

A C C E S S S T R U C T U R E S



From 2014, visitors will follow a new route from the mainland to reach the Mont-Saint-Michel, their final destination.

A new causeway (1085 metres), slightly offset to the East, will be extended by a pedestrian footbridge over the final part of the route (760 metres in a new maritime setting before reaching the foot of the ramparts). A ford (120 metres) will enable visitors to access the village all year round, except for a few hours every year, during exceptional high tides with a coefficient of over 110. The Mont will then become an island again, in the middle of its original water environment.



These link works have also been designed to blend into the landscape as seamlessly as possible. The causeway and the pedestrian footbridge maintain wide spaces for pedestrians. They are covered with wooden decking on each side of a central roadway reserved for shuttle services. Moving the car parks to the continent has freed up 15 hectares of strand. It will now be possible to take the time to enjoy the fullness of nature from these reclaimed spaces.

Three years' work (2011-2014) are necessary. It will then be time to destroy the XIXth century causeway, a symbolic event which will mark the end of the major work and the restoration of the Mont-Saint-Michel in its maritime environment.

Everything was thought of during and after these developments to preserve accessibility for everyone to the Mont. The old structures (causeway road, car park) will only be destroyed once the new structures are in service in order to maintain a permanent service to the Mont. The emergency services will be able to access the site under all tidal conditions to guarantee safety on the Mont.





ARCHITECTURAL EXPRESSION

A continuous and fluid movement

«The Mont Saint Michel draws on all the strength of the landscape in which it stands. It is the only landmark in the infinite flatness of the strands. This is why the project set itself the imperative of not disrupting the wonder of the site, created by its mysterious status and the absence of any marker points or scale. The landscape must continue as far as the eye can see; visitors must feel that they are immersed into an immense setting.

This reading of the site has encouraged us to keep a completely flat section as close as possible to the strands and to design as fine a structure as possible. The outline of the structure within the site is the end product of the choices that have been made, combined with the hydrological constraints.

From the mainland to the Mont, the structure's general geometry forms a continuous and fluid movement. The structure moves off gently towards the east, before turning back suddenly from the jetty, opening up wider views of the bay and the Tombelaine rock. The Mont reveals itself gradually in a sequence shot that embraces the whole bay. This general outline is bound by the external curve; no breaks are caused by variations in width. Very gradual adjustments give fluidity to the structure's line over the strand.

It is a structure with minimalist expression, but one which is ambitious in its design and performance. It implements high performance techniques to withstand the efforts to which it is subjected without ostentation”.

Two sequences in continuity: the causeway and the jetty completed by the dock.

«The causeway is a raised section of earth and stone on a very open trapezoidal profile.

The jetty, naturally extended the causeway, is a spur with a very compressed profile set at an angle, built on two rows of fine pillars. The rhythm established by the piles from the Couesnon's bed plays a key role in creating an island: these piles express the intermittent presence of the sea at their feet. At high tide, the structure's lines are reflected in the waters. The repetitive nature of the piles, combined with their slenderness, accentuates the structure's horizontal character.

The roadway is divided into three distinct strips: two pedestrian walkways covered with oak decking on each side of the central roadway. This central roadway, which is reserved for the shuttle services, is covered in concrete. This central strip is covered with thin slabs of reinforced concrete.

From the jetty to the dock, the two pedestrian strips lead into metal sections at an angle to the central roadway which is supported on piles. The central strip then becomes the backbone for the structure».

Dietmar Feichtinger, architect for the access structure
www.feichtingerarchitectes.com



TECHNICAL MARKERS

Pedestrian footbridge

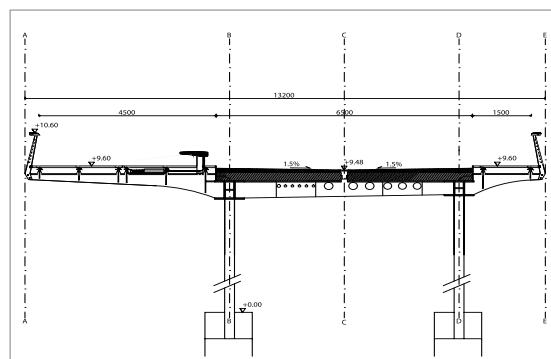
The apron's structure combines the properties of steel with the properties of concrete.

The apron's steel frame supports a reinforced concrete slab (25 cm thick), which is itself supported by lengthwise steel beams (45 cm to 55 cm in height) as well as crossbeams.

The slab and the steel beams create a mixed structure which is highly effective in transferring loads.

To guarantee simple and cost-effective assembly, the metal structure and floor slabs have been prefabricated in the factory and assembled on site.

- Total length: 760m
- Height: 9.50m (NGF - General Levelling of France), which is the current height of the causeway road
- Height under apron: 2 meters compared to the current car parks level
- Apron metal sections: 1 72m section at the end of the causeway, 5 120m sections, 1 72m section in the reservation, bound by expansion joints, with their ends embedded in foundation posts
- Apron width: 6.50m roadway and 2 footpaths overhanging the 4.50 m West and 1.50 m East consoles
- Lengthwise profile: flat except for the dock (slope of around 1%).



Steel posts

Every 11.70m the apron is supported by posts with their heads embedded in the apron and their feet embedded in the piles. The posts are doubled near the expansion joints at the ends of the rows.

To minimise the effects of the water, posts with very small diameter were the natural choice. The bridge's horizontal stability is obtained by connecting the posts at the foundation and the apron. High and low embedding has been chosen as it provides simple and effective connection which reduces horizontal deformation.

- Tube diameter: 24cm
- Thickness: from 4 to 6cm
- Heights: from 8.60m to 6.40m + length in the piles: 2m



Full-scale prototype

Post foundation

The 134 posts have been embedded in concrete piles 1m20 in diameter, which themselves have been drilled to around thirty metres in the natural terrain below sea level. The structure's stability is guaranteed by the friction of the concrete on the silt.

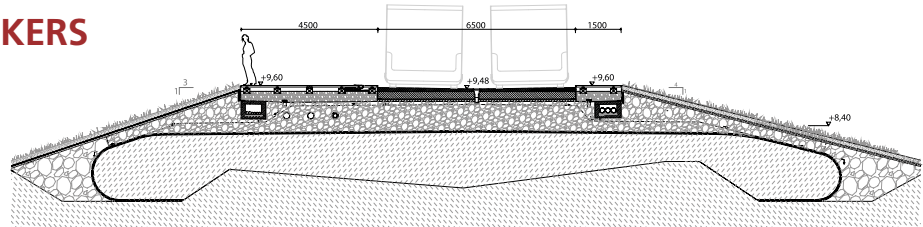
A full-scale prototype was produced on the site and set at the level of the final structure. It was composed of a metal structure frame on posts, with the road, the wooden decking on the two footpaths, the full guard rail and a bench with built-in lighting.

ACCESS STRUCTURES

TECHNICAL MARKERS

Causeway

- Total length: 1,085m
- Height: 9.50m (NGF)



This will re-use materials extracted from the site as part of the hydraulic developments. It is based on anti-washout geotextile and a geogrid to distribute efforts, anchored 2m below the embankment and 1.5m below the roadway. Rocks at the base of the causeway prevent washout due to currents.

A drainage layer is added to the sides to enable vegetation to grow (coco geotextile and a 5cm layer of earth).

A concrete roadway hangs over the causeway, with two side footpaths covered in wooden decking, in keeping with the footbridge.



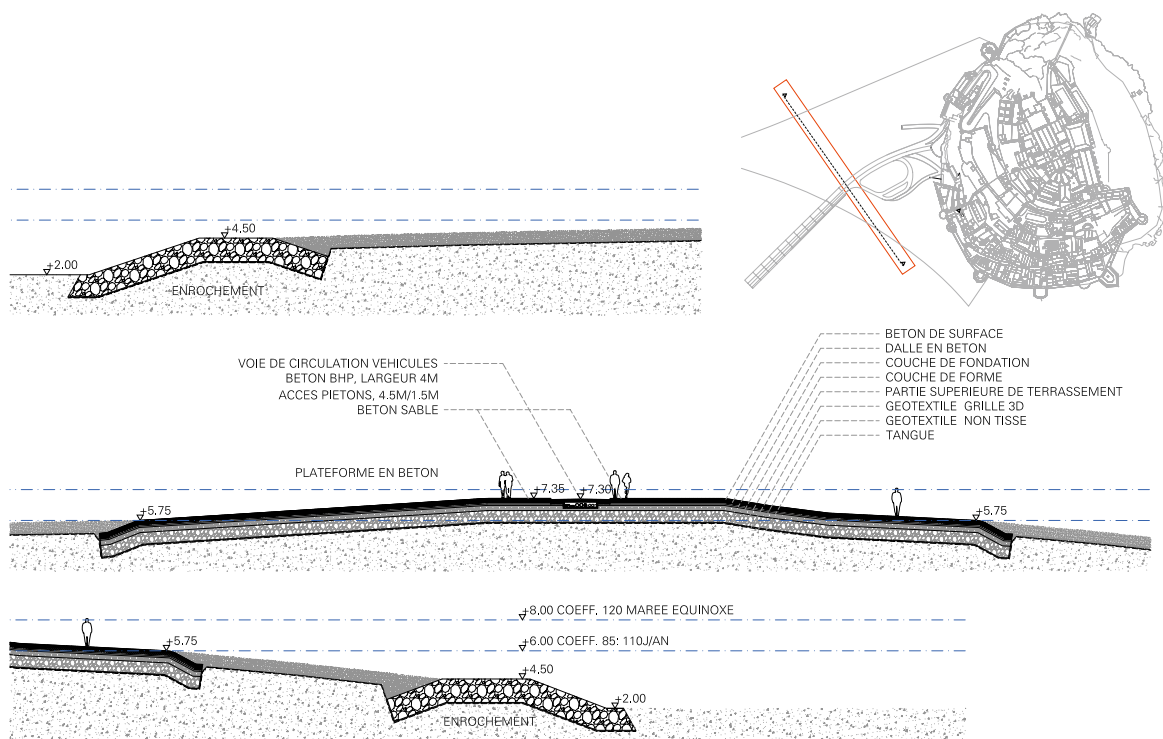
Reservation and ford

The reservation comprises an esplanade accessible to pedestrians and service and security vehicles, regularly submerged by the tides, and a raised ford, with different types of concrete covering. Rocks guarantee protection from the water.

- Surface: 25,000m²
- Materials: compacted silt, gravel and concrete surface covering
- Reservation height: from 4.50m to 7.30m NGF (ford hill)

Submersion of the reservation and ford: as an annual average, the reservation will be accessible without difficulty or with a short submersion time 335 days per year (670 tides out of 705). During exceptional coefficients of over 110, the Mont will be completely inaccessible for two hours, including cleaning time.

This will occur around 15 to 20 days per year, early in the morning or late in the evening, mostly in spring and autumn (35 tides out of 705 on average).



A C C E S S S T R U C T U R E S

PROVISIONAL PRODUCTION TIMETABLE

All of the work was carried out over a period of approximately 3 years, from May 2011 to spring 2015 and over several neighbouring perimeters: the causeway road, the footbridge and the reservation.



Phase 1 - Preparatory work (mid-May - end of 2011)

- Creation of site supply roads and layout of crossroads.
- Addition of silt extracted from the Couesnon (recovery backfill), stabilisation and drainage.
- Creation of a 6 metre long pedestrian footbridge prototype.

Phase 2 - Creation of the causeway (September 2011 - March 2014)

- Filling in of the causeway «core» with silt from September 2011.
- Creation of the roadway, sanitation and protection rockfill.
- Installation of new Mont supply networks (electricity, telephone, drinking water, waste water, fibre optics, etc.) and lighting networks for the structure.
- Installation of wooden decking on the verges (until May 2013).
- Destruction of the old causeway road in spring 2015.

Phase 3 - Creation of the central reservation at the foot of the Mont (February 2012 - end of 2013)

- Diversion of the networks "intercepted" by the site perimeter.
- Creation of the "fire path" at the foot of the ramparts (360 m³).
- Creation of access roads to the central reservation and of rockfill from February 2012.
- Creation of the reservation – 25,000 m² (2.5 ha), from spring 2012.
- Creation of peripheral areas until the end of 2014.

Phase 4 – Creation of the footbridge (End of 2011 - March 2014)

- Prefabrication of metal parts in the factory (Alsace): metal piles, apron, etc.
- Creation of the foundation posts for the "South end" (February to April 2012).
- Progressive creation of the bridge to the crossing point with the current causeway, with sequencing of the workshops (piles, posts, metal frame, concrete slabs, wooden decking, networks) from south to north.
- Creation of the "North end" of the pedestrian footbridge (from August to October 2012).
- Drilling of piles and posts on the current causeway planned for September 2012.

Commissioning of the structure planned for June 2014.

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DESIGN-CREATION OF THE ACCESS STRUCTURES - THE PARTICIPANTS

- PROJECT OWNER

Syndicat Mixte Baie du Mont-Saint-Michel

- PROJECT MANAGEMENT GROUP

Dietmar Feichtinger Architects
BET Schlaich, Bergermann & Partner

- COMPANIES

- Work package No. 1 (Site installations, earth movement, roadways, hydraulic protection): Rol Normandie / Vinci CT – Agence Terrassement Ouest

- Work package No. 2 (Special foundations, civil engineering, mixed apron, metallic structure, assembly and lifting): Eiffage Construction Métallique / Eiffage Travaux Maritimes et Fluviaux / Spie Fondations

- Work package No. 3 (Wooden decking and guard rail): Les Ateliers Aubert-Labansat

- Work package No. 4 (Interlocking and metalwork): BP Métal

- Work package No. 5 (Electricity and lighting): Cegelec Ouest

To keep up to date with how the work is progressing:

http://www.projetmontsaintmichel.com/les_travaux/ouvrages_d_acces.html

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