

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

### 521-1 Description.

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

Provide written certification from the manufacturer of the precast barrier wall that the barrier wall meets the requirements of this Section. Barrier wall is produced using certification acceptance; therefore, assume responsibility for performance of all quality control testing and inspections required by Sections 346 and 400 for barrier wall construction. Perform all Quality Control Testing and inspections using CTQP qualified testing personnel. Perform compressive strength testing in a laboratory inspected by CCRL or CMEC.

Ensure that each shipment of products to the job site includes a list of products shipped and the required written certification statement for each product. Provide this list and certifications to the Engineer.

### 521-2 Materials.

Meet the following requirements:

Portland Cement Concrete .....Section 346

Reinforcing Steel .....Section 415

Joint Materials..... 932-1.1

Joint Materials\* ..... 932-1.2 and 932-1.3

Barrier Delineators \*(1) ..... Sections 705 and 993

\*Use products listed on the Department's ~~Qualified~~ **Approved** Products List

(~~QPL~~**APL**).

(1) Mount delineators on the barriers in accordance with the details shown in the Plans and the Design Standards.

### 521-3 Use of Precast Temporary Barrier Wall.

**521-3.1 General:** Meet the requirements of 102-9.5.2.

**521-3.2 Precast Temporary Barrier Wall Meeting the Requirements of the Design Standards, Index No. 415:** Use precast temporary barrier wall when certification is provided to the Engineer that the precast temporary barrier wall was constructed in accordance with and meets the requirements of the Design Standards, Index No. 415, and meets the approval of the Engineer.

**521-3.3 Procurement of Proprietary Precast Temporary Barrier Wall:** Obtain and use precast temporary barrier wall listed on the ~~QPL~~**APL** from a manufacturing plant that is currently on the Department's list of Producers of Incidental Precast/Prestressed Concrete Products with an Accepted Quality Control Program. Producers seeking inclusion on the list shall meet the requirements of 105-3.

Ensure each precast temporary barrier wall section has permanent clear marking, showing the manufacture date, serial number, and manufacturer's name or symbol and the

Department approved drawing number that it meets. The markings may be located on a plate, plaque, or cast in the panel.

**521-3.4 Procurement of Precast Temporary Barrier Wall Meeting the Requirements of Design Standards, Index No. 414:** Obtain and use precast temporary barrier wall from a manufacturing plant that is currently on the Department's list of Producers of Incidental Precast/Prestressed Concrete Products with an Accepted Quality Control Program. Producers seeking inclusion on the list shall meet the requirements of 105-3.

#### **521-4 Construction.**

**521-4.1 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. 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.

**521-4.2 Stationary Form Construction:** Provide precast or cast in place concrete barrier wall constructed using stationary forms in accordance with Section 400 and provide a general surface 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 measured as an ordinate between the concrete and a 10 foot straightedge. Correct all alignment deviations greater than 3/8 inch. Straightedge by half lapping the straightedge for the full length of all plane surfaces.

**521-4.3 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. The concrete cover tolerance is plus or minus 1-1/4 inches from the plan dimensions, except the minimum concrete cover, as constructed, must not be less than 1-3/4 inches.

Provide a finished texture to the slip formed barrier wall 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 wall having areas of unconsolidated concrete, having surface blemishes, and/or having pockmarks greater than 1/2 inch in diameter after hand troweling and brushing. 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 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, 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.

#### **521-5 Curing.**

Meet the requirements of Section 400.

## **521-6 Joints.**

**521-6.1 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 wall supported by soil or flexible foundation materials in the manner detailed in the Plans.

**521-6.2 Contraction Joints in Barrier Wall 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 intervals. For barrier wall on bridge structures or approach slabs, space contraction joints as shown in the Contract Documents.

**521-6.3 Expansion Joints in Barrier Wall 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 wall, 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 wall, construct expansion joints as in reinforced barrier wall 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.

## **521-7 Repairs and Rejection.**

For permanent precast concrete barrier wall that has not been installed, evaluate cracks, spalls and other deficiencies in accordance with 450-12. Repair deficiencies in accordance with 450-13 or the plant's approved repair methods that are included as part of the Quality Control (QC) Plan. Ensure that the original performance and durability of the repaired barrier wall is maintained. Use materials for concrete repair that will meet or exceed the strength requirement for the class of concrete used. Materials meeting the requirements of Section 930 may be substituted for non-shrink grout when required by 450-13. Concrete barrier wall is subject to rejection if it fails to conform to any of the Specification requirements after repair. The disposition of concrete cracks in barrier wall after installation shall be in accordance with 400-21. Cracks in unreinforced, plain concrete barrier walls as detailed in Design Standards, Index No. 410 do not require repair unless directed by the Engineer.

## **521-8 Method of Measurement.**

The quantity to be paid for under this Section will be the plan quantity, in feet, 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 wall on bridge structures and approach slabs to be removed shall be included in the cost of removal of existing structures. Barrier wall to be removed along roadways to be paid for as concrete barrier wall removal.

**521-9 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:

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| Item No. 521- 1-  | Median Concrete Barrier Wall - per foot.                                |
| Item No. 521- 5-  | Concrete Traffic Railing Barrier - Bridge - per foot.                   |
| Item No. 521- 6-  | Concrete Parapet - per foot.  |
| Item No. 521- 7-  | Concrete Traffic Railing Barrier - Retaining Wall System -<br>per foot. |
| Item No. 521- 8-  | Concrete Traffic Railing – with Junction Slab - per foot.               |
| Item No. 521- 72- | Shoulder Concrete Barrier Wall - per foot.                              |
| Item No. 521- 73- | Concrete Barrier Wall Removal - per foot.                               |