

**SECTION 521**  
**CONCRETE BARRIERS, TRAFFIC RAILING BARRIERS**  
**AND PARAPETS**

**521-1 Description.**

Construct plain or reinforced concrete barriers, traffic railing barriers and parapets, herein referred to as barrier walls, with precast or cast in place concrete, in accordance with the details shown in the plans. Use stationary removable forms or sliding forms to construct the barrier wall. Do not use precast barrier walls on bridge or box culvert structures.

**521-2 Materials.**

Meet the following requirements:

Portland Cement Concrete .....	Section 346
Reinforcing Steel .....	Section 415
Joint Materials.....	Section 932

**521-3 Construction.**

**521-3.1 General:** The Contractor may use stationary removable forms or slip form construction methods provided a completed barrier wall with acceptable alignment and finish is obtained. Construct forms of metal or timber with a form liner. Do not use forms which are damaged or are not in alignment. At no expense to the Department, remove and replace sections of barrier wall having unconsolidated concrete, surface blemishes, deviations in alignment or profile which exceed tolerances, or other defects which cannot be repaired to the satisfaction of the Engineer.

**521-3.2 Stationary Form Construction:** Provide precast or cast in place concrete barrier walls constructed using stationary forms in accordance with Section 400 and providing a Class 3 finish. Align and erect the stationary form so that all plane surfaces of the finished wall will have no deviation greater than 3/8 inch [10 mm] measured as an ordinate between the concrete and a 10 foot [3.048 m] straightedge. Correct all alignment deviations greater than 3/8 inch [10 mm] in accordance with 521-3.1. Straightedge by half lapping the straightedge for the full length of all plane surfaces.

**521-3.3 Slip Form Construction:** When electing to use the slip form method in lieu of the stationary forming method, place the concrete with a slip form machine approved by the Engineer, designed to form and consolidate the concrete in one pass in such a manner that a minimum of hand finishing is necessary to provide a dense, suitably finished barrier wall in accordance with the Contract Documents. Rigidly hold the sliding forms together laterally so that the forms will not spread. Operate the slip form machine with a continuous forward movement to minimize stops and starts of the machine. Arrange the concrete consolidation elements of the machine to start and stop simultaneously with the starting movement and stopping movement of the slip form machine. Ensure that the consolidation elements consist of internal vibrators and form vibrators. Provide a slip form machine that is a self contained, self powered unit.

Provide a finished texture to the slip formed barrier walls by hand troweling, brushing, or both to eliminate pockmarks, blemishes and any other discontinuities in surface texture. Ensure that the final finish has a fine texture and is free of pinholes, pockmarks, and blemishes.

Remove and recast or repair sections of slip formed barrier walls having areas of unconsolidated concrete, having surface blemishes, and/or having pockmarks greater than 1/2 inch [13 mm] in diameter after hand troweling and brushing in accordance with 521-3.1. Repair areas of unsatisfactory surface finish by hand methods using mortar screened from the concrete used to construct the barrier wall. Use the mortar screened from the barrier wall concrete only to fill holes and surface blemishes below the slip formed surface of the concrete. Do not use mortar as a surface overlay coating on the barrier wall concrete.

During the finishing operation, while the concrete remains plastic, straightedge all plane surfaces of the slip formed barrier wall with a 10 foot [3.048 m] straightedge. Straightedge by half lapping the straightedge for the full length of the plane surfaces. Correct any deviation found during straightedging, greater than 3/8 inch [10 mm], measured as an ordinate between the concrete surface and the straightedge, in an approved manner at no expense to the Department. Do not use surface overlay coatings of mortar screened from the concrete, or surface overlay coatings of concrete to correct alignment deviations.

#### **521-4 Curing.**

Cure cast in place and precast barrier walls for 12 hours by leaving the form in place. After removing the form, cure the barrier wall by one of the methods specified in 400-16, for the remainder of the 72 hour curing period.

Cure slip formed barrier walls in accordance with 400-16.

#### **521-5 Joints.**

**521-5.1 General:** Place expansion and contraction joints in concrete barrier wall either mounted on or adjoining rigid structures in a manner similar to the type and method of jointing used in the supporting or adjoining structure or as shown in the Contract Documents. Place expansion and contraction joints in concrete barrier walls supported by soil or flexible foundation materials in the manner detailed in the plans.

**521-5.2 Contraction Joints in Barrier Walls Supported by or Adjoining Rigid Structures:** The Contractor may form or saw contraction joints. When sawing contraction joints, saw them as soon as the concrete has hardened sufficiently to permit sawing without raveling and before uncontrolled cracking occurs, but in no case later than 12 hours after casting. Match contraction joints to adjacent contraction joints in the structure. Space contraction joints at 15 to 30 foot [4.5 to 9.0 m] intervals. For barrier walls on bridge structures or approach slabs, space contraction joints as shown in the Contract Documents.

**521-5.3 Expansion Joints in Barrier Walls Supported by or Adjoining Rigid Structures:** Construct expansion joints at right angles to the face, and extend them through the entire cross-section of the barrier wall. Construct barrier wall expansion joints at the same location and width as the expansion joints in the structure on which the wall rests and at other locations shown in the Contract Documents. When constructing reinforced barrier walls, form expansion joints with an expansion filler material or removable forming materials and secure to the forms as required to provide proper position. When using slip forming to construct non-reinforced barrier walls, construct expansion joints as in reinforced barrier walls or saw the joint through the plastic concrete the full depth and width of the barrier section. Where using the plastic sawing method, place close fitting shields over the concrete on each side of the joint for protection during sawing and hand finishing of the concrete at the joint.

#### **521-6 Method of Measurement.**

The quantity to be paid for under this Section will be the plan quantity, in feet [meters], completed and accepted. The quantity will be measured along the top of the barrier wall from the begin to end station, including transitional and end sections, with no deduction for expansion joints or open joints. Barrier walls on bridge structures and approach slabs to be removed shall be included in the cost of Removal of Existing Structures. Barrier walls to be removed along roadways are included in the cost of clearing and grubbing, or if a pay item is included, in the cost of Removal of Concrete Barrier Wall.

#### **521-7 Basis of Payment.**

Price and payment will be full compensation for all work specified in this Section, including all reinforcing steel, conduits, materials and incidentals necessary to complete the work.

Payment will be made under:

Item No. 521-1 - Concrete Barrier Wall - per foot.

- Item No. 2521-1 - Concrete Barrier Wall - per meter.
- Item No. 521-5 - Concrete Traffic Railing Barrier (Bridge) – per foot.
- Item No. 2521-5 - Concrete Traffic Railing Barrier (Bridge) – per meter.
- Item No. 521-6 - Concrete Parapet (Bridge) – per foot.
- Item No. 2521-6 - Concrete Parapet (Bridge) – per meter.
- Item No. 521-72 - Concrete Barrier Wall – per foot.
- Item No. 2521-72 - Concrete Barrier Wall – per meter.