

Hamilton City Development Manual		
<b>Volume 3 : Standard Technical Specifications</b>		<b>Part 3 –Roading Projects</b>
Authorised by : Transportation Manager	<b>Section 8</b>	Page 1 of 4

## SECTION 8 : CONCRETE WORKS

### 8.1 GENERAL

This specification covers all concrete work for paths, vehicle crossings, various kerbs, kerb & channel and cut downs for vehicle crossings. These shall all be formed to the dimensions shown in the Standard Cross Sections and Details.

The strength of concrete as defined in NZS 3109 shall be as follows:

- 28 day in place minimum strength of 20 Mpa for all the above works.

### 8.2 FORMWORK

Formwork shall generally comply with the requirements of NZS 3109 as amplified below.

Formwork shall be used wherever necessary to support and confine the concrete and shape it to the required dimensions. Joints and linings shall be sufficiently tight to prevent loss of water from the concrete.

All timber for formwork shall be of an approved quality and kind, and for kerbs and channels shall be ex 40mm material, provided that 15mm timber or other suitable material may be used on short radius curves. Formwork shall be of sufficient depth to fully support all vertical faces and where supporting exposed surfaces, shall be long lengths, thickened and dressed smooth on one face and both edges.

Timber strips for chamfers shall be machined all round to be true to shape and form and they shall be kept in perfect order. Alternatively the chamfer or bullnose may be formed with a specific floating tool.

Steel forms, where used, shall be of approved design and shall be maintained in perfect condition. The joints between lengths shall be secured accurately during concreting to maintain a good line in the finished work.

Forms shall be designed to be easily removable without jarring the green concrete, and shall be kept thoroughly clean and treated to prevent adhesion of concrete. Forms for curved kerbs shall be brought to a true curve by springing the timber evenly round.

The shape, strength, rigidity, mortar tightness and surface smoothness of re-used forms shall be maintained at all times. Warped or bulged timber is not permitted. Timber which has been used shall have the surfaces which are to be in contact with the concrete thoroughly cleaned and treated before being used again.

### 8.3 CONCRETE MIX AND PROPORTIONS

Concrete mixes shall be proportioned to be workable and capable of being thoroughly consolidated by the means of compaction available and produced to provide the specified strength of concrete. The concrete may be either ordinary grade, high grade or special grade as defined in NZS 3109.

<b>Hamilton City Development Manual</b>	
<b>Volume 3 : Standard Technical Specifications</b>	<b>Part 3 –Roading Projects</b>
Authorised by : Transportation Manager	<b>Section 8</b> <span style="float: right;">Page 2 of 4</span>

The concrete used shall be either made on the site, or supplied ready mixed. In each case, the concrete production shall be in accordance with the relevant standards as follows:

NZS 3104 Specification for Concrete Production – High Grade and Special Grade  
 NZS 3108 Specification for Concrete Production – Ordinary Grade

#### **8.4 PLACING CONCRETE**

The Contractor shall give due notice to the Engineer of the time it is intended to place any concrete and no concrete shall be placed until consent has been obtained from the Engineer.

Concrete shall not be placed on frozen ground nor shall it be placed in unfavourable conditions which may be detrimental to the quality and finish of the concrete. Unfavourable conditions shall be deemed to include low temperatures (below 5°C with temperatures descending, or below 2°C with temperature ascending), excessively hot dry conditions, excessively wet conditions, or any conditions making it impractical to work and finish the concrete adequately.

Immediately prior to placing the concrete, the foundations shall be lightly damped, and formwork shall be cleaned out. In all cases surplus water shall be removed before concrete is placed.

The concrete shall be placed so that the coarse aggregate will not be separated from the rest of the material, and it shall be thoroughly worked and consolidated into all parts of the formwork, so that no voids or cavities are left. All concrete shall be handled from the mixer, or from the agitator or truck mixer, to the place of final deposit as rapidly as is practicable by methods which shall prevent segregation.

Unless otherwise approved, in no case shall more than 30 minutes elapse between discharge of concrete from the mixer or agitator truck and final placement. Under no circumstances shall partially hardened concrete be placed in the work.

Where a channel is finished with a sand/cement mortar coat, the mortar shall be placed within two hours of placing the concrete, provided that when hot dry conditions are prevailing, the allowable time shall be reduced to one hour.

If for any reason, a delay of more than two hours occurs, an approved PVA bonding agent shall be used to ensure that the mortar is adequately bonded to the concrete.

Before fresh concrete is placed upon or against any concrete which has already hardened the surface of the hardened concrete shall be thoroughly roughened and cleaned and cleared of all laitance, loose or foreign matter.

Hamilton City Development Manual		
<b>Volume 3 : Standard Technical Specifications</b>		<b>Part 3 –Roading Projects</b>
Authorised by : Transportation Manager	<b>Section 8</b>	Page 3 of 4

## 8.5 REINFORCEMENT

All reinforcement other than ties and stirrups shall be deformed unless otherwise detailed.

The length of lapped splices (without hooks) shall be 40 bar diameters in length.

Steel reinforcement, at the time concrete is placed, shall be free from loose flaky rust, mud, oil or other coatings that will destroy or reduce the bond.

Reinforcement shall be accurately placed, adequately supported and secured against displacement prior to or during concrete placement.

The minimum cover to all main reinforcing steel shall be 50 mm unless otherwise specified.

## 8.6 CURING OF CONCRETE

Strict attention shall be paid to adequate curing, which is an important factor in attaining the required strength for the concrete.

From immediately after placement, concrete shall be protected from premature drying, excessively hot or cold temperatures and mechanical injury, and shall be maintained with minimal moisture loss for the period necessary for hydration of the cement and hardening of the concrete.

All concrete surfaces not in contact with formwork shall be cured by the application of a curing compound conforming to ASTM C309 "Specification for liquid membrane - forming compounds for curing concrete".

In cold or wet weather, concrete shall be protected from the elements during the curing period by covering with sacks or other approved material.

## 8.7 MACHINE LAID KERB AND CHANNEL

Contractors who intend to construct the kerbs and channels by using an extrusion machine will be required to use an approved ready mixed concrete. The Concrete provided shall be designed so that after placement it will accurately retain its shape and present a good surface. No subsequent cement washing will be permitted. The machine shall be capable of providing well compacted concrete with the absence of entrapped air.

The machine shall not be used to pour curves with radii less than 5 m. For these curves the Contractor shall use formwork as specified.

A properly shaped screed shall be used in forming cutdowns.

Hamilton City Development Manual	
Volume 3 : Standard Technical Specifications	Part 3 –Roading Projects
Authorised by : Transportation Manager	Section 8 <span style="float: right;">Page 4 of 4</span>

## 8.8 FINISHED WORK

Methods shall be used that will provide a smooth, clean and even surface on the exposed faces of all concrete work, and will obtain the required finish directly on the structural concrete without the use of mortar renderings, provided that, if specific prior approval of the Engineer is obtained, the channel may be finished with a layer of mortar separately applied to its surface. In such case, the mortar shall consist of not more than two parts of approved sand to one of cement. It shall be nominally 6mm in thickness and shall be placed before the initial set of the concrete, and in any case within two hours of placing the concrete.

Alternatively a mortar layer to the above consistency may be applied in conjunction with the laying of the kerb and channel when the kerb and channel is laid by machine and the machine is designed for such use.

The top and face of the kerb and the channel surface shall be floated over with a steel tool before the concrete has finally set. No depressions which may hold water will be permitted. Only workers expert in this particular type of work are to carry out the finishing.

The surface finish of all kerb and channel, whether machine laid or hand laid, shall be uniform in colour, texture and shape.

## 8.9 BACKFILLING AGAINST CONCRETE WORK

Backfilling against the kerb and channel or any other concrete structure shall take place as soon as practicable after the concrete has reached sufficient strength with particular emphasis at curves, corners, intersections and pedestrian kerb crossings.

Care shall be taken to ensure that no damage is done to the path, crossing, kerb and channel or other concrete structure when placing and compacting the backfill.

## 8.10 FINAL SURFACES - For Footpath and Vehicle Crossing Areas

All final path and vehicle crossing surfaces shall be true to the lines and levels specified. Design considerations excepted, the final surface shall not vary by more than 5mm when checked with a 3m straight edge. No finished surface shall hold water.