

Project:
 Marina Coastal Expressway
 Contract 482

Location:
 Singapore

Project completed:
 2013

Owner/s:
 Land Transport Authority

Applicator/Contractor:
 Ssangyong Engineering &
 Construction Co., Ltd

Concrete Producer:
 Island Concrete (Pte) Ltd

Products used & amounts:
 MasterRheobuild[®] 1000 –
 1,500,000 litres
 MasterPozzolith[®] R 138 –
 600,000 litres

Improving concrete setting for the construction of Marina Coastal Expressway



Our reference of Marina Coastal Expressway (Singapore). Photo courtesy by Land Transport Authority Singapore.

The background

Marina Coastal Expressway (MCE) runs a total length of approximately 5km, connecting the Kallang-Paya Lebar Expressway (KPE) and the East Coast Parkway (ECP) in the East to the Ayer Rajah Expressway (AYE) in the West.

The scope of Contract 482 includes the design, construction and completion of 360m of dual carriageway depressed road structure, 640m of dual carriageway vehicular tunnel structure, slip tunnels, at-grade roads and 280m section of future transit tunnel undercrossing the MCE tunnels, trunk link sewer and associated manholes, waste water pump sump, storm water pump sump and future tunnel stub.

The challenge

The MCE Contract 482 Project is the largest contract ever awarded by the Land Transport Authority. Under this project, the mass castings to the base slabs and top slabs of the tunnels present huge challenges, with six hours of retardation needed along with a concrete placement temperature not higher than 32 degree Celsius. Singapore's hot weather often induces loss of workability in concreting tasks.

To ensure sufficient compaction of fresh concrete, it is critical to extend the time for fresh concrete to remain plastic. In addition, a rapid hydration process can lead to loss in concrete strength since the resultant concrete will have a poorer structure with a higher gel/space ratio. During the hydration process, a substantial heat would be produced. If the hydration process is performed too swiftly, it will lead to a rapid increase in temperature, thereby causing considerable early thermal movement in the concrete.

Contact:
 MB Solutions Singapore Pte Ltd
 Telephone: +65 6232 4899

Improving concrete setting for the construction of Marina Coastal Expressway

Our solution

Several trial mixtures were carried out in consultation with Master Builders Solutions as the supplier of concrete admixtures, in line with the project's key requirements. As the peak temperature of concrete administration must be controlled at a temperature of not higher than 75 degree Celsius, MasterPozzolith® R 138, a ready-to-use, chloride free admixture designed for hot weather concreting, was adopted.

Besides requiring a lower water ratio to produce concrete of a given consistency, the admixture also helps retard concrete setting, thus facilitating easier placement and finishing. In addition to the shorter placement time to save time and labor, MasterPozzolith® R 138 also offered the project several other benefits: better concrete durability; extended workability with no compromises in concrete strength as well as easier and quicker pumping operations that resulted in higher ultimate strength with better surface finish.

MasterRheobuild® 1000, a super-plasticising admixture containing a sulphonated polymer with chloride-free properties to impart rheoplastic attributes to concrete, was also adopted. The benefits it brought to the project were substantial. These included very high workability, high water reduction, superior cohesion, high early strength as well as low shrinkage and creep.

The customer's benefit

- Slowing down of hydration process to maintain concrete strength, slower temperature increase and extend workability in hot-weather concreting.
- Economical mix design featuring the right admixture was achieved.

Projects facts at a glance

- Concrete volume of 400,000m³ required.
- Consists of castings from 1,000m³ to 6,000m³ volumes per casting.
- Construction of this mega project involved more than 1,100 workers at its peak.

Master Builders Solutions by MBCC Group

The Master Builders Solutions brand expresses MBCC's expertise in providing customized chemical solutions for new construction, maintenance, repair and restoration of structures.

Master Builders Solutions is built on the experience gained from more than a century in the construction industry. At the core of the Master Builders Solutions brand is the combined know-how and experience of a global community of MBCC construction experts, who connect with you to solve all of your construction challenges.

Further information is available at:

www.master-builders-solutions.com/en-sg