

1200 New Jersey Ave., SE
Washington, D.C. 20590

In Reply Refer To:
HSST-1/B-354

Mr. Sandip Kerai
CSP Pacific
304 Neilson Street,
Onehunga Auckland 1061
New Zealand

Dear Mr. Kerai:

This letter is in response to your September 7, 2020 request for the Federal Highway Administration (FHWA) to review a roadside safety device, hardware, or system for eligibility for reimbursement under the Federal-aid highway program. This FHWA letter of eligibility is assigned FHWA control number B-354 and is valid until a subsequent letter is issued by FHWA that expressly references this device.

Decision

The following device is eligible within the length-of-need, with details provided in the form which is attached as an integral part of this letter:

- Sentryline-M, Level Terrain

Scope of this Letter

To be found eligible for Federal-aid funding, new roadside safety devices should meet the crash test and evaluation criteria contained in the American Association of State Highway and Transportation Officials'(AASHTO) Manual for Assessing Safety Hardware (MASH). However, the FHWA, the Department of Transportation, and the United States Government do not regulate the manufacture of roadside safety devices. Eligibility for reimbursement under the Federal-aid highway program does not establish approval, certification or endorsement of the device for any particular purpose or use.

This letter is not a determination by the FHWA, the Department of Transportation, or the United States Government that a vehicle crash involving the device will result in any particular outcome, nor is it a guarantee of the in-service performance of this device. Proper manufacturing, installation, and maintenance are required in order for this device to function as tested.

This finding of eligibility is limited to the crashworthiness of the system and does not cover other structural features, nor conformity with the Manual on Uniform Traffic Control Devices.

Eligibility for Reimbursement

Based solely on a review of crash test results and certifications submitted by the manufacturer, and the crash test laboratory, FHWA agrees that the device described herein meets the crash test and evaluation criteria of the AASHTO's MASH. Therefore, the device is eligible for reimbursement under the Federal-aid highway program if installed under the range of tested conditions.

Name of system: Sentryline-M, Level Terrain
Type of system: Longitudinal Barrier
Test Level: Test Level 4 (TL4)
Testing conducted by: Holmes Solutions LP
Date of request: September 7, 2020

FHWA concurs with the recommendation of the accredited crash testing laboratory on the attached form.

Full Description of the Eligible Device

The device and supporting documentation, including reports of the crash tests or other testing done, videos of any crash testing, and/or drawings of the device, are described in the attached form.

Notice

This eligibility letter is issued for the subject device as tested. Modifications made to the device are not covered by this letter. Any modifications to this device should be submitted to the user (i.e., state DOT) as per their requirements.

You are expected to supply potential users with sufficient information on design, installation and maintenance requirements to ensure proper performance.

You are expected to certify to potential users that the hardware furnished has the same chemistry, mechanical properties, and geometry as that submitted for review, and that it will meet the test and evaluation criteria of AASHTO's MASH.

Issuance of this letter does not convey property rights of any sort or any exclusive privilege. This letter is based on the premise that information and reports submitted by you are accurate and correct. We reserve the right to modify or revoke this letter if: (1) there are any inaccuracies in the information submitted in support of your request for this letter, (2) the qualification testing was flawed, (3) in-service performance or other information reveals safety problems, (4) the system is significantly different from the version that was crash tested, or (5) any other information indicates that the letter was issued in error or otherwise does not reflect full and complete information about the crashworthiness of the system.

Standard Provisions

- To prevent misunderstanding by others, this letter of eligibility designated as FHWA control number B-354 shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed upon request.

- This letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder.

- This FHWA eligibility letter is not an expression of any Agency view, position, or determination of validity, scope, or ownership of any intellectual property rights to a specific device or design. Further, this letter does not impute any distribution or licensing rights to the requester. This FHWA eligibility letter determination is made based solely on the crash-testing information submitted by the requester. The FHWA reserves the right to review and revoke an earlier eligibility determination after receipt of subsequent information related to crash testing.

Sincerely,

Michael S. Griffith
Director, Office of Safety Technologies
Office of Safety

Enclosures

Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

Submitter	Date of Request:	September 07, 2020	◉ New ○ Resubmission
	Name:	Sandip Kerai	
	Company:	CSPPacific	
	Address:	304 Neilson Street, Onehunga Auckland 1061	
	Country:	New Zealand	
	To:	Michael S. Griffith, Director FHWA, Office of Safety Technologies	

I request the following devices be considered eligible for reimbursement under the Federal-aid highway program.

Device & Testing Criterion - Enter from right to left starting with Test L ! - ! - ! - -

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'B':Rigid/Semi-Rigid Barriers	◉ Physical Crash Testing ○ Engineering Analysis	Sentryline-M	AASHTO MASH	TL4

By submitting this request for review and evaluation by the Federal Highway Administration, I certify that the product(s) was (were) tested in conformity with the AASHTO Manual for Assessing Safety Hardware and that the evaluation results meet the appropriate evaluation criteria in the MASH.

Individual or Organization responsible for the product:

Contact Name:	Sandip Kerai	Same asSubmitter ☒
Company Name:	CSP Pacific	Same asSubmitter ☒
Address:	304 Neilson Street, Onehunga Auckland 1061	Same asSubmitter ☒
Country:	New Zealand	Same asSubmitter ☒

Enter below all disclosures of financial interests as required by the FHWA `Federal-Aid Reimbursement Eligibility Process for Safety Hardware Devices' document.

Holmes Solutions LP completed all of the documented testing activities under a commercial contract with CSP Pacific. In accordance with the requirements of ISO 17025, all testing activities completed by Holmes Solutions LP were undertaken free from any undue commercial influence. For the completion of this testing service, Holmes Solutions LP received payment in the form of professional fees. The fees received for the testing activities were not linked to the technical performance of the product nor the outcome of the tests. Holmes Solutions LP does not have, nor ever had, any financial interest in CSP Pacific, and has no ownership of any of the products IP. Holmes Solutions LP does not receive any research funding (or other forms of research support) from CSP Pacific.

PRODUCT DESCRIPTION

Help

(•) New Hardware or Significant Modification ( ) Modification to Existing Hardware

The Sentryline-M barrier system consists of four individual 19.0 mm (0.75") cables supported on rectangular section steel line posts at 3.0 m (9.84 ft.) centres. The height of each cable was 900 mm (35.4"), 800 mm (31.5"), 700 mm (27.5") and 590 mm (23.2") respectively.
All posts were placed into 400 mm (15.75") deep concrete ground sockets in AASHTO standard soil at 3.0 m (9.84 ft.) centres. Steel cast in ground sockets were used for compliance testing but will be manufactured from HDPE plastic for future use, the steel sockets were considered worst case due to having only a minor 2.0 mm radius relief at the top of the sockets causing pinching of the post, thereby creating higher opportunity for system failure. The Length of Need consisted of 55 steel line posts with a total Length of Need of 165.0 m (541 ft.). The total length of the barrier system including terminal ends was 185.0 m (606ft.).
The post has a central slot at the top of the post approximately 80.0 mm (3.15") long x 20 mm (0.8") wide to accommodate the top cable. At the side of each post there are slots measuring 33.5 mm (1.3") Long x 11.0 mm (0.43") wide to accommodate half ties which attach the lower system cables to the post. There are two slots on one side of the post, and one slot on the opposing side.
The half ties are manufactured from 5052-H32 aluminum, and measure approximately 76.0 mm (3.0") in length x 48.0 mm (1.89") wide and 8.0 mm (0.31") thick. The half ties are placed into the side slots of each post to attach the cables to the post assembly. There are three half ties per post, with the top cable located in the central slot of the post.
Each of the four 19.0 mm (0.75") cables are terminated with cables fittings. The cables at terminal ends are terminated at a cable Terminal Frame Base which is bolted to in-ground concrete foundation and associated steel cages. Cable adjustment and tension is achieved using turnbuckles located within the length of need. One adjustment mechanism is provided per cable. All testing carried out on level terrain.

CRASH TESTING

By signature below, the Engineer affiliated with the testing laboratory, agrees in support of this submission that all of the critical and relevant crash tests for this device listed above were conducted to meet the MASH test criteria. The Engineer has determined that no other crash tests are necessary to determine the device meets the MASH criteria.

Engineer Name:	Emerson Ryder	
Engineer Signature:	Emerson Ryder Digitally signed by Emerson Ryder Date: 2020.08.14 08:41:53 +12'00'	
Address:	7 Canterbury Street Hornby, Christchurch	Same as Submitter ☐
Country:	New Zealand	Same as Submitter ☐

A brief description of each crash test and its result:

Help

Required Test Number	Narrative Description	Evaluation Results
4-10 (1100C)	The longitudinal barrier successfully contained and redirected a 1100C test vehicle impacting the test article at 25.2 degrees with a velocity of 99.9 km/h. No debris or detached elements penetrated or showed potential to penetrate the occupant compartment. No fragments were distributed outside of the vehicle trajectory and therefore did not present any undue hazard to other traffic, pedestrians or work zone personnel. Occupant risk factors satisfied the test criteria and the vehicle exit trajectory remained within acceptable limits. Dynamic Deflection was 1.80 m(5.9 ft.). Working Width was 2.0 m (6.5ft.) Test number was 137460.4-10. Test date was 21 May 2019	PASS
4-11 (2270P)	The longitudinal barrier successfully contained and redirected a 2270P test vehicle impacting the test article at 25.3 degrees with a velocity of 99.2 km/h. No debris or detached elements penetrated or showed potential to penetrate the occupant compartment. No fragments were distributed outside of the vehicle trajectory and therefore did not present any undue hazard to other traffic, pedestrians or work zone personnel. Occupant risk factors satisfied the test criteria and the vehicle exit trajectory remained within acceptable limits. Dynamic Deflection was 3.02 m(9.9 ft.). Working Width was also 3.02 m(9.9 ft.). Test number was 137460.4-11. Test date was 21 May 2019	PASS
4-12 (10000S)	The longitudinal barrier successfully contained and redirected a 10000S test vehicle impacting the test article at 14.6 degrees with a velocity of 88.5 km/h. No debris or detached elements penetrated or showed potential to penetrate the occupant compartment. No fragments were distributed outside of the vehicle trajectory and therefore did not present any undue hazard to other traffic, pedestrians or work zone personnel. Occupant risk factors satisfied the test criteria and the vehicle exit trajectory remained within acceptable limits. Dynamic Deflection was 2.15 m(7.0 ft.). Working Width was also 3.05 m(10.0 ft.) at a height of 3.0 m (9.8 ft.) above ground level. Test number was 137460.4-12. Test date was 24 May 2019	PASS
4-20 (1100C)		Non-Relevant Test, not conducted

Required Test Number	Narrative Description	Evaluation Results
4-21 (2270P)		Non-Relevant Test, not conducted
4-22 (10000S)		Non-Relevant Test, not conducted

Full Scale Crash Testing was done in compliance with MASH by the following accredited crash test laboratory (cite the laboratory's accreditation status as noted in the crash test reports.):

Laboratory Name:	HolmesSolutions LP	
Laboratory Signature:	Emerson Ryder Digitally signed by Emerson Ryder Date: 2020.08.14 08:42:24 +12'00'	
Address:	7 Canterbury Street Hornby, Christchurch	Same as Submitter ☐
Country:	New Zealand	Same as Submitter ☐
Accreditation Certificate Number and Dates of current Accreditation period :	1022 NZS ISO/IEC 17025:2005 Accreditation period valid until August 2021	

Submitter Signature*: Sandip Kerai (CSP) Digitally signed by Sandip Kerai (CSP) Date: 2020.09.07 12:22:40 +12'00'

Submit Form

ATTACHMENTS

Attach to this form:

1) Additional disclosures of related financial interest as indicated above.
2) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
3) A drawing or drawings of the device(s) that conform to the Task Force-13 Drawing Specifications [Hardware Guide Drawing Standards]. For proprietary products, a single isometric line drawing is usually acceptable to illustrate the product, with detailed specifications, intended use, and contact information provided on the reverse. Additional drawings (not in TF-13 format) showing details that are relevant to understanding the dimensions and performance of the device should also be submitted to facilitate our review.

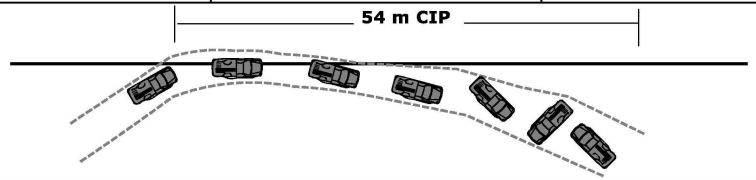
FHWA Official Business Only:

Eligibility Letter		
Number	Date	Key Words



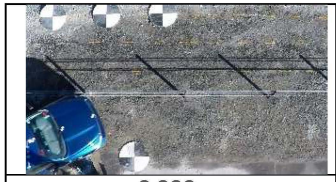


0.000 s	0.437s	0.200 s	0.300 s	0.400 s



Test Article:	Sentryline-M Wire Rope longitudinal barrier
Total Length	185.0 m (607 ft)
Key Elements - Barrier	MASH TL4-10 Test
Description	Wire Rope Safety Barrier with Steel Line Posts
Length of Need	165 metres (541 ft)
Cable Heights	900 mm (35.4"), 800mm (31.5"), 700mm (27.5"), 590mm (23.2")
Post Spacing	3.0 m (9.84 ft)
Test Vehicle	
Designation	1100C
Make/Model	2010 Nissan Tiida
Dimensions (LxWxH)	4320 mm x 1690 mm x 1590 mm
Curb Wt	1087 kg
Test Inertial Wt	1094.5 kg
Gross Static	1169.5 kg
Impact Conditions	
Speed	99.9 km/h
Angle	25.2°
Impact Point	1451 mm Upstream of line post 22
Exit Conditions	
Exit Speed:	76.5 km/h
Exit Angle:	2.3°
Test Date	21 May 2019
Test Number	137460.4-10

Post Impact Vehicle Behaviour	
Vehicle Stability	Good
Stopping Distance	54 metres from CIP
Vehicle Snagging	None
Vehicle Pocketing	None
Occupant Impact Velocity (m/s)	At 0.4220 seconds on front of interior
Longitudinal	3.2 m/s
Lateral (optional)	-3.6 m/s
Occupant Ride-down Deceleration	
X-direction (g)	-5.4 (0.4249 - 0.4349 seconds)
Y-direction (g)	8.2 (0.7023 - 0.7123 seconds)
THIV (optional) (m/s)	5.5 m/s at 0.4224 seconds
PHD (optional) (g)	9.0 (0.4401 - 0.4501 seconds)
ASI (optional)	0.53 (0.5342 - 0.5842 seconds)
Test Article Damage	Moderate
Test Article Deflections	
Dynamic	1.80 m
Permanent	0.65 m
Working Width	2.00 m
Vehicle Damage Exterior	
VDS	11FL-3
CDC	11LFEE3
Maximum Deformation	225 mm



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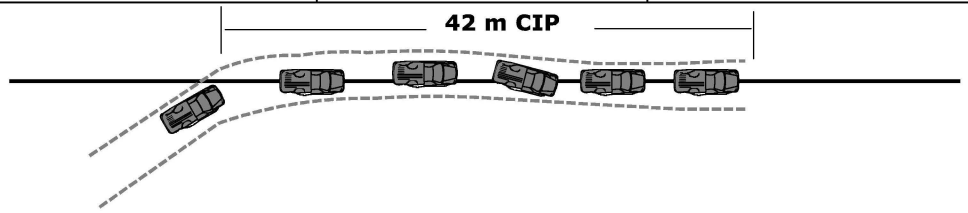


Test Article:	Sentryline-M Wire Rope longitudinal barrier
Total Length	185.0 m (606 ft)
Key Elements - Barrier	MASH TL4-11 Test
Description	Wire Rope Safety Barrier with Steel Line Posts
Length of Barrier Installation	165 meters (541 ft) LON
Height	900 mm (35.4"), 800mm (31.5"), 700mm (27.5"), 590mm (23.2")
Post Spacing	3.0 m (9.84 ft)
Test Vehicle	
Designation	2270P
Make/Model	2009 Dodge Ram 1500 Quad Cab
Dimensions mm (LxWxH)	5735 mm x 2000 mm x 1840 mm
Curb Wt	2255.0 kg
Test Inertial Wt	2222.5 kg
Gross Static	2222.5 kg
Impact Conditions	
Speed	99.2 km/h
Angle	25.3°
Impact Point	308 mm Upstream of line post 22
Exit Conditions	
Exit Speed:	0 km/h
Exit Angle:	0.6°
Test Date	21 May 2019
Test Number	137460.4-11

Post Impact Vehicle Behaviour		
Vehicle Stability	Good	
Stopping Distance	42 metres from CIP	
Vehicle Snagging	None	
Vehicle Pocketing	None	
Occupant Impact Velocity (m/s)	at 0.5024 seconds on front of interior	
Longitudinal	2.6 m/s	
Lateral (optional)	-2.2 m/s	
Occupant Ride-down Deceleration		
X-direction (g)	-4.5	(1.8943 - 1.9043 seconds)
Y-direction (g)	4.8	(0.7072 - 0.7172 seconds)
THIV (optional) (m/s)	4.1	at 0.5088 seconds
PHD (optional) (g)	5.2	
ASI (optional)	0.45	
Test Article Damage	Moderate	
Test Article Deflections		
Dynamic	3.02 m	
Permanent	0.74 m	
Working Width	3.02 m	
Vehicle Damage Exterior		
VDS	11FL-3	
CDC	11LFEE3	
Maximum Deformation	205 mm	

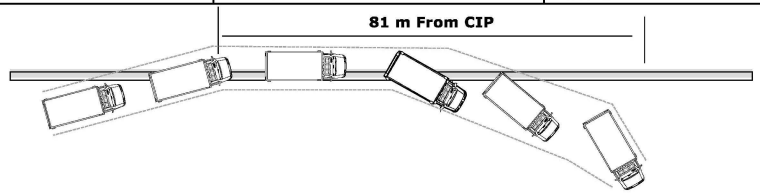

0.0 s


0.1 s


0.2 s


0.3 s


0.4 s

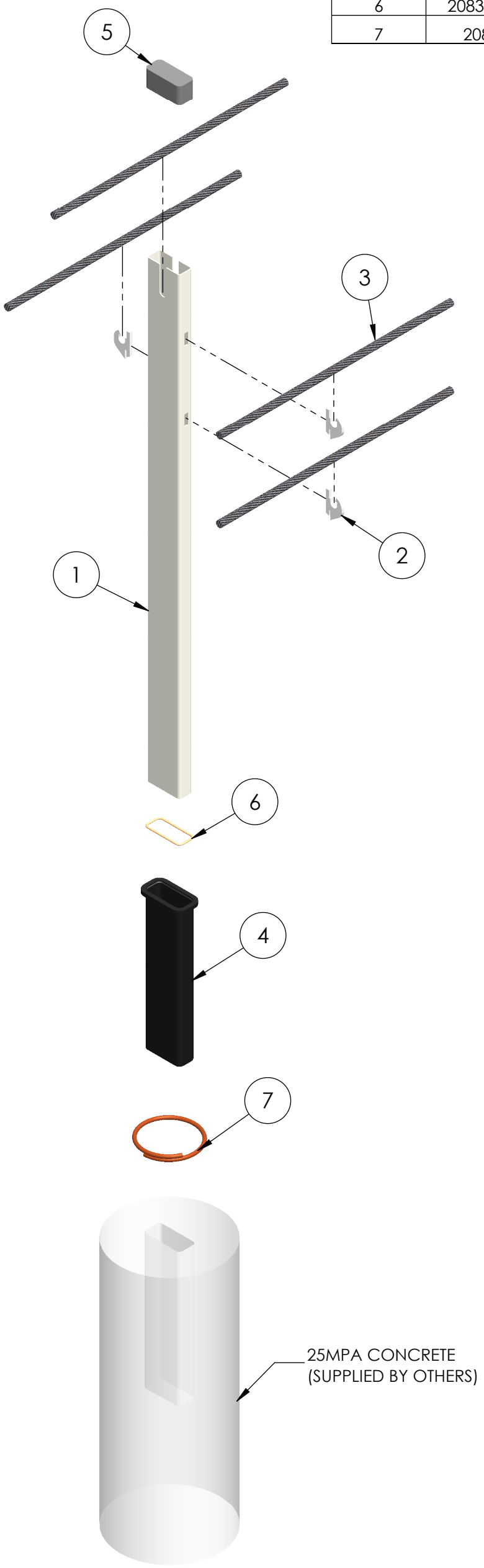


Test Article:	Sentryline-M Wire Rope longitudinal barrier
Total Length	185.0 m (607 ft)
Key Elements - Barrier	MASH TL4-12 Test
Description	Wire Rope Safety Barrier with Steel Line Posts
Length of Barrier Installation	165 meters (541 ft) LON
Height	900 mm (35.4"), 800mm (31.5"), 700mm (27.5"), 590mm (23.2")
Post Spacing	3.0 m (9.84 ft)
Test Vehicle	
Designation	10000S
Make/Model	Iveco EuroCargo
Dimensions (LxWxH)	9380 x 2340 x 3395 mm
Curb Wt	6765.0 kg
Test Inertial Wt	9925.0 kg
Gross Static	9925.0 kg
Impact Conditions	
Speed	88.5 km/h
Angle	14.6°
Impact Point	316 mm upstream of barrier 11A
Exit Conditions	
Exit Speed:	58.2 km/h
Exit Angle:	40.3°
Test Number	137460.4-12
Test Date	24-05-19

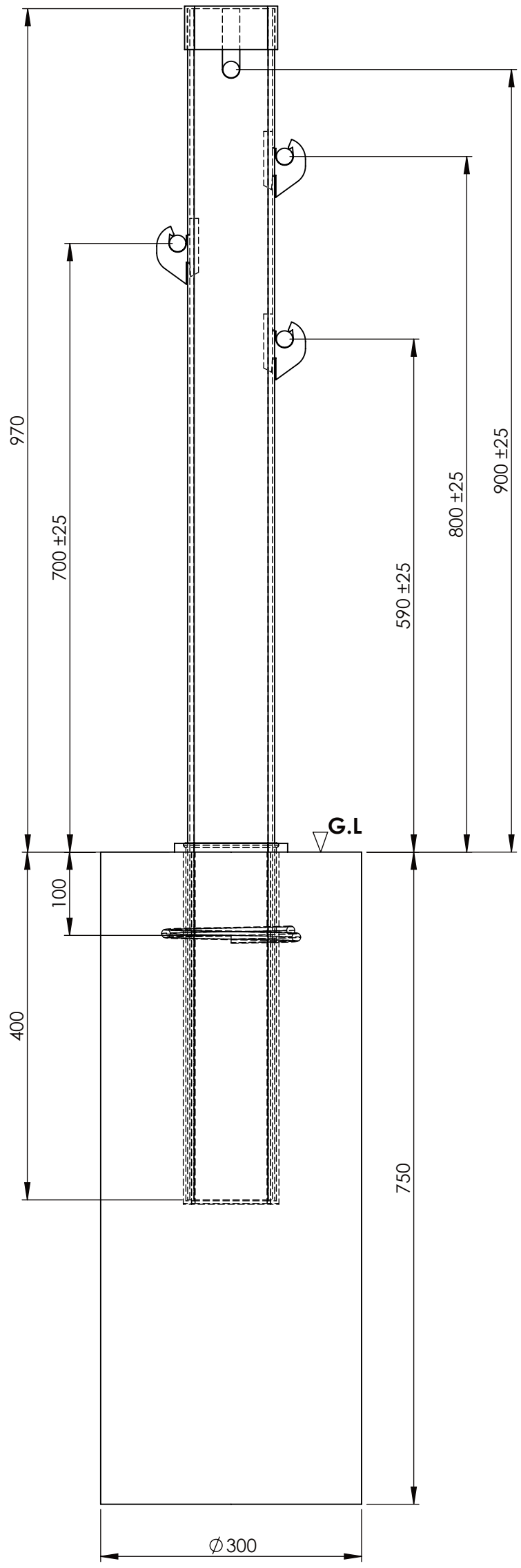
Post Impact Vehicle Behaviour		
Vehicle Stability	Acceptable	
Stopping Distance	81 m	
Vehicle Snagging	None	
Vehicle Pocketing	None	
Occupant Impact Velocity	At 1.3381 seconds on left side of interior	
Longitudinal (m/s)	-1.1	
Lateral (m/s) (optional)	-1.7	
Occupant Ride-down Deceleration		
X-direction	-2.7	(2.1642 - 2.1742 seconds)
Y-direction	2.6	(1.7918 - 1.8018 seconds)
THIV (optional) m/s	1.3 at 1.4185 seconds	
PHD (optional) g	2.9	(2.1642 - 2.1742 seconds)
ASI (optional)	0.26	(1.7671 - 1.8171 seconds)
Test Article Damage	Moderate	
Test Article Deflections		
Dynamic	2.15 m	
Permanent	0.61 m	
Working Width	3.05 m at 3.0 m above the ground (top of cargo box)	
Vehicle Damage Exterior		
VDS	11LF-3	
CDC	11LFEE3	
Maximum Deformation	120 mm	

REVISION	REV.DATE	CHANGES MADE

ITEM NO.	PART NO.	DESCRIPTION	QTY.	WEIGHT EA.	DWG NO.
1	2083131SLM	SL WIRE ROPE LINEPOST 1370mm WHITE - 3 SLOTS	1	7	FX747-1
2	2110162SLM	SL WIRE ROPE HALF TIE 8mm ALUMINIUM	3	0.04	FX747-2
3	2200036SLM	SL WIRE ROPE 19mm DIA.	AS REQUIRED		
4	2083070SLM	SL WIRE ROPE POST SOCKET	1	0.37	FX747-4
5	2083072SLM	SL WIRE ROPE LINEPOST CAP	1	0.07	FX747-3
6	2083073SLM	SL WIRE ROPE LINEPOST O-RING 5mm	1	0.01	FX747-5
7	2083086	SL WIRE ROPE REBAR RING SMOOTH	1	0.34	



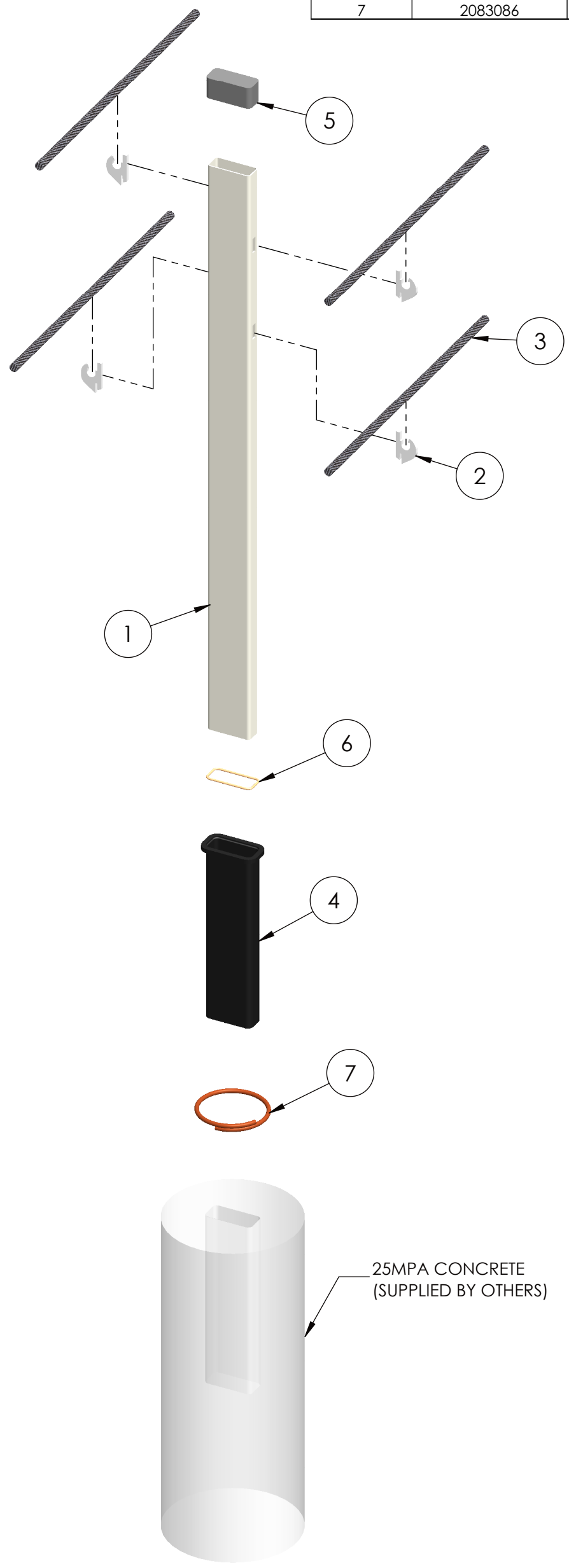
ISO EXPLODED VIEW
SCALE 1:10



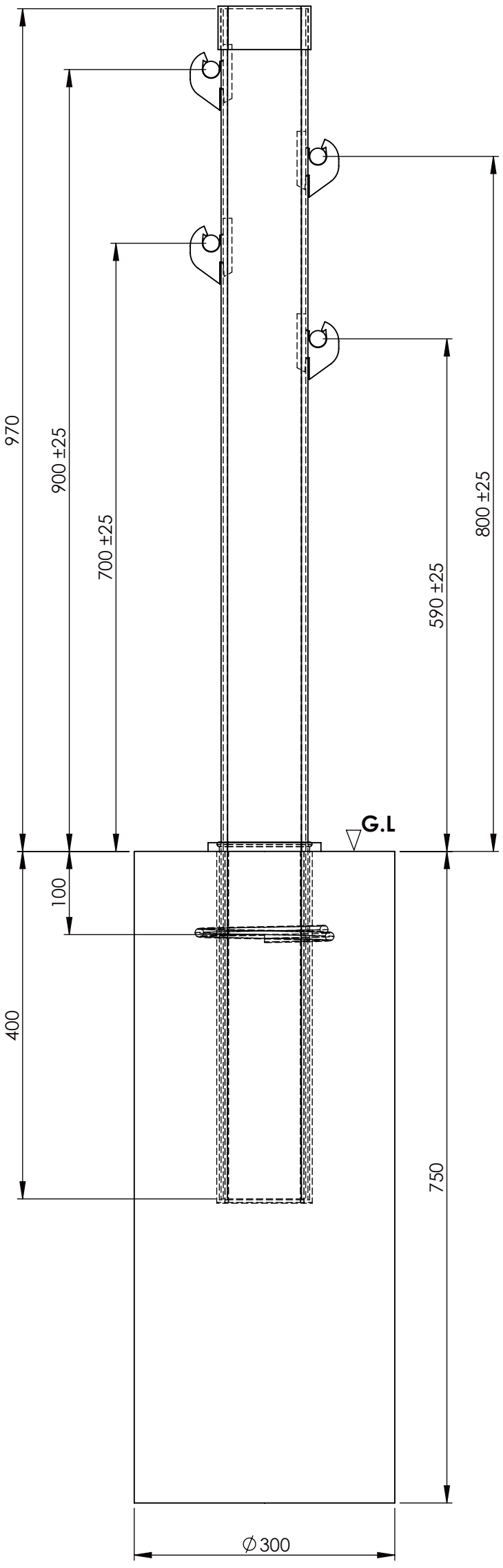
NOTES:					
	CSP PACIFIC 306 Neilson Street Onehunga, Auckland P O Box 12949, Penrose Auckland, New Zealand Telephone: 09 634 1239 Facsimile: 09 634 4525	SCALE A3 1:5 ASSEMBLY NO. 2083095SLM WEIGHT(Kg)	DESCRIPTION SF WIRE ROPE POST STD ASSY WHITE - 3 SLOTS	DRAWN S KERAI DATE 21/11/2019 DRW NO. FX747	DESTROY ALL PREVIOUS ISSUES 0 REVISION

REVISION	REV.DATE	CHANGES MADE

ITEM NO.	PART NO.	DESCRIPTION	QTY.	WEIGHT EA.	DWG NO.
1	2083131SLM-A	SL WIRE ROPE LINEPOST 1370mm WHITE - 4 SLOTS	1	7	FX747A-1
2	2110162SLM	SL WIRE ROPE HALF TIE 8mm ALUMINIUM	4	0.04	FX747-2
3	2200036SLM	SL WIRE ROPE 19mm DIA.	AS REQUIRED		
4	2083070SLM	SL WIRE ROPE POST SOCKET	1	0.37	FX747-4
5	2083072SLM	SL WIRE ROPE LINEPOST CAP	1	0.07	FX747-3
6	2083073SLM	SL WIRE ROPE LINEPOST O-RING 5mm	1	0.01	FX747-5
7	2083086	SL WIRE ROPE REBAR RING SMOOTH	1	0.34	



ISO EXPLODED VIEW
SCALE 1:10



ELEVATION VIEW
SCALE 1:6

NOTES:

CSP PACIFIC
306 Neilson Street
Onehunga, Auckland
P O Box 12949, Penrose
Auckland, New Zealand
Telephone: 09 634 1239
Facsimile: 09 634 4525

SCALE A3	1:5
ASSEMBLY NO.	2083095SLM-A
WEIGHT(Kg)	
DESCRIPTION	SF WIRE ROPE POST STD ASSY WHITE - 4 SLOTS
DRAWN	S KERAI
DATE	21/11/2019
DRW NO.	FX747A

DESTROY ALL PREVIOUS ISSUES

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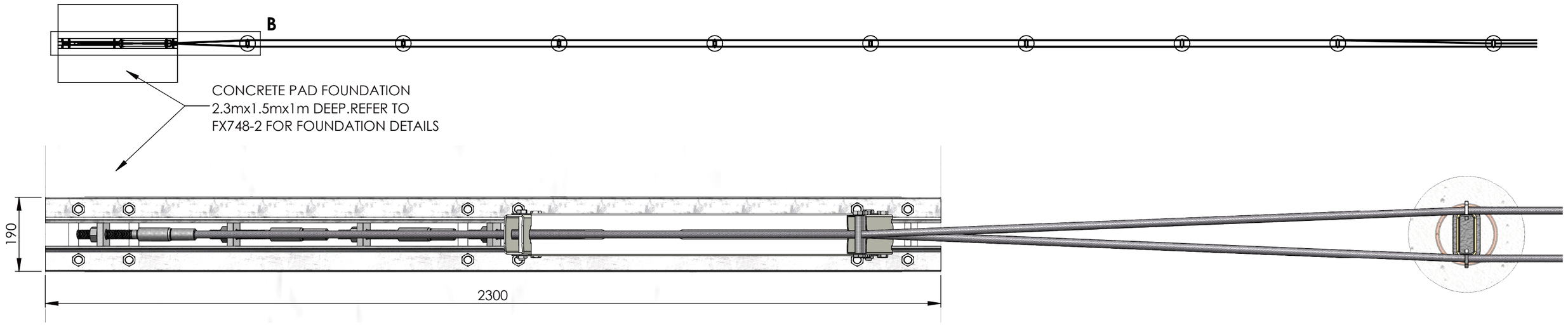
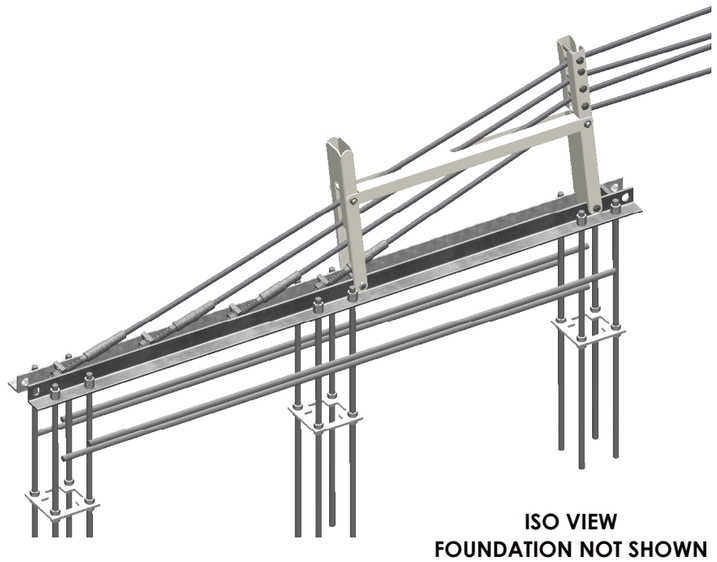
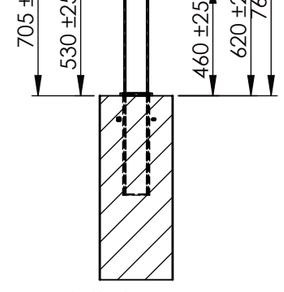
REVISION



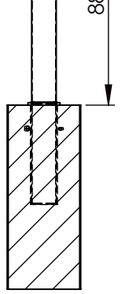
DETAIL B
SCALE 1 : 10



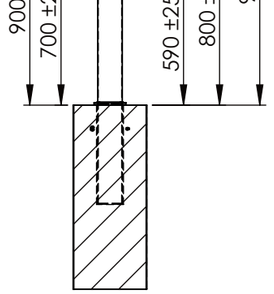
ISO VIEW
FOUNDATION NOT SHOWN
SCALE A3 1:20



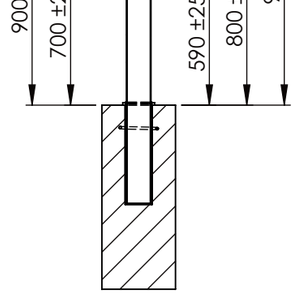
SECTION W-W
POSTS TLP1-TLP4 TYP DETAIL
(TLP3 SHOWN)
SCALE 1 : 25



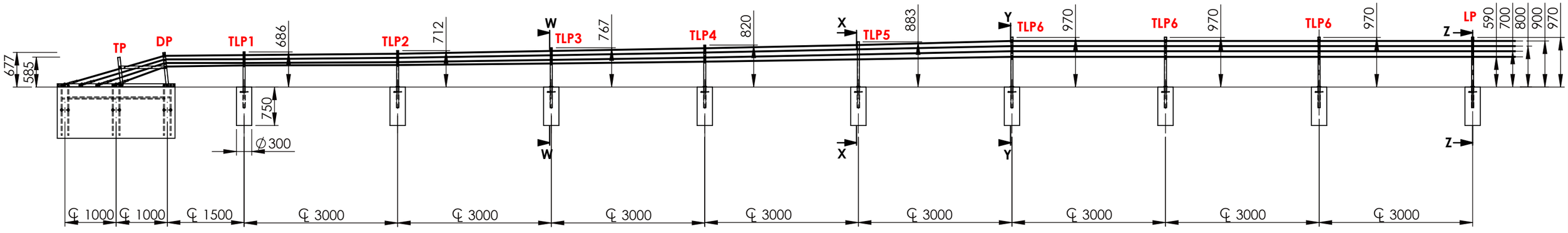
SECTION X-X
POST TLP5 DETAIL
SCALE 1 : 25



SECTION Y-Y
POST TLP6 DETAIL
SCALE 1 : 25



SECTION Z-Z
TYPICAL LP DETAIL
SCALE 1 : 25



NOTES:

REVISION	REV.DATE	CHANGES MADE

CSP PACIFIC
304 Neilson Street
Onehunga, Auckland
P O Box 12949, Penrose
Auckland, New Zealand
Telephone: 09 634 1239
Facsimile: 09 634 4525

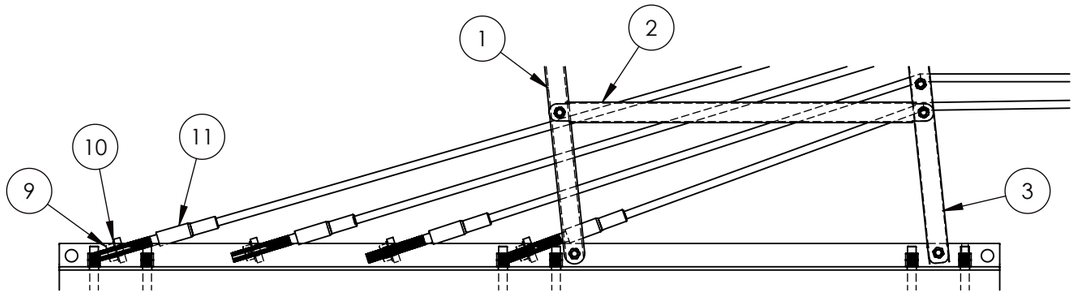
SCALE A3	1:75
ASSEMBLY NO.	2083091SLM
WEIGHT(Kg)	

DESCRIPTION
SL WIRE ROPE TERMINAL END UNIT
WHITE - CONCRETE BLOCK OPTION
GENERAL ARRANGEMENT

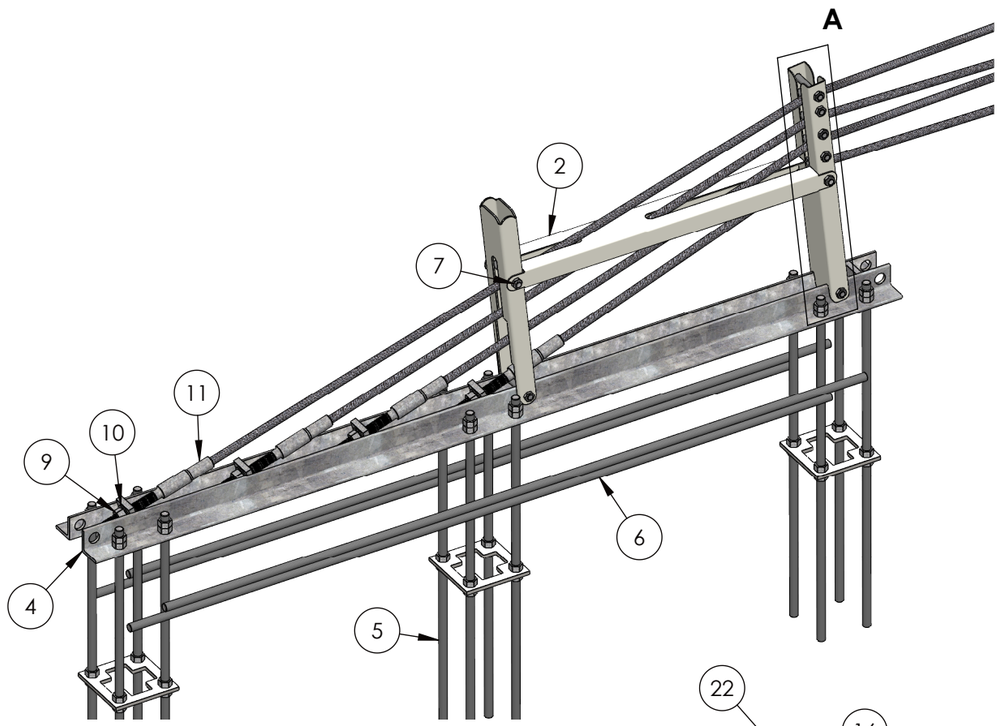
DRAWN	S KERAI
DRW NO.	FX748
DATE	21/11/2019

DESTROY ALL PREVIOUS ISSUES
0
REVISION

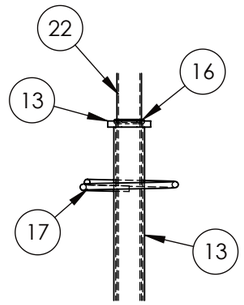
ITEM NO.	PART NO.	DESCRIPTION	QTY.	WEIGHT EA.	DWG NO.
1	2083133SLM	SL WIRE ROPE STE TRIGGER POST 570mm WHITE	1	3.46	FX750-4
2	2083076SLM	SL WIRE ROPE STE STRUT 107x50x2.5t 940mm WHITE	1	3.95	FX750-5
3	2083077SLM	SL WIRE ROPE STE DEFLECTION POST 660mm WHITE	1	2.68	FX750-3
4	2083032SLM	SL WIRE ROPE STE GROUND BASE FRAME 2300mm GALV	1	36.77	FX750, FX750-1
5	2083071SLM	SL WIRE ROPE STE HOLD DOWN ASSEMBLY 4M20x1000L 130CRS	3	13.25	FX751
6	2110230H	BNW FULLY THREADED ROD M20x2000L GALV	6	5	
7	2081130A	BNW ENG BOLT & 1/2NUT M16x110 GALV 8.8	6	0.21	
8	2081131	BNW ENG BOLT & 1/2NUT M16x120 GALV 8.8	2	0.23	
9	2110162	BNW ENG NUT M24 GALV 4.6	4	0.1	
10	2110839	BNW WASHER ROUND M24x50x3 GALV	4	0.03	
11	2083075	SL WIRE ROPE SELF SWAGE FITTING M24	4	1.54	
12	2200036	SL WIRE ROPE 19mm DIA	AS REQUIRED		
13	2083070SLM	SL WIRE ROPE POST SOCKET	8	0.37	FX747-4
14	2083078SLM	SL WIRE ROPE STE TRANSITION POST 1 1086mm WHITE	1	6	FX749-1
15	2110162SLM	SL WIRE ROPE HALF TIE 8mm ALUMINIUM	28	0.04	FX747-2
16	2083073SLM	SL WIRE ROPE LINEPOST O-RING 5mm	8	0.01	FX747-5
17	2083086	SL WIRE ROPE REBAR RING SMOOTH	8	0.34	
18	2083079SLM	SL WIRE ROPE STE TRANSITION POST 2 1112mm WHITE	1	6	FX749-2
19	2083080SLM	SL WIRE ROPE STE TRANSITION POST 3 1167mm WHITE	1	6	FX749-3
20	2080223SLM	SL WIRE ROPE STE TRANSITION POST 4 1220mm WHITE	1	6	FX749-4
21	2083130SLM	SL WIRE ROPE STE TRANSITION POST 5 1283mm WHITE	1	7	FX749-5
22	2083131SLM-A	SL WIRE ROPE LINEPOST 1370mm WHITE - 4 SLOTS	3	7	FX747A-1
23	2083072SLM	SL WIRE ROPE LINEPOST CAP	3	0.07	FX747-3



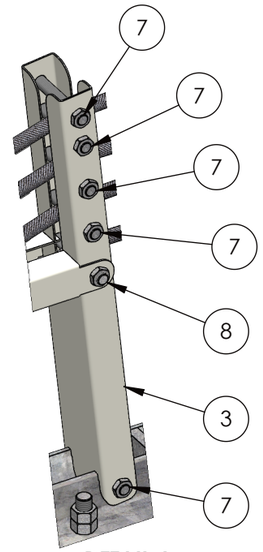
DETAIL B
SCALE 1 : 15



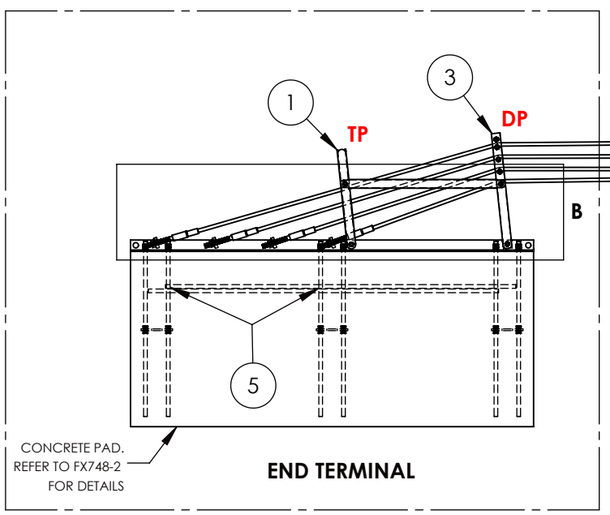
ISO VIEW
SCALE 1:20



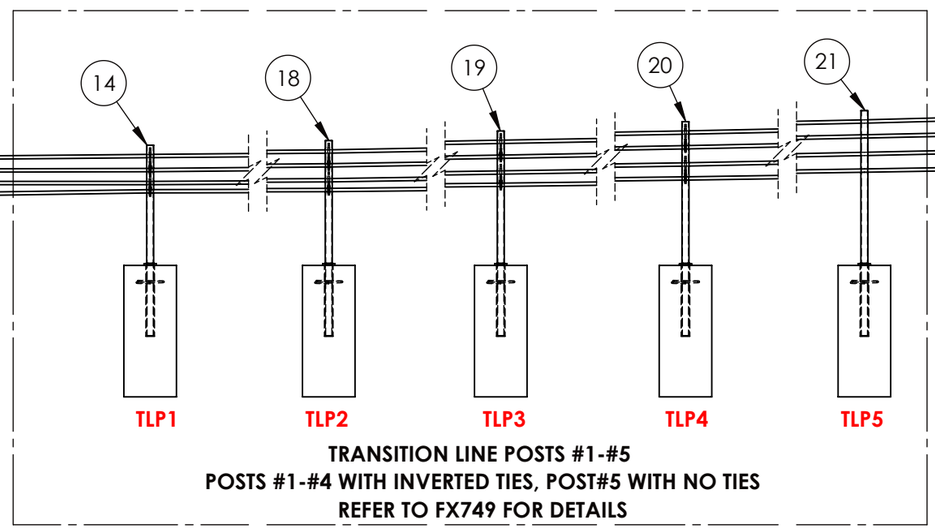
DETAIL C
SCALE 1 : 10



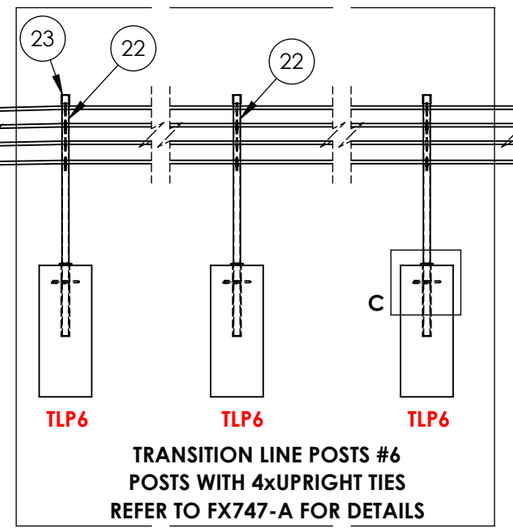
DETAIL A
SCALE 1 : 8



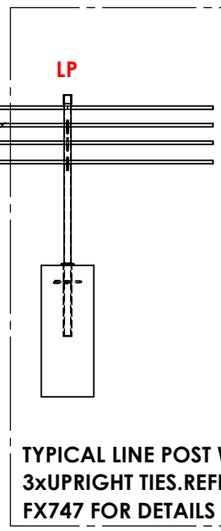
END TERMINAL



TRANSITION LINE POSTS #1-#5
POSTS #1-#4 WITH INVERTED TIES, POST#5 WITH NO TIES
REFER TO FX749 FOR DETAILS



TRANSITION LINE POSTS #6
POSTS WITH 4xUPRIGHT TIES
REFER TO FX747-A FOR DETAILS



TYPICAL LINE POST WITH
3xUPRIGHT TIES.REFER TO
FX747 FOR DETAILS

NOTES:

REVISION	REV.DATE	CHANGES MADE

CSP PACIFIC
304 Neilson Street
Onehunga, Auckland
P O Box 12949, Penrose
Auckland, New Zealand
Telephone: 09 634 1239
Facsimile: 09 634 4525

SCALE A3	1:35
ASSEMBLY NO.	2083091SLM
WEIGHT(Kg)	

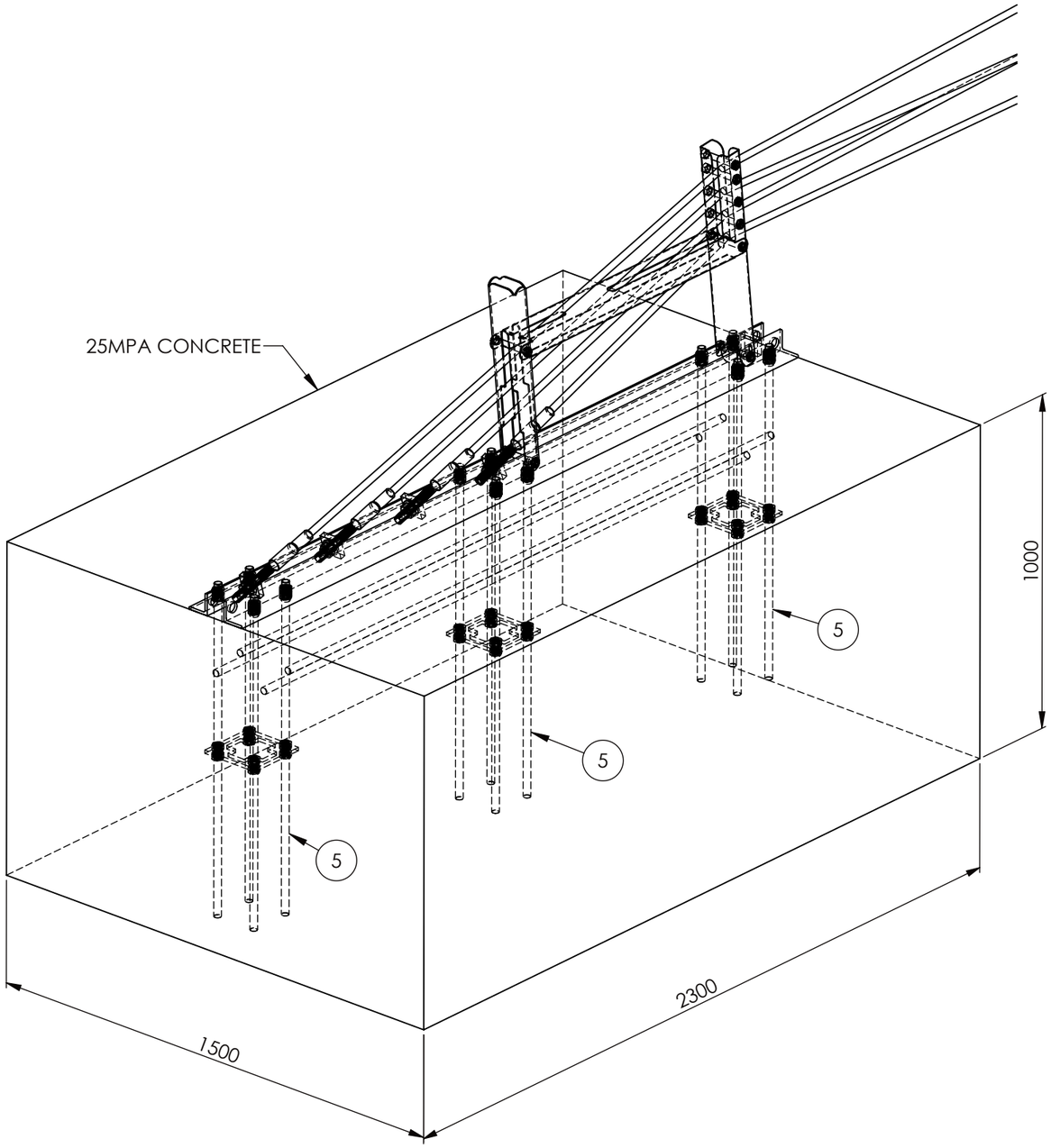
DESCRIPTION

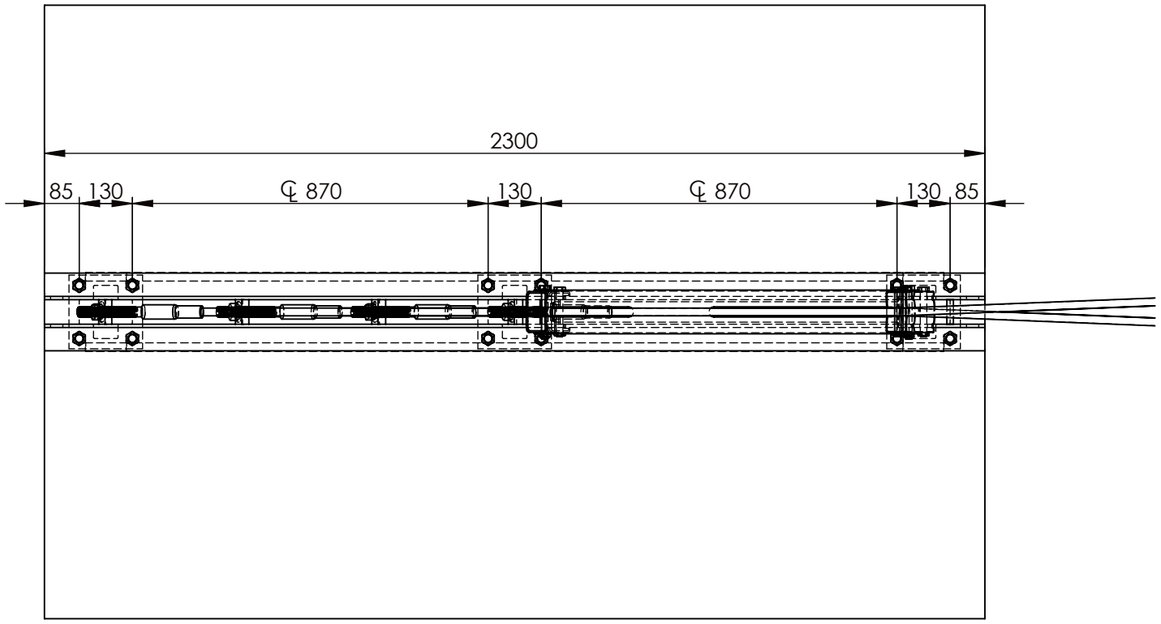
SL WIRE ROPE TERMINAL END UNIT
WHITE - CONCRETE BLOCK OPTION
BILL OF MATERIALS

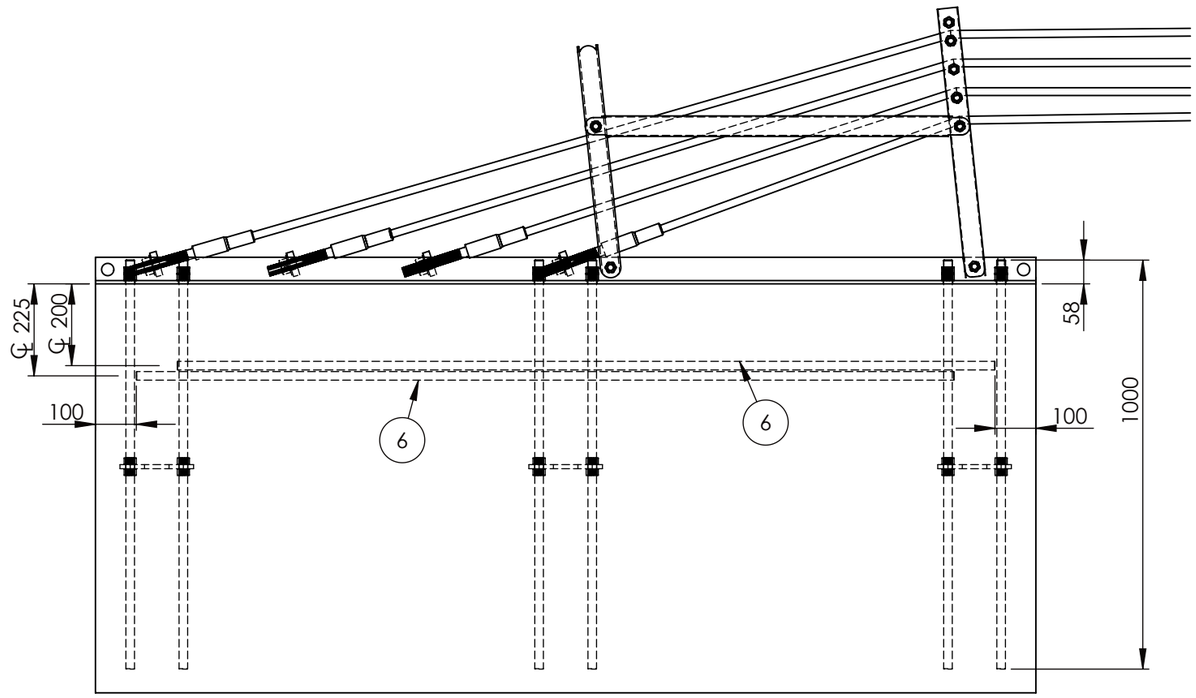
DRAWN	S KERAI
DRW NO.	FX748-1
DATE	21/11/2019

DESTROY ALL PREVIOUS ISSUES
0
REVISION

ITEM NO.	PART NO.	DESCRIPTION	QTY.	WEIGHT EA.	DWG NO.
5	2083071SLM	SL WIRE ROPE STE HOLD DOWN ASSEMBLY 4M20x1000L 130CRS	3	13.25	FX751
6	2110230H	BNW FULLY THREADED ROD M20x2000L GALV	6	5	







NOTES:

1.2m REINFORCING THREADED RODS TO BE TIED TO 1m HOLD DOWN ASSEMBLY WITH STEEL WIRE ON SITE.

2. 2x2m THREADED RODS USED FOR SUSPENDING BASE FRAME ABOVE FOUNDATION HOLE NOT SHOWN FOR CLARITY.

REVISION	REV.DATE	CHANGES MADE

CSP PACIFIC

304 Neilson Street
Onehunga, Auckland
P O Box 12949, Penrose
Auckland, New Zealand
Telephone: 09 634 1239
Facsimile: 09 634 4525

SCALE A3	1:15
ASSEMBLY NO.	
WEIGHT(Kg)	

DESCRIPTION

SL WIRE ROPE TERMINAL END UNIT
CONCRETE BLOCK FOUNDATION DETAILS

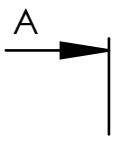
DRAWN	S KERAI
DRW NO.	FX748-2
DATE	21/11/2019

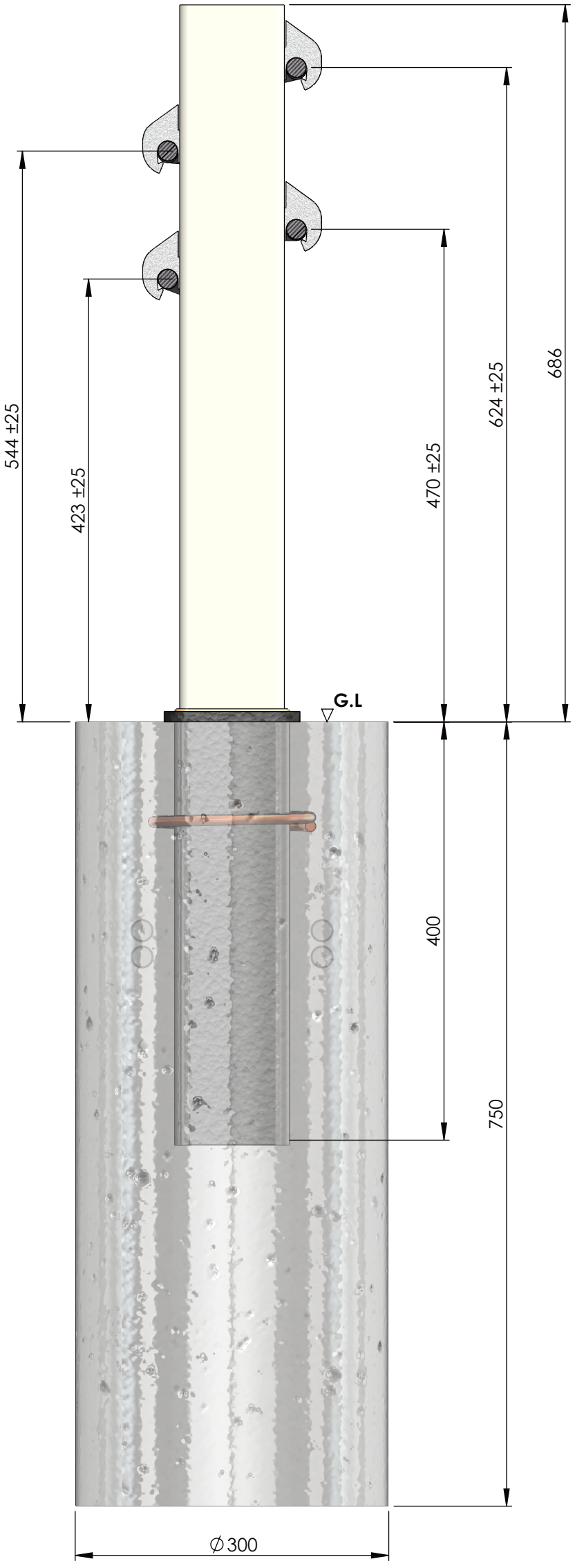
DESTROY ALL PREVIOUS ISSUES

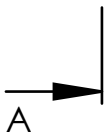
0

REVISION

REVISION	REV.DATE	CHANGES MADE



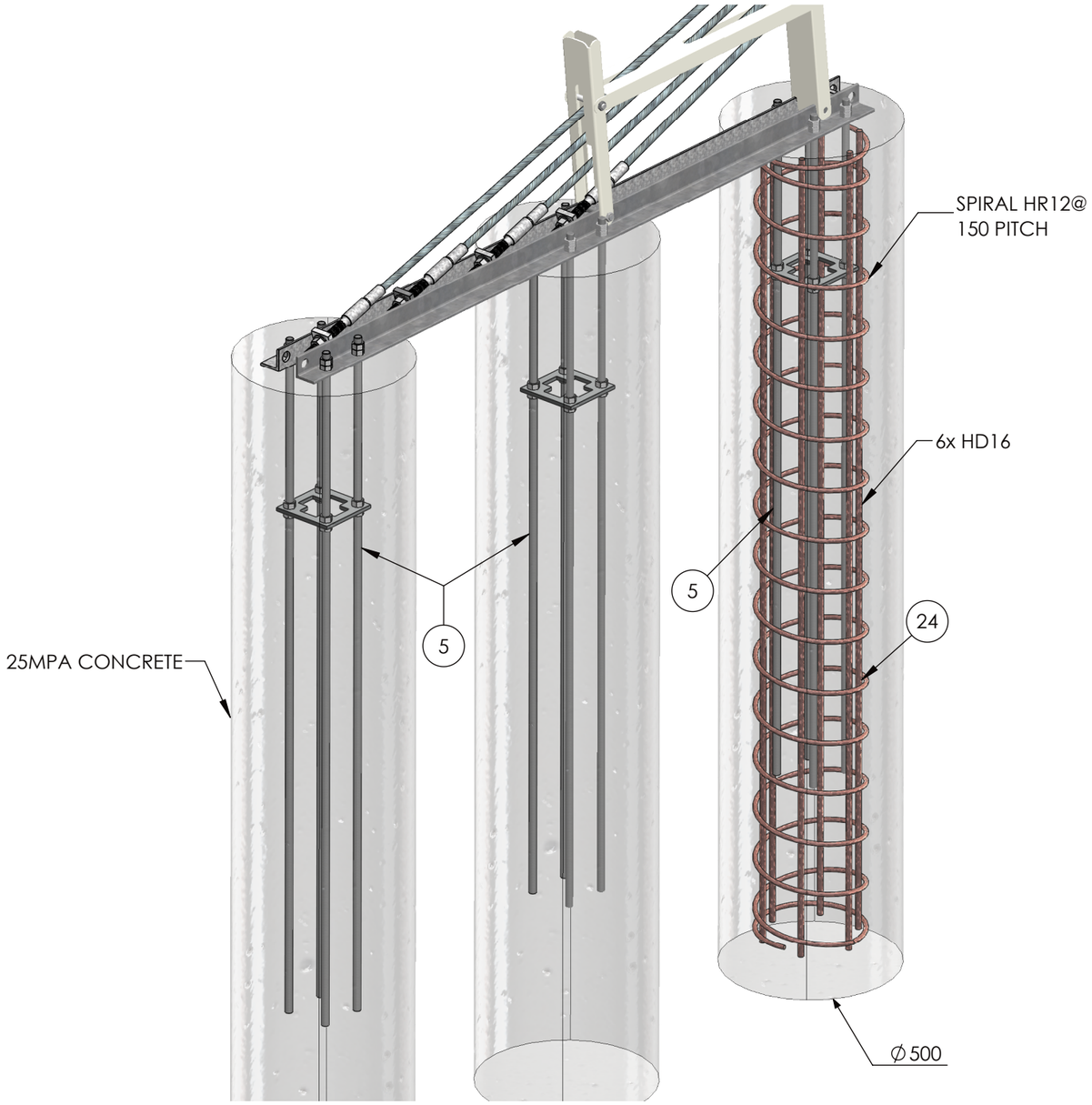


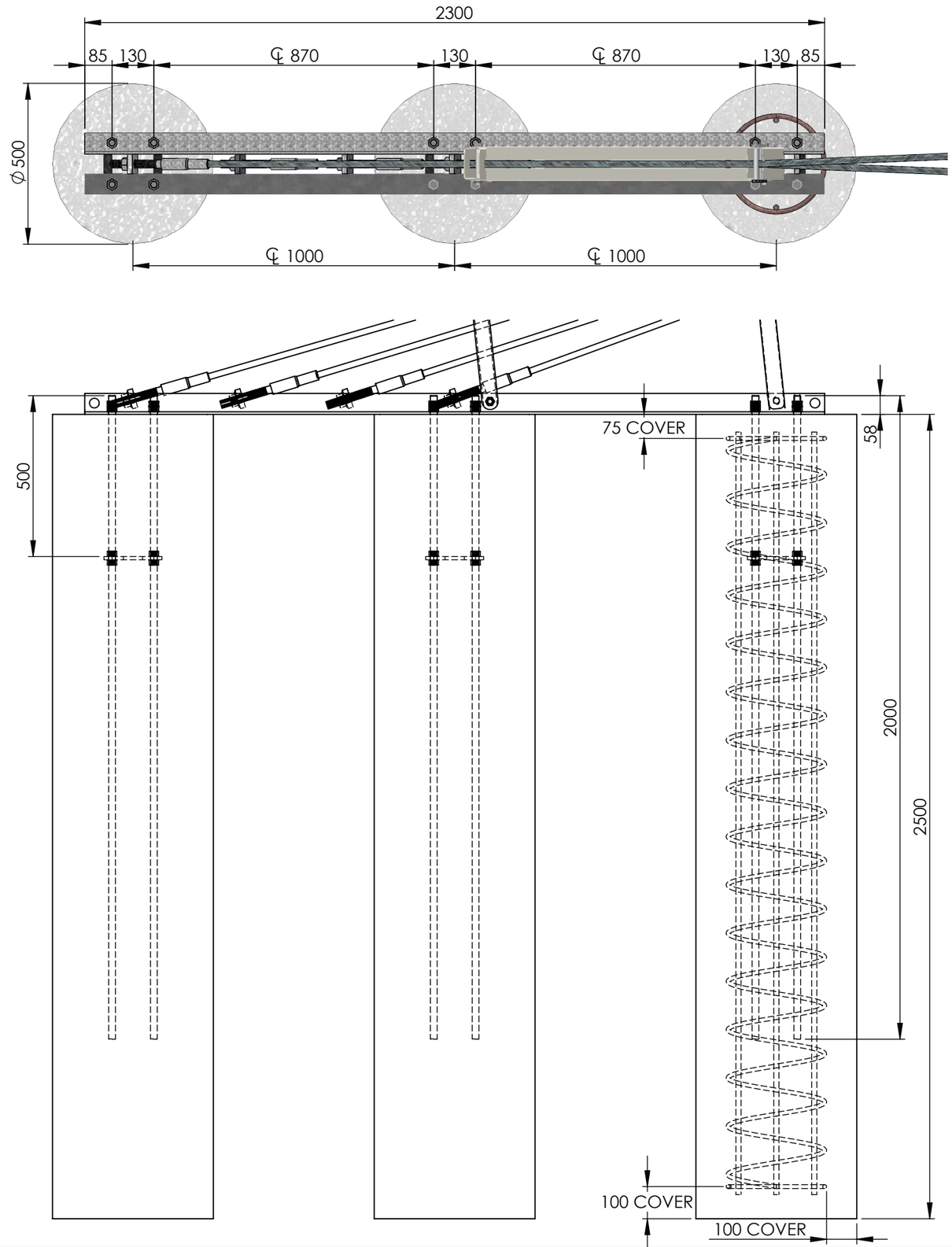


VIEW A-A
SCALE 1 : 5

NOTES:	306 Neilson Street Onehunga, Auckland P O Box 12949, Penrose Auckland, New Zealand Telephone: 09 634 1239 Facsimile: 09 634 4525	**SCALE A3** 1:5 **ASSEMBLY NO.** **WEIGHT(Kg)**	**DESCRIPTION** SL WIRE ROPE TERMINAL END TYPICAL TRANSITION POST DETAIL (TRANSITION POST 1 SHOWN)	**DRAWN** S KERAI **DATE** 19/11/2019 **DRW NO.** FX749	DESTROY ALL PREVIOUS ISSUES 0 REVISION

ITEM NO.	PART NO.	DESCRIPTION	QTY.	WEIGHT EA.	DWG NO.
5	2083071SLM	SL WIRE ROPE STE HOLD DOWN ASSEMBLY 4M20x2000 130 C.R.S	3	24.15	FX751-2
24	2083071CSLM	SL WIRE ROPE REINFORCING CAGE 2325L	1	36.56	FX756-1





NOTES:

REVISION	REV.DATE	CHANGES MADE
1	28-01-20	ADDED REINFORCING DETAILS FOR LEADING CONCRETE PILE

CSP PACIFIC
304 Neilson 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	1:15
ASSEMBLY NO.	2083098SLM
WEIGHT(Kg)	

DESCRIPTION

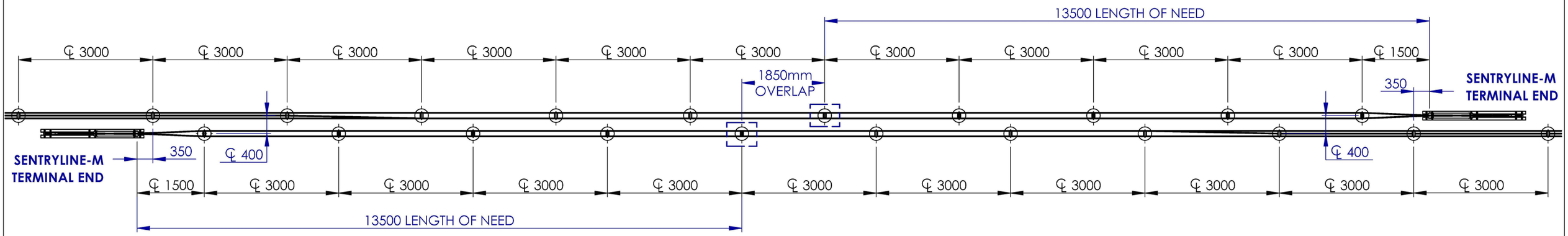
SL WIRE ROPE TERMINAL END UNIT
WHITE - PILE FOUNDATION

DRAWN	S KERAI
DRW NO.	FX756
DATE	5/02/2020

DESTROY ALL PREVIOUS ISSUES

1
REVISION

TRAFFIC DIRECTION



TRAFFIC DIRECTION

NOTES:

REVISION	REV.DATE	CHANGES MADE

CSP PACIFIC
304 Neilson Street
Onehunga, Auckland
P O Box 12949, Penrose
Auckland, New Zealand
Telephone: 09 634 1239
Facsimile: 09 634 4525

SCALE A3	1:85
ASSEMBLY NO.	
WEIGHT(Kg)	
DESCRIPTION	SENTRYLINE-M TERMINAL END OVERLAPPING DETAIL
DRAWN	S KERAI
DRW NO.	FX757
DATE	29/11/2019

DESTROY ALL PREVIOUS ISSUES

0

REVISION