GEODESIC DESIGN AND COLONIZING MARS

by

Micah Joseph Bramlett

33627 Ponderosa Way

Paynes Creek Ca 96075

micahjbramlett@gmail.com

For the advancement to a type 1 civilization.

“The present is theirs; the future, for which I really worked, is mine.”
― Nikola Tesla

Micah Joseph Bramlett

micahjbramlett@gmail.com

To Ling Bramlett, Deliah Bramlett, and Travis Claus

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ACKNOWLEDGEMENTS

I have admired the work of Jacques Fresco, Nicola Tesla, Albert Einstein, James Clark

Maxwell, Buckminster Fuller, and Jacques Fresco

These men have given me inspiration to hope for a future that

people will leave the world a better place than they found it. I also have to thank my

family for without their support I would not have the ability to imagine.

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ABSTRACT

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Colonizing Mars is difficult but not impossible. We first must understand the Mars is so very different than earth. To survive and thrive on Mars it will take a delicate balance. The right types of building and temperature control is vital to homeostasis

The surface temperature varies from minus 87 to minus 5 degrees Celsius (minus 125 to 23 degrees Fahrenheit).At the Viking sites, the average wind speed registered at 2 to 7 meters per second (5 to 16 mph) during the Martian summer. On Mars the surface winds accelerate to higher speeds than those on Earth. The general circulation pattern of winds is also very different from the terrestrial circulation pattern. During the fall, the average wind speed increased to 5 to 10 meters per second (11 to 22 mph). Across the year, the wind speed on Mars averaged 10 meters per second (or 22 mph). The low gravity of Mars allows for much greater wind speeds at times.Wind is a key energy source on Mars them down if wind speeds exceed 45 mph. Under the right weather conditions, the wind speed on Mars can reach up to 17 to 30 meters per second. The maximum speed of 30 meters per second (60 mph) was observed during a dust storm at the Viking site.

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 Careful selection must be made when choosing building type and materials.

 Sand grains from the surface are picked up by the winds and accelerated to high

speeds. This leads to a gouging and chipping effect which contributes toward sand

erosion of the surface by wind. Because of Mars' lower gravity, the winds can more

 easily lift and carry sand particles. But the lower atmospheric pressure of Mars makes

 the motion of sand particles different than what would be expected on Earth. This

makes the erosion of Martian rock a little different than on Earth. Therefore the

materials for facilities will be slowly eaten away.

Wind power is the most abundant natural power source on the Martian planet.

and the biggest enemy. Small wind is classified as any wind turbine that produces 300

kilowatts per hour or less. Different models in this category range between rooftop

models that produce 200 watts of power to 75-meter towers that can produce over 250

kilowatts per hour. . In order to produce usable energy, a wind turbine needs to receive

a minimum wind speed of 7-10 mph. However, this “cut in” wind speed is not sufficient

for most turbines to produce their optimal amount of power. Turbines have a rated

speed, which is the wind speed required to produce maximum power. Rated speeds

range from 25 to 35 mph, 22 mph is the average speed on mars the difference in gravity

will have an effect. Turbines generally have a fail-safe that shuts the turbine down in

high speeds. such as the Viking incident geodesic buildings can handle winds in excess

of 150 MPH..

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Chapter 1

Introduction

“If you want to find the secrets of the universe, think in terms of energy, frequency and vibration.”
― Nikola Tesla

Mars One could benefit from the following information. Aquastore® tanks are glass-fused-to-steel tanks used to store water and other industrial liquids. More than 100,000 have been installed in over 70 countries around the world. Aquastore tank designs incorporate recognized standards assuring high quality and long-lasting municipal and industrial service liquid storage tanks. Materials are carefully selected and inspected for conformance to rigid specifications. These design and material standards are proven in thousands of tanks all over the world. The tanks are glass-fused-to-steel tanks used to store water and other industrial liquids. Glass fused to steel sheets. Bolted and sealed with manus. Glass-fused-to steel has become the premium water and liquid storage technology leader. Aquastore uses glass-fused-to-steel technology over other tank designs for several reasons.

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CONSTRUCTION

Glass Fused-To-Steel Storage Tanks Technology Enhancing our lives

History of Glass Fused to Steel more than 85 years

1920’s Brewing Industry discovered the methodology of controlling corrosion by fusing glass to steel

•Hot Water Heaters in the 1930’s

(70 years)

•Agricultural Tanks since the 1940’s

(66 years)

•Municipal/Industrial Liquid Storage since the 1970’s (36 years)

•Impermeable to liquids and gases

•Excellent chemical resistance (pH3-11 @140ºF)•Excellent impact and abrasion resistance

•No undercutting

•Inert

•NSF Approved

•Flexible

•Superior longevity

•No re-painting or re-coating is required..EVER!!

•Resulting coating is

Tough and durable

Glass fused to steel The absolute best coating.

Proprietary High Strength U.S. Steel Steel is leveled, cut to panel sizes and grit blasted

to SSPC10Borosilicate glass fired at 1600° F Mechanical and chemical bond

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Edge Coating Designed to eliminate future resealing of sheet edges.

\*Testing

Sheets are tested for holidays / micro-voids, coating

thickness and color uniformity as they come off of the glassing line.

 With little work they could machine out kits for domes with a double bolt line a triple line

would be more weight The glass fused to steel geodesic domes will last in the harsh

conditions and the dust of the Martian planet.

On Mars the surface winds accelerate to higher speeds than those on

Earth. The general circulation pattern of winds is also very different from the terrestrial

circulation pattern. These winds can be whipped to an extreme during the frequent

Martian global dust storms.

 Sand grains from the surface are picked up by the winds and accelerated to high

 speeds. This leads to a gouging and chipping effect which contributes toward sand

erosion of the surface by wind. Because of Mars' lower gravity, the winds can more

easily lift and carry sand particles. But the lower atmospheric pressure of Mars makes

 the motion of sand particles different than what would be expected on Earth. This

makes the erosion of Martian rock a little different than on Earth.

**ntershelter™** is built to sustain hurricane strength winds or earthquakes and insulated to stay warm in extreme arctic sub-zero degree weather or cool in hot desert climates, these portable dome structures can be assembled in just a few hours by three untrained people. The pieces can fit in the back of a pick up truck, single helicopter sling, or a bush cargo plane and can be set up on almost any terrain. These shelters are

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not only ideal for research needs, quarantine shelters, and emergency relief situation and housing too. The concept is great but the materials are not right for colonization of a place like Mars instead look at insulation. A InterShelter 20ft Dome the P2000 insulation kit the P2000 kits come in thicknesses of 5/8" and 1" thick. that will allow you to warm your Polar Dome to 72 degrees F when it’s 35 below zero outside with nothing more than a 1,500 watt space heater. InterShelter holds the key to insulating these geodesic

structures. Howerver the structures they offer will not work for a colony house. Geodesic buildings have been used in the Antarctic for the ability to go up fast and keep in heat. The answer is an airtight glass fused to steel dome with proper insulation and heat..

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Chapter 2

Device Basics

2.1 The application of the device

 Once assembled, the structures are watertight, hurricane proof, and

earthquake proof. They can even be combined into multi-structures, providing

almost limitless possibilities as to size and design.

* The geo domes would come on pallets and go together like a kit. The price alone
* may make it easier to obtain. Lowest maintenance requirements over Geo dome life.
* Lowest total life cycle cost
* Faster construction
* Expandable
* Available in diameters in domes from 11 feet (3.3 m) to 204 feet (62.2 m) and capacity from 20,000 gallons (75 cu m) to over 6 million gallons (22,700 cu m)
* Specific tank designs, options and accessories to meet customer needs
* Tank and dome sizes should be about the same.

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# 2.2 Wind Turbine

### Wind is the response of the atmosphere to uneven heating conditions. This creates pressure differences in the atmosphere causing the wind to blow from regions of high atmospheric pressure to low atmospheric pressure. The larger the pressure difference the greater the wind velocity. Air pressure represents the amount of atmosphere that is pressing down on the surface of the planet at some point.

### Power in the wind(Watts) = 1/2 \* rho \* A \* V^3 .If your wind turbine has a blade diameter of 3 meters (about 10 feet) then swept area is a bit over 7 square meters (or about 80 square feet). Because of the formula for area, it's important to keep in mind that doubling blade diameter will cause the machine to sweep 4 times the area. Power available from a wind turbine is related to the \*square\* of the blade diameter.V = velocity (wind speed, in meters per second). Notice the V is to the 3rd power (cubed). This means if you double wind speed you have 8 times the energy. This is very important to think about. If a machine is designed to produce usable power in a 10 mph wind then it has to deal with 8 times that much energy in a 20 mph wind, 64 times that much energy in a 40 mph wind, and 512 times that much energy in a 80mph wind, etc... For the sake of the wind turbine and its tower, there must be some system by which it protects itself.

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## A closer look at the formula above and consider a small 5 foot diameter (60 inch) wind turbine in a 10 mph wind..Diameter = 5 feet = 1.524 mSwept area = pi x r^2 = 1.8241 square metersWind speed = 10mph = 4.4704 meters/secondPower in the wind = 1/2 \* 1.23 \* 1.8241 \* 4.4704^3 = 100.22 Watts.And remember, if you double wind speed you have 8 times the power, so in a 20mph wind there would be over 800 watts available.

# Sunforce Wind Turbine - 1500 Watts

 3 uniquely contoured fiberglass blades enable quiet and efficient charging capabilities

 Maximum Power Point Tracking (MPPT) charge controller protects battery from overcharging

 Manual 3-phase braking system provides safety

 Lightweight, yet durable diecast aluminum housing

 Overspeed/overcrank shutdown automatically stops the blades in excessive wind speed conditions to prevent damage to the turbine

Begins to supply power in winds as low as 6 MPH. Efficient unit has zero operating costs. Do-it-yourself installation. Blade Material: Fiberglass, Rotor Size (ft.): 5.58, Product Style: Land,4 or more per dome should power the heat needed and work and living requirements. These wind turbines retail for $3,799.99 + $36.17 shipping.

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**Chapter3**

**The Geo Grow**

Aquaponic plant and fish habitat as seen in attached paper. Food will be an issue with any extended mission, Mars one. For example fresh food would be nice on the trip but also when you get there.

**Growing vertically in your geodesic dome is simple.** If you have the volume, you should use it.  You can grow strawberries, tomatoes, cucumbers, beans, peas, squash, and many more vegetables vertically.  Your dome can even house dwarf fruit trees!  Extend your fruiting season with a climate more adapted to your fruit trees.  Harvest peaches, figs, nectarines, cherries, pears, lemons, limes, and many more types of fruit from inside your geodesic domes.

**For the smartest, best dome,** get a geodesic dome and grow vertically. Increase production and save water when you introduce Aquaponics and you will add another product to consume fish! Aquaponics systems can be complex, however, plants love the plant waste

and oxygenated water. Plants are grown in a way (for example a hydroponic system) that enables them to utilize the nutrient-rich water. The plants take up the nutrients, reducing or eliminating the water’s toxicity for the aquatic animal.The water, now clean, is returned to the aquatic animal environment and the cycle continues. Aquaponic systems do not discharge or exchange water. The systems rely on the relationship

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between the aquatic animals and the plants to maintain the environment. Water is only added to replace water loss from absorption by the plants, evaporation into the air, or the removal of biomass from the system..Aquaponic systems vary in size from small indoor units to large commercial units. The Geo-grow Aeroponic system is an enclosed plant habitat that will provide astronauts with fresh food wherever they land. Landing Application After arrival at a new gravity start your aquaponics. Water pumps and culture for duck weed. Fish eggs can be kept frozen until a location has the gravity needed. The farm is then started.

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sewage disposal. In a one way mission with little opportunity for resupply use of every available option is key. Sewage can be digested in a tank and use to make methane gas a potential clean energy.

Anaerobic digestion is a collection of processes by which microorganisms break down biodegradable material in the absence of oxygen. The process is used for industrial or domestic purposes to manage waste and/or to produce fuels. The digestion process begins with bacterial hydrolysis of the input materials. Insoluble organic polymers, such as carbohydrates, are broken down to soluble derivatives that become available for other bacteria. Methane gas that is produced can be used to power rover robots and other needed equipment.

After usable gases are removed The harmful sewage is still left behind although digested and harvested for methane. This waste water should be pumped into domes (as in my previous correspondence) These domes will not have fish. I purpose growing hemp in staged domes until water is clean. The hemp will provide protein rich seeds that can be ground and fed to fish in the domes (from my previous correspondence). The Hemp can be made into clothing and paper that will run short on a colonization with no return and little resupply.

On a mission like Mars One every resource is critical even human waste. I believe that using all possible resources is going to be vital to Mars colonist.

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