



ARTC

SJ23-0631-RPT

**Euroa Goods Shed
Follow-up Inspection Report
13 February 2024**



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RECORD OF DOCUMENT CONTROL

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INTRODUCTION

Sterling was initially engaged to inspect the Euroa Goods Shed (The Shed), to undertake a visual inspection of The Shed to assess its current structural condition and to provide recommendations. The initial inspection took place on 11th July, 2023, and the recommendations provided by Sterling included demolition or major strengthening works within 5 months.

ARTC have provided documentation confirming that on the 24 of November 2023 the Victorian Heritage Council issued an Interim Protection Order (IPO) on the Euroa Goods Shed. The IPO effectively means that the Euroa Goods Shed is a registered place under section 25 of the Heritage Act 2017, until the Heritage Council determine whether or not the place should be permanently listed on the register. The IPO prohibits demolition works to all or any part of a registered place, and as such Sterling has been advised that ARTC were unable to undertake the demolition works within recommended timeframes.

As demolition did not occur within Sterling's recommended timeframe, ARTC engaged Sterling to re-inspect The Shed and reassess its structural condition and provide recommendations on any make safe actions while the Heritage Council deliberates on its decisions. This inspection took place on January 22nd.

OBSERVATIONS

During our follow-up inspection of the Euroa Gods Shed, the following structural changes were observed:

1. The majority of the columns which were measured, exhibited increased rotation towards the Down Side by 1 degree to 1.5 degrees, since the previous inspection.
2. The central column at the Up End has rotated further inwards dragging with it the wall beam and cladding
3. Roof sheeting is missing at one location (from the movement of the sheeting and cladding observed during the inspection, we infer that the missing sheeting has been blown off in the wind).
4. Wall cladding and roof sheeting was moving in the wind during the inspection.

Increased Column Rotation

All 9No columns on the Up Side wall, and all 6No of the columns which could be safely accessed on the Down-Side wall were observed to be on a Down Side incline, of approximately 86°. This is an increase of 1° - 1.5° from the measurements taken during the previous inspection. Photos 1 and 2 show the difference in measurements across the 6-month period.



Photo: Previous incline at Downside wall (July 2023)



Photo 2: Current incline at Downside wall (Jan 2024)

Central column rotation at Up-End

Previously, inspectors recorded the Up End timber column in Photo 3 as disconnected from the roof framework and leaning inwards. Exact measurements with a spirit level were unable to be taken due to safety concerns regarding the decking at this location. Photo 4 displays the increased lean recorded in the site revisit.

Whilst no measurement could be taken during either inspection, significant column movement is clear, as shown by the contrasting positions of the column relative to the roof sheeting corrugations.



Photo 3: Previous column lean at Upend wall



Photo 4: Current column lean at Upend wall

Roof sheeting

A section of roof sheeting which was observed during the initial inspection, was noted as missing during the follow-up inspection. From the movement of the sheeting and cladding observed during the inspection, and the presence of sheeting material observed on the ground adjacent The Shed we infer that the missing sheeting has been blown off in the wind.

Other sheets were observed which are partially disconnected and could be seen moving under wind pressure during the site visit. Photos 5 and 6 show the location of the missing steel sheet.

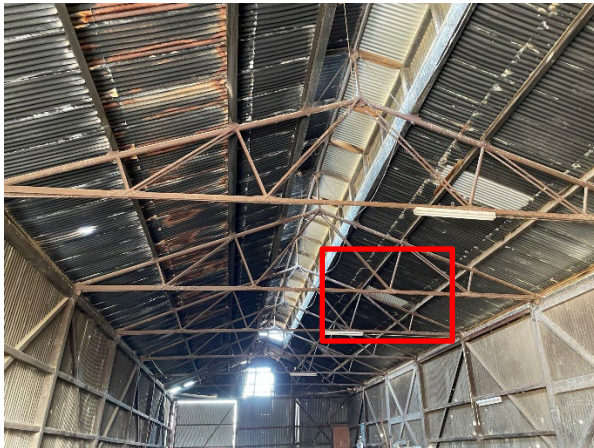


Photo 5: Previous steel roof sheet present



Photo 6: Current steel roof sheet missing



Photos 7 & 8, showing movement of roof sheeting during inspection

DISCUSSION AND RECOMMENDATIONS

As discussed in our report (ref#SJ23-0631-RPT-V3), The Shed has cross bracing in the longitudinal direction, however there is no bracing in the transverse direction (perpendicular to the track).

Furthermore, the columns are 'pin' connected to the bluestone wall, and also 'pin' connected to the steel trusses at the roof level, pin connections are unable to resist rotation induced by lateral forces such as wind loads.

The increase in structural lean of approximately 1.5 degrees over the 6-month period indicates a concerning rate of deterioration of the structure's lateral stability. This was highlighted in the initial report as a potential outcome due to ineffective connections between the frame and bluestone upstand, a lack of cross bracing in the transverse direction and rotting at the base of columns. The increased inward movement of the columns at the Up End is further indication of the structure's instability.

It is considered likely that the missing steel roof sheeting has blown off and fallen onto the ground adjacent The Shed. This presents a serious falling-object hazard, as the structure is within close proximity to the train station and tracks. Roof sheeting and wall cladding were observed moving in the wind during the inspection, which indicates a potential for further disconnection of sheeting / cladding, and an ongoing risk of injury and / or property damage.

Removal of the cladding would alleviate the risk of it falling, however the cladding may be providing a degree of structural stability via 'stitching' the structure together (note that the cladding and roof sheeting are not designed to perform this function). Cladding removal may hasten the rate of diminishing stability and trigger a spontaneous collapse.

Our previous recommendations included undertaking structural make-safe works consisting of either demolition, dismantlement, or major strengthening works within 5 months. The timeframe to carry out previous recommendations has lapsed, and the structure is now less stable both in terms of local stability (roof sheeting dislodging and falling) and global stability (the entire structure collapsing).

Due to the structural changes observed, as described herein, we are unable to provide a revised time period for demolition as the current condition of the structure is such that a collapse could occur without further warning, at any time.

Demolition is recommended as soon as practically possible.

The reason why demolition is recommended rather than other previously considered make-safe works, such as dismantlement or major strengthening works, is because of the structural changes observed between the inspections which indicate a concerning rate of deterioration of the structure's lateral stability, which has increased the likelihood of spontaneous collapse since the initial inspection.

Given the reduced stability of The Shed, there is an increased safety risk during dismantlement and /or major strengthening works as these methods require personnel to be within the 'at risk' zone both on the interior and exterior of The Shed. The advantage of Demolition is that it can be undertaken externally, and via the use of equipment which enables personnel to remain further from The Shed during this operation thus reducing the risk of injury.

The make-safe works that would be required to provide stability to The Shed, would include replacement of failed columns. Installation of the new columns would necessitate excavating and pouring new footings. The new footings would trigger the need for a Building Permit, which would require the footings to be compliant with the current code.

The excavation required to install code compliant footings is likely to exceed the depth of the existing footings beneath the bluestone walls and timber columns. This excavation risks undermining the bluestone walls and timber columns.

To mitigate the risk of instability occurring during column strengthening, the walls and roof would need to be de-loaded via propping. The propping would need to connect to the horizontal members in the walls, however these horizontal members are themselves in poor condition with significant rot observed. The risk associated with propping is that the members to which the props need to connect are in poor condition and may fail during propping.

Given the concern regarding global lateral stability of the Shed, any further reduction in stability such as that induced by undermining or failed propping could trigger a disproportionate collapse of The Shed in entirety.

Aside from these structural concerns there are the obvious difficulties regarding undertaking excavation, propping, and column erection within this proximity of the track.

For these reasons it is our opinion that from a structural engineering, safety and cost perspective, we would not recommend attempting to make-safe The Shed, and instead recommend Demolition as soon as practically possible.

Risk Mitigation

The Shed poses risks of both local and global collapse, a risk analysis is required in order to confirm appropriate mitigatory measures. The following risk mitigation discussion is provided for ARTC's consideration and potential inclusion in their risk assessment. Note that these measures would not eliminate risk of injury and / or property damage arising from collapse either global or local.

In order to reduce the risk of falling-cladding induced injury, the exclusion zone should be increased to extend to approximately 15m from the building line, which is calculated based on the height of the building plus a buffer zone.

We acknowledge that the track is located closer than this to The Shed, and therefore the exclusion zone fence at this location should be sufficiently robust to act as a protective barrier to deflect loose cladding away from the track.



Photos 9, typical deflection screen which could be used between The Shed and the track to prevent impact near ground level

Note that to be most effective at reducing risk of falling roof sheeting or cladding from fouling the track or colliding with a train, the deflection screen would need to be taller than The Shed. Construction of a fence of this height would require structural and geotechnical design, and either props, tie backs, or cantilevered piles, all of which would increase the lead time to implementation of this mitigatory measure.

We are aware that due to the location of the proposed screen within close proximity to the track, it is likely that these works could only be undertaken under Occupation. The proximity to track would likely also require additional permits and approval for design and construction from other rail entities, such as VicTrack and V/Line, and potentially a Town planning Permit.

Furthermore, there may be encumbrances associated with Heritage Victoria's IPO which could potentially delay screen construction, such as limiting or constraining physical works such as installation of propping adjacent the Good Shed.

We advise that given the anticipated difficulty and time required to erect a deflection screen of sufficient height to mitigate risk of falling cladding fouling track or colliding with a train, ARTC will need to undertake a risk assessment of the potential consequence should debris from The Shed either foul the track or collide with a moving train and implement appropriate mitigatory measures to address this risk.

Electrical wiring

The electrical wiring which is connected to the northern end of The Shed needs to be removed to prevent risk of electrocution and / or fire should The Shed collapse.



Photos 10A&10B, location of power lines connected to the northern and southern ends of The Shed (left to right)