Peace Project Water Use Plan

Physical Works Terms of Reference

- Peace and Williston Recreational Access
  - Maintenance of pre-WLR ramps

GMSWORKS #13    GMS WORKS #24

Note:
GMSWORKS#13 is now GMSWORKS#29 Lynx Creek and GMSWORKS#30 Taylor Ramp
GMSWORKS#24 is now GMSWORKS#31 Kwadacha
Terms of Reference for the Peace Water Use Plan
Peace and Williston Recreational Access

1.0 Introduction

These Terms of Reference outline the annual maintenance program necessary for the continued safe and reliable operation of two boat ramps on the Peace River (at Lynx Creek and Peace Island Park) and one boat ramp on the Finlay (at Kwadacha). These three boat ramps were recommended by the Peace WUP Committee (2003) and ordered by the comptroller (August 2007) along with a number of other boat ramps on the Williston and Dinosaur reservoirs and the Peace River. However, the ramps at Lynx Creek, Peace Island Park and Kwadacha were constructed prior to the comptroller’s August 2007 order and, as such, were not included in the subsequent TORs and feasibility studies (April 2008 and August 2009, respectively).

The Peace Water Use Plan water use planning process was initiated in February 2001 and completed in May 2003.

These Terms of Reference are submitted in response to the Order (Files No. 76974-35/Peace) issued by the Comptroller of Water Rights on 09 August 2007.

Schedule A (4) of the Order states that:

4) The licensee shall submit, within 9 months of the date of this order, for approval by the Comptroller, terms of reference for a feasibility study on reservoir access, evaluating improvements to access points as follows:

   a. Finlay Reach: new access at Ingenika and Fort Ware and improvements to the Tsay Keh Village barge landing …

Schedule C of the Order states that:

2) The licensee shall submit, within 9 months of the date of this Order, for approval by the Comptroller, terms of reference for a study to improve boat ramp access to the river at:

   a. Lynx Creek
   c. Peace Island Park

These Terms of Reference request approval of the maintenance plan for the three mentioned ramps including the annual budgets for each ramp as per the recommendations in the Peace WUP report (2003).

2.0 Description of Project

2.1 Location

The headwaters of the Peace, a tributary of the Mackenzie River, are located in north-eastern British Columbia (Figure 1). The Peace is formed by the confluence of the Finlay
and Parsnip rivers flowing in opposite directions in the Rocky Mountain Trench. At the confluence the Peace flows east and is the only river to cut through the Rocky Mountains. Once out of the Peace Canyon the river maintains an easterly direction, crossing the B.C./Alberta border. The Peace River is confluent with the Slave River that, in turn, flows north into Great Slave Lake in the Northwest Territories. The Mackenzie River begins at the outlet of Great Slave Lake and flows north to the Arctic Ocean.

Figure 1: Place Names in Peace Water Use Plan

2.2 Existing Works

The existing works comprising the Peace project include:

W.A.C. Bennett Dam:

- This dam, commissioned in 1967, is located at the head of the Peace Canyon and forms Williston Reservoir. The earthfill dam is 2040 m (6692.8 ft) in length at the crest and 183 m (600.4 ft) high with a crest elevation of 679.7 m (2230.0 ft) above sea level.
- Williston Reservoir covers approximately 1773 square kilometres (km²) (684.6 square miles (miles²)) at full pool and has an active storage of 393 Million
cubic metres (Mm$^3$) (32 Million acre feet (MAF)). The operating range of the reservoir for power generation is between 672.08 m (2205.0 ft) and 642.00 m (2106.3 ft).

- The spillway has three radial gates and nine sluice gates. The sill elevation for the radial gates is 653.53 m (2144.1 ft) and the sluice gates 641.60 m (2105 ft). The maximum discharge is 9200 m$^3$/s (325 000 ft$^3$/s) using the radial and sluice gates.

- Power Intakes: There is one power intake for each unit. They are located on the left side of the dam. Intakes are 3.96 x 5.94 m (13 x 19.5 ft). The sill elevation for intakes 1 to 3 is 594.36 m (1950.0 ft). The sill elevation of intakes 4 to 10 is 627.89 m (2060.0 ft).

G.M. Shrum Generating Station:
- The underground G.M. Shrum Generating Station (GMS) has 10 units with a total installed capacity of 2730 MW. Once through the turbines, the water is discharged through two manifolds, one for units G1 to G5 and one for G6 to G10, into the upper end of Dinosaur Reservoir.

Peace Canyon Dam:
- This dam is located at the foot of the Peace Canyon forming Dinosaur Reservoir. The Peace Canyon Dam consists of a concrete gravity dam and earthfill saddle dam on the right abutment. The main dam is 325 m (1066.3 ft) long and 61 m (200.1 ft) high with a crest elevation of 507.5 m (1665.0 ft) above sea level. The saddle dam is 200 m (656.2 ft) long and 20 m (65.6 ft) high.

- Dinosaur Reservoir covers approximately 9 km$^2$ (3.5 miles$^2$) at full pool. It has limited active storage. The shoreline length is 54.4 km (33.8 miles). The normal operating range is between 502.92 m (1650.0 ft) and 500.00 m (1640.4 ft).

- The spillway has six radial gates. The sill elevation for the radial gates is 491.3 m (1611.9 ft). The maximum discharge is 10 280 m$^3$/s (363 000 ft$^3$/s).

- Power Intake: There is one power intake for each unit. The intakes are 6.7 x 12.4 m (22.0 x 40.7 ft). The sill elevation is 426.3 m (1516.5 ft).

Peace Canyon Generating Station:
- The Peace Canyon Generating Station has four units with a total installed capacity of 700 MW. The water is discharged into the Peace River.

3.0 Background

The Peace Water Use Plan Consultative Committee (Consultative Committee) recommended a package that included operating constraints and physical works for the Peace system that would result in enhanced recreational access to the Williston Reservoir, the Dinosaur Reservoir and the Peace River below Peace canyon Dam.
Williston Reservoir

The Williston Reservoir, at the time of the Water Use Plan, had no boat launch sites in the Finlay Reach and only an informal site on the Finlay River at Kwadacha. Prior to the WUP being approved and the Peace Order being given under the Water Act, agreement was reached between Kwadacha and BC Hydro to build a new boat ramp on the Finlay River at Kwadacha. When the Peace Order (76975-35) was conveyed to BC Hydro it included the direction to undertake a feasibility study for a ramp at Kwadacha. The ramp was, of course, built without first undertaking a feasibility study and no provisions were made at the time for funding ongoing maintenance to the boat ramp.

Peace River

At the time of the WUP, the boat ramp at Blackfoot Park was the only trailer accessible boat launch between Taylor and the Alberta border. It is a rustic (i.e. gravel bed) launch that is suitable for 4-wheel drive access only and is not usable at low flows. As well, river currents can make launching and trailering problematic for most users. At Halfway River there are 3 undeveloped launch sites. Two of these sites are on the Halfway River and one is on the Peace River (near km 44), which is accessible via 1 km of very rough road. Prior to the Peace Order, BC Hydro agreed to fund boat ramp construction at Peace Island Park and at Lynx Creek. Both of these sites are recommended in the WUP report and are order in the Peace Order (76975-35). As with the Kwadacha site, neither the Lynx Creek ramp nor the Peace Island Park ramp were the subject of feasibility studies first and no provisions were made at the time for funding ongoing maintenance for these ramps.

All three of these ramps were recommended by the Peace WUP Committee (2003) and ordered by the Comptroller of Water Rights (August 2007 – Order 76975-35). These three boat ramps were not included in the TORs for GMSWORKS #12, 13 and 24 as they were already under construction via other channels. GMSWORKS #12 and 13 and 24 Feasibility of Boat Ramps Studies were submitted to the comptroller on 8 May, 2008. A component of these studies included consideration of and estimates for annual maintenance requirements for the ramp facilities. These feasibility studies will in turn be forwarded to the comptroller for approval of costs, including maintenance costs, leave to commence to final design. These terms of reference request approval for annual maintenance dollars for the three ramps that were not included in the feasibility studies.

4.0 Need for Maintenance

The three boat ramps covered by this TOR have different maintenance requirements than other ramps in the WLR system. These three ramps (Peace Island Park, Lynx Creek and Kwadacha) are all river ramps and subject to different forces, as well they are all pre-WLR ramps that were not engineered to the same standard and use pre-cast concrete planks that tend to be more problematic than cast-in-place concrete slabs.

5.0 What’s Involved for Each Ramp

5.1 Peace Island Park

The ramp at Peace Island Park, across the river from Taylor, BC is a low slope ramp constructed of large, salvaged, concrete stabs (with imbedded steel rails) set on a
graded bed of native river gravel. There is no rip-rap placed on the upstream edge of the concrete to reduce scour and undercutting of the slabs nor has a groyne been integrated to reduce and re-direct the river currents away from the ramp. Although the ramp is only 2 or 3 years old there is already evidence of significant erosion on the upstream edge of the ramp and at the toe of the ramp. Boaters are noticing that the scour at the toe is significant enough that if they drive off the edge of the concrete they have a difficult time pulling their trailer wheels back onto the ramp. Currents are significant at the ramp and an island adjacent to the site on the upstream site is subject to ongoing erosion.

The immediate maintenance plans for the Peace Island Park ramp are to construct a groyne using loc-blocks® to protect the ramp and deflect the current to make loading and unloading boats easier and safer. As well, we plan to place rip-rap material along the exposed edges of the ramp to prevent further scouring and to prevent trailers from falling off the end of the ramp. Rip-rap may also be placed along the upstream side and edge of the loc-block® groyne to prevent undercutting. Bumpers and cleats will be attached to the loc-block® groyne for boaters to tie to.

On going maintenance at Peace Island Park may revolve around ensuring that the scour protection elements remain effective and the ramp surface remains in good repair. Maintenance of upland parking areas is not necessary as the ramp is integrated with a large day and overnight park facility with ample parking.

At this time, the District of Taylor has expressed and interest in undertaking the annual maintenance of the ramp, as they maintain the rest of the park facilities, although no formal arrangements have been made. A possible protocol would be for the District to forward a maintenance program annually to be approved by BC Hydro at which time BC Hydro would forward the funds to the District.

5.2 Lynx Creek

The boat ramp at Lynx Creek, one of the listed ramps in the Peace Order of August 9, 2007, was constructed, outside of the WLR process by staff at GMS, in 2008. It is a small ramp located on BC Hydro property, about 7 kilometres from Hudson’s Hope, and provides access to the Peace River. The ramp is constructed of pre-cast concrete planks with an upstream rock groyne to deflect river currents and reduce erosion around the ramp.

While the ramp is only about two years old it requires a significant level of maintenance owing to some abuse from tandem trailer water tankers that access the Peace River at the Lynx Creek ramp site to fill up. The water tankers are under contract to the oil and gas industry in the area to supply water for the “fracing” process that releases gas bound in shale deposits. The ramp was not built to withstand the weight of a loaded tanker and the result is dislocation of the concrete planks and, in some cases, breakage. As well, it now appears that the rock groyne has settled significantly since construction and is no longer providing the same erosion protection or current deflection to the ramp.

Maintenance planned for 2010 may include making repairs to or replacing any pre-cast concrete planks that are dislodged or broken. We plan to replace the rock groyne with a double row of loc-blocks® that will function both as erosion protection and as a docking facility. It might be possible to schedule this work will for a low water period during the coming summer.
Future maintenance on the ramp may include ongoing work on the ramp surface to re-embed any dislocated pre-cast concrete planks as well as continuing work on the parking area and road access.

5.3 Kwadacha

The Kwadacha Boat Ramp is located on the west bank of the Finlay River across from the Village of Fort Ware. This boat ramp was included in the WUP and in the eventual order from the Water Comptroller but was initiated prior to WUP approval at the behest of BC Hydro’s Board of Directors. The ramp was designed by Wesmar Engineering and construction was completed in the fall of 2007. The ramp is constructed of pre-cast concrete planks, tied together with chain, on a gravel sub-grade. The ramp is oriented perpendicular to the river bank and launching is almost perpendicular to the river current. There is a small, graded, parking area upland from the ramp.

Immediately following construction, it became apparent that the orientation of the ramp, perpendicular to the current, presented some safety concerns and the ramp was not functional as built. A follow-up project was proposed to design and construct a rock groyne upstream from the ramp to deflect and reduce the effect of the current at the ramp site. Construction of the groyne was undertaken during fall/winter of 2008/2009 and completed by 31 March 2009.

Annual maintenance at this ramp may include repairs to the ramp including replacement and/or realignment of individual pre-cast concrete planks that will become dislodged and broken with use. The groyne may need to be maintained periodically as ice and freshet flows take their toll on the structure. Ice and freshet flows may have an impact on the ramp surface as well. Some maintenance funds might also be directed to gradually add a new alignment to the ramp by grading a slope on the south side of the ramp to take advantage of a back eddy that can be used for launching during the higher river flows. It is anticipated that the annual maintenance of the Kwadacha Ramp could be contracted to the Kwadacha First Nation due to their familiarity with and proximity to the ramp.

6.0 Cost Objectives

The following tables show the estimated costs associated with this project.

<table>
<thead>
<tr>
<th>Ramp Project</th>
<th>Total Program Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taylor Ramp</td>
<td>$314,445</td>
</tr>
<tr>
<td>(Peace Island Park)</td>
<td></td>
</tr>
<tr>
<td>Lynx Creek</td>
<td>$188,667</td>
</tr>
<tr>
<td>Kwadacha</td>
<td>$188,667</td>
</tr>
</tbody>
</table>