Shop Awning Inspection

GUIDELINE

Background

WorkSafe Queensland issued a past alert in response to a number of awning failures that have occurred in Queensland over the years. In 2012, a shop front awning collapsed on to a footpath in Burleigh Heads, tragically resulting in one death and several members of the public sustaining serious injuries.

WorkSafe Queensland has stated that these types of incidents primarily occur due to anchorage points or structural support systems failing from corrosion and weathering, or overall design inadequacies. This has prompted Local Governments across Australia to take action to ensure these structures are suitably maintained to protect public safety.

Awnings and any other relevant structures that form part of the building to which they are attached are the responsibility of the building owner, regardless of whether the structure is located over public land. The building owner is responsible for the structural integrity and adequacy of these structures and any associated risk posed to public safety.

Due to the large number of shops within the Fraser Coast Region with awnings, balconies and similar structures overhanging public land, many of which built in the late 19th and early 20th century, Council has undertaken an awning safety audit. As part of this audit, Council is writing to all relevant property owners to request their assistance and remind them of their legal obligations to ensure compliance and protect public safety.

It is recommended that owners of relevant buildings and structures take all appropriate actions to ensure the structural integrity and adequacy of these structures by conducting their own risk-assessment and/or engaging a suitably qualified building professional.

This guideline aims to offer guidance to professionals involved in inspecting, reporting on, or certifying existing tied awning.

The Issues

The inherit issues to evaluating the strength and serviceability of existing awnings which are tied back to masonry walls are seen to be as follows:

1. The design live load has increased considerably with the introduction of AS 1170 Part 1 -2002 ‘Structural design actions’ (referred to as AS/NZS 1170 Part 1 (2002) here forth) compared to earlier editions of this standard. Older awnings would have been designed to previous editions of this standard.
2. The critical design loading may be wind loading as opposed to the design live load.
3. Documentation of the original construction details are typically not available.
4. Lime mortar may have been used in older masonry walls rather than cementitious mortar.

5. Tie-rods, anchor plates and/or masonry ties are often affected by corrosion. Awnings located within coastal areas are more prone to corrosion by salt-laden spray than those in other locations.
6. Structural components are typically not accessible for inspection due to the following:
    - Positioning beyond where the tie-rods penetrate external masonry walls.
    - Anchor plates are located between other premises or party walls.
    - Awning tie-rods are anchored in walls or parapets of cavity masonry construction. In such cases, parapet strength will have to be assessed despite limited or no accessibility to the parapet masonry to determine its construction and condition.
7. No access for a structural engineer to measure framing member sizes, assess level of corrosion of fixings and members, or determine connection details when the awning framing is fully enclosed by roof sheeting on top face and lining on bottom face.
8. Due to inaccessibility to assess structural elements (framing, tie-rod or tie-rod anchors, for example), load testing may be employed to avoid removing masonry in place of visually examining tie-rod anchors.

Design Loads

Reference to the appropriate standards defined under the National Construction Code (NCC), Volume 1, Part B1 must be made where certification is required. The NCC refers to AS/NZS 1170 Part 1 (2002) for permanent, imposed and other actions. This standard classifies street awnings as Roof Category R1. The commentary to this standard states that:

"Roof Category R1 is intended to cover situations where people may gain unauthorised access through their own efforts to a roof not intended for such use. The lower load of 1.0 kPa allows for greater difficulty in gaining access compared to the value of 1.5 (kPa) where access may be facilitated by adjacent windows, balconies or other awnings. An example is a street awning on a multi-storey building with openable windows".

Table 3.2 of AS/NZS 1170 Part 1 (2002) specifies the following reference values for roof live loading actions:

- Awnings accessible from adjacent windows, roofs, or balconies – a uniformly distribution action of 1.5 kPa and a concentrated action of 1.8 kN.
- Awnings accessible only from ground level – a uniformly distributed action of 1.0 kPa and a concentrated action of 1.8 kN.

Consideration should be given to whether significant numbers of people may access an awning for purposes such as to watch a parade on the street, in which case the above loads may need to be increased.

The design loads nominated in AS/NZS 1170 Part 1 (2002) should also be adequate to allow for any ponding of water or accumulation of hail on the roof during rainstorms.

AS/NZS 1170 Part 2 - 'Structural design actions – wind actions' should be used to determine wind loads with consideration to both downward pressure and uplift. Special consideration should also be given to cases where nearby buildings may cause increased wind speeds due to a funnel effect or similar, and the design adjusted accordingly. Pressure caused by wind hitting a near-by multi-storey building result in higher design downwards loads than the above design live loads. Uplift due to wind may result in the tie-rods being considered inadequate due to compression force in the slender tie-rod.

Recommended Procedure

The recommended procedure involves the following stages:

Stage 1: Initial inspection and assessment

Stage 2: Secondary inspection after gaining internal access

Stage 3: Reporting and detailing of any rectification requirements

Stage 4: Final inspection

Stage 5: Certification

The recommended procedure is intended to ensure that:

(i) all visible and hidden structural elements in the awning have been inspected and evaluated for structural adequacy;

(ii) any deficiencies have been reported and rectification procedures have been advised; and

(iii) all rectification works have been inspected after completion by a builder;

(iv) the rectification works and overall design and structural adequacy of the awning has been certified by a suitably qualified structural engineer to be compliant with relevant standards.

STAGE 1 – Initial Inspection and Appraisal

A preliminary desktop investigation should be made to identify the existence of any structural drawings for the awning, typically through Council records. In many situations, however, no drawings will be available. Reliance should not be placed on these drawings if available as the actual conditions may vary greatly from those indicated on the drawings. Furthermore, various alterations may have been made to the structure since its initial installation.

A subsequent site inspection must be undertaken to determine generic information regarding the structure, such as the dimensions, age, structure type, external configuration, existence of any support and cross walls, gutter drainage and other relevant details. Extensive photographs of site conditions and details should be taken throughout this inspection process.

STAGE 2 – Second Inspection

The preliminary inspection should be used to determine information that will be used to guide the secondary inspection which will involve opening the awning and performing a detailed, internal inspection. This will need to detail re-instatement methods for the removed materials to perform the inspection.

This inspection will often require the front edge of the awning to be propped which typically requires Council approval and for barriers to be installed around the work site. The awning may also be required to be tied down against wind uplift, involving the use of concrete weight blocks.
To obtain approval, Council will require information regarding the length of time the barriers will be in place, what measures are to be taken to protect the public, and certification of the barriers to withstand vehicular impact. It is recommended that a specialist is consulted in propping and certification requirements for these works as they are familiar with Council requirements for the approval process.

Member size and condition of rafters and purlins will need to be determined by removing areas of roofing and/or lining. Where tie-rods penetrate masonry, an area equivalent to four to six bricks of the parapet/front wall masonry will need to be removed for inspection.

Once access to the internal structures of the awning has been obtained by removing materials such as roof sheeting and linings, a detailed inspection may then be conducted that includes the following:

- sketching the framing of the structural elements;
- sketching and measuring the member sizes and level of corrosion on the structural steel;
- sketching and measuring the connection details for the structural steel;
- measuring the size and assessing the level of corrosion of the tie-rods;
- sketching and measuring the connection details for the tie-rods, top and bottom;
- measuring the connection plates and fixing details within the masonry; and
- assessing and recording details of the masonry and condition of the masonry ties.

Extensive photographic records of all areas should be taken throughout the inspection process.

STAGE 3 – Reporting and Rectification Instructions

Required calculations should be carried out following the second inspection using Australian Standards AS 4100, AS 4600 and AS 3700, as required. Allowance can be made for the corrosion of steel elements by using the net thickness remaining on an element at the time of the inspection, unless the client advises of a further corrosion allowance on the remaining design life. All corrosion requires a corrosion removal and protection system to be devised.

If the there is insufficient access for inspection, load testing of the tie-rod anchors may be considered where there are any concerns regarding the adequacy of the anchors following the inspection or as a result of the calculations. AS 4100 should be used to determine proof loads based on the critical load case for load testing.

Two reports should be produced from this investigation and these are as follows:

- A report to the client regarding the status of the awning and any required works for the repair, strengthening, or replacement of structural elements. This should also include recommendations for maintenance and inspections.
- A report outlining detailed instructions for any required rectification works, including corrosion protection, where applicable.

STAGE 4 – Final Inspection

Rectification works will require inspections to be undertaken as necessary in order to ensure that the works are carried out in accordance with documentation issued by the structural engineer and the structural integrity is to the structural engineer's satisfaction.

STAGE 5 – Certification

Once the final inspection has been carried out, certification of the structure can be issued. This should detail the loads that have been used and assumptions made in the relevant calculations. Additionally, drawings, sketches, specifications, and any issued instructions should accompany the certification.

The scope of what the building professional is certifying should be clearly defined to identity what is being certified and what is not. Reasoning for some elements not being certified should be provided (e.g. not accessible).

The certificate may make recommendations for ongoing inspection intervals.

Certificates should explicitly state that the issuing of the certificate does not absolve any party of its liabilities, responsibilities and/ or contractual obligations.