

2nd PLACE WINNER
High School

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11th/11th/11th
EVA/ Stanton/ TCA
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Forty-eight years ago, John F. Kennedy's poignant voice echoed throughout American homes and hearts. This determined president challenged his nation to go to the moon and prove its excellence. The United States was in a race against the Soviets to reach a goal that seemed impossible. In the eight years it required to reach the moon, NASA suffered hardships and encountered challenges. The United States finally achieved its goal on July 20, 1969, when the Apollo XI landed on the moon. Now, thirty-nine years later we stand at the beginning of a new phase of humanity. In the cold, dark, universe, Mars alone is our focus for colonization. Thus we propose:

RED [Research and Exploration Domain]

RED will contain:

I. Breathable and Comfortable Environment

- A. A high density bio reactor was created by "Valcent's Vertigro" to create biofuel from algae.
- B. Plants will provide oxygen.
 - 1. Travelers will grow plants aeroponically.
 - 2. Travelers will grow plants in the greenhouse.
- C. ECLSS [Environmental Control and Life Support System]
 - 1. Air and pressure regulation
 - a. Pressure 12.5 PSI-reduces amount of air needed in city.
 - b. Relative humidity between 30% and 75%.

II. Adequate Food Supply

- A. Necessary nutrients will be provided daily, which includes a vitamin and mineral supplement.
- B. Plants will be grown by the travelers.
 - 1. Nuts, berries, herbs, lettuce, peas, celery, and turnips are the main plants that will be grown indoors.

2. Artichokes, asparagus, cabbage, carrots, cucumbers, and eggplant are able to be grown in Marian soil.
- C. Two or three season's worth of food will be brought with crew in case of food shortage.
- D. Protein [meat]
 1. Frozen fertilized fish eggs will be taken to eat and produce nitrogen for the compost piles.
 2. Because of their small size and rapid reproduction rate, rats will be bred and eaten.

III. Use and Recycling of Water

- A. Russian built water processor
 1. Recycles exhales
 2. Recycles sweat
- B. ECLSS [Environmental Control and Life Support System]
 1. ECLSS reclaims waste waters from waste waters from bases fuel cells, oral hygiene, hand washing, urine, and air humidity.
 2. ECLSS reclaims lab animals' breath and urine.
 3. ECLSS filters water in 3-step process.
 - a. Filter removes debris.
 - b. Water passes through multi-filtration beds removing organic/inorganic impurities.
 - c. Catalytic Oxidation Reactor removes volatile organic compounds killing bacteria and viruses.
- C. Colony will be re-reimbursed with water periodically.

IV. Efficient Energy

- A. Solar Energy
 1. Solar energy will be the primary source.
 2. Motorized solar panels will track the sun's rays making the process more efficient.
- B. Nuclear energy will be the secondary source.
- C. All energy will be stored in secondary batteries.

V. Proper Housing/Living Space

- A. The maximum number of occupants will be 100 people.
 1. No children will be allowed.
 2. Everyone will be cross-trained and equipped to run the base.
- B. Hotel Styled Housing
 1. Suite styled chambers will hold either four people or married couples.
 2. Each chamber of four will share a central kitchenette and greenhouse.

3. Housing will be efficient and economical.
- C. Each room will be equipped with their own ECLSS [Environmental Control and Life Support System].
- D. Beds, drawers, and tables will be retractable.

VI. Greenhouses

- A. Greenhouses will provide food, help manage recycling, and replenish the air.
- B. The greenhouse atmosphere cannot be kept at extreme low pressures because this will overwork the plants causing them to dry out and close their stomata.
- C. Instead of scientists pollinating each plant individually, insects such as honeybees will be brought to naturally fertilize the plants.
- D. Forming a triangular structure of three containers holding algae and diodes, a three dimensional high density bio reactor will be created.

VII. Shops/Business

- A. A community pizza shop will be in place in addition to the large cafeteria providing food for all the inhabitants.
- B. A lip balm will be made from the bees wax and sold.
- C. A clothing institution will be founded to provide new, highly functional garments for the travelers.

VIII. Protection

- A. Thermal control will be maintained by insulating the interior of the pods keeping the temperature between 55 and 75 degrees Fahrenheit.
- B. The colony will be partially submerged under Martian soil to protect the base from solar radiation; only a portion of the central pod and the garage will remain above ground.
- C. Base will be protected with airlock support.

IX. Transport

- A. A dozen rovers will be provided for exploration.
 1. The rovers will be solar powered.
 2. The rovers will be battery operated.
- B. Space craft will be supplied for returning home.
 1. Space craft will send data, Martian products, and possibly send travelers back to Earth.
 2. The craft will be returned with water, other supplies, and returning travelers.

IX. Recreational Center

- A. The recreational center is important to keep the travelers healthy and happy.
- B. This special pod is dedicated to sports, art, and other activities based on the traveler's interests.
- C. A movie theatre large enough to accommodate 100 will provide entertainment.
- D. Each traveler will be required to spend an allotted amount of time at the recreational facility in order to improve stamina and ensure mental stability.

X. Compost Piles

- A. Waste, leaves, food scraps, and Martian soil will be placed in barrels on the Martian surface.
- B. Because of their ability to reduce odor and quicken composition time, worms will be brought.

XI. Research/ Discovery

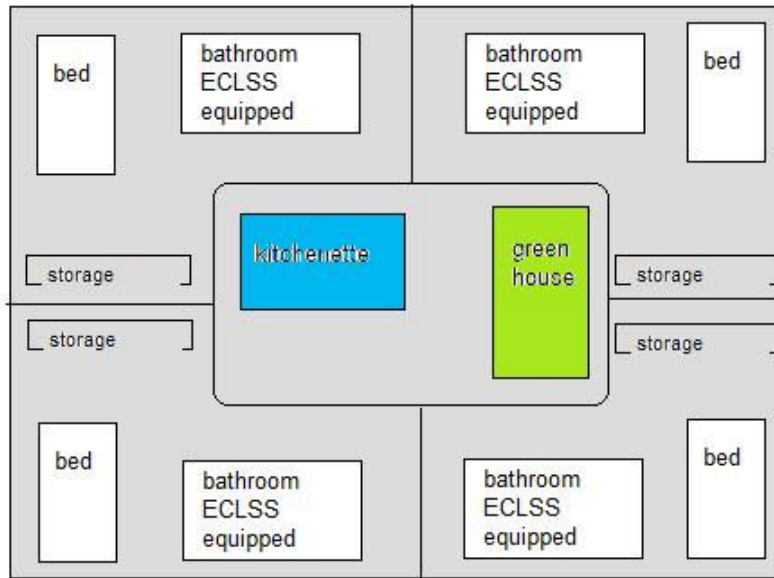
- A. An entire pod will be dedicated to experiments, lab work, and research.
- B. An observatory will be placed in the central pod above the surface for the travelers.
- C. The effects of space travel will be recorded and studied.
- D. Better survival techniques will be developed.

XII. Economics

- A. Rather than establishing a currency for our Mars colony, bartering will be exercised.
- B. Each traveler will be required to donate a designated portion of personally grown food to the colony.
- C. The central food supply center will ensure that enough food is grown and distributed properly.

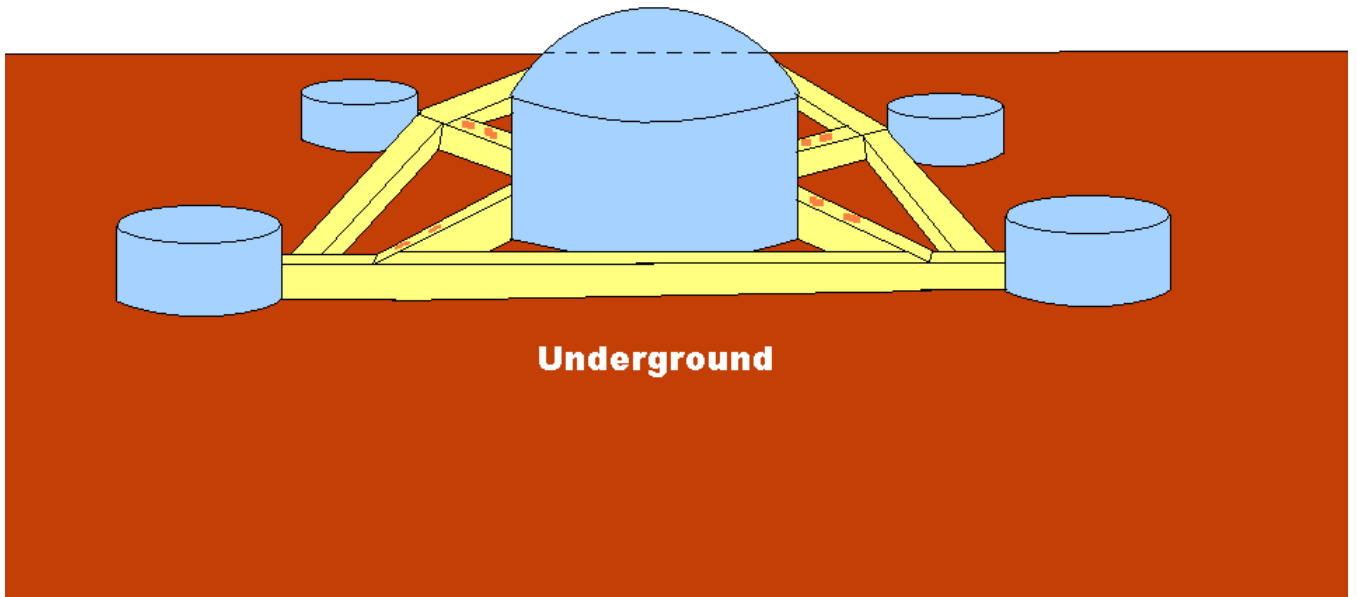
Our theories are ideal because we are using green technology to maximize the bio-regenerative capacity of our colony. Our colony has efficient resources, fresh ideas, and well-applied technology. RED will transform Martian colonization from fantasy to reality.

Chamber Prototype



Side View

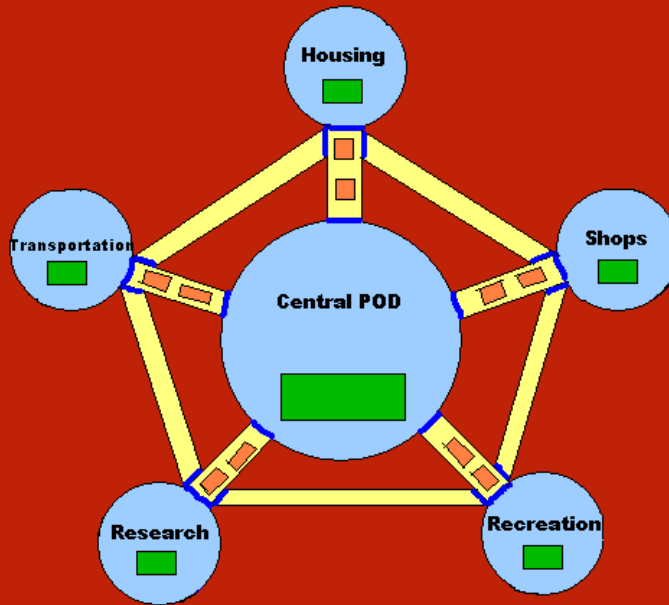
Above Ground



Aerial View

Legend

- "POD"
- A greenhouse for each "POD"
- Connecting Pathways
- Airlocks
- Solar Panels



Launch Base

Solar Panels