TECHNICAL SPECIFICATION – PART C – MINOR CONCRETE WORKS

Contents

1 GENERAL

This specification shall apply to the construction of concrete components for civil works such as kerb and channel, footpath crossings, footpaths and bikeways, structures for stormwater drainage, structures for sewerage reticulation, concrete work associated with water supply and reticulation, unreinforced revetment walls and associated construction.

All concrete work shall conform with the specification and the requirements of the relevant Local Authority. In addition to the above and all noted inclusions work undertaken shall comply with the requirements of "Main Roads Standard Specification MRS 11.70".

2 MIX DESIGN

The Contractor shall be solely responsible for the design and production of concrete to comply with this specification. These terms shall apply whether the concrete is supplied from an approved ready mixed plant or by site batching and mixing. If ready mixed concrete is to be supplied, the Contractor shall provide details of the proposed supplier for approval by the Superintendent.

3 CONCRETE

3.1 PORTLAND CEMENT

Shall comply with the Australian Standard AS2350 Type A. Type B early strength cement may be used in special construction with prior approval of the Superintendent.

3.2 FLY ASH

The use of fly ash as a supplementary cementing material is permitted subject to the approval of the Superintendent and shall comply with AS3582. The quantity of fly ash in the mix shall not exceed 50% of the quantity of cement by weight.

3.3 AGGREGATES

Fine and course aggregates shall comply with AS2758.1. Lightweight and slag aggregates shall not be used.

3.4 WATER

Water shall be clean, fresh and cool and free from matter injurious to concrete and reinforcing.

3.5 FIBRES

Steel fibres for use in sprayed concrete shall be from a manufacturer approved by the Superintendent.

3.6 REINFORCED STEEL

a) Plain Round Reinforcing Bars

Plain round reinforcing bars shall be Grade 230R complying with Australian Standard AS4671 'Steel Reinforcing Bars for Concrete'. Such bars shall have a minimum yield stress of 230 Mpa and denoted on the drawings by the letter R followed by the nominal bar diameter.

b) Hot-Rolled Deformed Reinforcing Bars

Hot- rolled deformed reinforcing bars shall comply with AS4671 and shall be Grade 410Y having a minimum yield stress of 410 Mpa and denoted on the drawings by a letter Y followed by the nominal bar diameter.

3.7 CONCRETE BATCHING

Concrete shall not be supplied from other than an approved ready-mixed concrete plant without the prior written approval of the Superintendent. Site batching and mixing of concrete, if approved, shall comply with the requirement of AS1379 'Ready Mixed Concrete".

The Contractor shall state the name of the proposed ready mixed supplier and shall not change the supplier without the Superintendent's approval. The production, delivery and testing of the ready mixed concrete shall be carried out in accordance with the requirements of AS1379.

3.8 CLASSES OF CONCRETE

a) Normal Class Concrete

Normal class concrete is designed by the strength grade with the prefix N and shall comply with the following requirements:

Class	Characteristic Strength Grade F'c (MPA)	Normal Maximum Aggregate Size (mm)
N20	20	20
N25	25	20
N32	32	20
N40	40	20
N50	50	20

Lightweight aggregate shall not be used.

Where the class of concrete is not nominated on the drawings or in the job specification, the concrete used shall be N40 or better unless directed otherwise by the Superintendent.

b) Special Class Concrete

(i) Lean Mix Concrete

Lean mix concrete shall consist of 1 part cement to 9 parts aggregate. Strength testing shall not be required unless directed by the Superintendent.

The aggregate shall be either 20 mm or 28 mm nominal maximum size.

c) Admixtures

Admixtures including blended cement, accelerators, retarders, waterproofing agents, air entrainment agents and additional water either before or after mixing, shall not be permitted unless otherwise specified or the Superintendent grants prior written approval.

3.9 CONCRETE PROPORTIONS AND CONSISTENCY

a) Proportions

The proportions of aggregate and cement for concrete shall be such as to produce a mix which will work readily into corners of the forms and around reinforcement by the method of placing and compaction to be employed on the job without permitting the materials to segregate or allowing excess free water to collect on the surface.

b) Slump Tests

Slump measurements shall be carried out in accordance with AS1012.

The slump measurement as per the relevant Australian Standard shall at all times be within the limits given in Table 1 below, or the limits as shown on the project drawings or as ordered by the Superintendent.

Where neither the project drawings nor the Superintendent specify a target slump the Contractor shall nominate a target slump prior to commencement of the concrete pour. Such a target slump shall comply with Table 1.

Variations in slump between concrete batches shall comply with the requirements of the relevant Australian Standard, i.e.-

Where the specified or target slump is 80 mm or less, the measured slump shall be within 15 mm of the specified or target slump.

Where the specified or target slump exceeds 80 mm, the measured slump shall be within 30 mm of the specified or target slump.

If the measured slump does not comply with the requirements of this specification then a check test shall be made immediately on another portion of the same sample. If this second test also does not comply with this specification the particular batch or truck load of concrete represented by the sample shall be deemed to have failed to meet the slump requirements of the specification and shall be rejected.

Table 1. **Required Slump**

Type of Construction	**Slump (mm)**	
	Min	Max
Pavement Slabs	50	80
Mass Footings, caissons & substructure walls	50	80
Tunnel Lining	50	100
Kerb & Channel – machine placed	15	40
Kerb & channel – hand placed	25	80
Unreinforced manhole walls	50	80
Mass concrete infills	50	80
Reinforced beams & walls	50	100
Columns	50	100
Pumped concrete	70	120
Thin walls	80	120
Tremie concrete	120	200
Reinforced footings	50	100

c) Durability Requirements

The effective cement and the water/cement ratio shall comply with that given in Table 2.

Table 2. **Required Cement Content and Water/Cement Ratio**

Description	**Minimum Effective Cement Content (Kg/m3)**	**Maximum Water/Cement Ratio**
Heavy industrial pavements	360	0.50

The effective cement content is defined as the Portland cement content in kilograms per cubic metre of finished concrete. Where fly ash is used, the effective cement content shall be defined as the Portland cement content plus half the mass of the fly ash used per cubic metre.

d) Addition of Water On Site

The addition of extra water to concrete mixes prior to discharge shall be subject to the following conditions.

Water shall NOT be added: -

(i) Where the water/cement ratio is specified for durability and the concrete supplier has not given written advice on the delivery docket stating an amount of water, which may be added while still complying with the water/cement ratio.

(ii) Where plant control of concrete is being carried out.

(iii) Where compressive strength resting cylinders have been taken prior to the proposed water addition

(iv) Where the depositing of concrete in forms has already commenced.

(v) When the Superintendent directs that no extra water be added.

Water may be added at the contractor's own risk: -

(i) Where the concrete is not subject to water/cement ratio control and strength testing cylinders are taken after the addition and proper mixing of the extra water.

(ii) Where the concrete supplier issues written instructions stating the amount of water, which may be added on site without detriment to the required concrete properties. Such a statement must be either written on a delivery docket or with specific reference to properly identify the concrete batch or batches concerned.

(iii) When the Superintendent issues a written instruction that water may be added.

Any extra water added to a concrete mix must be accurately measured in a manner approved by the Superintendent. The amount of water added shall be recorded immediately on all copies of the delivery docket and noted on all concrete records held by the Contractor and the Superintendent.

3.10 HANDLING AND PLACING OF CONCRETE

a) Inspection

The placement of any concrete shall not commence until the Superintendent has inspected and approved the formwork, reinforcements, anchorage etc. against which the concrete is to be placed.

b) Preparation

Before placing of concrete, all sawdust, chips and other construction debris and extraneous matter shall be removed from the interior of forms. Struts, stays and braces, serving temporarily to hold forms in the correct shape, shall be completely removed from the form when the concrete reaches a level, which renders them unnecessary.

The Contractor shall provide convenient and safe gangways supported clear of reinforcement to allow for ease movement of personnel and equipment.

c) Transportation

No concrete shall be used which does not reach it's final position in the forms within 1 hour after the introduction of water to the cement and aggregate batch, except when continuously agitated in a truck mixer when 1.5 hours elapse.

In hot weather (over 32 C) these times shall be reduced to 0.5 hours and 1 hour respectively.

d) Placing Concrete

Concrete shall not be placed if the slump determined in accordance with Table 1 above or alternately AS1012 is not within the required limits.

Concrete shall be placed so as to avoid segregation of the material and disturbance of the reinforcing.

Concrete shall be deposited continuously between construction joints either in, or close to, it's final position so that the new concrete is placed against plastic concrete to produce a monolithic mass.

When placing operations involve depositing concrete from a height greater than 1.0 metre, special precautions to the approval of the Superintendent shall be made to avoid segregation.

e) Adverse Weather Conditions

Unless under protective cover, concrete shall not be placed during rain. In the event of placing operations being interrupted by rain, the Contractor shall immediately cover any unhardened finished surfaces and continue placing concrete to a construction joint or other emergency point nominated where a construction joint shall be formed.

Facilities for such a protective shelter shall be at hand on the job prior to commencement of placing concrete.

Concrete which is placed when the surrounding air temperature is greater that 32 C shall have a temperature not greater than 32 C when placed in the forms. In addition shielding of reinforcing and steel forms from direct sunlight and winds, cold water spraying forms, or special mix designs employing refrigerated water or other approved means may be required. Special hot weather curing procedures shall be used as set down in Clause 3.12 of this specification.

Approval for concreting in cold weather shall be at the discretion of the Superintendent.

Concrete damaged by rain, water or other causes owing to failure to suspend operations or take adequate precautions during pouring under adverse conditions shall be demolished and replaced at the Contractor's expense. Other remedial measures may be approved as directed by the Superintendent.

f) Compaction

During and immediately after placing, concrete shall be thoroughly compacted by mechanical vibrators, which shall comply with following: -

(i) Vibrators shall be of an approved type, capable of transmitting vibration to the concrete at frequencies of not less than 6000 impulses per minute and at such an intensity so as to visibly effect concrete in a radius of 300 mm.

(ii) All vibration shall be internal or by vibrating mechanical screeds for slabs, unless otherwise approved by the Superintendent.

(iii) The Contractor shall provide a sufficient number of vibrators to efficiently compact each batch of concrete immediately after it is placed. At least one vibrator in working order shall be held in reserve at all times.

(iv) Vibrators shall be inserted into the concrete continuously and progressively along the pour for just sufficient time at each insertion to compact the concrete thoroughly. Over-vibration shall be avoided and vibrators shall not remain in any one position for more than twenty (20) seconds.

(v) Vibrators shall be placed to achieve uniform plasticity of the concrete but shall not be used to the extent that localised areas of mortar are formed.

3.11 FINISHING OF CONCRETE

Unformed concrete surfaces of floors and slabs shall be finished so that a dense, uniform and even surface is obtained with a minimum of working of the surface.

The addition of cement or other drying materials to the surface during finishing shall not be permitted.

Slabs, which are to be finished, monolithically (no other applied finish), shall be finished to a fine smooth texture as obtained from a steel trowel or power float. Finished surfaces shall be free from all defects and machine marks.

A damp broom shall be lightly pulled across the freshly trowelled surface to provide a skid and slip resistant finish.

3.12 CURING

a) General

Freshly placed concrete shall be protected from premature drying and excessively hot or cold temperatures. In windy conditions windbreaks shall be erected to shield the concrete surfaces during and after placement. The concrete shall be maintained at a reasonably constant temperature with minimum moisture loss for the duration of the curing period. Curing methods which do not conform with the requirements of this specification shall not be used without the prior written approval of the Superintendent.

b) Initial Curing

Immediately after the finishing operations have been completed and until the membrane, sheet or moist curing system has been applied, the surface of the concrete shall be kept continuously damp by means of a water fog or mist applied with approved equipment.

c) Final Curing

Immediately following the initial curing and before the concrete has dried, additional curing by one of the following methods shall commence: -

(i) Moist Curing

As soon as possible after the finishing operations have been completed and the concrete has set sufficiently to prevent marking of the surface, the forms and entire surface of the newly-laid concrete shall be covered with wet hessian mats, or other approved material.

Hessian mats shall have sufficient width, after shrinkage, to cover the entire width and faces of the concrete base. Provision shall be made to securely anchor the mats to ensure that they remain in place in windy conditions. The mats shall overlap each other by at least 150mm. The mats shall be saturated before placing and shall be kept continuously wet and in immediate contact with the base, edges and surface for the duration of the required curing period.

(ii) Sprayed Membrane Curing

On completion of the initial curing and for the remainder of the curing period, the entire exposed surface of the concrete including edges shall be uniformly coated with an approved membrane-curing compound. The concrete shall not be allowed to dry out before the application of the membrane. If any initial drying has occurred, the surface of the concrete shall be moistened with a spray of water. The curing compound shall be applied to the finished surfaces by means of an approved mechanical spraying device.

The spraying device shall be equipped with a spraying nozzle or nozzles that can be so controlled and operated as to completely and uniformly cover the surface with the required amount of curing compound. Spraying pressure shall be sufficient to produce a fine spray and to cover the surface thoroughly and completely with a uniform film. The spray nozzle shall be provided with a suitable guard.

The curing compound should be sprayed uniformly at a rate recommended by the manufacturer to achieve compliance with AS 3799.

The compound shall form a uniform, continuous, cohesive film that will not check; crack or peel, and that will be free from pinholes and other imperfections. If discontinuities, pinholes or abrasions exist, an additional coat shall be applied to the affected areas within 30 minutes.

Concrete surfaces that are subject to heavy rainfall within 3 hours after the curing compound has been applied shall be re-sprayed by the method and at the coverage specified above.

In the event of failure to achieve the required coverage, either moist curing blankets or impermeable sheet curing shall be immediately used.

(iii) Impermeable Sheet Curing

On completion of initial curing and for the remainder of the curing period, the moistened concrete surfaces shall be covered with approved impermeable curing sheets.

The most commonly used impermeable covering is waterproof plastic sheeting, such as clear polyethylene, or it's equivalent. The sheeting should be placed as soon as the condition of the concrete is such that the surface will not be marked or damaged.

The curing sheets shall be in pieces large enough to cover the entire width and edges of the base. Adjacent sheets shall overlap not less than 500mm and the lapped edges shall be securely tied or weighted down along their full length to prevent displacement or billowing by wind. Sheets shall be folded down over the side of the pavement edges, continuously weighted and secured. Tears and holes appearing in sheets during the curing period shall be repaired immediately.

The sheets shall remain in place for the entire duration of the specific curing period. Any damages that might reduce the serviceability and effectiveness of the sheets as a curing medium shall be prevented. Curing sheets that do not provide a continuous cover as required for effective curing may be rejected at any time.

d) Hot Weather Curing Methods

If the temperature of the surrounding air is higher than 32 C, the following curing methods shall apply: -

(i) The methods outlined in Clause 3.12 c) Section (i) and (iii) shall be the only approved curing methods without the written authorisation of the Superintendent.

(ii) Curing compounds shall not be used or approved for hot weather curing.

e) Period of Curing

Curing shall continue until the cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of air in contact with the concrete is above 10 C, complies with the following: -

(i) For normal Portland cement concrete: 14 days

(ii) For concrete mixes containing fly ash (where approved): 21 days

(iii) For high early strength cement: not less than 4 days or as directed by the Superintendent.

If the forms are removed during the curing period, one of the methods for final curing shall be employed immediately and continued for the remainder of the curing period.

The Contractor shall not permit walking over or upon finished surfaces for a minimum of 2 days after initial curing has commenced. Further construction false work cannot proceed until final curing or, at the Superintendent's discretion, when the concrete has reached sufficient strength to support superimposed construction loads.

3.13 REINFORCING STEEL

a) Certificate of Quality

The Superintendent may require the manufactures certificate of proof testing certifying the grade of any or all steel used in the job. No non-Australian reinforcing steel shall be placed on the job before evidence is submitted that the quality and properties comply with the relevant Australian Standard. When a manufacturer's certificate cannot be provided, proving tests, as set out in AS4671 shall be undertaken. Samples shall be selected by the superintendent and tests shall be made in a NATA approved laboratory. The cost of all testing and materials for testing shall be borne the Contractor.

b) Storage and Cleaning

Reinforcements shall be stored clear of the ground when delivered to the site. Prior to placing all reinforcing steel shall be free from mud, oil, paint, cement grout and loose rust that is detrimental to the bond between concrete and reinforcing.

c) Bending

All reinforcement shall be bent cold and shall be accurately formed to the dimensions given on the drawings. Unless otherwise indicated bending and cutting tolerances shall comply with AS3600.

d) Placing and Fastening

All reinforcements shall be accurately placed in the positions shown on the drawings. Fixing tolerances given in AS3600, shall be used such that the minimum cover specified on the drawings shall not be encroached upon. Bars shall be tied with 1.5mm annealed binding wire at all intersections except where spacing is less than 300m in each direction when alternate intersections shall be tied. Tack welding as a substitute for wire tying or for any other purpose shall not be used without prior approval of the Superintendent.

Cover of concrete to reinforcing shall be maintained by means of stays, blocks, ties, hangers or other approved supports. Blocks shall be precast mortar blocks of approved dimensions or approved metal or plastic chairs. Metal chairs which are in contact with the exterior surface of the concrete shall be galvanized and have approved plastic tips.

Generally fabric reinforcing shall be supplied in sheets and not rolls but if fabric reinforcing in rolls is approved it shall be straightened into flat sheets before being placed. All reinforcing bars that will project beyond concrete being placed, e.g. at construction joints, shall be firmly secured to prevent accidental disturbance of partly cured concrete.

e) Galvanising

Galvanising of reinforcing steel shall be carried out as follows: -

(i) Blast clean to achieve a Class 2 surface finish;
(ii) Acid etch or pickling:
(iii) Hot dip galvanising in accordance with AS 1397. The thickness of the coasting applied in the process shall produce a minimum coating weight of 600gm/sq m;
(iv) Threaded fasteners shall be treated in accordance with AS121.

Renovation of uncoated or damaged areas of galvanised surface shall comply with AS1397.

3.14 STEEL FIBRES

a) General

Fibre types and dose rates shall be in accordance with proprietary fibre reinforcement systems, which shall be approved by the Superintendent. Where fibre types and dose rates are specified on drawings, the Contractor may submit alternative reinforcement schemes for approval by the Superintendent. Mix designs

so submitted, must be supported by engineering calculations subject to the approval of the Superintendent.

b) Fibre Type

Steel fibres shall be from a supplier approved by the Superintendent.

c) Dosage Rate

Fibre dosage shall be as specified on the Drawings or as approved by the Superintendent.

d) Handling and Placement

In addition to the requirement specified in Section 3.10, the following requirement shall apply:

(i) Concrete shall be handled and placed by personnel experienced in the handing of fibre reinforced concrete.

(ii) Fibres shall be evenly distributed throughout the mix without visible segregation or clumping.

3.15 JOINTS

a) General

Joints shall be constructed to the details shown in the Drawings and as specified in this Specification. Joints shall be positioned in the locations as detailed on the drawings.

b) b) Construction Joints

If the Contractor wishes to make a construction joint to facilitate the placement of concrete, the Contractor shall obtain the prior approval of the Superintendent.

Where dowelled joints have been specified, dowels shall be placed in the construction joint.

All concrete shall be placed in a single layer, no horizontal construction joints shall be allowed.

Before placing fresh concrete against concrete, which has achieved initial set, the surfaces of the set concrete shall be cleaned of loose stones, foreign matter and laitance until sound concrete and the embedded aggregates are exposed over the whole surface. The surface shall be cleaned off with a wire brush.

Whenever the work of placing concrete is delayed until the concrete has taken its initial set, the point of stopping shall be deemed a construction joint.

Where expansion or contraction joints have been specified, concrete shall be placed continuously between such joints.

c) Contraction Joints

Contraction joints shall be, formed joints, sawn joints or a combination of the two.

Formed joints shall be constructed in the plastic concrete immediately following finishing operations.

Sawn joints shall be constructed in the hardened concrete. The time of sawing shall be such as to prevent uncontrolled cracking commensurate with the concrete having hardened sufficiently to permit cutting without excessive chipping, spalling or tearing of the finished surface.

d) Isolation Joints

Isolation joints shall be constructed in such a manner as to form a complete uniform separation between structures and members of structures.

e) Dowelled Joints

Dowels shall be straight, clean and smooth and be free of burred edges. They shall be coated along half their length with a debonding agent. They shall be galvanised in accordance with Section 3.13e).

Dowels shall be held rigidly in place, parallel to each other, and shall not deviate by more than 3 mm in 300mm from the specified alignment. The locational tolerance shall not exceed half the diameter of the dowel.

3.16 FORMWORK

a) General

The Contractor shall be responsible for the design of formwork and false work.

The design and construction of formwork and false work shall comply with AS3610 'Formwork for Concrete'.

b) Form Ties

The use of wire ties shall not be permitted. Permanent internal bolts shall have no part permanently embedded within the specified cover from the finished surface of the concrete and any holes left in concrete surfaces shall be repaired to the approval of the Superintendent.

c) Stripping Times

Forms and false work shall be designed so that they can be easily and safely removed in a planned sequence without damage, impact or shock to the concrete. Where quick re-use of forms or false work is desired, formwork shall be designed for removal leaving in place sufficient original undisturbed shores for support of the concrete. Where stripping is carried out in such stages the approved first stage stripping time shall be based on results of concrete tests taken in addition to those required for normal strength control testing. Otherwise the minimum stripping times for total formwork removal given in AS3600 and AS3610 shall apply.

For concrete mixes incorporating fly ash the minimum stripping times of AS3600 and AS 3610 shall be increased by 50%.

The Contractor shall not proceed with any part of his program until the Superintendent has approved that part of the programme in writing. Any work commenced or completed which does not conform to an approved programme shall be liable to rejection.

3.17 TESTING

Cement and Fly ash

The Contractor shall submit to the Superintendent, for each consignment of cement and fly ash, a copy of the manufacturer's certificate of compliance with the Concrete Specification. The certificate shall include the date of manufacture of the cement.

The Superintendent may also direct the Contractor to take and test samples from each consignment of cement and fly ash.

a) Aggregates

The Contractor shall carry out tests on the materials supplied for use as concrete aggregate in accordance with AS2758.1-1998.

The minimum frequency of testing concrete aggregates shall be 1 test per 100m³ of aggregate.

b) Concrete Compressive Tests

Concrete compression tests shall be carried out in accordance with AS1012.

Sampling of concrete shall be in accordance with the project assessment requirement of AS3600.

c) Rejection of Fresh Concrete

Fresh concrete shall be liable to rejection if it is defective in any of the following ways: -

(i) The specified slump determined in accordance with AS1012 is outside the specified limits.

(ii) The appearance and cohesiveness of the batch is significantly different from other batches of the same specification.

(iii) The time since batching is outside that stated in AS1379 and Clause 3.10c) of this specification.

(iv) For concrete where water/cement ratio is to be controlled the total amount of water added to the mix is outside the limits for the specified water/cement ratio.

(v) For concrete where cement content is controlled the cement content is less than that specified.

(vi) The concrete contains chemical admixtures of any kind without the written approval of the Superintendent.

(vii) Fibres are not adequately mixed in accordance with Section 3.14 of this Specification.

d) Rejection of Hardened Concrete

Hardened concrete shall be liable to rejection if it is defective in any of the following ways: -

The characteristic strength of the concrete as determined by testing to AS1012 fails to comply with the requirement of the relevant Australian Standard.

The concrete is porous, segregated or honeycombed.

Placing of the concrete has been interrupted so that there is a construction joint not in accordance with the original design and in such a location as may impair the load carrying capacity and/or serviceability of the structure or member.

(i) Construction tolerances have not been complied with.

(ii) The required surface finish has not been achieved.

(iii) The concrete has surface defects of a more serious nature than those permitted by Clause 3.11 of this specification.

(iv) The concrete has cracks, which are not allowable in accordance with Clause 3.11 of this specification.

e) Surface Defects

Subject to suitable repair as may be ordered by the Superintendent, surface defects such as chips, holes, and voids shall not cause concrete to be liable to rejection provided that: -

(i) The depth of the defect is not greater than 10 percent of the thickness of the section.

(ii) They will not reduce the strength of the section to less than the required strength.

(iii) The thickness of the cover to the reinforcement is not reduced below that specified.

f) Cracking

Cracking of concrete shall not cause the concrete to be liable for rejection provided that cracks which the superintendent considers may penetrate to the reinforcement will not reduce the strength of the member to less than the required design strength, and such cracks have been sealed to the approvals of the Superintendent to endure the protection of the reinforcement from corrosive influence.

4 POLYETHENE SHEET

Polyethylene sheet placed under the concrete to act as a waterproof membrane shall be 0.2mm thick 'VisQueen' waterproof membrane or approved equivalent. Sheet membranes shall be placed where shown on the drawings.

5 BEDDING LAYER

Bedding material shall comprise of a well-graded non-cohesive sand with a maximum particle size of 4.75mm. The thickness and location of the bedding layer shall be as specified on the drawings.