REPORT ON THE COST IMPLICATIONS OF PROPOSALS TO AMEND THE D-T-S PROVISIONS OF THE NCC – EMERGENCY EGRESS FOR ALL OCCUPANTS

COST IMPLICATIONS STUDY

27 JUNE 2014



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**Table of Contents**

1.0 Introduction 1

1.1 Major Assumptions 1

1.2 Cost Implications Summary 2

2.0 Basis of Report 4

2.1 Purpose and Status 4

2.2 Methodology 4

2.3 Information Used 5

2.4 Assumptions Specific to Property Types 6

2.5 Inclusions 10

2.6 Exclusions 11

3.0 Cost Implications of Proposed Changes 12

3.1 Proposal 1 - supplement existing audial emergency warning systems with visual warning in all areas required to be accessible 12

3.2 Proposal 2 - supplement existing audial emergency warning systems with visual and tactile warning in accessible Class 1b, 2 and 3 property types 12

3.3 Proposal 3 - require the co-location of lifts and exits 13

3.4 Proposal 4 - apply the accessway requirements of AS 1428.1 to paths of travel to exits 14

3.5 Proposal 5 - improve the accessibility of exits 15

3.6 Analysis of Effects on the NLA of Property Types 16

4.0 Glossary of Terms 17

Appendix A – Analysis of Cost Implications

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# Introduction

This report provides commentary on the cost implications of a range of proposed Deemed to Satisfy (D-t-S) provisions emanating from the Emergency Egress for all Occupants Project. This report has been prepared for the Australian Building Codes Board (ABCB) by Rider Levett Bucknall (RLB) in order to prepare a cost analysis reflecting the capital cost implications of five proposals on a representative range of generic building scenarios. RLB accepts neither responsibility nor liability to any other party who might use or rely upon this report without our prior knowledge and written consent.

## Major Assumptions

This report of cost implications is based on a number of assumptions, as per Section 2.4 further within this report.

The following assumptions are of particular note:

1. Capital cost estimates are based on new construction.
2. All installations are to be installed as part of main construction programme and not as isolated tasks.
3. Please refer to Section 4.0 of this report, the Glossary of Terms, for definitions of abbreviations used herein. Cost Implications Summary

The following costs are shown for the provisions being carried out across all property types. This also shows the cost implications of each proposal on a property type. Refer to Appendix A for a detailed analysis of the individual proposals for each property type.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Class** | **Property Type** | **Proposal 1** | **Proposal 2** | **Proposal 3** | **Proposal 4** | **Proposal 5** | **Total Cost Across Property Type** |
|  |  | **$** | **$** | **$** | **$** | **$** |
| **1b** | **Single Storey Holiday Accommodation - 1 Bedroom Cabin** | - | 1,400 | - | - | - | **$1,400** |
| **1b** | **Single Storey Holiday Accommodation - 2 Bedroom Cabin** | - | 3,100 | - | - | - | **$3,100** |
| **1b** | **Single Storey Holiday Accommodation - 3 Bedroom Cabin** | - | 5,400 | - | - | - | **$5,400** |
| **2** | **3 Storey Accommodation  No Lift** | 2,400 | - | - | - | 2,100 | **$4,500** |
| **2** | **7 Storey Accommodation  With Lift** | 4,000 | 3,200 | - | 12,900 | 297,800 | **$317,900** |
| **3** | **2 Storey Hotel / Motel No Lift - Scenario A** | 2,500 | 2,500 | - | 3,100 | 72,200 | **$80,300** |
| **3** | **2 Storey Hotel / Motel No Lift - Scenario B** | - | 33,100 | - | 3,100 | 72,200 | **$108,400** |
| **3** | **3 + Storey 200 Room Hotel With Lift - Scenario A** | 2,800 | 6,500 | - | 4,800 | 81,600 | **$95,700** |
| **3** | **3 + Storey 200 Room Hotel With Lift - Scenario B** | - | 135,700 | - | 4,800 | 79,000 | **$219,500** |
| **3** | **3+ Storey 350 Room Hotel With Lifts - Scenario A** | 2,800 | 15,100 | - | 4,800 | 177,200 | **$199,900** |
| **3** | **3+ Storey 350 Room Hotel With Lifts - Scenario B** | - | 232,300 | - | 4,800 | 177,200 | **$414,300** |
| **5** | **2 Storey Office Dwelling Size** | 3,400 | - | - | 4,000 | 35,100 | **$42,500** |
| **5** | **7 Storey Office** | 102,800 | - | 7,600 | 2,200 | 140,300 | **$252,900** |
| **5** | **20 Storey Office  (Avg Floor Plate of 900m2) - Scenario A** | 177,800 | - | 11,400 | 7,200 | 321,800 | **$518,200** |
| **5** | **20 Storey Office  (Avg Floor Plate of 900m2) - Scenario B** | 177,800 | - | 5,800 | 7,200 | 321,800 | **$512,600** |

## Cost Implications Summary (cont’d)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Class** | **Property Type** | **Proposal 1** | **Proposal 2** | **Proposal 3** | **Proposal 4** | **Proposal 5** | **Total Cost Across Property Type** |
|  |  | **$** | **$** | **$** | **$** | **$** |
| **6** | **Large Horizontal Spread  Shopping Centre - Scenario A** | 67,100 | - | 11,700 | 31,800 | 94,900 | **$205,500** |
| **6** | **Large Horizontal Spread  Shopping Centre - Scenario B** | 67,100 | - | 11,200 | 31,800 | 94,900 | **$205,000** |
| **6** | **2 Storey Restaurant** | 1,400 | - | - | 1,600 | 7,500 | **$10,500** |
| **7a** | **7 Storey Car Park** | 10,400 | - | - | 1,600 | 51,500 | **$63,500** |
| **7b** | **2 Storey Storage / Warehouse** | 41,000 | - | - | 24,000 | 8,700 | **$73,700** |
| **8** | **Single Storey Lab / Factory 500m2** | 2,500 | - | - | 1,600 | - | **$4,100** |
| **9a** | **3 Storey Hospital Building** | 18,600 | - | - | 2,500 | 30,500 | **$51,600** |
| **9b** | **500 Seat Theatre** | 18,900 | - | - | 4,600 | 300 | **$23,800** |
| **9b** | **1200 Seat Theatre** | 24,500 | - | - | 3,700 | 300 | **$28,500** |
| **9b** | **2 Storey School Building** | 44,700 | - | - | 13,600 | 58,800 | **$117,100** |
| **9b** | **Single Storey Community Hall** | 8,100 | - | - | 12,000 | 300 | **$20,400** |
| **9b** | **10,000 - 15,000 Seat Stadium** | 128,800 | - | - | 9,500 | 134,400 | **$272,700** |
|  | **Total Proposal Cost** | **$909,400** | **$438,300** | **$47,700** | **$197,200** | **$2,260,400** |  |

# 

# Basis of Report

## Purpose and Status

This report has been prepared to estimate the capital cost implications associated with amendments to the D-t-S provisions of the National Construction Code Series Building Code of Australia (BCA) 2014 emanating from the Emergency Egress for all Occupants Project. Estimates have been based on benchmarked cost information for the advised building classes.

Estimates have been based on the following 5 proposals:

1. Supplement existing audial emergency warning systems with visual warning to all areas required to be accessible.
2. Supplement existing audial emergency warning systems with visual and tactile warning in accessible Class 3 SOU’s.
3. Require the co-location of lifts and exits.
4. Apply the accessway requirements of AS 1428.1 to paths of travel to exits.
5. Improve the accessibility of exits including fire-isolated stairs and ramps.

## Methodology

Our approach to this exercise is to use our industry knowledge and experience to provide an analysis of the cost implications of the 5 proposals using typical examples of the advised building classes as a basis of reporting. Our cost models provide the ABCB with the information to review a summary of the cost implications either by each proposal or by each example of the selected building classes. Our analysis also provides a detailed estimate of the overall costs across all 20 advised property types. We have also provided an analysis of the effects of these proposals on NLA’s where appropriate. The following methodology outlines the works we carried out to complete this analysis:

1. Initial reviews were undertaken of the building classes and typical examples found of each property type in the RLB database. Upon completion these examples were used as a basis to prepare overall construction cost estimates for each of the selected property types. All estimates prepared by RLB contain rates dated at June 2014 based on a Sydney datum which can then be applied to other major locations.
2. A review was undertaken of the current BCA requirements that enabled us to provide a baseline for our reporting.
3. Upon review of the current BCA requirements regarding accessible areas as noted in Table D3.1 of Volume One NCC 2014, RLB identified within each of the selected property types the accessible areas to be included in this report. This allowed RLB to formulate a schedule of the works required for each of the property types. Upon identification of the accessible areas and the formulation of the schedule of works, RLB estimated the quantity of visual alarm devices required to supplement the audible alarm devices provided, and commented on the cost implications associated with the changes included in Proposals 1 and 2.

## Methodology (cont’d)

1. RLB used this information to estimate the quantity of tactile warning systems required to supplement the audible alarm devices and comment was provided on the cost implications associated with the changes included in Proposal 2.
2. In the selected property types RLB identified and assessed the relationship of the lifts with the fire isolated exits, providing comment and estimates (if applicable) for the provisions noted in Proposal 3.
3. Proposal 4 includes improvements to accessibility of fire-isolated stairs and ramps and additional requirements to provide safe paths of travel from exits to a safe place. RLB have identified within the selected property types paths of travel to exits and, where applicable, provided estimates of the works required to be carried out to provide for ramps instead of stairs and upgrades to provide safe paths of travel.
4. Proposal 5 refers to egress requirements and what can be done to improve the accessibility of a building. RLB has, where applicable, provided comment and estimated the cost implications associated with carrying out works to fire-isolated stairways, fire-isolated ramps and fire-isolated passageways to include for all objectives associated with Proposal 5.
5. In addition to providing estimates of the works involved in the above Proposals 1-5, we have also provided commentary, where applicable, on the potential impact on the NLA that these proposals may have on the property types.

## Information Used

1. The following Australian Standards have been used for reference in the compiling of this report:

* AS 1428.1 – 2009
* AS 1428.2 - 1992
* AS 1428.3 - 1992
* AS 1428.4.1 – 2009
* AS 1428.5 - 2010
* AS 1670.1 – 2004
* AS 1670.4 - 2004
* AS 3786 – 1993

1. The costs in this report are based upon rates applied to measured elemental quantities and are current as at June 2014.
2. Overall construction costs of each of the property types have been estimated based on typical examples of the advised building classes.
3. Existing scope of works and required building standards have been taken from National Construction Code Series 2014 Volume 1 – Building Code of Australia Class 2 to Class Buildings and Volume 2 – Building Code of Australia Class 1 and Class 10 Buildings.

## Information Used (cont’d)

1. Costs for the installation of visual alarm devices and pillow shakers have been taken from Orr Partners Report “Design and Cost Implications for the Provision of Occupant Warning for Hearing Disabilities” dated 31 March 2014.

## Assumptions Specific to Property Types

We have employed the following assumptions regarding the advised property types in preparing this report:

### Class 1b – Single Storey Holiday Accommodation

1. The holiday accommodation is based on a holiday park incorporating 1, 2 and 3 bedroom cabins located in groups across the park. 3 bedroom cabins are configured in blocks of 2, 2 bedroom cabins are configured in blocks of 4 and 1 bedroom cabins are configured in blocks of 6, with each cabin having its own point of egress.
2. Shared facilities on site have not been included in this analysis.
3. Each cabin is classified as a SOU.
4. Costs have been included for 1 No. of each type of cabin.

### Class 2 – 3 Storey Accommodation with no Lift Installation

1. The accommodation is based on a residential development with 21 apartments over 3 levels and a basement car park.
2. Access ramps have been installed to the main entrance and to 2 ground floor apartments.
3. Visual alarm devices are installed as part of a smoke detection system.

### Class 2 – 7 Storey Accommodation with Lift Installation

1. The accommodation is based on a residential block with a mix of 1, 2 and 3 bedroom units included.
2. Common areas include corridors to each storey and an entrance lobby to the ground floor. A total of 8 accessible areas have been included in this analysis.
3. It has been assumed that there are 6 escape stairs of concrete construction and therefore the risers are enclosed.
4. Visual alarm devices have been installed as part of a BOWS.

### Class 3 – 2 Storey Hotel / Motel with no Lift Installation

1. The accommodation is based on a hotel with approximately 40 rooms over 2 storeys.
2. Common areas include a bar / dining area, reception area and corridors to each storey.
3. It is assumed that there are 2 escape stairs in addition to the main reception entrance. For the purpose of this analysis we have allowed for the escape stairs in this property to be of an open steel construction. The installation of opaque risers has been included for this property.
4. Visual alarm devices have been installed as part of a BOWS.

### Class 3 – 3 + Storey Hotel with 200 Rooms and Lift Installation

1. The accommodation is based on a hotel with approximately 200 rooms over 8 storeys.
2. Common areas include a bar, dining area, reception area, common amenities and corridors to each storey.
3. It is assumed that there are 2 escape stairs in addition to the main reception entrance.
4. Visual alarm devices have been installed as part of a BOWS.

### Class 3 – 3 + Storey Hotel with 350 Rooms and Lift Installation

1. The accommodation is based on a hotel with approximately 350 rooms over 15 storeys.
2. Accessible areas and 350 SOU’s are analysed in accordance with the requirements of Table D3.1 of Volume One NCC 2014.
3. It is assumed that there are 2 escape stairs in addition to the main reception entrance.
4. Visual alarm devices have been installed as part of a BOWS.

### Class 5 – 2 Storey Office Dwelling Size

1. The office space is based on an open plan office over 2 storeys with a floor plate of approximately 200m2.
2. Accessible areas include to and within all areas normally used by the occupants in accordance with Table D3.1 of Volume One NCC 2014.
3. It is assumed that there is 1 escape stair in addition to the main reception entrance and the stair is approximately 10m from an open area. For the purpose of this analysis we have allowed for the escape stairs in this property to be of an open steel construction. The installation of opaque risers has been included for this property.

### Class 5 – 7 Storey Office

1. The office space is based on open plan offices over 7 storeys with a floor plate of approximately 1,500m2.
2. Accessible areas include to and within all areas normally used by the occupants in accordance with Table D3.1 of Volume One NCC 2014.
3. It is assumed that there is 1 escape stair in addition to the main reception entrance. For the purpose of this analysis we have allowed for the escape stairs in this property to be of an open steel construction. The installation of opaque risers has been included for this property.
4. Visual alarm devices have been installed as part of a BOWS.

### Class 5 – 20 Storey Office (Average Floor Plate 900m2)

1. The office space is based on open plan offices over 20 storeys with a floor plate of approximately 900m2.
2. Accessible areas include to and within all areas normally used by the occupants in accordance with Table D3.1 of Volume One NCC 2014.
3. It is assumed that there are 3 escape stairs in addition to the main reception entrance.
4. Visual alarm devices have been installed as part of a BOWS.

### Class 6 – Large Horizontal Spread Shopping Centre

1. The shopping centre is based on a large scale centre over 2 storeys with an area of approximately 19,000m2 GFA.
2. Accessible areas include to and within all areas normally used by the occupants in accordance with Table D3.1 of Volume One NCC 2014.
3. The car parking area is classified as a common area and allowances have been made for accessible areas as Table D3.5 of Volume One NCC 2014.
4. It is assumed that there are 6 escape stairs in addition to the main entrance foyer.

### Class 6 – 2 Storey Restaurant

1. The restaurant is based on a medium sized restaurant located over 2 storeys with an area of approximately 300m2 GFA.
2. Accessible areas include to and within all areas normally used by the occupants in accordance with Table D3.1 of Volume One NCC 2014.
3. It is assumed that there is 1 escape stair in addition to the main entrance foyer.

### Class 7a – 7 Storey Car Park

1. The car park is based on a large scale car park located over 7 storeys with an area of approximately 13,000m2 GFA and a capacity of approximately 400 car spaces.
2. The car parking area is classified as a common area and allowances have been made for accessible areas as Table D3.5 of Volume One NCC 2014.
3. It is assumed that there is 1 escape stair and of a solid concrete construction.

### Class 7b – 2 Storey Storage / Warehouse Facility

1. The facility is based on a warehouse facility with an area of approximately 14,000m2 GFA including a 2 storey office space of approximately 3,500m2.
2. Points of egress from the warehouse lead to open areas. Step ramps have been installed to these points of egress.
3. It is assumed that there is 1 escape stair leading to the main entrance foyer. For the purpose of this analysis we have allowed for the escape stairs in this property to be of an open steel construction. The installation of opaque risers has been included for this property type.

### Class 8 – Single Storey Laboratory / Factory – 500m2

1. The factory is based on an open plan factory with back of house office facilities and male and female amenities.
2. It is assumed there is 1 point of egress from the property and a step ramp has been installed at the point of egress.

### Class 9a – 3 Storey Hospital Building

1. The hospital is based on a medium sized local hospital building with an area of approximately 5,000m2 GFA with 60 beds over 3 storeys. Common areas include for dining area, function area, activity area, treatment area, staff room, corridors to each storey and male and female amenities.
2. It is assumed that there are 2 escape stairs in addition to the main entrance foyer.

### Class 9b – 500 Seat Theatre

1. The theatre is based on a medium sized theatre with a main performance area, ancillary rehearsal and storage rooms with an area of approximately 1,800m2 GFA. Also included is an office area, entrance foyer and male and female amenities.
2. A total of 10 wheelchair spaces have been included in the main theatre space in accordance with Table D3.9 of Volume One NCC 2014.
3. It is assumed here are 3 points of egress from the property.

### Class 9b – 1200 Seat Theatre

1. The theatre is based on a large theatre with a main performance area, ancillary rehearsal and storage rooms with an area of approximately 3,500m2 GFA. Also included is an office area, entrance foyer and male and female amenities.
2. A total of 20 wheelchair spaces have been included for in the main theatre space in accordance with Table D3.9 of Volume One NCC 2014.
3. It is assumed that there are 4 points of egress from the property.

### Class 9b – 2 Storey School Building

1. The school building is based on a high school consisting of individual 2 storey blocks incorporating teaching and administration areas. We have included for 5 teaching blocks with 12 classrooms per block.
2. It is assumed there are 9 points of egress from the teaching and administration blocks. A path of travel of 25m to open space has been allowed for from each point of egress and step ramps have been installed at each point of egress.
3. For the purpose of this analysis we have allowed for the escape stairs in this property to be of an open steel construction. The installation of opaque risers has been included for this property.

### Class 9b – Single Storey Community Hall

1. The community hall is based on a hall with an open plan area with back of house office facilities, kitchen / café area, entrance reception area and male and female amenities. The community hall can accommodate approximately 1,000 seats.
2. A total of 18 wheelchair spaces have been included for in the community hall in accordance with Table D3.9 of Volume One NCC 2014.
3. There is no fire isolated stairway and it is assumed that step ramps have been installed at each point of egress.

### Class 9b – Stadium Seating Capacity 10,000 – 15,000

1. The stadium is based on a venue with a capacity of approximately 15,000 seats. It incorporates office areas, male and female amenities, kitchen and eating facilities over 4 storeys. On grade car parking is provided.
2. A total of 133 wheelchair spaces have been included in the stadium in accordance with Table D3.9 of Volume One NCC 2014.
3. It is assumed that there are 8 points of egress from the property.
4. We have also provided 4 fire isolated stairways over 4 storeys of stadium and fire isolated ramps at these points of egress. Step ramps have been installed at the remaining points of egress.

## Inclusions

The estimate includes the following allowances:

1. Design and management fees
2. Preliminaries

## Exclusions

In compiling this report on Cost Implications, no allowance has been made for the following cost items:

1. Land and legal costs.
2. Fees and charges levied by local government for Development Plan applications, Development Approval, Construction Certification and the like.
3. Any costs and fees as a result of any development approval resubmissions.
4. Any special or additional contributions sought by authorities for public or other facilities as a condition of development approval.
5. Public utilities’ charges, contributions and levies.
6. Environmental impact study costs.
7. Plan First fee.
8. Transport Infrastructure levies.
9. Long Service Leave levies.
10. Affordable Housing contributions.
11. Removal of asbestos and other hazardous materials.
12. Staging/phasing costs.
13. Work outside site boundaries.
14. Diverting existing services.
15. Sub-station contribution.
16. Contingencies.
17. Escalation.
18. Variances to the working week of 38 hours per week.
19. Finance costs and interest charges.
20. Goods and Services Tax.
21. Promotion/Marketing costs.
22. Locational Adjustments.
23. Life cycle implications on building components and systems.

# Cost Implications of Proposed Changes

Details of the cost implications of the works contained in each of the proposals are shown in Appendix A.

The amendments to the D-t-S Provisions of BCA 2014 can be summarised in the following proposals. Specific assumptions for each of the proposals are detailed below.

## Proposal 1 - supplement existing audial emergency warning systems with visual warning in all areas required to be accessible

RLB have analysed three scenarios identified in this proposal regarding the installation of visual alarm devices in the advised property types. The first option refers to accessible areas according to Table D3.1 of Volume One NCC 2014 and included in Class 5, 6, 7, 8 and 9b buildings. The second option refers to areas required to have a BOWS. The third option refers to those areas required to be accessible and in Class 9a buildings. We have also considered and included in this proposal, areas that are required to be accessible i.e. common areas to building Classes 2 and 3 where applicable.

The following assumptions have been included for Proposal 1:

1. Visual alarm devices can be installed as part of the building smoke detection system.
2. Approximate coverage of a visual alarm device is 28m2 to areas where small coverage is required e.g. small rooms, and 90m2 to larger open areas e.g. warehouse.
3. Allowance has been made for additional circuitry for each VAD from all accessible areas to the existing addressable system. An allowance of 10m per VAD has been allowed.
4. Allowance has been made for the installation of each VAD as part of a BOWS in properties included in Class 3, 5, 7a and 9b buildings.

## Proposal 2 - supplement existing audial emergency warning systems with visual and tactile warning in accessible Class 1b and 3 property types

RLB have analysed three areas identified in this proposal regarding the installation of visual and tactile alarm devices in the advised property types. This proposal requires the installation of VADs to habitable rooms of SOUs that are required to be accessible and tactile warning to bedrooms. Scenario A tests the implications of applying this requirement to accessible SOUs only and Scenario B tests to all SOUs in the representative property types. The cost implications of VADs in common areas are also assessed for areas required to be accessible outside of SOUs in accordance with Table D3.1 of NCC Volume One.

## Proposal 2 - supplement existing audial emergency warning systems with visual and tactile warning in accessible Class 1b, 2 and 3 property types (cont’d)

The following assumptions have been included for Proposal 2:

1. Visual alarm devices are installed in each bedroom and common area as required.
2. Approximate coverage of a visual alarm device is 28m2 to areas where small coverage is required e.g. small rooms, and 90m2 to larger open areas e.g. warehouse.
3. Pillow shakers are installed in each bedroom.
4. An external power supply system has been allowed for in the Class 1b building.
5. Visual alarm devices can be installed as part of the building smoke detection system in Class 3 buildings.

## Proposal 3 - require the co-location of lifts and exits

RLB have analysed two scenarios regarding the co-location of lifts and exits. Scenario A proposes that at all locations where a lift or banks of lifts provide access to a storey they must be located within 6m of an exit. Scenario B proposes that at least one lift or bank of lifts is within 6m of an exit.

We have considered the effect this would have on the design and construction of the advised property types. It is thought that the major effect this would have would be to buildings with a large floor plate where additional fire isolated stairs may have to be considered, and to a high rise construction where additional banks of lifts are required to carry occupants to the upper storeys.

We have considered 2 types of property that may be affected by these Scenarios; a Class 5 - 20 Storey office block and a Class 6 - Large Horizontal Spread Shopping Centre.

Although good design practice would provide for the proposals in both scenarios we have assumed there is a requirement in each of the above noted property types for additional works are to be carried out.

The following assumptions have been included for Scenario A:

1. In the 20 storey office block estimate we have assumed that a fire isolated stair has been provided that is not within 6m of a bank of lifts servicing the first 10 storeys of the building. In this scenario an allowance for the redesign of the lift layout has been considered.

## Proposal 3 - require the co-location of lifts and exits (cont’d)

1. With the large scale shopping centre estimate we have assumed that a lift or bank of lifts has not been located within 6m of an exit. In this instance we have allowed for the design and construction of an additional fire isolated stair to the centre.

The following assumptions have been included for Scenario B:

1. Design costs have been allowed for any additional costs associated with the relocation of a lift to within 6m of a fire isolated stair. It is assumed that there are no additional building costs in the relocation of a previously designed lift core.
2. Design fees have been included at $200 per hour and an allowance of a period of 16 hours has been included for any additional design works. Additional structural engineer fees have been included at $180 per hour and an allowance of a period of 8 hours has been included.
3. In the 20 storey office block estimate, 1 lift has been assumed to require to be relocated to meet the proposal.
4. In the large scale shopping centre estimate, 4 lifts have been assumed to require to be relocated to meet the proposal.

## Proposal 4 - apply the accessway requirements of AS 1428.1 to paths of travel to exits

RLB have analysed two areas identified in this proposal regarding the accessway requirements as detailed in Australian Standard AS 1428.1. The first proposal incorporates requirements for a step in the path of travel and the installation of step ramps in place of steps and ramps in place of stairways as a means of overcoming differences in levels. The second proposal incorporates requirements for the path of travel after discharging from an exit to a road or an open space and the installation of an accessway from the point of discharge to a safe place.

The following assumptions have been included for Proposal 4:

1. Where applicable, we have included for the installation of threshold and step ramps at each point of egress and at differences in level in Class 2, 3, 5, 6, 7a, 7b, 8, 9a and 9b buildings.
2. Where there has been a ramp or threshold installation included in a 3 storey accommodation with no lift property type, it is assumed these installations are deemed to satisfy the provisions.
3. It has been assumed that each of the property types have points of egress that discharge onto an open space, therefore there is no requirement for any further installation to facilitate a safe path. It was found that in all of our examples the path of travel to an open space is suitable. In our analysis we found that there are significant costs associated with the installation of a safe path of travel where there are impediments in place, therefore we recommend that where there are impediments the points of egress should be revised through alternative design.

## Proposal 5 - improve the accessibility of exits

RLB have analysed egress requirements to fire-isolated stairways, fire-isolated ramps and fire-isolated passageways. In each instance consideration is given to the additional requirements for treads and landings, handrails and tactile ground surface indicators as required in AS 1428.1. Analysis has also been carried out on the effects of a minimum setback of 900mm from the property boundary, luminance contrast of surfaces and door controls (including opening forces).

The following assumptions have been included for Proposal 5:

1. An allowance has been made for additional hand railing to fire isolated stairways. Current BCA requirements include for hand railing to 1 side of a stairway only. We have included the cost of an additional handrail to each flight of stairs in this analysis. We have included a rate of $200 per metre for the cost of this handrail. This includes the material costs of the component at $110 per metre and $90 per metre for additional labour.
2. It has been assumed that currently designed handrails do not include for the handrail to either turn through 180o nor return fully to end post of wall face as detailed in AS1428.1 Clause 11.2. We have included in this analysis for the installation of 180o returns to the end post of the wall to each handrail. We have allowed $200 per return for this component. We have allowed approximately $200 for the steel component and additional fixings including additional welding and preparation.
3. An allowance for a wheelchair turn has been allowed for at intervals of 20m as detailed in AS 1428.1 Clause 6.5.3 where applicable. It has been assumed that larger scale property types will include corridors that incorporate a wheelchair turn.
4. An allowance for a passing space for 2 persons has been allowed for in each fire isolated passageway as detailed in AS 1428.1 Clause 6.4. It has been assumed that larger scale property types will include corridors that are wide enough to allow for the passing of 2 persons.
5. Additional handrails are to be provided to both sides of stair to all building classes as required.
6. The installation of TGSI’s has been allowed for in all fire isolated stairs where applicable. Installation has been included for TGSI’s as shown in Figure 26 (B) of AS1428.1.
7. Painting of the surfaces will be sufficient in reaching the required luminance contrast between doors and surrounding surfaces.

## Analysis of Effects on the NLA of Property Types

With the implementation of these proposals, consideration should be given to the effect of the NLA of the included property types. As part of our analysis we have reviewed the effect on the NLA where an increase in the area required for building components is required when the provisions are included. We have calculated the following effects of these proposals on the property types, where applicable:

1. Where there is a setback allowed for at each fire isolated stair the reduction in NLA is approximately 2m2.
2. Where there is a setback allowed for at each fire isolated ramp the reduction in NLA is approximately 3m2.
3. An allowance for the passing space of 2 persons in a fire isolated passageway reduces the NLA of the effected floor by approximately 2m2.

Although, where these proposals are incorporated, there is an increase in the area required within a property; the impact of these proposals is limited because the changes can be easily accommodated in the original design of the building. The overall cost of incorporating these additional areas would be minimal based on the additional materials required and the effect on the construction programme. The costs are not significant in the effected cases.

# Glossary of Terms

ABCB Australian Building Codes Board

BCA Building Code of Australia 2014

BOWS Building Occupant Warning System

D-t-S Deemed to Satisfy

GFA Gross Floor Area

NCC National Construction Code

NLA Net Lettable Area

RLB Rider Levett Bucknall

SOU Sole Occupancy Unit

TGSI Tactile Ground Surface Indicator

MATV Master Antennae Television System

VAD Visual Alarm Device

**Appendix A**

**Analysis of Cost Implications**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | |  | **Single Storey Holiday Accommodation - 1 Bedroom Cabin** | **Single Storey Holiday Accommodation - 2 Bedroom Cabin** | **Single Storey Holiday Accommodation - 3 Bedroom Cabin** | **3 Storey Accommodation No Lift** | **7 Storey Accommodation With Lift** | **2 Storey Hotel / Motel No Lift** | **2 Storey Hotel / Motel No Lift** | **3 + Storey 200 Room Hotel With Lift** | **3 + Storey 200 Room Hotel With Lift** | **3+ Storey 350 Room Hotel With Lifts** | **3+ Storey 350 Room Hotel With Lifts** | **2 Storey Office Dwelling Size** | **7 Storey Office** | **20 Storey Office  (Avg Floor Plate of 900m2)** | **20 Storey Office  (Avg Floor Plate of 900m2)** | **Large Horizontal Spread  Shopping Centre** | **Large Horizontal Spread  Shopping Centre** | **2 Storey Restaurant** | **7 Storey Car Park** | **2 Storey Storage / Warehouse** | **Single Storey Lab / Factory 500m2** | **3 Storey Hospital Building** | **500 Seat Theatre** | **1200 Seat Theatre** | **2 Storey School Building** | **Single Storey Community Hall** | **10,000 - 15,000 Seat Stadium** | **Total Cost** | **Overall Proposal Cost** |
| **Proposal** | | **Class** | **1b** | **1b** | **1b** | **2** | **2** | **3** | **3** | **3** | **3** | **3** | **3** | **5** | **5** | **5** | **5** | **6** | **6** | **6** | **7a** | **7b** | **8** | **9a** | **9b** | **9b** | **9b** | **9b** | **9b** |  |  |
| **Scenario** |  |  |  |  |  | **A** | **B** | **A** | **B** | **A** | **B** |  |  | **A** | **B** | **A** | **B** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Unit** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** | **$** |  |  |
| **1** | Supplement Existing Audible Emergency Warning Systems with Visual Warning in all Areas Required to be Accessible |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | - installation of visual alarm devices to accessible areas as noted in table D3.1 of the BCA |  | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 2,900 | 101,000 | 174,800 | 174,800 | 65,900 | 65,900 | 1,300 | 4,700 | 40,300 | 2,400 | 18,200 | 8,500 | 11,100 | 22,100 | 3,600 | 58,200 | **$755,700** |  |
|  | - installation of visual alarm devices to areas required to have building occupant warning as noted in table D3.1 of the BCA - common areas |  | N/A | N/A | N/A | 2,000 | 3,300 | 2,100 | N/A | 2,400 | N/A | 2,400 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 5,600 | N/A | N/A | N/A | 10,200 | 13,200 | 22,200 | 4,400 | 69,600 | **$137,400** |  |
|  | - upgrade all associated circuitry and wiring system as required to enable installation of visual alarm devices |  | N/A | N/A | N/A | 400 | 700 | 400 | N/A | 400 | N/A | 400 | N/A | 500 | 1,800 | 3,000 | 3,000 | 1,200 | 1,200 | 100 | 100 | 700 | 100 | 400 | 200 | 200 | 400 | 100 | 1,000 | **$16,300** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Proposal 1 Sub-total** |  | **-** | **-** | **-** | **2,400** | **4,000** | **2,500** | **-** | **2,800** | **-** | **2,800** | **-** | **3,400** | **102,800** | **177,800** | **177,800** | **67,100** | **67,100** | **1,400** | **10,400** | **41,000** | **2,500** | **18,600** | **18,900** | **24,500** | **44,700** | **8,100** | **128,800** |  | **909,400** |
| **2** | Supplement Existing Audible Emergency Warning Systems with Visual and Tactile Warning Devices |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | To Class 1b Buildings |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | - install visual alarm devices and pillow shaker to dwellings as required to 1 bedroom cabin |  | 1,300 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$1,300** |  |
|  | - install circuitry for installed visual alarm device to 1 bedroom cabin |  | 100 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$100** |  |
|  | - install visual alarm devices and pillow shaker to dwellings as required to 2 bedroom cabin |  | N/A | 3,000 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$3,000** |  |
|  | - install circuitry for installed visual alarm device to 2 bedroom cabin |  | N/A | 100 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$ 100** |  |
|  | - install visual alarm devices and pillow shaker to dwellings as required to 3 bedroom cabin |  | N/A | N/A | 5,300 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$ 5,300** |  |
|  | - install circuitry for installed visual alarm device to 3 bedroom cabin |  | N/A | N/A | 100 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$100** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Scenario A - to accessible areas as BCA D3.1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | - install visual alarm devices to accessible SOU as required |  | N/A | N/A | N/A | N/A | N/A | 500 | N/A | 1,100 | N/A | 4,400 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$6,000** |  |
|  | - install pillow shakers to each accessible SOU as required |  | N/A | N/A | N/A | N/A | N/A | 500 | N/A | 1,300 | N/A | 5,200 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$7,000** |  |
|  | - install additional alarm bus circuitry for installed visual alarm devices and pillow shakers |  | N/A | N/A | N/A | N/A | N/A | 200 | N/A | 500 | N/A | 1,900 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$2,600** |  |
|  | - install strobe light to accessible common areas |  | N/A | N/A | N/A | N/A | 2,800 | 1,100 | N/A | 3,200 | N/A | 3,200 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$10,300** |  |
|  | - install circuitry for installed strobe lights |  | N/A | N/A | N/A | N/A | 400 | 200 | N/A | 400 | N/A | 400 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$1,400** | **37,200** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Scenario B - to all SOU's |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | - install visual alarm devices to each room as required |  | N/A | N/A | N/A | N/A | N/A | N/A | 18,200 | N/A | 65,400 | N/A | 112,200 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$195,800** |  |
|  | - install pillow shakers to each room as required |  | N/A | N/A | N/A | N/A | N/A | N/A | 9,800 | N/A | 48,800 | N/A | 85,400 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$144,000** |  |
|  | - install additional alarm bus circuitry for installed visual alarm devices and pillow shakers |  | N/A | N/A | N/A | N/A | N/A | N/A | 4,300 | N/A | 17,900 | N/A | 31,100 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$53,300** |  |
|  | - install strobe light to common areas |  | N/A | N/A | N/A | N/A | N/A | N/A | 700 | N/A | 3,200 | N/A | 3,200 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$7,100** |  |
|  | - install circuitry for installed strobe lights |  | N/A | N/A | N/A | N/A | N/A | N/A | 100 | N/A | 400 | N/A | 400 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$900** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Proposal 2 Sub-total** |  | **1,400** | **3,100** | **5,400** | **-** | **3,200** | **2,500** | **33,100** | **6,500** | **135,700** | **15,100** | **232,300** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |  | **411,000** |
| **3** | Require the co-location of Lifts and Exits |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Scenario A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | - at all locations where a lift or bank of lifts provide   access to a storey the lift or bank of lifts must be  located within 6m of an exit |  | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 7,600 | 11,400 | N/A | 11,700 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$30,700** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Scenario B |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | - at least one lift or bank of lifts providing access to a   storey must be located within 6m of an exit. |  | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 5,800 | N/A | 11,200 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$17,000** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Proposal 3 Sub-total** |  | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |  | **-** | **-** | **-** | **7,600** | **11,400** | **5,800** | **11,700** | **11,200** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |  | **47,700** |
| **4** | Apply the access way Requirements of AS.1428.1 to Paths of Travel to Exits |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | - installation of threshold ramps to all points of egress |  | N/A | N/A | N/A | N/A | 3,200 | 1,300 | 1,300 | 1,300 | 1,300 | 1,300 | 1,300 | 1,300 | 1,300 | 1,900 | 1,900 | 3,800 | 3,800 | 700 | 700 | 10,000 | 700 | 2,500 | 1,900 | 1,900 | 5,700 | 5,000 | 2,500 | **$56,600** |  |
|  | - installation of step ramps to all points of differences in   level where steps would otherwise have been used |  | N/A | N/A | N/A | N/A | 9,700 | 1,800 | 1,800 | 3,500 | 3,500 | 3,500 | 3,500 | 2,700 | 900 | 5,300 | 5,300 | 28,000 | 28,000 | 900 | 900 | 14,000 | 900 | N/A | 2,700 | 1,800 | 7,900 | 7,000 | 7,000 | **$ 140,600** |  |
|  | - path of travel from the point of discharge from an exit   along a designated route to a safe place |  | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$ -** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Proposal 4 Sub-total** |  | **-** | **-** | **-** | **-** | **12,900** | **3,100** | **3,100** | **4,800** | **4,800** | **4,800** | **4,800** | **4,000** | **2,200** | **7,200** | **7,200** | **31,800** | **31,800** | **1,600** | **1,600** | **24,000** | **1,600** | **2,500** | **4,600** | **3,700** | **13,600** | **12,000** | **9,500** |  | **197,200** |
| **5** | Improve the Accessibility of Exits including Fire Isolated Stairs and Ramps |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Fire Isolated Stairs |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | *treads and landings* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | - installation of maximum set back of 900mm at property   boundaries and internal corridors - allow for redesign  of location of egress point and increase in wall length |  | N/A | N/A | N/A | N/A | 65,100 | 8,100 | 8,100 | 23,100 | 23,100 | 47,100 | 47,100 | 3,600 | 12,600 | 97,200 | 97,200 | 11,100 | 11,100 | 3,600 | 12,600 | 3,600 | N/A | 5,100 | N/A | N/A | 15,600 | N/A | 26,100 | **$521,100** |  |
|  | - installation of opaque risers to stairways |  | N/A | N/A | N/A | N/A | N/A | 22,500 | 22,500 | N/A | N/A | N/A | N/A | 16,900 | 78,800 | N/A | N/A | N/A | N/A | N/A | N/A | 1,200 | N/A | N/A | N/A | N/A | 10,200 | N/A | N/A | **$152,100** |  |
|  | *handrails - accessible handrails on both sides of stair in   accordance with AS 1428.1* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | - at bottom of stair extend the handrail one tread width   plus 300mm from the bottom riser including the instllation of a second handrail to each flight |  | N/A | N/A | N/A | N/A | 90,000 | 10,500 | 10,500 | 21,000 | 18,400 | 73,200 | 73,200 | 2,500 | 10,500 | 78,800 | 78,800 | 12,000 | 12,000 | 1,300 | 10,500 | 1,300 | N/A | 4,000 | N/A | N/A | 13,500 | N/A | 10,500 | **$ 532,500** |  |
|  | - increase in length of handrail to 300mm beyond the   last tread of the stair |  | N/A | N/A | N/A | N/A | 30,000 | 2,000 | 2,000 | 7,000 | 7,000 | 15,000 | 15,000 | 1,000 | 3,500 | 42,000 | 42,000 | 3,000 | 3,000 | 500 | 3,500 | 500 | N/A | 1,000 | N/A | N/A | 4,500 | N/A | 8,000 | **$190,500** |  |
|  | *tactile ground surface indicators - TGSI's to be installed at the top and bottom of stairways used as exits* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | - TGSI to be installed over 600 - 800mm starting 300mm   from top and bottom of stairways. |  | N/A | N/A | N/A | N/A | 5,000 | 3,300 | 3,300 | 5,800 | 5,800 | 12,400 | 12,400 | 900 | 5,800 | 34,700 | 34,700 | 5,000 | 5,000 | 900 | 5,800 | 900 | N/A | 1,700 | N/A | N/A | 7,500 | N/A | 9,900 | **$ 160,800** |  |
|  | - TGSI to be installed over 600 - 800mm starting 300mm   from top of stairways at landings greater than 3000mm |  | N/A | N/A | N/A | N/A | 24,800 | 1,700 | 1,700 | 3,300 | 3,300 | 5,800 | 5,800 | 900 | 5,800 | 34,700 | 34,700 | 5,000 | 5,000 | 900 | 5,800 | 900 | N/A | 1,700 | N/A | N/A | 7,500 | N/A | 9,900 | **$159,200** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Fire Isolated Ramps |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | - installation of maximum set back of 900mm at property   boundaries and internal corridors |  | N/A | N/A | N/A | N/A | 12,800 | 7,500 | 7,500 | 4,800 | 4,800 | 4,800 | 4,800 | N/A | 4,800 | 4,800 | 4,800 | 15,500 | 15,500 | N/A | 4,800 | N/A | N/A | 7,500 | N/A | N/A | N/A | N/A | 12,800 | **$117,500** |  |
|  | - handrails - accessible handrails on both sides of ramp   in accordance with AS 1428.1 |  | N/A | N/A | N/A | N/A | 10,000 | 5,000 | 5,000 | 2,500 | 2,500 | 2,500 | 2,500 | N/A | 5,000 | 5,000 | 5,000 | 25,000 | 25,000 | N/A | 5,000 | N/A | N/A | 5,000 | N/A | N/A | N/A | N/A | 50,000 | **$155,000** |  |
|  | - tactile ground surface indicators - TGSI's to be installed   at the top and bottom of ramps used as exits |  | N/A | N/A | N/A | N/A | 3,300 | 1,700 | 1,700 | 900 | 900 | 900 | 900 | N/A | 900 | 900 | 900 | 4,200 | 4,200 | N/A | 700 | N/A | N/A | 1,700 | N/A | N/A | N/A | N/A | 600 | **$24,400** |  |
|  | - kerb rails |  | N/A | N/A | N/A | N/A | 5,000 | 2,500 | 2,500 | 1,300 | 1,300 | 1,300 | 1,300 | N/A | 2,500 | 2,500 | 2,500 | 12,500 | 12,500 | N/A | 2,500 | N/A | N/A | 2,500 | N/A | N/A | N/A | N/A | 6,300 | **$59,000** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Fire Isolated Passageway |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | - allow for turning space in a corridor where the turn is  75 degree in a path of travel less than 1500mm wide |  | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1,900 | 1,900 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$3,800** |  |
|  | - allow for turning space in a corridor where the turn is  90 degree in a path of travel less than 1500mm wide |  | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1,900 | 1,900 | 1,900 | 1,900 | 3,800 | 3,800 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$15,200** |  |
|  | - allow for a turning space in a corridor where the turn is  >90 degree to 180 degree in a path of travel less than  1500mm wide |  | N/A | N/A | N/A | N/A | 50,000 | 6,300 | 6,300 | 6,300 | 6,300 | 6,300 | 6,300 | 6,300 | 6,300 | 6,300 | 6,300 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **$113,000** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Exit Door from a Fire Isolated Stair, Fire isolated Ramp or Fire Isolated Passageway to open space |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | - doorways to have a minimum luminance contrast of  30% with a minimum width of luminance contrast to be 50mm. |  | N/A | N/A | N/A | 1,600 | 1,600 | 800 | 800 | 2,800 | 2,800 | 6,000 | 6,000 | 800 | 1,400 | 8,400 | 8,400 | 1,200 | 1,200 | 200 | 200 | 200 | N/A | 200 | 200 | 200 | N/A | 200 | 200 | **$45,400** |  |
|  | - doorways to have a minimum clear opening of 850mm |  | N/A | N/A | N/A | 500 | 200 | 300 | 300 | 900 | 900 | N/A | N/A | 300 | 500 | 2,700 | 2,700 | 400 | 400 | 100 | 100 | 100 | N/A | 100 | 100 | 100 | N/A | 100 | 100 | **$10,900** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Proposal 5 Sub-total** |  | **-** | **-** | **-** | **2,100** | **297,800** | **72,200** | **72,200** | **81,600** | **79,000** | **177,200** | **177,200** | **35,100** | **140,300** | **321,800** | **321,800** | **94,900** | **94,900** | **7,500** | **51,500** | **8,700** | **-** | **30,500** | **300** | **300** | **58,800** | **300** | **134,400** |  | **$ 2,260,400** |
|  | **Property Type Total** |  | **1,400** | **3,100** | **5,400** | **4,500** | **317,900** | **80,300** | **108,400** | **95,700** | **219,500** | **199,900** | **414,300** | **42,500** | **252,900** | **518,200** | **512,600** | **205,500** | **205,000** | **10,500** | **63,500** | **73,700** | **4,100** | **51,600** | **23,800** | **28,500** | **117,100** | **20,400** | **272,700** |  |  |
|  | **Estimated Building Cost** |  | **56,000** | **76,000** | **110,000** | **3,960,000** | **34,800,000** | **2,600,000** | **2,600,000** | **61,338,600** | **61,338,600** | **74,400,000** | **74,400,000** | **720,000** | **32,940,000** | **66,500,000** | **66,500,000** | **57,000,000** | **57,000,000** | **900,000** | **12,060,000** | **14,000,000** | **4,000,000** | **29,680,000** | **10,080,000** | **19,600,000** | **26,100,000** | **8,100,000** | **132,300,000** |  |  |
|  | **Proportional % increase of Overall Construction Cost** |  | **2.50%** | **4.08%** | **4.91%** | **0.11%** | **0.91%** | **3.09%** | **4.17%** | **0.16%** | **0.36%** | **0.27%** | **0.56%** | **5.90%** | **0.77%** | **0.78%** | **0.77%** | **0.36%** | **0.36%** | **1.17%** | **0.53%** | **0.53%** | **0.10%** | **0.17%** | **0.24%** | **0.15%** | **0.45%** | **0.25%** | **0.21%** |  |  |