

SOLAR INTELLIGENT CITIES OF TOMORROW

for

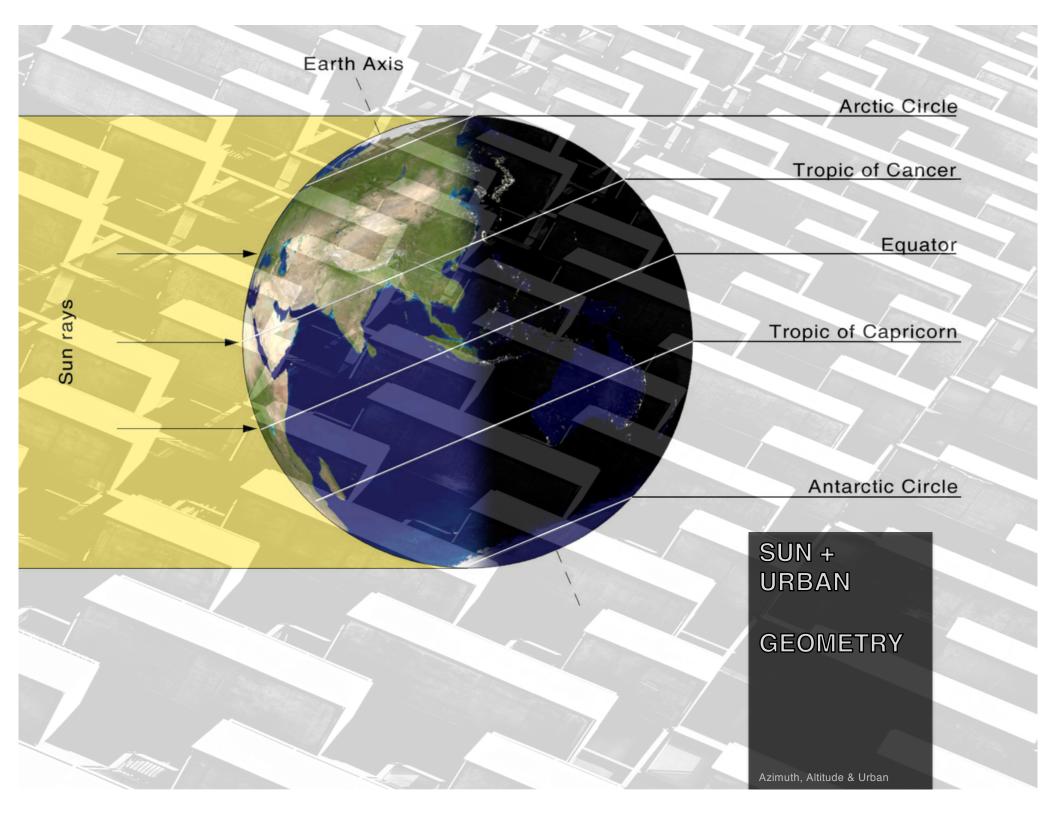
Architects Association

of Mahón

DR CRAIG LEE MARTIN

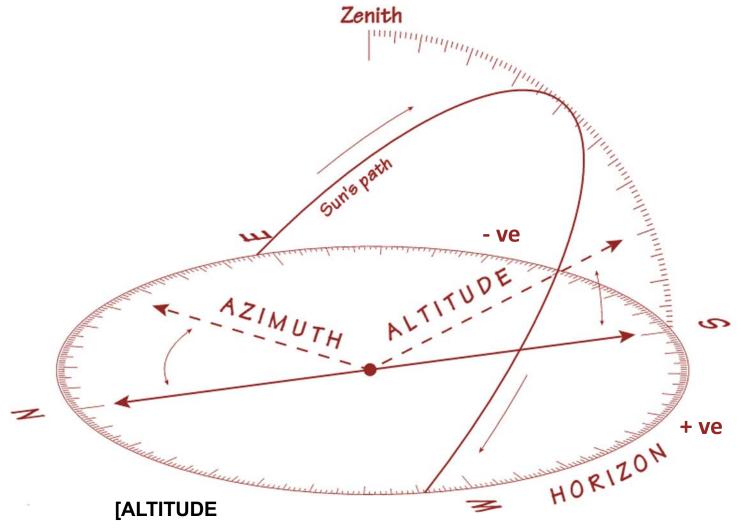




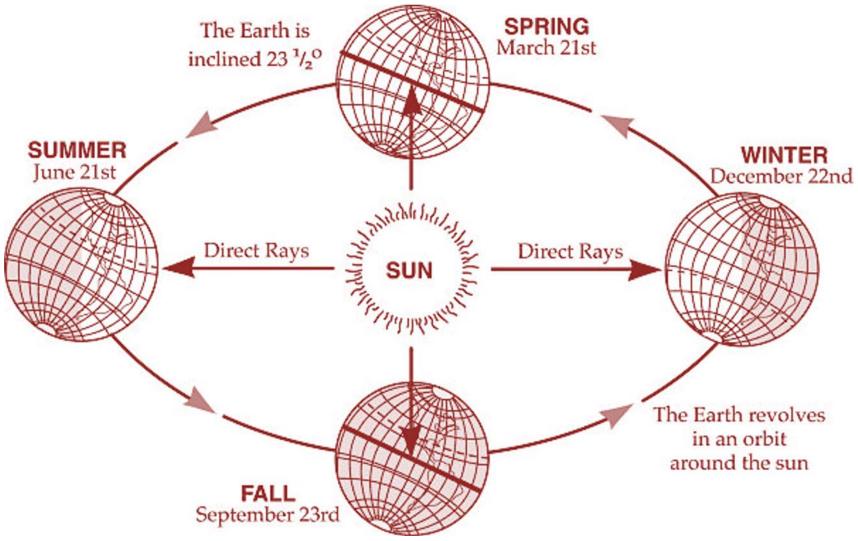


[HELIOTROPOLIS: SOLAR CITIES OF TOMORROW]

CELESTIAL GEOMETRIES: AZIMUTH & ALTITUDE

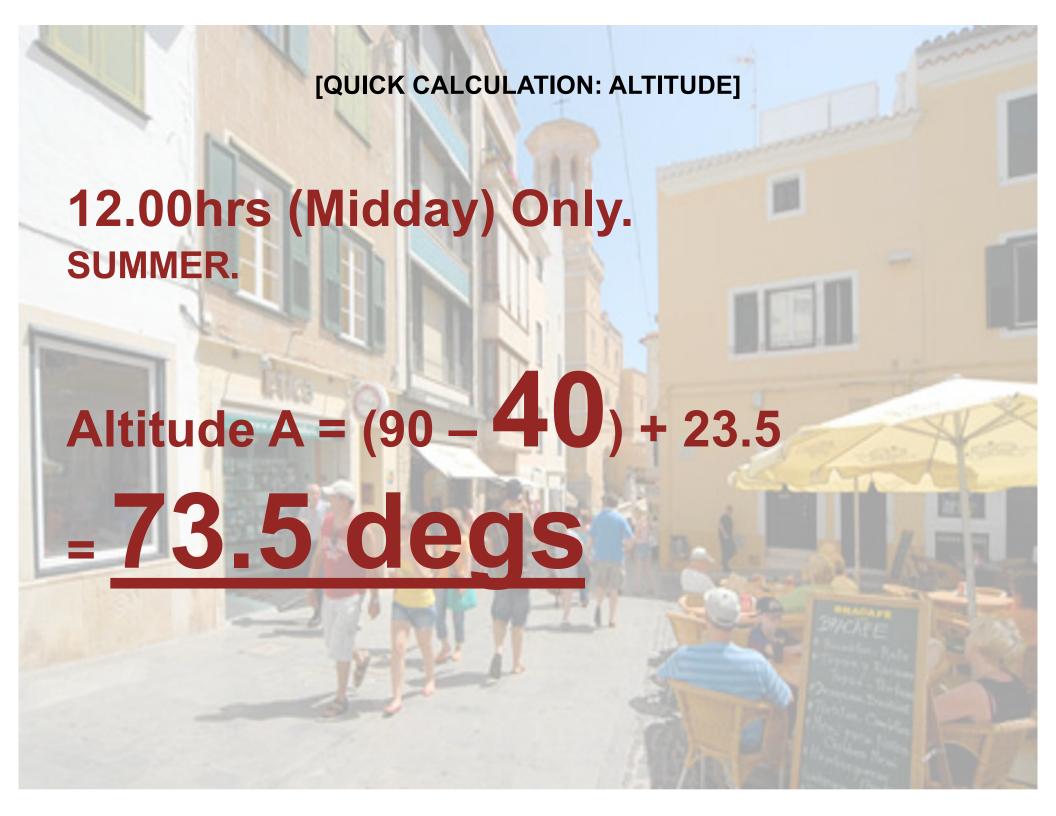


- The angle between the line to the centre of the sun and the horizontal plane.
- When the sun is on the horizon, solar altitude = 0 degrees.
- When the sun is directly overhead, solar altitude = 90 degrees]

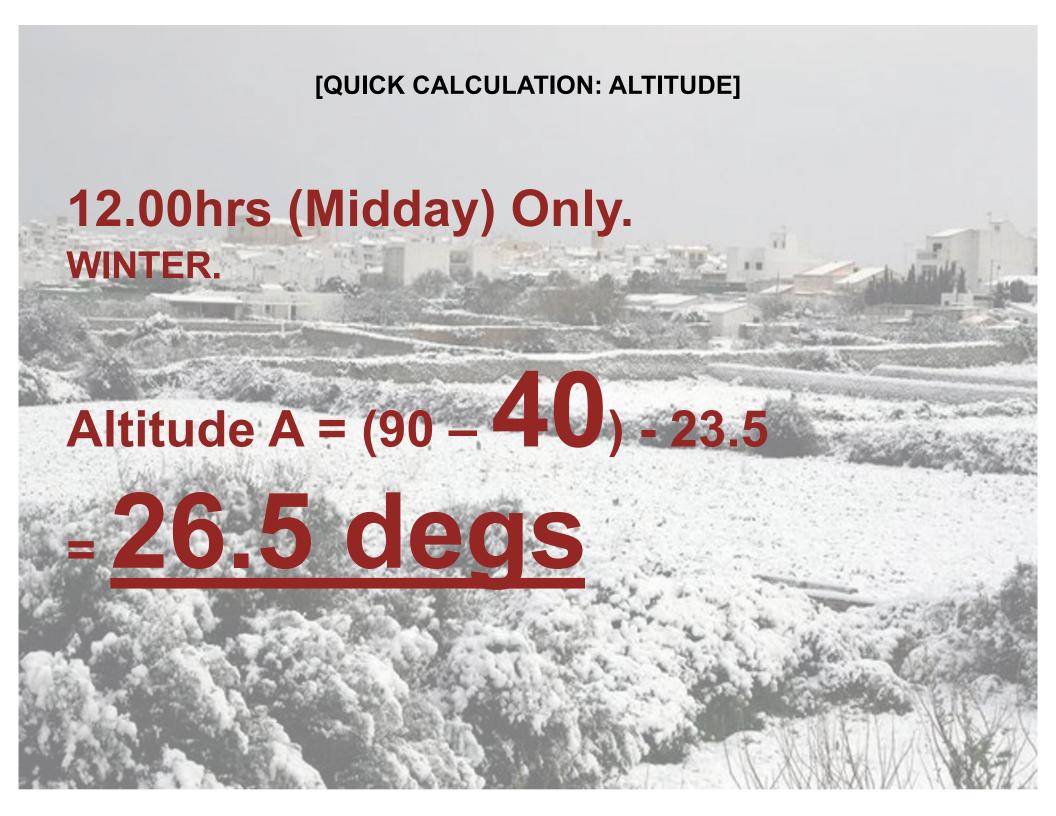


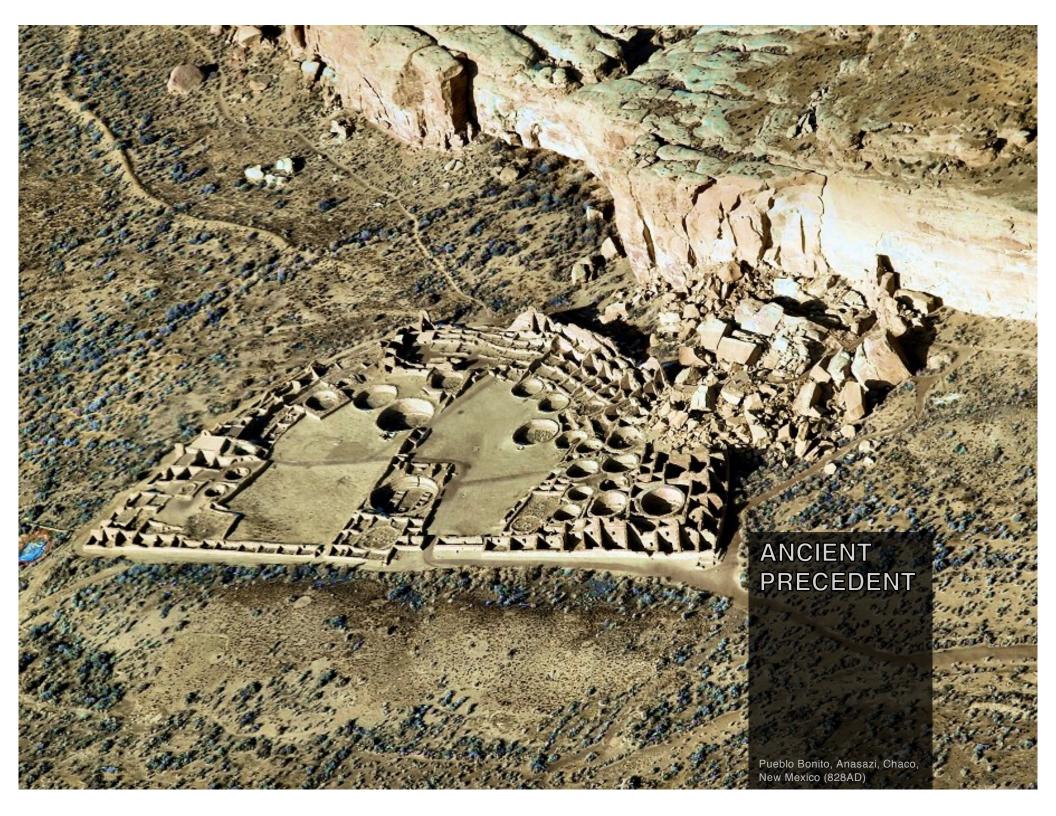
[EARTH'S AXIS

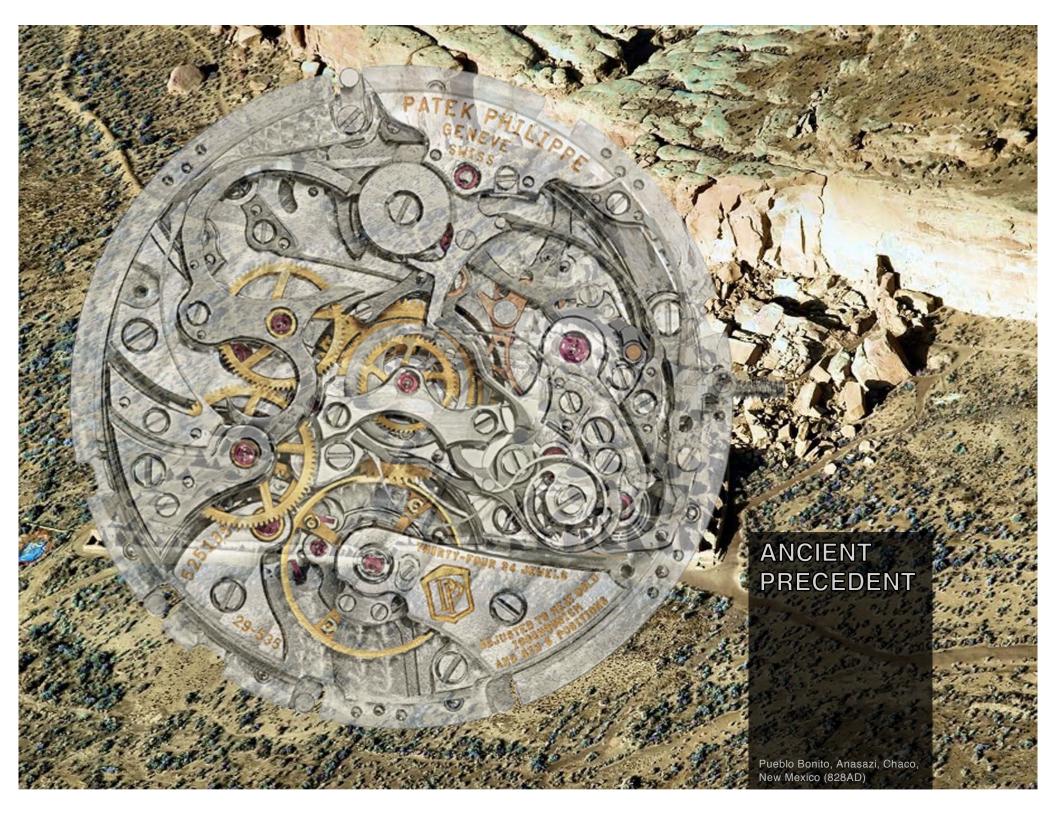
- **SUMMER:** On June 21st (the Summer Solstice) the Earth is positioned in its orbit so that the North Pole is leaning 23.5degs toward the sun. All locations North of the equator have day lengths greater than twelve hours.
- **EQUINOX(S):** Vernal & Autumnal, neither pole is tilted toward the sun. Here, day lengths, regardless of latitude, are exactly 12 hours
- **WINTER:** the Earth is positioned so that the South Pole is leaning 23.5degs toward the sun. All locations North of the equator have day lengths less than twelve hours]

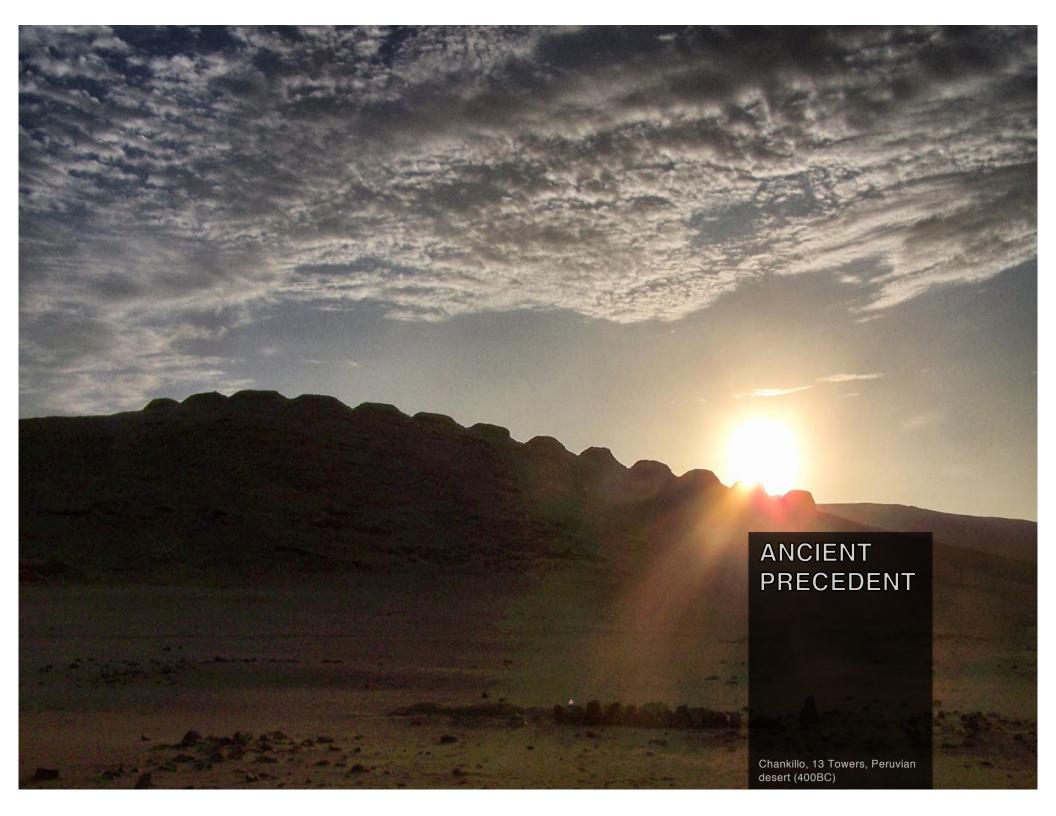


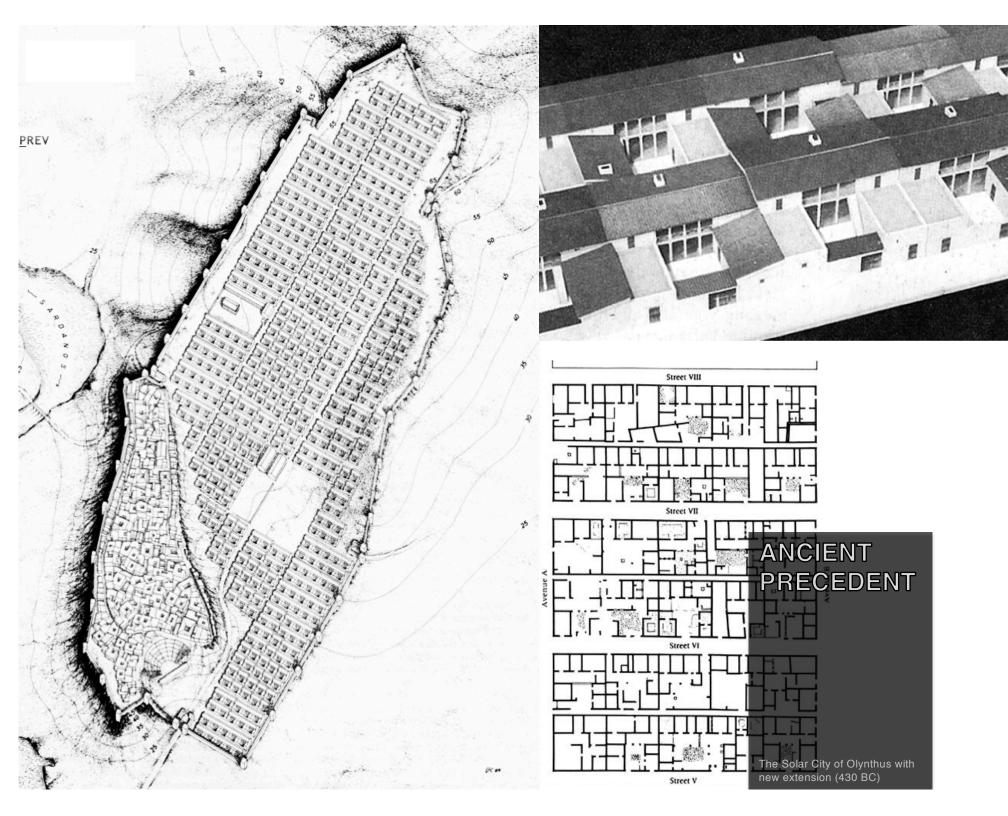


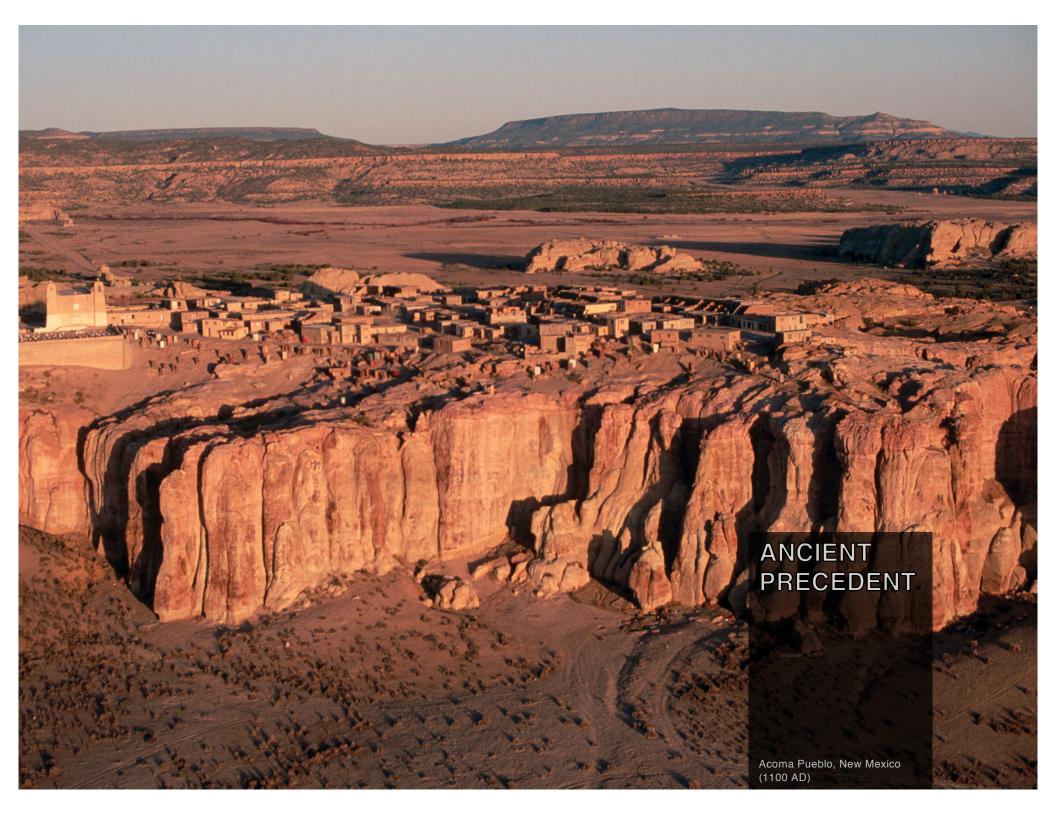


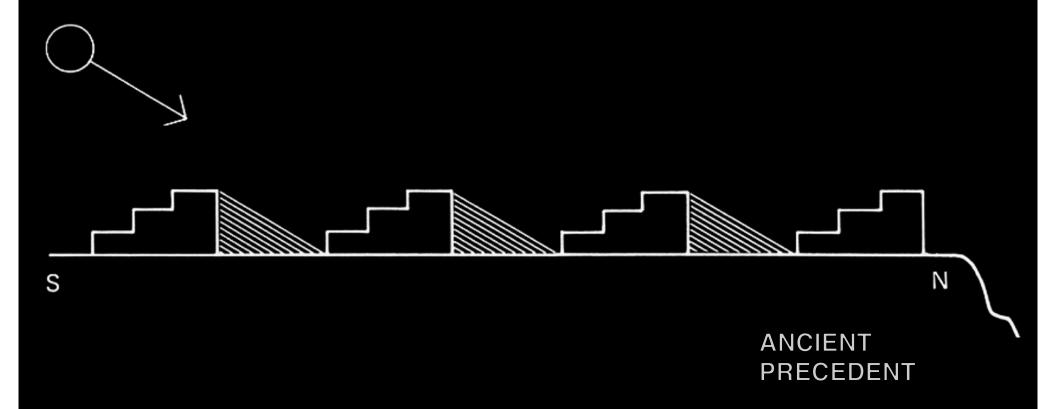


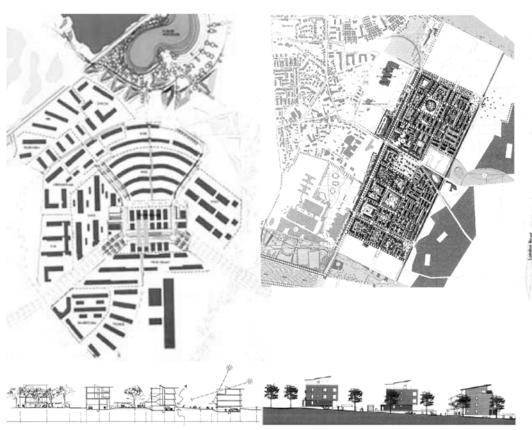


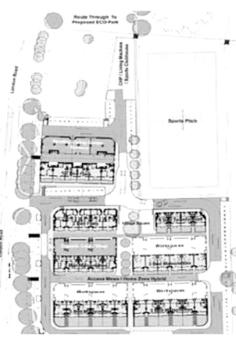














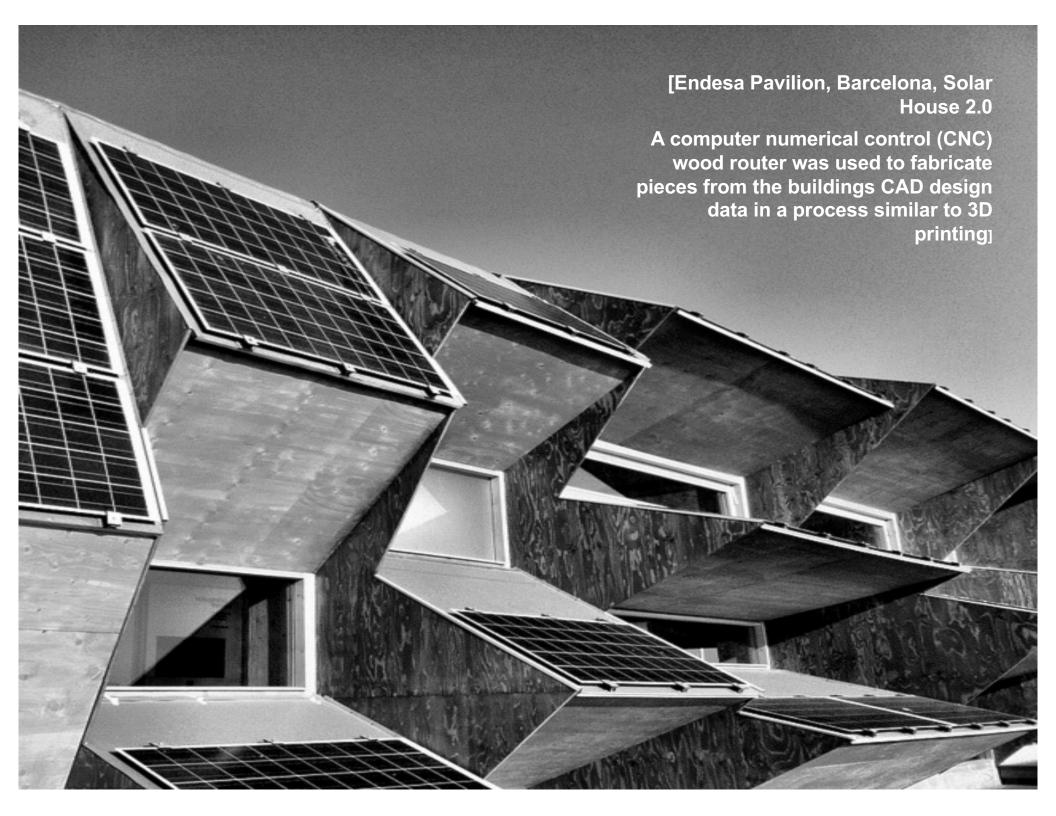




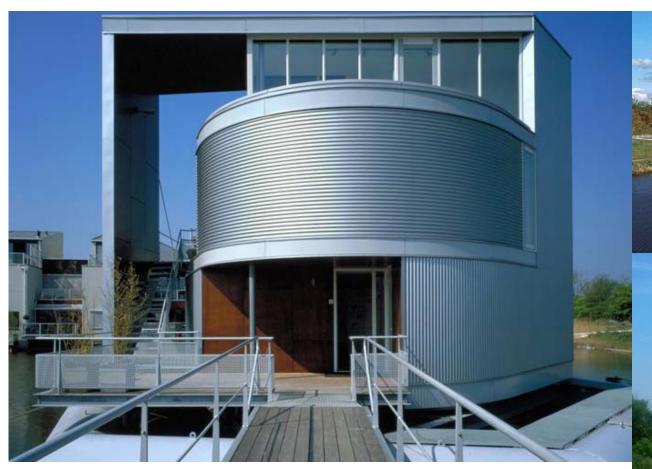
MODERN PRECEDENT

?

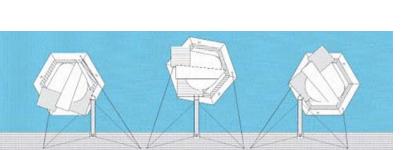
Acoma Pueblo, New Mexico (1100 AD)











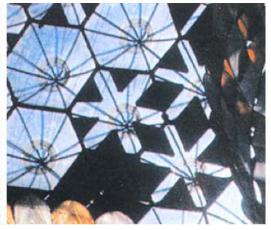


[The Water Villa (Middelburg, 2002) by Herman Herzberger.

The Villa can be rotated through 90degs using a process involving two steering wheels and so track either the sun or the shade]



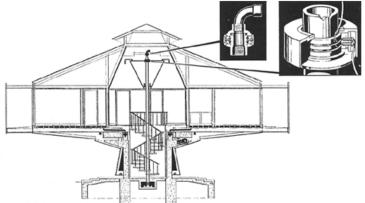


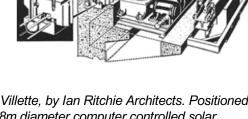


Dome for **Montreal Expo (1967) Buckminster Fuller**. Six dynamic shading devices unroll in each hexagon to track the daily motion of the sun.



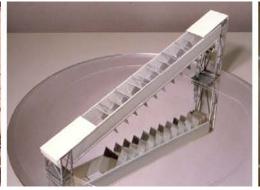
Richard Foster House, Wilton (1967). The entire house rotates on tracks to follow the sun movement.





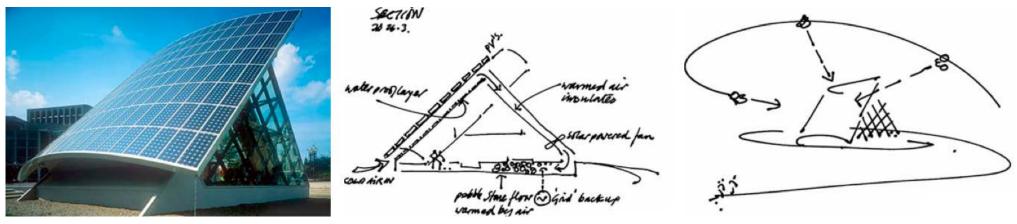
Rotating roof and heliomirrors, Museum, La Villette, by Ian Ritchie Architects. Positioned above the Museums entrance hall are two 28m diameter computer controlled solar tracking domes. "Robotic mirrors" control the level of direct light penetrating the interior.



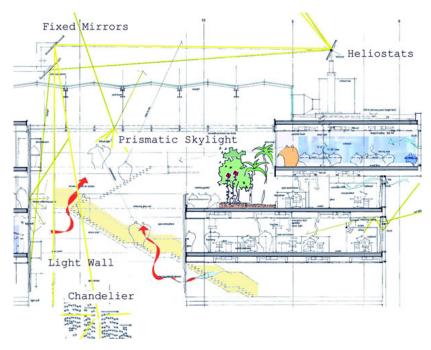








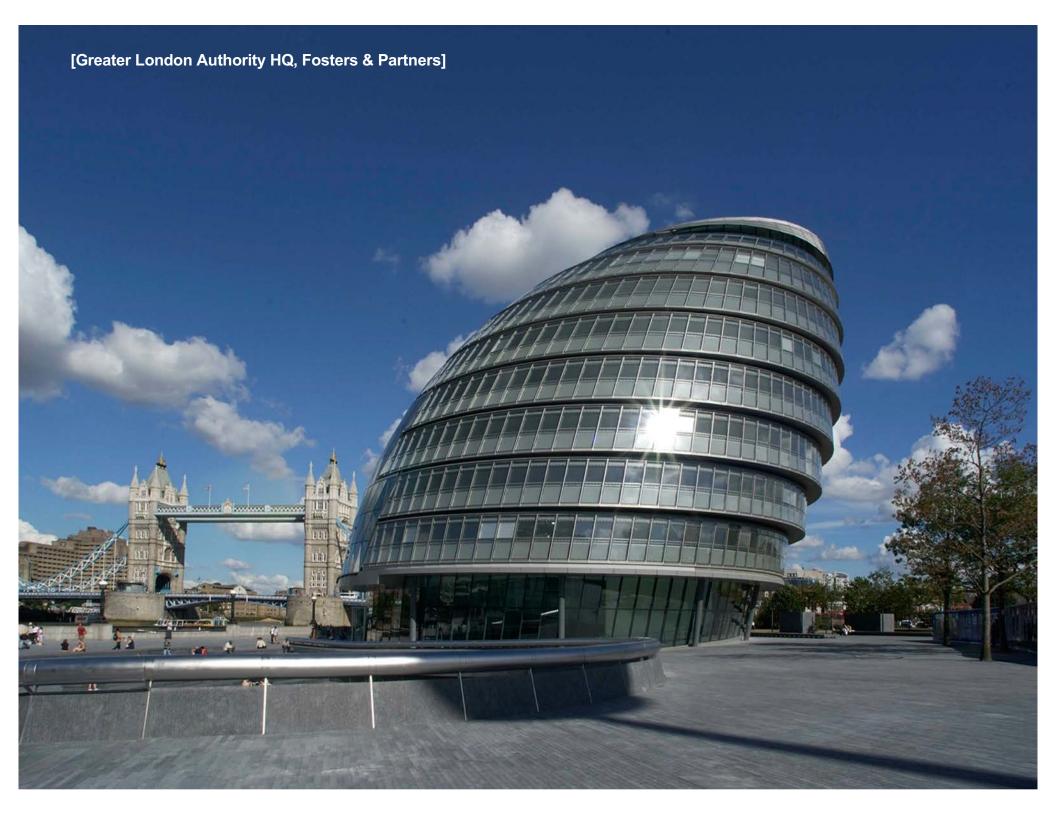
BP Solar Pavilion, Birmingham, by Arup Associates. This glass pavilion represents the state of the art in thin film photovoltaic glass. The form of the building is driven by a south-facing solar wall, which is curved and angled to maximise the absorption of solar energy. The surface also acts as a roof and shading device to the east and west vertical walls.

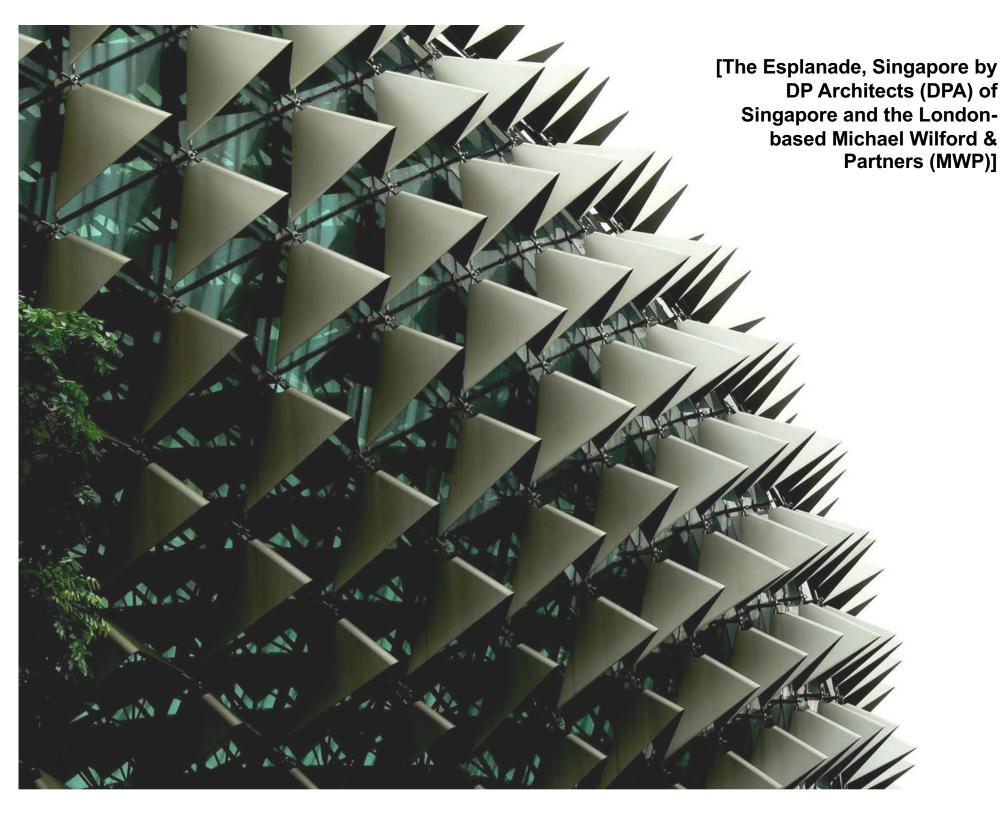


At the Genzyme Center in Cambridge, Massachusetts, a natural light enhancement system brings sunlight into a twelve-story atrium through a series of roof-mounted heliostats that are automated to track the movement of the sun across the sky.

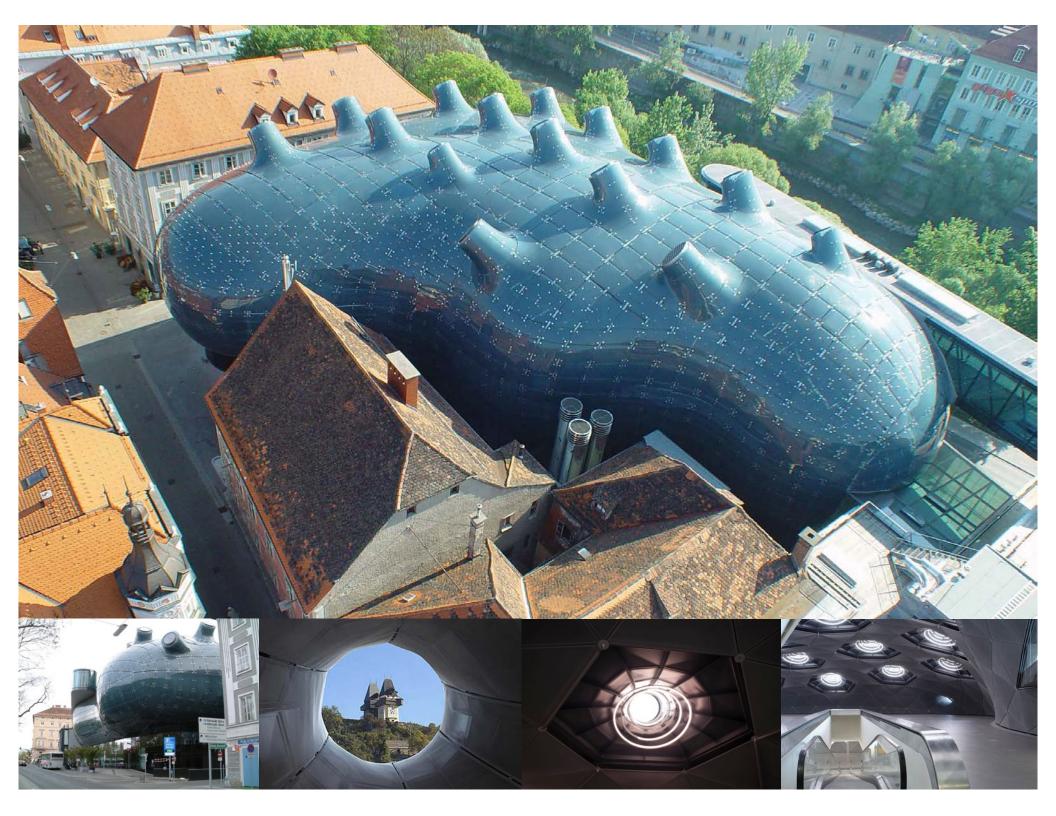










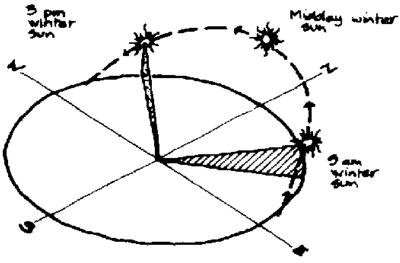


HIGH RISE UNLIMITED "NO MORE ADDITIONAL SHADOW" "MINIMIZING TIME FOR TRAVELLING" "MAXIMIZING USAGE OF PROPERTY SURFACE" "SPARING NATURAL COMMON SPACE AROUND" "SAVING ENERGY FOR COOLING SOLAR HEAT" "NO MORE SOLAR HEAT GAIN" "NEUTRAL LIGHTING" for LIBRARY ART MUSEUM GYMNASIUM THEATER SHOPPING CENTER OFFICE ABORATORY ACTORY 2HRS SHADOW DWELLING 4HRS SHADOW "EQUAL BENEFIT OF SOLAR HEAT" for olds, babies and mothers in a dense city "WELCOME BACK TO THE CITY"

Solar Oriented City – Shoei Yoh

Proposal for a new model of Asian metropolis. The solar design aims to create a more pleasurable and healthier city to live and work in,

Yoh's Solar Oriented City attempts to incorporate greater levels of sunshine into the existing high-density environment of Tokyo]

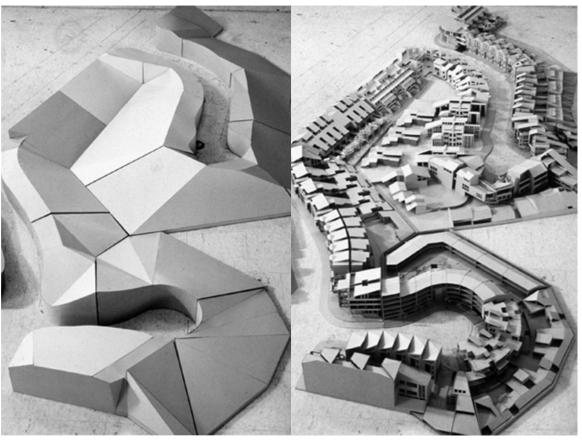


Slope required to protect block of to east

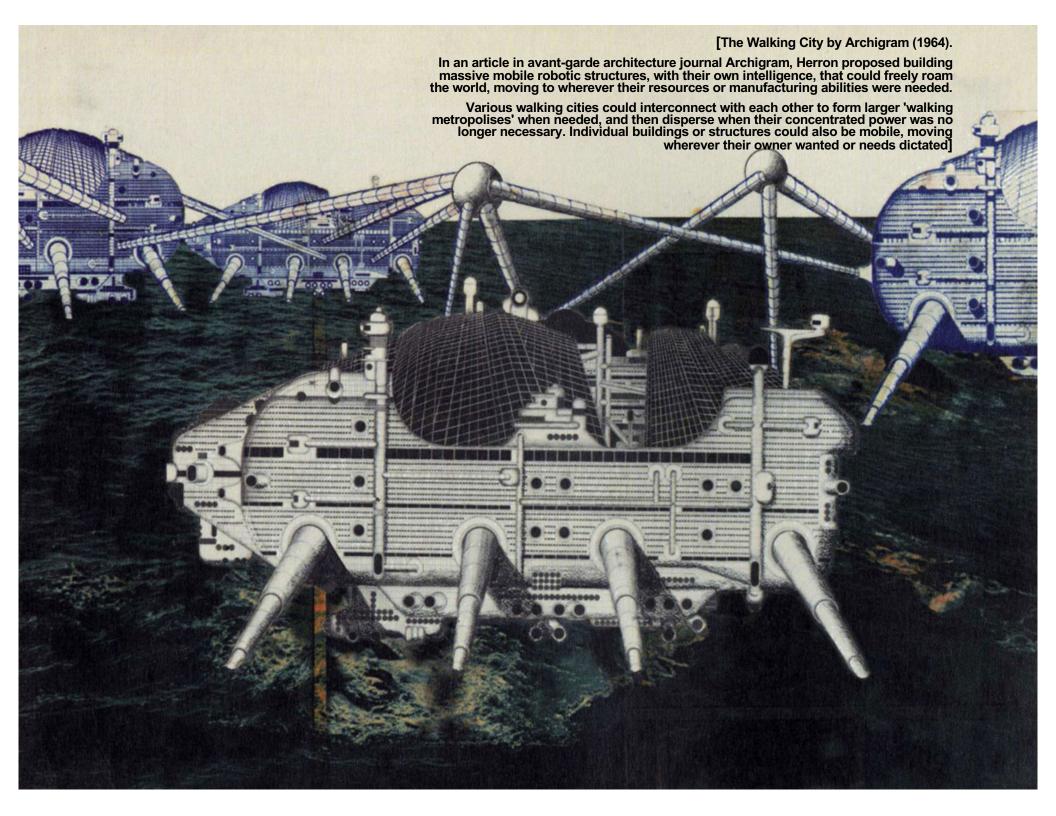
[The Solar Envelope, Professor Ralph Knowles (Sun, Rhythm, Form 1981)

The Solar Envelope is a way to assure urban solar access for both energy and life quality.

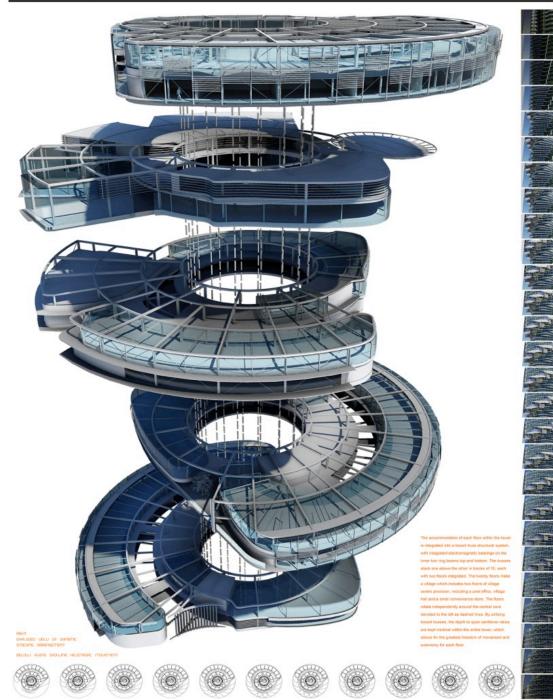
It regulates development within imaginary boundaries derived from the sun's relative motion. Buildings within this container will not overshadow their surroundings during critical periods of the day and year]

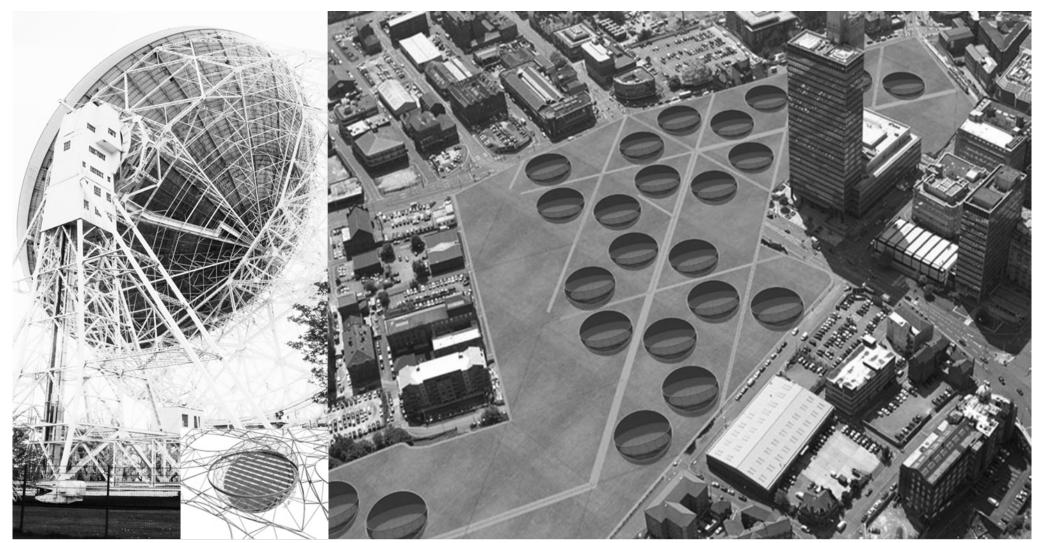


No protection required for black of land to morth

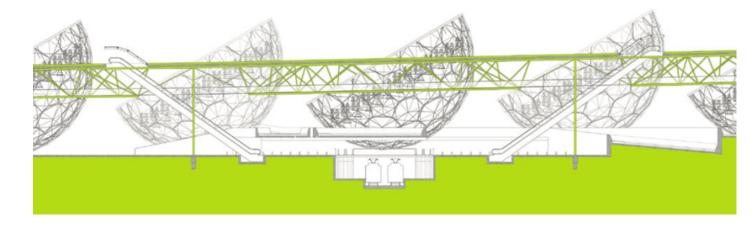


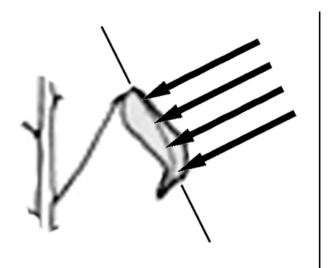
[RESEARCH & EDUCATION - A VISION OF THE FUTURE TECHNO-

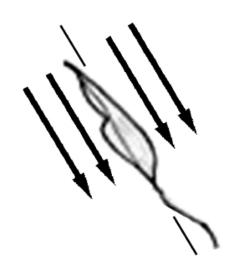


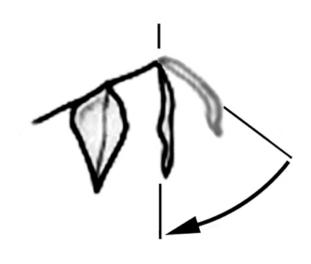


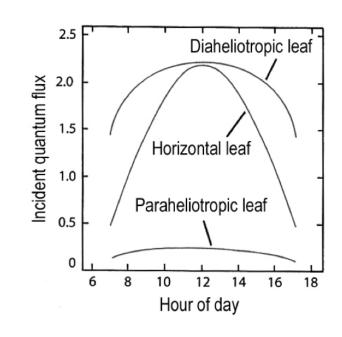
THE LOVELL TELESCOPE
Radio eye on the universe
The 76-m Lovell Telescope is the
world's third largest, fullysteerable radio telescope and has
stood proudly over the plains of
Cheshire since 1957.



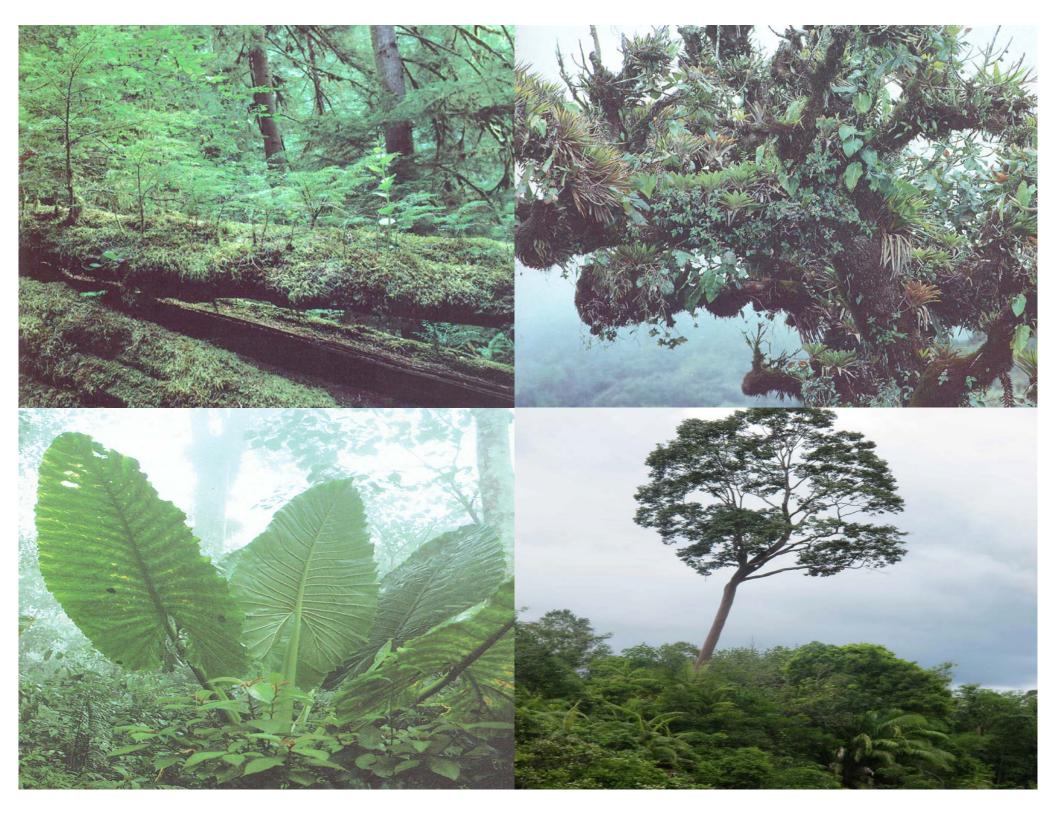




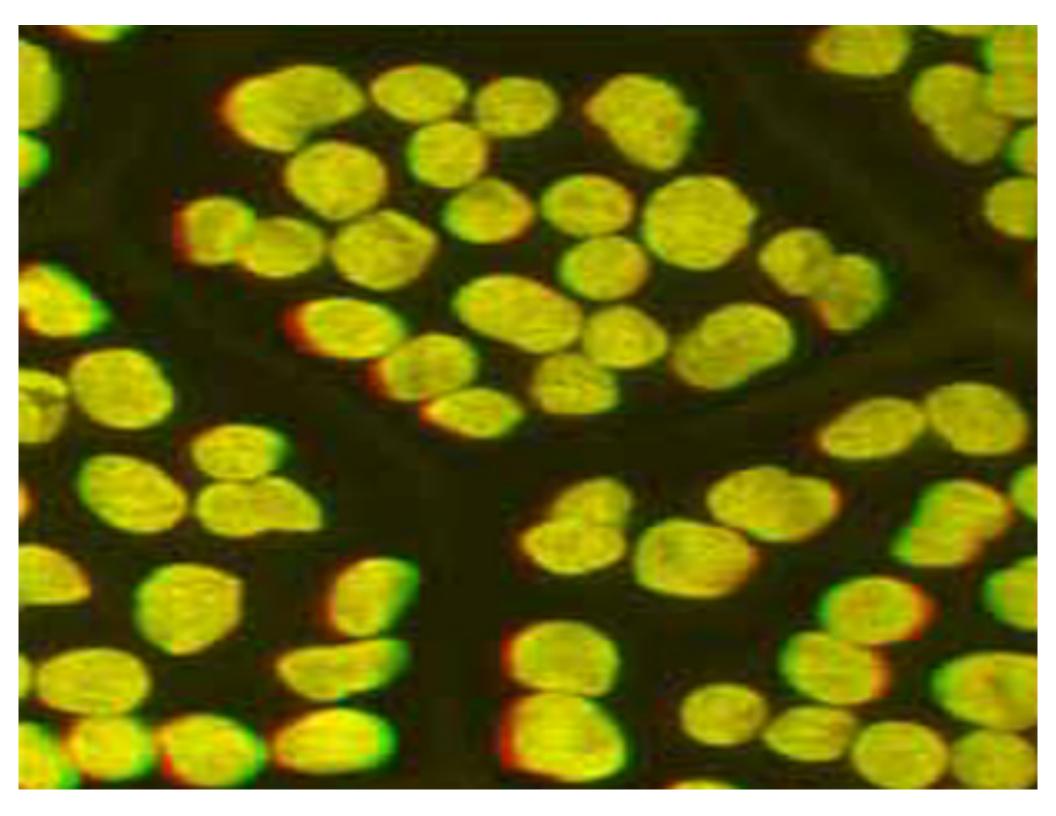


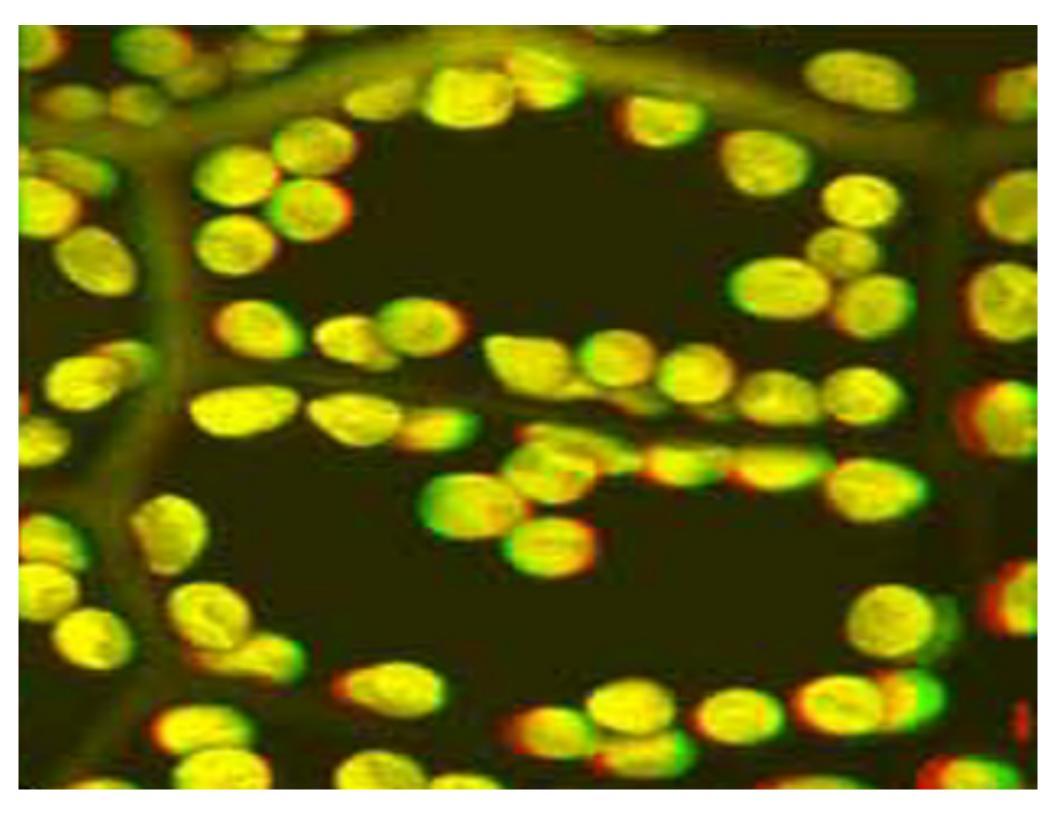






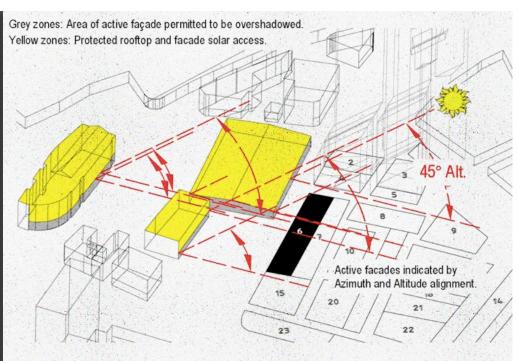




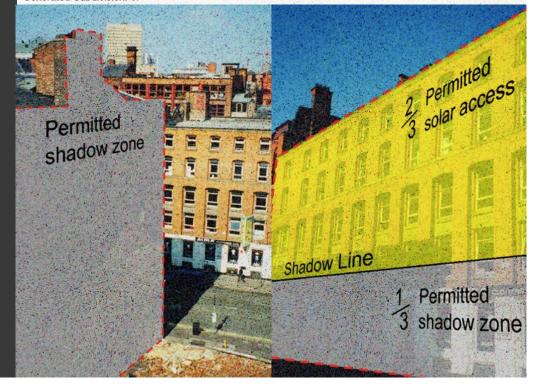


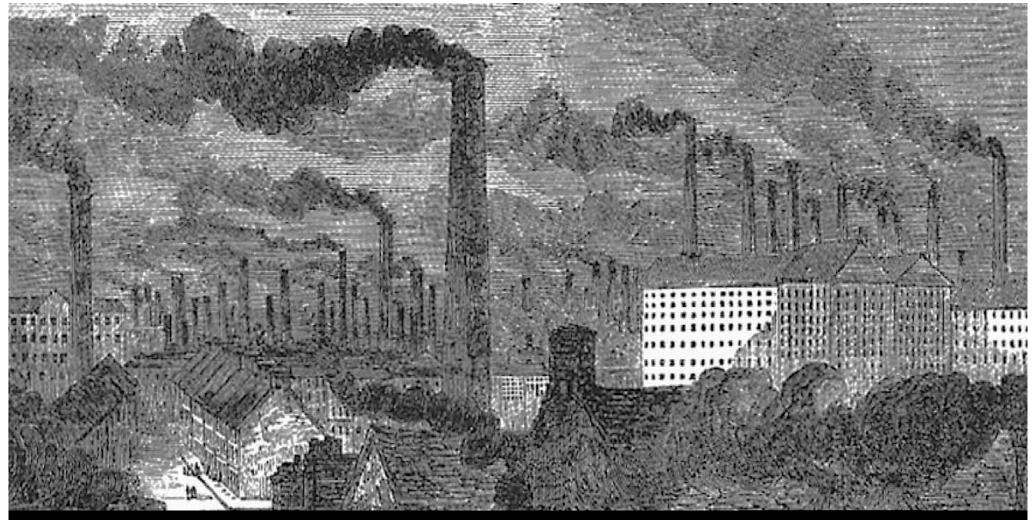
NEXT:

- 1. EXISTING
- 2. SEQUENTIAL METHOD
- 1. SPATIAL VISUALISATION OF SUN & SHADE
- 2. IDENTIFIES POTENTIAL FOR PASSIVE & ACTIVE TECHNOLOGIES
- 3. SOLAR ACCESS (EXISTING & FUTURE)
- 4. SIMPLE RULES



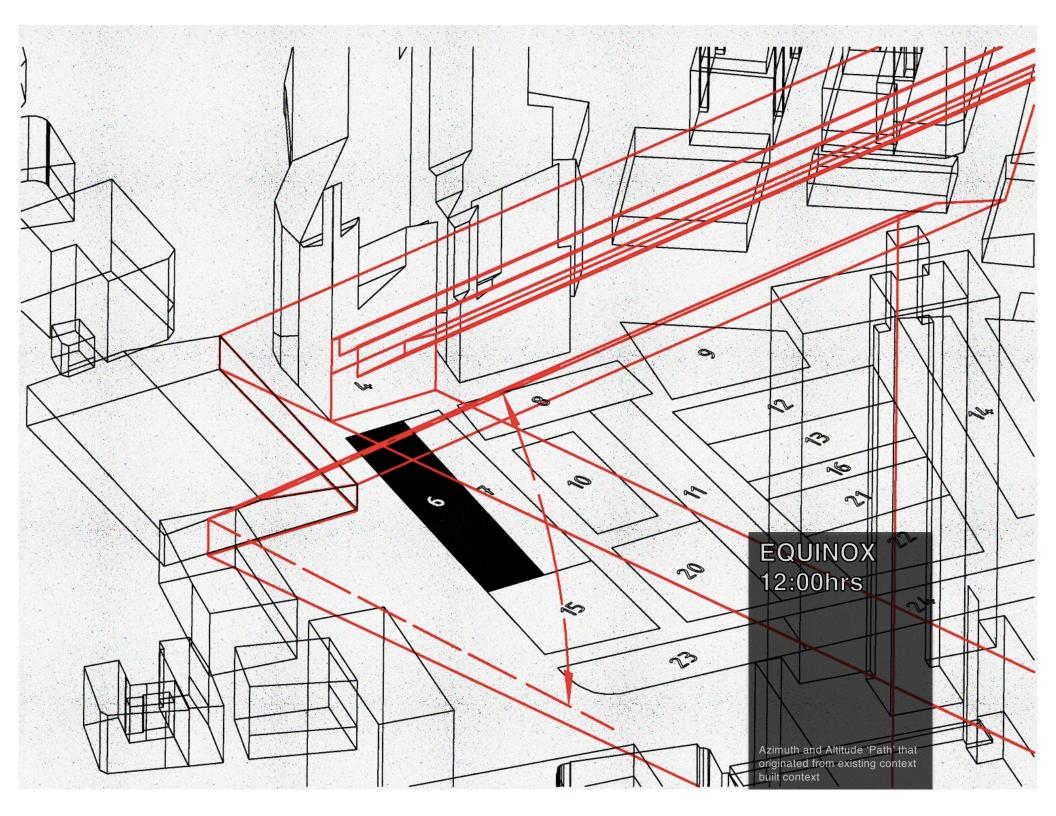
Scenario 1. Summer Morning Seed Grid Generation.
Critical Insolation Time Period: 09.00hrs.
Generated Subdivision: 6.

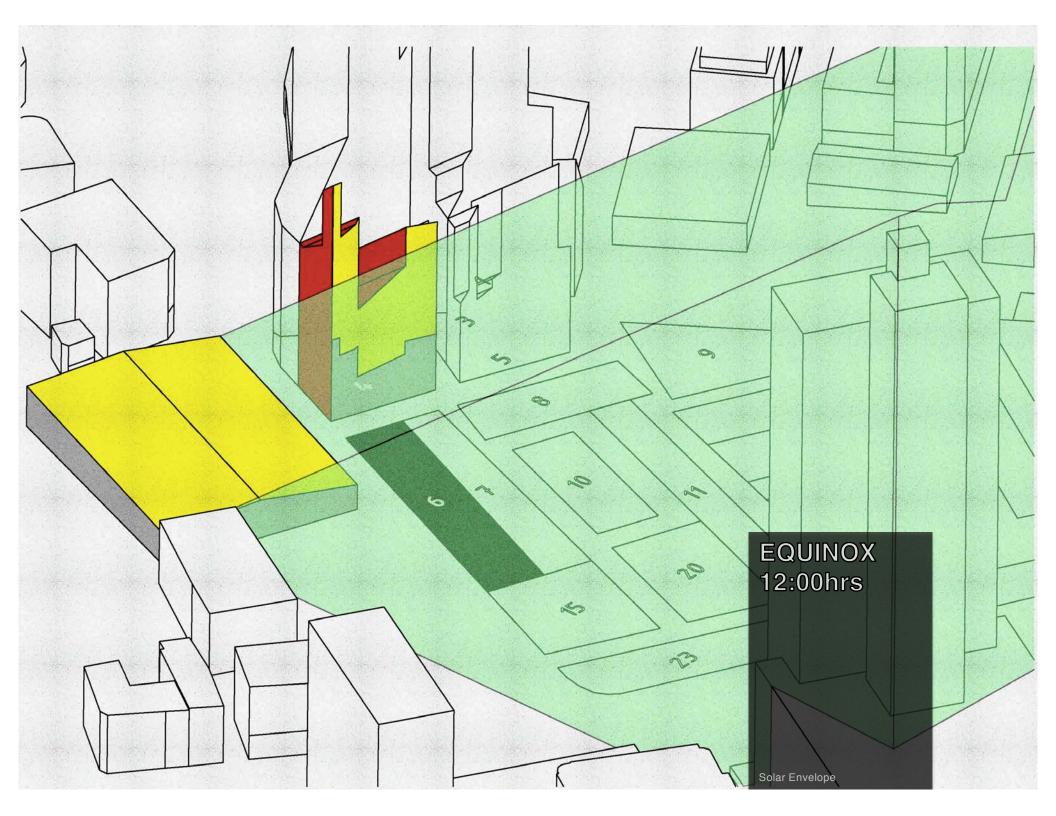


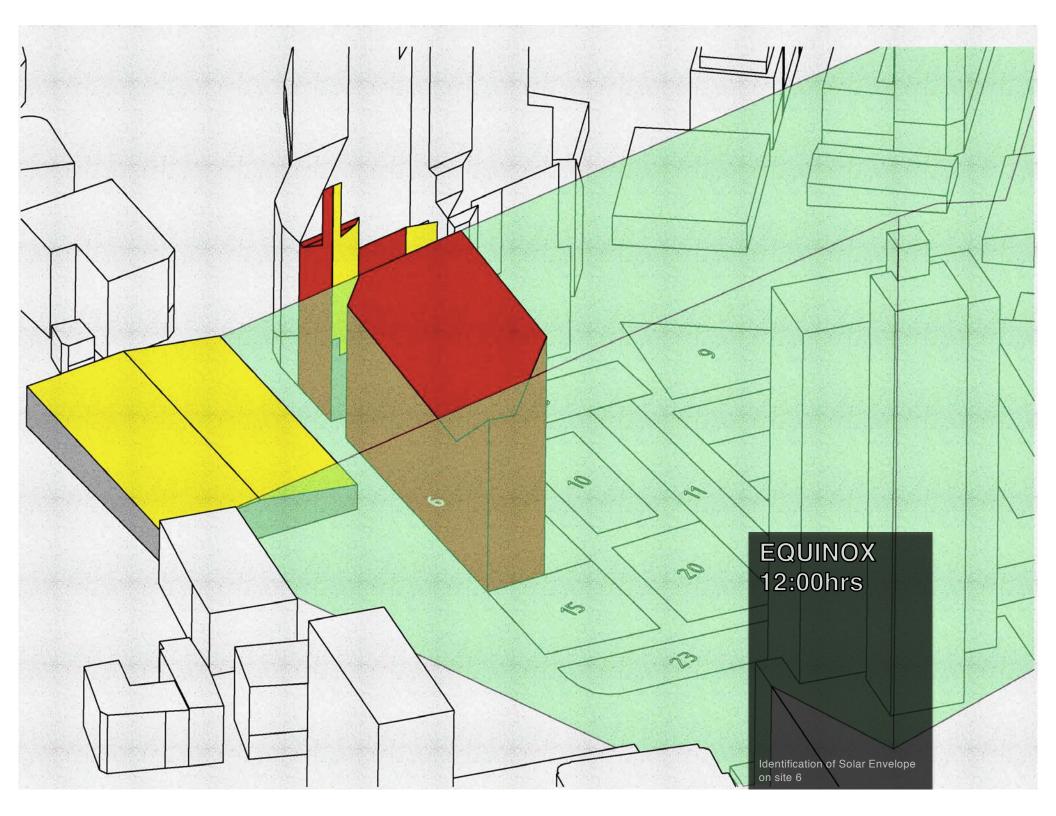


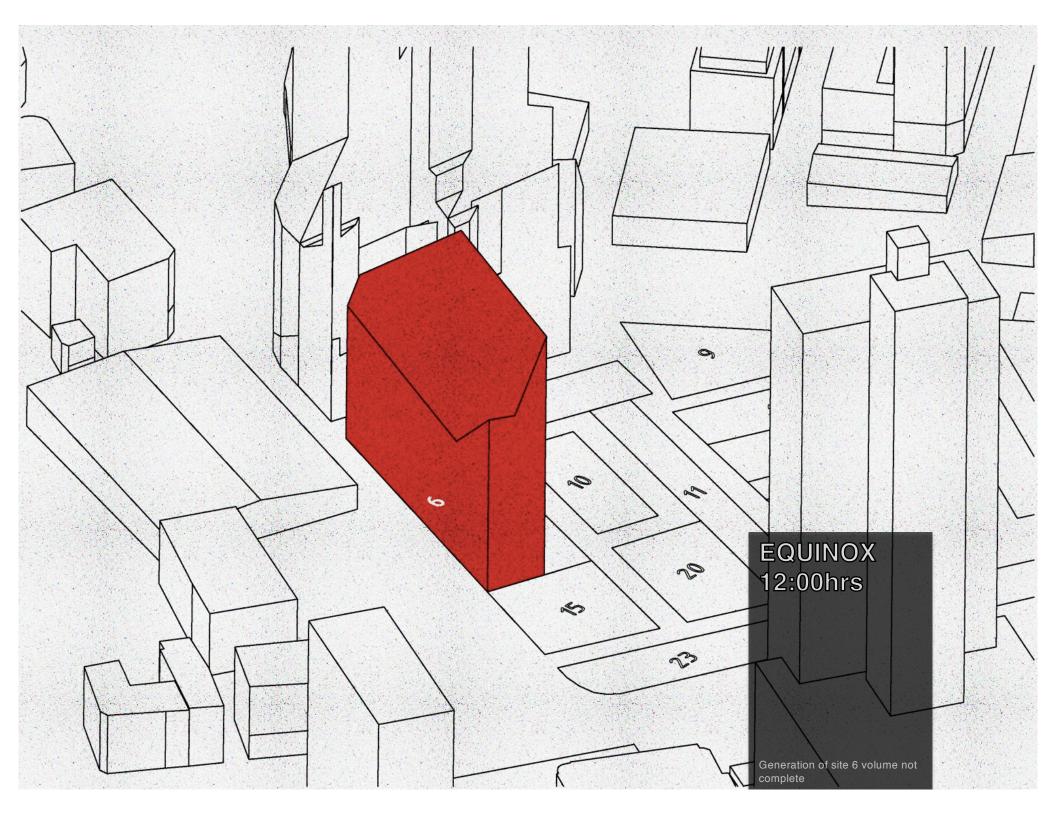
NON-SOLAR

EXISTING



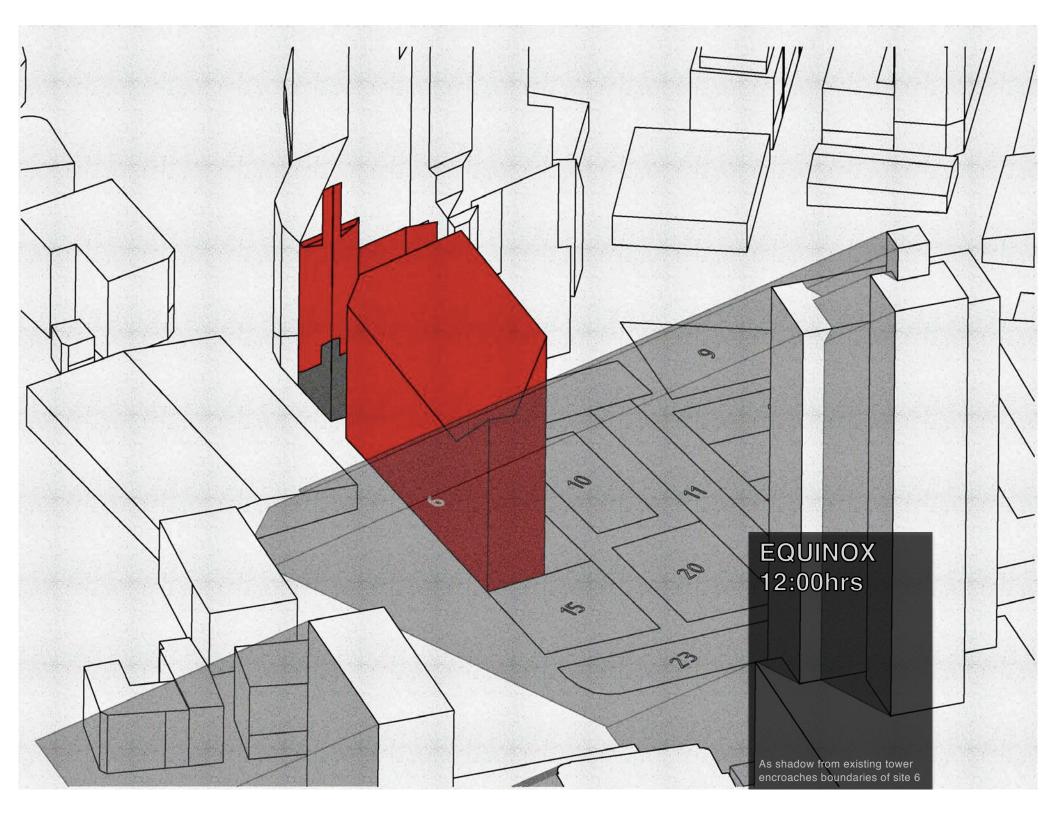


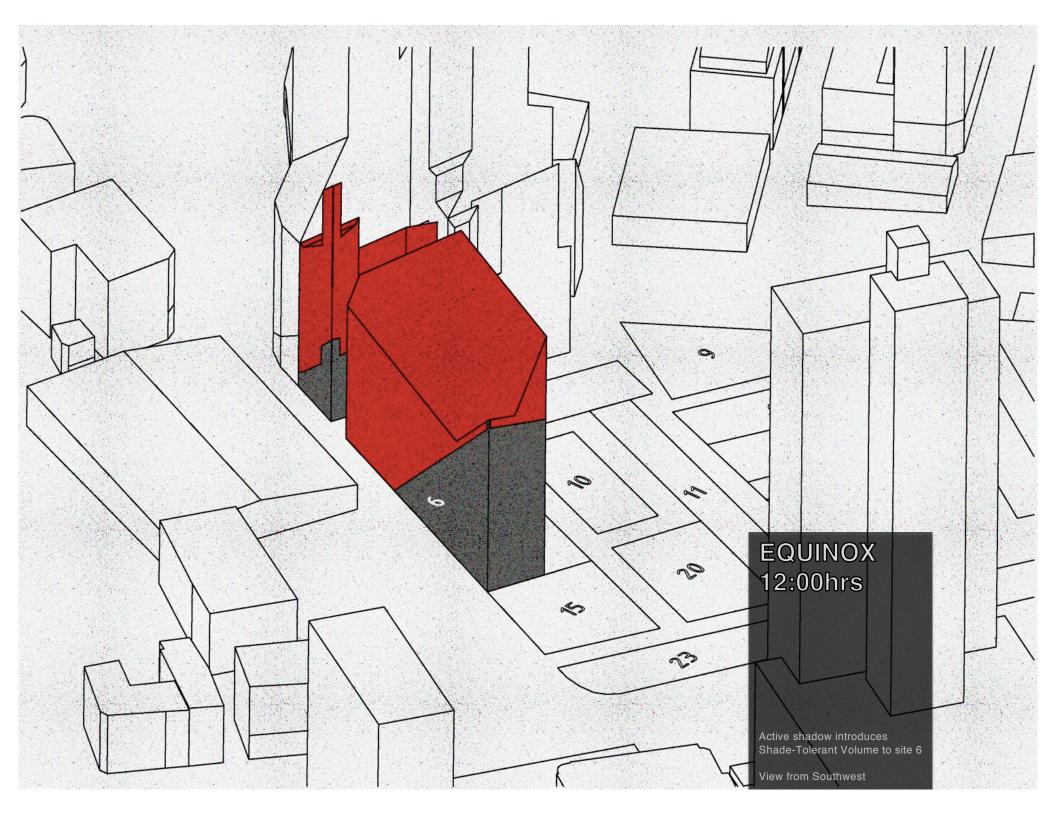


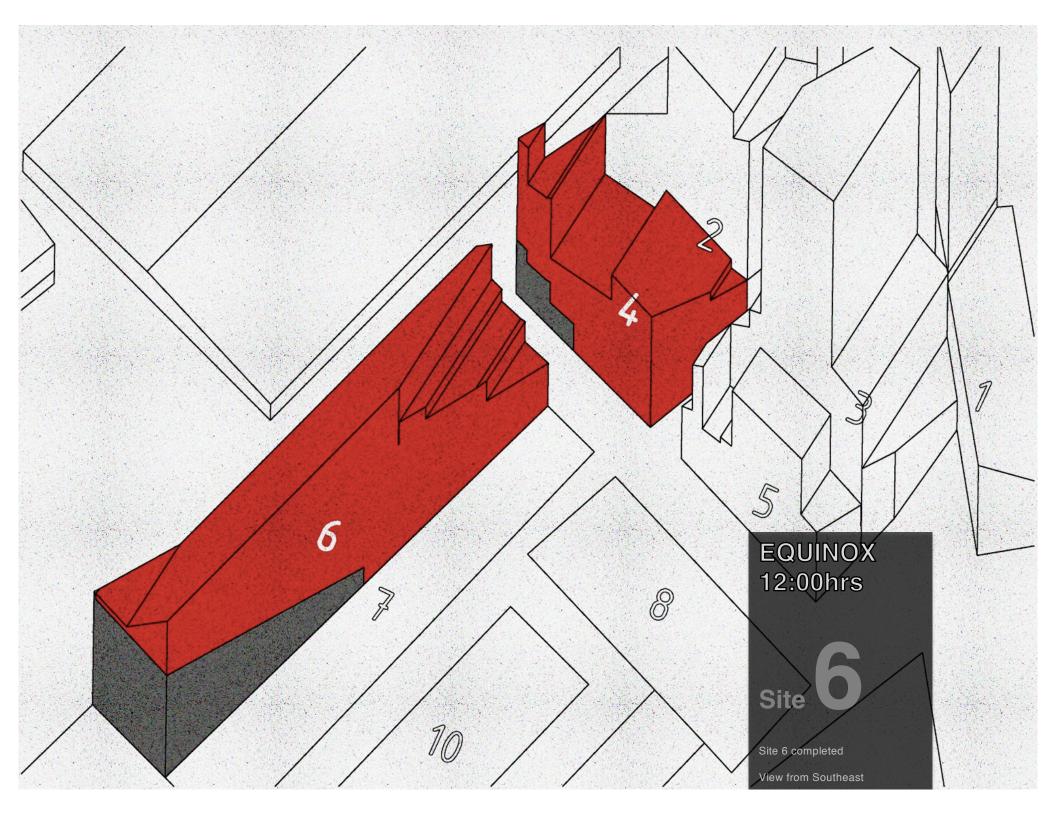


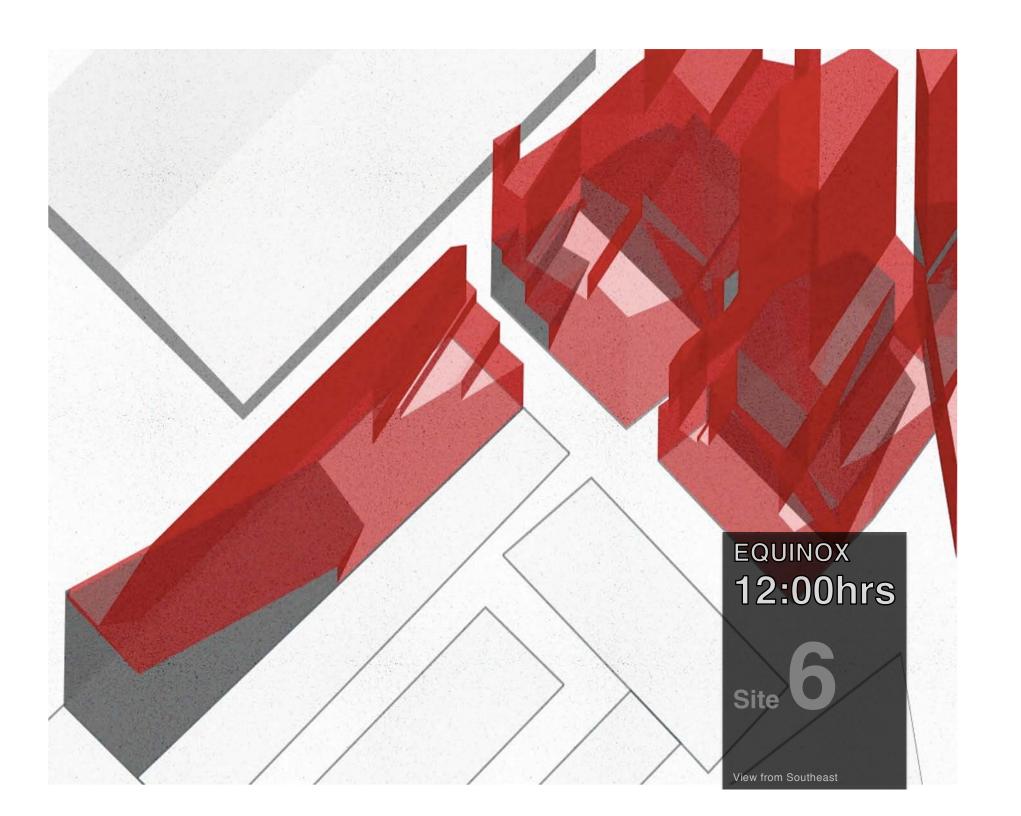




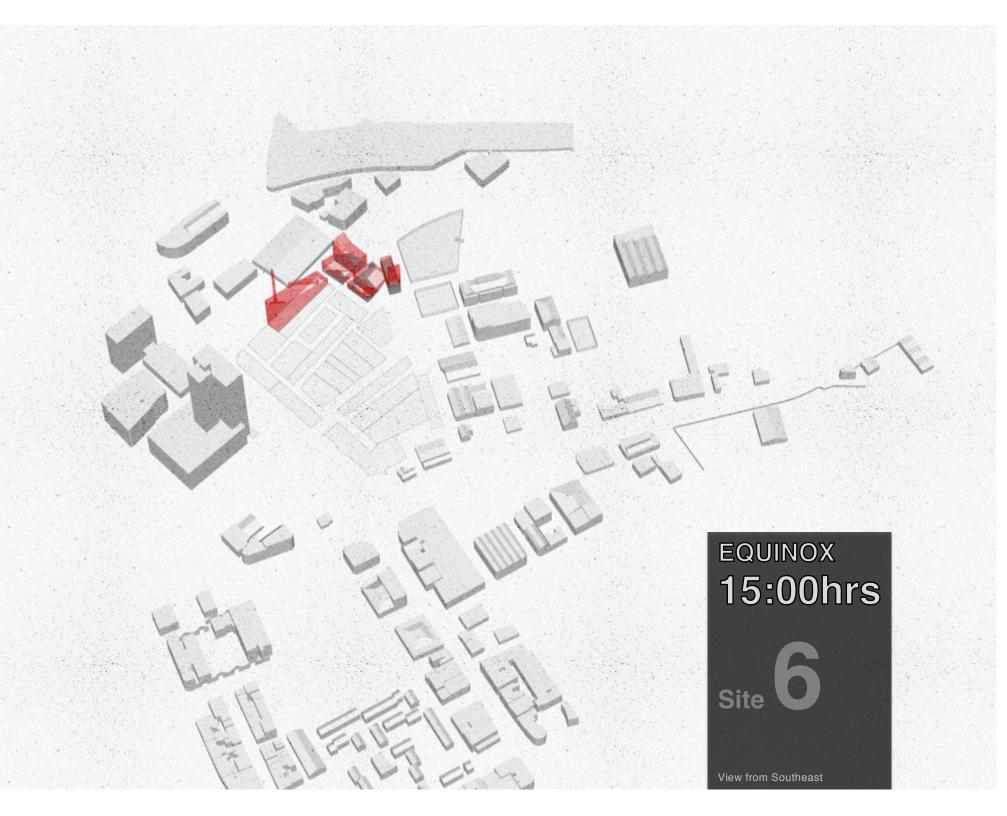






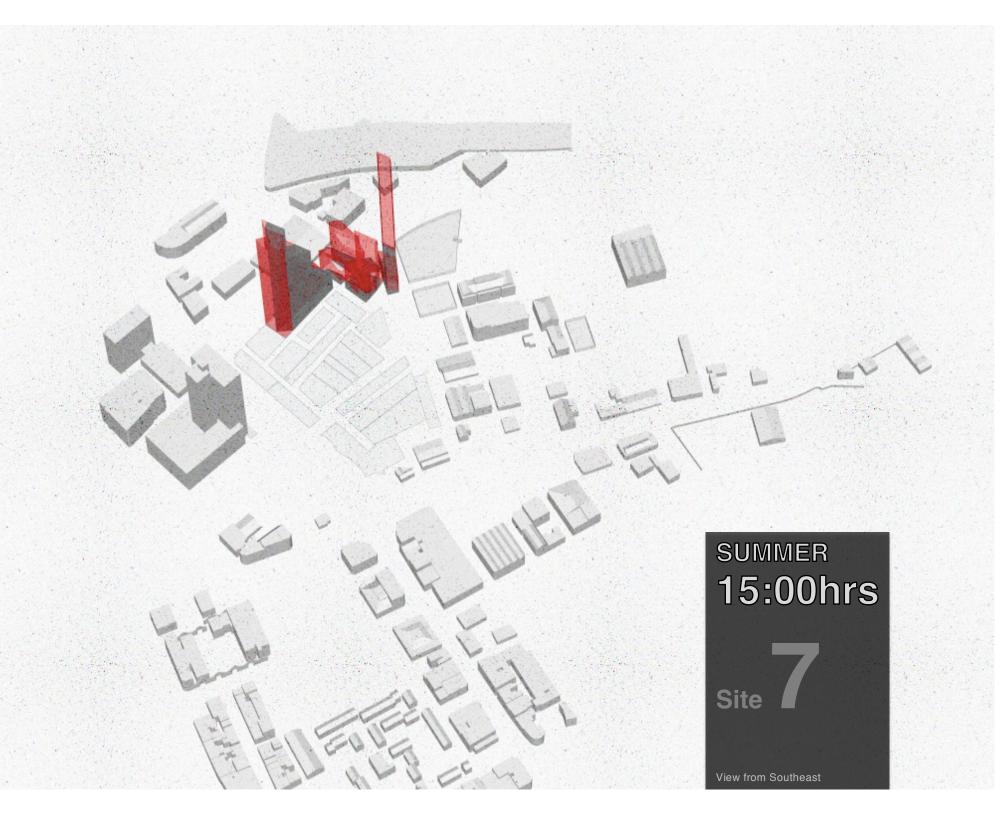
































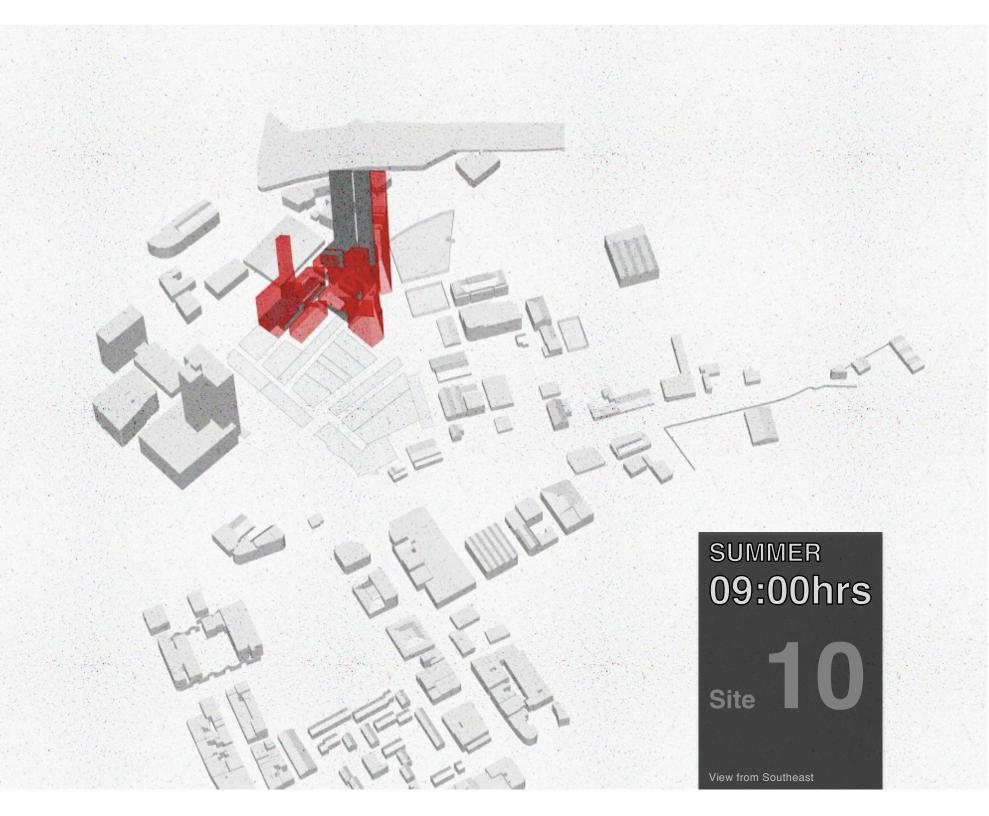


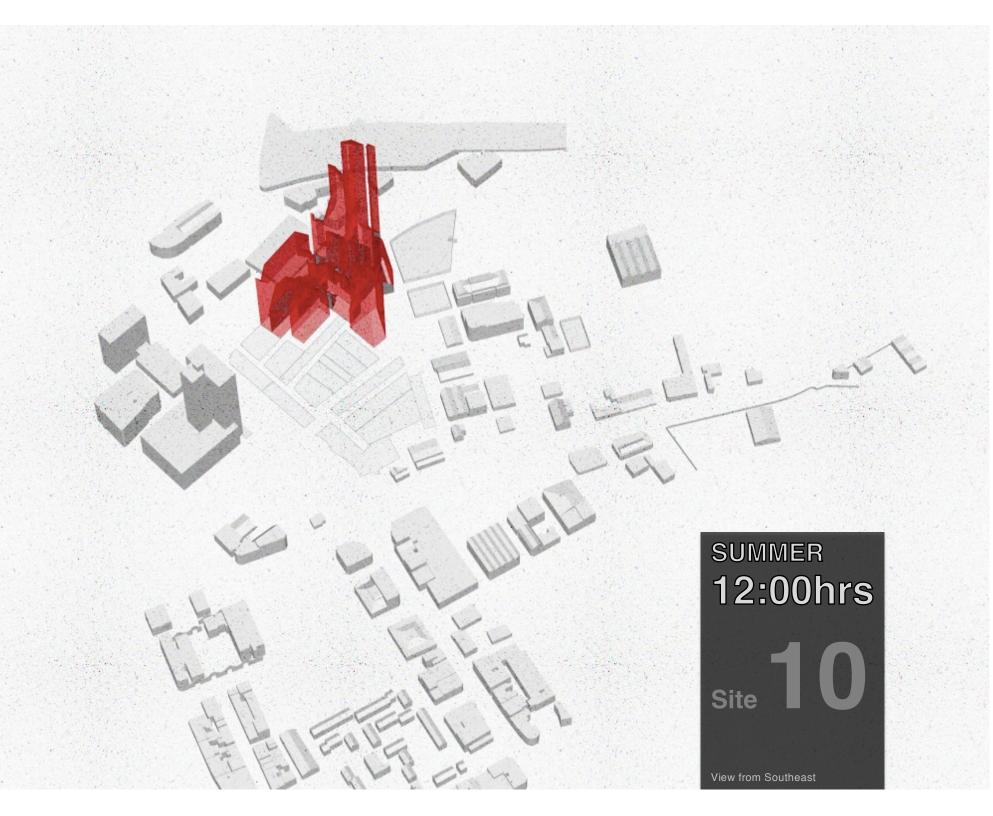








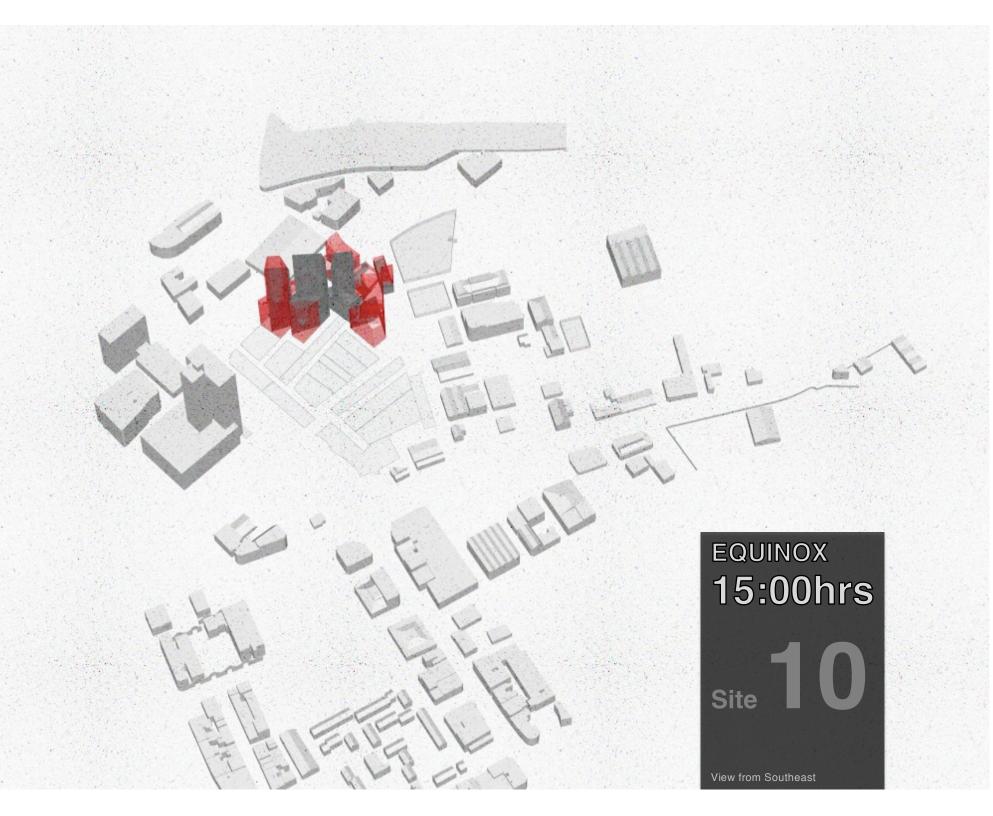


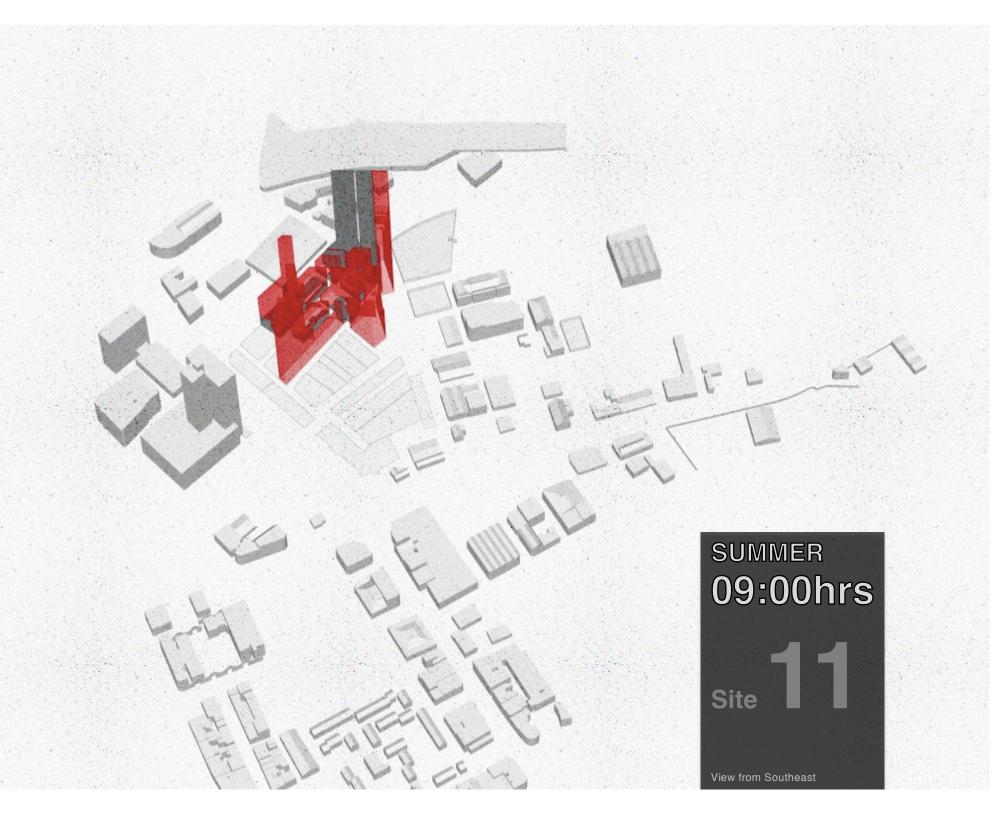


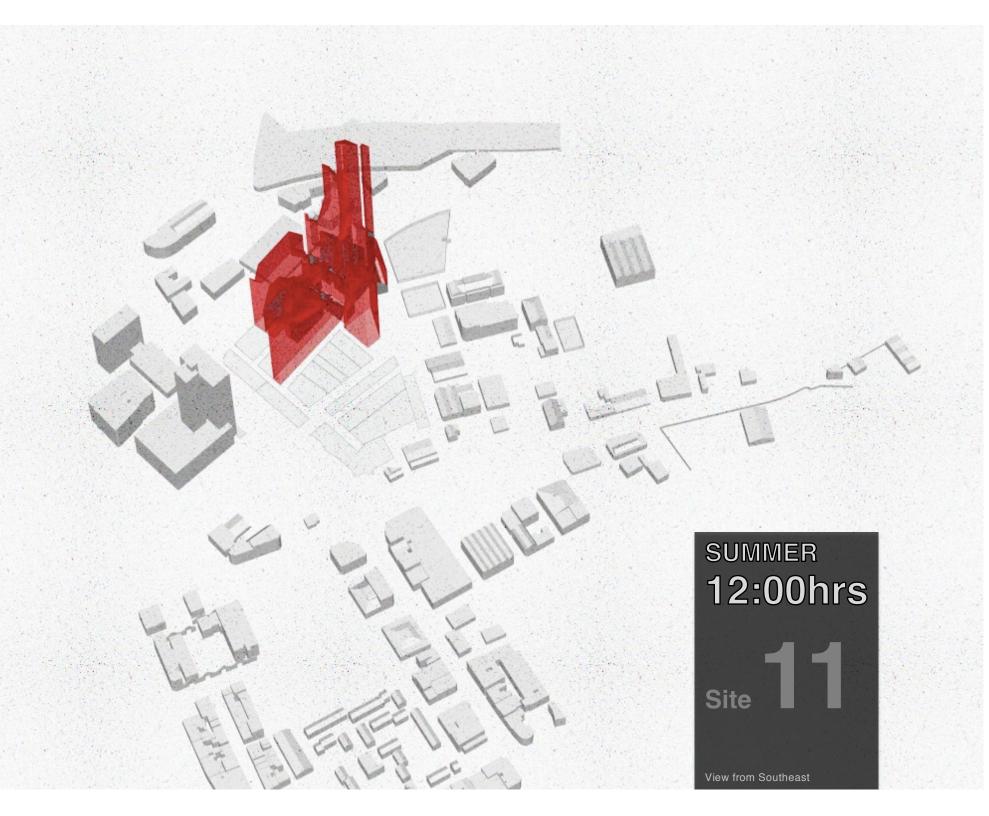


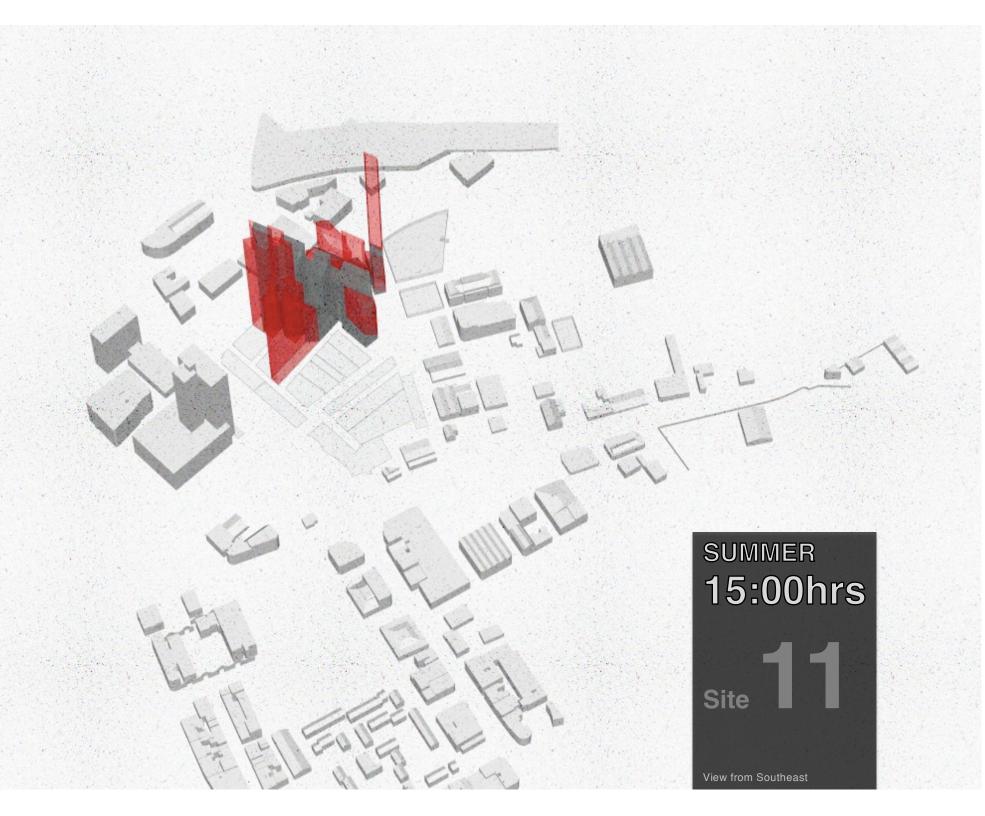








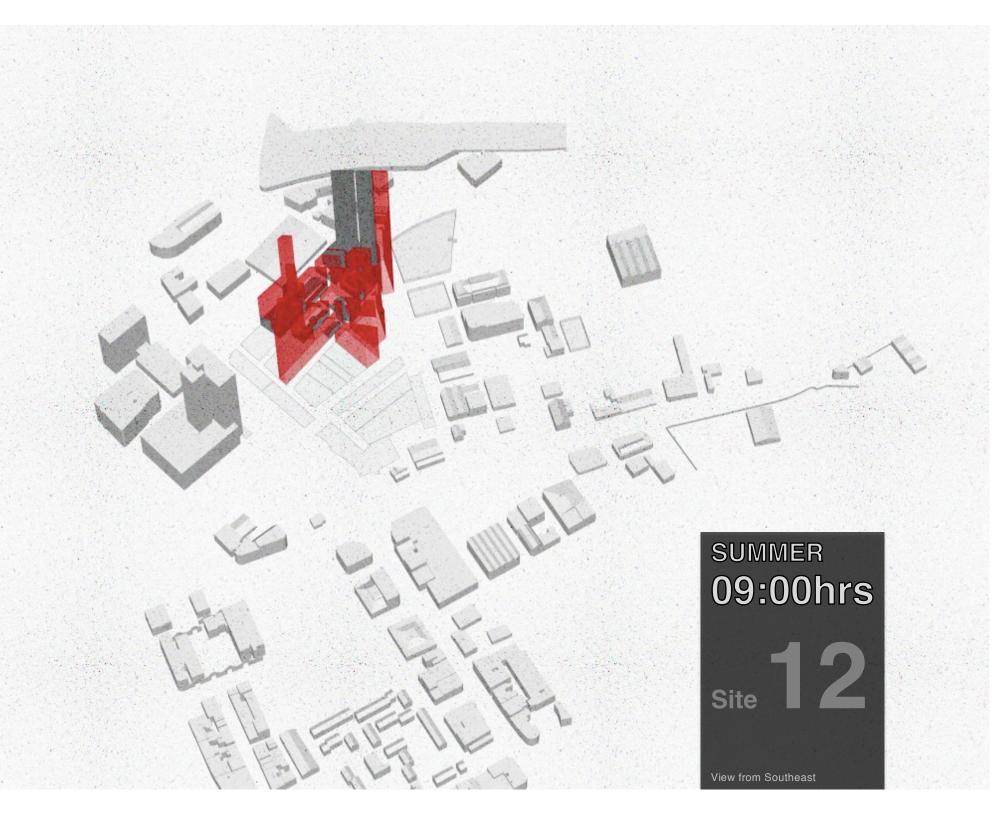


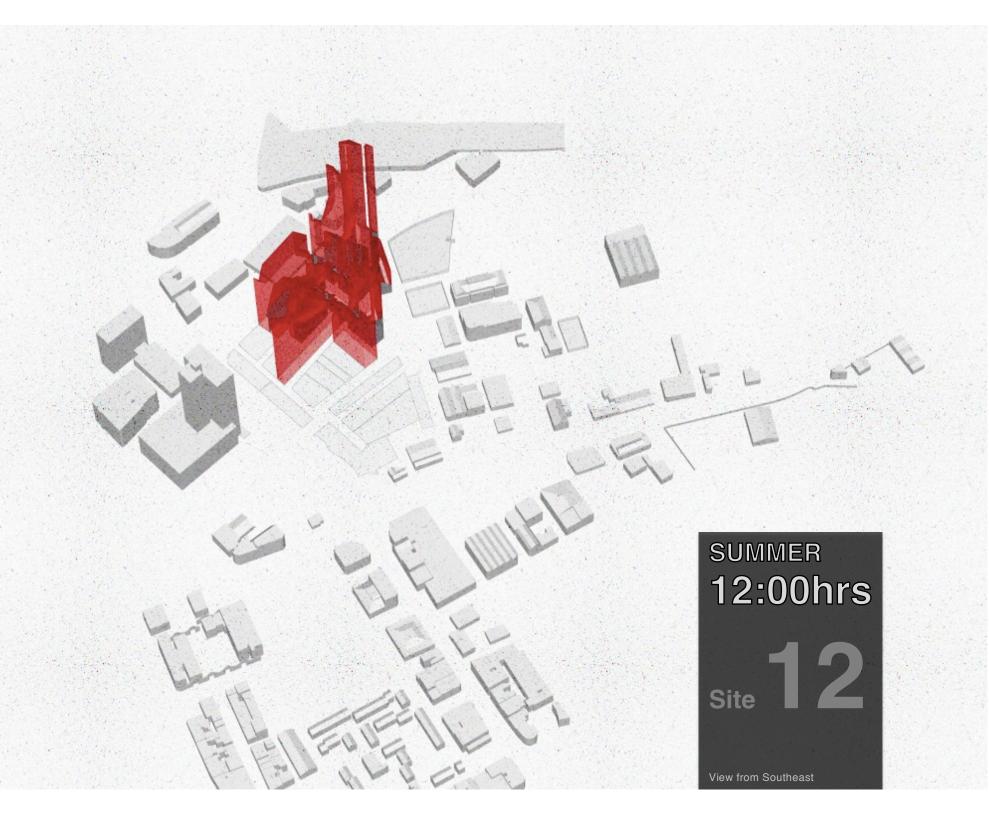


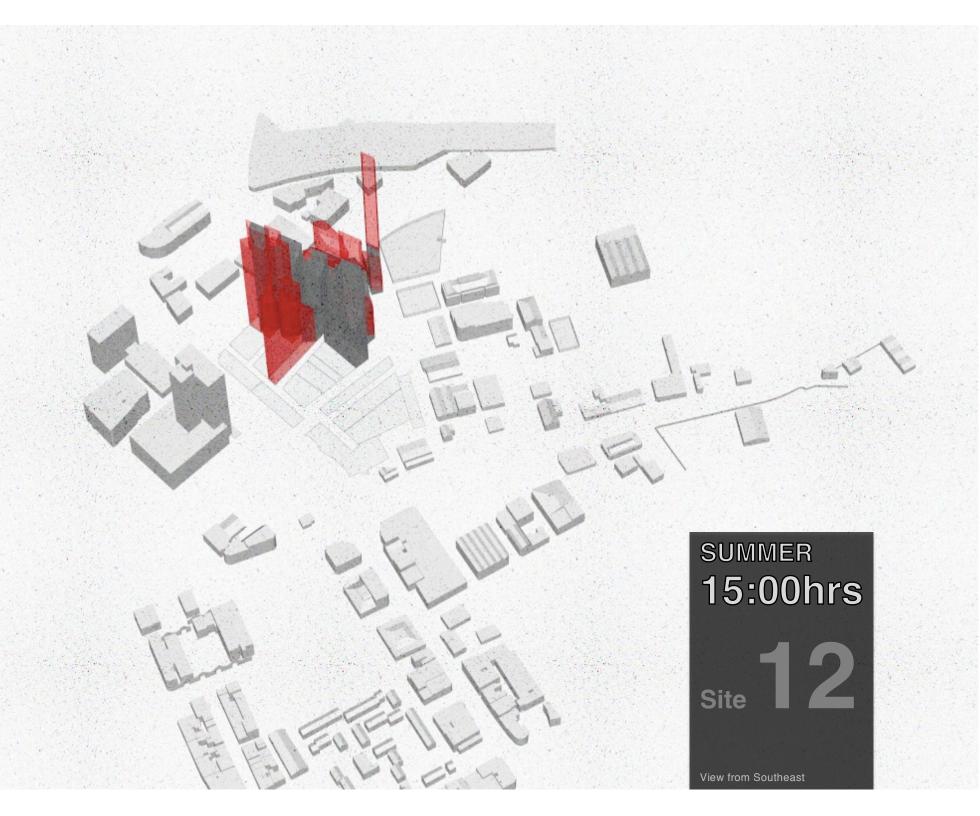






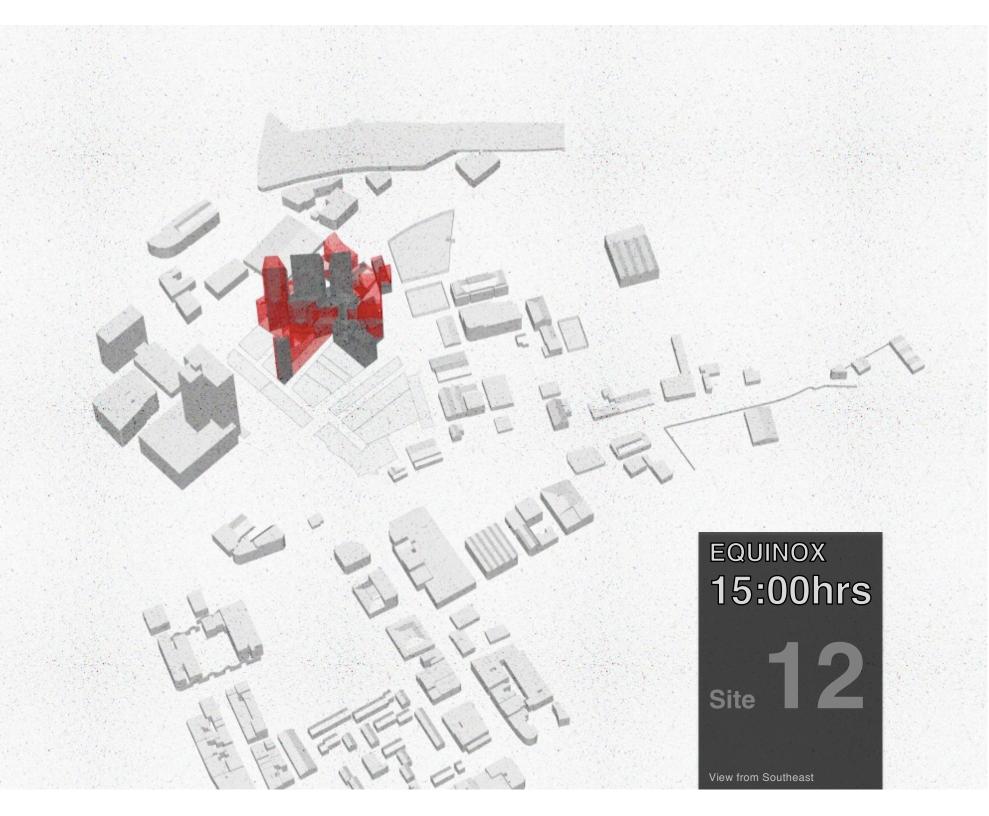




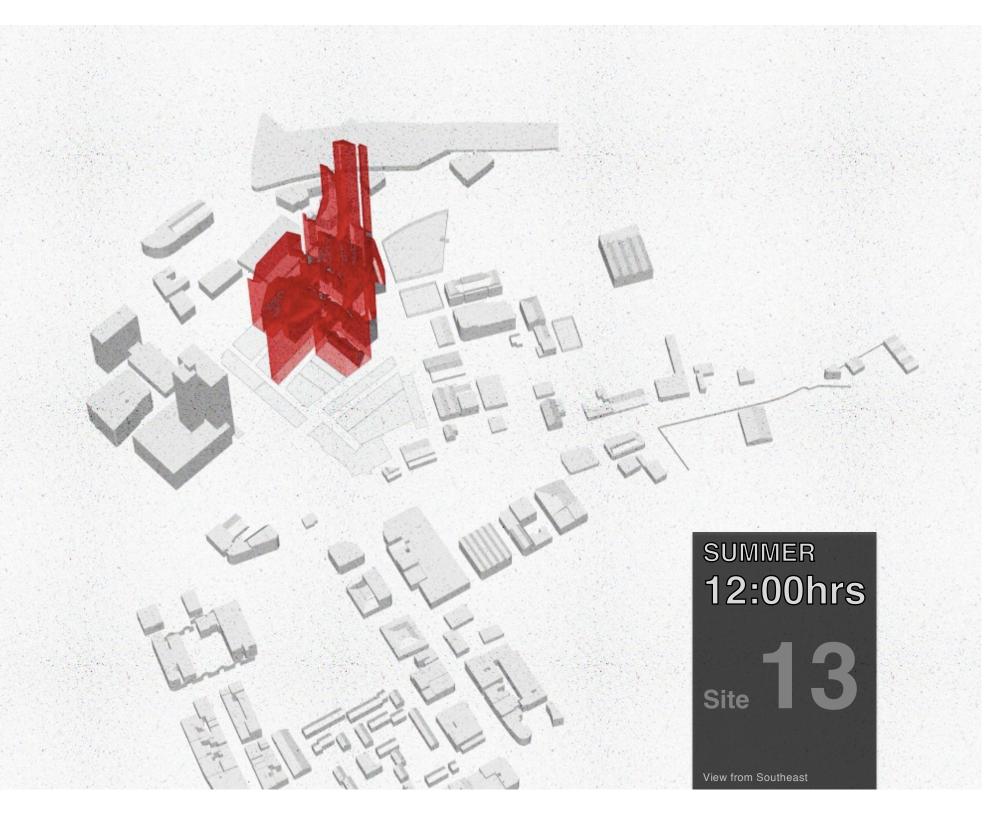


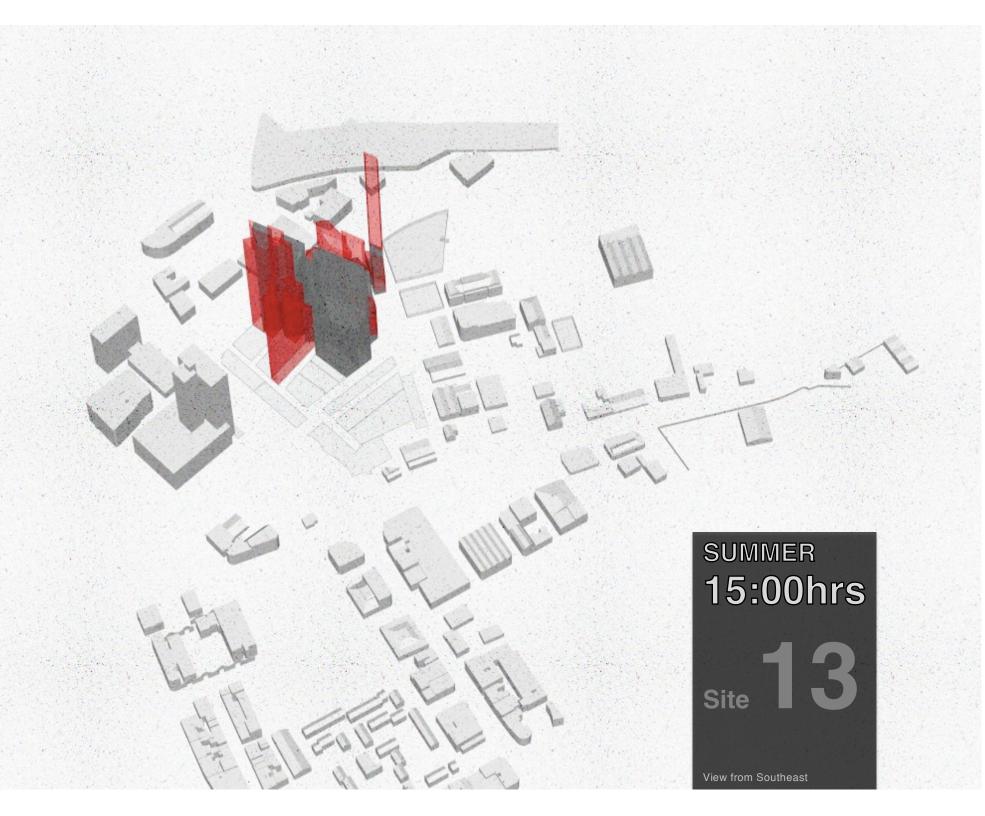








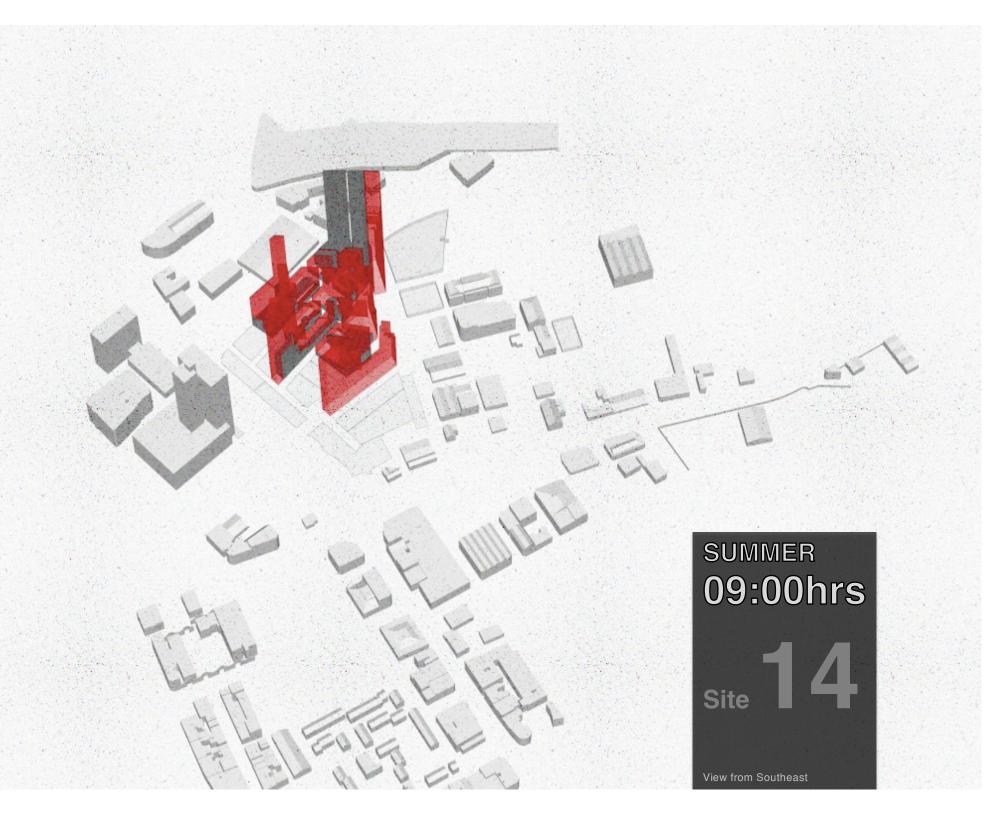




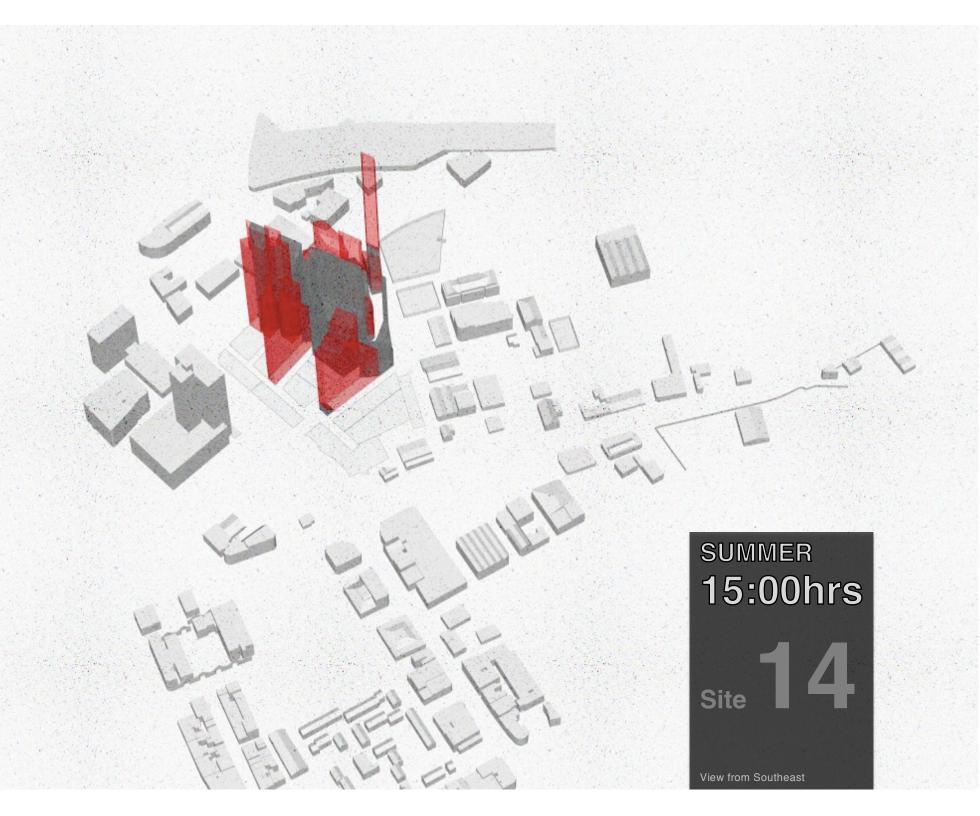


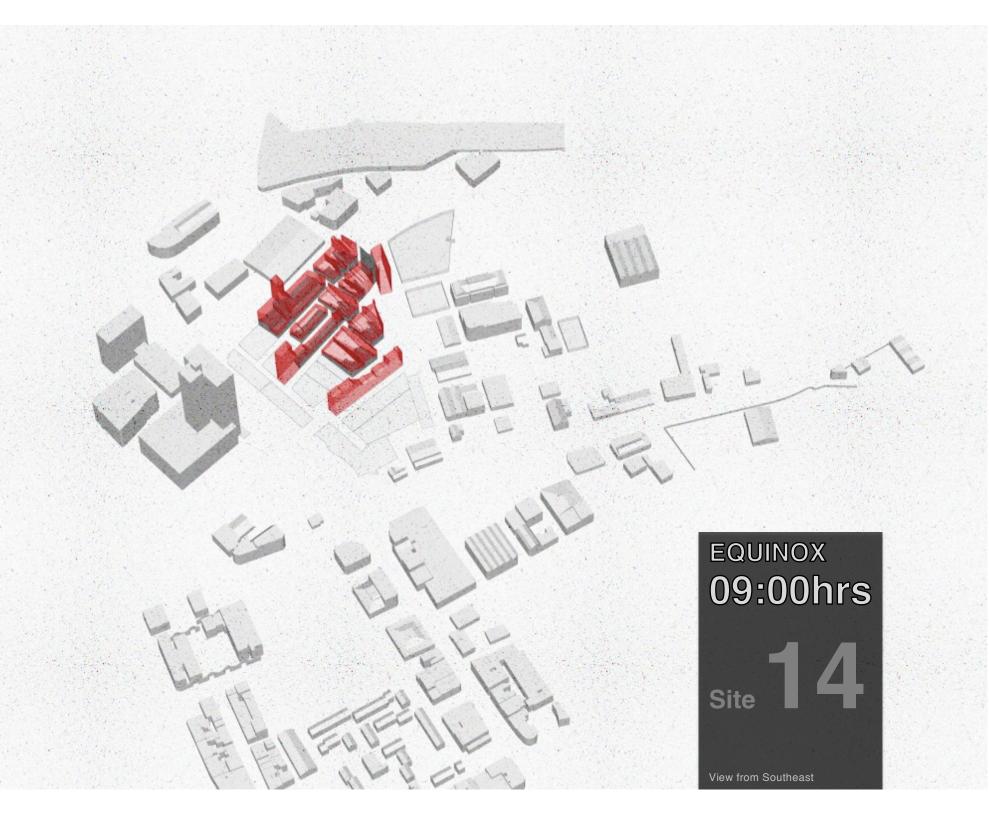






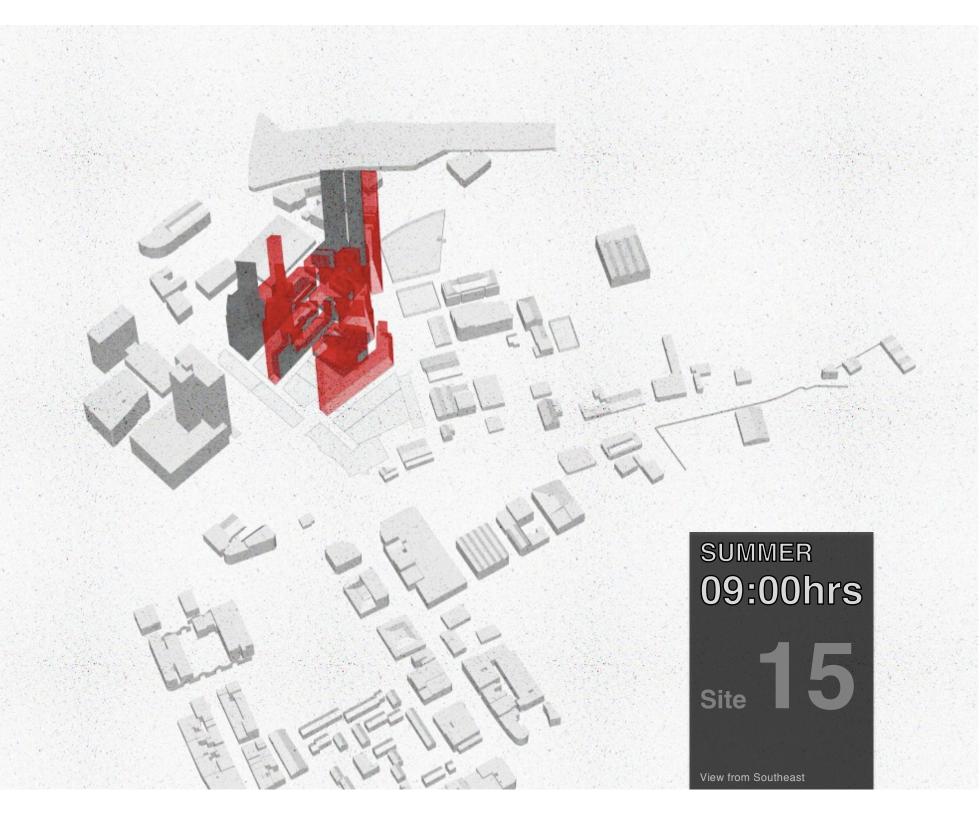


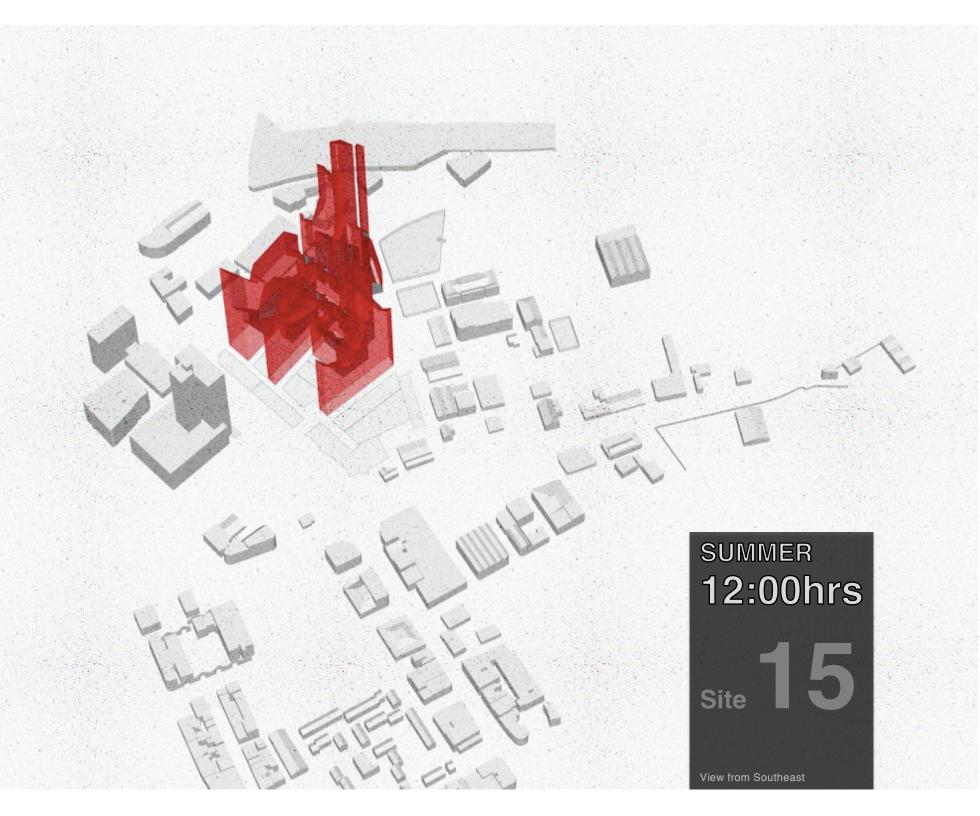


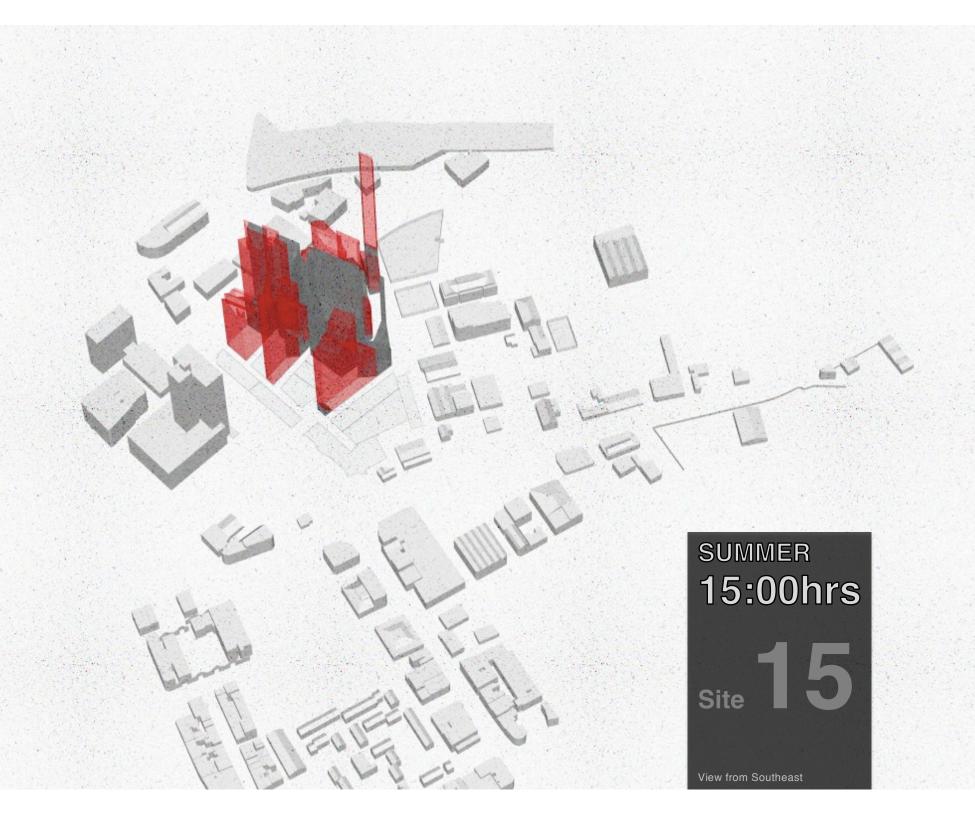










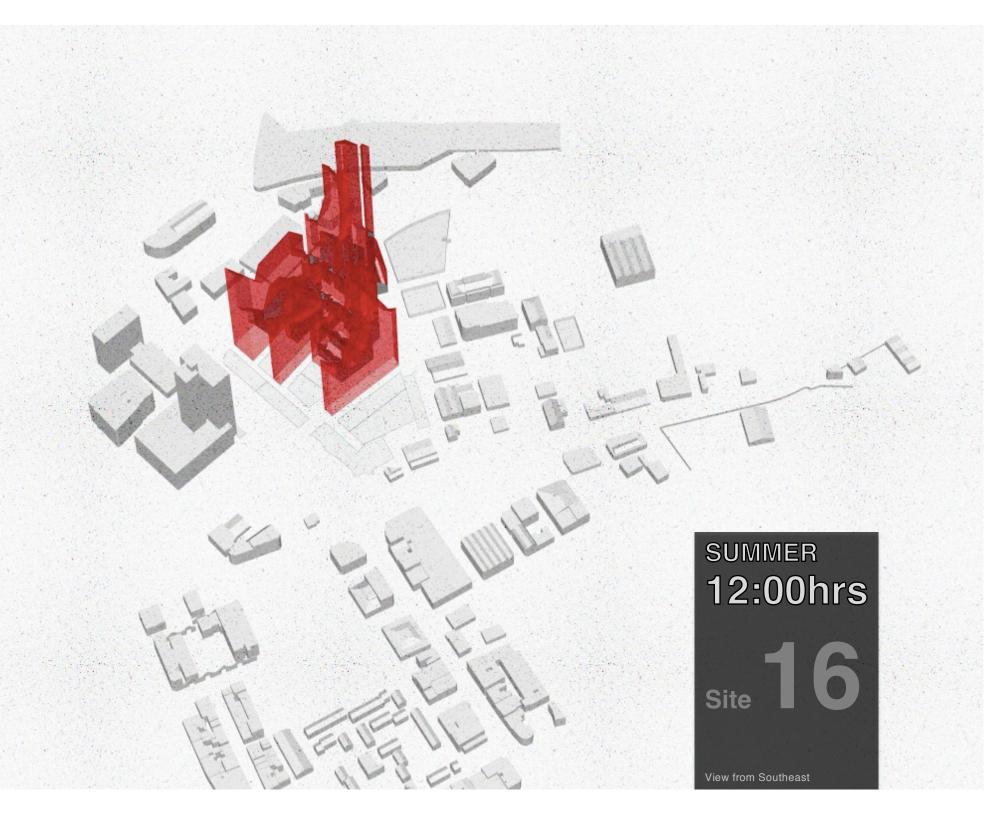


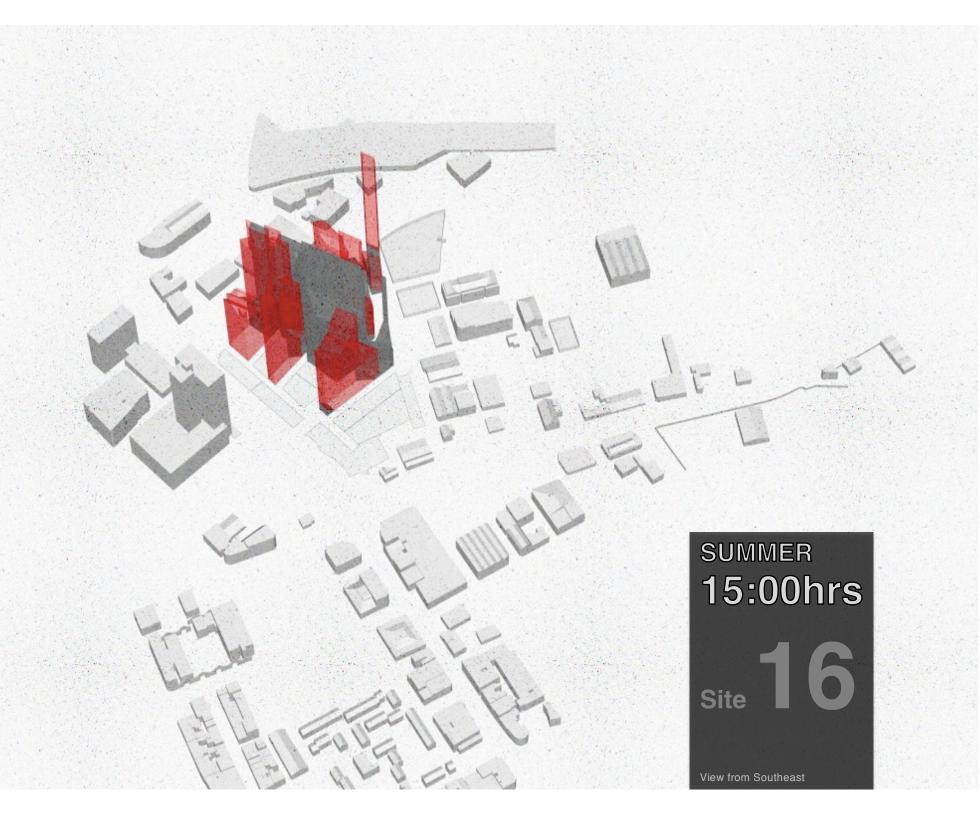






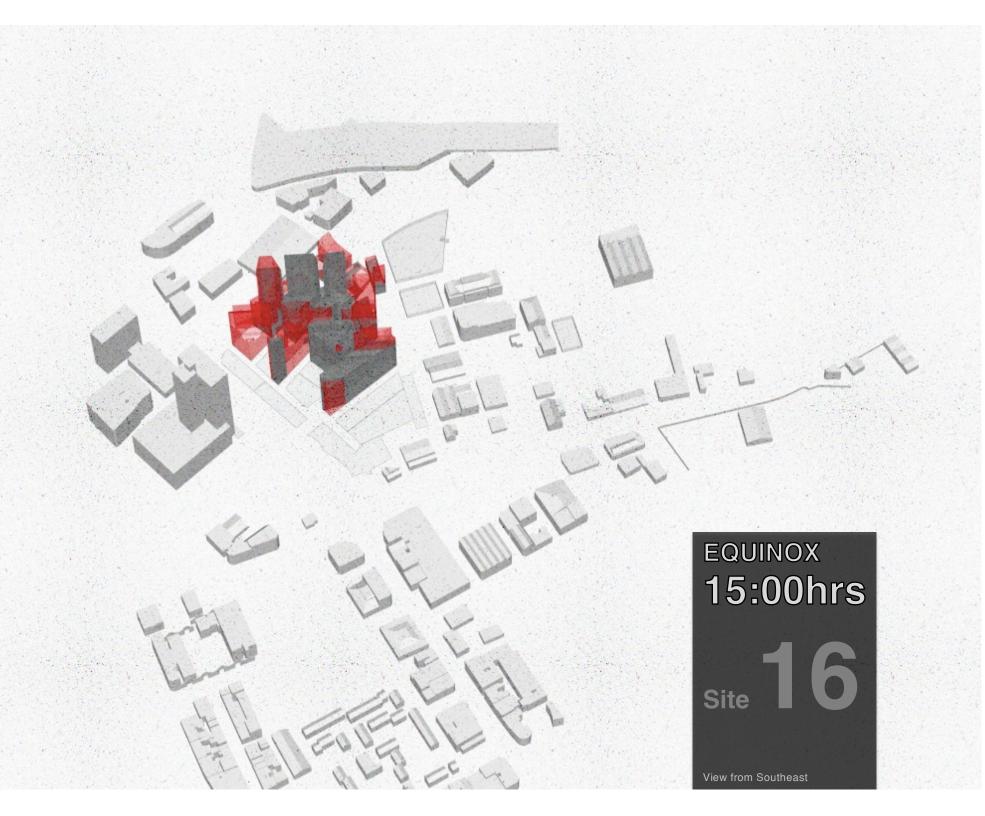




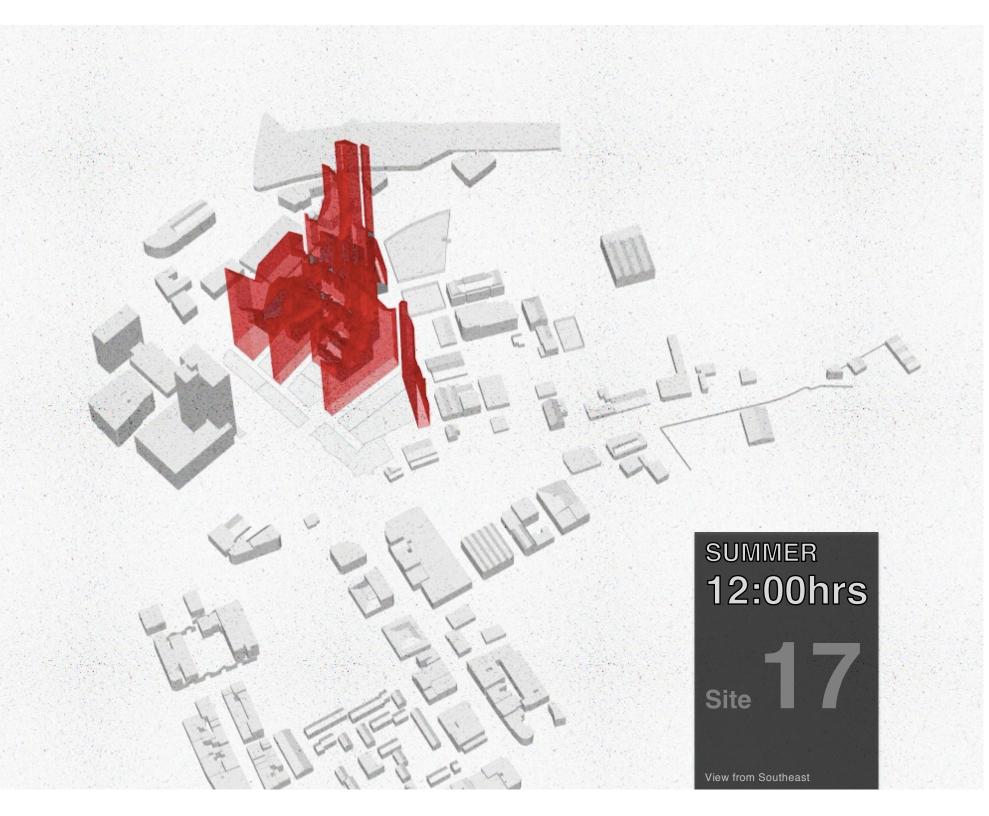


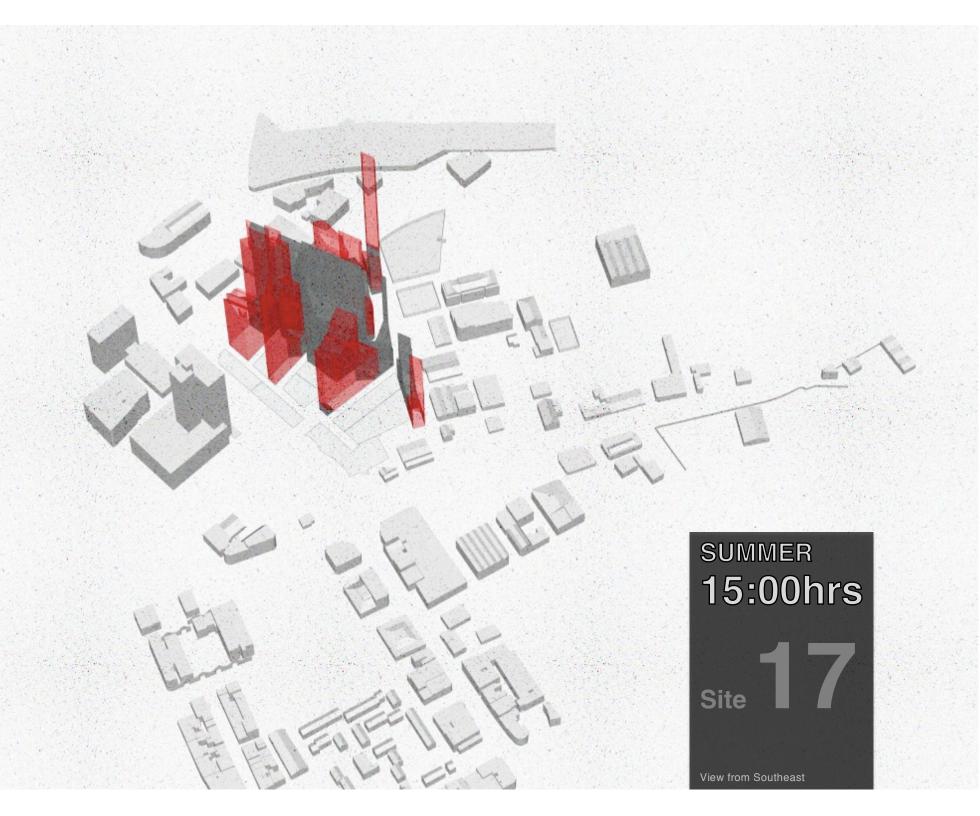








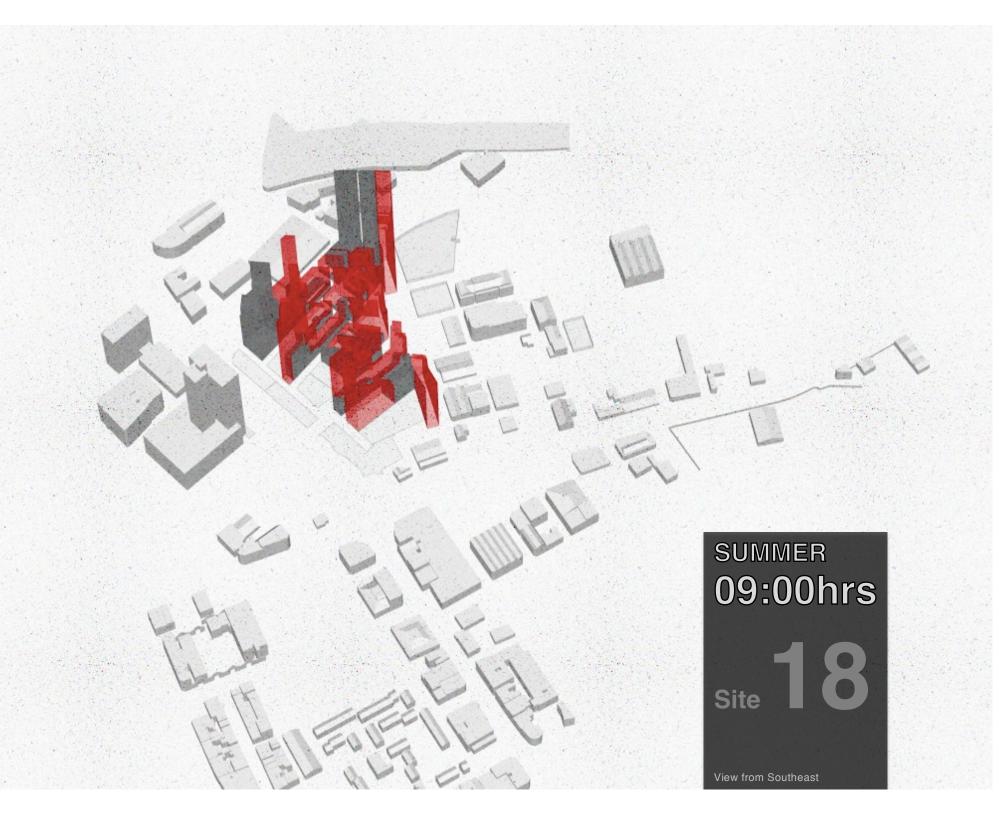




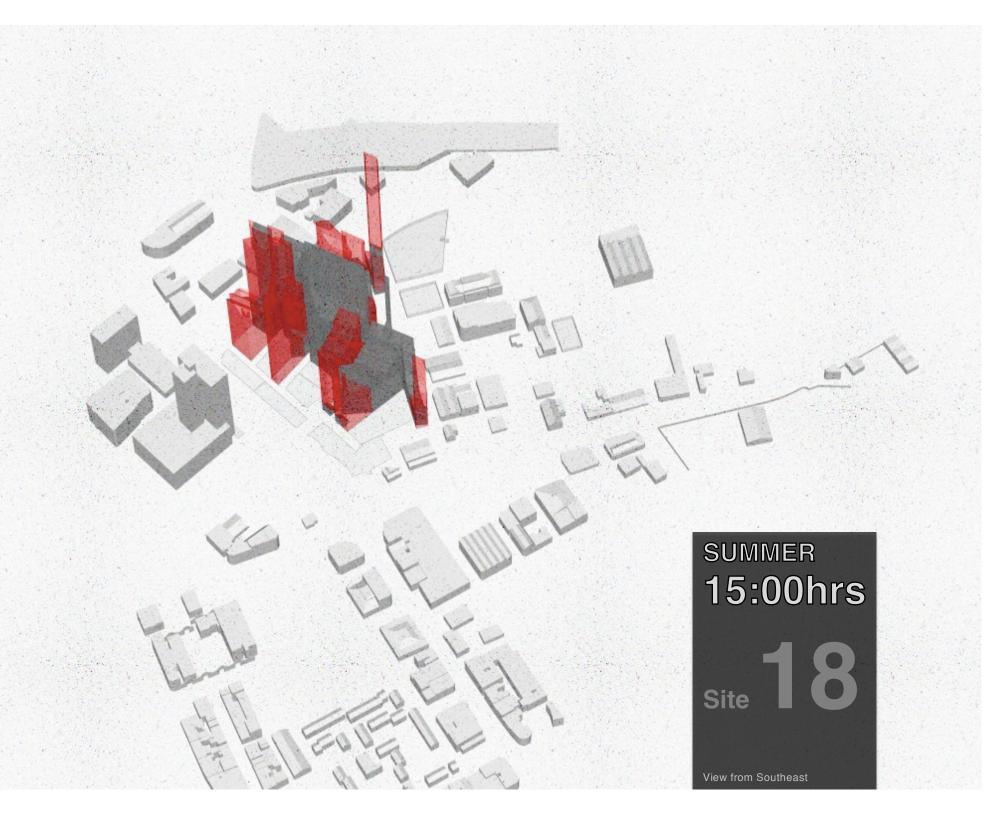






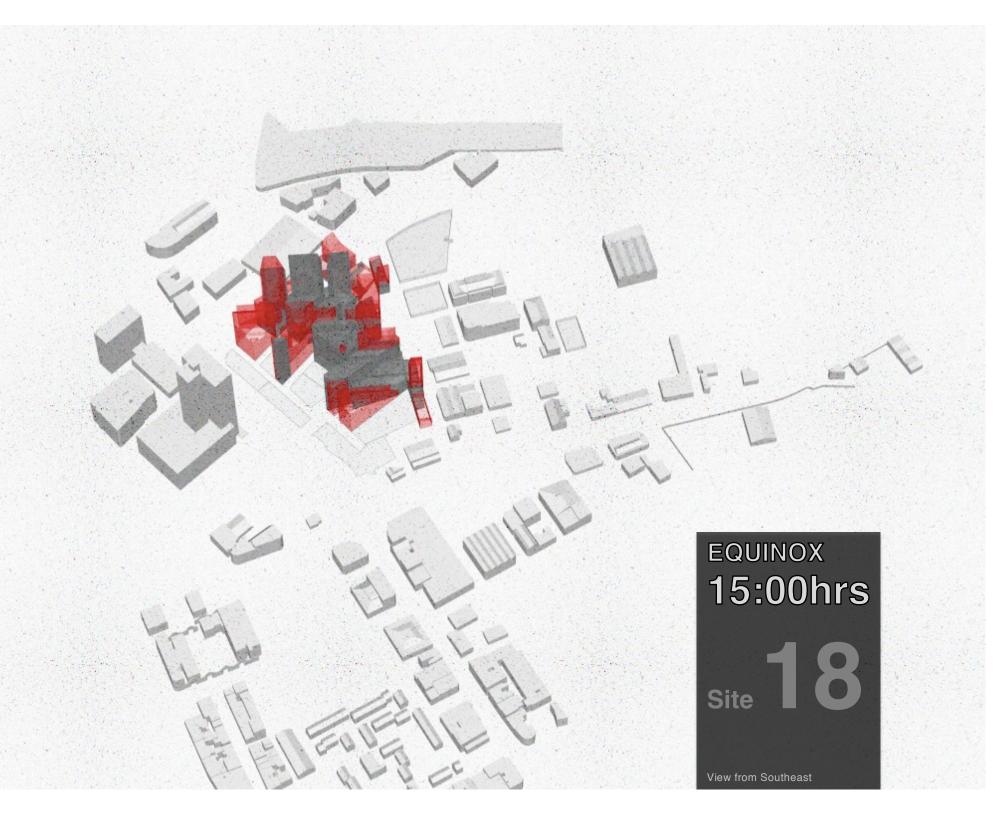


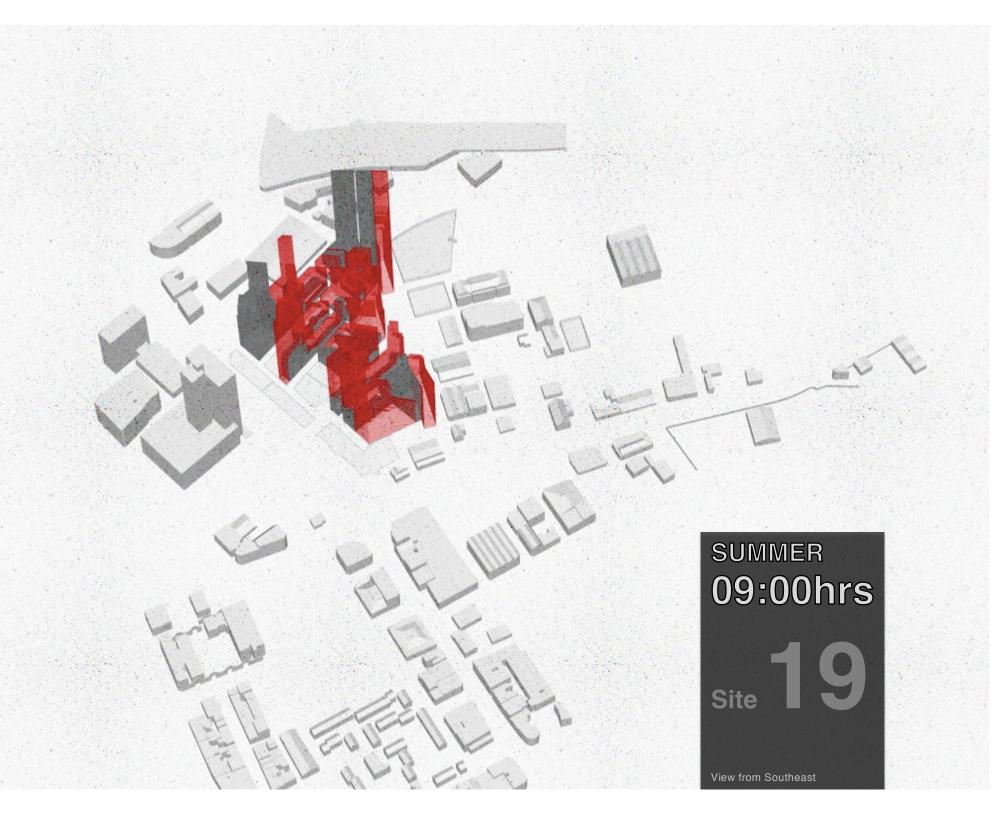


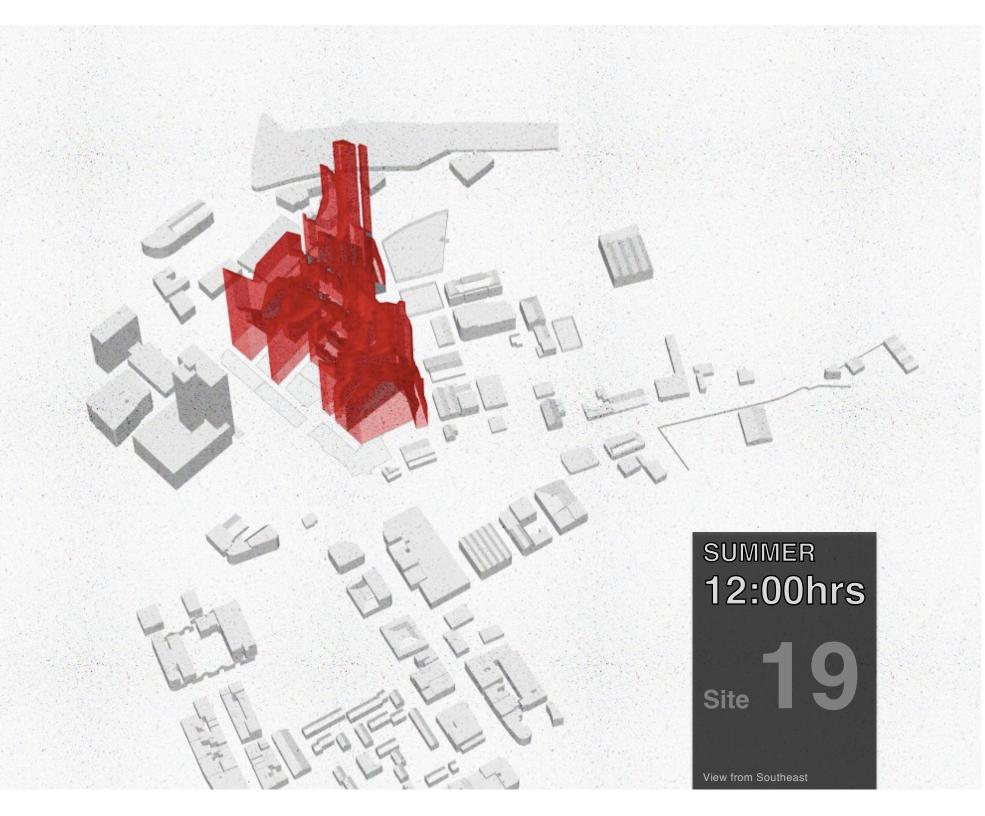










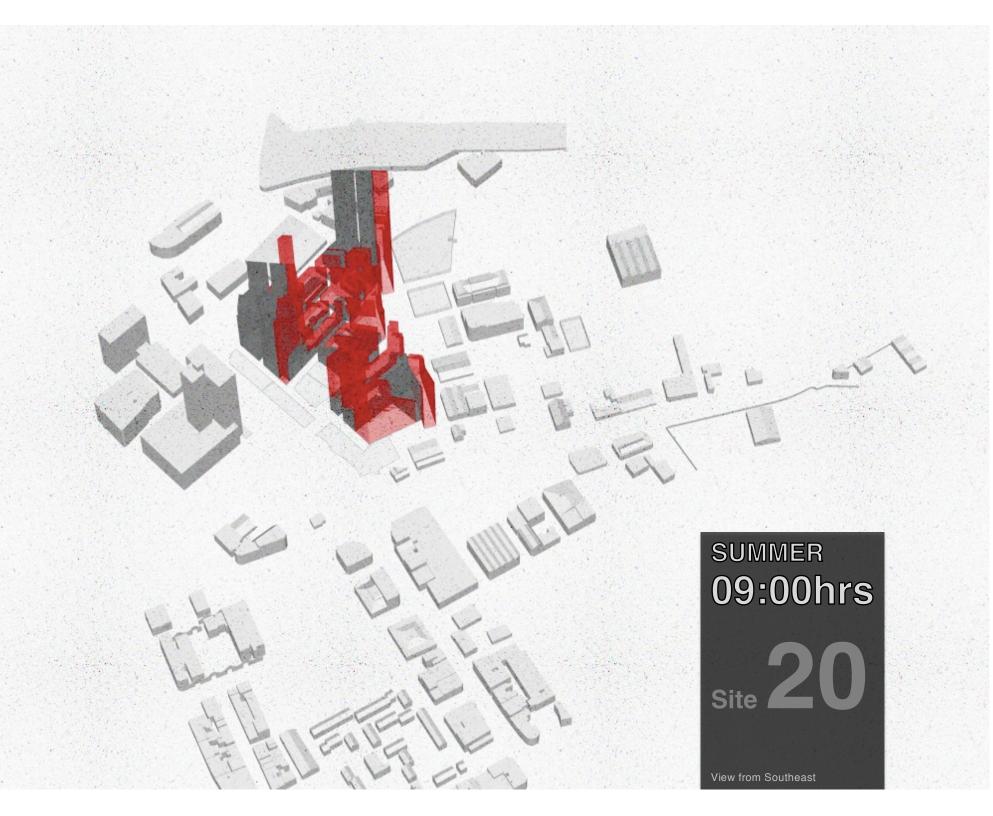




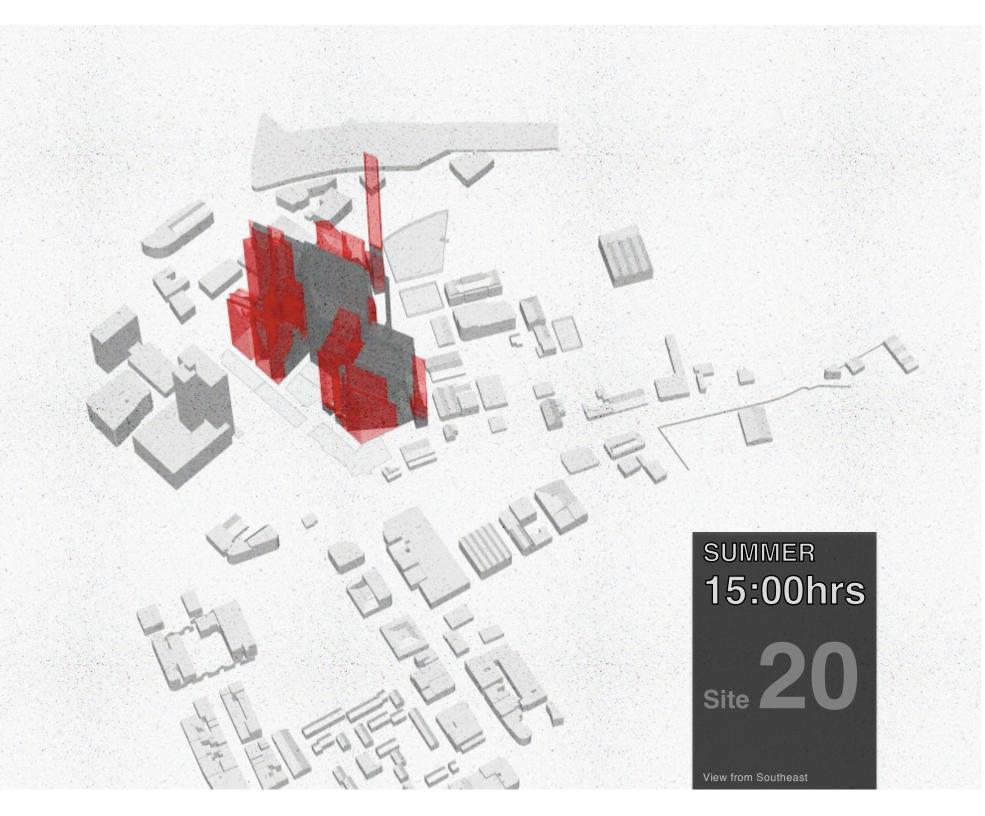








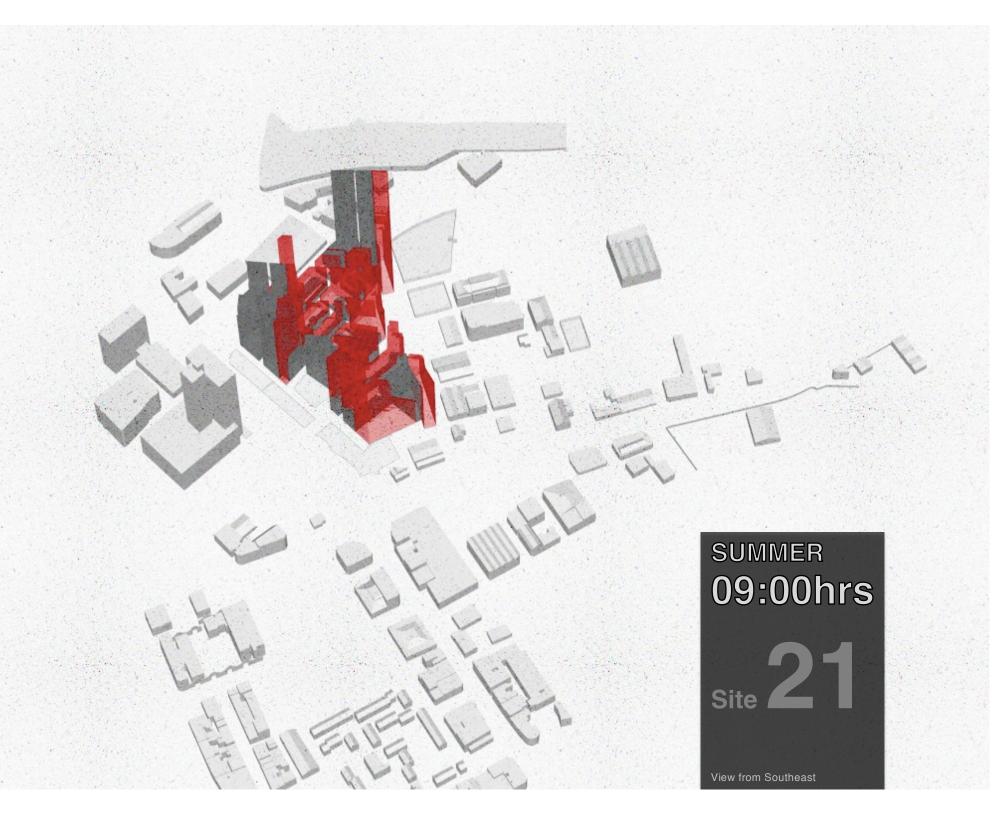


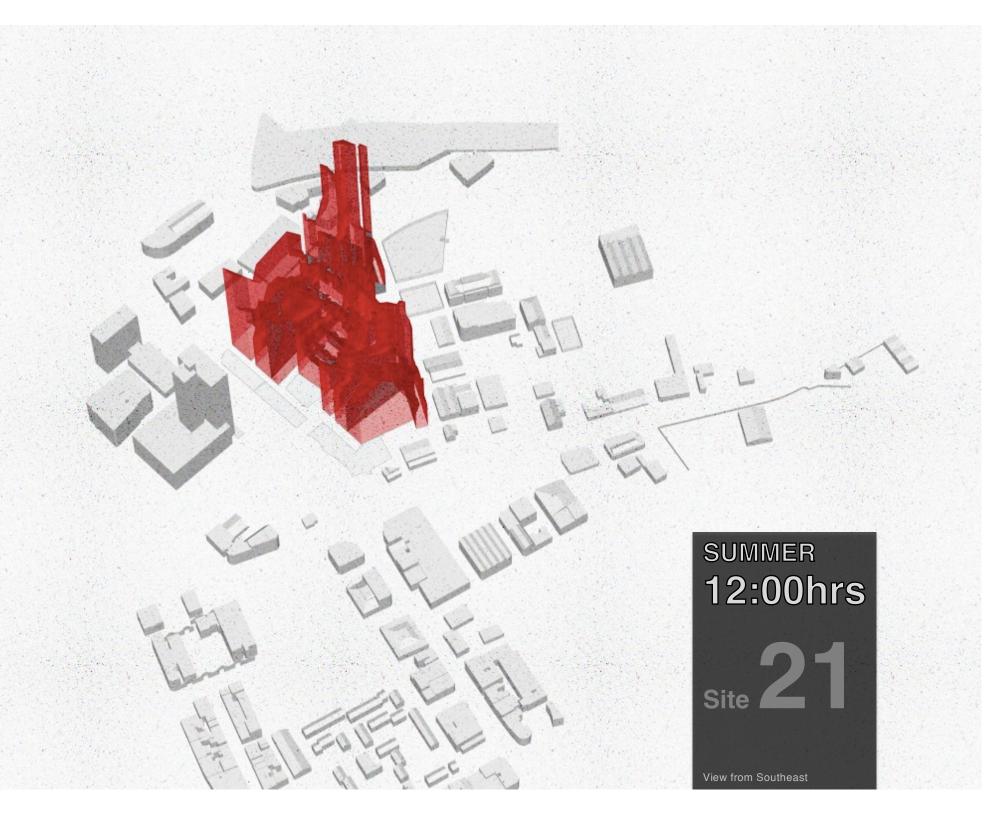


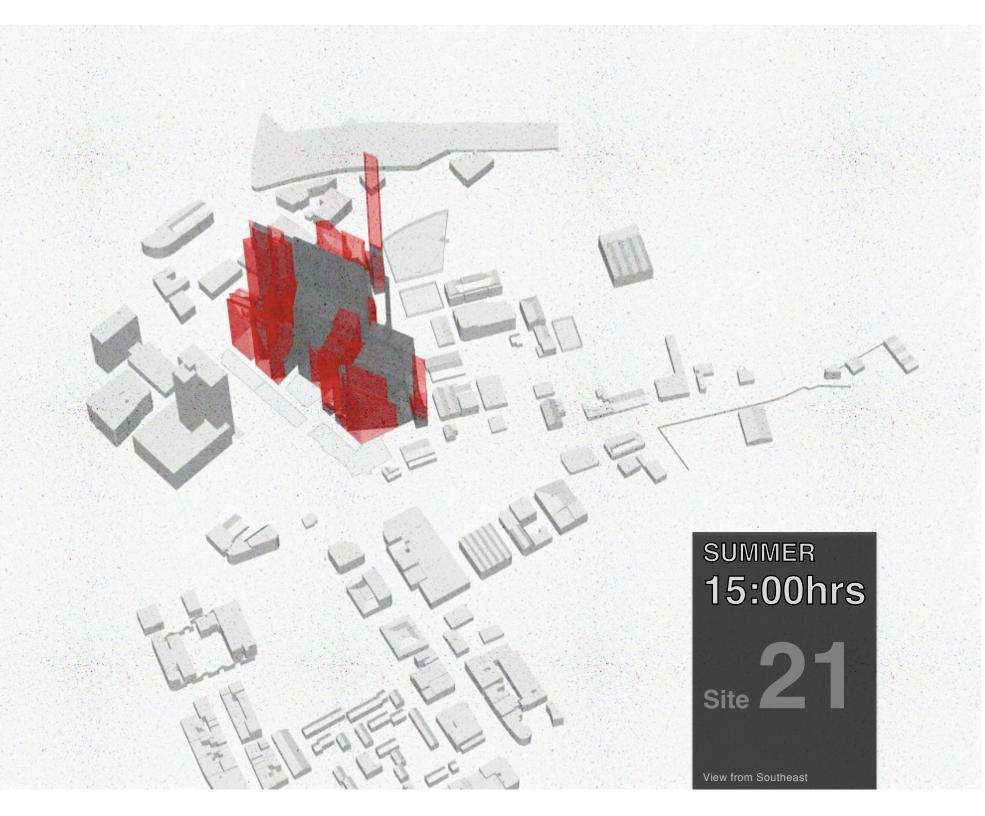


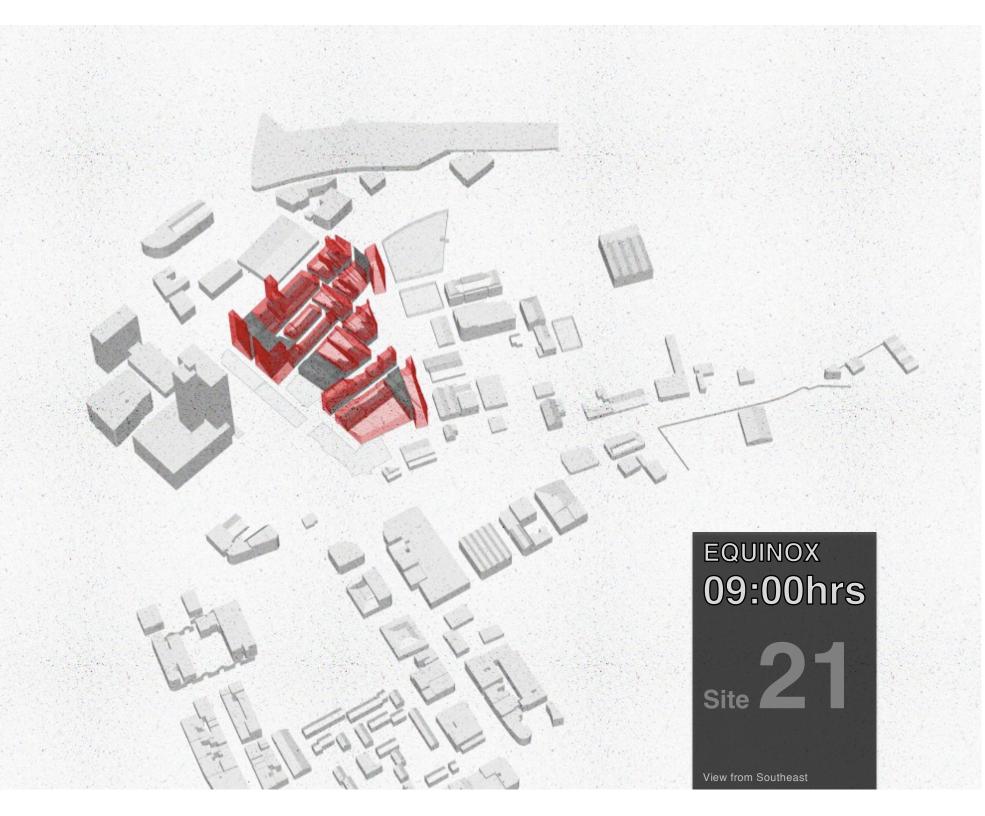






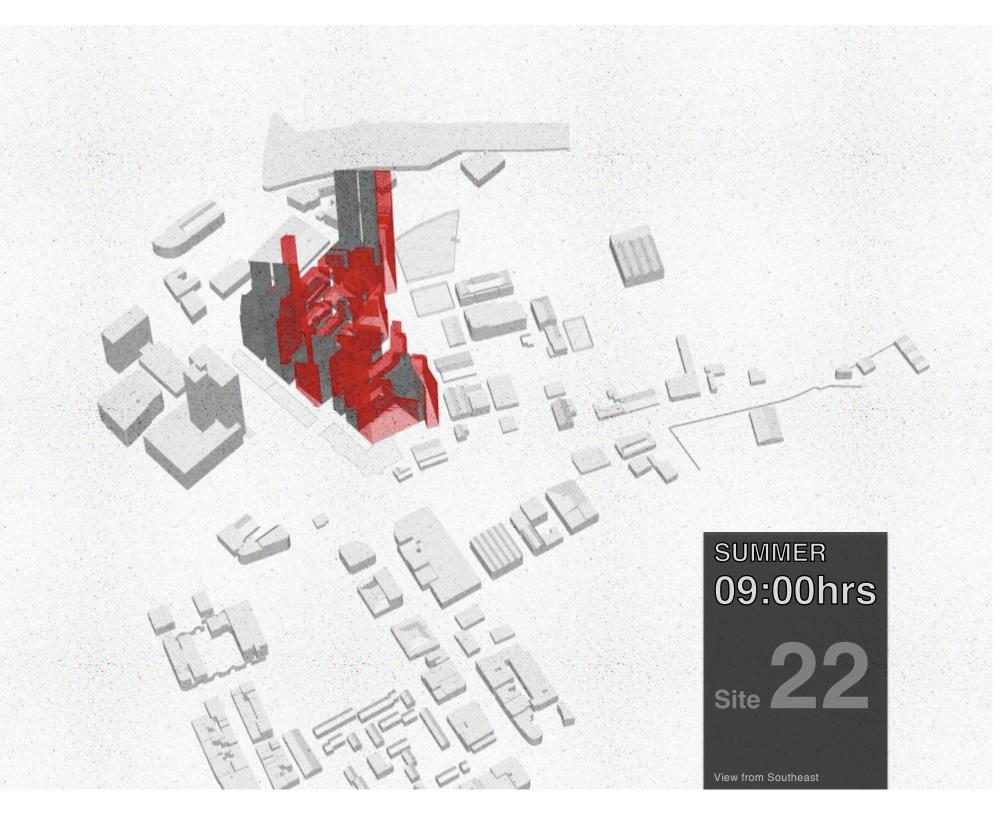


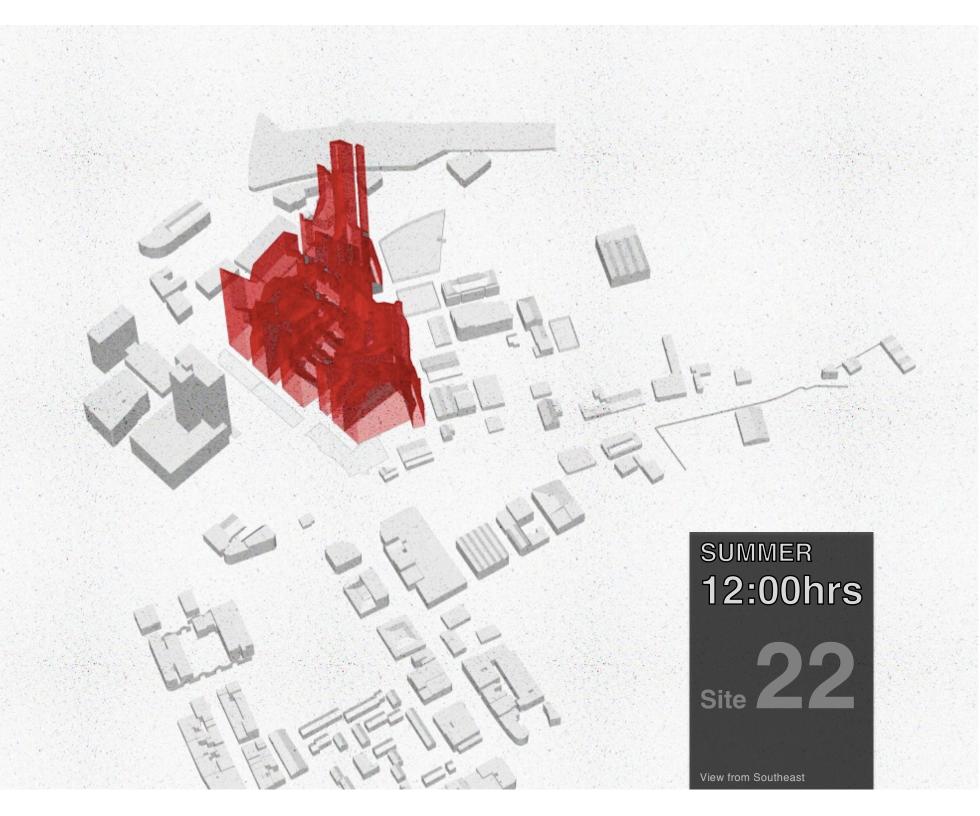


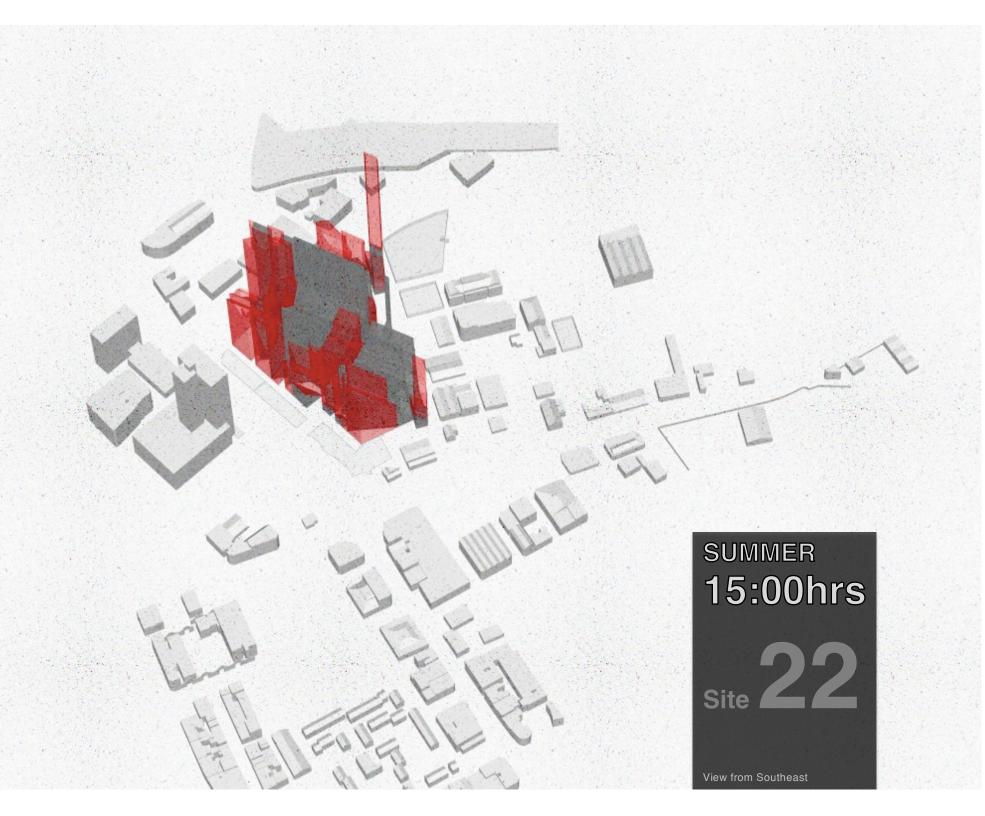


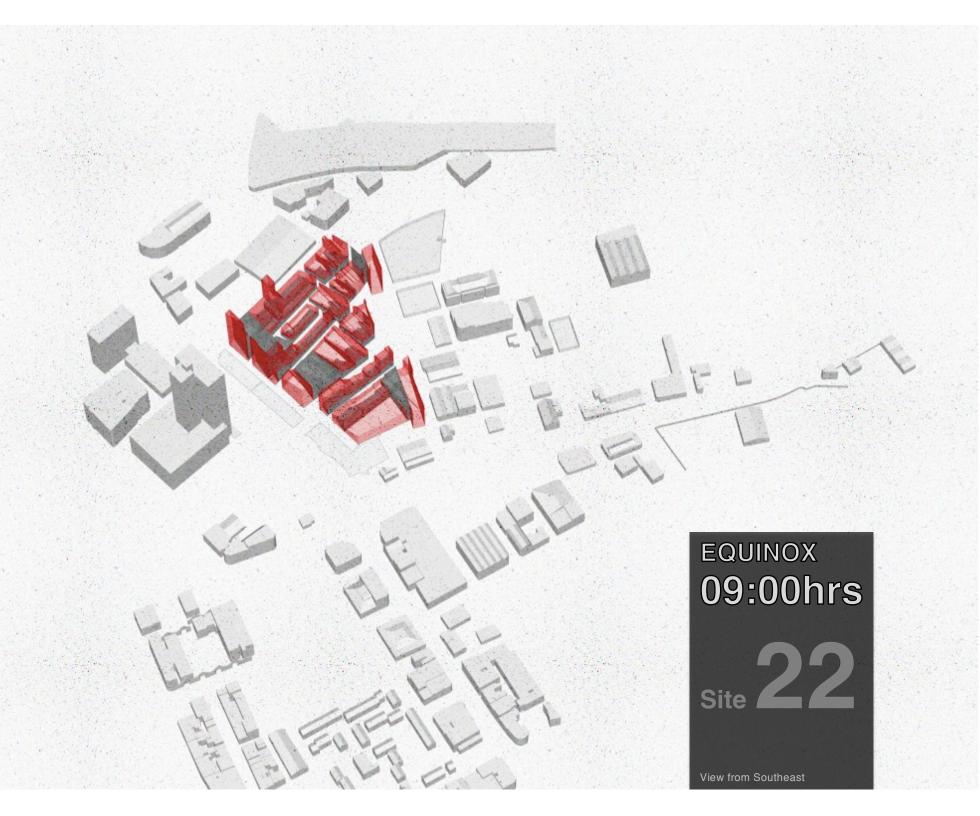






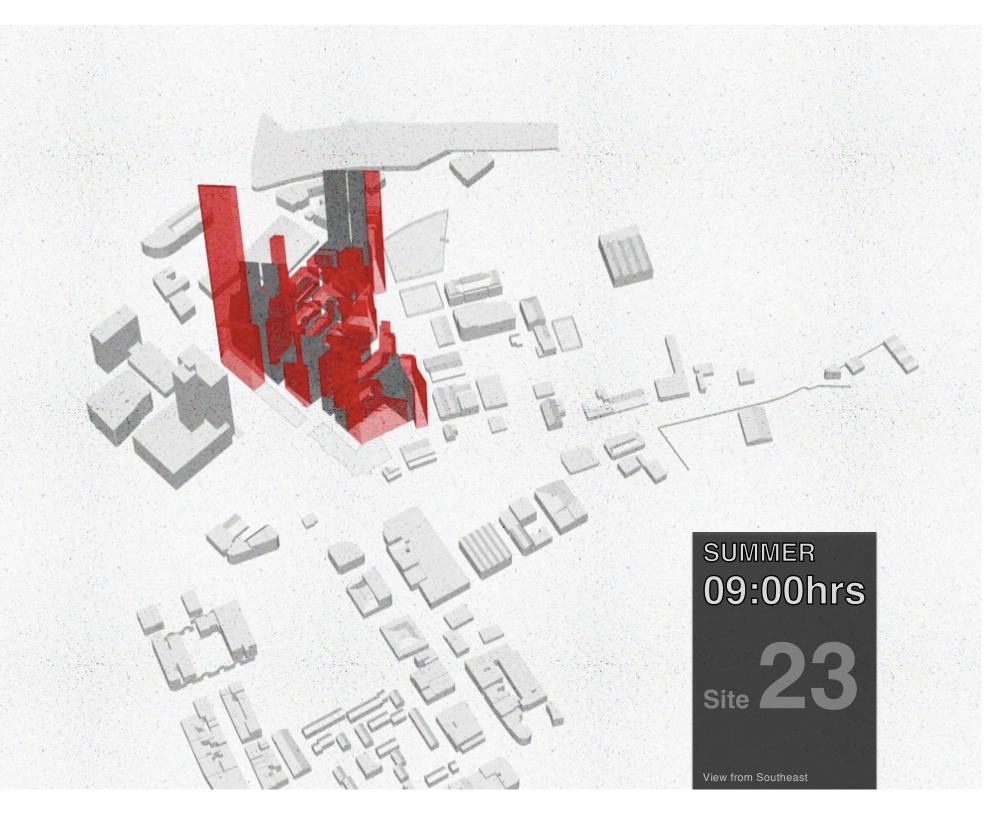




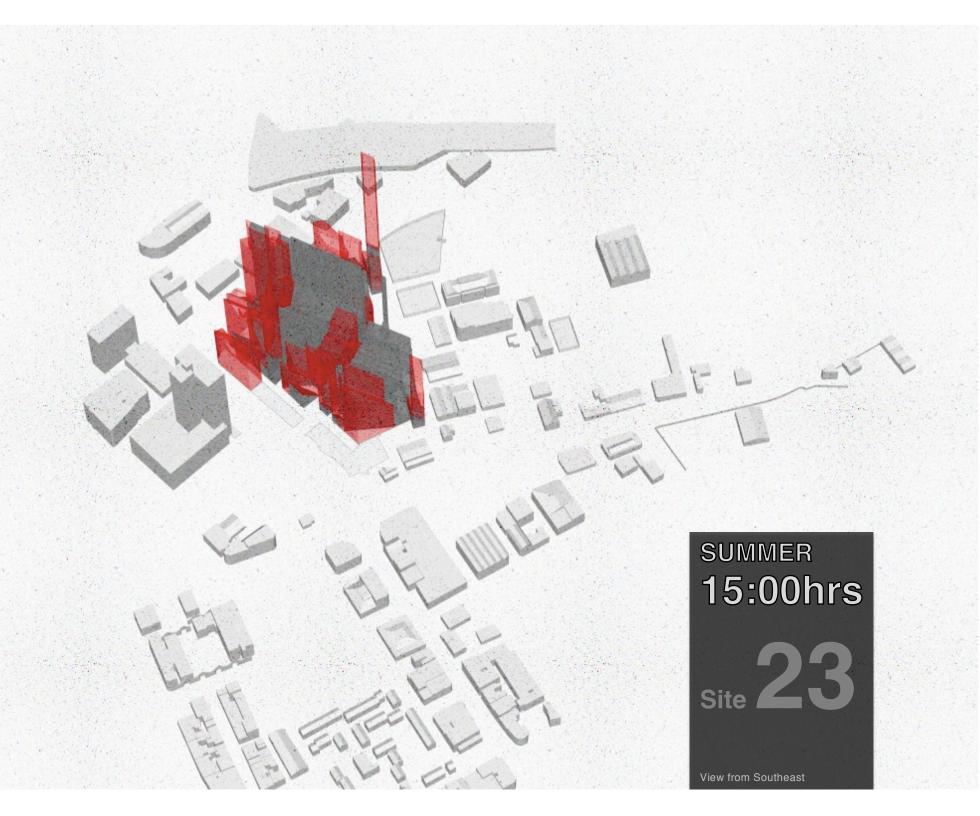








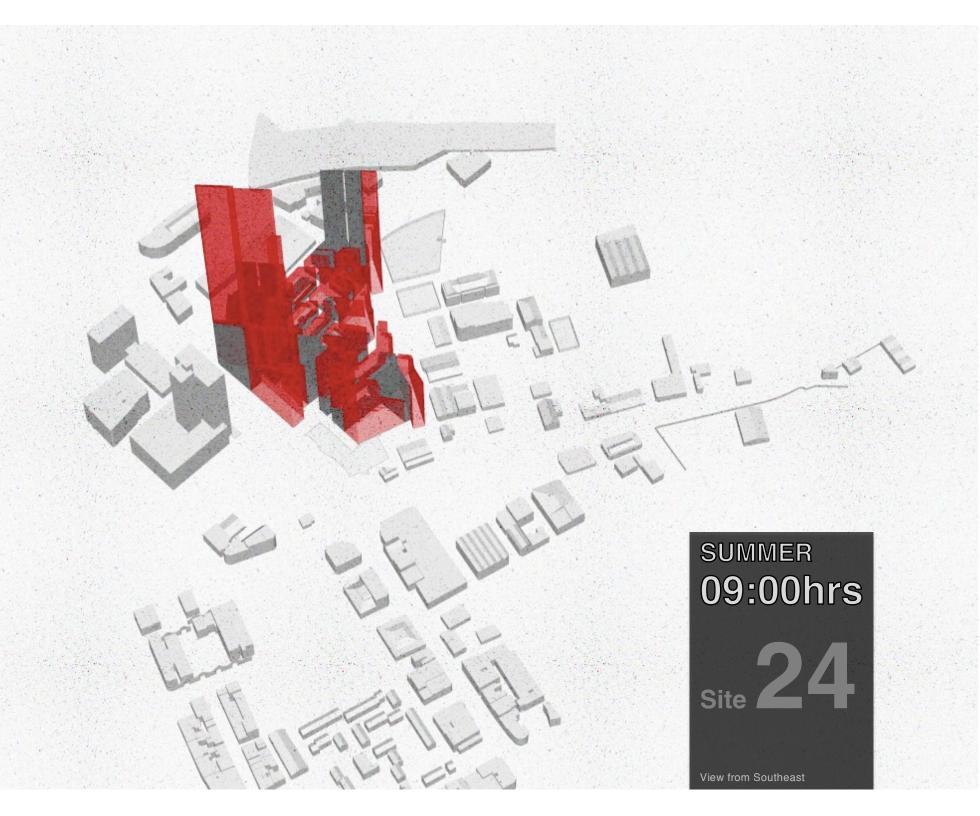




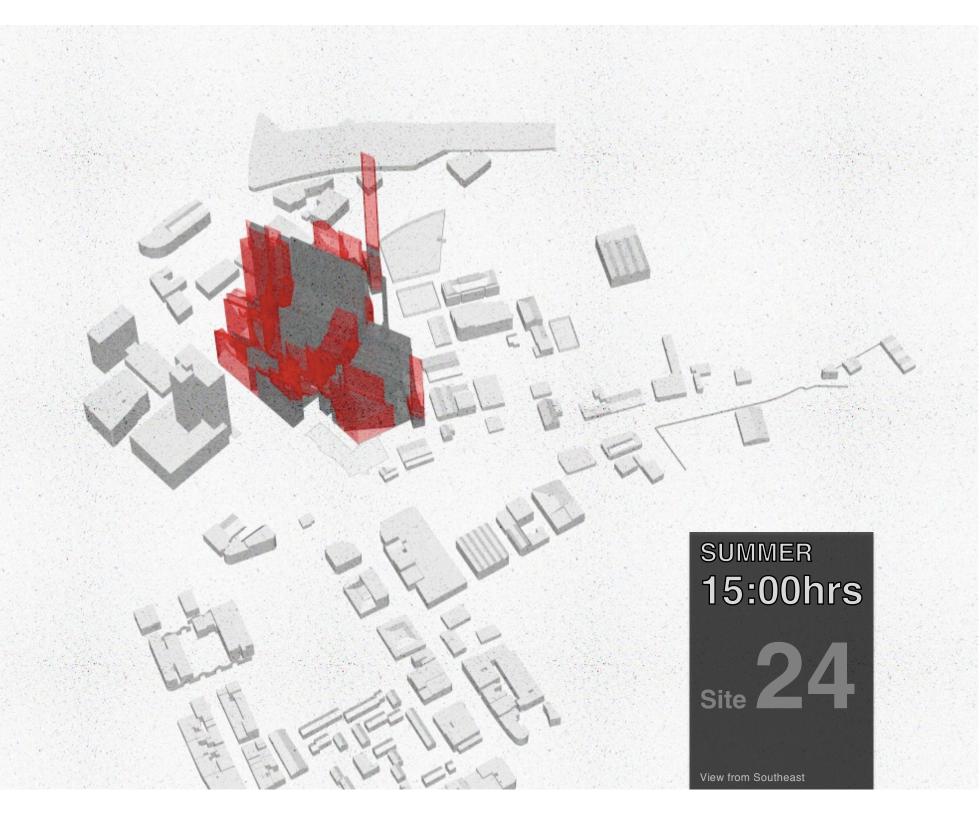








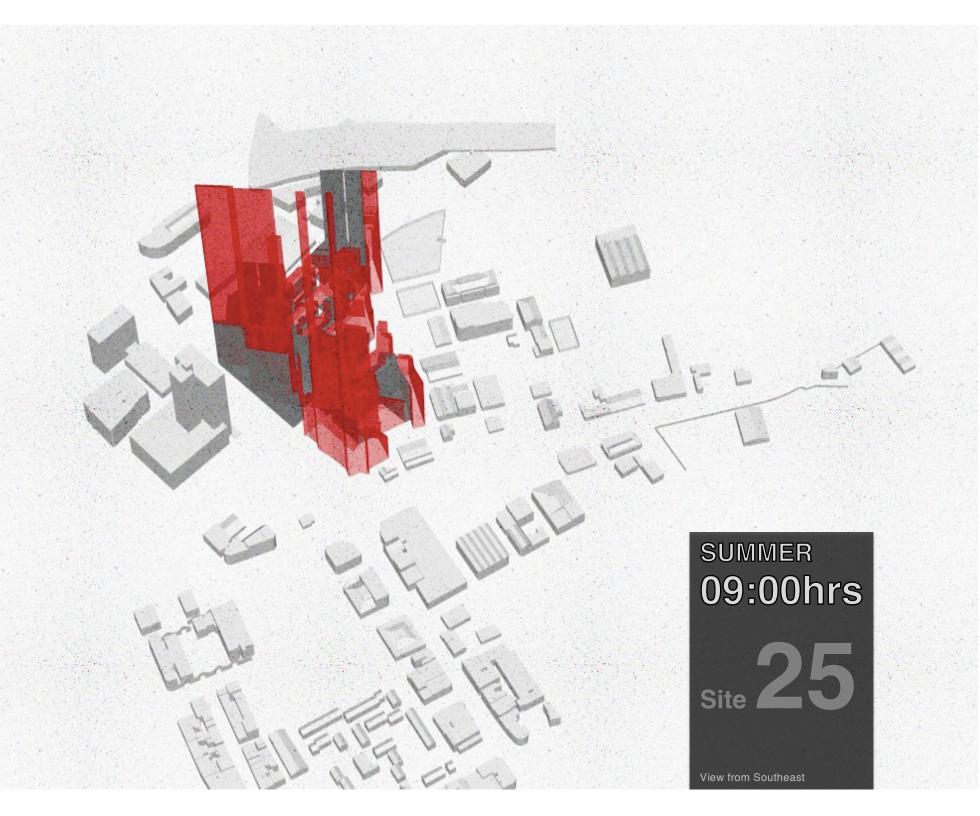




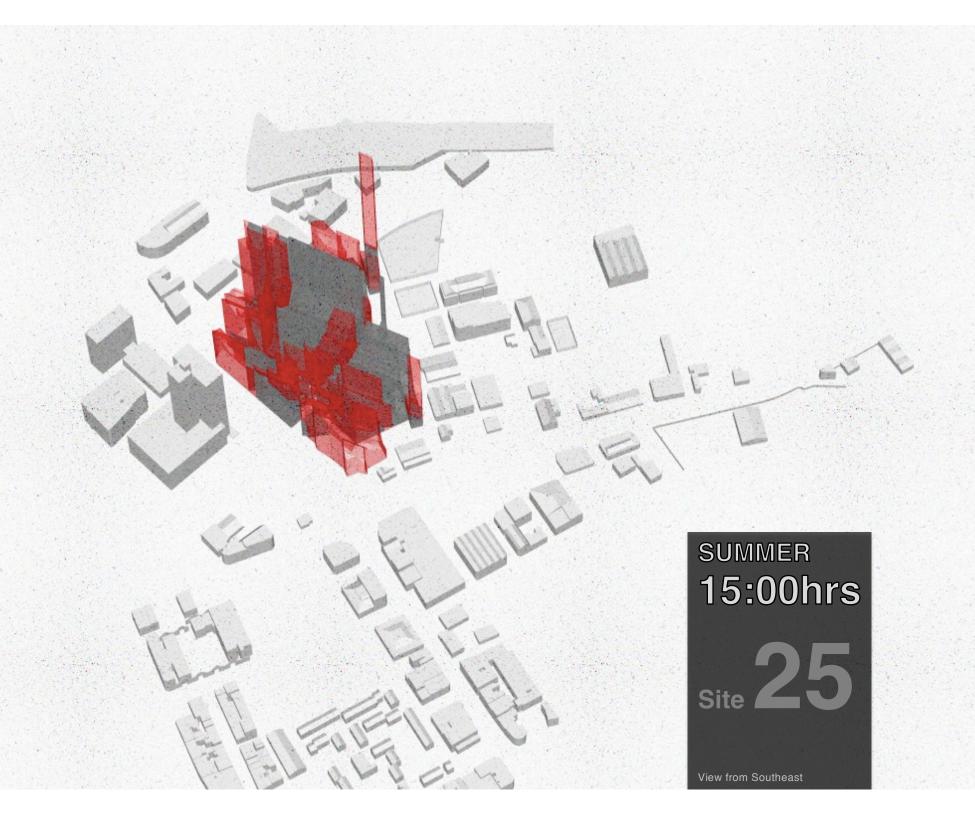




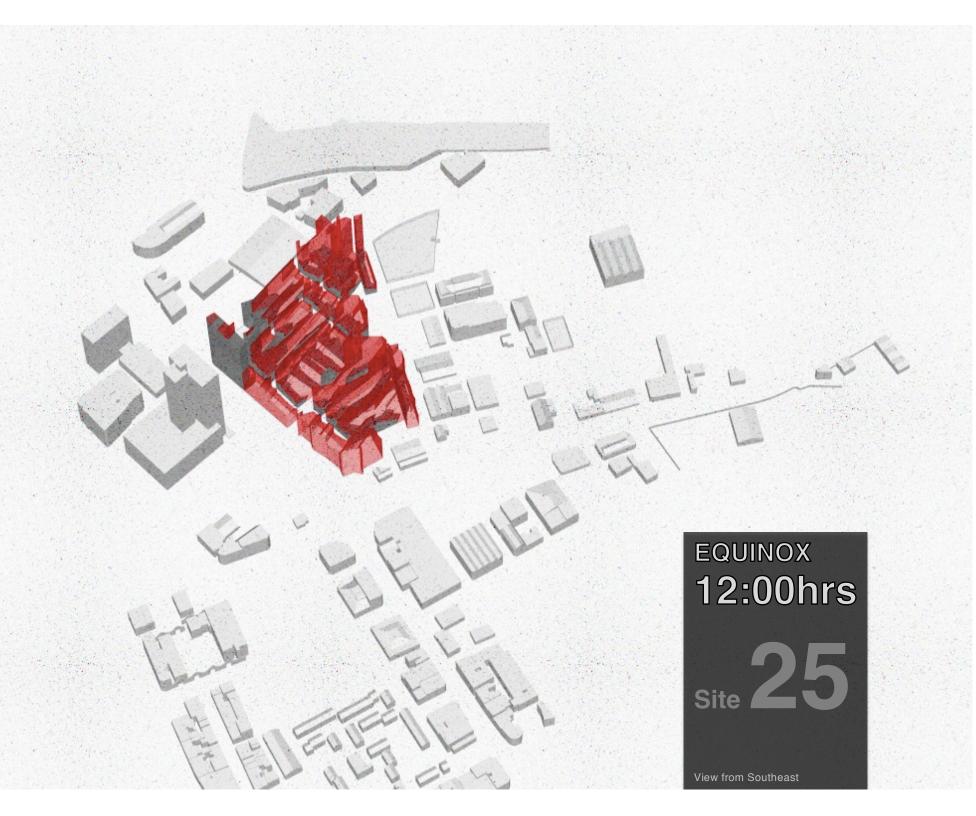


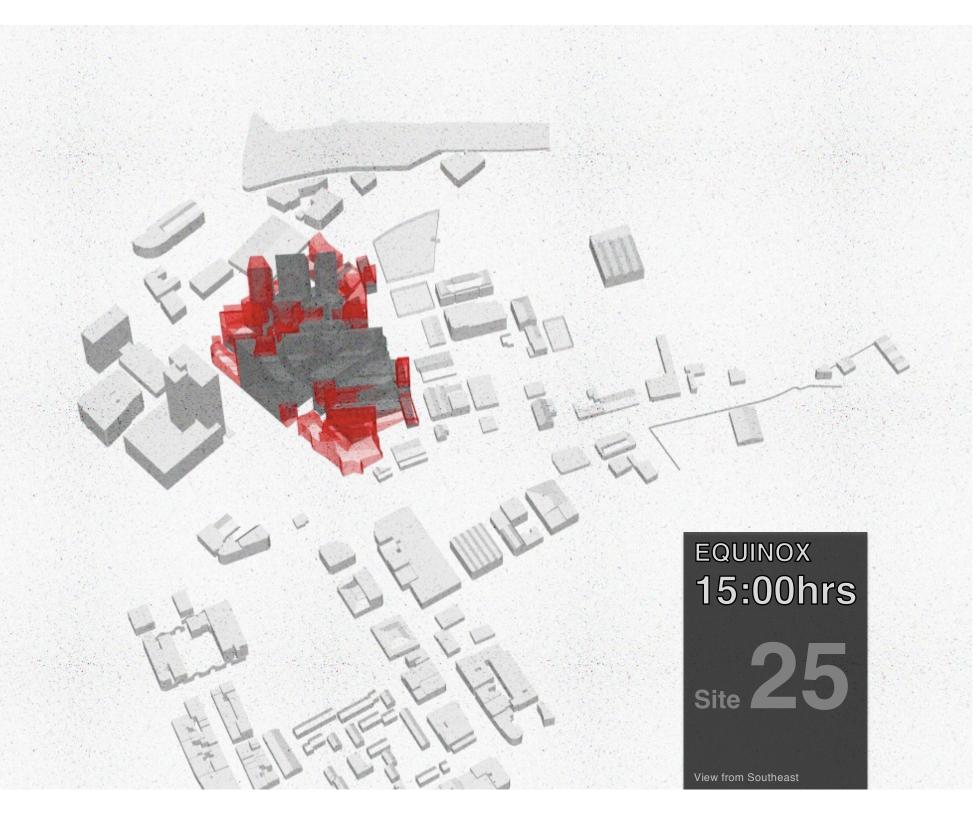




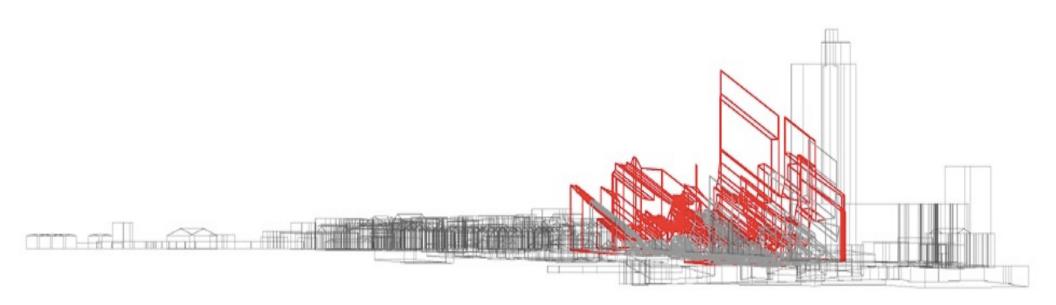




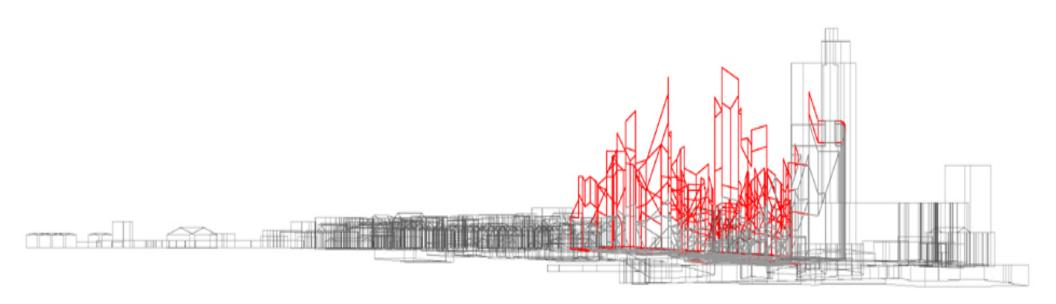




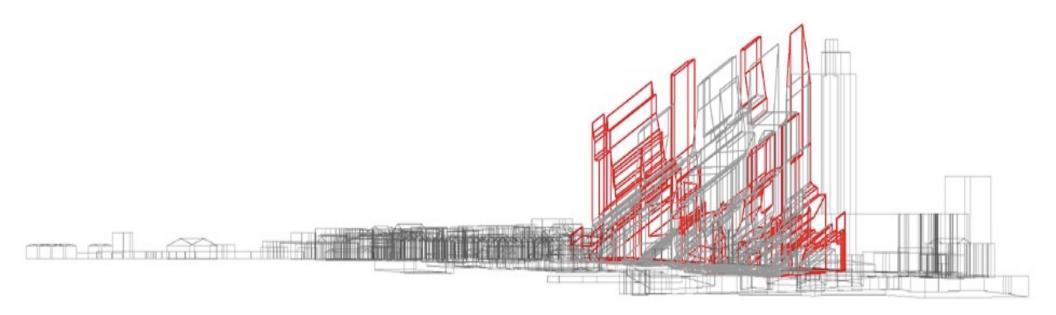




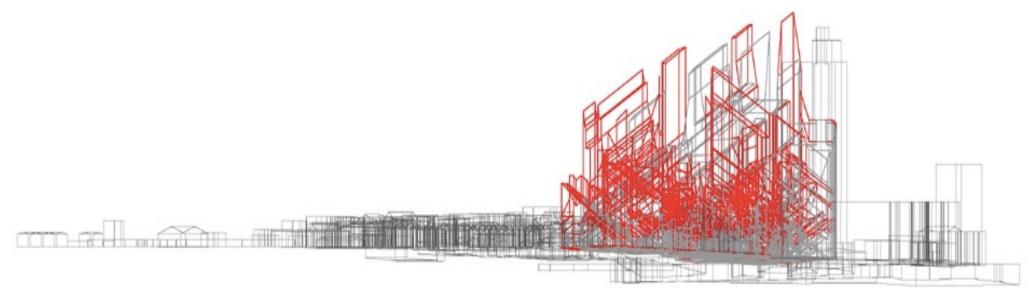


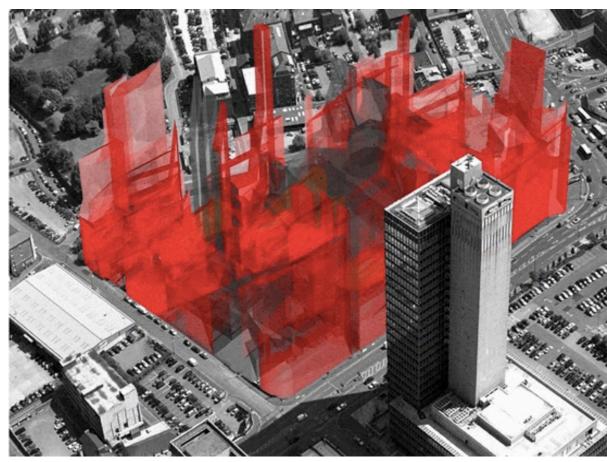








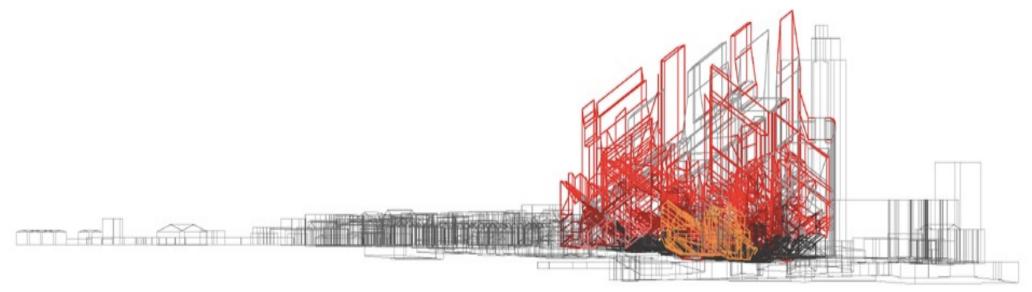


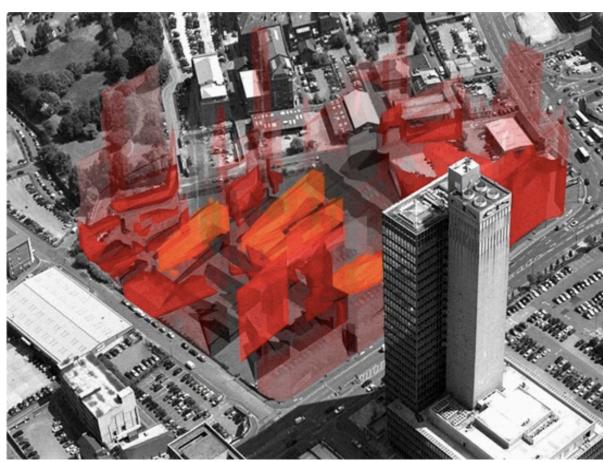


CYCLIC COMMUNITY ALL 3 TIMES

OVERLAPS IN TIME BECOME APPARENT

iew from Southwest



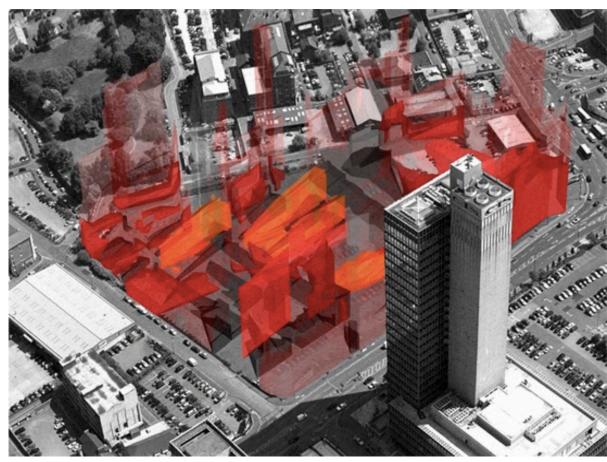


STASIS COMMUNITY

BOOLEAN OPERATION VISUALLY IDENTIFIES COMMONALITIES

iew from Southwest

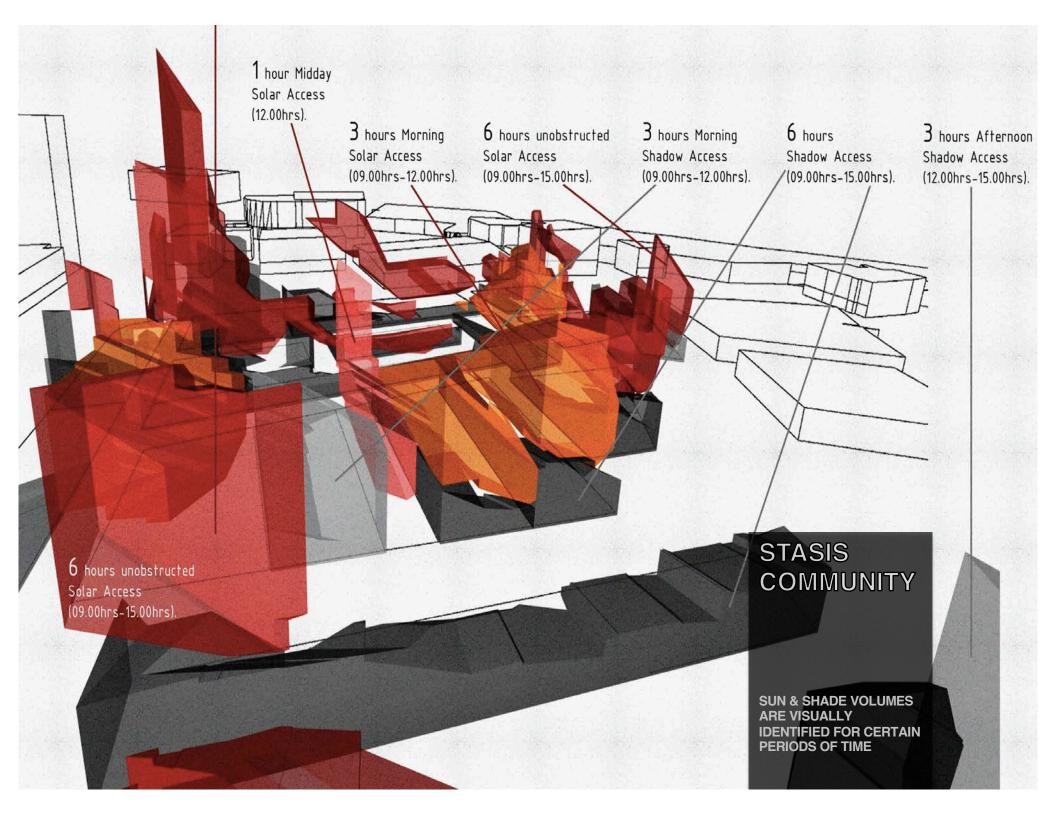




EQUINOX BOOLEAN

BOOLEAN OPERATION VISUALLY IDENTIFIES COMMONALITIES

West Elevation



CONCLUSION:

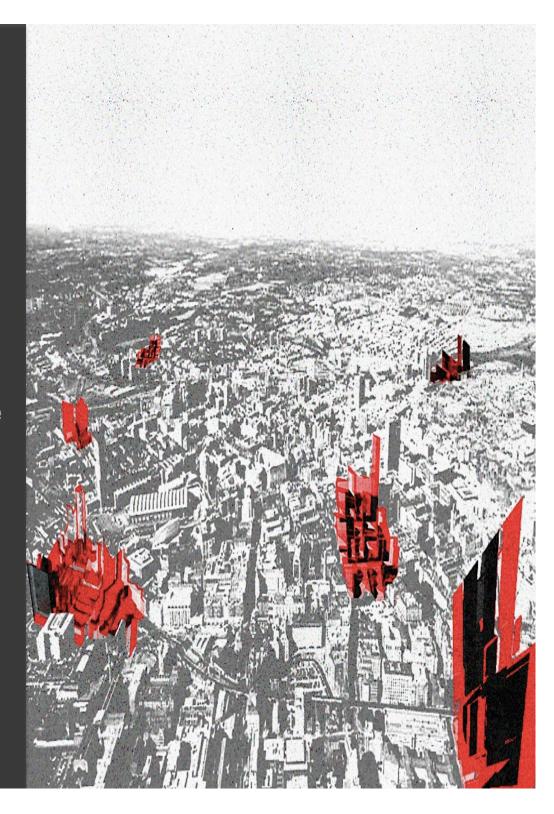
- 1. MUTUALISM / ENERGY EXCHANGE
- 2. MIXED-USE
- 3. COMMUNITY OPTIONS
- 4. INTER-SEASONAL
- 1. SELECTIVE MASTERPLAN:

Masterplan selects the maximum size and function of buildings according to their capacity to utilize available resources.

2. URBAN:

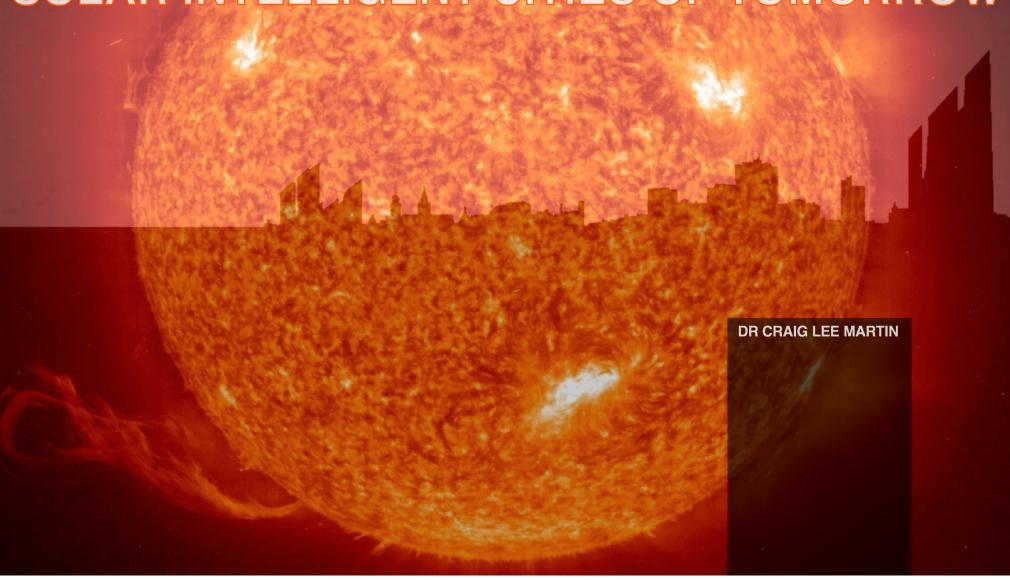
Masterplan generation cannot begin without an existing urban context.

A benefit, as sustainable cities are inevitably urban.



HELIOTROPOLIS

SOLAR INTELLIGENT CITIES OF TOMORROW



The City-zen MENORCA ROADSHOW

MON 24/04 to FRI 28/04/2017

Venue: The Institut Menorquí d'Estudis

Camí des Castell, 28 07702 Maó (Illes Balears)





SUSTAINABLE CITY VISION!

WE INVITE ALL CITY STAKEHOLDERS TO JOIN IN OVER ALL 5 DAYS WITH:

ENERGY WORKSHOPS - DESIGN SOLUTIONS - SERIOUS GAMING URBAN INTERVENTIONS - NEIGHBOURHOODS STRATEGIES FUTURE & SMART TECHNOLOGIES - CARBON ACCOUNTING

The City-zen Roadshow travel's across Europe to define sustainable visions for cities, their neighborhoods and citizens. A Roadshow consists of a 5-day event in which technologies will be demonstrated, futures are mapped, designed and evaluated.

Travelling with the Roadshow is an experienced team of internationally renowned sustainability experts, whose specialisms will combine with multidisciplinary stakeholder groups.

The final 'City Vision' will be presented on Friday 28th April at 09:00-10:30am.

For more information on how to get involved with the Menorca Roadshow, and to contribute to it's sustainable City Vision contact:

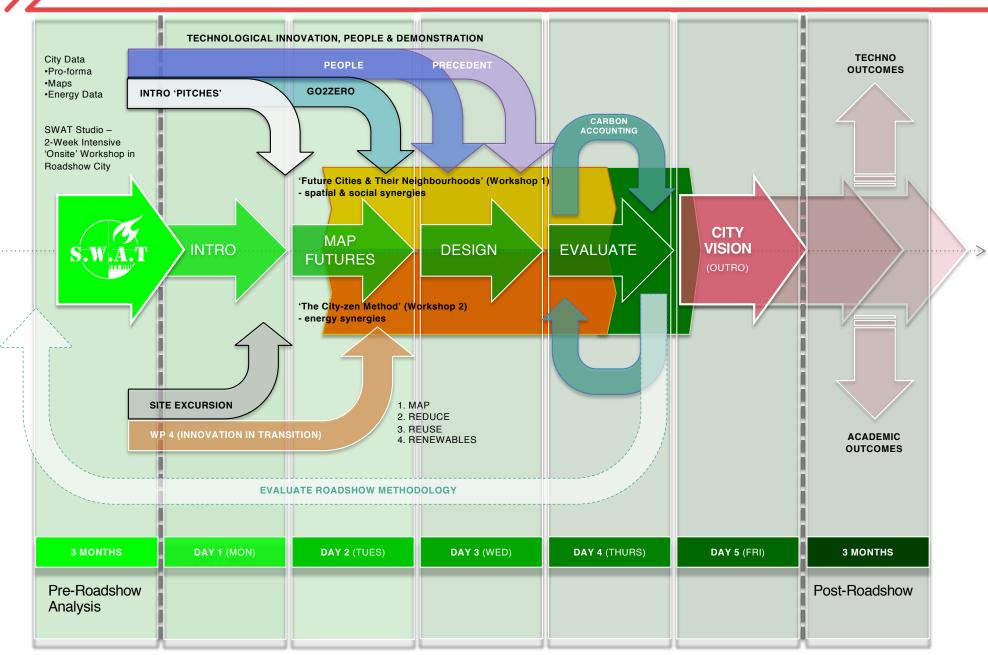
Jesus Cardona (jcardona@nontropia.com)
Dr Craig L. Martin, Delft University of Technology (c.l.martin@tudelft.nl)

For more information on the City-zen Project see: http://www.cityzen-smartcity.eu





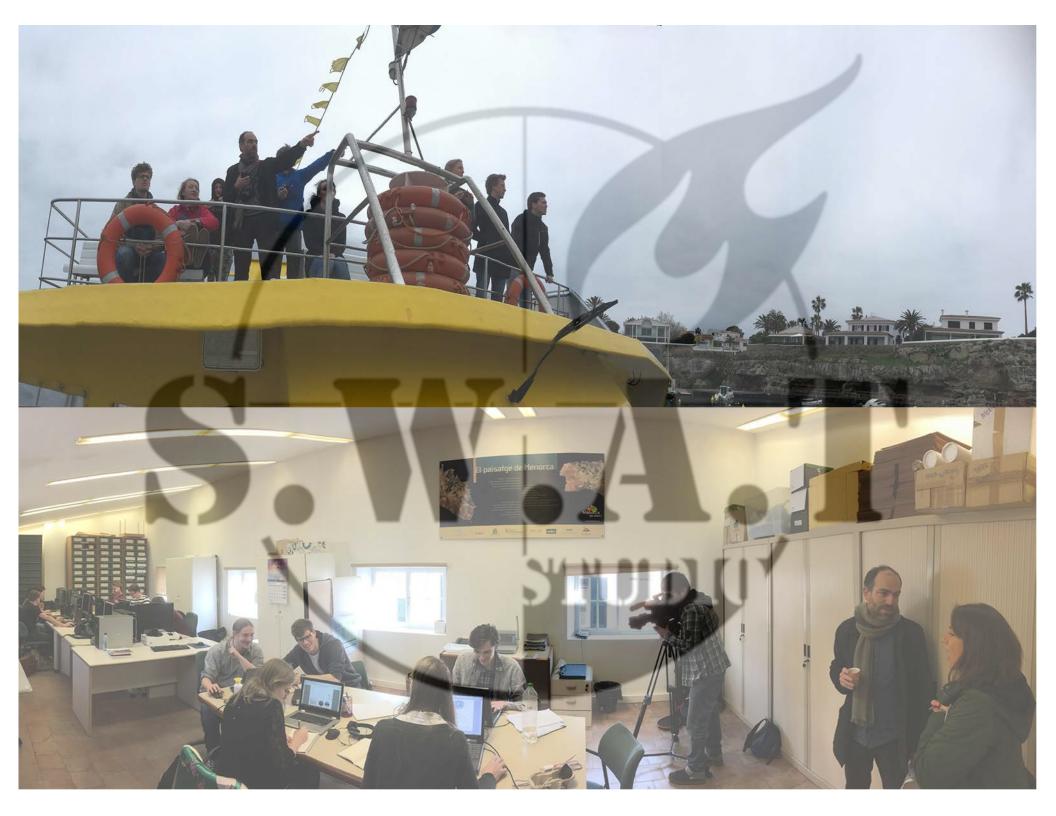
5 DAY FORMAT: SCHEMATIC

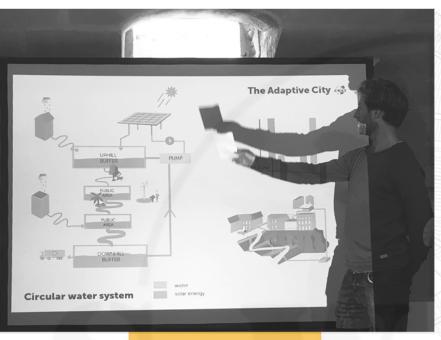


Ine City-ZEN 'MENORCA (Manon)' ROADSHOW MONDAY 24" APRIL to FRIDAY 28" APRIL 2017 VENUE / NOTES Time **ACTIVITIES** 'MINI-BUS' EXCURSION AROUND MAHON SITE + BEYOND 10:30 - 12:00 LUNCH 12:00 - 12:30 Venue: Institut Menorqui d'Estudis (IME), Cami des Castell, 28 07702 Maó. Tel.: 971 35 15 00 Coach pick up at 10:30 outside IME WELCOME & INTRODUCTION! 12:30 - 12:45 The Roadshow Methodology 12:45 - 13:00 DAY by Dr. Craig L. Martin, Delft University of Technol **Future Cities & Their Neighbourhoods** 13:00 - 13:15 The City-zen Method 13:15 - 13:30 24/04/17 (Mon) 13:30 - 13:45 QUESTIONS? Theme: 'INTRO' Venue: IME Menorca SWAT Studio 2017 14:00 - 14:15 MENORCA 'Pitches' 14:15 - 16:30 Menorca Project Presentations by 'The City' ALL WELCOME! INFORMAL DRINKS & DISCUSSION 16:40 - 17:00 Venue: t.b.a. **EVENING DINNER** 20:00 + Roadshow team + Invited Guest COFFEE 'Future Cities & Their Neighbourhoods' The City-zen Method' AM DAY (Workshop 1) 09:30 - 12:00 LUNCH Venue: IME 12:30 - 14:00 25/04/17 BREAK (Tues) 14:15 - 15:45 BREAK PM Theme: 16:00 - 16:30 'MAP BREAK FUTURES' DAY 2 'MAP FUTURES' SUMMARY + WORKSHOP 1 & 2 'CATCH-UP' 16:40 - 17:00 ALL WELCOME! 'BIOCLIMATIC DESIGN' (ARCHITECTS' ASSOC.) Venue: Architects Association Building 20:00 + COFFEE 08:15 - 08:30 ΑM SERIOUS GAME 'Go2Zero' 08:30 - 12:30 DAY LUNCH 3 Venue: IME **FUTURE TECHNOLOGIES** 13:00 - 13:45 Seminar by MENORCA SMART ISLAND Seminar discussion on sustainable technologies in Menorca & Spain 26/04/17 PM (Wed) **PEOPLE & TECHNOLOGY TOUR** 14:00 - 16:30 Mini-Masterclass 1 'THE LINK BETWEEN PEOPLE & TECHNOLOGY'
Walking Tour of Mahon Site by Dr Han Vandevyvere (VITO) Theme: 'DESIGN' BREAK DAY 3 'DESIGN' SUMMARY + WORKSHOP 1 & 2 'CATCH-UP 16:40 - 17:00 ALL WELCOME! 09:15 - 09:30 Venue: IME CARBON ACCOUNTING EXPLAINED 09:30 - 10:30 DAY AM BREAK 10:40 - 12:00 LUNCH 27/04/17 Venue: IME (Thurs) 12:30 - 14:30 Theme: BREAK PM EVALUATE ALL WELCOME! 14:40 - 16:30 & DISCUSSION of CITY VISION (Cont...) BREAK DAY 4 'EVALUATION' SUMMARY + WORKSHOP 1 & 2 'CATCH-UP' 16:40 - 17:00 ALL WELCOME! 09:45 - 10:00 COFFEE Venue: IME DAY 5 10:00 - 10:05 WELCOME! 28/04/17 10:05 - 10:10 Introduction by Mayor & Jesús Cardona (IME) / Dr Craig L. Martin (TU Delft)

THE CITY VISION

(Fri)







ENERGY

roof potentials





communal green-blue roof investments



facade upgrades



urban landmark roofs





urban roofs as shade providing landmarks



Final SWAT Presentation Friday 10th March, IME 10:00 to 11:00