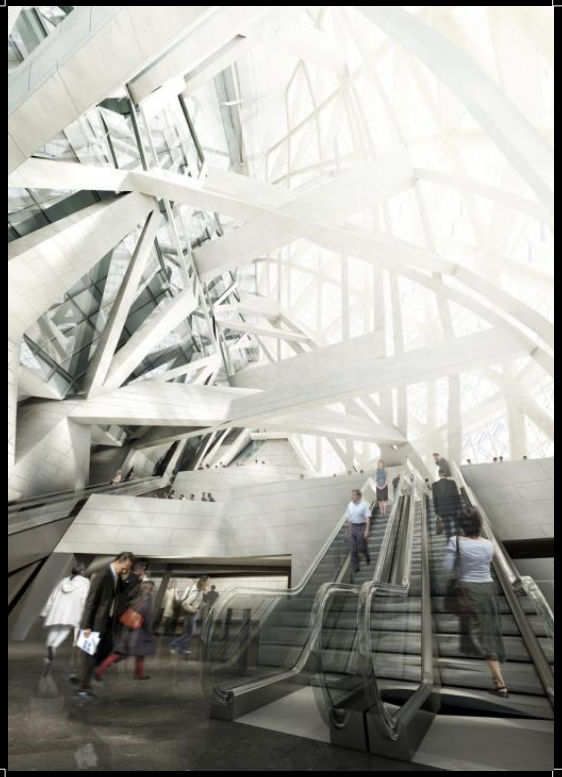
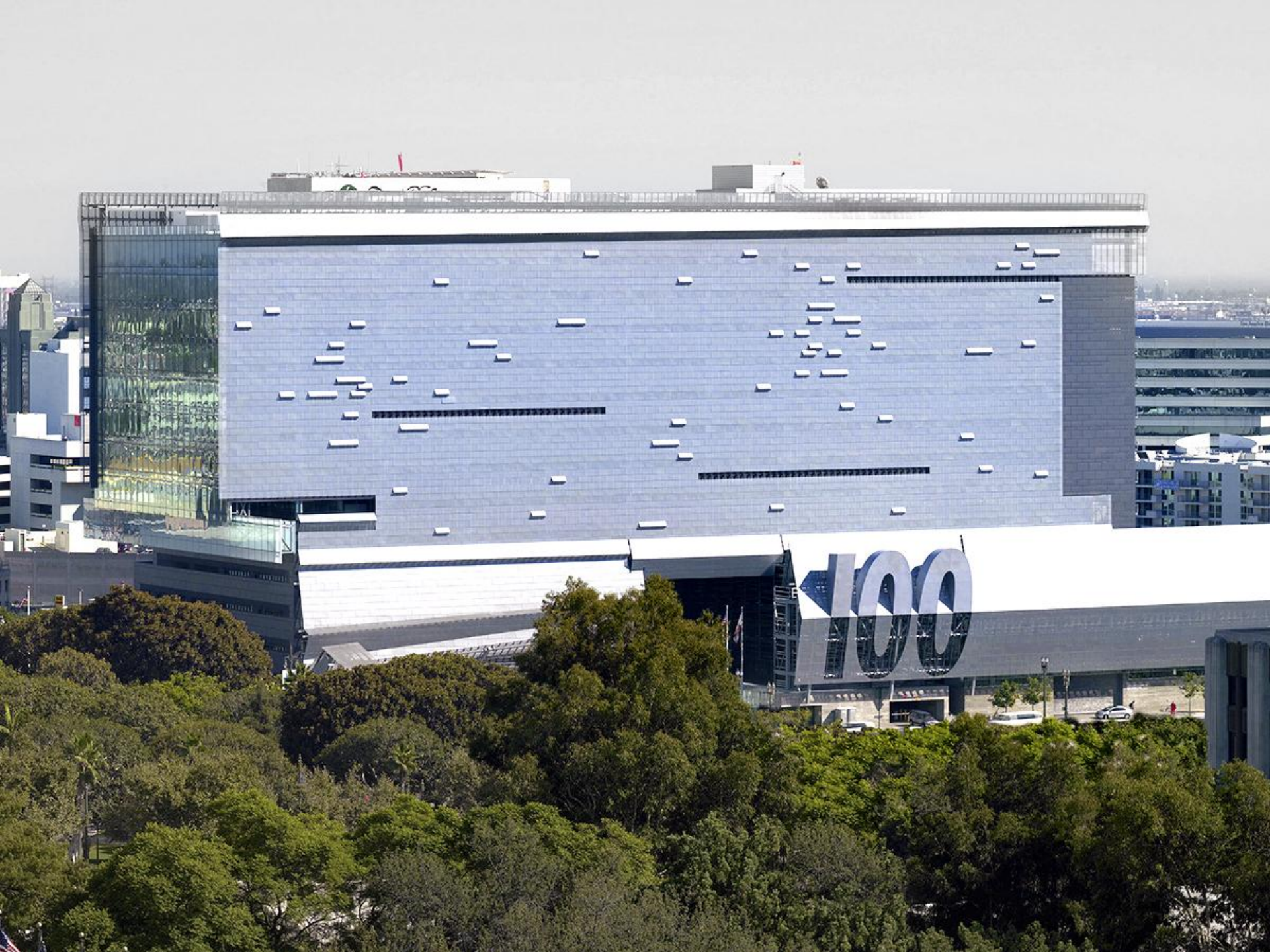
GeoBuiz Summit 2015

GEOBIM



mOrphosis

Founded in 1972, Morphosis is an interdisciplinary practice involved in rigorous design and research that yields innovative, iconic buildings and urban environments. Morphosis is a dynamic and evolving practice that responds to the shifting and advancing social, cultural, political and technological conditions of modern life.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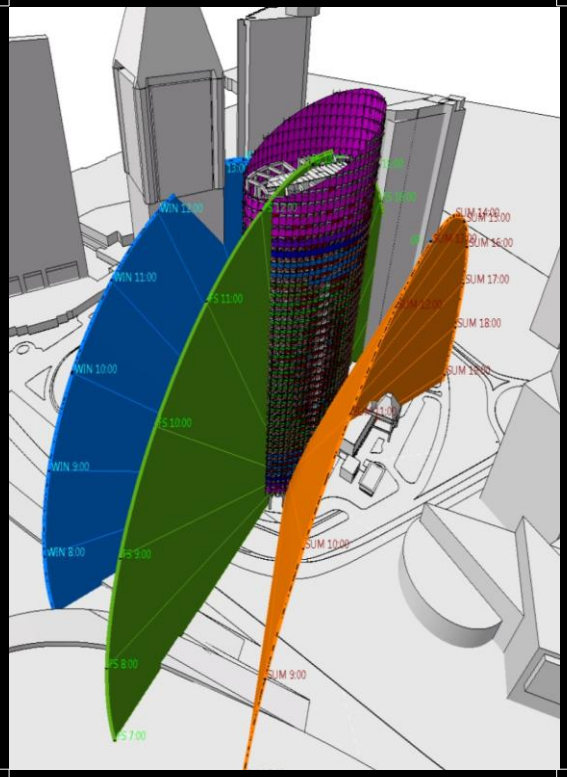
GATES HALL

ERSONCOLLEGE 5960

CONTEXT

As an architect our work is rooted in a constant questioning of the context in which we are developing our designs. Within this context one is responsible for balancing project factors ranging from building program and socio-economics to environmental performance and construction processes. A key factor to the development of a design is the gathering and organization of project information. It is within this evolution of design and the expansion of project data that our work gains richness and complexity.


WIN 11:00
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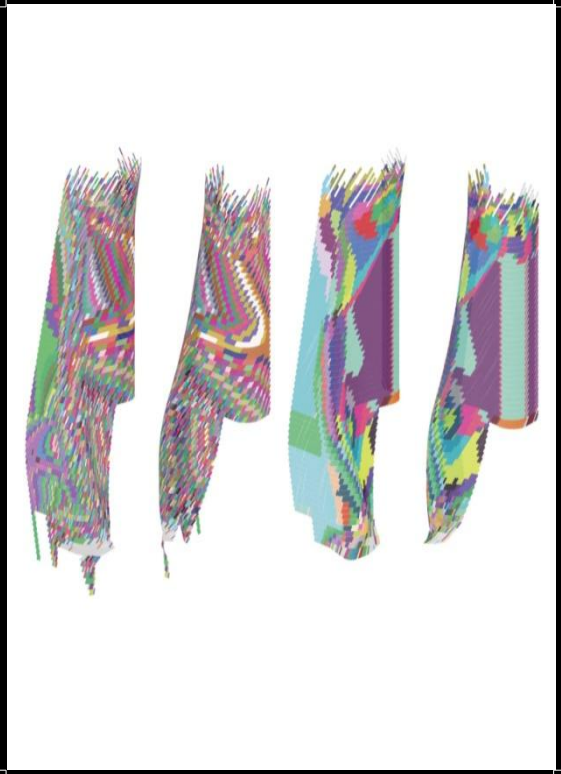
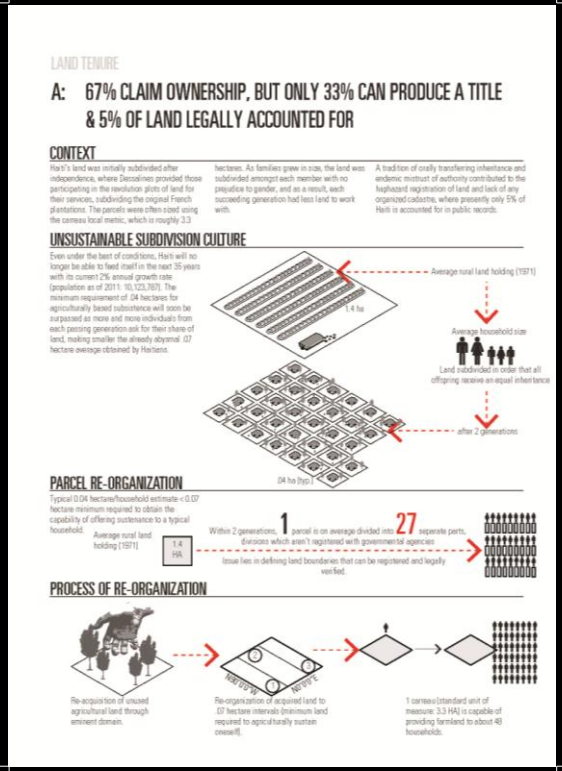
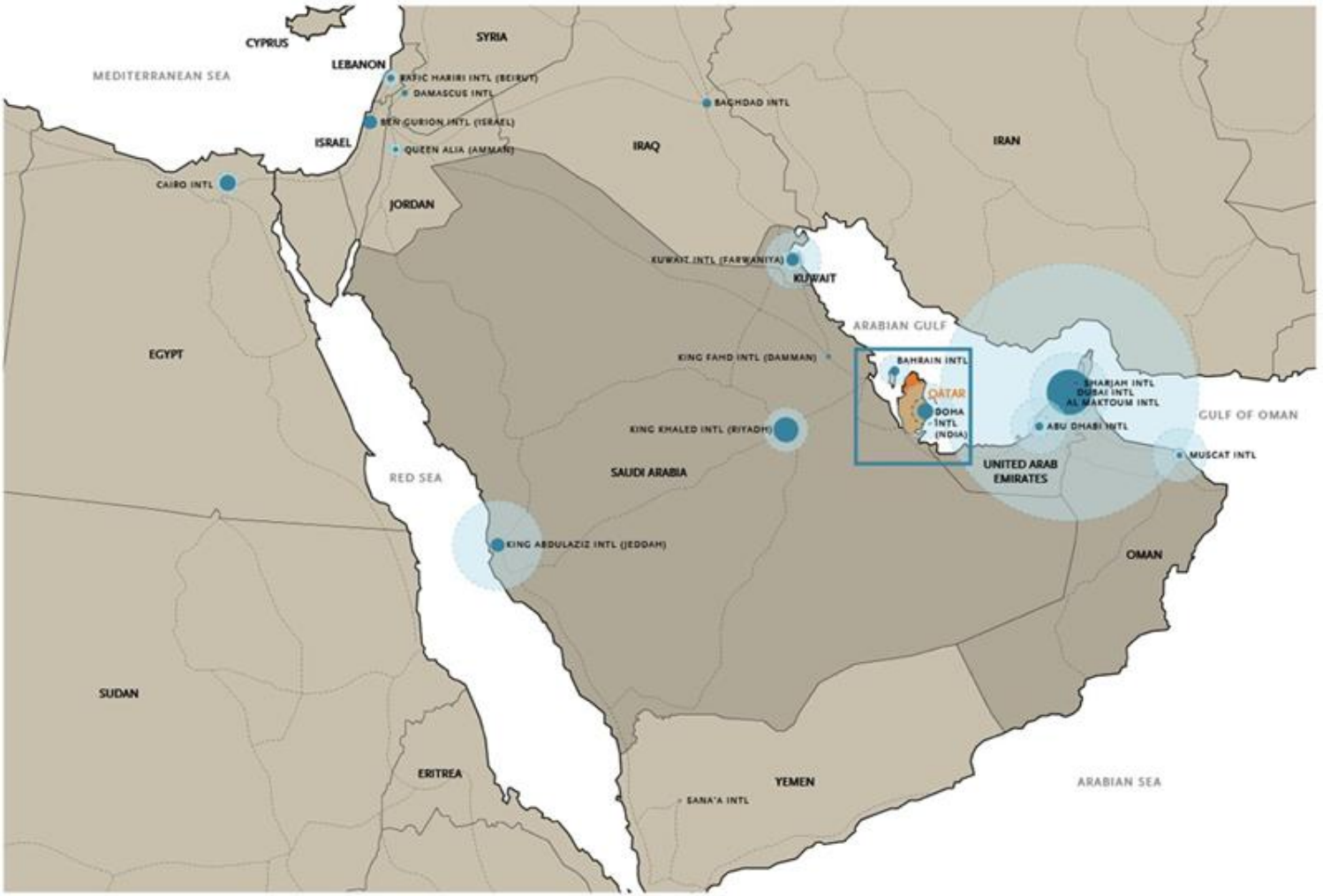
←GIS
BIM→





GIS

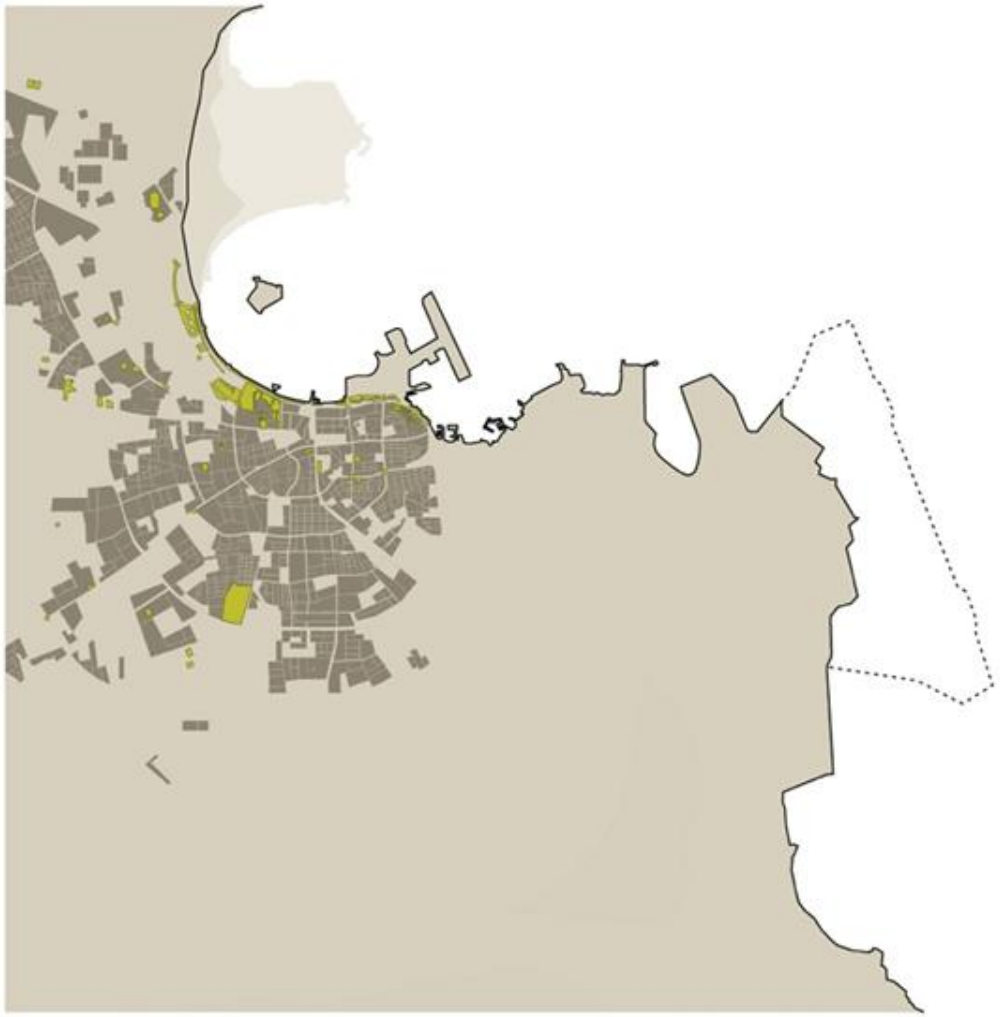
In discussing the application of GIS data to our work we must differentiate between our architectural projects and urban design proposals. The latter provides a broader context in which one can address the dynamic and evolving nature of society. The prior can only be successful when it developed in support of the broader context. After all architecture is an agent of culture.



REGIONAL AIRPORTS

NEW DOHA INTERNATIONAL AIRPORT CITY

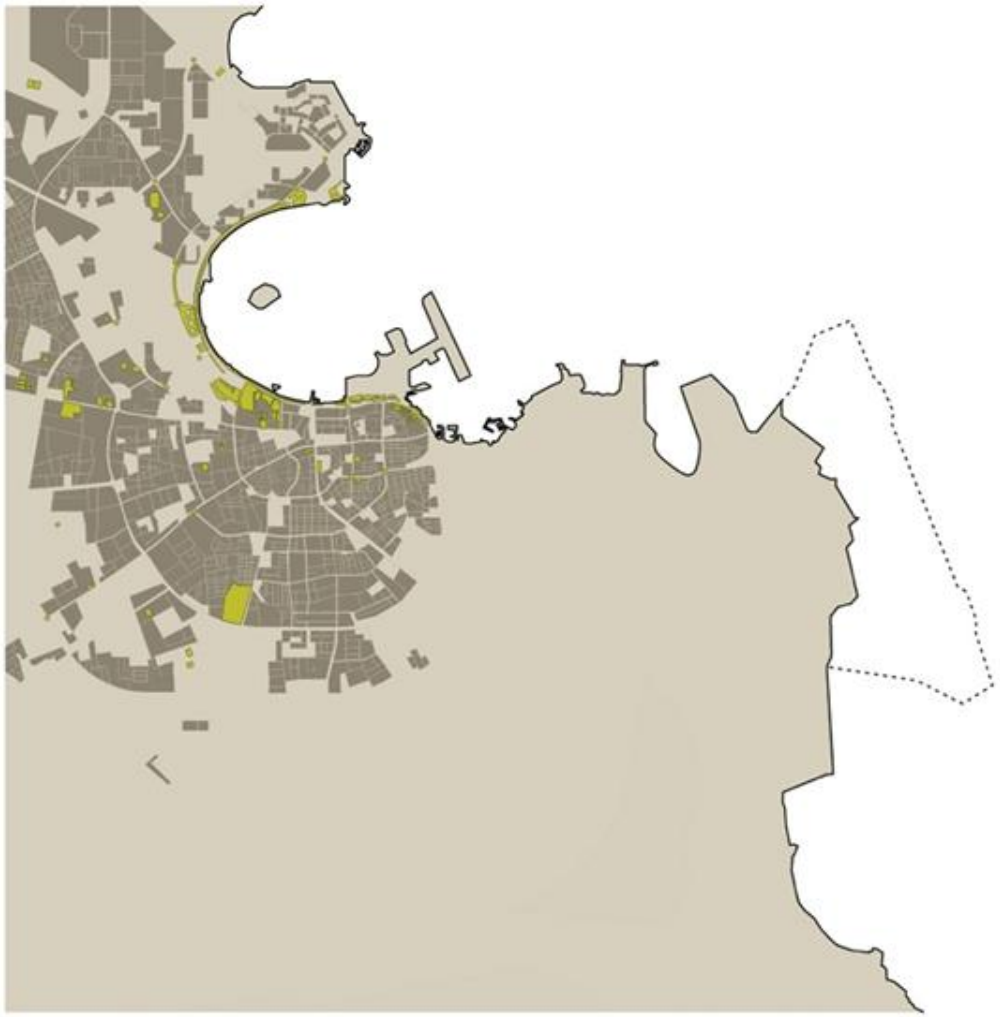
1,000km | | | | 0 N



DOHA CITY CENTER: 1977

NEW DOHA INTERNATIONAL AIRPORT CITY

4km 0 N



DOHA CITY CENTER: 1988

NEW DOHA INTERNATIONAL AIRPORT CITY

4km 0 N

DOHA CITY CENTER: 1999

NEW DOHA INTERNATIONAL AIRPORT CITY

4km 0 N

DOHA CITY CENTER: 2009

NEW DOHA INTERNATIONAL AIRPORT CITY

4km 0 N

DOHA CITY CENTER: 2020

NEW DOHA INTERNATIONAL AIRPORT CITY

4km 0 N

DOHA CITY CENTER: 2022

NEW DOHA INTERNATIONAL AIRPORT CITY

4km 0 N

DOHA CITY CENTER: 2023

NEW DOHA INTERNATIONAL AIRPORT CITY

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DOHA CITY CENTER: 2024

NEW DOHA INTERNATIONAL AIRPORT CITY

4km 0 N

DOHA CITY CENTER: 2026

NEW DOHA INTERNATIONAL AIRPORT CITY

4km 0 N

DOHA CITY CENTER: 2027

NEW DOHA INTERNATIONAL AIRPORT CITY

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DOHA CITY CENTER: 2028

NEW DOHA INTERNATIONAL AIRPORT CITY

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DOHA CITY CENTER: 2029

NEW DOHA INTERNATIONAL AIRPORT CITY

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DOHA CITY CENTER: 2030

NEW DOHA INTERNATIONAL AIRPORT CITY

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DOHA CITY CENTER: 2033

NEW DOHA INTERNATIONAL AIRPORT CITY

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DOHA CITY CENTER: 2036

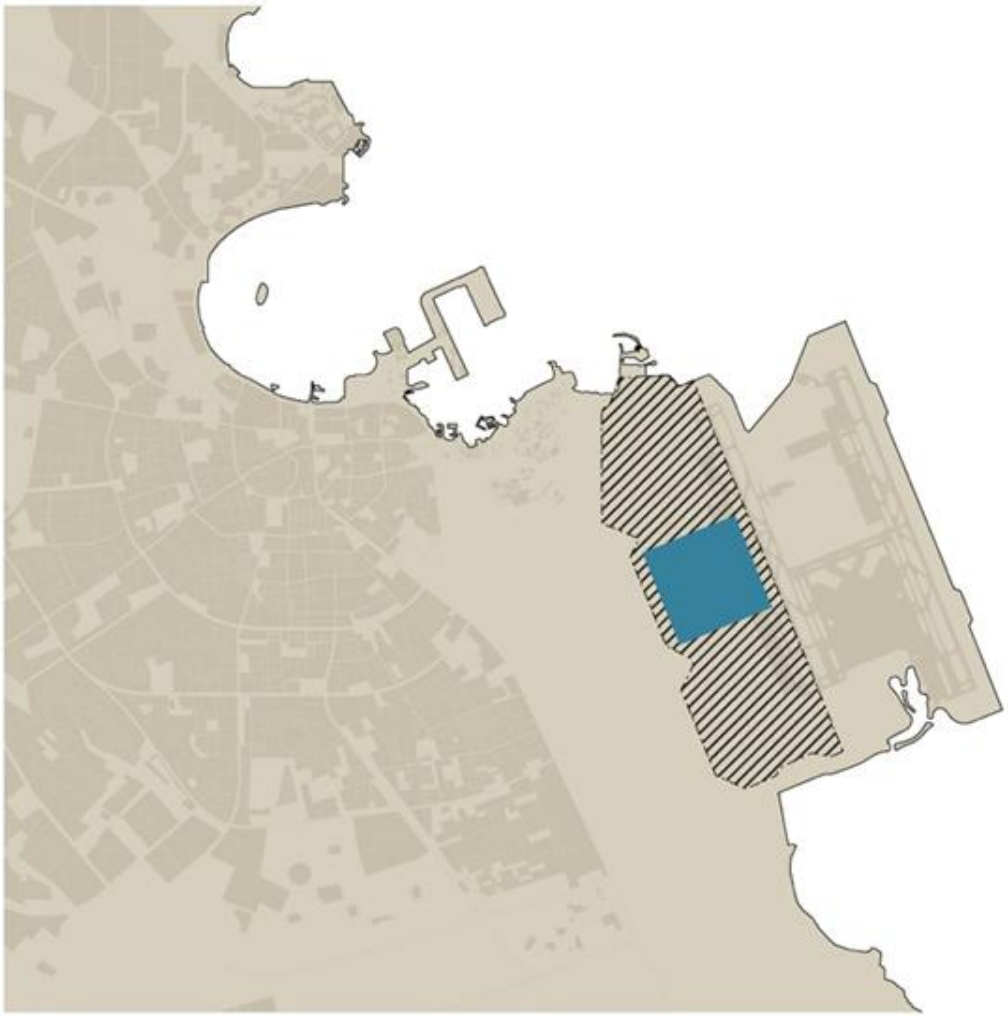
NEW DOHA INTERNATIONAL AIRPORT CITY

4km 0 N

DOHA CITY CENTER: 2040

NEW DOHA INTERNATIONAL AIRPORT CITY

4km 0 N



REQUIRED PROGRAM VS. SITE AREA

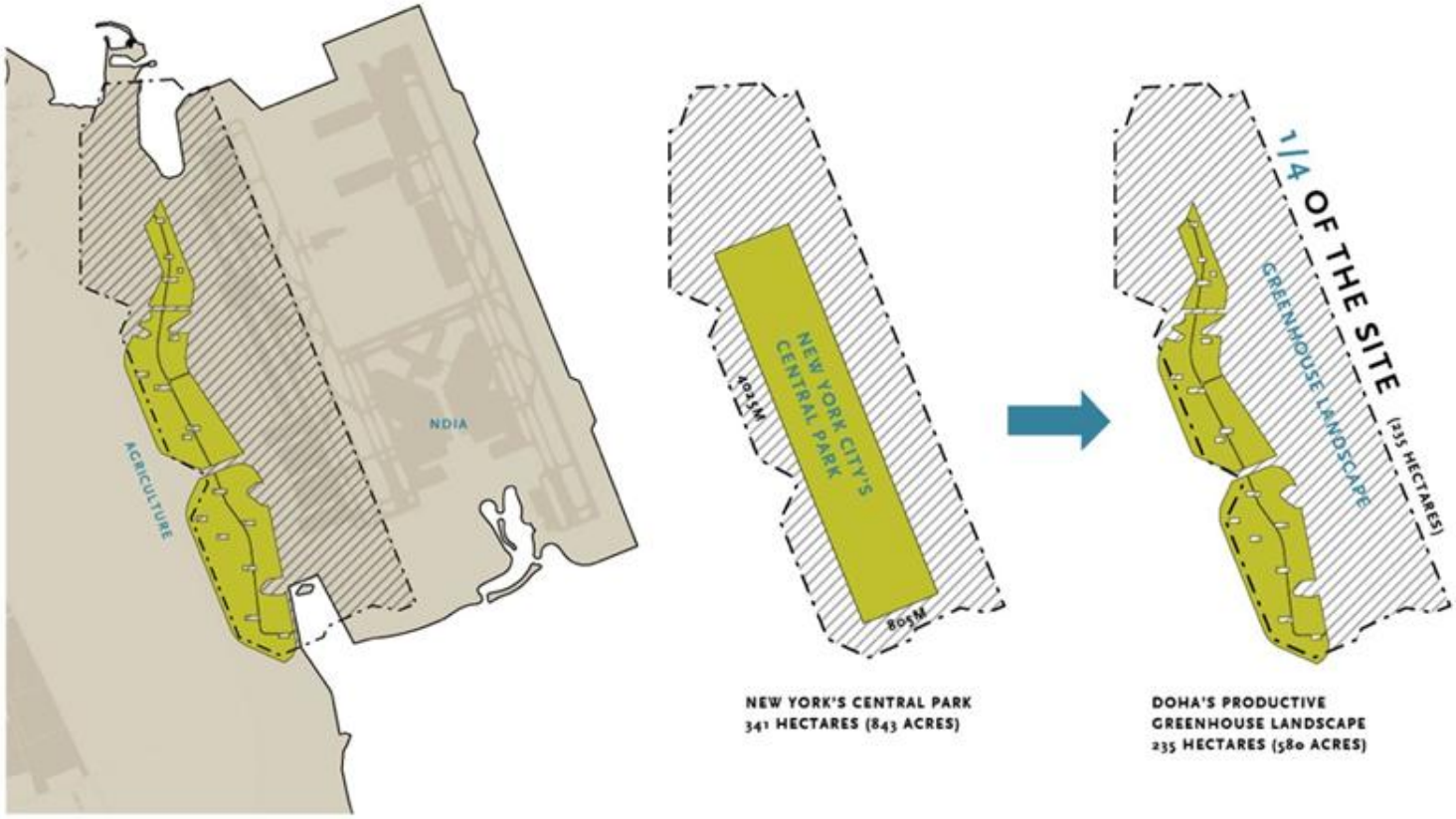
NEW DOHA INTERNATIONAL AIRPORT CITY

4km 0 N

DENSIFICATION STRATEGY

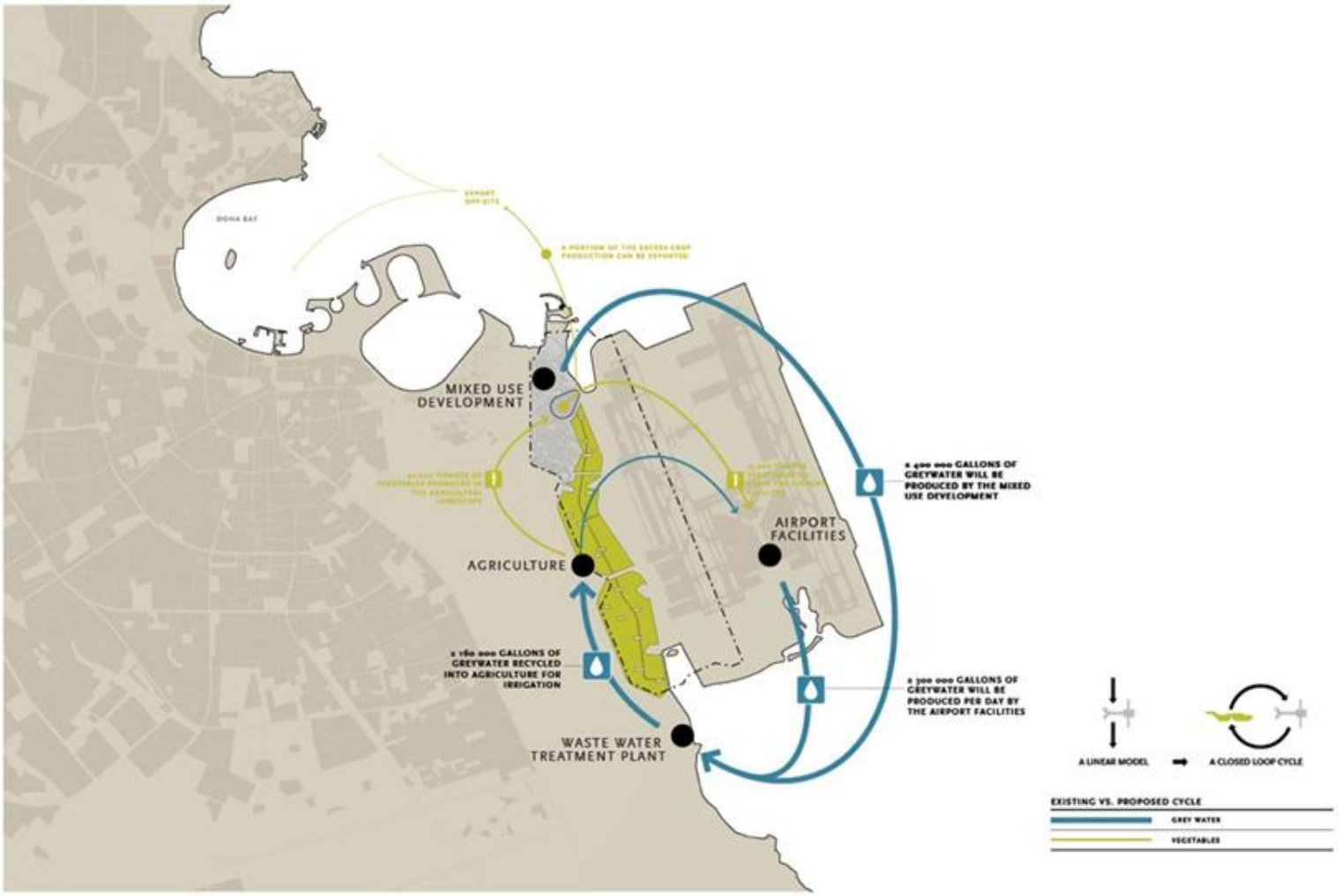
NEW DOHA INTERNATIONAL AIRPORT CITY

4km 0 N



SELF-SUFFICIENCY

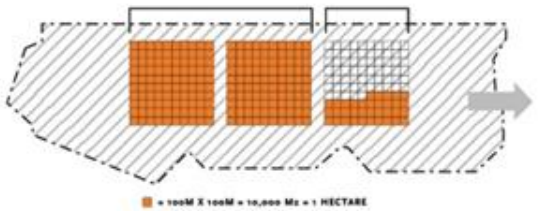
NEW DOHA INTERNATIONAL AIRPORT CITY



WATER CYCLES

NEW DOHA INTERNATIONAL AIRPORT CITY

4km 0 N



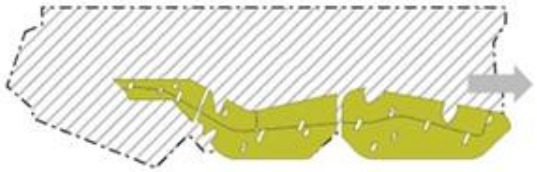
TOTAL AREA OF AGRICULTURE

THE PROPOSED AREA OF AGRICULTURE ON THE NDIA SITE IS

235 HECTARES

WITH A 15% COEFFICIENT (~35 HECTARES) DEDUCTED FOR INFRASTRUCTURE, SHADED AREAS FOR WORKERS, ETC.

200 HECTARES X 185 TONNES AVG. YIELD / HA = 40,190 TONNES



TOTAL VEGETABLE PRODUCTION

THE PROPOSED AREA OF AGRICULTURE ON THE NDIA SITE WOULD PRODUCE

40,000 TONNES

OF VEGETABLES PER YEAR.

SOURCE: *WWW.CUESTAROBLE.COM
*FACULTY OF FOOD AND AGRICULTURE, UAE UNIVERSITY
WWW.CFS.UAEU.AC.AE/RESEARCH/EJAS.HTML

	YIELD / HA*	X	CROP AREA	=	TOTAL YIELD
	250		25		6,250
	350		25		8,750
	100		25		2,500
	400		25		11,400
	85		25		2,125
	160		25		4,560
	35		25		875
	130		25		3,705
TOTAL	185 TONNES/HA		200 HA		40,190 TONNES

40,000 TONNES / 0.156 TONNES VEG / PERSON / YR = 256,410 PEOPLE FED

1 = 1000 PEOPLE

1 tomato = 200 grams

1 tonne = 5000 tomatoes

1 person eats the equivalent of 2.5 large tomatoes in vegetables a day (that's 500 grams or 1.1lbs), and 780 large tomatoes a year (156,000 grams or 350lbs)

TOTAL # OF PEOPLE PROVIDED FOR

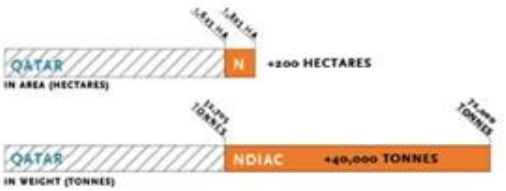
IF THE NDIA SITE MAXIMIZED ITS AGRICULTURAL PRODUCTION, IT COULD FEED

250,000 PEOPLE

100% OF THEIR VEGETABLE INTAKE PER YEAR. USING A TUNNEL SYSTEM (WITH HIGH EFFICIENCY HYDROPONICS COULD INCREASE THIS NUMBER 25%.

SOURCE:
USDA FOOD CONSUMPTION STATISTICS
WWW.USDA.GOV/FACTBOOK/CHAPTER2.PDF

INCREASE IN VEGGIES AS A % INCREASE COMPARED TO AREA INCREASE



% OF QATAR'S CURRENT FARMING

FOR 2005, QATAR PRODUCED 32,705 TONS OF VEGETABLES FROM 1,623 HECTARES OF LAND. THE NDIA PROPOSAL WOULD INCREASE QATAR'S AGRICULTURAL PRODUCTION WITH

122% MORE VEGETABLES GROWN IN ONLY

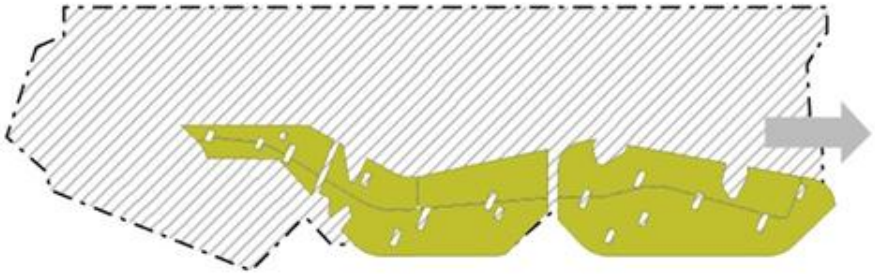
12% MORE AREA

SOURCE: NATIONAL MASTER PLAN, P.69

SELF-SUFFICIENCY

NEW DOHA INTERNATIONAL AIRPORT CITY

200 HECTARES X 185 TONNES AVG. YIELD / HA = 40,190 TONNES



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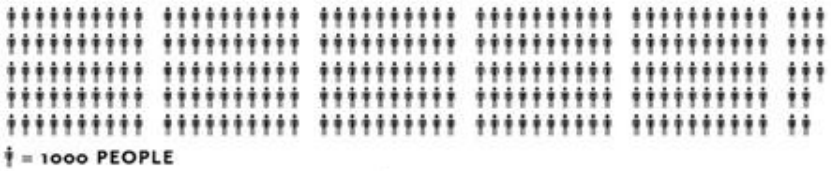

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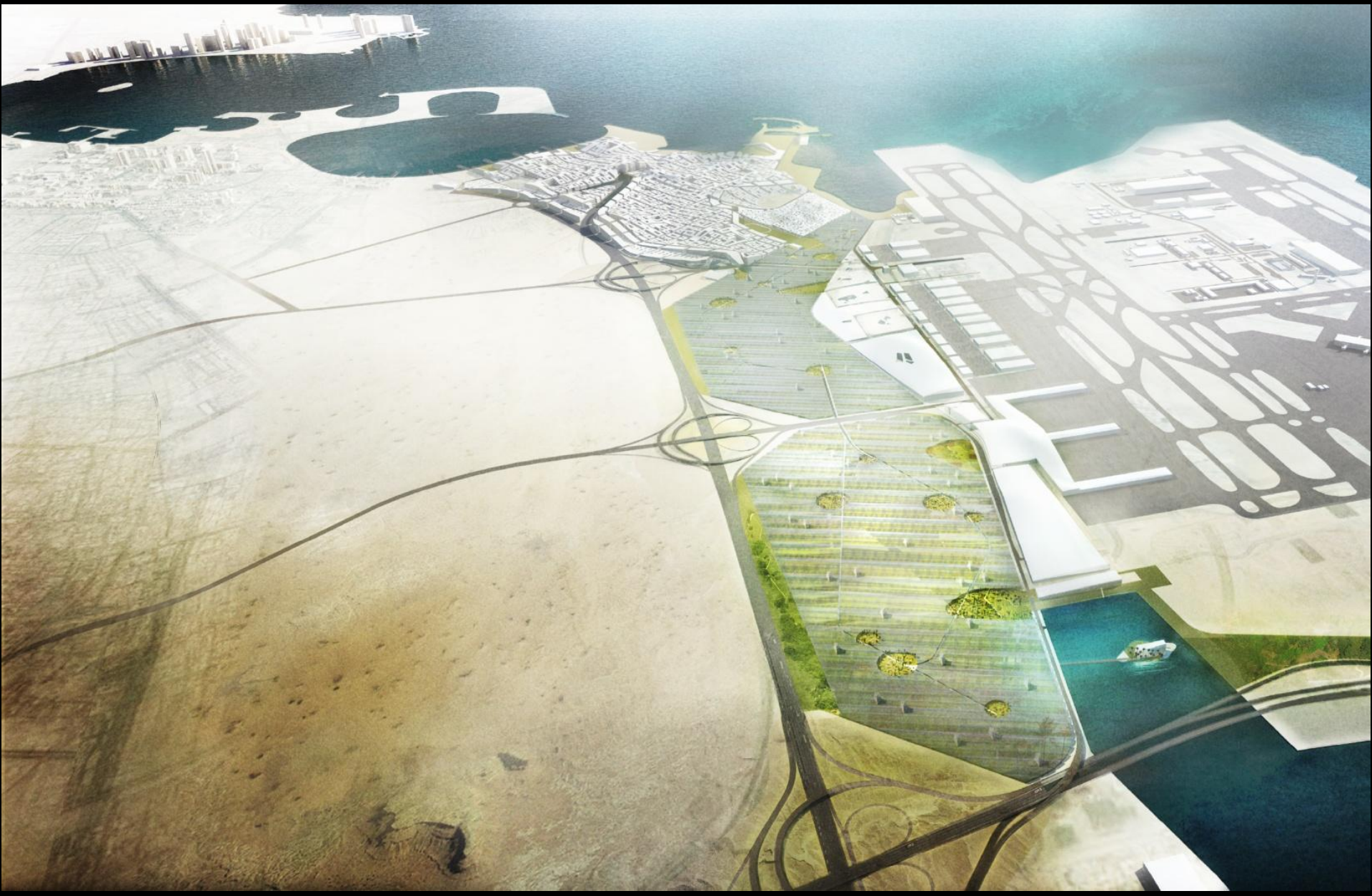
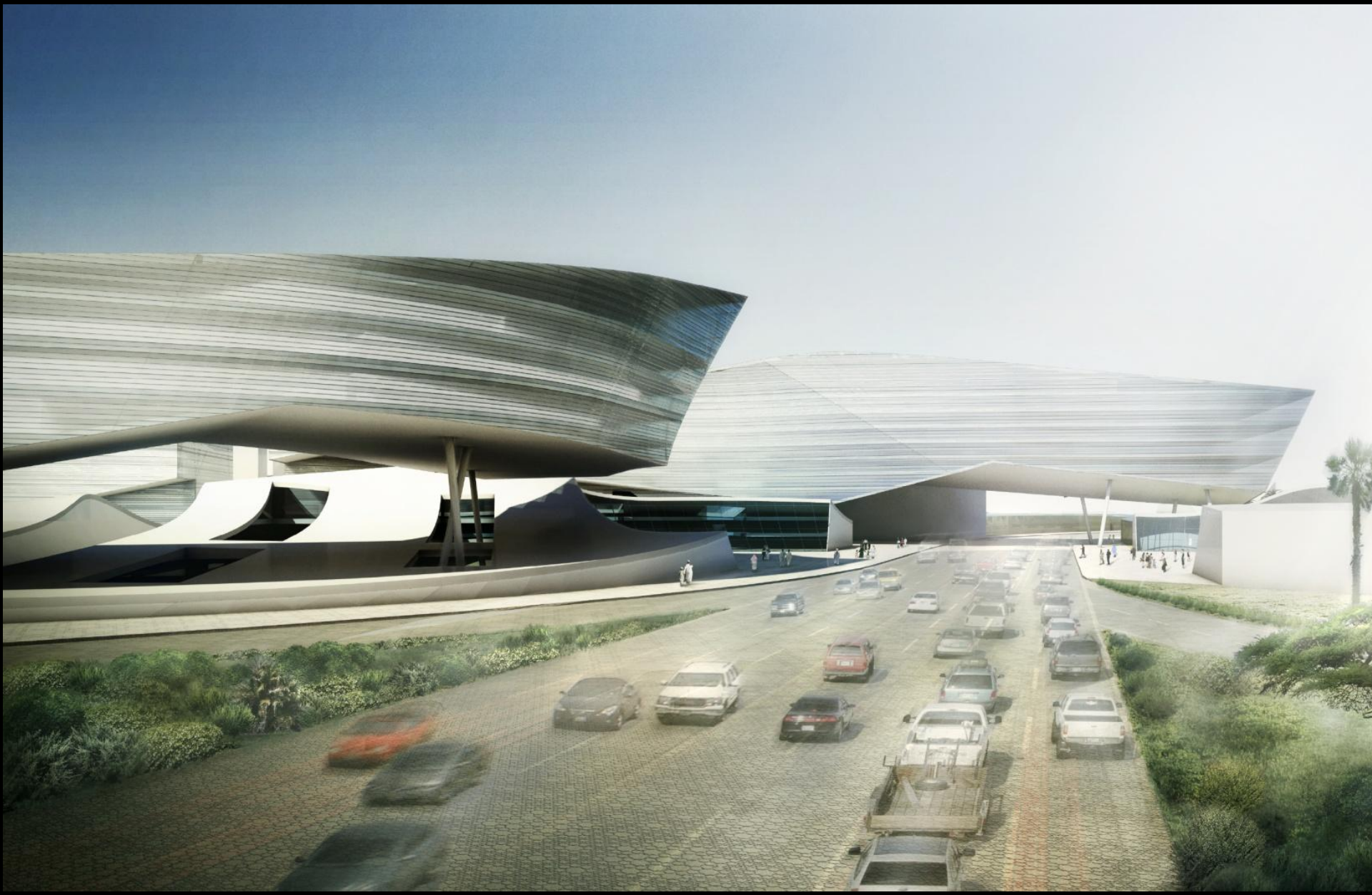
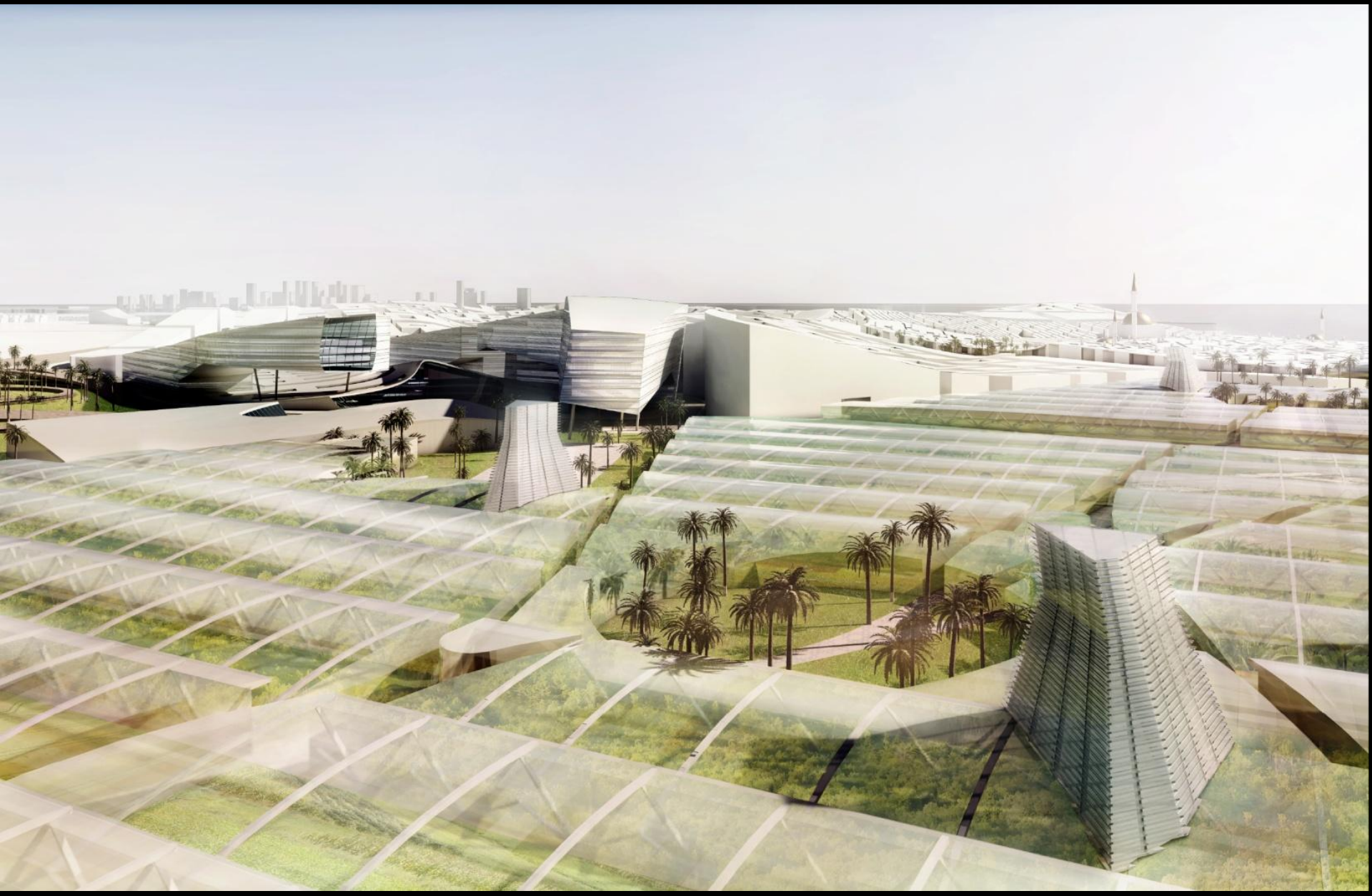
SOURCE:
USDA FOOD CONSUMPTION STATISTICS
WWW.USDA.GOV/FACTBOOK/CHAPTER2.PDF

INCREASED VEGETABLE PRODUCTION AND PEOPLE FED

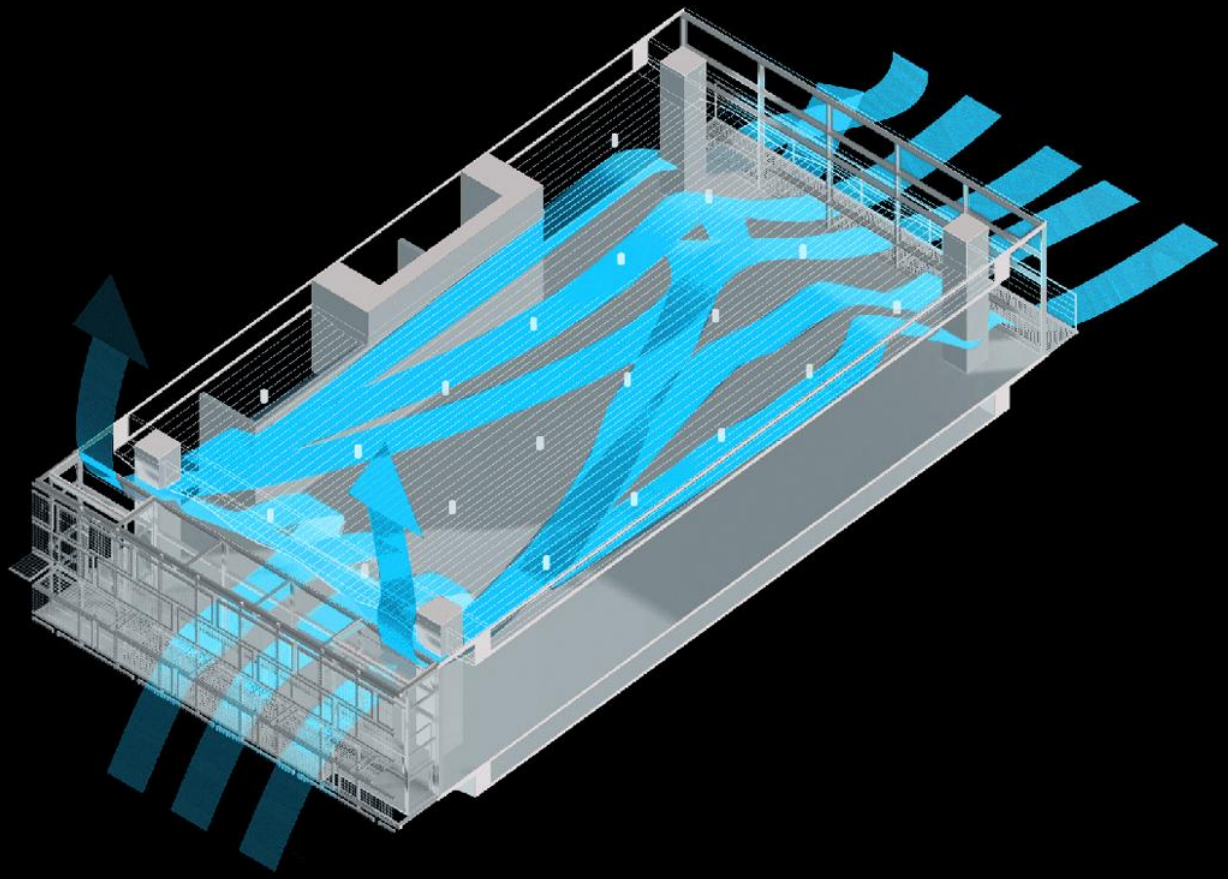
NEW DOHA INTERNATIONAL AIRPORT CITY





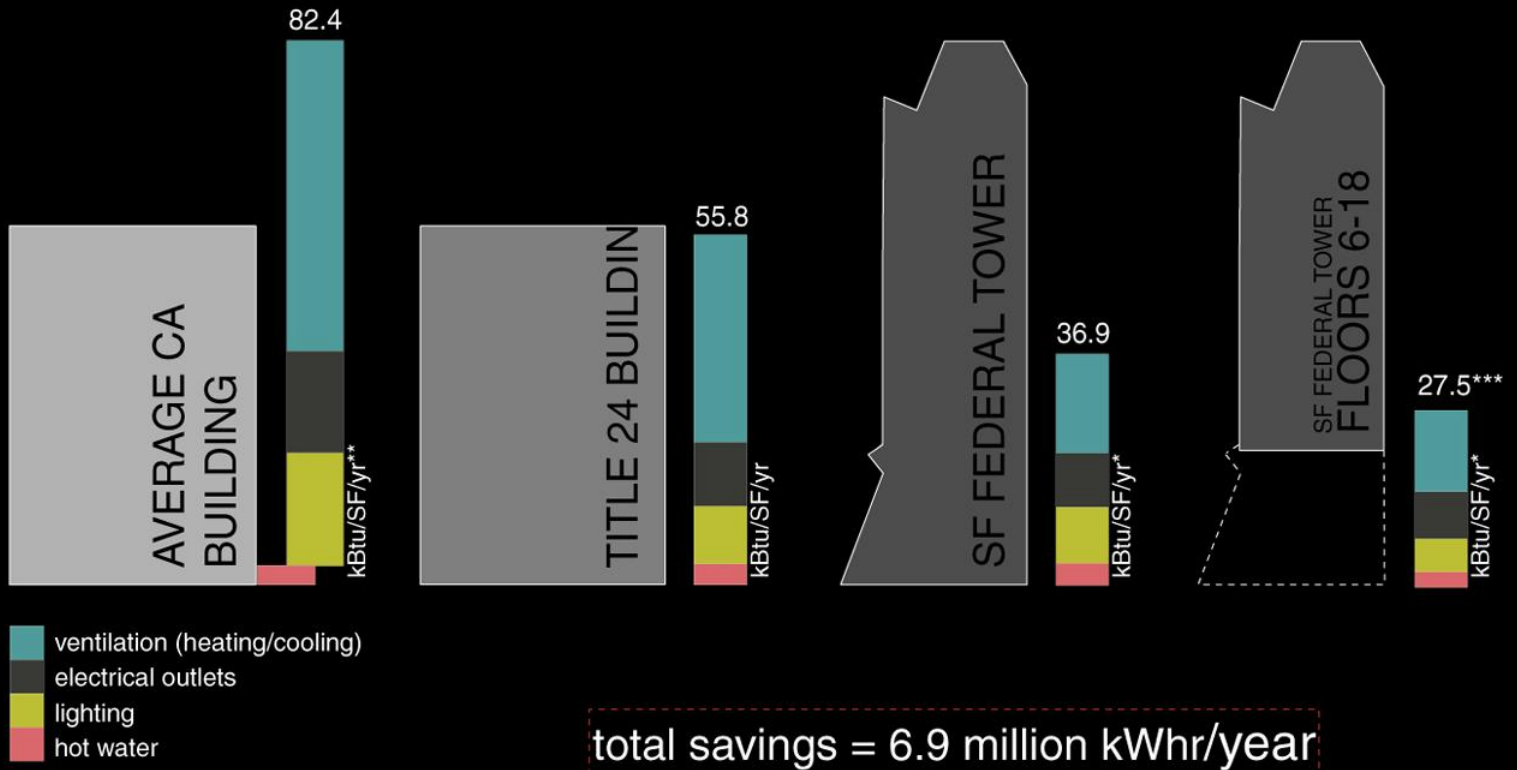


GRANT BLDG.
HOTEL



VENTILATION

SAN FRANCISCO FEDERAL BUILDING



ENERGY USAGE COMPARISON

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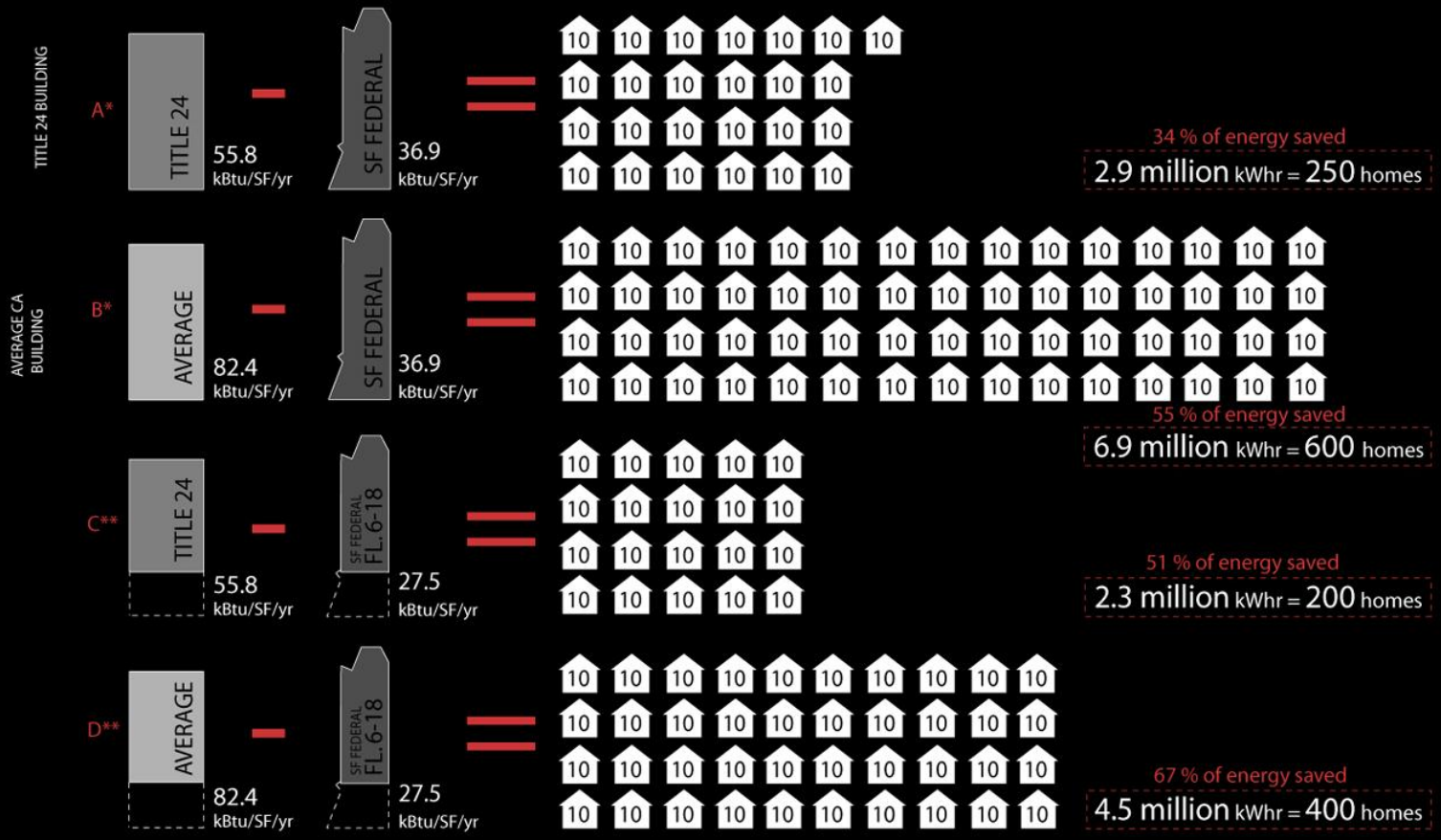

ENERGY SAVING COMPARISON

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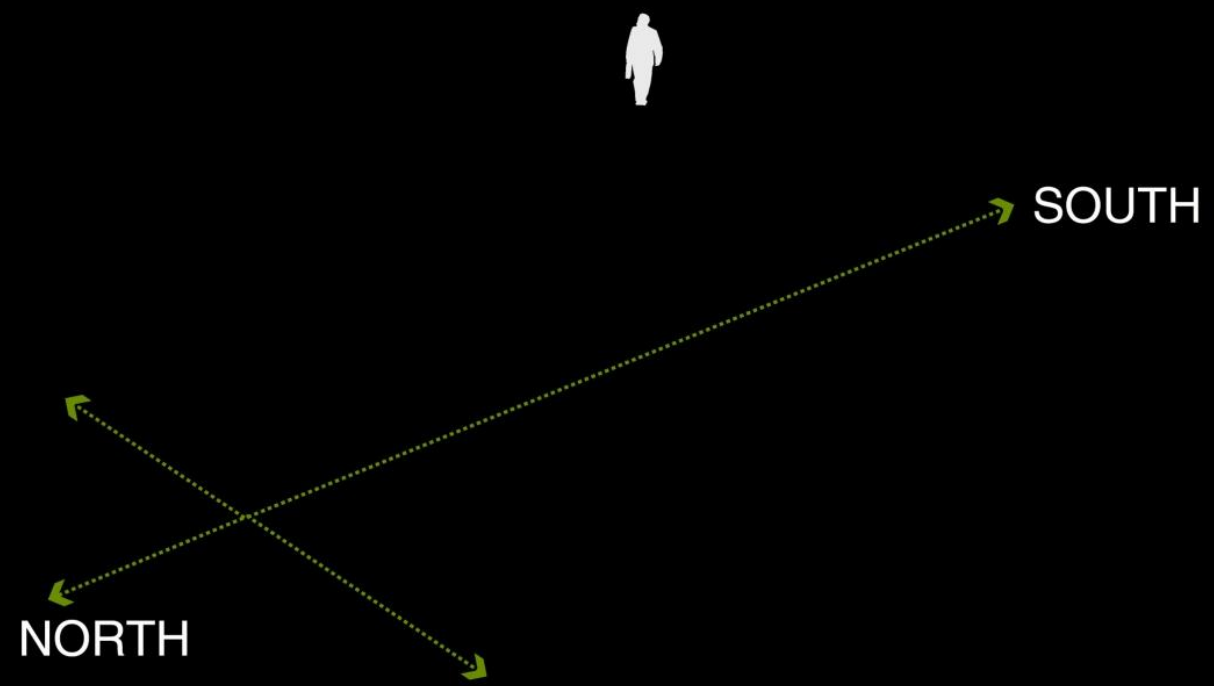
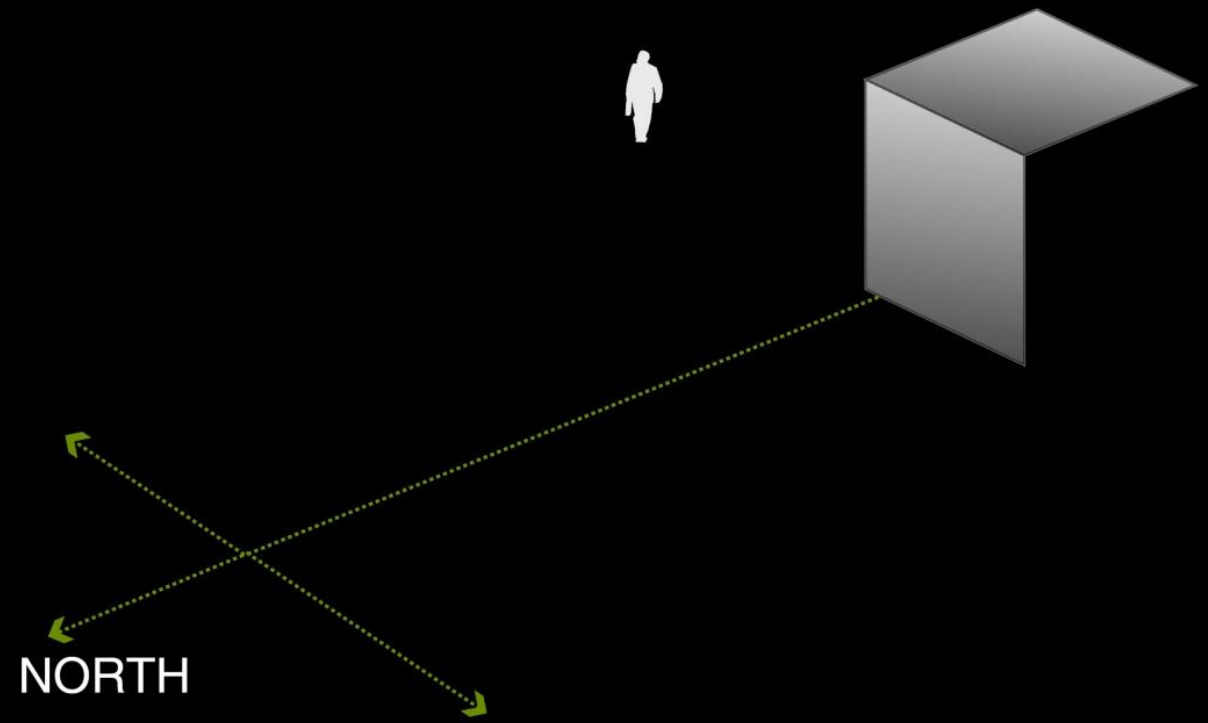


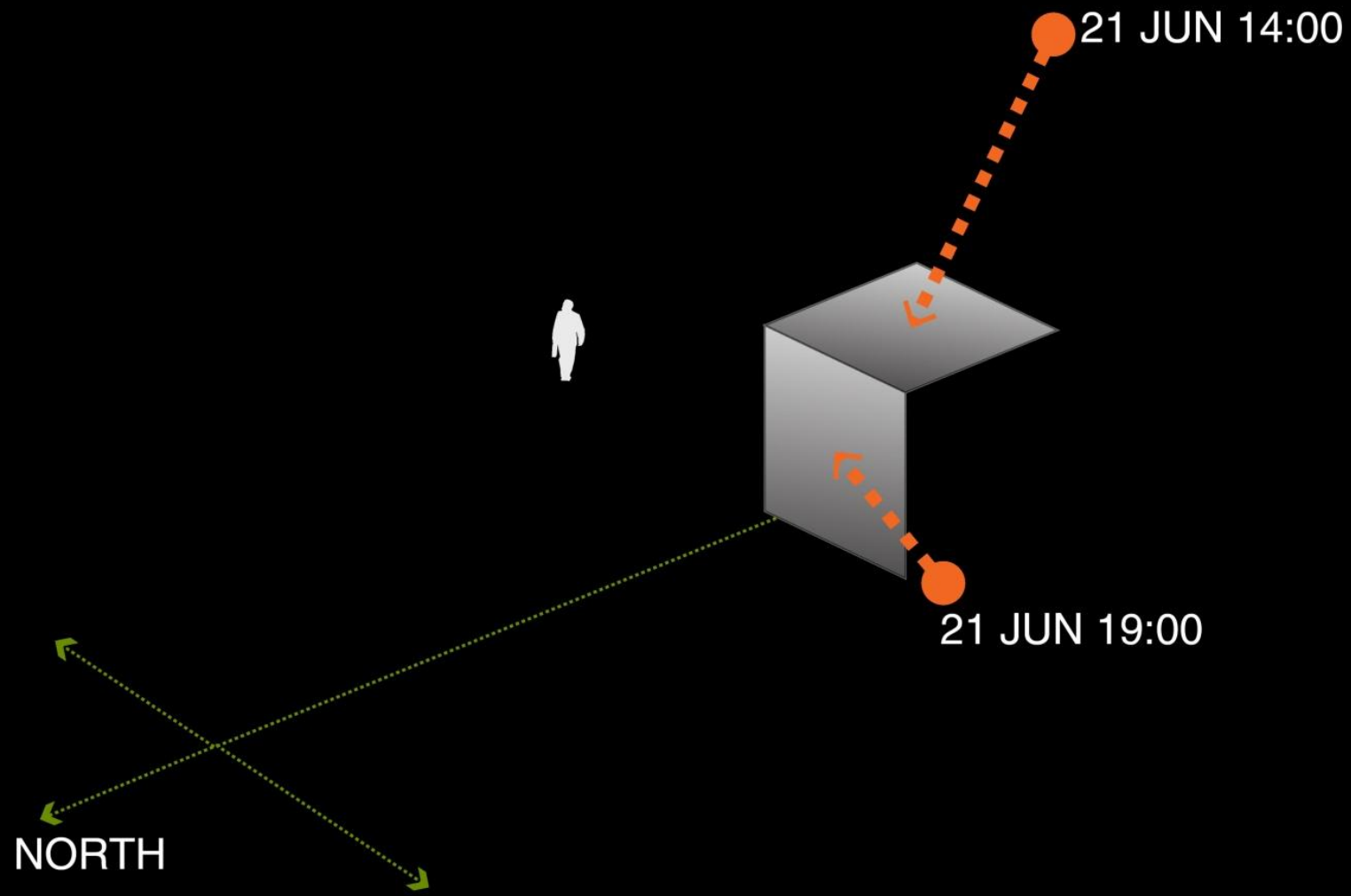
BUILDING ORIENTATION AND SOLAR SHADING

MORPHOSIS ARCHITECTS



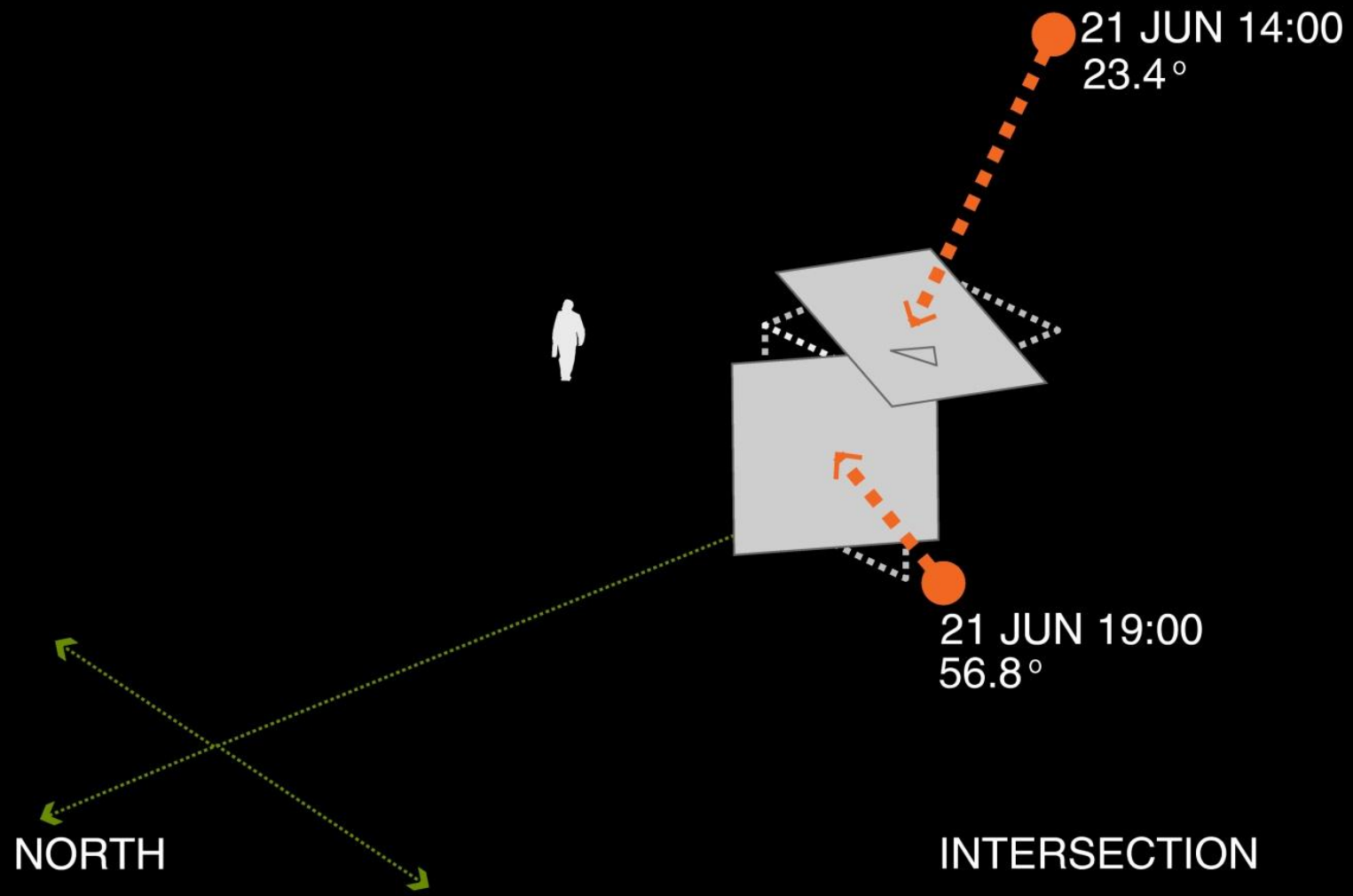
BUILDING ORIENTATION AND SOLAR SHADING

MORPHOSIS ARCHITECTS



BUILDING ORIENTATION AND SOLAR SHADING

MORPHOSIS ARCHITECTS



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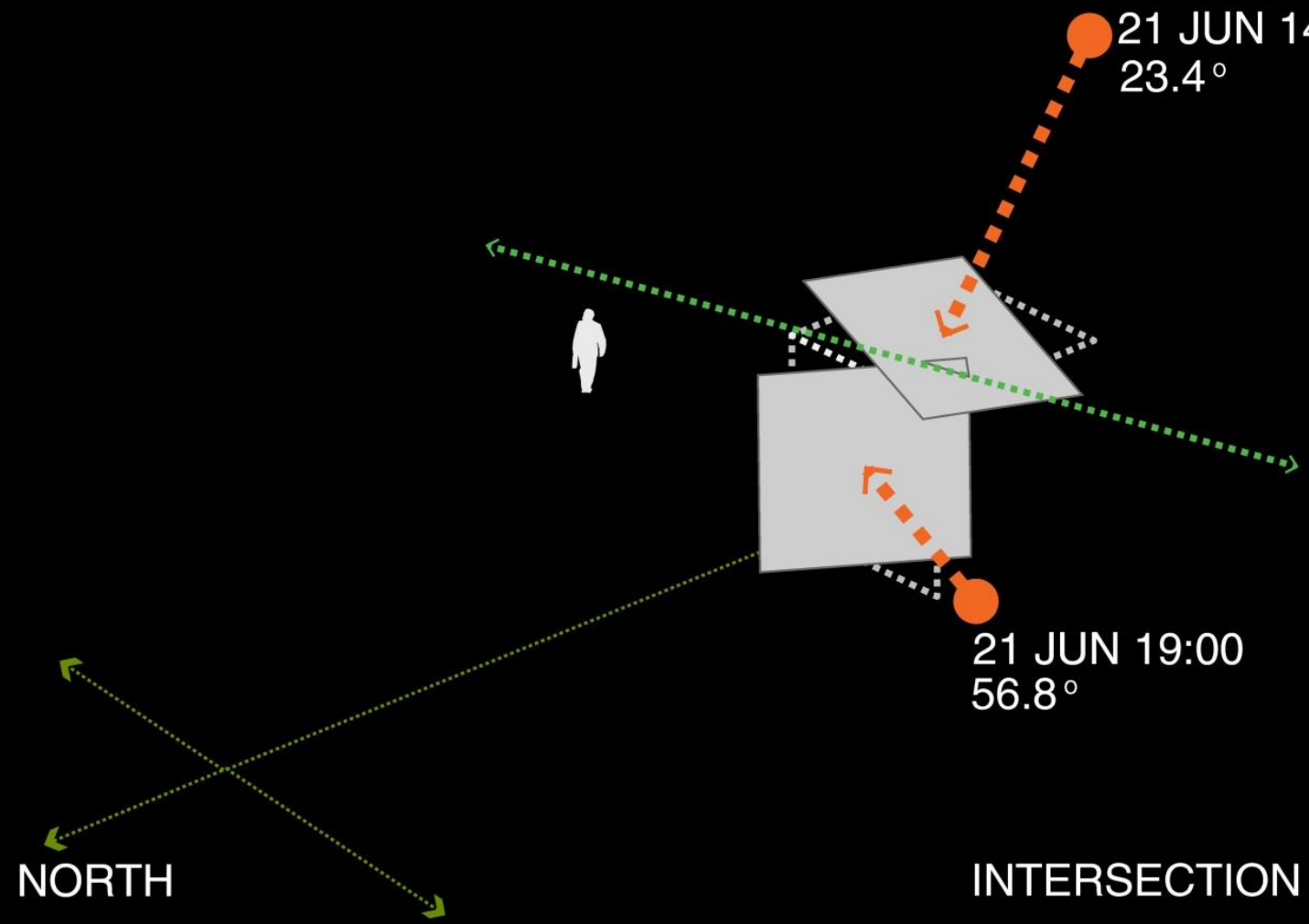
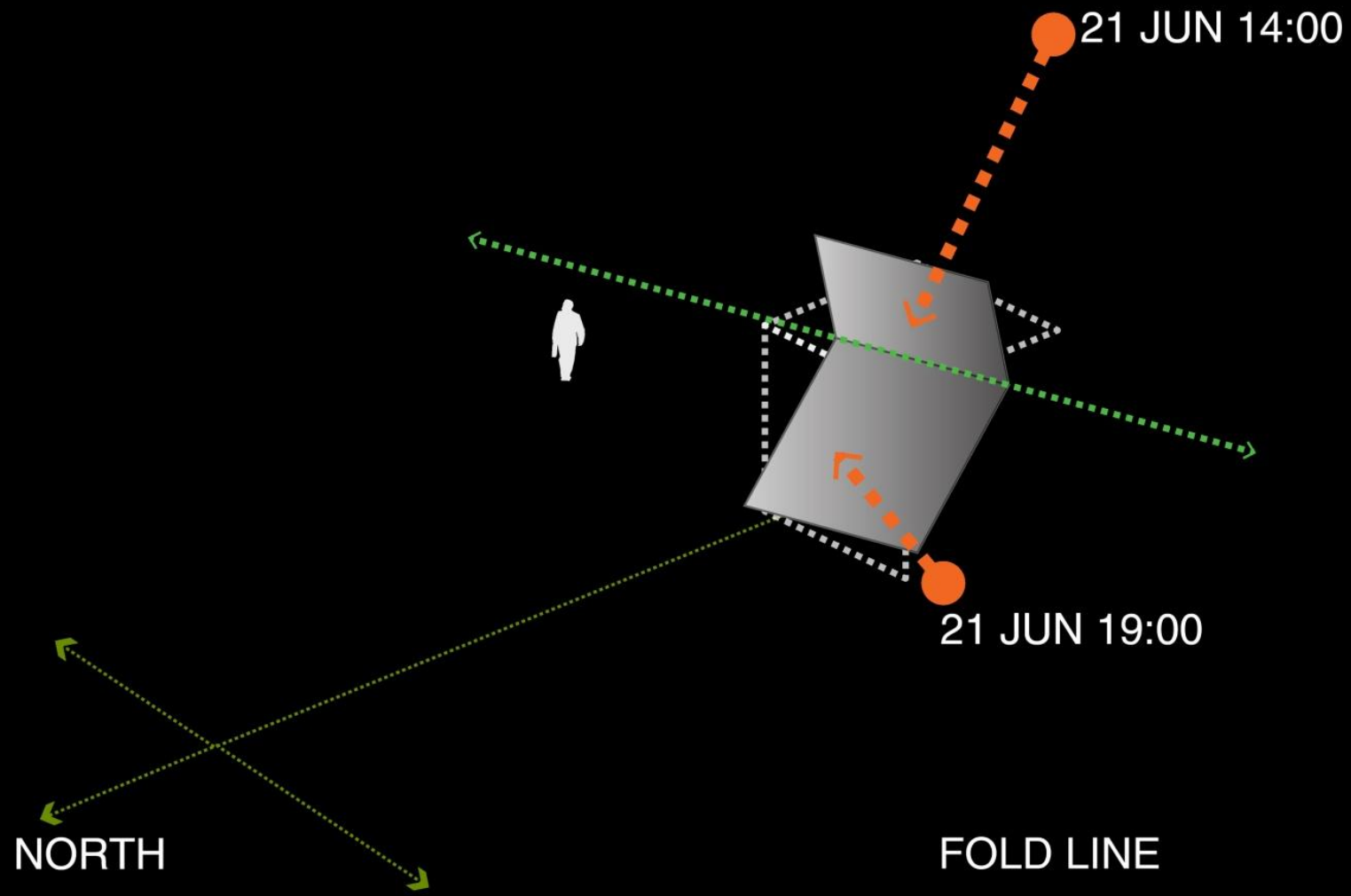
MORPHOSIS ARCHITECTS



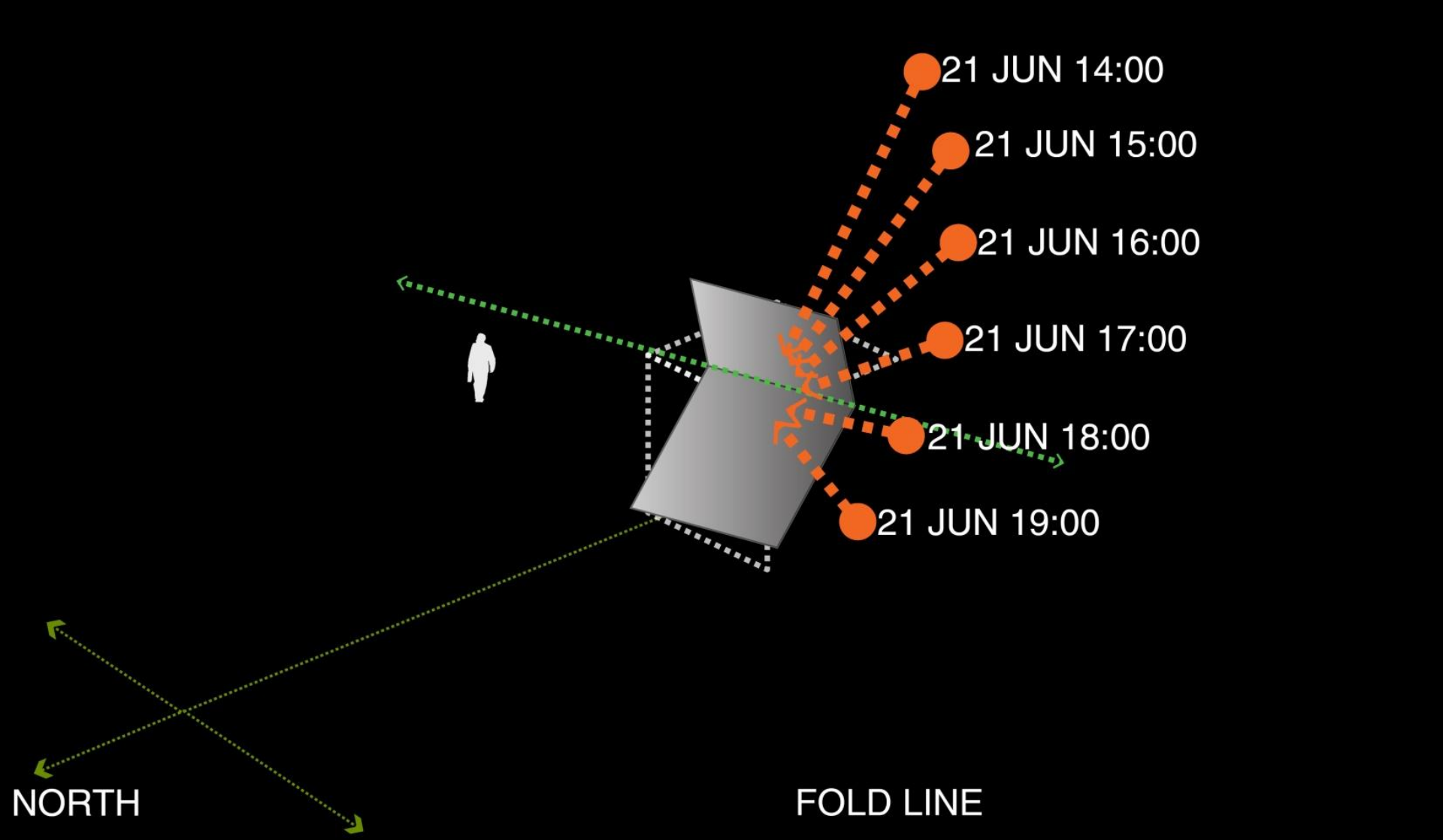
BUILDING ORIENTATION AND SOLAR SHADING

MORPHOSIS ARCHITECTS



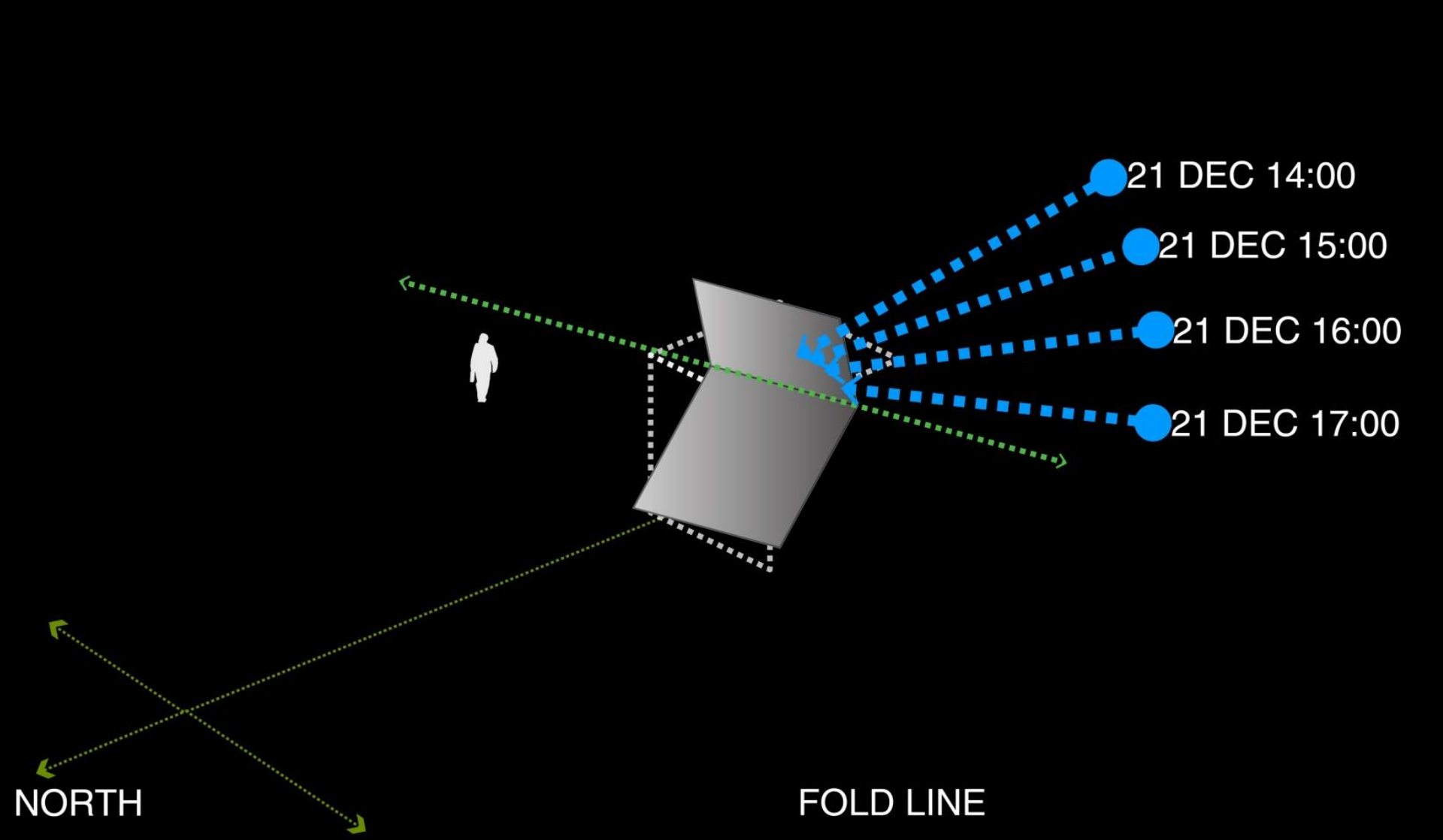
BUILDING ORIENTATION AND SOLAR SHADING

MORPHOSIS ARCHITECTS



BUILDING ORIENTATION AND SOLAR SHADING

MORPHOSIS ARCHITECTS



BUILDING ORIENTATION AND SOLAR SHADING

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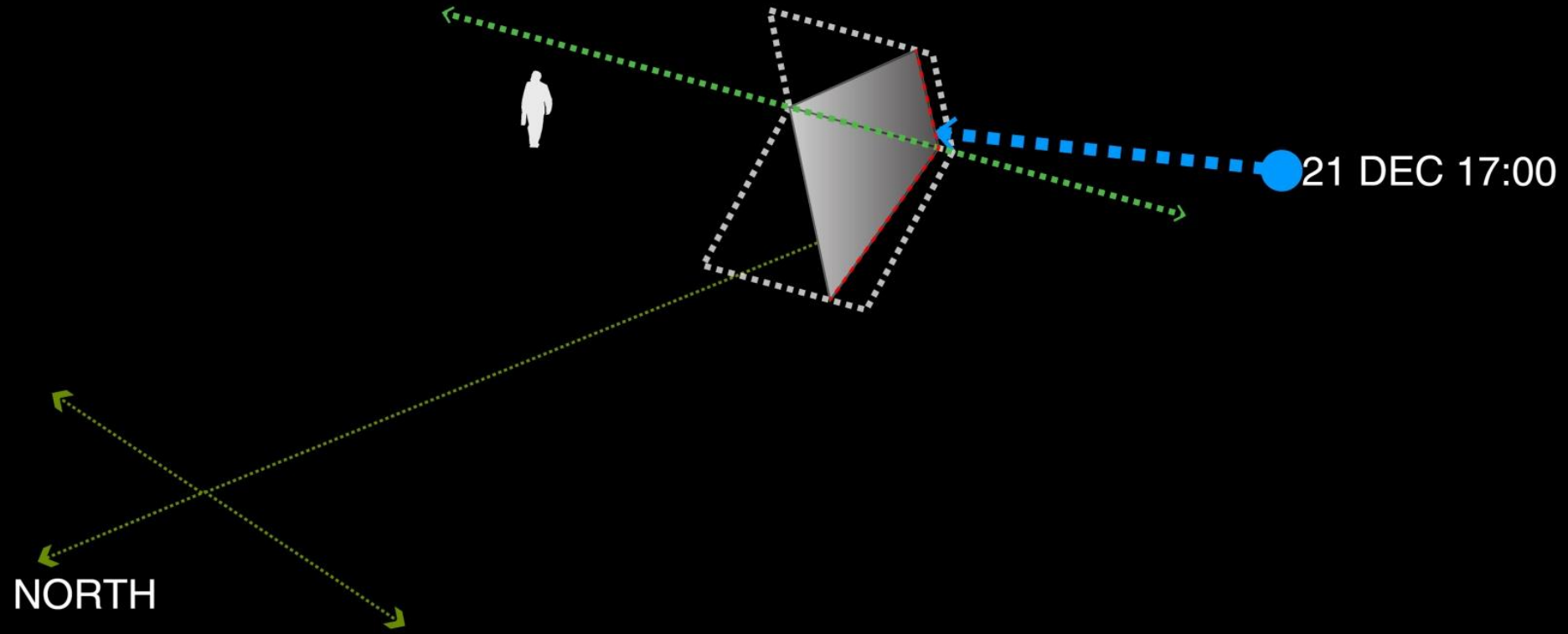
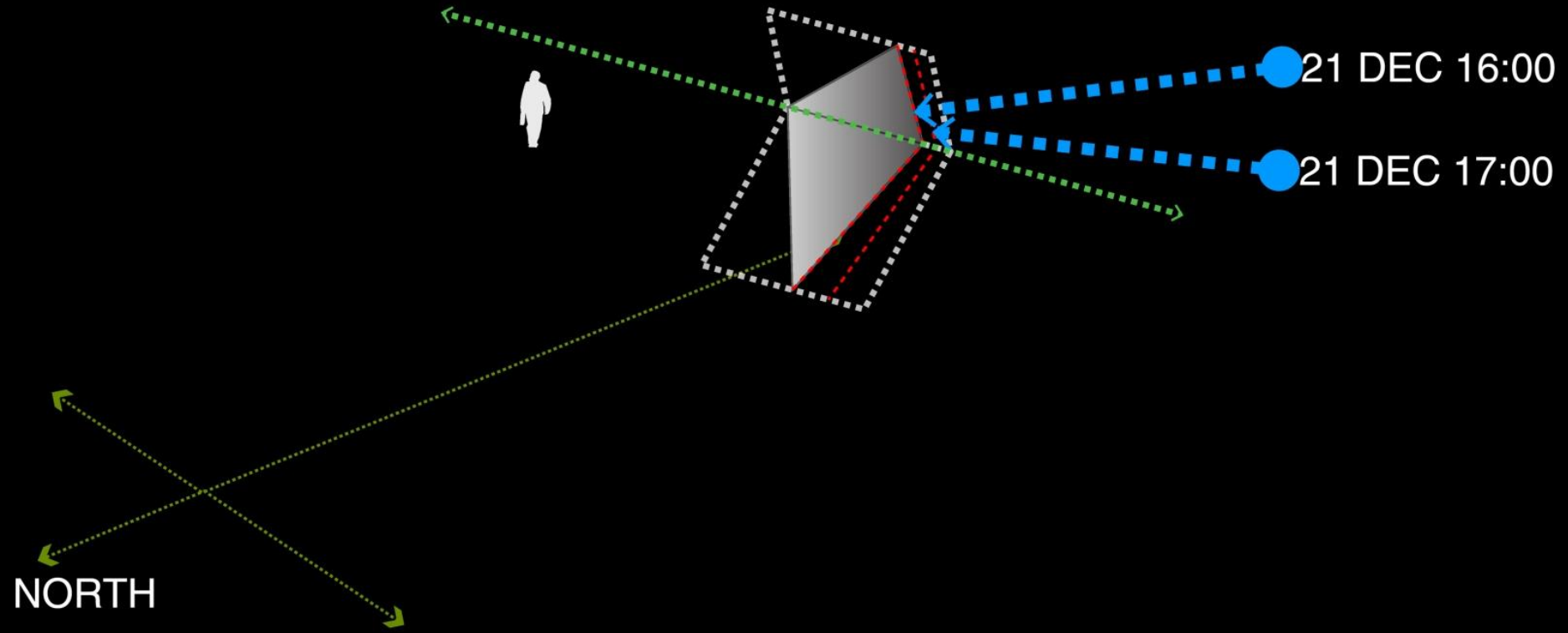


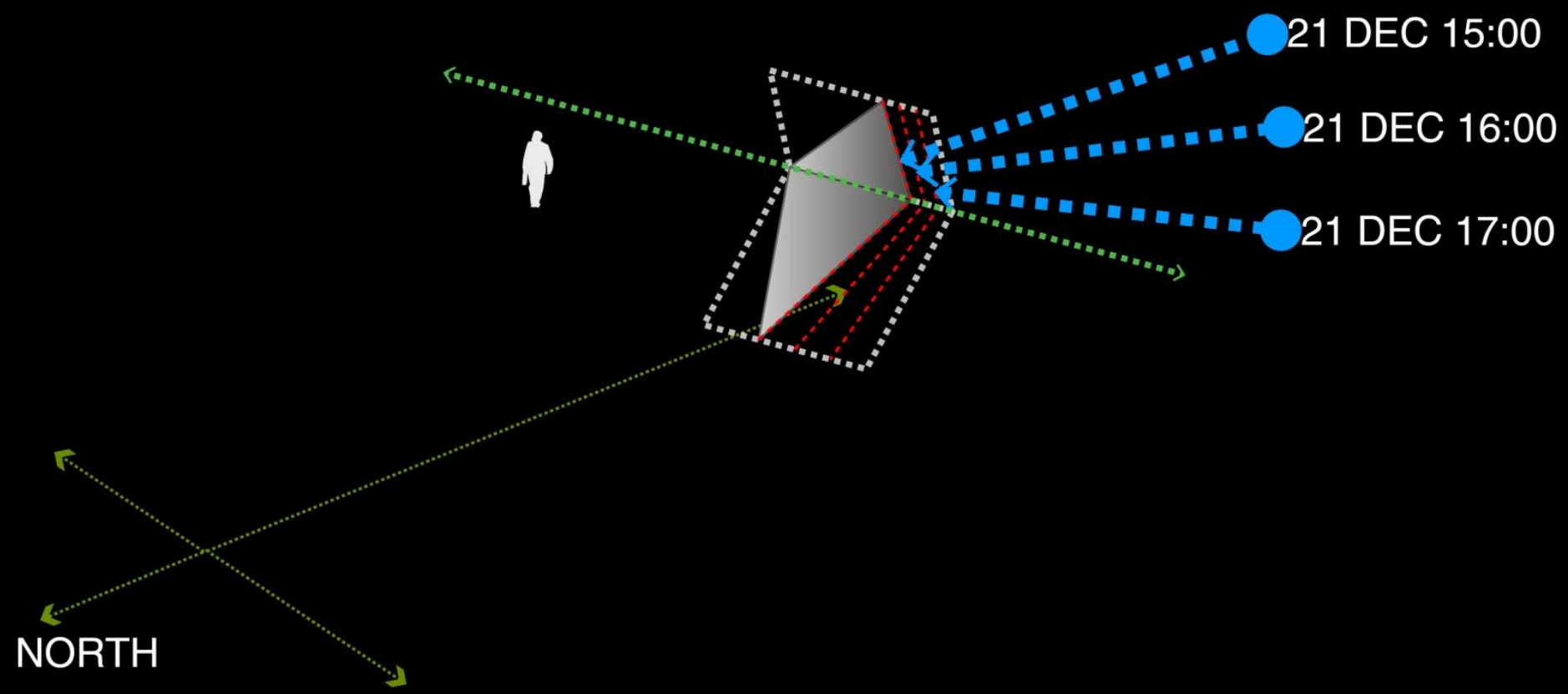
BUILDING ORIENTATION AND SOLAR SHADING

MORPHOSIS ARCHITECTS



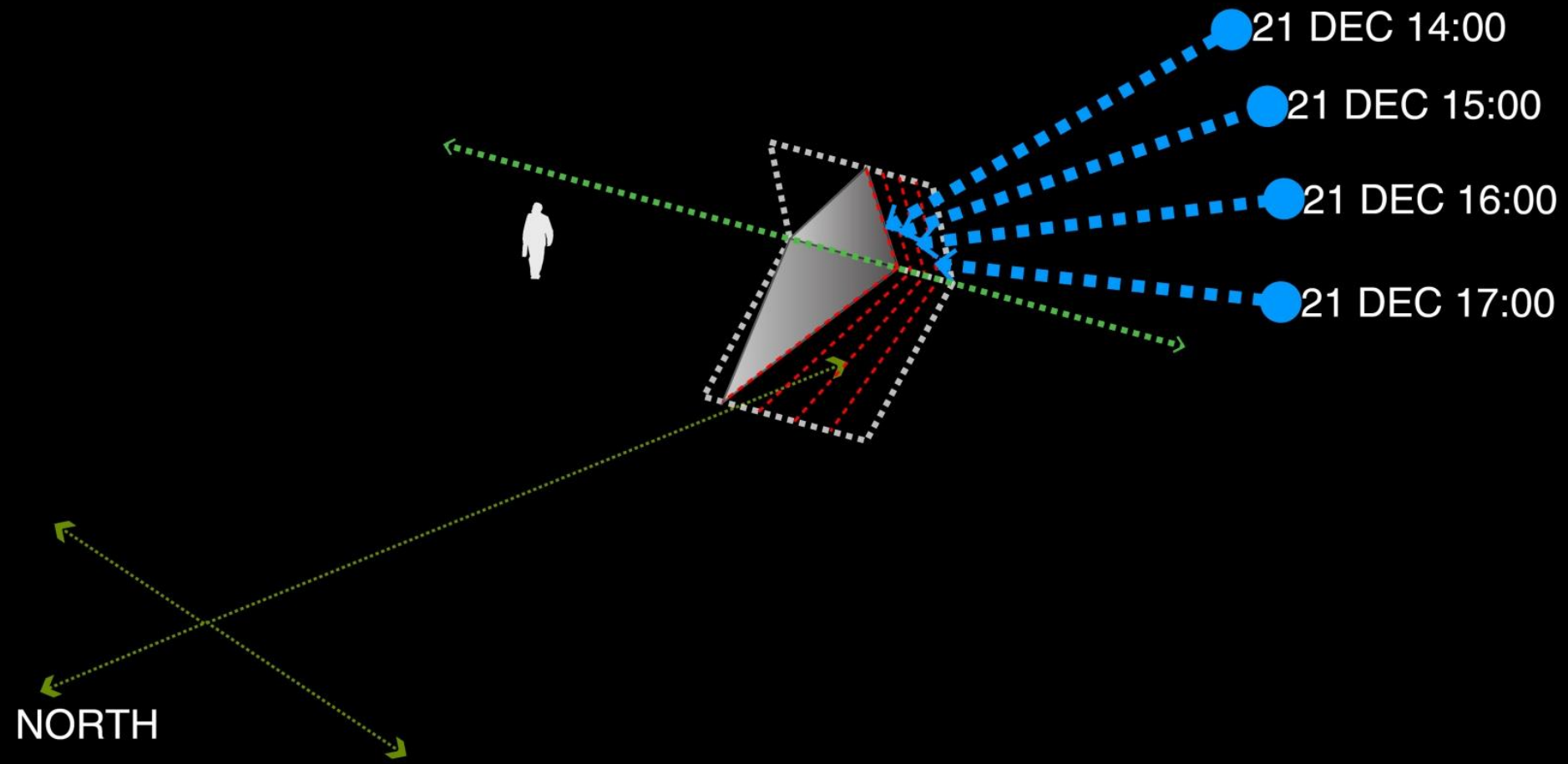
BUILDING ORIENTATION AND SOLAR SHADING

MORPHOSIS ARCHITECTS



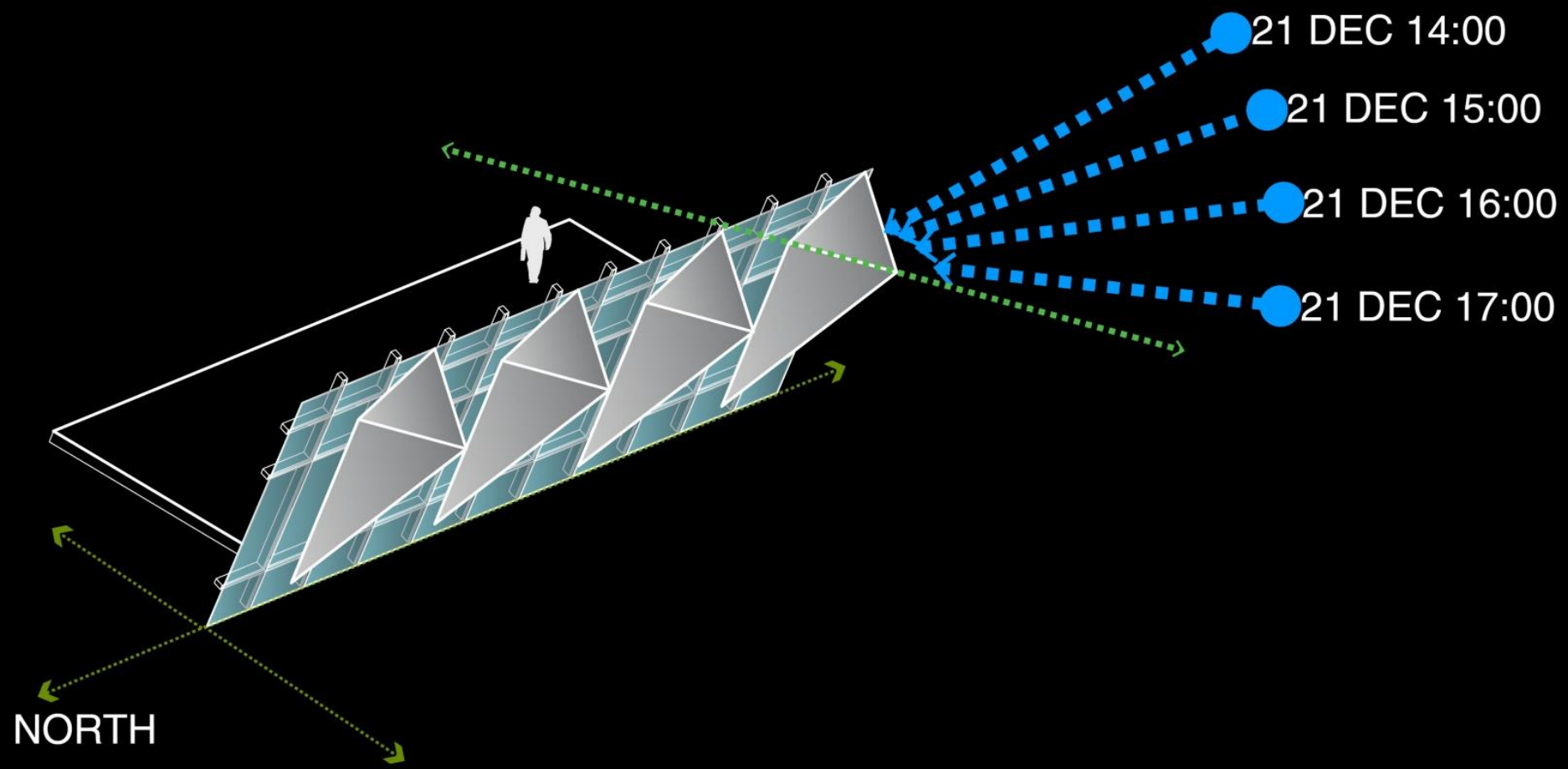
BUILDING ORIENTATION AND SOLAR SHADING

MORPHOSIS ARCHITECTS



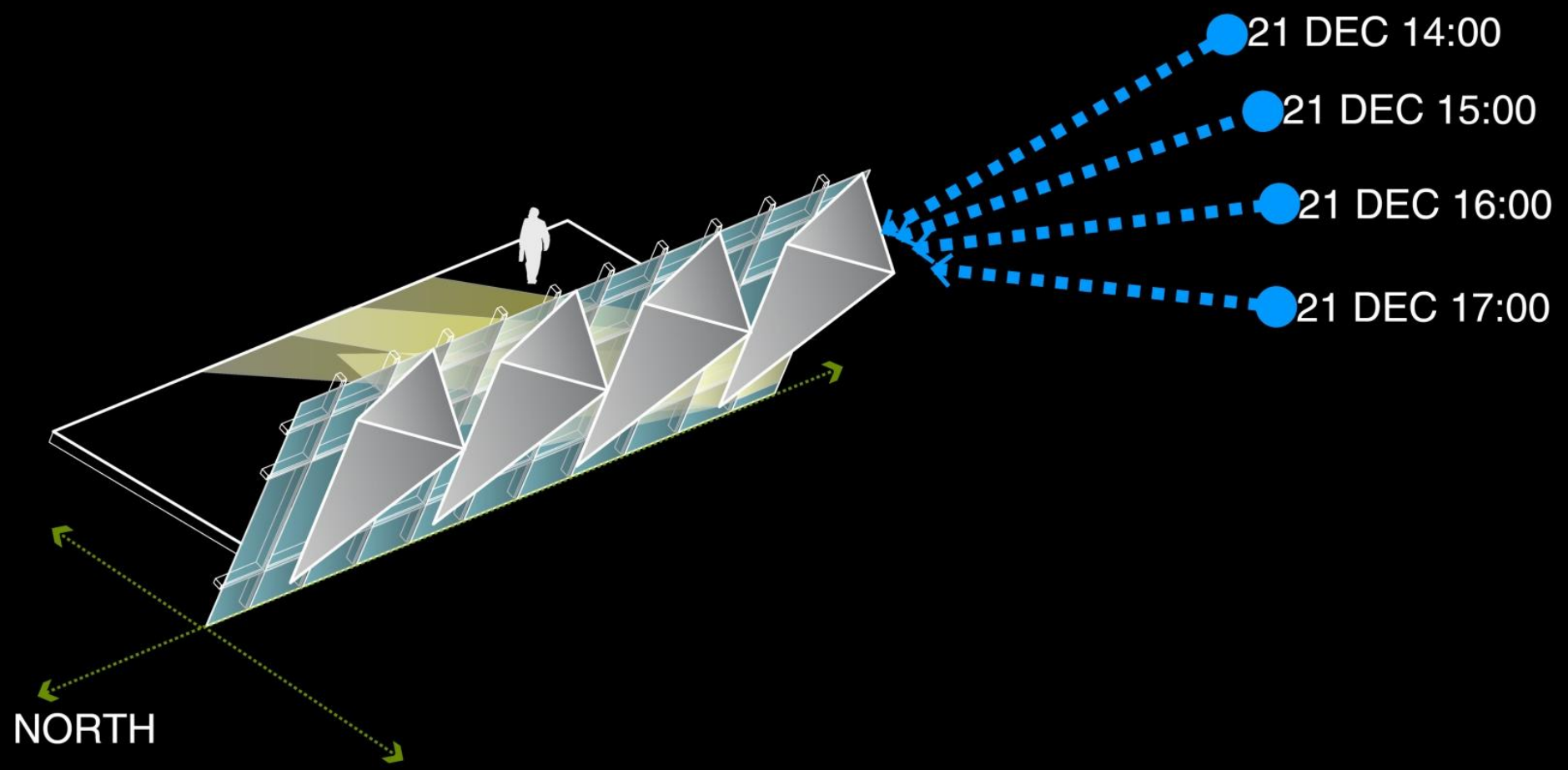
BUILDING ORIENTATION AND SOLAR SHADING

MORPHOSIS ARCHITECTS



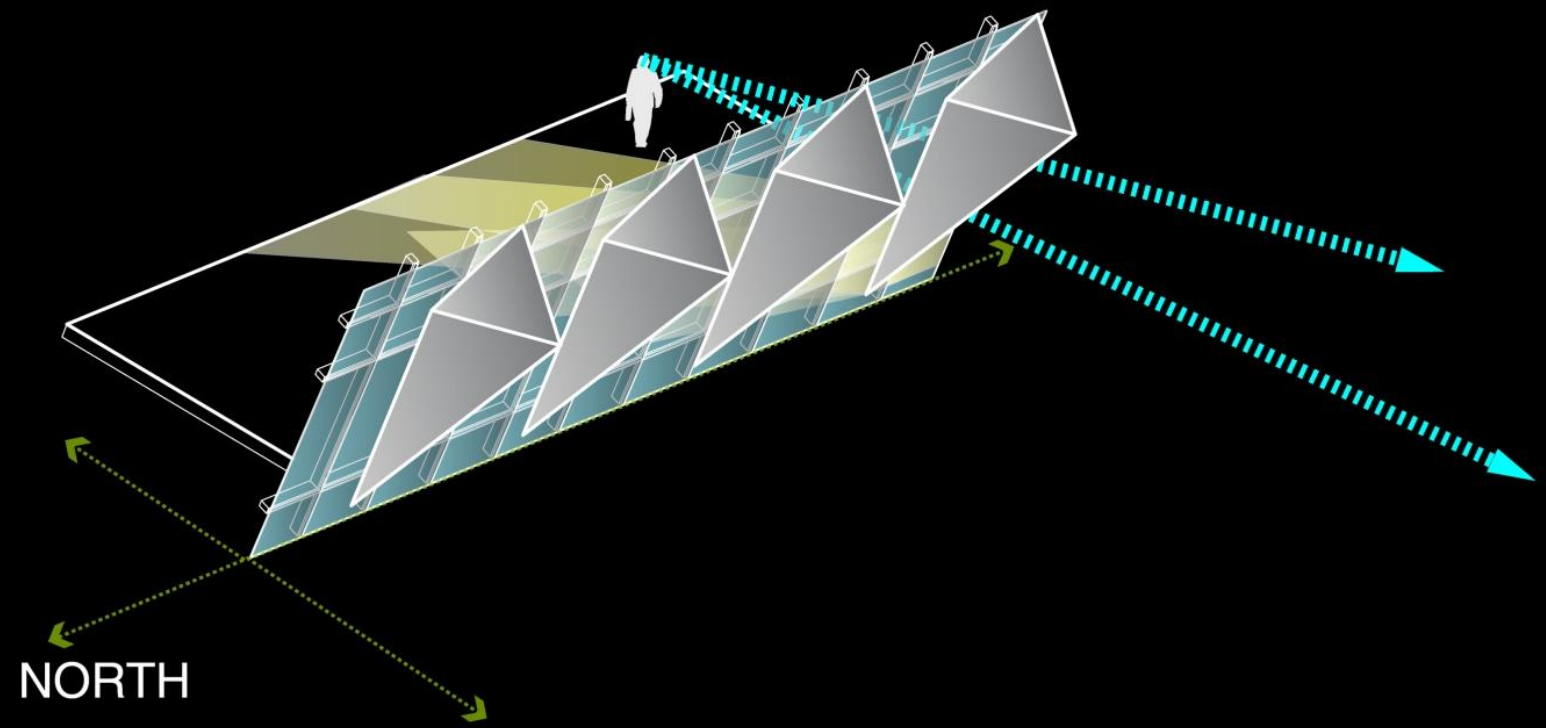
BUILDING ORIENTATION AND SOLAR SHADING

MORPHOSIS ARCHITECTS



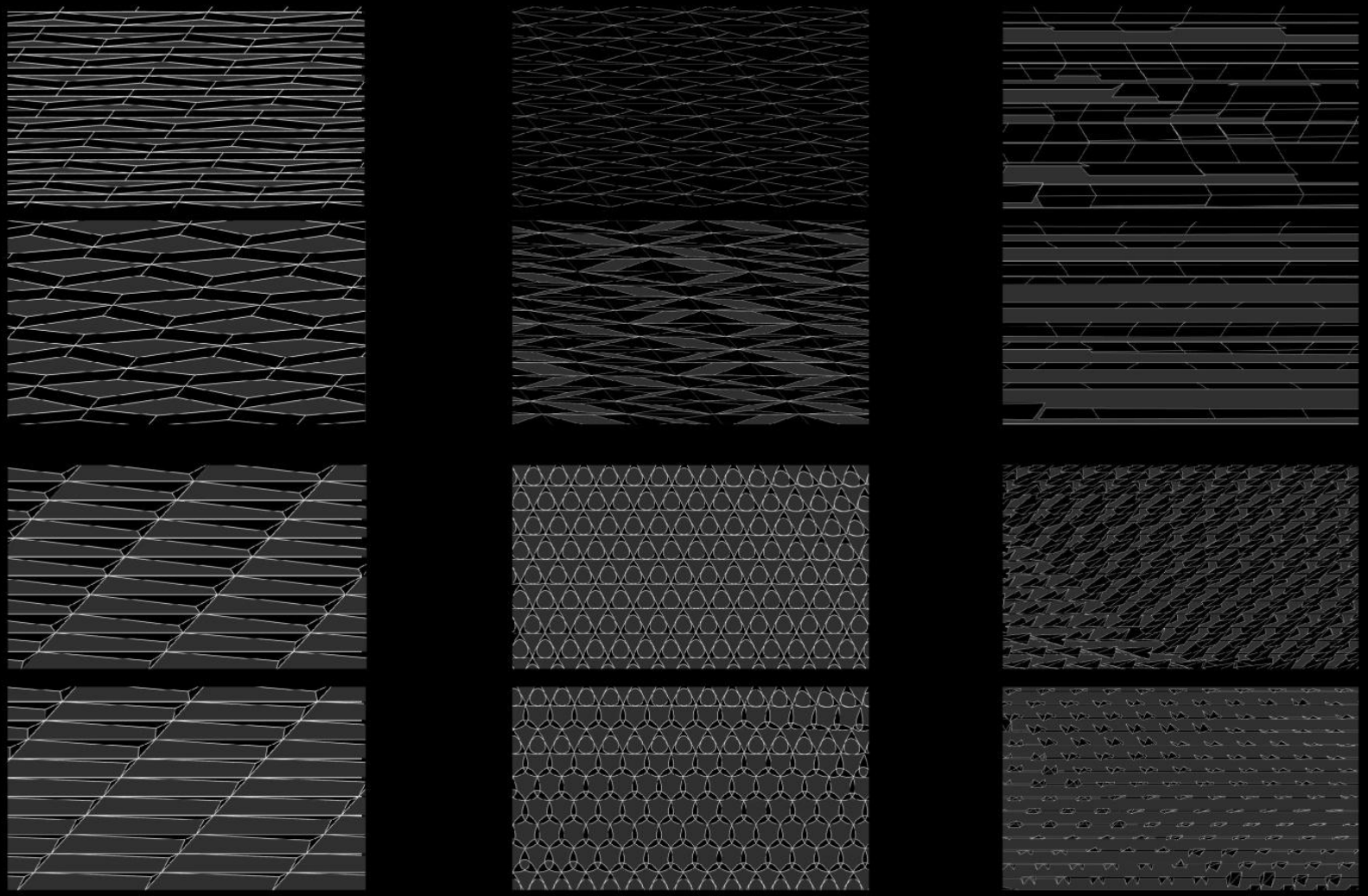
BUILDING ORIENTATION AND DAYLIGHTING

MORPHOSIS ARCHITECTS



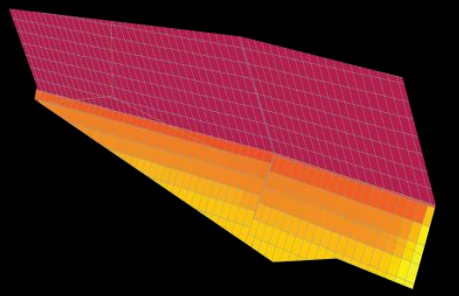
BUILDING ORIENTATION AND VIEW COORDIDORS

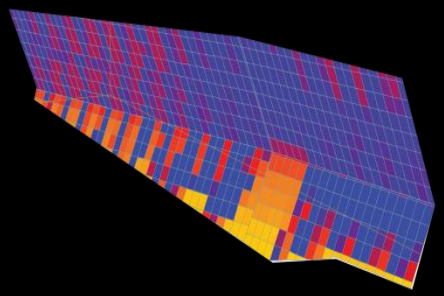
MORPHOSIS ARCHITECTS

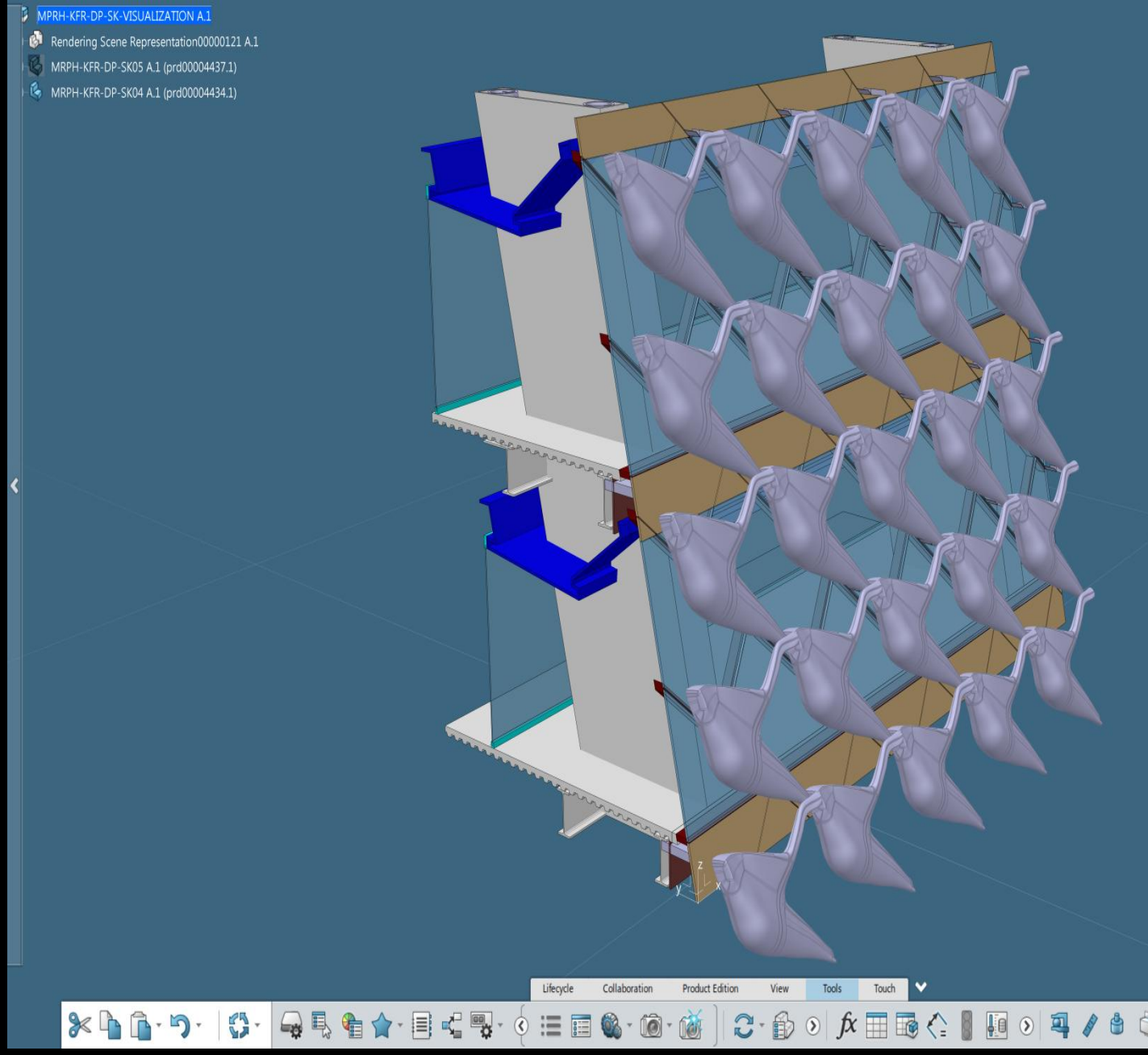


DESIGN OPTIONEERING

MORPHOSIS ARCHITECTS

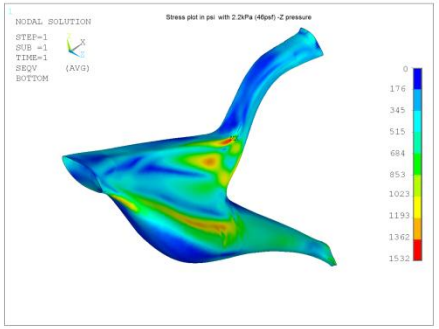


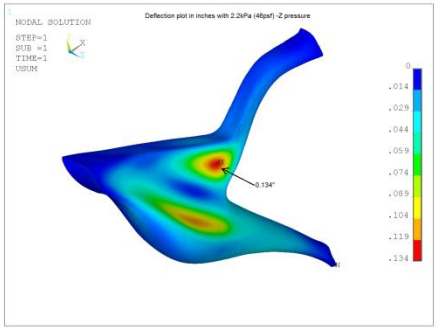




DESIGN SOLUTIONS

MORPHOSIS ARCHITECTS



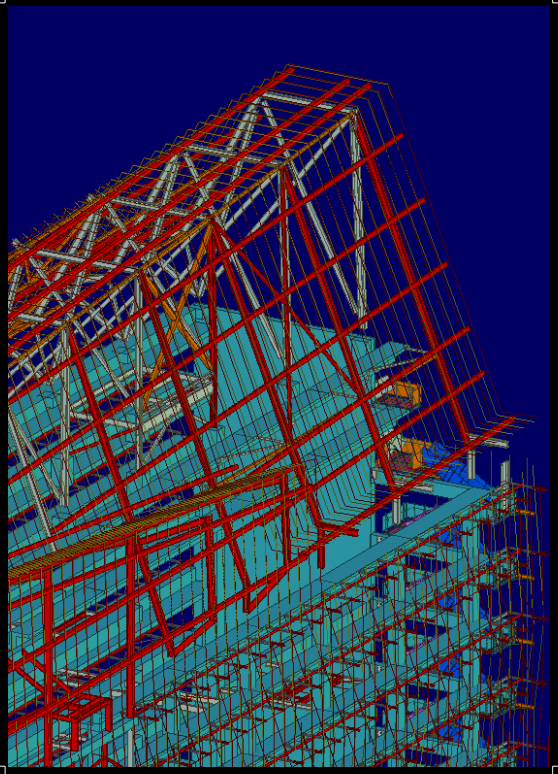


PROTOTYPING

MORPHOSIS ARCHITECTS

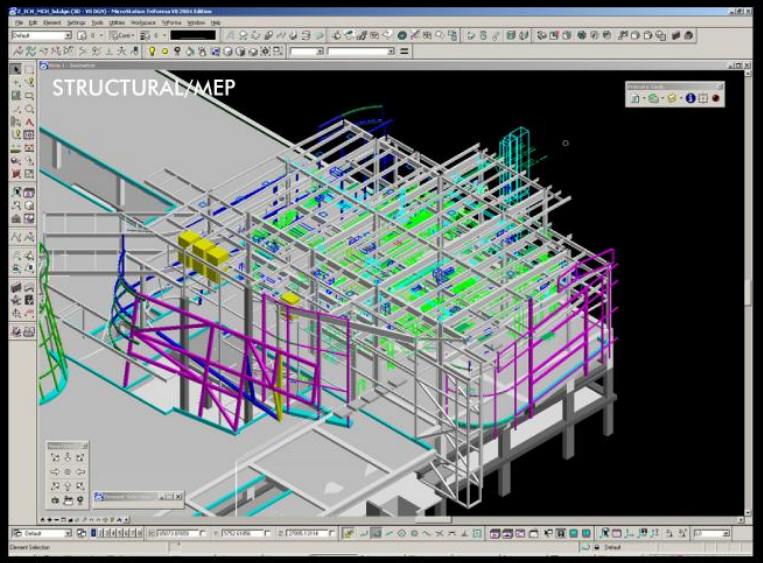
PROTOTYPING

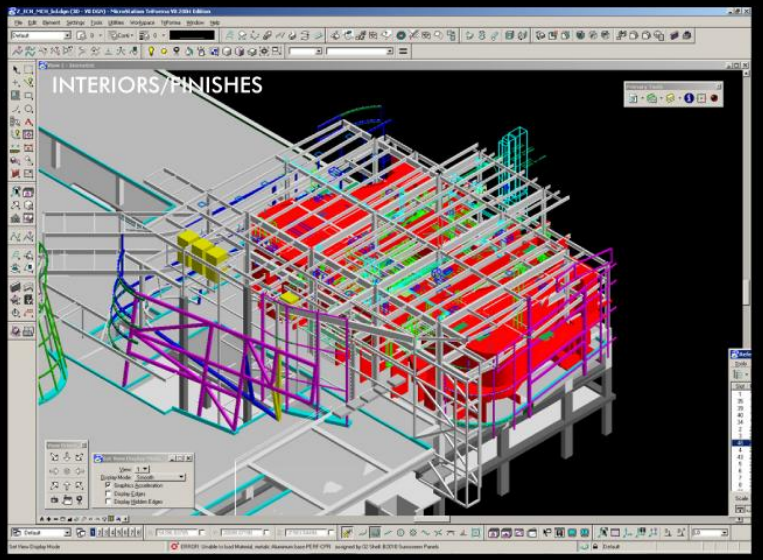
MORPHOSIS ARCHITECTS

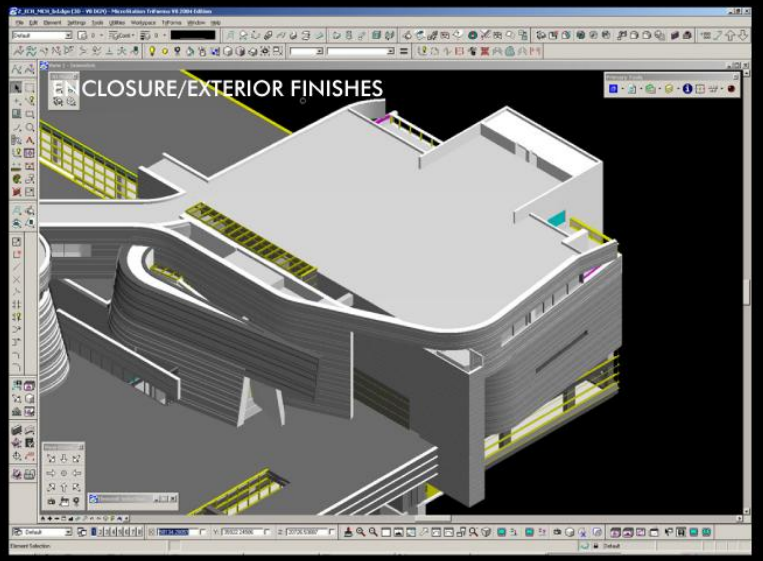


BIM

The advancement of tools in the design industry has provided a new paradigm for the role of architects in the development of building projects. At Morphosis we see the most potential for impact of these tools in the early design phase and subsequently during construction documentation and administration.

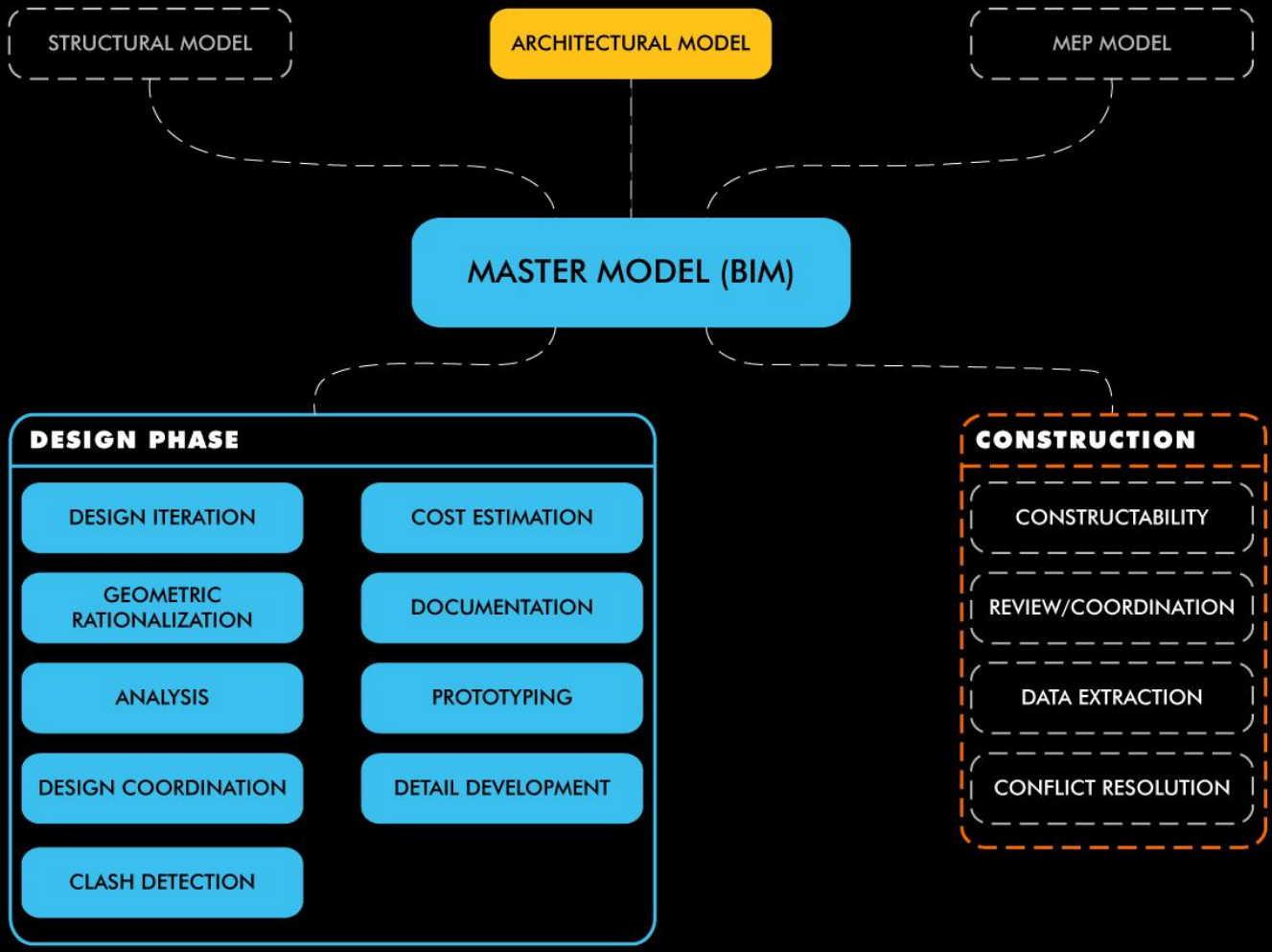






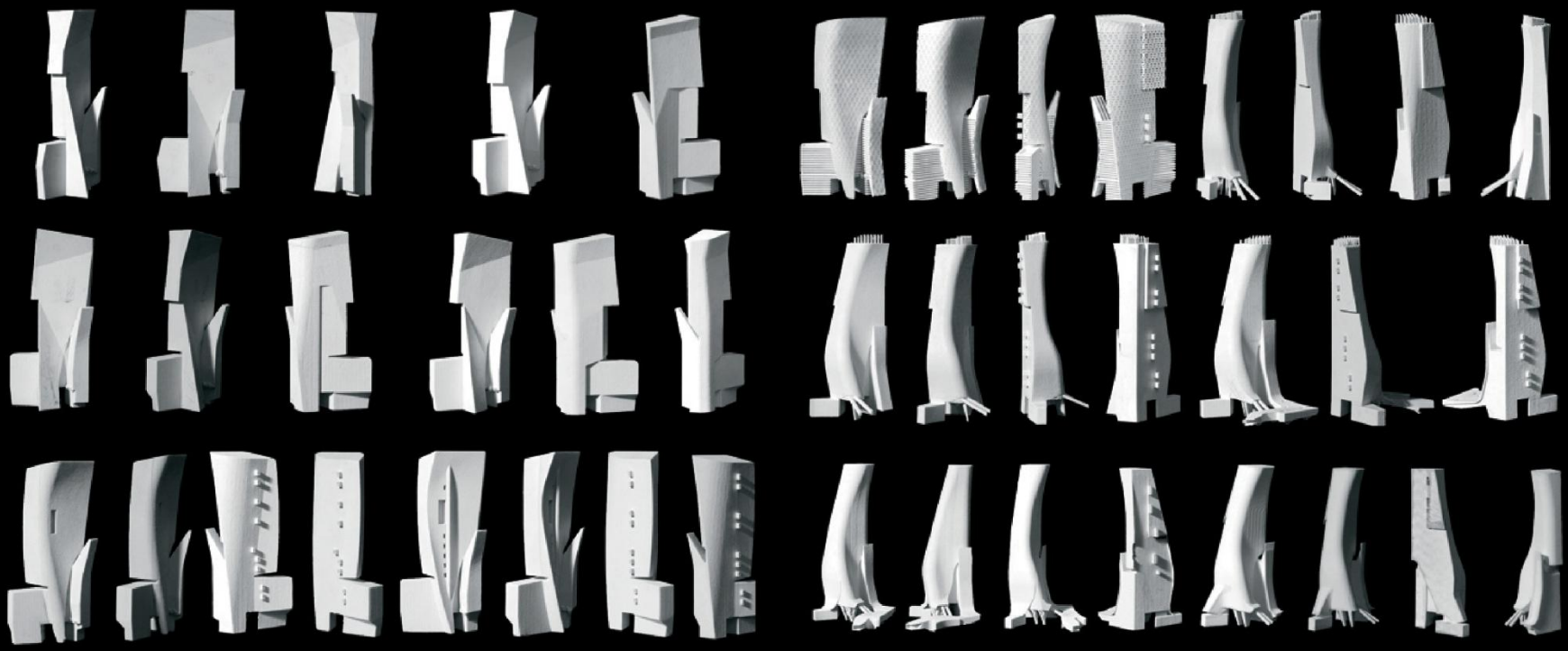
3D MODEL

DESIGN PHASE



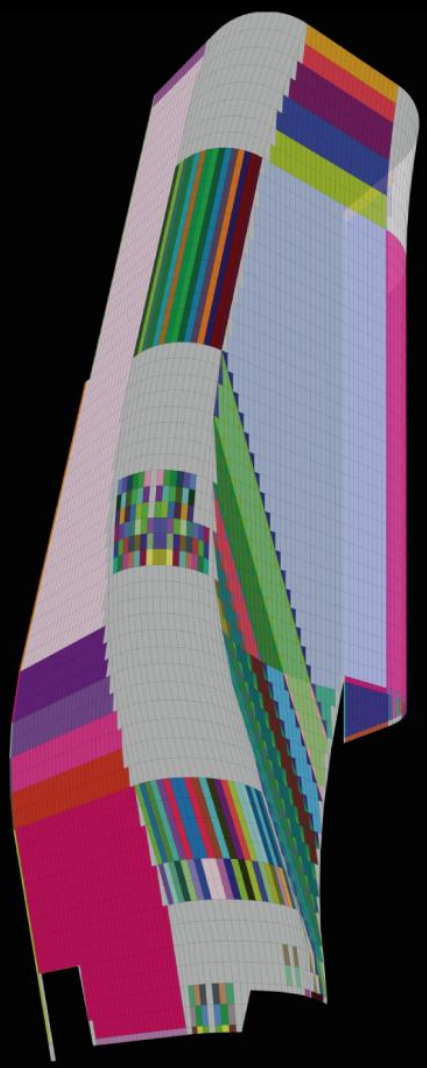
3D MODEL

DESIGN PHASE



DESIGN ITERATION

DESIGN PHASE



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387 panels
364 panels
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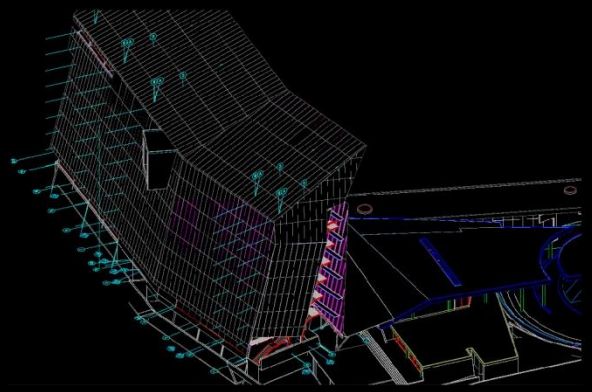
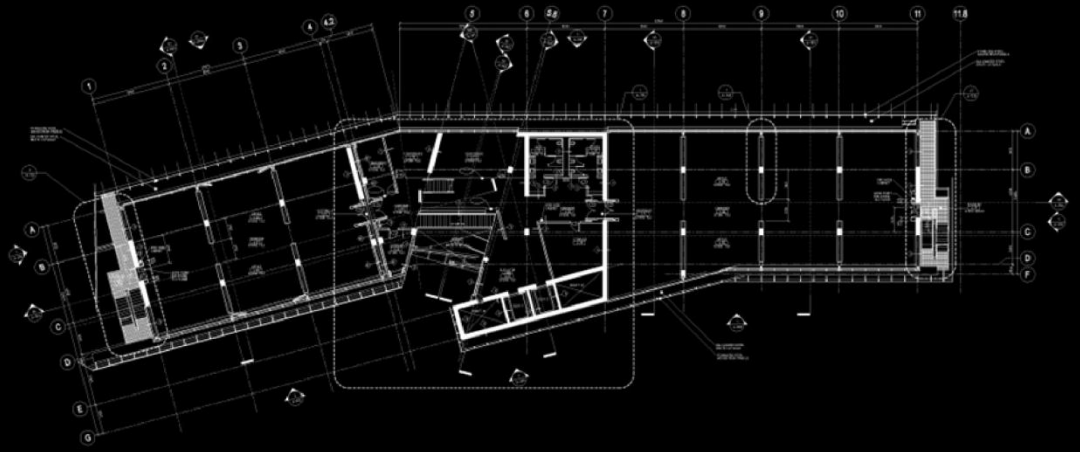
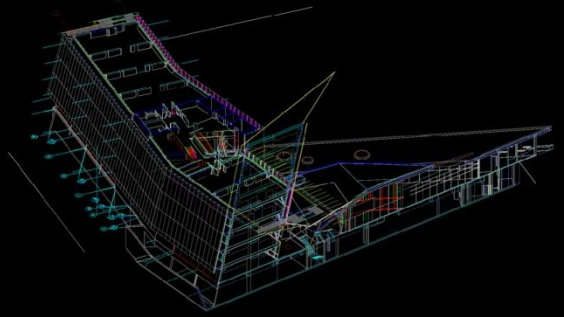
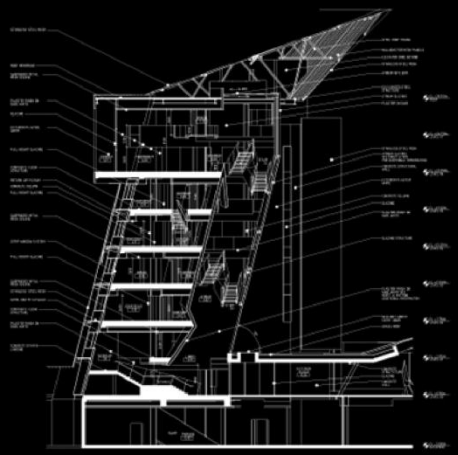
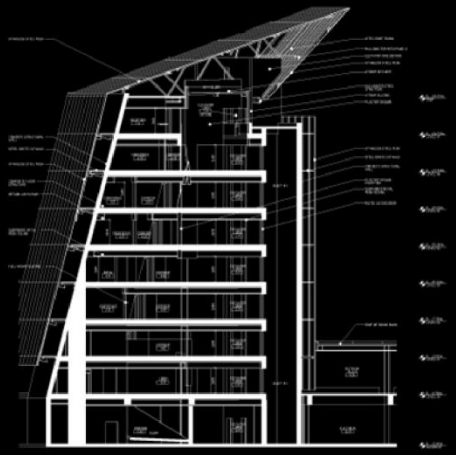
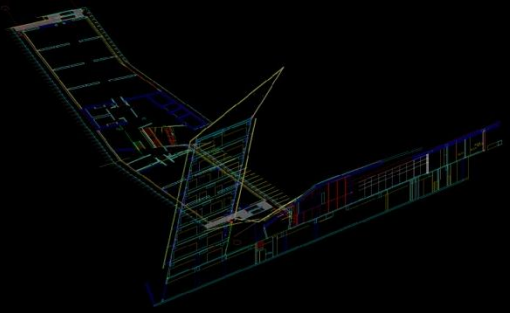








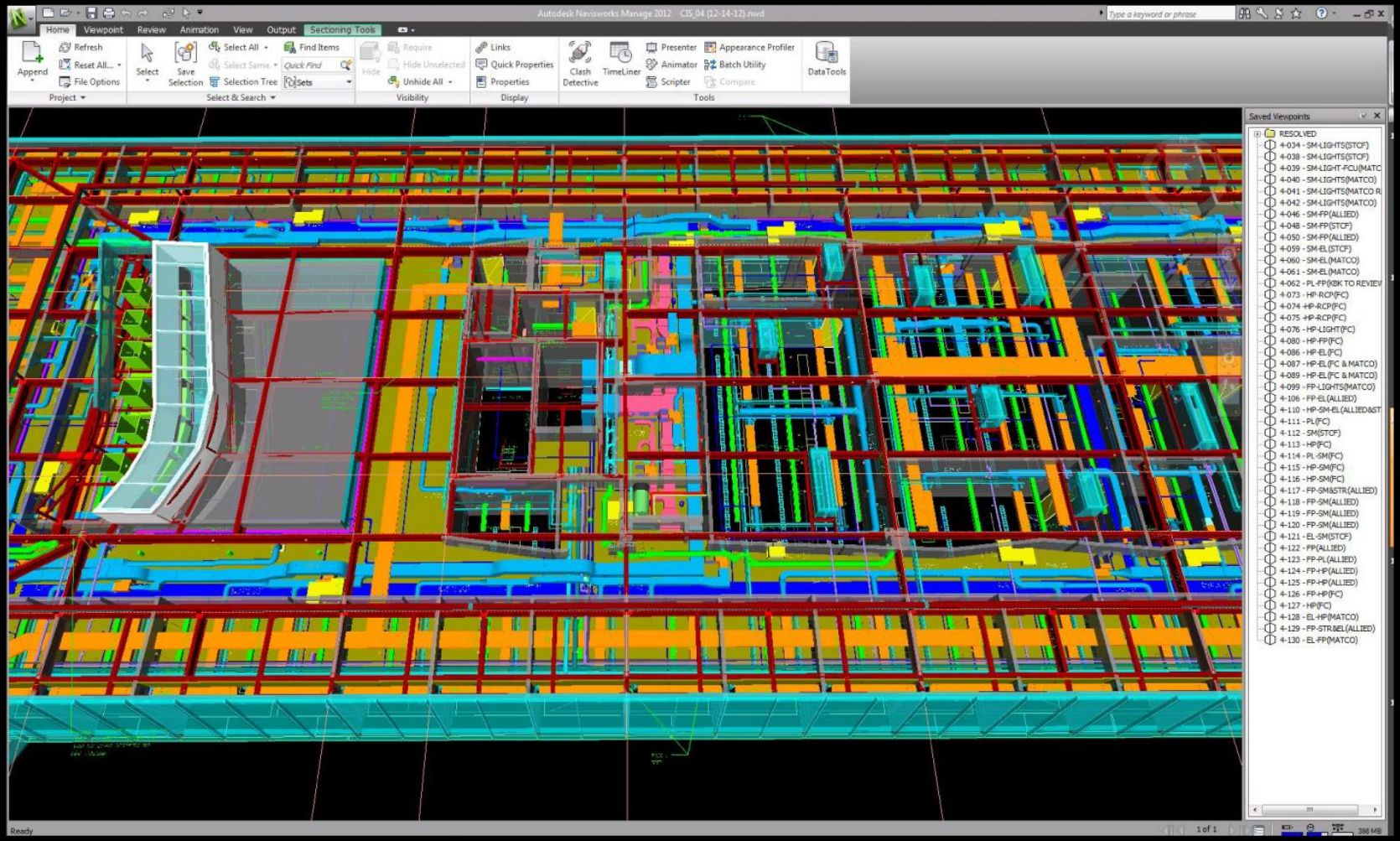




3D → 2D

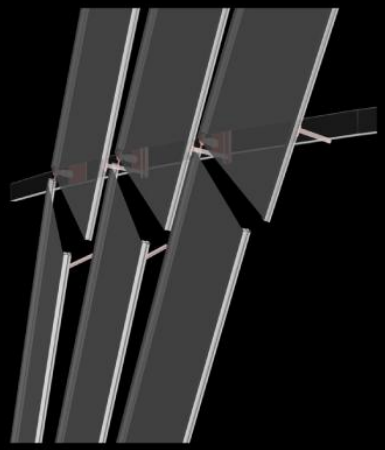
DOCUMENTATION

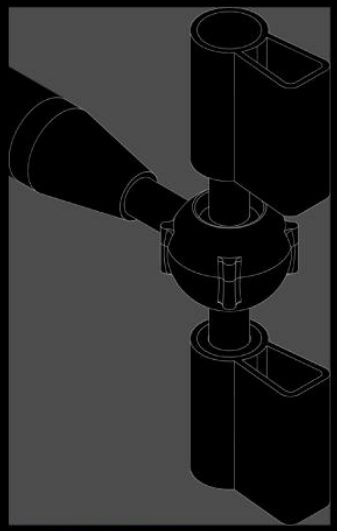
DESIGN PHASE

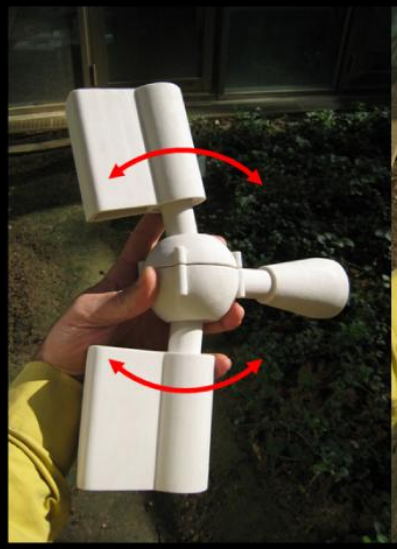


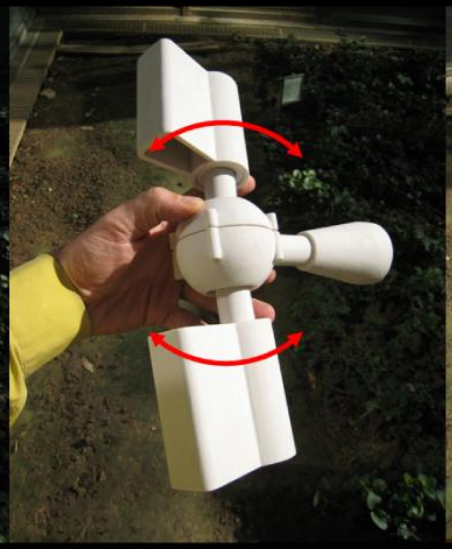
COORDINATION / CLASH DETECTION

DESIGN PHASE

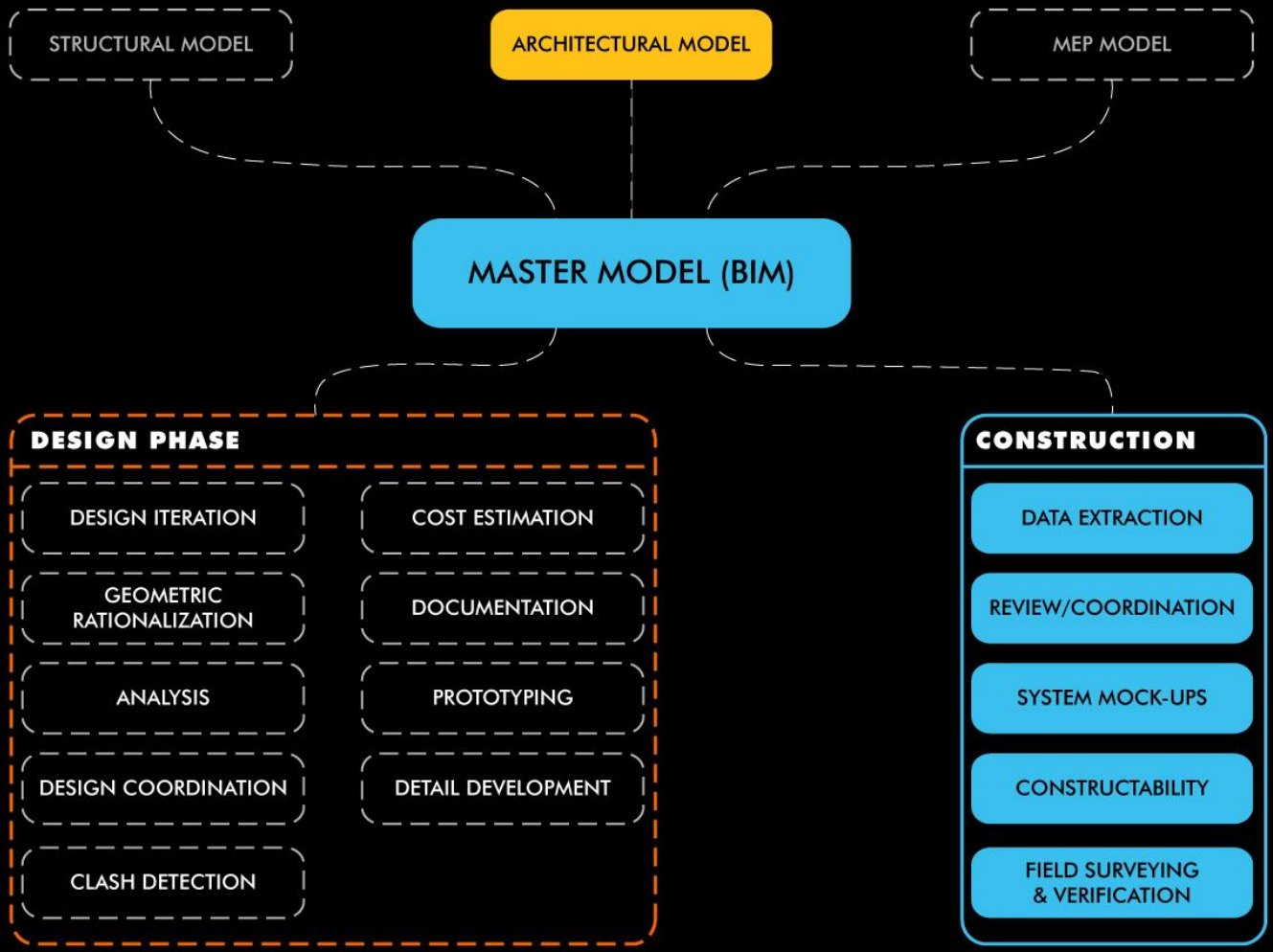






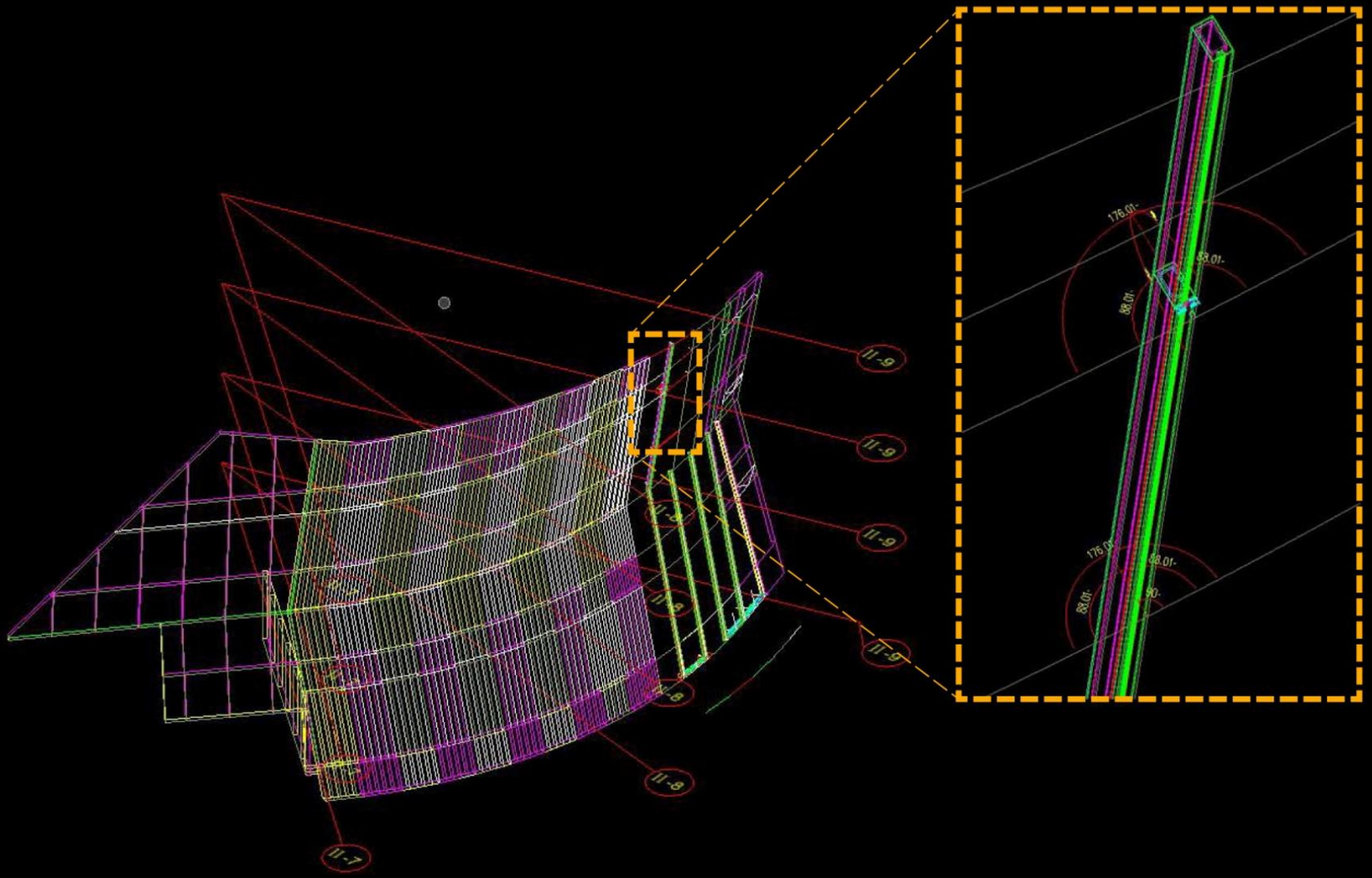


DETAIL DEVELOPMENT / PROTOTYPING



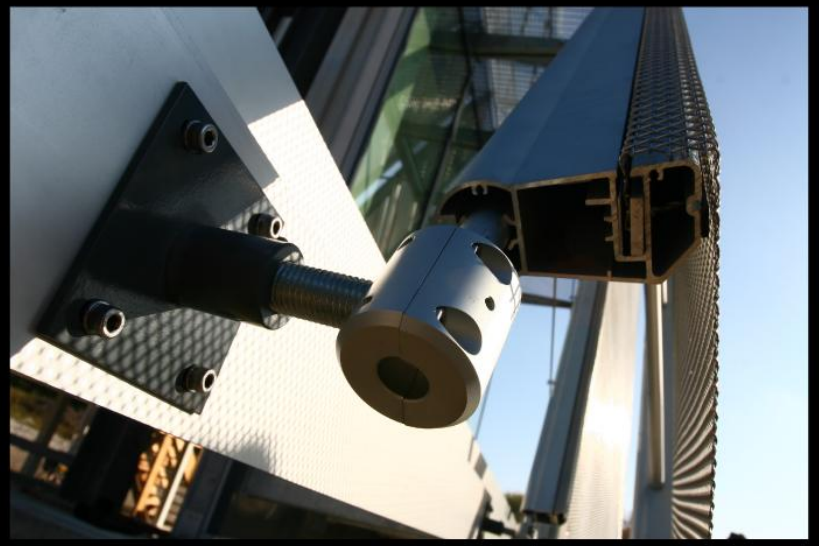
3D MODEL

CONSTRUCTION PHASE



DATA EXTRACTION

CONSTRUCTION PHASE



SYSTEM MOCK-UPS

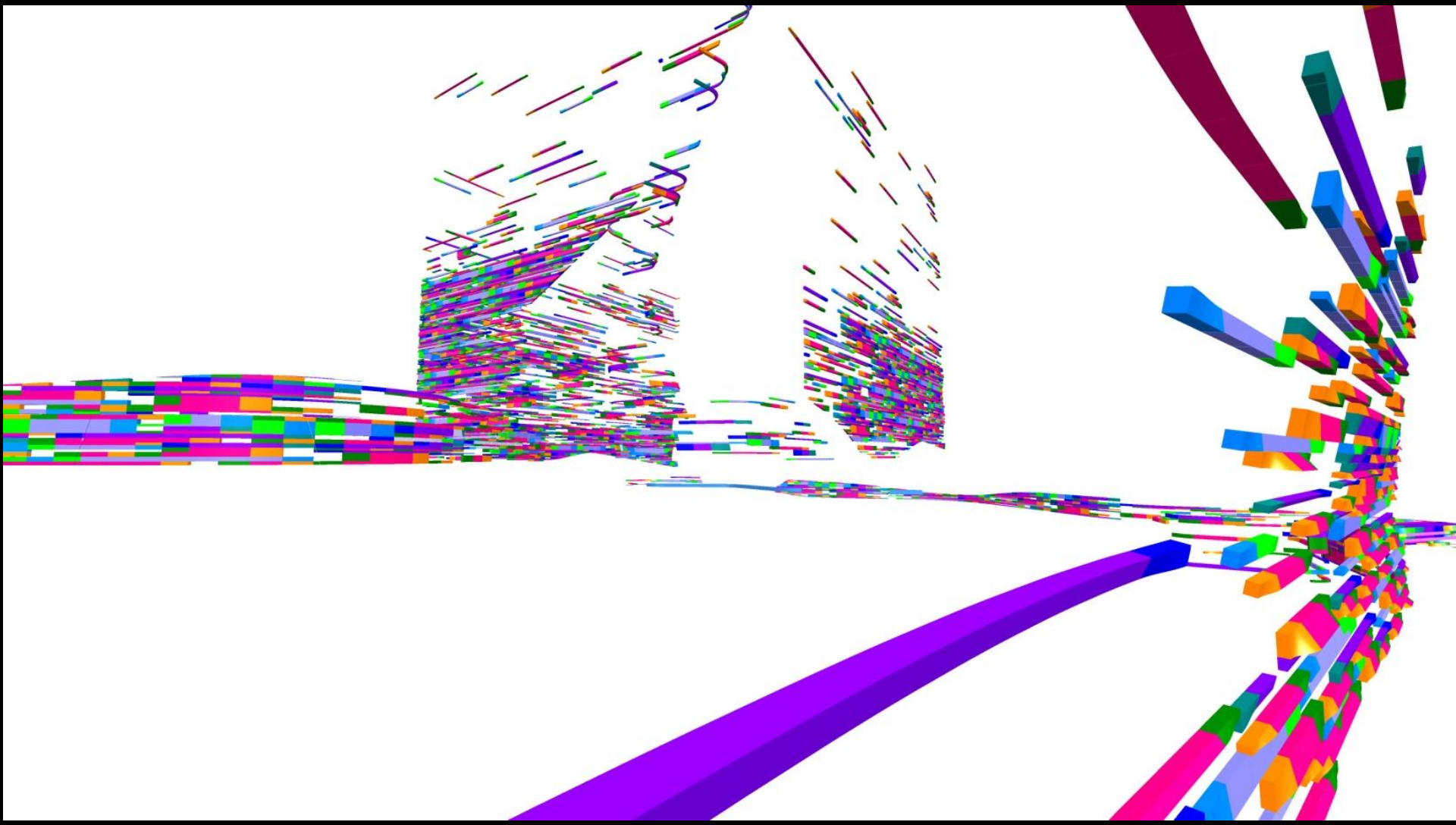
CONSTRUCTION PHASE

CONSTRUCTABILITY

CONSTRUCTION PHASE

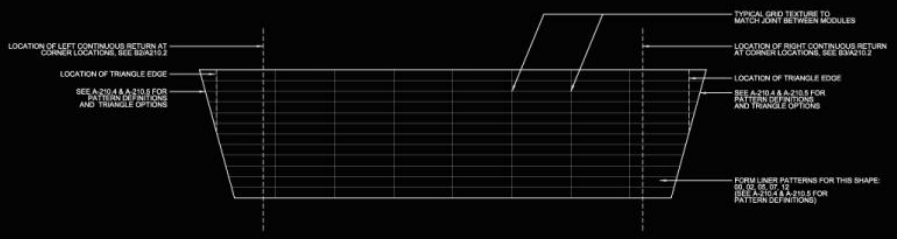
FIELD SURVEYING AND VERIFICATION

CONSTRUCTION PHASE

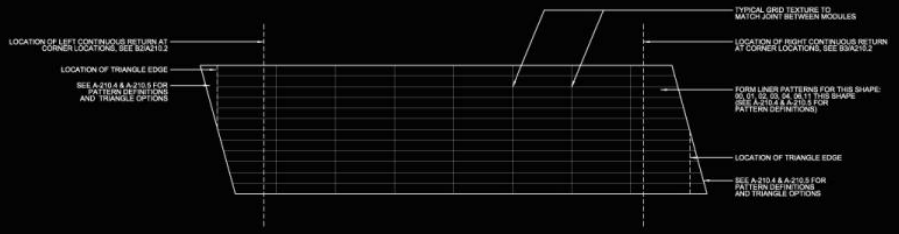


DESIGN INTENT

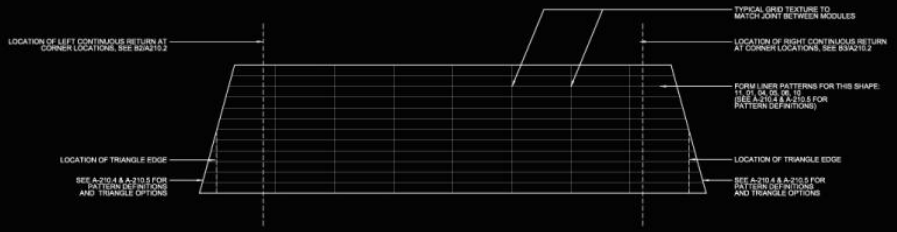
PEROT MUSEUM OF NATURE AND SCIENCE



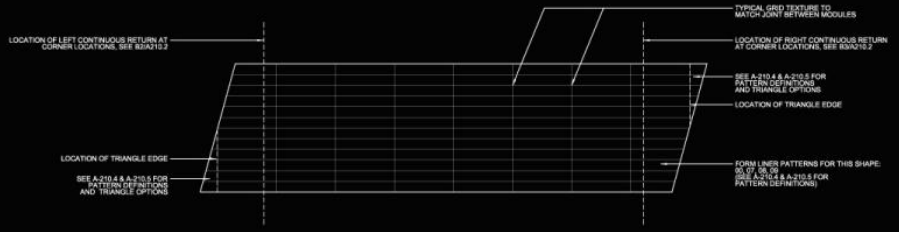
SHAPE B



SHAPE D



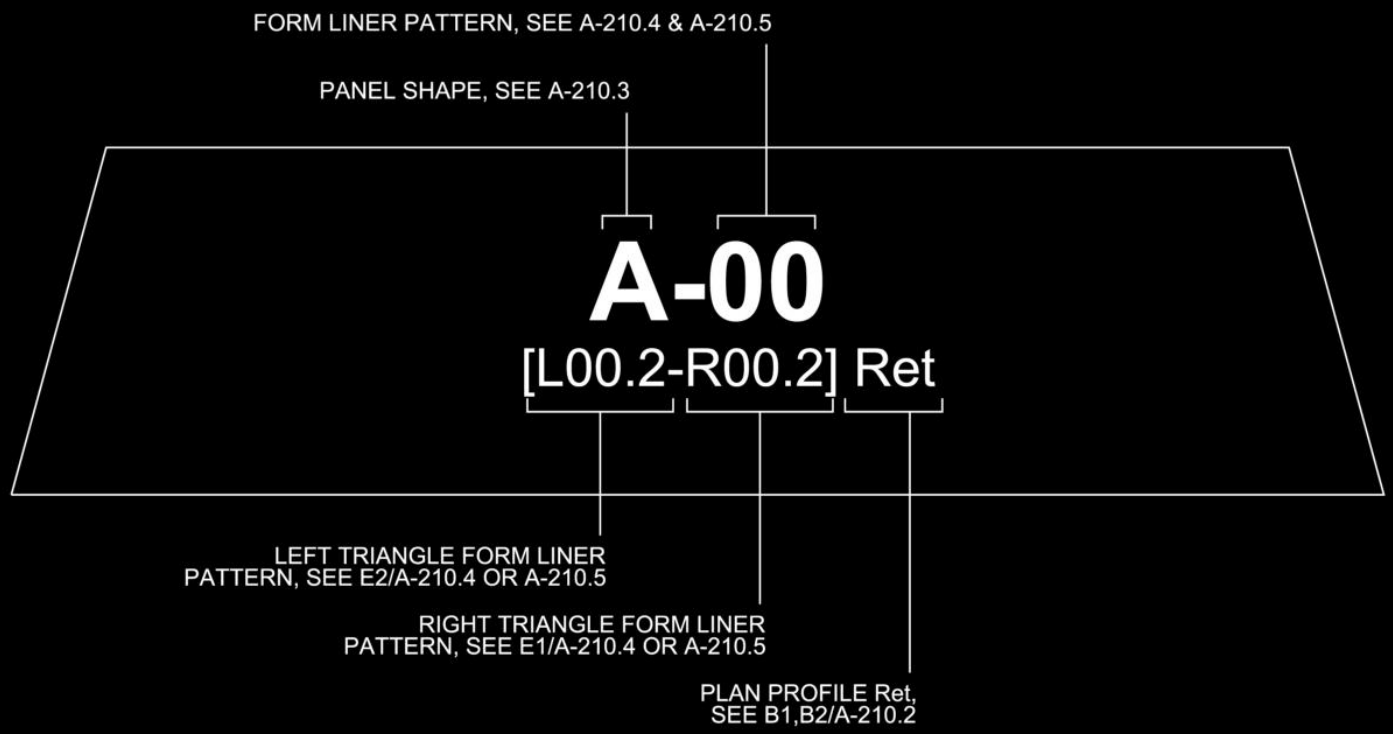
SHAPE A



SHAPE C

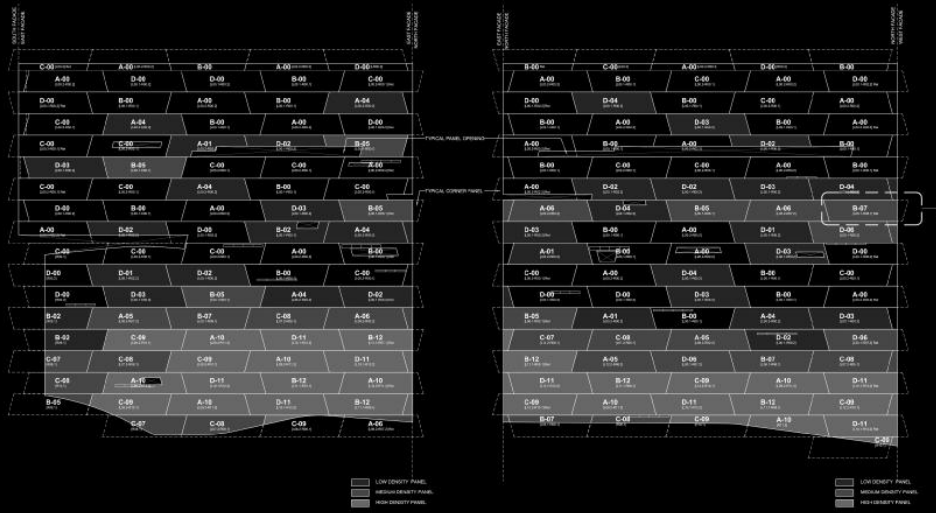
FAÇADE PANEL ORGANIZATION

PEROT MUSEUM OF NATURE AND SCIENCE



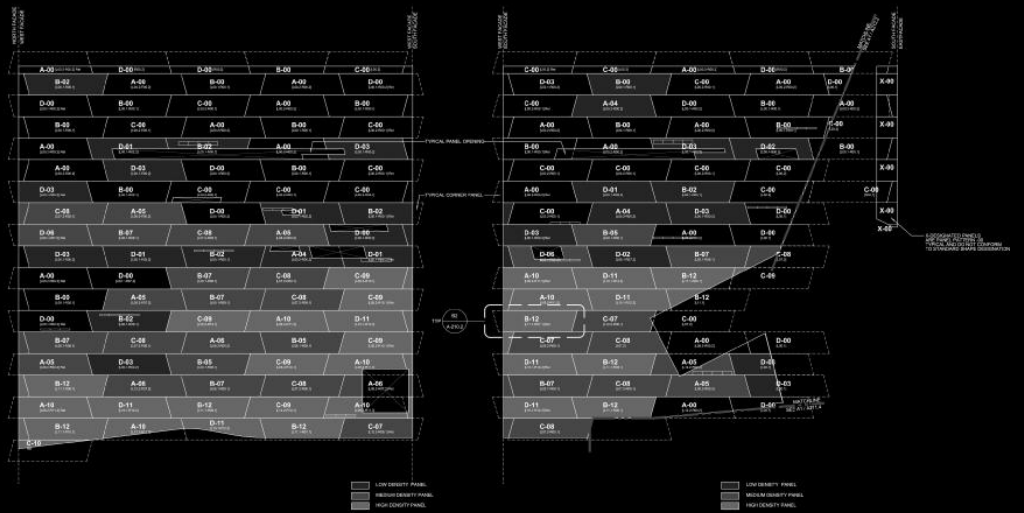
CONSISTANT NOMINCLATURE

PEROT MUSEUM OF NATURE AND SCIENCE



E3 EAST FACADE - PRECAST CONCRETE PANEL LAYOUT
SCALE: 1/16"=1'-0" a-210.2

C3 NORTH FACADE - PRECAST CONCRETE PANEL LAYOUT
SCALE: 1/16"=1'-0" a-210.2

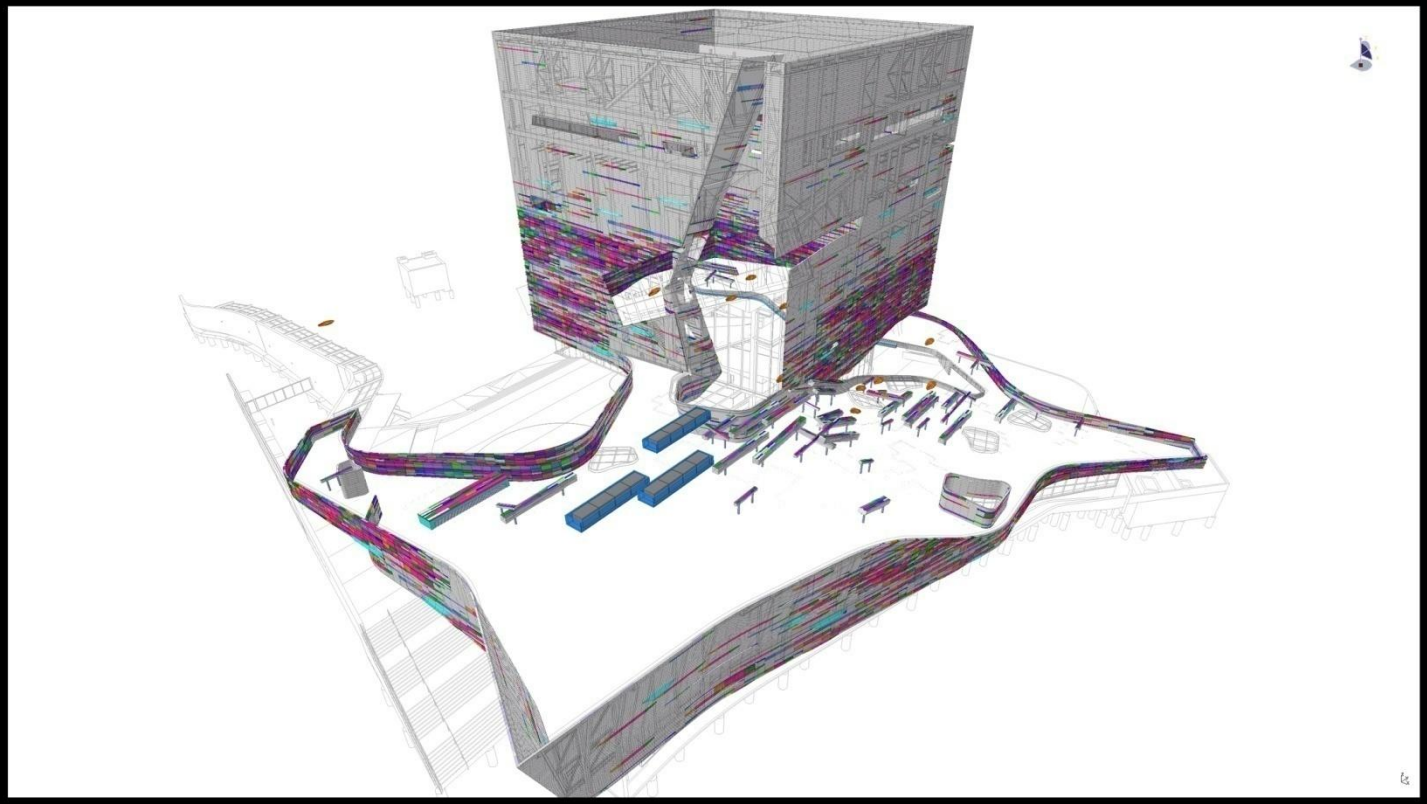


E1 WEST FACADE - PRECAST CONCRETE PANEL LAYOUT
SCALE: 1/16"=1'-0" a-210.2

C1 SOUTH FACADE - PRECAST CONCRETE PANEL LAYOUT
SCALE: 1/16"=1'-0" a-210.2

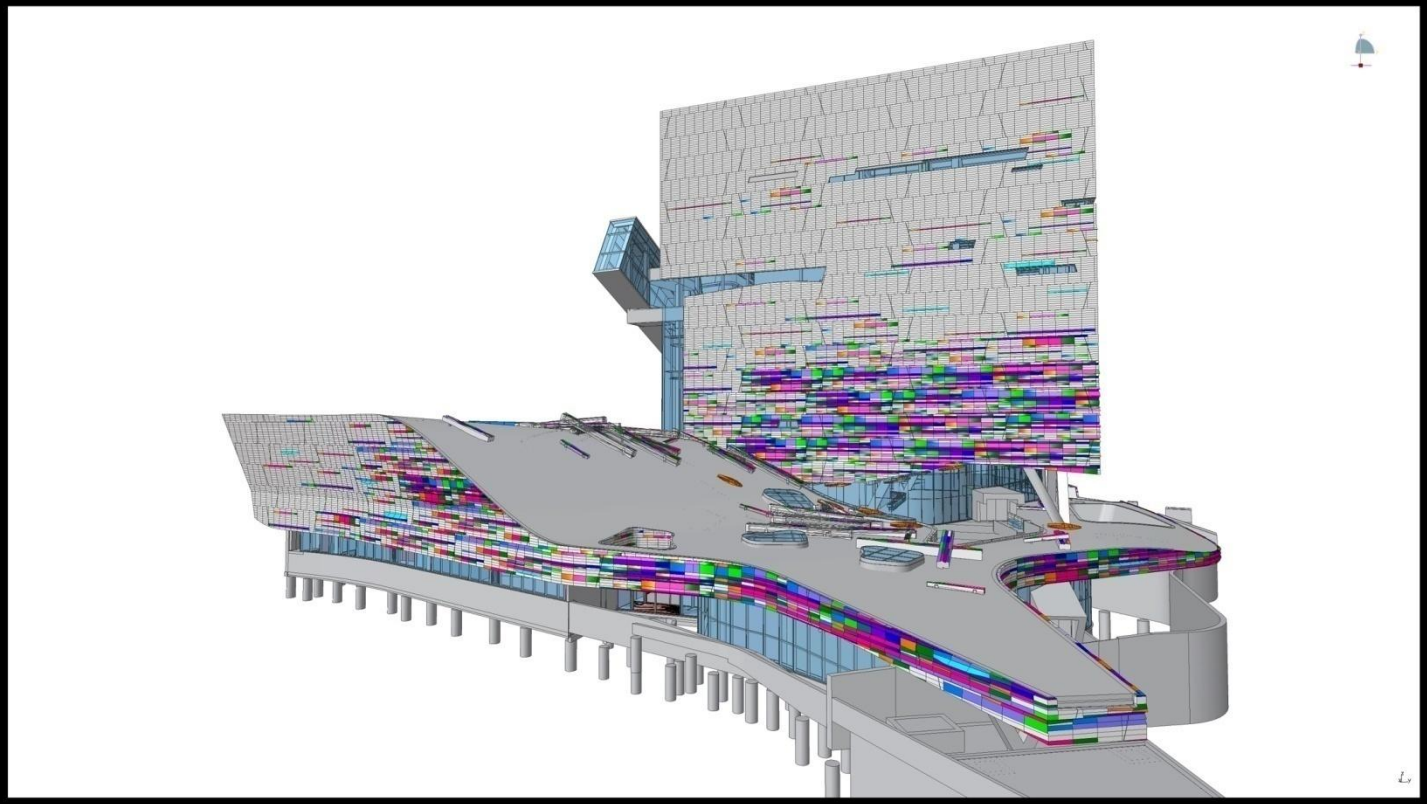
FAÇADE LAYOUT DRAWINGS

PEROT MUSEUM OF NATURE AND SCIENCE



FAÇADE BIM

PEROT MUSEUM OF NATURE AND SCIENCE



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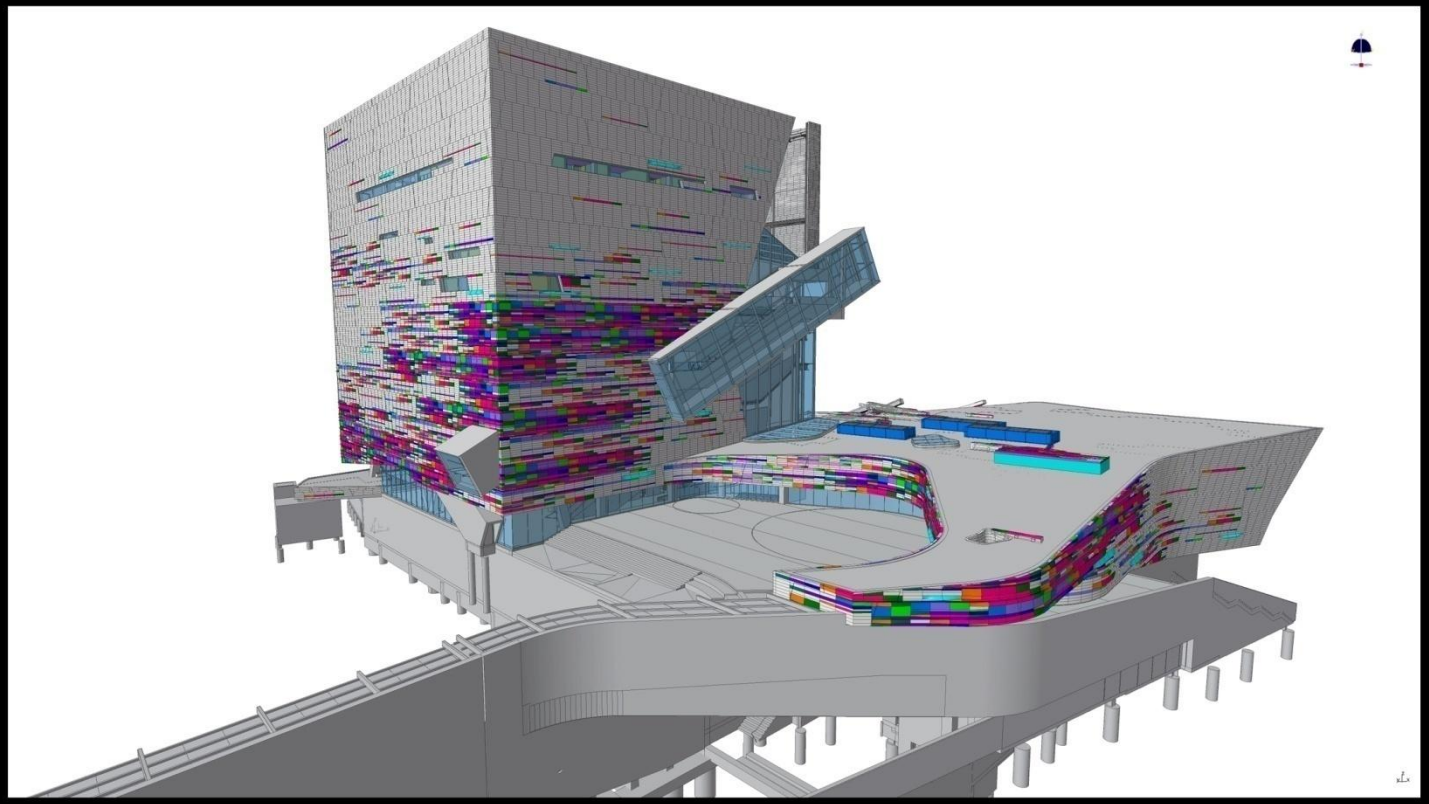

FAÇADE BIM

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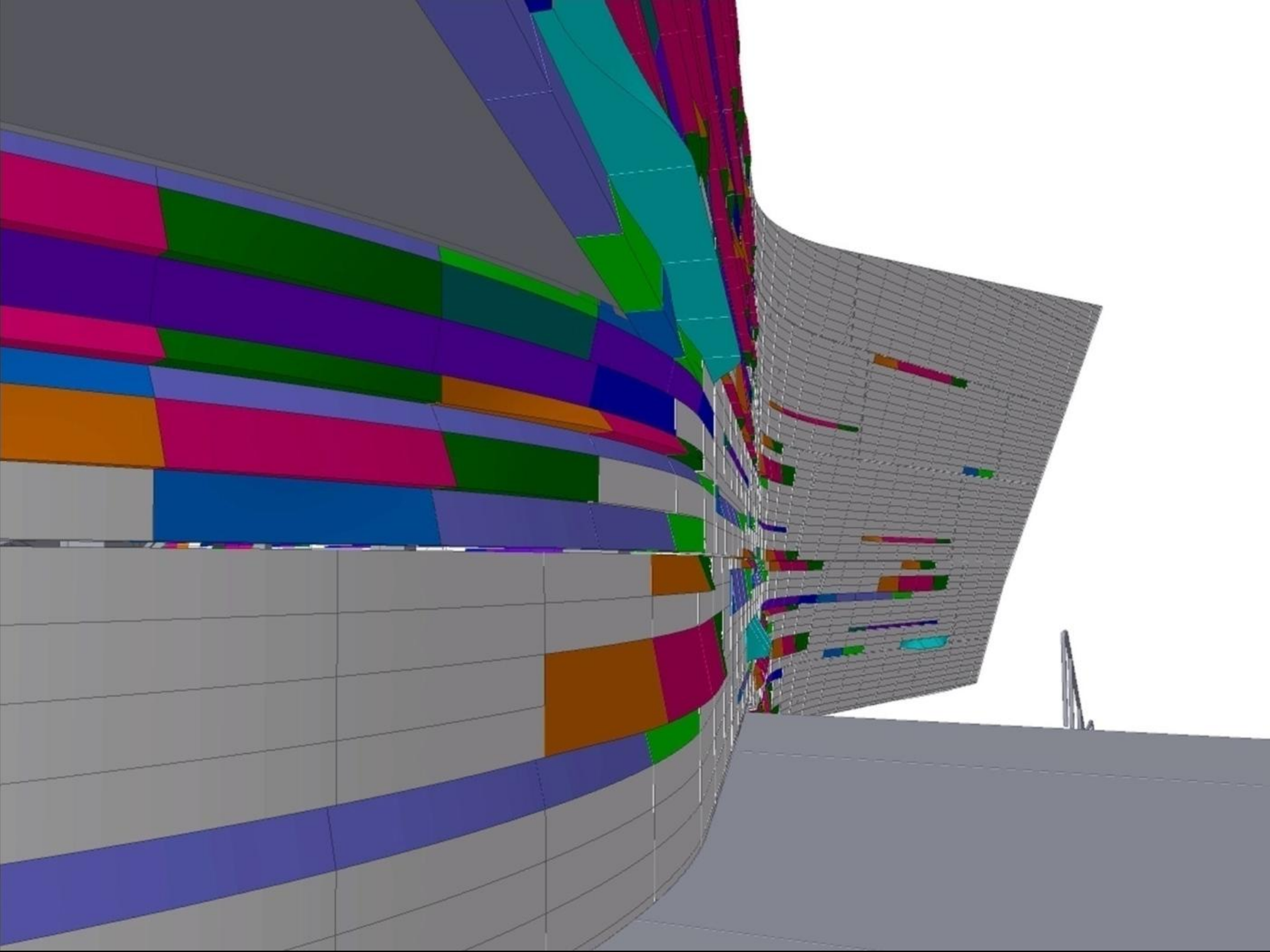


ADVANCIAL

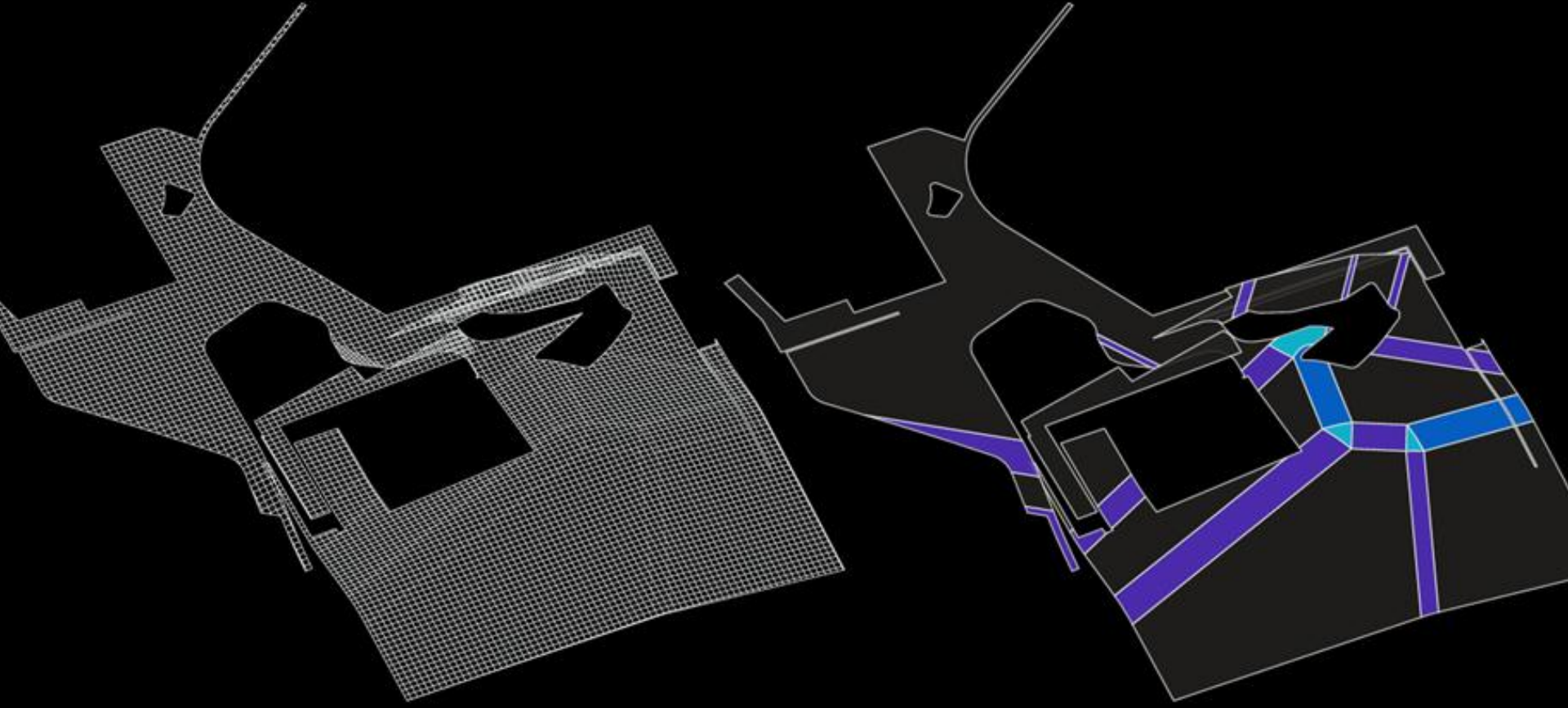
FAÇADE INSTALLATION

PEROT MUSEUM OF NATURE AND SCIENCE

PEROT MUSEUM OF NATURE AND SCIENCE
CAFE

LOBBY CEILING

PEROT MUSEUM OF NATURE AND SCIENCE



FLAT AREA : Panels can be repeatable except at the edge

SINGLE CURVATURE (CYLINDRICAL) AREA : Panels can be repeatable except at the edge within each area
Each panel need to be bent, faceted or allowing gaps

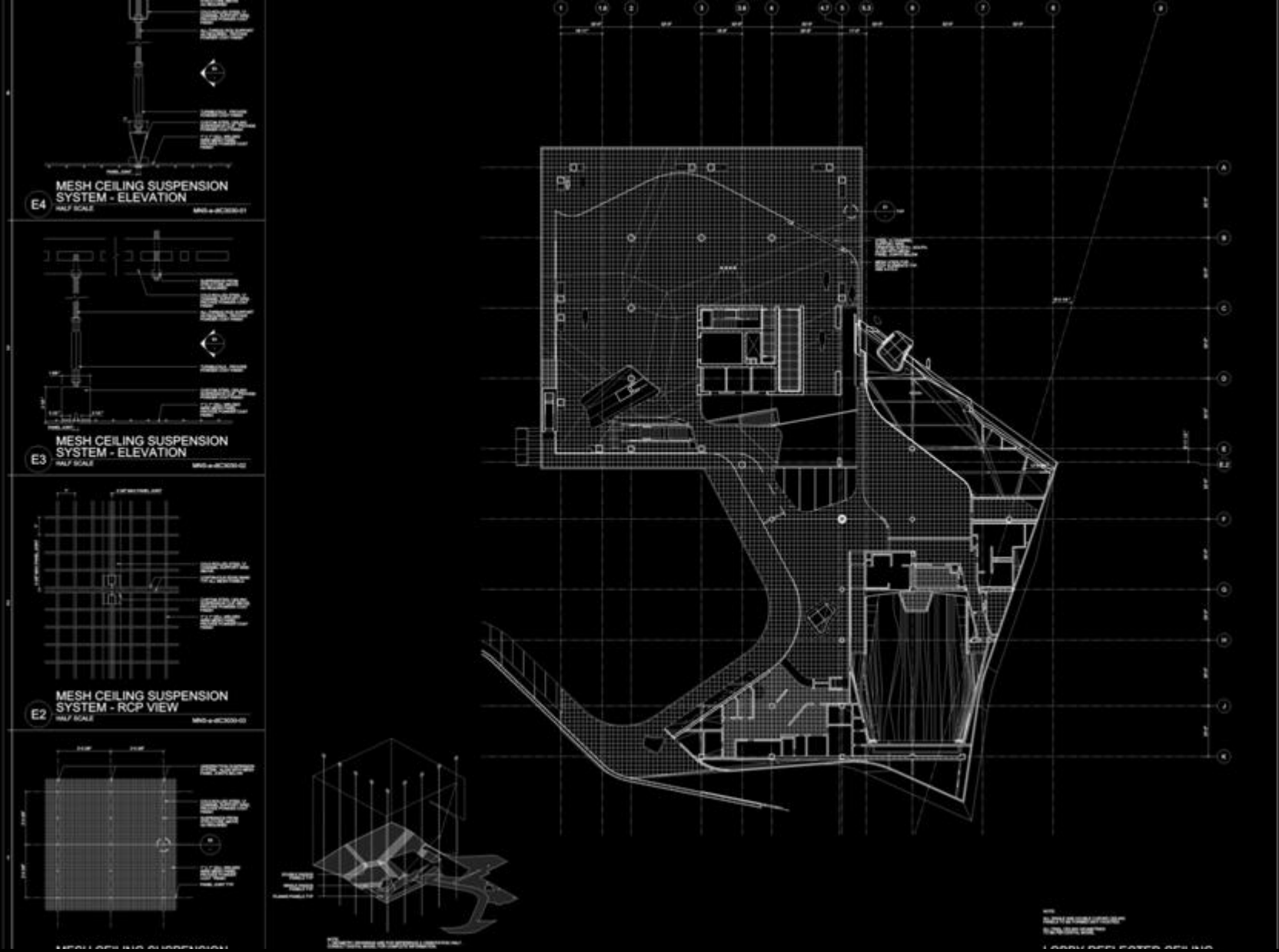
SINGLE CURVATURE (CYLINDRICAL) AREA : Panels cannot be repeatable
Each panel need to be bent, faceted or allowing gaps

DOUBLE CURVATURE AREA : Panels cannot be repeatable
Each panel need to be bent, faceted or allowing gaps

MNS CEILING GRID 2011/05/20

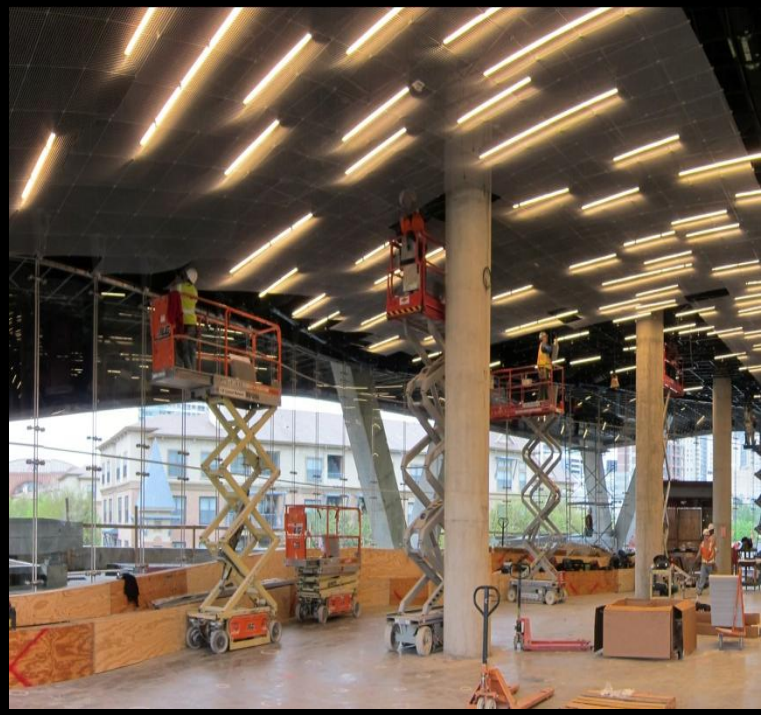
CEILING GEOMETRY RATIONALIZATION

PEROT MUSEUM OF NATURE AND SCIENCE



CONSTRUCTION DRAWINGS

PEROT MUSEUM OF NATURE AND SCIENCE



CEILING INSTALLATION

PEROT MUSEUM OF NATURE AND SCIENCE

LOBBY CEILING

PEROT MUSEUM OF NATURE AND SCIENCE

LOBBY CEILING

PEROT MUSEUM OF NATURE AND SCIENCE