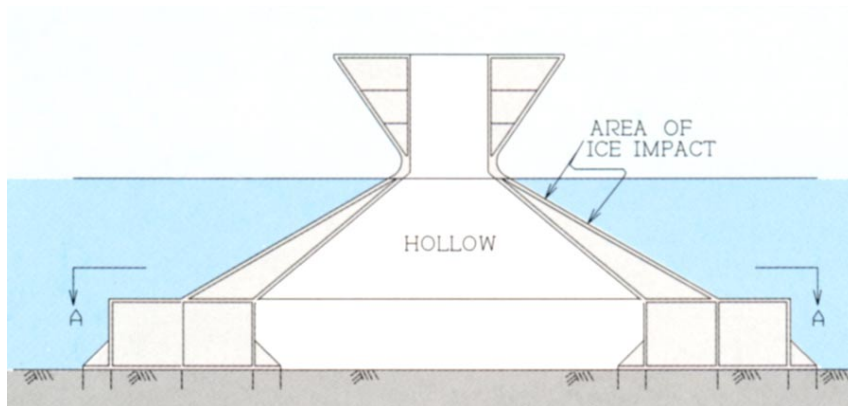


Double-Shell Conical Structures



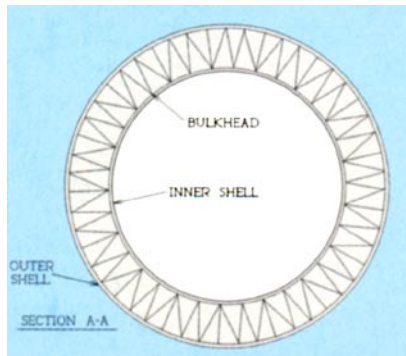
Generic double-shelled conical GBS substructure.

Ben C. Gerwick, Inc. has during the past ten years been engaged in the development and refinement of advanced concepts for concrete gravity base structure, (GBS), platforms in the Arctic.

Double-shell conical structures represent a very promising concept. Conceptual double-shell conical structures have been developed for several major oil companies. The double-shell conical GBS concept was developed for service in relatively deep water in the U.S. Beaufort and Chukchi Seas.

Design ice features include multi-year ridges with thicknesses of up to 25 m (80 ft). Conically shaped GBS structures can resist large ice features by breaking them in upward flexure against the sloped peripheral wall of the structure.

Arctic GBS structures require large foundation areas to resist potential ice induced sliding and over-turning. The double-shell configuration can be designed for adequate strength to resist concentrated ice forces, while minimizing material volume, and cost, by elimination of the core of the structure.



Section A-A through double cone.

The outer peripheral wall of ice resistant GBS platforms must be made strong enough to resist high local punch shear forces on the order of six to ten M Pa (870 to 1,450 psi) over small areas. High local loads can impact anywhere on the ice resistant peripheral wall, and the entire wall must be made strong enough to resist the local ice loads.

As the intensity of ice pressure typically diminish rapidly with increasing loaded area, this leaves the outer shells of a double-shell conical structure with adequate capacity to carry large global loads in three-dimensional membrane action, without the need for expensive internal bulkheads.

Double-shell conical structures have been analyzed and found to possess good system and member ductility. The three-dimensional shape of the shells, together with the truss action of the interconnecting bulkheads, results in an efficient distribution of forces and efficient development of structural capacity.

Services Performed:

- Concrete Gravity Structures
- GBS Platforms
- Double-Hull Structures
- Ice Loading
- Design in Arctic Regions
- Concrete Durability
- Structural Analyses