Water-wise Development at Google Bay View

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Bay View Project Context

CHARLESTON EAST

GOOGLEPLEX

BAY VIEW
What is Geo-Exchange and Geo-Energy Piles?

- Heat pump technology based heating & cooling system
- Heat pumps:
  - Electric driven refrigerant based thermal energy conversion technology
  - "Move" thermal energy from lower to higher temperature level in opposite direction to natural energy flow
- Uses earth’s stable temperatures as a low-grade heat source and sink for heat pumps
- Geo-Energy Piles - Geo-Exchange loops integrated into building structural piles

[Diagram of heat pump system]

[Diagram of Geo-Exchange loop]

[Diagram of building integrated with Geo-Exchange piles]

[Google link: http://industrialheatpumps.nl/en/]
Precedent Projects with Installed Geothermal Piles

North American Geoexchange Pile Projects
- Ramada Geneva Lakefront
- Trevor Day School
- Federal Center South Buildings
- 5th Ave & Madison St
- Parks Canada Discovery Cen...
- Calgary International Airport

Base map
For cooling, eliminated 60% of energy demands and 90% of water demands... 5M gallons/year!
Conventional System Diagram
Charleston East System Diagram

- Municipal Potable Water
- Municipal Recycled Water
- Rainwater
- Stormwater

BLENDING (TDS < 550 ppm)

- Potable Building Uses
- Consumption Human Waste
- Cooling Blowdown
- Non-Potable Building Uses
- Irrigation

Sanitary Sewer
Demands & Supply Overview

NON-POTABLE

POTABLE

DEMANDS

Cooling

Irrigation

Toilets / Urinals

Sinks
Showers
Laundry

Consumption
Reducing Potable Demand: City RW

**DEMANDS**
- Consumption
- Sinks
- Showers
- Laundry
- Toilets / Urinals
- Irrigation
- Cooling

**SUPPLIES**
- City Potable
- City Recycled Water
Reducing Potable Demand: City RW + Rain/Storm

**DEMANDS**
- Cooling
- Irrigation
- Toilets / Urinals
- Sinks
  - Showers
  - Laundry
- Consumption

**SUPPLIES**
- City Recycled Water
- City Potable

**CONVENTIONAL**
- City Potable

**CHARLESTON EAST**
- City Recycled Water
- Stormwater
- Rainwater
Reducing Potable Demand: Rain/Storm + Onsite Generation

**DEMANDS**
- Cooling
- Irrigation
- Toilets / Urinals
- Sinks
- Showers
- Laundry
- Consumption

**SUPPLIES**
- City Recycled Water
  - City Potable
  - Stormwater
  - Rainwater

**CHARLESTON EAST**
- On-site Treated Wastewater
- Stormwater
- Rainwater
- City Potable for Potable Only

**BAY VIEW**
- Non-potable Export
  - On-site Treated Wastewater
More projects to come!

CHARLESTON EAST
SIZE: 595k SF
WATER: Dual Plumbing, Blending, Rain/Storm, Net Positive Ready

CARIBBEAN SITE
SIZE: 1M SF
WATER: Dual Plumb, other systems under eval.

BAY VIEW
SIZE: 1.1M SF
WATER: Dual Plumb, Blending, Rain/Storm, Net Positive Water

1212 BORDEAUX
SIZE: 100k sf
WATER: Dual Plumb

More projects to come!