

TECHNICAL MEMORANDUM

To:	City of Joondalup	From:	Gil Alexander
Attention:	Richard Greening	Date:	6 September, 2022
Email:	Richard.Greening@joondalup.wa.gov.au	JDSi Ref:	JDS222126.02
CC:	Matthew.MacPherson@joondalup.wa.gov.au	Pages:	4 plus attachments
Subject:	Lane 5 Clontarf Street, Sorrento		

Client,

1 Background

The City of Joondalup (the City) proposes to construct lane 5 to link the existing Lane 1 to Clontarf Street, Sorrento. Concept plan and long sections have been undertaken by the City showing a 4.4m width pavement involving approximately 450m³ of bulk earthworks removal, a truncation on lot 402 at the connection between Lane 1 and Lane 5, retaining walls along lots 403 and 402, adjustments to the existing drainage pipeline and a new limestone wall at the entrance to provide adequate sight distances. Refer to Attachment 3 and Attachment 4. An existing sewer main is located within the Lane 5 which will also be impacted by the proposed works.

JDSi has been commissioned by the City to provide a technical memorandum covering the following: -

- Retaining structure material/methodology
- Works footprint/access/dilapidation issues
- Earthwork's material/excavation issues (caprock possibility)
- Truncation requirement at northern-most end (intersection of Lane 1 & Lane 5)
- Retaining wall at Lane 5 / Clontarf Street to accommodate sightlines at intersection
- Requirement to accommodate waste vehicle turning movement access in both directions along Lane 5 (does not require vehicles to be lane compliant)
- Critical assumptions
- Possible mythology for delivery
- Indicative timeline
- OPC of Design – including broad units and rates
- OPC of construction (based on a certain methodology) – including broad units and rates

2 Technical Issues

This part of the memorandum will address the items required by the City as listed above.

2.1 Access and Dilapidation Issues

Lane 5 construction site is at the end of the existing lane 1 which provides rear access to adjacent lots. Access for the construction of the Lane 5 would need to use Clontarf Street as the main access point for the works site, to minimise impact on the adjoining residents.

The works footprint is very confined and restricted to the width of the Lane 5 (6.1m). The type and construction of the retaining walls fronting lots 402 and 403 will be dictated by the available work footprint, and the need to provide a 4.4m wide pavement within Lane 5.

Prior to the commencement of any works, the civil contractor would need to undertake site dilapidation surveys of all the adjoining properties. Given the possibility of cap rock (to be confirmed or otherwise by the site geotechnical investigations) there is a potential for construction vibrations to be transmitted to the adjoining properties with the potential of structural damage.

The contractor will need to minimise the construction vibrations (and noise) by reducing/tempering the amplitude and frequency of the compaction equipment, and to use wheel rolling as the main form of pavement compaction.

2.2 Earthworks

The alignment of Lane 5 traverses an existing sand dune requiring approximately 450m³ of bulk earthworks with a cut depth of up to 2.3m. There is also the possibility of limestone/ caprock to be encountered within the excavation. A geotechnical site investigation, including assessing the likelihood of rock, is required prior to undertaking detailed design of the works.

Based on the preliminary long section of Lane 5, the adjoining lots 403 and 402 will require retaining of up to 2.3m. This is the most critical of the civil works. Refer to **2.3 Retaining Walls** below.

2.3 Retaining Walls

The narrowness of the Lane 5 reserve width (6.1m) and the requirement to achieve 4.4m wide pavement to achieve a low volume, low speed bi-directional traffic flow, precludes the use of traditional mass block retaining wall construction. A retaining wall system with a minimal footprint is required. There are a number of retaining wall options that should be considered, including: -

2.3.1 Steel Sheet Piling

Steel sheet piling could be installed along the boundary lines of lots 403 and 402 in advance of, or after the shaping of benching to allow the access of machines. Once installed and the excavation for Lane 5 completed, the steel piles could be left in place, or a post and panel system could be installed, and the steel sheet piling removed. This would leave the retaining wall either on, or immediately adjacent to, the Lane 5/lot boundary without encroaching into the lots and would maximise the width of the lane to achieve the 4.4m wide pavement. The steel sheet piling is not overly aesthetic, would need surface treatment with an ongoing maintenance regime, or else faced with either blocks, or gunited.

However, this option is expensive, noisy, will cause construction vibrations to the surrounding residences, and steel sheet piling for permanent installation is not easy to source. The possibility of encountering cap rock would further complicate the use of steel sheet piles.

2.3.2 Steel Post and Concrete Panel Retaining Wall

After the removal of the bulk of the earthworks to a level matching the adjoining properties (lots 402 and 403) steel posts could be drilled and concreted in, followed by the controlled installation of the concrete panels. Given the dunal nature of the material likely to be encountered, pre microfine grouting of the sand would need to be undertaken to ensure the integrity (level of consolidation) of the material within the lots is not compromised. The posts would need to be galvanised and would require an ongoing maintenance regime during the life of the structure.

2.3.3 Microfine Cement Injection with Block Facing

After the removal of the bulk of the earthworks to a level matching the adjoining properties (lots 403 and 402) microfine cement grout injection is undertaken as determined by the geotechnical engineer. The remainder of the earthworks would be undertaken, including the trimming of the grouted material to create a face. A permanent block facing is then anchored to the set continuous microfine grout block. Refer **Figure 1 Microfine Cement Injection** below.

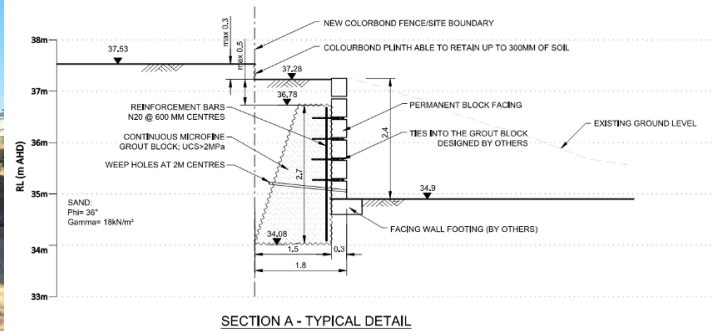


FIGURE 1 Microfine Cement Injection

As can be seen from **Figure 1 Microfine Cement Injection**, approximately 1.8m width on each side of the Lane 5 would be required to accommodate a 2.4m high retaining wall. Consequently, the adjoining owners of lots 403 and 402 would need to agree to microfine cement injection extending into their property boundary, so that the permanent block face could be moved back towards the lot boundary to achieve the required 4.4m pavement width with adequate clearances from the retaining wall.

JDSi recommends the adoption of the microfine cement injection with block facing as the most likely option being the best cost and time effective approach.

2.3.4 Pavement Design and Geometry

The preliminary design undertaken by the council aims to achieve a 4.4m wide pavement to accommodate low volume and low speed bi-directional traffic flow, including waste vehicle movement in both directions (no need to be lane compliant). This will necessitate the truncation of the intersection of Lane 1 and Lane 5, and the resumption of land from lot 402. The exact requirements of the truncation will be determined at detailed design stage.

Given the confined space, the grade, and the need to minimise construction vibrations and contract timeline to reduce the potential impact on the residents, it is recommended that the pavement design be a thick lift asphalt over limestone.

2.3.5 Indicative Project Timeline

An indicative project timeline has been undertaken and can be found in **Attachment 1** of this technical memorandum. The timeline has been arbitrarily adopted as the start date has not been defined.

2.3.6 Order of Probable Costs

An order of probable costs has been undertaken and can be found in **Attachment 2** of this technical memorandum. Notes under Section 4 of the OPC provides details of the assumptions used for the OPC.

2.3.7 Critical Assumptions

The following critical assumptions have been made with regards to this technical memorandum: -

- The adjoining owners of lots 402 and 403 agree to allow microfine cement injection into their property boundary for the construction of the microfine cement injection with block facing retaining wall option to be used. If this is not possible, then: -
 - one of the steel sheet piling retaining wall options will need to be adopted (at increased expense), OR
 - the pavement width will need to be reduced precluding the bi-directional vehicle access, and possibly the waste vehicle movement.
- The Water Corporation agree to the concrete encasement of the existing sewer located within Lane 5. Should the Water Corporation not agree to the encasement, then it would be more problematic to relocate the sewer.
 - The City is able to resume land from lot 402 to create the truncation at the junction of Lane 1 and Lane 5

- We have assumed minimal cap rock to be encountered and that it would not impact onto the design of the retaining walls
- The OPC assumes the adoption of the microfine cement injection with block facing as the most cost and time effective approach. The other retaining wall options along lots 402 and 403 have not been costed and will only need to be should the adjoining owners not agree to the microfine cement injection into their property boundary.

We trust this information meets your current requirements. If you have any queries or need more information, please contact us.

Kind regards,



Gil Alexander
Senior Civil Engineer

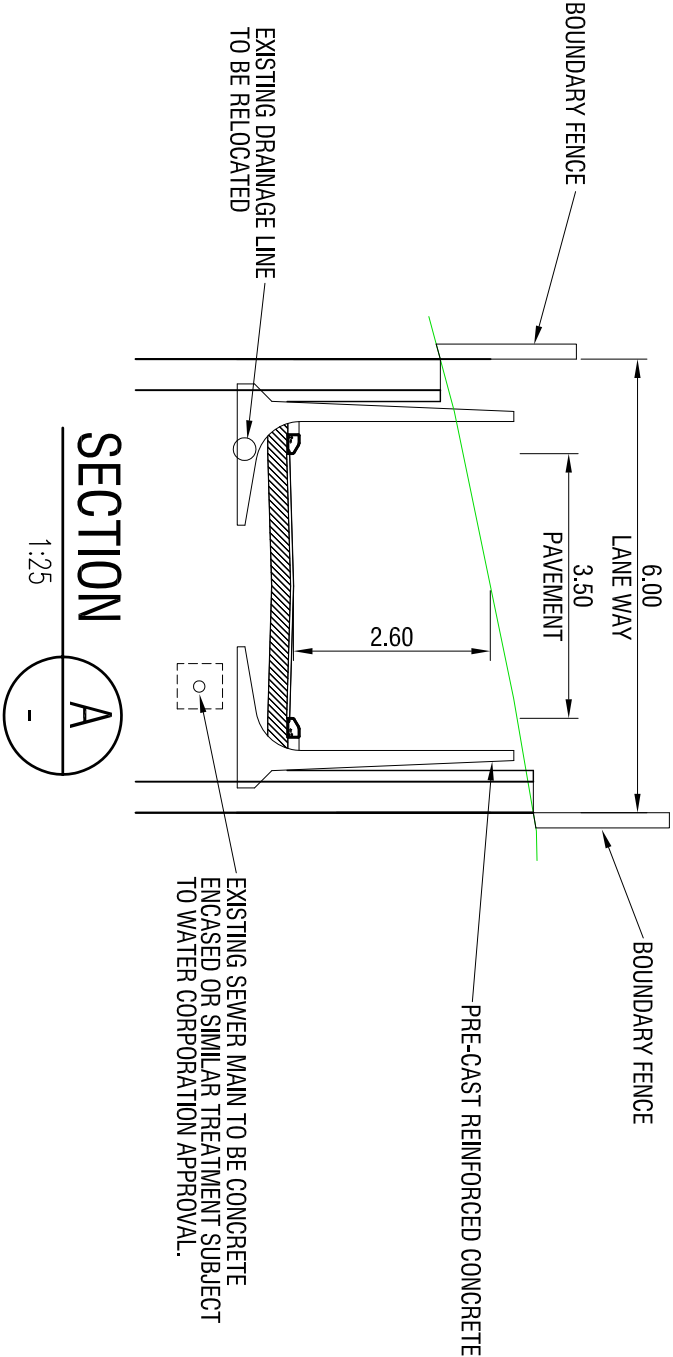
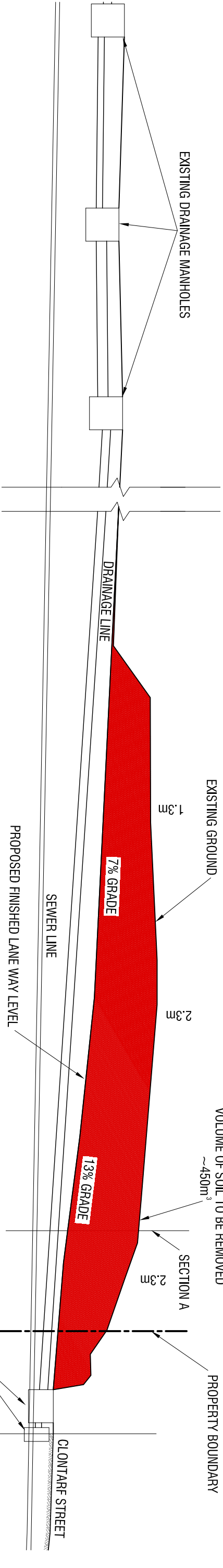
Attachments:	Attachment 1	<i>Indicative Project Timeline</i>
	Attachment 2	<i>Order of Probable Costs</i>
	Attachment 3	<i>City of Joondalup Concept Plan</i>
	Attachment 4	<i>City of Joondalup Concept Plan</i>

Clontarf Street, Sorrento

Client: City of Joondalup
 Date: 6/09/2022
 Revision: Initial
 Subject: Preliminary Order of Probable Costs



1	Internal Construction Works		
1.01	Preliminaries & Management	\$	54,000
1.02	Demolition	\$	6,000
1.03	Earthworks	\$	19,000
1.04	Retaining Walls	\$	177,000
1.05	Sewer Reticulation	\$	16,000
1.06	Roadworks	\$	47,000
1.07	Stormwater Drainage	\$	92,000
1.08	Water Reticulation	\$	-
1.09	Electrical Reticulation	\$	-
1.10	NBN Communications	\$	-
Total Internal Construction		\$	411,000
15% Contingency		\$	61,650
Order of Probable costs to +/- 30%		\$	141,795
Total Internal Construction (inc Contingency)		\$	614,445
2	Fees & Charges		
2.1	Statutory Fees		
2.11	Council Supervision Fees (1.5%)	\$	3,000
2.12	Council Maintenance Bond (5%)	\$	7,000
2.13	Water Corporation inspection fee - sewer	\$	2,000
2.2	Professional Fees		
2.21	Geotechnical	\$	15,000.00
2.22	Structural	\$	10,000.00
2.23	Civil - Design	\$	40,000.00
2.24	Civil - Residential engagement	\$	2,000.00
2.25	Civil - Superintendence & technical input during tender phase	\$	21,000.00
2.26	Legal - Land acquisition	\$	11,000.00
2.27	Surveyor	\$	10,000.00
Total Fees & Charges		\$	121,000
3	Total Budget Estimate		
		\$	735,445
4	Notes and Assumptions		
4.01	General		
a)	Costs are based on draft concept provided by the City of Joondalup and to accuracy of +/- 30%. Detailed design needs to be completed for a detailed order of probable costs.		
b)	Rates are based on current market contract rates, but will need to be proved at time of tender.		
c)	The effect of GST has not been included in these costings.		
d)	Cost estimate is based on no external civil works being required i.e. no infrastructure upgrades nor service network reinforcement.		
e)	Estimate is based on preliminary information only and is subject to further studies, including geotechnical, and approvals from adjoining owners for grouting and laneway truncation resumption.		
f)	Construction water assumed to be obtained from a suitable available hydrant.		
g)	No allowance for landscaping and irrigation.		
4.02	Demolition		
a)	Estimate includes indicative allowance for the demolition of existing fencing at the proposed laneway truncation and reinstatement with a stratco type fence - (assuming no asbestos). Allowance made to remove existing paving at house 100 and reinstatement with asphalt.		
4.03	Earthworks		
a)	A preliminary earthworks volume has been adopted from information provided by the City of Joondalup. Final quantities of fill required to be determined by a feature survey and detailed geotechnical and environmental investigations.		
b)	Excess cut material to be removed from site with a rate of \$32/m ³ applied in estimate.		
4.04	Retaining Walls		
a)	Estimate allows for microfine cement injection into the adjoining properties, trimming of the grouted sand, installation of drainage pipework, and facing with concrete block retaining wall. The other retainwall options have not been costed as they are considered to be more expensive.		
4.05	Sewer Reticulation		
a)	Estimate includes allowance for the existing DN150 Minister's sewer to be concrete encased. Approvals will need to be negotiated with the water Corporation.		
4.06	Stormwater Drainage		
a)	Estimate includes allowance for a pit and pipe system to collect and infiltrate the stormwater drainage within the reserve.		
4.07	Roadworks		
a)	Estimate includes an allowance for feature brick paving at the entrance and two pram ramps as per the concept plan provided by the City of Joondalup.		
4.08	Water Reticulation, gas, electrical and communications		
a)	Estimate excludes any need to amend the existing water reticulation, gas, electrical and communications infrastructure as the existing lots are not serviced from within Clontarf Street.		
4.09	Fees		
a)	Water Corporation inspection fee allowed for the concrete encasement of the existing sewer line.		
b)	Council inspection fees and maintenance bond allowed in these costings for completeness.		
c)	Estimate includes an allowance for the relevant consultancy fees		



LANE 5
SORRENTO
LONGSECTION
PRELIMINARY CONCEPT ONLY

