

## **Section 2535. Bin Type Crib Walls**

### **2535.01 DESCRIPTION.**

- A.** Bin type crib walls will be used to retain earth embankments when lateral clearance will not allow normal earth slopes. These walls may be constructed of precast concrete units in the form of alternate courses of stretchers and headers or may be constructed of formed galvanized sheets so that when assembled, they will form a succession of vertical, rectangular cells which will be filled with suitable backfill material.
- B.** Both precast concrete units and formed galvanized sheets are required to conform to the contract documents.

### **2535.02 MATERIALS.**

For materials used in construction of the cell walls, meet the following requirements for the respective types:

#### **A. Concrete Crib Units.**

Precast concrete complying with the applicable requirements of [Section 2407](#).

#### **B. Formed Galvanized Sheets.**

##### **1. Sheets.**

Comply with requirements of [Section 4141](#) for the type of base metal and galvanizing. Ensure the sheets are of the gage specified in the contract documents. Sheets may be galvanized before punching and forming.

##### **2. Nuts and Bolts.**

Use bolts and nuts galvanized according to ASTM A 153, Class C. Use unfinished regular bolts meeting requirements of ASTM A 307, Grade A, full diameter body.

- Threads: ANSI B1.1, Unified Coarse Thread Series.
- Bolt heads and nuts: either standard square, hexagonal, or heavy hexagonal style; meet the requirements of ASTM A 307 or ASTM A 563.

### **2535.03 CONSTRUCTION.**

#### **A. Excavation.**

- 1.** Excavate the site to provide a firm foundation at the desired elevation. If the wall face is to be battered, excavate the foundation to be sloped to the heel to provide the required batter of the wall face. Otherwise, excavate the foundation to be level. Compact the soil beneath the entire bin area by rolling or tamping to provide a firm foundation.
- 2.** Unless designated otherwise, when construction of bin type crib wall is included in the contract for grading a section of road, all excavation in connection with this construction is classified according to [Article](#)

2102.03, B, the same as other excavation in the contract. When not included in contracts for grading, all excavation in connection with this construction is Class 23 Excavation according to [Article 2402.03, J](#).

## **B. Construction of Crib Walls.**

1. When the total height of wall does not exceed 6 feet (1.8 m), the foundation may be level and wall face vertical. When the height of wall exceeds 6 feet (1.8 m), batter the wall face as indicated in the contract documents, but no less than 2 inches in 12 inches (50 mm in 300 mm). Adjust the foundation to provide the required batter in the wall face. Ensure courses of stretchers or plates in the wall face are level.
2. When specified in the contract documents, cover the subgrade for the wall with special backfill material meeting requirements of [Section 4132](#). When drainage is provided beneath the wall foundation, cover the drain and foundation with porous backfill material meeting requirements of [Section 4131](#).
3. **Concrete Units.**
  - a. Furnish concrete crib wall units in two patterns: one to be used as stretchers, and the other to be used as headers in building the wall. Ensure these units:
    - Meet the requirements for dimensions and reinforcement shown in the contract documents,
    - Are free from cracks, spalls, or surface depressions on any face,
    - Have rectangular cross section, and
    - Are beveled as shown in the contract documents.
  - b. Place a double row of stretchers along the line of the toe of the wall. Place one or more rows of stretchers along the heel of the wall, as indicated in the contract documents, according to the height of the wall. Ensure the end stretchers are of a length that full bearing is provided for the end headers. Place headers at right angles to the wall face at 6 foot (1.8 m) intervals. Leave a space of 1/4 inch (6 mm) between the stretcher and the projecting lug of the header to allow for slight movement of the wall.
  - c. Use the stretchers for the wall face that are indicated in the contract documents. Open type stretchers will provide approximately a 5 inch (125 mm) vertical opening between courses of stretchers. Closed type stretchers will provide approximately 1 inch (25 mm) vertical space between courses of stretchers.
  - d. Ensure stretcher courses in the wall face are level. If shimming is necessary, do so using layers of heavy asphalt roofing paper at bearings. Where the wall is stepped up or down, hold end headers in place using extra headers placed parallel to and between the rows of stretchers.
4. **Formed Galvanized Sheets.**
  - a. Ensure sheets are fabricated so they may be assembled and bolted to form cells of the shape and dimensions shown in the contract

documents. Assemble the sheets as shown in the contract documents. Sheets may be placed individually and bolted in place, or the transverse walls and posts may be assembled as a unit and sheets of the front and rear walls placed individually.

- b. After the plates of each course are in place, draw tight all bolts in that course.
- c. Tighten all bolts in each course at least twice to assure that all bolts are properly tightened.

### **C. Placing Backfill.**

1. After each 3 foot (1 m) lift of crib wall cell is completed, promptly place backfill material consisting of suitable earth or granular material, as specified. Ensure the backfill material completely fills the cell, as well as the space between the cell and any face of natural earth behind the wall. Place backfill material in layers no greater than 6 inches (150 mm), thoroughly compacted by tamping. Granular material may be compacted by vibration.
2. Use a method of compaction that neither distorts the wall nor displaces the units.

## **2535.04 METHOD OF MEASUREMENT.**

Measurement for the items associated with Bin Type Crib Walls will be as follows:

### **A. Excavation.**

1. Part of a contract for grading a section of road: as provided in [Section 2102](#).
2. Not a part of a contract for grading a section of road: Class 23 excavation will be computed as provided in [Section 2402](#). In addition, the quantity of excavation will include only material actually removed above the elevation of the subgrade designated in the contract documents and bounded by:
  - Vertical planes 1 foot (0.3 m) beyond the horizontal projection of the headers at the ends, and
  - The stretchers at the rear and by the natural ground surface at the top and front.

### **B. Backfill Material.**

1. Granular backfill material furnished: cubic yards (cubic meters) or in tons (megagrams) as indicated in the contract documents and as provided in [Article 2402.04, E](#).
2. Earth backfill material: not measured.

### **C. Bin Type Crib Wall.**

The Engineer will compute in square yards (square meters) the face area of each design of bin type crib wall from measurements of the length of wall and the height from the extreme top and bottom of stretcher units or sheets.

**2535.05 BASIS OF PAYMENT.**

- A.** Payment for the various items associated with Bin Type Crib Walls will be the contract unit price as follows:
- 1. Excavation.**  
Per cubic yard (cubic meter) for the type of excavation.
  - 2. Backfill Material.**  
Per cubic yard (cubic meter) or per ton (megagram).
  - 3. Bin Type Crib Wall.**  
Per square yard (square meter) for each design constructed.
- B.** Payments are full compensation for:
- Furnishing all materials, tools, and labor necessary to construct the crib walls complete for the respective type,
  - For placing and compacting of earth or granular backfill material, and
  - For all other operations necessary to the work and not covered by other items.