

HI NOON SKI CLUB LTD, THREDBO NSW

BCA AND ACCESS PERFORMANCE SOLUTION REPORT

DEVELOPED UNDER THE PERFORMANCE REQUIREMENTS
OF THE BCA AND ACCESS CODE

- ACCESS TO BUILDINGS
- CEILING HEIGHTS

DATE ► 6 JANUARY 2025

REPORT NO ► 3430 REV B **FINAL**

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REVISION STATUS

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EXECUTIVE SUMMARY AND REQUIREMENTS OF PERFORMANCE SOLUTIONS

J² Consulting Engineers has been commissioned to carry out a BCA and Access Performance Solution analysis and assessment of the proposed internal alterations to existing Hi Noon Ski Club Ltd located in Thredbo NSW.

It has been determined that the following Performance Solutions are required to be addressed as the proposed building deviates from the prescriptive requirements of the BCA. The following Performance Solutions sought are as follows:

- To forgo the requirement to provide a compliant continuous accessible path of travel (CAPT) between the allotment boundary and the lower ground floor of the building in accordance with AS1428.1-2009 due to limitations with the existing building structure.
- To permit a reduced head height in a sanitary compartment due to limitations associated with a stair over.

This report provides a BCA and Access Performance Solution report to permit the following deviations for the Building Code of Australia's prescriptive requirements of the subject building.

#	Performance Solutions	BCA DTS Provision	BCA Performance Requirement	Assessment Methodology
1.	To forgo the requirement to provide a compliant continuous accessible path of travel (CAPT) between the allotment boundary and the lower ground floor of the building in accordance with AS1428.1-2009 due to limitations with the existing building structure.	D4D3, D4D4 Inter alia AS1428.1-2009	D1P1	Qualitative assessment demonstrating compliance with the performance requirements under A2G2 via a performance-based analysis under A2G2(2)(b)(ii) and (d).
Assessment Methodology In order to address the provisions of the BCA, a qualitative and comparative performance-based solution formulated in accordance with A2G2(2)(b)(ii) and (d) has been adopted to demonstrate compliance of the Performance Solution with the relevant Performance Requirements. Acceptance Criteria It must be demonstrated through the proposed trial design that access is provided to the degree necessary via a continuous accessible path of travel incorporating a non-compliant turning space due to part of the balustrade being located within this space . The assessment must show that the proposed arrangement satisfies the relevant Performance Requirement D1P1 through a qualitative comparative assessment. Trial Design The trial design considers and compares the proposed scenario to required widths at accessible doorways under AS1428.1 in addition to determining if access is provided to the degree necessary.				
2.	To permit a reduced head height in a sanitary compartment due to limitations associated with a stair over.	F5D2	F5P1	Qualitative assessment demonstrating compliance with the performance requirements under A2G2 via a performance-based analysis under A2G2(2)(b)(ii) and (d).
Assessment Methodology In order to address the provisions of the BCA, a qualitative and comparative performance-based solution formulated in accordance with A2G2(2)(b)(ii) and (d) has been adopted to demonstrate compliance of the Performance Solution with the relevant Performance Requirements. Acceptance Criteria				

#	Performance Solutions	BCA DTS Provision	BCA Performance Requirement	Assessment Methodology
	It must be demonstrated via the proposed trial design that the reduced ceiling height above the toilet does not unduly interfere with the rooms intended function in addition to categorically satisfying each element of the relevant Performance Requirement F5P1 through a qualitative assessment. Trial Design The trial design considers the activity support level and typical occupant use of the specific spaces where the reduced ceiling height occurs.			

Requirements of Performance Solutions

In considering the relevant provisions of the BCA, the Performance Solutions, subject to the provisions of the following requirements, are considered to meet and comply with the Performance Requirements D1P1 and F5P1:

Requirements of Performance Solution 1 – Access to buildings

Nil requirements

Requirements of Performance Solution 2– Ceiling heights:

1. Signage similar to the below which notes “CAUTION – REDUCED CEILING HEIGHT – WATCH YOUR HEAD” shall be installed to the wall adjacent to the affected ceiling of the subject room. The sign should be colour contrasting to the background and be positioned in a readily apparent position (i.e. wall adjacent to the affected ceiling).
2. Cautionary tiger tape is to be provided at the wall-ceiling junction where the height is less than 2.1m.

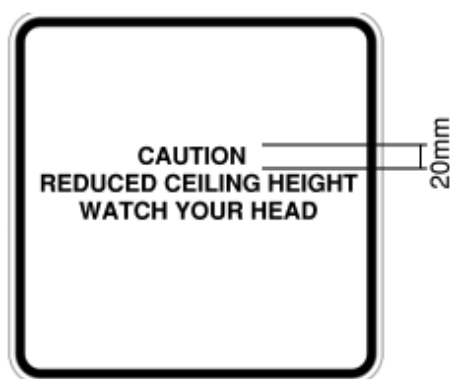


Figure A - Proposed signage

Maintenance:

1. The above Performance Solution requirements must form part of an on-going management plan to ensure they are maintained for the life of the building.

The Performance Solutions have been developed using a qualitative assessment and are considered to comply with BCA Performance Requirements D1P1 and F5P1. The BCA Recognises these Assessment Methods as an acceptable method for determining that the Performance Solution satisfies the Performance Requirements in accordance with BCA Clause A2G2(1)(a), A2G2(2)(b)(ii) and (d).



1.0 INTRODUCTION

J² Consulting Engineers has been commissioned to carry out a BCA and Access Performance Solution analysis and assessment of the proposed internal alterations to the existing Hi Noon Ski Club Ltd located in Thredbo NSW.

It has been determined that the following Performance Solutions are required to be addressed as the proposed building deviates from the prescriptive requirements of the BCA. The following Performance Solutions sought are as follows:

- To forgo the requirement to provide a compliant continuous accessible path of travel (CAPT) between the allotment boundary and the lower ground floor of the building in accordance with AS1428.1-2009 due to limitations with the existing building structure.
- To permit a reduced head height in a sanitary compartment due to limitations associated with a stair over.

1.1 Basis of Report

This report is based on:

1. The Disability (Access to Premises – Building) Standards 2010.
2. The Building Code of Australia 2022 (BCA), published by the Australian Building Codes Board.
3. Relevant provisions of The Guide to the BCA 2022 (electronic), published by the Australian Building Codes Board.
4. Australian Standard AS1428.1 – 2009 Australian Standard for Design for access and mobility – Part 1: General requirements for access – New building work.
5. Architectural drawings prepared by TZ Design, as detailed below:

Drawing Number	Drawing Title	Revision/ Date
353-01	Site Plan	J / 12 Sep 2024
353-02	Lower Level Floor Plan – Existing	J / 12 Sep 2024
353-03	Lower Level Floor Plan – Proposed	J / 12 Sep 2024
353-04	Plan Detail – Bike Storage area	J / 12 Sep 2024
353-05	Elevations 1 & 2 – Existing	J / 12 Sep 2024
353-06	Elevations 1 & 2 – Proposed	J / 12 Sep 2024

No other aspects or parts of the building will be assessed as part of this report. The remainder of the project is assumed to comply with the relevant Deemed-to-Satisfy provisions or the Performance Requirements of the BCA.

This report is based upon, and limited to, the information depicted in the documentation provided for assessment and does not make any assumptions regarding 'design intention' or the like.

1.2 Purpose of the Report

In issuing a Construction Certificate and/or Occupation Certificate, consideration by the Certifier under the Environmental Planning and Assessment Act is that the development complies with the relevant provisions of the BCA. Compliance with the performance provisions of the BCA is a statutory obligation of building developments. The Performance Requirements of the BCA can be satisfied by:

- (i) Demonstrating compliance with the Deemed-to-Satisfy provisions of the BCA;
- (ii) Formulating a Performance Solution.

Therefore, if a development does not/cannot satisfy the deemed-to-satisfy provisions in any regard, a performance solution must therefore be developed to address the issue. This report acknowledges the non-compliances with the Deemed-to-Satisfy provisions of the BCA but demonstrates compliance with the performance provisions of the BCA by way of a Performance Solution in accordance with the requirements of the BCA.



To this extent, this report has been prepared to identify and analyse the proposed Performance solution and demonstrate the suitability of this design to ensure it satisfies the Performance Requirements of the BCA / Access Code.

This report is prepared to for the purposes of submitting to the Certifier for acceptance prior to issuing Construction Certificate as relevant to the development.

1.3 Limitations of the Report

The report is limited to the development of a Performance Solution to address the specific compliance departures identified by this report and should not be considered to address the following:

- Compliance with the Building Code of Australia 2022 or Access Code, other than the specific matters identified under Section 1.0 of this report.
- Disability Discrimination Act 1992 (DDA focuses on results and does not offer prescriptive compliance options).
- Compliance with local planning policies and/or guidelines, unless otherwise noted.
- Work Health and Safety considerations.
- Does not provide concessions for any Performance Solutions or exemptions from the requirements of the BCA, other than that identified in the Executive Summary of this report.

This report and assessment have been undertaken on the information made available by the client / design team. No liability is accepted on the accuracy of the information provided.

1.4 Assumptions of the Report

This report does not provide concessions for any Performance Solutions or exemptions from the requirements of the BCA, other than the specific compliance departure(s) identified at Part 1.0 of this report.

1.5 Relevant Stakeholders

Role	Representative	Organisation
Certifying Authority	TBC	TBC
Client	Paul Kupacz	Hi Noon Ski Club Ltd
Architect	Ziggi Krpan	TZ Design
Access Consultant	Karen Watson	J ² Consulting Engineers
BCA Consultant	Abby Mortimer/James Alexander	J ² Consulting Engineers

1.6 Occupant Characteristics

Characteristics	Assessment
Type	Building occupants (throughout the building) may range in mobility, age, gender etc. and are considered to be a reflection of the general population.
Occupant mobility	The majority of occupants are considered to be mobile and ambulatory consistent with the Australian population. Any person with a disability within the building is expected to be capable of acting independently or be accompanied by a carer/guardian/parent.
Familiarity	Building occupants are typically expected to be awake or asleep within the areas of the building that this Performance Solution relates to and likely to be familiar with the building given it is club ski lodge for use by members and guests.

1.7 General Objectives

The general objectives of this Performance Solution will be to:

1. Provide, as far as is reasonable, people with safe, equitable and dignified access to a building and the services and facilities within the buildings located on the site.

To this extent, this report has been prepared to identify and analyse the proposed Performance Solution(s) and



demonstrate the suitability of this design to ensure it satisfies the relevant Performance Requirements of the BCA.

1.8 Assessment Data - Building Code of Australia 2022

Item	Assessment
BCA Building Classification(s):	Class 3 (Ski Club Ground floor and Level One)



2.0 PERFORMANCE SOLUTION 1 – ACCESS TO BUILDINGS

A Performance Solution has been developed to forgo the requirement to provide a compliant continuous accessible path of travel (CAPT) between the allotment boundary and the lower ground floor of the building in accordance with AS1428.1-2009 due to limitations with the existing building structure.

2.1 Details of Deemed-to-Satisfy Deviation

Pursuant to A2G2 of the BCA, the following Deemed-to-Satisfy provisions have been identified as being subject to the Performance Solution:

D4D3 Access to buildings

- (1) *An accessway must be provided to a building required to be accessible –*
- (a) *From the main points of a pedestrian entry at the allotment boundary; and*
 - (b) *From another accessible building connected by a pedestrian link; and*
 - (c) *From any required accessible carparking space on the allotment.*

...

D4D4 Parts of buildings to be accessible

In a building required to be accessible –

- (a) *every ramp and stairway, except for ramps and stairways in areas exempted by D4D5, must comply with –*
 - (i) *for a ramp, except for a fire-isolated ramp, clause 10 of AS1428.1; and*
 - (ii) *for a stairway, except for a fire-isolated stairway, clause 11 of AS 1428.1; and*
 - (iii) *for a fire-isolated stairway, clause 11.1(f) and (g) of AS1428.1; and*
- (b) *every passenger lift must comply with E3D7 and E3D8; and*
- (c) *accessways must have –*
 - (i) *passing spaces complying with AS 1428.1 at maximum 20 m intervals on those parts of an accessway where a direct line of sight is not available; and*
 - (ii) *turning spaces complying with AS 1428.1—*
 - (A) *within 2 m of the end of accessways where it is not possible to continue travelling along the accessway; and*
 - (B) *at maximum 20 m intervals along the accessway; and*
- (d) *an intersection of accessways satisfies the spatial requirements for a passing and turning space; and*
- (e) *a passing space may serve as a turning space; and*
- (f) *a ramp complying with AS 1428.1 or a passenger lift need not be provided to serve a storey or level other than the entrance storey in a Class 5, 6, 7b or 8 building—*
 - (i) *containing not more than 3 storeys; and*
 - (ii) *with a floor area for each storey, excluding the entrance storey, of not more than 200m²; and*
- (g) *clause 7.4.1(a) of AS 1428.1 does not apply and is replaced with 'the pile height or pile thickness shall not exceed 11 mm and the carpet backing thickness shall not exceed 4 mm'; and*
- (h) *the carpet pile height or pile thickness dimension, carpet backing thickness dimension and their combined dimension shown in Figure 8 of AS 1428.1 do not apply and are replaced with 11 mm, 4 mm and 15 mm respectively.*

Access is to comply with Australian Standard AS1428.1-2009 – Design for access and mobility. Part 1 – General requirement for access – New building (AS1428.1). The following clauses are directly related to the access to the building:

6.5 Circulation space for a wheelchair turn

6.5.1 60° to 90° turn

The space required for a wheelchair to make a 60° to 90° turn shall have a gradient no steeper than 1 in 40 and shall be not less than 1500mm wide and 1500mm long in the direction of travel. The space may be splayed across the internal corner as shown in Figure 4.

6.5.2 30° to <60°

Where the angle of turn is 30° to <60° and the width of the path of travel is less than 1200mm, a splay of at least 500mm x 500mm shall be made on the internal corner, as shown in Figure 4.

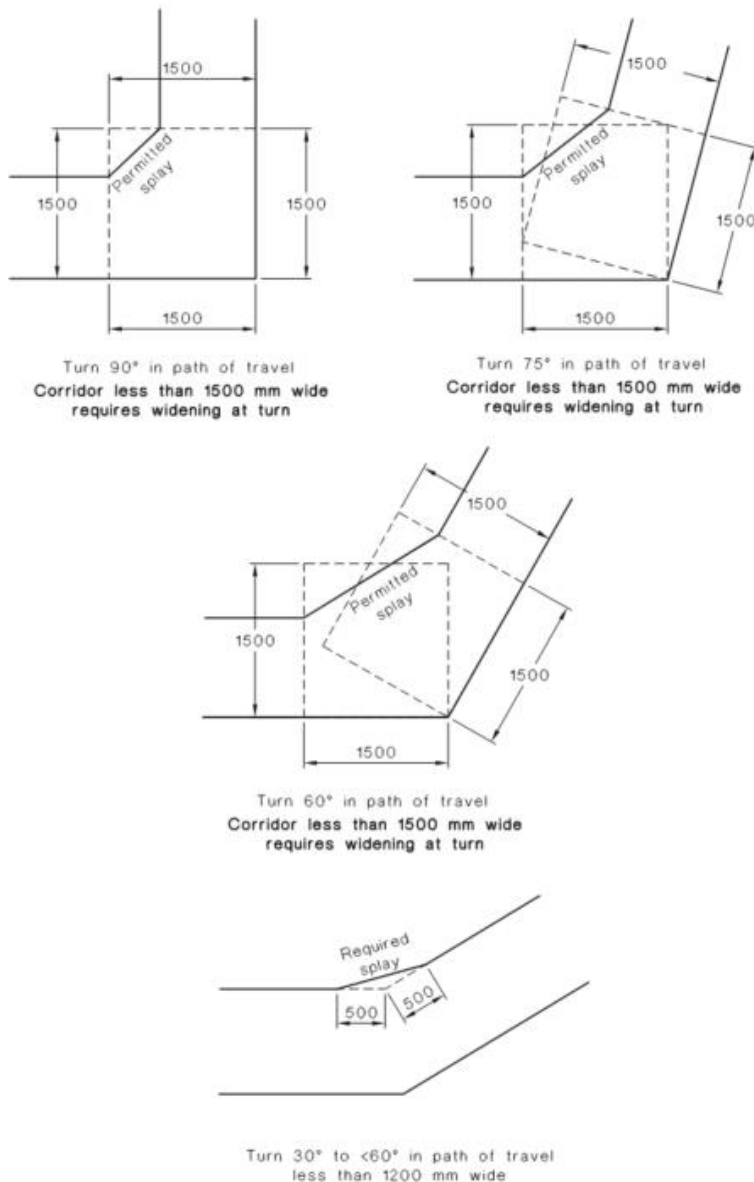


Figure 1 – Extract from AS1428.1.-2009 – Space required for a 30° to 90° degree turn

2.2 Details of Deemed-to-Satisfy Deviation

BCA Clause D4D3 requires an accessway to be provided to a building from the main points of pedestrian entry at the allotment boundary. In Class 3 buildings, access is required to all common areas within the building from the accessible pedestrian entrance. AS1428.1- 2009 defines a continuous accessible path of travel as an uninterrupted path of travel to, into or within a building providing access to all accessible facilities and Clause 6.5 stipulates that a turning space of no less than 1500mm wide by 1500mm long shall be provided to enable a wheelchair to make a 60° to 90° turn in the direction of travel.

The lower ground floor of the ski club is required to be accessible and although a continuous accessible path of travel is provided between the allotment boundary and the building entrance, the required turning space of 1500mm by 1500mm (unobstructed) to allow for a 90° turn is not provided along the accessway due to part of the balustrade being located within this turning space.

This arrangement is shown below:

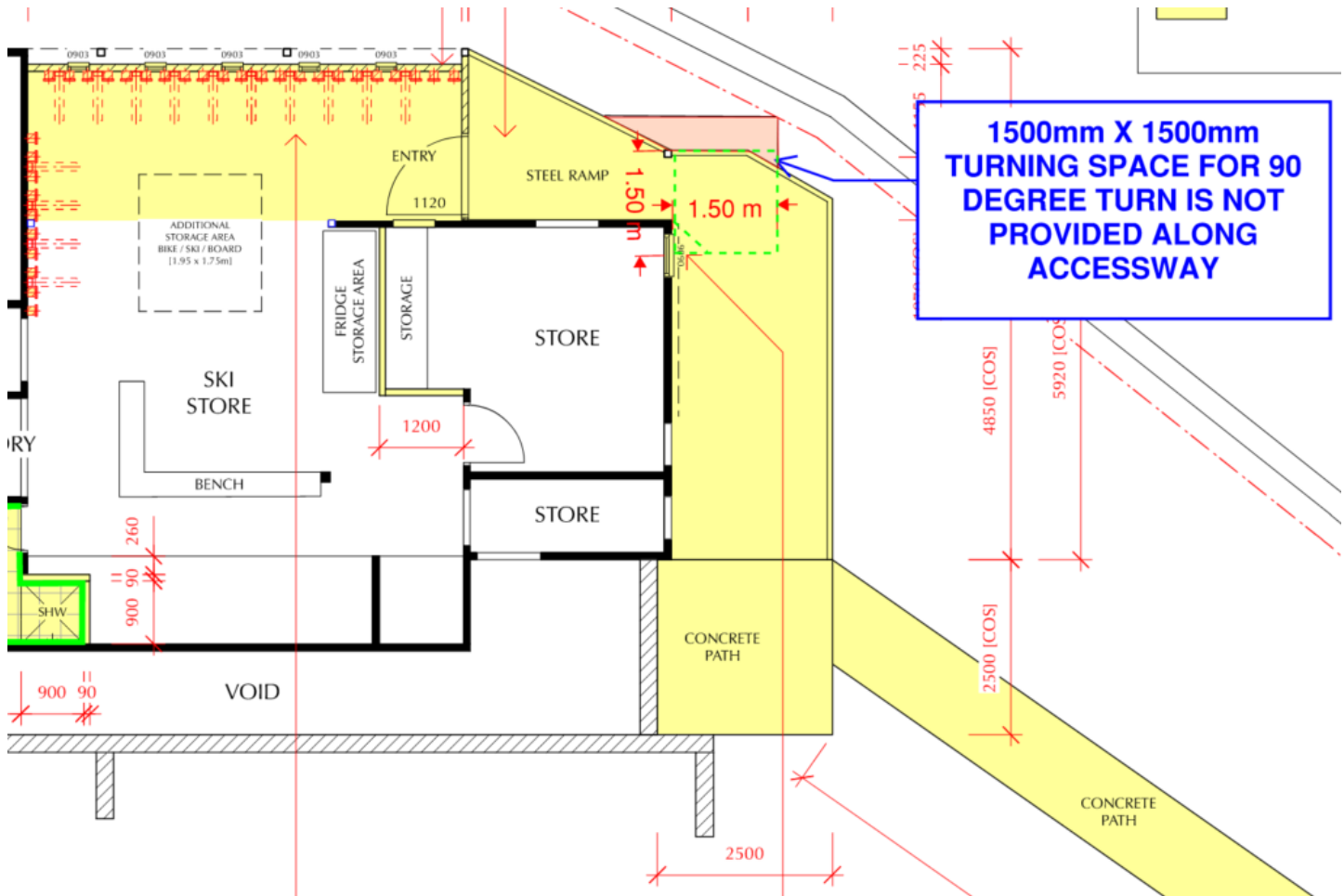


Figure 2 –Turning space of 1500mm x 1500mm is not achieved along accessway due to part of the balustrade

2.3 Relevant Performance Requirements

Pursuant to A2G2(3) of BCA Performance Requirement D1P1 has been identified as being directly relevant to the Deemed-to-Satisfy provisions identified above:

D1P1 Access for people with a disability

Access must be provided, to the degree necessary, to enable—

(a) people to—

(i) approach the building from the road boundary and from any accessible carparking spaces associated with the building; and

(ii) approach the building from any accessible associated building; and

(iii) access work and public spaces, accommodation and facilities for personal hygiene; and

(b) identification of accessways at appropriate locations which are easy to find.

2.4 Assessment Methodology

In order to address the provisions of the BCA, a qualitative performance-based solution formulated in accordance with A2G2(2)(b)(ii) has been adopted to demonstrate compliance of the Performance Solution with the relevant Performance Requirements.



2.5 Acceptance Criteria

It must be demonstrated through the proposed trial design that access is provided to the degree necessary via a continuous accessible path of travel incorporating a non-compliant [turning space due to part of the balustrade being located within this space](#). The assessment must show that the proposed arrangement satisfies the relevant Performance Requirement D1P1 through a qualitative comparative assessment.

2.6 Access Assessment

The BCA defines an accessway as being a continuous accessible path of travel as defined in AS1428.1 to, into or within a building. Under AS1428.1, a continuous accessible path of travel is defined as an uninterrupted path of travel to, into or within a building providing access to all accessible features.

In accordance with BCA Clause D4D3, Class 3 buildings must provide access to all common areas within the building from the accessible pedestrian entrance. To achieve this, and in accordance with Clause 6.5 of AS1428.1-2009, a [circulation space of 1500mm length and 1500mm width to enable a wheelchair to make a 60° to 90° turn in the direction of travel is required to be achieved](#).

Contrary to the requirements of BCA Clause D4D3 and the associated continuous accessible path of travel [circulation space requirements contained within AS1428.1-2009, the minimum turning space of dimension 1500mm by 1500mm has not been achieved along the continuous accessible path of travel between the allotment boundary and the building entrance due to part of a balustrade being located within this space resulting in a turning space with a reduction of approximately 0.06m² in the outer corner](#).

To meet the requirements of the BCA and the Premises Standards, the proposed internal alterations to the existing Hi Noon Ski Club Ltd located in Thredbo NSW must satisfy Performance Requirement D1P1. Performance Requirement D1P1 states that access must be provided to the degree necessary to enable people to *access work and public spaces, accommodation and facilities for personal hygiene*. In considering the above Performance Requirement, it is critical to consider the requirement 'to the degree necessary'. The governing requirements contained within Part A of the BCA state that the meaning of 'to the degree necessary' means:

- (i) that consideration of all the criteria referred to in the Performance Requirement will determine the outcome appropriate to the circumstance; and*
- (ii) that in certain cases it may not be necessary to incorporate any specific measures to meet the relevant Performance Requirement.*

The subject Performance Solution proposes to permit a non-compliant [circulation space, specifically a reduced turning space to enable a wheelchair to make a 90° turn, at a point along the path of travel between the allotment boundary and the building entrance due to part of a balustrade being located within the turning space](#).

The proposed arrangement includes a walkway between the building entrance door and the allotment boundary and a forward approach to the turning space from both directions. A structural column exists along the accessway however greater than 1m is provided between the building and the column to facilitate access along the accessway and the column is located outside of the subject turning space. Additionally, there are no doors located along the accessway that would require a person in a wheelchair to manoeuvre through. The accessway between the subject turning space and the allotment boundary is greater than 2m in width and therefore enables a person in a wheelchair greater space to swing out at the turning space rather than completing a tight 90° turn when travelling from both directions.

Under Clause 13.2 of AS1428.1, a minimum clear opening door width of 850mm is required for doorways on a continuous accessible path of travel. When provided with adequate door circulation spaces, this enables users with mobility aids to move through the doorway. Where the doorway includes a door, the provision of adequate circulation space allows users with mobility aids to effectively open the door and move through the doorway depending on the angle of approach and the direction the door swing opens (door either opens toward or away from the user or slides open). For example, if a person using a wheelchair is approaching a door from the front, there will be less space required to open and move through the door as the person will have less manoeuvring to do. If, however, the same person is approaching the door from the side, more space would usually be required to allow for that person to turn their mobility aid, open the door and



move through in comfort. Hinge doors that swing towards the user will again require greater circulation spaces as opposed to a door that swings away from the user. When considering the requirement for minimum clear opening door widths of 850mm at doorways on a continuous accessible path of travel, and comparing the proposed scenario, it would be reasonable to consider a continuous accessible path of travel **with reduced turning space not incorporating any doorways and a width of greater than 2m, would also be acceptable to provide occupants with access.**

Further to this, the proposed upgraded accessway is considered an improvement to current access to the building, replacing an accessway incorporating stairs to the building entrance. The proposed accessway upgrade will therefore provide improved and greater access to occupants.

On the basis of the above, it is considered that the continuous accessible path of travel between the allotment boundary and building entrance on lower ground floor whilst not providing a **compliant turning space**, provides access to occupants to the degree necessary and satisfies the requirements of Performance Requirement D1P1.

2.7 Assessment against the relevant Performance Requirement

The following is an assessment of the relevant Performance Requirements D1P1:

D1P1 Access for people with a disability	
<i>Access must be provided, to the degree necessary, to enable –</i>	
<i>(a) people to-</i>	
<i>(i) approach the building from the road boundary and from any accessible carparking spaces associated with the building; and</i>	Access is provided to a greater number of occupants and users via the proposed scenario with the current accessway incorporating stairs being replaced with a continuous accessible path of travel from the allotment boundary to the building entrance, albeit the reduced turning space along the accessway due to a balustrade being located just within this space.
<i>(ii) approach the building from any accessible associated building; and</i>	Not applicable to this Performance Solution.
<i>(iii) access work and public spaces, accommodation and facilities for personal hygiene; and</i>	Not applicable to this Performance Solution.
<i>(b) identification of accessways at appropriate locations which are easy to find.</i>	Not applicable to this Performance Solution.

2.8 Assessment Conclusion

The above assessment demonstrates that access is provided to the degree necessary when considering and comparing the proposed scenario to the minimum clear opening door widths required on doorways on a continuous accessible path of travel under AS1428.1 and is considered to comply with Performance Requirement D1P1 through a qualitative **and comparative** assessment.



3.0 PERFORMANCE SOLUTION 2 – CEILING HEIGHTS

A Performance Solution has been developed to permit a reduced head height in a sanitary compartment due to limitations associated with a stair over.

3.1 Deemed-to-Satisfy Provisions

Pursuant to A2G2 of the BCA, the following Deemed-to-Satisfy provisions have been identified as being subject to the Performance Solution:

F5D2 Height of rooms and other spaces

- (1) *The height of rooms and other spaces in a Class 2 or 3 building or Class 4 part of a building must be not less than-*
 - (a) *For a kitchen, laundry, or the like – 2.1m; and*
 - (b) *For a corridor, passageway or the like – 2.1m; and*
 - (c) *For a habitable room excluding a kitchen – 2.4m; and*
 - (d) *In a habitable room, or space within a habitable room, with a sloping ceiling or projections below the ceiling line-*
 - (i) *In an attic – a height of not less than 2.2m for not less than two-thirds of the floor area of the room or space; and*
 - (ii) *In other rooms – a height of not less than 2.4m for not less than two-thirds of the floor area of the room or space; and*
 - (e) *In a non-habitable room, or space within a non-habitable room, with a sloping ceiling or projections below the ceiling line - a height of not less than 2.1m for not less than two thirds of the floor area of the room or space.*

...

- (8) *The height of rooms and other spaces in any building must be not less than –*
 - (a) *for a bathroom, shower room, sanitary compartment, other than an accessible adult change facility, airlock, tea preparation room, pantry, store room, garage, carparking area, or the like – 2.1m; and*
 - (b) *for a commercial kitchen – 2.4m; and*
 - (c) *above a stairway, ramp, landing or the like – 2m measured vertically above the nosing line of stairway treads or the floor surface of the ramp, landing or the like; and*
 - (d) *for a required accessible adult change facility – 2.4m.*

Access is to comply with Australian Standard AS1428.1-2009 – Design for access and mobility. Part 1 – General requirement for access – New building (AS1428.1). The following clauses are directly related to the access to the building:

3.2 Details of Deemed-to-Satisfy Deviation

In accordance with BCA Clause F5D2, bathrooms and sanitary compartments within buildings must provide a room height of at least 2.1m.

The proposed internal alterations to the existing Hi Noon Ski Club Ltd includes alterations to the existing sanitary compartment located off of the ski store on the lower level, part of which is located under the stair accessing the upper level of the building. Due to the toilet being located under the stair, the ceiling above the toilet is less than 2.1m and reduces in height from one side of the toilet to the other as a result of the stair above. The lowest part of the ceiling is approximately 1.6m in height.

The arrangement is shown below:

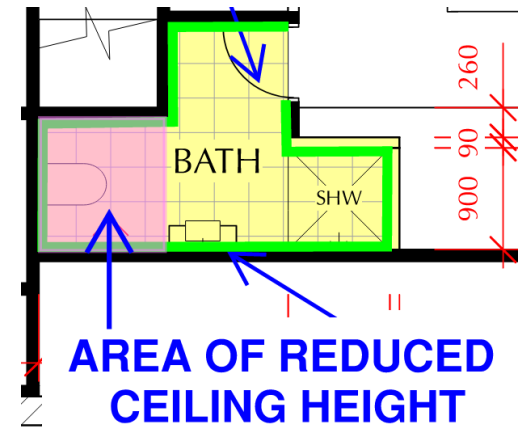


Figure 3 and Figure 4 – Water Closet located under stair does not achieve ceiling height of at least 1.2m

3.3 Relevant Performance Requirements

Pursuant to A2G2(3) of the BCA Performance Requirement F5P1 has been identified as being directly relevant to the Deemed-to-Satisfy provisions identified above:

F5P1 Room or space heights

A habitable room or space must have sufficient height that does not unduly interfere with its intended function.

Further to this the Guide to the BCA further clarifies that Performance Requirement FP3.1, as per the below:

Sufficient height

The intent of FP3.1 is to ensure that the height of a room or space is sufficient for the intended use of the room or space. 'Intended use' recognises that the height required in a room or space is directly related to the room or space's intended function.

3.4 Assessment Methodology

In order to address the provisions of the BCA, a qualitative performance-based solution formulated in accordance with A2G2(2)(b)(ii) has been adopted to demonstrate compliance of the Performance Solution with the relevant Performance Requirements.

3.5 Acceptance Criteria

It must be demonstrated via compliance with the verification method that the space provides an appropriate activity support level that does not unduly interfere with its intended function thereby satisfying Performance Requirement F5P1.

3.6 Access Assessment

The intent of Performance requirement F5P1 and the Deemed to Satisfy provisions are to ensure that a room or space has sufficient height for the intended use of the room or space. To verify this, it considers the 'activity support level' which is defined as the degree to which occupants can undertake activities with respect to the likely activity traits and occupant traits.

If we consider the affected part of the sanitary facility and the activities that occur or that may be affected by the reduced ceiling height, it can be seen that the toilet fixture is located within the reduced ceiling height area, with a reduced ceiling height of 1600mm at the lowest part. The ceiling height reduces from 2.1m to 1.6m from the wall on one side of the toilet fixture to the other. A toilet compliant with AS1428.1 -2009 has a maximum width of 400mm (600mm for the cistern) and the typical/average dimension of a standing human body at the front of the toilet would typically occupy an area of 450mm (Metric Handbook Planning and Design Data – Sixth Edition edited by Pamela Buxton), which would place a

standing human body approximately 400mm-800mm from the side wall achieving a 2.1m height ceiling.

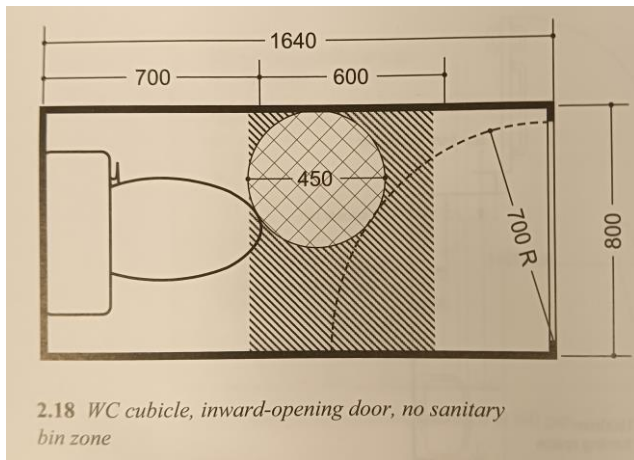


Figure 5- Typical Water Closet and human body dimensions – Metric Handbook Planning and Design Data – Sixth Edition

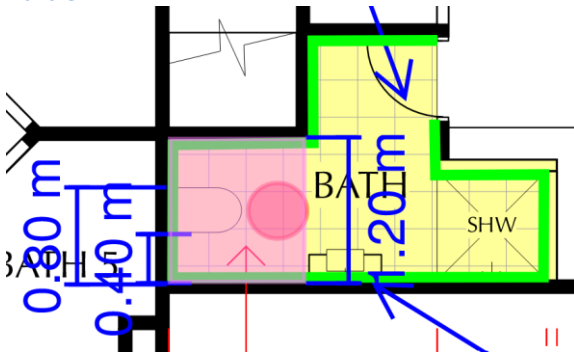
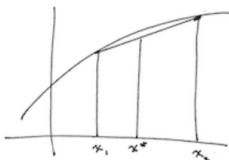


Figure 6 – Relative location of a human body within the reduced ceiling height area

If we use linear interpolation to determine the height of the ceiling under the toilet fixture itself, we obtain a ceiling height of between 1.9m and 1.8m.

Linear interpolator

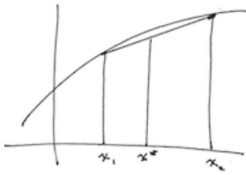


Fill in five values and leave one blank. Click the Calculate button, and the blank value will be filled in by linear interpolation. ([Help and details](#))

x	y
0	2.1
1.85	1.6
0.4	1.99189189189

Calculate

Figure 7 - John D Cook Consulting Linear interpolator calculator – interpolation results for ceiling height at 0.4m from side wall



Fill in five values and leave one blank. Click the Calculate button, and the blank value will be filled in by linear interpolation. ([Help and details](#))

x	y
0	2.1
1.85	1.6
0.8	1.88378378378

Calculate

Figure 8 - John D Cook Consulting Linear interpolator calculator – interpolation results for ceiling height at 0.8m from side wall

The Australian Bureau of Statistics (ABS) outlined that the highest average height were males in the 18-41 age group with an average height of 1778mm (1756mm overall), refer to graph below for average height of adults (Australia), by year of birth. This represents a 322mm difference from the required 2100mm ceiling height which is what is required.

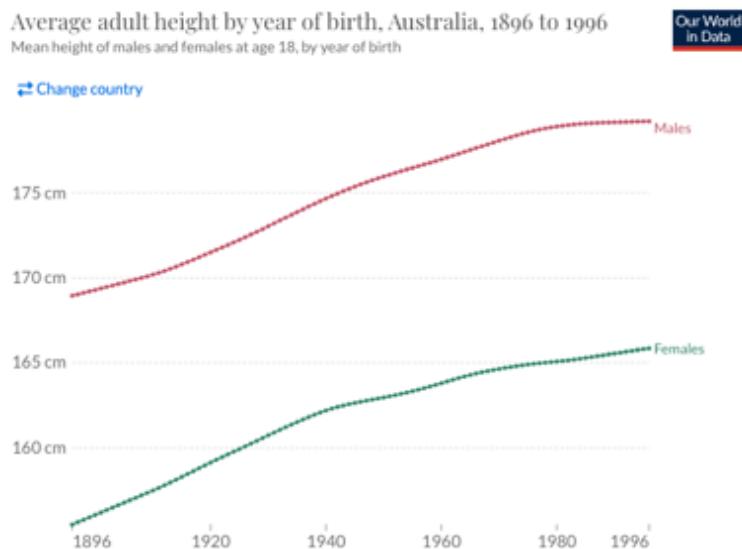


Figure 9 – Average heights of adults by birth (Australia), Our World Data

Further to this, the height of the 95th percentile of males is 1862mm as recognised by the American National Institute of Occupational Health and Safety (http://www.cdc.gov/niosh/pot_anth.html). The average and 95th percentile heights of American and Australian males are historically similar, with males being the taller of the sexes in each country. Therefore, it would be expected that close to 5% of occupants would be at risk of injury from the reduction in height around the toilet fixture. In addition, any occupants that may be over this height would generally be cognisant of their height as most doorways in buildings are reduced to 1980mm, which would require the occupant to be more aware of their surroundings as they would be required to adjust their movement through doorways on a regular basis.

Further to this, the sanitary facilities are used infrequently and for short periods of time.

On the basis of the above, it is considered that the proposed reduction in the under-stair ceiling height within the sanitary

facility would not have a detrimental impact upon occupants using the building.

To offset the reduced ceiling height, it is proposed to alert occupants by the provision of cautionary tiger tape along the reduced ceiling height and signage, similar to the below:

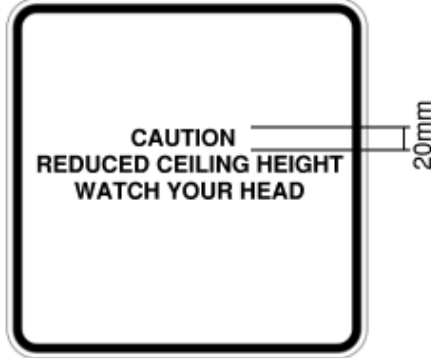


Figure 10- Proposed signage

On the basis of the above discussion, it is considered that the intended function within the building is not impacted by the reduced room height. On this basis the requirements of Performance Requirement F5P1 are considered to be achieved through a qualitative analysis.

3.7 Assessment against the relevant Performance Requirement

The following is an assessment of the relevant Performance Requirements F5P1:

F5P1 Room or space heights	
<i>A habitable room or space must have sufficient height that does not unduly interfere with its intended function.</i>	The room subject to the low ceiling height is a sanitary compartment not normally inhabited by occupants for a long period of time. Occupants use the affected area for a short period of time infrequently throughout the day and the proposed signage allows occupants to be notified of the reduced ceiling height and to take caution.

3.8 Assessment Conclusion

Based on the above discussion, it can be concluded that the reduced ceiling height is not likely to cause an injury or interfere with the intended function of the room. It has been demonstrated that the infrequently used sanitary facilities and the amenity of the room has not been reduced.

On this basis, it is considered that the acceptance criteria and relevant Performance Requirement F5P1 is satisfied subject to the following requirement:

1. Signage similar to the below which notes "CAUTION – REDUCED CEILING HEIGHT – WATCH YOUR HEAD" shall be installed to the wall adjacent to the affected ceiling of the subject room. The sign should be colour contrasting to the background and be positioned in a readily apparent position (i.e. wall adjacent to the affected ceiling).
2. Cautionary tiger tape is to be provided at the wall-ceiling junction where the height is less than 2.1m.

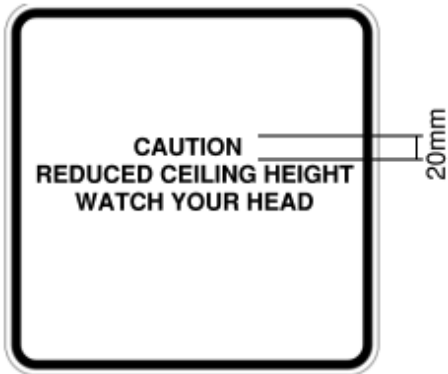


Figure 11 – Proposed signage



4.0 CONCLUSION AND REQUIREMENTS

4.1 Conclusion

The above-mentioned Performance Solutions have been developed using a qualitative assessment against the Deemed-to-Satisfy provisions and are considered to comply with the BCA Performance Requirements D1P1 and F5P1. The BCA recognises these assessment methods for determining the Performance Solution to satisfy the Performance Requirement in accordance with BCA Clause A2G2(1) and A2G2(2)(b)(ii) and (d).

Accordingly, based on the above, it is considered that the directly related Performance Requirements D1P1 and F5P1 have been met, considering –

- The Performance Solution requirements listed above.
- Assessment of the requirements of the relevant Performance Requirements.
- The Building Code of Australia 2022; and
- The intent as stated in the Guide to the BCA 2022.

4.2 Requirements of Performance Solution

The Performance Solutions detailed above are subject to the requirements detailed within the Executive Summary of this report.

A handwritten signature in black ink, appearing to read 'Karen Watson'.

Karen Watson
BCA and Access Consultant
B. EnvHlth
Diploma of Access Consulting

A handwritten signature in black ink, appearing to read 'James Alexander'.

James Alexander
Director
B. App.Sci (Bldg), Grad Dip (Disp Res),
ME(Fire safety), Grad Dip (Bldg Surv)
AIBS Nationally Accredited Level 1 Building Surveyor
BPB Grade A1 Accredited Certifier and PCA
Fire Safety Engineer BDC0002



APPENDIX A – REFERENCES

1. Australian Building Codes Board. "Building Code of Australia 2022"
2. Australian Building Codes Board. "The Guide to the BCA 2022".
3. Australian Standard AS 1428.1-2009 – Australian Standard for Access and Mobility. Part 1: General requirements for access – New building work
4. Australian Standard AS 1428.2 – 1992 – Australian Standard for Design for Access and Mobility. Part 2 – Enhanced and additional requirements – Buildings and facilities.
5. Disability (Access to Premises – Buildings) Standards 2010 and Guidelines