

“The cities will be part of the country; I shall live 30 miles from my office in one direction, under a pine tree; my secretary will live 30 miles away from it too, in the other direction, under another pine tree. We shall both have our own car.

We shall use up tires, wear out road surfaces and gears, and consume oil and gasoline. All of which will necessitate a great deal of work… enough for all.”

— Le Corbusier, The Radiant City 1967
Akademgorodok, Novosibirsk - Russia

Regional Plan

Figure 6.3 Akademgorodok aerial view

- Citation: (DiMaio, 2000)
- Area: 910 ha
- Distance to Capital City: 2800 km
- Population: 65,000
- Date of origin: 1950's
- Mean perimeter segment measurement: 786 m
- Median perimeter segment measurement: 830 m
Figure 6.4 Courtyard block in Barbican

- Citation: (Chant & Goodman, 1999)
- Area: 22.8 ha
- Distance to Capital City: N/A
- Population: 4,000
- Date of origin: 1969
- Mean perimeter segment measurement: 218m
- Median perimeter segment measurement: 175m
Blue Area, Islamabad - Pakistan

Figure 6.5 Islamabad streetscape

- Citation: (Doxiadis, 1968)
- Area: 5,610 ha
- Distance to Capital City: N/A
- Population: 530,000
- Date of origin: 1958
- Mean perimeter segment measurement: 1659m
- Median perimeter segment measurement: 1800m
Brasilia, F.D. - Brasil

Figure 6.6. Brasilia aerial view

- Citation: (Hall, 2002)
- Area: 4,695 ha
- Distance to Capital City: N/A
- Population: 2,600,000
- Date of origin: 1960
- Mean perimeter segment measurement: 1537m
- Median perimeter segment measurement: 1950m
Figure 6.7 Cabrini Green housing scheme

- Citation: (Miller, 2009)
- Area: 66.8 h.a
- Distance to Capital City: 968km
- Population: 15,000
- Date of origin: 1942 - 2008
- Mean perimeter segment measurement: 431m
- Median perimeter segment measurement: 400m
Chandigarh - India

Regional Plan

Main Urban Connections

Figure 6.8 Chandigarh personal image

- Citation: (Evenson, 1966)
- Area: 12,267 ha
- Distance to Capital City: 230 km
- Population: 900,000
- Date of origin: 1953
- Mean perimeter segment measurement: 1065 m
- Median perimeter segment measurement: 1270 m

Radiant City
Co-op City, New York - USA

Regional Plan

Figure 6.9 Co-op City streetscape

- Citation: Hall, 2002
- Area: 97.6 ha
- Distance to Capital City: 330km
- Population: 55,000+
- Date of origin: 1973
- Mean perimeter segment measurement: 776m
- Median perimeter segment measurement: 633m
Figure 7.0 Aerial view of Cumbernauld

- Citation: (Merlin, 1969)
- Area: 91.4 ha
- Distance to Capital City: 560 km
- Population: 49,664
- Date of origin: 1956
- Mean perimeter segment measurement: 799 m
- Median perimeter segment measurement: 500 m
Drumul Taberei, Bucharest, Romania

Figure 7.1 Drumul Taberei aerial view

- Citation: (Dimancescu, 2007)
- Area: 466 ha
- Distance to Capital City: N/A
- Population: 63,000+
- Date of origin: 1974
- Mean perimeter segment measurement: 790m
- Median perimeter segment measurement: 605m

Citation: • (Dimancescu, 2007)
Area: • 466 h.a
Distance to Capital City: • N/A
Population: • 63,000+
Date of origin: • 1974
Mean perimeter segment measurement: • 790m
Median perimeter segment measurement: • 605m
La Grande Borne, Grigny - France

Regional Plan

Figure 7.2 Le Grande Borne aerial view

- Citation: (Chant & Goodman, 1999)
- Area: 83.3 ha
- Distance to Capital City: 22 km
- Population: 26,790
- Date of origin: 1980's
- Mean perimeter segment measurement: 1320 m
- Median perimeter segment measurement: 1350 m
Le Mirail, Toulouse - France

Figure 7.3 Le Mirail aerial view

- Citation: (Chant & Goodman, 1999)
- Area: 239 ha
- Distance to Capital City: 580km
- Population: 27,500
- Date of origin: 1968
- Mean perimeter segment measurement: 567m
- Median perimeter segment measurement: 565m
Marzahn, Berlin - Germany

Regional Plan

Figure 7.4 Aerial view of Marzahn

- Citation: (Appleyard, 1976)
- Area: 595 hectares
- Distance to Capital City: N/A
- Population: 102,309
- Date of origin: 1977
- Mean perimeter segment measurement: 1064m
- Median perimeter segment measurement: 1125m
Milton Keynes - UK

**Regional Plan**

**Figure 7.5 Aerial view of Milton Keynes**

- Citation: (Kostof, 1991)
- Area: 8,180 h.a
- Distance to Capital City: 70km
- Population: 195,687
- Date of origin: 1967
- Mean perimeter segment measurement: 1074m
- Median perimeter segment measurement: 1030m
Regional Plan

Figure 7.6 Aerial of Pendrecht housing

- Citation: (Mumford, L. 2000)
- Area: 253 h.a
- Distance to Capital City: 60 km
- Population: 12,400
- Date of origin: 1953
- Mean perimeter segment measurement: 784 m
- Median perimeter segment measurement: 520 m
Figure 7.7 Aerial of Pruitt - Igoe

- Citation: (Miller, 2008)
- Area: 49.3 h.a
- Distance to Capital City: 1146km
- Population: 2,740 units
- Date of origin: 1954 - 1972
- Mean perimeter segment measurement: 489m
- Median perimeter segment Measurement: 550m
Regent Park, Toronto - Canada

Figure 7.8 Regent Park aerial sketch

- Citation: (Littlewood, 1967)
- Area: 19 ha
- Distance to Capital City: 352 km
- Population: 10,385 units
- Date of origin: 1940s
- Mean perimeter segment measurement: 383 m
- Median perimeter segment measurement: 360 m

Main Urban Connections

Citation: •
Area: •
Distance to Capital City: •
Population: •
Date of origin: •
Mean perimeter segment measurement: •
Median perimeter segment measurement: •
Figure 7.9 Roehampton - 1953

- Citation: Chant & Goodman, 1999
- Area: 20.3 ha
- Distance to Capital City: N/A
- Population: 13,000
- Date of origin: 1950's
- Mean perimeter segment measurement: 705m
- Median perimeter segment measurement: 1210m
Figure 8.0 Aerial of Stuyvesant Town

- Citation: (Hall, 2002)
- Area: 41 h.a
- Distance to Capital City: 330km
- Population: 25,000
- Date of origin: 1947
- Mean perimeter segment measurement: 484m
- Median perimeter segment measurement: 490m
The Grand Ensemble of Sarcelles, Paris - France

Figure 8.1 Sarcelles - 1978

- Citation: (Chant & Goodman, 1999)
- Area: 275 ha
- Distance to Capital City: N/A
- Population: 60,196
- Date of origin: 1960s
- Mean perimeter segment measurement: 710m
- Median perimeter segment measurement: 645m

Main Urban Connections

Regional Plan
Tsukuba Science City - Japan

Regional Plan

Figure 8.2 Aerial view of Tsukuba

- Citation: (Burton, 2002)
- Area: 448 ha
- Distance to Capital City: 50 km
- Population: 207,000
- Date of origin: 1960s
- Mean perimeter segment measurement: 797 m
- Median perimeter segment measurement: 840 m
New Urbanism

“We stand for the restoration of existing urban centres and towns within coherent metropolitan regions, the reconfiguration of sprawling suburbs into communities of real neighbourhoods and diverse districts, the conservation of natural environments, and the preservation of our built legacy. We recognise that physical solutions by themselves will not solve social and economic problems, but neither can economic vitality, community stability, and environmental health be sustained without a coherent and supportive physical framework.”

Congress for New Urbanism Charter
– Andres Duany, et al, Suburban Nation 2000
Figure 8.3 Brentwood neighbourhood

- Citation: (Katz, 1994)
- Area: 3,286 h.a
- Distance to Capital City: 3,700km
- Population: 4,200
- Date of origin: 2005
- Mean perimeter segment measurement: 1,330m
- Median perimeter segment measurement: 815m
Celebration - USA

Figure 8.4 Celebration aerial view

- Citation: (Dunlop, 1998)
- Area: 511 h.a
- Distance to Capital City: 1200km
- Population: 11,860
- Date of origin: 1990
- Mean perimeter segment measurement: 414m
- Median perimeter segment measurement: 433m
Communications Hill, Sacramento - USA

- **Citation:** (Katz, 1994)
- **Area:** 766 h.a
- **Distance to Capital City:** 3800 km
- **Population:** 28,000 units
- **Date of origin:** 2010
- **Mean perimeter segment measurement:** 848 m
- **Median perimeter segment measurement:** 760 m
Figure 8.6 Kentlands town centre

- Citation: (Duany & Plater-Zyberk, 1992)
- Area: 99.5 ha
- Distance to Capital City: 30km
- Population: 2000 homes
- Date of origin: 1990
- Mean perimeter segment measurement: 739m
- Median perimeter segment measurement: 665m
Laguna West, Sacramento - USA

Main Urban Connections

- Citation: (Katz, 1994)
- Area: 726 h.a
- Distance to Capital City: 3800km
- Population: 8,414
- Date of origin: 1991
- Mean perimeter segment measurement: 1280m
- Median perimeter segment measurement: 1090m
Orenco Station, Portland - United States

Regional Plan

Figure 8.8 Orenco Station masterplan

- Citation: (Hulme, 2005)
- Area: 70 ha
- Distance to Capital City: 3700 km
- Population: >46,124
- Date of origin: 1997
- Mean perimeter segment measurement: 388 m
- Median perimeter segment measurement: 355 m

Main Urban Connections
Figure 8.9 Poundbury aerial view

- Citation: (Duany & Plater-Zyberk, 1992)
- Area: 38 h.a
- Distance to Capital City: 186km
- Population: 6,000
- Date of origin: 1993
- Mean perimeter segment measurement: 634m
- Median perimeter segment measurement: 820m
Figure 9.0 Rosemary Beach masterplan

- Citation: (Katz, 1994)
- Area: 38.8 ha
- Distance to Capital City: 1250km
- Population: 500 homes
- Date of origin: 1995
- Mean perimeter segment measurement: 1723m
- Median perimeter segment measurement: 1655m
Seaside - USA

Main Urban Connections

- Citation: (Duany & Plater-Zyberk, 1992)
- Area: 26 h.a
- Distance to Capital City: 1250km
- Population: 2,000
- Date of origin: 1979
- Mean perimeter segment measurement: 1078m
- Median perimeter segment measurement: 1030m

Regional Plan

Figure 9.1 Seaside aerial view
Windsor, Vero Beach - USA

Main Urban Connections

- Citation: (Duany & Plater-Zyberk, 1992)
- Area: 175 ha
- Distance to Capital City: 1286 km
- Population: 350 homes
- Date of origin: 1989
- Mean perimeter segment measurement: 519 m
- Median perimeter segment measurement: 425 m
Informal Settlement

“Dharavi, a Mumbai slum where 600,000 residents are crammed into 520 acres, contains the attributes for environmentally and socially sustainable settlements for the world's increasingly urban population, he said. The district’s use of local materials, its walkable neighbourhoods, and mix of employment and housing add up to “an underlying intuitive grammar of design that is totally absent from the faceless slab blocks that are still being built around the world to ‘warehouse’ the poor.”

— Prince Charles 2009
Badli, New Delhi - India

Main Urban Connections

Figure 9.3 Typical Badli slum

- Citation: (UN Habitat, 1982)
- Area: 336 ha
- Distance to Capital City: N/A
- Population: 45,200
- Date of origin: 1961
- Mean perimeter segment measurement: 352m
- Median perimeter segment measurement: 333m
Barrio La Union, Caracas - Venezuela

Informal Settlement

Figure 9.4 Aerial View of Barrio La Union

- Citation: (Juppenlats, 1970)
- Area: 468 ha
- Distance to Capital City: N/A
- Population: Unknown
- Date of origin: 1940's
- Mean boundary segment measurement: 425m
- Median boundary segment measurement: 395m
Cemetery Squatters, Port au Prince - Haiti

Figure 9.5 Port au Prince slum

- Citation: (Keerwin, 2010)
- Area: 9.3 ha
- Distance to Capital City: N/A
- Population: 100,000
- Date of origin: 1960
- Mean perimeter segment measurement: 279m
- Median perimeter segment measurement: 310m
Dharavi, Mumbai - India

**Main Urban Connections**

- **Citation:** (Neuworth, 2005)
- **Area:** 534.8 ha
- **Distance to Capital City:** 1140 km
- **Population:** 1,000,000
- **Date of origin:** 1990
- **Mean perimeter segment measurement:** 308 m
- **Median perimeter segment measurement:** 290 m

**Regional Plan**

**Informal Settlement**

**Figure 9.6 Dharavi slum**

- **Citation:** (Neuworth, 2005)
- **Area:** 534.8 ha
- **Distance to Capital City:** 1140 km
- **Population:** 1,000,000
- **Date of origin:** 1990
- **Mean perimeter segment measurement:** 308 m
- **Median perimeter segment measurement:** 290 m
Hanna Nassif, Dar-es-Salaam - Tanzania

Informal Settlement

Figure 9.7 Hanna Nassif Slum

- Citation: (Obudho & Mhlanga, 1988)
- Area: 35.8 h.a
- Distance to Capital City: 388km
- Population: 23,000
- Date of origin: 1960's
- Mean perimeter segment measurement: 250m
- Median perimeter segment measurement: 300m
Karail, Dhaka - Bangladesh

Informal Settlement

Figure 9.8 Typical Karail Slum

- Citation: (CUS, 2006)
- Area: 22.8 ha
- Distance to Capital City: N/A
- Population: 120,000
- Date of origin: 1980
- Mean perimeter segment measurement: 291m
- Median perimeter segment measurement: 270m
Informal Settlement

Khayelitsha, Cape town - South Africa

Figure 9.9 Streetscape of Khayelitsha slum

- Citation: (MCAfrica, 2006)
- Area: 2,312 ha
- Distance to Capital City: 1300km
- Population: 406,779
- Date of origin: 1957
- Mean perimeter segment measurement: 1094m
- Median perimeter segment measurement: 1000m
Informal Settlement

Kibera, Nairobi - Kenya

Figure 10.0 Kibera Slum

- Citation: (Obudho & Mhlanga, 1988)
- Area: 143 h.a
- Distance to Capital City: N/A
- Population: 1,000,000
- Date of origin: 1960
- Mean perimeter segment measurement: 269m
- Median perimeter segment measurement: 268m

Main Urban Connections

Regional Plan
Kranidi - Greece

Figure 10.1 Kranidi Settlement

- Citation: (Doxiadis, 1968)
- Area: 133 ha
- Distance to Capital City: 100km
- Population: 10,000
- Date of origin: 1970
- Mean perimeter segment measurement: 269m
- Median perimeter segment measurement: 269m
Kricak, Yogyakarta - Indonesia

Main Urban Connections

Figure 10.2 Aerial view of Kricak slum

- Citation: (Duivesteijn & Van De Wal, 1994)
- Area: 174 ha
- Distance to Capital City: 427km
- Population: 300,000
- Date of origin: 1950
- Mean perimeter segment measurement: 410m
- Median perimeter segment Measurement: 318m

Regional Plan

Informal Settlement
Lagos, Lagos Island - Nigeria

Informal Settlement

Figure 10.3 Lagos slums
- Citation: Obudho & Mhlanga, 1988
- Area: 409 ha
- Distance to Capital City: 530km
- Population: 209,000
- Date of origin: 1963
- Mean perimeter segment measurement: 216m
- Median perimeter segment measurement: 200m
Las Colinas, Bogota - Columbia

Informal Settlement

Figure 10.4 Las Colinas slum

- Citation: (UN Habitat, 1982)
- Area: 489 ha
- Distance to Capital City: N/A
- Population: 10,000
- Date of origin: 1960
- Mean perimeter segment measurement: 319m
- Median perimeter segment Measurement: 325m

Regional Plan

Main Urban Connections
Hill Squatters, Lima - Peru

Informal Settlement

Regional Plan

Figure 10.5 Lima aerial view

- Citation: (UN Habitat, 1982)
- Area: 228.4 ha
- Distance to Capital City: N/A
- Population: Unknown
- Date of origin: 1960's
- Mean perimeter segment measurement: 419m
- Median perimeter segment Measurement: 370m

Main Urban Connections

Citation: •
Area: •
Distance to Capital City: •
Population: •
Date of origin: •
Mean perimeter segment measurement: •
Median perimeter segment Measurement: •

Informal Settlement

Figure 10.6 Maputo slums

- Citation: Obudho, Mhlanga, 1988
- Area: 265 ha
- Distance to Capital City: N/A
- Population: 22,000
- Date of origin: pre 1975
- Mean perimeter segment measurement: 375m
- Median perimeter segment measurement: 440m
Orangi Town, Karachi - Pakistan

**Regional Plan**

**Informal Settlement**

**Figure 10.7 Oranji Town aerial view**

- **Citation:** (UN Habitat, 1982)
- **Area:** 197 h.a
- **Distance to Capital City:** 1140km
- **Population:** 1,500,000
- **Date of origin:** 1965
- **Mean perimeter segment measurement:** 334m
- **Median perimeter segment Measurement:** 298m
Rocinha, Rio De Janeiro - Brazil

Figure 10.8 Rocinha aerial view

- Citation: (Neuwirth, 2005)
- Area: 141 ha
- Distance to Capital City: 930 km
- Population: 250,000
- Date of origin: 1970's
- Mean perimeter segment measurement: 337 m
- Median perimeter segment measurement: 360 m
Rufisque, Dakar - Senegal

Informal Settlement

Figure 10.9 Rufisque slum

- Citation: (UN Habitat, 1982)
- Area: 1,342 ha
- Distance to Capital City: N/A
- Population: 179,797
- Date of origin: 1987
- Mean perimeter segment measurement: 440m
- Median perimeter segment measurement: 425m
Informal Settlement

Citation: • [UN Habitat, 1982]
Area: • 689 ha
Distance to Capital City: • N/A
Population: • 630,000
Date of origin: • 900
Mean perimeter segment measurement: • 258m
Median perimeter segment Measurement: • 240m

Figure 11.0 Tondo slum

Regional Plan

Main Urban Connections
Urban Village, Shenzhen - China

Figure 11.1 Urban Village aerial view

- Citation: (Kiu, 2009 & Liu, 2009)
- Area: 237 h.a
- Distance to Capital City: 1930km
- Population: 70,000
- Date of origin: 1980's
- Mean perimeter segment measurement: 205m
- Median perimeter segment measurement: 180m
West Point, Monrovia - Liberia

Informal Settlement

- Citation: (Obudho & Mhlanga, 1988)
- Area: 891 h.a
- Distance to Capital City: N/A
- Population: 75,000
- Date of origin: 1980's
- Mean perimeter segment measurement: 310m
- Median perimeter segment measurement: 320m
Informal Settlement: New Urbanism:
### Summary of results:

<table>
<thead>
<tr>
<th>NON PTUD</th>
<th>PTUD</th>
<th>Historic Cities</th>
<th>Informal Settlement</th>
<th>Informal Settlement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barcelona</td>
<td>Radiant City</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bremen</td>
<td>Garden City</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freudenstadt</td>
<td>Garden City</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delhi</td>
<td>New Urbanism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bologna</td>
<td>Akademgorodok</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcutta</td>
<td>Ciudad Guayana</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grammichelle</td>
<td>Farsta</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Karachi</td>
<td>Brentwood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boston</td>
<td>Barbican Estate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicago</td>
<td>Cumbernauld</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Karlsruhe</td>
<td>Glenrothes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caracas</td>
<td>Celebration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brasilia</td>
<td>East Kilbride</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Kilbride</td>
<td>Greenbelt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greenbelt</td>
<td>Communications Hill</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: The images depict various city layouts and planning initiatives, illustrating the application of different urban design concepts.*
Summary of results:

NON PTUD

Historic Cities | Historic Cities | Informal Settlement | Informal Settlement

Lubeck | Nuremberg | Dakar | Kibera

Neuf Brisach | Palmanova | Dar es Salaam | Karail

Noto | Paris | Khayelitsha | Kranidi

Radiant City | Radiant City | Garden City | New Urbanism

Cabrini Green | Drumul Taberei | Greendale | Kentlands

Bronx Co-op City | Islamabad | Greenhills | Laguna West

Cumbernauld | Le Mirail | Hilversum | Poundbury
Summary of results:

<table>
<thead>
<tr>
<th>NON PTUD</th>
<th>PTUD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historic Cities</td>
<td>Radiant City</td>
</tr>
<tr>
<td>Pavia</td>
<td>Regent Park</td>
</tr>
<tr>
<td>Verdun</td>
<td>Letchworth</td>
</tr>
<tr>
<td>Yogyakarta</td>
<td>Riverside</td>
</tr>
<tr>
<td>Manila</td>
<td>Rosemary Beach</td>
</tr>
<tr>
<td>Piacenza</td>
<td>Roehampton</td>
</tr>
<tr>
<td>Verona</td>
<td>Lusaka</td>
</tr>
<tr>
<td>Lagos</td>
<td>Vallingby</td>
</tr>
<tr>
<td>Maputo</td>
<td>Seaside</td>
</tr>
<tr>
<td>Pompeii</td>
<td>Tsukuba</td>
</tr>
<tr>
<td>Vienna</td>
<td>Radburn</td>
</tr>
<tr>
<td>Lima</td>
<td>Welwyn</td>
</tr>
<tr>
<td>Rocinha</td>
<td>Vero Beach</td>
</tr>
</tbody>
</table>
Cities classified as Pre-professional Urban Design Theory, have primary findings confirming the existence of the 400-meter scaled framework. Cities from antiquity through the industrial age can be seen, with little exception, to exemplify the 400-meter ‘rule’. Cities dating from the majority of human history are classified into this sub category, it was expected and has been shown that there is some of variation in the urban form of the case studies. The form of individual sanctuary areas has a significant variance over time and geography, yet as defined, the 400 meter rule manifests itself as a range from 300 to 500 meters. Also present in later North American examples is the presence of the Jeffersonian grid, which is larger than 400 meters in practice, but is often scaled down, or further bisected with main streets in the industrial city case studies from North America. Further findings are best represented as findings from a singular case study from each of the sub-categories in the Pre-Professional Theory era.

Ancient City, Lucca: pages 41 - 42
The case study area at Lucca is shown with a map of the ancient settlement overlaid with the city’s existing form. The urban framework of Lucca is remarkably unchanged in its history, making it the ideal case study for an ancient city. The 400-meter scale is present with no sanctuary area perimeter segment being longer than 440 meters. The mean for perimeter segments is 274 meters, well below a 400-meter scale.

Medieval City, Nuremburg: pages 55 - 56
The case study at Nuremburg has a much more varied form than the ancient city of Lucca. This is in part to its development in the medieval era, and in part to its riverside location requiring the urban framework to adapt and stretch to accommodate the river as is done with the a river crossing main road segment at 790 meters. This should be considered a statistical outlier, and can likely be explained as two segments being broken by the river, a useful transportation artery in medieval times. The average measurement taken from inside the walled portion of the medieval city is 329 meters, confirming the presence of the 400-meter scale.

Renaissance City, Palmanova: pages 67 - 68
The city at Palmanova is largely identical to its renaissance origins. The case study exemplifies the 400-meter rule more clearly than any other settlement in this atlas. It is a small planned, walled city built in a radial pattern. The distance from the city centre and plaza is 400 meters exactly. There are three sanctuary areas, arranged around the piazza, with 400-meter main roads radiating from the centre to the edge of the city at the wall.

Baroque City, Noto Valley: pages 73 - 74
The Noto Valley case study is an example of the pure Baroque city, built after the Sicilian Earthquake. The 400-meter scale is most evident by the three segments measured at 400 meters forming a repeating pattern in the city centre. The average measurement of perimeter segments in the Noto Valley study area is 241 meters. Much smaller than 400 meters; it is important to note a measurement greater than 400 meters only occurs twice, both the result of topographical challenges in city design.

Industrial City, Barcelona: pages 77 - 78
The 400-meter scale is present in Barcelona, though larger than the Baroque example in Noto Valley. At Barcelona it is possible to see the firm and explicit return to a gridded system of streets in Cerda’s plan. When measured, the grid is implemented on a 410x410 meter square sanctuary area. This grid is broken occasionally, by major public buildings, topography, rail infrastructure, and diagonal roads, yet, the average segment is measured at 435 meters. The average measurement, though still within the suggested range of confirmation for the 400 meter scale, would be even more convincing if 3 outliers of 670 meters were disregarded.

The era of Professional Urban Design Theory ushers in the Garden City Movement and the Radiant City, and continues today with New Urbanism. All of these in one way or another have attempted to design the city while simultaneously driving social change for the better. They are committed to the designability of the neighbourhood unit and are basing the scale of the city as designed on the perimeter of a neighbourhood unit. Analysing these as a framework shows that the sanctuary area as defined by this research is oversized and outgrown when compared to the historical cities.

The Garden City, Letchworth: pages 119 - 120
The first garden city realised, and one developed with the direct influence of Ebenezer Howard, Letchworth is the closest the Garden City ever came to realising its theoretical idealism. The urban framework of Letchworth is a significant growth from the industrial era. The town centre of Letchworth, a non-residential, single use commercial and service part of the city has three segments that measure less than 300 meters. With three of these segments included, the average distance for a perimeter segment of a sanctuary area in Letchworth is still 551 meters. In addition there is a significant disparity between the smallest (230 meters) and largest (1500 meters) segments. The entire settlement area of Letchworth divides into just 15 sanctuary areas, a fraction of a similarly sized city of the industrial era.

Radiant City, Chandigarh: pages 153 - 154
The city of Chandigarh is the most puritanical representation of Le Corbusier’s ideals as it was designed and implemented by the master himself. Chandigarh represents an explosion in urban scale, which has yet to be replicated, a possible sign of its consequences. The city is laid out in a near perfect grid of superblocks, or sectors, as they are known locally. The majority of the sectors are a 1350 x 850 meter rectangle. Each rectangle is a sanctuary area, and neighbourhood unit as designed. The 3 sectors closest to the monumental government buildings are significantly smaller and have the only segments in the city shorter than 800 meters in length. Including these altered sectors the average for the detail area (and the city as a whole) is a segment length of 921 meters.

New Urbanism, Seaside: 201 - 202
The town of Seaside, Florida in the United States is a hallmark of New Urbanism, award winning, under expansion, and often seen as the seminal work of New Urbanism. Seaside has easily discernable neighbourhoods; unfortunately these neighbourhoods are neither adjacent to one another, nor at the scale of the 400-meter framework. Seaside is a small settlement, with just six sanctuary area perimeter segments to measure. The average of these segments is 1078 meters, which is beyond even the 800 meters suggested by the Congress for New Urbanism Charter.
Informal settlements represent a return (or at least a lack of departure from) the 400-meter scale. Informal settlements emerge and grow as a response to other urban social problems. They often represent the only affordable housing for their inhabitants. The framework that emerges grows and alters not only with the size and population of the settlement, but also with the availability of land. The actual size, shape, and population of an informal settlement is difficult to discern, all figures regarding informal settlements being instantly outdated as the settlement itself remains in a state of flux. The geographical and cultural context of the settlements is of interest as they can affect the size and condition of the settlement.

In one special case, that of Khayelitsha, South Africa, we have a documented formally planned, informal settlement. This area developed out of the Apartheid system with the intention of the resettlement of the majority black population into government planned townships. These townships were little more than formalised shantytowns with similar conditions to those seen in other informal settlements analysed. The urban framework of this settlement is that of an overgrown professionally planned scale. The formality of the settlement led to this overgrown scale, whereas the emergent informal settlements studied clearly exhibit the 400-meter scales.

Informal Settlement, Rocinha: pages 237 - 238

The settlement at Rocinha is a very well documented Brazilian favela. The framework of the favela is highly irregular, determined by the significant grade of the hills upon which it is built. The nature and shape is that of an unplanned shantytown, haphazard at best. The scale, however is that which has been consistent outside of the professional theory world. The average perimeter segment measures at 337 meters. The highest and lowest segment only measure 580 to 110 meters. The emergent and unplanned nature of the slum has resulted in a highly irregular urban framework that organically arrives at a similar scale as that of the majority of human history.

II. Implications

The findings expose the natural emergence and evolution of an urban scale over the course of human history. This scale is shown to exist everywhere professional theory is absent. Resulting is the permanent alteration of urban scale, implemented when professional urban design theory emerged and became the dominant form of conventional urbanism. The implications of this emergent and organic framework development are predominately exposed at lower speeds) and pedestrians due to their condensed urban framework, the 400-meter framework.

A condensed framework adds not only permeability to the city, but flexibility. It is assumed at this point, though further research is needed, that permeability of the 400-meter city is the driving factor behind its increased flexibility.

The flexibility and permeability benefits of the 400-meter framework are easily framed to support the argument of the sustainable city. Many arguments, including those of new urbanism make the argument suggesting that higher density; walkable, urban areas lead to a more sustainable human settlement and living pattern, than the automobile and land dependant models from the radiant city and garden city movements. The dense, pleasant, walkable neighbourhoods that foster a sustainable lifestyle already exist, as can be seen in the atlas, in cities conceived outside of professional urban design theory.

Historic cities are shown in the atlas to be highly adaptable. Much of the ancient and medieval cities are obviously not ancient, yet the framework of the cities remains largely unchanged from its conception. The adaptable nature of a 400-meter framework supports not only the flexible framework of a 400-meter city, but also furthers support for the settlement’s sustainability. A settlement that existed for 100 years before the industrial revolution, and continues to exist can be anecdotally referred to as a sustainable city.

The implications for the research of the 400-meter framework and the emergent neighbourhood model are less clear. This research does not suppose to assume which of the urban frameworks is better, than any other. It does highlight that the 400-meter framework is based in human history and has lasted for several thousand years, while others are based in logic, occasionally being significantly altered after 50 years. The value judgement of the framework cannot yet be made.

Further understanding the urban framework, and its implications, requires additional analysis of both a quantitative and qualitative nature. An understanding of the frameworks must not be based in logic and casual observation; it must be rooted in substantial high quality research. This will include (but not limited to) traffic pattern studies, economic value studies, income level studies, a socioeconomic portrait, land use analysis, and additional qualitative analysis about the human perception of urban spaces both from the frame of reference of the denizen and the outsider. The psychology of users and the sociology of different urban spaces must be compiled and compared to urban frameworks. Additionally, further research should add additional quantification of the space in terms of population and density studies. A comparison of land values tied to urban frameworks must be compiled to determine the presence of a statistically significant or causal relationship between land value and urban framework. Future research must answer the human questions of these spaces.

It is only with the compilation of this additional research that the current atlas of urban framework will begin to shoulder its full potential. This atlas is proof and documentation of the existence and subsequent alteration of urban frameworks, however any value judgements must be reserved for further research into the nature and perception of urban space.
III. Relevance

The relevance of the work compiled in the atlas differs when considered for the fields of architecture and urban design. The relevance for urban design is much more apparent on the surface. The work clearly exposes the major change in urban form at the hands of the field of professional urban design theory. This change is most illustrated in the manner that urban designers (through the advancement and implementation of their theories) for better or for worse have drastically and permanently altered the organic human scale of urban settlement.

This urban framework study shows the physical representation of the end of the historically prevalent emergent neighbourhood development process. In cities developed and influenced under a professional theory there is a logical ordered urban framework and system of land use. These professionally planned cities remove the freedom for altering urban form. The grand logical design is all encompassing and controlling, limiting the flexibility and adaptability of the area.

The rigid use of an oversized framework was shown to have developed out of the designable neighbourhood unit. The neighbourhood unit is clearly visible in the framework of professional theory era cities and has been shown to be a very limiting basis for the development of an urban framework. The over-scaled framework removes, or makes more difficult, movement between two neighbourhood units. This attempt to control the users and citizens of the urban area is an overreach for urban design and resulted in an urban form shown in every map in this atlas in the Garden City, Radiant City, and New Urbanist chapters.

Showing the break of urban design with traditional urban scale, and all of the implications of this, highlights the importance of urban design in placemaking. It also can be used to infer the type of places that are created by urban designers when there is no consideration for anything other than an artfully conceived logical order. With further research into the nature of 400 meter and non-400-meter scaled cities, an understanding could be developed regarding the consequences of urban framework on the liveability of a city.

Also implied is the failure of the neighbourhood unit as a designable entity. The entire theory of the neighbourhood unit as a geographic entity based on a radius of 400 meters (i.e. 800mts of diameter) is inherently unfit to frame human urban design as a discipline, and therefore has deeply informed all models produced by professional urban designers in the last century. This means re-thinking the methodology of practicing city designers and working for an entirely different technical and cultural foundation for the profession is necessary.

The relevance the 400-meter framework analysis to architecture as a profession is in the relationship of a city’s urban framework and its buildings, and in the relationship of architecture to urban design as a profession.

The architect can find value in the ascertaining of the profound difference in form a city takes when its design is not derived from the city and its people, rather imposed from a logic based theory. An architect can also begin to imagine the profound effect on building in a city of a 400 meter scale, and the benefits and challenges this offers, however this is not any different than designing new spaces for a historical city.

At a general level this work is a call for an evidence-based approach to the study and design of the built environment, an attempt to expand the penetration of science into urban design and architecture, from setting up a hypothesis and testing it critically in rigorous conditions, making it widely testable within the disciplinary field. This research, even in its present somewhat preliminary form, is such a test. It is about constructing tested empirical knowledge. The relevance of that for architects refers to the need to bring the culture of architecture and urbanism out of the domain of expression (the domain of visual arts), and closer to that of usefulness (the domain of practical arts and experimental science). After many decades of fashionable and fascinating theories, theories are needed that work; this research is an investigation of the field of what has been working for centuries, which involves architecture as much as urbanism in the formation of feasible answers to the questions posed by contemporary global urbanisation.

Also of relevance to architecture is finding a place to embrace urban design and the strengths it offers. The harshest criticisms of new urbanism often come from the field of architecture. Architects often respond negatively to form based coding and any attempt on the part of urban designers to infringe on the creative freedom of an architect. The emergent neighbourhood theory and the 400-meter framework could have major implications on this relationship. Both the emergent neighbourhood model and the 400-meter scale dilute many of the draconian ideas of heavy-handed new urbanism, suggesting only that a framework for development be put in place and the neighbourhod be allowed to emerge. Architects that are opposed to the over design of space as new urbanism can occasionally be guilty of, will find a more amenable design paradigm in this approach to urban design.
Bibliography:


Table of illustrations:


Figure 1.1  Le Corbusier's 400m rule diagram - Corbusier, Le. 1964. “The Radiant City.” London. Faber and Faber Limited. Page 56.


Figure 1.5  Map of ancient Pavia - Cervent, Marta. 2004. “Citta Romane di Fondazione.” L’erma di Bretschneider. Roma. Page 110.


Figure 1.9  Map of Bremen - 1600. http://www.google.co.uk/imghr?url=http://img.search.com/thumb/180/bremen_braun-hogenberg.jpg&imgrefurl=http://www.search.com/reference/Bremen&usg=9Yc3DiRzBlokWvWGA?docId=135&w=180&sz=15&h=bnm$s=tart=2&zoom=0&um=1&itbmsg=1&itbclip=180&itbnu=1&itbtt=180&prev=/images%3Fq%3D1600%2BBremen%2Bmap%25start%3D20%26um%3D1%26hl%3Dnl%26tbnid%26r1%26tbn%3D1R2SHCN_enGB369%26ndsp%3D20%26tbm%3Disch.1.[04/09/2010].


Figure 2.2  Map of Tripoli - 1978 - Tripoli__http://mappery.com/Tripoli-City-Map. [04/09/2010].

Figure 2.3  Map of Verdun - 1624 - http://www.fortified-places.com/images/verdun_image3.jpg 1624. [04/09/2010].


Figure 2.8  Grammichele aerial view - http://it.greenplanet.net/agroalimentare/17-allele-notizie/23996- grammichele-dallagricoltura-verso-un-nuovo-capitolo-di-storia.html. [04/09/2010].


Figure 3.0  Aerial view of Noto - http://www.msnbc.msn.com/id/23071331. [04/09/2010].

Figure 3.1  Aerial view of Ragusa - http://www.nozio.com/Europe/Italy/Sicily/Ragusa/destination_guides/Ragusa. html. [04/09/2010].


Figure 3.5  Lincoln Park Chicago - Personal Collection.

Figure 3.6  Aerial view of Manchester - http://www.aerial-manchester.co.uk/. [04/09/2010].
Figure 6.7  Cabrini Green housing scheme - http://www.panoramio.com/photo/5579777. [01/09/2010].
Figure 6.8  Chandigarh - personal image.
Figure 6.9  Co-op streetscape - http://www.nytimes.com/2008/04/06/realstate/06live.html?_r=1. [01/09/2010].
Figure 7.0  Aerial view of Cumbernauld - http://panoramio.com/photo/5579777. [04/08/2010].
Figure 7.1  Drumul Taberei aerial view - http://vettwinning.eu/index.php?option=com_content&view=article&id=14&Itemid=23. [04/08/2010].
Figure 7.3  Le Mirail aerial view - http://www.ladepeche.fr/article/2008/12/10/505756-le-reve-envole-du-mirail.html. [04/08/2010].
Figure 7.4  Aerial view of Marzhan - http://www.photographersdirect.com/buyers/stockphoto.asp?imageid=1641598. [06/09/2010].
Figure 7.6  Aerial of Pendrecht housing - http://www.gemeentearchief.rotterdam.nl/content/index.php?option=com_content&amp;task=view&amp;id=440&amp;Itemid=335. [06/09/2010].
Figure 7.8  Regent Park aerial sketch - http://www.toronto.ca/culture/history/gallery/ch1/regent.htm. [06/09/2010].
Figure 8.0  Aerial of Stuyvesant Town - http://www.gsapp.org/Archive/HP/2005-2006/history/history_themes1.html. [06/08/2010].
Figure 8.2  Aerial view of Tsukuba - http://www.mikekrautter.com/blog/wp-content/uploads/2008/08/tama_shi_tokyo.jpg. [06/09/2010].
Figure 8.3  Brentwood neighbourhood - http://panoramio.com/photo/2103931. [02/09/2010].
Figure 8.4  Celebration aerial view - http://www.puddleofred.com/blog/wp-content/uploads/2010/03/celebrl.jpg. [02/09/2010].
Figure 8.5  Communications Hill masterplan - http://www.hmhca.com/projects/mixed-use.php. [02/09/2010].
Figure 8.6  Kentlands town centre - http://instructors.dwrl.utexas.edu/dean/node/94. [02/09/2010].
Figure 8.7  Laguna West residential street - http://www.demographia.com/db-nu-calgw.htm. [02/09/2010].
Figure 8.8  Oreno Station masterplan - http://www.planetizen.com/node/92. [02/09/2010].
Figure 8.9  Poundbury aerial view - http://www.princes-foundation.org/index.php?id=176. [02/09/2010].
Figure 8.10  Rosemary Beach masterplan - http://www.dpz.com/project.aspx?type=8&amp;Project_Number=9705&amp;Project_Name=Rosemary+Beach. [17/08/2010].
Figure 8.11  Seaside aerial view - http://www.avoe.org/index_NEW_2.html. [17/08/2010].
Figure 8.13  Typical Badli slum - http://www.guardian.co.uk/world/2009/jan/16/plastic-bags-india-delhi-ban. [17/08/2010].
Figure 8.15  Port au Prince slum - http://www.panoramio.com/photo/31174675. [02/09/2010].
Figure 8.16  Dharavi slum – personal image.
Figure 8.17  Hanna Nassif Slum - http://www.panoramio.com/photo/29936190. [02/09/2010].
Figure 8.18  Typical Karail Slum - http://humanitarian.worldconcern.org/2009/05/bangladesh-slum/. [02/09/2010].


Figure 10.1 Kranidi Settlement - http://www.basimakopouloi.gr/ermionida.htm. [04/09/2010].

Figure 10.2 Aerial view of Kricak slum: http://bluegumpictures.com.au/collections/indonesia_java/indonesia_java017.php. [04/09/2010].

Figure 10.3 Lagos slums - http://www.cbc.ca/sports/soccer/fifaworldcup/blog/2010/05/a-new-day-in-nigeria.html. [04/09/2010].

Figure 10.4 Las Colinas slum - http://www.panoramio.com/photo/22508556. [04/09/2010].

Figure 10.5 Lima aerial view - http://www.urbana.org/gfx/trek2005/Bangkok/lima.jpg. [04/09/2010].

Figure 10.6 Maputo slums - http://news.bbc.co.uk/1/hi/world/africa/8363045.stm. [04/09/2010].

Figure 10.7 Oranjí Town aerial view - http://www.memumbai.com/node/101. [06/09/2010].

Figure 10.8 Rocinha aerial view - http://www.flickr.com/photos/leszekwasilewski/3385948566/. [06/09/2010].

Figure 10.9 Rufisque slum - http://crs-blog.org/floodwater-turns-dakar-slum-into-swamp/. [06/09/2010].

Figure 11.0 Tondo slum - http://www.arrakeen.ch/asia2004/369%20%20Tondo.JPG. [06/09/2010].

Figure 11.2 West Point aerial view - http://www.bbc.co.uk/worldservice/lg/business/2009/11/091125_ liberia_picture_gallery.shtml. [06/09/2010].