



Iowa Department of Transportation

DEVELOPMENTAL SPECIFICATIONS FOR PRECAST NOISE WALL

Effective Date
October 20, 2009

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

09007.01 DESCRIPTION.

- A. Construct precast noise wall units according to this specification and in reasonably close conformity with the lines, grades, design, and dimensions shown in the contract documents. Use one of the approved wall systems in Appendix A of this specification.
- B. Noise walls are defined as large panels that are held in place by columns and are used to reduce noise pollution.

09007.02 MATERIALS.

A. Concrete.

1. **Cement:** meet the requirements of Section 4101 of the Standard Specifications.
2. **Cement content for face panels and precast columns:** no less than 600 pounds per cubic yard (360 kg per cubic meter) of concrete.
3. **Coarse aggregate:** Class 3 or better durability. Gravel may be used with the Engineer's approval, based on past history of deleterious and stain-producing material found in the aggregate source.
4. **Air content:** 7.5% as a target value, with a maximum variation of +1.5% and -1.0%. When specified, or approved by the Engineer, admixtures for the purpose of improving workability for retardation may be used.
5. **Proposed mix design:** Submit to the Engineer, at the Preconstruction Conference, for approval.

B. Compressive Strength.

1. Meet the following requirements:
 - a. **Design strength:** minimum of 3500 psi (24 MPa).
 - b. **Form removal/moving strength:** minimum of 2000 psi (13.8 MPa).

2. The fabricator is to cast a minimum of three cylinders per lot to evaluate design strength. A lot is considered one week unless the Engineer establishes otherwise. The fabricator is to use the three cylinders to determine design strength. The fabricator is to cast six additional cylinders if form removal/moving is conducted at an early age. They are to use three of these cylinders to determine form removal/moving strength, and are to maintain three as back-ups. The average of three test specimens will be considered a test result.
3. The strength samples are to be cured with the elements until curing operations have ceased.
4. Elements will be considered acceptable for shipping when the required design strength has been achieved for a given lot.

D. Reinforcement & Anchors.

1. Use reinforcing steel meeting the requirements of Article 4151.03 of the Standard Specifications.
2. Use plastic supports meeting the following to chair reinforcing steel:
 - Of similar color to the precast units.
 - Approved as noted in Materials I.M. 451.01, Appendix A.
3. Use anchor bolts from the approved source listed in Materials I.M. 453.08, Appendix A. Set them according to Article 2405.09 of the Standard Specifications.
4. Ensure galvanized anchors or lifting devices that remain exposed, or have less than 1 inch (25 mm) cover, are according to Article 4100.07 of the Standard Specifications.
5. Submit all lifting systems to the Engineer for approval prior to production. In the submittal include all hardware to be used, placement of all hardware, and stress calculations.
6. Use masonry plates, anchor bolts, nut, washers, and threaded rods galvanized according to Article 4100.07 of the Standard Specifications.
7. Use threaded rods and anchor bolts meeting the requirements of ASTM F 1554, Grade 55 psi (380 MPa).
8. Use epoxy-coated panels in the splash zone.

09007.02 PATCHING.

- A. Fill all lifting devices with patching materials that will bond to the underlying concrete and be of a similar texture and color to the underlying concrete. Lifting devices only used by the fabricator are to be patched by the fabricator before shipment. Patch all other lifting devices after placement. Use methods and materials approved by the Engineer to fill lifting devices.
- B. Conduct all patching such that it is visually blended with surrounding material and is not visually objectionable. Conduct a test patch for the Engineer to review to ensure acceptability.

09007.03 CASTING.

- A. Set noise wall lifting anchors in place, within a tolerance of +/- 1.0 inch (25 mm), to the required position as detailed in the lifting system submittal.
- B. Place the concrete in each unit without interruption and consolidate appropriately for the mix used.

- C. Use clear form oil from the same manufacturer throughout the casting operation. Place form oil in a uniform coating, avoiding excess. Remove excess oil.
- D. Apply the following tolerances to all columns and panels:
 - All dimensions 0.25 inches (5 mm).
 - Panels or columns are not to be bowed, warped, or out of plane in any direction impacting the placement and interlocking of the panels.
 - No objectionable surface defects.

09007.04 CURING.

- A. As soon as practical (after initial set) after casting, but no later than 30 minutes, cover wall and columns with wet burlap and keep continuously wet until form removal/moving strength is achieved. Leave forms in place for a minimum of 24 hours following casting.
- B. After the initial curing period is completed, walls and panels may be moved from casting beds to a secondary curing area and covered with wet burlap and polyethylene (plastic) 3.0 mil (60 μ m) thick, properly secured to retain moisture.
- C. Other curing methods may be used if the Engineer approves.

09007.05 MARKING.

Ensure the length and placement identification number are clearly scribed on the bottom of each column. Ensure that special panels have a unique marking: 1) identifying the piece and unique characteristics; and 2) placed in an area visible during handling, but concealed in final placement. Ensure each shipment is accompanied by a certification statement.

09007.06 HANDLING, STORAGE & SHIPPING.

Handle units with care. Lift using padded straps or padded contact areas. Store the units above ground on wooden or padded supports, or on a sand bed. Use supports that are adequate, firm, and placed evenly to prevent sagging. Handle, ship, and store columns and panels in a manner as to prevent and /or eliminate the causes of cracking, fracturing, damaging, and excessive bending stresses.

09007.07 REJECTION.

Failure to meet the specified requirements may result in rejection of columns or panels.

09007.08 METHOD OF MEASUREMENT AND BASIS OF PAYMENT.

Precast Noise Wall will be measured and paid for according to the plans.

Appendix A: PRECAST CONCRETE NOISE WALLS

GENERAL

- A. Approval to furnish precast concrete noise walls will be based on:
 - Certification from approved sources (approved plant prior to letting), and
 - Conformance to the contract documents.
- B. Approved sources are listed in this specification under Approved Sources: Precast Concrete Noise Walls.

PLANT APPROVAL

- A. Plant approval will be on the basis of certification and approved plant quality control.
- B. An up-to-date Quality Control Plan (subject to the Engineer's approval) describing all materials, mix design(s), quality of work, and fabrication methods is required.

MATERIALS

Aggregates, cementitious materials, admixtures, and reinforcing steel from approved sources.

PATCHING

- A. **Polymer grouts:** accepted based on approved brands as noted in Materials I.M. 491.11, Appendix A.
- B. **Hydraulic cement grouts:** accepted based on approved brands as noted in Materials I.M. 491.13, Appendix A.

TOLERANCES

- A. All dimensions within 1/4 inch (5 mm).
- B. Angular distortion with regard to the height of the wall not to exceed 1/4 inch in 5 feet (5 mm in 1.5 m).
- C. No objectionable surface defects. Defects on smooth-formed surfaces not to exceed 1/8 inch in 5 feet (2.5 mm in 1.5 m). Defects on textured surfaces not to exceed 5/16 inch in 5 feet (8 mm in 1.5 m).

CAUSES FOR REJECTION

- A. Failure to meet any of the specified requirements.
- B. Defects that indicate imperfect molding.
- C. Defects that indicate honeycomb or open texture concrete.
- D. Surface defects that exceed 5/16 inch (8 mm) in 5 feet (1.5 m).
- E. Chipping, cracking or fractures.

HANDLING, STORAGE & SHIPPING

Handle, store, and ship in a manner as to prevent and/or eliminate the causes of cracking, fracturing, damaging, and excessive bending stresses.

- Handle units with care. Minimize handling.
- Lift using padded straps or padded contact areas.
- Stored above ground on wooden or padded supports.
- Ensure support is adequate, firm, and placed evenly to prevent sagging.

LEVELING PAD

Ensure the leveling pad is Portland cement concrete with a nominal compressive strength of 3500 psi (24 MPa).

MARKING

Ensure the length and placement identification number are clearly scribed on the bottom of each column. Ensure special panels are uniquely marked, identifying the piece and unique characteristics. Ensure the mark is placed in an area visible during handling, but concealed in final placement.

CERTIFICATION DOCUMENTS

- A. Ensure the producer/fabricator of the precast concrete noise wall furnishes on each shipment day a certified bill of materials or invoice, which identifies the county, project number, contractor's name and the number of panels. Ensure the certification of compliance (stated as below) is signed by a designated or responsible company representative.

The materials itemized in this shipment are certified to be in compliance with the applicable ASTM Standards and the Iowa Department of Transportation Standard Specifications.

Authorized Signature & Date

- B. Forward one copy of the above-described documents to the Engineer on the day the item(s) are delivered to the project and send one copy to the respective District Materials Engineer.

APPROVED SOURCES: PRECAST CONCRETE NOISE WALLS

The following producers are approved to furnish precast concrete noise walls on the basis of certification in accordance with the Standard Specifications:

CSI Precast
2825 Maury Street
Des Moines, IA 50317
Telephone 515.264.1065

Wieser Precast, Inc.
440 Hawkeye Drive
Williamsburg, IA 52361
telephone 319.668.1888