

Pass + Co U.K. Ltd.

PASSCO L1 VEHICLE RESTRIANT SYSTEMS



INSTALLATION MANUAL

List of Contents

1.0 General

- 1.1 Manual Scope
- 1.2 Quality Assurance
- 1.3 Product Design, Warranty and Durability
- 1.4 Product Training
- 1.5 Health and Safety

2.0 VRS Layout Requirements & System Selection

- 2.1 VRS Terminology
- 2.2 PASSCO L1 System Selection
- 2.3 Minimum Length for PASSCO L1 Systems
- 2.4 VRS Set-Back
- 2.5 PASSCO L1 System Installation Height
- 2.6 Visibility
- 2.7 Sloping Ground
- 2.8 Post Installation Types

3.0 Limitations on Use

4.0 Installation

- 4.1 Setting Out
- 4.2 Driven Posts
- 4.3 Concrete Foundations
- 4.4 Surface Mounted Posts
- 4.5 Installation Tolerances / Requirements

5.0 PASSCO L1 VRS Assembly

- 5.1 System Assembly
- 5.2 Connection to 'Legacy' Non-Proprietary Safety Barrier Systems
- 5.3 Connection to Other Proprietary V.R.S, Terminals, Crash Cushions or Transitions
- 5.4 Installation on Curves
- 5.5 Progression Through VRS Working Width
- 5.6 Permissible Post Deviation

6.0 Inspection, Maintenance & Repair

- 6.1 Inspection
- 6.2 Maintenance
- 6.3 Repair
- 6.4 Site Records

7.0 Ground Condition Testing

1. General

1.1 – Manual Scope

This manual sets out the procedures for the installation, repair, inspection and maintenance of Pass & Co L1 vehicle restraint systems supplied by Pass & Co UK Ltd. Our PASSCO L1 systems have been designed and impact tested in accordance with the performance specification set out in the European road restraint systems test / specification standard EN 1317-2 for containment classifications N2 and H1 in a number of post pitch configurations, all which utilise a standardised suite of componentry.

Some products have been tested for dual containment classification, which is where the L1 product name is derived, allowing cost effective application and ease of installation.

The product range has been developed to suit the requirements of the UK highways network, with additional testing in both socketed concrete foundations and driven posts and is compatible with all Non-proprietary Safety barrier Systems (NPSBS) other proprietary systems and terminal sections. Please seek advice from Pass & Co UK Ltd.

1.2 – Quality Assurance

Pass & Co UK Ltd are fully compliant with BS EN ISO 9001:2015, NHSS 10B and have procedures in place to ensure product compliance with CRP regulations. Pass & Co UK Ltd. are committed to providing quality products and services which fully comply with current legislation and any client specification.

1.3 – Product Design, Warranty and Durability

The product assurances given by Pass & Co UK Ltd for warranty and liability for the Pass & Co L1 family of products will be invalidated if it is demonstrated that components have been used from an unapproved source in installation, maintenance or repair, and if the VRS does not comply with Pass & Co UK Ltd specifications.

1.4 – Product Training

Pass & Co UK Ltd policy is that all works to install, repair, inspect and maintain Pass & Co VRS on UK roads must be undertaken by fully trained and properly qualified personnel in accordance with the mandatory requirements of Sector Scheme 10B and as specified in DMRB CD 377 Requirements for road restraint systems Revision 4 (formerly TD 19/06) Sector 10B training is available from Pass & Co UK Ltd through our designated Lantra Awards approved training centre at Fencing and Construction Training Ltd. (FaCT Birmingham).

Pass & Co UK Ltd training policy extends to anyone installing Pass & Co outside of the UK and for details of available training contact Pass & Co.

1.5 – Health & Safety

It is the installers responsibility to ensure that all necessary safety procedures are in place and implemented at all times. The site specific conditions and restrictions should be assessed and a risk assessment produced by the installer for the specific site. All endeavours must be used to ensure that no one is injured or put at risk during the installation, repair inspection or maintenance of the Pass & Co Vehicle Restraint Systems.

2. VRS Layout Requirements & System Selection

Layout designs should be undertaken by competent persons with legislative knowledge to comply with:

- Series 400 of The Specification for Highways Works
- DMRB CD 377 'Requirements for Road Restraint Systems' (formerly TD 19/06)
- DMRB CD127 'Cross-sections and Headrooms'
- VRS product requirements.

Please note, that this manual contains guidance only, which may differ from specific national requirements, which are revised on a continuous basis.

Each site must be assessed in its own right by the Design Organisation, to ensure specification compliance and system performance. The system installer remains responsible to define any features of any one particular scheme which would limit the use and operation of Pass & Co products, such as length of need, supporting surface, foundation requirements, end anchorages, horizontal and vertical alignment etc.

2.1 – VRS Terminology

The following is taken from DMRB CD 377 'Requirements for Road Restraint Systems' for other national standards please refer to the relevant documents for guidance.

Vehicle Restraint System (VRS): A tested system installed on a road to provide a level of containment for an errant vehicle. A typical system consists of:

- Terminal-safety barrier-terminal
- Terminal-safety barrier-parapet-safety barrier-terminal, and includes transitions

Safety Barrier: A type of vehicle restraint system installed alongside or on the verge or central reserve of a road which is typically comprised of metal and/or concrete/or plastic components.

Vehicle Parapet: A vehicle restraint system that is installed on the edge of a bridge, retaining wall, or similar elevated structure where there is a vertical drop.

Containment Level: VRS Containment Class for specific vehicle type / speed / angle of impact (see EN1317-2 for details)

Working Width: The maximum lateral distance between any part of a safety barrier on the undeformed traffic side, and the maximum dynamic position of any part of the barrier during impact testing to BSEN1317-2.

Note: further details are provided in BS EN 1317-2

Working Width Class: The designation of W1, W2, W3, W4 etc. for classes of working width levels, as defined in BS EN 1317-2.

Impact Severity Level (ISL): A measure of the severity of an impact with a vehicle restraint system using a combination of vehicle acceleration and theoretical head impact velocity (see EN1317-2 for details)

Note: The Impact Severity Levels (ISL) shall either be level A or B.

Vehicle Intrusion: The vehicle intrusion of an LGV is the maximum dynamic lateral position from the undeformed traffic side of the barrier in consideration of a notional load having the width and length the vehicle platform, and a total height of 4 m. The vehicle intrusion of a bus is the maximum dynamic lateral position of the bus from the undeformed traffic side of the barrier.

Note: further details are provided in BS EN 1317-2

Vehicle Intrusion Class: The designation of VI1, VI2, VI3, VI4 etc. for classes of vehicle intrusion levels, as defined in BS EN 1317-2.

Length of Need: The total minimum length of full containment vehicle restraint systems (VRS) stipulated as being required in advance of, alongside, and after a hazard(s) to achieve a 'broadly acceptable' level of risk.

Note: The length over which various VRS reach full containment can vary and need to be checked with the manufacturer.

Set-Back & PSB (Point of Setback): The distance between the PSB (Point of Setback) and the traffic face of a VRS. The PSB is the point from which set-back of the safety barrier or parapet face is to be measured.

Legacy System: Permanent safety barriers, parapets and crash cushions currently on the road network that were manufactured and installed before CE marking under the Construction Products Regulations (2011/305/EU [Ref 15.N]) became a statutory requirement.

2.2 – PASSCO L1 System Selection

The Design Organisation must specify the required Performance Class for each safety barrier installation in terms of Containment Level, Impact Severity Level (ISL) and Working Width Classification (W1 to W8).

Minimum Containment Levels for permanent safety barriers on roads with a speed limit of 50 mph or more shall be:

- 1) Normal Containment Level N2:
- 2) Higher Containment Level H1:
- 3) Very High Containment Level H4a:

Minimum Containment Levels for permanent safety barriers on roads with a speed limit of 50 mph or less shall be:

- 1) Normal Containment Level N1:
- 2) Higher Containment Level H1:
- 3) Very High Containment Level H4a:

Where a site specific risk assessment indicates that a containment level higher than the minimum level is required, the higher containment level shall be specified.

C.E. Certified PASSCO H2 and H4a systems are available but are not Covered within this Manual.

For details of the available systems within the PASSCO L1 range, covered by this manual, please see Table 2 overleaf.

Table 2

PASSCO CE Marked System Name	Containment Class	ASI Class	Normalised Working Width	Normalised Vehicle Intrusion Class	Post Type	Post Centres	General Arrangement Drawing	Permissible Post Deviation Drawing
L1 UK (ES1.00)	N2	B	W1	N/A	C100	1000	L1UK-PCGA-01	L1UK-PCGA-07
L1 UK (ES2.00)	N2	B	W2	N/A	C100	2000	L1UK-PCGA-02	L1UK-PCGA-08
L1 UK (ES2.00)	H1	A	W4	VI7	C100	2000	L1UK-PCGA-02	L1UK-PCGA-08
L1 UK (ES3.00)	N2	B	W3	N/A	C100	3000	L1UK-PCGA-03	L1UK-PCGA-09
L1 UK (ES4.00)	N2	A	W4	N/A	C100	4000	L1UK-PCGA-04	L1UK-PCGA-10
L1 UK (ES1.33)	N2	A	W2	N/A	C100	1333	L1UK-PCGA-05	L1UK-PCGA-11
L1 UK (ES1.33)	H1	A	W3	VI6	C100	1333	L1UK-PCGA-05	L1UK-PCGA-11

PASSCO MPS (Motorcycle Protection System)

Motorcycle protection systems can be fitted to the full range of PASSCO L1 systems as per the PASSCO MPS, which has been impact tested in accordance with EN1317-8.

Please contact Pass & Co UK Ltd. for further information.



PASSion VRS

Many of the PASSCO L1 Range of Systems are available with an Aesthetically Pleasing Timber Clad finish. The PASSion Timber Clad Arrangement has been tested in accordance with EN1317-2.

Please contact Pass & Co UK Ltd. for further information.



2.3 – Minimum Lengths for PASSCO L1 Systems

As prescribed with DMRB CD 377 'Requirements for Road Restraint Systems' (formerly TD 19/06) the length of full containment safety barrier, i.e. the length of need in advance of and beyond a hazard(s), required to reduce the risk to occupants of an errant vehicle and to other parties that can be affected to an acceptable level as identified by the RRRAP, which shall be specified to the installation contractor by the design organisation through contract specific specification Appendix 4/1 and Construction Issue Drawings.

It is recommended that the minimum total length of Pass & Co VRS in advance of a hazard and beyond a hazard shall be in accordance with the below, please note, this is NOT in addition to lengths specified within the RRRAP, i.e., the greater of the two shall be used:

Table 3

Containment Level	Minimum FULL HEIGHT lengths of VRS	
	In advance of hazard	Beyond hazard
N2	30m *	7.5m
H1 or H2	30m	10.5m

*** Minimum 10m at Hazard WW in advance of hazard – for N2 containment ONLY (can also be adjacent to a transition, a parapet or higher containment VRS)**

2.4 – VRS Setback

Set Back should normally be as described in Table 2.24 CD127 – Chapter 2 Highway cross-sections below. The Design organisation may use further relaxations in accordance with the notes 1 to 3, where required, although relaxations should not be used where alternatives are available.

If both set back and working width cannot be achieved, it is generally accepted that set back should be reduced and working width maintained.

In central reserves where there are two single sided safety barriers it must be ensured that the working width is maintained between the two.

Note: When setback and or working width cannot be maintained, a departure from standard must be obtained from the overseeing authority.

Location	Desirable minimum set-back value (mm)	Available relaxations described in notes
In verges with no adjacent hard strip or hard shoulder	1200	Note 1) and 2)
In verges with an adjacent hard strip or hard shoulder	600	Note 3)
Central reserves	1200	Notes 1) and 2)

Notes:

Relaxations to set-back are permitted as follows:

- 1) Relaxations to 600mm for roads of speed limit 50mph or less (including temporary mandatory speed limits).
- 2) Relaxation to 1000mm at existing roads with physical constraints (e.g., a structure) where it could be difficult to provide the desirable value.
- 3) Relaxation to 450mm where it is considered necessary to position the VRS away from the edge of an existing embankment in order to provide support to the foundation.

2.5 – PASSCO L1 System Installation Height

Where the horizontal distance between the traffic face of the VRS to the point of setback (PSB) is less than 1.5m, the specified height to centreline of beam should be measured from the edge of the paved area. Where the distance between the face of the beam and the edge of the adjacent paved area is greater than 1.5m the height should be measured from the adjacent ground beneath the beam.

The Pass & Co systems should be set to the heights shown on the drawings with a tolerance of plus or minus 30mm for all systems.

2.6 – Visibility

The VRS layout of PASSCO L1 systems shall comply with the sight distance requirements set out in DMRB, and as instructed by the design organisation.

2.7 – Adjacent Ground

The ground immediately below, in front and to each side of the Pass & Co L1 VRS shall be generally level (with a maximum slope of 1 in 20) within the set back and working width zones as prescribed within DMRB CD 377 Requirements for road restraint systems Revision 4 (formerly TD 19/06)

2.8 – Post Installation Types

The type of post foundation used will be dictated by the ground conditions on the site. As a rule, soil type ground properly compacted will allow the use of driven posts. The suitability of driven posts must be established by following the Pass & Co UK Ltd. testing procedure for Pass & Co driven posts.

Where site conditions preclude the use of driven posts, the posts other methods of founding the posts are available:

- 1) Forming a hole and backfilling with a self-compacting (same size) aggregate.
- 2) Set into or mounted upon a pre-cast concrete foundation.
- 3) Cast directly into an in-situ concrete foundation, either individual or strip foundation.
- 4) Set into a steel socket which is cast into an in-situ concrete foundation of cored hole.
- 5) Set into a driven socket.
- 6) Surface mounted (using either internally threaded anchorages or threaded bar)
- 7) Other solutions are available, please contact Pass & Co UK Ltd. for more information.

3. Limitations on Use

Pass & Co VRS must be installed in accordance with:

- Series 400 of The Specification for Highways Works
- DMRB CD 377 'Requirements for Road Restraint Systems' (formerly TD 19/06)
- DMRB CD127 'Cross-sections and Headroom'
- VRS product requirements.

Please note, that this manual contains guidance only, which may differ from specific national requirements, which are revised on a continuous basis.

Each site must be assessed by the Design Organisation, to ensure specification compliance and system performance. The system installer remains responsible to define any features of any one scheme which would limit the use and operation of Pass & Co products, such as length of need, supporting surface, foundation requirements, end anchorages, horizontal and vertical alignment etc.

- Please refer to 2.3 for minimum required lengths.
- Radii less than 30 meters must be factory formed.
- Half Length beams (2000mm effective) can be utilised to achieve a radius between 30 and 50 metres.
- Factory formed radii must not be less than 6m.

4. Installation

4.1 – Setting Out

Establish the length of safety barrier for installation both in advance of and departure from the hazard, using scheme drawings / specifications provided. At this stage, exclude terminal / transitional lengths and set out the safety barrier **beam** positions first, as this will provide you with available start/finish positions using multiples of the standard 4 metre beam, and beam slot positions should centres require post deviation.

Ensuring that the length of need is satisfied, double check for any visible obstructions on the fence line. It is important that they are addressed first. Using the permissible post deviations as per system drawings, mark out deviated post positions (if required) and work away from this position, marking posts for the VRS run against the extent of the marked beams.

When setting out the post positions, it is important that an accumulation of tolerance errors is avoided, marking beams prior to post positions will assist in avoidance of this error.

If posts are to be driven, then the safety barrier beams can be laid out adjacent to the post installation to ensure post positions remain within the overall system tolerances. The tolerance on the post pitch is dictated by the slot.

Once the safety barrier run has been successfully marked for installation, the position of terminals and/or transitions can be marked. Where system progression is required follow the guidelines set out in the general arrangement drawings.

4.2 – Driven Posts

Before any post driving is considered the area should be thoroughly checked for the presence of services. Wherever it is practicable, the installation of VRS over services should be avoided. We would recommend a minimum of 1000mm safe working distance between driven posts and adjacent services.

PASSCO L1 VRS utilises a single post configuration, the C100 post, where the closed side of the post sits against the beam. This is applicable to either verge or central reserve applications.

Drive the posts to the correct height and line. Excessive driving times indicate that the ground conditions are too hard. Excessive damage may occur to the posts and therefore in these circumstances concrete foundations should be used as an alternative to driven posts.

4.3 – Concrete Foundations

The size of concrete foundations are dictated by the soil conditions local to the post installation. As a general rule, increasing the depth of foundation is likely to result in a more economic foundation size than increasing the width or length of foundation.

Foundations should, where possible, be constructed with vertical sides to ensure their optimum performance under load.

Before any mechanical excavation is considered the area should be thoroughly checked for the presence of services. Wherever it is practicable the installation of VRS over services should be avoided. We would recommend a minimum of 1000mm safe working distance between adjacent services and mechanical excavation by auger or an excavator with a bucket.

- 1) Establish post centres and excavate foundations to suit the ground conditions. When constructing the foundations ensure there is a minimum of 150mm from the edge of the concrete to the post socket. It is advisable to have some socket length protruding from the finished concrete level and up to 100mm is acceptable, except at maintenance cross overs.
- 2) Place concrete in the foundation and vibrate to compact. Concrete should be ST5 or equivalent. Higher grades of concrete can be used.
- 3) Place the post and socket, if required, into the concrete, install the reinforcing ring, if required, and set the post to line and level. Make final adjustments to height and line before the initial set of the concrete. Slope the concrete away from the post and socket to help avoid corrosion where possible.
- 4) Fill the socket with a filler such as expanding foam to protect the socket from the incursion of detritus.
- 5) Where the concrete foundations are in filter drains, they will always require casings. The outside of the casing should be backfilled with uncontaminated filter media on the line of the filter drain and backfilled with the excavated spoil elsewhere. A plastic membrane of at least 125 microns thick should be laid at the base to prevent contamination of the filter media. Consideration should be given by all parties on the best method of preventing contamination of the filter media.
- 6) It is critical when determining the size of all test foundations that the lack of ground support is considered, and the foundation is of sufficient volume to support the post and allow it to become plastic before any foundation displacement can occur.

4.4 – Surface Mounted Posts

If surface mounted posts are to be installed, a suitable M20 anchorage system must be selected which can resist the required tensile test loadings (per anchorage) as stated in Table 4 below. The design organisation and/or contractor must also satisfy themselves by calculation that the strata that will receive the anchorage is suitable to resist these loadings.

Series 400 of the Specification for Highways Works (March 2020 amendment) considers that the holding down system should have a serviceable life which is like that of the structure on which it is mounted, and it should be considered that during the lifespan of the structure the post may be replaced numerous times, as such stainless steel is often prescribed for the holding down bolts.

The adequacy of the anchorage system shall be proven on site by applying incremental tensile load tests to BS5080: Part 1:1993, Incremental Loading as Clause 7.13 to a frequency determined by the design organisation (usually to a minimum of 10% of installed anchorages)

Installation of cradle anchorages or proprietary resin anchors of sufficient strength are both suitable methods of anchoring surface mounted posts.

Note: It is critical when installing resin anchors that the holes are drilled to the correct diameter and depth then thoroughly cleaned in accordance with the anchor manufacturers installation instructions.

Post baseplates / feet should be installed on a grout bed of between 10 and 30mm, to the required horizontal and vertical alignment of the VRS posts.

When the resin anchor and grout bed have suitably cured, fasteners should be tightened to the correct torque and thread engagement in accordance with manufacturer's instructions.

Surface mounted posts should be manufactured to the correct height for the location the use of detachable height adjusters is not permitted.

Table 4

Post Type	VRS Performance Classification	Tensile Test Load in Anchorage
C100x60 as item 091.03SM drawing number L1UK/PCSF/04	N2W1 N2W2 N2W3 N2W4 H1W3 H1W4	50Kn

Note: PASSCO can provide anchorage solutions suitable to the vast majority of installations, please contact Pass & Co UK Ltd. for further information.

4.5 – Installation Tolerances / Requirements

PASSCO L1 VRS must be installed with the centre line of impact beam (as specified on system G.A. drawings) running parallel to the carriageway or surface level, at a tolerance +/- 30mm.

The VRS must present a smooth and flowing alignment, with transverse deviations in alignment at an established PSB (Point of Setback) of over 30mm not being permitted.

Table 5

PASSCO L1 Installation and Maintenance Tolerances			
Description	Installation tolerance (mm)	Maintenance tolerance (mm)	Comment
Installation height	+/- 30mm	+/- 50mm	The maintenance tolerance can be used during installation when the safety barrier height reference is changing from carriageway to verge level or when connecting to an existing VRS.
Deviation in alignment	+/- 30mm	+/- 30mm	

Posts shall be installed perpendicular to the guardrail and be correctly aligned and levelled.

The tolerance on system post pitch is dictated by the pre-formed post fixing slots on the impact beam.

Site fabrication of new drilled holes to locate post fixings within the impact beam should not be required if the system is correctly set out and installed, with the exception **only** of installing a length of PASSCO L1 VRS between two fixed positions. I.E.

- Existing Retained Terminal (Fixed Position 1)
- New PASSCO L1 VRS
- Existing Retained Parapet Transition (Fixed Position 2)

In the instance above, a special length prefabricated or site fabricated beam will be required. If site fabrication is required as a temporary solution, this will limit the serviceable life of the component, and therefore a special length replacement beam should be fabricated and installed to suit site specific requirements. Please contact Pass & Co UK Ltd. who will fabricate special length beams of this type upon request.

Please refer to 5.6 below should obstructions prevent VRS post installation at pitches detailed on the relevant VRS drawings. NOTE: Any deviation in post pitches must utilise one of the seven pre-formed post fixing slots on the impact beam.

5. PASSCO L1 VRS Assembly

5.1 – System Assembly

PASSCO L1 fasteners utilise a 'lip' located on the underside of the head of the M16mm setscrews used for both joining the post to the impact beam and for jointing the impact beams at lap positions.

The 'lip' is designed to locate within the machined 'teardrop' hole within the washer plate (joining the post to the beam) and the 'teardrop' holes to the depart end of the impact beam (joining impact beams) to allow proper function of the setscrew assembly. This lip assembly also negates the requirement for a second washer to be utilised between the underside of the bolt head and the washer plate / impact beam.

This arrangement also allows tightening of fixings simply by exerting pressure on the head of the setscrew, securing the lip of the setscrew within the teardrop, allowing a free hand to tightening the nut at the rear of the system.

Impact beams shall be hung on the posts (initially hand tight only) using M16 setscrew assemblies which include (in order of assembly):

- Item 040.09 – M16x45mm Setscrew with Lip – Grade 8.8.
- Item 010.00 – Washer Plate – 40x6x115.
- Item 040.30 – M16 Washer – 18mm Diameter Hole.
- M16 Nut – Included within Item 040.09.

Impact beams must be hung in their correct orientation so that the teardrop holes in the beam are to the traffic face, allowing the lip at the underside of the head of the setscrew to locate within the teardrop hole as per system drawing L1UK/PCGA/006

Impact beams shall be jointed (initially hand tight only) using M16 setscrew assemblies which include (in order of assembly):

- Item 040.00 – M16x27mm Setscrew with Lip – Grade 4.6.
- Item 040.30 – M16 Washer – 18mm Diameter Hole.
- M16 Nut – Included within Item 040.00.

All M16 setscrews (8No. per lap position and 1No. per post position) shall be in installed hand tight, removing any slack in the impact beam, prior to mechanical tightening.

Undertake tightening of all setscrews to a minimum torque setting of 70 Nm. We recommend that the setscrews at lap positions are torqued first, followed by setscrews at post positions.

5.2 – Connection into 'Legacy' Non-Proprietary Safety Barrier Systems

For connection to either TCB or OBB 'Legacy' systems please see PASSCO L1 general arrangement drawings. The system requirements for both NPSBS and PASSCO L1 vehicle restraint systems must be adhered to.

When connecting to either TCB or OBB correct system progression must be maintained.

If connecting to TCB there must be an adjuster assembly within 35m of the joint between PASSCO L1 systems as detailed in BS6779 and the TCB. Connection to OBB should be made using an A06 connection piece (SF-11)

5.3 – Connection into Other Proprietary VRS, Terminals, Crash Cushions or Transitions

PASSCO L1 VRS products can be connected into other proprietary systems that:

- 1) Have been certified for installation in accordance with the construction products regulation effected on the 1st of January 2021.
- 2) Have been correctly installed in accordance with Sector Scheme 10B requirements.
- 3) Remain within one working width of the adjoining system (VRS Only)

Pass & Co UK Ltd. will guarantee the interconnectivity between systems if they adhere to the above specifications and have been connected using fixings provided by Pass & Co UK Ltd, unless the system promoter provides express permission to use their fasteners in which instance Pass & Co UK Ltd. will accept the connection.

NOTE: Please pay particular attention to working width requirements and/or post configuration requirements when attempting to connect PASSCO L1 systems into other system Promoter terminals, crash cushions or transitions. If in doubt, please contact Pass & Co UK Ltd.

5.4 – Installation on Curves

On curves with a radius greater than 50 metres standard 4 metre beams can be used. Where the radius is between 50 metres and 30 metres, half-length beams (2000mm effective length) can be utilised.

Under a 30-metre radius pre-formed beams to suit the required curvature should be used. In any instance all post centres remain as prescribed within the general arrangement drawings.

5.5 – Progression Through VRS Working Width

The minimum length of progression through the working widths of the PASSCO L1 systems are detailed within the PASSCO L1 general arrangement drawings.

5.6 – Permissible Post Deviation

In general post positions must not be varied from those that are detailed on the relevant VRS drawings. Wherever possible, it is good practice to avoid repositioning of posts by adjusting the working width class locally within any one run by adjusting post centres (please see section 7 above)

Where site topography / obstructions restrict the ability to adjust the working width class locally, permissible post centre deviations can be used, however, these variations are limited in distance and repeatability, and any deviation in post pitches must utilise one of the seven pre-formed post fixing slots on the impact beam.

Please consult Pass & Co UK Ltd. should an obstruction preclude employment of these prescribed methods, as alternative solutions are available that can be tailored to suit site specific conditions.

Date:	
Client / Contractor:	
Contract Title:	
Location:	
Tick As Appropriate:	Containment Level: <input type="checkbox"/> N1 <input type="checkbox"/> N2 <input type="checkbox"/> H1 <input type="checkbox"/> H2

CHECKS	Contract Requirement	Actual	Comments
CE Marked VRS Title and Post Centres (<i>as installed</i>)			
Actual Working Width at Hazard Location(s)			
Set Back (<i>Traffic Face of Beam to PSB</i>)			
Strike Beam Height to C/L of Beam			
Post Type / Installation			
Foundation Details & Socket Cavities (<i>Concrete Foundations Only</i>)			
Grout Pad / Anchorage Arrangement Compliance (<i>Surface Mounted Only</i>)			
M16 Setscrew Torque Check			
Post Deviation and Compliant Application?			
System Progression / Transitional Arrangement(s)			
Approach Termination			
Depart Termination			

I confirm that I have checked the V.R.S. in the above location and confirm that the inspected work has been completed in accordance with contract and product specification.

Signed on behalf of Installation Contractor:

Signed on behalf of Client:

Name (Print):

Name (Print):

Signature:

Signature:

Date:

Date:

6. Inspection, Maintenance & Repair

6.1 – Inspection

A compliance inspection of the safety barrier installation should be carried out upon completion of any one VRS run, using the inspection check list on page 11. The compliance inspection should be undertaken and signed off by an appointed Lead Installer or Supervisor appointed by the installation contractor.

The appointed person should be trained in the installation of PASSCO L1 systems to the satisfaction of LANTRA in accordance with Sector Scheme 10B, written or approval from Pass & Co UK Ltd.

6.2 – Maintenance

A correctly installed and certified PASSCO L1 VRS is maintenance free for the period of its design life of not less than 20 years. A visual inspection regime is recommended to check for impact damage. Where this is identified repairs must be carried out. The visual inspection should also look at the ground conditions as erosion, slippage or ponding of water can all affect the viability of a VRS product.

6.3 – Repair

When repairing PASS & CO VRS only components with plastic deformation need to be replaced. If the component has only minor damage and is localised, then no replacement is necessary other than for aesthetic reasons.

Small scratches and indentations should be treated with a zinc rich paint. Substantially damaged beams must be replaced as must any deformed posts. The bolt holes in adjacent beams should be checked for splitting or distortion and if any are identified those beams should also be replaced.

The repaired installation should be checked for compliance and an inspection certificate produced. When replacing damaged components all fasteners that are removed must be replaced with new.

Care should be taken to ensure ground conditions are suitable to support the replacement posts and proven by push testing. where the push test fails driven posts may have to be replaced with concrete foundations.

7. Ground Condition Testing

Ground condition testing must be carried out to establish the strength or compaction of the ground in to which the VRS is to be installed, as the posts function is to yield upon impact within its foundation (driven or concrete installations included)

Testing should be carried out at the location where the posts are to be / have been installed, and the test load should be applied in the direction in which it would be loaded in service.

The frequency of testing should be as described in the contract specific appendix 4/1 document. As a minimum Pass & Co UK Ltd. recommend that at least one test is carried out for each VRS run or one test for every 100 metres whichever is the greater. There should be further tests if there is a change in ground conditions for example the VRS crosses a cut fill line then each ground condition should be tested.

Please refer to PASSCO N2 + H1+ H2 Ground Condition Test Procedure for test methodology.

Pass & Co UK Ltd. improve and update products and systems regularly, and current information / documentation (including this manual) may not reflect what has historically been installed. It is therefore recommended that reference is made to the job specific contract file for any system details at that time.

Product information including copies of general arrangement drawings and CE certificates can be found on our website. Please visit www.passco.international

Any technical enquiries relating to the application of this manual should be submitted via the contact details below.

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