

Studies for the Technical, Economic-Financial,
Environmental, Vulnerability & Social Feasibility
for the Construction, Equipment, Test &
Commissioning, Operation and Maintenance
under Works Concession with Public Service of
the Passenger Rapid Train in the Great
Metropolitan Area

Fourth Report: Economic and Financial Survey

Document 1: Economic and financial analysis

Rev_06
April 2020

Document management

Rev.	Date	Author	Revisor	Details
0.0	December 2019	José Antonio Correa José Angel Calvo Caneiro Josu Lezcano Castillo	José Angel Calvo Caneiro Juan Pablo Romero Junquera	Forth Report Writing
1.0	December 2019	José Antonio Correa José Angel Calvo Caneiro Josu Lezcano Castillo	José Angel Calvo Caneiro Juan Pablo Romero Junquera	Forth Report Revision 1
2.0	February 2020	José Antonio Correa José Angel Calvo Caneiro Josu Lezcano Castillo	José Angel Calvo Caneiro Juan Pablo Romero Junquera	Forth Report Revision 2
3.0	February 2020	José Antonio Correa José Angel Calvo Caneiro Josu Lezcano Castillo	José Angel Calvo Caneiro Juan Pablo Romero Junquera	Forth Report Revision 3
4.0	February 2020	José Antonio Correa José Angel Calvo Caneiro Josu Lezcano Castillo	José Angel Calvo Caneiro Juan Pablo Romero Junquera	Forth Report Revision 4
5.0	March 2020	José Antonio Correa José Angel Calvo Caneiro Josu Lezcano Castillo	José Angel Calvo Caneiro Juan Pablo Romero Junquera	Forth Report Revision 5
6.0	April 2020	José Antonio Correa José Angel Calvo Caneiro Josu Lezcano Castillo	José Angel Calvo Caneiro Juan Pablo Romero Junquera	Forth Report Revision 6

Table of contents

1	INTRODUCTION	1
1.1	PROJECT DESCRIPTION.....	3
2	CAPEX-OPEX-REINVESTMENT	7
2.1	COST ANALYSIS	7
2.1.1	<i>Unit cost analysis</i>	<i>7</i>
2.1.2	<i>Element cost analysis.....</i>	<i>10</i>
2.2	CAPEX.....	16
2.2.1	<i>Infrastructures and systems.....</i>	<i>18</i>
2.2.2	<i>Indirect costs.....</i>	<i>36</i>
2.2.3	<i>Rolling stock.....</i>	<i>37</i>
2.2.4	<i>Design and implementation.....</i>	<i>38</i>
2.2.5	<i>SEVRI.....</i>	<i>39</i>
2.2.6	<i>Land</i>	<i>40</i>
2.2.7	<i>Environmental and social measures</i>	<i>41</i>
2.2.8	<i>Alternative with uneven intersections</i>	<i>42</i>
2.3	OPEX.....	52
2.3.1	<i>Common costs</i>	<i>54</i>
2.3.2	<i>Costs per line.....</i>	<i>54</i>
2.4	REINVESTMENT.....	57
3	FINANCIAL EVALUATION	61
3.1	GLOSSARY	61
3.2	FINANCIAL EVALUATION PROCESS. APPROACH	62
3.3	ASSUMPTIONS AND STARTING HYPOTHESIS.....	63
3.3.1	<i>Macroeconomic assumptions</i>	<i>63</i>
3.3.2	<i>Tax assumptions</i>	<i>63</i>
3.3.3	<i>Operational Structure</i>	<i>64</i>
3.3.4	<i>Costs</i>	<i>66</i>
3.3.5	<i>Financing</i>	<i>71</i>
3.3.6	<i>Depreciation</i>	<i>72</i>
3.4	FINANCIAL ANALYSIS: THE PROJECT GENERATES INCOME.....	73
3.4.1	<i>Minimum Attractive Return Rate (TREMA).....</i>	<i>73</i>
3.4.2	<i>Travel income</i>	<i>77</i>

3.4.3	<i>Income in PPDi</i>	81
3.4.4	<i>Revenues in PPDD</i>	91
3.4.5	<i>Other income</i>	103
3.4.6	<i>Financial flow (CAPEX, OPEX and income)</i>	106
3.4.7	<i>Calculation of the indicators</i>	125
3.4.8	<i>Case with lower CAPEX because fewer uneven crossings are involved</i>	126
3.5	SENSITIVITY ANALYSIS.....	127
3.5.1	<i>Taxes</i>	128
3.5.2	<i>OPEX</i>	129
3.5.3	<i>Investment</i>	130
3.5.4	<i>Demand</i>	134
3.5.5	<i>Supplementary income</i>	139
3.5.6	<i>Distribution of the government contribution</i>	142
3.5.7	<i>Comparison of alternatives</i>	144
3.5.8	<i>Optimal time to make the investment</i>	148
3.6	CONCLUSIONS	149
ANNEX I: UNIT PRICES		151
ANNEX II: CAPEX BY LINES		173
1	CAPEX OF LINE 1	175
1.1	INFRASTRUCTURE AND SYSTEMS	175
1.1.1	<i>Preliminary works</i>	176
1.1.2	<i>Structures</i>	177
1.1.3	<i>Platform and track superstructure</i>	178
1.1.4	<i>Stations</i>	178
1.1.5	<i>Depots, workshops and administrative buildings</i>	179
1.1.6	<i>Drainage</i>	180
1.1.7	<i>Electrification</i>	180
1.1.8	<i>Signaling systems</i>	181
1.1.9	<i>Systems and communications</i>	181
1.1.10	<i>Urban integration</i>	183
1.1.11	<i>Restoration of historical heritage</i>	183
1.1.12	<i>Affected services and replacements</i>	183
1.1.13	<i>Quality control</i>	183
1.1.14	<i>Waste management</i>	183
1.1.15	<i>Health and safety</i>	184

1.2	INDIRECT COSTS	184
1.3	ROLLING STOCK	184
1.4	DESIGN AND IMPLEMENTATION	184
1.5	SEVRI	185
1.6	LAND.....	185
1.7	ENVIRONMENTAL AND SOCIAL MEASURES	185
2	CAPEX OF LINE 2	187
2.1	INFRASTRUCTURE AND SYSTEMS	187
2.1.1	<i>Preliminary works</i>	<i>188</i>
2.1.2	<i>Structures.....</i>	<i>189</i>
2.1.3	<i>Platform and track superstructure</i>	<i>190</i>
2.1.4	<i>Stations.....</i>	<i>190</i>
2.1.5	<i>Depots, workshops and administrative buildings</i>	<i>191</i>
2.1.6	<i>Drainage</i>	<i>192</i>
2.1.7	<i>Electrification.....</i>	<i>192</i>
2.1.8	<i>Signaling systems.....</i>	<i>193</i>
2.1.9	<i>Systems and communications.....</i>	<i>194</i>
2.1.10	<i>Urban integration.....</i>	<i>195</i>
2.1.11	<i>Restoration of historical heritage.....</i>	<i>195</i>
2.1.12	<i>Affected services and replacements</i>	<i>196</i>
2.1.13	<i>Quality control.....</i>	<i>196</i>
2.1.14	<i>Waste management.....</i>	<i>196</i>
2.1.15	<i>Health and safety</i>	<i>196</i>
2.2	INDIRECT COSTS	196
2.3	ROLLING STOCK	197
2.4	DESIGN AND IMPLEMENTATION	197
2.5	SEVRI	197
2.6	LAND.....	197
2.7	ENVIRONMENTAL AND SOCIAL MEASURES	198
3	CAPEX OF LINE 3	199
3.1	INFRASTRUCTURE AND SYSTEMS	199
3.1.1	<i>Preliminary works</i>	<i>200</i>
3.1.2	<i>Structures.....</i>	<i>201</i>
3.1.3	<i>Platform and track superstructure</i>	<i>202</i>

3.1.4	Stations.....	202
3.1.5	Depots, workshops and administrative buildings.....	203
3.1.6	Drainage.....	204
3.1.7	Electrification.....	204
3.1.8	Signaling systems.....	205
3.1.9	Systems and communications.....	205
3.1.10	Urban integration.....	207
3.1.11	Restoration of historical heritage.....	207
3.1.12	Affected services and replacements.....	207
3.1.13	Quality control.....	207
3.1.14	Waste management.....	207
3.1.15	Health and safety.....	208
3.2	INDIRECT COSTS.....	208
3.3	ROLLING STOCK.....	208
3.4	DESIGN AND IMPLEMENTATION.....	208
3.5	SEVRI.....	209
3.6	LAND.....	209
3.7	ENVIRONMENTAL AND SOCIAL MEASURES.....	209
4	CAPEX OF LINE 4.....	211
4.1	INFRASTRUCTURE AND SYSTEMS.....	211
4.1.1	Preliminary works.....	212
4.1.2	Structures.....	213
4.1.3	Platform and track superstructure.....	214
4.1.4	Stations.....	214
4.1.5	Depots, workshops and administrative buildings.....	215
4.1.6	Drainage.....	216
4.1.7	Electrification.....	216
4.1.8	Signaling systems.....	217
4.1.9	Systems and communications.....	217
4.1.10	Urban integration.....	219
4.1.11	Restoration of historical heritage.....	219
4.1.12	Affected services and replacements.....	219
4.1.13	Quality control.....	219
4.1.14	Waste management.....	219
4.1.15	Health and safety.....	220

4.2	INDIRECT COSTS	220
4.3	ROLLING STOCK	220
4.4	DESIGN AND IMPLEMENTATION	220
4.5	SEVRI	221
4.6	LAND.....	221
4.7	ENVIRONMENTAL AND SOCIAL MEASURES	221
5	CAPEX OF LINE 5	223
5.1	INFRASTRUCTURE AND SYSTEMS	223
5.1.1	<i>Preliminary works</i>	<i>224</i>
5.1.2	<i>Structures.....</i>	<i>225</i>
5.1.3	<i>Platform and track superstructure</i>	<i>226</i>
5.1.4	<i>Stations.....</i>	<i>226</i>
5.1.5	<i>Depots, workshops and administrative buildings</i>	<i>227</i>
5.1.6	<i>Drainage</i>	<i>227</i>
5.1.7	<i>Electrification.....</i>	<i>227</i>
5.1.8	<i>Signaling systems.....</i>	<i>228</i>
5.1.9	<i>Systems and communications.....</i>	<i>229</i>
5.1.10	<i>Urban integration.....</i>	<i>230</i>
5.1.11	<i>Restoration of historical heritage.....</i>	<i>230</i>
5.1.12	<i>Affected services and replacements</i>	<i>231</i>
5.1.13	<i>Quality control.....</i>	<i>231</i>
5.1.14	<i>Waste management.....</i>	<i>231</i>
5.1.15	<i>Health and safety</i>	<i>231</i>
5.2	INDIRECT COSTS	231
5.3	ROLLING STOCK	232
5.4	DESIGN AND IMPLEMENTATION	232
5.5	SEVRI	232
5.6	LAND.....	232
5.7	ENVIRONMENTAL AND SOCIAL MEASURES	233
	ANNEX III: ANALYSIS OF INTERSECTIONS TO BE UNEVEN	235
1	ANALYSIS OF INTERSECTIONS TO BE UNEVEN.....	237
	ANNEX IV: OPEX CALCULATION	249
1	COMMON COSTS.....	251
1.1	DIRECTORATE GENERAL	251

1.2	OPERATION MANAGEMENT	252
1.3	OPERATING CONSUMABLES	252
2	COSTS LINE 1	253
2.1	GENERAL OPERATION.....	253
2.2	OPERATING CONSUMABLES	253
2.3	INFRASTRUCTURE MAINTENANCE MANAGEMENT.....	254
2.4	INFRASTRUCTURE CONSUMABLES	255
2.5	ROLLING STOCK MANAGEMENT.....	256
2.6	ROLLING STOCK CONSUMABLES.....	257
3	COSTS LINE 2	259
3.1	GENERAL OPERATION.....	259
3.2	OPERATING CONSUMABLES	259
3.3	INFRASTRUCTURE MAINTENANCE MANAGEMENT.....	260
3.4	INFRASTRUCTURE CONSUMABLES	261
3.5	ROLLING STOCK MANAGEMENT.....	262
3.6	ROLLING STOCK CONSUMABLES.....	263
4	COSTS LINE 3	265
4.1	GENERAL OPERATION.....	265
4.2	OPERATING CONSUMABLES	265
4.3	INFRASTRUCTURE MAINTENANCE MANAGEMENT.....	266
4.4	INFRASTRUCTURE CONSUMABLES	267
4.5	ROLLING STOCK MANAGEMENT.....	268
4.6	ROLLING STOCK CONSUMABLES.....	269
5	COSTS LINE 2+4.....	271
5.1	GENERAL OPERATION.....	271
5.2	OPERATING CONSUMABLES	271
5.3	INFRASTRUCTURE MAINTENANCE MANAGEMENT.....	272
5.4	INFRASTRUCTURE CONSUMABLES	273
5.5	ROLLING STOCK MANAGEMENT.....	274
5.6	ROLLING STOCK CONSUMABLES.....	275
6	COSTS LINE 3+5.....	277
6.1	GENERAL OPERATION.....	277
6.2	OPERATING CONSUMABLES	277

6.3	INFRASTRUCTURE MAINTENANCE MANAGEMENT.....	278
6.4	INFRASTRUCTURE CONSUMABLES	279
6.5	ROLLING STOCK MANAGEMENT.....	280
6.6	ROLLING STOCK CONSUMABLES.....	281
ANNEX V: DETAIL OF FINANCIAL CALCULATIONS		283
1	DETAIL OF FINANCIAL COST CALCULATIONS (IN MILLIONS OF DOLLARS).....	285
2	DETAIL CALCULATIONS DISTRIBUTION OF RESOURCES FOR INVESTMENT (IN DOLLARS)	287
3	DETAIL CALCULATIONS DISTRIBUTION OF RESOURCES FOR INVESTMENT (IN DOLLARS)	293
ANNEX VI: URBAN INTEGRATION		299
1	INTRODUCTION: COMMERCIAL POTENTIAL OF AVAILABLE SPACES.....	301
2	AVAILABILITY OF LAND AND MARKETABLE SPACES	303
2.1	SQUARE METERS AVAILABLE FOR TERTIARY USES IN THE STATIONS	303
2.1.1	<i>Atlántico Station.....</i>	<i>303</i>
2.1.2	<i>Pacífico Station</i>	<i>304</i>
2.1.3	<i>Belén Station.....</i>	<i>304</i>
2.1.4	<i>Heredia Station</i>	<i>305</i>
2.1.5	<i>Cartago Station.....</i>	<i>305</i>
2.2	LAND AVAILABLE FOR REAL ESTATE DEVELOPMENT	306
2.2.1	<i>Land available in Atlántico</i>	<i>306</i>
2.2.2	<i>Land available in Pacífico</i>	<i>307</i>
2.2.3	<i>Land available at Las Cañas.....</i>	<i>308</i>
2.2.4	<i>Land available in Cartago</i>	<i>309</i>
3	ESTIMATION OF POSSIBLE USES	311
4	POSSIBLE ADDITIONAL SOURCES OF INCOME.....	323
4.1	VALUE CAPTURE INSTRUMENTS.....	323
4.1.1	<i>Contribution for improvements or valorization</i>	<i>323</i>
4.1.2	<i>Exchanges and Sale of Construction Rights</i>	<i>324</i>
4.1.3	<i>Capital gains</i>	<i>324</i>
4.1.4	<i>Land Adjustment Scheme</i>	<i>325</i>
4.1.5	<i>Tax Increment Finance (TIF).....</i>	<i>325</i>
4.2	CONSIDERATIONS ON EXISTING STUDIES "CAPITAL GAIN CAPTURE STUDY GAM SAN JOSÉ ELECTRIC TRAIN CAPITAL GAIN CAPTURE POTENTIAL (SEPTEMBER 2019)"	326
4.3	CONCLUSIONS APPLICABILITY OF VALUE CAPTURE INSTRUMENTS IN COSTA RICA.....	328

5	PILOT PROPOSAL: PACÍFICO STATION	331
5.1	CHARACTERISTICS OF THE AREA OF STUDY	331
5.2	LAND USE REGULATION	332
5.3	OPTION 1: CONTINUING DEVELOPMENT SCENARIO: RAIL USE	335
5.4	OPTION 2: SPACE RELEASE SCENARIO, GARAGE CONVERSION	337
5.5	ECONOMIC ESTIMATION OF THE SCENARIOS	339
5.6	GENERAL ASSESSMENT OF THE MAIN IMPACTS	341
5.6.1	<i>Value generation</i>	341
5.6.2	<i>Employment generation</i>	343
5.7	URBAN OPERATION MODEL	345
6	CONCLUSIONS	351

Table of figures

Figure 1. GAM Electric Train.....	3
Figure 2. GAM Electric Train Stations.	4
Figure 3. Concession models and scope of financial analysis for the GAM Electric Train.	66
Figure 4. Conceptual payment behavior according to concession model, figures not at scale.	66
Figure 5. Sensitivity of the IRR to changes in demand according to the concession scheme (without considering guarantees of income).....	76
Figure 6. Travel and base income (thousands USD nominal) - 600 colones; 800 colones at peak time.	78
Figure 7. Conservative travel and income (thousands USD nominal) - 600 colones; 800 colones in rush hour.....	80
Figure 8. Travel and optimistic income (thousands USD nominal) - 600 colones; 800 colones at peak time.	81
Figure 9. PPD _i (constant thousands of dollars) - base demand.....	83
Figure 10. Net payments State (thousands of actual dollars) - base demand.....	84
Figure 11. PPD _i (thousands of nominal dollars) - base demand.....	84
Figure 12. PPD _i (constant thousands of dollars) - conservative demand.....	86
<i>Figure 13. Net payment from the State (thousands of constant dollars) - conservative demand.....</i>	<i>87</i>
Figure 14. PPD _i (thousands of nominal dollars) - conservative demand.....	87
Figure 15. PPD _i (constant thousands of dollars) - optimistic demand.....	89
<i>Figure 16. Net payment from the State (thousands of constant dollars) - optimistic demand</i>	<i>90</i>
Figure 17. PPD _i (thousands of nominal dollars) - optimistic demand.....	90
Figure 18. PPDD including travel revenue (millions of constant dollars) - base demand. .	94
Figure 19. Net payment from the State (millions of constant dollars) - base demand.	95

Figure 20. PPDD including travel income (millions of nominal dollars) - base demand.....	96
Figure 21. PPDD including travel revenue (millions of constant dollars) - conservative demand.....	97
<i>Figure 22. Net payment from the State (millions of constant dollars) - conservative demand.</i>	98
Figure 23. PPDD including travel income (millions of nominal dollars) - conservative demand.....	99
Figure 24. PPDD including travel revenue (millions of constant dollars) - optimistic demand.	100
<i>Figure 25. Net payment from the State (millions of constant dollars) - optimistic demand</i>	101
Figure 26. PPDD including travel revenue (millions of nominal dollars) - optimistic demand.	102
Figure 27. Comparison of the models proposed.....	150
Figure 28. Availability of land and marketable spaces.....	303
Figure 29. Atlántico Station.....	304
Figure 30. Pacífico Station Heritage Buildings.	304
Figure 31. Belén Station.	304
Figure 32. Heredia Station.	305
Figure 33. Cartago Station.....	305
Figure 34. Land available for the Atlántico Station.	306
Figure 35. Land available at Pacífico Station.	307
Figure 36. Land available for Las Cañas Station.....	308
Figure 37. Land available for Cartago Station	309
Figure 38. Annual income from capture of capital gains from the study conducted by HR&A.	327
Figure 39. Current status of the land at the Pacific Station.....	332

Figure 40. Pacífico Station Land Development Scenario 01.....	336
Figure 41. Image Development Scenario 01.....	336
Figure 42. Pacífico Station Land Development Scenario 02.....	338
Figure 43. Image Development Scenario 02.....	338
Figure 44. Methodology to carry out the financial assessment of the projects.....	339
Figure 45. Urban operation model Development Scenario 01.....	346
Figure 46. Urban operation model Development Scenario 02.....	347
Figure 47. Urban operation model Development Scenario 02.....	349

Index of tables

Table 1. Periods of variation in demand.....	4
Table 2. Operating frequencies in the lines as a function of time and day.	5
Table 3. Main characteristics of the lines.	5
Table 4. Unit costs of concrete.....	8
Table 5. Unit costs of reinforcing steel.	8
Table 6. Unit costs of rails.....	9
Table 7. Unit costs of sleepers.....	9
Table 8. Unit cost of fastenings.....	10
Table 9. Costs of structure elements.....	11
Table 10. Costs of platform elements and track superstructure.....	12
Table 11. Station element costs.....	12
Table 12. Costs of depot and workshop elements.....	13
Table 13. Costs of signaling elements.	14
Table 14. Costs of ticketing elements.	14
Table 15. CAPEX of the GAM Electric Train.	17
Table 16. Distribution of the CAPEX of the Electric Train per line.	17
Table 17. CAPEX: Infrastructures and systems.	18
Table 18. Distribution of the CAPEX of infrastructure and systems per line.	18
Table 19. CAPEX: Preliminary works.....	19
Table 20. Distribution of the CAPEX of preliminary works per line.	20
Table 21. CAPEX: Structures.....	21
Table 22. Distribution of the CAPEX of structures per line.	21
Table 23. CAPEX: Platform and track superstructure.....	22
Table 24. Distribution of the CAPEX of platform and track superstructure per line.	23

<i>Table 25. CAPEX: Stations.....</i>	<i>24</i>
<i>Table 26. Distribution of the CAPEX of stations per line.....</i>	<i>25</i>
<i>Table 27. CAPEX: Depots, workshops and administrative buildings.</i>	<i>26</i>
<i>Table 28. Distribution of the CAPEX of depots, workshops and administrative buildings per line.....</i>	<i>26</i>
<i>Table 29. CAPEX: Drainage.</i>	<i>27</i>
<i>Table 30. Distribution of the CAPEX of drainage per line.</i>	<i>27</i>
<i>Table 31. CAPEX: Electrification.....</i>	<i>28</i>
<i>Table 32. Distribution of the CAPEX of electrification per line.</i>	<i>28</i>
<i>Table 33. CAPEX: Signaling systems.</i>	<i>29</i>
<i>Table 34. Distribution of the CAPEX of signaling per line.....</i>	<i>29</i>
<i>Table 35. CAPEX: Systems and communications.....</i>	<i>31</i>
<i>Table 36. Distribution of the CAPEX of electrification per line.</i>	<i>31</i>
<i>Table 37. CAPEX: Urban integration.....</i>	<i>32</i>
<i>Table 38. Distribution of the CAPEX of urban integration per line.</i>	<i>32</i>
<i>Table 39. CAPEX: Rehabilitation of historical heritage assets.....</i>	<i>33</i>
<i>Table 40. Distribution of the CAPEX of the rehabilitation of historical heritage assets per line.</i>	<i>33</i>
<i>Table 41. CAPEX: Affected services and replacements.....</i>	<i>34</i>
<i>Table 42. Distribution of the CAPEX of affected services and replacements per line.</i>	<i>34</i>
<i>Table 43. CAPEX: Quality Control.</i>	<i>34</i>
<i>Table 44. Distribution of the CAPEX of quality control per line.</i>	<i>35</i>
<i>Table 45. CAPEX: Waste management.</i>	<i>35</i>
<i>Table 46. Distribution of the CAPEX of waste management per line.</i>	<i>35</i>
<i>Table 47. CAPEX: Health and Safety.....</i>	<i>36</i>
<i>Table 48. Distribution of the CAPEX of health and safety per line.....</i>	<i>36</i>

<i>Table 49. CAPEX: Indirect costs.....</i>	<i>37</i>
<i>Table 50. Distribution of the CAPEX of indirect costs per line.</i>	<i>37</i>
<i>Table 51. CAPEX: Rolling stock.....</i>	<i>38</i>
<i>Table 52. Distribution of the CAPEX of rolling stock per line.</i>	<i>38</i>
<i>Table 53. CAPEX: Design and implementation.</i>	<i>39</i>
<i>Table 54. Distribution of the CAPEX of design and implementation per line.....</i>	<i>39</i>
<i>Table 55. CAPEX: SEVRI.</i>	<i>39</i>
<i>Table 56. Distribution of the CAPEX of SEVRI per line.</i>	<i>40</i>
<i>Table 57. CAPEX: Land.....</i>	<i>40</i>
<i>Table 58. Distribution of the CAPEX of the properties per line.</i>	<i>41</i>
<i>Table 59. CAPEX: Environmental and social measures.....</i>	<i>41</i>
<i>Table 60. Distribution of the CAPEX of environmental and social measures per line.</i>	<i>41</i>
<i>Table 61. Uneven intersections in the alternative.....</i>	<i>42</i>
<i>Table 62. CAPEX of the GAM Electric Train with uneven crossings.....</i>	<i>43</i>
<i>Table 63. CAPEX: Infrastructures and systems with uneven crossings.....</i>	<i>43</i>
<i>Table 64. CAPEX: Preliminary work with uneven crossings.</i>	<i>44</i>
<i>Table 65. CAPEX: Structures with uneven crossings.</i>	<i>45</i>
<i>Table 66. CAPEX: Platform and track superstructure with uneven crossings.....</i>	<i>46</i>
<i>Table 67. CAPEX: Stations with uneven crossings.</i>	<i>46</i>
<i>Table 68. CAPEX: Depots, workshops and administrative buildings with uneven crossings.</i>	<i>47</i>
<i>Table 69. CAPEX: Drainage with uneven crossings.....</i>	<i>47</i>
<i>Table 70. CAPEX: Electrification with uneven crossings.</i>	<i>48</i>
<i>Table 71. CAPEX: Signaling systems with uneven crossings.....</i>	<i>48</i>
<i>Table 72. CAPEX: Systems and communications with uneven crossings.</i>	<i>49</i>

<i>Table 73. CAPEX: Urban integration with uneven crossings.</i>	50
<i>Table 74. CAPEX: Rehabilitation of historical heritage properties with uneven crossings.</i>	50
<i>Table 75. CAPEX: Affected services and replacements with uneven crossings.</i>	50
<i>Table 76. CAPEX: Quality control with uneven crossings.</i>	50
<i>Table 77. CAPEX: Waste management with uneven crossings.</i>	50
<i>Table 78. CAPEX: Health and safety with uneven crossings.</i>	50
<i>Table 79. CAPEX: Indirect costs with uneven crossings.</i>	51
<i>Table 80. CAPEX: Indirect costs with uneven crossings.</i>	51
<i>Table 81. CAPEX: Design and implementation with uneven crossings.</i>	51
<i>Table 82. CAPEX: SEVRI with uneven crossings.</i>	51
<i>Table 83. CAPEX: Premises with uneven crossings.</i>	51
<i>Table 84. CAPEX: Environmental and social measures with uneven crossings.</i>	51
<i>Table 85. Salaries depending on the position.</i>	53
<i>Table 86. OPEX: Common annual costs.</i>	54
<i>Table 87. OPEX: Annual costs of Line 1.</i>	55
<i>Table 88. OPEX: Annual costs of Line 2.</i>	55
<i>Table 89. OPEX: Annual costs of Line 3.</i>	55
<i>Table 90. OPEX: Annual costs of Line 4.</i>	56
<i>Table 91. OPEX: Annual costs of Line 5.</i>	56
<i>Table 92. Reinvestment of the Electric Train.</i>	59
<i>Table 93. Tangible and intangible investment costs in nominals.</i>	67
<i>Table 94. Working capital and funding sources - complete system in nominals.</i>	69
<i>Table 95. Investment calendar - complete system in nominals.</i>	69
<i>Table 96. Estimated CABEL disbursement schedule in nominals.</i>	70
<i>Table 97. OPEX –complete system in constants.</i>	70

<i>Table 98. Lifetime of various investment concepts.....</i>	<i>73</i>
<i>Table 99. Travel and base income (thousands of dollars).</i>	<i>78</i>
<i>Table 100. Travel and income in the conservative scenario (in thousands of nominal dollars).</i>	<i>80</i>
<i>Table 101. Travel and income in an optimistic scenario (in thousands of nominal dollars).</i>	<i>81</i>
<i>Table 102. PPD application factor.....</i>	<i>82</i>
<i>Table 103. Annual PPDi tariff - base case.....</i>	<i>82</i>
<i>Table 104. PPDi (constant thousands of dollars) - base demand.....</i>	<i>83</i>
<i>Table 105. PPDi (thousands of nominal dollars) - base demand.....</i>	<i>85</i>
<i>Table 106. Annual PPDi tariff - conservative demand.</i>	<i>85</i>
<i>Table 107. PPDi (constant thousands of dollars) - conservative demand.....</i>	<i>86</i>
<i>Table 108. PPDi (constant thousands of dollars) - conservative demand.....</i>	<i>88</i>
<i>Table 109. Annual PPDi rate - optimistic case.</i>	<i>88</i>
<i>Table 110. PPDi (constant thousands of dollars) - optimistic demand.....</i>	<i>89</i>
<i>Table 111. PPDi (thousands of nominal dollars) - optimistic demand.....</i>	<i>91</i>
<i>Table 112. Application factor to the PPDD.</i>	<i>92</i>
<i>Table 113. Annual PPDD rate - base case.....</i>	<i>92</i>
<i>Table 114. PPDD (millions of constant dollars) - base demand.....</i>	<i>95</i>
<i>Table 115. PPDD (millions of nominal dollars) - base demand.....</i>	<i>96</i>
<i>Table 116. Annual PPDD rate and minimum income - conservative demand.....</i>	<i>97</i>
<i>Table 117. PPDD (millions of constant dollars) - conservative demand.....</i>	<i>98</i>
<i>Table 118. PPDD (millions of nominal dollars) - conservative demand.</i>	<i>99</i>
<i>Table 119. Annual PPDD rate and minimum income - optimistic demand.....</i>	<i>100</i>
<i>Table 120. PPDD (millions of constant dollars) - optimistic demand.....</i>	<i>101</i>
<i>Table 121. PPDD (millions of nominal dollars) - optimistic demand.....</i>	<i>102</i>

<i>Table 122. Financial indicators of the different projected scenarios.</i>	103
<i>Table 123. Potential indirect income.</i>	105
<i>Table 124. Cash flow 2021-2031 (nominal dollars) - PPDi base demand.....</i>	107
<i>Table 125. Cash flow 2032-2045 (nominal dollars) - PPDi base demand.....</i>	108
<i>Table 126. Cash flow 2046-2056 (nominal dollars) - PPDi base demand.....</i>	109
<i>Table 127. Cash flow 2021-2031 (nominal dollars) - PPDi conservative demand.....</i>	110
<i>Table 128. Cash flow 2032-2045 (nominal dollars) - PPDi demand conservative.....</i>	111
<i>Table 129. Cash flow 2046-2056 (nominal dollars) - PPDi conservative demand.....</i>	112
<i>Table 130. Cash flow 2021-2031 (nominal dollars) - PPDi demand optimistic.....</i>	113
<i>Table 131. Cash flow 2032-2045 (nominal dollars) - PPDi demand optimistic.....</i>	114
<i>Table 132. Cash flow 2046-2056 (nominal dollars) - PPDi demand optimistic.....</i>	115
<i>Table 133. Cash flow 2021-2031 (nominal dollars) - PPDD demand base.....</i>	116
<i>Table 134. Cash flow 2032-2045 (nominal dollars) - Base demand PPDD.....</i>	117
<i>Table 135. Cash flow 2046-2056 (nominal dollars) - Base demand PPDD.....</i>	118
<i>Table 136. Cash flow 2021-2031 (nominal dollars) - PPDD demand conservative.....</i>	119
<i>Table 137. Cash flow 2032-2045 (nominal dollars) - PPDD demand conservative.....</i>	120
<i>Table 138. Cash flow 2046-2056 (nominal dollars) - PPDD demand conservative.....</i>	121
<i>Table 139. Cash flow 2021-2031 (millions of nominal dollars) - PPDD demand optimistic.</i>	122
<i>Table 140. Cash flow 2032-2045 (millions of nominal dollars) - PPDD demand optimistic.</i>	123
<i>Table 141. Cash flow 2046-2056 (millions of nominal dollars) - PPDD demand optimistic.</i>	124
<i>Table 142. Financial indicators of the different projected scenarios.</i>	125
<i>Table 143. Tangible and intangible investment costs considering intersections.</i>	126

<i>Table 144. Financial indicators of the different scenarios projected with intersection CAPEX.</i>	127
<i>Table 145. VAT Sensitivity – in constant.</i>	128
<i>Table 146. Sensitivity to increases in electricity costs (results in nominals).</i>	129
<i>Table 147. Sensitivity to decreases in electrical energy costs (results in nominals).</i>	129
<i>Table 148. Sensitivity to CAPEX changes (unsolicited) PPDi base (results in nominals).</i>	130
<i>Table 149. Sensitivity to CAPEX changes (unsolicited) PPDi conservative demand (results in nominals).</i>	130
<i>Table 150. Sensitivity to CAPEX changes (unsolicited) PPDi optimistic demand (results in nominals).</i>	131
<i>Table 151. Sensitivity to CAPEX changes (unsolicited) Base PPDD (results in nominals).</i>	131
<i>Table 152. Sensitivity to CAPEX changes (unsolicited) PPDD demands conservatism (results in nominals).</i>	131
<i>Table 153. Sensitivity to CAPEX changes (unsolicited) PPDD optimistic demand (results in nominals).</i>	131
<i>Table 154. Change of payments for agreed CAPEX increases - PPDi base demand (IRR and NPV in nominal).</i>	132
<i>Table 155. Change of payments for agreed increases CAPEX - PPDi conservative demand (IRR and NPV in nominal).</i>	132
<i>Table 156. Change of payments for agreed increases CAPEX - PPDi optimistic demand (IRR and NPV in nominal).</i>	132
<i>Table 157. Change of payments for agreed increases CAPEX - PPDD base demand (IRR and NPV in nominal).</i>	133
<i>Table 158. Change of payments for agreed increases CAPEX - PPDD base demand (IRR and NPV in nominal).</i>	133
<i>Table 159. Change of payments for agreed increases CAPEX - PPDD optimistic demand (IRR and NPV in nominal).</i>	133

<i>Table 160. Sensitivity to drops in demand - PPDi base demand (IRR and NPV in nominal).</i>	134
<i>Table 161. Sensitivity to drops in demand - PPDi demand conservative (IRR and NPV in nominal).</i>	134
<i>Table 162. Sensitivity to falls in demand - PPDi optimistic demand (IRR and NPV in nominal).</i>	134
<i>Table 163. Sensitivity to drops in demand - base demand PPDD (IRR and NPV in nominal).</i>	135
<i>Table 164. Sensitivity to falls in demand - PPDD demand conservative (IRR and NPV in nominal).</i>	135
<i>Table 165. Sensitivity to falls in demand - optimistic demand PPDD (IRR and NPV in nominal).</i>	135
<i>Table 166. Sensitivity to demand increases - PPDi base demand (IRR and NPV in nominal).</i>	137
<i>Table 167. Sensitivity to increases in demand - PPDi demand conservative (IRR and NPV in nominal).</i>	137
<i>Table 168. Sensitivity to increases in demand - PPDi optimistic demand (IRR and NPV in nominal).</i>	137
<i>Table 169. Sensitivity to increases in demand - base demand PPDD (Non-state TIR and VAN in nominal terms).</i>	138
<i>Table 170. Sensitivity to increases in demand - conservative demand PPDD (Non-state TIR and VAN in nominal terms).</i>	138
<i>Table 171. Sensitivity to increases in demand - optimistic demand PPDD (Non-state TIR and VAN in nominal terms).</i>	138
<i>Table 172. Sensitivity to include advertising and rental payments - PPDi.</i>	139
<i>Table 173. Sensitivity to include payments for advertising and leases - PPDD.</i>	140
<i>Table 174. Sensitivity to include sale of rights for real estate development - PPDi.</i>	141
<i>Table 175. Sensitivity to include sale of rights for real estate development - PPDD.</i>	141

<i>Table 176. Alternatives of government contribution disbursements to be analyzed.....</i>	<i>142</i>
<i>Table 177. Disbursement Schedule Sensitivity - PPDi.</i>	<i>143</i>
<i>Table 178. Sensitivity to disbursement schedule - PPDD.....</i>	<i>144</i>
<i>Table 179. Total cost comparison for government considering transportation revenues (millions of constant dollars).....</i>	<i>145</i>
<i>Table 180. Comparison of the effects of falls in estimated demand (millions of constant dollars).....</i>	<i>147</i>
<i>Table 181. Total cost comparison for government considering changes in demand (millions of constant dollars).</i>	<i>148</i>
<i>Table 182. Comparison of project NPVs with a one-year delay.....</i>	<i>148</i>
<i>Table 183. Comparison of NPV of State payments one year late. (NPV at 8.31% on payments in constant terms).</i>	<i>148</i>
<i>Table 184. Unit prices of the units of work used.....</i>	<i>172</i>
<i>Table 185. CAPEX of Line 1.</i>	<i>175</i>
<i>Table 186. CAPEX of Line 1: Infrastructure and systems.....</i>	<i>175</i>
<i>Table 187. CAPEX of Line 1: Preliminary works.</i>	<i>176</i>
<i>Table 188. CAPEX of Line 1: Structures.</i>	<i>177</i>
<i>Table 189. CAPEX of Line 1: Platform and track superstructure.</i>	<i>178</i>
<i>Table 190. CAPEX of Line 1: Stations.</i>	<i>179</i>
<i>Table 191. CAPEX of Line 1: Depots, workshops and administrative buildings.....</i>	<i>179</i>
<i>Table 192. CAPEX of Line 1: Drainage.....</i>	<i>180</i>
<i>Table 193. CAPEX of Line 1: Electrification.</i>	<i>181</i>
<i>Table 194. CAPEX of Line 1: Signaling systems.....</i>	<i>181</i>
<i>Table 195. CAPEX of Line 1: Systems and communications.</i>	<i>182</i>
<i>Table 196. CAPEX of Line 1: Urban integration.</i>	<i>183</i>
<i>Table 197. CAPEX of Line 1: Restoration of historical heritage.....</i>	<i>183</i>

<i>Table 198. CAPEX of Line 1: Affected services and replacements.</i>	183
<i>Table 199. CAPEX of Line 1: Quality control.....</i>	183
<i>Table 200. CAPEX of Line 1: Waste management.....</i>	183
<i>Table 201. CAPEX of Line 1: Health and safety.....</i>	184
<i>Table 202. CAPEX of Line 1: Indirect costs.</i>	184
<i>Table 203. CAPEX of Line 1: Rolling stock.</i>	184
<i>Table 204. CAPEX of Line 1: Design and implementation.</i>	184
<i>Table 205. CAPEX of Line 1: SEVRI.....</i>	185
<i>Table 206. CAPEX of Line 1: Land.</i>	185
<i>Table 207. CAPEX of Line 1: Environmental and social measures.</i>	185
<i>Table 208. CAPEX of Line 2.</i>	187
<i>Table 209. CAPEX of Line 2: Infrastructure and systems.....</i>	187
<i>Table 210. CAPEX of Line 2: Preliminary works.</i>	188
<i>Table 211. CAPEX of Line 2: Structures.</i>	189
<i>Table 212. CAPEX of Line 2: Platform and track superstructure.</i>	190
<i>Table 213. CAPEX of Line 2: Stations.</i>	191
<i>Table 214. CAPEX of Line 2: Depots, workshops and administrative buildings.....</i>	192
<i>Table 215. CAPEX of Line 2: Drainage.....</i>	192
<i>Table 216. CAPEX of Line 2: Electrification.</i>	193
<i>Table 217. CAPEX of Line 2: Signaling systems.....</i>	193
<i>Table 218. CAPEX of Line 2: Systems and communications.</i>	195
<i>Table 219. CAPEX of Line 2: Urban integration.</i>	195
<i>Table 220. CAPEX of Line 2: Restoration of historical heritage.....</i>	195
<i>Table 221. CAPEX of Line 2: Affected services and replacements.</i>	196
<i>Table 222. CAPEX of Line 2: Quality control.....</i>	196

<i>Table 223. CAPEX of Line 2: Waste management.....</i>	<i>196</i>
<i>Table 224. CAPEX of Line 2: Health and safety.....</i>	<i>196</i>
<i>Table 225. CAPEX of Line 2: Indirect costs.</i>	<i>196</i>
<i>Table 226. CAPEX of Line 2: Rolling stock.</i>	<i>197</i>
<i>Table 227. CAPEX of Line 2: Design and implementation.</i>	<i>197</i>
<i>Table 228. CAPEX of Line 2: SEVRI.....</i>	<i>197</i>
<i>Table 229. CAPEX of Line 2: Land.</i>	<i>197</i>
<i>Table 230. CAPEX of Line 2: Environmental and social measures.</i>	<i>198</i>
<i>Table 231. CAPEX of Line 3.</i>	<i>199</i>
<i>Table 232. CAPEX of Line 3: Infrastructure and systems.....</i>	<i>199</i>
<i>Table 233. CAPEX of Line 3: Preliminary works.</i>	<i>200</i>
<i>Table 234. CAPEX of Line 3: Structures.</i>	<i>201</i>
<i>Table 235. CAPEX of Line 3: Platform and track superstructure.</i>	<i>202</i>
<i>Table 236. CAPEX of Line 3: Stations.</i>	<i>203</i>
<i>Table 237. CAPEX of Line 3: Depots, workshops and administrative buildings.....</i>	<i>203</i>
<i>Table 238. CAPEX of Line 3: Drainage.....</i>	<i>204</i>
<i>Table 239. CAPEX of Line 3: Electrification.</i>	<i>205</i>
<i>Table 240. CAPEX of Line 3: Signaling systems.....</i>	<i>205</i>
<i>Table 241. CAPEX of Line 3: Systems and communications.</i>	<i>206</i>
<i>Table 242. CAPEX of Line 3: Urban integration.</i>	<i>207</i>
<i>Table 243. CAPEX of Line 3: Restoration of historical heritage.....</i>	<i>207</i>
<i>Table 244. CAPEX of Line 3: Affected services and replacements.</i>	<i>207</i>
<i>Table 245. CAPEX of Line 3: Quality control.....</i>	<i>207</i>
<i>Table 246. CAPEX of Line 3: Waste management.....</i>	<i>207</i>
<i>Table 247. CAPEX of Line 3: Health and safety.....</i>	<i>208</i>

<i>Table 248. CAPEX of Line 3: Indirect costs.</i>	<i>208</i>
<i>Table 249. CAPEX of Line 3: Rolling stock.</i>	<i>208</i>
<i>Table 250. CAPEX of Line 3: Design and implementation.</i>	<i>208</i>
<i>Table 251. CAPEX of Line 3: SEVRI.....</i>	<i>209</i>
<i>Table 252. CAPEX of Line 3: Land.</i>	<i>209</i>
<i>Table 253. CAPEX of Line 3: Environmental and social measures.</i>	<i>209</i>
<i>Table 254. CAPEX of Line 4.</i>	<i>211</i>
<i>Table 255. CAPEX of Line 4: Infrastructure and systems.....</i>	<i>211</i>
<i>Table 256. CAPEX of Line 4: Preliminary works.</i>	<i>212</i>
<i>Table 257. CAPEX of Line 4: Structures.</i>	<i>213</i>
<i>Table 258. CAPEX of Line 4: Platform and track superstructure.</i>	<i>214</i>
<i>Table 259. CAPEX of Line 4: Stations.</i>	<i>215</i>
<i>Table 260. CAPEX of Line 3: Depots, workshops and administrative buildings.....</i>	<i>215</i>
<i>Table 261. CAPEX of Line 4: Drainage.....</i>	<i>216</i>
<i>Table 262. CAPEX of Line 4: Electrification.</i>	<i>217</i>
<i>Table 263. CAPEX of Line 4: Signaling systems.....</i>	<i>217</i>
<i>Table 264. CAPEX of Line 4: Systems and communications.</i>	<i>218</i>
<i>Table 265. CAPEX of Line 4: Urban integration.</i>	<i>219</i>
<i>Table 266. CAPEX of Line 4: Restoration of historical heritage.....</i>	<i>219</i>
<i>Table 267. CAPEX of Line 4: Affected services and replacements.</i>	<i>219</i>
<i>Table 268. CAPEX of Line 4: Quality control.....</i>	<i>219</i>
<i>Table 269. CAPEX of Line 4: Waste management.....</i>	<i>219</i>
<i>Table 270. CAPEX of Line 4: Health and safety.....</i>	<i>220</i>
<i>Table 271. CAPEX of Line 4: Indirect costs.</i>	<i>220</i>
<i>Table 272. CAPEX of Line 4: Rolling stock.</i>	<i>220</i>

<i>Table 273. CAPEX of Line 4: Design and implementation.</i>	220
<i>Table 274. CAPEX of Line 4: SEVRI.....</i>	221
<i>Table 275. CAPEX of Line 4: Land.</i>	221
<i>Table 276. CAPEX of Line 4: Environmental and social measures.</i>	221
<i>Table 277. CAPEX of Line 5.</i>	223
<i>Table 278. CAPEX of Line 5: Infrastructure and systems.....</i>	223
<i>Table 279. CAPEX of Line 5: Preliminary works.</i>	224
<i>Table 280. CAPEX of Line 5: Structures.</i>	225
<i>Table 281. CAPEX of Line 5: Platform and track superstructure.</i>	226
<i>Table 282. CAPEX of Line 5: Stations.</i>	227
<i>Table 283. CAPEX of Line 5: Drainage.....</i>	227
<i>Table 284. CAPEX of Line 5: Electrification.</i>	228
<i>Table 285. CAPEX of Line 5: Signaling systems.....</i>	228
<i>Table 286. CAPEX of Line 5: Systems and communications.</i>	230
<i>Table 287. CAPEX of Line 5: Urban integration.</i>	230
<i>Table 288. CAPEX of Line 5: Restoration of historical heritage.....</i>	230
<i>Table 289. CAPEX of Line 5: Affected services and replacements.</i>	231
<i>Table 290. CAPEX of Line 5: Quality control.....</i>	231
<i>Table 291. CAPEX of Line 5: Waste management.....</i>	231
<i>Table 292. CAPEX of Line 5: Health and safety.....</i>	231
<i>Table 293. CAPEX of Line 5: Indirect costs.</i>	231
<i>Table 294. CAPEX of Line 5: Rolling stock.</i>	232
<i>Table 295. CAPEX of Line 5: Design and implementation.</i>	232
<i>Table 296. CAPEX of Line 5: SEVRI.....</i>	232
<i>Table 297. CAPEX of Line 5: Land.</i>	232

<i>Table 298. CAPEX of Line 5: Environmental and social measures.</i>	<i>233</i>
<i>Table 299. Analysis of the studied intersections.....</i>	<i>238</i>
<i>Table 300. Summary of analysed intersections.....</i>	<i>239</i>
<i>Table 301. Common OPEX: Directorate General.....</i>	<i>251</i>
<i>Table 302. Common OPEX: Operation Management.....</i>	<i>252</i>
<i>Table 303. Common OPEX: Operating consumables.</i>	<i>252</i>
<i>Table 304. OPEX for Line 1: General operation.....</i>	<i>253</i>
<i>Table 305. OPEX for Line 1: Operating consumables.....</i>	<i>254</i>
<i>Table 306. OPEX for Line 1: Infrastructure Maintenance Management.....</i>	<i>255</i>
<i>Table 307. OPEX for Line 1: Infrastructure consumables.....</i>	<i>256</i>
<i>Table 308. OPEX for Line 1: Rolling Stock Maintenance Management.....</i>	<i>257</i>
<i>Table 309. OPEX for Line 1: Rolling stock consumables.</i>	<i>257</i>
<i>Table 310. OPEX for Line 2: General operation.....</i>	<i>259</i>
<i>Table 311. OPEX for Line 2: Operating consumables.....</i>	<i>260</i>
<i>Table 312. OPEX for Line 2: Infrastructure Maintenance Management.....</i>	<i>261</i>
<i>Table 313. OPEX for Line 2: Infrastructure consumables.....</i>	<i>262</i>
<i>Table 314. OPEX for Line 2: Rolling Stock Maintenance Management.....</i>	<i>263</i>
<i>Table 315. OPEX for Line 2: Rolling stock consumables.</i>	<i>263</i>
<i>Table 316. OPEX for Line 3: General operation.....</i>	<i>265</i>
<i>Table 317. OPEX for Line 3: Operating consumables.....</i>	<i>266</i>
<i>Table 318. OPEX for Line 3: Infrastructure Maintenance Management.....</i>	<i>267</i>
<i>Table 319. OPEX for Line 3: Infrastructure consumables.....</i>	<i>268</i>
<i>Table 320. OPEX for Line 3: Rolling Stock Maintenance Management.....</i>	<i>269</i>
<i>Table 321. OPEX for Line 3: Rolling stock consumables.</i>	<i>269</i>
<i>Table 322. OPEX for Line 2+4: General operation.....</i>	<i>271</i>

<i>Table 323. OPEX for Line 2+4: Operating consumables.....</i>	<i>272</i>
<i>Table 324. OPEX for Line 2+4: Infrastructure Maintenance Management.....</i>	<i>273</i>
<i>Table 325. OPEX for Line 2+4: Infrastructure consumables.....</i>	<i>274</i>
<i>Table 326. OPEX for Line 2+4: Rolling Stock Maintenance Management.....</i>	<i>275</i>
<i>Table 327. OPEX for Line 2+4: Rolling stock consumables.</i>	<i>275</i>
<i>Table 328. OPEX for Line 3+5: General operation.....</i>	<i>277</i>
<i>Table 329. OPEX for Line 3+5: Operating consumables.....</i>	<i>278</i>
<i>Table 330. OPEX for Line 3+5: Infrastructure Maintenance Management.....</i>	<i>279</i>
<i>Table 331. OPEX for Line 3+5: Infrastructure consumables.....</i>	<i>280</i>
<i>Table 332. OPEX for Line 3+5: Rolling Stock Maintenance Management.....</i>	<i>281</i>
<i>Table 333. OPEX for Line 3+5: Rolling stock consumables.</i>	<i>281</i>
<i>Table 334. Income Potential on INCOFER-owned land by type of Station.</i>	<i>311</i>
<i>Table 335. Commercial potential of the available spaces.....</i>	<i>319</i>
<i>Table 336. Overall Cost Development Scenario 1.....</i>	<i>339</i>
<i>Table 337. Overall Cost Development Scenario 2.....</i>	<i>340</i>
<i>Table 338. Calculation of Value Generation.....</i>	<i>342</i>
<i>Table 339. Basic data for the calculation of jobs.</i>	<i>344</i>
<i>Table 340. Detail of the employment generated in Scenario 1.</i>	<i>344</i>
<i>Table 341. Detail of the employment generated in Scenario 2.</i>	<i>345</i>

1 INTRODUCTION

This document is the first of four documents that make up the fourth report of the Studies for the Technical, Economic-Financial, Environmental, Vulnerability & Social Feasibility for the Construction, Equipment, Test & Commissioning, Operation and Maintenance under Works Concession with Public Service of the Passenger Rapid Train in the Great Metropolitan Area.

This study consists of six reports:

- First Report: Work Plan.
- Second Report: Technical environmental, social, vulnerability assessment and gender studies.
- Third Report: Technical Feasibility Study.
- **Fourth Report: Economic and Financial Study.**
- Fifth Report: Financial Structuring and Document for the Bidding Process.
- Final Report.

Specifically, the objective of the economic-financial study is to bring together and analyze the elements necessary to evaluate and structure the proposal that would give the project the greatest economic-financial viability.

To this end, the Third Report: Technical Feasibility will be taken into account, as well as the fiscal contingencies for the analysis of the competent authorities.

Based on the cost estimates made, the overall impact of all the interventions that have been successful from the technical point of view is analyzed and the preliminary cost of the project will be assessed based on the technical feasibility made. This includes a unit price study and an element costing supported by the local experience of the consulting firm in the country.

For a correct understanding of the contents included in this report, it is distributed in six large sections according to the different typologies of economic-financial studies required by the project throughout the evaluation horizon.

These are:

- Financial analysis at a conceptual level
- Cost-benefit analysis ("CBA")
- Risk analysis
- Value for money analysis
- Technical and user fee analysis
- System integration analysis

In short, the Fourth Report: Economic and Financial Study consists of four documents:

- **Document 1: Economic and financial analysis.**
- Document 2: Cost-benefit analysis.
- Document 3: Risk analysis and value for money.
- Document 4: Technical pricing and system integration analysis.

In the economic and financial analysis document, various alternative scenarios for remuneration and scope of the project have been put forward. Given this diversity of models, one of which must be selected for the bidding process, only one scenario has been evaluated for this analysis: the total development at the beginning of lines 1 to 5, both inclusive.

As this is a feasibility study, some of the elements contemplated have been carried out in the form of macro concepts based on the experience of similar actions in neighboring areas or international experiences. These concepts will be developed in detail in the construction project phases required for the implementation of the Electric Train.

Given that the proposed infrastructure is made up of 5 proposed Electric Train lines to be built independently, the analysis of the costs involved in the construction, operation and maintenance is carried out both completely for the entire Electric Train system and individually for each of the lines. The aspects relating to these costs are analyzed below.

1.1 Project description

The GAM Electric Train consists of the development of a two-way railway system connecting the cities of Cartago, San José, Heredia and Alajuela. To do so, the intention is to take advantage of the existing route to promote the east-west connection of the GAM and to make this transport system the reference mode of public transport in the area, promoting sustainable mobility.

The proposed system covers a length of over 84 km with 46 stations along the route and is made up of 5 lines delimited by the INCOFER right-of-way. Lines 1 (Paraíso-Atlántico), 2 (Atlántico-Alajuela) and 3 (Atlántico-Ciruelas) will operate independently, while lines 4 (Alajuela-Ciruelas) and 5 (Ciruelas-El Coyol) are proposed as extensions of lines 2 and 3 respectively. There will also be four depots and a workshop with its corresponding administrative buildings. The Paraíso depot, located on Line 1, will be able to accommodate up to 20 trains, the Pacífico depot, which serves Line 3, will have a capacity for 24 trains and the Ciruelas depot, corresponding to Line 4, will have space for 12 trains. The Las Cañas depot, which is located on Line 2, apart from being able to accommodate 24 trains, will be in charge of carrying out the most complex maintenance tasks of the entire system since it will be the only one with a workshop.

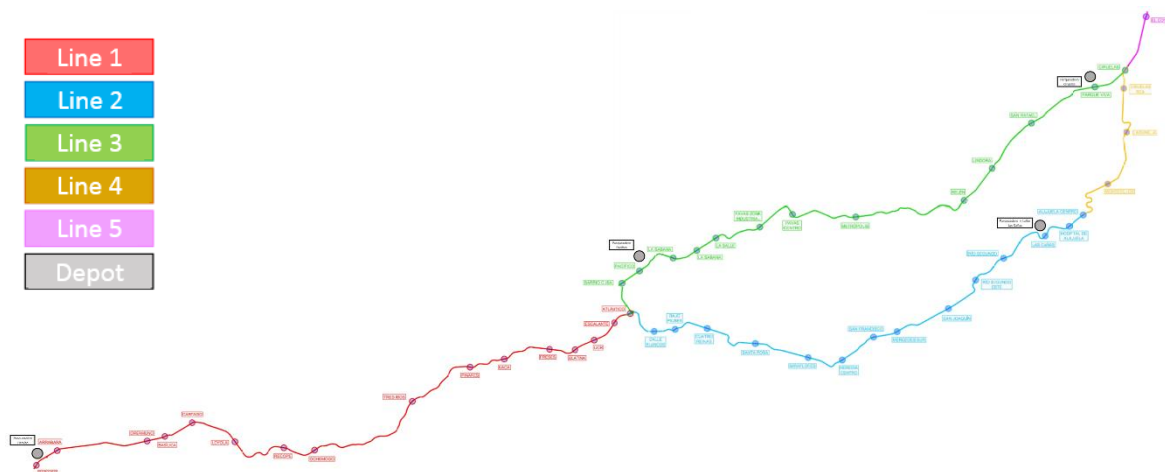


Figure 1. GAM Electric Train.

The stops that make up the GAM Electric Train can be seen in the following figure.



Figure 2. GAM Electric Train Stations.

In order to meet the demand, it is proposed to operate the 3 main lines (i.e. lines 1, 2 and 3) with frequencies of 5 minutes at peak time (15 minutes at off-peak time) and with frequencies of 10 minutes at peak time (30 minutes at off-peak time) for extensions on working days. On non-working days, weekends and public holidays, the frequencies are reduced to 10 minutes at peak time (20 minutes at off-peak time) and 20 minutes at peak time (40 minutes at off-peak time) for lines 1-2-3 and 4-5 respectively.

All of this is detailed in Chapter 21: Operation of the Third Report, with its corresponding technical justification.

	Start	Finish
Morning off-peak time	05:00	06:00
Morning rush hour	06:00	10:00
Midday off-peak time	10:00	15:30
Afternoon rush hour	15:30	19:30
Afternoon off-peak time	19:30	23:00

Table 1. Periods of variation in demand.

	Lines 1,2 and 3		Lines 4 and 5	
	Working	Nonworking	Working	Nonworking
Off-peak	15 minutes	20 minutes	30 minutes	40 minutes
Rush hour	5 minutes	10 minutes	10 minutes	20 minutes

Table 2. Operating frequencies in the lines as a function of time and day.

From the tariff point of view, each line will be charged independently with a base rate for the main lines and a reduced fare for extensions.

In order to meet the system's demand, with the frequencies explained, 78 trains are required (including maintenance and reserve trains) as detailed in Chapter 21: Operation and Maintenance of the Third Report, which will be 5-module electric traction light articulated trains in double composition. The capacity of this type of train ranges from 430 passengers (4 passengers/m²) to 600 passengers (6 passengers/m²) without exceeding a length of 70 m. However, given the length of the station platforms (80 m), if future demand so requires, the rolling stock could be adapted to the seven modules in order to increase its transport capacity.

In summary, the following table shows the main characteristics of each line.

	Layout	Length	Stations	Depots	Workshop
Line 1	Urban/Interurban	27,4 km	16	Paraíso/Pacífico	Las Cañas
Line 2	Urban/Interurban	21,6 km	15	Pacífico/Aeropuerto	Las Cañas
Line 3	Urban/Interurban	25,4 km	14	Pacífico/Ciruelas	Las Cañas
Line 4	Interurban	7,8 km	5	Ciruelas/Las Cañas	Las Cañas
Line 5	Interurban	2,7 km	2	Ciruelas	Las Cañas

Table 3. Main characteristics of the lines.

In addition, 14 of the stations mentioned are proposed as intermodal stations, where the transfer of passengers between the bus system and the Electric Train would take place.

The following is a summary of the main magnitudes and characteristics of the project in order to have a more appropriate idea of its dimension:

- Infrastructure: Track infrastructure, systems and rolling stock.
- Length of the route: 84.85 km.
- Number of stations: 46.
- Rolling stock required: 78 in the year of commissioning.
- Maximum speed: 25 km/h in urban areas, 50 km/h in semi-urban areas, and 70 km/h in interurban areas.
- Train frequency: 5 minutes during peak hours.
- Passenger transport capacity: 600 passengers per unit in a double train.

In short, the Electric Urban Train project consists of improving the current train that operates between San José de Costa Rica and the towns of Alajuela, Belén and Paraíso on three respective lines, along with the extension from Belén to Ciruelas and two new sections from Alajuela to Ciruelas and from Ciruelas to El Coyoil, respectively.

2 CAPEX-OPEX-REINVESTMENT

2.1 Cost analysis

Once the study and analysis of the Electric Train Feasibility Study has been carried out and after having identified, from a technical point of view, the satisfactory improvements to the railway system, the cost analysis is carried out.

For this purpose, a study will be made of the different types of costs that make up the project investment, based on quotations from local companies and the firm's experience in projects with similar characteristics.

2.1.1 Unit cost analysis

As a first aspect to be analyzed in terms of investment costs, a review of the unit prices used for the cost estimate of the elements or items that make up the project is carried out. To this end, among all the prices applied in the economic quantification, the most significant elements of the project have been analyzed in detail, both because of their abundant use and because of their high price. In other words, the unit costs of the elements that have the greatest impact on the final amount of the project have been justified.

The prices used for the elements that make up the Electric Train have been obtained after contacting local suppliers and based on experience in other projects in and around Costa Rica, as well as other similar projects in the field of rail and urban transport. The prices applied are within the usual values for projects with similar characteristics. These prices can be found in the table presented in ANNEX I: UNIT PRICES.

The elements analyzed will be some such as concrete, reinforcing steel or railway materials such as rails, sleepers or fasteners.

Concrete

The costs provided by local companies and applied in making the economic estimate for the different types of concrete to be used are shown below. The prices of the reinforced concrete are without the price corresponding to the steel of reinforcement.

UNIT	UNIT	UNIT COST
Mass concrete 100 kg/cm ²	m3	113,00 USD
Mass concrete 150 kg/cm ²	m3	121,00 USD
Mass concrete 200 kg/cm ²	m3	124,93 USD
Reinforced concrete HA-250 kg/cm2	m3	132,50 USD
Reinforced concrete HA-300 kg/cm2	m3	229,74 USD
Reinforced concrete HA-400 kg/cm2	m3	300,40 USD

Table 4. Unit costs of concrete.

The prices of concrete should be analyzed in particular detail in the phases of the construction project given the high volumes of this resource required for the execution of the railway project. These have been applied to calculate the prices of the different elements of the project and are shown in ANNEX I: UNIT PRICES.

Reinforcement steel

The cost of the reinforcing steel used is obtained independently from that of the reinforced concrete, as no values have been provided in isolation.

In this sense, as a reference and given the importance of this resource in a project of this type, a price estimate is included, calculated on the basis of quotations from different local suppliers and making the estimate for an 85th percentile. The steel selected is the B 500 S reinforcement, usually used for the reinforcement of structural concrete. These have been applied to calculate the prices of the different elements of the project and are shown in ANNEX I: UNIT PRICES.

UNIT	UNIT	UNIT COST
Reinforcing steel B500S	kg	1,78 USD

Table 5. Unit costs of reinforcing steel.

As in the case of concrete, this price must be analyzed in particular detail in the phases of the construction project given the high volumes of this resource required for the execution of the railway project.

Rails

Along the proposed route, different types of platform are proposed depending on the area. Among the different superstructures, either in the case of slab track or ballast track, two types of rails are proposed, UIC54 (both on slab track and on ballast track) and the Ph37 (only present on slab track.)

After consulting the different sources, the value of the usual rail types is included:

UNIT	UNIT	UNIT COST
Rail UIC54	m	107,04 USD
Rail Ph37	m	134,21 USD

Table 6. Unit costs of rails.

Therefore, the costs per kilometer of these resources for double track would be 428,160 USD/km (107,04 USD/m x 4.000 m/km) for the UIC54, which will be used on both slab and ballast track, and 536,840 USD/km (134,21 USD/m x 4.000 m/km) for the Ph37 rail, which will only be implemented on slab track. Given that the Electric Train is about 84 km long, the importance of the price of these elements can be appreciated Prices can be found in ANNEX I: UNIT PRICES.

Sleeper

This element is basic to guarantee the correct location and settlement of the rails. Due to the limited tolerances that the placement of a rail should admit, it is proposed to use this resource as part of the railway superstructure.

A price estimation is included as a reference for a typology of common use in this type of design:

UNIT	UNIT	UNIT COST
Precast concrete bi-block sleeper	u	113,66 USD
Precast concrete single-block sleeper	u	141,71 USD

Table 7. Unit costs of sleepers.

The cost per kilometer of this resource for double track would be about 378,866 USD/km (113,66 USD/u x 3.333 u/km) with bi-block sleepers and 472,366 USD/km (141,71 USD/u x 3.333 u/km) with single block sleepers. The prices of the elements are shown in ANNEX I: UNIT PRICES.

Fastening

The cost, as a reference, of quality material of this type offered by different international suppliers and commonly used in this type of design, is included in the following table:

UNIT	UNIT	UNIT COST
Nabla-type fastening	u	45,79 USD

Table 8. Unit cost of fastenings.

This price can be found in ANNEX I: UNIT PRICES.

2.1.2 Element cost analysis

Once the cost of the resources that make up the different elements that make up the project has been analyzed, estimates can be made of the variations in the latter, so that the final revised investment cost can be obtained. Additionally, all prices used in this analysis, as well as the projects used as reference are shown in ANNEX I: UNIT PRICES.

Structures

The proposed structures are economically broken down according to their component elements. In other words, the bridges and viaducts will be divided into deck (per m²), pile (per m), foundation (per unit), etc. which have been calculated by estimating the quantities of the elements that make them up and applying the prices obtained from the quotations of local companies and experience.

The prices are attached:

UNIT	UNIT	UNIT COST
BRIDGES		
Deck (width 9m) prefabricated double t-beam depth 0,60m	m	3.430,40 USD
Deck (width 11m) prefabricated double t-beam depth 0,60m	m	4.128,28 USD
Deck (width 9m) prefabricated double t-beam depth 0,90m	m	3.936,80 USD
Deck (width 9m) prefabricated double t-beam depth 1,20m	m	4.443,16 USD

Deck (width 11m) prefabricated double t-beam depth 1,20m	m	5.394,23 USD
Deck (width 9m) prefabricated double t-beam depth 1,40m	m	4.780,76 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	m	5.202,72 USD
Bridge pier	m	1.976,66 USD
Bridge pier foundation	u	11.482,55 USD
Stirrup	u	74.583,71 USD
Single track bridge renovation	m2	7.300,00 USD
VIADUCTS		
Deck (width 9m) prefabricated double t-beam depth 1,65m	m	5.202,72 USD
Deck (width 11m) prefabricated double t-beam depth 1,65m	m	6.343,68 USD
Viaduct pier	m	3.573,23 USD
Viaduct pier foundation	m	11.482,55 USD
Stirrup	u	74.583,71 USD
CUT&COVER		
Demolition	km	200.000,00 USD
Screen wall	km	7.500.000,00 USD
Top slab	km	3.200.000,00 USD
Urbanization	km	2.400.000,00 USD
Interior excavation	km	2.400.000,00 USD
Bottom slab	km	2.400.000,00 USD
WALLS		
Concrete wall	m	557,01 USD

Table 9. Costs of structure elements.

Track platform and superstructure

Below are the approximate costs per kilometer of platform in slab and in ballast according to their type based on the prices consulted. Also included are the costs for the switches and crossings. These have been applied to calculate the prices of the different elements of the project and are shown in ANNEX I: UNIT PRICES.

UNIT	UNIT	UNIT COST
Ballast track		
Ballasted track on vignole rail	km	2.009.603,87 USD
Fenced ballasted track on vignole rail	km	89.952.497,16 USD
Fenced single ballast track on vignole rail	km	520.821,53 USD
Slab track		
Slab track on vignole rail	km	17.908.616,20 USD
Slab track at station on vignole rail	km	8.960.997,65 USD
Slab track on throat rail	km	11.618.970,12 USD
Single slab track on throat rail	km	359.792,22 USD
Fenced slab track on vignole rail	km	25.820.015,99 USD
Fenced single slab track on vignole rail	km	2.224.744,69 USD
Slab track viaduct on vignole rail	km	3.344.020,88 USD
Slab track CUT&COVER on vignole rail	km	3.174.275,95 USD

Track Equipment		
Bretelle	u	6.800.000,00 USD
Escapes	u	2.370.945,59 USD
Deviations	u	2.910.475,50 USD
End of track	u	262.929,92 USD

Table 10. Costs of platform elements and track superstructure.

Stations

The prices obtained have been estimated by taking as a reference the costs of stations with similar characteristics and adjusting the unit prices.

The cost of the stations, according to their type and as indicated in the Third Report, is approximately as follows:

UNIT	UNIT	UNIT COST
Station type (side platforms)	u	750.000 USD
Station type (central platform)	u	380.000 USD
Intermodal station	u	910.000 USD
Unique station	u	8.000.000 USD

Table 11. Station element costs.

The Atlántico station (singular station) is noteworthy, since it is the central station of the three main lines and the one that will have the Centralized Control Post, it will require a higher investment than the rest. In addition, it will have an office building and retail spaces located on a plot of land next to the National Park.

Depots, workshops and administrative buildings

The total cost of the identified yard and workshop areas is about 63,440,000 USD. This amount also includes areas for administrative activities and service areas, as well as both railway and administrative facilities.

Based on different references of similar solutions and adapting these values to the dimensions required by the railway system under analysis, the following ratios have been obtained:

UNIT	UNIT	UNIT COST
ADMINISTRATIVE BUILDING	m3	174,51 USD
Foundation and structures	m3	57,94 USD
Roofs, walls, partitions and cladding	m3	67,16 USD
Installations	m3	49,41 USD
WORKSHOP AND DEPOTS	m3	59,85 USD
Foundation and structures	m3	33,94 USD
Roofs, walls, partitions and cladding	m3	14,01 USD
Installations	m3	11,90 USD
URBANIZATION	m2	20,14 USD
Pavements, floors and finishes	m2	6,19 USD
Drainage	m2	7,31 USD
Fire hydrant network	m2	0,65 USD
Lighting	m2	2,83 USD
Routes	m2	3,16 USD

Table 12. Costs of depot and workshop elements.

In addition to the buildings, among the main costs of parking lots and workshops, there are roads and track equipment and maintenance facilities. These costs can be seen in ANNEX II: CAPEX BY LINES.

Depending on the needs and availability of the plots, the cost of each parking lot concludes as follows:

- Paraíso: 11,200,000 USD
- Las Cañas: 33,100,000 USD
- Pacífico: 11,600,000 USD
- Ciruelas: 7,600,000 USD

Electrification

The cost of the proposed electrification system is approximately USD 975,000/km which falls within the usual ratios applied for this type of elements.

The cost estimated in this study consists of 1.5 MW and 1 MW substations, catenary, power supply to stops and stabling tracks along with the rest of the electrical elements. However, the main costs relating to electrification, which account for over 60% of the cost of the chapter, correspond to catenary and substations. A cost of 1,237,166 USD is considered for each 1.5 MW substation and between 1,143,999 USD and 1,248,944 USD for each 1 MW substation depending on whether they are located in the stations or in the depots. This cost

includes the necessary equipment and civil works. For the cost of the catenary, compensated on posts, it has been estimated that it will cost around 280,000 USD/km. The values applied to calculate the prices of the different elements of the project, shown in ANNEX I: UNIT PRICES.

Signaling systems

Signaling includes rail and road signaling. The total cost of signaling is significant, approximately 78,000,000 USD, which is based on the following main ratios obtained from other projects with similar solutions:

UNIT	UNIT	UNIT COST
RAILWAY SIGNALING		
Interlocking	u	1.400.000,00 USD
Track equipment	km	180.000,00 USD
On-board equipment	u	80.000,00 USD
ROAD SIGNALING		
Level crossings with barrier and crossing conditioning	u	60.000,00 USD

Table 13. Costs of signaling elements.

Systems and communications

The cost of the proposed control and communication system is approximately USD 36,800,000, of which 50% is for ticketing systems. Specifically, 2 machines will be placed on each platform except for Atlántico, of which 8 will be placed throughout the station. For this reason, the prices applied to the ticketing systems are shown based on the experience of the realization of railway systems.

UNIT	UNIT	UNIT COST
TICKETS		
Vending machine	u	40.000,00 USD
Cancellation machine	u	20.000,00 USD

Table 14. Costs of ticketing elements.

The rest of the prices applied to each of the elements of the systems and communication can be consulted in ANNEX II: CAPEX BY LINES.

Urban integration

It is considered that in order to contemplate the best possible integration between the system and the city, these costs should be taken into account, so a ratio of 280,000 USD/km has been taken as a reference value. This ratio, however, is highly variable from one project to another, since it depends on several factors:

- The degree of quality required in the final development of the street.
- The extent of the development, as it is not the same to develop only the width of the street affected by the layout, as it is to take advantage of it to completely redevelop a 30-metre wide avenue.
- If the layout only runs through an urban section or intersperses urban and interurban sections, as there is hardly any need for development in the latter.

Within the chapter on urban integration, paving is the main sub-chapter, and can account for between 60% and 80% of the total cost of urban integration.

In addition to paving, urban furniture and landscaping can account for between 20% and 40% of the total cost of urban integration.

Given the level of feasibility of the project, this chapter should be studied in detail at the construction project stage. However, the ratio has been considered according to experience.

Rolling Stock

It is proposed to operate the Electric Train by means of double compositions, that is, by means of two simple coupled units, being the length of the simple unit a maximum of 40 meters.

In accordance with the volume of the fleet and the technical specifications proposed in the Third Report, aimed at an adjusted level of quality and price, based on IDOM's extensive experience in railway transport projects, having worked with many of the rolling stock manufacturers in the market over the last few years, the investment cost of the double composition is estimated at 5,800,000 USD. It is estimated that this price can be offered by the main international manufacturers, with some rolling stock manufacturers being able to lower these figures.

2.2 CAPEX

The proposed CAPEX is made up of various chapters in order to encompass all costs and consists of the following structure:

1. Infrastructures and systems
 - 1.1. Preliminary work
 - 1.2. Structures
 - 1.3. Track platform and superstructure
 - 1.4. Stations
 - 1.5. Depots, workshops and administrative buildings
 - 1.6. Drainage
 - 1.7. Electrification
 - 1.8. Signaling systems
 - 1.9. Systems and communications
 - 1.10. Urban integration
 - 1.11. Rehabilitation of historical heritage assets
 - 1.12. Affected services and replacement
 - 1.13. Quality control
 - 1.14. Waste management
 - 1.15. Health and Safety
2. Indirect costs
3. Rolling stock
4. Design and implementation
5. Risk assessment system
6. Land
7. Environmental and social measures

Thus, once all the chapters have been quantified, the investment required to carry out the entire project amounts to USD 1,372,265,657, as can be seen in the following table:

CAPEX	AMOUNT	PROPORTION
INFRASTRUCTURES AND SYSTEMS	682.728.072 USD	49,75%
INDIRECT COSTS	75.100.088 USD	5,47%
ROLLING STOCK	452.400.000 USD	32,97%
DESIGN AND IMPLEMENTATION	79.457.112 USD	5,79%
RISK ASSESSMENT SYSTEM	6.448.426 USD	0,47%
LAND	66.131.959 USD	4,82%
ENVIRONMENTAL AND SOCIAL MEASURES	10.000.000 USD	0,73%
TOTAL	1.372.265.657 USD	

Table 15. CAPEX of the GAM Electric Train.

Analyzing the lines individually, this amount is distributed as follows for each line:

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	404.163.793 USD	29,5%
Line 2: Atlántico - Alajuela	410.792.439 USD	29,9%
Line 3: Atlántico - Ciruelas	430.091.596 USD	31,3%
Line 4: Alajuela - Ciruelas	110.731.654 USD	8,1%
Line 5: Ciruelas - El Coyoil	16.486.175 USD	1,2%
Total	1.372.265.657 USD	100,0%

Table 16. Distribution of the CAPEX of the Electric Train per line.

Those elements that have been taken into account as lump sum items or common units for all the lines have been separated in proportion to the length of the lines with respect to the total route of 84.85 km. Therefore, the distribution in these cases would be as follows:

- Line 1: 27.35 km which corresponds to 32%.
- Line 2: 21.70 km which corresponds to 26%.
- Line 3: 25.30 km which corresponds to 30%.
- Line 4: 7.80 km which corresponds to 9%.
- Line 5: 2.70 km which corresponds to 3%.

The breakdown of the figures for each of the lines is in ANNEX II: CAPEX BY LINES.

2.2.1 Infrastructures and systems

The investment costs in infrastructure and systems of the Electric Train amount to 682,728,072 USD. These costs do not include the indirect costs component, which is detailed later in this document and its breakdown is shown in the following table:

INFRASTRUCTURES AND SYSTEMS	AMOUNT	PROPORTION
PRELIMINARY WORKS	17.449.088 USD	2,56%
STRUCTURES	82.716.243 USD	12,12%
PLATFORM AND TRACK SUPERSTRUCTURE	178.260.169 USD	26,11%
STATIONS	40.449.622 USD	5,92%
DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	63.439.725 USD	9,29%
DRAINAGE	11.761.307 USD	1,72%
ELECTRIFICATION	82.809.214 USD	12,13%
SIGNALLING SYSTEMS	78.293.000 USD	11,47%
SYSTEMS AND COMMUNICATIONS	36.806.095 USD	5,39%
URBAN INTEGRATION	24.758.000 USD	3,63%
RESTORATION OF HISTORICAL HERITAGE	12.500.000 USD	1,83%
AFFECTED SERVICES AND REPLACEMENT	34.608.335 USD	5,07%
QUALITY ASSURANCE	6.292.425 USD	0,92%
WASTE MANAGEMENT	3.146.212 USD	0,46%
HEALTH AND SAFETY	9.438.637 USD	1,38%
TOTAL INFRASTRUCTURE AND SYSTEMS	682.728.072 USD	

Table 17. CAPEX: Infrastructures and systems.

The total amounts corresponding to each of the lines are shown in the table presented below. However, the detailed costs of each of the 5 lines are detailed in ANNEX II: CAPEX BY LINES.

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	195.118.995 USD	28,6%
Line 2: Atlántico - Alajuela	206.868.939 USD	30,3%
Line 3: Atlántico - Ciruelas	213.108.987 USD	31,2%
Line 4: Alajuela - Ciruelas	54.658.428 USD	8,0%
Line 5: Ciruelas - El Cuyol	12.972.724 USD	1,9%
Total	682.728.072 USD	100%

Table 18. Distribution of the CAPEX of infrastructure and systems per line.

Preliminary work

This chapter includes those activities that can be carried out together for all the lines at the same time before proceeding to the construction of the Electric Train. Among these are the topographic, geological campaign, deviations and protection of networks, cleaning and removal of existing roads.

PRELIMINARY WORKS	MEASUREMENT	UNIT	PRICE	AMOUNT
TOPOGRAPHIC CAMPAIGN				850.000 USD
Topographical Campaign's Raised Item	8.500,00	ha	100,00	850.000 USD
GEOTECHNICAL CAMPAIGN				1.326.088 USD
Mobilization and demobilization of equipment and personnel to the area of operation	20,00	u	1.000,00	20.000 USD
Moving drilling machinery between geotechnical boreholes	262,00	u	100,00	26.200 USD
Vertical drilling with continuous core extraction in all types of terrain	5.240,00	m	155,00	812.200 USD
Unchanged sample taking	1.048,00	u	40,00	41.920 USD
SPT (Standard Penetration Test)	1.048,00	u	40,00	41.920 USD
Wax sampling on rock barrel	131,00	u	5,00	655 USD
Boxes of plastic or waxed cardboard for storing core material obtained by rotary drilling	1.747,00	u	3,00	5.241 USD
Polling testimony, photo reportage and final records	5.240,00	m	3,00	15.720 USD
PVC grooved tube, for measuring water levels	327,50	m	10,00	3.275 USD
Measurement of groundwater levels	49,13	u	5,00	246 USD
Water sampling in drilling	13,10	u	15,00	197 USD
Dynamic Penetration DPSH/Blast	2.175,00	m	15,00	32.625 USD
Geophysical research	4.800,00	m	14,00	67.200 USD
Mechanical (Backhoe) tiling up to 3-4m	137,00	u	175,00	23.975 USD
Unaltered sampling in calcite by means of a waxed block	137,00	u	100,00	13.700 USD
Laboratory	20,00	%	11.050,73	221.015 USD
TRANSIT DEVIATIONS				4.242.500 USD
Lifting of transit deviations	84,85	km	50.000,00	4.242.500 USD
DEVIATION AND PROTECTION OF NETWORKS				4.242.500 USD
Raised departure of deviation and protection of networks	84,85	km	50.000,00	4.242.500 USD
CLEANING, REMOVALS AND DEMOLITIONS				6.788.000 USD
Lift off for cleaning, track removal and dismantling	84,85	km	80.000,00	6.788.000 USD
TOTAL PRELIMINARY WORK				17.449.088 USD

Table 19. CAPEX: Preliminary works.

ANNEX II: CAPEX BY LINES shows the breakdowns of the costs of the preliminary work of each of the lines, while the following table shows the total distribution of these works for each line.

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	5.623.929 USD	32,2%
Line 2: Atlántico - Alajuela	4.462.543 USD	25,6%
Line 3: Atlántico - Ciruelas	5.202.737 USD	29,8%
Line 4: Alajuela - Ciruelas	1.604.440 USD	9,2%
Line 5: Ciruelas - El Coyol	555.439 USD	3,2%
Total	17.449.088 USD	100%

Table 20. Distribution of the CAPEX of preliminary works per line.

Structures

It is formed by all the necessary structures so that the Electric Train can circulate along the entire proposed route. The main structures to consider are: Bridges, Viaducts and Cut & Cover.

The bridges can be divided into two main units, on the one hand, the newly built overpasses, generally of small and moderate span, which will be demolished as they do not have sufficient space to accommodate a double track and will be rebuilt to provide a track of these characteristics. On the other hand, the remodeling of bridges, corresponding to the larger bridges that will be adequate to provide them with sufficient structural resistance to support the passage of trains.

As far as viaducts are concerned, these are built given the analysis carried out of the coexistence of the Electric Train with vehicular traffic, which is detailed in Chapter 9: Study of traffic and level crossings of the Third Report. Likewise, there is a section of great economic importance that will be built through Cut&Cover due to the space restrictions that exist between the Atlántico and Pacífico stops. The breakdown of the structures chapter is shown in the following table.

STRUCTURES	MEASUREMENT	UNIT	PRICE	AMOUNT
BRIDGES				20.219.641 USD
Deck (width 9m) prefabricated double t-beam depth 0,60m	241,34	m	3.430,40	827.893 USD
Deck (width 11m) prefabricated double t-beam depth 0,60m	20,25	m	4.128,28	83.598 USD
Deck (width 9m) prefabricated double t-beam depth 0,90m	109,05	m	3.936,80	429.308 USD
Deck (width 9m) prefabricated double t-beam depth 1,20m	119,63	m	4.443,16	531.535 USD
Deck (width 11m) prefabricated double t-beam depth 1,20m	81,76	m	5.394,23	441.032 USD
Deck (width 9m) prefabricated double t-beam depth 1,40m	161,76	m	4.780,76	773.336 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	245,58	m	5.202,72	1.277.684 USD
Bridge pier	50,00	m	1.976,66	98.833 USD
Bridge pier foundation	9,00	u	11.482,55	103.343 USD
Stirrup	84,00	u	74.583,71	6.265.032 USD
Other	51,00	u	23.800,00	1.213.800 USD
Single track bridge renovation	1.119,76	m2	7.300,00	8.174.248 USD
VIADUCTS				19.777.402 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	2.433,70	m	5.202,72	12.661.860 USD
Deck (width 11m) prefabricated double t-beam depth 1,65m	300,00	m	6.343,68	1.903.104 USD
Viaduct pier	408,00	m	3.573,23	1.457.878 USD
Viaduct pier foundation	77,00	u	11.482,55	884.156 USD
Stirrup	12,00	u	74.583,71	895.005 USD
Other	83,00	u	23.800,00	1.975.400 USD
CUT&COVER				33.792.000 USD
Demolition	1,32	km	200.000,00	264.000 USD
Screen wall	2,64	km	7.500.000,00	19.800.000 USD
Top slab	1,32	km	3.200.000,00	4.224.000 USD
Urbanization	1,32	km	2.400.000,00	3.168.000 USD
Interior excavation	1,32	km	2.400.000,00	3.168.000 USD
Bottom slab	1,32	km	2.400.000,00	3.168.000 USD
WALLS				8.927.199 USD
Concrete wall	16.027,00	m	557,01	8.927.199 USD
TOTAL STRUCTURES				82.716.243 USD

Table 21. CAPEX: Structures.

Below is a table with the amounts corresponding to each of the lines. The full breakdown of the structures chapter for each of the lines is given in ANNEX II: CAPEX BY LINES.

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	15.379.180 USD	18,6%
Line 2: Atlántico - Alajuela	18.796.282 USD	22,7%
Line 3: Atlántico - Ciruelas	47.222.673 USD	57,1%
Line 4: Alajuela - Ciruelas	1.318.108 USD	1,6%
Line 5: Ciruelas - El Coyol	0 USD	0,0%
Total	82.716.243 USD	100%

Table 22. Distribution of the CAPEX of structures per line.

Track platform and superstructure

This chapter focuses mainly on the type of platform selected along the route, but also includes the switches and crossings corresponding to the service route.

Basically, two groups of superstructures can be distinguished: slab track and ballast track. The ballast track and its possible variations (single/double track and fenced/non-fenced track) have been used mostly in interurban areas due to their lower cost and their ability to run at higher speeds.

In contrast, the slab track has been chosen for urban areas due to its better urban integration as well as its lower space requirement for implementation. Within the slab track, different typologies can be seen; single/double track and fenced/non-fenced track are implemented depending on the space and safety required in each section, while the choice of the type of rail is made according to the exclusivity of the traffic. This is due to the fact that the throat-type rail is commonly used in urban systems thanks to its capacity to coexist with vehicles and pedestrians without reducing the functionality of the area, while the vignole rail has been used in urban areas that will not be shared with other types of transport as the rail characteristics are superior.

PLATFORM AND TRACK SUPERSTRUCTURE	MEASUREMENT	UNIT	PRICE	AMOUNT
BALLAST TRACK				91.210.815 USD
Ballasted track on vignole rail	0,81	km	1.762.810,41	1.427.876 USD
Single ballast track on vignole rail	0,00	km	915.965,29	0 USD
Fenced ballasted track on vignole rail	43,96	km	2.030.530,41	89.262.117 USD
Fenced single ballast track on vignole rail	0,44	km	1.183.685,29	520.822 USD
SLAB TRACK				74.705.003 USD
Slab track on vignole rail	8,89	km	2.021.288,51	17.969.255 USD
Single slab track on vignole rail	0,00	km	1.018.259,59	0 USD
Slab track at station on vignole rail	4,80	km	1.866.874,51	8.960.998 USD
Slab track on throat rail	7,63	km	1.483.904,23	11.322.189 USD
Single slab track on throat rail	0,48	km	749.567,12	359.792 USD
Fenced slab track on vignole rail	11,28	km	2.289.008,51	25.820.016 USD
Fenced single slab track on vignole rail	1,73	km	1.285.979,59	2.224.745 USD
Slab track viaduct on vignole rail	2,74	km	1.778.734,51	4.873.733 USD
Slab track Cut&Cover on vignole rail	1,32	km	2.404.754,51	3.174.276 USD
TRACK EQUIPMENT				12.344.351 USD
Bretelle	16,00	u	425.000,00	6.800.000 USD
Escapes	13,00	u	182.380,43	2.370.946 USD
Deviations	30,00	u	97.015,85	2.910.476 USD
End of track	16,00	u	16.433,12	262.930 USD
TOTAL PLATFORM AND TRACK SUPERSTRUCTURE				178.260.169 USD

Table 23. CAPEX: Platform and track superstructure.

The following table shows the estimate for each Line for the chapter on platform and track superstructure. However, the breakdown of the amount for each line is given in ANNEX II: CAPEX BY LINES.

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	58.074.998 USD	32,6%
Line 2: Atlántico - Alajuela	45.175.027 USD	25,3%
Line 3: Atlántico - Ciruelas	52.401.933 USD	29,4%
Line 4: Alajuela - Ciruelas	17.505.486 USD	9,8%
Line 5: Ciruelas - El Coyol	5.102.725 USD	2,9%
Total	178.260.169 USD	100%

Table 24. Distribution of the CAPEX of platform and track superstructure per line.

Stations

The Electric Train is contemplated with a total of 46 stations (in the CAPEX are included 46 stations and facilities for 47 stations since the execution of Parque Viva would correspond to a private construction) distributed along its different lines. The stations are the connection point between the city and the electric train system, so in order to ensure adequate accessibility for passengers, three main types of station have been designed.

On the one hand, being the most repeated design along the route, the station type with side platforms is formed by 2 platforms at the sides of the track. On the other hand, several station types with a central platform have been arranged as a result of space restrictions in certain areas, so that these stations will have a single platform in the center of the track. Finally, a third type of station will be implemented, the intermodal station, which will have a connection with nearby bus lines thanks to the implementation of bus stations integrated with the train station.

Additionally, there is a unique station, the Atlántico station, which, as it is the central station for the three main lines of the Electric Train, requires a more complex and larger design. This station has been quantified within Line 2 as it would be the first line to be executed.

However, even if there are several station designs, all of them will have platforms at an appropriate height above street level with a length that will allow the accommodation of the rolling stock, which in this case will be in a double composition. The platforms will have metal

canopies to protect passengers from bad weather while waiting, and the accesses will have ramps to guarantee accessibility to all citizens. Thus, the platform platforms will be 90 m long, of which 80 m will correspond to the platforms and 10 to the access ramps. In addition, to prevent intrusion, the stations will be confined by a ticket control system using turnstiles.

STATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
STATION TYPE (SIDE PLATFORMS)	36,00	u	747.554,72	26.911.970 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal canopy structure	10,40	u	57.000,00	592.800 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	1,00	u	22.670,72	22.671 USD
STATION TYPE (CENTRAL PLATFORM)	5,00	u	379.819,36	1.899.097 USD
90 m platform with access ramps	1,00	u	60.000,00	60.000 USD
10 m metal canopy structure	5,20	u	57.000,00	296.400 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	0,50	u	22.670,72	11.335 USD
INTERMODAL STATION	4,00	u	909.638,72	3.638.555 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal structure canopy	10,40	u	57.000,00	592.800 USD
4 m metal canopy structure	5,00	u	30.000,00	150.000 USD
Urbanization	1.200,00	m2	20,14	24.168 USD
Equipment	1,00	u	22.670,72	22.671 USD
UNIQUE STATION	1,00	u	8.000.000,00	8.000.000 USD
Station	1,00	u	5.500.000,00	5.500.000 USD
OCC equipment	1,00	u	1.000.000,00	1.000.000 USD
Urbanization	1,00	u	1.500.000,00	1.500.000 USD
TOTAL STATIONS	40.449.622 USD			

Table 25. CAPEX: Stations.

The cost relating to the stations on each of the lines, details of which are given in ANNEX II: CAPEX BY LINES, is shown in the following table.

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	10.477.850 USD	25,9%
Line 2: Atlántico - Alajuela	18.422.199 USD	45,6%
Line 3: Atlántico - Ciruelas	8.559.354 USD	21,2%
Line 4: Alajuela - Ciruelas	2.242.664 USD	5,5%
Line 5: Ciruelas - El Coyol	747.555 USD	1,8%
Total	40.449.622 USD	100%

Table 26. Distribution of the CAPEX of stations per line.

Depots, workshops and administrative buildings

This chapter includes the costs involved in the construction of the stabling areas and maintenance of the rolling stock, as well as those costs for the construction of the administrative buildings for the workers included in the depots.

Based on the needs for rolling stock and the surface areas available for the construction of depots, it has been determined that four train depot areas are required given the calculations presented in Chapter 22: Depots and workshops of the Third Report. These have been located along the route so that each one can be associated with a line:

- Line 1: Paraíso
- Line 2: Las Cañas
- Line 3: Pacífico
- Line 4: Ciruelas

The four depots will have an entrance control building, stabling area, inspection and washing area, warehouse and offices. Only the Las Cañas depot will have the workshops and maintenance tracks of the Electric Train System of the Great Metropolitan Area, centralizing in this point the preventive and corrective maintenance of the vehicles. Thus, the investment requirements for the needs of depots, workshops and administrative buildings are as follows:

DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	MEASUREMENT	UNIT	PRICE	AMOUNT
PARAÍSO	1,00	u	11.195.844	11.195.844 USD
LAS CAÑAS	1,00	u	33.090.355	33.090.355 USD
PACÍFICO	1,00	u	11.551.293	11.551.293 USD
CIRUELAS	1,00	u	7.602.233	7.602.233 USD
TOTAL DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS				63.439.725 USD

Table 27. CAPEX: Depots, workshops and administrative buildings.

With the above-mentioned parking-line-assignment, the costs for this chapter individually are as follows.

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	11.195.844 USD	17,6%
Line 2: Atlántico - Alajuela	33.090.355 USD	52,2%
Line 3: Atlántico - Ciruelas	11.551.293 USD	18,2%
Line 4: Alajuela - Ciruelas	7.602.233 USD	12,0%
Line 5: Ciruelas - El Coyol	0 USD	0%
Total	63.439.725 USD	100%

Table 28. Distribution of the CAPEX of depots, workshops and administrative buildings per line.

The breakdown of the costs of each car park is detailed in ANNEX II: CAPEX BY LINES, each on its corresponding line.

Drainage

In order to guarantee the correct operation of the infrastructure in the event of extreme rainfall, drainage works have been designed that are capable of evacuating the water falling into the system. Therefore, this chapter includes those Transversal Drainage Works that allow the passage of water from one side to the other of the infrastructure without flooding. These are made up of concrete caissons of different dimensions depending on the needs, as well as bridges that cross the riverbeds that interfere with the layout, although the costs relating to the bridges are included in the chapter on Structures. On the other hand, the Longitudinal Drainage Works are included which allow the evacuation of water falling mainly on the track platform, there being different typologies depending on the track superstructure

of each section. The following table shows the investment required for the implementation of the GAM Electric Train drainage.

DRAINAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
TRANSVERSE DRAINAGE				1.484.656 USD
Frame 3mx2m	4,00	u	33.155,86	132.623 USD
Frame 5mx2,5m	15,00	u	54.015,69	810.235 USD
Frame 7mx3m	6,00	u	90.299,60	541.798 USD
LONGITUDINAL DRAINAGE				10.276.651 USD
Trapezoidal 1,00mx0,50m	91,78	km	63.641,19	5.840.988 USD
Circular diameter 0,40m	36,97	km	112.823,58	4.171.088 USD
Rectangular 0,50mx0,50m	4,52	km	58.534,25	264.575 USD
TOTAL DRAINAGE				11.761.307 USD

Table 29. CAPEX: Drainage.

The distribution of the investment by line is detailed in ANNEX II: CAPEX BY LINE and its total proportion can be seen in the following table.

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	4.212.733 USD	35,8%
Line 2: Atlántico - Alajuela	2.897.742 USD	24,7%
Line 3: Atlántico - Ciruelas	3.067.933 USD	26,1%
Line 4: Alajuela - Ciruelas	1.321.187 USD	11,2%
Line 5: Ciruelas - El Coyol	261.713 USD	2,2%
Total	11.761.307 USD	100%

Table 30. Distribution of the CAPEX of drainage per line.

Electrification

The electrification chapter covers all the installations required for the electricity supply of the different systems. Among them, the main ones can be defined as medium voltage substations and connections, low voltage connections in stations, electrification of depots and their equipment, as well as electrification of the track. The economic estimate of all these elements is summarized in the following table:

ELECTRIFICATION	MEASUREMENT	UNIT	PRICE	AMOUNT
MV SUBSTATIONS AND CONNECTIONS				36.062.383 USD
MV electrical connection	24,00	u	313.935,34	7.534.448 USD
Double group traction substation 1.5 MW	7,00	u	1.237.166,13	8.660.163 USD
Double group traction substation 1 MW	13,00	u	1.143.999,54	14.871.994 USD
Double group traction substation 1 MW for parking	4,00	u	1.248.944,36	4.995.777 USD
STOPS AND LV CONNECTIONS				5.056.779 USD
Single circuit LV electrical connection	47,00	u	33.254,42	1.562.958 USD
Electrical installations at quadruple platform stops	1,00	u	122.622,17	122.622 USD
Electrical installations at double platform stops	41,00	u	75.199,98	3.083.199 USD
Electrical installations at single platform stops	5,00	u	57.599,99	288.000 USD
TRACK ELECTRIFICATION				38.813.639 USD
Catenary compensated on h poles	84,34	km	280.873,38	23.688.861 USD
Bare feeder cable consisting of double copper wire 450 kcmil (2x225 mm2)	84,34	km	79.442,36	6.700.169 USD
Motorized disconnection and remote control	242,00	u	5.555,56	1.344.446 USD
Independent compensation	506,00	u	8.722,22	4.413.443 USD
Fixed anchor point	154,00	u	1.722,22	265.222 USD
Fixed point for catenary	256,00	u	3.888,87	995.551 USD
3 KV line	84,34	km	16.670,00	1.405.948 USD
DEPOT ELECTRIFICATION				2.168.186 USD
240 mm2 copper cable with 1.8/3 kv XLPE insulation for catenary supply	7.300,00	m	50,00	365.000 USD
240 mm2 copper cable with 1.8/3 kv XLPE insulation for return	6.750,00	m	50,00	337.500 USD
Catenary	13,10	km	111.884,44	1.465.686 USD
DEPOT EQUIPMENT				708.228 USD
Intermediate insulator anchoring point	50,00	u	166,67	8.334 USD
Section isolator	63,00	u	1.666,67	105.000 USD
Wiring	7.150,00	m	15,55	111.183 USD
Other facilities	4,00	u	120.927,83	483.711 USD
TOTAL ELECTRIFICATION				82.809.214 USD

Table 31. CAPEX: Electrification.

The part corresponding to each line is presented in the following table and its breakdown is detailed in ANNEX II: CAPEX BY LINES.

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	26.659.661 USD	32,2%
Line 2: Atlántico - Alajuela	23.087.952 USD	27,9%
Line 3: Atlántico - Ciruelas	24.263.599 USD	29,3%
Line 4: Alajuela - Ciruelas	7.580.893 USD	9,2%
Line 5: Ciruelas - El Coyol	1.217.109 USD	1,4%
Total	82.809.214 USD	100%

Table 32. Distribution of the CAPEX of electrification per line.

Signaling systems

The signaling section includes the signaling and traffic control systems required to regulate train traffic avoiding unsafe interferences between them, as well as with the rest of the transport modes. For this, rail signaling, and protection are identified on the one hand and road marking on the other hand.

SIGNALLING SYSTEMS	MEASUREMENT	UNIT	PRICE	AMOUNT
RAIL SIGNALLING				36.400.000 USD
In-line interlocking signaling	22,00	u	1.400.000,00	30.800.000 USD
Depot interlocking signaling	4,00	u	1.400.000,00	5.600.000 USD
RAILWAY PROTECTION				27.753.000 USD
On-track equipment	84,85	km	180.000,00	15.273.000 USD
On-board equipment	156,00	u	80.000,00	12.480.000 USD
ROAD SIGNS				14.140.000 USD
Pedestrian walkway configuration	94,00	u	10.000,00	940.000 USD
Level crossings with barrier and crossing conditioning	220,00	u	60.000,00	13.200.000 USD
TOTAL SIGNALLING SYSTEMS				78.293.000 USD

Table 33. CAPEX: Signaling systems.

In an independent analysis of the lines, detailed in ANNEX II: CAPEX BY LINES, the costs of signaling are distributed as follows for each line:

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	26.363.000 USD	33,7%
Line 2: Atlántico - Alajuela	21.546.000 USD	27,5%
Line 3: Atlántico - Ciruelas	21.634.000 USD	27,6%
Line 4: Alajuela - Ciruelas	6.304.000 USD	8,1%
Line 5: Ciruelas - El Coyol	2.446.000 USD	3,1%
Total	78.293.000 USD	100%

Table 34. Distribution of the CAPEX of signaling per line.

Systems and communications

This chapter groups together the communications networks and systems required for the operation of Electric Train. The planned communications network is based on a fixed communications network that connects the Centralized Control Centre (CCP), located in the Atlántico station, with the rest of the facilities, i.e. stations, substations and car parks. This network will provide service to the operating aid, telephony and intercom systems,

passenger information systems, sound, ticket distribution and validation, security, chronometry, signaling and remote energy control. The following table has been budgeted for this purpose:

SYSTEMS AND COMMUNICATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
OPTICAL FIBER				2.105.067 USD
Single-mode F.O. cable	93,34	km	8.333,33	777.833 USD
Modular F.O. distributor	76,00	u	5.388,89	409.556 USD
Cable head termination 64 F.O.	152,00	u	1.196,67	181.894 USD
1 F.O. splice	4.864,00	u	44,44	216.156 USD
1 F.O. connection	4.864,00	u	83,33	405.317 USD
1 F.O. bi-directional reflectometric measurement	64,00	u	50,00	3.200 USD
Fiber monitoring system	1,00	u	111.111,11	111.111 USD
FIXED COMMUNICATIONS NETWORK				1.837.373 USD
Copper UTP wiring	14.000,00	m	5,56	77.840 USD
Station/Substation Switch (level 2)	81,00	u	13.333,33	1.089.000 USD
Level 3 switch	8,00	u	20.277,78	162.222 USD
Copper distributor	76,00	u	227,78	17.311 USD
19" rack cabinet	85,00	u	2.000,00	170.000 USD
Integrated Service Network Configuration	89,00	u	3.333,33	296.666 USD
Central server for network management and communications	2,00	u	16.666,67	33.333 USD
WIFI				446.667 USD
WIFI infrastructure	1,00	u	446.667,00	446.667 USD
TETRA				8.127.395 USD
TETRA infrastructure	84,85	km	95.785,44	8.127.395 USD
TRAVELER INFORMATION SYSTEM (SIV)				1.716.330 USD
Terminal stop	182,00	u	6.333,33	1.152.666 USD
Local server stop indicators	47,00	u	2.508,89	117.918 USD
42" hall monitor.	91,00	u	3.213,33	292.413 USD
Central system	1,00	u	153.333,33	153.333 USD
MEGAPHONE				1.155.555 USD
Speaker, power amplifier, local server	47,00	u	22.222,22	1.044.444 USD
Central system	1,00	u	111.111,11	111.111 USD
TICKETS				18.240.000 USD
Vending machine	178,00	u	40.000,00	7.120.000 USD
Cancellation machine	534,00	u	20.000,00	10.680.000 USD
Central system	1,00	u	220.000,00	220.000 USD
Vending machine software development	1,00	u	110.000,00	110.000 USD
Cancellation software development	1,00	u	110.000,00	110.000 USD
TELEPHONY AND INTERCOM				214.152 USD
IP Intercom	182,00	u	694,44	126.388 USD
IP Phone	129,00	u	227,78	29.384 USD
Quadrangular distribution	1,00	u	2.824,44	2.824 USD
Central system	1,00	u	55.555,56	55.556 USD

CHRONOMETRY				286.667 USD
NTP PoE Clock	91,00	u	3.000,00	273.000 USD
Central Time Server	1,00	u	9.111,11	9.111 USD
Time Zone	2,00	u	1.333,33	2.667 USD
GPS antenna	2,00	u	944,44	1.889 USD
CCTV				1.719.445 USD
Outdoor fixed camera	165,00	u	5.000,00	825.000 USD
Recorder station	47,00	u	16.666,67	783.333 USD
Central system	1,00	u	111.111,11	111.111 USD
CCTA				130.556 USD
CCTA module	47,00	u	2.777,78	130.556 USD
SAE				222.222 USD
Central SAFs	1,00	u	222.222,22	222.222 USD
CENTRAL CONTROL STATION (PCC)				604.667 USD
Videowall	1,00	u	333.333,33	333.333 USD
LAN Network	1,00	u	111.111,11	111.111 USD
Operator PC	23,00	u	2.666,67	61.333 USD
Communication cabinets	15,00	u	3.333,33	50.000 USD
5m UTP copper cabling	300,00	m	38,89	11.667 USD
15m UTP copper cabling	300,00	m	50,00	15.000 USD
Installation, configuration, testing and commissioning of the PMC	1,00	u	22.222,22	22.222 USD
TOTAL SYSTEMS AND COMMUNICATIONS				36.806.095 USD

Table 35. CAPEX: Systems and communications.

The amount for each line is detailed in ANNEX II: CAPEX BY LINES. However, the table below shows the total amounts for each.

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	11.387.979 USD	30,8%
Line 2: Atlántico - Alajuela	11.808.517 USD	32,2%
Line 3: Atlántico - Ciruelas	10.026.291 USD	27,2%
Line 4: Alajuela - Ciruelas	2.713.421 USD	7,4%
Line 5: Ciruelas - El Coyol	869.886 USD	2,4%
Total	36.806.095 USD	100%

Table 36. Distribution of the CAPEX of electrification per line.

Urban integration

Given the social and urban relevance of the project, it has the capacity to bring about important changes in the city. For this reason, and in order to emphasize the image of the new transport system, in the economic quantification of urban integration, it has been considered an important item per kilometer of route so that the new system is easily recognizable and identifiable, both for its direct components and those that indirectly constitute the image of the whole (paving, furniture and other components of the network).

Therefore, these urban integration works include those necessary to reach the standard sections indicated for each road superstructure typology in Chapter 16: Urban Integration of the Third Report.

In addition, another item has been included corresponding to those stations that, without having been designed with a new bus station, as they are intermodal stations, have the possibility of implementing bus stations integrated with the train station.

URBAN INTEGRATION	MEASUREMENT	UNIT	PRICE	AMOUNT
A LUMP SUM FOR URBAN INTEGRATION	84,85	km	280.000,00	23.758.000 USD
A LUMP SUM FOR POSSIBLE INTERMODAL STATION	10,00	u	100.000,00	1.000.000 USD
TOTAL URBAN INTEGRATION	24.758.000 USD			

Table 37. CAPEX: Urban integration.

The breakdown by line is detailed in ANNEX II: CAPEX BY LINES and its conclusion can be seen in the following table.

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	7.958.000 USD	32,1%
Line 2: Atlántico - Alajuela	6.376.000 USD	25,8%
Line 3: Atlántico - Ciruelas	7.484.000 USD	30,2%
Line 4: Alajuela - Ciruelas	2.184.000 USD	8,8%
Line 5: Ciruelas - El Coyol	756.000 USD	3,1%
Total	24.758.000 USD	100%

Table 38. Distribution of the CAPEX of urban integration per line.

Rehabilitation of historical heritage assets

As a consequence of the existence of heritage stations along the route of the Electric Train, a budgetary chapter of an indicative nature has been considered for protection and possible extraordinary repairs. The investment has been made according to the historical heritage stations found on each line, 1 on Line 1 (Cartago), 2 on Line 2 (Atlántico and Heredia) and 2 on Line 3 (Pacífico and Belén) so that the corresponding estimate is shown below:

RESTORATION OF HISTORICAL HERITAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
A LUMP SUM FOR THE REHABILITATION OF HISTORICAL HERITAGE	1,00	PA	12.500.000	12.500.000 USD
TOTAL REHABILITATION OF HISTORICAL HERITAGE PROPERTIES	12.500.000 USD			

Table 39. CAPEX: Rehabilitation of historical heritage assets.

Each of the lines corresponds to the following amount:

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	2.500.000 USD	20,0%
Line 2: Atlántico - Alajuela	5.000.000 USD	40,0%
Line 3: Atlántico - Ciruelas	5.000.000 USD	40,0%
Line 4: Alajuela - Ciruelas	0 USD	0,0%
Line 5: Ciruelas - El Coyol	0 USD	0,0%
Line 1: Paraíso - Atlántico	12.500.000 USD	100%

Table 40. Distribution of the CAPEX of the rehabilitation of historical heritage assets per line.

Affected services and replacements

The purpose of this chapter is to assess the work required to replace the services affected during the construction of the GAM Electric Train. Following the study carried out in the report corresponding to the affected services, a measurement has been made of the services that will be affected as a result of the implementation of the Electric Train. These results have enabled a preliminary economic quantification to be made and it has been determined that the costs of affected services and replacements are approximately 5.5% of

the cost of the infrastructures. This percentage is applied to the subtotal in "Infrastructures and systems" up to the item "Rehabilitation of assets" of historical heritage.

AFFECTED SERVICES AND REPLACEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM FOR AFFECTED SERVICES AND REPLENISHMENT	5,50	%	6.292.424,63	34.608.335 USD
TOTAL AFFECTED SERVICES AND REPLACEMENT	34.608.335 USD			

Table 41. CAPEX: Affected services and replacements.

Each of the lines corresponds to the following amount:

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	9.890.825 USD	28,6%
Line 2: Atlántico - Alajuela	10.486.444 USD	30,3%
Line 3: Atlántico - Ciruelas	10.802.760 USD	31,2%
Line 4: Alajuela - Ciruelas	2.770.704 USD	8,0%
Line 5: Ciruelas - El Coyol	657.604 USD	1,9%
Total	34.608.335 USD	100%

Table 42. Distribution of the CAPEX of affected services and replacements per line.

Quality control

Quality control serves to ensure that during the building process the specifications of the project are met, as well as adequate quality conditions and applicable regulations. For this reason, the chapter corresponding to quality control has been quantified in the form of a raised item, based on IDOM's experience in similar projects, it is considered that 1% of the value of the work is enough, as shown in the following table. This percentage is applied to the subtotal in "Infrastructures and systems" up to the item "Rehabilitation of assets" of historical heritage.

QUALITY CONTROL	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF QUALITY CONTROL	1,00	%	6.292.424,63	6.292.425 USD
TOTAL QUALITY CONTROL	6.292.425 USD			

Table 43. CAPEX: Quality Control.

Each of the lines corresponds to the following amount:

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	1.798.332 USD	28,6%
Line 2: Atlántico - Alajuela	1.906.626 USD	30,3%
Line 3: Atlántico - Ciruelas	1.964.138 USD	31,2%
Line 4: Alajuela - Ciruelas	503.764 USD	8,0%
Line 5: Ciruelas - El Coyol	119.564 USD	1,9%
Total	6.292.425 USD	100%

Table 44. Distribution of the CAPEX of quality control per line.

Waste management

In order to reduce the environmental impact generated by the waste produced on the site, waste management aims at the prevention, reuse, recycling and other forms of recovery of construction and demolition waste, ensuring that waste destined for disposal operations is treated appropriately. To this end, this chapter is budgeted as a lump sum item in this study, with 0.5% of the cost of the work being a reasonable value based on IDOM's experience in similar projects. This percentage is applied to the subtotal in "Infrastructures and systems" up to the item "Rehabilitation of assets" of historical heritage.

WASTE MANAGEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF WASTE MANAGEMENT	0,50	%	6.292.424,63	3.146.212 USD
TOTAL WASTE MANAGEMENT	3.146.212 USD			

Table 45. CAPEX: Waste management.

Each of the lines corresponds to the following amount:

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	899.166 USD	28,6%
Line 2: Atlántico - Alajuela	953.313 USD	30,3%
Line 3: Atlántico - Ciruelas	982.069 USD	31,2%
Line 4: Alajuela - Ciruelas	251.882 USD	8,0%
Line 5: Ciruelas - El Coyol	59.782 USD	1,9%
Total	3.146.212 USD	100%

Table 46. Distribution of the CAPEX of waste management per line.

Health and Safety

It includes all procedures, equipment and auxiliary means to be used in the work in order to reduce the foreseen occupational risks. At the level of this study, the corresponding health and safety item is considered to be an increased item of 1.5% of the cost of the work, common values for projects of this importance based on IDOM's experience. This percentage is applied to the subtotal in "Infrastructures and systems" up to the item "Rehabilitation of assets" of historical heritage.

HEALTH AND SAFETY	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF HEALTH AND SAFETY	1,50	%	6.292.424,63	9.438.637 USD
TOTAL HEALTH AND SAFETY	9.438.637 USD			

Table 47. CAPEX: Health and Safety.

Each of the lines corresponds to the following amount:

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	2.697.498 USD	28,6%
Line 2: Atlántico - Alajuela	2.859.939 USD	30,3%
Line 3: Atlántico - Ciruelas	2.946.207 USD	31,2%
Line 4: Alajuela - Ciruelas	755.646 USD	8,0%
Line 5: Ciruelas - El Coyol	179.346 USD	1,9%
Total	9.438.637 USD	100%

Table 48. Distribution of the CAPEX of health and safety per line.

2.2.2 Indirect costs

The indirect costs for this phase in this type of project are represented as a percentage of the total direct costs that make up the project. In the case of Costa Rica, the following concepts are commonly considered among the indirect costs:

- Contingencies
- Administration
- Utility

It is usual that the sum of the concepts mentioned is between 10% and 13%, although the distribution may vary considerably depending on the contractor, since there are no fixed values of obligatory compliance for this type of contract. For this reason and merely as a reference, 11% has been applied as an estimate of contingency, administration and utility costs. This percentage is applied to the subtotal of the "Infrastructure and Systems" chapter.

INDIRECT COSTS	MEASUREMENT	UNIT	PRICE	AMOUNT
CONTINGENCIES, ADMINISTRATION AND UTILITY	11,00	%	6.827.280,72	75.100.088 USD
TOTAL INDIRECT COSTS	75.100.088 USD			

Table 49. CAPEX: Indirect costs.

Each of the lines corresponds to the following amount:

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	21.463.089 USD	28,6%
Line 2: Atlántico - Alajuela	22.755.583 USD	30,3%
Line 3: Atlántico - Ciruelas	23.441.989 USD	31,2%
Line 4: Alajuela - Ciruelas	6.012.427 USD	8,0%
Line 5: Ciruelas - El Coyol	1.427.000 USD	1,9%
Total	75.100.088 USD	100%

Table 50. Distribution of the CAPEX of indirect costs per line.

2.2.3 Rolling stock

The rolling stock units correspond to 5-module electric traction light articulated trains in double composition. This chapter includes all the trains required for the operation of the 5 lines as a whole, including the back-up trains. To be able to operate the service with frequencies of 5 minutes on Lines 1, 2 and 3 and with 10 minutes on Lines 4 and 5 at peak times, a total of 70 trains are required to which 8 more are added in maintenance and reserve. Of the 78 trains required to offer the service, 26 correspond to Line 1, 22 to Line 2, 24 to Line 3 and 6 to Line 4. Line 5 will not require rolling stock since, as it is an extension with a stop on line 3, the fleet of this line will be enough to cover the entire route. The

corresponding calculations can be found in detail in Chapter 21: Operation and Maintenance of the Third Report. The cost of the train fleet is shown below:

ROLLING STOCK	MEASUREMENT	UNIT	PRICE	AMOUNT
DOUBLE COMPOSITION ELECTRIC TRAIN	78,00	u	5.800.000,00	452.400.000 USD
TOTAL ROLLING STOCK	452.400.000 USD			

Table 51. CAPEX: Rolling stock.

Each of the lines corresponds to the following amount:

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	150.800.000 USD	33,3%
Line 2: Atlántico - Alajuela	127.600.000 USD	28,2%
Line 3: Atlántico - Ciruelas	139.200.000 USD	30,8%
Line 4: Alajuela - Ciruelas	34.800.000 USD	7,7%
Line 5: Ciruelas - El Coyol	0 USD	0,0%
Total	452.400.000 USD	100%

Table 52. Distribution of the CAPEX of rolling stock per line.

2.2.4 Design and implementation

As far as project design and implementation are concerned, these are normally defined as a percentage of the total project amount. Therefore, this chapter will be defined as a percentage of the project cost. On the one hand, the item corresponding to the development of the project and the final designs of the project itself is contemplated as 2.5 per cent of the infrastructure costs and indirect costs. And on the other hand, construction supervision, project management (also called the executing unit) and the grantor's contingencies are defined as a percentage of the infrastructure costs, indirect costs and rolling stock, with 3.5 per cent, 0.5 per cent and 1.0 per cent respectively. These concepts cover the management and assistance of project work, both by the builder and by the party contracted by the developer to supervise the work.

DESIGN AND IMPLEMENTATION	MEASUREMENT	UNIT	PRICE	AMOUNT
BASIC ENGINEERING AND FINAL DESIGNS	2,50	%	7.578.281,60	18.945.704 USD
CONSTRUCTION SUPERVISION	3,50	%	12.102.281,60	42.357.986 USD
PROJECT MANAGEMENT	0,50	%	12.102.281,60	6.051.141 USD
COST CONTINGENCIES OF THE GRANTOR IN THE CONSTRUCTION PHASE	1,00	%	12.102.281,60	12.102.282 USD
TOTAL DESIGN AND IMPLEMENTATION	79.457.112 USD			

Table 53. CAPEX: Design and implementation.

The amounts relating to the designs and implementations of the different lines individually are broken down in ANNEX II: CAPEX BY LINES, while the following table shows the totals for each line for this chapter.

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	23.783.656 USD	29,9%
Line 2: Atlántico - Alajuela	23.601.839 USD	29,7%
Line 3: Atlántico - Ciruelas	24.701.323 USD	31,1%
Line 4: Alajuela - Ciruelas	6.290.314 USD	7,9%
Line 5: Ciruelas - El Coyol	1.079.979 USD	1,4%
Total	79.457.112 USD	100%

Table 54. Distribution of the CAPEX of design and implementation per line.

2.2.5 SEVRI

Following the methodology of the MIDEPLAN, the costs relating to the Specific System of Institutional Risk Assessment (SEVRI, Sistema Específico de Valoración del Riesgo Institucional) are included in the CAPEX. The costs associated to SEVRI are made up of 0.5% of the investment corresponding to infrastructure and systems, rolling stock and designs and implementation.

SEVRI	MEASUREMENT	UNIT	PRICE	AMOUNT
COSTS ASSOCIATED WITH THE SEVRI	0,5	%	12.896.852,72	6.448.426 USD
TOTAL SEVRI	6.448.426 USD			

Table 55. CAPEX: SEVRI.

The quantities of each unit for the 5 lines can be seen in ANNEX II: CAPEX BY LINES. However, the proportion of each unit in the total estimate for the land is shown below.

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	1.955.829 USD	30,3%
Line 2: Atlántico - Alajuela	1.904.132 USD	29,5%
Line 3: Atlántico - Ciruelas	2.002.261 USD	31,1%
Line 4: Alajuela - Ciruelas	508.806 USD	7,9%
Line 5: Ciruelas - El Coyol	77.399 USD	1,2%
Total	6.448.426 USD	100%

Table 56. Distribution of the CAPEX of SEVRI per line.

2.2.6 Land

The land corresponds to those areas of private property that require expropriation in order to run the Electric Train, either because they interfere with the right-of-way, because they coincide with plots of land required for the construction of parking lots, or because of space restrictions in station areas. Based on the information in Chapter 24: Expropriations, the economic estimate of the action is as follows, to which 5% has been applied as a provision for acquisition risks.

LAND	MEASUREMENT	UNIT	PRICE	AMOUNT
LAND ACQUISITION	49.925.300	USD	1,00	49.925.300 USD
ACQUISITION OF PROPERTY	13.057.517	USD	1,00	13.057.517 USD
PROCUREMENT RISK PROVISION	5,00	%	629.828,18	3.149.141 USD
TOTAL LAND	66.131.959 USD			

Table 57. CAPEX: Land.

The quantities of each unit for the 5 lines can be seen in ANNEX II: CAPEX BY LINES. However, the proportion of each unit in the total estimate for the land is shown below.

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	7.842.224 USD	11,9%
Line 2: Atlántico - Alajuela	25.461.946 USD	38,5%
Line 3: Atlántico - Ciruelas	24.637.036 USD	37,3%
Line 4: Alajuela - Ciruelas	7.561.679 USD	11,4%
Line 5: Ciruelas - El Coyol	629.074 USD	1,0%
Total	66.131.959 USD	100%

Table 58. Distribution of the CAPEX of the properties per line.

2.2.7 Environmental and social measures

In the last chapter, two items have been contemplated for possible measures to be taken from the environmental and social points of view in order to reduce the possible impacts that the GAM Electric Train could generate. Details of the environmental and social measures are included in the Second Report.

ENVIRONMENTAL AND SOCIAL MEASURES	MEASUREMENT	UNIT	PRICE	AMOUNT
ENVIRONMENTAL MEASURES	1	PA	5.000.000,00	5.000.000 USD
SOCIAL MEASURES	1	PA	5.000.000,00	5.000.000 USD
TOTAL ENVIRONMENTAL AND SOCIAL MEASURES	10.000.000 USD			

Table 59. CAPEX: Environmental and social measures.

By distributing these amounts proportionally, the investment in environmental and social measures in each of the lines is:

	AMOUNT	PROPORTION
Line 1: Paraíso - Atlántico	3.200.000 USD	32,0%
Line 2: Atlántico - Alajuela	2.600.000 USD	26,0%
Line 3: Atlántico - Ciruelas	3.000.000 USD	30,0%
Line 4: Alajuela - Ciruelas	900.000 USD	9,0%
Line 5: Ciruelas - El Coyol	300.000 USD	3,0%
Total	10.000.000 USD	100%

Table 60. Distribution of the CAPEX of environmental and social measures per line.

2.2.8 Alternative with uneven intersections

At the request of INCOFER, in response to the express request of the Ministry of Public Works and Transport as the governing body in this area, it is requested that those points which, according to the HCM methodology, report a level of service greater than C, be made unlevelled. On the basis of this project and after analyzing these intersections, it has been concluded that in 3 of them road mode underpasses must be made, while in the rest of the intersections, the only alternative for making the crossings unlevelled is to raise the railway mode by means of viaducts. The justification for the above solutions is shown in ANNEX III: ANALYSIS OF INTERSECTIONS TO BE UNEVEN. The table below shows the intersections studied:

Name	PK	Solution
Loyola, Cartago	108+380	Railway viaduct
Curridabat	123+605	Railway viaduct
Antigua Aduana	127+100	Road underpass
Calle Blancos	201+670	Railway viaduct
Metalco	203+605	Railway viaduct
Santa Rosa	206+320	Railway viaduct
Río Segundo, est.	216+000	Railway viaduct
Río Segundo	217+730	Road underpass
Las Cañas	220+300	Railway viaduct
Hospital	220+750	Railway viaduct
Ciruelas RCA	406+590	Railway viaduct
Salida Platel	302+310	Road underpass
Demasa	310+790	Railway viaduct
Corazón de Jesús	320+020	Railway viaduct

Table 61. Uneven intersections in the alternative.

In order to carry out the intersections at different levels, an economic estimate has been made, obtaining as a result, a required investment of 1,553,962,837 USD, for the complete project.

The breakdown of this investment can be seen in the following tables:

BUDGET	AMOUNT	PROPORTION
INFRASTRUCTURES AND SYSTEMS	834.241.346 USD	53,68%
INDIRECT COSTS	91.766.548 USD	5,91%
ROLLING STOCK	452.400.000 USD	29,11%
DESIGN AND IMPLEMENTATION	92.070.592 USD	5,92%
RISK ASSESSMENT SYSTEM	7.352.392 USD	0,47%
LAND	66.131.959 USD	4,26%
ENVIRONMENTAL AND SOCIAL MEASURES	10.000.000 USD	0,64%
TOTAL	1.553.962.837 USD	

Table 62. CAPEX of the GAM Electric Train with uneven crossings.

INFRASTRUCTURES AND SYSTEMS	AMOUNT	PROPORTION
PRELIMINARY WORKS	17.449.088 USD	2,09%
STRUCTURES	210.398.938 USD	25,22%
PLATFORM AND TRACK SUPERSTRUCTURE	178.260.169 USD	21,37%
STATIONS	52.410.497 USD	6,28%
DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	63.439.725 USD	7,60%
DRAINAGE	11.761.307 USD	1,41%
ELECTRIFICATION	82.809.214 USD	9,93%
SIGNALLING SYSTEMS	78.293.000 USD	9,38%
SYSTEMS AND COMMUNICATIONS	36.806.095 USD	4,41%
URBAN INTEGRATION	24.758.000 USD	2,97%
RESTORATION OF HISTORICAL HERITAGE	12.500.000 USD	1,50%
AFFECTED SERVICES AND REPLACEMENT	42.288.732 USD	5,07%
QUALITY ASSURANCE	7.688.860 USD	0,92%
WASTE MANAGEMENT	3.844.430 USD	0,46%
HEALTH AND SAFETY	11.533.290 USD	1,38%
TOTAL INFRASTRUCTURE AND SYSTEMS	834.241.346 USD	

Table 63. CAPEX: Infrastructures and systems with uneven crossings.

PRELIMINARY WORKS	MEDICIÓN	UNIDAD	PRECIO	IMPORTE
TOPOGRAPHIC CAMPAIGN				850.000 USD
Topographical Campaign's Raised Item	8.500,00	ha	100,00	850.000 USD
GEOTECHNICAL CAMPAIGN				1.326.088 USD
Mobilization and demobilization of equipment and personnel to the area of operation	20,00	u	1.000,00	20.000 USD
Moving drilling machinery between geotechnical boreholes	262,00	u	100,00	26.200 USD
Vertical drilling with continuous core extraction in all types of terrain	5.240,00	m	155,00	812.200 USD
Unchanged sample taking	1.048,00	u	40,00	41.920 USD
SPT (Standard Penetration Test)	1.048,00	u	40,00	41.920 USD
Wax sampling on rock barrel	131,00	u	5,00	655 USD
Boxes of plastic or waxed cardDECK for storing core material obtained by rotary drilling	1.747,00	u	3,00	5.241 USD
Polling testimony, photo reportage and final records	5.240,00	m	3,00	15.720 USD
PVC grooved tube, for measuring water levels	327,50	m	10,00	3.275 USD
Measurement of groundwater levels	49,13	u	5,00	246 USD
Water sampling in drilling	13,10	u	15,00	197 USD
Dynamic Penetration DPSH/Blast	2.175,00	m	15,00	32.625 USD
Geophysical research	4.800,00	m	14,00	67.200 USD
Mechanical (Backhoe) tiling up to 3-4m	137,00	u	175,00	23.975 USD
Unaltered sampling in calicata by means of a waxed block	137,00	u	100,00	13.700 USD
Laboratory	20,00	%	11.050,73	221.015 USD
TRANSIT DEVIATIONS				4.242.500 USD
Lifting of transit deviations	84,85	km	50.000,00	4.242.500 USD
DEVIATION AND PROTECTION OF NETWORKS				4.242.500 USD
Raised departure of deviation and protection of networks	84,85	km	50.000,00	4.242.500 USD
CLEANING, REMOVALS AND DEMOLITIONS				6.788.000 USD
Lift off for cleaning, track removal and dismantling	84,85	km	80.000,00	6.788.000 USD
TOTAL PRELIMINARY WORK				17.449.088 USD

Table 64. CAPEX: Preliminary work with uneven crossings.

STRUCTURES	MEASUREMENT	UNIT	PRICE	AMOUNT
BRIDGES				20.219.641 USD
Deck (width 9m) prefabricated double t-beam depth 0,60m	241,34	m	3.430,40	827.893 USD
Deck (width 11m) prefabricated double t-beam depth 0,60m	20,25	m	4.128,28	83.598 USD
Deck (width 9m) prefabricated double t-beam depth 0,90m	109,05	m	3.936,80	429.308 USD
Deck (width 9m) prefabricated double t-beam depth 1,20m	119,63	m	4.443,16	531.535 USD
Deck (width 11m) prefabricated double t-beam depth 1,20m	81,76	m	5.394,23	441.032 USD
Deck (width 9m) prefabricated double t-beam depth 1,40m	161,76	m	4.780,76	773.336 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	245,58	m	5.202,72	1.277.684 USD
Bridge pier	50,00	m	1.976,66	98.833 USD
Bridge pier foundation	9,00	u	11.482,55	103.343 USD
Strirrup	84,00	u	74.583,71	6.265.032 USD
Other	51,00	u	23.800,00	1.213.800 USD
Single track bridge renovation	1.119,76	m2	7.300,00	8.174.248 USD
VIADUCTS				66.460.097 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	5.353,70	m	5.202,72	27.853.802 USD
Deck (width 11m) prefabricated double t-beam depth 1,65m	3.450,00	m	6.343,68	21.885.696 USD
Viaduct pier	1.387,00	m	3.573,23	4.956.070 USD
Viaduct pier foundation	255,00	u	11.482,55	2.928.050 USD
Strirrup	32,00	u	74.583,71	2.386.679 USD
Other	271,00	u	23.800,00	6.449.800 USD
CUT&COVER				33.792.000 USD
Demolition	1,32	km	200.000,00	264.000 USD
Wall screen	2,64	km	7.500.000,00	19.800.000 USD
Top slab	1,32	km	3.200.000,00	4.224.000 USD
Urbanization	1,32	km	2.400.000,00	3.168.000 USD
Interior excavation	1,32	km	2.400.000,00	3.168.000 USD
Bottom slab	1,32	km	2.400.000,00	3.168.000 USD
UNDERPASSES				81.000.000 USD
Bottom step	27.000,00	m2	2.000,00	54.000.000 USD
Reurbanization	27.000,00	m2	500,00	13.500.000 USD
Services affected	20,00	%	675.000,00	13.500.000 USD
WALLS				8.927.199 USD
Concrete wall	16.027,00	m	557,01	8.927.199 USD
TOTAL STRUCTURES				210.398.938 USD

Table 65. CAPEX: Structures with uneven crossings.

PLATFORM AND TRACK SUPERSTRUCTURE	MEASUREMENT	UNIT	PRICE	AMOUNT
BALLAST TRACK				91.210.815 USD
Ballasted track on vignole rail	0,81	km	1.762.810,41	1.427.876 USD
Single ballast track on vignole rail	0,00	km	915.965,29	0 USD
Fenced ballasted track on vignole rail	43,96	km	2.030.530,41	89.262.117 USD
Fenced single ballast track on vignole rail	0,44	km	1.183.685,29	520.822 USD
SLAB TRACK				74.705.003 USD
Slab track on vignole rail	8,89	km	2.021.288,51	17.969.255 USD
Single slab track on vignole rail	0,00	km	1.018.259,59	0 USD
Slab track at station on vignole rail	4,80	km	1.866.874,51	8.960.998 USD
Slab track on throat rail	7,63	km	1.483.904,23	11.322.189 USD
Single slab track on throat rail	0,48	km	749.567,12	359.792 USD
Fenced slab track on vignole rail	11,28	km	2.289.008,51	25.820.016 USD
Fenced single slab track on vignole rail	1,73	km	1.285.979,59	2.224.745 USD
Slab track viaduct on vignole rail	2,74	km	1.778.734,51	4.873.733 USD
Slab track Cut&Cover on vignole rail	1,32	km	2.404.754,51	3.174.276 USD
TRACK EQUIPMENT				12.344.351 USD
Bretelle	16,00	u	425.000,00	6.800.000 USD
Escapes	13,00	u	182.380,43	2.370.946 USD
Deviations	30,00	u	97.015,85	2.910.476 USD
End of track	16,00	u	16.433,12	262.930 USD
TOTAL PLATFORM AND TRACK SUPERSTRUCTURE				178.260.169 USD

Table 66. CAPEX: Platform and track superstructure with uneven crossings.

STATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
STATION TYPE (SIDE PLATFORMS)	32,00	u	747.554,72	23.921.751 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal canopy structure	10,40	u	57.000,00	592.800 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	1,00	u	22.670,72	22.671 USD
STATION TYPE (CENTRAL PLATFORM)	5,00	u	379.819,36	1.899.097 USD
90 m platform with access ramps	1,00	u	60.000,00	60.000 USD
10 m metal canopy structure	5,20	u	57.000,00	296.400 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	0,50	u	22.670,72	11.335 USD
INTERMODAL STATION	4,00	u	909.638,72	3.638.555 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal structure canopy	10,40	u	57.000,00	592.800 USD
4 m metal canopy structure	5,00	u	30.000,00	150.000 USD
Urbanization	1.200,00	m2	20,14	24.168 USD
Equipment	1,00	u	22.670,72	22.671 USD
ELEVATED STATION	4,00	u	3.737.773,60	14.951.094 USD
UNIQUE STATION	1,00	u	8.000.000,00	8.000.000 USD
Station	1,00	u	5.500.000,00	5.500.000 USD
OCC equipment	1,00	u	1.000.000,00	1.000.000 USD
Urbanization	1,00	u	1.500.000,00	1.500.000 USD
TOTAL STATIONS				52.410.497 USD

Table 67. CAPEX: Stations with uneven crossings.

DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	MEASUREMENT	UNIT	PRICE	AMOUNT
PARAÍSO	1,00	u	11.195.844	11.195.844 USD
LAS CAÑAS	1,00	u	33.090.355	33.090.355 USD
PACÍFICO	1,00	u	11.551.293	11.551.293 USD
CIRUELAS	1,00	u	7.602.233	7.602.233 USD

TOTAL PARKING LOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	63.439.725 USD			
---	-----------------------	--	--	--

Table 68. CAPEX: Depots, workshops and administrative buildings with uneven crossings.

DRAINAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
TRANSVERSE DRAINAGE				1.484.656 USD
Frame 3mx2m	4,00	u	33.155,86	132.623 USD
Frame 5mx2,5m	15,00	u	54.015,69	810.235 USD
Frame 7mx3m	6,00	u	90.299,60	541.798 USD
LONGITUDINAL DRAINAGE				10.276.651 USD
Trapezoidal 1,00mx0,50m	91,78	km	63.641,19	5.840.988 USD
Circular diameter 0,40m	36,97	km	112.823,58	4.171.088 USD
Rectangular 0,50mx0,50m	4,52	km	58.534,25	264.575 USD

TOTAL DRAINAGE	11.761.307 USD			
-----------------------	-----------------------	--	--	--

Table 69. CAPEX: Drainage with uneven crossings.

ELECTRIFICATION	MEASUREMENT	UNIT	PRICE	AMOUNT
MV SUBSTATIONS AND CONNECTIONS				36.062.383 USD
MV electrical connection	24,00	u	313.935,34	7.534.448 USD
Double group traction substation 1.5 MW	7,00	u	1.237.166,13	8.660.163 USD
Double group traction substation 1 MW	13,00	u	1.143.999,54	14.871.994 USD
Double group traction substation 1 MW for parking	4,00	u	1.248.944,36	4.995.777 USD
STOPS AND LV CONNECTIONS				5.056.779 USD
Single circuit LV electrical connection	47,00	u	33.254,42	1.562.958 USD
Electrical installations at quadruple platform stops	1,00	u	122.622,17	122.622 USD
Electrical installations at double platform stops	41,00	u	75.199,98	3.083.199 USD
Electrical installations at single platform stops	5,00	u	57.599,99	288.000 USD
TRACK ELECTRIFICATION				38.813.639 USD
Catenary compensated on h poles	84,34	km	280.873,38	23.688.861 USD
Bare feeder cable consisting of double copper wire 450 kcmil (2x225 mm2)	84,34	km	79.442,36	6.700.169 USD
Motorized disconnection and remote control	242,00	u	5.555,56	1.344.446 USD
Independent compensation	506,00	u	8.722,22	4.413.443 USD
Fixed anchor point	154,00	u	1.722,22	265.222 USD
Fixed point for catenary	256,00	u	3.888,87	995.551 USD
3 KV line	84,34	km	16.670,00	1.405.948 USD

DEPOT ELECTRIFICATION				2.168.186 USD
240 mm2 copper cable with 1.8/3 kV XLPE insulation for catenary supply	7.300,00	m	50,00	365.000 USD
240 mm2 copper cable with 1.8/3 kV XLPE insulation for return	6.750,00	m	50,00	337.500 USD
Catenary	13,10	km	111.884,44	1.465.686 USD
DEPOT EQUIPMENT				708.228 USD
Intermediate insulator anchoring point	50,00	u	166,67	8.334 USD
Section Isolator	63,00	u	1.666,67	105.000 USD
Wiring	7.150,00	m	15,55	111.183 USD
Other facilities	4,00	u	120.927,83	483.711 USD
TOTAL ELECTRIFICATION				82.809.214 USD

Table 70. CAPEX: Electrification with uneven crossings.

SIGNALING SYSTEMS	MEASUREMENT	UNIT	PRICE	AMOUNT
RAIL SIGNALING				36.400.000 USD
In-line interlocking signaling	22,00	u	1.400.000,00	30.800.000 USD
Depot interlocking signaling	4,00	u	1.400.000,00	5.600.000 USD
RAILWAY PROTECTION				27.753.000 USD
On-track equipment	84,85	km	180.000,00	15.273.000 USD
On-board equipment	156,00	u	80.000,00	12.480.000 USD
ROAD SIGNS				14.140.000 USD
Pedestrian walkway configuration	94,00	u	10.000,00	940.000 USD
Level crossings with barrier and crossing conditioning	220,00	u	60.000,00	13.200.000 USD
TOTAL SIGNALLING SYSTEMS				78.293.000 USD

Table 71. CAPEX: Signaling systems with uneven crossings.

SYSTEMS AND COMMUNICATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
OPTICAL FIBER				2.105.067 USD
Single-mode F.O. cable	93,34	km	8.333,33	777.833 USD
Modular F.O. distributor	76,00	u	5.388,89	409.556 USD
Cable head termination 64 F.O.	152,00	u	1.196,67	181.894 USD
1 F.O. splice	4.864,00	u	44,44	216.156 USD
1 F.O. connection	4.864,00	u	83,33	405.317 USD
1 F.O. bi-directional reflectometric measurement	64,00	u	50,00	3.200 USD
Fiber monitoring system	1,00	u	111.111,11	111.111 USD
FIXED COMMUNICATIONS NETWORK				1.837.373 USD
Copper UTP wiring	14.000,00	m	5,56	77.840 USD
Station/Substation Switch (level 2)	81,00	u	13.333,33	1.089.000 USD
Level 3 switch	8,00	u	20.277,78	162.222 USD
Copper distributor	76,00	u	227,78	17.311 USD
19" rack cabinet	85,00	u	2.000,00	170.000 USD
Integrated Service Network Configuration	89,00	u	3.333,33	296.666 USD
Central server for management and communications	2,00	u	16.666,67	33.333 USD

WIFI				446.667 USD
WIFI infrastructure	1,00	u	446.667,00	446.667 USD
TETRA				8.127.395 USD
TETRA infrastructure	84,85	km	95.785,44	8.127.395 USD
TRAVELER INFORMATION SYSTEM (SIV)				1.716.330 USD
Terminal stop	182,00	u	6.333,33	1.152.666 USD
Local server stop indicators	47,00	u	2.508,89	117.918 USD
42" hall monitor.	91,00	u	3.213,33	292.413 USD
Central system	1,00	u	153.333,33	153.333 USD
MEGAPHONE				1.155.555 USD
Speaker, power amplifier, local server	47,00	u	22.222,22	1.044.444 USD
Central system	1,00	u	111.111,11	111.111 USD
TICKETS				18.240.000 USD
Vending machine	178,00	u	40.000,00	7.120.000 USD
Cancellation machine	534,00	u	20.000,00	10.680.000 USD
Central system	1,00	u	220.000,00	220.000 USD
Vending machine software development	1,00	u	110.000,00	110.000 USD
Cancellation software development	1,00	u	110.000,00	110.000 USD
TELEPHONY AND INTERCOM				214.152 USD
IP Intercom	182,00	u	694,44	126.388 USD
IP Phone	129,00	u	227,78	29.384 USD
Quadrangular distribution	1,00	u	2.824,44	2.824 USD
Central system	1,00	u	55.555,56	55.556 USD
CHRONOMETRY				286.667 USD
NTP PoE Clock	91,00	u	3.000,00	273.000 USD
Central Time Server	1,00	u	9.111,11	9.111 USD
Time Zone	2,00	u	1.333,33	2.667 USD
GPS antenna	2,00	u	944,44	1.889 USD
CCTV				1.719.445 USD
Outdoor fixed camera	165,00	u	5.000,00	825.000 USD
Recorder station	47,00	u	16.666,67	783.333 USD
Central system	1,00	u	111.111,11	111.111 USD
CCTA				130.556 USD
CCTA module	47,00	u	2.777,78	130.556 USD
SAE				222.222 USD
Central SAFs	1,00	u	222.222,22	222.222 USD
CENTRAL CONTROL STATION (PCC)				604.667 USD
Videowall	1,00	u	333.333,33	333.333 USD
LAN Network	1,00	u	111.111,11	111.111 USD
Operator PC	23,00	u	2.666,67	61.333 USD
Communication cabinets	15,00	u	3.333,33	50.000 USD
5m UTP copper cabling	300,00	m	38,89	11.667 USD
15m UTP copper cabling	300,00	m	50,00	15.000 USD
Installation, configuration, testing and commissioning of the PMC	1,00	u	22.222,22	22.222 USD
TOTAL SYSTEMS AND COMMUNICATIONS				36.806.095 USD

Table 72. CAPEX: Systems and communications with uneven crossings.

URBAN INTEGRATION	MEASUREMENT	UNIT	PRICE	AMOUNT
A BOOSTER FOR URBAN INTEGRATION	84,85	km	280.000,00	23.758.000 USD
RAISED DEPARTURE OF POSSIBLE INTERMODAL STATION	10,00	u	100.000,00	1.000.000 USD

TOTAL URBAN INTEGRATION	24.758.000 USD			
--------------------------------	-----------------------	--	--	--

Table 73. CAPEX: Urban integration with uneven crossings.

RESTORATION OF HISTORICAL HERITAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
A LUMP SUM FOR THE REHABILITATION OF HISTORICAL HERITAGE	1,00	PA	12.500.000	12.500.000 USD

TOTAL REHABILITATION OF HISTORICAL HERITAGE PROPERTIES	12.500.000 USD			
---	-----------------------	--	--	--

Table 74. CAPEX: Rehabilitation of historical heritage properties with uneven crossings.

AFFECTED SERVICES AND REPLACEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF AFFECTED SERVICES AND REPLENISHMENT	5,50	%	7.688.860,33	42.288.732 USD

TOTAL AFFECTED SERVICES AND REPLACEMENT	42.288.732 USD			
--	-----------------------	--	--	--

Table 75. CAPEX: Affected services and replacements with uneven crossings.

QUALITY CONTROL	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF QUALITY CONTROL	1,00	%	7.688.860,33	7.688.860 USD

TOTAL QUALITY CONTROL	7.688.860 USD			
------------------------------	----------------------	--	--	--

Table 76. CAPEX: Quality control with uneven crossings.

WASTE MANAGEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF WASTE MANAGEMENT	0,50	%	7.688.860,33	3.844.430 USD

TOTAL WASTE MANAGEMENT	3.844.430 USD			
-------------------------------	----------------------	--	--	--

Table 77. CAPEX: Waste management with uneven crossings.

HEALTH AND SAFETY	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF HEALTH AND SAFETY	1,50	%	7.688.860,33	11.533.290 USD

TOTAL HEALTH AND SAFETY	11.533.290 USD			
--------------------------------	-----------------------	--	--	--

Table 78. CAPEX: Health and safety with uneven crossings.

INDIRECT COSTS	MEASUREMENT	UNIT	PRICE	AMOUNT
CONTINGENCIES, ADMINISTRATION AND UTILITY	11,00	%	8.342.413,46	91.766.548 USD

TOTAL INDIRECT COSTS	91.766.548 USD			
-----------------------------	-----------------------	--	--	--

Table 79. CAPEX: Indirect costs with uneven crossings.

ROLLING STOCK	MEASUREMENT	UNIT	PRICE	AMOUNT
DOUBLE COMPOSITION ELECTRIC TRAIN	78,00	u	5.800.000,00	452.400.000 USD

TOTAL ROLLING STOCK	452.400.000 USD			
----------------------------	------------------------	--	--	--

Table 80. CAPEX: Indirect costs with uneven crossings.

DESIGN AND IMPLEMENTATION	MEASUREMENT	UNIT	PRICE	AMOUNT
BASIC ENGINEERING AND FINAL DESIGNS	2,50	%	9.260.078,94	23.150.197 USD
CONSTRUCTION SUPERVISION	3,50	%	13.784.078,94	48.244.276 USD
PROJECT MANAGEMENT	0,50	%	13.784.078,94	6.892.039 USD
COST CONTINGENCIES OF THE GRANTOR IN THE CONSTRUCTION PHASE	1,00	%	13.784.078,94	13.784.079 USD

FULL DESIGN AND IMPLEMENTATION	92.070.592 USD			
---------------------------------------	-----------------------	--	--	--

Table 81. CAPEX: Design and implementation with uneven crossings.

SEVRI	MEASUREMENT	UNIT	PRICE	AMOUNT
COSTS ASSOCIATED WITH THE SEVRI	0,5	%	14.704.784,86	7.352.392 USD

TOTAL SEVRI	7.352.392 USD			
--------------------	----------------------	--	--	--

Table 82. CAPEX: SEVRI with uneven crossings.

LAND	MEASUREMENT	UNIT	PRICE	AMOUNT
LAND ACQUISITION	49.925.300	USD	1,00	49.925.300 USD
ACQUISITION OF PROPERTY	13.057.517	USD	1,00	13.057.517 USD
PROCUREMENT RISK PROVISION	5,00	%	629.828,18	3.149.141 USD

TOTAL AVERAGES	66.131.959 USD			
-----------------------	-----------------------	--	--	--

Table 83. CAPEX: Premises with uneven crossings.

ENVIRONMENTAL AND SOCIAL MEASURES	MEASUREMENT	UNIT	PRICE	AMOUNT
ENVIRONMENTAL MEASURES	1	PA	5.000.000,00	5.000.000 USD
SOCIAL MEASURES	1	PA	5.000.000,00	5.000.000 USD

TOTAL ENVIRONMENTAL AND SOCIAL MEASURES	10.000.000 USD			
--	-----------------------	--	--	--

Table 84. CAPEX: Environmental and social measures with uneven crossings.

2.3 OPEX

This section includes the costs associated with the operation and maintenance of the Electric Train.

For the estimation of the OPEX, a similar structure has been followed to the one used when dimensioning the personnel required for the operation and maintenance of the system, to which the rest of the costs derived from other areas such as consumables or energy have been added. Therefore, the structure is as follows:

- Direct costs
 - Common costs
 - Costs per line
 - Operation Managements
 - Maintenance management
 - Energy
 - Other direct expenses
- Indirect expenses

Direct costs will mainly include costs relating to staff salaries, costs relating to materials consumed and energy required for the operation of facilities and equipment. In order to determine these costs, the information calculated in the Third Report and its respective reports has been used, subsequently applying the corresponding prices.

Firstly, salaries have been determined from experience in other projects with similar characteristics in areas close to Costa Rica. These have been contrasted with the salaries defined by the Costa Rican Ministry of Labor on its web page, verifying that they are adequate, approximately 10% higher than the established minimums. Therefore, the salaries used are those shown in the following table.

PUESTO	ANNUAL SALARIES
Administrative	10.115 USD
Fraud control agent (intervention group)	15.172 USD
Station agent	15.172 USD
Security agent	10.115 USD
Agents	10.115 USD
Qualified agents	12.643 USD
Driver	21.241 USD
Director	67.313 USD
Human Resources Director	52.571 USD
Financial Director	73.432 USD
Managing Director	91.032 USD
Manager	40.888 USD
Maintenance Manager	52.571 USD
Managers	15.172 USD
Head of Technical Office	25.287 USD
Head of service	40.888 USD
Operator	21.241 USD
Simulation operator	15.172 USD
Ticketing and ticketing operator	15.172 USD
Marketing and Communications Manager	46.730 USD
Legal responsible	61.194 USD
Secretariat	10.115 USD
Management Secretary	15.172 USD
Executive Secretariat	12.643 USD
Supervisor	25.287 USD
Cleaning and Environmental Supervisor	21.241 USD
Technicians	15.172 USD

Table 85. Salaries depending on the position.

Secondly, the materials consumed in the different sectors of the system also represent a significant expense during the operation and maintenance of the system. These costs can be seen in ANNEX IV: OPEX CALCULATION, where the calculation of each concept is shown.

Finally, the costs related to energy consumption are defined in Chapter 17: Electrification and Catenary of the Third Report.

Given the level of feasibility of this document, in order to cover all possible costs involved in the operation and maintenance of the service, a percentage of 5% is considered to try to include possible costs not included in the analysis. This amount is defined as Other direct costs.

Similarly, 10% is considered for indirect costs.

2.3.1 Common costs

Common costs include those relating to general management, the operational reference shared by all lines and the consumption of materials by staff included in these two groups. The common costs of the system, therefore, are summarized in the following table.

COMMON COSTS	ELECTRIC TRAIN
DIRECTORATE GENERAL STAFF	501.964 USD
OPERATION MANAGEMENT	964.730 USD
MANAGEMENT STAFF	214.582 USD
TECHNICAL-ADMINISTRATIVE OFFICE STAFF	182.493 USD
PCC STAFF	549.655 USD
CONSUMABLES OF THE OPERATING MANAGEMENT	18.000 USD
OTHER DIRECT EXPENSES	73.335 USD
TOTAL DIRECT COSTS	1.540.029 USD
INDIRECT COSTS	154.003 USD
TOTAL COMMON COSTS	1.694.032 USD

Table 86. OPEX: Common annual costs.

The detailed calculation can be found in ANNEX IV: OPEX CALCULATION.

2.3.2 Costs per line

For each of the lines, the costs generated by the operation management personnel (including the consumption of own materials), the maintenance personnel, both infrastructure and rolling stock (together with the corresponding consumables) and the electricity consumption required for the optimum operation of the service are considered. The tables below show the operating and maintenance costs for each line.

ANNUAL COSTS	LINE 1
OPERATION MANAGEMENT	2.967.335 USD
LINE AND STATION STAFF	526.391 USD
DRIVERS	977.074 USD
SECURITY PERSONNEL STATIONS AND FACILITIES	748.913 USD
ONLINE SECURITY STAFF	121.376 USD
CLEANING STAFF TRAINS AND FACILITIES	518.881 USD
CONSUMABLE COSTS OF OPERATION MANAGEMENT	74.700 USD
MAINTENANCE MANAGEMENT	4.532.683 USD
INFRASTRUCTURE MAINTENANCE STAFF	1.950.785 USD
ROLLING STOCK MAINTENANCE PERSONNEL	958.261 USD
COSTS OF CONSUMABLES FOR INFRASTRUCTURE MAINTENANCE	553.107 USD
COSTS OF ROLLING STOCK MAINTENANCE CONSUMABLES	1.070.530 USD

ENERGY	4.060.983 USD
OTHER DIRECT COSTS	578.050 USD
TOTAL DIRECT COSTS	12.139.051 USD
OVERHEADS	1.213.905 USD
TOTAL COSTS PER LINE 1	13.352.956 USD

Table 87. OPEX: Annual costs of Line 1.

ANNUAL COSTS	LINE 2
OPERATION MANAGEMENT	2.820.250 USD
LINE AND STATION STAFF	526.391 USD
DRIVERS	828.389 USD
SECURITY PERSONNEL STATIONS AND FACILITIES	748.913 USD
ONLINE SECURITY STAFF	121.376 USD
CLEANING STAFF TRAINS AND FACILITIES	518.881 USD
CONSUMABLE COSTS OF OPERATION MANAGEMENT	76.300 USD
MAINTENANCE MANAGEMENT	5.598.851 USD
INFRASTRUCTURE MAINTENANCE STAFF	1.950.785 USD
ROLLING STOCK MAINTENANCE PERSONNEL	1.861.422 USD
COSTS OF CONSUMABLES FOR INFRASTRUCTURE MAINTENANCE	505.674 USD
COSTS OF ROLLING STOCK MAINTENANCE CONSUMABLES	1.280.970 USD
ENERGY	3.823.453 USD
OTHER DIRECT COSTS	612.128 USD
TOTAL DIRECT COSTS	12.854.681 USD
OVERHEADS	1.285.468 USD
TOTAL COSTS PER LINE 1	14.140.149 USD

Table 88. OPEX: Annual costs of Line 2.

ANNUAL COSTS	LINE 3
OPERATION MANAGEMENT	2.796.055 USD
LINE AND STATION STAFF	526.391 USD
DRIVERS	892.111 USD
SECURITY PERSONNEL STATIONS AND FACILITIES	698.340 USD
ONLINE SECURITY STAFF	121.376 USD
CLEANING STAFF TRAINS AND FACILITIES	488.537 USD
CONSUMABLE COSTS OF OPERATION MANAGEMENT	69.300 USD
MAINTENANCE MANAGEMENT	4.394.272 USD
INFRASTRUCTURE MAINTENANCE STAFF	1.950.785 USD
ROLLING STOCK MAINTENANCE PERSONNEL	958.261 USD
COSTS OF CONSUMABLES FOR INFRASTRUCTURE MAINTENANCE	488.786 USD
COSTS OF ROLLING STOCK MAINTENANCE CONSUMABLES	996.440 USD
ENERGY	3.151.424 USD
OTHER DIRECT COSTS	517.088 USD
TOTAL DIRECT COSTS	10.858.838 USD
OVERHEADS	1.085.884 USD
TOTAL COSTS PER LINE 3	11.944.722 USD

Table 89. OPEX: Annual costs of Line 3.

ANNUAL COSTS	LINE 4
OPERATION MANAGEMENT	843.251 USD
LINE AND STATION STAFF	121.376 USD
DRIVERS	148.685 USD
SECURITY PERSONNEL STATIONS AND FACILITIES	242.751 USD
ONLINE SECURITY STAFF	60.688 USD
CLEANING STAFF TRAINS AND FACILITIES	242.751 USD
CONSUMABLE COSTS OF OPERATION MANAGEMENT	27.000 USD
MAINTENANCE MANAGEMENT	1.500.518 USD
INFRASTRUCTURE MAINTENANCE STAFF	505.732 USD
ROLLING STOCK MAINTENANCE PERSONNEL	611.835 USD
COSTS OF CONSUMABLES FOR INFRASTRUCTURE MAINTENANCE	186.889 USD
COSTS OF ROLLING STOCK MAINTENANCE CONSUMABLES	196.062 USD
ENERGY	528.434 USD
OTHER DIRECT COSTS	143.610 USD
TOTAL DIRECT COSTS	3.015.814 USD
OVERHEADS	301.581 USD
TOTAL COSTS PER LINE 4	3.317.395 USD

Table 90. OPEX: Annual costs of Line 4.

ANNUAL COSTS	LINE 5
OPERATION MANAGEMENT	169.780 USD
LINE AND STATION STAFF	0 USD
DRIVERS	84.963 USD
SECURITY PERSONNEL STATIONS AND FACILITIES	20.229 USD
ONLINE SECURITY STAFF	60.688 USD
CLEANING STAFF TRAINS AND FACILITIES	0 USD
CONSUMABLE COSTS OF OPERATION MANAGEMENT	3.900 USD
MAINTENANCE MANAGEMENT	63.001 USD
INFRASTRUCTURE MAINTENANCE STAFF	0 USD
ROLLING STOCK MAINTENANCE PERSONNEL	0 USD
COSTS OF CONSUMABLES FOR INFRASTRUCTURE MAINTENANCE	12.302 USD
COSTS OF ROLLING STOCK MAINTENANCE CONSUMABLES	50.699 USD
ENERGY	0 USD
OTHER DIRECT COSTS	11.639 USD
TOTAL DIRECT COSTS	244.420 USD
OVERHEADS	24.442 USD
TOTAL COSTS PER LINE 5	268.862 USD

Table 91. OPEX: Annual costs of Line 5.

The detailed calculation can be found in ANNEX IV: OPEX CALCULATION.

2.4 Reinvestment

Once the construction has been completed and the railway service has begun, as a result of the use of the facilities, they deteriorate, and their efficiency or functionality may be reduced. For this reason, after the initial investment phase, in order to maintain the optimum operation of the service, both from the point of view of infrastructure and rolling stock, certain investments are required. The main variable for determining reinvestment costs is the useful life of the different elements that make up the Electric Train system. The useful life represents the period during which each element is capable of correctly fulfilling the function for which it has been implemented, so that at the end of that cycle the residual value it represents for the best continuity option for the project is preserved.

The sources used to estimate the useful life of the elements involved in this project include the ADIF (Spanish Railway Infrastructure Administrator) Railway Investment Evaluation Manual. Based on the useful life of each field and its initial investment cost, it was possible to estimate reinvestment needs. However, since the financial study was carried out for a 35-year period, those elements with useful lives longer than this horizon will not require reinvestment and therefore lack economic quantification in this regard.

The following shows the useful life and reinvestment required in the different areas of the project at the feasibility level, both for the complete project and for each of the lines independently.

REINVESTMENT	USEFUL LIFE	AMOUNT TOTAL	AMOUNT. LINE 1	AMOUNT. LINE 2	AMOUNT. LINE 3	AMOUNT. LINE 4	AMOUNT. LINE 5
INFRASTRUCTURES AND SYSTEMS							
STRUCTURES							
Railway bridges with any type of structure	80 years	-	-	-	-	-	-
PLATFORM AND TRACK SUPERSTRUCTURE							
Ballasted track	35 years	-	-	-	-	-	-
Slab track	50 years	-	-	-	-	-	-
Track devices	40 years	-	-	-	-	-	-
STATIONS							
Typical station facilities (side platforms)	15 years	6.727.992 USD	2.429.553 USD	2.055.775 USD	1.495.109 USD	560.666 USD	186.889 USD
Typical station facilities (central platform)	15 years	474.774 USD	189.910 USD	94.955 USD	189.910 USD	0 USD	0 USD
Intermodal station facilities	15 years	909.639 USD	0 USD	454.819 USD	454.819 USD	0 USD	0 USD
Unique station facilities	15 years	2.000.000 USD	0 USD	2.000.000 USD	0 USD	0 USD	0 USD
PARKING LOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS							
Workshop equipment paradise	20 years	548.532 USD	548.532 USD	0 USD	0 USD	0 USD	0 USD
Workshop equipment the canes	20 years	3.094.482 USD	0 USD	3.094.482 USD	0 USD	0 USD	0 USD
Peaceful workshop equipment	20 years	703.071 USD	0 USD	0 USD	703.071 USD	0 USD	0 USD
Workshop equipment plums	20 years	566.609 USD	0 USD	0 USD	0 USD	566.609 USD	0 USD
DRAINAGE							
Drainage devices	25 years	5.652.158 USD	1.935.050 USD	1.426.979 USD	1.578.281 USD	567.906 USD	143.942 USD
ELECTRIFICATION							
Electrical Substations	60 years	-	-	-	-	-	-
Catenary	15 years	21.347.501 USD	6.875.814 USD	5.456.818 USD	6.379.751 USD	2.025.359 USD	609.760 USD
Catenary support	60 years	-	-	-	-	-	-
Armed cables and transformer stations	60 years	-	-	-	-	-	-
SIGNALLING SYSTEMS	15 years	43.061.150 USD	14.499.650 USD	11.850.300 USD	11.898.700 USD	3.467.200 USD	1.345.300 USD
SYSTEMS AND COMMUNICATIONS	15 years	20.243.352 USD	6.263.389 USD	6.494.684 USD	5.514.460 USD	1.492.382 USD	478.437 USD
ROLLING STOCK	35 years	-	-	-	-	-	-

Table 92. Reinvestment of the Electric Train.



3 FINANCIAL EVALUATION

This section will evaluate the financial viability of the Electric Train (ET)TRP system under different public-private partnership schemes, determining the resource requirements that must be allocated by the government for its viability over 35 years.

The structure of the section is based in part on MIDEPLAN's "Guía metodológica general para la identificación, formulación y evaluación de proyectos de inversión pública Costa Rica" (the Guide), particularly in its section "2.1 Evaluación Financiero". It begins with a glossary, then presents the main assumptions and operational schemes to be analyzed, and proceeds to detail investment and operational costs (according to the classification requested in the Guide). Subsequently, income is detailed, according to the established Minimum Attractive Rate of Return (TREMA), as well as cash flows, presenting the main financial indicators (IRR and NPV) of the different scenarios. Finally, sensitivity exercises and alternative scenarios are carried out.

3.1 Glossary

The following are some of the terms used in this report:

- Balloon: Credit whose principal repayment occurs at the end of the agreed period.
- Capitalization of interest and commissions: Financial costs of credits that are paid by the credit itself, increasing the balance of the same.
- Long Term Credit: Loan that has a maturity of 15 years.
- Bridge credit: Credit obtained during the construction period to be settled after 5 years.
- VAT Credit: Credit line for financing VAT.
- Minimum income guarantee: Agreement in which if the income from the infrastructure is less than the minimum point, the public party commits to cover the missing part to reach the minimum income.
- System revenue: Revenue from payments made by end users.
- Payment for availability and transfer of income (PPDi): Payment made when the availability or existence of the infrastructure is verified, or a certain level of service quality is met. It has an OPEX component and a CAPEX component. In this scheme

the concessionaire receives the income for the use of the system and the differential to reach the payment established in advance in the respective contract and/or concession, is paid by the administration.

- Availability payment with demand transfer (PPDD): This is the name given to a combination of an underlying payment for availability that complements the project's income from demand. In this scheme, demand income is transferred to the concessionaire, complemented by payments made by the State, with a component for OPEX and another for CAPEX, given the insufficiency of demand income to cover the total operation. These payments from the State are not indexed to the level of demand and may be reduced by penalties for poor operation. It is accompanied by a minimum guaranteed income that limits demand risk in efficient management scenarios.

3.2 Financial evaluation process. Approach

To evaluate the financial viability of the project, an Excel spreadsheet software model was generated in which, considering two business models, estimated income, investment costs (CAPEX) and operation (OPEX) data were taken, and this information has been transferred to an economic-financial model. In the financial model, the flows of a potential private developer who builds and operates the TRP system have been modelled. The operation considers the five lines of the system are developed the first five years of the concession.

3.3 Assumptions and starting hypothesis

The main assumptions and starting assumptions include the key macroeconomic variables, the main investment elements, costs (both operating and financial) and revenues of the project.

3.3.1 Macroeconomic assumptions

Since the model is presented in United States dollars, data from both Costa Rica and the United States were used. With regard to inflation in Costa Rica, it was considered to be 3% per annum in accordance with the provisions of the Central Bank of Costa Rica's Macroeconomic Program 2019-2020. For U.S. inflation, the median of the inflation projections of the U.S. Federal Reserve members was used¹ (forecasting 1.9% for 2020 and 2% until 2022 and what is referred to in the report consulted as "long run").

For the exchange rate in 2019, 593.55 colons per dollar was used according to the average daily sales price in 2019². For the following years, the exchange rate was projected using the differential between the U.S. and Costa Rican inflation rates.

3.3.2 Tax assumptions

A 30% income tax rate was considered, including 3 years of the tax shield duration³ and 1% in local taxes applied on tariff income.

In consultation with INCOFER, it was concluded that VAT was not applicable to the tariff as it was the tariff for a public land transport service regulated by ARESEP. Although the regulation is special in accordance with the provisions of Article 21 of the General Concession Law, the fact is that the tariff structure and adjustment mechanisms must pass through the hands of ARESEP prior to incorporation into the cartel and, furthermore, users may subsequently lodge complaints with ARESEP regarding the application of the structure, adjustment parameters and service quality parameters. In short, as an express rule, VAT is not applied to this flow.

¹ US Federal Reserve, September 2019. <https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20190918.pdf>

² Central Bank of Costa Rica - period from January 1, 2019 to October 25, 2019

³ Income Tax Law No. 7092

On the payment that the State would make to the concessionaire as a subsidy in the exploitation phase in case it is required by the behavior of the demand. It was concluded that to the extent that this payment is of a compensatory nature (guarantee of minimum income) or a kind of restitution to achieve economic and financial balance, it would not be subject to VAT. On the contrary, if it is of a nature of payment for services, it would be subject to VAT, although it should be added that since the payment would be made by INCOFER (with the transfer made to it), the INCOFER Law has a general exemption in favor of INCOFER.

As for the acquisitions of goods and services made by the Concessionaire, as discussed, they are subject to VAT at a rate of 13%. However, since the above points do not consider the application of VAT, then this payment of VAT on goods and services is subject to a tax credit in favor of the Concessionaire. Since this credit is recovered over time, there is a financial burden for the concessionaire since it must finance the payment of VAT while the recovery takes place. However, the applicable law and regulations allow a sort of prior refund of the credit, which acts as an exemption. So, although there is a VAT registration, there is no material payment, no flow. For these purposes, the concessionaire must, at the beginning of the conditions precedent, make the application to the Directorate General of Finance and on the other hand, in the weeks prior to the tender, Taxation must work on regulating a procedure for these cases of public works concession, but no legal reforms are required.

Therefore, it has been modeled as a basis that the project would not be subject to VAT, so it is not considered either in the construction or in the collection of transport fees.

3.3.3 Operational Structure

The project of the ET is conceived with the operation of 5 lines, in each trip in one of them would be paid the rate established in advance.

The two business models to be analyzed are based on two different risk distributions of demand:

- In the Payment for Availability and Income Transfer (PPDi) model, the private concessionaire's income is determined in advance with a fixed amount that can be updated by inflation (it can be divided into two rates, one that covers the system's operation and the other that covers the investment payment and its return. Said amount is covered with two sources of income: i) the system's tariff income and a

payment made by the State for the additional amount necessary to reach the defined fixed amount. In this scenario, the system's revenues (tariffs) are collected by the concessionaire, who keeps them up to the limit of the PPDi and passes them on to the State.

- The second model transfers part of the demand risk to the concessionaire. In this scenario, the revenues of the system (tariffs) are for the concessionaire and are complemented by an Availability payment with demand transfer (PPDD) made by the State. This model also includes a minimum income guarantee by means of which, if the system's income is less than a pre-established floor, the State would be obliged to pay the difference between the income actually received and the amount of the guaranteed minimum income. In this case, the minimum guaranteed income is intended to cover at least the investment and operating costs and a minimum return below the market rate⁴. For modeling purposes, the model performs the IMG calculations on a total revenue level. However, the poster will request that the IMG value being bid only corresponds to the revenue being earned from travel. This is due to the fact that the income part corresponding to the PPDD is already fixed by definition.

On the other hand, in the second case it is assumed that if the demand is above the base case, 50% of the revenues will be shared with the State, which in any case, can use them to settle the payments it must make to the concessionaire. In a bidding process, the amount of minimum guaranteed income and the threshold for income sharing is set, focusing the assessment on the amount of the annual payment to be received from the State. In the financial model, the amount corresponding to the demand study has been considered as the activation point for revenue sharing, so in the base scenario's revenue sharing is not activated. In the demand sensitivity, the amounts of incremental revenues received by the State are detailed in the cases of demand above the forecast.

In all cases, the payments made by the State will be subject to penalties based on the performance of the obligations and services agreed upon with the concessionaire.

⁴ It is assumed that the minimum revenue should not cover the full target IRR but, because of the risk transfer, something less. In this case, an 8% return is assumed to calculate this income - approximately the risk-free rate of Costa Rica (considering the rates at which the government can place debt in the international market) plus 0.5%.

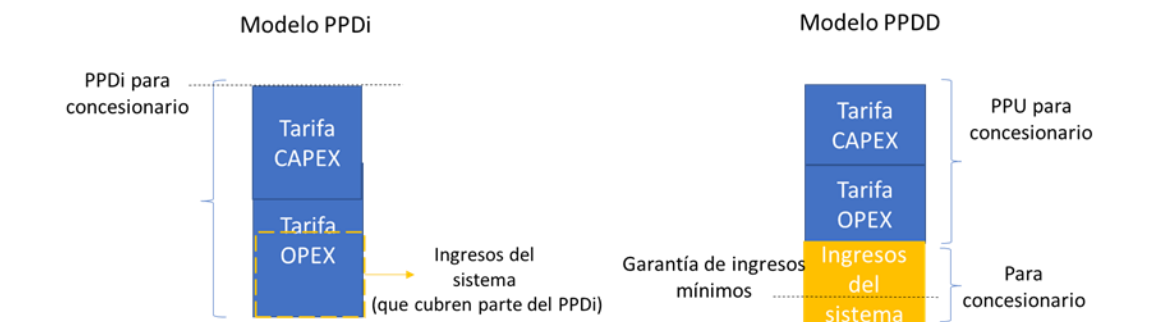


Figure 3. Concession models and scope of financial analysis for the GAM Electric Train.

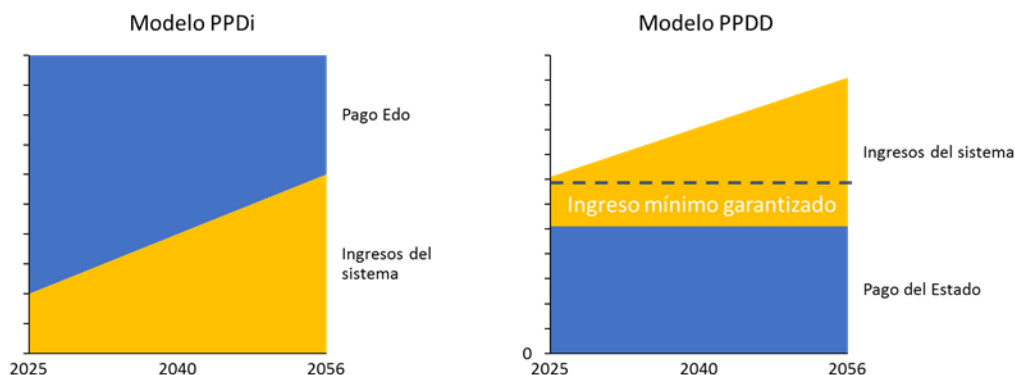


Figure 4. Conceptual payment behavior according to concession model, figures not at scale.

3.3.4 Costs

Investment costs

The investment costs are detailed in the first section of the report. Here the total amounts are detailed according to the classification of the MIDEPLAN guide and the investment schedule for each of the two alternatives is presented.

The investment costs for the complete system are in dollars, considering a fixed price, that is to say, the price is closed in advance so that the inflation that is projected during the

construction phase of the project is not applied to it. The costs are presented in the following table⁵:

INVESTMENT COSTS	USD
Tangibles	
Infrastructure and systems	834.241.346
Rolling Stock	452.400.000
Basic engineering and final designs	23.150.197
Plots of land	66.131.959
Environmental and social measures	10.000.000
SEVRI	7.352.392
Subtotal	1.393.275.894
Intangibles	
Construction supervision	48.244.276
Project Management	6.892.039
Contingencies	13.784.079
Management, contingencies and utility	91.766.548
Financial Costs*	298.103.101
Subtotal	458.790.044
Total	1.852.065.938

* The financial costs are calculated in nominal terms considering costs detailed per month is presented in ANNEX V.

Table 93. Tangible and intangible investment costs in nominals.

As can be seen, most of the costs are of a fixed nature. With respect to financial costs, these include commissions and capitalized interest, which are presented in nominal terms considering the financial costs of the loans that will actually be incurred⁶. The total amount of investment considered is that which would need to be covered by the concessionaire; there is no consideration of contributions by INCOFER.

⁵ The inclusion of a greater number of uneven crossings than those foreseen in the initial technical study, at the request of INCOFER following an express request from the Ministry of Public Works and Transport, is considered to be a base case

⁶ The financial costs consider inflation in the sense that the interest rate of the credit takes as a base a market base rate that carries the inflationary effect. If the model is run in constants, the credit is deflated at the interest rate to the projected inflation for the United States, that is, the credit is calculated at a lower interest rate. This data contributes little since banks always lend in nominal terms, they make their projections always considering inflation. In the model's scenario in nominal terms, investment costs will not change because they are considered to have been closed beforehand (fixed price) and the financial costs are run at the rate at which we actually estimate the bank will lend (without removing the inflationary effect). The government's contributions (the support of 550 million dollars) are not corrected for inflation since it is a fixed amount (whether or not there is inflation, the government will provide the developer with the same 550 million dollars for investment in the project).

Regarding working capital, considering the nature of the project, there will be no income until the different lines are completed, which, in the full scenario, would have a difference of 6 months. Therefore, the sources of financing for the project must be foreseen beforehand. It has been considered that the concessionaire will be able to obtain a credit with a 70% leverage (without considering the capitalizable financial costs), with the rest of the resources provided as capital (equity). Additionally, it should be noted that the government contribution of 550 million USD is expected to be paid as the different lines are completed in proportion to the amount that such line represents as part of the total investment. The contractual structure of the BCIE loan is taken as a basis, whereby the amount will be paid in 90% once the provisional approval certificate of the line is issued, leaving 10% of the amount corresponding to each line for the delivery of the final reception certificate of the corresponding line. Since this structure generates a financial effort derived from the need to leverage funds until the end of the work, alternative structures for disbursement of the BCIE credit have been proposed in the sensitivity analysis.

Although having capital tied up during the years of construction may be a deterrent for private individuals, it is precisely recommended that this be the subject of negotiation with CABEL and, if necessary, the possibility of relaxing the equity requirements contemplated by the current law be explored during the bid preparation process.

In any case, the distribution is presented as follows, assuming that the government contribution will be used to cover the costs incurred by the project in the month of its payment and the remainder will be used to prepaid credit and capital. It should be mentioned that these data assume that no VAT is included in the construction and costs do not consider inflation, assuming a flat-rate pricing scheme. Likewise, the credit absorbs 100% of the commissions and capitalized interest. The following financial structure calculation does not consider interest and commissions generated after the construction period nor the credit refinancing cost assumed at the end of the last month of investment. However, it does consider the last government contribution assumed to enter the first month of operation. The above is done to be consistent in the comparison with the total costs during the investment period. The calculation of the contributions is presented in ANNEX V: DETAIL OF FINANCIAL CALCULATIONS.

	Distribution to the project non-publicly provided		Distributed public contribution	
Initial investment	%	USD	%	USD
Capital	25%	466.188.851	16%	301,188,851
Credit	75%	1.385.877.087	54%	1,000,877,087
Government contribution (including last input during operation)	0%		30%	550,000,000
Total	100%	1.852.065.938	100%	1.852.065.938

Table 94. Working capital and funding sources - complete system in nominals.

As can be seen, one third of the project's financing will come from public contributions, with the rest financed by credit and the developer's own capital. Since this contribution will be made once each line has been completed, the resources to carry out the project must be provided before the entry of the public contributions.

In terms of time, the annual investment for the project is expected to be distributed as follows:

	2021	2022	2023	2024	2025	2026
Infrastructure and systems	-	28.830.866	185.341.217	335.268.605	271.260.897	13.539.759
Rolling stock	-	51.040.000	116.000.000	51.040.000	122.960.000	111.360.000
Design and implementation	4.924.141	17.549.520	22.077.684	22.742.096	19.018.847	5.758.303
Plots of land	-	25.461.946	32.479.260	-	8.190.753	-
Others	-	3.975.785	24.739.901	42.471.228	34.856.301	3.075.725
Financial Costs	35.582.108	36.137.785	47.006.844	63.390.557	75.854.536	40.131.271
Total	40.506.249	162.995.902	427.644.908	514.912.486	532.141.334	173.865.059

Table 95. Investment calendar - complete system in nominals.

The timetable for the planned disbursement of the CABI loan is as follows:

	Pagos y fechas	
	abr-26	jul-26
Línea 1	147.552.031	16.394.670
Línea 2	151.483.707	16.831.523
Línea 3	151.502.106	16.833.567
Línea 4	39.210.643	4.356.738
Línea 5	5.251.513	583.501

Table 96. Estimated CABEL disbursement schedule in nominals.

Operating costs

The system's operating costs provide for the following items, considering the expenses related to general management, operating management personnel and their related expenses as administrative costs and the rest as production costs. Further details on operating costs can be found in the first section of this document.

Operating costs	USD annual constants (2019)
Production costs	
<i>Operation Management</i>	
Line and station personnel	1.700.549
Drivers	2.931.222
Security personnel and facilities	2.459.147
Online security staff	485.503
Cleaning staff, trains and facilities	1.769.050
Operation management consumable costs	251.200
<i>Maintenance Management</i>	
Infrastructure maintenance personnel	6.358.087
Rolling stock maintenance personnel	4.389.779
Cost of infrastructure maintenance consumables	1.746.758
Cost of rolling stock maintenance consumables	3.603.981
Energy	11.564.294
Other and indirect	5.775.233
Administrative costs	1.694.032
Total	44.728.835

Table 97. OPEX –complete system in constants.

3.3.5 Financing

As mentioned, the project will be financed from three sources:

- Concessionaire's own capital
- Credit
- Government contribution

With regard to credit, the financial analysis considers between three and four credits, all denominated in dollars.

1. Bridge credit - which will be used to finance during the construction period in a scheme known for this type of infrastructure. A 5-year term of the credit is assumed, considering that during the construction period the commissions and interests are capitalized and once it is finished, the interests of the credit are paid until the fulfillment of the 5-year term, at which time it is settled with another credit.
The base rate assumed is the one-year LIBOR (1.96%)⁷, with a margin of 3% and another 3% considering the cost of a SWAP that equals the rate to be paid, resulting in an effective rate of 7.96% per annum. With respect to commissions, an availability commission (on the undrawn balance) of 0.25% and a structuring commission on the total credit of 1.75% were assumed
2. Balloon credit - When the first financial analyses were carried out, a high level of cash flow stress was detected in the first years of operation. This is because the PPD and PPDD are increasing in the first years of operation, that is, they will not be paid at 100% but in a linear growth. The term of this credit was assumed to be 4 years with a rate equal to that of the bridge credit. The main feature of this loan is that a small portion is amortized, with most of the principal being paid off at the end of the loan. In this regard, a 0.1% amortization of the loan amount per month was assumed. Finally, a structuring fee of 1.75% of the total loan is also assumed.
3. Long-term credit - Finally, a long-term credit was considered to finance the balloon credit. This credit has a term of 15 years, a realistic term for infrastructure projects. The interest rate is assumed at 7.46%, assuming a slightly lower margin for a credit on a project that, by the time it is taken, will have 4 years of operation. Likewise, a 1.75% structuring fee is considered. Also, a debt service reserve fund is included,

⁷ Source: Wall Street Journal as of October 24, 2019 -<https://www.wsj.com/market-data/bonds>

equivalent to the following 4 months of interest payments and amortization. The amortizations are assumed to be even throughout the life of the credit

Finally, the coverage rates on the long-term and global amortization credit debt were calculated, although no minimum rate was established, only an index above 1.00x was ensured. It should also be mentioned that it is assumed that in the case of the bridge and balloon credit, early repayments can be made with the resources from the payments of the government contribution that are generated as the project progresses.

A fourth credit considered in the financial analysis was a VAT credit, although in the base case, since it is expected that the project will not be subject to VAT, it is not used. In its case, the VAT credit was modeled as an amortized revolving credit with the construction's VAT refunds (a 6-month delay is assumed), a 5% rate and a 1.75% commission on the maximum credit balance.

In all cases, the debt would be borne exclusively by the private company to which the project concession contract was granted.

3.3.6 Depreciation

Investments are depreciated on a straight-line basis over the useful life established by the technical advice. That part of the investment that does not have a useful life (items that are part of the investment such as financial costs, environmental measures, project management, among others), was considered depreciated on a straight-line basis over the life of the concession.

Concept	Useful life (years)
Structures	80
<i>Platform and Track Superstructure</i>	
Ballast Track	35
Track in Plate	50
Track devices	40
Stations	15
Depots, workshops and administrative buildings	20
Drainage	25
<i>Electrification</i>	
Catenary	15
Other	60
Signalization systems	15
Systems and communication	15
Rolling stock	35

Table 98. Lifetime of various investment concepts.

3.4 Financial analysis: the project generates income

3.4.1 Minimum Attractive Return Rate (TREMA)

To determine a TREMA, the target IRR at which an investor would be willing to invest in the project was considered. The risk-free rate of an investment in Costa Rica (country risk) was taken into account, using as a basis the placement of Eurobonds made in November and resulting in a closing rate of 7.25% at 26 years⁸. Considering the above and experience in similar projects, different target IRRs were determined based on the business model to be analyzed. An analysis of the level of risk associated with the different alternatives was made, considering the level of probability of reaching an IRR of less than 10% for the concessionaire based on the volatility of the different scenarios:

Asset valuation model

The asset valuation model (CAPM) is a methodology for calculating the notional value that an investor would require from a financial asset. A calculation of the CAPM was made to

⁸ Source: <https://www.larepublica.net/noticia/credibilidad-en-costa-rica-permite-exitosa-colocacion-de-eurobonos>

estimate the theoretical IRR that an investor would require in the TE project. The model is defined by the following formula:

$$k_e = r_f + [E(r_m) - r_f] \cdot \beta_c + prima$$

where:

Ke= Cost of equity (i.e. the return the investor would be expecting)

r_f = Risk-free rate of return - the geometric average yield of the 10-year US bond between 1970 and 2019 was taken as a benchmark (assuming a country risk premium). The risk-free return for Costa Rica was also taken by taking the weekly arithmetic average of the 10-year government bond between 2014 and 2019.

r_m = Market return - the S&P 500 Index (from the New York Stock Exchange) geometric average between 1970 and 2019 was used as a reference.

B = Profitability factor according to the type of industry - The Damodaran database, updated to January 2020, was taken as the source, using the factor for the global transport industry

Prima = Country risk. Arithmetic average between 2013 and 2019 of the emerging market bond index (EMBI) for Costa Rica.

With this formula two valuations were made, one in which the factors related to the US were used and the country risk premium of Costa Rica was added, and another in which a risk-free rate of return was considered directly from Costa Rica (and therefore no country risk premium was added). In the scenario adding the country risk premium separately, the cost of equity results in 14.67%, and in which the risk-free rate of return from Costa Rica is used from the beginning, it is 10.55%.

Both numbers are around the target IRR determined for the PPD_i and PPDD business models. The determination to use 10% as the basis for the PPD_i is in range compared to the theoretical determination. Also using 10% as the cut-off level from which the target IRR of the PPDD was calculated (that target IRR such that, if demand drops by 30%, the result

in a demand transfer scheme is an IRR of 10%) results in a target IRR of 13.5%. This data is also within the theoretical parameter calculated as described above.

Payment for availability and income

In this scheme, the private party receives all its payments from tariff revenue with the government paying what is necessary to achieve the availability payment established in advance in the contract/concession and is only subject to possible deductions for service failures and non-compliance with the service levels established in the contract, without having any demand risk component. As such, a target rate of 10% of the concessionaire's IRR was considered, i.e. 275 basis points more than the risk-free rate (considering the last issue of Eurobonds) or approximately 37% more than the risk-free rate.

Availability payment with demand transfer and minimum income guarantee

In this scheme, the private sector has a demand risk when receiving income from travel in the TE, although it is tempered by the existence of a minimum level of income. In this case, the greater risk it absorbs leads to a higher return, which has been established at 13.5% of the concessionaire's IRR. This represents almost 80% more than the risk-free rate in Costa Rica. The greatest risk of this scheme can be clearly seen in the variability of the IRRs of the two schemes in the face of equal changes in demand (Figure 4) and forms the basis of why a different target rate is used for the PPDD.

For both concession schemes, the respective rate was used as a target, in particular to determine the income from the part of the PPD_i or PPDD corresponding to the investment and its profitability. The target rate was in turn determined by reproducing the bidder's risk allocation process, generating a target IRR for the concessionaire for each alternative that takes into consideration the different level of risk assumed. For this purpose, the target IRR was considered in the case of PPDDs that cut around the target IRR of 10% in the PPD_i model with demand decreases of 30%, given that according to IDOM's experience, this is a level of deviation often taken as a reference in projects exposed to demand risk without a previous track record. In this way, an increasing IRR is required according to the level of exposure to demand risk of the project.

This exercise to find a target IRR so that it coincides with the target IRR in the PPD_i scenario in the event of a loss of demand can be seen in the following graph, which was carried out with the assumptions analyzed as of December 2019.

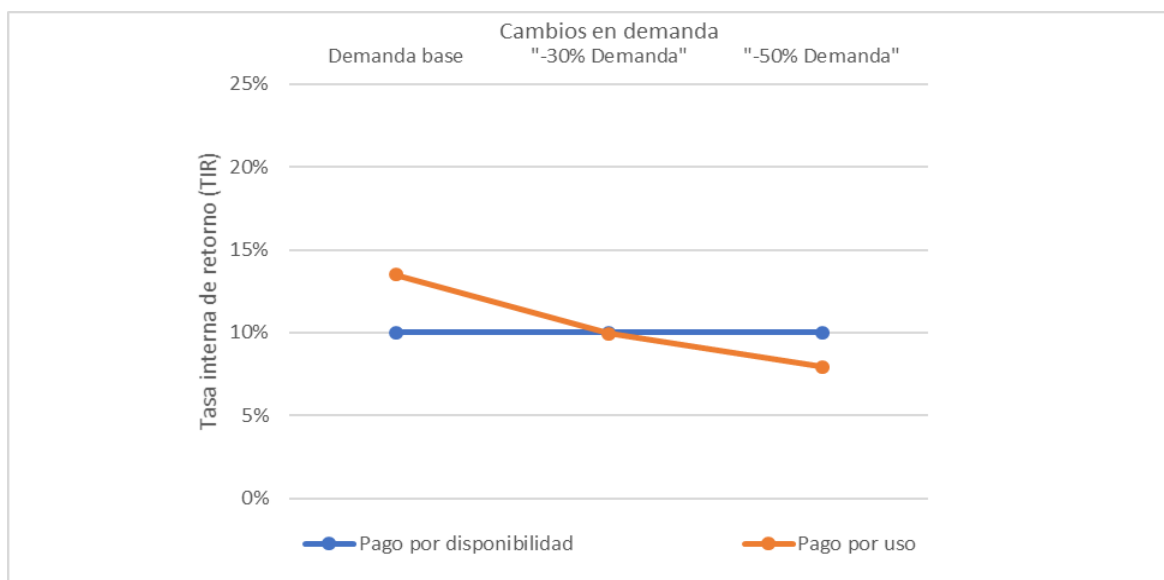


Figure 5. Sensitivity of the IRR to changes in demand according to the concession scheme (without considering guarantees of income).

In any of the models of transmission of demand risk, the existence of a revenue floor must be accompanied in the cartel by a sharing of demand revenue between the Administration and the bidder based on thresholds to be set in the cartel. In general, this threshold should be the base level of demand estimated in the cartel: since the model is calibrated to reach the target IRR with that level of demand, higher levels of demand would generate revenue sharing.

As regards the minimum guaranteed revenue in the case of the PPDD, its estimation was made considering that the concessionaire assumes the risk of losing its objective profitability in case the service is correctly provided but demand is below the forecast. However, given that the demand factor in this project is difficult to control by the concessionaire, and taking into consideration the practically greenfield nature of the project, we consider that the exposure to demand risk should not be so high as to lead (we insist, in a scenario of correct execution of the service) to the non-sustainability of the project.

Therefore, the minimum guaranteed income has been considered to be that which over the life of the concession allows (if there are no deviations from other factors) a minimum IRR equal to the risk-free profitability of the country (7.25% in Eurobonds) plus a differential of 0.75%. This profitability is insufficient for a project of this type since the investor assumes the operation and construction risks in all cases but avoids the risk of bankruptcy or

abandonment of the concession in the event of inefficient evolution of demand. At the same time, this level of income only allows reaching the minimum IRR if the concessionaire operates the network without penalties and does not experience increases in its construction and operation costs, so the exposure to risk remains high.

Finally, given that this minimum income would be a bidding variable, the proposals will be made downwards on the same, thus increasing the risk exposure of the bidders.

It should be noted that in any case the operator is not guaranteed its IRR, since any deviation in construction or operating costs, or failure to meet KPIs will place it below that threshold, so in no case does the guaranteed minimum revenue eliminate project risk or can it be equated to a risk-free project.

3.4.2 Travel income

The income of the project comes basically from the collection of the fare per trip. This projection depends on the demand of each line, for which several scenarios were developed, considering a rate of between 600 colones to 1,400 colones per trip. A scenario of 600 colones per trip (approximately one dollar) was proposed with a fare scheme in which 800 colones per trip would be paid at peak hours, thus increasing income and helping financial viability under both a PPDi and PPDD concession scheme. In addition, three demand scenarios were worked on (base, conservative and optimistic).

It is assumed that the cost of the ticket increases every year with Costa Rican inflation of the previous year. The first years there is a growth curve, multiplying the result of the demand study by a factor of 0.7 and increasing it by 10% each year until reaching 100% in 2028. Said factor is applied considering that the demand projections do not consider a "ramp-up" but it is estimated that said period can take between 2 and 2.5 years, for which reason an escalation was applied so that in the third year of complete operation of the system the projected demand is reached at 100%. This means that the first year the actual demand is estimated to be 70% of the calculated demand, the second year 80% and the third year 90% before reaching 100% of the calculated demand in the fourth year. A period of 3 years has been set, a normal value for situations such as those raised in the present project, mainly because the inhabitants of San José will have to adapt to the use of the Rapid Passenger Train in their daily life as it is a new system that they do not have at present. In short, a period of 3 years is required for the inhabitants to gradually get used to moving around in a system they do not currently have.

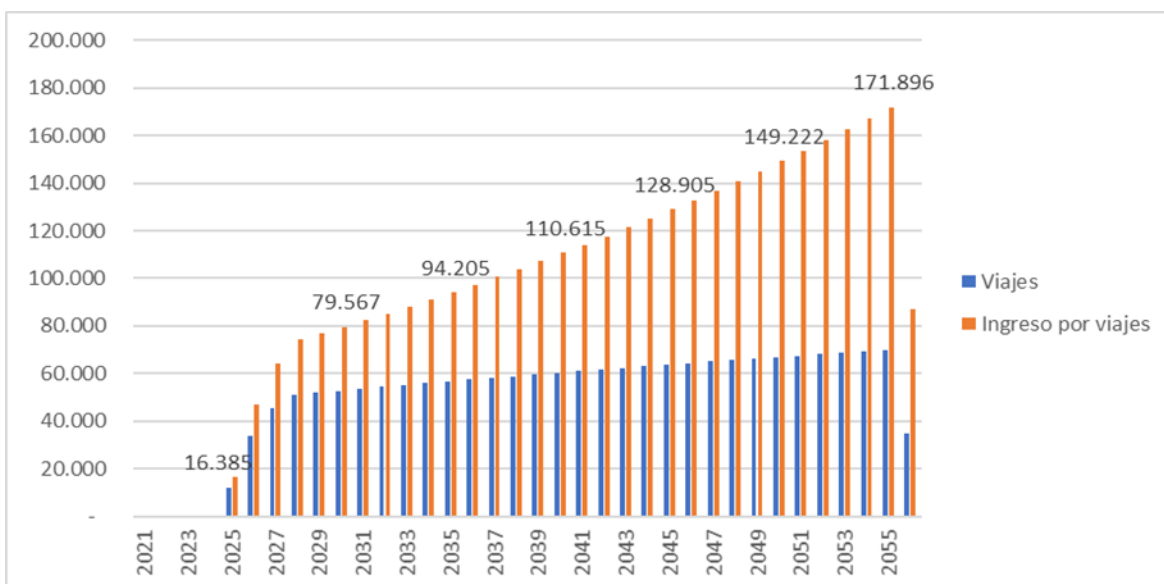


Figure 6. Travel and base income (thousands USD nominal) - 600 colones; 800 colones at peak time.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Travel	-	-	-	-	11.981	33.518	45.286	51.138	51.948	52.749	53.539	54.320
Travel income	-	-	-	-	16.385	46.745	64.408	74.171	76.838	79.567	82.359	85.214
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Travel	55.091	55.861	56.620	57.371	58.111	58.842	59.563	60.274	60.976	61.667	62.348	63.020
Travel income	88.136	91.136	94.205	97.344	100.553	103.834	107.187	110.615	114.118	117.697	121.354	125.089
	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
Travel	63.681	64.332	64.972	65.603	66.223	66.833	67.438	68.036	68.629	69.217	69.799	34.709
Travel income	128.905	132.801	136.779	140.841	144.989	149.222	153.553	157.984	162.516	167.153	171.896	87.171

Table 99. Travel and base income (thousands of dollars).

Travel is 11.9 million in 2025 and reaches 69 million in the last full year of operation. Revenues, considering the proposed fare scheme, reach 139 million USD in 2055. For this calculation the trips were multiplied by 600 colons (no VAT was applied since the project is considered exempt from it), for each year the rate is updated by the inflation of Costa Rica of the previous year (assuming that each January there will be an update of the rates by the inflation of the year that ended) and the amount is converted to dollars according to the exchange rate projected for the year in question. Finally, the amount is multiplied by a factor of 1.24 to account for the fact that a higher rate is charged during peak hours. It is also noted that the number of trips is multiplied by the amount of operating time of the respective line,

so in the last year the trips are lower. ANNEX V: DETAIL OF FINANCIAL CALCULATIONS contains the relevant part of the model corresponding to the calculation of tariff revenues. The formulations can be consulted directly in the model.

The financial analyses also included conducting the sensitivities considering two other revenue scenarios, conservative and optimistic based on a conservative and optimistic demand projection.

The demand growth rates applied in each of the scenarios are based on the following considerations:

Conservative scenario: only the population growth rate is applied, which is approximately 0.6%. Thus, only the number of people is taken into account, leaving a safety margin with respect to the demand that would surely be generated, which is a conservative scenario.

Base scenario: a growth rate of around 1.3% has been applied, which comes from considering not only the population growth rate but also the city's motorization rate. In this way, both the number of people and their tendency to own and use their private vehicles are taken into account, obtaining a more probable scenario than the previous one.

Optimistic scenario: a common value in the growth rates is usually 2%, which, in addition, represents a similar deviation than the conservative scenario (0.7%) with respect to the base scenario, but in this case above, obtaining an optimistic scenario consistent with the rest of the scenarios for its evaluation.

In the conservative case, revenues are seen as follows:

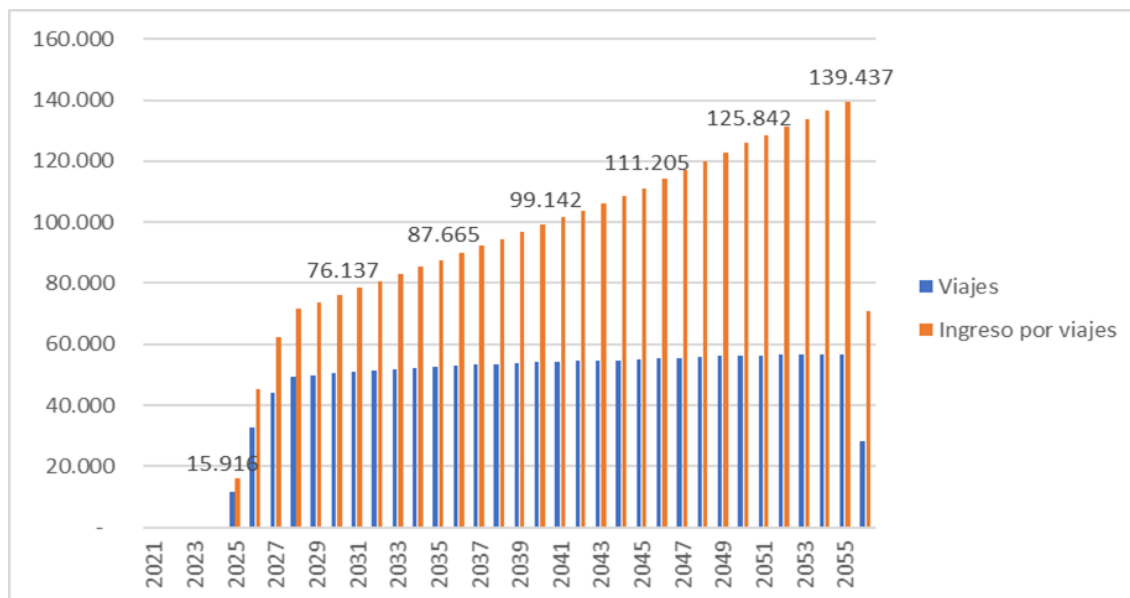


Figure 7. Conservative travel and income (thousands USD nominal) - 600 colones; 800 colones in rush hour.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Travel	-	-	-	-	11.638	32.587	43.914	49.377	49.937	50.475	50.947	51.401
Travel income	-	-	-	-	15.916	45.446	62.456	71.617	73.864	76.137	78.372	80.635
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Travel	51.836	52.272	52.689	52.982	53.262	53.529	53.782	54.023	54.228	54.422	54.605	54.777
Travel income	82.927	85.281	87.665	89.898	92.162	94.457	96.784	99.142	101.490	103.870	106.282	108.728
	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
Travel	54.937	55.269	55.577	55.861	56.122	56.362	56.417	56.471	56.522	56.571	56.619	28.155
Travel income	111.205	114.092	117.000	119.927	122.874	125.842	128.460	131.128	133.846	136.615	139.437	70.711

Table 100. Travel and income in the conservative scenario (in thousands of nominal dollars).

The dynamics of revenue calculation in this scenario is the same, although the data for travel is lower, with 11.6 million in the first year (representing 15.9 million USD) and ending in the last full year of operation with 56.6 million trips and 139 million USD in revenue.

Data for the optimistic scenario is presented below.

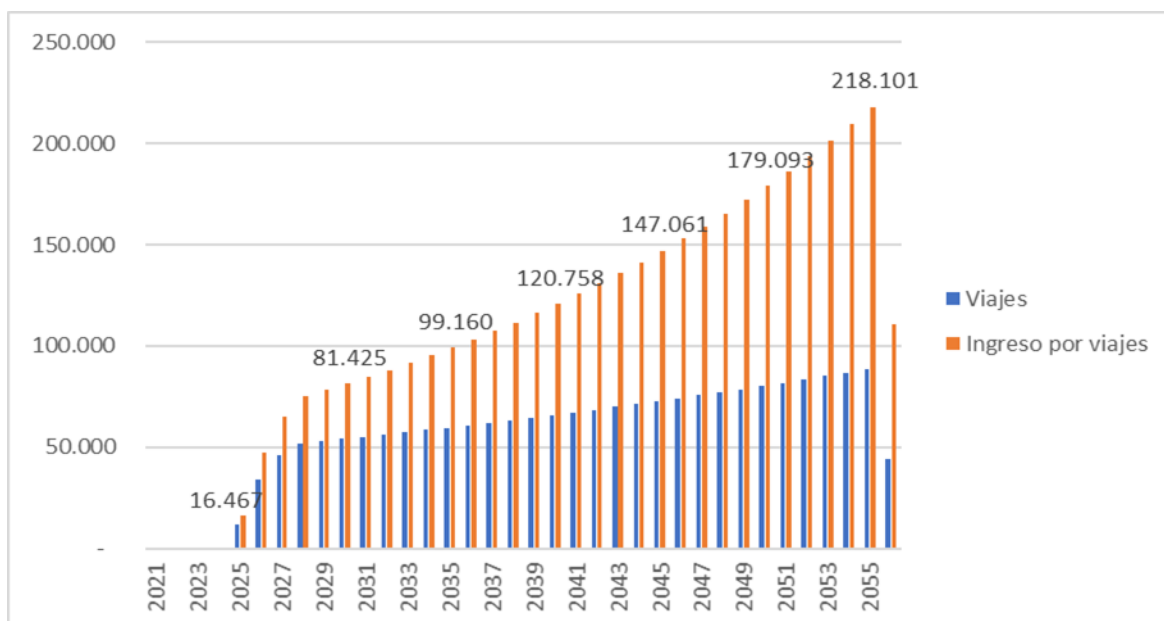


Figure 8. Travel and optimistic income (thousands USD nominal) - 600 colones; 800 colones at peak time.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Travel	-	-	-	-	12.042	33.777	45.780	51.884	52.922	53.980	55.060	56.161
Travel income	-	-	-	-	16.467	47.106	65.111	75.253	78.278	81.425	84.698	88.103
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Travel	57.284	58.430	59.598	60.790	62.006	63.246	64.511	65.802	67.118	68.460	69.829	71.226
Travel income	91.644	95.328	99.160	103.146	107.293	111.605	116.092	120.758	125.613	130.662	135.914	141.378
	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
Travel	72.650	74.103	75.585	77.097	78.639	80.212	81.816	83.452	85.121	86.824	88.560	44.038
Travel income	147.061	152.973	159.122	165.518	172.172	179.093	186.292	193.780	201.570	209.673	218.101	110.602

Table 101. Travel and income in an optimistic scenario (in thousands of nominal dollars).

3.4.3 Income in PPDi

The availability payment represents a fixed amount that will be covered by the system's income and the management's payment of the remaining amount. For the purposes of its calculation, the fixed amount was divided into two components: an OPEX component that

pays for system expenses and a CAPEX component that pays for the investment and its return. The amount of both components has two additional conditions: i) it is updated at the beginning of the year by the United States inflation (since it will be denominated in dollars) of last year and ii) a factor of less than 1x will be applied the first years of the beginning of each line in order to facilitate its financing by the government.

The application of the factor represents a difference, in constant terms, of \$124 million for the years in which it applies, which does not have to be disbursed by the public sector. The difference in the annual availability payment (between 174 million in the base case and 155 million without applying the factor) is 18.3 million pesos more per year, that is, the factor represents an availability payment 11% more expensive than if it were not used.

Year of line operation	1	2	3	4	5	6	7	8
Percentage to be applied to the tariff of each line	50%	60%	70%	80%	90%	100%	100%	

Table 102. PPD application factor.

Calculating the flow that will allow to obtain an IRR of 10%, we have the following result in terms of constant dollars.

Annual availability payment		USD 2019
CAPEX Rate		129.335.047
OPEX Rate		44.728.835
Total		174.063.882
Payment of the administration*		96.229.818

Average Annual Fee Income	76.470.953
----------------------------------	-------------------

* Average annual payment to be made after deducting system revenue, considering only full years of operation with a factor to be applied to the 1x rate. Annual fee income for full years of operation after ramp-up.

Table 103. Annual PPD_i tariff - base case.

By applying the ramp-up factor to the PPD_i as well as the update for inflation, we have an increasing amount, in which the OPEX represents 30% of the payment, the rest being absorbed by the CAPEX rate. As can be seen, the project's income will be sufficient to cover everything related to the OPEX and a good part of the CAPEX, the rest having to be placed by the government.

It must be considered that this income is not guaranteed but is subject to penalties derived from the compliance with the indicators defined in the bidding notice, which may result in an actual IRR lower than the one contemplated.

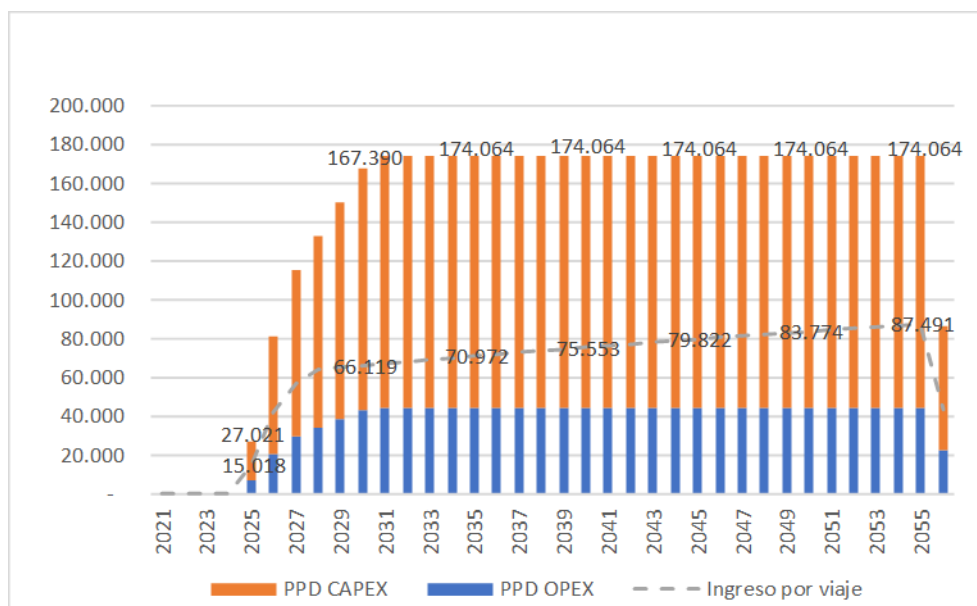


Figure 9. PPDi (constant thousands of dollars) - base demand.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
OPEX PPD	-	-	-	-	7.194	20.670	29.551	34.024	38.497	42.970	44.729	44.729
PPD CAPEX	-	-	-	-	19.827	60.366	85.620	98.553	111.487	124.420	129.335	129.335
Total	-	-	-	-	27.021	81.035	115.171	132.578	149.984	167.390	174.064	174.064
Income per trip	-	-	-	-	15.018	42.014	56.765	64.100	65.116	66.119	67.110	68.088
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
OPEX PPD	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729
PPD CAPEX	129.335	129.335	129.335	129.335	129.335	129.335	129.335	129.335	129.335	129.335	129.335	129.335
Total	174.064	174.064	174.064	174.064	174.064	174.064	174.064	174.064	174.064	174.064	174.064	174.064
Income per trip	69.055	70.020	70.972	71.913	72.841	73.757	74.661	75.553	76.432	77.298	78.152	78.994
	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
OPEX PPD	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	22.242
PPD CAPEX	129.335	129.335	129.335	129.335	129.335	129.335	129.335	129.335	129.335	129.335	129.335	64.314
Total	174.064	174.064	174.064	174.064	174.064	174.064	174.064	174.064	174.064	174.064	174.064	86.556
Income per trip	79.822	80.638	81.441	82.231	83.009	83.774	84.532	85.282	86.025	86.761	87.491	43.506

Table 104. PPDi (constant thousands of dollars) - base demand.

The above represents a payment for the State of up to 106 million USD in constant terms, as shown in the following graph.

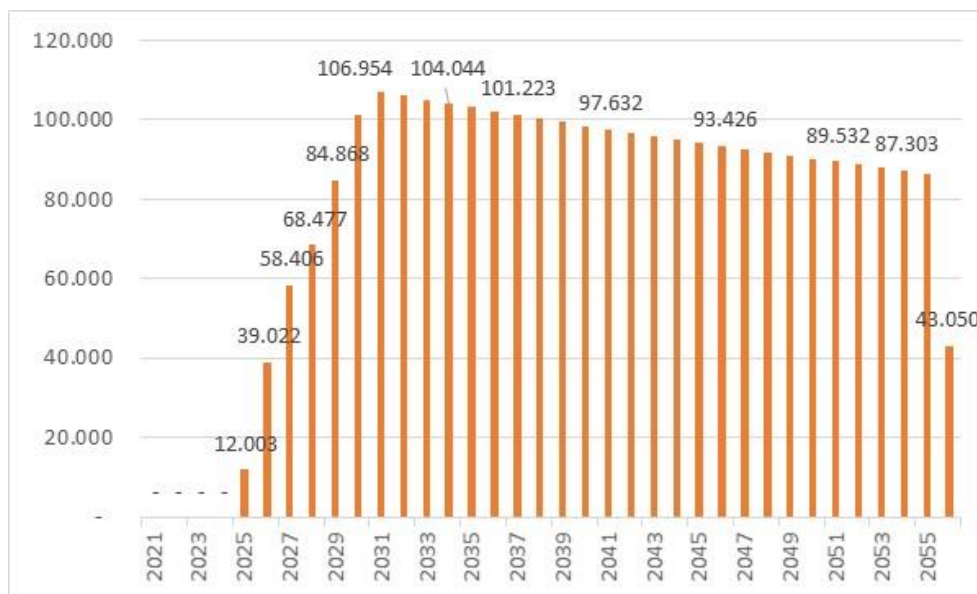


Figure 10. Net payments State (thousands of actual dollars) - base demand.

In nominal terms, the evolution is as follows

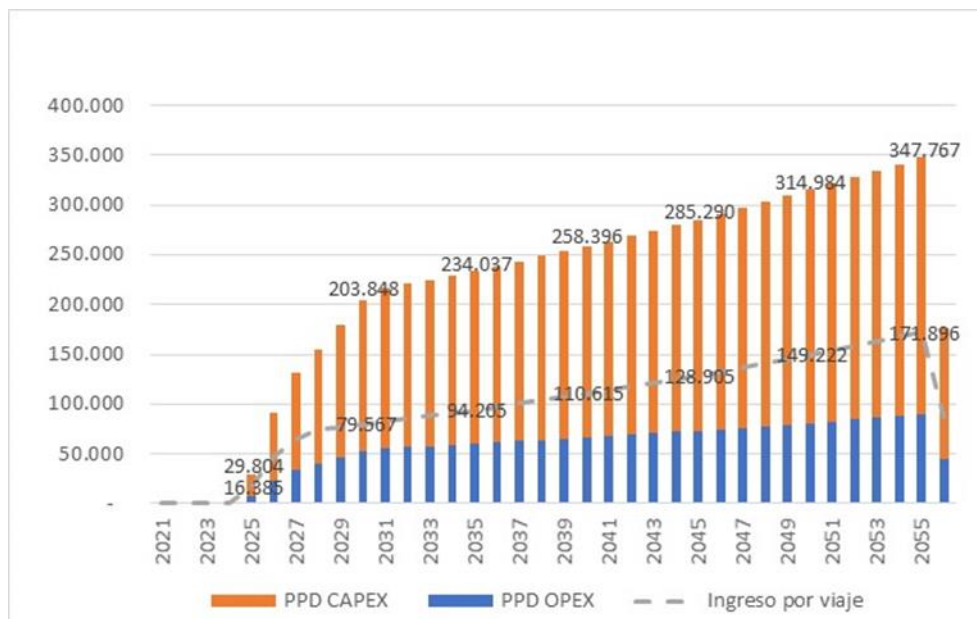


Figure 11. PPDi (thousands of nominal dollars) - base demand.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
OPEX PPD	-	-	-	-	7.935	23.255	33.912	39.826	45.963	52.329	55.560	56.671
PPD CAPEX	-	-	-	-	21.869	67.915	98.254	115.358	133.106	151.519	160.654	163.867
Total	-	-	-	-	29.804	91.170	132.166	155.184	179.069	203.848	216.214	220.539
Income per trip	-	-	-	-	16.385	46.745	64.408	74.171	76.838	79.567	82.359	85.214
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
OPEX PPD	57.805	58.961	60.140	61.343	62.570	63.821	65.098	66.400	67.728	69.082	70.464	71.873
PPD CAPEX	167.145	170.488	173.897	177.375	180.923	184.541	188.232	191.997	195.837	199.753	203.748	207.823
Total	224.949	229.448	234.037	238.718	243.493	248.362	253.330	258.396	263.564	268.835	274.212	279.696
Income per trip	88.136	91.136	94.205	97.344	100.553	103.834	107.187	110.615	114.118	117.697	121.354	125.089
	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
OPEX PPD	73.310	74.777	76.272	77.798	79.354	80.941	82.559	84.211	85.895	87.613	89.365	91.136
PPD CAPEX	211.980	216.219	220.544	224.955	229.454	234.043	238.724	243.498	248.368	253.336	258.402	263.467
Total	285.290	290.996	296.816	302.752	308.807	314.984	321.283	327.709	334.263	340.948	347.767	354.603
Income per trip	128.905	132.801	136.779	140.841	144.989	149.222	153.553	157.984	162.516	167.153	171.896	176.638

Table 105. PPDi (thousands of nominal dollars) - base demand.

As can be seen, the transport revenue generated by the TE would manage to cover the OPEX component of the PDP, although the State will still have to cover the remainder. In nominal terms, this represents up to 175.9 million USD by 2055. In constant terms, the income from travel also manages to cover the OPEX portion of the PDP.

Conservative demand scenario

Considering the PPDi concession scheme in the conservative demand scenario, the following payment results are presented:

Annual availability payment	USD constant 2019
CAPEX Rate	129.277.230
OPEX Rate	44.728.835
Total	174.006.065
Payment of the administration*	105.742.753

Average Annual Fee Income	67.654.967
----------------------------------	-------------------

* Average annual payment to be made after deducting system revenue, considering only full years of operation with a factor to be applied to the 1x rate. Annual fee income for full years of operation after ramp-up.

Table 106. Annual PPDi tariff - conservative demand.

Note that in this scenario the availability payment is slightly lower than in the base. This is derived from the local tax on tariff revenues. Having less income derived from the system

there is less tax burden (the 1% tax that is only generated on tariff income not on the administration's payment) which allows to obtain the target IRR with a very slightly lower fixed amount. However, precisely because of having less income from the system, the payment of the administration is higher since it must compensate for this drop-in tariff income by a lower overall demand.

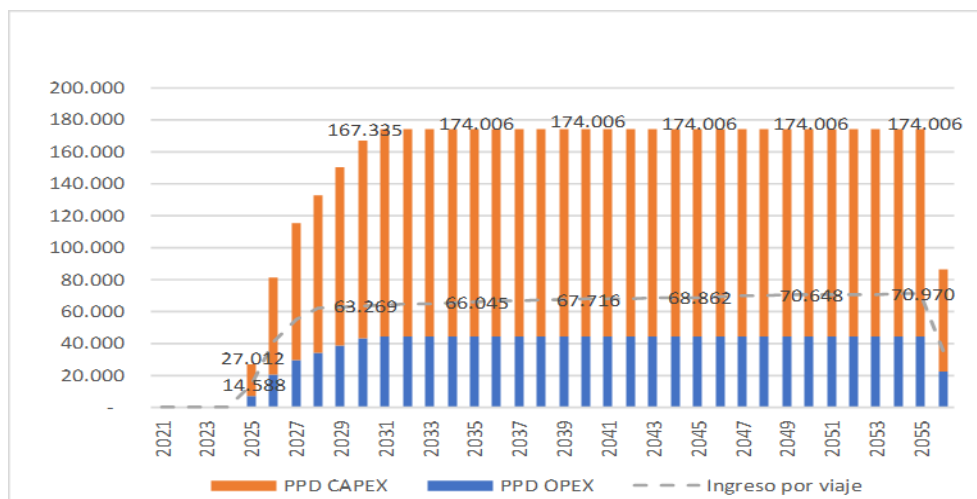


Figure 12. PPDi (constant thousands of dollars) - conservative demand.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
OPEX PPD	-	-	-	-	7.194	20.670	29.551	34.024	38.497	42.970	44.729	44.729
PPD CAPEX	-	-	-	-	19.818	60.339	85.582	98.509	111.437	124.365	129.277	129.277
Total	-	-	-	-	27.012	81.009	115.133	132.534	149.934	167.335	174.006	174.006
Income per trip	-	-	-	-	14.588	40.847	55.045	61.893	62.595	63.269	63.861	64.430
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
OPEX PPD	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729
PPD CAPEX	129.277	129.277	129.277	129.277	129.277	129.277	129.277	129.277	129.277	129.277	129.277	129.277
Total	174.006	174.006	174.006	174.006	174.006	174.006	174.006	174.006	174.006	174.006	174.006	174.006
Income per trip	64.975	65.521	66.045	66.412	66.763	67.097	67.414	67.716	67.974	68.217	68.446	68.661
	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
OPEX PPD	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	22.242
PPD CAPEX	129.277	129.277	129.277	129.277	129.277	129.277	129.277	129.277	129.277	129.277	129.277	64.285
Total	174.006	174.006	174.006	174.006	174.006	174.006	174.006	174.006	174.006	174.006	174.006	86.528
Income per trip	68.862	69.278	69.664	70.020	70.348	70.648	70.718	70.785	70.849	70.911	70.970	35.291

Table 107. PPDi (constant thousands of dollars) - conservative demand.

This scenario represents a payment for the State, of up to 110.1 million dollars in constant terms, in that year (2031) where, because it is at the beginning of the system's demand growth curve, there is less tariff income with which to cover the PPDi. As there is less income, the administration ends up paying more in total.

The net payment in constant terms is as follows:

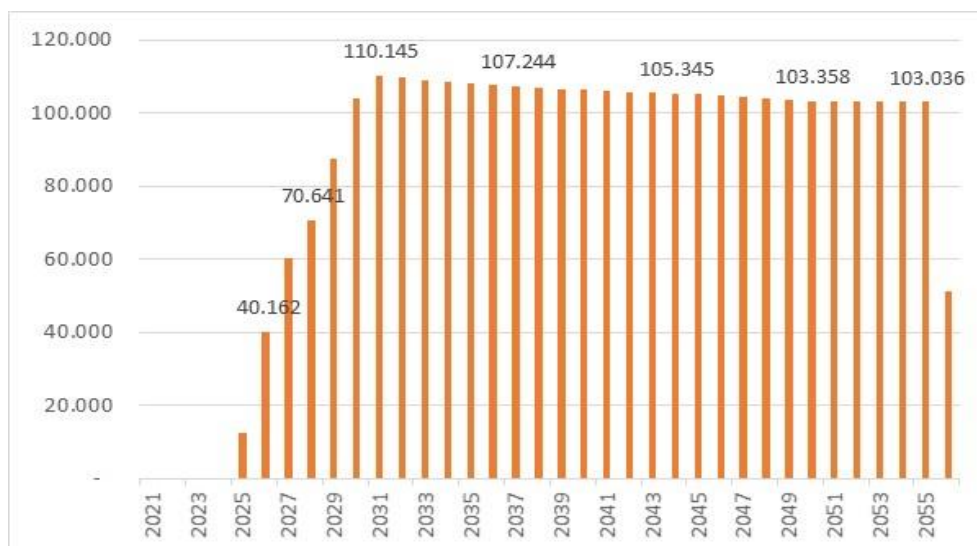


Figure 13. Net payment from the State (thousands of constant dollars) - conservative demand

In current terms, the development of the payment is as follows:

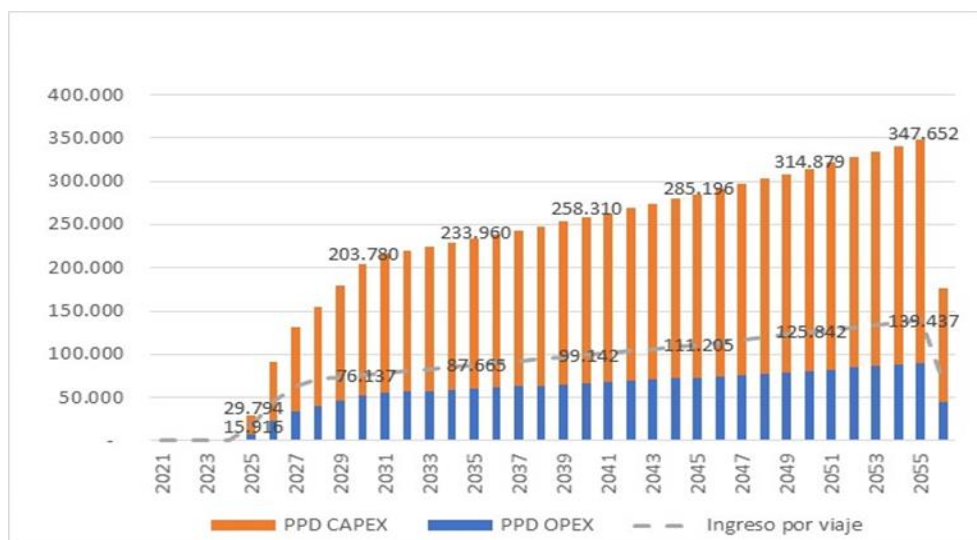


Figure 14. PPDi (thousands of nominal dollars) - conservative demand.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
OPEX PPD	-	-	-	-	7.935	23.255	33.912	39.826	45.963	52.329	55.560	56.671
PPD CAPEX	-	-	-	-	21.860	67.885	98.210	115.306	133.047	151.451	160.582	163.794
Total	-	-	-	-	29.794	91.139	132.122	155.132	179.010	203.780	216.143	220.465
Income per trip	-	-	-	-	15.916	45.446	62.456	71.617	73.864	76.137	78.372	80.635
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
OPEX PPD	57.805	58.961	60.140	61.343	62.570	63.821	65.098	66.400	67.728	69.082	70.464	71.873
PPD CAPEX	167.070	170.411	173.820	177.296	180.842	184.459	188.148	191.911	195.749	199.664	203.657	207.730
Total	224.875	229.372	233.960	238.639	243.412	248.280	253.245	258.310	263.477	268.746	274.121	279.603
Income per trip	82.927	85.281	87.665	89.898	92.162	94.457	96.784	99.142	101.490	103.870	106.282	108.728
	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
OPEX PPD	73.310	74.777	76.272	77.798	79.354	80.941	82.559	84.211	85.895	87.613	89.365	91.147
PPD CAPEX	211.885	216.123	220.445	224.854	229.351	233.938	238.617	243.389	248.257	253.222	258.287	263.450
Total	285.196	290.899	296.717	302.652	308.705	314.879	321.176	327.600	334.152	340.835	347.652	354.597
Income per trip	111.205	114.092	117.000	119.927	122.874	125.842	128.840	131.878	134.956	138.073	141.230	144.427

Table 108. PPD_i (constant thousands of dollars) - conservative demand.

The maximum payment by management in nominal terms is in the year 2055 in the amount of 208 million USD.

Optimistic demand scenario

Finally, the scenario is also presented with an optimistic demand (assuming constant annual growth rates of 2%). The results are as follows.

Annual availability payment	USD constant 2019
CAPEX Rate	129.386.628
OPEX Rate	44.728.835
Total	174.115.463
Payment of the administration*	85.691.260

Average Annual Fee Income	86.058.547
----------------------------------	-------------------

*Average annual payment to be made after deducting system revenue, considering only full years of operation with a factor to be applied to the 1x rate. Annual fee income for full years of operation after ramp-up.

Table 109. Annual PPD_i rate - optimistic case.

Here again we see the effect that an increase in demand generates a higher level of fixed payment to reach the expected IRR but the increase in demand itself generates a lower payment from the administration.

In constant terms, the evolution of revenues is seen as follows:

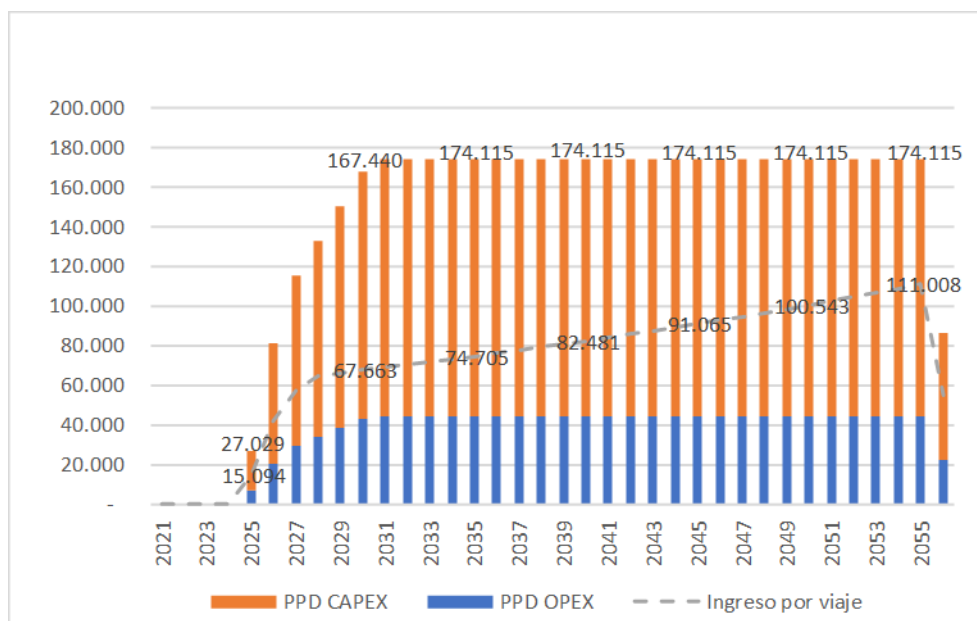


Figure 15. PPDi (constant thousands of dollars) - optimistic demand.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
OPEX PPD	-	-	-	-	7.194	20.670	29.551	34.024	38.497	42.970	44.729	44.729
PPD CAPEX	-	-	-	-	19.835	60.390	85.654	98.593	111.531	124.470	129.387	129.387
Total	-	-	-	-	27.029	81.060	115.205	132.617	150.028	167.440	174.115	174.115
Income per trip	-	-	-	-	15.094	42.338	57.384	65.035	66.336	67.663	69.016	70.396
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
OPEX PPD	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729
PPD CAPEX	129.387	129.387	129.387	129.387	129.387	129.387	129.387	129.387	129.387	129.387	129.387	129.387
Total	174.115	174.115	174.115	174.115	174.115	174.115	174.115	174.115	174.115	174.115	174.115	174.115
Income per trip	71.804	73.240	74.705	76.199	77.723	79.278	80.863	82.481	84.130	85.813	87.529	89.280
	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
OPEX PPD	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	44.729	22.242
PPD CAPEX	129.387	129.387	129.387	129.387	129.387	129.387	129.387	129.387	129.387	129.387	129.387	64.340
Total	174.115	174.115	174.115	174.115	174.115	174.115	174.115	174.115	174.115	174.115	174.115	86.582
Income per trip	91.065	92.887	94.744	96.639	98.572	100.543	102.554	104.605	106.697	108.831	111.008	55.201

Table 110. PPDi (constant thousands of dollars) - optimistic demand.

This scenario represents a payment for the State of up to 105 million USD in constant terms in 2031. Thanks to the rapid increase in the demand curve, the administration's payments end up being lower.

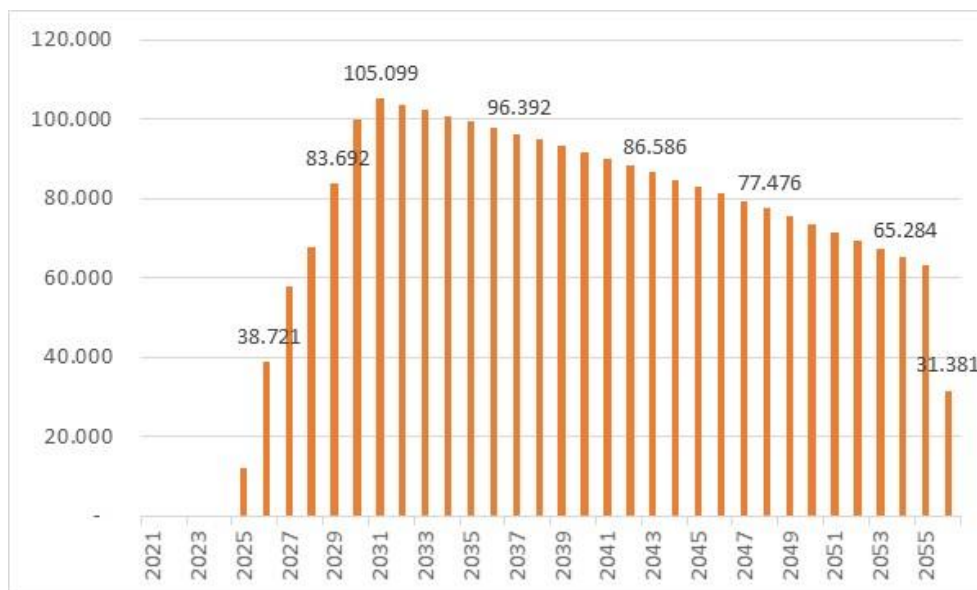


Figure 16. Net payment from the State (thousands of constant dollars) - optimistic demand

In nominal terms, revenues behave as follows:

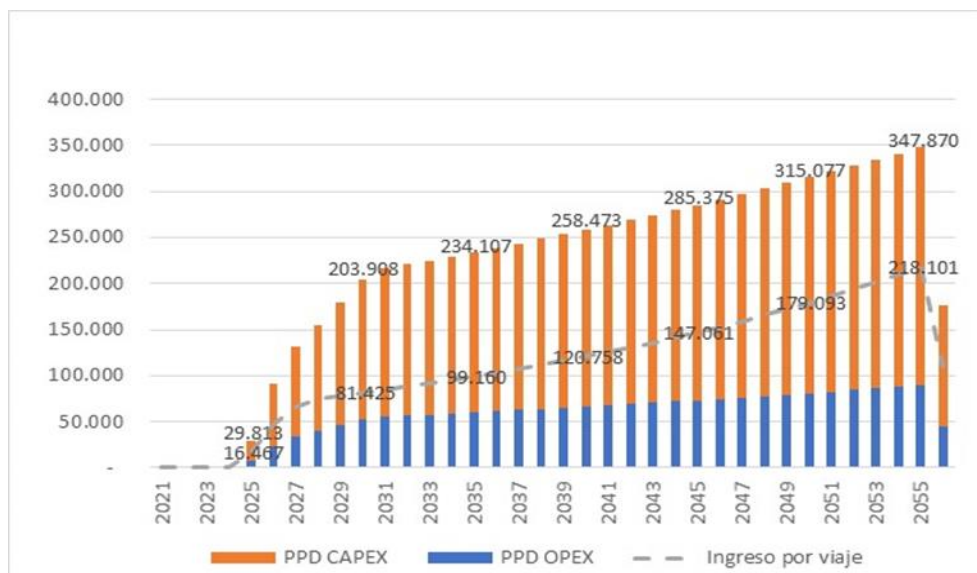


Figure 17. PPDi (thousands of nominal dollars) - optimistic demand.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
OPEX PPD	-	-	-	-	7.935	23.255	33.912	39.826	45.963	52.329	55.560	56.671
PPD CAPEX	-	-	-	-	21.878	67.942	98.293	115.404	133.160	151.579	160.718	163.933
Total	-	-	-	-	29.813	91.197	132.205	155.230	179.122	203.908	216.278	220.604
Income per trip	-	-	-	-	16.467	47.106	65.111	75.253	78.278	81.425	84.698	88.103
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
OPEX PPD	57.805	58.961	60.140	61.343	62.570	63.821	65.098	66.400	67.728	69.082	70.464	71.873
PPD CAPEX	167.211	170.556	173.967	177.446	180.995	184.615	188.307	192.073	195.915	199.833	203.830	207.906
Total	225.016	229.516	234.107	238.789	243.565	248.436	253.405	258.473	263.642	268.915	274.293	279.779
Income per trip	91.644	95.328	99.160	103.146	107.293	111.605	116.092	120.758	125.613	130.662	135.914	141.378
	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
OPEX PPD	73.310	74.777	76.272	77.798	79.354	80.941	82.559	84.211	85.895	87.613	89.365	91.147
PPD CAPEX	212.064	216.306	220.632	225.044	229.545	234.136	238.819	243.595	248.467	253.437	258.505	263.671
Total	285.375	291.082	296.904	302.842	308.899	315.077	321.378	327.806	334.362	341.049	347.870	354.818
Income per trip	147.061	152.973	159.122	165.518	172.172	179.093	186.292	193.780	201.570	209.673	218.101	226.902

Table 111. PPD_i (thousands of nominal dollars) - optimistic demand.

In this scenario, the largest management payment would be in 2044 for an amount of 138.4 million USD.

3.4.4 Revenues in PPDD

In the scheme known as PPDD, the concessionaire will have the income from the transportation fee and additionally a payment from the government divided into two components: an OPEX component that is destined to the payment of expenses for this concept of the system and a CAPEX component that pays for the investment and its return. Thanks to the system's income, it is estimated that the payment requested by the concessionaire from the State will be lower.

Having said this, the transfer of demand risk implies that 13.5% has been used as the target IRR, a higher IRR so that when demand falls by 30% in the conservative scenario, the resulting IRR is 10% (the same as in the PPD_i scenario). Additionally, in this scheme, if chosen, it is foreseen that for its success a minimum income guarantee will be required, which was determined, as explained above, as that which during the life of the concession allows (if there are no deviations from other factors) to achieve a minimum IRR equal to the country's risk-free profitability (7.25% in Eurobonds) plus a differential of 0.75%. This profitability is insufficient for a project of this type since the investor assumes the operation

and construction risks in all cases but avoids the risk of bankruptcy or abandonment of the concession.

As in the PPDi scheme, the payment of the CAPEX and OPEX components of the PPDD has two conditions: (i) it is updated at the beginning of the year by last year's US inflation (since it will be denominated in dollars) and (ii) a factor of less than 1x will be applied in the first years of the start of each line in order to facilitate its financing by the government.

The application of the factor represents a difference, in constant terms, of \$78 million in the years in which it applies, which does not have to be disbursed by the public sector. The difference in the annual availability payment (between the 123 million in the base case and 108 million without applying the factor) is 14.9 million pesos more per year, that is, applying the factor represents an availability payment 14% more expensive than if it were not used

Year of line operation	1	2	3	4	5	6	7	8
Percentage to be applied to the tariff of each line	50%	60%	70%	80%	90%	100%	100%	

Table 112. Application factor to the PPDD.

Calculating the flow that will allow to obtain an IRR of 13.5%, we have the following result in terms of constant dollars for the whole system:

Paid per Annual Availability	USD constant 2019
CAPEX Rate	78.598.375
OPEX Rate	44.728.835
Total	123.327.210
Guaranteed minimum income	153.247.726
Guaranteed minimum income on demand	29.920.516

Table 113. Annual PPDD rate - base case.

The minimum guaranteed income is developed in order to reduce the demand risk of the concessionaire in this scenario. The minimum revenue is the amount of income that the concessionaire should obtain annually (in constant terms) to achieve (assuming the development of construction and operation is carried out without setbacks) 8% IRR for the concessionaire, given that we consider that the exposure to demand risk should not be so

high as to incur in the non-sustainability of the project. In this way, the incentives of the concessionaire are preserved (it is estimated that the concessionaire wants an IRR of 13.5% - as commented - predicated on maintaining controlled construction costs and a good operation that avoids penalties established by contract) but the demand risk is reduced, over which the concessionaire has little control, providing incentives for bidders to develop the project who estimate that the risks that the project will incur are not prohibitive for them.

The minimum income calculated in the model implies that, if the income in a given year, considering tariff income and the fixed payment of the administration (before penalties), does not reach 153 million USD (inflationary), the administration must additionally pay the differential between the income actually obtained and the 153 million USD level. If the concessionaire's revenues are above this level, management only makes the fixed payment determined in advance (decreasing any penalties that may apply). Indeed, the CAPEX and OPEX rates are subject to penalties derived from the compliance with the KPIs, which would not be linked to the minimum revenue, so that the effective IRR of the dealer may be lower than the one that would result from applying the guaranteed minimum revenue. For the tender, the minimum revenue will be applied only on the travel income. That is, in this case, if the income from trips does not reach 29.9 million dollars or the amount that corresponds each year according to the inflationary amount (or lower amounts in case they have been offered by the concessionaire), the administration will cover the difference between the income from trips and said 29.9 million. In this way, the amount of the minimum guaranteed income is decoupled from the fixed component, so that possible fluctuations in the fee associated with penalties or the initial growing fee period do not artificially activate the "trigger" of the minimum guaranteed income.

On the other hand, the projected revenues cover the OPEX; however, for the calculation of the CAPEX and OPEX tariffs, the distribution between CAPEX and OPEX tariffs applied in the PPDi model was maintained. The financial balance is not affected; the method of applying the CAPEX and OPEX tariffs can be defined in the cartel.

The minimum guaranteed income is applied under the following conditions in the model:

- **Guaranteed minimum income (GMI):** The minimum income amount will be updated for U.S. inflation in January of each year based on the previous year's inflation rate. Likewise, in case of partial operation (lines that have not yet entered into operation or in the year the concession ends), the period of time operated with respect to the corresponding calendar year will be taken and that proportion of the year of operation

will be applied to the amount of the minimum revenue. For example, if only half of the year the system was operated, the amount of the guaranteed minimum revenue will be half of the amount established.

- Reference Amount: The amount of income of the concessionaire that will be taken to compare with the GMI level will be the gross income generated by the system (before taxes) plus the fixed payment of the administration (updated by inflation) before possible penalties.
- - Application period: The GMI will not apply the first three years of system operation. That is, between 2025 (estimated year of operation of L2 and L3) and 2027 there will not be an GMI, the system income from fees and the fixed payment from the administration, will be the only income from the concessionaire.

Once the project is operational, the amount of the minimum income will be inflated and the conditions described above will be applied but will be based on the level of demand income; this IMG (of 29.9 million USD in this case) will be valued against the gross income generated by the system (before tax). If the income is less than the IMG, the administration will cover the difference.

The following are the revenue projections under a PPDD scheme.

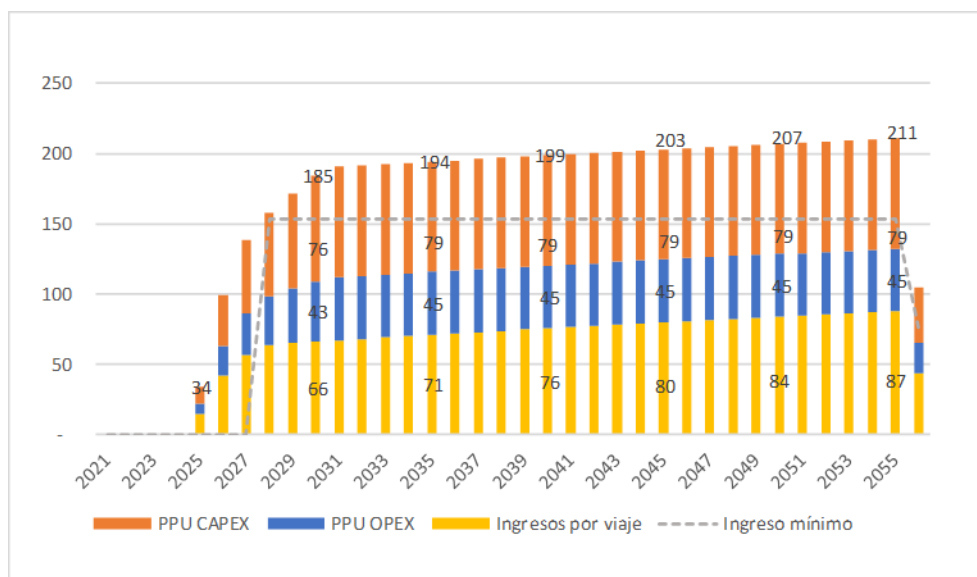


Figure 18. PPDD including travel revenue (millions of constant dollars) - base demand.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
OPEX PPDD	-	-	-	-	7	21	30	34	38	43	45	45
PPDD CAPEX	-	-	-	-	12	37	52	60	68	76	79	79
Income per trip	-	-	-	-	15	42	57	64	65	66	67	68
Total	-	-	-	-	34	99	138	158	171	185	190	191
Minimum income	-	-	-	-	-	-	-	153	153	153	153	153
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
OPEX PPDD	45	45	45	45	45	45	45	45	45	45	45	45
PPDD CAPEX	79	79	79	79	79	79	79	79	79	79	79	79
Income per trip	69	70	71	72	73	74	75	76	76	77	78	79
Total	192	193	194	195	196	197	198	199	200	201	201	202
Minimum income	153	153	153	153	153	153	153	153	153	153	153	153
	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
OPEX PPDD	45	45	45	45	45	45	45	45	45	45	45	22
PPDD CAPEX	79	79	79	79	79	79	79	79	79	79	79	39
Income per trip	80	81	81	82	83	84	85	85	86	87	87	44
Total	203	204	205	206	206	207	208	209	209	210	211	105
Minimum income	153	153	153	153	153	153	153	153	153	153	153	76

Table 114. PPDD (millions of constant dollars) - base demand.

In constant terms, there is no provision for the use of the minimum income at any time. For its part, the administration would pay 123.3 million USD annually. In nominal terms, the income looks as follows.

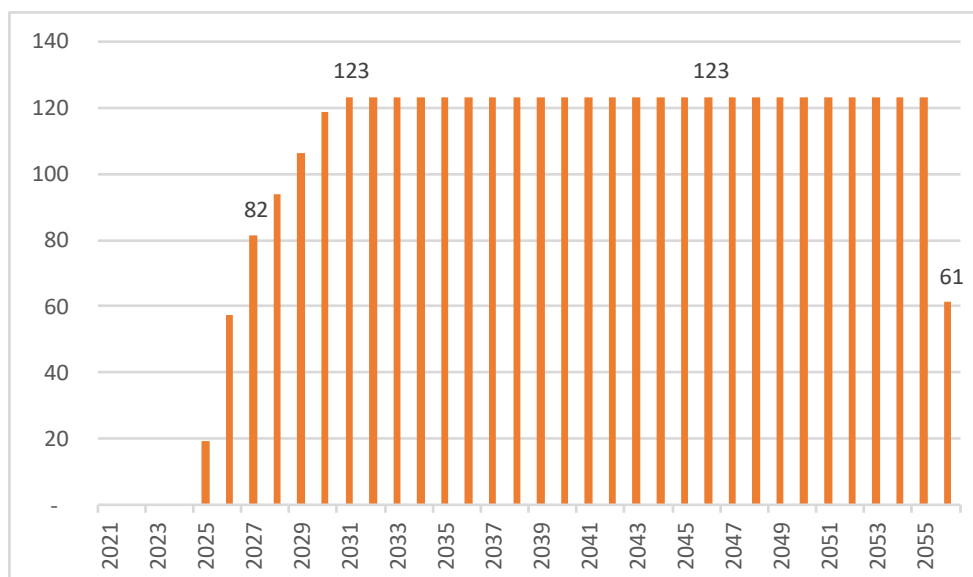


Figure 19. Net payment from the State (millions of constant dollars) - base demand.

In nominal terms, the income looks like this:

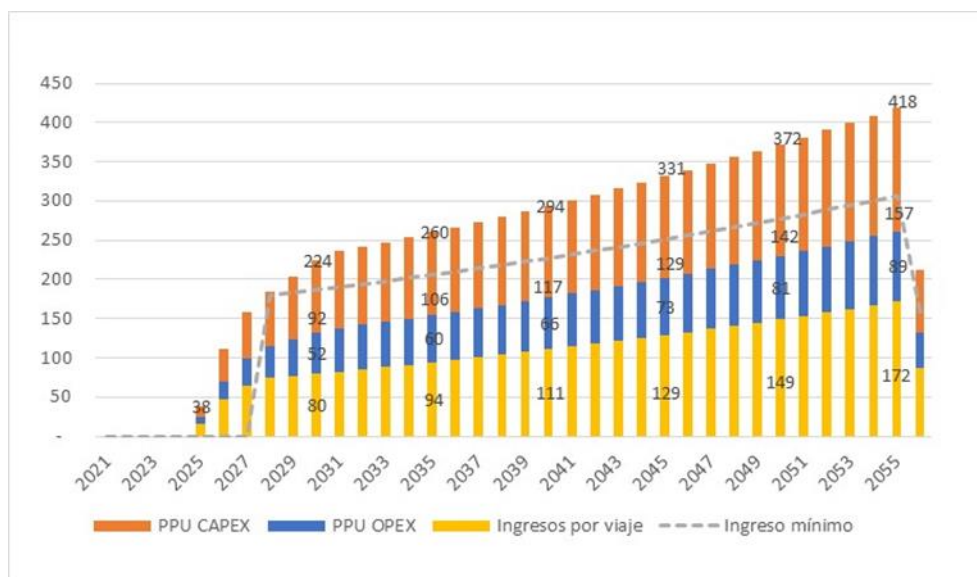


Figure 20. PPDD including travel income (millions of nominal dollars) - base demand.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
OPEX PPDD	-	-	-	-	8	23	34	40	46	52	56	57
PPDD CAPEX	-	-	-	-	13	41	60	70	81	92	98	100
Income per trip	-	-	-	-	16	47	64	74	77	80	82	85
Total	-	-	-	-	38	111	158	184	204	224	236	241
Minimum income	-	-	-	-	-	-	-	179	183	187	190	194

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
OPEX PPDD	58	59	60	61	63	64	65	66	68	69	70	72
PPDD CAPEX	102	104	106	108	110	112	114	117	119	121	124	126
Income per trip	88	91	94	97	101	104	107	111	114	118	121	125
Total	248	254	260	266	273	280	287	294	301	308	316	323
Minimum income	198	202	206	210	214	219	223	227	232	237	241	246

	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
OPEX PPDD	73	75	76	78	79	81	83	84	86	88	89	45
PPDD CAPEX	129	131	134	137	139	142	145	148	151	154	157	80
Income per trip	129	133	137	141	145	149	154	158	163	167	172	87
Total	331	339	347	355	364	372	381	390	399	409	418	212
Minimum income	251	256	261	267	272	277	283	289	294	300	306	155

Table 115. PPDD (millions of nominal dollars) - base demand.

Income projections foresee a payment of up to 246 million USD in the last full year of the concession (123 million USD inflationary).

As with the PPDi, the results are presented with conservative and optimistic demand scenarios.

Conservative demand scenario

Paid per Annual Availability	USD constant 2019
CAPEX Rate	83.791.573
OPEX Rate	44.728.835
Total	128.520.408
Guaranteed minimum income	152.746.487
Guaranteed minimum income on demand	24.226.079

Table 116. Annual PPDD rate and minimum income - conservative demand.

The reduction in demand means that the PPDD tariff has to be higher in order to reach the target IRR of 13.5%. There is a slight variation in the guaranteed minimum income, but it remains close to 153 million USD. The revenue projection in this scenario looks as follows:

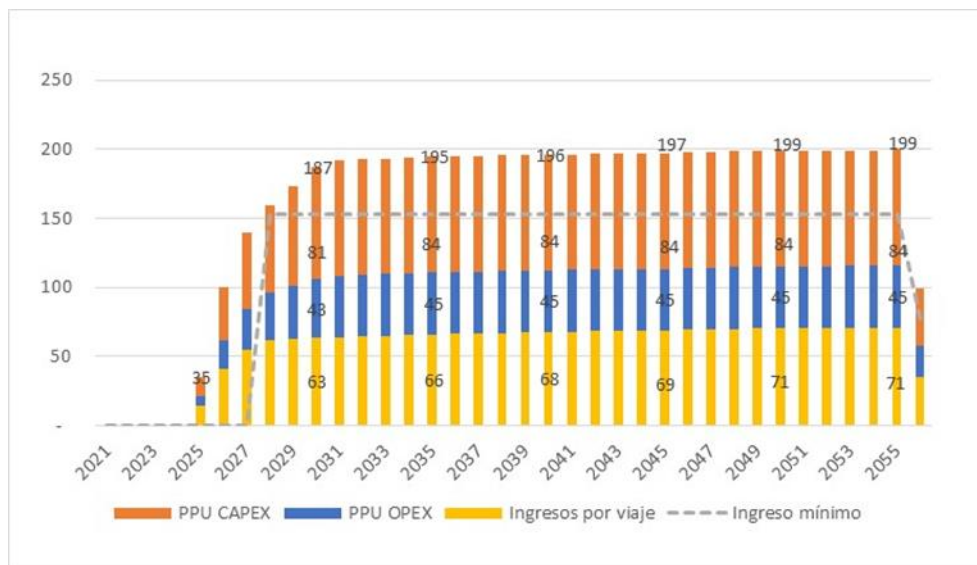


Figure 21. PPDD including travel revenue (millions of constant dollars) - conservative demand.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
OPEX PPDD	-	-	-	-	7	21	30	34	38	43	45	45
PPDD CAPEX	-	-	-	-	13	39	55	64	72	81	84	84
Income per trip	-	-	-	-	15	41	55	62	63	63	64	64
Total	-	-	-	-	35	101	140	160	173	187	192	193
Minimum income	-	-	-	-	-	-	-	153	153	153	153	153
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
OPEX PPDD	45	45	45	45	45	45	45	45	45	45	45	45
PPDD CAPEX	84	84	84	84	84	84	84	84	84	84	84	84
Income per trip	65	66	66	66	67	67	67	68	68	68	68	69
Total	193	194	195	195	195	196	196	196	196	197	197	197
Minimum income	153	153	153	153	153	153	153	153	153	153	153	153
	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
OPEX PPDD	45	45	45	45	45	45	45	45	45	45	45	22
PPDD CAPEX	84	84	84	84	84	84	84	84	84	84	84	42
Income per trip	69	69	70	70	70	71	71	71	71	71	71	35
Total	197	198	198	199	199	199	199	199	199	199	199	99
Minimum income	153	153	153	153	153	153	153	153	153	153	153	76

Table 117. PPDD (millions of constant dollars) - conservative demand.

In constant terms, there is no provision for the use of the minimum income at any time. For its part, the administration would pay 129 million USD per year.

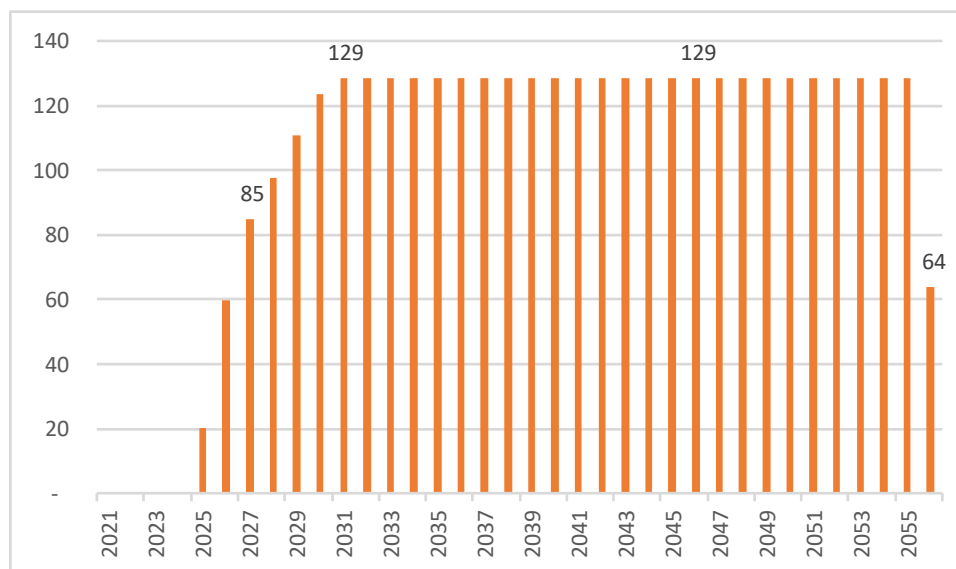


Figure 22. Net payment from the State (millions of constant dollars) - conservative demand.

In nominal terms, the income looks like this:

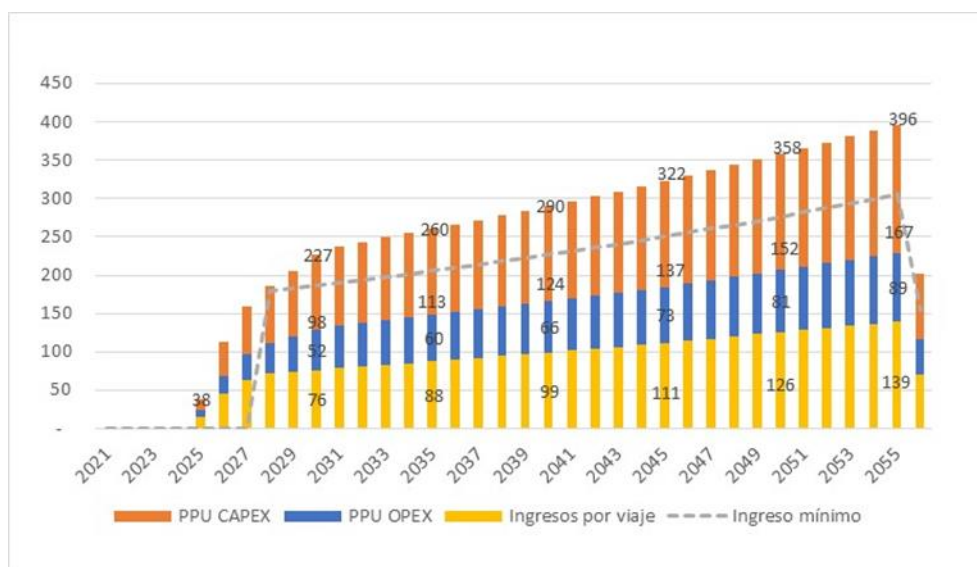


Figure 23. PPDD including travel income (millions of nominal dollars) - conservative demand.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
OPEX PPDD	-	-	-	-	8	23	34	40	46	52	56	57
PPDD CAPEX	-	-	-	-	14	44	64	75	86	98	104	106
Income per trip	-	-	-	-	16	45	62	72	74	76	78	81
Total	-	-	-	-	38	113	160	186	206	227	238	243
Minimum income	-	-	-	-	-	-	-	179	182	186	190	194

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
OPEX PPDD	58	59	60	61	63	64	65	66	68	69	70	72
PPDD CAPEX	108	110	113	115	117	120	122	124	127	129	132	135
Income per trip	83	85	88	90	92	94	97	99	101	104	106	109
Total	249	255	260	266	272	278	284	290	296	302	309	315
Minimum income	197	201	205	209	214	218	222	227	231	236	241	245

	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
OPEX PPDD	73	75	76	78	79	81	83	84	86	88	89	45
PPDD CAPEX	137	140	143	146	149	152	155	158	161	164	167	85
Income per trip	111	114	117	120	123	126	128	131	134	137	139	71
Total	322	329	336	343	351	358	366	373	381	388	396	201
Minimum income	250	255	260	266	271	276	282	288	293	299	305	155

Table 118. PPDD (millions of nominal dollars) - conservative demand.

The maximum management payment is in the last full year of operation (2055) for a total of 257 million USD.

Optimistic demand scenario

Considering the optimistic demand scenario, management's payment would be as follows:

Paid per Annual Availability	USD constant 2019
CAPEX Rate	74.356.519
OPEX Rate	44.728.835
Total	119.085.354
Guaranteed minimum income	153.741.098
Guaranteed minimum income on demand	34.655.744

Table 119. Annual PPDD rate and minimum income - optimistic demand.

Higher demand leads to lower management fees, resulting in 119 million USD per year. The minimum guaranteed income is 153.7 million USD. Revenue projections under this scenario are presented below.

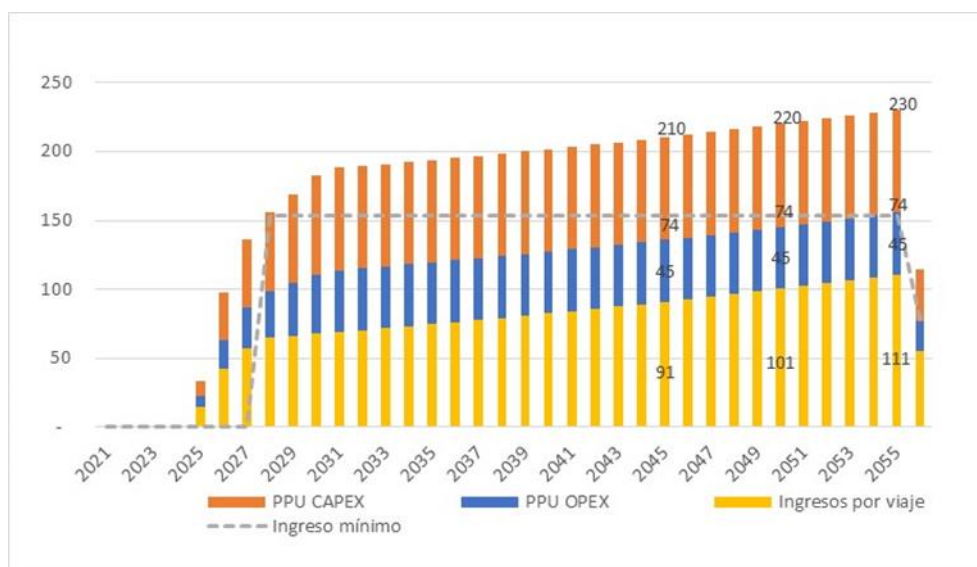


Figure 24. PPDD including travel revenue (millions of constant dollars) - optimistic demand.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
OPEX PPDD	-	-	-	-	7	21	30	34	38	43	45	45
PPDD CAPEX	-	-	-	-	11	35	49	57	64	72	74	74
Income per trip	-	-	-	-	15	42	57	65	66	68	69	70
Total	-	-	-	-	-	-	-	154	154	154	154	154
Minimum income	-	-	-	-	34	98	136	156	169	182	188	189
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
OPEX PPDD	45	45	45	45	45	45	45	45	45	45	45	45
PPDD CAPEX	74	74	74	74	74	74	74	74	74	74	74	74
Income per trip	72	73	75	76	78	79	81	82	84	86	88	89
Total	154	154	154	154	154	154	154	154	154	154	154	154
Minimum income	191	192	194	195	197	198	200	202	203	205	207	208
	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
OPEX PPDD	45	45	45	45	45	45	45	45	45	45	45	22
PPDD CAPEX	74	74	74	74	74	74	74	74	74	74	74	37
Income per trip	91	93	95	97	99	101	103	105	107	109	111	55
Total	154	154	154	154	154	154	154	154	154	154	154	76
Minimum income	210	212	214	216	218	220	222	224	226	228	230	114

Table 120. PPDD (millions of constant dollars) - optimistic demand.

In constant terms, the maximum payment from management is 119 million USD. The minimum income level is not activated in the base scenario:

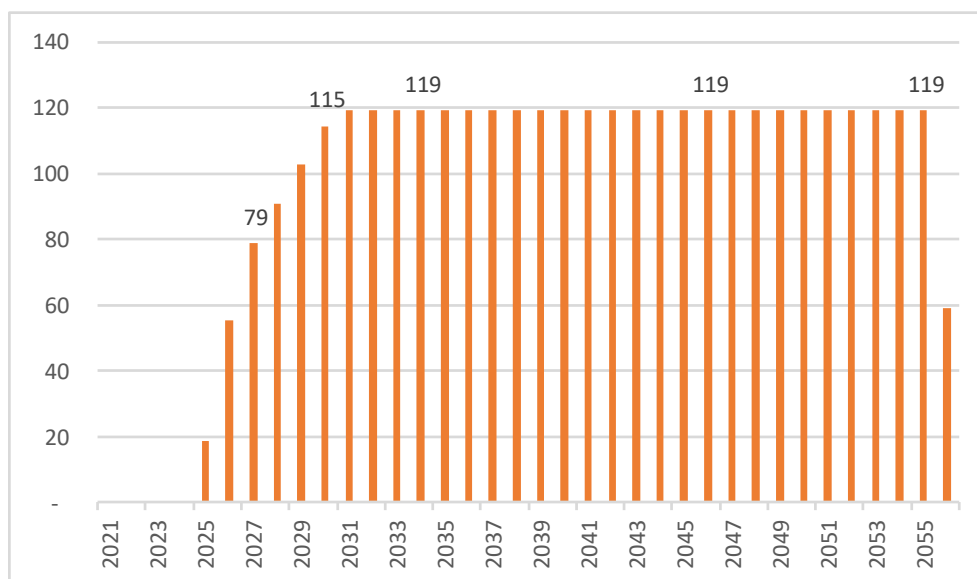


Figure 25. Net payment from the State (millions of constant dollars) - optimistic demand

In nominal terms, the income projection would look like this:

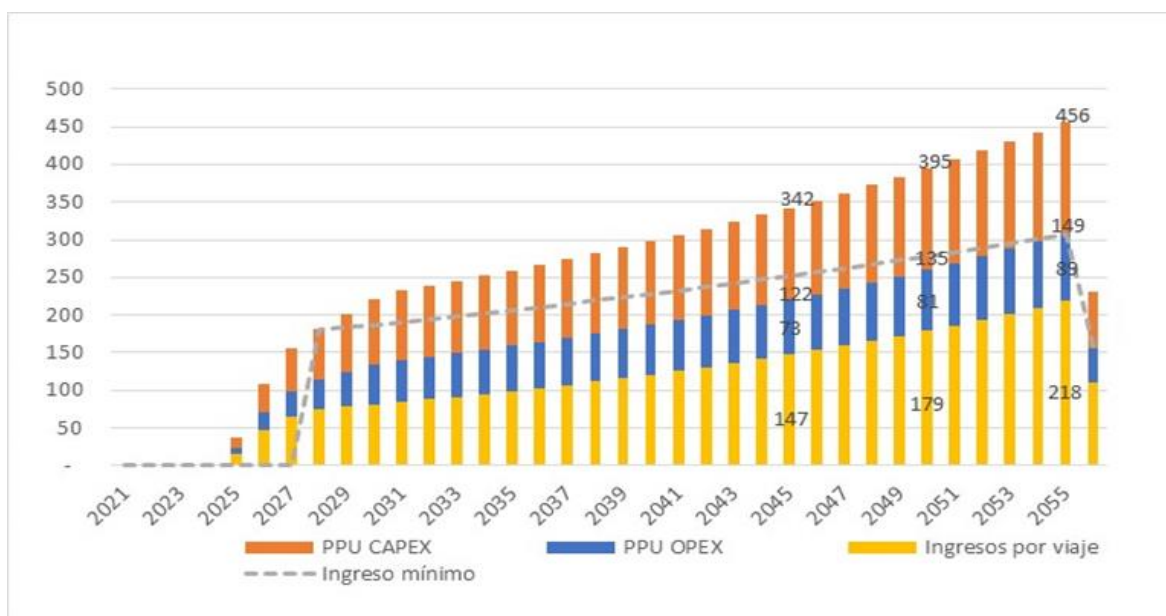


Figure 26. PPDD including travel revenue (millions of nominal dollars) - optimistic demand.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
OPEX PPDD	-	-	-	-	8	23	34	40	46	52	56	57
PPDD CAPEX	-	-	-	-	13	39	56	66	77	87	92	94
Income per trip	-	-	-	-	16	47	65	75	78	81	85	88
Total	-	-	-	-	-	-	-	180	184	187	191	195
Minimum income	-	-	-	-	37	109	156	181	201	221	233	239

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
OPEX PPDD	58	59	60	61	63	64	65	66	68	69	70	72
PPDD CAPEX	96	98	100	102	104	106	108	110	113	115	117	119
Income per trip	92	95	99	103	107	112	116	121	126	131	136	141
Total	199	203	207	211	215	219	224	228	233	237	242	247
Minimum income	246	252	259	266	274	282	289	298	306	315	324	333

	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
OPEX PPDD	73	75	76	78	79	81	83	84	86	88	89	45
PPDD CAPEX	122	124	127	129	132	135	137	140	143	146	149	75
Income per trip	147	153	159	166	172	179	186	194	202	210	218	111
Total	252	257	262	267	273	278	284	289	295	301	307	156
Minimum income	342	352	362	373	383	395	406	418	430	443	456	231

Table 121. PPDD (millions of nominal dollars) - optimistic demand.

Under this scheme, the maximum management payment, in nominal terms, is given in 2055 when the PPDD rate would be 238 million USD, less than in the base or conservative scenario.

Summarizing the results according to the different scenarios, we have the following table:

Scenario	IRR	Project IRR	NPV	Project NPC	Annual Payment (USD cte.)*	Total Payment (USD cte.)
PPDi Base	10,00%	9,16%	5	304.459.718	96.229.818	2.813 mdd
PPDi Conservative	10,00%	9,16%	3	304.568.887	105.742.753	3.070mdd
PPDi Optimistic	10,00%	9,16%	0	304.303.742	85.691.260	2.533 mdd
PPDi Base	13,50%	10,68%	\$1	368.180.644	123.327.210	3.621 mdd
PPDi Conservative	13,50%	10,64%	\$1	356.804.224	128.520.408	3.774 mdd
PPDi Optimistic	13,50%	10,74%	\$1	385.099.667	119.085.354	3.497 mdd

* For the PPDi the annual payment is the annual average paid by the administration after deducting the system's income, considering only the complete years of operation with a factor to be applied to the PPD at 100% in all lines.

Table 122. Financial indicators of the different projected scenarios.

As can be seen, in all cases, the PPDi structure represents a lower payment for the State compared to the PPDD. This, however, is predicated on the demand estimates being met, otherwise the administration's payment may increase substantially, considering that the fixed payment in such structure is around 174 million dollars. In contrast, the IMG that is part of the PPDD structure is, in all three demand scenarios, between 152 million USD and 153 million USD. Additionally, analyzing the effects of different demand scenarios within each structure, the increase in demand results in lower payments for management and vice versa.

3.4.5 Other income

The financial analysis carried out so far assumes that the revenues of the concessionaire are only the payments made by the State and, depending on the scheme, the revenues from travel in the ET. However, there are also possible sources of income derived from businesses that are peripheral to the transport system.

Among the complementary income from this type of transport system, the following are generally considered:

- Income from the exploitation of tertiary spaces in stations (commercial, hotel, etc.).
- Revenue from the rental of space for advertising inside and outside stations and in other service elements: signs, naming rights linked to flagship stations, advertising on service cards, etc.
- Operation of car parks linked to stations.
- Marketing of spaces within the right-of-way of the public service network in the assigned right-of-way strip (fibre optic networks, etc.).

In addition to these usual sources of income in projects such as this, the potential for the development of tertiary areas on properties adjacent to some of the stations is also identified in the current case, as shown in ANNEX V: DETAIL OF FINANCIAL CALCULATIONS.

Traditional supplementary income is highly volatile and difficult to estimate as a base case⁹. In any case, projections have been made with income from estimable sources; however, those that represent income for the local government through taxes that depend on the revaluation in the real estate market are not considered because they are not directly part of the concessionaire's income.

For the purposes of the study, a preliminary estimate has been made of income from:

- Advertising
- Commercial spaces in the stations

This supplementary income estimate is combined with a specific one for real estate.

- With regard to advertising, an annual income of 4,878 USD per kilometer of system was estimated, using another project carried out by IDOM in Central America as a reference. Considering the entire system, this yields approximately 414,146 dollars in constant terms, per year.
- With respect to commercial space, a rental price of 14 USD per m² per month is assumed. Two scenarios were carried out, according to whether the use of the depots is changed during the Pacífico station. An in-depth discussion of both alternatives can be found in ANNEX VI: URBAN INTEGRATION. The estimated commercial spaces, in the Pacífico, Atlántico, San Antonio de Belén and Cartago

⁹ In this regard, the UNOPS report "Technical assistance on definitions for transaction strategy" of November 2017 states that "The decision to include or not this type of complementary or optional services in passenger transport concession contracts is generally debatable (...)".

stations, are 11,866 m² (leaving the workshops as they are) or 23,708 m² (if the use of the workshops is changed). This implies an income, in constant terms, for the whole system of 1,993,626 dollars per year in the first scenario (from the start of operation of the whole system) or 3,983,083 dollars per year in the second scenario.

The remaining types of complementary income are difficult to estimate rigorously. In general, in a project of this type, and according to the profile of the route, the total income from complementary uses could be around 5% of the total income¹⁰.

- With respect to real estate, there are INCOFER lands in the Pacífico and Atlántico stations that are expected to be used in the project to be sold by the concessionaire for the development of commercial and office space. This implies the development of 9,260 m² of space in the Atlántico station and 59,711 m² in the Pacífico station (in scenario 1) or up to 84,845 m² in scenario 2 (renovation of workshops for real estate use). Considering the sales price for someone who will not develop the land (as is expected to be the case of the ET concessionaire), an income of 11.57 million USD was estimated for the first years in scenario 1 and up to 15.8 million USD in the workshop conversion scenario.

Peripheral income	Annual (2019 dollars)	Total during concession (dollars 2019)
Advertising	414.146	12.642.866
Commercial lease scenario 1	1.993.626	60.907.274
Commercial lease scenario2	3.983.083	121.689.258
Real estate development scenario 1	N/A	11.495.238
Real estate development scenario 2	N/A	15.814.101

Table 123. Potential indirect income.

It is important to mention that for the base cases, as well as the preparation of the bidding cartel, the resources for the sale of tertiary uses are not contemplated as it is a risk that is difficult to control by the operator. What is foreseen is a possible "up-side" offered to the bidders who in return can present reductions in the public contributions. Later on, scenarios

¹⁰ IDOM's experience in similar projects, together with the UNOPs report "Technical Assistance in the Definitions for the Transaction Strategy", amounts to 5% of the amount received on line 4 of the Brazilian Metro for "space for shops, advertising, optical fibre, among others (...)".

will be presented of changes in the payments to be considered for advertising and commercial income, as well as for the sale of tertiary uses. Finally, it should be mentioned that among the potential complementary uses are others that are difficult to quantify, such as "naming rights", parking, etc., which, due to the difficulty of quantification and volatility, are not taken into account.

It is therefore recommended in tendering:

- Require from the bidders their estimates of income from complementary uses, and the impact of their exploitation on the payments to be received from the Administration. In the event of having a very small weight, it could be foreseen that these revenues are excluded from the equation, and that they are subsequently developed by the concessionaire under a revenue sharing model.
- Require the estimated value of the potentially exploitable lands, and an economic proposal with and without them, leaving it to INCOFER to award the project with or without the lands, and if necessary, develop them directly INCOFER.

3.4.6 Financial flow (CAPEX, OPEX and income)

Considering the investment, operating costs and revenues calculated in order to obtain the target IRR, the cash flows for the developer are presented in the 6 scenarios analyzed:

- PPDi - basic demand
- PPDi - conservative demand
- PPDi - optimistic demand
- PPDD - basic demand
- PPDD - conservative demand
- PPDD - optimistic demand

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Income	-	-	-	-	29.803.935,63	91.169.653,19	132.165.864,01	155.183.544,80	179.069.066,47	203.847.935,59	216.214.375,48
OPEX	-	-	-	-	17.382.642,50	41.580.464,00	52.355.579,27	53.402.690,85	54.470.744,67	55.560.159,56	56.671.362,75
Income Tax	-	-	-	-	-	-	-	-	-	-	7.830.010,62
VAT	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-
Local tax	-	-	-	-	163.847,53	467.452,57	644.078,85	741.712,23	768.383,80	795.671,17	823.586,39
Operating flow	-	-	-	-	12.257.445,61	49.121.736,62	79.166.205,90	101.039.141,72	123.829.938,00	147.492.104,86	150.889.415,71
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	3.446.898,69	88.800.682,02	266.446.644,35	279.731.126,13	290.700.622,39	58.860.770,91	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	1.015.811.523,81	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	970.376.893,67	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	69.704.370,49	89.133.403,58	1.127.252.071,50	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	21.137.865,96	12.406.858,31	12.406.858,31	12.406.858,31	975.546.417,97	-
Long-term loan repayment	-	-	-	-	-	-	-	-	-	32.922.032,02	65.844.064,03
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	39.689.583,72	77.385.966,52	76.643.550,86	75.479.182,63	37.074.598,91	-
Long-term interest payment	-	-	-	-	-	-	-	-	-	35.632.924,35	66.717.994,42
Long-term debt service reserve allocatio	-	-	-	-	-	-	-	-	-	46.082.423,17	437.176,22
Designation of long-term debt service re	-	-	-	-	-	-	-	-	-	1.676.401,71	1.824.334,15
Allocation to reinvestment reserve	-	-	-	-	-	-	-	-	-	-	8.171.475,01
Downsizing of the reinvestment reserve	-	-	-	-	-	-	-	-	-	-	-
Flow after financing	3.446.898,69	88.800.682,02	266.446.644,35	210.026.755,63	213.824.664,42	(64.285.489,83)	(10.626.618,93)	11.988.732,56	35.943.897,06	(7.712.996,17)	11.543.040,18
CAPEX	4.924.140,99	126.858.117,17	380.638.063,36	451.521.929,34	456.286.798,23	133.733.787,96	-	-	-	-	-
Reinvestments	-	-	-	-	-	-	-	-	-	-	-
Contributed capital	1.477.242,30	38.057.435,15	114.191.419,01	119.884.768,34	124.585.981,02	25.226.044,68	-	-	-	-	-
State contribution	-	-	-	151.483.707,00	168.333.628,50	230.182.664,50	-	-	-	-	-
Free cash flow	0,00	-	(0,00)	29.873.301,64	50.457.475,71	57.389.431,39	(10.626.618,93)	11.988.732,56	35.943.897,06	(7.712.996,17)	11.543.040,18
Dealer Cash Flow	(1.477.242,30)	(38.057.435,15)	(114.191.419,01)	(90.011.466,70)	(74.128.505,31)	32.163.386,71	(10.626.618,93)	11.988.732,56	35.943.897,06	(7.712.996,17)	11.543.040,18

Table 124. Cash flow 2021-2031 (nominal dollars) - PPDi base demand.

Year	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Income	220,538,662,99	224,949,436,25	229,448,424,97	234,037,393,47	238,718,141,34	243,492,504,17	248,362,354,25	253,329,601,34	258,396,193,36	263,564,117,23	268,835,399,57	274,212,107,57	279,696,349,72	285,290,276,71
OPEX	57,804,790,01	58,960,885,81	60,140,103,53	61,342,905,60	62,569,763,71	63,821,158,98	65,097,582,16	66,399,533,81	67,727,524,48	69,082,074,97	70,463,716,47	71,872,990,80	73,310,450,62	74,776,659,63
Income Tax	16,377,680,83	18,823,511,66	21,236,090,35	23,668,383,07	26,083,907,80	28,593,697,65	31,087,532,72	33,602,709,83	36,603,635,01	40,320,346,36	43,143,574,72	45,115,818,37	47,738,749,04	50,647,163,43
VAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Local tax	852,143,65	881,355,30	911,363,29	942,053,21	973,437,06	1,005,527,10	1,038,336,37	1,071,874,02	1,106,152,39	1,141,181,68	1,176,973,96	1,213,541,59	1,250,894,83	1,289,046,23
Operating flow	145,504,048,50	146,283,683,48	147,160,867,81	148,084,051,59	149,091,032,77	150,072,120,43	151,138,903,00	152,255,483,68	152,958,881,47	153,020,514,21	154,051,134,42	156,009,756,80	157,396,255,24	158,577,407,42
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term loan repayment	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	32,922,032,02
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term interest payment	62,140,966,21	57,213,662,58	52,461,496,65	47,709,330,73	43,080,087,55	38,204,998,89	33,452,832,97	28,700,667,05	24,019,208,90	19,196,335,21	14,444,169,28	9,692,003,36	4,958,330,24	685,680,66
Long-term debt service reserve allocatic	183,692,89	280,484,98	202,139,36	141,789,11	-	89,569,00	63,458,94	37,348,88	-	-	-	-	-	0,00
Designation of long-term debt service re	1,921,126,24	1,842,780,62	1,764,435,00	1,581,162,01	1,685,218,38	1,651,864,63	1,625,754,58	1,528,936,75	1,633,003,41	1,562,295,64	1,562,295,64	1,543,802,84	1,580,788,44	22,533,882,53
Allocation to reinvestment reserve	8,171,475,01	14,480,848,42	14,480,848,42	14,480,848,42	15,115,714,77	15,115,714,77	15,309,673,13	15,309,673,13	15,309,673,13	7,692,902,27	7,692,902,27	1,891,825,06	1,891,825,06	1,891,825,06
Downsizing of the reinvestment reserve	-	-	-	-	-	-	-	-	81,714,750,09	-	63,093,734,13	-	-	6,348,663,45
Flow after financing	11,084,976,60	10,307,404,09	15,936,754,34	21,489,181,30	26,736,384,80	32,469,638,38	38,094,628,51	43,892,667,34	131,133,688,91	61,849,508,34	130,726,028,61	80,125,667,19	86,282,824,35	151,960,415,66
CAPEX	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reinvestments	-	-	-	-	-	-	-	-	81,714,750,09	-	63,093,734,13	-	-	6,348,663,45
Contributed capital	-	-	-	-	-	-	-	-	-	-	-	-	-	-
State contribution	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Free cash flow	11,084,976,60	10,307,404,09	15,936,754,34	21,489,181,30	26,736,384,80	32,469,638,38	38,094,628,51	43,892,667,34	49,418,938,82	61,849,508,34	67,632,294,47	80,125,667,19	86,282,824,35	145,611,752,21
Dealer Cash Flow	11,084,976,60	10,307,404,09	15,936,754,34	21,489,181,30	26,736,384,80	32,469,638,38	38,094,628,51	43,892,667,34	49,418,938,82	61,849,508,34	67,632,294,47	80,125,667,19	86,282,824,35	145,611,752,21

Table 125. Cash flow 2032-2045 (nominal dollars) - PPDi base demand.

Year	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
Income	290.996.082,25	296.816.003,89	302.752.323,97	308.807.370,45	314.983.517,86	321.283.188,21	327.708.851,98	334.263.029,02	340.948.289,60	347.767.255,39	176.392.112,82
OPEX	76.272.192,82	77.797.636,68	79.353.589,41	80.940.661,20	82.559.474,42	84.210.663,91	85.894.877,19	87.612.774,73	89.365.030,23	91.152.330,83	46.233.657,64
Income Tax	52.419.505,33	53.822.778,19	55.110.115,26	56.438.065,98	57.795.625,22	59.213.818,33	60.627.416,28	62.034.121,69	63.500.113,61	64.706.180,45	35.385.980,91
VAT	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-
Local tax	1.328.008,04	1.367.792,35	1.408.413,69	1.449.885,97	1.492.222,19	1.535.533,61	1.579.840,42	1.625.164,12	1.671.529,50	1.718.958,34	871.708,95
Operating flow	160.976.376,05	163.827.796,68	166.880.205,61	169.978.757,29	173.136.196,02	176.323.172,36	179.606.718,08	182.990.968,47	186.411.616,26	190.189.785,76	93.900.765,31
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	-	-	-	-	-	-	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	-	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	-	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	-	-	-	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	-	-	-	-	-	-
Long-term loan repayment	-	-	-	-	-	-	-	-	-	-	-
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	-	-	-	-	-	-
Long-term interest payment	(0,00)	(0,00)	-	-	-	-	-	-	-	-	-
Long-term debt service reserve allocatio	0,00	0,00	-	-	-	-	-	-	-	-	-
Designation of long-term debt service re	0,00	-	-	-	-	-	-	-	-	-	-
Allocation to reinvestment reserve	12.254.688,20	12.254.688,20	12.060.729,84	12.060.729,84	12.060.729,84	11.506.025,69	11.506.025,69	10.997.729,49	10.997.729,49	10.997.729,49	-
Downsizing of the reinvestment reserve	-	1.939.583,62	-	-	5.547.041,51	-	5.082.961,98	-	-	109.977.294,91	-
Flow after financing	148.721.687,85	153.512.692,10	154.819.475,77	157.918.027,45	166.622.507,69	164.817.146,67	173.183.654,37	171.993.238,98	175.413.886,77	289.169.351,19	93.900.765,31
CAPEX	-	-	-	-	-	-	-	-	-	-	-
Reinvestments	-	1.939.583,62	-	-	5.547.041,51	-	5.082.961,98	-	-	109.977.294,91	-
Contributed capital	-	-	-	-	-	-	-	-	-	-	-
State contribution	-	-	-	-	-	-	-	-	-	-	-
Free cash flow	148.721.687,85	151.573.108,47	154.819.475,77	157.918.027,45	161.075.466,18	164.817.146,67	168.100.692,39	171.993.238,98	175.413.886,77	179.192.056,27	93.900.765,31
Dealer Cash Flow	148.721.687,85	151.573.108,47	154.819.475,77	157.918.027,45	161.075.466,18	164.817.146,67	168.100.692,39	171.993.238,98	175.413.886,77	179.192.056,27	93.900.765,31

Table 126. Cash flow 2046-2056 (nominal dollars) - PPDi base demand.

The cash flow of the scenario with the complete system in PPDi presents negative flows in the year 2027 and 2030, partly as a result of the growth factor established for the PPD. Apart from this, every year they present positive flows for the dealer. A combination of eliminating the increasing payment factor and negotiating a lower debt service reserve allocation than assumed (46 million allocation versus a negative flow of only 7 million in 2030) would allow both negative flows to be resolved.

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Income	-	-	-	-	29.794.159,29	91.139.292,93	132.121.941,34	155.131.976,13	179.009.563,54	203.780.201,65	216.142.557,78
OPEX	-	-	-	-	17.382.642,50	41.580.464,00	52.355.579,27	53.402.690,85	54.470.744,67	55.560.159,56	56.671.362,75
Income Tax	-	-	-	-	-	-	-	-	-	-	7.812.617,55
VAT	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-
Local tax	-	-	-	-	159.158,24	454.463,86	624.562,85	716.169,43	738.636,54	761.369,05	783.719,74
Operating flow	-	-	-	-	12.252.358,55	49.104.365,08	79.141.799,22	101.013.115,85	123.800.182,33	147.458.673,04	150.874.857,74
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	3.446.898,69	88.800.682,02	266.446.644,35	279.731.126,13	290.700.622,39	58.860.770,91	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	1.015.811.523,81	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	970.376.893,67	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	69.704.370,49	89.133.403,58	1.127.252.071,50	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	21.137.865,96	12.406.858,31	12.406.858,31	12.406.858,31	975.546.417,97	-
Long-term loan repayment	-	-	-	-	-	-	-	-	-	32.922.032,02	65.844.064,03
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	39.689.583,72	77.385.966,52	76.643.550,86	75.479.182,63	37.074.598,91	-
Long-term interest payment	-	-	-	-	-	-	-	-	-	35.632.924,35	66.717.994,42
Long-term debt service reserve allocation	-	-	-	-	-	-	-	-	-	46.082.423,17	437.176,22
Designation of long-term debt service reserve	-	-	-	-	-	-	-	-	-	1.676.401,71	1.824.334,15
Allocation to reinvestment reserve	-	-	-	-	-	-	-	-	-	-	8.171.475,01
Downsizing of the reinvestment reserve	-	-	-	-	-	-	-	-	-	-	-
Flow after financing	3.446.898,69	88.800.682,02	266.446.644,35	210.026.755,63	213.819.577,36	(64.302.861,37)	(10.651.025,60)	11.962.706,68	35.914.141,39	(7.746.428,00)	11.528.482,22
CAPEX	4.924.140,99	126.858.117,17	380.638.063,36	451.521.929,34	456.286.798,23	133.733.787,96	-	-	-	-	-
Reinvestments	-	-	-	-	-	-	-	-	-	-	-
Contributed capital	1.477.242,30	38.057.435,15	114.191.419,01	119.884.768,34	124.585.981,02	25.226.044,68	-	-	-	-	-
State contribution	-	-	-	151.483.707,00	168.333.628,50	230.182.664,50	-	-	-	-	-
Free cash flow	0,00	-	(0,00)	29.873.301,64	50.452.388,65	57.372.059,85	(10.651.025,60)	11.962.706,68	35.914.141,39	(7.746.428,00)	11.528.482,22
Dealer Cash Flow	(1.477.242,30)	(38.057.435,15)	(114.191.419,01)	(90.011.466,70)	(74.133.592,37)	32.146.015,17	(10.651.025,60)	11.962.706,68	35.914.141,39	(7.746.428,00)	11.528.482,22

Table 127. Cash flow 2021-2031 (nominal dollars) - PPDi conservative demand.

Year	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Income	220.465.408,94	224.874.717,12	229.372.211,46	#####	238.638.848,80	243.411.625,78	248.279.858,29	253.245.455,46	258.310.364,57	263.476.571,86	268.746.103,30	274.121.025,36	279.603.445,87	285.195.514,79
OPEX	57.804.790,01	58.960.885,81	60.140.103,53	61.342.905,60	62.569.763,71	63.821.158,98	65.097.582,16	66.399.533,81	67.727.524,48	69.082.074,97	70.463.716,47	71.872.990,80	73.310.450,62	74.776.659,63
Income Tax	16.369.441,90	18.816.720,41	21.230.791,21	23.664.683,80	26.082.457,91	28.594.606,66	31.090.913,21	33.608.676,73	36.612.306,52	40.331.968,05	43.158.268,35	45.133.708,79	47.759.963,56	50.671.832,61
VAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Local tax	806.352,71	829.273,66	852.813,56	876.646,35	898.977,50	921.618,69	944.572,12	967.838,49	991.418,57	1.014.897,35	1.038.698,91	1.062.824,67	1.087.275,91	1.112.053,72
Operating flow	145.484.824,32	146.267.837,23	147.148.503,16	#####	149.087.649,69	150.074.241,45	151.146.790,81	152.269.406,43	152.979.114,99	153.047.631,49	154.085.419,56	156.051.501,11	157.445.755,79	158.634.968,83
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term loan repayment	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	32.922.032,02
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term interest payment	62.140.966,21	57.213.662,58	52.461.496,65	47.709.330,73	43.080.087,55	38.204.998,89	33.452.832,97	28.700.667,05	24.019.208,90	19.196.335,21	14.444.169,28	9.692.003,36	4.958.330,24	685.680,66
Long-term debt service reserve allocation	183.692,89	280.484,98	202.139,36	141.789,11	-	89.569,00	63.458,94	37.348,88	-	-	-	-	-	0,00
Designation of long-term debt service reserve	1.921.126,24	1.842.780,62	1.764.435,00	1.581.162,01	1.685.218,38	1.651.864,63	1.625.754,58	1.528.936,75	1.633.003,41	1.562.295,64	1.562.295,64	1.543.802,84	1.580.788,44	22.533.882,53
Allocation to reinvestment reserve	8.171.475,01	14.480.848,42	14.480.848,42	14.480.848,42	15.115.714,77	15.115.714,77	15.309.673,13	15.309.673,13	15.309.673,13	7.692.902,27	7.692.902,27	1.891.825,06	1.891.825,06	1.891.825,06
Downsizing of the reinvestment reserve	-	-	-	-	-	-	-	-	81.714.750,09	-	63.093.734,13	-	-	6.348.663,45
Flow after financing	11.065.752,42	10.291.557,84	15.924.389,69	21.480.549,66	26.733.001,71	32.471.759,40	38.102.516,32	43.906.590,09	131.153.922,43	61.876.625,62	130.760.313,74	80.167.411,50	86.332.324,89	152.017.977,07
CAPEX	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reinvestments	-	-	-	-	-	-	-	-	81.714.750,09	-	63.093.734,13	-	-	6.348.663,45
Contributed capital	-	-	-	-	-	-	-	-	-	-	-	-	-	-
State contribution	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Free cash flow	11.065.752,42	10.291.557,84	15.924.389,69	21.480.549,66	26.733.001,71	32.471.759,40	38.102.516,32	43.906.590,09	49.439.172,34	61.876.625,62	67.666.579,61	80.167.411,50	86.332.324,89	145.669.313,63
Dealer Cash Flow	11.065.752,42	10.291.557,84	15.924.389,69	21.480.549,66	26.733.001,71	32.471.759,40	38.102.516,32	43.906.590,09	49.439.172,34	61.876.625,62	67.666.579,61	80.167.411,50	86.332.324,89	145.669.313,63

Table 128. Cash flow 2032-2045 (nominal dollars) - PPDi demand conservative.

Year	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
Income	290.899.425,09	296.717.413,59	302.651.761,86	308.704.797,10	314.878.893,04	321.176.470,90	327.600.000,32	334.152.000,32	340.835.040,33	347.651.741,14	176.333.522,47
OPEX	76.272.192,82	77.797.636,68	79.353.589,41	80.940.661,20	82.559.474,42	84.210.663,91	85.894.877,19	87.612.774,73	89.365.030,23	91.152.330,83	46.233.657,33
Income Tax	52.446.633,72	53.852.539,98	55.142.689,71	56.473.636,79	57.834.379,44	59.257.083,17	60.675.329,89	62.086.825,29	63.557.752,41	64.768.902,74	35.417.784,89
VAT	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-
Local tax	1.140.922,92	1.169.996,06	1.199.270,07	1.228.743,25	1.258.416,63	1.284.600,15	1.311.276,73	1.338.456,78	1.366.150,88	1.394.369,77	707.105,33
Operating flow	161.039.675,63	163.897.240,86	166.956.212,67	170.061.755,86	173.226.622,54	176.424.123,66	179.718.516,51	183.113.943,52	186.546.106,81	190.336.137,79	93.974.974,60
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	-	-	-	-	-	-	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	-	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	-	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	-	-	-	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	-	-	-	-	-	-
Long-term loan repayment	-	-	-	-	-	-	-	-	-	-	-
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	-	-	-	-	-	-
Long-term interest payment	(0,00)	(0,00)	-	-	-	-	-	-	-	-	-
Long-term debt service reserve allocation	0,00	0,00	-	-	-	-	-	-	-	-	-
Designation of long-term debt service reserve	0,00	-	-	-	-	-	-	-	-	-	-
Allocation to reinvestment reserve	12.254.688,20	12.254.688,20	12.060.729,84	12.060.729,84	12.060.729,84	11.506.025,69	11.506.025,69	10.997.729,49	10.997.729,49	10.997.729,49	-
Downsizing of the reinvestment reserve	-	1.939.583,62	-	-	5.547.041,51	-	5.082.961,98	-	-	109.977.294,91	-
Flow after financing	148.784.987,42	153.582.136,28	154.895.482,83	158.001.026,02	166.712.934,21	164.918.097,97	173.295.452,80	172.116.214,03	175.548.377,32	289.315.703,21	93.974.974,60
CAPEX	-	-	-	-	-	-	-	-	-	-	-
Reinvestments	-	1.939.583,62	-	-	5.547.041,51	-	5.082.961,98	-	-	109.977.294,91	-
Contributed capital	-	-	-	-	-	-	-	-	-	-	-
State contribution	-	-	-	-	-	-	-	-	-	-	-
Free cash flow	148.784.987,42	151.642.552,66	154.895.482,83	158.001.026,02	161.165.892,70	164.918.097,97	168.212.490,82	172.116.214,03	175.548.377,32	179.338.408,30	93.974.974,60
Dealer Cash Flow	148.784.987,42	151.642.552,66	154.895.482,83	158.001.026,02	161.165.892,70	164.918.097,97	168.212.490,82	172.116.214,03	175.548.377,32	179.338.408,30	93.974.974,60

Table 129. Cash flow 2046-2056 (nominal dollars) - PPDi conservative demand.

Given the structure of this alternative (fixed payment covered with tariff revenues and the rest with government payments), the drop in demand does not really affect the project's flow much, there are still negative flows in 2027 and 2030 as in the base scenario, which as in the base scenario could be solved by not applying the payment factor and negotiating the constitution of the long-term debt service reserve somewhat less.

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Income	-	-	-	-	29.812.657,52	91.196.738,86	132.205.049,29	155.229.551,40	179.122.151,57	203.908.363,92	216.278.447,09
OPEX	-	-	-	-	17.382.642,50	41.580.464,00	52.355.579,27	53.402.690,85	54.470.744,67	55.560.159,56	56.671.362,75
Income Tax	-	-	-	-	-	-	-	-	-	-	7.852.769,78
VAT	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-
Local tax	-	-	-	-	164.674,09	471.062,71	651.106,13	752.532,56	782.782,88	814.249,20	846.980,40
Operating flow	-	-	-	-	12.265.340,94	49.145.212,15	79.198.363,90	101.074.327,99	123.868.624,02	147.533.955,16	150.907.334,15
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	3.446.898,69	88.800.682,02	266.446.644,35	279.731.126,13	290.700.622,39	58.860.770,91	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	1.015.811.523,81	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	970.376.893,67	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	69.704.370,49	89.133.403,58	1.127.252.071,50	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	21.137.865,96	12.406.858,31	12.406.858,31	12.406.858,31	975.546.417,97	-
Long-term loan repayment	-	-	-	-	-	-	-	-	-	32.922.032,02	65.844.064,03
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	39.689.583,72	77.385.966,52	76.643.550,86	75.479.182,63	37.074.598,91	-
Long-term interest payment	-	-	-	-	-	-	-	-	-	35.632.924,35	66.717.994,42
Long-term debt service reserve allocation	-	-	-	-	-	-	-	-	-	46.082.423,17	437.176,22
Designation of long-term debt service reserve	-	-	-	-	-	-	-	-	-	1.676.401,71	1.824.334,15
Allocation to reinvestment reserve	-	-	-	-	-	-	-	-	-	-	8.171.475,01
Downsizing of the reinvestment reserve	-	-	-	-	-	-	-	-	-	-	-
Flow after financing	3.446.898,69	88.800.682,02	266.446.644,35	210.026.755,63	213.832.559,75	(64.262.014,31)	(10.594.460,92)	12.023.918,82	35.982.583,08	(7.671.145,88)	11.560.958,62
CAPEX	4.924.140,99	126.858.117,17	380.638.063,36	451.521.929,34	456.286.798,23	133.733.787,96	-	-	-	-	-
Reinvestments	-	-	-	-	-	-	-	-	-	-	-
Contributed capital	1.477.242,30	38.057.435,15	114.191.419,01	119.884.768,34	124.585.981,02	25.226.044,68	-	-	-	-	-
State contribution	-	-	-	151.483.707,00	168.333.628,50	230.182.664,50	-	-	-	-	-
Free cash flow	0,00	-	(0,00)	29.873.301,64	50.465.371,04	57.412.906,91	(10.594.460,92)	12.023.918,82	35.982.583,08	(7.671.145,88)	11.560.958,62
Dealer Cash Flow	(1.477.242,30)	(38.057.435,15)	(114.191.419,01)	(90.011.466,70)	(74.120.609,98)	32.186.862,24	(10.594.460,92)	12.023.918,82	35.982.583,08	(7.671.145,88)	11.560.958,62

Table 130. Cash flow 2021-2031 (nominal dollars) - PPDi demand optimistic.

Year	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Income	220.604.016,03	225.016.096,35	229.516.418,28	234.106.746,65	238.788.881,58	243.564.659,21	248.435.952,39	253.404.671,44	258.472.764,87	263.642.220,17	268.915.064,57	274.293.365,86	279.779.233,18	285.374.817,84
OPEX	57.804.790,01	58.960.885,81	60.140.103,53	61.342.905,60	62.569.763,71	63.821.158,98	65.097.582,16	66.399.533,81	67.727.524,48	69.082.074,97	70.463.716,47	71.872.990,80	73.310.450,62	74.776.659,63
Income Tax	16.388.621,64	18.832.983,42	21.243.912,70	23.674.324,35	26.087.722,22	28.595.124,70	31.086.296,63	33.598.517,67	36.596.176,80	40.309.293,62	43.128.580,13	45.096.514,98	47.714.748,70	50.618.056,48
VAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Local tax	881.027,34	916.442,89	953.282,08	991.602,13	1.031.462,58	1.072.925,33	1.116.054,80	1.160.918,00	1.207.584,60	1.256.127,11	1.306.620,93	1.359.144,51	1.413.779,43	1.470.610,56
Operating flow	145.529.577,05	146.305.784,23	147.179.119,97	148.097.914,57	149.099.933,08	150.075.450,20	151.136.018,80	152.245.701,97	152.994.724,47	154.016.147,04	155.964.715,57	157.340.254,44	158.509.491,18	
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term loan repayment	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	32.922.032,02
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term interest payment	62.140.966,21	57.213.662,58	52.461.496,65	47.709.330,73	43.080.087,55	38.204.998,89	33.452.832,97	28.700.667,05	24.019.208,90	19.196.335,21	14.444.169,28	9.692.003,36	4.958.330,24	685.680,66
Long-term debt service reserve allocation	183.692,89	280.484,98	202.139,36	141.789,11	-	89.569,00	63.458,94	37.348,88	-	-	-	-	-	0,00
Designation of long-term debt service reserve	1.921.126,24	1.842.780,62	1.764.435,00	1.581.162,01	1.685.218,38	1.651.864,63	1.625.754,58	1.528.936,75	1.633.003,41	1.562.295,64	1.562.295,64	1.543.802,84	1.580.788,44	22.533.882,53
Allocation to reinvestment reserve	8.171.475,01	14.480.848,42	14.480.848,42	14.480.848,42	15.115.714,77	15.115.714,77	15.309.673,13	15.309.673,13	15.309.673,13	7.692.902,27	7.692.902,27	1.891.825,06	1.891.825,06	1.891.825,06
Downsizing of the reinvestment reserve	-	-	-	-	-	-	-	-	81.714.750,09	-	63.093.734,13	-	-	6.348.663,45
Flow after financing	11.110.505,15	10.329.504,84	15.955.006,50	21.503.044,28	26.745.285,10	32.472.968,15	38.091.744,30	43.882.885,63	131.116.286,42	61.823.718,60	130.691.041,22	80.080.625,96	86.226.823,55	151.892.499,42
CAPEX	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reinvestments	-	-	-	-	-	-	-	-	81.714.750,09	-	63.093.734,13	-	-	6.348.663,45
Contributed capital	-	-	-	-	-	-	-	-	-	-	-	-	-	-
State contribution	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Free cash flow	11.110.505,15	10.329.504,84	15.955.006,50	21.503.044,28	26.745.285,10	32.472.968,15	38.091.744,30	43.882.885,63	49.401.536,34	61.823.718,60	67.597.307,09	80.080.625,96	86.226.823,55	145.543.835,98
Dealer Cash Flow	11.110.505,15	10.329.504,84	15.955.006,50	21.503.044,28	26.745.285,10	32.472.968,15	38.091.744,30	43.882.885,63	49.401.536,34	61.823.718,60	67.597.307,09	80.080.625,96	86.226.823,55	145.543.835,98

Table 131. Cash flow 2032-2045 (nominal dollars) - PPDi demand optimistic.

Year	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
Income	291.082.314,20	296.903.960,49	302.842.039,69	308.898.880,49	315.076.858,10	321.378.395,26	327.805.963,17	334.362.082,43	341.049.324,08	347.870.310,56	176.444.383,75
OPEX	76.272.192,82	77.797.636,68	79.353.589,41	80.940.661,20	82.559.474,42	84.210.663,91	85.894.877,19	87.612.774,73	89.365.030,23	91.152.330,83	46.233.657,64
Income Tax	52.384.859,47	53.782.137,43	55.062.999,49	56.383.969,68	57.734.015,96	59.144.165,03	60.549.160,58	61.946.677,00	63.402.864,71	64.598.481,13	35.331.368,05
VAT	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-
Local tax	1.529.726,19	1.591.218,16	1.655.181,97	1.721.717,01	1.790.926,63	1.862.918,33	1.937.803,96	2.015.699,84	2.096.726,98	2.181.011,25	1.106.022,75
Operating flow	160.895.535,72	163.732.968,23	166.770.268,82	169.852.532,60	172.992.441,09	176.160.647,99	179.424.121,44	182.786.930,85	186.184.702,16	189.938.487,35	93.773.335,31
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	-	-	-	-	-	-	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	-	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	-	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	-	-	-	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	-	-	-	-	-	-
Long-term loan repayment	-	-	-	-	-	-	-	-	-	-	-
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	-	-	-	-	-	-
Long-term interest payment	(0,00)	(0,00)	-	-	-	-	-	-	-	-	-
Long-term debt service reserve allocation	0,00	0,00	-	-	-	-	-	-	-	-	-
Designation of long-term debt service reserve	0,00	-	-	-	-	-	-	-	-	-	-
Allocation to reinvestment reserve	12.254.688,20	12.254.688,20	12.060.729,84	12.060.729,84	12.060.729,84	11.506.025,69	11.506.025,69	10.997.729,49	10.997.729,49	10.997.729,49	-
Downsizing of the reinvestment reserve	-	1.939.583,62	-	-	5.547.041,51	-	5.082.961,98	-	-	109.977.294,91	-
Flow after financing	148.640.847,51	153.417.863,65	154.709.538,98	157.791.802,76	166.478.752,75	164.654.622,30	173.001.057,73	171.789.201,36	175.186.972,67	178.940.757,85	93.773.335,31
CAPEX	-	-	-	-	-	-	-	-	-	-	-
Reinvestments	-	1.939.583,62	-	-	5.547.041,51	-	5.082.961,98	-	-	109.977.294,91	-
Contributed capital	-	-	-	-	-	-	-	-	-	-	-
State contribution	-	-	-	-	-	-	-	-	-	-	-
Free cash flow	148.640.847,51	151.478.280,02	154.709.538,98	157.791.802,76	160.931.711,25	164.654.622,30	167.918.095,75	171.789.201,36	175.186.972,67	178.940.757,85	93.773.335,31
Dealer Cash Flow	148.640.847,51	151.478.280,02	154.709.538,98	157.791.802,76	160.931.711,25	164.654.622,30	167.918.095,75	171.789.201,36	175.186.972,67	178.940.757,85	93.773.335,31

Table 132. Cash flow 2046-2056 (nominal dollars) - PPDi demand optimistic.

As discussed in the conservative case, the structure of the PPDi scheme means that there are no major variations in project flow despite changes in demand. Therefore, we also see that there are the same two years 2027 and 2030 with negative flow, although in somewhat smaller amounts and that can be solved with the same strategies outlined above. This is explained by the fact that the fixed payment determined is slightly higher (due to the paradoxical effect that a higher demand implies a greater tax burden for this scheme, given that a greater percentage of the income comes from tariff revenues that are taxed with a local tax of 1%), which results in a marginally higher flow.

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Income	-	-	-	-	37.609.565,39	111.272.605,84	158.029.890,77	184.101.250,70	203.691.302,31	223.975.876,73	235.550.187,98
OPEX	-	-	-	-	17.382.642,50	41.580.464,00	52.355.579,27	53.402.690,85	54.470.744,67	55.560.159,56	56.671.362,75
Income Tax	-	-	-	-	-	-	-	-	361.317,00	14.929.208,72	19.856.625,22
VAT	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-
Local tax	-	-	-	-	163.847,53	467.452,57	644.078,85	741.712,23	768.383,80	795.671,17	823.586,39
Operating flow	-	-	-	-	20.063.075,37	69.224.689,28	105.030.232,66	129.956.847,62	148.090.856,83	152.690.837,28	158.198.613,62
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	3.446.898,69	88.800.682,02	266.446.644,35	279.731.126,13	290.700.622,39	58.860.770,91	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	1.015.811.523,81	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	970.376.893,67	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	69.704.370,49	89.133.403,58	1.127.252.071,50	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	21.137.865,96	12.406.858,31	12.406.858,31	12.406.858,31	975.546.417,97	-
Long-term loan repayment	-	-	-	-	-	-	-	-	-	32.922.032,02	65.844.064,03
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	39.689.583,72	77.385.966,52	76.643.550,86	75.479.182,63	37.074.598,91	-
Long-term interest payment	-	-	-	-	-	-	-	-	-	35.632.924,35	66.717.994,42
Long-term debt service reserve allocation	-	-	-	-	-	-	-	-	-	46.082.423,17	437.176,22
Designation of long-term debt service reserve	-	-	-	-	-	-	-	-	-	1.676.401,71	1.824.334,15
Allocation to reinvestment reserve	-	-	-	-	-	-	-	-	-	-	8.171.475,01
Downsizing of the reinvestment reserve	-	-	-	-	-	-	-	-	-	-	-
Flow after financing	3.446.898,69	88.800.682,02	266.446.644,35	210.026.755,63	221.630.294,18	(44.182.537,18)	15.237.407,83	40.906.438,46	60.204.815,89	(2.514.263,75)	18.852.238,09
CAPEX	4.924.140,99	126.858.117,17	380.638.063,36	451.521.929,34	456.286.798,23	133.733.787,96	-	-	-	-	-
Reinvestments	-	-	-	-	-	-	-	-	-	-	-
Contributed capital	1.477.242,30	38.057.435,15	114.191.419,01	119.884.768,34	124.585.981,02	25.226.044,68	-	-	-	-	-
State contribution	-	-	-	151.483.707,00	168.333.628,50	230.182.664,50	-	-	-	-	-
Free cash flow	0,00	-	(0,00)	29.873.301,64	58.263.105,47	77.492.384,04	15.237.407,83	40.906.438,46	60.204.815,89	(2.514.263,75)	18.852.238,09
Dealer Cash Flow	(1.477.242,30)	(38.057.435,15)	(114.191.419,01)	(90.011.466,70)	(66.322.875,55)	52.266.339,37	15.237.407,83	40.906.438,46	60.204.815,89	(2.514.263,75)	18.852.238,09

Table 133. Cash flow 2021-2031 (nominal dollars) - PPDD demand base.

Year	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Income	241,469,744,30	247,516,016,95	253,704,425,75	#####	266,479,554,07	273,071,275,17	279,802,573,04	286,675,716,68	293,693,320,89	300,857,811,34	308,171,831,89	315,638,083,94	323,259,086,02	331,037,618,63
OPEX	57,804,790,01	58,960,885,81	60,140,103,53	61,342,905,60	62,569,763,71	63,821,158,98	65,097,582,16	66,399,533,81	67,727,524,48	69,082,074,97	70,463,716,47	71,872,990,80	73,310,450,62	74,776,659,63
Income Tax	22,657,005,23	25,593,485,87	28,512,890,58	31,464,599,12	34,412,331,62	37,467,328,95	40,519,598,36	43,606,544,44	47,192,773,27	51,508,454,60	54,944,504,42	57,543,611,28	60,807,569,92	64,371,366,01
VAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Local tax	852,143,65	881,355,30	911,363,29	942,053,21	973,437,06	1,005,527,10	1,038,336,37	1,071,874,02	1,106,152,39	1,141,181,68	1,176,973,96	1,213,541,59	1,250,894,83	1,289,046,23
Operating flow	160,155,805,42	162,080,289,97	164,140,068,36	#####	168,524,021,69	170,777,260,13	173,147,056,16	175,597,764,42	177,666,870,75	179,126,100,09	181,586,637,05	185,007,940,26	187,890,170,65	190,600,546,76
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term loan repayment	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	65,844,064,03	32,922,032,02
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term interest payment	62,140,966,21	57,213,662,58	52,461,496,65	47,709,330,73	43,080,087,55	38,204,998,89	33,452,832,97	28,700,667,05	24,019,208,90	19,196,335,21	14,444,169,28	9,692,003,36	4,958,330,24	685,680,66
Long-term debt service reserve allocation	183,692,89	280,484,98	202,139,36	141,789,11	-	89,569,00	63,458,94	37,348,88	-	-	-	-	-	0,00
Designation of long-term debt service reserve	1,921,126,24	1,842,780,62	1,764,435,00	1,581,162,01	1,685,218,38	1,651,864,63	1,625,754,58	1,528,936,75	1,633,003,41	1,562,295,64	1,562,295,64	1,543,802,84	1,580,788,44	22,533,882,53
Allocation to reinvestment reserve	8,171,475,01	14,480,848,42	14,480,848,42	14,480,848,42	15,115,714,77	15,115,714,77	15,309,673,13	15,309,673,13	15,309,673,13	7,692,902,27	7,692,902,27	1,891,825,06	1,891,825,06	1,891,825,06
Downsizing of the reinvestment reserve	-	-	-	-	-	-	-	-	81,714,750,09	-	63,093,734,13	-	-	6,348,663,45
Flow after financing	25,736,733,52	26,104,010,58	32,915,954,89	39,680,352,08	46,169,373,71	53,174,778,08	60,102,781,67	67,234,948,08	155,841,678,18	87,955,094,22	158,261,531,23	109,123,850,65	116,776,739,75	183,983,555,00
CAPEX	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reinvestments	-	-	-	-	-	-	-	-	81,714,750,09	-	63,093,734,13	-	-	6,348,663,45
Contributed capital	-	-	-	-	-	-	-	-	-	-	-	-	-	-
State contribution	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Free cash flow	25,736,733,52	26,104,010,58	32,915,954,89	39,680,352,08	46,169,373,71	53,174,778,08	60,102,781,67	67,234,948,08	74,126,928,10	87,955,094,22	95,167,797,10	109,123,850,65	116,776,739,75	177,634,891,55
Dealer Cash Flow	25,736,733,52	26,104,010,58	32,915,954,89	39,680,352,08	46,169,373,71	53,174,778,08	60,102,781,67	67,234,948,08	74,126,928,10	87,955,094,22	95,167,797,10	109,123,850,65	116,776,739,75	177,634,891,55

Table 134. Cash flow 2032-2045 (nominal dollars) - Base demand PPDD.

Year	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
Income	338.976.458,91	347.078.403,05	355.346.521,04	363.783.852,00	372.393.378,72	381.187.944,14	390.171.316,77	399.347.432,05	408.720.590,40	418.294.827,68	212.147.696,04
OPEX	76.272.192,82	77.797.636,68	79.353.589,41	80.940.661,20	82.559.474,42	84.210.663,91	85.894.877,19	87.612.774,73	89.365.030,23	91.152.330,83	46.233.657,64
Income Tax	66.813.618,33	68.901.497,94	70.888.374,38	72.931.010,45	75.018.583,48	77.185.245,11	79.366.155,72	81.559.442,60	83.831.803,85	85.864.452,14	46.112.655,88
VAT	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-
Local tax	1.328.008,04	1.367.792,35	1.408.413,69	1.449.885,97	1.492.222,19	1.535.533,61	1.579.840,42	1.625.164,12	1.671.529,50	1.718.958,34	871.708,95
Operating flow	194.562.639,72	199.011.476,09	203.696.143,55	208.462.294,38	213.323.098,62	218.256.501,51	223.330.443,44	228.550.050,59	233.852.226,83	239.559.086,37	118.929.673,57
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	-	-	-	-	-	-	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	-	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	-	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	-	-	-	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	-	-	-	-	-	-
Long-term loan repayment	-	-	-	-	-	-	-	-	-	-	-
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	-	-	-	-	-	-
Long-term interest payment	(0,00)	(0,00)	-	-	-	-	-	-	-	-	-
Long-term debt service reserve allocation	0,00	0,00	-	-	-	-	-	-	-	-	-
Designation of long-term debt service reserve	0,00	-	-	-	-	-	-	-	-	-	-
Allocation to reinvestment reserve	12.254.688,20	12.254.688,20	12.060.729,84	12.060.729,84	12.060.729,84	11.506.025,69	11.506.025,69	10.997.729,49	10.997.729,49	10.997.729,49	-
Downsizing of the reinvestment reserve	-	1.939.583,62	-	-	5.547.041,51	-	5.082.961,98	-	-	109.977.294,91	-
Flow after financing	182.307.951,51	188.696.371,51	191.635.413,71	196.401.564,54	206.809.410,29	206.750.475,82	216.907.379,73	217.552.321,10	222.854.497,33	228.561.356,87	118.929.673,57
CAPEX	-	-	-	-	-	-	-	-	-	-	-
Reinvestments	-	1.939.583,62	-	-	5.547.041,51	-	5.082.961,98	-	-	109.977.294,91	-
Contributed capital	-	-	-	-	-	-	-	-	-	-	-
State contribution	-	-	-	-	-	-	-	-	-	-	-
Free cash flow	182.307.951,51	186.756.787,88	191.635.413,71	196.401.564,54	201.262.368,78	206.750.475,82	211.824.417,75	217.552.321,10	222.854.497,33	228.561.356,87	118.929.673,57
Dealer Cash Flow	182.307.951,51	186.756.787,88	191.635.413,71	196.401.564,54	201.262.368,78	206.750.475,82	211.824.417,75	217.552.321,10	222.854.497,33	228.561.356,87	118.929.673,57

Table 135. Cash flow 2046-2056 (nominal dollars) - Base demand PPDD.

In the full-system PPDD scenario, operating flows are positive in all years except 2030, when long-term credit is contracted and when the establishment of the debt service reserve generates a significant burden on the project. A less stringent government support disbursement structure would reduce financing costs sufficiently to eliminate this negative flow or a negotiation for the long-term debt service reserve. Notwithstanding the above, positive flows over the life of the project allow this scheme to be considered viable.

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Income	-	-	-	-	38.018.760,95	112.700.731,84	160.023.482,53	186.178.935,78	206.061.206,64	226.629.615,63	238.014.281,06
OPEX	-	-	-	-	17.382.642,50	41.580.464,00	52.355.579,27	53.402.690,85	54.470.744,67	55.560.159,56	56.671.362,75
Income Tax	-	-	-	-	-	-	-	-	2.872.613,04	15.735.621,02	20.607.813,14
VAT	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-
Local tax	-	-	-	-	159.158,24	454.463,86	624.562,85	716.169,43	738.636,54	761.369,05	783.719,74
Operating flow	-	-	-	-	20.476.960,21	70.665.803,99	107.043.340,41	132.060.075,50	147.979.212,39	154.572.465,99	159.951.385,43
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	3.446.898,69	88.800.682,02	266.446.644,35	279.731.126,13	290.700.622,39	58.860.770,91	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	1.015.811.523,81	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	970.376.893,67	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	69.704.370,49	89.133.403,58	1.127.252.071,50	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	21.137.865,96	12.406.858,31	12.406.858,31	12.406.858,31	975.546.417,97	-
Long-term loan repayment	-	-	-	-	-	-	-	-	-	32.922.032,02	65.844.064,03
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	39.689.583,72	77.385.966,52	76.643.550,86	75.479.182,63	37.074.598,91	-
Long-term interest payment	-	-	-	-	-	-	-	-	-	35.632.924,35	66.717.994,42
Long-term debt service reserve allocation	-	-	-	-	-	-	-	-	-	46.082.423,17	437.176,22
Designation of long-term debt service reserve	-	-	-	-	-	-	-	-	-	1.676.401,71	1.824.334,15
Allocation to reinvestment reserve	-	-	-	-	-	-	-	-	-	-	8.171.475,01
Downsizing of the reinvestment reserve	-	-	-	-	-	-	-	-	-	-	-
Flow after financing	3.446.898,69	88.800.682,02	266.446.644,35	210.026.755,63	222.044.179,02	(42.741.422,47)	17.250.515,58	43.009.666,34	60.093.171,46	(632.635,04)	20.605.009,90
CAPEX	4.924.140,99	126.858.117,17	380.638.063,36	451.521.929,34	456.286.798,23	133.733.787,96	-	-	-	-	-
Reinvestments	-	-	-	-	-	-	-	-	-	-	-
Contributed capital	1.477.242,30	38.057.435,15	114.191.419,01	119.884.768,34	124.585.981,02	25.226.044,68	-	-	-	-	-
State contribution	-	-	-	151.483.707,00	168.333.628,50	230.182.664,50	-	-	-	-	-
Free cash flow	0,00	-	(0,00)	29.873.301,64	58.676.990,32	78.933.498,75	17.250.515,58	43.009.666,34	60.093.171,46	(632.635,04)	20.605.009,90
Dealer Cash Flow	(1.477.242,30)	(38.057.435,15)	(114.191.419,01)	(90.011.466,70)	(65.908.990,70)	53.707.454,08	17.250.515,58	43.009.666,34	60.093.171,46	(632.635,04)	20.605.009,90

Table 136. Cash flow 2021-2031 (nominal dollars) - PPDD demand conservative.

Year	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Income	243.470.424,26	249.019.222,91	254.695.049,78	#####	266.155.756,91	271.945.036,13	277.836.041,80	283.830.256,15	289.929.192,39	296.092.816,94	302.365.034,82	308.747.512,74	315.241.938,57	321.850.005,99
OPEX	57.804.790,01	58.960.885,81	60.140.103,53	61.342.905,60	62.569.763,71	63.821.158,98	65.097.582,16	66.399.533,81	67.727.524,48	69.082.074,97	70.463.716,47	71.872.990,80	73.310.450,62	74.776.659,63
Income Tax	23.270.946,49	26.060.072,15	28.827.642,70	31.616.767,70	34.337.530,34	37.154.629,76	39.957.768,26	42.784.116,93	46.097.954,87	50.116.841,57	53.243.947,81	55.521.655,00	58.451.511,37	61.668.179,97
VAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Local tax	806.352,71	829.273,66	852.813,56	876.646,35	898.977,50	921.618,69	944.572,12	967.838,49	991.418,57	1.014.897,35	1.038.698,91	1.062.824,67	1.087.275,91	1.112.053,72
Operating flow	161.588.335,05	163.168.991,29	164.874.489,98	#####	168.349.485,36	170.047.628,69	171.836.119,27	173.678.766,91	175.112.294,47	175.879.003,04	177.618.671,63	180.290.042,28	182.392.700,68	184.293.112,67
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term loan repayment	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	32.922.032,02
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term interest payment	62.140.966,21	57.213.662,58	52.461.496,65	47.709.330,73	43.080.087,55	38.204.998,89	33.452.832,97	28.700.667,05	24.019.208,90	19.196.335,21	14.444.169,28	9.692.003,36	4.958.330,24	685.680,66
Long-term debt service reserve allocation	183.692,89	280.484,98	202.139,36	141.789,11	-	89.569,00	63.458,94	37.348,88	-	-	-	-	-	0,00
Designation of long-term debt service reserve	1.921.126,24	1.842.780,62	1.764.435,00	1.581.162,01	1.685.218,38	1.651.864,63	1.625.754,58	1.528.936,75	1.633.003,41	1.562.295,64	1.562.295,64	1.543.802,84	1.580.788,44	22.533.882,53
Allocation to reinvestment reserve	8.171.475,01	14.480.848,42	14.480.848,42	14.480.848,42	15.115.714,77	15.115.714,77	15.309.673,13	15.309.673,13	15.309.673,13	7.692.902,27	7.692.902,27	1.891.825,06	1.891.825,06	1.891.825,06
Downsizing of the reinvestment reserve	-	-	-	-	-	-	-	-	81.714.750,09	-	63.093.734,13	-	-	6.348.663,45
Flow after financing	27.169.263,15	27.192.711,90	33.650.376,51	40.035.412,11	45.994.837,39	52.445.146,64	58.791.844,77	65.315.950,57	153.287.101,90	84.707.997,17	154.293.565,81	104.405.952,66	111.279.269,79	177.676.120,91
CAPEX	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reinvestments	-	-	-	-	-	-	-	-	81.714.750,09	-	63.093.734,13	-	-	6.348.663,45
Contributed capital	-	-	-	-	-	-	-	-	-	-	-	-	-	-
State contribution	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Free cash flow	27.169.263,15	27.192.711,90	33.650.376,51	40.035.412,11	45.994.837,39	52.445.146,64	58.791.844,77	65.315.950,57	71.572.351,82	84.707.997,17	91.199.831,68	104.405.952,66	111.279.269,79	171.327.457,47
Dealer Cash Flow	27.169.263,15	27.192.711,90	33.650.376,51	40.035.412,11	45.994.837,39	52.445.146,64	58.791.844,77	65.315.950,57	71.572.351,82	84.707.997,17	91.199.831,68	104.405.952,66	111.279.269,79	171.327.457,47

Table 137. Cash flow 2032-2045 (nominal dollars) - PPDD demand conservative.

Year	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
Income	328.949.818,57	336.154.283,66	343.464.777,34	350.882.850,95	358.410.360,09	365.680.085,85	373.092.144,89	380.649.439,61	388.354.925,29	396.211.610,81	200.949.995,02
OPEX	76.272.192,82	77.797.636,68	79.353.589,41	80.940.661,20	82.559.474,42	84.210.663,91	85.894.877,19	87.612.774,73	89.365.030,23	91.152.330,83	46.233.657,64
Income Tax	63.861.751,77	65.683.601,01	67.386.594,36	69.127.052,95	70.893.819,56	72.608.167,66	74.322.973,27	76.036.057,07	77.813.717,90	79.336.863,65	42.802.726,66
VAT	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-
Local tax	1.140.922,92	1.169.996,06	1.199.270,07	1.228.743,25	1.258.416,63	1.284.600,15	1.311.276,73	1.338.456,78	1.366.150,88	1.394.369,77	707.105,33
Operating flow	187.674.951,07	191.503.049,91	195.525.323,51	199.586.393,55	203.698.649,48	207.576.654,13	211.563.017,71	215.662.151,02	219.810.026,28	224.328.046,56	111.206.505,39
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	-	-	-	-	-	-	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	-	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	-	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	-	-	-	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	-	-	-	-	-	-
Long-term loan repayment	-	-	-	-	-	-	-	-	-	-	-
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	-	-	-	-	-	-
Long-term interest payment	(0,00)	(0,00)	-	-	-	-	-	-	-	-	-
Long-term debt service reserve allocation	0,00	0,00	-	-	-	-	-	-	-	-	-
Designation of long-term debt service reserve	0,00	-	-	-	-	-	-	-	-	-	-
Allocation to reinvestment reserve	12.254.688,20	12.254.688,20	12.060.729,84	12.060.729,84	12.060.729,84	11.506.025,69	11.506.025,69	10.997.729,49	10.997.729,49	10.997.729,49	-
Downsizing of the reinvestment reserve	-	1.939.583,62	-	-	5.547.041,51	-	5.082.961,98	-	-	109.977.294,91	-
Flow after financing	175.420.262,86	181.187.945,33	183.464.593,67	187.525.663,71	197.184.961,14	196.070.628,44	205.139.954,00	204.664.421,53	208.812.296,79	213.330.317,07	111.206.505,39
CAPEX	-	-	-	-	-	-	-	-	-	-	-
Reinvestments	-	1.939.583,62	-	-	5.547.041,51	-	5.082.961,98	-	-	109.977.294,91	-
Contributed capital	-	-	-	-	-	-	-	-	-	-	-
State contribution	-	-	-	-	-	-	-	-	-	-	-
Free cash flow	175.420.262,86	179.248.361,71	183.464.593,67	187.525.663,71	191.637.919,64	196.070.628,44	200.056.992,02	204.664.421,53	208.812.296,79	213.330.317,07	111.206.505,39
Dealer Cash Flow	175.420.262,86	179.248.361,71	183.464.593,67	187.525.663,71	191.637.919,64	196.070.628,44	200.056.992,02	204.664.421,53	208.812.296,79	213.330.317,07	111.206.505,39

Table 138. Cash flow 2046-2056 (nominal dollars) - PPDD demand conservative.

In the scenario with optimistic demand for the PPDD scheme, also the payments allow a viable project with all and the year of stress of 2030 that can be solved negotiating an allowance of debt service reserve something lower than the one supposed in our financial assumptions.

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Income	-	-	-	-	36.974.961,25	109.406.181,33	155.510.146,90	181.399.848,86	200.765.661,95	220.864.247,95	232.620.545,13
OPEX	-	-	-	-	17.382.642,50	41.580.464,00	52.355.579,27	53.402.690,85	54.470.744,67	55.560.159,56	56.671.362,75
Income Tax	-	-	-	-	-	-	-	-	-	11.732.063,81	18.970.714,16
VAT	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-
Local tax	-	-	-	-	164.674,09	471.062,71	651.106,13	752.532,56	782.782,88	814.249,20	846.980,40
Operating flow	-	-	-	-	19.427.644,67	67.354.654,63	102.503.461,51	127.244.625,45	145.512.134,41	152.757.775,37	156.131.487,81
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	3.446.898,69	88.800.682,02	266.446.644,35	279.731.126,13	290.700.622,39	58.860.770,91	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	1.015.811.523,81	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	970.376.893,67	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	69.704.370,49	89.133.403,58	1.127.252.071,50	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	21.137.865,96	12.406.858,31	12.406.858,31	12.406.858,31	975.546.417,97	-
Long-term loan repayment	-	-	-	-	-	-	-	-	-	32.922.032,02	65.844.064,03
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	39.689.583,72	77.385.966,52	76.643.550,86	75.479.182,63	37.074.598,91	-
Long-term interest payment	-	-	-	-	-	-	-	-	-	35.632.924,35	66.717.994,42
Long-term debt service reserve allocation	-	-	-	-	-	-	-	-	-	46.082.423,17	437.176,22
Designation of long-term debt service reserve	-	-	-	-	-	-	-	-	-	1.676.401,71	1.824.334,15
Allocation to reinvestment reserve	-	-	-	-	-	-	-	-	-	-	8.171.475,01
Downsizing of the reinvestment reserve	-	-	-	-	-	-	-	-	-	-	-
Flow after financing	3.446.898,69	88.800.682,02	266.446.644,35	210.026.755,63	220.994.863,48	(46.052.571,83)	12.710.636,68	38.194.216,29	57.626.093,47	(2.447.325,66)	16.785.112,28
CAPEX	4.924.140,99	126.858.117,17	380.638.063,36	451.521.929,34	456.286.798,23	133.733.787,96	-	-	-	-	-
Reinvestments	-	-	-	-	-	-	-	-	-	-	-
Contributed capital	1.477.242,30	38.057.435,15	114.191.419,01	119.884.768,34	124.585.981,02	25.226.044,68	-	-	-	-	-
State contribution	-	-	-	151.483.707,00	168.333.628,50	230.182.664,50	-	-	-	-	-
Free cash flow	0,00	-	(0,00)	29.873.301,64	57.627.674,77	75.622.349,39	12.710.636,68	38.194.216,29	57.626.093,47	(2.447.325,66)	16.785.112,28
Dealer Cash Flow	(1.477.242,30)	(38.057.435,15)	(114.191.419,01)	(90.011.466,70)	(66.958.306,25)	50.396.304,72	12.710.636,68	38.194.216,29	57.626.093,47	(2.447.325,66)	16.785.112,28

Table 139. Cash flow 2021-2031 (millions of nominal dollars) - PPDD demand optimistic.

Year	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Income	238.983.688,73	245.542.863,27	252.304.753,70	259.276.289,82	266.464.655,57	273.877.298,84	281.521.941,52	289.406.590,05	297.539.546,32	305.929.419,02	314.585.135,42	323.515.953,68	332.731.475,52	342.241.659,52
OPEX	57.804.790,01	58.960.885,81	60.140.103,53	61.342.905,60	62.569.763,71	63.821.158,98	65.097.582,16	66.399.533,81	67.727.524,48	69.082.074,97	70.463.716,47	71.872.990,80	73.310.450,62	74.776.659,63
Income Tax	21.902.523,45	24.991.013,49	28.080.413,33	31.225.187,30	34.390.454,41	37.688.916,58	41.012.093,37	44.399.093,25	48.316.211,24	52.995.453,27	56.829.601,38	59.863.291,33	63.600.421,40	67.678.108,98
VAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Local tax	881.027,34	916.442,89	953.282,08	991.602,13	1.031.462,58	1.072.925,33	1.116.054,80	1.160.918,00	1.207.584,60	1.256.127,11	1.306.620,93	1.359.144,51	1.413.779,43	1.470.610,56
Operating flow	158.395.347,94	160.674.521,08	163.130.954,77	165.716.594,79	168.472.974,87	171.294.297,94	174.296.211,18	177.447.044,99	180.288.226,00	182.595.763,66	185.985.196,64	190.420.577,04	194.406.824,08	198.316.280,35
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term loan repayment	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	65.844.064,03	32.922.032,02
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-term interest payment	62.140.966,21	57.213.662,58	52.461.496,65	47.709.330,73	43.080.087,55	38.204.998,89	33.452.832,97	28.700.667,05	24.019.208,90	19.196.335,21	14.444.169,28	9.692.003,36	4.958.330,24	685.680,66
Long-term debt service reserve allocation	183.692,89	280.484,98	202.139,36	141.789,11	-	89.569,00	63.458,94	37.348,88	-	-	-	-	-	0,00
Designation of long-term debt service reserve	1.921.126,24	1.842.780,62	1.764.435,00	1.581.162,01	1.685.218,38	1.651.864,63	1.625.754,58	1.528.936,75	1.633.003,41	1.562.295,64	1.562.295,64	1.543.802,84	1.580.788,44	22.533.882,53
Allocation to reinvestment reserve	8.171.475,01	14.480.848,42	14.480.848,42	14.480.848,42	15.115.714,77	15.115.714,77	15.309.673,13	15.309.673,13	15.309.673,13	7.692.902,27	7.692.902,27	1.891.825,06	1.891.825,06	1.891.825,06
Downsizing of the reinvestment reserve	-	-	-	-	-	-	-	-	81.714.750,09	-	63.093.734,13	-	-	6.348.663,45
Flow after financing	23.976.276,04	24.698.241,68	31.906.841,30	39.121.724,50	46.118.326,90	53.691.815,89	61.251.936,69	69.084.228,65	158.463.033,44	91.424.757,79	162.660.090,82	114.536.437,43	123.293.393,19	191.699.288,59
CAPEX	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reinvestments	-	-	-	-	-	-	-	-	81.714.750,09	-	63.093.734,13	-	-	6.348.663,45
Contributed capital	-	-	-	-	-	-	-	-	-	-	-	-	-	-
State contribution	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Free cash flow	23.976.276,04	24.698.241,68	31.906.841,30	39.121.724,50	46.118.326,90	53.691.815,89	61.251.936,69	69.084.228,65	76.748.283,35	91.424.757,79	99.566.356,69	114.536.437,43	123.293.393,19	185.350.625,15
Dealer Cash Flow	23.976.276,04	24.698.241,68	31.906.841,30	39.121.724,50	46.118.326,90	53.691.815,89	61.251.936,69	69.084.228,65	76.748.283,35	91.424.757,79	99.566.356,69	114.536.437,43	123.293.393,19	185.350.625,15

Table 140. Cash flow 2032-2045 (millions of nominal dollars) - PPDD demand optimistic.

Year	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
Income	352.056.834,83	362.187.715,51	372.645.415,40	383.441.463,54	394.587.820,24	406.096.893,79	417.981.557,80	430.255.169,23	442.931.587,14	456.025.192,19	231.280.481,97
OPEX	76.272.192,82	77.797.636,68	79.353.589,41	80.940.661,20	82.559.474,42	84.210.663,91	85.894.877,19	87.612.774,73	89.365.030,23	91.152.330,83	46.233.657,64
Income Tax	70.677.215,66	73.367.263,93	76.004.012,20	78.746.744,60	81.587.304,61	84.559.714,59	87.601.838,97	90.714.603,04	93.967.543,62	97.044.945,62	51.782.197,52
VAT	-	-	-	-	-	-	-	-	-	-	-
VAT recovered	-	-	-	-	-	-	-	-	-	-	-
Local tax	1.529.726,19	1.591.218,16	1.655.181,97	1.721.717,01	1.790.926,63	1.862.918,33	1.937.803,96	2.015.699,84	2.096.726,98	2.181.011,25	1.106.022,75
Operating flow	203.577.700,15	209.431.596,75	215.632.631,81	222.032.340,73	228.650.114,59	235.463.596,96	242.547.037,68	249.912.091,61	257.502.286,31	265.646.904,49	132.158.604,06
VAT credit provision	-	-	-	-	-	-	-	-	-	-	-
Bridging credit provision	-	-	-	-	-	-	-	-	-	-	-
Global amort credit provision	-	-	-	-	-	-	-	-	-	-	-
Long-term credit provision	-	-	-	-	-	-	-	-	-	-	-
VAT credit amortization	-	-	-	-	-	-	-	-	-	-	-
Amortization of bridge credit	-	-	-	-	-	-	-	-	-	-	-
Amortisation of global amort credit	-	-	-	-	-	-	-	-	-	-	-
Long-term loan repayment	-	-	-	-	-	-	-	-	-	-	-
Interest payment VAT	-	-	-	-	-	-	-	-	-	-	-
Bridge interest payment	-	-	-	-	-	-	-	-	-	-	-
Payment of global amort interest	-	-	-	-	-	-	-	-	-	-	-
Long-term interest payment	(0,00)	(0,00)	-	-	-	-	-	-	-	-	-
Long-term debt service reserve allocation	0,00	0,00	-	-	-	-	-	-	-	-	-
Designation of long-term debt service reserve	0,00	-	-	-	-	-	-	-	-	-	-
Allocation to reinvestment reserve	12.254.688,20	12.254.688,20	12.060.729,84	12.060.729,84	12.060.729,84	11.506.025,69	11.506.025,69	10.997.729,49	10.997.729,49	10.997.729,49	-
Downsizing of the reinvestment reserve	-	1.939.583,62	-	-	5.547.041,51	-	5.082.961,98	-	-	109.977.294,91	-
Flow after financing	191.323.011,95	199.116.492,17	203.571.901,97	209.971.610,89	222.136.426,25	223.957.571,27	236.123.973,97	238.914.362,12	246.504.556,82	254.649.175,00	132.158.604,06
CAPEX	-	-	-	-	-	-	-	-	-	-	-
Reinvestments	-	1.939.583,62	-	-	5.547.041,51	-	5.082.961,98	-	-	109.977.294,91	-
Contributed capital	-	-	-	-	-	-	-	-	-	-	-
State contribution	-	-	-	-	-	-	-	-	-	-	-
Free cash flow	191.323.011,95	197.176.908,54	203.571.901,97	209.971.610,89	216.589.384,75	223.957.571,27	231.041.011,99	238.914.362,12	246.504.556,82	254.649.175,00	132.158.604,06
Dealer Cash Flow	191.323.011,95	197.176.908,54	203.571.901,97	209.971.610,89	216.589.384,75	223.957.571,27	231.041.011,99	238.914.362,12	246.504.556,82	254.649.175,00	132.158.604,06

Table 141. Cash flow 2046-2056 (millions of nominal dollars) - PPDD demand optimistic.

In the scenario with optimistic demand for the PPDD scheme, also the payments allow a viable project with all and the stress year of 2030.

3.4.7 Calculation of the indicators

Due to the nature of the financial analysis, the indicators used are the Net Present Value (NPV) and the Internal Rate of Return (IRR) at the level of cash available to shareholders. In this regard, these indicators were calculated using as reference a different target TREMA or IRR according to the concession scheme used. In the case of the PPDi scenarios, the discount rate used for the concessionaire's NPV was 10% nominal, while in the case of the PPDD, the rate was 13.5% nominal and for the project's NPV the weighted capital cost of the project was used (without considering the resources contributed by the State).

The results of the 6 scenarios are shown again below.

Scenario	IRR	Project IRR	NPV	Project NPC	Annual Payment (USD cte.)*	Total Payment (USD cte.)
PPDi Base	10,00%	9,16%	5	304.459.718	96.229.818	2.813 mdd
PPDi Conservative	10,00%	9,16%	3	304.568.887	105.742.753	3.070mdd
PPDi Optimistic	10,00%	9,16%	0	304.303.742	85.691.260	2.533 mdd
PPDi Base	13,50%	10,68%	1	368.180.644	123.327.210	3.621 mdd
PPDi Conservative	13,50%	10,64%	1	356.804.224	128.520.408	3.774 mdd
PPDi Optimistic	13,50%	10,74%	1	385.099.667	119.085.354	3.497 mdd

* For the PPDi the annual payment is the annual average paid by the administration after deducting the system's income, considering only the complete years of operation with a factor to be applied to the PPD at 100% in all lines.

Table 142. Financial indicators of the different projected scenarios.

In terms of annual payment, the cheapest option for the administration is the PPDi assuming that there will be a demand as foreseen in the optimistic scenario. As mentioned, the above is true as long as the tariff revenues are actually met, otherwise, it would be subject to payments of around 174 million dollars according to the calculated PDD, as seen in table 103 in the section on income in PPDi.

In this sense, if the government can ensure that the system's revenues, in the PPDi scenario, will actually behave as projected, this scheme is more appropriate, in terms of the net payments that the government will make throughout the 35 years of the concession. Given that the certainty of the projections represents a risk, a more expensive but less risky

scheme for the government is the PPDD structure. In the sensitivity analysis, the costs for the government will be presented in case the demand is 30% and 50% below the projected, allowing to see the costs that the State would have to bear. The impact of increases in the level of demand with respect to the estimated.

3.4.8 Case with lower CAPEX because fewer uneven crossings are involved

In addition to the results presented, the PPDD scenarios were run assuming a lower CAPEX resulting from maintaining the unevenness foreseen in the initial studies for the system's intersections. As in the base case, the main indicators in this area are presented here. The amount of investment (including financial costs) would total 1,582,127,946, just over 200 million USD below the base case shown above.

Investment Costs	USD constant (2019)
Flows	
Infrastructure and systems	682.728.072
Rolling Stock	452.400.000
Basic engineering and final designs	18.945.704
Land	66.131.959
Environmental and social measures	10.000.000
SEVRI	6.448.426
<i>Subtotal</i>	<i>1.236.654.161</i>
Intangibles	
Construction supervision	42.357.986
Project Management	6.051.141
Contingencies	12.102.282
Management, contingencies and utility	75.100.088
Financial Costs*	251.359.696
<i>Subtotal</i>	<i>386.971.192</i>
Total	1.623.625.353

* The financial costs are calculated in nominal terms taking into account flat-rate costs.

Table 143. Tangible and intangible investment costs considering intersections.

Applying this change in the investment and with some modifications in the reinvestments, the other variables were kept constant in order to recalculate a payment that would satisfy the target IRR according to the scheme used and considering each of the three demand scenarios.

Scenario	IRR	Project IRR	NPV	Project NPC	Annual Payment (USD cte.)*	Total Payment (USD cte.)
PPDD Base	13,50%	12,25%	1	460.779.188	98.632.213	2.895 mdd
PPDD Conservative	13,50%	12,23%	0	449.267.347	103.741.296	3.045 mdd
PPDD Optimistic ¹	13,52%	12,28%	354.726	477.876.171	94.422.874	2.772 mdd

¹The result of applying the calculated IMG in this scenario is a slightly higher return. A lower IMG would eliminate this effect

Table 144. Financial indicators of the different scenarios projected with intersection CAPEX.

As can be seen, the payments and overall project cost for management are significantly reduced compared to the base scenario in which the gaps were included as discussed in section 2.2.8 of this document. This is logical given that, with less investment, the developer will need less compensation to obtain the same return. At the same time, the impact of the CABEL credit represents a higher percentage of the CAPEX, increasing the effect of such credit.

3.5 Sensitivity analysis

The MIDEPLAN guide calls for sensitivity analysis in at least three scenarios (pessimistic, normal, optimistic). In this case it has been decided to perform several more analyses by changing key variables that are likely to have variations during the course of the project. In order to be able to see the impact, different variables are reviewed according to the changed variable:

- For changes in execution (CAPEX, energy costs) the PPD and PPDD are kept constant, reviewing how the project's IRR and NPV change in different scenarios.
- For changes in the project approach (taxes that are finally exempt; inclusion of peripheral income and efficiency scenario in OPEX) that condition the remuneration that is requested in the bidding, it is proposed how the payments requested to the State could vary, that is, how the PPD and PPDD change.
- Finally, for changes in demand, we will review how this affects the case based on the State's payments, determining which scheme is riskier for the State.

3.5.1 Taxes

The VAT exemption for the project results in an improvement of the project results. If no such exemption is possible, the results would be slightly less positive, affecting the PPDi scheme more in percentage terms. In this case, a higher proportion of the income comes from tariff revenues. Given that the ticket rate is set at 600 colons, the application of VAT would reduce the amount of income that the concessionaire actually receives, reducing its income. In this scenario in terms of total costs, PPDi remains more attractive. Likewise, the greater the demand, the greater the increase in percentage terms of the government's payment, because in scenarios with high demand a greater proportion of the concessionaire's income is subject to VAT (the transport tariff).

The results are presented with VAT. The percentage changes with respect to the base results are shown in parentheses. It was not considered for the calculation that additional government VAT revenues would be allocated to this project.

Scenario	Basic annual payment *(USD 2019)	Total basis of payment	Annual payment without VAT exemption	Full payment without VAT exemption *(USD 2019)
PPDi Base	96.229.818	2.813 mdd	105.700.302 (9,8%)	3.092 mdd (10%)
PPDi Conservative	105.742.753	3.070mdd	114.118.829 (7,92%)	3.320 mdd (8,15%)
PPDi Optimistic	85.691.260	2.533 mdd	96.374.145 (12,5%)	2.845 mdd (12,3%)
Base PPDD	123.327.210	3.621 mdd	132.764.166 (7,7%)	3.899 mdd (7,6%)
PPDD Conservative	128.520.408	3.774 mdd	137.359.270 (6,9%)	4.034 mdd (7,7%)
Optimist PPDD ¹	119.085.354	3.497 mdd	129.027.871 (8,3%)	3.789 mdd (8,3%)

* Given its variable nature, the average annual payment for the PPDi is presented for the full calendar years after the end of the PPD payment factor growth period.

Table 145. VAT Sensitivity – in constant.

3.5.2 OPEX

With regard to operating costs, two variables were sensitized. On the one hand, the cost of energy, since by the nature of the energy market in Costa Rica, this is a variable that can be taken into account by potential investors. Below are the nominal IRR and NPV for both the developer and the project in the event of changes in the cost of energy (upper part of each scenario) and the project (lower part of each scenario).

Scenario		IRR - Base	NPV - Base	IRR - Energy +10%.	NPV - Energy +10%.
PPDi Base	Concesionare Project	10,00%	5	9,81%	-\$6.752.462
		9,16%	304.459.718	9,08%	\$294.036.286
PPDi Conservative	Concesionare Project	10,00%	3	9,81%	-\$6.752.464
		9,16%	304.568.887	9,08%	\$294.145.455
PPDi Optimistic	Concesionare Project	10,00%	0	9,81%	-\$6.752.467
		9,16%	304.303.742	9,08%	\$293.880.310
Base PPDD	Concesionare Project	13,50%	1	13,32%	-\$3.883.355
		10,68%	368.180.644	10,61%	\$359.097.622
PPDD Conservative	Concesionare Project	10,00%	5	9,81%	-\$6.752.462
		9,16%	304.459.718	9,08%	\$294.036.286
Optimist PPDD ¹	Concesionare Project	10,00%	3	9,81%	-\$6.752.464
		9,16%	304.568.887	9,08%	\$294.145.455

Table 146. Sensitivity to increases in electricity costs (results in nominals).

Scenario	IRR - Base	NPV - Base	IRR - Energy - 10%.	NPV - Energy - 10%.
PPDi Base	10,00%	5	10,19%	\$6.752.472
	9,16%	304.459.718	9,25%	\$314.883.150
PPDi Conservative	10,00%	3	10,19%	\$6.752.470
	9,16%	304.568.887	9,25%	\$314.992.319
PPDi Optimistic	10,00%	0	10,19%	\$6.752.467
	9,16%	304.303.742	9,25%	\$314.727.174
Base PPDD	13,50%	1	13,68%	\$3.808.517
	10,68%	368.180.644	10,76%	\$377.263.667
PPDD Conservative	13,50%		13,68%	\$3.808.517
	10,64%	1356.804.224	10,72%	\$365.887.247
Optimist PPDD ¹	13,50%	1	13,68%	\$3.999.362
	10,74%	385.099.667	10,82%	\$394.182.690

Table 147. Sensitivity to decreases in electrical energy costs (results in nominals).

As can be seen, changes of 10% in energy costs have some impact, considering that the OPEX tariff remains fixed, whether there are savings or cost overruns for this concept, representing variations of no more than 19 base points with changes that are many times smaller as far as the project's IRR is concerned.

3.5.3 Investment

The possible cost overruns incurred by the concessionaire impact its performance since the rate in any of the scenarios is set in the bidding phase. On the other hand, increases in investment costs agreed in advance (at the request of management) will result in higher payments of either PPDi or PPDD, regardless of the level of demand.

Scenarios were run with cost overruns of 10% and 20%, as well as savings of the same amounts. It is observed that the investment has a strong impact on the profitability of the project for the developer and especially in the case of the PPDi independently of the demand scenario (given that the results are practically the same), the profitability is below a national country risk rate for Costa Rica, below 8% for increases of 20%. As can be seen, in terms of the **project's** NPV, despite the cost overruns in the CAPEX, this is positive in all cases and less variable than changes in the CAPEX.

Scenario	IRR	Project IRR	NPV	Project NPV
PPDi Base	10,00%	9,16%	\$5	\$304.459.718
+10% CAPEX	8,11%	8,10%	-\$74.155.909	\$195.905.755
+20% CAPEX	6,55%	7,21%	-\$150.242.090	\$88.334.775
-10% CAPEX	12,41%	10,46%	\$73.857.658	\$414.439.546
-20% CAPEX	15,48%	12,10%	\$145.114.623	\$526.601.097

Table 148. Sensitivity to CAPEX changes (unsolicited) PPDi base (results in nominals).

Scenario	IRR	Project IRR	NPV	Project NPV
PPDi Conservative	10,00%	9,16%	\$3	\$304.568.887
+10% CAPEX	8,12%	8,10%	-\$74.153.828	\$196.013.778
+20% CAPEX	6,56%	7,21%	-\$150.245.047	\$88.441.891
-10% CAPEX	12,40%	10,46%	\$73.863.987	\$414.550.211
-20% CAPEX	15,48%	12,10%	\$145.123.171	\$526.713.796

Table 149. Sensitivity to CAPEX changes (unsolicited) PPDi conservative demand (results in nominals).

Scenario	IRR	Project IRR	NPV	Project NPV
PPDi Optimistic	10,00%	9,16%	0	\$304.303.742
+10% CAPEX	8,11%	8,10%	-\$74.158.616	\$195.751.456
+20% CAPEX	6,55%	7,21%	-\$150.238.204	\$88.181.801
-10% CAPEX	12,41%	10,46%	\$73.849.535	\$414.281.383
-20% CAPEX	15,49%	12,10%	\$145.103.664	\$526.439.959

Table 150. Sensitivity to CAPEX changes (unsolicited) PPDi optimistic demand (results in nominals).

The results in the case of the PPDD scheme are also high impact, although the concessionaire's IRR does not fall below 9%. As in the PPDi structure, here in terms of the project's NPV and IRR, the results are less variable and, in all cases, positive.

Scenario	IRR	Project IRR	NPV	Project NPV
PPDD Base	13,50%	10,68%	\$1	\$368.180.644
+10% CAPEX	11,31%	9,55%	-\$52.968.133	\$259.781.070
+20% CAPEX	9,49%	8,59%	-\$108.256.636	\$153.156.037
-10% CAPEX	16,22%	12,08%	\$51.465.890	\$479.196.715
-20% CAPEX	19,73%	13,84%	\$102.436.725	\$594.248.395

Table 151. Sensitivity to CAPEX changes (unsolicited) Base PPDD (results in nominals).

Scenario	IRR	Project IRR	NPV	Project NPV
PPDD Conservative	13,50%	10,64%	1	\$356.804.224
+10% CAPEX	11,27%	9,49%	-\$52.596.294	\$248.588.097
+20% CAPEX	9,41%	8,53%	-\$107.486.582	\$142.112.984
-10% CAPEX	16,29%	12,06%	\$51.397.724	\$467.579.393
-20% CAPEX	19,88%	13,84%	\$102.291.162	\$582.300.784

Table 152. Sensitivity to CAPEX changes (unsolicited) PPDD demands conservatism (results in nominals).

Scenario	IRR	Project IRR	NPV	Project NPV
PPDD Optimistic	13,50%	10,74%	\$1	\$385.099.667
+10% CAPEX	11,38%	9,62%	-\$53.294.689	\$276.425.610
+20% CAPEX	9,61%	8,69%	-\$108.935.340	\$169.581.049
-10% CAPEX	16,14%	12,11%	\$51.795.160	\$496.472.624
-20% CAPEX	19,55%	13,85%	\$102.868.041	\$612.013.772

Table 153. Sensitivity to CAPEX changes (unsolicited) PPDD optimistic demand (results in nominals).

If CAPEX increases are due to additional requests from the administration, this would imply an agreed increase in payments, either PPD or PPDD, and therefore in the cost to the government. The following are the results of changes in payments for scenarios involving 40% or 50% of the pre-agreed CAPEX increase.

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)*	Total payment (USD 2019)
PPDi Base	10,00%	9,16%	5	304.459.718	96.229.818	2.813 mdd
+40% CAPEX	10,00%	9,01%	2	444.162.056	164.669.398	4.823 mdd
+50% CAPEX	10,00%	8,99%	1	479.115.427	181.779.293	5.325 mdd

*Given its variable nature, the average annual payment for the PPDi is presented for the full calendar years after the end of the PPD payment factor growth period.

Table 154. Change of payments for agreed CAPEX increases - PPDi base demand (IRR and NPV in nominal).

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)*	Total payment (USD 2019)
PPDi Conservative	10,00%	9,16%	3	304.568.887	105.742.753	3.070 mdd
+40% CAPEX	10,00%	9,01%	1	444.270.427	174.182.333	5.079 mdd
+50% CAPEX	10,00%	8,99%	5	479.223.692	191.292.229	5.582 mdd

*Given its variable nature, the average annual payment for the PPDi is presented for the full calendar years after the end of the PPD payment factor growth period.

Table 155. Change of payments for agreed increases CAPEX - PPDi conservative demand (IRR and NPV in nominal).

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)*	Total payment (USD 2019)
PPDi Optimistic	10,00%	9,16%	0	304.303.742	85.691.260	2.533 mdd
+40% CAPEX	10,00%	9,01%	2	444.007.257	154.130.841	4.543 mdd
+50% CAPEX	10,00%	8,99%	2	478.960.795	171.240.736	5.045 mdd

*Given its variable nature, the average annual payment for the PPDi is presented for the full calendar years after the end of the PPD payment factor growth period.

Table 156. Change of payments for agreed increases CAPEX - PPDi optimistic demand (IRR and NPV in nominal).

As can be seen, the increase in CAPEX increases the administration's payment significantly in order to maintain the dealer's target IRR. In fact, in all cases, the increase in payment is

more, in percentage terms, than the increase in CAPEX. In the PPDD structure, what we see is:

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)	Total payment (USD 2019)
PPDD Base	13,50%	10,68%	1	368.180.644	123.327.210	3.621 mdd
+40% CAPEX	13,50%	10,57%	2	545.440.277	206.268.937	6.057 mdd
+50% CAPEX	13,50%	10,56%	0	589.808.256	227.004.368	6.666 mdd

Table 157. Change of payments for agreed increases CAPEX - PPDD base demand (IRR and NPV in nominal).

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)	Total payment (USD 2019)
PPDD Conservative	13,50%	10,64%	1	356.804.224	128.520.408	3.774 mdd
+40% CAPEX	13,50%	10,55%	2	\$534.195.971	211.462.135	6.210 mdd
+50% CAPEX	13,50%	10,53%	3	\$578.582.836	232.197.567	6.819 mdd

Table 158. Change of payments for agreed increases CAPEX - PPDD base demand (IRR and NPV in nominal).

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)	Total payment (USD 2019)
PPDD Optimistic	13,50%	10,74%	\$1	385.099.667	119.085.354	3.497 mdd
+40% CAPEX	13,50%	10,61%	\$0	\$561.558.361	201.941.648	5.930 mdd
+50% CAPEX	13,50%	10,59%	\$1	\$605.898.874	222.677.080	6.539 mdd

Table 159. Change of payments for agreed increases CAPEX - PPDD optimistic demand (IRR and NPV in nominal).

As you can see, in the PPDD structure, there is also a price increase greater than the CAPEX increase. Having said that, in this scenario the cheapest scheme is still PPDi with an optimistic demand. In all cases, annual payments would be well above 100 million USD per year by the administration.

3.5.4 Demand

Changes in demand will particularly affect the PPDD scenario whose profitability depends more on demand and whose payments by the government also imply a set minimum income. For this analysis, apply the minimum guaranteed income in the PPDD scenarios. First, the effects of a drop-in demand will be analyzed, and then the effect of increases in demand.

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)*	Total payment (USD 2019)	State NPV**
PPDi Base	10,00%	9,16%	5	\$304.459.718	96.229.818	2.813 mdd	-\$606.780.932
-10% demand	10,01%	9,17%	\$384.976	\$305.084.598	104.013.225	3.043 mdd	-\$654.329.556
-20% demand	10,02%	9,17%	\$769.947	\$305.709.479	111.796.631	3.273 mdd	-\$701.878.179
-30% demand	10,03%	9,18%	\$1.154.918	\$306.334.360	119.580.037	3.502 mdd	-\$749.426.802
-50% demand	10,05%	9,19%	\$1.924.860	\$307.584.121	135.146.850	3.962 mdd	-\$844.524.048

*Due to its variable nature, the average annual payment for the PPDi is presented for the full calendar years after the end of the PPD payment factor growth period.

**Discounted to 8.31% in real terms according to MIDEPLAN's "Social Prices - Investment Area - Public Investment Unit.

Table 160. Sensitivity to drops in demand - PPDi base demand (IRR and NPV in nominal).

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)*	Total payment (USD 2019)	State NPV (constant)
PPDi Conservative	10,00%	9,16%	3	\$304.568.887	105.742.753	3.070 mdd	-\$644.134.805
-10% demand	10,01%	9,17%	\$355.643	\$305.135.309	112.569.084	3.274 mdd	-\$687.912.092
-20% demand	10,02%	9,17%	\$711.282	\$305.701.730	119.395.416	3.478 mdd	-\$731.689.378
-30% demand	10,04%	9,18%	\$1.066.922	\$306.268.152	126.221.747	3.682 mdd	-\$775.466.665
-50% demand	10,05%	9,19%	\$1.778.201	\$307.400.995	139.874.409	4.090 mdd	-\$863.021.238

*Due to its variable nature, the average annual payment for the PPDi is presented for the full calendar years after the end of the PPD payment factor growth period.

Table 161. Sensitivity to drops in demand - PPDi demand conservative (IRR and NPV in nominal).

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)*	Total payment (USD 2019)	State NPV (constant)
PPDi Optimistic	10,00%	9,16%	0	304.303.742	85.691.260	2.533 mdd	-\$572.987.360
-10% demand	10,01%	9,17%	\$411.140	\$304.986.635	94.533.680	2.791 mdd	-\$623.947.412
-20% demand	10,02%	9,17%	\$822.279	\$305.669.527	103.376.101	3.049 mdd	-\$674.907.465
-30% demand	10,04%	9,18%	\$1.233.419	\$306.352.420	112.218.521	3.307 mdd	-\$725.867.517
-50% demand	10,06%	9,19%	\$2.055.698	\$307.718.205	129.903.361	3.823 mdd	-\$827.787.621

*Given its variable nature, the average annual payment for the PPDi is presented for the full calendar years after the end of the PPD payment factor growth period.

Table 162. Sensitivity to falls in demand - PPDi optimistic demand (IRR and NPV in nominal).

As can be seen, decreases in demand under each of the scenarios increase the annual payment to be made while there will be less income to cover the PPDi. The IRR of both the project and the concessionaire are only slightly modified, upwards, while a greater proportion of the fixed payment will come from tariff revenues, which are subject to 1% local tax. In all cases the net present value of the payments also increases. For the calculation of this, a discount rate of 8.31% was taken on the payments to be made in constant terms throughout the life of the concession.

The variation in the payments of the PPDD scheme is as follows:

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)*	Total payment (USD 2019)	State NPV ¹¹
PPDD Base	13,50%	10,68%	\$1	368.180.644	123.327.210	3.621 mdd	-\$766.798.512
-10% demand	12,52%	10,25%	-\$21.088.282	\$315.686.908	123.327.210	3.623 mdd	-\$767.598.611
-20% demand	11,57%	9,83%	-\$41.314.647	\$264.929.960	123.327.210	3.630 mdd	-\$770.723.559
-30% demand	10,58%	9,40%	-\$62.046.177	\$214.968.349	123.327.210	3.637 mdd	-\$774.486.584
-50% demand	8,69%	8,53%	-\$100.443.839	\$119.528.793	123.327.210	3.665 mdd	-\$787.265.893

Table 163. Sensitivity to drops in demand - base demand PPDD (IRR and NPV in nominal).

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)*	Total payment (USD 2019)	State NPV
PPDD Conservative	13,50%	10,64%	\$1	356.804.224	128.520.408	3.774 mdd	-\$799.088.592
-10% demand	12,54%	10,23%	-\$20.182.762	\$308.149.430	128.520.408	3.774 mdd	-\$799.088.592
-20% demand	11,65%	9,84%	-\$38.718.265	\$262.058.327	128.520.408	3.779 mdd	-\$801.701.026
-30% demand	10,71%	9,43%	-\$58.190.600	\$216.036.843	128.520.408	3.786 mdd	-\$804.718.358
-50% demand	8,91%	8,62%	-\$94.822.423	\$128.565.674	128.520.408	3.809 mdd	-\$815.579.712

Table 164. Sensitivity to falls in demand - PPDD demand conservative (IRR and NPV in nominal).

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)*	Total payment (USD 2019)	State NPV
PPDD Optimistic	13,50%	10,74%	\$1	\$385.099.667	119.085.354	3.497 mdd	-\$740.423.653
-10% demand	12,54%	10,30%	-\$21.352.948	\$329.146.699	119.085.354	3.501 mdd	-\$742.629.760
-20% demand	11,53%	9,85%	-\$43.341.514	\$273.707.890	119.085.354	3.508 mdd	-\$745.800.295
-30% demand	10,55%	9,41%	-\$64.470.008	\$220.435.354	119.085.354	3.519 mdd	-\$751.092.316
-50% demand	8,61%	8,49%	-\$103.986.447	\$117.450.507	119.085.354	3.551 mdd	-\$765.709.383

Table 165. Sensitivity to falls in demand - optimistic demand PPDD (IRR and NPV in nominal).

¹¹ Discounted NPV at 12% calculated on the State's estimated payments in constant terms.

As can be seen, drops in demand affect the IRR of the PPDD concessionaire much more since it is exposed to demand risk, which does not happen under the PPDi scheme. Conversely, the cost to the government varies much more in the PPDi scenario since it has to make up for shortfalls in demand to reach the established fixed payment. At the same time, it is important to note that the drop in demand in the PPDD structure activates the IMG in specific years (between two and three years) even with 50% less demand, keeping the payments to be made by the State very stable.

On the other hand, the greater variability of government payments in the PPDi scenario means that with a sufficiently large drop in demand, the PPDD scheme is cheaper than the PPDi. In all scenarios, with declines of 30% or less, total payments in constant dollars are cheaper under the PPDD scheme than PPDi.

With respect to increases in demand, given that in the two scenarios described (both PPDi and PPDD) the government absorbs all (PPDi) or at least part of the demand risk (PPDD), it is proposed that increases above the base scenario involve sharing part of the resources with the government itself in the case of the PPDD. In this sense, the revenues above the base scenario would be 50% for the government and the rest for the concessionaire. In the case of the PPDD all revenues would go to pay the agreed fixed amount and anything above that ceiling would be for the government.

For modeling purposes, in the case of PPDi all demand increases are assumed to pay the PPD tariff. Any amount above the PPDi ceiling is for the government but for the calculation of annual payments, total and NPV are not considered (i.e. if in a year the revenue is 100 USD more than the PPD rate, it is taken as no payment was made by the government (everything was covered by the demand, there is no "negative credit" for 100 USD for the purposes of full payment).

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)*	Total payment (USD 2019)	State NPV ¹²
PPDi Base	10,00%	9,16%	5	\$304.459.718	96.229.818	2.813 mdd	-\$606.780.932
+10% demand	9,99%	9,16%	-\$384.967	\$303.834.837	88.446.412	2.583 mdd	-\$559.232.309
+20% demand	9,98%	9,15%	-\$769.938	\$303.209.956	80.663.006	2.353 mdd	-\$511.683.686
+30% demand	9,97%	9,15%	-\$1.154.909	\$302.585.076	72.879.599	2.123 mdd	-\$464.135.063
+50% demand	9,95%	9,14%	-\$1.924.851	\$301.335.314	57.312.787	1.664 mdd	-\$369.037.817

*Given its variable nature, the average annual payment for the PPDi is presented for the full calendar years after the end of the PPD payment factor growth period.

Table 166. Sensitivity to demand increases - PPDi base demand (IRR and NPV in nominal).

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)*	Total payment (USD 2019)	State NPV
PPDi Conservative	10,00%	9,16%	3	\$304.568.887	105.742.753	3.070 mdd	-\$644.134.805
+10% demand	9,99%	9,16%	-\$355.636	\$304.002.466	98.916.422	2.866 mdd	-\$600.357.518
+20% demand	9,98%	9,15%	-\$711.276	\$303.436.044	92.090.091	2.662 mdd	-\$556.580.232
+30% demand	9,97%	9,15%	-\$1.066.915	\$302.869.623	85.263.760	2.458 mdd	-\$512.802.945
+50% demand	9,95%	9,14%	-\$1.778.194	\$301.736.780	71.611.098	2.050 mdd	-\$425.248.372

*Given its variable nature, the average annual payment for the PPDi is presented for the full calendar years after the end of the PPD payment factor growth period.

Table 167. Sensitivity to increases in demand - PPDi demand conservative (IRR and NPV in nominal).

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)*	Total payment (USD 2019)	State NPV
PPDi Optimistic	10,00%	9,16%	0	\$304.303.742	85.691.260	2.533 mdd	-\$572.987.360
+10% demand	9,99%	9,16%	-\$411.140	\$303.620.849	76.848.840	2.275 mdd	-\$522.027.308
+20% demand	9,98%	9,15%	-\$822.279	\$302.937.957	68.006.420	2.017 mdd	-\$471.067.256
+30% demand	9,96%	9,15%	-\$1.233.419	\$302.255.064	59.163.999	1.759 mdd	-\$420.107.204
+50% demand	9,94%	9,14%	-\$2.055.698	\$300.889.279	41.479.159	1.243 mdd	-\$318.187.099

*Given its variable nature, the average annual payment for the PPDi is presented for the full calendar years after the end of the PPD payment factor growth period.

Table 168. Sensitivity to increases in demand - PPDi optimistic demand (IRR and NPV in nominal).

As can be seen, increases in demand cause the dealer's IRR to drop very slightly, resulting in a higher percentage of his payment coming from tariff revenues, which are subject to a 1% tax. In all cases, the increase in demand means that the government has to put less money into covering the PPDi amount.

¹² Discounted NPV at 12% calculated on the State's estimated payments in constant terms.

In the case of the PPDD structure, for the purpose of presenting results it is assumed that the income that is shared with the administration at 50% is destined by the same to cover the payments for which the total payment and NPV are subtracted.

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)	Total payment (USD 2019)	State NPV (constant)	State Revenue Sharing * (constant)
PPDD Base	13,50%	10,68%	\$1	\$368.180.644	123.327.210	3.621 mdd	-\$766.798.512	
+10% demand	13,99%	10,90%	\$10.560.436	\$394.926.760	123.327.210	3.508 mdd	-\$743.261.944	114.924.487
+20% demand	14,48%	11,11%	\$21.120.871	\$421.672.876	123.327.210	3.394 mdd	-\$719.725.375	229.848.974
+30% demand	14,96%	11,32%	\$31.643.250	\$448.418.992	123.327.210	3.280 mdd	-\$696.188.807	344.773.461
+50% demand	15,92%	11,74%	\$52.536.161	\$501.911.223	123.327.210	3.053 mdd	-\$649.115.670	574.622.434

*Sharing revenues have already been deducted from total payments

Table 169. Sensitivity to increases in demand - base demand PPDD (Non-state TIR and VAN in nominal terms).

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)	Total payment (USD 2019)	State NPV (constant)	State Revenue Sharing * (constant)
PPDD Conservative	13,50%	10,64%	\$1	356.804.224	128.520.408	3.774 mdd	-\$799.088.592	
+10% demand	13,97%	10,85%	\$9.828.367	\$381.131.621	128.520.408	3.673 mdd	-\$777.418.835	102.005.483
+20% demand	14,44%	11,05%	\$19.656.733	\$405.459.019	128.520.408	3.572 mdd	-\$755.749.078	204.010.967
+30% demand	14,90%	11,25%	\$29.389.512	\$429.786.416	128.520.408	3.471 mdd	-\$734.079.321	306.016.450
+50% demand	15,82%	11,64%	\$48.825.375	\$478.441.210	128.520.408	3.269 mdd	-\$690.739.807	510.027.416

*Sharing revenues have already been deducted from total payments

Table 170. Sensitivity to increases in demand - conservative demand PPDD (Non-state TIR and VAN in nominal terms).

Scenario	IRR	Project IRR	NPV	Project NPV	Annual payment (USD 2019)	Total payment (USD 2019)	State NPV	State Revenue Sharing *
PPDD Optimistic	13,50%	10,74%	\$1	385.099.667	119.085.354	3.497 mdd	-\$740.423.653	
+10% demand	14,01%	10,97%	\$11.411.303	\$414.202.749	119.085.354	3.369 mdd	-\$715.198.427	128.982.818
+20% demand	14,51%	11,19%	\$22.581.743	\$443.305.831	119.085.354	3.242 mdd	-\$689.973.201	257.965.636
+30% demand	15,00%	11,41%	\$33.752.182	\$472.408.913	119.085.354	3.114 mdd	-\$664.747.975	386.948.454
+50% demand	15,98%	11,84%	\$55.909.157	\$530.615.076	119.085.354	2.858 mdd	-\$614.297.524	644.914.090

*Sharing revenues have already been deducted from total payments

Table 171. Sensitivity to increases in demand - optimistic demand PPDD (Non-state TIR and VAN in nominal terms).

In scenarios with above-expected demand, the effect is more pronounced in the PPDi scenario, as 100% of the increase in revenue helps reduce the government's payment obligations. Thus, the PPDi scheme is cheaper for the government in a scenario where demand revenues are higher than projected compared to a PPDD scheme.

3.5.5 Supplementary income

Additional revenue from passenger transport per se can be considered to make an adjustment to the payment. Two scenarios are used in this regard, depending on whether or not use is made of the workshops at the Pacífico station for other real estate uses.

Scenario	Annual payment (USD 2019)*	Total payment (USD 2019)
PPDi Base	96.229.818	2.813 mdd
Scenario 1 - min. Pacífico	93.538.156	2.734 mdd
Scenario 2 - max Pacífico	91.313.904	2.669 mdd
PPDi Conservative	105.742.753	3.070 mdd
Scenario 1 - min. Pacífico	103.051.091	2.991 mdd
Scenario 2 - max Pacífico	100.826.839	2.925 mdd
PPDi Optimistic	85.691.260	2.533 mdd
Scenario 1 - min. Pacífico	82.999.599	2.454 mdd
Scenario 2 - max Pacífico	80.775.347	2.389 mdd

*Due to its variable nature, the average annual payment for the PPDi is presented for the full calendar years after the end of the PPD payment factor growth period.

Table 172. Sensitivity to include advertising and rental payments - PPDi.

In the case of PPDi scenarios with different demands, the effect is the same, the inclusion of advertising and lease revenues in the scenario without developing the Pacific station workshops results in requesting a lower payment from the administration, representing just over \$2.6 million in the annual payment and approximately 79 million USD during the life of the concession. With the development of the workshops, the decrease in average annual payments is around \$4.9 million and the total payment is between 144 and 145 million USD with respect to the base cases according to each level of demand.

In the case of the PPDD structure, the inclusion of these revenues has the following results.

Scenario	Annual payment (USD 2019)*	Total payment (USD 2019)
PPDD Base	123.327.210	3.621 mdd
Scenario 1 - min. Pacífico	120.603.459	3.542 mdd
Scenario 2 - max Pacífico	118.353.586	3.475 mdd
PPDD Conservative	128.520.408	3.774 mdd
Scenario 1 - min. Pacífico	125.796.657	3.694 mdd
Scenario 2 - max Pacífico	123.546.784	3.628 mdd
PPDD Optimistic	119.085.354	3.497 mdd
Scenario 1 - min. Pacífico	116.349.000	3.417 mdd
Scenario 2 - max Pacífico	114.091.548	3.350 mdd

Total payment amounts are truncated (i.e. not rounded) to the million.

Table 173. Sensitivity to include payments for advertising and leases - PPDD.

In this structure, the inclusion of advertising and rental income has the same effect in monetary terms as in the PPDi scenarios. Annual payments are also reduced by about 2.7 million (for Scenario 1) and 5 million (for Scenario 2) and total payments are also reduced by about 80 million (Scenario 1). Total payments drop slightly more but are around the reduction of 146 million USD to 147 million USD over the life of the concession depending on the demand scenario.

On the other hand, there are also real estate properties that the developer could cede to third parties for real estate development (limited to the temporal horizon of the concession). Likewise, in this case there are two scenarios depending on whether the workshops of the Pacífico station are used in part for these purposes. If only these revenues are considered as part of the project, the payments made by the State would be susceptible to change in the following manner:

Scenario	Annual payment (USD 2019)*	Total payment (USD 2019)
PPDi Base	96.229.818	2.813 mdd
Scenario 1 - min. Pacífico	94.830.725	2.772 mdd
Scenario 2 - max Pacífico	94.337.567	2.757 mdd
PPDi Conservative	105.742.753	3.070 mdd
Scenario 1 - min. Pacífico	104.343.661	3.028 mdd
Scenario 2 - max Pacífico	103.850.331	3.014 mdd
PPDi Optimistic	85.691.260	2.533 mdd
Scenario 1 - min. Pacífico	84.292.168	2.492 mdd
Scenario 2 - max Pacífico	83.799.275	2.478 mdd

*Due to its variable nature, the average annual payment for the PPDi is presented for the full calendar years after the end of the PPD payment factor growth period.

Table 174. Sensitivity to include sale of rights for real estate development - PPDi.

As can be seen, the effect of real estate revenues is much smaller since it is a one-time payment (non-recurring such as advertising and leasing) and for a total amount that is less than the total during the whole concession of the other complementary revenues. In terms of annual payment, scenario 1 implies a reduction of about 1.4 million USD and in scenario 2 the reduction is 1.8 million USD annually with respect to the original scenario. Similarly, in total payment the reductions are around 41-42 million USD in total for scenario 1 and in scenario 2 the reductions are between 55-56 million USD in total.

With respect to the PPDD, the results are as follows (it is noted that due to its non-recurrent nature, real estate income would not be considered for the application of the GMI in this structure):

Scenario	Annual payment (USD 2019)*	Total payment (USD 2019)
PPDD Base	123.327.210	3.621 mdd
Scenario 1 - min. Pacífico	121.711.920	3.574 mdd
Scenario 2 - max Pacífico	121.156.816	3.558 mdd
PPDD Conservative	128.520.408	3.774 mdd
Scenario 1 - min. Pacífico	126.913.333	3.727 mdd
Scenario 2 - max Pacífico	126.358.228	3.710 mdd
PPDD Optimistic	119.085.354	3.497 mdd
Scenario 1 - min. Pacífico	117.393.310	3.447 mdd
Scenario 2 - max Pacífico	116.844.502	3.431 mdd

Table 175. Sensitivity to include sale of rights for real estate development - PPDD.

As can be seen, in the PPDD scheme the effect of real estate revenues is also lower than that of advertising revenues and tertiary uses. Having said that, this scheme shows a slightly higher sensitivity to these revenues than PPD_i. In development scenario 1, annual payment is reduced by between 1.6 and 1.7 million dollars (according to the demand scenario) and total payment by between 50 and 47 million dollars.

3.5.6 Distribution of the government contribution

The project has a government contribution of 550,000,000 USD. However, the way in which the government contribution is disbursed to the developer will have an impact by allowing the concessionaire to have more or less working capital as well as the amount of credit available to it, also reducing financial costs and therefore the amount of payment that would be requested. In the base case we have used in this report, the contribution is distributed in two moments:

- at the beginning the testing period of each line - 90% of the proportional amount of investment of that line
- at the beginning of operation of each line - 10% of the proportional amount of investment of that line

Five other disbursement schedules will be discussed:

Milestones	Base	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Half of construction	0%	30%	25%	30%	40%
2/3 construction	0%	20%	15%	30%	30%
Start testing	90%	40%	50%	30%	20%
Start of operation	10%	10%	10%	10%	10%

According to the current draft of the contract 10% of the total resources would be available until the **whole system is operational.*

Table 176. Alternatives of government contribution disbursements to be analyzed.

Scenario	Annual payment (USD 2019)*	Total payment (USD 2019)
PPDi Base	96.229.818	2.813 mdd
Alternative 1 (30-20-40-10)	92.341.710	2.699 mdd
Alternative 2 (25-15-50-10)	92.878.241	2.714 mdd
Alternative 3 (30-30-30-10)	91.943.392	2.687 mdd
Alternative 4 (40-30-20-10)	91.302.472	2.668 mdd
Alternative 5 (0-0-90-10*)	96.870.153	2.832 mdd
PPDi Conservative	105.742.753	3.070 mdd
Alternative 1 (30-20-40-10)	101.854.645	2.955 mdd
Alternative 2 (25-15-50-10)	102.391.176	2.971 mdd
Alternative 3 (30-30-30-10)	101.456.328	2.944 mdd
Alternative 4 (40-30-20-10)	100.815.407	2.925 mdd
Alternative 5 (0-0-90-10*)	106.383.088	3.088 mdd
PPDi Optimistic	85.691.260	2.533 mdd
Alternative 1 (30-20-40-10)	81.803.153	2.419 mdd
Alternative 2 (25-15-50-10)	82.339.684	2.435 mdd
Alternative 3 (30-30-30-10)	81.404.835	2.407 mdd
Alternative 4 (40-30-20-10)	80.763.915	2.389 mdd
Alternative 5 (0-0-90-10*)	86.331.596	2.552 mdd

*Given its variable nature, the average annual payment for the PPDi is presented for the full calendar years after the end of the PPD payment factor growth period.

Table 177. Disbursement Schedule Sensitivity - PPDi.

The change in the disbursement schedule represents a difference of up to 5.5 million USD per year, approximately 164 million USD over the life of the concession. The earlier and the greater the disbursement, the concessionaire to obtain the same target IRR would request a lower payment. At the same time, these savings should be counterbalanced with the incentive for the concessionaire to finish the work on time, advising the payment to be somewhat postponed.

Scenario	Annual payment (USD 2019)*	Total payment (USD 2019)
PPDD Base	123.327.210	3.621 mdd
Alternative 1 (30-20-40-10)	117.994.922	3.465 mdd
Alternative 2 (25-15-50-10)	118.794.385	3.488 mdd
Alternative 3 (30-30-30-10)	117.405.037	3.448 mdd
Alternative 4 (40-30-20-10)	116.440.421	3.419 mdd
Alternative 5 (0-0-90-10*)	124.072.814	3.643 mdd
PPDD Conservative	128.520.408	3.774 mdd
Alternative 1 (30-20-40-10)	123.178.814	3.617 mdd
Alternative 2 (25-15-50-10)	123.982.258	3.641 mdd
Alternative 3 (30-30-30-10)	122.586.062	3.600 mdd
Alternative 4 (40-30-20-10)	121.607.221	3.571 mdd
Alternative 5 (0-0-90-10*)	129.266.012	3.796 mdd
PPDD Optimistic	119.085.354	3.497 mdd
Alternative 1 (30-20-40-10)	113.783.942	3.341 mdd
Alternative 2 (25-15-50-10)	114.574.905	3.364 mdd
Alternative 3 (30-30-30-10)	113.200.164	3.324 mdd
Alternative 4 (40-30-20-10)	112.238.128	3.296 mdd
Alternative 5 (0-0-90-10*)	119.835.954	3.519 mdd

Table 178. Sensitivity to disbursement schedule - PPDD.

The modifications to the disbursement schedule in the PPDD scheme have a greater impact in terms of amount, there are variations of more than 7.6 million in the annual payment and 225 million over the life of the concession.

3.5.7 Comparison of alternatives

If we compare the scenarios where a different payment was determined by the government, we have the following:

Scenarios	Base (Total Payment USD 2019)	With VAT	CAPEX +40%	CAPEX +50%	Advertising revenue 1	Advertising revenue 2	Real estate income 1	Real estate income 2	Disbursement 30/20/40/10	Disbursement 20/15/50/10	Disbursement 30/30/30/10	Disbursement 40/30/20/10	Disbursement 0/0/90/10*
PPDi Base	2.813	3.092	4.823	5.325	2.734	2.669	2.772	2.757	2.699	2.714	2.687	2.668	2.832
PPDi Conservative	3.070	3.320	5.079	5.582	2.991	2.925	3.028	3.014	2.955	2.971	2.944	2.925	3.088
PPDi Optimistic	2.533	2.845	4.543	5.045	2.454	2.389	2.492	2.478	2.419	2.435	2.407	2.389	2.552
Base PPDD	3.621	3.899	6.057	6.666	3.542	3.475	3.574	3.558	3.465	3.488	3.448	3.419	3.643
PPDD Conservative	3.774	4.034	6.210	6.819	3.694	3.628	3.727	3.710	3.617	3.641	3.600	3.571	3.796
Optimist PPDD	3.497	3.789	5.930	6.539	3.417	3.350	3.447	3.431	3.341	3.364	3.324	3.296	3.519

Table 179. Total cost comparison for government considering transportation revenues (millions of constant dollars).



As can be seen, the greatest variations in cost are mostly related to changes in CAPEX. The six most expensive sensitivities are all PPDD scenarios in which there has been a 40% or 50% increase in CAPEX (at management's request).

The above results, however, are dependent on the transport revenue that can be obtained, although structurally, the PPDi scheme is much more exposed than the PPDD to falls in demand, since the administration is responsible for the payment determined beforehand in the PPDi.

Scenario	Base (Total Payment USD 2019)	-10% demand	-20% demand	-30% demand	-50% demand
PPDi Base	2.813 mdd	3.043 mdd	3.273 mdd	3.502 mdd	3.962 mdd
PPDi Conservative	3.070 mdd	3.274 mdd	3.478 mdd	3.682 mdd	4.090 mdd
PPDi Optimistic	2.533 mdd	2.791 mdd	3.049 mdd	3.307 mdd	3.823 mdd
PPDD Base	3.621 mdd	3.623 mdd	3.630 mdd	3.637 mdd	3.665 mdd
PPDD Conservative	3.774 mdd	3.774 mdd	3.779 mdd	3.786 mdd	3.809 mdd
PPDD Optimistic	3.497 mdd	3.501 mdd	3.508 mdd	3.519 mdd	3.551 mdd

Table 180. Comparison of the effects of falls in estimated demand (millions of constant dollars).

As you can see, while PPDi can be a good option if you are confident about the level of demand, in the event of sharp drops in demand, this scheme can actually become one of the most expensive. Considered in terms of equal demand scenarios, starting at a drop of 37-38%, it is better to have the PPDD scheme than the PPDi.

In the case of "up-side", given that the calculation considers that even what is shared by the concessionaire in the PPDD scheme will serve to cover the payment of the PPDD tariff itself, no change in the patterns is noted with respect to the scenario that is more advantageous for the administration and the one that is more contrary. Basically, the scenario with the fixed payment and the highest demand (optimistic PPDi) is the most advantageous in all the cases analyzed, while the most disadvantageous is the one with a fixed payment that must come from the administration's resources (PPDD) in a scenario with little expected demand, which leads the concessionaire to request a high payment (conservative PPDD).

Scenario	Base (Total Payment USD 2019)	+10% demand	+20% demand	+30% demand	+50% demand
PPDi Base	2.813 mdd	2.583 mdd	2.353 mdd	2.123 mdd	1.664 mdd
PPDi Conservative	3.070 mdd	2.866 mdd	2.662 mdd	2.458 mdd	2.050 mdd
PPDi Optimistic	2.533 mdd	2.275 mdd	2.017 mdd	1.759 mdd	1.243 mdd
PPDD Base	3.621 mdd	3.508 mdd	3.394 mdd	3.280 mdd	3.053 mdd
PPDD Conservative	3.774 mdd	3.673 mdd	3.572 mdd	3.471 mdd	3.269 mdd
PPDD Optimistic	3.497 mdd	3.369 mdd	3.242 mdd	3.114 mdd	2.858 mdd

Table 181. Total cost comparison for government considering changes in demand (millions of constant dollars).

3.5.8 Optimal time to make the investment

Considering the nature of the financial analysis, costs and revenues are only updated, it is considered that the more the investment is delayed, the more impact it will have on the project's NPV, seen from the fixed point in time of the present, since an additional year will pass without the revenues of that project. Although the above is true, it will also imply a less negative NPV of the payments to be made by the State as it delays its implementation by one year.

Scenario	Project NPV in 2019 Base (constant)	VAN project in 2019 (start delay one year)
PPDi Base	240.974.540	230.007.644
PPDD Base	301.200.511	285.202.411

Table 182. Comparison of project NPVs with a one-year delay.

Scenario	NPV payments from the State in 2019 Base (constants)	NPV payments from the State in 2019 (start delay one year)
PPDi Base	-606.780.932	-560.226.140
PPDD Base	-766.798.512	-707.966.496

Table 183. Comparison of NPV of State payments one year late. (NPV at 8.31% on payments in constant terms).

When comparing the alternatives of PPDD and PPDi, it has been considered that the PPDD provides greater stability in the face of demand and exchange rate risk, since in the case of PPDi 100% of the demand risk, as well as the exchange rate risk associated with

the tariffs, is transferred to the State. This volatility on demand is considered a high risk, which is qualified in the case of the PPDD, because although it is more expensive in the base scenario, it responds better to variations in demand.

3.6 Conclusions

The two models proposed are considered to be viable and potentially attractive to investors and financiers in the current market. After the comparison and scenario analysis, the following is observed:

- Factors in favor of the PPDD:
 - Exposure to demand risk: In this case, a good part of the demand risk is transferred to the concessionaire. This limits the risks assumed by INCOFER and the State of Costa Rica.
 - Budget stability: In the case of the PPDi, net payments fluctuate with direct sensitivity to demand, while in the case of the PPDD, stability is very high, since with decreases in demand in the range of 30-40%, the application of the minimum guaranteed income clause is timely, keeping payments stable.
 - Less exposure to exchange rate risk: The exchange rate risk linked to the tariffs (to be charged in colones) is transferred to the concessionaire in the PPDD. In the case of PPDi, it is retained by the State, given that at equal demand, a lower income in dollars due to the fall in parity is directly compensated by the State.
- Factors in favor of PPDi:
 - Lower cost in demand scenarios with falls of less than 40%: In the base scenario, the cost difference is 800 million in constant terms.
 - Acknowledged and highly attractive model for financiers and concessionaires: the lack of exposure to demand risk makes it attractive and easily bankable and marketable.

In view of these factors (greater stability prevailing in the PPDD model, which is, however, more expensive in demand scenarios than -40% of the estimated), and considering the characteristics of the project (brownfield, no demand track record and high possibilities of deviation), both models could be feasible to implement. In the base demand scenario, the performance of government payments (in constant terms and rounded to the nearest million) in the face of changes in demand is shown below:

	Variación sobre la demanda base							
	20%	10%	0%	-10%	-20%	-30%	-40%	-50%
PPDi	2.353	2.583	2.813	3.043	3.273	3.502	3.732	3.962
PPDD	3.394	3.508	3.621	3.623	3.630	3.637	3.650	3.665

Millones de dólares constantes

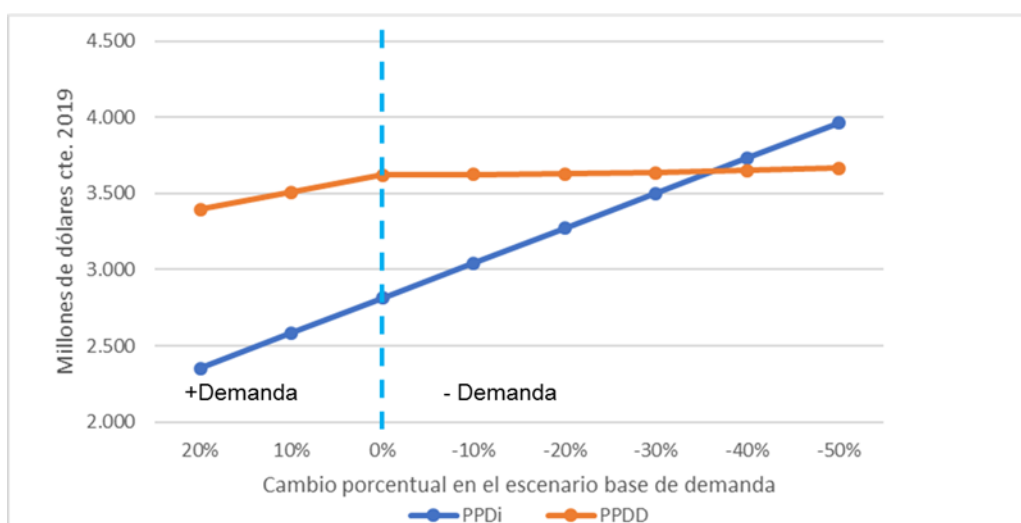


Figure 27. Comparison of the models proposed.

It can be seen that the cut between models occurs from a 37.5% drop in projected base demand.

While both models are feasible to implement, it is recommended that the PPDD model be assessed first, insofar as it involves at least partial sharing of demand risk.

Alternatively, a comparison and evaluation mechanism can be established in the bidding process that allows the comparison of proposals under the two models proposed, in case the consultation process with potential bidders foreseen in the national legislation determines that this option generates the greatest possibilities of competitive participation.

ANNEX I: UNIT PRICES

This annex shows the unit prices of each of the work units contemplated in the Economic and Financial Feasibility Studies of the Passenger Rapid Train System (TRP) in the Greater Metropolitan Area (GAM), including the breakdown of prices.

The prices used have been obtained from local suppliers, as well as from IDOM's own experience and knowledge of carrying out other railway and urban transport projects of a similar scale and projects located in Costa Rica and its surroundings.

The main projects used as a reference are those shown in the following list:

- Road interconnection and intercity passenger railway transport on the North-South axis of Guatemala City (Guatemala).
- Interchanges between the intersection of national routes N 2 and N 236 (Taras) and the intersection of national routes N 2 and N 10 (Cartago), including the improvement of national route N 2 (Costa Rica).
- Urban Light Transit (LRT) in Bogotá, western corridor (Colombia).
- Extension of the tramway from Vitoria-Gasteiz to Zabalzana (Spain).
- East-West tram line in Zaragoza (Spain).

However, the specific origin of the values comes from the expert analysis by IDOM, which has made the necessary calculations based on the experience acquired in other similar projects. The data from these similar projects is confidential and forms part of IDOM's know-how, and therefore only references can be made.

It should be mentioned that those units valued economically as a percentage (USD/%) have prices obtained as a percentage (1%) of the amount from which they originate.

The following table shows the unit prices:

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER	Price	Unit
INFRASTRUCTURES AND SYSTEMS		
PRELIMINARY WORKS		
TOPOGRAPHIC CAMPAIGN		
Topographical Campaign's	100,00	USD / ha
GEOTECHNICAL CAMPAIGN		
Mobilization and demobilization of equipment and personnel to the area of operation	1.000,00	USD / u
Moving drilling machinery between geotechnical boreholes	100,00	USD / u
Vertical drilling with continuous core extraction in all types of terrain	155,00	USD / m
Unchanged sample taking	40,00	USD / u
SPT (Standard Penetration Test)	40,00	USD / u
Wax sampling on rock barrel	5,00	USD / u
Boxes of plastic or waxed cardboard for storing core material obtained by rotary drilling	3,00	USD / u
Polling testimony, photographic reportage and definitive records	3,00	USD / m
PVC grooved tube, for measuring water levels	10,00	USD / m
Measurement of groundwater levels	5,00	USD / u
Drilling water sampling	15,00	USD / u
Dynamic DPSH/Brush Penetration	15,00	USD / m
Geophysical research	14,00	USD / m
Mechanical (Backhoe) tiling up to 3-4m	175,00	USD / u
Unaltered sampling in tiling by means of a waxed block	100,00	USD / u
Laboratory	11.050,73	USD / %
TRANSIT DEVIATIONS		
CONSIGNMENT OF TRANSIT DEVIATIONS	50.000,00	USD / km
DEVIATION AND PROTECTION OF NETWORKS		
CONSIGNMENT OF DEVIATION AND PROTECTION OF NETWORKS	50.000,00	USD / km
CLEANING, REMOVAL AND DISMANTLING VIA		
CONSIGNMENT OF CLEANING, REMOVALS AND DISMANTLING VIA	80.000,00	USD / km
STRUCTURES		
PUENTES		
BOARD (WIDTH 9M) PREFABRICATED DOUBLE T-BEAM EDGE 0,60M	3.430,40	USD / m
Reinforcement Concrete HA-30	229,74	USD / m3
6 cm thick prefabricated reinforced concrete slab for integral formwork of cantilevered sections	39,47	USD / m2
B-500S steel in reinforcements	1,78	USD / kg
Precast prestressed concrete beam, double T type, 0.60 m edge	109,55	USD / m
Waterproofing of boards with epoxy bitumen	14,23	USD / m2
Barrier, prefabricated reinforced concrete	89,47	USD / m
BOARD (WIDTH 11M) PREFABRICATED DOUBLE T-BEAM EDGE 0,60M	4.128,28	USD / m
Reinforcement Concrete HA-30	229,74	USD / m3
6 cm thick prefabricated reinforced concrete slab for integral formwork of cantilevered sections	39,47	USD / m2
B-500S steel in reinforcements	1,78	USD / kg
Precast prestressed concrete beam, double T type, 0.60 m edge	109,55	USD / m
Waterproofing of boards with epoxy bitumen	14,23	USD / m2

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER	Price	Unit
Barrier, prefabricated reinforced concrete	89,47	USD / m
<i>BOARD (WIDTH 9M) PREFABRICATED DOUBLE T-BEAM EDGE 0,90M</i>	<i>3.936,80</i>	<i>USD / m</i>
Reinforcement Concrete HA-30	229,74	USD / m3
6 cm thick prefabricated reinforced concrete slab for integral formwork of cantilevered sections	39,47	USD / m2
B-500S steel in reinforcements	1,78	USD / kg
Precast prestressed concrete beam, double T type, 0.90 m edge	236,15	USD / m
Waterproofing of boards with epoxy bitumen	14,23	USD / m2
Barrier, prefabricated reinforced concrete	89,47	USD / m
<i>BOARD (WIDTH 9M) PREFABRICATED DOUBLE T-BEAM EDGE 1,20M</i>	<i>4.443,16</i>	<i>USD / m</i>
Reinforcement Concrete HA-30	229,74	USD / m3
6 cm thick prefabricated reinforced concrete slab for integral formwork of cantilevered sections	39,47	USD / m2
B-500S steel in reinforcements	1,78	USD / kg
Precast prestressed concrete beam, double T type, 1.20 m edge	362,74	USD / m
Waterproofing of boards with epoxy bitumen	14,23	USD / m2
Barrier, prefabricated reinforced concrete	89,47	USD / m
<i>BOARD (WIDTH 11M) PREFABRICATED DOUBLE T-BEAM EDGE 1,20M</i>	<i>5.394,23</i>	<i>USD / m</i>
Reinforcement Concrete HA-30	229,74	USD / m3
6 cm thick prefabricated reinforced concrete slab for integral formwork of cantilevered sections	39,47	USD / m2
B-500S steel in reinforcements	1,78	USD / kg
Precast prestressed concrete beam, double T type, 1.20 m edge	362,74	USD / m
Waterproofing of boards with epoxy bitumen	14,23	USD / m2
Barrier, prefabricated reinforced concrete	89,47	USD / m
<i>BOARD (WIDTH 9M) PREFABRICATED DOUBLE T-BEAM EDGE 1,40M</i>	<i>4.780,76</i>	<i>USD / m</i>
Reinforcement Concrete HA-30	229,74	USD / m3
6 cm thick prefabricated reinforced concrete slab for integral formwork of cantilevered sections	39,47	USD / m2
B-500S steel in reinforcements	1,78	USD / kg
Precast prestressed concrete beam, double T type, 1.40 m edge	447,14	USD / m
Waterproofing of boards with epoxy bitumen	14,23	USD / m2
Barrier, prefabricated reinforced concrete	89,47	USD / m
<i>BOARD (WIDTH 9M) PREFABRICATED DOUBLE T-BEAM EDGE 1,65M</i>	<i>5.202,72</i>	<i>USD / m</i>
Reinforcement Concrete HA-30	229,74	USD / m3
6 cm thick prefabricated reinforced concrete slab for integral formwork of cantilevered sections	39,47	USD / m2
B-500S steel in reinforcements	1,78	USD / kg
Precast prestressed concrete beam, double T type, 1.65 m edge	552,63	USD / m
Waterproofing of boards with epoxy bitumen	14,23	USD / m2
Barrier, prefabricated reinforced concrete	89,47	USD / m
<i>BATTERY BRIDGE</i>	<i>1.976,66</i>	<i>USD / m</i>
Reinforcement Concrete HA-40	300,40	USD / m3
Formwork seen in curved walls	22,54	USD / m2
B-500S steel in reinforcements	1,78	USD / kg
<i>BRIDGE PILE FOUNDATION</i>	<i>11.482,55</i>	<i>USD / u</i>
Mass concrete HM-15	121,00	USD / m3

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER		
	Price	Unit
Reinforcement Concrete HA-25	132,50	USD / m3
B-500S steel in reinforcements	1,78	USD / kg
Ordinary formwork on hidden walls	14,54	USD / m2
Excavation of trenches, wells and foundations in any kind of terrain	4,04	USD / m3
Localized filling with selected soil from quarry	8,52	USD / m3
STIRRUP	74.583,71	USD / u
Mass concrete HM-15	121,00	USD / m3
Reinforcement Concrete HA-25	132,50	USD / m3
B-500S steel in reinforcements	1,78	USD / kg
Ordinary formwork on hidden walls	14,54	USD / m2
Elastomeric strapping material on support plates	3.718,72	USD / u
Waterproofing the back of walls	12,36	USD / m2
PVC tube D 300 mm	78,51	USD / m
Excavation of trenches, wells and foundations in any kind of terrain	4,04	USD / m3
Localized filling with selected soil from quarry	8,52	USD / m3
OTHER	23.800,00	USD / u
Cost for carrying out load tests, per span	17.000,00	USD / u
Lifting or pushing aids for elements, per span	6.800,00	USD / u
SINGLE TRACK BRIDGE RENOVATION	7.300,00	USD / m2
VIADUCTS		
BOARD (WIDTH 9M) PREFABRICATED DOUBLE T-BEAM EDGE 1,65M	5.202,72	USD / m
Reinforcement Concrete HA-30	229,74	USD / m3
6 cm thick prefabricated reinforced concrete slab for integral formwork of cantilevered sections	39,47	USD / m2
B-500S steel in reinforcements	1,78	USD / kg
Precast prestressed concrete beam, double T type, 1.65 m edge	552,63	USD / m
Waterproofing of boards with epoxy bitumen	14,23	USD / m2
Barrier, prefabricated reinforced concrete	89,47	USD / m
BOARD (WIDTH 11M) PREFABRICATED DOUBLE T-BEAM EDGE 1,65M	6.343,68	USD / m
Reinforcement Concrete HA-30	229,74	USD / m3
6 cm thick prefabricated reinforced concrete slab for integral formwork of cantilevered sections	39,47	USD / m2
B-500S steel in reinforcements	1,78	USD / kg
Precast prestressed concrete beam, double T type, 1.65 m edge	552,63	USD / m
Waterproofing of boards with epoxy bitumen	14,23	USD / m2
Barrier, prefabricated reinforced concrete	89,47	USD / m
VIADUCT PILE	3.573,23	USD / m
Reinforcement Concrete HA-40	300,40	USD / m3
Formwork seen on flat surfaces	19,61	USD / m2
Formwork seen in curved walls	22,54	USD / m2
B-500S steel in reinforcements	1,78	USD / kg
VIADUCT PILE FOUNDATION	11.482,55	USD / u
Mass concrete HM-15	121,00	USD / m3
Reinforcement Concrete HA-25	132,50	USD / m3
B-500S steel in reinforcements	1,78	USD / kg
Ordinary formwork on hidden walls	14,54	USD / m2
Excavation of trenches, wells and foundations in any kind of terrain	4,04	USD / m3

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER		
	Price	Unit
Localized filling with selected soil from quarry	8,52	USD / m3
STIRRUP	74.583,71	USD / u
Mass concrete HM-15	121,00	USD / m3
Reinforcement Concrete HA-25	132,50	USD / m3
B-500S steel in reinforcements	1,78	USD / kg
Ordinary formwork on hidden walls	14,54	USD / m2
Elastomeric strapping material on support plates	3.718,72	USD / u
Waterproofing the back of walls	12,36	USD / m2
PVC tube D 300 mm	78,51	USD / m
Excavation of trenches, wells and foundations in any kind of terrain	4,04	USD / m3
Localized filling with selected soil from quarry	8,52	USD / m3
OTHER	23.800,00	USD / u
Cost for carrying out load tests, per span	17.000,00	USD / u
Lifting or pushing aids for elements, per span	6.800,00	USD / u
CUT & COVER		
DEMOLITION	200.000,00	USD / km
WALL SCREEN	7.500.000,00	USD / km
TOP SLAB	3.200.000,00	USD / km
URBANIZATION	2.400.000,00	USD / km
INTERIOR EXCAVATION	2.400.000,00	USD / km
BOTTOM SLAB	2.400.000,00	USD / km
WALLS		
CONCRETE WALL	557,01	USD / m
Reinforcement Concrete HA-25	132,50	USD / m3
B-500S steel in reinforcements	1,78	USD / kg
Formwork seen on flat surfaces	19,61	USD / m2
PVC tube D 160 mm	60,21	USD / m
Waterproofing the back of walls	12,36	USD / m2
PLATFORM AND TRACK SUPERSTRUCTURE		
BALLAST TRACK		
BALLAST TRACK VIGNOLE RAIL	1.762.810,41	USD / km
UIC-54 rail	107,04	USD / m
Nabla-type fastening	45,79	USD / u
Prefabricated concrete monobloc sleeper	141,71	USD / u
Concrete prism 0,50x0,40m, with five ducts D 110 mm	45,89	USD / m
Ballast	67,52	USD / m3
Subballast	52,51	USD / m3
QS3 artificial skunk	25,01	USD / m3
BALLAST TRACK VIGNOLE RAIL SINGLE TRACK	915.965,29	USD / km
UIC-54 rail	107,04	USD / m
Nabla-type fastening	45,79	USD / u
Prefabricated concrete monobloc sleeper	141,71	USD / u
Concrete prism 0,50x0,40m, with five ducts D 110 mm	45,89	USD / m
Ballast	67,52	USD / m3
Subballast	52,51	USD / m3
QS3 artificial skunk	25,01	USD / m3
FENCED BALLAST TRACK VIGNOLE RAIL	2.030.530,41	USD / km
UIC-54 rail	107,04	USD / m
Nabla-type fastening	45,79	USD / u
Prefabricated concrete monobloc sleeper	141,71	USD / u
Concrete prism 0,50x0,40m, with five ducts D 110 mm	45,89	USD / m

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER		
	Price	Unit
Ballast	67,52	USD / m3
Subballast	52,51	USD / m3
QS3 artificial skunk	25,01	USD / m3
2m high double torsion mesh	133,86	USD / m
FENCED BALLAST TRACK VIGNOLE RAIL SINGLE TRACK	1.183.685,29	USD / km
UIC-54 rail	107,04	USD / m
Nabla-type fastening	45,79	USD / u
Prefabricated concrete monobloc sleeper	141,71	USD / u
Concrete prism 0,50x0,40m, with five ducts D 110 mm	45,89	USD / m
Ballast	67,52	USD / m3
Subballast	52,51	USD / m3
QS3 artificial skunk	25,01	USD / m3
2m high double torsion mesh	133,86	USD / m
SLAB TRACK		
SLAB TRACK VIGNOLE RAIL	2.021.288,51	USD / km
UIC-54 rail	107,04	USD / m
Nabla-type fastening	45,79	USD / u
Prefabricated concrete bi-block sleeper	113,66	USD / u
Concrete prism 0,50x0,40m, with six ducts D 110 mm	48,86	USD / m
Concrete prism 0,50x0,30m, with three ducts D 110 mm	33,63	USD / m
B-500S steel in reinforcements	1,78	USD / kg
Reinforcement Concrete HA-30	229,74	USD / m3
Mass concrete HM-10	113,00	USD / m3
QS3 artificial skunk	25,01	USD / m3
SLAB TRACK VIGNOLE RAIL SINGLE TRACK	1.018.259,59	USD / km
UIC-54 rail	107,04	USD / m
Nabla-type fastening	45,79	USD / u
Prefabricated concrete bi-block sleeper	113,66	USD / u
Concrete prism 0,50x0,40m, with six ducts D 110 mm	48,86	USD / m
B-500S steel in reinforcements	1,78	USD / kg
Reinforcement Concrete HA-30	229,74	USD / m3
Mass concrete HM-10	113,00	USD / m3
QS3 artificial skunk	25,01	USD / m3
SLAB TRACK VIGNOLE RAIL AT STATION	1.866.874,51	USD / km
UIC-54 rail	107,04	USD / m
Nabla-type fastening	45,79	USD / u
Prefabricated concrete bi-block sleeper	113,66	USD / u
B-500S steel in reinforcements	1,78	USD / kg
Reinforcement Concrete HA-30	229,74	USD / m3
Mass concrete HM-10	113,00	USD / m3
SLAB TRACK GROOVED RAIL	1.483.904,23	USD / km
Ph-37N rail	134,21	USD / m
Elastomeric material	2,94	USD / m3
Concrete prism 0,50x0,40m, with six ducts D 110 mm	48,86	USD / m
Concrete prism 0,50x0,30m, with three ducts D 110 mm	33,63	USD / m
B-500S steel in reinforcements	1,78	USD / kg
Reinforcement Concrete HA-30	229,74	USD / m3
Mass concrete HM-10	113,00	USD / m3
QS3 artificial skunk	25,01	USD / m3
SLAB TRACK GROOVED RAIL SINGLE RAIL	749.567,12	USD / km
Ph-37N rail	134,21	USD / m
Elastomeric material	2,94	USD / m3

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER	Price	Unit
Concrete prism 0,50x0,40m, with six ducts D 110 mm	48,86	USD / m
B-500S steel in reinforcements	1,78	USD / kg
Reinforcement Concrete HA-30	229,74	USD / m3
Mass concrete HM-10	113,00	USD / m3
QS3 artificial skunk	25,01	USD / m3
FENCED SLAB TRACK VIGNOLE RAIL	2.289.008,51	USD / km
UIC-54 rail	107,04	USD / m
Nabla-type fastening	45,79	USD / u
Prefabricated concrete bi-block sleeper	113,66	USD / u
Concrete prism 0,50x0,40m, with six ducts D 110 mm	48,86	USD / m
Concrete prism 0,50x0,30m, with three ducts D 110 mm	33,63	USD / m
B-500S steel in reinforcements	1,78	USD / kg
Reinforcement Concrete HA-30	229,74	USD / m3
Mass concrete HM-10	113,00	USD / m3
QS3 artificial skunk	25,01	USD / m3
2m high double torsion mesh	133,86	USD / m
FENCED SLAB TRACK VIGNOLE RAIL SINGLE TRACK	1.285.979,59	USD / km
UIC-54 rail	107,04	USD / m
Nabla-type fastening	45,79	USD / u
Prefabricated concrete bi-block sleeper	113,66	USD / u
Concrete prism 0,50x0,40m, with six ducts D 110 mm	48,86	USD / m
B-500S steel in reinforcements	1,78	USD / kg
Reinforcement Concrete HA-30	229,74	USD / m3
Mass concrete HM-10	113,00	USD / m3
QS3 artificial skunk	25,01	USD / m3
2m high double torsion mesh	133,86	USD / m
SLAB TRACK VIGNOLE RAIL IN VIADUCT	1.778.734,51	USD / km
UIC-54 rail	107,04	USD / m
Nabla-type fastening	45,79	USD / u
Prefabricated concrete bi-block sleeper	113,66	USD / u
B-500S steel in reinforcements	1,78	USD / kg
Reinforcement Concrete HA-30	229,74	USD / m3
Mass concrete HM-10	113,00	USD / m3
SLAB TRACK VIGNOLE RAIL IN CUT&COVER	2.404.754,51	USD / km
UIC-54 rail	107,04	USD / m
Nabla-type fastening	45,79	USD / u
Prefabricated concrete bi-block sleeper	113,66	USD / u
Concrete prism 0,50x0,30m, with three ducts D 110 mm	33,63	USD / m
Concrete prism 0,50x0,40m, with six ducts D 110 mm	48,86	USD / m
B-500S steel in reinforcements	1,78	USD / kg
Reinforcement Concrete HA-30	229,74	USD / m3
Mass concrete HM-10	113,00	USD / m3
RAIL SWITCHES		
BRETELLE	425.000,00	USD / u
ESCAPES	182.380,43	USD / u
DESVIATIONS	97.015,85	USD / u
END OF TRACK	16.433,12	USD / u
STATIONS		
STATION TYPE (SIDE PLATFORMS)	747.554,72	USD / u
90 M PLATFORM WITH ACCESS RAMPS	60.000,00	USD / u
10 M METAL STRUCTURE CANOPY	57.000,00	USD / u
URBANIZATION	20,14	USD / m2

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER		
	Price	Unit
EQUIPMENT	22.670,72	USD / u
Luminaires	379,50	USD / u
Litter bins	401,59	USD / u
2m high double torsion mesh	133,86	USD / m
TYPE STATION (CENTRAL PLATFORM)	379.819,36	USD / u
90 M PLATFORM WITH ACCESS RAMPS	60.000,00	USD / u
10 M METAL STRUCTURE CANOPY	57.000,00	USD / u
URBANIZATION	20,14	USD / m2
EQUIPMENT	22.670,72	USD / u
Luminaires	379,50	USD / u
Litter bins	401,59	USD / u
2m high double torsion mesh	133,86	USD / m
INTERMODAL STATION	909.638,72	USD / u
90 M PLATFORM WITH ACCESS RAMPS	60.000,00	USD / u
10 M METAL STRUCTURE CANOPY	57.000,00	USD / u
4 M METAL STRUCTURE CANOPY	30.000,00	USD / u
URBANIZATION	20,14	USD / m2
EQUIPMENT	22.670,72	USD / u
Luminaires	379,50	USD / u
Litter bins	401,59	USD / u
2m high double torsion mesh	133,86	USD / m
SINGULAR STATION	8.000.000,00	USD / u
ESTACIÓN	5.500.000,00	USD / u
OCC EQUIPMENT	1.000.000,00	USD / u
URBANIZATION	1.500.000,00	USD / u
DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS		
PARAÍSO		
ESPLANADE GENERATION		
CLEARING OF LAND	1,09	USD / m2
Clearing the land	1,09	USD / m2
EXCAVATION	4,04	USD / m3
Excavation of trenches, wells and foundations in any kind of terrain	4,04	USD / m3
FILLING IN	8,52	USD / m3
Localized filling with selected soil from quarry	8,52	USD / m3
ADMINISTRATIVE BUILDING		
FOUNDATIONS AND STRUCTURES	57,94	USD / m3
ROOFS, FACADES, PARTITIONS AND COATINGS	67,16	USD / m3
FACILITIES	49,41	USD / m3
WORKSHOP AND DEPOT BUILDING		
FOUNDATIONS AND STRUCTURES	33,94	USD / m3
ROOFS, FACADES, PARTITIONS AND COATINGS	14,01	USD / m3
FACILITIES	11,90	USD / m3
MAINTENANCE FACILITIES		
ELEVATED PLATFORMS	108.000,00	USD / u
AUTOMATIC WASHING PLANT	260.000,00	USD / u
SANDBOX SYSTEM	340.000,00	USD / u
FURNITURE	17.000,00	USD / u
URBANIZATION		
PAVEMENTS, PAVING AND FINISHES	6,19	USD / m2
DRAINAGE	7,31	USD / m2
NETWORK OF HYDRANTS	0,65	USD / m2

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER		
LIGHTING	2,83	USD / m2
CONNECTIONS	3,16	USD / m2
TRACKS		
BALLAST TRACK IN ROAD TRAFFIC AREAS	310,34	USD / m
DESVIATIONS	97.015,85	USD / u
END OF TRACKS	16.433,12	USD / u
LAS CAÑAS		
ESPLANADE GENERATION		
CLEARING OF LAND	1,09	USD / m2
Clearing the land	1,09	USD / m2
EXCAVATION	4,04	USD / m3
Excavation of trenches, wells and foundations in any kind of terrain	4,04	USD / m3
FILLING IN	8,52	USD / m3
Localized filling with selected soil from quarry	8,52	USD / m3
DEMOLITION	18,15	USD / m2
Demolition	18,15	USD / m2
RETAINING WALL	1.991,38	USD / m
Reinforcement Concrete HA-25	132,50	USD / m3
B-500S steel in reinforcements	1,78	USD / kg
Formwork seen on flat surfaces	19,61	USD / m2
PVC tube D 160 mm	60,21	USD / m
Waterproofing the back of walls	12,36	USD / m2
ADMINISTRATIVE BUILDING		
FOUNDATIONS AND STRUCTURES	57,94	USD / m3
ROOFS, FACADES, PARTITIONS AND COATINGS	67,16	USD / m3
FACILITIES	49,41	USD / m3
WORKSHOP AND DEPOT BUILDING		
FOUNDATIONS AND STRUCTURES	33,94	USD / m3
ROOFS, FACADES, PARTITIONS AND COATINGS	14,01	USD / m3
FACILITIES	11,90	USD / m3
MAINTENANCE FACILITIES		
INSPECTION PIT	68.000,00	USD / u
WHEEL MEASURING PIT	20.500,00	USD / u
SPRAY BOOTH PIT	28.500,00	USD / u
BOGIE TOUR PIT	4.500,00	USD / u
LATHE PIT	28.500,00	USD / u
CRANE BRIDGE	160.000,00	USD / u
ELEVATED PLATFORMS	108.000,00	USD / u
HYDRAULIC JACK SYSTEM	965.000,00	USD / u
BOGIE MAINTENANCE EQUIPMENT	570.000,00	USD / u
DITCH LATCH	1.300.000,00	USD / u
AUTOMATIC WASHING PLANT	260.000,00	USD / u
PAINT BOOTH	305.000,00	USD / u
SANDBOX SYSTEM	340.000,00	USD / u
FURNITURE	17.000,00	USD / u
OTHER VEHICLES AND EQUIPMENT	285.000,00	USD / u
URBANIZATION		
PAVEMENTS, PAVING AND FINISHES	6,19	USD / m2
DRAINAGE	7,31	USD / m2
NETWORK OF HYDRANTS	0,65	USD / m2
LIGHTING	2,83	USD / m2

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER		
CONNECTIONS	3,16	USD / m2
TRACKS		
BALLAST TRACK IN ROAD TRAFFIC AREAS	310,34	USD / m
MAINTENANCE TRACKS ON PILLARS	358,61	USD / m
ESCAPES	182.380,43	USD / u
DESVIATIONS	97.015,85	USD / u
END OF TRACKS	16.433,12	USD / u
PACÍFICO		
ESPLANADE GENERATION		
CLEARING, DEMOLITION AND DISMANTLING OF TRACKS	17,09	USD / m2
Clearing the land	1,09	USD / m2
Track Disassembly	16,00	USD / m2
DEMOLITION	18,15	USD / m2
Demolition	18,15	USD / m2
ADMINISTRATIVE BUILDING		
FOUNDATIONS AND STRUCTURES	57,94	USD / m3
ROOFS, FACADES, PARTITIONS AND COATINGS	67,16	USD / m3
FACILITIES	49,41	USD / m3
WORKSHOP AND DEPOT BUILDING		
FOUNDATIONS AND STRUCTURES ADECUATION	33,94	USD / m3
ROOFS, FACADES, PARTITIONS AND COVERINGS ADECUATIONS	14,01	USD / m3
FACILITIES	11,90	USD / m3
MAINTENANCE FACILITIES		
ELEVATED PLATFORMS	108.000,00	USD / u
AUTOMATIC WASHING PLANT	260.000,00	USD / u
SANDBOX SYSTEM	340.000,00	USD / u
FURNITURE	17.000,00	USD / u
URBANIZATION		
PAVEMENTS, PAVING AND FINISHES	6,19	USD / m2
DRAINAGE	7,31	USD / m2
NETWORK OF HYDRANTS	0,65	USD / m2
LIGHTING	2,83	USD / m2
CONNECTIONS	3,16	USD / m2
TRACKS		
BALLAST TRACK IN ROAD TRAFFIC AREAS	310,34	USD / m
ESCAPES	182.380,43	USD / u
DESVIATIONS	97.015,85	USD / u
END OF TRACKS	16.433,12	USD / u
CIRUELAS		
ESPLANADE GENERATION		
CLEARING OF LAND	1,09	USD / m2
Clearing the land	1,09	USD / m2
ADMINISTRATIVE BUILDING		
FOUNDATIONS AND STRUCTURES	57,94	USD / m3
ROOFS, FACADES, PARTITIONS AND COATINGS	67,16	USD / m3
FACILITIES	49,41	USD / m3
WORKSHOP AND DEPOT BUILDING		
FOUNDATIONS AND STRUCTURES	33,94	USD / m3
ROOFS, FACADES, PARTITIONS AND COATINGS	14,01	USD / m3
FACILITIES	11,90	USD / m3
MAINTENANCE FACILITIES		

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER		
<i>ELEVATED PLATFORMS</i>	<i>108.000,00</i>	<i>USD / u</i>
<i>AUTOMATIC WASHING PLANT</i>	<i>260.000,00</i>	<i>USD / u</i>
<i>SANDBOX SYSTEM</i>	<i>340.000,00</i>	<i>USD / u</i>
<i>FURNITURE</i>	<i>17.000,00</i>	<i>USD / u</i>
URBANIZATION		
<i>PAVEMENTS, PAVING AND FINISHES</i>	<i>6,19</i>	<i>USD / m2</i>
<i>DRAINAGE</i>	<i>7,31</i>	<i>USD / m2</i>
<i>NETWORK OF HYDRANTS</i>	<i>0,65</i>	<i>USD / m2</i>
<i>LIGHTING</i>	<i>2,83</i>	<i>USD / m2</i>
<i>CONNECTIONS</i>	<i>3,16</i>	<i>USD / m2</i>
TRACKS		
<i>BALLAST TRACK IN ROAD TRAFFIC AREAS</i>	<i>310,34</i>	<i>USD / m</i>
<i>DESVIATIONS</i>	<i>97.015,85</i>	<i>USD / u</i>
<i>END OF TRACKS</i>	<i>16.433,12</i>	<i>USD / u</i>
DRAINAGE		
TRANSVERSE DRAINAGE		
<i>FRAME 3MX2M</i>	<i>33.155,86</i>	<i>USD / u</i>
Excavation of trenches, wells and foundations in any kind of terrain	4,04	USD / m3
Localized filling with selected soil from quarry	8,52	USD / m3
Waterproofing the back of walls	12,36	USD / m2
Reinforcement Concrete HA-30	229,74	USD / m3
B-500S steel in reinforcements	1,78	USD / kg
Formwork seen on flat surfaces	19,61	USD / m2
Ordinary formwork on hidden walls	14,54	USD / m2
Fin 3x2m	805,06	USD / u
<i>FRAME 5MX2,5M</i>	<i>54.015,69</i>	<i>USD / u</i>
Excavation of trenches, wells and foundations in any kind of terrain	4,04	USD / m3
Localized filling with selected soil from quarry	8,52	USD / m3
Waterproofing the back of walls	12,36	USD / m2
Reinforcement Concrete HA-30	229,74	USD / m3
B-500S steel in reinforcements	1,78	USD / kg
Formwork seen on flat surfaces	19,61	USD / m2
Ordinary formwork on hidden walls	14,54	USD / m2
Fin 5x2,5m	1.677,21	USD / u
<i>FRAME 7MX3M</i>	<i>90.299,60</i>	<i>USD / u</i>
Excavation of trenches, wells and foundations in any kind of terrain	4,04	USD / m3
Localized filling with selected soil from quarry	8,52	USD / m3
Waterproofing the back of walls	12,36	USD / m2
Reinforcement Concrete HA-30	229,74	USD / m3
B-500S steel in reinforcements	1,78	USD / kg
Formwork seen on flat surfaces	19,61	USD / m2
Ordinary formwork on hidden walls	14,54	USD / m2
Fin 7x3m	2.817,71	USD / u
<i>DOUBLE FRAME 4MX4M</i>	<i>114.832,44</i>	<i>USD / u</i>
Excavation of trenches, wells and foundations in any kind of terrain	4,04	USD / m3
Localized filling with selected soil from quarry	8,52	USD / m3
Waterproofing the back of walls	12,36	USD / m2
Reinforcement Concrete HA-30	229,74	USD / m3

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER		
B-500S steel in reinforcements	1,78	USD / kg
Formwork seen on flat surfaces	19,61	USD / m2
Ordinary formwork on hidden walls	14,54	USD / m2
Fin 4x4m	2.146,83	USD / u
LONGITUDINAL DRAINAGE		
TRAPEZOIDAL 1,00MX0,50M	63.641,19	USD / km
Mass concrete HM-20	124,93	USD / m3
Formwork seen on flat surfaces	19,61	USD / m2
Excavation of trenches, wells and foundations in any kind of terrain	4,04	USD / m3
CIRCULAR DIAMETER 0,40M	112.823,58	USD / km
PVC tube D 400 mm	103,60	USD / m
Drainage grids and drains	458,98	USD / u
PVC tube D 100 mm	23,46	USD / m
PVC tube D 63 mm	7,33	USD / m
RECTANGULAR 0,50MX0,50M	58.534,25	USD / km
Mass concrete HM-20	124,93	USD / m3
Formwork seen on flat surfaces	19,61	USD / m2
Excavation of trenches, wells and foundations in any kind of terrain	4,04	USD / m3
ELECTRIFICATION		
MV SUBSTATIONS AND CONNECTIONS		
MV ELECTRICAL CONNECTION	313.935,34	USD / u
Line cell in SF6. Disconnecter + circuit-breaker + output earthing. Includes electronic relay. According to requirement	11.111,11	USD / u
Three-pole disconnector as required by the electricity supply company.	11.111,11	USD / u
Electronic trip unit for circuit-breakers as required by the electricity supply company.	16.666,67	USD / u
Relay cabinet according to the requirement of the electric company.	8.333,33	USD / u
Control equipment for the integration of the new line output position, as required by the electricity supply company.	3.888,89	USD / u
Power quality recording equipment, as required by the electricity supply company.	13.333,33	USD / u
Equipment to carry out the measurement, including electronic combined active-reactive meter, according to the requirement of the electric company.	7.777,78	USD / u
CONCRETE 3000 PSI-(B)	333,33	USD / m3
Metallic structure for equipment support, according to the requirement of the electrical supply company.	0,56	USD / Kg
Material necessary to facilitate the output of new medium voltage line, including grounding, as required by the utility company.	25.000,00	USD / u
Single-pole, medium voltage insulated cable for electrical connection from the electricity supply company's facilities.	25,56	USD / m
Documentation to be submitted to the electricity supply company	2.222,22	USD / u
Concrete prism 0,50x0,40m, with six ducts D110mm	105,56	USD / m
Chest for laying the supply line	333,33	USD / u
DOUBLE GROUP TRACTION SUBSTATION 1.5 MW	1.237.166,13	USD / u
Modular building for substation	55.555,56	USD / u
Cell and line finish protection	36.666,67	USD / u

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER	Price	Unit
Transformer-rectifier unit protection cubicle	18.333,33	USD / u
Auxiliary service transformer protection cubicle	18.333,33	USD / u
Measuring cell	12.222,22	USD / u
1600 kVA encapsulated dry rectifier group transformer	100.000,00	USD / u
Auxiliary Services Transformer, dry encapsulated, 160 kVA	8.888,89	USD / u
Transformer for 3 kV network, dry encapsulated, 250 kVA.	15.555,56	USD / u
Surge protection system and current balancing between group transformer secondary	55.555,56	USD / u
Cell with 1500 kW twelve-pulse rectifier	61.111,11	USD / u
Cell with bipolar group switch	44.444,44	USD / u
Cell with extra-fast feeder output circuit breaker	72.222,22	USD / u
Cell with extra fast by-pass circuit breaker	72.222,22	USD / u
Single-pole internal feeder outlet switch	5.555,56	USD / u
Return Cell	50.000,00	USD / u
Indoor self-checking lightning arrester for feed output protection	5.555,56	USD / u
Lighting and power installation	3.333,33	USD / u
Ventilation and air conditioning installation	5.000,00	USD / u
General low-voltage electrical panel	9.444,44	USD / u
Lighting and power switchboard	6.666,67	USD / u
Electric panel for ventilation and air conditioning	2.222,22	USD / u
Rectifier, inverter and 110 V d.c. electric panel	25.555,56	USD / u
Electrical panel for essential services in 120 V a.c.	3.222,22	USD / u
Bilge pump	1.333,33	USD / u
Remote control panel for catenary switches	11.111,11	USD / u
Local Control Station in substation	11.111,11	USD / u
Master PLC. Includes power supply and communication modules as well as I/O modules.	6.666,67	USD / u
Auxiliary PLC. It includes power supply and communication modules as well as I/O modules.	5.555,56	USD / u
Remote substation creep protection equipment with up to three collaterals	16.666,67	USD / u
Multimode Switch 3 RJ45 / 2FO.	1.444,44	USD / u
Supply and Laying of 8 o.f. Multimode Fiber Optic Cable	11,11	USD / u
Software licenses.	22.222,22	USD / u
Internal wiring of the substation and trays	33.333,33	USD / u
Equipment for carrying out the grounding	20.000,00	USD / u
Fire detection and extinguishing equipment	20.000,00	USD / u
Safety equipment and first aid	4.444,44	USD / u
Final work documentation.	5.555,56	USD / u
Tooling and maintenance equipment.	5.555,56	USD / u
Concrete fck 28MPa in slabs, in slab track formation	83,33	USD / u
DOUBLE GROUP TRACTION SUBSTATION 1 MW	1.143.999,54	USD / u
Modular building for substation	55.555,56	USD / u
Cell and line finish protection	36.666,67	USD / u
Transformer-rectifier unit protection cubicle	18.333,33	USD / u
Auxiliary service transformer protection cubicle	18.333,33	USD / u
Measuring cell	12.222,22	USD / u
Rectifier Group Transformer, dry encapsulated, 1250 kVA.	77.777,78	USD / u
Auxiliary Services Transformer, dry encapsulated, 160 kVA	8.888,89	USD / u
Transformer for 3 kV network, dry encapsulated, 250 kVA.	15.555,56	USD / u
Surge protection system and current balancing between group transformer secondary	55.555,56	USD / u

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER	Price	Unit
Cell with 1000 kW twelve-pulse rectifier	38.888,89	USD / u
Cell with bipolar group switch	44.444,44	USD / u
Cell with extra-fast feeder output circuit breaker	72.222,22	USD / u
Cell with extra fast by-pass circuit breaker	72.222,22	USD / u
Single-pole internal feeder outlet switch	5.555,56	USD / u
Return Cell	50.000,00	USD / u
Indoor self-checking lightning arrester for feed output protection	5.555,56	USD / u
Lighting and power installation	3.333,33	USD / u
Ventilation and air conditioning installation	5.000,00	USD / u
General low-voltage electrical panel	9.444,44	USD / u
Lighting and power switchboard	6.666,67	USD / u
Electric panel for ventilation and air conditioning	2.222,22	USD / u
Rectifier, inverter and 110 V d.c. electric panel	25.555,56	USD / u
Electrical panel for essential services in 120 V a.c.	3.222,22	USD / u
Remote control panel for catenary switches	11.111,11	USD / u
Bilge pump	1.333,33	USD / u
Local Control Station in substation	11.111,11	USD / u
Master PLC. Includes power supply and communication modules as well as I/O modules.	6.666,67	USD / u
Auxiliary PLC. It includes power supply and communication modules as well as I/O modules.	5.555,56	USD / u
Remote substation creep protection equipment with up to three collaterals	16.666,67	USD / u
Multimode Switch 3 RJ45 / 2FO.	1.444,44	USD / u
Supply and Laying of 8 o.f. Multimode Fiber Optic Cable	11,11	USD / u
Software licenses.	22.222,22	USD / u
Internal wiring of the substation and trays	33.333,33	USD / u
Equipment for carrying out the grounding	20.000,00	USD / u
Fire detection and extinguishing equipment	20.000,00	USD / u
Safety equipment and first aid	4.444,44	USD / u
Final work documentation.	5.555,56	USD / u
Tooling and maintenance equipment.	5.555,56	USD / u
Concrete fck 28MPa in slabs, in slab track formation	83,33	USD / u
DOUBLE GROUP TRACTION SUBSTATION 1 MW FOR DEPOT	1.248.944,36	USD / u
Modular building for substation	55.555,56	USD / u
Cell and line finish protection	36.666,67	USD / u
Transformer-rectifier unit protection cubicle	18.333,33	USD / u
Auxiliary service transformer protection cubicle	18.333,33	USD / u
Measuring cell	12.222,22	USD / u
Rectifier Group Transformer, dry encapsulated, 1250 kVA.	77.777,78	USD / u
Auxiliary Services Transformer, dry encapsulated 1000 kVA.	138.888,89	USD / u
Surge protection system and current balancing between group transformer secondary	55.555,56	USD / u
Cell with 1000 kW twelve-pulse rectifier	38.888,89	USD / u
Cell with bipolar group switch	44.444,44	USD / u
Cell with extra-fast feeder output circuit breaker	72.222,22	USD / u
Cell with extra fast by-pass circuit breaker	72.222,22	USD / u
Single-pole internal feeder outlet switch	5.555,56	USD / u
Return Cell	50.000,00	USD / u
Indoor self-checking lightning arrester for feed output protection	5.555,56	USD / u
Lighting and power installation	3.333,33	USD / u
Ventilation and air conditioning installation	5.000,00	USD / u

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER	Price	Unit
General low-voltage electrical panel	9.444,44	USD / u
Lighting and power switchboard	6.666,67	USD / u
Electric panel for ventilation and air conditioning	2.222,22	USD / u
Rectifier, inverter and 110 V d.c. electric panel	25.555,56	USD / u
Electrical panel for essential services in 120 V a.c.	3.222,22	USD / u
Remote control panel for catenary switches	11.111,11	USD / u
Bilge pump	1.333,33	USD / u
Local Control Station in substation	11.111,11	USD / u
Master PLC. Includes power supply and communication modules as well as I/O modules.	6.666,67	USD / u
Auxiliary PLC. It includes power supply and communication modules as well as I/O modules.	5.555,56	USD / u
Remote substation creep protection equipment with up to three collaterals	16.666,67	USD / u
Multimode Switch 3 RJ45 / 2FO.	1.444,44	USD / u
Supply and Laying of 8 o.f. Multimode Fiber Optic Cable	11,11	USD / u
Software licenses.	22.222,22	USD / u
Internal wiring of the substation and trays	33.333,33	USD / u
Equipment for carrying out the grounding	20.000,00	USD / u
Fire detection and extinguishing equipment	20.000,00	USD / u
Safety equipment and first aid	4.444,44	USD / u
Final work documentation.	5.555,56	USD / u
Tooling and maintenance equipment.	5.555,56	USD / u
Concrete fck 28MPa in slabs, in slab track formation	83,33	USD / u
STATIONS AND LV CONNECTIONS		
SINGLE CIRCUIT LV ELECTRICAL CONNECTION	33.254,42	USD / u
Cable 1x5 AWG Cu XLPE 600 V	22,22	USD / m
Electronic combined active-reactive counter.	277,78	USD / u
Concrete prism 0,50x0,30m, with three ducts D110mm	88,89	USD / m
Registration box 0,4x0,4x0,50m for electricity	233,33	USD / u
ELECTRICAL INSTALLATIONS AT QUADRUPLE PLATFORM STATIONS	122.622,17	USD / u
Documentation	1.111,11	USD / u
PLC and stop programming	11.111,11	USD / u
Miscellaneous (clock, ...)	6.666,67	USD / u
50 kVA 3 kV line reduction unit	6.666,67	USD / u
Low voltage electrical panel	13.333,33	USD / u
Universal single socket	33,33	USD / u
Lighting. LED system for canopy lighting. IP65.	4.166,67	USD / u
635 CFM helical fan with 10 mm water column. Upper coupling.	333,33	USD / u
3 kW uninterrupted power supply - 60 minutes	7.777,78	USD / u
Bilge pump	1.888,89	USD / u
Wiring at a standstill	2.222,22	USD / u
Ground network	2.222,22	USD / u
ELECTRICAL INSTALLATIONS AT DOUBLE PLATFORM STATIONS	75.199,98	USD / u
Documentation	1.111,11	USD / u
PLC and stop programming	11.111,11	USD / u
Miscellaneous (clock, ...)	6.666,67	USD / u
Low voltage electrical panel	13.333,33	USD / u
Universal single socket	33,33	USD / u

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER			Price	Unit
Lighting. LED system for canopy lighting. IP65.			4.166,67	USD / u
635 CFM helical fan with 10 mm water column. coupling.	Upper		333,33	USD / u
3 kW uninterrupted power supply - 60 minutes			7.777,78	USD / u
Bilge pump			1.888,89	USD / u
Wiring at a standstill			2.222,22	USD / u
Ground network			2.222,22	USD / u
50 kVA 3 kV line reduction unit			6.666,67	USD / u
ELECTRICAL INSTALLATIONS AT SINGLE PLATFORM STATIONS			57.599,99	USD / u
Documentation			1.111,11	USD / u
PLC and stop programming			11.111,11	USD / u
Miscellaneous (clock, ...)			6.666,67	USD / u
Low voltage electrical panel			13.333,33	USD / u
Universal single socket			33,33	USD / u
Lighting. LED system for canopy lighting. IP65.			4.166,67	USD / u
635 CFM helical fan with 10 mm water column. coupling.	Upper		333,33	USD / u
3 kW uninterrupted power supply - 60 minutes			7.777,78	USD / u
Bilge pump			1.888,89	USD / u
Wiring at a standstill			2.222,22	USD / u
Ground network			2.222,22	USD / u
50 kVA 3 kV line reduction unit			6.666,67	USD / u
TRACK ELECTRIFICATION				
CATENARY COMPENSATED ON H POLES			280.873,38	USD / km
150mm Cu ETP circular contact wire ²			18,89	USD / m
Catenary support assembly. Includes suspension and bracket. Consider the double insulation.			611,11	USD / u
Catenary support metal pole grounding			377,78	USD / u
25 mm copper equipotential pendulum assembly ²			38,89	USD / u
Holder made of electrolytic copper wire of 185 mm ²			22,22	USD / m
Grey post. H-240 steel profile with hot galvanized finish. Free height of 7 meters above ground level.			666,67	USD / u
Aluminum-steel guard cable 110 mm ²			5,56	USD / m
Polarized protection for grounding and returns in case of fault			4.444,44	USD / u
CONCRETE 3000 PSI-(B)			333,33	USD / m3
BARE FEEDER CABLE CONSISTING OF DOUBLE COPPER WIRE 450 KCMIL (2X225 MM²)			79.442,36	USD / km
Bare copper cable with a cross-section of 450 kcmil			31,11	USD / m
Material for post feeder support, including insulators, retainers, anchorage tails and catenary connection every 30 m			277,78	USD / u
MOTORISED DISCONNECTION AND REMOTE CONTROL			5.555,56	USD / u
INDEPENDENT COMPENSATION			8.722,22	USD / u
Independent compensation equipment for tensioning of supporting wire and contact wire.			7.500,00	USD / u
Anchor glue with insulators for fastening by means of a cone clamp of supporting wire Cu185 mm ²			277,78	USD / u
Anchor glue with insulators for fastening, by means of cone clamp, of copper contact wire of 150 mm ²			277,78	USD / u
Anchorage tie rod assembly			333,33	USD / u
FIXED ANCHOR POINT			1.722,22	USD / u

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER	Price	Unit
Anchor glue with insulators for fastening by means of a cone clamp of supporting wire Cu185 mm ²	277,78	USD / u
Anchor glue with insulators for fastening, by means of cone clamp, of copper contact wire of 150 mm ²	277,78	USD / u
Anchorage tie rod assembly	333,33	USD / u
CONCRETE 3000 PSI-(B)	333,33	USD / m3
FIXED POINT FOR CATENARY	3.888,87	USD / u
Set of glues to fix the fixed point. Includes insulators and clips for fixing the bracket	2.222,22	USD / u
Anchorage tie rod assembly	333,33	USD / u
CONCRETE 3000 PSI-(B)	333,33	USD / m3
3 KV LINE	16.670,00	USD / km
Cable 1x3x35 mm ² Cu 3/3 kV	16,67	USD / m
DEPOT ELECTRIFICATION		
240 mm ² copper cable with 1.8/3 kV XLPE insulation for catenary supply	50,00	USD / m
240 mm ² copper cable with 1.8/3 kV XLPE insulation for return	50,00	USD / m
Catenary	111.884,44	USD / km
107mm Cu circular contact wire ²	27,78	USD / m
Catenary support assembly. Includes suspension and bracket. Consider the double insulation.	611,11	USD / u
Catenary support metal pole grounding	377,78	USD / u
Grey post. H-240 steel profile with hot galvanized finish. Free height of 7 meters above ground level.	666,67	USD / u
Aluminum-steel guard cable 110 mm ²	5,56	USD / m
Polarized protection for grounding and returns in case of fault	4.444,44	USD / u
CONCRETE 3000 PSI-(B)	333,33	USD / m3
Anchor glue with insulators for fastening by means of a cone clamp of supporting wire Cu185 mm ²	277,78	USD / u
Anchor glue with insulators for fastening, by means of cone clamp, of copper contact wire of 150 mm ²	277,78	USD / u
Anchorage tie rod assembly	333,33	USD / u
Anchor glue with insulators for fastening by means of a cone clamp of supporting wire Cu185 mm ²	1.000,00	USD / u
Anchor glue with insulators for fastening, by means of cone clamp, of copper contact wire of 150 mm ²	755,56	USD / u
Anchorage tie rod assembly	500,00	USD / u
107mm Cu circular contact wire ²	22,22	USD / m
DEPOT EQUIPMENT		
INTERMEDIATE INSULATOR ANCHORING POINT	166,67	USD / u
Intermediate insulator in anchor glue	166,67	USD / u
SECTION ISOLATOR	1.666,67	USD / u
Section Isolator	1.666,67	USD / u
WIRING	15,55	USD / m
Supply and installation of control cable type EAPSP 9 x 1 x 1,5 mm ² - Cu. - 0,6 / 1 kV	11,11	USD / m
Supply and installation of power cable 2 x 4 mm ² - Cu. - 0,6 / 1 kV	4,44	USD / m
OTHER FACILITIES	120.927,83	USD / u
Supply and installation of local control panel for switches (up to 12 switches)	22.222,22	USD / u

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER		
	Price	Unit
Supply and assembly of LAT's motorized and remote-controlled switchboard and rudder system	2.222,22	USD / u
Supply and assembly of power supply switch to the in 2,000 A bipolar LAT	555,56	USD / u
Supply and assembly of rudders and manual operation of LAT switches	555,56	USD / u
Supply and assembly of power switch	833,33	USD / u
Supply and installation of voltage detector with voltage display in LAT	1.666,67	USD / u
Supply and installation of a red LED signal that identifies voltage in LAT.	38,89	USD / u
Supply and installation of a green LED signal identifying the absence of voltage on the LAT	388,89	USD / u
Supply and assembly of grounding pole	1.333,33	USD / u
Supply and installation of key interlocking panel	777,78	USD / u
Supply and installation of switchboard and wiring for LED light supply	11.111,11	USD / u
Supply and installation of control panel and wiring for the interlocking system	9.444,44	USD / u
Supply, assembly and integration (programming) of the local control panel of disconnectors in SCADA	8.333,33	USD / u
Supply, assembly and integration (programming) of the safety interlocking system into the SCADA	3.888,89	USD / u
Supply and installation of emergency traction release system for depots and workshops	11.111,11	USD / u
SIGNALLING SYSTEMS		
RAIL SIGNALLING		
IN-LINE INTERLOCKING SIGNALLING	1.400.000,00	USD / u
DEPOT INTERLOCKING SIGNALLING	1.400.000,00	USD / u
RAILWAY PROTECTION		
ON-TRACK EQUIPMENT	180.000,00	USD / km
ON-BOARD EQUIPMENT	80.000,00	USD / u
ROAD SIGNS		
PEDESTRIAN WALKWAY CONFIGURATION	10.000,00	USD / u
LEVEL CROSSINGS WITH BARRIER AND CROSSING CONDITIONING	60.000,00	USD / u
SYSTEMS AND COMMUNICATIONS		
OPTICAL FIBER		
Single-mode O.F. cable	8.333,33	USD / km
Modular O.F. distributor	5.388,89	USD / u
Cable head termination 64 O.F.	1.196,67	USD / u
1 O.F. splice	44,44	USD / u
1 O.F. connection	83,33	USD / u
1 O.F. bi-directional reflectometric measurement	50,00	USD / u
Fiber monitoring system	111.111,11	USD / u
FIXED COMMUNICATIONS NETWORK		
Copper UTP wiring	5,56	USD / m
Station/Substation Switch (level 2)	13.333,33	USD / u
Level 3 switch	20.277,78	USD / u
Copper distributor	227,78	USD / u
19" rack cabinet	2.000,00	USD / u
Integrated Service Network Configuration	3.333,33	USD / u

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER		
Central server for network management and communications	16.666,67	USD / u
WIFI		
WIFI infrastructure	446.667,00	USD / u
TETRA		
TETRA infrastructure	95.785,44	USD / km
TRAVELER INFORMATION SYSTEM (SIV)		
Terminal stop	6.333,33	USD / u
Local server stop indicators	2.508,89	USD / u
42" hall monitor.	3.213,33	USD / u
Central system	153.333,33	USD / u
MEGAPHONE		
Speaker, power amplifier, local server	22.222,22	USD / u
Central system	111.111,11	USD / u
TICKETS		
Vending machine	40.000,00	USD / u
Cancellation machine	20.000,00	USD / u
Central system	220.000,00	USD / u
Vending machine software development	110.000,00	USD / u
Cancellation software development	110.000,00	USD / u
TELEPHONY AND INTERCOM		
IP Intercom	694,44	USD / u
IP Phone	227,78	USD / u
Quadrangular distribution	2.824,44	USD / u
Central system	55.555,56	USD / u
CHRONOMETRY		
NTP PoE Clock	3.000,00	USD / u
Central Time Server	9.111,11	USD / u
Time Zone	1.333,33	USD / u
GPS antenna	944,44	USD / u
CCTV		
Outdoor fixed camera	5.000,00	USD / u
Recorder station	16.666,67	USD / u
Central system	111.111,11	USD / u
CCTA		
CCTA module	2.777,78	USD / u
SAE		
Central SAFs	222.222,22	USD / u
CENTRAL CONTROL STATION (PCC)		
Videowall	333.333,33	USD / u
LAN Network	111.111,11	USD / u
Operator PC	2.666,67	USD / u
Communication cabinets	3.333,33	USD / u
5m UTP copper cabling	38,89	USD / m
15m UTP copper cabling	50,00	USD / m
Installation, configuration, testing and commissioning of the PMC	22.222,22	USD / u
URBAN INTEGRATION		
URBAN INTEGRATION LUMP ITEM	280.000,00	USD / km
POSSIBLE INTERMODAL STATION LUMP ITEM	100.000,00	USD / u
RESTORATION OF HISTORICAL HERITAGE		
RESTORATION OF HISTORICAL HERITAGE LUMP ITEM	12.500.000,00	USD / PA
AFFECTED SERVICES AND REPLACEMENT		
AFFECTED SERVICES AND REPLACEMENT LUMP ITEM	6.292.424,63	USD / %

FEASIBILITY STUDY ELECTRIC TRAIN - INCOFER		
	Price	Unit
QUALITY CONTROL		
QUALITY CONTROL LUMP ITEM	6.292.424,63	USD / %
WASTE MANAGEMENT		
WASTE MANAGEMENT LUMP ITEM	6.292.424,63	USD / %
HEALTH AND SAFETY		
HEALTH AND SAFETY LUMP ITEM	6.292.424,63	USD / %
INDIRECT COSTS		
CONTINGENCIES, ADMINISTRATION AND UTILITY	6.827.280,72	USD / %
ROLLING STOCK		
DOUBLE COMPOSITION ELECTRIC TRAIN	5.800.000,00	USD / u
DESIGN AND IMPLEMENTATION		
BASIC ENGINEERING AND FINAL DESIGNS	7.578.281,60	USD / %
CONSTRUCTION SUPERVISION	12.102.281,60	USD / %
PROJECT MANAGEMENT	12.102.281,60	USD / %
GRANTOR COST CONTINGENCIES IN THE CONSTRUCTION PHASE	12.102.281,60	USD / %
SEVRI		
COSTS ASSOCIATED WITH THE SPECIFIC RISK ASSESSMENT SYSTEM	12.896.852,72	USD / %
LANDS		
LAND ACQUISITION	1,00	USD
CONSTRUCTION ACQUISITION	1,00	USD
ACQUISITION RISK PROVISION	629.828,18	USD / %
ENVIRONMENTAL AND SOCIAL MEASURES		
ENVIRONMENTAL MEASURES	5.000.000,00	USD / PA
SOCIAL MEASURES	5.000.000,00	USD / PA

Table 184. Unit prices of the units of work used.

ANNEX II: CAPEX BY LINES

1 CAPEX OF LINE 1

CAPEX	AMOUNT	PROPORTION
INFRASTRUCTURES AND SYSTEMS	195.118.995 USD	48,28%
INDIRECT COSTS	21.463.089 USD	5,31%
ROLLING STOCK	150.800.000 USD	37,31%
DESIGN AND IMPLEMENTATION	23.783.656 USD	5,88%
RISK ASSESSMENT SYSTEM	1.955.829 USD	0,48%
LAND	7.842.224 USD	1,94%
ENVIRONMENTAL AND SOCIAL MEASURES	3.200.000 USD	0,79%
TOTAL	404.163.793 USD	

Table 185. CAPEX of Line 1.

1.1 Infrastructure and systems

INFRASTRUCTURES AND SYSTEMS	AMOUNT	PROPORTION
PRELIMINARY WORKS	5.623.929 USD	2,88%
STRUCTURES	15.379.180 USD	7,88%
PLATFORM AND TRACK SUPERSTRUCTURE	58.074.998 USD	29,76%
STATIONS	10.477.850 USD	5,37%
DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	11.195.844 USD	5,74%
DRAINAGE	4.212.733 USD	2,16%
ELECTRIFICATION	26.659.661 USD	13,66%
SIGNALLING SYSTEMS	26.363.000 USD	13,51%
SYSTEMS AND COMMUNICATIONS	11.387.979 USD	5,84%
URBAN INTEGRATION	7.958.000 USD	4,08%
RESTORATION OF HISTORICAL HERITAGE	2.500.000 USD	1,28%
AFFECTED SERVICES AND REPLACEMENT	9.890.825 USD	5,07%
QUALITY ASSURANCE	1.798.332 USD	0,92%
WASTE MANAGEMENT	899.166 USD	0,46%
HEALTH AND SAFETY	2.697.498 USD	1,38%
TOTAL INFRASTRUCTURE AND SYSTEMS	195.118.995 USD	

Table 186. CAPEX of Line 1: Infrastructure and systems.

1.1.1 Preliminary works

PRELIMINARY WORKS	MEASUREMENT	UNIT	PRICE	AMOUNT
TOPOGRAPHIC CAMPAIGN				273.900 USD
Topographical Campaign's Raised Item	2.739,00	ha	100,00	273.900 USD
GEOTECHNICAL CAMPAIGN				427.029 USD
Mobilization and demobilization of equipment and personnel to the area of operation	6,00	u	1.000,00	6.000 USD
Moving drilling machinery between geotechnical boreholes	85,00	u	100,00	8.500 USD
Vertical drilling with continuous core extraction in all types of terrain	1.689,03	m	155,00	261.800 USD
Unchanged sample taking	339,00	u	40,00	13.560 USD
SPT (Standard Penetration Test)	339,00	u	40,00	13.560 USD
Wax sampling on rock barrel	42,00	u	5,00	210 USD
Boxes of plastic or waxed cardboard for storing core material obtained by rotary drilling	562,00	u	3,00	1.686 USD
Polling testimony, photo reportage and final records	1.689,03	m	3,00	5.067 USD
PVC grooved tube, for measuring water levels	105,56	m	10,00	1.056 USD
Measurement of groundwater levels	15,84	u	5,00	79 USD
Water sampling in drilling	4,22	u	15,00	63 USD
Dynamic Penetration DPSH/Blast	701,08	m	15,00	10.516 USD
Geophysical research	1.547,20	m	14,00	21.661 USD
Mechanical (Backhoe) tiling up to 3-4m	44,00	u	175,00	7.700 USD
Unaltered sampling in calcite by means of a waxed block	44,00	u	100,00	4.400 USD
Laboratory	20,00	%	3.558,58	71.172 USD
TRANSIT DEVIATIONS				1.367.500 USD
Lifting of transit deviations	27,35	km	50.000,00	1.367.500 USD
DEVIATION AND PROTECTION OF NETWORKS				1.367.500 USD
Raised departure of deviation and protection of networks	27,35	km	50.000,00	1.367.500 USD
CLEANING, REMOVALS AND DEMOLITIONS				2.188.000 USD
Lift off for cleaning, track removal and dismantling	27,35	km	80.000,00	2.188.000 USD
TOTAL PRELIMINARY WORK				5.623.929 USD

Table 187. CAPEX of Line 1: Preliminary works.

1.1.2 Structures

STRUCTURES	MEASUREMENT	UNIT	PRICE	AMOUNT
BRIDGES				5.802.205 USD
Deck (width 9m) prefabricated double t-beam depth 0,60m	173,38	m	3.430,40	594.763 USD
Deck (width 11m) prefabricated double t-beam depth 0,60m	10,25	m	4.128,28	42.315 USD
Deck (width 9m) prefabricated double t-beam depth 0,90m	39,48	m	3.936,80	155.425 USD
Deck (width 9m) prefabricated double t-beam depth 1,20m	0,00	m	4.443,16	0 USD
Deck (width 11m) prefabricated double t-beam depth 1,20m	60,65	m	5.394,23	327.160 USD
Deck (width 9m) prefabricated double t-beam depth 1,40m	28,07	m	4.780,76	134.196 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	0,00	m	5.202,72	0 USD
Bridge pier	23,50	m	1.976,66	46.452 USD
Bridge pier foundation	4,00	u	11.482,55	45.930 USD
Stirrup	36,00	u	74.583,71	2.685.014 USD
Other	22,00	u	23.800,00	523.600 USD
Single track bridge renovation	170,87	m2	7.300,00	1.247.351 USD
VIADUCTS				6.175.872 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	515,00	m	5.202,72	2.679.401 USD
Deck (width 11m) prefabricated double t-beam depth 1,65m	300,00	m	6.343,68	1.903.104 USD
Viaduct pier	122,00	m	3.573,23	435.934 USD
Viaduct pier foundation	23,00	u	11.482,55	264.099 USD
Stirrup	4,00	u	74.583,71	298.335 USD
Other	25,00	u	23.800,00	595.000 USD
CUT&COVER				0 USD
Demolition	0,00	km	200.000,00	0 USD
Screen wall	0,00	km	7.500.000,00	0 USD
Top slab	0,00	km	3.200.000,00	0 USD
Urbanization	0,00	km	2.400.000,00	0 USD
Interior excavation	0,00	km	2.400.000,00	0 USD
Bottom slab	0,00	km	2.400.000,00	0 USD
WALLS				3.401.103 USD
Concrete wall	6.106,00	m	557,01	3.401.103 USD
TOTAL STRUCTURES				15.379.180 USD

Table 188. CAPEX of Line 1: Structures.

1.1.3 Platform and track superstructure

PLATFORM AND TRACK SUPERSTRUCTURE	MEASUREMENT	UNIT	PRICE	AMOUNT
BALLAST TRACK				36.021.609 USD
Ballasted track on vignole rail	0,00	km	1.762.810,41	0 USD
Single ballast track on vignole rail	0,00	km	915.965,29	0 USD
Fenced ballasted track on vignole rail	17,74	km	2.030.530,41	36.021.609 USD
Fenced single ballast track on vignole rail	0,00	km	1.183.685,29	0 USD
SLAB TRACK				18.259.832 USD
Slab track on vignole rail	3,60	km	2.021.288,51	7.276.639 USD
Single slab track on vignole rail	0,00	km	1.018.259,59	0 USD
Slab track at station on vignole rail	1,60	km	1.866.874,51	2.986.999 USD
Slab track on throat rail	1,77	km	1.483.904,23	2.626.510 USD
Single slab track on throat rail	0,00	km	749.567,12	0 USD
Fenced slab track on vignole rail	1,63	km	2.289.008,51	3.731.084 USD
Fenced single slab track on vignole rail	0,14	km	1.285.979,59	180.037 USD
Slab track viaduct on vignole rail	0,82	km	1.778.734,51	1.458.562 USD
Slab track Cut&Cover on vignole rail	0,00	km	2.404.754,51	0 USD
TRACK EQUIPMENT				3.793.557 USD
Bretelle	7,00	u	425.000,00	2.975.000 USD
Escapes	2,00	u	182.380,43	364.761 USD
Deviations	4,00	u	97.015,85	388.063 USD
End of track	4,00	u	16.433,12	65.732 USD
TOTAL PLATFORM AND TRACK SUPERSTRUCTURE				58.074.998 USD

Table 189. CAPEX of Line 1: Platform and track superstructure.

1.1.4 Stations

STATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
STATION TYPE (SIDE PLATFORMS)	13,00	u	747.554,72	9.718.211 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal canopy structure	10,40	u	57.000,00	592.800 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	1,00	u	22.670,72	22.671 USD
STATION TYPE (CENTRAL PLATFORM)	2,00	u	379.819,36	759.639 USD
90 m platform with access ramps	1,00	u	60.000,00	60.000 USD
10 m metal canopy structure	5,20	u	57.000,00	296.400 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	0,50	u	22.670,72	11.335 USD
INTERMODAL STATION	0,00	u	909.638,72	0 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal structure canopy	10,40	u	57.000,00	592.800 USD
4 m metal canopy structure	5,00	u	30.000,00	150.000 USD
Urbanization	1.200,00	m2	20,14	24.168 USD
Equipment	1,00	u	22.670,72	22.671 USD

UNIQUE STATION	0,00	u	8.000.000,00	0 USD
Station	1,00	u	5.500.000,00	5.500.000 USD
OCC equipment	1,00	u	1.000.000,00	1.000.000 USD
Urbanization	1,00	u	1.500.000,00	1.500.000 USD
TOTAL STATIONS	10.477.850 USD			

Table 190. CAPEX of Line 1: Stations.

1.1.5 Depots, workshops and administrative buildings

DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	MEASUREMENT	UNIT	PRICE	AMOUNT
PARAÍSO	1,00	u		11.195.844 USD
Esplanade generation				504.769 USD
Clearing of land	36.100,00	m2	1,09	39.349 USD
Excavation	43.500,00	m3	4,04	175.740 USD
Filling	34.000,00	m3	8,52	289.680 USD
Administrative building				544.471 USD
Foundations and structures	3.120,00	m3	57,94	180.773 USD
Roofs, facades, partitions and coatings	3.120,00	m3	67,16	209.539 USD
Facilities	3.120,00	m3	49,41	154.159 USD
Workshop and depot building				6.100.391 USD
Foundations and structures	101.928,00	m3	33,94	3.459.436 USD
Roofs, facades, partitions and coatings	101.928,00	m3	14,01	1.428.011 USD
Facilities	101.928,00	m3	11,90	1.212.943 USD
Maintenance facilities				833.000 USD
Elevated platforms	2,00	u	108.000,00	216.000 USD
Automatic washing plant	1,00	u	260.000,00	260.000 USD
Sandbox system	1,00	u	340.000,00	340.000 USD
Furniture	1,00	u	17.000,00	17.000 USD
Urbanization				727.054 USD
Pavements, paving and finishes	36.100,00	m2	6,19	223.459 USD
Drainage	36.100,00	m2	7,31	263.891 USD
Network of hydrants	36.100,00	m2	0,65	23.465 USD
Lighting	36.100,00	m2	2,83	102.163 USD
Connections	36.100,00	m2	3,16	114.076 USD
Track				2.486.159 USD
Slab track in road traffic areas	3.105,00	m	310,34	963.606 USD
Deviations	14,00	u	97.015,85	1.358.222 USD
End of track	10,00	u	16.433,12	164.331 USD
TOTAL DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	11.195.844 USD			

Table 191. CAPEX of Line 1: Depots, workshops and administrative buildings.

1.1.6 Drainage

DRAINAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
TRANSVERSE DRAINAGE				694.461 USD
Frame 3mx2m	3,00	u	33.155,86	99.468 USD
Frame 5mx2,5m	6,00	u	54.015,69	324.094 USD
Frame 7mx3m	3,00	u	90.299,60	270.899 USD
LONGITUDINAL DRAINAGE				3.518.272 USD
Trapezoidal 1,00mx0,50m	36,16	km	63.641,19	2.301.265 USD
Circular diameter 0,40m	9,22	km	112.823,58	1.040.233 USD
Rectangular 0,50mx0,50m	3,02	km	58.534,25	176.773 USD
TOTAL DRAINAGE				4.212.733 USD

Table 192. CAPEX of Line 1: Drainage.

1.1.7 Electrification

ELECTRIFICATION	MEASUREMENT	UNIT	PRICE	AMOUNT
MV SUBSTATIONS AND CONNECTIONS				11.954.757 USD
MV electrical connection	8,00	u	313.935,34	2.511.483 USD
Double group traction substation 1.5 MW	2,00	u	1.237.166,13	2.474.332 USD
Double group traction substation 1 MW	5,00	u	1.143.999,54	5.719.998 USD
Double group traction substation 1 MW for parking	1,00	u	1.248.944,36	1.248.944 USD
STOPS AND LV CONNECTIONS				1.591.616 USD
Single circuit LV electrical connection	15,00	u	33.254,42	498.816 USD
Electrical installations at quadruple platform stops	0,00	u	122.622,17	0 USD
Electrical installations at double platform stops	13,00	u	75.199,98	977.600 USD
Electrical installations at single platform stops	2,00	u	57.599,99	115.200 USD
TRACK ELECTRIFICATION				12.501.479 USD
Catenary compensated on h poles	27,31	km	280.873,38	7.670.652 USD
Bare feeder cable consisting of double copper wire 450 kcmil (2x225 mm ²)	27,31	km	79.442,36	2.169.571 USD
Motorized disconnection and remote control	83,00	u	5.555,56	461.111 USD
Independent compensation	164,00	u	8.722,22	1.430.444 USD
Fixed anchor point	20,00	u	1.722,22	34.444 USD
Fixed point for catenary	72,00	u	3.888,87	279.999 USD
3 KV line	27,31	km	16.670,00	455.258 USD
DEPOT ELECTRIFICATION				454.219 USD
240 mm ² copper cable with 1.8/3 kv XLPE insulation for catenary supply	850,00	m	50,00	42.500 USD
240 mm ² copper cable with 1.8/3 kv XLPE insulation for return	850,00	m	50,00	42.500 USD
Catenary	3,30	km	111.884,44	369.219 USD

DEPOT EQUIPMENT				157.590 USD
Intermediate insulator anchoring point	10,00	u	166,67	1.667 USD
Section isolator	14,00	u	1.666,67	23.333 USD
Wiring	750,00	m	15,55	11.663 USD
Other facilities	1,00	u	120.927,83	120.928 USD
TOTAL ELECTRIFICATION				26.659.661 USD

Table 193. CAPEX of Line 1: Electrification.

1.1.8 Signaling systems

SIGNALLING SYSTEMS	MEASUREMENT	UNIT	PRICE	AMOUNT
RAIL SIGNALLING				12.600.000 USD
In-line interlocking signaling	8,00	u	1.400.000,00	11.200.000 USD
Depot interlocking signaling	1,00	u	1.400.000,00	1.400.000 USD
RAILWAY PROTECTION				9.083.000 USD
On-track equipment	27,35	km	180.000,00	4.923.000 USD
On-board equipment	52,00	u	80.000,00	4.160.000 USD
ROAD SIGNS				4.680.000 USD
Pedestrian walkway configuration	30,00	u	10.000,00	300.000 USD
Level crossings with barrier and crossing conditioning	73,00	u	60.000,00	4.380.000 USD
TOTAL SIGNALLING SYSTEMS				26.363.000 USD

Table 194. CAPEX of Line 1: Signaling systems.

1.1.9 Systems and communications

SYSTEMS AND COMMUNICATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
OPTICAL FIBER				670.358 USD
Single-mode F.O. cable	30,09	km	8.333,33	250.750 USD
Modular F.O. distributor	24,00	u	5.388,89	129.333 USD
Cable head termination 64 F.O.	48,00	u	1.196,67	57.440 USD
1 F.O. splice	1.536,00	u	44,44	68.260 USD
1 F.O. connection	1.536,00	u	83,33	127.995 USD
1 F.O. bi-directional reflectometric measurement	20,48	u	50,00	1.024 USD
Fiber monitoring system	0,32	u	111.111,11	35.556 USD
FIXED COMMUNICATIONS NETWORK				553.930 USD
Copper UTP wiring	4.200,00	m	5,56	23.352 USD
Station/Substation Switch (level 2)	25,00	u	13.333,33	333.333 USD
Level 3 switch	2,56	u	20.277,78	51.911 USD
Copper distributor	24,00	u	227,78	5.467 USD
19" rack cabinet	24,00	u	2.000,00	48.000 USD
Integrated Service Network Configuration	27,56	u	3.333,33	91.867 USD
Central server for management and communications	0,00	u	16.666,67	0 USD
WIFI				142.933 USD

WIFI infrastructure	0,32	u	446.667,00	142.933 USD
TETRA				2.619.732 USD
TETRA infrastructure	27,35	km	95.785,44	2.619.732 USD
TRAVELER INFORMATION SYSTEM (SIV)				531.340 USD
Terminal stop	56,00	u	6.333,33	354.666 USD
Local server stop indicators	15,00	u	2.508,89	37.633 USD
42" hall monitor.	28,00	u	3.213,33	89.973 USD
Central system	0,32	u	153.333,33	49.067 USD
MEGAPHONE				368.889 USD
Speaker, power amplifier, local server	15,00	u	22.222,22	333.333 USD
Central system	0,32	u	111.111,11	35.556 USD
TICKETS				5.740.800 USD
Vending machine	56,00	u	40.000,00	2.240.000 USD
Cancellation machine	168,00	u	20.000,00	3.360.000 USD
Central system	0,32	u	220.000,00	70.400 USD
Vending machine software development	0,32	u	110.000,00	35.200 USD
Cancellation software development	0,32	u	110.000,00	35.200 USD
TELEPHONY AND INTERCOM				48.220 USD
IP Intercom	56,00	u	694,44	38.889 USD
IP Phone	37,00	u	227,78	8.428 USD
Quadrangular distribution	0,32	u	2.824,44	904 USD
Central system	0,00	u	55.555,56	0 USD
CHRONOMETRY				84.000 USD
NTP PoE Clock	28,00	u	3.000,00	84.000 USD
Central Time Server	0,00	u	9.111,11	0 USD
Time Zone	0,00	u	1.333,33	0 USD
GPS antenna	0,00	u	944,44	0 USD
CCTV				515.000 USD
Outdoor fixed camera	53,00	u	5.000,00	265.000 USD
Recorder station	15,00	u	16.666,67	250.000 USD
Central system	0,00	u	111.111,11	0 USD
CCTA				41.667 USD
CCTA module	15,00	u	2.777,78	41.667 USD
SAE				71.111 USD
Central SAFs	0,32	u	222.222,22	71.111 USD
CENTRAL CONTROL STATION (PCC)				0 USD
Videowall	0,00	u	333.333,33	0 USD
LAN Network	0,00	u	111.111,11	0 USD
Operator PC	0,00	u	2.666,67	0 USD
Communication cabinets	0,00	u	3.333,33	0 USD
5m UTP copper cabling	0,00	m	38,89	0 USD
15m UTP copper cabling	0,00	m	50,00	0 USD
Installation, configuration, testing and commissioning of the PMC	0,00	u	22.222,22	0 USD
TOTAL SYSTEMS AND COMMUNICATIONS				11.387.979 USD

Table 195. CAPEX of Line 1: Systems and communications.

1.1.10 Urban integration

URBAN INTEGRATION	MEASUREMENT	UNIT	PRICE	AMOUNT
A LUMP SUM FOR URBAN INTEGRATION	27,35	km	280.000,00	7.658.000 USD
A LUMP SUM FOR POSSIBLE INTERMODAL STATION	3,00	u	100.000,00	300.000 USD
TOTAL URBAN INTEGRATION	7.958.000 USD			

Table 196. CAPEX of Line 1: Urban integration.

1.1.11 Restoration of historical heritage

RESTORATION OF HISTORICAL HERITAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
A LUMP SUM FOR THE REHABILITATION OF HISTORICAL HERITAGE	0,20	PA	12.500.000	2.500.000 USD
TOTAL REHABILITATION OF HISTORICAL HERITAGE PROPERTIES	2.500.000 USD			

Table 197. CAPEX of Line 1: Restoration of historical heritage.

1.1.12 Affected services and replacements

AFFECTED SERVICES AND REPLACEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM FOR AFFECTED SERVICES AND REPLENISHMENT	5,50	%	1.798.331,75	9.890.825 USD
TOTAL AFFECTED SERVICES AND REPLACEMENT	9.890.825 USD			

Table 198. CAPEX of Line 1: Affected services and replacements.

1.1.13 Quality control

QUALITY ASSURANCE	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF QUALITY CONTROL	1,00	%	1.798.331,75	1.798.332 USD
TOTAL QUALITY CONTROL	1.798.332 USD			

Table 199. CAPEX of Line 1: Quality control.

1.1.14 Waste management

WASTE MANAGEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF WASTE MANAGEMENT	0,50	%	1.798.331,75	899.166 USD
TOTAL WASTE MANAGEMENT	899.166 USD			

Table 200. CAPEX of Line 1: Waste management.

1.1.15 Health and safety

HEALTH AND SAFETY	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF HEALTH AND SAFETY	1,50	%	1.798.331,75	2.697.498 USD
TOTAL HEALTH AND SAFETY	2.697.498 USD			

Table 201. CAPEX of Line 1: Health and safety.

1.2 Indirect costs

INDIRECT COSTS	MEASUREMENT	UNIT	PRICE	AMOUNT
CONTINGENCIES, ADMINISTRATION AND UTILITY	11,00	%	1.951.189,95	21.463.089 USD
TOTAL INDIRECT COSTS	21.463.089 USD			

Table 202. CAPEX of Line 1: Indirect costs.

1.3 Rolling stock

ROLLING STOCK	MEASUREMENT	UNIT	PRICE	AMOUNT
DOUBLE COMPOSITION ELECTRIC TRAIN	26,00	u	5.800.000,00	150.800.000 USD
TOTAL ROLLING STOCK	150.800.000 USD			

Table 203. CAPEX of Line 1: Rolling stock.

1.4 Design and implementation

DESIGN AND IMPLEMENTATION	MEASUREMENT	UNIT	PRICE	AMOUNT
BASIC ENGINEERING AND FINAL DESIGNS	2,50	%	2.165.820,84	5.414.552 USD
CONSTRUCTION SUPERVISION	3,50	%	3.673.820,84	12.858.373 USD
PROJECT MANAGEMENT	0,50	%	3.673.820,84	1.836.910 USD
COST CONTINGENCIES OF THE GRANTOR IN THE CONSTRUCTION PHASE	1,00	%	3.673.820,84	3.673.821 USD
TOTAL DESIGN AND IMPLEMENTATION	23.783.656 USD			

Table 204. CAPEX of Line 1: Design and implementation.

1.5 SEVRI

SEVRI	MEASUREMENT	UNIT	PRICE	AMOUNT
COSTS ASSOCIATED WITH THE SEVRI	0,50	%	3.911.657,40	1.955.829 USD
TOTAL SEVRI	1.955.829 USD			

Table 205. CAPEX of Line 1: SEVRI.

1.6 Land

LAND	MEASUREMENT	UNIT	PRICE	AMOUNT
LAND ACQUISITION	5.481.748	USD	1,00	5.481.748 USD
ACQUISITION OF PROPERTY	1.987.037	USD	1,00	1.987.037 USD
PROCUREMENT RISK PROVISION	5,00	%	74.687,85	373.439 USD
TOTAL LAND	7.842.224 USD			

Table 206. CAPEX of Line 1: Land.

1.7 Environmental and social measures

ENVIRONMENTAL AND SOCIAL MEASURES	MEASUREMENT	UNIT	PRICE	AMOUNT
ENVIRONMENTAL MEASURES	0,32	PA	5.000.000,00	1.600.000 USD
SOCIAL MEASURES	0,32	PA	5.000.000,00	1.600.000 USD
TOTAL ENVIRONMENTAL AND SOCIAL MEASURES	3.200.000 USD			

Table 207. CAPEX of Line 1: Environmental and social measures.

2 CAPEX OF LINE 2

CAPEX	AMOUNT	PROPORTION
INFRASTRUCTURES AND SYSTEMS	206.868.939 USD	50,36%
INDIRECT COSTS	22.755.583 USD	5,54%
ROLLING STOCK	127.600.000 USD	31,06%
DESIGN AND IMPLEMENTATION	23.601.839 USD	5,75%
RISK ASSESSMENT SYSTEM	1.904.132 USD	0,46%
LAND	25.461.946 USD	6,20%
ENVIRONMENTAL AND SOCIAL MEASURES	2.600.000 USD	0,63%
TOTAL	410.792.439 USD	

Table 208. CAPEX of Line 2.

2.1 Infrastructure and systems

INFRASTRUCTURES AND SYSTEMS	AMOUNT	PROPORTION
PRELIMINARY WORKS	4.462.543 USD	2,16%
STRUCTURES	18.796.282 USD	9,09%
PLATFORM AND TRACK SUPERSTRUCTURE	45.175.027 USD	21,84%
STATIONS	18.422.199 USD	8,91%
DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	33.090.355 USD	16,00%
DRAINAGE	2.897.742 USD	1,40%
ELECTRIFICATION	23.087.952 USD	11,16%
SIGNALLING SYSTEMS	21.546.000 USD	10,42%
SYSTEMS AND COMMUNICATIONS	11.808.517 USD	5,71%
URBAN INTEGRATION	6.376.000 USD	3,08%
RESTORATION OF HISTORICAL HERITAGE	5.000.000 USD	2,42%
AFFECTED SERVICES AND REPLACEMENT	10.486.444 USD	5,07%
QUALITY ASSURANCE	1.906.626 USD	0,92%
WASTE MANAGEMENT	953.313 USD	0,46%
HEALTH AND SAFETY	2.859.939 USD	1,38%
TOTAL INFRASTRUCTURE AND SYSTEMS	206.868.939 USD	

Table 209. CAPEX of Line 2: Infrastructure and systems.

2.1.1 Preliminary works

PRELIMINARY WORKS	MEASUREMENT	UNIT	PRICE	AMOUNT
TOPOGRAPHIC CAMPAIGN				217.550 USD
Topographical Campaign's Raised Item	2.175,50	ha	100,00	217.550 USD
GEOTECHNICAL CAMPAIGN				338.993 USD
Mobilization and demobilization of equipment and personnel to the area of operation	5,00	u	1.000,00	5.000 USD
Moving drilling machinery between geotechnical boreholes	67,00	u	100,00	6.700 USD
Vertical drilling with continuous core extraction in all types of terrain	1.340,11	m	155,00	207.717 USD
Unchanged sample taking	268,00	u	40,00	10.720 USD
SPT (Standard Penetration Test)	268,00	u	40,00	10.720 USD
Wax sampling on rock barrel	34,00	u	5,00	170 USD
Boxes of plastic or waxed cardboard for storing core material obtained by rotary drilling	447,00	u	3,00	1.341 USD
Polling testimony, photo reportage and final records	1.340,11	m	3,00	4.020 USD
PVC grooved tube, for measuring water levels	83,76	m	10,00	838 USD
Measurement of groundwater levels	12,56	u	5,00	63 USD
Water sampling in drilling	3,35	u	15,00	50 USD
Dynamic Penetration DPSH/Blast	556,25	m	15,00	8.344 USD
Geophysical research	1.227,58	m	14,00	17.186 USD
Mechanical (Backhoe) tiling up to 3-4m	35,00	u	175,00	6.125 USD
Unaltered sampling in calcite by means of a waxed block	35,00	u	100,00	3.500 USD
Laboratory	20,00	%	2.824,94	56.499 USD
TRANSIT DEVIATIONS				1.085.000 USD
Lifting of transit deviations	21,70	km	50.000,00	1.085.000 USD
DEVIATION AND PROTECTION OF NETWORKS				1.085.000 USD
Raised departure of deviation and protection of networks	21,70	km	50.000,00	1.085.000 USD
CLEANING, REMOVALS AND DEMOLITIONS				1.736.000 USD
Lift off for cleaning, track removal and dismantling	21,70	km	80.000,00	1.736.000 USD
TOTAL PRELIMINARY WORK				4.462.543 USD

Table 210. CAPEX of Line 2: Preliminary works.

2.1.2 Structures

STRUCTURES	MEASUREMENT	UNIT	PRICE	AMOUNT
BRIDGES				4.818.162 USD
Deck (width 9m) prefabricated double t-beam depth 0,60m	61,02	m	3.430,40	209.323 USD
Deck (width 11m) prefabricated double t-beam depth 0,60m	10,00	m	4.128,28	41.283 USD
Deck (width 9m) prefabricated double t-beam depth 0,90m	32,28	m	3.936,80	127.080 USD
Deck (width 9m) prefabricated double t-beam depth 1,20m	47,27	m	4.443,16	210.028 USD
Deck (width 11m) prefabricated double t-beam depth 1,20m	21,11	m	5.394,23	113.872 USD
Deck (width 9m) prefabricated double t-beam depth 1,40m	50,36	m	4.780,76	240.759 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	109,98	m	5.202,72	572.195 USD
Bridge pier	15,50	m	1.976,66	30.638 USD
Bridge pier foundation	3,00	u	11.482,55	34.448 USD
Stirrup	26,00	u	74.583,71	1.939.176 USD
Other	16,00	u	23.800,00	380.800 USD
Single track bridge renovation	125,83	m2	7.300,00	918.559 USD
VIADUCTS				11.165.220 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	1.578,70	m	5.202,72	8.213.534 USD
Deck (width 11m) prefabricated double t-beam depth 1,65m	0,00	m	6.343,68	0 USD
Viaduct pier	236,50	m	3.573,23	845.069 USD
Viaduct pier foundation	45,00	u	11.482,55	516.715 USD
Stirrup	6,00	u	74.583,71	447.502 USD
Other	48,00	u	23.800,00	1.142.400 USD
CUT&COVER				0 USD
Demolition	0,00	km	200.000,00	0 USD
Screen wall	0,00	km	7.500.000,00	0 USD
Top slab	0,00	km	3.200.000,00	0 USD
Urbanization	0,00	km	2.400.000,00	0 USD
Interior excavation	0,00	km	2.400.000,00	0 USD
Bottom slab	0,00	km	2.400.000,00	0 USD
WALLS				2.812.901 USD
Concrete wall	5.050,00	m	557,01	2.812.901 USD
TOTAL STRUCTURES				18.796.282 USD

Table 211. CAPEX of Line 2: Structures.

2.1.3 Platform and track superstructure

PLATFORM AND TRACK SUPERSTRUCTURE	MEASUREMENT	UNIT	PRICE	AMOUNT
BALLAST TRACK				17.470.839 USD
Ballasted track on vignole rail	0,50	km	1.762.810,41	881.405 USD
Single ballast track on vignole rail	0,00	km	915.965,29	0 USD
Fenced ballasted track on vignole rail	8,17	km	2.030.530,41	16.589.433 USD
Fenced single ballast track on vignole rail	0,00	km	1.183.685,29	0 USD
SLAB TRACK				24.492.887 USD
Slab track on vignole rail	1,21	km	2.021.288,51	2.445.759 USD
Single slab track on vignole rail	0,00	km	1.018.259,59	0 USD
Slab track at station on vignole rail	1,40	km	1.866.874,51	2.613.624 USD
Slab track on throat rail	3,72	km	1.483.904,23	5.520.124 USD
Single slab track on throat rail	0,00	km	749.567,12	0 USD
Fenced slab track on vignole rail	4,80	km	2.289.008,51	10.987.241 USD
Fenced single slab track on vignole rail	0,09	km	1.285.979,59	115.738 USD
Slab track viaduct on vignole rail	1,58	km	1.778.734,51	2.810.401 USD
Slab track Cut&Cover on vignole rail	0,00	km	2.404.754,51	0 USD
TRACK EQUIPMENT				3.211.302 USD
Bretelle	5,00	u	425.000,00	2.125.000 USD
Escapes	4,00	u	182.380,43	729.522 USD
Deviations	3,00	u	97.015,85	291.048 USD
End of track	4,00	u	16.433,12	65.732 USD
TOTAL PLATFORM AND TRACK SUPERSTRUCTURE				45.175.027 USD

Table 212. CAPEX of Line 2: Platform and track superstructure.

2.1.4 Stations

STATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
STATION TYPE (SIDE PLATFORMS)	11,00	u	747.554,72	8.223.102 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal canopy structure	10,40	u	57.000,00	592.800 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	1,00	u	22.670,72	22.671 USD
STATION TYPE (CENTRAL PLATFORM)	1,00	u	379.819,36	379.819 USD
90 m platform with access ramps	1,00	u	60.000,00	60.000 USD
10 m metal canopy structure	5,20	u	57.000,00	296.400 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	0,50	u	22.670,72	11.335 USD
INTERMODAL STATION	2,00	u	909.638,72	1.819.277 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal structure canopy	10,40	u	57.000,00	592.800 USD
4 m metal canopy structure	5,00	u	30.000,00	150.000 USD
Urbanization	1.200,00	m2	20,14	24.168 USD
Equipment	1,00	u	22.670,72	22.671 USD

UNIQUE STATION	1,00	u	8.000.000,00	8.000.000 USD
Station	1,00	u	5.500.000,00	5.500.000 USD
OCC equipment	1,00	u	1.000.000,00	1.000.000 USD
Urbanization	1,00	u	1.500.000,00	1.500.000 USD
TOTAL STATIONS	18.422.199 USD			

Table 213. CAPEX of Line 2: Stations.

2.1.5 Depots, workshops and administrative buildings

DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	MEASUREMENT	UNIT	PRICE	AMOUNT
LAS CAÑAS	1,00	u		33.090.355 USD
Esplanade generation				3.461.599 USD
Clearing of land	48.000,00	m2	1,09	52.320 USD
Excavation	90.400,00	m3	4,04	365.216 USD
Filling	82.500,00	m3	8,52	702.900 USD
Demolition	8.300,00	m2	18,15	150.645 USD
Retaining wall	1.100,00	m	1.991,38	2.190.518 USD
Administrative building				1.557.502 USD
Foundations and structures	8.925,00	m3	57,94	517.115 USD
Roofs, facades, partitions and coatings	8.925,00	m3	67,16	599.403 USD
Facilities	8.925,00	m3	49,41	440.984 USD
Workshop and depot buildings				17.289.468 USD
Foundations and structures	288.880,00	m3	33,94	9.804.587 USD
Roofs, facades, partitions and coatings	288.880,00	m3	14,01	4.047.209 USD
Facilities	288.880,00	m3	11,90	3.437.672 USD
Maintenance facilities				5.462.000 USD
Inspection pit	6,00	u	68.000,00	408.000 USD
Wheel measuring pit	1,00	u	20.500,00	20.500 USD
Spray booth pit	1,00	u	28.500,00	28.500 USD
Bogie turning pit	5,00	u	4.500,00	22.500 USD
Lathe pit	1,00	u	28.500,00	28.500 USD
Crane bridge	3,00	u	160.000,00	480.000 USD
Elevated platforms	4,00	u	108.000,00	432.000 USD
Hydraulic jack system	1,00	u	965.000,00	965.000 USD
Bogie maintenance equipment	1,00	u	570.000,00	570.000 USD
Pit latch	1,00	u	1.300.000,00	1.300.000 USD
Automatic washing plant	1,00	u	260.000,00	260.000 USD
Paint booth	1,00	u	305.000,00	305.000 USD
Sandbox system	1,00	u	340.000,00	340.000 USD
Furniture	1,00	u	17.000,00	17.000 USD
Other vehicles and equipment	1,00	u	285.000,00	285.000 USD

Urbanization				1.133.882 USD
<i>Pavements, paving and finishes</i>	56.300,00	m2	6,19	348.497 USD
<i>Drainage</i>	56.300,00	m2	7,31	411.553 USD
<i>Network of hydrants</i>	56.300,00	m2	0,65	36.595 USD
<i>Lighting</i>	56.300,00	m2	2,83	159.329 USD
<i>Connections</i>	56.300,00	m2	3,16	177.908 USD
Track				4.185.905 USD
<i>Slab track in road traffic areas</i>	5.100,00	m	310,34	1.582.734 USD
<i>Maintenance tracks on pillars</i>	373,00	m	358,61	133.762 USD
<i>Escapes</i>	2,00	u	182.380,43	364.761 USD
<i>Deviations</i>	20,00	u	97.015,85	1.940.317 USD
<i>End of track</i>	10,00	u	16.433,12	164.331 USD
TOTAL DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS				33.090.355 USD

Table 214. CAPEX of Line 2: Depots, workshops and administrative buildings.

2.1.6 Drainage

DRAINAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
TRANSVERSE DRAINAGE				303.234 USD
Frame 3mx2m	1,00	u	33.155,86	33.156 USD
Frame 5mx2,5m	5,00	u	54.015,69	270.078 USD
Frame 7mx3m	0,00	u	90.299,60	0 USD
LONGITUDINAL DRAINAGE				2.594.507 USD
Trapezoidal 1,00mx0,50m	17,34	km	63.641,19	1.103.538 USD
Circular diameter 0,40m	12,80	km	112.823,58	1.444.142 USD
Rectangular 0,50mx0,50m	0,80	km	58.534,25	46.827 USD
TOTAL DRAINAGE				2.897.742 USD

Table 215. CAPEX of Line 2: Drainage.

2.1.7 Electrification

ELECTRIFICATION	MEASUREMENT	UNIT	PRICE	AMOUNT
MV SUBSTATIONS AND CONNECTIONS				10.589.989 USD
MV electrical connection	7,00	u	313.935,34	2.197.547 USD
Double group traction substation 1.5 MW	3,00	u	1.237.166,13	3.711.498 USD
Double group traction substation 1 MW	3,00	u	1.143.999,54	3.431.999 USD
Double group traction substation 1 MW for parking	1,00	u	1.248.944,36	1.248.944 USD
STOPS AND LV CONNECTIONS				1.656.638 USD
Single circuit LV electrical connection	15,00	u	33.254,42	498.816 USD
Electrical installations at quadruple platform stops	1,00	u	122.622,17	122.622 USD
Electrical installations at double platform stops	13,00	u	75.199,98	977.600 USD
Electrical installations at single platform stops	1,00	u	57.599,99	57.600 USD

TRACK ELECTRIFICATION				9.921.486 USD
Catenary compensated on h poles	21,69	km	280.873,38	6.092.144 USD
Bare feeder cable consisting of double copper wire 450 kcmil (2x225 mm2)	21,69	km	79.442,36	1.723.105 USD
Motorized disconnection and remote control	73,00	u	5.555,56	405.556 USD
Independent compensation	126,00	u	8.722,22	1.099.000 USD
Fixed anchor point	22,00	u	1.722,22	37.889 USD
Fixed point for catenary	52,00	u	3.888,87	202.221 USD
3 KV line	21,69	km	16.670,00	361.572 USD
DEPOT ELECTRIFICATION				711.596 USD
240 mm2 copper cable with 1.8/3 kv XLPE insulation for catenary supply	3.300,00	m	50,00	165.000 USD
240 mm2 copper cable with 1.8/3 kv XLPE insulation for return	3.100,00	m	50,00	155.000 USD
Catenary	3,50	km	111.884,44	391.596 USD
DEPOT EQUIPMENT				208.243 USD
Intermediate insulator anchoring point	16,00	u	166,67	2.667 USD
Section isolator	20,00	u	1.666,67	33.333 USD
Wiring	3.300,00	m	15,55	51.315 USD
Other facilities	1,00	u	120.927,83	120.928 USD
TOTAL ELECTRIFICATION				23.087.952 USD

Table 216. CAPEX of Line 2: Electrification.

2.1.8 Signaling systems

SIGNALLING SYSTEMS	MEASUREMENT	UNIT	PRICE	AMOUNT
RAIL SIGNALLING				9.800.000 USD
In-line interlocking signaling	6,00	u	1.400.000,00	8.400.000 USD
Depot interlocking signaling	1,00	u	1.400.000,00	1.400.000 USD
RAILWAY PROTECTION				7.426.000 USD
On-track equipment	21,70	km	180.000,00	3.906.000 USD
On-board equipment	44,00	u	80.000,00	3.520.000 USD
ROAD SIGNS				4.320.000 USD
Pedestrian walkway configuration	30,00	u	10.000,00	300.000 USD
Level crossings with barrier and crossing conditioning	67,00	u	60.000,00	4.020.000 USD
TOTAL SIGNALLING SYSTEMS				21.546.000 USD

Table 217. CAPEX of Line 2: Signaling systems.

2.1.9 Systems and communications

SYSTEMS AND COMMUNICATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
OPTICAL FIBER				611.666 USD
Single-mode F.O. cable	23,87	km	8.333,33	198.917 USD
Modular F.O. distributor	24,00	u	5.388,89	129.333 USD
Cable head termination 64 F.O.	48,00	u	1.196,67	57.440 USD
1 F.O. splice	1.536,00	u	44,44	68.260 USD
1 F.O. connection	1.536,00	u	83,33	127.995 USD
1 F.O. bi-directional reflectometric measurement	16,64	u	50,00	832 USD
Fiber monitoring system	0,26	u	111.111,11	28.889 USD
FIXED COMMUNICATIONS NETWORK				613.376 USD
Copper UTP wiring	4.700,00	m	5,56	26.132 USD
Station/Substation Switch (level 2)	26,00	u	13.333,33	346.667 USD
Level 3 switch	2,08	u	20.277,78	42.178 USD
Copper distributor	24,00	u	227,78	5.467 USD
19" rack cabinet	33,00	u	2.000,00	66.000 USD
Integrated Service Network Configuration	28,08	u	3.333,33	93.600 USD
Central server for network management and communications	2,00	u	16.666,67	33.333 USD
WIFI				116.133 USD
WIFI infrastructure	0,26	u	446.667,00	116.133 USD
TETRA				2.078.544 USD
TETRA infrastructure	21,70	km	95.785,44	2.078.544 USD
TRAVELER INFORMATION SYSTEM (SIV)				569.780 USD
Terminal stop	62,00	u	6.333,33	392.666 USD
Local server stop indicators	15,00	u	2.508,89	37.633 USD
42" hall monitor.	31,00	u	3.213,33	99.613 USD
Central system	0,26	u	153.333,33	39.867 USD
MEGAPHONE				362.222 USD
Speaker, power amplifier, local server	15,00	u	22.222,22	333.333 USD
Central system	0,26	u	111.111,11	28.889 USD
TICKETS				5.914.400 USD
Vending machine	58,00	u	40.000,00	2.320.000 USD
Cancellation machine	174,00	u	20.000,00	3.480.000 USD
Central system	0,26	u	220.000,00	57.200 USD
Vending machine software development	0,26	u	110.000,00	28.600 USD
Cancellation software development	0,26	u	110.000,00	28.600 USD
TELEPHONY AND INTERCOM				110.506 USD
IP Intercom	62,00	u	694,44	43.055 USD
IP Phone	49,00	u	227,78	11.161 USD
Quadrangular distribution	0,26	u	2.824,44	734 USD
Central system	1,00	u	55.555,56	55.556 USD
CHRONOMETRY				106.667 USD
NTP PoE Clock	31,00	u	3.000,00	93.000 USD
Central Time Server	1,00	u	9.111,11	9.111 USD

Time Zone	2,00	u	1.333,33	2.667 USD
GPS antenna	2,00	u	944,44	1.889 USD
CCTV				621.111 USD
Outdoor fixed camera	52,00	u	5.000,00	260.000 USD
Recorder station	15,00	u	16.666,67	250.000 USD
Central system	1,00	u	111.111,11	111.111 USD
CCTA				41.667 USD
CCTA module	15,00	u	2.777,78	41.667 USD
SAE				57.778 USD
Central SAFs	0,26	u	222.222,22	57.778 USD
CENTRAL CONTROL STATION (PCC)				604.667 USD
Videowall	1,00	u	333.333,33	333.333 USD
LAN Network	1,00	u	111.111,11	111.111 USD
Operator PC	23,00	u	2.666,67	61.333 USD
Communication cabinets	15,00	u	3.333,33	50.000 USD
5m UTP copper cabling	300,00	m	38,89	11.667 USD
15m UTP copper cabling	300,00	m	50,00	15.000 USD
Installation, configuration, testing and commissioning of the PMC	1,00	u	22.222,22	22.222 USD
TOTAL SYSTEMS AND COMMUNICATIONS				11.808.517 USD

Table 218. CAPEX of Line 2: Systems and communications.

2.1.10 Urban integration

URBAN INTEGRATION	MEASUREMENT	UNIT	PRICE	AMOUNT
A LUMP SUM FOR URBAN INTEGRATION	21,70	km	280.000,00	6.076.000 USD
A LUMP SUM FOR POSSIBLE INTERMODAL STATION	3,00	u	100.000,00	300.000 USD
TOTAL URBAN INTEGRATION				6.376.000 USD

Table 219. CAPEX of Line 2: Urban integration.

2.1.11 Restoration of historical heritage

RESTORATION OF HISTORICAL HERITAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
A LUMP SUM FOR THE REHABILITATION OF HISTORICAL HERITAGE	0,40	PA	12.500.000	5.000.000 USD
TOTAL REHABILITATION OF HISTORICAL HERITAGE PROPERTIES				5.000.000 USD

Table 220. CAPEX of Line 2: Restoration of historical heritage.

2.1.12 Affected services and replacements

AFFECTED SERVICES AND REPLACEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM FOR AFFECTED SERVICES AND REPLENISHMENT	5,50	%	1.906.626,17	10.486.444 USD
TOTAL AFFECTED SERVICES AND REPLACEMENT	10.486.444 USD			

Table 221. CAPEX of Line 2: Affected services and replacements.

2.1.13 Quality control

QUALITY CONTROL	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF QUALITY CONTROL	1,00	%	1.906.626,17	1.906.626 USD
TOTAL QUALITY CONTROL	1.906.626 USD			

Table 222. CAPEX of Line 2: Quality control.

2.1.14 Waste management

WASTE MANAGEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF WASTE MANAGEMENT	0,50	%	1.906.626,17	953.313 USD
TOTAL WASTE MANAGEMENT	953.313 USD			

Table 223. CAPEX of Line 2: Waste management.

2.1.15 Health and safety

HEALTH AND SAFETY	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF HEALTH AND SAFETY	1,50	%	1.906.626,17	2.859.939 USD
TOTAL HEALTH AND SAFETY	2.859.939 USD			

Table 224. CAPEX of Line 2: Health and safety.

2.2 Indirect costs

INDIRECT COSTS	MEASUREMENT	UNIT	PRICE	AMOUNT
CONTINGENCIES, ADMINISTRATION AND UTILITY	11,00	%	2.068.689,39	22.755.583 USD
TOTAL INDIRECT COSTS	22.755.583 USD			

Table 225. CAPEX of Line 2: Indirect costs.

2.3 Rolling stock

ROLLING STOCK	MEASUREMENT	UNIT	PRICE	AMOUNT
DOUBLE COMPOSITION ELECTRIC TRAIN	22,00	u	5.800.000,00	127.600.000 USD
TOTAL ROLLING STOCK				127.600.000 USD

Table 226. CAPEX of Line 2: Rolling stock.

2.4 Design and implementation

DESIGN AND IMPLEMENTATION	MEASUREMENT	UNIT	PRICE	AMOUNT
BASIC ENGINEERING AND FINAL DESIGNS	2,50	%	2.296.245,22	5.740.613 USD
CONSTRUCTION SUPERVISION	3,50	%	3.572.245,22	12.502.858 USD
PROJECT MANAGEMENT	0,50	%	3.572.245,22	1.786.123 USD
COST CONTINGENCIES OF THE GRANTOR IN THE CONSTRUCTION PHASE	1,00	%	3.572.245,22	3.572.245 USD
TOTAL DESIGN AND IMPLEMENTATION				23.601.839 USD

Table 227. CAPEX of Line 2: Design and implementation.

2.5 SEVRI

RISK ASSESSMENT SYSTEM	MEASUREMENT	UNIT	PRICE	AMOUNT
COSTS ASSOCIATED WITH THE SEVRI	0,50	%	3.808.263,62	1.904.132 USD
TOTAL SEVRI				1.904.132 USD

Table 228. CAPEX of Line 2: SEVRI.

2.6 Land

LAND	MEASUREMENT	UNIT	PRICE	AMOUNT
LAND ACQUISITION	19.353.495	USD	1,00	19.353.495 USD
ACQUISITION OF PROPERTY	4.895.977	USD	1,00	4.895.977 USD
PROCUREMENT RISK PROVISION	5,00	%	242.494,72	1.212.474 USD
TOTAL LAND				25.461.946 USD

Table 229. CAPEX of Line 2: Land.

2.7 Environmental and social measures

ENVIRONMENTAL AND SOCIAL MEASURES	MEASUREMENT	UNIT	PRICE	AMOUNT
ENVIRONMENTAL MEASURES	0,26	PA	5.000.000,00	1.300.000 USD
SOCIAL MEASURES	0,26	PA	65000.000,00	1.300.000 USD
TOTAL ENVIRONMENTAL AND SOCIAL MEASURES	2.600.000 USD			

Table 230. CAPEX of Line 2: Environmental and social measures.

3 CAPEX OF LINE 3

CAPEX	AMOUNT	PROPORTION
INFRASTRUCTURES AND SYSTEMS	213.108.987 USD	49,55%
INDIRECT COSTS	23.441.989 USD	5,45%
ROLLING STOCK	139.200.000 USD	32,37%
DESIGN AND IMPLEMENTATION	24.701.323 USD	5,74%
RISK ASSESSMENT SYSTEM	2.002.261 USD	0,47%
LAND	24.637.036 USD	5,73%
ENVIRONMENTAL AND SOCIAL MEASURES	3.000.000 USD	0,70%
TOTAL	430.091.596 USD	

Table 231. CAPEX of Line 3.

3.1 Infrastructure and systems

INFRASTRUCTURES AND SYSTEMS	AMOUNT	PROPORTION
PRELIMINARY WORKS	5.202.737 USD	2,44%
STRUCTURES	47.222.673 USD	22,16%
PLATFORM AND TRACK SUPERSTRUCTURE	52.401.933 USD	24,59%
STATIONS	8.559.354 USD	4,02%
DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	11.551.293 USD	5,42%
DRAINAGE	3.067.933 USD	1,44%
ELECTRIFICATION	24.263.599 USD	11,39%
SIGNALLING SYSTEMS	21.634.000 USD	10,15%
SYSTEMS AND COMMUNICATIONS	10.026.291 USD	4,70%
URBAN INTEGRATION	7.484.000 USD	3,51%
RESTORATION OF HISTORICAL HERITAGE	5.000.000 USD	2,35%
AFFECTED SERVICES AND REPLACEMENT	10.802.760 USD	5,07%
QUALITY ASSURANCE	1.964.138 USD	0,92%
WASTE MANAGEMENT	982.069 USD	0,46%
HEALTH AND SAFETY	2.946.207 USD	1,38%
TOTAL INFRASTRUCTURE AND SYSTEMS	213.108.987 USD	

Table 232. CAPEX of Line 3: Infrastructure and systems.

3.1.1 Preliminary works

PRELIMINARY WORKS	MEASUREMENT	UNIT	PRICE	AMOUNT
TOPOGRAPHIC CAMPAIGN				253.300 USD
Topographical Campaign's Raised Item	2.533	ha	100,00	253.300 USD
GEOTECHNICAL CAMPAIGN				395.437 USD
Mobilization and demobilization of equipment and personnel to the area of operation	6,00	u	1.000,00	6.000 USD
Moving drilling machinery between geotechnical boreholes	78,00	u	100,00	7.800 USD
Vertical drilling with continuous core extraction in all types of terrain	1.562,43	m	155,00	242.177 USD
Unchanged sample taking	312,00	u	40,00	12.480 USD
SPT (Standard Penetration Test)	312,00	u	40,00	12.480 USD
Wax sampling on rock barrel	39,00	u	5,00	195 USD
Boxes of plastic or waxed cardboard for storing core material obtained by rotary drilling	521,00	u	3,00	1.563 USD
Polling testimony, photo reportage and final records	1.562,43	m	3,00	4.687 USD
PVC grooved tube, for measuring water levels	97,65	m	10,00	977 USD
Measurement of groundwater levels	14,65	u	5,00	73 USD
Water sampling in drilling	3,91	u	15,00	59 USD
Dynamic Penetration DPSH/Blast	648,53	m	15,00	9.728 USD
Geophysical research	1.431,23	m	14,00	20.037 USD
Mechanical (Backhoe) tiling up to 3-4m	41,00	u	175,00	7.175 USD
Unaltered sampling in calcite by means of a waxed block	41,00	u	100,00	4.100 USD
Laboratory	20,00	%	3.295,31	65.906 USD
TRANSIT DEVIATIONS				1.265.000 USD
Lifting of transit deviations	25,30	km	50.000,00	1.265.000 USD
DEVIATION AND PROTECTION OF NETWORKS				1.265.000 USD
Raised departure of deviation and protection of networks	25,30	km	50.000,00	1.265.000 USD
CLEANING, REMOVALS AND DEMOLITIONS				2.024.000 USD
Lift off for cleaning, track removal and dismantling	25,30	km	80.000,00	2.024.000 USD
TOTAL PRELIMINARY WORK				5.202.737 USD

Table 233. CAPEX of Line 3: Preliminary works.

3.1.2 Structures

STRUCTURES	MEASUREMENT	UNIT	PRICE	AMOUNT
BRIDGES				8.612.031 USD
Deck (width 9m) prefabricated double t-beam depth 0,60m	0,00	m	3.430,40	0 USD
Deck (width 11m) prefabricated double t-beam depth 0,60m	0,00	m	4.128,28	0 USD
Deck (width 9m) prefabricated double t-beam depth 0,90m	37,29	m	3.936,80	146.803 USD
Deck (width 9m) prefabricated double t-beam depth 1,20m	72,36	m	4.443,16	321.507 USD
Deck (width 11m) prefabricated double t-beam depth 1,20m	0,00	m	5.394,23	0 USD
Deck (width 9m) prefabricated double t-beam depth 1,40m	0,00	m	4.780,76	0 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	135,60	m	5.202,72	705.489 USD
Bridge pier	5,50	m	1.976,66	10.872 USD
Bridge pier foundation	1,00	u	11.482,55	11.483 USD
Stirrup	16,00	u	74.583,71	1.193.339 USD
Other	9,00	u	23.800,00	214.200 USD
Single track bridge renovation	823,06	m2	7.300,00	6.008.338 USD
VIADUCTS				2.436.310 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	340,00	m	5.202,72	1.768.925 USD
Deck (width 11m) prefabricated double t-beam depth 1,65m	0,00	m	6.343,68	0 USD
Viaduct pier	49,50	m	3.573,23	176.875 USD
Viaduct pier foundation	9,00	u	11.482,55	103.343 USD
Stirrup	2,00	u	74.583,71	149.167 USD
Other	10,00	u	23.800,00	238.000 USD
CUT&COVER				33.792.000 USD
Demolition	1,32	km	200.000,00	264.000 USD
Screen wall	2,64	km	7.500.000,00	19.800.000 USD
Top slab	1,32	km	3.200.000,00	4.224.000 USD
Urbanization	1,32	km	2.400.000,00	3.168.000 USD
Interior excavation	1,32	km	2.400.000,00	3.168.000 USD
Bottom slab	1,32	km	2.400.000,00	3.168.000 USD
WALLS				2.382.332 USD
Concrete wall	4.277,00	m	557,01	2.382.332 USD
TOTAL STRUCTURES				47.222.673 USD

Table 234. CAPEX of Line 3: Structures.

3.1.3 Platform and track superstructure

PLATFORM AND TRACK SUPERSTRUCTURE	MEASUREMENT	UNIT	PRICE	AMOUNT
BALLAST TRACK				20.580.690 USD
Ballasted track on vignole rail	0,31	km	1.762.810,41	546.471 USD
Single ballast track on vignole rail	0,00	km	915.965,29	0 USD
Fenced ballasted track on vignole rail	9,61	km	2.030.530,41	19.513.397 USD
Fenced single ballast track on vignole rail	0,44	km	1.183.685,29	520.822 USD
SLAB TRACK				27.886.473 USD
Slab track on vignole rail	4,08	km	2.021.288,51	8.246.857 USD
Single slab track on vignole rail	0,00	km	1.018.259,59	0 USD
Slab track at station on vignole rail	1,40	km	1.866.874,51	2.613.624 USD
Slab track on throat rail	2,14	km	1.483.904,23	3.175.555 USD
Single slab track on throat rail	0,48	km	749.567,12	359.792 USD
Fenced slab track on vignole rail	3,40	km	2.289.008,51	7.782.629 USD
Fenced single slab track on vignole rail	1,50	km	1.285.979,59	1.928.969 USD
Slab track viaduct on vignole rail	0,34	km	1.778.734,51	604.770 USD
Slab track Cut&Cover on vignole rail	1,32	km	2.404.754,51	3.174.276 USD
TRACK EQUIPMENT				3.934.770 USD
Bretelle	3,00	u	425.000,00	1.275.000 USD
Escapes	5,00	u	182.380,43	911.902 USD
Deviations	17,00	u	97.015,85	1.649.269 USD
End of track	6,00	u	16.433,12	98.599 USD
TOTAL PLATFORM AND TRACK SUPERSTRUCTURE				52.401.933 USD

Table 235. CAPEX of Line 3: Platform and track superstructure.

3.1.4 Stations

STATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
STATION TYPE (SIDE PLATFORMS)	8,00	u	747.554,72	5.980.438 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal canopy structure	10,40	u	57.000,00	592.800 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	1,00	u	22.670,72	22.671 USD
STATION TYPE (CENTRAL PLATFORM)	2,00	u	379.819,36	759.639 USD
90 m platform with access ramps	1,00	u	60.000,00	60.000 USD
10 m metal canopy structure	5,20	u	57.000,00	296.400 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	0,50	u	22.670,72	11.335 USD
INTERMODAL STATION	2,00	u	909.638,72	1.819.277 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal structure canopy	10,40	u	57.000,00	592.800 USD
4 m metal canopy structure	5,00	u	30.000,00	150.000 USD
Urbanization	1.200,00	m2	20,14	24.168 USD
Equipment	1,00	u	22.670,72	22.671 USD

UNIQUE STATION	0,00	u	8.000.000,00	0 USD
Station	1,00	u	5.500.000,00	5.500.000 USD
OCC equipment	1,00	u	1.000.000,00	1.000.000 USD
Urbanization	1,00	u	1.500.000,00	1.500.000 USD
TOTAL STATIONS	8.559.354 USD			

Table 236. CAPEX of Line 3: Stations.

3.1.5 Depots, workshops and administrative buildings

DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	MEASUREMENT	UNIT	PRICE	AMOUNT
PACÍFICO	1,00	u		11.551.293 USD
Esplanade generation				394.342 USD
<i>Clearing, demolition and dismantling of tracks</i>	<i>21.800,00</i>	<i>m2</i>	<i>17,09</i>	<i>372.562 USD</i>
<i>Demolition</i>	<i>1.200,00</i>	<i>m2</i>	<i>18,15</i>	<i>21.780 USD</i>
Administrative building				523.746 USD
<i>Foundations and structures</i>	<i>0,00</i>	<i>m3</i>	<i>57,94</i>	<i>0 USD</i>
<i>Roofs, facades, partitions and coatings</i>	<i>0,00</i>	<i>m3</i>	<i>67,16</i>	<i>0 USD</i>
<i>Facilities</i>	<i>10.600,00</i>	<i>m3</i>	<i>49,41</i>	<i>523.746 USD</i>
Workshop and depot building				5.619.460 USD
<i>Adaptation of foundations and structure</i>	<i>96.000,00</i>	<i>m3</i>	<i>33,94</i>	<i>3.258.240 USD</i>
<i>Adaptation of roofs, facades, partitions and coverings</i>	<i>96.000,00</i>	<i>m3</i>	<i>14,01</i>	<i>1.344.960 USD</i>
<i>Facilities</i>	<i>85.400,00</i>	<i>m3</i>	<i>11,90</i>	<i>1.016.260 USD</i>
Maintenance facilities				833.000 USD
<i>Elevated platforms</i>	<i>2,00</i>	<i>u</i>	<i>108.000,00</i>	<i>216.000 USD</i>
<i>Automatic washing plant</i>	<i>1,00</i>	<i>u</i>	<i>260.000,00</i>	<i>260.000 USD</i>
<i>Sandbox system</i>	<i>1,00</i>	<i>u</i>	<i>340.000,00</i>	<i>340.000 USD</i>
<i>Furniture</i>	<i>1,00</i>	<i>u</i>	<i>17.000,00</i>	<i>17.000 USD</i>
Urbanization				708.928 USD
<i>Pavements, paving and finishes</i>	<i>35.200,00</i>	<i>m2</i>	<i>6,19</i>	<i>217.888 USD</i>
<i>Drainage</i>	<i>35.200,00</i>	<i>m2</i>	<i>7,31</i>	<i>257.312 USD</i>
<i>Network of hydrants</i>	<i>35.200,00</i>	<i>m2</i>	<i>0,65</i>	<i>22.880 USD</i>
<i>Lighting</i>	<i>35.200,00</i>	<i>m2</i>	<i>2,83</i>	<i>99.616 USD</i>
<i>Connections</i>	<i>35.200,00</i>	<i>m2</i>	<i>3,16</i>	<i>111.232 USD</i>
Track				3.471.817 USD
<i>Slab track in road traffic areas</i>	<i>3.500,00</i>	<i>m</i>	<i>310,34</i>	<i>1.086.190 USD</i>
<i>Escapes</i>	<i>1,00</i>	<i>u</i>	<i>182.380,43</i>	<i>182.380 USD</i>
<i>Deviations</i>	<i>20,00</i>	<i>u</i>	<i>97.015,85</i>	<i>1.940.317 USD</i>
<i>End of track</i>	<i>16,00</i>	<i>u</i>	<i>16.433,12</i>	<i>262.930 USD</i>
TOTAL DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	11.551.293 USD			

Table 237. CAPEX of Line 3: Depots, workshops and administrative buildings.

3.1.6 Drainage

DRAINAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
TRANSVERSE DRAINAGE				198.331 USD
Frame 3mx2m	0,00	u	33.155,86	0 USD
Frame 5mx2,5m	2,00	u	54.015,69	108.031 USD
Frame 7mx3m	1,00	u	90.299,60	90.300 USD
LONGITUDINAL DRAINAGE				2.869.602 USD
Trapezoidal 1,00mx0,50m	21,40	km	63.641,19	1.361.921 USD
Circular diameter 0,40m	13,00	km	112.823,58	1.466.707 USD
Rectangular 0,50mx0,50m	0,70	km	58.534,25	40.974 USD
TOTAL DRAINAGE				3.067.933 USD

Table 238. CAPEX of Line 3: Drainage.

3.1.7 Electrification

ELECTRIFICATION	MEASUREMENT	UNIT	PRICE	AMOUNT
MV SUBSTATIONS AND CONNECTIONS				10.496.822 USD
MV electrical connection	7,00	u	313.935,34	2.197.547 USD
Double group traction substation 1.5 MW	2,00	u	1.237.166,13	2.474.332 USD
Double group traction substation 1 MW	4,00	u	1.143.999,54	4.575.998 USD
Double group traction substation 1 MW for parking	1,00	u	1.248.944,36	1.248.944 USD
STOPS AND LV CONNECTIONS				1.374.707 USD
Single circuit LV electrical connection	13,00	u	33.254,42	432.307 USD
Electrical installations at quadruple platform stops	0,00	u	122.622,17	0 USD
Electrical installations at double platform stops	11,00	u	75.199,98	827.200 USD
Electrical installations at single platform stops	2,00	u	57.599,99	115.200 USD
TRACK ELECTRIFICATION				11.599.548 USD
Catenary compensated on h poles	25,40	km	280.873,38	7.134.184 USD
Bare feeder cable consisting of double copper wire 450 kcmil (2x225 mm ²)	25,40	km	79.442,36	2.017.836 USD
Motorized disconnection and remote control	68,00	u	5.555,56	377.778 USD
Independent compensation	150,00	u	8.722,22	1.308.333 USD
Fixed anchor point	54,00	u	1.722,22	93.000 USD
Fixed point for catenary	63,00	u	3.888,87	244.999 USD
3 KV line	25,40	km	16.670,00	423.418 USD
DEPOT ELECTRIFICATION				615.161 USD
240 mm ² copper cable with 1.8/3 kv XLPE insulation for catenary supply	2.000,00	m	50,00	100.000 USD
240 mm ² copper cable with 1.8/3 kv XLPE insulation for return	1.800,00	m	50,00	90.000 USD
Catenary	3,80	km	111.884,44	425.161 USD

DEPOT EQUIPMENT				177.361 USD
Intermediate insulator anchoring point	12,00	u	166,67	2.000 USD
Section isolator	14,00	u	1.666,67	23.333 USD
Wiring	2.000,00	m	15,55	31.100 USD
Other facilities	1,00	u	120.927,83	120.928 USD
TOTAL ELECTRIFICATION				24.263.599 USD

Table 239. CAPEX of Line 3: Electrification.

3.1.8 Signaling systems

SIGNALLING SYSTEMS	MEASUREMENT	UNIT	PRICE	AMOUNT
RAIL SIGNALLING				9.800.000 USD
In-line interlocking signaling	6,00	u	1.400.000,00	8.400.000 USD
Depot interlocking signaling	1,00	u	1.400.000,00	1.400.000 USD
RAILWAY PROTECTION				8.394.000 USD
On-track equipment	25,30	km	180.000,00	4.554.000 USD
On-board equipment	48,00	u	80.000,00	3.840.000 USD
ROAD SIGNS				3.440.000 USD
Pedestrian walkway configuration	26,00	u	10.000,00	260.000 USD
Level crossings with barrier and crossing conditioning	53,00	u	60.000,00	3.180.000 USD
TOTAL SIGNALLING SYSTEMS				21.634.000 USD

Table 240. CAPEX of Line 3: Signaling systems.

3.1.9 Systems and communications

SYSTEMS AND COMMUNICATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
OPTICAL FIBER				601.360 USD
Single-mode F.O. cable	27,83	km	8.333,33	231.917 USD
Modular F.O. distributor	21,00	u	5.388,89	113.167 USD
Cable head termination 64 F.O.	42,00	u	1.196,67	50.260 USD
1 F.O. splice	1.344,00	u	44,44	59.727 USD
1 F.O. connection	1.344,00	u	83,33	111.996 USD
1 F.O. bi-directional reflectometric measurement	19,20	u	50,00	960 USD
Fiber monitoring system	0,30	u	111.111,11	33.333 USD
FIXED COMMUNICATIONS NETWORK				490.689 USD
Copper UTP wiring	3.700,00	m	5,56	20.572 USD
Station/Substation Switch (level 2)	22,00	u	13.333,33	293.333 USD
Level 3 switch	2,40	u	20.277,78	48.667 USD
Copper distributor	21,00	u	227,78	4.783 USD
19" rack cabinet	21,00	u	2.000,00	42.000 USD
Integrated Service Network Configuration	24,40	u	3.333,33	81.333 USD
Central server for management and communications	0,00	u	16.666,67	0 USD
WIFI				134.000 USD

WIFI infrastructure	0,30	u	446.667,00	134.000 USD
TETRA				2.423.372 USD
TETRA infrastructure	25,30	km	95.785,44	2.423.372 USD
TRAVELER INFORMATION SYSTEM (SIV)				459.735 USD
Terminal stop	48,00	u	6.333,33	304.000 USD
Local server stop indicators	13,00	u	2.508,89	32.616 USD
42" hall monitor.	24,00	u	3.213,33	77.120 USD
Central system	0,30	u	153.333,33	46.000 USD
MEGAPHONE				322.222 USD
Speaker, power amplifier, local server	13,00	u	22.222,22	288.889 USD
Central system	0,30	u	111.111,11	33.333 USD
TICKETS				4.932.000 USD
Vending machine	48,00	u	40.000,00	1.920.000 USD
Cancellation machine	144,00	u	20.000,00	2.880.000 USD
Central system	0,30	u	220.000,00	66.000 USD
Vending machine software development	0,30	u	110.000,00	33.000 USD
Cancellation software development	0,30	u	110.000,00	33.000 USD
TELEPHONY AND INTERCOM				41.469 USD
IP Intercom	48,00	u	694,44	33.333 USD
IP Phone	32,00	u	227,78	7.289 USD
Quadrangular distribution	0,30	u	2.824,44	847 USD
Central system	0,00	u	55.555,56	0 USD
CHRONOMETRY				72.000 USD
NTP PoE Clock	24,00	u	3.000,00	72.000 USD
Central Time Server	0,00	u	9.111,11	0 USD
Time Zone	0,00	u	1.333,33	0 USD
GPS antenna	0,00	u	944,44	0 USD
CCTV				446.667 USD
Outdoor fixed camera	46,00	u	5.000,00	230.000 USD
Recorder station	13,00	u	16.666,67	216.667 USD
Central system	0,00	u	111.111,11	0 USD
CCTA				36.111 USD
CCTA module	13,00	u	2.777,78	36.111 USD
SAE				66.667 USD
Central SAFs	0,30	u	222.222,22	66.667 USD
CENTRAL CONTROL STATION (PCC)				0 USD
Videowall	0,00	u	333.333,33	0 USD
LAN Network	0,00	u	111.111,11	0 USD
Operator PC	0,00	u	2.666,67	0 USD
Communication cabinets	0,00	u	3.333,33	0 USD
5m UTP copper cabling	0,00	m	38,89	0 USD
15m UTP copper cabling	0,00	m	50,00	0 USD
Installation, configuration, testing and commissioning of the PMC	0,00	u	22.222,22	0 USD
TOTAL SYSTEMS AND COMMUNICATIONS				10.026.291 USD

Table 241. CAPEX of Line 3: Systems and communications.

3.1.10 Urban integration

URBAN INTEGRATION	MEASUREMENT	UNIT	PRICE	AMOUNT
A LUMP SUM FOR URBAN INTEGRATION	25,30	km	280.000,00	7.084.000 USD
A LUMP SUM FOR POSSIBLE INTERMODAL STATION	4,00	u	100.000,00	400.000 USD
TOTAL URBAN INTEGRATION	7.484.000 USD			

Table 242. CAPEX of Line 3: Urban integration.

3.1.11 Restoration of historical heritage

RESTORATION OF HISTORICAL HERITAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
A LUMP SUM FOR THE REHABILITATION OF HISTORICAL HERITAGE	0,40	PA	12.500.000	5.000.000 USD
TOTAL REHABILITATION OF HISTORICAL HERITAGE PROPERTIES	5.000.000 USD			

Table 243. CAPEX of Line 3: Restoration of historical heritage.

3.1.12 Affected services and replacements

AFFECTED SERVICES AND REPLACEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM FOR AFFECTED SERVICES AND REPLENISHMENT	5,50	%	1.964.138,13	10.802.760 USD
TOTAL AFFECTED SERVICES AND REPLACEMENT	10.802.760 USD			

Table 244. CAPEX of Line 3: Affected services and replacements.

3.1.13 Quality control

QUALITY CONTROL	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF QUALITY CONTROL	1,00	%	1.964.138,13	1.964.138 USD
TOTAL QUALITY CONTROL	1.964.138 USD			

Table 245. CAPEX of Line 3: Quality control.

3.1.14 Waste management

WASTE MANAGEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF WASTE MANAGEMENT	0,50	%	1.964.138,13	982.069 USD
TOTAL WASTE MANAGEMENT	982.069 USD			

Table 246. CAPEX of Line 3: Waste management.

3.1.15 Health and safety

HEALTH AND SAFETY	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF HEALTH AND SAFETY	1,50	%	1.964.138,13	2.946.207 USD
TOTAL HEALTH AND SAFETY				2.946.207 USD

Table 247. CAPEX of Line 3: Health and safety.

3.2 Indirect costs

INDIRECT COSTS	MEASUREMENT	UNIT	PRICE	AMOUNT
CONTINGENCIES, ADMINISTRATION AND UTILITY	11,00	%	2.131.089,87	23.441.989 USD
TOTAL INDIRECT COSTS				23.441.989 USD

Table 248. CAPEX of Line 3: Indirect costs.

3.3 Rolling stock

ROLLING STOCK	MEASUREMENT	UNIT	PRICE	AMOUNT
DOUBLE COMPOSITION ELECTRIC TRAIN	24,00	u	5.800.000,00	139.200.000 USD
TOTAL ROLLING STOCK				139.200.000 USD

Table 249. CAPEX of Line 3: Rolling stock.

3.4 Design and implementation

DESIGN AND IMPLEMENTATION	MEASUREMENT	UNIT	PRICE	AMOUNT
BASIC ENGINEERING AND FINAL DESIGNS	2,50	%	2.365.509,75	5.913.774 USD
CONSTRUCTION SUPERVISION	3,50	%	3.757.509,75	13.151.284 USD
PROJECT MANAGEMENT	0,50	%	3.757.509,75	1.878.755 USD
COST CONTINGENCIES OF THE GRANTOR IN THE CONSTRUCTION PHASE	1,00	%	3.757.509,75	3.757.510 USD
TOTAL DESIGN AND IMPLEMENTATION				24.701.323 USD

Table 250. CAPEX of Line 3: Design and implementation.

3.5 SEVRI

SEVRI	MEASUREMENT	UNIT	PRICE	AMOUNT
COSTS ASSOCIATED WITH THE SEVRI	0,50	%	4.004.522,99	2.002.261 USD
TOTAL SEVRI	2.002.261 USD			

Table 251. CAPEX of Line 3: SEVRI.

3.6 Land

LAND	MEASUREMENT	UNIT	PRICE	AMOUNT
LAND ACQUISITION	21.920.168	USD	1,00	21.920.168 USD
LAND ACQUISITION	1.543.676	USD	1,00	1.543.676 USD
PROCUREMENT RISK PROVISION	5,00	%	234.638,44	1.173.192 USD
TOTAL LAND	24.637.036 USD			

Table 252. CAPEX of Line 3: Land.

3.7 Environmental and social measures

ENVIRONMENTAL AND SOCIAL MEASURES	MEASUREMENT	UNIT	PRICE	AMOUNT
ENVIRONMENTAL MEASURES	0,30	PA	5.000.000,00	1.500.000 USD
SOCIAL MEASURES	0,30	PA	5.000.000,00	1.500.000 USD
TOTAL ENVIRONMENTAL AND SOCIAL MEASURES	3.000.000 USD			

Table 253. CAPEX of Line 3: Environmental and social measures.

4 CAPEX OF LINE 4

CAPEX	AMOUNT	PROPORTION
INFRASTRUCTURES AND SYSTEMS	54.658.428 USD	49,36%
INDIRECT COSTS	6.012.427 USD	5,43%
ROLLING STOCK	34.800.000 USD	31,43%
DESIGN AND IMPLEMENTATION	6.290.314 USD	5,68%
RISK ASSESSMENT SYSTEM	508.806 USD	0,46%
LAND	7.561.679 USD	6,83%
ENVIRONMENTAL AND SOCIAL MEASURES	900.000 USD	0,81%
TOTAL	110.731.654 USD	

Table 254. CAPEX of Line 4.

4.1 Infrastructure and systems

INFRASTRUCTURES AND SYSTEMS	AMOUNT	PROPORTION
PRELIMINARY WORKS	1.604.440 USD	2,94%
STRUCTURES	1.318.108 USD	2,41%
PLATFORM AND TRACK SUPERSTRUCTURE	17.505.486 USD	32,03%
STATIONS	2.242.664 USD	4,10%
DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	7.602.233 USD	13,91%
DRAINAGE	1.321.187 USD	2,42%
ELECTRIFICATION	7.580.893 USD	13,87%
SIGNALLING SYSTEMS	6.304.000 USD	11,53%
SYSTEMS AND COMMUNICATIONS	2.713.421 USD	4,96%
URBAN INTEGRATION	2.184.000 USD	4,00%
RESTORATION OF HISTORICAL HERITAGE	0 USD	0,00%
AFFECTED SERVICES AND REPLACEMENT	2.770.704 USD	5,07%
QUALITY ASSURANCE	503.764 USD	0,92%
WASTE MANAGEMENT	251.882 USD	0,46%
HEALTH AND SAFETY	755.646 USD	1,38%
TOTAL INFRASTRUCTURE AND SYSTEMS	54.658.428 USD	

Table 255. CAPEX of Line 4: Infrastructure and systems.

4.1.1 Preliminary works

PRELIMINARY WORKS	MEASUREMENT	UNIT	PRICE	AMOUNT
TOPOGRAPHIC CAMPAIGN				78.250 USD
Topographical Campaign's Raised Item	782,50	ha	100,00	78.250 USD
GEOTECHNICAL CAMPAIGN				122.190 USD
Mobilization and demobilization of equipment and personnel to the area of operation	2,00	u	1.000,00	2.000 USD
Moving drilling machinery between geotechnical boreholes	24,00	u	100,00	2.400 USD
Vertical drilling with continuous core extraction in all types of terrain	481,70	m	155,00	74.664 USD
Unchanged sample taking	96,00	u	40,00	3.840 USD
SPT (Standard Penetration Test)	96,00	u	40,00	3.840 USD
Wax sampling on rock barrel	12,00	u	5,00	60 USD
Boxes of plastic or waxed cardboard for storing core material obtained by rotary drilling	161,00	u	3,00	483 USD
Polling testimony, photo reportage and final records	481,70	m	3,00	1.445 USD
PVC grooved tube, for measuring water levels	30,11	m	10,00	301 USD
Measurement of groundwater levels	4,52	u	5,00	23 USD
Water sampling in drilling	1,20	u	15,00	18 USD
Dynamic Penetration DPSH/Blast	199,94	m	15,00	2.999 USD
Geophysical research	441,25	m	14,00	6.178 USD
Mechanical (Backhoe) tiling up to 3-4m	13,00	u	175,00	2.275 USD
Unaltered sampling in calcite by means of a waxed block	13,00	u	100,00	1.300 USD
Laboratory	20,00	%	1.018,25	20.365 USD
TRANSIT DEVIATIONS				390.000 USD
Lifting of transit deviations	7,80	km	50.000,00	390.000 USD
DEVIATION AND PROTECTION OF NETWORKS				390.000 USD
Raised departure of deviation and protection of networks	7,80	km	50.000,00	390.000 USD
CLEANING, REMOVALS AND DEMOLITIONS				624.000 USD
Lift off for cleaning, track removal and dismantling	7,80	km	80.000,00	624.000 USD
TOTAL PRELIMINARY WORK				1.604.440 USD

Table 256. CAPEX of Line 4: Preliminary works.

4.1.2 Structures

STRUCTURES	MEASUREMENT	UNIT	PRICE	AMOUNT
BRIDGES				987.244 USD
Deck (width 9m) prefabricated double t-beam depth 0,60m	6,94	m	3.430,40	23.807 USD
Deck (width 11m) prefabricated double t-beam depth 0,60m	0,00	m	4.128,28	0 USD
Deck (width 9m) prefabricated double t-beam depth 0,90m	0,00	m	3.936,80	0 USD
Deck (width 9m) prefabricated double t-beam depth 1,20m	0,00	m	4.443,16	0 USD
Deck (width 11m) prefabricated double t-beam depth 1,20m	0,00	m	5.394,23	0 USD
Deck (width 9m) prefabricated double t-beam depth 1,40m	83,33	m	4.780,76	398.381 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	0,00	m	5.202,72	0 USD
Bridge pier	5,50	m	1.976,66	10.872 USD
Bridge pier foundation	1,00	u	11.482,55	11.483 USD
Stirrup	6,00	u	74.583,71	447.502 USD
Other	4,00	u	23.800,00	95.200 USD
Single track bridge renovation	0,00	m2	7.300,00	0 USD
VIADUCTS				0 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	0,00	m	5.202,72	0 USD
Deck (width 11m) prefabricated double t-beam depth 1,65m	0,00	m	6.343,68	0 USD
Viaduct pier	0,00	m	3.573,23	0 USD
Viaduct pier foundation	0,00	u	11.482,55	0 USD
Stirrup	0,00	u	74.583,71	0 USD
Other	0,00	u	23.800,00	0 USD
CUT&COVER				0 USD
Demolition	0,00	km	200.000,00	0 USD
Screen wall	0,00	km	7.500.000,00	0 USD
Top slab	0,00	km	3.200.000,00	0 USD
Urbanization	0,00	km	2.400.000,00	0 USD
Interior excavation	0,00	km	2.400.000,00	0 USD
Bottom slab	0,00	km	2.400.000,00	0 USD
WALLS				330.864 USD
Concrete wall	594,00	m	557,01	330.864 USD
TOTAL STRUCTURES				1.318.108 USD

Table 257. CAPEX of Line 4: Structures.

4.1.3 Platform and track superstructure

PLATFORM AND TRACK SUPERSTRUCTURE	MEASUREMENT	UNIT	PRICE	AMOUNT
BALLAST TRACK				14.132.492 USD
Ballasted track on vignole rail	0,00	km	1.762.810,41	0 USD
Single ballast track on vignole rail	0,00	km	915.965,29	0 USD
Fenced ballasted track on vignole rail	6,96	km	2.030.530,41	14.132.492 USD
Fenced single ballast track on vignole rail	0,00	km	1.183.685,29	0 USD
SLAB TRACK				2.620.170 USD
Slab track on vignole rail	0,00	km	2.021.288,51	0 USD
Single slab track on vignole rail	0,00	km	1.018.259,59	0 USD
Slab track at station on vignole rail	0,30	km	1.866.874,51	560.062 USD
Slab track on throat rail	0,00	km	1.483.904,23	0 USD
Single slab track on throat rail	0,00	km	749.567,12	0 USD
Fenced slab track on vignole rail	0,90	km	2.289.008,51	2.060.108 USD
Fenced single slab track on vignole rail	0,00	km	1.285.979,59	0 USD
Slab track viaduct on vignole rail	0,00	km	1.778.734,51	0 USD
Slab track Cut&Cover on vignole rail	0,00	km	2.404.754,51	0 USD
TRACK EQUIPMENT				752.824 USD
Bretelle	0,00	u	425.000,00	0 USD
Escapes	2,00	u	182.380,43	364.761 USD
Deviations	4,00	u	97.015,85	388.063 USD
End of track	0,00	u	16.433,12	0 USD
TOTAL PLATFORM AND TRACK SUPERSTRUCTURE				17.505.486 USD

Table 258. CAPEX of Line 4: Platform and track superstructure.

4.1.4 Stations

STATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
STATION TYPE (SIDE PLATFORMS)	3,00	u	747.554,72	2.242.664 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal canopy structure	10,40	u	57.000,00	592.800 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	1,00	u	22.670,72	22.671 USD
STATION TYPE (CENTRAL PLATFORM)	0,00	u	379.819,36	0 USD
90 m platform with access ramps	1,00	u	60.000,00	60.000 USD
10 m metal canopy structure	5,20	u	57.000,00	296.400 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	0,50	u	22.670,72	11.335 USD
INTERMODAL STATION	0,00	u	909.638,72	0 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal structure canopy	10,40	u	57.000,00	592.800 USD
4 m metal canopy structure	5,00	u	30.000,00	150.000 USD
Urbanization	1.200,00	m2	20,14	24.168 USD
Equipment	1,00	u	22.670,72	22.671 USD

UNIQUE STATION	0,00	u	8.000.000,00	0 USD
Station	1,00	u	5.500.000,00	5.500.000 USD
OCC equipment	1,00	u	1.000.000,00	1.000.000 USD
Urbanization	1,00	u	1.500.000,00	1.500.000 USD
TOTAL STATIONS	2.242.664 USD			

Table 259. CAPEX of Line 4: Stations.

4.1.5 Depots, workshops and administrative buildings

DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	MEASUREMENT	UNIT	PRICE	AMOUNT
CIRUELAS	1,00	u		7.602.233 USD
Esplanade generation				22.563 USD
Clearing of land	20.700,00	m2	1,09	22.563 USD
Administrative building				544.471 USD
Foundations and structures	3.120,00	m3	57,94	180.773 USD
Roofs, facades, partitions and coatings	3.120,00	m3	67,16	209.539 USD
Facilities	3.120,00	m3	49,41	154.159 USD
Workshop and depot building				3.689.753 USD
Foundations and structures	61.650,00	m3	33,94	2.092.401 USD
Roofs, facades, partitions and coatings	61.650,00	m3	14,01	863.717 USD
Facilities	61.650,00	m3	11,90	733.635 USD
Maintenance facilities				833.000 USD
Elevated platforms	2,00	u	108.000,00	216.000 USD
Automatic washing plant	1,00	u	260.000,00	260.000 USD
Sandbox system	1,00	u	340.000,00	340.000 USD
Furniture	1,00	u	17.000,00	17.000 USD
Urbanization				416.294 USD
Pavements, paving and finishes	20.670,00	m2	6,19	127.947 USD
Drainage	20.670,00	m2	7,31	151.098 USD
Network of hydrants	20.670,00	m2	0,65	13.436 USD
Lighting	20.670,00	m2	2,83	58.496 USD
Connections	20.670,00	m2	3,16	65.317 USD
Track				2.096.152 USD
Slab track in road traffic areas	2.055,00	m	310,34	637.749 USD
Deviations	13,00	u	97.015,85	1.261.206 USD
End of track	12,00	u	16.433,12	197.197 USD
TOTAL PARKING LOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	7.602.233 USD			

Table 260. CAPEX of Line 3: Depots, workshops and administrative buildings.

4.1.6 Drainage

DRAINAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
TRANSVERSE DRAINAGE				288.631 USD
Frame 3mx2m	0,00	u	33.155,86	0 USD
Frame 5mx2,5m	2,00	u	54.015,69	108.031 USD
Frame 7mx3m	2,00	u	90.299,60	180.599 USD
LONGITUDINAL DRAINAGE				0 USD
Trapezoidal 1,00mx0,50m	13,92	km	63.641,19	1.032.556 USD
Circular diameter 0,40m	1,30	km	112.823,58	885.885 USD
Rectangular 0,50mx0,50m	0,00	km	58.534,25	146.671 USD
TOTAL DRAINAGE				1.321.187 USD

Table 261. CAPEX of Line 4: Drainage.

4.1.7 Electrification

ELECTRIFICATION	MEASUREMENT	UNIT	PRICE	AMOUNT
MV SUBSTATIONS AND CONNECTIONS				3.020.815 USD
MV electrical connection	2,00	u	313.935,34	627.871 USD
Double group traction substation 1.5 MW	0,00	u	1.237.166,13	0 USD
Double group traction substation 1 MW	1,00	u	1.143.999,54	1.144.000 USD
Double group traction substation 1 MW for parking	1,00	u	1.248.944,36	1.248.944 USD
STOPS AND LV CONNECTIONS				325.363 USD
Single circuit LV electrical connection	3,00	u	33.254,42	99.763 USD
Electrical installations at quadruple platform stops	0,00	u	122.622,17	0 USD
Electrical installations at double platform stops	3,00	u	75.199,98	225.600 USD
Electrical installations at single platform stops	0,00	u	57.599,99	0 USD
TRACK ELECTRIFICATION				3.682.471 USD
Catenary compensated on h poles	7,54	km	280.873,38	2.117.785 USD
Bare feeder cable consisting of double copper wire 450 kcmil (2x225 mm ²)	7,54	km	79.442,36	598.995 USD
Motorized disconnection and remote control	15,00	u	5.555,56	83.333 USD
Independent compensation	48,00	u	8.722,22	418.667 USD
Fixed anchor point	54,00	u	1.722,22	93.000 USD
Fixed point for catenary	63,00	u	3.888,87	244.999 USD
3 KV line	7,54	km	16.670,00	125.692 USD
DEPOT ELECTRIFICATION				387.211 USD
240 mm ² copper cable with 1.8/3 kv XLPE insulation for catenary supply	1.150,00	m	50,00	57.500 USD
240 mm ² copper cable with 1.8/3 kv XLPE insulation for return	1.000,00	m	50,00	50.000 USD
Catenary	2,50	km	111.884,44	279.711 USD

DEPOT EQUIPMENT				165.033 USD
Intermediate insulator anchoring point	12,00	u	166,67	2.000 USD
Section isolator	15,00	u	1.666,67	25.000 USD
Wiring	1.100,00	m	15,55	17.105 USD
Other facilities	1,00	u	120.927,83	120.928 USD
TOTAL ELECTRIFICATION				7.580.893 USD

Table 262. CAPEX of Line 4: Electrification.

4.1.8 Signaling systems

SIGNALLING SYSTEMS	MEASUREMENT	UNIT	PRICE	AMOUNT
RAIL SIGNALLING				2.800.000 USD
In-line interlocking signaling	1,00	u	1.400.000,00	1.400.000 USD
Depot interlocking signaling	1,00	u	1.400.000,00	1.400.000 USD
RAILWAY PROTECTION				2.364.000 USD
On-track equipment	7,80	km	180.000,00	1.404.000 USD
On-board equipment	12,00	u	80.000,00	960.000 USD
ROAD SIGNS				1.140.000 USD
Pedestrian walkway configuration	6,00	u	10.000,00	60.000 USD
Level crossings with barrier and crossing conditioning	18,00	u	60.000,00	1.080.000 USD
TOTAL SIGNALLING SYSTEMS				6.304.000 USD

Table 263. CAPEX of Line 4: Signaling systems.

4.1.9 Systems and communications

SYSTEMS AND COMMUNICATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
OPTICAL FIBER				177.545 USD
Single-mode F.O. cable	8,58	km	8.333,33	71.500 USD
Modular F.O. distributor	6,00	u	5.388,89	32.333 USD
Cable head termination 64 F.O.	12,00	u	1.196,67	14.360 USD
1 F.O. splice	384,00	u	44,44	17.065 USD
1 F.O. connection	384,00	u	83,33	31.999 USD
1 F.O. bi-directional reflectometric measurement	5,76	u	50,00	288 USD
Fiber monitoring system	0,09	u	111.111,11	10.000 USD
FIXED COMMUNICATIONS NETWORK				153.705 USD
Copper UTP wiring	1.200,00	m	5,56	6.672 USD
Station/Substation Switch (level 2)	7,00	u	13.333,33	93.333 USD
Level 3 switch	0,72	u	20.277,78	14.600 USD
Copper distributor	6,00	u	227,78	1.367 USD
19" rack cabinet	6,00	u	2.000,00	12.000 USD
Integrated Service Network Configuration	7,72	u	3.333,33	25.733 USD
Central server for management and communications	0,00	u	16.666,67	0 USD
WIFI				40.200 USD

WIFI infrastructure	0,09	u	446.667,00	40.200 USD
TETRA				747.126 USD
TETRA infrastructure	7,80	km	95.785,44	747.126 USD
TRAVELER INFORMATION SYSTEM (SIV)				116.607 USD
Terminal stop	12,00	u	6.333,33	76.000 USD
Local server stop indicators	3,00	u	2.508,89	7.527 USD
42" hall monitor.	6,00	u	3.213,33	19.280 USD
Central system	0,09	u	153.333,33	13.800 USD
MEGAPHONE				76.667 USD
Speaker, power amplifier, local server	3,00	u	22.222,22	66.667 USD
Central system	0,09	u	111.111,11	10.000 USD
TICKETS				1.239.600 USD
Vending machine	12,00	u	40.000,00	480.000 USD
Cancellation machine	36,00	u	20.000,00	720.000 USD
Central system	0,09	u	220.000,00	19.800 USD
Vending machine software development	0,09	u	110.000,00	9.900 USD
Cancellation software development	0,09	u	110.000,00	9.900 USD
TELEPHONY AND INTERCOM				10.638 USD
IP Intercom	12,00	u	694,44	8.333 USD
IP Phone	9,00	u	227,78	2.050 USD
Quadrangular distribution	0,09	u	2.824,44	254 USD
Central system	0,00	u	55.555,56	0 USD
CHRONOMETRY				18.000 USD
NTP PoE Clock	6,00	u	3.000,00	18.000 USD
Central Time Server	0,00	u	9.111,11	0 USD
Time Zone	0,00	u	1.333,33	0 USD
GPS antenna	0,00	u	944,44	0 USD
CCTV				105.000 USD
Outdoor fixed camera	11,00	u	5.000,00	55.000 USD
Recorder station	3,00	u	16.666,67	50.000 USD
Central system	0,00	u	111.111,11	0 USD
CCTA				8.333 USD
CCTA module	3,00	u	2.777,78	8.333 USD
SAE				20.000 USD
Central SAFs	0,09	u	222.222,22	20.000 USD
CENTRAL CONTROL STATION (PCC)				0 USD
Videowall	0,00	u	333.333,33	0 USD
LAN Network	0,00	u	111.111,11	0 USD
Operator PC	0,00	u	2.666,67	0 USD
Communication cabinets	0,00	u	3.333,33	0 USD
5m UTP copper cabling	0,00	m	38,89	0 USD
15m UTP copper cabling	0,00	m	50,00	0 USD
Installation, configuration, testing and commissioning of the PMC	0,00	u	22.222,22	0 USD
TOTAL SYSTEMS AND COMMUNICATIONS				2.713.421 USD

Table 264. CAPEX of Line 4: Systems and communications.

4.1.10 Urban integration

URBAN INTEGRATION	MEASUREMENT	UNIT	PRICE	AMOUNT
A LUMP SUM FOR URBAN INTEGRATION	7,80	km	280.000,00	2.184.000 USD
A LUMP SUM FOR POSSIBLE INTERMODAL STATION	0,00	u	100.000,00	0 USD
TOTAL URBAN INTEGRATION	2.184.000 USD			

Table 265. CAPEX of Line 4: Urban integration.

4.1.11 Restoration of historical heritage

RESTORATION OF HISTORICAL HERITAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
A LUMP SUM FOR THE REHABILITATION OF HISTORICAL HERITAGE	0,00	PA	12.500.000	0 USD
TOTAL REHABILITATION OF HISTORICAL HERITAGE PROPERTIES	0 USD			

Table 266. CAPEX of Line 4: Restoration of historical heritage.

4.1.12 Affected services and replacements

AFFECTED SERVICES AND REPLACEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM FOR AFFECTED SERVICES AND REPLENISHMENT	5,50	%	503.764,31	2.770.704 USD
TOTAL AFFECTED SERVICES AND REPLACEMENT	2.770.704 USD			

Table 267. CAPEX of Line 4: Affected services and replacements.

4.1.13 Quality control

QUALITY CONTROL	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF QUALITY CONTROL	1,00	%	503.764,31	503.764 USD
TOTAL QUALITY CONTROL	503.764 USD			

Table 268. CAPEX of Line 4: Quality control.

4.1.14 Waste management

WASTE MANAGEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF WASTE MANAGEMENT	0,50	%	503.764,31	251.882 USD
TOTAL WASTE MANAGEMENT	251.882 USD			

Table 269. CAPEX of Line 4: Waste management.

4.1.15 Health and safety

HEALTH AND SAFETY	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF HEALTH AND SAFETY	1,50	%	503.764,31	755.646 USD
TOTAL HEALTH AND SAFETY	755.646 USD			

Table 270. CAPEX of Line 4: Health and safety.

4.2 Indirect costs

INDIRECT COSTS	MEASUREMENT	UNIT	PRICE	AMOUNT
CONTINGENCIES, ADMINISTRATION AND UTILITY	11,00	%	546.584,28	6.012.427 USD
TOTAL INDIRECT COSTS	6.012.427 USD			

Table 271. CAPEX of Line 4: Indirect costs.

4.3 Rolling stock

ROLLING STOCK	MEASUREMENT	UNIT	PRICE	AMOUNT
DOUBLE COMPOSITION ELECTRIC TRAIN	6,00	u	5.800.000,00	34.800.000 USD
TOTAL ROLLING STOCK	34.800.000 USD			

Table 272. CAPEX of Line 4: Rolling stock.

4.4 Design and implementation

DESIGN AND IMPLEMENTATION	MEASUREMENT	UNIT	PRICE	AMOUNT
BASIC ENGINEERING AND FINAL DESIGNS	2,50	%	606.708,55	1.516.771 USD
CONSTRUCTION SUPERVISION	3,50	%	954.708,55	3.341.480 USD
PROJECT MANAGEMENT	0,50	%	954.708,55	477.354 USD
COST CONTINGENCIES OF THE GRANTOR IN THE CONSTRUCTION PHASE	1,00	%	954.708,55	954.709 USD
TOTAL DESIGN AND IMPLEMENTATION	6.290.314 USD			

Table 273. CAPEX of Line 4: Design and implementation.

4.5 SEVRI

SEVRI	MEASUREMENT	UNIT	PRICE	AMOUNT
COSTS ASSOCIATED WITH THE SEVRI	0,50	%	1.017.611,69	508.806 USD
TOTAL SEVRI	508.806 USD			

Table 274. CAPEX of Line 4: SEVRI.

4.6 Land

LAND	MEASUREMENT	UNIT	PRICE	AMOUNT
LAND ACQUISITION	2.858.927	USD	1,00	2.858.927 USD
LAND ACQUISITION	4.342.672	USD	1,00	4.342.672 USD
PROCUREMENT RISK PROVISION	5,00	%	72.015,99	360.080 USD
TOTAL LAND	7.561.679 USD			

Table 275. CAPEX of Line 4: Land.

4.7 Environmental and social measures

ENVIRONMENTAL AND SOCIAL MEASURES	MEASUREMENT	UNIT	PRICE	AMOUNT
ENVIRONMENTAL MEASURES	0,09	PA	5.000.000,00	450.000 USD
SOCIAL MEASURES	0,09	PA	5.000.000,00	450.000 USD
TOTAL ENVIRONMENTAL AND SOCIAL MEASURES	900.000 USD			

Table 276. CAPEX of Line 4: Environmental and social measures.

5 CAPEX OF LINE 5

CAPEX	AMOUNT	PROPORTION
INFRASTRUCTURES AND SYSTEMS	12.972.724 USD	78,69%
INDIRECT COSTS	1.427.000 USD	8,66%
ROLLING STOCK	0 USD	0,00%
DESIGN AND IMPLEMENTATION	1.079.979 USD	6,55%
RISK ASSESSMENT SYSTEM	77.399 USD	0,47%
LAND	629.074 USD	3,82%
ENVIRONMENTAL AND SOCIAL MEASURES	300.000 USD	1,82%
TOTAL		16.486.175 USD

Table 277. CAPEX of Line 5.

5.1 Infrastructure and systems

INFRASTRUCTURES AND SYSTEMS	AMOUNT	PROPORTION
PRELIMINARY WORKS	555.439 USD	4,28%
STRUCTURES	0 USD	0,00%
PLATFORM AND TRACK SUPERSTRUCTURE	5.102.725 USD	39,33%
STATIONS	747.555 USD	5,76%
DEPOTS, WORKSHOPS AND ADMINISTRATIVE BUILDINGS	0 USD	0,00%
DRAINAGE	261.713 USD	2,02%
ELECTRIFICATION	1.217.109 USD	9,38%
SIGNALLING SYSTEMS	2.446.000 USD	18,85%
SYSTEMS AND COMMUNICATIONS	869.886 USD	6,71%
URBAN INTEGRATION	756.000 USD	5,83%
RESTORATION OF HISTORICAL HERITAGE	0 USD	0,00%
AFFECTED SERVICES AND REPLACEMENT	657.604 USD	5,07%
QUALITY ASSURANCE	119.564 USD	0,92%
WASTE MANAGEMENT	59.782 USD	0,46%
HEALTH AND SAFETY	179.346 USD	1,38%
TOTAL INFRASTRUCTURE AND SYSTEMS		12.972.724 USD

Table 278. CAPEX of Line 5: Infrastructure and systems.

5.1.1 Preliminary works

PRELIMINARY WORKS	MEASUREMENT	UNIT	PRICE	AMOUNT
TOPOGRAPHIC CAMPAIGN				27.000 USD
Topographical Campaign's Raised Item	270,00	ha	100,00	27.000 USD
GEOTECHNICAL CAMPAIGN				42.439 USD
Mobilization and demobilization of equipment and personnel to the area of operation	1,00	u	1.000,00	1.000 USD
Moving drilling machinery between geotechnical boreholes	8,00	u	100,00	800 USD
Vertical drilling with continuous core extraction in all types of terrain	166,73	m	155,00	25.843 USD
Unchanged sample taking	33,00	u	40,00	1.320 USD
SPT (Standard Penetration Test)	33,00	u	40,00	1.320 USD
Wax sampling on rock barrel	4,00	u	5,00	20 USD
Boxes of plastic or waxed cardboard for storing core material obtained by rotary drilling	56,00	u	3,00	168 USD
Polling testimony, photo reportage and final records	166,73	m	3,00	500 USD
PVC grooved tube, for measuring water levels	10,42	m	10,00	104 USD
Measurement of groundwater levels	1,56	u	5,00	8 USD
Water sampling in drilling	0,42	u	15,00	6 USD
Dynamic Penetration DPSH/Blast	69,20	m	15,00	1.038 USD
Geophysical research	152,74	m	14,00	2.138 USD
Mechanical (Backhoe) tiling up to 3-4m	4,00	u	175,00	700 USD
Unaltered sampling in calcite by means of a waxed block	4,00	u	100,00	400 USD
Laboratory	20,00	%	353,66	7.073 USD
TRANSIT DEVIATIONS				135.000 USD
Lifting of transit deviations	2,70	km	50.000,00	135.000 USD
DEVIATION AND PROTECTION OF NETWORKS				135.000 USD
Raised departure of deviation and protection of networks	2,70	km	50.000,00	135.000 USD
CLEANING, REMOVALS AND DEMOLITIONS				216.000 USD
Lift off for cleaning, track removal and dismantling	2,70	km	80.000,00	216.000 USD
TOTAL PRELIMINARY WORK				555.439 USD

Table 279. CAPEX of Line 5: Preliminary works.

5.1.2 Structures

STRUCTURES	MEASUREMENT	UNIT	PRICE	AMOUNT
BRIDGES				0 USD
Deck (width 9m) prefabricated double t-beam depth 0,60m	0,00	m	3.430,40	0 USD
Deck (width 11m) prefabricated double t-beam depth 0,60m	0,00	m	4.128,28	0 USD
Deck (width 9m) prefabricated double t-beam depth 0,90m	0,00	m	3.936,80	0 USD
Deck (width 9m) prefabricated double t-beam depth 1,20m	0,00	m	4.443,16	0 USD
Deck (width 11m) prefabricated double t-beam depth 1,20m	0,00	m	5.394,23	0 USD
Deck (width 9m) prefabricated double t-beam depth 1,40m	0,00	m	4.780,76	0 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	0,00	m	5.202,72	0 USD
Bridge pier	0,00	m	1.976,66	0 USD
Bridge pier foundation	0,00	u	11.482,55	0 USD
Stirrup	0,00	u	74.583,71	0 USD
Other	0,00	u	23.800,00	0 USD
Single track bridge renovation	0,00	m2	7.300,00	0 USD
VIADUCTS				0 USD
Deck (width 9m) prefabricated double t-beam depth 1,65m	0,00	m	5.202,72	0 USD
Deck (width 11m) prefabricated double t-beam depth 1,65m	0,00	m	6.343,68	0 USD
Viaduct pier	0,00	m	3.573,23	0 USD
Viaduct pier foundation	0,00	u	11.482,55	0 USD
Stirrup	0,00	u	74.583,71	0 USD
Other	0,00	u	23.800,00	0 USD
CUT&COVER				0 USD
Demolition	0,00	km	200.000,00	0 USD
Screen wall	0,00	km	7.500.000,00	0 USD
Top slab	0,00	km	3.200.000,00	0 USD
Urbanization	0,00	km	2.400.000,00	0 USD
Interior excavation	0,00	km	2.400.000,00	0 USD
Bottom slab	0,00	km	2.400.000,00	0 USD
WALLS				0 USD
Concrete wall	0,00	m	557,01	0 USD
TOTAL STRUCTURES				0 USD

Table 280. CAPEX of Line 5: Structures.

5.1.3 Platform and track superstructure

PLATFORM AND TRACK SUPERSTRUCTURE	MEASUREMENT	UNIT	PRICE	AMOUNT
BALLAST TRACK				3.005.185 USD
Ballasted track on vignole rail	0,00	km	1.762.810,41	0 USD
Single ballast track on vignole rail	0,00	km	915.965,29	0 USD
Fenced ballasted track on vignole rail	1,48	km	2.030.530,41	3.005.185 USD
Fenced single ballast track on vignole rail	0,00	km	1.183.685,29	0 USD
SLAB TRACK				1.445.642 USD
Slab track on vignole rail	0,00	km	2.021.288,51	0 USD
Single slab track on vignole rail	0,00	km	1.018.259,59	0 USD
Slab track at station on vignole rail	0,10	km	1.866.874,51	186.687 USD
Slab track on throat rail	0,00	km	1.483.904,23	0 USD
Single slab track on throat rail	0,00	km	749.567,12	0 USD
Fenced slab track on vignole rail	0,55	km	2.289.008,51	1.258.955 USD
Fenced single slab track on vignole rail	0,00	km	1.285.979,59	0 USD
Slab track viaduct on vignole rail	0,00	km	1.778.734,51	0 USD
Slab track Cut&Cover on vignole rail	0,00	km	2.404.754,51	0 USD
TRACK EQUIPMENT				651.898 USD
Bretelle	1,00	u	425.000,00	425.000 USD
Escapes	0,00	u	182.380,43	0 USD
Deviations	2,00	u	97.015,85	194.032 USD
End of track	2,00	u	16.433,12	32.866 USD
TOTAL PLATFORM AND TRACK SUPERSTRUCTURE				5.102.725 USD

Table 281. CAPEX of Line 5: Platform and track superstructure.

5.1.4 Stations

STATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
STATION TYPE (SIDE PLATFORMS)	1,00	u	747.554,72	747.555 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal canopy structure	10,40	u	57.000,00	592.800 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	1,00	u	22.670,72	22.671 USD
STATION TYPE (CENTRAL PLATFORM)	0,00	u	379.819,36	0 USD
90 m platform with access ramps	1,00	u	60.000,00	60.000 USD
10 m metal canopy structure	5,20	u	57.000,00	296.400 USD
Urbanization	600,00	m2	20,14	12.084 USD
Equipment	0,50	u	22.670,72	11.335 USD
INTERMODAL STATION	0,00	u	909.638,72	0 USD
90 m platform with access ramps	2,00	u	60.000,00	120.000 USD
10 m metal structure canopy	10,40	u	57.000,00	592.800 USD
4 m metal canopy structure	5,00	u	30.000,00	150.000 USD
Urbanization	1.200,00	m2	20,14	24.168 USD
Equipment	1,00	u	22.670,72	22.671 USD

UNIQUE STATION	0,00	u	8.000.000,00	0 USD
Station	1,00	u	5.500.000,00	5.500.000 USD
OCC equipment	1,00	u	1.000.000,00	1.000.000 USD
Urbanization	1,00	u	1.500.000,00	1.500.000 USD
TOTAL STATIONS	747.555 USD			

Table 282. CAPEX of Line 5: Stations.

5.1.5 Depots, workshops and administrative buildings

Line 5 does not have parking lots, workshops and administrative buildings, so its economic estimate is 0 USD.

5.1.6 Drainage

DRAINAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
TRANSVERSE DRAINAGE				0 USD
Frame 3mx2m	0,00	u	33.155,86	0 USD
Frame 5mx2,5m	0,00	u	54.015,69	0 USD
Frame 7mx3m	0,00	u	90.299,60	0 USD
LONGITUDINAL DRAINAGE				261.713 USD
Trapezoidal 1,00mx0,50m	2,96	km	63.641,19	188.378 USD
Circular diameter 0,40m	0,65	km	112.823,58	73.335 USD
Rectangular 0,50mx0,50m	0,00	km	58.534,25	0 USD
TOTAL DRAINAGE	261.713 USD			

Table 283. CAPEX of Line 5: Drainage.

5.1.7 Electrification

ELECTRIFICATION	MEASUREMENT	UNIT	PRICE	AMOUNT
MV SUBSTATIONS AND CONNECTIONS				0 USD
MV electrical connection	0,00	u	313.935,34	0 USD
Double group traction substation 1.5 MW	0,00	u	1.237.166,13	0 USD
Double group traction substation 1 MW	0,00	u	1.143.999,54	0 USD
Double group traction substation 1 MW for parking	0,00	u	1.248.944,36	0 USD
STOPS AND LV CONNECTIONS				108.454 USD
Single circuit LV electrical connection	1,00	u	33.254,42	33.254 USD
Electrical installations at quadruple platform stops	0,00	u	122.622,17	0 USD
Electrical installations at double platform stops	1,00	u	75.199,98	75.200 USD
Electrical installations at single platform stops	0,00	u	57.599,99	0 USD

TRACK ELECTRIFICATION				1.108.655 USD
Catenary compensated on h poles	2,40	km	280.873,38	674.096 USD
Bare feeder cable consisting of double copper wire 450 kcmil (2x225 mm2)	2,40	km	79.442,36	190.662 USD
Motorized disconnection and remote control	3,00	u	5.555,56	16.667 USD
Independent compensation	18,00	u	8.722,22	157.000 USD
Fixed anchor point	4,00	u	1.722,22	6.889 USD
Fixed point for catenary	6,00	u	3.888,87	23.333 USD
3 KV line	2,40	km	16.670,00	40.008 USD
DEPOT ELECTRIFICATION				0 USD
240 mm2 copper cable with 1.8/3 kv XLPE insulation for catenary supply	0,00	m	50,00	0 USD
240 mm2 copper cable with 1.8/3 kv XLPE insulation for return	0,00	m	50,00	0 USD
Catenary	0,00	km	111.884,44	0 USD
DEPOT EQUIPMENT				0 USD
Intermediate insulator anchoring point	0,00	u	166,67	0 USD
Section isolator	0,00	u	1.666,67	0 USD
Wiring	0,00	m	15,55	0 USD
Other facilities	0,00	u	120.927,83	0 USD
TOTAL ELECTRIFICATION				1.217.109 USD

Table 284. CAPEX of Line 5: Electrification.

5.1.8 Signaling systems

SIGNALLING SYSTEMS	MEASUREMENT	UNIT	PRICE	AMOUNT
RAIL SIGNALLING				1.400.000 USD
In-line interlocking signaling	1,00	u	1.400.000,00	1.400.000 USD
Depot interlocking signaling	0,00	u	1.400.000,00	0 USD
RAILWAY PROTECTION				486.000 USD
On-track equipment	2,70	km	180.000,00	486.000 USD
On-board equipment	0,00	u	80.000,00	0 USD
ROAD SIGNS				560.000 USD
Pedestrian walkway configuration	2,00	u	10.000,00	20.000 USD
Level crossings with barrier and crossing conditioning	9,00	u	60.000,00	540.000 USD
TOTAL SIGNALLING SYSTEMS				2.446.000 USD

Table 285. CAPEX of Line 5: Signaling systems.

5.1.9 Systems and communications

SYSTEMS AND COMMUNICATIONS	MEASUREMENT	UNIT	PRICE	AMOUNT
OPTICAL FIBER				44.139 USD
Single-mode F.O. cable	2,97	km	8.333,33	24.750 USD
Modular F.O. distributor	1,00	u	5.388,89	5.389 USD
Cable head termination 64 F.O.	2,00	u	1.196,67	2.393 USD
1 F.O. splice	64,00	u	44,44	2.844 USD
1 F.O. connection	64,00	u	83,33	5.333 USD
1 F.O. bi-directional reflectometric measurement	1,92	u	50,00	96 USD
Fiber monitoring system	0,03	u	111.111,11	3.333 USD
FIXED COMMUNICATIONS NETWORK				25.673 USD
Copper UTP wiring	200,00	m	5,56	1.112 USD
Station/Substation Switch (level 2)	1,00	u	13.333,33	13.333 USD
Level 3 switch	0,24	u	20.277,78	4.867 USD
Copper distributor	1,00	u	227,78	228 USD
19" rack cabinet	1,00	u	2.000,00	2.000 USD
Integrated Service Network Configuration	1,24	u	3.333,33	4.133 USD
Central server for network management and communications	0,00	u	16.666,67	0 USD
WIFI				13.400 USD
WIFI infrastructure	0,03	u	446.667,00	13.400 USD
TETRA				258.621 USD
TETRA infrastructure	2,70	km	95.785,44	258.621 USD
TRAVELER INFORMATION SYSTEM (SIV)				38.869 USD
Terminal stop	4,00	u	6.333,33	25.333 USD
Local server stop indicators	1,00	u	2.508,89	2.509 USD
42" hall monitor.	2,00	u	3.213,33	6.427 USD
Central system	0,03	u	153.333,33	4.600 USD
MEGAPHONE				25.556 USD
Speaker, power amplifier, local server	1,00	u	22.222,22	22.222 USD
Central system	0,03	u	111.111,11	3.333 USD
TICKETS				413.200 USD
Vending machine	4,00	u	40.000,00	160.000 USD
Cancellation machine	12,00	u	20.000,00	240.000 USD
Central system	0,03	u	220.000,00	6.600 USD
Vending machine software development	0,03	u	110.000,00	3.300 USD
Cancellation software development	0,03	u	110.000,00	3.300 USD
TELEPHONY AND INTERCOM				3.318 USD
IP Intercom	4,00	u	694,44	2.778 USD
IP Phone	2,00	u	227,78	456 USD
Quadrangular distribution	0,03	u	2.824,44	85 USD
Central system	0,00	u	55.555,56	0 USD
CHRONOMETRY				6.000 USD
NTP PoE Clock	2,00	u	3.000,00	6.000 USD
Central Time Server	0,00	u	9.111,11	0 USD

Time Zone	0,00	u	1.333,33	0 USD
GPS antenna	0,00	u	944,44	0 USD
CCTV				31.667 USD
Outdoor fixed camera	3,00	u	5.000,00	15.000 USD
Recorder station	1,00	u	16.666,67	16.667 USD
Central system	0,00	u	111.111,11	0 USD
CCTA				2.778 USD
CCTA module	1,00	u	2.777,78	2.778 USD
SAE				6.667 USD
Central SAFs	0,03	u	222.222,22	6.667 USD
CENTRAL CONTROL STATION (PCC)				0 USD
Videowall	0,00	u	333.333,33	0 USD
LAN Network	0,00	u	111.111,11	0 USD
Operator PC	0,00	u	2.666,67	0 USD
Communication cabinets	0,00	u	3.333,33	0 USD
5m UTP copper cabling	0,00	m	38,89	0 USD
15m UTP copper cabling	0,00	m	50,00	0 USD
Installation, configuration, testing and commissioning of the PMC	0,00	u	22.222,22	0 USD
TOTAL SYSTEMS AND COMMUNICATIONS				869.886 USD

Table 286. CAPEX of Line 5: Systems and communications.

5.1.10 Urban integration

URBAN INTEGRATION	MEASUREMENT	UNIT	PRICE	AMOUNT
A LUMP SUM FOR URBAN INTEGRATION	2,70	km	280.000,00	756.000 USD
A LUMP SUM FOR POSSIBLE INTERMODAL STATION	0,00	u	100.000,00	0 USD
TOTAL URBAN INTEGRATION				756.000 USD

Table 287. CAPEX of Line 5: Urban integration.

5.1.11 Restoration of historical heritage

RESTORATION OF HISTORICAL HERITAGE	MEASUREMENT	UNIT	PRICE	AMOUNT
A LUMP SUM FOR THE REHABILITATION OF HISTORICAL HERITAGE	0,00	PA	12.500.000	0 USD
TOTAL REHABILITATION OF HISTORICAL HERITAGE PROPERTIES				0 USD

Table 288. CAPEX of Line 5: Restoration of historical heritage.

5.1.12 Affected services and replacements

AFFECTED SERVICES AND REPLACEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM FOR AFFECTED SERVICES AND REPLENISHMENT	5,50	%	119.564,27	657.604 USD
TOTAL AFFECTED SERVICES AND REPLACEMENT	657.604 USD			

Table 289. CAPEX of Line 5: Affected services and replacements.

5.1.13 Quality control

QUALITY CONTROL	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF QUALITY CONTROL	1,00	%	119.564,27	119.564 USD
TOTAL QUALITY CONTROL	119.564 USD			

Table 290. CAPEX of Line 5: Quality control.

5.1.14 Waste management

WASTE MANAGEMENT	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF WASTE MANAGEMENT	0,50	%	119.564,27	59.782 USD
TOTAL WASTE MANAGEMENT	59.782 USD			

Table 291. CAPEX of Line 5: Waste management.

5.1.15 Health and safety

HEALTH AND SAFETY	MEASUREMENT	UNIT	PRICE	AMOUNT
LUMP SUM OF HEALTH AND SAFETY	1,50	%	119.564,27	179.346 USD
TOTAL HEALTH AND SAFETY	179.346 USD			

Table 292. CAPEX of Line 5: Health and safety.

5.2 Indirect costs

INDIRECT COSTS	MEASUREMENT	UNIT	PRICE	AMOUNT
CONTINGENCIES, ADMINISTRATION AND UTILITY	11,00	%	129.727,24	1.427.000 USD
TOTAL INDIRECT COSTS	1.427.000 USD			

Table 293. CAPEX of Line 5: Indirect costs.

5.3 Rolling stock

ROLLING STOCK	MEASUREMENT	UNIT	PRICE	AMOUNT
DOUBLE COMPOSITION ELECTRIC TRAIN	0,00	u	5.800.000,00	0 USD
TOTAL ROLLING STOCK				0 USD

Table 294. CAPEX of Line 5: Rolling stock.

5.4 Design and implementation

DESIGN AND IMPLEMENTATION	MEASUREMENT	UNIT	PRICE	AMOUNT
BASIC ENGINEERING AND FINAL DESIGNS	2,50	%	143.997,23	359.993 USD
CONSTRUCTION SUPERVISION	3,50	%	143.997,23	503.990 USD
PROJECT MANAGEMENT	0,50	%	143.997,23	71.999 USD
COST CONTINGENCIES OF THE GRANTOR IN THE CONSTRUCTION PHASE	1,00	%	143.997,23	143.997 USD
TOTAL DESIGN AND IMPLEMENTATION				1.079.979 USD

Table 295. CAPEX of Line 5: Design and implementation.

5.5 SEVRI

RISK ASSESSMENT SYSTEM	MEASUREMENT	UNIT	PRICE	AMOUNT
COSTS ASSOCIATED WITH THE SEVRI	0,50	%	154.797,03	77.399 USD
TOTAL SEVRI				77.399 USD

Table 296. CAPEX of Line 5: SEVRI.

5.6 Land

LAND	MEASUREMENT	UNIT	PRICE	AMOUNT
LAND ACQUISITION	310.961,81	USD	1,00	310.962 USD
LAND ACQUISITION	288.156,23	USD	1,00	288.156 USD
PROCUREMENT RISK PROVISION	5,00	%	5.991,18	29.956 USD
TOTAL LAND				1.584.426 USD

Table 297. CAPEX of Line 5: Land.

5.7 Environmental and social measures

ENVIRONMENTAL AND SOCIAL MEASURES	MEASUREMENT	UNIT	PRICE	AMOUNT
ENVIRONMENTAL MEASURES	0,03	PA	5.000.000,00	150.000 USD
SOCIAL MEASURES	0,03	PA	5.000.000,00	150.000 USD
TOTAL ENVIRONMENTAL AND SOCIAL MEASURES	300.000 USD			

Table 298. CAPEX of Line 5: Environmental and social measures.

ANNEX III: ANALYSIS OF INTERSECTIONS TO BE UNEVEN

1 ANALYSIS OF INTERSECTIONS TO BE UNEVEN

The analysis of unevenly projected intersections is carried out in order to avoid the crossing between the Electric Train and the road. Of the 14 intersections studied, only 3 of them (Antigua Aduana, Río Segundo and Salida Platel) could be unlevelled by means of road underpasses, while the rest of the intersections would require action on the railway line (viaduct). The images attached at the end of the document show all the intersections with their corresponding conditions. Below are the conclusions of the analysis for each of the intersections:

Intersection	Name	Solution	Reason
4	Loyola, Cartago	Viaduct	Insufficient space to go down to the level. Insufficient space for access.
12	Curridabat	Viaduct	Insufficient space for access leaving homes without access.
17	Antigua Aduana	Road underpass	-
19	Calle Blancos	Viaduct	Insufficient space for access to housing. There is access for trucks to company very close and would not reach the level of unevenness.
20	Metalco	Viaduct	There is access for trucks to company very close and would not reach the level of unevenness.
21	Santa Rosa	Viaduct	Insufficient space for access to housing. There is access for trucks to company very close and would not reach the level of unevenness.
26	Río Segundo, est.	Viaduct	There is access for trucks to company very close and would not reach the level of unevenness.
27	Río Segundo	Road underpass	-
28	Las Cañas	Viaduct	It affects a major road having to eliminate many turns, losing the functionality of the network. If it were to be carried out, it would be a major work.
29	Hospital	Viaduct	The Inyu Las Cañas River is very close. There is access for trucks to company very close and would not reach the level of unevenness.
30	Ciruelas RCA	Viaduct	Insufficient space for access to housing. There is access for trucks to company very close and would not reach the level of unevenness.
33	Salida Platel	Road underpass	-

Intersection	Name	Solution	Reason
38	Demasa	Viaduct	Insufficient space to maintain access to adjacent buildings. Insufficient space to maintain access to companies in the vicinity, making their access by car unusable.
40	Corazón de Jesús	Viaduct	Insufficient space for access to housing. There is access for trucks to company very close and would not reach the level of unevenness. Insufficient space to maintain access to companies in the vicinity, making access by car unusable.

Table 299. Analysis of the studied intersections.

When planning the underpasses, it was considered that all the affected lanes would be buried. This includes sidewalks and access lanes on surfaces of the houses once the underpass is made.

It should be noted that, in order to carry out the underpasses, some of the turns involved in them will have to be eliminated and the adjacent streets will have to be arranged to maintain adequate traffic in the vicinity of the intersections.

On the other hand, for the implementation of railway viaducts, it is necessary to raise those stations that are located in areas where viaducts are required. Thus, the stations to be raised would be:

- Freses
- Calle Blancos
- Hospital Alajuela
- Ciruelas RCA

In addition, the viaducts imply the suppression of the footbridges in the brewery and in the area of Las Cañas, since they enter into conflict when the route is raised.

It is worth mentioning that the Demasa intersection, at the time the study was carried out, only had 2 (1+1) lanes, thus obtaining service levels F. However, this intersection currently has 4 (2+2) lanes, so its service levels improve to B according to the HCM.

In summary, the intersections studied assume the following:

Crossing	Gauge station	Name	EST	Solution	Start	End	Length	Height	Involved crossings
43	4	Loyola, Cartago	108+380	Viaduct	108+200	108+550	350 m	5,5 m	43
84	12	Curridabat	123+605	Viaduct	123+200	123+750	550 m	5,5 m	84
104	17	Antigua Aduana	127+100	Road underpass	Required area:		12.000 m2	5,5 m	104
115	19	Calle Blancos	201+670	Viaduct	201+340	202+230	890 m	5,5 m	114, 115, 116, 117
122	20	Metalco	203+605	Viaduct	203+440	203+780	340 m	5,5 m	122
132	21	Santa Rosa	206+320	Viaduct	206+150	206+730	580 m	5,5 m	132, 133
185	26	Río Segundo, est.	216+000	Viaduct	215+900	216+350	450 m	5,5 m	185
191	27	Río Segundo	217+730	Road underpass	Required area:		6.000 m2	5,5 m	191
206	28	Las Cañas	220+300	Viaduct	220+150	221+230	1.080 m	5,5 m	206, 207, 208, 209, 210, 211, 212
210	29	Hospital	220+750						
382	30	Ciruelas RCA	406+590	Viaduct	406+050	406+950	900 m	5,5 m	382, 383, 384, 385, 386, 387, 388
246	33	Salida Platel	302+310	Road underpass	Required area:		9.000 m2	5,5 m	246
299-300	38	Demasa	310+790	Viaduct	310+620	310+960	340 m	5,5 m	299-300
336-337	40	Corazón de Jesús	320+020	Viaduct	319+740	320+500	760 m	5,5 m	335, 336-337, 338, 339, 340, 341

Table 300. Summary of analysed intersections.

Leyenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

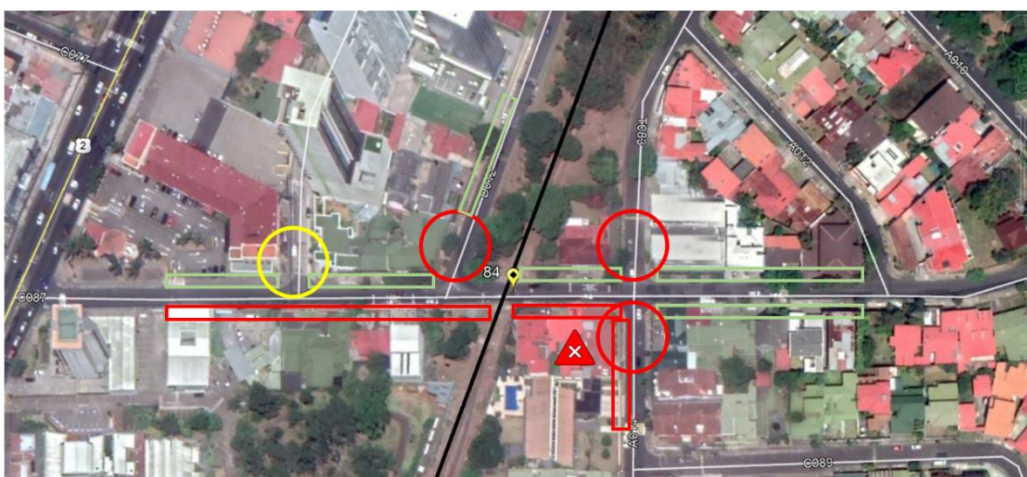
Intersección 4 **Loyola, Cartago**



Leyenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

Intersección 12 **Curridabat**



Leyenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

Intersección 17 **Antigua Aduana**



Leyenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

Intersección 19 **Calle Blancos**



Legenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

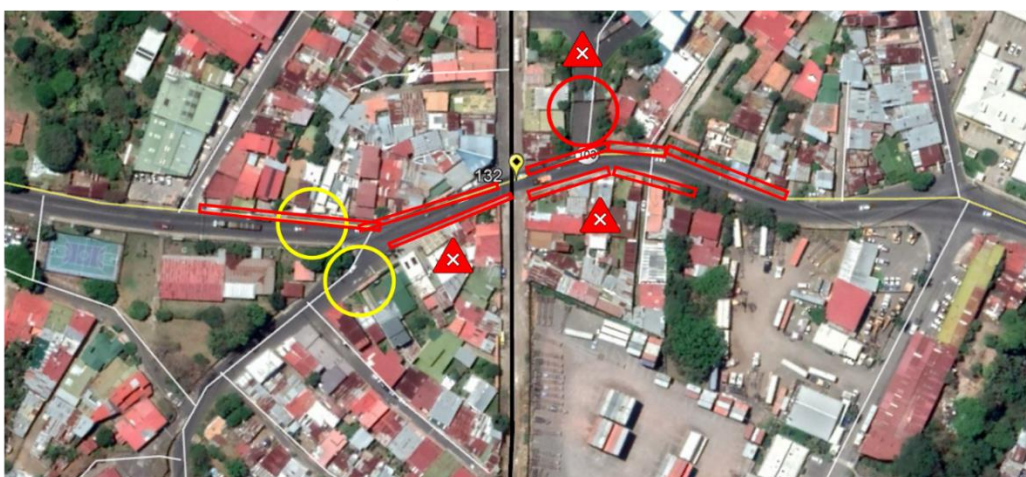
Intersección 20 Metalco



Legenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

Intersección 21 Santa Rosa



Leyenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

Intersección 26 **Río Segundo, est.**



Leyenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

Intersección 27 **Río Segundo**



Leyenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

Intersección 28

Las Cañas

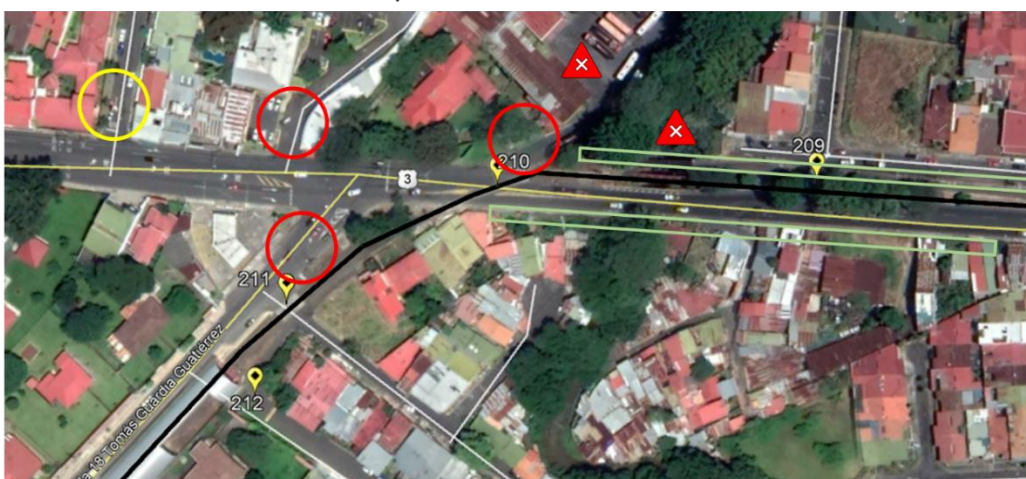


Leyenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

Intersección 29

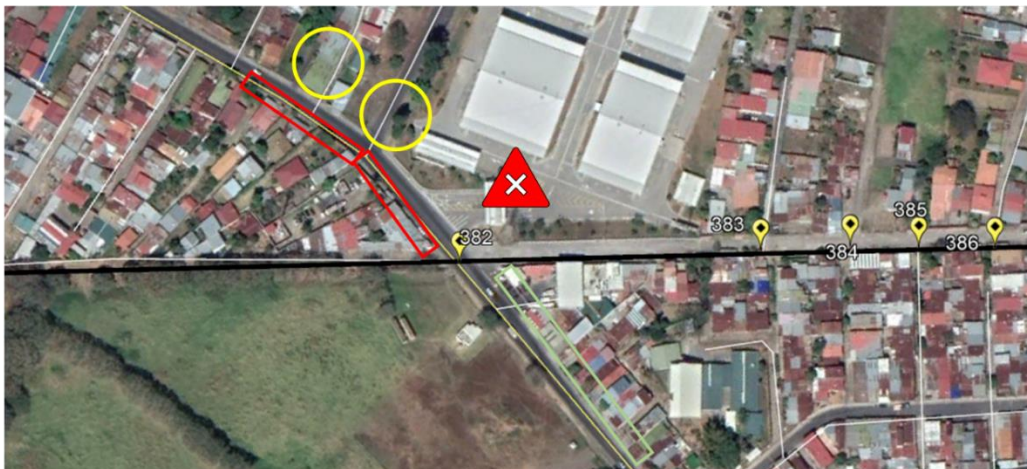
Hospital



Leyenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

Intersección 30 Ciruelas RCA



Leyenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

Intersección 33 Salida Platel



Leyenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

Intersección 38

Demasa



Leyenda

- Espacio suficiente para carretera de acceso
- Espacio insuficiente para carretera de acceso
- Mínima intervención para adecuación
- Gran intervención para adecuación
- ✕ Intervención inviable para adecuación

Intersección 40

Corazón de Jesús



ANNEX IV: OPEX CALCULATION

1 COMMEN COSTS

1.1 Directorate general

DIRECTORATE GENERAL	STAFF	COST
DIRECTORATE GENERAL STAFF		
MANAGING DIRECTOR	1	91.032 USD
MANAGEMENT SECRETARIAT	1	15.172 USD
HUMAN RESOURCES DIRECTOR	1	52.571 USD
FINANCIAL DIRECTOR	1	73.432 USD
MARKETING AND COMMUNICATIONS OFFICER	1	46.730 USD
LEGAL HOLDER	1	61.194 USD
ADMINISTRATIVE	8	10.115 USD
SECRETARIATS	8	10.115 USD
TOTAL STAFF DIRECTORATE GENERAL	22 staff	501.964 USD

Table 301. Common OPEX: Directorate General.

1.2 Operation Management

COMMON OPERATIONAL MANAGEMENT	STAFF	COST
MANAGEMENT STAFF	4	214.582 USD
DIRECTOR OF OPERATIONS	1	67.313 USD
DIRECTOR OF INFRASTRUCTURE MAINTENANCE	1	67.313 USD
DIRECTOR OF ROLLING STOCK MAINTENANCE	1	67.313 USD
EXECUTIVE OFFICE	1	12.643 USD
TECHNICAL-ADMINISTRATIVE OFFICE STAFF	10	182.493 USD
TECHNICAL-ADMINISTRATIVE OPERATION OFFICE MANAGER	1	40.888 USD
SECRETARIAT	1	10.115 USD
HEAD OF TECHNICAL OFFICE	1	25.287 USD
TECHNICAL MANAGERS	2	15.172 USD
SIMULATION OPERATOR	1	15.172 USD
ECONOMIC OPERATORS	1	15.172 USD
TICKETING OPERATOR	1	15.172 USD
PERSONNEL MANAGERS	2	15.172 USD
PCC STAFF	24	549.655 USD
CCP MANAGER	1	40.888 USD
ROOM SUPERVISOR	5	25.287 USD
TRAFFIC OPERATOR, IISS, SAE, TETRA	5	21.241 USD
CUSTOMER SERVICE OPERATOR, TRAVEL INFORMATION SYSTEM	3	21.241 USD
SECURITY, CCTV AND ACCESS CONTROL OPERATOR	5	21.241 USD
ENERGY OPERATOR	5	21.241 USD
TOTAL COMMON OPERATION MANAGEMENT STAFF	38 staff	946.730 USD

Table 302. Common OPEX: Operation Management.

1.3 Operating consumables

TOTAL COMMON OPERATING CONSUMABLES	QUANTITY	COST
PERSONAL CLOTHING		0 USD
CLOTHED STAFF	0 staff	200,00 USD
OFFICE SUPPLIES		18.000 USD
OFFICE PERSONNEL	60 staff	300,00 USD
MATERIALS CLEANING STATIONS, WORKSHOPS AND BUILDING		0 USD
SIDE PLATFORM STATION	0 stations	-
CENTRAL PLATFORM	0 stations	-
STATION	0 stations	1.500,00 USD
DEPOTS	0 depots	2.000,00 USD
WORKSHOPS	0 workshops	3.500,00 USD
ADMINISTRATION BUILDING	0 buildings	6.500,00 USD
TOTAL COMMON OPERATING CONSUMABLES		18.000,00 USD

Table 303. Common OPEX: Operating consumables.

2 COSTS LINE 1

2.1 General operation

OPERATION MANAGEMENT LINE 1	STAFF	COST
LINE AND STATION STAFF	37	526.391 USD
LINE AND STATION MANAGER	1	40.888 USD
STATION AGENT	12	15.172 USD
STATION ASSISTANT	12	10.115 USD
FRAUD CONTROL OFFICER (INTERVENTION GROUP)	12	15.172 USD
DRIVERS	46	977.074 USD
DRIVER	46	21.241 USD
SECURITY PERSONNEL STATIONS AND FACILITIES	71	748.913 USD
SAFETY AND CIVIL PROTECTION MANAGER	1	40.888 USD
CIVIL DEFENCE AGENT	1	10.115 USD
SECURITY AGENT IN STATIONS	44	10.115 USD
SECURITY AGENT IN FACILITIES (WORKSHOPS, ADM BUILDING)	13	10.115 USD
FRAUD CONTROL SECURITY OFFICER (INTERVENTION GROUP)	12	10.115 USD
ONLINE SECURITY STAFF	12	121.376 USD
ONLINE SECURITY AGENT	12	10.115 USD
CLEANING STAFF TRAINS AND FACILITIES	48	518.881 USD
CLEANING AND ENVIRONMENTAL SUPERVISOR	3	21.241 USD
CLEANING AGENT IN STATIONS	24	10.115 USD
TRAIN CLEANING AGENT	15	10.115 USD
ADMINISTRATIVE BUILDING CLEANING AGENT	6	10.115 USD
TOTAL OPERATING MANAGEMENT STAFF LINE 1	214 staff	2.892.635 USD

Table 304. OPEX for Line 1: General operation.

2.2 Operating consumables

TOTAL OPERATING CONSUMABLES LINE 1	QUANTITY	COST
PERSONAL CLOTHING		42.200,00 USD
CLOTHED STAFF	211 staff	200,00 USD
OFFICE SUPPLIES		1.500,00 USD
OFFICE PERSONNEL	5 staff	300,00 USD
MATERIALS CLEANING STATIONS, WORKSHOPS AND BUILDING		31.000,00 USD
SIDE PLATFORM STATION	13 stations	-
CENTRAL PLATFORM	2 stations	-
STATION	15 stations	1.500,00 USD
DEPOTS	1 depots	2.000,00 USD

WORKSHOPS	0 workshops	3.500,00 USD
ADMINISTRATION BUILDING	1 buildings	6.500,00 USD
TOTAL OPERATING CONSUMABLES LINE 1		74.700,00 USD

Table 305. OPEX for Line 1: Operating consumables.

2.3 Infrastructure Maintenance Management

LINE INFRASTRUCTURE MAINTENANCE 1	STAFF	COST
DIRECTORATE OF INFRASTRUCTURE MAINTENANCE	1	52.571 USD
DIRECTOR OF INFRASTRUCTURE MAINTENANCE	0	67.313 USD
INFRASTRUCTURE MAINTENANCE MANAGER	1	52.571 USD
MAINTENANCE ROAD AND CIVIL WORKS	28	389.843 USD
HEAD OF SERVICE	1	40.888 USD
ROAD MAINTENANCE	18	235.165 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified Agents</i>	5	12.643 USD
<i>Agents</i>	9	10.115 USD
MAINTENANCE OF CIVIL WORKS	9	113.790 USD
<i>Technicians</i>	3	15.172 USD
<i>Qualified Agents</i>	3	12.643 USD
<i>Agents</i>	3	10.115 USD
POWER SYSTEM MAINTENANCE	29	430.302 USD
HEAD OF SERVICE	1	40.888 USD
CATENARY MAINTENANCE	14	194.707 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified Agents</i>	5	12.643 USD
<i>Agents</i>	5	10.115 USD
MAINTENANCE OF SUBSTATIONS	14	194.707 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified Agents</i>	5	12.643 USD
<i>Agents</i>	5	10.115 USD
SIGNALING SYSTEMS AND COMMUNICATIONS	25	374.672 USD
HEAD OF SERVICE	1	40.888 USD
SIGNALING AND TRAIN CONTROL	12	189.649 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	5	15.172 USD
<i>Qualified Agents</i>	5	12.643 USD
COMMUNICATIONS, VOICE AND DATA	12	144.134 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified Agents</i>	5	12.643 USD
<i>Agents</i>	5	10.115 USD

STATION EQUIPMENT	39	602.250,88 USD
HEAD OF SERVICE	1	40.888 USD
TICKETING AND ACCESS CONTROL	12	177.006 USD
Supervisor	2	25.287 USD
Technicians	5	15.172 USD
Agents	5	10.115 USD
TRANSPORTATION ELEMENTS	12	189.649 USD
Supervisor	2	25.287 USD
Technicians	5	15.172 USD
Qualified Agents	5	12.643 USD
STATION FACILITIES	14	194.708 USD
Supervisor	2	25.287 USD
Technicians	2	15.172 USD
Qualified Agents	5	12.643 USD
Agents	5	10.115 USD
MANAGEMENT	7	101.146 USD
Supervisor	2	25.287 USD
Agents	5	10.115 USD
TOTAL STAFF INFRASTRUCTURE MAINTENANCE LINE 1	129 staff	1.950.785 USD

Table 306. OPEX for Line 1: Infrastructure Maintenance Management.

2.4 Infrastructure consumables

INFRASTRUCTURE MAINTENANCE LINE 1	QUANTITY	COST
TRACK		136.750,00 USD
SUPPLY OF MATERIALS	54,70 km	2.500,00 USD
TRACK MACHINERY		43.760,00 USD
SUPPLY OF MATERIALS	54,70 km	320,00 USD
OUTSIDE FACILITIES	54,70 km	480,00 USD
CATENARY		38.290,00 USD
SUPPLY OF MATERIALS	54,70 km	700,00 USD
CATENARY EQUIPMENT		11.487,00 USD
SUPPLY OF MATERIALS	54,70 km	210,00 USD
ELECTRIC TRACTION SYSTEM		58.400,00 USD
SUPPLY OF MATERIALS	8 substations	2.920,00 USD
OUTSIDE FACILITIES	8 substations	4.380,00 USD
TICKETS		56.000,00 USD
SUPPLY OF MATERIALS	56 machines	400,00 USD
OUTSIDE FACILITIES	56 machines	600,00 USD
ACCESS CONTROL		40.320,00 USD
SUPPLY OF MATERIALS	168 turnstiles	80,00 USD
OUTSIDE FACILITIES	168 turnstiles	160,00 USD

SEASONAL FACILITIES		45.000,00 USD
SUPPLY OF MATERIALS	15 stations	2.400,00 USD
OUTSIDE FACILITIES	15 stations	600,00 USD
RAIL SIGNALLING		90.000,00 USD
SUPPLY OF MATERIALS	9 interlocks	4.000,00 USD
OUTSIDE FACILITIES	9 interlocks	6.000,00 USD
COMMUNICATIONS		1.000,00 USD
SUPPLY OF MATERIALS	1 buildings	600,00 USD
OUTSIDE FACILITIES	1 buildings	400,00 USD
PCC		0,00 USD
OUTSIDE FACILITIES	0 PCC	23.000,00 USD
MATERIALS AND SUPPLIES		32.100,00 USD
PERSONAL CLOTHING	129 staff	200,00 USD
OFFICE SUPPLIES	21 staff	300,00 USD
INFRASTRUCTURE MAINTENANCE LINE 1		553.107,00 USD

Table 307. OPEX for Line 1: Infrastructure consumables.

2.5 Rolling Stock Management

ROLLING STOCK MAINTENANCE LINE 1	STAFF	COST
DIRECTION OF ROLLING STOCK MAINTENANCE	1	52.571 USD
DIRECTOR OF ROLLING STOCK MAINTENANCE	0	67.313 USD
ROLLING STOCK MAINTENANCE MANAGER	1	52.571 USD
LIGHT MAINTENANCE	53	791.900 USD
HEAD OF SERVICE	1	40.888 USD
PREVENTATIVE MAINTENANCE	23	318.611 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	3	15.172 USD
<i>Qualified agents</i>	6	12.643 USD
<i>Agents</i>	5	10.115 USD
<i>Wheel Turning Technicians</i>	5	15.172 USD
<i>Undercarriage blowing and washing</i>	2	10.115 USD
CORRECTIVE MAINTENANCE	24	356.541 USD
<i>Supervisor</i>	5	25.287 USD
<i>Technicians</i>	5	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	9	10.115 USD
TRAIN MOVEMENT	5	75.860 USD
<i>Technicians</i>	5	15.172 USD
HEAVY MAINTENANCE	0	0 USD
HEAD OF SERVICE	0	40.888 USD
ASSEMBLY - DISASSEMBLY	0	0 USD
<i>Supervisor</i>	0	25.287 USD
<i>Qualified agents</i>	0	12.643 USD

Agents	0	10.115 USD
BOGIES	0	0 USD
Supervisor	0	25.287 USD
Qualified agents	0	12.643 USD
Agents	0	10.115 USD
ELECTRICAL - ELECTRONIC EQUIPMENT	0	0 USD
Supervisor	0	25.287 USD
Technicians	0	15.172 USD
Qualified agents	0	12.643 USD
Agents	0	10.115 USD
MECHANICAL EQUIPMENT - TYRES	0	0 USD
Supervisor	0	25.287 USD
Technicians	0	15.172 USD
Qualified agents	0	12.643 USD
Agents	0	10.115 USD
WAREHOUSE MANAGEMENT	7	113.790 USD
Supervisor	2	25.287 USD
Qualified agents	5	12.643 USD

TOTAL PERSONNEL MAINTENANCE OF ROLLING STOCK LINE 1	61 staff	958.261 USD
--	-----------------	--------------------

Table 308. OPEX for Line 1: Rolling Stock Maintenance Management.

2.6 Rolling stock consumables

ROLLING STOCK MAINTENANCE LINE 1	QUANTITY	COST
ROLLING STOCK		1.015.029,84 USD
SUPPLY OF MATERIALS	2.550 mil km	92,00 USD
OUTSIDE FACILITIES	2.550 mil km	306,00 USD
WORKSHOPS AND DEPOT		40.000,00 USD
SUPPLY OF DEPOT MATERIALS	1 depots	40.000,00 USD
WORKSHOP MATERIALS SUPPLY	0 workshops	250.000,00 USD
OUTSIDE FACILITIES	0 buildings	160.000,00 USD
MATERIALS AND SUPPLIES		15.500,00 USD
PERSONAL CLOTHING	61 staff	200,00 USD
OFFICE SUPPLIES	11 staff	300,00 USD

ROLLING STOCK MAINTENANCE LINE 1	1.070.529,84 USD
---	-------------------------

Table 309. OPEX for Line 1: Rolling stock consumables.

3 COSTS LINE 2

3.1 General operation

OPERATION MANAGEMENT LINE 2	STAFF	COST
LINE AND STATION STAFF	37	526.391 USD
LINE AND STATION MANAGER	1	40.888 USD
STATION AGENT	12	15.172 USD
STATION ASSISTANT	12	10.115 USD
FRAUD CONTROL OFFICER (INTERVENTION GROUP)	12	15.172 USD
DRIVERS	39	828.389 USD
DRIVER	39	21.241 USD
SECURITY PERSONNEL STATIONS AND FACILITIES	71	748.913 USD
SAFETY AND CIVIL PROTECTION MANAGER	1	40.888 USD
CIVIL DEFENCE AGENT	1	10.115 USD
SECURITY AGENT IN STATIONS	44	10.115 USD
SECURITY AGENT IN FACILITIES (WORKSHOPS, ADM BUILDING)	13	10.115 USD
FRAUD CONTROL SECURITY OFFICER (INTERVENTION GROUP)	12	10.115 USD
ONLINE SECURITY STAFF	12	121.376 USD
ONLINE SECURITY AGENT	12	10.115 USD
CLEANING STAFF TRAINS AND FACILITIES	48	518.881 USD
CLEANING AND ENVIRONMENTAL SUPERVISOR	3	21.241 USD
CLEANING AGENT IN STATIONS	24	10.115 USD
TRAIN CLEANING AGENT	15	10.115 USD
BUILDING CLEANING AGENT ADMINISTRATIVE	6	10.115 USD
TOTAL OPERATION MANAGEMENT STAFF LINE 2	207 staff	2.743.950 USD

Table 310. OPEX for Line 2: General operation.

3.2 Operating consumables

TOTAL OPERATING CONSUMABLES LINE 2	QUANTITY	COST
PERSONAL CLOTHING		40.800,00 USD
CLOTHED STAFF	204 staff	200,00 USD
OFFICE SUPPLIES		1.500,00 USD
OFFICE PERSONNEL	5 staff	300,00 USD
MATERIALS CLEANING STATIONS, WORKSHOPS AND BUILDING		34.000,00 USD
SIDE PLATFORM STATION	14 stations	-
CENTRAL PLATFORM	1 stations	-
STATION	15 stations	1.500,00 USD
DEPOTS	1 depots	2.000,00 USD

WORKSHOPS	1 workshops	3.000,00 USD
ADMINISTRATION BUILDING	1 buildings	6.500,00 USD
TOTAL OPERATING CONSUMABLES LINE 2		76.300,00 USD

Table 311. OPEX for Line 2: Operating consumables.

3.3 Infrastructure Maintenance Management

INFRASTRUCTURE MAINTENANCE LINE 2	STAFF	COST
DIRECTORATE OF INFRASTRUCTURE MAINTENANCE	1	52.571 USD
DIRECTOR OF INFRASTRUCTURE MAINTENANCE	0	67.313 USD
INFRASTRUCTURE MAINTENANCE MANAGER	1	52.571 USD
ROAD MAINTENANCE AND CIVIL WORKS	28	389.843 USD
HEAD OF SERVICE	1	40.888 USD
ROAD MAINTENANCE	18	235.165 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	9	10.115 USD
MAINTENANCE OF CIVIL WORKS	9	113.790 USD
<i>Technicians</i>	3	15.172 USD
<i>Qualified agents</i>	3	12.643 USD
<i>Agents</i>	3	10.115 USD
MAINTENANCE OF ENERGY SYSTEMS	29	430.302 USD
HEAD OF SERVICE	1	40.888 USD
CATENARY MAINTENANCE	14	194.707 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	5	10.115 USD
SUBSTATION MAINTENANCE	14	194.707 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	5	10.115 USD
SIGNALLING AND COMMUNICATION SYSTEMS	25	374.672 USD
HEAD OF SERVICE	1	40.888 USD
TRAIN CONTROL AND SIGNALLING	12	189.649 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	5	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
COMMUNICATIONS, VOICE AND DATA	12	144.134 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	5	10.115 USD

STATION EQUIPMENT	39	602.251 USD
HEAD OF SERVICE	1	40.888 USD
TICKETING AND ACCESS CONTROL	12	177.006 USD
Supervisor	2	25.287 USD
Technicians	5	15.172 USD
Agents	5	10.115 USD
CONVEYING ELEMENTS	12	189.649 USD
Supervisor	2	25.287 USD
Technicians	5	15.172 USD
Qualified agents	5	12.643 USD
STATION FACILITIES	14	194.707 USD
Supervisor	2	25.287 USD
Technicians	2	15.172 USD
Qualified agents	5	12.643 USD
Agents	5	10.115 USD
MANAGEMENT	7	101.146 USD
Supervisor	2	25.287 USD
Agents	5	10.115 USD
TOTAL STAFF INFRASTRUCTURE MAINTENANCE LINE 2	129 staff	1.950.785 USD

Table 312. OPEX for Line 2: Infrastructure Maintenance Management.

3.4 Infrastructure consumables

INFRASTRUCTURE MAINTENANCE LINE 2	QUANTITY	COST
TRACK		108.500,00 USD
SUPPLY OF MATERIALS	43,40 km	2.500,00 USD
TRACK MACHINERY		34.720,00 USD
SUPPLY OF MATERIALS	43,40 km	320,00 USD
OUTSIDE FACILITIES	43,40 km	480,00 USD
CATENARY		30.380,00 USD
SUPPLY OF MATERIALS	43,40 km	700,00 USD
CATENARY EQUIPMENT		9.114,00 USD
SUPPLY OF MATERIALS	43,40 km	210,00 USD
ELECTRIC TRACTION SYSTEM		51.100,00 USD
SUPPLY OF MATERIALS	7 substations	2.920,00 USD
OUTSIDE FACILITIES	7 substations	4.380,00 USD
TICKETS		58.000,00 USD
SUPPLY OF MATERIALS	58 machines	400,00 USD
OUTSIDE FACILITIES	58 machines	600,00 USD
ACCESS CONTROL		41.760,00 USD
SUPPLY OF MATERIALS	174 turnstiles	80,00 USD
OUTSIDE FACILITIES	174 turnstiles	160,00 USD

SEASONAL FACILITIES		45.000,00 USD
SUPPLY OF MATERIALS	15 stations	2.400,00 USD
OUTSIDE FACILITIES	15 stations	600,00 USD
RAIL SIGNALLING		70.000,00 USD
SUPPLY OF MATERIALS	7 interlocks	4.000,00 USD
OUTSIDE FACILITIES	7 interlocks	6.000,00 USD
COMMUNICATIONS		2.000,00 USD
SUPPLY OF MATERIALS	2 buildings	600,00 USD
OUTSIDE FACILITIES	2 buildings	400,00 USD
PCC		23.000,00 USD
OUTSIDE FACILITIES	1 PCC	23.000,00 USD
MATERIALS AND SUPPLIES		32.100,00 USD
PERSONAL CLOTHING	129 staff	200,00 USD
OFFICE SUPPLIES	21 staff	300,00 USD
INFRASTRUCTURE MAINTENANCE LINE 2		505.674,00 USD

Table 313. OPEX for Line 2: Infrastructure consumables.

3.5 Rolling Stock Management

ROLLING STOCK MAINTENANCE LINE 2	STAFF	COST
DIRECTION OF ROLLING STOCK MAINTENANCE	1	52.571 USD
DIRECTOR OF ROLLING STOCK MAINTENANCE	0	67.313 USD
ROLLING STOCK MAINTENANCE MANAGER	1	52.571 USD
LIGHT MAINTENANCE	53	791.900 USD
HEAD OF SERVICE	1	40.888 USD
PREVENTATIVE MAINTENANCE	23	318.611 USD
Supervisor	2	25.287 USD
Technicians	3	15.172 USD
Qualified agents	6	12.643 USD
Agents	5	10.115 USD
Wheel Turning Technicians	5	15.172 USD
Undercarriage blowing and washing	2	10.115 USD
CORRECTIVE MAINTENANCE	24	356.541 USD
Supervisor	5	25.287 USD
Technicians	5	15.172 USD
Qualified agents	5	12.643 USD
Agents	9	10.115 USD
TRAIN MOVEMENT	5	75.860 USD
Technicians	5	15.172 USD
HEAVY MAINTENANCE	63	903.161 USD
HEAD OF SERVICE	1	40.888 USD
ASSEMBLY - DISASSEMBLY	11	156.777 USD
Supervisor	2	25.287 USD
Qualified agents	6	12.643 USD

Agents	3	10.115 USD
BOGIES	8	118.847 USD
Supervisor	2	25.287 USD
Qualified agents	3	12.643 USD
Agents	3	10.115 USD
ELECTRICAL - ELECTRONIC EQUIPMENT	22	300.911 USD
Supervisor	2	25.287 USD
Technicians	5	15.172 USD
Qualified agents	9	12.643 USD
Agents	6	10.115 USD
MECHANICAL EQUIPMENT - TYRES	21	285.739 USD
Supervisor	2	25.287 USD
Technicians	5	15.172 USD
Qualified agents	7	12.643 USD
Agents	7	10.115 USD
WAREHOUSE MANAGEMENT	7	113.790 USD
Supervisor	2	25.287 USD
Qualified agents	5	12.643 USD
TOTAL PERSONNEL MAINTENANCE OF ROLLING STOCK LINE 2	124 staff	1.861.422 USD

Table 314. OPEX for Line 2: Rolling Stock Maintenance Management.

3.6 Rolling stock consumables

ROLLING STOCK MAINTENANCE LINE 2	QUANTITY	COST
ROLLING STOCK		800.169,51 USD
SUPPLY OF MATERIALS	2.010 mil km	92,00 USD
OUTSIDE FACILITIES	2.010 mil km	306,00 USD
WORKSHOPS AND DEPOT		450.000,00 USD
SUPPLY OF DEPOT MATERIALS	1 depots	40.000,00 USD
WORKSHOP MATERIALS SUPPLY	1 workshops	250.000,00 USD
OUTSIDE FACILITIES	1 buildings	160.000,00 USD
MATERIALS AND SUPPLIES		30.800,00 USD
PERSONAL CLOTHING	124 staff	200,00 USD
OFFICE SUPPLIES	20 staff	300,00 USD
ROLLING STOCK MAINTENANCE LINE 2		1.280.969,51 USD

Table 315. OPEX for Line 2: Rolling stock consumables.

4 COSTS LINE 3

4.1 General operation

OPERATION MANAGEMENT LINE 3	STAFF	COST
LINE AND STATION STAFF	37	526.391 USD
LINE AND STATION MANAGER	1	40.888 USD
STATION AGENT	12	15.172 USD
STATION ASSISTANT	12	10.115 USD
FRAUD CONTROL OFFICER (INTERVENTION GROUP)	12	15.172 USD
DRIVERS	42	892.111 USD
DRIVER	42	21.241 USD
SECURITY PERSONNEL STATIONS AND FACILITIES	66	698.340 USD
SAFETY AND CIVIL PROTECTION MANAGER	1	40.888 USD
CIVIL DEFENCE AGENT	1	10.115 USD
SECURITY AGENT IN STATIONS	39	10.115 USD
SECURITY AGENT IN FACILITIES (WORKSHOPS, ADM BUILDING)	13	10.115 USD
FRAUD CONTROL SECURITY OFFICER (INTERVENTION GROUP)	12	10.115 USD
ONLINE SECURITY STAFF	12	121.376 USD
ONLINE SECURITY AGENT	12	10.115 USD
CLEANING STAFF TRAINS AND FACILITIES	45	488.537 USD
CLEANING AND ENVIRONMENTAL SUPERVISOR	3	21.241 USD
CLEANING AGENT IN STATIONS	21	10.115 USD
TRAIN CLEANING AGENT	15	10.115 USD
BUILDING CLEANING AGENT ADMINISTRATIVE	6	10.115 USD
TOTAL OPERATING MANAGEMENT STAFF LINE 3	202 staff	2.726.755 USD

Table 316. OPEX for Line 3: General operation.

4.2 Operating consumables

TOTAL OPERATING CONSUMABLES LINE 3	QUANTITY	COST
PERSONAL CLOTHING		39.800,00 USD
CLOTHED STAFF	199 staff	200,00 USD
OFFICE SUPPLIES		1.500,00 USD
OFFICE PERSONNEL	5 staff	300,00 USD
MATERIALS CLEANING STATIONS, WORKSHOPS AND BUILDING		28.000,00 USD
SIDE PLATFORM STATION	11 stations	-
CENTRAL PLATFORM	2 stations	-
STATION	13 stations	1.500,00 USD
DEPOTS	1 depots	2.000,00 USD

WORKSHOPS	0 workshops	3.000,00 USD
ADMINISTRATION BUILDING	1 buildings	6.500,00 USD
TOTAL OPERATING CONSUMABLES LINE 3		69.300,00 USD

Table 317. OPEX for Line 3: Operating consumables.

4.3 Infrastructure Maintenance Management

INFRASTRUCTURE MAINTENANCE LINE 3	STAFF	COST
DIRECTORATE OF INFRASTRUCTURE MAINTENANCE	1	52.571 USD
DIRECTOR OF INFRASTRUCTURE MAINTENANCE	0	67.313 USD
INFRASTRUCTURE MAINTENANCE MANAGER	1	52.571 USD
ROAD MAINTENANCE AND CIVIL WORKS	28	389.843 USD
HEAD OF SERVICE	1	40.888 USD
ROAD MAINTENANCE	18	235.165 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	9	10.115 USD
MAINTENANCE OF CIVIL WORKS	9	113.790 USD
<i>Technicians</i>	3	15.172 USD
<i>Qualified agents</i>	3	12.643 USD
<i>Agents</i>	3	10.115 USD
MAINTENANCE OF ENERGY SYSTEMS	29	430.302 USD
HEAD OF SERVICE	1	40.888 USD
CATENARY MAINTENANCE	14	194.707 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	5	10.115 USD
SUBSTATION MAINTENANCE	14	194.707 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	5	10.115 USD
SIGNALLING AND COMMUNICATION SYSTEMS	25	374.672 USD
HEAD OF SERVICE	1	40.888 USD
TRAIN CONTROL AND SIGNALLING	12	189.649 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	5	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
COMMUNICATIONS, VOICE AND DATA	12	144.134 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	5	10.115 USD

STATION EQUIPMENT	39	602.251 USD
HEAD OF SERVICE	1	40.888 USD
TICKETING AND ACCESS CONTROL	12	177.006 USD
Supervisor	2	25.287 USD
Technicians	5	15.172 USD
Agents	5	10.115 USD
CONVEYING ELEMENTS	12	189.649 USD
Supervisor	2	25.287 USD
Technicians	5	15.172 USD
Qualified agents	5	12.643 USD
STATION FACILITIES	14	194.707 USD
Supervisor	2	25.287 USD
Technicians	2	15.172 USD
Qualified agents	5	12.643 USD
Agents	5	10.115 USD
MANAGEMENT	7	101.146 USD
Supervisor	2	25.287 USD
Agents	5	10.115 USD
TOTAL STAFF INFRASTRUCTURE MAINTENANCE LINE 3	129 staff	1.950.785 USD

Table 318. OPEX for Line 3: Infrastructure Maintenance Management.

4.4 Infrastructure consumables

INFRASTRUCTURE MAINTENANCE LINE 3	QUANTITY	COST
TRACK		126.500,00 USD
SUPPLY OF MATERIALS	50,60 km	2.500,00 USD
TRACK MACHINERY		40.480,00 USD
SUPPLY OF MATERIALS	50,60 km	320,00 USD
OUTSIDE FACILITIES	50,60 km	480,00 USD
CATENARY		35.420,00 USD
SUPPLY OF MATERIALS	50,60 km	700,00 USD
CATENARY EQUIPMENT		10.626,00 USD
SUPPLY OF MATERIALS	50,60 km	210,00 USD
ELECTRIC TRACTION SYSTEM		51.100,00 USD
SUPPLY OF MATERIALS	7 substations	2.920,00 USD
OUTSIDE FACILITIES	7 substations	4.380,00 USD
TICKETS		58.000,00 USD
SUPPLY OF MATERIALS	48 machines	400,00 USD
OUTSIDE FACILITIES	48 machines	600,00 USD
ACCESS CONTROL		34.560,00 USD
SUPPLY OF MATERIALS	144 turnstiles	80,00 USD
OUTSIDE FACILITIES	144 turnstiles	160,00 USD

SEASONAL FACILITIES		39.000,00 USD
SUPPLY OF MATERIALS	13 stations	2.400,00 USD
OUTSIDE FACILITIES	13 stations	600,00 USD
RAIL SIGNALLING		70.000,00 USD
SUPPLY OF MATERIALS	7 interlocks	4.000,00 USD
OUTSIDE FACILITIES	7 interlocks	6.000,00 USD
COMMUNICATIONS		1.000,00 USD
SUPPLY OF MATERIALS	1 buildings	600,00 USD
OUTSIDE FACILITIES	1 buildings	400,00 USD
PCC		0,00 USD
OUTSIDE FACILITIES	0 PCC	23.000,00 USD
MATERIALS AND SUPPLIES		32.100,00 USD
PERSONAL CLOTHING	129 staff	200,00 USD
OFFICE SUPPLIES	21 staff	300,00 USD
INFRASTRUCTURE MAINTENANCE LINE 3		488.786,00 USD

Table 319. OPEX for Line 3: Infrastructure consumables.

4.5 Rolling Stock Management

MAINTENANCE OF ROLLING STOCK LINE 3	STAFF	COST
DIRECTION OF ROLLING STOCK MAINTENANCE	1	52.571 USD
DIRECTOR OF ROLLING STOCK MAINTENANCE	0	67.313 USD
ROLLING STOCK MAINTENANCE MANAGER	1	52.571 USD
LIGHT MAINTENANCE	53	791.900 USD
HEAD OF SERVICE	1	40.888 USD
PREVENTATIVE MAINTENANCE	23	318.611 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	3	15.172 USD
<i>Qualified agents</i>	6	12.643 USD
<i>Agents</i>	5	10.115 USD
<i>Wheel Turning Technicians</i>	5	15.172 USD
<i>Undercarriage blowing and washing</i>	2	10.115 USD
CORRECTIVE MAINTENANCE	24	356.541 USD
<i>Supervisor</i>	5	25.287 USD
<i>Technicians</i>	5	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	9	10.115 USD
TRAIN MOVEMENT	5	75.860 USD
<i>Technicians</i>	5	15.172 USD
HEAVY MAINTENANCE	0	0 USD
HEAD OF SERVICE	0	40.888 USD
ASSEMBLY - DISASSEMBLY	0	0 USD
<i>Supervisor</i>	0	25.287 USD
<i>Qualified agents</i>	0	12.643 USD

Agents	0	10.115 USD
BOGIES	0	0 USD
Supervisor	0	25.287 USD
Qualified agents	0	12.643 USD
Agents	0	10.115 USD
ELECTRICAL - ELECTRONIC EQUIPMENT	0	0 USD
Supervisor	0	25.287 USD
Technicians	0	15.172 USD
Qualified agents	0	12.643 USD
Agents	0	10.115 USD
MECHANICAL EQUIPMENT - TYRES	0	0 USD
Supervisor	0	25.287 USD
Technicians	0	15.172 USD
Qualified agents	0	12.643 USD
Agents	0	10.115 USD
WAREHOUSE MANAGEMENT	7	113.790 USD
Supervisor	2	25.287 USD
Qualified agents	5	12.643 USD
TOTAL PERSONNEL MAINTENANCE OF ROLLING STOCK LINE 3		61 staff
		958.261 USD

Table 320. OPEX for Line 3: Rolling Stock Maintenance Management.

4.6 Rolling stock consumables

ROLLING STOCK MAINTENANCE LINE 3	QUANTITY	COST
ROLLING STOCK		940.940,07 USD
SUPPLY OF MATERIALS	2.364 mil km	92,00 USD
OUTSIDE FACILITIES	2.364 mil km	306,00 USD
WORKSHOPS AND DEPOT		40.000,00 USD
SUPPLY OF DEPOT MATERIALS	1 depots	40.000,00 USD
WORKSHOP MATERIALS SUPPLY	0 workshops	250.000,00 USD
OUTSIDE FACILITIES	0 buildings	160.000,00 USD
MATERIALS AND SUPPLIES		15.500,00 USD
PERSONAL CLOTHING	61 staff	200,00 USD
OFFICE SUPPLIES	11 staff	300,00 USD
MAINTENANCE OF ROLLING STOCK LINE 3		996.440,07 USD

Table 321. OPEX for Line 3: Rolling stock consumables.

5 COSTS LINE 2+4

5.1 General operation

OPERATION MANAGEMENT LINE 2+4	STAFF	COST
LINE AND STATION STAFF	46	647.767 USD
LINE AND STATION MANAGER	1	40.888 USD
STATION AGENT	15	15.172 USD
STATION ASSISTANT	15	10.115 USD
FRAUD CONTROL OFFICER (INTERVENTION GROUP)	15	15.172 USD
DRIVERS	46	977.074 USD
DRIVER	46	21.241 USD
SECURITY PERSONNEL STATIONS AND FACILITIES	95	991.664 USD
SAFETY AND CIVIL PROTECTION MANAGER	1	40.888 USD
CIVIL DEFENCE AGENT	1	10.115 USD
SECURITY AGENT IN STATIONS	53	10.115 USD
SECURITY AGENT IN FACILITIES (WORKSHOPS, ADM BUILDING)	25	10.115 USD
FRAUD CONTROL SECURITY OFFICER (INTERVENTION GROUP)	15	10.115 USD
ONLINE SECURITY STAFF	18	182.063 USD
ONLINE SECURITY AGENT	18	10.115 USD
CLEANING STAFF TRAINS AND FACILITIES	72	761.632 USD
CLEANING AND ENVIRONMENTAL SUPERVISOR	3	21.241 USD
CLEANING AGENT IN STATIONS	27	10.115 USD
TRAIN CLEANING AGENT	30	10.115 USD
BUILDING CLEANING AGENT ADMINISTRATIVE	12	10.115 USD
TOTAL OPERATION MANAGEMENT STAFF LINE 2+4	277 staff	3.560.201 USD

Table 322. OPEX for Line 2+4: General operation.

5.2 Operating consumables

TOTAL OPERATING CONSUMABLES LINE 2+4	QUANTITY	COST
PERSONAL CLOTHING		54.800,00 USD
CLOTHED STAFF	274 staff	200,00 USD
OFFICE SUPPLIES		1.500,00 USD
OFFICE PERSONNEL	5 staff	300,00 USD
MATERIALS CLEANING STATIONS, WORKSHOPS AND BUILDING		47.000,00 USD
SIDE PLATFORM STATION	17 stations	-
CENTRAL PLATFORM	1 stations	-
STATION	18 stations	1.500,00 USD
DEPOTS	2 depots	2.000,00 USD

WORKSHOPS	1 workshops	3.000,00 USD
ADMINISTRATION BUILDING	2 buildings	6.500,00 USD
TOTAL OPERATING CONSUMABLES LINE 2+4		103.300,00 USD

Table 323. OPEX for Line 2+4: Operating consumables.

5.3 Infrastructure Maintenance Management

INFRASTRUCTURE MAINTENANCE 2+4 LINE	STAFF	COST
DIRECTORATE OF INFRASTRUCTURE MAINTENANCE	1	52.571 USD
DIRECTOR OF INFRASTRUCTURE MAINTENANCE	0	67.313 USD
INFRASTRUCTURE MAINTENANCE MANAGER	1	52.571 USD
ROAD MAINTENANCE AND CIVIL WORKS	40	531.448 USD
HEAD OF SERVICE	1	40.888 USD
ROAD MAINTENANCE	24	300.911 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	7	12.643 USD
<i>Agents</i>	13	10.115 USD
MAINTENANCE OF CIVIL WORKS	15	189.649 USD
<i>Technicians</i>	5	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	5	10.115 USD
MAINTENANCE OF ENERGY SYSTEMS	37	521.334 USD
HEAD OF SERVICE	1	40.888 USD
CATENARY MAINTENANCE	18	240.223 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	7	12.643 USD
<i>Agents</i>	7	10.115 USD
SUBSTATION MAINTENANCE	18	240.223 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	7	12.643 USD
<i>Agents</i>	7	10.115 USD
SIGNALLING AND COMMUNICATION SYSTEMS	33	475.818 USD
HEAD OF SERVICE	1	40.888 USD
TRAIN CONTROL AND SIGNALLING	16	245.280 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	7	15.172 USD
<i>Qualified agents</i>	7	12.643 USD
COMMUNICATIONS, VOICE AND DATA	16	189.649 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	7	12.643 USD
<i>Agents</i>	7	10.115 USD

STATION EQUIPMENT	51	753.970 USD
HEAD OF SERVICE	1	40.888 USD
TICKETING AND ACCESS CONTROL	16	227.579 USD
Supervisor	2	25.287 USD
Technicians	7	15.172 USD
Agents	7	10.115 USD
CONVEYING ELEMENTS	16	245.280 USD
Supervisor	2	25.287 USD
Technicians	7	15.172 USD
Qualified agents	7	12.643 USD
STATION FACILITIES	18	240.223 USD
Supervisor	2	25.287 USD
Technicians	2	15.172 USD
Qualified agents	7	12.643 USD
Agents	7	10.115 USD
MANAGEMENT	9	121.376 USD
Supervisor	2	25.287 USD
Agents	7	10.115 USD
TOTAL STAFF INFRASTRUCTURE MAINTENANCE LINE 2+4	171 staff	2.456.517 USD

Table 324. OPEX for Line 2+4: Infrastructure Maintenance Management.

5.4 Infrastructure consumables

INFRASTRUCTURE MAINTENANCE 2+4 LINE	QUANTITY	COST
TRACK		175.750,00 USD
SUPPLY OF MATERIALS	70,30 km	2.500,00 USD
TRACK MACHINERY		56.240,00 USD
SUPPLY OF MATERIALS	70,30 km	320,00 USD
OUTSIDE FACILITIES	70,30 km	480,00 USD
CATENARY		49.210,00 USD
SUPPLY OF MATERIALS	70,30 km	700,00 USD
CATENARY EQUIPMENT		14.763,00 USD
SUPPLY OF MATERIALS	70,30 km	210,00 USD
ELECTRIC TRACTION SYSTEM		65.700,00 USD
SUPPLY OF MATERIALS	9 substations	2.920,00 USD
OUTSIDE FACILITIES	9 substations	4.380,00 USD
TICKETS		70.000,00 USD
SUPPLY OF MATERIALS	70 machines	400,00 USD
OUTSIDE FACILITIES	70 machines	600,00 USD
ACCESS CONTROL		50.400,00 USD
SUPPLY OF MATERIALS	210 turnstiles	80,00 USD
OUTSIDE FACILITIES	210 turnstiles	160,00 USD

SEASONAL FACILITIES		54.000,00 USD
SUPPLY OF MATERIALS	18 stations	2.400,00 USD
OUTSIDE FACILITIES	18 stations	600,00 USD
RAIL SIGNALLING		90.000,00 USD
SUPPLY OF MATERIALS	9 interlocks	4.000,00 USD
OUTSIDE FACILITIES	9 interlocks	6.000,00 USD
COMMUNICATIONS		3.000,00 USD
SUPPLY OF MATERIALS	3 buildings	600,00 USD
OUTSIDE FACILITIES	3 buildings	400,00 USD
PCC		23.000,00 USD
OUTSIDE FACILITIES	1 PCC	23.000,00 USD
MATERIALS AND SUPPLIES		41.500,00 USD
PERSONAL CLOTHING	171 staff	200,00 USD
OFFICE SUPPLIES	21 staff	300,00 USD
INFRASTRUCTURE MAINTENANCE 2+4 LINE		692.563,00 USD

Table 325. OPEX for Line 2+4: Infrastructure consumables.

5.5 Rolling Stock Management

MAINTENANCE OF ROLLING STOCK LINE 2+4	STAFF	COST
DIRECTION OF ROLLING STOCK MAINTENANCE	2	105.142 USD
DIRECTOR OF ROLLING STOCK MAINTENANCE	0	67.313 USD
ROLLING STOCK MAINTENANCE MANAGER	2	52.571 USD
LIGHT MAINTENANCE	83	1.275.304 USD
HEAD OF SERVICE	2	40.888 USD
PREVENTATIVE MAINTENANCE	32	447.573 USD
Supervisor	3	25.287 USD
Technicians	5	15.172 USD
Qualified agents	9	12.643 USD
Agents	6	10.115 USD
Wheel Turning Technicians	6	15.172 USD
Undercarriage blowing and washing	3	10.115 USD
CORRECTIVE MAINTENANCE	40	609.407 USD
Supervisor	9	25.287 USD
Technicians	9	15.172 USD
Qualified agents	9	12.643 USD
Agents	13	10.115 USD
TRAIN MOVEMENT	9	136.548 USD
Technicians	9	15.172 USD
HEAVY MAINTENANCE	63	903.161 USD
HEAD OF SERVICE	1	40.888 USD
ASSEMBLY - DISASSEMBLY	11	156.777 USD
Supervisor	2	25.287 USD
Qualified agents	6	12.643 USD

Agents	3	10.115 USD
BOGIES	8	118.847 USD
Supervisor	2	25.287 USD
Qualified agents	3	12.643 USD
Agents	3	10.115 USD
ELECTRICAL - ELECTRONIC EQUIPMENT	22	300.911 USD
Supervisor	2	25.287 USD
Technicians	5	15.172 USD
Qualified agents	9	12.643 USD
Agents	6	10.115 USD
MECHANICAL EQUIPMENT - TYRES	21	285.739 USD
Supervisor	2	25.287 USD
Technicians	5	15.172 USD
Qualified agents	7	12.643 USD
Agents	7	10.115 USD
WAREHOUSE MANAGEMENT	12	189.649 USD
Supervisor	3	25.287 USD
Qualified agents	9	12.643 USD
TOTAL PERSONNEL MAINTENANCE OF ROLLING STOCK LINE 2+4		160 staff
		2.473.257 USD

Table 326. OPEX for Line 2+4: Rolling Stock Maintenance Management.

5.6 Rolling stock consumables

MAINTENANCE OF ROLLING STOCK LINE 2+4	QUANTITY	COST
ROLLING STOCK		946.632,00 USD
SUPPLY OF MATERIALS	2.378 mil km	92,00 USD
OUTSIDE FACILITIES	2.378 mil km	306,00 USD
WORKSHOPS AND DEPOT		490.000,00 USD
SUPPLY OF DEPOT MATERIALS	2 depots	40.000,00 USD
WORKSHOP MATERIALS SUPPLY	1 workshops	250.000,00 USD
OUTSIDE FACILITIES	1 buildings	160.000,00 USD
MATERIALS AND SUPPLIES		40.400,00 USD
PERSONAL CLOTHING	160 staff	200,00 USD
OFFICE SUPPLIES	28 staff	300,00 USD
MAINTENANCE OF ROLLING STOCK LINE 2+4		1.477.032,00 USD

Table 327. OPEX for Line 2+4: Rolling stock consumables.

6 COSTS LINE 3+5

6.1 General operation

OPERATION MANAGEMENT LINE 3+5	STAFF	COST
LINE AND STATION STAFF	37	526.391 USD
LINE AND STATION MANAGER	1	40.888 USD
STATION AGENT	12	15.172 USD
STATION ASSISTANT	12	10.115 USD
FRAUD CONTROL OFFICER (INTERVENTION GROUP)	12	15.172 USD
DRIVERS	46	977.074 USD
DRIVER	46	21.241 USD
SECURITY PERSONNEL STATIONS AND FACILITIES	68	718.569 USD
SAFETY AND CIVIL PROTECTION MANAGER	1	40.888 USD
CIVIL DEFENCE AGENT	1	10.115 USD
SECURITY AGENT IN STATIONS	41	10.115 USD
SECURITY AGENT IN FACILITIES (WORKSHOPS, ADM BUILDING)	13	10.115 USD
FRAUD CONTROL SECURITY OFFICER (INTERVENTION GROUP)	12	10.115 USD
ONLINE SECURITY STAFF	18	182.063 USD
ONLINE SECURITY AGENT	18	10.115 USD
CLEANING STAFF TRAINS AND FACILITIES	45	488.537 USD
CLEANING AND ENVIRONMENTAL SUPERVISOR	3	21.241 USD
CLEANING AGENT IN STATIONS	21	10.115 USD
TRAIN CLEANING AGENT	15	10.115 USD
BUILDING CLEANING AGENT ADMINISTRATIVE	6	10.115 USD
TOTAL OPERATION MANAGEMENT STAFF LINE 3+5	214 staff	2.892.635 USD

Table 328. OPEX for Line 3+5: General operation.

6.2 Operating consumables

TOTAL OPERATING CONSUMABLES LINE 3+5	QUANTITY	COST
PERSONAL CLOTHING		42.200,00 USD
CLOTHED STAFF	211 staff	200,00 USD
OFFICE MATERIALS		1.500,00 USD
OFFICE PERSONNEL	5 staff	300,00 USD
MATERIALS CLEANING STATIONS, WORKSHOPS AND BUILDING		29.500,00 USD
SIDE PLATFORM STATION	12 stations	-
CENTRAL PLATFORM	2 stations	-
STATION	14 stations	1.500,00 USD
DEPOTS	1 depots	2.000,00 USD

WORKSHOPS	0 workshops	3.000,00 USD
ADMINISTRATION BUILDING	1 buildings	6.500,00 USD
TOTAL OPERATING CONSUMABLES LINE 3+5		73.200,00 USD

Table 329. OPEX for Line 3+5: Operating consumables.

6.3 Infrastructure Maintenance Management

INFRASTRUCTURE MAINTENANCE 3+5 LINE	STAFF	COST
DIRECTORATE OF INFRASTRUCTURE MAINTENANCE	1	52.571 USD
DIRECTOR OF INFRASTRUCTURE MAINTENANCE	0	67.313 USD
INFRASTRUCTURE MAINTENANCE MANAGER	1	52.571 USD
ROAD MAINTENANCE AND CIVIL WORKS	28	389.843 USD
HEAD OF SERVICE	1	40.888 USD
ROAD MAINTENANCE	18	235.165 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	9	10.115 USD
MAINTENANCE OF CIVIL WORKS	9	113.790 USD
<i>Technicians</i>	3	15.172 USD
<i>Qualified agents</i>	3	12.643 USD
<i>Agents</i>	3	10.115 USD
MAINTENANCE OF ENERGY SYSTEMS	29	430.302 USD
HEAD OF SERVICE	1	40.888 USD
CATENARY MAINTENANCE	14	194.707 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	5	10.115 USD
SUBSTATION MAINTENANCE	14	194.707 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	5	10.115 USD
SIGNALLING AND COMMUNICATION SYSTEMS	25	374.672 USD
HEAD OF SERVICE	1	40.888 USD
TRAIN CONTROL AND SIGNALLING	12	189.649 USD
<i>Supervisor</i>	2	25.287 USD
<i>Technicians</i>	5	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
COMMUNICATIONS, VOICE AND DATA	12	144.134 USD
<i>Technicians</i>	2	15.172 USD
<i>Qualified agents</i>	5	12.643 USD
<i>Agents</i>	5	10.115 USD

STATION EQUIPMENT	39	602.251 USD
HEAD OF SERVICE	1	40.888 USD
TICKETING AND ACCESS CONTROL	12	177.006 USD
Supervisor	2	25.287 USD
Technicians	5	15.172 USD
Agents	5	10.115 USD
CONVEYING ELEMENTS	12	189.649 USD
Supervisor	2	25.287 USD
Technicians	5	15.172 USD
Qualified agents	5	12.643 USD
STATION FACILITIES	14	194.707 USD
Supervisor	2	25.287 USD
Technicians	2	15.172 USD
Qualified agents	5	12.643 USD
Agents	5	10.115 USD
MANAGEMENT	7	101.146 USD
Supervisor	2	25.287 USD
Agents	5	10.115 USD
TOTAL STAFF INFRASTRUCTURE MAINTENANCE 3+5 LINE	129 staff	1.950.785 USD

Table 330. OPEX for Line 3+5: Infrastructure Maintenance Management.

6.4 Infrastructure consumables

INFRASTRUCTURE MAINTENANCE 3+5 LINE	QUANTITY	COST
TRACK		122.000,00 USD
SUPPLY OF MATERIALS	48,80 km	2.500,00 USD
TRACK MACHINERY		39.040,00 USD
SUPPLY OF MATERIALS	48,80 km	320,00 USD
OUTSIDE FACILITIES	48,80 km	480,00 USD
CATENARY		34.160,00 USD
SUPPLY OF MATERIALS	48,80 km	700,00 USD
CATENARY EQUIPMENT		10.248,00 USD
SUPPLY OF MATERIALS	48,80 km	210,00 USD
ELECTRIC TRACTION SYSTEM		51.100,00 USD
SUPPLY OF MATERIALS	7 substations	2.920,00 USD
OUTSIDE FACILITIES	7 substations	4.380,00 USD
TICKETS		52.000,00 USD
SUPPLY OF MATERIALS	52 machines	400,00 USD
OUTSIDE FACILITIES	52 machines	600,00 USD
ACCESS CONTROL		37.440,00 USD
SUPPLY OF MATERIALS	156 turnstiles	80,00 USD
OUTSIDE FACILITIES	156 turnstiles	160,00 USD

SEASONAL FACILITIES		42.000,00 USD
SUPPLY OF MATERIALS	14 stations	2.400,00 USD
OUTSIDE FACILITIES	14 stations	600,00 USD
RAIL SIGNALLING		80.000,00 USD
SUPPLY OF MATERIALS	8 interlocks	4.000,00 USD
OUTSIDE FACILITIES	8 interlocks	6.000,00 USD
COMMUNICATIONS		1.000,00 USD
SUPPLY OF MATERIALS	1 buildings	600,00 USD
OUTSIDE FACILITIES	1 buildings	400,00 USD
PCC		0,00 USD
OUTSIDE FACILITIES	0 PCC	23.000,00 USD
MATERIALS AND SUPPLIES		32.100,00 USD
PERSONAL CLOTHING	129 staff	200,00 USD
OFFICE SUPPLIES	21 staff	300,00 USD
INFRASTRUCTURE MAINTENANCE 3+5 LINE		501.088,00 USD

Table 331. OPEX for Line 3+5: Infrastructure consumables.

6.5 Rolling Stock Management

ROLLING STOCK MAINTENANCE 3+5 LINE	STAFF	COST
DIRECTION OF ROLLING STOCK MAINTENANCE	1	52.571 USD
DIRECTOR OF ROLLING STOCK MAINTENANCE	0	67.313 USD
ROLLING STOCK MAINTENANCE MANAGER	1	52.571 USD
LIGHT MAINTENANCE	53	791.900 USD
HEAD OF SERVICE	1	40.888 USD
PREVENTATIVE MAINTENANCE	23	318.611 USD
Supervisor	2	25.287 USD
Technicians	3	15.172 USD
Qualified agents	6	12.643 USD
Agents	5	10.115 USD
Wheel Turning Technicians	5	15.172 USD
Undercarriage blowing and washing	2	10.115 USD
CORRECTIVE MAINTENANCE	24	356.541 USD
Supervisor	5	25.287 USD
Technicians	5	15.172 USD
Qualified agents	5	12.643 USD
Agents	9	10.115 USD
TRAIN MOVEMENT	5	75.860 USD
Technicians	5	15.172 USD
HEAVY MAINTENANCE	0	0 USD
HEAD OF SERVICE	0	40.888 USD
ASSEMBLY - DISASSEMBLY	0	0 USD
Supervisor	0	25.287 USD
Qualified agents	0	12.643 USD

Agents	0	10.115 USD
BOGIES	0	0 USD
Supervisor	0	25.287 USD
Qualified agents	0	12.643 USD
Agents	0	10.115 USD
ELECTRICAL - ELECTRONIC EQUIPMENT	0	0 USD
Supervisor	0	25.287 USD
Technicians	0	15.172 USD
Qualified agents	0	12.643 USD
Agents	0	10.115 USD
MECHANICAL EQUIPMENT - TYRES	0	0 USD
Supervisor	0	25.287 USD
Technicians	0	15.172 USD
Qualified agents	0	12.643 USD
Agents	0	10.115 USD
WAREHOUSE MANAGEMENT	7	113.790 USD
Supervisor	2	25.287 USD
Qualified agents	5	12.643 USD
TOTAL PERSONNEL MAINTENANCE OF ROLLING STOCK LINE 3+5		61 staff
		958.261 USD

Table 332. OPEX for Line 3+5: Rolling Stock Maintenance Management.

6.6 Rolling stock consumables

ROLLING STOCK MAINTENANCE 3+5 LINE	QUANTITY	COST
ROLLING STOCK		991.638,63 USD
SUPPLY OF MATERIALS	2.492 mil km	92,00 USD
OUTSIDE FACILITIES	2.492 mil km	306,00 USD
WORKSHOPS AND DEPOT		40.000,00 USD
SUPPLY OF DEPOT MATERIALS	1 depots	40.000,00 USD
WORKSHOP MATERIALS SUPPLY	0 workshops	250.000,00 USD
OUTSIDE FACILITIES	0 buildings	160.000,00 USD
MATERIALS AND SUPPLIES		15.500,00 USD
PERSONAL CLOTHING	61 staff	200,00 USD
OFFICE SUPPLIES	11 staff	300,00 USD
ROLLING STOCK MAINTENANCE 3+5 LINE		1.047.138,63 USD

Table 333. OPEX for Line 3+5: Rolling stock consumables.

ANNEX V: DETAIL OF FINANCIAL CALCULATIONS

1 DETAIL OF FINANCIAL COST CALCULATIONS (IN MILLIONS OF DOLLARS)

The calculations correspond to section 3.3.4.

Mes	jul-21	ago-21	sep-21	oct-21	nov-21	dic-21	ene-22	feb-22	mar-22	abr-22	may-22	jun-22	jul-22	ago-22	sep-22	oct-22	nov-22	dic-22
Crédito puente																		
Saldo inicial	-	22.079.740	25.364.011	28.656.004	31.966.651	35.283.733	39.029.007	42.789.302	46.537.062	50.327.468	54.122.280	57.800.921	61.481.974	65.190.131	108.646.455	117.360.348	127.651.746	137.012.944
Disposición	506.747	506.747	506.747	506.747	506.747	913.164	913.164	913.164	913.164	913.164	771.546	771.546	771.546	40.346.126	5.592.859	7.105.283	6.165.769	23.623.352
Comisión capitalizada	21.446.924	2.630.106	2.621.856	2.613.558	2.605.245	2.595.858	2.586.434	2.577.041	2.567.541	2.558.030	2.548.811	2.539.585	2.530.291	2.421.378	2.399.539	2.373.746	2.350.284	2.282.729
Intereses capitalizados	126.068	147.419	163.391	190.341	205.091	236.252	260.697	257.555	309.701	323.618	358.284	369.923	406.320	688.820	721.495	812.369	845.144	1.048.450
Intereses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortización	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saldo final	22.079.740	25.364.011	28.656.004	31.966.651	35.283.733	39.029.007	42.789.302	46.537.062	50.327.468	54.122.280	57.800.921	61.481.974	65.190.131	108.646.455	117.360.348	127.651.746	137.012.944	163.967.474

Mes	ene-23	feb-23	mar-23	abr-23	may-23	jun-23	jul-23	ago-23	sep-23	oct-23	nov-23	dic-23	ene-24	feb-24	mar-24	abr-24
Crédito puente																
Saldo inicial	163.967.474	173.094.463	222.990.637	237.108.149	251.230.114	266.780.143	302.063.061	317.984.158	364.061.163	383.534.786	407.493.799	429.996.777	477.420.963	503.838.675	533.844.975	564.735.440
Disposición	5.759.352	46.467.414	10.494.171	10.494.171	11.808.163	31.462.696	11.974.696	41.946.548	15.344.991	19.655.064	18.198.467	42.840.911	21.728.911	25.419.732	25.958.411	26.884.219
Comisión capitalizada	2.259.854	2.134.801	2.099.419	2.064.026	2.025.053	1.936.625	1.896.722	1.781.241	1.732.435	1.672.387	1.615.989	1.497.131	1.430.922	1.355.718	1.278.298	1.198.551
Intereses capitalizados	1.107.782	1.293.959	1.523.922	1.563.769	1.716.813	1.883.597	2.049.679	2.349.216	2.396.196	2.631.562	2.688.523	3.086.143	3.257.879	3.230.850	3.653.756	3.736.462
Intereses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortización	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saldo final	173.094.463	222.990.637	237.108.149	251.230.114	266.780.143	302.063.061	317.984.158	364.061.163	383.534.786	407.493.799	429.996.777	477.420.963	503.838.675	533.844.975	564.735.440	596.554.671

Mes	may-24	jun-24	jul-24	ago-24	sep-24	oct-24	nov-24	dic-24	ene-25	feb-25	mar-25	abr-25	may-25	jun-25	jul-25	ago-25	sep-25	oct-25
Crédito puente																		
Saldo inicial	596.554.671	628.626.156	659.937.375	692.968.146	724.173.512	746.862.345	789.780.042	725.937.926	750.838.275	793.774.133	818.843.409	846.324.913	871.632.152	897.497.393	929.476.724	956.750.015	1.000.192.937	1.043.784.043
Disposición	26.884.219	26.136.273	27.586.489	25.636.434	17.184.835	37.086.698	-	19.224.905	37.088.905	19.634.127	21.424.636	19.330.928	19.603.964	25.784.050	20.775.328	36.771.425	36.963.119	-
Comisión capitalizada	1.118.171	1.039.697	956.913	878.704	821.840	714.277	874.282	811.875	704.266	641.436	572.560	509.133	444.308	364.160	295.805	186.926	77.675	283.283
Intereses capitalizados	4.069.095	4.135.249	4.487.369	4.690.228	4.682.158	5.116.722	4.987.973	4.863.570	5.142.687	4.793.713	5.484.308	5.467.178	5.816.969	5.831.121	6.202.158	6.484.571	6.550.313	6.812.627
Intereses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortización	-	-	-	-	-	-	69.704.370	-	-	-	-	-	-	-	-	-	-	89.133.404
Saldo final	628.626.156	659.937.375	692.968.146	724.173.512	746.862.345	789.780.042	725.937.926	750.838.275	793.774.133	818.843.409	846.324.913	871.632.152	897.497.393	929.476.724	956.750.015	1.000.192.937	1.043.784.043	961.746.550

Mes	nov-25	dic-25	ene-26	feb-26	mar-26	abr-26	may-26	jun-26
Crédito puente								
Saldo inicial	961.746.550	985.070.349	1.028.260.030	1.030.961.163	1.039.978.885	1.074.776.389	974.495.066	982.200.058
Disposición	16.918.070	36.406.070	2.837.953	2.837.953	27.828.083	1.105.368	27.089.368	-
Comisión capitalizada	224.827	116.582	109.813	87.212	(0)	251.332	232.021	147.782
Intereses capitalizados	6.180.901	6.667.029	6.711.304	6.092.557	6.969.421	6.787.909	6.367.603	6.374.317
Intereses	-	-	-	-	-	-	-	-
Amortización	-	-	4.119.984	-	107.320.564	-	1.015.811.524	-
Saldo final	985.070.349	1.028.260.030	1.030.961.163	1.039.978.885	1.074.776.389	974.495.066	982.200.058	-



2 DETAIL CALCULATIONS DISTRIBUTION OF RESOURCES FOR INVESTMENT (IN DOLLARS)

The calculations correspond to section 3.3.4.

Año	2021	2021	2021	2021	2021	2021	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022
Meses	Jul-21	ago-21	sep-21	oct-21	nov-21	dic-21	ene-22	feb-22	mar-22	abr-22	may-22	jun-22	Jul-22	ago-22	sep-22	oct-22	nov-22	dic-22
Total necesidad de recursos	22.296.917	3.501.449	3.509.170	3.527.823	3.534.259	4.136.630	4.151.651	4.139.116	4.181.762	4.186.168	4.009.303	4.011.716	4.038.819	60.747.520	11.110.833	13.336.519	12.003.670	37.078.824
Orígenes																		
Capital	217.177	217.177	217.177	217.177	217.177	391.356	391.356	391.356	391.356	391.356	330.662	330.662	330.662	17.291.197	2.396.940	3.045.121	2.642.472	10.124.294
Crédito puente	22.079.740	3.284.272	3.291.993	3.310.646	3.317.082	3.745.274	3.760.295	3.747.760	3.790.406	3.794.812	3.678.640	3.681.054	3.708.157	43.456.324	8.713.893	10.291.398	9.361.198	26.954.531
Crédito IVA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aportación pública	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total orígenes	22.296.917	3.501.449	3.509.170	3.527.823	3.534.259	4.136.630	4.151.651	4.139.116	4.181.762	4.186.168	4.009.303	4.011.716	4.038.819	60.747.520	11.110.833	13.336.519	12.003.670	37.078.824
Aportación pública total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crédito Puente																		
Saldo inicial	-	22.079.740	25.364.011	28.656.004	31.966.651	35.283.733	39.029.007	42.789.302	46.537.062	50.327.468	54.122.280	57.800.921	61.481.974	65.190.131	108.646.455	117.360.348	127.651.746	137.012.944
Disposición	506.747	506.747	506.747	506.747	506.747	913.164	913.164	913.164	913.164	913.164	771.546	771.546	771.546	40.346.126	5.592.859	7.105.283	6.165.769	23.623.352
Comisión capitalizada	18.808.587	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Comisión de disponibilidad capitalizada	2.638.337	2.630.106	2.621.856	2.613.558	2.605.245	2.595.858	2.586.434	2.577.041	2.567.541	2.558.030	2.548.811	2.539.585	2.530.291	2.421.378	2.399.539	2.373.746	2.350.284	2.282.729
Intereses capitalizados	126.068	147.419	163.391	190.341	205.091	236.252	260.697	257.555	309.701	323.618	358.284	369.923	406.320	688.820	721.495	812.369	845.144	1.048.450
Intereses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortización	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saldo final	22.079.740	25.364.011	28.656.004	31.966.651	35.283.733	39.029.007	42.789.302	46.537.062	50.327.468	54.122.280	57.800.921	61.481.974	65.190.131	108.646.455	117.360.348	127.651.746	137.012.944	163.967.474
Pago a capital con aportación estatal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saldo capital	217.177	434.354	651.532	868.709	1.085.886	1.477.242	1.868.598	2.259.954	2.651.311	3.042.667	3.373.329	3.703.992	4.034.654	21.325.851	23.722.790	26.767.911	29.410.384	39.534.677

Año	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
Meses	ene-23	feb-23	mar-23	abr-23	may-23	jun-23	jul-23	ago-23	sep-23	oct-23	nov-23	dic-23
Total necesidad de recursos	11.595.282	69.810.780	18.615.013	18.619.467	20.610.670	48.766.930	21.053.110	64.054.097	26.050.047	32.382.613	30.302.321	65.784.576
Orígenes												
Capital	2.468.294	19.914.606	4.497.502	4.497.502	5.060.641	13.484.013	5.132.013	17.977.092	6.576.425	8.423.599	7.799.343	18.360.391
Crédito puente	9.126.989	49.896.174	14.117.511	14.121.966	15.550.029	35.282.918	15.921.097	46.077.005	19.473.622	23.959.014	22.502.978	47.424.186
Crédito IVA	-	-	-	-	-	-	-	-	-	-	-	-
Aportación pública	-	-	-	-	-	-	-	-	-	-	-	-
Total orígenes	11.595.282	69.810.780	18.615.013	18.619.467	20.610.670	48.766.930	21.053.110	64.054.097	26.050.047	32.382.613	30.302.321	65.784.576
Aportación pública total	-	-	-	-	-	-	-	-	-	-	-	-
Crédito Puente												
Saldo inicial	163.967.474	173.094.463	222.990.637	237.108.149	251.230.114	266.780.143	302.063.061	317.984.158	364.061.163	383.534.786	407.493.799	429.996.777
Disposición	5.759.352	46.467.414	10.494.171	10.494.171	11.808.163	31.462.696	11.974.696	41.946.548	15.344.991	19.655.064	18.198.467	42.840.911
Comisión capitalizada	-	-	-	-	-	-	-	-	-	-	-	-
Comisión de disponibilidad capitalizada	2.259.854	2.134.801	2.099.419	2.064.026	2.025.053	1.936.625	1.896.722	1.781.241	1.732.435	1.672.387	1.615.989	1.497.131
Intereses capitalizados	1.107.782	1.293.959	1.523.922	1.563.769	1.716.813	1.883.597	2.049.679	2.349.216	2.396.196	2.631.562	2.688.523	3.086.143
Intereses	-	-	-	-	-	-	-	-	-	-	-	-
Amortización	-	-	-	-	-	-	-	-	-	-	-	-
Saldo final	173.094.463	222.990.637	237.108.149	251.230.114	266.780.143	302.063.061	317.984.158	364.061.163	383.534.786	407.493.799	429.996.777	477.420.963
Pago a capital con aportación estatal	-	-	-	-	-	-	-	-	-	-	-	-
Saldo capital	42.002.971	61.917.577	66.415.079	70.912.581	75.973.222	89.457.234	94.589.247	112.566.339	119.142.764	127.566.363	135.365.706	153.726.096

Año	2024	2024	2024	2024	2024	2024	2024	2024	2024	2024	2024	2024
Meses	ene-24	feb-24	mar-24	abr-24	may-24	jun-24	jul-24	ago-24	sep-24	oct-24	nov-24	dic-24
Total necesidad de recursos	35.730.102	40.900.471	42.015.499	43.341.039	43.593.293	42.512.478	44.853.552	42.192.409	30.053.763	58.811.996	57.768.290	33.139.594
Orígenes												
Capital	9.312.391	10.894.171	11.125.033	11.521.808	11.521.808	11.201.260	11.822.781	10.987.043	7.364.929	15.894.299	-	8.239.245
Crédito puente	26.417.712	30.006.300	30.890.465	31.819.231	32.071.485	31.311.218	33.030.771	31.205.366	22.688.833	42.917.696	5.862.255	24.900.350
Crédito IVA	-	-	-	-	-	-	-	-	-	-	-	-
Aportación pública	-	-	-	-	-	-	-	-	-	-	51.906.035	-
Total orígenes	35.730.102	40.900.471	42.015.499	43.341.039	43.593.293	42.512.478	44.853.552	42.192.409	30.053.763	58.811.996	57.768.290	33.139.594
Aportación pública total	-	-	-	-	-	-	-	-	-	-	151.483.707	-
Crédito Puente												
Saldo inicial	477.420.963	503.838.675	533.844.975	564.735.440	596.554.671	628.626.156	659.937.375	692.968.146	724.173.512	746.862.345	789.780.042	725.937.926
Disposición	21.728.911	25.419.732	25.958.411	26.884.219	26.884.219	26.136.273	27.586.489	25.636.434	17.184.835	37.086.698	-	19.224.905
Comisión capitalizada	-	-	-	-	-	-	-	-	-	-	-	-
Comisión de disponibilidad capitalizada	1.430.922	1.355.718	1.278.298	1.198.551	1.118.171	1.039.697	956.913	878.704	821.840	714.277	874.282	811.875
Intereses capitalizados	3.257.879	3.230.850	3.653.756	3.736.462	4.069.095	4.135.249	4.487.369	4.690.228	4.682.158	5.116.722	4.987.973	4.863.570
Intereses	-	-	-	-	-	-	-	-	-	-	69.704.370	-
Amortización	-	-	-	-	-	-	-	-	-	-	-	-
Saldo final	503.838.675	533.844.975	564.735.440	596.554.671	628.626.156	659.937.375	692.968.146	724.173.512	746.862.345	789.780.042	725.937.926	750.838.275
Pago a capital con aportación estatal	-	-	-	-	-	-	-	-	-	-	29.873.302	-
Saldo capital	163.038.487	173.932.658	185.057.691	196.579.499	208.101.307	219.302.567	231.125.348	242.112.391	249.477.321	265.371.620	235.498.318	243.737.563

Año	2025	2025	2025	2025	2025	2025	2025	2025	2025	2025	2025	2025
Meses	ene-25	feb-25	mar-25	abr-25	may-25	jun-25	jul-25	ago-25	sep-25	oct-25	nov-25	dic-25
Total necesidad de recursos	58.831.103	50.315.425	36.663.491	33.591.922	34.266.941	43.029.638	36.177.003	59.202.104	59.432.443	31.264.582	30.574.400	58.792.283
Orígenes												
Capital	15.895.245	8.414.626	9.181.987	8.284.683	8.401.699	11.050.307	8.903.712	15.759.182	15.841.337	-	7.250.602	15.602.602
Crédito puente	42.935.858	25.069.276	27.481.504	25.307.239	25.865.242	31.979.331	27.273.291	43.442.922	43.591.106	7.095.910	23.323.799	43.189.681
Crédito IVA	-	-	-	-	-	-	-	-	-	-	-	-
Aportación pública	-	16.831.523	-	-	-	-	-	-	-	24.168.672	-	-
Total orígenes	58.831.103	50.315.425	36.663.491	33.591.922	34.266.941	43.029.638	36.177.003	59.202.104	59.432.443	31.264.582	30.574.400	58.792.283
Aportación pública total	-	16.831.523	-	-	-	-	-	-	-	151.502.106	-	-
Crédito Puente												
Saldo inicial	750.838.275	793.774.133	818.843.409	846.324.913	871.632.152	897.497.393	929.476.724	956.750.015	1.000.192.937	1.043.784.043	961.746.550	985.070.349
Disposición	37.088.905	19.634.127	21.424.636	19.330.928	19.603.964	25.784.050	20.775.328	36.771.425	36.963.119	-	16.918.070	36.406.070
Comisión capitalizada	-	-	-	-	-	-	-	-	-	-	-	-
Comisión de disponibilidad capitalizada	704.266	641.436	572.560	509.133	444.308	364.160	295.805	186.926	77.675	283.283	224.827	116.582
Intereses capitalizados	5.142.687	4.793.713	5.484.308	5.467.178	5.816.969	5.831.121	6.202.158	6.484.571	6.550.313	6.812.627	6.180.901	6.667.029
Intereses	-	-	-	-	-	-	-	-	-	89.133.404	-	-
Amortización	-	-	-	-	-	-	-	-	-	-	-	-
Saldo final	793.774.133	818.843.409	846.324.913	871.632.152	897.497.393	929.476.724	956.750.015	1.000.192.937	1.043.784.043	961.746.550	985.070.349	1.028.260.030
Pago a capital con aportación estatal	-	-	-	-	-	-	-	-	-	38.200.030	-	-
Saldo capital	259.632.808	268.047.434	277.229.421	285.514.104	293.915.803	304.966.110	313.869.822	329.629.005	345.470.341	307.270.311	314.520.913	330.123.514

Año	2026	2026	2026	2026	2026	2026
Meses	ene-26	feb-26	mar-26	abr-26	may-26	jun-26
Total necesidad de recursos	17.768.993	10.233.987	46.723.825	45.738.338	8.178.720	45.221.195
Orígenes						
Capital	-	1.216.265	11.926.321	-	473.729	11.609.729
Crédito puente	6.821.117	9.017.722	34.797.504	7.039.241	7.704.991	33.611.466
Crédito IVA	-	-	-	-	-	-
Aportación pública	10.947.876	-	-	38.699.097	-	-
Total orígenes	17.768.993	10.233.987	46.723.825	45.738.338	8.178.720	45.221.195
Aportación pública total	16.833.567	-	-	192.014.188	-	-
Crédito Puente						
Saldo inicial	1.028.260.030	1.030.961.163	1.039.978.885	1.074.776.389	974.495.066	982.200.058
Disposición	-	2.837.953	27.828.083	-	1.105.368	27.089.368
Comisión capitalizada	-	-	-	-	-	-
Comisión de disponibilidad capitalizada	109.813	87.212	(0)	251.332	232.021	147.782
Intereses capitalizados	6.711.304	6.092.557	6.969.421	6.787.909	6.367.603	6.374.317
Intereses	-	-	-	-	-	-
Amortización	4.119.984	-	-	107.320.564	-	-
Saldo final	1.030.961.163	1.039.978.885	1.074.776.389	974.495.066	982.200.058	1.015.811.524
Pago a capital con aportación estatal	1.765.707	-	-	45.994.527	-	-
Saldo capital	328.357.807	329.574.072	341.500.393	295.505.866	295.979.595	307.589.324



3 DETAIL CALCULATIONS DISTRIBUTION OF RESOURCES FOR INVESTMENT (IN DOLLARS)

The calculations correspond to section 3.6.1.

Año	2021	2021	2021	2021	2021	2021	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022	2022
Meses	jul-21	ago-21	sep-21	oct-21	nov-21	dic-21	ene-22	feb-22	mar-22	abr-22	may-22	jun-22	jul-22	ago-22	sep-22	oct-22	nov-22	dic-22
Orígenes																		
Capital	217.177	217.177	217.177	217.177	217.177	391.356	391.356	391.356	391.356	391.356	330.662	330.662	330.662	17.291.197	2.396.940	3.045.121	2.642.472	10.124.294
Crédito puente	22.079.740	3.284.272	3.291.993	3.310.646	3.317.082	3.745.274	3.760.295	3.747.760	3.790.406	3.794.812	3.678.640	3.681.054	3.708.157	43.456.324	8.713.893	10.291.398	9.361.198	26.954.531
Crédito IVA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aportación pública	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total orígenes	22.296.917	3.501.449	3.509.170	3.527.823	3.534.259	4.136.630	4.151.651	4.139.116	4.181.762	4.186.168	4.009.303	4.011.716	4.038.819	60.747.520	11.110.833	13.336.519	12.003.670	37.078.824
Aportación pública total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crédito Puente																		
Saldo inicial	-	22.079.740	25.364.011	28.656.004	31.966.651	35.283.733	39.029.007	42.789.302	46.537.062	50.327.468	54.122.280	57.800.921	61.481.974	65.190.131	108.646.455	117.360.348	127.651.746	137.012.944
Disposición	506.747	506.747	506.747	506.747	506.747	913.164	913.164	913.164	913.164	913.164	771.546	771.546	771.546	40.346.126	5.592.859	7.105.283	6.165.769	23.623.352
Comisión capitalizada	18.808.587	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Comisión de disponibilidad capitalizada	2.638.337	2.630.106	2.621.856	2.613.558	2.605.245	2.595.858	2.586.434	2.577.041	2.567.541	2.558.030	2.548.811	2.539.585	2.530.291	2.421.378	2.399.539	2.373.746	2.350.284	2.282.729
Intereses capitalizados	126.068	147.419	163.391	190.341	205.091	236.252	260.697	257.555	309.701	323.618	358.284	369.923	406.320	688.820	721.495	812.369	845.144	1.048.450
Intereses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amortización	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saldo final	22.079.740	25.364.011	28.656.004	31.966.651	35.283.733	39.029.007	42.789.302	46.537.062	50.327.468	54.122.280	57.800.921	61.481.974	65.190.131	108.646.455	117.360.348	127.651.746	137.012.944	163.967.474
Pago a capital con aportación estatal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saldo capital	217.177	434.354	651.532	868.709	1.085.886	1.477.242	1.868.598	2.259.954	2.651.311	3.042.667	3.373.329	3.703.992	4.034.654	21.325.851	23.722.790	26.767.911	29.410.384	39.534.677

Año	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
Meses	ene-23	feb-23	mar-23	abr-23	may-23	jun-23	jul-23	ago-23	sep-23	oct-23	nov-23	dic-23
Orígenes												
Capital	2.468.294	19.914.606	4.497.502	4.497.502	5.060.641	13.484.013	5.132.013	17.977.092	6.576.425	8.423.599	7.799.343	18.360.391
Crédito puente	9.126.989	49.896.174	14.117.511	14.121.966	15.550.029	35.282.918	15.921.097	46.077.005	19.473.622	23.959.014	22.502.978	47.424.186
Crédito IVA	-	-	-	-	-	-	-	-	-	-	-	-
Aportación pública	-	-	-	-	-	-	-	-	-	-	-	-
Total orígenes	11.595.282	69.810.780	18.615.013	18.619.467	20.610.670	48.766.930	21.053.110	64.054.097	26.050.047	32.382.613	30.302.321	65.784.576
Aportación pública total	-	-	-	-	-	-	-	-	-	-	-	-
Crédito Puente												
Saldo inicial	163.967.474	173.094.463	222.990.637	237.108.149	251.230.114	266.780.143	302.063.061	317.984.158	364.061.163	383.534.786	407.493.799	429.996.777
Disposición	5.759.352	46.467.414	10.494.171	10.494.171	11.808.163	31.462.696	11.974.696	41.946.548	15.344.991	19.655.064	18.198.467	42.840.911
Comisión capitalizada	-	-	-	-	-	-	-	-	-	-	-	-
Comisión de disponibilidad capitalizada	2.259.854	2.134.801	2.099.419	2.064.026	2.025.053	1.936.625	1.896.722	1.781.241	1.732.435	1.672.387	1.615.989	1.497.131
Intereses capitalizados	1.107.782	1.293.959	1.523.922	1.563.769	1.716.813	1.883.597	2.049.679	2.349.216	2.396.196	2.631.562	2.688.523	3.086.143
Intereses	-	-	-	-	-	-	-	-	-	-	-	-
Amortización	-	-	-	-	-	-	-	-	-	-	-	-
Saldo final	173.094.463	222.990.637	237.108.149	251.230.114	266.780.143	302.063.061	317.984.158	364.061.163	383.534.786	407.493.799	429.996.777	477.420.963
Pago a capital con aportación estatal	-	-	-	-	-	-	-	-	-	-	-	-
Saldo capital	42.002.971	61.917.577	66.415.079	70.912.581	75.973.222	89.457.234	94.589.247	112.566.339	119.142.764	127.566.363	135.365.706	153.726.096

Año	2024	2024	2024	2024	2024	2024	2024	2024	2024	2024	2024	2024
Meses	ene-24	feb-24	mar-24	abr-24	may-24	jun-24	jul-24	ago-24	sep-24	oct-24	nov-24	dic-24
Orígenes												
Capital	9.312.391	10.894.171	11.125.033	11.521.808	11.521.808	11.201.260	11.822.781	10.987.043	7.364.929	15.894.299	-	8.239.245
Crédito puente	26.417.712	30.006.300	30.890.465	31.819.231	32.071.485	31.311.218	33.030.771	31.205.366	22.688.833	42.917.696	5.862.255	24.900.350
Crédito IVA	-	-	-	-	-	-	-	-	-	-	-	-
Aportación pública	-	-	-	-	-	-	-	-	-	-	51.906.035	-
Total orígenes	35.730.102	40.900.471	42.015.499	43.341.039	43.593.293	42.512.478	44.853.552	42.192.409	30.053.763	58.811.996	57.768.290	33.139.594
Aportación pública total	-	-	-	-	-	-	-	-	-	-	151.483.707	-
Crédito Puente												
Saldo inicial	477.420.963	503.838.675	533.844.975	564.735.440	596.554.671	628.626.156	659.937.375	692.968.146	724.173.512	746.862.345	789.780.042	725.937.926
Disposición	21.728.911	25.419.732	25.958.411	26.884.219	26.884.219	26.136.273	27.586.489	25.636.434	17.184.835	37.086.698	-	19.224.905
Comisión capitalizada	-	-	-	-	-	-	-	-	-	-	-	-
Comisión de disponibilidad capitalizada	1.430.922	1.355.718	1.278.298	1.198.551	1.118.171	1.039.697	956.913	878.704	821.840	714.277	874.282	811.875
Intereses capitalizados	3.257.879	3.230.850	3.653.756	3.736.462	4.069.095	4.135.249	4.487.369	4.690.228	4.682.158	5.116.722	4.987.973	4.863.570
Intereses	-	-	-	-	-	-	-	-	-	-	-	-
Amortización	-	-	-	-	-	-	-	-	-	-	69.704.370	-
Saldo final	503.838.675	533.844.975	564.735.440	596.554.671	628.626.156	659.937.375	692.968.146	724.173.512	746.862.345	789.780.042	725.937.926	750.838.275
Pago a capital con aportación estatal	-	-	-	-	-	-	-	-	-	-	29.873.302	-
Saldo capital	163.038.487	173.932.658	185.057.691	196.579.499	208.101.307	219.302.567	231.125.348	242.112.391	249.477.321	265.371.620	235.498.318	243.737.563

Año	2025	2025	2025	2025	2025	2025	2025	2025	2025	2025	2025	2025
Meses	ene-25	feb-25	mar-25	abr-25	may-25	jun-25	jul-25	ago-25	sep-25	oct-25	nov-25	dic-25
Orígenes												
Capital	15.895.245	8.414.626	9.181.987	8.284.683	8.401.699	11.050.307	8.903.712	15.759.182	15.841.337	-	7.250.602	15.602.602
Crédito puente	42.935.858	25.069.276	27.481.504	25.307.239	25.865.242	31.979.331	27.273.291	43.442.922	43.591.106	7.095.910	23.323.799	43.189.681
Crédito IVA	-	-	-	-	-	-	-	-	-	-	-	-
Aportación pública	-	16.831.523	-	-	-	-	-	-	-	24.168.672	-	-
Total orígenes	58.831.103	50.315.425	36.663.491	33.591.922	34.266.941	43.029.638	36.177.003	59.202.104	59.432.443	31.264.582	30.574.400	58.792.283
Aportación pública total	-	16.831.523	-	-	-	-	-	-	-	151.502.106	-	-
Crédito Puente												
Saldo inicial	750.838.275	793.774.133	818.843.409	846.324.913	871.632.152	897.497.393	929.476.724	956.750.015	1.000.192.937	1.043.784.043	961.746.550	985.070.349
Disposición	37.088.905	19.634.127	21.424.636	19.330.928	19.603.964	25.784.050	20.775.328	36.771.425	36.963.119	-	16.918.070	36.406.070
Comisión capitalizada	-	-	-	-	-	-	-	-	-	-	-	-
Comisión de disponibilidad capitalizada	704.266	641.436	572.560	509.133	444.308	364.160	295.805	186.926	77.675	283.283	224.827	116.582
Intereses capitalizados	5.142.687	4.793.713	5.484.308	5.467.178	5.816.969	5.831.121	6.202.158	6.484.571	6.550.313	6.812.627	6.180.901	6.667.029
Intereses	-	-	-	-	-	-	-	-	-	-	-	-
Amortización	-	-	-	-	-	-	-	-	-	89.133.404	-	-
Saldo final	793.774.133	818.843.409	846.324.913	871.632.152	897.497.393	929.476.724	956.750.015	1.000.192.937	1.043.784.043	961.746.550	985.070.349	1.028.260.030
Pago a capital con aportación estatal	-	-	-	-	-	-	-	-	-	38.200.030	-	-
Saldo capital	259.632.808	268.047.434	277.229.421	285.514.104	293.915.803	304.966.110	313.869.822	329.629.005	345.470.341	307.270.311	314.520.913	330.123.514

Año	2026	2026	2026	2026	2026	2026
Meses	ene-26	feb-26	mar-26	abr-26	may-26	jun-26
Orígenes						
Capital	-	1.216.265	11.926.321	-	473.729	11.609.729
Crédito puente	6.821.117	9.017.722	34.797.504	7.039.241	7.704.991	33.611.466
Crédito IVA	-	-	-	-	-	-
Aportación pública	10.947.876	-	-	38.699.097	-	-
Total orígenes	17.768.993	10.233.987	46.723.825	45.738.338	8.178.720	45.221.195
Aportación pública total	16.833.567	-	-	192.014.188	-	-
Crédito Puente						
Saldo inicial	1.028.260.030	1.030.961.163	1.039.978.885	1.074.776.389	974.495.066	982.200.058
Disposición	-	2.837.953	27.828.083	-	1.105.368	27.089.368
Comisión capitalizada	-	-	-	-	-	-
Comisión de disponibilidad capitalizada	109.813	87.212	(0)	251.332	232.021	147.782
Intereses capitalizados	6.711.304	6.092.557	6.969.421	6.787.909	6.367.603	6.374.317
Intereses	-	-	-	-	-	-
Amortización	4.119.984	-	-	107.320.564	-	-
Saldo final	1.030.961.163	1.039.978.885	1.074.776.389	974.495.066	982.200.058	1.015.811.524
Pago a capital con aportación estatal	1.765.707	-	-	45.994.527	-	-
Saldo capital	328.357.807	329.574.072	341.500.393	295.505.866	295.979.595	307.589.324



ANNEX VI: URBAN INTEGRATION

1 INTRODUCTION: COMMERCIAL POTENTIAL OF AVAILABLE SPACES

This section includes an analysis of the income generation potential of the available spaces and land owned by INCOFER associated with the new electric train infrastructure, through the classification of stations according to their potential.

It also develops an illustrative example of an urban proposal on one of the available lands, allowing to glimpse the potential for transformation of these areas along the line through the construction of a more sustainable, efficient, compact, friendly and identity-based urban model, and capable of obtaining a return on the capital gains generated by public investment.

To this end, a general costing of the proposed interventions, a market analysis and an assessment of the cost-benefits of the intervention in quantitative and qualitative terms (possible benefits of the real estate operation, employment generation, fiscal impacts) are carried out, which allow the feasibility and impact of the proposal to be measured.

This example of a real estate development proposal is a first approximation of its economic viability, through an exercise with an illustrative purpose, and as a first step for a subsequent pre-feasibility study that may have the necessary detail for its execution.

This study should be extended along the entire line of the TRP, in order to identify and take advantage of opportunities throughout the infrastructure and to be able to establish the conditions and framework for its implementation and attraction of private investment.

2 AVAILABILITY OF LAND AND MARKETABLE SPACES

Below is a picture with the assets owned by INCOFER for possible economic exploitation and/or real estate development:

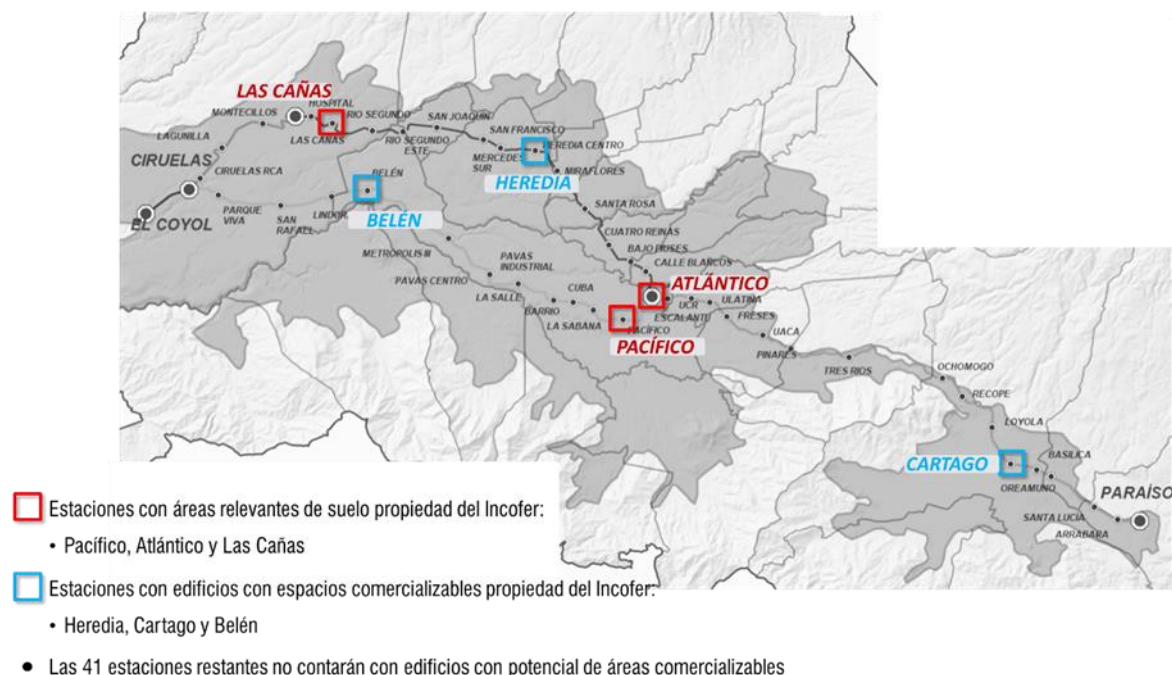


Figure 28. Availability of land and marketable spaces.

2.1 Square meters available for tertiary uses in the stations

The following are the existing stations owned by INCOFER for tertiary use:

2.1.1 Atlántico Station

Located in the San José Canton, District of Carmen, the Atlántico Station was declared Architectural Heritage of Costa Rica by decree N°11664-C of July 29, 1980. The building has an area of 396 m² on one (1) level, currently used for a cafeteria and the sale of tickets for the Train.



Figure 29. Atlántico Station.

2.1.2 Pacífico Station

Located in San José, Hospital District, the Pacífico Station has a set of three (3) buildings declared as Architectural Heritage of Costa Rica by decree No. 26552-C of January 9, 1998 with a built area of 22,689 m². These buildings are currently used as INCOFER offices and workshops.



Figure 30. Pacífico Station Heritage Buildings.

2.1.3 Belén Station

Located in the Canton of Heredia, District of San Antonio, Belén Station was declared Architectural Heritage of Costa Rica by decree No. 33637-C of March 16, 2007. The building has a built area of 158 m² on one (1) level. It is currently used for the sale of handicrafts.



Figure 31. Belén Station.

2.1.4 Heredia Station

Located in the Canton of Heredia, District of San Heredia, the Heredia Station was declared Architectural Heritage of Costa Rica by decree N°31350-C of September 16, 2003. The building has a built area of 324.55 m² on one (1) level.



Figure 32. Heredia Station.

2.1.5 Cartago Station

Located in the Canton of Cartago, Western District, Cartago Station was declared Costa Rican Architectural Heritage by decree No. 26049-C of May 30, 1997. The building has a built area of 140 m² on one (1) level. It is currently used for public parking and a supermarket.



Figure 33. Cartago Station.

2.2 Land available for real estate development

The following are the available lands owned by the INCOFER for real estate developments:

2.2.1 Land available in Atlántico

Atlántico's publicly owned land is identified by the registration number 643008. It has an approximate area of 22,977 m² and is located near the historic center of San Jose at the point where the 3 lines of the TRP converge. Currently the land is used for the Railroad and the lots to the north house buildings in use by the Costa Rican Social Security Fund and some parking lots.

The area available for real estate development, discounting the area destined for the TRP project and the area of the buildings of the Costa Rican Social Security Fund is currently used, corresponds to the yellow polygon which has an area of approximately 4,630 m².



Figure 34. Land available for the Atlántico Station.

2.2.2 Land available in Pacífico

Pacífico's publicly owned land consists of two (2) lots identified with the registration numbers 78808 and 14855 located near the historical center of San José with an approximate area of 57,031 m² according to National Registry data and 74,180 m² according to the information of the Cadastre of the Municipality of San José, which are currently used for the yard areas and workshops of the INCOFER trains.

To this area, 3,338 m² corresponding to six (6) private properties are added, which are going to be expropriated in the framework of the Electric Train project.

The land available for real estate development, discounting the area destined to the tracks and the train depots is 19,017 m² (yellow polygon), or 59,937 m² (sum of the yellow and orange polygon) in case it is decided to relocate the depots to another alternative place more in line with the potential of the land.

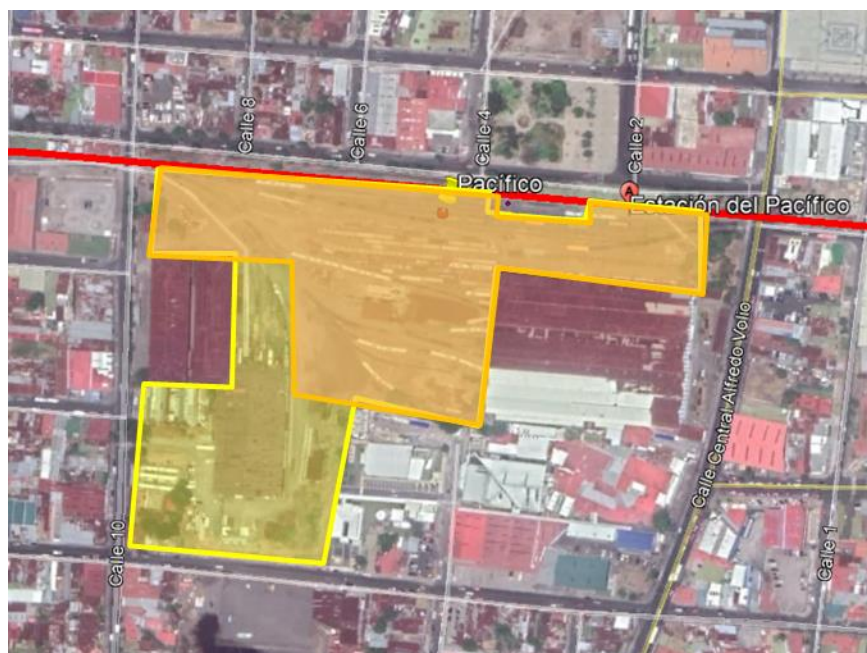


Figure 35. Land available at Pacífico Station.

2.2.3 Land available at Las Cañas

The publicly owned land of Las Cañas is identified with the registration number 169370. It has an approximate area of 31,373 m² (yellow polygon) and is located near the Juan Santamaría International Airport. The land is currently used to store vehicles confiscated by the Ministry of Public Works and Transport (MOPT). To this area, 65,137 m² (orange polygon) are added, corresponding to a property owned by Banco Lafise Sociedad Anónima which is going to be expropriated within the framework of the Electric Train project.

The land available for real estate development is 0 m² since 100% of the land will be used for different purposes associated with the electric train



Figure 36. Land available for Las Cañas Station.

2.2.4 Land available in Cartago

The publicly owned land of Cartago station has an area of approximately 5,287 m². It is currently used for a parking lot and a supermarket.

The land available for real estate development should be rectified since there is currently an agreement between the Costa Rican Railroad Institute and Luis Guillermo Torres Zuñiga for the use of an 801 m² area for parking, but it should be rectified if the exploitable area corresponds to the total area of the property, i.e. 5,287 m².



Figure 37. Land available for Cartago Station .

3 ESTIMATION OF POSSIBLE USES

This section includes an analysis of the potential of the stations to generate income from the assets owned by INCOFER under concession.

Based on a detailed analysis of the assets and the stations, a classification of these is made according to their potential (High/Medium/Low), and an estimate of the possible income associated to each type of station:

- Basic uses on platforms: advertising panels and vending machines
- Small commercial retail (uses in existing buildings/extensions): food premises, AmPm, confectionery, technology and reading
- Mixed (new buildings): small retail, supermarket, bank office, pharmacy, professional business, offices, restaurants, leisure premises, business centers, medical centers, hotels.

The construction of residential uses is excluded from the possible uses, taking into account that its administration and management is more complex, and it is not recommended to consider this use in the proposed business model.

Below is a summary table showing the different types of viable income for each type of station:

Station class	Type of uses on land owned by INCOFER			Capturing environmental capital gains
	Basic uses on platforms	Small retail commercial	Mixed	
P1 Stations: High Potential	Advertising and vending machines	25 – 200 m2	In function of the available soil	Yes
P2 Stations: Medium Potential	Advertising and vending machines	25 – 200 m2	-	To consider
P3 Stations: Low Potential	Advertising and vending machines	0 m2 – No space available	0 m2 – No space available	To consider

Table 334. Income Potential on INCOFER-owned land by type of Station.

In addition to the sources of income derived from the assets owned by INCOFER under concession, it is important to highlight other possible sources of income derived from tax

burdens and acquisition of rights in lots owned by third parties whose destination would be the Public Administration.

From the previous year, the stations are classified according to their potential to generate income:

COMMERCIAL POTENTIAL OF THE AVAILABLE SPACES									
		Available area			Potential for commercial use				Potential
N°	Station	Area available for tertiary use	INCOFER land available for real estate development	Limitations on use	Basic uses on platforms	Small commercial retail	Mixed	Capturing environmental capital gains	
LÍNEA 1. PARAÍSO-ATLÁNTICO									
1	Station Paraíso (proposal)								
		NO	NO	N/A	X			To be considered	P3
2	Station Arrabará (proposal)								
		NO	NO	N/A	X			To be considered	P3
3	Station Santa Lucia (proposal)								
		NO	NO	N/A	X			To be considered	P3
4	Station Oreamuno (proposal)								
		NO	NO	N/A	X			To be considered	P3
5	Station Basílica (is moved)								
		NO	NO	N/A	X			To be considered	P3
6	Station Cartago (existing)								
		SI Station: 139 m²	SI Lot 1: 5.287 m²	Land ownership must be rectified to determine the usable area.	X	X	N/A	To be considered	P2
7	Station Loyola (proposal)								
		NO	NO	N/A	X			To be considered	P3
8	Station Recope (proposal)								
		NO	NO	N/A	X			To be considered	P3

COMMERCIAL POTENTIAL OF THE AVAILABLE SPACES									
		Available area			Potential for commercial use				Potential
N°	Station	Area available for tertiary use	INCOFER land available for real estate development	Limitations on use	Basic uses on platforms	Small commercial retail	Mixed	Capturing environmental capital gains	
9	Station Ochomogo (proposal)	NO	NO	N/A	X			To be considered	P3
10	Station Tres Ríos (is moved)	NO	NO	N/A	X			To be considered	P3
11	Station Pinares (proposal)	NO	NO	N/A	X			To be considered	P3
12	Station Uaca (existing)	NO	NO	N/A	X			To be considered	P3
13	Station Freses (existing)	NO	NO	N/A	X			To be considered	P3
14	Station Ulatina (existing)	NO	NO	N/A	X			To be considered	P3
15	Station UCR (is moved)	NO	NO	N/A	X			To be considered	P3
16	Station Escalante (proposal)	NO	NO	N/A	X			To be considered	P3
17	Station Atlántico (existing). Interchanger Lines 1, 2 and 3.	YES	YES		X	X	X	YES	P1

COMMERCIAL POTENTIAL OF THE AVAILABLE SPACES									
N°	Station	Available area			Potential for commercial use				Potential
		Area available for tertiary use	INCOFER land available for real estate development	Limitations on use	Basic uses on platforms	Small commercial retail	Mixed	Capturing environmental capital gains	
		Station: 396 m ²	Lot 1: 22.977 m ²	Limitation due to the existence of buildings owned by the Caja Costarricense del Seguro Social which cannot be contemplated. The exploitable area is reduced to 4,630 m ²					
LÍNEA 2. ATLÁNTICO-ALAJUELA									
18	Station Calle Blancos (existing)								
		NO	NO	N/A	X			To be considered	P3
19	Station Bajo Piuses (proposal)								
		NO	NO	N/A	X			To be considered	P3
20	Station Cuatro Reinas (proposal)								
		NO	NO	N/A	X			To be considered	P3
21	Station Santa Rosa (existing, is moved)								
		NO	NO	N/A	X			To be considered	P3
22	Station Miraflores (existing)								
		NO	NO	N/A	X			To be considered	P3
23	Station Heredia Centro (existing)								
		YES	NO	N/A	X	X		To be considered	P2

COMMERCIAL POTENTIAL OF THE AVAILABLE SPACES									
N°	Station	Available area			Potential for commercial use				Potential
		Area available for tertiary use	INCOFER land available for real estate development	Limitations on use	Basic uses on platforms	Small commercial retail	Mixed	Capturing environmental capital gains	
24	Station San Francisco (existing, is moved)								
		NO	NO	N/A	X			To be considered	P3
25	Station Mercedes Sur (proposal)								
		NO	NO	N/A	X			To be considered	P3
26	Station San Joaquín (existing, is moved)								
		NO	NO	N/A	X			To be considered	P3
27	Station Río Segundo Este (proposal)								
		NO	NO	N/A	X			To be considered	P3
28	Station Río Segundo (existing)								
		NO	NO	N/A	X			To be considered	P3
29	Station Las Cañas (proposal)								
		NO	YES Lot 1: 31.373 m ² Lot to be expropriated: 65,137 m ²	Limitation by rail use. 100% of the land is allocated to areas necessary for the development of the TRP project.	X			YES	P2
30	Station Hospital Alajuela (existing)								
		NO	NO	N/A	X			To be considered	P3
31	Station Alajuela Centro. Interchange Lines 2, 3 and 4 (proposal)								
		NO	NO	N/A	X			To be considered	P3

COMMERCIAL POTENTIAL OF THE AVAILABLE SPACES									
		Available area			Potential for commercial use				Potential
N°	Station	Area available for tertiary use	INCOFER land available for real estate development	Limitations on use	Basic uses on platforms	Small commercial retail	Mixed	Capturing environmental capital gains	
LÍNEA 3. ATLÁNTICO-CIRUELAS									
32	Station Pacífico (existing)	YES Station: 1.332 m² Storage: 9.515 m² Workshops: 11.842 m²	YES Lot 1: 28.562 m2 Lot 2: 16.180 m² Lots to be expropriated: 3.338 m²	Limitation of operation due to railway use and a group of buildings catalogued as Architectural Heritage.	X	X	X	YES	P1
34	Station Barrio Cuba (existing, is moved)								
		NO	NO	N/A	X			To be considered	P3
33	Station La Sabana (existing)								
		NO	NO	N/A	X			To be considered	P3
35	Station La Salle (existing)								
		NO	NO	N/A	X			To be considered	P3
36	Station Pavas Zona Industrial (existing)								
		NO	NO	N/A	X			To be considered	P3
37	Station Pavas Centro (existing, is moved)								
		NO	NO	N/A	X			To be considered	P3
38	Station Metrópolis (existing)								
		NO	NO	N/A	X			To be considered	P3
39	Station Belén (existing)								

COMMERCIAL POTENTIAL OF THE AVAILABLE SPACES									
		Available area			Potential for commercial use				Potential
N°	Station	Area available for tertiary use	INCOFER land available for real estate development	Limitations on use	Basic uses on platforms	Small commercial retail	Mixed	Capturing environmental capital gains	
		YES	NO	N/A	X	X		To be considered	P2
40	Station Lindora (proposal)								
		NO	NO	N/A	X			To be considered	P3
41	Station San Rafael (proposal)								
		NO	NO	N/A	X			To be considered	P3
42	Station Parque Viva (proposal, private construction)								
		NO	NO	N/A	X			To be considered	P3
43	Station Ciruelas (proposal). Interchanger Lines 4 and 5.								
		NO	NO	N/A	X			To be considered	P3
LÍNEA 4. ALAJUELA-CIRUELAS									
44	Station Montecillos (proposal)								
		NO	NO	N/A	X			To be considered	P3
45	Station Lagunilla (proposal)								
		NO	NO	N/A	X			To be considered	P3
46	Station Ciruelas RCA (proposal)								
		NO	NO	N/A	X			To be considered	P3
LÍNEA 5. LAS CIRUELAS-EL COYOL									
47	Station El Coyol (proposal)								

COMMERCIAL POTENTIAL OF THE AVAILABLE SPACES									
N°	Station	Available area			Potential for commercial use				Potential
		Area available for tertiary use	INCOFER land available for real estate development	Limitations on use	Basic uses on platforms	Small commercial retail	Mixed	Capturing environmental capital gains	
		NO	NO	N/A	X			To be considered	P3

Table 335. Commercial potential of the available spaces.



From the previous exercise, it is concluded that the following are the stations classified with HIGH Potential (P1) since they have the possibility of generating income through; 1. basic uses on platforms; 2. small retail commercial uses and 3. mixed uses (new buildings) because they have land owned by INCOFER:

- Pacífico Station
- Atlántico Station

On the other hand, the following are the stations classified as having MEDIUM potential (P2) as they have the possibility of generating income through 1. Basic uses on platforms and 2. Small retail commercial uses in existing buildings:

- Heredia Station
- Belén Station
- Cartago Station
- Las Cañas Station

Finally, the remaining 41 stations have a LOW potential (P3) since they do not have buildings with marketable spaces or available land with the potential to generate real estate development, beyond the possibility of generating income through basic uses on platforms such as advertising panels and vending machines.

4 POSSIBLE ADDITIONAL SOURCES OF INCOME

The treaties in this section correspond to income that would correspond to the public administration, not corresponding to the concessionaire, although they could contribute to financing the cost of the work if implemented successfully.

4.1 Value capture instruments

The importance of instruments for capturing capital gains lies in their potential for obtaining resources to finance public investment. Normally these instruments are adopted by "higher standard" and local regulatory plans or regulations indicate how they should be applied.

Some of the existing financing instruments and their applicability in specific cases around the world are described below:

4.1.1 Contribution for improvements or valorization

The valuation contribution, also known as improvement contribution, applies to properties that have acquired or will acquire value as a result of a public interest investment. For the application of this tool, an area of influence must be defined and the number of properties that benefit from the work must be determined in order to determine the payment of the tax. The income obtained through this tool must be used for the purpose that originated the contribution.

In Colombia, this instrument has been applied since 1921 to finance public works. For the construction of the future Bogotá Metro, this instrument is expected to be an important source of income.

To date, there are several related studies, among which the most recent was contracted by the IDU - Urban Development Institute in 2016, which contains the methodology and verification of results for the collection of this mechanism, and its implementation and/or updating will depend on the new Administration.

Currently, and in agreement with the District government, resources are guaranteed to build the first line of the subway until its second phase that would be ready in 2022 and which would go from the Portal de las Americas in the west of Bogota, to Calle 72 with Avenida Caracas. However, for the financing of the other lines, this instrument could constitute one of the main sources of income.

Other Latin American countries with experience in the application of this instrument are Argentina and Brazil. In the case of Argentina, this instrument has been applied with the Subway project in Buenos Aires, where a percentage of the highest land value has been charged to all the properties located within a range of 400 meters next to and beside the stations of the new line. In the case of Brazil, this instrument was applied to help finance the work on the Sao Paulo subway.

4.1.2 Exchanges and Sale of Construction Rights

This instrument commonly used in areas to be densified consists of granting the developer the right to build at higher densities than would normally be allowed under the zoning plan in exchange for monetary or in-kind compensation. The levies are contributions of land for public use while the sale of rights are payments in compensation for greater development at altitude.

This tool allows the municipality to collect more resources associated with its urban management and at the same time, it allows the determination of priority areas for development.

In countries such as Argentina, this instrument has been applied through projects such as the Rehabilitation of Puerto Norte in Rosario, where a Master Plan was developed in the sector where the port used to be located, and through a tool called "urban development agreements" it was possible to carry out the land levy and construction for road layouts; the infrastructure of streets and networks; and 15% of the surface area of the land for public space and equipment, as compensation for the right to develop at the heights defined by the plan.

4.1.3 Capital gains

Urban development actions that regulate the use of land and urban air space by increasing its exploitation, generate benefits that give rights to public entities to participate in the capital gains resulting from such actions.

There are two ways of generating capital gains; through a change in urban regulations, or; through the construction of public infrastructure, which is called valorization.

In the Colombian context, the charge for participation in capital gains appeared conceptually in Law 9 of 1989 under the figure of municipal development contribution, but it was only until

Law 388 of 1997, that it was denominated under the current figure. This law specified, extended and restructured the conceptual basis of the participation in capital gains, establishing rules of the game for the generating facts, calculation, liquidation, forms of payment, exemptions and the rest related to the collection of this tax.

4.1.4 Land Adjustment Scheme

The land rezoning scheme, also known as Real Estate Integration, allows for the "grouping" of different individual plots of land within a partial plan area, in order to reconfigure them in such a way as to provide the necessary land for public use and to develop the balloon of plots as a whole. In order to allow the State to group land to implement some work, the owners of such land will accept an exchange for other land that has better conditions and/or opportunities than the first one. Therefore, each owner must accept the conditions mentioned, since he will exchange a certain size of land for a smaller one, but with better overall conditions to develop it. Although the land received is smaller, its price per square meter will increase with the conditioning that is done in the entire partial plan.

The best-known cases at international level are Germany, Japan and South Korea. In this last case, the mechanism was introduced in 1934 and has allowed the financing of 654 projects in almost 44 thousand hectares by the year 2000, mobilizing between 25% and 68% of the land for public use, according to the project (Lee, 2002).

4.1.5 Tax Increment Finance (TIF)

This instrument consists in financing an intervention, through the future increase of the generated tax. This increase is normally used to guarantee the municipal debt through the issuance of TIF bonds to finance public investments based on the increase in the estimated collection during a specific period.

One of the pioneering countries in the application of this instrument is the United States, where its applicability dates back to 1952.

4.2 Considerations on existing studies "Capital Gain Capture Study GAM San José Electric Train Capital Gain Capture Potential (September 2019)"

In parallel with the consultancy on the Technical Feasibility of the TRP carried out by IDOM, a study was developed by the company HR&A, contracted by the BID to evaluate the potential for development oriented towards the transit and capture of added value around three pilot stations of the Electric Train.

In order to assess this study, and in order to articulate the results obtained from this study with the present consultancy, this section aims to analyze its content and possible articulation with the contents of the IDOM study.

The scope of the work of HR&A is made up of four phases as follows: 1) Prioritization exercise of stations; 2) Analysis of the real estate market; 3) DOT development scenarios; 4) Projections of real estate values and; 4) Projections of capital gains capture.

With respect to the first phase, the station prioritization exercise was developed through a dynamic multi-criteria matrix that evaluated the potential DOT (Development Oriented to Sustainable Transport) and capital gain capture in the area of six previously selected stations (Alajuela-Centro; Alajuela-Aeropuerto; Alajuela INVU Las Cañas; Paraíso; Tibás-Bajo Puises and Tibás-Cuatro Reinas) of the Electric Train.

As for the second phase, the potential for real estate development and future demand was determined in the surroundings of the 3 prioritized stations, in an area of 900 meters.

The third phase consisted of proposing a DOT scenario, where the existing conditions of the study areas were considered, including physical limitations of the site, infrastructure and other characteristics of land use in the area to establish the "developable" properties. Subsequently, real estate use and density distributions (CAS*) by typology were applied to the developable land, to quantify the new development potential after electrification and the creation of an intermodal station in the center.

Finally, in the last phase, a projection was made of the income from capital gain capture of the three prioritized stations, modeling three (3) instruments of capital gain capture (Additional Building Rights; Property Income by Special District and FIRI) where a potential income of 295,000,000 USD is estimated in a 30-year horizon.

Ingresos Anuales de Capturas de Plusvalías por Estación

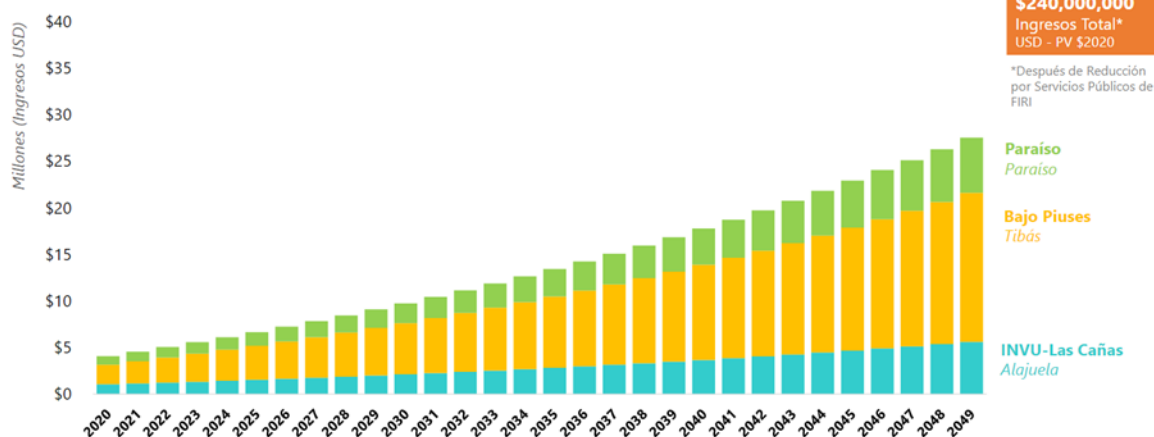


Figure 38. Annual income from capture of capital gains from the study conducted by HR&A.

From this study, we conclude the following:

- The study conducted by HR&A is appropriate for establishing management guidelines, as it estimates a hypothetical maximum potential for development.
- These are theoretical tax revenues, linked to development and land revaluation hypotheses in the stations' areas of influence.
- Their materialization depends on the generation of instruments, willingness and participation by multiple owners, real property demand, and various factors not controllable by the public sector or the concessionaire.
- It is a potential budgetary income, not transferable to the concessionaire. If it materializes, it could reduce the impact on the public coffers. In annual terms, the total income varies between 5 and 35 million/year.

Bearing in mind the above, it is evident that the focus of the study carried out by HR&A differs completely from the focus of the study carried out by IDOM, since the HR&A study proposes an approach of theoretical development, in the long term and with a rather complex execution, incorporating instruments that are currently not regulated in Costa Rican regulations and would require a very dynamic real estate market with a high demand sustained over time (30 years), a willingness and participation on the part of multiple owners and political continuity in the long term, while the study carried out by IDOM is limited to analyzing the possible real estate development on available public land, with a first

approximation of its economic viability within the current framework of the real estate market, proposing a more tangible and short-term business possibility, capable of attracting investors from the real estate sector.

4.3 Conclusions Applicability of Value Capture Instruments in Costa Rica

The implementation of a public work such as the Electric Train is a fact that creates urban impacts that will generate important benefits to the properties located within the area of influence of the stations.

For the construction of public works, Costa Rican regulations provide, among other things, an instrument for attracting financing called "contribution for improvements", which is framed in Law No. 74 on the contribution for works of special public interest, Article 71 of the Urban Planning Law and Article 77 of the Municipal Code (Law 7794), and through which it would be possible to tax the owners of the properties benefited by the work, thus allowing them to contribute to financing its execution.

In order to implement this instrument, its collection should be regulated by a Decree and the following aspects should be defined: (i) the list of works included in the approved works plan; (ii) the distributable amount established, which will take into account the benefit produced to the properties to be encumbered; (iii) the distribution method adopted; (iv) the delimitation of the TRP's areas of influence, which may be of different levels depending on the graduation of the benefit generated; and (v) the rules that will be taken into account to assign, by means of a motivated resolution, the encumbrance corresponding to each property, as well as to make the corresponding payment by the affected owners or holders.

For this purpose, it is necessary to carry out a study of the benefit or capital gain generated in the area of influence of the collection and tax payment capacity, which allows establishing the bases and the most appropriate methodology for its implementation.

It is evident that in the short term this instrument, which exists in the Law, must be exploited and made viable and that, in any case, for the implementation of other instruments for capturing capital gains in Costa Rica it is necessary:

- Establish the necessary legal and regulatory framework.
- Establish the areas around the stations that should be the object of the instruments for capturing capital gains.

From the above, it can be concluded that the Rapid Passenger Train represents an opportunity to innovate in the mechanisms for building public works and that the use of new instruments to capture value will, in the long term, enable a more effective land policy for the GAM, with an appropriate balance between the burdens and benefits of urban management.

5 PILOT PROPOSAL: PACÍFICO STATION

In this section, the possible real estate development of tertiary uses of the Pacific Station is shown as a pilot, as it is one of the most important stations in the system due to its location and as it is one of the stations classified with HIGH potential for income generation.

In order to demonstrate the development potential of this station, two (2) possible development scenarios are developed below; firstly, a scenario in which the available area is exploited after discounting the area affected by the train tracks and the location of the depots and; secondly, a second development scenario, in which a large part of the land is released, by proposing the relocation of the depots to an alternative location more in line with the potential of the land, thus allowing the exploitation of a much larger area.

The study aims to extend the opportunities along the line, to complete the infrastructure and to establish the conditions and framework for its implementation and attraction of private investment.

5.1 Characteristics of the area of study

- Strategic location and high patrimonial value.
- Proximity to the Historic Centre of San José.
- Highly consolidated sector which has suffered a significant social and urban deterioration in recent years.
- Presence of public property currently underutilized.
- Proximity to important urban facilities such as: José María Cañas General Park, González Víquez Square and San Juan de Dios Hospitals, Children's Hospital, Raúl Blanco Cervantes and Dr. Adolfo Carit Women's Hospital.

Below shows a map of the current status of the grounds at the Pacífico station:

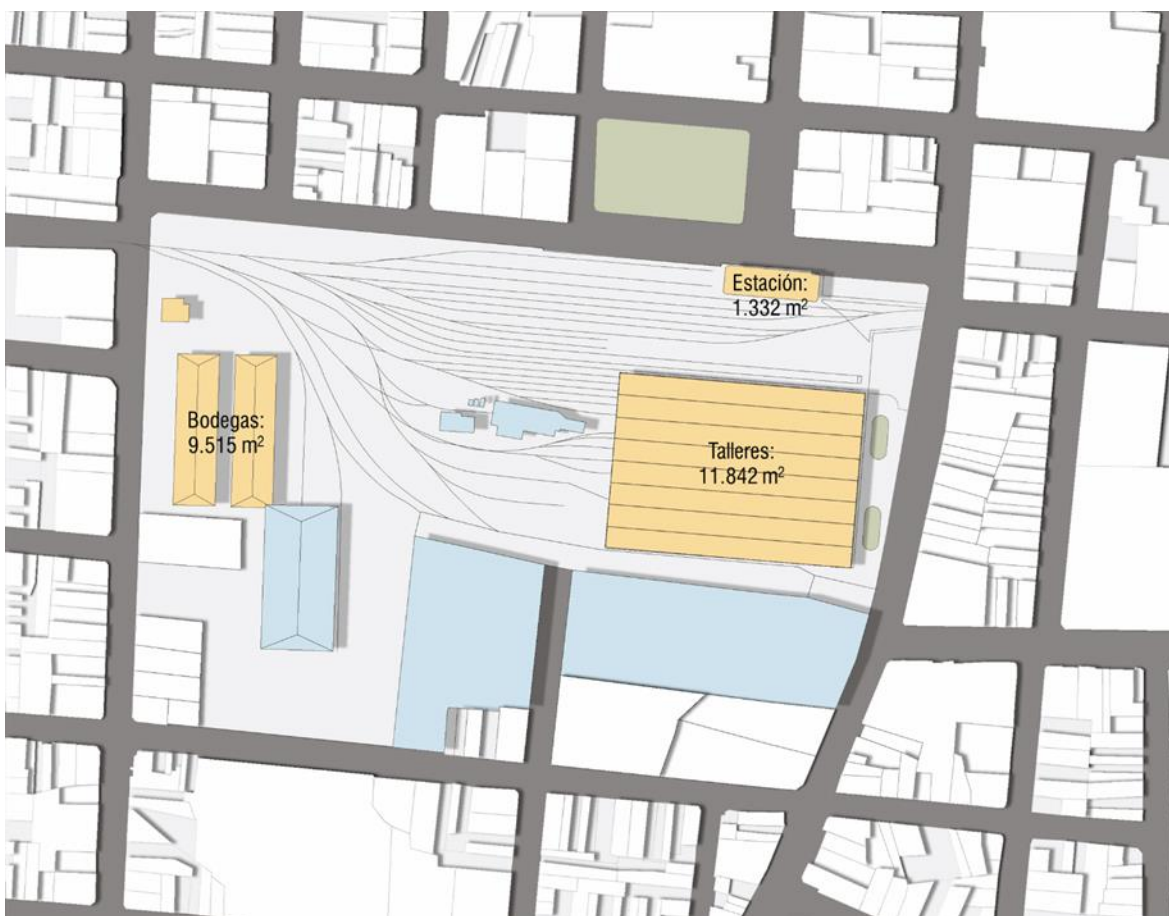


Figure 39. Current status of the land at the Pacific Station.

5.2 Land use regulation

In accordance with the Zoning Map and the Urban Development Regulations, the property in question has an area called: **INSTITUTIONAL, COMMUNAL AND GOVERNMENT SERVICES (ZSICG)**, which considerably limits its use.

Taking into account the above, and as stipulated in **Article 8. Variation of requirements;** specifically, **section 8.2 Extension of the boundary between different land uses** where the following is specified:

“The extension of the boundary between different land uses will be allowed, for one time only. This will apply to adjacent lots and in accordance with the cadastral mosaic reflected

in the Land Use Zoning Map. These lots must have frontage and access to the same road through which the urban services are provided: water, electricity, sewage, and similar.

The dividing line extension may not be applied to lots that face or are located diagonally. The variation to this requirement will be resolved by municipal agreement, at the request of the interested party, after analysis and technical opinion of the competent agency to grant the Certificates of Land Use and the Joint Commission INVU-MSJ. For this purpose, there must be a file in which the identification of its impact on the urban environment is recorded.

Taking into account the above, the possibility of granting to the properties classified as **INSTITUTIONAL, COMMUNAL AND GOVERNMENT SERVICES (ZSICG)**, the zoning of the adjacent properties, classified as **MIXED COMMERCIAL RESIDENTIAL ZONE (ZMRC)** in order to make viable the use of the land.

The above is aligned with the next reforms of the RDU where it is proposed to eliminate the zoning of **INSTITUTIONAL, COMMUNAL AND GOVERNMENT SERVICES (ZSICG)**, and seeks to make the adjacent area homologated as an extension in the land use map to the properties with the characteristics described.

Thus, the whole property would be given a **MIXED RESIDENTIAL COMMERCIAL ZONE (ZMRC)** use and the conditions for its development would be the following:

SECTION II. MIXED RESIDENTIAL-COMMERCIAL ZONE (ZMRC)

Article 7. Definition. These are areas of the canton in process of transformation, generally located in areas of transition, between commercial and service centers or corridors and existing residential areas, providing a functional mix of residence and commerce. The purpose is to reinforce or maintain the existing residential function in the area in question, while accepting its coexistence with undisturbed commercial and service activities.

7.1. Requirements:

- Minimum lot size: 250 m².
- Minimum front of lot: 10 m.
- Frontal Withdrawal: See RDU Withdrawal Map.
- Height Coefficient: See Table of Values in art. 24 of the RDG.

7.2. Permitted activities:

In addition to the permitted activities and those permitted with conditions in the residential use areas, the following activities are permitted in the ZMRC:

Parking and taxi and porter's station; Sale of motorbike parts; Retail sale of furniture; Retail sale of household appliances; Sale of prepared food and Express Service; Liquor store (retail sale); Retail sale and repair of bicycles and Cycle; Sale of domestic gas; Retail sale of sports goods; Retail sale of computer and office equipment; Hardware store; Locksmith's shop; Rental and/or sale of audio-visual equipment; Funeral parlor, Chapel of vigil; Clinical, microbiology and chemical laboratory; Hotel, Guesthouse and similar; Workshop for the repair of computer equipment; Workshop for the repair of minor household appliances; Workshop for the repair of audio and video electronic devices for domestic use; Pool, Billiards; Sports academy (karate, kung fu, yoga, swimming and similar) Teaching Institute and Academy; Modeling Agency; Advertising Agency; Public and Private Parking; Insurance Offices; Software, Information Technology, Programming, Networking Service and other activities; Video and Electronic Games Rooms; Diplomatic Headquarters; Bank, Savings and Loan Cooperative, Finance Companies; Telecommunications Infrastructure; Academic and Technical University Center; Secondary Technical and Academic Education Center; Primary Education Center; Nursing Home, Old People's Home, Day Center; Church; Courthouse, City Hall; Post Office; Fire Station; Police Station; Red Cross; State Banking Agency, Medical Services Clinic, Medical Office and related are hospitalization, Museum, Theater; Library.

The following activities are allowed in the vicinity of existing and consolidated hospitals, a maximum of five blocks away from the hospital building and not beyond the boundary of the mixed zone Laboratory of radiology, pathology and dissection of corpses; Hospital; Clinic of Medical Services (with hospitalization and with an area not bigger than 500 m²). (*Condition 8 of the General List of Activities annexed to these rules*)

Allowed with a maximum area of 500 m² Market and Supermarket; Retail sale of miscellaneous items in non-specialized stores; Government administrative office; Offices of organizations or associations; Administrative and miscellaneous services office. (*Condition 10 of the General List of Activities annexed to these rules*).

5.3 Option 1: Continuing Development Scenario: rail use

In the first scenario, it is proposed to develop real estate developments for tertiary uses on the available land after discounting the area affected by the train tracks and the depots. This is a continuous scenario where the dynamics of land use continue to be subordinated to the train infrastructure.

In this scenario, there continues to be an evident urban fragmentation in a north-south direction as a consequence of the presence of the train tracks and the depots, leaving only 19,000 m² of land available for real estate development.

Likewise, and taking into account that one of the heritage buildings will be used to house the depots, in this scenario, it is only possible to economically exploit the existing train station and the buildings of the winery for small retail uses.

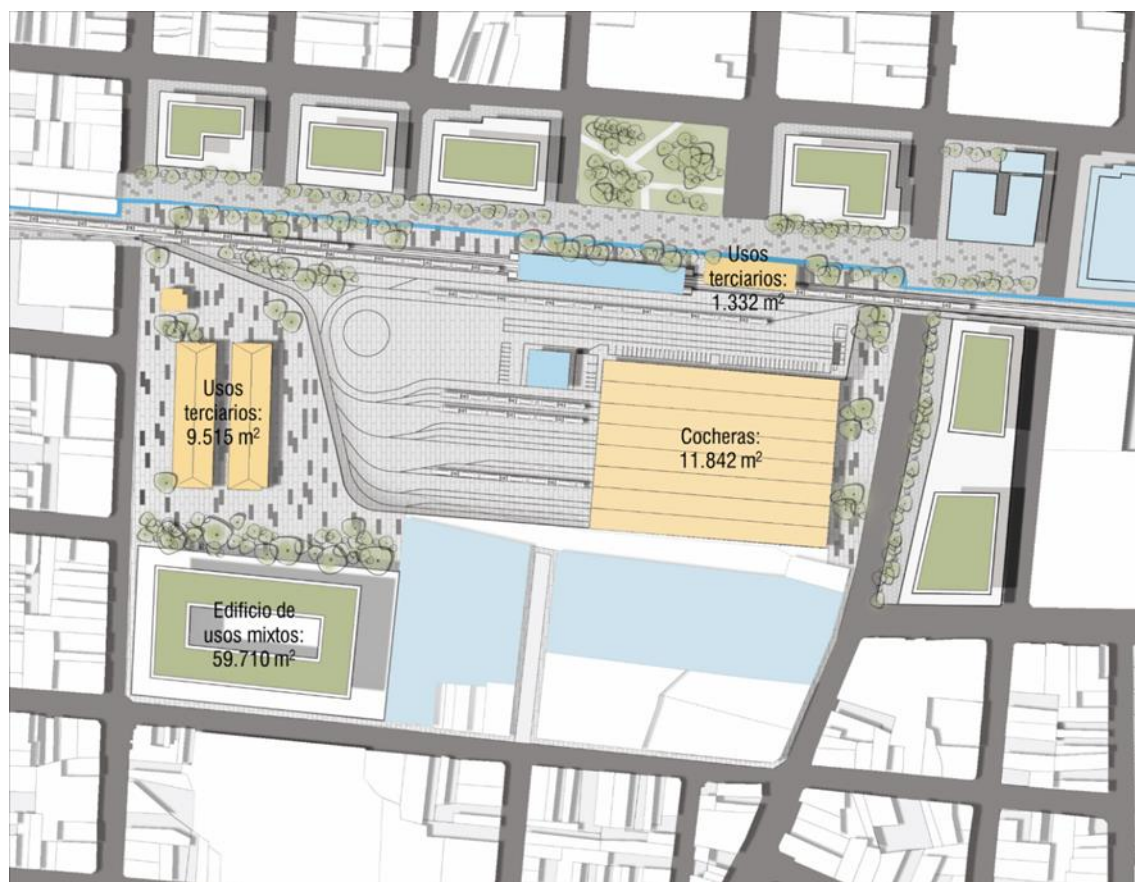


Figure 40. Pacifico Station Land Development Scenario 01.



Figure 41. Image Development Scenario 01.

5.4 Option 2: Space Release Scenario, Garage Conversion

In the second proposed development scenario, a large amount of land is to be released for possible real estate developments with tertiary uses by relocating the TRP garages to an alternate location in the corridor, more in line with the potential of the land.

Likewise, by releasing the building destined in scenario 1 to the depots, an important opportunity arises to transform and put in value this structure classified as Costa Rican Architectural Heritage.

In this development scenario, it is possible to economically exploit the train station, the warehouse buildings and the workshop building for small retail uses.

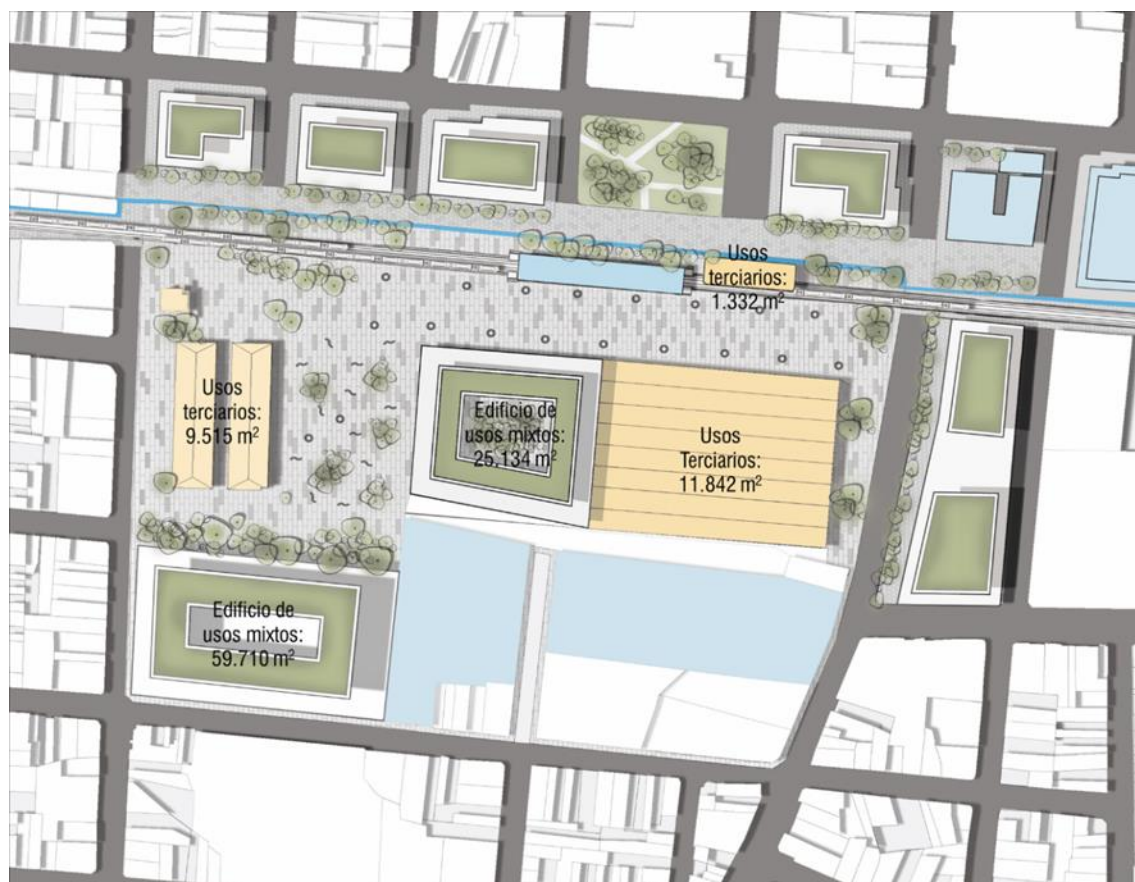


Figure 42. Pacifico Station Land Development Scenario 02.



Figure 43. Image Development Scenario 02.

5.5 Economic Estimation of the Scenarios

In order to finance the proposed projects and to be able to make an estimate of the investment required for their execution, a financial assessment of the projects is made based on the following methodology:

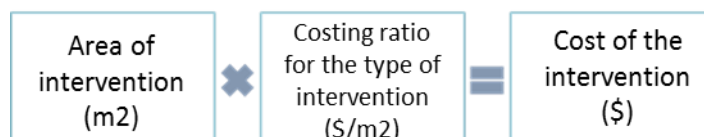


Figure 44. Methodology to carry out the financial assessment of the projects.

To determine the cost ratios, information from similar projects in Costa Rica, budgets and cost estimates prepared by the Ministry of Finance, information from real estate developers in the city, among others, have been used.

The following is the overall total costing of all proposed interventions for the two Development Scenarios:

Development Scenario 1							
	Item	Estimated values				Reference values	
		Quantity	Unit	Cost USD	Cost CRC	Value m ² (USD)	Value m ² (CRC)
1	Cost of urbanization			171.971	93.561.000		
1.1	Sidewalks	507,5	m ²	19.671	5.684.000	39	11.200
1.2	Public Space	7.615	m ²	152.300	87.877.100	20	11.540
2	Costs Urban elements			109.353	63.196.360		
2.1	Urban lighting	40	unit	86.366	49.912.102	2.159	1.247.803
2.2	Bollards	20	unit	692	400.000	35	20.000
2.3	Benches	40	unit	8.679	5.015.421	217	125.386
2.4	Arborization	60	unit	5.189	2.999.051	86	49.984
2.5	Dumpsters	30	unit	4.966	2.869.786	166	95.660
2.6	Bicycle parking lots	1	unit	3.461	2.000.000	3.461	2.000.000
3	Cost of Real Estate Development			52.025.007	30.065.828.000		
3.1	Business premises	22804	m ²	12.114.023	7.000.828.000	531	307.000
3.2	Office Building	36904	m ²	39.910.984	23.065.000.000	1.081	625.000
	Grand Total			52.306.331	30.222.585.460		

Table 336. Overall Cost Development Scenario 1.

From the previous year, it is concluded that the approximate investment needed for the development of the proposed Scenario 1 is **52,306,331 USD**, equivalent to **30,222,585,460 CRC**.

Development Scenario 2							
	Item	Estimated values				Reference values	
		Quantity	Unit	Cost USD	Quantity	Unit	Valor m2 CRC
1	Cost of urbanization			1.356.908	747.221.457		
1.1	Sidewalks	3253	m ²	126.110	36.440.320	39	11.200
1.2	Public Space	28011	m ²	560.234	323.254.903	20	11.540
1.3	Train line	11550	m ²	670.564	387.526.234	58	33.551
2	Costs Urban elements			301.762	174.391.633		
2.1	Urban lighting	120	unit	259.099	149.736.307	2.159	1.247.803
2.2	Bollards	40	unit	1.384	800.000	35	20.000
2.3	Benches	80	unit	17.357	10.030.843	217	125.386
2.4	Arborization	120	unit	10.379	5.998.102	86	49.984
2.5	Dumpsters	40	unit	6.621	3.826.381	166	95.660
2.6	Bicycle parking lots	2	unit	6.921	4.000.000	3.461	2.000.000
3	Cost Buildings per use			75.654.161	43.721.378.000		
3.1	Business premises	34.224	m ²	18.180.596	10.506.768.000	531	307.000
3.2	Office Building	39.906	m ²	39.913.147	23.066.250.000	1.081	625.000
3.3	Hotels	13.714	m ²	17.560.418	10.148.360.000	1.280	740.000
	Grand Total			77.312.831	44.642.991.090		

Table 337. Overall Cost Development Scenario 2.

From the previous exercise, it is concluded that the approximate investment required for the development of the proposed Scenario 2 is **USD 77,312,831**, equivalent to **CRC 44,642,991,090**.

Note 1. The budgets do not include the costs of rehabilitating existing buildings or indirect costs (preliminary studies, designs and construction plans, inspection, permits, administration and contingencies).

Note 2. The estimated values for the proposed works were analyzed based on the "Manual of unitary base values by construction typology" of the Ministry of Finance, similar projects in Costa Rica and the experience of IDOM in similar projects.

5.6 General assessment of the main impacts

5.6.1 Value generation

The value generation calculation of the proposed scenarios is measured from the changes in the vocation of the area (land uses), the creation of public space and the increase in the square meters built.

Table 334 below shows a comparative table with the assessment made for the two (2) proposed development scenarios:

	Development Scenario 1	Development Scenario 2
Land uses		
Actual		Public Lot 1 Area: 16.180 m ² Use: (ZSIGC)
		Public Lot 2 Area: 58.000 m ² Use: (ZSIGC)
	Currently both properties have the use: INSTITUTIONAL, COMMUNAL AND GOVERNMENT SERVICES (ZSIGC) according to the Zoning Map and the Urban Development Regulations.	
Proposed	In Scenario 1, the use of Lot 1 is proposed to be changed to a MIXED RESIDENCE COMMERCIAL ZONE (MCRC), taking advantage of this use of the adjacent property. Lot 2 remains with the ZSIGC use as it cannot be exploited by real estate developments because it is affected by the train tracks and the parking lots.	In Scenario 2, it is proposed to change the use of all the land to the MIXED RESIDENCE COMMERCIAL ZONE (ZMRC), in order to exploit both lands through real estate developments, and taking advantage of the transfer of the garages to a location more in line with the potential of the land.
Vocation of the area		

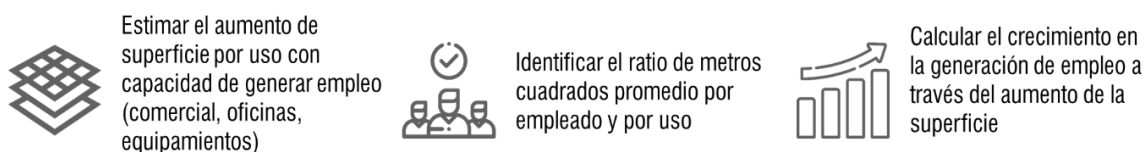
Actual	The main activities currently taking place around the station are commercial and service activities, as well as government activities. The vocation of the land is railway as it houses the INCOFER offices and the train maintenance workshops.	
Proposed	In Scenario 1, an attempt is made to articulate the railway vocation of the land with some real estate developments for tertiary use.	In Scenario 2, the aim is to transform the vocation of the sector by freeing up the land currently used for railways, thus creating an opportunity to generate new real estate developments, equipment and public space.
Public Space		
		3.263 m ²
Actual	Currently the lots only have the area of public space corresponding to a square which is part of the heritage complex along with the 3 existing buildings.	
Proposed	7.615 m ²	28.011 m ²
Constructed square meters		
Actual		
Architectural Heritage Buildings	Station Pacífico: 1.332 m ² Bodegas: 9.515 m ² Workshop: 11.842 m ²	
Soil available	19.008 m ²	59.937 m ²
Proposed		
Trade Architectural Heritage Buildings	Station Pacífico: 1.332 m ² Bodegas: 9.515 m ² Workshop: 11.842 m ²	
Trade	22.804 m ²	34.224 m ²
Offices	36.904 m ²	36.906 m ²
Hotels	0	13.714 m ²

Table 338. Calculation of Value Generation.

5.6.2 Employment generation

In order to make this estimate, it should be borne in mind that only those uses that generate direct employment will be taken into consideration, i.e. commercial uses, offices and hotels. It should be noted that temporary employment derived from the construction of the different uses has not been considered for this calculation.

The following methodology has been applied for this estimate:



First, once the area of intervention has been identified and disaggregated by use of each of the interventions, the difference between the future area and the current area is estimated, with the aim of calculating the increase in area after the implementation of the projects.

The gross area is then calculated for each use, in order to estimate the useful area on which the uses should be calculated.

This area is multiplied by a coefficient that allows the identification within the gross area of operation, of the useful area with the capacity to house areas that generate employment.

The result of applying this ratio to the increase in surface area after the interventions will be the number of new jobs generated.



In order to carry out the previous calculation, IDOM has considered the following percentages for the calculation of the gross area and ratios for the calculation of employment

by use based on its experience in similar projects and data obtained from secondary sources:

Economic activity	Gross area calculation (%)	Ratio m²/ employee
Commercial	60%	20 m ²
Offices	80%	10 m ²
Hotels	75%	100 m ²

Table 339. Basic data for the calculation of jobs.

Once this methodology has been applied, the next capacity to generate employment in the proposed scenarios has been estimated:

	Increase in area (m²)	Useful Area (m²)	New jobs generated (no. employees)
Commercial	33.651*	20.191	1.010
Offices	36.904	29.523	2.952
Total	70.555	49.714	3.969

* For the calculation of the commercial area, the sum of the following areas is considered, which include both the commercial areas associated to the real estate as well as the commercial spaces owned by INCOFER: (Train station (1332) + INCOFER offices (9,515) + New commerce (22,804) = 33,651.

Table 340. Detail of the employment generated in Scenario 1.

As can be seen, once the interventions of Development Scenario 1 have been carried out, it is estimated that there is a capacity to generate around 3,969 jobs in the area, derived from the generation of 70,555 m² of commercial and office use.

	Increase in area (m ²)	Useful Area (m ²)	New jobs generated (no. employees)
Commercial	56.913*	34.148	1.707
Offices	36.906	29.525	2.952
Hotel	13.714	10.286	103
Total	107.533	73.958	4.763

* For the calculation of the commercial area, the sum of the following areas is considered, which include both the commercial areas associated to the real estate as well as the commercial spaces owned by INCOFER: (Train station (1332) + INCOFER offices (9,515) Workshops (11,842) + New commerce (34,224) = 56,913

Table 341. Detail of the employment generated in Scenario 2.

As can be seen, once the interventions of Development Scenario 2 have been carried out, it is estimated that around 4,763 jobs can be generated in the area, derived from the generation of 107,533 m² of commercial, office and hotel use.

5.7 Urban operation model

Below is the urban operation model of the proposed Development Scenarios, which details the value of the land, which corresponds to the sale price for the right of use of exploitation, considering a 35-year concession model (assuming a useful life of 50 years for a real estate asset).

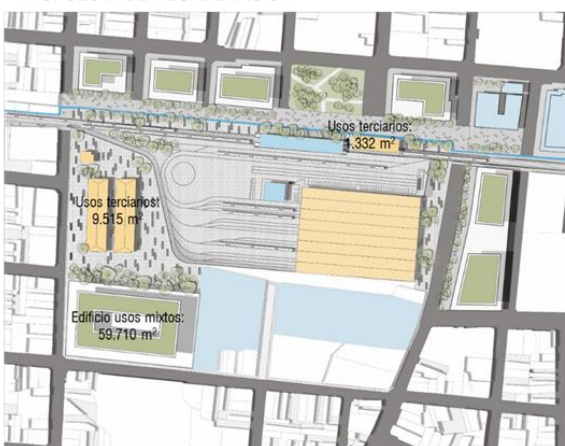
The proposed methodology seeks to obtain the value of the land as "waste" or the balance between the sale price of the property, subtracting the profit and the construction price.

Thus, by deducting the costs from the total value of the sales, the maximum value that the lot would support is reached.

SITUACIÓN ORIGINAL



PROPUESTA DE REORDENACIÓN



MODELO DE ESTIMACIONES ECONÓMICAS

INGRESOS

Uso comercial (38%):	22,804 m ²
Uso oficinas (62%):	36,906 m ²
Área Total:	59.710 m²

Precio comercio: **1,650 USD/m²**

- Valor de repercusión del suelo **20%**
- Factor corrector por concesión: **0.70**
- Coef. M² vendible/m²C: **0.60**

Valor de las ventas: $1,650 \times 22,804 \times 0.60 =$ **22.575.960 USD**

Valor del suelo urbanizado (incidencia del 20%):

$20\% \times 1,650 \times 22,804 \times 0.60 =$ **4.515.192 USD**

Valor final con factor de corrección: $4.515.192 \times 0.70 = 3.160.634$

Precio oficinas: **1,700 USD/m²**

- Valor de repercusión del suelo **20%**
- Factor corrector por concesión: **0.70**
- Coef. M² vendible/m²C: **0.80**

Valor de las ventas: $1,700 \times 36,906 \times 0.80 =$ **50.193.248 USD**

Valor del suelo urbanizado (incidencia del 20%):

$20\% \times 1,700 \times 36,906 \times 0.80 =$ **10.038.650 USD**

Valor final con factor de corrección: $10.038.650 \times 0.70 = 7.027.055$

Total Ingresos: $3.160.634 + 7.027.055 = 10.187.689$ USD

GASTOS

Los gastos necesarios para conseguir suelo ya urbanizado son más reducidos dentro de la ciudad consolidada, al contar ya con servicios.

Andenes:	507,50 m ²
Espacio Público:	7.615 m ²

- Costo andenes: **39 USD/m²**
- Costo Espacio Público: **20 USD/m²**

Total Costos de urbanización: $(39 \times 507,50) + (20 \times 7.615) = 172.093$ USD

Además, los costes se completarían con costes de adecuación del suelo, descontaminación, infraestructuras adicionales requeridas, proyectos y estudios.

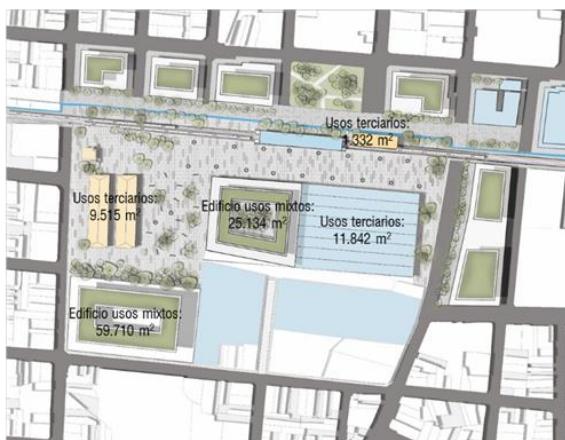
Figure 45. Urban operation model Development Scenario 01.

According to this estimate and taking into account that the estimated value of the project amounts to 52,306,331 USD, it is concluded that the value of the land corresponds to 20% of the value of the project.

SITUACIÓN ORIGINAL



PROPUESTA DE REORDENACIÓN



MODELO DE ESTIMACIONES ECONÓMICAS

INGRESOS

Uso comercial (40%):	34,224 m ²
Uso oficinas (43%):	36,906 m ²
Uso Hotel (16%):	13,715 m ²
Área Total:	84.845 m²

Precio comercio: **1,650 USD/m²**

- Valor de repercusión del suelo **20%**
- Factor corrector por concesión: **0.70**
- Coef. M² vendible/m²C: **0.60**

Valor de las ventas: $1,650 \times 34,224 \times 0.60 = 33.881.958 \text{ USD}$

Valor del suelo urbanizado (incidencia del 20%):

$20\% \times 1,650 \times 34,224 \times 0.60 = 6.776.392 \text{ USD}$

Valor final con factor de corrección: $6.776.392 \times 0.70 = 4.743.474$

Precio oficinas: **1,700 USD/m²**

- Valor de repercusión del suelo **20%**
- Factor corrector por concesión: **0.70**
- Coef. M² vendible/m²C: **0.80**

Valor de las ventas: $1,400 \times 36,906 \times 0.60 = 50.193.248 \text{ USD}$

Valor del suelo urbanizado (incidencia del 20%)

$20\% \times 1,400 \times 36,906 \times 0.60 = 10.038.650 \text{ USD}$

Valor final con factor de corrección: $10.038.650 \times 0.70 = 7.027.055$

Precio hotel: **1,900 USD/m²**

- Valor de repercusión del suelo **20%**
- Factor corrector por concesión: **0.70**
- Coef. M² vendible/m²C: **0.75**

Valor de las ventas: $1,900 \times 13,715 \times 0.75 = 19.543.020 \text{ USD}$

Valor del suelo urbanizado (incidencia del 20%)

$20\% \times 1,900 \times 13,715 \times 0.75 = 3.908.604 \text{ USD}$

Valor final con factor de corrección: $3.908.604 \times 0.70 = 2.736.023$

Total Ingresos: $4.743.474 + 7.027.055 + 2.736.023 = 14.506.552$

GASTOS

Los gastos necesarios para conseguir suelo ya urbanizado son más reducidos dentro de la ciudad consolidada, al contar ya con servicios.

Andenes: 507,50 m²

Espacio Público: 7.615 m²

• Costo andenes: **39 USD/m²**

• Costo Espacio Público: **20 USD/m²**

Total Costos de urbanización: $(39 \times 507,50) + (20 \times 7.615) = 172.093 \text{ USD}$

Además, los costes se completarían con costes de adecuación del suelo, descontaminación, infraestructuras adicionales requeridas, proyectos y estudios.

Figure 46. Urban operation model Development Scenario 02.

According to this estimate and taking into account that the estimated value of the project amounts to USD 77,312,831, it is concluded that the value of the land corresponds to 18% of the value of the project.

From the previous analysis, it is concluded that, in both scenarios, in which a maximization of the use of the land is sought in accordance with the norm and the potential for development, the relation between the value of the land and the value of the project is in reasonable ranges, taking into account that normally this percentage oscillates between 10% and 20% of the sales in consolidated urban areas, according to use, social stratum and the building index.



Figure 47. Urban operation model Development Scenario 02.



6 CONCLUSIONS

From the exercise carried out, it is possible to determine which are the electric train stations with potential to generate income which should be the object of a Real Estate Development Plan of the TRP, which allows the definition of spaces and investment opportunities, and operations susceptible to be the object of concession and bidding with real estate investors.

In addition, the need arises to develop a Management Plan for the TRP line, which establishes along the line not only land regulations, but also the necessary actions for the greatest success and use of transport infrastructure from developments oriented towards sustainable transport (identification of spaces for intermodality, access routes, possible formulas for capturing land value), allowing the optimization of value generation, by integrating urban actions on centralities and land uses; on mobility and transport, and on the public space system.

The pilot exercise carried out highlights the need to articulate the TRP project with the development of the territory under the understanding that this generates economic gains that should benefit both the private sector business and the public sector and citizens in the form of payment of taxes and transfers of quality developed land.

Likewise, from this year onwards, it demonstrates the revenue potential of one of the stations classified as having a high potential and its capacity to generate value both by attracting potential investors and by obtaining new central, civic and intermodal areas in one of the most relevant stations in the system.