### SECTION 501 – PORTLAND CEMENT CONCRETE

**DESCRIPTION**

**501.01.01 GENERAL**

***Add the following to this subsection:***

C. All cement used on the work shall be standard brand Portland cement conforming to the "Specifications for Portland Cement" (ASTM C150), Type V, in accordance with requirements contained in Section 701 of the USS.

**MATERIALS**

**501.02.03 ADMIXTURES**

***ADD The following to this subsection:***

Q. The use of calcium chloride shall not be permitted.

**CONSTRUCTION**

**501.03.04 CLASSIFICATION AND PROPORTIONS**

***ADD The following PARAGRAPH to this subsection:***

F. Concrete shall be composed of cement, admixtures (when approved), aggregates and water. These materials shall be as specified. The exact proportions in which these materials are to be used for different parts of the work shall be determined by the Contractor and submitted to the Engineer for review prior to use in the work. In general, the mix shall be so designed as to produce concrete capable of being deposited so as to obtain maximum density and minimum shrinkage and, where deposited in forms, to have maximum smoothness of surface. Mix designs where sand represents more than 41 percent of the total weight of fine and coarse aggregate shall not be permitted. The proportions shall be changed whenever necessary or desirable in the opinion of the Engineer. Concrete mixes shall be designed by a Registered Professional Engineer in the State of Nevada representing a qualified independent testing laboratory and approved in advance by the Engineer. Concrete mixing operations shall conform to ASTM C 94. Water shall not be added to concrete after leaving the batch plant unless specifically authorized by the Engineer.

**501.03.10 WEATHER LIMITATIONS**

***ADD THE FOLLOWING PARAGRAPH TO “PART A: GENERAL” OF THIS SUBSECTION:***

4. All exposed concrete surfaces shall be sprayed liberally with an evaporation retarder when the ambient air temperature is greater than 100 degrees F.; or when the ambient air temperature is above 90 degrees F. and the wind speed is above 20 mph; or as directed by the Engineer. Evaporation retarders shall be per the Qualified Products List established by the Nevada Department of Transportation. Spraying shall be per manufacturer’s recommendation and shall occur immediately upon completion of the finish.

***ADD THE FOLLOWING PARAGRAPH TO “PART B: COLD WEATHER – GENERAL” OF THIS SUBSECTION:***

7. Concrete shall not be placed on frozen ground, nor shall it be placed when atmospheric temperature is below 40 F. and within 24 hours of the time that the concrete is to be placed, except with the written permission of the Engineer and only after such precautionary measures for the protection of the concrete have been taken as the Engineer may direct.

***ADD THE FOLLOWING PARAGRAPH TO “PART D: HOT WEATHER” OF THIS SUBSECTION:***

9. When the temperature is 90 F. or above, or is likely to rise above 90 F. within the 24-hour period after concrete placement; or when there is any combination of high air temperature, low relative humidity and wind velocity which would impair concrete strength or quality, follow the recommendations of ACI 305R and the following:

1. Keep concrete as cool as possible during placement and curing
2. Do not allow concrete temperature to exceed 90° F. at placement.
3. Prevent plastic shrinkage cracking due to rapid evaporation of moisture.
4. Dampen subgrade and forms with cool water immediately prior to placement of concrete.

Protect the concrete with temporary wet covering during any appreciable delay between placement and finishing.

1. Take appropriate precautions per ACI 305R when the actual or anticipated evaporation rate equals or exceeds 0.2 pounds per square foot per hour as determined from ACI 305R, Figure 2.1.4.

***Add the following subsections TO this SECTION:***

**501.03.70 CORROSION PROTECTION REQUIREMENT**

A. Pipe, conduit, dowels and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there shall be a minimum of two inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement shall not be permitted.

**501.03.71 PREPARATION OF SURFACES FOR CONCRETING**

A. Native material surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud and debris at the time of placing concrete.

B. Concrete surfaces upon or against which concrete is to be placed, where the placement of the old concrete has been stopped or interrupted so that, in the opinion of the Engineer, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be leveled with a wooded float to provide a reasonably smooth surface. A surface consisting largely of coarse aggregate shall be avoided. The joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material.

C. No concrete shall be placed until all form work, installation of parts to be embedded, and preparation of surfaces involved in the placing have been approved by the Engineer.

**501.03.72 EXCLUSION OF WATER**

A. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited under water without the explicit permission of the Engineer and then only in strict accordance with the Engineer’s directions, nor shall the Contractor, without explicit permission from the Engineer, allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as to injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing groundwater, if required, shall be subject to the approval of the Engineer and shall be the responsibility of the Contractor. Said items shall be considered incidental to construction and no additional compensation shall be made.

**501.03.73 TAMPING AND VIBRATING**

A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogenous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement.

**501.03.74 CARE AND REPAIR OF CONCRETE**

B. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which for any other reason does not conform to the specifications, shall be removed and replaced at the Contractor's expense.

**END OF SECTION 501**