# 06050 Precast Concrete Barriers

## Index



## Tables and Equations

## 06050-1 Description

The work shall consist of supplying all labour, plant, equipment and material for the fabrication and installation of precast concrete barriers in accordance with this Specification, the construction drawings provided herein and the General Requirements.

## 06050-2 Materials

### 2.1 Qualifications

The manufacturer is to be CSA certified for Precast Structural Concrete Products under CSA A251 or shall adhere to the specifications as set out under CSA A251. Adherence to the CSA A251 specifications shall be monitored by an independent consultant supplied by the City.

### 2.2 Concrete

A minimum compressive strength of 35MPa shall be used in fabricating precast concrete barriers.

Cement used on the work shall be Type 1 Portland Cement and conform to current CSA Specifications.

The consistency for hand placed concrete shall be such that the slump shall not exceed 80mm or be less than 25mm.

An approved air entraining agent shall be used in all concrete and shall comply with the Specifications for Air Entraining Admixture for Concrete (A.S.T.M. Designation: C-260) and used in strict accordance with the manufacturer's recommendations. The air entrainment limits shall be between 5 to 8 percent by volume as determined in accordance with C.S.A. A 23.2.18.

Ready mixed concrete shall conform in every respect to all specifications herein contained and with the "Standard Specifications for Ready Mixed Concrete" (A.S.T.M. Designation: C-94 or C.S.A. A 23.1.13) and shall further be subject to any additional written directions that the Engineer may deem necessary to ensure the obtaining of concrete of the quality specified.

## 2.3 Concrete Testing

During the progress of the work, test cylinders will be taken to determine the quality of the concrete. Concrete tests will be done by a Testing Laboratory approved by the Engineer.

1. The Contractor shall, at his own expense, supply the following tests.
2. Slump Test
3. Air Entraining Test

Set of three (3) test cylinders. One cylinder will be broken at seven (7) days and two test cylinders will be broken at twenty-eight (28) days.

The Contractor shall provide, at his own expense, materials and facilities as the Engineer may require for carrying out the above mentioned tests.

The fresh concrete will be sampled in accordance with A.S.T.M. Designation: C-172 or C.S.A. A 23.2.21.

Concrete with a slump greater than 75mm shall be rodded. Concrete with slump of 25mm to 75mm may be rodded or vibrated. Concrete with slump of less than 25mm shall be consolidated by vibration.

The concrete supplied shall have a basic minimum specified compressive strength of twenty-eight (28) days. The average of the two (2) cylinders of any single test broken at twenty-eight (28) days shall be equal to or greater than the specified strength at twenty-eight (28) days. No more than one (1) test in ten (10), and no two (2) consecutive tests shall be below the specified strength.

## 2.4 Reinforcing Steel

Reinforcing steel shall be fabricated from deformed bars and/or welded wire mesh conforming to the requirements of CSA Standard G30.12-M and conforming to the grade shown on the plans. (A.S.T.M. Designation: A-615, Grade 40).

### 2.5 Miscellaneous Metals

Miscellaneous metals shall conform to the requirements of A.S.T.M. Designation: A-36 or better.

### 2.6 Protective Coatings for Exposed Metal

Connectors - coupling inserts shall be completely galvanized with not less than 600g/$m^2$ as per C.S.A. G164-M.

## 06050-3 Construction, Workmanship and Procedures

### 3.1 Forms

Forms shall be true to shape, lines and dimensions as called for on the drawings. They shall be substantial and tight to prevent leakage of moisture. Maximum tolerance for final dimensions is as indicated on plans, or where not indicated ±3mm.

The face of the forms shall be treated with a release agent to ensure that stripping of the forms may be carried out without damage to the concrete. Care shall be taken to maintain all embedded steel will be free of the release agent.

### 3.2 Reinforcing Steel

All reinforcing steel shall be accurately placed in the positions shown on the plans, and shall be retained in such positions by means of bar accessories and wires so that the bars shall not be moved out of alignment during or after the pouring of concrete. The reinforcing steel shall be free from mud, oil, releasing agents or other nonmetallic coatings that adversely affect the bonding capacity.

The maximum permissible tolerance for location of the reinforcing steel shall be ±5mm of the location shown on the plans.

The minimum clear cover for reinforcing steel in concrete shall be 40mm or as stated in CAN3-A23.3-M84.

### 3.3 Concrete Compaction (Vibration)

The concrete shall be thoroughly compacted by mechanical vibrators during casting. The concrete will be worked around reinforcement, embedded fixtures and into the

corners of the forms. Internal vibrators or form vibrators may be used at the manufacturer's discretion. Care shall be exercised to avoid over vibration that causes aggregate segregation.

## 3.4 Curing

### 3.4.1 Moist Curing

The surfaces of fresh concrete shall be kept continuously moist for a period of at least 7 days and are protected against the harmful effects of sunshine, drying winds, cold running water, surface water and mechanical shock. The temperature of the concrete shall be kept at 20°C for not less than 7 days.

### 3.4.2 Steam Curing

If steam curing is used to maintain a daily cycle of casting, the following criteria for curing shall be adhered to:

1. The maximum rate of temperature rise of the concrete is 20°C per hour.
2. The maximum temperature to which the concrete is raised is 70°C.
3. The maximum rate of cooling is 20°C per hour.

Immediately after stripping of forms, the members shall be steam cured for an additional 12 hours at a temperature of not less than 65°C.

After completion of moist curing or steam curing, the members are stored and allowed to dry out for a further period of 7 days prior to being put into service.

## 3.5 Concrete Finishing

Honeycomb spots, holes, broken corners and edges, and other concrete spalls shall be repaired by thoroughly cleaning the area, applying an approved bonding agent, and carefully filling with a grout of cement and fine aggregate mixed in proportions to obtain a strength equivalent to that of the concrete being repaired. (35MPa) The resulting surfaces shall be smooth and uniform.

### 3.6 Concrete Sealer

The concrete barrier shall be sealed using penetrating sealer specified by the Engineer. The entire surface area shall be sealed.

The concrete surface should be dry and free of oils, grease, dirt, wax and other contaminates considered as detrimental to the penetration of the sealer. New concrete shall be cured to at least 80% of the design strength before the first coat of the sealer is applied. New concrete shall be satisfactorily cleaned using forced air or water.

Application: The penetrant sealer may be applied with a roller, brush or sprayer. At least two coats will be required for a proper coverage. All manufacturer's specifications shall be adhered to with inspection to application.

Table 1: Product Application

| | |
|---|---|
| Duralane | 40 |
| Chemtrete | BSM-40 |
| Permaseal | 444 |
| Drytrete | 40 |
| Hydrozo Silane | 40 m |
| Hydrozo Silane | 40 IPA |
| Capseal | X |
| Capseal | U |

### 06050-4 Handling, Storage and Delivery

Care shall be taken in the handling, storage and delivery of completed precast units to avoid damage. Damage to units prior to acceptance by the City at the point of installation, shall be rectified by the supplier at no extra cost to the City.

### 06050-5 Installation

The units shall be installed as shown on the construction drawings.

A smooth vertical profile shall be maintained along the top of the concrete barriers. It may be required to place steel shims underneath the units to compensate for any depressions in the roadway's profile. Hand pack grout will be required where a gap of more than 10mm results between the underside of the unit and the roadway surface.

## 06050-6 Payment

Precast concrete barriers are paid for at the unit rate per 2.5 metre unit. A separate unit price will apply to the supply of the transition and terminal ends. Payment for the supply shall be full compensation for all labour, materials and equipment required to fabricate the barriers and deliver to installation site.

A separate unit price will cover the installation of each unit at the location specified by the Engineer.

**End of Specification 06050**