

# APPENDIX A - TAV CAPITAL COST

## FULL ROUTE

Section: **Barão de Mauá - Campinas**

Chainage: **Km 0.000 - Km 510.760**

Length: **510,76 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
<b>A</b>	<b>CIVIL ENGINEERING WORKS</b>						
<b>A1</b>	<b>EARTHWORKS</b>						90
1	Site clearance	m <sup>2</sup>	22,637,692	0.3	6,564,931	0.02%	
2	Planting on banks	m <sup>2</sup>	12,355,462	1.1	12,973,235	0.04%	
3	Fill	m <sup>3</sup>	97,935,373	2.7	265,404,861	0.77%	
4	Cut	m <sup>3</sup>	90,308,265		1,029,586,103	2.97%	
4a	In soil	m <sup>3</sup>	70,194,575	8.2	574,815,577	1.66%	
4b	In rock	m <sup>3</sup>	20,113,690	22.6	454,770,526	1.31%	
5	Borrow	m <sup>3</sup>	37,436,649	6.7	250,825,548	0.72%	
6	Dump	m <sup>3</sup>	36,679,681	1.8	65,289,832	0.19%	
7	Mass haul	km.m <sup>3</sup>	1,445,136,504	0.4	578,054,602	1.67%	
	<b>TOTAL A1</b>				<b>2,208,699,112</b>	<b>6.38%</b>	
	TOTAL A1 - PER KM				4,324,336		
<b>A2</b>	<b>STRUCTURES</b>						90
1	Tunnelling	m	90,912		10,753,945,971	31.06%	
1a	Urban area	m	46,578		4,040,462,925	11.67%	
	Soft ground - Twin bore - 7.85m diameter - NATM - Rate covers two tracks	m	2,985	133,713	399,133,096	1.15%	
	Soft ground - Twin bore - 7.85m diameter - TBM - Rate covers two tracks	m	43,593	83,530	3,641,329,829	10.52%	
1b	Rural area	m	44,334		6,713,483,046	19.39%	
	Soft ground - Single bore - 16m diameter - NATM	m	16,338	166,355	2,717,910,441	7.85%	
	Soft ground - Single bore - 16m diameter - TBM	m	2,440	124,802	304,516,099	0.88%	
	Rock - Single bore - 16m diameter - NATM	m	18,384	159,325	2,929,024,549	8.46%	
	Rock - Single bore - 16m diameter - TBM	m	7,172	106,251	762,031,957	2.20%	
2	Bridges and viaducts	m <sup>2</sup>	1,499,878	4,745	7,116,618,762	20.55%	
3	Retaining walls	m <sup>2</sup>	322,954	881	284,454,654	0.82%	
	<b>TOTAL A2</b>				<b>18,155,019,387</b>	<b>52.43%</b>	
	TOTAL A2 - PER KM				35,545,090		
	<b>TOTAL A (A1 + A2)</b>				<b>20,363,718,499</b>	<b>58.81%</b>	
	TOTAL A (A1 + A2) - PER KM				39,869,427		
<b>B</b>	<b>PERMANENT WAY</b>						20
1	Plain line track (per single-track km)	km	1,022	1,556,637	1,590,136,803	4.59%	
2	Switches & crossings	unit	250	1,073,600	268,400,000	0.78%	
3	Drainage	km	384	631,309	242,401,868	0.70%	
4	Fences	m	767,935	48.9	37,544,318	0.11%	
	<b>TOTAL B</b>				<b>2,138,482,989</b>	<b>6.18%</b>	
	TOTAL B - PER KM				4,186,863		
<b>C</b>	<b>BUILDINGS AND EQUIPMENTS</b>						70
1	Passenger stations	stations	8		709,996,822	2.05%	
1a	Barão de Mauá (RJ)	global	1	71,364,000	71,364,000	0.21%	
1b	Galeão Airport (RJ)	global	1	95,206,800	95,206,800	0.27%	
1c	Barra Mansa / Volta Redonda (RJ)	global	1	16,734,848	16,734,848	0.05%	
1d	São José dos Campos (SP)	global	1	44,648,774	44,648,774	0.13%	
1e	Guarulhos Airport (SP)	global	1	105,274,400	105,274,400	0.30%	
1f	Campo de Marte (SP)	global	1	234,950,000	234,950,000	0.68%	
1g	Viracopos Airport (SP)	global	1	97,716,667	97,716,667	0.28%	
1h	Campinas (SP)	global	1	44,101,333	44,101,333	0.13%	
2	Maintenance depots	global	1	707,784,249	707,784,249	2.04%	

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Section: **Barão de Mauá - Campinas**

Chainage: **Km 0.000 - Km 510.760**

Length: **510,76 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
2a	Main and subsidiary depots - Civil works	global	1	68,040,000	68,040,000	0.20%	
2b	Main and subsidiary depots - Maintenance equipment	global	1	450,000,000	450,000,000	1.30%	
2c	Engineering depot and stabling sidings (per single-track km)	km	82	1,556,637	127,644,249	0.37%	
2d	Locomotives	unit	3	20,700,000	62,100,000	0.18%	
	<b>TOTAL C</b>				<b>1,417,781,071</b>	<b>4.09%</b>	
	TOTAL C - PER KM				2,775,825		
<b>D</b>	<b>SYSTEM ELEMENTS</b>						
<b>D1</b>	<b>SIGNALLING</b>						20
1	CTC (Centralised Traffic Control)	unit	2	1,894,860	3,789,720	0.01%	
2	Signalling	global	1		153,040,888	0.44%	
2a	Indoor - Control (Total)	set	11	179,278	1,972,058	0.01%	
2b	Outdoor - Signals, Markerboards, Markerboards Overrunlight	set	1,418	15,932	22,590,942	0.07%	
2c	Outdoor - Point machines (regular, high speed points)	set	248	266,458	66,081,488	0.19%	
2d	Outdoor - Track vacancy detection section	section	652	95,700	62,396,400	0.18%	
3	ATP (Automatic Train Protection) - ETCS L2	km	511	312,620	159,673,871	0.46%	
	<b>TOTAL D1</b>				<b>316,504,479</b>	<b>0.91%</b>	
	TOTAL D1 - PER KM				619,673		
<b>D2</b>	<b>TELECOMMUNICATIONS</b>						20
1	Transmission Facilities	global	1		3,461,150	0.01%	
1a	Transmission Facilities for each station	set	11	271,150	2,982,650		
1b	Transmission Facilities for central controlling - network management center (NMC)	set	1	478,500	478,500		
2	Cables incl. Internal Networks and Cable Components	global	1		77,102,300	0.22%	
2a	Line transmission cables (redundancy)	km	1,300	57,420	74,646,000		
2b	Station cables for each station	set	11	223,300	2,456,300		
3	Railway Operation Telecommunication System (ROTS)	set	11	239,250	2,631,750	0.008%	
4	Radio Systems (GSM-R)	global	1		24,291,850	0.07%	
4a	Radio Systems (GSM-R) track line transceiver station (BTS) for open line	pc	105	111,650	11,723,250		
4b	Radio Systems (GSM-R) track line transceiver station (BTS) for lines in tunnels	pc	38	303,050	11,515,900		
4c	Radio Systems (GSM-R) central unit for line (BSC)	pc	4	63,800	255,200		
4d	Radio Systems (GSM-R) central unit (MSC)	pc	2	398,750	797,500		
5	Fire / Unauthorised Access Detection Systems	global	1		9,426,450	0.03%	
5a	Fire /Unauthorised Access Detection Systems for each technical station building	pc	11	207,350	2,280,850		
5b	Fire Detection Systems for tunnels over 500meters length	global	1	7,145,600	7,145,600		
6	CCTV systems	global	1		1,888,480	0.005%	
6a	CCTV central unit for each station	pc	8	143,550	1,148,400		
6b	Cameras for each track side per platform (2 cameras per track)	pc	52	12,760	663,520		
6c	Cameras for each technical room per station	pc	8	9,570	76,560		
7	Passenger Information System - Chronometry System for platforms, OCC and depots	global	1		311,025	0.0009%	
7a	Main chronometry system for station, OCC and depots	pc	11	14,355	157,905		
7b	Controlled Clocks for platforms, OCC and depots	pc	48	3,190	153,120		
8	Data Recollection and Supervision System (SCADA)	global	1		2,312,750	0.007%	
8a	Data Recollection and Supervision System (SCADA) for each station and depot (controller unit)	pc	11	175,450	1,929,950		
8b	Data Recollection and Supervision System (SCADA) for OCC (central unit)	set	1	382,800	382,800		
9	Passenger Information System - Train Destination Display (TD)	global	1		5,793,040	0.02%	
9a	TD controller unit for each station	pc	8	111,650	893,200		
9b	TD display unit for each station	pc	52	73,370	3,815,240		
9c	TD display board for main station	pc	3	303,050	909,150		

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No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9d	TD for OCC (central unit)	set	1	175,450	175,450		
10	Passenger Information System - Public Address System (Speaker System)	global	1		4,976,400	0.01%	
10a	Loudspeaker for each platform	pc	2,800	1,276	3,572,800		
10b	PA System (Speaker System): controller unit for station	set	8	159,500	1,276,000		
10c	PA System (Speaker System): central unit in OCC	set	1	127,600	127,600		
11	Ticketing System	global	1		26,716,250	0.08%	
11a	Ticket vending machine	pc	95	79,750	7,576,250		
11b	Gate arrays - Big stations	set	3	3,987,500	11,962,500		
11c	Gate arrays - Small stations	set	5	1,435,500	7,177,500		
12	Hot axle box detection unit (HABD)	pc	12	893,200	10,718,400	0.03%	
13	Overall Systems Components (PS, housing, cable, etc.)	global	1		144,663,948	0.42%	
13a	Power supply (8 Stations plus 3 Depots)	set	11	982,839	10,811,229		
13b	Power supply (Block post)	set	80	851,411	68,112,880		
13c	Housing (shelter)	set	80	95,700	7,656,000		
13d	Earthing field elements	set	2,503	2,233	5,589,199		
13e	Cable plant	km	968	54,230	52,494,640		
	<b>TOTAL D2</b>				<b>314,293,793</b>	<b>0.91%</b>	
	TOTAL D2 - PER KM				615,345		
<b>D3</b>	<b>ELECTRIFICATION</b>						35
1	Catenary	km	1,104	798,462	881,118,683	2.54%	
2	ATFS [Grid Substations (+ traction Feeder Station)]	global	1		375,840,000	1.09%	
2a	Building Construction	unit	12	26,100,000	313,200,000	0.90%	
2b	Electrical Installations	unit	12	5,220,000	62,640,000	0.18%	
3	ATS [Small Substations / Mid-Point Substations]	global	1		104,400,000	0.30%	
3a	Building Construction	unit	30	348,000	10,440,000	0.03%	
3b	Electrical Installations	unit	30	3,132,000	93,960,000	0.27%	
	<b>TOTAL D3</b>				<b>1,361,358,683</b>	<b>3.93%</b>	
	TOTAL D3 - PER KM				2,665,358		
	<b>TOTAL D (D1 + D2 + D3)</b>				<b>1,992,156,954</b>	<b>5.75%</b>	
	TOTAL D (D1 + D2 + D3) - PER KM				3,900,376		
<b>E</b>	<b>SOCIO-ENVIRONMENTAL WORKS<sup>3</sup></b>						N/A
1	Land acquisition (excludes constructions and improvements)	global	1	599,720,000	599,720,000	1.73%	
2	Indemnification for buildings	global	1		1,630,998,034	4.71%	
2a	Residential buildings	m2 AC <sup>4</sup>	598,310	1,068	639,204,489	1.85%	
2b	Industrial buildings	m2 AC <sup>4</sup>	308,587	1,875	578,600,625	1.67%	
2c	Infrastructure facilities	m2 AG <sup>4</sup>	1,225,475	280	343,133,000	0.99%	
2d	Institutional facilities	m2 AG <sup>4</sup>	125,107	560	70,059,920	0.20%	
3	Resettlement	No. of families	618	55,000	33,990,000	0.10%	
4	Reurbanisation, TAV crossings	m2 AU <sup>4</sup>	1,679,000	180	302,220,000	0.87%	
5	Noise protection	m2 AU <sup>4</sup>	1,679,000	150	251,850,000	0.73%	
6	Native Forest Reclaiming	global	1		127,316,400	0.37%	
6a	Due to removal of forest	ha	831	60,000	49,862,400	0.14%	
6b	Due to intervention in APP	ha	1,291	60,000	77,454,000	0.22%	
7	Relocation of roads affected by TAV	global	1		586,000,000	1.69%	
7a	Secondary roads	No. of roads	57	4,000,000	228,000,000	0.66%	
7b	Nearby roads	No. of roads	179	2,000,000	358,000,000	1.03%	
8	Environmental compensation	global	1	150,000,000	150,000,000	0.43%	

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## FULL ROUTE

Section: **Barão de Mauá - Campinas**

Chainage: **Km 0.000 - Km 510.760**

Length: **510,76 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9	Environmental supervision of works	km	511	415,000	211,965,505	0.61%	
	<b>TOTAL E</b>				<b>3,894,059,939</b>	<b>11.25%</b>	
	<b>TOTAL E - PER KM</b>				<b>7,624,047</b>		
<b>F</b>	<b>ROLLING STOCK</b>						30
1	High-Speed service trains	train sets	42	65,232,937	2,739,783,333	7.91%	
	<b>TOTAL F</b>				<b>2,739,783,333</b>	<b>7.91%</b>	
	<b>TOTAL F - PER KM</b>				<b>5,364,128</b>		
<b>G</b>	<b>COMPLEMENTARY SERVICES</b>						N/A
1	Testing and certification	global	1	94,638,806	94,638,806	0.27%	94.6
2	Geotechnical studies	km	511	5,000	2,553,801	0.007%	2.6
3	Utility diversion	global	1	203,637,185	203,637,185	0.59%	203.6
4	Temporary works during construction	global	1	523,279,790	523,279,790	1.51%	523.3
5	Permanent road access to tunnels and bridges	global	1	52,327,979	52,327,979	0.15%	52.3
6	Design	global	1	538,864,689	538,864,689	1.56%	538.9
7	Project Management	global	1	666,555,631	666,555,631	1.92%	666.6
	<b>TOTAL G</b>				<b>2,081,857,881</b>	<b>6.01%</b>	2081.9
	<b>TOTAL G - PER KM</b>				<b>4,075,998</b>		
<b>GT</b>	<b>GRAND TOTAL</b>				<b>34,627,840,667</b>	<b>100%</b>	
	<b>GRAND TOTAL - PER KM</b>				<b>67,796,663</b>		

### NOTES:

- In the values provided above, a dot (.) is used to separate decimals, and a comma (,) to separate thousands.
- For a detailed description of this Table and the assumptions considered to obtain the quantities and costs listed above, please refer to Volume 5 - Section 2
- Data produced and supplied by Prime Engenharia (Items 1 to 10), as the Environmental Studies are outside the scope of works of the Consortium Halcrow - Sinergia.
- The following definitions have been provided by Prime Engenharia:
  - AC: Área Construída afetada. O custo unitário é a média resultante para todo o TAV.
  - AG: Área Geográfica Bruta afetada.
  - AU: Área Urbana Bruta afetada.

# APPENDIX A - TAV CAPITAL COST

## SECTION 1

Section: **Barão de Mauá (RJ) - Galeão Airport (RJ)**

Chainage: **Km 0.000 - Km 15.166**

Length: **15.17 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
<b>A</b>	<b>CIVIL ENGINEERING WORKS</b>						
<b>A1</b>	<b>EARTHWORKS</b>						90
1	Site clearance	m <sup>2</sup>	3,431,454	0.3	995,122	0.07%	
2	Planting on banks	m <sup>2</sup>	1,830,253	1.1	1,921,766	0.14%	
3	Fill	m <sup>3</sup>	558,804	2.7	1,514,359	0.11%	
4	Cut	m <sup>3</sup>	888,305		20,084,576	1.47%	
4a	In soil	m <sup>3</sup>	-	8.2	-	0.00%	
4b	In rock	m <sup>3</sup>	888,305	22.6	20,084,576	1.47%	
5	Borrow	m <sup>3</sup>	-	6.7	-	0.00%	
6	Dump	m <sup>3</sup>	676,923	1.8	1,204,923	0.09%	
7	Mass haul	km.m <sup>3</sup>	4,749,650	0.4	1,899,860	0.14%	
	<b>TOTAL A1</b>				<b>27,620,605</b>	<b>2.02%</b>	
	<b>TOTAL A1 - PER KM</b>				1,821,173		
<b>A2</b>	<b>STRUCTURES</b>						90
1	Tunnelling		3,310		276,484,797	20.22%	
1a	Urban area	m	3,310		276,484,797	20.22%	
	Soft ground - Twin bore - 7.85m diameter - NATM - Rate covers two tracks	m	-	133,713	-	0.00%	
	Soft ground - Twin bore - 7.85m diameter - TBM - Rate covers two tracks	m	3,310	83,530	276,484,797	20.22%	
1b	Rural area	m	-		-	0.00%	
	Soft ground - Single bore - 16m diameter - NATM	m	-	166,355	-	0.00%	
	Soft ground - Single bore - 16m diameter - TBM	m	-	124,802	-	0.00%	
	Rock - Single bore - 16m diameter - NATM	m	-	159,325	-	0.00%	
	Rock - Single bore - 16m diameter - TBM	m	-	106,251	-	0.00%	
2	Bridges and viaducts	m <sup>2</sup>	66,002	4,745	313,165,815	22.90%	
3	Retaining walls	m <sup>2</sup>	30,592	881	26,945,128	1.97%	
	<b>TOTAL A2</b>				<b>616,595,739</b>	<b>45.10%</b>	
	<b>TOTAL A2 - PER KM</b>				40,655,433		
	<b>TOTAL A (A1 + A2)</b>				<b>644,216,345</b>	<b>47.12%</b>	
	<b>TOTAL A (A1 + A2) - PER KM</b>				42,476,606		
<b>B</b>	<b>PERMANENT WAY</b>						20
1	Plain line track (per single-track km)	km	30	1,556,637	47,217,102	3.45%	
2	Fences	unit	7	1,073,600	7,969,799	0.58%	
3	Drainage	km	7	631,309	4,204,125	0.31%	
4	Fences	m	13,319	49	651,154	0.05%	
	<b>TOTAL B</b>				<b>60,042,179</b>	<b>4.39%</b>	
	<b>TOTAL B - PER KM</b>				3,958,900		
<b>C</b>	<b>BUILDINGS AND EQUIPMENTS</b>						70
1	Passenger stations	global	1	71,364,000	71,364,000	5.22%	
1a	Barão de Mauá (RJ)	global	1	71,364,000	71,364,000	5.22%	
1b	Galeão Airport (RJ)	global	1	-	-	0.00%	
1c	Barra Mansa / Volta Redonda (RJ)	global	1	-	-	0.00%	
1d	São José dos Campos (SP)	global	1	-	-	0.00%	
1e	Guarulhos Airport (SP)	global	1	-	-	0.00%	
1f	Campo de Marte (SP)	global	1	-	-	0.00%	
1g	Viracopos Airport (SP)	global	1	-	-	0.00%	
1h	Campinas (SP)	global	1	-	-	0.00%	
2	Maintenance depots	global	1	21,016,758	21,016,758	1.54%	

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Chainage: **Km 0.000 - Km 15.166**

Length: **15.17 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
2a	Main and subsidiary depots - Civil works	global	1	2,020,362	2,020,362	0.15%	
2b	Main and subsidiary depots - Maintenance equipment	global	1	13,362,181	13,362,181	0.98%	
2c	Engineering depot and stabling sidings (per single-track km)	km	2	1,556,637	3,790,235	0.28%	
2d	Locomotives	unit	0	20,700,000	1,843,981	0.13%	
	<b>TOTAL C</b>				<b>92,380,758</b>	<b>6.76%</b>	
	TOTAL C - PER KM				6,091,154		
<b>D</b>	<b>SYSTEM ELEMENTS</b>						
<b>D1</b>	<b>SIGNALLING</b>						20
1	CTC (Centralised Traffic Control)	unit	0.1	1,894,860	112,531	0.01%	
2	Signalling	global	1		4,544,356	0.33%	
2a	Indoor - Control (Total)	set	0.3	179,278	58,558	0.00%	
2b	Outdoor - Signals, Markerboards, Markerboards Overrunlight	set	42	15,932	670,809	0.05%	
2c	Outdoor - Point machines (regular, high speed points)	set	7	266,458	1,962,206	0.14%	
2d	Outdoor - Track vacancy detection section	section	19	95,700	1,852,782	0.14%	
3	ATP (Automatic Train Protection) - ETCS L2	km	15	312,620	4,741,314	0.35%	
	<b>TOTAL D1</b>				<b>9,398,200</b>	<b>0.69%</b>	
	TOTAL D1 - PER KM				619,673		
<b>D2</b>	<b>TELECOMMUNICATIONS</b>						20
1	Transmission Facilities	global	1		102,774	0.01%	
1a	Transmission Facilities for each station	set	0.3	271,150	88,566		
1b	Transmission Facilities for central controlling - network management center (NMC)	set	0.03	478,500	14,208		
2	Cables incl. Internal Networks and Cable Components	global	1		2,289,455	0.17%	
2a	Line transmission cables (redundancy)	km	39	57,420	2,216,519		
2b	Station cables for each station	set	0.3	223,300	72,937		
3	Railway Operation Telecommunication System (ROTS)	set	0.3	239,250	78,146	0.006%	
4	Radio Systems (GSM-R)	global	1		721,316	0.05%	
4a	Radio Systems (GSM-R) track line transceiver station (BTS) for open line	pc	3	111,650	348,107		
4b	Radio Systems (GSM-R) track line transceiver station (BTS) for lines in tunnels	pc	1	303,050	341,950		
4c	Radio Systems (GSM-R) central unit for line (BSC)	pc	0.1	63,800	7,578		
4d	Radio Systems (GSM-R) central unit (MSC)	pc	0.1	398,750	23,681		
5	Fire / Unauthorised Access Detection Systems	global	1		279,907	0.02%	
5a	Fire / Unauthorised Access Detection Systems for each technical station building	pc	0.3	207,350	67,727		
5b	Fire Detection Systems for tunnels over 500meters length	global	0.03	7,145,600	212,180		
6	CCTV systems	global	1		56,076	0.004%	
6a	CCTV central unit for each station	pc	0.2	143,550	34,100		
6b	Cameras for each track side per platform (2 cameras per track)	pc	2	12,760	19,702		
6c	Cameras for each technical room per station	pc	0.2	9,570	2,273		
7	Passenger Information System - Chronometry System for platforms, OCC and depots	global	1		9,235	0.0007%	
7a	Main chronometry system for station, OCC and depots	pc	0.3	14,355	4,689		
7b	Controlled Clocks for platforms, OCC and depots	pc	1	3,190	4,547		
8	Data Recollection and Supervision System (SCADA)	global	1		68,674	0.005%	
8a	Data Recollection and Supervision System (SCADA) for each station and depot (controller unit)	pc	0.3	175,450	57,307		
8b	Data Recollection and Supervision System (SCADA) for OCC (central unit)	set	0.03	382,800	11,367		
9	Passenger Information System - Train Destination Display (TD)	global	1		172,017	0.01%	
9a	TD controller unit for each station	pc	0.2	111,650	26,522		
9b	TD display unit for each station	pc	2	73,370	113,289		
9c	TD display board for main station	pc	0.1	303,050	26,996		

# APPENDIX A - TAV CAPITAL COST

## SECTION 1

Section: **Barão de Mauá (RJ) - Galeão Airport (RJ)**

Chainage: **Km 0.000 - Km 15.166**

Length: **15.17 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9d	TD for OCC (central unit)	set	0.03	175,450	5,210		
10	Passenger Information System - Public Address System (Speaker System)	global	1		147,768	0.01%	
10a	Loudspeaker for each platform	pc	83	1,276	106,090		
10b	PA System (Speaker System): controller unit for station	set	0.2	159,500	37,889		
10c	PA System (Speaker System): central unit in OCC	set	0.03	127,600	3,789		
11	Ticketing System	global	1		793,305	0.06%	
11a	Ticket vending machine	pc	3	79,750	224,967		
11b	Gate arrays - Big stations	set	0.1	3,987,500	355,211		
11c	Gate arrays - Small stations	set	0.1	1,435,500	213,127		
12	Hot axle box detection unit (HABD)	pc	0.4	893,200	318,269	0.02%	
13	Overall Systems Components (PS, housing, cable, etc.)	global	1		4,295,613	0.31%	
13a	Power supply (8 Stations plus 3 Depots)	set	0.3	982,839	321,026		
13b	Power supply (Block post)	set	2	851,411	2,022,526		
13c	Housing (shelter)	set	2	95,700	227,335		
13d	Earthing field elements	set	74	2,233	165,964		
13e	Cable plant	km	29	54,230	1,558,762		
	<b>TOTAL D2</b>				<b>9,332,557</b>	<b>0.68%</b>	
	TOTAL D2 - PER KM				615,345		
<b>D3</b>	<b>ELECTRIFICATION</b>						35
1	Catenary	km	33	798,462	26,163,705	1.91%	
2	ATFS [Grid Substations (+ traction Feeder Station)]	global	1		11,160,094	0.82%	
2a	Building Construction	unit	0.4	26,100,000	9,300,078	0.68%	
2b	Electrical Installations	unit	0.4	5,220,000	1,860,016	0.14%	
3	ATS [Small Substations / Mid-Point Substations]	global	1		3,100,026	0.23%	
3a	Building Construction	unit	1	348,000	310,003	0.02%	
3b	Electrical Installations	unit	1	3,132,000	2,790,023	0.20%	
	<b>TOTAL D3</b>				<b>40,423,825</b>	<b>2.96%</b>	
	TOTAL D3 - PER KM				2,665,358		
	<b>TOTAL D (D1 + D2 + D3)</b>				<b>59,154,582</b>	<b>4.33%</b>	
	TOTAL D (D1 + D2 + D3) - PER KM				3,900,376		
<b>E</b>	<b>SOCIO-ENVIRONMENTAL WORKS<sup>3</sup></b>						N/A
1	Land acquisition (excludes constructions and improvements)	global	1	42,030,000	42,030,000	3.07%	
2	Indemnification for buildings	global	1		288,314,783	21.09%	
2a	Residential buildings	m2 AC <sup>4</sup>	32,068	1,068.35	34,259,848	2.51%	
2b	Industrial buildings	m2 AC <sup>4</sup>	82,277	1,875	154,269,375	11.28%	
2c	Infrastructure facilities	m2 AG <sup>4</sup>	111,929	280	31,340,120	2.29%	
2d	Institutional facilities	m2 AG <sup>4</sup>	122,224	560	68,445,440	5.01%	
3	Resettlement	No. of families	13	55,000	715,000	0.05%	
4	Reurbanisation, TAV crossings	m2 AU <sup>4</sup>	28,800	180	5,184,000	0.38%	
5	Noise protection	m2 AU <sup>4</sup>	28,800	150	4,320,000	0.32%	
6	Native Forest Reclaiming	global	1		448,200	0.03%	
6a	Due to removal of forest	ha	-	60,000	-	0.00%	
6b	Due to intervention in APP	ha	7.47	60,000	448,200	0.03%	
7	Relocation of roads affected by TAV	global	1		6,000,000	0.44%	
7a	Secondary roads	No. of roads	1	4,000,000	4,000,000	0.29%	
7b	Nearby roads	No. of roads	1	2,000,000	2,000,000	0.15%	
8	Environmental compensation	global	1	4,450,000	4,450,000	0.33%	

# APPENDIX A - TAV CAPITAL COST

## SECTION 1

Section: **Barão de Mauá (RJ) - Galeão Airport (RJ)**

Chainage: **Km 0.000 - Km 15.166**

Length: **15.17 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9	Environmental supervision of works	km	15	415,000	6,294,048	0.46%	
	<b>TOTAL E</b>				<b>357,756,031</b>	<b>26.17%</b>	
	TOTAL E - PER KM				23,588,756		
<b>F</b>	<b>ROLLING STOCK</b>						30
1	High-Speed service trains	train sets	1	65,232,937	81,354,402	5.95%	
	<b>TOTAL F</b>				<b>81,354,402</b>	<b>5.95%</b>	
	TOTAL F - PER KM				5,364,128		
<b>G</b>	<b>COMPLEMENTARY SERVICES</b>						N/A
1	Testing and certification	global	1	2,810,180	2,810,180	0.21%	
2	Geotechnical studies	km	15	5,000	75,832	0.006%	
3	Utility diversion	global	1	6,442,163	6,442,163	0.47%	
4	Temporary works during construction	global	1	17,202,277	17,202,277	1.26%	
5	Permanent road access to tunnels and bridges	global	1	1,720,228	1,720,228	0.13%	
6	Design	global	1	17,709,571	17,709,571	1.30%	
7	Project Management	global	1	26,406,896	26,406,896	1.93%	
	<b>TOTAL G</b>				<b>72,367,147</b>	<b>5.29%</b>	
	TOTAL G - PER KM				4,771,550		
<b>GT</b>	<b>GRAND TOTAL</b>				<b>1,367,271,444</b>	<b>100%</b>	
	GRAND TOTAL - PER KM				90,151,469		

### NOTES:

- In the values provided above, a dot (.) is used to separate decimals, and a comma (,) to separate thousands.
- For a detailed description of this Table and the assumptions considered to obtain the quantities and costs listed above, please refer to Volume 5 - Section 2
- Data produced and supplied by Prime Engenharia (Items 1 to 10), as the Environmental Studies are outside the scope of works of the Consortium Halcrow - Sinergia.
- The following definitions have been provided by Prime Engenharia:
  - AC: Área Construída afetada. O custo unitário é a média resultante para todo o TAV.
  - AG: Área Geográfica Bruta afetada.
  - AU: Área Urbana Bruta afetada.

# APPENDIX A - TAV CAPITAL COST

## SECTION 2

Section: **Galeão Airport (RJ) - Barra Mansa / Volta Redonda (RJ)**

Chainage: **Km 15.166 - Km 118.302**

Length: **103.14 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
<b>A</b>	<b>CIVIL ENGINEERING WORKS</b>						
<b>A1</b>	<b>EARTHWORKS</b>						90
1	Site clearance	m <sup>2</sup>	3,264,064	0.3	946,579	0.01%	
2	Planting on banks	m <sup>2</sup>	1,442,739	1.1	1,514,876	0.02%	
3	Fill	m <sup>3</sup>	25,795,233	2.7	69,905,081	0.85%	
4	Cut	m <sup>3</sup>	10,239,685		191,730,870	2.32%	
4a	In soil	m <sup>3</sup>	2,759,039	8.2	22,593,464	0.27%	
4b	In rock	m <sup>3</sup>	7,480,646	22.6	169,137,406	2.05%	
5	Borrow	m <sup>3</sup>	12,708,412	6.7	85,146,358	1.03%	
6	Dump	m <sup>3</sup>	533,077	1.8	948,877	0.01%	
7	Mass haul	km.m <sup>3</sup>	269,339,430	0.4	107,735,772	1.31%	
	<b>TOTAL A1</b>				<b>457,928,413</b>	<b>5.55%</b>	
	<b>TOTAL A1 - PER KM</b>				<b>4,440,056</b>		
<b>A2</b>	<b>STRUCTURES</b>						90
1	Tunnelling		26,442		3,226,146,464	39.09%	
1a	Urban area	m	8,180		683,276,627	8.28%	
	Soft ground - Twin bore - 7.85m diameter - NATM - Rate covers two tracks	m	-	133,713	-	0.00%	
	Soft ground - Twin bore - 7.85m diameter - TBM - Rate covers two tracks	m	8,180	83,530	683,276,627	8.28%	
1b	Rural area	m	18,262		2,542,869,837	30.81%	
	Soft ground - Single bore - 16m diameter - NATM	m	1,981	166,355	329,549,552	3.99%	
	Soft ground - Single bore - 16m diameter - TBM	m	-	124,802	-	0.00%	
	Rock - Single bore - 16m diameter - NATM	m	9,109	159,325	1,451,288,328	17.59%	
	Rock - Single bore - 16m diameter - TBM	m	7,172	106,251	762,031,957	9.23%	
2	Bridges and viaducts	m <sup>2</sup>	351,820	4,745	1,669,315,536	20.23%	
3	Retaining walls	m <sup>2</sup>	85,949	881	75,703,020	0.92%	
	<b>TOTAL A2</b>				<b>4,971,165,020</b>	<b>60.24%</b>	
	<b>TOTAL A2 - PER KM</b>				<b>48,200,226</b>		
	<b>TOTAL A (A1 + A2)</b>				<b>5,429,093,432</b>	<b>65.79%</b>	
	<b>TOTAL A (A1 + A2) - PER KM</b>				<b>52,640,282</b>		
<b>B</b>	<b>PERMANENT WAY</b>						20
1	Plain line track (per single-track km)	km	206	1,556,637	321,089,793	3.89%	
2	Switches & crossings	unit	50	1,073,600	54,196,909	0.66%	
3	Drainage	km	52	631,309	32,552,625	0.39%	
4	Fences	m	103,127	49	5,041,901	0.06%	
	<b>TOTAL B</b>				<b>412,881,228</b>	<b>5.00%</b>	
	<b>TOTAL B - PER KM</b>				<b>4,003,281</b>		
<b>C</b>	<b>BUILDINGS AND EQUIPMENTS</b>						70
1	Passenger stations	global	1	95,206,800	95,206,800	1.15%	
1a	Barão de Mauá (RJ)	global	1	-	-	0.00%	
1b	Galeão Airport (RJ)	global	1	95,206,800	95,206,800	1.15%	
1c	Barra Mansa / Volta Redonda (RJ)	global	1	-	-	0.00%	
1d	São José dos Campos (SP)	global	1	-	-	0.00%	
1e	Guarulhos Airport (SP)	global	1	-	-	0.00%	
1f	Campo de Marte (SP)	global	1	-	-	0.00%	
1g	Viracopos Airport (SP)	global	1	-	-	0.00%	
1h	Campinas (SP)	global	1	-	-	0.00%	
2	Maintenance depots	global	1	142,919,966	142,919,966	1.73%	

# APPENDIX A - TAV CAPITAL COST

## SECTION 2

Section: Galeão Airport (RJ) - Barra Mansa / Volta Redonda (RJ)

Chainage: Km 15.166 - Km 118.302

Length: 103.14 km

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
2a	Main and subsidiary depots - Civil works	global	1	13,739,038	13,739,038	0.17%	
2b	Main and subsidiary depots - Maintenance equipment	global	1	90,866,651	90,866,651	1.10%	
2c	Engineering depot and stabling sidings (per single-track km)	km	17	1,556,637	25,774,679	0.31%	
2d	Locomotives	unit	1	20,700,000	12,539,598	0.15%	
	<b>TOTAL C</b>				<b>238,126,766</b>	<b>2.89%</b>	
	TOTAL C - PER KM				2,308,868		
<b>D</b>	<b>SYSTEM ELEMENTS</b>						
<b>D1</b>	<b>SIGNALLING</b>						20
1	CTC (Centralised Traffic Control)	unit	0.4	1,894,860	765,243	0.01%	
2	Signalling	global	1		30,902,918	0.37%	
2a	Indoor - Control (Total)	set	2.2	179,278	398,210	0.00%	
2b	Outdoor - Signals, Markerboards, Markerboards Overrunlight	set	286	15,932	4,561,696	0.06%	
2c	Outdoor - Point machines (regular, high speed points)	set	50	266,458	13,343,563	0.16%	
2d	Outdoor - Track vacancy detection section	section	132	95,700	12,599,449	0.15%	
3	ATP (Automatic Train Protection) - ETCS L2	km	103	312,620	32,242,289	0.39%	
	<b>TOTAL D1</b>				<b>63,910,449</b>	<b>0.77%</b>	
	TOTAL D1 - PER KM				619,673		
<b>D2</b>	<b>TELECOMMUNICATIONS</b>						20
1	Transmission Facilities	global	1		698,896	0.01%	
1a	Transmission Facilities for each station	set	2.2	271,150	602,274		
1b	Transmission Facilities for central controlling - network management center (NMC)	set	0.20	478,500	96,622		
2	Cables incl. Internal Networks and Cable Components	global	1		15,568,951	0.19%	
2a	Line transmission cables (redundancy)	km	263	57,420	15,072,960		
2b	Station cables for each station	set	2.2	223,300	495,991		
3	Railway Operation Telecommunication System (ROTS)	set	2.2	239,250	531,418	0.006%	
4	Radio Systems (GSM-R)	global	1		4,905,153	0.06%	
4a	Radio Systems (GSM-R) track line transceiver station (BTS) for open line	pc	21	111,650	2,367,228		
4b	Radio Systems (GSM-R) track line transceiver station (BTS) for lines in tunnels	pc	8	303,050	2,325,358		
4c	Radio Systems (GSM-R) central unit for line (BSC)	pc	0.8	63,800	51,531		
4d	Radio Systems (GSM-R) central unit (MSC)	pc	0.4	398,750	161,036		
5	Fire / Unauthorised Access Detection Systems	global	1		1,903,444	0.02%	
5a	Fire /Unauthorised Access Detection Systems for each technical station building	pc	2.2	207,350	460,563		
5b	Fire Detection Systems for tunnels over 500meters length	global	0.20	7,145,600	1,442,882		
6	CCTV systems	global	1		381,333	0.005%	
6a	CCTV central unit for each station	pc	1.6	143,550	231,892		
6b	Cameras for each track side per platform (2 cameras per track)	pc	11	12,760	133,982		
6c	Cameras for each technical room per station	pc	1.6	9,570	15,459		
7	Passenger Information System - Chronometry System for platforms, OCC and depots	global	1		62,804	0.0008%	
7a	Main chronometry system for station, OCC and depots	pc	2.2	14,355	31,885		
7b	Controlled Clocks for platforms, OCC and depots	pc	10	3,190	30,919		
8	Data Recollection and Supervision System (SCADA)	global	1		467,004	0.006%	
8a	Data Recollection and Supervision System (SCADA) for each station and depot (controller unit)	pc	2.2	175,450	389,707		
8b	Data Recollection and Supervision System (SCADA) for OCC (central unit)	set	0.20	382,800	77,297		
9	Passenger Information System - Train Destination Display (TD)	global	1		1,169,765	0.01%	
9a	TD controller unit for each station	pc	1.6	111,650	180,360		
9b	TD display unit for each station	pc	11	73,370	770,396		
9c	TD display board for main station	pc	0.6	303,050	183,581		

# APPENDIX A - TAV CAPITAL COST

## SECTION 2

Section: Galeão Airport (RJ) - Barra Mansa / Volta Redonda (RJ)

Chainage: Km 15.166 - Km 118.302

Length: 103.14 km

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9d	TD for OCC (central unit)	set	0.20	175,450	35,428		
10	Passenger Information System - Public Address System (Speaker System)	global	1		1,004,864	0.01%	
10a	Loudspeaker for each platform	pc	565	1,276	721,441		
10b	PA System (Speaker System): controller unit for station	set	1.6	159,500	257,657		
10c	PA System (Speaker System): central unit in OCC	set	0.20	127,600	25,766		
11	Ticketing System	global	1		5,394,703	0.07%	
11a	Ticket vending machine	pc	19	79,750	1,529,841		
11b	Gate arrays - Big stations	set	0.6	3,987,500	2,415,538		
11c	Gate arrays - Small stations	set	1.0	1,435,500	1,449,323		
12	Hot axle box detection unit (HABD)	pc	2.4	893,200	2,164,322	0.03%	
13	Overall Systems Components (PS, housing, cable, etc.)	global	1		29,211,397	0.35%	
13a	Power supply (8 Stations plus 3 Depots)	set	2.2	982,839	2,183,067		
13b	Power supply (Block post)	set	16	851,411	13,753,754		
13c	Housing (shelter)	set	16	95,700	1,545,945		
13d	Earthing field elements	set	505	2,233	1,128,604		
13e	Cable plant	km	195	54,230	10,600,027		
	<b>TOTAL D2</b>				<b>63,464,055</b>	<b>0.77%</b>	
	TOTAL D2 - PER KM				615,345		
<b>D3</b>	<b>ELECTRIFICATION</b>						35
1	Catenary	km	223	798,462	177,920,676	2.16%	
2	ATFS [Grid Substations (+ traction Feeder Station)]	global	1		75,891,827	0.92%	
2a	Building Construction	unit	2.4	26,100,000	63,243,189	0.77%	
2b	Electrical Installations	unit	2.4	5,220,000	12,648,638	0.15%	
3	ATS [Small Substations / Mid-Point Substations]	global	1		21,081,063	0.26%	
3a	Building Construction	unit	6	348,000	2,108,106	0.03%	
3b	Electrical Installations	unit	6	3,132,000	18,972,957	0.23%	
	<b>TOTAL D3</b>				<b>274,893,567</b>	<b>3.33%</b>	
	TOTAL D3 - PER KM				2,665,358		
	<b>TOTAL D (D1 + D2 + D3)</b>				<b>402,268,070</b>	<b>4.87%</b>	
	TOTAL D (D1 + D2 + D3) - PER KM				3,900,376		
<b>E</b>	<b>SOCIO-ENVIRONMENTAL WORKS<sup>3</sup></b>						N/A
1	Land acquisition (excludes constructions and improvements)	global	1	92,300,000	92,300,000	1.12%	
2	Indemnification for buildings	global	1		233,499,645	2.83%	
2a	Residential buildings	m2 AC <sup>4</sup>	158,197	1,068	169,009,765	2.05%	
2b	Industrial buildings	m2 AC <sup>4</sup>	31,360	1,875	58,800,000	0.71%	
2c	Infrastructure facilities	m2 AG <sup>4</sup>	20,321	280	5,689,880	0.07%	
2d	Institutional facilities	m2 AG <sup>4</sup>	-	560	-	0.00%	
3	Resettlement	No. of families	266	55,000	14,630,000	0.18%	
4	Reurbanisation, TAV crossings	m2 AU <sup>4</sup>	428,800	180	77,184,000	0.94%	
5	Noise protection	m2 AU <sup>4</sup>	428,800	150	64,320,000	0.78%	
6	Native Forest Reclaiming	global	1		22,310,400	0.27%	
6a	Due to removal of forest	ha	169	60,000	10,129,200	0.12%	
6b	Due to intervention in APP	ha	203	60,000	12,181,200	0.15%	
7	Relocation of roads affected by TAV	global	1		128,000,000	1.55%	
7a	Secondary roads	No. of roads	13	4,000,000	52,000,000	0.63%	
7b	Nearby roads	No. of roads	38	2,000,000	76,000,000	0.92%	
8	Environmental compensation	global	1	30,290,000	30,290,000	0.37%	

# APPENDIX A - TAV CAPITAL COST

## SECTION 2

Section: **Galeão Airport (RJ) - Barra Mansa / Volta Redonda (RJ)**

Chainage: **Km 15.166 - Km 118.302**

Length: **103.14 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9	Environmental supervision of works	km	103	415,000	42,801,324	0.52%	
	<b>TOTAL E</b>				<b>705,335,369</b>	<b>8.55%</b>	
	TOTAL E - PER KM				6,838,905		
<b>F</b>	<b>ROLLING STOCK</b>						30
1	High-Speed service trains	train sets	8	65,232,937	553,233,194	6.70%	
	<b>TOTAL F</b>				<b>553,233,194</b>	<b>6.70%</b>	
	TOTAL F - PER KM				5,364,128		
<b>G</b>	<b>COMPLEMENTARY SERVICES</b>						N/A
1	Testing and certification	global	1	19,110,025	19,110,025	0.23%	
2	Geotechnical studies	km	103	5,000	515,679	0.006%	
3	Utility diversion	global	1	54,290,934	54,290,934	0.66%	
4	Temporary works during construction	global	1	130,933,790	130,933,790	1.59%	
5	Permanent road access to tunnels and bridges	global	1	13,093,379	13,093,379	0.16%	
6	Design	global	1	134,900,152	134,900,152	1.63%	
7	Project Management	global	1	158,795,437	158,795,437	1.92%	
	<b>TOTAL G</b>				<b>511,639,396</b>	<b>6.20%</b>	
	TOTAL G - PER KM				4,960,836		
<b>GT</b>	<b>GRAND TOTAL</b>				<b>8,252,577,455</b>	<b>100%</b>	
	GRAND TOTAL - PER KM				80,016,676		

### NOTES:

- In the values provided above, a dot (.) is used to separate decimals, and a comma (,) to separate thousands.
- For a detailed description of this Table and the assumptions considered to obtain the quantities and costs listed above, please refer to Volume 5 - Section 2
- Data produced and supplied by Prime Engenharia (Items 1 to 10), as the Environmental Studies are outside the scope of works of the Consortium Halcrow - Sinergia.
- The following definitions have been provided by Prime Engenharia:
  - AC: Área Construída afetada. O custo unitário é a média resultante para todo o TAV.
  - AG: Área Geográfica Bruta afetada.
  - AU: Área Urbana Bruta afetada.

# APPENDIX A - TAV CAPITAL COST

## SECTION 3

Section: Barra Mansa / Volta Redonda (RJ) - São José dos Campos (SP)

Chainage: Km 118.302 - Km 328.663

Length: 210.36 km

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
<b>A</b>	<b>CIVIL ENGINEERING WORKS</b>						
<b>A1</b>	<b>EARTHWORKS</b>						90
1	Site clearance	m <sup>2</sup>	4,114,203	0.3	1,193,119	0.01%	
2	Planting on banks	m <sup>2</sup>	948,148	1.1	995,556	0.01%	
3	Fill	m <sup>3</sup>	44,573,017	2.7	120,792,876	1.11%	
4	Cut	m <sup>3</sup>	29,096,981		407,644,127	3.73%	
4a	In soil	m <sup>3</sup>	17,352,242	8.2	142,095,583	1.30%	
4b	In rock	m <sup>3</sup>	11,744,739	22.6	265,548,544	2.43%	
5	Borrow	m <sup>3</sup>	24,196,420	6.7	162,116,015	1.48%	
6	Dump	m <sup>3</sup>	14,087,110	1.8	25,075,056	0.23%	
7	Mass haul	km.m <sup>3</sup>	750,825,804	0.4	300,330,322	2.75%	
	<b>TOTAL A1</b>				<b>1,018,147,071</b>	<b>9.32%</b>	
	TOTAL A1 - PER KM				4,840,013		
<b>A2</b>	<b>STRUCTURES</b>						90
1	Tunnelling		13,190		1,984,901,134	18.17%	
1a	Urban area	m	1,740		145,342,461	1.33%	
	Soft ground - Twin bore - 7.85m diameter - NATM - Rate covers two tracks	m	-	133,713	-	0.00%	
	Soft ground - Twin bore - 7.85m diameter - TBM - Rate covers two tracks	m	1,740	83,530	145,342,461	1.33%	
1b	Rural area	m	11,450		1,839,558,673	16.84%	
	Soft ground - Single bore - 16m diameter - NATM	m	2,175	166,355	361,822,451	3.31%	
	Soft ground - Single bore - 16m diameter - TBM	m	-	124,802	-	0.00%	
	Rock - Single bore - 16m diameter - NATM	m	9,275	159,325	1,477,736,222	13.53%	
	Rock - Single bore - 16m diameter - TBM	m	-	106,251	-	0.00%	
2	Bridges and viaducts	m <sup>2</sup>	648,774	4,745	3,078,302,875	28.18%	
3	Retaining walls	m <sup>2</sup>	89,616	881	78,932,877	0.72%	
	<b>TOTAL A2</b>				<b>5,142,136,886</b>	<b>47.08%</b>	
	TOTAL A2 - PER KM				24,444,415		
	<b>TOTAL A (A1 + A2)</b>				<b>6,160,283,957</b>	<b>56.40%</b>	
	TOTAL A (A1 + A2) - PER KM				29,284,428		
<b>B</b>	<b>PERMANENT WAY</b>						20
1	Plain line track (per single-track km)	km	421	1,556,637	654,909,640	6.00%	
2	Switches & crossings	unit	103	1,073,600	110,542,531	1.01%	
3	Drainage	km	223	631,309	140,601,538	1.29%	
4	Fences	m	445,429	49	21,777,014	0.20%	
	<b>TOTAL B</b>				<b>927,830,723</b>	<b>8.49%</b>	
	TOTAL B - PER KM				4,410,672		
<b>C</b>	<b>BUILDINGS AND EQUIPMENTS</b>						70
1	Passenger stations	global	1	16,734,848	16,734,848	0.15%	
1a	Barão de Mauá (RJ)	global	1	-	-	0.00%	
1b	Galeão Airport (RJ)	global	1	-	-	0.00%	
1c	Barra Mansa / Volta Redonda (RJ)	global	1	16,734,848	16,734,848	0.15%	
1d	São José dos Campos (SP)	global	1	-	-	0.00%	
1e	Guarulhos Airport (SP)	global	1	-	-	0.00%	
1f	Campo de Marte (SP)	global	1	-	-	0.00%	
1g	Viracopos Airport (SP)	global	1	-	-	0.00%	
1h	Campinas (SP)	global	1	-	-	0.00%	
2	Maintenance depots	global	1	291,506,194	291,506,194	2.67%	

# APPENDIX A - TAV CAPITAL COST

## SECTION 3

Section: **Barra Mansa / Volta Redonda (RJ) - São José dos Campos (SP)**

Chainage: **Km 118.302 - Km 328.663**

Length: **210.36 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
2a	Main and subsidiary depots - Civil works	global	1	28,022,779	28,022,779	0.26%	
2b	Main and subsidiary depots - Maintenance equipment	global	1	185,335,839	185,335,839	1.70%	
2c	Engineering depot and stabling sidings (per single-track km)	km	34	1,556,637	52,571,231	0.48%	
2d	Locomotives	unit	1	20,700,000	25,576,346	0.23%	
	<b>TOTAL C</b>				<b>308,241,042</b>	<b>2.82%</b>	
	TOTAL C - PER KM				1,465,300		
<b>D</b>	<b>SYSTEM ELEMENTS</b>						
<b>D1</b>	<b>SIGNALLING</b>						20
1	CTC (Centralised Traffic Control)	unit	0.8	1,894,860	1,560,824	0.01%	
2	Signalling	global	1		63,031,025	0.58%	
2a	Indoor - Control (Total)	set	4.5	179,278	812,207	0.01%	
2b	Outdoor - Signals, Markerboards, Markerboards Overrunlight	set	584	15,932	9,304,247	0.09%	
2c	Outdoor - Point machines (regular, high speed points)	set	102	266,458	27,216,151	0.25%	
2d	Outdoor - Track vacancy detection section	section	269	95,700	25,698,420	0.24%	
3	ATP (Automatic Train Protection) - ETCS L2	km	210	312,620	65,762,868	0.60%	
	<b>TOTAL D1</b>				<b>130,354,718</b>	<b>1.19%</b>	
	TOTAL D1 - PER KM				619,673		
<b>D2</b>	<b>TELECOMMUNICATIONS</b>						20
1	Transmission Facilities	global	1		1,425,500	0.01%	
1a	Transmission Facilities for each station	set	4.5	271,150	1,228,427		
1b	Transmission Facilities for central controlling - network management center (NMC)	set	0.41	478,500	197,074		
2	Cables incl. Internal Networks and Cable Components	global	1		31,755,154	0.29%	
2a	Line transmission cables (redundancy)	km	535	57,420	30,743,509		
2b	Station cables for each station	set	4.5	223,300	1,011,645		
3	Railway Operation Telecommunication System (ROTS)	set	4.5	239,250	1,083,906	0.010%	
4	Radio Systems (GSM-R)	global	1		10,004,779	0.09%	
4a	Radio Systems (GSM-R) track line transceiver station (BTS) for open line	pc	43	111,650	4,828,307		
4b	Radio Systems (GSM-R) track line transceiver station (BTS) for lines in tunnels	pc	16	303,050	4,742,909		
4c	Radio Systems (GSM-R) central unit for line (BSC)	pc	1.6	63,800	105,106		
4d	Radio Systems (GSM-R) central unit (MSC)	pc	0.8	398,750	328,456		
5	Fire / Unauthorised Access Detection Systems	global	1		3,882,353	0.04%	
5a	Fire /Unauthorised Access Detection Systems for each technical station building	pc	4.5	207,350	939,385		
5b	Fire Detection Systems for tunnels over 500meters length	global	0.41	7,145,600	2,942,968		
6	CCTV systems	global	1		777,784	0.007%	
6a	CCTV central unit for each station	pc	3.3	143,550	472,977		
6b	Cameras for each track side per platform (2 cameras per track)	pc	21	12,760	273,276		
6c	Cameras for each technical room per station	pc	3.3	9,570	31,532		
7	Passenger Information System - Chronometry System for platforms, OCC and depots	global	1		128,098	0.0012%	
7a	Main chronometry system for station, OCC and depots	pc	4.5	14,355	65,034		
7b	Controlled Clocks for platforms, OCC and depots	pc	20	3,190	63,064		
8	Data Recollection and Supervision System (SCADA)	global	1		952,523	0.009%	
8a	Data Recollection and Supervision System (SCADA) for each station and depot (controller unit)	pc	4.5	175,450	794,864		
8b	Data Recollection and Supervision System (SCADA) for OCC (central unit)	set	0.41	382,800	157,659		
9	Passenger Information System - Train Destination Display (TD)	global	1		2,385,907	0.02%	
9a	TD controller unit for each station	pc	3.3	111,650	367,871		
9b	TD display unit for each station	pc	21	73,370	1,571,335		
9c	TD display board for main station	pc	1.2	303,050	374,440		

# APPENDIX A - TAV CAPITAL COST

## SECTION 3

Section: Barra Mansa / Volta Redonda (RJ) - São José dos Campos (SP)

Chainage: Km 118.302 - Km 328.663

Length: 210.36 km

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9d	TD for OCC (central unit)	set	0.41	175,450	72,260		
10	Passenger Information System - Public Address System (Speaker System)	global	1		2,049,567	0.02%	
10a	Loudspeaker for each platform	pc	1,153	1,276	1,471,484		
10b	PA System (Speaker System): controller unit for station	set	3.3	159,500	525,530		
10c	PA System (Speaker System): central unit in OCC	set	0.41	127,600	52,553		
11	Ticketing System	global	1		11,003,286	0.10%	
11a	Ticket vending machine	pc	39	79,750	3,120,335		
11b	Gate arrays - Big stations	set	1.2	3,987,500	4,926,844		
11c	Gate arrays - Small stations	set	2.1	1,435,500	2,956,107		
12	Hot axle box detection unit (HABD)	pc	4.9	893,200	4,414,453	0.04%	
13	Overall Systems Components (PS, housing, cable, etc.)	global	1		59,580,920	0.55%	
13a	Power supply (8 Stations plus 3 Depots)	set	4.5	982,839	4,452,685		
13b	Power supply (Block post)	set	33	851,411	28,052,795		
13c	Housing (shelter)	set	33	95,700	3,153,180		
13d	Earthing field elements	set	1,031	2,233	2,301,953		
13e	Cable plant	km	399	54,230	21,620,307		
	<b>TOTAL D2</b>				<b>129,444,230</b>	<b>1.19%</b>	
	TOTAL D2 - PER KM				615,345		
<b>D3</b>	<b>ELECTRIFICATION</b>						35
1	Catenary	km	454	798,462	362,895,267	3.32%	
2	ATFS [Grid Substations (+ traction Feeder Station)]	global	1		154,792,492	1.42%	
2a	Building Construction	unit	4.9	26,100,000	128,993,744	1.18%	
2b	Electrical Installations	unit	4.9	5,220,000	25,798,749	0.24%	
3	ATS [Small Substations / Mid-Point Substations]	global	1		42,997,915	0.39%	
3a	Building Construction	unit	12	348,000	4,299,791	0.04%	
3b	Electrical Installations	unit	12	3,132,000	38,698,123	0.35%	
	<b>TOTAL D3</b>				<b>560,685,673</b>	<b>5.13%</b>	
	TOTAL D3 - PER KM				2,665,358		
	<b>TOTAL D (D1 + D2 + D3)</b>				<b>820,484,622</b>	<b>7.51%</b>	
	TOTAL D (D1 + D2 + D3) - PER KM				3,900,376		
<b>E</b>	<b>SOCIO-ENVIRONMENTAL WORKS<sup>3</sup></b>						N/A
1	Land acquisition (excludes constructions and improvements)	global	1	120,900,000	120,900,000	1.11%	
2	Indemnification for buildings	global	1		160,474,082	1.47%	
2a	Residential buildings	m2 AC <sup>4</sup>	96,214	1,068	102,790,227	0.94%	
2b	Industrial buildings	m2 AC <sup>4</sup>	18,181	1,875	34,089,375	0.31%	
2c	Infrastructure facilities	m2 AG <sup>4</sup>	84,266	280	23,594,480	0.22%	
2d	Institutional facilities	m2 AG <sup>4</sup>	-	560	-	0.00%	
3	Resettlement	No. of families	104	55,000	5,720,000	0.05%	
4	Reurbanisation, TAV crossings	m2 AU <sup>4</sup>	524,600	180	94,428,000	0.86%	
5	Noise protection	m2 AU <sup>4</sup>	524,600	150	78,690,000	0.72%	
6	Native Forest Reclaiming	global	1		43,493,400	0.40%	
6a	Due to removal of forest	ha	109	60,000	6,559,800	0.06%	
6b	Due to intervention in APP	ha	616	60,000	36,933,600	0.34%	
7	Relocation of roads affected by TAV	global	1		260,000,000	2.38%	
7a	Secondary roads	No. of roads	26	4,000,000	104,000,000	0.95%	
7b	Nearby roads	No. of roads	78	2,000,000	156,000,000	1.43%	
8	Environmental compensation	global	1	61,780,000	61,780,000	0.57%	

# APPENDIX A - TAV CAPITAL COST

## SECTION 3

Section: **Barra Mansa / Volta Redonda (RJ) - São José dos Campos (SP)**

Chainage: **Km 118.302 - Km 328.663**

Length: **210.36 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9	Environmental supervision of works	km	210	415,000	87,299,566	0.80%	
	<b>TOTAL E</b>				<b>912,785,048</b>	<b>8.36%</b>	
	TOTAL E - PER KM				4,339,149		
<b>F</b>	<b>ROLLING STOCK</b>						30
1	High-Speed service trains	train sets	17	65,232,937	1,128,400,093	10.33%	
	<b>TOTAL F</b>				<b>1,128,400,093</b>	<b>10.33%</b>	
	TOTAL F - PER KM				5,364,128		
<b>G</b>	<b>COMPLEMENTARY SERVICES</b>						N/A
1	Testing and certification	global	1	38,977,694	38,977,694	0.36%	
2	Geotechnical studies	km	210	5,000	1,051,802	0.010%	
3	Utility diversion	global	1	61,602,840	61,602,840	0.56%	
4	Temporary works during construction	global	1	165,910,607	165,910,607	1.52%	
5	Permanent road access to tunnels and bridges	global	1	16,591,061	16,591,061	0.15%	
6	Design	global	1	170,792,697	170,792,697	1.56%	
7	Project Management	global	1	210,063,636	210,063,636	1.92%	
	<b>TOTAL G</b>				<b>664,990,336</b>	<b>6.09%</b>	
	TOTAL G - PER KM				3,161,195		
<b>GT</b>	<b>GRAND TOTAL</b>				<b>10,923,015,820</b>	<b>100%</b>	
	GRAND TOTAL - PER KM				51,925,247		

### NOTES:

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  - AC: Área Construída afetada. O custo unitário é a média resultante para todo o TAV.
  - AG: Área Geográfica Bruta afetada.
  - AU: Área Urbana Bruta afetada.

# APPENDIX A - TAV CAPITAL COST

## SECTION 4

Section: São José dos Campos (SP) - Guarulhos Airport (SP)

Chainage: Km 328.663 - Km 390.433

Length: 61.77 km

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
<b>A</b>	<b>CIVIL ENGINEERING WORKS</b>						
<b>A1</b>	<b>EARTHWORKS</b>						90
1	Site clearance	m <sup>2</sup>	3,884,973	0.3	1,126,642	0.03%	
2	Planting on banks	m <sup>2</sup>	2,343,001	1.1	2,460,151	0.07%	
3	Fill	m <sup>3</sup>	11,685,272	2.7	31,667,087	0.87%	
4	Cut	m <sup>3</sup>	21,885,327		179,216,511	4.91%	
4a	In soil	m <sup>3</sup>	21,885,327	8.2	179,216,511	4.91%	
4b	In rock	m <sup>3</sup>	-	22.6	-	0.00%	
5	Borrow	m <sup>3</sup>	531,817	6.7	3,563,175	0.10%	
6	Dump	m <sup>3</sup>	4,965,889	1.8	8,839,282	0.24%	
7	Mass haul	km.m <sup>3</sup>	101,380,440	0.4	40,552,176	1.11%	
	<b>TOTAL A1</b>				<b>267,425,025</b>	<b>7.33%</b>	
	<b>TOTAL A1 - PER KM</b>				<b>4,329,318</b>		
<b>A2</b>	<b>STRUCTURES</b>						90
1	Tunnelling		7,099		1,017,571,435	27.88%	
1a	Urban area	m	2,730		290,765,785	7.97%	
	Soft ground - Twin bore - 7.85m diameter - NATM - Rate covers two tracks	m	1,250	133,713	167,141,163	4.58%	
	Soft ground - Twin bore - 7.85m diameter - TBM - Rate covers two tracks	m	1,480	83,530	123,624,622	3.39%	
1b	Rural area	m	4,369		726,805,650	19.92%	
	Soft ground - Single bore - 16m diameter - NATM	m	4,369	166,355	726,805,650	19.92%	
	Soft ground - Single bore - 16m diameter - TBM	m	-	124,802	-	0.00%	
	Rock - Single bore - 16m diameter - NATM	m	-	159,325	-	0.00%	
	Rock - Single bore - 16m diameter - TBM	m	-	106,251	-	0.00%	
2	Bridges and viaducts	m <sup>2</sup>	184,632	4,745	876,041,914	24.00%	
3	Retaining walls	m <sup>2</sup>	44,021	881	38,773,257	1.06%	
	<b>TOTAL A2</b>				<b>1,932,386,605</b>	<b>52.95%</b>	
	<b>TOTAL A2 - PER KM</b>				<b>31,283,223</b>		
	<b>TOTAL A (A1 + A2)</b>				<b>2,199,811,630</b>	<b>60.28%</b>	
	<b>TOTAL A (A1 + A2) - PER KM</b>				<b>35,612,542</b>		
<b>B</b>	<b>PERMANENT WAY</b>						20
1	Plain line track (per single-track km)	km	124	1,556,637	192,309,137	5.27%	
2	Switches & crossings	unit	30	1,073,600	32,459,957	0.89%	
3	Drainage	km	41	631,309	26,189,021	0.72%	
4	Fences	m	82,967	49	4,056,276	0.11%	
	<b>TOTAL B</b>				<b>255,014,390</b>	<b>6.99%</b>	
	<b>TOTAL B - PER KM</b>				<b>4,128,404</b>		
<b>C</b>	<b>BUILDINGS AND EQUIPMENTS</b>						70
1	Passenger stations	global	1	44,648,774	44,648,774	1.22%	
1a	Barão de Mauá (RJ)	global	1	-	-	0.00%	
1b	Galeão Airport (RJ)	global	1	-	-	0.00%	
1c	Barra Mansa / Volta Redonda (RJ)	global	1	-	-	0.00%	
1d	São José dos Campos (SP)	global	1	44,648,774	44,648,774	1.22%	
1e	Guarulhos Airport (SP)	global	1	-	-	0.00%	
1f	Campo de Marte (SP)	global	1	-	-	0.00%	
1g	Viracopos Airport (SP)	global	1	-	-	0.00%	
1h	Campinas (SP)	global	1	-	-	0.00%	
2	Maintenance depots	global	1	85,598,533	85,598,533	2.35%	

# APPENDIX A - TAV CAPITAL COST

## SECTION 4

Section: São José dos Campos (SP) - Guarulhos Airport (SP)

Chainage: Km 328.663 - Km 390.433

Length: 61.77 km

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
2a	Main and subsidiary depots - Civil works	global	1	8,228,672	8,228,672	0.23%	
2b	Main and subsidiary depots - Maintenance equipment	global	1	54,422,432	54,422,432	1.49%	
2c	Engineering depot and stabling sidings (per single-track km)	km	10	1,556,637	15,437,134	0.42%	
2d	Locomotives	unit	0	20,700,000	7,510,296	0.21%	
	<b>TOTAL C</b>				<b>130,247,307</b>	<b>3.57%</b>	
	TOTAL C - PER KM				2,108,561		
<b>D</b>	<b>SYSTEM ELEMENTS</b>						
<b>D1</b>	<b>SIGNALLING</b>						20
1	CTC (Centralised Traffic Control)	unit	0.2	1,894,860	458,324	0.01%	
2	Signalling	global	1		18,508,572	0.51%	
2a	Indoor - Control (Total)	set	1.3	179,278	238,498	0.01%	
2b	Outdoor - Signals, Markerboards, Markerboards Overrunlight	set	171	15,932	2,732,120	0.07%	
2c	Outdoor - Point machines (regular, high speed points)	set	30	266,458	7,991,812	0.22%	
2d	Outdoor - Track vacancy detection section	section	79	95,700	7,546,142	0.21%	
3	ATP (Automatic Train Protection) - ETCS L2	km	62	312,620	19,310,756	0.53%	
	<b>TOTAL D1</b>				<b>38,277,652</b>	<b>1.05%</b>	
	TOTAL D1 - PER KM				619,673		
<b>D2</b>	<b>TELECOMMUNICATIONS</b>						20
1	Transmission Facilities	global	1		418,587	0.01%	
1a	Transmission Facilities for each station	set	1.3	271,150	360,718		
1b	Transmission Facilities for central controlling - network management center (NMC)	set	0.12	478,500	57,869		
2	Cables incl. Internal Networks and Cable Components	global	1		9,324,655	0.26%	
2a	Line transmission cables (redundancy)	km	157	57,420	9,027,593		
2b	Station cables for each station	set	1.3	223,300	297,062		
3	Railway Operation Telecommunication System (ROTS)	set	1.3	239,250	318,281	0.009%	
4	Radio Systems (GSM-R)	global	1		2,937,826	0.08%	
4a	Radio Systems (GSM-R) track line transceiver station (BTS) for open line	pc	13	111,650	1,417,795		
4b	Radio Systems (GSM-R) track line transceiver station (BTS) for lines in tunnels	pc	5	303,050	1,392,718		
4c	Radio Systems (GSM-R) central unit for line (BSC)	pc	0.5	63,800	30,864		
4d	Radio Systems (GSM-R) central unit (MSC)	pc	0.2	398,750	96,449		
5	Fire / Unauthorised Access Detection Systems	global	1		1,140,023	0.03%	
5a	Fire /Unauthorised Access Detection Systems for each technical station building	pc	1.3	207,350	275,843		
5b	Fire Detection Systems for tunnels over 500meters length	global	0.12	7,145,600	864,180		
6	CCTV systems	global	1		228,390	0.006%	
6a	CCTV central unit for each station	pc	1.0	143,550	138,886		
6b	Cameras for each track side per platform (2 cameras per track)	pc	6	12,760	80,245		
6c	Cameras for each technical room per station	pc	1.0	9,570	9,259		
7	Passenger Information System - Chronometry System for platforms, OCC and depots	global	1		37,615	0.0010%	
7a	Main chronometry system for station, OCC and depots	pc	1.3	14,355	19,097		
7b	Controlled Clocks for platforms, OCC and depots	pc	6	3,190	18,518		
8	Data Recollection and Supervision System (SCADA)	global	1		279,701	0.008%	
8a	Data Recollection and Supervision System (SCADA) for each station and depot (controller unit)	pc	1.3	175,450	233,406		
8b	Data Recollection and Supervision System (SCADA) for OCC (central unit)	set	0.12	382,800	46,295		
9	Passenger Information System - Train Destination Display (TD)	global	1		700,603	0.02%	
9a	TD controller unit for each station	pc	1.0	111,650	108,022		
9b	TD display unit for each station	pc	6	73,370	461,410		
9c	TD display board for main station	pc	0.4	303,050	109,951		

# APPENDIX A - TAV CAPITAL COST

## SECTION 4

Section: São José dos Campos (SP) - Guarulhos Airport (SP)

Chainage: Km 328.663 - Km 390.433

Length: 61.77 km

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9d	TD for OCC (central unit)	set	0.12	175,450	21,219		
10	Passenger Information System - Public Address System (Speaker System)	global	1		601,840	0.02%	
10a	Loudspeaker for each platform	pc	339	1,276	432,090		
10b	PA System (Speaker System): controller unit for station	set	1.0	159,500	154,318		
10c	PA System (Speaker System): central unit in OCC	set	0.12	127,600	15,432		
11	Ticketing System	global	1		3,231,030	0.09%	
11a	Ticket vending machine	pc	11	79,750	916,262		
11b	Gate arrays - Big stations	set	0.4	3,987,500	1,446,730		
11c	Gate arrays - Small stations	set	0.6	1,435,500	868,038		
12	Hot axle box detection unit (HABD)	pc	1.5	893,200	1,296,270	0.04%	
13	Overall Systems Components (PS, housing, cable, etc.)	global	1		17,495,475	0.48%	
13a	Power supply (8 Stations plus 3 Depots)	set	1.3	982,839	1,307,496		
13b	Power supply (Block post)	set	10	851,411	8,237,486		
13c	Housing (shelter)	set	10	95,700	925,907		
13d	Earthing field elements	set	303	2,233	675,951		
13e	Cable plant	km	117	54,230	6,348,635		
	<b>TOTAL D2</b>				<b>38,010,294</b>	<b>1.04%</b>	
	TOTAL D2 - PER KM				615,345		
<b>D3</b>	<b>ELECTRIFICATION</b>						35
1	Catenary	km	133	798,462	106,561,381	2.92%	
2	ATFS [Grid Substations (+ traction Feeder Station)]	global	1		45,453,615	1.25%	
2a	Building Construction	unit	1.5	26,100,000	37,878,012	1.04%	
2b	Electrical Installations	unit	1.5	5,220,000	7,575,602	0.21%	
3	ATS [Small Substations / Mid-Point Substations]	global	1		12,626,004	0.35%	
3a	Building Construction	unit	4	348,000	1,262,600	0.03%	
3b	Electrical Installations	unit	4	3,132,000	11,363,404	0.31%	
	<b>TOTAL D3</b>				<b>164,641,000</b>	<b>4.51%</b>	
	TOTAL D3 - PER KM				2,665,358		
	<b>TOTAL D (D1 + D2 + D3)</b>				<b>240,928,946</b>	<b>6.60%</b>	
	TOTAL D (D1 + D2 + D3) - PER KM				3,900,376		
<b>E</b>	<b>SOCIO-ENVIRONMENTAL WORKS<sup>3</sup></b>						N/A
1	Land acquisition (excludes constructions and improvements)	global	1	70,210,000	70,210,000	1.92%	
2	Indemnification for buildings	global	1		26,938,955	0.74%	
2a	Residential buildings	m2 AC <sup>4</sup>	7,909	1,068.35	8,449,580	0.23%	
2b	Industrial buildings	m2 AC <sup>4</sup>	9,861	1,875	18,489,375	0.51%	
2c	Infrastructure facilities	m2 AG <sup>4</sup>	-	280	-	0.00%	
2d	Institutional facilities	m2 AG <sup>4</sup>	-	560	-	0.00%	
3	Resettlement	No. of families	24	55,000	1,320,000	0.04%	
4	Reurbanisation, TAV crossings	m2 AU <sup>4</sup>	45,000	180	8,100,000	0.22%	
5	Noise protection	m2 AU <sup>4</sup>	45,000	150	6,750,000	0.18%	
6	Native Forest Reclaiming	global	1		32,407,800	0.89%	
6a	Due to removal of forest	ha	313.87	60,000	18,832,200	0.52%	
6b	Due to intervention in APP	ha	226.26	60,000	13,575,600	0.37%	
7	Relocation of roads affected by TAV	global	1		78,000,000	2.14%	
7a	Secondary roads	No. of roads	8	4,000,000	32,000,000	0.88%	
7b	Nearby roads	No. of roads	23	2,000,000	46,000,000	1.26%	
8	Environmental compensation	global	1	18,140,000	18,140,000	0.50%	

# APPENDIX A - TAV CAPITAL COST

## SECTION 4

Section: **São José dos Campos (SP) - Guarulhos Airport (SP)**

Chainage: **Km 328.663 - Km 390.433**

Length: **61.77 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9	Environmental supervision of works	km	62	415,000	25,634,841	0.70%	
	<b>TOTAL E</b>				<b>267,501,596</b>	<b>7.33%</b>	
	<b>TOTAL E - PER KM</b>				<b>4,330,558</b>		
<b>F</b>	<b>ROLLING STOCK</b>						30
1	High-Speed service trains	train sets	5	65,232,937	331,345,936	9.08%	
	<b>TOTAL F</b>				<b>331,345,936</b>	<b>9.08%</b>	
	<b>TOTAL F - PER KM</b>				<b>5,364,128</b>		
<b>G</b>	<b>COMPLEMENTARY SERVICES</b>						N/A
1	Testing and certification	global	1	11,445,498	11,445,498	0.31%	
2	Geotechnical studies	km	62	5,000	308,854	0.008%	
3	Utility diversion	global	1	21,998,116	21,998,116	0.60%	
4	Temporary works during construction	global	1	56,655,045	56,655,045	1.55%	
5	Permanent road access to tunnels and bridges	global	1	5,665,505	5,665,505	0.16%	
6	Design	global	1	58,341,419	58,341,419	1.60%	
7	Project Management	global	1	70,189,546	70,189,546	1.92%	
	<b>TOTAL G</b>				<b>224,603,983</b>	<b>6.15%</b>	
	<b>TOTAL G - PER KM</b>				<b>3,636,093</b>		
<b>GT</b>	<b>GRAND TOTAL</b>				<b>3,649,453,788</b>	<b>100%</b>	
	<b>GRAND TOTAL - PER KM</b>				<b>59,080,661</b>		

### NOTES:

- In the values provided above, a dot (.) is used to separate decimals, and a comma (,) to separate thousands.
- For a detailed description of this Table and the assumptions considered to obtain the quantities and costs listed above, please refer to Volume 5 - Section 2
- Data produced and supplied by Prime Engenharia (Items 1 to 10), as the Environmental Studies are outside the scope of works of the Consortium Halcrow - Sinergia.
- The following definitions have been provided by Prime Engenharia:
  - AC: Área Construída afetada. O custo unitário é a média resultante para todo o TAV.
  - AG: Área Geográfica Bruta afetada.
  - AU: Área Urbana Bruta afetada.

# APPENDIX A - TAV CAPITAL COST

## SECTION 5

Section: **Guarulhos Airport (SP) - Campo de Marte (SP)**

Chainage: **Km 390.433 - Km 412.244**

Length: **21.81 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
<b>A</b>	<b>CIVIL ENGINEERING WORKS</b>						
<b>A1</b>	<b>EARTHWORKS</b>						90
1	Site clearance	m <sup>2</sup>	815,089	0.3	236,376	0.01%	
2	Planting on banks	m <sup>2</sup>	756,037	1.1	793,839	0.03%	
3	Fill	m <sup>3</sup>	163,900	2.7	444,169	0.02%	
4	Cut	m <sup>3</sup>	1,360,602		11,141,819	0.48%	
4a	In soil	m <sup>3</sup>	1,360,602	8.2	11,141,819	0.48%	
4b	In rock	m <sup>3</sup>	-	22.6	-	0.00%	
5	Borrow	m <sup>3</sup>	-	6.7	-	0.00%	
6	Dump	m <sup>3</sup>	2,986,682	1.8	5,316,294	0.23%	
7	Mass haul	km.m <sup>3</sup>	22,941,180	0.4	9,176,472	0.40%	
	<b>TOTAL A1</b>				<b>27,108,968</b>	<b>1.17%</b>	
	TOTAL A1 - PER KM				1,242,892		
<b>A2</b>	<b>STRUCTURES</b>						90
1	Tunnelling		17,761		1,485,987,768	64.26%	
1a	Urban area	m	17,761		1,485,987,768	64.26%	
	Soft ground - Twin bore - 7.85m diameter - NATM - Rate covers two tracks	m	48	133,713	6,418,221	0.28%	
	Soft ground - Twin bore - 7.85m diameter - TBM - Rate covers two tracks	m	17,713	83,530	1,479,569,547	63.98%	
1b	Rural area	m	-		-	0.00%	
	Soft ground - Single bore - 16m diameter - NATM	m	-	166,355	-	0.00%	
	Soft ground - Single bore - 16m diameter - TBM	m	-	124,802	-	0.00%	
	Rock - Single bore - 16m diameter - NATM	m	-	159,325	-	0.00%	
	Rock - Single bore - 16m diameter - TBM	m	-	106,251	-	0.00%	
2	Bridges and viaducts	m <sup>2</sup>	-	4,745	-	0.00%	
3	Retaining walls	m <sup>2</sup>	11,175	881	9,842,828	0.43%	
	<b>TOTAL A2</b>				<b>1,495,830,596</b>	<b>64.68%</b>	
	TOTAL A2 - PER KM				68,580,848		
	<b>TOTAL A (A1 + A2)</b>				<b>1,522,939,564</b>	<b>65.85%</b>	
	TOTAL A (A1 + A2) - PER KM				69,823,740		
<b>B</b>	<b>PERMANENT WAY</b>						20
1	Plain line track (per single-track km)	km	44	1,556,637	67,904,250	2.94%	
2	Switches & crossings	unit	11	1,073,600	11,461,593	0.50%	
3	Drainage	km	4	631,309	2,556,926	0.11%	
4	Fences	m	8,100	49	396,029	0.02%	
	<b>TOTAL B</b>				<b>82,318,798</b>	<b>3.56%</b>	
	TOTAL B - PER KM				3,774,153		
<b>C</b>	<b>BUILDINGS AND EQUIPMENTS</b>						70
1	Passenger stations	global	1	105,274,400	105,274,400	4.55%	
1a	Barão de Mauá (RJ)	global	1	-	-	0.00%	
1b	Galeão Airport (RJ)	global	1	-	-	0.00%	
1c	Barra Mansa / Volta Redonda (RJ)	global	1	-	-	0.00%	
1d	São José dos Campos (SP)	global	1	-	-	0.00%	
1e	Guarulhos Airport (SP)	global	1	105,274,400	105,274,400	4.55%	
1f	Campo de Marte (SP)	global	1	-	-	0.00%	
1g	Viracopos Airport (SP)	global	1	-	-	0.00%	
1h	Campinas (SP)	global	1	-	-	0.00%	
2	Maintenance depots	global	1	30,224,795	30,224,795	1.31%	

# APPENDIX A - TAV CAPITAL COST

## SECTION 5

Section: **Guarulhos Airport (SP) - Campo de Marte (SP)**

Chainage: **Km 390.433 - Km 412.244**

Length: **21.81 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
2a	Main and subsidiary depots - Civil works	global	1	2,905,539	2,905,539	0.13%	
2b	Main and subsidiary depots - Maintenance equipment	global	1	19,216,531	19,216,531	0.83%	
2c	Engineering depot and stabling sidings (per single-track km)	km	4	1,556,637	5,450,844	0.24%	
2d	Locomotives	unit	0	20,700,000	2,651,881	0.11%	
	<b>TOTAL C</b>				<b>135,499,195</b>	<b>5.86%</b>	
	TOTAL C - PER KM				6,212,368		
<b>D</b>	<b>SYSTEM ELEMENTS</b>						
<b>D1</b>	<b>SIGNALLING</b>						20
1	CTC (Centralised Traffic Control)	unit	0.1	1,894,860	161,834	0.01%	
2	Signalling	global	1		6,535,366	0.28%	
2a	Indoor - Control (Total)	set	0.5	179,278	84,214	0.00%	
2b	Outdoor - Signals, Markerboards, Markerboards Overrunlight	set	61	15,932	964,710	0.04%	
2c	Outdoor - Point machines (regular, high speed points)	set	11	266,458	2,821,904	0.12%	
2d	Outdoor - Track vacancy detection section	section	28	95,700	2,664,538	0.12%	
3	ATP (Automatic Train Protection) - ETCS L2	km	22	312,620	6,818,617	0.29%	
	<b>TOTAL D1</b>				<b>13,515,818</b>	<b>0.58%</b>	
	TOTAL D1 - PER KM				619,673		
<b>D2</b>	<b>TELECOMMUNICATIONS</b>						20
1	Transmission Facilities	global	1		147,803	0.01%	
1a	Transmission Facilities for each station	set	0.5	271,150	127,369		
1b	Transmission Facilities for central controlling - network management center (NMC)	set	0.04	478,500	20,434		
2	Cables incl. Internal Networks and Cable Components	global	1		3,292,530	0.14%	
2a	Line transmission cables (redundancy)	km	56	57,420	3,187,638		
2b	Station cables for each station	set	0.5	223,300	104,892		
3	Railway Operation Telecommunication System (ROTS)	set	0.5	239,250	112,385	0.005%	
4	Radio Systems (GSM-R)	global	1		1,037,345	0.04%	
4a	Radio Systems (GSM-R) track line transceiver station (BTS) for open line	pc	4	111,650	500,623		
4b	Radio Systems (GSM-R) track line transceiver station (BTS) for lines in tunnels	pc	2	303,050	491,768		
4c	Radio Systems (GSM-R) central unit for line (BSC)	pc	0.2	63,800	10,898		
4d	Radio Systems (GSM-R) central unit (MSC)	pc	0.1	398,750	34,056		
5	Fire / Unauthorised Access Detection Systems	global	1		402,541	0.02%	
5a	Fire /Unauthorised Access Detection Systems for each technical station building	pc	0.5	207,350	97,400		
5b	Fire Detection Systems for tunnels over 500meters length	global	0.04	7,145,600	305,141		
6	CCTV systems	global	1		80,645	0.003%	
6a	CCTV central unit for each station	pc	0.3	143,550	49,041		
6b	Cameras for each track side per platform (2 cameras per track)	pc	2	12,760	28,335		
6c	Cameras for each technical room per station	pc	0.3	9,570	3,269		
7	Passenger Information System - Chronometry System for platforms, OCC and depots	global	1		13,282	0.0006%	
7a	Main chronometry system for station, OCC and depots	pc	0.5	14,355	6,743		
7b	Controlled Clocks for platforms, OCC and depots	pc	2	3,190	6,539		
8	Data Recollection and Supervision System (SCADA)	global	1		98,762	0.004%	
8a	Data Recollection and Supervision System (SCADA) for each station and depot (controller unit)	pc	0.5	175,450	82,415		
8b	Data Recollection and Supervision System (SCADA) for OCC (central unit)	set	0.04	382,800	16,347		
9	Passenger Information System - Train Destination Display (TD)	global	1		247,383	0.01%	
9a	TD controller unit for each station	pc	0.3	111,650	38,143		
9b	TD display unit for each station	pc	2	73,370	162,924		
9c	TD display board for main station	pc	0.1	303,050	38,824		

# APPENDIX A - TAV CAPITAL COST

## SECTION 5

Section: **Guarulhos Airport (SP) - Campo de Marte (SP)**

Chainage: **Km 390.433 - Km 412.244**

Length: **21.81 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9d	TD for OCC (central unit)	set	0.04	175,450	7,492		
10	Passenger Information System - Public Address System (Speaker System)	global	1		212,509	0.01%	
10a	Loudspeaker for each platform	pc	120	1,276	152,571		
10b	PA System (Speaker System): controller unit for station	set	0.3	159,500	54,490		
10c	PA System (Speaker System): central unit in OCC	set	0.04	127,600	5,449		
11	Ticketing System	global	1		1,140,875	0.05%	
11a	Ticket vending machine	pc	4	79,750	323,532		
11b	Gate arrays - Big stations	set	0.1	3,987,500	510,839		
11c	Gate arrays - Small stations	set	0.2	1,435,500	306,504		
12	Hot axle box detection unit (HABD)	pc	0.5	893,200	457,712	0.02%	
13	Overall Systems Components (PS, housing, cable, etc.)	global	1		6,177,643	0.27%	
13a	Power supply (8 Stations plus 3 Depots)	set	0.5	982,839	461,676		
13b	Power supply (Block post)	set	3	851,411	2,908,652		
13c	Housing (shelter)	set	3	95,700	326,937		
13d	Earthing field elements	set	107	2,233	238,678		
13e	Cable plant	km	41	54,230	2,241,700		
	<b>TOTAL D2</b>				<b>13,421,414</b>	<b>0.58%</b>	
	TOTAL D2 - PER KM				615,345		
<b>D3</b>	<b>ELECTRIFICATION</b>						35
1	Catenary	km	47	798,462	37,626,765	1.63%	
2	ATFS [Grid Substations (+ traction Feeder Station)]	global	1		16,049,646	0.69%	
2a	Building Construction	unit	0.5	26,100,000	13,374,705	0.58%	
2b	Electrical Installations	unit	0.5	5,220,000	2,674,941	0.12%	
3	ATS [Small Substations / Mid-Point Substations]	global	1		4,458,235	0.19%	
3a	Building Construction	unit	1	348,000	445,824	0.02%	
3b	Electrical Installations	unit	1	3,132,000	4,012,412	0.17%	
	<b>TOTAL D3</b>				<b>58,134,646</b>	<b>2.51%</b>	
	TOTAL D3 - PER KM				2,665,358		
	<b>TOTAL D (D1 + D2 + D3)</b>				<b>85,071,877</b>	<b>3.68%</b>	
	TOTAL D (D1 + D2 + D3) - PER KM				3,900,376		
<b>E</b>	<b>SOCIO-ENVIRONMENTAL WORKS<sup>3</sup></b>						N/A
1	Land acquisition (excludes constructions and improvements)	global	1	9,820,000	9,820,000	0.42%	
2	Indemnification for buildings	global	1		201,324,920	8.71%	
2a	Residential buildings	m2 AC <sup>4</sup>	-	1,068	-	0.00%	
2b	Industrial buildings	m2 AC <sup>4</sup>	88,768	1,875	166,440,000	7.20%	
2c	Infrastructure facilities	m2 AG <sup>4</sup>	124,589	280	34,884,920	1.51%	
2d	Institutional facilities	m2 AG <sup>4</sup>	-	560	-	0.00%	
3	Resettlement	No. of families	-	55,000	-	0.00%	
4	Reurbanisation, TAV crossings	m2 AU <sup>4</sup>	-	180	-	0.00%	
5	Noise protection	m2 AU <sup>4</sup>	-	150	-	0.00%	
6	Native Forest Reclaiming	global	1		1,450,800	0.06%	
6a	Due to removal of forest	ha	-	60,000	-	0.00%	
6b	Due to intervention in APP	ha	24	60,000	1,450,800	0.06%	
7	Relocation of roads affected by TAV	global	1		-	0.00%	
7a	Secondary roads	No. of roads	-	4,000,000	-	0.00%	
7b	Nearby roads	No. of roads	-	2,000,000	-	0.00%	
8	Environmental compensation	global	1	6,410,000	6,410,000	0.28%	

# APPENDIX A - TAV CAPITAL COST

## SECTION 5

Section: **Guarulhos Airport (SP) - Campo de Marte (SP)**

Chainage: **Km 390.433 - Km 412.244**

Length: **21.81 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9	Environmental supervision of works	km	22	415,000	9,051,648	0.39%	
	<b>TOTAL E</b>				<b>228,057,368</b>	<b>9.86%</b>	
	<b>TOTAL E - PER KM</b>				10,455,975		
<b>F</b>	<b>ROLLING STOCK</b>						30
1	High-Speed service trains	train sets	2	65,232,937	116,998,067	5.06%	
	<b>TOTAL F</b>				<b>116,998,067</b>	<b>5.06%</b>	
	<b>TOTAL F - PER KM</b>				5,364,128		
<b>G</b>	<b>COMPLEMENTARY SERVICES</b>						N/A
1	Testing and certification	global	1	4,041,399	4,041,399	0.17%	
2	Geotechnical studies	km	22	5,000	109,056	0.005%	
3	Utility diversion	global	1	15,229,396	15,229,396	0.66%	
4	Temporary works during construction	global	1	36,516,589	36,516,589	1.58%	
5	Permanent road access to tunnels and bridges	global	1	3,651,659	3,651,659	0.16%	
6	Design	global	1	37,624,542	37,624,542	1.63%	
7	Project Management	global	1	44,527,831	44,527,831	1.93%	
	<b>TOTAL G</b>				<b>141,700,471</b>	<b>6.13%</b>	
	<b>TOTAL G - PER KM</b>				6,496,684		
<b>GT</b>	<b>GRAND TOTAL</b>				<b>2,312,585,339</b>	<b>100%</b>	
	<b>GRAND TOTAL - PER KM</b>				106,027,423		

### NOTES:

- In the values provided above, a dot (.) is used to separate decimals, and a comma (,) to separate thousands.
- For a detailed description of this Table and the assumptions considered to obtain the quantities and costs listed above, please refer to Volume 5 - Section 2
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# APPENDIX A - TAV CAPITAL COST

## SECTION 6

Section: **Campo de Marte (SP) - Viracopos Airport (SP)**

Chainage: **Km 412.244 - Km 487.594**

Length: **75.35 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
<b>A</b>	<b>CIVIL ENGINEERING WORKS</b>						
<b>A1</b>	<b>EARTHWORKS</b>						90
1	Site clearance	m <sup>2</sup>	3,178,438	0.3	921,747	0.01%	
2	Planting on banks	m <sup>2</sup>	1,670,954	1.1	1,754,501	0.03%	
3	Fill	m <sup>3</sup>	11,298,188	2.7	30,618,089	0.47%	
4	Cut	m <sup>3</sup>	21,526,101		176,274,849	2.69%	
4a	In soil	m <sup>3</sup>	21,526,101	8.2	176,274,849	2.69%	
4b	In rock	m <sup>3</sup>	-	22.6	-	0.00%	
5	Borrow	m <sup>3</sup>	-	6.7	-	0.00%	
6	Dump	m <sup>3</sup>	11,800,000	1.8	21,004,000	0.32%	
7	Mass haul	km.m <sup>3</sup>	273,000,000	0.4	109,200,000	1.66%	
	<b>TOTAL A1</b>				<b>339,773,187</b>	<b>5.18%</b>	
	<b>TOTAL A1 - PER KM</b>				<b>4,509,302</b>		
<b>A2</b>	<b>STRUCTURES</b>						90
1	Tunnelling		20,788		2,469,740,596	37.62%	
1a	Urban area	m	12,857		1,158,605,488	17.65%	
	Soft ground - Twin bore - 7.85m diameter - NATM - Rate covers two tracks	m	1,687	133,713	225,573,713	3.44%	
	Soft ground - Twin bore - 7.85m diameter - TBM - Rate covers two tracks	m	11,170	83,530	933,031,776	14.21%	
1b	Rural area	m	7,931		1,311,135,108	19.97%	
	Soft ground - Single bore - 16m diameter - NATM	m	7,733	166,355	1,286,424,375	19.59%	
	Soft ground - Single bore - 16m diameter - TBM	m	198	124,802	24,710,733	0.38%	
	Rock - Single bore - 16m diameter - NATM	m	-	159,325	-	0.00%	
	Rock - Single bore - 16m diameter - TBM	m	-	106,251	-	0.00%	
2	Bridges and viaducts	m <sup>2</sup>	228,228	4,745	1,082,896,214	16.49%	
3	Retaining walls	m <sup>2</sup>	49,187	881	43,323,418	0.66%	
	<b>TOTAL A2</b>				<b>3,595,960,228</b>	<b>54.77%</b>	
	<b>TOTAL A2 - PER KM</b>				<b>47,723,807</b>		
	<b>TOTAL A (A1 + A2)</b>				<b>3,935,733,415</b>	<b>59.95%</b>	
	<b>TOTAL A (A1 + A2) - PER KM</b>				<b>52,233,109</b>		
<b>B</b>	<b>PERMANENT WAY</b>						20
1	Plain line track (per single-track km)	km	151	1,556,637	234,583,355	3.57%	
2	Switches & crossings	unit	37	1,073,600	39,595,444	0.60%	
3	Drainage	km	38	631,309	24,153,492	0.37%	
4	Fences	m	76,519	49	3,741,004	0.06%	
	<b>TOTAL B</b>				<b>302,073,295</b>	<b>4.60%</b>	
	<b>TOTAL B - PER KM</b>				<b>4,008,967</b>		
<b>C</b>	<b>BUILDINGS AND EQUIPMENTS</b>						70
1	Passenger stations	global	1	234,950,000	234,950,000	3.58%	
1a	Barão de Mauá (RJ)	global	1	-	-	0.00%	
1b	Galeão Airport (RJ)	global	1	-	-	0.00%	
1c	Barra Mansa / Volta Redonda (RJ)	global	1	-	-	0.00%	
1d	São José dos Campos (SP)	global	1	-	-	0.00%	
1e	Guarulhos Airport (SP)	global	1	-	-	0.00%	
1f	Campo de Marte (SP)	global	1	234,950,000	234,950,000	3.58%	
1g	Viracopos Airport (SP)	global	1	-	-	0.00%	
1h	Campinas (SP)	global	1	-	-	0.00%	
2	Maintenance depots	global	1	104,415,169	104,415,169	1.59%	

# APPENDIX A - TAV CAPITAL COST

## SECTION 6

Section: **Campo de Marte (SP) - Viracopos Airport (SP)**

Chainage: **Km 412.244 - Km 487.594**

Length: **75.35 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
2a	Main and subsidiary depots - Civil works	global	1	10,037,534	10,037,534	0.15%	
2b	Main and subsidiary depots - Maintenance equipment	global	1	66,385,804	66,385,804	1.01%	
2c	Engineering depot and stabling sidings (per single-track km)	km	12	1,556,637	18,830,591	0.29%	
2d	Locomotives	unit	0	20,700,000	9,161,241	0.14%	
	<b>TOTAL C</b>				<b>339,365,169</b>	<b>5.17%</b>	
	TOTAL C - PER KM				4,503,887		
<b>D</b>	<b>SYSTEM ELEMENTS</b>						
<b>D1</b>	<b>SIGNALLING</b>						20
1	CTC (Centralised Traffic Control)	unit	0.3	1,894,860	559,075	0.01%	
2	Signalling	global	1		22,577,205	0.34%	
2a	Indoor - Control (Total)	set	1.6	179,278	290,926	0.00%	
2b	Outdoor - Signals, Markerboards, Markerboards Overrunlight	set	209	15,932	3,332,706	0.05%	
2c	Outdoor - Point machines (regular, high speed points)	set	37	266,458	9,748,606	0.15%	
2d	Outdoor - Track vacancy detection section	section	96	95,700	9,204,967	0.14%	
3	ATP (Automatic Train Protection) - ETCS L2	km	75	312,620	23,555,729	0.36%	
	<b>TOTAL D1</b>				<b>46,692,009</b>	<b>0.71%</b>	
	TOTAL D1 - PER KM				619,673		
<b>D2</b>	<b>TELECOMMUNICATIONS</b>						20
1	Transmission Facilities	global	1		510,603	0.01%	
1a	Transmission Facilities for each station	set	1.6	271,150	440,012		
1b	Transmission Facilities for central controlling - network management center (NMC)	set	0.15	478,500	70,590		
2	Cables incl. Internal Networks and Cable Components	global	1		11,374,440	0.17%	
2a	Line transmission cables (redundancy)	km	192	57,420	11,012,077		
2b	Station cables for each station	set	1.6	223,300	362,363		
3	Railway Operation Telecommunication System (ROTS)	set	1.6	239,250	388,246	0.006%	
4	Radio Systems (GSM-R)	global	1		3,583,631	0.05%	
4a	Radio Systems (GSM-R) track line transceiver station (BTS) for open line	pc	15	111,650	1,729,461		
4b	Radio Systems (GSM-R) track line transceiver station (BTS) for lines in tunnels	pc	6	303,050	1,698,872		
4c	Radio Systems (GSM-R) central unit for line (BSC)	pc	0.6	63,800	37,648		
4d	Radio Systems (GSM-R) central unit (MSC)	pc	0.3	398,750	117,650		
5	Fire / Unauthorised Access Detection Systems	global	1		1,390,628	0.02%	
5a	Fire /Unauthorised Access Detection Systems for each technical station building	pc	1.6	207,350	336,480		
5b	Fire Detection Systems for tunnels over 500meters length	global	0.15	7,145,600	1,054,148		
6	CCTV systems	global	1		278,596	0.004%	
6a	CCTV central unit for each station	pc	1.2	143,550	169,417		
6b	Cameras for each track side per platform (2 cameras per track)	pc	8	12,760	97,885		
6c	Cameras for each technical room per station	pc	1.2	9,570	11,294		
7	Passenger Information System - Chronometry System for platforms, OCC and depots	global	1		45,884	0.0007%	
7a	Main chronometry system for station, OCC and depots	pc	1.6	14,355	23,295		
7b	Controlled Clocks for platforms, OCC and depots	pc	7	3,190	22,589		
8	Data Recollection and Supervision System (SCADA)	global	1		341,186	0.005%	
8a	Data Recollection and Supervision System (SCADA) for each station and depot (controller unit)	pc	1.6	175,450	284,714		
8b	Data Recollection and Supervision System (SCADA) for OCC (central unit)	set	0.15	382,800	56,472		
9	Passenger Information System - Train Destination Display (TD)	global	1		854,612	0.01%	
9a	TD controller unit for each station	pc	1.2	111,650	131,768		
9b	TD display unit for each station	pc	8	73,370	562,839		
9c	TD display board for main station	pc	0.4	303,050	134,121		

# APPENDIX A - TAV CAPITAL COST

## SECTION 6

Section: **Campo de Marte (SP) - Viracopos Airport (SP)**

Chainage: **Km 412.244 - Km 487.594**

Length: **75.35 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9d	TD for OCC (central unit)	set	0.15	175,450	25,883		
10	Passenger Information System - Public Address System (Speaker System)	global	1		734,138	0.01%	
10a	Loudspeaker for each platform	pc	413	1,276	527,074		
10b	PA System (Speaker System): controller unit for station	set	1.2	159,500	188,241		
10c	PA System (Speaker System): central unit in OCC	set	0.15	127,600	18,824		
11	Ticketing System	global	1		3,941,288	0.06%	
11a	Ticket vending machine	pc	14	79,750	1,117,679		
11b	Gate arrays - Big stations	set	0.4	3,987,500	1,764,756		
11c	Gate arrays - Small stations	set	0.7	1,435,500	1,058,854		
12	Hot axle box detection unit (HABD)	pc	1.8	893,200	1,581,221	0.02%	
13	Overall Systems Components (PS, housing, cable, etc.)	global	1		21,341,405	0.33%	
13a	Power supply (8 Stations plus 3 Depots)	set	1.6	982,839	1,594,916		
13b	Power supply (Block post)	set	12	851,411	10,048,285		
13c	Housing (shelter)	set	12	95,700	1,129,444		
13d	Earthing field elements	set	369	2,233	824,541		
13e	Cable plant	km	143	54,230	7,744,220		
	<b>TOTAL D2</b>				<b>46,365,880</b>	<b>0.71%</b>	
	TOTAL D2 - PER KM				615,345		
<b>D3</b>	<b>ELECTRIFICATION</b>						35
1	Catenary	km	163	798,462	129,986,160	1.98%	
2	ATFS [Grid Substations (+ traction Feeder Station)]	global	1		55,445,423	0.84%	
2a	Building Construction	unit	1.8	26,100,000	46,204,519	0.70%	
2b	Electrical Installations	unit	1.8	5,220,000	9,240,904	0.14%	
3	ATS [Small Substations / Mid-Point Substations]	global	1		15,401,506	0.23%	
3a	Building Construction	unit	4	348,000	1,540,151	0.02%	
3b	Electrical Installations	unit	4	3,132,000	13,861,356	0.21%	
	<b>TOTAL D3</b>				<b>200,833,090</b>	<b>3.06%</b>	
	TOTAL D3 - PER KM				2,665,358		
	<b>TOTAL D (D1 + D2 + D3)</b>				<b>293,890,979</b>	<b>4.48%</b>	
	TOTAL D (D1 + D2 + D3) - PER KM				3,900,376		
<b>E</b>	<b>SOCIO-ENVIRONMENTAL WORKS<sup>3</sup></b>						N/A
1	Land acquisition (excludes constructions and improvements)	global	1	125,300,000	125,300,000	1.91%	
2	Indemnification for buildings	global	1		412,645,768	6.29%	
2a	Residential buildings	m2 AC <sup>4</sup>	187,086	1,068	199,873,328	3.04%	
2b	Industrial buildings	m2 AC <sup>4</sup>	61,944	1,875	116,145,000	1.77%	
2c	Infrastructure facilities	m2 AG <sup>4</sup>	345,098	280	96,627,440	1.47%	
2d	Institutional facilities	m2 AG <sup>4</sup>	-	560	-	0.00%	
3	Resettlement	No. of families	200	55,000	11,000,000	0.17%	
4	Reurbanisation, TAV crossings	m2 AU <sup>4</sup>	526,700	180	94,806,000	1.44%	
5	Noise protection	m2 AU <sup>4</sup>	526,700	150	79,005,000	1.20%	
6	Native Forest Reclaiming	global	1		24,731,400	0.38%	
6a	Due to removal of forest	ha	238	60,000	14,293,200	0.22%	
6b	Due to intervention in APP	ha	174	60,000	10,438,200	0.16%	
7	Relocation of roads affected by TAV	global	1		98,000,000	1.49%	
7a	Secondary roads	No. of roads	7	4,000,000	28,000,000	0.43%	
7b	Nearby roads	No. of roads	35	2,000,000	70,000,000	1.07%	
8	Environmental compensation	global	1	22,130,000	22,130,000	0.34%	

# APPENDIX A - TAV CAPITAL COST

## SECTION 6

Section: **Campo de Marte (SP) - Viracopos Airport (SP)**

Chainage: **Km 412.244 - Km 487.594**

Length: **75.35 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9	Environmental supervision of works	km	75	415,000	31,270,001	0.48%	
	<b>TOTAL E</b>				<b>898,888,169</b>	<b>13.69%</b>	
	<b>TOTAL E - PER KM</b>				11,929,600		
<b>F</b>	<b>ROLLING STOCK</b>						30
1	High-Speed service trains	train sets	6	65,232,937	404,183,819	6.16%	
	<b>TOTAL F</b>				<b>404,183,819</b>	<b>6.16%</b>	
	<b>TOTAL F - PER KM</b>				5,364,128		
<b>G</b>	<b>COMPLEMENTARY SERVICES</b>						N/A
1	Testing and certification	global	1	13,961,496	13,961,496	0.21%	
2	Geotechnical studies	km	75	5,000	376,747	0.006%	
3	Utility diversion	global	1	39,357,334	39,357,334	0.60%	
4	Temporary works during construction	global	1	99,001,357	99,001,357	1.51%	
5	Permanent road access to tunnels and bridges	global	1	9,900,136	9,900,136	0.15%	
6	Design	global	1	101,966,534	101,966,534	1.55%	
7	Project Management	global	1	126,455,408	126,455,408	1.93%	
	<b>TOTAL G</b>				<b>391,019,012</b>	<b>5.96%</b>	
	<b>TOTAL G - PER KM</b>				5,189,411		
<b>GT</b>	<b>GRAND TOTAL</b>				<b>6,565,153,860</b>	<b>100%</b>	
	<b>GRAND TOTAL - PER KM</b>				87,129,478		

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  - AU: Área Urbana Bruta afetada.

# APPENDIX A - TAV CAPITAL COST

## SECTION 7

Section: **Viracopos Airport (SP) - Campinas (SP)**

Chainage: **Km 487.594 - Km 510.760**

Length: **23.17 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
<b>A</b>	<b>CIVIL ENGINEERING WORKS</b>						
<b>A1</b>	<b>EARTHWORKS</b>						90
1	Site clearance	m <sup>2</sup>	3,949,471	0.3	1,145,347	0.07%	
2	Planting on banks	m <sup>2</sup>	3,364,330	1.1	3,532,547	0.23%	
3	Fill	m <sup>3</sup>	3,860,959	2.7	10,463,199	0.67%	
4	Cut	m <sup>3</sup>	5,311,264		43,493,351	2.79%	
4a	In soil	m <sup>3</sup>	5,311,264	8.2	43,493,351	2.79%	
4b	In rock	m <sup>3</sup>	-	22.6	-	0.00%	
5	Borrow	m <sup>3</sup>	-	6.7	-	0.00%	
6	Dump	m <sup>3</sup>	1,630,000	1.8	2,901,400	0.19%	
7	Mass haul	km.m <sup>3</sup>	22,900,000	0.4	9,160,000	0.59%	
	<b>TOTAL A1</b>				<b>70,695,843</b>	<b>4.54%</b>	
	<b>TOTAL A1 - PER KM</b>				<b>3,051,647</b>		
<b>A2</b>	<b>STRUCTURES</b>						90
1	Tunnelling		2,322		293,113,779	18.82%	
1a	Urban area	m	-		-	0.00%	
	Soft ground - Twin bore - 7.85m diameter - NATM - Rate covers two tracks	m	-	133,713	-	0.00%	
	Soft ground - Twin bore - 7.85m diameter - TBM - Rate covers two tracks	m	-	83,530	-	0.00%	
1b	Rural area	m	2,322		293,113,779	18.82%	
	Soft ground - Single bore - 16m diameter - NATM	m	80	166,355	13,308,412	0.85%	
	Soft ground - Single bore - 16m diameter - TBM	m	2,242	124,802	279,805,367	17.96%	
	Rock - Single bore - 16m diameter - NATM	m	-	159,325	-	0.00%	
	Rock - Single bore - 16m diameter - TBM	m	-	106,251	-	0.00%	
2	Bridges and viaducts	m <sup>2</sup>	20,422	4,745	96,896,408	6.22%	
3	Retaining walls	m <sup>2</sup>	12,414	881	10,934,127	0.70%	
	<b>TOTAL A2</b>				<b>400,944,313</b>	<b>25.74%</b>	
	<b>TOTAL A2 - PER KM</b>				<b>17,307,108</b>		
	<b>TOTAL A (A1 + A2)</b>				<b>471,640,156</b>	<b>30.28%</b>	
	<b>TOTAL A (A1 + A2) - PER KM</b>				<b>20,358,755</b>		
<b>B</b>	<b>PERMANENT WAY</b>						20
1	Plain line track (per single-track km)	km	46	1,556,637	72,123,527	4.63%	
2	Switches & crossings	unit	11	1,073,600	12,173,767	0.78%	
3	Drainage	km	19	631,309	12,144,141	0.78%	
4	Fences	m	38,473	49	1,880,940	0.12%	
	<b>TOTAL B</b>				<b>98,322,375</b>	<b>6.31%</b>	
	<b>TOTAL B - PER KM</b>				<b>4,244,170</b>		
<b>C</b>	<b>BUILDINGS AND EQUIPMENTS</b>						70
1	Passenger stations	global	1	141,818,000	141,818,000	9.10%	
1a	Barão de Mauá (RJ)	global	1	-	-	0.00%	
1b	Galeão Airport (RJ)	global	1	-	-	0.00%	
1c	Barra Mansa / Volta Redonda (RJ)	global	1	-	-	0.00%	
1d	São José dos Campos (SP)	global	1	-	-	0.00%	
1e	Guarulhos Airport (SP)	global	1	-	-	0.00%	
1f	Campo de Marte (SP)	global	1	-	-	0.00%	
1g	Viracopos Airport (SP)	global	1	97,716,667	97,716,667	6.27%	
1h	Campinas (SP)	global	1	44,101,333	44,101,333	2.83%	
2	Maintenance depots	global	1	32,102,833	32,102,833	2.06%	

# APPENDIX A - TAV CAPITAL COST

## SECTION 7

Section: **Viracopos Airport (SP) - Campinas (SP)**

Chainage: **Km 487.594 - Km 510.760**

Length: **23.17 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
2a	Main and subsidiary depots - Civil works	global	1	3,086,077	3,086,077	0.20%	
2b	Main and subsidiary depots - Maintenance equipment	global	1	20,410,563	20,410,563	1.31%	
2c	Engineering depot and stabling sidings (per single-track km)	km	4	1,556,637	5,789,535	0.37%	
2d	Locomotives	unit	0	20,700,000	2,816,658	0.18%	
	<b>TOTAL C</b>				<b>173,920,833</b>	<b>11.16%</b>	
	TOTAL C - PER KM				7,507,443		
<b>D</b>	<b>SYSTEM ELEMENTS</b>						
<b>D1</b>	<b>SIGNALLING</b>						20
1	CTC (Centralised Traffic Control)	unit	0.1	1,894,860	171,890	0.01%	
2	Signalling	global	1		6,941,446	0.45%	
2a	Indoor - Control (Total)	set	0.5	179,278	89,446	0.01%	
2b	Outdoor - Signals, Markerboards, Markerboards Overrunlight	set	64	15,932	1,024,653	0.07%	
2c	Outdoor - Point machines (regular, high speed points)	set	11	266,458	2,997,245	0.19%	
2d	Outdoor - Track vacancy detection section	section	30	95,700	2,830,101	0.18%	
3	ATP (Automatic Train Protection) - ETCS L2	km	23	312,620	7,242,297	0.46%	
	<b>TOTAL D1</b>				<b>14,355,632</b>	<b>0.92%</b>	
	TOTAL D1 - PER KM				619,673		
<b>D2</b>	<b>TELECOMMUNICATIONS</b>						20
1	Transmission Facilities	global	1		156,987	0.01%	
1a	Transmission Facilities for each station	set	0.5	271,150	135,283		
1b	Transmission Facilities for central controlling - network management center (NMC)	set	0.05	478,500	21,703		
2	Cables incl. Internal Networks and Cable Components	global	1		3,497,114	0.22%	
2a	Line transmission cables (redundancy)	km	59	57,420	3,385,704		
2b	Station cables for each station	set	0.5	223,300	111,410		
3	Railway Operation Telecommunication System (ROTS)	set	0.5	239,250	119,368	0.008%	
4	Radio Systems (GSM-R)	global	1		1,101,801	0.07%	
4a	Radio Systems (GSM-R) track line transceiver station (BTS) for open line	pc	5	111,650	531,729		
4b	Radio Systems (GSM-R) track line transceiver station (BTS) for lines in tunnels	pc	2	303,050	522,324		
4c	Radio Systems (GSM-R) central unit for line (BSC)	pc	0.2	63,800	11,575		
4d	Radio Systems (GSM-R) central unit (MSC)	pc	0.1	398,750	36,172		
5	Fire / Unauthorised Access Detection Systems	global	1		427,554	0.03%	
5a	Fire /Unauthorised Access Detection Systems for each technical station building	pc	0.5	207,350	103,452		
5b	Fire Detection Systems for tunnels over 500meters length	global	0.05	7,145,600	324,102		
6	CCTV systems	global	1		85,655	0.005%	
6a	CCTV central unit for each station	pc	0.4	143,550	52,088		
6b	Cameras for each track side per platform (2 cameras per track)	pc	2	12,760	30,095		
6c	Cameras for each technical room per station	pc	0.4	9,570	3,473		
7	Passenger Information System - Chronometry System for platforms, OCC and depots	global	1		14,107	0.0009%	
7a	Main chronometry system for station, OCC and depots	pc	0.5	14,355	7,162		
7b	Controlled Clocks for platforms, OCC and depots	pc	2	3,190	6,945		
8	Data Recollection and Supervision System (SCADA)	global	1		104,899	0.007%	
8a	Data Recollection and Supervision System (SCADA) for each station and depot (controller unit)	pc	0.5	175,450	87,536		
8b	Data Recollection and Supervision System (SCADA) for OCC (central unit)	set	0.05	382,800	17,363		
9	Passenger Information System - Train Destination Display (TD)	global	1		262,754	0.02%	
9a	TD controller unit for each station	pc	0.4	111,650	40,513		
9b	TD display unit for each station	pc	2	73,370	173,047		
9c	TD display board for main station	pc	0.1	303,050	41,236		

# APPENDIX A - TAV CAPITAL COST

## SECTION 7

Section: **Viracopos Airport (SP) - Campinas (SP)**

Chainage: **Km 487.594 - Km 510.760**

Length: **23.17 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9d	TD for OCC (central unit)	set	0.05	175,450	7,958		
10	Passenger Information System - Public Address System (Speaker System)	global	1		225,714	0.01%	
10a	Loudspeaker for each platform	pc	127	1,276	162,051		
10b	PA System (Speaker System): controller unit for station	set	0.4	159,500	57,875		
10c	PA System (Speaker System): central unit in OCC	set	0.05	127,600	5,788		
11	Ticketing System	global	1		1,211,764	0.08%	
11a	Ticket vending machine	pc	4	79,750	343,635		
11b	Gate arrays - Big stations	set	0.1	3,987,500	542,591		
11c	Gate arrays - Small stations	set	0.2	1,435,500	325,548		
12	Hot axle box detection unit (HABD)	pc	0.5	893,200	486,152	0.03%	
13	Overall Systems Components (PS, housing, cable, etc.)	global	1		6,561,495	0.42%	
13a	Power supply (8 Stations plus 3 Depots)	set	0.5	982,839	490,363		
13b	Power supply (Block post)	set	4	851,411	3,089,383		
13c	Housing (shelter)	set	4	95,700	347,252		
13d	Earthing field elements	set	114	2,233	253,508		
13e	Cable plant	km	44	54,230	2,380,989		
	<b>TOTAL D2</b>				<b>14,255,363</b>	<b>0.92%</b>	
	TOTAL D2 - PER KM				615,345		
<b>D3</b>	<b>ELECTRIFICATION</b>						35
1	Catenary	km	50	798,462	39,964,730	2.57%	
2	ATFS [Grid Substations (+ traction Feeder Station)]	global	1		17,046,902	1.09%	
2a	Building Construction	unit	0.5	26,100,000	14,205,752	0.91%	
2b	Electrical Installations	unit	0.5	5,220,000	2,841,150	0.18%	
3	ATS [Small Substations / Mid-Point Substations]	global	1		4,735,251	0.30%	
3a	Building Construction	unit	1	348,000	473,525	0.03%	
3b	Electrical Installations	unit	1	3,132,000	4,261,726	0.27%	
	<b>TOTAL D3</b>				<b>61,746,882</b>	<b>3.96%</b>	
	TOTAL D3 - PER KM				2,665,358		
	<b>TOTAL D (D1 + D2 + D3)</b>				<b>90,357,877</b>	<b>5.80%</b>	
	TOTAL D (D1 + D2 + D3) - PER KM				3,900,376		
<b>E</b>	<b>SOCIO-ENVIRONMENTAL WORKS<sup>3</sup></b>						N/A
1	Land acquisition (excludes constructions and improvements)	global	1	139,160,000	139,160,000	8.93%	
2	Indemnification for buildings	global	1		307,799,881	19.76%	
2a	Residential buildings	m2 AC <sup>4</sup>	116,836	1,068	124,821,741	8.01%	
2b	Industrial buildings	m2 AC <sup>4</sup>	16,196	1,875	30,367,500	1.95%	
2c	Infrastructure facilities	m2 AG <sup>4</sup>	539,272	280	150,996,160	9.69%	
2d	Institutional facilities	m2 AG <sup>4</sup>	2,883	560	1,614,480	0.10%	
3	Resettlement	No. of families	11	55,000	605,000	0.04%	
4	Reurbanisation, TAV crossings	m2 AU <sup>4</sup>	125,100	180	22,518,000	1.45%	
5	Noise protection	m2 AU <sup>4</sup>	125,100	150	18,765,000	1.20%	
6	Native Forest Reclaiming	global	1		2,474,400	0.16%	
6a	Due to removal of forest	ha	1	60,000	48,000	0.00%	
6b	Due to intervention in APP	ha	40	60,000	2,426,400	0.16%	
7	Relocation of roads affected by TAV	global	1		16,000,000	1.03%	
7a	Secondary roads	No. of roads	2	4,000,000	8,000,000	0.51%	
7b	Nearby roads	No. of roads	4	2,000,000	8,000,000	0.51%	
8	Environmental compensation	global	1	6,800,000	6,800,000	0.44%	

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## SECTION 7

Section: **Viracopos Airport (SP) - Campinas (SP)**

Chainage: **Km 487.594 - Km 510.760**

Length: **23.17 km**

No.	Item	Quantity		Cost			Asset Life (Years)
		Unit	Value (Year 2014)	Unit Cost (R\$)	Total Cost (R\$)	% of Grand Total	
9	Environmental supervision of works	km	23	415,000	9,614,078	0.62%	
	<b>TOTAL E</b>				<b>523,736,359</b>	<b>33.62%</b>	
	TOTAL E - PER KM				22,607,532		
<b>F</b>	<b>ROLLING STOCK</b>						30
1	High-Speed service trains	train sets	2	65,232,937	124,267,822	7.98%	
	<b>TOTAL F</b>				<b>124,267,822</b>	<b>7.98%</b>	
	TOTAL F - PER KM				5,364,128		
<b>G</b>	<b>COMPLEMENTARY SERVICES</b>						N/A
1	Testing and certification	global	1	4,292,514	4,292,514	0.28%	
2	Geotechnical studies	km	23	5,000	115,832	0.007%	
3	Utility diversion	global	1	4,716,402	4,716,402	0.30%	
4	Temporary works during construction	global	1	17,060,125	17,060,125	1.10%	
5	Permanent road access to tunnels and bridges	global	1	1,706,012	1,706,012	0.11%	
6	Design	global	1	17,529,776	17,529,776	1.13%	
7	Project Management	global	1	30,116,876	30,116,876	1.93%	
	<b>TOTAL G</b>				<b>75,537,537</b>	<b>4.85%</b>	
	TOTAL G - PER KM				3,260,643		
<b>GT</b>	<b>GRAND TOTAL</b>				<b>1,557,782,961</b>	<b>100%</b>	
	GRAND TOTAL - PER KM				67,243,047		

### NOTES:

- In the values provided above, a dot (.) is used to separate decimals, and a comma (,) to separate thousands.
- For a detailed description of this Table and the assumptions considered to obtain the quantities and costs listed above, please refer to Volume 5 - Section 2
- Data produced and supplied by Prime Engenharia (Items 1 to 10), as the Environmental Studies are outside the scope of works of the Consortium Halcrow - Sinergia.
- The following definitions have been provided by Prime Engenharia:
  - AC: Área Construída afetada. O custo unitário é a média resultante para todo o TAV.
  - AG: Área Geográfica Bruta afetada.
  - AU: Área Urbana Bruta afetada.