Telstra Operations, Network Delivery
Fixed Networks

Technical Requirements
Document No: TM00181

Exchange Common Infrastructure

Cable Runways

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1. PURPOSE

The purpose of this Specification is to provide the detailed Technical Requirements to internal and external workforces engaged in the design and construction of Telstra plant.
This document is a guide for design staff with material selection and quantities when designing support methods for new cable tray or extending existing cable tray.
These drawings are not the only options available, but should cover most situations for cable tray supporting methods.
For cable tray and accessories, refer to manufacturers' handbooks.
All material will comply with guidelines detailed in Section 6 material.

2. SCOPE

This Specification applies to the design and construction associated with the Technology area:

Cable Runways

The methods described are suggested methods only; each site must be investigated for the most appropriate supporting structure to apply.

A qualified Structural Engineer must approve any proposals that require supporting from ceilings or walls.

3. TECHNICAL REQUIREMENTS

3.1. Responsibilities.

3.1.1. Design Officer

The Design Officer shall obtain the relevant exchange floor plan and indicate the proposed path and height above the floor or below the ceiling for the cable tray being planned.

The Design Officer shall calculate the required cable tray load rating for the tray.

The Design Officer shall select the most suitable support method from the selection included in this document.

The Design Officer shall suggest structural mounting spacing and fixing systems based on previous experience but the final fixing specifications shall be approved by an accredited Structural Engineer.

Upon return of the Structural Engineer's report, the Design Officer can calculate the material quantities from the appropriate material list.

The completed cable tray design, including drawing details, floor plan layout and structural engineering report (if required), must be approved by Telstra Planning. Any structural engineering report is to be archived with the Design file.

The Design Officer shall refer to this specification in the design pack to provide the installation staff with an accurate guide showing how to assemble the cable tray supports.

The Design Officer shall determine if earthing or isolation of the cable tray is required, refer to Section 4.

If there are site dependent issues such as obstructions in the cable tray path, then the Design Officer and Project Manager may initiate direct contact with the Telstra Planner to discuss options.

3.1.2. Project Manager

The Project Manager shall, when necessary, contact an accredited Structural Engineer to visit the site and approve the selected support method.

3.1.2.1. Structural Engineer

The Structural Engineer will visit the site and determine the engineering requirements of the selected support method for the proposed path, the number of supports, their placement, anchor type and size and then populate the remainder of the cable tray support table.

Items to be considered are:

The type of structure of the floor, walls and ceiling.

Whether additional bracing of brackets is required.

The type, size and position of fixing anchors.

The spacing between cable tray supports.

The structural engineer will prepare a report which is to be included in the design pack that is submitted to the Telstra planner.

On completion of the installation, an engineering certification by the original structural engineering firm for all works covered under the initial structural engineering document needs to be obtained and kept with the project documentation.

3.1.2.2. Telstra Planner

The Telstra Planner will decide whether to approve the design proposal. The Project Manager will be advised if the design is approved or whether any changes need to be made.

3.2. Design

3.2.1. Cable Types in Runways

A cable runway is typically designed for a certain cable type.

Sheathed optic fibre cable shall be run in a cable tray exclusively for optic fibre cable.

Signal/Comms/Bus cabling shall be run in a cable tray exclusively for these cable types.

Power cabling (DC.) shall be run in a cable tray exclusively for DC power cabling. The exception to this requirement is when AC power cabling shares the cable tray and shall have a physical barrier between the DC and AC cables.

Where a cable runway is provided at a small site, sharing of the runway is permitted, refer to Section 3.2.6.

3.2.2. Cable Weights

The weight of cable and busbar used in the Telstra network is listed in Table 1.

Cable Type	S / I	Kilogram/Metre	Cable Diameter (mm)
4.5mm Co-axial	353/00164	0.036	
Single twisted pair (Alcatel) - S12 type		0.025	5
6pr twisted pair (Alcatel) - S12 type		0.060	8
1pr twisted pair	353/00344	0.034	
4pr twisted pair	353/00345	0.052	
8pr twisted pair	353/00346	0.100	9
CAT6 Cable		0.045	6.75
16pr twisted pair	353/00347	0.160	12
20pr twisted pair	353/00378	0.185	13
8 wire - AXE type	323/06562	0.019	3.6
16 wire - AXE type	323/06563	0.033	4.8
24 wire - AXE type	323/06564	0.045	5.6
32 wire	323/06565	0.070	5.9
48 wire - AXE type	323/06567	0.081	7
64 wire - AXE type	323/06568	0.104	7.9
64 pair - S12 type		0.404	16
100 pair (IPF - MDF)		0.403	17
13mm dia. blue optic		0.150	13
19mm dia. black optic		0.290	19
150mm² power - blue, double insulated	318/00049	1.917	25
150mm² power - red, single insulated	318/00050	1.744	20
120mm² power - gr/y, single insulated	318/00046	1.198	18.3
70mm² power - blue, double insulated	318/00044	0.890	17.8

70mm² power - red, single insulated	318/00045	0.712	14.4
35mm² power - blue, double insulated	318/00013	0.500	14.3
35mm² power - red, single insulated	318/00014	0.400	10.8
16mm² power - blue, double insulated	318/00135	0.306	11.1
16mm² power - red, single insulated	318/00130		7.6
2.5mm² HOD	318/00035	0.090	
6mm² HOD	318/00036	0.180	
10mm² HOD	318/00037	0.250	
50mm² grey earth strengthening	318/00040	0.570	12.8
BUSBAR		Kilogram/metre	
160 x 10mm copper busbar		14.29	
100 x 10mm copper busbar		8.93	
50 x 10mm copper busbar		4.47	

Table 1 - Weight of Typical Cable & Busbar used in the Telstra Network

3.2.3. Cable Tray Capacity

The maximum capacity of any tray shall be when the cables are level with the lip of the cable tray and not above it.

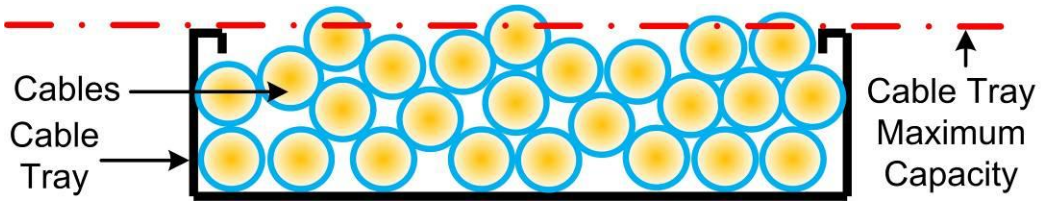


Figure 1 - Example of Cable Tray Filled to Capacity

The maximum number of cables that will fill the cable tray shall be determined by:

$$\frac{\text{Cable tray width}}{\text{Diameter of cable}} \times \frac{\text{Cable tray depth}}{\text{Diameter of cable}} = \text{Maximum number of cables.}$$

If different diameter cables are to be run in the same cable tray, then approximation shall be used, e.g. 33% of 12mm diameter and 66% of 17mm diameter.

This calculation assumes that the cables are square, however typically the cables are not run neatly so the calculation will be sufficient.

Side plates and/or cable guides may be used to extend height of cable tray.

For ST3 cable tray used as a power tray two layers of 150sqmm DC cable is permited with the expectation that cables are tied in neatly with minimal crossovers.

There are two factors in the rating of the Cable tray that the Design must incorporate

The cable load, and

A safety factor

3.2.3.1. Cable load

The cable load of the cable tray is determined by the following factors:

The type and weight of the cable (Kg/M).

The maximum number of cables that will fill the cable tray.

The cable load of the cable tray does not include the total weight of the cable tray and support.

The weight of cable and busbar used in the Telstra network is listed in Section 3.2.2.

Cable tray capacity is detailed in Section 3.2.3.

Example

.
A 300 mm wide cable tray is to be provided for optic fibre cable. The optic fibre cable has a diameter of 13mm and referencing Table 1 shows that it has a weight of 0.150 Kg/M. The maximum number of 13mm diameter optic fibre cables to fill the 300mm wide cable tray is 92 cables therefore:

92 (cables) x 0.15 (Kg/M) = 13.8 Kg/M

3.2.3.2. Safety Factor

Cable tray is not to be walked on at any time. However during the course of running cable, staff may accidentally lean against the tray. To allow for accidental contact a lean weight of 100kg is to be added to the structural Engineers assessment request. This is not a capacity of Kg "per metre" but a single time lean support weight of a staff member in Kg not Kg per metre. This lean weight is not included on the labelling required as per Section 7.2

Depending on the location of the tray it may not be fundamentally possible for staff to lean on the tray. Reduced weighting can be used if supported by the structural engineers report and the Design.

An example of where a lean allowance would not be required is where the tray is mounted directly onto the wall as per section 3.2.6

3.2.4. Cable Tray Support Methods

The following cable tray support methods are detailed in this specification.

Suspended from ceiling.

Single tier of tray suspended from ceiling.

Two tiers of tray suspended from ceiling.

Diagonal Brace.

Cable runway using Tel -Tray.

Mounted directly to wall.

Cantilever bracket mounted on pillar.

Cantilever bracket mounted onto a pillar.

Ceiling support for cantilever bracket mounted onto a pillar (if required).

Cantilever bracket mounted on wall.

Cantilever Bracket mounted on a solid masonry wall.

Cantilever Bracket mounted on a cavity wall.

Cantilever Bracket mounted on solid masonry wall, supported to floor.

Cantilever Bracket mounted on a cavity wall, supported to floor.

Additional ceiling support for Cantilever Bracket (if required).

3.2.5. Cable Tray Support – Suspended From Ceiling

The structure of the ceiling and cable tray loading will determine which of the following methods will be used.

Single tier of tray suspended from ceiling.

Two tiers of tray suspended from ceiling.

Diagonal Brace (if required).

Cable runway using Tel-Tray.

3.2.5.1. Single Tier of Tray Suspended from Ceiling

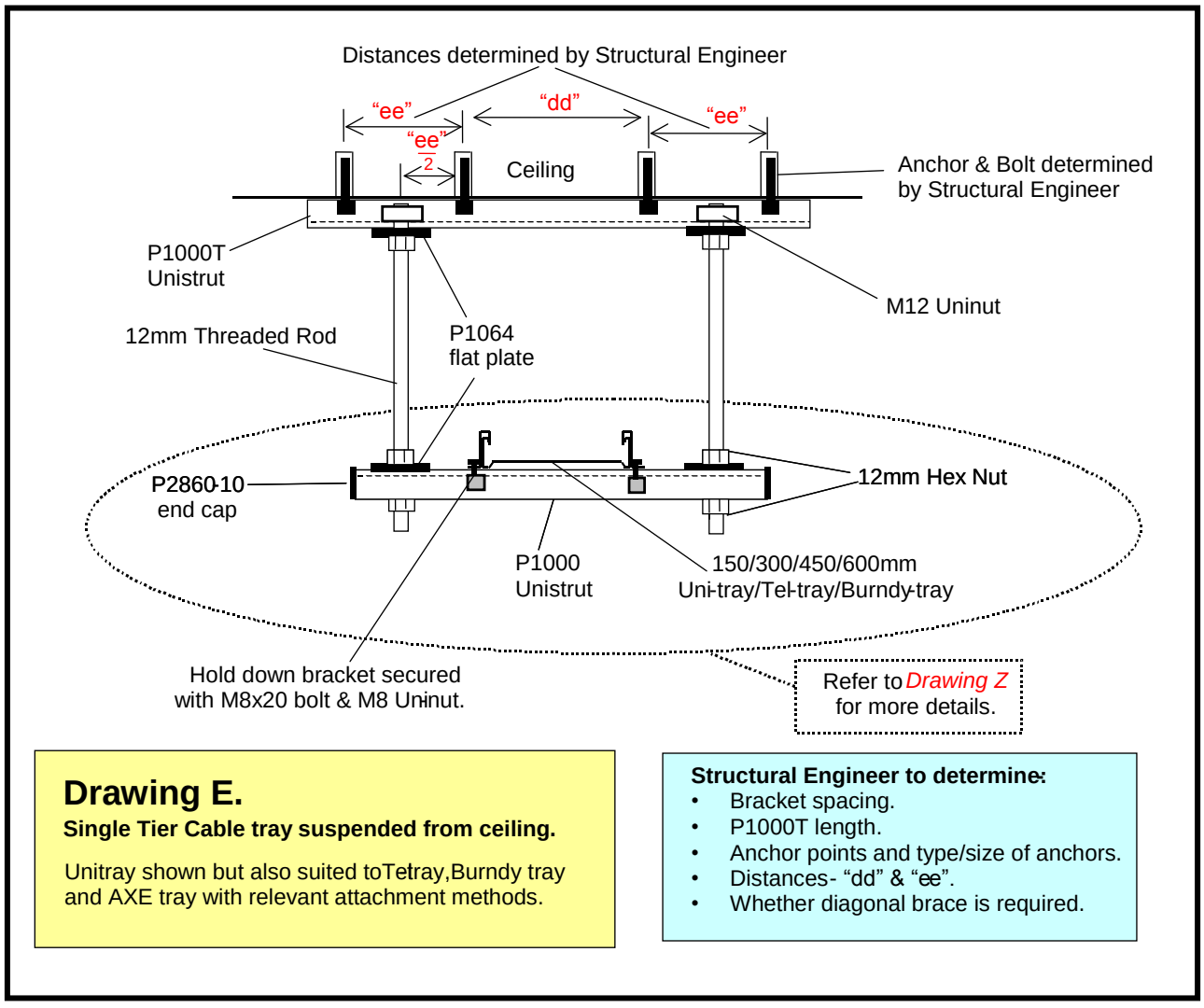


Figure 2 - Single Tier of Tray Suspended from Ceiling

Description	Product Number	Serial / Item	Serial / Item Galvanised	Quantity/ Bracket	Notes
Unistrut Channel Slotted, 3M length	P1000T	353/00451	426/00299 (6M) or 426/00464		Note 1
Unistrut Channel, 3M length	P1000	353/2520	426/00213		Note 1
12mm Threaded Rod, 1M length		67/00478	67/00273		
12mm Threaded Rod, 3M length		67/00467	426/00535		
12mm Uni-nut with spring	P1010	353/02536	426/00418	2	
12mm Hex Nuts		353/02318	426/00529	6	
CAP,CHANNEL END 41X41MM	2240 PVC	353 / 2095	353 / 2095	2	
PLATE,FLAT 40X40MM HOLE 14MM	1064 ZA	353/02179	purchase	4	
BRACKET,HOLD DOWN FOR TELTRAY KIT. Bolt ,Nut Washer Bracket Qty 5		353/01467		2	Note 3
BRACKET,HOLD DOWN ST3 TRAY	AUG2HDC	N/A	353/02407		
BOLT HEX HEAD, NUT and Washer M8X25 GL (Bolt for hold down bracket.)		N/A	067/00431	2	Note 4
Ceiling Anchors		purchase	purchase	4	Note 5

Table 2 – Parts List: Ceiling Hanger - Single Tier Cable Tray

Note 1:

One x 3M length will be enough for several supports. The support length is to be specified by Structural Engineer.
P1000 is also available in 6M length - 353/02256. P1000T is also available in 6M length - 353/01824.

Hot diped Galvanised (426/00299) is 6 meters else use 426/00464 @ 450mm long.
Galvanised is not used within the exchange but is required in cable chambers.

Note 3: Bracket dependent upon type of cable tray used.

Note 4: Bolt length is dependent upon bracket used.

Note 5: Type and size to be determined by Structural Engineer.

3.2.5.2. Two Tiers of Tray Suspended from Ceiling

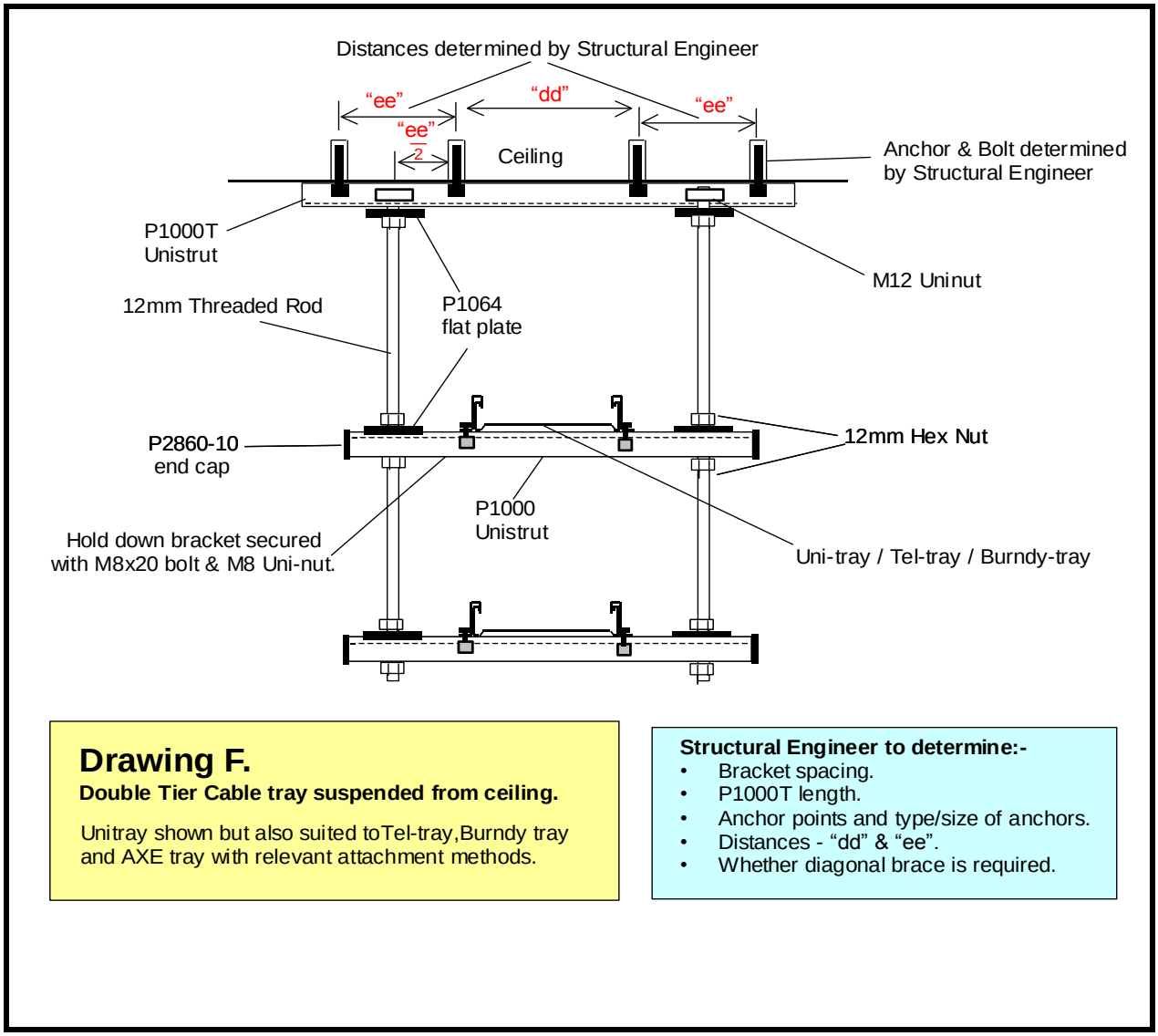


Figure 3 - Two Tiers of Tray Suspended from Ceiling

Description	Product Number	Serial / Item		Quantity / Bracket	Notes
Unistrut Channel Slotted, 3M length	P1000T	353/00451	426/00299 (6M) or 426/00464		Note 1
Unistrut Channel, 3M length	P1000	353/2520	426/00213		Note 1
12mm Threaded Rod, 1M length		67 / 00478	67/00273		Note 2

12mm Threaded Rod, 3M length		67 / 00467	426/00535		Note 2
12mm Uni-nut with spring	P1010	353/02536	426/00418	2	
12mm Hex Nuts		353/02318	426/00529	10	
Plastic CAP,CHANNEL END 41X41MM	P2860-10	353 / 2095	353 / 2095	4	
PLATE,FLAT 40X40MM HOLE 14MM	P1064	353/02179	purchase	6	
BRACKET,HOLD DOWN FOR TELTRAY KIT. Bolt ,Nut Washer Bracket		353/01467	N/A	4	Note 3
BRACKET,HOLD DOWN ST3 TRAY		N/A	353/02407	4	Note 4
BOLT HEX HEAD, NUT and Washer M8X25 GL (Bolt for hold down bracket.)		N/A	067/00431	2	Note 4
Ceiling Anchors		purchase	purchase	4	Note 5

Table 3 - Parts List: Ceiling Hanger Double Tier Cable Tray

Note 1:

One x 3M length will be enough for several supports. The support length is to be specified by Structural Engineer.
P1000 is also available in 6M length - 353/02256. P1000T is also available in 6M length - 353/01824.

Galvanised 426/00299 is 6 meters else use 426/00464 @ 450mm long.

Note 3: Bracket dependent upon type of cable tray used.

Note 4: Bolt length is dependent upon bracket used.

Note 5: Type and size to be determined by Structural Engineer.

3.2.5.3. Diagonal Brace

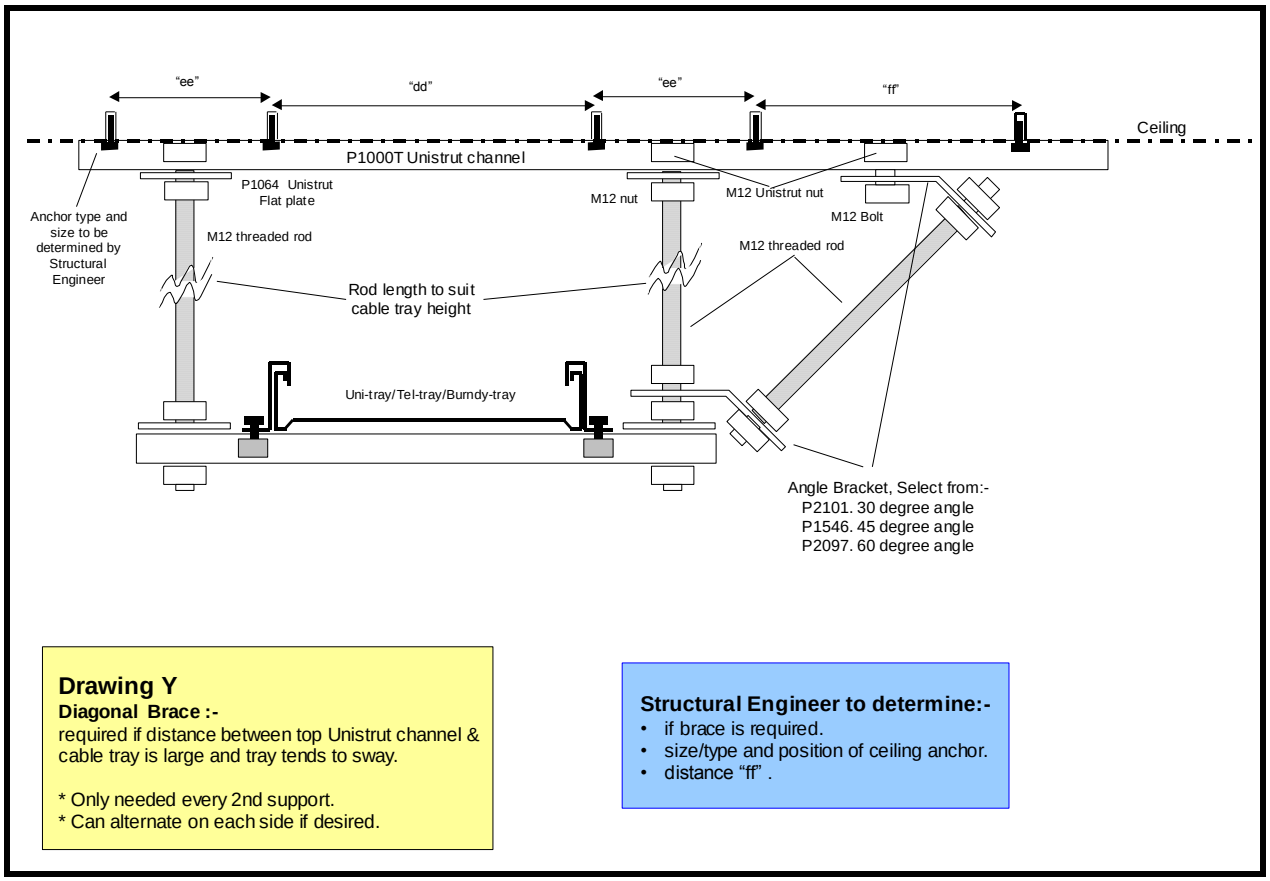


Figure 4 - Diagonal Brace

Description	Product Number	Serial / Item	Serial / Item Galvanised	Quantity / Bracket	Notes.
12mm Threaded Rod, 3M length		67 / 00467	426/00213		Note 1.
12mm Uni-nut with spring	P1010	353/02536	426/00418	1	
12mm Hex Nuts		353/02318	426/00529	5	
M12x24mm Hex Bolt	HHS1224	353 / 02083	426/00521		
Angle Plate		Note 2.	purchase	2	
Ceiling Anchors		purchase	purchase	1	Note 3.

Table 4 - Parts List: Anti-sway Brace for Ceiling Suspended Cable Tray

One x 3M length will be enough for several braces.
Threaded Rod is also available in 1M lengths - 67/478

Angle plate determined by length of rod. Select from:-

BRACKET,ANGLE 30 DEG 53X83 UNI P2101 ZPA	353	02270
BRACKET,ANGLE 45 DEG 76 X 59MM 1546 ZPA	353	02383

BRACKET,ANGLE 60 DEG 86 X 48MM 2097 ZPA	353	02382
BRACKET,ANGLE 90 DEG 41X105MM 1326 ZA	353	02056
BRACKET,ANGLE 90 DEG 41X57MM 1068 ZA	353	02055

Structural Engineer to determine size/type and position of ceiling anchor.

3.2.5.4. Cable Runway using Tel-Tray

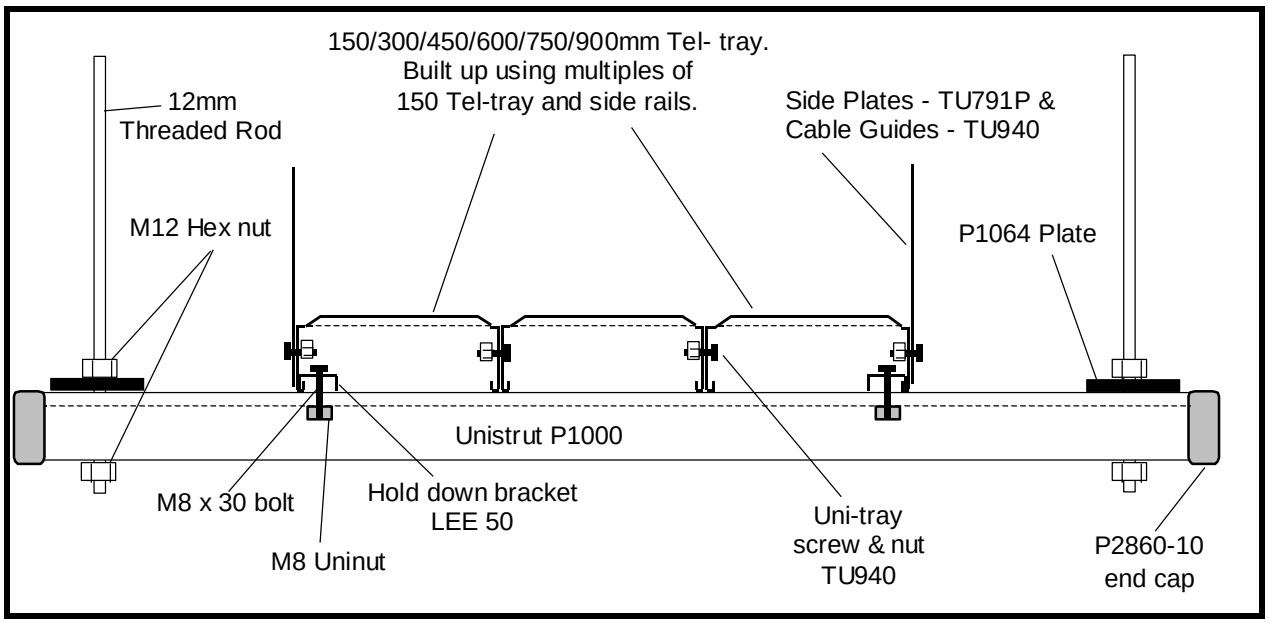


Figure 5 - Detailed View of Ceiling Support using Tel-Tray

Figure 5 details the ceiling support using Tel-Tray with side plates to extend depth of cable tray.

This method is suitable when tray with high loading figures is required, type and size of ceiling anchor to be determined by Structural Engineer.

3.2.6. Cable Tray – Mounted Directly to Wall

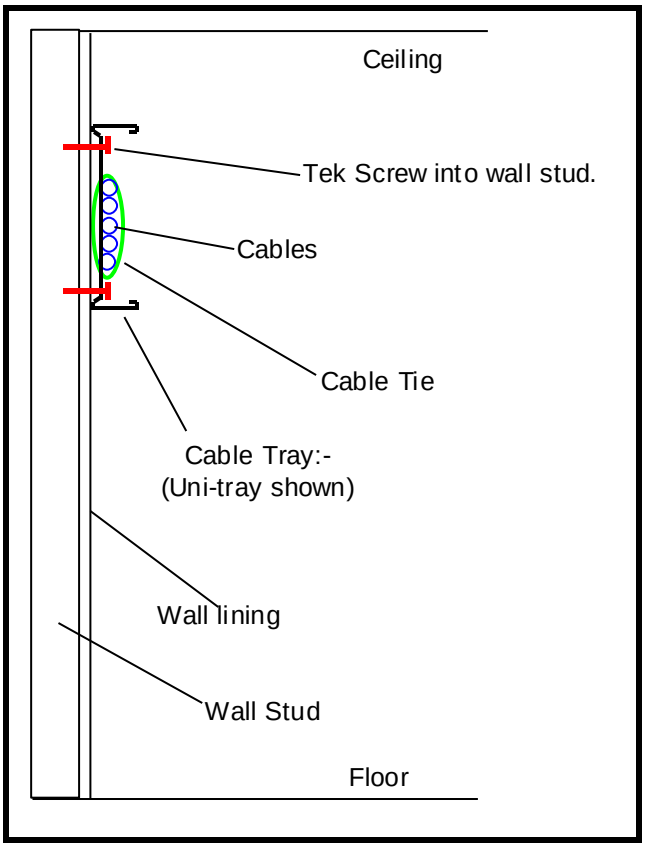


Figure 6 - Cable Tray – Bolted Directly to Wall

This method is typically used in small rural type buildings, i.e. walls constructed of wooden studs with aluminium or similar lining. It is only suitable for small a quantity of cables.

Power cables, optic fibre cables and signalling/comms/bus cables may be run on the same cable tray but shall be separated and bundled separately.

Material List is as required on a site by site basis.

3.2.7. Cable Tray – Cantilever Bracket Mounted on Pillar

Cantilever bracket mounted onto a pillar.

Ceiling support for cantilever bracket mounted onto a pillar (if required).

3.2.7.1. Cantilever Bracket Mounted on Pillar

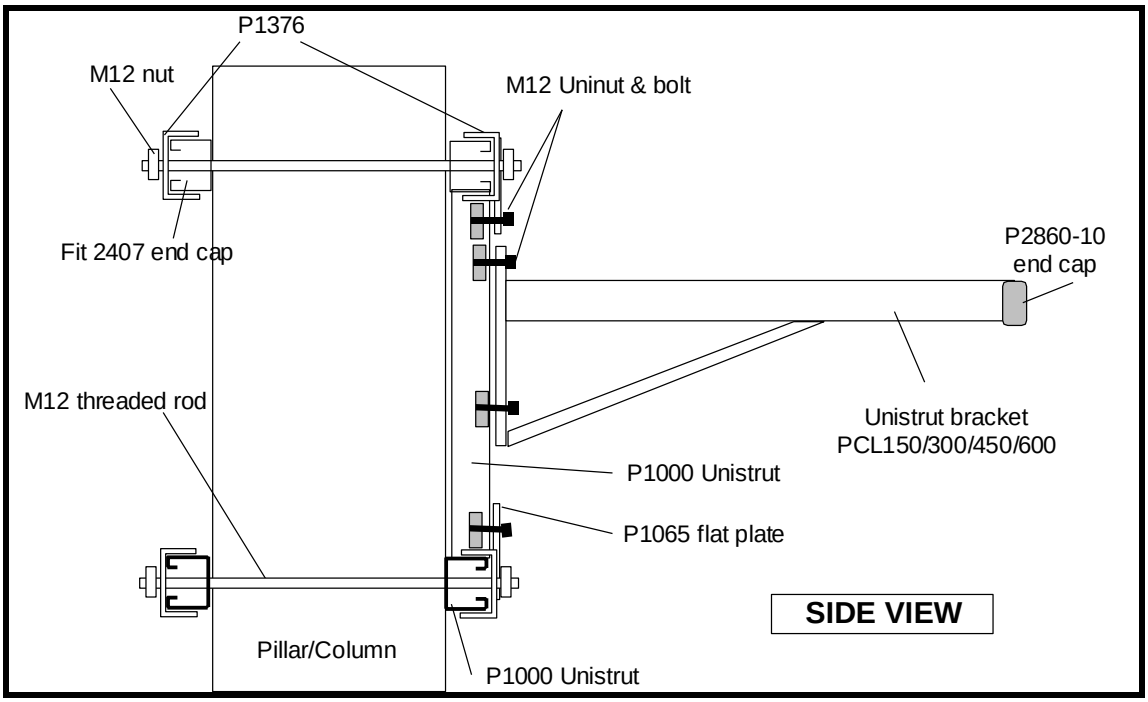


Figure 7 - Cantilever Bracket Mounted on Pillar (Side View)

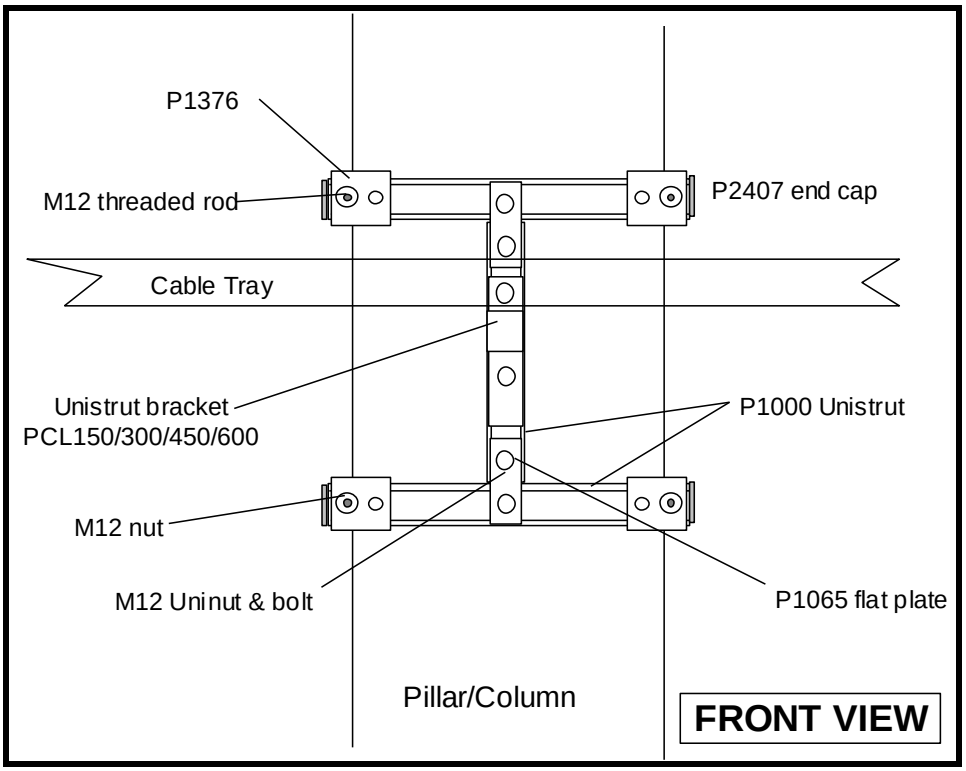


Figure 8 - Cantilever Bracket Mounted on Pillar (Front View)

Description	Product Number	Serial / Item	Serial / Item Galvanised	Quantity / Bracket	Notes.
Unistrut Channel, 6M length	P1000	353 / 02256	353/0184		Note 1.
10mm Threaded Rod (3M length)		353/02534			Note 2.
10mm Hex Nut		67 / 00454		8	Note 6.
12mm Threaded Rod (1M length)		67 / 00478	67/00273		Note 2.
12mm Threaded Rod, 3M length		67 / 00467	426/00535		Note 2.
12mm Hex Nuts		353/02318	426/00529	8	Note 6.
12mm Uni-nut with spring	P1010	353/02536	426/00418	6	
PLATE,FLAT FITTING 90 X 40MM	P1065	353 / 02177		2	
CAP,CHANNEL END PVC	P2860-10	353 / 02172	353/02172	1	
CAP CHANNEL END 41X41MM	P2240	353 / 02095	353/02095	8	
"U" Plate Use Bracket U shape P1377 - U/strut channel joining (not ideal)	**P1376**	353/02181		**8**	
BRACKET,HOLD DOWN FOR TELTRAY KIT. Bolt ,Nut Washer Bracket		353/01467	N/A	2	Note 3.
BRACKET,HOLD DOWN ST3 TRAY		N/A	353/02407	2	
BOLT HEX HEAD, NUT and Washer M8X25 GL (Bolt for hold down bracket.)		N/A	067/00431	2	Note 4
Ceiling Anchors		purchase	purchase		Note 5
Cantilever Bracket				1	Note 5.

Table 5 - Parts List: Cantilever Bracket Mounted on Pillar

One x 6M length will be enough for several supports. P1000 is also available in 3M length - 353 / 20255.

Threaded rod diameter will be determined by Structural Engineer.

Bracket dependent upon type of cable tray used.

Bolt length is dependent upon bracket used.

Cantilever Bracket to suit tray size. Select from PCL150, PCL300, PCL450 or PCL600.

353 /2392 BRACKET,CANTILEVER 150MM 2663-150 ZA
353 /2288 BRACKET,CANTILEVER 300MM 2663-300 ZA
353 /2479 BRACKET,CANTILEVER 400MM 2663-400 ZA
353 /2393 BRACKET,CANTILEVER 450MM 2663-450 ZA
353 /2175 BRACKET,CANTILEVER 550MM 2663-550 ZA
353 /2176 BRACKET,CANTILEVER 700MM 2663-700 ZA

353 /2327	BRACKET,BRACED CANTILEVER 320MM CL150 ZA
353 /2328	BRACKET,BRACED CANTILEVER 470MM CL300 ZA
353 /2329	BRACKET,BRACED CANTILEVER 635MM CL450 ZA
353 /2245	BRACKET,BRACED CANTILEVER 780MM CL600 ZA

Quantity of 8 Hex Nuts required with size dependent upon rod diameter selected.

3.2.7.2. Ceiling Support for Cantilever Bracket

Structural Engineer is to determine if additional support is required for the Cantilever bracket.

Use threaded rod from ceiling to outer section of Cantilever Bracket as per Figure 9.

Structural Engineer to determine:

If support rod is required

P1000T length

Size/type and position of ceiling anchors

Distance '*ee*'

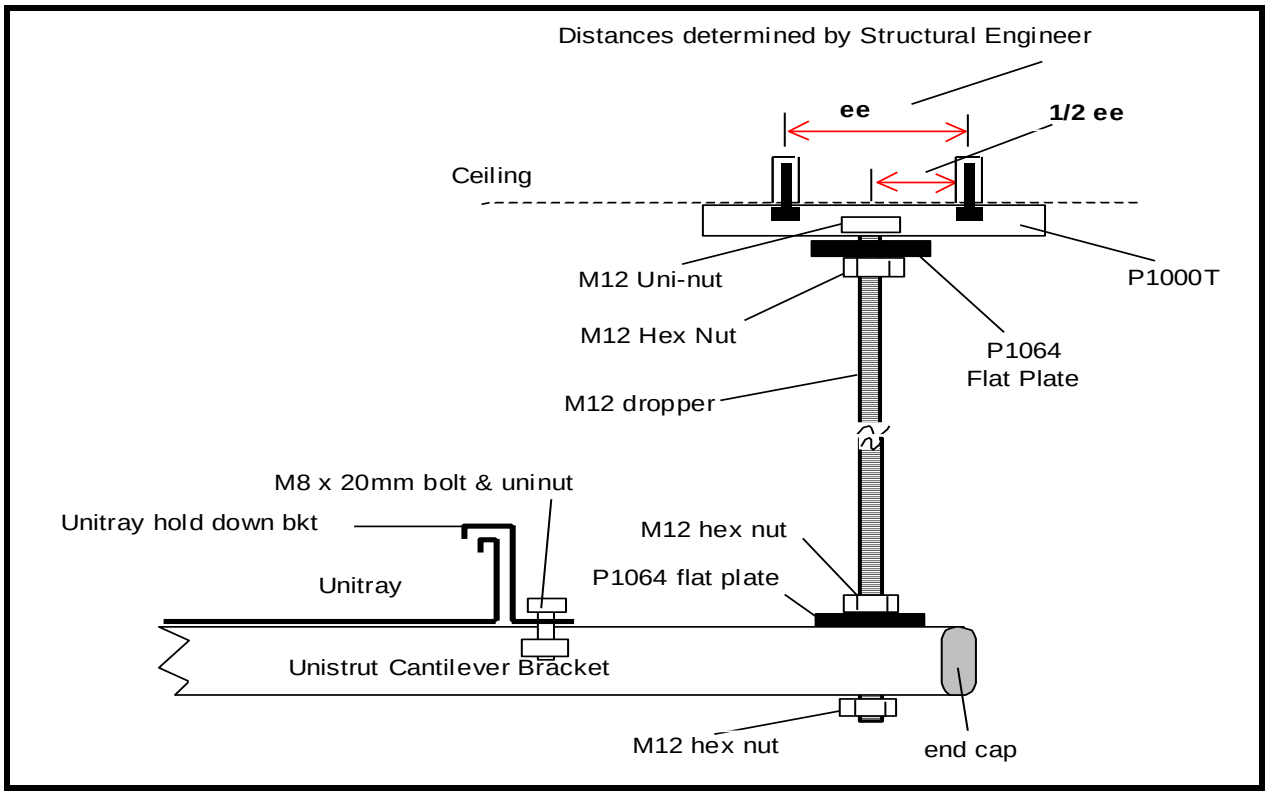


Figure 9 - Ceiling Support for Cantilever Bracket

Description	Product Number	Serial / Item	Serial / Item Galvanised	Quantity / Bracket	Notes.
Unistrut Channel, Slotted 3M length	P1000T	353/00451	426/00299 (6M or 426/00464		Note 1.
12mm Threaded Rod, 3M length		67 / 00467	426/00535		Note 2.
12mm Uni-nut with spring	P1010	353/02536	426/00418	1	
12mm Hex Nuts		353/02318	426/00529	3	
PLATE,FLAT 40X40MM HOLE 14MM	P1064	353/02179	purchase	2	
Ceiling Anchors				2	Note 3.

Table 6 - Parts List: Ceiling Support for Cantilever Bracket

One x 3M length will be enough for several supports.

Structural Engineer to determine size/type of ceiling anchors.

3.2.8. Cable Tray –Wall Mounted Cantilever Bracket

The structure of the wall will determine which method of mounting the Cantilever Brackets shall be used.

Cantilever Bracket mounted on a solid concrete wall.

Cantilever Bracket mounted on a cavity wall.

Cantilever Bracket mounted on solid concrete wall, supported to floor.

Cantilever Bracket mounted on a cavity wall, supported to floor.

Ceiling support for Cantilever Bracket (if required).

3.2.8.1. Cantilever Bracket Mounted on a Solid Concrete Wall

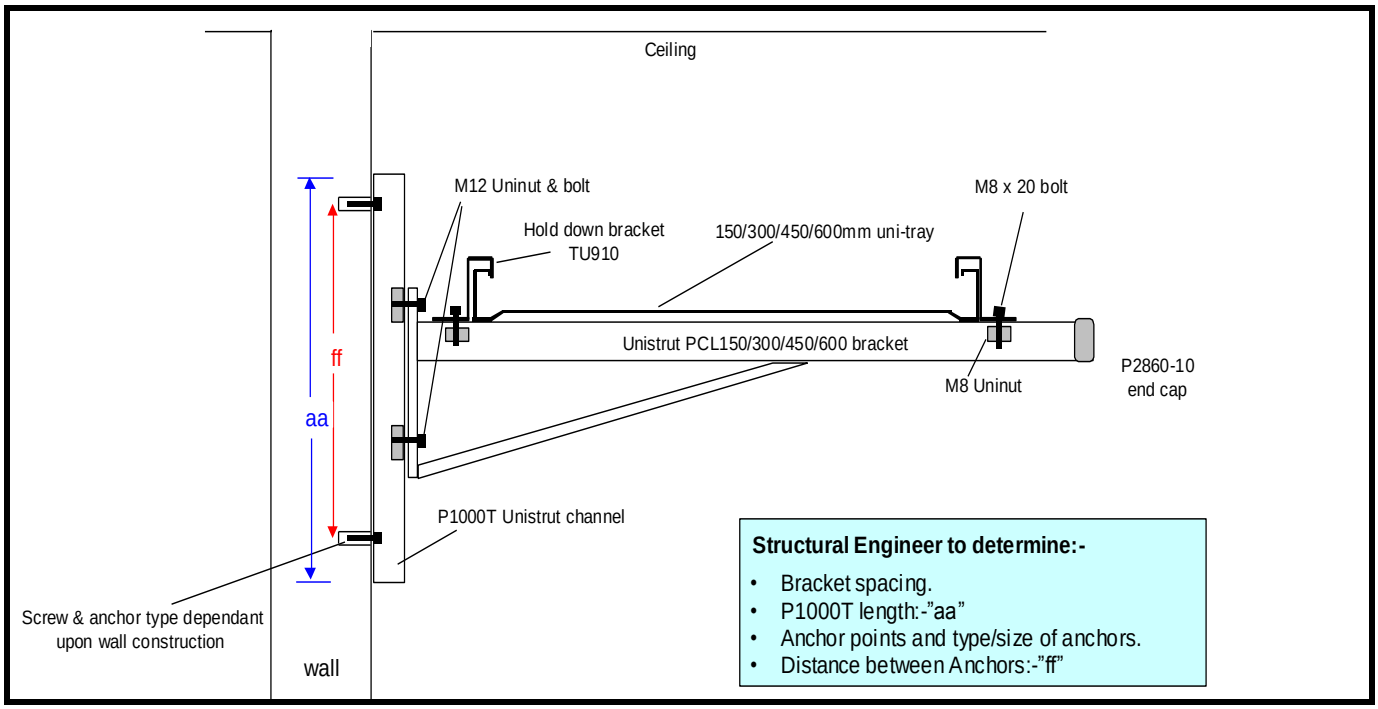


Figure 10 - Cantilever Bracket on Solid Concrete Wall

Description	Product Number	Serial / Item	Serial / Item Galvanised	Quantity / Bracket	Notes.
Unistrut Channel Slotted, 3M length	P1000T	353/00451	426/00299 (6M) or 426/00464		Note 1.
BRACKET,BRACED CANTILEVER 320MM CL150 ZA	CL150	353 / 02327			Note 2.
BRACKET,BRACED CANTILEVER 470MM CL300 ZA	CL300	353 / 02328			Note 2.
BRACKET,BRACED CANTILEVER 635MM CL450 ZA	CL450	353 / 02329			Note 2.
BRACKET,BRACED CANTILEVER 780MM CL600 ZA	CL600	353 / 02245			Note 2.
CAP,CHANNEL END PVC	P2860-10	353/02172	353/02172	1	
M12x24mm Hex Bolt	HHS1224	353/02083	426/00521	2	
12mm Uni-nut with spring	P1010	353/02536	426/00418	2	
BRACKET,HOLD DOWN FOR TELTRAY KIT. Bolt ,Nut Washer Bracket		353/01467	N/A	2	Note 3.
BRACKET,HOLD DOWN ST3 TRAY		N/A	353/02407	2	
BOLT HEX HEAD, NUT and Washer M8X25 GL (Bolt for hold down bracket.)		N/A	067/00431	2	Note 4
Wall Anchors				2	Note 5.

Table 7 - Parts List: - Cantilever Bracket on Solid Concrete Wall

One x 3M length will be enough for several supports.
Support length to be specified by Structural Engineer.
Refer to Figure 10 dimension “aa”

Select bracket length to suit cable tray size.

Bracket dependent upon type of cable tray used.

Bolt & Nut are dependent upon bracket used.

Type and size to be determined by Structural Engineer.

3.2.8.2. Cantilever Bracket Mounted on a Cavity Wall

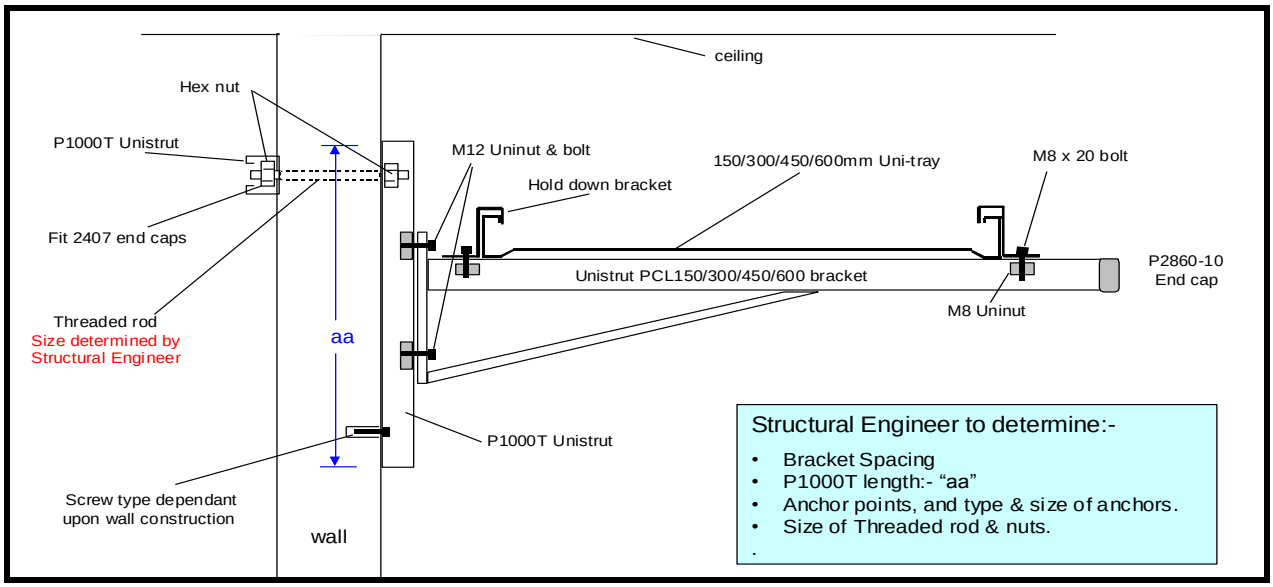


Figure 11 - Cantilever Bracket on Cavity Wall

Description	Product Number	Serial / Item		Quantity / Bracket	Notes.
Unistrut Channel Slotted, 3M length	P1000T	353/00451			Note 1.
BRACKET,BRACED CANTILEVER 320MM CL150 ZA	CL150	353 / 02327			Note 2.
BRACKET,BRACED CANTILEVER 470MM CL300 ZA	CL300	353 / 02328			Note 2.
BRACKET,BRACED CANTILEVER 635MM CL450 ZA	CL450	353 / 02329			Note 2.
BRACKET,BRACED CANTILEVER 780MM CL600 ZA	CL600	353 / 02245			Note 2.
CAP,CHANNEL END 41X41MM	2240 PVC	353 / 2095	353 / 2095	2	
CAP,CHANNEL END PVC	P2860-10	353/02172	353/02172	1	
M12x24mm Hex Bolt	HHS1224	353/02083	426/00521	2	
12mm Uni-nut with spring	P1010	353/02536	426/00418	2	
BRACKET,HOLD DOWN FOR TELTRAY KIT. Bolt ,Nut Washer Bracket		353/01467	N/A	2	Note 3.
BRACKET,HOLD DOWN ST3 TRAY		N/A	353/02407	2	
BOLT HEX HEAD, NUT and Washer M8X25 GL (Bolt for hold down bracket.)		N/A	067/00431	2	Note 4
10mm Threaded Rod (3M length)		353/02534	67/00468		Note 2.
10mm Hex Nut		353/02286 or 67/454		2	Note 7.
12mm Threaded Rod (1M length)		67 / 00478	67/00273		Note 5.
12mm Threaded Rod (3M length)		67 / 00467	426/00535		Note 5.
12mm Hex Nut		353/02318	426/00529	2	Note 7.
Wall Anchors				1	Note 6.

Table 8 - Parts List: - Cantilever Bracket on Cavity Wall

One x 3M length will be enough for several supports.
Support length to be specified by Structural Engineer.
Refer to Figure 11 dimension “aa”.

Select bracket length to suit cable tray size.

Bracket dependent upon type of cable tray used.

Bolt & nut are dependent upon bracket used.

Threaded rod diameter to be determined by Structural Engineer. Available in 1M length or 3M length.

Type and size to be determined by Structural Engineer.

Quantity of 2 Hex nuts required. Size dependent upon diameter of rod selected.

3.2.8.3. Cantilever Bracket Mounted on a Solid Masonry Wall, Supported to Floor

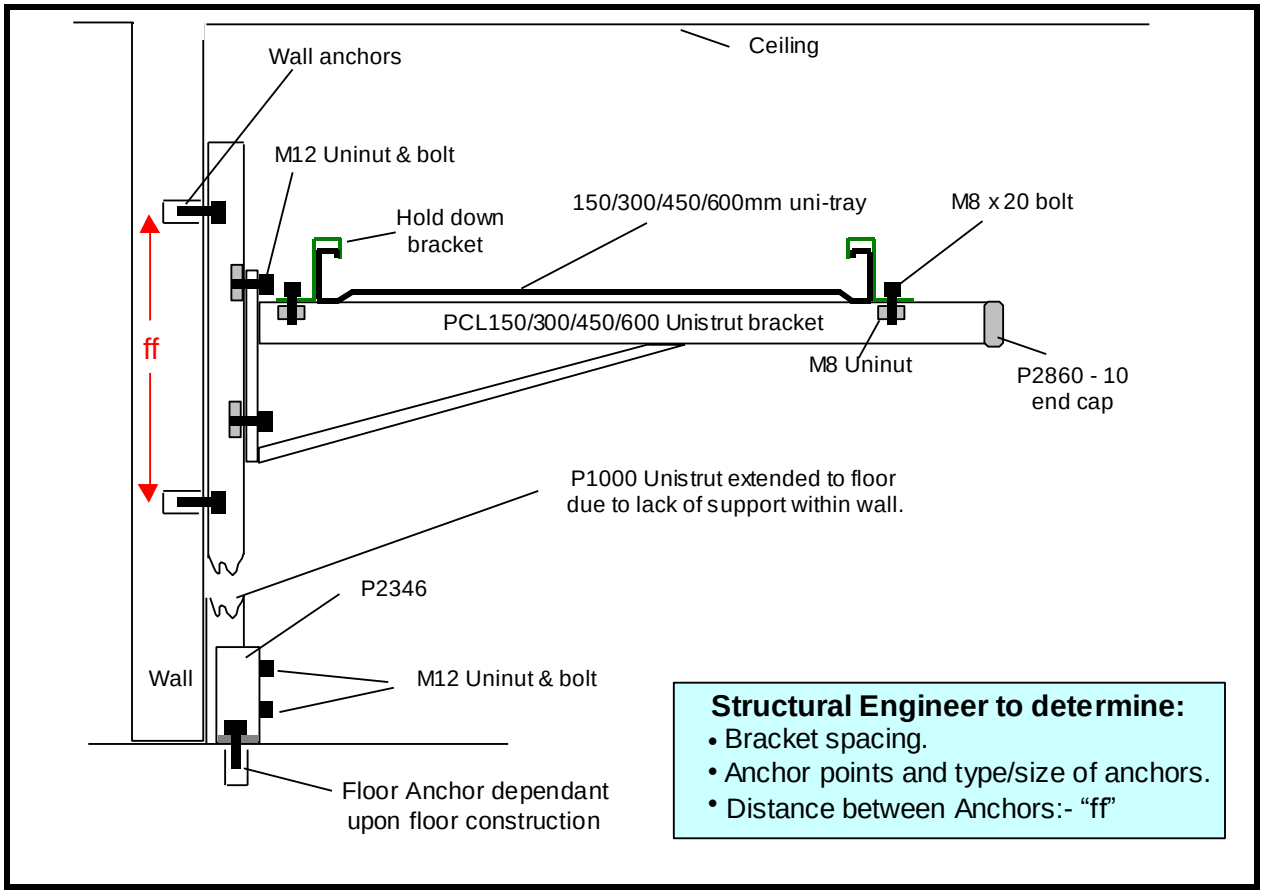


Figure 12 - Cantilever Bracket on Solid Concrete Wall, Supported to Floor

Description	Product Number	Serial / Item		Quantity/ Bracket	Notes.
Unistrut Channel Slotted, 3M length	P1000T	353/00451			Note 1.
BRACKET,BRACED CANTILEVER 320MM CL150 ZA	CL150	353 / 02327			Note 2.
BRACKET,BRACED CANTILEVER 470MM CL300 ZA	CL300	353 / 02328			Note 2.
BRACKET,BRACED CANTILEVER 635MM CL450 ZA	CL450	353 / 02329			Note 2.
BRACKET,BRACED CANTILEVER 780MM CL600 ZA	CL600	353 / 02245			Note 2.
CAP,CHANNEL END PVC	P2860-10	353/02172	353/02172	1	
M12x24mm Hex Bolt	HHS1224	353/02083	426/00521	2	
12mm Uni-nut with spring	P1010	353/02536	426/00418	2	
BRACKET,HOLD DOWN FOR TELTRAY KIT. Bolt ,Nut Washer Bracket		353/01467	N/A	2	Note 3.
BRACKET,HOLD DOWN ST3 TRAY		N/A	353/02407	2	
BOLT HEX HEAD, NUT and Washer M8X25 GL (Bolt for hold down bracket.)		N/A	067/00431	2	Note 4
Wall Anchors				2	Note 5.

Table 9 - Parts List: - Cantilever Bracket on Solid Concrete Wall, Supported to Floor

One x 3M length will be enough for several supports.
Support length to be specified by Structural Engineer.
Refer to Figure 12 dimension “aa”.

Select bracket length to suit cable tray size.

Bracket dependent upon type of cable tray used.

Bolt & nut are dependent upon bracket used.

Type and size to be determined by Structural Engineer.

3.2.8.4. Cantilever Bracket Mounted on a Cavity Wall, Supported to Floor

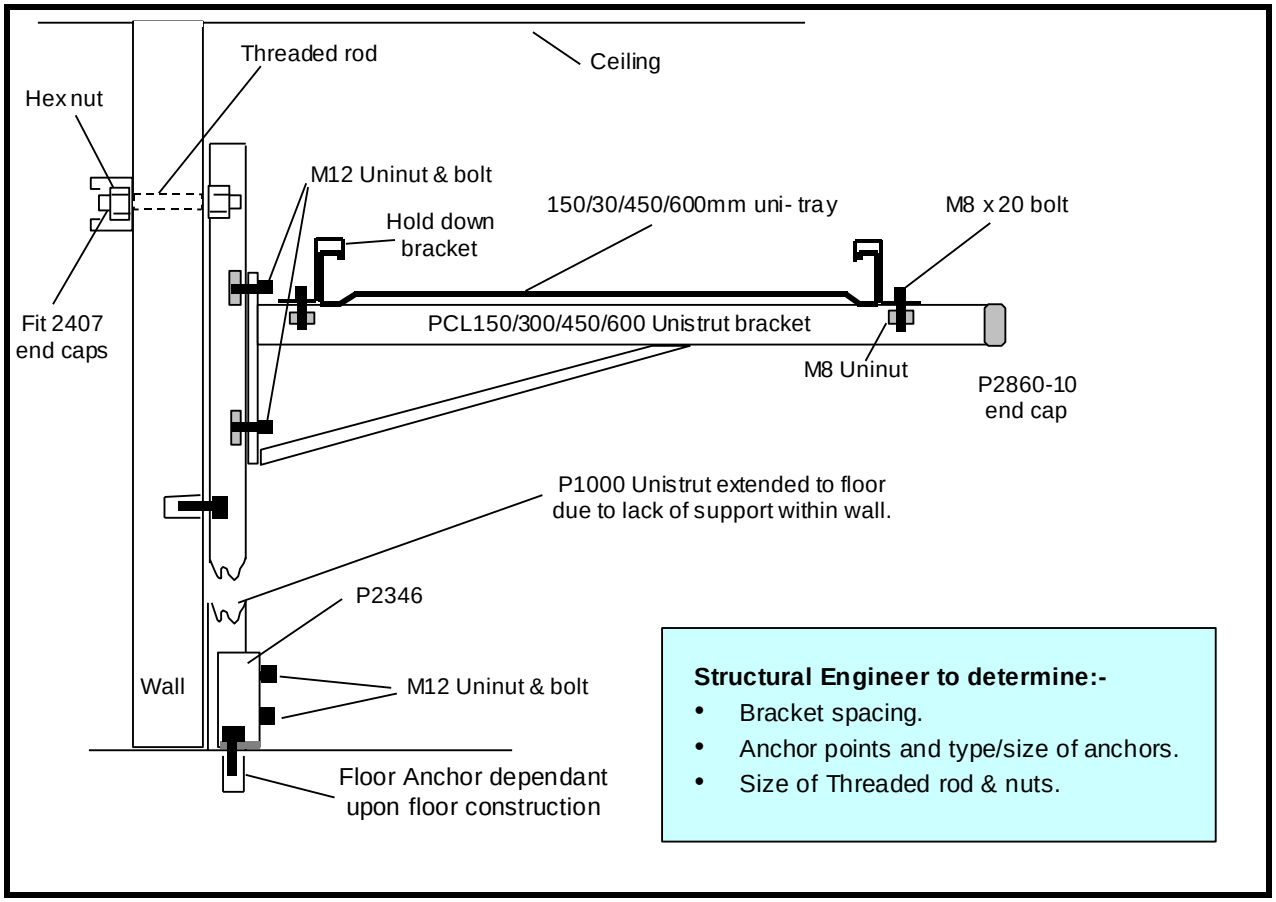


Figure 13 - Cantilever Bracket on Cavity Wall, Supported to Floor

Description	Product Number	Serial / Item		Quantity/ Bracket	Notes
Unistrut Channel, 6M length	P1000	353 / 20256			Note 1.
BRACKET,BRACED CANTILEVER 320MM CL150 ZA	CL150	353 / 02327			Note 2.
BRACKET,BRACED CANTILEVER 470MM CL300 ZA	CL300	353 / 02328			Note 2.
BRACKET,BRACED CANTILEVER 635MM CL450 ZA	CL450	353 / 02329			Note 2.
BRACKET,BRACED CANTILEVER 780MM CL600 ZA	CL600	353 / 02245			Note 2.
CAP,CHANNEL END PVC	P2860-10	353/02172	353/02172	1	
CAP,CHANNEL END 41X41MM	2240 PVC	353 / 2095	353 / 2095	2	
M12x24mm Hex Bolt	HHS1224	353/02083	426/00521	4	

12mm Uni-nut with spring	P1010	353/02536	426/00418	4	
BRACKET,HOLD DOWN FOR TELTRAY KIT. Bolt ,Nut Washer Bracket		353/01467	N/A	2	Note 3.
BRACKET,HOLD DOWN ST3 TRAY		N/A	353/02407	2	
BOLT HEX HEAD, NUT and Washer M8X25 GL (Bolt for hold down bracket.)		N/A	067/00431	2	Note 4
8mm Threaded Rod (1M length)		067/00277	067/00619		Note 5.
8mm Threaded Rod (3M length)		067/00582	67 / 00581		Note 5.
8mm Hex Nut		067/00443		2	Note 7.
10mm Threaded Rod (3M length)		353/02534	67/00468		Note 5.
10mm Hex Nut		353/02286 or 67/454		2	Note 7.
12mm Threaded Rod (1M length)		067/00478	67/00273		Note 5.
12mm Threaded Rod (3M length)		067/00467	426/00535		Note 5.
12mm Hex Nut		353/02318	426/00529	2	Note 7.
BRACKET,WING SHAPE (Floor attachment bracket)	P2346	353 / 02217		1	
Floor Anchors				2	Note 6.
Wall Anchors				2	Note 6.

Table 10 - Parts List - Cantilever Bracket on Cavity Wall, Supported to Floor

Support length to be specified by Structural Engineer.

Select bracket length to suit cable tray size.

Bracket dependent upon type of cable tray used.

Bolt & Nut are dependent upon bracket used.

Threaded rod diameter to be determined by Structural Engineer. Available in 1M length or 3M length.

Type and size to be determined by Structural Engineer.

Quantity of 2 Hex nuts required. Size dependent upon diameter of rod selected.

3.2.8.5. Ceiling Support for Cantilever Bracket

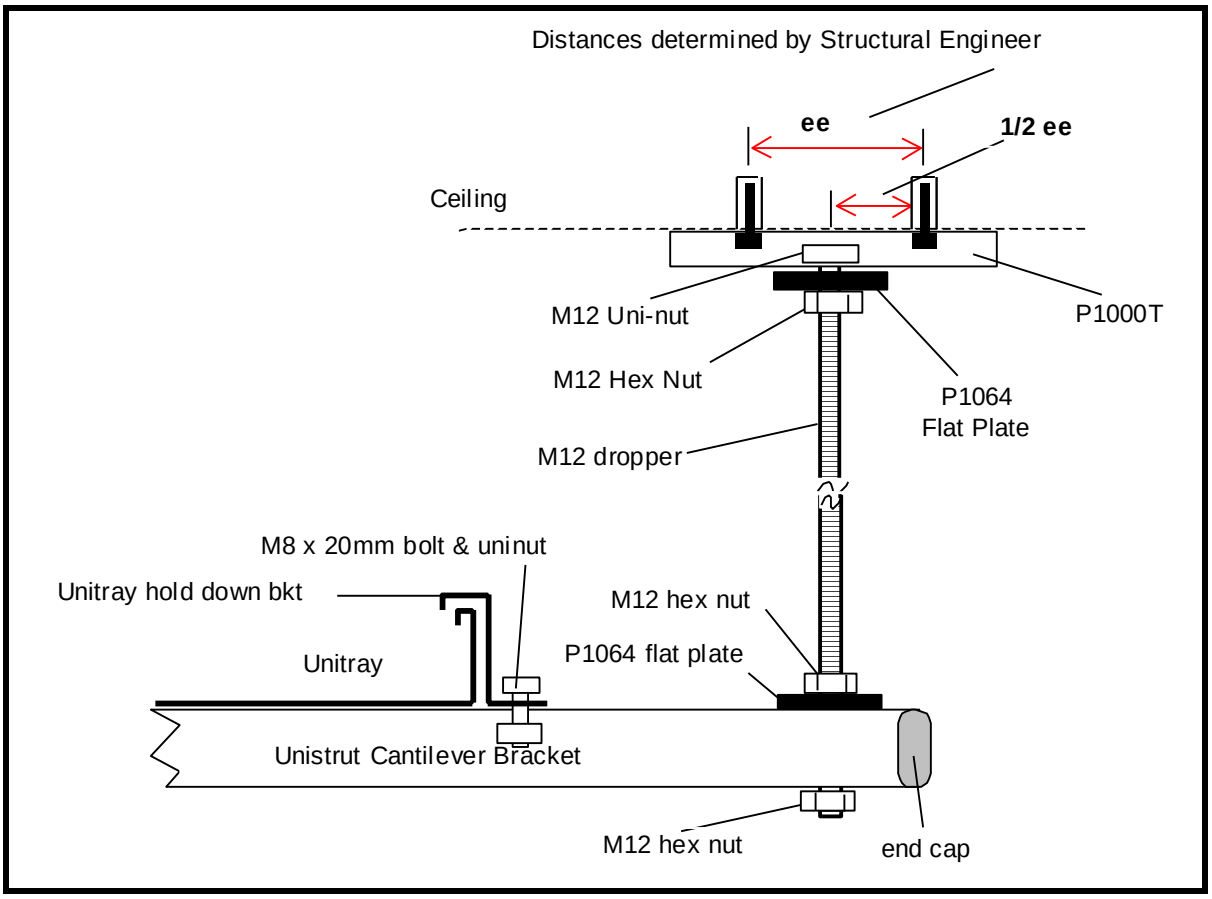


Figure 14 - Ceiling Support for Cantilever Bracket

Description	Product Number	Serial / Item		Quantity / Bracket	Notes.
Unistrut Channel, Slotted 3M length	P1000T	353/00451	426/00299 (6M or 426/00464		Note 1.
12mm Threaded Rod, 3M length		67/00467	426/00535		Note 2.
12mm Uni-nut with spring	P1010	353/02536	426/00418	1	
12mm Hex Nuts		353/02318	426/00529	3	
PLATE,FLAT 40X40MM HOLE 14MM	1064 ZA	353/02179		2	
Ceiling Anchors				2	Note 3.

Table 11- Parts List - Ceiling Support for Cantilever Bracket

One x 3M length will be enough for several supports.

Threaded Rod is also available in 1M lengths – 67/ 00478

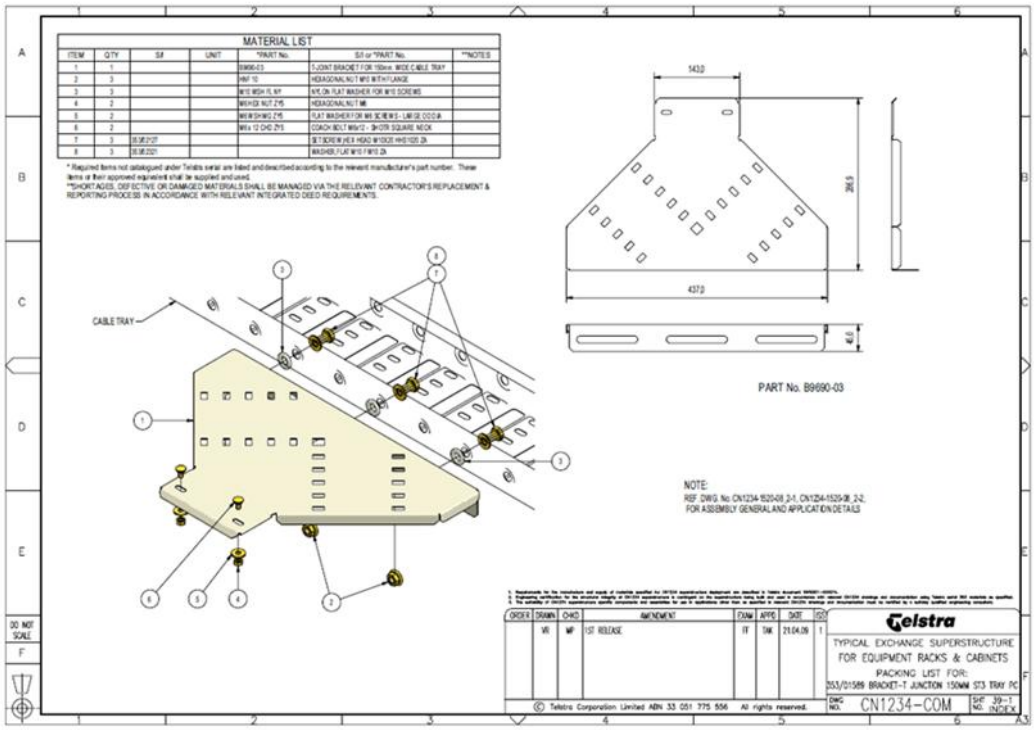
Structural Engineer to determine size/type of ceiling anchors.

4. CABLE TRAY“T” JUNCTIONS, BENDS AND CURVES

The following pages contain examples and specifications for cable tray to be used in T Junctions, Bends and Curves using ST3 SUPATRAY Hardware.

4.1. T junction – 150mm tray

353/01589



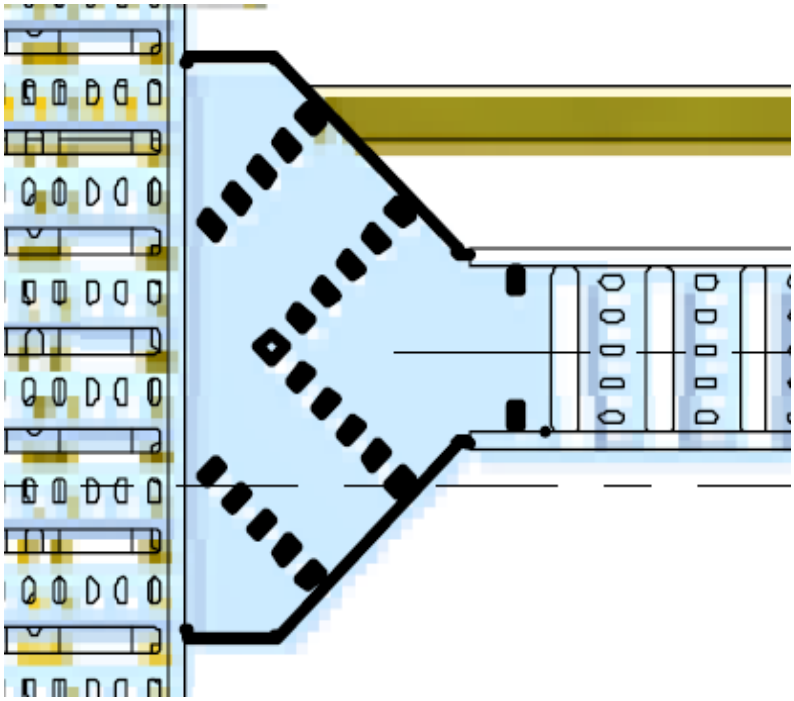
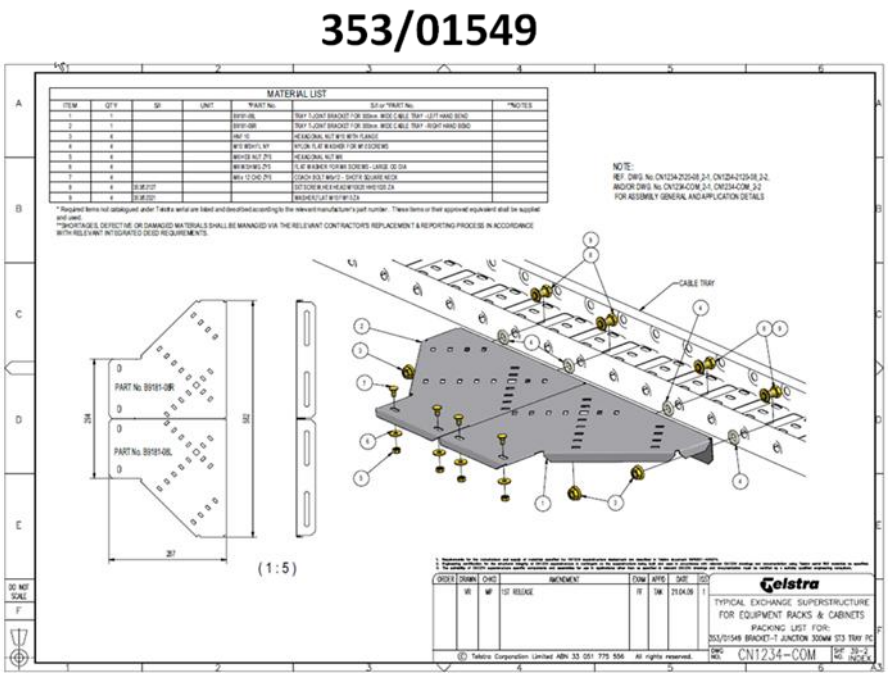


Figure 15 T junction 150mm tray

4.2. T junction – 300mm tray



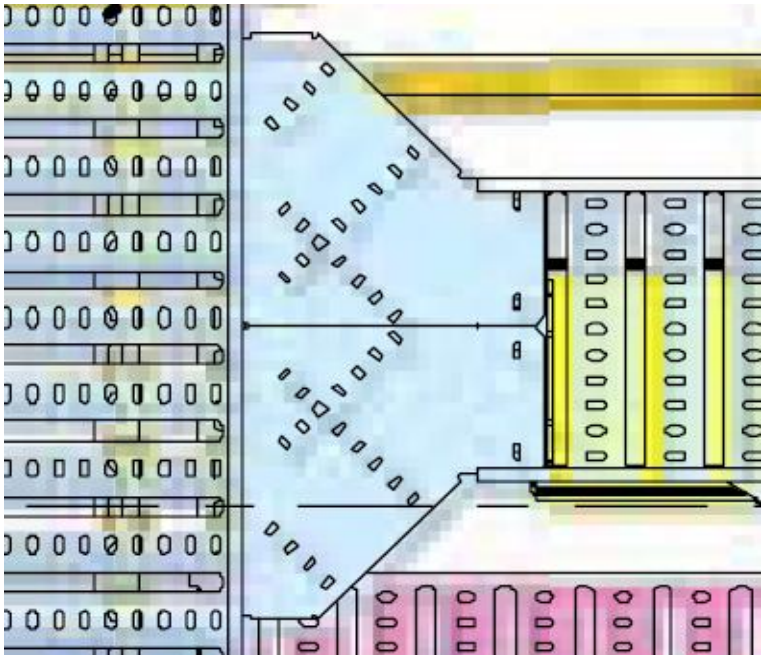


Figure 16 T junction 300mm tray

4.3. T junction – 450mm tray

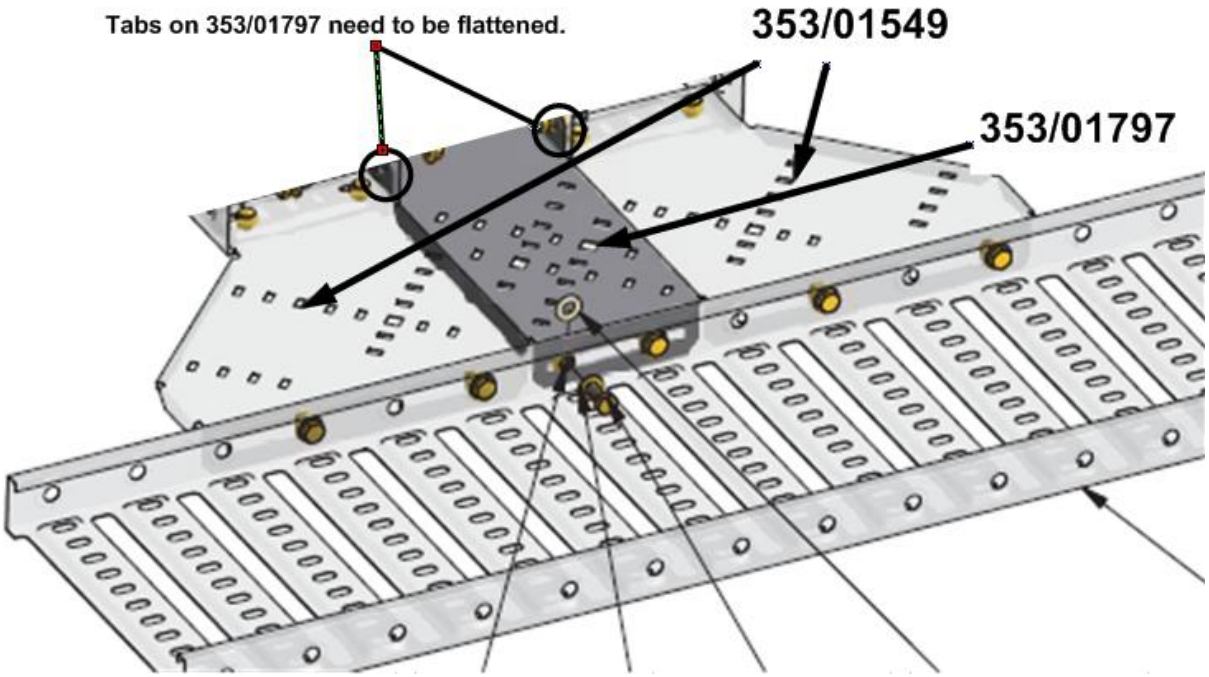


Figure 17 T junction 450mm tray

4.4. *Curve in Horizontal Tray 150mm, 300mm, 450mm and 600mm*

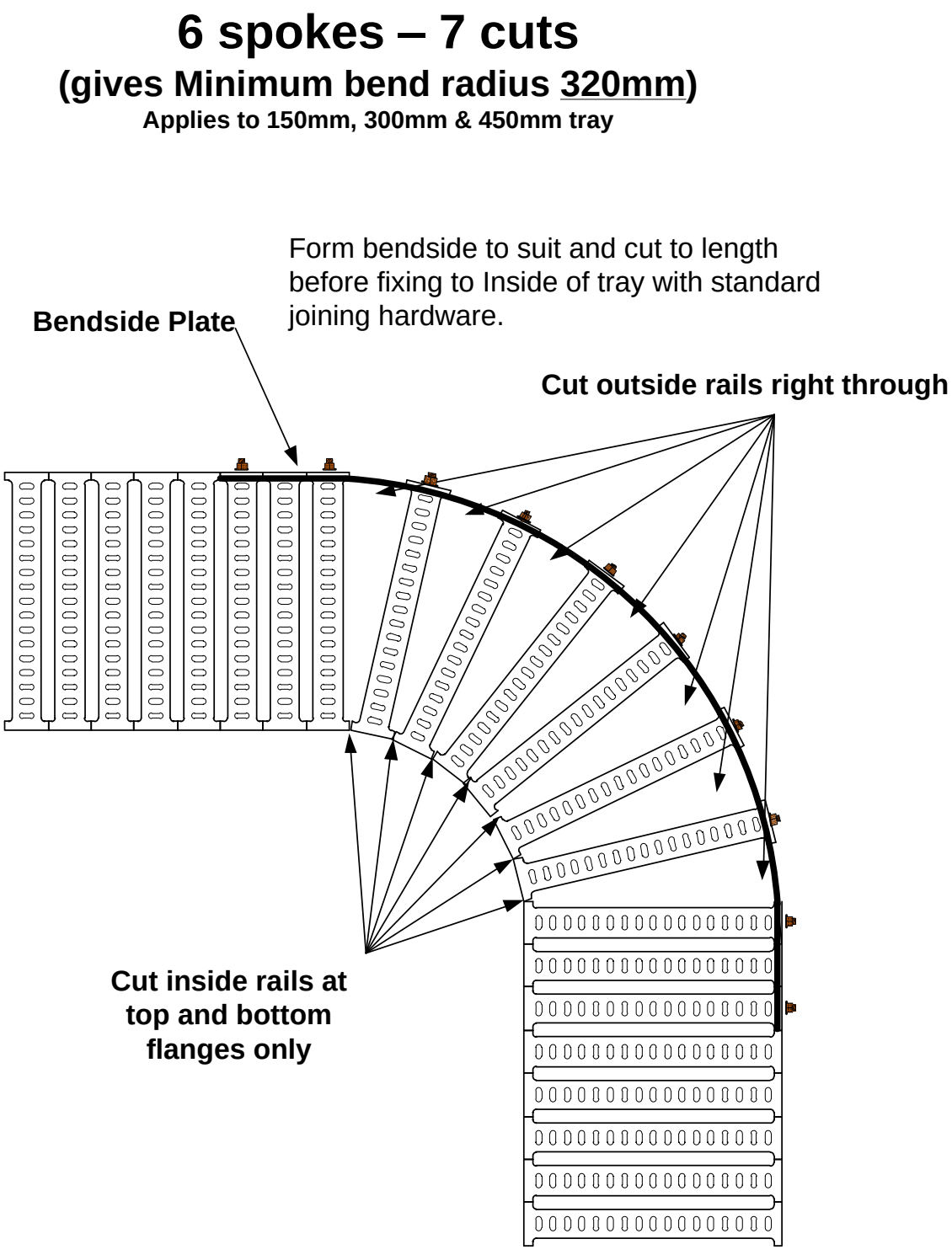


Figure 18 Tray Curve Horizontal (min radius 320mm)

4.5. *External Bend (Convex) in Vertical Tray 150mm, 300mm , 450mm and 600mm*

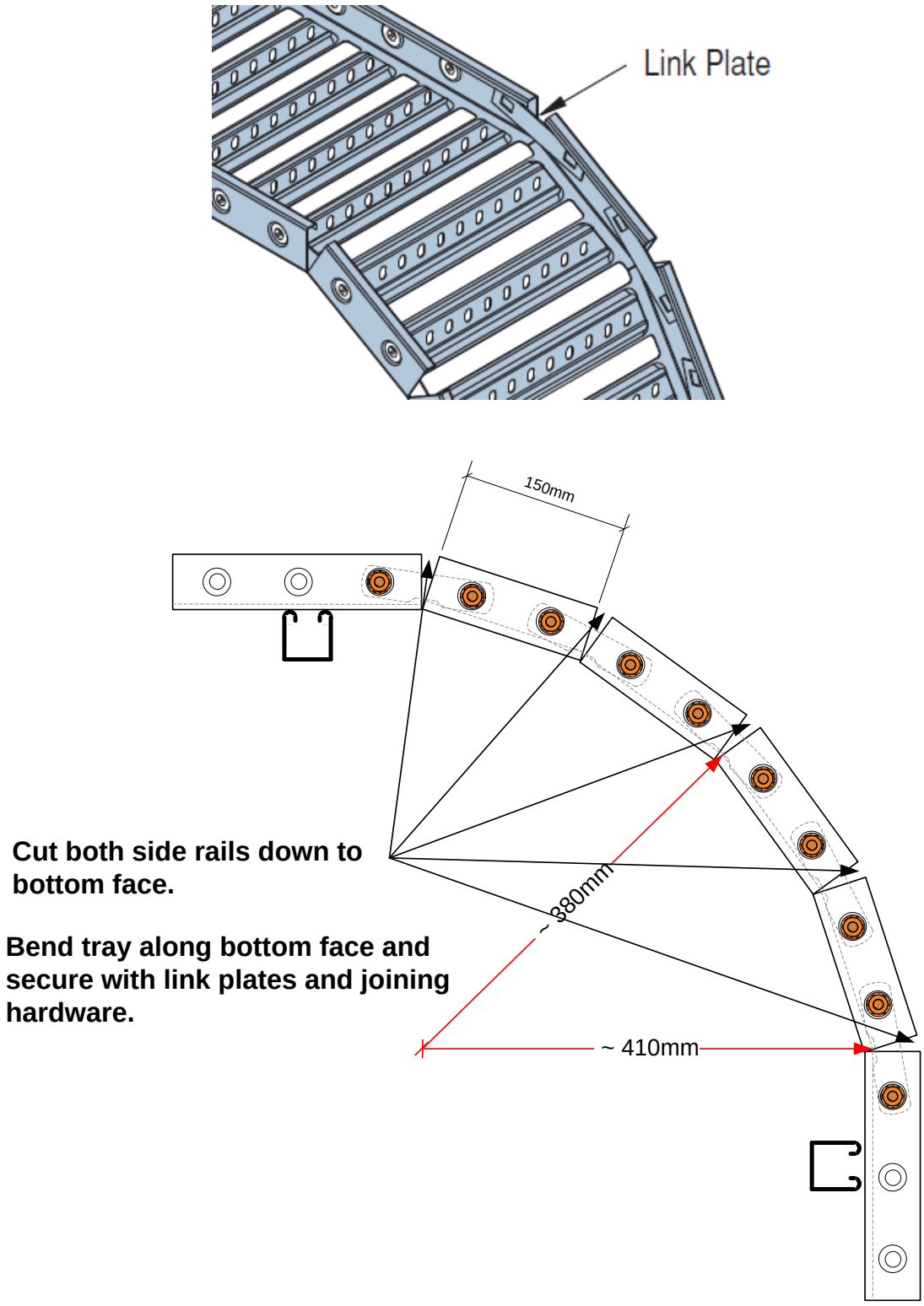
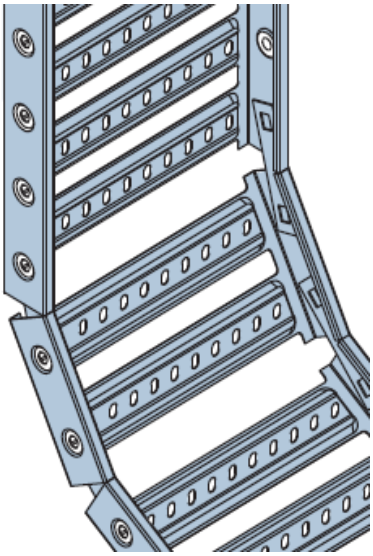


Figure 19 Convex Vertical Bend – bend radius 380mm

4.6. Internal Bend (Concave) in Vertical Tray 150mm, 300mm , 450mm and 600mm



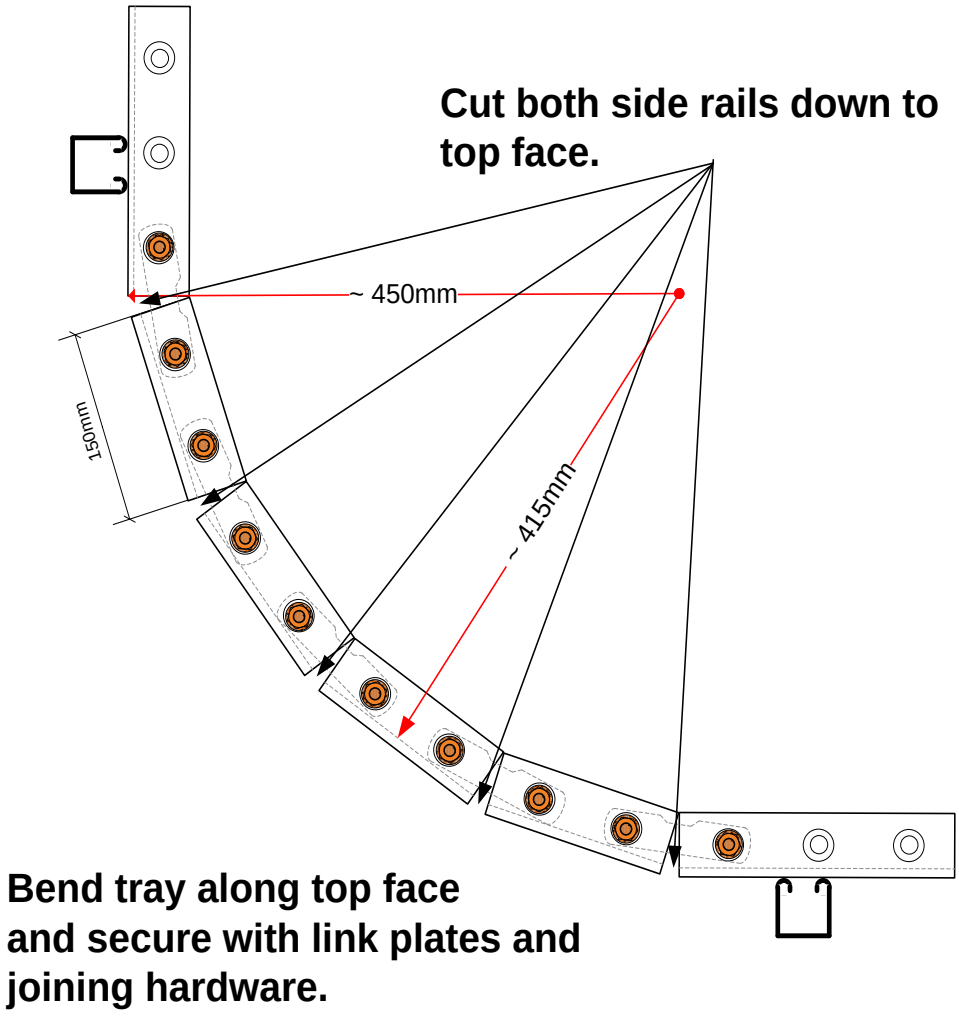


Figure 20 Concave Vertical Bend – bend radius 415mm

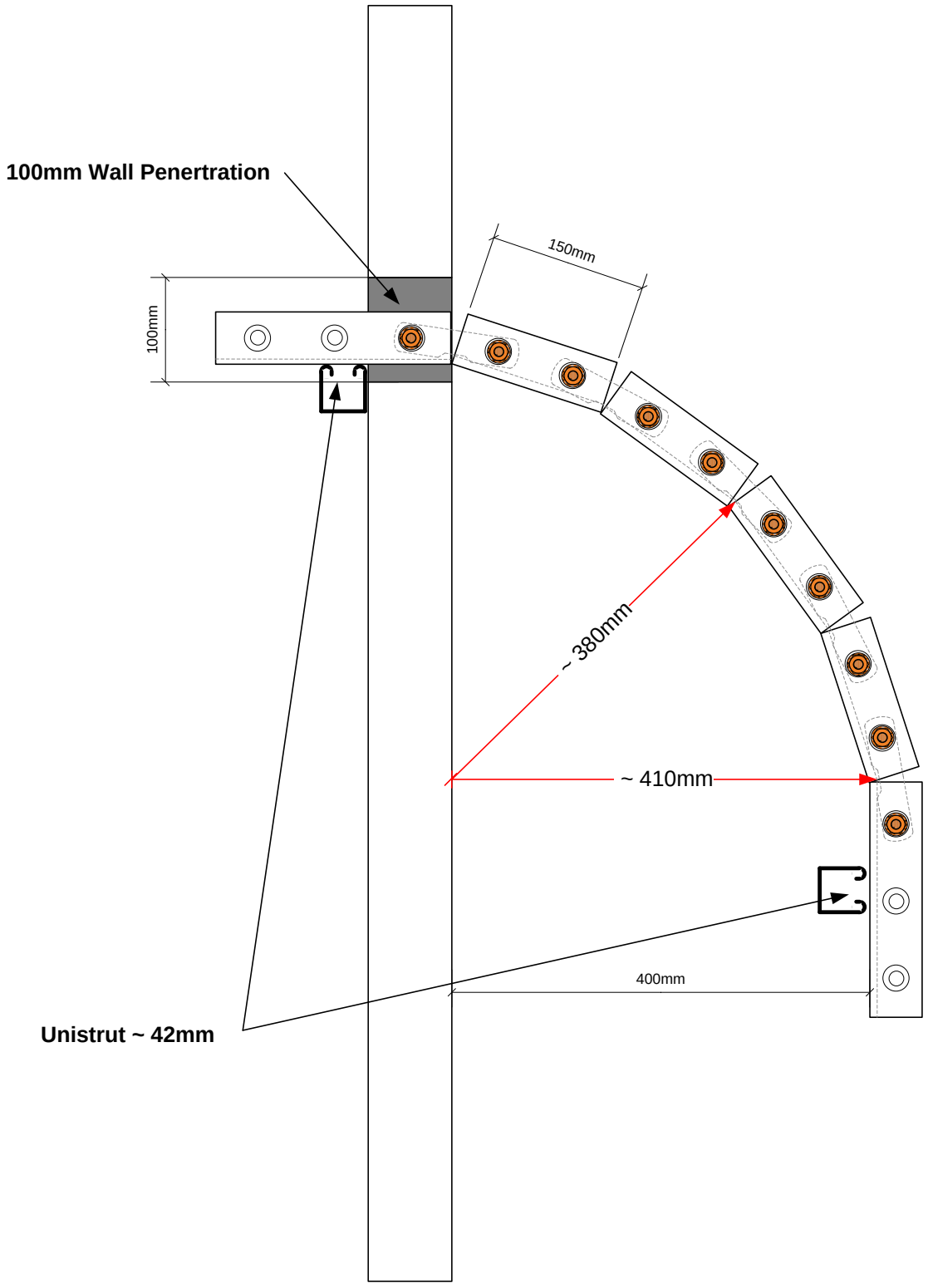


Figure 21 Convex Vertical Bend – wall penetration, max distance from wall

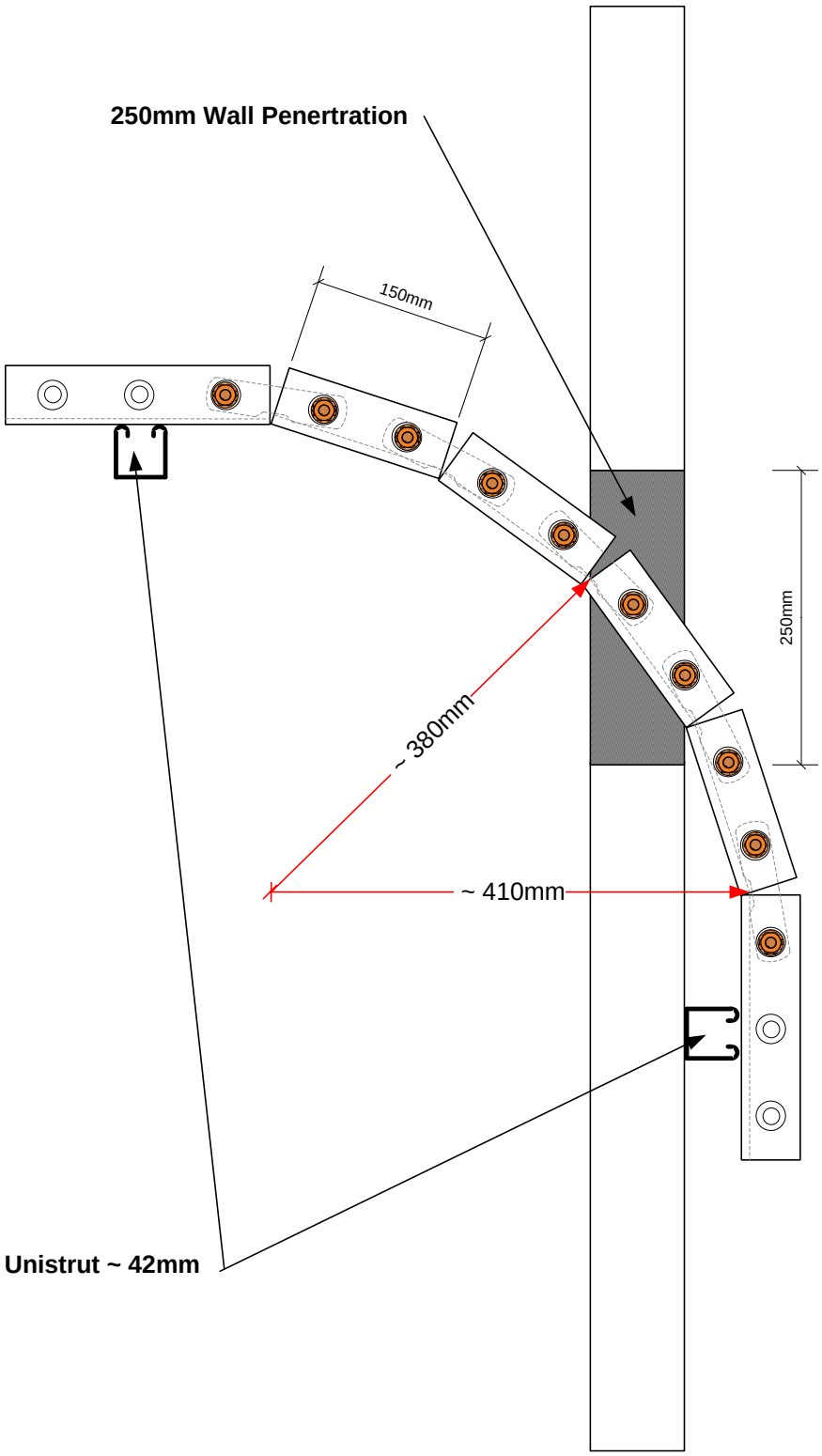
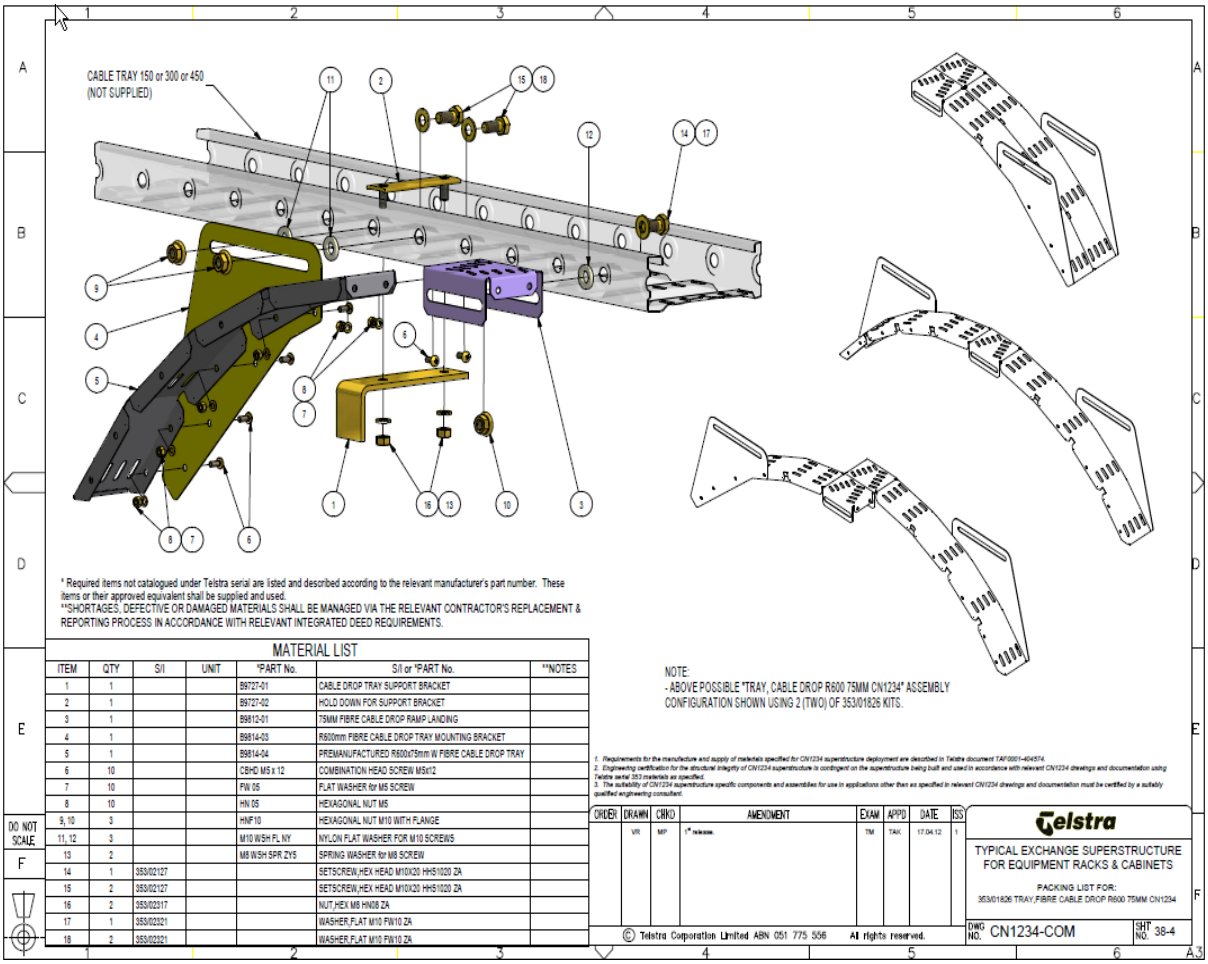


Figure 22 Vertical Bend – wall penetration, min distance from wall

4.7. 600mm radius drop off from Tray into Rack

353/01826



* Required items not catalogued under Telstra serial are listed and described according to the relevant manufacturer's part number. These items or their approved equivalent shall be supplied and used.
**SHORTAGES, DEFECTIVE OR DAMAGED MATERIALS SHALL BE MANAGED VIA THE RELEVANT CONTRACTOR'S REPLACEMENT & REPORTING PROCESS IN ACCORDANCE WITH RELEVANT INTEGRATED DEED REQUIREMENTS.

MATERIAL LIST

ITEM	QTY	S/I	UNIT	*PART No.	S/I or *PART No.	**NOTES
1	1			B9727-01	CABLE DROP TRAY SUPPORT BRACKET	
2	1			B9727-02	HOLD DOWN FOR SUPPORT BRACKET	
3	1			B9812-01	75MM FIBRE CABLE DROP RAMP LANDING	
4	1			B9814-03	R600mm FIBRE CABLE DROP TRAY MOUNTING BRACKET	
5	1			B9814-04	PREMANUFACTURED R600x75mm W FIBRE CABLE DROP TRAY	
6	10			CBHD M5 x 12	COMBINATION HEAD SCREW M5x12	
7	10			FW 05	FLAT WASHER for M5 SCREW	
8	10			HN 05	HEXAGONAL NUT M5	
9, 10	3			HNF10	HEXAGONAL NUT M10 WITH FLANGE	
11, 12	3			M10 WSH FL NY	NYLON FLAT WASHER FOR M10 SCREWS	
13	2			M8 WSH SPR ZY5	SPRING WASHER for M8 SCREW	
14	1	353/02127			SETSCREW,HEX HEAD M10X20 HHS1020 ZA	
15	2	353/02127			SETSCREW,HEX HEAD M10X20 HHS1020 ZA	
16	2	353/02317			NUT,HEX M8 HN08 ZA	
17	1	353/02321			WASHER,FLAT M10 FW10 ZA	
18	2	353/02321			WASHER,FLAT M10 FW10 ZA	

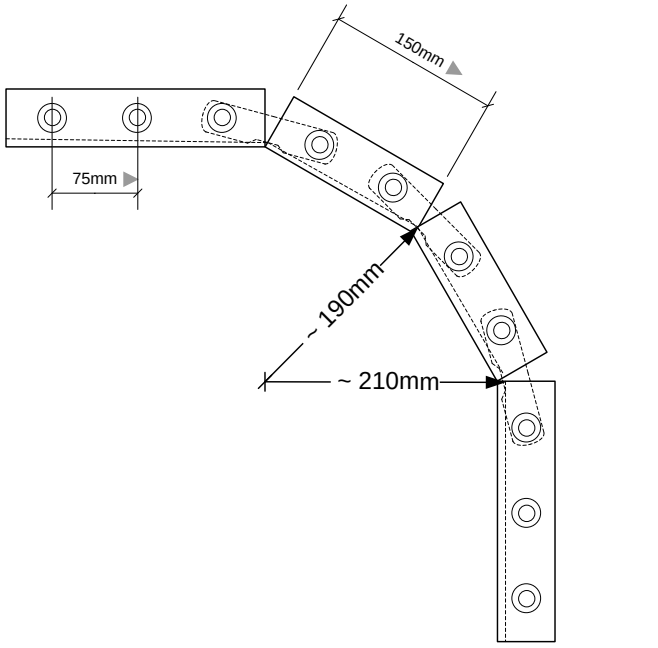
1. Requirements for the manufacture and supply of materials specified for CN1234 superstructure deployment are described in Telstra document TAF0001-404574.
2. Engineering certification for the structural integrity of CN1234 superstructure is contingent on the superstructure being built and used in accordance with relevant CN1234 drawings and documentation using Telstra serial 353 materials as specified.
3. The suitability of CN1234 superstructure specific components and assemblies for use in applications other than as specified in relevant CN1234 drawings and documentation must be certified by a suitably qualified engineering consultant.

ORDER	DRAWN	CHKD	AMENDMENT	EXAM	APPD	DATE	ISS
	VR	MP	1st release.	TM	TAK	17.04.12	1

Figure 23 600mm radius drop off from Tray into Rack

4.8. Dimensions for drawings shown in vendor's catalogue.

Bend radius 190mm



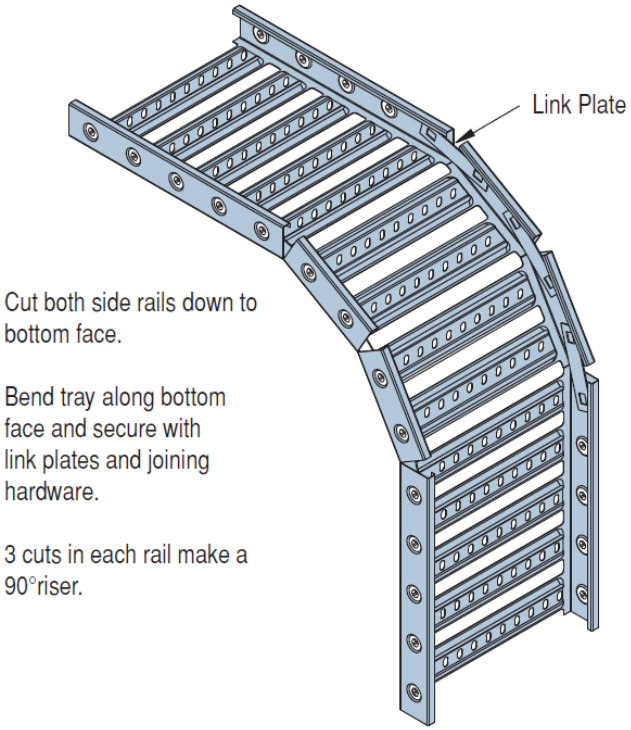
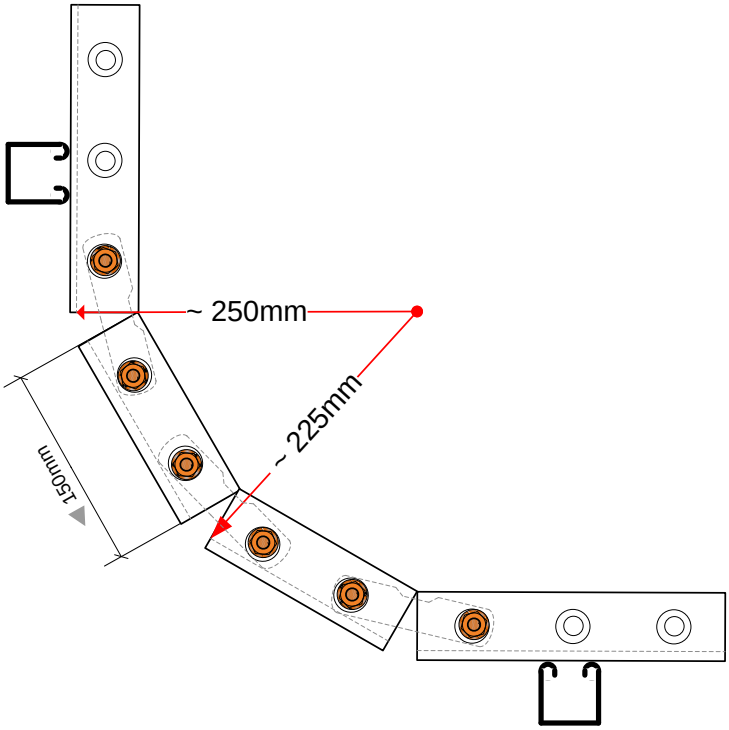


Figure 24 Convex Vertical Bend – showing spec for Vendor drawing

4.9. *Bend radius 225mm*



Cut both side rails down to top face.

Bend tray along bottom face and secure with link plates and joining hardware.

3 cuts in each rail make a 90°riser.

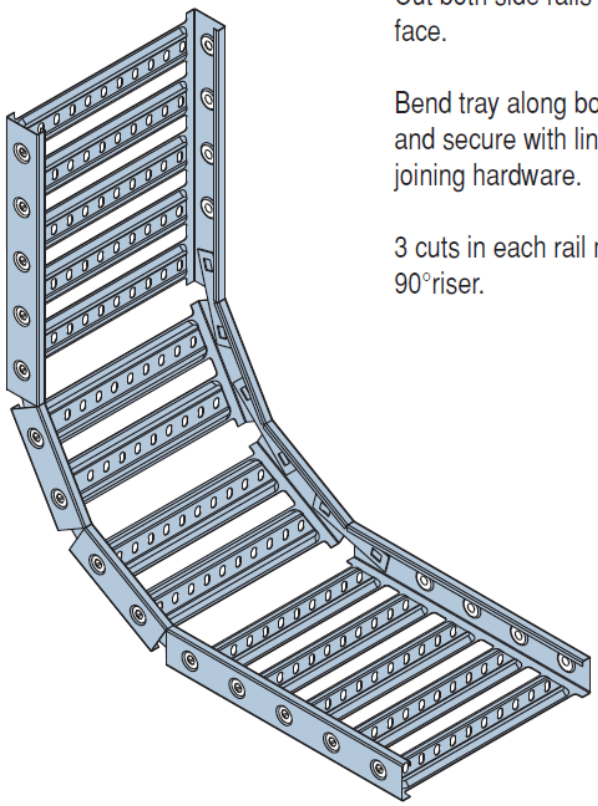


Figure 25 Concave Vertical Bend – showing spec for Vendor drawing

4.10. Bend radius 210mm (minimum)

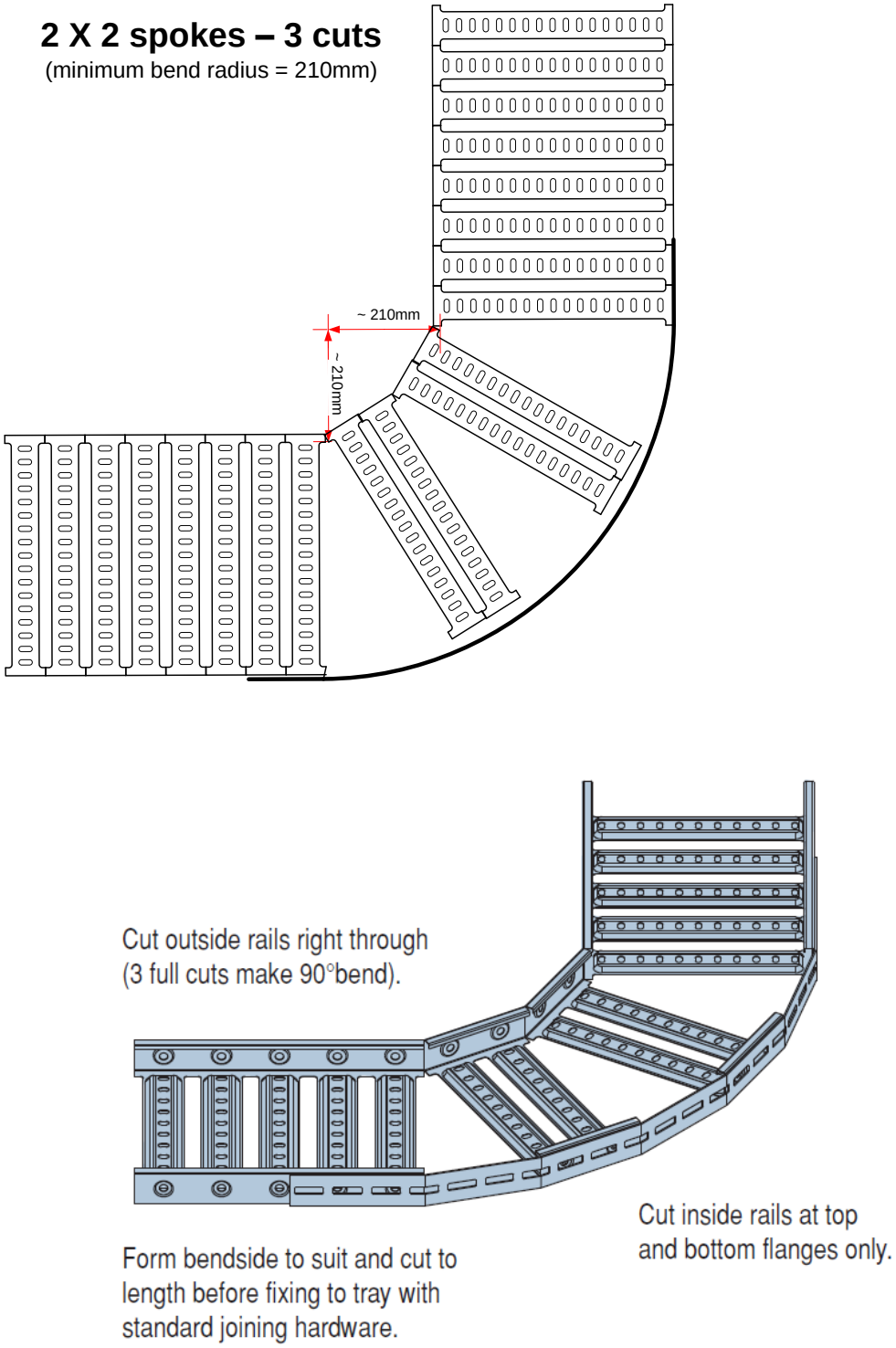


Figure 26 Horizontal Curve – showing spec for Vendor drawing

4.11. T-X brackets should not be used for Fibre Tray

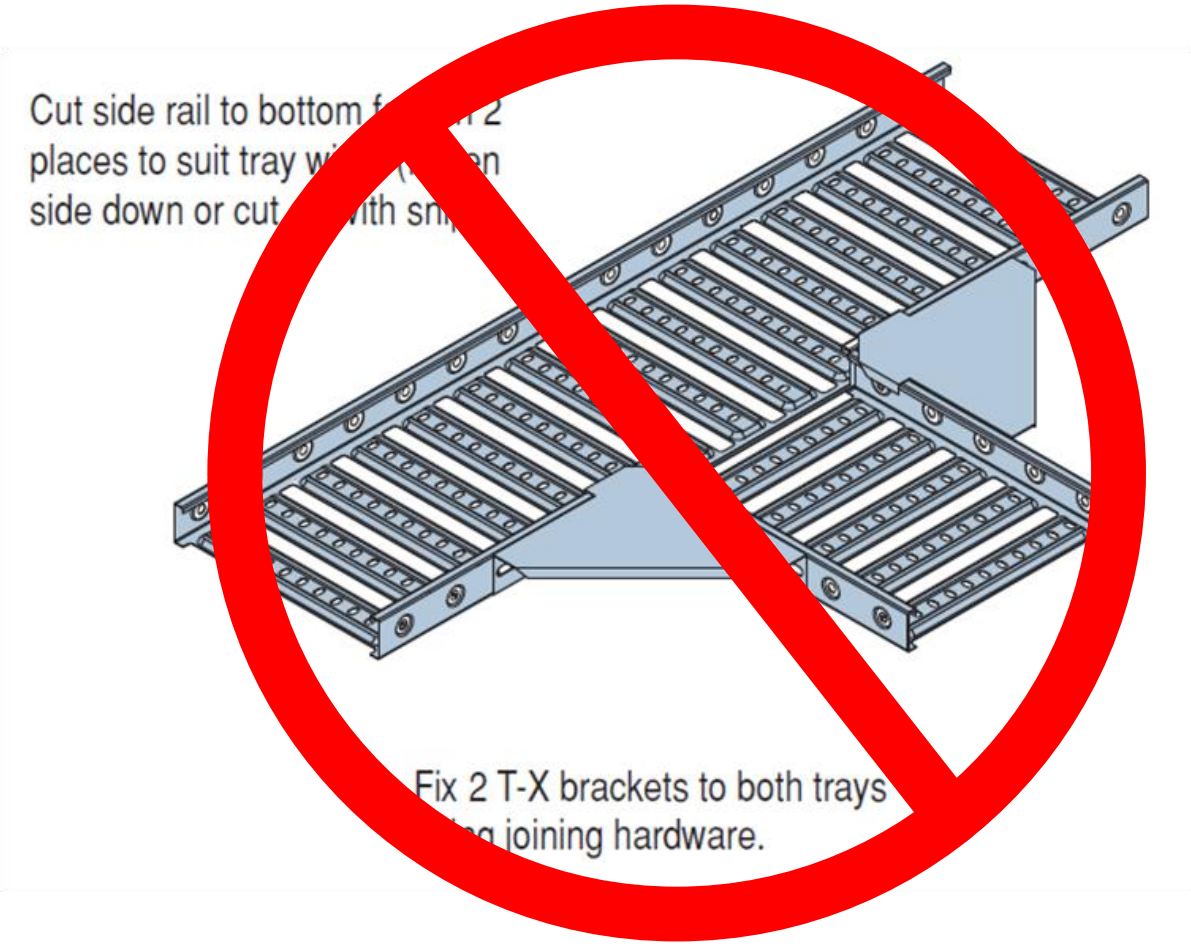


Figure 27 T-X brackets should not be used

4.12. Convex Vertical Bend – Minimum bend radius 290mm

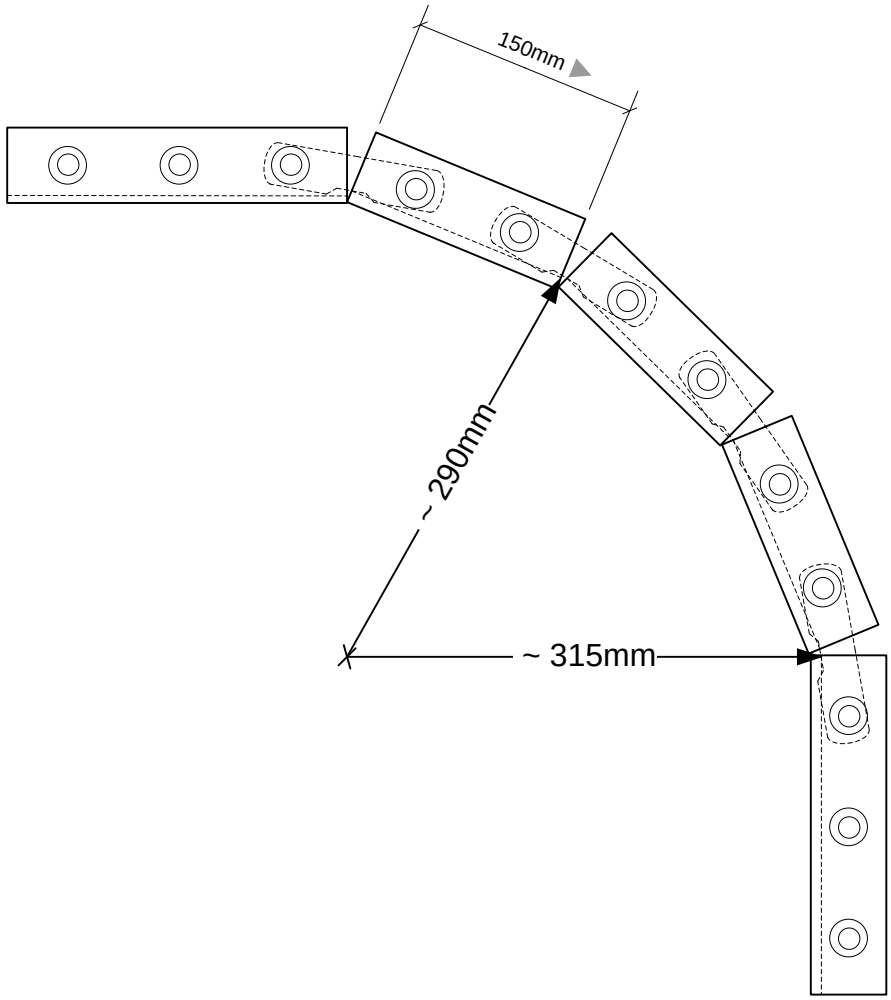


Figure 28 Convex Vertical Bend – Minimum bend radius 290mm

5. CABLE RUNWAY EARTHING

Cable runways are not required to be earthed.

If a cable runway is bonded to superstructure or an IBN, then it must not cause an earthing violation by bonding two or more IBN's together.

Where a cable runway is bonded to superstructure or an IBN, it shall require an isolation point at each location where it traverses the boundary of an IBN (including a superstructure area).

The degree of isolation required is detailed in the Telstra publications:

007338 C6-9 "Earthing of AC & DC Rack Based Equipment" and

007338 C12-10 "Power and Environment Principles for New Technology Deployments".

Cable runway brackets are generally secured using standard fittings that may cause a bond with the building fabric (e.g.: a dynabolt touching the building reinforcement). Where a cable runway is secured using standard fittings that may cause a bond with the building fabric, it shall be isolated from any section bonded to an equipment or superstructure IBN.

6. MATERIAL

A list of the commonly used parts for cable runways is available at TAF0001-372935

It is not a complete list of items available for each tray type.

Consult the manufacturer's hand-books/data sheets/Design for more detailed information.

All Cable Trays and associated hardware (e.g.: hangers, brackets etc) will meet the finishes

specified below and shall be used in all areas within the Telephone exchange (including but not limited to: Equipment Areas, Power & Battery Rooms, MDF Areas):

Unistrut channel & fittings: to AS1789 (Fe/Zn 12c2C).

Nuts, bolts, screws: to AS1897 (Fe/Zn 5c Type C).

Cable trays – Powdercoated 90 micron thickness polyester.

Cable chambers and tunnels will use a hot dipped galvanised finish.

Description	Vendor	Product Number	Serial / Item	Length	Notes
LABELS					
Cable Tray Warning label			141/00602		Pkt 25
Cable Tray Design Loading label			141/00603		Pkt 25

Table 12 - Material List

6.1. Tel-tray

Tel-tray width greater than 300mm is made up using multiples of 150mm & 300mm tray bolted together.
E.g. 450mm = 1xTT150PT + 1xTT300PT

600mm = 2xTT300PT,
900mm = 3xTT300PT.

6.2. NEMA-12B Tray

NEMA 12B ladder tray offers an 'off the shelf' solution for bends, risers & tee's. It is available in grey powder coating for use within an exchange building and in a hot dipped galvanized coating for use in cable chambers.
The NEMA 12B ladder tray is available in 300 mm wide & 450 mm wide sections. The Serial item list is available in TAF0001-372935

A standard Unistrut M8 bolt (30mm) and channel nut is required for the fixing of the hold down bracket.

The NEMA 12B ladder tray can provide 112kg per meter of working load over 3.6meters spans where sutiable supports have been deployed. Supports shall be determined from structurally approved drawings.

6.2.1. Preferred Anchor Types

The preferred anchors are detailed in Table 13. Different manufacturers of masonry anchors may be used provided they meet or exceed the specifications of the preferred anchors.

Some cases may require special anchoring methods which will be determined by Network Building Services or Structural Engineer.

Anchor Type (Manufacturer) **Manufacturer part number underlined**	**Dimension**	**Serial / Item**
Dynabolt (Ramset) Masonry Anchor		
D8042	8mm x 40mm (6mm thread)	89 / 00353
D10048	10mm x 48mm (8mm thread)	89 / 00160
D10100	10mm x 100mm (8mm thread)	89 / 00195
D12058	12mm x 58mm (10mm thread)	89 / 00161
D12070	12mm x 70mm (10mm thread)	89 / 00162
D12098	12mm x 98mm (10mm thread)	89 / 00196
Hilti Masonry Anchor		
HKD M10 Flush, drop in metal anchor	10mm x 40mm (12mm hole)	89 / 00349
HKD M12 Flush, drop in metal anchor	12mm x 50mm (15mm hole)	89 / 00351
HASR M12x160 (Use with 89 / 00363)	12mm x 160mm SS Rod	89 / 00361
HASR M16x190 (Use with 89 / 00364)	16mm x 190mm SS Rod	89 / 00362

HEA M12	(Use with 89 / 00361)	Chemical Adhesive Capsule	89 / 00363
HEA M16	(Use with 89 / 00362)	Chemical Adhesive Capsule	89 / 00364
HPS 8/5	Nylon Tap-in Anchor	8mm x 50mm	89 / 00316
Excalibar Screwbolt (Powers Fasteners)			
		6mm x 50mm	89 / 00523
		8mm x 50mm	89 / 00524
		8mm x 75mm	89 / 00525
		8mm x 100mm	89 / 00526
		10mm x 60mm	89 / 00527
		10mm x 75mm	89 / 00528
		10mm x 100mm	89 / 00529

Table 13 - Preferred Anchor Types

INSTALLATION

There shall be adequate number of staff available for the job/task at hand. Due to the potential danger when erecting any overhead structure staff must not work alone.

It shall be ensured that all staff involved are familiar with the safety and work procedures necessary to install the cable runway and that they have the necessary safety clothing, tools and project material.

Warning signs and barriers shall be erected to alert other staff of the activity in hand.

On completion, conduct an installation quality audit, refer to Section 6.5.

6.3. Tightening Bolts & Channel Nuts

The Unistrut bolts and channel nuts shall be tightened in accordance with the following guidelines.

According to the TYCO Unistrut Engineering Data for the slip and pullout performance of zinc plated channel nuts for P1000 channel, different torque settings are required for different nut sizes.

The torqueing of the bolts when using the 6 mm gauge Unistrut components (e.g.P1000) may not require a torque wrench during assembly, but a certain rotation of the bolt from finger tight shall suffice. This information is detailed in Table 14. A torque wrench shall be used when it is specified to be used by the Structural Design.

Channel Type	Nut Type	Bolt Size	Torque (Nm)	Rotation from finger tight (degrees)

P1000	P1007	M8	22	360
	P1008	M10	44	360
	P1010	M12	77	180

Table 14 – Tightening Guidelines for Zinc Plated Channel Nuts & Bolts

Where the bolts and channel nuts are used to secure lighter gauge brackets and components, the bolts should be tightened sufficiently (not to the guidelines in Table 14) to prevent movement but should not be over tightened to cause deformation of the bracket. This would include components such as Cable Tray Hold Down Brackets.

6.4. Labelling

Cable runways shall be labelled with a set of labels every three metres on each accessible side of the cable tray. The two labels within the set should have approximately 100mm spacing between the two label types

Section 7.2.1 and 7.2.2 for detail on the two labels required.

6.4.1. Cable Tray Design Loading Label

A Cable Tray Design Loading label is available as 141/00603 in packs of 25.

The label is yellow with black text that reads “THIS CABLE TRAY HAS A DESIGN LOADING OF ..... KG/M. DO NOT FILL ABOVE SIDE OF TRAY”.

Design loading will be the maximum cable load. approved by the engineer and does not include the safety factor detailed in Section 3.2.4.2

The label has a blank section where the design loading shall be written in by the Installer. This information shall be supplied in the design pack.

6.4.2. Cable Tray Warning Label

A Cable Tray Warning label is available as 141/00602 in packs of 25.

The label is yellow with black text that reads “DO NOT SIT, STAND OR WALK ON TRAY”.

6.4.3. Cable Tray NBN Label

The optical fibre cable tray from all NBN Co footprints to the external plant/Access location are reserved for NBN Co use.
Any other use of these marked cable trays by Telstra or other carriers will need an approved exemption.
Exemptions must be submitted via email to Andrew.C.Bilinski@team.telstra.com for approval to use the FSAM cable tray.

Cable trays deployed under the NBN program shall be labelled every 2 m to 3 m.
The label shall be affixed to both sides of the cable tray where accessible and visible.

Figure 29 FSAM cable tray lable position

The following rules shall be applied when determining how often the labels shall be fitted taking into consideration site constraints:

- Only label the cable tray in the cable chamber when a cable tray was allocated or installed for NBN FSAM cables
- Only label the cable tray where it is visible and accessible, i.e. do not label the side of tray if a wall, air conditioning duct, etc. is obstructing visibility of the label when viewed from the equipment floor
- Label all vertical risers cable trays installed for NBN This is particularly important at multi storey Agg Nodes sites, each floor should have at least one label
- Do not label optical fibre intra suite (OMF) cable trays
- Only label an intersuite cable tray when it is used to connect between separated superstructure areas

The following label must be used. This label can be affixed to the cable tray without any other material or tools required by the installer.

Serial and Item - 141/00651 (25 label per bag are supplied by the vendor)
Size of label is 220/200mm x 20mm

NBN Co. Use Only

Ref to TM00181

Figure 30 NBN Cable tray label

6.5. Installation Quality Audit

On completion of the cable runway installation a local installation quality audit shall be performed to ensure that the installation is safe and satisfactory. Typical items to be considered are:

All heights and dimensions correct to ± 10 mm.

Brackets are correctly spaced.

Brackets and cable tray installed vertically and horizontally.

All nuts and bolts tight.

All sharp edges removed and/or protected.

Painted surfaces not damaged or repainted as required.

Work area and all floor areas cleaned and left in safe condition.

Continuity of earth mesh and isolation from building and other earths.

Labels correct and in place. {Format: <Label> 100mm <Label> 3000mm <Repeat>}

6.6. Data Base of Records

6.6.1. CADLINK

The spacing between cable tray supports shall be shown on the exchange floor plan.

Any structural reports or Designs are to be loaded into the Cadlink site file.

7. REFERENCES

Document Number	Title
UniStrut Catalogue	UniStrut Catalogue
C12-10	POWER AND ENVIRONMENT PRINCIPLES FOR NEW TECHNOLOGY DEPLOYMENTS
TM00100	Exchange Superstructure - Type 92 Superstructure & Variations

8. DEFINITIONS

The following words, acronyms and abbreviations are referred to in this document.

Term	Definition
AC	Alternating current
CADLINK	Telstra's Drawing Database
DC	Direct current
TYCO	Telstra vendor supplying Unistrut

ATTACHMENTS

Document Number	Title

DOCUMENT CONTROL SHEET

Contact for Enquiries and Proposed Changes

If you have any questions regarding this document contact:

Name: Mathew Emy

Designation: Deployment Solution Expert

Phone: 03 8649 4151

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If you have a suggestion for improving this document, please contact the person listed above.

Record of Issues

Issue No	Issue Date	Nature of Amendment
1	20/12/2010	Creation of document from CSD10496
2	13/05/11	3.1.1.3 Addition of "certify the installation" if a engineered solution was required.
3	20/05/12	Elucidate the 100kg point load, add location to store engineering certification.
3	June 2012	Re numbered sections + added section 4
4	Aug 2012	Updated material tables change to serial items.
5	July 2013	Fixed loss of heading formatting and added NEMA tray.
6	Jan 2014	Added section 6.4.3 NBN cable tray use and markings.