

**AP-REP** challenges our psycho-social assumptions regarding the creeping ubiquity of the "Big Box," as a symbol of dehumanized contemporary life, by subverting that form's use for direct civic good and public enrichment. Such an industrial scale structure may at first appear as overwhelming as Big Industry, itself. But it is only within that context that any potentially successful movement toward sustainable human existence must be made. Sustainability is not anathema to the future of a successful U.A.E., as some in the west might postulate. Rather, any vision that ignores its continued success is not a sustainable vision at all. AP-REP proposes a narrative by which this premise might not only appear realistic, but appealing and desirable.

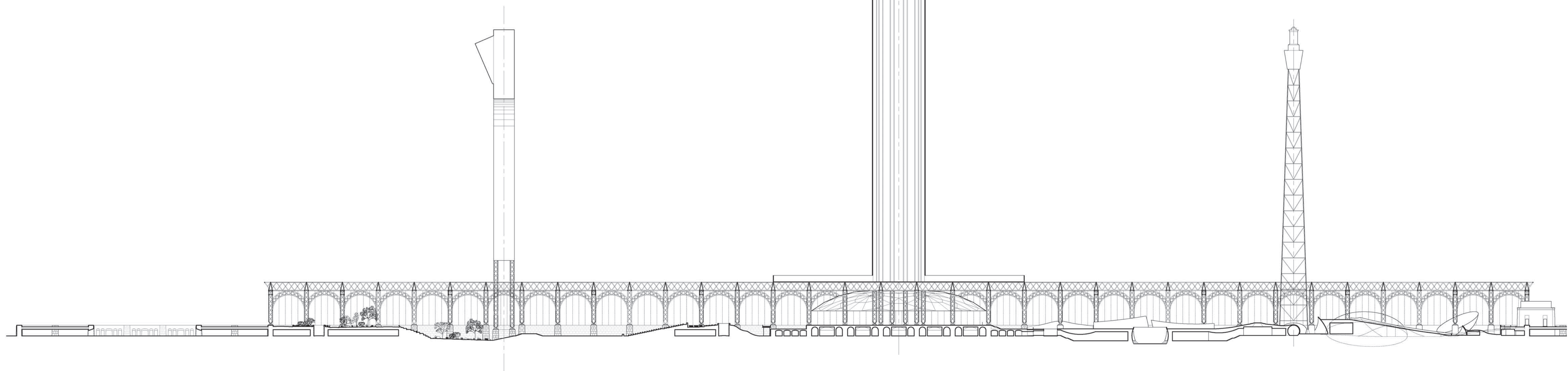
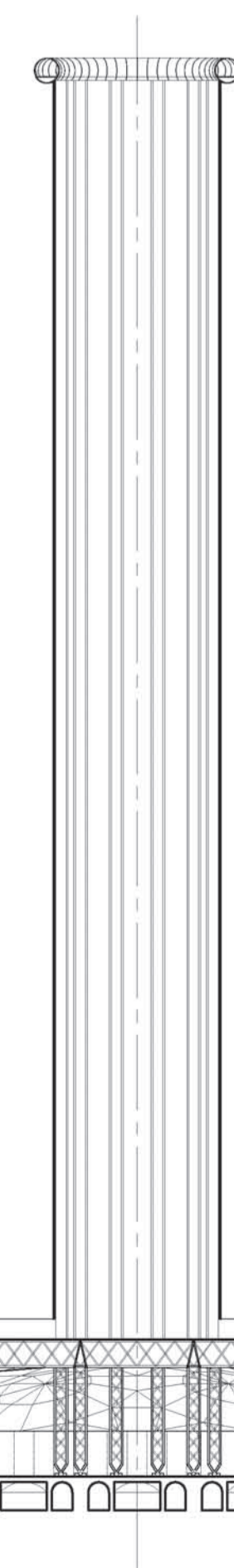
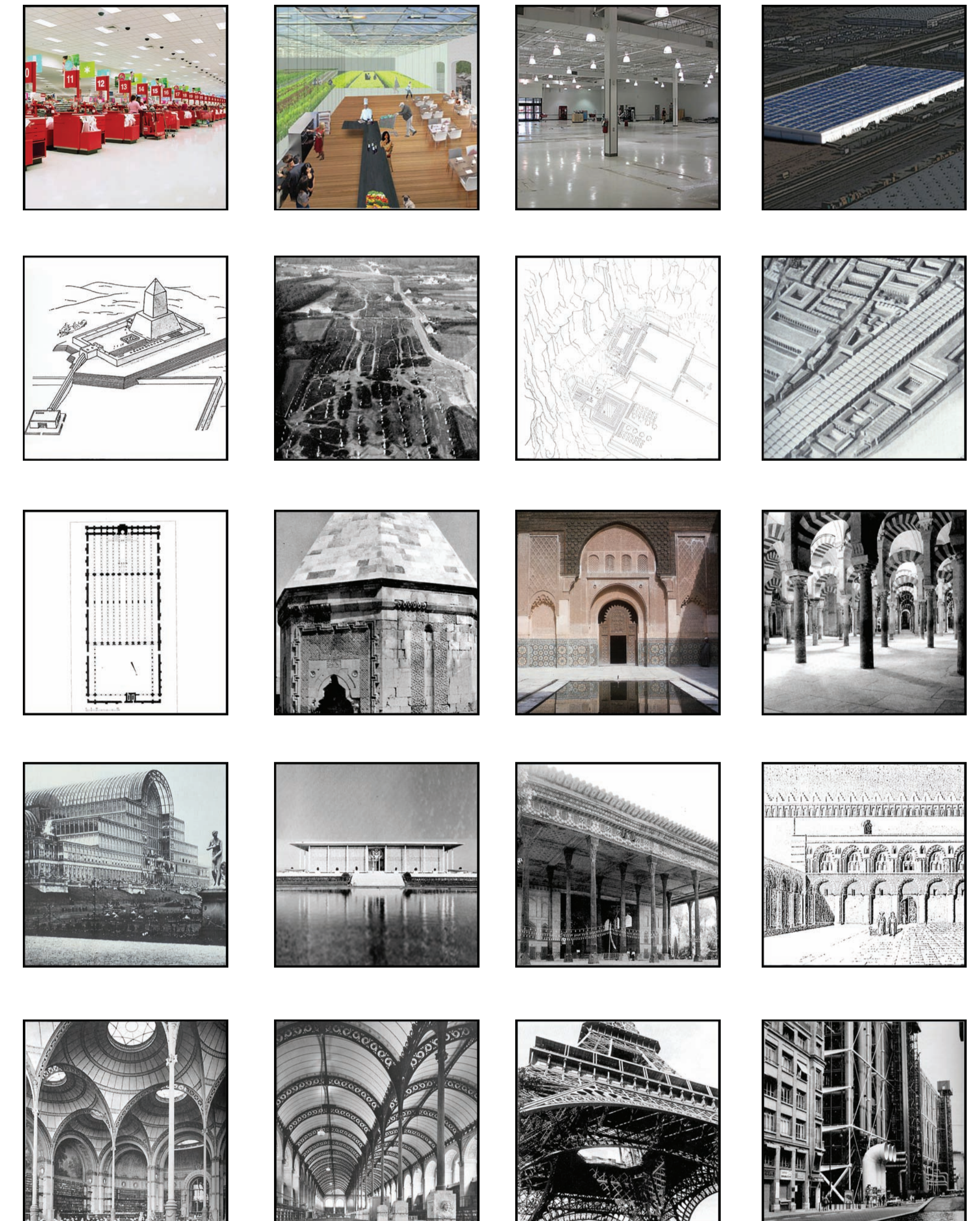
In the wake of the 20th Century, it is clear to us that any attempt to reconcile the seemingly disparate constructs of nature and artifice through the use of visual analogy or conceptual art is desperate, futile, and a legitimate expression of trauma, at best. The struggle to find harmony between the two by approaching them through the decorative arts offers some relief. When mankind proceeds under the illusion that humanity and nature are somehow fundamentally at odds, rather than seeing them as microcosmic echoes of each other, we unwittingly maintain a general denial of human nature.

It is human to seek shelter in familiar things – all familiar things being essentially man-made, even Nature, itself. It is human to fend off destitution and loneliness with fanciful hopes of redemption and the comfort of intimate sentiments shared under shelter. In more temperate climes, nature is something we approach as the Other for comfort. Any vision that claims we can live symbiotically in peace with nature has a utopian flair that offends common sense or may seem ridiculously idealistic, when viewed from within the conventional polar dichotomy. There is no imperative reason to see things in such a fractured way. For through acculturation and time all forms lose the teeth of their original intent and gain an organic trajectory within passing society. All things return to nature.

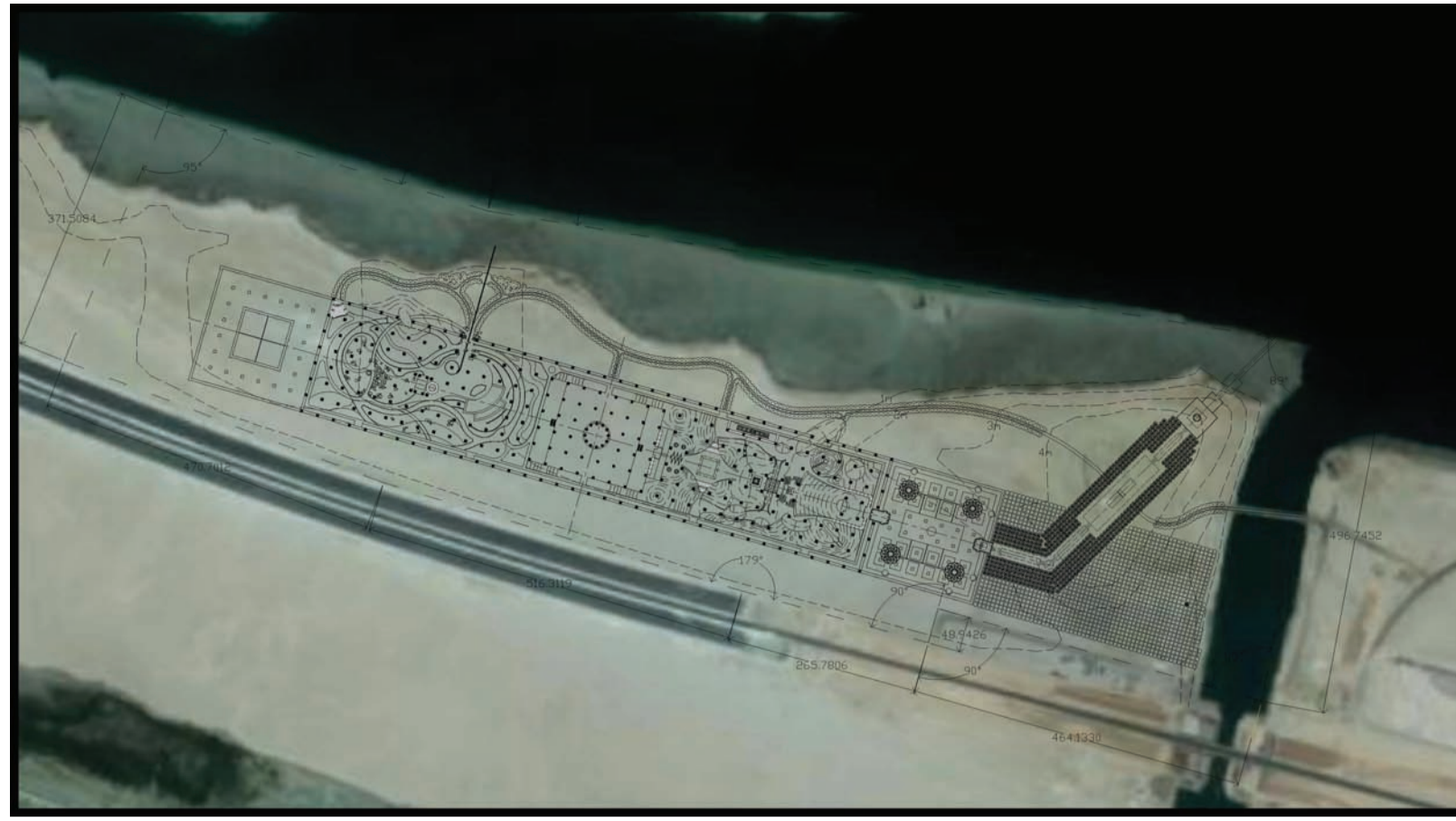
Despite the feelings of personal detachment and the individual's sense of alienation that often accompany contemporary corporatized social forms (embodied by the Big Box structure), we can take some personal, if morbid, comfort in the knowledge that humanity's legacy will be biological. All of the institutions which fence us in will deteriorate in the sands of time, leaving only ruins, remnants, and habits. Of this we can be certain. For this reason, man-made things ought look man-made without concern, for by that quality they glorify humanity and nature.

And so in response, AP-REP's seemingly violent imposition on the landscape is designed to accommodate both graceful deterioration and conservation by way of re-use and adaptability. It is a place that, from Abu Dhabi, appears monolithic and brutal, not unlike the desert itself, yet upon approach becomes transparent and alive. The super-structure is a dynamic shade regulating device that enables a multiplicity of social institutions as a civic oasis. At its functional core, here is an armature for the scientific exploration of solar technologies. The peripheral functions are manifold and complimentary to that end.

The Park's expression recalls an earlier era in the Islamic world when royal benefactors endowed public monumental destinations for the enrichment of their citizenry, such as the Great Mosques, Hamam, Caravansaries, Hospitals, Madrassas, Türbe & Mausoleums, "Lunatic Asylums," (literally refuges for the mentally impaired), Parks & Avenues, Bazaars and Imperial Colonies. It harkens back, in its tectonic imagery to the world's first era of Industrialization, when new technologies found expression in the monuments of the day, such as the Eiffel Tower, London's Chrystal Palace, Paris's Biblioteque Nationale, and New York's old Penn Station. The complexity of program is in keeping with recent aesthetic developments in Islamic Culture, making concession to entertainment and leisure complexes throughout the region. Through establishing itself in the alternative energy industry and by voluntarily giving renewable resources a vibrant role within the local social fabric, the U.A.E. can ensure the longevity of its ascent in a more sustainable world. That is the modest aspiration of this proposal.



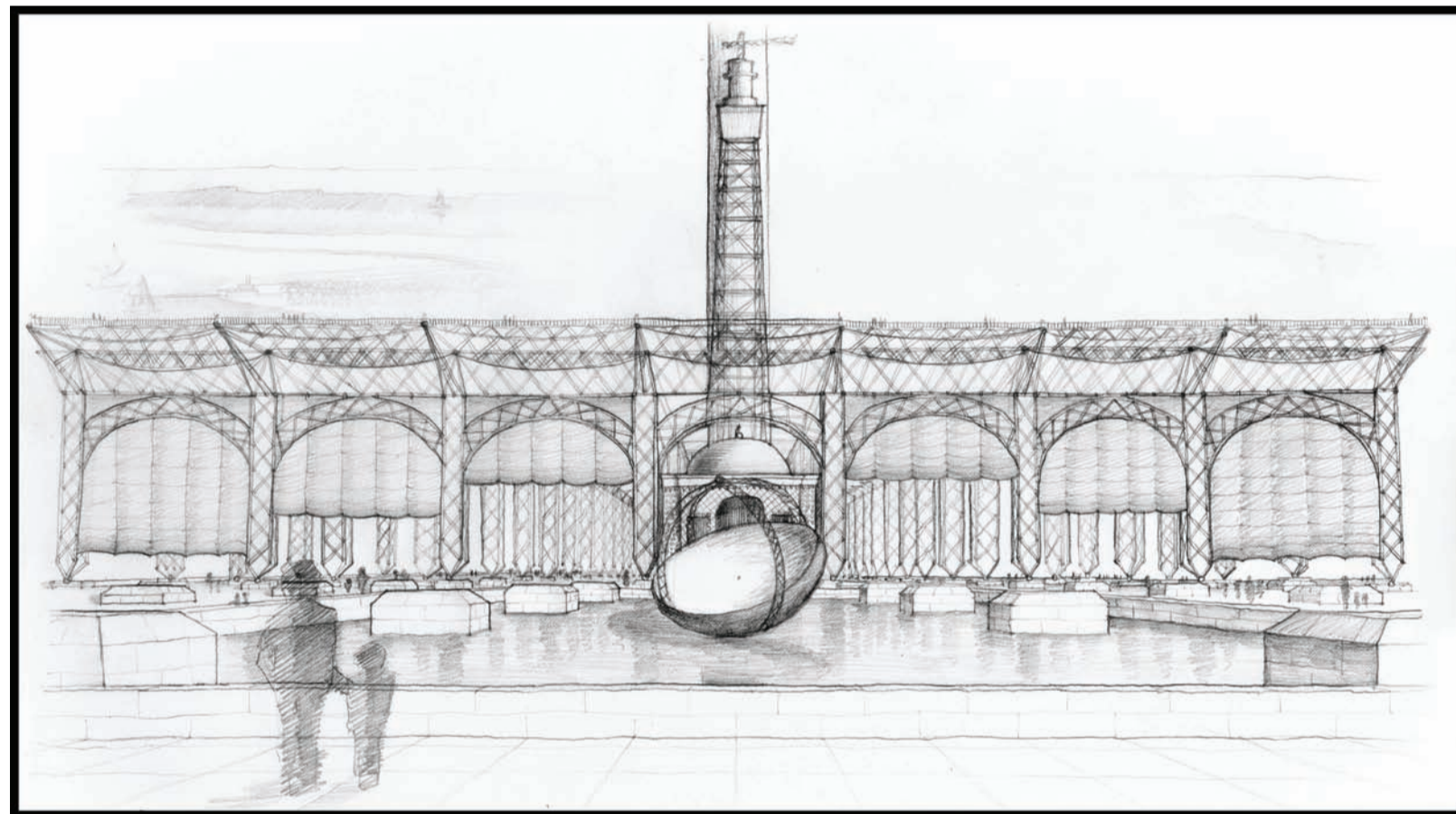




Context – Site #2 : Site Plan

AP-REP is located about 20k east-northeast of Abu Dhabi, between Yas and Saadiyat Islands on a strip of land flanked by on one side by a recently built bypass highway that gives quick access to and from downtown Abu Dhabi on a northerly route to Dubai, about 120k away. The other side is bound by the canalized, marshy back-waters and barrier islands along the coast of the Arabian Gulf. The western edge of the site is a property line, shared by the adjacent parcel. To the east, the site is bound by a canal, which may be traversed by an existing, pedestrian scale bridge to Yas Island. The AP-REP development program calls for a coastal walk way, the ultimate goal of which, from a master-planning perspective, is to continue in both directions, one on dry land, the other crossing the re-purposed foot bridge onto Yas Island to the east.

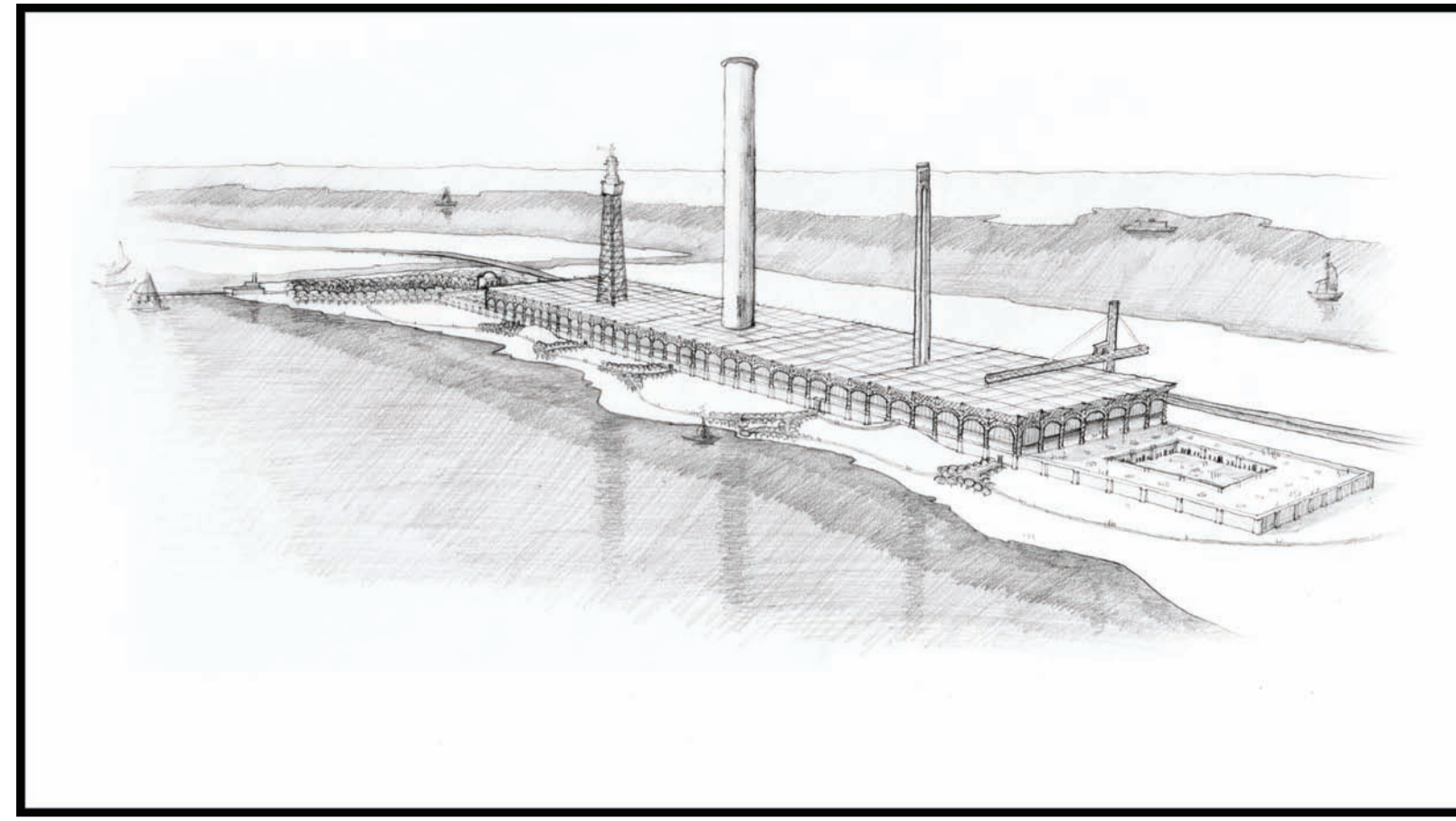
The site is currently flat and sandy. The impact of any earthworks required by construction of the AP-REP facility are minimal and don't alter the geography significantly. Though within the super-structure land is excavated and filled to create a rolling, complex landscape that rises to heights of 8m above sea level and depth of 6 meters below. The masonry of the megalithic plinth is sandstone in order to integrate aesthetically with the site. All steel structures are white, tubular trusses so as to maximize a light, airy feeling.



Procession – Approach : Façade Reflecting Pool Perspective

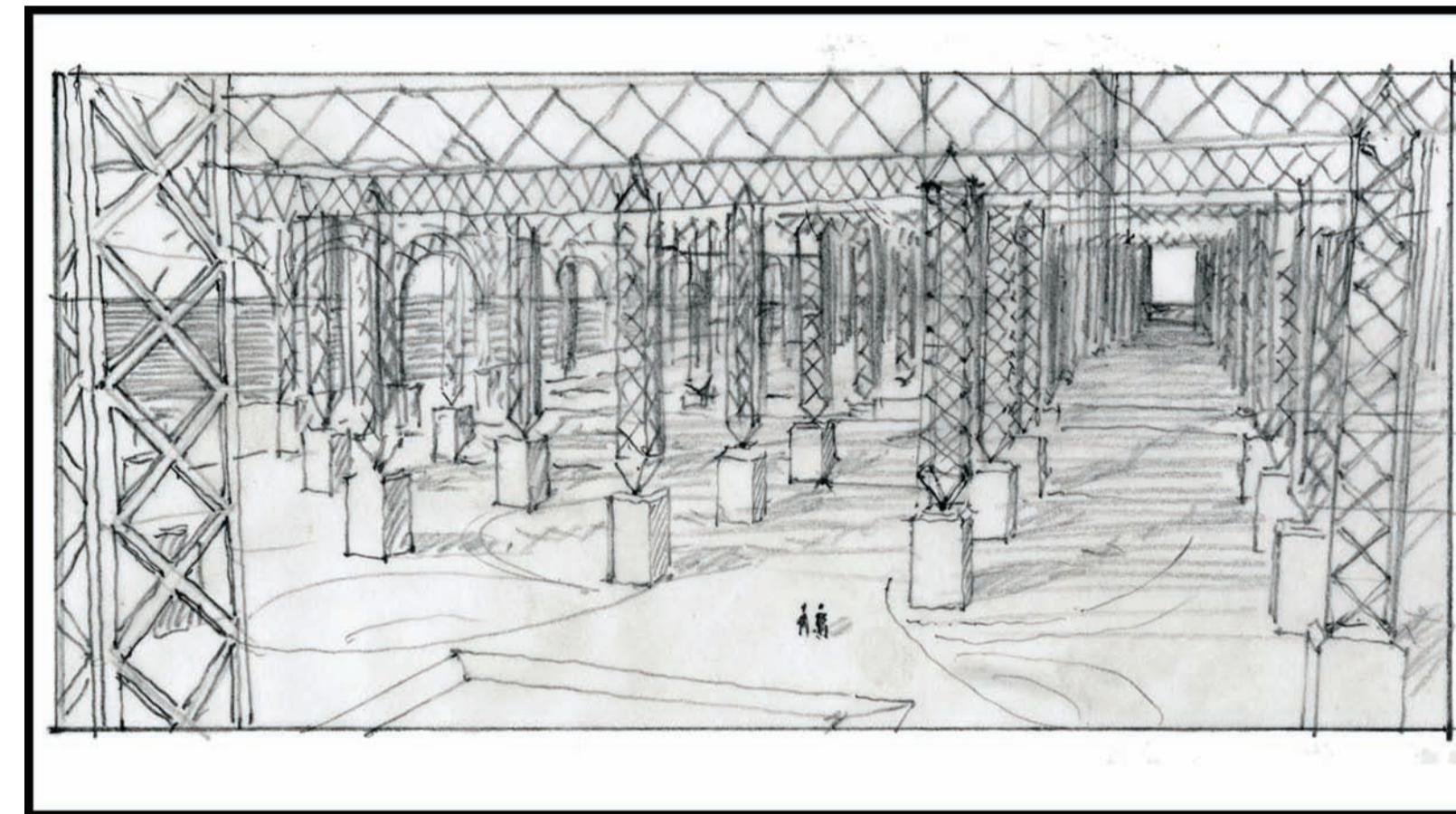
An indoor parking structure<sup>1</sup>, on the eastern end of the megalith, offers a familiar entrée to the site from the highway. Large circular open-air elevators deliver visitors to the roof, which supports a reflecting pool, aflat and a native grass garden.<sup>2</sup> To one side, the grand, masonry, entry hall into the facility<sup>3</sup> reveals a towering edifice and an industrial-scale, open-air hypostyle hall, stretching out to the west. On the other side, to the east of the car park/roof garden, an identical hall containing a grand staircase<sup>4</sup>, provides access to a subterranean series of galleries below<sup>5</sup>, or a wide grassy path above.<sup>6</sup> Both of these lead visitors under or through a fig tree and date palm orchard<sup>7</sup> to a türbe commemorating the benefactors and patrons of this institution. (Far within the depths of the orchard, out near the banks of the canal, stands a lone pomegranate tree.<sup>8</sup>) The türbe marks the gateway to the marina and marina café.<sup>9</sup> It stands proudly on a plinth and observation deck, overlooking the back-waters to the north and the canal leading south. From here a boardwalk extends into the deeper waters offering slips for the pleasure craft of well-healed visitors and water taxis that serve to bring tourists from hotels in the nearby metropolises.

1 The Waking Void 2 The Promise/Foreshadowing 3 The Passage 4 Ascent/Descent of Man 5 Plague 6 Denial 7 The Wilderness 8 Temptation 9 The Station



Essentials : Aerial Perspective

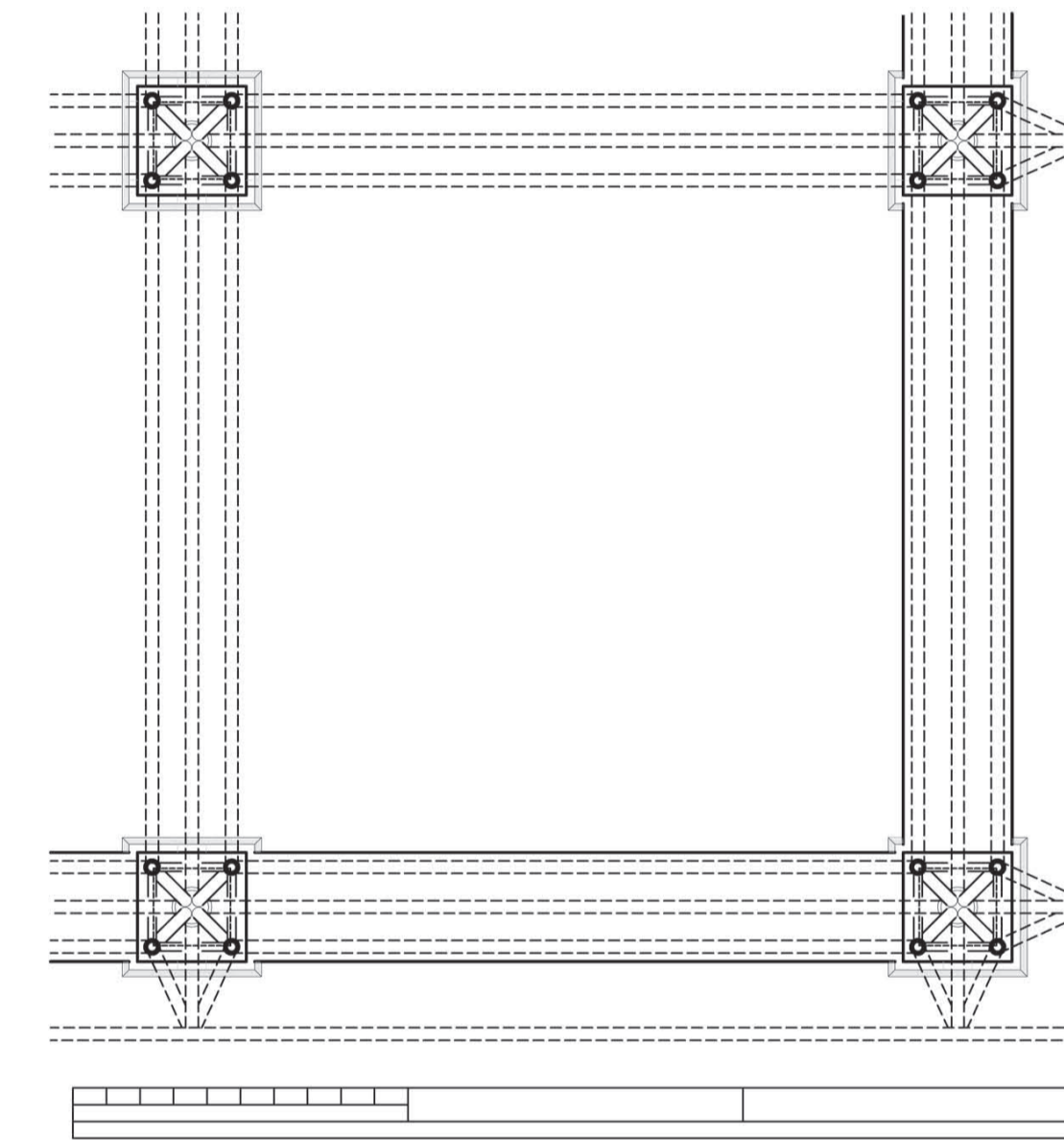
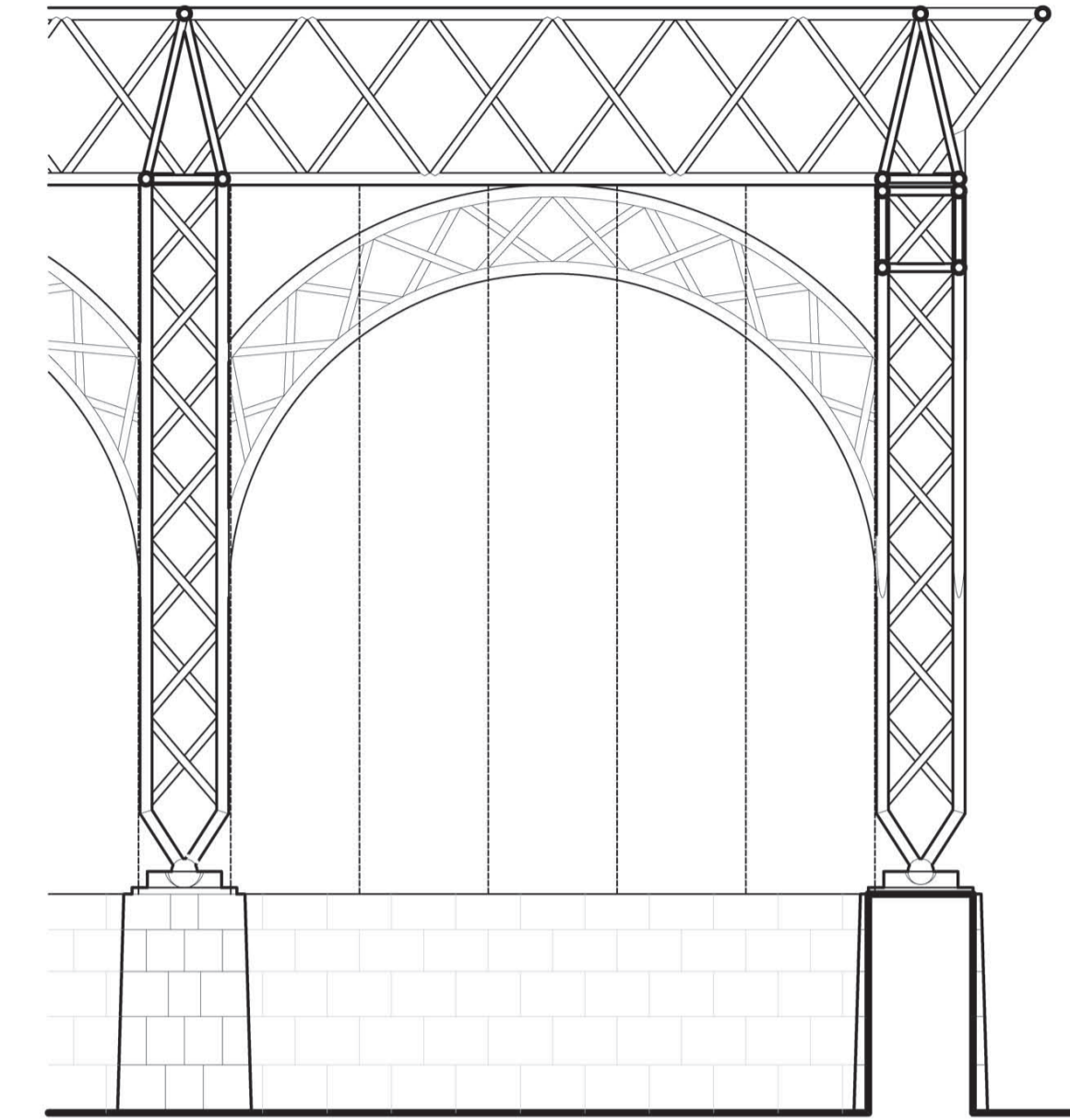
The super-structure is divided into five 160mx160m square sections. Each section is an open platform for a different type of solar energy collection device, each able to be retrofitted with new technologies as they emerge. A retractable crane on a rail track, located along the south side of the structure, provides the means for these transitions. Towers enabling the capture of the sun's energy rise out of the structure, reminding us of power plants and lighthouses. The heliostropic motion of all but one of the solar-collection systems gives expression to the sun's movement and offer dynamic shade as protection from the elements. Foil faced roman-shades at the perimeter are held in position by taught catenaries and are raised or lowered for maximum comfort and to regulate solar exposure in the area beneath the permeable solar-collecting roof. They billow and ripple in the wind as a soft façade.



Procession – Immersion : Interior Perspective

Upon entering the colonnaded super-structure one stands on a platform facing west before an immense hall.<sup>10</sup> It is divided into three major sections. The first is delineated by mounds of earth, large concrete and steel fragments like remnants from an industrial past.<sup>11</sup> The second<sup>12</sup> is the central platform, or ballroom, enclosing the bathhouse. The third is defined by picturesque, naturalistic earth works, canyons and bridges that evoke a Middle Eastern romanticism.<sup>13</sup> The megalithic stone plinth continues beyond the superstructure for another bay. This area has its own car park and entrance, and it is not accessible by the visitors to the Park. It is the home of the solar-tech R&D labs.<sup>14</sup> With a scientist from this area to guide you, one can access portions of the super-structure's roof or visit the observation deck atop the solar chimney.

10 Environment/Domain 11 Subsistence 12 Destiny 13 Abundance 14 Self-awareness



Enclosed within the AP-REP facility are numerous complimentary functions, meant to publicize and promote emerging green technologies:

- \* Research, development, and testing site for alternative power solutions
- \* Shaded exercise park and passively powered bathhouse
- \* Education center and outdoor interactive museum
- \* Lecture and performance spaces
- \* Experimental gardens and botanical conservatory
- \* Elevated observation decks, courtyard café and marina café
- \* Marina exhibit promoting wind-powered travel
- \* Power station for storage of amassed energy, on site use, sale of excess to public grid
- \* River-walk and orchard
- \* Host site for auspicious events, exhibitions, and destination parties

Taking advantage of the natural cooling from winds off of the water and the shade provided by the structure, activities at the AP-REP Site include:

- \* Experimental education kiosks and exhibits
- \* Sub-grade running track and walking trail
- \* Desert climate botanical and agricultural gardens
- \* A library of work-out/dance energy-capturing piezoelectric clothing
- \* Playground for power generation and pumps
- \* Retail facilities for science toys, piezoelectric clothing, and branded souvenirs
- \* Bathhouse/spa facility
- \* Open-air theaters for presentations and performances

All of these activities explain and promote the mission of the R&D facility, which is to explore alternative power generation and illustrate how we can thrive in a benign and symbiotic way with such technology.





ENVIRONMENT / DOMAIN

1 SELF AWARENESS  
ID LABS

2 ABUNDANCE

3 DESTINY

4 SUBSTANCE

5 THE PROMISE  
VISIONARY GARDEN

5A THE PASSAGE  
ENTRY HALL

5B ASCENT / DESCENT  
STAIR HALL

- DOME
- PLANETARIUM
- PLANE
- BALLROOM
- WATER
- SPA

Statement of Park Function

A visit to the Park is meant to be playful, educational and rejuvenating. It is geared toward the celebration of life, both personal and social. In that spirit, it is a place that can host auspicious events. It houses a bathhouse/spa/exercise facility, an outdoor ballroom, an orchard for exploring and picnicking, an interactive landscape/earthwork/art museum, an outdoor science museum, a subterranean painting gallery, and various exhibition spaces for performance. All the while it is shaded by a building-like armature, for which the primary raison-d'être is to celebrate the sun and the positive role it plays, or can play, in our lives.

Key Map to Park Features

A - Primary Perimeter Path

At the edge of the facility's enclosure wall is a gently graded path of generous width that circumnavigates the park's vast space. It offers visitors the opportunity for leisurely walks, a main pedestrian route for accessing distant parts the facility under the superstructure.

B - Secondary Paths

Secondary walking paths weave their way throughout the park, offering visitors changing panoramas, access to intimate spaces, access to interactive art installations, education kiosks, performance/presentation areas and necessary amenities. Grade changes along these paths take visitors through subtle variations in microclimate, over footbridges, spanning the Canyon Track, up or down stairs that traverse terraced gardens, all offering unique views and varied destinations.

C - The Central Platform

The middle bay of the super-structure, within the park's interior, between eastern and western gardens, is a large elevated masonry platform. This is the outdoor ballroom. It is a singular space for weddings, banquets, and parties that seek to make an impact. It houses, beneath it, the bathhouse /spa facility. This bay in the structure is unique in that the technology being developed above it has an impermeable roof, whereas the rest are relatively open to the sky. Below this solid ceiling a gently sloping tensile structure creates a slight dome, capable of being retracted, depending on the required use. At its center, an independent structure rises up to support the solar chimney above. Within this structure, a platform can be raised or lowered, to function as a dais or a lighting/DJ booth. This platform typically holds an interactive lighting display station for visitors as night falls.

D - Ballroom

Why a Ballroom? All of life's activities have a relation to energy. Mammalian life would be unimaginable without the energy of the sun. Human life would be unbearable without fire. Modern life would be unthinkable without electricity. The celebration of life at pivotal moments is perhaps our most significant social expression of the glory of human existence. That is what makes this site a perfect place to celebrate life's rites of passage and its achievements.

The ballroom connects social interactions to physical ones: powered by energy from the sun and cooled by water from the ground, the AP-REP ballroom is a singular space for weddings, banquets, and parties that seek to make an impact. A polished floor reflects the concave tensile dome above, a homage to the centrality of the solar system. Under the solar dome, rhythm and motion of bodies on the dance floor recall revolutions of planets and moons in relation to the sun. Under the solar dome we give our vows and our eulogies commemorating our commitments to one another.

E - Bathhouse/Spa

This facility and the ballroom have their own parking lot and entry point along the south wall of the facility for use by members/regular visitors and auspicious event attendants. It utilizes the heated water from the concentrated solar thermal generator and cool water from ground-source heat pumps to run its facilities. Its structure is the same as the plinth wall surrounding the facility - solid masonry in the form of catacombs to insulate the interior spaces of the spa, per their use. Light is delivered through openings at the edges and translucent stone panels and open oculi in the floor of the ballroom above, along with decorative LED lighting, as required.

F - Night Lighting/Interactive LED Light Shows/Laser Projection

While the primary activities of the park occur during daylight hours, its program encourages dusk and night-time uses. Centrally controlled LED display lighting is integrated into the steel super-structure, offering opportunities for interactive pattern manipulation scrolls, VJ art performances, an animated constellation display that follows the movement of the night sky, and iPhone App interactivity exhibitions. Additionally, the structure offers temporary and permanent laser projection displays that utilize the aluminum-faced shades or the tensile roof structures for projections screens. A planetarium-like exhibition and education program is one potential use for this system on the tensile ceiling of the ballroom.

G - Botanical/Agricultural Program for Eastern and Western Flanks of the Park

Topographical changes within the facility's interior landscape on the western side of the park are defined by earth terracing. Terraces follow the organic plan of the design here, creating subtle variations in micro-climate. While providing the naturalistic visual appeal implicit to the ancient farming technique, these terraces also offer locations for agricultural exhibits for research and experimentation.

On site botanists, agriculturalists, and gardeners share space within the far western plinth structure, where the Solar Tech R&D scientists have space for offices and labs as well as occupying space beneath the central 'ballroom' where the bathhouse is located.

The topography in the eastern end of interior landscape is reminiscent, in form, of concrete factories and modern mining store-houses. Large piles of earth packed up against imposing masonry walls and held back by large curved, sculptural slabs of steel and concrete mimic raw materials mined for industrial uses. But these piles of earth have top soil that facilitates an enormous, decorative botanical garden, reminding us simultaneously of nature's inevitable return and the role of humanity in sculpting a place worth being, even an a barren place.

H - Canyon Path/Running Track

A 1 kilometer long running, biking and walking path weaves its way through the columns of the hypostyle hall. It is situated within a canyon of stone to provide a cooler environment for these activities, which would usually be driven indoors by the local environment. The canyon walls are at times composed of cut stone to appear ancient and at other times boulders to evoke the dry river beds that only carry water after infrequent heavy rain in the region, known as wadis.

Along the route, one encounters fitness stations built of stones and eroded logs, naturalistic seating areas, and informational displays and interactive exhibits. The canyon path diverges at times to offer routes of alternative distance, for shorter or longer runs, but also to keep someone who wants to exercise from entangling with someone who wants to stroll and learn. The grade of its dirt floor undulates to strengthen the impression of a natural setting.

I - Craters and Domes/Planetary Spheres

Monolithic metal ellipses, like the sliced leftover of giant spheres perch atop, sink into and burry themselves in the landscape of the eastern bays of the park's interior landscape. They invite visitors to descend into craters for cooler temperatures, to relax and lounge in their embrace and protection. They can be ascended for a lookout of the surrounding areas, or entered to discover messages revealed through perforations at various times of day as the sun passes through etchings in their exterior shell.

J - Dune Intrusion/the Sands of Time

Dunes are incorporated as some of the exterior landscaping features along the northern edge of the park. At points the dunes rise up to meet the top edge of the plinth wall, spilling over into the interior landscape. At other points the plinth wall disintegrates, as if a ruin, for another opportunity for the dune to interact with the interior park functions. Atop the dunes one can get panoramic views of the entire park and views north and west into the backwaters that extend to the sea.

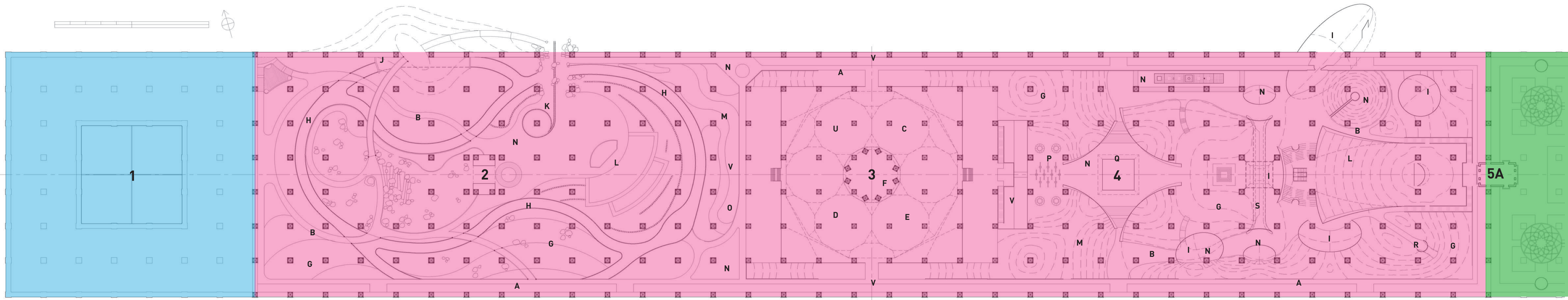
The soft dunes provide climbing, rolling and sitting opportunities for children and adults to play. Where the dune leans against the plinth wall, in some locations there are other interactive ways to engage the dune. Through a hole in the wall a sand slide can be ridden to feel the effect of gravity on the earth. Children can feel what it's like to move the earth by carrying a bucket from the bottom of the slide back up to the top of the sandy hill. The plinth wall transitions from stone to glass in places to expose the sedimentary layers of the dune as it reaches down below the sea level and to display life below the surface.

K - Spiral Falaj/The Waters of Time

A long narrow trench cuts through the crumbling plinth wall from the waters of the ocean. Once it has entered the park, it descends, spiraling to a central pool surrounding a masonry structural pier. The pillar will display seawater levels on markings as water flows in and out of the pool with the tide and with a rising and lowering water table. A falaj, a singular channel, is a narrow stone-lined canal, used for irrigation within a larger, ancient system known as an aflaj. Aflaj were, and continue to be in some locations, vital, man-made, underground water routing systems in the Middle East. Traditional aflaj transported fresh water, while this falaj is connected to the sea. The declining water table has dried up most of the ancient aflaj, rendering them of little impact. Consequently the region relies more and more on desalination and modern water pumping technology for human and agricultural use.

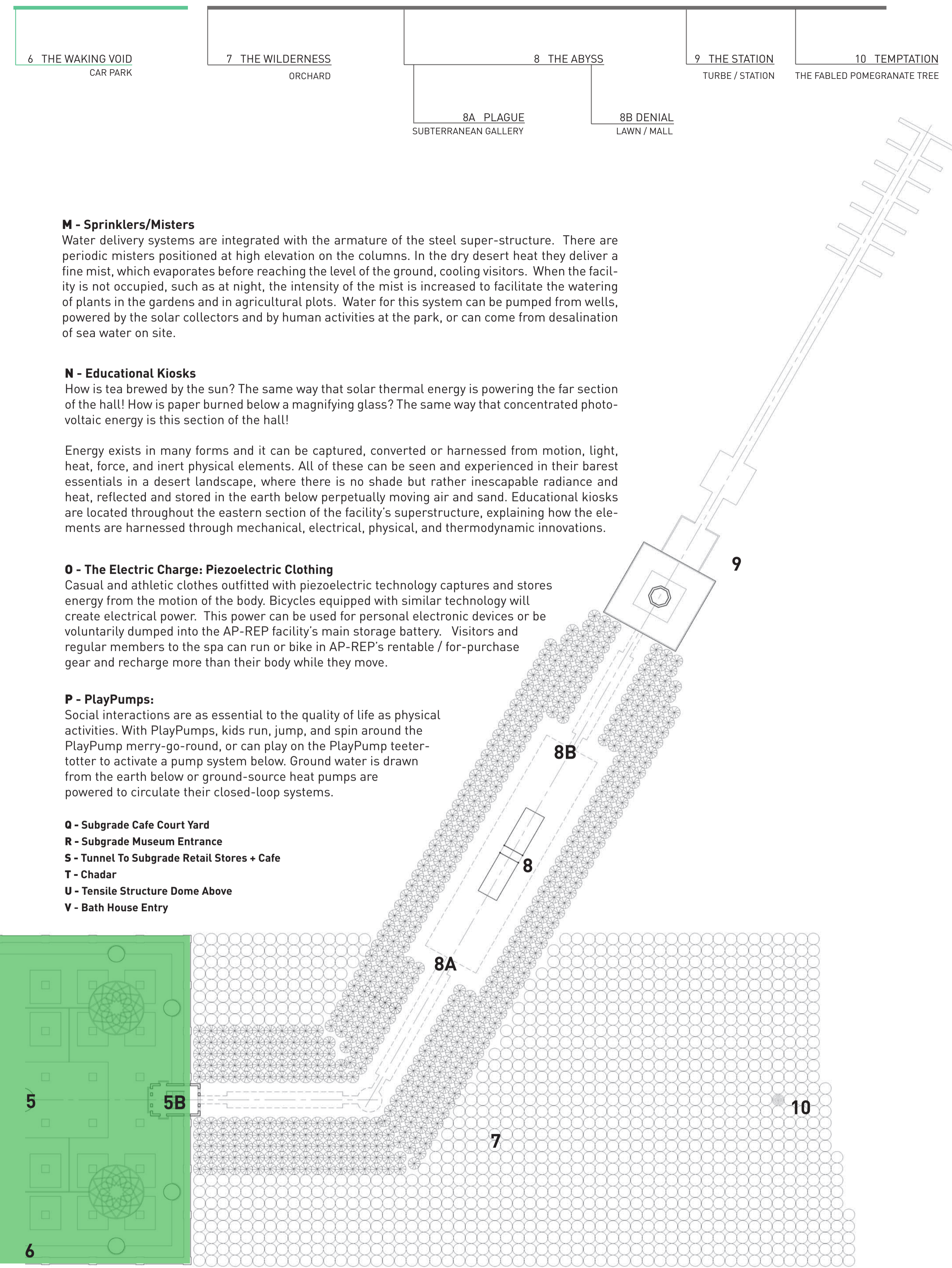
L - Amphitheaters

Both eastern and western areas of the park provide amphitheaters embedded in the landscape. Their potential uses include the presentation of lectures, musical concerts, and Cirque Du Soleil-like performances. The structural grid above allows for infinite rigging possibilities for acrobatics by professional performers as well as opportunities stationary VIP hammock box-seats. Smaller, dynamic hammocks located throughout the park provide everyday lounging and playing opportunities for visitors.





THE ETERNAL VOID



**M - Sprinklers/Misters**  
Water delivery systems are integrated with the armature of the steel super-structure. There are periodic misters positioned at high elevation on the columns. In the dry desert heat they deliver a fine mist, which evaporates before reaching the level of the ground, cooling visitors. When the facility is not occupied, such as at night, the intensity of the mist is increased to facilitate the watering of plants in the gardens and in agricultural plots. Water for this system can be pumped from wells, powered by the solar collectors and by human activities at the park, or can come from desalination of sea water on site.

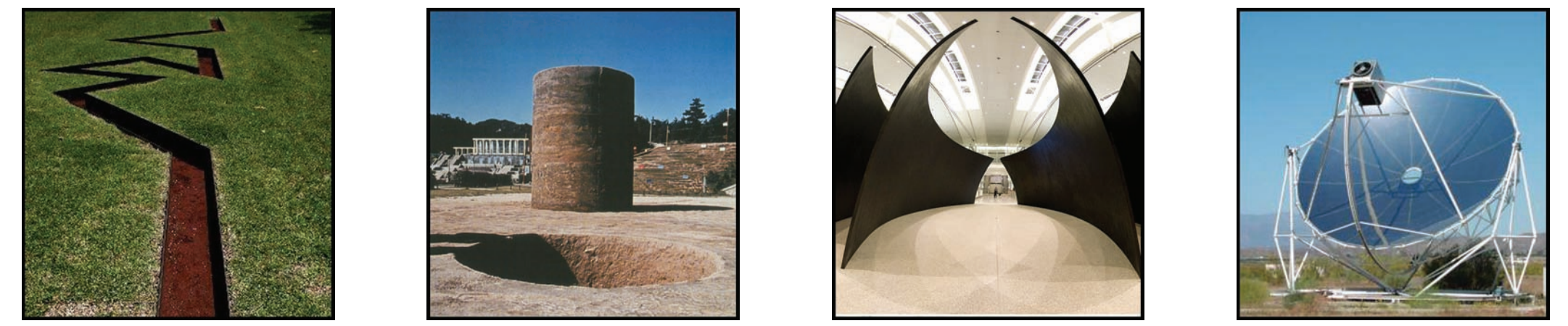
**N - Educational Kiosks**  
How is tea brewed by the sun? The same way that solar thermal energy is powering the far section of the hall! How is paper burned below a magnifying glass? The same way that concentrated photovoltaic energy is this section of the hall!

Energy exists in many forms and it can be captured, converted or harnessed from motion, light, heat, force, and inert physical elements. All of these can be seen and experienced in their barest essentials in a desert landscape, where there is no shade but rather inescapable radiance and heat, reflected and stored in the earth below perpetually moving air and sand. Educational kiosks are located throughout the eastern section of the facility's superstructure, explaining how the elements are harnessed through mechanical, electrical, physical, and thermodynamic innovations.

**O - The Electric Charge: Piezoelectric Clothing**  
Casual and athletic clothes outfitted with piezoelectric technology captures and stores energy from the motion of the body. Bicycles equipped with similar technology will create electrical power. This power can be used for personal electronic devices or be voluntarily dumped into the AP-REP facility's main storage battery. Visitors and regular members to the spa can run or bike in AP-REP's rentable / for-purchase gear and recharge more than their body while they move.

**P - PlayPumps:**  
Social interactions are as essential to the quality of life as physical activities. With PlayPumps, kids run, jump, and spin around the PlayPump merry-go-round, or can play on the PlayPump teeter-totter to activate a pump system below. Ground water is drawn from the earth below or ground-source heat pumps are powered to circulate their closed-loop systems.

- Q - Subgrade Cafe Court Yard**
- R - Subgrade Museum Entrance**
- S - Tunnel To Subgrade Retail Stores + Cafe**
- T - Chadar**
- U - Tensile Structure Dome Above**
- V - Bath House Entry**



CPV	PV	Solar Chimney	Solar Thermal	CIGS
Annual energy output (MWh) 1,476.30	Annual energy output (MWh) 973.08	Annual energy output (MWh) 551.59	Annual energy output (MWh) 159,230.31 (622,908,972,720.00 BTU's)	Annual energy output (MWh) 2,957.01

AP-REP's Technology

The AP-REP super-structure has been designed to be a platform for five existing solar technologies, all of which are commercially available and in use today, but are not yet cost-competitive. Innovation is still required mainstream these commercial technologies. Repositioning these and other technologies, such that they become ubiquitous and inarguably modern features in the landscape is AP-REP's goal. This is a vision of a near future: modernity that aspires to harmony between nature and human nature is its core thesis. The initial cost of this facility is estimated to be between US\$1b and US\$2b.

The sun's energy is captured on the rooftop of the great hall through photovoltaic, concentrated photovoltaic, solar thermal and solar convection technologies. Photovoltaic energy is used in two sections, employing different technologies: tandem junction amorphous silicon (a-Si) and copper indium gallium selenide (CIGS), both of which attempt to solve the issue of cost in different ways. A-Si can be produced in extremely large panels, highlighting that its solution to the cost problem is scale. CIGS can be produced in flexible strips of extremely small sizes, highlighting that its solution is volume. Both technologies can be used in building-integrated photovoltaic [BIPV] products, emphasizing that their goal is not simply energy generation, but also efficiency. BIPV enables distributed generation, giving people the benefit of powering their homes, vehicles, equipment, and appliances independently. Both a-Si and CIGS have the potential to displace a portion of revenues in the construction industry that go towards inefficient or single-use materials. Capture of just 0.05% of the world construction market will reap benefits of close to \$2 billion dollars a year.

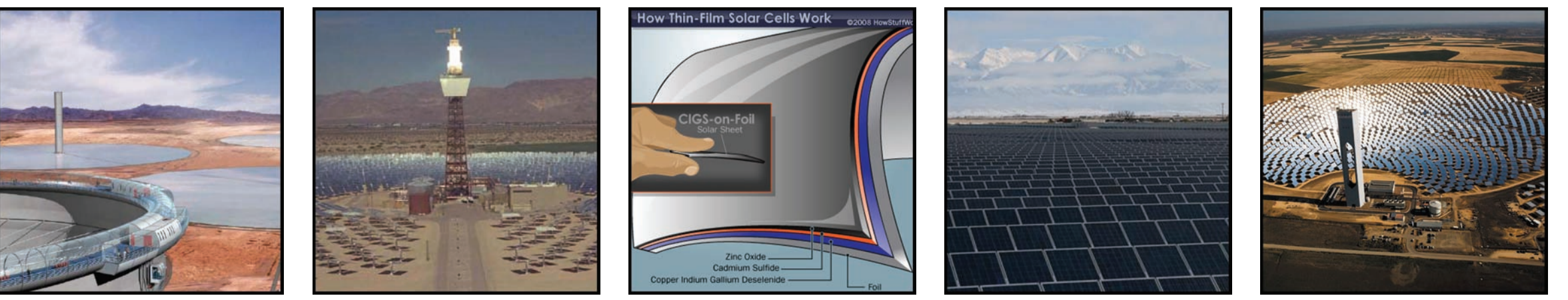
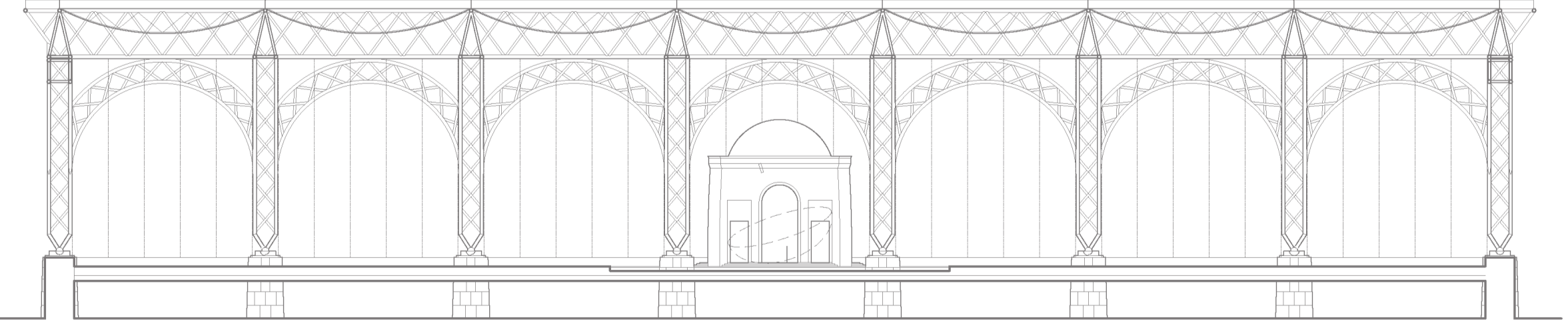
Concentrated photovoltaic (CPV) and concentrated solar thermal are used in two other separate sections. These technologies seek to solve energy and cost problems through massive scale and centralized designs. They are appropriate where cheap land is available and solar resources are abundant - such as desert lands. CPV uses mirrors to reflect radiant energy from the sun, concentrating it onto a single photovoltaic collector. The collector converts the solar energy to electricity in the same way as a-Si and CIGS - by passing the radiant energy through a semiconductor material which draws out electrons and creates the current that is electricity. Solar thermal reflects radiant energy from the sun to a collector which contains water. Water temporarily stores heat energy, which can be used directly or converted into power to be stored long term. Both of these technologies have the potential to displace large-scale fossil fuel facilities. Just a 0.05% redirection of global energy revenues will earn over \$1 billion dollars in a year.

The last technology used on the AP-REP roof is a solar chimney. This is the lowest cost solar technology, but also the least efficient. Radiant energy from the sun heats air below the glass roof of a low, flat enclosure. As the heated air rises, the stack in the center of the structure channels the air upwards. A turbine within the tower uses the resulting updraft to create electricity. Simply put, convection created by confined radiant energy generates power.

These five technologies highlight the possibilities for harnessing solar energy: electricity, heat, and convection are but a few. The Innovation Center housed within the labs in the low, western-most bay invites scientists and product developers to collaborate on refining existing methods and creating new ones in order to solve critical issues of the 21st century in a practical and sustainable way. The hall itself and the structure above provide the opportunity for these innovations to be showcased to the citizens of and the visitors to the U.A.E. A solar technology innovation that captures just 4% global solar market share would earn \$1.4 billion a year.

5 Return on Investment Scenarios	Value of Outcome
1 <b>GOING CONCERN:</b> Operates indefinitely as an R&D, science, learning, recreation & entertainment center	189.5
2 <b>CONSTRUCTION:</b> An on-site building-integrated PV technology transforms construction industry, attracting 0.05% of annual construction expenditures	1,909.9
3 <b>ENERGY:</b> On-site technologies achieve subsidy-free (US) grid-parity for centralized utility scale deployment, earning equivalent of 0.05% of annual global oil and gas revenues	1,219.0
4 <b>TECHNOLOGY:</b> An incubated solar technology disrupts marketplace and becomes solar PV industry standard, gaining 4% solar market share	1,484.0
5 <b>ALL OF THE ABOVE</b>	4,612.9

Commercial Building Electricity Energy Intensity	
Energy use / square foot (MWh / year)	0.027
Energy use / square meter (MWh / year)	0.002
Energy requirements in our building (MWh / year)	317
Rooftop energy generated per year (MWh)	165,188
Energy surplus (deficit) (MWh)	164,871



AP-REP

The Alternative Power Research and Exhibition Park  
for the  
**Land Art Generator Initiative**

Presented by the Studio for the Production of Reality  
In collaboration with The Windmill Factory Artist Collective

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