



Additional documents

Finance, Policy, Operations and Legislation Committee

Wednesday, 22 January 2020, 6.00pm

FPOL2001-6 HARVEY BEACH JETTY

ATTACHMENT 1 - Harvey Beach Jetty – Fixed Timber Structure Inspection



Report

Project: Condition Inspection
Structure: Harvey Beach Jetty
Location: North Fremantle
Client: City of Fremantle
Date: 15th January 2020



Photo Franmarine

PREPARED BY FRANMARINE UNDERWATER SERVICES PTY LTD



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Document Status			
Revision 1	Document Owner: Adam Falconer-West	Document Number: F1080-COF-HBJI-FR Rev 1	
Action	Name and Position		Date
Prepared By:	Blake Miller	Operations Manager	16/01/2020
Reviewed By	Kelly Roberts	HSEQ Manager	16/01/2020
Approved By:	Adam Falconer-West	CEO	16/01/2020

Document Amendment Record					
Rev	Description	Author	Date	Approved By	Date
1	Previous	B Miller	16/01/2020	A Falconer-West	16/01/2020
2	Current	B Miller	21/01/2020	A Falconer-West	21/01/2020

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2 PROJECT PARTICULARS

PROJECT:	Condition Inspection	
STRUCTURE:	Harvey Beach Jetty	
INSPECTION DATE:	15 th January 2020	
CLIENT:	City of Fremantle	
CLIENT REP:	Tim Marks	
JOB LOCATION:	North Fremantle	
	WESTERN AUSTRALIA	
PROJECT MANAGER:	Blake Miller	
INSPECTION TEAM:	Supervisor:	Sam Ducie
	Diver:	Danny Moriarty



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3 METHODOLOGY

Franmarine Underwater Services (FUS) were engaged by the client City of Fremantle to conduct a condition assessment inspection of the fixed timber structure, the Harvey Beach Jetty.

The inspection work was to include a close visual inspection of:

1. The timber jetty piles and headstocks, both above and below the waterline.
2. The topside wharf components including the whalers, decking and handrails.

The inspection work was conducted by qualified divers trained in under water inspection techniques and in accordance with client requirements and time schedules.

Franmarine deployed signage and floating flags to make all waterway users aware of the operations and ensure the safety of both FUS divers and other waterway users.

The work was documented using HD stills photography equipment.

Documents used to assist the project:

- AS/NZS 2299.1:2015
- FRANMARINE Operation Manual
- Underwater Inspection Handbook
- Previous inspection reports supplied by City of Fremantle





4 REFERENCE TABLES

The below tables are referenced throughout the report to formally standardise both biofouling and condition ratings referred to herein.

4.1 CONDITION RATING TABLE OF PILES

RATING	CONDITION	DESCRIPTION	RECOMMENDED ACTION
1	As New	As new with no visible defects/damage.	Inspect at next scheduled inspection. No repairs required.
2	Very Good	No or very minor defects which do not affect the overall integrity or durability of the element or component.	Inspect at next scheduled inspection. No repairs required.
3	Good	Limited defects present may affect the long-term durability of the element or component. Minor deterioration of the protective coating or parent material is evident.	Inspect at next scheduled inspection. No repairs required.
4	Fair	Defects present may have minor impact on integrity. The short-term durability of the element or component may be affected. Localised areas of advanced deterioration may be present.	Further testing is justified and mostly reactive maintenance and some minor upgrades. Priority of repairs is Low.
5	Poor	Advanced deterioration present. Defects present may have a moderate impact on integrity. The immediate durability of the element or component.	Visual assessment indicates high cost maintenance; further testing/assessment, upgrade or rehabilitation works are required in the medium to short term.
6	Very Poor	Advanced deterioration. Defects present likely to have a major impact on integrity. Further deterioration will compromise the safety of the structure.	Further testing/assessment, rehabilitation or renewal required in the short term.
7	Failed/ Unserviceable	Very advanced deterioration present. Defects present likely to have an extreme impact on integrity and may constitute failure of the element.	Rehabilitation required immediately or replace member/asset.



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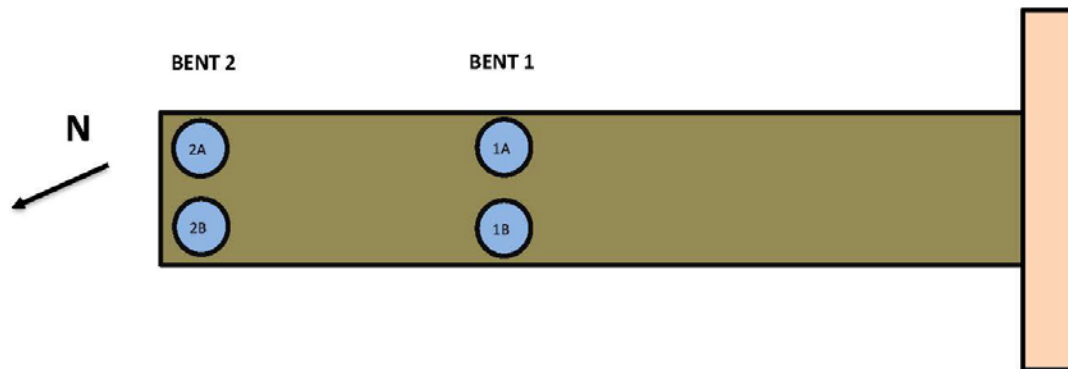
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5 OBSERVATIONS AND FINDINGS

5.1 PILES

5.1.1 PILE ARRANGEMENT



5.1.2 PILE 1A

PILE 1A PARTICULARS			
Inspection Date:	15/01/2020	Overall Condition Rating:	7
Pile Seabed Circumference (mm):	1050	Pile Cap Circumference (mm):	N/A
Probe Seabed (mm):	10	Probe Intertidal (mm):	N/A
Overview	- Pile 1A was observed to have failed at the intertidal zone due to severe wood rot and marine borer. - Due to the failure of the pile, the pile cap circumference measurement and intertidal probing could not be achieved during the inspection. - The pile condition at seabed appeared to be in fair condition and considered suitable for pile splicing. - Pile 1A is in need of immediate repair/replacement.		





Pile 1A Failure



Pile 1A Failure (1)



Pile 1A seabed condition



Pile 1A seabed condition (1)



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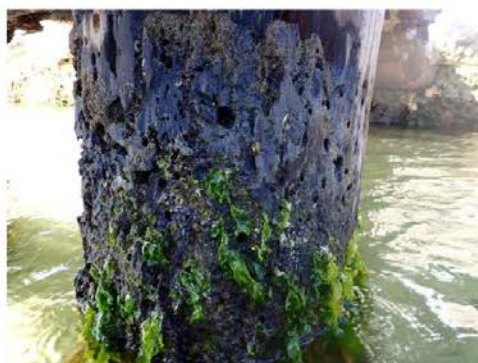


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5.1.3 PILE 1B

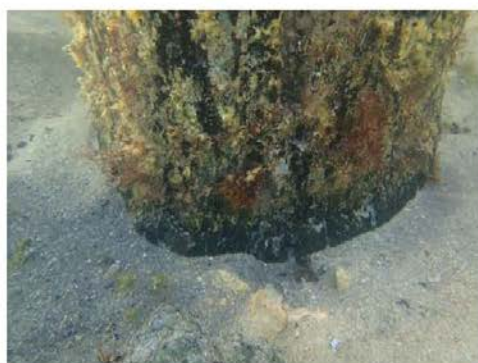
PILE 1B PARTICULARS			
Inspection Date:	15/01/2020	Overall Condition Rating:	7
Pile Seabed Circumference (mm):	1170	Pile Cap Circumference (mm):	1200
Probe Seabed (mm):	10	Probe Intertidal (mm):	45
Overview	- Pile 1B was observed to be in very poor condition at the intertidal zone due to severe wood rot, splitting and marine borer. - Large holes were observed in the pile as a result of severe wood rot and measured up to 180mm in depth. - The pile condition at seabed appeared to be in fair condition and considered suitable for pile splicing. - Pile 1B is in need of immediate repair/replacement.		



Pile 1B poor condition



Pile 1B severe wood rot



Pile 1B seabed condition



Pile 1B seabed condition (1)



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5.1.4 PILE 2A

PILE 2A PARTICULARS			
Inspection Date:	15/01/2020	Overall Condition Rating:	7
Pile Seabed Circumference (mm):	1060	Pile Cap Circumference (mm):	1160
Probe Seabed (mm):	10	Probe Intertidal (mm):	40
Overview	- Pile 2A was observed to be in poor condition at the intertidal zone due to severe wood rot, splitting and marine borer. - Significant splitting at the pile cap was observed and measured up to 120mm in depth. - The pile condition at seabed appeared to be in fair condition and considered suitable for pile splicing. - Pile 2A is in need of immediate repair/replacement.		



Pile 2A poor condition



Pile 2A severe splitting



Pile 2A seabed condition



Pile 2A seabed condition (1)



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5.1.5 PILE 2B

PILE 2B PARTICULARS			
Inspection Date:	15/01/2020	Overall Condition Rating:	7
Pile Seabed Circumference (mm):	1060	Pile Cap Circumference (mm):	1170
Probe Seabed (mm):	10	Probe Intertidal (mm):	40
Overview	- Pile 2B was observed to be in poor condition at the intertidal zone due to severe wood rot, splitting and marine borer. - Significant splitting and wood rot at was observed at the pile cap and was penetrating through the entire pile thickness. - The pile condition at seabed appeared to be in fair condition and considered suitable for pile splicing. - Pile 2B is in need of immediate repair/replacement.		



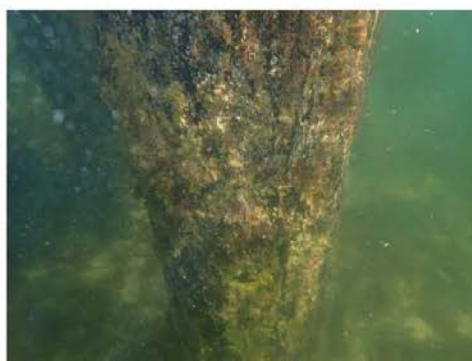
Pile 2B poor condition



Pile 2B severe splitting and rotting



Pile 2B seabed condition



Pile 2B seabed condition (1)



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5.2 HEADSTOCKS

5.2.1 BENT ONE HEADSTOCKS

- Two (2) timber headstocks were in position at Bent One (1). These headstocks spanned between pile 1A and 1B.
- Both headstocks were in poor condition due to significant wood rot, splitting and marine borer.
- All fixings connecting the headstocks to the piles were observed to be in poor condition subject to significant corrosion and are in need of replacement.
- The headstocks at Bent One (1) both have a condition rating of seven (7) and are in need of immediate replacement.



Bent one headstock condition



Bent one headstock and fixing condition



Bent one headstock condition (1)



Bent one headstock condition (2)



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5.2.2 BENT TWO HEADSTOCKS

- Two (2) timber headstocks were in position at Bent Two (2). These headstocks spanned between pile 2A and 2B.
- Both headstocks were in poor-average condition due to apparent wood rot, splitting and marine borer.
- All fixings connecting the headstocks to the piles were observed to be in poor condition subject to significant corrosion and are in need of replacement.
- The headstocks at Bent Two (2) both have a condition rating of six (6) and are in need of replacement.



Bent two headstock condition



Bent two headstock condition (1)



Bent two headstock condition (2)



Bent two typical fixing condition



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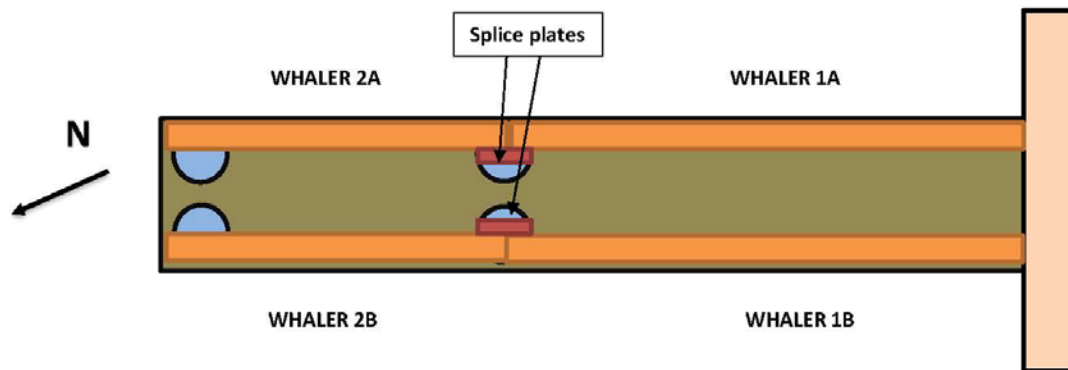


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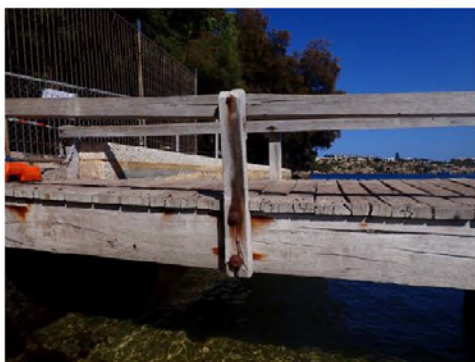
5.3 WHALERS

5.3.1 WHALER ARRANGEMENT



5.3.2 WHALER 1A

- Whaler 1A spanned between shore and Bent One (1) and was observed to be in an overall poor-average condition.
- The failure of Pile 1A on Bent One (1) has resulted in Whaler 1A being subject to significant stress. Subsequently, stress cracking can be observed in multiple locations on both the external and internal faces of the whaler.
- Whalers 1A and 1B are joined by a timber splice plate above the Bent One (1) on the internal side of the whaler. As the splice plate is small in length, fixings have been installed too close to the end of the whalers and splice plate causing the timbers to split at the end grain.
- All fixings associated with Whaler 1A were observed to be in poor condition subject to significant corrosion and are in need of replacement.
- Whaler 1A has a condition rating of five (5) and is recommended to be replaced.



Whaler 1A



Stress cracking external face



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Stress cracking internal face



Stress cracking internal face (1)



Whaler 1A to 1B external



Whaler 1A to 1B splice plate



Typical fixing condition



Typical fixing condition (1)



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5.3.3 WHALER 1B

- Whaler 1B spanned between Bent One (1) and Bent Two (2) and was observed to be in average-good condition.
- Whaler 1B was subject to minor defects only predominantly in the form of small splits.
- All fixings associated with Whaler 1B were observed to be in poor condition subject to significant corrosion and are in need of replacement.
- Whaler 1B has a condition rating of three (3), it is recommended the end grains be treated to prevent further splitting.



Whaler 1B



Typical external face condition



Typical internal face condition



Whaler 1A to 1B external



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Typical fixing condition



Typical fixing condition (1)

5.3.4 WHALER 2A

- Whaler 2A spanned between shore and Bent One (1) and was observed to be in an overall poor-average condition.
- Similar to Whaler 1A, the failure of Pile 1A on Bent One (1) has resulted in Whaler 2A being subject to significant stress. Subsequently, stress cracking can be observed in multiple locations on both the external and internal faces of the whaler.
- Whalers 2A and 2B are joined by a timber splice plate above the Bent One (1) on the internal side of the whaler. As the splice plate is small in length, fixings have been installed too close to the end of the whalers and splice plate causing the timbers to split at the end grain.
- All fixings associated with Whaler 2A were observed to be in poor condition subject to significant corrosion and are in need of replacement.
- Whaler 2A has a condition rating of five (5) and is recommended to be replaced.



Whaler 2A



Stress cracking external face



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Stress cracking internal face



Whaler 2A to 2B external



Whaler 2A to 2B splice plate



Typical fixing condition

5.3.5 WHALER 2B

- Whaler 2B spanned between Bent One (1) and Bent Two (2) and was observed to be in average – good condition.
- Whaler 2B was subject to minor defects only predominantly in the form of small splits.
- All fixings associated with Whaler 2B were observed to be in poor condition subject to significant corrosion and are in need of replacement.
- Whaler 2B has a condition rating of three (3), it is recommended that the end grains be treated to prevent further splitting.



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Whaler 2B



Typical external face condition



Typical internal face condition



Whaler 1A to 1B external



Typical fixing condition



Typical fixing condition (1)



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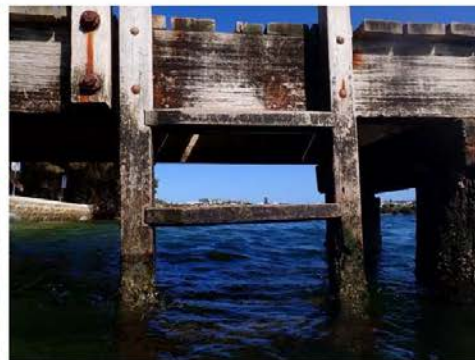


5.4 LADDER

- The ladder was secured to whaler 2A and observed to be in average condition due to minor wood rot and splitting.
- The ladder's bottom rung is missing; however, coach bolts remain in position and are a hazard.
- All fixings associated with Ladder were observed to be in fair condition subject to minor corrosion and are in need of corrosion treatment.
- The Ladder has a condition rating of six (6) it is recommended that at a minimum the bottom rung is replaced, and the fixings have the corrosion treated.



Jetty Ladder above waterline



Jetty Ladder at waterline



Jetty Ladder missing rung



Jetty Ladder exposed coach bolts



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5.5 DECKING

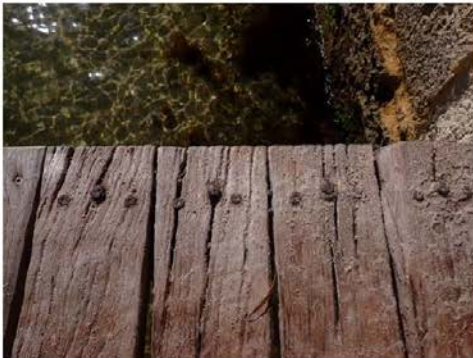
- The decking timbers were observed to be in an overall fair condition.
- Timber splitting was apparent on all decking timbers and appeared to be a result of a combination of: No end grain sealing resulting in moisture entering the timbers and; in some instances, the fixings are positioned too close to the end of the decking timbers causing splitting.
- The fixings associated with the decking timbers were generally in fair condition, isolated fixings showed signs of corrosion and in some instances were proud of the decking timber.
- The decking timbers have a condition rating of four (4), at minimum it is recommended that the end grains be sealed in effort to prevent further timber splitting, however, ultimately the timber decking will need replacing in the short to medium term (within 5 years). Any proud fixings are to be made recessed into the decking. Timbers with significant splitting are to be replaced immediately.



Decking condition



Decking condition (1)



Typical splitting



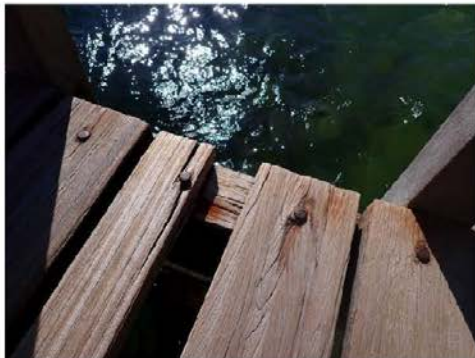
Fixings proud of decking



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Typical decking timber in need of replacement



Typical end grains untreated

5.6 HANDRAILS

- The hand railing on the jetty was observed to be in an overall fair condition.
- Timber splitting was apparent on all hand railing components and appeared to be a result of a combination of: No end grain sealing resulting in moisture entering the timbers and; in some instances, the fixings are positioned too close to the end of the timbers causing splitting.
- The fixings associated with the decking timbers were generally in poor condition due to corrosion and are need of replacement.
- The handrails have a condition rating of five (5), it is recommended that all end grains be treated, and multiple sections be replaced, however ultimately ALL handrails will need replacing in the short to medium term (within 5 years).



Handrail conditions



Handrail Timber splitting



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Handrail Timber splitting (1)



Handrail Timber splitting (2)



Handrail in good condition



Handrail in good condition (1)



Handrail fixing condition



Handrail fixing condition (1)



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6 RECOMMENDATIONS

6.1 IMMEDIATE ACTION

- The Harvey Beach Jetty is considered to be in a poor/unsafe condition. Multiple components of the Jetty need immediate rectification in order to make safe, however, it is likely that ALL components of Harvey Beach Jetty will need replacement within the next five (5) years. The components requiring immediate action are as follows:
- Piles;** All four (4) piles to be spliced with structural I-Beams and encased in an underwater epoxy grout compound with a compressive strength of 70MPa. This will restore the pile to its original capacity. Please see below diagram of similar splicing techniques.

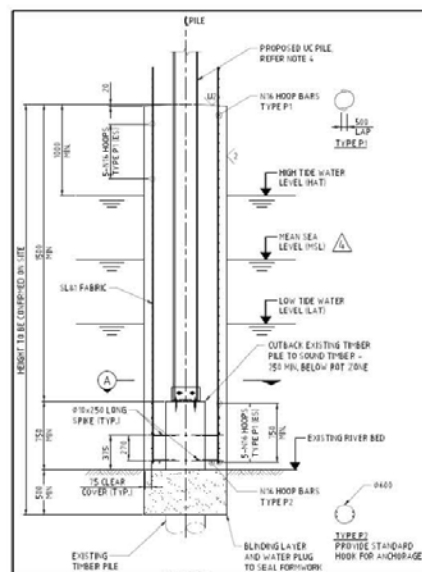


Figure 3. Side View of Pile Splice

- Headstocks;** The headstocks are to be replaced. These can be replaced with I-Beam welded to the new piles or like for like Structural Jarrah dependant on the City's aesthetic preference. Any headstock installed is to be adequately protected from the deleterious marine environment.
- Whalers;** Whalers 1A and 1B are to be replaced with like for like structural jarrah.
- Ladder;** Jetty ladder bottom rung to be replaced and made safe.
- Decking and Handrails;** Sections of decking/handrails subject to significant splitting and deemed unsafe to be replaced. Proud fixings associated with the decking/handrails are to be recessed into the timbers.
- Fixings;** All fixings subject to significant corrosion be replaced.
- End Grains;** All exposed timber end grains be treated to prevent further moisture entering causing splitting.



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6.2 REMEDIAL ACTION

- Any whalers, decking boards, handrails and fixings not rectified during the immediate actions will likely need replacing within the short to medium term (within 5 years). These can be routinely inspected and replaced as required by the City of Fremantle.

7 SUMMARY

The Harvey Beach Jetty is considered to be in poor condition and requires extensive repairs in order to make safe for public use.

Franmarine Underwater Services have provided these findings and recommendations based on similar completed projects and industry experience, however, recommend that the City of Fremantle's engineers review all findings and recommendations provided within this report.

Please note that additional still photographs may be provided upon client request.

Thank you for the opportunity to provide our services.

If we can be of any future assistance, please do not hesitate to contact us at any time.

END OF REPORT



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