



**SPECIAL PROVISIONS
FOR
FOAMED CELLULAR CONCRETE FILL**

**Cass County
IMN-080-1(495)53--0E-15**

**Effective Date
June 17, 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.

230321.01 DESCRIPTION.

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

230321.02 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 30 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.
 - g.** Written evidence that producer/ supplier is certified and approved by the foaming agent manufacturer.

- h. Written evidence that FCCF installer is certified and approved by the foaming agent manufacturer.
 - i. Detailed FCCF placement layout with placement sequence and curing procedures. This will include a thermal control plan in order to meet the temperature requirements of the specification.
 - j. Correlation between wet density measured in accordance with ASTM C138 and the dry density measured in accordance with ASTM C495 for the mix design submitted.
2. At least 6 weeks prior to placement, and in the presence of the Engineer, a Trial Batch will 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.
 3. 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 C495, to verify the submitted test results and validate the FCCF installer's testing procedures and quality of the furnished product.

B. Materials.

Materials used for the 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, 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. The foaming agent from the selected foaming agent manufacturer shall conform to ASTM C869 and ASTM C796, and shall produce a FCCF material that complies with the specification in Table 1.

Table 1. Foamed Cellular Concrete Fill Properties

PROPERTY	REQUIREMENTS	TEST METHOD
Cast Density	Maximum 30 pcf	ASTM C495, except that samples shall not be oven dried at anytime before testing.
Minimum Unconfined Compressive Strength at 28 days	Minimum 100 psi	ASTM C495

230321.03 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 Class 10 earthwork fill.
2. Prior to placement of FCCF, the subdrains shall be installed at the locations shown in plans in accordance with DR-301, Type 4 Installation, with DR-306 type outlets. The subdrain trench shall be encapsulated in engineering fabric the entire length according to Section 4196.01, B.2 of the Standard Specifications.
3. FCCF shall be a homogeneous mixture, and all material shall be approved prior to use.
4. Subgrade shall be prepared in accordance with Section 2109 of the Standard Specifications, where FCCF is placed against natural ground.
5. The prepared surface shall be clean and free of foreign material, ponded water, and frost.
6. The FCCF will be placed at locations designated on the plans and in accordance with the foaming agent manufacturer's recommendations.
7. 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. The FCCF shall be mixed onsite prior to placement.
8. The discharge hose length shall not exceed lengths recommended by the foaming agent manufacturer.
9. Care should be taken to ensure levelled filling through the specified fill area. Uneven filling is not permitted.
10. During construction, the surface of intermediate FCCF lifts should be kept relatively horizontal, while only the top lift shall be sloped to grade.
11. FCCF shall be placed in lifts not exceeding 48 inches in depth or to the maximum depth indicated by the thermal control plan. Limit the area of FCCF placement to the volume that can be placed within 1 hour. Stagger placements such that vertical joints, if any, are at least 10 feet apart.
12. 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 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.

13. 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 Engineer.
14. FCCF shall not be placed on any surface containing frost or frozen material, or when the ambient temperature is below 32 degrees Fahrenheit or is expected to fall below 32 degrees Fahrenheit 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.
15. When ambient temperature is above 100 degrees Fahrenheit or in windy conditions, precautions shall be by the FCCF installer to minimize moisture loss through excessive surface evaporation due to a combination of ambient temperature, relative humidity, FCCF placement temperature and wind.
16. FCCF shall not be placed while raining and or wet conditions.
17. Cure FCCF in accordance with the accepted QC and placement plan.
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. 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.
21. Any FCCF that does not comply with the minimum specified criteria shall be removed and replaced at no additional cost to the Engineer.
22. The temperature of the curing FCCF shall not exceed 160 degrees Fahrenheit, and the maximum temperature differential shall not exceed 35 degrees Fahrenheit, unless the thermal control plan provides enough information that this values can be increased.

C. Testing to be completed by the contractor

1. The contractor shall measure the Density per ASTM C138 during the placement of the first batch each day of operation and repeat as adjustments to the foam are conducted until the target unit weight is achieved.
2. In accordance with ASTM C495, retrieve a sample from production and cast one set (Six test specimens) for each 300 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. When casting sample for compressive strength, density tests per ASTM C138 shall also be conducted and recorded on the same sample.
3. Test one cylinder at 7 days of age and three cylinders at 28 days of age in accordance with ASTM C495.

4. Test 2 cylinders for Oven dry density at 28 days of age in accordance ASTM C495.

230321.04 METHOD OF MEASUREMENT.

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

230321.05 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, perforated subdrains, porous backfill, engineering fabric and coordination with earthwork contractors.