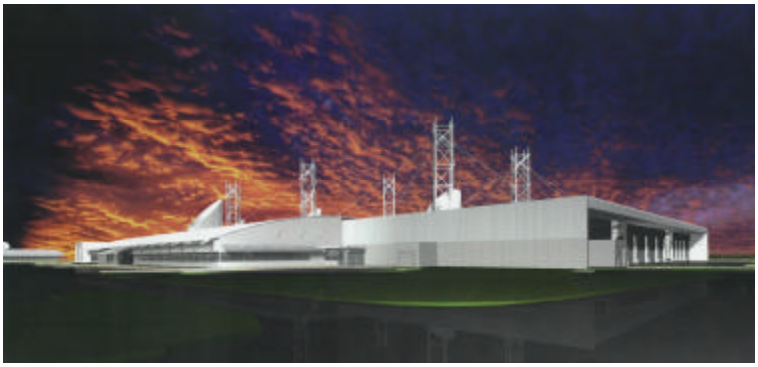
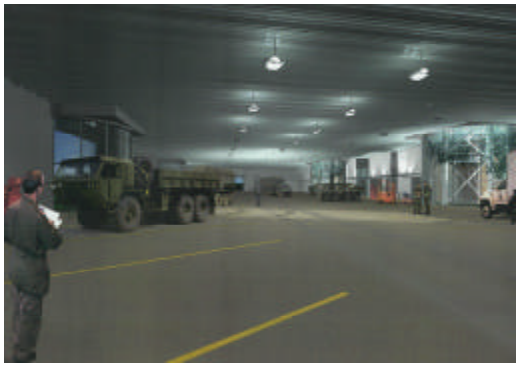
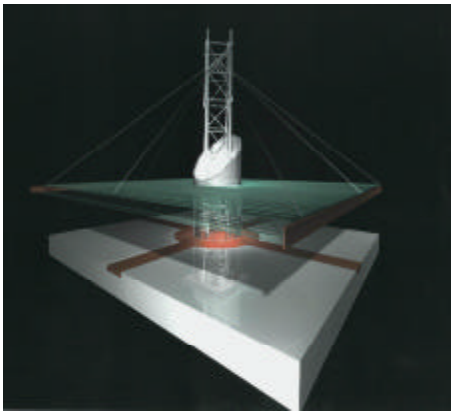
AIR FORCE LOGISTICAL SUPPORT BUILDINGS
Design-Build Proposal

17 Wing, Department of National Defense **Winnipeg, Manitoba**





Maintenance Facility



Office Building

Project Description

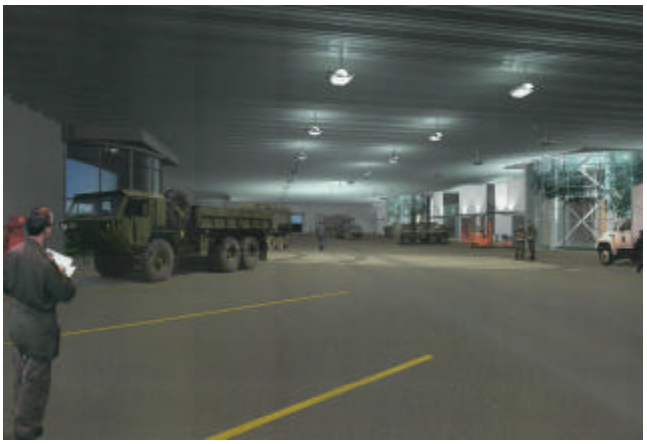
In 2003, KGS Group worked with GBR Architects and Dominion Construction on the preliminary design for a new 16,000 m^2 logistics facility and office building for DND 17 Wing in Winnipeg. This $35 million GBR/KGS design-build submission was highest rated of all submissions from a quality and technical standpoint. The design, for which KGS Group contributed structural, mechanical and electrical design services, was developed sufficiently to allow detailed “firm price” cost estimates and a complete energy analysis.

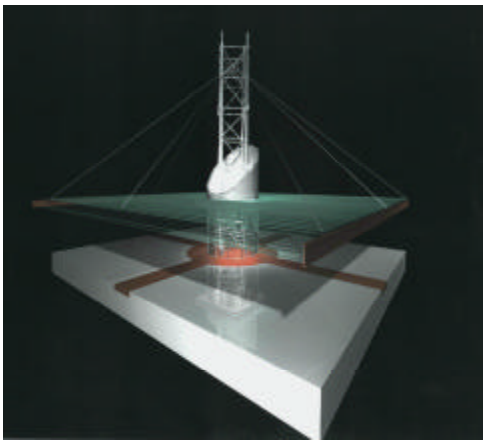
Mechanical challenges included the design of large HVAC systems that would not only meet the ASHRAE Standard 90.1 – 2001 energy standard, but improve on them by more than 25%. Design alternatives were simulated on Carrier HAP software before the scenario offering the most appropriate mix of low energy costs and low capital costs was established. The proposed design included air to air heat recovery system and the use of groundwater for space and ventilation air cooling and heating.

The proposed structural system for the building utilized a “stressed skin” corrugated steel shell system (which served as both the building envelope and the structural roof skeleton). This reduced the structural steel weight of the building while allowing the use of dramatic open spaces with minimal columns. The reduction in the interior columns required the use of six interior towers to suspend the roof system. In order to incorporate the use of natural light in the building interior, these column towers were designed to frame skylights.

KGS GROUP

17 Wing, Department of National Defense **Winnipeg, Manitoba**





Mechanical & Electrical Systems

This building consisted of various zones including areas for office/computer systems, base maintenance and military vehicle storage, vehicle repair garage, material storage areas, as well as vehicle car wash and paint facilities. Project challenges included the design of large HVAC systems that would not only meet the ASHRAE Standard 90.1 – 2001 energy standard, but exceed them by more than 25%. Up to 30 energy conservation design alternatives were simulated on Carrier HAP software before the scenario offering the most appropriate mix of low energy costs and low capital costs was established.

The final design included air to air heat recovery systems. It also used groundwater for space and ventilation air cooling to replace the need for chillers and related cooling towers. In winter the same groundwater system, using a secondary glycol loop, was used to preheat outside ventilation air. This 'double use' of the well water system for both cooling and heating without using a heat pump not only reduced capital costs over conventional systems but significantly reduced natural gas fired steam requirements, electrical power consumption, and long term maintenance costs. By using the groundwater for both cooling and heating, the net annual impact on the underground aquifer temperature was projected to be zero with a potential for a slight decrease in ground water temperature, thus providing an exceptionally 'green' solution for the building HVAC system.

Structural System

The structural system for the building employed several innovative approaches to accommodate the functional requirements and the "green" approach required by the client. The roof system utilized a "stressed skin" corrugated steel shell system (commonly referred to as a Behlen Building type) which served as both the building envelope and the structural roof skeleton. This reduced the structural steel weight of the building while allowing the use of dramatic open spaces with minimal columns. The reduction in the interior columns required the use of six interior towers to suspend the roof system. In order to incorporate the use of natural light in the building interior, these column towers were designed to frame skylights. In some cases these towers were further enlarged to allow not only natural light but also interior planting to enhance aesthetics as well as energy conservation. The towers were also position to function as hubs for interior circulation corridors.