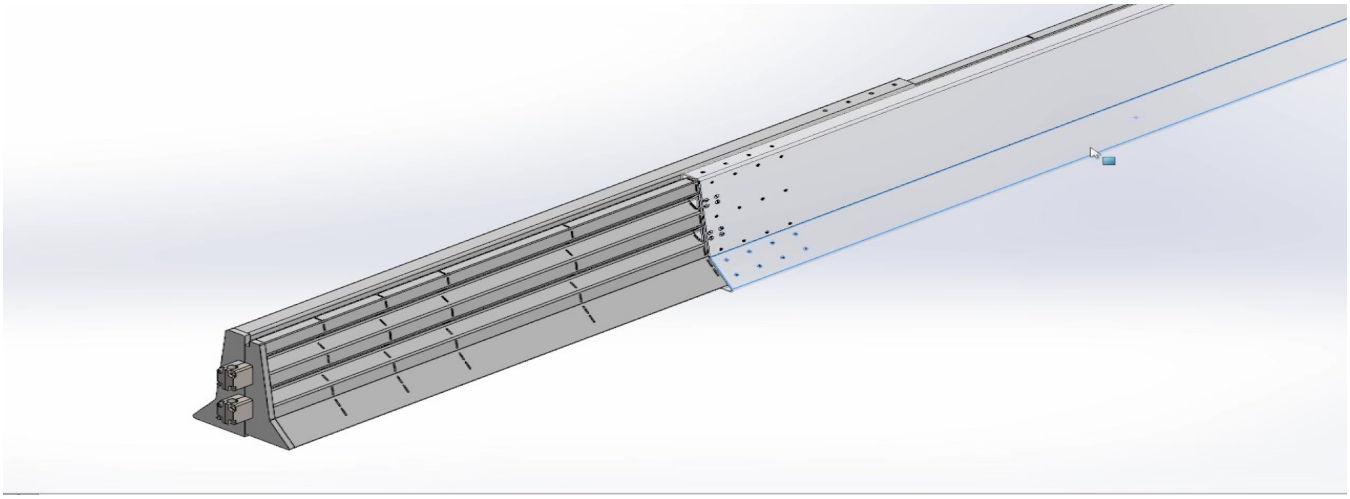
3-AXE Multidirectional Movable Barrier

Technical Data & Design-Coordination Sheet | Reference application: Pattullo Bridge Replacement

System purpose. A project-engineered steel barrier assembly that spans a bridge expansion joint and maintains the roadway restraint profile while accommodating relative longitudinal (Ux), transverse (Uy), vertical (Uz), and compound movement.



1. System architecture

Component	Function
Fixed side sections	Connect the movable assembly to project-specific embedded stainless-steel anchor plates at the adjacent concrete
Central telescopic section	Nested longitudinal elements extend and retract with joint opening and closing.
Hinge assemblies	Provide transverse and vertical articulation at both ends of the movable section.
Access covers	Close rectangular front access openings after installation and permit inspection/connection access.
Transportation member	Temporary I-beam used during handling; removed after final connection in accordance with the installation procedu

2. Pattullo Bridge reference configurations

Attribute	TL-4 outer	TL-4 median	TL-5 outer
Nominal height	810 mm	810 mm	1,070 mm
Nominal width	390 mm	600 mm	420 mm
Project material	S355 / S355J2+N steel; hot-dip galvanized	Same	Same
Articulation hardware	Stainless-steel hinges / project-specific bushings	Same	Same
Reference loading basis	Canadian Highway Bridge Design Code (April 2016), TL-4	Same	Same, TL-5
Reference force set	Pt 100 kN; Pl 30 kN; Pv 30 kN	Pt 100 kN; Pl 30 kN; Pv 30 kN	Pt 210 kN; Pl 70 kN; Pv 90 kN
Reported analysis result	S3 total deflection 121 mm; working width reduction 155 mm	S3 total deflection 121 mm; working width reduction 155 mm	Analysis conclusion: acceptable for specified TL-5 per
Reference lengths	6,235–11,470 mm	Project-specific	Project-specific

3. Reference seismic movement envelope

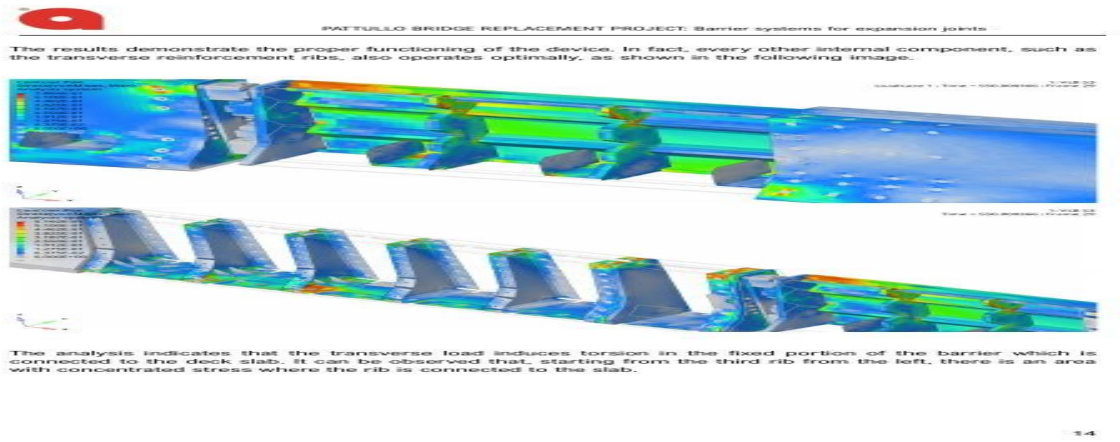
The Pattullo Bridge schedules required SLS movement capability and 975-year earthquake movements. The largest component values in the supplied location schedules occurred at S3. Values below are project references—not universal catalog limits.

Condition / location	Ux (longitudinal)	Uy (transverse)	Uz (vertical)
S3 SLS scheduled extrema	+579 / −441.683 mm	up to ±141 mm	up to ±52 mm
S3 975-year EQ scheduled extrema	+1,376 / −1,328.683 mm	up to ±857 mm	up to 77 mm

Movement directions may occur in combination. Design must use the project’s complete movement matrix, sign convention, simultaneity rules, installation temperature/position, tolerances and required reserve stroke.

4. Verification and quality evidence

Evidence stream	Pattullo reference evidence
Finite-element analysis	Project-specific models evaluated barrier plates, internal ribs, fixed sections, bolts/anchors, load placement and defor
Model correlation basis	The supporting TL-4 study references prior MDS H2 barrier TB11/TB51 testing under EN 1317 and reports model defle
Functional test	TL4_S3_LEFT movement test dated July 30, 2025: X-direction sliding, Y-direction misalignment, Z-direction misalignm
Fabrication / installation	Preassembled, project-length units; project drawings, anchor interfaces, lifting/handling and removal of the transport
Inspection / maintenance	Periodic inspection and post-event inspection should address alignment, freedom of movement, hinges/bushings, fas



5. Engineer’s specification framework

Use this framework to develop a project specification; replace bracketed items with project requirements.

Scope	Provide a project-engineered multidirectional movable traffic-barrier assembly spanning each designated bridge expansion joint.
Performance	Maintain the specified barrier profile and load path while accommodating the complete Ux/Uy/Uz movement matrix, including required compound SLS and seismic/ULS cases.
Barrier demand	Design for [TL-4 / TL-5 / governing project criterion] using [applicable bridge code, edition and owner criteria]. Identify whether containment is established by project-specific static analysis, simulation, physical crash testing, or an approved equivalency pathway.
Geometry	Match adjacent barrier/parapet height, face geometry, offsets, roadway clearances and joint cover/interface constraints.
Materials	Structural steel grade and toughness, corrosion protection, stainless components, bushings, fasteners and dissimilar-metal isolation shall suit the project environment and design life.
Anchorage	Coordinate embedded plates, reinforcement zones, edge distances, concrete strength, anchor actions, tolerances and replaceability with the bridge engineer of record.
Submittals	Design calculations; movement-envelope check; stamped shop drawings where required; material/coating data; welding and fabrication QA; installation/handling plan; inspection and maintenance manual; functional test procedure and report.
Acceptance	Verify dimensions, extension/retraction, transverse and vertical articulation, compound motion, clearances, covers, fasteners, coatings and installation position. Record acceptance criteria and results.
Inspection	Inspect after installation, at owner-defined intervals, and following vehicle impact or significant seismic events. Restore damaged coatings and replace distorted or seized components per manufacturer instructions.

6. Minimum information for concept development

Expansion-joint movement table • adjacent barrier sections • required performance level • joint plans/elevations • available anchorage zones and reinforcement • concrete properties • installation sequence and access • temperature datum • environmental exposure • design life • inspection and replacement requirements.

Important: This sheet summarizes the supplied Pattullo Bridge reference documentation. It is not a product approval, universal design, crash-test certificate or substitute for project-specific engineering. Final design, code compliance, anchorage, structural interfaces and acceptance remain subject to the owner and engineer of record.