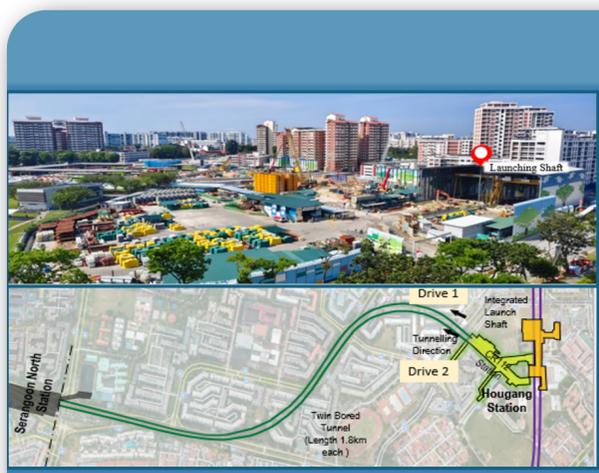
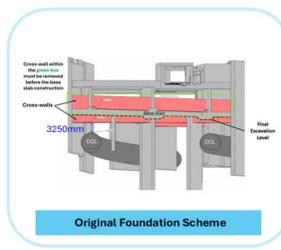
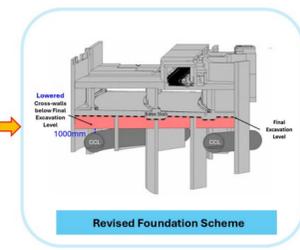


MINISTER'S VALUE-FOR-MONEY ACHIEVEMENT AWARD

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INNOVATIVE CONSTRUCTION APPROACH FOR RAIL AND ROAD TUNNELS

	<p>Engineering Solution</p> <ul style="list-style-type: none"> Repositioned cross-walls below Final Excavation Level Streamlined cross-walls configuration reducing construction complexity <p>Project Outcomes</p> <ul style="list-style-type: none"> Accelerated project timeline by 20 months Achieved cost savings of \$8 mil Enhanced construction safety Improved structural durability & robustness <p>Industry Impact</p> <ul style="list-style-type: none"> Set new industry benchmark for construction near operational tunnels Developed scalable methodology for future projects <div style="display: flex; justify-content: space-around;"> <div data-bbox="938 1366 1219 1616">  <p>Original Foundation Scheme</p> </div> <div data-bbox="1238 1366 1538 1616">  <p>Revised Foundation Scheme</p> </div> </div>
<p>RAIL (Cross Island Line)</p>	<p>ROAD (North-South Corridor)</p>

PROJECT TEAM



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Team Leader
Co-Leader
Deputy Leader
Member
Member
Member

OVERVIEW

NEED FOR
PROJECT

SOLUTION

IMPACT

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INNOVATIVE CONSTRUCTION APPROACH FOR RAIL AND ROAD TUNNELS

NEED FOR PROJECT



- There are complex site constraints for both Cross Island Line (CRL) and North-South Corridor (NSC) projects.
- **CRL** - The intermediate launching shaft was in close proximity to private houses and required complex advance works.
- Hence, there was a need to simplify tunnelling operations to reduce risks and improve efficiency.

- **NSC** - The close-proximity construction above live Circle Line (CCL) tunnels risked ground instability, structural damage, and potential critical disruption to rail operations.
- Hence, there was a need to safeguard tunnel integrity, maintain uninterrupted rail services, ensure construction safety, and protect project timelines.



PROBLEM STATEMENT

Need to find new construction approach to overcome the complex site constraints in densely developed urban environment with protracted construction methodologies.

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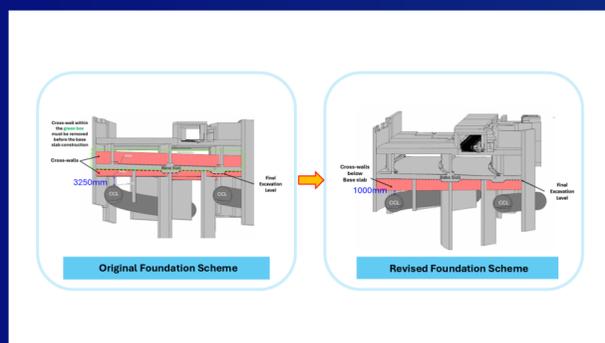
SOLUTION

- Streamlined construction of rail tunnel for CRL and NSC road tunnel.



CRL

- Implemented alternate Bored Tunnelling strategy -Omission of intermediate launching shaft and integrating the launching Shaft with station.
- Simplified tunnelling operations by reducing tunnel drives from 4 to 2.



NSC

- Revised the foundation scheme – replacing bite-sized sequential excavation with larger excavation area.
- Optimised foundation design by eliminating unnecessary cross-walls.
- Repositioned remaining cross-walls below base slab level to reduce abortive work.
- Validated design & construction feasibility through site trials.
- Shortened excavation duration by reducing abortive work and enlarging casting area.
- Maximised programme value with efficient construction sequencing.

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SOLUTION STATEMENT

Implemented a strategic approach in construction methodology to streamline construction processes and reduce project risks.

OVERVIEW

NEED FOR
PROJECT

SOLUTION

IMPACT

MINISTER'S VALUE-FOR-MONEY ACHIEVEMENT AWARD

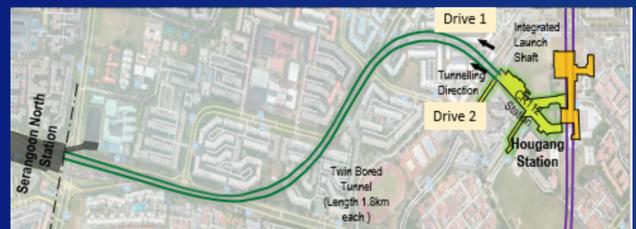
INNOVATIVE CONSTRUCTION APPROACH FOR RAIL AND ROAD TUNNELS

IMPACT

- Streamlined construction of rail tunnel for CRL and NSC road tunnel.

CRL

- Reduction of bored tunnel drives from four to two which helped efficiently manage manpower and tunnelling materials.
- Reduction of high-risk activities (e.g. dismantling Tunnel Boring Machines from four to two).
- Eliminated complex advance works.
- Cost savings: \$21mil.**
- Construction time savings: 3.5 months.**



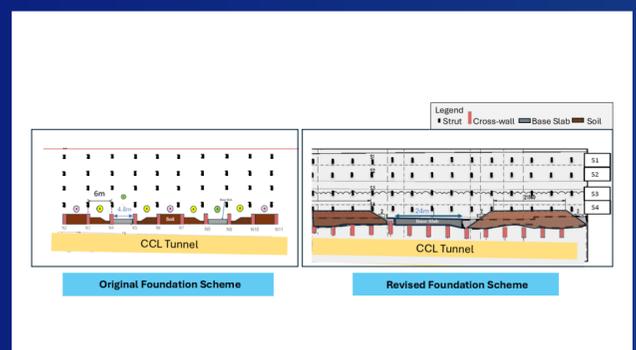
Cost Savings at \$8mil

	Original Scheme (\$8mil)	Optimised Scheme (\$8mil)	Net Savings (\$8mil)
One-off (Materials)	17.8	12.7	4.9
Recurring (Maintenance)*	4.4	1.3	3.1
Total	22.2	14.2	8.0

*Occurs every 5 years during the 120-year maintenance period

NSC

- Reduction of excavation exposure time lowered infrastructure risks and improved operational safety for live CCL tunnels.
- Minimised construction joints lowered maintenance needs.
- Enhanced site safety by minimising hazard exposure during construction.
- Prevented programme delays with streamlined construction methodology.
- Achieved efficient design which avoided potential disputes.
- Cost savings: \$8mil.**
- Construction time savings: 20 months.**



Time Savings of 20 months



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OUTCOME STATEMENT

Simplified construction methodologies that garnered major benefits and provided a framework for value engineering.