

SECTION 00444 - LOW DENSITY CELLULAR CONCRETE

(Follow all instructions and make all edits with "Track Changes" turned on. This Section is not published in the Oregon Standard. If there are no instructions [purple text] above a subsection, paragraph, sentence, or bullet, then include it in the Project, unless the item(s) that are included in the subsection, paragraph, sentence, or bullet are not required on the Project and then they should be deleted. In general do not re-number or re-letter subsections when item(s) are deleted. Delete all purple text before preparing the final document. All other modifications to this Section will require ODOT Technical Resource and State Specifications Engineer approval.)

Section 00444 is not a Standard Specification and is included in this Project by Special Provision.

Description

00444.00 Scope - This Work consists of furnishing, placing, and testing Low Density Cellular Concrete at the locations shown.

00444.01 Abbreviations and Definitions:

(a) Abbreviations:

LDCC - Low Density Cellular Concrete
SCM - Supplementary Cementitious Materials
SSD - Saturated Surface Dry
w/cm Ratio - Water-Cementitious Material Ratio

(b) Definitions:

Low Density Cellular Concrete - Concrete made with hydraulic cement, water, and foaming agents, and may include fly ash, chemical admixtures, and other Materials. LDCC is flowable at the time of placement and has a maximum cast density of 50 pounds per cubic foot.

00444.04 Required Submittals - Submit the following information for each LDCC mix design at least 21 Calendar Days before beginning LDCC placement:

(a) LDCC Placement Plan - Include the following:

- LDCC installation sequence, including production rates, hose or pipe lengths and sizes, depths of lifts, temporary bulkhead locations, and other relevant details
- If the depth of any lift exceeds 2 feet, a written letter of certification from the foaming agent manufacturer stating that the depth of lift may be increased to the maximum

depth of lift used. According to 00444.40(d), do not exceed 4 feet of depth for a single lift.

- Confinement methods required to contain concrete Materials, debris, and other products from contacting sensitive environmental areas, according to Section 00290 and applicable regulatory permits
- A list of proposed mixing and pumping Equipment to be used on the Project and setup locations
- Maximum length of piping run used on a completed project using similar Equipment
- Form types and locations for LDCC installation

(b) LDCC Mix Design - Include the following for each LDCC mix design:

(1) Supplier Information - Supplier's unique mix design identification number and batch plant location

(2) Foaming Agent Manufacturer's Certification - Written certification from foaming agent manufacturer indicating approval of mix design constituents

(3) Proportions:

- Weight per cubic yard (pounds per cubic yard) of cement, SCM, mix water, and chemical admixtures
- Absolute volumes of cement, SCM, mix water, air content, and chemical admixtures
- Dosage rates for chemical admixtures (ounces per cubic yard)
- w/cm Ratio including all chemical admixtures

(4) Cement - For each cement used, provide the following:

- Manufacturer
- Brand name
- Type
- QPL Product number
- Source or location plant

(5) SCM - For each SCM used, provide the following:

- Manufacturer
- Brand name
- Source
- QPL Product number
- Class

(6) Chemical Admixtures - For each admixture used, provide the following:

- Manufacturer

- Brand name
- QPL Product number

(7) Water - Identify the source of water to be used and provide a certificate of compliance certifying that the water meets the requirements of 02020.10.

(8) Trial Batch Compressive Strength Test Results - Report the individual test results and the ASTV of cylinders from the trial batch for new mix designs. For current designs, provide the individual tests and the average of the cylinder sets presented for evaluation.

(c) Personnel:

- **Quality Control Personnel** - Provide the name and certification number of the CCT who prepared the mix design, the QCT who cast the test cylinders, the laboratory where the cylinders were tested, and the CSTT who tested the cylinders.
- **LDCC Personnel Qualifications** - Provide a list identifying the on-site supervisors and mixing operators assigned to the Project, and their relevant experience. Provide on-site supervisors that have at least 2 years' experience directly supervising the placement of LDCC, with responsibility for on-site construction operations. Provide mixing operators that have at least 1 years' experience in the use of LDCC.
- **LDCC Contractor Experience** - Submit a project reference list of at least 3 separate LDCC projects similar in scope and scale to the Project, successfully completed in the last 5 years', involving placement of LDCC in quantities roughly equivalent with the quantities for this Project. For each project listed, include a brief description of each project and the owner's contact person's name and current phone number.

The Engineer will respond to the LDCC submittals within 21 Calendar Days after receipt of all information. Provide any additional information and submit a revised plan, if requested, for approval. All procedural approvals given by the Engineer are subject to trial in the field and will not relieve the Contractor of the responsibility to satisfactorily complete the work. Submit request for modification of approved procedures to the Engineer and allow 21 Calendar Days for approval of modifications. Do not begin LDCC placement until all submittals have been approved.

Materials

00444.10 Materials - Furnish Materials meeting the following requirements:

Chemical Admixtures	02040
Portland Cement	02010
Supplementary Cementitious Materials.....	02030
Water.....	02020

00444.11 Chemical Admixtures - When required by mix design, furnish chemical admixtures for accelerating, water reducing, and other specific properties may be used when approved by the foaming agent manufacturer.

00444.12 Portland Cement - When required by mix design, furnish portland cement that has been approved by the foaming agent manufacturer.

00444.13 Supplementary Cementitious Materials - When required by mix design, furnish SCM that have been approved by the foaming agent manufacturer.

00444.14 Foaming Agent - Furnish, use, and test foaming agent according to ASTM C869 and ASTM C796.

00444.15 Properties of LDCC - Furnish a mixture with uniform composition and consistency, that will produce the properties shown below, at point of placement, according to the LDCC Class shown:

Table 00444-1

	Class				
	I	II	III	IV	V
Maximum Cast Density (pcf)	24	30	36	42	50
Minimum Compressive Strength at 28 Days (psi)	10	40	80	120	160

00444.16 Quality Control - Maintain quality control according to Section 00165 and this Section.

Labor

00444.30 Personnel Qualifications - Provide on-site supervisors and mixing operators who meet the experience requirements of 00444.04(c).

Provide technicians having CSTT and QCT technical certifications.

Construction

00444.40 Installation - Place the Material according to the Specifications and the foaming agent manufacturer's recommendations.

(a) Placement Conditions - Do not place LDCC when the ambient temperature is lower than 35 °F or when the ambient temperature is expected to be less than 35 °F within 24 hours of placement.

Do not place LDCC when the ambient temperature is higher than 95 °F or is expected to be higher than 95 °F within 24 hours of placement.

Do not place LDCC when it is actively raining. If precipitation occurs during the placement, cover the LDCC with plastic sheeting or other approved methods.

(b) Mixing - Mix LDCC according to the foaming agent manufacturer's specification. Do not mix LDCC in excess of the foaming agent manufacturer's recommendations.

(c) Pre-placement Inspection - Inspect the area and remove all deleterious Material and standing water. Remove crushed or broken LDCC from prior lifts as directed. Ensure that bulkheads are strong enough to retain the LDCC during placement. Tie down or otherwise secure Material that is covered with LDCC to ensure that it remains in place within the LDCC and does not float.

(d) Placing - Avoid excessive handling of the LDCC. Unless otherwise shown, place LDCC in lifts not to exceed 4 feet in depth with the final surface elevation within 0.1 foot of the elevation shown.

Do not drive on or place loads on the LDCC until the LDCC has attained the minimum compressive strength shown in Table 00444-1 or 20 psi, whichever is less.

Remove and replace, at no cost to the Agency, Material that does not conform to the Specifications.

00444.41 Water Removal System - . Provide a water removal system that remains in operation until the final LDCC lift has been placed and accepted and ensure that no flowing or standing water comes into contact with the LDCC.

00444.42 Quality Control Testing - During placement of the LDCC, perform hourly wet-cast density tests and adjust the mix as necessary to maintain the specified cast density.

At 2-hour intervals, take cylinder specimens for compressive strength testing. Test compressive cylinder specimens according to ASTM C495.

LDCC not meeting the requirements of 00444.15 is rejected.

Provide the Engineer with daily reports, including cast density reports, within 24 hours of sampling. Provide the Engineer with a final report detailing compression testing and cast density results. Submit final report within 30 Calendar Days after the last LDCC placement.

(Use only one of the following options as instructed below. Delete the option that does not apply.)

[Option 1 - Use the following subsections .80 and .90 when LDCC will be measured on the lump sum basis.]

Measurement

00444.80 Measurement - No measurement of quantities will be made for Work performed under this Section.

The estimated quantities of Low Density Cellular Concrete are:

(List the estimated quantities of LDCC.)

Type and Class

Quantity (Cu. Yd.)

Payment

00444.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract lump sum amount for the item "Low Density Cellular Concrete, Class _____".

[Option 2 - Use the following subsections .80 and .90 when LDCC will be measured on the volume basis.]

Measurement

00444.80 Measurement - LDCC will be measured on the volume basis. Measurement will be limited to the Neat Lines shown or directed.

Payment

00444.90 Payment - The accepted quantities of Low Density Cellular Concrete will be paid for at the Contract unit price, per cubic yard, for the item "Low Density Cellular Concrete, Class _____".

The class of the LDCC is inserted in the blank.

Payment will be payment in full for furnishing and placing all Materials, and for providing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

No separate or additional payment will be made for:

- Required submittals, testing, or test reports
- Curing, joint filler, admixtures and other similar items
- Additional LDCC placed outside the Neat Lines shown