

Aula 

NOVA SPKA

Tomorrow 's future, today's solution



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This team has the pleasure to present you Nova Spika, the Mars Colony on Mawrth Vallis.

As it is well known, Mars has remarkable differences compared with Earth, such as: atmosphere characteristic (both composition and properties), the existence of dust storms, gravity, materials that can be found, aquifers, levels of radiation, farming possibilities, etcetera.

After studying all these differences (see 02), we tried to answer two basic questions: how we will protect ourselves and how to organise 1 million people so they can both survive and live. This way we designed Nova Spika as an underground city, which is divided in 10 main cores or Tochos, each one supporting 20 Districts. From this point on we would explain the basic idea of how the complete colony works, and focus on what you will find on the models.

- **TOCHO**

This is a cylindrical structure of 68m of height and with 5 floors of 0.36km² each one. Although it's not modelled, this structure would contain different industry buildings and typical city buildings (such as farming constructions, metals industries, hospitals, university campuses or waste treatment and recycling among others). In Mars surface above the Tocho there will be the structures needed to obtain energy. The idea is to produce everything needed to survive at this Tocho structure, and after, distribute it to the district through a transport specialized floor (6th floor). To get more information about what will be produced, how would be horizontal transport, how would be communications or how we will feed 1 million people, we encourage you to see the point 04 of the complete document.

Vertical movement will be carried out through lifts, heavy elevators and mechanic stairs.

- **DISTRICT**

As we have said, each Tocho has 20 districts, which are the residential areas, and whose last floor is 15m deep underground. Here, we have two important parts:

→ A central cylinder of 40m of radius and a height of 72m. This structure is divided in 9 floors of 6m height, where the last one is for maintenance purposes and the rest are for community life, so people can satisfy their daily needs. Crossing the centre of the structure from surface we can find the light dome, an important part of the district, because it's how we will deliver natural sun light inside the district (see 03.4).

→ 8 Residential Branches per floor, corridors with 10 houses for each side (20 by branch) connected to the central cylinder and to a boulevard. Each house is thought to have between 3 and 4 people living together. We have named other structure: the boulevard. This is a green area used as a connection between two districts and the correspondent Tocho, this way, people can take a walk.

The same way as the Tocho, vertical movements will be done through lifts, heavy lifts, stair and mechanics stairs. And there will be an extra floor (not modelled) dedicated to horizontal transport (the transport floor).

02. MODELS GUIDE

We focus the models in give a better approach to the district structure, trying to use plants that barely need water and the least fountains in order to not waste it. Also, the aesthetic we show is our concept taken from futurism, but giving although a comfortable and homelike point. At folder Shells you will find the structure of a tocho with its 20 districts, which it is supposed to be a guide of how the different elements interact.

02.1. Central cylinder of district

As we have said before, this is where people will satisfy their daily needs, i.e., this is where we can find food markets, different business (from entertainment to cloth shops) and other services such as primary clinics or fireman's station. The central cylinder of 2 district are thought to be complementary: at least in one of the two districts, people would find a typical village basic service. In the complete document you can find a proposal (see 03.3 Possible distribution) of business we could find. Also, the central part of the cylinder is crossed by the Light Dome's axis, this way there will be natural light filtered.

At folder Empty District you will find the central cylinder with pillars, the Light Dome's axis, entrances to residential branches and all the object used for vertical movement. Also, we added the Light Dome and the entrance shell, to show how they interact with this central cylinder.

We suppose that people will not need vehicles as powerful as a car inside the district, because the distances are short enough. So, the road (in orange like colour) are prepared just for emergency vehicles like an ambulance and for people to walk or move with some kind of bicycle or a self-balancing vehicle (this is, Segway-like). The space unused in this model is where people can build according to their needs. There are 3 different types of floor: the simple, the double and the maintenance floor.

Simple Floor

At folder First Floor you would find an example of how a simple floor could be distributed. From our distribution proposal (see 03.3 Possible distribution), we decided to show you how could be District 1, 1st floor. This floor is where clinics and medical facilities are. As we have said before, at the centre of the floor you can find the Light Dome axis, so near it we thought it would be nice to have a small park where people could enjoy natural light.

Double Floor

At folder 5th and 6th floors you will find an example of how a double floor could be distributed. From our distribution proposal (see 03.3 Possible distribution), we decided to show you how could be District 1, 5th and 6th floors. They are thought to be a commercial area where you can find shops, pubs, restaurants... Just like at the first floor, at the centre you will find a small park.

Maintenance Floor

At folder Maintenance Floor, you will find not only maintenance and control areas (for both the district and the Light Dome), but batteries and water and microalgae deposits. These deposits are thought so that, in an emergency case or a problem with the Tocho-District electric and water connection, the district could have a day to solve the problem or move people to other district before running out of energy and water.

Colony entrance

At folder Colony Entrance, you will find a plausible design for an entrance to a district of the colony. It has 2 parts: the pressurization and decontamination area, and the excavated road that leads to surface.

02. MODELS GUIDE

02.2. Light dome

As we have said before this structure (folder Light dome) allows to drive sun light inside the district (see 03.4) but we need to use a filter so that the dangerous UV radiation does not pass (cosmic radiation does not reflect and it is supposed that will not reach the district because of the 15m of substrate before reaching the colony).

We can find 3 parts:

- Exterior mirrors to reflect sun light to the dome. We can orient the mirrors, giving us two advantages: being able to reflect the most quantity of sunlight possible and putting them down at night or during sandstorms.
- The Dome. Thanks to its octagonal pyramid structure, it concentrates sunlight and send it to the central axis. The pyramid is covered by 144 mirrors in 18 levels that can rotate small angles to reflect the maximum amount of sunlight inside the central axis. Also, it has a radiation insulating cover to avoid directly-driven cosmic radiation entering.
- The central axis, which distribute light inside the district using the same principle that a channel of light. This is possible reducing cylinder diameter in each floor, allowing a cone to capture the light from the axis, and reflect it to Moser's lamps.

02.3. Residential Branches

As we have said before, a Residential Branch is a long corridor with a total of 20 houses. At the Folder with the same name, you can find how we imagine this residential area.

02.4. Boulevard

The Boulevard (at folder Boulevard) is a green area connected to the Residential Branches of the District. We can find boulevard accesses at branches of 1-2(to boulevard 1) and 7-8(to boulevard 2) floors. These boulevards connect the Tocho with district branches.