

## PASSENGER RAIL NETWORK

# LIGHTING OF STATION ENVIRONMENT TO COMPLY WITH DISABILITY STANDARDS FOR ACCESSIBLE PUBLIC TRANSPORT

Prepared for The Australasian Rail Association by:  
WEBB Queensland  
7 Baroona Road  
MILTON QLD 4064

**QUEENSLAND RAIL LIGHTING ADVICE**

---

## TABLE OF CONTENTS

1.0	INTRODUCTION.....	3
2.0	DEFINITIONS.....	4
3.0	APPLICABLE AUSTRALIAN (AND NEW ZEALAND) STANDARDS .....	5
4.0	OTHER APPLICABLE STANDARDS.....	6
5.0	OTHER PUBLICATIONS.....	6
6.0	RECOMMENDATION .....	7
	APPENDIX A.....	9

## 1.0 INTRODUCTION

The Disability Standards for Accessible Public Transport (DSFAPT) requires that “any lighting provided must comply with minimum levels of maintenance illumination for various situations shown in the notes to AS 1428.2 (1992) Clause 19.1.

AS 1428.2 Clause 19 requires the following:

“Illumination levels shall be uniform and comply with the requirements for maintenance illumination set out in AS 1680.2.

### Notes:

1. The following minimum levels of maintenance illumination are recommended:

Entrances	150 lux
Passageways and walkways	150 lux
Stairs	150 lux
Lifts	See AS 1735.12
Toilet and Locke Rooms	200 lux
Counter Tops	250 lux
General Displays	200 – 300 lux
Telephones	200 lux

2. Many people require better artificial lighting than is normally provided. This applies particularly to older people and to all people with impaired sight.
3. For people with impaired hearing, a level of illumination of not less than 150 lux, without glare, is needed to allow for lip reading.”

There are a number of discrepancies between this Standard (AS 1428.2) and other standards specifically relating to lighting (in particular AS 1158.3.1).

There is a wide range of disabilities that need to be considered in the provision of facilities suitable for the disabled, including persons with physical impairment who require either a wheelchair or walking aid to maintain mobility and persons with impaired vision and the hearing impaired.

For persons with impaired vision there are a number of tasks that would require varying degrees of enhanced lighting. To assist general mobility there is a requirement for any steps or changes of level to be highlighted. To operate ticket vending machines or read timetable information, higher levels of lighting are required than might be required for non-disabled members of the public.

Persons in wheelchairs or using other walking aids require any steps or changes in level to be clearly visible. Also there is a requirement for them to be able to see to assemble wheelchairs etc at the point where they get out of their car.

For persons with impaired hearing, the critical task is to be able to lip read. This requires a high level of vertical illuminance on the face.

Queensland Rail on behalf of the Australasian Rail Association have engaged WEBB Queensland to clarify these discrepancies and make a series of recommendations for implementation. During the preparation of these recommendations, comments were received from rail operators and providers in NSW, VIC, S.A., W.A. and Qld.

WEBBs are a firm of specialist engineering consultants, established in 1973, specializing in Lighting Consultancy, Electrical Engineering, Mechanical Engineering, Communications Consultancy and Technology Consultancy.

Webb's experience in delivering successful engineering and lighting designs for major Buildings, City Lighting and Urban Design Projects is significant.

Examples of City Lighting and Urban Design Projects that Webb's are currently working on or have recently completed include the Lighting of South Bank Parklands, Roma Street Parkland, Queensland Rail Station Upgrades, the South East Transit Project in Brisbane and the Relighting of Anzac Parade in Canberra as well as Electrical and Lighting Consultancies for the Sydney 2000 Olympics.

Webb's understanding of the tasks involved with lighting extends beyond the need to "just light" an area or object, but considers the space or object in context with issues such as the surrounding urban design, functional components, human interface, long term durability of the installation, safety, amenity, festivity, etc.

## 2.0 DEFINITIONS

For the purpose of this report, the following definitions apply.

### Average illuminance (Eav)

The mean maintained illuminance in a horizontal plane at ground level, calculated in accordance with AS 1158.3.1.

### Covered Area on an Open Station

Any shelter, canopies, building awning etc. located on the platform – Lighting in accordance with the requirements for waiting areas in AS 1680.2.1.

### Enclosed Footbridges

An enclosed footbridge forming a part of the primary access path to the station – Lighting in accordance with the requirements for passageways and corridors in AS 1428.2.

### Enclosed Station

A fully enclosed or underground station where the platforms are fully covered and no significant amount of natural light (direct or indirect) reaches the platform area – Lighting in accordance with the requirements of AS 1680 and AS 1428.2.

### Maintenance factor

A factor applied to the lighting design to take account of light losses during the interval between scheduled maintenance. The maintenance factor to be applied to all calculations is 0.7 unless calculations carried out in accordance with AS 1680.1 (Section 12) or AS 1158.3.1, Clause 2.4 indicate otherwise. The values of luminous flux provided by the lamp manufacturer for new (100hr) lamps are to be used in all calculations.

### Minimum illuminance (Emin)

The lowest value of maintained illuminance in a horizontal plane at ground level within an area.

### Minimum Vertical Illuminance (EVmin)

The lowest value of illuminance on a designated vertical plane at a height of 1.5m above ground level, calculated in accordance with AS 1158.3.1.

### Open Footbridges

An unenclosed footbridge forming a part of the primary access path to the station – Lighting in accordance with AS 1158.3.1 – Same lighting level as adjoining area.

### Open Station

A station which is essentially open to the sky. The platform may contain ticket offices, covered canopies etc. – Lighting in accordance with AS 1158.3.1 with levels adjusted to allow for the visually impaired.

### Platform

For the purpose of the lighting installation the platform is to be treated as being the area enclosed within the platform fencing from the edge of the coping and the full length of the set down area of the train. It should also include any open seating areas included within the platform fencing.

### Primary access path

A primary access path is a path (or paths) that permits independent travel for all passengers within Public Transport premises. This will include paths from the car park, the bus interchange etc. – Lighting in accordance with AS 1158 with levels adjusted to allow for the visually impaired.

## Definitions

### Uniformity

- U1 - Applied to enclosed spaces – The ratio of the minimum illuminance to the average illuminance as defined in AS 1680.1.
- U2 - Applied to open spaces – The ratio of the maximum illuminance to the average illuminance as defined in AS 1158.3.1.

### Yellow Line (Near Platform Edge)

The line created by the edge of the TSIs (Tactile Surface Indicators) away from the track.

## 3.0 APPLICABLE AUSTRALIAN (AND NEW ZEALAND) STANDARDS

The Australian and New Zealand Standards that are considered applicable in this instance are:

- AS 1428.1 Design for Access and Mobility  
General Requirement for Access

In this Standard, reference is made to AS 1680.0 for lighting levels within buildings.

It also requires that special provisions be made in conference rooms, meeting rooms, auditorium etc to enable lip reading.

- AS1428.2 Design for Access and mobility.

This Standard applies to Buildings and Facilities and makes reference to the requirements of AS1680.2 (Interior Lighting) and also recommends lighting levels for specific circulation areas within buildings. It also makes a statement that older people and all people with impaired sight require better artificial lighting than is normally provided and that people with impaired hearing require “150 lux, without glare” to allow for lip reading.

- AS/NZS 1158.3 Road Lighting – Pedestrian Area Lighting

This Standard applies to general outdoor areas including open-air car parks, subways, unenclosed footbridges, steps and ramps. It nominates applicable levels of lighting for all of these areas including making specific requirements for lighting to parking spaces for use by the disabled.

- AS/(NZS 1680) Interior Lighting.

The AS1680 series of Standards applies to interior lighting and sets out requirements for a quality lighting installation including uniformity of lighting as well as nominating lighting levels for various areas. In the case of general circulation areas, the recommended lighting levels are lower than those given in AS1428.2.

#### 4.0 OTHER APPLICABLE STANDARDS

Applicable Standards other than Australian and New Zealand Standards.

- Disability Standards for Accessible Public Transport.

This Standard stipulates that Illumination levels must comply with the requirements of AS1428.2 (as outlined above)

The reference to AS 1680 (Interior Lighting) in AS 1428.2 suggests that the levels stated therein should be applied to interior spaces and is not intended to be applied to exterior spaces.

Standards Australia have advised that the lighting levels recommended in AS 1158.3.1 are based on persons with “normal” vision and the higher levels recommended for disabled parking spaces is to allow loading and unloading wheel chairs.

#### 5.0 OTHER PUBLICATIONS

The following papers/publications were also considered in the preparation of this report.

“Safe and Accessible Stations” produced by the Association for the Blind of W. A. (Inc).

and

“Lighting for Low Vision – Principles and Practice in the Design for the Elderly” by Peter J Turner.

## 6.0 RECOMMENDATION

WEBBs recommendations are based on:

- AS/NZS 1158.3 Road Lighting Part 3.1 Pedestrian Area (Cat P) Lighting – Performance and Installation Design Requirements
- AS 1680.1.1990 Interior Lighting Part 1 : General Principles and Recommendations
- AS 1680.2.1 – 1993 Interior Lighting Part 2.1 – Circulation spaces and other General Areas.
- Research carried out in conjunction with the Illuminating Engineering Society of Australia and New Zealand (Qld Chapter) with input from the Department of Disabilities Services Qld.
- The report “Safe and Accessible Stations” published by the Association for the Blind of W. A.
- The paper “Lighting for Low Vision – Principles and Practices for the Elderly” published in “Lighting in Australia” on February 1991.

Generally recommended levels are based on levels set out in The Codes except in areas where the codes are considered ambiguous or the lighting levels inappropriate.

Standards Australia have confirmed that levels stated in the AS/NZS1158 series of standards are based on “normal” vision. One of the recommendations in papers reviewed is that higher levels of lighting be provided for persons with low vision. This increased level of lighting has been incorporated in recommendations herein where considered appropriate.

The following table sets out levels required in the Code and recommended levels for areas not specifically covered and areas where the level in the Code is considered inappropriate. The recommended illuminance values are the minimum considered appropriate. Where there is a change in lighting levels from one area to another, care should be taken to ensure that this is a gradual change.

### NOTES

1. NOT SPECIFICALLY COVERED IN ANY CODE. RECOMMEND MINIMUM LEVEL HIGHER THAN THE MINIMUM FOR THE REMAINDER OF THE PLATFORM
2. LEVEL APPROXIMATELY TWICE THAT RECOMMENDED IN AS1158.3.1
3. NOT SPECIFICALLY COVERED IN ANY CODE. RECOMMENDED LEVEL AS PER AREA WITH SIMILAR VISUAL TASK
4. LEVEL OF ILLUMINANCE NOT LESS THAN THAT OF ADJOINING AREA
5. FOOTBRIDGES SHOULD BE CONSIDERED THE SAME AS RAMPS AND STAIRS
6. THERE IS A REQUIREMENT FOR THE LIGHTING TO BE AS UNIFORM AS POSSIBLE. ANY CHANGE IN LIGHTING LEVEL SHOULD BE GRADUAL.

# WEBB

TABLE 1 – RECOMMENDED LIGHTING LEVELS FOR RAILWAY STATIONS

	CODE REQUIREMENTS					COMMENT	RECOMMENDED ILLUMINANCE			RECOMMENDED UNIFORMITY	
	CODE		Eav	E min	EV min		Eav	E min	EV min	U1	U2
<b>ENCLOSED STATIONS</b>											
ENTRANCE, PASSAGEWAYS, WALKWAYS	AS1428.2	SECTION 19	150			AGREED	150			0.5	
STAIRS	AS1428.2	SECTION 19	150			AGREED	150			0.5	
RAMPS	AS1428.2	SECTION 19	150			AGREED	150			0.5	
TOILETS AND LOCKER ROOMS	AS1428.2	SECTION 19	200			AGREED	200			0.5	
COUNTER TOPS	AS1428.2	SECTION 19	250			AGREED	250			0.5	
DISPLAYS (TIMETABLES)	AS1428.2	SECTION 19	200-300			AGREED	200			0.5	
TELEPHONES (TICKET MACHINES)	AS1428.2	SECTION 19	200			AGREED	200			N/A	
GENERAL PLATFORM	AS1680.2.1	TABLE E1, 1.2	160			AGREED	160			0.5	
YELLOW LINE (PLATFORM EDGE)						NOTE 1		150			
<b>OPEN STATIONS</b>											
TOILETS AND LOCKER ROOMS	AS1428.2	SECTION 19	200			AGREED	200			0.5	
COUNTER TOPS	AS1428.2	SECTION 19	250			AGREED	250			0.5	
DISPLAYS (TIMETABLES)	AS1428.2	SECTION 19	200-300			AGREED	200			0.5	
TELEPHONES (TICKET MACHINES)	AS1428.2	SECTION 19	200			AGREED	200			N/A	
YELLOW LINE (PLATFORM EDGE)						NOTE 1		30			
GENERAL PLATFORM	AS1158.3.1	CAT P6	21	7	7	NOTE 2	42	21	14		7
COVERED AREAS	AS1680.2.1	TABLE E1, 1.2	160			AGREED	160			0.5	
CORE AREAS (AWNING)	AS1680.2.1	TABLE E1, 1.2	160			AGREED	160			0.5	
RAMPS AND STEPS (OPEN)	AS1158.3.1	P8	7	2	2	NOTES 4 & 5	42	21	14		7
OPEN FOOTBRIDGE	AS1158.3.1	CAT P8	7	2	2	NOTES 4 & 5	42	21	14		7
PRIMARY ACCESS PATHS	AS1158.3.1	CAT P6	21	7	7	NOTE 2	42	21	14		7
ENCLOSED FOOTBRIDGE	AS 1428.2	SECTION 19	150			AGREED	150			0.5	
SUBWAYS	AS1158.3.1	CAT P10	35	17.5	17.5	AGREED	35	17.5	17.5		7

## APPENDIX A

### Further Research and Recommendations for Future Action

Since being commissioned for this report, WEBBs have been investigating information relating to Lighting for people with Disabilities.

This has taken two (2) basic directions; "Code Requirements" and "The needs of People with Disabilities".

In terms of the needs for people with Disabilities, WEBBs In conjunction with the IES held a seminar to address the Lighting for people with disabilities in the External Environment.

Two papers were presented by people with both visual and physical disabilities who gave their thoughts on their needs.

In summary the following issues were noted as important:

- Level of illuminance is not as important as uniformity.
- The lighting of vertical elements is more important than the horizontal illuminance as they look for larger vertical elements such as trees and buildings for way finding.
- Colour and reflectivity.
- Minimal change in surface colours.
- Lack of shadows.
- Expression of change of levels particularly stairs.

Part of the reasoning that formed some of the above issues relates to people who may be legally blind but still have partial vision. Under these conditions, objects are not seen in three dimension but appear as if only two-dimensional thus the confusion in change of levels and shadows.

It is important to note that they were of the opinion that not all disabled conditions could be satisfied but with input, a reasonable level of success could be achieved.

Also as detailed further in this report, the recommendation by the Association for the Blind of WA to have double the quantity of light for people with disabilities was seen as a good recommendation.

From this information gathered to date, WEBBs are of the opinion that the lighting of Platforms etc can only be successful if the following issues are also considered in conjunction with the lighting design:

- Paths of Travel and Wayfinding from point of arrival e.g. car park or footpath.
- The colour and texture of the path of travel.
- Placement of signage and ticketing machine etc along paths of travel.
- Further input from people with disabilities.

# WEBB

Flowing from this meeting, the Illuminating Engineering Society of Australian and New Zealand (Old Chapter) is forming a committee to further pursue and seek clarification of the issues addressed with the report.

Also, AS 1428.2 is currently under review. The IES ANZ and ARA should seek to make submissions relating to lighting during this review period.