International
Canada

Client
City of Calgary

Location
Calgary, Alberta, Canada

Estimated Completion Date
2008

Contract Value
Engineering Fees: CDN $35M
Construction: CDN $300M

Pine Creek Wastewater Treatment Plant

A Landmark Project

The City of Calgary (the City) has been recognized as having the highest-ranked level of wastewater treatment among major Canadian cities. Treated effluent is discharged to the Bow River, an important natural and recreational resource and world-class sport fishery which has its source in the Rocky Mountains. To maintain this high standard of treatment and to accommodate growth, the City retained CH2M HILL to provide design and construction services for the new Pine Creek Wastewater Treatment Plant (WWTP). This facility will have an initial capacity of 100 ML/d to serve a population of 250,000 and an ultimate capacity of 700 ML/d to serve a population of 1,750,000.

CH2M HILL is the prime consultant providing project management and lead process design services for this landmark facility. Major subconsultants include Stantec, Earth Tech, and Graham Edmunds Cartier. The scope of services includes conceptual, functional, detailed design, and construction services. Commissioning and post-construction services are expected to follow. CH2M HILL is also providing high-level guidance to the City in managing offsite projects within the Pine Creek Wastewater Treatment Program.

Environmentally Sensitive Setting

The facility is located in a parkland setting adjacent to residential development. Therefore, environmental mitigation and contextual integration issues have been critical to project success. The site attracts recreational users and wildlife and is replete with archaeological artifacts. A significant public participation process was undertaken to obtain stakeholder input and endorsement. Due to its location, the layout includes a number of features to integrate the overall facility into its surroundings.

Innovative Wastewater Technology

The Pine Creek WWTP will use state-of-the-art treatment processes that include Biological Nutrient Removal for ammonia and phosphorus removal, effluent filtration for enhanced solids and phosphorus removal, and ultraviolet light disinfection. The treated effluent will be discharged to the Bow River via diffusers installed below the river bed. A portion of the treated effluent will be used to irrigate nearby golf course and tree nursery developments.

Effluent quality will meet or exceed the following criteria:

$CBOD_5$	15 mg/L
TSS	20 mg/L
Total Phosphorus	0.5 mg/L
Total Nitrogen	15 mg/L
NH_3-N, summer	5 mg/L
NH_3-N, winter	10 mg/L
Fecal Coliform Counts	200 per 100 mL

Sustainable Design

The facility design incorporates the sustainable planning concept of a Triple Bottom Line – the balancing of environmental, societal, and economic needs. The treatment process will protect the water quality of the Bow River, while the layout, architecture, landscaping, and odour and noise control design will decrease the impact of the facility on the environment. The landscape design includes trails and bike paths that extend to the plant – and beyond.

The Leadership in Energy and Environmental Design (LEED™) Green Building Rating system, which has been used to guide the design, incorporates green building concepts such as recycled building materials and energy-saving heating and cooling systems. The entire site is being approached as a LEED 'campus' under the new LEED Canada NC 1.0 accreditation process. The operations, maintenance, and administration building will be the key LEED building on the site.

Cutting Edge Research Facility

A unique aspect of the plant is the onsite Calgary Water Centre, a collaborative effort between the City and the University of Calgary. It will include a university research facility, visitor interpretive centre, and public education areas focusing on water technologies.

The university research component of the Centre will include a small wastewater treatment plant and up to 12 identical research streams that emulate natural stream flows, riffles, and pools. The research streams will model the behaviour of chemicals and additives frequently found in streams near urban developments, investigating how the chemicals are transported and where they tend to accumulate in the streams.

A Contracting Strategy for Challenging Market Conditions

A robust construction market has limited contractor bonding capacity, material/labour supply, and risk acceptance by the construction industry for all projects in Western Canada. CH2M HILL worked with the City to develop the preferred contracting strategy, cost mitigation measures, and construction 'packages' of significant scale and scope to attract contractors who were well-qualified yet small enough to mitigate bonding capacity constraints. The strategy incorporates 12 construction contracts and offers a risk-sharing approach between the City and the construction contractors.

Key Project Elements

- Engagement of multiple stakeholder groups
- Sustainable design employing Triple Bottom Line planning concepts
- Design integrated with the environmentally-sensitive Bow River Valley and future extension of Fish Creek Provincial Park
- Responsive to archaeological, wildlife, and aesthetic challenges, including adjacent high-end residential development
- Innovative wastewater technology
- Cutting-edge research facility
- Contracting strategy for a challenging construction market