

Bronze

AWARD OF COMMENDATION

EDP CONSULTING GROUP SDN BHD & AD CONSULTANTS (M) SDN BHD

- District Cooling Plant at Lot 4U2 (Plot 12289), Phase 1,
Precint 4, Putrajaya

The intention of the client, Gas District Cooling (Putrajaya) Sdn Bhd (GDC) was to establish a plant to cater to the increasing cooling demand requirement of Core Island of Putrajaya by about 10,000 RT. GDC had the intention to build and conceptualised Phase 1 of Plant 4 as primarily a Thermal Energy Storage (TES) facility rather than an outright conventional Chilled Water (CHW) Plant with Chillers.

This is a collaborative effort between the Contractor, Suncon Construction Sdn Bhd and the design team comprising AD Consultants (M) Sdn Bhd (ADC) and EDP Consulting Group Sdn Bhd (EDP). ADC and EDP worked together to provide an alternative design bid to the Client GDC. It was based on the alternative designs that included the reengineering the Structural and Mechanical design that produce a winning bid.

ADC put together a TES Water Diffuser System that ensures efficient thermal stratification of the cold chilled water and the warm return water in the Thermal Energy Storage Tank. ADC's challenge was to achieve guaranteed capacity with minimum capacity at optimum overall cost. ADC met the challenge by making the mathematics meet the reality.

Knowing that the pumps constitute the largest power consumption, ADC improved plant efficiency by careful equipment selection, matching them with pipe and system design. The end result was a plant that looked efficiently laid out, operationally efficient and coupled with a control system that gave operational stability and efficient energy consumption.

EDP's challenge was to look at a tank design that would be cost effective and constructible for a tank size of that magnitude. Eventually, EDP proposed a post tensioned concrete tank (as opposed to a RC tank that was in the conforming design bid). The post tensioned concrete tank would firstly be effective in providing a degree of thermal insulation, thus reducing cost of insulation. In addition, the design of the post tensioning was to utilise the pre-compression provided by the tensioned cable hoops to resist the large hydrostatic forces imposed by the stored water. The tank size measure 33.7m high with an internal diameter of 45.5m. The design made the tank more constructible with a uniform wall thickness that allow for quick turnaround time for each cast of concrete. Steel reinforcement was significantly reduced and replaced with lesser quantities of 15.2 mm diameter ASTM A416 strands. From an engineering point of view, this is the arguably the largest post tension chilled water tank in the country. It demonstrated the effective use of post tensioning for large storage tank. From a sustainable point of view, there was less concrete use in this type of construction thereby reducing its carbon footprint.

The plant is significant in many ways mainly because of its size. It is possibly one of the biggest, if not the biggest Thermal Energy Chilled Water Storage Tank in the world. It is also significant in Engineering terms because it has been be conceptualised

and designed very much jointly between the Structural and Mechanical Engineers, to optimise the design so as to achieve the cost that won the bid.

This project when completed is to provide chilled water for cooling in the Core Island of Putrajaya. It is an energy efficient system that in this world where climate change is of great concern, both nationally and globally, this engineering effort claims to meet that challenge.

