

NATSPEC for refurbishment, retrofitting and adaptive re-use

This TECHreport outlines how the NATSPEC specification system may be used for refurbishment, retrofit and adaptive re-use projects. Key upgrade options are summarised and refurbishment related items in NATSPEC worksections are highlighted.

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NATSPEC FOR REFURBISHMENT, RETROFITTING AND ADAPTIVE RE-USE

1 INTRODUCTION

1.1 NATSPEC and refurbishment

Specifications are essentially written descriptions of the required quality of the built product and its component products. In this respect, specifying a refurbishment or adaptive re-use project is no different from specifying a new build project. This TECHreport outlines how a NATSPEC based specification may be used for refurbishment and adaptive re-use projects by highlighting the appropriate worksections for various upgrade options.

1.2 Definitions

The terms refurbishment, retrofit, and adaptive re-use are related, yet each has a different focus.

- Refurbishment: *The remodelling, refashioning and general renovation of a building, site, product or infrastructure.*¹
- Adaptive re-use: *...a process that changes a disused or ineffective item into a new item that may be used for a different purpose.*²
- Retrofit: *The process of modifying a building's systems or structure after it is initially built and occupied.*³

1.3 Reasons for building refurbishment

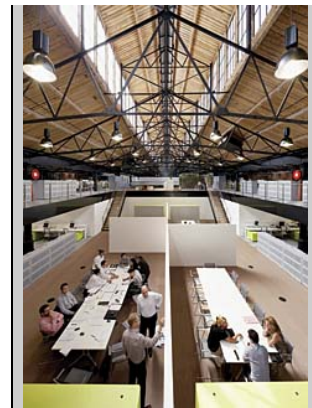
Refurbishment is usually undertaken to:

- Replace deteriorated finishes and building components.
- Reorganise spaces for new uses.
- Improve environmental quality.
- Achieve code compliance and improve safety.

1.4 Levels of refurbishment

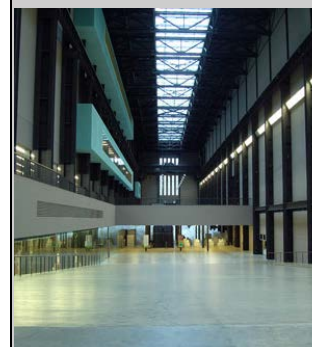
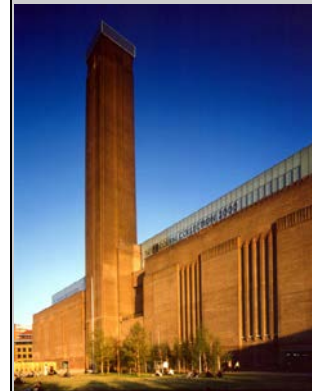
Refurbishment may be broadly grouped into three levels:

- Minor:
 - Building tune up and aesthetics.
 - Minor repairs to building services.
 - Non-tenancy upgrades in sanitary facilities and common areas.
- Major:
 - Central plant upgrade or replacement.
 - Non-tenancy upgrades in sanitary facilities and common areas.
 - Technology upgrades, such as lighting and air conditioning. May involve alterations to risers, walls and replacement of ceilings.
 - Facade upgrade.
 - Roof upgrade.
- Total:
 - Strip back to base building structure.
 - Removal of all building services.
 - Replacement of all building services with new technologies.⁴
 - Facade replacement.
 - Roof replacement.



Goods Shed North, Melbourne.

Elenberg Fraser, BVN 2009.
Adaptation of the heritage listed former 1890 railway goods building to offices with a 5 Star Green Star design rating.



Tate Modern, London

Herzog & de Meuron, 2000.
Adaption of the 20th century Bankside Power Station to the Tate Modern art gallery.

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2 DESIGN ISSUES

Some of the main issues for refurbishment, retrofit or adaptive re-use projects include:

- NCC compliance:
Accessibility and fire safety system improvements to enhance building useability and safety.
- Sustainability and ESD:
Building systems and building fabric upgrades to create a more sustainable, energy efficient structure and improve a building’s NABERS rating.
- Change of use:
Retention and re-use of existing buildings to conserve their embodied energy, and reduce energy usage associated with demolition, waste disposal and new construction. Maintain heritage significance, where applicable, through reversible design insertions and sensitively designed new work.
- Demolition:
Removal of hazardous materials and protection of retained fabric. Address sustainability through material re-use and recycling.

3 KEY UPGRADE OPPORTUNITIES

3.1 Overview

Refurbishing provides an opportunity to improve a building’s environmental performance, increase occupant comfort and reduce running costs.

This TECHreport focuses on upgrade opportunities in the following areas:

- Demolition.
- Structure.
- Facade improvement.
- Accessibility.
- Mechanical services.
- On-site power generation.
- Water conservation.
- Fire safety.
- Lighting.

3.2 Demolition

A key part of sustainable refurbishment is planning and undertaking demolition in a way that reduces waste and encourages material re-use and recycling. The Demolished materials and Demolition clauses in the *0201 Demolition* and *0202 Demolition (interior and alterations)* worksections can be used to specify demolished materials to be diverted for re-use or recycling. Material re-use and recycling can also be specified for the Waste management plan in the *0172 Environmental management*. Salvage for re-use is also covered in *0531 Suspended ceilings – combined*, that has options for scheduling demountability. The re-use of recovered hardware can be documented in *0455 Door hardware - Submissions*. The *0201 Demolition* and *0202 Demolition (interior and alterations)* worksections - Protection clauses can be used to specify weather protection for existing plant, equipment and materials intended for re-use. Re-use of building service components is covered in *0201 Demolition – Building services*.

3.3 Structure

Base building structural modifications may be required for refurbishment and/or change of use projects to increase or reconfigure usable floor space, improve fire protection, strengthen the existing structure, or as a result of other modifications such as new stairs, lifts, etc.

Strengthening may be required when the existing structure is no longer adequate due to change of use and new loading, or changes in design standards. Strengthening options include replacement framing, supplementary framing, or strengthening the existing framing.

For residential buildings, retrofitting the structure to include new balconies is a popular way to add useable space. Atrium spaces may be cut through existing floors to improve daylight penetration and ventilation for deep floor plates.

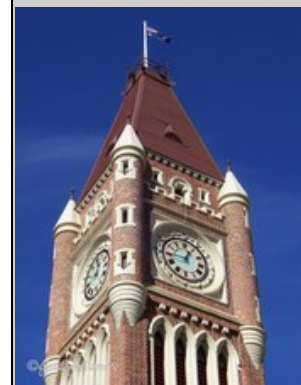
Performance requirements may be specified in worksections such as *0310 Concrete –*



55 Baker Street, London.

Make, 2008

Adaptive re-use of the 1950s office buildings, former headquarters of Marks & Spencer, into a mixed use office, retail, leisure and residential complex. BREEAM rating of ‘Excellent’.



Perth Town Hall

Cox Howlett + Bailey Woodland & Hocking Planning and Architecture, 2005

Staged refurbishment and restoration of heritage listed 1870s building, including services and access upgrade.

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combined or in the detailed concrete series 0311 Concrete formwork to 0321 Precast concrete. 0341 Structural steelwork and 0381 Structural timber may also be used to specify structural modifications, and changes to load bearing masonry can be specified in 0335 Brick Construction and/or 0334 Block Construction.

3.4 Facade improvement

Facade upgrades can both improve a building’s environmental performance and assist to reposition the building in the marketplace. New facades will need to comply with BCA Section J Energy efficiency provisions, and existing building facades may need to be upgraded to comply if required by State or Territory legislation.

Strategies for improving the performance of an existing facade include the following:

- Applying solar control film.
- Resealing existing windows.
- Reglazing existing windows with high performance glass.

These options may be specified in 0461 Glazing. Other strategies to reduce heat gain include:

- Providing automated internal blinds.
- Installing an additional panel of glazing to the internal face of the facade.
- Shading windows externally.

0574 Window coverings, 0461 Glazing, 0432 Curtain walls and 0457 External screens have provisions for specifying the above options. Site reglazing for refurbishment works can be specified in 0462 Structural silicone glazing - Site reglazing.

Improvements to the existing curtain wall such as resealing and improving spandrel panel insulation through to replacing the entire facade may be covered in 0432 Curtain walls.

3.5 Accessibility

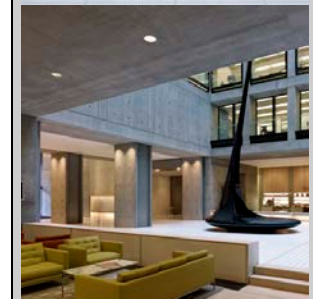
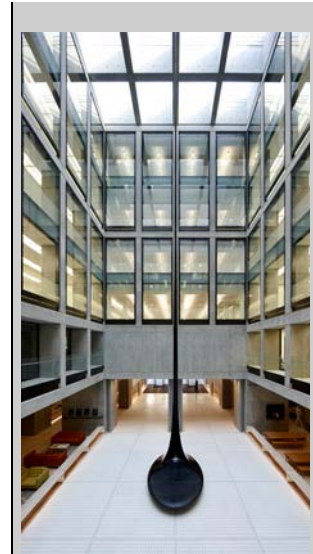
The Commonwealth’s Disability (Access to Premises - Buildings) Standards introduced in March 2010 and incorporated into the National Construction Code (NCC) in May 2011, resulted in changes to requirements for accessibility in and around buildings. The Premises Standards are triggered for Building Code of Australia (BCA) for new Class 1b, 3 and 5-10 buildings or those undergoing refurbishment work that requires building approval. The internal parts of a Class 2 sole-occupancy unit are not required to comply, except where accommodation for short-term rent is provided. Both new work and affected portions of the existing building (the main pedestrian entrance and an accessible path of travel to the new work) need to comply. Compliance issues include:

- Doorways:

Options include modifying existing doors such as changing door swings and replacing door hardware, widening existing doorways or installing alternative compliant doors to meet the access code requirements in AS1428.1 and AS1428.2. 0453 Doors and access panels and 0455 Door hardware may be used to specify performance requirements and schedule doors and hardware. Re-use of recovered hardware can be scheduled in 0201 Demolition or 0202 Demolition (interior and alterations) and the standard of refurbishment work to recovered hardware is covered in 0455 Door hardware - Submissions.

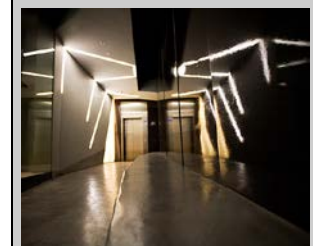
- Sanitary facilities:

Accessible facilities, including ambulant and unisex accessible compartments, need to be provided for new work. Ambulant compartments may be provided by upgrading existing cubicles (provided they are adequately sized) with grab rails, appropriately positioned toilet paper dispensers, and correct height and type of toilet seats and backrests. 0802 Hydraulic design and install, 0811 Sanitary fixtures and 0812 Tapware, may be used to specify fixtures and fittings conforming to AS 1428.1 and AS 1428.2 for accessible sanitary facilities and showers. Grab rails, toilet backrests and shower seats may be covered in 0191 Sundry items.



Angel Building, London
Allford Hall Monaghan Morris, 2010.

Refurbishment of an early 1980s commercial block to create high specification offices, café and rooftop terraces.



86-88 George Street, Sydney
Terroir Architects 2007.

Refurbishment of the heritage building’s commercial office and retail spaces. State heritage listed building with a 5 star Green Star office design rating.

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- Stairs, ramps and walkways:

Stairs, ramps and walkways in the required path of travel may only need minor modifications if existing risers/goings, gradients and handrail provisions comply. Handrails to AS 1428.1 and AS1428.2 may be specified in *0552 Metalwork – fabricated*. Luminance contrast for tread nosing (and tactile ground surface indicators (TGSIs) to AS/NZS 1428.4.1 and AS1428.2) may be specified in flooring worksections including *0652 Carpets*, *0655 Timber flooring*, and *0631 Ceramic tiling*.

Stairlifts are an option for low rise buildings where there are no lifts and it is not practical to install ramps. Where there is sufficient space, a platform lift may be used to supplement stairs less than 1 m high in an entrance and lobby.

Reversible interventions such as threshold ramps and landings may be a practical solution for overcoming access issues in heritage buildings, where altering the existing built fabric is not permitted.⁵

- Lift and lift lobby refurbishment:

Existing lifts in the accessible path of travel may only require a minor refurbishment to comply if the internal dimensions meet NCC requirements. Upgrades may include providing handrails and braille and tactile buttons to AS 1735.12 in both the lift car and at landings. Lifts over 3 storeys also require audible and visual information identifying stops and the position of the car.

- Floor finishes:

Firm, stable, slip-resistant flooring is required for an accessible path of travel. Existing uneven floors may need self levelling, cementitious toppings applied to create a suitable substrate for new finishes. However, consideration should be given to the effect such changes in floor levels may have on stairs, where riser heights and floor gradients may be affected.

Tactile ground surface indicators (TGSIs) to AS/NZS 1428.4.1 and AS1428.2. Highly polished or glossy surfaces on an accessible path of travel may cause glare and become slip hazards and should be avoided. *0631 Ceramic tiling*, *0632 Stone and terrazzo tiling* and *0651 Resilient finishes* have provisions for specifying the level of slip resistance required. Low pile carpets may be specified in *0652 Carpets*. Sustainable refurbishment options such as re-use of recovered carpet tiles can be scheduled in *0201 Demolition*. *0652 Carpets* covers reusable carpet tile backing in the Carpet tiles clause.

0224 Stormwater – site may be used to specify grates and covers located on the path of travel to AS1428.1 and AS1428.2.

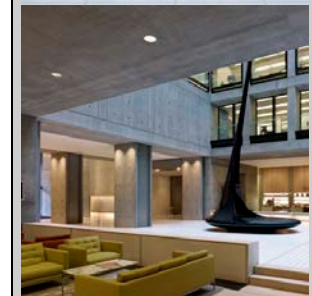
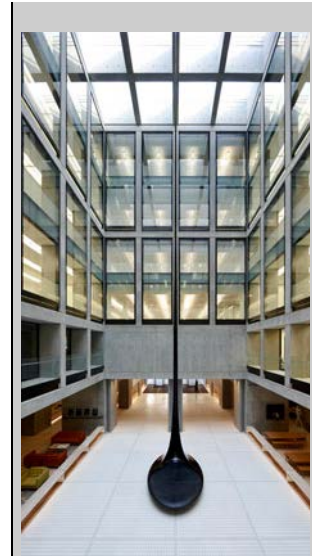
- Signage:

Areas that require braille and tactile signage include new accessible sanitary facilities, rooms with hearing augmentation systems, non-accessible pedestrian entrances and egress doors that require illuminated signs. *0581 Signage* may be used to specify signage to AS1428.1, AS 1428.2 and other statutory signage.

3.6 Mechanical services

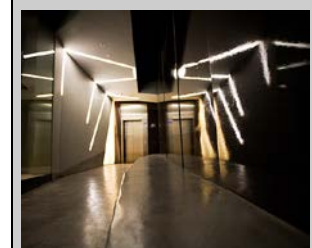
A minor upgrade to the mechanical systems may include installing metering, recommissioning systems to operate at their maximum efficiency, and upgrading and tuning existing controls and the Building Management System (BMS) to ensure the system only functions when the spaces are occupied. *0773 Building management systems*, *0791 Mechanical commissioning* and *0792 Mechanical maintenance*, may be adapted as required to suit an existing installation. Work on existing systems can be specified in *0701 Mechanical systems*.

A major upgrade may include cleaning and rebalancing ductwork and pipe work systems, upgrading filters on air handling units (AHUs), and installing variable speed drives on fans and pumps to improve energy efficiency. Other options include replacing old and inefficient equipment, selecting more efficient pumps and fans or converting existing variable air volume (VAV) systems to low temperature VAV systems.⁶ *0731 Fans*, and *0714 Mechanical pumps* may be used for specifying upgrades to these components.



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A total refurbishment is an opportunity to lower building energy consumption and improve indoor environment quality by replacing the existing air conditioning system with a new low energy system, such as a mixed mode system or chilled beams. Mixed mode VAV system air conditioning can be specified in *0701 Mechanical systems*, *0711 Chillers – combined*, *0714 Mechanical pumps* and *0724 Air handling plant – combined*. Mechanical Subgroups *073 Air handling components* and *074 Ductwork and components*, and particularly *0747 Variable air volume terminals* will also be relevant. *0773 Building management systems* can be used to specify automated operation of windows and blinds for a mixed mode system.

3.7 On-site power generation

- Cogeneration and trigeneration:

These systems produce electricity and thermal energy from a single fuel source (commonly natural gas). *0931 Power generation – engine driven* may be used to specify either a cogeneration system, which supplies electricity and heat for space heating, hot water and steam,⁷ or a trigeneration system which goes a step further and provides cooling. Another option to consider, if available, is connection to a local trigeneration energy network.

- Solar power:

Renewable solar energy may supplement a portion of a building's electricity or hot water needs. *0802 Hydraulic design and install* can be used to specify solar hot water systems. *0933 Power generation – photovoltaic* may be used to document stand alone or grid connected solar photovoltaic (PV) systems.

3.8 Water conservation

- Fixtures and equipment:

There is considerable potential for conserving water by specifying water efficient fixtures and equipment. *0811 Sanitary fixtures* may be used to schedule water efficient toilets and low water use/waterless urinals. Water efficient tapware and showerheads to AS/NZS 6400 can be scheduled in *0812 Tapware*. *0191 Sundry items* may be used to document selected equipment such as water efficient dishwashers.

- Landscape irrigation:

Water consumption may be reduced for irrigation in refurbishment projects through utilising recycled water or installing low water use Xeriscape™ gardens. *0825 Rainwater storage systems* has provisions for specifying rain water tanks and ancillaries.

- Heat rejection water systems (cooling towers):

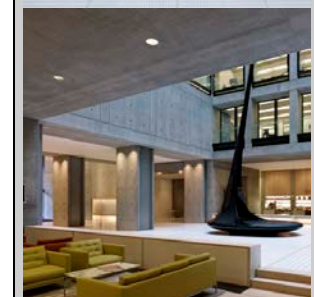
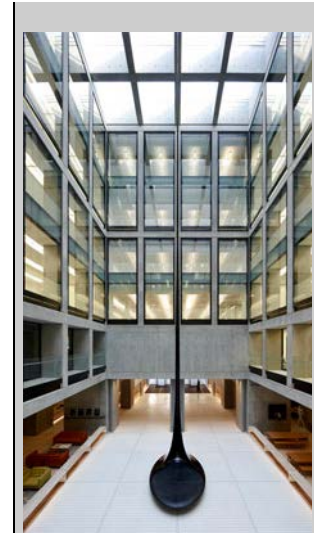
Water consumption may be decreased by specifying low water use cooling towers, reducing water use by increasing cycles of concentration and non-water consuming alternatives to cooling towers. *0713 Cooling towers* has provisions for specifying these water conserving options.

- Fire safety systems:

Thousands of litres of water a year may be wasted during fire protection system tests.⁸ *1033 Sprinklers* may be used to specify systems that recirculate water during the test or capture and re-use it on site. Water may also be conserved by improving fire sprinkler zoning to allow floor-by-floor testing.

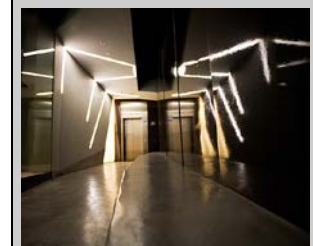
- Water harvesting and re-use:

When permitted by authorities, rainwater and greywater harvesting and re-use may significantly reduce potable water consumption. NATSPEC includes *0825 Rainwater storage systems* and *0826 Greywater systems*, for specifying these systems.



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3.9 Fire safety

Upgrading fire safety systems to conform to current requirements may include installing, modifying or replacing emergency warning systems, smoke detection and control systems, and sprinklers.⁹ Other issues include providing passive fire protection to the existing structure, and fire stair remodelling and pressurisation.¹⁰

Electrical fire system upgrades or replacements can be specified in *1072 Fire detection and alarms*, and *1073 Emergency warning and intercommunication*. Hydraulic upgrades may be covered in *1031 Hydrants*, *1032 Hose reels* and *1033 Sprinklers*.

Upgrades to the existing structure to meet current regulations or due to change of use may be covered in *0346 Structural fire protection systems*. Individual worksections such as *0331 Brick and block construction* and *0321 Precast concrete* have provisions to specify fire rating requirements. Other fire stopping measures such as fire doors and smoke seals may be specified in *0453 Doors and access panels*. Fire protection of service penetrations and control joints may be covered in *0182 Fire stopping*.

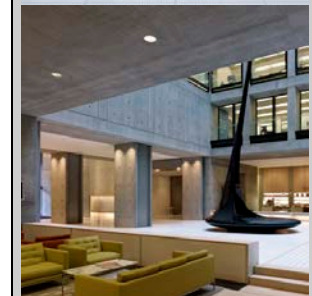
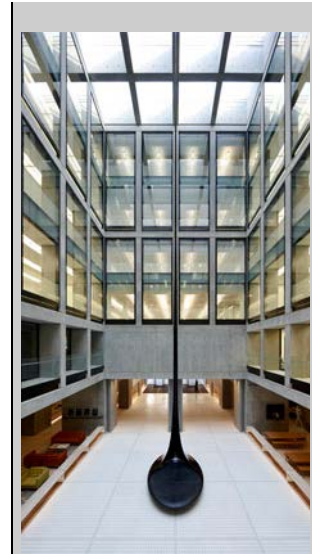
3.10 Lighting

Replacing outdated lighting may assist in reducing energy consumption, improving the indoor environment quality and reducing internal heat load. Options include installing energy efficient T5 fluorescent lamps and replacing incandescent lamps (including tungsten halogen and tungsten filament) with compact fluorescent or LEDs. Other options include providing automatic lighting controls, daylight sensors, motion detector sensors, and wiring of lighting to allow for separate switching of day-lit perimeter zones. Designing low level background illumination and supplementing with task lighting may also help reduce energy consumption. Upgrading external lighting may also help reduce light pollution through controlling light spill and upwards wasted light at night.

Provisions for specifying these upgrade options as well as refurbishment and re-use of existing luminaires can be scheduled in *0951 Lighting - Selections*.

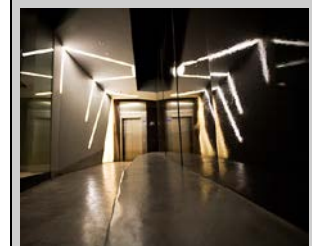
4 USING NATSPEC

As a specification template, NATSPEC will not contain all the technical requirements for every project. Specifying refurbishment, retrofit and adaptive re-use projects is similar to a new build project - the specifier will need to select the appropriate NATSPEC worksections and edit the material to suit the project. Editing may include deletion of options, or samples and tests clauses when not required. It may also include revising the quality level, adding new material that is not covered by the NATSPEC templates and editing standard text where it conflicts with project requirements, drawings, and completed prompts, or with added new material. For a step by step procedure for producing a specification from the NATSPEC templates refer to the NATSPEC paper *Specification Writing*.



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5 REFERENCED STANDARDS

AS 1428	<i>Design for access and mobility</i>
AS 1428.1:2009	<i>General requirements for access- New building work</i>
AS 1428.2:1992	<i>Enhanced and additional requirements – Buildings and facilities</i>
AS/NZS 1428.4.1:2009	<i>Means to assist the orientation of people with vision impairment – Tactile ground surface indicators</i>
AS 1735	<i>Lifts, escalators and moving walks</i>
AS 1735.12:2020	<i>Facilities for persons with disabilities (EN 81-70:2018, MOD)</i>
AS/NZS 6400:2016	<i>Water efficient products - Rating and labelling</i>

¹ Australian Government Department of the Environment and Energy, 2007, *Energy Efficiency in government operations (EEGO) Fact Sheet 9 of 12.*

www.environment.gov.au/system/files/energy/files/buildingrefurbishmentfs.pdf

² Australian Government Department of Environment and Heritage, 2004, *Adaptive Re-use – Preserving our past, building our future.*

www.environment.gov.au/heritage/publications/adaptive-reuse

³ 1200 buildings *What is a building retrofit?* City of Melbourne.

www.melbourne.vic.gov.au/1200buildings/what/Pages/WhatsRetrofit.aspx

⁴ Robinson, J, 2010, *Refurbishment of Existing Buildings: Good for the Planet and the Bottom Line.*

<http://higherlogicdownload.s3.amazonaws.com>

⁵ Department of Environment, Land, Water and Planning, *Access for all to Heritage Places*, 2008, Victoria State Government.

<https://www.heritage.vic.gov.au/research-and-publications/technical-guidance>

⁵ Eric Martin and Associates Architects, *Access to Heritage Place Guidelines*, Vic, January 2018.

http://www.emaa.com.au/uploads/4/6/3/2/46326229/20180112_access_to_heritage_buildings_guidelines_vic.pdf

⁶ Robinson, J, 2010, *Refurbishment of Existing Buildings: Good for the Planet and the Bottom Line*, p14.

⁷ NSW Office of Environment and Heritage, *Energy efficiency – Cogeneration*, NSW Government.

<http://www.environment.nsw.gov.au/business/cogeneration.htm>

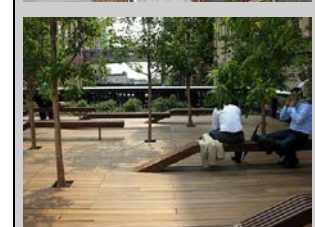
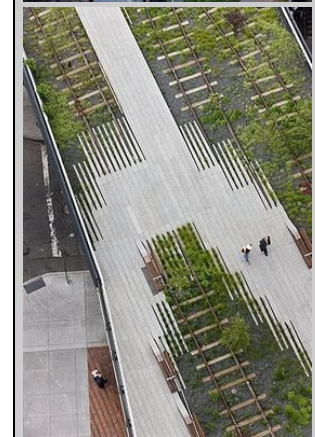
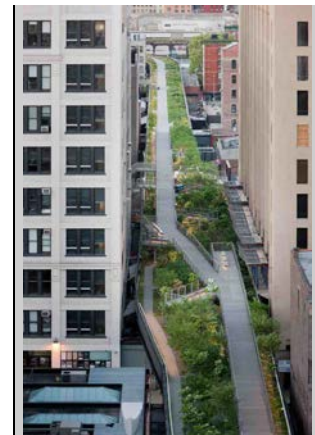
⁸ Plumbing Industry Commission 2009, *Guide To Fire Sprinkler System Water Saving.*

https://www.citywestwater.com.au/sites/default/files/attachments/guide_to_fire_sprinkler_system.pdf

⁹ Adelaide City Council and Jones Lang LaSalle, 2007, *Building Refurbishment Guide.*

¹⁰ OneSteel, 2000, *Fire engineering aids AMP refurbishment.*

<https://www.libertyfgf.com/media/54853/fire-engineering-aids-amps-refurbishment.pdf>



High Line, New York

James Corner Field Operations, Diller Scofidio + Renfro, Piet Oudolf, 2009-2014.

Staged adaptive re-use of a disused 1930s elevated freight train line to a public park.

APPENDIX A: NATSPEC REFURBISHMENT WORKSECTIONS

01 GENERAL**013 Generic preliminaries**

0133 Preliminaries (Interior and alterations)

014 Contract preliminaries

0140 Preliminaries - ABIC BW-1

0141 Preliminaries - ABIC MW-2008

0141 Preliminaries - ABIC MW-2011 C Qld

0142 Preliminaries - ABIC SW-2008

0142 Preliminaries - ABIC SW-2011 C Qld

0143 Preliminaries - AS 2124

0144 Preliminaries - AS 4000

0145 Preliminaries - AS 4905

0146 Preliminaries - AS 4902

0148 Preliminaries - ABIC EW-1

017 General requirements

0171 General requirements

0172 Environmental management

018 Common requirements

0181 Adhesives, sealants & fasteners

0182 Fire-stopping

0183 Metals and prefinishes

0184 Termite management

0185 Timber products, finishes and treatment

019 Sundry installations

0191 Sundry items

0193 Building access safety systems

02 SITE, URBAN AND OPEN SPACES**020 Demolition**

0201 Demolition

0202 Demolition (Interior and alterations)

022 Preparation and groundwork

0221 Site preparation

0222 Earthwork

0223 Service trenching

0224 Stormwater - site

024 Landscape structures

0241 Landscape - walling and edging

0242 Landscape - fences and barriers

0243 Landscape - water features

025 Landscape cultivation

0250 Landscape - combined

0251 Landscape - soils

0252 Landscape - natural grass surfaces

0253 Landscape - planting

0254 Irrigation

0255 Landscape - plant procurement

0256 Landscape - establishment

0259 Landscape - maintenance

026 Landscape finishes

0261 Landscape - furniture and fixtures

0262 External sports and playground surfacing

027 Pavements

0271 Pavement base and subbase

0272 Asphalt

0273 Sprayed bituminous surfacing

0274 Concrete pavement

0275 Paving - mortar and adhesive bed

0276 Paving - sand bed

0277 Pavement ancillaries

0278 Granular surfaces

0279 Paving - on pedestals

03 STRUCTURE**030 Foundations**

0301 Piling

031 Concrete - In situ

0310 Concrete - combined

0311 Concrete formwork

0312 Concrete reinforcement

0313 Concrete post-tensioned

0314 Concrete in situ

0315 Concrete finishes

0318 Shotcrete

032 Concrete - Systems

0321 Precast concrete

0322 Tilt-up concrete

033 Masonry

0331 Brick and block construction

0332 Stone masonry

0333 Stone repair

0334 Block construction

0335 Brick construction

034 Steel

0341 Structural steelwork

0342 Light steel framing

0343 Tensioned membrane structures

0344 Steel-hot-dip galvanized coatings

0345 Steel-protective paint coatings

0346 Structural fire protection systems

038 Timber

0381 Structural timber

0382 Light timber framing

0383 Sheet flooring and decking

04 ENCLOSURE**041 Tanking and damp-proofing**

0411 Waterproofing - external and tanking

042 Roofing

0421 Roofing - combined

0423 Roofing - profiled sheet metal

0424 Roofing - seamed sheet metal

0425 Roofing - shingles and shakes

0426 Roofing - slate

0427 Roofing - tiles

043 Cladding

0431 Cladding - combined

0432 Curtain walls

0433 Stone cladding

0434 Cladding - flat sheets and panels

0435 Cladding - planks and weatherboards

0436 Cladding - profiled and seamed sheet metal

0437 Cladding - insulated panel systems

045 Doors and windows

0451 Windows and glazed doors

0453 Doors and access panels

0454 Overhead doors

0455 Door hardware

0456 Louvre windows

0457 External screens

046 Glass

0461 Glazing

0462 Structural silicone glazing

0463 Glass blockwork

0466 Structural glass assemblies

0467 Glass components

047 Insulation

0471 Thermal insulation and pliable membranes

0472 Acoustic insulation

05 INTERIOR**051 Linings**

0511 Lining

052 Partitions

0520 Partitions - combined

0521 Partitions - demountable

0522 Partitions - framed and lined

0523 Partitions - brick and block

0524 Partitions - glazed

0525 Cubicle systems

0526 Terrazzo precast

0527 Room dividers

053 Ceilings

0531 Suspended ceilings - combined

0532 Suspended ceilings - flush lined

0533 Suspended ceilings - ceiling units

054 Access floors

0541 Access floors

055 Fixtures

0551 Joinery

0552 Metalwork - fabricated

0553 Stainless steel benching

057 Furniture and furnishings

0571 Workstations

0572 Miscellaneous furniture

0573 Fire extinguishers and blankets

0574 Window coverings

058 Signs and features

0581 Signage

APPENDIX A: NATSPEC REFURBISHMENT WORKSECTIONS

06 FINISH**061 Trowelled and sprayed coatings**

- 0611 Rendering and plastering
- 0612 Cementitious toppings
- 0613 Terrazzo in situ

062 Wet areas

- 0621 Waterproofing - wet areas

063 Tiling

- 0631 Ceramic tiling
- 0632 Stone and terrazzo tiling

064 Wall surfacing

- 0641 Applied wall finishes
- 0642 Wallcoverings

065 Floor surfacing

- 0651 Resilient finishes
- 0652 Carpets
- 0654 Engineered panel flooring
- 0655 Timber flooring
- 0656 Floor sanding and finishing
- 0657 Resin based seamless flooring

067 Painting and wallpapering

- 0671 Painting
- 0672 Textured and membrane coatings
- 0673 Powder coatings

07 MECHANICAL**070 Mechanical general**

- 0701 Mechanical systems
- 0702 Mechanical design and install
- 0703 Mechanical design and construct (Design)

071 Water plant

- 0711 Chillers - combined
- 0712 Water heating boilers
- 0713 Cooling towers
- 0714 Mechanical pumps
- 0715 Tanks, vessels and heat exchangers
- 0716 Chillers - centrifugal
- 0717 Chillers - water cooled screw
- 0718 Chillers - air cooled screw and scroll
- 0719 Chillers - absorption

072 Air plant

- 0721 Packaged air conditioning
- 0722 Room air conditioners
- 0723 Evaporative air coolers
- 0724 Air handling plant - combined
- 0725 Air handling plant - built up
- 0726 Air handling plant - minor
- 0727 Air handling plant - packaged

073 Air handling components

- 0731 Fans
- 0732 Air filters
- 0733 Air coils
- 0734 Humidifier
- 0736 Space heating

074 Ductwork and components

- 0741 Ductwork
- 0744 Ductwork insulation
- 0745 Attenuators and acoustic louvres
- 0746 Air grilles
- 0747 Variable air volume terminals
- 0748 Chilled beams

075 Piping

- 0751 Mechanical piping
- 0752 Mechanical piping insulation
- 0753 Water treatment
- 0754 Liquid fuels
- 0755 Medical gas systems

076 Refrigeration

- 0761 Refrigeration
- 0762 Cool rooms

077 Control

- 0771 Automatic controls
- 0772 Automatic controls - minor
- 0773 Building management systems

078 Mechanical electrical

- 0781 Mechanical electrical
- 0782 Mechanical electrical - minor
- 0784 Motors and starters

079 Mechanical commissioning and maintenance

- 0791 Mechanical commissioning
- 0792 Mechanical maintenance

08 HYDRAULIC**080 Hydraulic general**

- 0801 Hydraulic systems
- 0802 Hydraulic design and install

081 Hydraulic components

- 0811 Sanitary fixtures
- 0812 Tapware
- 0813 Water heaters
- 0814 Hydraulic pumps
- 0815 Boiling, chilled, and filtered water dispensers

0816 Tanks**082 Hydraulic systems**

- 0821 Stormwater - buildings
- 0822 Wastewater
- 0823 Cold and heated water
- 0824 Fuel gas

0825 Rainwater storage systems**0826 Greywater systems****088 Hydraulic electrical**

- 0882 Hydraulic electrical - minor

089 Hydraulic commissioning and maintenance

- 0891 Hydraulic maintenance

09 ELECTRICAL**090 Electrical general**

- 0901 Electrical systems
- 0902 Electrical design and install

091 Electrical equipment

- 0911 Cable support and duct systems

092 Power systems

- 0921 Low voltage power systems

093 Power supply equipment

- 0931 Power generation - engine driven
- 0933 Power generation - photovoltaic
- 0937 Uninterruptible power supply

094 Power distribution equipment

- 0941 Switchboards - proprietary
- 0942 Switchboards - custom-built
- 0943 Switchboard components
- 0947 Power factor correction

095 Lighting systems

- 0951 Lighting

096 Communication systems

- 0961 Telecommunications cabling
- 0962 Television distribution systems
- 0963 Sound systems

097 Safety systems

- 0971 Emergency evacuation lighting
- 0979 Lightning protection

098 Security systems

- 0981 Electronic security

099 Electrical commissioning and maintenance

- 0991 Electrical maintenance

10 FIRE**100 Fire general**

- 1001 Fire services systems
- 1002 Fire services design and install

101 Fire components

- 1014 Fire services pumps
- 1016 Fire services tanks

103 Wet fire suppression systems

- 1030 Combined wet fire suppression systems
- 1031 Hydrants
- 1032 Hose reels
- 1033 Sprinklers

104 Dry fire suppression systems

- 1041 Gaseous fire suppression systems

105 Chemical fire suppression systems

- 1051 Liquid chemical fire suppression systems

107 Fire safety systems

- 1072 Fire detection and alarms
- 1073 Emergency warning and intercommunication

108 Fire electrical

- 1082 Fire services electrical - minor

109 Fire commissioning and maintenance

- 1082 Fire services maintenance

20 CONVEYING**201 Conveying equipment**

- 2011 Lifts design and install