

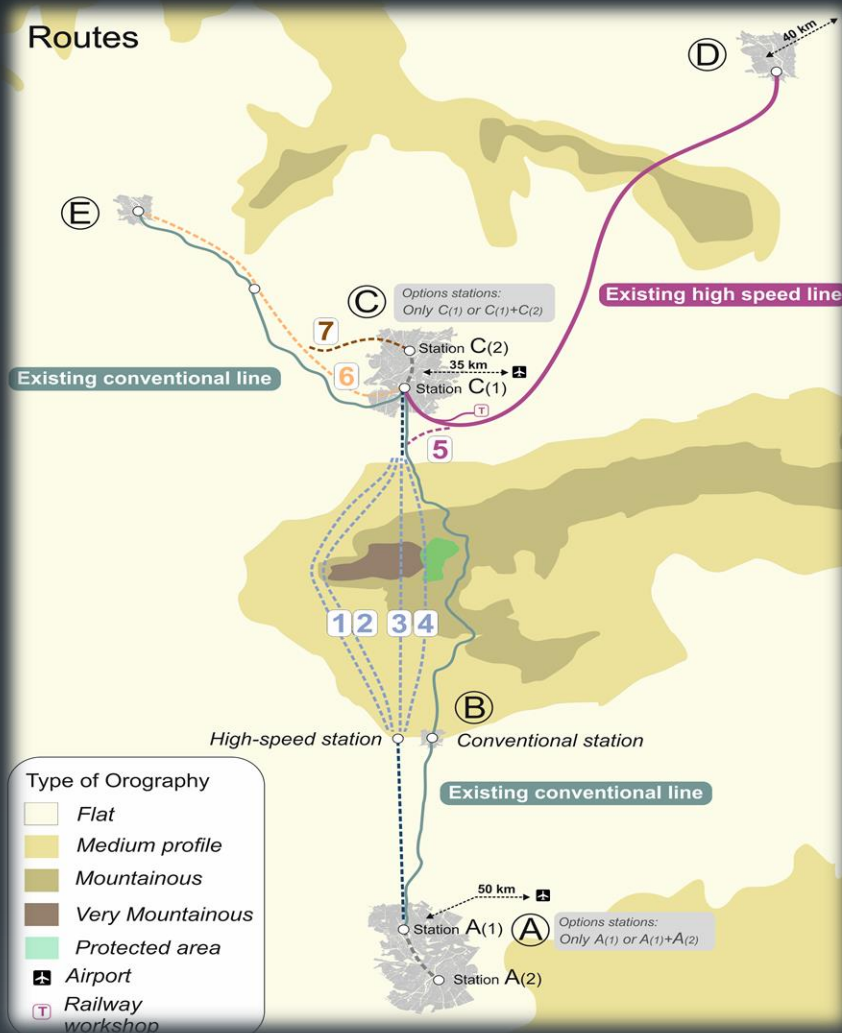
# High Speed Planner

Designed by  
UIC -International Union of Railways-  
FFE -Fundación de Ferrocarriles Españoles-

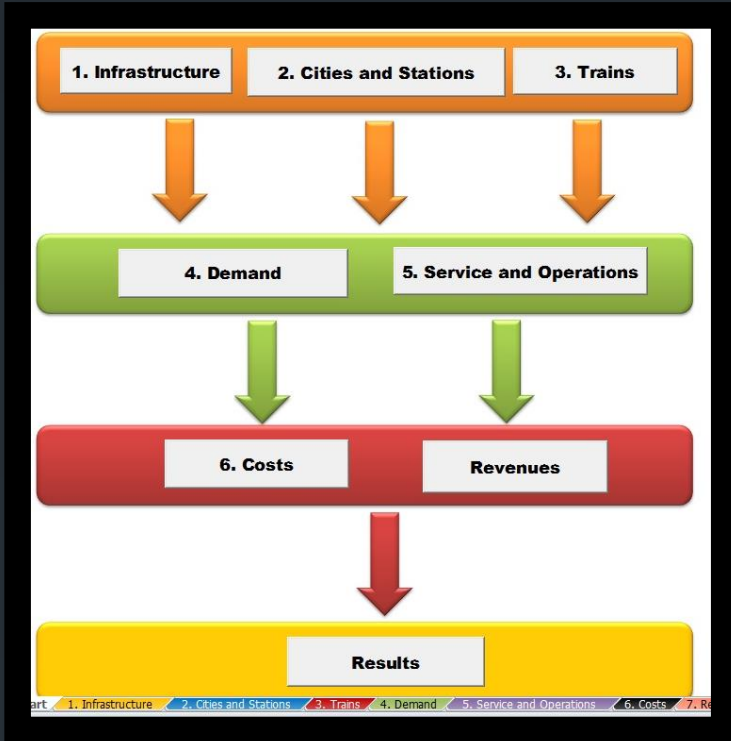


# What is the High Speed Planner?

The High Speed Planner is a didactic tool especially designed as a complement to be used during the **Training on High Speed Systems**.



# HSS main issues



The High Speed Planner allows the user to develop hypotheses taking into account the main parameters to be implemented in every **High Speed System** project.

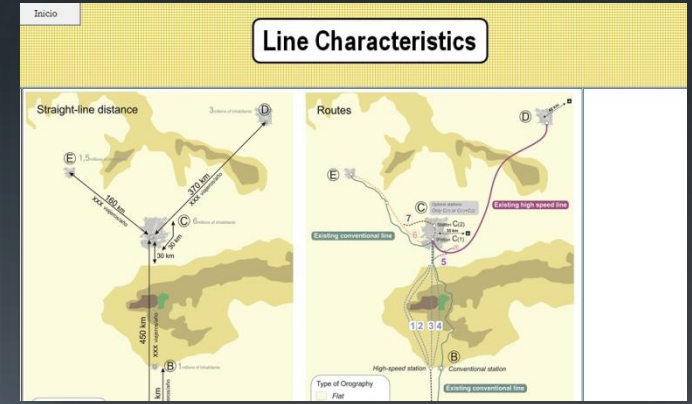
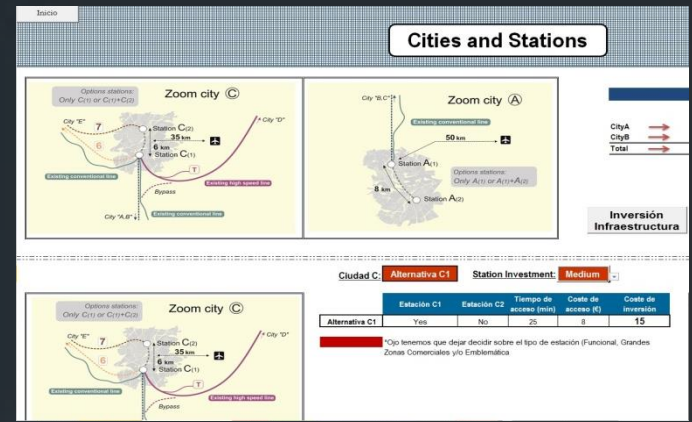
### Train Characteristics

#### Calculations

Direction (km/h)	Yes
Seats (class adjustment)	Not defined
Free train	Continental
Power Voltage (kV plus 1.5kV)	Yes
A.C. Power Voltage (25kV)	Yes
Overhaul	No
Regenerative brake	Yes
Articulated Coach	Not defined
Seats density	Normal density (2 stations)
Single or double-decker	Double-decker
Body width	Wide-body (2.500mm)
Number of coach doors per side	2
Reporting format	ASPANEXCEL 2

#### Summary

	1	2	3	4
Number of middle-coach	1	2	3	4
Número de coches auxiliares	2	2	2	2
Number of axle	52	161	261	261
Number of single axle	0	0	0	0
Number of bogies	0	10	10	10
Length (mm)	209	279	363	363
Gross weight (tons)	276	295	365	365
Payload capacity (tons)	15.4	19.2	24.0	24.0
Adhesion mass (tons)	136	136	136	136
<b>Costs</b>	<b>158</b>	<b>276</b>	<b>414</b>	<b>414</b>
<b>Performance</b>				
Width (Average) (mm)	3.400	3.400	3.400	3.400
Width (mm)	4.300	4.300	4.300	4.300
Height (mm)	4.190	4.390	4.390	4.390
Total weight (ton)	18	180	124	124
Function				
<b>Power output (kW)</b>	<b>0.942</b>	<b>0.648</b>	<b>6.150</b>	<b>6.150</b>
Coefficient A (km/h)	138	185	231	231
Coefficient B (km/h <sup>2</sup> )	1.133	1.654	2.184	2.184
Coefficient C (km/h <sup>3</sup> )	0.03395	0.03965	0.04574	0.04574
Schedule Coefficient	0.4	0.4	0.4	0.4
Value				
<b>Investment cost (M€)</b>	<b>13.87</b>	<b>17.92</b>	<b>21.97</b>	<b>21.97</b>
Operation Cost (M€)	0.566	0.717	0.870	0.870
Cost of capital (M€/year)	0.415	0.539	0.659	0.659
Insurance cost (M€/year)	0.042	0.054	0.066	0.066
<b>Costs operational / characteristic</b>				
Cost per km	2.61	2.61	2.61	2.61
<b>Investment and operating costs</b>				
Fixed Maintenance Cost (M€/km_year)	170.837	220.765	270.693	270.693
Variable maintenance cost (M€/km_year)	1.03	1.35	1.64	1.64



The participants of the **Training on High Speed Systems** will have the opportunity to use this special tool as a part of the training to simulate a real HSS project.

Line AC: **Trazado 2**

	km. of line (straight line)	Type of Orography	Line Maximum Speed (km/h)	km of line (km)	Minimal Time (h)
Section 1	180	Flat	400	183,60	0,459
Section 2	235	Medium	350	244,87	0,700
Section 3	40	Mountanous	400	40,80	0,102

Kilómetros of civil works				
	Total	Tunnel	Bridges	Earthworks
Present Line length (km)	469,27	45,25	19,69	404,34
Total lenght-no curve radii*	455			
Straight line distance	450			
Time of the journey (h)	1,26			

\*Without considering curve radii

Investment cost			
<b>Trackbed</b>			
Civil Engineering works (Eathwoks and Structures) (M€)	1.945,9	(M€/km)	4,15
Drainage (M€)	20,33	(M€/km)	0,04
Permanent Layer (M€)	37,85	(M€/km)	0,08
<b>Track and Electrification</b>			
Track (M€)	508	(M€/km)	1,08
Electrification (M€)	277,53	(M€/km)	0,59
<b>Signalling and Telecommunications</b>			
Signalling (M€)	428,4	(M€/km)	0,91
Communication (fixed and mobile) (M€)	117,3	(M€/km)	0,25
Land and rights (Expropriations) (M€)	262,4	(M€/km)	0,55
<b>Total Investment Cost (M€)</b>	<b>4.143,0</b>	<b>(M€/km)</b>	<b>8,82</b>
<b>Total Maintenance Cost (M€/año)</b>	<b>42,23</b>	<b>(M€/km)</b>	<b>0,09</b>
<b>Rail Traffic Management Cost (M€/año)</b>	<b>0,19</b>	<b>(M€/km)</b>	<b>0,00</b>

Line CD: **Trazado 5**

	km. of line (straight line)	Type of Orography	Line Maximum Speed (km/h)	km of line (km)	Minimal Time (h)
Section1	30	Flat	350	31,26	0,089

Kilómetros of civil works				
	Total	Tunnel	Bridges	Earthworks
Present Line length (km)	31,26	0,25	0,24	30,77
Total lenght-no curve radii*	30			
Straight line distance	370			
Time of the journey (h)	0,09			

\*Without considering curve radii

Investment cost			
<b>Trackbed</b>			
Civil Engineering works (Eathwoks and Structures) (M€)	31,1	(M€/km)	0,99
Drainage (M€)	1,35	(M€/km)	0,04
Permanent Layer (M€)	2,46	(M€/km)	0,07
<b>Track and Electrification</b>			
Track (M€)	26	(M€/km)	0,83
Electrification (M€)	18,22	(M€/km)	0,58
<b>Signalling and Telecommunications</b>			
Signalling (M€)	28,5	(M€/km)	0,91
Communication (fixed and mobile) (M€)	7,8	(M€/km)	0,25
Land and rights (Expropriations) (M€)	17,0	(M€/km)	0,54
<b>Total Investment Cost (M€)</b>	<b>168,8</b>	<b>(M€/km)</b>	<b>5,39</b>
<b>Total Maintenance Cost (M€/año)</b>	<b>2,72</b>	<b>(M€/km)</b>	<b>0,08</b>
<b>Rail Traffic Management Cost (M€/año)</b>	<b>0,15</b>	<b>(M€/km)</b>	<b>0,00</b>

All the main elements (social, economic and environmental) will be analyzed in order to take decisions and see the resulting outcomes.