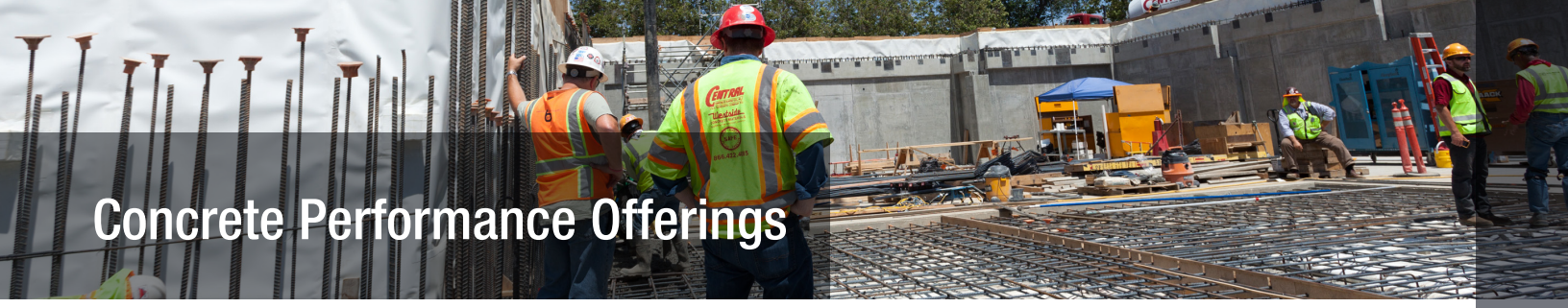
Concrete Performance Offerings

Central Concrete's Quality Assurance and Project Management team work closely with architects, engineers and contractors to assess the performance objectives of their project. We start by understanding the application, contractor considerations, such as schedule constraints or pumping requirements, structural specifications, sustainability goals, and much more.

The table below is a collaborative resource that summarizes the value, considerations, and common applications of various concrete performance options for both designers and contractors. Inquire about mix designs that achieve an individual or combination of these options.

	High Strength	High-Early Strength	High Modulus of Elasticity and Low Deflection	Low Shrinkage
Applications	▸ Core walls ▸ Shear walls ▸ Columns	▸ Post tensioned structural elements ▸ Walls, beams, slabs requiring formwork removal ▸ Paving	▸ Slabs ▸ Columns ▸ Shear Walls ▸ Tunnels ▸ Post tensioned structural elements	▸ Exposed concrete flatwork ▸ Post tensioned structural elements ▸ Industrial flooring
Architectural and Structural Design Highlights/ Benefits	▸ 8,000 – 10,000 psi standard ▸ Design potential above 15 ksi ▸ Strength achievable at targeted age ▸ Achievable with reduced carbon footprint ▸ Accommodates higher load capacity ▸ Potential to reduce structural member size	▸ Achievable with reduced carbon footprint. Often high proportion of total concrete embodied carbon, so this is a good application to target for reducing concrete carbon footprint. ▸ Shrinkage reduction is typically an inherent design property	▸ Higher modulus of elasticity results in reduced long and short term deflection ▸ Insure factor of safety for actual value compared to design value calculation from ACI code ▸ Potential to reduce member sizing ▸ Reduced prestress loss	▸ Reduction of shrinkage reduces the potential for visible cracking. ▸ Restraint of shrinkage from rebar, shape of element, and joint placements also contribute significantly to cracking potential of concrete elements.
Contractor Considerations	▸ Pumpable to 1,000' vertically ▸ Proper testing is critical. Code requires more restrictive curing conditions due to sensitivity ▸ Often designed with ½" maximum aggregate to accommodate rebar congestion	▸ Ability to design for accelerated construction schedule ▸ Ability to utilize real-time strength measurements with maturity testing for validating in-place achievement of constructability strength ▸ Often faster setting and have higher heat of hydration. Options available to mitigate those properties.	▸ Reduced deflection during shoring removal. ▸ Potential to accommodate accelerated schedule while meeting deflection requirements	▸ Reduced cracking potential ▸ Reduced warping/curling potential ▸ Jointing, ambient conditions, and curing techniques also contribute significantly to cracking and warping/curling potential.
Mix Design Considerations	▸ w/cm ▸ aggregate properties ▸ cementitious selection ▸ paste content	▸ w/cm ▸ aggregate properties ▸ cementitious selection ▸ paste content	▸ Coarse aggregate selection is a primary factor ▸ Cementitious selection and proportioning ▸ w/cm ▸ Aggregate proportioning	▸ Water content ▸ Aggregate properties and proportioning ▸ Admixtures



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	Low Permeability	Reduced Heat of Hydration	Synthetic Fibers to Reduce Surface Cracking Visibility	Lightweight
Applications	▸ Concrete in contact with soil ▸ Concrete in contact with salt water ▸ Concrete exposed to corrosive materials ▸ Water treatment facilities	▸ Mass concrete, as defined in ACI 116R as "any volume of concrete with dimensions large enough to require that measures be taken to cope with generation of heat from hydration of cement and attendant volume change to minimize cracking."	▸ Exposed slabs ▸ Topping slabs ▸ Smooth finish or polished floors ▸ Slabs with temperature & shrinkage rebar that are not part of the lateral structural system	▸ Elevated decks ▸ Slab on metal decks
Architectural and Structural Design Highlights/ Benefits	▸ Low permeability improves rebar protection by reducing ability of chlorides and other deleterious materials from permeating through concrete ▸ Low embodied carbon mixes inherently have improved permeability through use of supplementary cementitious materials ▸ Prescriptively designed for in ACI 318 for exposure classes S1, S2, S3, W1, and C2.	▸ Inherently mix has low embodied carbon due to high cement replacement with supplementary cementitious materials.	▸ Eliminate #3 or #4 rebar that is only utilized for temperature & shrinkage control. ▸ Eliminate WWF reinforcement ▸ Reduce or eliminate visibility of surface cracking	▸ Reduced dead load, especially for seismic design ▸ Compliance with fire-rated system
Contractor Considerations		▸ Mitigation of thermal and shrinkage stresses that can be caused by a rapid cooling surface and rapidly heating core. ▸ Real-time measurement of concrete temperature using embedded wireless sensors to show compliance with maximum temperature and differential	▸ Extend joint spacing ▸ Eliminate labor/material for some #3 and #4 rebar placement ▸ Submit plans to Central Concrete for evaluation and recommendations regarding mix design with fiber dosage and quantity of rebar or WWF that can be eliminated ▸ Techniques for successfully pumping a mix with fibers ▸ Smooth, flat finish is achievable with use of correct fiber product and avoiding performing finishing operations too early.	▸ Reduction of slump through pump line due to high absorption of lightweight aggregate. Central Concrete helps to mitigate this by proper conditioning of the lightweight aggregate prior to batching.
Mix Design Considerations		▸ Cementitious selection and proportioning	▸ Paste content and proportioning that corresponds to fiber dosage and mix placement requirements.	▸ Use of a lightweight aggregate ▸ Higher slump upon delivery to accommodate some slump loss through pump line.

Questions? We are ready to help.

Contact your Account Manager
or Regional Project Manager
www.centralconcrete.com
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