“Looking to other cities in the world it is evident that change is happening in a number of cities....
Common for all of them is a movement towards a more balanced traffic system, a strong focus at public space and an understanding of how a high quality public realm can invite more people to use the city in a variety of ways.”

(J. Gehl, Public Space- Public Life Sydney, 2007)
Appendix A: Shaping Our Thinking

There have been a number of urban consultants who are playing a worldwide role in shaping the way streets are perceived, arranged and implemented. As part of the process of rethinking the Sydney’s streets, inspiration has come from these consultants research and a number of best practice examples of cities with ‘great streets’

A.1 BACKGROUND RESEARCH

**Commission for Architecture and the Built Environment**

CABE offers expert independent design advice to improve quality of built environment in England. They advise on how to create well-designed buildings, places and spaces and review proposals for major developments. Their website provides resources and publications on design advice, and case studies. CABE has influenced and written extensively about street design in the UK. Influential publications include:

- This Way To Better Streets - 10 case studies
- Transforming Our Streets - produced for the Department for Transport, Local Government and the Regions and sets out clear recommendations for change
- Manual for Streets - produced for the Department for Transport, puts people first, identifying streets as major elements of placemaking and emphasising their role in creating successful neighbourhoods

CABE has developed 5 key principles that local authorities involved in street design should follow:

1. Vision - Maintain strong physical and organisational vision
2. Commitment - Be committed to long delivery timescales and management
4. Adaptation - Take account of climate and culture change to deliver sustainable spaces
5. Coherence - Deliver well-conceived projects that are resolved into a coherent design solution.

**Project for Public Spaces, PPS**

PPS was founded to expand upon the work of William Whyte (author of The Social Life of Small Urban Spaces) and is a nonprofit planning, design and educational organisation dedicated to helping people create and sustain public places that build stronger communities. PPS is based in New York and has completed projects in over 40 countries. PPS focuses on Placemaking and what makes a great space. They have nine program areas, these are: parks, transportation, markets, downtowns, civic centres, multi-use, campuses, squares, and waterfronts and offer a large collection of resources, articles and critiques on public spaces around the world. Articles relevant to street design include:

- A Guide to Transit-Friendly Streets
- Balancing Street Space for Pedestrians and Vehicles
- Traffic Calming 101

PPS has had a strong influence in street design for New York. They were bought in along with strategic partners to create a bold vision for reinventing NYC streets as vibrant public spaces. The campaign ‘Liveable Streets’ has seen pilot projects implemented and has raised the profile of progressive transportation and public space issues.
Briefing

This way to better streets: 10 case studies on improving street design

Streets are hard-working spaces. They balance a wide range of uses, communicate values and signify the transformation of neighborhoods. As our environment changes, so do our needs and the ways in which we use them. Streets need to respond to the demands of climate change and shifts in culture. Gehl Architects has been involved in the production of city plans and policy all over the world including New York, London, Zurich, and most recently, Sydney with the Public Spaces, Public Life Survey.

Gehl Research coordinates lectures and master classes all around the world with the human dimension within planning as a point of departure. Focus is on:

- Putting humans first
- Creating human and efficient planning processes
- How to study city life and city space
- Planning for pedestrians and bicyclists

Influential publications include the books; Life Between Buildings, Public Spaces - Public Life, New City Spaces and New City Life.

Results include 49 acres of road space given back to the public in the form of bike lanes, pedestrian areas and public plazas.

**Jan Gehl and Gehl Architects**

With the human dimension as a starting point Jan Gehl has worked (through the last 30 years) to improve city environments throughout the world. The objective of Gehl Architects is to create a stronger coherence between life lived and the planned or existing building structures, with a vision to create better cities that improve people’s quality of life. Gehl Architects has been involved in the production of city plans and policy all over the world including New York, London, Zurich, and most recently, Sydney with the Public Spaces, Public Life Survey.

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Influential publications include the books; Life Between Buildings, Public Spaces - Public Life, New City Spaces and New City Life.
A.2 BEST PRACTICE EXAMPLES

Worldwide, there are leading ‘best practice’ examples of how best to implement change to improve the pedestrian experience, public life and public domain quality of streets. These cities, and the reason they are considered exemplar, are listed below;

**Lyon, France**
- Logical hierarchy of high quality materials based on the function of the street
- Opportunity for modification of the standard palette of materials in ‘special areas’ to allow the expression of a unique character within a certain area

**Barcelona, Spain**
- Consistency of streetscape materials that allow the streets to be ‘neutral’ as spaces linking the zones for public activity (the squares). Allowing for a change of materials to express uniqueness within these spaces.

**Melbourne, Australia**
- Providing a consistent and unified palette of materials
- Consistency of geometry on the streets; setbacks for the kerbs, zones for furniture and spatial arrangements

**Copenhagen, Denmark**
- Prioritising cycling throughout the city
- Creation of pedestrian only, pedestrian priority, and limited vehicular access streets
- Reducing parking in the city and encouraging walking or cycling as an easier alternative
- Designing public spaces (squares and plazas) to offer a range of different activities and recreation opportunities

**New York, USA**
- Transforming 49 acres of traffic lanes and parking bays into public use as bike lanes and plazas
- Encouraging weekend streets closures for local community oriented activities
New York City Image, Street Design manual, NYC Department of Transportation, 2009

Bourke St Mall, Melbourne,
A.3 CITY OF SYDNEY INITIATIVES

The City of Sydney has undertaken a number of recent studies and initiatives of relevance to Sydney’s street design. These broad scale studies have guided the development of the new streets design code, and form the basis of the vision for Sydney’s streetscapes. These important initiatives include;

**Public Spaces Public Life, Sydney, Gehl, 2007**

This study, undertaken by Jan Gehl in 2007, provided a vision for Central Sydney as a more human, benign city. It is based upon the transformation of the city centre currently dominated by vehicular traffic, towards a friendlier, more equitable and sustainable place where the people and their needs are the fundamental drivers of public domain quality.

The key recommendation from Gehl’s study was to differentiate street types to identify a hierarchy of vehicular and pedestrian access, and create a more legible public domain with improved provision for cyclists, public transport and private vehicles. This would ensure that streets are not only for transport, but also for a wide range of social activities.

Key objectives identified in the study are to:

- Create a green connected pedestrian network linking existing and new public open space.
- Intensify street tree planting to enhance identity of streets.
- Develop an attractive pedestrian environment, with high quality pavements and street furniture.
- Widen the footpaths wherever possible.
- Introduce more public seating, improve signage and reduce clutter.
- Create an integrated cycle network aligned to public transport and introduce dedicated cycle lanes.
- Improve universal accessibility.
- Encourage activation of laneways.
- Increase public art in the City Centre.
Sustainable Sydney 2030
Published in 2009 by the City, Sustainable Sydney 2030 provides an holistic vision and roadmap for an integrated, sustainable Sydney. Gehl’s vision developed in the Public Spaces Public Life study for a more human, benign city has been enshrined in Sydney 2030, within a broader framework for making our city a green, global, connected, and ultimately sustainable urban environment. A sustainable, green and connected street network will contribute to the achievement of the 2030 targets for;
• A Leading Environmental Performer
• Integrated Transport for a Connected City
• A City For Walking and Cycling
• A Lively, Engaging City Centre
• Sustainable Development, Renewal and Design
• An Integrated Inner Sydney Transport Network
• A Liveable Green Network
• Activity Hubs as a Focus for the City’s Village Communities and Transport

Greening Sydney Plan
The Greening Sydney Plan provides a framework to increase tree canopy and landscape areas, enhance habitat and biodiversity and improve public domain quality of the City’s streets.
Liveable Green Networks
One of the key principals (moves) of Sustainable Sydney 2030 is a ‘Liveable Green Network'. This is defined as continuous green corridors that provide safe, high quality and continuous routes for pedestrian and cyclists connecting ‘green’ spaces, the liveable main streets, Activity Hubs, and the main activities across the city.
The Liveable Green Network is made up of streets and lanes with pedestrian and/or bicycle priority and good amenity to enable people to conveniently move around and across the city.

Pedestrian Cycling and Traffic Calming (PCTC)
PCTC devices are used to manage and calm traffic on roads, increase pedestrian, bicycle and public transport access and provide better safety and amenity for local residents. The City is promoting their use on roads to develop an improved pedestrian and cycle environment. The changes include;
• Slower speed limits and the creation of slow points - including central islands and blisters
• Tighter turning radius on roundabouts and on corner kerbs
• Raised pedestrian thresholds and crossings
• Creation of shared traffic zones including continuing the pedestrian surface treatment across intersections.
• Widening footpaths and creating kerb extensions.

Cycle Network Planning
The City of Sydney Cycle Strategy and Action Plan 2007 - 2017 (the Strategy) provide overall direction and aims to achieving greater participation in cycling in Sydney. The strategy defines a coordinated network of cycling routes to interconnect with the City’s villages. The City will develop separated bicycle roads within the existing road kerbs to provide safe cycling facilities for all cyclists.
The aim of the cycle strategy is;
• To provide major routes at the spacing required to encourage residents and visitors onto bicycles as a sustainable transport option.
• To create and maintain a comfortable and bicycle friendly environment in Sydney
• To improve cycling safety
• To promote the benefits of cycling, and
• To increase the number of trips made by bicycle in Sydney

The selection of an appropriate treatment type for cycle routes is
a function of a number of parameters including carriageway width, anticipated bicycle volumes, vehicle traffic volume and local conditions. Please refer to Council’s detailed Cycle Strategy for latest plan and relevant details.

Laneways Revitalisation Program
The City of Sydney wants to bring life back to the laneways in the City Centre and reactivate these unique, under-used city spaces. Pedestrian laneways are those with either part or full closure to vehicular traffic. These laneways should be designed to a pedestrian scale speed and level of detail wherever possible, to make them attractive and comfortable spaces for pedestrians, and remind drivers that they should proceed cautiously and slowly. Laneways can also serve as valuable public space and should be designed with seating, landscaping, and pedestrian lighting where possible to create safe, usable space.
“...key renewal sites provide immediate opportunities to plan for collective and innovative approaches to energy generation, waste treatment and affordable housing. They also provide people oriented development- new public domains, housing and work places that are accessible to and inclusive of everyone.”

(Sustainable Sydney 2030 : THE VISION)
Appendix B: Future Transformations

B.1 INTRODUCTION

These street designs are more aspirational as they require adjustments to the existing street arrangement and kerb alignment to be realised. These street types are likely to be implemented only where the City of Sydney proposes major changes to existing streets, or when new streets are constructed in urban renewal areas. Designers and developers are to consult with the City of Sydney regarding the hierarchy and location of new streets in Urban Renewal areas.
B.2 STREET TYPES

B.2.1 GEORGE STREET BOULEVARD

Boulevards are wide streets that act as grand promenades between important destinations. They often have an exceptional level of landscaping, public open space, public transport infrastructure (such as light rail) and visual quality. The main spine / boulevard in the City Centre is George Street. Vehicular access may be limited to restricted hours for deliveries.

*Note: the Illustration below is indicative only, and subject to further detailed design.*
B.2.2 TRANSIT STREETS

Transit streets are streets where public transport operations are given priority. Transit Streets are streets where private vehicles have limited or no access, and bus or light rail use is prioritised. Delivery access may be allowed at all times or in off-hours, and cycle lanes may be provided if space permits.

Note: the Illustration below is indicative only, and subject to further detailed design.
B.2.3 SLOW STREETS

Slow streets make extensive use of traffic-calming measures and reduced speed limit signage to discourage vehicular through-traffic, reduce vehicular speeds, and green the streetscape, creating a comfortable environment for bicycling and walking.

*Note: the illustration below is indicative only, and subject to further detailed design.*
B.2.4 PEDESTRIAN PRIORITY STREETS

Pedestrian Zones usually involve either dedicated 10km/hr shared way and/ or full time/ partial restriction of vehicle access to a street. Delivery access may be allowed in off-hours in these streets. 10km shared zones will require the removal or reduction of separational elements from a typical road so that slow speed limits are self enforcing as per RTA guidelines. Inclusive access requirements to ensure safe navigation for visually impaired pedestrians needs to be a primary design objective.

*Note: the Illustration below is indicative only, and subject to further detailed design*
“Embodying the aspirations set by the community in the 2030 consultation, the big moves of the 2030 Vision are intended to “remake the City” into one that is green, global and connected. The Big Moves will secure Sydney’s future growth prospects while improving its attractiveness and liveability. They will ensure the sustainability of the City environmentally, socially and economically.”

(Sustainable Sydney 2030 : THE VISION)
Appendix C: Sustainable Material Considerations

C.1 PAVING AND FURNITURE MATERIALS

Objective
In preparing this Design Code, a detailed assessment of the sustainability of existing and new paving and furniture materials was undertaken by Cundall. In the report from Cundall (Appendix D), materials in the Sydney Streets Design Code standard palette have been compared in terms of environmental sustainability to assist with the decision-making process for the revision of the Street Design Codes. Additionally, the material components in the furniture have been examined with regards to sustainability.

Methodology
There are three main ways of assessing the environmental impact of a material:
• Cradle to gate analysis - Consideration of a materials impact through the production stage only
• Cradle to site analysis - Impact of the production stage and transport to site
• Cradle to grave analysis - Impact of production stage, transport to site and beyond, including repair / replacement and demolition

This analysis aims to undertake the most detailed assessment; cradle to grave; where possible, examining the source and raw production of the material, the transport to site and the durability and likely lifespan. Each material has been considered in terms of source of supply and transport emissions, durability and environmental impacts. While embodied energy data for each material varies considerably depending on the source of data, the UK Building Research Establishment has established a relative rating scheme for materials as a part of their
environmental Assessment Method (BREEAM). This scheme is based on extensive analysis of extraction, production and processing, and covers a number of environmental impact areas that include climate change, ecotoxicity, fossil fuel depletion, eutrophication and ozone depletion.

Materials are rated from A+ (the best result averaged across all impact areas) and E (the worst performers). This rating assumes that production is local, so in order to provide a comparison which is more specific to Sydney, the source of the material has been included, as well as the transport emissions that would result in a one-way trip by freight truck. Additionally, a durability index has been provided, which ranks each material from A (most durable) to C (least durable). A material’s lifetime can have significant impact on replacement. Finally an appraisal has been made of the impact on local ambient temperatures and the contribution to the ‘heat island’ effect. Materials were rated, low, Medium or High in terms of their impact on the local environment and contribution to the heat island effect.

The summary of the findings from the study support the continued use of Austral Black granite in City Centre and Gateway Corridors due to high longevity, use of lighter coloured materials that absorb less of the sun’s heat, and continued use of concrete pavers and asphalt that have a lower rating (under the BRE scheme), although impacts due to low longevity is a significant factor that requires consideration.

The Cundall report is provided in Appendix D.

C.2 LIGHTING
The City of Sydney is currently reviewing the standard light fittings with regard to energy efficiency and amenity on footpaths. Lights and lamp types will be tested to determine the most appropriate choice of lamp, fitting and location which will inform a new Lighting Code, separate to this Streets Code.
C.3 WATER SENSITIVE URBAN DESIGN (WSUD)

The City has completed the Decentralised Water Master Plan and WSUD Technical Guidelines that provide comprehensive principles and guidelines that promote a more integrated approach to managing stormwater as well as greening and enhancing biodiversity.

There are several devices and means that can be used to integrate WSUD principles. Examples of WSUD devices include:
• permeable pavers,
• infiltration units,
• wetlands,
• bio-retention units,
• raingardens.

Raingardens are one of the simplest forms of a bio-retention unit. The use of raingardens and other devices in streetscape projects wherever practicable will help achieve the multiple objectives of improving stormwater quality, greening and enhancing biodiversity as outlined in Sustainable Sydney 2030.
“The Vision is of a Green, Global, Connected City: Green with a modest environmental impact, green with trees, parks, gardens and linked open spaces, native flora and fauna, green by example and green by reputation.”

(Sustainable Sydney 2030 : Support Document)
Appendix D: Materials Comparison

SSDC: COMPARISON OF MATERIALS IN THE STANDARD STREET DESIGN PALETTE, CUNDALL, 2010
The current Sydney Streets Design Code Standard palette has been compared in terms of environmental sustainability to assist with the decision-making process for the revision of the Street Design Codes. The objective is to compare materials in the current standard palette in terms of environmental sustainability to assist with the decision-making process for the revision of the Sydney Streets Design Code.

Methodology

Materials are rated from A+ (the best result averaged across all impact areas) and E (the worst performers). This rating assumes that production is local, so in order to provide a comparison which is more comprehensive and specific to Sydney, the assumed source of the material has been included, as well as the transport emissions which would result from a one-way trip by freight truck. Additionally, a durability index has been provided, which ranks each material from A (most durable) to C (least durable). Finally, an assessment has been made of the impact on local ambient temperatures and the contribution to the heat island effect. Each material has been ranked in terms of its potential impact on local environment and made of the impact of local ambient temperatures and the contribution to the heat island effect. Materials have been ranked in terms of their potential impact on local environment and made of the impact of local ambient temperatures and the contribution to the heat island effect.

Environmental Rating

As detailed above, the UK BRE Materials Rating scheme has been used as a basis for this analysis. This scheme is based on extensive analysis of extraction, production, and processing, and covers the following environmental impact areas:

- Air Dispersion
- Water Discontent
- Wind Dispersion
- Ozone Dispersion
- Fossil Fuel Dispersion
- Climate Change

The BRE Green Guide to Specification has been used in this analysis to provide a recognised format by which to benchmark the current materials in the Sydney Streets Design Code palette. The BRE Green Guide to Specification is a document which seeks to benchmark the environmental performance of materials and products, including the energy required for production and the transport emissions that would result from a one-way trip by freight truck. This guide is used to provide a recognised format by which to benchmark the current materials in the Sydney Streets Design Code palette.
Sydney Street Design Code

Transport Emissions

Where possible the specific site where the material is quarried has been considered. Transport emissions to the Sydney CBD from the specific site have then been calculated.

Materials will cause a net effect on the location and the environmental impact will therefore vary. The exact occurrence of glare will be highly dependent on the location; however it is important to note which materials will cause glare. When selecting a material for a particular exposure location, glare should be considered in the context of each street type.

Where possible the specific site where the material is quarried has been considered. Transport emissions to the Sydney CBD from the specific site have then been calculated.

Durability

The selected materials have been rated according to their durability. This durability rating has been based upon a number of factors, including strength, water absorption and likely lifespan. An overall rating has been given to each material, to benchmark them against one another, rated A (most durable) to C (least durable). The durability impact should not be underestimated. A material which has low performance strength and a lower predicted lifespan will need replacing sooner than a better performing material.

The durability of each material has been rated according to its application and exposure. The durability of each material has been assessed for vehicular traffic and pedestrian traffic, as for some materials there is a difference due to its particular application and exposure. Consideration should be given to the expected energy of a material when exposed to vehicular traffic and pedestrian traffic. This can have a significant effect on the durability of a material. A material that is more resistant to vehicular traffic and pedestrian traffic will be more durable.

The durability of each material has been rated according to its application and exposure. Where possible the specific site where the material is quarried has been considered. Transport emissions to the Sydney CBD from the specific site have then been calculated.

Sydney Street Design Code

Materials Comparison

Please see the table on the following pages for results of the comparative analysis.
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*Materials Comparison*

Sydney Street Design Code

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**Sydney Street Design Code**

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**Correspondence**

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**Reports**

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**Materials Comparison**

*Sydney Street Design Code*
Other Considerations

Typical stone materials in the standard palette (Austral Verde, Austral black etc) require intensive and disruptive quarrying practices; however the materials are durable and likely require less frequent repair/replacement. Availability of supply is also a major consideration – stone supply is limited, and in many cases requires transport over long distances by emissions-intensive road freight.

Asphalt and concrete pavers have a better rating under the BRE scheme, however their lower durability means that earlier replacement may be required, and the potential additional carbon emissions from their production must be considered. The sub-base used has a major impact on environmental ratings, and the use of a recycled material for pavement sub-base can significantly improve environmental outcomes.

The lighter coloured materials, such as limestone and sandstone, have less of an impact on the surrounding environment and retain less heat through reflecting more of the sun's heat. However, the impact of these materials should be considered carefully.

Another consideration which is important and not currently included in the table above is the reusability and recycling potential of any materials. This should be considered when making any decisions to change a material in the standard palette. Additionally, the potential disposal through repair and replacement must be considered. Materials that are easier to repair and replace may have a higher durability and can therefore be considered for substitution.

Standard Furniture

The current street furniture within the Sydney Streets Design Code is provided by JC Decaux. This includes seats, benches, bicycle racks and rubbish bins. JC Decaux are ISO 14001 certified which means that they have a company Environmental Management System with the aim of reducing the environmental footprint of the company and decreasing the waste produced by the company's activities.

As the Sydney streets furniture will be provided by an external company, it is important to ensure that the environmental credentials of the company are held to scrutiny. An ISO accreditation should be a minimum.