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[1] www.hannsjoerg-voth.de, [2] Voth Maroc ain nejma Stiftung, [3] Ziegert | Roswag | Seiler Architekten Ingenieure, Berlin, D

Celestial Stairs, Golden Spiral and City of Orion

Maintaining the works of Hannsjörg Voth in the Plaine de Marha, Morocco

From 1980 (start of construction in 1985) to 2003, the conceptual and land art artist Hannsjörg Voth created his works Celestial Stairs, City of Orion, and Golden Spiral in the vast expanses of the Plaine de Marha (Morocco), located between the Sahara and the Atlas Mountains. Initially, Celestial Stairs, the first of the three works, was designed as ephemeral land art. When Voth returned to Morocco for the construction of his second work, the Golden Spiral, the Celestial Stairs became the artist's studio, which led him to begin conservation measures which had not been part of his previous design.

Inside the Celestial Stairs as well as the Golden Spiral, the artist created sparsely equipped refuges for himself and his wife Ingrid Amslinger as part of the work. For many years up to the present day, they have spent a large part of the year in these studios during the winter months and continued their work on new pieces. In addition, Hannsjörg Voth created a number of drawings and objects which are tightly interwoven with the mythology and magic of the place.

Using her own specific form of photographic documentation, Ingrid Amslinger has interpreted the works in their context. Apart from her participation in the execution, she is closely connected to the works through her documentation.

Sand storms and rain, termites and, above all, vandalism by off-road tourists have caused damage to the works over the years. Up until 2015, Hannsjörg Voth traveled to Morocco himself to organize and manage maintenance of the works. In recent years he has been supported by the "Verein zur Erhaltung der Bauskulpturen in der Marha-Ebene Marokko e.V."

Hannsjörg Voth, "Iron Wings" in front of the Celestial Stairs

(Association for Maintaining the Land Art Sculptures in the Plaine de Marha of Morocco).

In 2014, Hannsjörg Voth handed over the responsibility for the maintenance of the works as well as the rights to them to the "Fondation Voth Maroc ain nejma". Along with the architect Elie Mouyal of Marrakesh, the author of this paper was appointed to the foundation's board which integrates the knowledge of earthbuilding experts Ziegert | Roswag | Seiler Architekten Ingenieure into the future process.

It is the task of the foundation and its board to continue the maintenance efforts of Hannsjörg Voth. In addition, suitable restoration measures, long-term preservation strategies and an effective method for the use and management of the works need to be developed and established. At the core of the efforts will be visitor management as well as appropriate advertising of the site and controlling the already existing stream of visitors. Here, balance must be achieved between the benefits of receiving visitors and the accompanying risks to the preservation of the works. In any case, the number of visitors will most likely be limited.

The focus of this publication is a description of the current state, with a particular emphasis on the stabilization of the structures and options for long-term restoration and preservation.

The works and their structural design

In the 1980s, Hannsjörg Voth traveled to various countries in search of a suitable, remote location for a large land art project. In Morocco, in the vast Plaine de Marha, where the Atlas Mountains and the Sahara meet, he found a suitable, remote place for the pieces which were to crown his life's work.

From 1986 to 2003, he created three large-scale projects which are in view of one another and form a coherent group of works.

For the realization of his works, Hannsjörg Voth referenced local building techniques, particularly rammed earth construction. Although the art works are not buildings in a traditional sense, he constructed his land art sculptures with the help of local craftsmen in the regional building tradition using historical means and local materials.

The works were produced in dimensions customary in Morocco, primarily using a similar maximum height. The following is a detailed description of the works and their structural design.

Celestial Stairs, view from the south with camels

Celestial Stairs 1980 – 1987 (start of construction in 1985)

"In the south of Morocco I want to build an earthen structure in the shape of a triangle. In Morocco there is an unbroken earth building tradition, and therefore local craftsmen will build the "Celestial Stairs".

The triangle, with its long leg (ground) measuring 23 metres, has a height of 16 metres. The hypotenuse is 28 metres: Here, a staircase with 50 steps runs up between two closed stringer banisters which are 140 cm high and 52 cm wide.

The front side of the triangle is 6.80 metres wide at the base and tapers to 3.60 metres at the top. The upright side is profiled and vertically structured by a 60 cm deep groove.

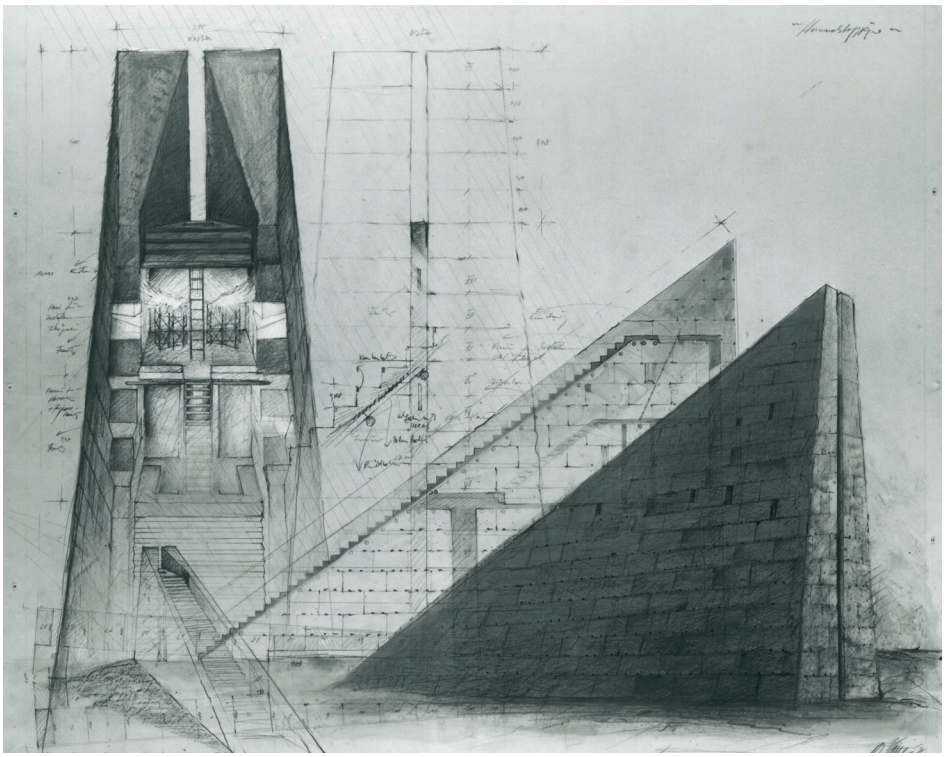
The 52 steps lead to a platform located 4 metres below the top of the structure. From this level, two rooms which are situated below one another can be accessed.

After completion of the "Celestial Stairs" I would like to live in the lower room for a few months and, during this time, work on an object consisting of two wings for the upper room. The wings have feathers made of hand-forged knives. The wing span is 3.50 metres. The tips touch the side walls of the room. The space between the wings remains empty so that a person can fit inside." [1]

In the longitudinal view, the Celestial Stairs is a triangular structure which can be climbed to a height of 16 metres via 52 steps. Thick rammed earth walls rise from a natural stone foundation and are slightly slanted towards the interior of the building on the outside. Small, slit-like windows are set into the walls to illuminate the interior and allow views of the exterior space. The cross wall at the top of the stairs is grooved by a slit in its center. At the upper end of the staircase, this slit offers a focused view to the east into the vastness of the plain.

With their approx. 80 cm high rammed earth sections and their regular anchor bolt holes of the formwork, the walls exhibit typical local rammed earth aesthetics. From the landing at the upper end of the stairs, the interior space of the Celestial Stairs can be reached through a trap door and via a wooden ladder. The interior space is tiered four floors down by wooden steps and ladders which are arranged parallel to the staircase on the exterior.

Celestial Stairs. Drawing by Hannsjörg Voth



Celestial Stairs, view from the work space to the entry

The "Iron Wings" can be found at the highest level [2]. The two floors beneath had been designed as live-in studios and were used as such for an extended period of time. The lowest one and a half-storied level served as storage.

The ceilings above the individual levels and above the staircase are formed by eucalyptus logs with cut square timber placed across them. Giant cane was used for ceiling boards. A black plastic tarp was placed on top to act as trickle protection and to seal the staircase. The steps of the exterior staircase are constructed of air-dried earth blocks. Wooden strips serve as edge protectors for the steps.

Golden Spiral 1992 – 1997

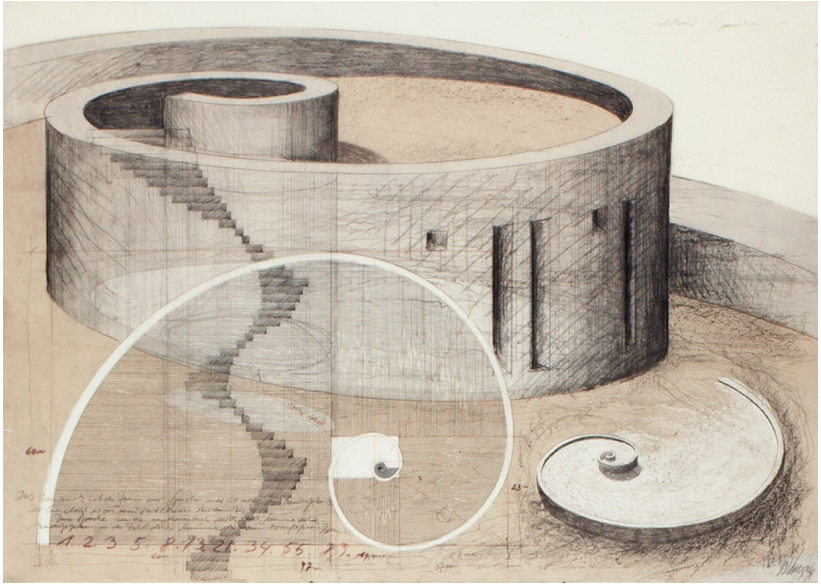
"The structure is in the shape of a spiral. In the center, which in its construction is based on the golden ratio, is a well.

The layout consists of nine quadrants of different radii which increase based on the principle of the Fibonacci sequence, a series of numbers in which each number is the sum of the two preceding numbers: 1, 2, 3, 5, 8, 13, 21, 34, 55 ...

Every third term of this sequence approximates the golden ratio. This relationship between the golden ratio and the Fibonacci sequence is a principle which can be found in many natural processes.

After a length of 260 metres, the ascending enclosing wall, constructed of quarry stone, reaches its highest point of six metres. A raised ramp filled with a clay soil mix leads to the center of the spiral, to the entrance. A winding granite staircase leads 27 steps down to the work and living spaces located under the ramp.

Celestial Stairs, construction site



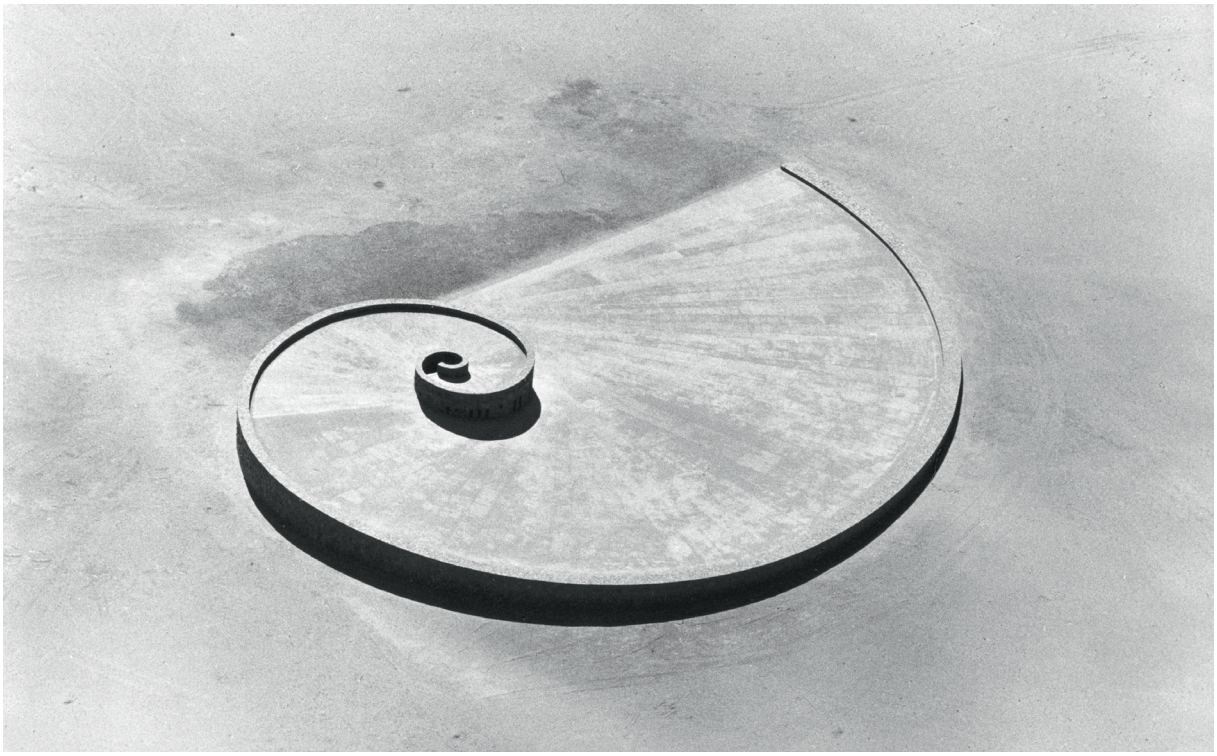
Golden Spiral. Drawing by Hannsjörg Voth

Another 100 steps lead down to the well. An ark – a prehistoric boat forged from gold – floats on the surface of the water." [3]

Integrated living areas are situated below the ramp of the spiral. To this day they are used by the artist as a home and a studio during his stays in Morocco. The retaining walls of the spiral, and therefore of the rooms as well, are made of quarry stone masonry which forms two exterior shells connected with transverse girders and anchors. In different areas, the space in between is filled with a mix of concrete and quarry stone, or clay or sand. The staircase was built up from the bottom of the well using natural stone blocks. Stairs which were cut from natural stones were inserted. The ceilings of the studios are made of round cedar logs and cut boards.

Originally, the ramp was constructed as a rammed earth surface. Again and again, motorcycle and ATV riders

Golden Spiral with original earthen surface on the ramp



Golden Spiral, well

severely damaged the surface of the Golden Spiral.

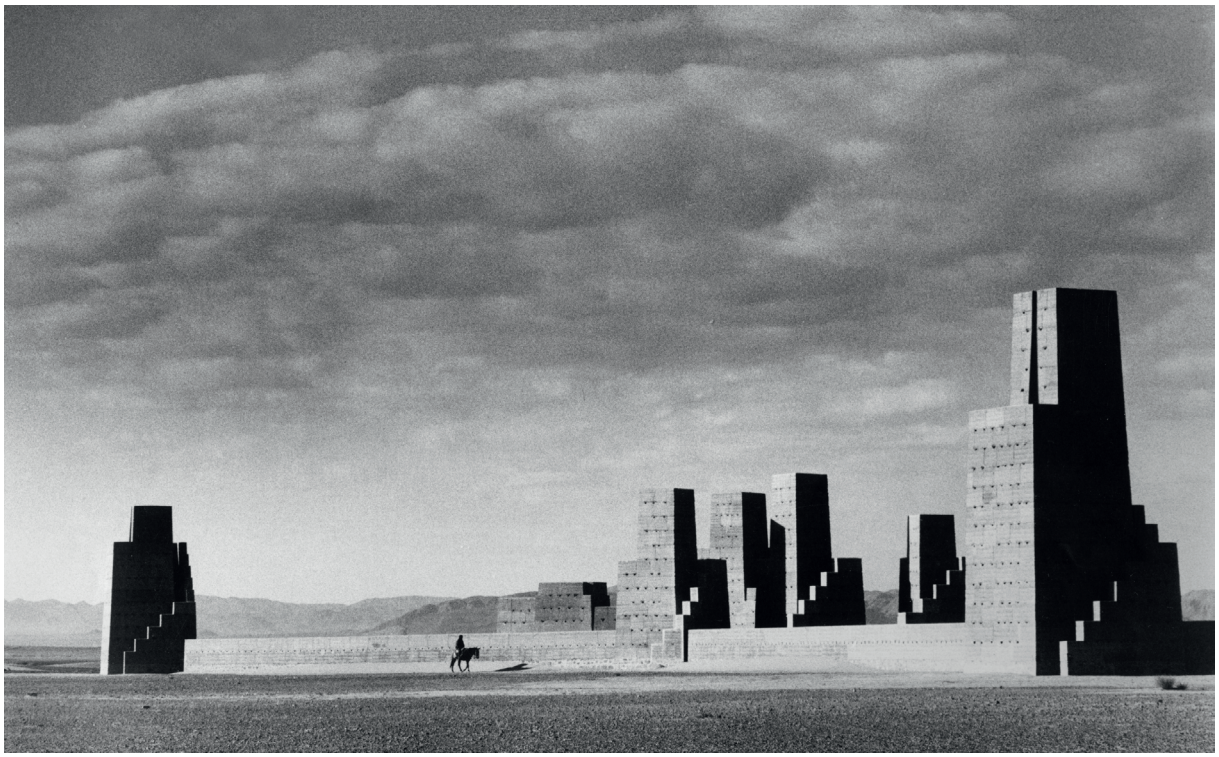
To protect the surface of the spiral it was therefore covered with flagstone in 2013, even though the artist prefers the earthen surface from a conceptual perspective.

City of Orion 1997 – 2003

"Orion is one of the oldest constellations. Its mythological origins can be traced back to the Sumerian-Babylonian Epic of Gilgamesh dating from the third millenium B.C. In this epic, the constellation depicts a tall warrior who, carrying a sword and swinging a club, fends off the furious attacks of a bull.

The Egyptians saw their god Osiris, the god of the dead, in the Orion constellation. In Greek mythology, among other figures, Orion embodies a great hunter from a distant past who races across the night sky with his two dogs. Orion is the starting point for the design, with its beautiful figuration and myths which have surrounded this constellation and its neighboring stellar constellations since the beginning of civilization. According to the concept, the seven brightest stars – Rigel, Saiph, the three stars of the belt Mintaka, Alnitak and Alnilam, as well as Bellatrix and Betelgeuse – are represented by the same number of observation towers constructed in rammed earth along with seventeen smaller stars which form the "head" and the "shield" of Orion. The arrangement and orientation of the towers within the layout of the structure is determined by the position of the stars in the constellation. Their dimensions in height, width and depth are derived from the brightness and expansion of the stars. The central star where Orion's

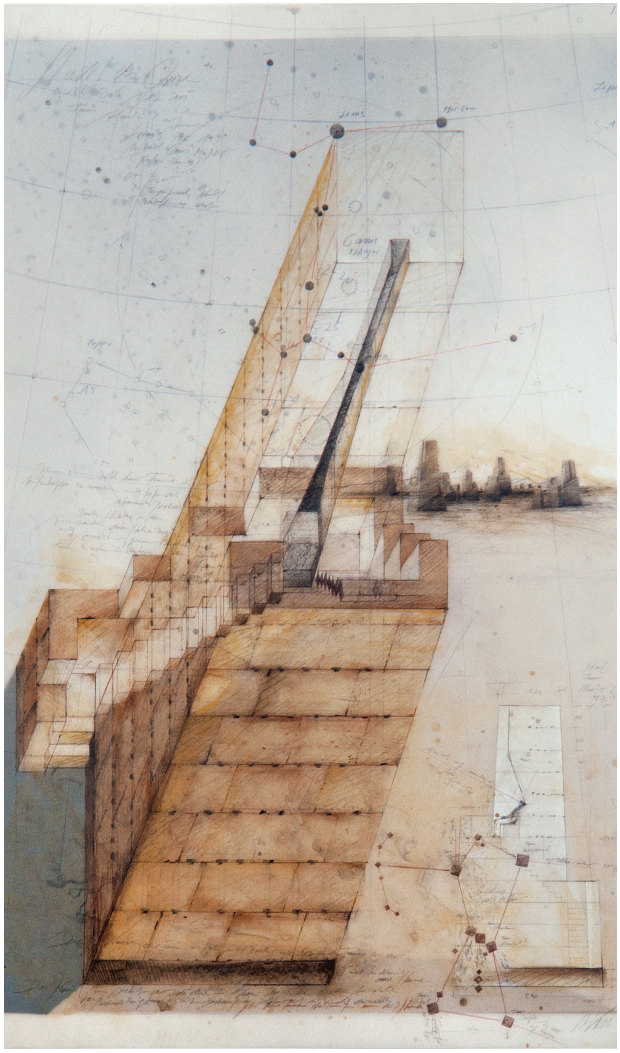
City of Orion, east view with a rider



sword hangs off his belt, M 42 (Orion Nebula), is symbolized by a covered well."

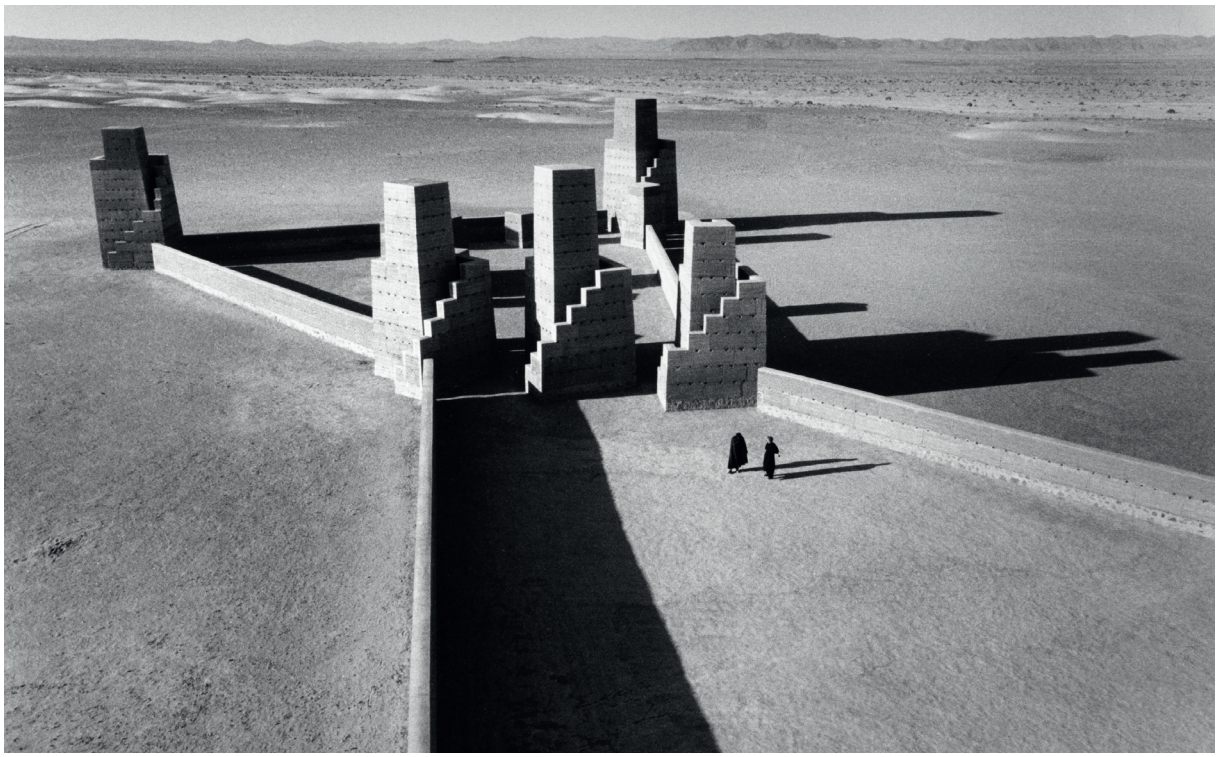
Staircases leading up along the sides of the seven main towers can be used to reach observation seats located in the upper thirds of the towers. At certain times, specific stars – Procyon (Canis Minor constellation), Aldebaran (Taurus constellation), Castor (Gemini constellation), Capella (Auriga constellation), Sirius (Canis Major constellation), Lep (Lepus constellation), Alnilam (Orion constellation) – can be observed through slits in the walls, conveying the movement of celestial bodies and cosmic correlations of space and time to the viewer. Although the seven high towers are astronomical buildings, the primary intention of the structure's design is to represent the Orion constellation three-dimensionally on earth in the form of a large-scale sculpture. [4]

Like the Celestial Stairs, the towers and walls of the City of Orion were also constructed using rammed earth. Here too, the structure is built on a natural stone foundation. The towers consist of thick rammed earth walls and their interiors are filled with soil and sand. The horizontal surfaces are covered and leveled with straw-clay.



City of Orion, Rigel. Drawing by Hannsjörg Voth

City of Orion, view to the south



Structural damage to the works

The recorded damage can mainly be traced back to natural environmental conditions but has also been caused by unauthorized visitors.

In the past, insensitive motorcycle tourists and ATV riders frequently tried to ride to the top of the Celestial Staircase. The Golden Spiral is also affected by illegal motorcycle riding. The ramp, initially constructed out of rammed earth, was therefore covered with natural stone. To this day, illegal driving causes damage on top of the banister of the spiral.

Natural damage to the works has three primary causes:

1. Sand storms and rain showers erode the rammed earth surfaces on the weather side.
2. In the downwind areas, mainly in the City of Orion and the Golden Spiral, sand storms cause drifts and sand piles. They lead to ground moisture along the natural stone foundation, cause corrosion of the anchors of the Golden Spiral, soak the rammed earth surfaces and thus result in damage to the earthen surfaces.
3. Termites attack the wooden components of the ceilings in the Celestial Staircase and the Golden Spiral.

The following explains specific damage to the individual works:

Damage to the Celestial Stairs

The surfaces on the weather side exhibit signs of erosion. However, even though the Celestial Stairs is the oldest of the works, it shows a smaller loss of material than the City of Orion. This might be linked to the earthen material used and its application.

Repairs with straw-clay have been carried out in recent years around the anchor bolt holes of the formwork and along the upper edge of the foundation. Especially after a rain, these repairs stand out due to their lighter color. The insides and the top of the stair stringers have also been plastered with straw-clay. The upper part of the sharp edge of the groove in the back wall is eroding due to weathering. In the lower part, donkeys in particular which were taken to the well as "water carriers" scratched their fur on the edge which also led to damage. In this section the edge was reinforced with natural stone masonry, in the upper part it was repaired with straw-clay.

The earthen surface and the edge protectors (wood) of the stairs are not strong enough for the current number of visitors, and are detaching. The wooden components of the ceilings and the staircase were

City of Orion, building site

Celestial Stairs, erosion of the north facade

Termite damage around the beams of the staircase

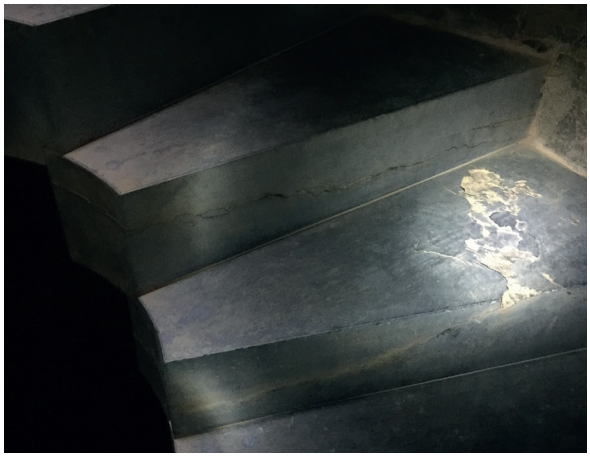
severely infested with termites in the two lower stories. Parts of the beams have been exchanged and the new beams have been painted with waste oil. Currently, there are no signs of termite infestation. The original windows are simple, flush wooden windows without weatherboards. As a result, they are not able to ward off driving rain or sand dust. Metal shutters have been installed in front of the windows to protect against vandalism. In recent years a German-built metal window was installed for testing purposes. After some time the fittings became clogged with sand dust rendering the window non-functional. The trap door on the highest landing does not provide sufficient protection against vandalism.

Damage to the Golden Spiral

Unauthorized motorcycle and ATV riding on the exterior surfaces of the ramp and the balustrade have caused rocks to loosen. Sand drifts have periodically covered individual wall anchors with wet sand, causing the anchors to corrode. To protect them from corrosion, exposed anchors have been painted; this is however not possible around the wall joints. The ceiling of the "chamber" in the interior of the spiral is infested with termites. The ceiling's structural integrity therefore needs to be checked.

The most critical damage to the Golden Spiral are spalling and cracks on the stairs below the entrance

Celestial Stairs, erosion above the foundation, repairs of the groove



Golden Spiral, damage to the marble stairs

City of Orion, erosion and sand drifts

platform which leads to the interior spaces. They were made of local, black marble. The stairs in the upper section of the staircase were made of Impala, a type of granite found in the south of Africa. They are less susceptible to moisture and remain damage-free as they are less affected by the moisture of the well.

Damage to the City of Orion

The main damage to the City of Orion is the erosion of the rammed earth surfaces which has reached critical depths of up to ten centimetres. Some of the capstones of the anchor bolt holes of the formwork are exposed and are at risk of falling out.

Sand drifts transport moisture from the building ground to the rammed earth surface and damage it. In addition, turbulence within the sand drifts leads to erosion damage.

Past repairs which were done with straw-clay stand out visually from the original structure. Therefore, the suitability of these repair measures needs to be reconsidered and a general restoration concept must be developed. The erosion of the rammed earth walls is progressing at such a fast rate that it is going to be critical in the short to medium term, and needs to be stopped for restoration to commence.

Management plan, strategies for further action

The primary objective of the foundation is to obtain the long-term rights of use and access to the works and the surrounding landscape. Currently, negotiations with the Moroccan government and various local authorities are being conducted. In the past, local groups have appropriated the works for events and guided tours which has led to miscellaneous damage to the works and bad publicity. In the meantime, rangers have been employed who limit access to a reasonable level and a suitable type. In order to preserve the unique location of the works and the surrounding calmness, the foundation intends to correct the routing of a planned road which would pass by the works at close proximity.

Currently the foundation is working with the board to develop a management plan for the cultural site. The first priority is to implement all necessary restoration measures and to determine and introduce continuous maintenance procedures. These primarily include the repair of all damage described above and ongoing measures such as the removal of sand drifts, etc.

In addition, management options for visitor management are being developed which will address the following issues. It is essential to discuss the potentials from the viewpoint of the different countries and to involve various players from the cultural sector and tourism, etc.:

Removal of sand drifts

Off-road tourists do not respect the marked boundaries

- How is the participation of local groups implemented, which is an essential contribution to the development of a sense of appreciation of the works and, thus, their preservation?
- What are the intercultural potentials of the works between Morocco/North Africa and Europe/Western world and how can they be utilized or activated?
- Who are the visitors/visitor groups?
- How should guided tours and possible supplementary programs be developed and organized for the respective groups?
- What is the most suitable way to transfer visitors to the works (e.g. off-road vehicles etc.)
- Who are the partners which will facilitate further exchange programs?
- What is reasonable and adequate when it comes to making exclusive offers to a circle of people whose financial contributions to the preservation of the works can be more substantial, without excluding the general public?
- How can the economic challenges be solved in the short and long term?

In preparation for the management plan, first talks have been conducted with Hannsjörg Voth and relevant literature has been examined. In addition, it is necessary in the long run to create a comprehensive, digital archive and inventory in order to better understand and convey the works. Such an archive would also facilitate academic work.

Summary

The works of Hannsjörg Voth are of great artistic and architectural importance and need to be preserved. They were constructed with a special kind of cooperation, characterized by political government control, or even partnership, and the artist's strong will. Without this strong will, which was largely above local entanglements, the construction of the works would not have been possible for many years. Beyond artistic importance, this will manifests itself in the works as they are experienced today. They place themselves into a unique, local context to the surrounding landscape and to the cosmic references created by the artist.

A new kind of cooperation between the foundation in Morocco and the partners in Germany will be based on the relevance of the works for both cultures and will develop new qualities with the main responsibilities lying with Morocco.

The restoration and long-term preservation of the works is technically possible. The short-term as well as long-term financing of the maintenance efforts, however, poses more severe problems. Hopefully, controlled public visits to the sites will contribute financially without causing any damage to the works.

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Nomad looking out across the Plaine de Marha