

HOVERING TRAILS

INSTALLATION MANUAL



The design is protected by WIPO - The world international property organization.
The product was founded by the Technology Development Fund of Iceland the year 2017 and 2018

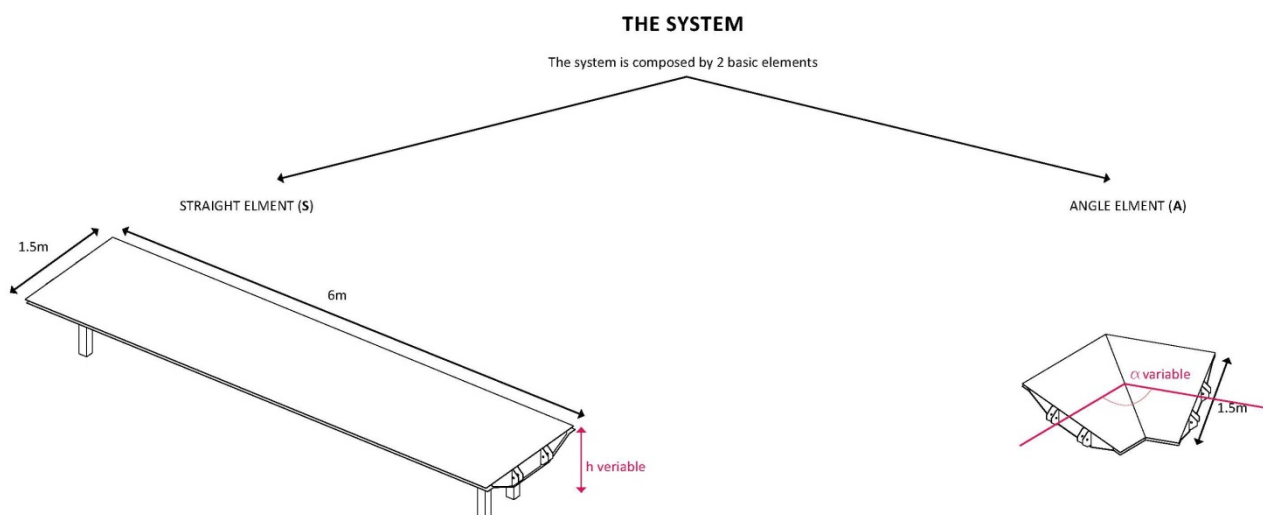
General information

It is a flexible and environmentally friendly trail that minimizes points of contact with the ground and therefore shields the sensitive area beneath and around it. The approach can be applied and adapted to different circumstances and needs in Nature. The design is unique, since it can be applied over lava, by hot springs and swamp, without damaging the substrate.

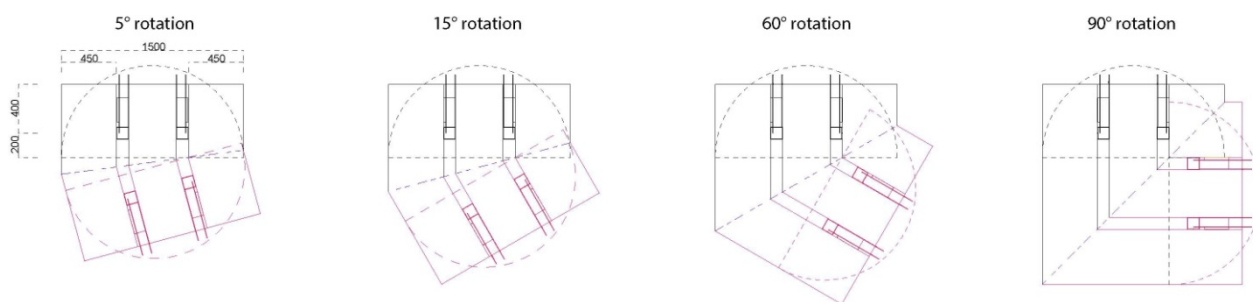
Description

The system is made out of trapezoidal aluminium units. S elements that are straight and A elements that make the turns. All units are 1500 mm large and 205mm thick in the middle. The length can be different.

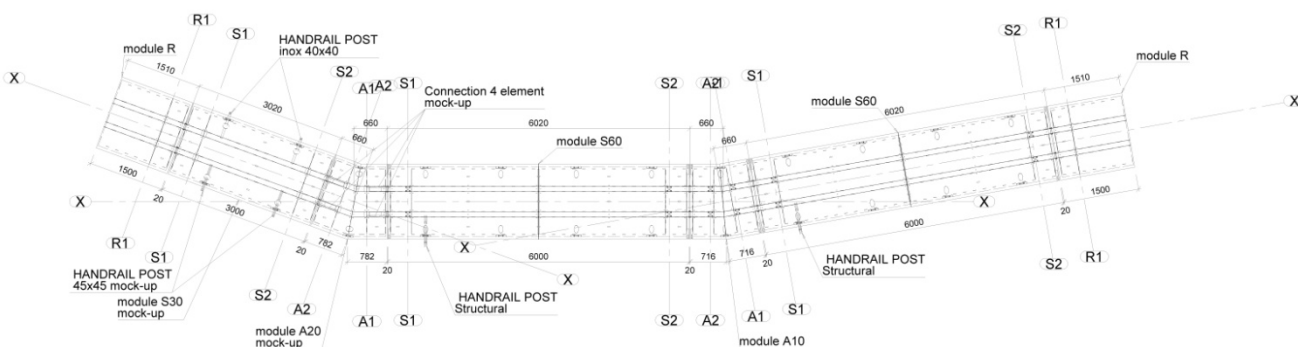
The elements are in general placed on ground screws that they are connected to by an post anchor.



Examples of turning units:



Assembling example:



Installation process

1. Placement of an installation jig.
2. Placement of the ground screws.
3. Installation jig taken away and ground screws flange put to its defined level.
4. Post anchors bolted under the element without tightening the bolts.
5. The first element put in place with the post anchors positioned on the screws flange.
6. Height of the element and the slope is adjusted with the treaded shaft of the post anchor.
7. All bolts and nuts are tightened.
8. If the next element is a turn and no screws under it then it is directly attached and put in a horizontal position. All turning elements should be horizontal.
9. Installation jig is put in place for the next element.
10. Step 2 to 9 are repeated.

Foundation - ground screws

Ground screws are used for founding . Each element has the possibility of fixing under it 4 ground screws or other type of foundation. There are in general one pair of ground screws under each strait element in a strait line. When the strait units are separated by a turn there is one pair of screws on the strait elements on each side next to the turning unit. Ground screws can also be put under the turning units. The maximum distance between screws is 6m. The ground screws need to be placed precisely under the threaded shaft of the post anchor. A maximal displacement of 30mm from the axe is permitted.



Resistance of load forces is 2,5T, resistance of lifting force is 650kg at each ground screw.

Minimum dept of the ground screw is 1m in resistant sol (gravel, sand)

In soft soil (mud, clay) the length of the ground screws should be 1,6m.

If there is a rock in a dept between 0,6 and 1m then the ground screw can be cut so it stands on the rock; In that case the cut end should be protected against corrosion. If the rock is at 60cm dept or less, then a hole should be drilled in the rock for a embedding into the rock.

The embedding is done with a small ground screw, a cut ground screw or with a galvanised steel tube with a tread on the inside to level with the M30 shaft.

Machines for screwing Installation JIG

For the screwing there are three possibilities.

1. A small belt machine can be used if the field permits it.
2. Small hand positioned electric screwing machines can be rented.
3. A hand drill can be used in some cases.



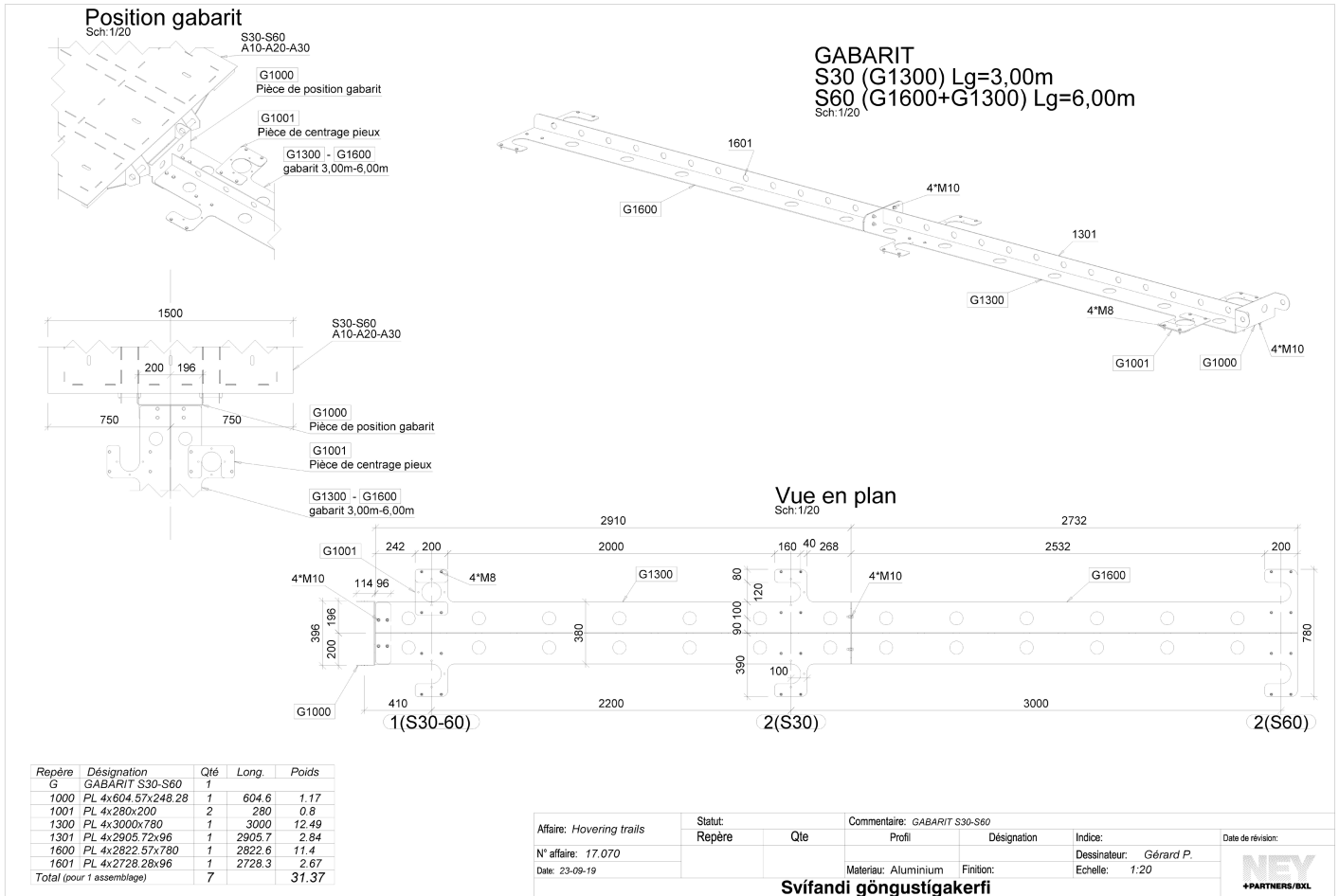
40 kg, 3600Nm, 30 Volt.

Installation JIG

An installation jig should be used for the placement of the ground screws/foundation.

The jig can be placed on the ground for the placement of the first module, but for the rest it is always fixed to an element with the 30mm axe.

1. all the screws for the element should be drilled down to the jig.
2. the jig is then taken away and the screwing continued until a correct height.
3. the jig is placed again to insure the good positioning of the ground screws.



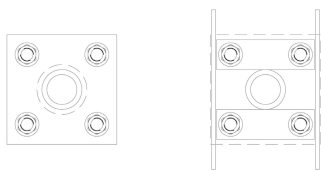
Post anchor

Special connection piece is used to connect the elements to the ground screws, adjust the height and the slope. A threaded shaft goes through a ball in stainless steel. Two plates in aluminium with four stainless steel A4 M10x60mm bolts fixe the slope by tightening around the ball. They are fully tightened when the deck has been correctly positioned.

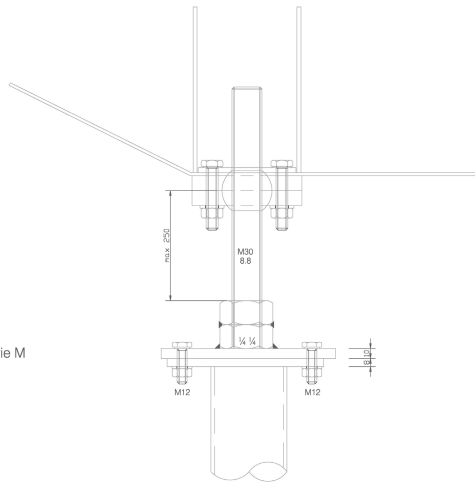
The maximal height between the center of the ball and the nuts melted to the lower plate of the post anchor is 250mm.

To rise this height can only be authorised in special cases with the agreement of the engineer. If 90mm long nuts are added with preloaded assembly then their length can be added beneath a treaded shaft of max. 250mm. Six stainless steel A4 M12x45mm bolts are used to attach the post anchor on the ground screws.

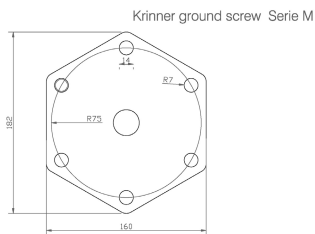
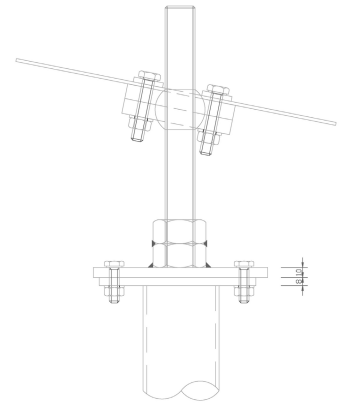
Aluminium plates for fixation



Cross section

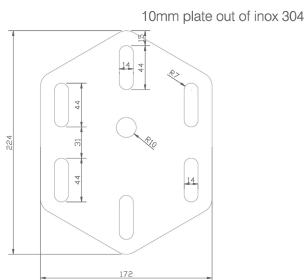


Long section



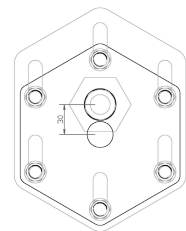
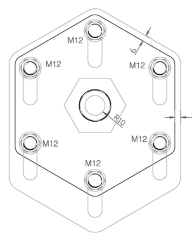
Krinner ground screw Serie M

HORIZONTAL DEPLACEMENT MAX 30mm



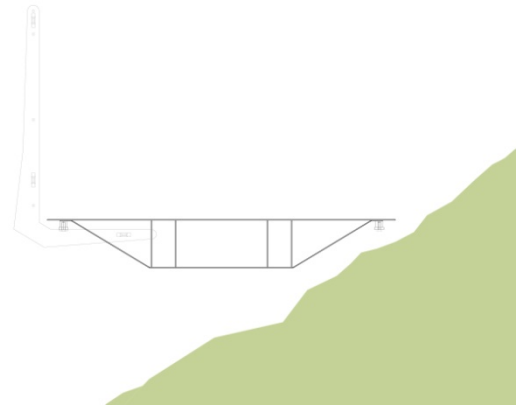
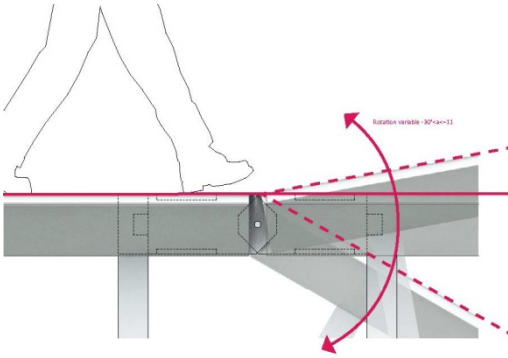
10mm plate out of inox 304

PLAQUE ASYMETRIQUE Serie M



Connection of elements and adaptation to the landscape

The elements are fixed together by an 30mm axe that is 650mm long. It is slided trough the center of the four holes and is fixed on both ends by a stainless cotter pin (hole dim. 6mm).



The architect gives information of the height of the top and the degrees of the slope. For handicap access the aim is that the trail should not be steeper 1:20 in continue and not more than 1:12 on 3m long deck when it is possible.



A ramp can connects to the landscape. The ramps is fixed by an axe on one side and is lies on the ground on the other side.

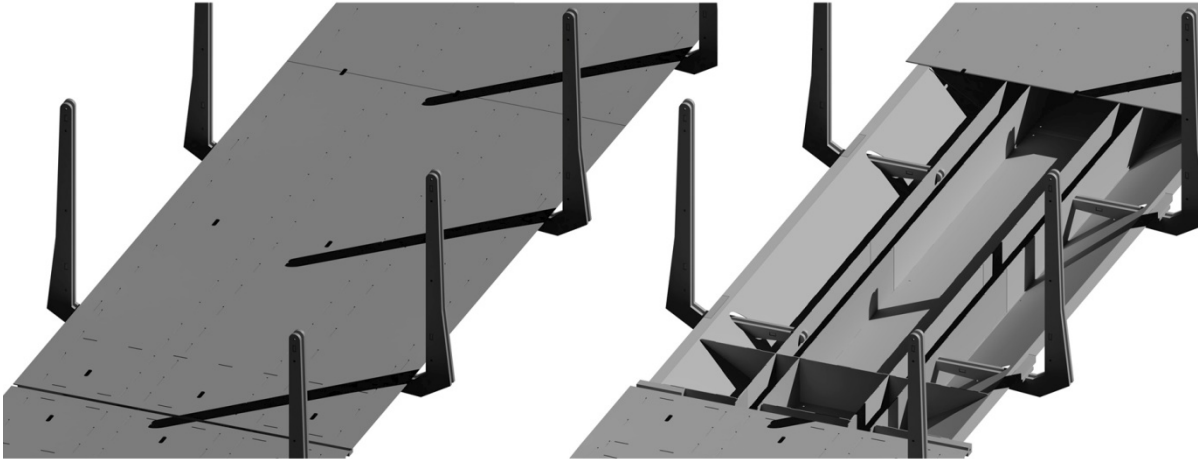
Transport

The modules are all 1,5m large and between 1,3m og 6m long. The turning units and ramps can easily be carried by two persons (approximately between 60 and 80kg). The 3m strait unit (approximately 128 kg) can be carried by 4 men and the 6m unit can be carried by 6 men (approximately 240 kg). The best is to role it on wheels on the modules that are in place. In many places the elements can be carried by a small machines.

The maximum load on the modules is 500 kg/m². An acceptance from the engineer is needed for the type of the machine before it can run on the modules.

Railing

The handrails are screwed under the elements on desired places shown on the architects drawing. The end of the handrails post is glided into the hole on the side and fixed to the element from beneath by two stainless A4 933 bolts size M12, with a stainless washer. For a stainless handrail the bolts are M12x35 FS and in the case of an aluminium handrail they should be M12x40 FS.



The top of the handrail is designed to receive a 10mm wide wire in stainless steel 316. The wire is fixed to a eyebolt dim. 10mm on the corner of the module that the railing ends and a stainless steel 316 cable tensioner is placed at one end. A wire rope clamp/clip for dim. 10mm is fixed around the cable at every handrail post.

The lower holes in the post are planned for 8 or 6mm wide wires or a net following the architects instructions. If there is a metallic net then it is fixed to the wires. A Dynlce net would be custom-made and attached by stainless cable tie. If a wooden gripping surface is planned then it is placed by gliding the wire trough the readymade pieces of hardwood.

