SECTION 00552 - PRECAST REINFORCED CONCRETE MEMBERS

(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 [orange 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 orange text before preparing the final document. All other modifications to this Section will require ODOT Technical Resource and State Specifications Engineer approval.)

Section 00552, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00552.00 Scope - This Work consists of the manufacture, storage, transportation and installation of precast reinforced concrete pile caps, wingwalls, Bridge approach slabs or other precast concrete members. Precast reinforced concrete members in this Specification will be referred to as "Members".

00552.02 Submittals - Essential elements of design and section dimensions for Members are as shown. Submit unstamped Working Drawings for all Members for approval according to 00150.35. Include lifting details, storage details, erection plan and bracing plan on the Working Drawings for all Members.

00552.03 Alternate Designs: Agency design specifications will be furnished by the Agency upon request. Do not incorporate alternate Materials or Members into the Work until the proposal is accepted by the Engineer. The Contractor may propose a different steel reinforcing system or different Member dimensions provided the following requirements are met:

- Before manufacturing the Members, submit stamped design calculations, Working Drawings and specifications according to 00150.35.
- With the calculations, show that the Member meets all applicable limit states used for the Agency design.
- Member dimensions are not increased by more than 1 inch. Where overall depth is increased, verify that the required minimum vertical Roadway clearance is maintained.
- Structural changes required to accommodate an approved alternate system or section are made at no additional cost to the Agency.

00552.04 Member Tolerances - Fabricate Members to the dimensional tolerances in the *PCI Manual for Quality Control for Plants and Production of Structural Precast Concrete Products*. Acceptance or rejection of Members outside these tolerances will depend on how the Structure's strength, rideability and appearance are affected.

Materials

00552.11 Materials - Furnish Materials meeting the following requirements:

Concrete Coating	02210
Concrete	02001
Curing Materials	02050
Deformed Bar Reinforcement	02510.10
Epoxy Coated Reinforcement	02510.11
Mechanical Splices	02510.20
High-Strength Anchor Bolts or Rods	02560.30
Corrugated Metal Pipe	02420.10
Portland Cement Concrete Repair Material	02015
Structural Grout	02080.60

00552.12 Acceptance of Concrete - Acceptance of concrete is according to Section 00165 and the following:

(a) Aggregate - Acceptance of Aggregate is based on the Contractor's quality control testing, if verified, according to Section 00165.

(b) Plastic Concrete - Acceptance of plastic concrete is based on tests performed by the QCT, according to Section 02001.

(c) Hardened Concrete:

(1) General - Acceptance of hardened concrete is based on analysis of compressive strength test results of cylinders cast and cured by the Contractor and tested according to AASHTO T 22 by a CSTT at an ODOT certified laboratory and verified according to Section 00165.

(2) Sampling and Testing - Obtain a sample from a delivery vehicle, selected at random, during placement in each bed. Test the sample for temperature, slump, density and air content and cast at least three cylinders for testing at 28 Days. Cure the cylinders in a manner similar to the Members they represent. Alternately, the cylinders may be cured in a curing chamber correlated in temperature with the concrete in the beds. Leave the cylinders in the bed with the Member or in the curing chamber until the Member is stripped. After the Member is stripped, place the acceptance cylinders in storage in a moist condition according to AASHTO T 23.

(3) Actual Strength Test Value - The ASTV at 28 Days is the average compressive strength of the three cylinders tested.

Discard all specimens that show definite evidence of improper sampling, molding, handling, curing, or testing, except low strength. The average strength of the remaining cylinders are then considered the test result.

(4) Acceptance - Hardened concrete Members with an ASTV meeting or exceeding the specified design strength, $f'c$, are acceptable for strength.

If the ASTV is less than $f'c$ but at least 85 percent of $f'c$, the Engineer may review the results to determine if the Member is suitable for the intended purpose. If suitable, the concrete represented by an ASTV less than $f'c$ may be accepted subject to a price adjustment according to 00150.25.

Concrete that has an ASTV less than 85 percent of $f'c$ will not be accepted. All costs of removal, replacement, and all related Work are the Contractor's responsibility.

Equipment

00552.20 Vibrators - Provide either internal or external vibrators in working condition meeting the manufacturer's rating. When epoxy coated reinforcement is used, use internal vibrators fitted with a manufactured rubber head to minimize damage to the epoxy coating.

Construction

00552.40 Forming - Provide forms that are mortar-tight and sufficiently rigid to conform to the specified dimensions without appreciable distortion, warping or opening of joints. Before placing concrete in the forms, remove all dirt, sawdust, excess water and other foreign material. Tighten forms before depositing new concrete on or against hardened concrete. Provide a 3/4-inch chamfer on all exposed concrete edges unless otherwise shown.

00552.41 - Placing Reinforcement - Place reinforcement according to the Plans, Section 00530, and these Specifications.

00552.42 Placing Concrete:

(a) General - Place concrete so that the finished Members are uniform and monolithic, free from cold joints.

Do not deposit concrete in the forms until the Engineer has inspected and approved the placement of reinforcement, conduit, and other embedded items.

In preparation for placing concrete, prepare forms according to 00552.40. Remove struts, stays and braces serving temporarily to hold the forms in correct shape and alignment before the placing of concrete or when the concrete placing has reached an elevation rendering them unnecessary. Remove these temporary members entirely from the forms and do not bury them in the concrete.

Place concrete to its final position, without segregation of materials or displacement of the reinforcement.

(b) Consolidation - Consolidate concrete, during and immediately after placing, by mechanical vibration as follows:

- Operate vibrators at frequencies that produce consolidated placements.
- Do not use vibration for shifting concrete to the extent of causing segregation.
- Vibrate at points uniformly spaced and not further than twice the radius over which vibration is visibly effective.

- Continue vibration until the concrete is thoroughly consolidated, but not until segregation occurs or localized areas of grout form.

00552.43 Hot or Cold Weather - Produce and place concrete within the temperature range specified in 02001.20(d). When the air temperature is, or is expected to be, below 40 °F or above 100 °F, observe the following precautions:

- Do not place concrete in forms, on reinforcing steel or on appurtenances when the surface temperature of these facilities is below 40 °F. Provide heat to maintain their temperature at 40 °F minimum.
- Do not place concrete when the surface temperature of forms or reinforcing steel is 100 °F or more.

00552.44 Top Surface Finish - After the concrete is placed and consolidated, strike the concrete to grade and Cross Section shown and float it to produce a uniform surface. Before initial set of the surface concrete and the concrete has hardened sufficiently, provide a surface finish on the top surface as shown or specified.

(a) General Members - Provide a broom finish on top of Members.

(b) Members with Cast-in-place Deck - Provide a rake finish on top of Members. Texture it with a 1/8 inch wide steel-tined rake tool that will mark the finished concrete to a depth of 1/8 inch to 3/16 inch. Space the markings 3/4 inch on centers. Do not overlap the texturing. Produce the texture transverse to the Roadway centerline and full Member width.

(c) Members with ACP Wearing Surface - Provide a broom finish on top of Members.

00552.45 Curing Concrete:

(a) General Requirements - Cure Members with water, wet burlap, curing compound or other approved methods. Begin curing as soon as possible without damaging the freshly placed concrete. Continue curing for a minimum of 7 Calendar Days after placement.

Keep surfaces not covered by waterproof forms damp by applying water with a fog nozzle until the surface has set sufficiently to allow sprinkling with water or covering with wet burlap and plastic.

Do not interrupt curing for more than one hour during cure period.

(b) Additional Cure Time - If, during the cure time period, the surrounding temperature falls below 45 °F, extend the cure for the number of hours the temperature is below 45 °F.

00552.46 Surface Finish Other Than Top Surface - Provide a surface finish as shown or specified.

Where no finish is shown or specified, provide a general surface finish to concrete surfaces.

For concrete surfaces receiving a Class 1 or Class 2 surface finish, finish the surfaces when the Member is in its final position and finish to a point 1 foot below the finished ground line.

(a) General Surface Finish - Apply a general surface finish as a final finish or preparatory to a higher class finish.

Remove all metal form bolts, snap ties and any other metal to a depth of 1 inch below the finished concrete surface. Repair air pockets over 1/2 inch in depth, all form tie removals, rock pockets and unsound concrete, and fill resulting holes or depressions with concrete or a PCC repair Material from the QPL. On exposed surfaces, correct all bulges, fins, depressions, repairs, stains or discolorations to produce a smooth surface with uniform texture, lines, and appearance.

The Engineer will determine the extent of required repairs.

(b) Class 1 Surface Finish (Ground, Sacked, and Coated) - After completion of the general surface finish, grind the surface with a power grinder or an equivalent method to remove laitance and surface film. Sack the surface to fill all holes using a paste of fine mortar sand, cement, water, and bonding agent. The ratio of bonding agent to water is one part bonding agent to two parts water, or as recommended by the manufacturer. Apply coating according to 00540.53(d).

(c) Class 2 Surface Finish (Ground, Floated and Coated or Uncoated) - After completion of the general finish, grind the surface with a power grinder or an equivalent method to remove laitance and surface film. Float the surface with a rubber or sponge float, using a paste of fine mortar sand, cement, water, and bonding agent to fill air holes or voids and to bring the surface to a uniform texture. Keep the textured surface damp a minimum of 12 hours or until the paste has set, whichever is longer. If dusting occurs after the retextured surface sets and is rubbed, refinish the surface.

00552.47 Surface Preparation for Members with Overlay or Membrane - Prepare top surface of Members according to Section 00504, not less than 28 Calendar Days after casting.

00552.48 Exposed Reinforcement - After a Member is removed from the form, clean any projecting reinforcement of dirt, oil, grease, rust and corrosives and protect it from damage until concrete is cast around it.

00552.49 Lifting, Storing, Transporting, Erecting, and Bracing - Be responsible for the safety of precast Members during all stages of construction. Lifting, storage, transporting, erecting and bracing of Members is the sole responsibility of the Contractor subject to the following requirements:

(a) Lifting:

- Lift Members so as to prevent damage.
- Lift Members at the support points specified by the manufacturer.
- Lift Members in a manner that does not cause damaging bending or torsional forces.
- Members will be rejected if not handled as specified.

(b) Storing - Store Members with support points that are level transversely.

(c) Transporting - Transport Members from the casting yard not less than 7 Calendar Days after casting, not less than 7 Calendar Days after all concrete patching and repairing is complete and after 28-Day compressive strengths have been achieved.

Damaged Members will be rejected. Replace damaged Members, or if allowed by the Engineer, repair damaged Members to the Engineer's satisfaction at no additional cost to the Agency.

(d) Erecting and Bracing - After a Member has been erected and until it is secured to the Structure, provide temporary bracing as necessary to resist wind or other loads.

00552.50 Precast Member Connections - Provide connections between Members as shown and specified.

(a) Closure Pour - Provide exposed Aggregate finish up to a 1/4" amplitude at Member interfaces that are in contact with the closure pour Material by using surface retarders from the QPL or other methods approved by the Engineer. Visually verify the surface profile of all prepared surfaces according to *International Concrete Repair Institute (ICRI) Guideline 310.2R-2013 Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair - surface profile CSP 7*.

Provide necessary forms and seal the closure pour space. Wet Member interfaces for a minimum of 8 hours and to a saturated surface dry condition immediately before placing the closure pour Material. Ensure that the surfaces are free of contaminants. Blow out with compressed air any standing water in depressions, holes or low area.

(b) Welding - Perform structural steel welding according to 00560.26(b).

(c) Bolting - After Members are set as shown, mark the position of the nut with a permanent felt tip pen or similar marker. Rotate the nut of each anchor bolt past snug-tight by no more than 1/6 turn, unless shown otherwise.

(d) Mechanical Splice - Use mechanical splice from the QPL. Install mechanical splice in Members and make connection between the Members as shown and according to the manufacturer's recommendation.

(Use the following subsection .51, when pile cap socket connection is required.)

00552.51 Pile Cap Socket Connections - Ensure that surface inside pile cap sockets is free of contaminants. After precast pile caps are erected in place as shown and the bottom of sockets are sealed, fill the sockets with the Material as shown and specified. Allow the Material to flow from the vents until water or entrapped air is removed.

Measurement

00552.80 Measurement - The quantities of Work performed under this Section will be measured according to the following:

Length Basis - The quantities will be the theoretical horizontal length shown for each Member, added together to calculate a total length for each Member type and size.

Area Basis - The quantities of precast approach slabs will be determined by calculating the theoretical top surface area of the Members based on the dimensions shown. The quantities of precast wingwalls will be determined by calculating the theoretical wall face area projected onto a vertical plane along one side of the precast wingwalls based on the dimensions shown.

Field measurement of Member dimensions will not be made.

Payment

00552.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) _____Precast Pile Cap	Foot
(b) Precast Bridge Approach Slab	Square Yard
(c) Precast Wingwalls	Square Foot

In item (a), the pile cap height and width will be inserted in the blank.

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

No separate or additional payment will be made for:

- reinforcement, anchorages, corrugated metal pipe, plates, nuts, mechanical splices, and all other material contained within and extending from the Member
- furnishing and placing sand leveling courses
- furnishing, transporting, and placing Members
- furnishing and placing anchor bolts, dowels, and threaded rods where applicable
- furnishing and grouting bolt blockouts, voids, and socket connections
- providing surface finish on Members
- plant assembly, fit-up and corrective work