Thank you for joining!
This lecture will begin shortly, at 11:00am UTC, 12:00noon BST
Lecture Series

Overview of the seven lectures forming part of this series:

1. **Introduction to the UN 2030 Sustainable Development Goals**, Mina Hasman, SOM
   Provides an overview of the UN 2030 SDGs together with other related international agreements, and describes the importance of the Goals for Built Environment Professionals.

2. **Planning for Rapid Urbanisation**, Ben Bolgar, The Prince’s Foundation
   Outlines a framework for use in secondary cities which are experiencing rapid growth but which may have little or no access to professional planning expertise.

3. **Planned City Extensions**, Alfredo Caraballo, Allies and Morrison
   Provides a reminder of key master-planning and urban design principles such as: site analysis, micro-climate design, density, mixed use, walkability etc.

4. **Resilient Infrastructure**, Ian Carradice, Arup
   Explains the context, relevance and drivers to develop resilient infrastructure by adopting an integrated design approach and considering planetary solutions to address climate related challenges.

5. **Climate Responsive Design**, Peter Clegg, Isabel Sandeman and Rachel Sayers from FCB Studios, and Rafiq Azzam, Shatotto
   Part one is focused on ‘A Manifesto for delivering Climate Responsive Design’, and Part Two, entitled ‘Collaborating for Sustainable Development’, provides a case study of how the principles of Climate responsive design have be used on a project in Bangladesh to create an inspiring and comfortable educational environment for the Aga Khan Academies Unit.

6. **Heritage-led Regeneration**, Geoff Rich, Feilden Clegg Bradley Studios
   Describes the value of heritage led regeneration in terms of the reuse of existing buildings, and the potential to generate social and economic development.

7. **Sustainable Outcomes Guide**, Gary Clark, HOK London Studio
   Provides a practical explanation of the outcomes that need to be delivered if we are to achieve development which is sustainable. Includes meaningful, measurable targets and associated metrics.
Planned city extensions
Case study: MADINAT AL IRFAN
Muscat, Oman
A MODEL FOR THE NEW URBAN AGENDA IN THE AGE OF CLIMATE CHANGE:

‘Humanity faces the greatest wave of urbanisation in its history, with 60% of the global population expected to live in urban areas by 2030 and 70% by 2050.

This presents both a challenge and an opportunity – to lock new urban expansion into a new development model towards climate-resilient and low-carbon societies.’

United Nations Framework Convention on Climate Change, 8 Dec 2015
A FRAMEWORK FOR SUSTAINABLE URBAN DEVELOPMENT

- builds on existing cultural identity
- reduces environmental impact
- promotes social cohesion
- improves public health
- supports a competitive economy
RAPID URBANISATION POSES A DESIGN DILEMMA
MANY CITIES ARE STILL NOT BEING DESIGNED WITH PEOPLE IN MIND.
THEY ARE INCREASINGLY HOMOGENEOUS AND PLACELESS.
RAPID URBANISATION IS OFTEN ILL-CONSIDERED, SPRAWLING AND ENERGY INTENSIVE
WHICH IN THE ERA OF CLIMATE CHANGE, INCREASINGLY PUTS US AT RISK.
MADINAT AL IRFAN
The Brief: 11 Principles
PRINCIPLE 1: LEARN FROM THE PAST TO INFORM THE FUTURE
PRINCIPLE 2: CREATE PLACES OF DISTINCT CHARACTER
PRINCIPLE 3: CREATE A COMFORTABLE ENVIRONMENT FOR PEDESTRIANS
PRINCIPLE 4: PROVIDE AN INTEGRATED TRANSPORT SYSTEM
PRINCIPLE 5: CREATE ACTIVE MIXED-USE PLACES
PRINCIPLE 6: CREATE AN INTEGRATED, SUSTAINABLE COMMUNITY
PRINCIPLE 7: CELEBRATE THE NATURAL LANDSCAPE
PRINCIPLE 8: EMBRACE QUALITY AND DIVERSITY IN ITS BUILDINGS
PRINCIPLE 9: COMPLETE AT EVERY STAGE
PRINCIPLE 10: SMART CITY CONCEPT
PRINCIPLE 11: PROVIDE A CATALYST FOR CHANGE
MADINAT AL IRFAN
Design Principles
Between the Sea and the Mountain
Between the Sea and the Mountain

Design with Nature
Between the Sea and the Mountain

Design with Nature

Gateway to Oman
Between the Sea and the Mountain

Design with Nature

Gateway to Oman

Pearls on a String
Between the Sea and the Mountain
Design with Nature
Gateway to Oman
Pearls on a String
Memorable Places
MADINAT AL IRFAN
Sustainability: five key themes
1 Appropriate Design
Responding to the climate – Learning from the vernacular
1 Appropriate Design
Responding to the climate – Learning from the vernacular

2 Landscape - Ecology
Protecting the natural environment – Enhancing biodiversity
1 Appropriate Design
Responding to the climate – Learning from the vernacular

2 Landscape - Ecology
Protecting the natural environment – Enhancing biodiversity

3 Resources
Responsible consumption – efficient use
1 Appropriate Design
Responding to the climate – Learning from the vernacular

2 Landscape - Ecology
Protecting the natural environment – Enhancing biodiversity

3 Resources
Responsible consumption – efficient use

4 Public Transport
Connecting the city – Changing behaviour
1 Appropriate Design
Responding to the climate – Learning from the vernacular

2 Landscape - Ecology
Protecting the natural environment – Enhancing biodiversity

3 Resources
Responsible consumption – efficient use

4 Public Transport
Connecting the city – Changing behaviour

5 Governance
Setting standards – safeguarding the future
MADINAT AL IRFAN

Understanding the site
Irfan is strategically placed in the Muscat metropolitan corridor...
sitting in close proximity to the airport and major roads...
...on a comparable scale to Mutrah and Ruwi...
...the missing link in the region
MADINAT AL IRFAN

Responding to the site
... DETERMINES WHERE TO BUILD
AN ORGANIC FIGURE
...JOINED BY A SERIES OF BRIDGES
THE DOWNTOWN AND THE HILL TOP VILLAGES
Irfan has two urban centres and a series of villages...
ILLUSTRATIVE MASTERPLAN

31,100 TREES
OVER 55 SPECIES
ILLUSTRATIVE MASTERPLAN

131,672 SQM URBAN SQUARES
46,394 SQM PROMENADE
151,389 SQM AGRICULTURE TERRACES
147,493 SQM URBAN PARKS
110,066 SQM DIWAN GARDENS

59 HECTARES TOTAL
ILLUSTRATIVE MASTERPLAN

539,337 SQM (APPROX. 130KM) FOOTPATH
131,672  SQM SQUARES
176,925  SQM SHARED SURFACES
119,805  SQM INTERNAL PLOT LINK
97 HECTARES
ILLUSTRATIVE MASTERPLAN

9.75 KM LRT ROUTE
15 LRT STOPS
17.4 KM BUS ROUTE
22 BUS STOPS
10.7 KM CYCLEPATH
ILLUSTRATIVE MASTERPLAN

2016 BUILDINGS

TOTAL IPMS1: 5,700,670 Sqm
ILLUSTRATIVE MASTERPLAN

RESIDENTIAL: 2,778,204 SQM
COMMERCIAL: 1,525,190 SQM
RETAIL: 260,272 SQM
GOVERNMENT/CIVIC: 874,435 SQM
HOTELS: 177,269 SQM
CULTURAL: 85,300 SQM
MADINAT AL IRFAN
The Anatomy of the City
ANATOMY OF THE CITY
ANATOMY OF THE CITY

1. THE DISTRICT WITHIN THE CITY:
   - Topography
   - Climate
   - Orientation

2. THE BLOCK WITHIN THE DISTRICT:
   - Block size
   - Character / grain
   - Flexibility of land use and building types
   - Open spaces and walkability

3. THE PLOT WITHIN THE BLOCK:
   - Plot types
   - Plot coverage
   - Adjacency rules, to ensure privacy
   - Build to lines

4. THE BUILDING WITHIN THE PLOT:
   - Building types
   - Street Wall Control
   - Building heights
   - Built up area control - IPMS

5. THE ELEMENTS WITHIN THE BUILDING:
   - Building types
   - Street Wall Control
   - Building heights
   - Built up area control - IPMS
DISTRICT WITHIN THE CITY

MICROCLIMATIC DESIGN FACTORS

<table>
<thead>
<tr>
<th>Solar shading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massing and density of buildings</td>
</tr>
<tr>
<td>Building heights</td>
</tr>
<tr>
<td>Orientation with respect to North</td>
</tr>
<tr>
<td>Building shape and form</td>
</tr>
<tr>
<td>Landscape and planting</td>
</tr>
<tr>
<td>Water features</td>
</tr>
<tr>
<td>Materials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local topography</td>
</tr>
<tr>
<td>Building heights</td>
</tr>
<tr>
<td>Orientation with respect to North</td>
</tr>
<tr>
<td>Building shape and form</td>
</tr>
<tr>
<td>Landscape and planting</td>
</tr>
</tbody>
</table>
DISTRICT WITHIN THE CITY

MICROCLIMATIC DESIGN FACTORS

Wind diagram for Madiant al Irfan
Street following the north-east breeze
Result of topography and wind in the structure of the masterplan
DISTRICT WITHIN THE CITY

MICROCLIMATIC DESIGN FACTORS
Walkable routes from point A to point B at different times of the day.
BLOCK WITHIN THE DISTRICT
BLOCK WITHIN THE DISTRICT

NEW YORK, MANHATTAN:

BARCELONA, CERDÁ:

PARIS, HAUSSMANN:

DOHA, MSHEIREB:

OMAN, MADINAT AL IRFAN:
BLOCK WITHIN THE DISTRICT

BLOCK SIZE

Fig. 5.3-02 Shape of the urban settlements and north-south orientated streets

Fig. 5.3-03 Flexible length, fixed width

Fig. 5.3-04 Dimensions of a generic block in Madinat Al Irfan

Fig. 5.3-05 Maximise façade facing north-south orientated streets

Fig. 5.3-06 9x9 grid for basement car parking
BLOCK WITHIN THE DISTRICT

BLOCK SIZE

Fig.5.3-07: Generic block in Nadirat Al Irian, and a catalogue of blocks taken from the Concept Masterplan overlaid with the generic block.

Fig.5.3-08: Blocks of the Concept Masterplan.
**BLOCK WITHIN THE DISTRICT**

**URBAN GRAIN**

**SMALL GRAIN**
Typical plot sizes: 400 - 1,300 sqm

**MEDIUM GRAIN**
Typical plot sizes: 1,000 - 2,500 sqm

**LARGE GRAIN**
Typical plot sizes: 2,300 - 11,371 sqm

**MIXED GRAIN**
Typical plot sizes: 400 - 11,371 sqm

Fig. 5.3-09. Photographs of models showing a variety of urban grains in Madinat Al Irfan.
BLOCK WITHIN THE DISTRICT

BLOCK SUBDIVISION CRITERIA
BLOCK WITHIN THE DISTRICT

MICROCLIMATIC DESIGN FACTORS
PLOT WITHIN THE BLOCK
Plot within the block

Fig. 5.4-01 Study of type of blocks in sample block
PLOT WITHIN THE BLOCK

Fig. 5.4-01 Study of type of blocks in sample block
PLOT WITHIN THE BLOCK

PLOT - BASEMENT CAR PARKING

Fig. 5.4-05 Individual and shared basement car park
PLOT WITHIN THE BLOCK

PLOT - BUILDING TYPOLOGIES

RESIDENTIAL:

- Plot 27x37m
  - Plot area: 756sqm
  - Plot coverage: 64%

- Plot 27x46m
  - Plot area: 1242sqm
  - Plot coverage: 62%

- Plot 27x37m
  - Plot area: 999sqm
  - Plot coverage: 70%

- Plot 36x28m
  - Plot area: 1008sqm
  - Plot coverage: 67%

- Plot 54x28m
  - Plot area: 1512sqm
  - Plot coverage: 72%

COMMERICAL:

- Plot 36x37m
  - Plot area: 1332sqm
  - Plot coverage: 63%

- Plot 45x45m
  - Plot area: 2084sqm
  - Plot coverage: 60%

- Plot 45x19m
  - Plot area: 810sqm
  - Plot coverage: 61%

- Plot 27x37m
  - Plot area: 999sqm
  - Plot coverage: 70%

- Plot 28x38m
  - Plot area: 1324sqm
  - Plot coverage: 70%

- Plot 54x28m
  - Plot area: 1512sqm
  - Plot coverage: 72%

- Plot 54x64m
  - Plot area: 3456sqm
  - Plot coverage: 78%
PLOT WITHIN THE BLOCK

PLOT - BUILDING TYPOLOGIES

Fig.5.4-07 Combination of different typologies in Madinat Al Irfan plots
ANATOMY OF THE VILLAGE

PLOT WITHIN THE CITY

VILLAS

TOWNVILLAS

TOWNHOUSES

Fig.5.5-08 Village plot depths
ANATOMY OF THE VILLAGE

PLOT WITHIN THE CITY

VILLAS

TOWNVILLAS

TOWNHOUSES

RIBBON BLOCK

ISLAND BLOCK

Fig. 5.5-08 Village plot depths
ANATOMY OF THE VILLAGE

PLOT WITHIN THE CITY

VILLAGE BLOCKS

RIBBON BLOCKS

ISLAND BLOCKS

Fig. 5.5-10: Blocks in villages and hamlets of Madinat Al-Iftah
ANATOMY OF THE VILLAGE

MICROCLIMATIC DESIGN FACTORS

Fig. 5.3-20 Village Block in summer with and without landscape planting

Fig. 5.3-21 Village Block in winter with and without landscape planting

Fig. 5.3-24 Village orientation studies in summer

Fig. 5.3-25 Village orientation studies in winter
ANATOMY OF THE CITY

BUILDING TYPOLOGIES
BUILDING TYPOLOGIES

VILLAS AND TOWN VILLAS

<table>
<thead>
<tr>
<th>Location</th>
<th>Villages, suburban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average unit size</td>
<td>300 Sqm (1)</td>
</tr>
<tr>
<td>Unit sizes</td>
<td>3 bedroom: 210-280 Sqm (2)</td>
</tr>
<tr>
<td></td>
<td>4 bedroom: 280-310 Sqm (2)</td>
</tr>
<tr>
<td></td>
<td>5 bedroom: 340 - 570 Sqm (2)</td>
</tr>
<tr>
<td>Plot coverage</td>
<td>Villa: 30%</td>
</tr>
<tr>
<td></td>
<td>Townvillas: 40% (3)</td>
</tr>
<tr>
<td>No. floors</td>
<td>2 (1)</td>
</tr>
</tbody>
</table>

Note: (1) Data provided by Omran / Booz&Co.
(2) IPMS18

Fig. 3.4-11 Townvillas

<table>
<thead>
<tr>
<th>Location</th>
<th>Villages, suburban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average unit size</td>
<td>240 Sqm (1)</td>
</tr>
<tr>
<td>Unit sizes</td>
<td>3 bedroom: 200-230 Sqm (2)</td>
</tr>
<tr>
<td></td>
<td>4 bedroom: 230-260 Sqm (2)</td>
</tr>
<tr>
<td></td>
<td>5 bedroom: 260 - 290 Sqm (2)</td>
</tr>
<tr>
<td>Plot coverage</td>
<td>60% (1)</td>
</tr>
<tr>
<td>No. floors</td>
<td>2-3 (1)</td>
</tr>
</tbody>
</table>

Note: (1) Data provided by Omran / Booz&Co.
(2) IPMS18

Fig. 3.4-12 Villa

Fig. 3.4-13 Townhouse
BUILDING TYPOLOGIES

VILLAS AND TOWN VILLAS

Fig. 3.6-15 Ground floor of a standard villa

Fig. 3.6-17 First floor of a standard villa

Fig. 3.6-16 Section of a villa in residential area

Fig. 3.6-18 Functional diagram of a residential unit
BUILDING TYPOLOGIES

TOWN HOUSES

Fig. 5.6-27: Ground floor of a standard townhouse with formal area

Fig. 5.6-28: First floor of a standard townhouse

Fig. 5.6-29: Second floor of a standard townhouse

Fig. 5.6-30: Ground floor of a townhouse with informal layout

Fig. 5.6-31: Ground floor of a townhouse with a shop/office facing the street

Legend:
- Private family zone
- Public formal zone
- Service area
- Additional ground floor uses

Scale: 0 1m 5m 10m
BUILDING TYPOLOGIES

APARTMENTS

Table 6.4.03

<table>
<thead>
<tr>
<th>Floor Plate Size (SQM)</th>
<th>Number of Apartments</th>
<th>Number of Core Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>920 SQM</td>
<td>4 apartments</td>
<td>1 core</td>
</tr>
<tr>
<td>660 SQM</td>
<td>4 apartments</td>
<td>1 core</td>
</tr>
<tr>
<td>675 SQM</td>
<td>2 apartments</td>
<td>1 core</td>
</tr>
<tr>
<td>692 SQM</td>
<td>2 apartments</td>
<td>1 core</td>
</tr>
<tr>
<td>710 SQM</td>
<td>2 apartments</td>
<td>1 core</td>
</tr>
<tr>
<td>4 apartments</td>
<td>1 core</td>
<td></td>
</tr>
<tr>
<td>3 apartments</td>
<td>1 core</td>
<td></td>
</tr>
<tr>
<td>2 apartments</td>
<td>1 core</td>
<td></td>
</tr>
<tr>
<td>1 apartment</td>
<td>1 core</td>
<td></td>
</tr>
</tbody>
</table>

**Urban and Villages**

4-6 apartments per core

Average floor plate size: 1,340 SQM

1-2 apartments per core

Average floor plate size: 875 SQM

Perimeter block: 200 SQM

Point block: 250 SQM

4-10

---

Fig. 5.4-32: Residential perimeter blocks, floorplate sizes, number of apartments and cores

Fig. 5.4-35: Residential point blocks

Fig. 5.4-36: Clusters of point blocks

---

Data provided by Omran / Booz & Co.

(PMS)
APARTMENTS
BUILDING TYPOLOGIES

APARTMENTS
BUILDING TYPOLOGIES

OFFICES

Table 5.3-05

<table>
<thead>
<tr>
<th>Type of Office Building</th>
<th>Area Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small office building</td>
<td>300 - 1,500 Sqm</td>
</tr>
<tr>
<td>Medium office building</td>
<td>1,500 - 2,500 Sqm</td>
</tr>
<tr>
<td>Large office building</td>
<td>2,500 - 4,500 Sqm</td>
</tr>
</tbody>
</table>

* Data based on information provided by Oman / Dooz & Co.
* Floorplate IPMS1

Fig.5.4-51 Central Business District Square

Fig.5.4-52 Office building in Ibn Sina Central boulevard

Fig.5.4-53 Office building in Ibn Sina Central boulevard

Fig.5.6-49 Office building categories - benchmarking.

Fig.5.6-50 Office building categories - Madinat Al Irfan typologies.
BUILDING TYPOLOGIES

RETAIL

PRIMARY AND SECONDARY RETAIL SHOPS

<table>
<thead>
<tr>
<th>Location</th>
<th>urban/village in ground floors only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit size [sqm]</td>
<td>Primary: 150 - 300 Sqm (1)</td>
</tr>
<tr>
<td></td>
<td>Secondary: 50 - 200 Sqm (1)</td>
</tr>
<tr>
<td>No. Floors</td>
<td>1-2</td>
</tr>
</tbody>
</table>

(1) MPS3B
## Building Typologies

### Retail

#### Department Store

<table>
<thead>
<tr>
<th>Location</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target no. units</td>
<td>2</td>
</tr>
<tr>
<td>Unit size (sqm)</td>
<td>30,000 Sqm (1)&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>4,000-7,000 Sqm (2)&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>No. Floors</td>
<td>5-8</td>
</tr>
</tbody>
</table>

<sup>1</sup> IMPS1 excluding basements  
<sup>2</sup> IMPS1 floorplate size

#### Pavilions

<table>
<thead>
<tr>
<th>Location</th>
<th>Urban and suburban street and rooftops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit size (sqm)</td>
<td>4 - 2,600 Sqm (1)&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>No. Floors</td>
<td>1</td>
</tr>
</tbody>
</table>

<sup>1</sup> IMPS1
BUILDING TYPOLOGIES

RETAIL

SOUK

<table>
<thead>
<tr>
<th>Location</th>
<th>urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target no. units</td>
<td>2</td>
</tr>
<tr>
<td>Unit size (sqm)</td>
<td>150-300 Sqm (1)</td>
</tr>
<tr>
<td>No. Floors</td>
<td>1-3</td>
</tr>
</tbody>
</table>

(1) IMP53B
### Building Typologies

**Mosques**

<table>
<thead>
<tr>
<th><strong>Location</strong></th>
<th>urban/village</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target no. units</strong></td>
<td>16 (°)</td>
</tr>
<tr>
<td><strong>Unit size (sqm)</strong></td>
<td>820 Sqm (°)</td>
</tr>
<tr>
<td><strong>No. Floors</strong></td>
<td>1-3</td>
</tr>
</tbody>
</table>

(°) IPMS1 excluding basements  
(°) Data provided by Omran / Booz&Co. report  
(°) Based on catchment areas defined by Abu Dhabi Community Facility Planning Standards
<table>
<thead>
<tr>
<th>Location</th>
<th>urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit size (sqm)</td>
<td>12,000-38,000 Sqm (1)</td>
</tr>
<tr>
<td></td>
<td>2,500-8,500 Sqm (2)</td>
</tr>
<tr>
<td>Standard room size (sqm)</td>
<td>30 Sqm</td>
</tr>
<tr>
<td>No. Floors</td>
<td>4-8</td>
</tr>
</tbody>
</table>

(1) IPMS1 excluding basements
(2) IPMS1 building footprint
BUILDING TYPOLOGIES

BRIDGES

Table S.4-20  Catalogue of bridges of Mālik al 'Inān

<table>
<thead>
<tr>
<th>Bridge</th>
<th>Height</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge 1</td>
<td>4m</td>
<td>75.4m</td>
</tr>
<tr>
<td>Bridge 2</td>
<td>23m</td>
<td>73m</td>
</tr>
<tr>
<td>Bridge 3</td>
<td>15m</td>
<td>62.2m</td>
</tr>
<tr>
<td>Bridge 4a</td>
<td>20m</td>
<td>100m</td>
</tr>
<tr>
<td>Bridge 4b</td>
<td>17m</td>
<td>70.2m</td>
</tr>
<tr>
<td>Bridge 5</td>
<td>10m</td>
<td>40.4m</td>
</tr>
<tr>
<td>Bridge 6</td>
<td>15.7m</td>
<td>25.7m</td>
</tr>
<tr>
<td>Bridge 7</td>
<td>16m</td>
<td>19.7m</td>
</tr>
<tr>
<td>Bridge 8</td>
<td>14.7m</td>
<td>115m</td>
</tr>
<tr>
<td>Bridge 9</td>
<td>7.2m</td>
<td>154.3m</td>
</tr>
<tr>
<td>Bridge 10</td>
<td>28.7m</td>
<td>196m</td>
</tr>
<tr>
<td>Bridge 11</td>
<td>3.1m</td>
<td>180.5m</td>
</tr>
<tr>
<td>Bridge 12</td>
<td>16m</td>
<td>113.1m</td>
</tr>
<tr>
<td>Bridge 13</td>
<td>15.1m</td>
<td>160.1m</td>
</tr>
<tr>
<td>Bridge 14</td>
<td>14m</td>
<td>12.1m</td>
</tr>
<tr>
<td>Bridge 15</td>
<td>15m</td>
<td>41.7m</td>
</tr>
</tbody>
</table>

Fig. 5.4-131  Kit of parts

Fig. 5.4-140  Examples of bridges built with the kit of parts
ANATOMY OF THE CITY
BUILDING ELEMENTS

COLONNADES
COURTYARDS
ENTRANCES
WINDOWS

CANOPIES
OVERHANGS
CORNICES
ANATOMY OF THE CITY
BUILDING ELEMENTS

SCREENS

TERRACES

FACADE DEPTH - LAYERING
MADINAT AL IRFAN

Places
WADI LANDSCAPE

1. IRFAN CENTRAL WADI
2. IRFAN HEIGHTS WADI
3. IRFAN VILLAGE WADIS
4. IRFAN WEST WADI
5. KEY WADI LOCATIONS
6. MADINAT AL IRFAN PARK GARDENS
WADI LANDSCAPE

IRFAN CENTRAL WADI

GARDEN WALK  URBAN OASIS  URBAN TERRACES  PICNIC & PLAY
WADI LANDSCAPE

IRFAN VILLAGE WADIS
CITY OF BRIDGES
IRFAN CENTRAL
IRFAN CENTRAL

KEY SPACES AND BUILDINGS
IRFAN HEIGHTS
IRFAN HEIGHTS

KEY SPACES AND BUILDINGS

1. IRFAN HEIGHTS MOSQUE
2. GATEWAY TO HIGH TOWN
3. IRFAN HEIGHTS SOUK
4. IRFAN HEIGHTS COMMUNITY MOSQUE
5. IRFAN HEIGHTS COMMUNITY SQUARE
6. IRFAN HEIGHTS PARK
IRFAN HEIGHTS
VILLAGES AND HAMLETS
VILLAGES AND HAMLETS
MADINAT AL IRFAN

Landscape
URBAN LANDSCAPE

KEY SPACES

1. MOSQUE GARDEN
2. MADINAT AL IRFAN CENTRAL SQUARE
3. BOULEVARD GARDEN
4. GATEWAY SQUARE
5. THEATRE SQUARE
6. CBD SQUARE
7. SOUK SQUARE
8. MADINAT AL IRFAN SQUARE
9. DIWAN
10. PROMENADE
URBAN LANDSCAPE

MADINAT AL IRFAN SQUARE
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SECONDARY PUBLIC SPACES
URBAN LANDSCAPE

HARDSCAPE STRATEGY

MATERIALS
## Urban Landscape

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<th>Park</th>
<th>Residential</th>
<th>Open Space</th>
<th>Shade/Planting</th>
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<td>Festuca pratensis</td>
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<td>Festuca ovina</td>
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### Seasonal Calendar

<table>
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<th>Apr</th>
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</table>
URBAN LANDSCAPE

LIGHTING STRATEGY

LANTERNS

LANDMARKS

INTEGRATED
VILLAGE & HAMLET LANDSCAPE

MOSQUE SQUARE
WADI LANDSCAPE

TYPOLOGIES
WADI LANDSCAPE

TYPOLOGIES

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CORNICHE
TERRACES
WADI BASIN
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TYPOLOGIES

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MATERIALS
WADI LANDSCAPE

TYPOLOGIES

FURNITURE

WAYFINDING

SHADE STRUCTURES
MADINAT AL IRFAN
Design codes
DESIGN CODES

WHAT ARE THEY FOR?
Deciphering the Invitation: Dressing for the Occasion

**Black Tie Optional**
- Crisp White Dress Shirt
- Dark Conservative Tie
- Solid Dark Suit or Tuxedo
- Dark Dressy Leather Shoes and Dark Dress Socks

**Semi-Formal**
- Crisp Dress Shirt Unobtrusive Pattern
- Conservative Tie
- Dark Suit

**Business Casual**
- Tie Optional
- White, Color or Patterned Dress Shirt
- Sports Jacket or Blazer (Recommended)
- Khakis or Nice Trousers
- Lace-Up or Slip-On Leather Shoes or Boots

**Casual**
- Sweater, Polo or Casual Button Down Shirt
- Khakis or Dark Jeans
- Khakis or Canvas Shoes
- Leather or Canvas Shoes
DESIGN CODES

WHAT ARE THEY FOR?
DESIGN CODES

WHAT ARE THEY FOR?
DESIGN CODES

HOW DO THEY WORK?

Vision/Parameter Plans

Site

Phase 1

Design Codes/Guidelines

Urban

Building

Elements

- Mandatory
- Open to interpretation
- Recommendation
DESIGN CODES

HOW DO THEY WORK?

VISION / PARAMETER PLANS

SITE

PHASE 1
DESIGN CODES

HOW DO THEY WORK?

DESIGN CODES / GUIDELINES

URBAN

BUILDING

ELEMENTS

Street type

Street Wall Control

Type of Colonnades
DESIGN CODE

CODE PRECEDENTS

King’s Cross, Olympic Legacy, Dohaland, Lusail, Seri Tanjung Pinang, Solidere...
12 codes
7 countries
from 2007-2015
from 12 to 3,600 hectares

KEY FACTORS

Scale of Project
Land Ownership
Local Development Context
Implementation
Time Frame
### DESIGN CODE

### SELECTIVE MATRIX

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<tr>
<td>Site-wide, Public Realm</td>
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<td>Landscape</td>
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<td>Sustainability</td>
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<td>Other Site-wide Policies</td>
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<td>Architecture Massing, Uses</td>
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<td>Architecture Material &amp; Detail</td>
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<tr>
<td>Support documents</td>
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</table>

#### Consultant oriented axis

#### User oriented axis

|   | 1.1 | 1.2 | 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 | 3.1 | 3.2 | 3.3 | 3.4 | 4.1 | 4.2 | 4.3 | 4.4 | 4.5 | 4.6 | 5.1 | 5.2 | 5.3 | 5.4 | 5.5 | 5.6 | 6.1 | 6.2 | 6.3 | 6.4 | 7.1 | 7.2 |
| Site-wide | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Area 1 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Area 2 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Area 3 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Area 4 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Area 5 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Area 6 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Area 7 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Area 8 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Area 9 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Area 10 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
DESIGN CODE PROPOSAL

SELECTIVE MATRIX

Site-wide

Area 1

Area 2

Area 3

Area 4

Area 5 (Key Landscape)

Area 6

Area 7

Area 8

Area 9

Area 10

Area 1 (Urban)

Area 3 (Resi)

Area 5 (Key Landscape)
DESIGN CODE PROPOSAL

IRFAN UDC TABLE OF CONTENTS

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A Tool For Delivery
An Illustrative Worked Example
Associated Documents
Character Areas
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Design Ambition: Sustainability
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Golden Rules
Guideline Hierarchy
Guideline Summary
Illustrative Schemes
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Organisation
Origin, Context
Parameter Plans
Purpose
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Sequenntial Build-Out Plans
Setting Standards To Deliver The Vision
Site Wide Architectural Vision
Standards, Regulations And Access
Status
Synergy
Synergy (Regional Context)
The Purpose Of This Document
Towards Implementation
Visions Of Place
Walkthrough

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Building Frontage
Car Parking
Connections
Cycle Routes
Developments
Earthworks And Grading
Edges
Enclosure
General Parameters
Geometry
Grain
High Landscape
High Street
Highway Design Standards
Illustrative Street Typologies
Infrastructure And Road Design
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Water Sensitive Urban Design

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ARCHITECTURE, MATERIAL & DETAIL

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An Architectural Language
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SUSTAINABILITY

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Innovation
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Water: Supply
Water: Waste Water

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Plot Boundaries
Protocol For Code Revision
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Stakeholder Consultation
Technical Standards And Codes
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General  
Specific
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  - How to use the Code
  - Relationship to other Documents
  - Monitoring and Approvals Process
  - Code Revision Protocol
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  - Version Tracker
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**Masterplan Vision**
**Character Area/Sectoral Visions**

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8. External References

Active Frontage
   A building front that promotes activity and encourages cross-movement between the building at ground level and the adjacent public realm by the way the building is designed or orientated. [Gascoigne UDC]

Building Frontage
   Portion of the building envelope facing the public realm, such as a street or a public square.

BUA
   Built-up Area.

Liwan
   A long narrow-fronted hall or vaulted portal found in Levantine homes that is often open to the outside living space for men guests. [Abdelmonem]

Majlis
   Rooftop spaces. [Dohaland MDS]

Malquaf
   Wind turret or wind-trap. The malquaf is a shaft rising above the rest of the house, placed on the northern end of the Qa’a. The north and the west sides of this malkaf are left open at the upper end to catch the prevailing cool breeze. [Fathy]

Mushrabeya
   A window fitted with a lattice screen made of small wooden bars. These bars are circular in section, so that they have the effect of breaking up the light which falls on them; thus the glare is softened and the eye is not dazzled. [Fathy]

Sablah
   A place in the home where guests are formally received.

Parameter Plans
   A set of plans that describe the parameters of the development in terms of its general use, height, access, and layout. [Gascoigne UDC]
DESIGN CODE PROPOSAL

IRFAN UDC TABLE OF CONTENTS

1. Front Matter
2. Site-wide Codes
3. Sector Codes
4. Block Level Codes
5. Building Level Codes
6. Element Level Codes
7. Key Area Guidance
8. External References

Type 1: Parameter Plan Based Codes

Parameter Plan based guidance
Street Hierarchy, Highway Design

Sector Locations
Land Uses
Streetwall Control Locations
Movement Networks
  Vehicular
  Cycle
  Pedestrian
  Public Transport
Landscape
Open Space Network
Infrastructure
Parking Strategy
DESIGN CODE PROPOSAL

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**Parameter Plan based guidance**

**Street Hierarchy, Highway Design**

- Sector Locations
- Land Uses
- Streetwall Control Locations
- Movement Networks
  - Vehicular
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- Open Space Network
- Infrastructure
- Parking Strategy

**Type 1: Parameter Plan Based Codes**
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**Type 3: Tutorial Codes**

- Perimeter block assembly
  - Building massing
  - Building density
  - Building Setbacks...
- Street Wall Controls
- Townscape Principles
  - Special buildings
  - Special frontages
  - Prominent corners...
- Village Fabric Principles
DESIGN CODE PROPOSAL

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**Perimeter block assembly**
- Building massing
- Building density
- Building Setbacks...

**Street Wall Controls**
- Street Wall Controls
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**Townscape Principles**
- Special buildings
- Special frontages
- Prominent corners...

**Village Fabric Principles**
- Village Fabric Principles

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**Type 3: Tutorial Codes**
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**Type 3: Tutorial Codes**
1. Front Matter
2. Site-wide Codes
3. Sector Codes
4. Block Level Codes
5. **Building Level Codes**
6. Element Level Codes
7. Key Area Guidance
8. External References

**Type 3: Tutorial Codes**

- **Building Types**
  - Schools
  - Mosques
  - Health Centres
  - Hotels
  - Theatres
  - Offices

- **Residential Types**
  - Villas
  - Town-villas
  - Town-houses
  - Low-rise Apartments
  - Mid-rise Apartments
DESIGN CODE PROPOSAL

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**Building Elements**
- Colonnades
- Entrances
- Balconies
- Roof Terraces
- Wind Turrets
- Basement Interfaces

**Material Palettes**
- Stone
- Timber
- Render
- Prohibited Materials
- Tree and Planting Palettes

*Type 4: "Kit of Parts" Codes*
DESIGN CODE PROPOSAL

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**Building Elements**
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- Prohibited Materials

**Tree and Planting Palettes**

**Type 4: “Kit of Parts” Codes**
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8. External References

Type 5: Special Cases

Irfan CBD Square
Irfan Square
Irfan Theatre Square
Mosque Garden
Irfan Central Souk
Village Square
Gateway Park
DESIGN CODE PROPOSAL

IRFAN UDC TABLE OF CONTENTS

1. Front Matter
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   - Irfan CBD Square
   - Irfan Square
   - Irfan Theatre Square
   - **Mosque Garden**
   - Irfan Central Souk
   - Village Square
   - Gateway Park
8. External References

Type 5: Special Cases
1. Front Matter
2. Site-wide Codes
3. Sector Codes
4. Block Level Codes
5. Building Level Codes
6. Element Level Codes
7. Key Area Guidance
8. External References

**Muscat Municipal Initiatives**
- Sustainability Standards
  - Omani Sustainability Standards

**Technical Standards**
- Directorate General for Standards and Metrology (Oman)
- SMIIC (Islamic Countries)
- BSI (UK)
- EN (Europe)
- ASTM (USA)

**Muscat Municipal Initiatives**
- Cultivating the Seasonal Flowers Program
- Program of Landscape Management for Workers’ Rehabilitation of Aforestation and Gardens

**Sustainability Standards**
- Omani Sustainability Standards

**Technical Standards**
- Directorate General for Standards and Metrology (Oman)
- SMIIC (Islamic Countries)
- BSI (UK)
- EN (Europe)
- ASTM (USA)
Establish urban design codes that are policy...
Complex and detailed thinking... distilled into a single A4 sheet for each development plot.

Translate the masterplan’s vision into something simple to understand.
MADINAT AL IRFAN
Governance
## Governance Approvals Landscape in Muscat

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X indicates the area of approval.
27-hectare site

Public sector development rights

Single master developer

Masterplan & Design Codes developed and monitored by master developer

Major public investment in the area e.g. Kings Cross St. Pancras Station

Long-term successful stakeholder consultation and collaboration

All approvals and permits by external agencies

Private public realm management, adopted streets
35-hectare site
Single land owner and master developer (Msheireb Properties, subsidiary of Qatar Foundation)
Masterplan & Design Codes developed and monitored by master developer
Developed as a single project (e.g. common site-wide basement)
Approvals and permits by external agencies
GOVERNANCE

LUSAIL CITY

- 3500-hectare site
- Lusail Real Estate Development Company (LREDC) - Master Developer
- Subsidiary of Qatari Diar
- Lusail City Administration Complex (LCAC) - Development Manager
  - Masterplan & Design Codes
  - Master development works Design Review
  - Monitoring and enforcement
- LREDC issues Temporary Building Permit (to allow enabling works)
- Final Building Permit by Municipality
- All services approvals directly through utility companies
✓ 190-hectare site
✓ Solidere:
  ✓ Joint Stock co, formed by Government decree
  ✓ Landowner, Planning Agency & Master Developer
  ✓ Finances/constructs all infrastructure, public space
  ✓ Develops 20%, sells 80%
✓ Responsible for Development Control, Quality Control, MP updates & Codes
✓ Building Permits issued by Municipality
✓ Public authority oversight by CDR*

* Council for Development and Reconstruction
Long term stewardship’ of land by private Great Estates
Ownership of freehold title; revenue stream through ground rents
Property leases have covenants (including ‘design codes’)
Active management of tenants
Investment in and management of public realm to enhance quality and land value
**GOVERNANCE**

**OLYMPIC LEGACY**

- 200-hectare site
- London Legacy Development Corporation (LLDC)
  - Public land (freehold) owner
  - Development authority
  - Planning authority
  - Manager of public realm
- Masterplan & Design Codes developed and monitored by LLDC
- Procurement and development agreements by LLDC
- Major public investment in infrastructure and land development - built under oversight of LLDC (and predecessor ODA)
- In the model of the Commission for New Towns
GOVERNANCE

GOVERNANCE MODELS

Scenario 1: **EXISTING STRUCTURE**

- Kings Cross, Msheireb

Scenario 2: **DEVELOPMENT AUTHORITY**

- Lusail City

Scenario 3: **PLANNING + DEVELOPMENT AUTHORITY**
  option (+ INFRACO)

- London Olympic Legacy (LLDC)
- London Docklands + Canary Wharf (LDDC)
- Solidere
...administered through strong city management and leadership for the long-term.
WHAT MAKES THE CITY?
A clear structure of public and civic infrastructure
Good streets...
Good streets...
Good streets...
Good streets...
Good streets...
Formal spaces...
and informal ones...
and informal ones..
at one with nature...
at one with nature...
at one with nature...
Madinat al Irfan... A City of Bridges...
AS IF IT HAS ALWAYS BEEN THERE
We hope you found this lecture of interest and that you will be interested in the other lectures in this series:

1. Introduction to the UN 2030 Sustainable Development Goals
2. Planning for Rapid Urbanisation
3. Planned City Extensions
4. Resilient Infrastructure
5. Climate Responsive Design
6. Heritage-led Regeneration
7. Sustainable Outcomes Guide

The Commonwealth Association of Architects would like to extend its thanks to all the contributors for their support in the creation of this pilot programme. The CAA welcomes feedback together with suggestions for future topics and would be pleased to hear from subject matter experts from around the Commonwealth who may be interested in contributing future material.

For this or any other issue, please contact: admin@comarchitect.org
Thank you for joining!

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www.commonwealthsustainablecities.org/cpd