

TOHOKU TOPO-URBANISM

Oblique Community Form in Post-Tsunami Japan

BY MATTHEW BUNZA

BACHELORS OF ART IN ARCHITECTURE
PORTLAND STATE UNIVERSITY, 2008

Submitted to the Department of Architecture
in partial fulfillment of the requirements for
the degree of Master of Architecture at the
Massachusetts Institute of Technology.
February 2013

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BY MATTHEW BUNZA

Submitted to the Department of Architecture in partial fulfillment of the requirements for the degree of Master of Architecture at the Massachusetts Institute of Technology on January 17th, 2013.

ABSTRACT :

Tohoku Topo-Urbanism explores the potential inhabitation of the oblique as an alternative model of community form and resilient reconstruction in Post-Tsunami Japan.

In its wake, the 2011 Tsunami left a redefined landscape and enormous questions about the future of people and place. Since then, the Japanese Government's plans for reconstruction put a moratorium on housing in lowland areas, necessitating a new residential geography. Because here, flat land is few and far between, the thesis proposes the notion that slopes become the new geography. Unfortunately, existing plans now result in mountain-top removal and extreme excavation in order to create flat 'buildable' land, and in other cases relocate entire communities far inland. The results can be detrimental to the natural and cultural landscape, and threaten to destroy already fragile communities.

Thus, this thesis is positioned as an alternate form of settlement that seeks a balance between productive and preserved landscape, and suggests that development emanate downslope from the hilltop; so that the oblique becomes a vital link between the highland and lowland nodes – a dual-datum reality of Post-Tsunami urban form.

The thesis sees the site as both abstract and specific; and asks how an understanding of ground conditions (such as slope, landform, vegetation, and orientation) can inform design. How might

topography generate access, infrastructure, and public space? How can landscape experience foster interaction between people and nature? The thesis explores these questions while solving problems inherent in normative methods of slope construction (constraints of economy, constructability, hazards, and mobility) by leveraging gravity, natural energy, innovative material and construction systems, and the power of place.

Tohoku Topo-Urbanism lies at the intersections of architecture, human settlement, and landscape; and thus the response and scope of the thesis is both multi-scalar and multi-disciplinary. It operates through policy, an urban masterplan (Chapter 03), and a strategy for landscape management; and finally, explores how architectural building typologies (Chapter 04) might fit within this framework.

The hope is that the sensitive inhabitation of slopes will allow communities to remain integrated with existing lowland areas and infrastructure, ensure safety from future natural disasters, while making every effort to foster interaction between the human, cultural, and natural landscapes.

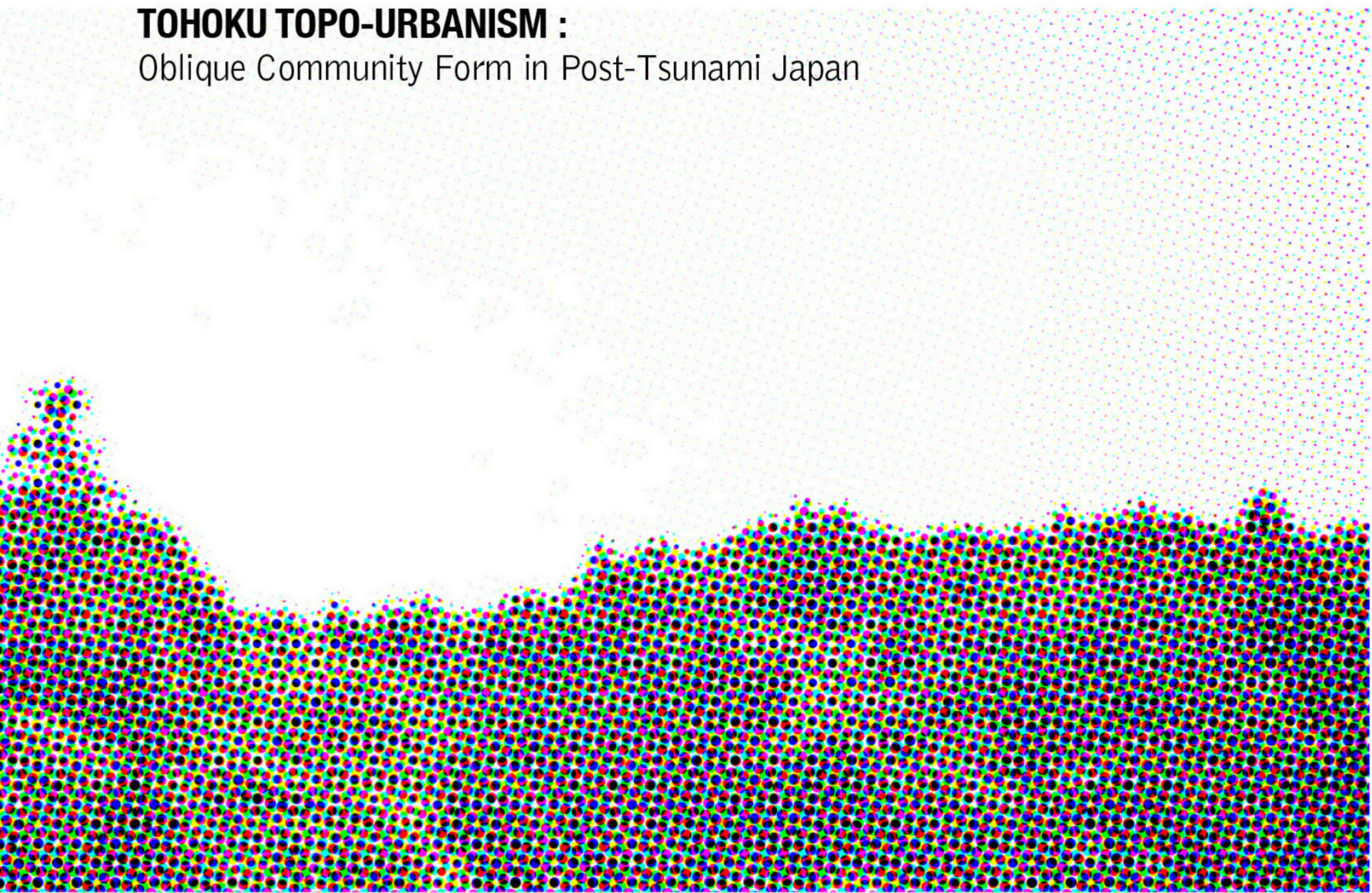
THESIS SUPERVISOR:
JAMES L. WESCOAT, JR.

TITLE:
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PROGRAM FOR ISLAMIC ARCHITECTURE, MIT**



TOHOKU TOPO-URBANISM :

Oblique Community Form in Post-Tsunami Japan



TOHOKU TOPO-URBANISM

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ACKNOWLEDGEMENTS :

I owe deep thanks to the following individuals:

First and foremost, to Shun Kanda and Jim Wescoat for making this thesis possible, and introducing me to the culture, context, and microcosm that is Minamisanriku.

To my thesis committee, for your time, guidance, inspiration, and even valued criticism.

To my parents, Geoff and Lin Bunza; my brother, Stephen Bunza; and Lauren Steele; for helping me remember where I came from and for your absolute and unwavering support.

To those who have lent a hand, an ear, or words of wisdom along the way:

Jiawen Chen, Yoonhee Cho, Reinhard Goethert, Erioseito Hendranata, Yoshihiro Hiraoka, Siwai Ho, Peng Huang, Duncan Kincaid, Suk Lee, Chris Mackey, Débora Mesa, Ana Miljacki, Eric Morris, Julian Ocampo, Yushiro Okamoto, Sayjel Patel,



Susanna Pho, Ali Qureshi, Laura Schmitz, David Suttle, Cynthia Stewart, Maya Taketani, Evelyn Ting, Shiyu Wei, Alexander Wood, and Rena Yang.

Special thanks to Peng, Yoonhee, Yushiro, Sayjel, Maya, Evelyn, and Shiyu — for going above and beyond when I needed you most.

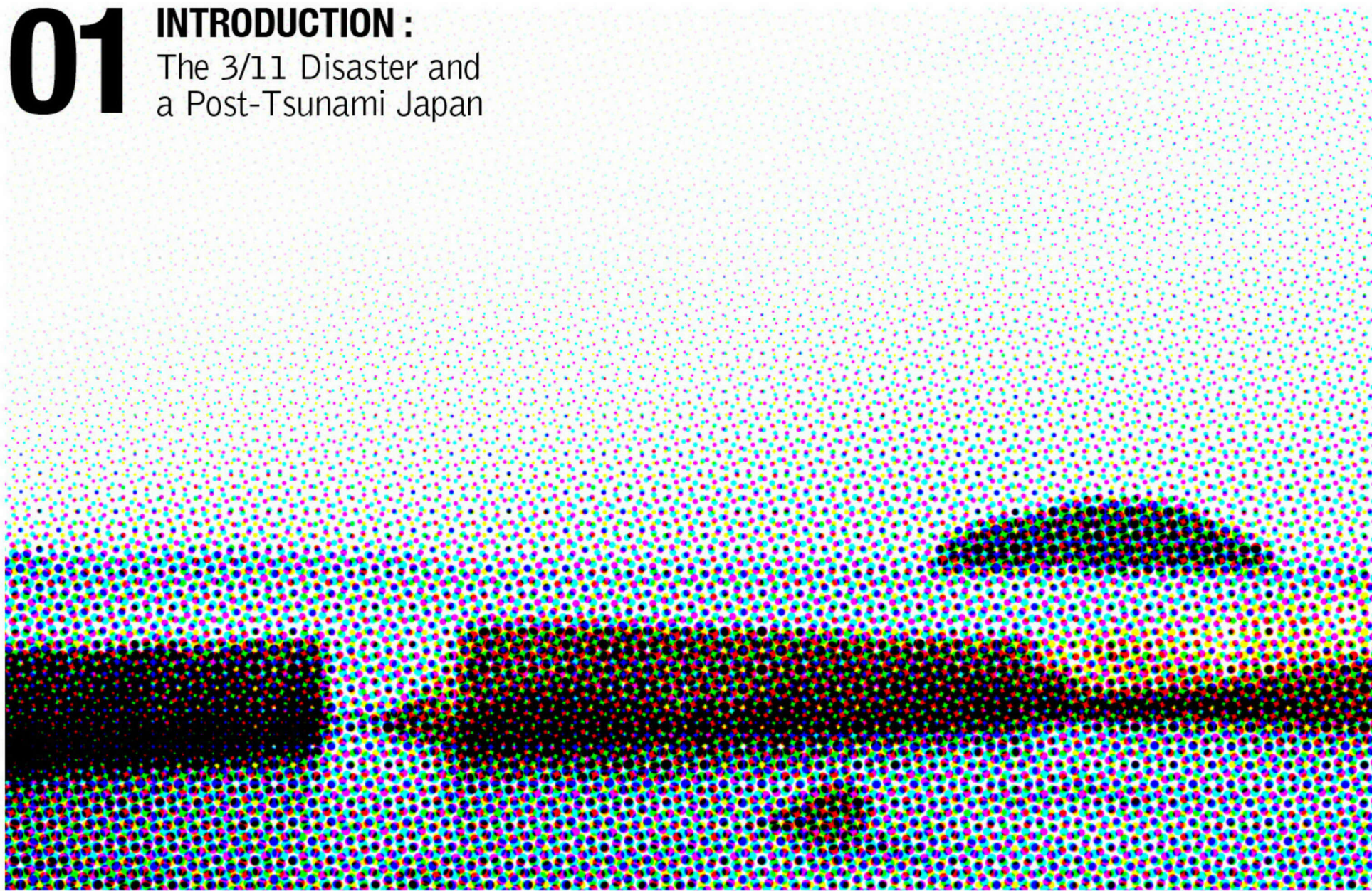
And finally, to my teachers and mentors, past and present, whose example and philosophy have made a lasting impact:

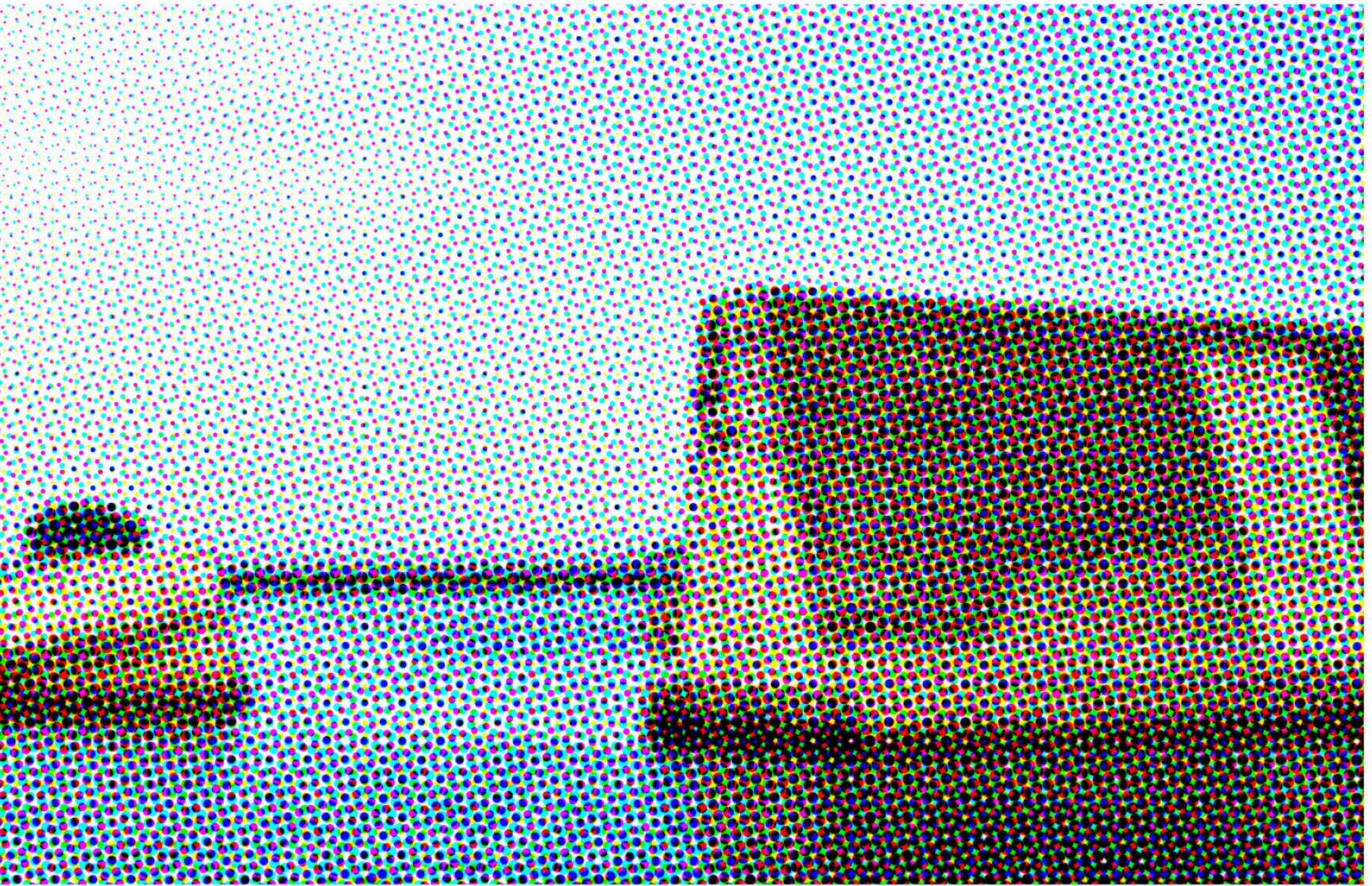
Rudy Barton, Brad Cloepfil, Antón García-Abril, Shun Kanda, Clive Knights, Brent Linden, John and Patricia Patkau, Andrew M. Scott, and especially Jim Siemens.

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01 INTRODUCTION :

The 3/11 Disaster and
a Post-Tsunami Japan





01.0 TOHOKU TOPO-URBANISM

THESIS.

Tohoku Topo-Urbanism explores the potential inhabitation of the oblique (the slopes) as an alternative model of community-form and resilient reconstruction in Post-Tsunami Japan.

PROBLEM STATEMENT.

On March 11th, 2011, a 9.0 mega-earthquake caused an enormous Tsunami – which was actually 14 tsunamis, with 40m high splash, 17m high waves, and 10m of total destruction – that in its wake left a redefined landscape; proof of a poor relationship between humans and nature; and enormous questions about the future of people and place.

Since then, the Japanese Government has put a total moratorium on all types of housing in the 'lowland' areas, and proposes the relocation of housing to safer ground; either to dispersed, space-constrained hilltops, or

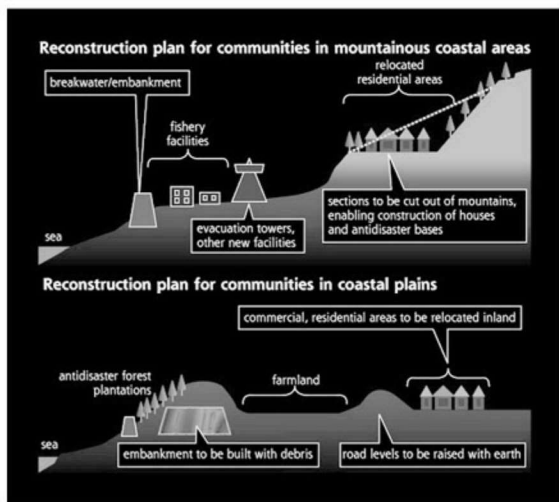
to larger valley floors, only found far inland.

Despite this shift away from the sea, the issue is that the relationship between people's homes and the sea still exists, given that the dominant industry here – fishing / aquaculture – necessitates direct connection to the ocean. It begs the question: in this new multi-nodal urban form, what is the new geography for housing?

For obvious reasons, development seeks cheap, flat, 'buildable' land. But, in the ever-mountainous geography of coastal Japan, flat land is few and far between – it exists in small, isolated pockets on hilltops, or in alluvial plains far inland. Thus, the reality – the thesis proposes – is that the coastal slopes are the new residential geography. In part, this is because the slopes potentially form vital links between highland and lowland nodes, keep connection to existing infrastructure and place, can be activated for natural energy and escape routes, and can accommodate contiguous



Ground Zero in Shizuoka, Post-3/11



Reconstruction Plans by the Japanese Government

development (which hilltops cannot), meaning that communities could remain intact.

Unfortunately, when proposing development on slopes, the Reconstruction Plans put forth by the Japanese government lead to problematic outcomes: On the slopes, they propose extreme excavation (thereby wiping away topography to create buildable land), which protects from one natural disaster (Tsunamis) only to allow vulnerability to another (mudslides). And, on hilltops, they propose mountain-top removal to increase the space of the hilltop. Both are detrimental to the natural and cultural landscape, and unfortunately, both are happening now. Thus, the thesis suggests an alternative approach.

SCOPE & APPROACH.

At its simplest, the thesis proposes the activation of the oblique as the new geography for housing, but suggests that slopes cannot be

thought of in isolation. Any plans must take into account the hilltops, the lowlands, the physical, natural, cultural, and climatic context; and at all scales over time.

The response and scope of this thesis, then, is both multi-scalar and multi-disciplinary. At its broadest, the thesis proposes the notion that one should look at a site topologically – or as a complex, total ecosystem, comprised of disparate forces, flows, and systems, whether human, cultural, natural, or artificial.

SITE.

The chosen site is a landform called Hadenya, on the Southern coast of Shizugawa Bay. It lies in a settlement called Togura, one of four urban nodes within the newly combined municipality of Minamisanriku, which was one of the most affected towns from the 3/11 Tsunami.

Hadenya is a promontory headland that juts out

01.0 TOHOKU TOPO-URBANISM

into the ocean, formed by the latent erosion of a once Pyroclastic landscape. The site was chosen because it represents the characteristics of the surrounding region—both for the natural features and vegetation, but also for the patterns of human development and program.

In its natural features, Hadenya—seen as an abstract agglomeration of landforms—contains ridges, valleys, hilltops, bowls, cliffs, and slopes both shallow and steep. It is home to a broad spectrum of flora that are also characteristic of the region. As far as human settlement, Hadenya has two culturally important structures (a small shrine and a temple) on its high points, with nearly 100% of development on the valley floor, which was nearly all destroyed on 3/11.

Beyond being the epitome of the surrounding region, Hadenya—and the rest of Minamisanriku for that matter—is a microcosm for so many larger issues that we face today: It faces an imbalance between man and nature, and commonly faces the threat of natural disasters. But it also faces

slower, lesser visible disasters: it is a shrinking city (both its population is in decline, and the sea is reclaiming parts of the city); there are enormous political and social issues related to temporary housing and reconstruction efforts; and its young people are all but gone, leaving an aging population and communities on the verge of total disappearance.

It is this potent mixture, this microcosm, that is so relevant to the issues the world faces today. It is this, but also the fact that these problems are connected to a real place and real people, that draws me to undertake this thesis. And in the same sense, it is this relevance to the place but also to other places, that positions the thesis to be both site-specific but also generic and abstract. More on this later...

PRECEDENTS.

Analysis of Hadenya's existing conditions in Chapter 02 leads to an inventory of its assets





and limits, where landscape is given the foremost importance in its power to metabolize community. But before the thesis delves into the larger scale design phase, it looks at local Urban and Architectural precedents, so as to further understand the profile of the area, and establish specific launching points for design.

LANDSCAPE / SETTLEMENT OPERATIONS.

The thesis proposes that—given the profile of these communities—the appropriate development here is a sensitive urbanism that aims to maximize resources by integrating existing infrastructure, inhabits the slopes to hold the bond between people and place, and sees the landscape as an enormous asset, and the most precious of resources that should be harnessed, not avoided or destroyed, because of its potential to bolster community, culture, and place.

In Chapter 03, the thesis first engages Policy to

modify reconstruction plans and set guidelines for slope development. From this foundation, it recognizes the limits of policy, and begins to operate at the Planning scale to develop and spatialize a Masterplan. Finally, it explores landscape and systems strategies that seeks a balance between a preserved and productive landscape, and defines concepts and elements at all scales of the Masterplan..

ARCHITECTURAL OPERATIONS.

Finally, in Chapter 04, the thesis again reaches the limits of the broader picture, and zooms in to develop several Architectural typologies for both housing and community program.

CONCLUSION.

Tohoku Topo-Urbanism explores the idea that a kind of topological understanding of the site, might offer a viable vision for an alternative

01.0 TOHOKU TOPO-URBANISM

community form in Post-Tsunami Japan.

It's important to note that several major assumptions were made in the course of the investigation. A few of these were:

- The Single Family House was accepted as a given typology to work with, due to the intent to be relevant to the profile of the communities since the reality is, that it is and will be the predominant housing typology for some time.
- The Automobile, which is one of the major drivers of community form in the area, was in fact challenged (although still accommodated), with the intent of utilizing alternative mobility and encouraging a pedestrian, village-scale settlement.
- Generic / Specific. The thesis is in parts both abstract and specific, and attempts have been made to be clear about both when and why the thesis methodology moves from one to the other.
- *Topo-Urbanism...* The notion of urbanism itself might be the wrong word. The term settlement is often used because the scale at which development operates (again, based on the profile of the place), is really towards a smaller scale, often comprising projects with 10-20 housing units, and rarely any more. The idea of abstraction, and the use of the 'Cluster' concept, is relevant because it operates at this level of 10-20 housing units. It is indeed micro, but as a small piece, it very much tries to fit within the context of larger patterns in the region, and thus hopes to be both scalable and relevant to regions in Tohoku and beyond.

What's at stake here is the total disappearance of already fragmented communities. Thus, the aim is that the inhabitation of hillsides will allow communities to remain integrated with existing infrastructure and industry in lowland areas, ensure safety from future natural disasters, while making every effort to foster interaction between the human, cultural, and natural landscape.





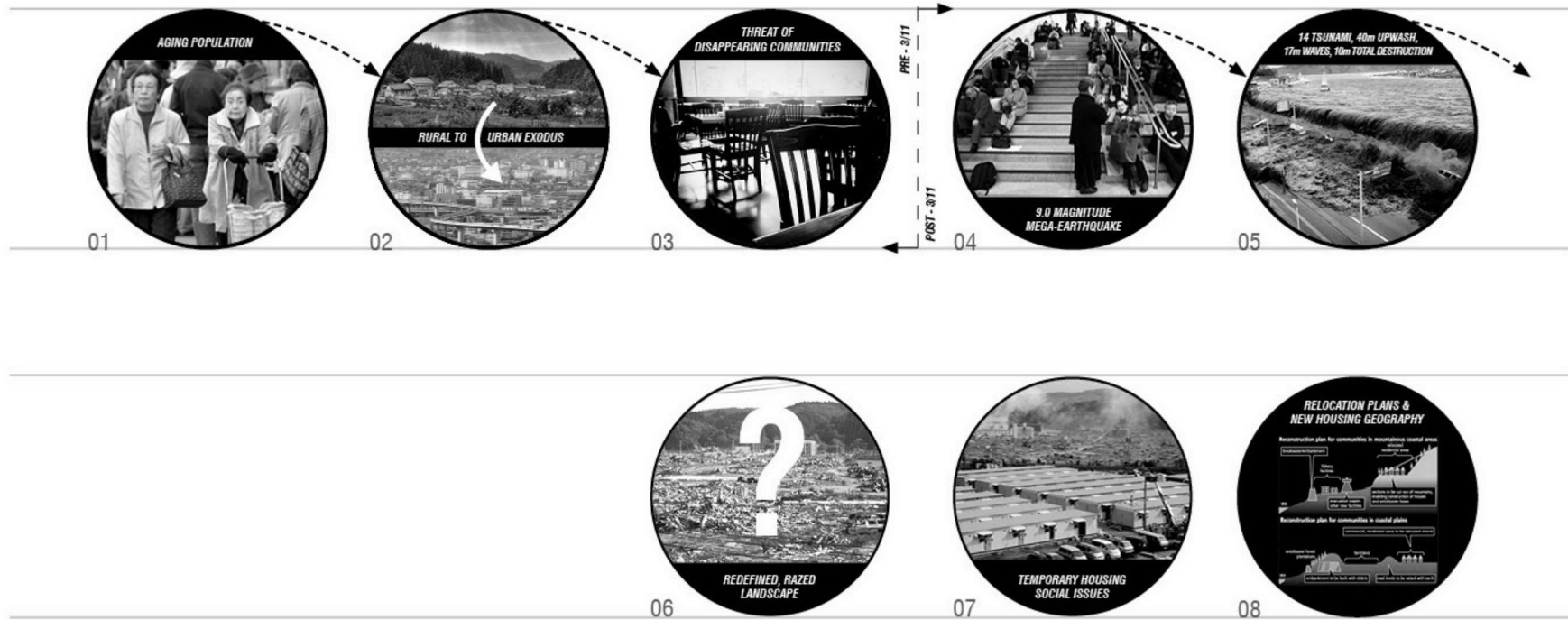
APPENDIX.

Chapter 05 contains supplemental information, including documentation of the thesis defense; research that was completed during the summer; a sampling of the initial proposal; and a bibliography.

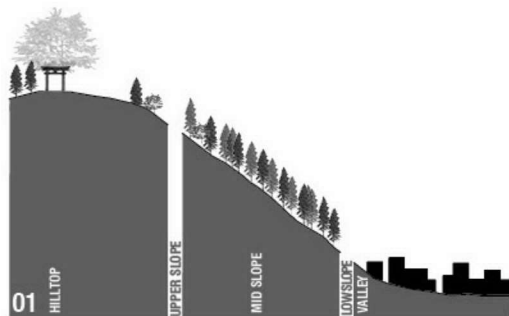
01.1 PROBLEM STATEMENT : ORIGINS / CAUSAL FLOWS

In the wake of 3/11, communities were confronted with issues such as whether to rebuild or not; how to deal with social issues related to temporary housing and the separation of communities; and when relocating, how to deal with development

that is detrimental to the natural landscape. Lesser known but equally potent, are the existing 'slow disasters' of an aging population; rural to urban exodus of the youth population; and Japan's national population decline.

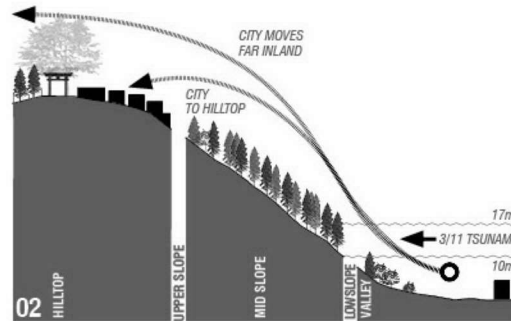


01.2 CONCEPTUAL FRAMEWORK / SCOPE & APPROACH OF THESIS



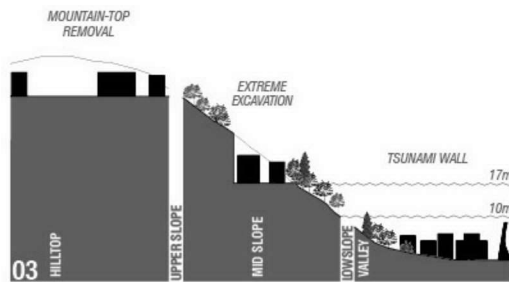
HILLTOPS AS CIVIC AND CULTURALLY IMPORTANT
CEDAR FORESTS ARE OVER-PLANTED ON SLOPES TO ENSURE FUTURE RESOURCES
DEVELOPMENT BOOM FILLS VALLEYS WITH ALL TYPES OF STRUCTURES AND USES

PRE-3/11



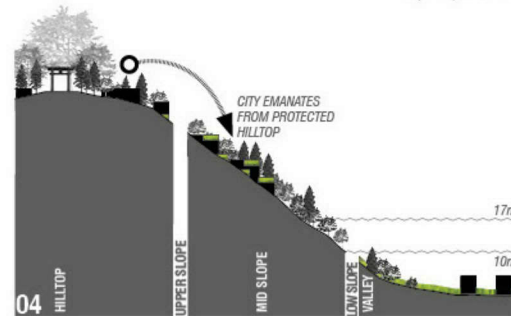
DEVELOPMENT GRAVITATES BACK TO HIGHER GROUND & FILLS LIMITED SITES
TSUNAMI-DAMAGED SLOPES RISK LANDSLIDE, GAP FORMS BETWEEN HIGH & LOW CITIES
GOVERNMENT MORATORIUM ON LOWLAND HOUSING DEVELOPMENT AFTER 3/11

3/11/2011



HILLTOPS REFORESTED AND PROTECTED IF CULTURALLY SIGNIFICANT
DEVELOPMENT GRAVITATES BACK TO LIMITED SITES ON UPPER SLOPES AND LINKS TO HILLTOPS. SOME SLOPE REFORESTATION.
CRITICAL COMMERCIAL & AGRICULTURAL PROGRAM W/ SAFE ZONES & ESCAPE ROUTES TO HILLTOPS.

POTENTIAL PROBLEMS FROM GOVT. PLANS



HILLTOPS REFORESTED AND PROTECTED IF CULTURALLY SIGNIFICANT
DEVELOPMENT GRAVITATES BACK TO LIMITED SITES ON UPPER SLOPES AND LINKS TO HILLTOPS. SOME SLOPE REFORESTATION.
CRITICAL COMMERCIAL & AGRICULTURAL PROGRAM W/ SAFE ZONES & ESCAPE ROUTES

PROPOSED POST-3/11

The conceptual approach of the thesis is borne from an understanding of the relationship between urban form, landscape, and landform over time.

Urban form in Pre-3/11 Japan has—since the Post-War era—gravitated to valleys in search of flat, buildable land, and access to water for transport, etc. On 3/11, this meant that nearly 95% of the urban fabric was destroyed, leaving undamaged fabric on the high ground, as if nothing ever happened.

The government has since put a moratorium on housing in the lowland areas, though a relationship to the sea still exists. Reconstruction plans suggest that housing move onto space-constrained hilltops or onto slopes. Because development seeks *tabula rasa*, this results in problematic outcomes, such as extreme excavation and mountain-top removal; which are detrimental to both the natural and cultural landscape.

The thesis proposes an alternative that protects hilltops, and directs development to the upper slopes in a sensitive inhabitation that forms the vital link between highland and lowland nodes.

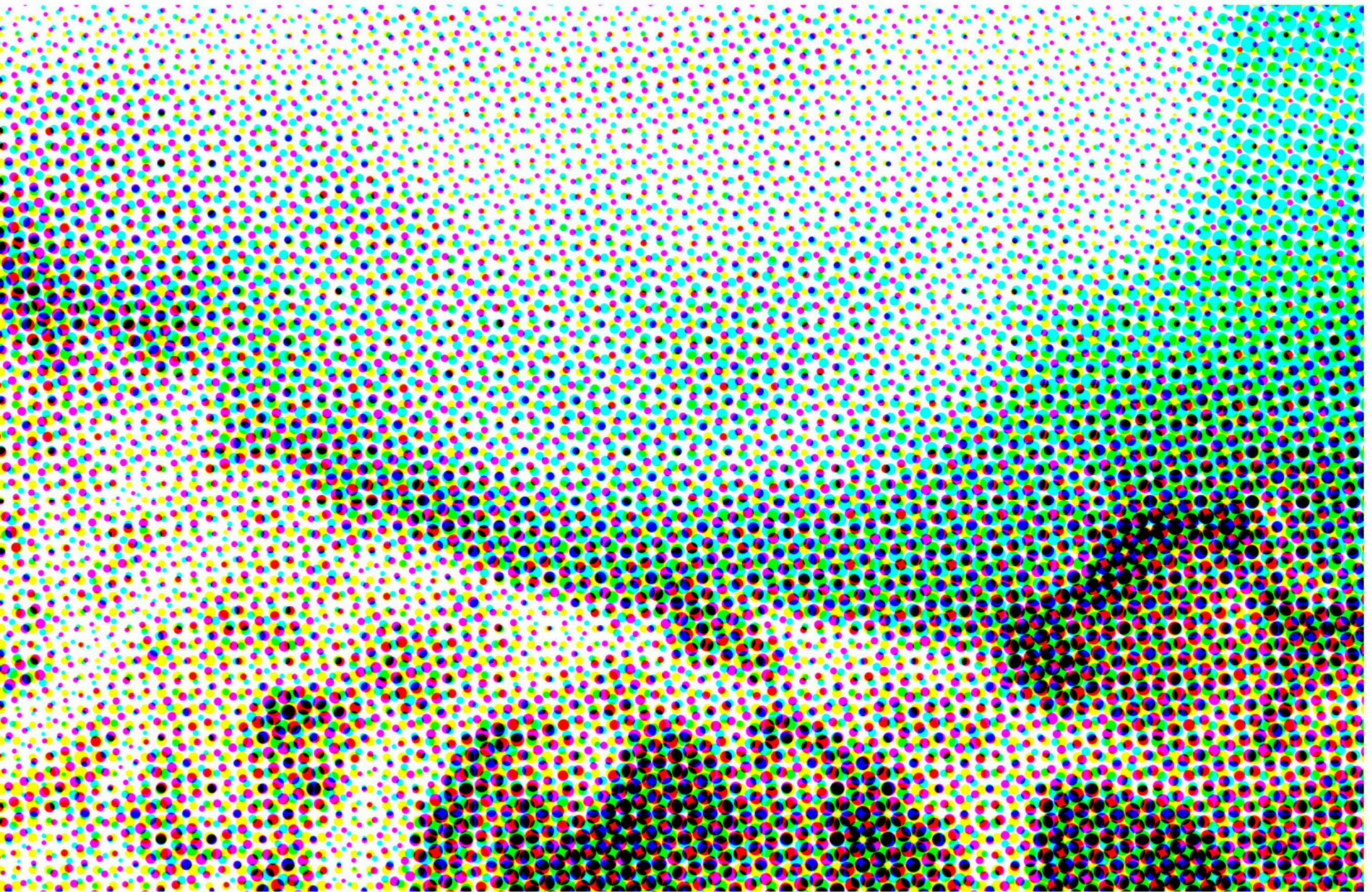
Tohoku Topo-Urbanism uses a methodology that is organized through the following investigations:

- Site and Context (Chapter 02)
- Policy, Planning, and Landscape (Chapter 03)
- Architectural Typologies (Chapter 04)
- Appendix of Supplemental Data (Chapter 05)

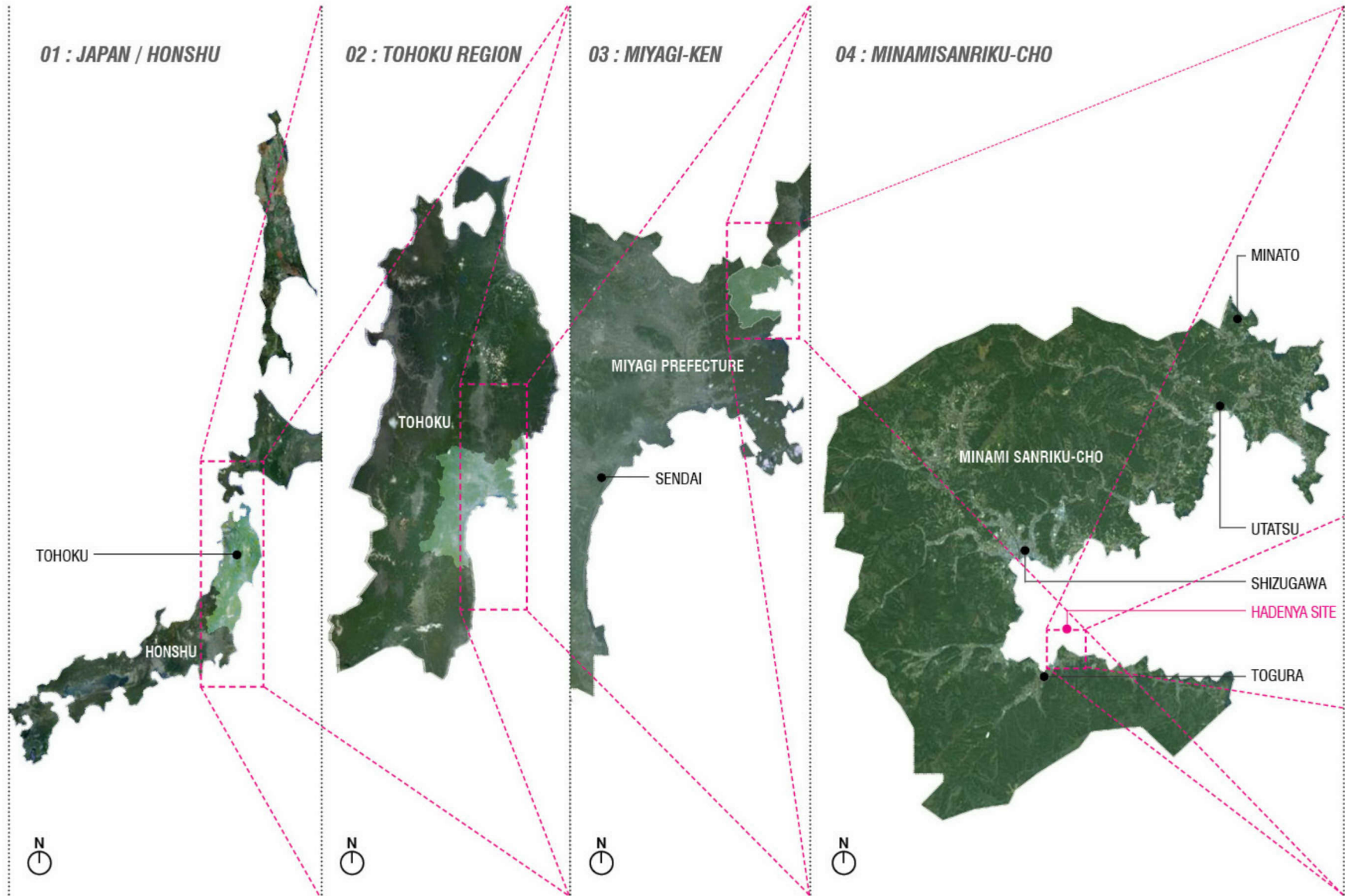
02 SITE / CONTEXT :

Minamisanriku and a place called Hadenya

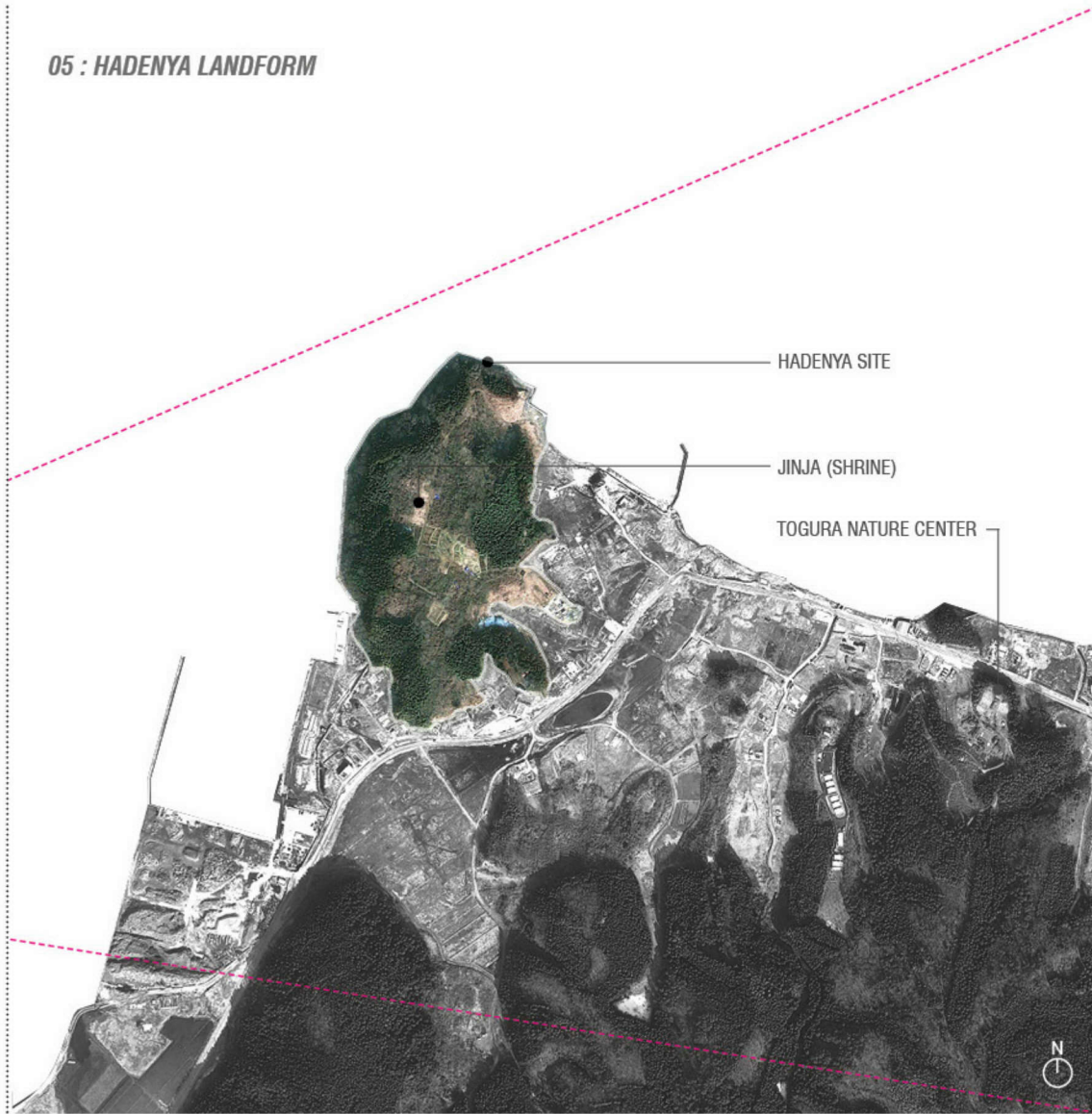




02.1 SITE CONTEXT : GEOGRAPHIC / POLITICAL



05 : HADENYA LANDFORM



Hadenya (adjacent left) is the remainder of an eroded ridge that projects out into Shizugawa Bay in the Pacific Ocean. Less than a kilometer long and 37m at its peak, it affords 360° views of the sea and the surrounding landscape, and is populated with rich vegetation such as Beech, Camelia, Mulberry, Cedar, Maple, and Bamboo forests; along with several cleared agricultural landscapes.

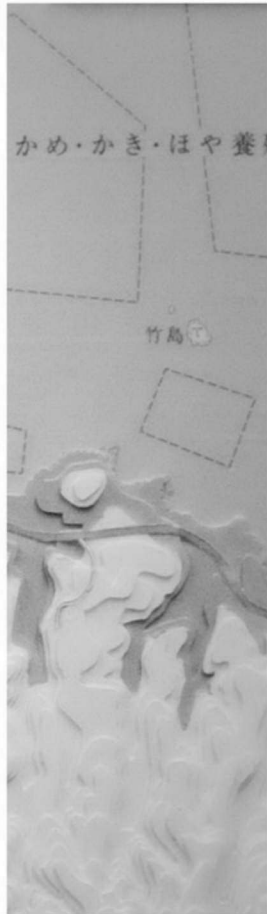
Though unpopulated, a small Shrine sits on its apex under the shadow of an enormous, symbolic Beech tree; while a Temple sits on a projecting ridge on its south face. Prior to March 11, 2001, there were four dozen houses on the lower valley at the foot of its slopes. Now, there are zero.

Hadenya lies within the settlement known as Togura, which is one of four urban nodes in the municipality of Minamisanriku, in Miyagi Prefecture, Japan (opposite page).

It is accessed by the sea (via the existing harbor and boat launch on its Western side) or more commonly by a two-lane road, which leads back to the major coastal highway several kilometers to the Southwest.

02.2 SITE CONTEXT : TOGURA / INUNDATION AREAS





Left: An image of a model showing inundation in the Togura area in the Southwest corner of Shizugawa Bay. Fishing areas are represented (by dashed gray boxes), as are existing temples (the dark dots), and the area of inundation on 3/11 (dark gray).

An analysis of the effects of the 3/11 tsunami quickly reveal that the difference between total destruction and zero damage, is topography.

In Togura (one of the four towns within the municipality of Minami Sanriku), the Tsunami wave reached a maximum height of about 17 meters, while just about everything below 10 meters has been completely destroyed. However, it was not merely the elevational datums of 10 and 17 meters that defined what was destroyed. Here, both the bathymetry (submarine topography) and the above land topography greatly affected the movement of the water.

For example, when an earthquake hits, fisherman immediately take their boats out to sea. They know that it is better to face off the tsunami in the open ocean when waves are near unnoticeable – otherwise any boats left in harbor would be destroyed). It is only on the coastline, when the

seafloor ramps up towards the coast that the wave is thrust vertically. Additionally, several hourglass or funnel-like shapes in the topography here actually accelerated the speed of the Tsunami (via the Venturi effect, also known as the Run-Up effect in the case of tsunamis). In this sense, it was in the smaller bays and inlets (which Minami Sanriku is so known for) that the Tsunami waves were of the greatest force and amplitude – again, proof of the irony that the ocean is both life giver and life taker here.

Coincidentally, the 3/11 mega-earthquake – albeit a massive magnitude 9.0 on the Richter scale – caused nearly no damage in comparison.

In this image, the Tsunami approached from the upper right (ENE), in a series of 14 consecutive waves that caused just as much damage when receding back out to the ocean as they did on the approach.

02.3 : **IDENTITY** : LIVELIHOOD / SENSE OF PLACE

01: **TOHOKU LIVELIHOODS**



FISHING INDUSTRY

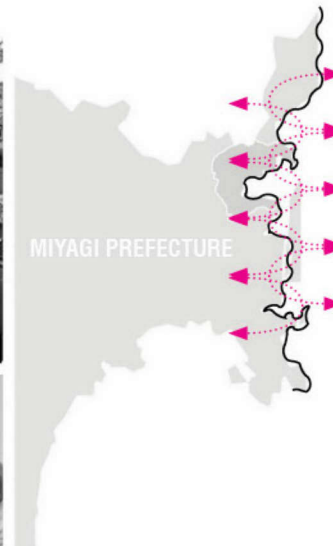


TOURISM INDUSTRY



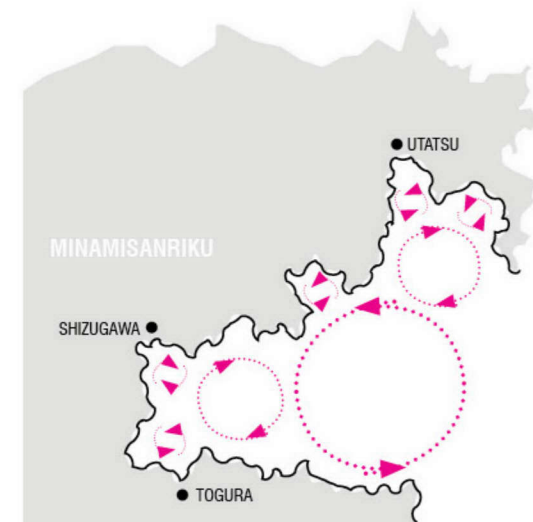
FORESTRY INDUSTRY

02 : **MIYAGI-KEN**
SANRIKU COAST



LIVELIHOODS DEFINED BY RELATIONSHIP BETWEEN MOUNTAIN AND OCEAN, WHETHER VIA INDUSTRY (FORESTRY AND FISHING) OR ECOSYSTEMS (FLOWS OF NUTRIENTS AND WATER).

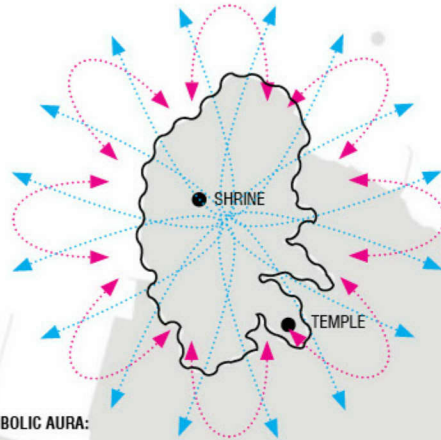
03 : **MINAMISANRIKU-CHO**
SHIZUGAWA BAY & INLETS



FISHING SETTLEMENTS, AND THUS SPATIAL AND OCCUPATIONAL BASED IDENTITIES FORM GROUPS TIED TO SPECIFIC COASTAL INLETS WHERE EACH LANDSCAPE AND EACH AQUACULTURE VARIES WIDELY IN DIVERSITY. SENSE OF PLACE IS DEFINED BY BOTH THE SMALLER INLETS, AND ALSO THE LARGER SENSE OF SHIZUGAWA BAY AND THE PRESENCE OF THE OCEAN.

04 : HADENYA LANDFORM

HADENYA



HADENYA'S SYMBOLIC AURA:

AS A SYMBOLIC SITE, RICH WITH NATURAL AND CULTURAL HISTORY, THE HOME OF BOTH AN IMPORTANT TEMPLE AND A SHRINE THAT WAS ONCE USED TO DEAL WITH EPIDEMICS.

HADENYA'S NATURAL GRAVITY :

ENORMOUS GROVES OF BEECH TREES SERVE AS WAYFARERS FOR FISHERMEN, AND REMINDERS OF THE NORTHERNMOST LIMIT OF THIS SPECIES OF TREE.

AS A LANDFORM, IT HOLDS ENORMOUS WEIGHT AS A VISUAL AND SPATIAL PRESENCE IN THE LANDSCAPE.



The main industries in the area are fishing, forestry, and tourism; which all have slowed to a snail's pace since the events on 3/11. In many ways, civic and cultural identity is defined by one's relationship to land and sea, be it an occupational, spiritual, or contextual connection.

In Tohoku, the coastline is comprised of a multi-scale fractal system of bays and inlets, which provide natural locations for harbors and habitat, each having a distinct aquacultural ecosystem, even over short distances.

As a result, the line between settlements is not just defined by distance (as in many places in Europe and the United States, where satellite towns formed in increments of one day's travel), but is instead defined by the relationship to a specific bay.

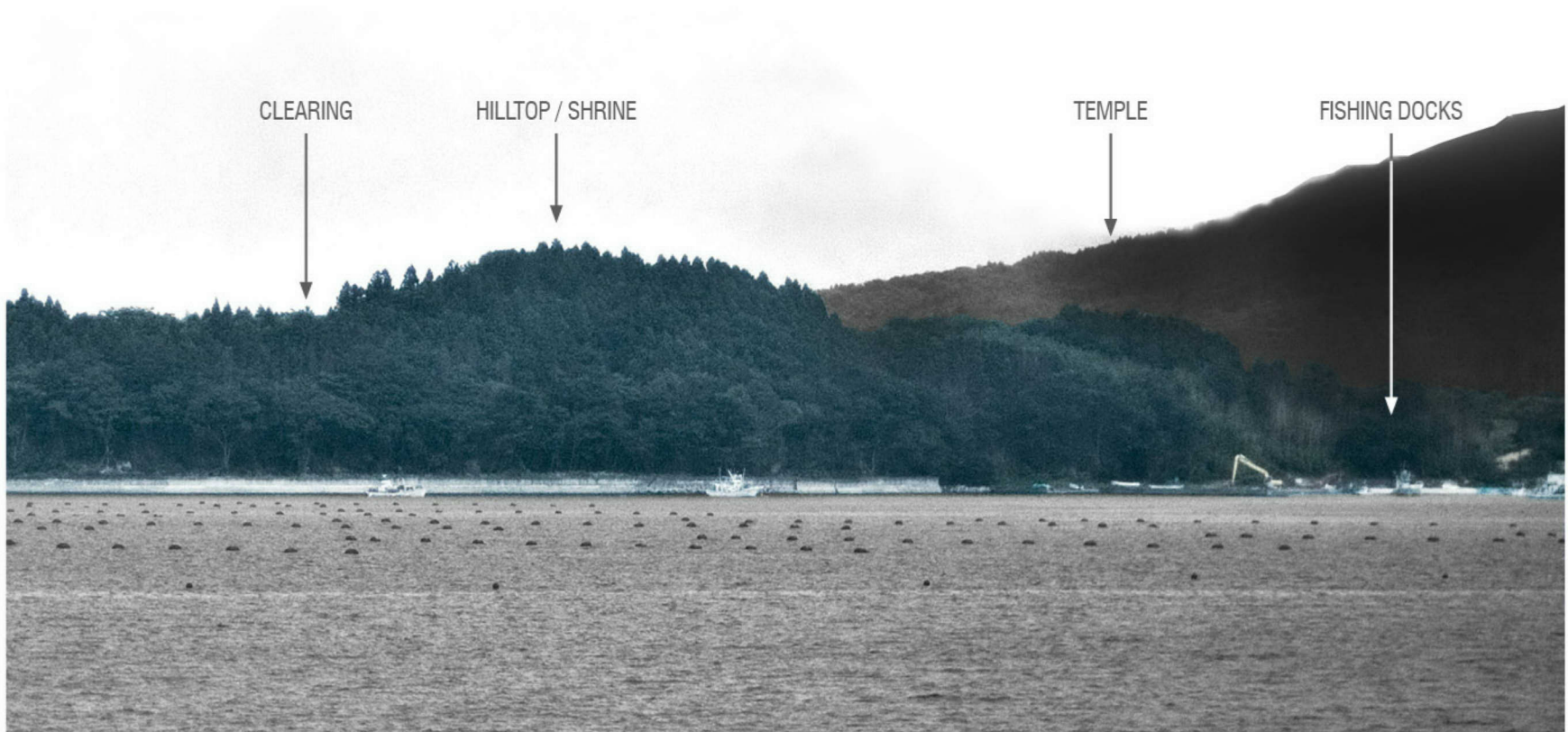
02.4 HADENYA : VISUAL EXPERIENCE AND LANDSCAPE IDENTITY

Below : The Hadenya landform (highlighted in green), seen from the West by way of the primary coastal highway. Centuries of Tsunami cycles have exposed shear cliffs (lower left) on Hadenya's Northernmost tip, while age-old clumps of indigenous Beech trees hold visual prowess on the culturally important peaks of Hadenya: the Ridge, the hilltop Shrine, and the Southern Temple.

In the foreground, fishing nets float in Shizugawa Bay, where octopus, kelp, abalone, and urchin are just a small selection of the rich aquacultural ecosystem in the niche market that Minamisanriku provides.

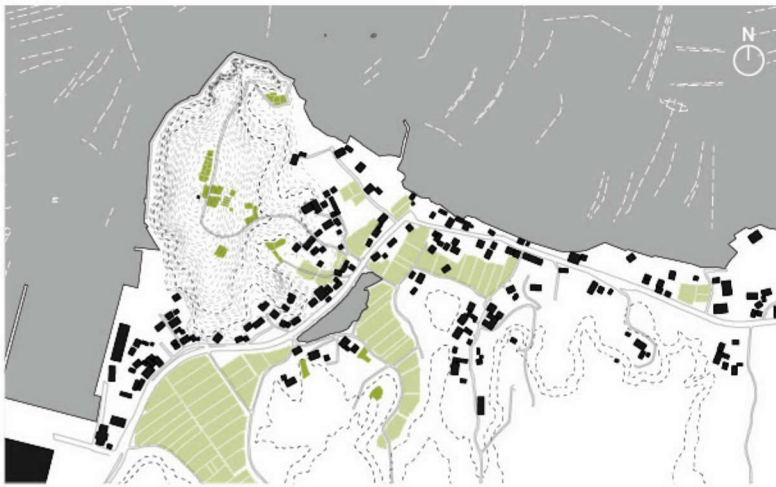
To the left, an example of the effects of erosion and time on this Rias landscape, where what are now islands were once part of the same intact ridge.





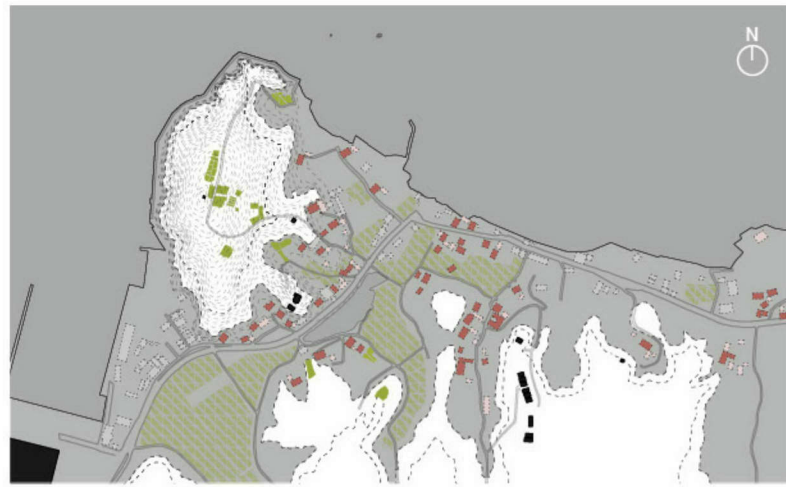
02.5 SITE CONTEXT : HADENYA PROGRAM PAST, PRESENT, AND FUTURE

PAST : XXXX - 2010



PLAN

3/11 : 2011

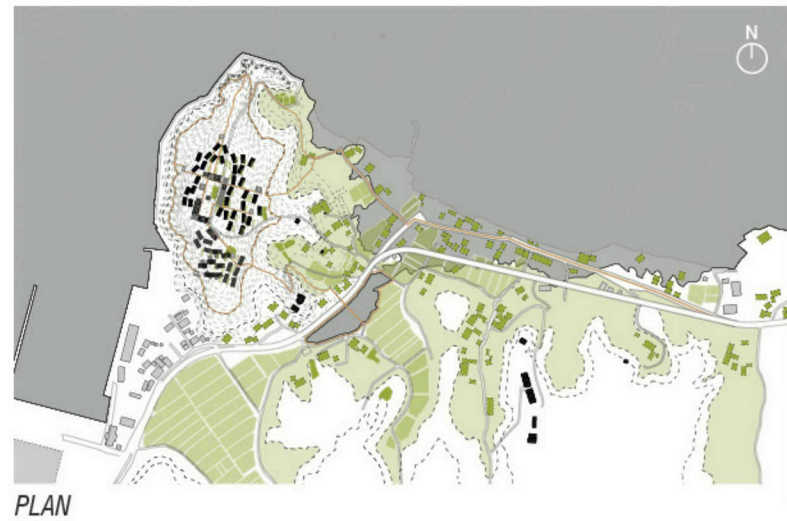


PLAN

CURRENT : 2012 - 2013



FUTURE : 2013-2050

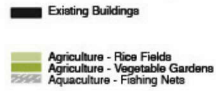


02.6 SITE CONTEXT : PHASING OF PROGRAM & PEOPLE

PAST : XXXX - 2010

HADENYA PAST : XXXX - 2010

Spatial Mapping



HUMAN POPULATION GROUPS

100 People (Out of 164 in the Area)
51 Households (Out of 80 in the Area)



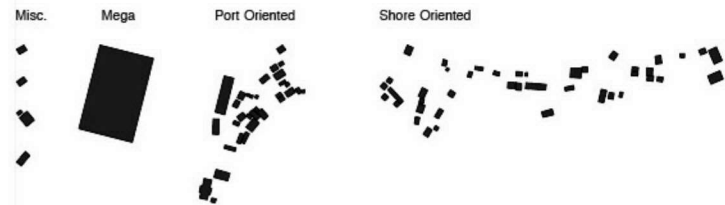
SINGLE FAMILY RESIDENTIAL

51 Households
(8,452m2 total / 165m2 avg footprint)
45 Detached Structures / Garages
(4,093m2 total / 90m2 avg footprint)



INDUSTRIAL / COMMERCIAL

80 Structures
(27,690m2 total / 346m2 avg footprint)
4 Cluster Groups:



CIVIC / CULTURAL

3 Structures
(27,690m2 total / 346m2 avg footprint)
2 Cluster Groups:

3/11 : 2011

HADENYA 3/11 : March 11th - 12th 2011

Spatial Mapping



HUMAN POPULATION

100 People Take Immediate Shelter on Hadenya
51 Households

62 People Take Immediate Shelter Elsewhere
29 Households



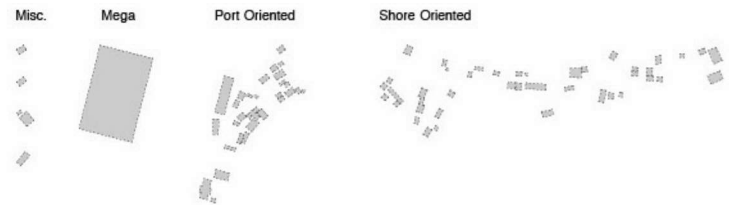
SINGLE FAMILY RESIDENTIAL

51 Households
(8,452m2 total / 165m2 avg footprint)
45 Detached Structures / Garages
(4,093m2 total / 90m2 avg footprint)



INDUSTRIAL / COMMERCIAL

80 Structures
(27,690m2 total / 346m2 avg footprint)
4 Cluster Groups:



CIVIC / CULTURAL

3 Structures
(27,690m2 total / 346m2 avg footprint)
2 Cluster Groups:

CURRENT : 2012 - 2013

HADENYA PRESENT : 2012 - 2013

Spatial Mapping

86 Households (from entire Togura Area)
80 Industrial / Commercial Structures (27,690m2 total)



HUMAN POPULATION

100 People (51 Households)



TEMPORARY HOUSING

Temporary Housing # 01

11 Households
(930m2 total / 85m2 each)
21 People
1.25 km E from Hadenya
Privately Funded
Private Selection



Temporary Housing # 02

33 Households
(2,785m2 total / 85m2 each)
60 People
1.50 km E from Hadenya
Publicly Funded
Public Lottery Selection
Incorporates Existing
Community Facilities /
Recreation Center



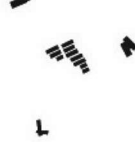
Temporary Housing # 03

28 Households
(2,375m2 total / 85m2 each)
55 People
3.75 km SW from Hadenya
Publicly Funded
Public Lottery Selection
Incorporates Existing
Community Facilities



Temporary Housing # 04

14 Households
(930m2 total / 85m2 each)
28 People
6.25 km E from Hadenya
Publicly Funded
Public Lottery Selection
Incorporates Existing
Community Facilities /
Recreation Center



CIVIC / CULTURAL

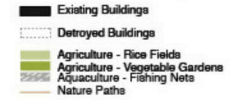
3 Structures
(27,690m2 total / 346m2 avg footprint)

2 Cluster Groups:

FUTURE : 2013-2050

HADENYA FUTURE : 2013 - XXXX

Spatial Mapping



HUMAN POPULATION GROUPS

98 People (Out of 162 in the Area)
49 Households (Out of 78 in the Area)



SINGLE FAMILY RESIDENTIAL

49 Households
(5,488m2 total / 115m2 avg footprint)



INDUSTRIAL / COMMERCIAL

80 Structures
(27,690m2 total / 346m2 avg footprint)

4 Cluster Groups:

Misc. Mega Port Oriented



CIVIC / CULTURAL

3 Structures
(27,690m2 total / 346m2 avg footprint)

2 Cluster Groups:

COLLECTIVE PROGRAM

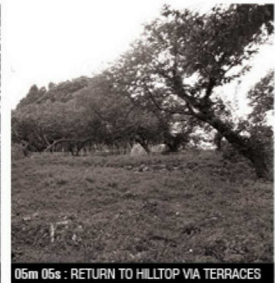
Parking / Charging (120m2 total)
Workshop (120m2 total)
Kitchen (120m2 total)
Guesthouse (140m2 total)
Gathering Space (60m2 total)

LANDSCAPE PROGRAM

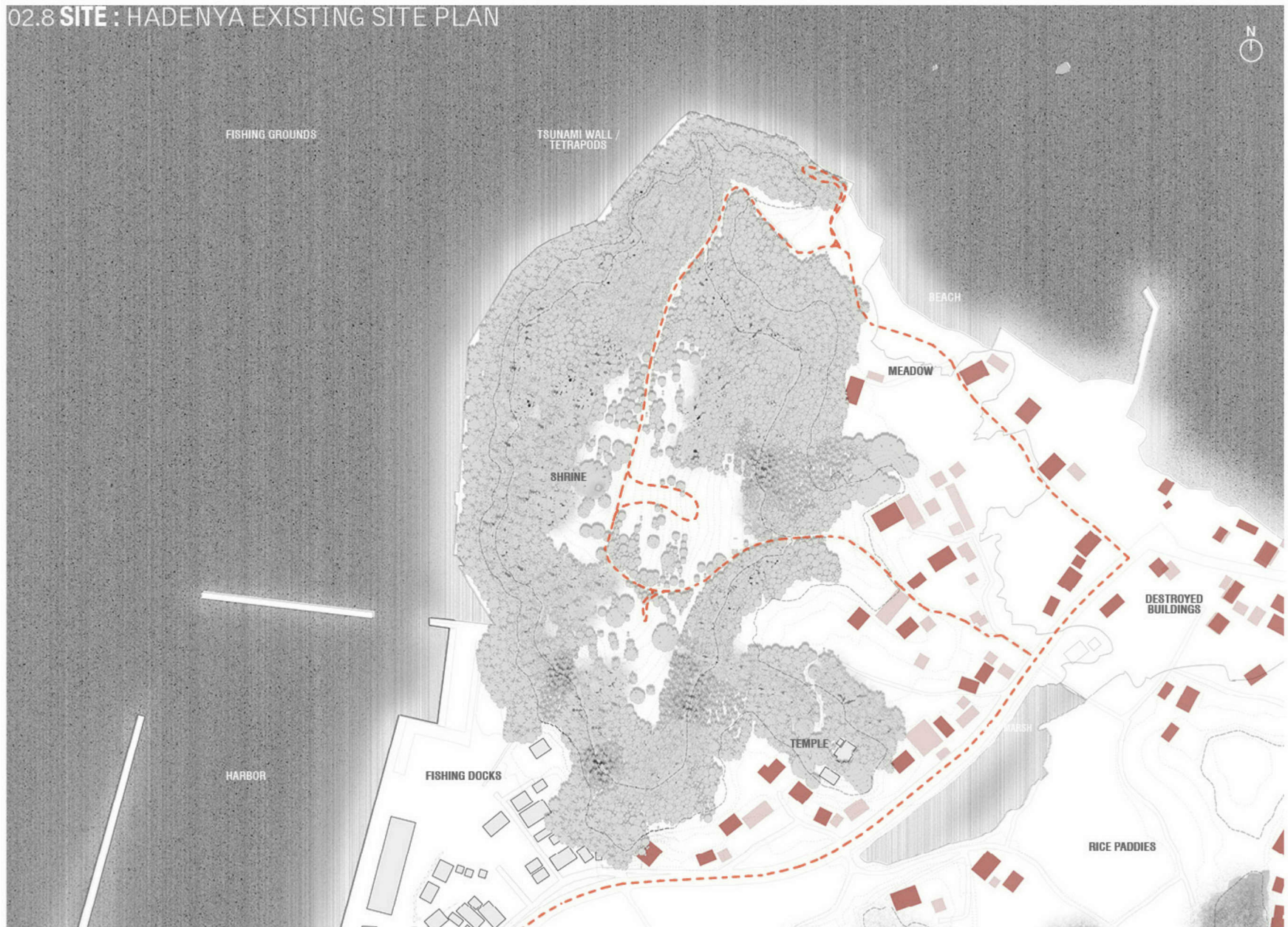
Nature Paths (560 linear meters)
(6) Azumaya (470m2 total)

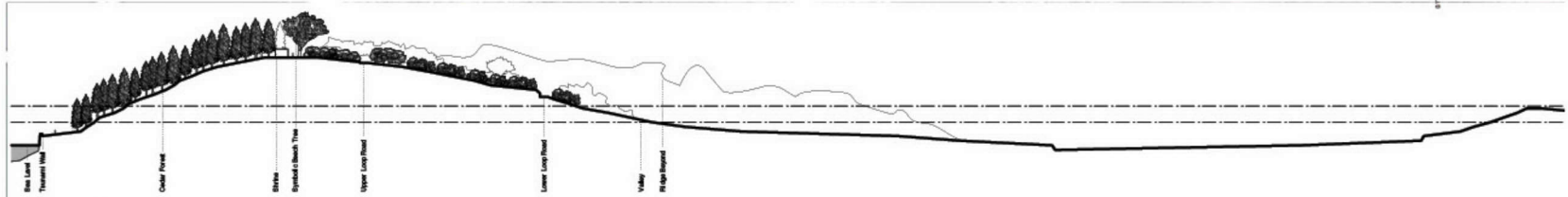


02.7 SITE EXPERIENCE : AN 8 MINUTE WALK THROUGH HADENYA LOOP

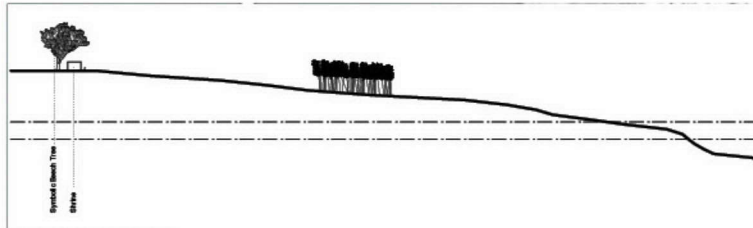


02.8 SITE : HADENYA EXISTING SITE PLAN





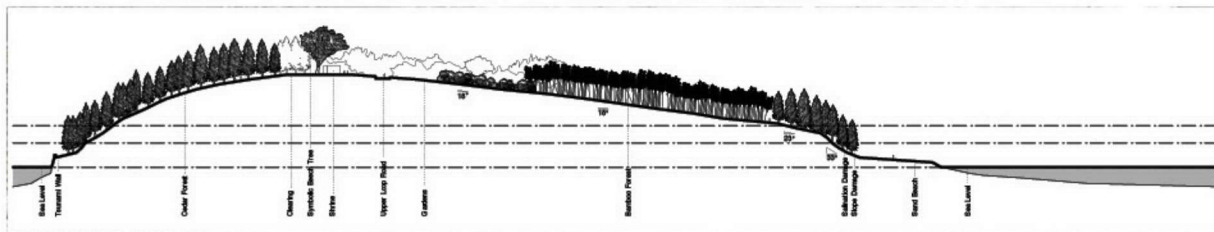
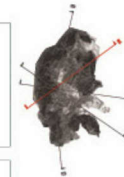
SECTION C : EAST NOTCH



SECTION D : SOUTH RIDGE

As a specific site, Hadenya contains cultural artifacts (temple, shrine), along with a rich palette of vegetation, that are all characteristic representatives of the surrounding region.

Note: The two horizontal datums (shown in dash) represent the 10m and 17m inundation levels of the 3/11 Tsunami.



SECTION E : NORTHWEST RIDGE

02.10 **SITE DESIGN IMPLICATIONS** : ASSETS & LIMITS

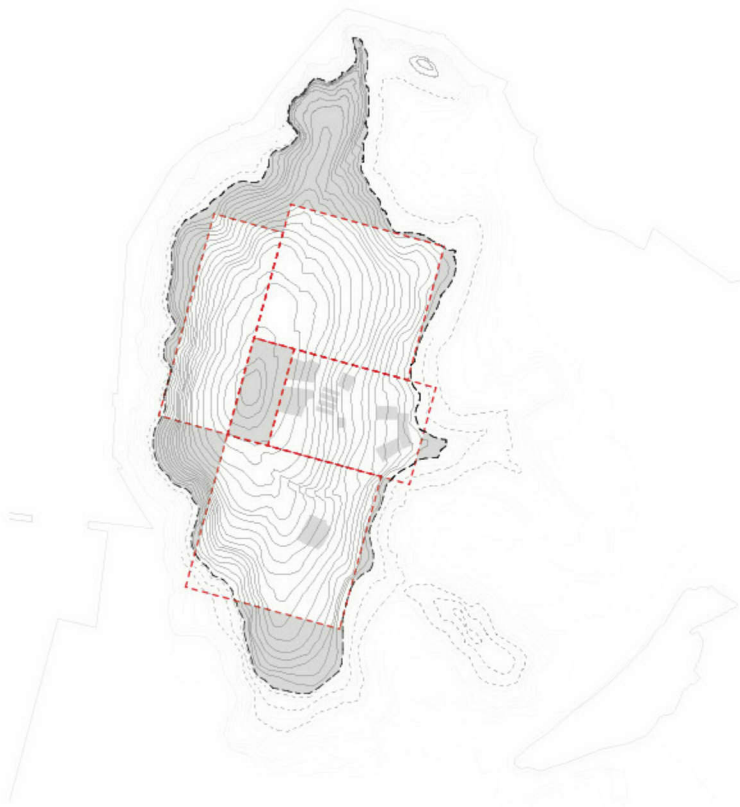


SCALE COMPARISON - HADENYA / MIT (REFERENCE)

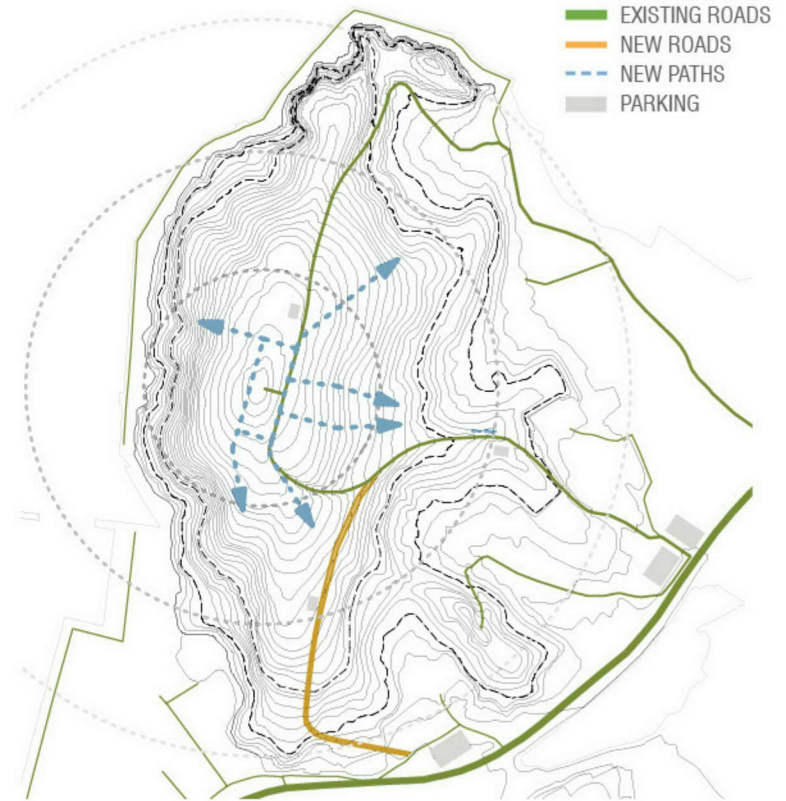


TOPOGRAPHY / LANDFORMS / DATUMS (LIMITS)

Diagrams investigating the variables that define the primary limits and possibilities inherent in the site. Below, right: The rings represent 1, 2, & 3 minute walking distance from the Hilltop Shrine.

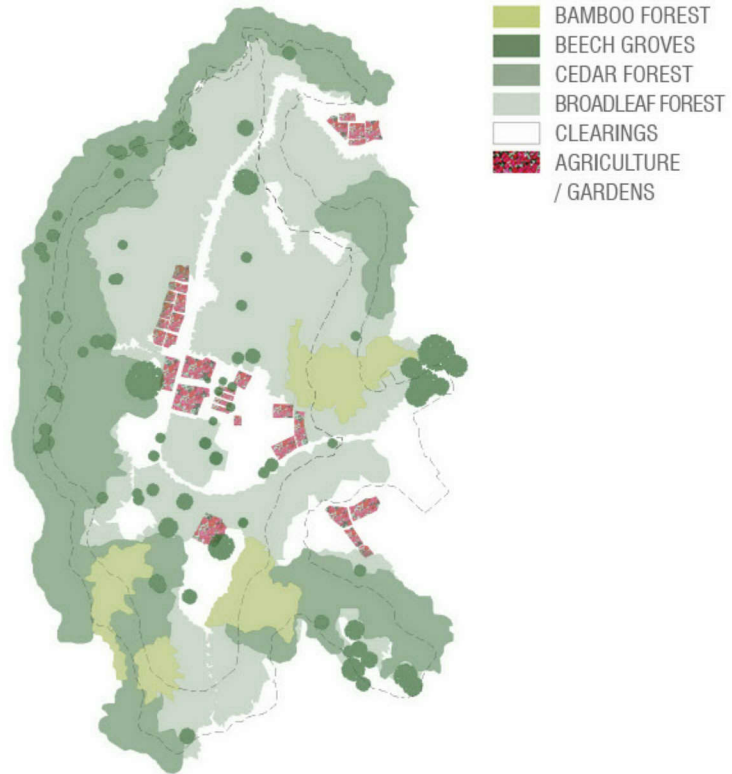


BUILDABLE ZONES (LIMITS)

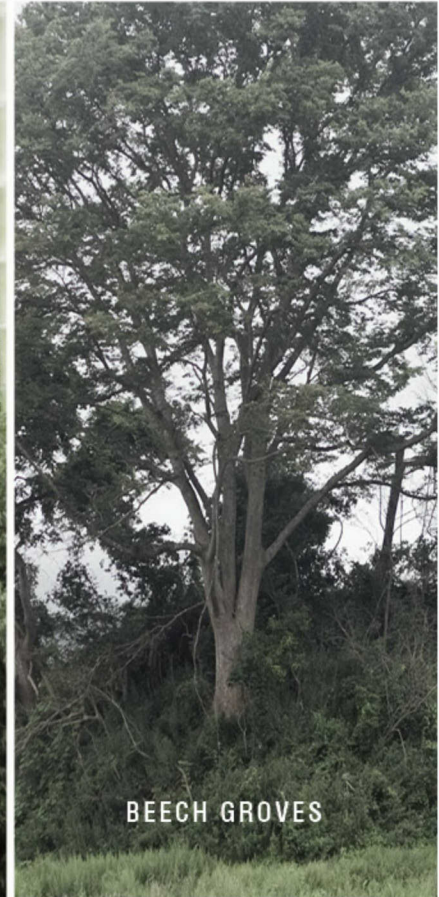
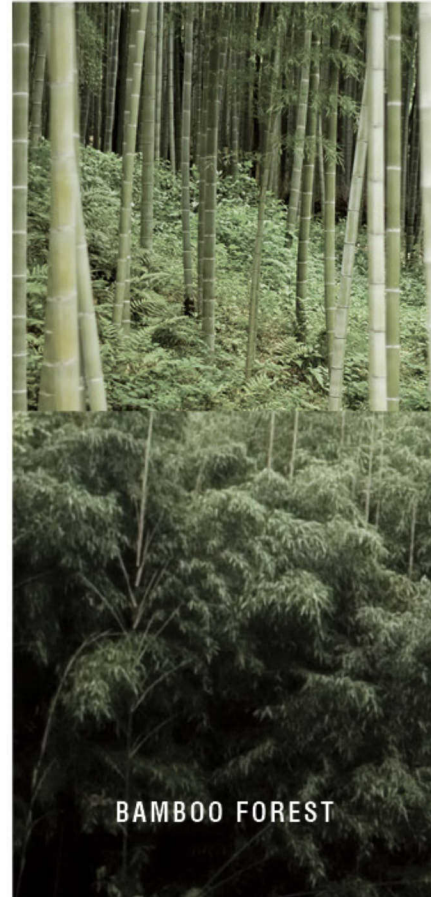


CIRCULATION / MOBILITY (LIMITS)

02.11 **SITE** : HADENYA EXISTING LANDSCAPES



LANDSCAPES / LAND COVER (ASSETS)



Hadenya's biggest assets are its powerful and unique landscapes. For example, the northern-most population of Beech forest—which was once abundant but is now all but gone—exists here. This rich palette of vegetation is representative of the surrounding region, and helps to define the specific landscapes. For the thesis, this is important because it helps to set the foundation for the site development strategies explored in the later design phases (Chapter 03).





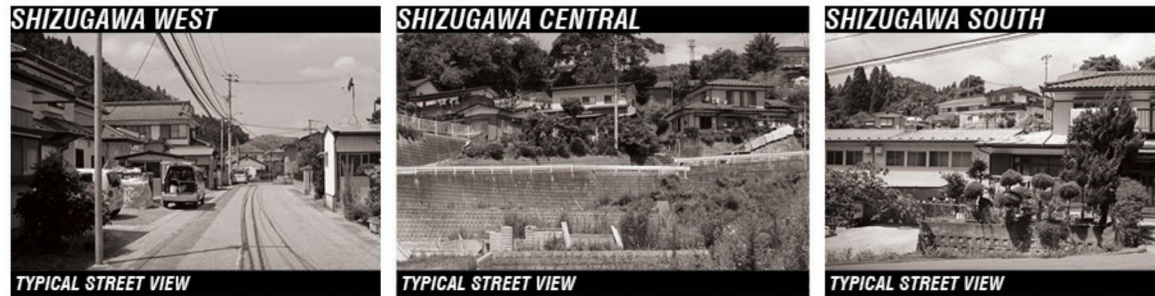
03 LANDSCAPE / SETTLEMENT OPERATIONS :

Policy, Planning, and Place within
Generic / Specific Design



03.1 PRECEDENTS : EXISTING TOHOKU NEIGHBORHOODS

Before moving directly into a masterplan, the thesis looked at several existing settlements in the area in order to understand the profile of local communities. Chosen, were three neighborhoods located in Shizugawa, not far from Hadenya, that had survived the 3/11 tsunami. These were looked at through the lens of community form and building typologies in relation to the slopes; water management in relation to the slopes; lot sizes, and social space.

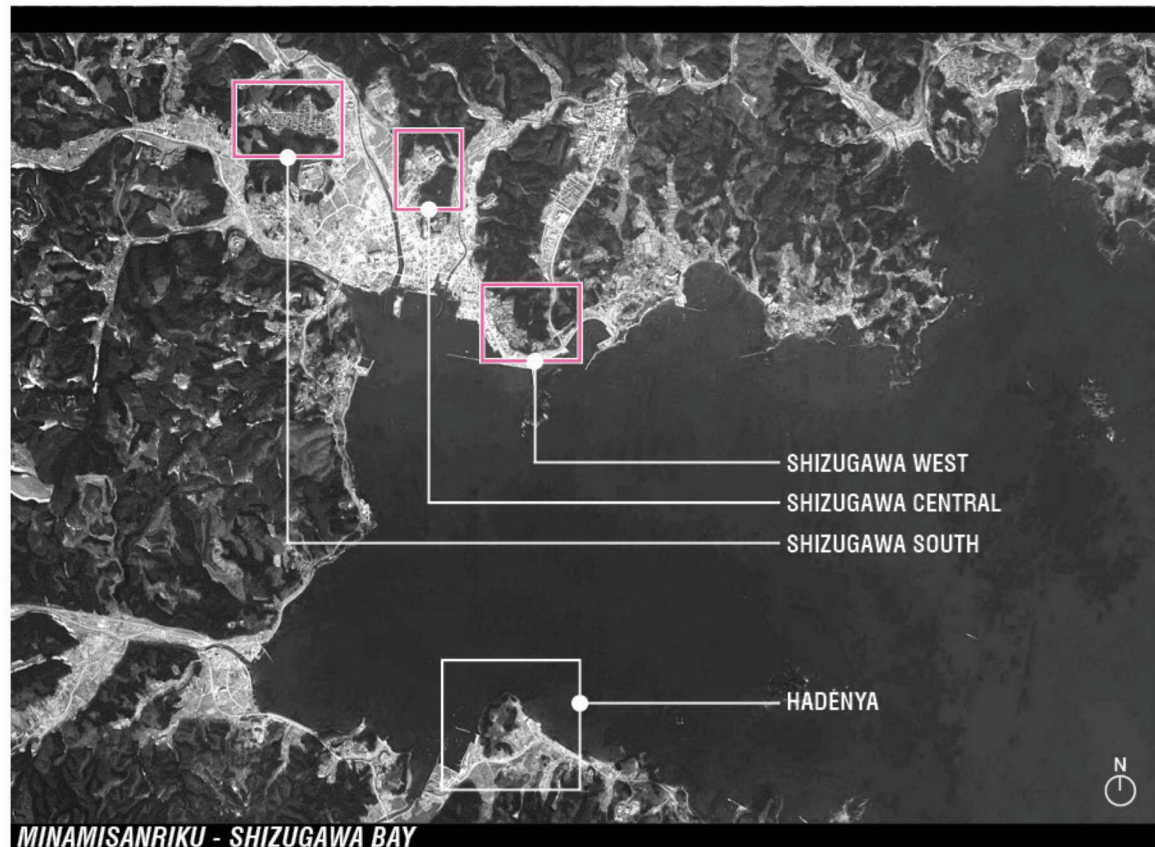


SUMMARY OF CONS :

- Housing units act individually
- Housing units run parallel to contours - loss of climatic orientation
- Open space given to vehicular infrastructure
- Most amenities exist within driving range outside neighborhood
- Extreme excavation & single use retaining walls

SUMMARY OF PROS :

- Presence of water flow in some cases
- Playground and small amenities exist within neighborhood
- Housing units run parallel to contours - minimize cut / fill
- Vehicular accessibility



SHIZUGAWA WEST



AERIAL VIEW

SHIZUGAWA CENTRAL



AERIAL VIEW

SHIZUGAWA SOUTH



AERIAL VIEW

NEIGHBORHOOD PLAN



NEIGHBORHOOD PLAN



NEIGHBORHOOD PLAN



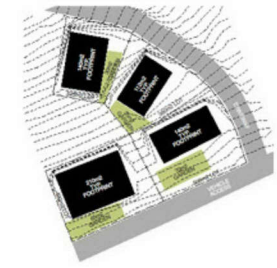
TYPICAL PARCEL - SINGLE



TYPICAL SECTION



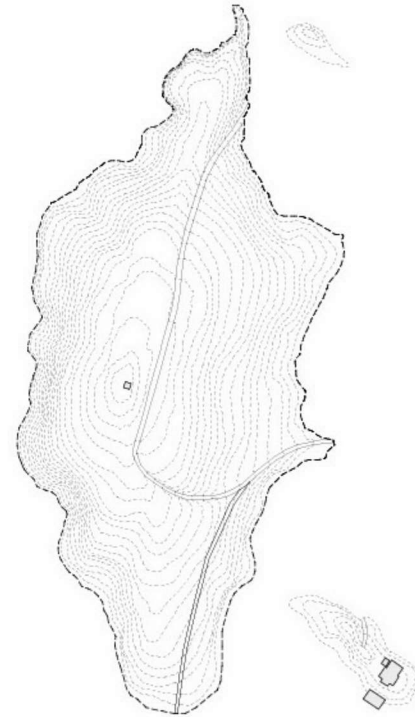
TYPICAL PARCEL - SINGLE



03.2 SITE DEVELOPMENT : PROPOSED POLICY / GUIDELINES

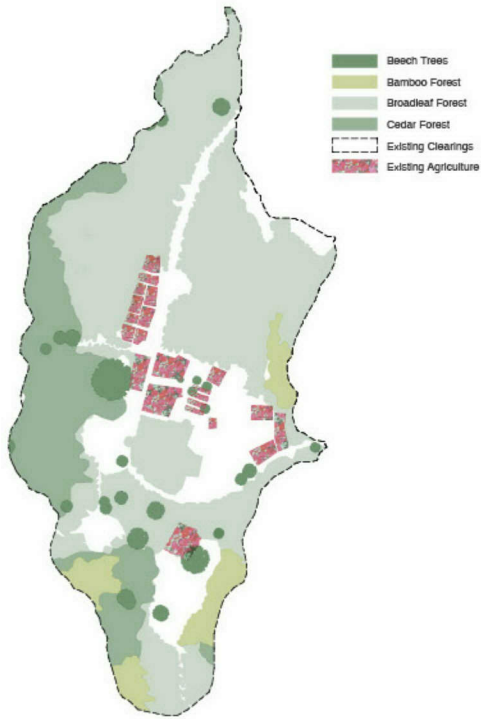


00 : EXISTING TOPOGRAPHY
> 114,800m2 SITE AREA



01 : HAZARD MITIGATION & HOUSING
> 55,157m2 SITE AREA (Contiguous Area, Not Islands)
> Avoid Sites Below 17m Elevation (500 yr Tsunami Datum)
> Avoid Sites on Extreme Slopes (Mudslides)

Diagrams intending to classify Hadenya's biggest assets — its landscapes.



02 : IDENTIFY LANDSCAPES

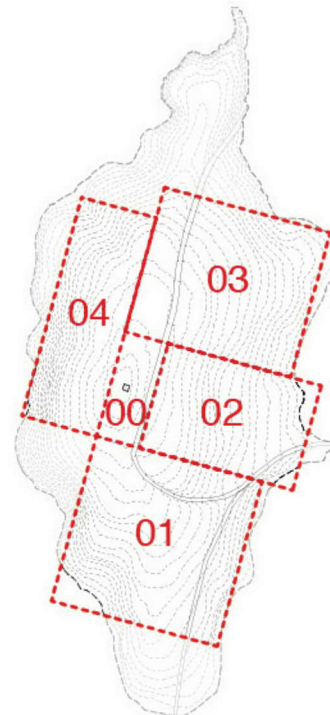
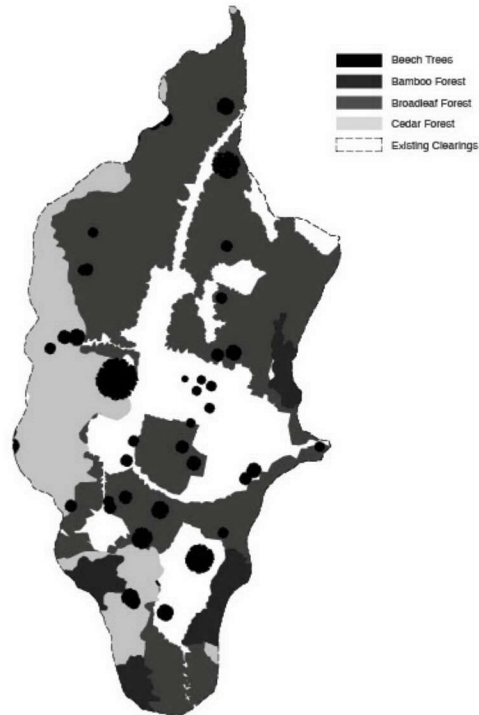
- > Beech Groves
- > Bamboo Forest
- > Broadleaf Forest
- > Cedar Forest
- > Meadows / Clearings



03 : LANDCOVER / CLEARINGS

- > Total Landcover: 42,576m²
- > Total Clearings: 12,581m²

03.2 SITE DEVELOPMENT : PROPOSED POLICY / GUIDELINES



00 PROTECTED HILLTOP
 01 SOUTH COMPLEX SLOPE
 02 EAST SIMPLE SLOPE
 03 NORTHEAST SIMPLE FAN
 04 WEST STEEP SLOPE

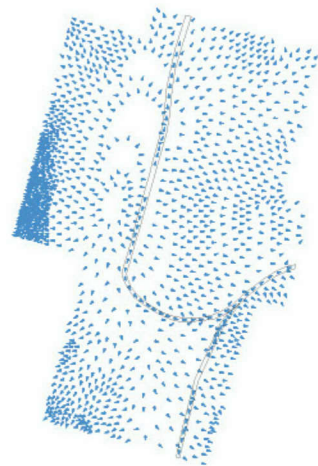
04 : PRESERVED LANDSCAPE vs. PRODUCTIVE LANDSCAPE

- > Full Protection of Beech Trees (Can Clear 0% on one's Lot)
- > Partial Protection of Bamboo Forest (Can Clear 15% on one's Lot)
- > Partial Protection of Broadleaf Forest (Can Clear 30% on one's Lot)
- > Existing Clearings Can Be Utilized for Development
- > Cedar Forest is Abundant & Can Be Harvested For Lumber (Can clear 50% on one's Lot)

05 : ORGANIZE SITE INTO SECTORS

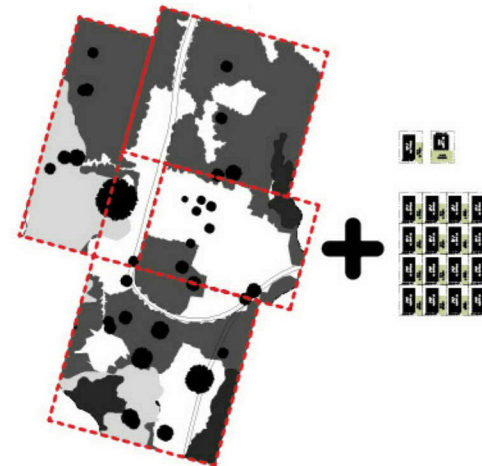
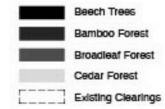
- > Protect and Define Culturally Important Hilltop
- > Divide Site Into (4) Sectors Based on Slope Variable
- > Sectors Connect to Hilltop and Utilize Existing Roads
- > Wholistic Site allows planning for typical community, access, infrastructure, and spatial relationships.
- > Abstract Sectors allows generic understanding of how same program reconfigures based on slope variable, so that learning outcomes can be applied to sites elsewhere.

Far left: The thesis balances a preserved and productive landscape. The harvesting of the non-indigenous cedar forest (planted Post-1945) for building material, and its subsequent replanting with Camelia, is one example of this.



06 : RAINWATER RUNOFF FLOWS

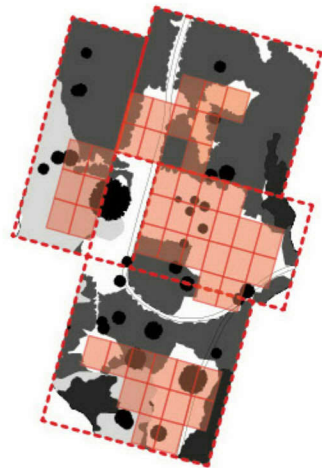
- > Rainwater collection separated into two categories:
 - 1) Rainwater for Groundwater Recharge
 - 2) Rainwater held in Reservoirs (for all other uses, i.e. drinking water, agriculture, etc).
- > Runoff should either infiltrate or be managed.
- > Rainwater should be stored on site (collective) and within each unit (individual).



07 : BUILDABLE ZONES + 300m2 LOTS

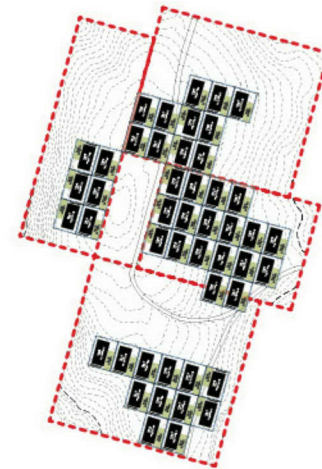
- > 300m2 Standard Lots
- > Abstract Space Planning Exercise
- > Assumes some units only have Ped. access
- > Allows 46 lots

03.2 SITE DEVELOPMENT : PROPOSED POLICY / GUIDELINES



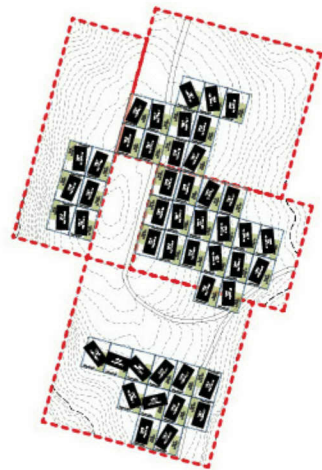
08 : **REGULARIZED LOTS / FOOTPRINTS**

- > 300m² Standard Lots
- > Footprints Parallel to Lot Lines



09 : **REGULARIZED LOTS / FOOTPRINTS**

- > 300m² Standard Lots
- > Footprints Parallel to Contours / Topography



10 : LOCATE STANDARD LOTS IN BUILDABLE ZONES

- > 300m² Standard Lots
- > Abstract Space Planning Exercise
- > Locate Lots in Existing Clearings, Buildable Slopes, and Unprotected Landscapes.
- > Lots should agglomerate with each other (sharing infrastructure, transportation, and encouraging human to human and human to landscape interaction).
- > Lots should be allotted in relation to existing and future mobility systems.
- > Lots should be located near, but not on Hilltop.

Left: Using a standard 300m² lot size, along with setbacks and lot area coverage from the existing code, the thesis tested what the resulting form would be using only the suggested guidelines and the deployment of housing lots to minimize degradation to the landscape (both cut / fill, and deforestation).

As seen on the left, though still helpful, the results of this exercise— or any attempt to use guidelines or policy from the larger scale— would still produce a status quo development without additional intention from both a spatial and ground-level, smaller scale, experiential perspective.

Thus, the next phase of the thesis concerns Landscape and Settlement concepts, followed by Architectural typologies (Chapter 04) that aim to provide intention at the smaller scales and begin to give a sense of order, or an over-arching hand.

Lastly, the notion of the capacity of the land was discussed much at this phase. How can development and the landscape find a win-win balance? How much is too much? The thesis struggled with this question, and ended up landing on approximately 40-45 housing units in order to accommodate the total group of people that were relocated. To keep the entire population together? Or to keep the integrity of the landscape? This was one of the central questions of the design phase.

03.3 HADENYA : MASTERPLAN OVERVIEW

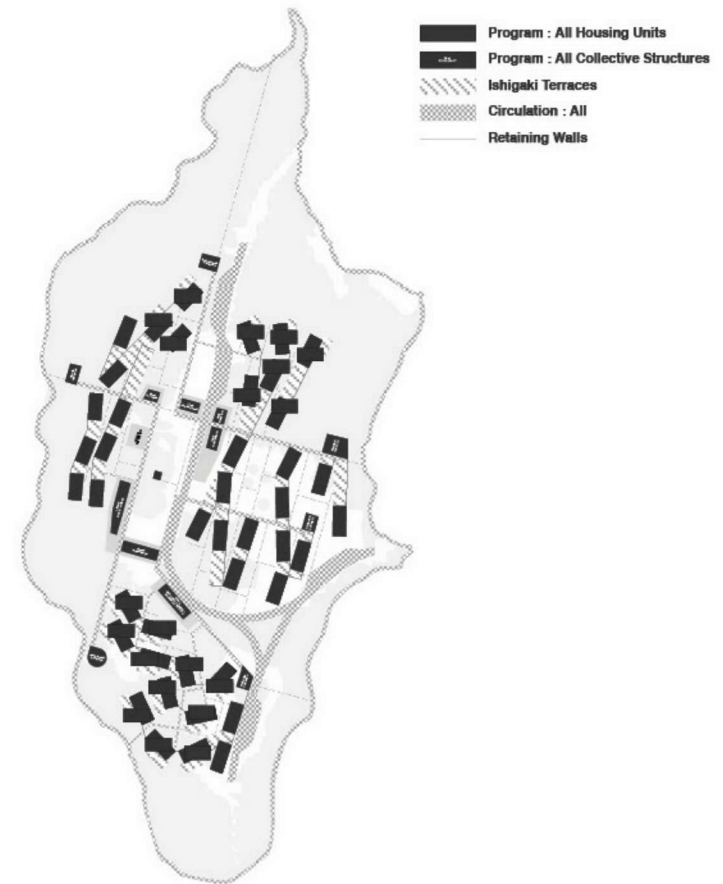
Below: A view of the Hadenya landform and symbolic Beech groves taken from a nature path running through the salt marsh in the lowlands.

Center and Right: A composite diagram showing circulation, figure / grounds, etc. The 17m elevation line (the high mark of the 3/11 tsunami) is etched in memory by a landscape path that rings the site and links secondary paths (which double as escape routes) between the highland and lowland nodes.

Across: Though the thesis does not directly engage the design of the lowlands, it assumes that much of this landscape is given back to the sea, reconnection the isolated salt marsh as a tidal estuary and wildlife habitat.



COMPOSITE

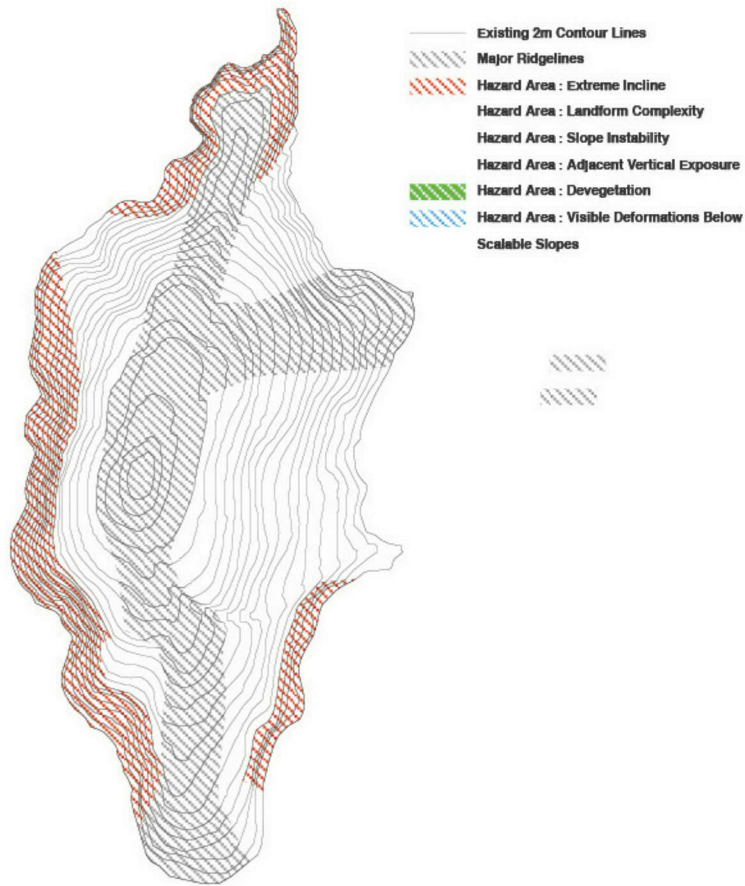


03.4 HADENYA : PROPOSED SITE PLAN



03.5 HADENYA : MASTERPLAN / LANDSCAPE CONCEPTS

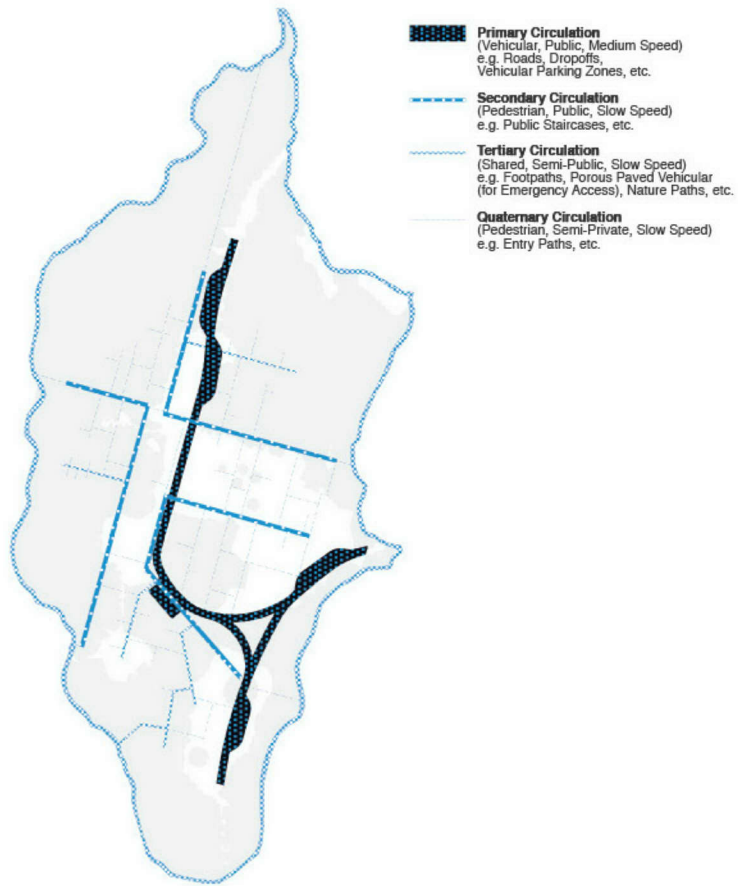
SLOPE MANAGEMENT



HOUSING PROGRAM



CIRCULATION NETWORKS



COMMUNITY PROGRAM

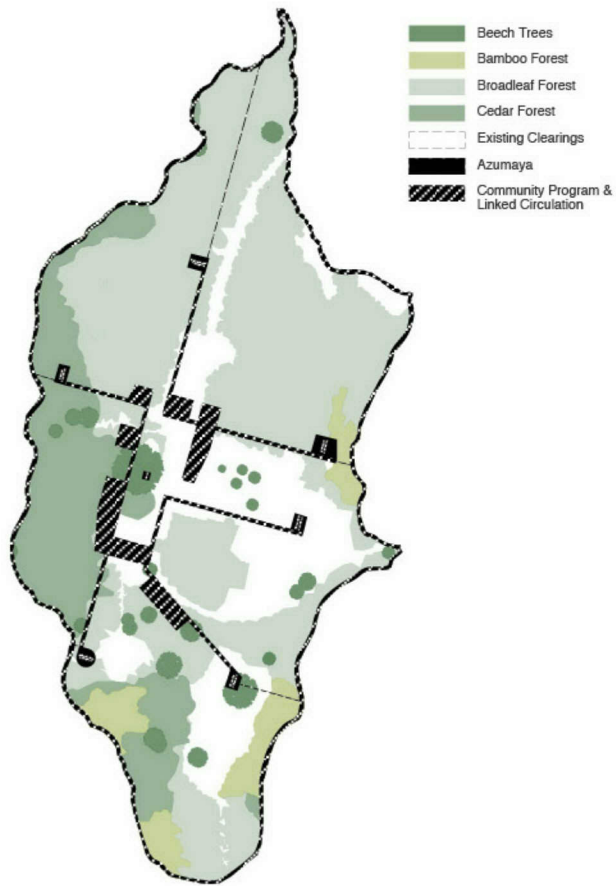


Azumaya Pavilions & Nature Paths



03.5 HADENYA : MASTERPLAN / LANDSCAPE CONCEPTS

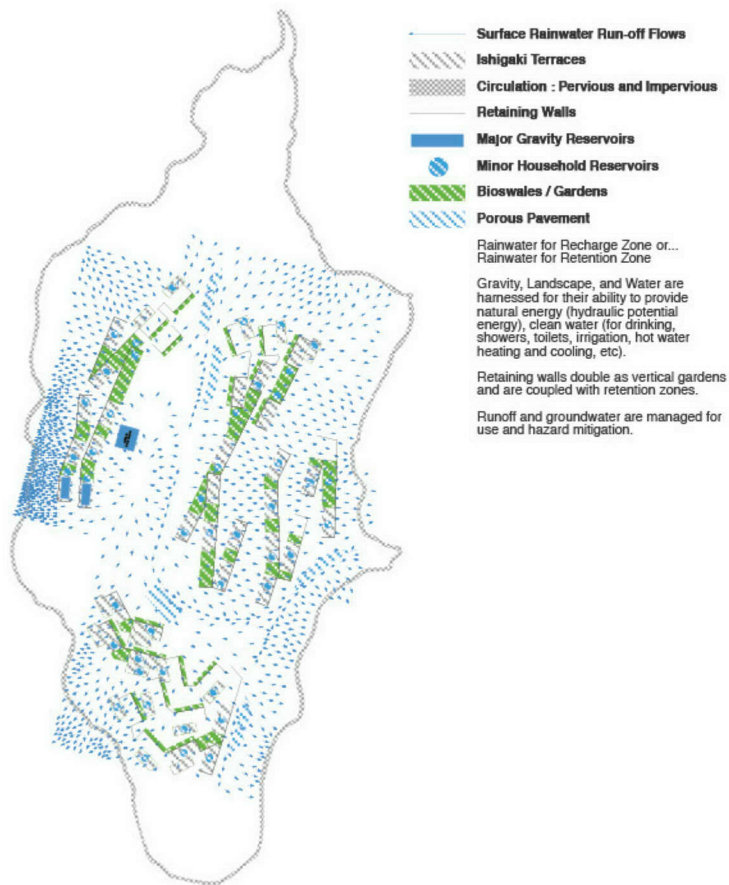
LANDSCAPE PROGRAM



COMMUNITY PROGRAM - THEMATIC LINES



WATER MANAGEMENT STRATEGY



Left: The thesis tries to see water as both life giver and life taker.

Though in close proximity to the sea, Hadenya is an island with limited reserves of groundwater and water that can be used for drinking or irrigation.

In some parts of the year, water is scarce; while in others, it can be so abundant that it can cause flooding and landslides (especially during monsoons or typhoons).

Thus, a strategy of managing water is employed that stores water on the hilltop and in shared housing foundations; abates stormwater runoff; and uses the gravity inherent in the slope to distribute the water downslope.

The location of housing units doubles as a system of swales, so that areas of both capture and groundwater recharge are accounted for.

03.6 HADENYA : MASTERPLAN / LANDSCAPE SUMMARY

Right: A composite aerial rendering of upper Hadenya, taken from the West.

Living in Hadenya is to live in a designed landscape of built elements, within an existing natural landscape. Communal program clearly holds the space of the hilltop, but allows it to breathe and for a sense of space and the natural landscape to roll through.

Housing clusters are landscapes in themselves, and emanate from the hilltop; traveling downslope with shared foundations that double as both water retention infrastructure and space for social interaction.

Primary vehicular circulation gains access to the most active areas, while secondary pedestrian circulation weaves its way into the housing clusters, leaving multiple routes to one's front door, either across the slope or up/down slope.

Emphasis is made on preserving the natural landscape (or replanting what has been affected by development) so that the presence of the landscape is always foremost.

-

These overall landscape / settlement concepts seek to lay the foundation for further resolution of the Hadenya experience, through Architectural building typologies found in the next chapter.





04 ARCHITECTURAL OPERATIONS :

Building Typologies and
Slope Experience





04.1 PRECEDENTS : THE JAPANESE HOUSE FROM MINKA TO MODERN



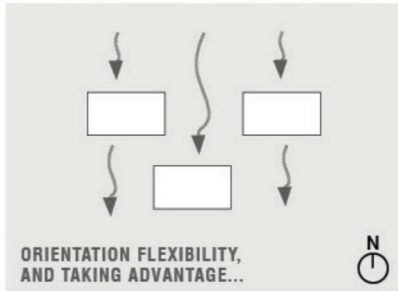
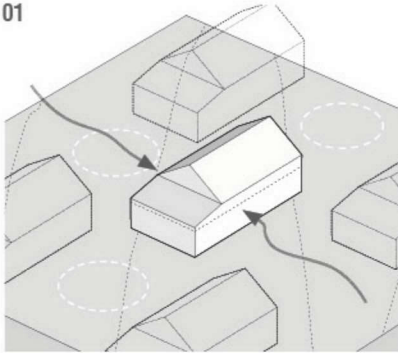
On the heels of the landscape / settlement studies, the thesis again, took a step back, looking at traditional Minka housing typologies (see adjacent images), and the inevitable progression towards the modern standard - the universal hermetic box. Precedent studies looked at the house through the lens of climatic response, flexibility, siting, access, aggregation, and social spaces.



It's important to note that the thesis intentionally took the single family house typology as a given. Why? In Minamisanriku, the profile is the stand-alone, two-storey, single family house, and emphasis was placed on working within this constraint in order to be as relevant as possible to the specific problem.

TRADITIONAL JAPANESE HOUSE & CLIMATE RESPONSE

01



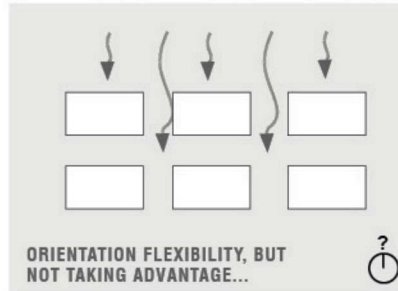
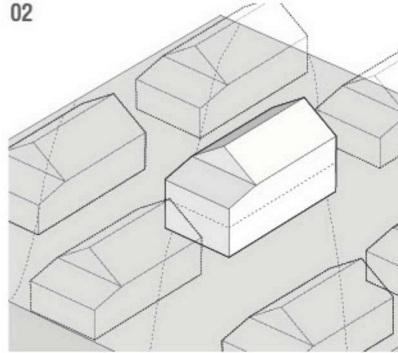
ORIENTATION FLEXIBILITY, AND TAKING ADVANTAGE...



- > ORIENTED FOR PREVAILING WIND AND SOLAR
- > CREATION OF USABLE OUTDOOR SPACES
- > LIGHTWEIGHT CONSTRUCTION, FLOATING FOUNDATION
- > OPEN-AIR, TRANSFORMABLE, USE OF INT. / EXT. LAYERS
- > UPPER VOLUME USED FOR ENERGY / STORAGE, NOT OCCUPIED.
- > FLEXIBLE PARTITIONS / MULTIPLE CONFIGURATIONS

MODERN STANDARD & THE LOSS OF ENVIRONMENTAL RESPONSE

02



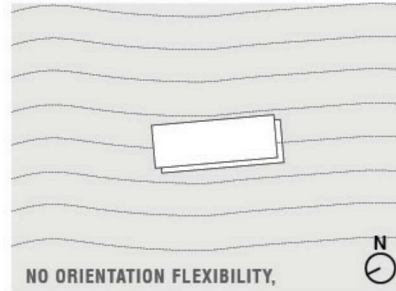
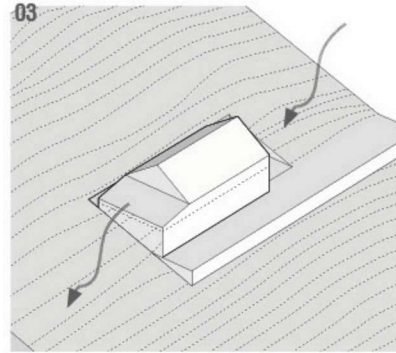
ORIENTATION FLEXIBILITY, BUT NOT TAKING ADVANTAGE...



- > ORIENTED FOR ECONOMY, STREET GRID
- > LIMITED USABLE SPACE (BESIDES STREET) BETWEEN BUILDINGS
- > UNIVERSAL CONCRETE SLAB FOUNDATION, SEALED ENVELOPE, SINGLE INT. / EXT. LAYER
- > UPPER VOLUME INHABITED DUE TO SPACE REQUIREMENTS
- > STATIC CONFIGURATIONS

PROBLEMS ON THE OBLIQUE

03



NO ORIENTATION FLEXIBILITY,



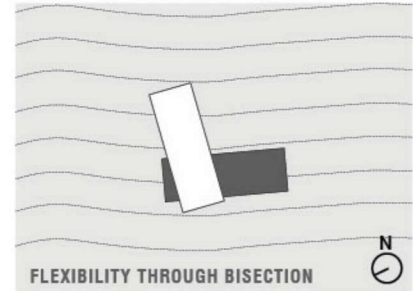
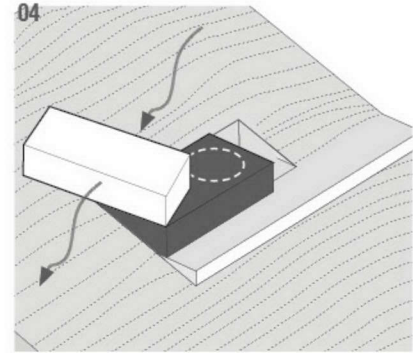
- > SINGLE ORIENTATION FOR ECONOMY (PARALLEL TO CONTOURS)
- > LIMITED USABLE SPACE (BESIDES STREET) BETWEEN BUILDINGS
- > 3 CUT RETENTION WALL FOCUSED INDIVIDUALLY
- > SEALED ENVELOPE, SINGLE INT. / EXT. LAYER
- > UPPER VOLUME INHABITED DUE TO SPACE REQUIREMENTS
- > STATIC CONFIGURATIONS



WHAT UNIT TYPOLOGY WOULD MAKE THIS WORK ON THE OBLIQUE?

POTENTIALS OF THE OBLIQUE

04



FLEXIBILITY THROUGH BISECTION



- > GROUND FLOOR ALIGNS WITH CONTOURS FOR MINIMAL CUT / FILL
- > UPPER FLOOR ALIGNS WITH CLIMATE (SOLAR / PREVAILING WIND)
- > GROUND FLOOR BENEFITS FROM EARTH SHELTERING
- > UPPER FLOOR BENEFITS FROM NATURAL VENTILATION AND SOUTHERN EXPOSURE FOR PASSIVE / SOLAR HEATING
- > ROTATION CREATES USABLE ROOF SPACE



WHAT UNIT TYPOLOGY WOULD MAKE THIS WORK ON THE OBLIQUE?

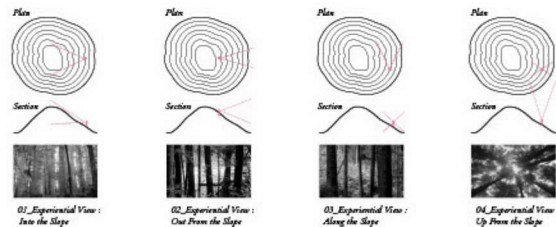
04.2 CONCEPTS : UNIT TYPOLOGIES AND SLOPE EXPERIENCE

Previous page: After an investigation into the single-family house typologies in the area, and their implications when on the oblique - the thesis invests in understanding how two possible housing typologies could be made to operate successfully on the oblique:

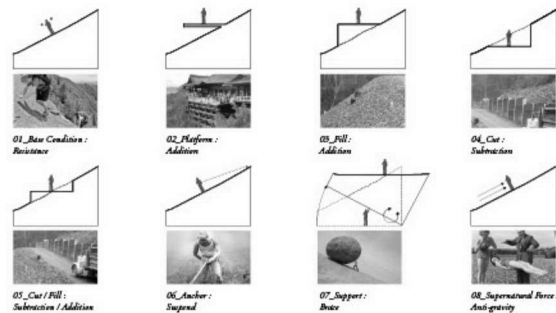
- A unit where both storeys run parallel to the contours (inflexible in orientation);
- A unit where the lower storey runs parallel to the contours but the upper storey does not (flexible in orientation)

Opposite: Given the palette of potential slope experience, these two typologies attempt to magnify the experience of the slope, and celebrate the integration of water systems and infrastructure.

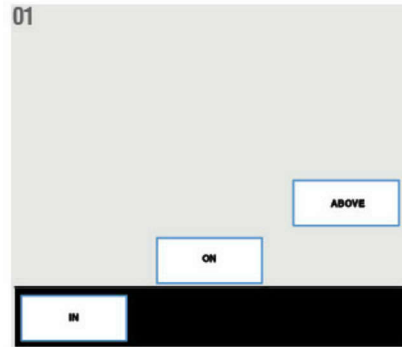
SLOPE SYSTEMS : VISUAL / SPATIAL EXPERIENCE EXPERIENCE RELATIVE TO POSITION IN THE LANDSCAPE



SLOPE SYSTEMS : INHABITATION / EXPERIENCE EXPERIENCE RELATIVE TO CONSTRUCTION TYPE



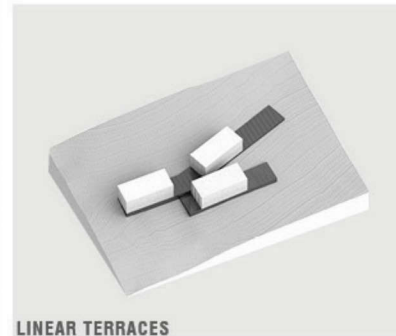
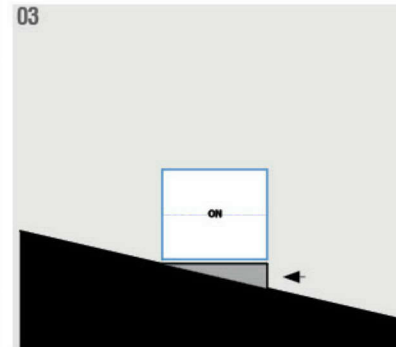
EXPERIENTIAL PALETTE



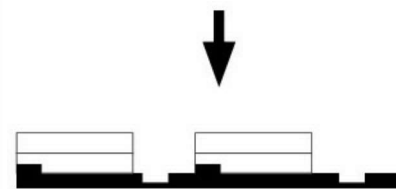
EXISTING SLOPE



UNIT TYPOLOGY 01 : ON

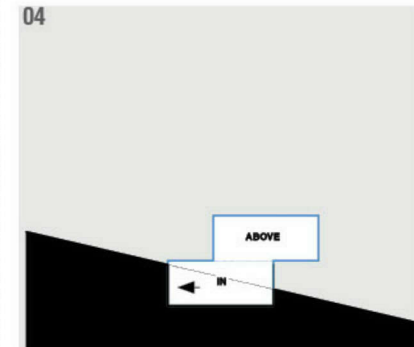


LINEAR TERRACES

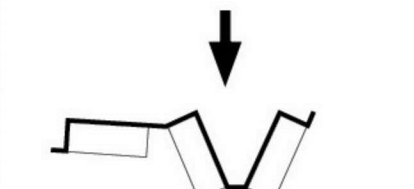


RELATION TO WATER RITUAL AND WATER INFRASTRUCTURE

UNIT TYPOLOGY 02 : IN / ABOVE



CHAIN LINKS



RELATION TO WATER RITUAL AND WATER INFRASTRUCTURE

04.3 HOUSING UNIT 01 : 'BAR / TERRACE'

OVERVIEW

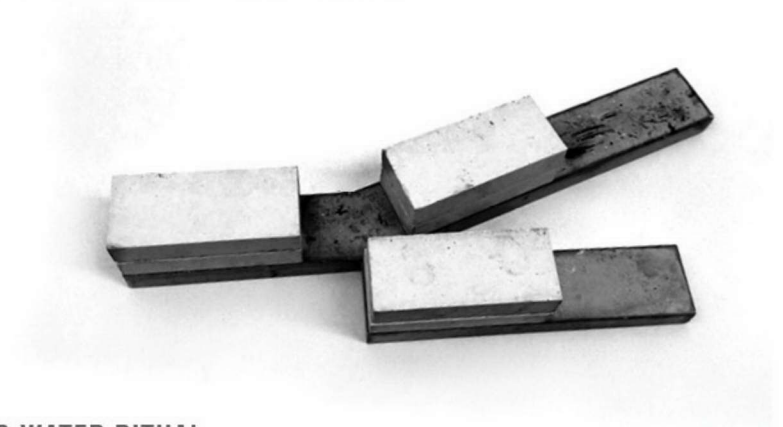
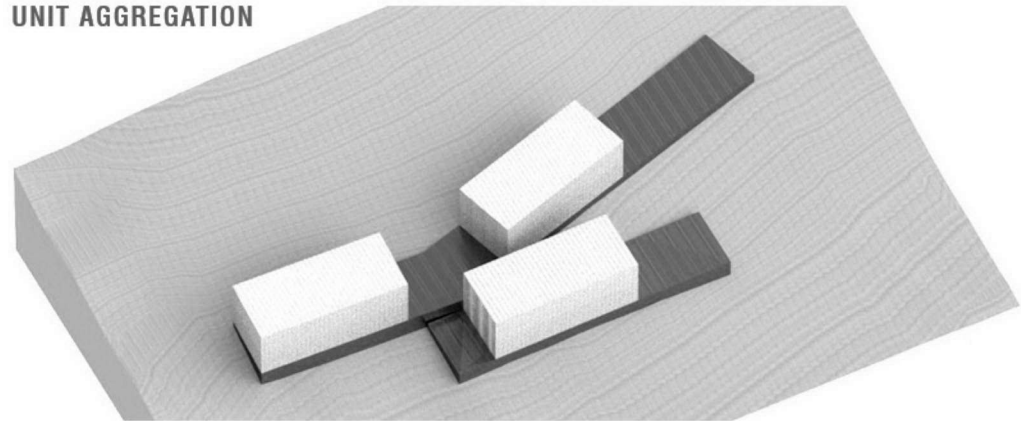
Born out of an interest in creating a unit type that respects the existing profile and housing typology, the Bar / Terrace typology is an aggregation of singular, carved wood volumes, which accept the two-storey, single-family rectangular footprints that are the profile in the area, but aims to collect them within a shared infrastructure that is both functional and experiential.

Here, the first move is an infrastructural abstraction of the ground in the form of a shared terrace. Incorporating the existing stone walls (or Ishigaki) on stie, the terraces run along the lines of the contours and collect units together, so that otherwise independent volumes become infrastructurally and spatially linked.

From the 'Experiential Palette' diagram on the previous page, this unit type asks how the 'On the Ground' experience can be transformed into something that doesn't just act individually, and isn't just a hermetic box.

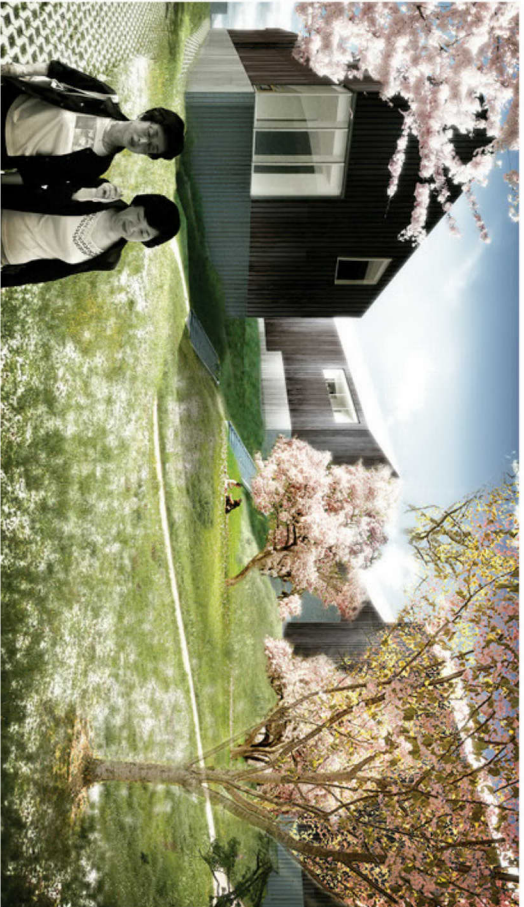
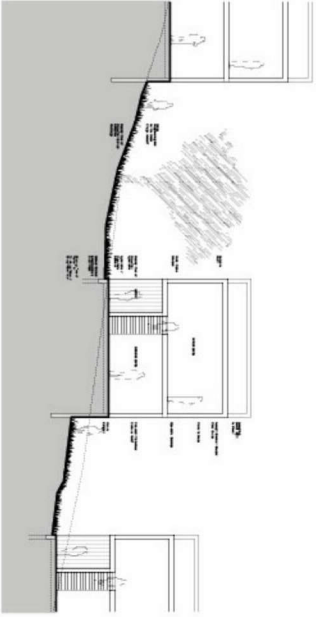
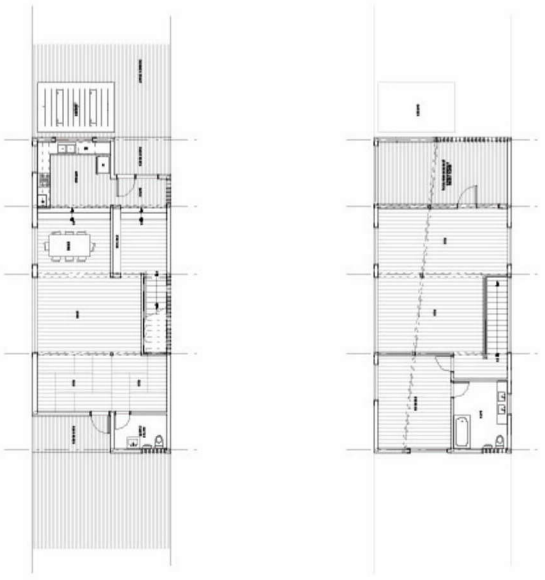
In instances of interaction with water — such as kitchens, baths, entries, gardens, and the like — the foundation protrudes into the space of the house, or is subtracted into the ground to create amplify these ritual experiences with water and the ground.

UNIT AGGREGATION



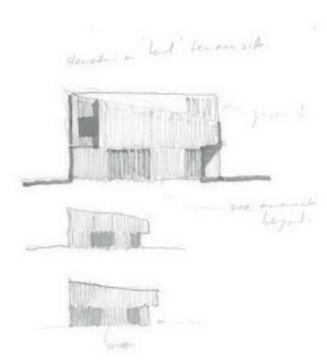
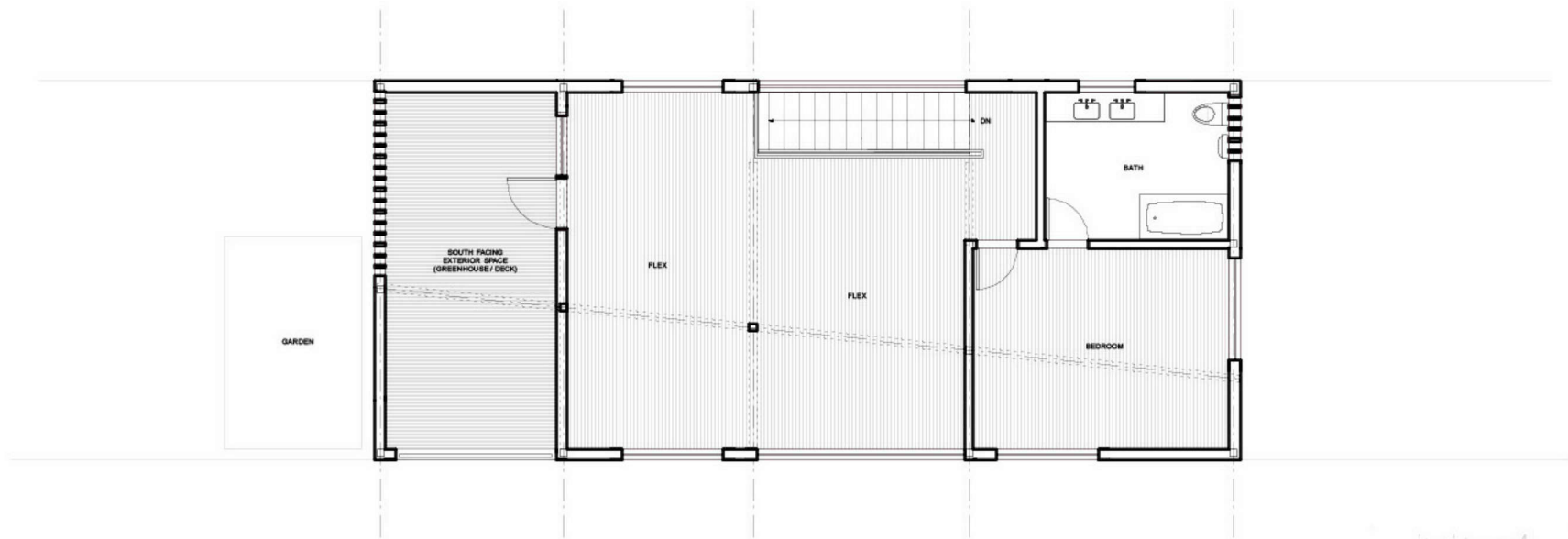
RELATION TO WATER RITUAL AND INFRASTRUCTURE





04.3 HOUSING UNIT 01 : 'BAR/TERRACE'

PLAN - UPPER LEVEL



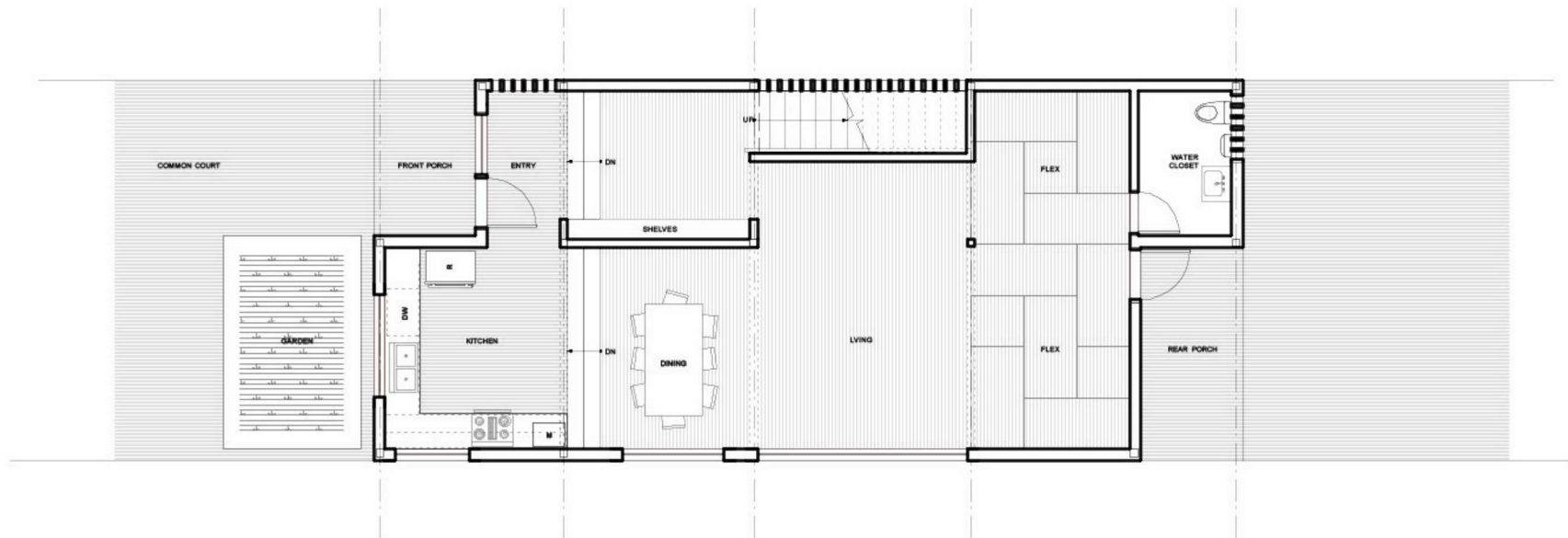
The two storey height of the typology allows views out to the ocean, but also accepts natural breezes coming in off the ocean. Terraces and rooflines both create acts of connection in a field of otherwise independent volumes, so that neighbors share a terrace, and a common 'blade of light' on the

roof. In the traditional Japanese Minka, the upper storey was an uninhabitable volume used primarily for storage, and to release heat in the hot summer months. Here, the upper storey again takes on this function, and the shifting ridge beam creates the opportunity for volumetric variety in the upper storey



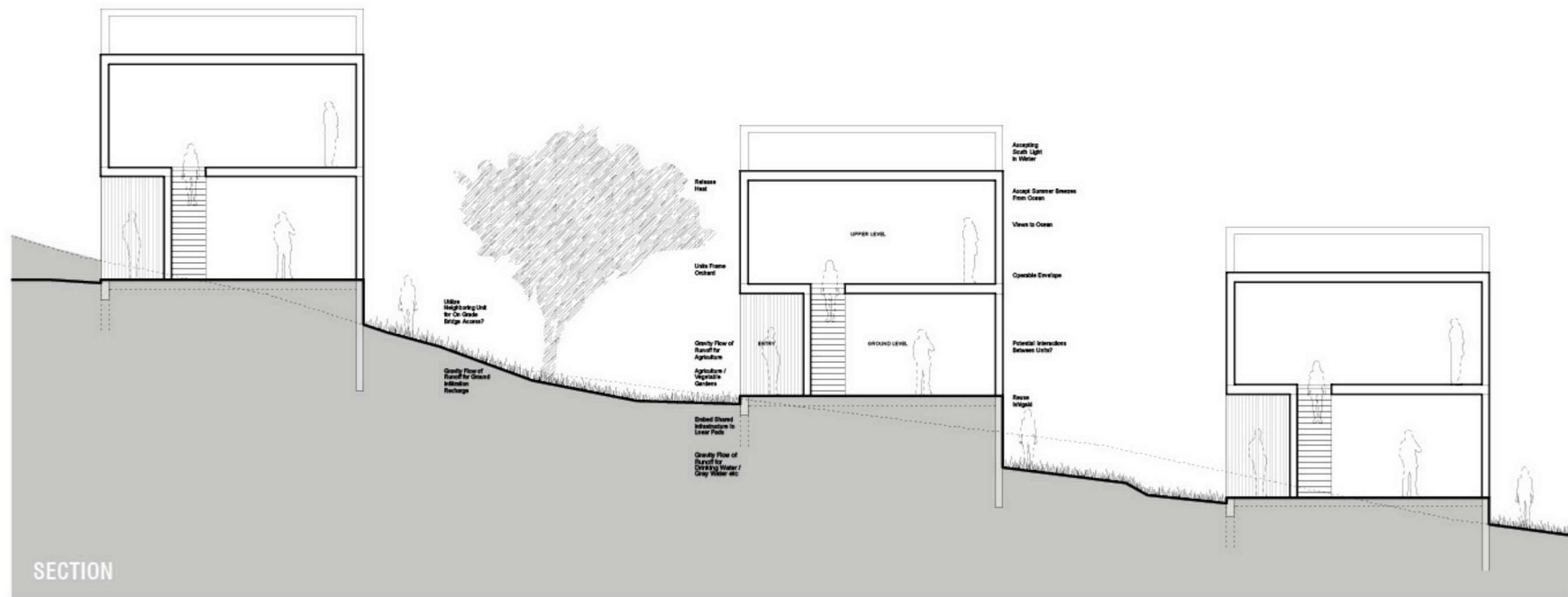
04.3 HOUSING UNIT 01 : 'BAR/TERRACE'

PLAN - LOWER LEVEL



The Lower Level of the Bar / Terrace aggregates the entries to multiple units, so that the stone terrace forms a micro moment of activity and potential, yet subtle, social interaction. The slope creates a breach of privacy on the uphill side, and a natural

vertical boundary on the downslope side. Thus, the uphill side of the unit (which also faces away from the ocean), is solid, while the downslope side is airy and much more porous.



04.4 HOUSING UNIT 02 : 'GROUND / SKY'

OVERVIEW

The Ground / Sky Typology is a bi-polar magnification of the potential for slope experience.

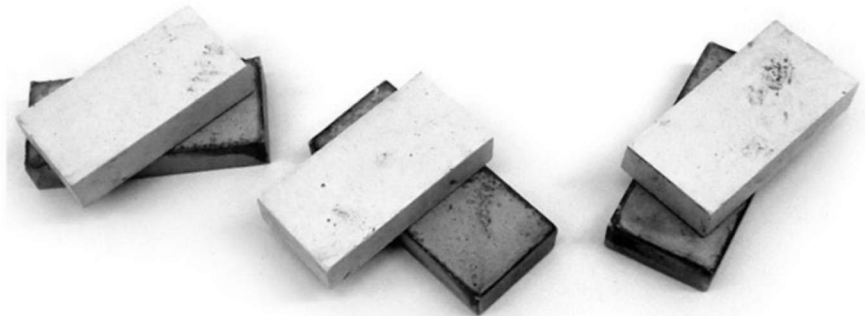
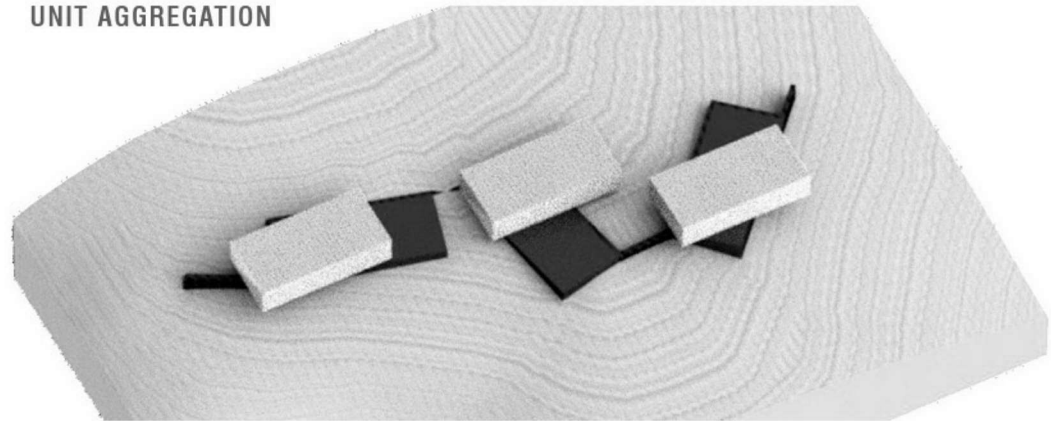
Where the previous typology accepted the middle ground, and the experience of being 'On' the ground, this typology rejects the middle ground and satiates itself with the two extremes.

The lower volume is a sunken mass in a pumice sea. It responds to the world of the ground, torquing itself to conform with the contours. It employs an energy strategy of partial earth-sheltering, and beckons darkness, reflection, and inwardness. The experience is tied to the gravity of the retaining wall that bounds space on three sides, and embeds that which relates to ritual, water, and earth.

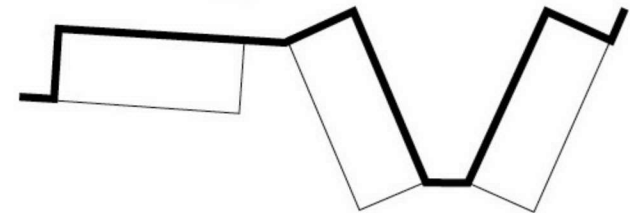
Conversely, the upper volume is a prefabricated, floating wood skeleton that belongs to the world of the sky and can take any orientation it likes.

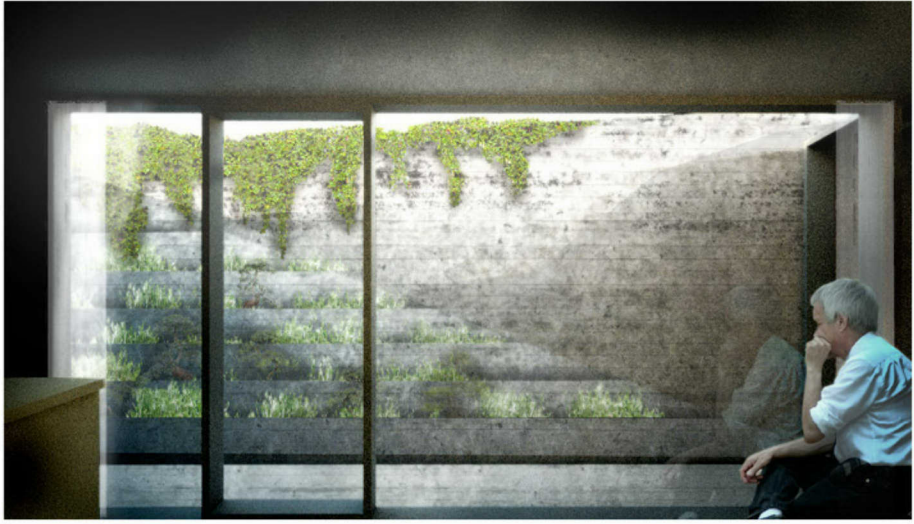
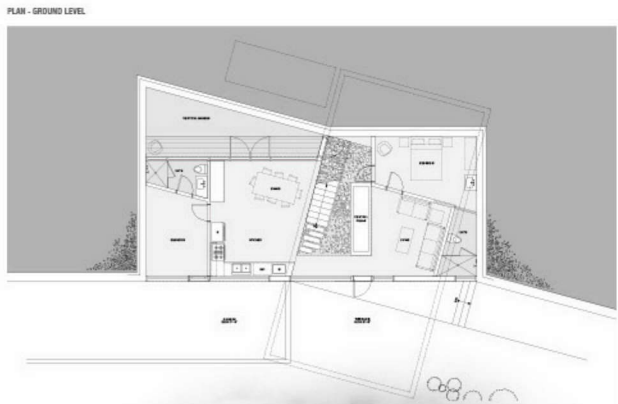
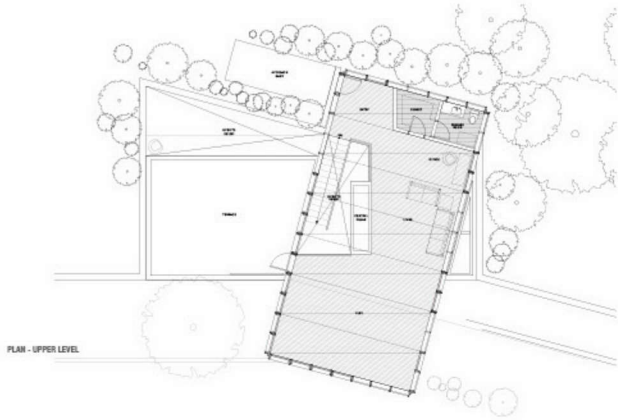
It is outward, craves openness, lightness of being, and can be as idiosyncratic as necessary. Clean open spaces allow for maximum flexibility and views of the landscape. Its energy strategy utilizes passive solar, thermal mass (from the volume below), flexibility, and natural ventilation.

UNIT AGGREGATION

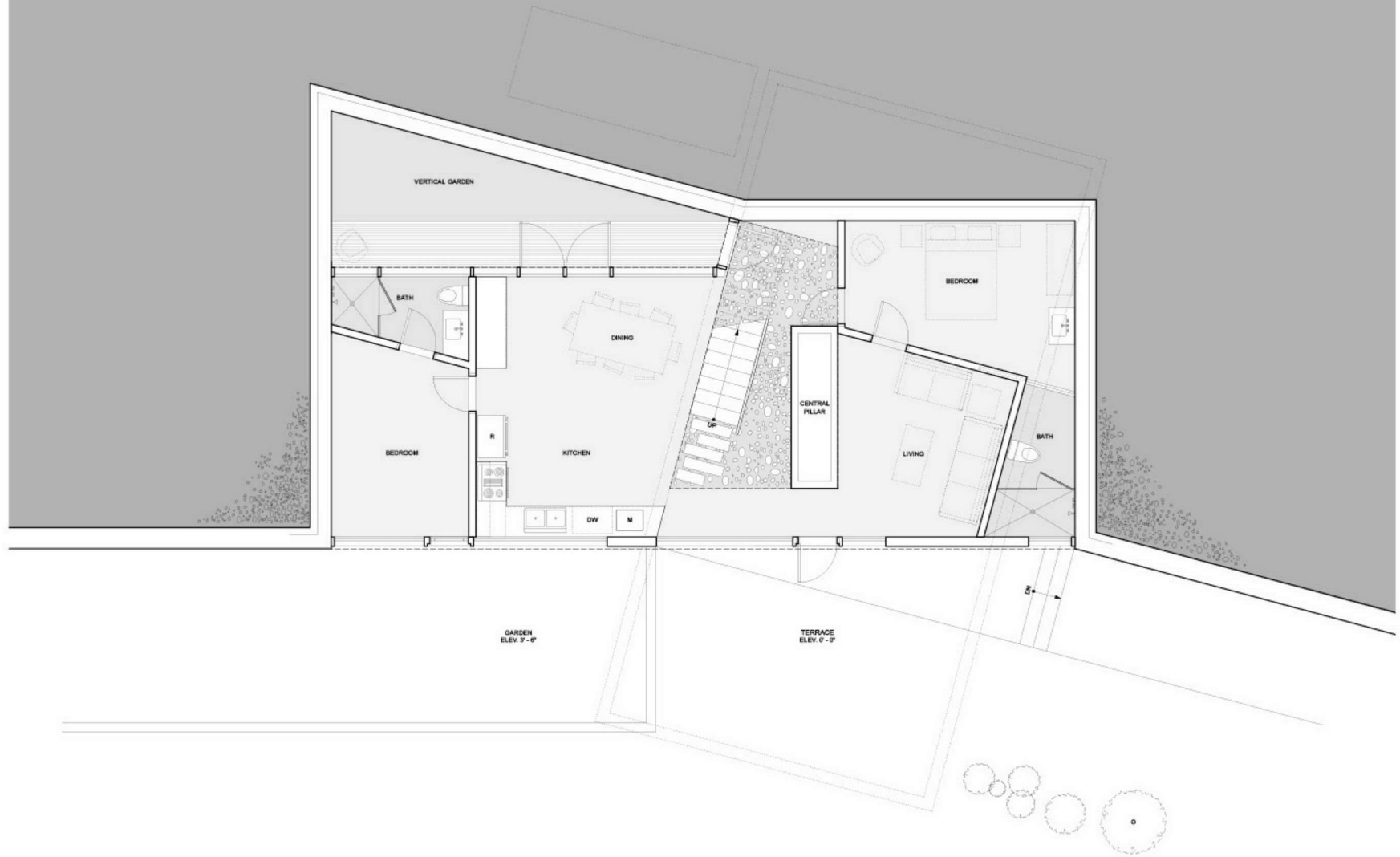


RELATION TO WATER RITUAL AND INFRASTRUCTURE





04.4 HOUSING UNIT 02 : 'GROUND / SKY'

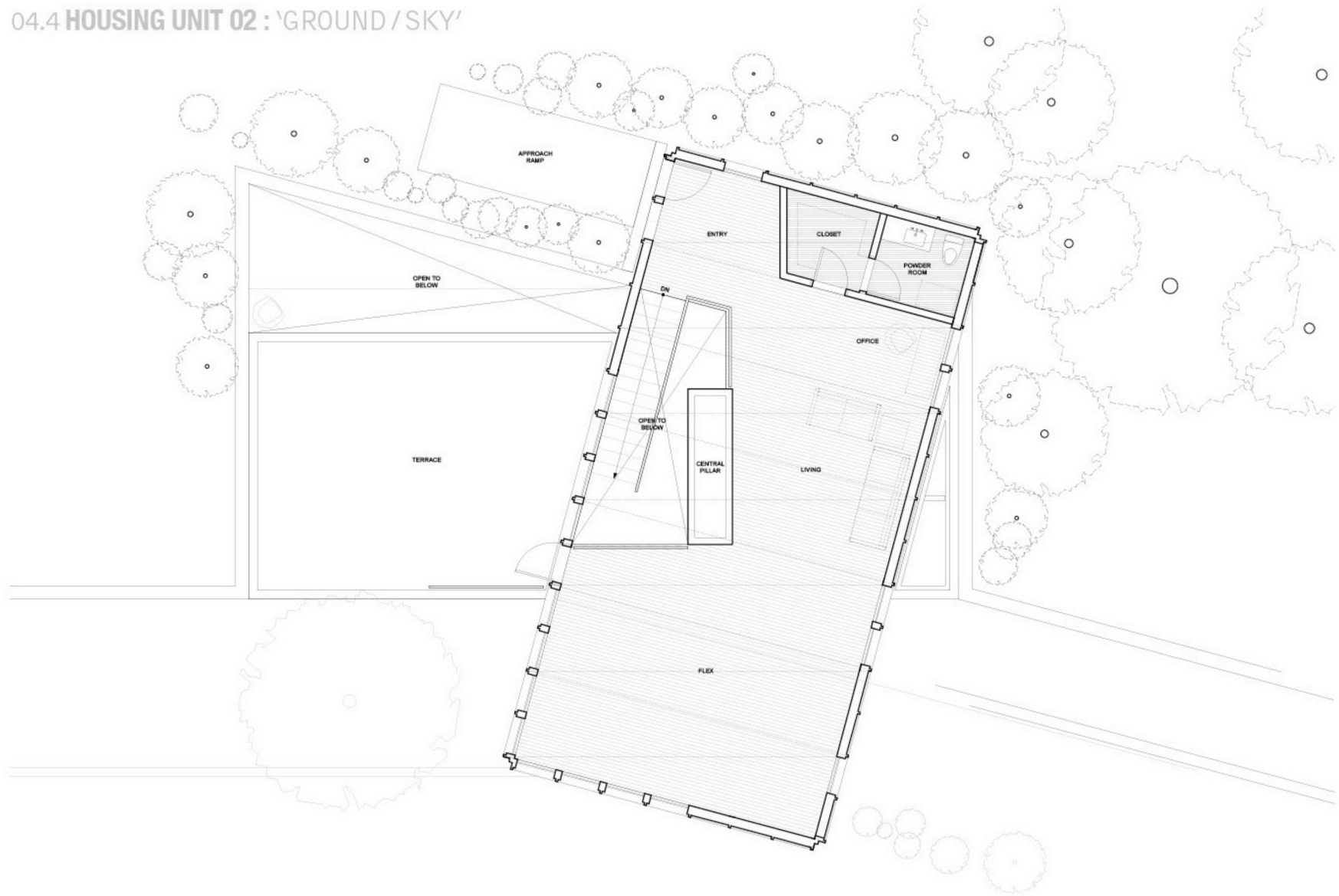


PLAN - GROUND LEVEL

A picture window frames a view of a planted retaining wall garden, on the Lower Level. The angle of the wall allows ambient sunlight to wash the lower level with a soothing, green light.



04.4 HOUSING UNIT 02 : 'GROUND / SKY'



PLAN - UPPER LEVEL

Left: A trapezoidal opening in the floor, guided by a vertical central pillar constructed of concrete and stone, allows elements of the upper and lower world to pierce that of the other.

View of Entry to 'Ground/Sky' Typology

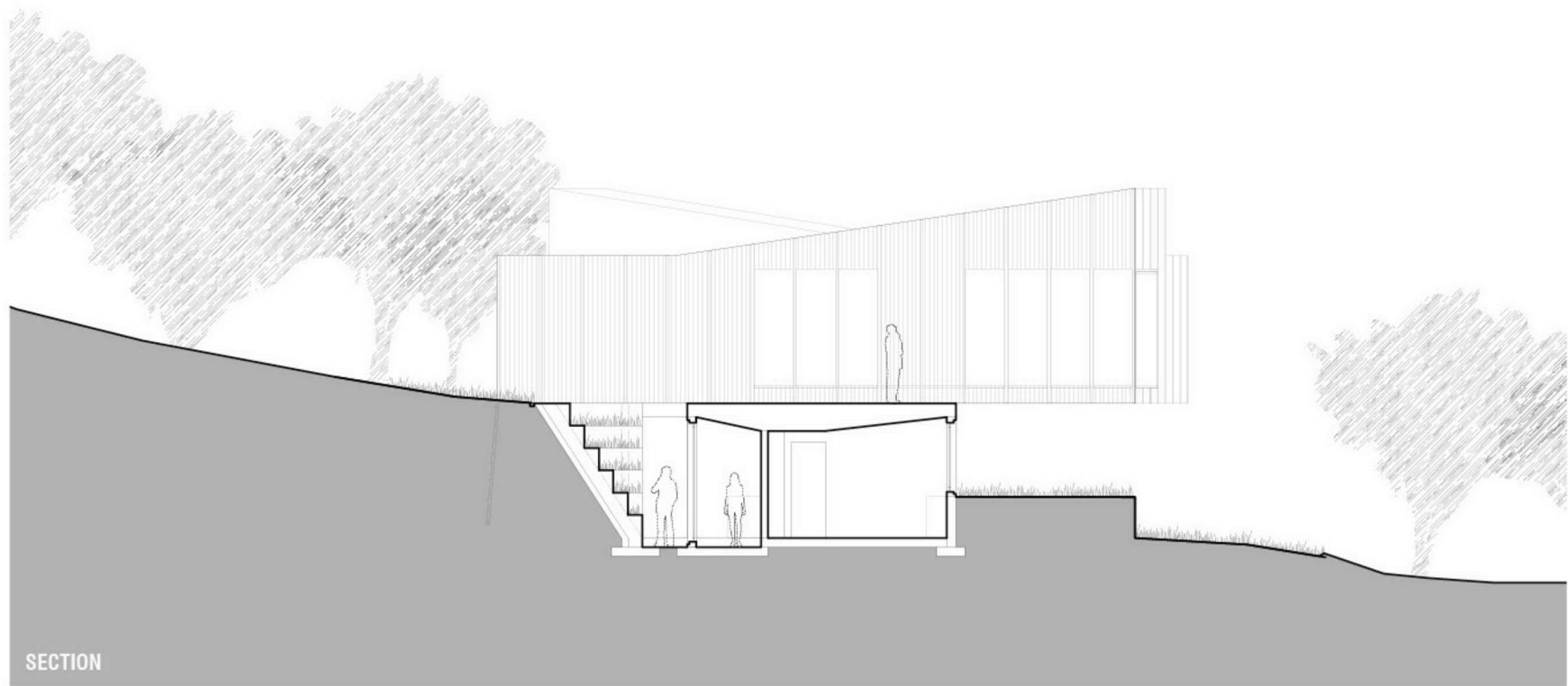


04.4 HOUSING UNIT 02 : 'GROUND / SKY'

Below: Building section, taken through the bedroom, bath, and exterior court on the lower level. An embedded, concrete volume supports a prefabricated wood volume above.

Right: A lower volume holds the horizon of the ground. A prefabricated, wood volume rests above. Exterior cladding on the wood box employs a traditional Japanese technique of using charred siding, helping to form a protective coating from insects and the environment.

Shown at right are two possible variations for the upper volume.





ELEVATION V.2



ELEVATION V.1

04.05 UNIT TYPOLOGIES : WATER INFRASTRUCTURE AND SLOPE EXPERIENCE

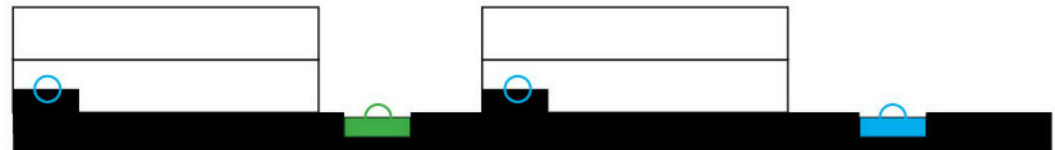
OVERVIEW

At the scale of the house, unit typologies begin with an infrastructural abstraction of the ground, with the aim of magnifying the experience of the landscape while running a perceived spatial and infrastructural common thread through otherwise individual volumes.

To an occupant living within the units, this manifests itself through human interaction with shared infrastructure.

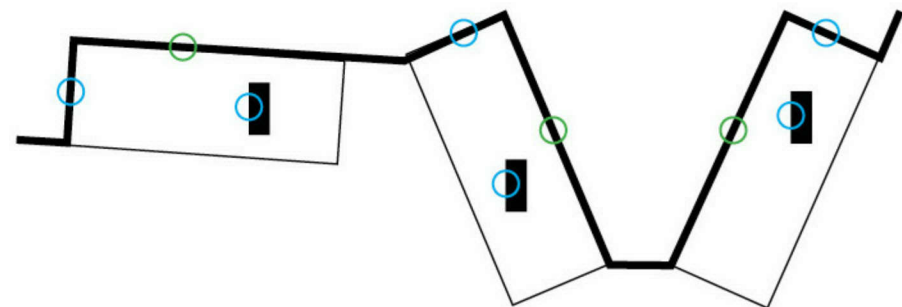
The thesis celebrates the rituals of water at all scales. From the fleeting 20 seconds of washing of hands; to irrigation of a vegetable garden; to a bath or shower; to the larger seasonal or multi-year cycles of monsoons, typhoons, and tsunamis; the rituals of human experience with water tap into the larger cycles - and the important role - that water plays in this place. as both life giver and life taker.

UNIT TYPE 01 (BAR / TERRACE) RELATION TO WATER RITUAL AND INFRASTRUCTURE



SECTION DIAGRAM

UNIT TYPE 02 (GROUND / SKY) RELATION TO WATER RITUAL AND INFRASTRUCTURE



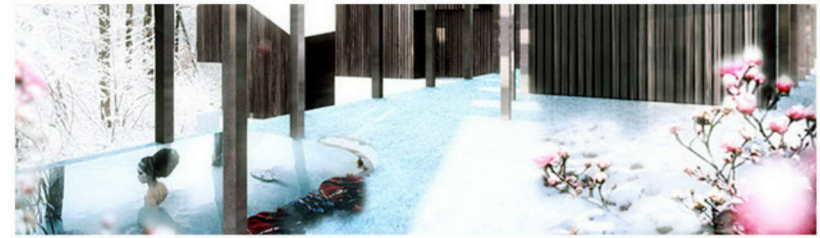
PLAN DIAGRAM



01: EXTRUDED KITCHEN



02: RECESSED BATHS / GARDENS



03: SENSE OF SHARED FOUNDATIONS



01: SHOWER



02: VERTICAL GARDEN



03: CENTRAL PILLAR



04: PLUNGE BATH

04.06 SLOPE SECTORS : SITE AS A SERIES OF ABSTRACT LANDFORMS

SECTOR 00 : HILLTOP

PARAMETERS

SLOPE : MAINLY FLAT, 0 - 5 DEGREES

LANDFORM : HILLTOP

LANDSCAPE : BEECH GROVE / OTHERWISE OPEN

MIRCROCLIMATE : NESW FACING, EXPOSED W/ EXCEPTION TO SHADE UNDER BEECH TREE

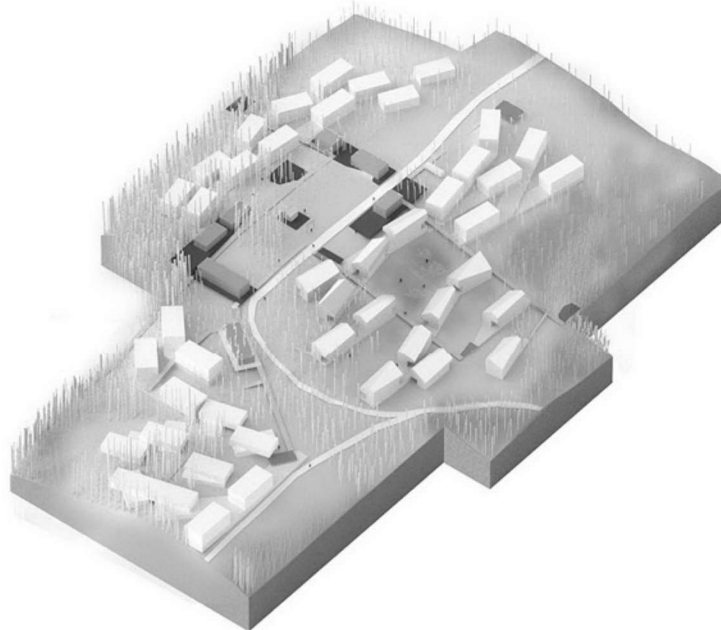
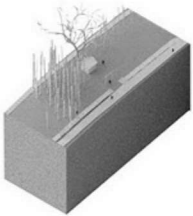
CIRCULATION ACCESS : DIRECT LOOP ACCESS

ASSETS : CULTURALLY IMPORTANT SHRINE, VIEWS TO OCEAN

LIMITS : SHOULD BE PROTECTED, NOT DEVELOPED

KEY DESIGN CONSIDERATIONS : HILLTOP SHOULD BE PROTECTED AS A CULTURALLY IMPORTANT SITE. REFORESTATION / REVEGETATION FOR PROTECTION, AND CAN BE FURTHER DEFINED WITH A BOUNDARY OF BUILT STRUCTURES AND LANDSCAPE ELEMENTS. BUILDABLE SECTORS RADIATE AND CONNECT AROUND HILLTOP. COLLECTIVE PROGRAM LINKS TO EXISTING ROADS WHILE REINFORCING 'ROOM' OF HILLTOP, AND FOSTERING LINKS BETWEEN HOUSING DEVELOPMENTS AND HILLTOP.

AXONOMETRIC



SECTOR 01 : COMPLEX RIDGE

PARAMETERS

SLOPE : STEEP / MODERATE (15-40 DEGREES)

LANDFORM : CONVEX / CONCAVE SLOPE & COMPLEX RIDGE

LANDSCAPE : MEADOW, CEDAR FOREST, BAMBOO FOREST, SOME MIXED

DECIDUOUS, ONE SYMBOLIC BEECH TREE

MIRCROCLIMATE : SOUTH FACING, LIGHT BREEZE

CIRCULATION : DIRECT ACCESS TO EXISTING LOOP & PROPOSED ROAD

ASSETS : SEMI-CLEARED, BUILDABLE, POTENTIAL LINK TO EXISTING

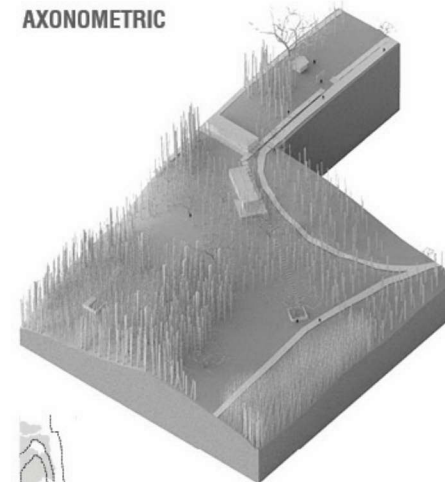
DEVELOPMENT BELOW, POTENTIAL FOR NEW ROAD, SOUTH FACING

POTENTIAL FOR WINTER HEATING.

LIMITS : LIMITED VIEWS OF OCEAN

KEY DESIGN CONSIDERATIONS : UTILIZE EXISTING CLEARINGS AND SYMBOLIC BROADLEAF TREE. SOUTH FACING ORIENTATION SHOULD BE HARNESSSED.

AXONOMETRIC



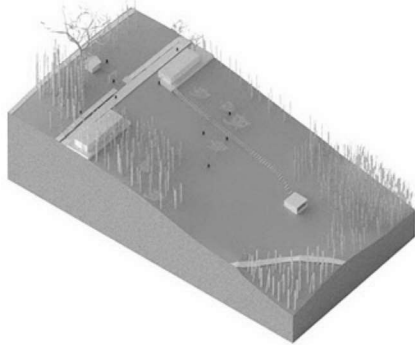
SECTOR 02 : SIMPLE TERRACE

PARAMETERS

SLOPE : MODERATE (10-35 DEGREES)
LANDFORM : SIMPLE SLOPE / TERRACE
LANDSCAPE : CLEARING / ORCHARD / GARDENS
MIRCROCLIMATE : EAST FACING, STRONG BREEZES
CIRCULATION : HILLTOP (2 ACCESS POINTS)
ASSETS : ALREADY TERRACED, VIEWS OF OCEAN, BUILDABLE, ACCESS
LIMITS : LITTLE LATE-DAY LIGHT, EXPOSURE DURING WINTER

KEY DESIGN CONSIDERATIONS : BUILT ENVIRONMENT SHOULD NOT HARM THE EXISTING VIEW CORRIDOR OR VALUE TO THE SITE. DESIGN SHOULD HARNESS EXISTING VIEWS AND FOSTER INTERACTION BETWEEN ORCHARD AND AGRICULTURAL LANDSCAPES WITH NEW DEVELOPMENT.

AXONOMETRIC



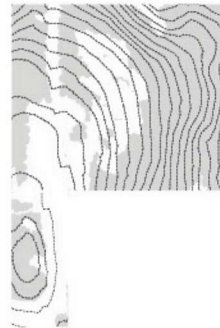
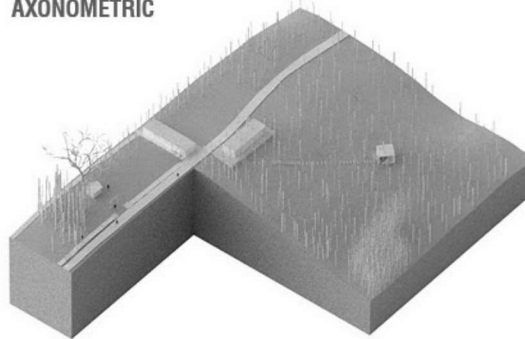
SECTOR 03 : SIMPLE FAN

PARAMETERS

SLOPE : MODERATE / STEEP (XX DEGREES)
LANDFORM : CONVEX SLOPE
LANDSCAPE : MIXED DECIDUOUS, SPARSE BEECH, BAMBOO
MIRCROCLIMATE : NORTHEAST / EAST FACING, SOME BREEZES
CIRCULATION : DIRECT ACCESS TO LOOP, ACCESS TO BEACH
ASSETS : POTENTIAL VIEW OF OCEAN
LIMITS : DENSE VEGETATION, NECESSARY SITE WORK

KEY DESIGN CONSIDERATIONS : EXISTING CLEARINGS CAN BE UTILIZED AS SITES FOR DEVELOPMENT. BAMBOO FOREST (AND DENSE ROOT SYSTEM) SHOULD BE AVOIDED, THOUGH SEEN AS AN ADJACENT ASSET FOR LANDSCAPE EXPERIENCE.

AXONOMETRIC



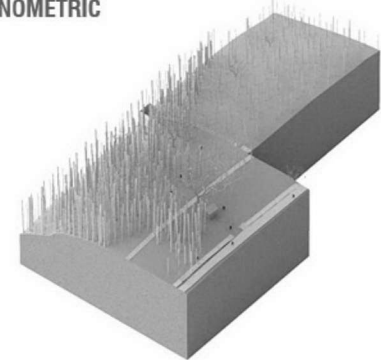
SECTOR 04 : STEEP SLOPE

PARAMETERS

SLOPE : STEEP (XX DEGREES)
LANDFORM : SIMPLE / CONVEX / CONCAVE SLOPE
LANDSCAPE : DENSE CEDAR FOREST, MIXED FOREST, BEECH
MIRCROCLIMATE : WEST FACING, STRONG BREEZES
CIRCULATION : LIMITED ACCESS TO VEHICULAR (BUT POSSIBLE)
ASSETS : POTENTIAL LINK / ESCAPE ROUTE TO BELOW
LIMITS : DENSE VEGETATION, STEEP SLOPE, LIMITED MORNING LIGHT

KEY DESIGN CONSIDERATIONS : KEEP SITE PREP TO A MINIMUM BY CONCENTRATING DEVELOPMENT. SPACES OF UNDER / MID / OVERSTORY COULD BE HARNESSSED FOR LANDSCAPE EXPERIENCE OF VERTICAL FIELD.

AXONOMETRIC



04.07 MASTERPLAN / CLUSTERS : DEPLOYMENT OF UNIT TYPES

Beyond communal program, which operates on the peripheral space of the hilltop; the housing unit typologies are deployed to specific areas in response to environmental, climatic, and ground conditions to which they are most suitable.

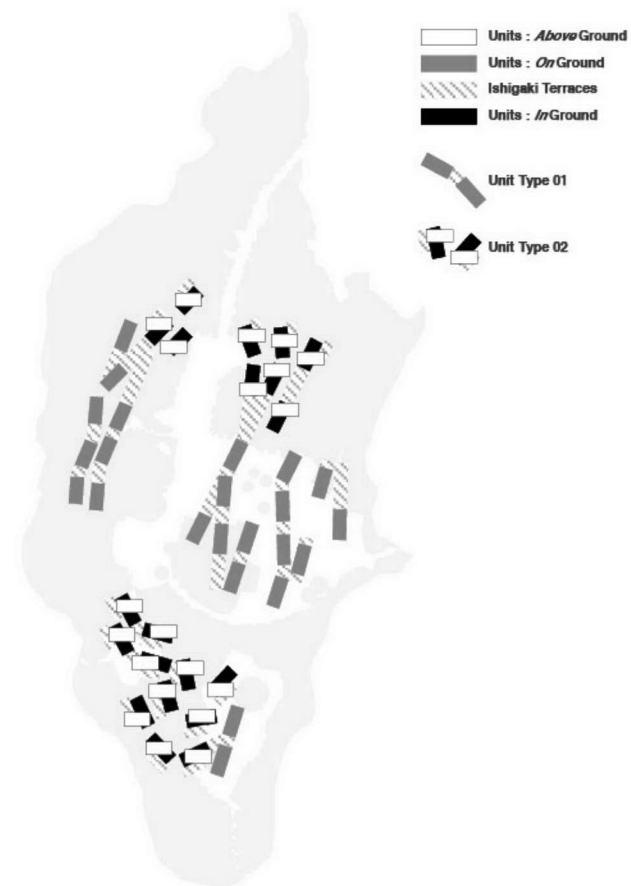
The Bar / Terrace typology uses formal, linear bars that run parallel to the contours. The limits of this typology arise when complex landforms occur (simply the inability of the geometry to turn sharp corners), or when the orientation of the footprint must take a different orientation than that of the contours. Thus, this typology is deployed to:

- The steep, West Slope because of its simple, linear landform and lack of sun exposure.
- The Terrace Orchard, where the existing terraces are magnified and the orientation of the footprints (though not south facing for passive solar benefits) are oriented to capture natural breezes and offer views of the ocean.

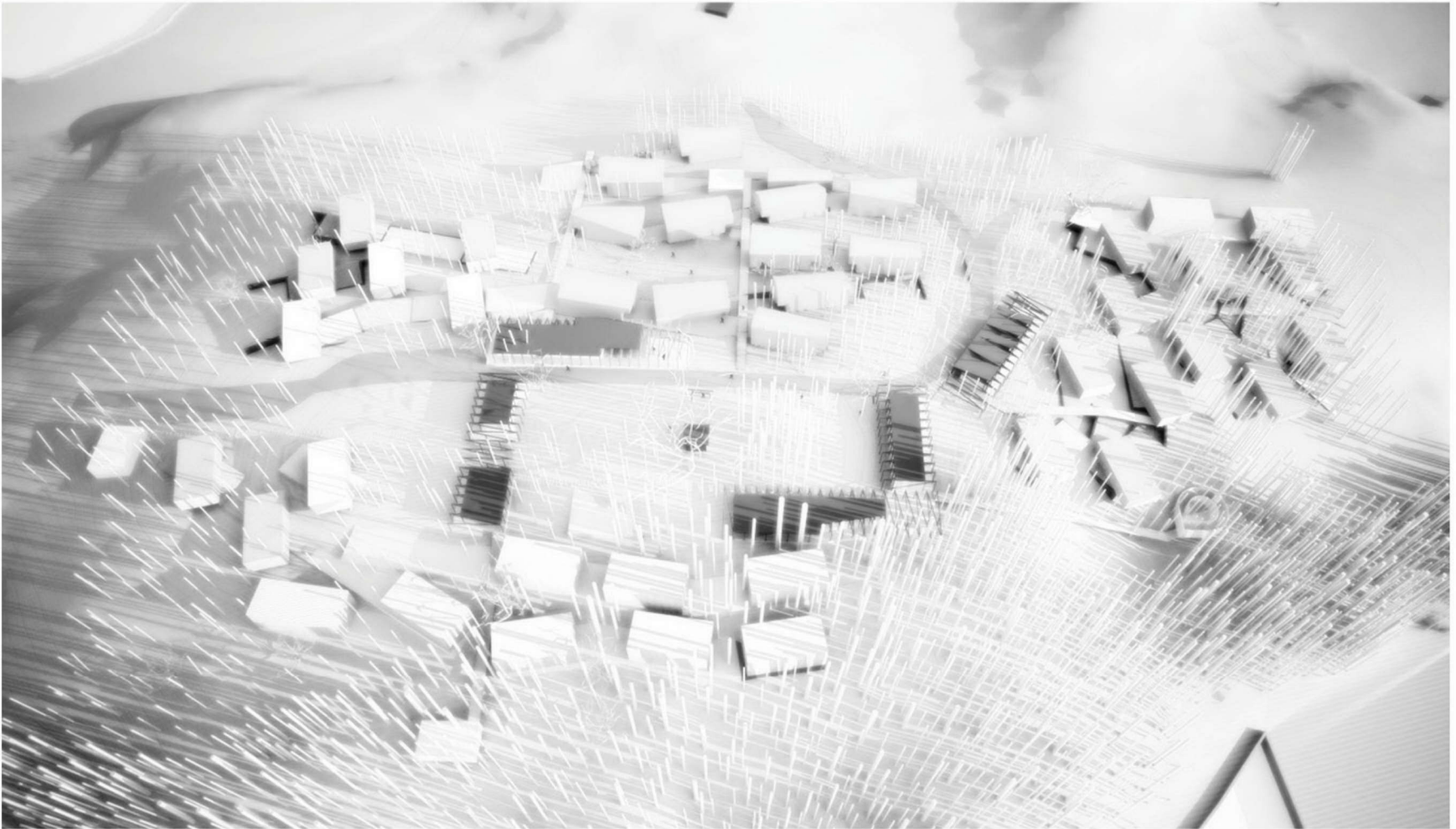
The Ground / Sky typology forms a linked chain of embedded volumes that run parallel to contours with an upper volume that orients to the South. This typology is thus deployed to the South Slope and the North Ridge because of:

- The need to respond to a complex landform
- The availability of southern exposure.

HOUSING PROGRAM



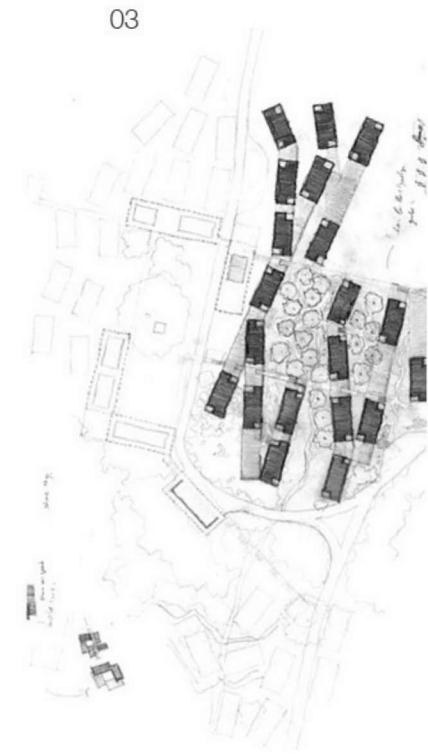
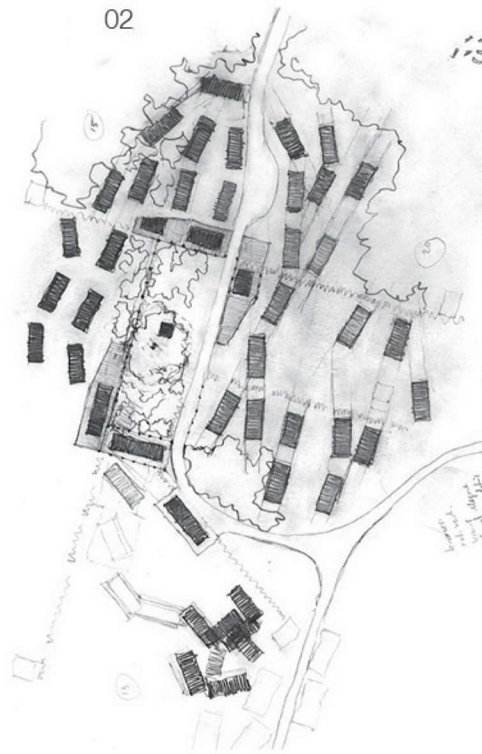
Aerial view of Masterplan from the West.

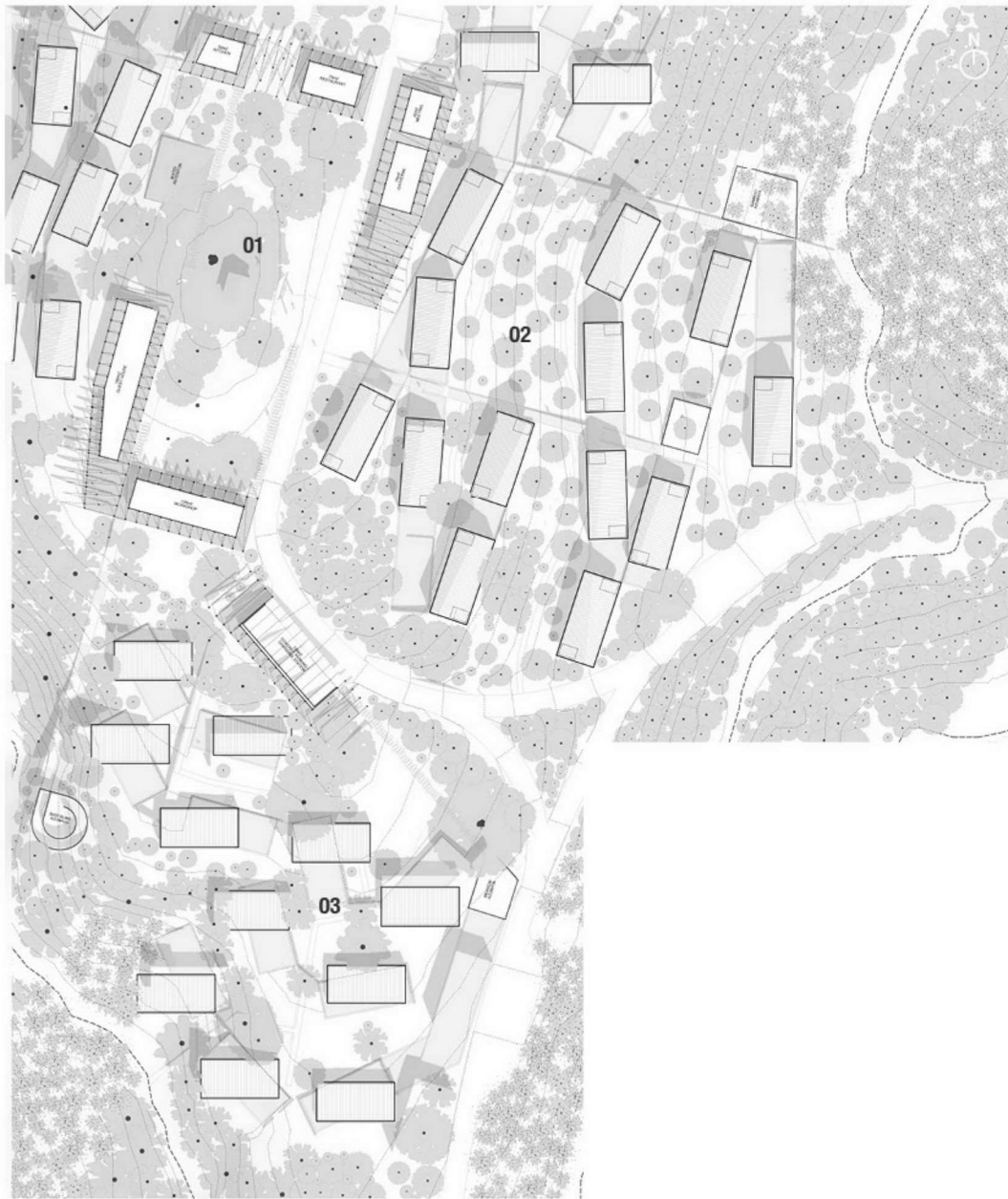


04.08 MASTERPLAN / CLUSTERS : FOCUS AREAS

Below: Selected working sketches to develop the relationships between the landscape sectors, the hilltop, the landscape pavillions, and the housing clusters.

- 01: Dec. 12th, 2012
- 02: Nov. 23rd, 2012
- 03: Nov. 20th, 2012





After a design phase focused on looking at the overall site as an integrated masterplan, the thesis steps back from the realities of site specificity and selects three of the abstract landscape sectors for further design development of architectural clusters.

The term cluster refers to an aggregation of the same unit typology (whether housing or collective program) in order to understand how the units can interact with each other to become more than the sum of their parts.

The three clusters chosen, are the *Hilltop*, the *South Ridge*, and the *Terrace Orchard*; because of their distinct landscape and programmatic characteristics, and the potential feasibility of their future development (given buildability, access to existing infrastructure, preparedness of the areas for development, etc).

- 01 Hilltop
- 02 South Ridge
- 03 Terrace Orchard

04.09 CLUSTER 01 : HILLTOP SHRINE & COMMUNAL PROGRAM

PARAMETERS

SLOPE : MAINLY FLAT, 0 - 5 DEGREES

LANDFORM : HILLTOP

LANDSCAPE : BEECH GROVE / OTHERWISE OPEN

MIRCROCLIMATE : NESW FACING, EXPOSED W/ EXCEPTION TO SHADE UNDER BEECH TREE

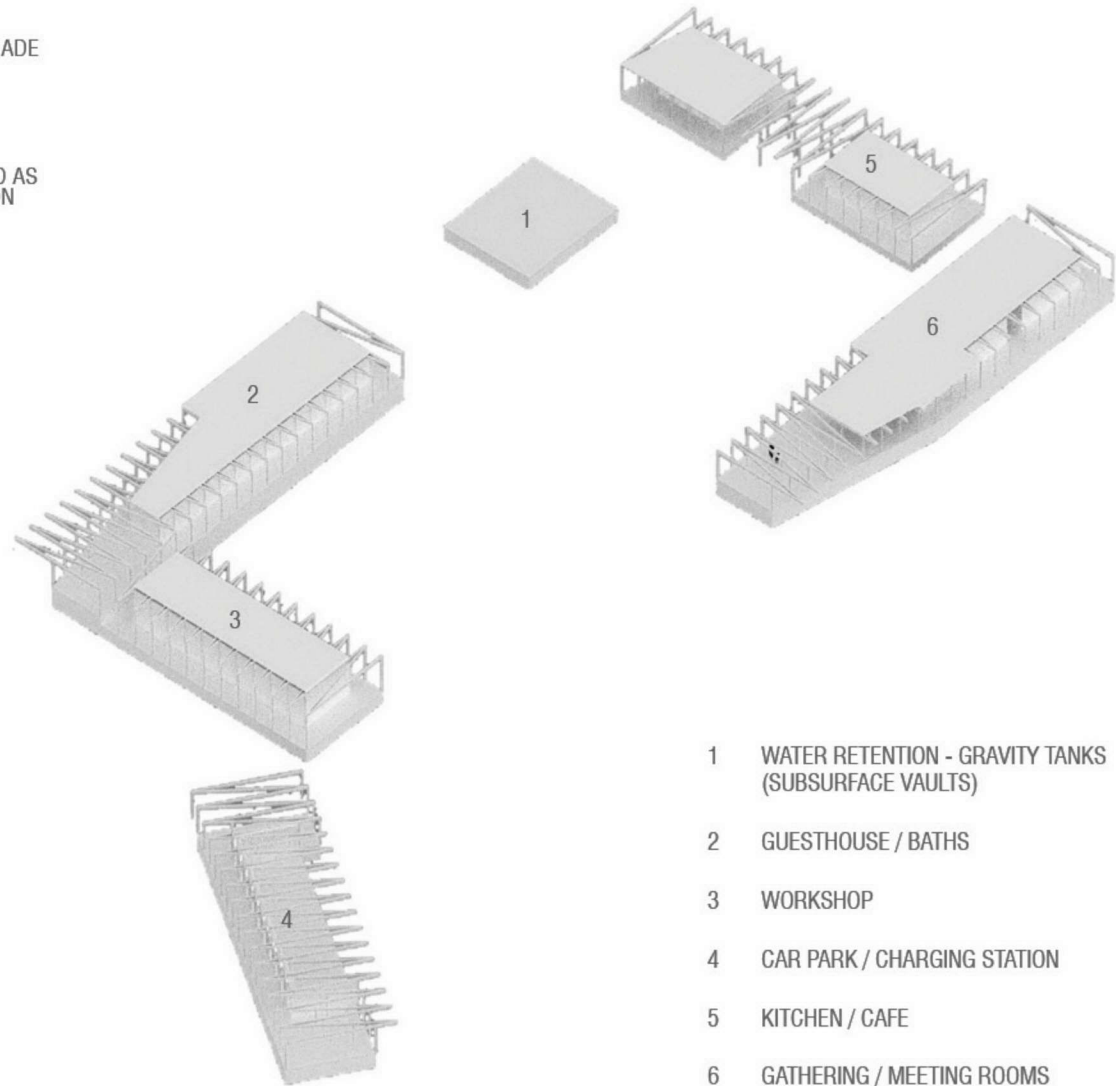
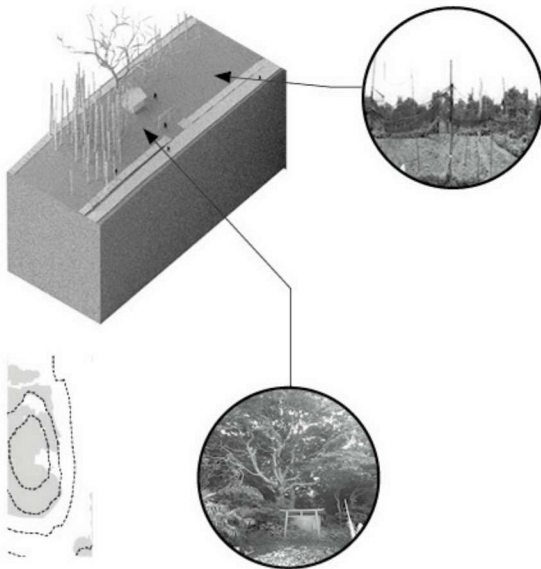
CIRCULATION ACCESS : DIRECT LOOP ACCESS

ASSETS : CULTURALLY IMPORTANT SHRINE, VIEWS TO OCEAN

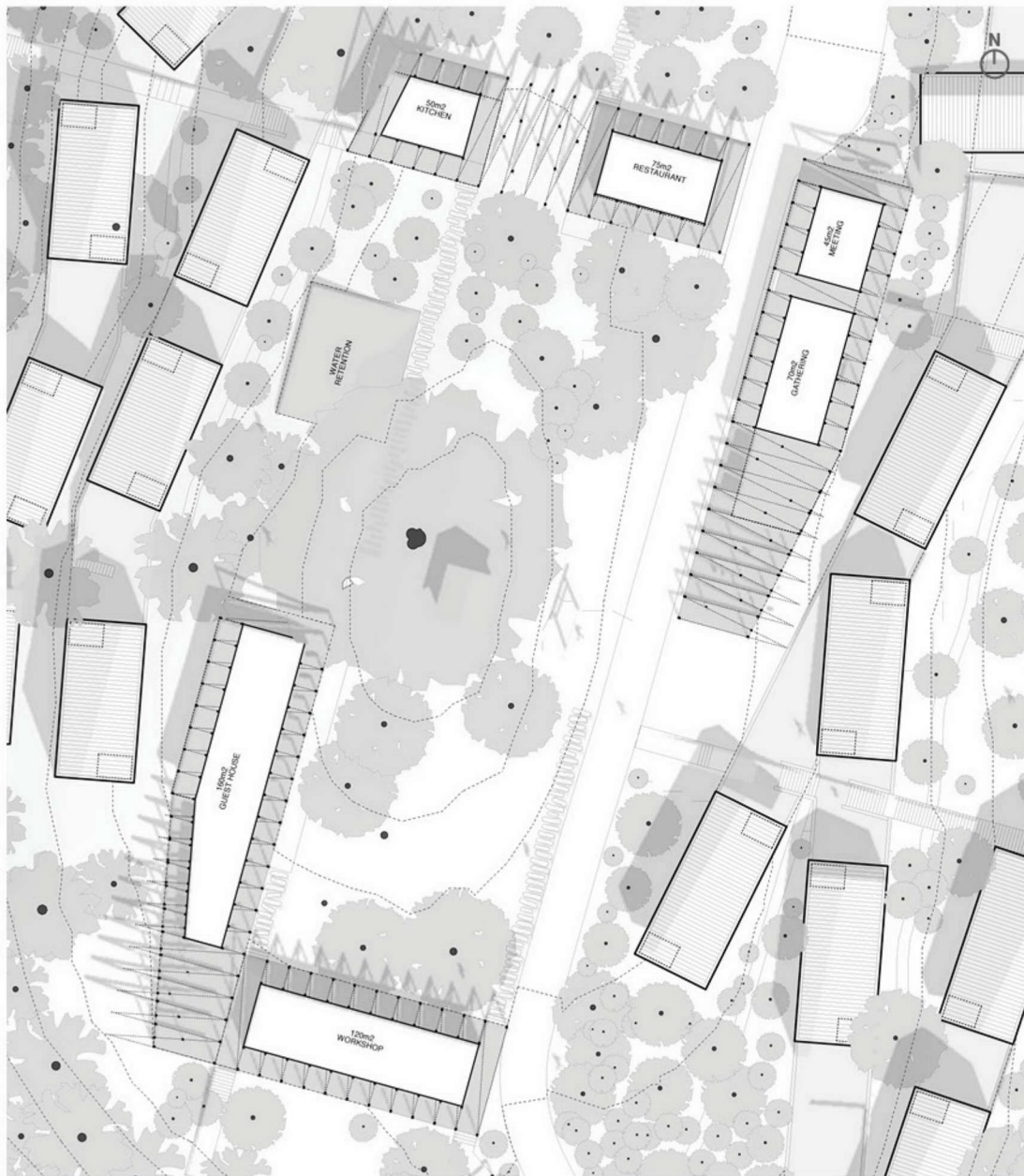
LIMITS : SHOULD BE PROTECTED, NOT DEVELOPED

KEY DESIGN CONSIDERATIONS : HILLTOP SHOULD BE PROTECTED AS A CULTURALLY IMPORTANT SITE. REFORESTATION / REVEGETATION FOR PROTECTION, AND CAN BE FURTHER DEFINED WITH A BOUNDARY OF BUILT STRUCTURES AND LANDSCAPE ELEMENTS. BUILDABLE SECTORS RADIATE AND CONNECT AROUND HILLTOP. COLLECTIVE PROGRAM LINKS TO EXISTING ROADS WHILE REINFORCING 'ROOM' OF HILLTOP, AND FOSTERING LINKS BETWEEN HOUSING DEVELOPMENTS AND HILLTOP.

AXONOMETRIC & LANDFORM



- 1 WATER RETENTION - GRAVITY TANKS (SUBSURFACE VAULTS)
- 2 GUESTHOUSE / BATHS
- 3 WORKSHOP
- 4 CAR PARK / CHARGING STATION
- 5 KITCHEN / CAFE
- 6 GATHERING / MEETING ROOMS



The design of the Hilltop cluster aims to achieve the following:

- Defining and 'holding' the space of the hilltop
- At the same time, allowing for maximum porosity and allowing the sense of the existing landscape and ridge to flow through.

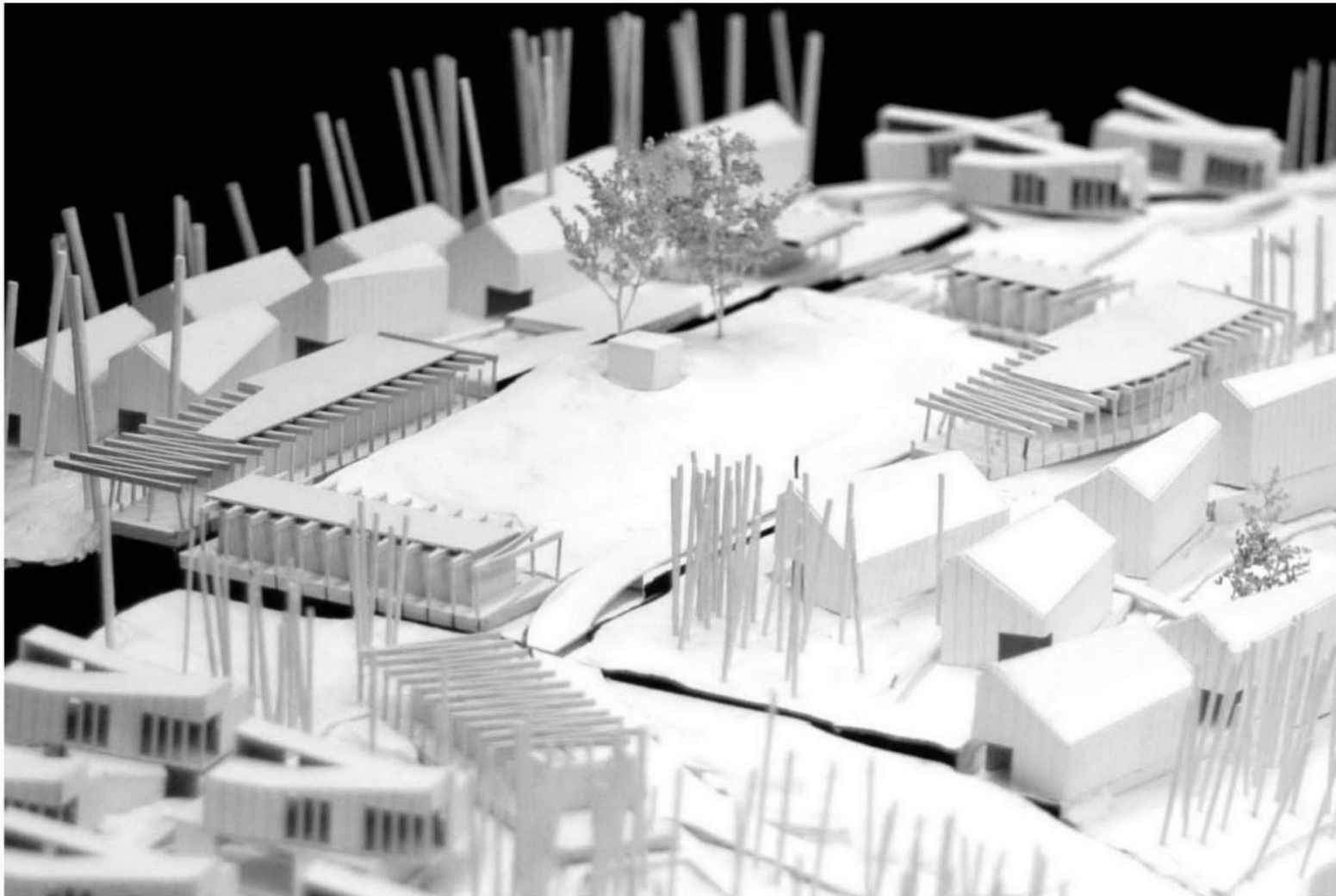
Effort is made to locate the communal pavilions so that they:

- Act as both a buffer between, but also a connection to the adjacent housing clusters downslope.
- Link the type and activity of program with identity of the housing cluster (formal, connected, secluded, active informal, etc).

The hilltop can be accessed directly by vehicle, by parking at one of the several vehicle nodes and walking, or directly by foot.

Architecture here is subtle, and intentionally respects and recedes to the power of the landscape. Everything from the broken footprints (which disperse building form), to the continuity of the roofplanes (which form a continuous horizon), to the structural system (that utilizes cedar harvested on-site and aims to create an implied, blurred boundary), seeks a balance between creating civic scale space while relenting to the scale of the landscape.

04.11 CLUSTER 03 : SOUTH RIDGE





04.10 CLUSTER 02 : TERRACED ORCHARD

SECTOR 01 - SIMPLE TERRACE : PARAMETERS

SLOPE : MODERATE (10-35 DEGREES)

LANDFORM : SIMPLE SLOPE / TERRACE

LANDSCAPE : CLEARING / ORCHARD / GARDENS

MIRCROCLIMATE : EAST FACING, STRONG BREEZES

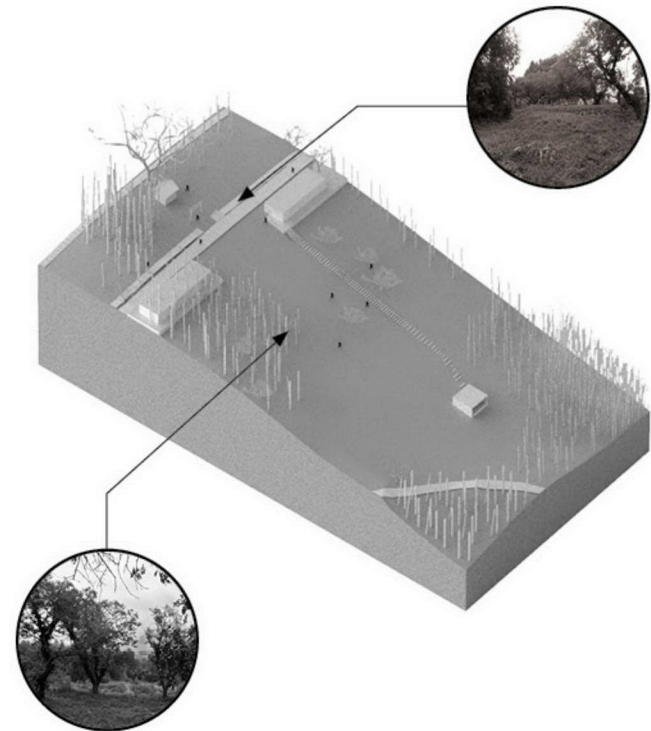
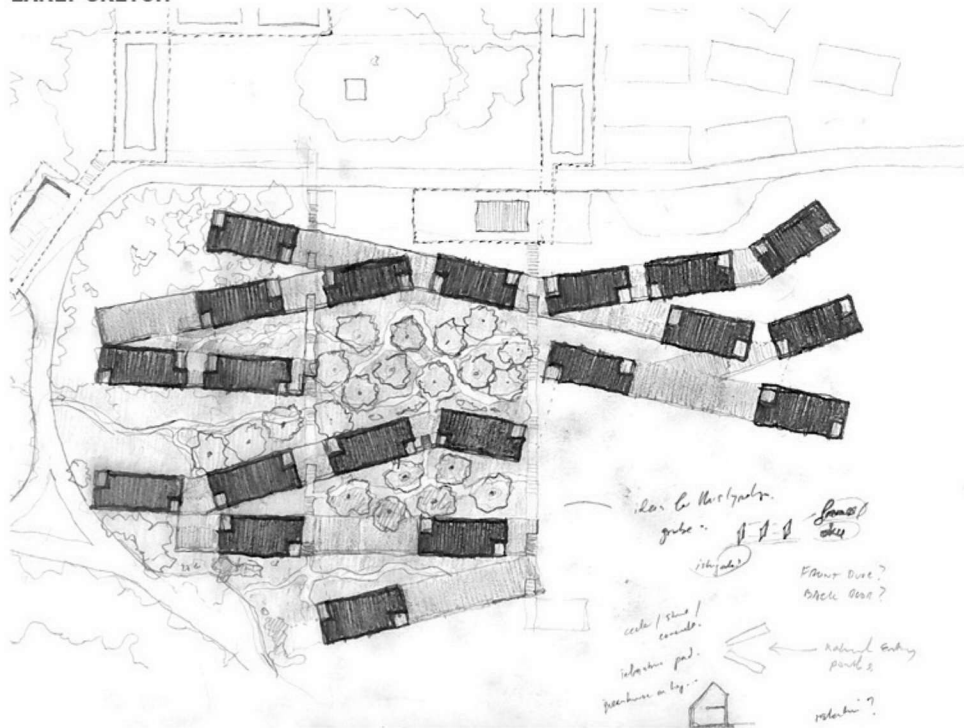
CIRCULATION : HILLTOP (2 ACCESS POINTS)

ASSETS : ALREADY TERRACED, VIEWS OF OCEAN, BUILDABLE, ACCESS

LIMITS : LITTLE LATE-DAY LIGHT, EXPOSURE DURING WINTER

KEY DESIGN CONSIDERATIONS : BUILT ENVIRONMENT SHOULD NOT HARM THE EXISTING VIEW CORRIDOR OR VALUE TO THE SITE. DESIGN SHOULD HARNESS EXISTING VIEWS AND FOSTER INTERACTION BETWEEN ORCHARD AND AGRICULTURAL LANDSCAPES WITH NEW DEVELOPMENT.

EARLY SKETCH



AXONOMETRIC & LANDFORM





The design of the Terrace Orchard cluster responds to two primary variables:

- Magnifying the existing terraced landscape
- The Potential to harness strong breezes from the West and views to the ocean.

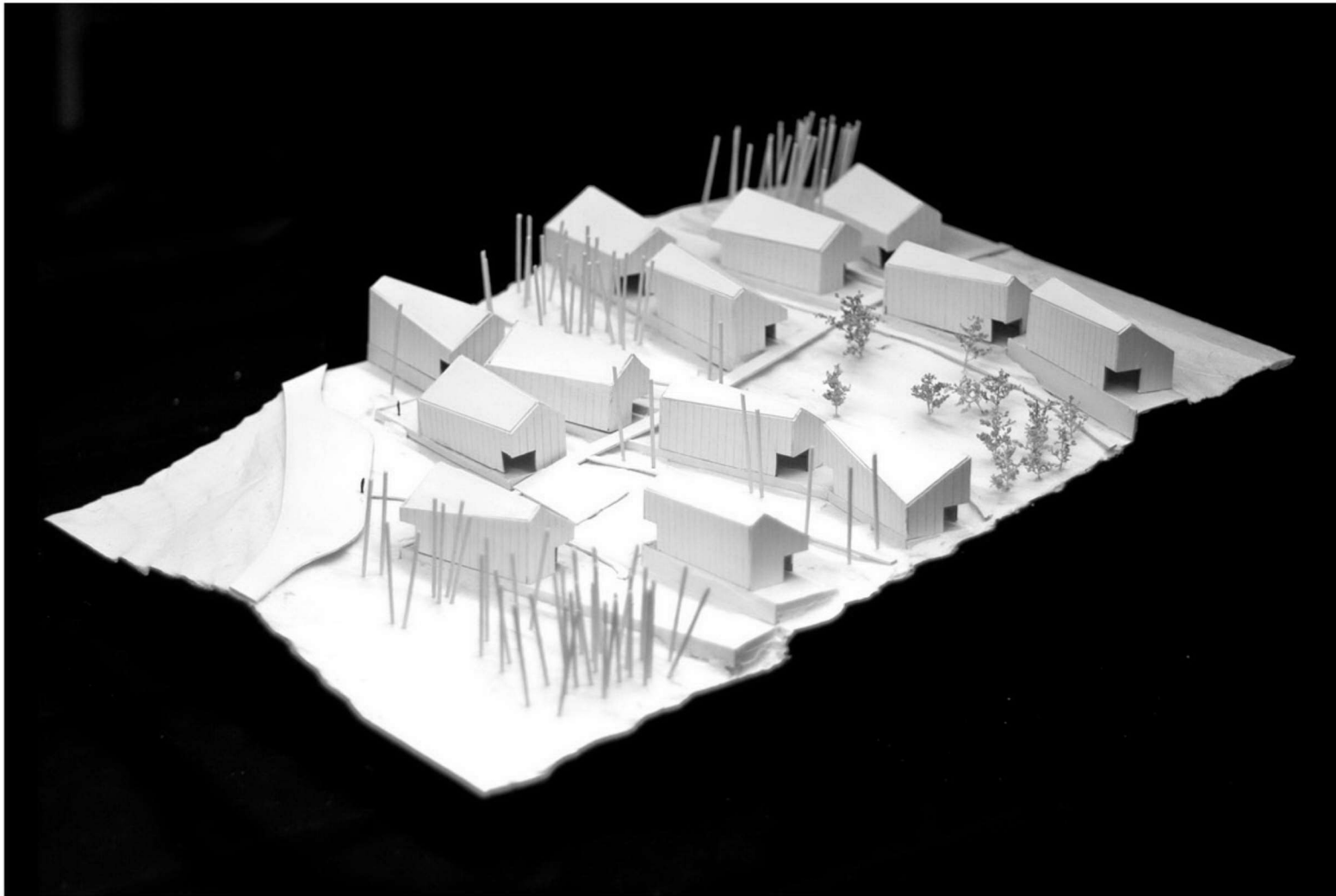
Effort is made to locate the cluster of housing units so that it:

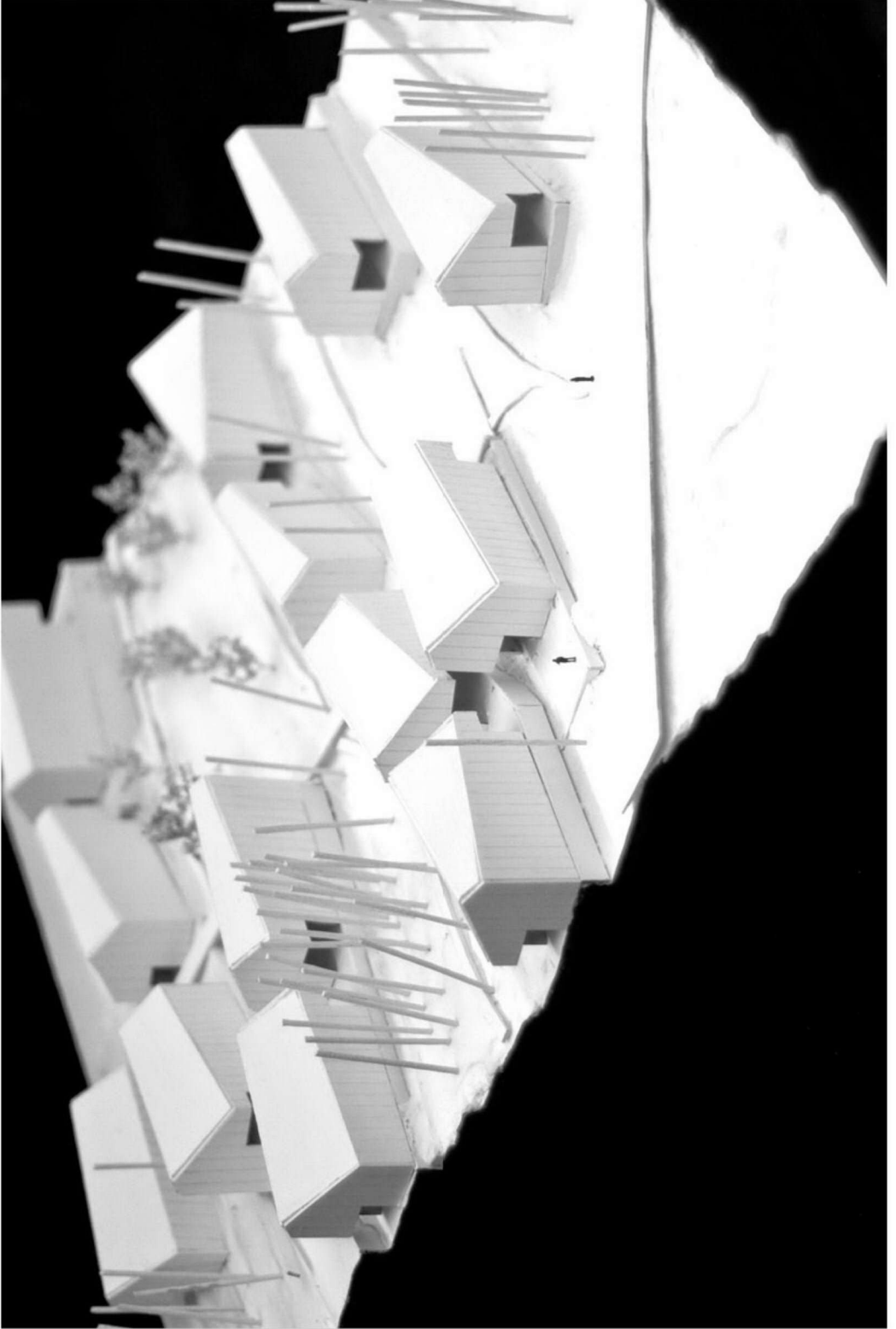
- Takes advantage of the proximity to existing vehicular circulation
- Utilizes the existing clearings and terraces to minimize devegetation and cut / fill.
- Emphasizes the fluid porosity of landscape along the grain of the slope (parallel with the contours), while aiming to create specific 'contained' views of the ocean against the grain of the slope.

The circulation system utilizes a simple primary, secondary, tertiary relationship like the branching structures of a leaf. This aims to provide the option to circulate directly up and down slope (via public staircase), while ensuring easy access across the slope (especially important for an aging population).

The first act is of an infrastructural abstraction of landscape via stone and concrete terraces that gather housing units together and embed water infrastructure. Units are subtracted to create landscape rooms, where an existing Mulberry / Sakura orchard is replenished as a space of interaction.

04.10 **CLUSTER 02** : TERRACED ORCHARD





04.11 CLUSTER 03 : SOUTH RIDGE

SECTOR 01 - COMPLEX RIDGE : PARAMETERS

SLOPE : STEEP / MODERATE (15-40 DEGREES)

LANDFORM : CONVEX / CONCAVE SLOPE & COMPLEX RIDGE

LANDSCAPE : MEADOW, CEDAR FOREST, BAMBOO FOREST, SOME MIXED DECIDUOUS, ONE SYMBOLIC BEECH TREE

MIRCROCLIMATE : SOUTH FACING, LIGHT BREEZE

CIRCULATION : DIRECT ACCESS TO EXISTING LOOP & PROPOSED ROAD

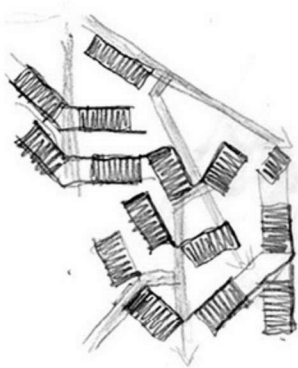
ASSETS : SEMI-CLEARED, BUILDABLE, POTENTIAL LINK TO EXISTING DEVELOPMENT BELOW, POTENTIAL FOR NEW ROAD, SOUTH FACING POTENTIAL FOR WINTER HEATING.

LIMITS : LIMITED VIEWS OF OCEAN

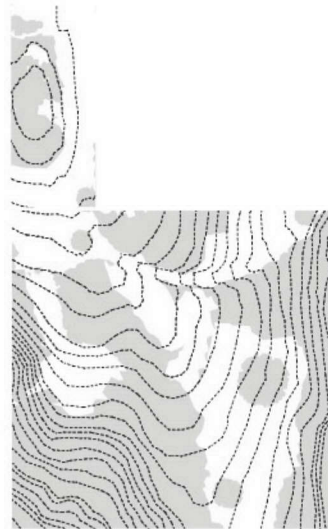
KEY DESIGN CONSIDERATIONS : UTILIZE EXISTING CLEARINGS AND SYMBOLIC BROADLEAF TREE. SOUTH FACING ORIENTATION SHOULD BE HARNESSSED.

WORKING SKETCH:

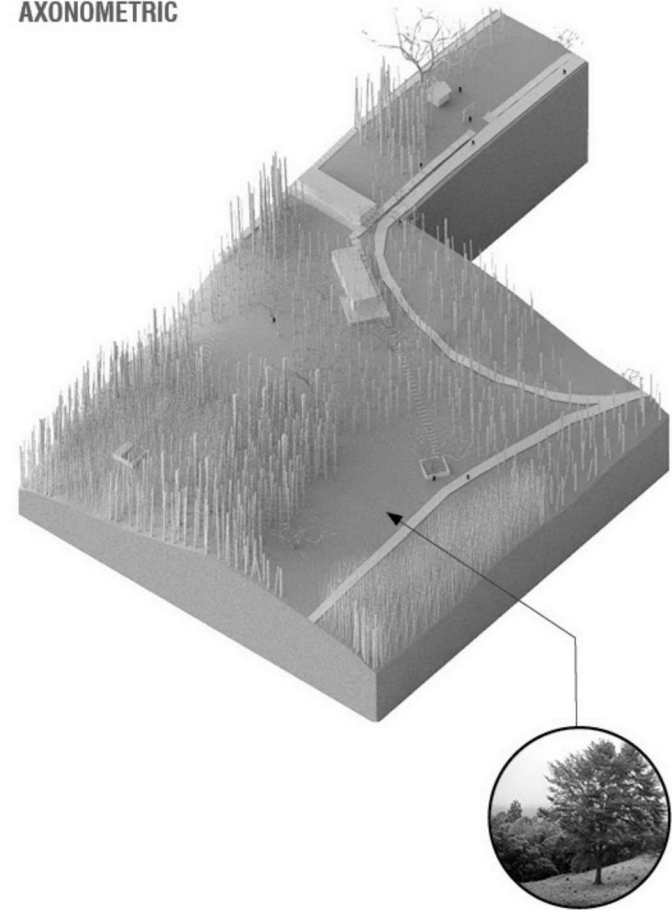
SHOWING FOOTPRINTS,
CIRCULATION, AND
RETAINING WALLS

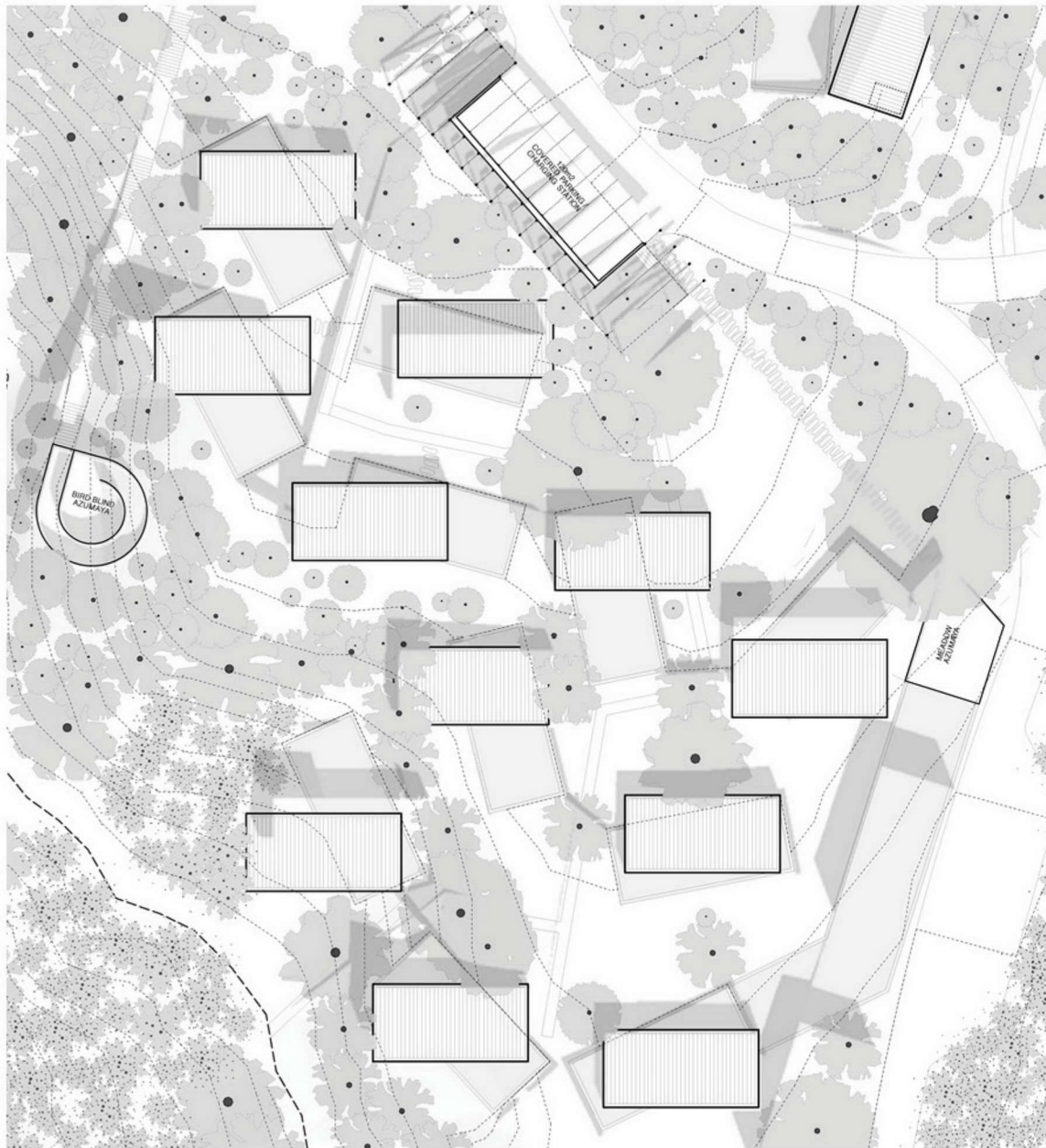


LANDFORM ICON



AXONOMETRIC





The design of the South Ridge cluster responds to two primary variables:

- The Complex Terrain of the Ridge
- The Potential to take advantage of a South facing orientation.

Attention was focused on locating the cluster of housing units so that it:

- Took advantage of proximity to existing vehicular circulation
- Utilized the existing clearings to minimize devegetation and maximized Southern exposure.

The design of the circulation system attempted to respond to the curving landform of the ridge, using a fractal geometry of 'vees' that aimed to respond to the housing footprints while generating shared social spaces in the intersections.

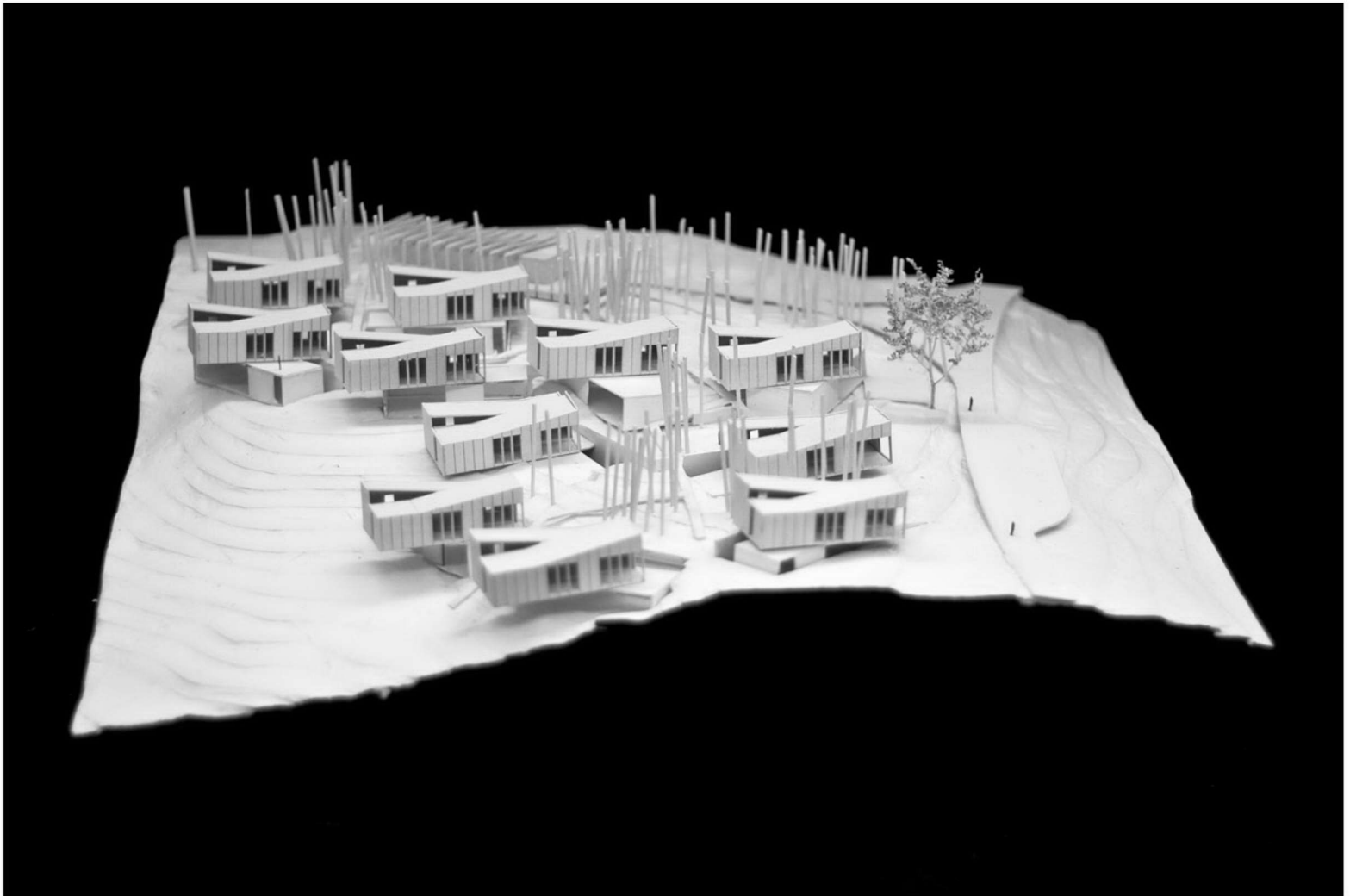
Housing footprints of the lower volumes orient themselves to be parallel with the contours, utilizing a chain-linked series of retaining walls with common infrastructure. This infrastructural abstraction of the ground embeds water infrastructure and unifies each tier of units. Upper volumes orient themselves to face south, while avoiding tree shadows and casting shadows on adjacent units.

04.11 CLUSTER 03 : SOUTH RIDGE



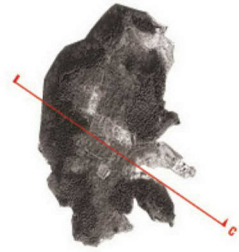
Left: The South Ridge's embedded lower-level volumes, along with the fractal circulation system that follows the curvature of the ridge.

Right: The landform of the ridge can be seen, generating lower level volumes that orient to the ground while a singular grain of South-facing volumes rest above, allowing orientation to the sky to give order to the built landscape.



04.12 **SITE SECTION** : OVERALL





Though Hadenya sometimes can be perceived as an island, it is anything but. In this East / West site section, one is reminded of the water cycles and impact on the natural and artificial landscape.

At its broadest, the thesis proposes the notion that one should look at the site topologically -- or as a complex, total ecosystem comprised of disparate human, cultural, natural, and artificial forces, flows, and systems.

Water, and the sense of above and below, are forefront of the Hadenya experience.



04.13 SITE SECTION : IN DETAIL



Above: Water emanates from the clouds and travels back down to Hadenya via rainfall or mist. It is managed to mitigate stormwater flooding, collected at the hilltop and in gravity tanks in shared foundations, or allowed to infiltrate the ground and recharge groundwater as it flows downslope.

Above Left: Water, carrying vital nutrients, sediments, and harmful toxins, re-enters the sea after traveling from the headlands above.



Above: Water (either from rainfall, or from sub-surface storage tanks), flows downslope with gravity. In the housing clusters, it is used to irrigate vegetable gardens and the camelia orchard; for drinking water and gray water in the housing units themselves, or allowed to continue flowing down to the lowlands.



Center: Water that bypasses sub-surface storage is allowed to continue flowing downslope. It is either slowly infiltrated into the ground, or manifested as surface runoff that travels at higher speed down to the lowlands below.

Attention is taken to manage this flow in relation to the slopes in order to mitigate erosion and landform inundation which could cause mudslides or other forms of slope destabilization.



Right: Water, carrying vital nutrients, sediments, and harmful toxins, re-enters the sea after traveling from the headlands above. Over time, it evaporates and forms into clouds that are carried by ocean breezes back towards land.

04.15 **CLUSTERS** : PRIMARY CIRCULATION / HILLTOP ENTRY

Upon entering Hadenya, one gradually travels uphill through the vehicular loop road. As the road veers to the right and glimpses of the hilltop are had, the out-stretched arm of the shared car park and charging staging reaches out to accept the user into the civic domain.

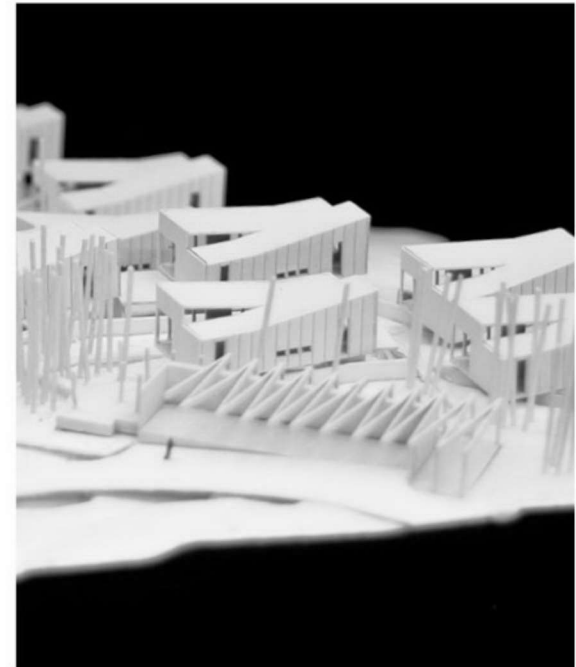
One can achieve glimpses of the other community structures, the huge symbolic beech grove, and the small shrine that is tucked away under its canopy.

Built out of cedar that is harvested on site, these skeletal / infill pavillions define the space of the hilltop and create a buffer / threshold between the housing clusters and the forested highpoint of Hadenya.

Beyond housing community program within, and defining space on the outside; these light

structures brush the edge of the hilltop landscape, vary their elevation on the ground plane, but hold a common horizon at their roof line.

Here, the emphasis is a balance between the protection of the hilltop, but crucially, not overpowering it or exceeding the capacity of the land, and a willingness to concede to the power of the landscape.



View of Entry to Hilltop (Carpark in foreground on left, Workshop in focus on left, Workshop in focus)



04.16 CLUSTERS: HILLTOP

After entry into the space of the hilltop, one is overwhelmingly within the presence of the small Shrine and the enormous Beech overhead. But, nestled just downslope and along its forested edges, is the ring of community pavillions with shared programs. Here, are the:

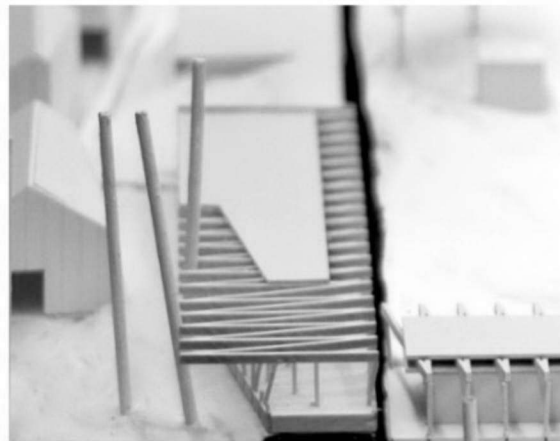
- Carpark and charging station
- Guesthouse and community bath (Right, Opposite)
- Embedded water storage structure
- Common kitchen and noodle restaurant
- Community gathering space and meeting rooms

Right: The structure of the community pavillions is made of cedar harvested from the slopes of Hadenya. As an assembly, it intentionally forms

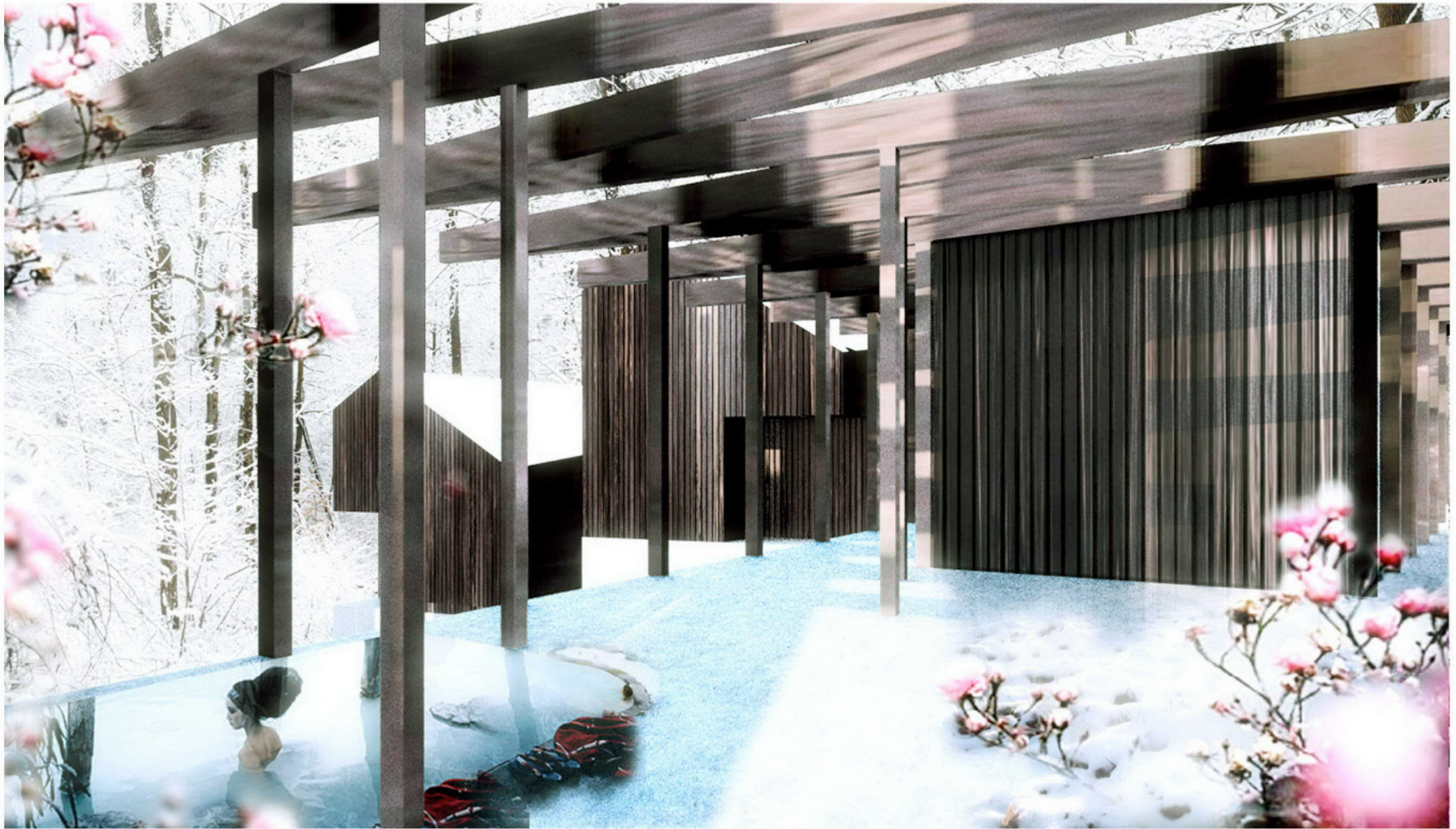
an ambiguous, implied line, aiming to soften the sense of boundary between the hilltop and the surrounding landscape.

The geometry of these pavillions are occasionally skewed to respond to the language of the adjacent housing units that are downslope. When this occurs, slender columns are shifted inward to align with the floorplate, and cantilevers form at the ceiling plane, further reinforcing the ambiguity of the line between hilltop and the surrounding landscape.

Structurally, the cantilevers alternative direction, counter balancing themselves with the next, and utilizing a seemingly random, though very specific, pattern of interior columns to handle the structural loads and form a forest-like spatial field.



View of Guesthouse and Outdoor Bath at Hilltop.



04.17 CLUSTERS : TERRACE ORCHARD

Opposite: Pictured, is one of the secondary circulation staircases in the Terrace Orchard cluster.

Below, inset: Options to circulate across (level) with the slope, and the ability to move directly up and down the slope are encouraged, so as to have maximum range of movement and multiple routes to one's front door, and through one's neighborhood.

Moving amidst two fields — the first of an orchard of Camelia trees and the other a field of wooden houses — one feels the openness of the landscape but also the sense of boundary and definition. This sense is important because of the

need to maintain privacy within a neighborhood, but also because it fortifies the presence of nature interacting with the built landscape.

Moving further up the staircase along a run of rough stone steps, there is another larger cadence of moving from terrace, to soil, to terrace, to soil.

The wooden housing volumes, locked into their shared terraces, are carved at their opposite corners to create covered porches and shaded, more intimate points of entry. Every so often, three houses are pulled together by a common gravity, as the carves in the wooden volumes come to face one another.



View uphill at staircase (secondary circulation) towards the Hilltop.



04.18 CLUSTERS : TERRACE ORCHARD - LANDSCAPE ROOM

In the heart of the Terrace Orchard cluster, a void is formed by the subtraction of two housing units. Here, the remnants of an existing Camelia orchard are brought back to life with the replanting of Camelia and Sakura trees, which give identity to this room in the landscape, filling it with sounds, scents, and life.

Below inset: The subtraction of housing units is visible from above.

Opposite: The collection of housing units on linear terraces that run parallel to the contours offers many things. First, the otherwise individual volumes achieve an infrastructural and spatial connection.

Secondly, by collecting built fabric into concentrated lines, natural corridors are freed up on either side. With the housing footprints only 7-8 meters wide, the sense of nature (manifested in the landscape corridors) on either side is powerfully

apparent (along with the benefit to natural cross ventilation).

The sense of fluidity along the direction of the slope is paramount, like sinuous bands of ground that weave their way through a field of houses; while the opposite exists in the up / down slope direction, as layer after layer holds one back.

In the opposite image, the secondary circulation (staircases) can be seen running up and down the slope, while a more organic network of paths (tertiary circulation allows a more free form of movement for pedestrians, bicycles, scooters, golf carts, or small cars.

In the left foreground, porous pavers are visible that allow emergency vehicle (or service) access to the heart of the housing cluster, while still giving the sense of fluid landscape and allowing rain or stormwater to infiltrate the ground.



View of Sakura / Mulberry Orchard in Terrace Sector (Spring)



04.19 CLUSTERS : TERRACE ORCHARD FROM HILLTOP

Opposite: Upon arrival at the hilltop, one finally regains the lost vista to the ocean. It is not a culminating experience, though, and the view is not what is most important.

In a place where livelihood is dependent on the sea, it is the landscape and nature that is life giver and life taker.

The presence of the ocean is framed, composed, and borne from pieces of the community. The view is its own landscape, but it is an integral part of the built landscape as well, and vice versa.

Though Hadenya sometimes can be perceived as an island, it is anything but. Here, one is constantly reminded of the potent power of nature, and of the water cycle and its impact on the natural and artificial landscape.

As was stated at the outset; at its broadest, the thesis proposes the notion that one should look at the site topologically -- or as a complex, total ecosystem comprised of disparate human, cultural, natural, and artificial forces, flows, and systems.

Water, and the sense of above and below, are at

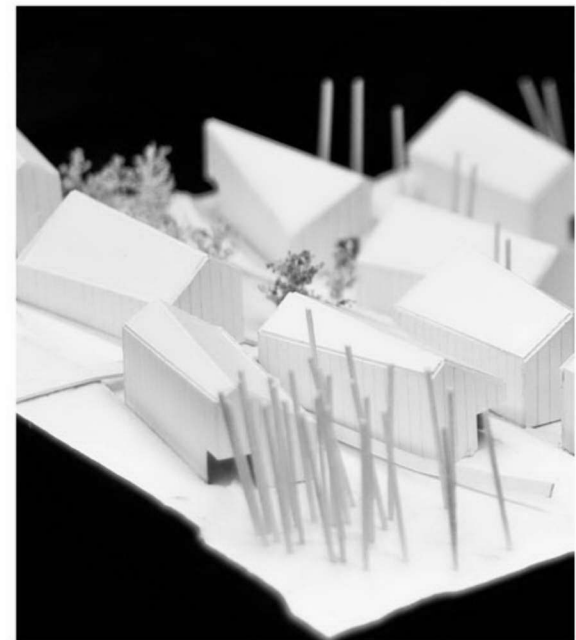
the forefront of the Hadenya experience.

We are not just talking about the tsunami, or monsoons, or typhoons; but about the way of life here in general, and the interdependence of all aspects of a system.

There is a saying in Minamisanriku that the fisherman, more than anyone, understand the interrelation of the sea and the mountains and the natural cycle here. It is said that the fisherman, in an act to ensure the future survival of his catch, will go up to the mountains and plant a tree, because he knows that the tree will grow, will create nutrients, and that those will end up affecting the ecosystem in the sea.

This sense of the sea and mountains, of above and below, are integral to the way of life in Minamisanriku, and in some small way, the thesis hopes that it is tapping into that.

The aim is that the sensitive inhabitation of slopes will allow communities to remain integrated with existing lowland areas and infrastructure, ensure safety from future natural disasters, while making every effort to foster interaction between the human, cultural, and natural landscapes.



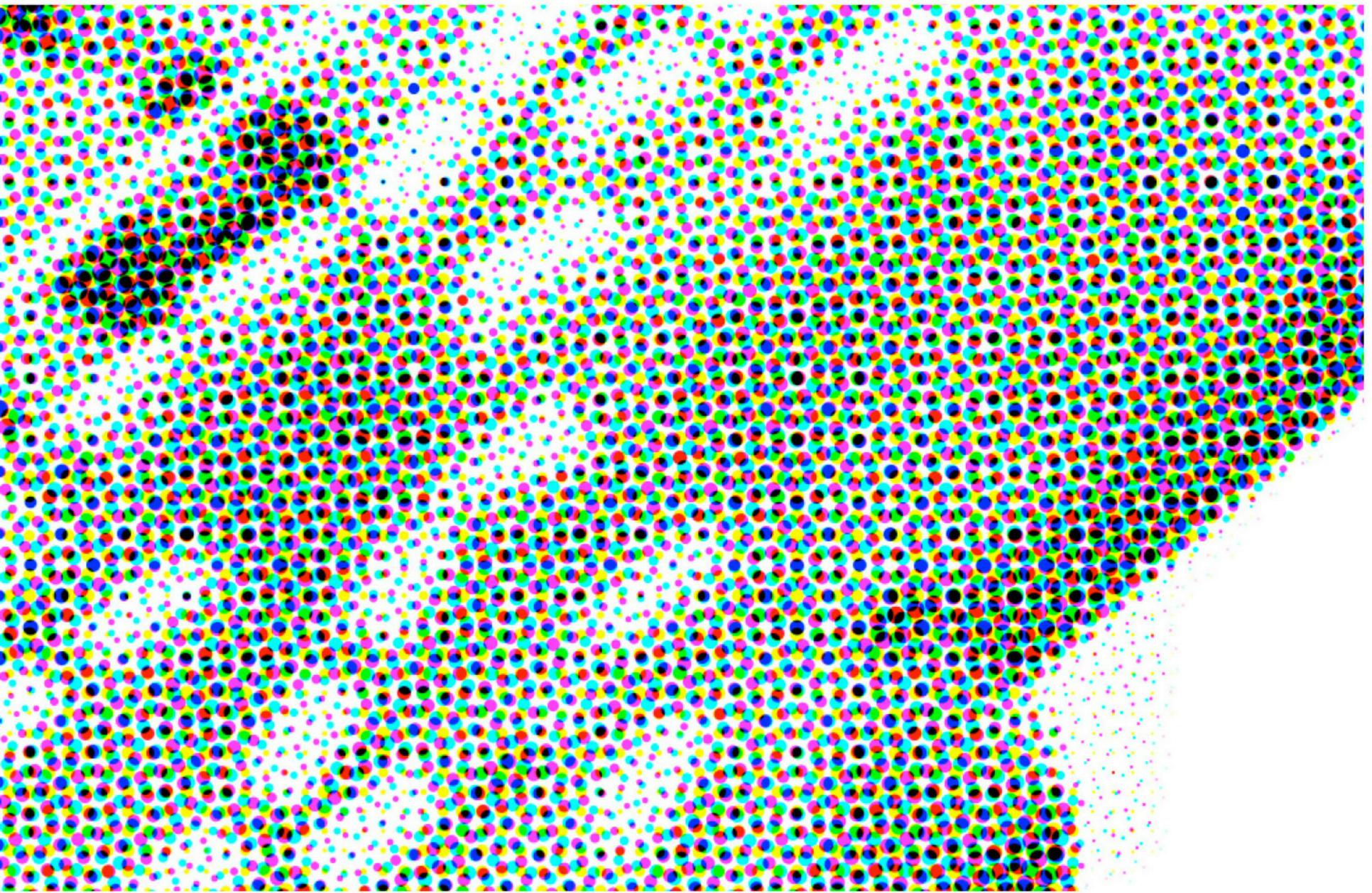
View to the Ocean from Hilltop; views are composed by pieces of the community.



05 APPENDIX :

Supplemental Material,
Bibliography, etc

- 114 Thesis Defense : Dec. 20th, 2012
- 134 Slopes Research : August 31, 2012
- 136 Initial Proposal : May 18th, 2012
- 168 Bibliography



05.01 APPENDIX A : THESIS DEFENSE @ MIT MEDIA LAB - 2012 12 20

Massachusetts Institute of Technology
Master of Architecture Final Thesis Review 2012

Thursday, December 20th, 2012
9am-5pm, MIT Media Lab, Building E14, 6th Floor

Critics:

Yolande Daniels
Visiting Critic, MIT
Partner, Studio SUMO

Felecia Davis
Ph.D. Candidate, Design and Computation
Massachusetts Institute of Technology

Mark Gage
Assistant Dean, Associate Professor Yale School
of Architecture
Partner, Gage/Clemenceau Architects

Rania Ghosn
Assistant Professor of Architecture
Alfred Taubman College of Architecture and
Urban Planning University of Michigan

Renée Green
Associate Professor of Art Culture Technology
Director of ACT Massachusetts Institute of
Technology

Eric Höweler
Assistant Professor of Architecture Harvard
University, GSD
Principal, Howeler + Yoon Architects

Mark Jarzombek, PhD
Professor, History, Culture, and Theory
Massachusetts Institute of Technology

Sheila Kennedy
Professor in Practice, Architectural Design
Massachusetts Institute of Technology
Principal, Kennedy Violich Architects

John May, PhD
Assistant Professor of Architecture
John H. Daniels Faculty of Architecture,
University of Toronto

Nasser Rabbat, PhD
Professor, History, Culture, and Theory
Director of Aga Khan Program Massachusetts
Institute of Technology

Christoph Reinhart
Associate Professor, Building Technology
Massachusetts Institute of Technology

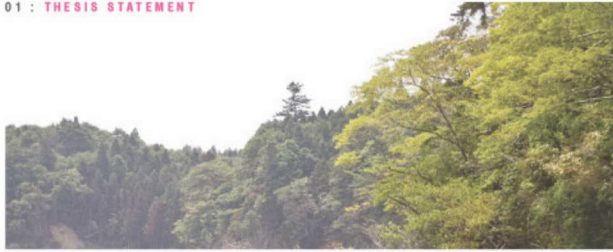
Ashley Schafer
Associate Professor Knowlton School of
Architecture, Ohio State University
Founding editor of Praxis

Jonathan D Solomon
Associate Professor, Associate Dean
Syracuse University
Founding editor of 306090

Marcelo Spina
Design Faculty, SciArc
Principal, PATTERNS

Marc Tsurumaki
Adjunct Assistant Professor, Columbia University
GSAPP
Principal, LTL Architects

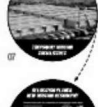
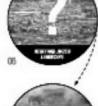
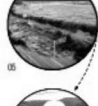
01 : THESIS STATEMENT



TOHOKU TOPO-URBANISM

Mitsuo Baba, Masao Aoy | MAO Aoy

ORIGINS / CAUSAL FLOWS



THIS IS STATEMENT

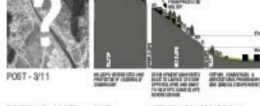
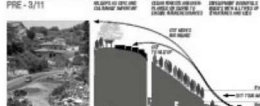
Shikha Topo Urbanism explores the relationship of the site as an alternative model of cause and effect beyond conventional urbanism in the 21st Japan.

In an urban environment characterized by urbanization, landscape ecology, geography, history, and the impact of natural disasters, the site is a unique opportunity to explore the relationship between urbanism and nature. The site is a unique opportunity to explore the relationship between urbanism and nature. The site is a unique opportunity to explore the relationship between urbanism and nature.

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CONCEPTUAL FRAMEWORK



02 : SITE CONTEXT

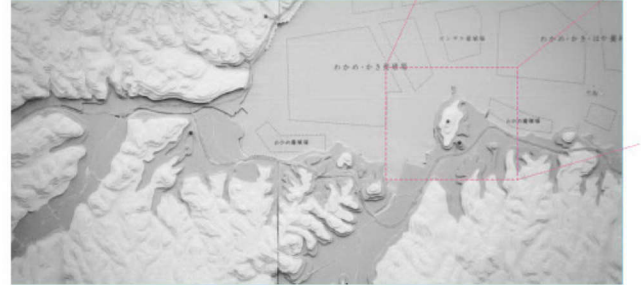
SITE CONTEXT : GEOGRAPHIC / POLITICAL



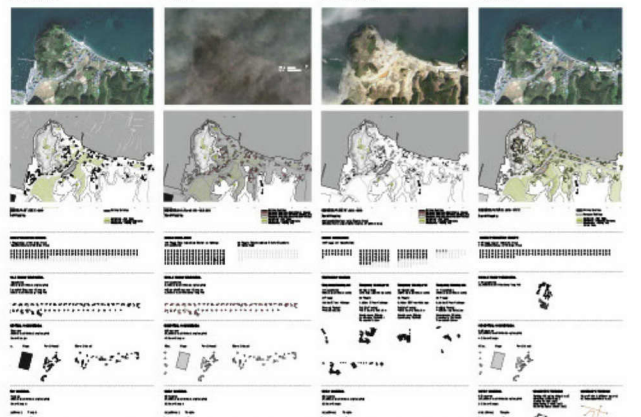
IDENTITY : LIVELIHOOD / SENSE OF PLACE



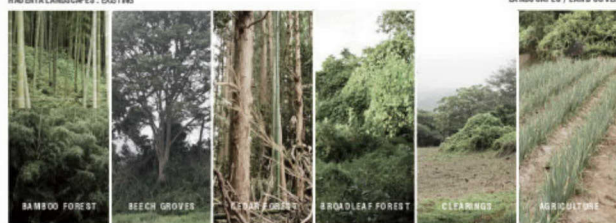
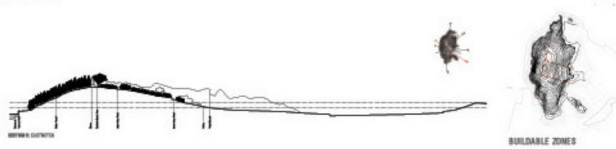
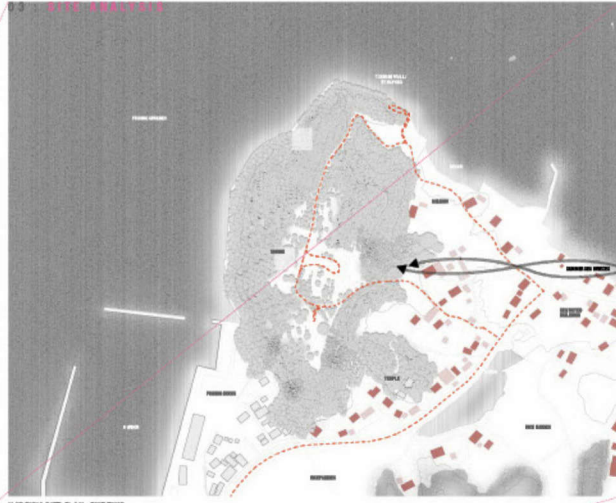
TOHOKU CONTEXT / BUILDING AREAS



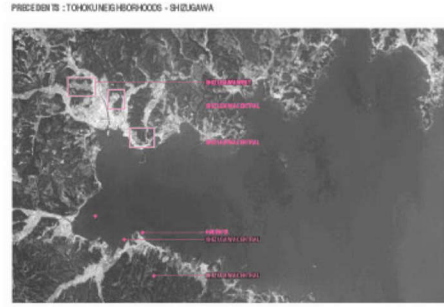
PHASES OF PROGRAM & PEOPLE



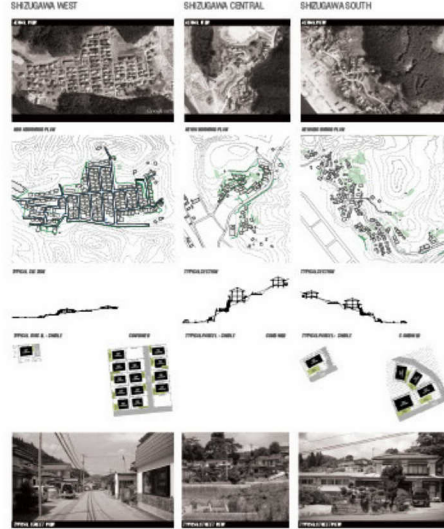
SITE CONTEXT : VIEW OF HADEN'S LANDFORM FROM THE WEST



04 : PRECEDENTS OF URBAN FORM & POLICY

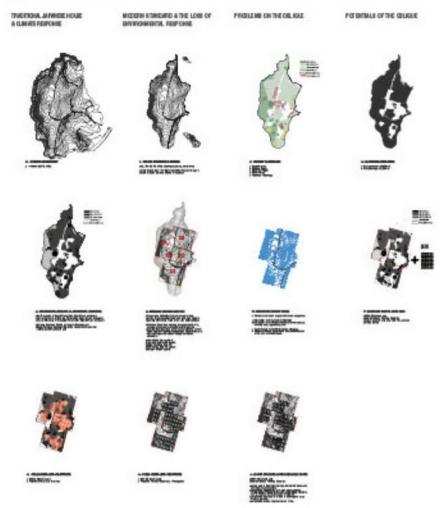


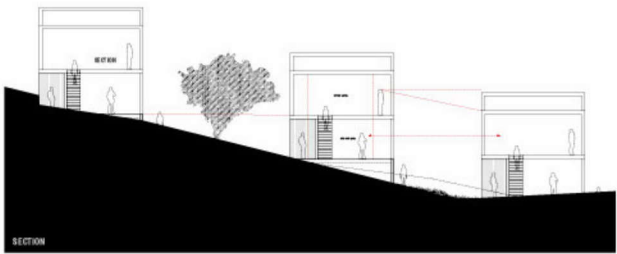
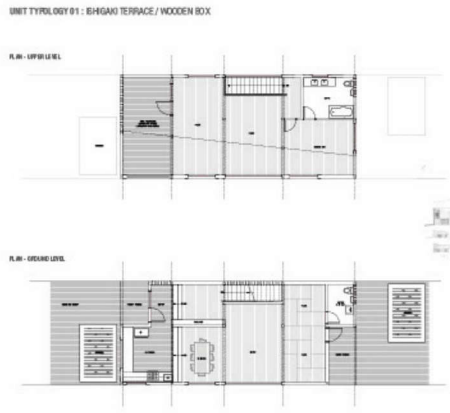
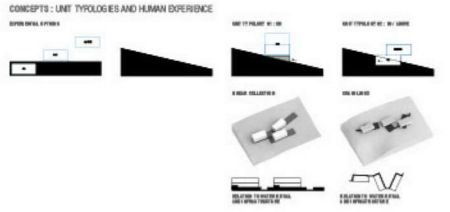
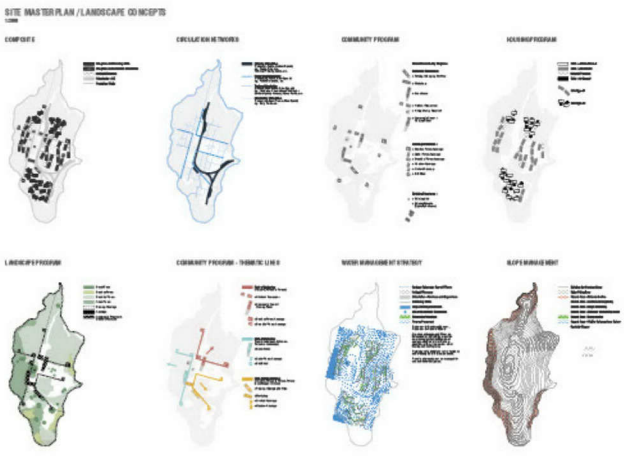
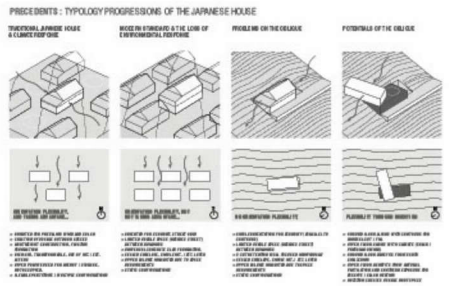
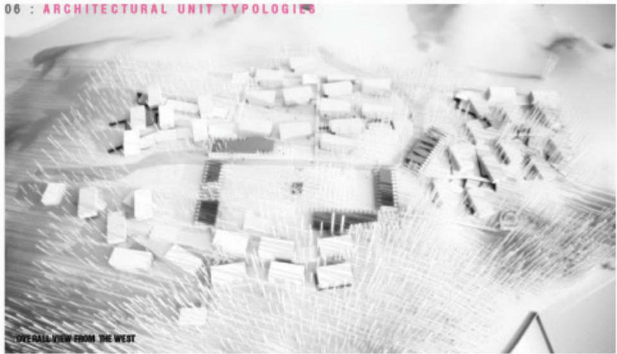
PRECEDENTS : TOKUNEGI HOORHOODS - SHIZUGAWA



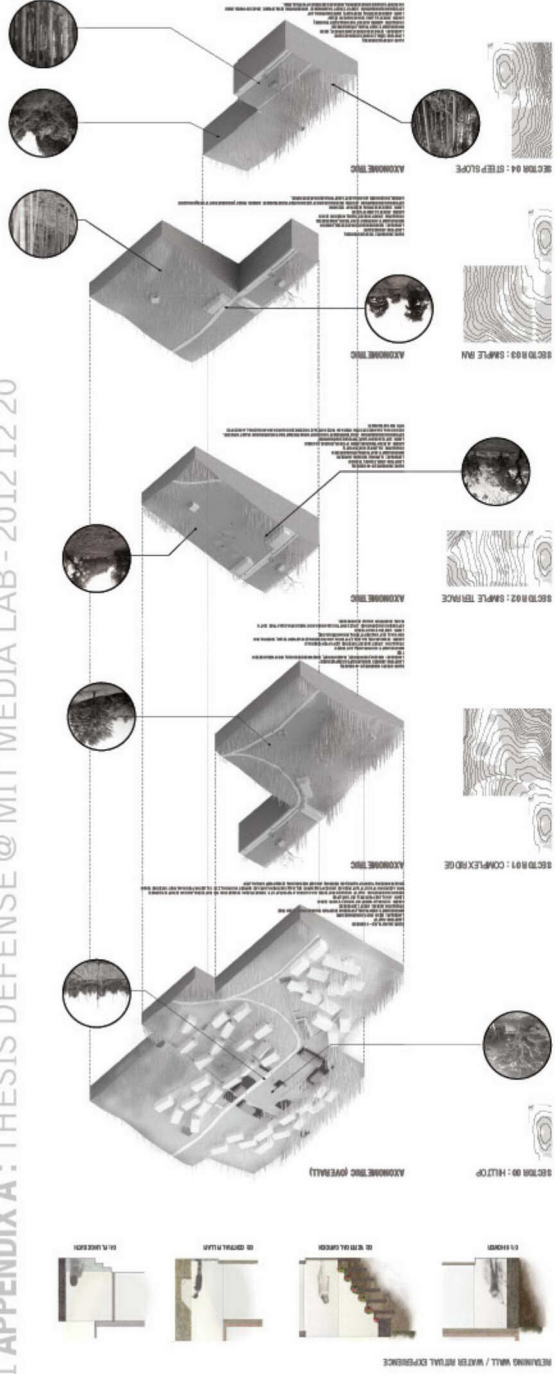
- CONCEPTS OF FORM**
 - ORGANIC FORMS
 - ORGANIC FORMS WITH HORIZONTAL EXTENSION
 - ORGANIC FORMS WITH HORIZONTAL EXTENSION
 - ORGANIC FORMS WITH HORIZONTAL EXTENSION
 - ORGANIC FORMS WITH HORIZONTAL EXTENSION
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 - ORGANIC FORMS WITH HORIZONTAL EXTENSION

SITE DEVELOPMENT : POLICY / GUIDELINES

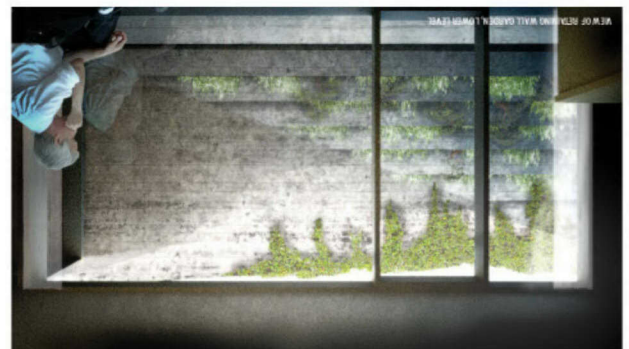
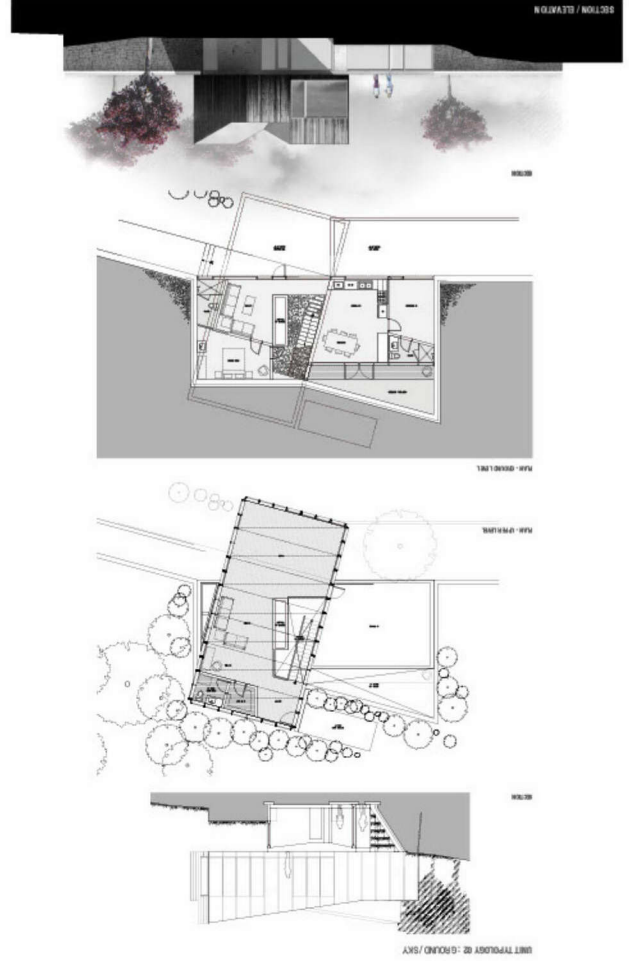


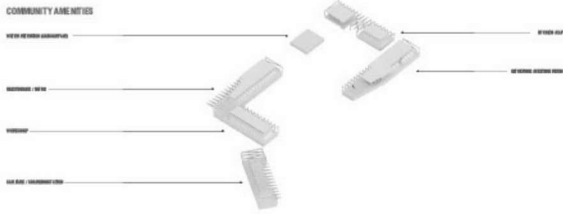


05.01 APPENDIX A : THESIS DEFENSE @ MIT MEDIA LAB - 2012 12 20

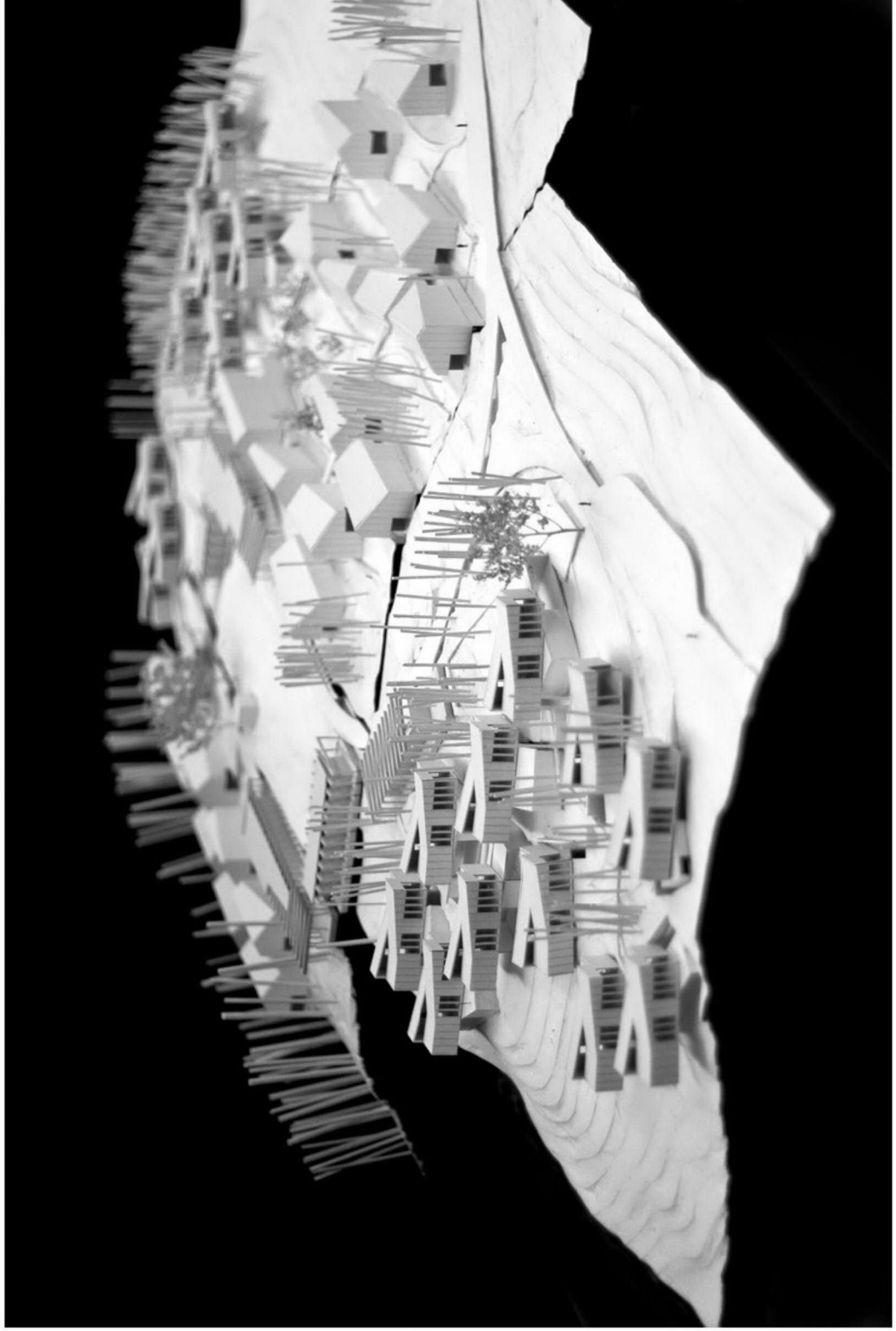


08 : ARCHITECTURAL FRAMEWORK









Final Model 1:200 (6'-0" x 4'6")



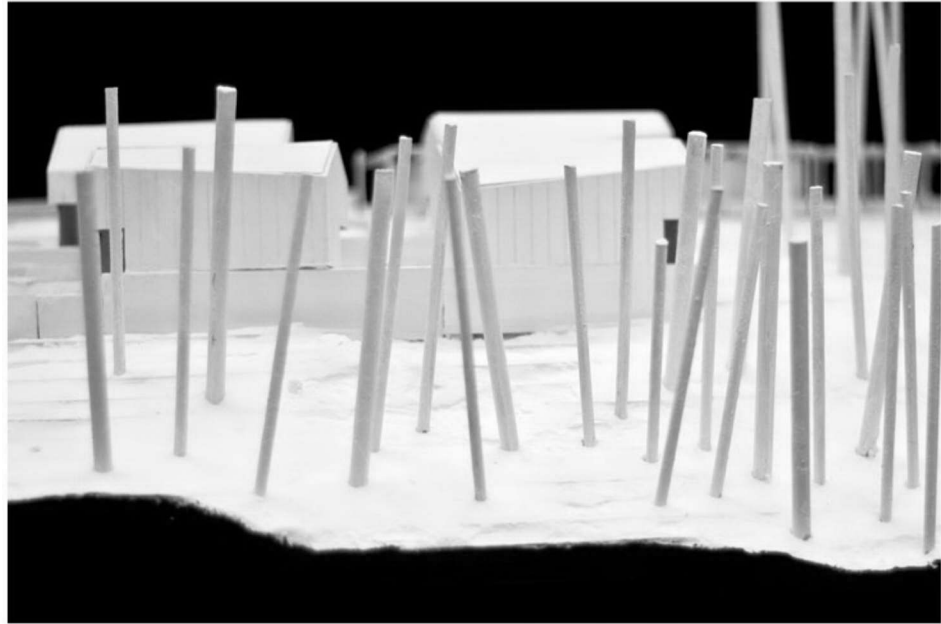
05.01 **APPENDIX A** : THESIS DEFENSE @ MIT MEDIA LAB - 2012 12 20

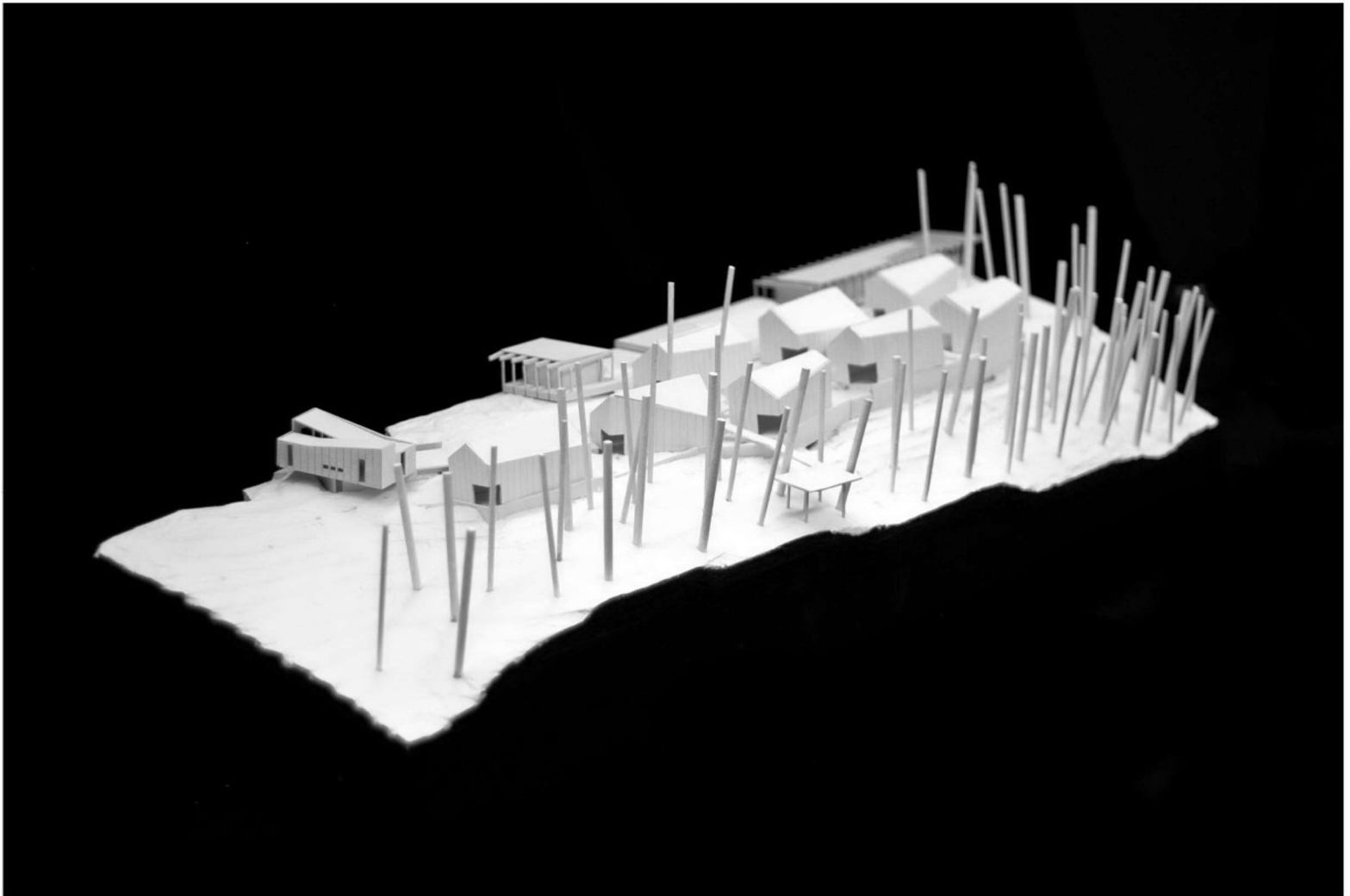


Final Model 1:200 (6'-0" x 4'6")



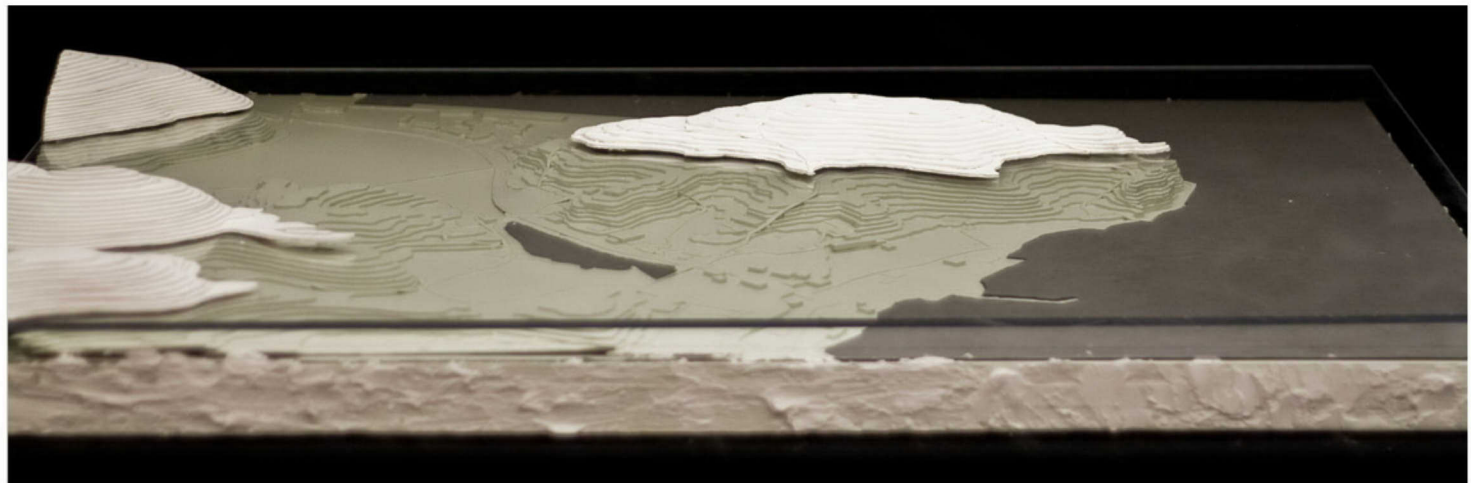
05.01 APPENDIX A : THESIS DEFENSE @ MIT MEDIA LAB - 2012 12 20







Site Model 1:1000 (2'-0" x 3'-0")
The 1/4" plexi sheet represents the ~17m
datum of inundation from the 3/11 Tsunami.



05.01 **APPENDIX A** : THESIS DEFENSE @ MIT MEDIA LAB - 2012 12 20



Site Model 1:1000 (2'-0" x 3'-0")
The 1/4" plexi sheet represents the ~17m
datum of inundation from the 3/11 Tsunami.



05.01 APPENDIX A : THESIS DEFENSE @ MIT MEDIA LAB - 2012 12 20



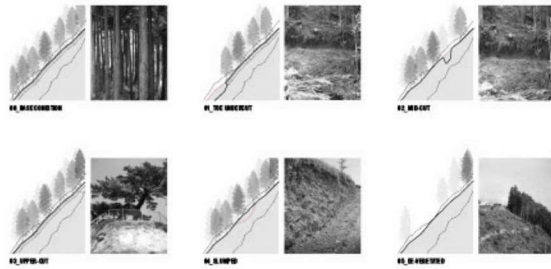
Photo by Sunnie Lau



10 : SLOPE SYSTEMS RESEARCH

SLOPE SYSTEMS : GEOMORPHOLOGY / DEFORMATIONS

3/11 TSUNAMI DAMAGE RESULTING IN FUTURE SLOPE EQUILIBRIUM (LANDSLIDES)



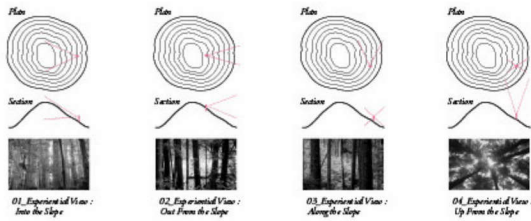
SLOPE SYSTEMS : WATER MANAGEMENT / LANDSCAPE

EXPERIENCE RELATIVE TO CONSTRUCTION TYPE



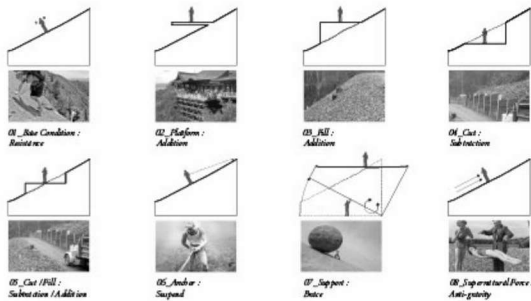
SLOPE SYSTEMS : VISUAL / SPATIAL EXPERIENCE

EXPERIENCE RELATIVE TO POSITION IN THE LANDSCAPE



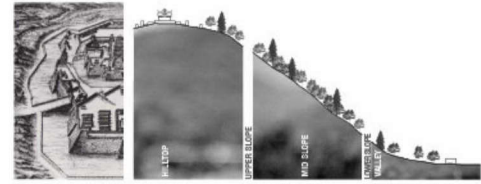
SLOPE SYSTEMS : INHABITATION / EXPERIENCE

EXPERIENCE RELATIVE TO CONSTRUCTION TYPE



01 : OBLIQUE URBANISM IN JAPAN

FEUDAL / EDO / INDUSTRIAL / POST-WAR / POST-3/11 / PROPOSED

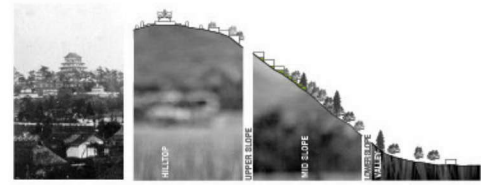


FEUDAL PERIOD (1185-1603)

SAMURAI CASTLES BUILT ON HILLYTOPS FOR DEFENSIVE BENEFITS

INDIENOUS MIXED WOODLAND AND MINIMAL DEVELOPMENT

MIXED VALLEYS WITH SPARSE DEVELOPMENT

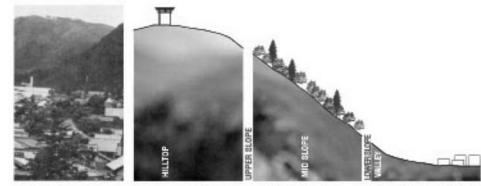


EDO PERIOD (1603-1868)

TIMBER HARVESTED & LOW SAMURAI CLASSES FORM PROTECTIVE RINGS

AGRICULTURE AND DEVELOPMENT ON UPPER SLOPES

MIXED VALLEYS WITH SPARSE DEVELOPMENT

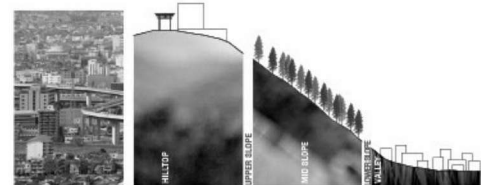


INDUSTRIAL (1868-1945)

SHRINE AND RELIGIOUS STRUCTURES REPLACE SAMURAI CASTLES

TOTAL ENCLASURE OF DEVELOPMENT ON SIDES, MIXED VEGETATION RETURNS

DEVELOPMENT GRAVITATES TOWARDS VALLEYS AND WATER TRANSPORT YACHTS

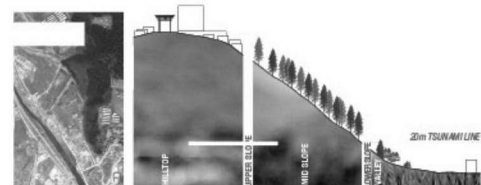


POST-WAR (1945-2011)

CIVIC STRUCTURES AND SCHOOLS POPULATE HILLYTOP SITES

CLUMP FORESTS ARE OVER-PLANTED ON SLOPES TO ENSURE FUTURE RESOURCES

DEVELOPMENT ROOMS HILLS VALLEYS WITH ALL TYPES OF STRUCTURES AND USES

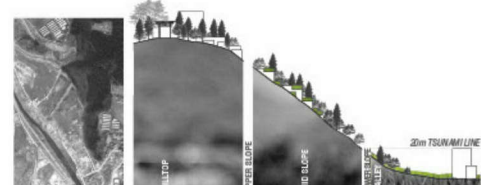


POST 3/11 (2011 - 2012)

DEVELOPMENT GRAVITATES BACK TO LIMITED SITES ON HILLS LIMITED SITES

TSUNAMI-DAMAGED SLOPES RISK LANDSLIDE, GAP FORMS BETWEEN HIGH & LOW CITIES

GOVERNMENT MONITORING ON LOWLAND HOUSING DEVELOPMENT AFTER 3/11



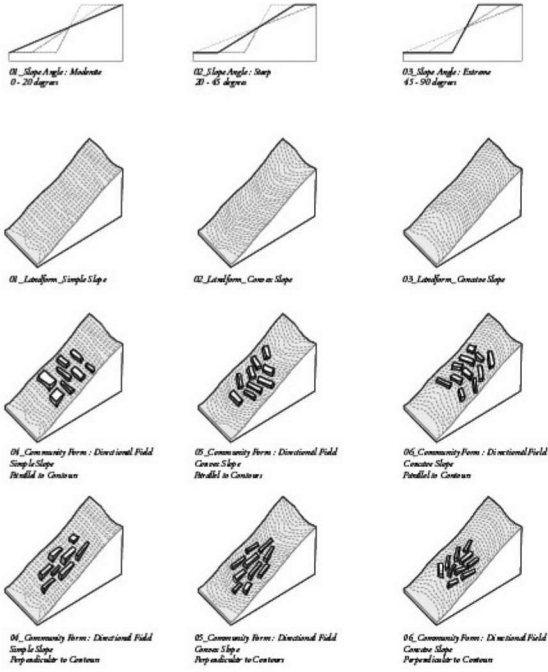
PROPOSED (2012 - FUTURE)

HILLYTOPS RESTORED AND PROTECTED IF CULTURALLY SIGNIFICANT

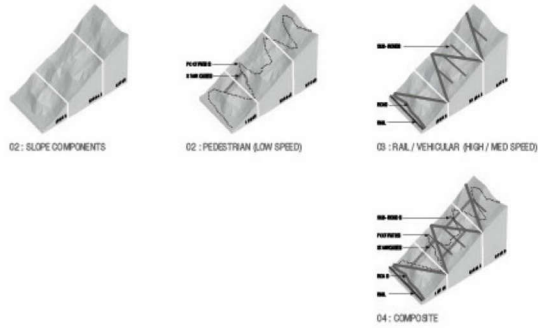
DEVELOPMENT GRAVITATES BACK TO LIMITED SITES ON UPPER SIDES AND LINKS TO HILLYTOPS, SOME SLOPE REPAIRS

CIVILIAN COMMERCIAL & AGRICULTURAL PROGRAM IN SAFETY ZONES & ESCAPE ROUTES

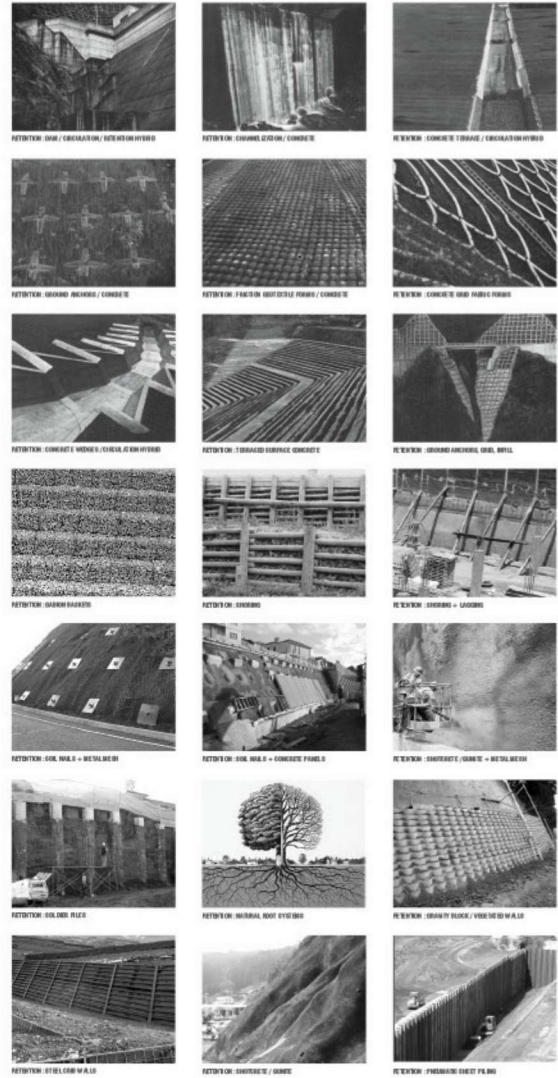
SLOPE SYSTEMS : LANDFORM MORPHOLOGY / COMMUNITY FORM
LANDFORMS RELATIVE TO COMMUNITY FORMS



SLOPE SYSTEMS : CIRCULATION / MOBILITY
RAIL / VEHICULAR / PEDESTRIAN



SLOPE SYSTEMS : RETENTION SYSTEMS
EXISTING RETENTION SYSTEMS IN JAPAN





M.Arch. THESIS : **TOHOKU TOPO-URBANISM**

Matthew Bunza
M.Arch ADV Candidate '13

THESIS COMMITTEE

James L . Wescoat, Jr., Ph.D
Professor, MIT / Harvard Aga Khan Program for Islamic Architecture
Thesis Supervisor

Antón García-Abril, Ph.D
Professor, MIT Dept. of Architecture / Principal, Ensemble Studio, Madrid
Thesis Reader

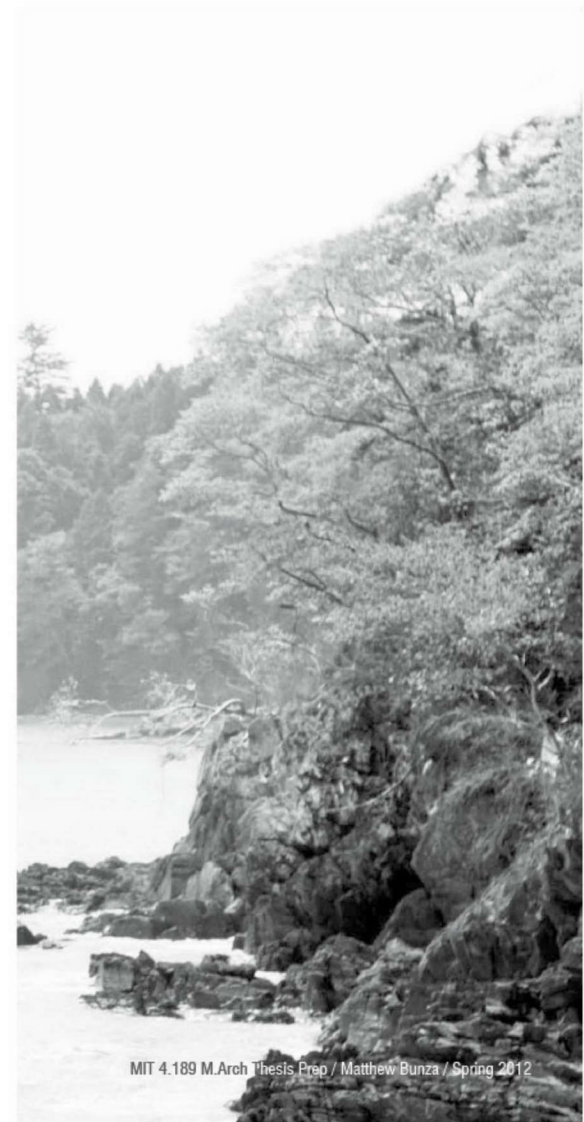
ABSTRACT

THESIS STATEMENT & CENTRAL RESEARCH QUESTION

This thesis explores the potential inhabitation of slopes¹ in the aim of developing a catalogue of slope-urbanism typologies as means for post-disaster reconstruction in Tohoku, Japan. It asks how architecture and ecology could be hybridized with civil engineering technology by making use of both new and existing slope stabilization infrastructure. By integrating multidisciplinary knowledge into multifunctional systems, the hope is that new models of disaster-resilient, ecological urban form could emerge that provide relevant solutions to problems faced on the ground in Japan and elsewhere.

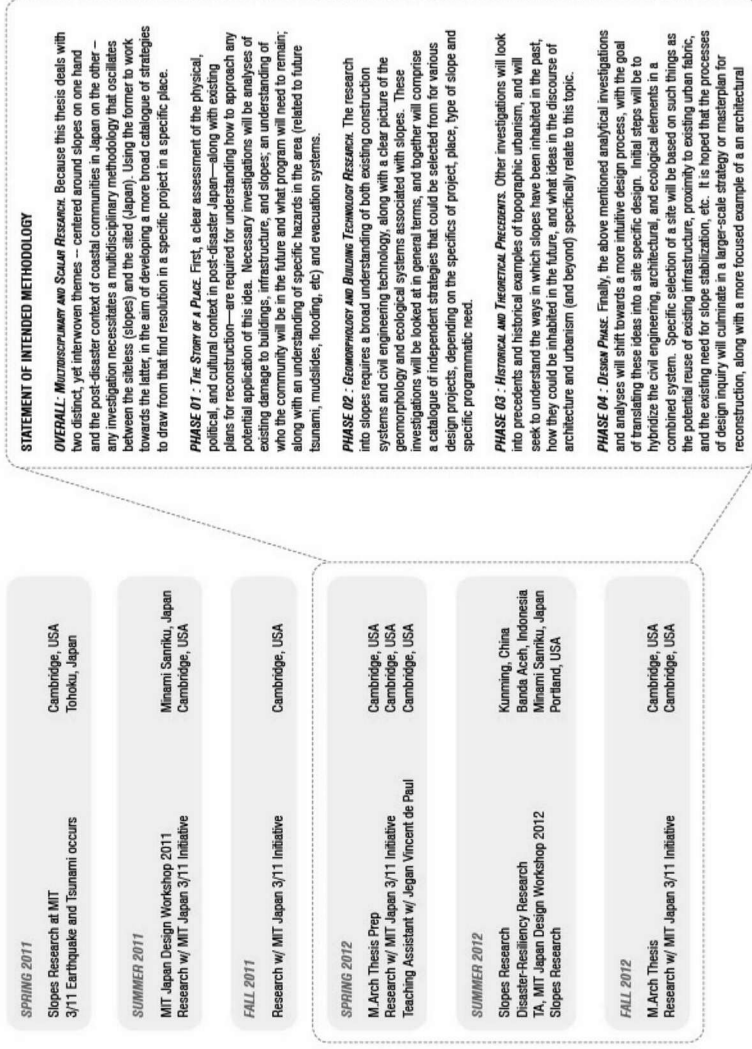
¹ or the *natural oblique*, to borrow a term coined by the French architects and thinkers Claude Parent and Paul Virilio.

OVERVIEW : Contents



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METHODOLOGY



SPRING 2011 Slopes Research at MIT 3/11 Earthquake and Tsunami occurs	Cambridge, USA Tohoku, Japan
SUMMER 2011 MIT Japan Design Workshop 2011 Research w/ MIT Japan 3/11 Initiative	Minami Sanriku, Japan Cambridge, USA
FALL 2011 Research w/ MIT Japan 3/11 Initiative	Cambridge, USA
SPRING 2012 M.Arch Thesis Prep Research w/ MIT Japan 3/11 Initiative Teaching Assistant w/ Jegan Vincent de Paul	Cambridge, USA Cambridge, USA Cambridge, USA
SUMMER 2012 Slopes Research Disaster-Resiliency Research TA, MIT Japan Design Workshop 2012 Slopes Research	Kunming, China Banda Aceh, Indonesia Minami Sanriku, Japan Portland, USA
FALL 2012 M.Arch Thesis Research w/ MIT Japan 3/11 Initiative	Cambridge, USA Cambridge, USA

CAUSAL FLOWS

3/11 : GREAT TOHOKU EARTHQUAKE

AT 2:47PM ON MARCH 11TH, 2011, AN EARTHQUAKE THAT MEASURED 9.0 ON THE RICHTER SCALE STRUCK 75KM OFF THE EASTERN COAST OF TOHOKU, JAPAN.

ONIGHI, JAPAN / 11 MARCH 2011 / 05:46 UTC / 6.3 MW

CONTEXT : 3/11

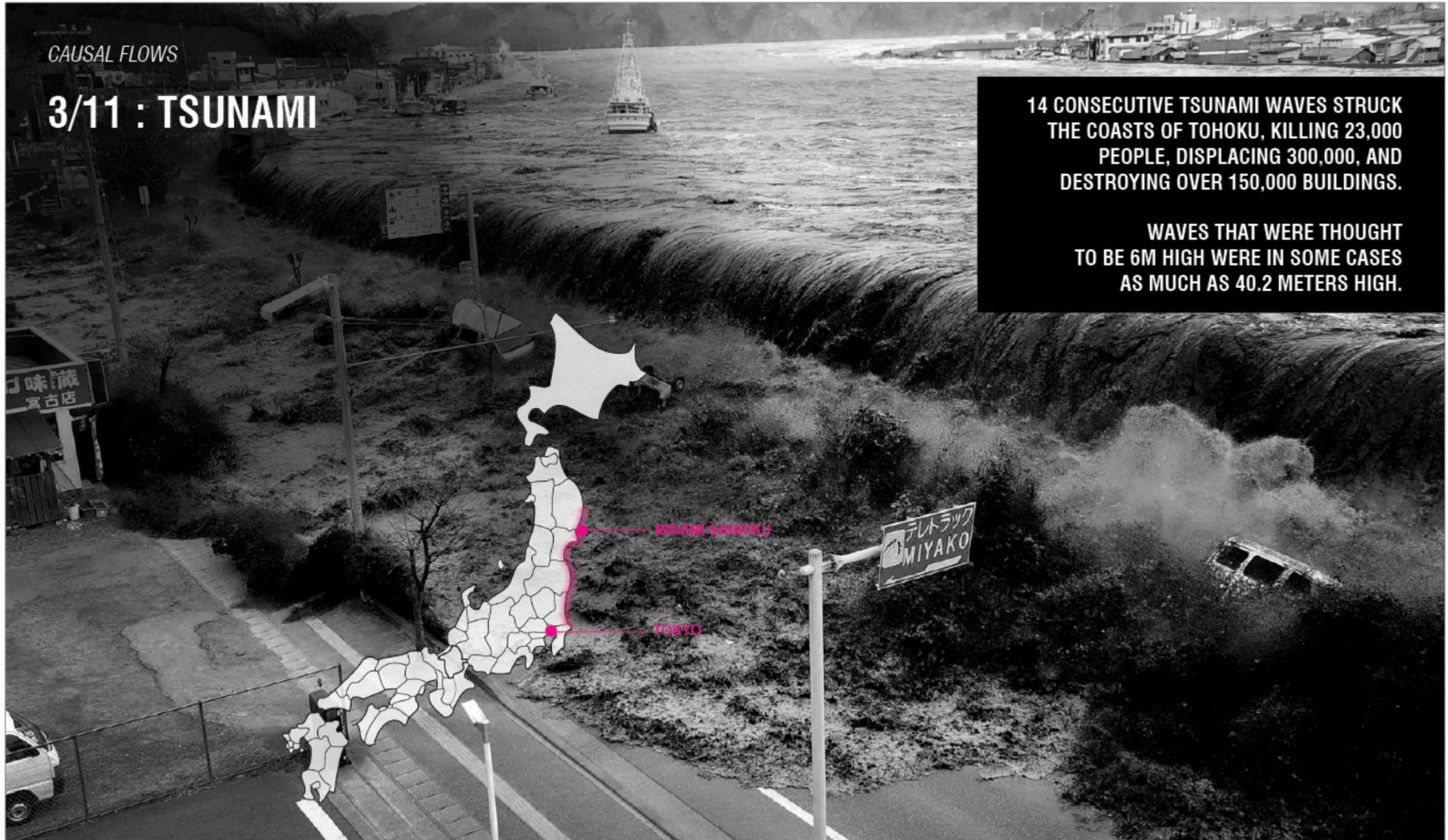
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CAUSAL FLOWS

3/11 : TSUNAMI

14 CONSECUTIVE TSUNAMI WAVES STRUCK THE COASTS OF TOHOKU, KILLING 23,000 PEOPLE, DISPLACING 300,000, AND DESTROYING OVER 150,000 BUILDINGS.

WAVES THAT WERE THOUGHT TO BE 6M HIGH WERE IN SOME CASES AS MUCH AS 40.2 METERS HIGH.



CONTEXT : 3/11

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CONTENTS

part 01

CONTEXT / PROBLEM STATEMENT.

3/11 Disaster
 Japan
 Utsu Pro-3/11 Character of Urban Fabric (Photograph)
 Utsu Pro-3/11 (Aerial Photograph)
 Utsu Post-3/11 (Aerial Photograph)
 Utsu 3/11 Tsunami Damage (Diagram)
 Utsu Critical Datasets 10m & 17m (Diagram)
 Issues of Relocation & Reconstruction.
 Diagram of Relocation Phases
 Reconstruction Committee's Plan for Total / Distant Relocation
 Why Government Proposes Distant Relocation
 Metrics of Total Relocation

part 03 [continued]

Concepts of Japanese Civic / Social Space:
 Buddhist Temples vs. 'Urban Parks' or 'Piazas'
 Inhabitation of the Oblique / Urbanism & Topography:
 Meiji Castle Towns / Post-Eco Industrial Towns (in Japan)
 Cemeteries in Japan (in Japan)
 Macchi Picchi / Italian Hill Towns / China / Favelas in South America
 Theorizing the Oblique.
 Vinilo & Parent's Function of the Oblique
 Frampton's Critical Regionalism & Site Specificity
 Milton Keynes Grid / Cartesian Grid / Contour Parallel Grid
 Innovations and Ideas on Slope Urbanism.
 Warsaw Zarewsky's Z-Slope System.
 Construction Systems / Strategies (Pre-hab, etc) on steeper sites.

part 02

ANALYSIS.

Site Analysis.
 Utsu Topography & Figure / Ground (Plan Drawing)
 Utsu Damaged / Destroyed Buildings & Infrastructure (Plan Drawing)
 Utsu Longitudinal & Cross Sections (Section Drawings)
 Utsu Geomorphology (What's changed, what will change)
 Utsu Slope Makeup (soil sections, vegetation, etc).
 Program / People.
 What was damaged / destroyed.
 What needs relocation / what must stay in lowlands
 Additional Civic / Social Space
 Additional Energy Infrastructure / Ecological Systems
 What were patterns of living?
 What were jobs / businesses?
 What could attract tourism (attract people) and activate industries?
 Potential Project Sites
 Slopes that require stability (Diagram)
 Slopes that are more level / sheltered (Diagram)
 Slopes that are already deforested (Diagram)
 Slopes that already have infrastructure (Diagram)
 Potential Reusable Infrastructure.
 JR Line, Highways, Energy, Communications, etc (Plan Diagram)
 Reuse of Tsunami Debris (millions of tons)
 What to do with the lowlands.
 Critical Safety / Hazards Considerations.
 Evacuation Routes / Times (Plan)
 Landslide Risk Factors?

part 04

DESIGN STUDIES.

Slope Inhabitation Catalogue.
 Resistance. Anchor. Platform. Cut. Fill. Cutoff.
 Slope Deformation Catalogue.
 Slump / MUD / Lower / Toe Deformation
 Slump / Creep Deformation
 Slope Relocation Catalogue.
 Retaining Wall
 Ground Anchors
 Soil Nails
 Geonoties
 Pressure Plates
 Slope Circulation Catalogue.
 Direct / Diagonal / Switchback / Elevator + Ramp / Gravity / Helicopter
 Slope Natural Systems Catalogue.
 Water : Gravity Flow / Hydraulic Potential Energy / Micro Hydro / Natural Filtration
 Wind
 Solar / Passive Solar
 Geothermal

part 03

PRECEDENTS.

Diagram : Concepts of the Japanese House.
 Spatial Organization (Plan / Section Diagrams)
 Zones / Program (Plan Diagrams)
 Tsunami (Diagram)
 Open Air Living / Inside Outside

part 05

ANTICIPATED RESULTS / POSSIBLE VISION.

Urban Scale.
 Regional Masterplan / Local Masterplan
 Architectural Hybridizations.
 Overlay Option A
 Overlay Option B
 Detailed Design.
 Scaled Housing Units
 Infrastructure
 Mobility
 Lowlands

05 : UTATSU / ISATOMAE

URBAN FABRIC

SOURCES: MIYAGI UNIVERSITY / YOSHIHIRO HIRAOKA

MIDDLE SCHOOL
JR LINE / STATION

ELEM. SCHOOL
RECREATION CENTER
DISASTER CENTER

CENTRAL COMMERCIAL
OPEN SPACE

TRADITIONAL
MACHIYAS

MAIN STREET

CHANNELIZED RIVER

DISASTER CENTER

OCEAN

CONTEXT : Utatsu

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05 : *UTATSU / ISATOMAE*

SOURCES: GOOGLE EARTH / GEOEYE, 2011

2011 03 12



CONTEXT : Utatsu

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05: UTATSU / ISATOMAE

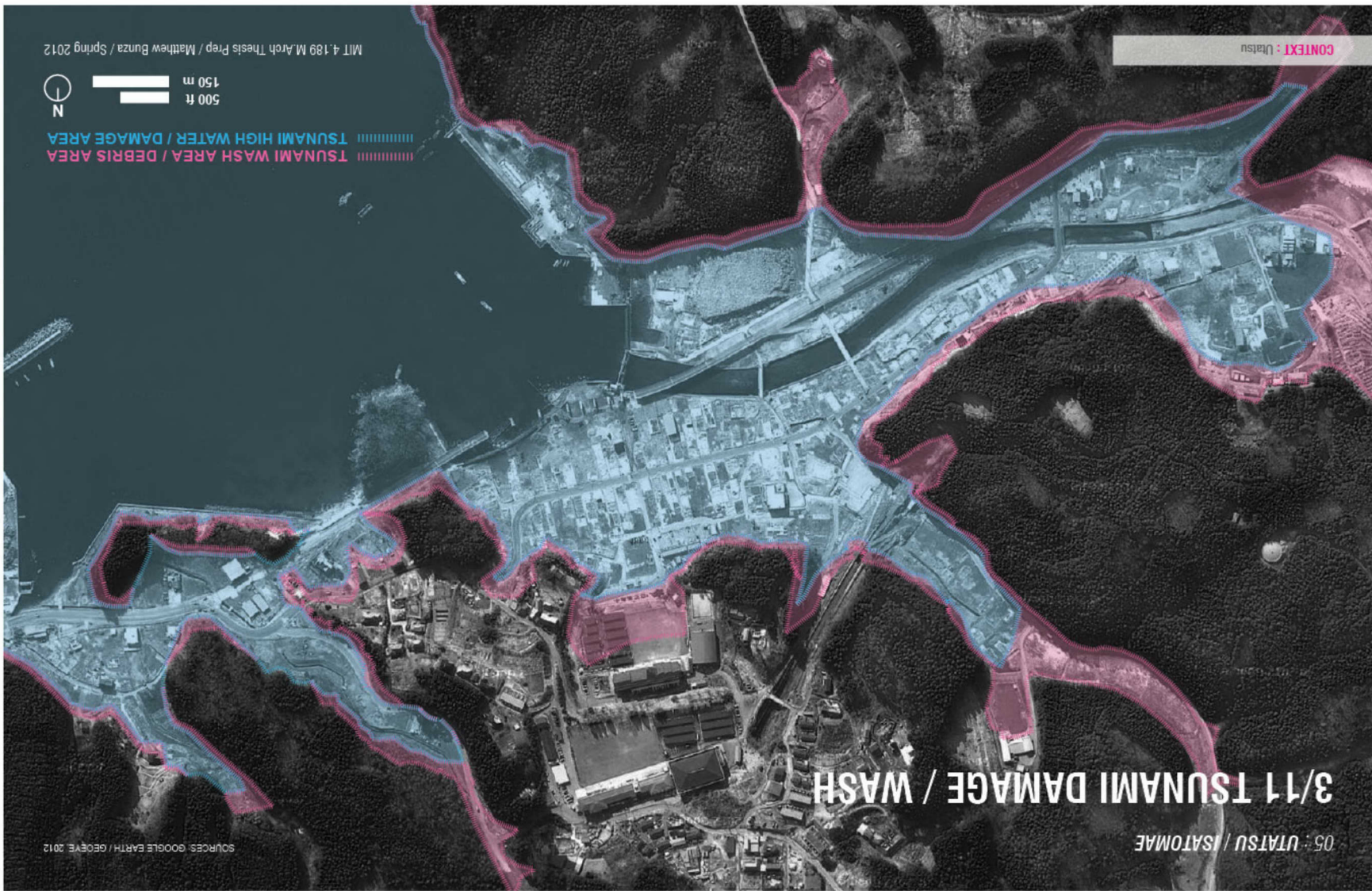
SOURCES: GOOGLE EARTH / GEE EYE 2012

CRITICAL DATUMS ≥17 m Elev



CONTEXT : Utatsu

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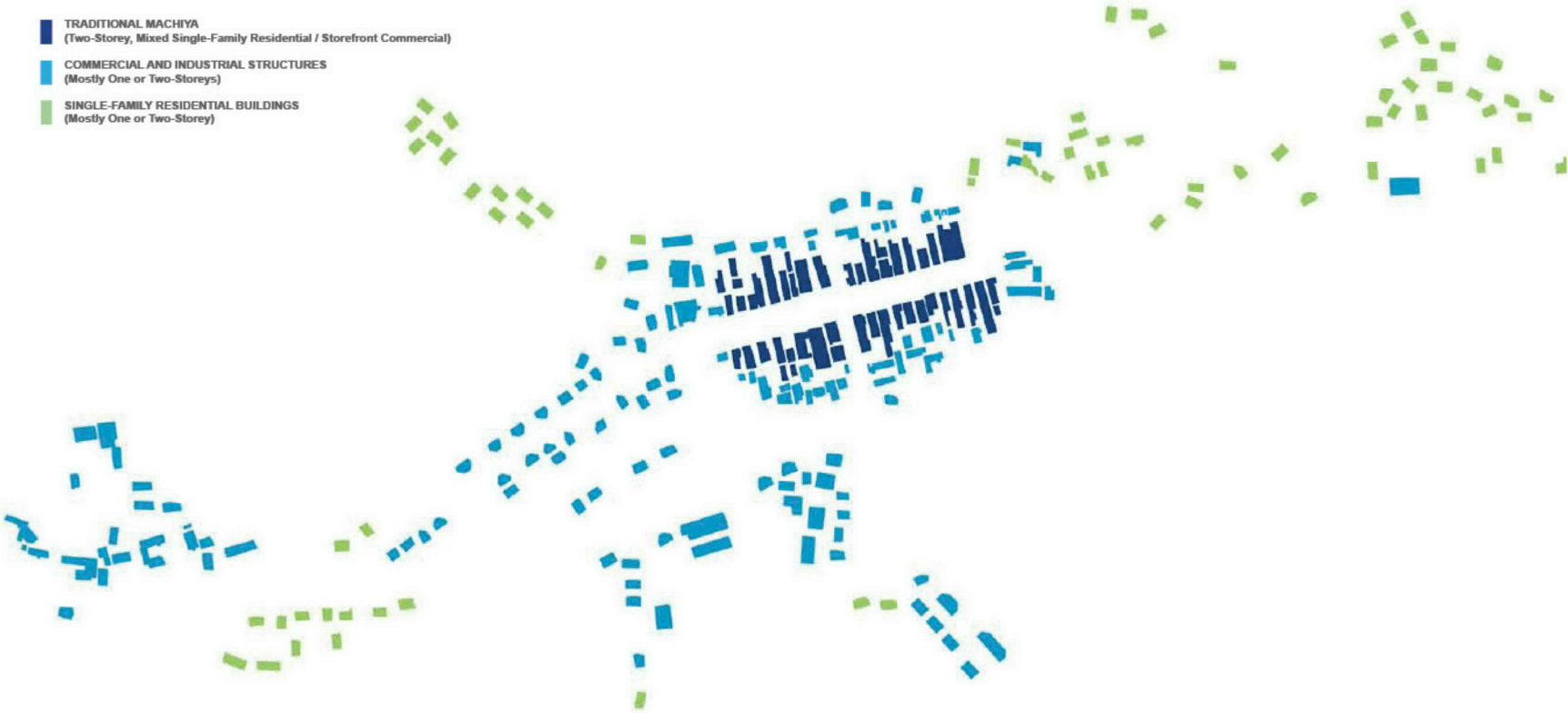


05.03 APPENDIX C : INITIAL PROPOSAL (SELECTED MATERIAL) - 2012 05 18

EXISTING PROGRAM : Destroyed Program

UTATSU

- TRADITIONAL MACHIYA
(Two-Storey, Mixed Single-Family Residential / Storefront Commercial)
- COMMERCIAL AND INDUSTRIAL STRUCTURES
(Mostly One or Two-Storeys)
- SINGLE-FAMILY RESIDENTIAL BUILDINGS
(Mostly One or Two-Storey)



CONTEXT : Utatsu

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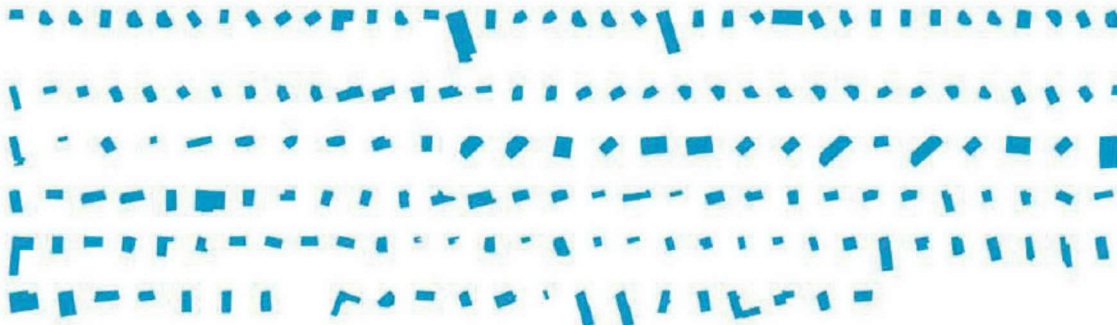
EXISTING PROGRAM : Destroyed Program

UTATSU

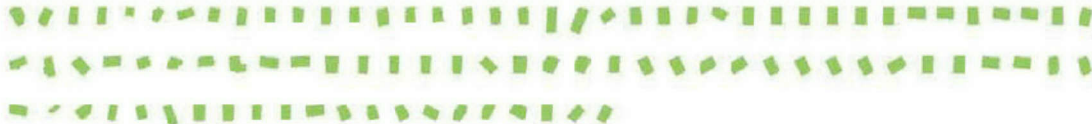
49 TRADITIONAL MACHIYA
(Two-Storey, Mixed Single-Family Residential / Storefront Commercial)



179 COMMERCIAL AND INDUSTRIAL STRUCTURES
(Mostly One or Two-Storeys)



95 SINGLE-FAMILY RESIDENTIAL BUILDINGS
(Mostly One or Two-Storey)



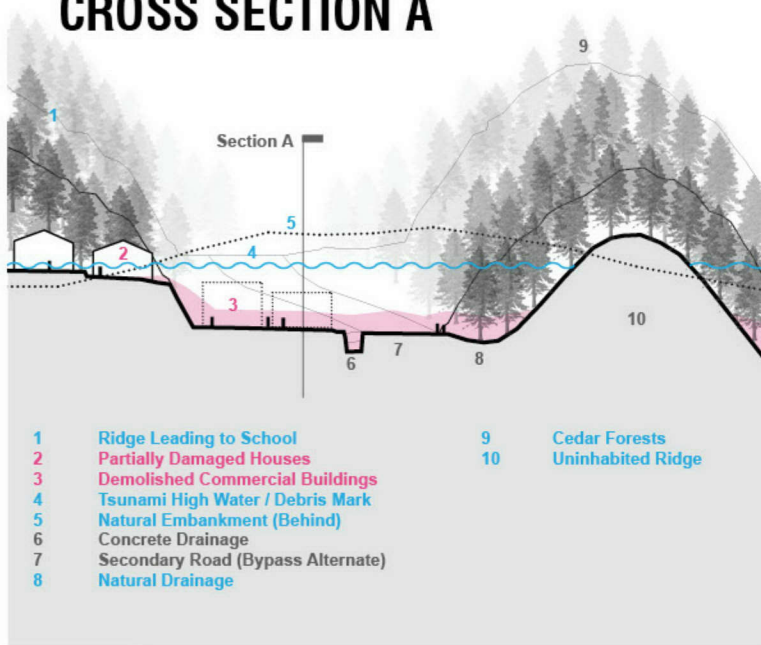
CONTEXT : Utatsu

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GEOGRAPHY : Utatsu Topography

Japan > Honshu > Miyagi Prefecture > Minami Sanriku > Utatsu > Isotomal Area > **EAST VALLEY ROAD**

CROSS SECTION A



The East Valley Road transect runs SE to NW on the East Side of the Ishotomae Area of the town of Utatsu, Japan. About 600m long (though the entire length is ~2000m) and fluctuating between ~40-60m wide, the road is essentially a shallow valley (with a ~1-5 degree incline) flanked by ~30-45 degree slopes with scalable walls of ~40m on either side, heavily forested with ~20m tall Cedar and other various deciduous trees, and small scale underbrush.

Eight single/double storey residential (?) building foundations remain on this transect. All structures above foundations have been completely destroyed. Two single/double storey commercial (?) building foundations remain. All structures above foundations have been completely destroyed.

Man-made concrete drainage infrastructure. ~3m tall x 2m wide cross section, with smaller tributaries from hills above. Drainage is all intact.

Above-ground power lines remain with minimal damage.

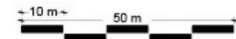
Possibilities:

- (5) Vital Future Link... (Dependent on hillside activation)
- (7) Current Support Viaduct... (Moving both people and water)
- (5) Secluded Forest... (Ecosystem)

Limits:

- Limited buildable land
- Vulnerability from Monsoon flooding?

- Debris Fields
- 3/11 Tsunami High Mark
- Building Damage Related
- Water / Nature Related
- Infrastructure Related

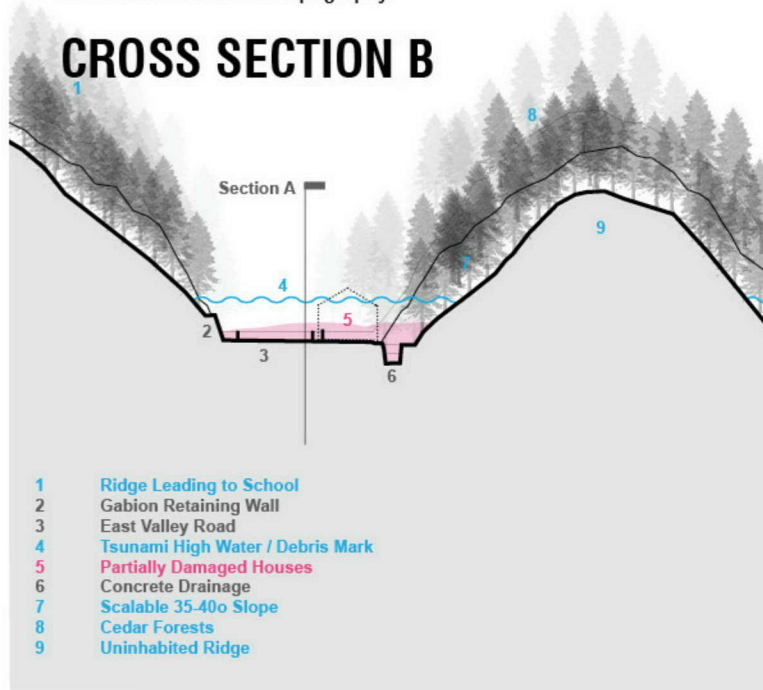


CONTEXT : Utatsu

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GEOGRAPHY : Utatsu Topography

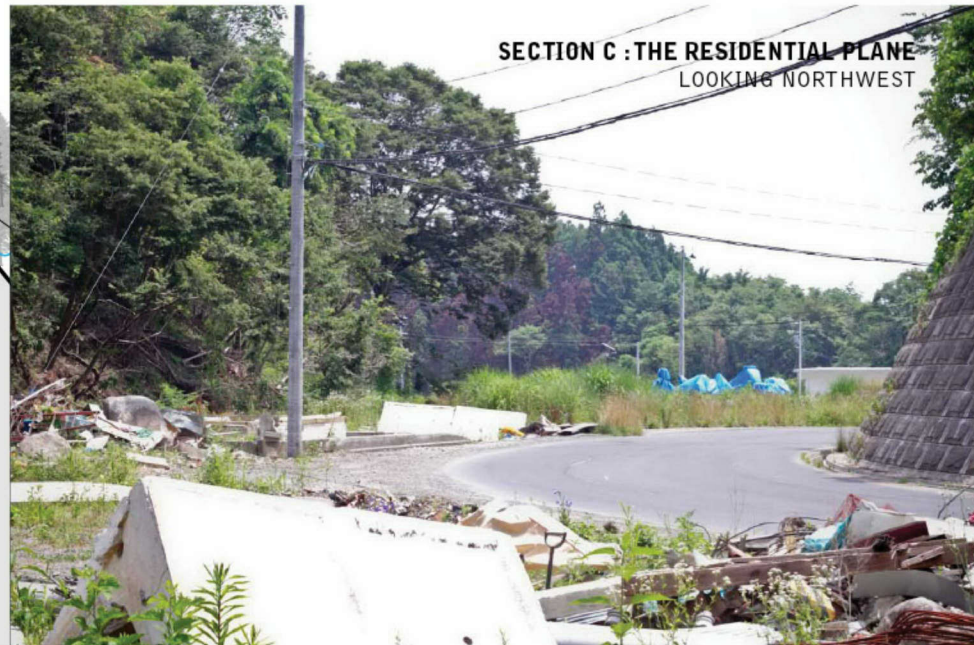
CROSS SECTION B



- 1 Ridge Leading to School
- 2 Gabion Retaining Wall
- 3 East Valley Road
- 4 Tsunami High Water / Debris Mark
- 5 Partially Damaged Houses
- 6 Concrete Drainage
- 7 Scalable 35-40o Slope
- 8 Cedar Forests
- 9 Uninhabited Ridge

Japan > Honshu > Miyagi Prefecture > Minami Sanriku > Utatsu > Isotomal Area > EAST VALLEY ROAD

SECTION C : THE RESIDENTIAL PLANE
LOOKING NORTHWEST



The East Valley Road transect runs SE to NW on the East Side of the Ishotomae Area of the town of Utatsu, Japan. About 600m long (though the entire length is ~2000m) and fluctuating between ~40-60m wide, the road is essentially a shallow valley (with a ~1-5 degree incline) flanked by ~30-45 degree slopes with scalable walls of ~40m on either side, heavily forested with ~20m tall Cedar and other various deciduous trees, and small scale underbrush.

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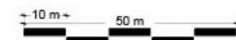
Possibilities:

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- (7) Current Support Viaduct... (Moving both people and water)
- (5) Secluded Forest... (Ecosystem)

Limits:

Limited buildable land
Vulnerability from Monsoon flooding?

- Debris Fields
- 3/11 Tsunami High Mark
- X Building Damage Related
- X Water / Nature Related
- X Infrastructure Related



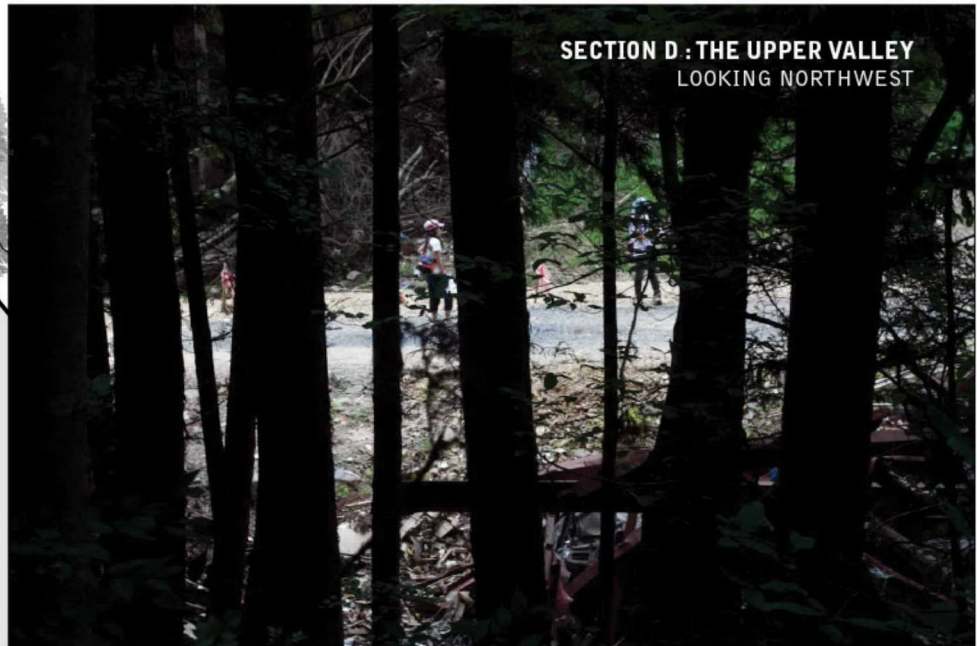
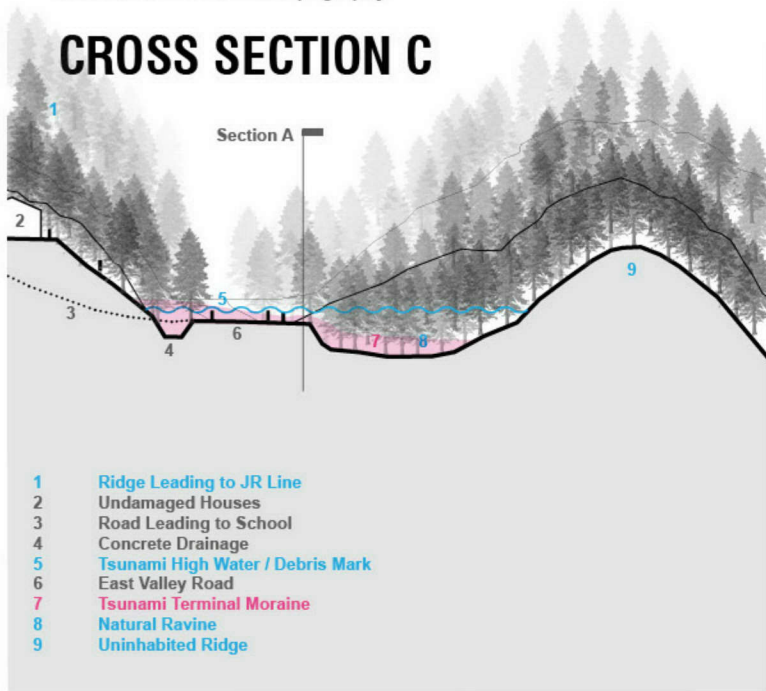
CONTEXT : Utatsu

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GEOGRAPHY : Utatsu Topography

Japan > Honshu > Miyagi Prefecture > Minami Sanriku > Utatsu > Isotomal Area > EAST VALLEY ROAD

CROSS SECTION C



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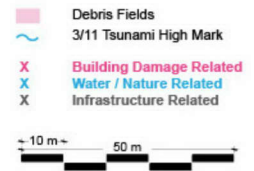
Above-ground power lines remain with minimal damage.

Possibilities:

- (5) Vital Future Link... (Dependent on hillside activation)
- (7) Current Support Viaduct... (Moving both people and water)
- (5) Secluded Forest... (Ecosystem)

Limits:

Limited buildable land
Vulnerability from Monsoon flooding?



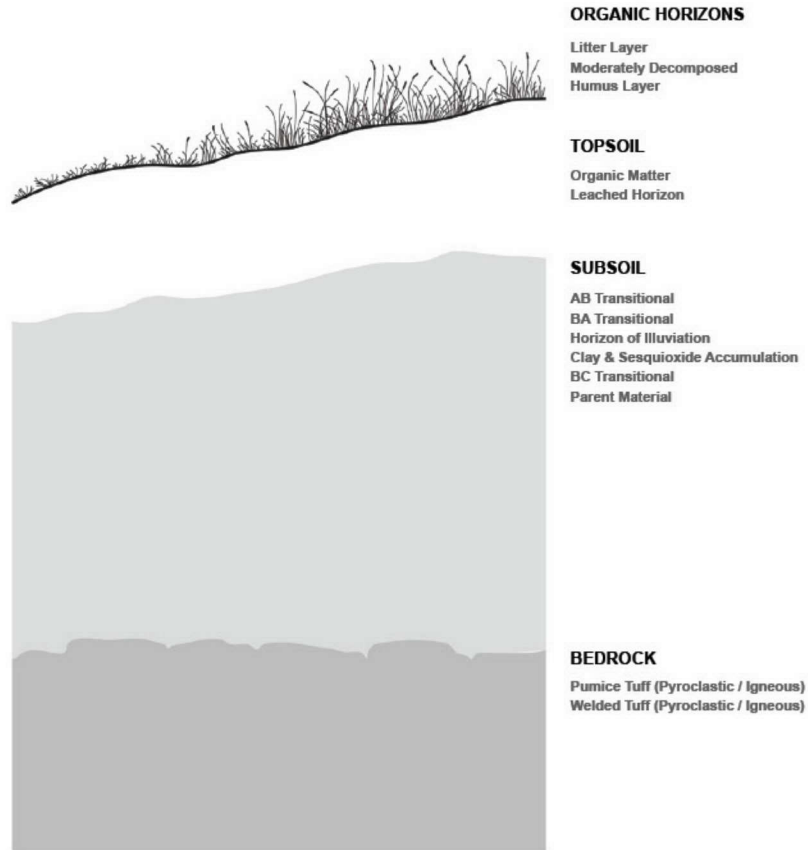
CONTEXT : Utatsu

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EXISTING GEOMORPHOLOGY : Minami Sanriku

SOURCES: FUNDAMENTALS OF SOIL SCIENCE

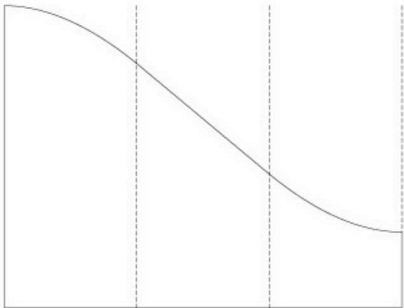
SOIL MAKEUP



CONTEXT : Utatsu

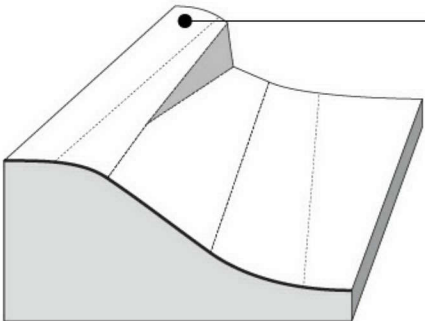
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SLOPE UNITS



01_THREE FORM ELEMENTS OF SLOPES

Litter Layer



TOPSOIL

Organic Matter

CONVEX

AB Transitional

02_SLOPE ELEMENTS

Litter Layer

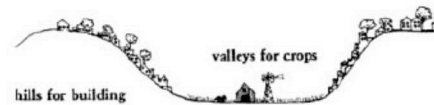
SLOPE URBANISM THEORY : Christopher Alexander's *Pattern Language*

CITY COUNTRY FINGERS AGRICULTURAL VALLEYS

Keep interlocking fingers of farmland and urban land, even at the center of the metropolis. The urban fingers should never be more than 1 mile wide, while the farmland fingers should never be less than 1 mile wide.



Keep town and city development along the hilltops and hill-sides—CITY COUNTRY FINGERS (3). And in the valleys, treat the ownership of the land as a form of stewardship, embracing basic ecological responsibilities—THE COUNTRYSIDE (7). . . .



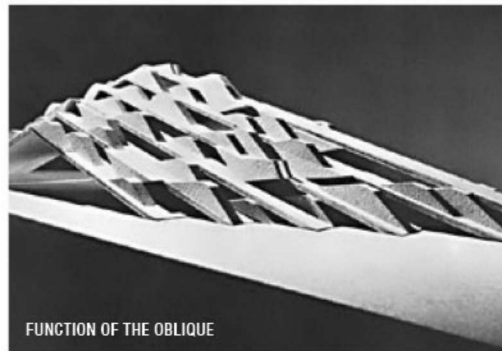
SLOPE + CONSTRUCTION : Macchu Picchu, Peru - *Water & Agriculture*



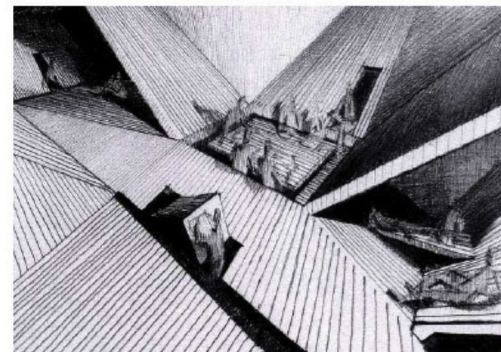
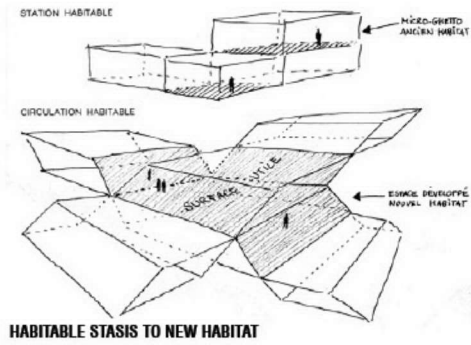
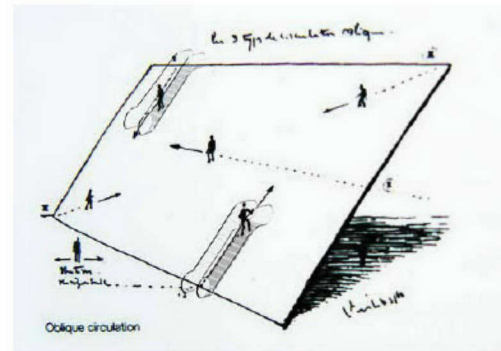
RESEARCH : precedents

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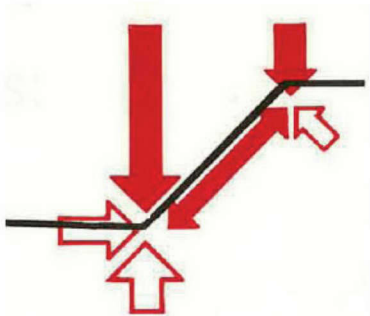
SLOPE URBANISM THEORY : Claude Parent & Paul Virilio's *Oblique*



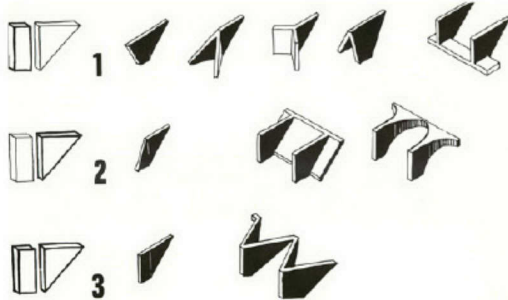
FUNCTION OF THE OBLIQUE



SLOPE URBANISM THEORY : MIT Structural Engineer Wacław Zalewski's *Z-Slope*

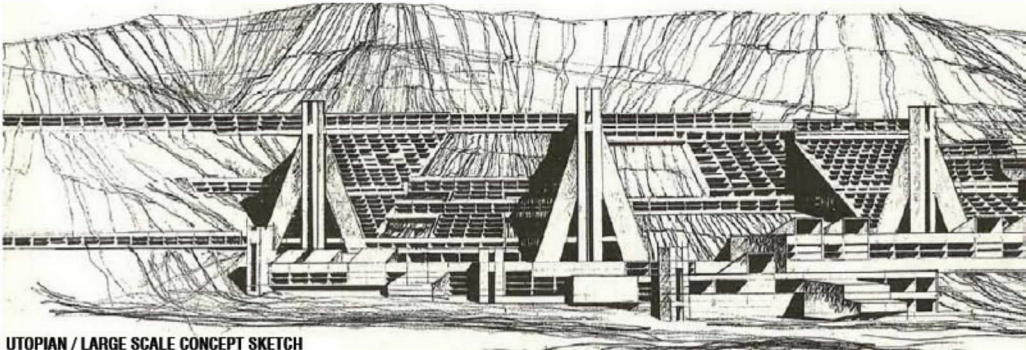


FORCE DIAGRAM



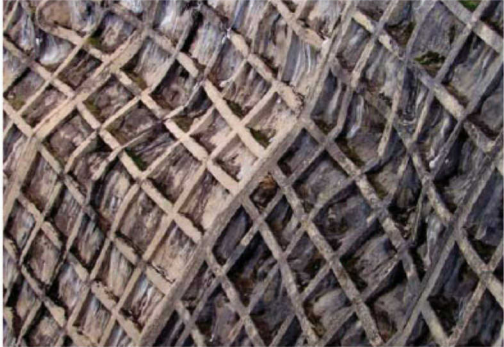
MASSING TYPES

Smart Slope City - Spring - Gohlert 8



UTOPIAN / LARGE SCALE CONCEPT SKETCH

SLOPE + CONSTRUCTION : Japan Slope Engineering - *Pros & Cons*



RESEARCH : precedents

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SLOPE + CONSTRUCTION : Japan Slope Circulation



RETAINING WALLS WITH PUBLIC PATHS



CRIB WALLS - MT. FUJI SWITCHBACKS

CATALOGUE : Slope Deformations



00_BASE CONDITION



01_TOE UNDERCUT



02_MID-CUT



03_UPPER-CUT



04_SLUMPED

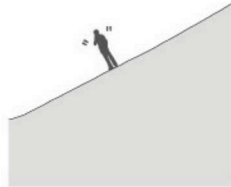


05_DE-VEGETATED

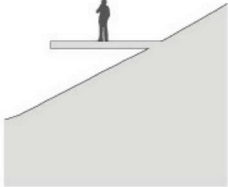
RESEARCH : precedents

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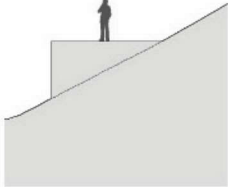
CATALOGUE : Slope Inhabitation



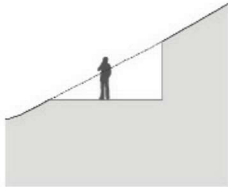
00 BASE CONDITION :
RESISTANCE



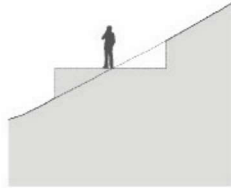
01 PLATFORM :
ADDITION



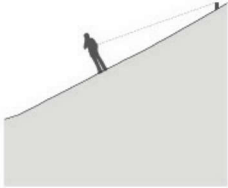
02 FILL :
ADDITION



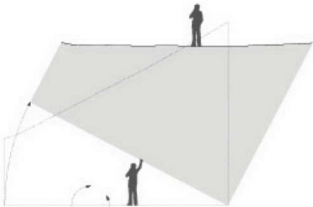
03 CUT :
SUBTRACTION



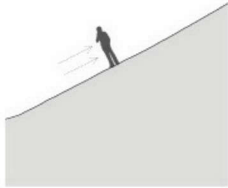
04 CUT/FILL :
SUBTRACTION/ADDITION



05 ANCHOR :
SUSPEND



06 SUPPORT :
BRACE



07 SUPERNATURAL FORCE :
REPULSION

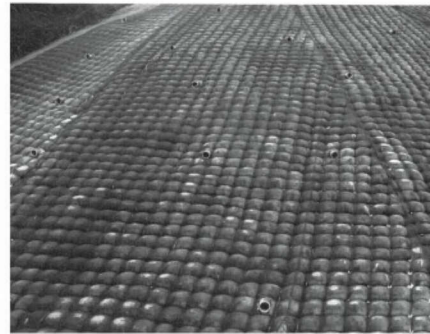
RESEARCH : precedents

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CATALOGUE : Slope Existing Retention Strategies [Japan]



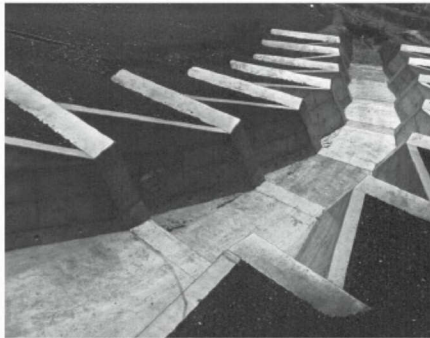
01_GROUND ANCHORS / CONCRETE



02_GEO TEXTILES / CONCRETE



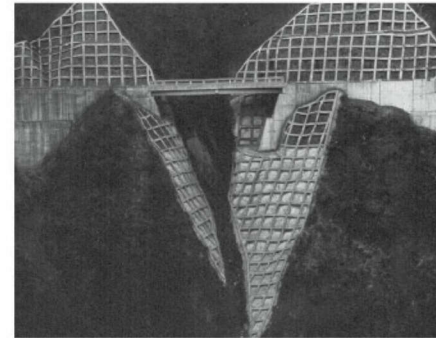
03_?



04_WEDGE RETENTION / CONCRETE



05_TERRACE RETENTION / CONCRETE



06_INFILLED GROUND ANCHORS / CONCRETE

SUMMARY

INGREDIENTS :

*SITE
PEOPLE AND PLACE*

*DISASTER CONTEXT
PHASES OF RECONSTRUCTION
JAPANESE GOVT.'S TOTAL RELOCATION PLAN*

*RELEVANT ELEVATION DATUMS
SAFETY / ESCAPE ROUTES*

*EXISTING TOPOGRAPHY / VEGETATION
POTENTIAL SITES
POTENTIAL PROGRAM
REPROGRAMMING THE LOWLANDS*

*SLOPE URBANISM THEORY
CIVIL ENGINEERING PRECEDENTS
SLOPE CIRCULATION & MOBILITY
NATURAL SLOPE ENERGY
CONNECTION TO REMAINING COMMUNITY*

CONTEXT : Utatsu

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05.04 APPENDIX D : BIBLIOGRAPHY

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- BUILDING TECHNOLOGY & SYSTEMS
- SLOPES, TOPOGRAPHY, GEOMORPHOLOGY
- ENVIRONMENTAL, ECOLOGY, WATER, HAZARDS
- JAPAN

