

**Pre-bid Conference for  
Contract #3292**

**High Performance Concrete (HPC)**  
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# High Performance Concrete (HPC) for Contract #3292

- What is HPC and why does NDOT specify HPC?
- What are the specification requirements?
- How to make HPC a success?
- What lessons were learned from past contracts?
- What are the consequences of not doing the job right the first time?
- Conclusions

# What is HPC?

Concrete that is engineered to meet specific needs of a project; including mechanical, durability, or construction properties.

# Why Does NDOT Specify HPC?

- NDOT is constructing a significant number of new bridges
- The life expectancy of these structures will be increased to 75 - 100 years without major rehabilitation
- Minimize future maintenance and reduce traffic interruptions

# What are the Specification Requirements?

**501.03.04 Classifications and Proportions.** The first row of Table I in Supplemental Notice #1 is hereby deleted and the following substituted therefore:

Class of Concrete	Cementitious Range kg/m <sup>3</sup> (lb/yd <sup>3</sup> )	Max. Nom. Course Aggregate Size mm (in.)	Max. Water Cement Ratio kg/kg (lb/lb)	Min. 28-day Compressive Strength Mpa (psi)	Slump Range mm (in.) (Nev. T438)	Entrained Air Range %	Unit Mass Variation kg/m <sup>3</sup> (lb/ft <sup>3</sup> )	Use
D Modified (Major) (Special)	360-500 (611-846)	9.5 (3/8)	0.4 (0.4)	Specified on Plans	25-100 (1-4)	N/A	± 50 (± 3)	Special Use

**In addition to the requirements shown in Table 1, submit mix designs that conform to the following:**

**Table II**

Class of Concrete	Min. 28-day Compressive Strength Mpa (psi)	Min. 56-day Modulus of Elasticity Mpa (ksi)	Max. 56-day Permeability Coulombs	Max. Concrete Bleeding (Method A) % after 2 hours	56-day Shrinkage Range %	56-day Creep Range Microstrain / kPa (microstrain / psi)
AA, Modified (Major)	Specified on Plans	X				
AA, Modified (Major)(Mass Concrete)	Specified on Plans	X				
D, Modified (Major)(Special)	Specified on Plans	X		X	X	X
DA, Modified (Major)	Specified on Plans	X				
DA, Modified (Major)(Special)	Specified on Plans	X			X	X
DA, Modified (Major)(Mass Concrete)	Specified on Plans	X			X	X
EA, Modified (Major)	Specified on Plans	X	X			
EA, Modified (Major)(Special)	Specified on Plans	X	X		X	X

# How to Make HPC a Success?

- Communications
- Communications
- Communications

# What Lessons Were Learned from Past Contracts?

- HPC requires team effort among materials and admixture suppliers, contractor, and agency
- NDOT recommends that the material supplier rather than contractor make adjustments in the admixtures at the project site in order to improve the workability
- Ensure the materials supplier knows
  - the specification requirements
  - method of concrete placement and haul distance
  - tentative time of the year for concrete placement
  - structural component for the concrete placement

# What Lessons Were Learned from Past Contracts?

- Stockpile consistency
- Absorption - aggregate should be at saturated surface dry (SSD)
- Crushed sand vs. rounded sand
- Contractor/materials supplier having good quality control
- On-site batch plant vs. hauling concrete
- Batch plant vs. central plant

# What Lessons Were Learned from Past Contracts?

- Concrete trucks are required to be certified
- Care should be taken that water is not added into the concrete during washing of the concrete trucks
- 10 to 15 minutes after the concrete for bridge deck is placed, place pre-wetted burlap
- 10-day continuous wet curing of the bridge deck is very critical

# Consequences of Not Doing the Job Right the First Time!



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# Self-Consolidating Concrete (SCC)

- SCC is allowed to be used on this project if contractor requests the use of it
- Forms need to be designed to withstand the hydraulic pressure and should be water tight

# Conclusions

- Quality HPC can be achieved through team effort, good quality control on contractor's part, effective communication, planning ahead, and having backup plans
- Do the job right the first time!

# Through Effective Communications and Team Work

