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INCREMENTAL URBANISM: ULAANBAATAR’S GER SETTLEMENTS

DESIGN FOLIO
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Waste collection prototype implemented in the ger districts of Chingeltei-16, Ulaanbaatar, Mongolia
Project Details

Designer
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Title
Incremental Urbanism: Ulaanbaatar’s Ger Settlements

Function
Urban strategy including built architectural prototypes

Location
Ulaanbaatar, Mongolia

Client
Self-initiated

Practical Completion
ongoing (Waste collection prototype 2015, Ger Plug In 2017)

Funding body
Waste Collection Point, The Asia Foundation and the Municipality of Ulaanbaatar; The Ger Plug-In, The Lorinet Foundation
The prototype took advantage of the height difference of the topography to form a ramp leading from the high ground to the road and bus stop with several places for rubbish drop off along the way.
**Budget**
Waste Collection point $USD 40,000,
Ger Plug-In $USD 13,600

**Unit Cost**
Waste Collection point $USD 330/sqm:
Ger Plug-In $USD 260/sqm

**Area/Size**
Waste Collection Point, 120m2;
Ger Plug-In, 53 m2
Ger Plug-In, an affordable housing prototype being tested in the ger districts of Bayankhoshuu, Ulaanbaatar, Mongolia.
Summary of the Work and its Significance, Originality, and Rigor

For thousands of years, Mongolians have been living in gers – portable structures made of timber, felt and canvas. They are highly evolved designed objects, easy to disassemble, move and reassemble in a matter of hours without any tools or fixings. It is a perfect dwelling for the nomads. Yet, when this specific type of dwelling forms the basic unit of inhabitation for Mongolia’s capital city, Ulaanbaatar, it has led to unsustainable urban development, resulting in sprawling districts that lack basic urban infrastructure of water and sewage that contribute to toxic levels of air pollution in the city.
This project documents the process of transformation and spatial characteristics of selected ger districts describing how settlements densify by subdivision without improvements to infrastructure. It highlights the difficulties in implementing ger district development projects and positions the ger districts as a unique case study of an informal settlement because the majority of ger district inhabitants are land owners. Additionally, the project proposes an alternative mechanism for ger district development in the form of an incremental urban strategy. The target is to demonstrate how these districts can be incrementally developed by the residents themselves to include infrastructure, better housing, and community facilities, each with improved environmental performance to
improve air quality and reduce reliance on coal. This strategic framework for development includes:

• a design for an affordable housing prototype – the Ger Plug-In – as an adaptation of a traditional ger with embedded infrastructure and improved energy efficiency;

• a design for a waste collection and recycling building to improve solid waste collection within the districts

• scenario plans to increase density for three different ger district typologies: the central; mid and fringe areas

• an action plan for incremental development that conceptualizes how Green Climate Funds can be accessed to support low interest rate mortgages to initiate development
The project was selected for exhibition at the Venice Biennale 2016 by chief curator Alejandro Aravena, and subsequent site specific installations were designed for exhibitions in London at the Design Museum and in Sydney at the Museum for Applied Arts and Sciences. The work has been published in international journals such as Architectural Design, disseminated in a comprehensive design report and presented at international lectures.
The Ger Plug-In is located in the fringe areas where the new development plans do not reach.
Originality

The Ger districts of Ulaanbaatar are a unique typology of informal settlement. The project documents the specific spatial characteristics of the ger districts as a result of rural to urban migration and investigates their incremental stages of urban development. By surveying residents’ plots and conducting interviews, we have established the key issues facing residents with respect to basic urban infrastructure and understood how residents’ inhabit and improve their own plots. By investigating the disadvantages and limitations of top-down urban planning for ger district redevelopment, we have demonstrated the pressing need to create an alternative development mechanism.
1 The Ger Plug-In tests new designs for low tech, affordable, environmental systems including underfloor heating, a cleaner dual fuel efficient boiler and a trombe wall.

2 A community center prototype that is currently being constructed and programmed by a local NGO.

3 A recycling station is contained under the ramp of the Waste Collection Point, which splayed apart to create an open public space.
The innovative approach is to create an incremental strategy that includes:

- a design for an affordable housing prototype – the Ger Plug-In – as an adaptation of a traditional ger with embedded infrastructure and improved energy efficiency;
- a design for a waste collection and recycling building to improve solid waste collection within the districts
- a design for a community hub in response to resident and stakeholder feedback establishing the need for a community space to support after-school facilities and events
- scenario plans to increase density for three different ger district typologies: the central; mid and fringe areas
- an action plan for incremental development that conceptualises how Green Climate Funds can be accessed to support low interest rate mortgages to initiate development
Incremental scenario for the fringe districts over short, mid, and long term periods. It increases density as well as the provision of infrastructure, and community services.
Rigor

The project was divided into three parts, each with their own distinct methods of investigation.

1. Ger district analysis: to understand the spatial characteristics of the ger districts and how they were formed. This includes:
   • Base mapping to create a series of maps showing: existing development initiatives; formal infrastructure including roads, bus stops and water kiosks; and informal infrastructure.
   • Figure ground analysis of two selected districts: Chingeltei 16 and Sukhbaatar 16. These maps were created by comparing google earth aerial imagery with our own drone survey. This enabled us to see how plots had developed over time and
analyse the ratio between gers and houses
• Household surveys included interviews and measured drawings of each plot showing how residents have built additional structures over time

1 Figure ground mapping of the ger districts using both satellite and drone images to develop knowledge on how the ger districts transform.
2. Prototype development: to design and implement a series of prototypes addressing findings from Part 1. They include: a waste collection point; an affordable housing typology - The Ger Plug-In; and a community centre - The Ger Innovation Hub.

The methods include:

• Design development using drawings and models
• Conduct engagement meetings with key stakeholders and residents to receive feedback
• Develop selected prototypes for implementation involving detailed material, structural and construction design
• Monitor and evaluate the performance of realized prototypes in terms of use and environmental performance in the case of the Ger Plug-In.
3. Incremental strategy
   • Propose scenario plans to increase density for three different ger district typologies by creating sequential drawings over time
   • Develop an action plan that conceptualises how Green Climate Funds can be accessed to support low interest rate mortgages to initiate development
   • Conduct meetings with key stakeholders including Mongolian banks, The Mongolian Sustainable Finance Association, and other active NGOs on how proposal can be implemented
**Significance**

The project positions the Ger districts of Ulaanbaatar as a unique example of an informal, yet legal, settlement. It documents their spatial characteristics and mechanisms of growth and the impact of this urbanisation process. Based on this research, the creation of an incremental urban strategy for the Ger districts through the implementation of a series of architectural prototypes, sets out an alternative model for how these districts can be upgraded. This contributes new knowledge regarding the upgrading of informal settlements that addresses a disciplinary gap between large scale redevelopment and small scale interventions.
The findings of the Plug-In has proved that residents use an estimated 93% less coal during winter than their previous year living in a ger. If we extrapolate these numbers, if each of the 104,000 ger households was replaced by a Plug-In this would result in an estimated saving of 27,664 tonnes of coal per year, a profound impact that would improve air quality to the entire city.

Using the mechanism of the Green Climate Funds, the aim is to get the Plug-In accepted as a viable product eligible for low interest rate mortgages. This would allow thousands of households’ access to improved infrastructure with lower carbon emissions. This would radically shift the policy for ger district redevelopment both within the government and by funding agencies
such as the Asian Development Bank. As a more agile bottom-up solution it could change the mindset of decision makers. As the ger district phenomenon is not just specific to Ulaanbaatar, but exists in every urban area of Mongolia, it could have widespread ramifications for the entire country.
STAGE 0
Existing condition
Single family on a plot without infrastructure

Carbon Emissions: 100%
No of Families: 1
Infrastructure: No

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STAGE 1
Owner takes loan to build infrastructure with added capacity and an energy efficient house.

Carbon Emissions: >20% reduction
No of Families: 1
Infrastructure: Yes

TOOLKIT

STAGE 2
New residents move to plot and take loan to pay for right to land use and to build a house

Carbon Emissions: >20% reduction
No of Families: 2+
Infrastructure: Yes

TOOLKIT

STAGE 3
Income from rent used to invest in new programmes and infrastructure such as shops and greenhouses to generate different income streams

Carbon Emissions: >20% reduction
No of Families: 4+
Infrastructure: Yes

TOOLKIT

1 Proposed mechanism to unlock Green Climate Funding as part of the incremental strategy.
2 Development of a 1 plot upgrading scenario that is tied into the proposed financial strategy.
Dissemination and Evidence of Peer Review

Publications:


The 11th edition of the annual conference of the International Forum on Urbanism (IFoU) is organised by UIC Barcelona in cooperation with the Urban Resilience Research Net (URNet) and UN-Habitat.

Seeding the City in Ulaanbaatar’s Ger Districts: Urbanisation from the Inside-out”, Monu No. 27 Small Urbanism, Bruil, Netherlands. pp 110 - 115 ISSN 18603211 Monu is a biannual journal on urbanism.


Architectural Design (AD) is a UK based international architectural journal.


1 Structural and environmental systems of the Ger Plug-In prototype.
Dissemination and Evidence of Peer Review

Exhibitions:

“Settling the Nomads” in Reporting from the Front curated by Alejandro Aravena at la Biennale di Venezia, Venice, May 28, 2016 – November 27, 2016

The Biennale di Venezia is an international architectural exhibition held once every two years that address the academic side of architecture as well as show new projects under the theme set out. The 15th International Architecture Exhibition was titled ‘Reporting from the Front’. It investigates designs that produce architecture for the common good.


‘Fear and Love’ was the opening headline exhibition of the The Design Museum, London in 2016. The exhibition explores urgent underlying issues in the world today that inspire fear and love.

“Ger District Hub” in Common Good, Museum for Applied Arts and Sciences (MAAS), Sydney, March 2-Dec 2, 2018.

‘Common Good’ is a survey of key movements emerging in contemporary design
in the Asia-Pacific region that responds to social, ethical, and environmental challenges. The exhibition was launched as part of the Sydney Design Festival 2018.

Broadcast:


1 1:1 Structural testing for the Ger Plug-In prototype.
Dissemination and Evidence of Peer Review


“Battling Mongolia’s Pollution Problem.” Business Daily, BBC World Service, 10 July 2018 https://www.bbc.co.uk/programmes/w3cswgvp BBC World Service


Lectures:


“Designing for Contradictions Part 1”, Berlage Keynote, 9th November 2017

“Rural Urban Framework: Designing in Sites of Contradiction”, The School of the Art Institute of Chicago (SCAI), 19 October 2017


“Rural Urban Framework”, Harvard University China GSD, May 2017

“Rural Urban Framework”, Rensselaer Institute/ CASE, SOM May 2017

“Rural Urban Framework: Designing the rural”, TALKS about architecture is an ongoing international lecture-series that offers a podium to emerging architects. Rotterdam. Sept 2016


The waste collection prototype is located in one of the areas where The Asia Foundation has identified as having the worst areas for rubbish build up alongside certain neighbourhoods or Khorooqs that they had forged good relationships with local leaders.
1 Interior of the Ger Plug-In where the central columns are removed and the ger is suspended from above from a new truss.

2 Environmental data being collected for the Ger Plug-in through the second winter.

3 Site specific installations for the Venice Architecture Biennale 2016 that investigated different structures for hybridising the ger with a new structure.

4 Community engagement workshops with local residents and leaders.
The Ger Plug-In prototype is conceived as being in-between a ger and a house.
The Department of Architecture educates students in an active culture of service, scholarship and invention. Uniquely situated at the crossroads of China and global influence, the Department takes the approach that design is best explored from a sophisticated understanding of both. With a multidisciplinary curriculum emphasizing technology, history and culture, students gain broad knowledge and skills in the management of the environmental, social, and aesthetic challenges of contemporary architectural practice. With opportunities for design workshops, international exchanges, and study travel, graduates of the Department of Architecture are well prepared for contribution to both international and local communities of architects and designers.