

TECTO ARHITECTURA - EXERCITII DE SUSTENABILITATE IN ROMANIA



Conferința Internațională despre Construcții Sustenabile și Eficiență Energetică | EURO-CONSTRUCTII | 2018

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- [S] M L XL - 2004

- SUSTAINABLE ARCHITECTURE
- ECOLOGY AND TECHNOLOGY
- ENERGY EFFICIENCY
- INDOOR / OUTDOOR MULTI-COMFORT CONCEPTS





BIOMASS COGENERATION PLANT FOR HEATING AND ELECTRICITY

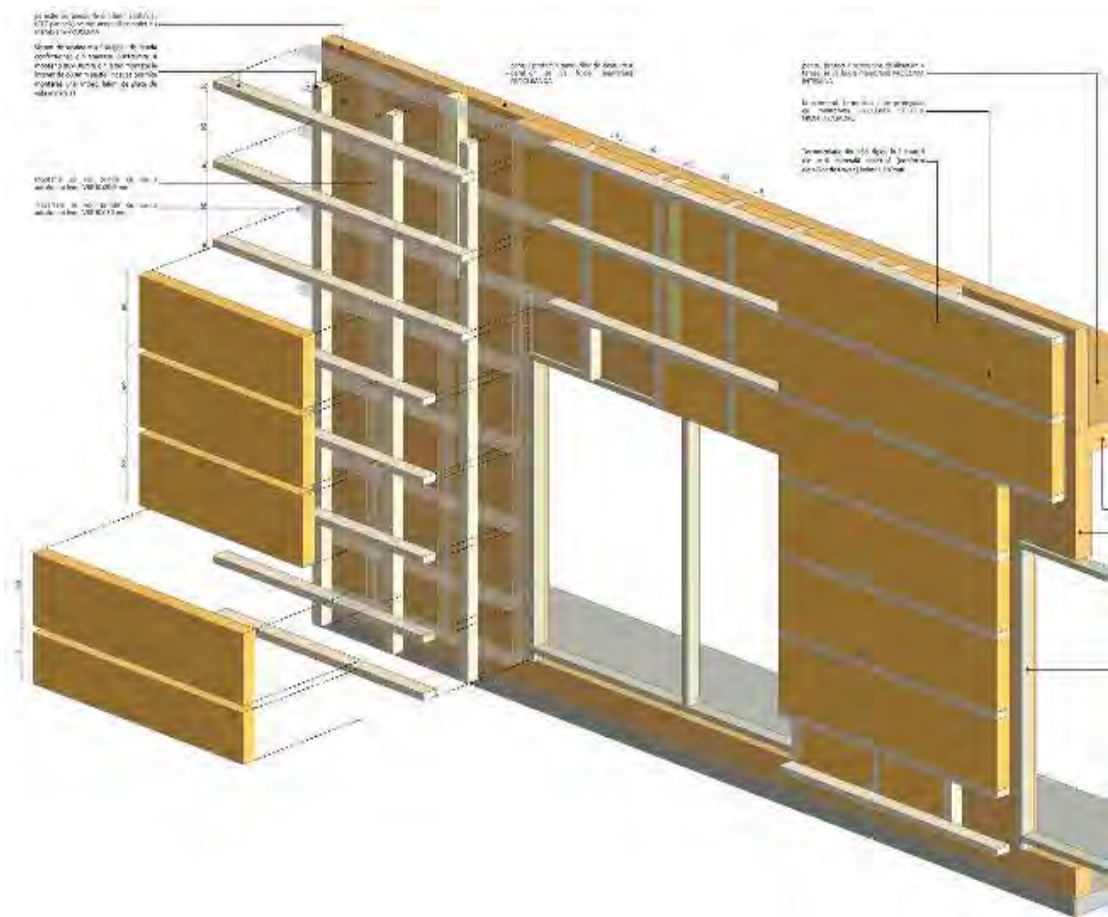
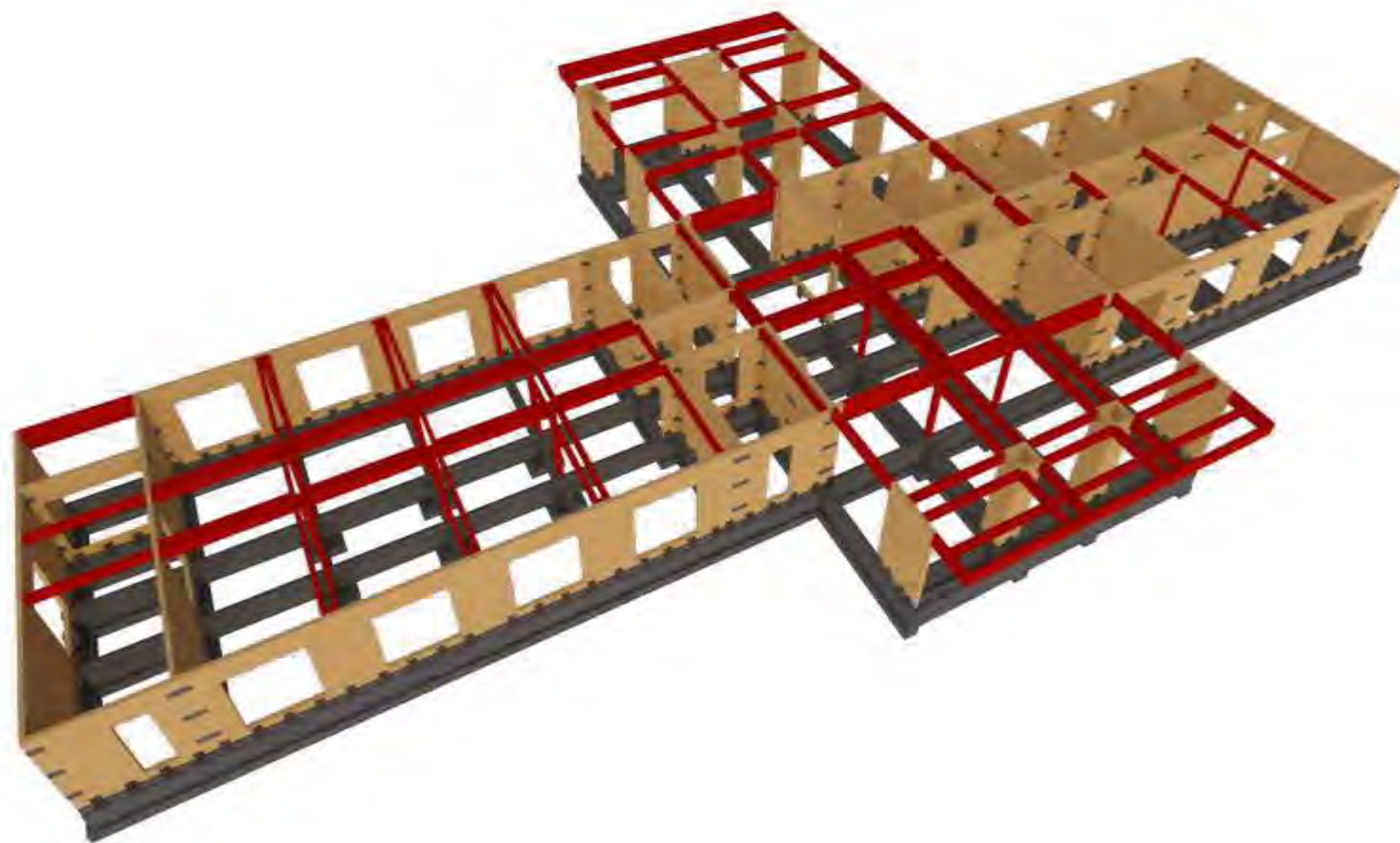


THERMAL INSULATION extruded polystyrene boards, 200mm thick, U value=0.18 W/(m²K)

WATERPROOFING "Sika Isotopex N" type solvent-free bitumen emulsion applied by brush roller on the concrete foundations

DRAINAGE SYSTEM
 Polystyrene drainage tube
 Gravel drainage layer
 Polypropylene filter screen







Timber is the only truly renewable construction material, with the lowest energy consumption of any building material across its lifecycle. The use of timber in the construction of buildings aims to achieve negative net CO2 emissions.

The timber used for the construction of the office building stores approx. 750 tones of carbon for the life of the building.

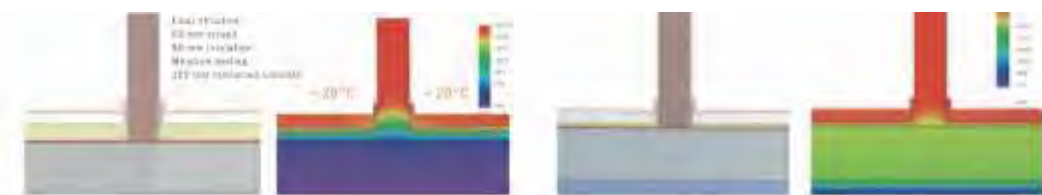
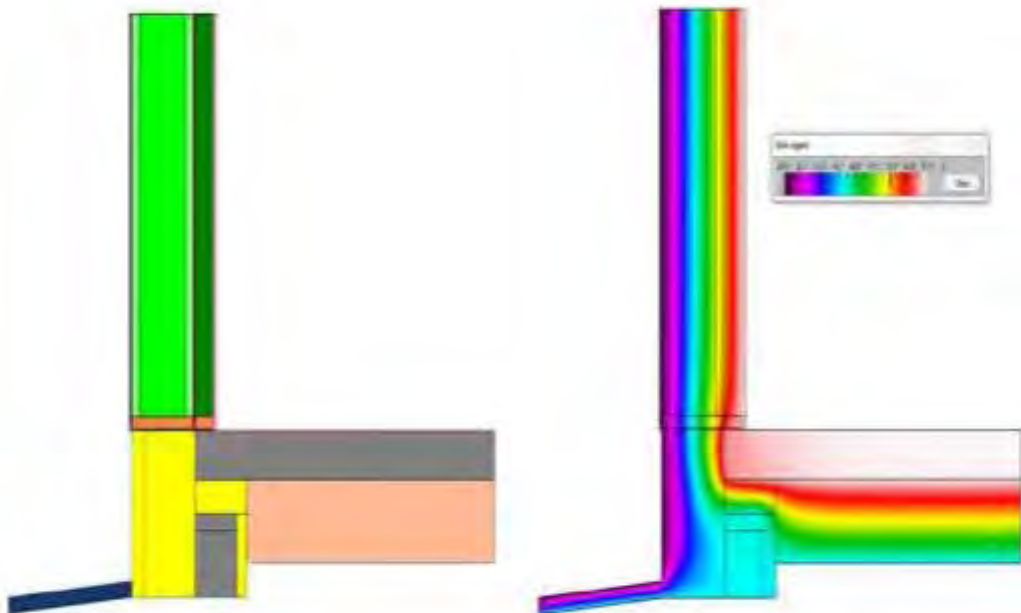
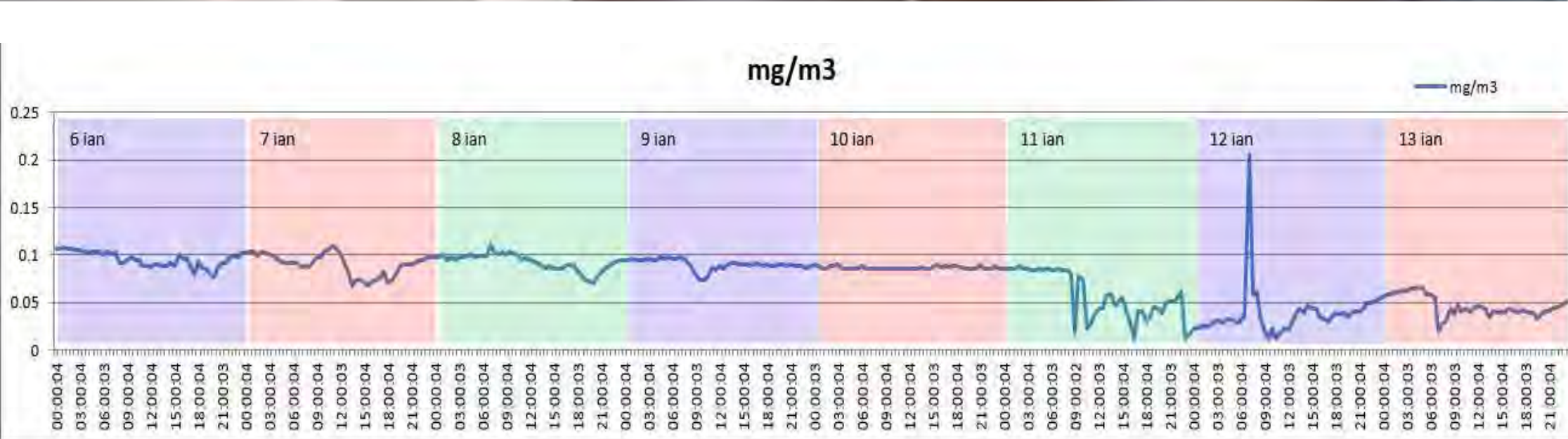


Fig. 3. Development of isotherms for a KLH wall on a concrete floor slab with internal insulation at the same time. It can be clearly recognised that the KLH panel is intersected by the 10° and 12° isotherms (mould and condensation isotherms limit).



Fig. 4. Development of isotherms for a KLH wall on a concrete floor slab with external insulation at the same time. It can be clearly recognised that the KLH panel is no longer intersected by the 10° and 12° isotherms (mould and condensation isotherms limit).





Formaldehyde concentration

In-house determination by Rigips Romania using "PPM Formaldemeter™" measurement tool

Healthy Environment



Optimized lighting conditions to improve concentration and performance



RO Legislation



HOUSING	
Cold & Moderate	Hot
New < 15; Renovation < 25 (1)	
in future next local regulation level	
New < 15; Renovation < 25	
in future next local regulation level	
0.6	1.0
60% (3)	
Min	Targeted
10% (4)	6% (4)
≥ 25dB	≥ 25dB
≤ 40dB	≤ 40dB
≥ 45dB (4)	≥ 45dB (4)
≤ 50dB	≤ 50dB
25 dB	20 dB
EPD for all B2 products	

Criteria	Offices
Heating energy demand (kWh/m²a)	< 70
Cooling energy demand (kWh/m²a)	< 25
No criteria	
No criteria	
No criteria	
Between offices R'w	> 46dB
Between offices L'n,w	< 62dB
Reverberation period	< 0.8 sec.
Not applicable	
Exterior noise	< 40dB

RECI
6,3
7,8
60%
< 5%
55dB
NA
0,5
< 20dB

Certificat de performanță energetică

Performanța energetică a clădirii

Clasă energetică: **A**

Consumul anual specific de energie: 16,96 kWh/m²an

Indicele de emisii activante CO₂: 1,22 kgCO₂/m²an

Consumul anual specific de energie (kWh/m²an) pentru:	Clasă energetică
Încalzire	A
Apă caldă de consum	A
Climatizare	A
Ventilație mecanică	A
Iluminat artificial	A
Consumul anual specific de energie din surse regenerabile (kWh/m²an) BT 5%	

Date privind clădirea certificată:

Adresa clădirii: Clădire administrativă, DN 11 Nr. 875, Com. Rădăuți, Județ Constanța

Clădirea clădită: Birouri

Regim încălzire: P+E

Anul construcției: 2015

Programul de calcul utilizat: **AIEnergy Clădiri v.2.0**

Denți privind clasificarea energetică a clădirii:

Specificații (C. 1.1)	Numărul și descrierea	Seriile și Nr. certificat de clasificare	În vigoare începând de la data emiterii	Scadente până la data emiterii
1	MISCOBIRMIHAELA	UA11490	19/12/2015	

DATE PRIVIND EVALUAREA PERFORMANȚEI ENERGETICE A CLĂDIRII

Grile de clasificare energetică a clădirii funcție de consumul de căldură anual specific:

ÎNCĂLZIRE: 6,31 kWh/m²an

APĂ CALDĂ DE CONSUM: 1,36 kWh/m²an

CLIMATIZARE: 5,29 kWh/m²an

VENTILAȚIE MECANICĂ: 2,98 kWh/m²an

VENTILARE MECANICĂ: 2,98 kWh/m²an

Performanța energetică a clădirii de referință:

Consumul anual specific de energie (kWh/m²an) pentru:	Notare energetică
Încalzire	125,46
Apă caldă de consum	2,58
Climatizare	26,43
Ventilație mecanică	23,14
Iluminat	15,45

Paralelismul spațiilor clădirii certificate și soluțiile aplicabile:

- Clădirea individuală
- Ușa este prevăzută cu sistem dublu de închidere și sistem de siguranță (închidere chibrit)
- Fenestrală în care lămina și profilurile cu garnitură de acustic
- Fără evaluare de izolație termică la scară de clădire
- Controlul este realizat la un post centralizat sau centralizate prin sistem de control funcțional
- Clădirea este prevăzută cu iluminat și climatizare termică
- Sistem de iluminat LED
- Sistem de aer condiționat
- Sistem de aer condiționat
- Clădirea este prevăzută cu sistem de ventilație mecanică (închidere și ventilare mecanică)

Recomandări pentru reducerea costurilor prin îmbunătățirea performanței energetice a clădirii:

- Soluții recomandate pentru iluminat: NA ESTE CAZUL
- Soluții recomandate pentru climatizare: NA ESTE CAZUL

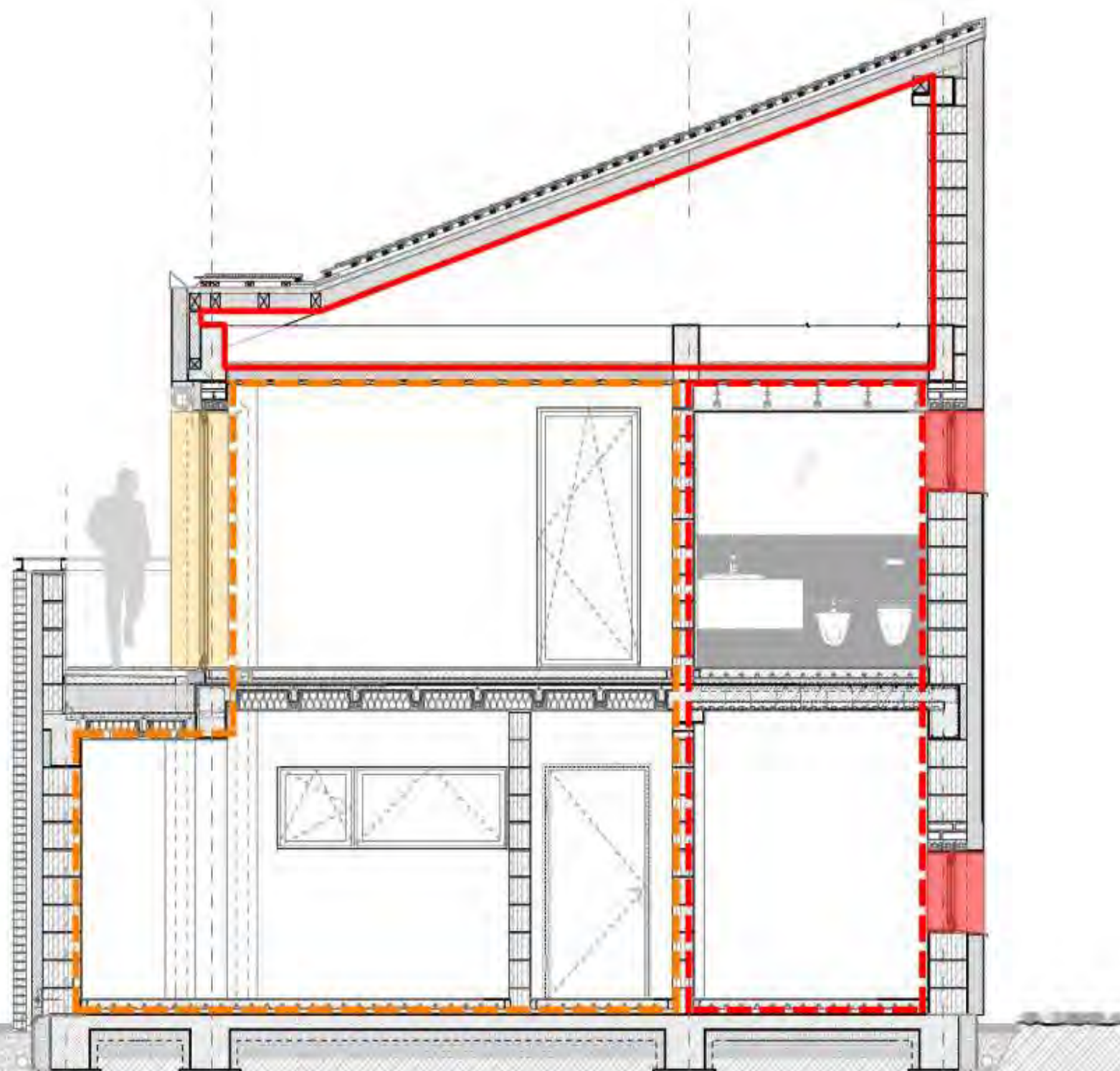
Is not only about saving energy...







Casa e4 – orientare și spații tampon

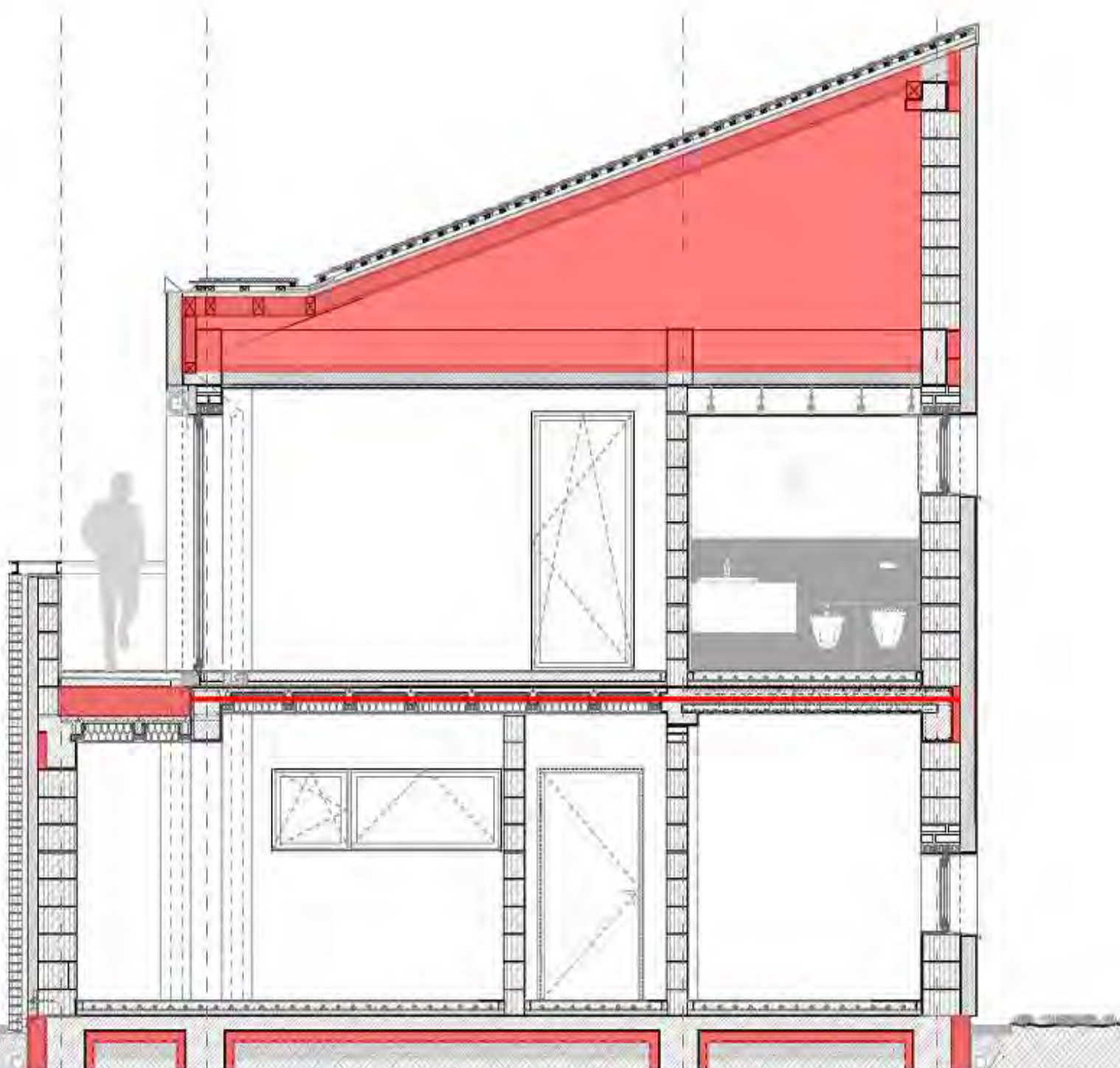


1. Suprafețe vitrate mari orientate spre Sud
2. Deschideri reduse ale ferestrelor de pe fațada Nord
3. Deschideri reduse ale ferestrelor de pe fațadele Est și Vest pentru controlul supraîncălzirii pe timp de vară
4. Orientarea spațiilor de locuit spre Sud
5. Poziționarea spațiilor tehnice, a spațiilor secundare și a circulațiilor spre Nord ca spații-tampon
6. Utilizarea podului cu rol de spațiu-tampon contra supraîncălzirii pe timp de vară și a frigului pe timp de iarnă



Casa e4

Reducerea influenței punților termice



1. Izolare suplimentară în dreptul punților termice din beton
2. Izolare suplimentară a fundațiilor
3. Utilizarea de console metalice și izolații în dreptul plăcilor de la nivelul terenului pentru întreruperea punților termice
4. Coborârea plăcilor în dreptul teraselor pentru o mai bună izolare termică
5. Utilizarea de pereți ușori de închidere (pe structura de lemn) la pod pentru a reduce punțile termice și a spori gradul de izolare

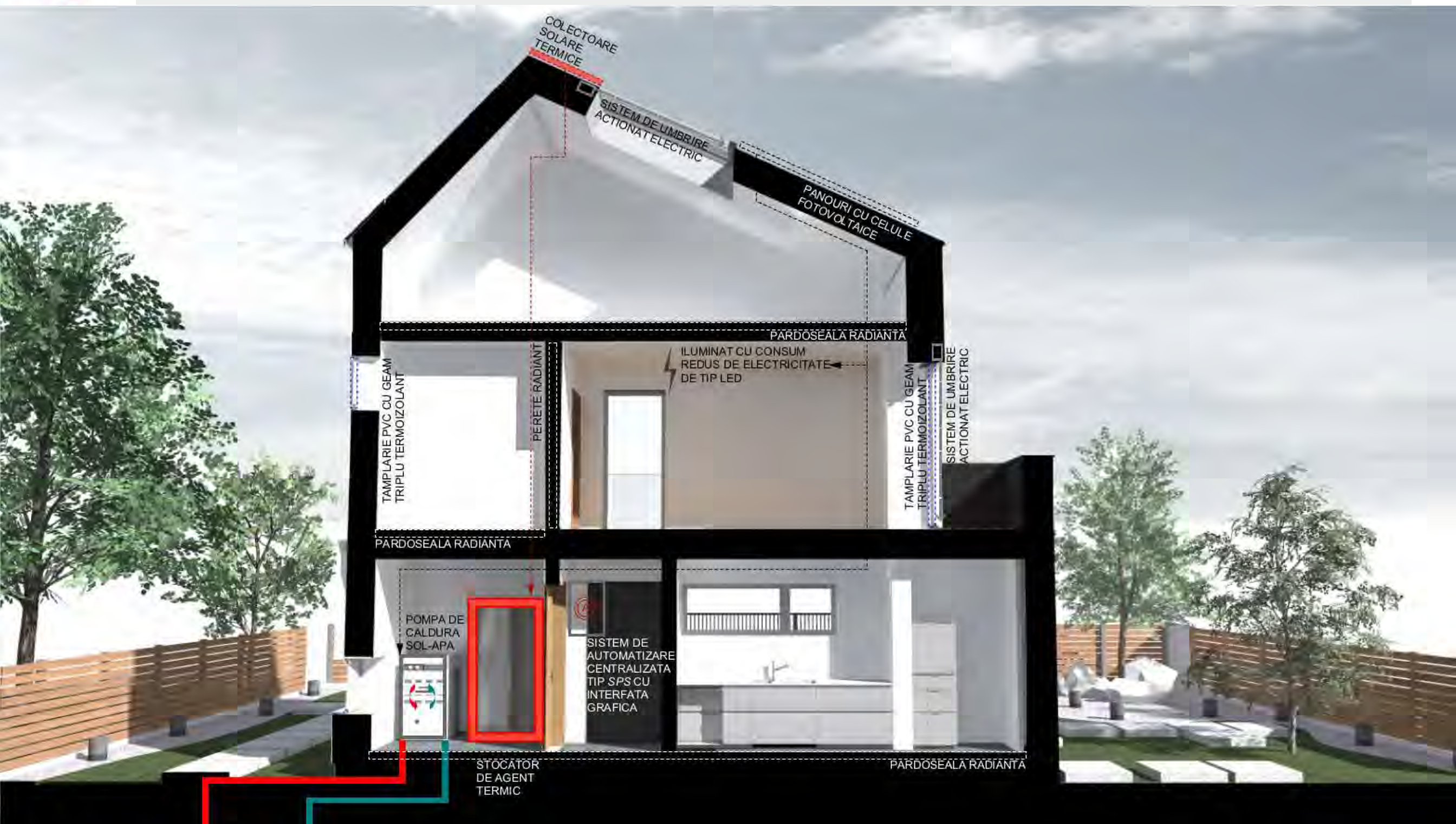


Casa e4 – strategii pasive vara



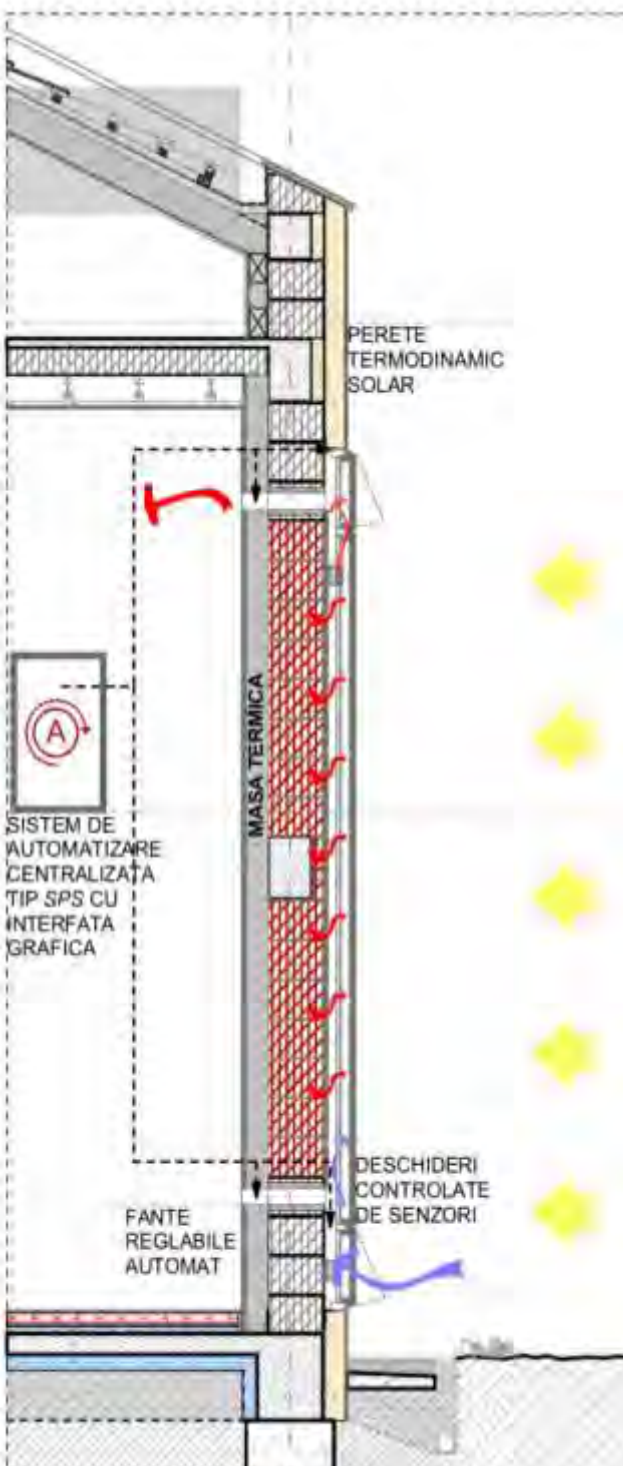


Casa e4 – strategii pasive iarna





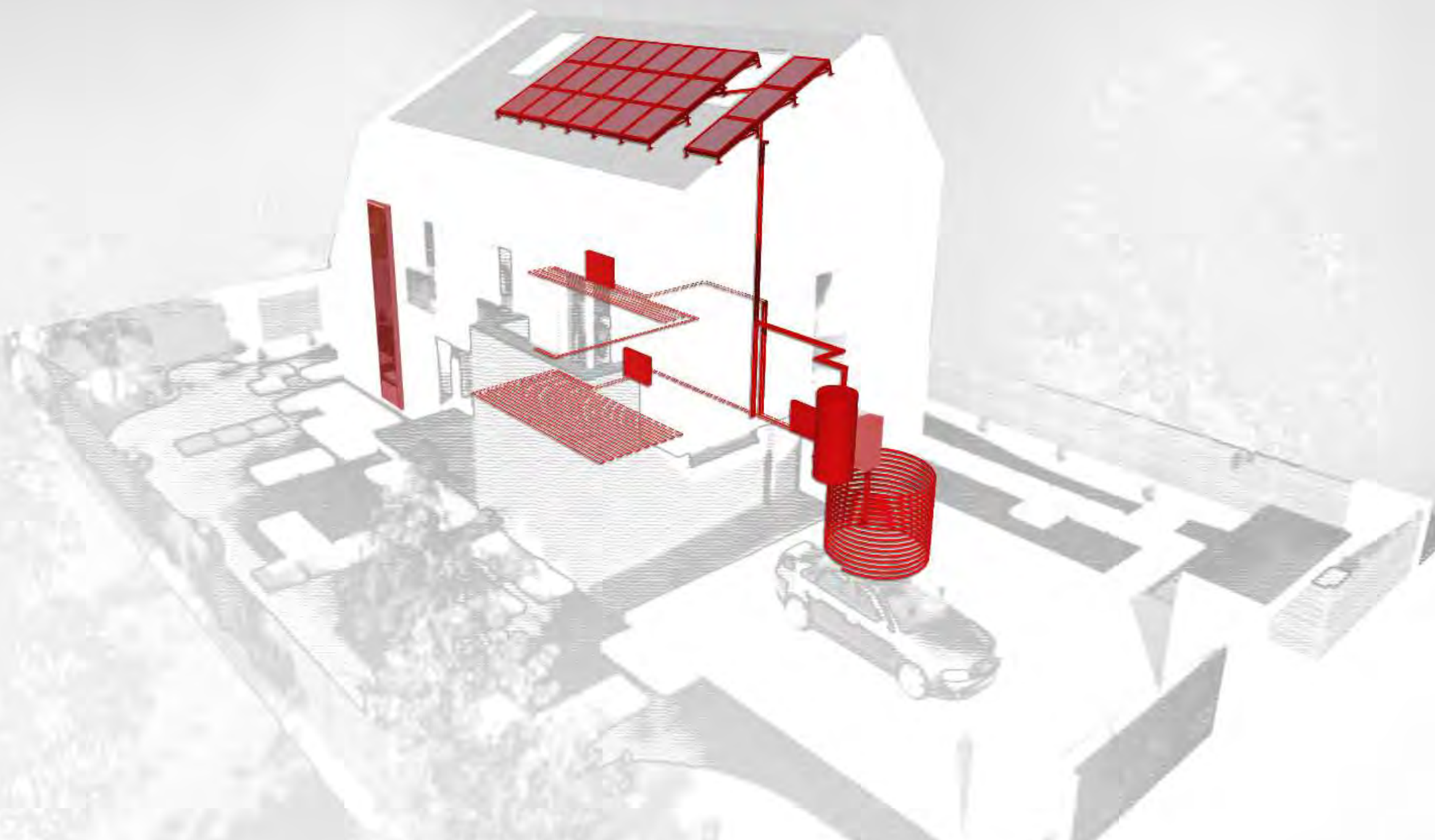
Casa e4 – perete termodinamic solar



- Perete Trombe pentru încălzire pasivă pe timp de iarnă
- Pune în evidență inerția termică a produselor ceramice
- Perete multistratificat compus dintr-un perete structural cu inerție termică ridicată, din cărămidă vopsită în culori închise, și o suprafață vitrată, despărțite de un spațiu de ventilare
- Deschiderea orificiului de evacuare superior, pe perioada verii, pentru ventilație, face din peretele Trombe un horn solar având rolul de ventilator natural în timpul zilei

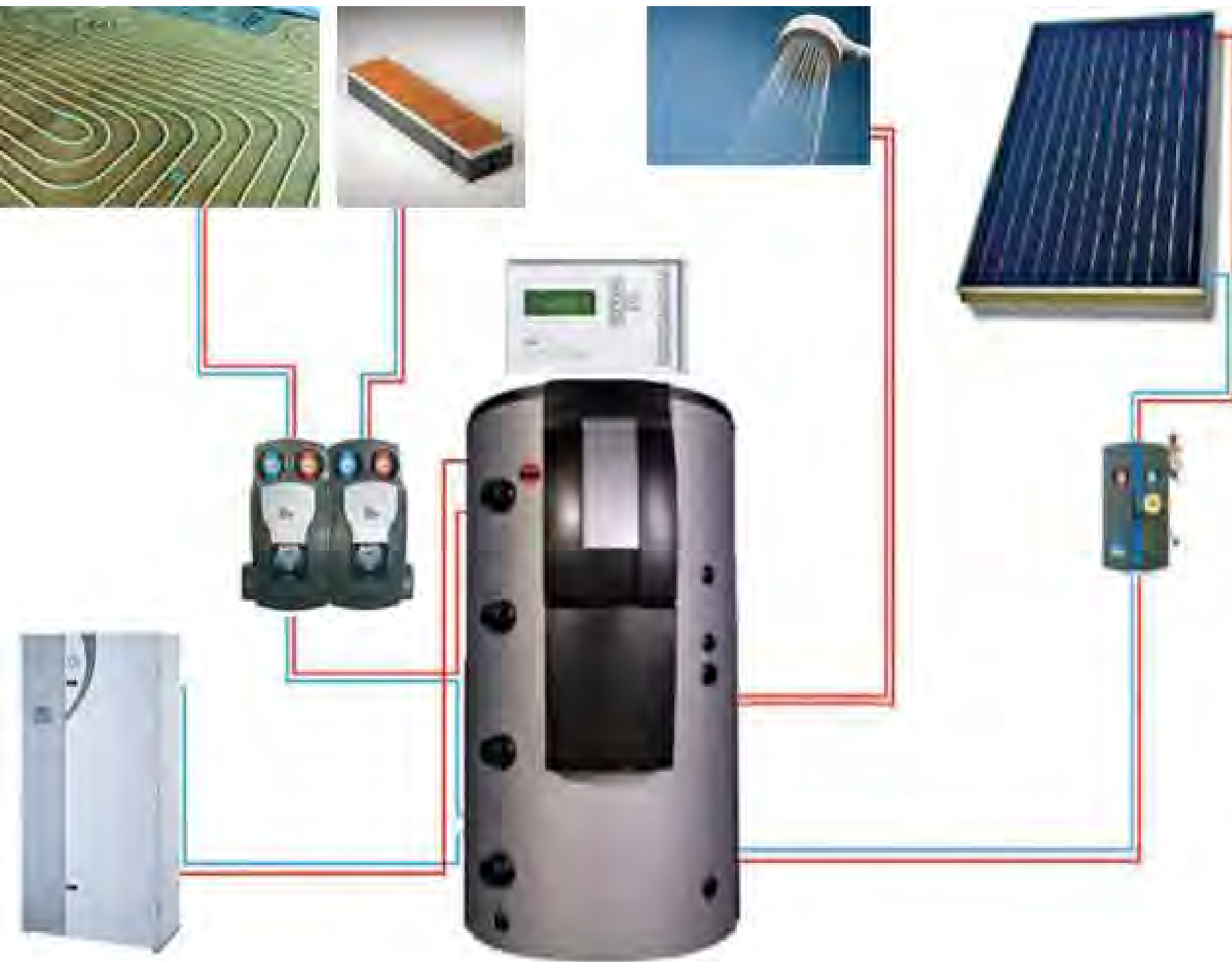


Casa e4 – sisteme de energie Clean Energy Concept





Casa e4 – sisteme de energie Clean Energy Concept





Casa e4 – sisteme de energie Clean Energy Concept



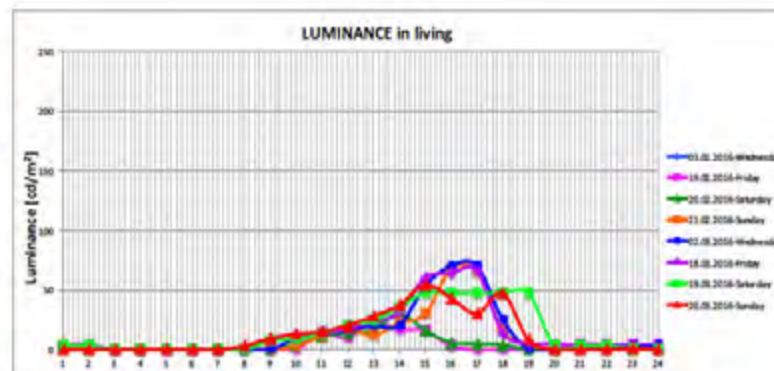
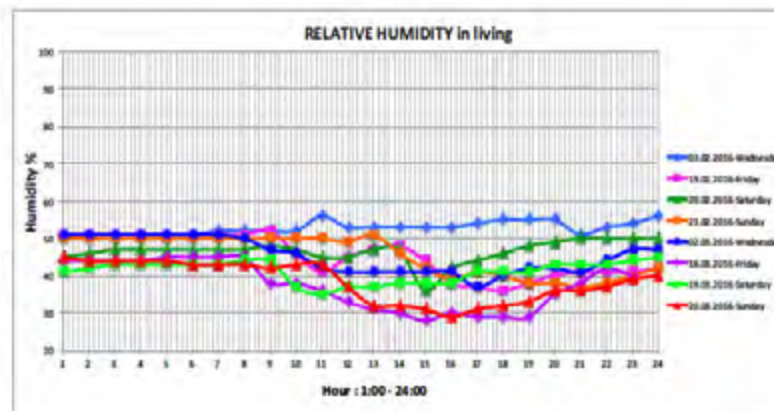
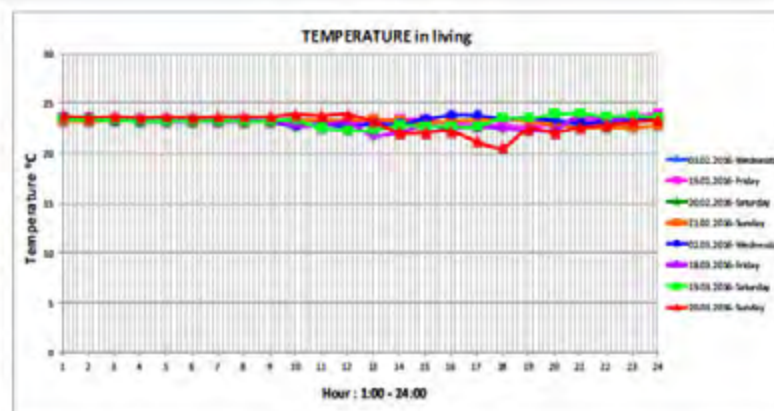


Casa e4 – confort interior





Casa e4 - sănătate



Parameter	Input	
Clothing (clo)	0,75	[0 to 2clo]
Air temp. (°C)	23,0	[10 to 30°C]
Mean radiant temp. (°C)	24,0	[10 to 40°C]
Activity (met)	1,5	[0.8 to 4met]
Air speed (m/s)	0,20	[0 to 1m/s]
Relative humidity (%)	55,0	[30 to 70%]

DSBU – NEW SCHOOL CAMPUS

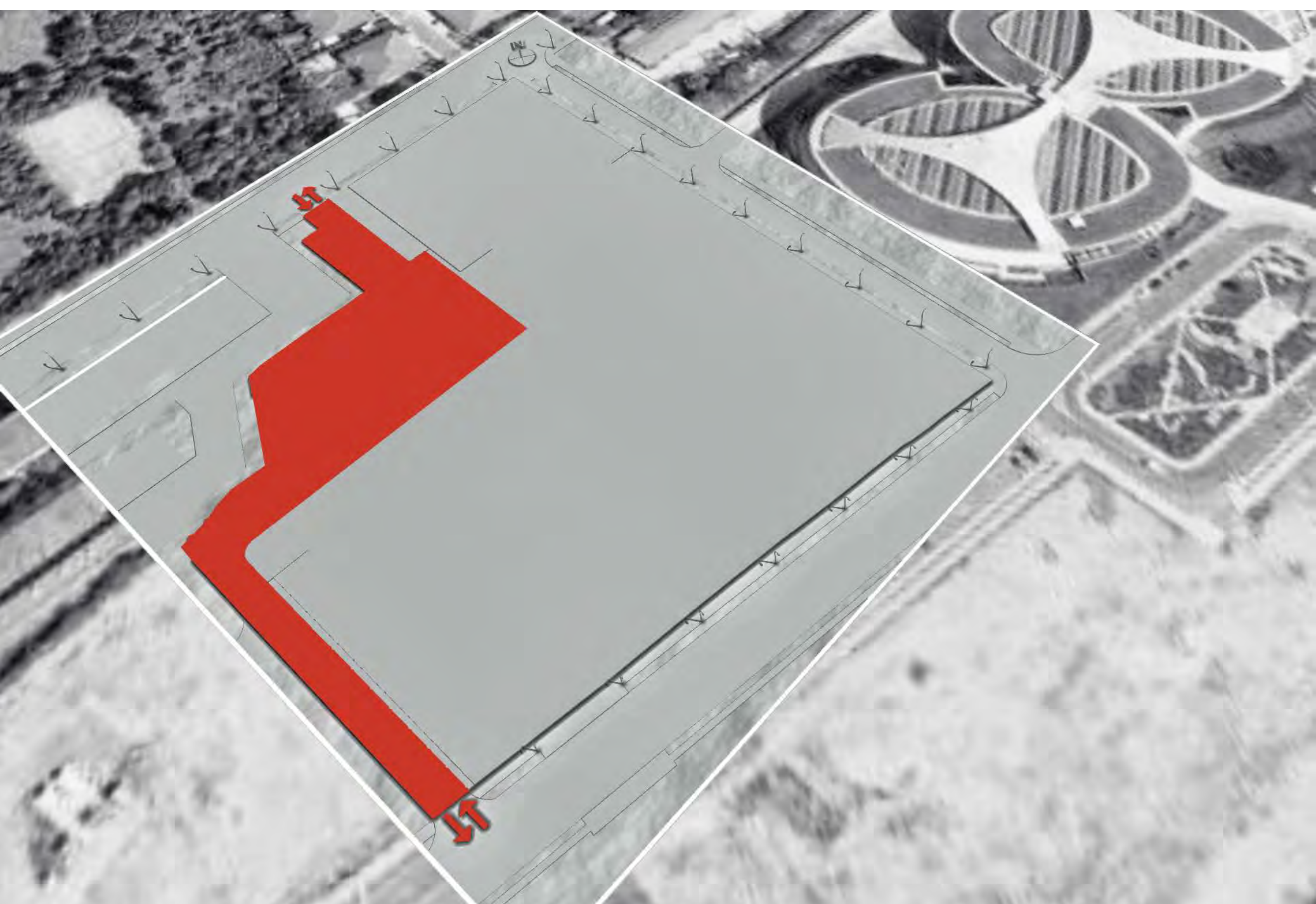


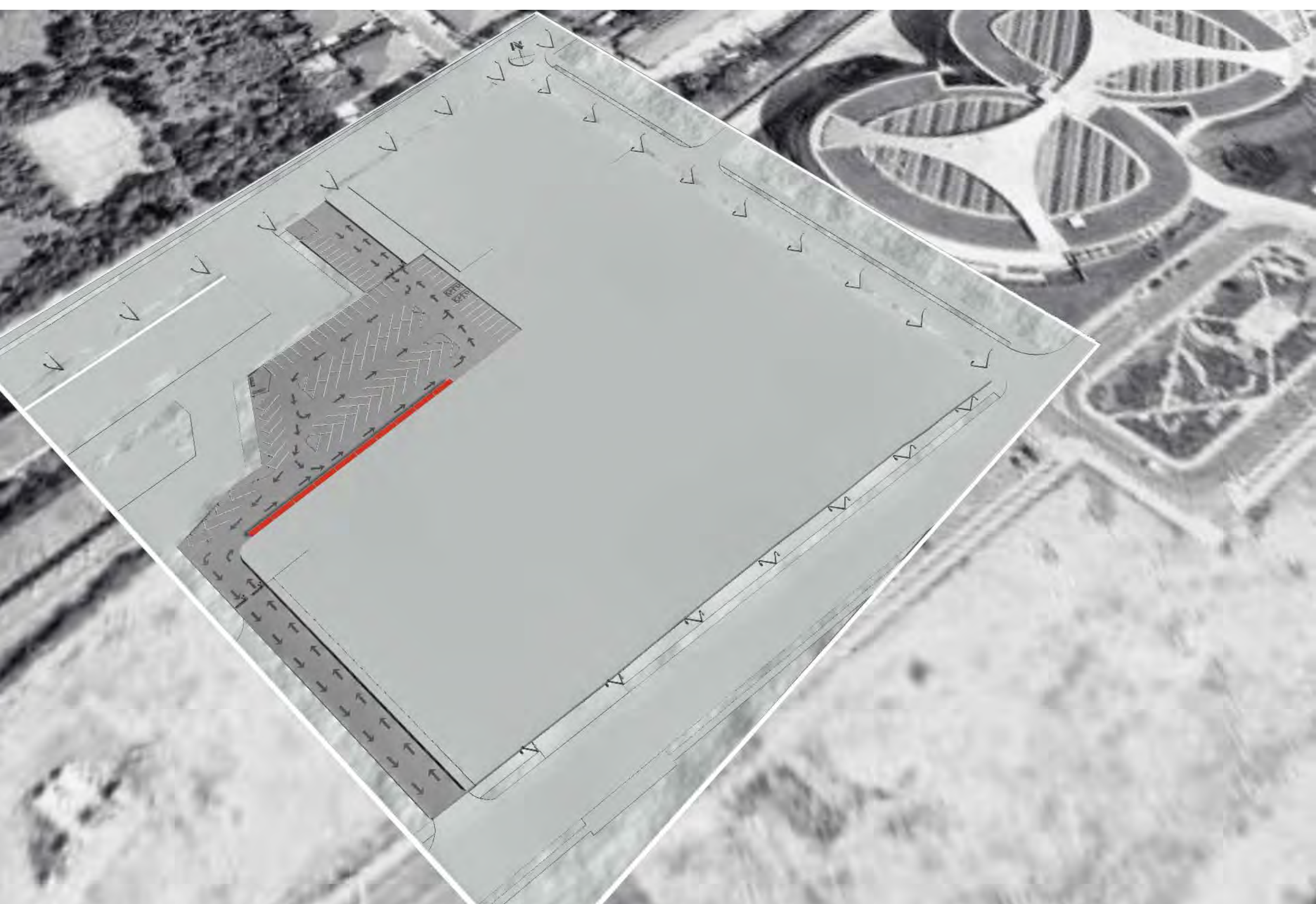
THE CONTEST 2015-2016

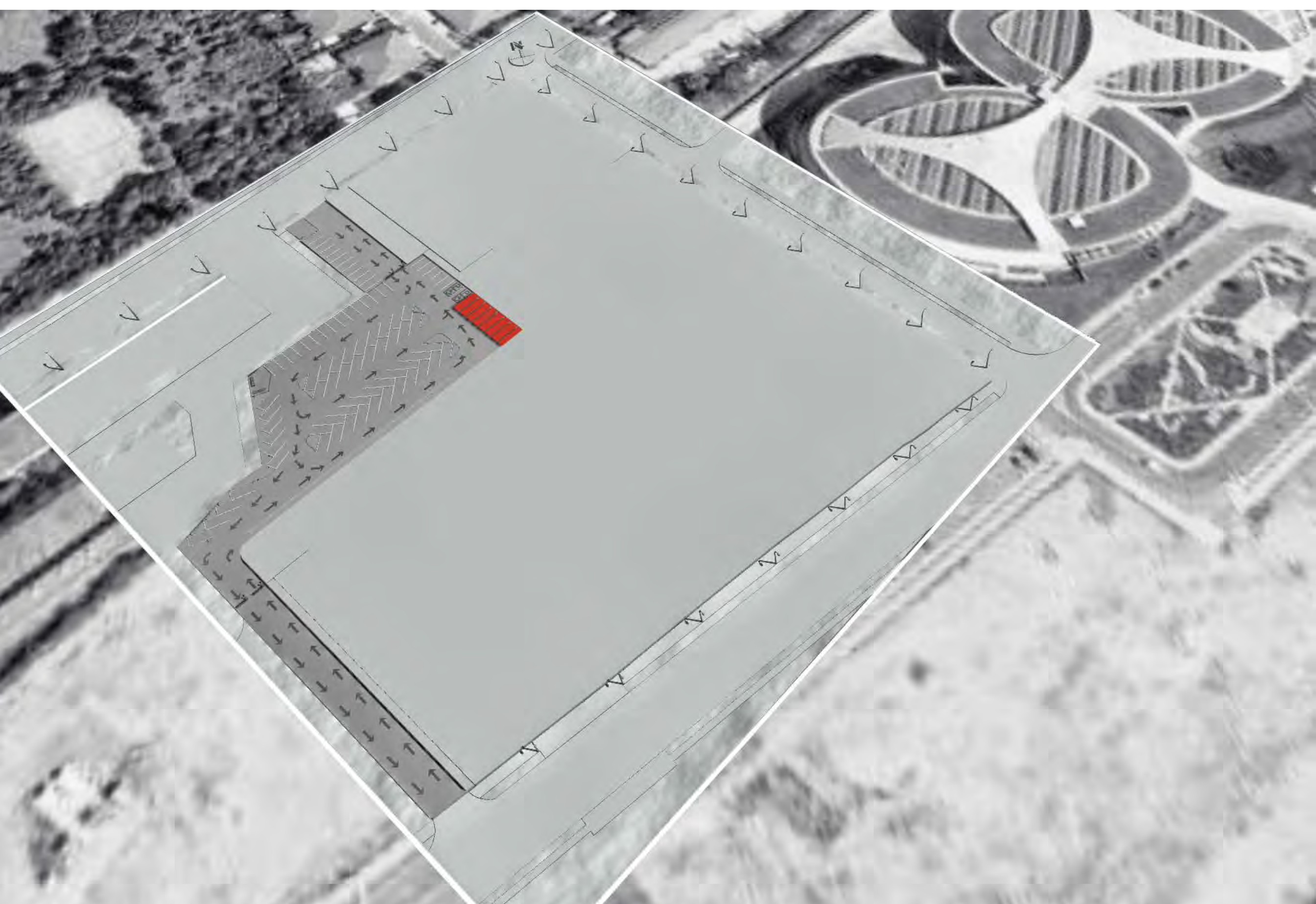


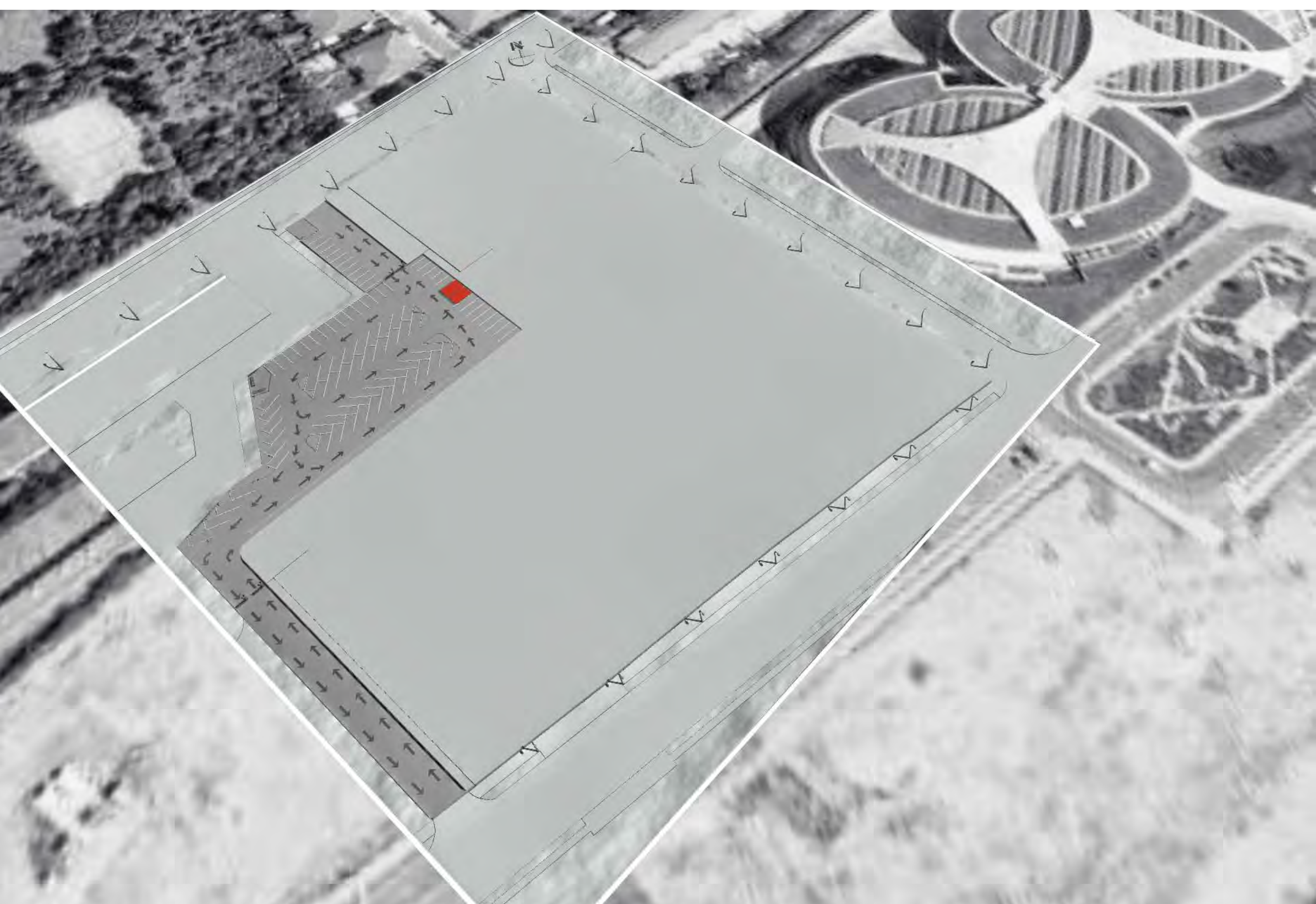


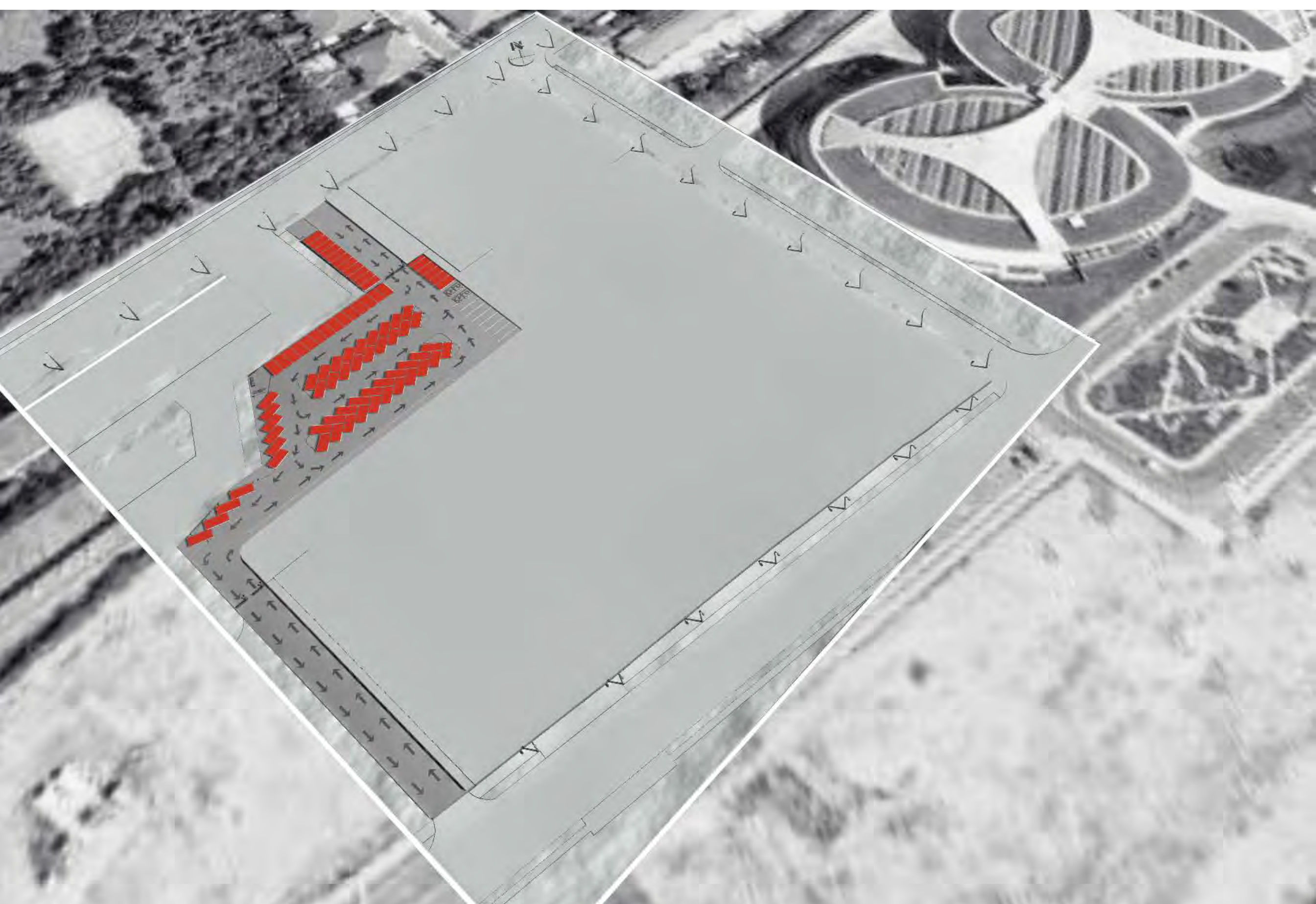


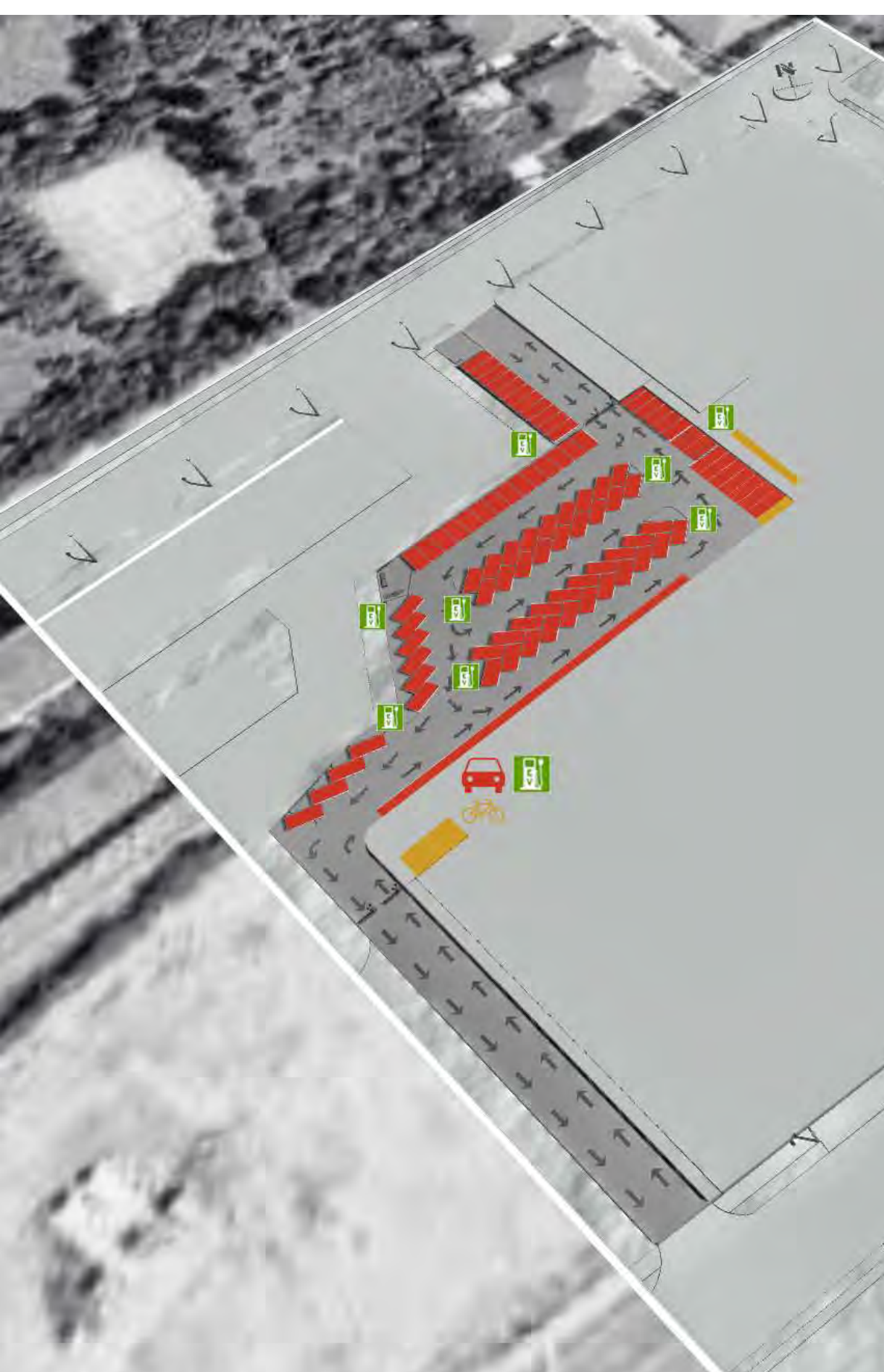












Permeable Parking to prevent heat island effect, avoid flooding and allow the soil beneath to receive the nutrients it requires.



Sustainable Transportation by providing electric charge stations in order to encourage the use of hybrid or electric cars in the future.



Sustainable Transportation to focus on eco mobility from an early age and environmental friendly behavior.

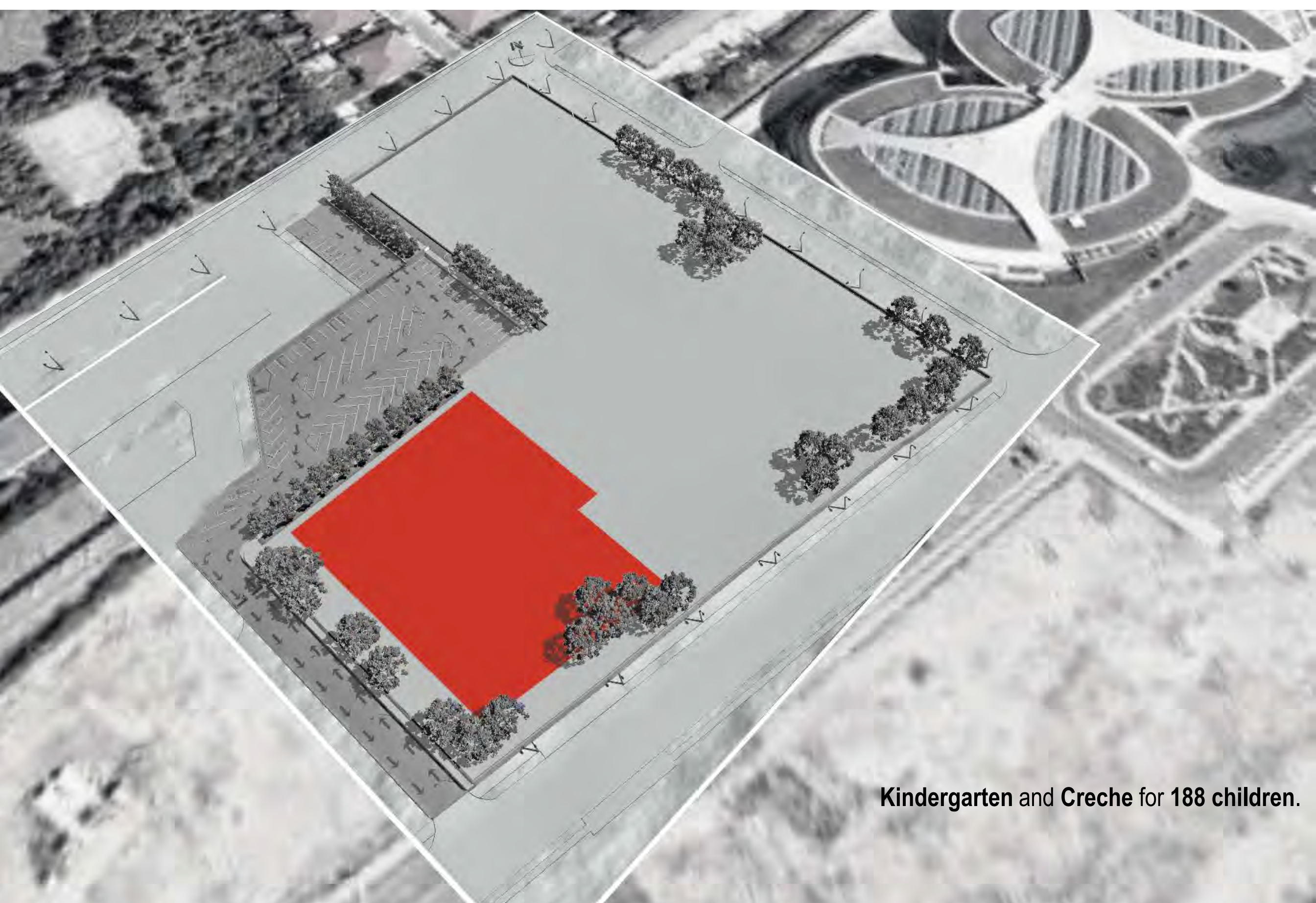


TREE TOPS

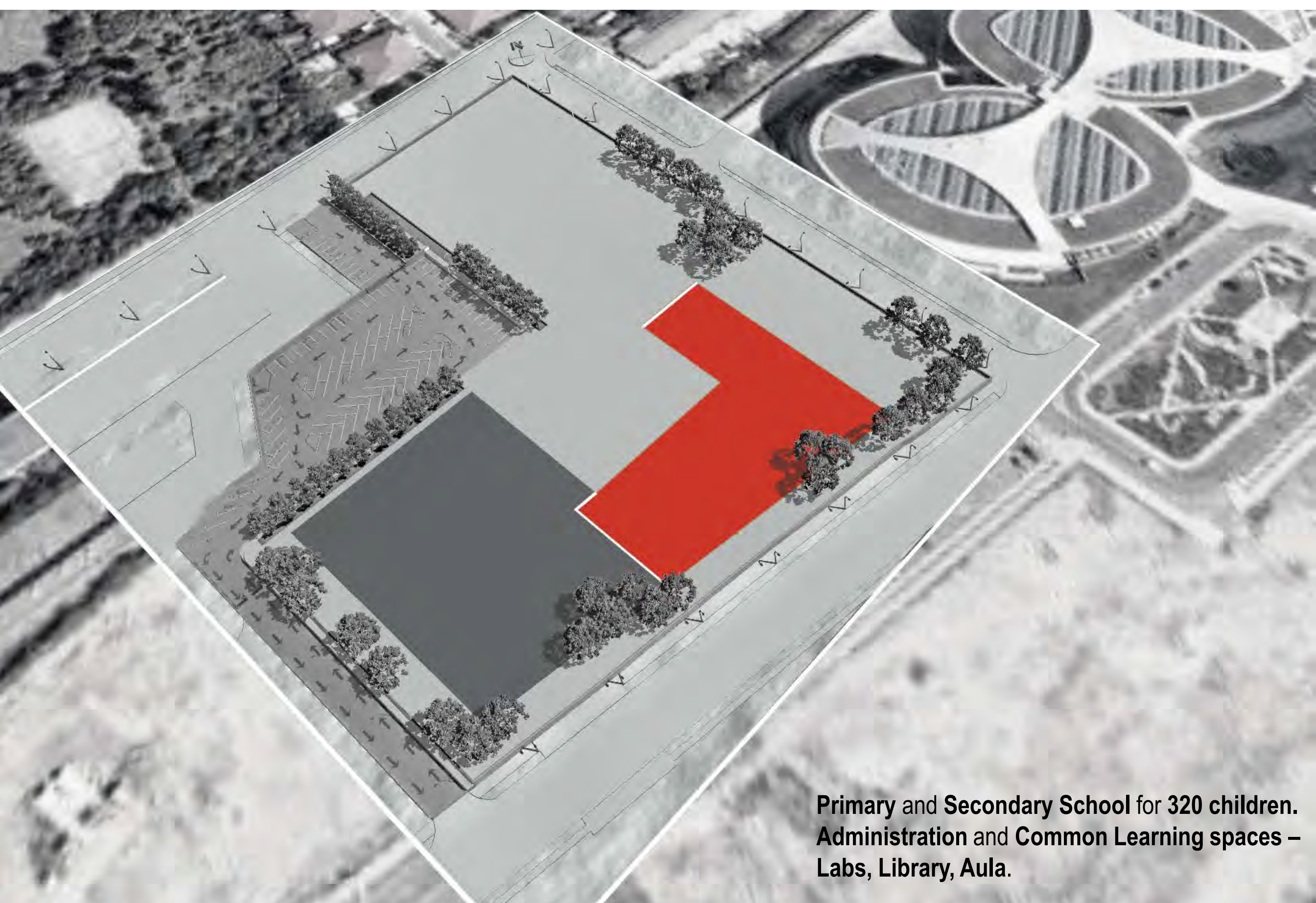


TALL GRASS

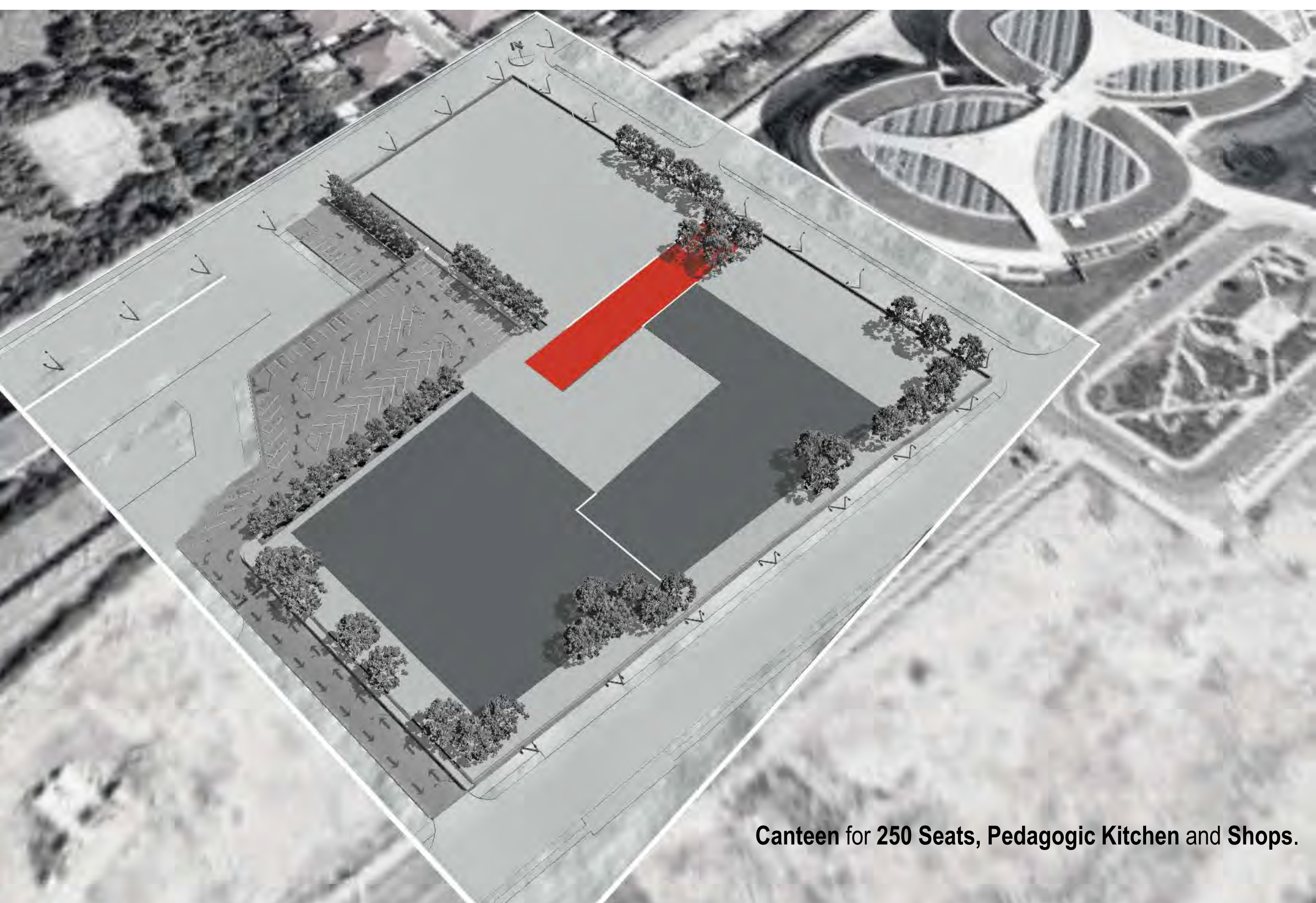
Vegetation Barrier by using trees, wild plants and local species for the green areas so that existing natural balance can be preserved.



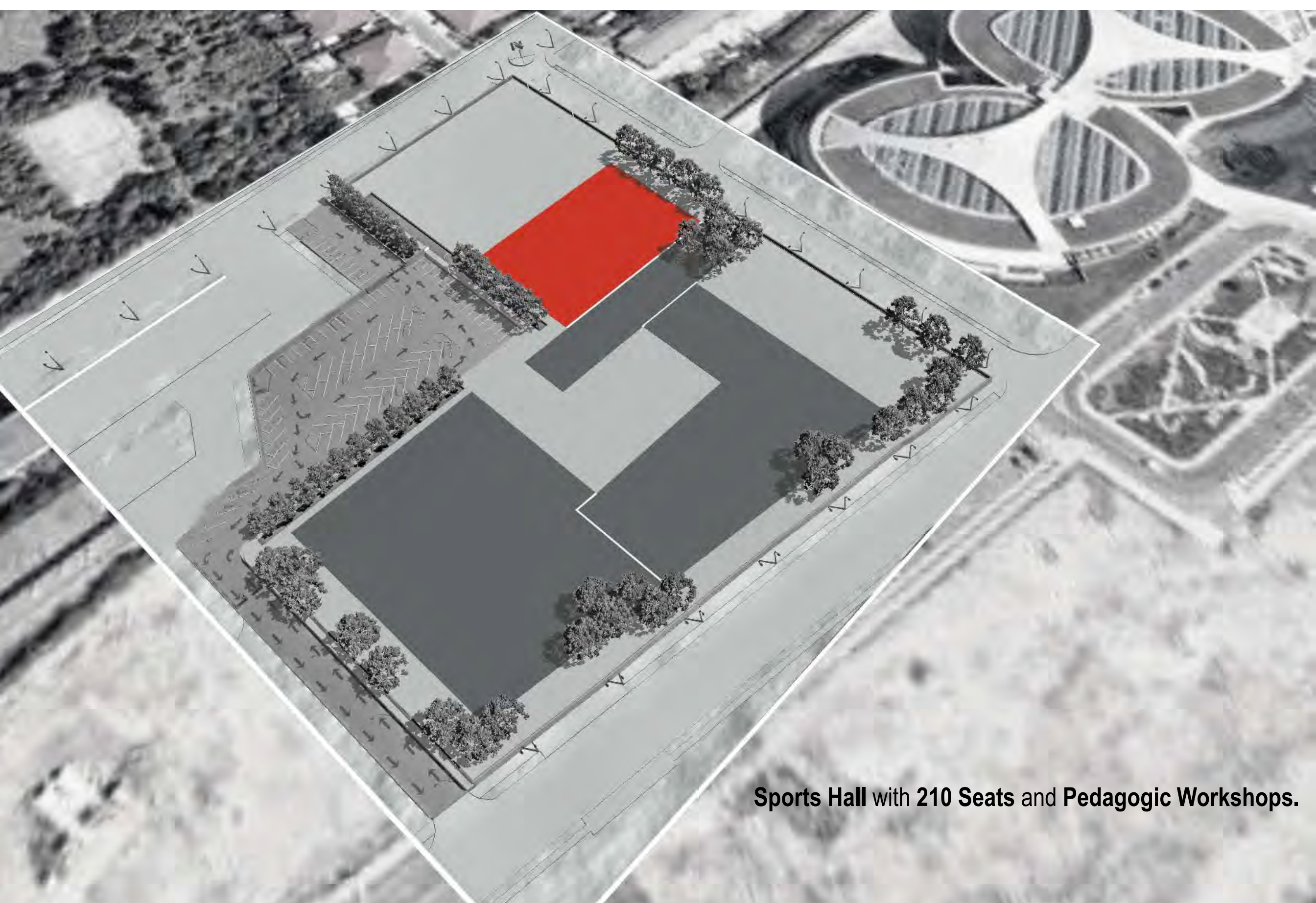
Kindergarten and Creche for 188 children.



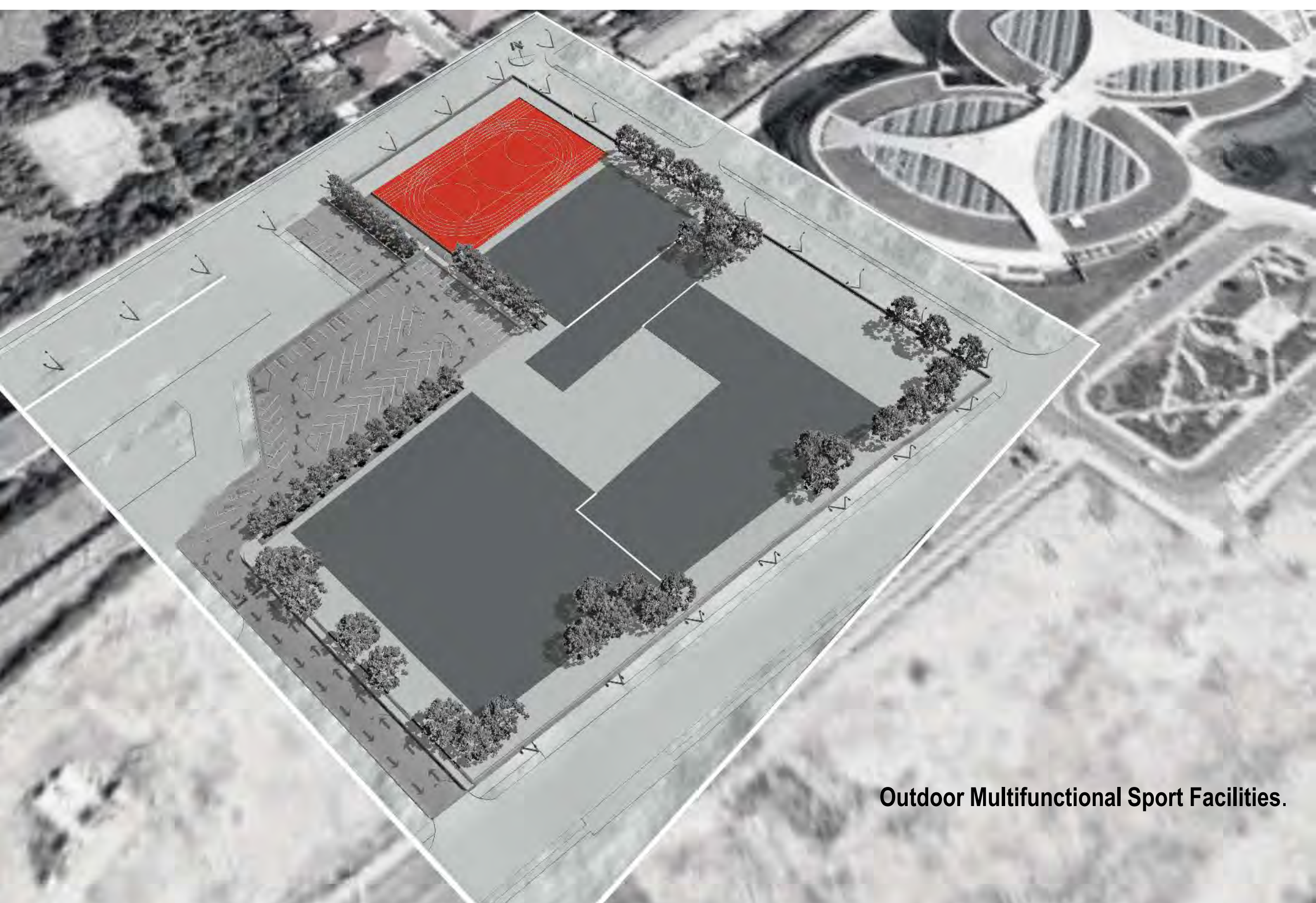
**Primary and Secondary School for 320 children.
Administration and Common Learning spaces –
Labs, Library, Aula.**



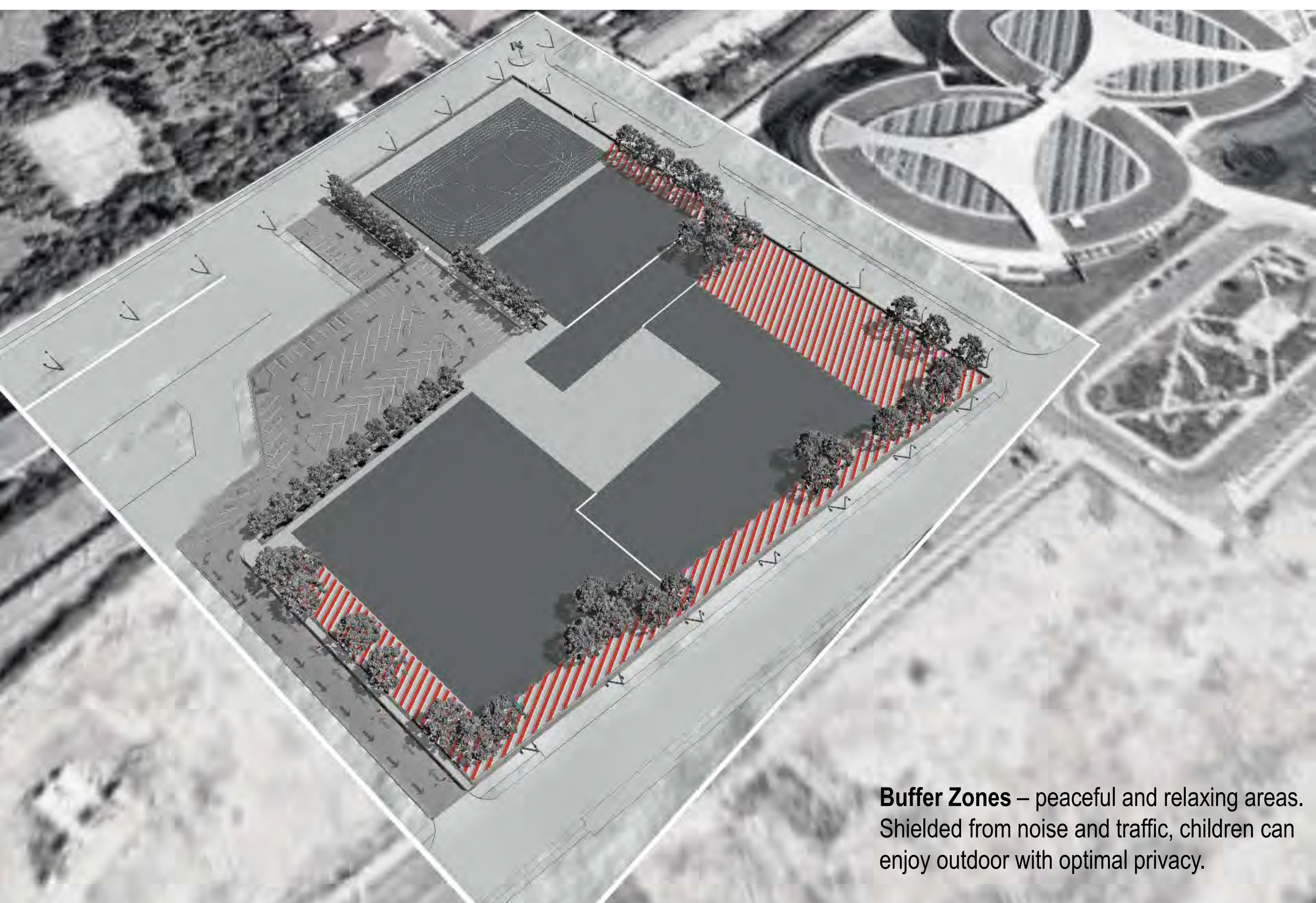
Canteen for 250 Seats, Pedagogic Kitchen and Shops.



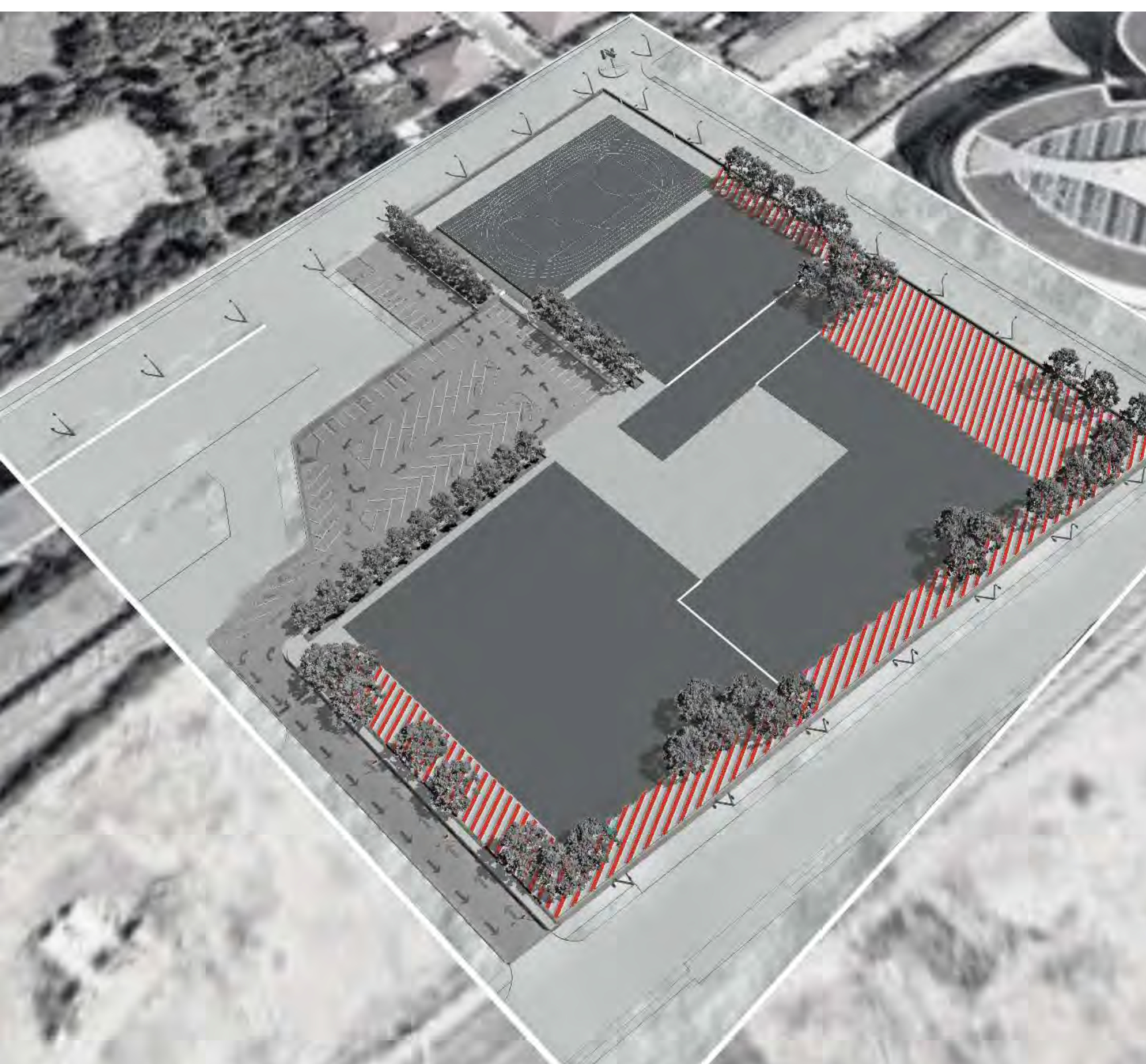
Sports Hall with 210 Seats and Pedagogic Workshops.

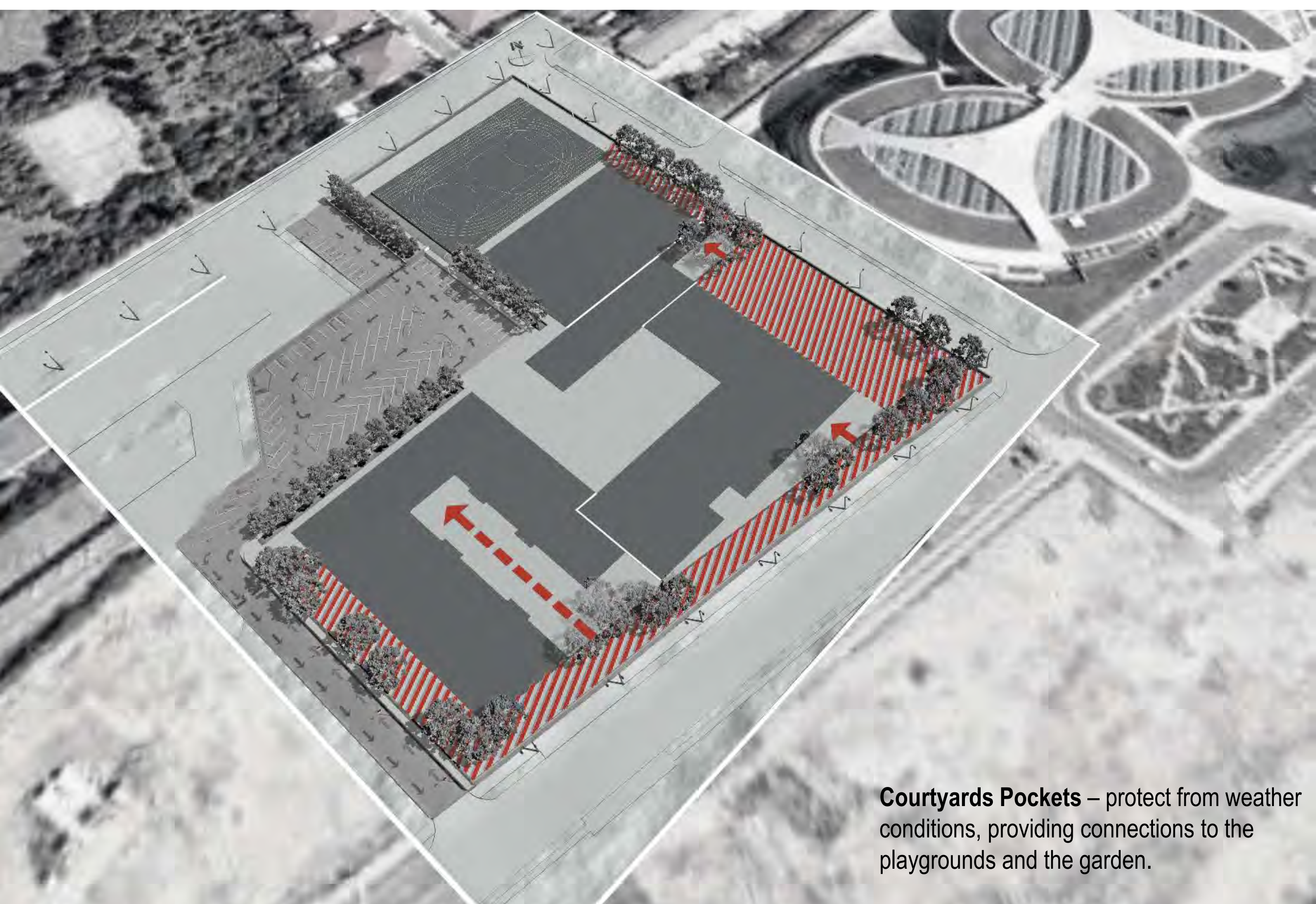


Outdoor Multifunctional Sport Facilities.

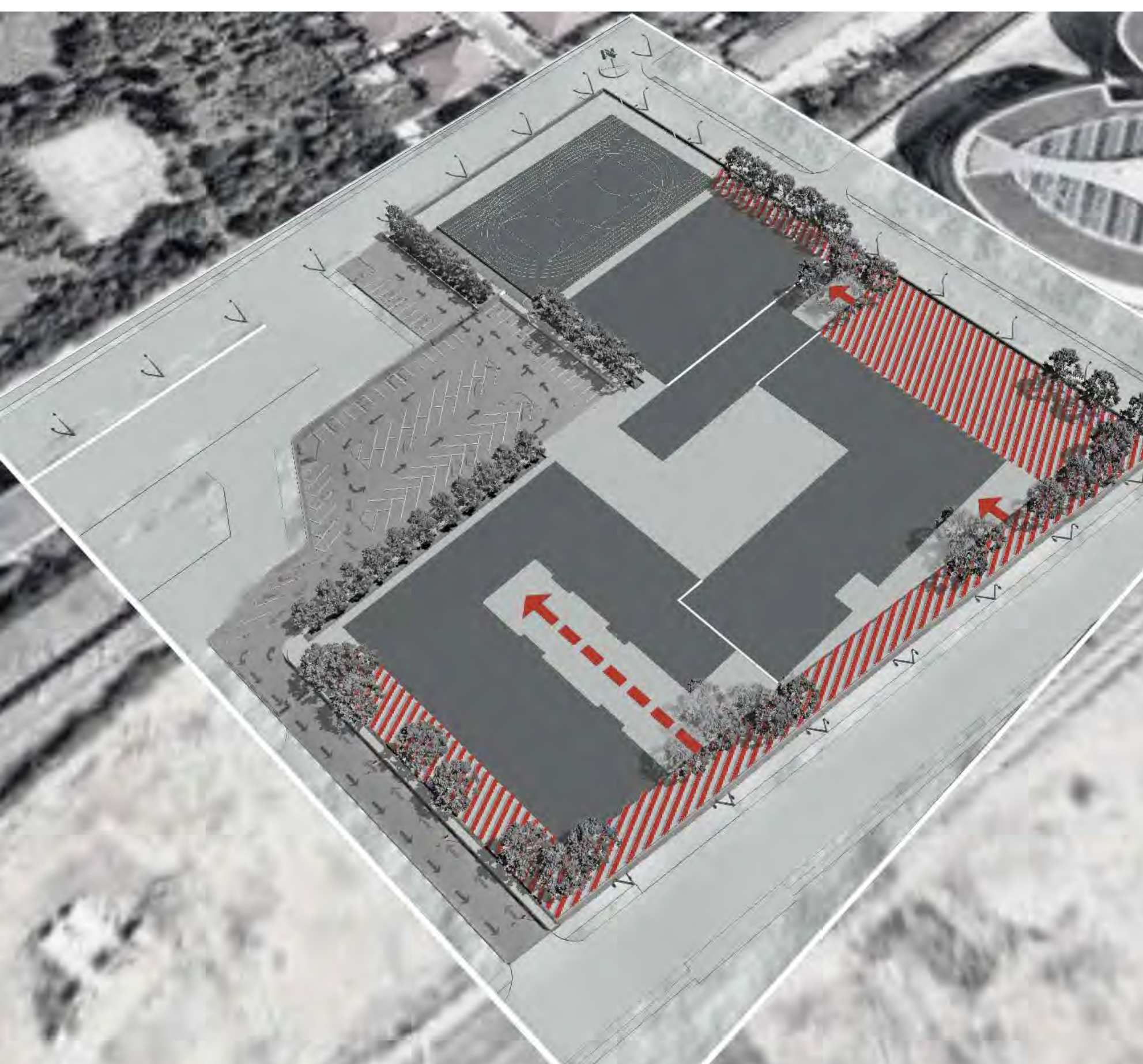


Buffer Zones – peaceful and relaxing areas. Shielded from noise and traffic, children can enjoy outdoor with optimal privacy.





Courtyards Pockets – protect from weather conditions, providing connections to the playgrounds and the garden.

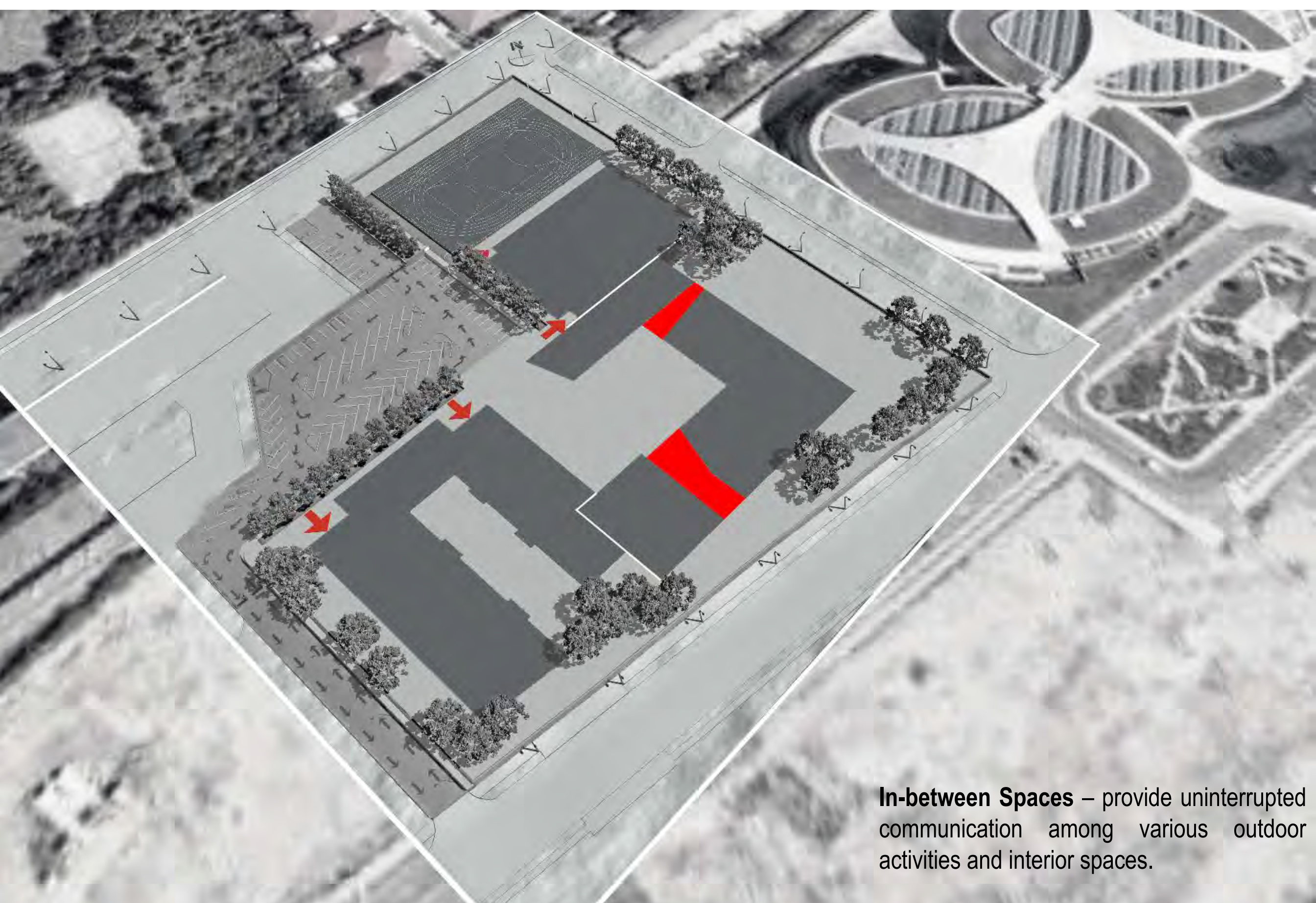




Central Plaza – praises the historic central square of the traditional city as a threshold between nature and architecture.

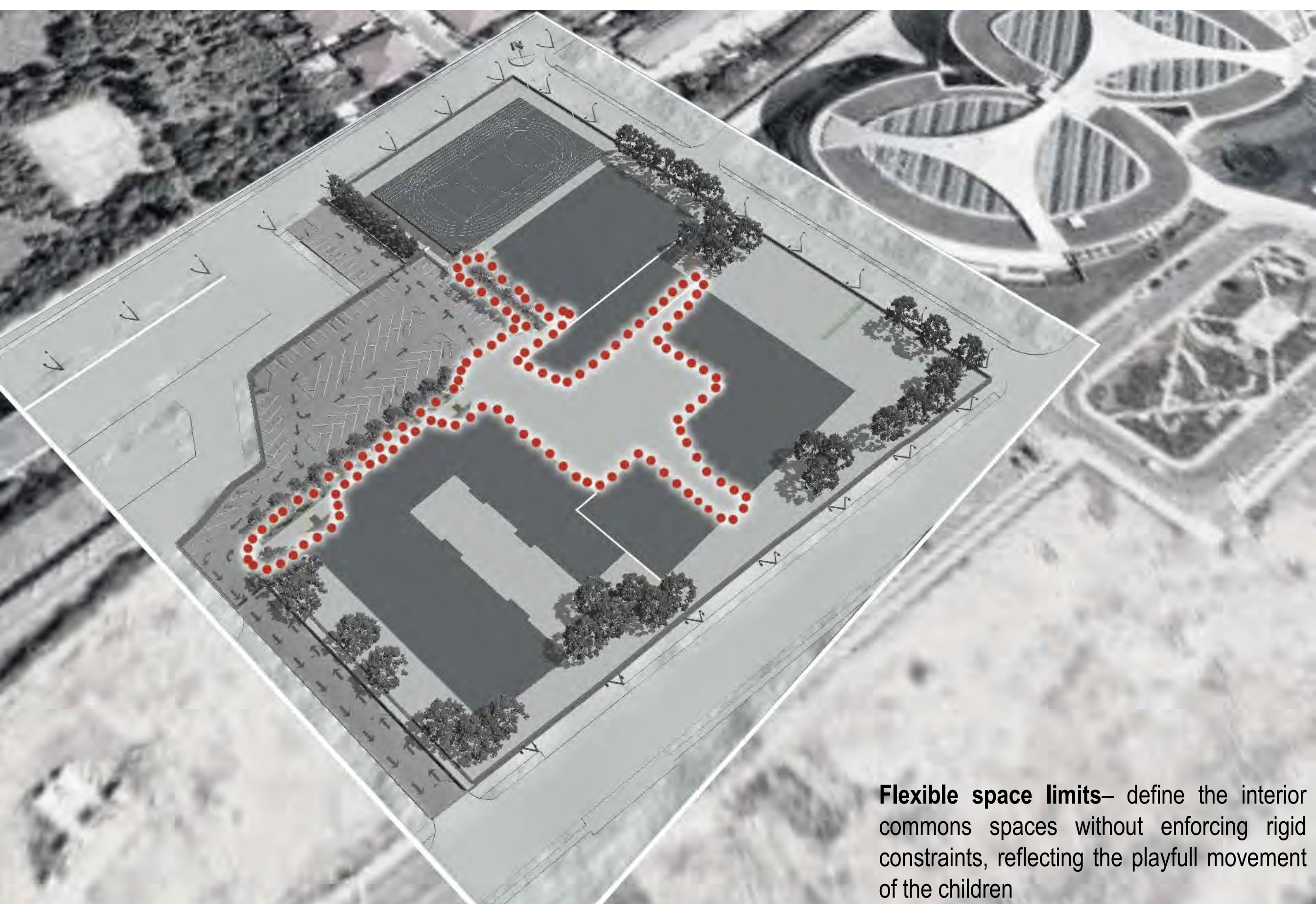


Connectivity. Protected, semi-opened spaces allow free movement among spaces characterized by specific privacy degree and users.



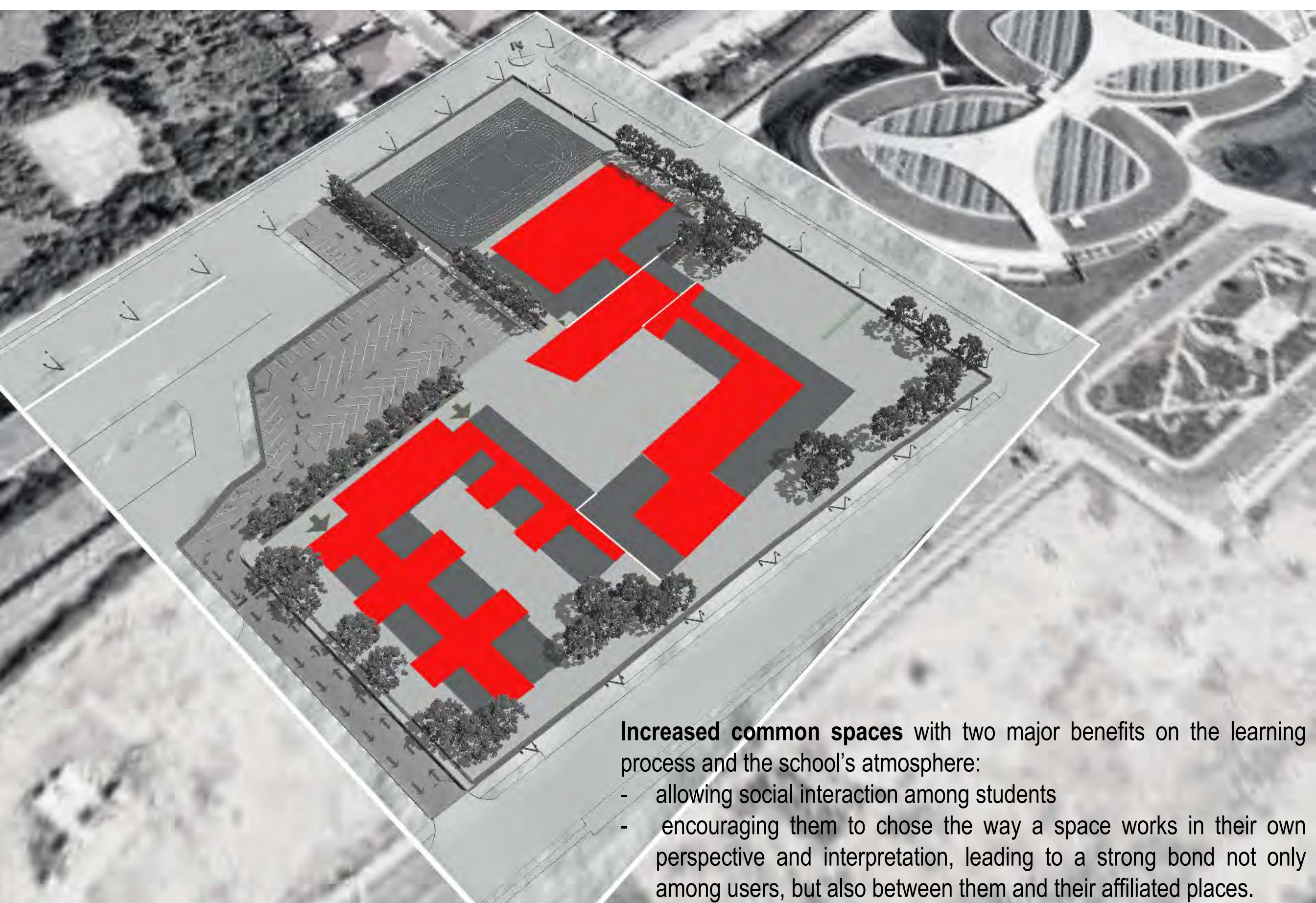
In-between Spaces – provide uninterrupted communication among various outdoor activities and interior spaces.





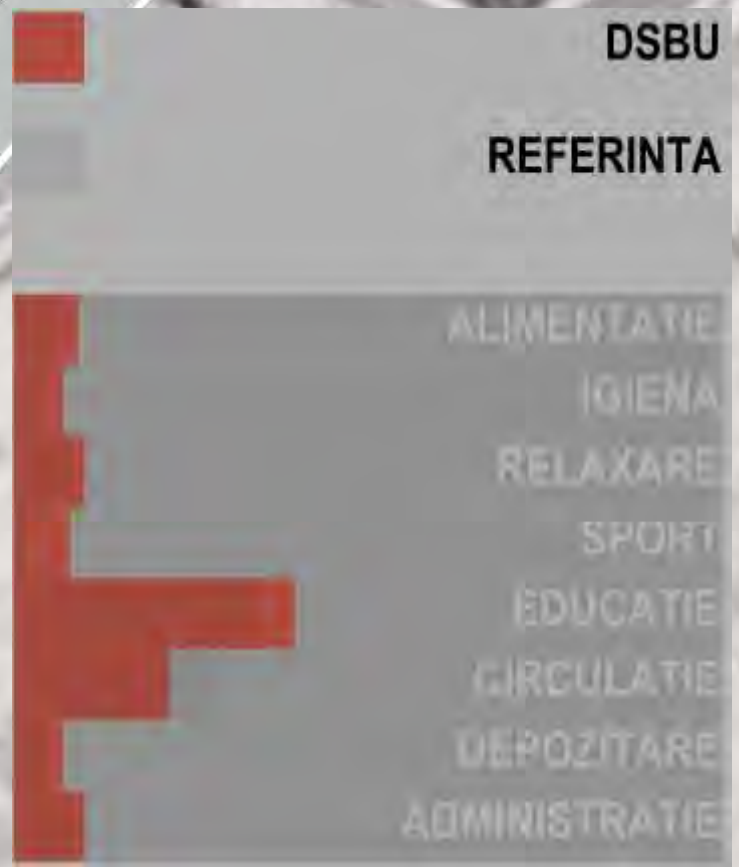
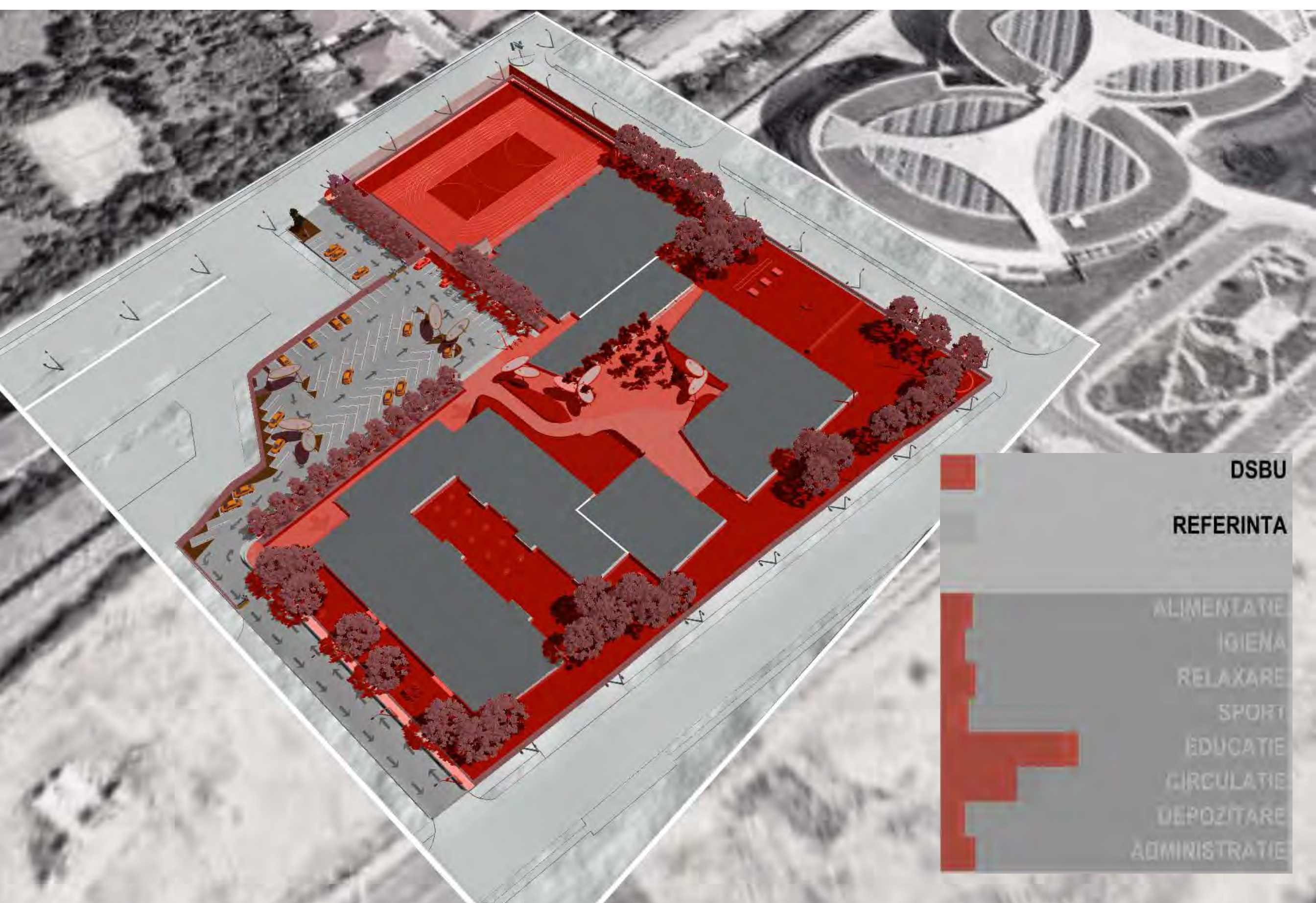
Flexible space limits– define the interior commons spaces without enforcing rigid constraints, reflecting the playfull movement of the children





Increased common spaces with two major benefits on the learning process and the school's atmosphere:

- allowing social interaction among students
- encouraging them to chose the way a space works in their own perspective and interpretation, leading to a strong bond not only among users, but also between them and their affiliated places.





FRAXINUS ANGUSTIFOLIA



BETULA PENDULA



Citrus



FLORIBURI ORNAMENTALI

Granit - Pavaj Plaza

Beton aparent - Ziduri Jardiniere



Lemn - Bancute ziduri

Plinta Tabla - Jardiniere si ziduri

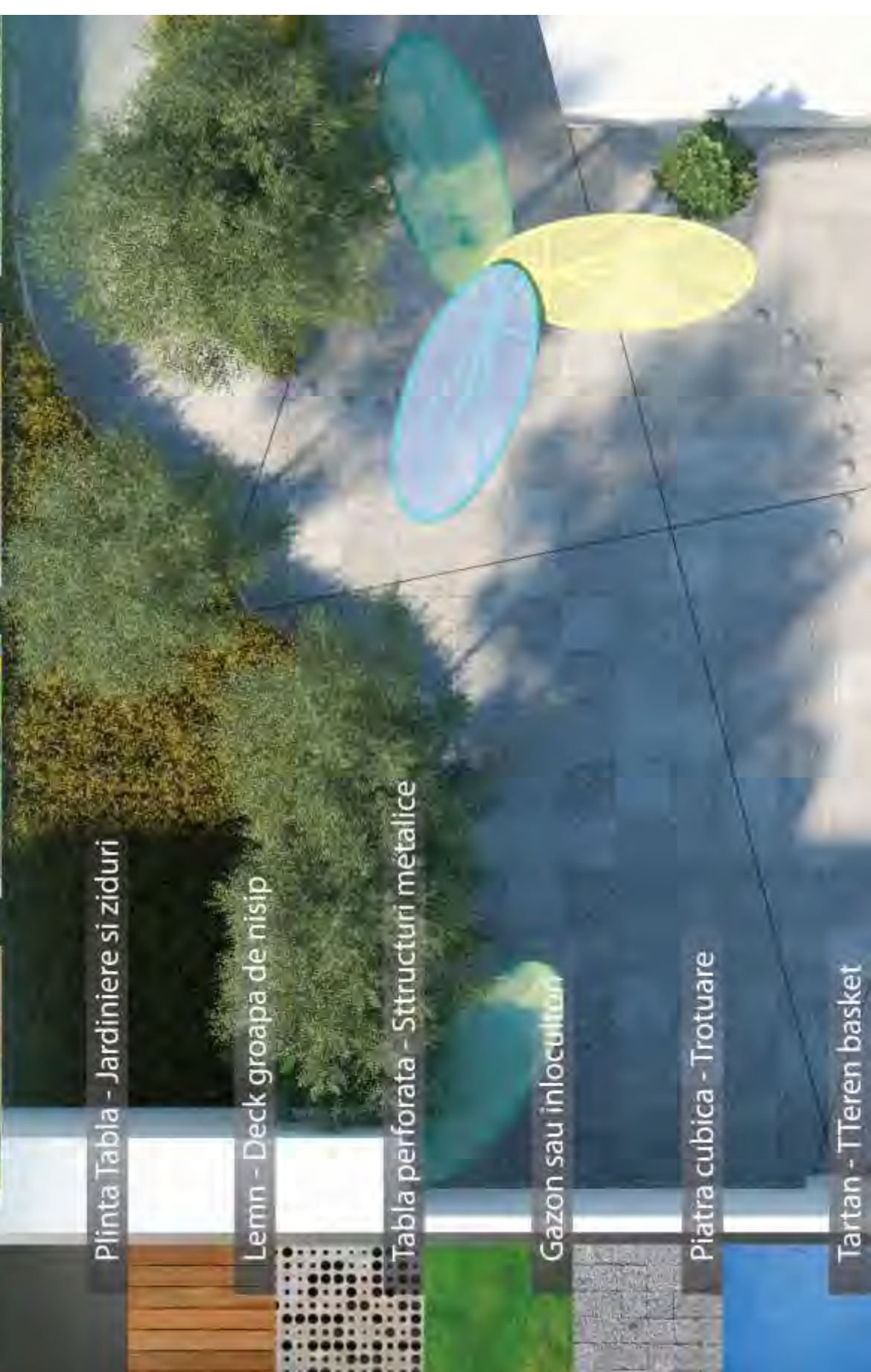
Lemn - Deck groapa de nisip

Tabla perforata - Sstructuri metalice

Gazon sau inlocuituri

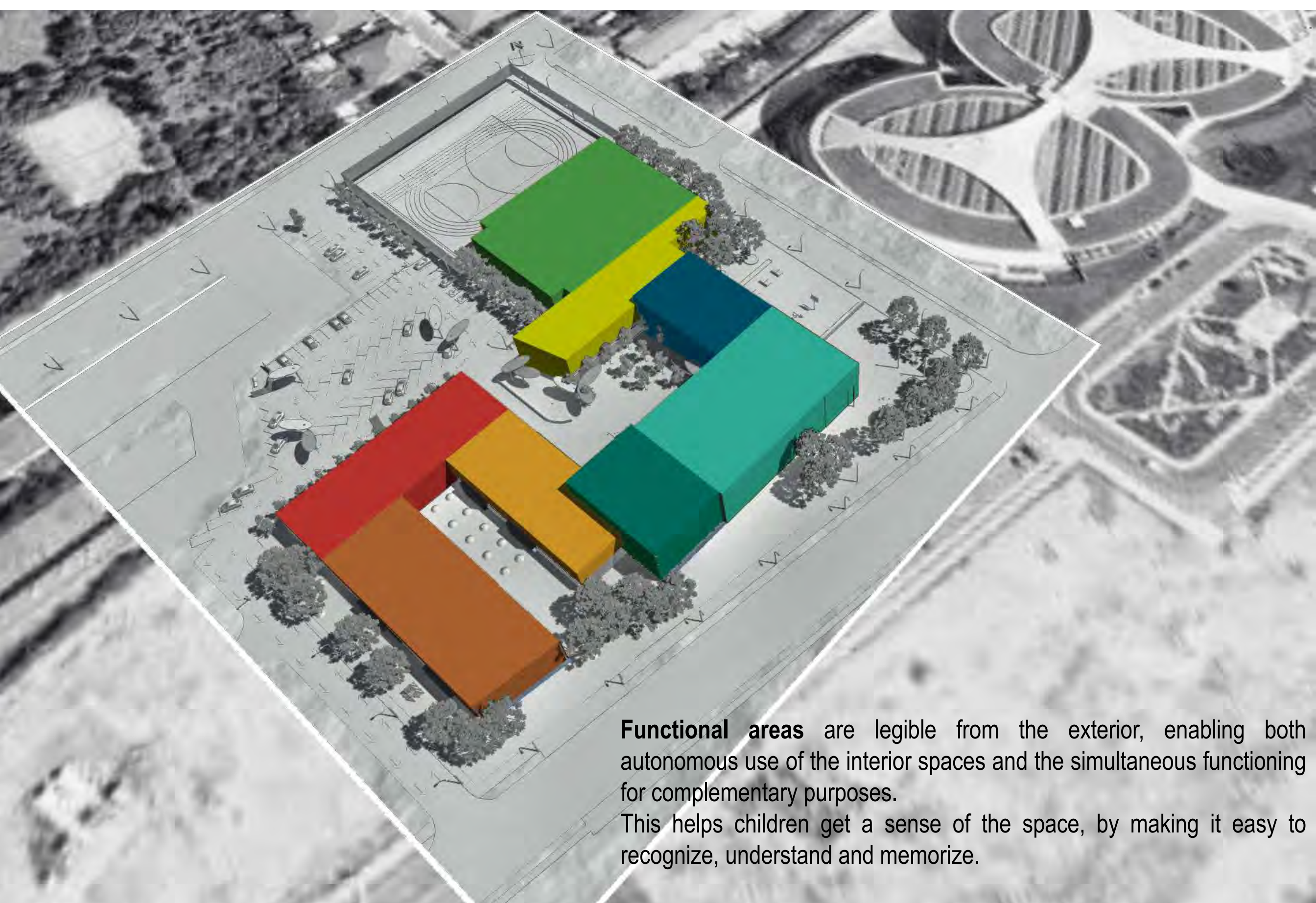
Piatra cubica - Trotuare

Tartan - TTeren basket









Functional areas are legible from the exterior, enabling both autonomous use of the interior spaces and the simultaneous functioning for complementary purposes.

This helps children get a sense of the space, by making it easy to recognize, understand and memorize.



Green Roofs for social activities and urban farming– improve thermal performance, preventing rapid temperature fluctuations and overheating effects throughout the day. They also protect against dust, acting as a buffer for heavy rains and complete the landscape because of the use of local plants.

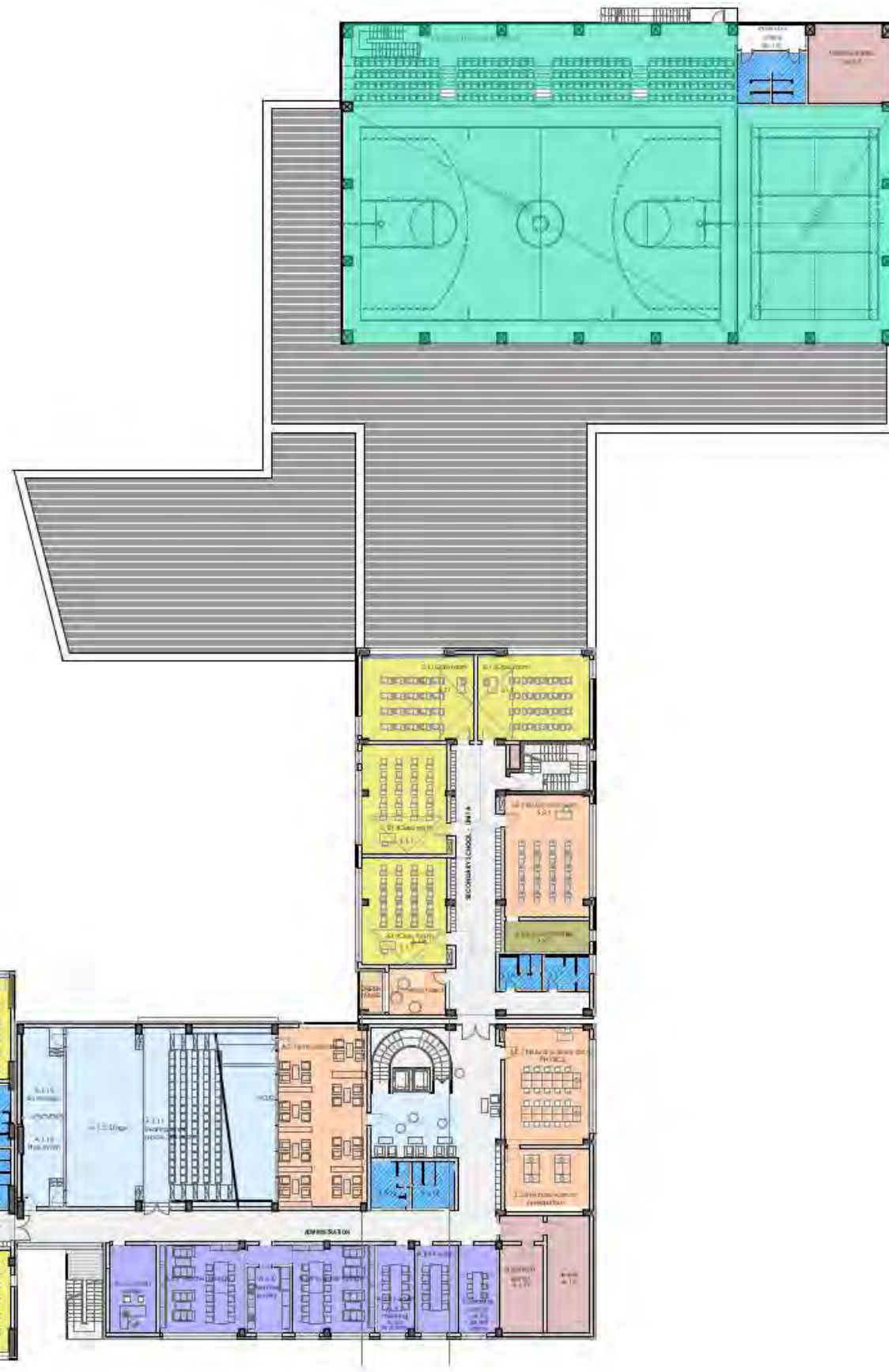
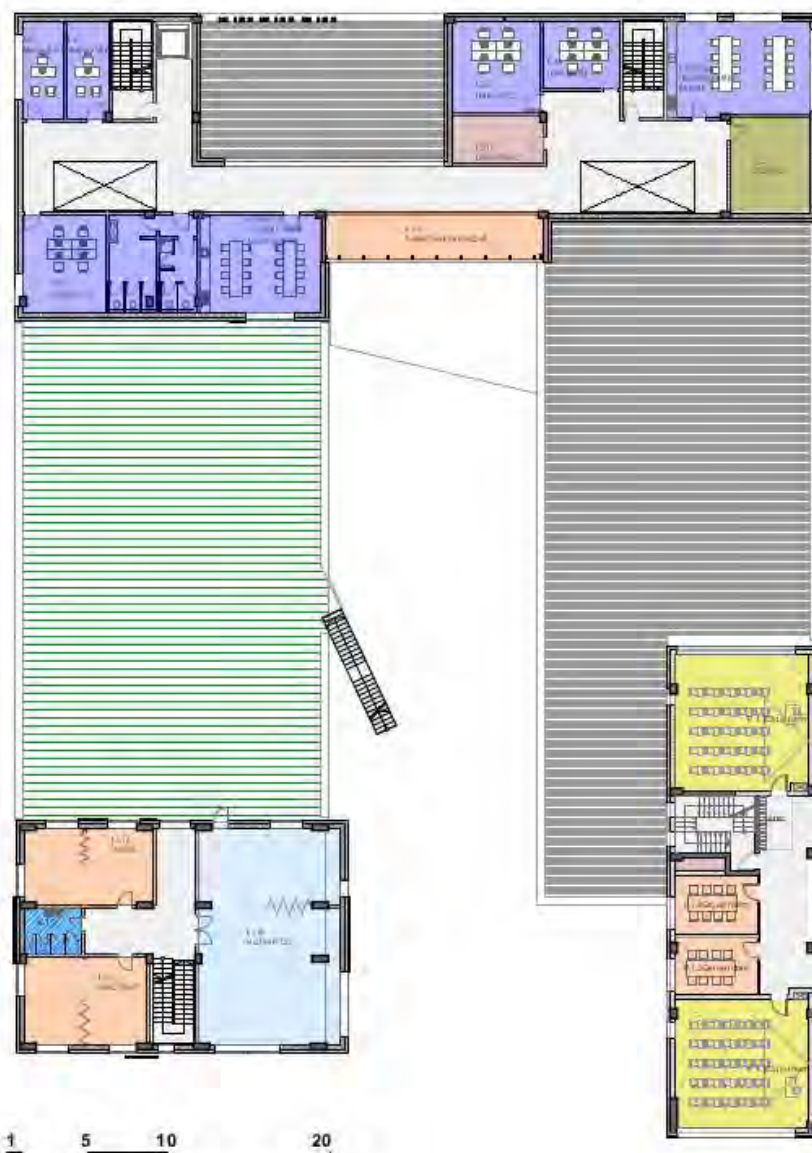


- LEGENDA / LEGEND:**
- Circulatii / Circulations
 - Sala de clasa/ classroom
 - Laborator, clase speciale /Laboratory, special classes
 - Spatiu multifunctional, biblioteca, foaier/ multifunctional space, library, foyer
 - Prim ajutor/ First aid
 - Administrativ / Administration
 - Toalele / Toilets
 - Sala sport / Sport Hall
 - Cantina / Canteen
 - Tehnic / Technic
 - Depozitare / Storage
 - Dormitor / Dormitory
 - Teren joaca / Playground
 - Plaza / Plaza
 - Terasa circulabila / Trafficable terrace
 - Terasa neirculabila / Non-trafficable terrace
 - Circulati carosabili si parcan /Road traffic and parking lots



LEGENDA / LEGEND:

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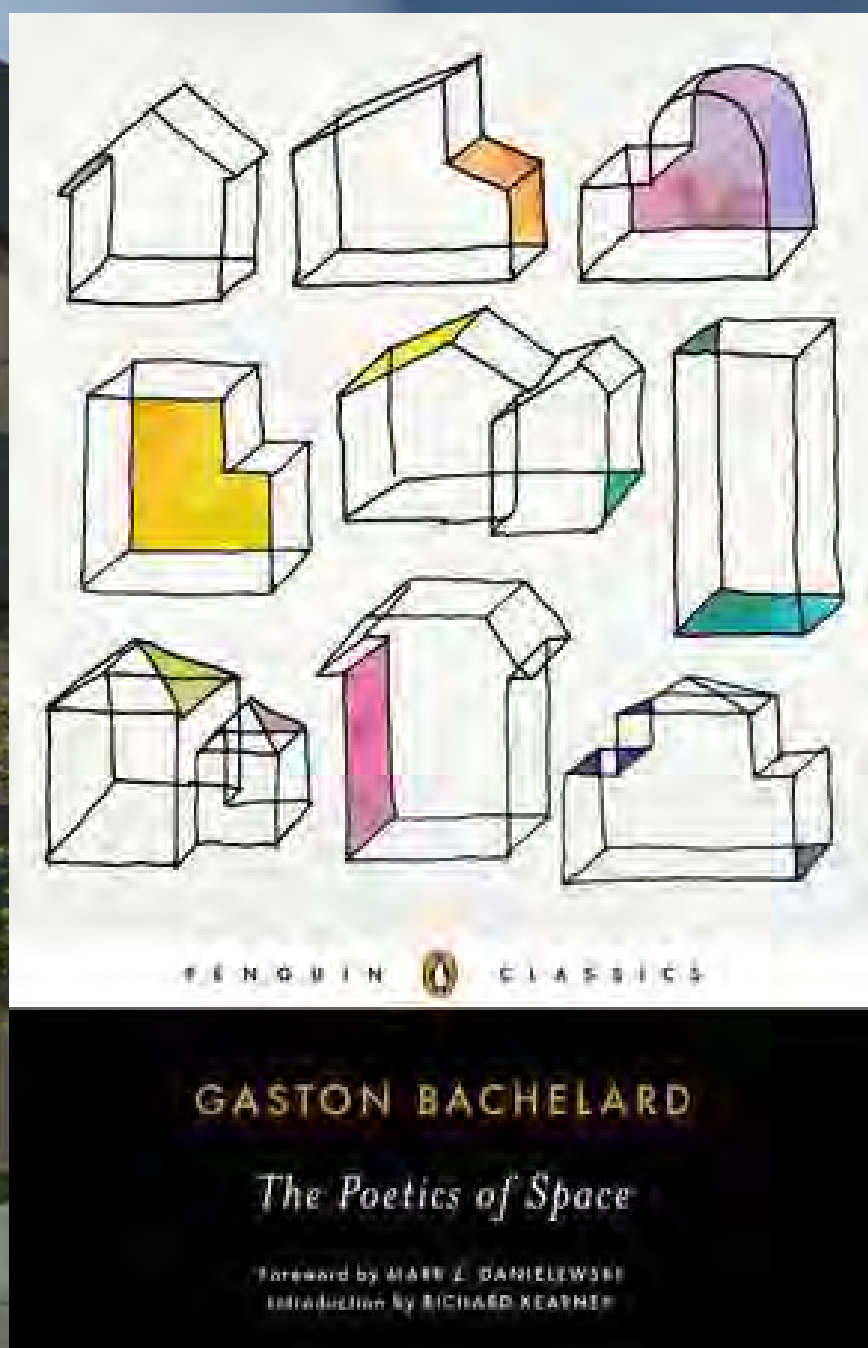
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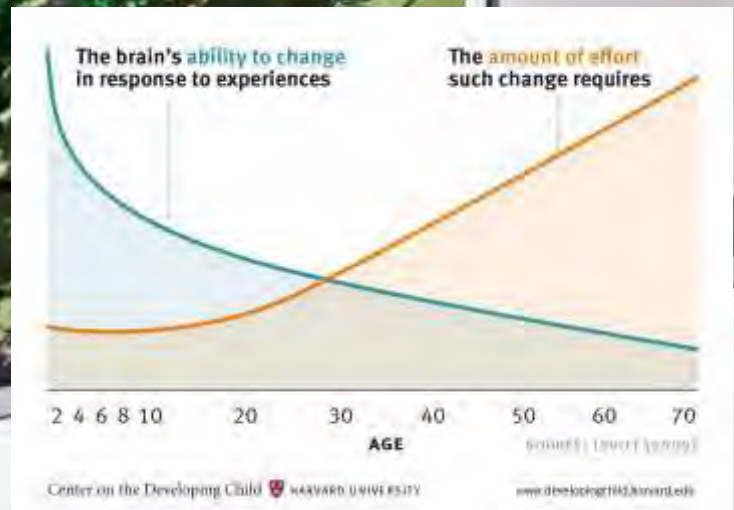
**Social and Educational Challenge:
Bringing back the crowd in Common Spaces.**



Words ... are little houses, each with its cellar and garret. Common sense lives on the ground floor, always ready to engage in 'foreign commerce' on the same level as the others, as the passers-by, who are never dreamers. To go upstairs in the word house is to withdraw step by step; while to go down to the cellar is to dream, it is losing oneself in the distant corridors of an obscure etymology, looking for treasures that cannot be found in words. To mount and descend in the words themselves—this is a poet's life.







**Early Learning Challenge:
Bringing Nature Experience back to School.**



Additional Natural Light for Common Spaces.





Green Spaces for Learning and Playing.



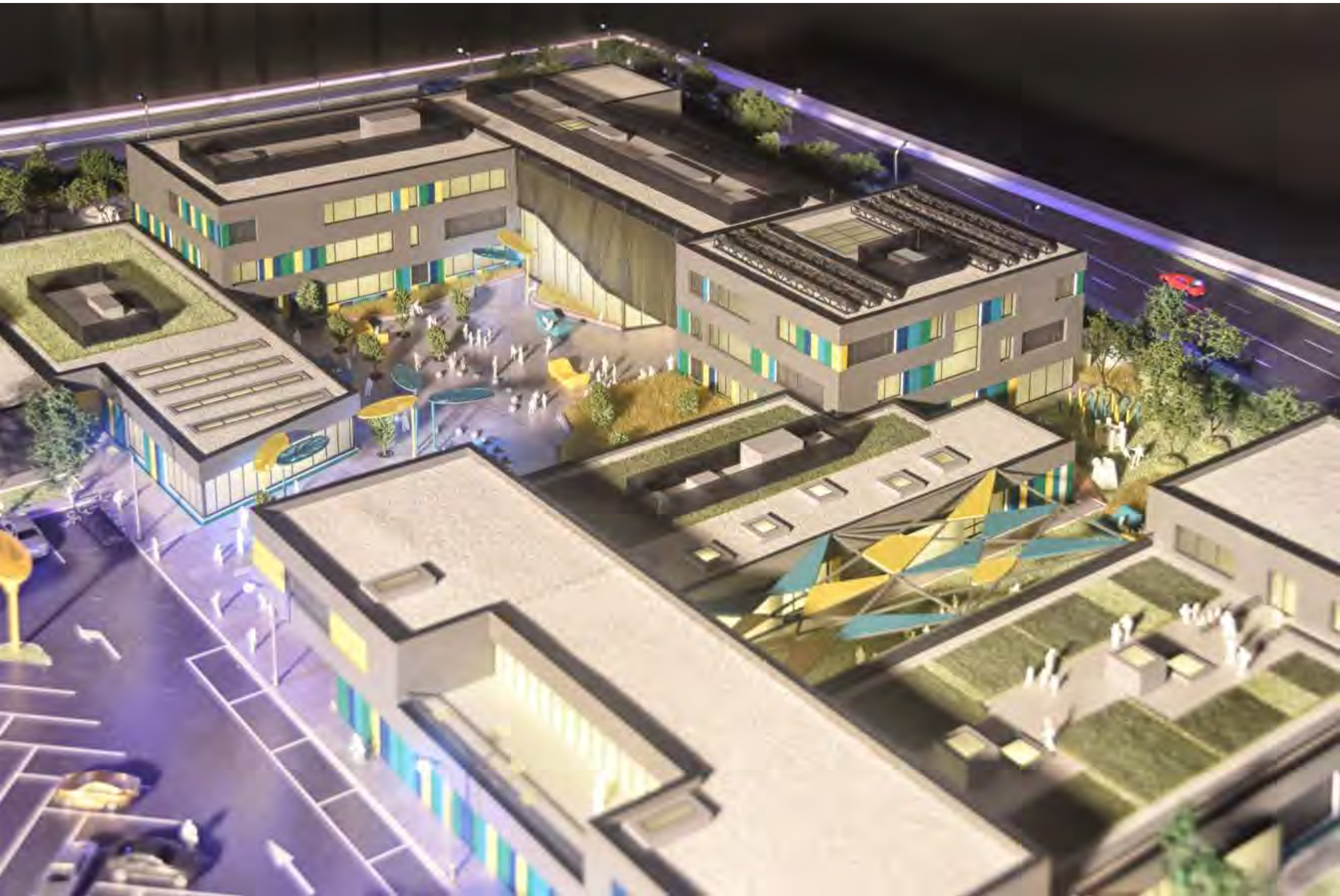


Connectivity between Nature and Built environment.



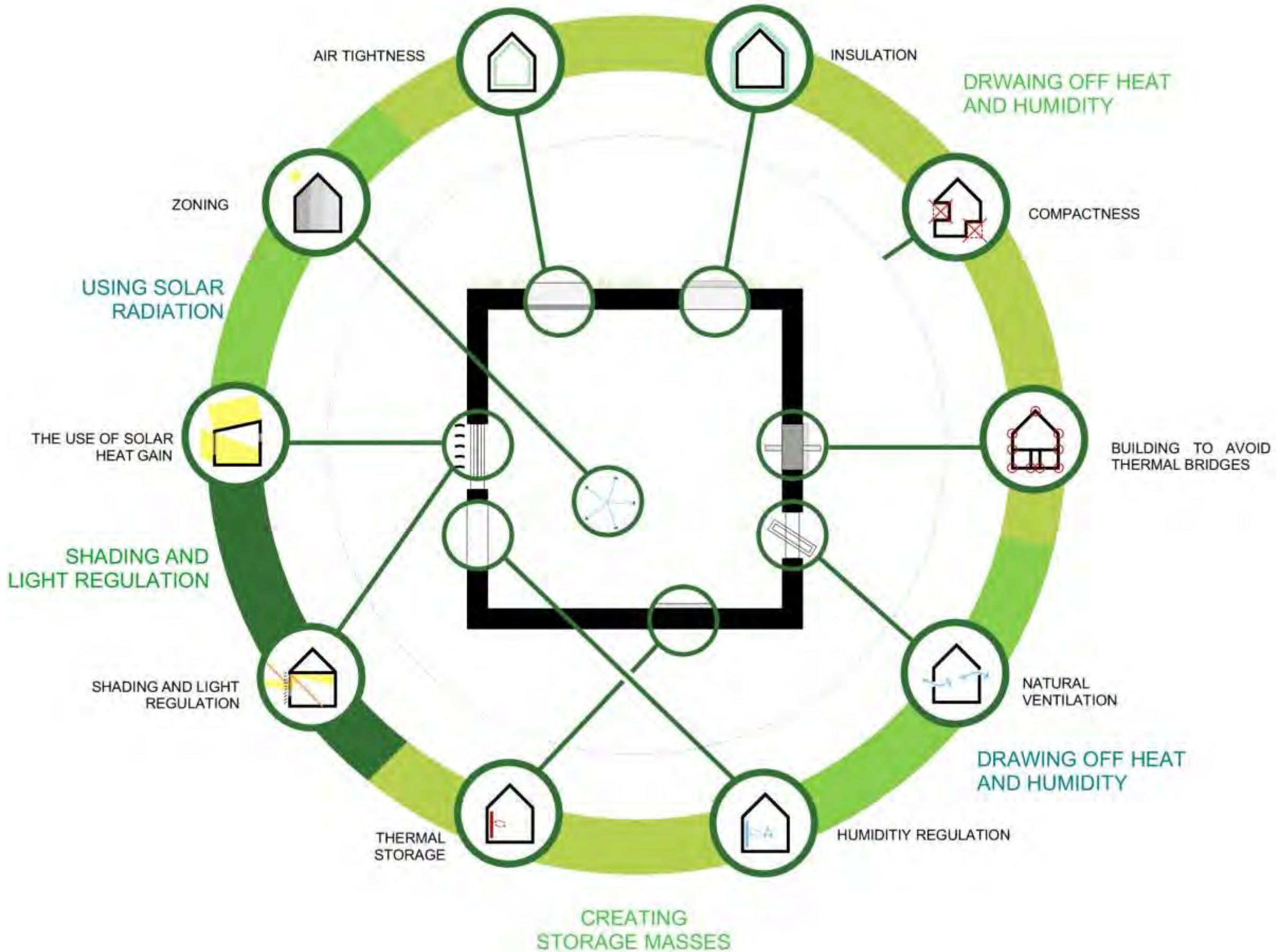














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SUN STUDY - EAST



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CLEAN MOBILITY



WASTE



WATER



BIODIVERSITY



ENERGY



MATERIALS



natural ventilation



energy efficient
mechanical ventilation



solar gain



energy efficient
equipment



sustainable
lifestyle



motion & sport



sustainable food



sustainable
waste treatment



Consuming Water



Consuming Water

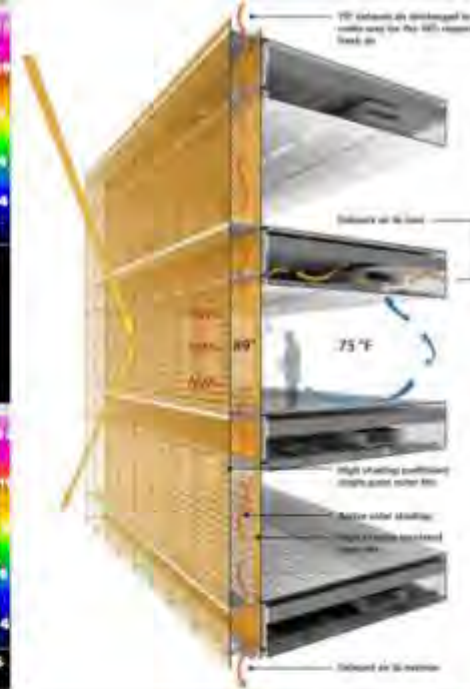


Consuming Electricity



Consuming Power





Multi-Comfort Strategies:

Superior thermal insulation

Airtightness

Low energy consumption

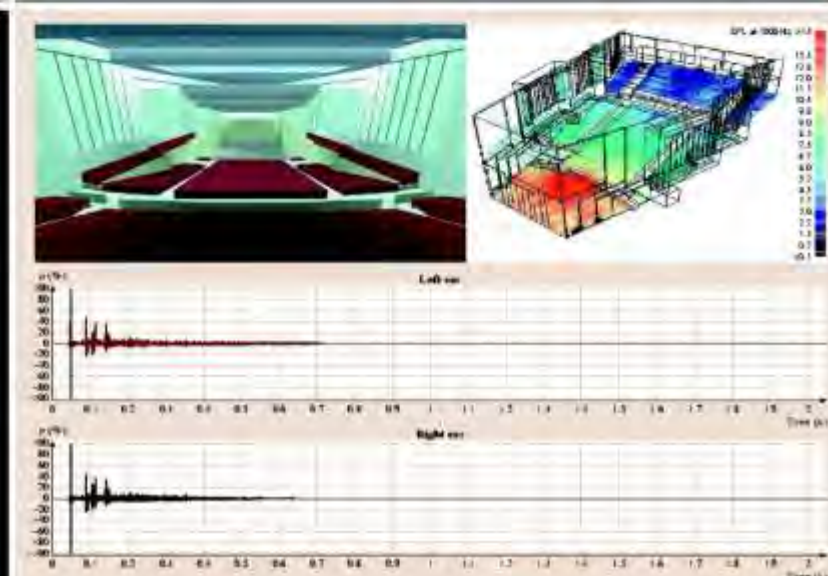
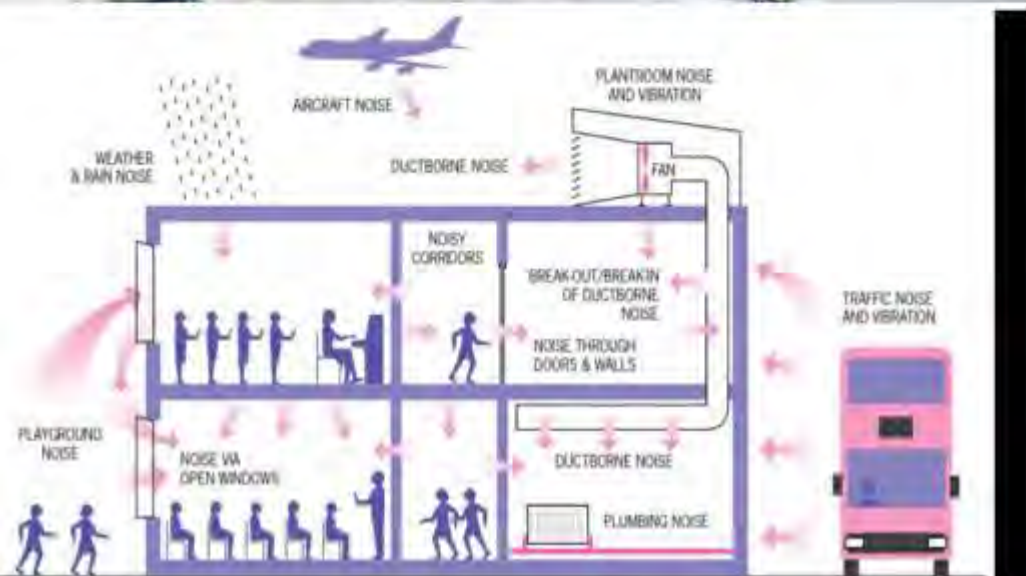
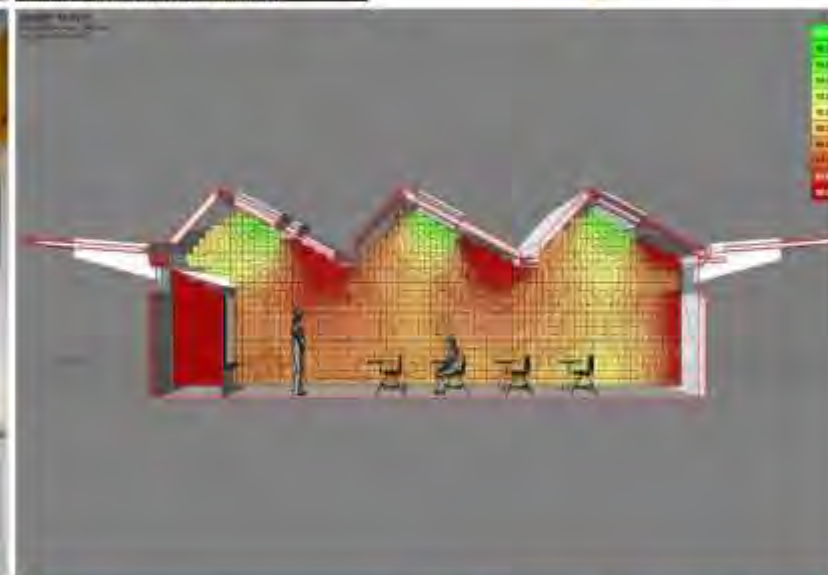
Fire Protection

Fresh air and humidity control

Enhanced daylight autonomy

Sound protection

Performant acoustics







VĂ MULȚUMIM!



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