THE ADAPTABLE ENVIRONMENT

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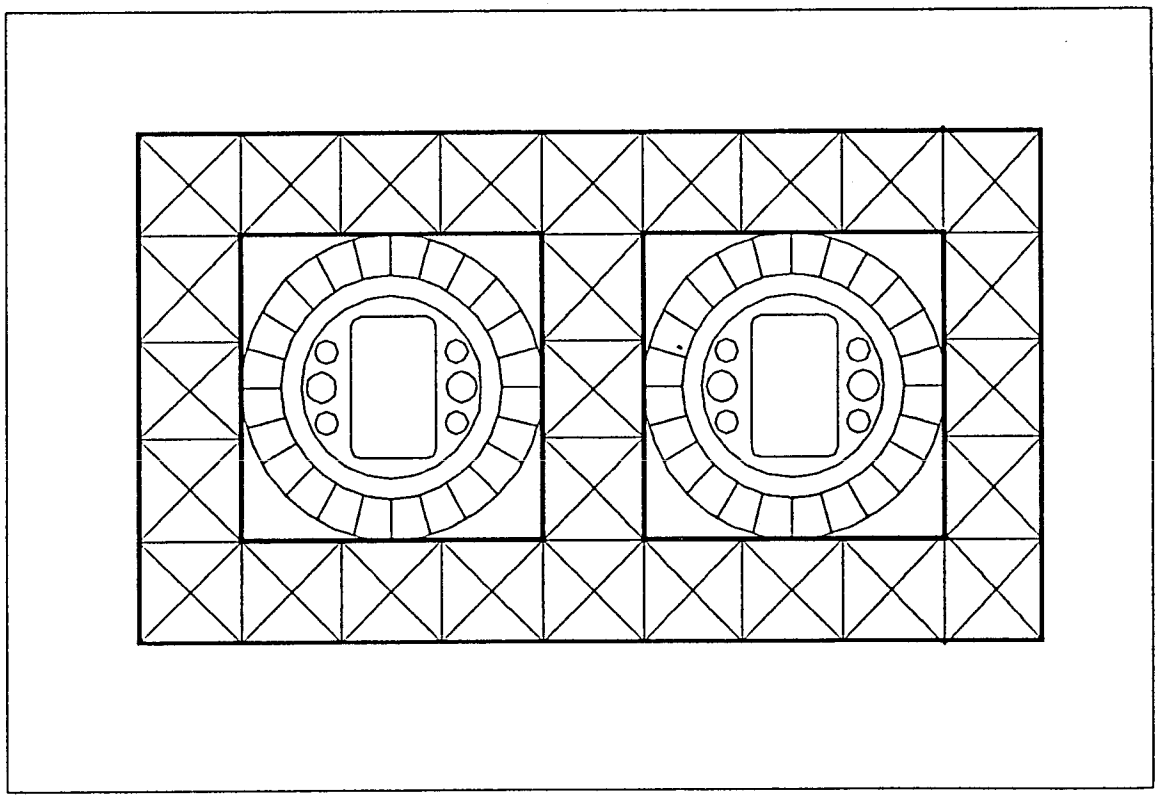


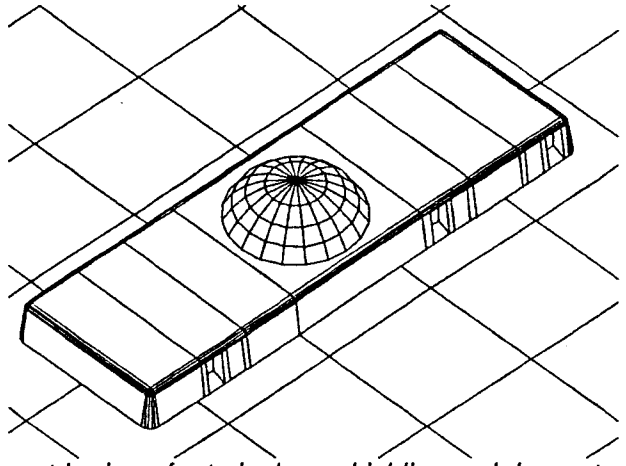
The primary goal of the following project was to develop a simple yet systematic method of construction requiring the least amount of materials, time and labor. By utilizing the design concept of a wine rack, the base evolved into two separate systems. The rack would be analogous to the radiation shield and the bottle equated with the pressurized habitation modules. The individual "bottles" could be replaced if needed, and would form an easily expandable system. As a safety precaution, life support systems would be redundant in all modules.

Compacted lunar regolith would be utilized for radiation protection in the shelter, covering the exterior rack system. In order to reduce human involvement, robotic processing plants would gather, compact into blocks and place the regolith over the structure. Space frame construction would be utilized in the rack's construction.

Beneath the exterior shelter, cylindrical aluminum pressure vessels would contain the living quarters. All modules would have similar dimensions of 5 M (16.4 feet) diameter and 15 M (49.2 feet) length. There would be two primary uses for these modules. Circulation modules would create a central access spine and contain six airlock connections. Radiating from these central modules would be the multi-use modules whose functions would range from living quarters to laboratories. A third type of structure located beneath the shielding rack would be an inflatable dome signifying the "cross-over" technology point. This fabric and space frame dome would be utilized for operations requiring large open spaces such as lunar materials processing plants.

The Earth constructed habitation modules would have standardized shells and common utility distribution systems. Each interior would be customized on earth for its particular use in the lunar base. The modules' size is of human scale and would allow for privacy. By forming a long axis, the circulation spine could relieve the feeling of confinement.

Construction of the base would begin prior to human habitation. Robotics would prepare the lunar surface and begin production of the shielding regolith blocks. The initial phase would require 5 modules (3 multi-use, 1 circulation, 1 airlock and exterior link). After the modules are placed beneath the radiation shield, connec-



Isometric view of exterior base shielding and dome structure.

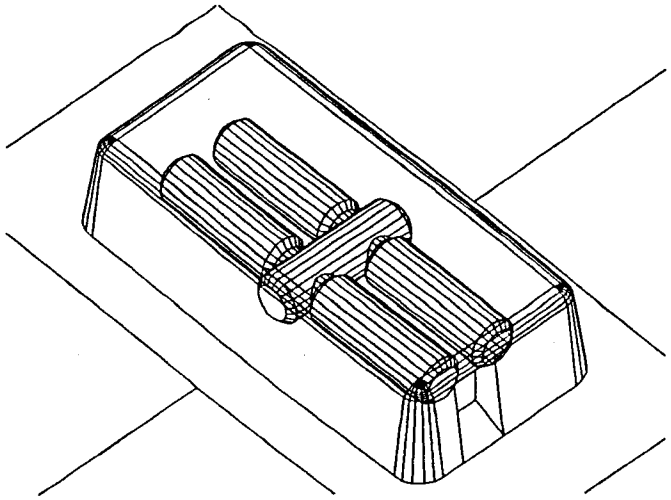
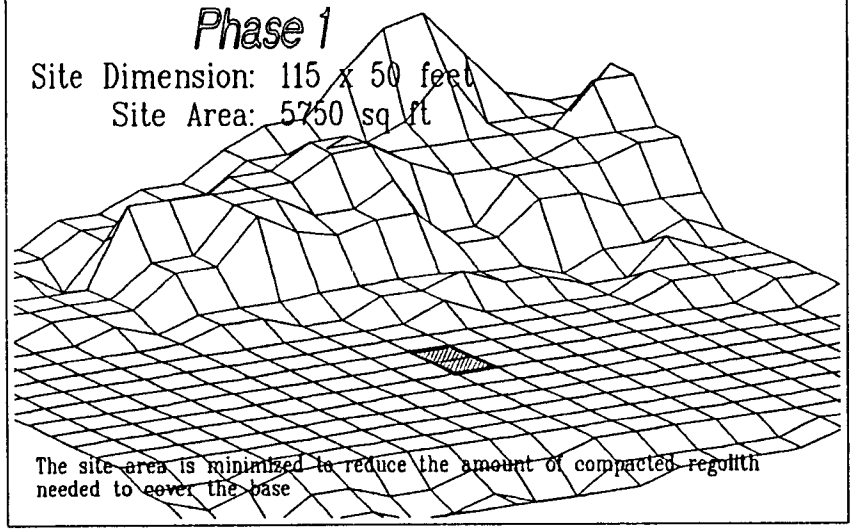


Diagram showing placement of modules beneath protective shield.

tions would be sealed and the remaining regolith blocks placed around the shelter. Additional modules could be added to the base as they are needed.

Phase 1

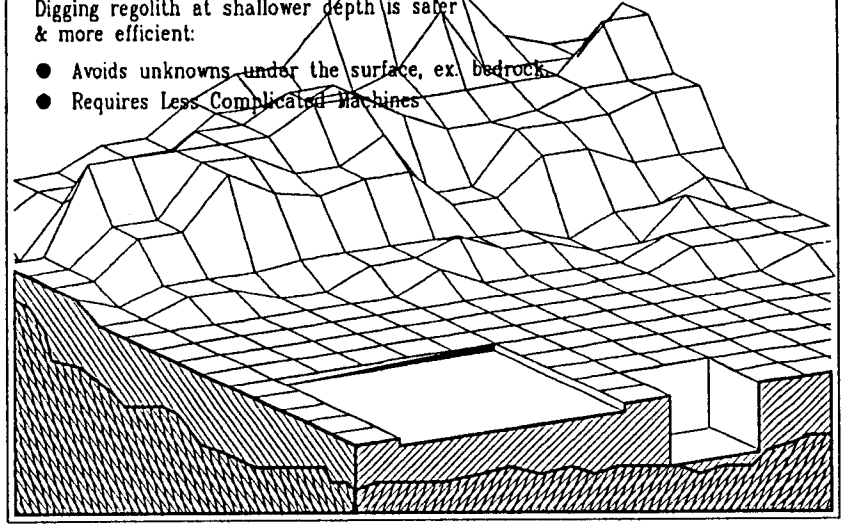
Site Dimension: 115 x 50 feet
Site Area: 5750 sq ft



The site area is minimized to reduce the amount of compacted regolith needed to cover the base

Digging regolith at shallower depth is safer & more efficient:

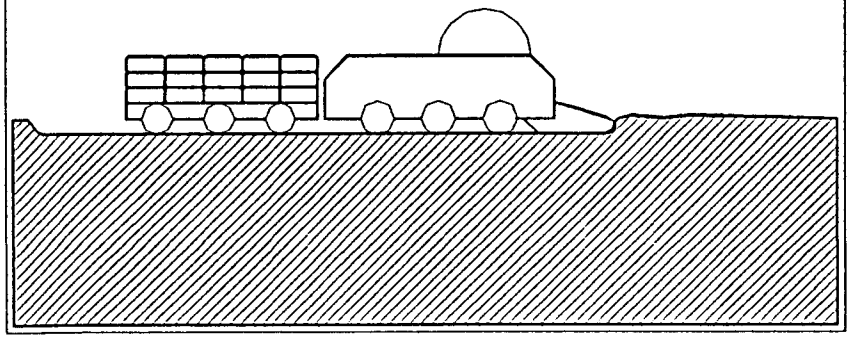
- Avoids unknowns under the surface, ex. bedrock.
- Requires Less Complicated Machines



Compacted regolith is produced in the form of blocks.

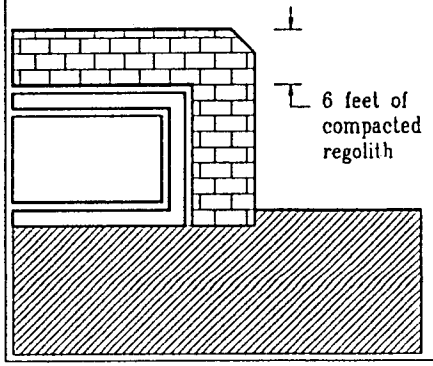
Compacting the regolith

Digging regolith

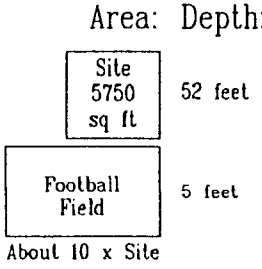


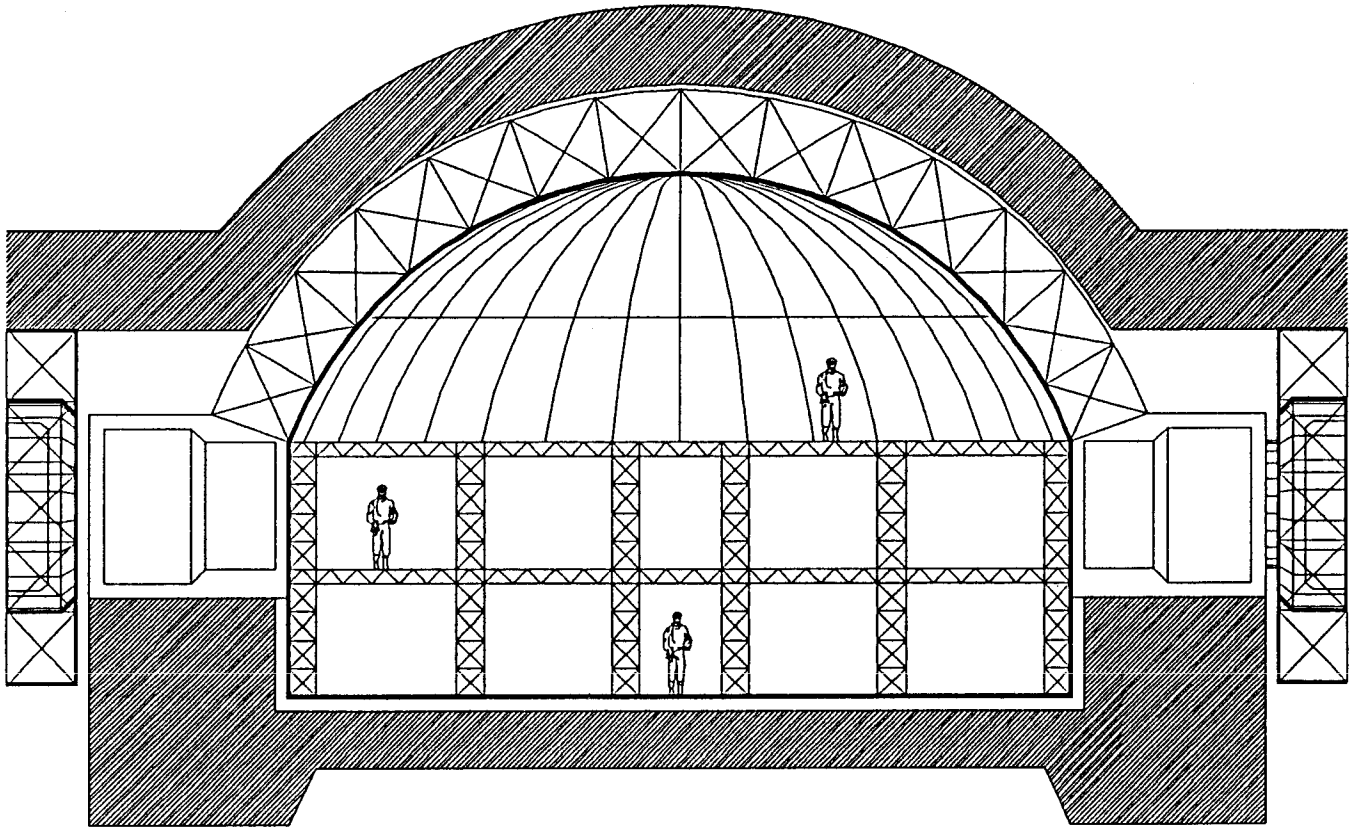
Protection from Radiations:

The base is protected from radiations by a layer of compacted regolith.

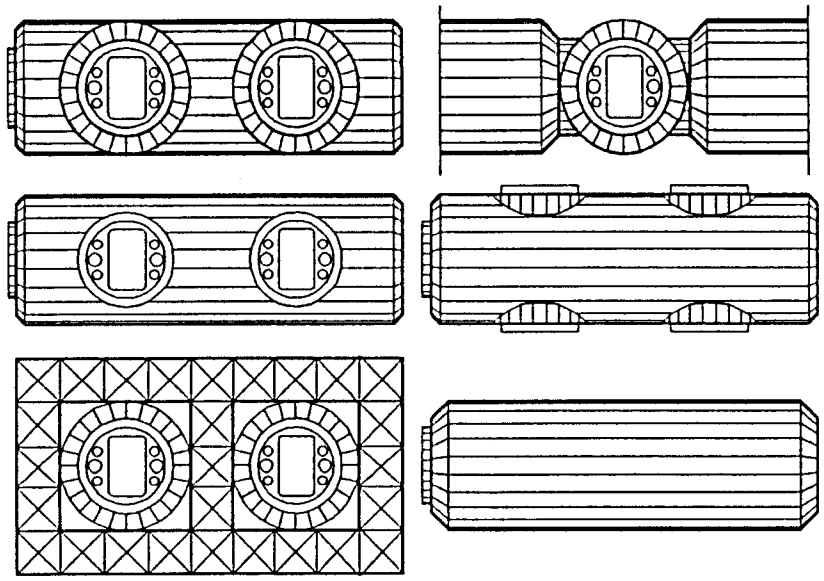


Covering an area of 5750 sq ft requires about 100,000 cubic ft of compacted regolith. Since the volume of unpacked regolith will be reduced to 1/3 when compacted, the amount of unpacked regolith needed is about 300,000 cubic ft.

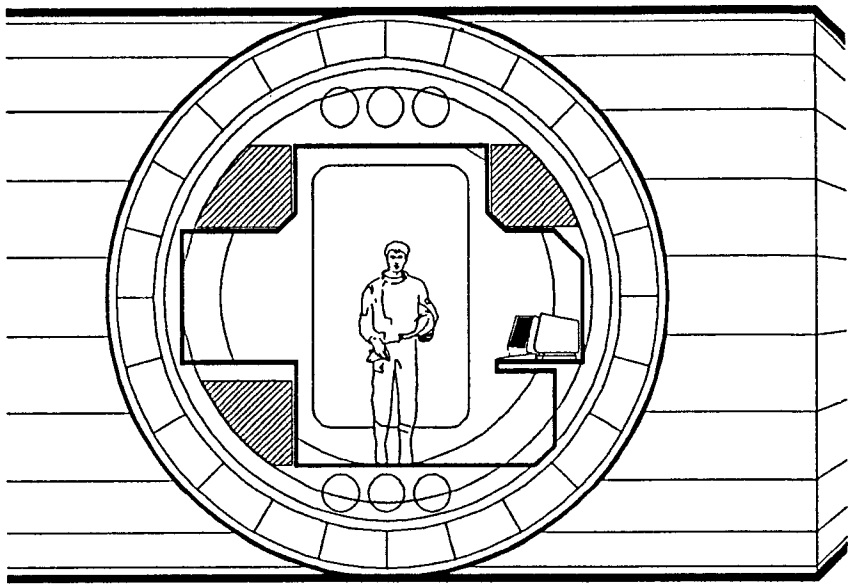




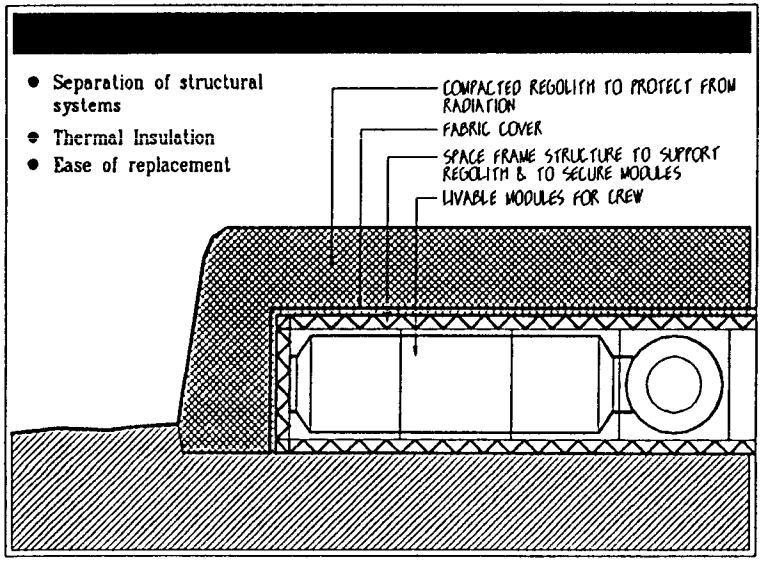
Section through large central dome area. The expanse is created using space frame construction and would be utilized for large scale operations such as lunar materials processing and storage.

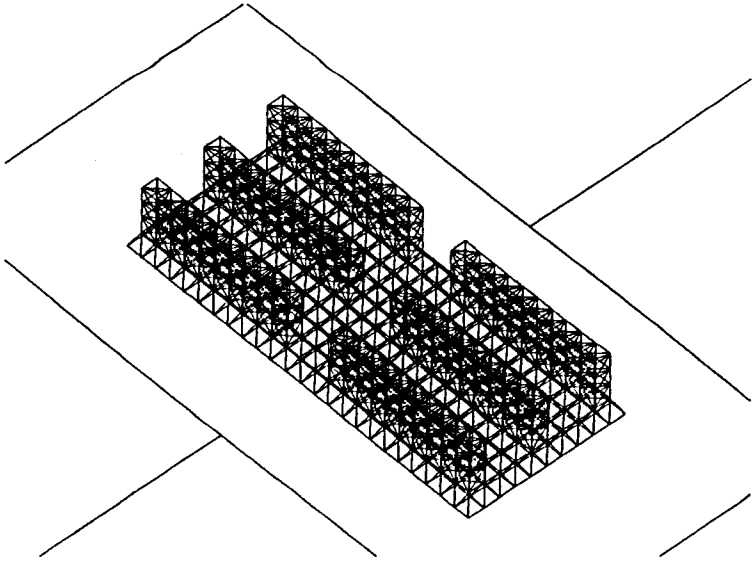


Habitat module elevations showing links. The diagram demonstrates how the modules are placed in the exterior shielding structure.

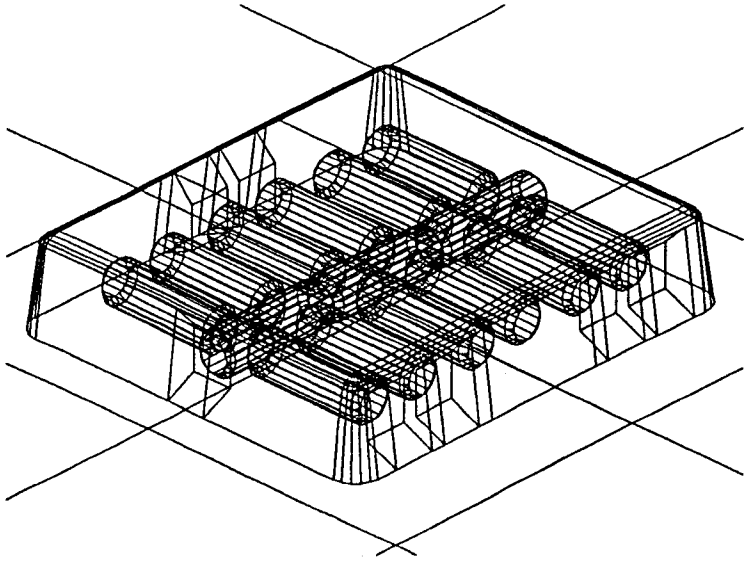


A Section through a module link . The section shows the relationship between the pathways and the communication/life support links.

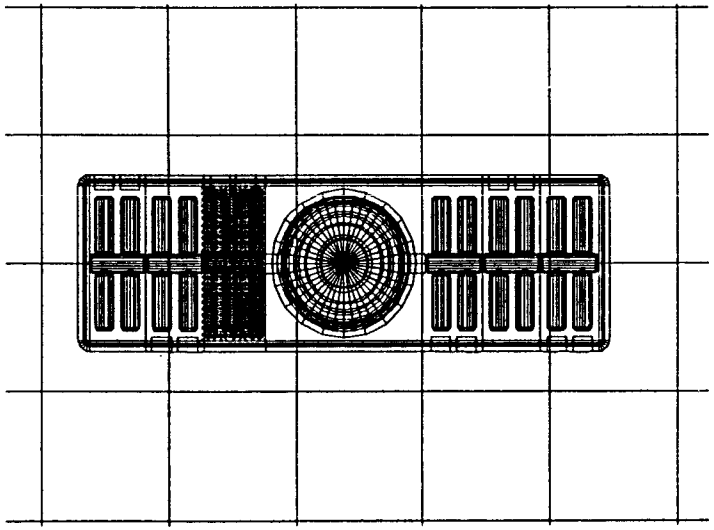




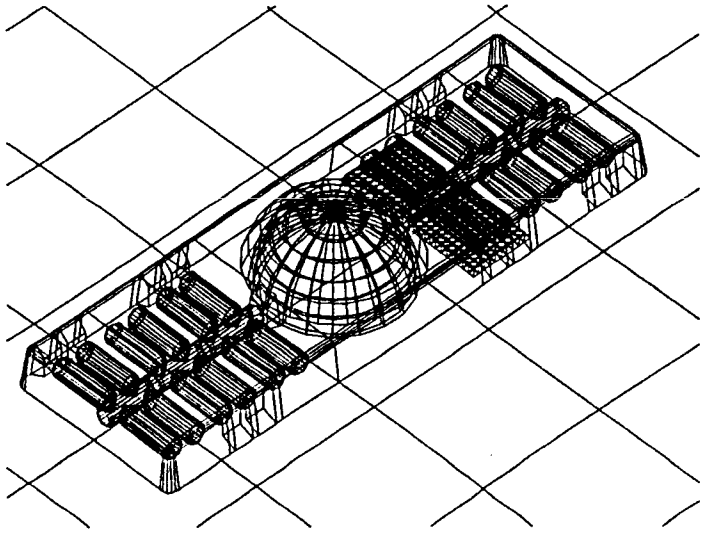
Isometric of shielding superstructure.



Isometric of module placement in phase 2 of development.



Plan view of fourth phase base design.



Isometric of base showing domed structure.