APPLICANT 3 – A RE-WORK OF A RAILWAY SYSTEM

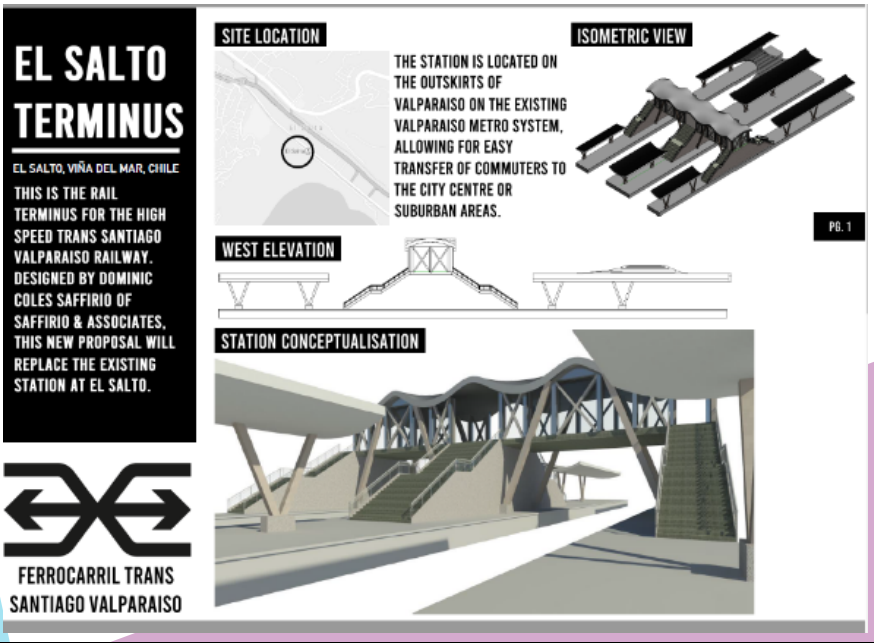
What does/did your project aim to achieve? **Please write up to a maximum of 300 characters**
It aimed to reduce road congestion and pollution by providing a high-speed electric rail connection between the two prosperous cities in Chile. The rail connection is fully sustainable as it would be powered by a new geothermal plant making the net production of CO2 zero. This railway link will turn a 2-hour polluted journey into a completely green 15-20 minute commute from between each city. The project also revitalises parts of the disused railway line and will encourage economic development.

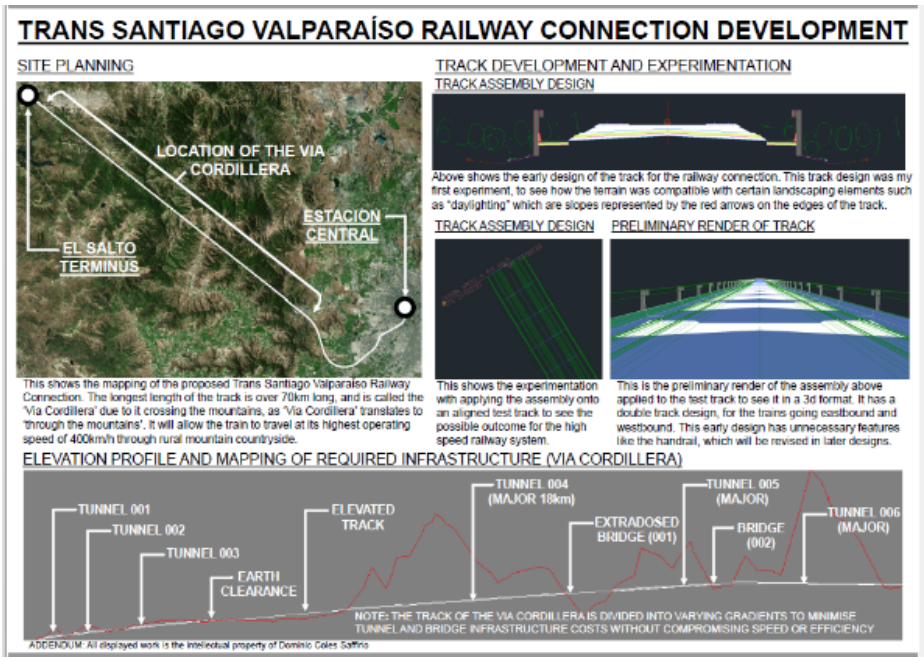
Please describe and explain your project making clear and direct reference to your supporting documentation. **Please write up to a maximum of 1000 characters**
Due to the high seismic activity in the area, the design of the track and other infrastructure had to be able to withstand high magnitude earthquakes. I solved this by creating my slab track based on the Shinkansen's design with reinforced concrete track and padding to help mitigate the effects of the P-Wave. I also designed a custom fastening assembly, to secure the track down safely and deal with the vibrations caused by the maximum operating train speed of 400km/h, the second-fastest globally.

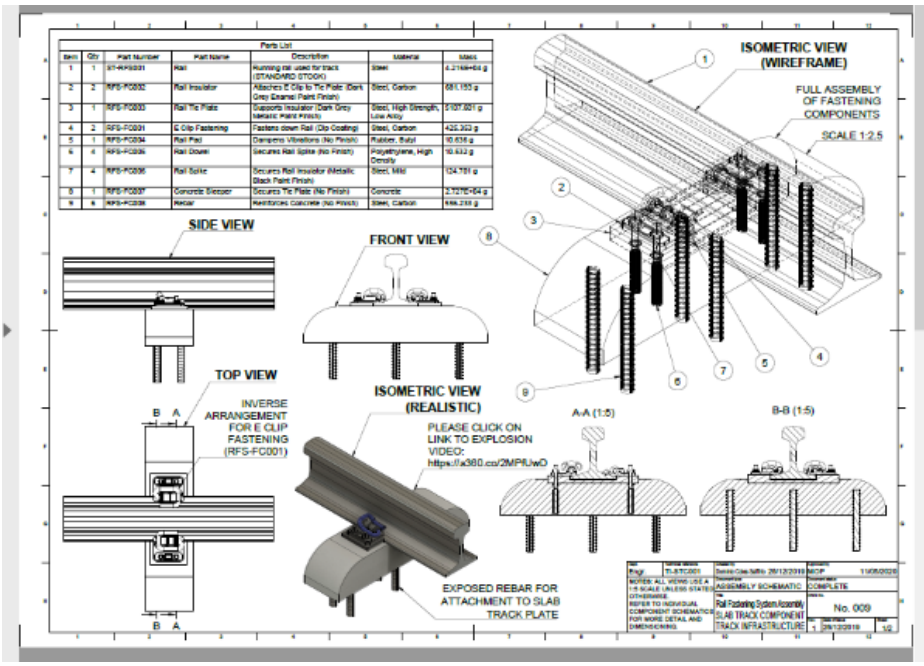
What have been the successes and failures of you project so far? **Please write up to a maximum of 500 characters**
As the rail line passes through the mountains, I needed to create tunnels and bridges, so I used Civil 3D to calculate the elevation profile and start to plan out the required earthworks and infrastructure. The cross-section of the track uses multiple shallow gradients to reduce tunnel length, as it is expensive but also creates the 'piston effect'. Currently, I am designing the tunnels, and I have designed perforated hoods at the entrance and exit of the tunnel to minimise the compression wave.

What lessons of an engineering nature have you learnt from working on this project? **Please write up to a maximum of 500 characters**
I have learnt that I need to pay attention to the smallest details that may hinder the overall efficiency of the railway line. I also taught myself how to use engineering programmes such as Fusion 360 for the fastening components, Autocad, Civil 3D and Revit for the terminus design which was a big challenge. I also researched heavily into structural engineering for the design of the rail terminus at Valparaíso, as well as researching fluid mechanics for the design of the 18km long major tunnel.

VISUAL EVIDENCE







MARKER'S COMMENTS

This project is extremely impressive and this particular application writeup is included just to show the level that some students achieve. It looks like the sort of project that consumed the applicant's every waking moment! Not only has the applicant delved into architectural engineering but also civil engineering, structural engineering, fluid mechanics and mechanical engineering, and the CAD work is outstanding. One criticism would be that the last section of this write up – lessons learnt - does not really tell us what *lessons* the applicant has learnt but more about *what* the applicant had to learn and do.