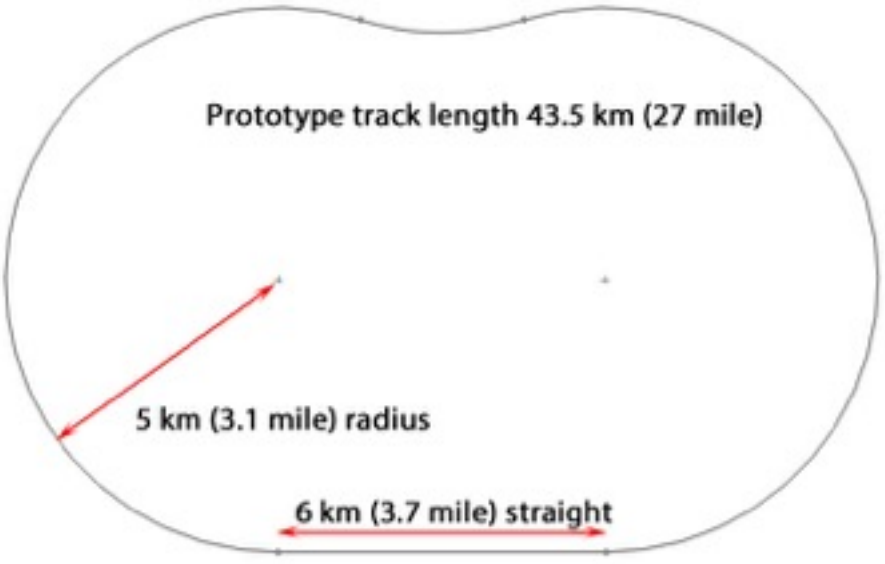
Hyperloop Prototype Test Track



The need for a prototype test track
To do any Hyperloop development, a prototype test track is required. It is not as simple as the stretch of beach for the Wright brothers, of the short track for Stephenson's Rocket, but the project is just as important. Once a test track is built, various designs for the capsule can be tested.

Running at Full Speed
Hyperloop operates close to the speed of sound in air, this cannot be scaled, so the prototype needs to run at the full proposed speed of 1,200 km/h (746 mph). The track needs to be a full loop for continuous running, and the loop will allow the capsule to induce air-flow along the tube.

Size - 2/3rd scale
The size can be scaled down, but it should still be capable of carrying test 'passengers'. If wheels are used, the diameter cannot be reduced below 1m, as the centripetal forces get too high. So a 2/3 scale would be good, with a tube ID of 2.0 metres (80") and a capsule OD of about 1.2 m (48").

Curve radius for 2.5g
Hyperloop is proposed to have maximum 1g horizontal acceleration, giving a 1.41g combined g-force for the passengers, this gives a curve radius of 11.3 km at 1,200 km/h. The prototype track could have a curve radius of 5 km, giving 2.5g combined, which is acceptable for fully reclined test pilots.

Tube construction - all types
The prototype track could test all of the proposed constructions, including steel tube on pylons, in-ground cast concrete, or a tunnel. As well as the main curves, the straight sections should incorporate small curves, grade changes, and station junctions.

Cost $40 - $80 million
The test track could be built in the desert, with no land acquisition costs. The tube needs to be very accurate, but need not last forever. The construction cost would be $40 - $80 million. This is about 0.1% of the SF-LA HSR construction budget, and less than what has been spent already on feasibility studies. If successful, Hyperloop could give a 50% reduction in HSR capital cost, a 90% saving in energy, and a 80% saving in travel time.

Funding
The track could be funded by one corporation with a view to future licensing, or by an international consortium of potential Hyperloop customers and constructors. For instance Siemens, the big German HSR train manufacturer, may take a shareholding to develop their own capsule technology. Or the Australian government may take an interest for their proposed Sydney-Melbourne high-speed link.

CFD Analysis

An important part of Hyperloop research is CFD analysis of the complex flow around the pod. This can answer many questions at relatively low cost. But it is a complex study, due to the compression around the pod, possible shock-waves, and induced flow along the tube.