AUS-SPEC

Infrastructure Specifications

1195 Rigid road safety barrier systems

1195 RIGID CONCRETE SAFETY BARRIER SYSTEMS

IMPORTANT: This document has been adapted from the NATSPEC suite of specification templates for use in the Cessnock City Council area by both Council and industry. NATSPEC regularly updates the base templates (currently in April and October each year), and Council may incorporate changes into its version of AUS-SPEC from time to time. To assist in highlighting any changes made by Council to the NATSPEC templates, the following conventions are used.

- See ANNEXURE M at the end of this document which contains (where practical) Cessnock City Council customisations (also known as 'office master' text). References to the Annexure are to also be inserted at relevant clauses in the main body of the document.
- Where content is added to the main body of the document, it is to be shown in brown text like this.
- Where content is deleted or excluded from the main body of the document, it is to be shown ~~struck through like this~~. Such clauses are to have no effect.

Where there is a conflict between main body text and Cessnock City Council specific clauses, Council's specific clauses shall prevail.

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide concrete road safety barrier systems from precast units, fixed forms or slipforming, as documented.

1.2 CROSS REFERENCES

General

Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:

- *0136 General requirements (Construction)*.
- *0152 Schedule of rates (Construction)*.
- *0161 Quality management (Construction)*.
- *0319 Auxiliary concrete works*.
- *1101 Traffic management*.
- *1102 Control of erosion and sedimentation (Construction)*.
- *1191 Pavement markings*.
- *1192 Signposting*.
- *1194 Non-rigid road safety barrier systems*.

1.3 STANDARD

General

Design, testing, materials, evaluation, fabrication and installation, construction and location of rigid road safety barrier systems: To AS/NZS 3845.1 (2015).

Roadside risk assessment, design, selection and location of barriers: To AGRD06.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Rigid road safety barrier system: A road safety barrier system where there is no observable dynamic deflection. The deformation is contained in the impacting vehicle.

1.5 TOLERANCES

General

Tolerances for concrete safety barriers: To AS/NZS 3845.1 (2015) Table 5.7.5.

Grade changes or curves surface deviation: Uniform transition.

1.6 SUBMISSIONS

Execution details

Method statement: Before installation of barrier system, submit details of the manufacture, supply and installation of road barriers.

Roadside design: Before installation, obtain approval from the roads authority for the roadside risk assessment, selection and location of barriers by a professional engineer. Only safety barriers that have been accepted by the Austroads Safety Barrier Assessment Panel (ASBAP) and TfNSW are permitted in the Cessnock City area.

Curing: Submit the proposed method and materials for curing before using.

Method statement for precast units: Submit details of source of precast items, proposed methods of manufacture, program of manufacture, storage and handling, transportation and delivery, and erection.

Fixed form construction: If repairs are required, submit details of proposed formed surface repair method for fixed form barriers.

Slipforming construction: Before extruding concrete barrier, submit evidence that the proposed machine can extrude the barrier shape, as documented.

Products and materials

Curing compound: Submit evidence, from a registered testing authority, that the curing compound conforms to the requirements of this worksection.

Records

Precast barrier units manufacturing records: Submit details of non-conforming or defective works and remedial works carried out.

Tests

Requirement: Submit results, as follows:

- Concrete strength: Compressive strength of placed concrete to the *0319 Auxiliary concrete works* worksection.
- Relative compaction: Of barrier foundation.

Warranties

Requirement: Submit the manufacturer's warranty for precast barriers.

1.7 INSPECTIONS

Notice

General: Give notice so that inspection may be made of the following:

- Set-out: Completed barrier set-out.
- Erection of barrier systems: Completed barrier erection.
- Fixed form construction: If repairs are required, completed repairs after stripping.
- Removal of temporary traffic control devices: Completed removal of control devices after approval of barrier installation.
- Rectification of pavement surrounding barrier: Completed rectification.

2 MATERIALS

2.1 CONCRETE

Properties

Ready-mixed concrete production and delivery: To AS 1379 (2007).

Concrete: Supply and placement of concrete, steel reinforcement, formwork, tolerances, construction joints and protection to the *0319 Auxiliary concrete works* worksection, unless documented otherwise.

Slump: Conform to the following specified slump at the point of placement:

- Extrusion: 10 to 15 mm.
- Slipforming: 25 mm.
- Fixed forms: Maximum 75 mm for concrete compacted by vibrators.

Precast reinforced concrete

Dimensions and configuration: As documented.

Concrete strength testing

Sampling and testing: By a NATA registered testing authority.

Testing method and frequency for compressive strength: To the *0319 Auxiliary concrete works* worksection.

Timing: Submit the 28 day strength results.

2.2 REINFORCEMENT

General

Minimum concrete cover: To AS/NZS 3845.1 (2015) clause 5.7.3 to the nearest concrete surface.

Reinforcement support material: Concrete or plastic. Do not use wire, timber or coarse aggregate to support reinforcing steel.

3 EXECUTION

3.1 GENERAL

Traffic safety

Material stacks: Locate temporary stacks of new or surplus material associated with the works clear of traffic flow and behind the line of the safety barrier system being removed or under construction.

Works program: Sequence construction activities so that there are no traffic hazards or safety issues for road users.

Protection from traffic: Protect constructed concrete barriers from general traffic impact for 7 days after placing.

3.2 ESTABLISHMENT

Existing underground services

Services laid in close proximity to the barrier system: Locate and protect services from damage before placing footings and installing barriers.

Set-out

Location of barriers: Set out barriers to documented locations. Peg or paint mark the start and finish points and line of barriers.

Transition and overlaps: Provide transition or overlaps to Austroads AGRD06 (2022) Table 6.14.

3.3 INSTALLATION

Preparation of the base

Cleaning: Before placing concrete or mortar for precast units, clean base to remove all loose materials and dust.

Fixed forms or slipforming:

- Filling joints in concrete surface: Fill joints on the line of barrier with silicone sealant, extending the full width of joint and 100 mm minimum outside of both edges. Form a convex surface proud of pavement plane.
- Debonding: After filling joint, debond concrete surface, on the line of barrier, by applying curing compound at a rate of 0.3 L/m², extending the full width of joint and 100 mm minimum outside of both edges.

Precast barriers: For lifting and installation conform to AS 3850.3 (2021). After debonding the concrete surface, construct a 15 mm thick cement mortar pad for the full width of the barrier system.

Terminals

Requirement: Rigid barriers shall be terminated at both ends by installing crash-worthy cushions or terminals. The trailing end terminal shall be designed for vehicular impact if there is a significant risk of oncoming vehicles impacting (as determined in accordance with AGRD06). Crash cushions and terminals are to be ASBAP and TfNSW accepted products only.

Connections to non-rigid barriers

Connections: If connecting rigid barrier to a non-rigid barrier, cast anchorage assemblies into the barrier as documented to *1194 Non-rigid road safety barrier systems*, and install an approved transition section to ensure safe performance to the manufacturer's specification.

Dowelled base fixings

Dowels in cored holes: Provide for barriers constructed on new or existing pavements.

Cored holes: Provide in fine concrete or cement-mortar-filled holes at regular staggered spacings as appropriate and as documented.

Precast units: If used, align and space the cored holes accurately.

Foundations

Requirement: Provide foundation with sufficient strength to resist forces applied during vehicular crash to manufacturer's specifications and TfNSW barrier acceptance conditions.

Barrier adjacent to pavement: Shape and compact the foundation material to form a firm base as follows:

- Barriers not constructed on pavement courses: 95% relative compaction to AS 1289.5.4.1 (2007) for standard compactive effort.
- Barriers placed on pavement courses: To the requirements of the respective pavement course.

Electrical conduits

Conduit location: For barriers containing street lighting standards, locate the conduit carrying electrical cables in the base rather than in the barrier, as documented.

Slipform barriers: Conduit trench forms a key, no dowels are required.

3.4 PLACING, COMPACTING AND FINISHING CONCRETE

General

Placing: Place concrete continuously between the ends of the concrete barrier systems, between construction joints or within a precast barrier segment.

Concrete placed in situ: Except at properly formed construction joints, do not place fresh concrete against concrete that has taken its initial set.

Formwork construction: Conform to AS 3610.1 (2018) Section 4 and Austroads ATS 5305 (2023).

Concrete finish: Uniform in appearance with class 3 surface finish to AS 3610.1 (2018).

Fixed form construction

Tamping: Tamp unformed surfaces to bring a layer of fines to the surface and then screed to the documented level.

High/low spots: Immediately after compaction and screeding, test surfaces for high or low spots and if required, make corrections before the concrete hardens.

Repairs of formed surfaces: If required, perform immediately after stripping the forms.

Hand finishing

Slipform construction: If hand finishing is required, provide barriers uniform in appearance.

3.5 ALIGNMENT AND LEVEL

Finish and appearance

Top and face of the barrier: Conform to the following:

- True to line.
- The top surface uniform in width.
- Free from humps, sags and other irregularities.

3.6 JOINTS IN CONCRETE PLACED IN SITU

General

Finished barriers: Movement joints and cracks to AS/NZS 3845.1 (2015) clause 5.7.4.

Joint: Straight, square ±5° to the line of the barrier.

Contraction joints

Depth: 50 ±5 mm on all exposed surfaces at 6.0 m spacing along the barrier.

Joint method: Sawn or formed.

Sawing: Saw joints before uncontrolled cracking begins and within 12 hours after placing the concrete.

Expansion joints

Width: 6 mm.

Joint material: Preformed joint filler of bituminous fibreboard.

Joint location: As documented.

Pavement and barrier joints

Barrier cast on concrete pavement: Joint type in barrier system to match those in the concrete base. Continue the contraction, isolation, tied or expansion joints in the pavement through the barrier to form a continuous joint through both structures.

Barrier cast adjacent to concrete pavement: Form contraction joints at 6.0 m centres.

Precast units

Connections: Conform to AS 3850.3 (2021). Place precast units so that all connections are tight, secure and true in line and level.

3.7 CONCRETE CURING

General

Curing method: Cure concrete placed in barriers by steam curing, moisture curing or by spraying a curing compound on all exposed surfaces of the fresh concrete.

Curing precast units: Moist curing systems may be used if it can be demonstrated that it is an effective process.

Protection: Protect exposed surfaces from rain or other damage, until hard set has occurred.

Curing period: Maintain the curing membrane as a continuous and unbroken film for 7 days after placing concrete.

Damage to the membrane: Rectify by respraying the affected area as soon as the damage occurs.

Curing compound

Slipformed barriers: Provide curing compound conforming to AS 3799 (1998) as follows:

- Wax emulsion: Class A Type 1.
- Hydrocarbon resin: Class B Type 1-D.
- Waterborne compound: Class Z Type 1-D.

Application rate: Apply curing compound in a fine spray to provide even coverage at a rate of 0.2 L/m² or the rate required to achieve 95% water retention, whichever is the greater.

On-site equipment: Keep equipment and materials required for curing operations onsite at all times during slipforming of barrier.

3.8 DELINEATORS

Fixing

Delineators: To AS/NZS 1906.2 (2007), and only products approved during crash testing and evaluation to AS/NZS 3845.1.

Fixing method: Fix to the concrete barrier with brackets as documented.

Arrangement and colour

Approach colour: Arrange delineators so that drivers approaching from either direction will see only red reflectors on their left side and white reflectors on their right.

3.9 SIGNAGE AND LINE MARKING AT BARRIER

Permanent signage, and longitudinal line marking

Requirement: Provide permanent signage and longitudinal linemarking adjacent to the concrete barrier to the *1191 Pavement markings* and *1192 Signposting* worksections.

Removal of temporary traffic control devices

Temporary traffic control devices: Do not remove before completed installation of concrete barrier, permanent signage and longitudinal linemarking have been approved.

3.10 COMPLETION

Rectification of ground/pavement

Disturbed ground or pavement around post: Trim and compact to a dense, tight, smooth and sealed condition so that resistance to water penetration is similar to that of the adjacent surface.

4 ANNEXURE A

4.1 ANNEXURE – SUMMARY OF HOLD AND WITNESS POINTS

For private developments, certain Hold and Witness Points where specifically noted below require representatives of both the Superintendent and the Principal Certifier (e.g. Council) to authorise release.

Clause and description	Type	Submission/Inspection details	Submission/Notice times	Process held
SUBMISSIONS, Execution details Method statement	H – Superintendent and Principal Certifier	Details of manufacturing, supply and installation.	2 weeks before commencement	Manufacturing of barriers
SUBMISSIONS, Execution details Method statement for precast units	H	Details of manufacturing, storage, handling, transportation, delivery and erection.	5 days before manufacturing	Manufacturing of barriers
SUBMISSIONS, Execution details Curing	H	Details of curing method and materials.	5 days before manufacturing	Manufacturing of barriers
SUBMISSIONS, Execution details Slipforming construction	H	Evidence that machine can extrude the required shape.	5 days before manufacturing	Extrusion of barriers
INSPECTIONS, Notice Set-out	H	Completed barrier set-out.	3 days before installation	Installation
SUBMISSIONS, Execution details Fixed form construction	H	If repairs are required, details of repair method.	3 days before repair	Repair
INSPECTIONS, Notice Fixed form construction	W	Completed repairs after stripping.	2 days before inspection	-
INSPECTIONS, Notice Erection of barrier systems	W – Superintendent and Principal Certifier	Completed barrier erection.	2 days before inspection	-
INSPECTIONS, Notice Removal of temporary traffic control devices	W	Completed removal of temporary control devices after approval of barrier installation.	1 day before inspection or after removal	-
INSPECTIONS, Notice	W	Completed rectification.	2 days before inspection	-

Clause and description	Type	Submission/Inspection details	Submission/Notice times	Process held
Rectification of pavement surrounding barrier				
Note: H = Hold Point, W = Witness Point				

4.2 ANNEXURE – PAY ITEMS

This schedule applies to Council projects. For private development works use of this schedule is optional, at the Superintendent's discretion.

Pay items	Unit of measurement	Schedule rate inclusions
1195.1 Road safety barrier 1195.1(1) Type F 1195.1(2) Type VCB	Linear metre measured along the top of the barrier, excluding terminal ends.	Provide a separate schedule for differing base conditions. All costs associated with all operations and provision of materials as documented to provide complete safety barriers systems.
1195.2 Terminal ends	Each terminal end provided.	All costs associated with all operations and provision of materials as documented to provide complete terminal ends, including cast in anchorage assemblies for the connection of non-rigid road safety barriers.
Traffic management		To *1101 Traffic management*.
Erosion and sedimentation control		To *1102 Control of erosion and sedimentation (Construction)*.
Linemarking and signage		To *1191 Pavement markings* and *1192 Signposting*.

4.3 ANNEXURE - REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS 1289		Methods of testing soils for engineering purposes
AS 1289.5.4.1	2007	Soil compaction and density tests - Compaction control test - Dry density ratio, moisture variation and moisture ratio
AS 1379	2007	Specification and supply of concrete
AS 1906		Retroreflective materials and devices for road traffic control purposes
AS/NZS 1906.2	2007	Retroreflective devices (non-pavement application)
AS 3610		Formwork for concrete
AS 3610.1	2018	Specifications
AS 3799	1998	Liquid membrane-forming curing compounds for concrete
AS/NZS 3845		Road safety barrier systems and devices
AS/NZS 3845.1	2015	Road safety barrier systems
AS 3850		Prefabricated concrete elements
AS 3850.3	2021	Civil construction
Austroads AGRD		Guide to road design
Austroads AGRD06	2022	Roadside design, safety and barriers
Austroads ATS		Austroads technical specifications
Austroads ATS 5305	2023	Formwork for concrete
EN 15804	2012	Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
ISO 14025	2006	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 21930	2017	Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services

5 ANNEXURE M – CESSNOCK CITY COUNCIL SPECIFIC CLAUSES

M1.	Variations to or non-conformances with Council's AUS-SPEC are to be evaluated with reference to the procedure in Council's *Development Engineering Handbook*. Acceptance is to be obtained in writing from: an authorised representative of Council's Director of Infrastructure and Engineering Services.	**Variation procedure**
M2.	This specification applies in addition to any development consent (DA) conditions. If there is any inconsistency, the conditions of consent shall prevail.	**DA Conditions**
M3.	Refer to the Cessnock City Council *Development Engineering Handbook* for final inspection, works-as-executed and handover requirements.	**Completion**

6 AMENDMENT HISTORY

0	15/01/2024	First Published