Chartered Membership and CPEng

1. Engineering Knowledge

I applied my engineering expertise in civil construction compliance and contracting advice while working with various organizations, including Auckland Council and the Ministry of Education. My role involved addressing complex challenges in the development of affordable housing and social housing projects. For instance, as Principal Engineer for Auckland Council's Housing Project office, I contributed to the redevelopment of the Hobsonville Air Base. I carefully reviewed project specifications and site conditions to identify potential risks and compliance issues at the outset. I coordinated with stakeholders, including contractors and local authorities, to ensure that our objectives aligned with New Zealand's engineering regulations. I performed regular inspections and site assessments to monitor progress and checked the construction work against the technical dimensions and specifications outlined in the structural drawings to ensure compliance and quality standards were consistently met.

I applied my engineering expertise in civil construction compliance and contracting advice during the construction of the 15 Trig Road Whenuapai Secondary School project. I faced significant challenges due to severe weather conditions, including one of the wettest winters on record and the impact of Cyclone Gabriel, which resulted in torrential rain. At this stage, I was involved in constructing the new internal roads for the school, which included excavating the clay subgrade. The design required the subgrade to achieve a California Bearing Ratio (CBR) greater than 10%. However, initial testing on the excavated clay revealed an average CBR of only 3.5, primarily due to the weak and saturated clay material.

To address this issue, I engaged a specialized company, Highway Stabilisers, to conduct on-site testing of the clay and develop a design that incorporated cement and lime to enhance the CBR value. After a thorough evaluation, I agreed on a design to add 2% cement and 3% lime to the subgrade. I executed the stabilization during a dry period of weather, followed by a five-day curing period. While the results for most sections of the new roads were favorable, I identified certain areas that failed to improve, presenting a significant technical problem.

As the project was time-sensitive due to the school's scheduled opening, I was requested by the engineer to devise an economical and effective solution. By applying my 30 years of experience in roading across various organizations, including Auckland Transport, I performed an in-depth analysis of the failed sections. I conducted deflection testing using a static 10-tonne roller to evaluate the load-bearing capacity of the subgrade. I determined that the high moisture content still present in the clay was preventing the lime and cement design from achieving optimal performance under the current conditions.

I then devised a targeted remediation strategy based on my findings. I undertook to undercut the failed sections of the subgrade by 500 mm, thereby removing the compromised material. I

then reintroduced the stockpiled, dry upper trimmings, which still exhibited lime traces, in 150 mm lifts, ensuring thorough compaction at each lift to optimize the structural integrity of the subgrade. Following this remediation, I conducted scala penetrometer testing on the newly treated sections and successfully achieved a CBR value of 10.

This remedial work not only rectified the compliance issues but also resulted in cost savings by eliminating the need to re-establish Highway Stabilisers on site. I was able to complete the work within a narrow weather window, given the exceptionally wet winter we were experiencing. Through this experience, I demonstrated my ability to apply advanced engineering principles, such as soil stabilization and material performance evaluation, as well as my understanding of good practices for professional engineering specific to New Zealand.

Furthermore, I actively pursued continuous learning to enhance my knowledge base and engineering skills. I have attended Unitec to further my qualifications and participated in numerous short courses focused on innovative construction techniques and compliance methodologies. As a member of Engineering New Zealand, I regularly engage in professional development programs that align with industry standards.

Furthermore, I work as a consultant with Auckland Council, where I receive monthly updates about policy changes and amendments to codes of practice. I was assigned to review a newly installed wastewater drainage line, which required me to produce a comprehensive report assessing its compliance with the current CCTV Pipe Inspection Manual (4th edition). I had just completed training conducted by Project Max on this updated manual, which equipped me to effectively review the CCTV footage. I evaluated the identified defects against the acceptable criteria and clearly outlined the criteria for compliance. This process enabled me to recommend necessary actions for sections that did not meet the standards, ensuring the integrity of the drainage system.

I also focused on construction projects involving earthworks, where I ensured compliance with land use consent conditions set by Auckland City Council, in line with the GD05 Erosion and Sediment Control Guidelines. Throughout the construction phases, I implemented and continuously updated silt control measures. I coordinated with the Auckland Council compliance officer to facilitate the gradual closure of the site and the stabilization of the earthworks.

Through these experiences, I have not only applied advanced engineering principles and methodologies but have also committed to continuous learning and professional growth, ensuring that my contributions align with the highest standards of engineering practice in New Zealand.

2. Managing Engineering Work

I served as the Project Manager for Ngarda Civil and Mining Limited at the Marandoo Mine in Western Australia, located 1,413 km northwest of Perth. I managed a complex project focused on recycling the dewatering process for an iron ore mine expansion that operated below the water table. I directed the construction of 17 agricultural fields that utilized recycled water from 27 bores, which had a total capacity of 107.4 ML/day. I designed a system of rotating sprinklers that irrigated these fields, allowing for the production of 2,500 tonnes of hay each year.

I faced significant challenges due to the remote location and extreme heat conditions, which could reach up to 45 degrees Celsius. I implemented a comprehensive resource planning strategy to ensure that all necessary staff and equipment were available for safe and efficient operations. I organized teams into rotating three-week shifts, allowing for continuous site presence while scheduling regular flights back to Perth for rest periods. I found that this approach minimized turnover, maintained productivity, and prevented delays that could have significantly increased costs.

I also coordinated closely with mechanics and equipment operators to reduce the risk of equipment failures. I arranged for mechanics to be flown to the site as needed, ensuring that all machinery remained operational to avoid costly disruptions. Additionally, I performed financial analysis to optimize resource allocation and manage project costs effectively. I evaluated various sourcing options and material selections to ensure we operated within budget.

For cost control, I conducted a comprehensive analysis of materials sourcing and transportation expenses. I evaluated multiple supply options for critical materials, choosing local sources for bulk items such as piping and structural components. This decision significantly reduced transportation costs and minimized delays associated with long-distance shipping. For equipment selection, I analyzed various options based on fuel efficiency, durability, and maintenance requirements. I opted for fuel-efficient machinery with lower maintenance demands, which not only reduced operational costs but also ensured smooth, uninterrupted work progress. To further manage expenses, I introduced drone surveying for monthly progress checks over the 830-hectare project area. This use of drone technology allowed me to monitor the site cost-effectively, avoiding the need for additional personnel on-site and ensuring that design specifications were consistently met.

I prioritized risk management due to the environmental sensitivity of the project, particularly because of its proximity to Karijini National Park. I identified risks related to encroachment into protected areas, which could result in significant fines and project delays. A breach could not only lead to financial penalties but also halt operations for investigations, potentially causing substantial delays in the project timeline.

To address these risks, I implemented GPS boundaries on all heavy machinery to ensure operators remained within designated areas. I communicated the importance of these

protocols and provided training to ensure crew members understood the implications of non-compliance. However, an incident occurred when an operator disabled his GPS alarm and inadvertently entered the protected area, causing damage to native vegetation. In response, I immediately terminated the operator's employment to uphold our commitment to environmental stewardship. I then conducted a team briefing to reinforce compliance protocols and emphasized the necessity of adhering to project boundaries. Moreover, I implemented periodic checks on machinery and reminded operators about the GPS alarms to prevent future incidents.

As the Principal Development Engineer for Auckland City Council from December 2013 to December 2019, I managed a comprehensive housing project across Auckland. My responsibilities included reviewing all engineering plan applications and ensuring compliance with the Auckland Unitary Plan, Council Codes of Practice, Quality Management Plan, and environmental requirements. I prioritized quality control and documentation processes, which significantly enhanced the efficiency of application processing and the issuance of 223 and 224c approvals.

To ensure compliance with approved engineering plans, I collaborated closely with contractors on-site, guiding them in maintaining quality standards for the construction of utilities, drainage, and roadworks. I monitored and recorded the performance of all activities in line with Auckland Council codes of practice, ensuring that every aspect of the project met regulatory requirements.

In both projects, I demonstrated strong engineering judgment and proactive risk management. I identified potential risks early on, implemented monitoring solutions, and coordinated effective responses to ensure project compliance and success. My approach focused on maintaining high standards of quality control and environmental stewardship throughout the project lifecycles.

3- Professional acumen

In my role as Senior Project Manager for the Whenuapai School project, I encountered a critical issue with the stormwater connector for the subdivision lots. I found that the existing clay ceramic saddle could not support the backfill, posing a risk for potential failures during inspections. I designed a new uPVC saddle with a design life of 100 years, significantly longer than the 30-year lifespan of the clay saddle. By implementing this new saddle, I helped Auckland Council Healthy Waters save costs associated with replacing aging clay saddles, reducing the need for excavation and minimizing environmental disruptions. I prioritized sustainability by choosing a solution that decreases carbon emissions and demonstrated accountability in addressing this engineering challenge while contributing to the long-term resilience of the infrastructure.

Similarly, I recognized that the new agricultural pivots were located near a National Park, presenting significant risks if machines operated outside the designated project area. To mitigate these risks, I arranged for environmental staff from the design consultant to be on-site full-time to monitor our activities. I conducted a pre-start meeting with plant operators to emphasize the importance of adhering to established risk controls. I ensured that all bulldozers used for clearing operations were equipped with GPS controls and alarms to alert operators if they approached the National Park boundary. However, when an operator disabled his alarm and inadvertently entered the protected area, causing damage to native trees and plants, I regarded this as a serious breach of conduct. I made the decision to terminate the operator's employment immediately, reinforcing my commitment to accountability and the importance of environmental stewardship. After this incident, there were no further breaches, demonstrating the effectiveness of the measures I implemented in both situations.

4- Developing technical solutions

While working as a Senior Project Manager for the Whenuapai School project, I encountered several critical issues that required my professional acumen to resolve effectively. One significant issue arose with the private wastewater treatment plant. The resource consent specified a maximum output of 6,650 liters per day; however, monitoring data showed that the plant was exceeding this limit. In response to this situation, I immediately took action by analyzing the data and inspecting the wastewater lines, manholes, and pump station tanks. During my investigation, I discovered that stormwater was infiltrating the wastewater storage tanks, which was due to the plant's location in a high-water table area.

To address this challenge, I installed a temporary flowmeter to accurately monitor the wastewater flow from the upstream buildings. The data indicated that the flows matched the estimated design levels, allowing me to rule out issues within the pipe network. To further investigate, I oversaw excavations around the storage tanks, where I found damaged pipes caused by high groundwater levels. After repairing the pipes and resealing the tanks, I monitored the system for two weeks, which confirmed compliance with the resource consent conditions. This experience highlighted my commitment to proactive problem-solving and effective communication with stakeholders.

Another challenge I faced was related to site access. The principal contractor failed to provide adequate access to the site, which prevented the installation of essential construction equipment like excavators and delayed our backfilling operations. To resolve this issue, I proposed an alternative solution using bulker bags filled with clean sand. I developed a construction method statement detailing this approach, including risk assessments and control measures. After presenting this solution to the client, I received approval to proceed. Implementing this innovative approach allowed us to maintain productivity and keep the project on schedule, demonstrating my ability to adapt to changing circumstances.

Additionally, I encountered an issue with the stormwater connector for the subdivision lots. The existing clay ceramic saddle was not strong enough to support the backfill, leading to potential failures during quality control inspections. Recognizing the importance of addressing this issue, I designed a new uPVC saddle that met all council compliance requirements. I worked closely with Auckland Council to review the design and ensure it was robust enough to withstand the necessary conditions. After several iterations and testing, I secured approval for the new design, which is now being utilized in the project. This experience underscored my commitment to quality assurance and compliance with regulatory standards.

Furthermore, I encountered a challenging situation during the construction of a new wastewater uPVC SN 16 pipe with a diameter of 150mm. After completing the installation, I conducted a CCTV review of the line and discovered several dips that raised concerns about the pipe's compliance with Watercare's standards for vesting as a new asset. To address this issue, I prepared a comprehensive review report based on the latest WNZ Gravity Pipe Inspection Manual, which included detailed findings from the CCTV inspection.

I submitted this report to Watercare for their assessment, and their feedback indicated that while lines 1 and 2 could be accepted, line 3 required remediation due to its sagging sections. Recognizing the urgency of the situation, I took the initiative to research potential solutions. I discovered a new technology developed by Advanced Construction Products in America, specifically designed to correct low spots in PVC pipes. I coordinated with the supplier to arrange for the equipment needed to implement this solution. The technology involves positioning a specialized machine at the sag point of the pipe, where lift pressure is applied. This pressure, combined with vibration from a central mechanism, effectively raises the sagging sections of the pipe back into alignment.

After applying this innovative solution, I conducted another round of CCTV inspections to verify that the corrections had been successful. I was pleased to report that the adjustments met Watercare's standards, resulting in the pipe's acceptance for vesting. This approach not only resolved the issue efficiently but also saved significant costs associated with open trenching to relay the pipe, which would have been required due to its location under a new road. Through these experiences, I demonstrated my ability to identify challenges, devise practical solutions, and ensure compliance, all while keeping the projects on track and within budget.