



Urban Design

September 2007

The Institution of Professional Engineers New Zealand Incorporated (IPENZ) is the non-aligned professional body for engineering and technology professionals in New Zealand.

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ISSN 1176-0907

Scope

This *Practice Note* is primarily directed at engineers, designers and other professions involved in the urban design process. It aims to encourage IPENZ Members to adopt the Urban Design Protocol (the Protocol) in their engineering activities, and raise awareness of the values inherent in delivering an improved urban environment, both socially and functionally, to our communities.

The term “urban design” has a wide, almost boundary-less definition with different connotations depending on professional discipline or the particular context within which the urban environment is being assessed. This *Practice Note* does not intend to offer a definition as to what constitutes urban design. Instead, it aims to describe the underlying issues that currently drive urban design practice in New Zealand, and place engineering into that contextual frame by offering suggested guidelines for getting from where we are now to where we would like to be in the future.

Focusing on the urban environment through the Protocol is particularly appropriate because most New Zealanders live in a town or city, and improving the quality of life for our predominantly urban population is fundamental to future social cohesion and societal well being.

The Protocol is a voluntary commitment to specific urban design initiatives by signatory organisations which include central and local government, the property sector, design professionals, professional institutes and other groups. The full list of signatories can be viewed at www.mfe.govt.nz/issues/urban/designprotocol/signatories.html

The Protocol aims to make our towns and cities more successful by using quality urban design to help them become:

- competitive places that thrive economically and facilitate creativity and innovation
- liveable places that provide a choice of housing, work and lifestyle options
- environmentally responsible places that sustainably manage all aspects of the environment
- inclusive places that offer opportunities for all citizens
- distinctive places that have a strong identity and sense of place
- well-governed places that have a shared vision and sense of direction

The Protocol identifies seven essential design qualities:

- Context – seeing that buildings, places and spaces are part of the whole town or city.
- Character – reflecting and enhancing the distinctive character, heritage and identity of our urban environment.
- Choice – ensuring diversity and choice for people.
- Connections – enhancing how different networks link together for people.
- Creativity – encouraging innovative and imaginative solutions.
- Custodianship – ensuring design is environmentally sustainable, safe and healthy.
- Collaboration – communicating and sharing knowledge across sectors and professions, and with communities.

For more details visit www.mfe.govt.nz/issues/urban/design-protocol/index.html

Background

As a signatory to the Protocol, IPENZ has assumed a responsibility (shared with all signatories) to make New Zealand towns and cities more successful through “quality urban design”.

This commitment is consistent with the *IPENZ Code of Ethics*, which includes reference to the need for Members to value sustainable management and care for the environment. Reference can also be made to *IPENZ Practice Note 05 “Sustainability and Engineers”*.

There is a growing body of informed opinion which suggests that a series of challenges, unlike any that humanity has faced before, now confronts us. As each becomes tangibly evident, or is confirmed by scientific evidence which is reasonable beyond dispute, there will be a demand for social and economic adjustment, and for practical solutions that are designed to mitigate their consequences. This is one role of urban design.

Almost 87 per cent of New Zealand’s population lives in towns and cities. This is an emphatic indication of the extent to which the quality of the urban environment affects the lives of New Zealanders. But towns and cities are complex in the extreme. They must possess a wide range of functional necessities, and they must also in equal measure cater for the intricacies of human intellectual and physical needs and behaviour. It follows that, to be successful, cities must strike the best possible balance between all these demands, and strive to achieve this with the support of the community as a whole.

If successful urban environments are to be sustained they must be resilient and have the capacity to adapt to changing circumstances. An important part of adaptability is anticipating and preparing for change because this is almost always preferable to dealing with events after they have occurred. Currently, attention is being increasingly focused on the ways in which we meet our energy needs, the implications of climate change, air and water quality, and demographic evolution (changing family structures and migration).

Each of these issues has clear functional implications, but there are other important, if more subtle, forces at work which also have a direct bearing on the quality of life enjoyed by urban populations. For example, physical and mental health can be related to levels of stress: a poorly-designed environment may create stress, while a well-designed environment can avoid or relieve it. Ultimately, good urban design is about delivering a better quality of life to all those who inhabit our urban areas.

A particular challenge to engineers is the question of resource stewardship and what that means for society and the economy. Waste, for example, is commonly regarded as either a production by-product or as an inevitable end-of-life outcome. The reality, however, is that much waste is created before anything is actually built, manufactured or sold, and much of it results from design decisions. These decisions may be influenced by a commercial imperative or consumer preferences. But, although

this is a general practice, it makes very little economic sense when sustainability is factored into the equation. Largely non-renewable resources used for production, distribution and waste disposal create an open loop that produces little of permanence, and consumes many more resources than necessary.

If the implications of this are not understood and responded to appropriately then the consequences of resource depletion or related effects (such as climate change) will ultimately override community expectations of a sustainable lifestyle and livelihood. Professional engineers have a potentially significant role to play as sources of information, as advocates, and as a group that can offer practical solutions across a wide range of fields.

An evolving challenge for engineers is to achieve more for less; where more means enhanced performance, improved effectiveness and extended durability. This needs lateral thinking and a willingness to innovate. It also involves going back to first principles in our design briefs and questioning the value of habitual behaviour based on by-rout solutions and the status quo. In practical terms it means minimising consumption by making our urban environments long lasting, adaptable and efficient, whilst at the same time making them better places in which to live. It also involves cultivating close interactions with individuals and groups who are active in related fields, and basing this on a shared sense of purpose and respect for particular areas of expertise. The principles described in this *Practice Note* seek to achieve these goals.

Key Factors Influencing Urban Design Practice

The Protocol proposes “ideas for actions” in a series of eight categories:

- championing urban design and raising awareness
- developing strategy and policy
- planning futures
- being a good client
- making decisions
- exchanging information and research
- integrating management
- building capacity

In terms of this *Practice Note* these actions can be given the following contexts:

1. Championing urban design and raising awareness

Few activities take place without the direct or indirect involvement of professional engineers, and every opportunity should be taken to both propose and encourage forward-looking innovation and creativity when seeking solutions to environmental challenges. Encourage all sectors to adopt a common appreciation of the need to make our urban environments work well, and that the future starts with decisions made today, and every day.

2. Developing strategy and policy

Think beyond specifics by considering all urban design implications when developing strategies and policies. An overarching consideration should be the extent to which

strategies and policies contribute to the long-term future of communities and their quality of life. Because there is always some uncertainty about the exact nature and magnitude of future events there should be a willingness to continuously review strategies and policies to ensure that their relevance is maintained.

3. Planning futures

Consult as widely as possible and take an integrated approach to planning, design and implementation. Because valuable inputs can come from all parts of the community this should include street-level engagement, cross-sector professional interactions, and communication with all levels of governance. Respect the contributions of all parties, seek consensus on objectives, and encourage debate and conclusions that are genuinely inclusive and forward looking.

4. Being a good client and influencing the client

Ensure that briefs refer to the importance of good urban design as an expected outcome, and that they draw attention to the need to take into account trends which may have significant future effects, whether on their own or in concert with others. Consider encouraging the adoption of partnering as a mechanism for achieving an integrated approach to project planning and design. Where possible, establish feedback loops which use post-occupancy evaluations to enhance the quality of the briefing process.

5. Making decisions

Obtain the best possible information by consulting widely, and by working closely with territorial authorities, other professionals and the community. Assemble a high-quality team of design professionals to assist with decision-making processes. Ensure that there is a shared understanding of the urban design implications that will arise from each stage in the decision-making process, and that best practice is expected at all levels.

6. Exchanging information and research

Better urban design outcomes are achieved when sound and comprehensive research is available and acted upon. While much of this is available from government bodies and universities, experience acquired by individual private sector organisations can also be a valuable resource. Actively encourage these organisations to systematically collect, collate and widely distribute this information, including post-occupancy evaluations.

7. Integrating management

The urban environment is complex. Because of the many layers involved, and because development often has effects beyond its immediate boundaries, an integrated, multidisciplinary approach to project planning and design is needed. This requires removing boundaries between disciplines, and engaging with a broad range of contributors. This is consistent with the “integrated environmental management” concept referred to in the Resource Management Act

8. Building capacity

Make urban design skills available to organisations involved in work that affects the urban environment, and ensure that the currency of in-house skills is maintained. To reinforce this, encourage a culture whereby urban impacts are an automatic point of reference for all project-related decisions, whether or not there is an in-house urban design capacity.

Guiding Principles

In order to meet these challenges the following principles are suggested as a guide to professional practice:

1. Aim for sustainability

The Protocol has its roots in sustainable development. A stated aim of the Protocol is “to ensure New Zealand’s towns and cities are successful places for people”. Success in this context is unavoidably connected to sustainability; they are inseparable points of reference.

IPENZ has a parallel interest in sustainability. “Sustainable Management and Care for the Environment” is one of the five fundamental values in the *IPENZ Code of Ethics* and *IPENZ Practice Note 05 “Sustainability and Engineers”* offers further guidance on the topic.

2. Seek to reduce society’s demand for resources

New Zealand’s high level of urbanisation has nationally significant consequences. A number of issues involving professional engineers, such as energy efficiency, waste, pollution, and potentially climate change, contribute directly to resource demand, or to matters associated with meeting that demand. The key issue is the availability of resources, the demands placed on those resources, and their accessibility. It is expected that these resources, and any related infrastructure, are both affordable and secure for the consumer.

Making our towns and cities more compact can reduce land consumption and the spread of infrastructure, and increase travel efficiencies, but it demands higher-quality design in private and public spaces.

3. Think ahead (and be aware of external influences)

New Zealand is part of the global community of nations. What happens overseas has related effects on all members of that community.

Consideration must be given to the potential economic effects of continued unconstrained use of fossil fuels, and to the consequences of their consumption in the context of climate change.

Improved resource stewardship demands that we make better design and technology choices.

4. Think simple, innovative, clever and creative

Challenge the status quo. Here are some starting points for breaking away from the convenience of using repetitive solutions:

- Keep it simple.
- Think long term.
- Don’t lose sight of first principles.
- Avoid habitual behaviour – look for better ways.
- Take up the challenge: use less, but gain more by being innovative.
- Evaluate whole-of-life costs and benefits before making design commitments, and set up feedback loops (for example, post-occupancy evaluations).
- The lowest cost may not be the cheapest solution.
- Remember Pareto: initially, 20 per cent of the effort produces 80 per cent of the results; thereafter the law of diminishing returns applies.
- Put health and welfare first by using progressive engineering. (Consider the 40/3/37 proposition. In developed countries human lifespan has extended by 40 years over the last century; three of these years are due to medical advances and 37 can be attributed to engineering.)
- Engineering can directly influence health issues such as commuter stress, traffic noise, road safety, crime prevention and lack of exercise.
- Maximise free benefits, for example, the productive use of solar gain.
- Minimise all forms of waste, starting with project planning and design.
- Think renewables first, fossil fuels last.

5. Be practical

Some things are free, or can provide more than one benefit. It makes sense to maximise the use of free inputs, and it also makes sense to minimise continued inputs such as energy and maintenance. A few examples are:

- Building orientation has significant implications for imported energy consumption. Houses of all types can be net exporters of energy given appropriate orientation and design, and the inclusion of currently available technology. Most commercial buildings can be designed and equipped to achieve near-zero purchased energy demand.
- High levels of building insulation reduce energy demand. The combination of appropriate design techniques and construction materials can substantially reduce maintenance requirements.
- Subdivisions designed with pedestrians and cyclists in mind have more connections and smaller blocks that minimise journey time. Liveable neighbourhoods include residential streets with low traffic volumes and speeds.
- Good access to high-quality public space helps offset the higher densities required to minimise urban sprawl and maximise public transport efficiency.
- Urban arterial roads and motorways address issues like community severance, noise and economic effects on neighbouring activities.
- Localise as much as possible. Suitable activities for this approach are organic and inorganic waste management, and energy production. The localisation concept involves forming communities that are relatively self-contained.

The extent to which localisation occurs directly affects the amount of energy required for transportation, and the provision of infrastructure and its maintenance.

- Stormwater can be retained and used for irrigation in drier cities, and be partially treated and reticulated for domestic or industrial greywater use.
- More prominent engineering works with local design input create a strong local identity and sense of place.

6. Communicate

Contribute to the developing wave of environmental concern by offering practical solutions, and by supporting others with related interests:

- Join in with public debate.
- Provide examples.
- Make submissions.
- Join with and support professional associates, across all sectors.
- Join appropriate volunteer groups and actively participate.

Actions to Enhance Engineering Contributions

The urban environment is one that almost everyone enjoys, shares and pays for. Engineers contribute – directly and indirectly, visibly and invisibly – to many parts of that environment. It is important that these contributions are seen not as isolated, stand-alone inputs, but as part of a collaborative effort. Mutually supportive and balanced inputs to the urban environment will add value by creating positive interactions.

Given the social and functional importance of the urban environment it is imperative that engineers advance design solutions that anticipate as far as reasonably possible the impact of trends such as climate change, rising energy costs and the transition to alternative energy forms. It is arguably better to be prepared for, and thus pre-empt, environmental and economic change than to work on remediation after the event. This means shifting away from conventional thinking based on “business as usual”, and moving towards finding ways of doing much more with everything, and improving the quality of life at the same time.

Some suggested actions that derive from this proposition are:

- Think and plan ahead, with the trends discussed in this *Practice Note* being an important consideration.
- Add breadth to specialised skills by seeing them as a part of this wider context and adapting them accordingly.
- Be willing to challenge the status quo and move beyond the boundaries set by conventional practice, where this is clearly beneficial to the wider community.
- Form multidisciplinary teams whenever possible, to increase the breadth of knowledge and skill available. Work together and look for ways to add value by integrating these inputs.
- Have an open mind, be receptive to new ideas, and be willing to innovate and be creative. Encourage others to do the same.
- Communicate as widely as possible. Continuously and openly exchanging knowledge and experience, while listening to others, will gain respect and trust.

Conclusion

To be successful, towns and cities require high standards of design and sustainable urban development. A successful urban environment will provide a high quality of life for its residents indefinitely and distribute the benefits widely among the population.

The term urban design tends to be thought of in the context of what is immediately visible or directly evident to the inhabitants in a functional sense. Such a narrow perspective, however, tends to focus our attention on the external appearance of buildings, the open space around them, and transportation.

While these are vital, there are many other parts to our towns and cities which must also function well: what lies behind building facades, what is buried under the roads, how waste is dealt with, and how energy is obtained, distributed and used. Another important factor, common to all parts of the urban environment, is maintenance and eventual renewal.

In the face of both climate change and rising energy costs it is essential that as engineers, we raise awareness amongst other professions, decision makers, and the public at large about the need for adaptation. Engineers also need to ensure that adaptation concepts are then integrated into future urban design practice.

In the context of the Protocol, it is clear that particular attention needs to be directed at energy and waste. Both are ubiquitous in our daily lives, and each has important connections with the other. For example, consolidating the urban environment can reduce the quantity of infrastructure, which reduces both initial costs (for example, use of materials) and subsequent maintenance and renewal liabilities. It can also reduce the amount of directly wasted energy, principally where transportation is involved. Other forms of waste, particularly where there is an organic content, can be used for energy production.

Applying this way of thinking – working from the general to the particular – to all aspects of the urban environment shows that back-to-basics analysis and close cross-sector interactions have potentially considerable benefits.

The actions proposed by this *Practice Note* are but a starting point. The first action is to recognise the need for improved urban design in New Zealand. The second action is to communicate and work together with other professions to achieve a better urban environment – an environment that is competitive, liveable, sustainable, inclusive, distinctive and well-governed.



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