



**SPECIAL PROVISIONS
FOR
FOAMED CELLULAR CONCRETE FILL**

**Wapello County
BRF-063-2(172)--38-90**

**Effective Date
December 16, 2025**

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

230384.01 DESCRIPTION.

- A.** This work shall consist of providing and placing foamed cellular concrete fill (FCCF) as infill material between the expanded polystyrene (EPS) fill and the bridge deck, as specified on the plans in accordance with this special provision.
- B.** The FCCF installer shall coordinate its work with the EPS fill contractor and earthwork contractor.

230384.02 DESIGN AND MATERIALS.

A. Design Submittals.

- 1.** Submit a FCCF quality control (QC) and placement plan. Placement of the FCCF shall be in accordance with the information provided in the QC and placement plan. Submit the plan to the Engineer for review and comment no later than 14 days prior to FCCF placement. FCCF production shall not begin before the plan has been reviewed and accepted by the Engineer. The submitted QC and placing plan shall, at a minimum, provide the following.
 - a.** An organization chart including names, telephone numbers, current certification/ titles, roles, and responsibilities of those involved with the quality control program.
 - b.** The process of communication by which the quality control information will be disseminated to the appropriate persons, including material suppliers. This shall include a list of recipients, communication means that will be used, action time frames, and report formats.
 - c.** Materials list of items proposed to be provided under this section.
 - d.** Manufacturer's specifications, catalog cuts, and other product data needed to demonstrate compliance with the specified requirements.
 - e.** Mix design for FCCF, prepared by the foaming agent manufacturer, showing compliance with the specified properties.
 - f.** Certification of batch, mixing, and placing equipment by the foaming agent manufacturer, meeting the requirements specified herein.

- a. Written evidence that producer / supplier is certified and approved by the foaming agent manufacturer.
 - b. Written evidence that FCCF installer is certified and approved by the foaming agent manufacturer.
 - c. FCCF curing procedures.
- d. At least 6 weeks prior to placement, a trial batch shall be prepared, and the trial batch testing results submitted 30 calendar days later showing the proposed FCCF material properties comply with the requirements of this specification. The equipment, materials and techniques used to produce the trial batch shall be that which will be used to produce the FCCF. The accepted trial batch mix design and tested properties will become the standard of the material furnished under this contract.
- e. At least 6 weeks prior to placing, the Contractor shall submit ten 3 inch diameter by 6 inch tall cylinder samples of the designed and tested FCCF material to the Engineer. Specimens shall be covered after casting to prevent loss of moisture and shall not be oven dried. At the Engineer's option, the samples may be tested for strength and density in accordance with the requirements of ASTM C 495, to verify the submitted test results and validate the FCCF installer's testing procedures and quality of the furnished product.
- f. The FCCF installer shall supply daily records of production and quantities of materials used each day to the Engineer. The FCCF installer shall provide cast density reports within 24 hours of sampling. Provide the Engineer with a final report detailing unconfined compression testing and cast density results. Submit the final report within 30 calendar days after the last FCCF placement.

B. Materials.

Materials used for FCCF shall meet the following requirements:

1. Portland cement and Portland pozzolan cement type 1 meeting the requirements of Section 4101 of the Standard Specifications.
2. Air entraining, water reducing, and set retarding admixtures meeting the requirements of Section 4103 of the Standard Specifications.
3. Pozzolans and admixtures (for accelerating, water reducing, retaining, bond improving etc.) may only be used if specifically designated and approved by the foaming agent manufacturer.
4. During the placement of initial batches, the cast density shall be checked and the mix adjusted as required to obtain the specified cast density at the point of placement. Take one set (four test specimens) for each 100 cubic yards of FCCF placed or every 4 hours of placing, whichever results in the greater number of sets. Minimum of two sets per day.
5. Testing shall be performed by the Contractor in accordance with ASTM C 495 (except that samples shall not be oven dried at any time before testing). The specimens shall be cylinders 3 inches in diameter and 6 inches in height. Cylinders shall be covered after casting to prevent damage and loss of moisture. Specimens shall be tested at 7 days, 28 days (two specimens), and 56 days to monitor the unconfined compressive strength. Additional cylinders shall be cast if additional breaks are desired. The Contractor shall report test results to Engineer of distribution.
6. The foaming agent from the selected foaming agent manufacturer shall conform to ASTM C 869 and ASTM C 796 and shall produce a FCCF material that complies with the specification in Table 1.

Table 230384.02-1: Foamed Cellular Concrete Fill Properties

PROPERTY	REQUIREMENTS	TEST METHOD
Maximum Cast Density	30 pcf	ASTM C 495, except that samples shall not be oven dried at anytime before testing.
Minimum Unconfined Compressive Strength at 28 days	50 psi	ASTM C 495
Minimum Effective Friction Angle	28 degrees	ASTM D 4767
Coefficient of Permeability at 2 psi	On the order of 10^{-5} cm/sec	ASTM D 2434
Freeze-thaw Resistance, minimum cycles at relative Young's Modulus, E = 70%	120 cycles	ASTM C 666 Procedure B (rapid freezing in air and thawing in water), modified per E. L. Bidwell, University of Illinois, letter dated April 2, 1975.

230384.03 CONSTRUCTION.**A. Personnel Requirements.**

1. The FCCF installer shall be certified by the foaming agent manufacturer and regularly engaged in the production and placement of the FCCF. This shall include the completion of foamed cellular concrete fills having a minimum of 1000 total cubic yards in the past 4 years. Furthermore, the material shall have been successfully applied on at least three FCCF projects, which have performed satisfactorily for at least 3 years.
2. The FCCF installer foreman shall have a minimum of 2 years of experience in this type of work and shall have worked on at least one of the three successful FCCF projects presented.
3. The FCCF installer shall employ adequate number of skilled workers who are thoroughly trained and experienced in the necessary craft and who are familiar with the specified requirements and the methods needed to assure proper performance of this work.

B. Placement.

1. The placement of the FCCF shall be coordinated with the placement of EPS block fill and Class 10 earthwork fill.
2. FCCF shall be a homogeneous mixture, and all material shall be approved prior to use.
3. Subgrade shall be prepared in accordance with Section 2109 of the standard Specifications, where FCCF is placed against natural ground.
4. The prepared surface shall be clean and free of foreign material, ponded water, and frost.
5. The FCCF will be placed at locations designated on the plans and in accordance with the foaming agent manufacturer's recommendations.
6. FCCF shall only be proportioned, mixed, and placed using equipment approved by the foaming agent manufacturer as indicated in the accepted FCCF QC and placement plan. Once mixed, the FCCF shall be conveyed promptly to the location of placement without excessing handling.
7. The discharge hose length shall not exceed lengths recommended by the foaming agent manufacturer.
8. Care should be taken to ensure leveled filling through the specified fill area. Uneven filling is not permitted.

9. During construction, the surface of intermediate FCCF lifts should be kept relatively horizontal, while only the top lift shall be sloped to grade.
10. FCCF shall be placed in lifts not exceeding 48 inches in depth. Limit the area of FCCF placement to the volume that can be placed within 1 hour, up to the maximum lift height of 48 inches. Stagger placements such that vertical joints, if any, are at least 10 feet apart. FCCF shall be placed in one lift from the bottom of the girder to the bottom of the bridge deck.
11. Allow a minimum of 24 hours between subsequent lifts. Prior to verification of the minimum specified unconfined compressive strength by testing, additional FCCF lifts may be placed after the 24 hour minimum at the Contractor's risk. Any material that does not meet the minimum specified strength within 28 days shall be removed and replaced by the Contractor at no additional cost to the Engineer.
12. Material shall be protected before, during and after installation, and the FCCF installer shall protect the work and materials of other trades. In the event of damage, immediately make replacements and repairs to the acceptance of the Engineer, at no additional cost to the Contracting Authority.
13. FCCF shall not be placed on any surface containing frost or frozen material, or when the ambient temperature is below 32°F or is expected to fall below 32°F in less than 24 hours, unless precautions are taken to maintain temperatures above freezing. Any FCCF that is damaged by freezing shall be removed and replaced at no additional cost to the Engineer.
14. When ambient temperature is above 100°F or in windy conditions, precautions shall be by the FCCF installer to minimize moisture loss though excessive surface evaporation due to a combination of ambient temperature, relative humidity, FCCF placement temperature and wind.
15. FCCF shall not be placed while it is raining and / or in wet conditions.
16. Cure FCCF in accordance with the accepted QC and placement plan.
17. The final surface elevation of the FCCF shall be within a tolerance of 0.1 foot of the elevations shown on the plans and shall be sloped to promote drainage if indicated on the plans.
18. Heavy construction equipment, or other unusual loading of the FCCF shall not be permitted until FCCF has attained the specified 28 day unconfined compressive strength.
19. Excavations or sawing of the FCCF for utilities, drains or other conflicts shall be by methods approved by the Engineer.
20. Any FCCF that does not comply with the minimum specified criteria shall be removed and replaced at no additional cost to the Contracting Authority.

230384.04 METHOD OF MEASUREMENT.

Measurement for Foamed Cellular Concrete Fill, in cubic yards, will be the quantity shown in the plans.

230384.05 BASIS OF PAYMENT.

The Contractor shall be paid the contract unit price per cubic yard for Foamed Cellular Concrete Fill. This payment shall be full compensation for design submittal preparation, material testing, material transportation, mixing, placing and incidentals needed to complete the work. Incidentals include forming, temporary shoring, ground or surface water control, bridge deck coring and coordination with earthwork and geofoam contractors.