APPENDIX A

SPECIAL PROVISIONS
FOR TRAFFIC SIGNAL CONSTRUCTION

NW GIBSON HILL RD AT
NW CROCKER LN
TRAFFIC SIGNAL

CITY OF ALBANY, OREGON

SPECIAL PROVISIONS

WORK TO BE DONE

The Work to be done under this Contract and subject to the Traffic Signal Specifications consists of the following on NW Gibson Hill Rd in the City of Albany:

1. Construct new traffic signal at the intersection of NW Gibson Hill Rd and NW Crocker Ln.
2. Perform additional and incidental Work as called for by the Specifications and Plans relating to the proposed traffic signal.

APPLICABLE SPECIFICATIONS

The Specifications that are applicable to the Work on this Project are the 2018 edition of the "Oregon Standard Specifications for Construction", except as specified herein for traffic signal poles.

All number references in these Special Provisions shall be understood to refer to the Sections and subsections of the Standard Specifications and Supplemental Specifications bearing like numbers and to Sections and subsections contained in these Special Provisions in their entirety.

APPLICABLE STANDARD DRAWINGS

The Standard Drawings that are applicable to the Work on this Project are the Oregon Standard Drawings with an effective date of "December 1, 2019 - May 31, 2020", except as specified herein for traffic signal poles.

CLASS OF PROJECT

This is a City of Albany project.

SECTION 00440 - COMMERCIAL GRADE CONCRETE

Comply with Section 00440 of the Standard Specifications modified as follows:

Add the following subsection:

00440.02 Abbreviations and Definitions:

ASTV – Actual Strength Test Value – See 02001.02 for definition.

00440.12 Properties of Commercial Grade Concrete - Replace the bullet that begins "Compressive strength…" with the following bullet:

- **Compressive Strength -** ASTV minimum of 3,000 psi at 28 days

00440.14(d) Hardened CGC - Add the following to the end of this subsection:

When large traffic signal pole foundations are poured on separate days, cast one set of cylinders for each pour.

The ASTV at 28 Days is the average compressive strength of the three cylinders tested. Discard all specimens that show definite evidence, other than low strength, of improper sampling, molding, handling, curing, or testing. The average strength of the remaining cylinders shall then be considered the test result.

00440.40(b) Placing – Add the following bulleted item:

- Place concrete according to 00540.48(a) through 00540.48(c) for sign supports, signal supports, and luminaire supports.

00440.40(c) Forms - Add the following paragraph:

For sign supports, signal supports, and luminaire supports, remove forms and perform subsequent loading according to Table 00540-1.

SECTION 00530 - STEEL REINFORCEMENT FOR CONCRETE

Comply with Section 00530 of the Standard Specifications.

SECTION 00905 - REMOVAL AND REINSTALLATION OF EXISTING SIGNS

Comply with Section 00905 of the Standard Specifications.

SECTION 00920 - SIGN SUPPORT FOOTINGS

Comply with Section 00920 of the Standard Specifications modified as follows:

00920.10 Materials – Delete all items on the list of materials and replace with:

V-Loc® Model 23 – VR3 (Soil).……City of Albany Standard Drawing No. 208
V-Loc® Model 23 – VR1 (Concrete).……City of Albany Standard Drawing No. 208

00920.90 Payment – Replace the Sentence that begins with: “The accepted quantities of Work performed under this Section will be paid for…” with the following:

The accepted quantities of Work performed under this Section will be paid for at the Contract lump sum amount for the item "Signs, in Place".

SECTION 00930 - METAL SIGN SUPPORTS

Comply with Section 00930 of the Standard Specifications modified as follows:

00930.40(e)(1) General – Add the following sentence to the end of the paragraph:

The installation will be rejected if the geometry does not satisfy the requirements of 02560.05.

00930.90 Payment – Replace the Sentence that begins with: “No separate or additional payment will be made for…” with the following:

The accepted quantities of Work performed under this Section will be paid for at the Contract lump sum amount for the item "Signs, in Place".

SECTION 00940 - SIGNS

Comply with Section 00940 of the Standard Specifications modified as follows:

00940.90 Payment -

Replace pay item(a), with the following pay item and remove Pay Items (b) – (f)

(a) Signs, in Place ……..Lump Sum

Replace the paragraph that begins “No separate or additional payment will be made…” with the following paragraph:

No separate or additional payment will be made for coating backs of aluminum substrate signs, sign supports, sign support footings or sign support installation hardware or fasteners.

SECTION 00960 - COMMON PROVISIONS FOR ELECTRICAL SYSTEMS

Comply with Section 00960 of the Standard Specifications modified as follows:

Comply with Section 00960 of the Standard Specifications modified as follows:

00960.01 Regulations, Standards, and Codes - Replace the paragraph that begins "Wherever reference is made…" with the following paragraph:

Use the code, order, or standard in effect on the date the Project is advertised unless otherwise shown.

Replace the paragraph that begins "Do not begin installations…" with the following paragraph:

Safe wiring labels normally required by the Department of Consumer and Business Services, Building Codes Division will not be required for traffic management systems listed on the Red Sheets (see 00160.00) as allowed by ORS 479.540 and OAR 918-261-0037. The Red Sheets may be viewed on ODOT's web site.

00960.02 Equipment List and Drawings - Replace this subsection with the following subsection:

00960.02 Equipment List and Drawing Submittals - Within 30 Calendar Days after execution of the Contract, submit two copies of the Blue Sheets (see 00160.00) and two copies of the Green Sheets (see 00160.00) according to 00150.37 for all materials the Contractor proposes to install. Blue Sheets and Green Sheets will be made available to the Contractor by the Engineer.

Fill out the Blue Sheets and Green Sheets based on the Project requirements. Check off all pre-approved items to be used on the Project. When proposing write-in items, check off the box under "Write-in items" and follow the instructions. Use the current version of the Blue Sheets and Green Sheets that is in effect on the date of Advertisement.

Within 14 Calendar Days after receipt of submittals, the Engineer will review the submittals and designate them in writing as "approved", "approved as noted", or "returned for correction". Do not proceed with the Work before receiving written approval of the submittals from the Engineer.

Add the following subsection:

00960.03 Permits – Provide the Engineer with copies of all required electrical permits prior to performing any work.

00960.10 Materials - Replace this subsection, except for the subsection number and title, with the following:

Furnish Materials meeting the following requirements:

Commercial Grade Concrete	00440
Controlled Low Strength Materials	00442
Delineators	00840.10 and 00840.11
Metal Illumination and Traffic Signal Supports	00962
Selected General Backfill	00330.13
Selected Granular Backfill	00330.14
Steel Reinforcement	00530

Furnish electrical Materials that have been approved through the Blue Sheet and Green Sheet submittal process in 00960.02.

Anchor rods shall conform to 02560.30 and to the types and sizes shown.

Use commercially available 30 pound nonperforated asphalt-saturated felt where shown.

Use commercially available No. 10 - 0 sand when sand blanket is required.

Use commercially available UL listed insulating vinyl plastic tape where shown.

Use commercially available UL listed silicon bronze (or copper alloy) split bolt where shown.

Use commercially available galvanized steel weatherproof compression fittings where

shown.

00960.41(c) Excavation for Conduit - Replace this subsection, except for the subsection number and title, with the following:

Excavate and backfill conduit as follows:

Minimum Cover from Finished Surface[1]

Type of Conduit	Roadway and Shoulders	Other Areas
Metal	30 inches	30 inches
Rigid Nonmetallic	30 inches	30 inches

[1]Use permit depths if greater than these.

Remove and replace sidewalks, curbs, paved surfaces, and other materials as needed. Replace and finish all surfaces to correspond with the existing surfaces. Restore all disturbed landscaping and underground systems to original condition.

Excavate trenches, foundations, and junction boxes to locations, Neat Lines, grades and Cross Sections as shown or as established or approved. Furnish, place, and remove any shoring required to prevent caving of walls.

Dispose of all excavated Materials according to 00290.20.

00960.41(g) Backfill - Replace the first paragraph with the following:

Use an approved sand blanket, granular backfill meeting the requirements of Section 00405.14, or controlled low-strength material (CLSM) meeting the requirements of Section 00442 as follows:

00960.41(g)(1)(c)(3) Other Areas - Replace this subsection, except for the subsection number and title, with the following:

Place granular backfill in layers not greater than 6 inches thick. The top 1 foot may be Class A backfill only when not under Structures.

Compact the backfill Material according to 00405.46(c)(2) to the top of the trench, surrounding ground level or upper limit of excavation as directed. The sand blanket requirement of 00960.41(g)(1)(a) and 00960.41(g)(1)(b) may be waived when approved by the Engineer.

00960.42 (a) General – Add the following:

Install a polyethylene pull line with 40 inches of slack tied off at each end of every conduit run.

00960.43 Foundations – Replace this subsection, except for the subsection number and title, with the following:

Construct foundations for pedestals, posts, and cabinets according to Section 00440 and the applicable portions of 00540.48(a). Place concrete:

- Directly against the sides of the excavation in undisturbed or well-compacted material or place in forms.
- With a continuous pour.
- To the elevation shown or directed.
- With conduit ends and anchor rods held securely in proper vertical position, to proper height, using a manufacturer's recommended template until the concrete sets.

Maintain rebar clearances during concrete pour.

Make no adjustments of anchor rods after concrete has set.

Set forms square and true to line and grade. Construct forms of rigid materials that remain in position until removed.

Remove forms and place subsequent loading according to Table 00540-1.

Finish tops of foundations to Roadway, sidewalk or curb grade, or as directed.

Finish exposed concrete foundations to present a smooth, neat appearance. Fill all holes.

00960.71 As-Built Plans - Upon completion of the traffic signal installation, submit a red-lined copy of the original Plans noting all changes made. The information furnished shall include all modifications made and shall represent the material installed and in operation. It shall be sufficiently detailed to enable maintenance forces to replace or repair any part of the Project under routine or emergency maintenance by direct reference.

SECTION 00962 - METAL ILLUMINATION AND TRAFFIC SIGNAL SUPPORTS

Comply with Section 00962 of the Standard Specifications modified as follows:

00962.05(a) Traffic Signal Mast Arm Supports - Add the following to the end of this subsection:

The following standard signal mast arm pole drawings are prequalified for use on the Project:

Valmont Industries Inc.	Drg. DB00631 sh 1, Rev. A, 2/4/03 Drg. DB00631 sh 2, Rev. A, 2/4/03 Drg. DB00631 sh 3, Rev. A, 2/4/03
Ameron Pole Products Division	Drg. OR1, Rev. B, 2/99 Drg. OR2, Rev. C, 2/99 Drg. OR3, Rev. B, 11/98 Drg. OR4, Rev. B, 7/98 Drg. OR5, Rev. C, 11/98 Drg. OR6, Rev. C, 11/98
Union Metal	Drg. 50200-A51, R1, 2/97 Drg. 50114-A19, R1, 2/97 Drg. 50200-A50, R1, 2/97 Drg. 71045-B47, sh1, R11, 2/99

Drg. 71045-B47, sh2, R11, 2/99
Drg. 71045-B48, sh1, R14, 2/99
Drg. 71045-B48, sh2, R14, 2/99
Drg. 71045-B49, sh1, R19, 2/99
Drg. 71045-B49, sh2, R19, 2/99
Drg. 71045-B49, sh3, R19, 2/99

Omit external terminal cabinet and external conduit entry details shown on the approved pole drawings and replace with recessed terminal cabinet details provided on project plans provided specifically for this project.

00962.46(j)(2)(d) Final Tightening - In the table, replace the words "ASTM A325" with the words "ASTM F3125, Grade A325"

00962.46(j)(3) Bolt Inspection - Replace the sentence that begins “The installation will be rejected if…” with the following sentence:

The installation will be rejected if the geometry does not satisfy the requirements of 02560.05.

SECTION 00963 - SIGNAL SUPPORT DRILLED SHAFTS

Comply with Section 00963 of the Standard Specifications modified as follows:

00963.02 Subsurface Investigation – Delete this subsection

00963.10 Materials – Replace the entire subsection except the subsection name and number with the following:

Furnish Materials meeting the following requirements:

Reinforcement.....00530 and 02510

Furnish Commercial Grade Concrete meeting the requirements of Section 00440. Concrete slump shall be no greater than 5 inches max.

00963.47(a) Concrete Placement - Replace the paragraph that begins "Unless otherwise approved, allow…**"** with the following paragraph:

Allow a maximum of 60 minutes between concrete placements and use no concrete older than 90 minutes from batch time. Use procedures for concrete placement which ensure that the concrete within the shaft becomes a monolithic, homogeneous unit.

00963.90 Payment – Replace this section with the following:

00963.90 Payment – No additional or separate payment will be made for construction of concrete traffic signal foundations, including:
• excavating the shafts and disposing of the excavated material
• furnishing, placing, splicing and removing temporary shaft casing and forms
• concrete and all reinforcement
• anchor rods, anchor plates, nuts, and washers

Payment for drilled shaft traffic signal foundations will be incidental to the Bid Item “Traffic Signal - Complete”

SECTION 00970 - HIGHWAY ILLUMINATION

Comply with Section 00970 of the Standard Specifications modified as follows:

00970.02 Equipment List and Drawings– Replace the entire subsection except the subsection name and number with the following:

In additional to the requirements of Section 00960, submit catalogue cut sheets for the following:
• Light fixture including LED board and driver
• Approved photoelectric control from ODOT Blue Sheets

Add the following subsection:

00970.15 LED Luminaires on Traffic Signal Supports - Furnish the following approved model or an approved equal:

- American Electric 'Autobahn" Series LED Catalog Number:
  ATB2 60BLEDE70MVOLTR3 LED

00970.42 Cable and Wire - Replace the paragraph that begins "Support the conductors…" with the following paragraph:

Support the conductors at the top of the pole using a flexible metal cable support grip to prevent insulation damage at the upsweep arm opening. When splicing cable into a new or existing circuit at a pole base (minimum wire length: 18 inches outside handhole), install a watertight, in-line fuse holder in the pole base for each underground wire going up the pole. This fuse holder shall be constructed so the wire to the ballast can be disconnected without cutting or disconnecting wiring at the ballast. Insulate terminal ends of the in-line fuse holder using either heat shrink tubing or electrical insulating rubber tape over-wrapped with electrical vinyl plastic tape as specified.

00970.45 LED Luminaires - Replace the sentence that begins "Install LED luminaires as shown …" with the following sentence:

Install LED luminaires as shown or specified

00970.90 Payment - Add the following sentence:

No separate or additional payment will be made for illumination. All illumination shown on the plans is incidental to the bid item "Traffic Signal – Complete"

SECTION 00990 - TRAFFIC SIGNALS

Comply with Section 00990 of the Standard Specifications modified as follows:

00990.00 Scope - Replace this subsection, except for the subsection number and title, with the following:

In addition to the requirements of Section 00960 and Section 00962, install traffic signals according to the following Specifications.

Add the following subsection:

00990.02 Electrical Materials - Submit all electrical materials the Contractor proposes to install according to 00960.02.

Add the following subsection:

00990.11 Traffic Signal Control Devices - The traffic signal controllers and related Equipment shall conform to requirements of the current edition of the ODOT Standard Specification for Microcomputer Signal Controller and errata.

The most current published version of the ODOT Standard Specification for Microcomputer Signal Controller, including all published errata, on ODOT's Traffic Standards website (see 00110.05(e)) at the time of Advertisement is the version in effect for the Project.

Add the following subsection:

00990.30 Video/Radar Detector Manufacturer's Representative - Provide the services of a manufacturer's representative on-site within 2 weeks in advance of the anticipated signal completion date to set up devices with Agency electrical crew present. Coordinate with ODOT Region 2 Signal Operations Engineer for meeting time in the field with Manufacturer's Representative.

00990.41(a) Signal Circuit Overhead Terminal Cabinets - Replace this subsection with the following subsection:

00990.41(a) Signal Circuit Recessed Terminal Cabinets – Recessed terminal cabinet shall be constructed structurally integrated into the pole as shown on the project plans.

In each cabinet, install the number of sectional terminal blocks needed for the circuits, plus spare terminal blocks as shown on the details plan. Spares are not to be used by the Contractor.

Terminate only one wire in each termination point. If necessary, add additional terminals of the same capacity to accommodate additional taps. If additional terminals are required, use a factory jumper between the terminals.

Enter on the marking strip the wire number and/or letter as coded at the terminal strips in the controller cabinets. Use only mechanically printed labels.

00990.42 Indication Equipment : Replace this subsection with the following subsection:

00990.42 Controller Cabinet Terminations:

(a) General - Terminate all field wiring to the terminal blocks physically attached to the controller cabinet

00990.43 (a) Pedestrian Push Buttons - Replace the entire subsection except the subsection name and number with the following:

Mount pedestrian push buttons on a pole, pedestal or post whose foundation directly abuts an asphalt concrete or Portland cement concrete landing or walkway as shown on the project plans. Install push buttons with the vibrotactile arrow and the instruction sign finger pointing in the direction of the crosswalk for which it is intended.

The pushbutton assemblies approved for installation on this project are Polara Navigator 4-Wire with vibrotactile arrow and 9” x 12” Instruction Sign. The Catalog number for ordering pushbuttons is: EN49VN0B. This project requires a total of 6 ped stations, two of which shall feature push-button and instruction arrow signs that point to the right when facing the units while standing at the landing, and; four stations with instruction sign arrows and push-button arrows that point to the left when standing at the landing facing the ped station.

00990.43 (d) Microwave and Radar Detection Systems – Replace the entire subsection except the subsection name and number with the following:

Install microwave and radar detection systems as shown or as specified in the Special Provisions.

Furnish the following radar detection system cabinet interface devices from the ODOT "Green Sheets" to complete interface between controller and sensors in the controller cabinet:

- Wavetronix Click 656 unit, and;
- SDLC cable, or approved equal.

Contact ODOT Region 2 Traffic Signal Operations Engineer two-weeks prior to installing radar units to coordinate field visit to determine optimal mounting heights, locations and aiming.

00990.47 Railroad Interconnect - Replace this subsection with the following subsection:

00990.47 Illumination on Traffic Signal Poles - Install illumination and associated appurtenances on traffic signal poles as shown and according to applicable portions of Section 00970.

Add the following subsection:

00990.48 Signal Covers - Cover mounted vehicle signals and pedestrian signals at all times until the signal installation is ready for continuous operation.

Add the following subsection:

00990.49 Pushbutton Covers - Cover mounted pushbuttons at all times until the pushbuttons are operational.

Add the following subsection:

00990.60 Cabinet Protection - Keep interiors of all cabinets clean and free of dust, dirt, moisture, and other foreign matter.

00990.70(a) Delivery of Control Equipment - Replace this subsection, except for the subsection number and title, with the following:

Provide all traffic control signal Equipment for the Project according to the cabinet print(s), including all associated manuals, diagrams, and other documents. The cabinet print(s) will be made available to the Contractor by the Engineer. Deliver all traffic signal control Equipment, including wiring diagrams and operation manuals, in one shipment. Partial shipments will not be accepted and will be returned to the Contractor at no additional cost to the Agency. Include the following information with the Equipment shipments:

- Contractor
- Location

- For controller cabinets, TSSU ID number
- Contract number
- Completed Green Sheets

Deliver the traffic signal control Equipment and information for testing to:

Oregon Department of Transportation
Traffic Systems Services Unit
2445 Liberty St. NE
Salem, Oregon 97303-6738

Add the following subsection:

00990.70(f) Control Equipment Installation - Add the following paragraph to the end of this subsection:

The Agency will be responsible for providing signal timing software and timing parameters.

00990.70(i) Interconnect System Testing – Delete this subsection

00990.90 Payment - Add the following paragraphs to the end of this subsection:

Replace the Sentence: “Item (a) includes furnishing and installing all items of the traffic signal system and the detection system.”

With the following: Item (a) includes furnishing and installing all items of the traffic signal system and detection system, all signage, illumination and other appurtenances included on the traffic signal plans.

Delete the sentence beginning with: Mast arm pole and strain pole foundations will be paid for according to 00963.90.

Replace the sentence beginning with “No separate or additional payment will…” with the following paragraph:

No separate or additional payment will be made for:

- Replacement of disturbed earthwork, Base and Surfacing materials
- Illumination and associated appurtenances shown on traffic signal poles.
- Traffic signal foundations, including steel reinforcement, anchor rods/bolts and commercial grade concrete
- Signs included on traffic signal plans

SECTION 02001 - Concrete

Comply with Section 02001 of the Standard Specifications modified as follows:

02001.00 Scope - Replace this subsection, except for the subsection number and title, with the following:

This Section includes the requirements for the properties, submittals, production, quality control and acceptance of portland cement concrete (concrete) for structural, precast

prestressed, and paving applications.

02001.01 General - Delete this subsection.

02001.02 Abbreviations and Definitions - Replace this subsection, except for the subsection number and title, with the following:

ASTV - Actual Strength Test Value

f'_c - Minimum Specified Compressive Strength at 28 days

f'_{cr} - Required Average Compressive Strength

GGBFS - Ground Granulated Blast Furnace Slag

HPC - High Performance Concrete

HRWRA - High-Range Water-Reducing Admixture (super-plasticizer)

IC - Internally Cured

LWFA - Lightweight Fine Aggregate

PPCM - Precast prestressed concrete member

SCM - Supplementary Cementitious Materials

SSD - Saturated Surface-Dry

w/cm Ratio - Water-Cementitious Material Ratio

WRA - Water Reducing Admixture

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, other than low strength, of improper sampling, molding, handling, curing, or testing. The average strength of the remaining cylinders shall then be considered the test result.

Cementitious Materials - Portland cement and supplementary cementitious materials.

High Performance Concrete - Concrete designed for enhanced durability and performance characteristics. High performance concrete is identified by the letters "HPC" in front of the concrete class designation (for example, HPC4500 - 1 1/2).

Internally Cured Concrete - Concrete designed to utilize lightweight fine aggregate to mitigate shrinkage.

Moderate Exposure - Elevations below 1,000 feet.

Pozzolans - Fly ash, silica fume, and metakaolin.

Severe Exposure - Elevations 1,000 feet and above.

Supplementary Cementitious Materials - Fly ash, silica fume, metakaolin, and ground granulated blast furnace slag.

02001.10 Materials - Replace this subsection, except for the subsection number and title, with the following:

Furnish Materials meeting the requirements of the following:

Aggregates	02690
Cement	02010
Chemical Admixtures	02040
Concrete Modifiers	02035
Supplementary Cementitious Materials	02030
Synthetic Fiber Reinforcing	02045
Water	02020

Add the following subsection:

02001.15 Concrete Mix Design - Submit current or new mix designs, prepared by a CCT, with the information listed in 02001.15(c), for each required class of concrete to the Engineer for review. Allow 21 Calendar Days for the review. Design mixes by the volumetric method in ACI 211.1 to achieve the properties of 02001.20 and 02001.30 when tested in accordance with 02001.15(b). Provide a design that will be workable, placeable and finishable given the specific conditions for the Project and Structure. Do not proceed with concrete placement until the Engineer has determined that the mix design complies with the Specifications. Review of concrete mix designs does not relieve the Contractor of the responsibility to provide concrete meeting the Specification and jobsite requirements.

(a) Current Mix Designs - Mix designs that meet the requirements for the specified class of concrete and are currently being used or have been used within the past 12 months on any project, public or private may be submitted for review. Provide individual tests results that comprise the average if more than one data point exists. For paving designs the flexural strength testing must be from within the last two years. For HPC designs the Length Change and Permeability tests must be from within the last two years.

(b) New Mix Designs - Make at least one trial batch for each concrete mix design. Notify the Engineer at least 48 hours before making each trial batch. The Engineer may witness preparation and testing. Prepare and test trial batches using the same materials, at the same proportions, and having the same plastic properties of concrete that will be used in the Project. Simulate haul time, batching sequence and mixing conditions to ensure the trial batch is representative of the mixture that will be delivered to the Project. Furnish all Materials, Equipment, testing and Work required for designing the mixes at no additional cost to the Agency.

(1) Trial Batch Plastic Properties - For each trial batch, test according to the following test methods:

Test	Test Method
Sampling Fresh Concrete	WAQTC TM 2
Concrete Temperature	AASHTO T 309
Slump	AASHTO T 119 [1]
Air Content	AASHTO T 152
Density	AASHTO T 121
Yield	AASHTO T 121
Molding Concrete Specimens	AASHTO T 23 or R 39 [2]
Water Cement Ratio	[3]

[1] For drilled shaft concrete test the slump retention by subsequent tests at half-hour

intervals for the duration of the estimated drilled shaft placement, including temporary casing extraction. Report in table or graphical format.

[2] Cast cylinders in single use plastic molds

[3] Use ODOT's Field Operating Procedure for AASHTO T 121 in the MFTP

(2) Trial Batch Hardened Properties - When applicable, test properties according to the following test methods:

Test	Test Method
Compressive Strength	AASHTO T 22
Flexural Strength	AASHTO T 97
Length Change	ASTM C157
Permeability	AASHTO T 277

a. Compressive Strength Tests - For each trial batch, cast and cure at least three test cylinders according to AASHTO T 23 or AASHTO R 39, in 6 inch by 12 inch or 4 inch by 8 inch single use plastic molds. The use of unbonded caps according to ASTM C1231 is permitted. Test at 28 days according to AASHTO T 22.

b. Flexural Strength Tests - For each paving concrete trial batch, cast and cure at least three flexural beams according to AASHTO T 23 or AASHTO R 39. Test flexural beams at 28 days according to AASHTO T 97.

c. Length Change Tests - For all HPC mix designs, except for precast bridge rail elements, make at least three specimens from the trial batch for length change testing. Sample prisms shall have a square, 4 inch by 4 inch cross section. Wet cure the samples until they have reached an age of 28 days, including the period in the molds. Following the wet cure, air store and measure samples according to ASTM C157, Section 11.1.2 for 28 days. Report length change results at total specimen age of 56 days.

d. Permeability Tests - For alternate HPC mix designs, make at least three specimens from the trial batch for permeability testing. Prepare, cure, dry and test according to AASHTO T 277. Report permeability in coulombs at 90 days.

(c) Required Submittals for Mix Designs - Submit the following information for each concrete mix design:

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

(2) Mix Design Constituent Proportions:

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

(3) Aggregates - Identify the Aggregate source by the ODOT source number. Report current values of the following:

- Bulk specific gravities (SSD)
- Fine Aggregate absorptions
- Coarse Aggregate absorptions
- Dry-rodded density of coarse Aggregates
- Average stockpile gradations
- Fineness modulus of sand used in the mix design calculations

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

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

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

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

(6) Concrete Modifiers - For each concrete modifier used, provide the following:

- Manufacturer
- Brand name
- QPL product number

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

- Manufacturer
- Brand name
- Design dosage rate
- QPL product number

(8) Synthetic Fiber Reinforcing - For each synthetic fiber reinforcing used, provide the following:

- Manufacturer
- Brand name
- Design dosage rate
- QPL product number

(9) 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.

(10) Plastic Concrete Tests - Report the temperature, slump, density, air content, yield, and w/cm Ratio of the trial batch or the average of these values for the cylinder sets presented for evaluation of a current mix design.

For drilled shaft concrete, report the following additional information:

- The total time estimate from initial batching through drilled shaft placement, including haul time, placing concrete, and temporary casing extraction.
- Initial slump test results and subsequent results at 30-minute intervals, verifying slump is maintained for the total time estimated for drilled shaft placement, including temporary casing extraction. Report data in a table or graph format.

(11) 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.

(12) Strength Analysis - Provide an analysis, showing all calculations, demonstrating that the mix design meets the requirements of 02001.20(a)(1).

(13) HPC Test Results - For all HPC except precast bridge rail elements, report the length change according to 02001.15(b)(2)(c).

For alternate HPC designs only, report the permeability according to 02001.15(b)(2)(d).

(14) Quality Control Personnel - Provide the name and certification number of the CCT who prepared the mix design, the QCT who performed the plastic concrete tests and cast the test cylinders, the CSTT who tested the cylinders, and the ODOT certification number of the laboratory where the cylinders were tested.

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02001.20 Concrete Properties, Tolerances, and Limits - Replace the paragraph that begins “Provide concrete that is a workable…” with the following paragraph:

Provide concrete that is workable, placeable, uniform in composition and consistency, and having the following properties:

02001.20(a) Strength - Replace this subsection, except for the subsection number and title, with the following:

Provide concrete meeting the required Classes shown in the Contract Documents. The class of concrete designates the minimum required compressive strength, f'_c at 28 days.

Table 02001-1

Concrete Strength and Water/Cementitious Material (w/cm) Ratio		
Type of Concrete	**Strength f'_c (psi)**	**Maximum w/cm Ratio**
Structural	3300	0.50
	3300 (Seal)	0.45
	4000	0.48
	4000 (Drilled Shaft	
	HPC4500	0.40
	HPC(IC)4500	
	5000 +	
Paving	4000	0.44
PPCM's (with cast-in-place decks and no entrained air)	5000	0.48
	5500	0.44
	6000 +	0.42

(1) Required Average Compressive Strength (*f*'cr) - Except for PPCM designs, provide calculations demonstrating compliance with ACI 301 section 4.2.3.3 using the ASTV from either field results or trial batch cylinders,

(2) Flexural Strength - Provide paving concrete mix designs with a minimum of 600 psi at 28 Days.

02001.20(b) Air Entrainment - Replace Table 02001-2 with the following:

Table 02001-2

Air Entrainment		
Nominal Maximum Aggregate Size, inch.	**Moderate Exposure (Percent)**	**Severe Exposure (Percent)**
3/8	6.0	7.5
1/2	5.5	7.0
3/4	5.0	6.0
1	4.5	6.0
1 1/2	4.5	5.5

02001.20(c) Slump - Replace this subsection, except for the subsection number and title, with the following:

Provide concrete at the appropriate slump shown in Table 02001-3. Take corrective action to maintain a consistent slump at the point of discharge from the delivery vehicle.

Table 02001-3

Concrete Slump	
Condition	**Slump**
Concrete without WRA	4" max.
Concrete with WRA	5" max.
Concrete with HRWRA	6" ± 2"
Precast Prestressed Concrete with HRWRA	10" max.
Seal Concrete	8" ± 2"
Signal Foundation/ Drilled Shaft Concrete	5" max.[1]
[1] Maintain a minimum slump of 4 inches throughout drilled shaft placement, including temporary casing extraction.	

Add the following subsection:

02001.20(e) Durability - For HPC designs, except designs for precast bridge rail elements, the following additional requirements apply:

Test	Test Method	Acceptance Value
Length Change	ASTM C157	-0.045%
Permeability	AASHTO T 277	1,000 Coulombs (max.) at 90 days [1]

[1] Only required for alternate HPC designs. See 02001.30(b)(2).

02001.30 Concrete Mix Design - Replace this subsection with the following subsection:

02001.30 Concrete Constituents:

(a) Portland Cement - Use Type I or II cement for structural or paving concrete. Use Type III cement for precast prestressed concrete.

(b) Supplementary Cementitious Materials - SCM may be used separately or in combinations up to the specified maximum percentage by mass according to the following:

(1) General Limits - SCM may be used separately or in combination as shown:

Separate SCM	Maximum
Fly Ash + Other Pozzolans	30%
GGBFS	50%
Silica Fume	5%

Combined SCM	Maximum
Fly Ash + Other Pozzolans + GGBFS + Silica Fume	50%*
Fly Ash + Other Pozzolans + Silica Fume	30%*

* Fly ash + other pozzolans shall constitute no more than 25% and silica fume shall constitute no more than 5% of the total weight of cementitious materials.

When silica fume is added to truck mixed concrete, mix the batch a minimum of 100 revolutions at the mixing speed specified by the manufacturer before leaving the batch plant.

(2) HPC Cementitious Composition - Provide HPC with one of the following:

- Cementitious material with 66 percent portland cement, 30 percent fly ash or GGBFS, and 4 percent silica fume.
- Cement with SCM proportioned according to 02001.30(b)(1) and with trial batches performed to demonstrate that the proposed alternate mix design provides a maximum of 1,000 coulombs at 90 days when tested according to AASTHO T 277.

(c) Blended Hydraulic Cement - Blended hydraulic cement may be used subject to the limits of 02001.30(b) and 02010.20.

(d) Chemical Admixtures - Use chemical admixtures according to the manufacturer's recommendations. Use WRA in all seal concrete and in Class 5000 concrete or greater. Use HRWRA in all HPC.

Use a hydration stabilizer from the QPL in all concrete for bridge decks. Use an appropriate amount to extend the initial set time of the concrete by 90 minutes.

(e) Aggregate - If the nominal maximum size of the coarse Aggregate is not included as a part of the class of concrete, or shown on the Plans, any size from 1 1/2-inch to 3/8-inch nominal maximum size Aggregate may be used according to ACI guidelines except:

- Use 1 1/2 inch nominal maximum size Aggregates in bridge deck concrete.
- Use 1 1/2 inch nominal maximum size Aggregates in paving concrete unless otherwise indicated.
- Use 3/8 inch nominal maximum size Aggregates in drilled shafts unless otherwise indicated.

(1) HPC Coarse Aggregate Content - Proportion all HPC for a minimum coarse Aggregate absolute solid volume according to Table 02001-4:

Table 02001-4

Absolute Solid Volume	
Maximum Nominal Aggregate Size	**Cu. Yd. (Aggregate) / Cu. Yd. (Concrete)**
3/8"	0.36
1/2"	0.38
3/4"	0.40
1"	0.42
1 1/2"	0.44

Two or more Aggregate products or sources meeting Specifications may be blended to improve concrete properties. Blending non-specification Aggregate Materials, except for gradation, with specification Materials is not allowed.

(f) Synthetic Fiber Reinforcing for Concrete - Use synthetic fiber reinforcing from the QPL and according to Section 02045 in all high performance concrete. Use synthetic fiber reinforcing according to the manufacturer's recommendations at the rate designated on the QPL. Fiber packaging is not allowed in the mixed concrete.

02001.31 Concrete Constituents - Delete this subsection.

02001.32 New Mix Designs - Delete this subsection.

02001.33 Required Over Design Strength (f'_{cr}) for New Mix Designs - Delete this subsection.

02001.34(a) Length Change Tests - Delete this subsection.

02001.34(b) Permeability Tests – Delete this subsection.

02001.35 Required Submittals for Mix Designs - Delete this subsection.

02001.37 Trial Batch Costs – Delete this subsection.

02001.40 Concrete Production - Replace this subsection, except for the subsection number and title, with the following:

Produce concrete according to the following sections of ASTM C94, Standard Specification for Ready-Mixed Concrete:

ASTM Section	ASTM Title
9.	Measuring Materials
10.	Batching Plant
11.	Mixers and Agitators
12.	Mixing and Delivery[1]

[1] When haul time or placement conditions warrant exceeding the time of discharge, submit a detailed breakdown of the estimated time needed from batching to discharge of a load along with the measures that will be taken to ensure slump, temperature and uniformity will be maintained. This request must be submitted in advance and may establish a new time limit at the Engineers discretion.

(a) Delivery Tickets - Send a concrete delivery ticket with each load of concrete supplied to the Project. Each delivery ticket shall include the following information:

- Concrete supplier's name, address and telephone number
- Address and telephone number of batch plant if different from above
- Date and time the concrete batch was produced
- ODOT mix design number
- Size of load batched
- Weights or volumes of constituents batched in the load
- Amount of water that can be added at the job site
- Amount of water actually added at the job site

(b) Adjusting Concrete Proportions - Replace this subsection, except for the subsection number and title, with the following:

After a mix design has been reviewed and accepted, submit any proposed adjustments to concrete proportions for review. Significant changes to the mix design, as determined by the Engineer, may require verification of performance by trial batch according to 02001.32. Significant changes include, but are not limited to the following:

- Decreases in cementitious material content.
- Changes in cement source.
- Increases in SCM quantity replacing cement.
- Changes in SCM source.
- Substitution of aggregates from a different source.
- Admixture product changes.
- Large admixture dosage changes, excluding seasonal adjustments for air entraining agents and Type A or D water reducers (± 25 oz/cubic yard).

02001.50 Quality Control Personnel - Replace this subsection with the following subsection:

02001.50 Quality Control - Provide quality control according to Section 00165 and the following:

- Sample and test according to the MFTP.
- Provide certified technicians to sample and test the mix for temperature, air content, slump, water-cementitious ratio, density and yield, from the first load of each placement, whenever there is a visible change in the slump of the concrete, and when a set of cylinders is obtained.
- If the results of any test are outside of the specification limits, stop placement of the load. Correct the load or, if the load cannot be corrected, do not incorporate it into the Work. Test subsequent loads before any further concrete placement. Correct subsequent loads if any of the tests are still outside the specification limits. Return to the specified test frequency when the test results from two consecutive loads are shown to meet the specification limits.
- The Contractor shall designate a person responsible for accepting and rejecting concrete onsite.

Certified Technician duties:

(a) Certified Aggregate Technician (CAgT) -

- Sample and test Aggregates.
- Sample and test each stockpiled size according to the test procedures and at the frequencies shown in the Field Tested Materials Acceptance Guide section of the MFTP.
- Record and evaluate test results according to Section 00165.
- Provide Stat-Spec results to the Engineer.
- Notify the CCT whenever a fine aggregate fineness modulus varies by more than ± 0.20 from the mix design it is to be used in.
- Test the fine and coarse aggregates for total moisture content according to AASHTO T 255.

(b) Quality Control Technician (QCT) -

- Attend pre-placement meetings for bridge deck pours and paving.
- Be at the concrete placement site when concrete placement is in progress.
- Have a copy of the mix design on site and available during concrete placement.
- Obtain and check each batch ticket upon arrival of the concrete at the jobsite for the correct mix design.
- Sample the concrete and test for ambient air temperature, plastic concrete temperature, slump, air content, density, w/cm Ratio and yield at the frequencies required by and according to the tests listed in the MFTP, after concrete mixture proportions are adjusted in the field, and at such times as requested by the Engineer.
- Notify the Contractor and the Engineer immediately when the concrete is not in compliance with the Specifications.
- Be in direct contact with the CCT by telephone, radio or other means to convey information.
- Notify the CCT of loads rejected and the reason for rejection.
- Notify the CCT immediately whenever the w/cm Ratio varies from the mix design target by more than ± 0.03.
- Notify the CCT immediately whenever the air content varies from the mix design target by more than ± 1.5 percent.
- Notify the CCT immediately whenever the slump varies from the allowable limits of Table 02001-3.
- Notify the CCT immediately whenever the density of the plastic concrete varies from the mix design target by more than ± 3.0 pounds per cubic foot.

(c) Concrete Control Technician (CCT) –

- Prepare new concrete mix designs.
- Notify the Engineer 48 hours prior to trial batching.
- Control the quality of concrete during production.
- Submit proposed adjustments of the mix design, in writing, to the Engineer for approval by the middle of the following work shift.
- Ensure approved adjustments are implemented prior to proceeding with production.

- Before batching is started and when there is a significant change in the slump of the concrete ensure moisture contents of the coarse and fine aggregate are verified by the CAgT. Make necessary adjustments to maintain consistent concrete properties. Provide moisture content test results to the Engineer upon request.
- Monitor concrete properties and compressive strength tests throughout the duration of the Project.
- Make adjustments to loads that fail to meet the air content or slump criteria of these Specifications prior to the 90-minute time limit. Adjustments shall comply with the provisions of ASTM C94.
- Make adjustments to maintain a satisfactory over-design f'_{cr}.
- Perform an analysis and verify the accuracy of coarse and fine aggregate moistures whenever the w/cm Ratio varies from the mix design target by more than ± 0.03.
- Perform an analysis and make necessary adjustments whenever the unit weight of the plastic concrete varies from the mix design by more than ± 3.0 pounds per cubic foot.
- Perform an analysis whenever the fineness modulus of the fine aggregate varies by more than ± 0.20 from the established mix design. If necessary to maintain proper workability, ability to pump or ability to finish, make an adjustment to the coarse/fine aggregate ratio and submit to the Engineer by the middle of the following work shift.

02001.60 Delivery Tickets – Replace this subsection with the following subsection:

02001.60 Acceptance of Concrete - Acceptance of concrete will be according to Section 00165 and the following:

(a) Aggregate - Acceptance of aggregate will be according to 02690.12.

(b) Plastic Concrete - Acceptance of plastic concrete will be based on tests performed by the Contractor's QCT, according to the tolerances and limits of 02001.20, when discharged within the time allotted in 02001.40.

(c) Hardened Concrete - Cast and cure test specimens according to AASHTO T 23 in 6 inch x 12 inch or 4 inch x 8 inch, single-use plastic molds and test at 28 days according to AASHTO T 22.

(1) General - For all classes of concrete, acceptance of hardened concrete will be based on an analysis of compressive strength tests of cylinders cast by the QCT. Test cylinders at an Agency certified laboratory.

(2) Acceptance - Hardened concrete with an ASTV meeting or exceeding the specified design strength, f'_c will be accepted 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 concrete represented by the cylinders is suitable for the intended purpose. Remove concrete that has an ASTV less than 85 percent of f'_c unless otherwise authorized, in writing, by the Engineer. If the concrete is removed, the cost of removal, replacement and all related Work is the Contractor's responsibility. If the Engineer determines that the concrete is suitable for the intended purpose, the concrete may be allowed to remain in place, subject to a price adjustment according to 00150.25. If an ASTV falls below f'_c, the Contractor may submit a written plan outlining a proposed alternate method of evaluating compressive strength. Submit the plan for review by the Engineer within 3 days of the test. Provide evidence that a reasonable f'_{cr} (over-design) was maintained and that there is credible evidence (besides low strength) which warrants consideration of this option. The Engineer may allow an alternate method of acceptance if the compressive strength test results are determined to be suspect from definable external factors.

SECTION 02040 – CHEMICAL ADMIXTURES

Comply with Section 02040 of the Standard Specifications modified as follows:

02040.10 Materials - Replace this subsection, except for the subsection number and title, with the following:

Furnish admixtures from the QPL.

SECTION 02050 - CURING MATERIALS

Comply with Section 02050 of the Standard Specifications modified as follows:

02050.10 Liquid Compounds - Delete the paragraph that begins “Furnish liquid membrane-forming curing…“ with the following paragraph:

Furnish liquid membrane-forming curing compounds from the QPL and meeting the requirements of ASTM C309.

Delete the paragraph that begins “Before using liquid compounds, submit…”.

02050.20 Polyethylene Films - Replace the paragraph that begins “Furnish clear or white…“ with the following paragraph:

Furnish clear or white polyethylene films for curing concrete meeting the requirements of ASTM C171.

SECTION 02080 – GROUT

Comply with Section 02080 of the Standard Specifications modified as follows:

002080.00 Scope - Replace this subsection, except for the subsection number and title, with the following:

This Section includes the requirements for grout.

02080.60 Structural Grout - Replace the sentence that begins “Furnish structural grout from the QPL…” with the following sentence:

Furnish structural grout from the QPL.

SECTION 02510 – REINFORCEMENT

Comply with Section 02510 of the Standard Specifications modified as follows:

02510.10 Deformed Bar Reinforcement - Replace this subsection, except for the subsection number and title, with the following:

Furnish deformed bar reinforcement from the QPL and conforming to the requirements of ASTM A 706, AASHTO M31 (ASTM A615), or AASHTO M334 (ASTM A1035 CS). Unless otherwise specified or shown, all reinforcing bars shall be Grade 60.

SECTION 02530 - STRUCTURAL STEEL

Comply with Section 02530 of the Standard Specifications modified as follows:

02530.70 Galvanizing - Replace the paragraph that begins "Steel that will be finished by hot-dip galvanizing…" with the following paragraph:

Steel that will be finished by hot-dip galvanizing for use as sign bridges, illumination poles, traffic signal poles, sign supports, bridge rail and items designated on the Plans as "Galvanize - Control Silicon" shall have controlled silicon content. The silicon content shall be in either of the ranges 0 - 0.06 percent or 0.13 - 0.25 percent. Before galvanizing, submit mill test certificates verifying silicon content to the Engineer and the galvanizer.

SECTION 02560 - FASTENERS

Comply with Section 02560 of the Standard Specifications modified as follows:

Add the following subsection:

02560.05 Geometry - Bolt or rod length used shall be such that the end of the bolt or rod extends beyond or is at least flush with the outer face of the nut when properly installed.

02560.10(b) Nuts– Replace this subsection, except for the subsection number and title, with following:

Nuts for carbon steel bolts shall conform to the requirements of the following, or equivalent:

Plain (Noncoated) Bolts:

- 1/4" - 1 1/2" - ASTM A563, Grade A, hex
- Over 1 1/2" - 4" - ASTM A563, Grade A, heavy hex

Galvanized Bolts:

- All - ASTM A563, Grade A, C, D, or DH, heavy hex

02560.20(a) Bolts – Replace this subsection, except for the subsection number and title, with following:

High-strength bolts used in noncoated weathering steel connections shall be Type 3. High-strength bolts shall conform to the requirements of the following:

Heavy Hex Head:

- ASTM F3125, Grade A325

Twist-Off:

- ASTM F3125, Grade F1852

02560.20(b) Nuts – Replace this subsection, except for the subsection number and title, with following:

Nuts for high-strength bolts shall conform to the requirements of the following, or equivalent:

Type 1 Plain (Noncoated) Bolts:

- All - Heavy hex ASTM A563, Grade C, D, or DH

Type 1 Galvanized Bolts:

- All - Heavy hex ASTM A563, Grade DH

Type 3 Bolts:

- All - Heavy hex ASTM A563, Grade C3 or DH3

02560.20(f) Lock-Pin and Collar Fasteners - Delete this subsection.

02560.30(c) Nuts – Replace this subsection, except for the subsection number and title, with following:

Nuts for tie rods, anchor bolts, and anchor rods shall conform to the requirements of the following, or equivalent:

Plain Steel Tie Rods, Anchor Bolts, and Anchor Rods:

- All - Heavy hex ASTM A563, Grade A

Galvanized Steel Tie Rods, Anchor Bolts, and Anchor Rods:

- All - Heavy hex ASTM A563, Grade A, C, D, or DH

Plain Or Galvanized High-Strength Tie Rods, Anchor Bolts, or Anchor Rods:

- All - Heavy hex ASTM A563, Grade DH

02560.40 Galvanizing and Coating - Replace this subsection with the following subsection:

02560.40 Galvanizing and Coating:

(a) High Strength Fasteners - When specified, hot-dip galvanize Grade A325 fasteners or mechanically deposit zinc to Grade F1852 fasteners according to ASTM F3125.

(b) Tie Rods, Anchor Bolts, Anchor Rods and Carbon Fasteners - Hot-dip galvanize, tie rods, anchor bolts, anchor rods, nuts, washers and carbon fasteners according to ASTM F2329 as appropriate to the product.

Overtap nuts for galvanized fasteners, galvanized tie rods, galvanized anchor bolts, and galvanized anchor rods according to ASTM A563.

Measure the zinc thickness on the wrench flats or top of bolt head of galvanized bolts and on the wrench flats of galvanized nuts.

(c) Direct Tension Indicators – When specified, apply mechanically deposited zinc according to ASTM F959.

(d) Repair of Hot-Dip Galvanizing - Repair damaged hot-dip galvanizing according to ASTM A780. Minimum zinc content for Method A2 is 94 percent on the dry film.

02560.60(b) Other Test Requirements - In the paragraph that begins "Wedge test all bolts according…" replace the words "AASHTO M 164 (ASTM A325)" with the words "ASTM F3125, Grade A325 or Grade F1852".

02560.70 Lubricating Fasteners - Replace this subsection, except for the subsection number and title, with following:

Furnish all galvanized and coated fasteners with a factory applied commercial water-soluble

wax that contains a visible dye of a color that contrasts with the color of galvanizing or coating. Black fasteners shall be "oily" to the touch when installed.

Field lubricate galvanized bolts in tapped holes, galvanized anchor rods, and galvanized tie rods with a lubricant from the QPL. Apply lubricant to threads and to bearing surfaces that will turn during installation.

Protect fasteners from dirt and moisture at the Project site.

Retest heavy hex head fasteners that do not pass the field rotational capacity test. Clean and relubricate heavy hex head fasteners with a lubricant from the QPL prior to retesting.

Relubrication of Twist-Off fasteners is not permitted.

SECTION 02690 - PCC AGGREGATES

Replace Section 02690 of the Standard Specifications with the following Section 02690:

SECTION 02690 - PCC AGGREGATES

Description

02690.00 Scope - This Section includes the requirements for coarse and fine aggregates for portland cement concrete.

02690.01 Definitions:

Coating - Foreign or deleterious substances found adhering to the aggregate particles.

Detrimental Materials - Materials that adversely affect concrete, including but not limited to clay, shale, mica, silt, bark, alkali, sticks, organic matter, soft and flaky particles.

Nominal Maximum Size Of Aggregate - One sieve larger than the first sieve that retains more than 10 percent of the material using an agency specified set of sieves based on cumulative percent retained. Where large gaps in specification sieves exist, intermediate sieves may be inserted to determine nominal maximum size.

Materials

02690.10 Materials - PCC Aggregates shall consist of natural or crushed rock that is hard, strong, durable and free from adherent coatings or other detrimental materials.

Produce, handle and store the aggregates in a way that will maintain passing material properties and avoid introducing deleterious materials or segregation prior to its use in portland cement concrete.

02690.11 Alternate Grading - The Contractor may request approval to produce coarse and fine aggregates in sizes other than those stated in 02690.20 and 02690.30. The request shall be in writing, and shall state the proposed target value and specified tolerances for each of the individual sieve sizes of the materials the Contractor proposes to produce.

02690.12 Acceptance of Aggregate - Acceptance of aggregate will be according to Section 00165 and based on the Contractor's quality control testing, if verified, according to Section 00165.

(a) Aggregate Gradation - A stockpile contains specification aggregate gradation when the quality level for each sieve size calculated according to 00165.40 is equal to or greater than the quality level indicated in Table 00165-2 for a PF of 1.00. Each required sample represents a sublot. When the quality level indicated in Table 00165-2 yields a PF of less than 1.00 for any constituent, the material is non-specification.

(b) Non-specification Aggregate Gradation - Stockpiled aggregates that contain non-specification aggregate gradation will be rejected by the Engineer unless non specification material is removed from the stockpile. Do not add additional material to the stockpile until enough non-specification material is removed so that the quality level for each constituent is equal to or greater than the quality level in Table 00165-2 for a 1.00 PF.

Reprocessing of non-conforming material and the testing required for acceptance will be at no additional cost to the Agency. Acceptance of reprocessed material will be based on passing test results or accepted visually by the Engineer.

02690.20 Coarse Aggregate:

(a) Harmful Substances - Harmful substances shall not exceed the following limits:

Test	Test Method ODOT	Test Method AASHTO	Percent (by Weight)
Lightweight Pieces	–	T 113	1.0
Material passing No. 200 sieve	–	T 11	1.0
Wood Particles	TM 225	–	0.05

(b) Soundness - Coarse aggregates for concrete shall be tested for soundness using sodium sulfate salt, according to AASHTO T 104. The weighted percentage loss shall not exceed 12 percent by weight.

(c) Durability - Coarse aggregates shall meet the following durability requirements:

Test	Test Method ODOT	Test Method AASHTO	Requirements
Abrasion	–	T 96	30.0% Max.
Oregon Air Aggregate Degradation:			
Passing No. 20 sieve	TM 208	–	30.0% Max.
Sediment Height	TM 208	–	3.0" Max.

(d) PCC Paving Aggregate - In addition to requirements above, comply with the following:

(1) Fracture - Provide aggregate with at least two fractured faces on at least 50 percent of the particles retained on the 3/8 inch, 1/2 inch, 3/4 inch, 1 inch, and 1 1/2 inch sieves, as determined by AASHTO T 335.

(2) Elongated Pieces - Provide aggregate with elongated pieces not exceeding 10 percent by weight of the material retained on the No. 4 sieve when tested according to ODOT TM 229 with the proportional caliper device set at a ratio of 5:1.

(e) Grading and Separation by Sizes for Prestressed Concrete - Sampling shall be according to AASHTO T 2 and sieve analysis shall be determined according to AASHTO T 27 and AASHTO T 11. PCC coarse aggregate shall conform to grading and separated sizes as follows:

(1) Where indicated in Table 02690-1, the coarse aggregate shall be separated into two sizes and each separated size shall be measured into the batch in the quantity determined by the mix design.

For each of the indicated maximum sizes of coarse aggregates, the separated sizes shall be as indicated in Table 02690-2:

Table 02690-1

Maximum Nominal Size of Aggregates	Separated Sizes
1"	1" - No. 4
3/4"	3/4" - No. 4
3/4"	3/4" - 1/2" and 1/2" - No. 4
3/4"	3/4" - 3/8" and 3/8" - No. 4

(2) The grading of each of the specified separated sizes of coarse aggregate shall conform to the following:

Table 02690-2

	Separated Sizes					
Sieve Size	**1" - No. 4**	**3/4"- No. 4**	**3/4"- 1/2"**	**3/4"- 3/8"**	**1/2"- No. 4**	**3/8"- No. 4**
	Percent Passing (by Weight)					
1 1/2"	100	–	–	–	–	–
1"	90 - 100	100	100	100	–	–
3/4"	50 - 80	90 - 100	85 - 100	85 - 100	100	100
1/2"	–	–	0 - 15	–	85 - 100	–
3/8"	15 - 40	20 - 50	–	0 - 15	35 - 65	85 - 100
No. 4	0 - 10	0 - 10	–	–	0 - 15	0 - 15
No. 200	*	*	*	*	*	*

* See 02690.20(a). Do not evaluate material passing the No. 200 sieve according to 00165.40.

(f) Grading and Separation by Sizes for Other Concrete - Sampling shall be according to AASHTO T 2. Sieve analysis shall be according to AASHTO T 27 and AASHTO T 11. Provide aggregates meeting the gradation requirements of Tables 02690-3 and 02690-4 for structural concrete. Provide a CAgT to perform sampling and testing when required.

Table 02690-3

	Gradation of Coarse Aggregates			
Sieve Size	**Combined* Sizes 1 1/2" - No. 4**	**Separated Sizes 1 1/2" - 3/4"**	**Separated Sizes 1" - No. 4**	**Separated Sizes 3/4" - 1/2"**
	Percent Passing (by Weight)			
2"	100	100	–	–
1 1/2"	90 - 100	90 - 100	100	–
1"	70 - 89	20 - 55	90 - 100	100
3/4"	35 - 70	0 - 15	–	85 - 100
1/2"	–	–	25 - 60	0 - 15
3/8"	10 - 30	0 - 5	–	–

No. 4	0 - 5	–	0 - 10	–
No. 8	–	–	0 - 5	–
No. 200	**	**	**	**

* For 1 1/2 inch coarse aggregate use two or more separated sizes which when combined shall meet the gradation limits for 1 1/2" - No. 4

** See 02690.20(a). Do not evaluate material passing the No. 200 sieve according to 00165.40.

Table 02690-4

Gradation of Coarse Aggregates

Sieve Size	Separated Sizes 3/4" - 3/8"	Separated or Combined Sizes 3/4" - No. 4	Separated Sizes 1/2" - No. 4	Separated Sizes 3/8" - No. 8
	Percent Passing (by Weight)			
1"	100	100	–	–
3/4"	90 - 100	90 - 100	100	–
1/2"	20 - 55	–	90 - 100	100
3/8"	0 - 15	20 - 55	40 - 70	85 - 100
No. 4	0 - 5	0 - 10	0 - 15	10 - 30
No. 8	–	0 - 5	0 - 5	0 - 10
No. 16	–	–	–	0 - 5
No. 200	*	*	*	*

* See 02690.20(a). Do not evaluate material passing the No. 200 sieve according to 00165.40.

02690.30 Fine Aggregates:

(a) Different Sources - Do not mix fine aggregates from different sources of supply, or store in the same pile. Do not use alternately in the same class of mix, without prior approval.

(b) Harmful Substances - The amount of harmful substances shall not exceed the following limits:

Test	Test Method (AASHTO)	Percent (by Weight)
Lightweight Pieces	T 113	2.0%
Material passing No. 200 sieve	T 11	3.0%

(c) Soundness - Fine aggregate shall be tested for soundness using sodium sulfate salt, according to AASHTO T 104. The weighted percentage loss shall not exceed 10 percent by weight.

(d) Organic Impurities - All fine aggregate shall meet the requirements of AASHTO M 6 for organic impurities.

(e) Sand Equivalent - Fine aggregate shall be tested according to AASHTO T 176 and shall have a sand equivalent of not less than 75.

(f) Sand for Mortar - Sand for mortar shall conform to the requirements of this Section.

(g) Grading - Sampling shall be according to AASHTO T 2. Sieve analysis shall be determined according to AASHTO T 27 and AASHTO T 11. Provide aggregates meeting the gradation requirements of Table 02690-5 for structural concrete. Provide a CAgT to perform sampling and testing when required.

Table 02690-5

Gradation of Fine Aggregate*

Sieve Size	Percent Passing (by Weight)
3/8"	100
No. 4	90 - 100
No. 8	70 - 100
No. 16	50 - 85
No. 30	25 - 60
No. 50	5 - 30
No. 100	0 - 10
No. 200	**

* Determine the fineness modulus according to AASHTO T 27 and AASHTO T 11. Maintain the fine aggregate fineness modulus within plus or minus 0.20 from the fineness modulus used in the Contractor's mix design. Fine aggregates in which the fineness modulus varies by more than 0.20 from the mix design target shall not be incorporated until an assessment is done to determine whether an adjustment in the aggregate proportions is necessary. Proportion changes must be performed by a CCT according to the provisions of ACI 211. Submit analysis of FM and mix design adjustments to the Engineer for approval.

** See 02690.30(b). Do not evaluate material passing No. 200 sieve according to 0165.40.

SECTION 02910 - SIGN MATERIALS

Comply with Section 02910 of the Standard Specifications modified as follows:

02910.20 Reflective and Retroreflective Sheeting - Replace the title of this subsection with "**Retroreflective Sheeting**"

02910.20(a) General - Replace the paragraph that begins "Use retroreflective sheeting Type…" with the following paragraph:

Use retroreflective sheeting from the QPL and the following:

02910.32(b) Retroreflective Sheeting Legend – Replace the paragraph that begins "The Silver-white or white letters…" with the following paragraph:

Removable legend shall be fabricated with sheeting conforming to 02910.20 that is permanently adhered to a flat aluminum frame.

02910.40 Hardware - Replace the paragraph that begins "The bolts, nuts, and washers…" with the following paragraph:

The bolts, nuts, and washers used to fabricate and erect signs shall be aluminum alloy, stainless steel, or hot-dip galvanized steel. Aluminum for bolts and nuts shall conform to ASTM B211, alloys 2024-T4 or 6061-T6 as the Contractor elects. Aluminum washers shall

conform to ASTM B209, alloy Alclad 2024-T4. Stainless steel for bolts, nuts, and washers shall be Type 304 or Type 316. Galvanized steel bolts, nuts and washers shall be medium carbon steel. Galvanize steel hardware according to AASHTO M 232 (ASTM A153).

02910.75(a) Warranty Period – Replace the bullet that begins “For retroreflective Type III and Type IV …” with the following paragraph:

- For retroreflective ASTM Type III and Type IV sheeting used for permanent signs, the warranty period shall be for 10 years.

Replace the bullet that begins “For retroreflective Type IX sheeting used …” with the following paragraph:

- For retroreflective ASTM Type IX and Type XI sheeting used for permanent signs, the warranty period shall be for 12 years.

02910.75(b) Failure – Replace the bullet that begins “70 percent of minimum coefficient…” with the following paragraph:

- 70 percent of minimum coefficient of retroreflection for designated sheeting or cuttable film according to ASTM D4956 for the remaining 3 years of the warranty period for Type III and Type IV sheeting and remaining 5 years of the warranty period for Type IX and Type XI sheeting.

02910.75(c) Remedy – Replace the bullet that begins “For the remaining 3 years …” with the following paragraph:

- For the remaining 3 years (5 years for ASTM Type IX and Type XI sheeting), furnish replacement sheeting required to restore the sign panel to a condition that meets the Specifications.

SECTION 02925 – TRAFFIC SIGNAL MATERIALS

Comply with Section 02925 of the Standard Specifications.

SECTION 02926 - HIGHWAY ILLUMINATION MATERIALS

Comply with Section 02926 of the Standard Specifications modified as follows:

02926.00 Scope - Replace this subsection, except for the subsection number and title, with the following:

In addition to all applicable portions of AASHTO "Roadway Lighting Design Guide" (2018) and "Recommended Practice for Lighting Roadway and Parking Facilities" (ANSI/IES, RP - 8, 2018), this Section includes the requirements for highway illumination installations.

02926.41(e) Photoelectric Relay - Replace the paragraph that begins “Power consumption shall be…” with the following paragraph:

Power consumption shall be less than 1 W. At the designated voltage, the photoelectric relay shall be capable of controlling a minimum HID or LED luminaire load of 1000 W. Minimum operating temperature range shall be from -40 °F to 150 °F.

02926.54(b)(1) LED Luminaires on Traffic Signal Supports – Replace this subsection, except for the subsection number and title, with the following:

The LED luminaire model and catalogue number approved for installation on this project is:

- Model: American Electric ‘Autobahn” Series ATB2 LED Cobra Head,
- Catalog Number: ATB2 60BLEDE70MVOLTR3

Any substitutions for the approved fixture to be installed will require written approval by the engineer.

02926.54(c) Submittals - Replace the entire subsection except for the subsection name and title, with the following:

Before beginning LED luminaire installation, submit the following according to 00150.37 for review by the Engineer:

One copy of LED luminaire manufacturer's data sheets, including light source, drivers, surge protection device, and installation instructions.

Within 21 Calendar Days after receipt of submittals, the Engineer will review the submittals and designate them in writing as "approved", "approved as noted", or "returned for correction". Do not begin LED luminaire installation before receiving written approval of submittals from the Engineer.