Dec. 9, 2010 APEGM – Shoreline Protection Meeting

Presentation by: Dean Gould, P. Eng.
Association of Professional Engineers and Geoscientists of the Province of Manitoba

- Present member of the Manitoba - Shoreline Erosion Technical Review Committee (SETRC).
- Dean Gould, P. Eng.
- Dean Gould Engineering & Associates, 306 – 3285 Pembina Highway, Winnipeg, MB, R3V 1T7, Ph: (204) 269-2829

Location: Vicount Gort Hotel, 1670 Portage Ave, Winnipeg, MB
Meeting Notes by: J. Nicholson, P. Eng.

Dean Gould, P. Eng., is a member of the Manitoba Shoreline Erosion Technical Review Committee (SETRC). The SETRC are an advisory committee only, and do not have any regulatory authority.
- There has been a rate of erosion report of Lake Winnipeg by Mr. Frank Penner and Mr. Ludlow.
- The Baird report examined the water level variations, and the wind effect on water levels.
- Loss of property and who owns it. Lake Winnipeg elevation below 713.5 feet (above sea level) becomes the fisheries ownership.
- Canadian federal department of Fisheries & Oceans, Hydraulics, Municipalities, Land Surveyors, Manitoba provincial Water Stewardship, all have regulations. There is no regulatory powers for the SETRC committee.

- They suggest buildings be setback from the shoreline. There has been a 50 foot erosion rate. There must be properly designed and constructed shoreline protection. The armouring, and toe embedment, must help prevent water undercutting and undermining.

- There hove been four (4) Manitoba shoreline protection demonstrations projects in recent years, three on Lake Winnipeg, and one on Lake Manitoba.
- Different locations require different shoreline protection techniques and solutions. There is no one solution.
- Consider the end treatment and possibility of liability. Designed rip rap treatment for some locations.
- There is a need for adequate back-drains for wave recession and water movement.
- There must be stability of walls and structures.
- There must be adequate land drainage for water. Septic holding tank locations could be bad as they could capture and hold this (non drained) water, which is not wanted to occur.
- Subsurface water drainage is very important. The groundwater must be able to flow to help prevent flooding. Examples are Lake Manitoba, and artesian water wells.
- The quality of the stone, durability, grading, and size of stone, are all very important considerations.
- The height of the protection, and splash pads are very important. There have been past problems up to 720 feet above sea level elevations (and even at higher elevations, due to storms).
- On October 27, 2010, there was an extreme (wind) storm with recorded levels above 722 feet above sea level elevation on Lake Winnipeg. The SETRC is now looking at shoreline protection at up to 724 feet above sea level. The Lake Winnipeg was at 715.2 feet above sea level elevation before this storm.
- Design considerations – rip rap design, functions of slope, height of waves. Lake Winnipeg data from Oct. 27, 2010 storm, deep water waves, back hydraulic pressures.

- Stability of wall designs – gabions (which are wire baskets filled with rock), must be installed correctly (or they can be destroyed). Avoid water undercurrents, and eddy currents.
- There can be failures (from Oct. 27, 2010 storm) – using geo-textile (good separator, but not good for water drainage), concrete wall failures (Winnipeg Beach, MB in southern Interlake), undermining (Grand Beach, MB boardwalk collapse), and other examples of undermining.
- Weak soils, ground water release. French drain was a past solution.

- Groynes – very hard to design correctly. Hydraulically very complex to design and install correctly. Can destroy beach, and fish habitat, creates navigation hazards, and can cause sand to be moved / eroded – adds and removes sand deposits along the shoreline. (A groyne is a rigid hydraulic structure built from an ocean shore (in coastal engineering) or from a bank (in rivers) that interrupts water flow and limits the movement of sediment. In the ocean, groynes create beaches, or avoid having them washed away by longshore drift. In a river, groynes prevent erosion and ice-jamming.)

The three (3) Lake Winnipeg shoreline protection demonstration projects.
1) Winnipeg Beach, MB southern Interlake – Sea wall replacement. Parks – splash design and had lots of back drainage.
2) Hnausa Park, MB – low shoreline protection. Biologically complex. Four foot vertical drop. Rock at shoreline edge – 718 feet above sea level elevation. Then biological planting. Department of Fisheries & Oceans. Then added larger trees.
3) Traverse Bay, MB – high shoreline protection. UMA Engineering firm involved in this project. Shoreline was scalping areas out. Large land loss in short period of time. Added shoreline protection with multi-level shoreline work. Excavated down to 709 feet above sea level elevation, then added geo-textile, then added rip rap rock. Used toe embedment. Grass impregnated geo-textile at higher shoreline elevation levels.

Twin Beach, Lake Manitoba, MB – 11 year old Segmental Block wall, with stone rip rap at base for toeing.

Permitting Process – part of planning districts / municipalities, for effective shoreline protection. Measure of private property control.

ISSUES
- Issues of wire rusting, and longevity of Gabions.
- Storm water levels and frequency on Lake Winnipeg are increasing. The Lake is at higher water elevations.
- No data on long term geo-textile performance, and drainage.
- Longevity of limestone – depends on stone hardness.
- Impacts of ice action on shorelines. Ice pressure ridges. Freeze at the bottom. Higher water encroaching inward. In the spring, ice moves in, increased pressure (this has been measured to 7000 lbs./square foot), as part of melt and re-freeze action.

Asked Questions at Meeting Presentation End
- Has any use been made, or attempts, using sand catches, as a shoreline protection technique? Dean Gould, P. Eng. stated he was not sure if this sand catches method has been tried.

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Dean Gould, P. Eng.
A Manitoban by birth and a U of M graduate, registered in 1964 with APEGM. In 1962 he served as the Soils Engineer for the Red River Floodway until 1965 when he became the Materials Engineer for the Department of Public Works on the Alaska Highway. In this position he was responsible for a highway soils department establishing material sources for over 1000 miles, initiating paving (then termed dust control) , providing foundation design for bridges and developing Geotechnical design for new road systems. In 1968 he returned to Winnipeg and was involved in the earthworks design of the South Indian Lake and Lake Winnipeg Regulation dams and dikes with UMA (now AECOM) and with Manitoba Hydro. With Manitoba Hydro he also served on the Task Force for the Winnipeg River redevelopment study.

In 1978 he became the Manager of Geotechnical operation for ID Engineering (now Stantec Consulting) and in 1982 joined Ducks Unlimited as the Provincial Engineer, writing the Geotechnical

design manual for that National organization and through presentation was involved in various sizes of water retention projects throughout Canada.

In 1986 he started a private practice that continues through today. Projects have included retention ponds, landfills, dike designs, tunnels, shoring design, numerous bridge and building foundations, riverbank stability projects and transmission lines. In addition he has served on Value Engineering Committees evaluating design for major projects such as the Red River Floodway expansion, the Winnipeg BRT and the Kenaston Underpass (in south Winnipeg). In 2004 he became the Chairman of the Shoreline Erosion Technical Committee and together with other ongoing projects provides engineering advice to landowners, municipalities, and contracts, on improving methods to limit erosion and loss of property and infrastructure.

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