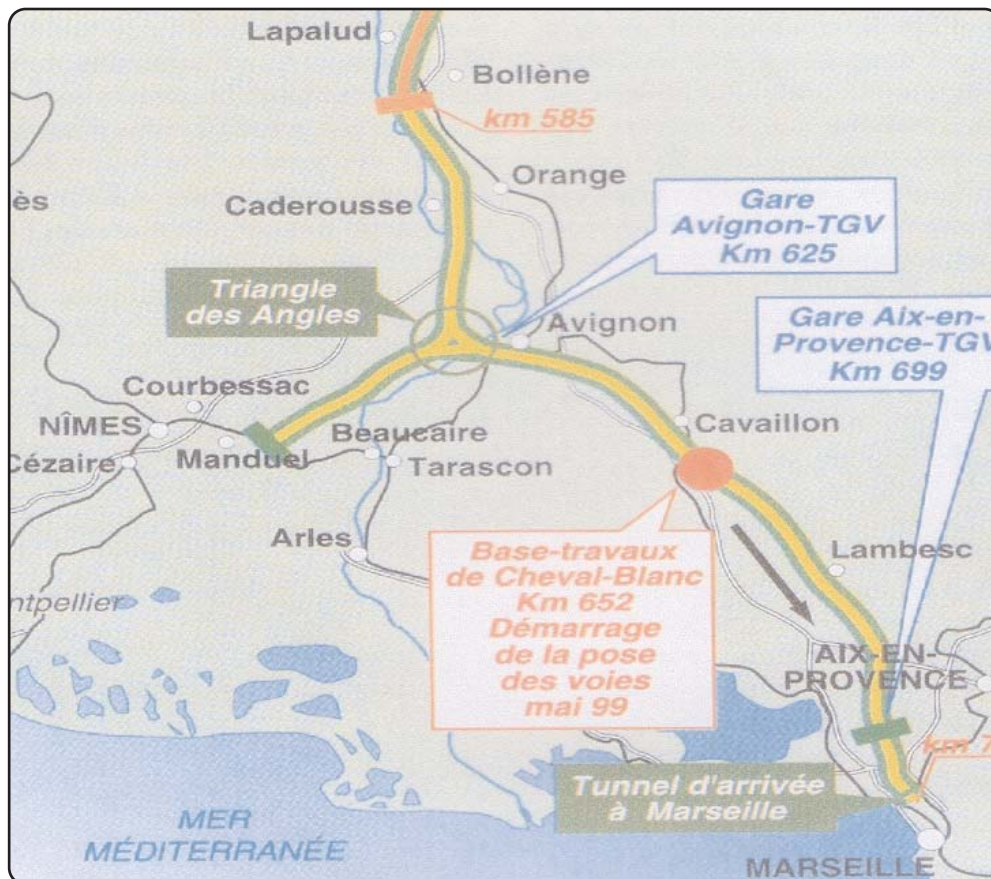




Tunnel of Marseille TGV Mediterranean Route

subject to technical modifications - 06/2005



GENERAL

At the beginning of April 2001, 5 crossings were installed as track access platforms on a newly built section of track on the Paris-Marseilles TGV line before, after and in a tunnel (7,800 m) at the northern approach to Marseilles. The purpose of these platforms is to guarantee rapid and uncomplicated rereiling of road-rail vehicles in an emergency.

Special features of this project were

- ↪ the high speed of the trains - 250 km/h
- ↪ differing types of superstructure at both entry portals and in the tunnel
- ↪ 2- track line, UIC 60 rail on different types of concrete sleepers
- ↪ bridging a drainage channel at the northern portal and in the tunnel between both tracks
- ↪ access to signalling components under the covering we installed



THIS INVOLVES PLATFORMS OF DIFFERENT DESIGNS:

The entire section of the line is of a two track design.

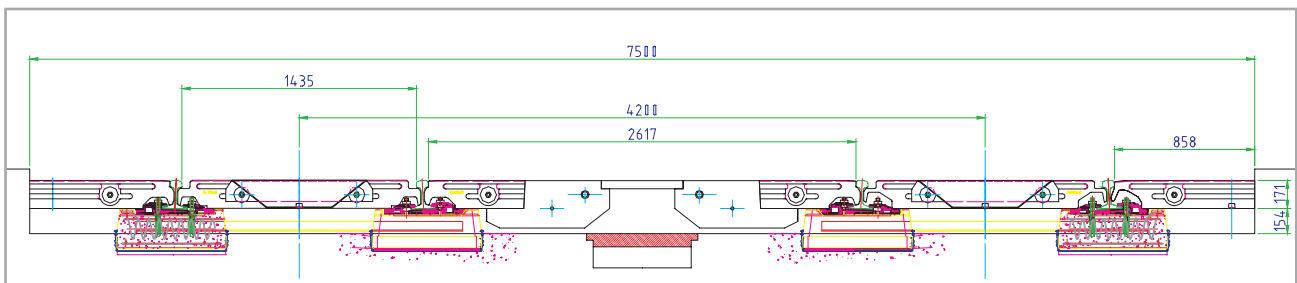
- 1) A platform of **ecoSTRAIL** panels was set up on 2 tracks over a length of 21.6 metres at the northern portal of the tunnel.

UIC 60 rails - Bibloc concrete sleepers type VAX VSB GV

The sleepers were cast into a concrete supporting slab and mounted elastically. The free space between the concrete supporting slab and the underside of the **ecoSTRAIL** panels was bridged on the inside by a special steel structure, outside by prefabricated concrete elements and between the tracks by specially designed concrete kerbstones.

Components of the signalling system are situated in this free space which must be accessible very quickly at any time. To do this, apertures were cut out of the rubber panels, which were held by a steel frame and closed by a steel hatch cover.

The deflections plates at the beginning and end were screwed to the concrete supporting slab to prevent air suction causing the panels to lift because of the considerable height of the structure.



Steel sub-structure in the inner area



Covering for the steel sub-structure

NORTHERN END OF TUNNEL



Assembling the inner panels



Bridging the drainage pipeline out of the tunnel



Access hatch which can be closed in the inner panel area



Fixing the panels with bolts and tie rods



Height-adjustable concrete kerbstone for the between tracks area



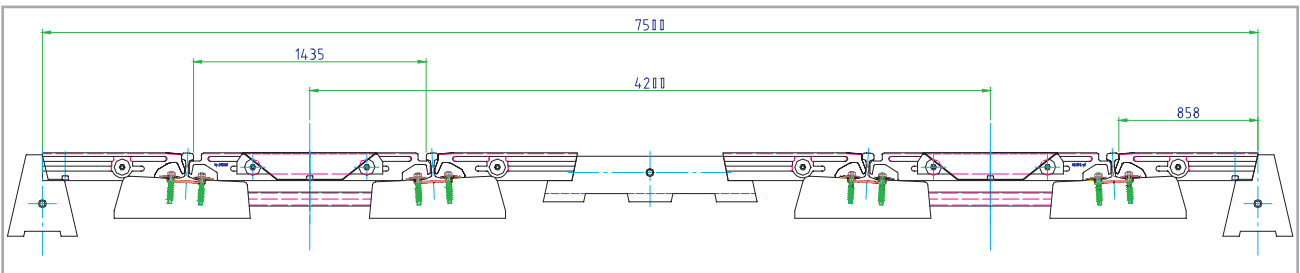
Laying the concrete kerbstones

SOUTHERN END OF TUNNEL

2) **ecoSTRAIL** was installed over a length of 19.8 m at the southern portal within the city of Marseille.

UIC 60 rails - concrete sleepers VAX U41 NAT

in a bed of ballast. Special concrete kerbstones were designed and manufactured for both the outer area and the area between the tracks.



Concrete kerbstones for outer panels



Fitting the outer panels in the area between the tracks



Concrete kerbstones for the area between the tracks



View in the direction of the tunnel



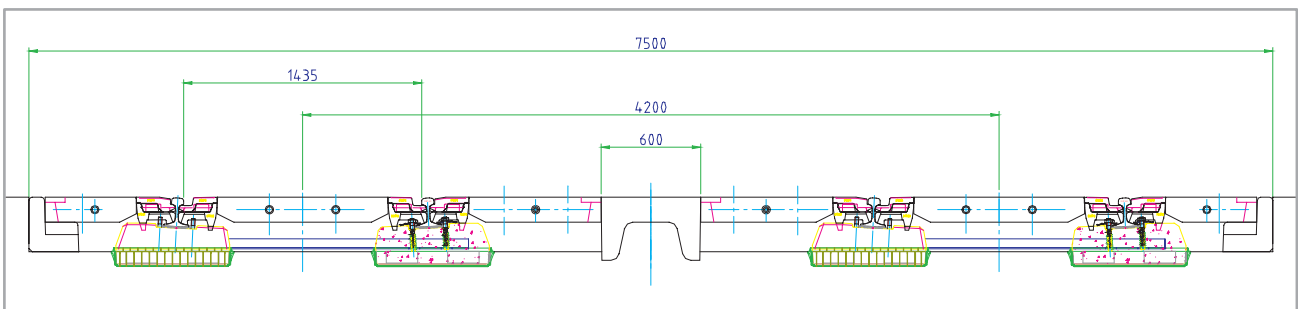
Finished platform

INSIDE THE TUNNEL

- 3) 3 platforms, each 21.6 metres long were fitted with **STRAILprofil** inside the tunnel.

UIC 60 rails - Bibloc concrete sleepers SAT S 312 NAT

The requirement imposed on all the products used inside the tunnel was class 1 fire resistance. In addition, the surfaces which react sensitively to fire were to be kept as small as possible. As a consequence, **STRAILprofil** was used there and combined with concrete slabs.



STRAILprofil combined with concrete panels in the inside of the tunnel

TECHNICAL DATA ecoSTRAIL

Material

Recycling-rubber on basis of natural and synthetic caoutchouc with additional virgin rubber layer as wearing protection.

Product design

Colour: black

Surface: rhombal profile
Upon choice with vulcanized mixture of minerals for improvement of skid resistance

Measurements: width = 900mm for inner panels
length and height depending on type of rail and sleeper

Perimeters of product

↗ Core mixture

Shore hardness	70 ±8	Shore
Density	1,15 ±0,04	g / cm
Tear strength	> 2	N / mm
Ultimate elongation	> 40	%

↗ Surface layer

Shore hardness	67 ±3	Shore
Density	1,15 ±0,015	g / cm
Tear strength	> 8,5	N / mm
Ultimate elongation	> 100	%

TECHNICAL DATA STRAILprofile

Material

Elastomers, powdered rubber and thermoplastic recyclelate

Product design

Colour: Black

Upper surface: Pyramid profile with GRP embedded to increase non-slip characteristics

Perimeters of product

Young's modulus:	> 400 N/mm ²
Tensile strength:	9 MPa
Elongation at tear:	> 8%