# 33 71 13 PRECAST CONCRETE BARRIER

## Part 1 General

### 1.1 DESCRIPTION

.1 Supply and installation of precast concrete barriers in accordance to this section. Precast Concrete barrier supplied shall be as per British Columbia Standard Specifications for Highway Construction (latest edition), Section 941 – Precast Reinforced Concrete Barriers. In addition, all end faces to **have 25 mm chamfered edges**.

.2 Barrier drain pipes shall be supplied and installed in accordance with the Contract Documents at locations specified by the Departmental Representative. Payment will be made under **"Lump Sum Price Item 3 – Prime Cost Sum"**.

### 1.2 MEASUREMENT AND PAYMENT PROCEDURES

.1 Remove and Dispose Precast Concrete Barrier:

.1 Removal and disposal of concrete barrier will be measured in metres of barrier removed and disposed of outside of the National Parks in accordance with the Contract Documents. Payment will be made under **"Unit Price Item 13a – Precast Concrete Barrier – Remove and Dispose Existing Barrier"** and shall be inclusive of all costs of labour, materials, equipment to satisfactorily complete this item in accordance with the Contract Documents.

.2 Remove, Stockpile and Reinstall Barrier:

.1 Removal, temporary stockpiling and reinstalling concrete barrier will be measured in metres of barrier reinstalled in its final position, in accordance with the Contract Documents. Payment will be made under **"Unit Price Item 13b – Precast Concrete Barrier – Remove and Reinstall Existing Barrier"** and shall be inclusive of all costs of labour, materials, equipment to satisfactorily complete this item in accordance with the Contract Documents.

.2 Cleaning of shoulders, by methods accepted by the Departmental Representative, in front and behind barrier locations shall be considered incidental to the Work. Barriers that are to be placed back into their original location must be cleaned of all debris. Cleaning of barrier is considered incidental to the Work and no additional payment will be made.

.3 Supply and Install Precast Concrete Barrier:

.1 Supply and installation of 810mm Precast Concrete Barrier shall be per each unit of specific type 810mm precast concrete barrier including end treatments supplied, loaded, hauled and installed at locations as directed by the Departmental Representative in accordance with the Contract Documents. Payment will be made per the applicable component Unit Price bid under **"Unit Price Item 13c – Precast Concrete Barrier – Supply and Install Barrier".**

.4 Barrier costs shall be inclusive of all costs of labour, materials, and equipment to satisfactorily complete this item as specified and in accordance with this Section

.5 The supply and installation of barrier mounted reflectors shall not be measured directly and shall be considered incidental to the unit price items.

.6 The placement and removal of Precast Concrete Barriers for use as temporary barricades during construction will not be measured for payment and shall be considered incidental to the Contract.

.7 The survey and layout of the Precast Concrete Barriers as per requirements identified in this Section and the plans, will not be measured directly for payment but shall be considered incidental to **"Unit Price Item 13 – Precast Concrete Barrier".**

.8 Supply and installation of barrier reflectors on all final barrier locations in accordance with the Contract Documents will not be measured for payment and shall be considered incidental to **"Unit Price Item 13b – Precast Concrete Barrier – Remove and Reinstall Existing Barrier"** and **"Unit Price Item 13c – Precast Concrete Barrier – Supply and Install Barrier".**

.9 Mobilization and demobilization required for this Work shall be incidental to **"Lump Sum Price Item 1 – Mobilization / Demobilization",** and no additional payment will be made.

.10 Traffic Control for survey, installation, removal or relocation of Precast Concrete Barriers shall be incidental to **"Lump Sum Price Item 2 – Traffic Accommodation"** and no separate payment will be made to the Contractor.

.11 Environmental mitigations required in accordance with Section 01 35 43 – Environmental Procedures, for the Work in this Section shall be incidental to the Contract and no separate payment will be made to the Contractor.

## Part 2 Products

### 2.1 MATERIALS

.1 Precast Concrete barrier shall be manufactured as per British Columbia Standard Specifications for Highway Construction (latest edition), Section 941 - Precast Reinforced Concrete Barriers with the following exceptions:

.1 All end faces to have 25mm chamfered edges.

.2 Synthetic Fiber reinforcing shall be added to the precast concrete barriers in accordance with the Contract Documents.

.2 810mm Special Drainage Barrier to be per manufactured as per the Contract Documents and as directed by Departmental Representative.

.3 Barrier reflectors to be hard plastic type raised pavement markers mounted with fast cure construction adhesive.

.1 Reflectors to be placed at 25m intervals mounted as per the Drawings or as directed by the Departmental Representative.

.2 Acceptable products include:

.1 3M Raised Pavement Marker (RPM)

.2 Stimsonite Raised Pavement Marker (RPM)

.3 Or equivalent as approved by the Departmental Representative

### 2.2 PRECAST CONCRETE BARRIER

.1 Concrete Quality: to CAN/CSA-A23.1 except where amended below.

.2 Compressive Strength: Compressive strength test result is equal to or exceeds 30 MPa and no individual cylinder strength is less than 27 MPa.

.3 Calcium chloride or admixtures containing calcium chloride are not to be used in concrete.

.4 Cement Content: minimum of 320 kg/m3.

.5 Water/Cement Ratio: maximum of 0.45.

.6 Coarse Aggregate: nominal maximum size not exceeding 28mm.

.7 Slump: 50 mm plus or minus 20mm.

.8 Entrainment Air: 5 to 8%.

.9 Reinforcement:

.1 Fibrillated fiber strand reinforced concrete to be used for production of barriers. Welded wire mesh reinforcement will not be permitted.

.2 50 mm fibrillated polypropylene fibres to be added at the rate of 1.0 kg/m3.

.3 Fibrillated fibres shall meet requirements of ASTM C 1116 Type 3 Synthetic Fibre Reinforced Concrete or shotcrete.

.4 Fibres shall have a minimum tensile strength of 350 MPa and a minimum modulus of elasticity of 4.2 GPa.

.5 Fibres are to be added early in the mixing process following manufacture's recommendations to ensure evenly distributed fibres.

.6 A single length of 15 mm rebar shall be wire tied to the horizontal sections of the hook or eye assemblies as indicated in the Contract Documents.

.7 Additional 10M rebar shall be installed for drainage barriers as indicated in the Contract Documents.

.10 Concrete Placing and Consolidation:

.1 To CAN/CSA-A23.4, Clause 19.

.11 Concrete Curing and Protection:

.1 Strictly to CAN/CSA-A23.4, Clause 21.

.2 During curing period temperature differential between concrete surface and ambient air not to exceed 20 $^{0}$ C.

.12 Exposed Concrete Surfaces:

.1 Uniform in texture and colour as produced from well-maintained steel form surfaces and proper vibration methods without excessive surface fines or laitance.

.13 Surface defects will normally be cause for rejection of any unit except where such are within the following permissible limits or area subject to making good within the following permissible limits:

.1 Unobtrusive defects of any kind where their total area is not in excess of 2% of exposed surface area of unit.

.2 Air holes not greater than 3 mm in diameter and not more than 20 in any isolated 300 mm x 300 mm area.

.3 Sharp ridges at edges of exposed concrete surfaces softened where necessary by careful rubbing or grinding.

.4 Patching of isolated small holes, cavities and similar self-confining defects may be permitted when authorized by the Departmental Representative.

.14 Patching, if authorized, to be completed as follows:

.1 Defective are saturated with water and defect prepared with cement paste and filled with mortar.

.2 Mortar to be properly proportioned to same sand and cement as original concrete and reasonably colour-matched to cured dry unit with addition of white cement where necessary, to be pre-shrunk for about one hour before retempering and use.

.3 Patching mortar to be well tooled in, finished flush and smooth and are covered to cure adequately.

.15 Surface tolerance to be +/- 3 mm unless otherwise directed by the Departmental Representative.

.16 Finished Product:

.1 Contractor to notify Departmental Representative in advance of manufacturing of schedule so that inspection can be carried out. All processes are subject to inspection by the Departmental Representative. Inspection or release of units by the Departmental Representative is required prior to shipping.

.2 Identification indicated by embedding manufacturer's name or trademark, year of manufacture, and form number on end of each unit is manner, size and depth that will be permanently legible.

.3 Authorized patching or making good to be inspected by the Departmental Representative before shipment or upon delivery and rejected units replaced at no cost.

.17 Welded Steel Wire Mesh Reinforcement:

.1 Welded wire mesh reinforcement will not be permitted.

.18 Reinforcing Steel for Bent and Hooked Connections:

.1 To CAN/CSA-G40.21-M, Grade 260W.

.19 Bending:

.1 Carefully bend reinforcing steel to radii detailed and install as indicated in the Contract Documents.

.2 Inspect reinforcing steel after bending for evidence of fracture. Fractured pieces to be replaced.

.20 Surface Treatment:

.1 Treatment of exposed surfaces not required.

.21 Pick-up Points:

.1 Form with accurately placed rigid PVC pipe recessed 15 mm from both finished surfaces as indicated in the Contract Documents.

.22 Drainage Slots:

.1 Drainage slots to be cast-in as indicated in the Contract Documents.

## Part 3 Execution

### 3.1 DELIVERY

.1 Care shall be taken to protect Precast Concrete Barrier from elements and temperature extremes during curing period. Under no circumstances are barrier components to be exposed to freezing conditions until fully cured.

.2 Storage of Precast Concrete Barriers on site to be in single layer, for first seven days.

.3 Stacking of three layers high, with wood blocking between lifts, permitted with Departmental Representative approval, after seven days.

.4 Barriers to be stacked three layers high, with wood blocking between lifts, at delivery location. Cost of supply and installation of wood blocking shall be incidental to the Contract and no separate payment will be made.

### 3.2 INSTALLATION

.1 Precast Concrete Barriers shall be installed permanently on asphalt concrete pavement in accordance with the Contract Documents or as directed by the Departmental Representative.

.2 Contractor shall do the layout of the barriers for both removal and installation operations.

.3 The Departmental Representative will determine location of barriers with drainage opening for drainage and for small animal crossings. Some of the roadside drainage barriers will require the installation of drain pipe to control runoff. The drain shall be supplied installed at locations and as directed by the Departmental Representative.

### 3.3 FIELD QUALITY CONTROL

.1 Contractor shall carry out all the necessary quality control to ensure the barrier work complies with the Contract Documents.

### 3.4 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**