Innovative Bioclimatic European School Complex Competition, Crete, Greece

ZE2014

VESSELS OF KNOWLEDGE - A ZERO ENERGY IMMERSIVE LEARNINGSCAPE








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DESIGN CONCEPT - *VESSELS OF KNOWLEDGE*

OVERVIEW

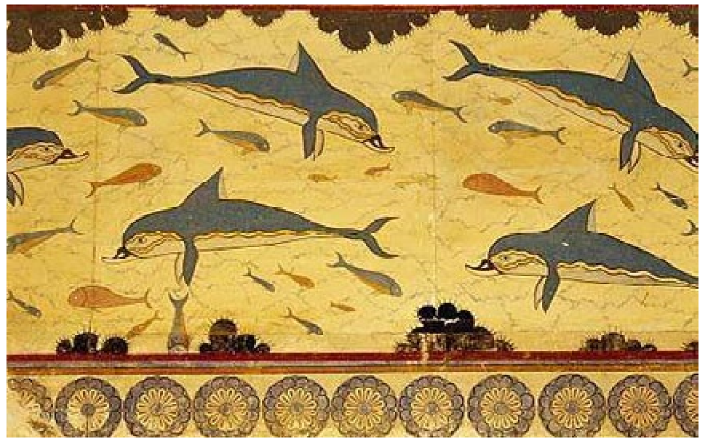
The design of the new innovative bioclimatic european school complex in crete, greece, is driven by 4 key ideas:

A. A zero-energy building
B. An immersive learningscape
C. A multi-cultural environment
D. A contextual facility

The rich multicultural history of crete informs the design of the building and the siting of the facility on the property. Crete's historic sailing culture provides a rich metaphor for the design: ***3 vessels of knowledge***, providing students with a state of the art, multi-cultural experience.

Similarly to crete's past emphasis on global commerce and cultural sharing via sailing, students of the new school will embark in a journey that will provide them with the best global education available where the facility supports a different kind of learning, a 21st century learning environment: ***the immersive learningscape***.

The 3-story facility will become an exemplary sustainable project driven by the goal of a design that consumes less energy that it produces achieving a zero-energy design



01

DESIGN CONCEPT - *3 PATHS OF LIGHT*

CRETE

The rich history of crete can be attributed to both the influences from trading with mediterranean civilizations and the invadors that resided in the island throughout its history. Crete's prominence in the Mediterranean Sea is highlighted by its equidistant proximity to Europe, Asia, and Africa. The impact of such diverse cultures have shaped the island and its past. The new Bioclimatic School will be yet another example of excellence in its tradition of cultural blending and historic significance.

The 3 paths of light demonstrates the idea that the influences in the island and its multiculturality make Crete a highly unique and rich environment

1.a

ZERO ENERGY - THE BUILDING AS A TEACHING TOOL

Concept

Inspired by its ecosystem, the concept for The Innovative Bioclimatic European School Complex is driven by its context, a facility that will not only minimize its impact on its surroundings, but one that will give back to the community and to its environment more than it takes. Driven by concepts of Conservation, Restoration, Reduction, Recycling and Renewable Resources, ***the Facility will be designed as a Zero Energy Building (ZEB)***. This approach will best showcase the Bioclimatic School's commitment to Conservation and Environmental Initiatives.

Similar to the behavior of the local wildlife and flora within the immediate ecology, the new building will demonstrate its resourcefulness by adapting to the site and taking advantage of all the resources it has to offer. The promise to research, preservation of the natural environment, and its sensitiveness to its ecosystem will be demonstrated by the building and via educational interactive areas and displays throughout the indoors and outdoors.

Just as olive trees adapt to the dry sunny climate- representing a ***symbiotic relationship*** with the environment - the facility will exemplify how to live with the resources that you have. Analogous to the way that Crete has always adopted great ideas from its multi-cultural past, the Bioclimatic School will offer a new way of thinking about humankind's interaction with the environment through an exemplary Zero Energy facility.

Road to a "Zero Energy Building"

Our design is committed to this challenge of finding sustainable solutions to reduce building energy consumption., and we understand the required effort to reach the goal of a "Zero Energy Building" (ZEB). Achieving a ZEB begins by evaluating the program and the site to ***minimize the building load*** as much as possible, then using ***energy efficient technologies*** to meet the needs of the building. Finally, on-site ***renewable energy*** sources are used to offset the building energy consumption.

1. Reduce Building Load

The best way to save energy is to turn it off, whether it is lights, computers or air conditioning. The next best solution is to limit the amount of need for energy consuming components. For a building, this means making important design decisions that help reduce the overall building load, which translates into energy savings. It starts by embracing the site attributes to shape and position the building on the site, or "into the site".

Another area to reduce load is by improving the building envelope and increasing insulation values above and beyond the ASHRAE minimum requirements. Other building envelope attributes could include movable building components that shade and insulate the building depending on climate conditions, hence allowing the building to open up and breathe when cooling is desirable or shut off and retain all of the heat when needed.

Building loads also come from internal loads such as people, lights and equipment. People add heat to the space and also require ventilation. In the summer months, cooling would require a high energy investment for this facility, but taking advantage of natural ventilation can reduce this cooling load. Ventilation in the winter months would require a heating load; by recovering wasted energy through an energy wheel, however, as much as 50% of that heat can be recovered thereby reducing the required heating load. Using demand controlled ventilation can reduce the ventilation load even further by only providing the amount of ventilation needed to suit the occupied conditions.

Lighting and equipment can be as much as 27 w/square meterfor this type of building. Through efficient lighting design, daylight harvesting, occupancy sensors and plug load management, the lighting and equipment load could be reduced by 20– 40%.

2. Use Energy Efficient Technologies

Using a ground coupled geothermal system to cool and heat the ventilation air will allow for higher efficiencies than normally achieved by air-to-air heat pump systems.
In concert with the geothermal system, the building will be heated and/or cooled with a radiant floor system to allow for exhibit flexibility and improved occupant comfort. The supplemental displacement air system will complement the radiant floor by allowing for the system to react quicker to load variations.

A solar thermal array will provide the necessary heat for the radiant floor system as well as provide hot water for the domestic water load. The water will be heated and stored in storage tanks for use as needed.

Low-flow and high efficiency plumbing fixtures will be used to achieve water efficiency goals. Rain water will be harvested and stored in tanks on site to provide water for irrigation and the rain garden.

3. Use Renewable Energy

Utilizing the natural resources available from the sun, wind and earth provide an excellent way to create energy onsite. The southern exposure from the site offers plenty of available solar hours to produce electricity through photovoltaic panels and produce hot water though solar thermal collectors. These panels would be located on the roof and angled to the south to harvest the energy.

In addition to the available solar energy, the site offers strong potential to capture wind energy through wind micro turbines located on site. The average wind speed in Heraklion, Crete is rouhgly 10 mph, or 8.7 knots, making the use of wind turbines a good choice for renewable energy generation

1.a

ZERO ENERGY- THE BUILDING AS A TEACHING TOOL

ARCHITECTURE, SUSTAINABILITY, & CURRICULUM

Providing a facility that is Zero Energy will not only exemplify the core values of the new Bio-climatic School, but will also fullfill the fantastic potential of the facility to become a ***Teaching Tool.***

From the landscaping and the architecture, to the materials and the systems and renewable technologies used in the building, each and every corner of the project can be utilized towards an instructional curriculum that emphasizes sustainability, purpose of design, application of new technologies, the functionality of systems, and a holistic approach to problem solving a challenge such as global warming. In this spirit, students will learn about life, about concepts, about sustainability, our impact to our environment, and the choices that we make by merely using the building as a key element of curriculum. This is critical in a 21st century education, understanding the relevance of what you are learning today can be applied towards real applications and future solutions to global challenges

The following describes how the different components of the architecture can be used towards a school curriculum:

Thermal
- Insulation
- Day lighting
- Heat Island

Lighting Systems
- Electric light
- candela
- Day vs. Artificial
- Heat through lighting
- Direct vs. Indirect
- Shadow/Shade (Art)

Mechanical Systems
- Air Flow
- CO2 Sensors
- Energy Recovery
- Motors (spinning)
- Conductors vs. Insulators
- Water to Air
- Heat Transfer
- Piping and Colors

Indoor Air Quality Systems
- Volumes
- Air filtration
- Materials (recycling, toxics, high-pollutants, history, legal, legislation)

Waste Systems
- Recycling
- Reuse
- Direction of waste from landfill
- Grey Water
- Black Water

Geothermal
- Heat Transfer
- Geology
- Density and Hardness
- Ground Water
- Natural / Ecology Policy

Solar
- Chemistry (Light to Electricity)
- Social Studies (Foreign Types and Policy)
- Earth Science (Solar Radiation / Astronomy)

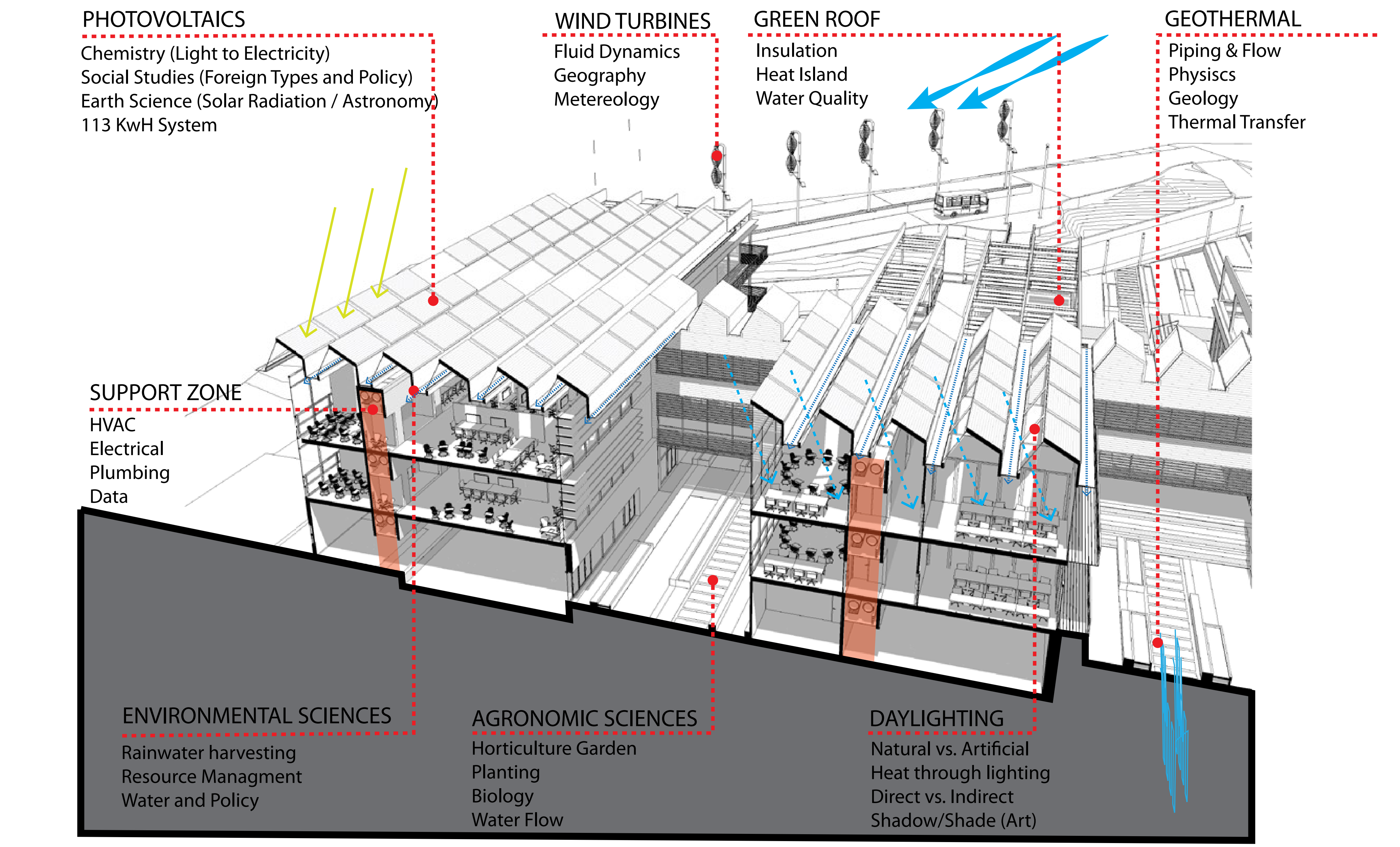
Wind
- Fluid Dynamics
- Geography
- Visitors/Movement

Education Signage
- Industry Dashboards (real time Energy consumption)

1.a

ZERO ENERGY - THE BUILDING AS A TEACHING TOOL

THE BUILDING AS A TEACHING TOOL - SUSTAINABILITY INTEGRATED TO CURRICULUM - ***The Zero-Energy Experience***



1.a

ZERO ENERGY - CALCULATIONS & DATA

ACTIVE & PASSIVE DESIGN

The design of the New Bioclimatic School in Crete will highlight the following passive strategies and active engineering systems strategies:

Day Lighting: The 3 bars are oriented east to west so as to maximize indirect day light through its north facades, and controlled direct daylight on its south facades. Controlling of day lighting will occur through internal and external sun shades, as well as learning balconies on the south faces. The learning spaces will be located either facing North or South. The sun exposure on East and West surfaces is minimized. Additionally, the Sail (saw-toothed roof structure) will allow indirect northern light to penetrate onto all spaces on the 3rd level.

Natural Ventilation: All learning spaces will have operable doors and windows to allow natural ventilation to occur. Spaces adjacent to the ground will have large sliding doors to allow seamless connection to the outdoors. Rooms in upper levels will also highlight large sliding doors on the south facades, with access to learning balconies (for arts and science projects), and operable windows on the north façade.

Heating and Cooling: The facility will be mostly heated and cooled through a radiant slab. A Geothermal system will be coupled with a radiant slab system to run conditioned water through the slabs.

Geothermal System: Specifications of the type of geothermal system will depend on further exploration of sub-soils and thermal transfer conditions of the earth. A vertical or horizontal system will be determined depending on that data. Moreover, if access to aquifers is available, the potential to create a 1-hole system and using the underground cold water as a thermal transfer would be explore. Given the HVAC loads, we foresee that the parcel could support a geothermal system without any serious challenges.

Lighting: The need for lighting will be greatly reduced by the expansive introduction of day lighting to the school. Highly efficient lighting will be used and operated by a motion sensor system that will shut down lights when spaces are not in operation.

Rain Water Harvesting: Given the reality of considerable droughts in summer months, the design of the school has prioritized the need to collect all potential available rain water on the site. The roof structure of the school "the Sail" is designed to collect all the rain water that fall on it. Three 250,000 liter underground tanks will collect the water to be used for toilets, urinals, landscaping.

Grey Water Recycling & Leech Field: Water from sinks will be used to flush toilets. A leech field at the northern most location of the site will treat all black water discharge from the school.

Estimated Energy Consumption Goal per year: 476,600 kw/yr
Estimated Energy Consumption Goal per square meter: 2.77 kbtuh/sm/yr

HVAC Loads –	***218,000 kw/yr***
Internal Loads –	***164,300 kw/yr***
Misc Loads –	***94,300 kw/yr***
Total:	***476,600 kw/yr***

Solar Photovoltaics (156.33 w/mt2 efficiency)

Mt2 Array	***Hrs/Yr***	***W/mt2***	***KW***	***KW/year***
824 mt2	***2,760***	***156.33***	***128.8***	***355,488 KW/Yr***

Wind Turbines:

5 Helix Turbines - Type - Vertical axis helical Savonius rotor (VAWT)

Turbine	***#of Turbines***	***Hrs/Yr***	***KW***	***KW/year***
4.5 Kw/Turbine	***5***	***2,760***	***22.5***	***62,100 KW/yr***

1.b

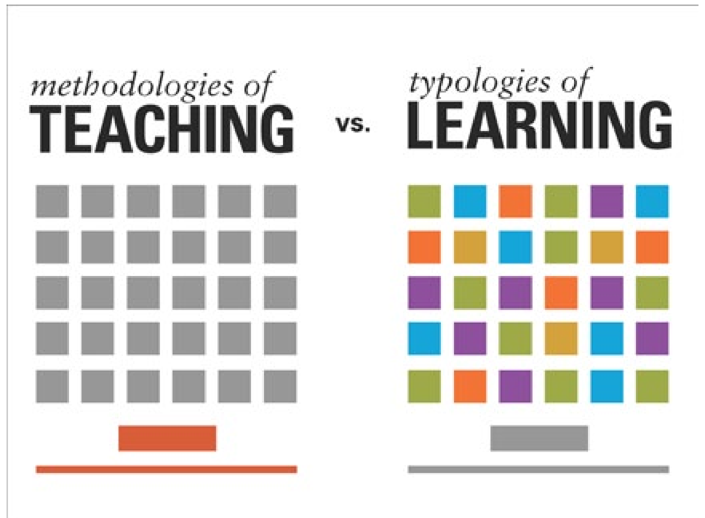
THE IMMERSIVE LEARNINGSCAPE

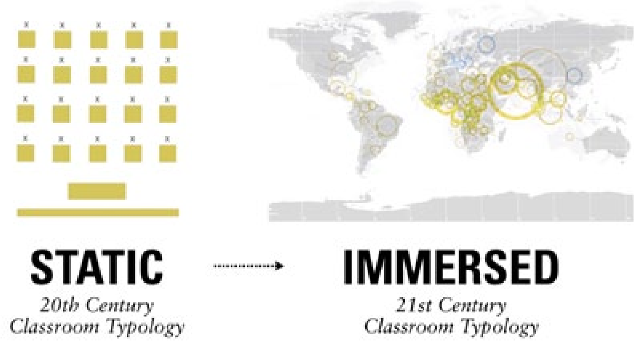
21st Century

Learning/Technology

21ST CENTURY LEARNING

Our new Millennium calls for a new way to think about education and the spaces in which education takes place. While the design of the classroom has historically been focused on a teacher-centered space for passive learning, the evolution of technology and the shifting ways in which individuals learn are pushing us to rethink the antiquated classroom model and whether it is the best way to adapt to ALL learning methods. We need to provide environments that empower the individual to become ***Prosumers***: both consumers and *producers* of information.

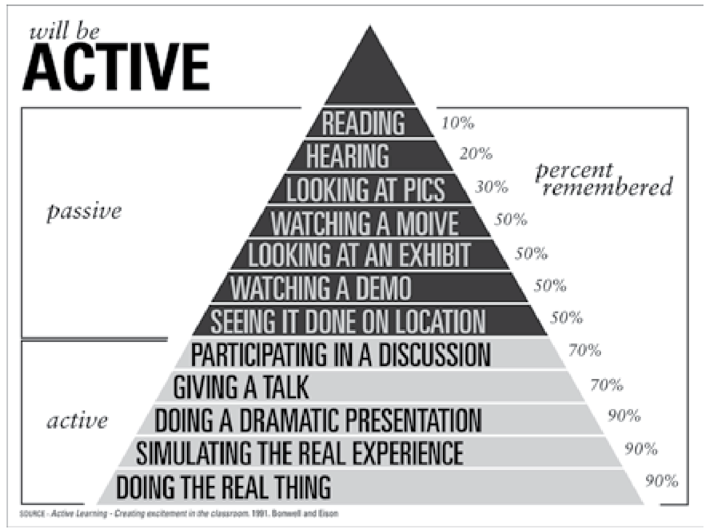




While customization of every part of our lives continually evolves over time (as with DVR's on TV's, smart-phone applications, consumer goods, foods in restaurants, etc.), education is still delivered in mass production. Why? The classroom is partially to blame, since it can't adequately accommodate multiple methods of learning. It does not facilitate the advancement of interactions between students and professors, or professor-student mentorship. Nor does it accommodate the flexibility and adaptability needed to support multiple teamwork-oriented and technology-facilitated, collaborative and interdisciplinary learning environments. Most of all, the standard classroom does not support active engaging or creative learning.

If we are to compete successfully in a global economy, we need to provide spaces that make us wonder, think, create, innovate, collaborate, speculate, question, interact and be active. Research shows that when students do these things (instead of just listening), they retain 90% of the knowledge (Active Learning). We need to become a society of doers. We visualize facilities that foster a belief that earning happens anywhere, anytime, anyhow. All spaces, media and people can teach us, so we need to depart from the concept of the word "classroom". Especially since it has been proven that we do not learn best in a class, that a room is no longer the only place we get information from and that teachers are not the only persons we learn from.

We are proposing a concept called the Immersive Learningscape.



The Immersive Learningscape speaks to two important aspects of education in the new millennium:

- First is the idea that learning happens best when it is immersive. Whether with writing, social sciences, history, geography, environmental studies or math, learning truly happens when you are immersed in the subject at hand. When you can interact with it in a multi-sensory method and manipulate, test, adjust and respond to the questions and challenges you encounter. In this form, learning is active, engaging, interesting and challenging.

- Second is the notion that the classroom gives way to the LearningScape: a combination of spaces that create a landscape for various ways of scholarship and multiple opportunities for size-specific learning. These spaces allow for technology-focused, project-based learning; for flexibility of activities and education, unexpectedness in thought provoking, collaborative environments and brainstorming space for innovative and creative learning. The areas in this landscape of learning will better facilitate and encourage interdisciplinary and innovative encounters between students and faculty, and will address the potential for every square foot of space to be maximized as learning spots, nooks, paths and spaces.

1.b

THE IMMERSIVE LEARNINGSCAPE

The Immersive Learningscape will be a place that integrates five typologies of learning spaces, based on the team size of the learners and the tasks at hand:

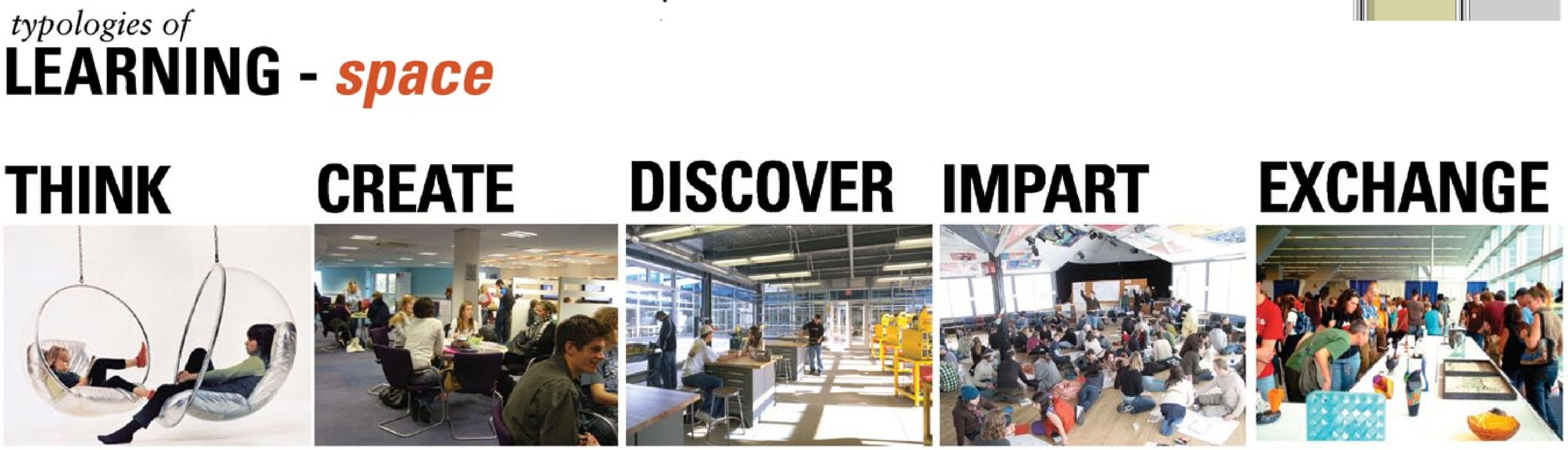
T*hink* – based on the concept that learning occurs at the individual level. Small intimate spaces allow for the time and environment to analyze and investigate, think and digest information.

Create – focuses on learning through teamwork. These spaces can be arranged in multiple configurations, allowing for flexibility of engagement and multiplicity of programming as well as interactive learning in small to medium size groups.

Discover – designed to foster learning through a 'workshop' setting. This environment is designed for learning through testing, hands-on and exploration, allowing for larger group meetings where equipment is necessary. These spaces will encourage arts and sciences to co-create and invent via fabrication, testing, deconstruction, reconstruction, production and design.

Impart – rendered more like a typical classroom. These spaces accommodate larger group gatherings, yet feature break-out zones for smaller team areas and operable partitions to combine two classrooms for very large gatherings.

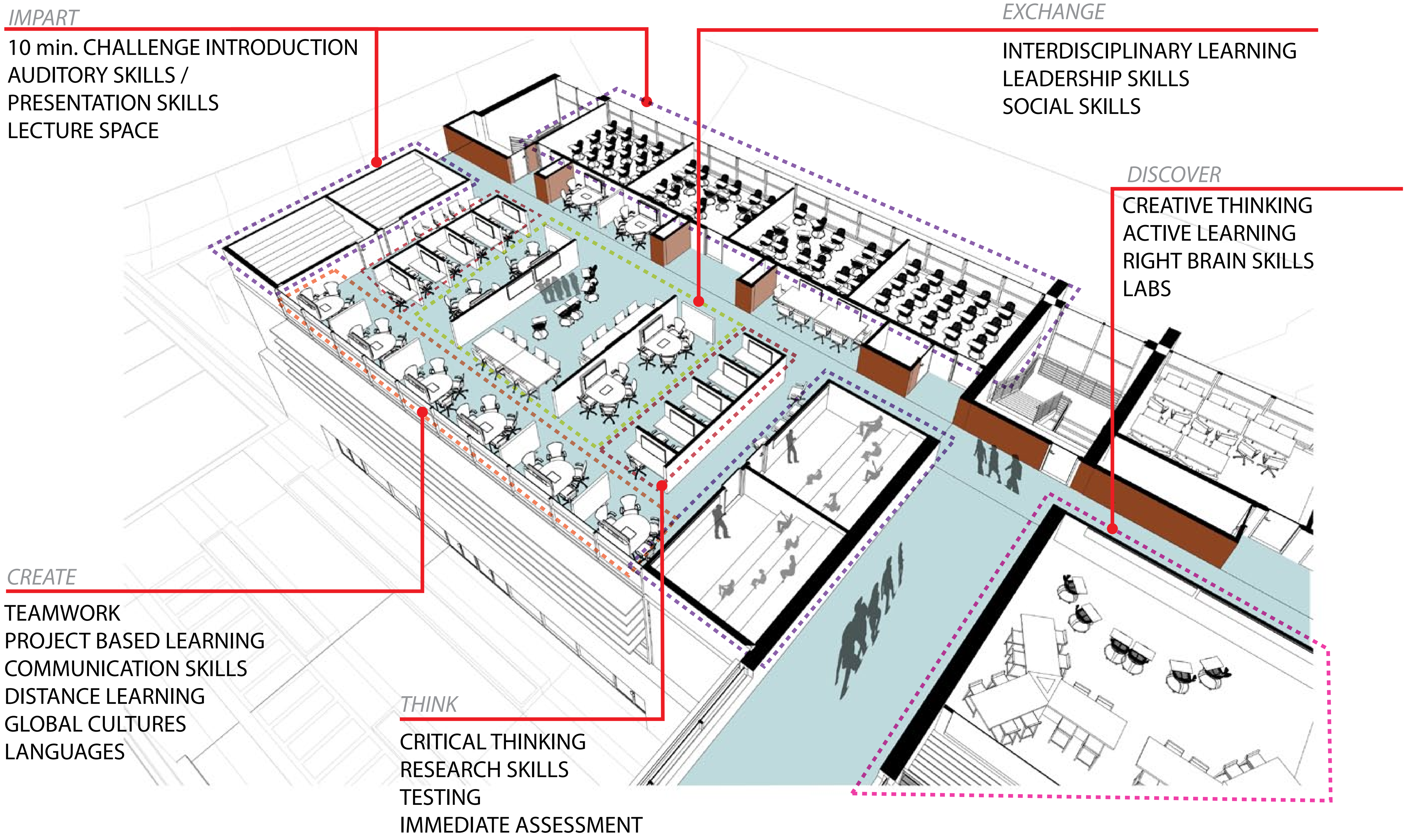
Exchange – inspired by the potential of social learning. Paralleling that of academic learning, this space becomes communal space, an environment shared between students, guests and citizens alike. Rendered as a vertical space, this dynamic space unites all learning academies.



1.b

THE IMMERSIVE LEARNINGSCAPE

THE IMMERSIVE LEARNINGSCAPE - AN ACTIVE LEARNING ENVIRONMENT FOR THE ACQUISITION OF 21st CENTURY SKILLS



1.c

A MULTI-CULTURAL FACILITY

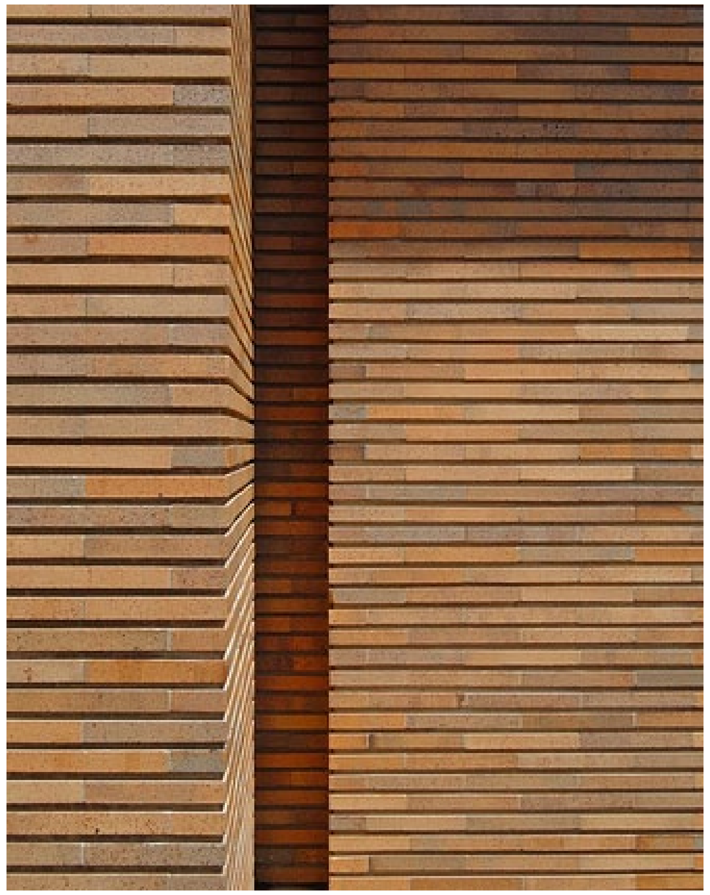
The New Bioclimatic School in Greece will embrace the multi-cultural quality of Crete and the school itself through the design of an arrival school plaza that will highlight planters with colorful flowers that will symbolize each and everyone of the EU member nations.

LANDSCAPING DESIGN - PLANTER DIAGRAM

1.d

A CONTEXTUAL DESIGN - A SCHOOL THAT BELONGS IN CRETE

REGIONAL ARCHITECTURE

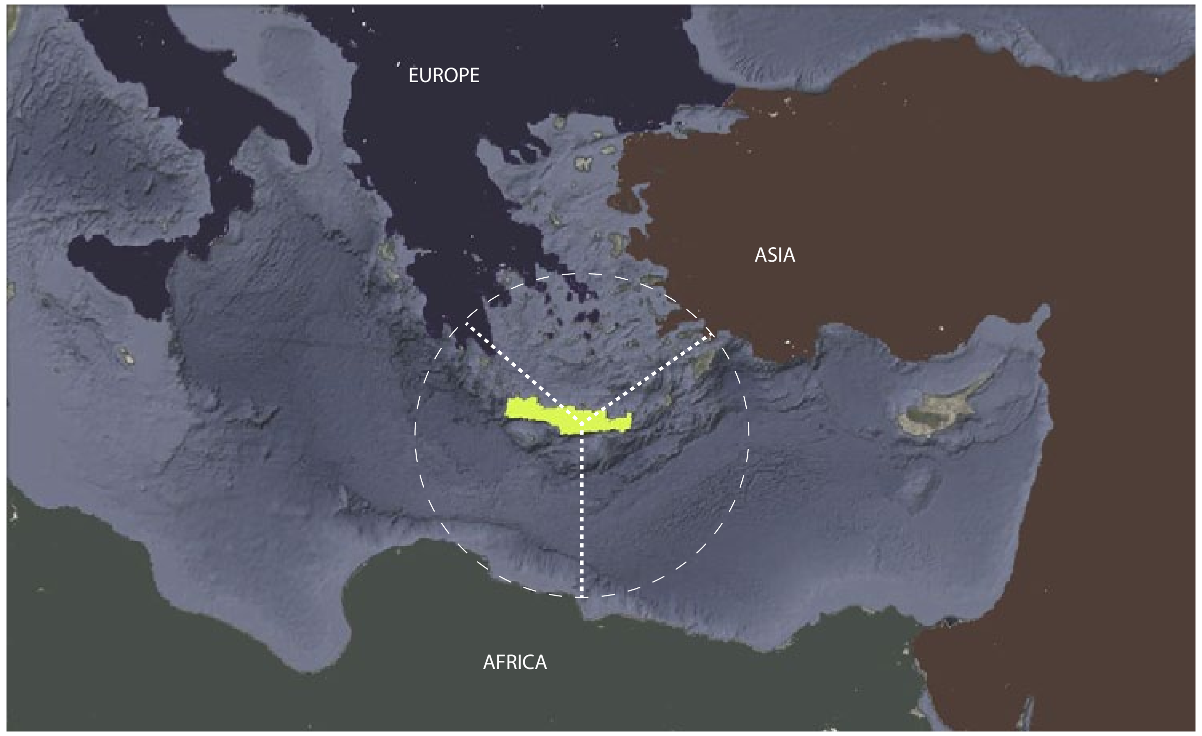


02

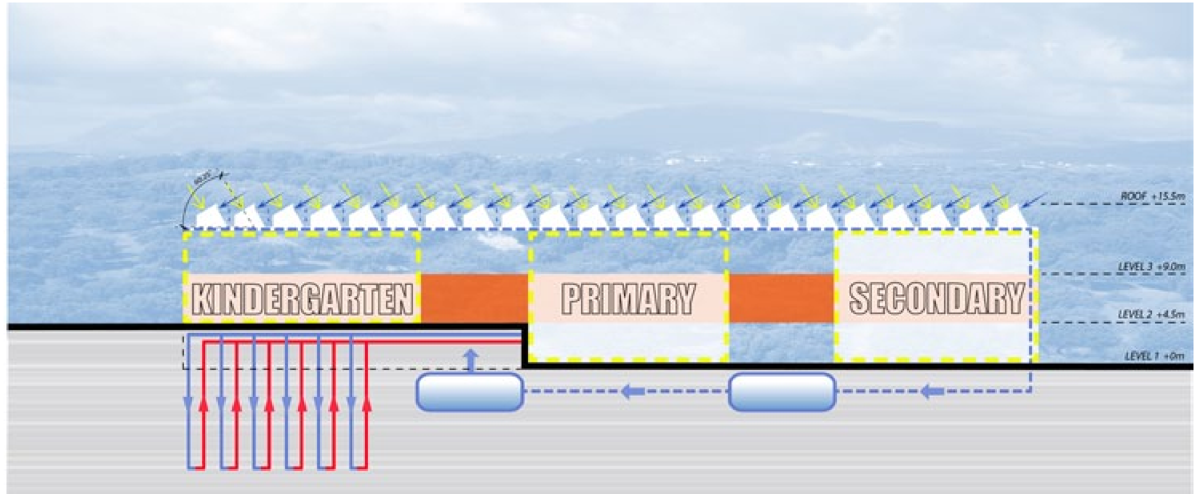
URBAN AND ARCHITECTURAL DESIGN

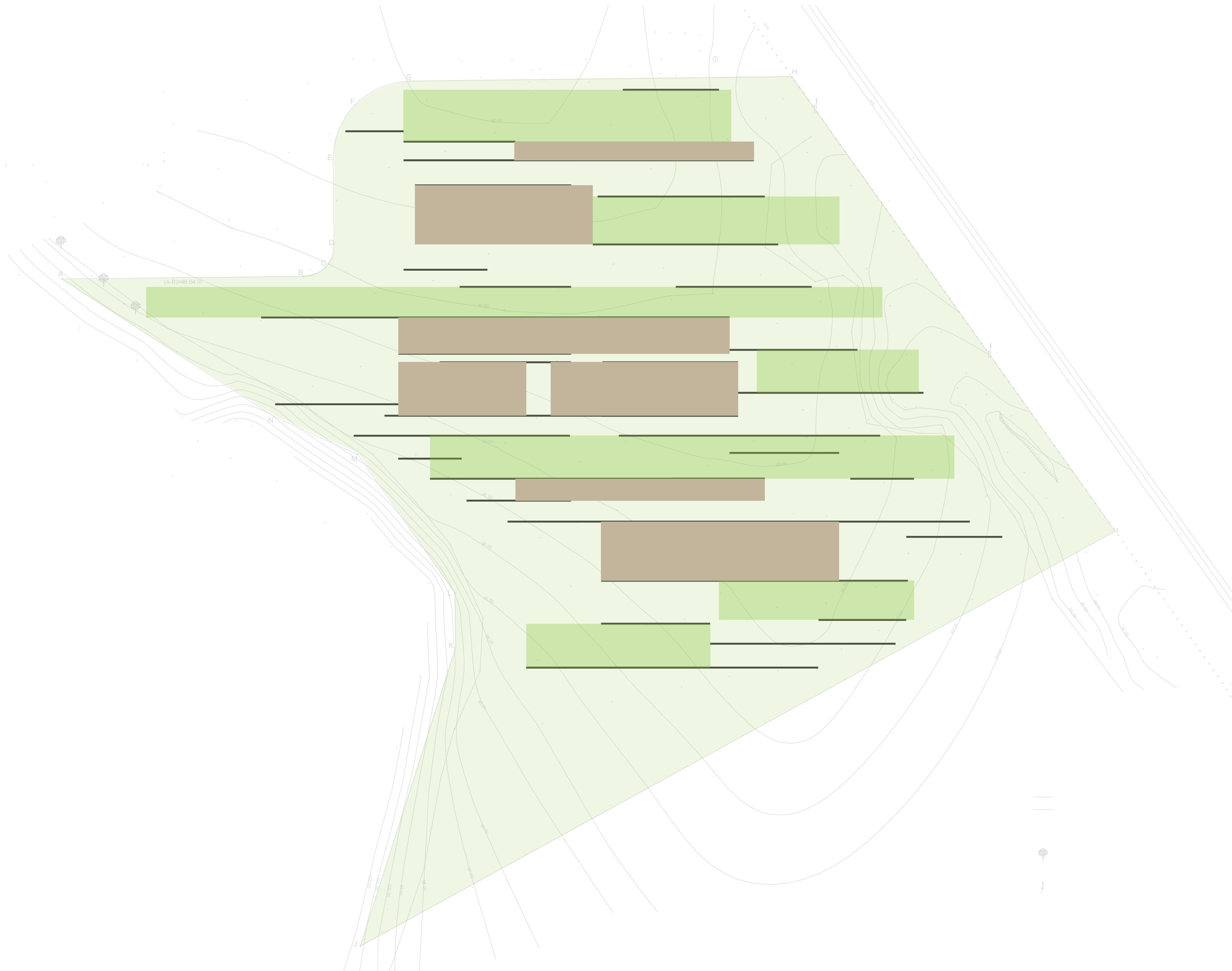
2.a

DIAGRAMS



CRETE





THE SAIL AND THE VESSELS

WALLS IN THE LANDSCAPE - UNEARTHING THE SITE

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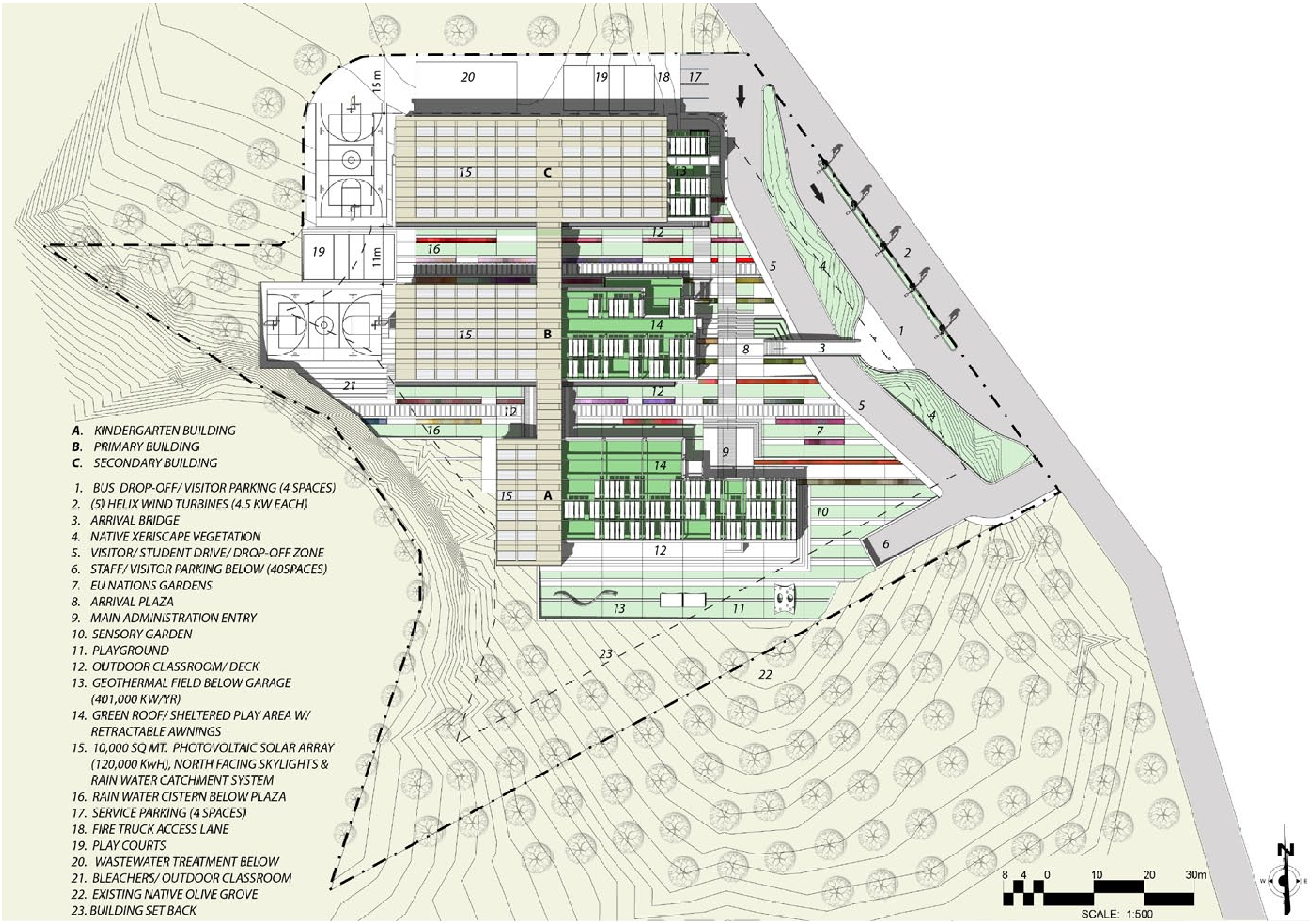
VESSELS OF KNOWLEDGE - A ZERO ENERGY IMMERSIVE LEARNINGSCAPE

2.b

SITE PLAN



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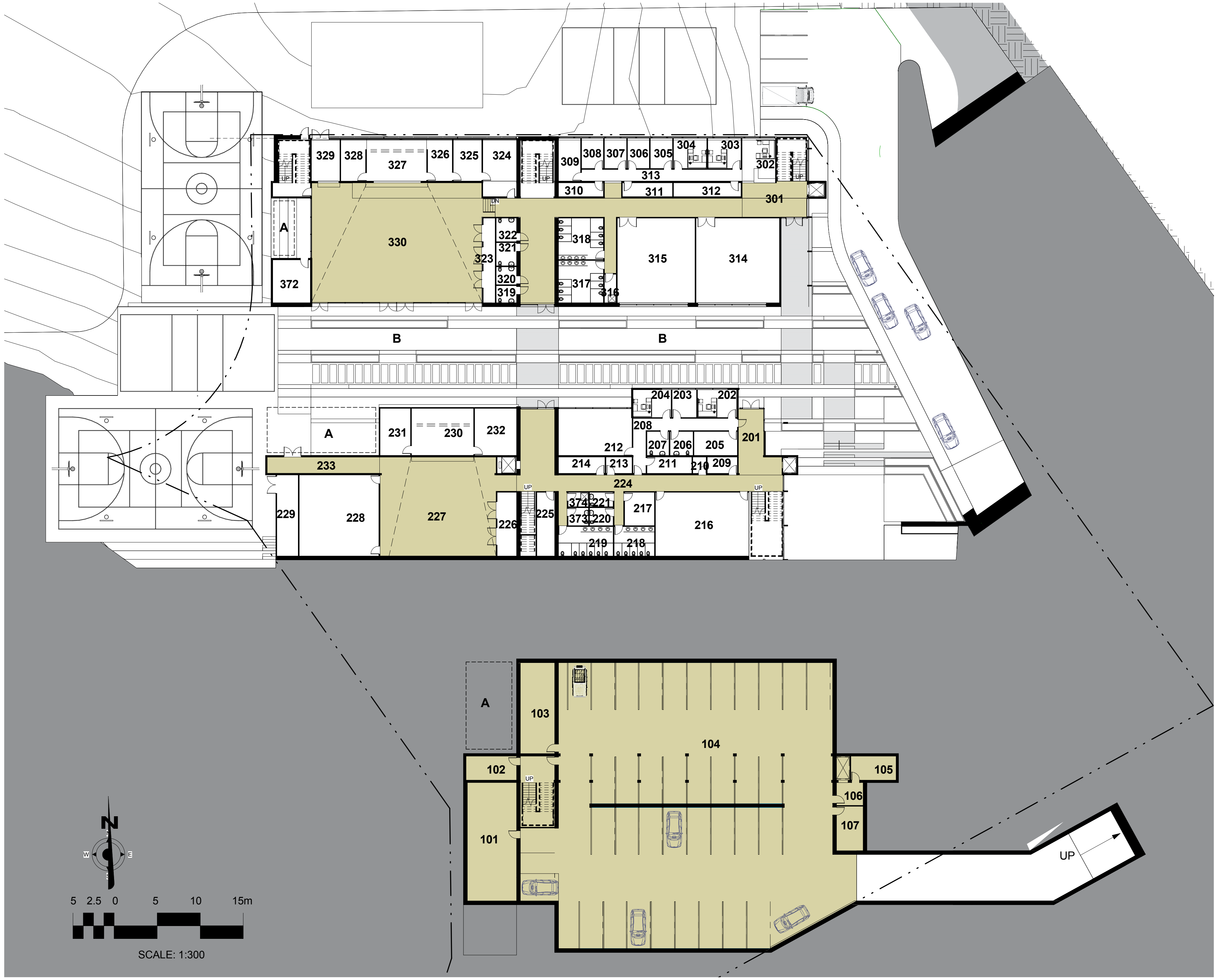
VESSELS OF KNOWLEDGE - A ZERO ENERGY IMMERSIVE LEARNINGSCAPE

2.c

FLOOR PLANS - LEVEL 1



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VESSELS OF KNOWLEDGE - A ZERO ENERGY IMMERSIVE LEARNINGSCAPE

2.c

FLOOR PLANS - LEVEL 1 - PROGRAM (AREA) TABULATION

Room Area Comments
LEVEL 1

Room	Area	Comments
101	79.2 m²	Geothermal Pump Room - Electromechanical Gear Room
102	16.4 m²	General Building Storage
103	42.5 m²	Boiler / Fuel Tank Room (Ventilated)
104		40 Car Underground Parking Garage
105	14.7 m²	Electrical Room
106	8.2 m²	Foyer
107	16.0 m²	Electrical Room
201	27.6 m²	Admin Reception / Welcome Area
202	14.8 m²	Secretariat / Archives
203	9.2 m²	General Office
204	14.4 m²	Head Teacher Office
205	14.0 m²	Parent's Association / Student Club Room
206	7.4 m²	Staff Toilets
207	7.1 m²	Staff Toilets
208	24.5 m²	Primary Administration Hallway
209	6.7 m²	Storage
210	3.0 m²	Copier
211	9.9 m²	General Office
212	47.1 m²	Primary Staff Room / Office
213	5.8 m²	Storage
214	10.3 m²	Doctor's Infirmary
216	81.2 m²	General Storage Room
217	13.5 m²	General Teaching Resources Storage
218	16.1 m²	Pupil's Toilets Boys
219	21.8 m²	Pupil's Toilets Girls
220	5.7 m²	Disabled Toilet
221	4.6 m²	Visitor's Toilet Men
224	107.7 m²	Primary Main Hallway Level 1
225	15.4 m²	Electrical / Boiler
226	16.8 m²	Gymnastics Gear Storage Room
227	161.2 m²	Multipurpose Hall (Primary)
228	87.7 m²	Dining Area / Kitchen / Storage
229	23.6 m²	School Canteen
230	39.9 m²	Theater Stage
231	19.5 m²	Theater Storage
232	26.9 m²	Back Stage
233	24.9 m²	Rear Hallway
301	35.4 m²	Admin Area / Reception
302	19.4 m²	Secretariat / Copier / Archives
303	13.6 m²	Head teacher Office 1
304	13.6 m²	Head Teacher Office 2
305	9.1 m²	Deputy Head Teacher Office 1
306	8.9 m²	Deputy Head Teacher Office 2
307	9.1 m²	Deputy Head Teacher Office 3
308	8.9 m²	Deputy Head Teacher Office 4
309	12.9 m²	Parent Association / Student Club Room
310	8.4 m²	Doctor's Office / Infirmary
311	9.3 m²	General Office 1
312	12.6 m²	General Office 2
313	169.8 m²	Admin Hallway
314	96.1 m²	Staff Room / Offices 1
315	89.5 m²	Staff Room / Offices 2
316	4.6 m²	Cleaning Equipment Storage Room
317	25.9 m²	Pupil's Toilets - Boys
318	25.2 m²	Pupil's Toilets - Girls
319	4.8 m²	Visitor's Toilets - Women
320	4.9 m²	Visitor's Toilets - Men
321	6.4 m²	Staff Toilet- Women
322	6.5 m²	Staff Toilet - Men
323	13.6 m²	Gymnastics Gear Storage Room
324	26.4 m²	General Teacher's Resources Storage
325	16.2 m²	Theater Storage
326	14.2 m²	Theater Backstage (Left)
327	39.0 m²	Theater Stage
328	14.2 m²	Theater Backstage (Right)
329	16.2 m²	School Canteen
330	278.7 m²	Multi-Purpose Hall
372	22.0 m²	Electromechanical Gear Room
373	4.9 m²	Visitor's Toilet Women
374	4.0 m²	Cleaning Storage Room
	2089.6 m²	

2.c

FLOOR PLANS - LEVEL 2

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VESSELS OF KNOWLEDGE - A ZERO ENERGY IMMERSIVE LEARNINGSCAPE

2.c

FLOOR PLANS - LEVEL 2 - PROGRAM (AREA) TABULATION

Room	Area	Comments
LEVEL 2 -		
111	15.7 m^2	Waiting Room / Reception
112	29.5 m^2	Secretariat
113	15.0 m^2	Director's Office
114	11.1 m^2	Vice-Director's Office
115	9.2 m^2	Professional Practice Guidance Office
116	9.2 m^2	Professional Practice Guidance Office
117	11.9 m^2	School Psychologist / Parent Briefing Rm
118	26.1 m^2	General Archives
119	10.7 m^2	Copier Room
120	10.1 m^2	Men's Room
121	10.1 m^2	Ladie's Room
122	6.8 m^2	Disabled Toilet
123	31.1 m^2	Administration Hallway
124	130.8 m^2	Main Kindegaden Hallway
125	14.7 m^2	Reception Welcome Area (K)
126	14.7 m^2	Head Teacher
127	12.7 m^2	General Teacher Resources Storage
128	4.7 m^2	Staff Toilets
129	4.7 m^2	Disabled Toilets
130	10.8 m^2	Girls Pupil Toilet
131	10.8 m^2	Boys Pupil Toilet
132	4.7 m^2	Wardrobe / Toddlers Lockers / Clothing
133	46.2 m^2	Quiet Room / Napping
134	45.7 m^2	Kindergarden Classroom 1
135	45.7 m^2	Kindergarden Classroom 2
136	46.2 m^2	Dining Room / Kitchen Area
137	25.0 m^2	Kitchen Storage / Hall Storage / Chair Storage
138	97.9 m^2	Multi-Purpose Hall
139	18.4 m^2	Boiler Room / Fuel Tank room
140	16.4 m^2	Premises Manager Office
141	53.3 m^2	Meeting Room
142	12.3 m^2	Back Hallway

Room	Area	Comments
LEVEL 2		
240	109.1 m^2	Library / Reading Room
241	11.8 m^2	General Archives
242	41.9 m^2	Classroom 1
243	43.0 m^2	Classroom 2
244	43.0 m^2	Classroom 3
245	43.5 m^2	Classroom 4
246	43.5 m^2	Classroom 5
247	43.0 m^2	Classroom 6
248	43.0 m^2	Classroom 7
249	43.0 m^2	Science Classroom 1
250	43.5 m^2	Science Lab 1
251	6.0 m^2	Arts Storage
252	11.1 m^2	ICT Storage
253	11.1 m^2	Teacher Storage
254	44.5 m^2	Arts & Crafts Room 1
255	44.1 m^2	ICT Room 1
256	44.1 m^2	Foreign Language 1
257	2.2 m^2	Electrical Closet
258	65.5 m^2	Front Hallway
259	67.6 m^2	Rear Hallway

Room	Area	Comments
LEVEL 2		
331	113.6 m^2	Technology / Science Library
332	4.0 m^2	Teacher Storage
333	4.0 m^2	IT Storage
334	30.3 m^2	Foreign Language Classroom 1
335	7.0 m^2	Teacher Storage
336	64.3 m^2	Science Lab 1
337	16.3 m^2	Science Storage
338	43.3 m^2	Informatics Lab 1 / Teleconference
339	74.8 m^2	Front Hallway
340	65.0 m^2	Science Lab 2
341	30.3 m^2	Foreign Language Classroom 2
342	30.0 m^2	Teaching Classroom Type II - 1
343	30.0 m^2	Teaching Classroom Type II - 2
344	29.7 m^2	Teaching Classroom Type II - 3
345	2.9 m^2	Storage
346	286.0 m^2	Immersive Learningscape - Project-based Learning Space
347	19.1 m^2	Tiered Classroom 1- 10 min. Project Challenge presentation
348	18.5 m^2	Tiered Classroom 2- 10 min. Project Challenge presentation
349	18.7 m^2	Tiered Classroom 3 - 10 min. Project Challenge presentation
350	18.1 m^2	Tiered Classroom 4- 10 min. Project Challenge presentation
	2523.0 m^2	

FLOOR PLANS - LEVEL 3

Innovative Bioclimatic European School Complex Competition, Crete, Greece

VESSELS OF KNOWLEDGE - A ZERO ENERGY IMMERSIVE LEARNINGSCAPE

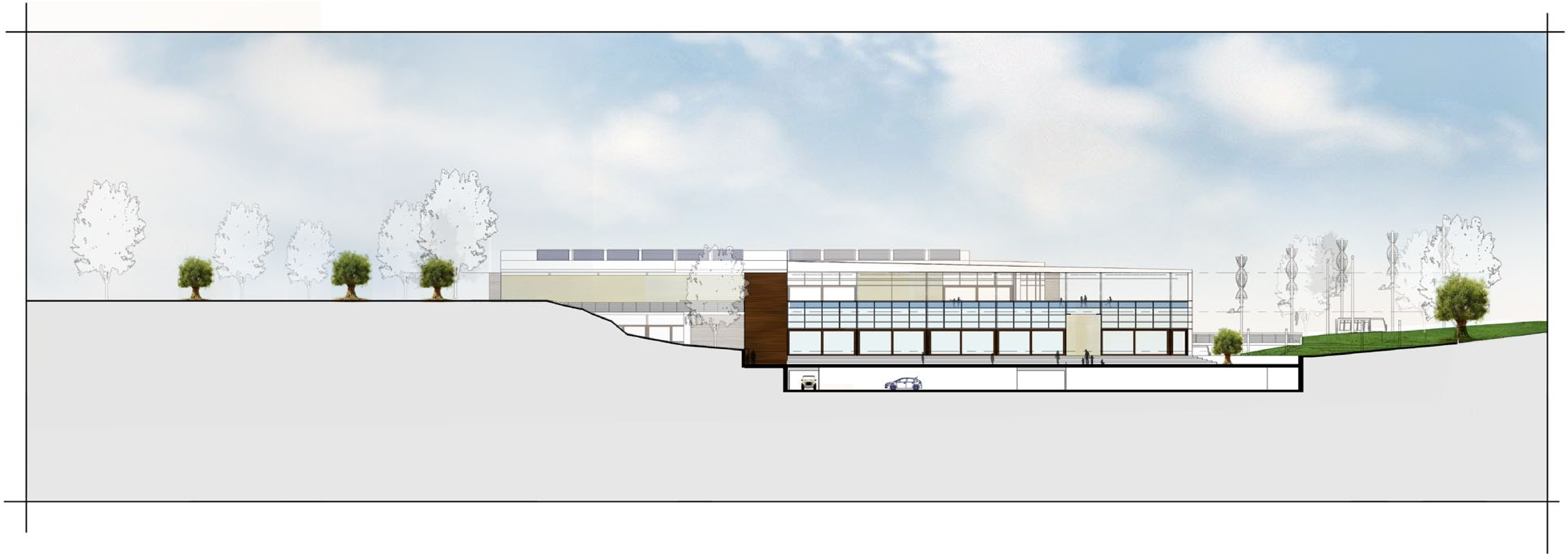
2.c

FLOOR PLANS - LEVEL 3 - PROGRAM (AREA) TABULATION

Room	Area	Comments
LEVEL 3		
261	43.5 m²	Classroom 8
262	43.0 m²	Classroom 9
263	43.0 m²	Classroom 10
264	43.0 m²	Science Classroom 2
265	43.5 m²	Science Lab 2
266	44.5 m²	Arts & Crafts Room 2
267	44.1 m²	Classroom 11
268	44.1 m²	Classroom 12
269	6.0 m²	Arts Storage
270	11.1 m²	ICT Storage
271	11.1 m²	Teacher Storage
272	2.2 m²	Electrical Closet
273	66.7 m²	Rear Hallway
274	311.9 m²	3rd Level 'Spine'
351	113.6 m²	Arts / History / Literature Library
352	4.0 m²	Teacher Storage
353	4.0 m²	IT Storage
354	30.3 m²	Foreign Language Classroom 3
355	7.0 m²	Teacher Storage
356	64.3 m²	Art Lab / Studio 1
357	16.3 m²	Art Storage
358	43.3 m²	Informatics Lab 2 / Teleconference
359	65.0 m²	Art Lab/ Studio 2
361	30.3 m²	Foreign Language Classroom 4
362	30.0 m²	Teaching Classroom Type II - 4
363	30.0 m²	Teaching Classroom Type II - 5
364	29.7 m²	Teaching Classroom Type II - 6
365	2.9 m²	Storage
366	286.0 m²	Immersive Learningscape - Project-based Learning Space
367	19.1 m²	Tiered Classroom 5- 10 min. Project Challenge presentation
368	18.5 m²	Tiered Classroom 6- 10 min. Project Challenge presentation
369	18.7 m²	Tiered Classroom 7- 10 min. Project Challenge presentation
370	18.1 m²	Tiered Classroom 8- 10 min. Project Challenge presentation
371	93.1 m²	Front Hallway - level 3
	1682.3 m²	

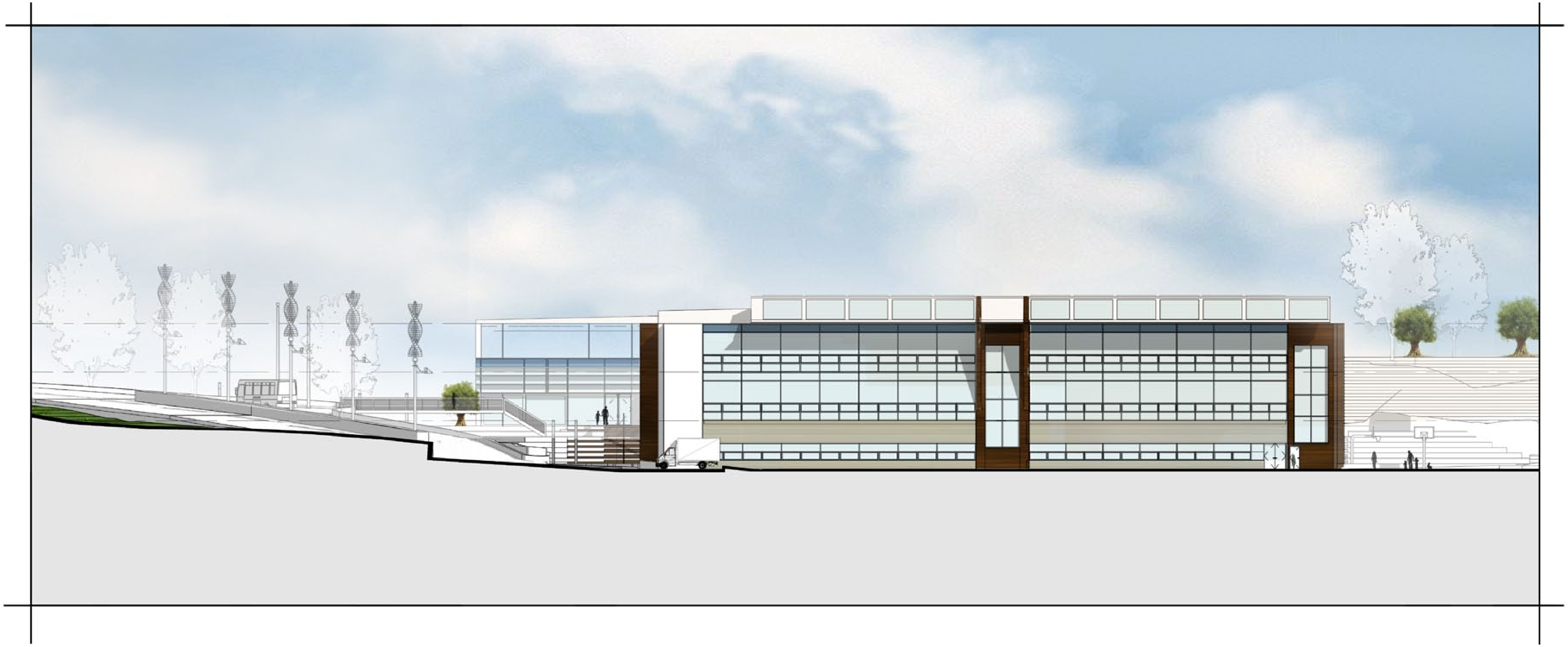
TOTAL MT2 6,294 m²

ELEVATIONS - SOUTH



2.d

ELEVATIONS - NORTH



2.d

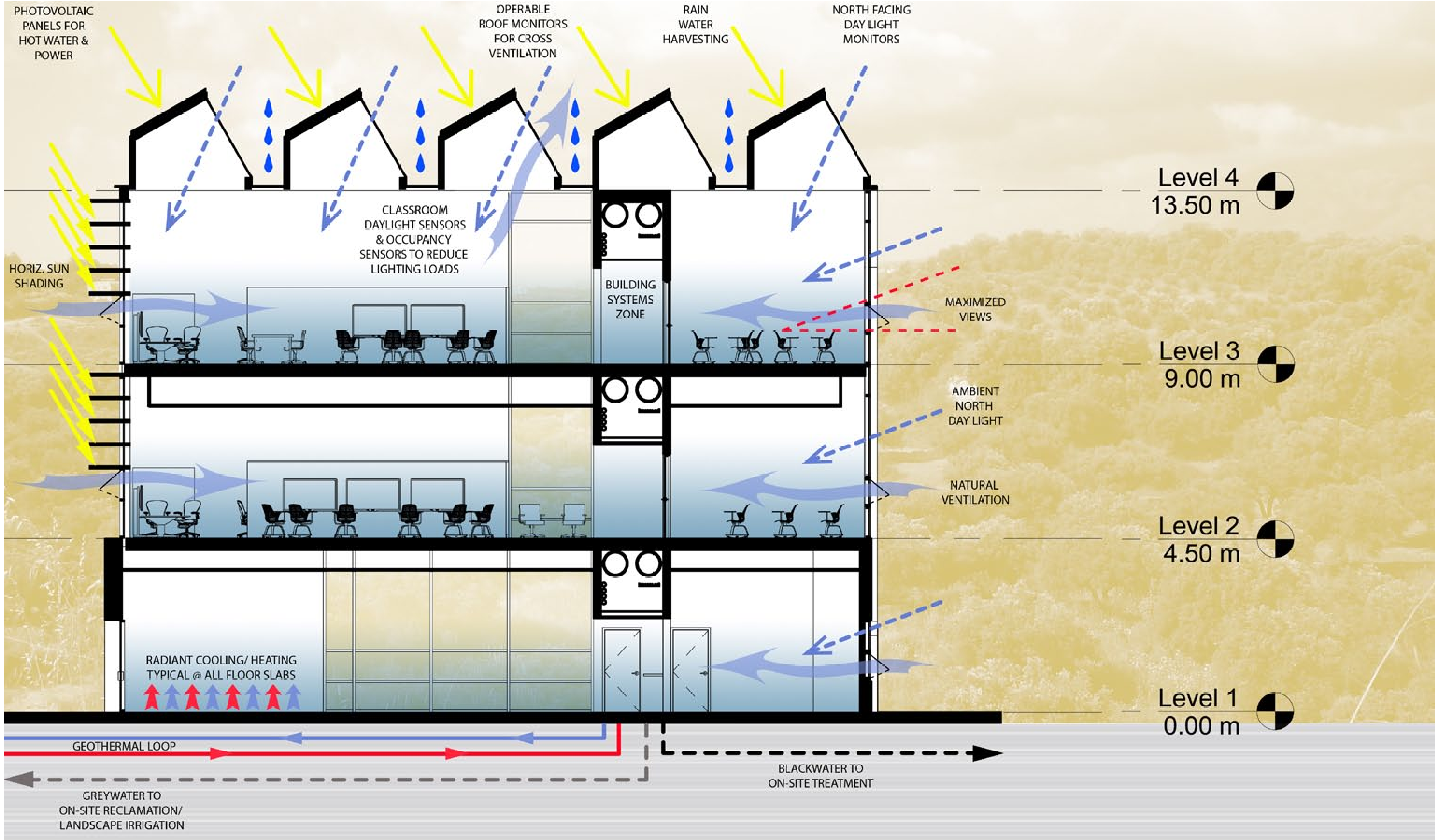
ELEVATIONS - WEST

2.e

SECTIONS - CROSS SECTION

2.e

SECTIONS - SUSTAINABILITY



2.f

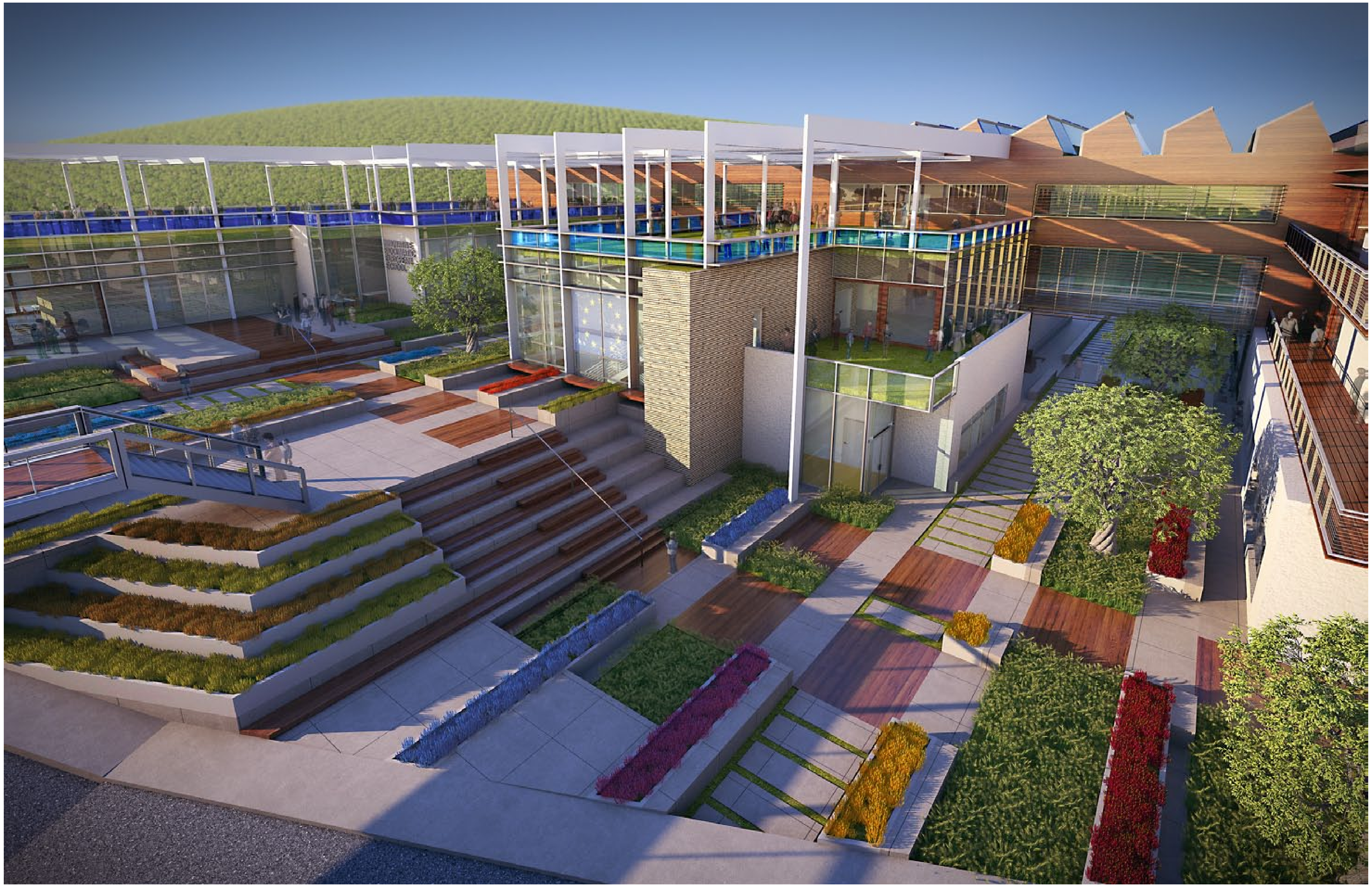
RENDERINGS - VIEW FROM SOUTH EAST - APPROACH TO SCHOOL

2.f

RENDERINGS - SCHOOL GARDENS & ENTRY

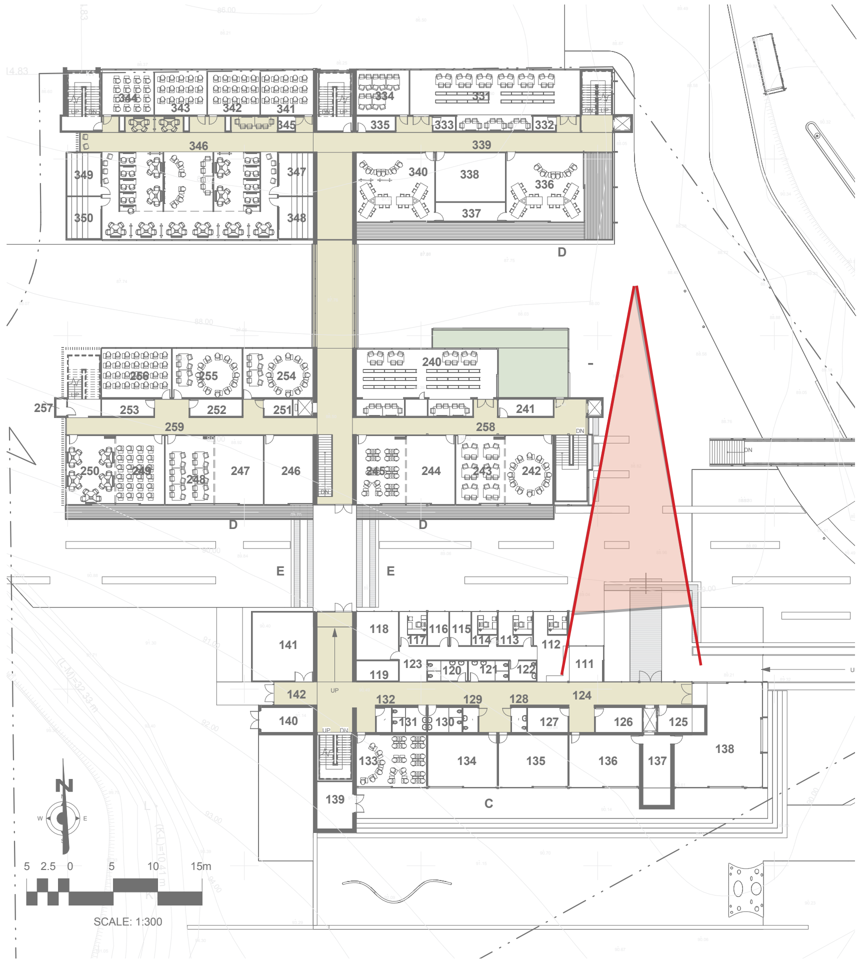
2.f

RENDERINGS - EUROPEAN COMMUNITY GARDENS



2.f

RENDERINGS - ENTRY BRIDGE & EUROPEAN COMMUNITY GARDENS



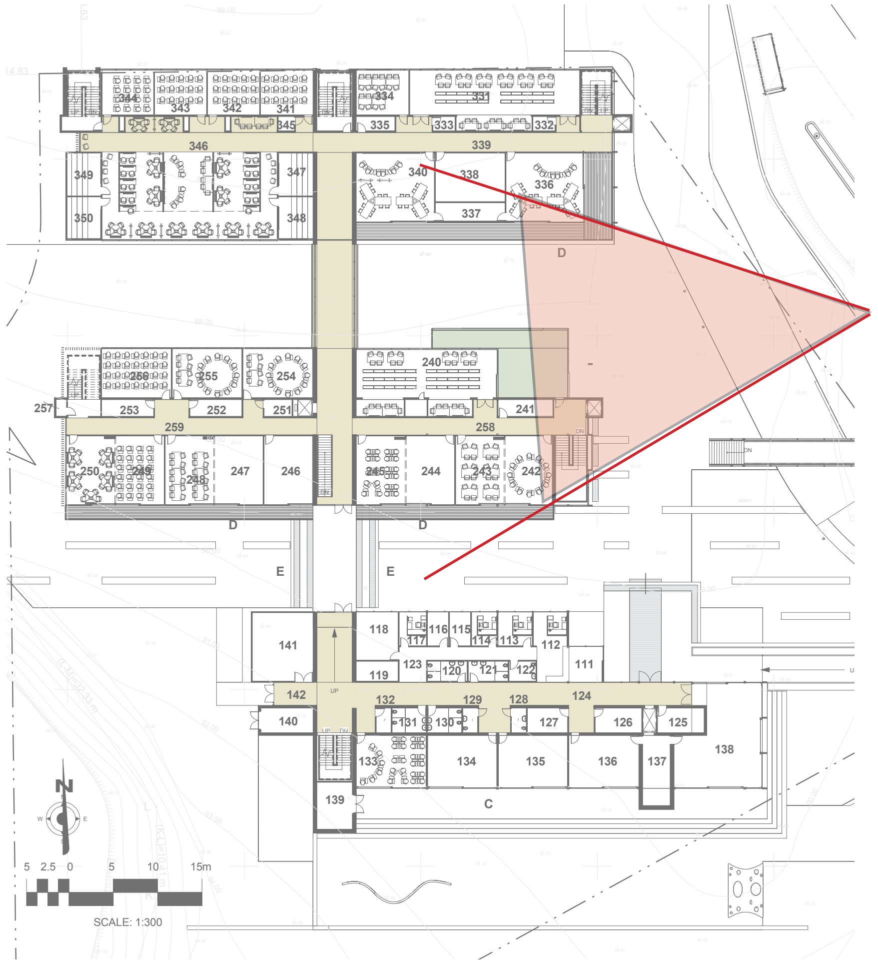
Innovative Bioclimatic European School Complex Competition, Crete, Greece

ZE2014

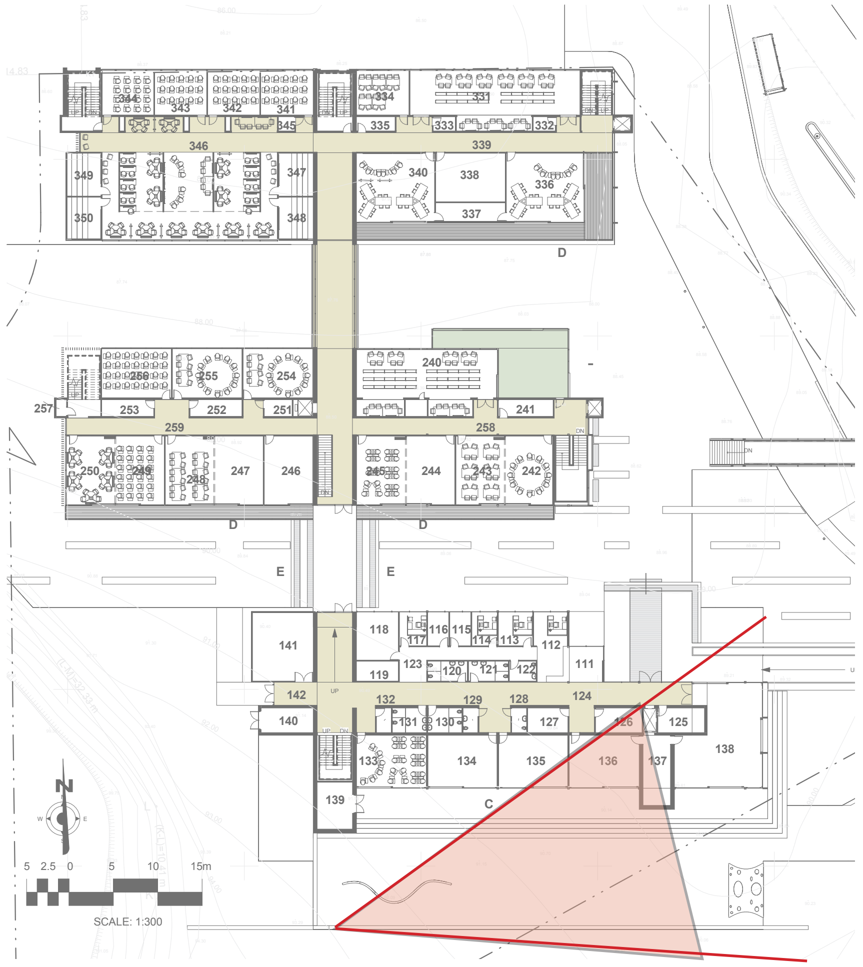
VESSELS OF KNOWLEDGE - A ZERO ENERGY IMMERSIVE LEARNINGSCAPE

2.f

RENDERINGS - PRIMARY & SECONDARY SCHOOL ENTRIES

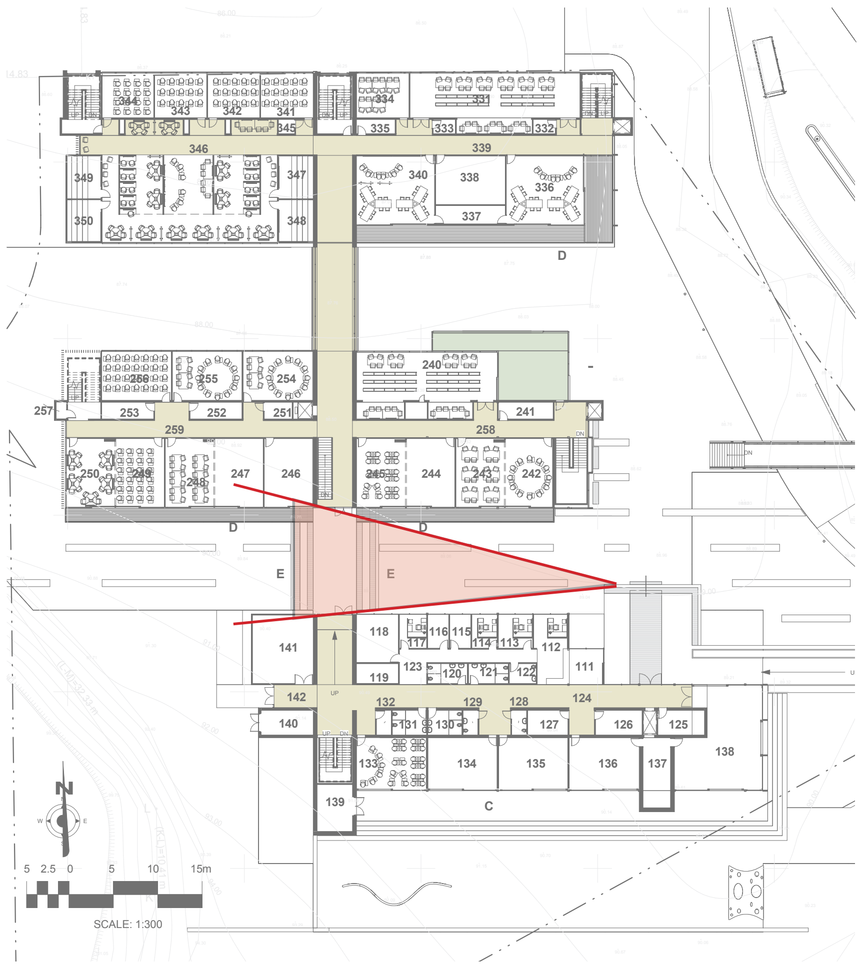


RENDERINGS - KINDERGARTEN PLAYGROUND



2.f

RENDERINGS - OUTDOOR CLASSROOM AND SENSORY GARDEN



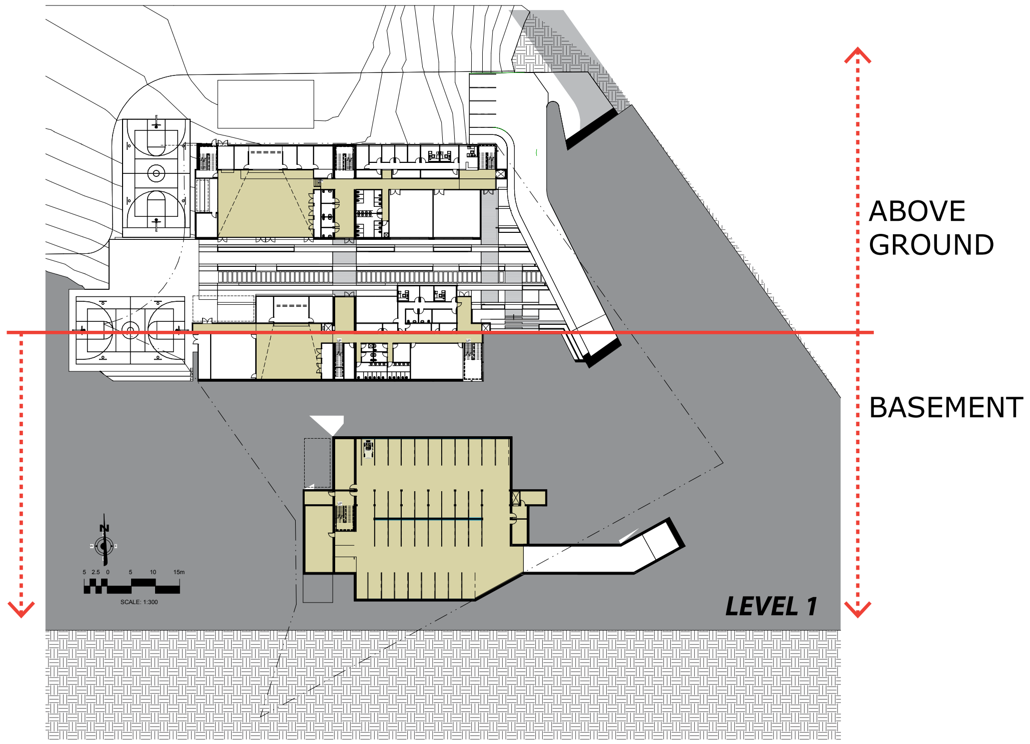
Innovative Bioclimatic European School Complex Competition, Crete, Greece

ZE2014

VESSELS OF KNOWLEDGE - A ZERO ENERGY IMMERSIVE LEARNINGSCAPE

3.0

AREA + VOLUME TABULATIONS



AREA TOTALS:

Total Land Coverage / Constructed Surface:	3071 m2
Total Gross:	8278.6 m2
Total Gross Below Ground:	1993 m2
Total Gross Above Ground:	6285.6 m2
Total Net:	7391.5 m2
Total Net Parking Garage	1096.6 m2
Total Net 1st Level:	2089.6 m2
Total Net 2nd Level:	2523.0 m2
Total Net 3rd Level:	1682.3 m2
Total Heated/ Cooled Space	6294.9 m2
Total Volume:	28,094 m3
Total Volume Kindergarten Bldg	3855 m3
Total Volume Primary Building	8436 m3
Total Volume Secondary Building	15,803 m3

AREA DETAILS:

Garage:	1096 m2
Basement Rooms Kindergarten Bldg:	267 m2
Partial Basement Rooms Primary:	720 m2
Basement / Partial Basement Total:	1993 m2
Kindergarden / Administration Bldg:	
Level 2:	880 m2
Primary School Building:	
Level 1:	1021 m2
Level 2:	1004 m2
Level 3:	498 m2
Primary Total:	2523 m2
Secondary School Building:	
Level 1:	1178 m2
Level 2:	1120 m2
Level 3:	1120 m2
Secondary Total:	3418 m2
Connector Bridge:	
Level 2:	60 m2
Level 3:	326 m2
Connector Bridge Total:	386 m2

3.0

Environmental Analysis

CRETE

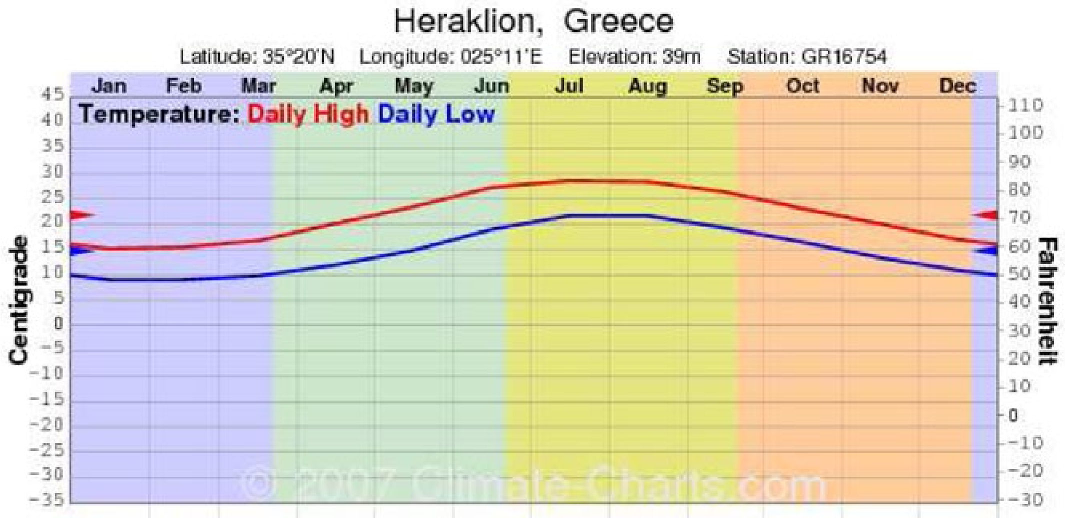
HERAKLION

VICINITY

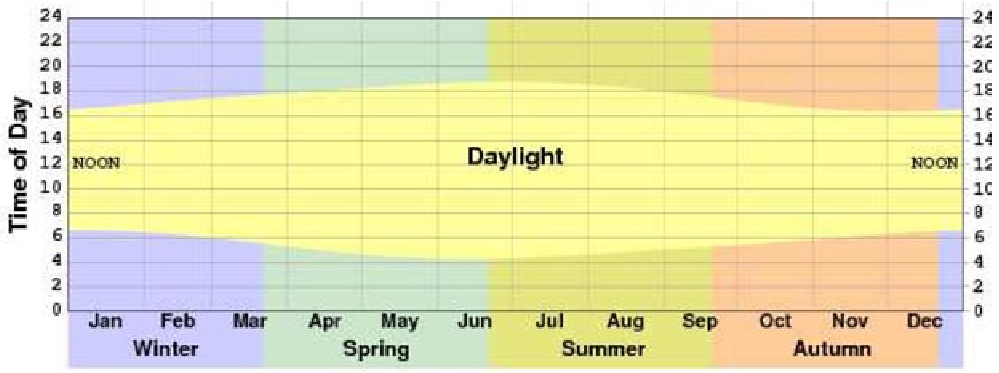
data for Heraklion

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C (°F)	15.2 (59.4)	15.5 (59.9)	16.8 (62.2)	20.2 (68.4)	23.5 Climate (74.3)	27.3 (81.1)	28.6 (83.5)	28.4 (83.1)	26.4 (79.5)	23.1 (73.6)	20.1 (68.2)	17.0 (62.6)	21.9 (71.4)
Daily mean °C (°F)	12.1 (53.8)	12.3 (54.1)	13.3 (55.9)	16.1 (61.0)	19.2 (66.6)	23.2 (73.8)	25.2 (77.4)	25.1 (77.2)	22.9 (73.2)	19.8 (67.6)	16.8 (62.2)	14.0 (57.2)	18.4 (65.1)
Average low °C (°F)	9.0 (48.2)	9.0 (48.2)	9.8 (49.6)	12.0 (53.6)	14.9 (58.8)	19.0 (66.2)	21.7 (71.1)	21.7 (71.1)	19.3 (66.7)	16.5 (61.7)	13.4 (56.1)	10.9 (51.6)	14.8 (58.6)
Precipitation mm (inches)	91.5 (3.602)	77.4 (3.047)	57.4 (2.26)	30.0 (1.181)	15.2 (0.598)	3.2 (0.126)	1.0 (0.039)	0.7 (0.028)	19.5 (0.768)	68.8 (2.709)	58.8 (2.315)	77.1 (3.035)	500.6 (19.709)
Avg. precipitation days	10.1	9.1	6.9	3.4	1.9	0.5	0.1	0.1	1.3	4.9	6.0	8.9	53.2

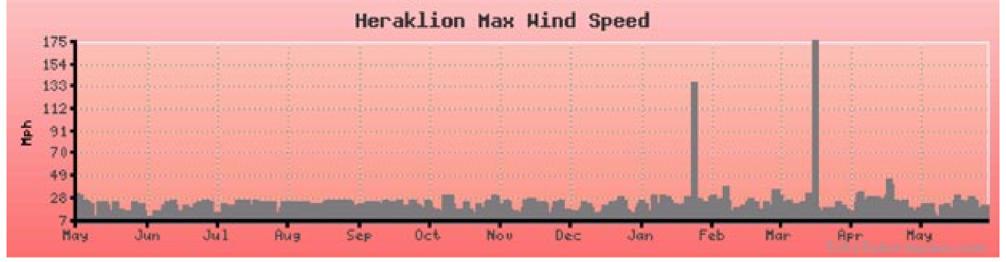
WEATHER DATA



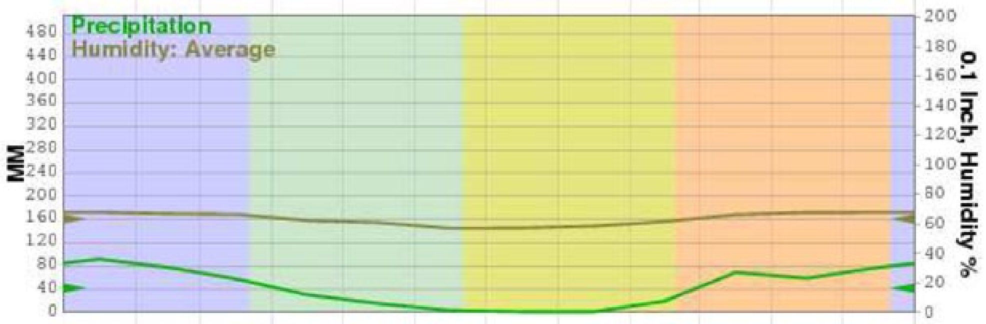
TEMPERATURES



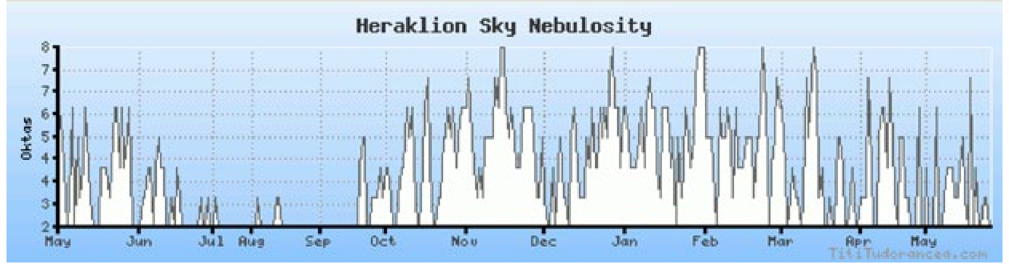
DAYLIGHT HOURS



WIND SPEEDS



PRECIPITATION



SKY NEBULOSITY

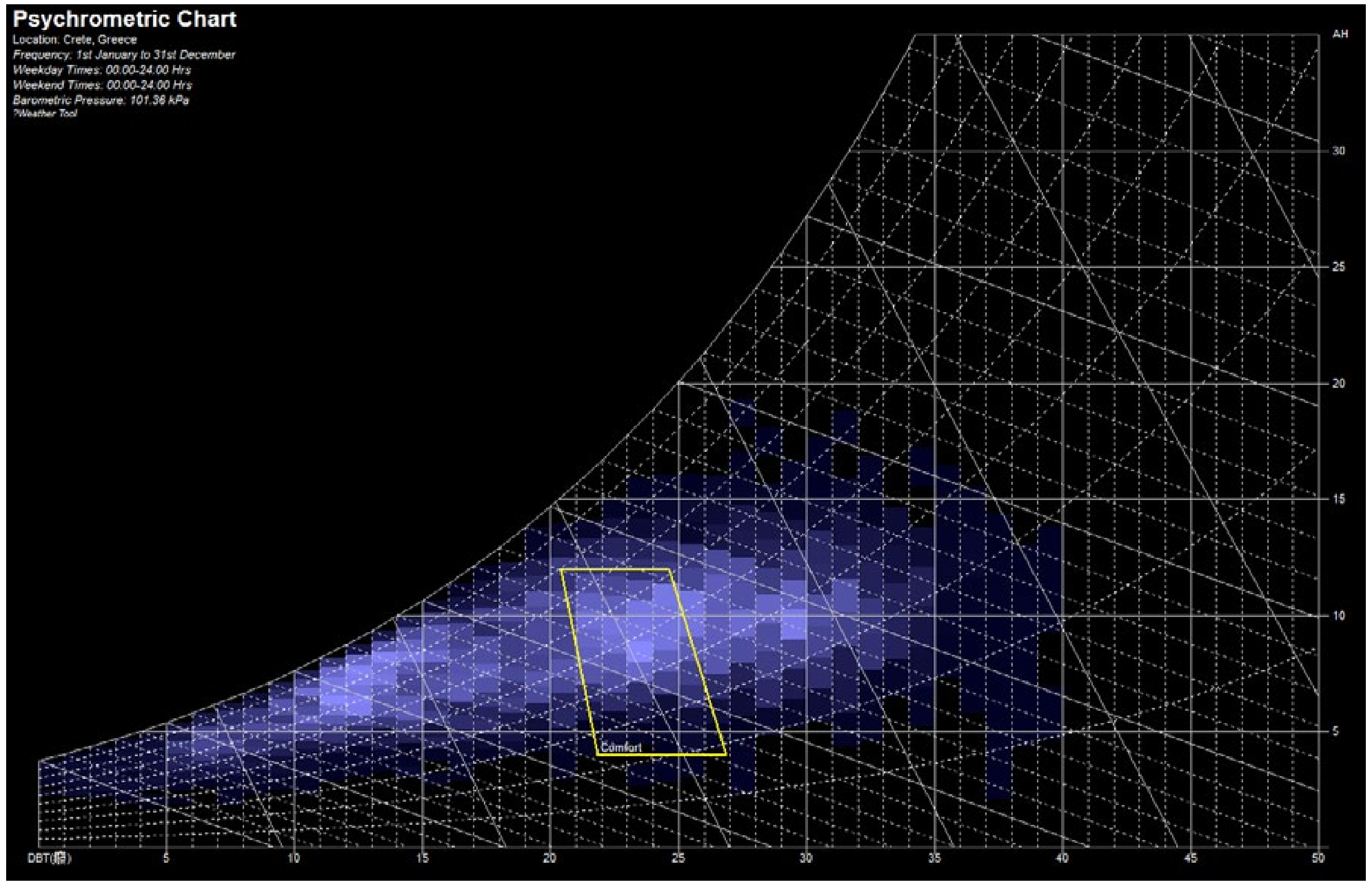
Innovative Bioclimatic European School Complex Competition, Crete, Greece

ZE2014

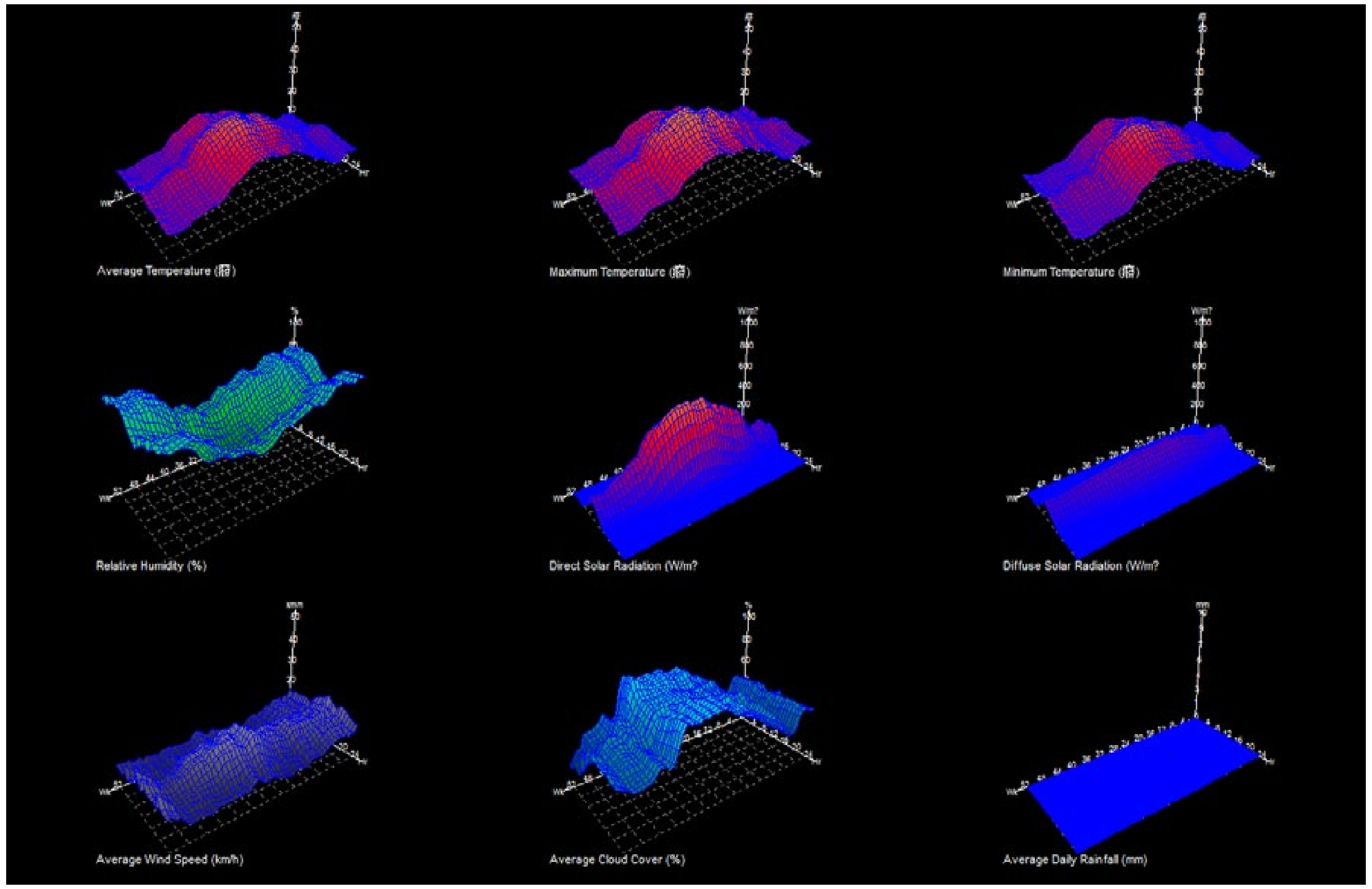
VESSELS OF KNOWLEDGE - A ZERO ENERGY IMMERSIVE LEARNINGSCAPE

3.0

Environmental Analysis - SITE



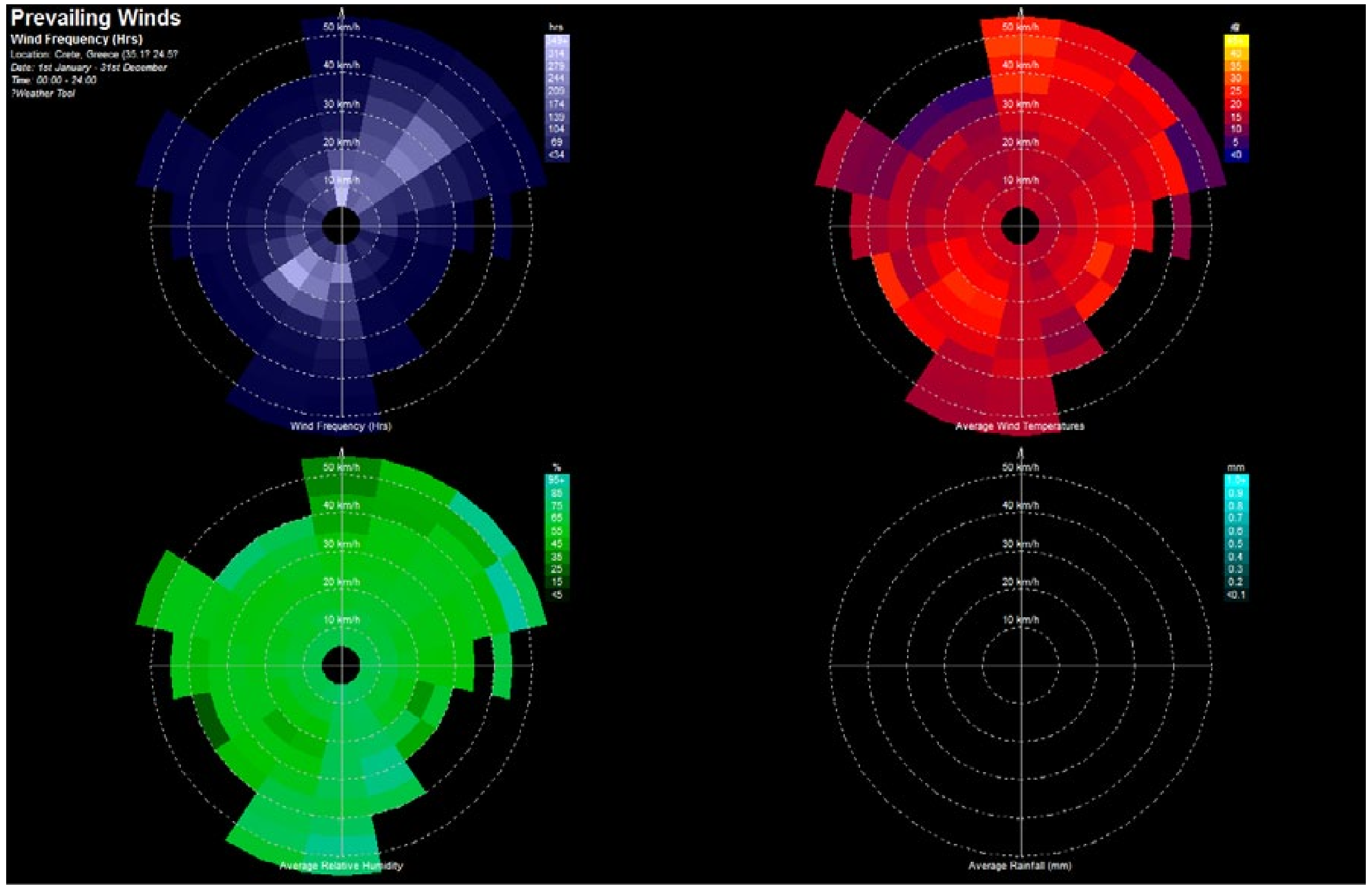
PSYCHOMETRIC CHART - SITE



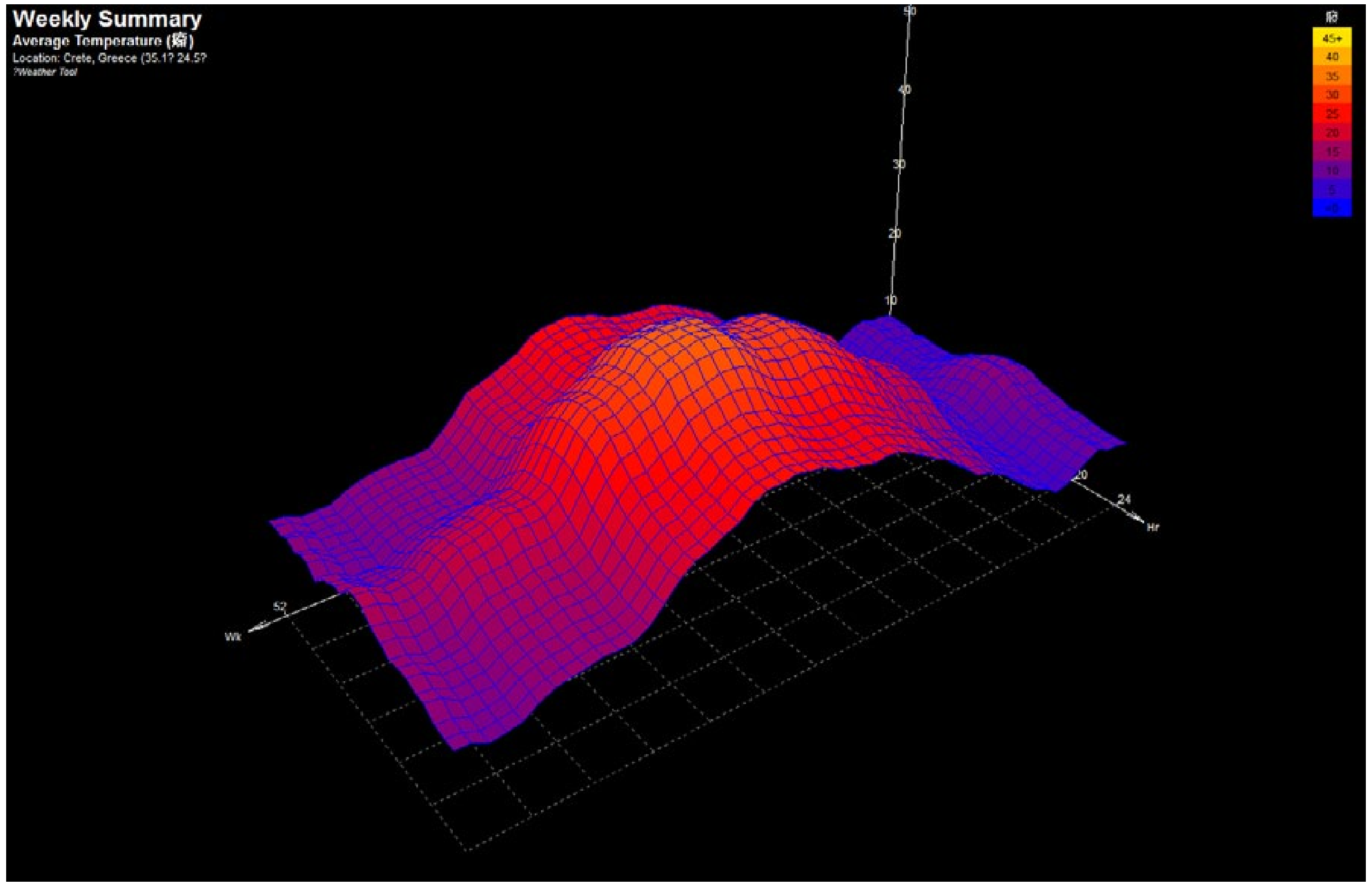
AVERAGE HOURLY / DATE TEMPERATURE - SITE

3.0

Environmental Analysis - SITE



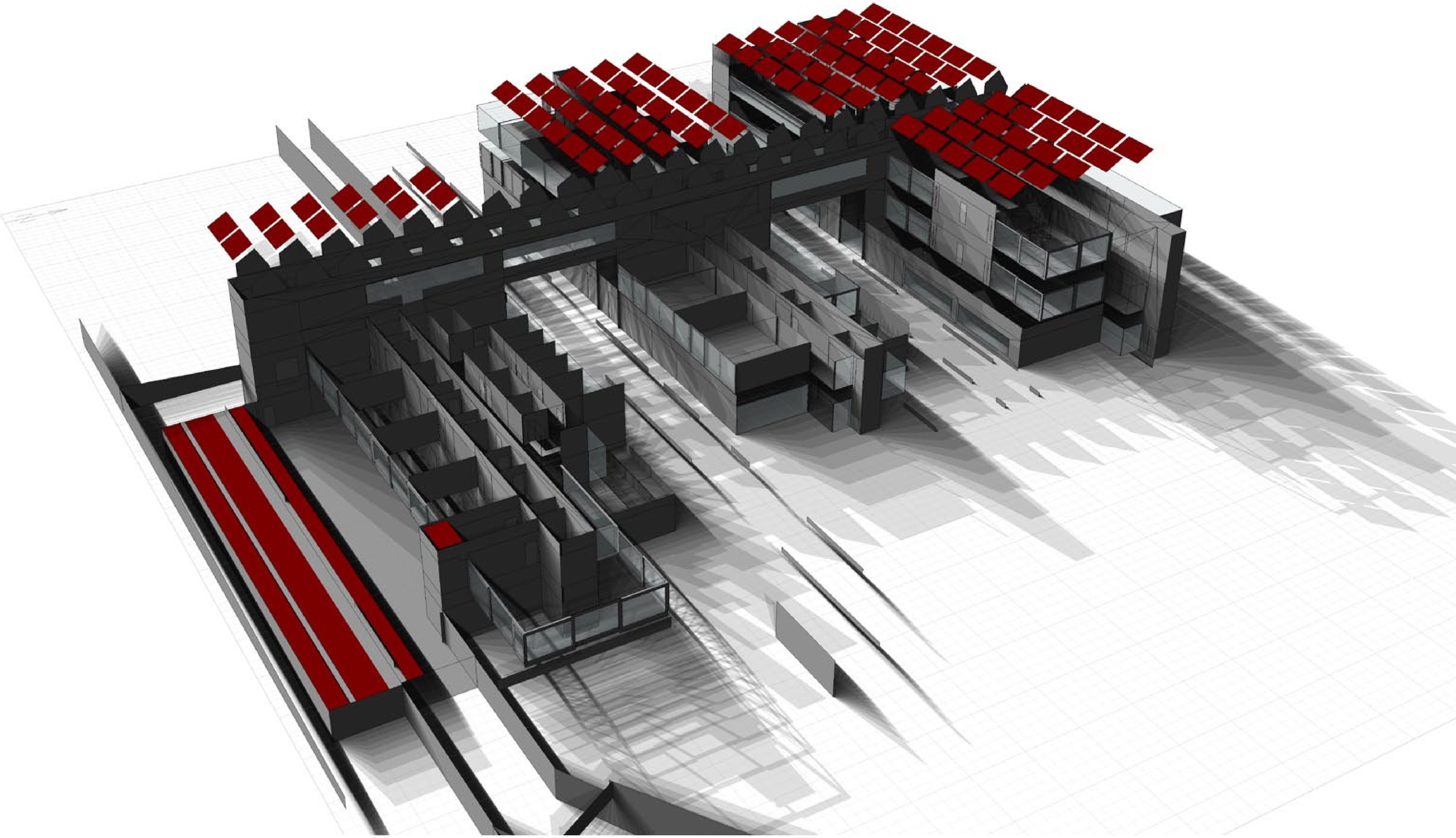
PREVAILING WINDS CHART - SITE



SUMMARY WEEKLY TEMPERATURE CHART - SITE

3.0

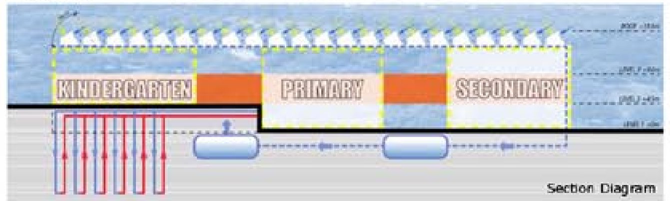
Environmental Analysis - SHADOW RANGE



Innovative Bioclimatic European School:
Vessels of Knowledge - A Zero Energy Immersive Learningscape

3 Paths of Light


Site-Parti Diagram



Section Diagram


SE Aerial

OVERVIEW

The design of the new Innovative Bioclimatic European School Complex in Crete, Greece, is driven by 4 key ideas:

A. A Zero-Energy Building
B. An Immersive Learningscape
C. A Multi-Cultural Environment
D. A Contextual Facility

The rich, multi-cultural history of Crete informs the design of the building and the siting of the facility on the property. Crete's historic sailing culture provides a rich metaphor for the design:
3 VESSELS OF KNOWLEDGE, providing students with a state of the art, multi-cultural experience.

Similar to Crete's past emphasis on global commerce and cultural sharing via sailing, students of the new school will embark in a journey that will provide them with the best global education available where the facility supports a different kind of learning, a 21st Century learning environment:
THE IMMERSIVE LEARNINGSCAPE.

The 3-story facility will become an exemplary sustainable project driven by the goal of a design that consumes less energy than it produces, achieving a zero-energy design.


ZE2014
Plaza Perspective

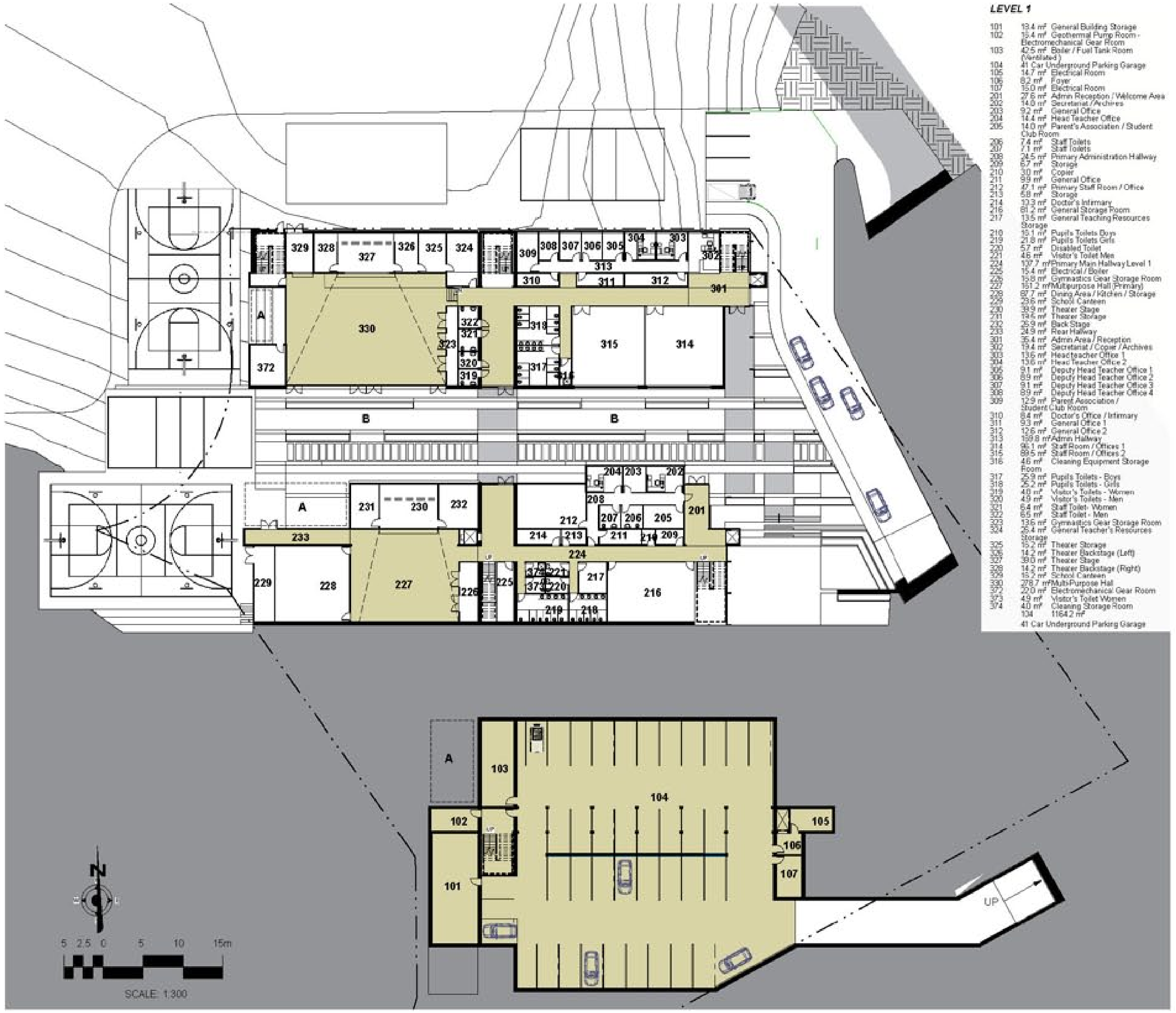
Section


#1
Entry Perspective

Innovative Bioclimatic European School Complex Competition, Crete, Greece

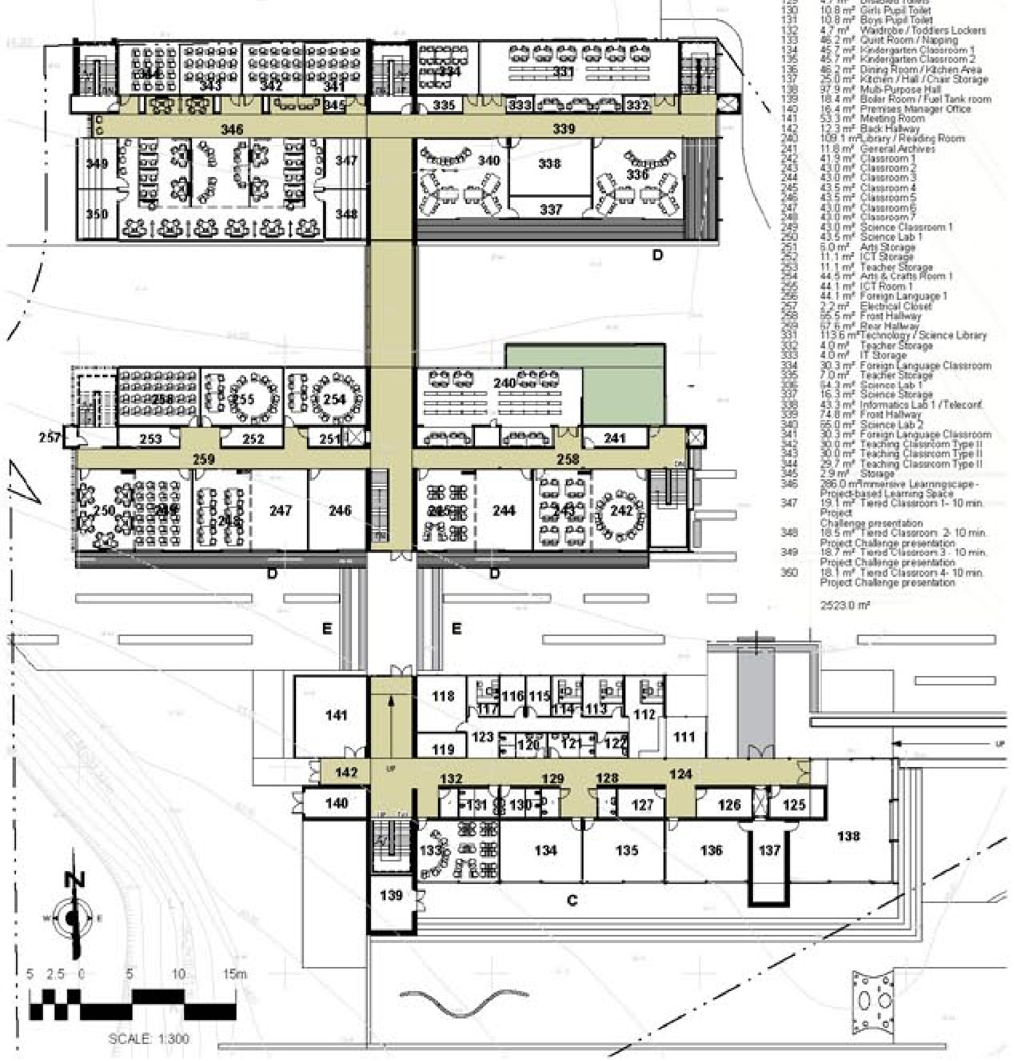
ZE2014

VESSELS OF KNOWLEDGE - A ZERO ENERGY IMMERSIVE LEARNINGSCAPE



LEVEL 1

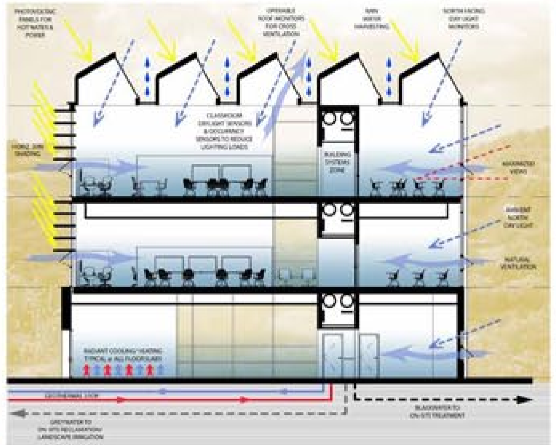
101	13.4 m²	General Building Storage
102	15.4 m²	Geothermal Pump Room - Electromechanical Gear Room
103	42.5 m²	Boiler / Fuel Tank Room (Ventilated)
104		41 Car Underground Parking Garage
105	14.7 m²	Electrical Room
106	8.2 m²	Foyer
107	15.0 m²	Electrical Room
201	27.6 m²	Admin Reception / Welcome Area
202	14.0 m²	Secretariat / Archives
203	9.2 m²	General Office
204	14.4 m²	Head Teacher Office
205	14.0 m²	Parent's Association / Student Club Room
206	7.4 m²	Staff Toilets
207	7.1 m²	Staff Toilets
208	24.5 m²	Primary Administration Hallway
209	6.7 m²	Storage
210	3.0 m²	Copier
211	9.9 m²	General Office
212	47.1 m²	Primary Staff Room / Office
213	6.8 m²	Storage
214	13.3 m²	Doctor's Infirmary
216	81.2 m²	General Storage Room
217	13.5 m²	General Teaching Resources Storage
218	15.1 m²	Pupils Toilets Boys
219	21.8 m²	Pupils Toilets Girls
220	5.7 m²	Disabled Toilet
221	4.6 m²	Visitor's Toilet Men
224	137.7 m²	Primary Main Hallway Level 1
225	15.4 m²	Electrical / Boiler
226	15.8 m²	Gymnastics Gear Storage Room
227	151.2 m²	Multipurpose Hall (Primary)
228	87.7 m²	Dining Area / Kitchen / Storage
229	23.6 m²	School Canteen
230	39.9 m²	Theater Stage
231	19.5 m²	Theater Storage
232	25.9 m²	Back Stage
233	24.9 m²	Rear Hallway
301	35.4 m²	Admin Area / Reception
302	19.4 m²	Secretariat / Copier / Archives
303	13.6 m²	Headteacher Office 1
304	13.6 m²	Head Teacher Office 2
305	9.1 m²	Deputy Head Teacher Office 1
306	8.9 m²	Deputy Head Teacher Office 2
307	9.1 m²	Deputy Head Teacher Office 3
308	8.9 m²	Deputy Head Teacher Office 4
309	12.9 m²	Parent Association / Student Club Room
310	8.4 m²	Doctor's Office / Infirmary
311	9.3 m²	General Office 1
312	12.6 m²	General Office 2
313	139.8 m²	Admin Hallway
314	96.1 m²	Staff Room / Offices 1
315	89.5 m²	Staff Room / Offices 2
316	4.6 m²	Cleaning Equipment Storage Room
317	25.9 m²	Pupils Toilets - Boys
318	25.2 m²	Pupils Toilets - Girls
319	4.8 m²	Visitor's Toilets - Women
320	4.9 m²	Visitor's Toilets - Men
321	6.4 m²	Staff Toilet - Women
322	6.5 m²	Staff Toilet - Men
323	13.6 m²	Gymnastics Gear Storage Room
324	25.4 m²	General Teacher's Resources Storage
325	15.2 m²	Theater Storage
326	14.2 m²	Theater Backstage (Left)
327	39.0 m²	Theater Stage
328	14.2 m²	Theater Backstage (Right)
329	15.2 m²	School Canteen
330	278.7 m²	Multi-Purpose Hall
372	22.0 m²	Electromechanical Gear Room
373	4.9 m²	Visitor's Toilet Women
374	4.0 m²	Cleaning Storage Room
	104	1164.2 m²
	41 Car Underground Parking Garage	



LEVEL 2

111	15.7 m²	Waiting Room / Reception
112	29.5 m²	Secretariat
113	15.0 m²	Director's Office
114	11.1 m²	Vice-Director's Office
115	9.2 m²	Professional Practice Guidance Office
116	9.2 m²	Professional Practice Guidance Office
117	11.9 m²	School Psychologist / Parent Briefing Rm
118	26.1 m²	General Archives
119	10.7 m²	Copier Room
120	10.1 m²	Men's Room
121	10.1 m²	Ladie's Room
122	6.8 m²	Disabled Toilet
123	31.1 m²	Administration Hallway
124	130.8 m²	Main Kindergarten Hallway
125	14.7 m²	Reception Welcome Area (K)
126	14.7 m²	Head Teacher
127	12.7 m²	General Teacher Storage
128	4.7 m²	Staff Toilets
129	4.7 m²	Disabled Toilets
130	10.8 m²	Girls Pupil Toilet
131	10.8 m²	Boys Pupil Toilet
132	4.7 m²	Wardrobe / Toddlers Lockers
133	46.2 m²	Quiet Room / Napping
134	45.7 m²	Kindergarten Classroom 1
135	45.7 m²	Kindergarten Classroom 2
136	46.2 m²	Dining Room / Kitchen Area
137	25.0 m²	Kitchen / Hall / Chair Storage
138	97.9 m²	Multi-Purpose Hall
139	18.4 m²	Boiler Room / Fuel Tank room
140	16.4 m²	Premises Manager Office
141	53.3 m²	Meeting Room
142	12.3 m²	Back Hallway
240	109.1 m²	Library / Reading Room
241	11.8 m²	General Archives
242	41.9 m²	Classroom 1
243	43.0 m²	Classroom 2
244	43.0 m²	Classroom 3
245	43.5 m²	Classroom 4
246	43.5 m²	Classroom 5
247	43.0 m²	Classroom 6
248	43.0 m²	Classroom 7
249	43.0 m²	Science Classroom 1
250	43.5 m²	Science Lab 1
251	6.0 m²	Arts Storage
252	11.1 m²	ICT Storage
253	11.1 m²	Teacher Storage
254	44.5 m²	Arts & Crafts Room 1
255	44.1 m²	ICT Room 1
256	44.1 m²	Foreign Language 1
257	2.2 m²	Electrical Closet
258	56.5 m²	Front Hallway
259	57.6 m²	Rear Hallway
331	113.6 m²	Technology / Science Library
332	4.0 m²	Teacher Storage
333	4.0 m²	IT Storage
334	30.3 m²	Foreign Language Classroom
335	7.0 m²	Teacher Storage
336	64.3 m²	Science Lab 1
337	16.3 m²	Science Storage
338	43.3 m²	Informatics Lab 1 / Telecont.
339	74.8 m²	Front Hallway
340	65.0 m²	Science Lab 2
341	30.3 m²	Foreign Language Classroom
342	30.0 m²	Teaching Classroom Type II
343	30.0 m²	Teaching Classroom Type II
344	29.7 m²	Teaching Classroom Type II
345	2.9 m²	Storage
346	286.0 m²	Immersive Learningscape - Project-based Learning Space
347	19.1 m²	Tiered Classroom 1- 10 min. Project Challenge presentation
348	18.5 m²	Tiered Classroom 2- 10 min. Project Challenge presentation
349	18.7 m²	Tiered Classroom 3 - 10 min. Project Challenge presentation
360	18.1 m²	Tiered Classroom 4- 10 min. Project Challenge presentation
	2523.0 m²	

Plaza Perspective



West Elevation

Playground Perspective

Innovative Bioclimatic European School Complex Competition, Crete, Greece

ZE2014

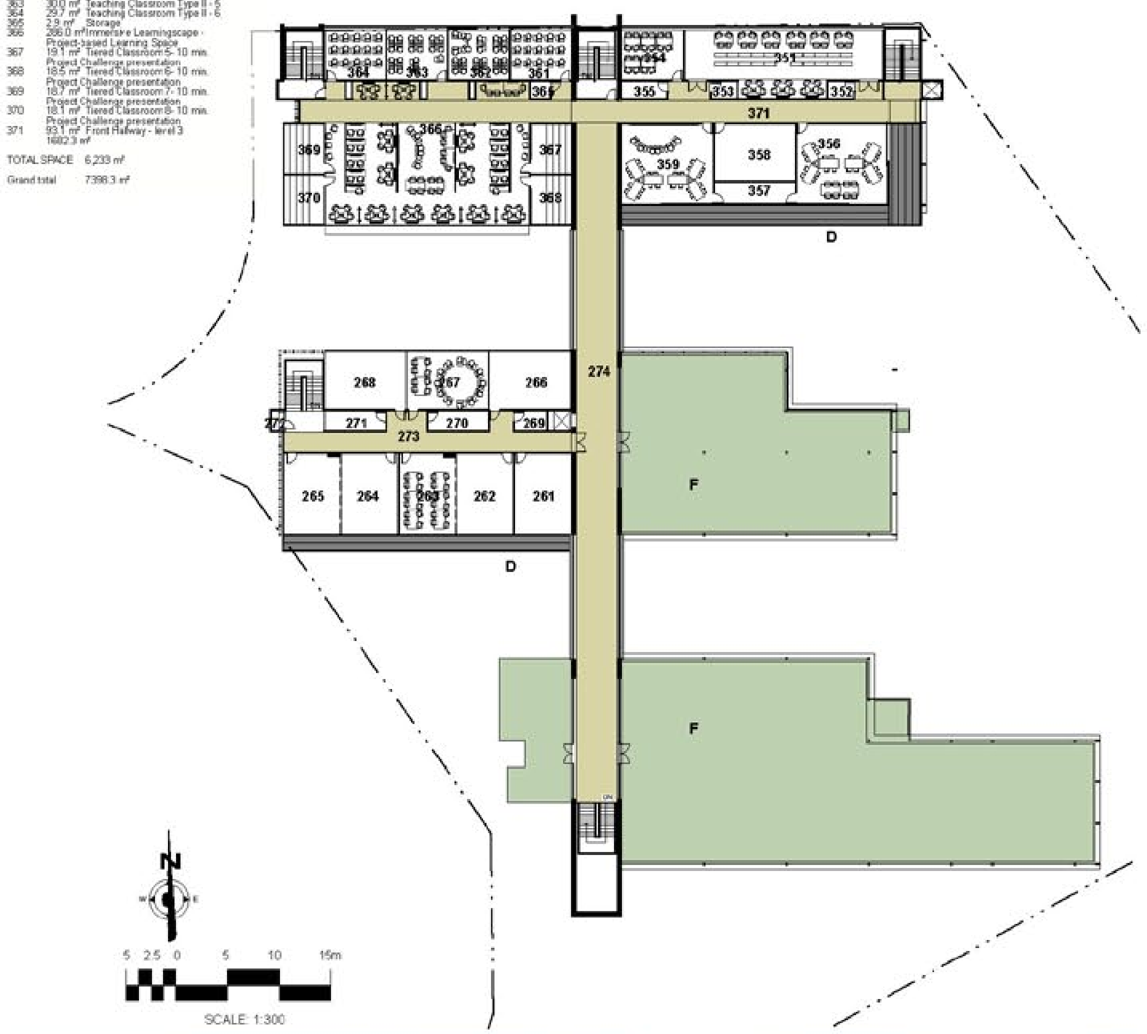
VESSELS OF KNOWLEDGE - A ZERO ENERGY IMMERSIVE LEARNINGSCAPE

LEVEL 2

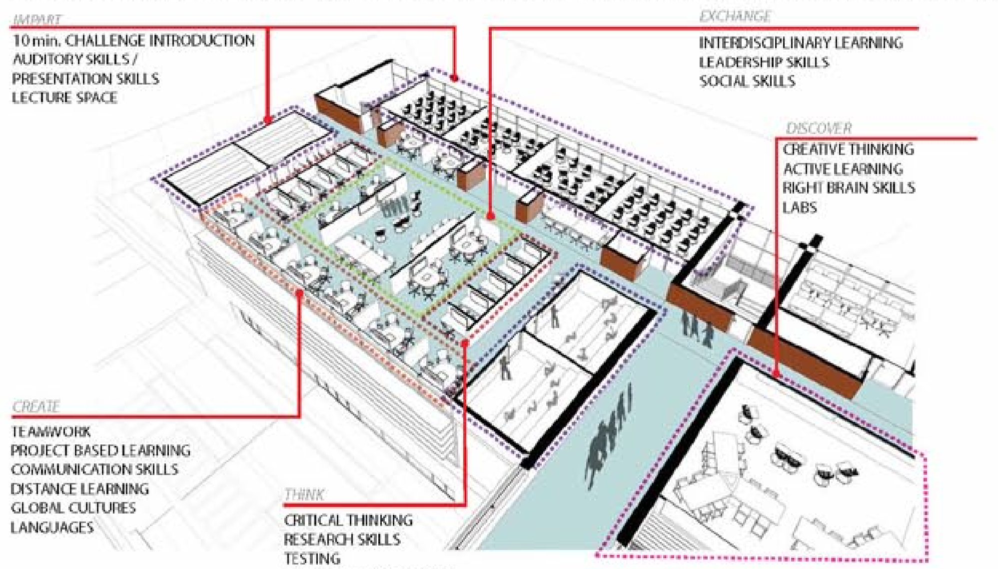
261	43.5 m²	Classroom 8
262	43.0 m²	Classroom 9
263	43.0 m²	Classroom 10
264	43.0 m²	Science Classroom 2
265	43.5 m²	Science Lab 2
266	44.5 m²	Arts & Crafts Room 2
267	44.1 m²	Classroom 11
268	44.1 m²	Classroom 12
269	6.0 m²	Arts Storage
270	11.1 m²	ICT Storage
271	11.1 m²	Teacher Storage
272	2.2 m²	Electrical Closet
273	66.7 m²	Rear Hallway
274	311.9 m²	3rd Level 'Spine'
351	113.6 m²	Arts / History / Literature Library
352	4.0 m²	Teacher Storage
353	4.0 m²	IT Storage
354	30.3 m²	Foreign Language Classroom 3
355	7.0 m²	Teacher Storage
356	64.3 m²	Art Lab / Studio 1
357	16.3 m²	Art Storage
358	43.3 m²	Informatics Lab 2 / Teleconference
359	65.0 m²	Art Lab/ Studio 2
361	30.3 m²	Foreign Language Classroom 4
362	30.0 m²	Teaching Classroom Type II - 4
363	30.0 m²	Teaching Classroom Type II - 5
364	29.7 m²	Teaching Classroom Type II - 6
365	2.9 m²	Storage
366	266.0 m²	Immersive Learningscape - Project-based Learning Space
367	19.1 m²	Tiered Classroom 5- 10 min. Project Challenge presentation
368	18.5 m²	Tiered Classroom 6- 10 min. Project Challenge presentation
369	18.7 m²	Tiered Classroom 7- 10 min. Project Challenge presentation
370	18.1 m²	Tiered Classroom 8- 10 min. Project Challenge presentation
371	93.1 m²	Front Hallway - level 3
	1682.3 m²	

TOTAL SPACE 6,233 m²

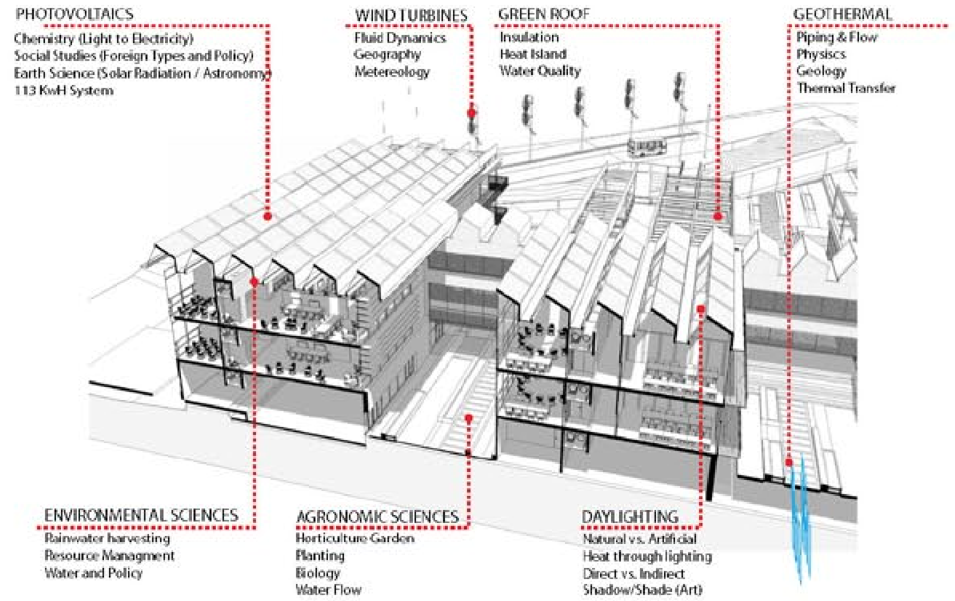
Grand total 7398.3 m²



THE IMMERSIVE LEARNINGSCAPE - AN ACTIVE LEARNING ENVIRONMENT FOR THE ACQUISITION OF 21st CENTURY SKILLS



THE BUILDING AS A TEACHING TOOL - SUSTAINABILITY INTEGRATED TO CURRICULUM - *The Zero-Energy Experience*



CRETE

The rich history of Crete can be attributed to both the influences from trading with Mediterranean civilizations and the invaders that resided in the island throughout its history. Crete's prominence in the Mediterranean Sea is highlighted by its equidistant proximity to Europe, Asia, and Africa. The impact of such diverse cultures have shaped the island and its past. The new Bioclimatic School will be yet another example of excellence in its tradition of cultural blending and historic significance.

The 3 paths of light demonstrates the idea that the influences in the island and its multiculturality make Crete a highly unique and rich environment

CONCEPT

Inspired by its ecosystem, the concept for The Innovative Bioclimatic European School Complex is driven by its context, a facility that will not only minimize its impact on its surroundings, but one that will give back to the community and to its environment more than it takes. Driven by concepts of Conservation, Restoration, Reduction, Recycling and Renewable Resources, ***the Facility will be designed as a Zero Energy Building (ZEB)***. This approach will best showcase the Bioclimatic School's commitment to Conservation and Environmental Initiatives.

Similar to the behavior of the local wildlife and flora within the immediate ecology, the new building will demonstrate its resourcefulness by adapting to the site and taking advantage of all the resources it has to offer. The promise to research, preservation of the natural environment, and its sensitiveness to its ecosystem will be demonstrated by the building and via educational interactive areas and displays throughout the indoors and outdoors.

Just as olive trees adapt to the dry sunny climate- representing a ***symbiotic relationship*** with the environment - the facility will exemplify how to live with the resources that you have. Analogous to the way that Crete has always adopted great ideas from its multi-cultural past, the Bioclimatic School will offer a new way of thinking about humankind's interaction with the environment through an exemplary Zero Energy facility.

ARCHITECTURE, SUSTAINABILITY, & CURRICULUM

Providing a facility that is Zero Energy will not only exemplify the core values of the new Bio-climatic School, but will also fulfill the fantastic potential of the facility to become a ***Teaching Tool.***

From the landscaping and the architecture, to the materials and the systems and renewable technologies used in the building, each and every corner of the project can be utilized towards an instructional curriculum that emphasizes sustainability, purpose of design, application of new technologies, the functionality of systems, and a holistic approach to problem solving a challenge such as global warming. In this spirit, students will learn about life, about concepts, about sustainability, our impact to our environment, and the choices that we make by merely using the building as a key element of curriculum. This is critical in a 21st century education, understanding the relevance of what you are learning today can be applied towards real applications and future solutions to global challenges.

South Elevation

North Elevation

Outdoor Classroom Perspective

Innovative Bioclimatic European School Complex Competition, Crete, Greece

ZE2014

VESSELS OF KNOWLEDGE - A ZERO ENERGY IMMERSIVE LEARNINGSCAPE

Innovative Bioclimatic European School:

Vessels of Knowledge - A Zero Energy Immersive Learningscape

Innovative Bioclimatic European School Complex Competition, Crete, Greece

ZE2014	*VESSELS OF KNOWLEDGE - A ZERO ENERGY IMMERSIVE LEARNINGSCAPE*