

SECTION 00535 - POST-INSTALLED ANCHOR SYSTEMS

(Follow all instructions and make all edits with “Track Changes” turned on. If there are no instructions [purple text] above a subsection, paragraph, sentence, or bullet, then include it in the Project. 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.)

Comply with Section 00535 of the Standard Specifications modified as follows:

00535.00 Scope - Replace this subsection, except for the subsection number and title, with the following:

This Work consists of drilling and preparing holes in hardened concrete and providing and installing anchor bolts, rods, or reinforcing bars using a resin bonded anchor system or a mechanical anchor system as shown.

00535.01 Required Submittals - Replace the title of this subsection with “**Submittals**”

Add the following to the end of the subsection:

Submit the anchor system manufacturer's installation instructions at least 21 Calendar Days before installation.

00535.10(a) Resin Bonded Anchor System - Replace the paragraph that begins “Furnish anchor bolts meeting ...” with the following paragraph:

Furnish anchor bolts and rods meeting the requirements of 02560.30 and reinforcing steel meeting the requirements of Section 02510 as shown. High-strength anchor bolts meeting the requirements of ASTM A193, Grade B7 may be substituted in place of these specified in 02560.30(b).

Replace the paragraph that begins “Furnish a polyester ...” with the following paragraph:

Furnish a polyester, vinyl ester, or epoxy resin bonding system from the QPL that sustains the minimum pullout force shown. Furnish resin used for installation of the anchor system as shown from the same lot used for testing according to 00535.45(a)(1).

Replace the paragraph that begins “Unless shown otherwise, galvanize all ...” with the following paragraph:

Unless shown otherwise, galvanize all anchors that have any portion of the anchor exposed. Galvanize according to AASHTO M 232 (ASTM A153) or AASHTO M 298 (ASTM B695), Class 50. When within 25 aerial miles of the Pacific Ocean, galvanize according to

AASHTO M 232 (ASTM A153) only. Anchors that become completely encased in concrete will not require galvanizing.

00535.10(b) Mechanical Anchor System - Replace this subsection, except for the subsection number and title, with the following:

Furnish a mechanical anchor system from the QPL that sustains the minimum pullout force and is not longer than the embedment depth shown. Furnish anchors used for installation from the same lot used for testing according to 00535.45(a)(2). Unless shown otherwise, furnish galvanized mechanical anchors according to AASHTO M 232 (ASTM A153).

00535.40 Construction - Replace the paragraph that begins "Install the anchor system according ..." with the following paragraph:

Install the anchor system according to the manufacturer's installation instructions and to the embedment depths shown.

00535.40(a) General - Replace the paragraph that begins "Clean holes with a nonmetallic..." with the following paragraph:

Drill and clean holes according to the manufacturer's installation instructions. Protect drilled and cleaned holes from contamination. If a drilled hole becomes contaminated, as determined by the Engineer, re-clean the hole.

Replace the paragraph that begins "Provide components connected ..." with the following paragraph:

Furnish components connected to the installed anchors with the same metal type or provide electrical isolation when metal type of the components is dissimilar or unknown.

00535.40(b) Resin Bonded Anchor System - Replace the paragraph that begins "For resin bonded anchor system ..." with the following paragraph:

For resin bonded anchor system with anchor and nuts, after the resin is fully cured, mark the position of the nut with a felt tip pen or similar marker. Rotate the nut of each anchor past snug-tight by no more than 1/6 turn, unless shown otherwise, to avoid unintended damage.

00535.45(a)(1) Resin Bonded Anchor System - Replace Table 00535-1 with the following table.

TABLE 00535-1

<u>Minimum Pullout Force</u>							
<u>Anchor Bolts or Rods</u>				<u>Rebar</u>			
	<u>Grade 36</u>	<u>Grade 55</u>	<u>Grade 105</u>			<u>Grade 60</u>	
<u>Dia. (inch)</u>	<u>Force (Pounds)</u>			<u>Embed Depth (inch)*</u>	<u>Size</u>	<u>Force (Pounds)</u>	<u>Embed. Depth (inch)*</u>

<u>1/2</u>	<u>7,400</u>	<u>9,700</u>	<u>15,300</u>	<u>4.50</u>	<u>3</u>	<u>7,900</u>	<u>3.25</u>
<u>5/8</u>	<u>11,700</u>	<u>16,900</u>	<u>24,300</u>	<u>6.00</u>	<u>4</u>	<u>14,400</u>	<u>5.25</u>
<u>3/4</u>	<u>17,300</u>	<u>22,500</u>	<u>36,000</u>	<u>7.50</u>	<u>5</u>	<u>22,300</u>	<u>6.50</u>
<u>7/8</u>	<u>24,000</u>	<u>31,200</u>	<u>49,900</u>	<u>9.25</u>	<u>6</u>	<u>31,700</u>	<u>7.50</u>
<u>1</u>	<u>31,700</u>	<u>40,900</u>	<u>65,400</u>	<u>11.00</u>	<u>7</u>	<u>43,800</u>	<u>8.75</u>
					<u>8</u>	<u>56,700</u>	<u>10.25</u>

*± 1/8 inch

Add the following subsection:

00535.45(c) Anchor Test Summary - Test the installed anchors according to Table 00535-2 and Section 00165.

(Fill in anchor information and test requirements. At minimum, consider specifying a demonstration test to confirm epoxy resin lot quality and for Contractor to practice anchor installation. Add or delete rows in the table as necessary to list all applicable anchor systems.)

Table 00535-2

Str. #	Sheet #	Anchor System (Mech/Resin)	Anchor Type (bolt/ <u>rod</u> rebar)	Anchor Size	Anchor Grade	Anchor Sustained Tension (yes/no)	Demo. Test (yes/no)	Prod. Test (yes/no)

Replace anchors that fail at no additional cost to the Agency.

00535.45 Testing - Replace the paragraph that begins “Do not incorporate demonstration ...” with the following paragraph:

Do not incorporate demonstration test anchors into the Work. Do not begin installing the anchor system until the installation process is approved. Test results with the average load meeting or exceeding the minimum pullout force are acceptable. If any test anchor has a capacity less than 95 percent of the minimum pullout force, the anchor lot is rejected.

00535.45(a) Demonstration Tests - Replace the paragraph that begins “Install three test anchors ...” with the following paragraph:

Install three test anchors using the same Materials and methods that is used for installing the anchor system. One demonstration test includes 3 test anchors.

00535.45(b) Production Tests - Replace the paragraph that begins “Use anchors from the same ...” with the following paragraph:

Use anchors from the same lot used for the demonstration tests. Perform production tests during installation of the anchor system, after the installation is finished, and for the resin bonded anchor system the resin has cured according to the manufacturer's

recommendations. One production test includes 1 test anchor. Maintain the test load at the required load level for a minimum of 10 seconds. Measurable displacement is a failure. If the Engineer suspects improper installations, more testing may be required.