

CONDITION REPORT
SHEDS 6, 7 & 8
OUTER HARBOUR PORT, BUNBURY



ventia 


WML
Consulting Engineers

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Shed Plans

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Cost Estimate

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BCA Assessment Report

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Quantity Surveyor Report

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Civil Condition Report

APPENDIX F

Hydraulic and fire services report

APPENDIX G

Electrical Services Report

1 INTRODUCTION

WML Consultants have been appointed by Ventia Australia Pty Ltd to conduct a condition inspection of sheds 6-8 located at the Outer Harbour Port, Bunbury. The site layout can be seen in Photograph 1.

For this report, the sheds have been structurally assessed visually and the observations are recorded in Section 2, Section 3 and Section 4. WML Consultants have also engaged other engineering disciplines to assess other existing services for the site.

Tecon Australia were engaged to assess the building for Building Code of Australia (BCA) compliance. Mr. David Brightwell visited the site on 09 May 2022 to visually inspect the sheds. The purpose of the report is to provide a general review of the existing storage sheds 6, 7 & 8 on the Bunbury Outer Harbour. The review will include observations and recommendations to high level changes to the buildings regarding BCA deemed to satisfy compliance requirements. For a detailed report, refer Appendix C.

Borrell Rafferty Associates were engaged to prepare the demolition report of the sheds 6, 7 & 8 on the Bunbury Outer Harbour. Mr. Paul Rafferty have prepared the report from available drawings sent by Southern Port Authority. The purpose of the report is to provide the demolition cost breakdown of each shed. In the report, inclusion for pile removal up to 1.5m depth is also considered. In the provided drawings, there was no evidence of piling. For a detailed report, refer Appendix D.

WML Consultants have also engaged their civil team to conduct the condition inspection of the civil elements of the site. Mr. Naoki Tanaka visited the site on 09 May 2022 and again on 12 May 2022 to inspect in wet condition. The report includes the visual observations of damage and cracking of civil infrastructure, roads and pavements, concrete paths and kerbing, and visual observations of surface drainage and condition. For a detailed report, refer Appendix E.

TJ Peach & Associates were engaged to conduct hydraulic and fire services investigation. Mr. Tim Peach visited the site on 31 May 2022 to visually inspect the sheds. The report includes the assessment of the condition and capacity of the existing hydraulic and fire services infrastructure. The report also provides recommendations with regards to the proposed repurposing of the shed structures. For a detailed report, refer Appendix F.

Inkosi Design were engaged to conduct the condition inspection of the existing electrical services. Mr. Graeme McDonald visited the site on 31 May 2022 to visually inspect the sheds. The report includes the assessment of the current electrical services and makes recommendations with regards to the proposed repurposing of the shed structures. For a detailed report, refer Appendix G.



Photograph 1 Outer Harbour Port Shed 6, 7 & 8

2 OBSERVATIONS – SHED 6

The following pages contain observations recorded during our inspections dated 31 May 2022, 07 July 2022, and 01 September 2022.

We observed that there had typically been substantial corrosion of wall sheeting on the western and southern side. Also, there were defects observed on the north wall of the shed.

There was significant deterioration observed in the unloading bay due to corrosion. Majority of girts and purlins are corroded and can be seen in Photograph 15. Additionally, significant damage was observed in the unloading bay due to impact of vehicle which can be seen in Photograph 12 and Photograph 13.

2.1 External Inspection



Photograph 2 Impact Damage Observed During Inspection and Corrosion of Sheeting



Photograph 3 Corrosion on Wall Sheeting



Photograph 4 Corrosion on Wall Sheeting



Photograph 5 Corrosion on Wall Sheeting



Photograph 6 Corrosion on Wall Sheeting



Photograph 7 Corrosion on Wall Sheeting



Photograph 8 Wall Sheeting East Side Minimum Damage



Photograph 9 Post Damage Due to Impact



Photograph 10 Roof Sheeting



Photograph 11 Roof Sheeting

2.2 Unloading Bay



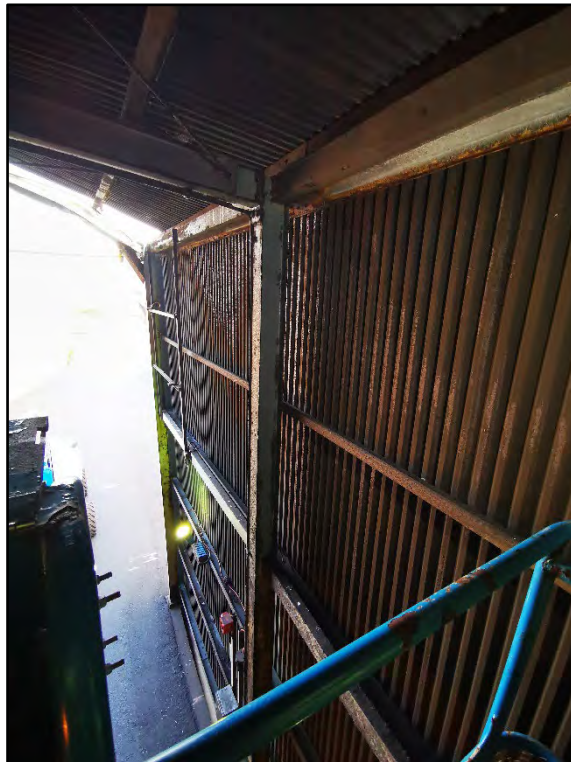
Photograph 12 Impact Damage on Rafter in Unloading Bay



Photograph 13 Damage to Purlins, Bracings and Roof Sheeting Due to Impact



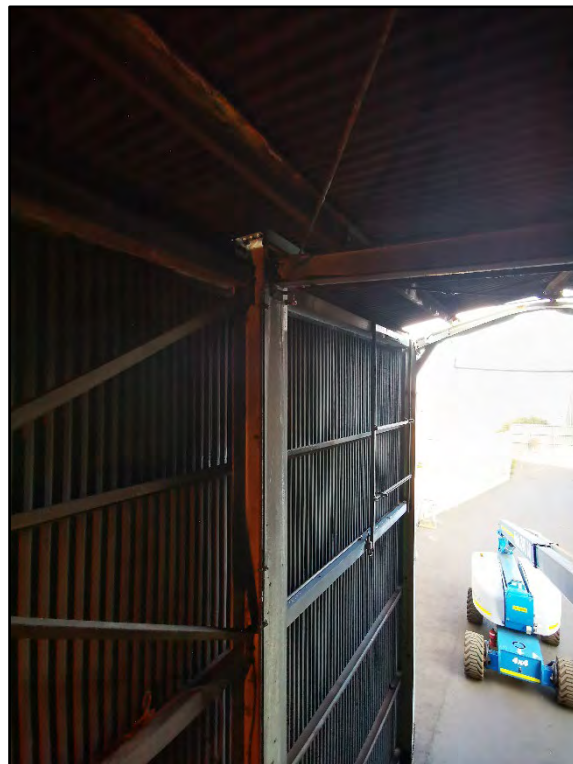
Photograph 14 Surface Corrosion of Purlins, Columns and Rafters



Photograph 15 Surface Corrosion of Beams, Columns, Girts, and Wall Sheeting



Photograph 16 Damage to Purlin and Bracing due to Impact

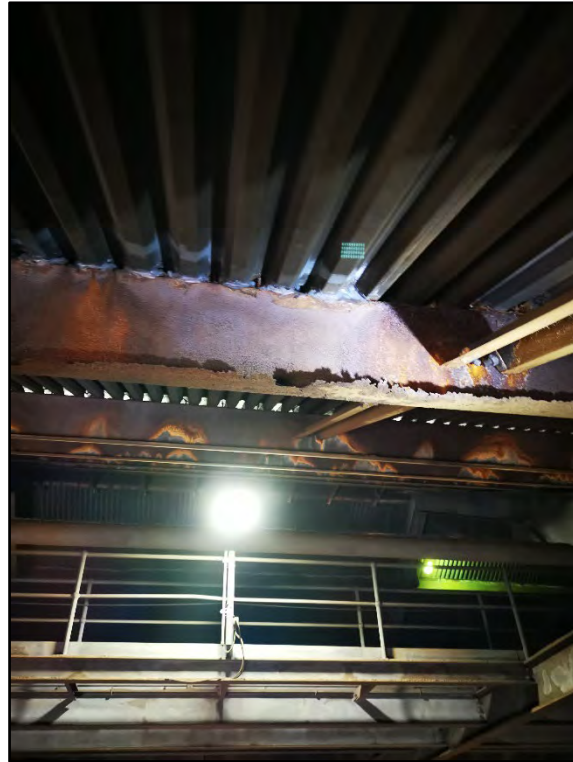


Photograph 17 Corrosion of Purlins, Rafter, and Column



Photograph 18 Corrosion of Wall Girts and Sheeting

2.3 Internal Inspection



Photograph 19 Deterioration to Purlin due to Corrosion



Photograph 20 Surface Corrosion of Purlins



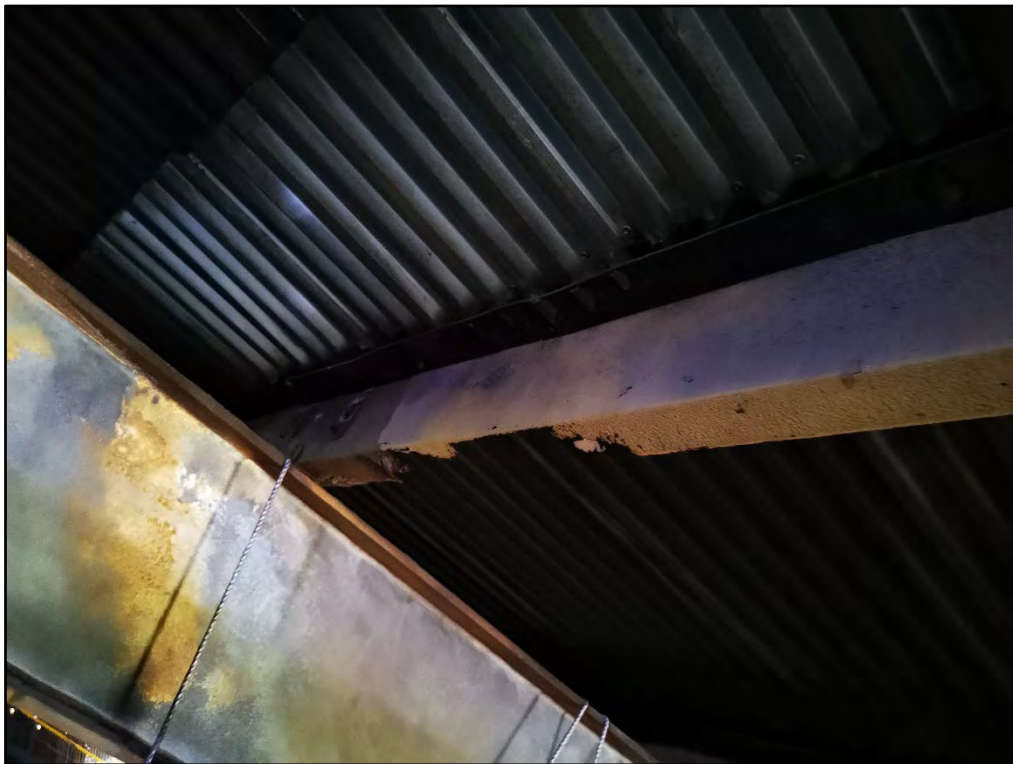
Photograph 21 Damaged Purlin and Surface Corrosion of Purlins



Photograph 22 Deteriorated Purlin due to Corrosion



Photograph 23 Surface Corrosion of Purlins and Rafters



Photograph 24 Deteriorated Purlin due to Corrosion



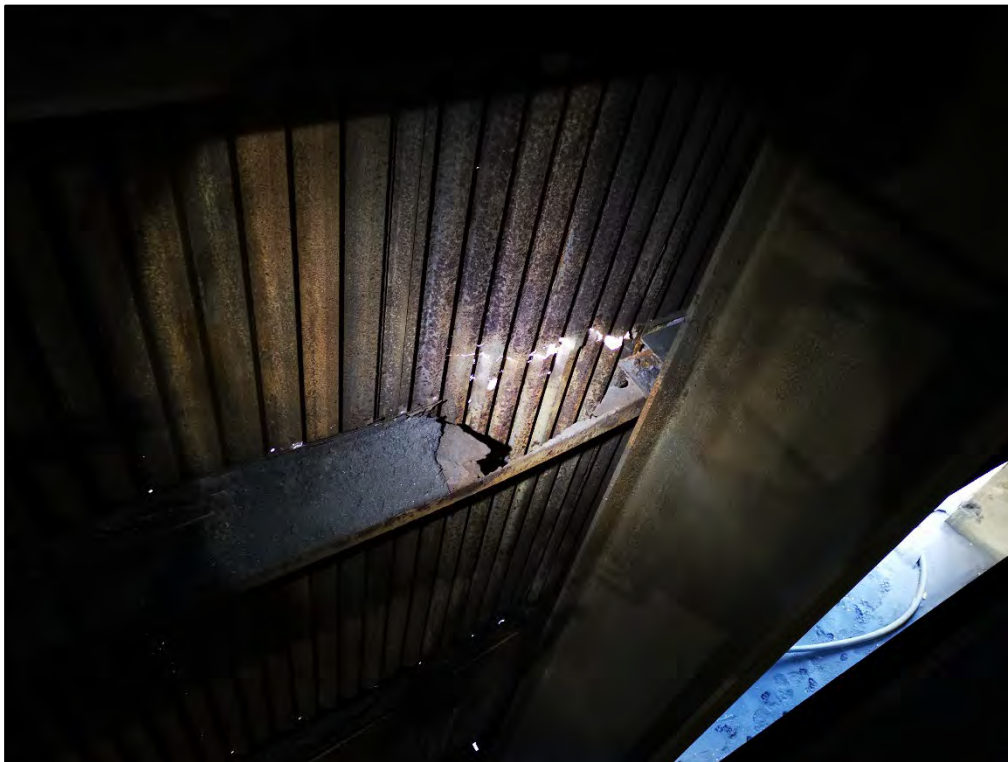
Photograph 25 Deteriorated Fascia Purlin due to Corrosion



Photograph 26 Deteriorated Purlin due to Corrosion



Photograph 27 Surface Corrosion of Purlins



Photograph 28 Damaged Girt due to Corrosion and Product Deposit



Photograph 29 Bent Cross Brace



Photograph 30 Stairway Inside Shed 6



Photograph 31 Heavily Corroded Girt



Photograph 32 Bay 6 in Shed 6 was Covered with Tarpaulin



Photograph 33 Top Flange of Beam Damaged due to Impact



Photograph 34 Delamination of Fascia Purlin due to Corrosion



Photograph 35 Deteriorated Purlin due to Corrosion



Photograph 36 Impact Damage of Column



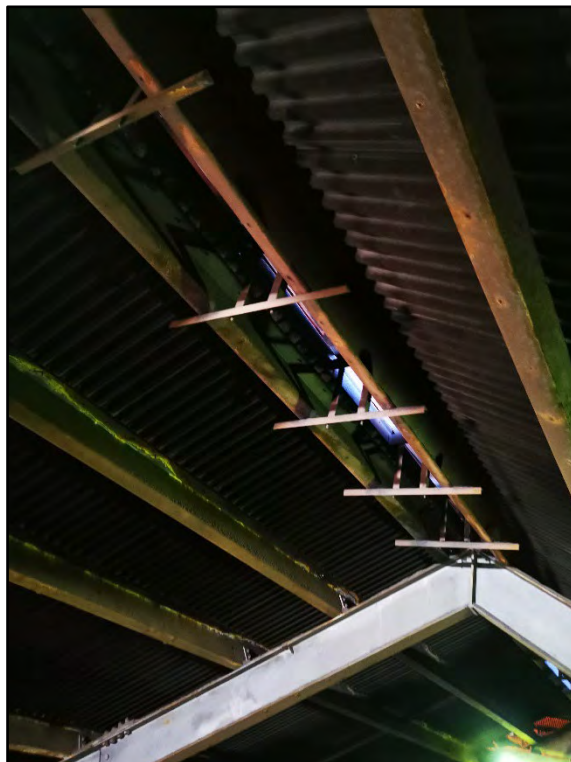
Photograph 37 Impact Damage of Column



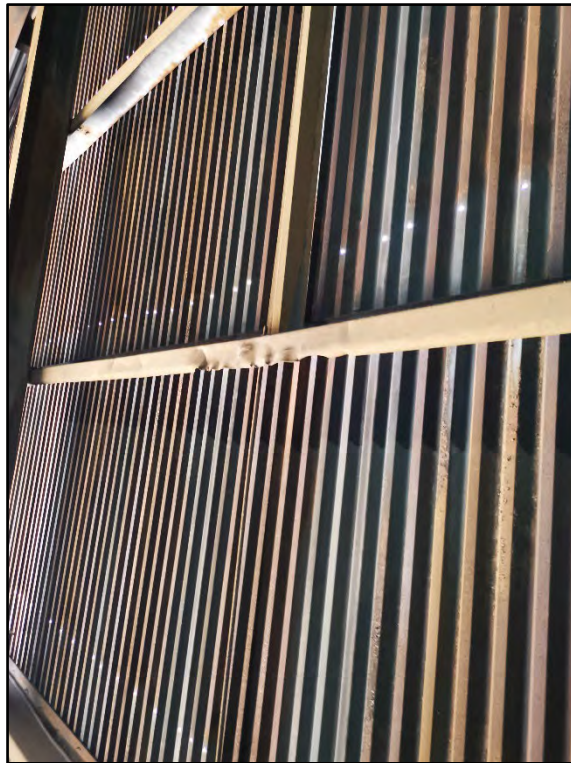
Photograph 38 Surface Corrosion of Roof Sheetting



Photograph 39 Surface Corrosion of Purlins and Rafters on Walkway and Conveyor



Photograph 40 Surface Corrosion of Purlins on Conveyor and Walkway



Photograph 41 Deteriorated Girt requires replacement



Photograph 42 Shed 6 South Side on 31 May 2022



Photograph 43 Shed 6 South Side Sheet Missing on 01 September 2022

3 OBSERVATIONS – SHED 7

The following pages contain observations recorded during our inspections dated 31 May 2022 and 07 July 2022.

Majority of the damage observed was due to corrosion in eastern and western sides.

There was significant deterioration observed in the unloading bay due to corrosion. The girts were heavily corroded and, in some cases, sectional loss can be seen in Photograph 62. Additionally, a significant damage was observed in the unloading bay due to impact of vehicle which can be seen in Photograph 67 and Photograph 68.

3.1 External Inspection



Photograph 44 Shed 7



Photograph 45 Impact Damage and corrosion Observed



Photograph 46 Corrosion Deterioration at the Bottom of the Sheet



Photograph 47 Heavily Corroded Door Frame



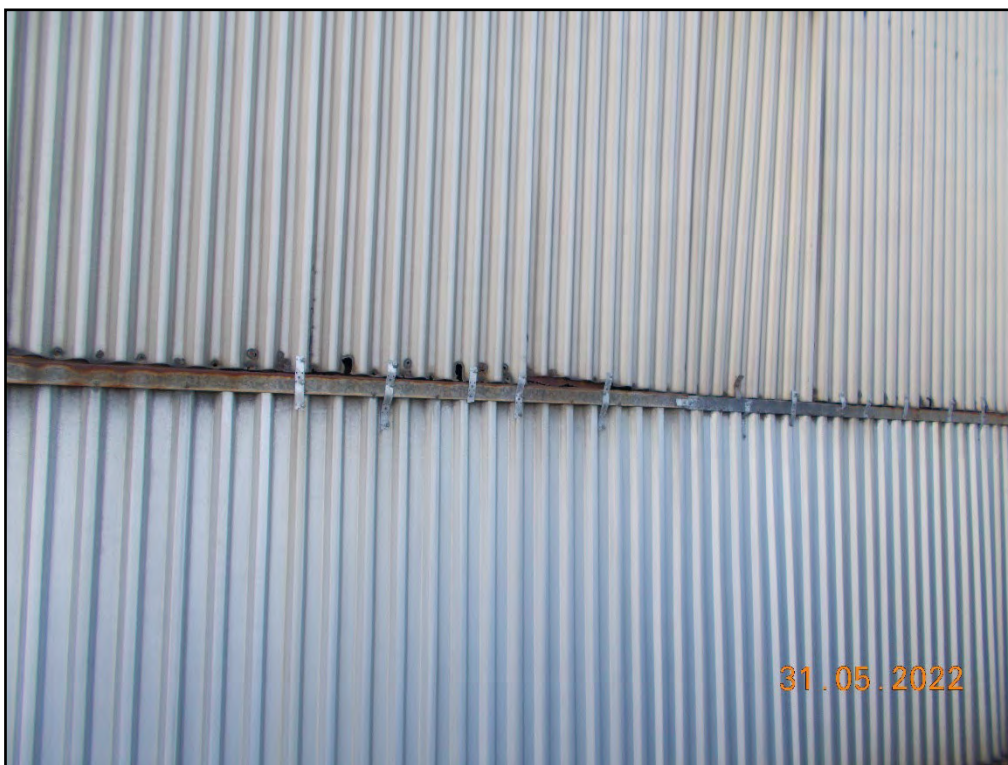
Photograph 48 Surface Corrosion of Steel Member and Wall Sheeting



Photograph 49 Stair Stringers Heavily Corroded, wall sheeting patched to lower edge



Photograph 50 Patching to Wall Sheeting



Photograph 51 Surface Corrosion of Steel Section and Wall Sheeting



Photograph 52 Damage Observed Due to Corrosion



Photograph 53 Deterioration Observed to the Flashing North Side of Shed 7



Photograph 54 Electrical Shed



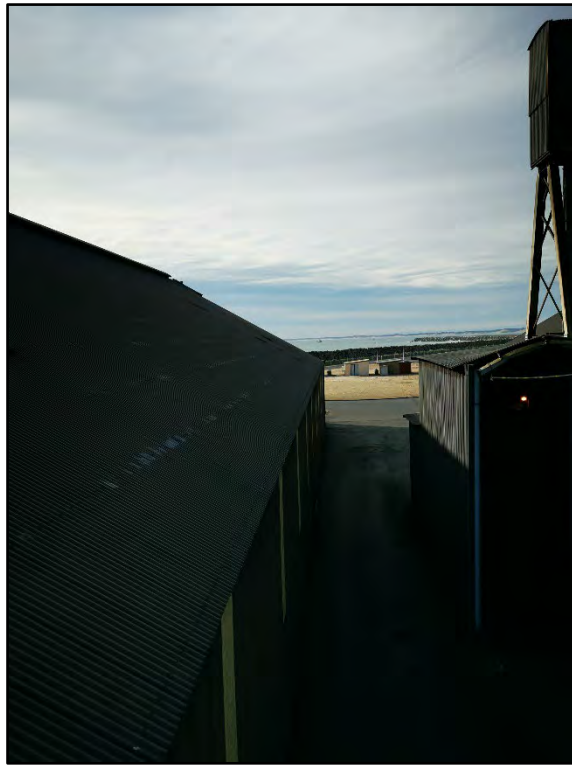
Photograph 55 Corrosion of Access Door



Photograph 56 No Significant Corrosion



Photograph 57 Patch Work on Roof Sheeting



Photograph 58 No Significant Corrosion



Photograph 59 Shed 7 Eastern Side on 31 May 2022

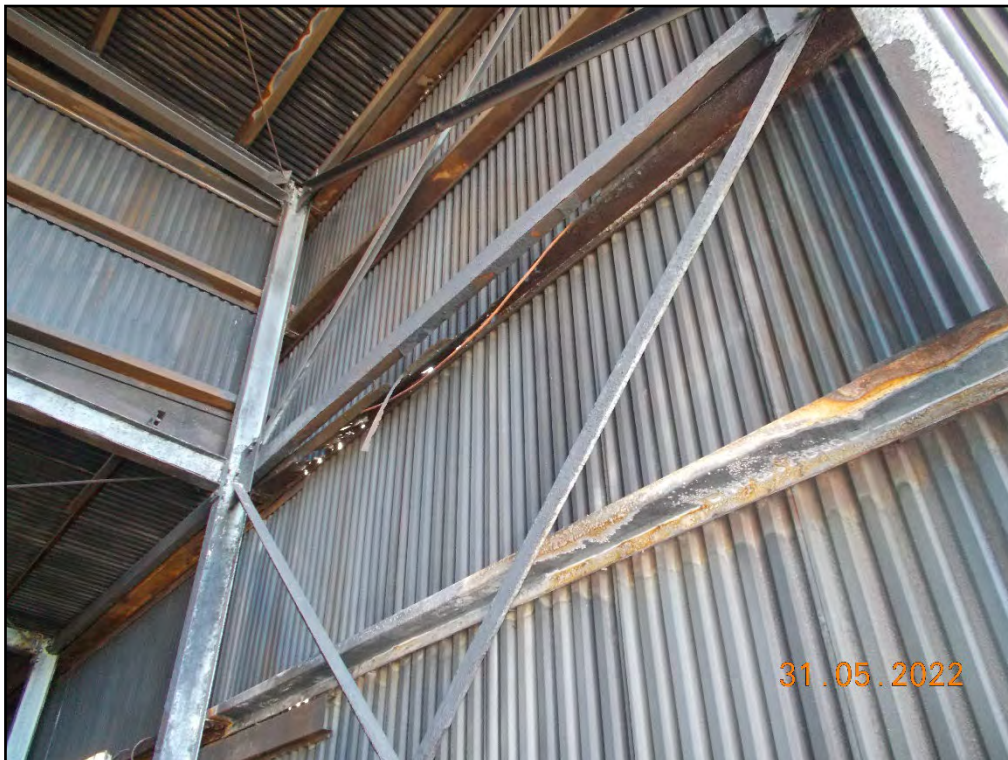


Photograph 60 Shed 7 Eastern Side Sheet Missing on 02 September 2022

3.2 Unloading Bay



Photograph 61 Unloading Bay



Photograph 62 Wall Girts deteriorated Due to heavy Corrosion



Photograph 63 Surface Corrosion of Girts



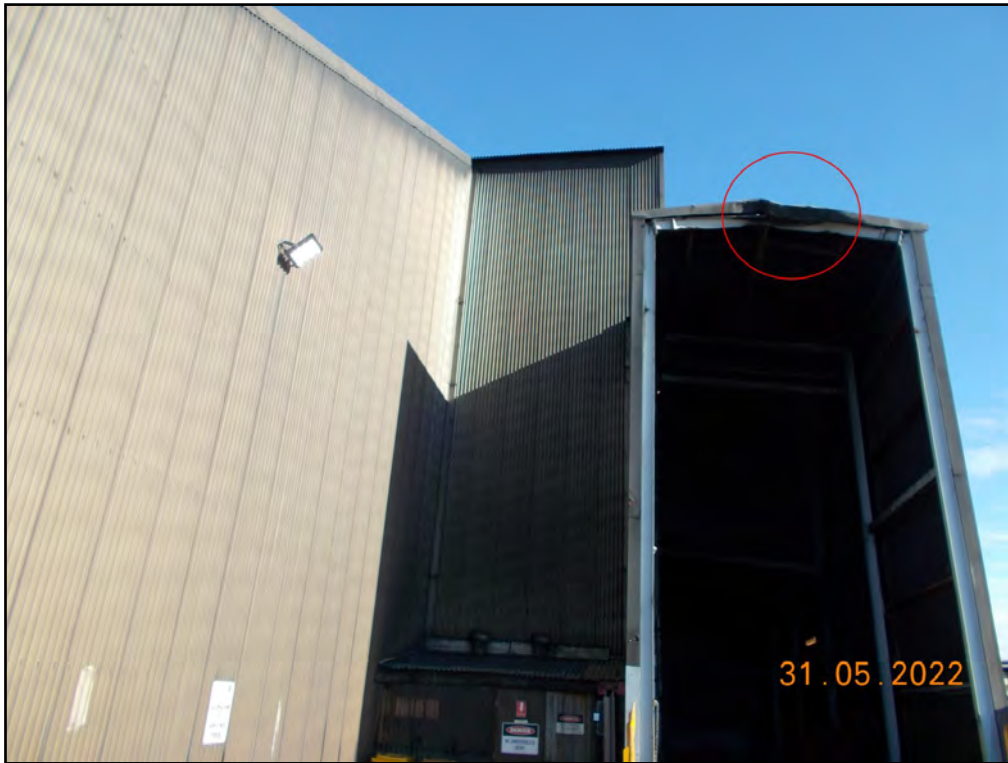
Photograph 64 Corrosion of Wall Sheeting



Photograph 65 Heavy Corrosion of Girts



Photograph 66 Heavy Corrosion of Girts



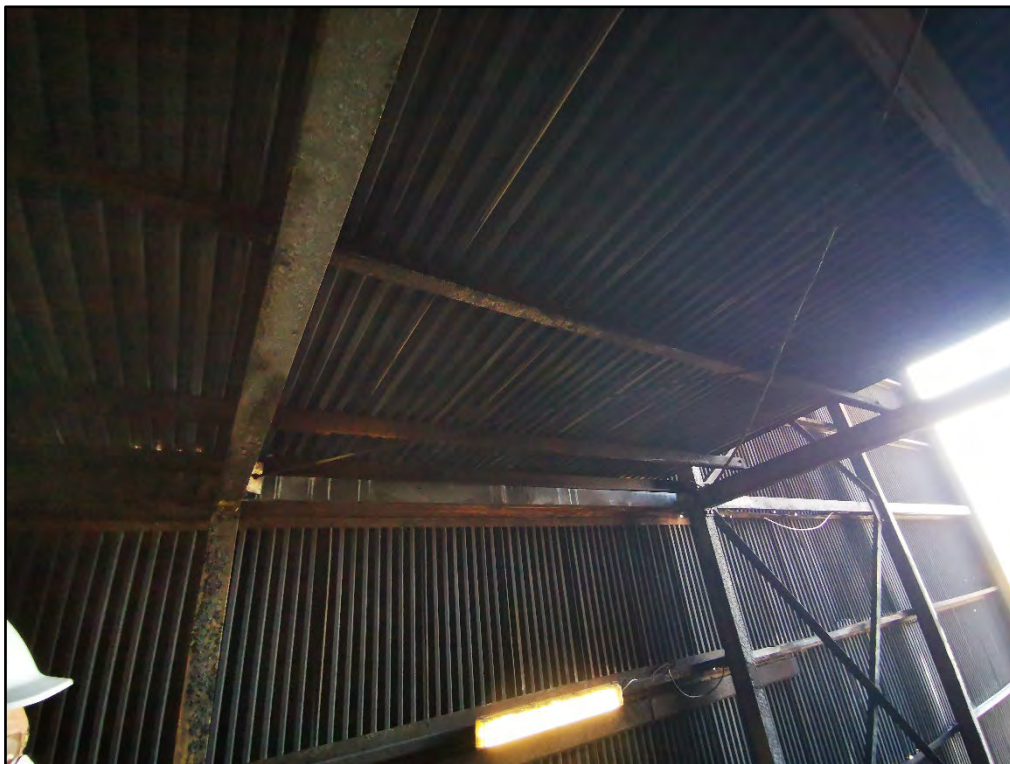
Photograph 67 Damaged Steel Section Due to Impact



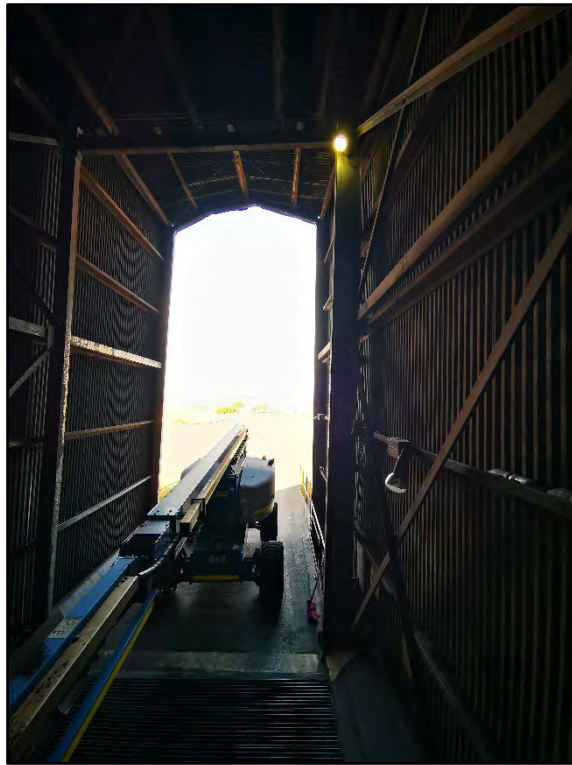
Photograph 68 Impact Damage Due to Vehicle



Photograph 69 Surface Corrosion of Columns, Rafter, and Purlins



Photograph 70 Corrosion of Columns, Rafters, Purlins and Girts

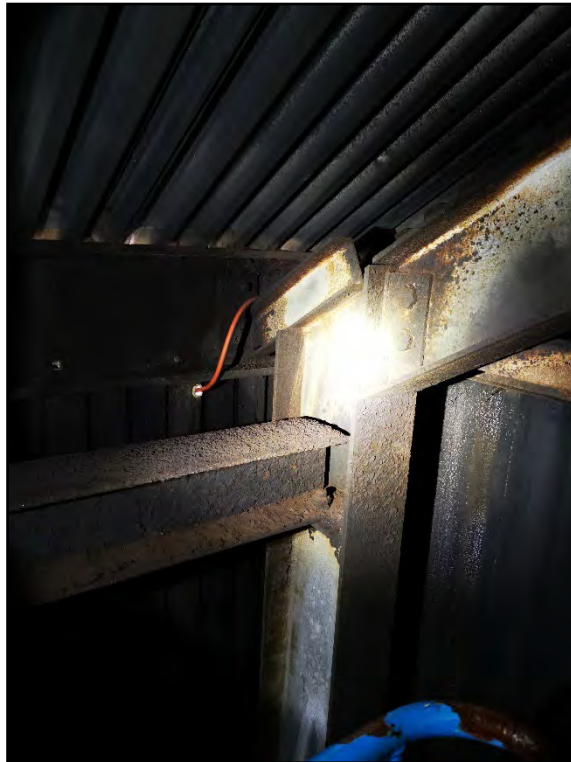


Photograph 71 Damage Due to Impact and Corrosion of Steel Members

3.3 Internal Inspection



Photograph 72 Product in Gridline A 1-4 to G 1-4



Photograph 73 Surface Corrosion and Product Deposit on Steel Members



Photograph 74 Door Frame Showing Signs of Corrosion

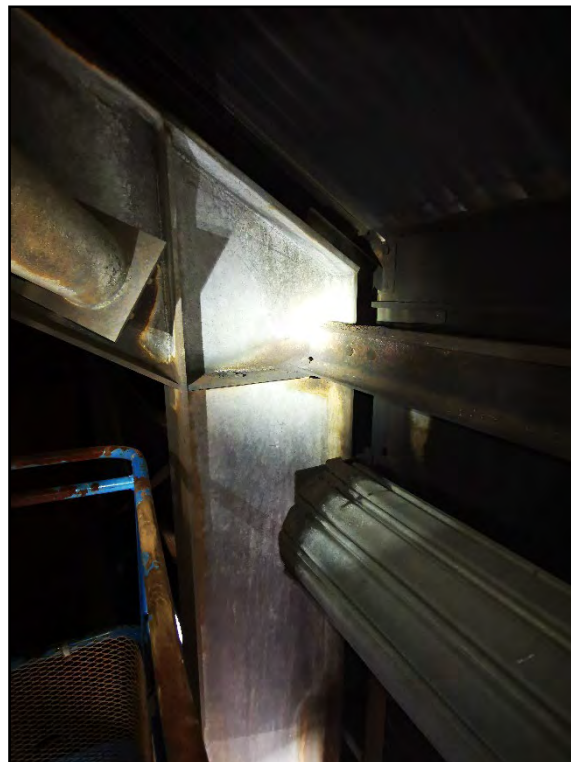


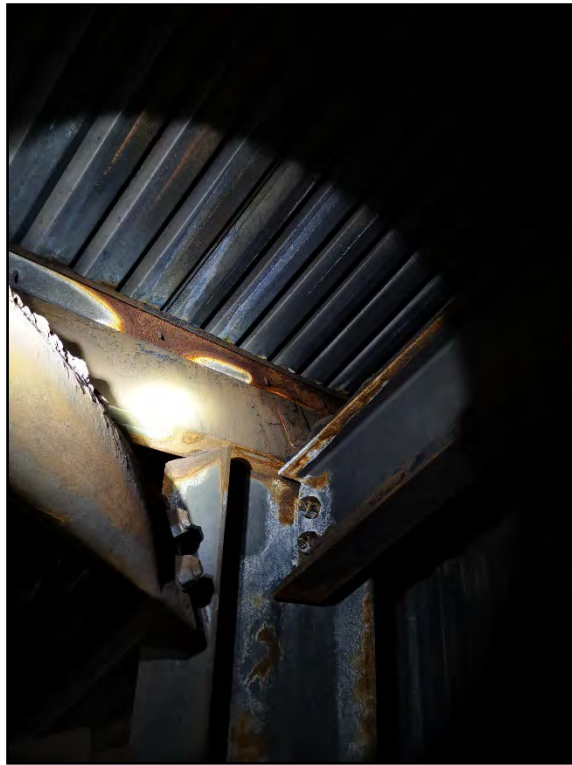
Figure 75 Door Frame Beam Showing Signs of Corrosion



Photograph 76 Surface Corrosion of Purlins



Photograph 77 Surface Corrosion of Purlin and Roof Sheeting and Product Deposit on Flanges of UB Section



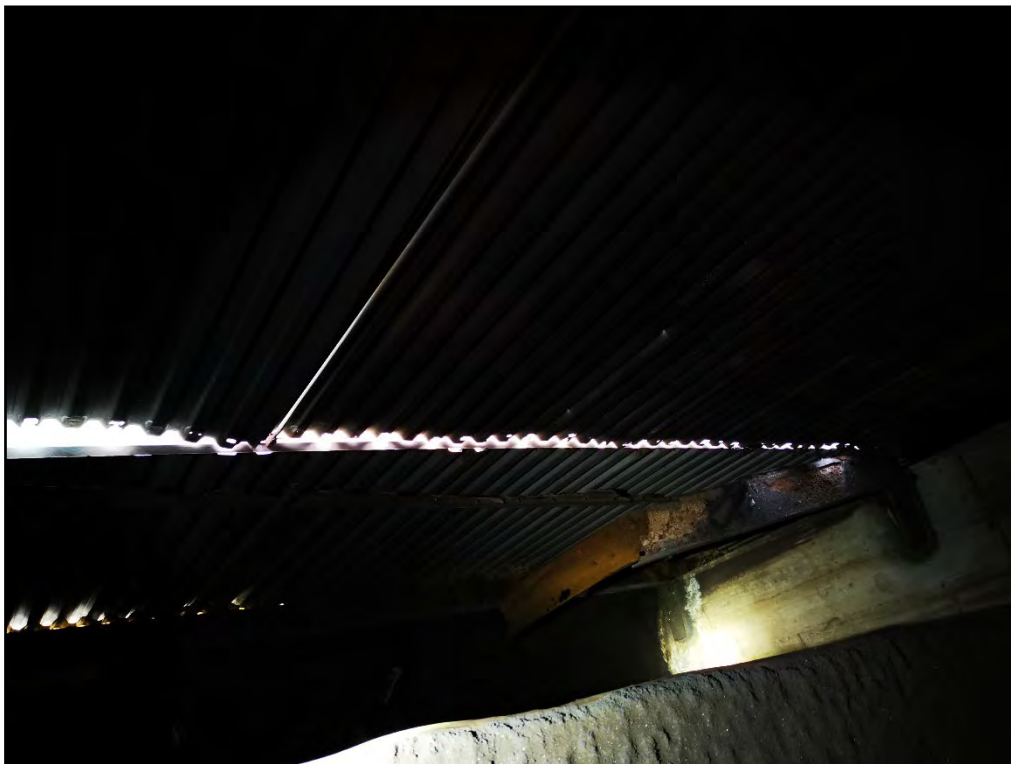
Photograph 78 Surface Corrosion of Purlin, Column, Beam and Bracing with Bolt Connection



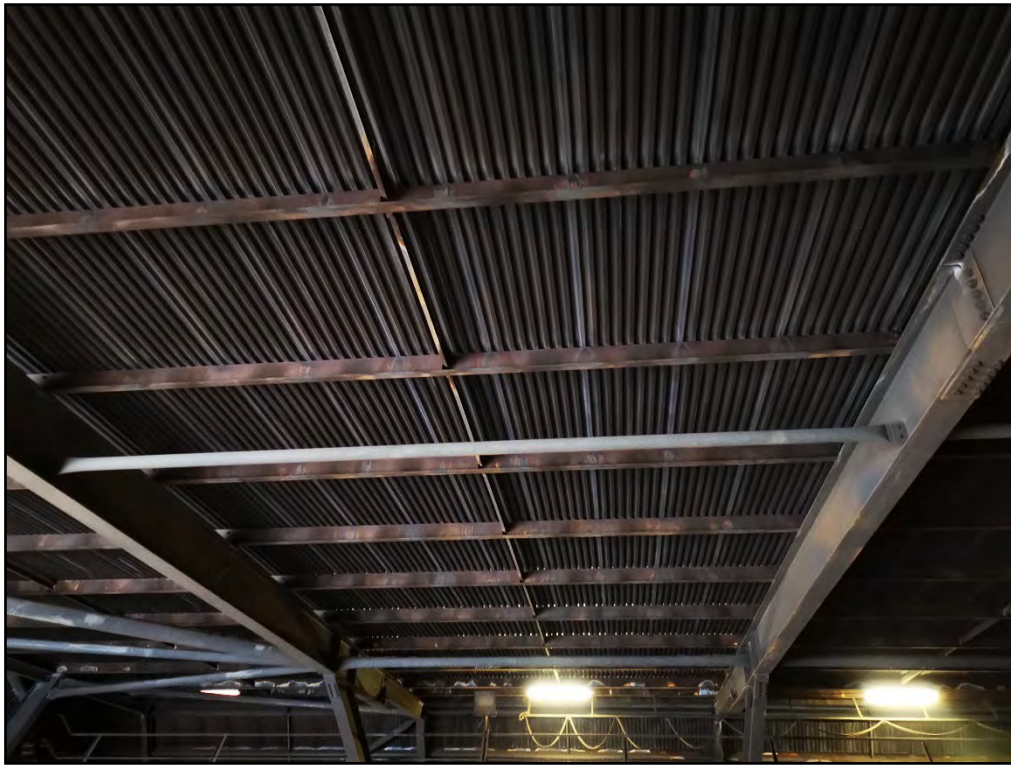
Photograph 79 Surface Corrosion of Purlin with Product Deposit



Photograph 80 Corrosion of Fascia Purlin and Product Deposit



Photograph 81 Complete Failure of Wall Girt Due to Corrosion and Product Deposit



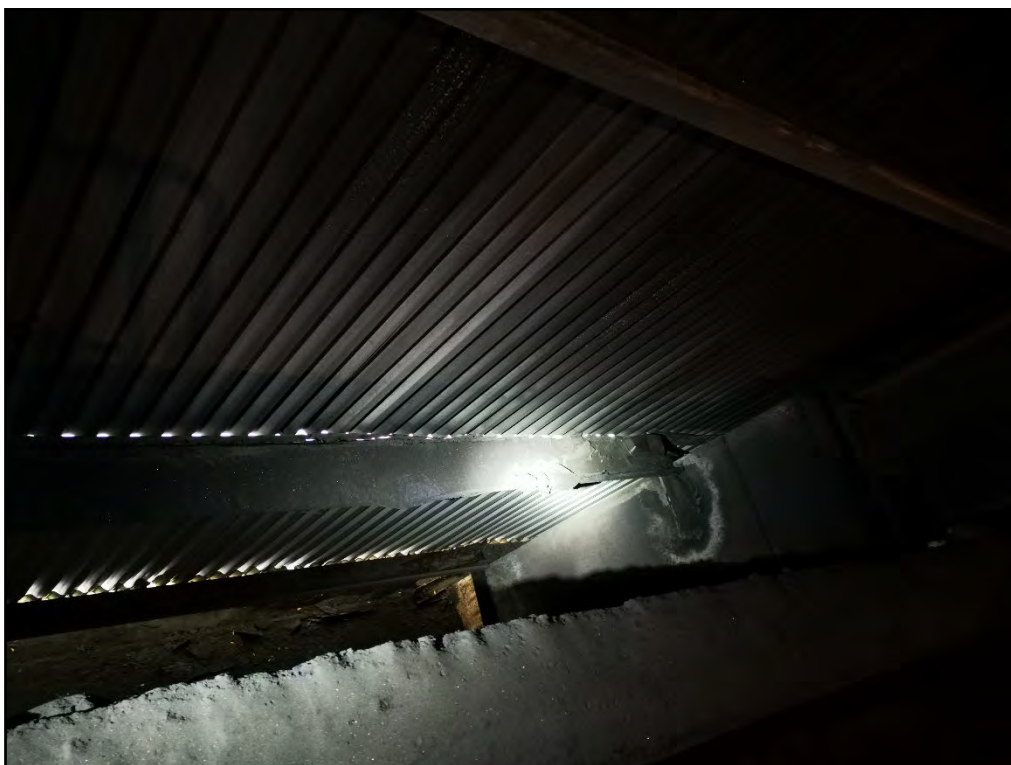
Photograph 82 Surface Corrosion of Purlins and Roof Sheeting



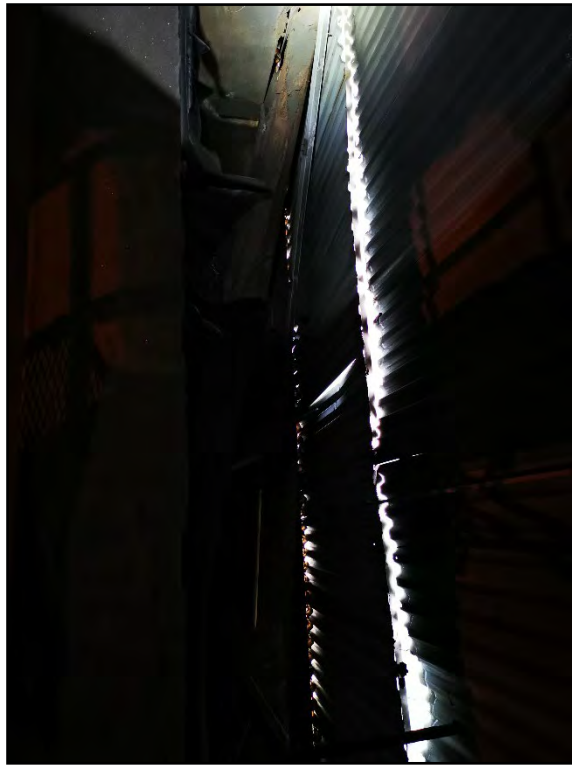
Photograph 83 Corrosion of Fascia Purlin and Product Deposit on UB Section



Photograph 84 Surface Corrosion of Rafter Due to Water Leakage and Product Deposit



Photograph 85 Damaged Wall Girt Due to Corrosion and Product Deposit



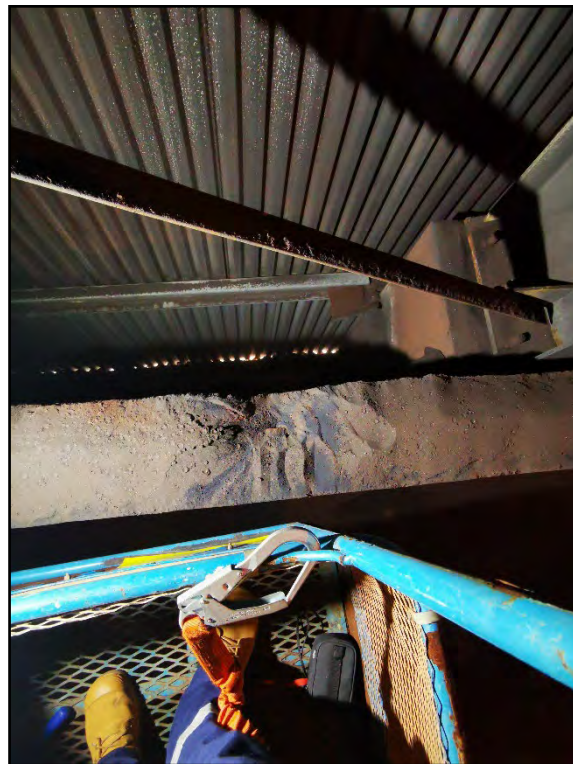
Photograph 86 Complete Failure of Wall Girt



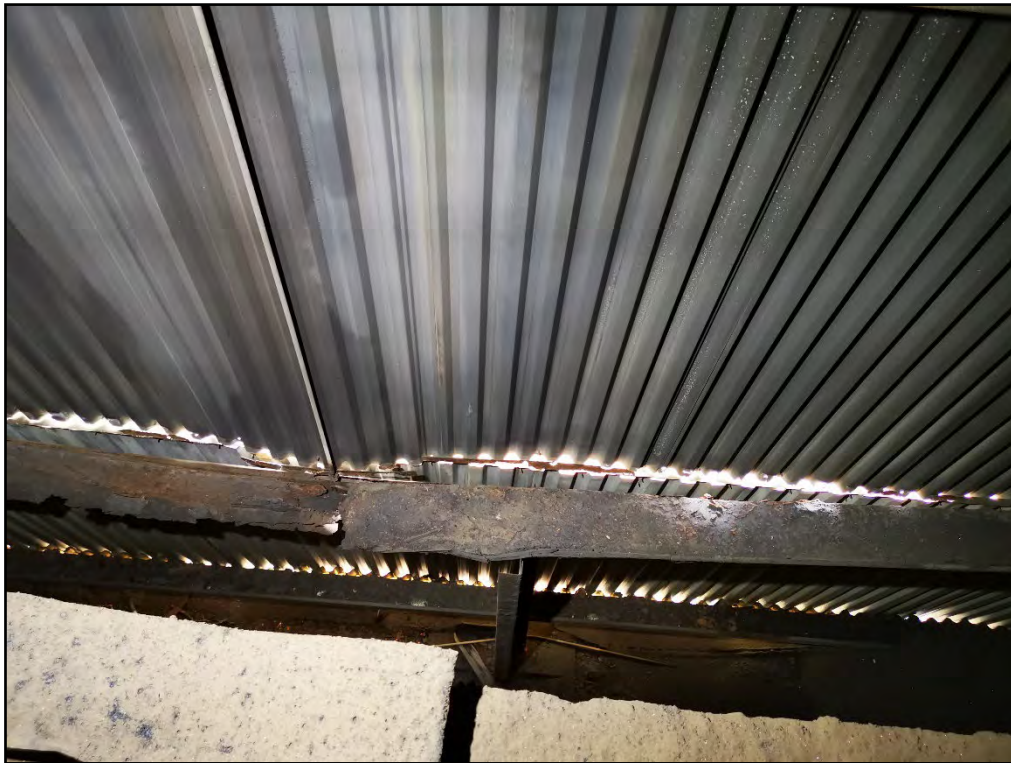
Photograph 87 Corrosion of Fascia Purlin and Product Deposit



Photograph 88 Wall Girt Missing



Photograph 89 Wall Girt Missing and Product Deposit



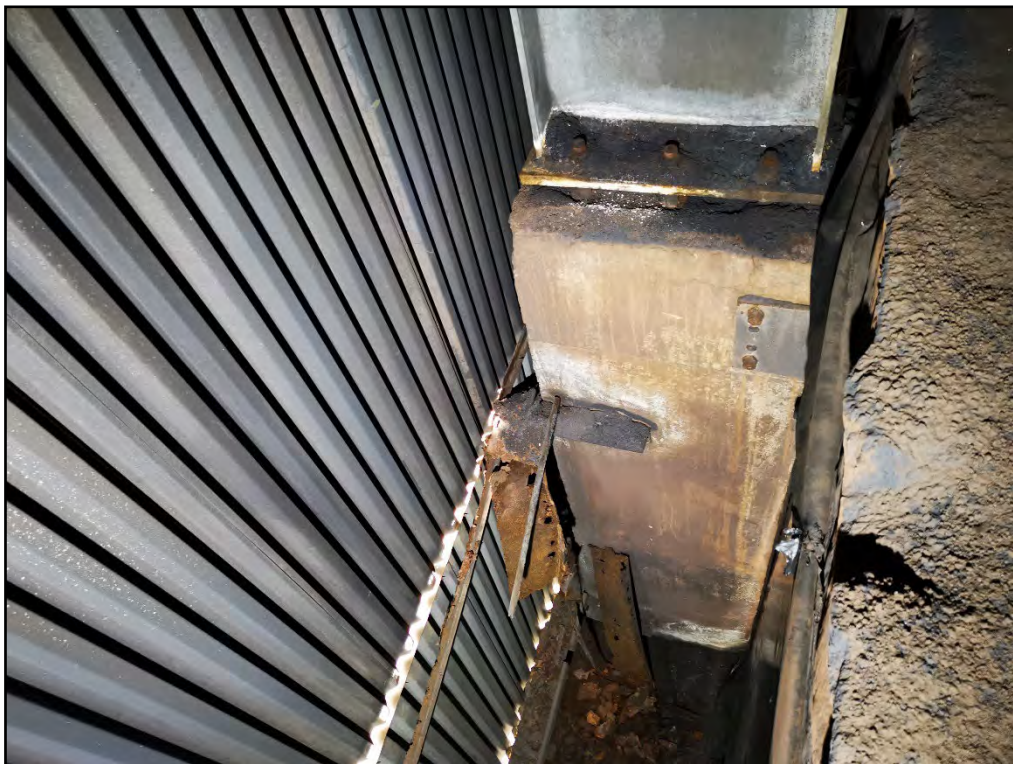
Photograph 90 Complete Failure of Wall Girt



Photograph 91 Complete Failure of Wall Girt



Photograph 92 Surface Corrosion of Purlins and Rafters



Photograph 93 Complete Failure of Wall Girt



Photograph 94 Sectional Loss of Purlin Due to Corrosion



Photograph 95 Sectional Loss of Purlin Due to Corrosion and Roof Sheetting



Photograph 96 Surface Corrosion of Purlins and Rafters



Photograph 97 Sectional Loss of Purlin and Corrosion of Roof Sheeting



Photograph 98 Failure of purlin and bridging Due to Corrosion



Photograph 99 Sectional Loss of Purlin



Photograph 100 Surface Corrosion of Rafters, Purlin and Roof Sheeting with Product Deposit



Photograph 101 Damage to Girt Due to Product Deposit



Figure 102 Surface Corrosion of Rafters, Purlins and Roof Sheeting



Photograph 103 Sectional Loss and Damage of Girt Due to Product Deposit



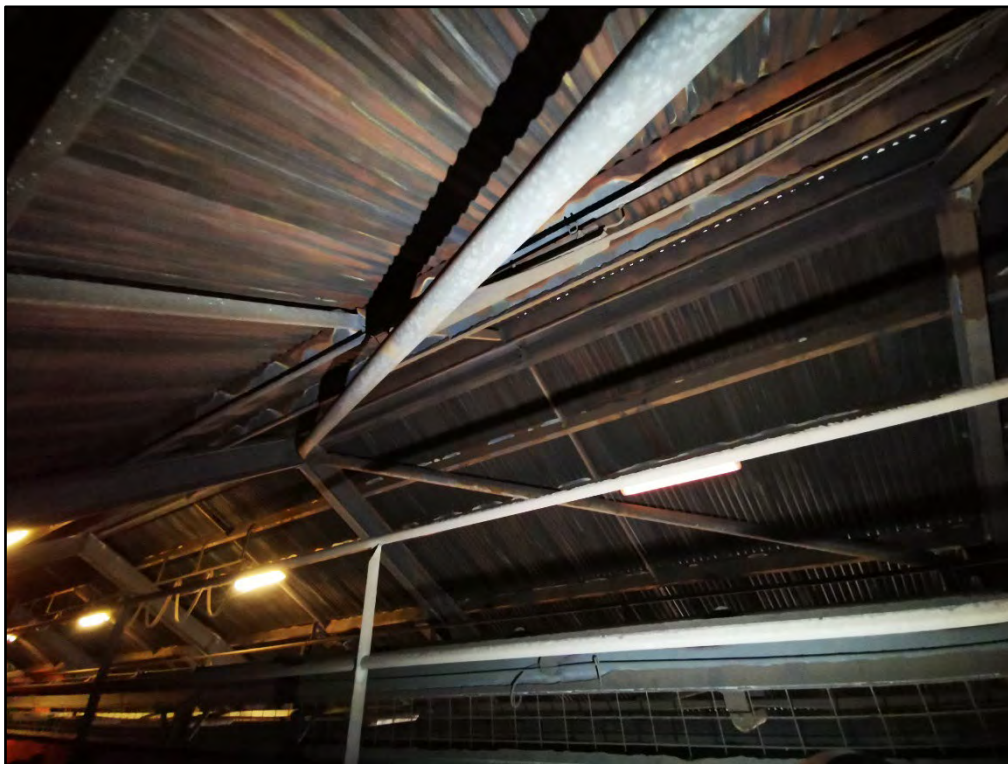
Photograph 104 Surface Corrosion of Purlins and Roof Sheeting



Photograph 105 Surface Corrosion of Bolts, Rafter and Purlin Due to Product Deposit



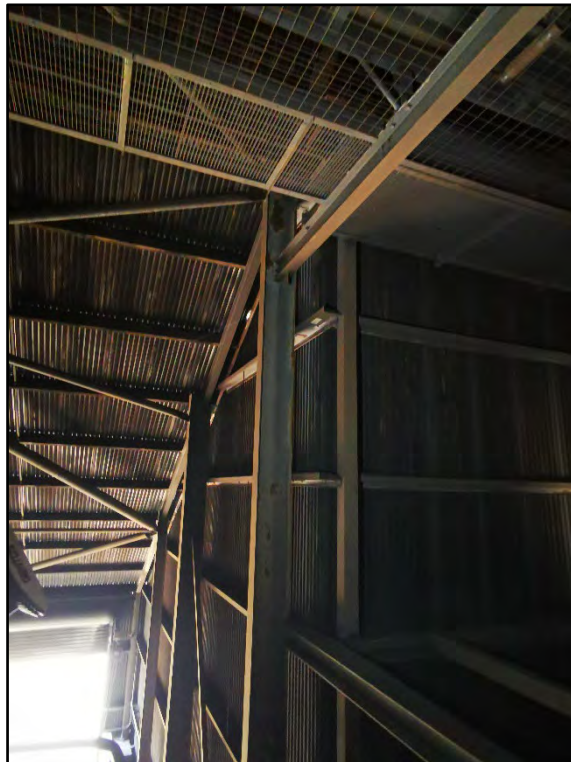
Photograph 106 Surface Corrosion of Bolts, Rafter and Purlin Due to Product Deposit



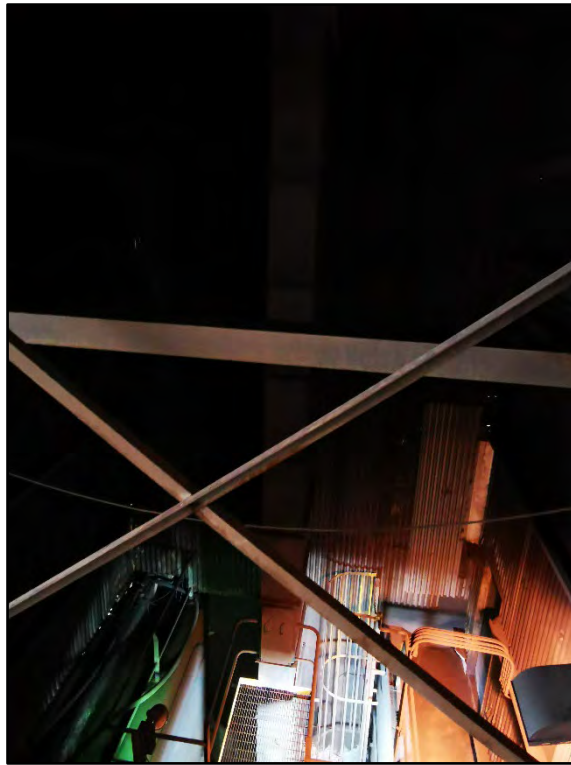
Photograph 107 Surface Corrosion of Purlins, Rafters, Bracing and Roof Sheetting



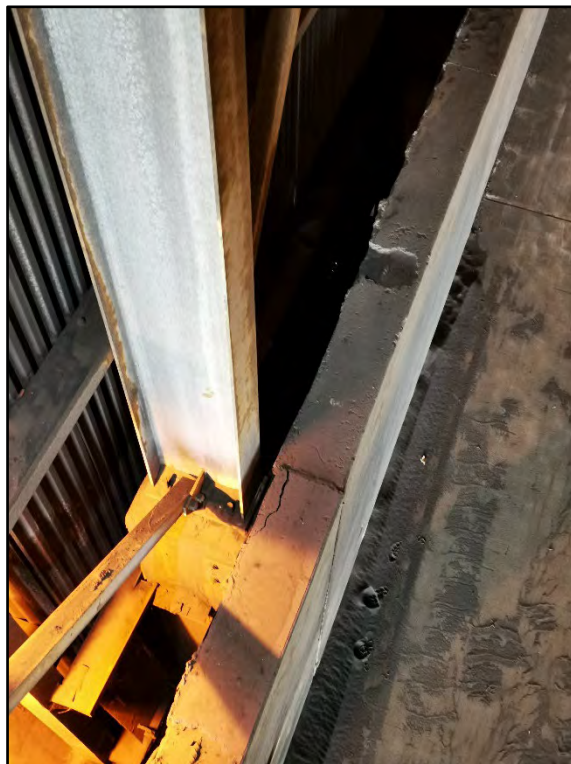
Photograph 108 Surface Corrosion of Purlins, Girts, and Sheeting



Photograph 109 Surface Corrosion of Columns, Rafters, Girts, and Purlins



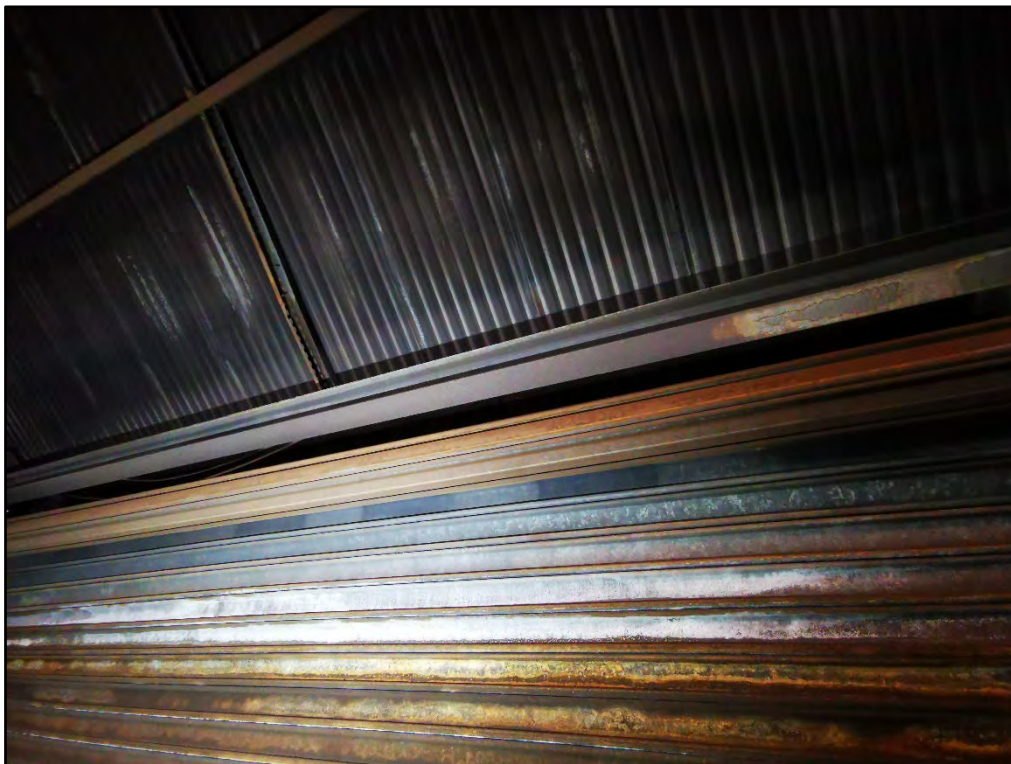
Photograph 110 Surface Corrosion of Cross Bracing



Photograph 111 Crack on Top of Concrete Wall and Surface Corrosion of Column



Photograph 112 Corrosion of Fascia Purlin



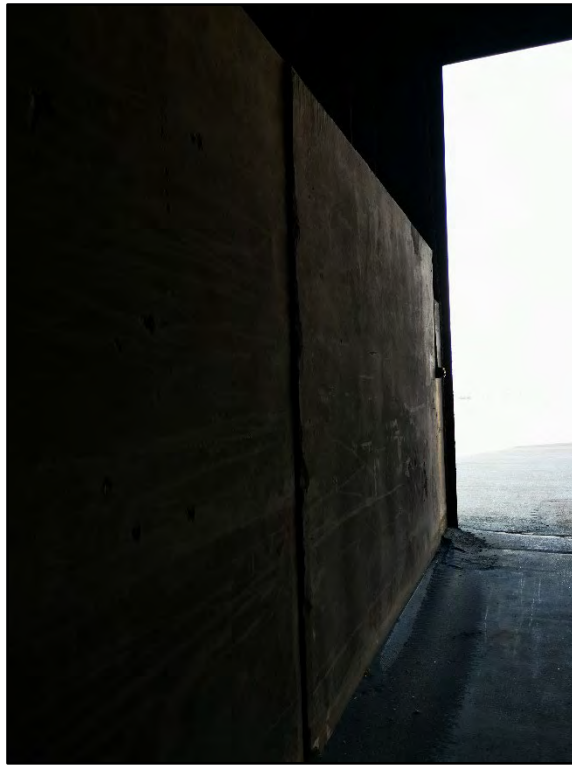
Photograph 113 Heavily Corroded Door Sheeting



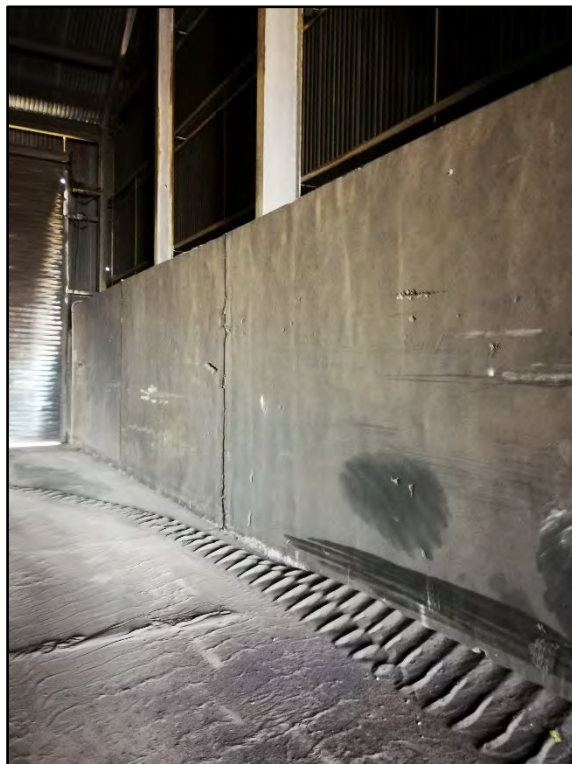
Photograph 114 Surface Corrosion of Door Frame



Photograph 115 Surface Crack on the Wall



Photograph 116 Wall Movement



Photograph 117 Minor Impact Damages Due to Loader



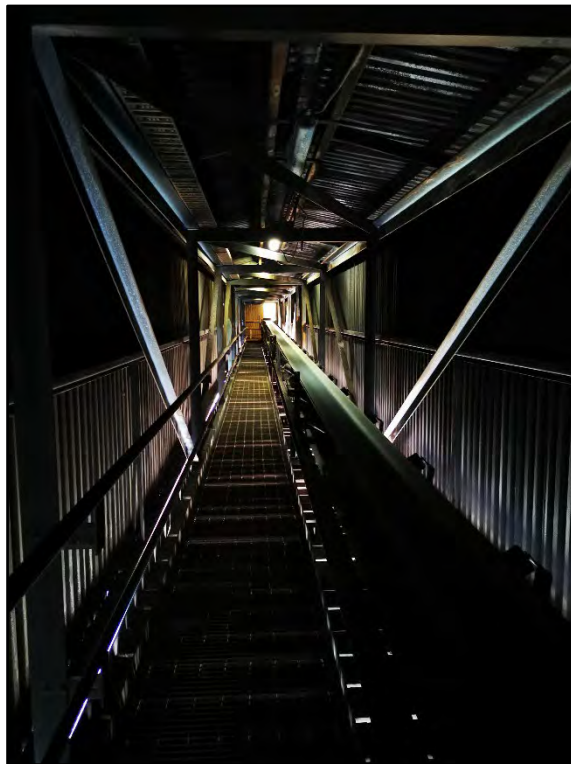
Photograph 118 Minor Impact Damages Due to Loader



Photograph 119 No Slab Damage or Crack Observed



Photograph 120 Surface Corrosion of Purlins on Conveyor and Walkway



Photograph 121 Walkway Connecting Shed 7 & 8

4 OBSERVATIONS – SHED 8

The following pages contain observations recorded during our inspections dated 31 May 2022 and 02 September 2022.

Majority of the damage due to corrosion was observed in northern side of the shed.

Southern side of the shed, which is facing public road, was replaced with new purlins and roof sheeting.

There were some deterioration observed at the bottom of the Eastern wall of the shed. Northern wall of the shed needs replacing due to the deterioration observed and internal corrosion.

4.1 External Inspection



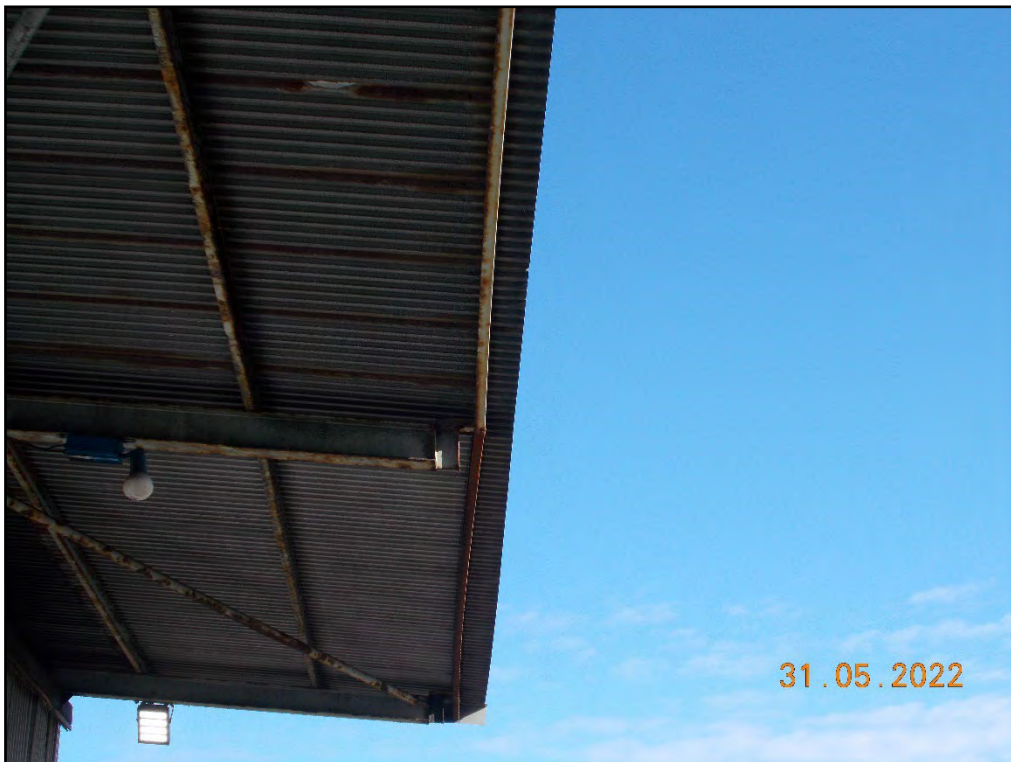
Photograph 122 Corrosion of Rafters and Purlins.



Photograph 123 Corrosion Deterioration Observed at the Bottom



Photograph 124 Deterioration Due to Corrosion



Photograph 125 Corrosion of Rafters, Purlins, and Bracings



Photograph 126 Corrosion of Door Frame



Photograph 127 Corrosion of Bolts



Photograph 128 Damage Due to Impact



Photograph 129 No Damage



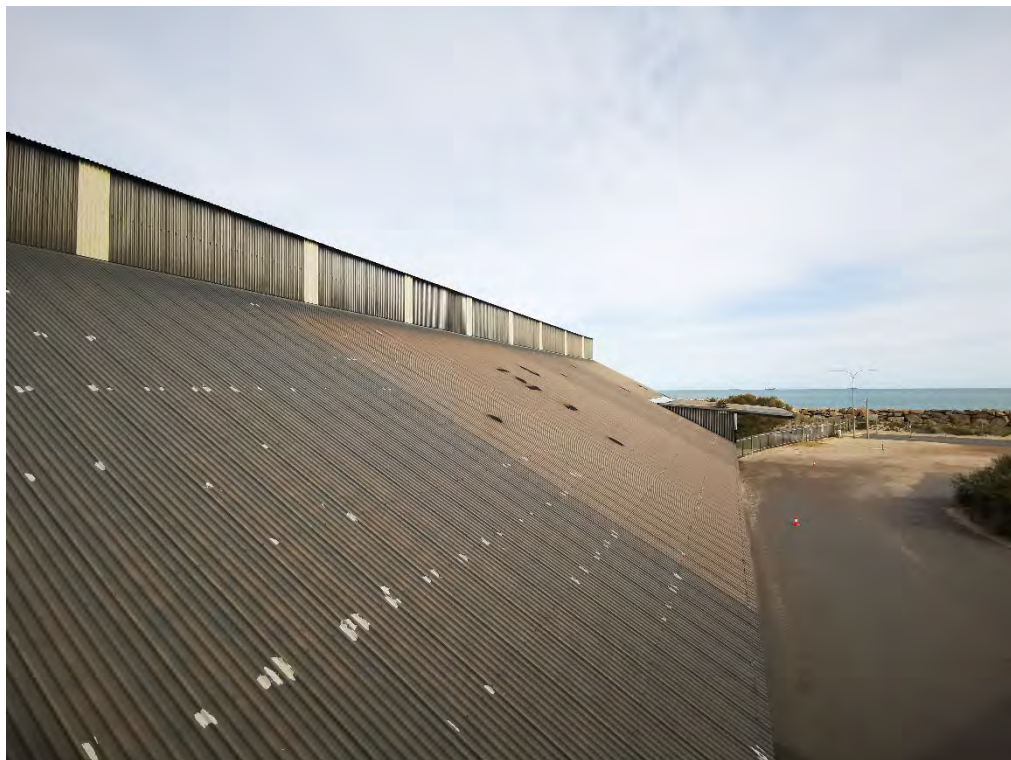
Photograph 130 No Damage



Photograph 131 Deterioration at the Bottom of Wall Sheeting



Photograph 132 Roof Sheeting and Conveyor System



Photograph 133 Roof Sheeting

4.2 Internal Inspection



Photograph 134 Product Inside the Shed Restricted the Access



Photograph 135 Deteriorated Purlin due to Corrosion



Photograph 136 Delamination of Purlin due to Corrosion



Photograph 137 Damaged Concrete Wall and Impact damage to Column Bay H-3



Photograph 138 Deteriorated Girts, purlins due to Corrosion and Surface Corrosion of Beams and Columns



Photograph 139 Deterioration of Purlin



Photograph 140 Deterioration to Purlin and New Purlins and Roof Sheetting on South Side



Photograph 141 Daeteriorated Purlin due to Corrosion



Photograph 142 Damaged Purlin due to Impact



Photograph 143 Corroded Fascia Purlin



Photograph 144 Surface Corrosion of Purlins and New Purlins and Roof Sheeting in Southern Side



Photograph 145 Cracked Concrete Wall



Photograph 146 Heavily Corroded Steel Members



Photograph 147 Deterioration Purlin due to Corrosion



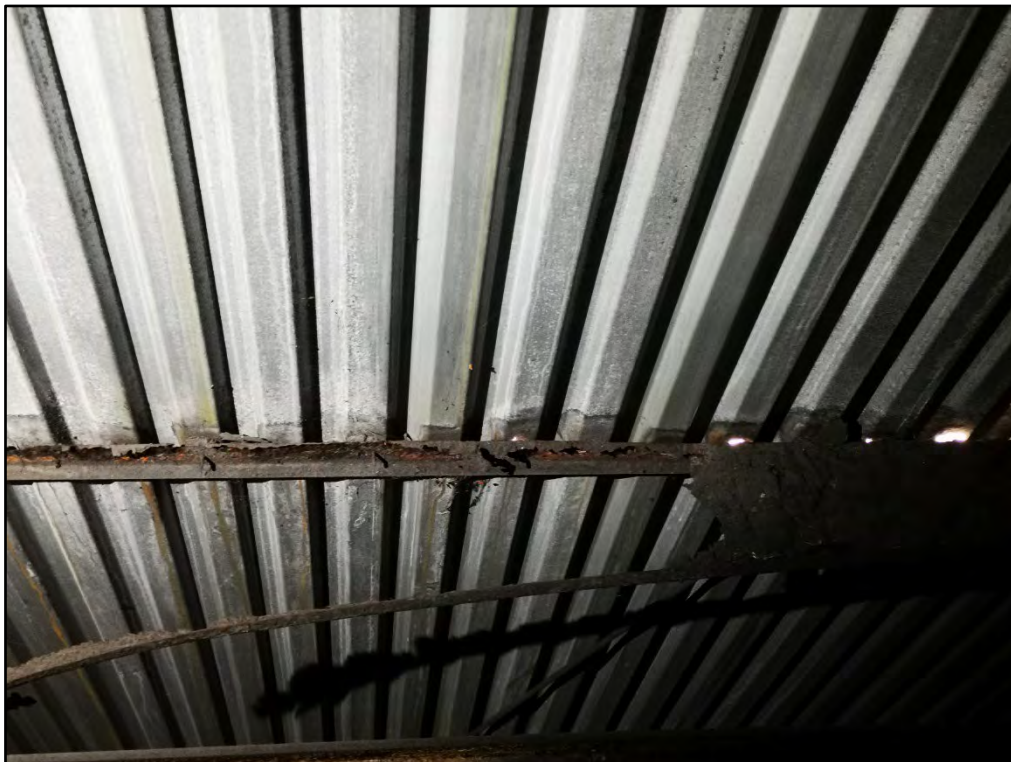
Photograph 148 Heavily Corroded Purlin



Figure 149 Heavily Corroded Steel Members



Photograph 150 Damaged PFC Section



Photograph 151 Sectional Loss of Girt due to Corrosion



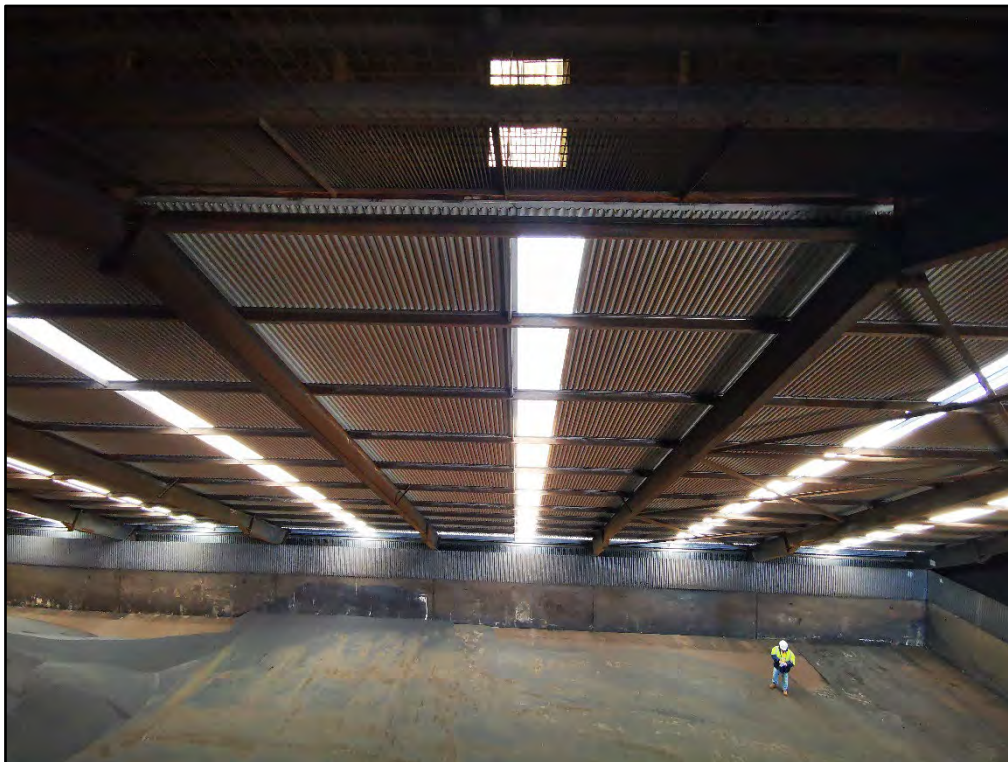
Photograph 152 Surface Corrosion of Purlins



Photograph 153 Deterioration to Fascia Purlin due to Corrosion



Photograph 154 Damaged Purlin due to Impact in South Side



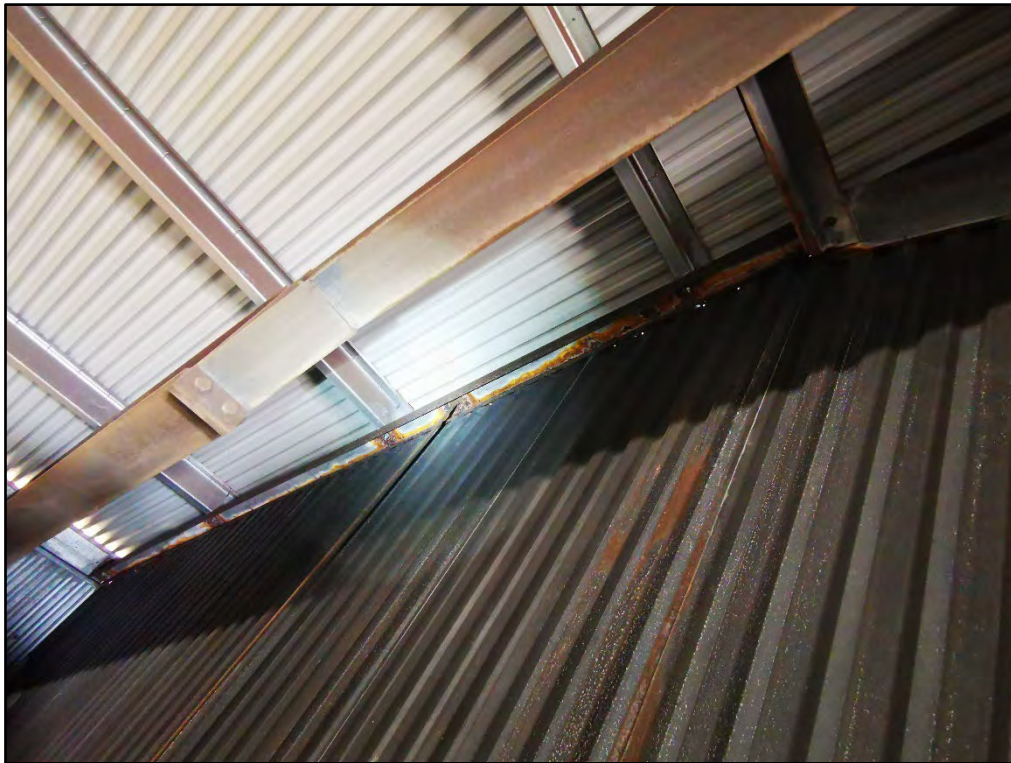
Photograph 155 New Purlins and Roof Sheetting



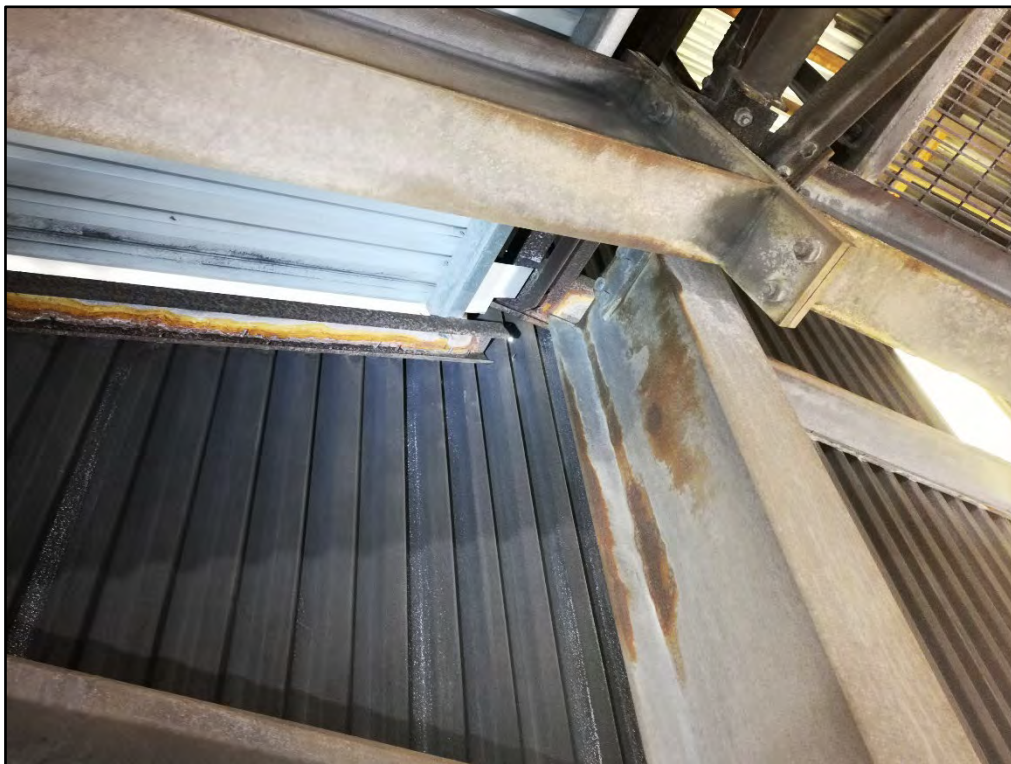
Photograph 156 Surface Corrosion of Column



Photograph 157 Surface Corrosion of Fascia Purlin



Photograph 158 Surface Corrosion of Fascia Purlin



Photograph 159 Heavily Corroded Stiffener to the Sheeting



Photograph 160 Heavily Corroded EA Section



Photograph 161 Heavily Corroded Wall Girt



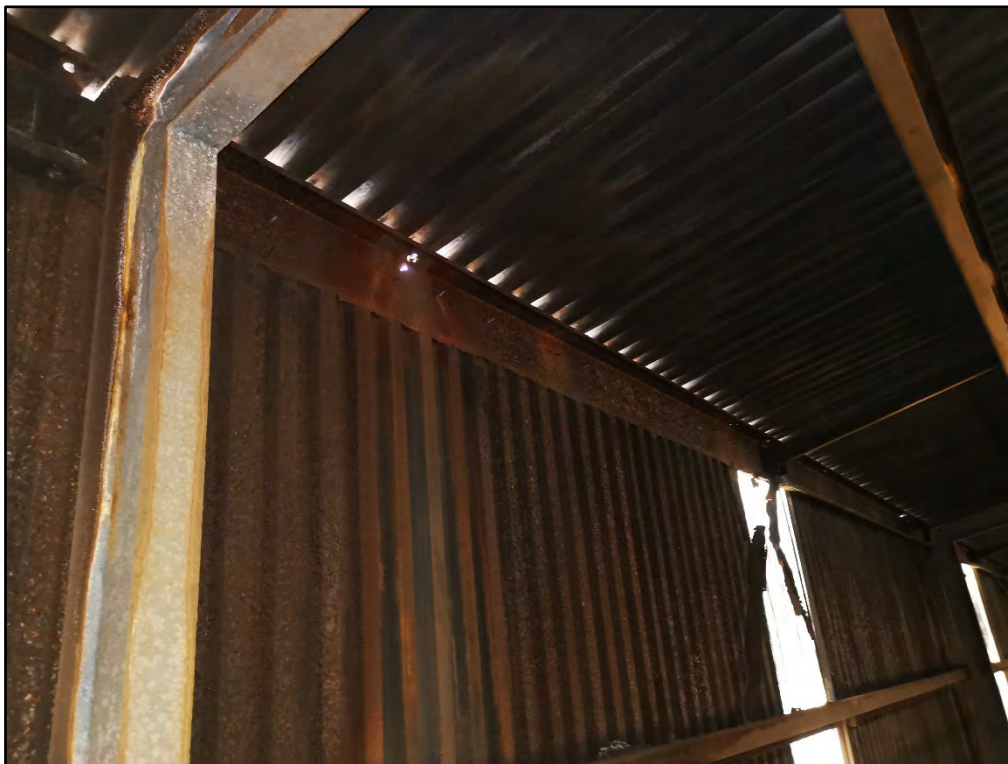
Photograph 162 Delamination of Wall Girts due to Corrosion



Photograph 163 Delamination of Wall Girts due to Corrosion



Photograph 164 Deformed CHS Section



Platform 165 Deterioration to Fascia Purlin on Conveyor and Walkway



Photograph 166 Heavily Corroded Purlins on Conveyor and Walkway



Photograph 167 Heavily Corroded Fascia Purlin on Conveyor and Walkway



Photograph 168 Sectional Loss of Fascia Purlin and Surface Corrosion of Purlins and Girts



Photograph 169 Surface Corrosion of Steel Members and Damaged Fascia Purlin

5 DISCUSSION

5.1 Structural

The report illustrates deterioration that was visible from ground level and the EWP during the inspection.

The sheds are showing signs of corrosion and weathering which is expected due to their life cycle. Wall and roof sheeting on sheds 6, 7 & 8 have shown signs of corrosion and needs replacing. Some impact damage was also observed during visual inspection.

The major steel sections such as rafters, columns, and beams in the sheds 6, 7 & 8 are in a good condition. There are signs of surface corrosion which can be cleaned and repainted. During inspection, there were deposits of material on the flanges of the steel sections. Purlins and girts have shown signs of surface corrosion and need replacing in the next five years. A few purlins and girts need immediate attention as they have been severely damaged due to corrosion.

The unloading bays, north of shed 7 and west of shed 6, have shown signs of corrosion and weathering. Girts and purlins are heavily corroded, and, in some cases, sectional loss can be seen clearly. Girts and purlins need replacing where identified. In addition, impact damages due to vehicles were noticed at the entrance of the bays and needs immediate attention.

Stairs at the southern side of the shed 7 needs to be thoroughly inspected to ensure its structural adequacy is not compromised due to corrosion and the corrosion is restricted to the surface.

The attached drawings (Appendix A) indicate the general area where items have been identified or located and specific items that have been observed during inspection.

The working practises need to be investigated and procedures put in place to prevent impact causing structural damage from reoccurring. Continued impact of the magnitude is high risk and may impact the structural integrity of the steel members.

Upon completion of the external roof inspection of all three sheds there were no evidence of fall arrest system. Within WA, it is a requirement in the OS&H Regulations 1996 to address the risk of a fall 2m or above. Installation of new fall arrest system should be in accordance with AS 1891.

A high level budget has been prepared to replace the structural members to extend the life of the existing buildings. A detailed cost estimation has been shown in Section 6.

5.2 BCA Compliance

According to the current use the buildings are classified as class 7b in accordance with the Building Act. To change the use of a building, it is a requirement to reclassify the building to class 9b place of assembly use. Class 9b buildings require equal access to all levels if additional floor or mezzanine was to be considered.

Fire services needs to be designed and installed to provide BCA compliant coverage for any building over 500 m² floor area. The proposed works will require referral to Department of Fire and Emergency services.

Another option would be to incorporate all or some of the buildings into Large Isolated Building (LIB) which within the BCA requires class 9b buildings to be sprinkler protected and have 18m min. perimeter separation/access around the building.

Therefore, if the proposed structures are setback a minimum of 3m from any property boundaries no fire ratings or protection of openings is required. Further assessment would be required regarding floor plan layouts etc. to establish travel distance and exit doors compliance.

It is apparent that significant works are required to bring the building up to standard where public may access them.

Refer to BCA report in Appendix C for detailed observations and recommendations.

5.3 Quantity Surveyor – Demolition

The demolition cost for shed 6 (1,539 m²) is \$226,100, shed 7 (2,417 m²) is \$284,100 and shed 8 (2,618 m²) is \$311,500. Additional allowance has been made in Ancillary/Miscellaneous Structures of \$120,800 which includes lifts and lift pits, hoppers, and conveyor belts.

As requested, allowance for demolition of piles has been included in External Works and Services. The total cost for removal of piles up to depth of 1.5m is \$440,050. The total External Works and Services cost is \$957,700. In the provided drawings, there was no evidence of piling.

The total demolition cost including approvals, professional fees and escalation is \$2,317,780. Refer to demolition report in Appendix C for detailed cost estimation of all three sheds.

5.4 Civil

The site was in a good condition with no severe damage observed. There are a few locations where kerbs are damaged or missing.

The road surface is in a good condition with some minor repairs required, such as potholes and cracks in areas of the bitumen surface.

Cracks were observed on concrete paths which may require scheduled inspections to avoid trip-hazards developing. A new path may be required to replace the damaged one at some point in the future.

Refer to civil report in Appendix E for detailed report on observations and recommendations.

5.5 Hydraulic and Fire

During the inspection, there was no domestic water services to sheds 6, 7 & 8 found. However, there is an existing DN150 cold water service connection which enters the Port Authority land to the south of the access gates along Causarina Drive. As part of any future development, it would be intended to service the sheds from the existing DN150 main supply with separate backflow prevention device and sub water meter assembly. Water supply pressure and flow rate should be verified by a contractor at the time of detailed design.

There is no wet fire services installed to any of the sheds. As the existing buildings are >500 m² in floor area, fire hydrant and fire hose reel protection will be required to be installed. Consideration needs to be given to the water supply configuration. A separate fire service connection will likely need to be established at the boundary, independent of the domestic water supply, to comply with AS2419.1 and AS/NZS3500.

There is no gas service connection to the Port Authority land. However, there is a newly installed 160ØPE gas main located along Causarina Drive, south of the Port Authority access gate. Should gas be required for the future development, Atco Gas Australia will need to be consulted about extending the existing gas main at Causarina Drive, in order for a gas meter set to be installed at the boundary of the Port Authority land.

There is no reticulated gravity sewer connection to the Port Authority land. The nearest Water Corporation reticulated sewer is located south of the Port Authority land in The Strand. Due to the required setbacks from the ocean, it is recommended that a private sewerage pumping station and private rising main is considered for the future development.

The existing sheds are not fitted with guttering or rainwater pipe connections. It is recommended that guttering and rainwater pipes are fitted to the sheds as a part of any future development. A high level budget was prepared to bring the existing hydraulic and fire services up to the current legislation. A detailed cost estimation has been shown in Section 6.

Refer to Hydraulic Services Report in Appendix F for detailed observations and recommendations.

5.6 Electrical

The existing electrical services are of a capacity and condition that is not suitable for the redevelopment of the buildings to cater for public access. Subject to the final building usages, a power supply upgrade to buildings will be required to cater for the new services.

The redevelopment will trigger a number of National Construction Code requirements with regards to fire safety that will have an impact to the required electrical system. At present, no fire safety system was found. Expect a minimum, a fire detection and emergency warning system will be required to the redeveloped building. This will also require the NBN network for monitoring and Fire Brigade notification.

A high level budget was prepared to bring the existing electrical services up to the current legislation. A detailed cost estimation has been shown in Section 6.

Refer to Electrical Report in Appendix G for detailed observations and recommendations.

6 COST ESTIMATION

After carefully assessing the sheds, a detailed high-level budget has been prepared which includes upgrades to the fire, hydraulic, and electrical systems to comply with the current legislation. In the budget, costing for fall arrest anchorage system has been allocated as it is a statutory requirement to have according to OS&H regulation 1996.

In the cost estimate, allowances have been made for the replacement of heavily corroded steel members on an urgent basis. We have also allowed for the cost of maintenance over the next five years. Total cost for upgrading and replacing the steel members in shed 6 is \$1,805,727, shed 7 is \$2,126,052.50 and shed 8 is \$1,887,066.50. The total cost of three sheds is \$5,818,846 including GST.

The cost estimate to demolish shed 6 is \$226,100, shed 7 is \$284,100 and shed 8 is \$311,500. The cost estimate to rebuild the shed 6 is \$1,765,100, shed 7 is \$2,701,100 and shed 8 is \$2,929,500. The total cost to demolish and replace is \$8,217,400 excluding GST.

Refer to cost estimate in Appendix B for detailed cost breakdown of each shed.