

In and Of the Rock

Drawing "a teacher or monitor", tunnel in Paris Catacombs

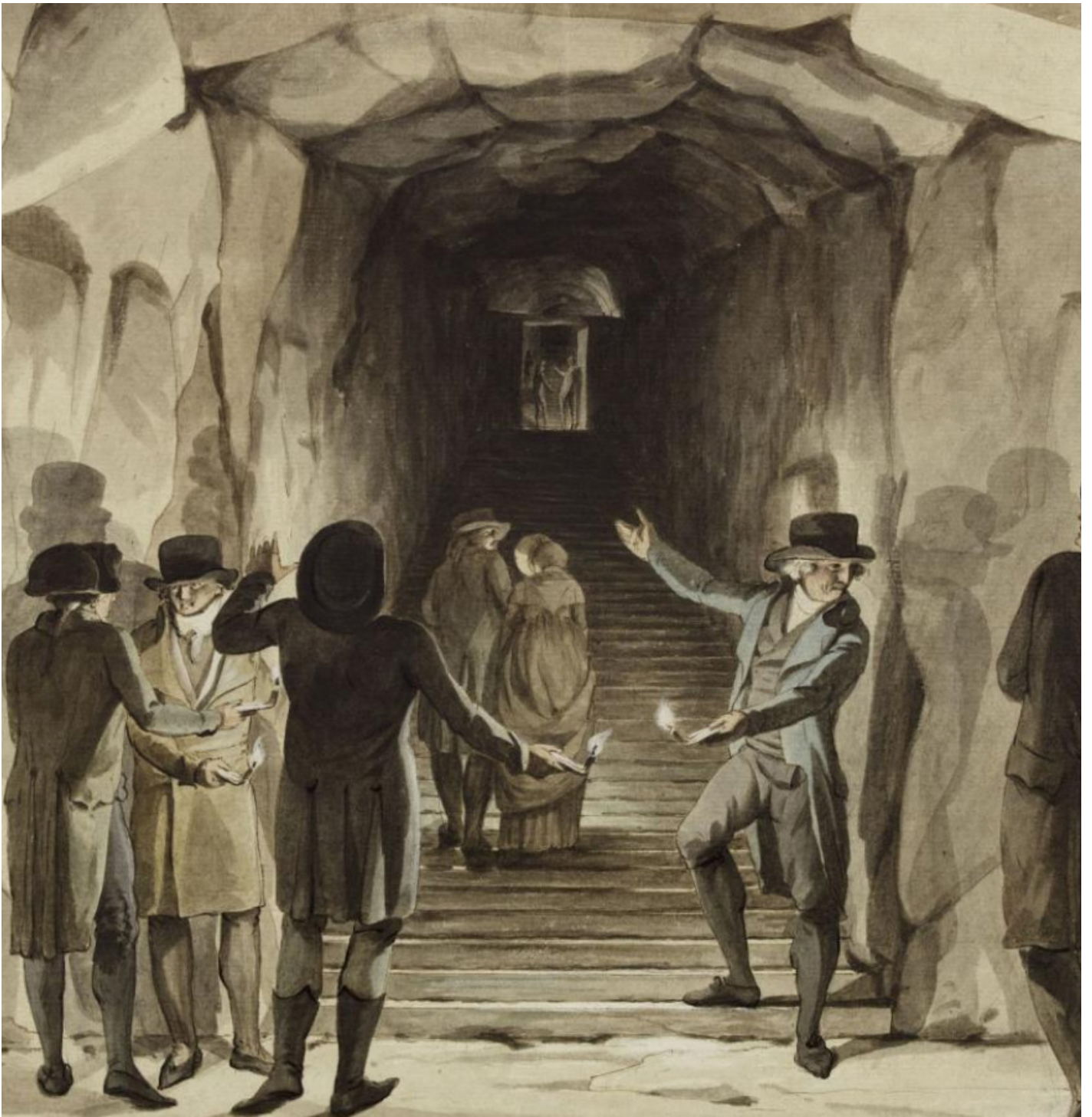


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3	<i>Abstract</i>	Spirituality in Gibraltar follows its own local logic.	- The project acknowledges Gibraltar's "blended" identity and anticipates future blending with new and different communities.
5	<i>Beyond the Rock</i> Photographs Collective Position Five Propositions Site Information and Drawings	Around the base of the rock, in the dense town and port, cultures mix and intersect and negotiate in streets and buildings. Churches, mosques and synagogues, religions have found places – sometimes highly traditional senses in their symbolism, sometimes not. These communities reach a balance and form the dynamics of the peninsula. The compression reinforces the difference of certain beliefs, a fierce shared sense of coexistence as well as a multi-faith and Gibraltarian identity. Currently, they share a cemetery located at the junction of the airport and the city center, not just creating a religious blending atmosphere, but also being under the pressure coming from invasive city expansion.	- Preference for ecological treatment of corpses will correspond to decline in "traditional" burial; the interior climate of the Rock is more stable and predictable than the exposed surface soil.
25	<i>Individual Site</i> Information Drawings Photographs		- The relocation of the cemetery makes space for the living.
30	<i>Individual Discourse</i> Precedent Studies Visualized Evidence Architectural References Expert Conversation		- The designer designs tools, rules, and possibilities, not spaces, rituals, or meanings.
64	<i>Individual Contribution</i> Description Outcomes and Deliverables		- Design can incorporate paradoxes: fragility and stability; folly and necessity; lifetimes and eternities.
80	<i>Bibliography</i>	Above the settlement, they make designs in, on and around the Rock. Technologies, structures, and spaces from different centuries have erected a vibrant vein of the Rock, as if the Rock is evolving by itself. From prehistoric burial chambers undergoing hi-tech archaeological research to world-war tunnels reinvented as tourist destinations, from man-size caves to large tunnels enabling transportations to pass through, incursions into the Rock such as abandonment, reinforcement, renovation and extension are made according to available technology for the rituals and requirements of the day.	Zhichao Tu ^(CN)
82	<i>Afterword</i> Reflection: Individual Contribution in Relation to Collection Position and Individual Discourse	Developed trajectories of both tunnels and religions are similar, they can reflect and compensate each other, allowing both contradiction and similarities co-exist simultaneously. This project takes the phased relocation of Gibraltar's multi-faith cemetery from its hard-to-survive site on flat ground and prime real estate adjacent to the airport, to a steeply sloping, east-facing site of defunct "Water Catchment" that are barren lands nowadays as the basis both for reassessing spirituality in, on and of the rock, and for reinventing the ways in which spaces are made in, on, and of it. The shared funeral system with introduced ecological methods continuously change the life forms and textures of the Rock with the help of vegetations as new tombs, which is slow in process but full of energies, making a comparison with the high-speed developing urban environment.	
		Life does not end but continues in another way.	



As Found Propositions

Photographs from authors during
fieldtrip in Gibraltar, June 2019

Beyond the Rock

Spatial interventions define and are defined by flux. Fluxes manifest in infrastructure, urban arrangements, buildings, and rooms, guiding, directing, and facilitating our movement. Simultaneously, the practice of movement defines our perception of space. On land we orientate through boundaries, borders, obstructions, and divisions between fields, regions, and states. At sea, our position is determined by intersecting lines of connections through distant objects, creating reference points and networks.

Gibraltar—a small peninsula on the southern tip of Europe—has been one of these reference points for many years. The stable presence of the Rock has been central to many stories, myths, and projects—from the Pillars of Hercules to the dream of Atlantropa. The 421-meter-high limestone formation has been a reference point for sailors, a strategic location for military garrisons, and a crucial stopover for migratory birds and insects. Gibraltar is therefore associated with being a stable, static, and steadfast small town, where one only ends up by virtue of circumstance.

However, Gibraltar is anything but stagnant. Surrounded by water, the territory is part of a global trading network characterized by the movement of cargo, passengers, and migrants. It lies in the midst of the Strait, to which the peninsula lends its name, which defines and unfolds the dynamic, fluctuating, and ever-changing condition of the territory.

As maritime choke points, continental straits determine the rhythm, capacity, and intensity of shipping patterns. Located between two polarities, they pose an inherent condition of tension, conflict, and imbalance. As such, straits channel and catalyze flux. Where there is difference, there is flux; where there is flux, there is dynamism. The Strait of Gibraltar, too, can be understood in such terms—strategically located between two continents, it separates the Atlantic Ocean from the Mediterranean Sea. On its edge lies Gibraltar—the entry point to the Mediterranean.

Gibraltar is a relatively unimportant yet historically significant entity; the peninsula is a mere 6.8 sqkm with 33,000 people living almost exclusively on the west side.

Around 250 Barbary macaques and many other species live or stopover in the Upper Rock Nature Reserve, covering 36% of the land. Gibraltar is still crucial in its wider context. Over the course of history, the seemingly insignificant territory has been fought over, conquered, isolated, and reconnected by many. Early Islamic settlers from 711 AD conceived of the city as a fortress; in the sixteenth century the old town started to extend from the Moorish Castle, and the following centuries saw Spanish and Anglo-Dutch troops taking hold of the Rock. Their defenses, moles, batteries, and bastions shaped its surface, while tunnels and excavations shaped the interior of the Rock.

When the end of Great Siege (1779–1783) temporarily stabilized tensions, Genoese, Portuguese, and Moroccan merchants made their way to Gibraltar to make their fortunes at this British trading outpost. In the nineteenth century this multicultural community expanded the city into reclaimed land and onto the Rock, leaving their architectural marks on the city. Today, Gibraltar remains a British Overseas Territory but with separate legal jurisdiction. It is said that as long as the monkeys stay, the British won't leave. But that, soon, might change. Could we reimagine Gibraltar as an autonomous territory?

Independence and Interdependence

Gibraltar is not an island, yet it is prone to isolation. Without any natural resources, the peninsula is highly dependent on its relationship with its surrounding context. This has put tremendous pressure on its border—a 1.2-km-long threshold beneath the Spanish town of La Linea. As Gibraltar is highly dependent on imports and cheap labor from Spain, obstructing this frontier can have a dramatic effect on Gibraltar's economy. As such, it forms an important bargaining tool for its neighbor.

Since the 1713 Treaty of Utrecht officially assigned Gibraltar to the British, Spain has tried to reclaim the strategic outpost by force and persuasion. Gibraltarians, however, want to stay British; in the 1967 sovereignty referendum, a massive majority of 99.6% of Gibraltarians expressed their eagerness to remain under British rule.

As a response, Spanish dictator Francisco Franco restricted all forms of trade and traffic across the border, leaving Gibraltar with no other option but to turn to northern Europe and Africa for

help. For 16 years, until the border fully reopened in 1985, the UK, the Netherlands, Portugal, and Morocco provided the territory with food, water, medical oxygen, and construction materials by sea and air. Franco's actions also forced Gibraltar to look inwards, identify its strengths, and make alliances to overcome its weaknesses.

Following the reopening of the border, the government of Gibraltar actively rebuilt its economy by accentuating its differences from its surrounding context. Over the past four decades, three major industries have emerged—in the 1990s tourism and ship refueling (bunkering) began to account for a significant daily in- and outflow of both people and ships. Financial services then emerged as another major industry after beneficial tax policies implemented in 2009 attracted foreign investors and online gambling enterprises. The boost to employment and general shift towards high-end residential development has brought a significant temporary population increase in recent years, mainly from the UK. These have negated some of Gibraltar's dependencies, but the built environment is still highly dependent on Spain.

Up to 12,000 tourists a month at the cruise terminal, peruse Main Street, and take the cable car for a quick visit on the Rock to illegally feed the monkeys, while 15,000 workers cross the border from the neighboring Spanish town of La Linea every day.

With limited options for urban expansion, the local construction market is highly competitive. Fast-paced developments arise on reclaimed land and former British military grounds, over which the local authorities have little to no control. Often initiated by Spanish contractors and private investors, building culture is characterized by a case-by-case system with little room for architectural innovation. In turn, Spanish urban planning culture restricts Gibraltarian architects to their familiar territory.

How can Gibraltar expand its architectural context and open new doors for its architects?

While the political situation of the European Union and the United Kingdom are destabilizing, Gibraltar finds itself in an ever-more vulnerable state.

However, opposite the Strait in Morocco and Algeria, solar and biomass energy sectors are rapidly evolving. They are likely to result in large-scale urban and infrastructural expansion, creating major investment opportunities in northern Africa.

In this projection, Gibraltar aims to monetize these opportunities by shifting its gaze to Northern Africa, plugging into the energy circuit south of the Strait.

As such, Gibraltar's potential, importance, and territory are no longer defined by its administrative borders, but rather in relation to the networks it operates within.

What could be the repercussions on the local building culture of Gibraltar?

If Gibraltar wants to gain control over its precarious condition then one thing is inevitable—connection.

As new and improved infrastructural connections create opportunities for investment and expansion in and around Gibraltar, improved connection to Morocco enhances the capacity of energy, freight, and capital flows across the Strait.

Gibraltar's beneficial tax policies make import through the territory appealing for both Europe and Africa, accelerating urban expansion and economic growth in nearby cities.

For Gibraltar specifically, the change means that the territory transforms from a geopolitically insignificant peninsula to a crucial node in the intercontinental trading network.

How can Gibraltar exploit this new nodal condition, and how can architecture assist that?

3) Gibraltar as Destination

A transport hub integrated within Gibraltar's urban tissue concentrates all traffic and freight, distributing the flows along and across the territory. By expanding its context to Africa, economic opportunities attract migration from its surrounding area, creating potential for Gibraltar to become more attractive to investors, tourists, and residents. Additionally, the optimization of ferry routes between Africa and Europe enhances the overseas connection for passengers. How can spatial strategies accommodate and optimize these new and intensified fluxes?

4) Population Growth and Urban Expansion

When financial opportunities open up, people from other countries arrive to reap the rewards. Improved maritime connections and accessibility strengthen the capacity, speed, and frequency of traffic across the Strait, and are thus projected to bring a substantial population increase—laborers from Northern Africa and investors from China are shifting their gaze from Africa up to Gibraltar. To accommodate this population increase, Gibraltar is projected to expand and densify into the sea as well as on land, following its existing strategies of long-term planning on the west side, and rapid reclamations on the east side. How could the peninsula deal with the contested changing coast lines, and how would these new communities express themselves in public space?

5) Climate Change

Gibraltar's natural water borders form not just a connection across the Strait, but also a threat to its expansion. While rising sea levels amplify the spatial pressure on the territory, rising temperatures, extreme weather events, pollution, and overfishing have resulted, and continue to result, in mass extinction and biodiversity loss to which the unique species in Gibraltar are especially vulnerable. How can we reconsider these crucial thresholds between the city and the water, and the city and the Upper Rock, accommodating both human and non-human populations?

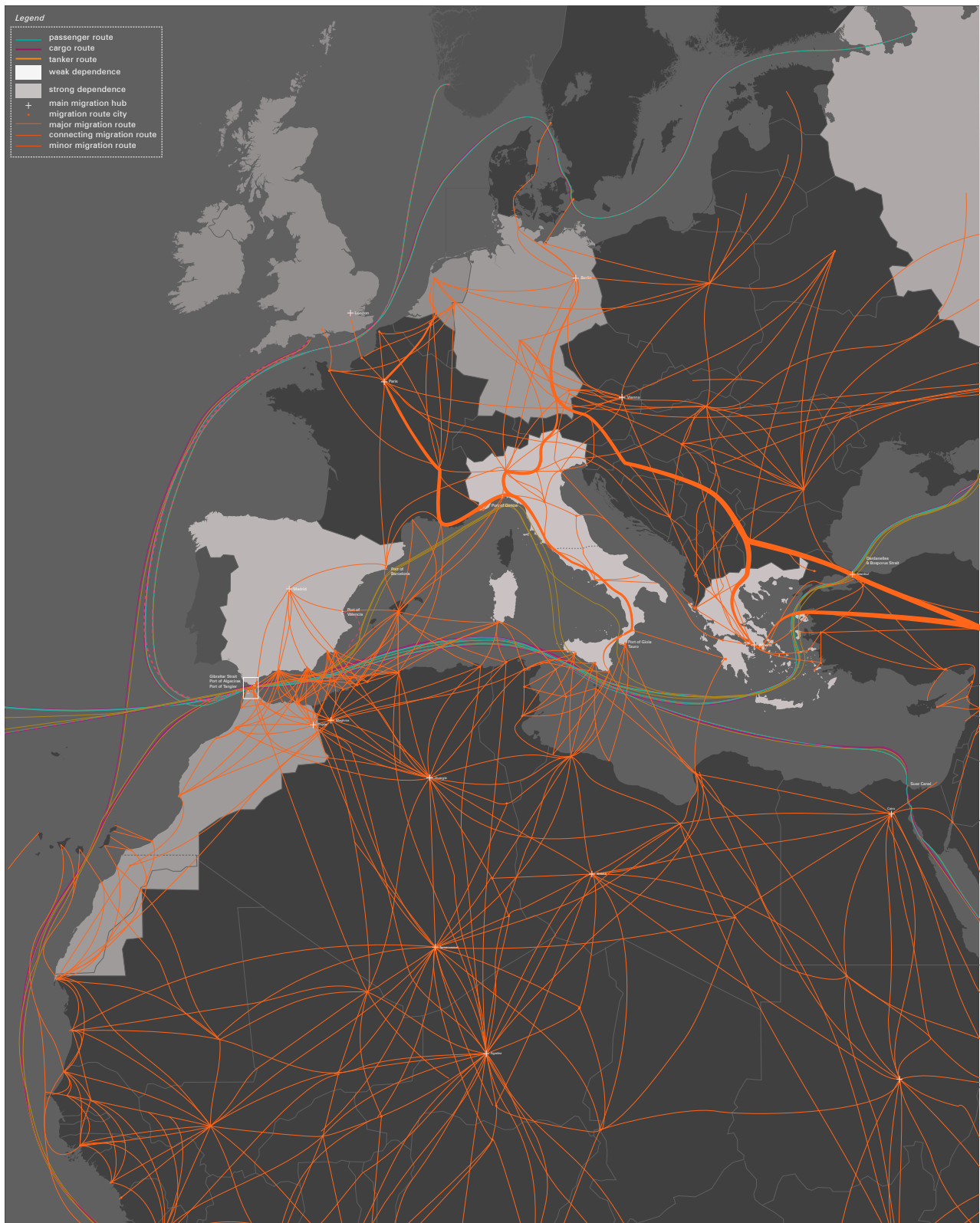


Gibraltar: The Built Environment



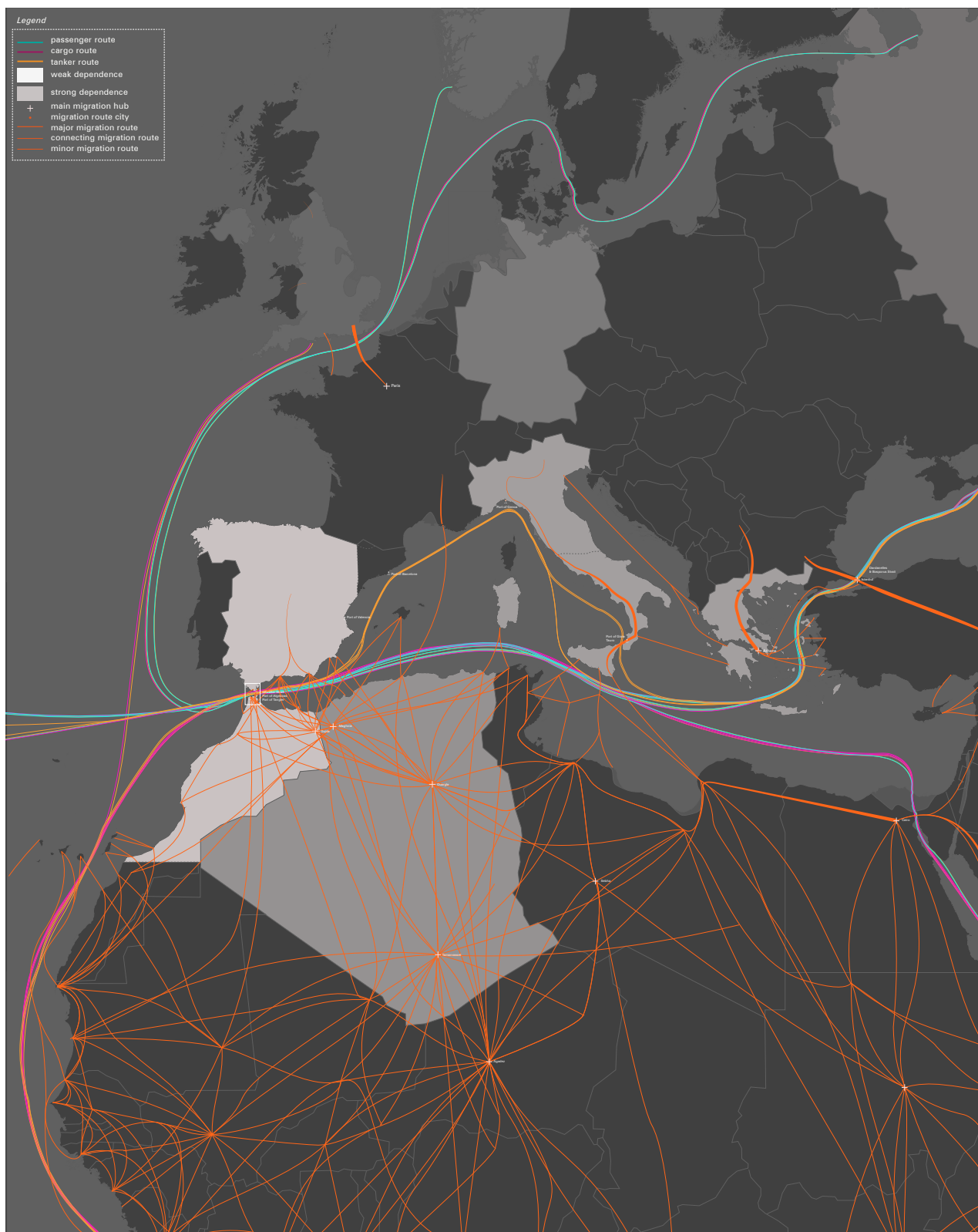
Site location of Gibraltar

1) Geopolitical Shift



2020

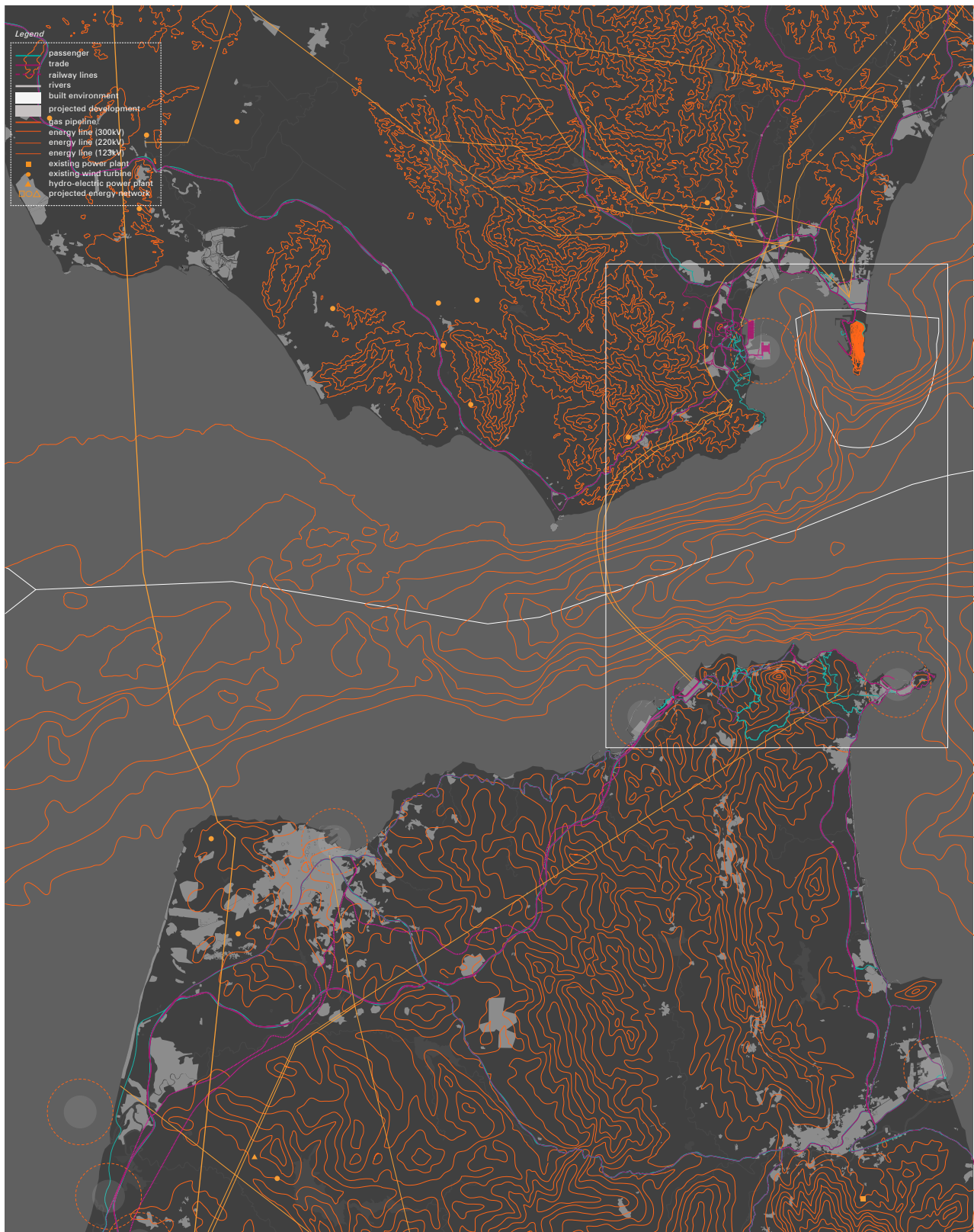
The Territory of Gibraltar: map with present dependencies and migratory routes



2050

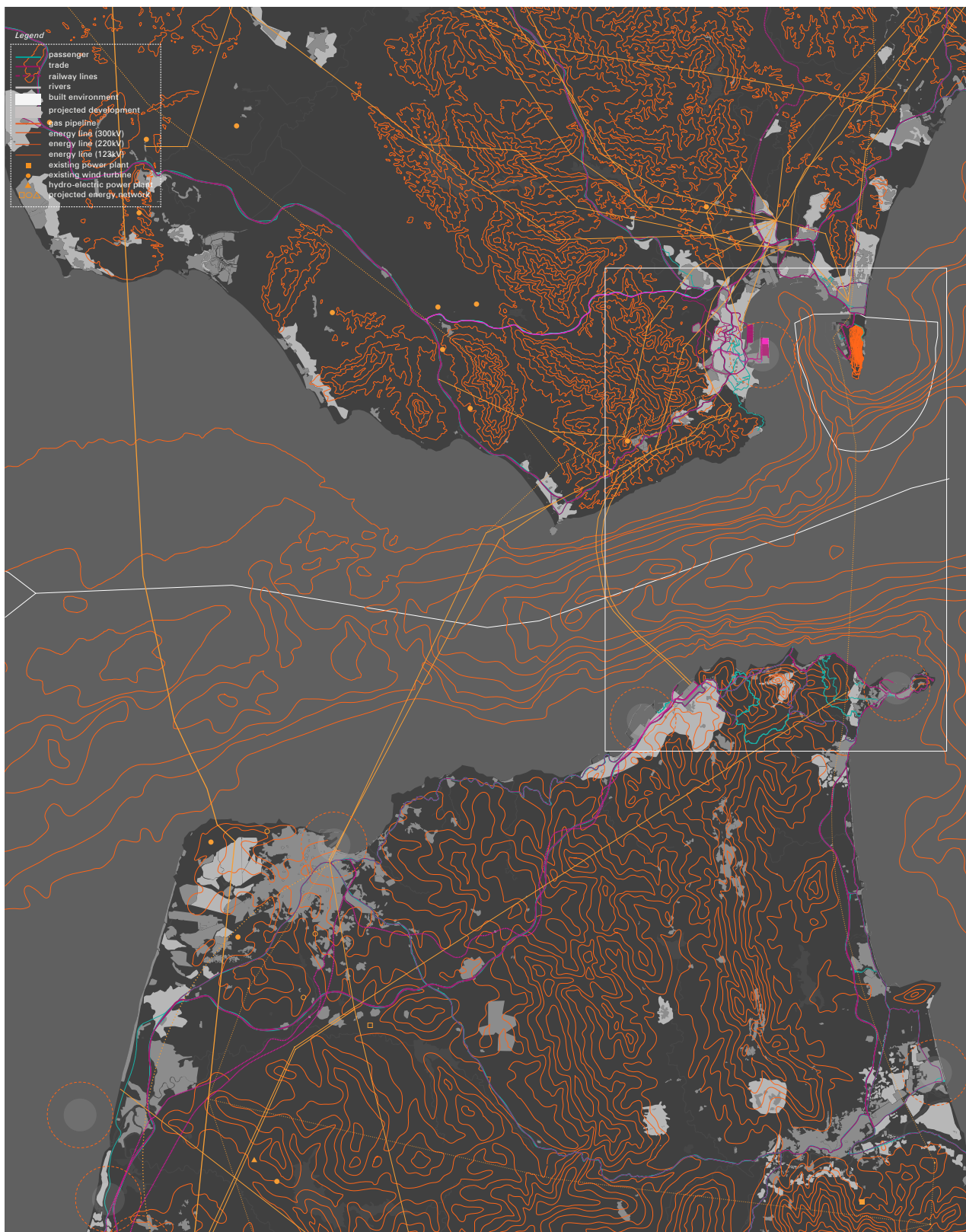
The Territory of Gibraltar: map with future dependencies and the re-orientation towards Africa

2) Infrastructural Connectivity



2020

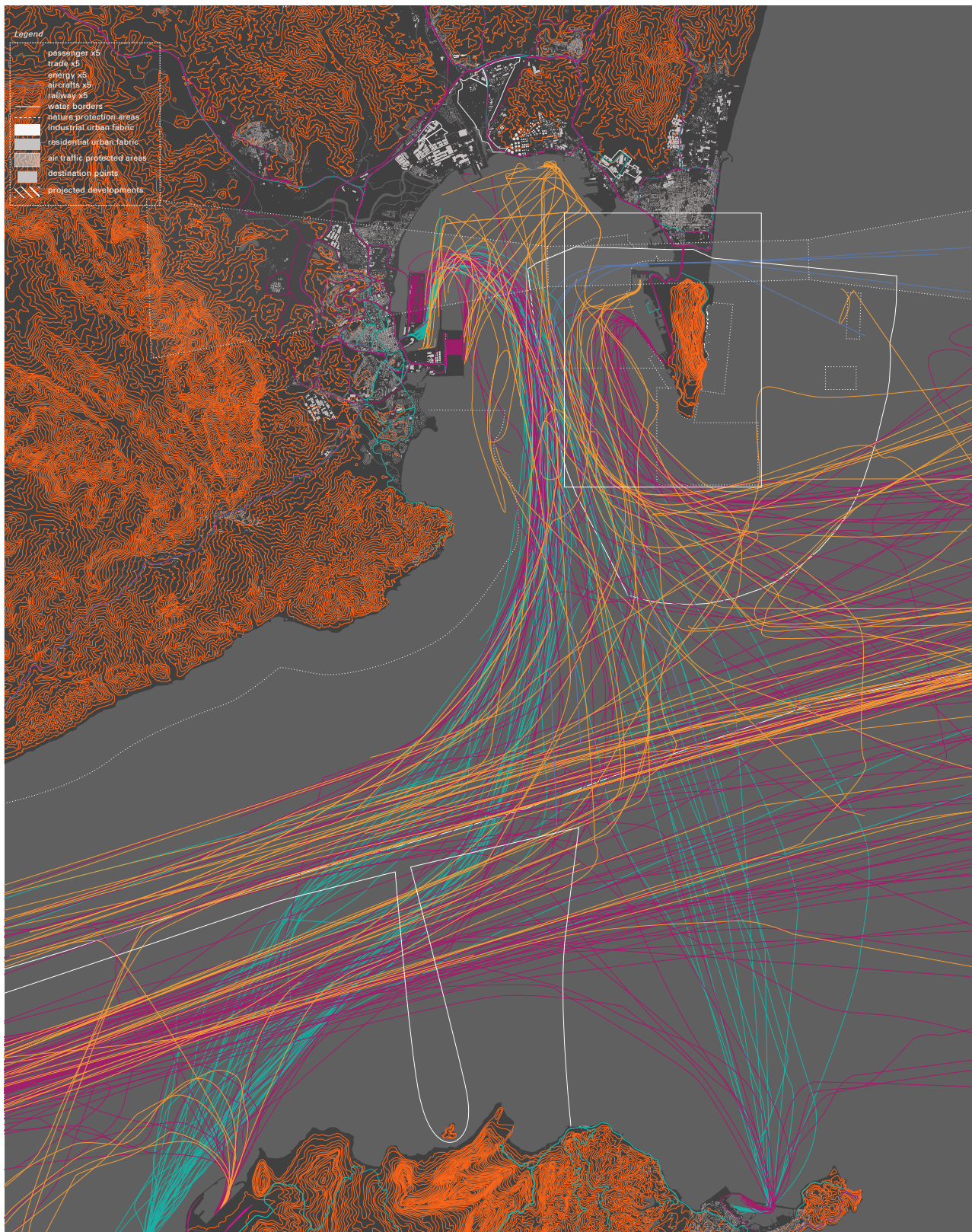
The Strait of Gibraltar: map with the existing economies and infrastructural developments



2050

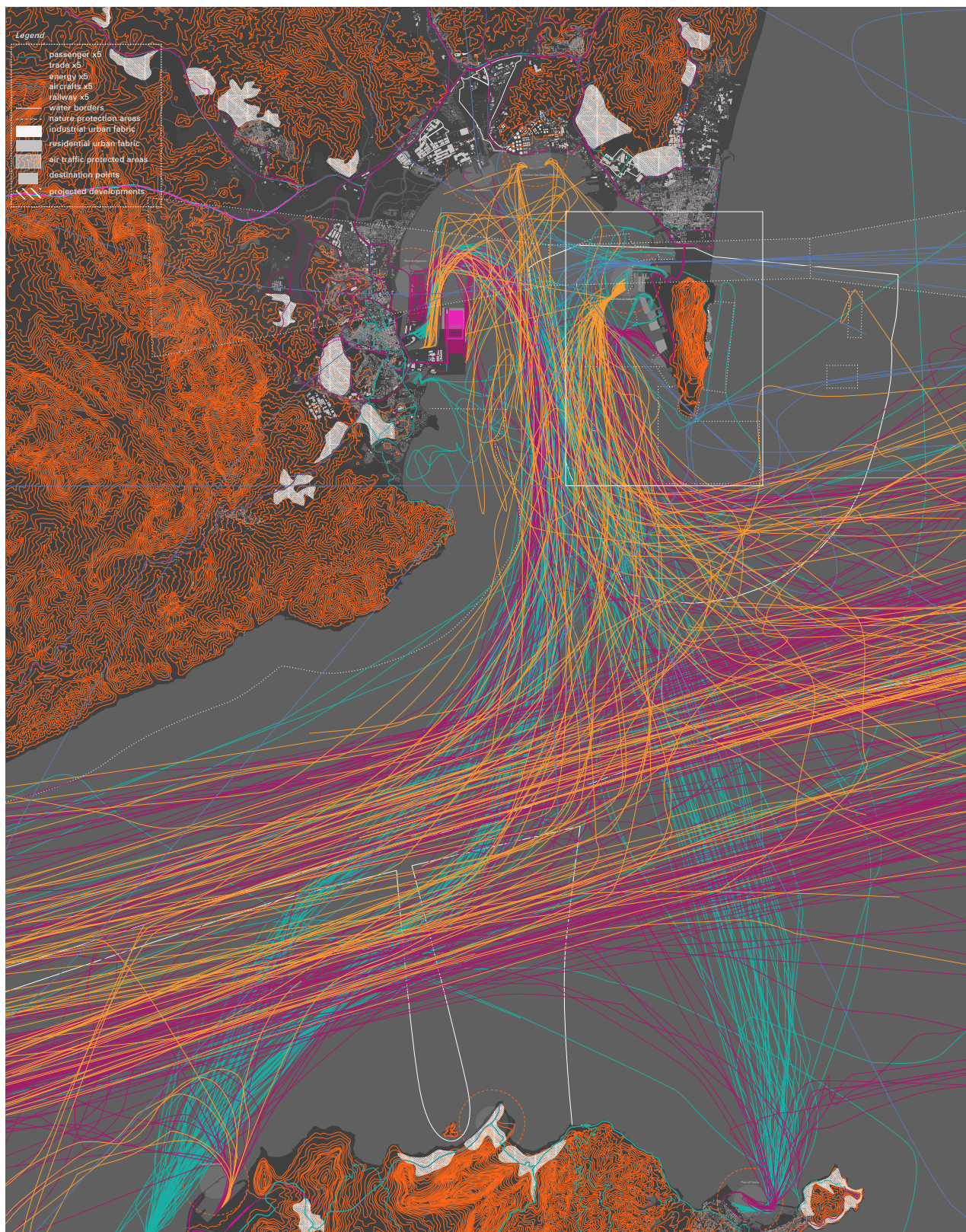
The Strait of Gibraltar: map with
the future growing economies and
infrastructural developments

3) Gibraltar as Destination



2020

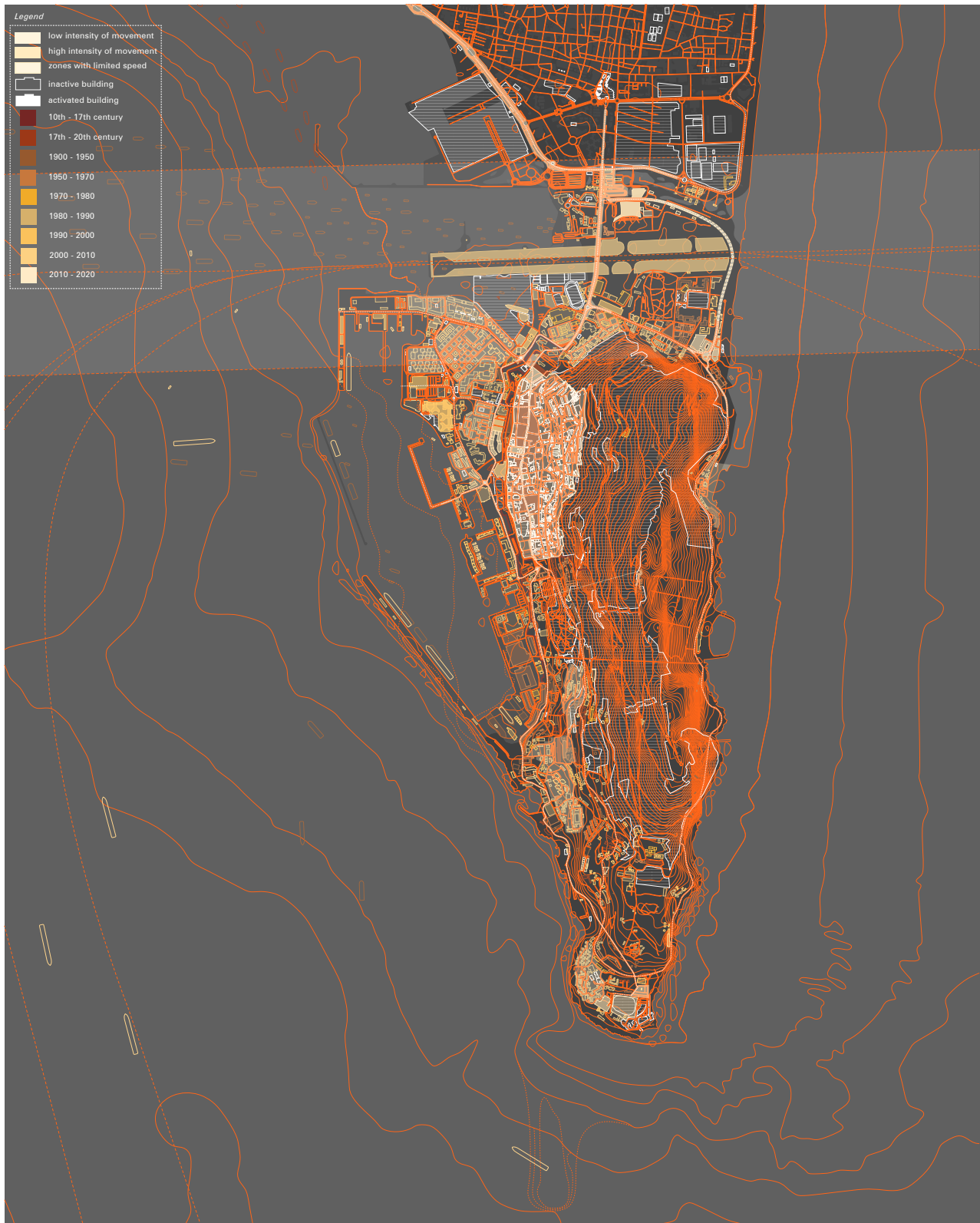
The Bay of Gibraltar: map with the existing weekly traffic through and across the Strait



2050

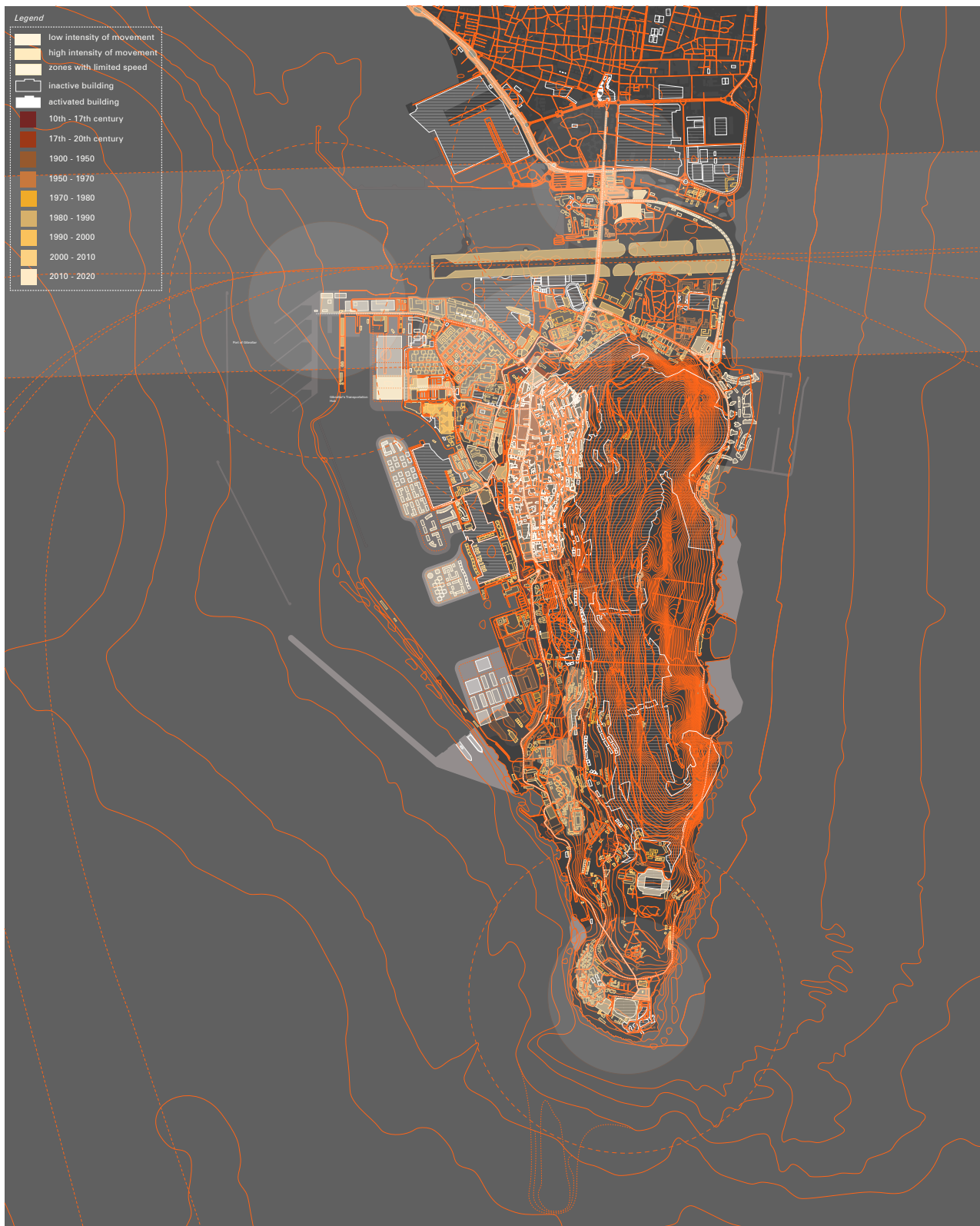
The Bay of Gibraltar: map with the future weekly traffic through and across the Strait

4) Population Growth and Urban Expansion



2020

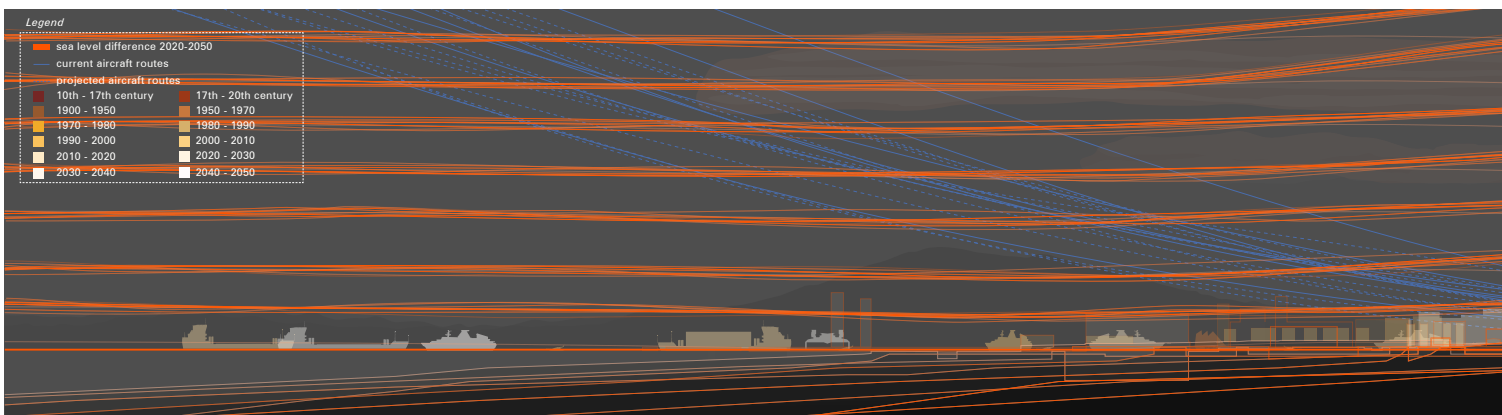
The Rock of Gibraltar: map with the existing built environment and the peninsula at its current state of flux

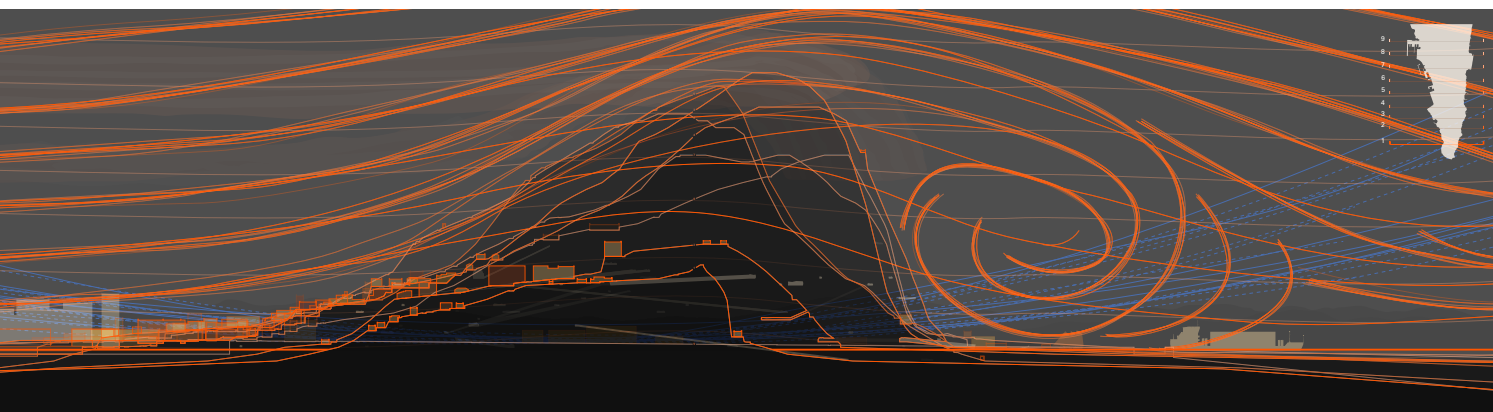


2050

The Rock of Gibraltar: map with the peak areas of the peninsula on the backdrop of future development

5) Climate Change





2020, 2050

The Rock of Gibraltar: section with
external and climatic conditions



2050

The Eleven Contributions



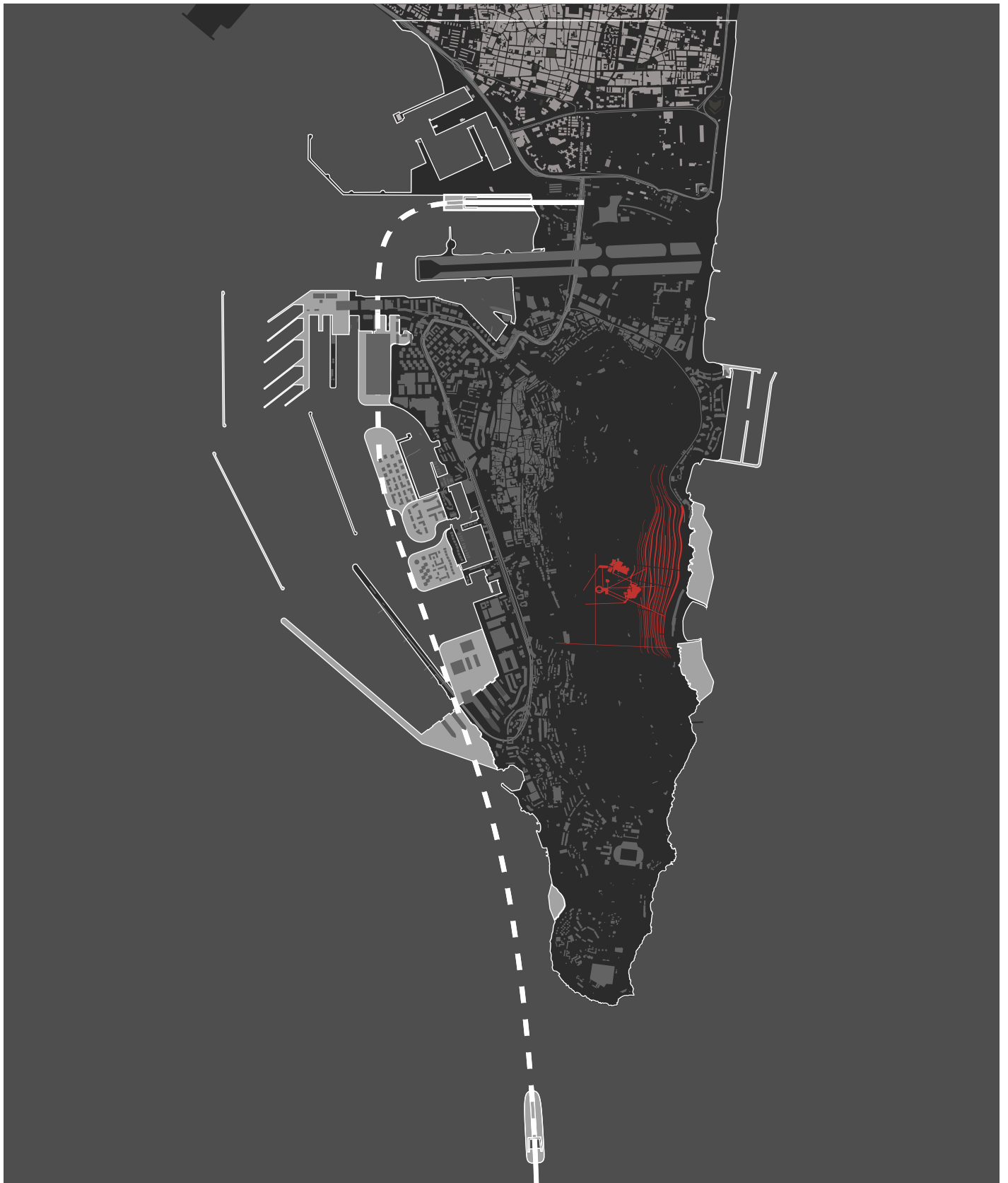
2020, 2050

Beyond The Rock: 1:1000 wax site
model



2020, 2050

*Beyond The Rock: 1:1000 wax site
model*



0 0.5 1km

Site Drawing

Location of the new cemetery in Gibraltar

Drawn by Zhichao Tu

Individual Site

As the project aims to define a language for the construction of cemetery in this peninsula, it presents a ideal site located on the Gibraltar's Rock.

In the context of Gibraltar's Rock in 2050, new cemetery will replace the existing one gradually to hold various funerary rituals and propose a new way to co-exist between different religions.

To the east of Gibraltar, above the small village of the Catalan Gulf, an area of approximately 130,000 square meters has been used as a rainwater catchment for the region's water supply since the early 1900s. The site rises 250m at a uniform angle of 34 degrees across its width. It is part of the dune structure and is believed to have formed during the period when the Mediterranean was an arid basin. To be used as a catchment area, it has been covered with corrugated steel plates and measures to stabilize and improve the environment are needed to make it safe and to meet EU requirements for habitat protection.

Rather than occupying the most valuable settlements, it is better to place new cemetery inside the Gibraltar's Rock, which is more reasonable and has to do with the spiritual entrustment of the locals.

The project evaluated the phased relocation of the multi-faith cemetery from an unusable location on flat ground and major real estate adjacent to the airport to an eastwardly inclined site of a vanishing catchment system. Nowadays it is barren land with few plantations only, which is both the foundation for re-evaluating the spirituality of the Gibraltar's Rock and re-inventing them in and on the Gibraltar's Rock.



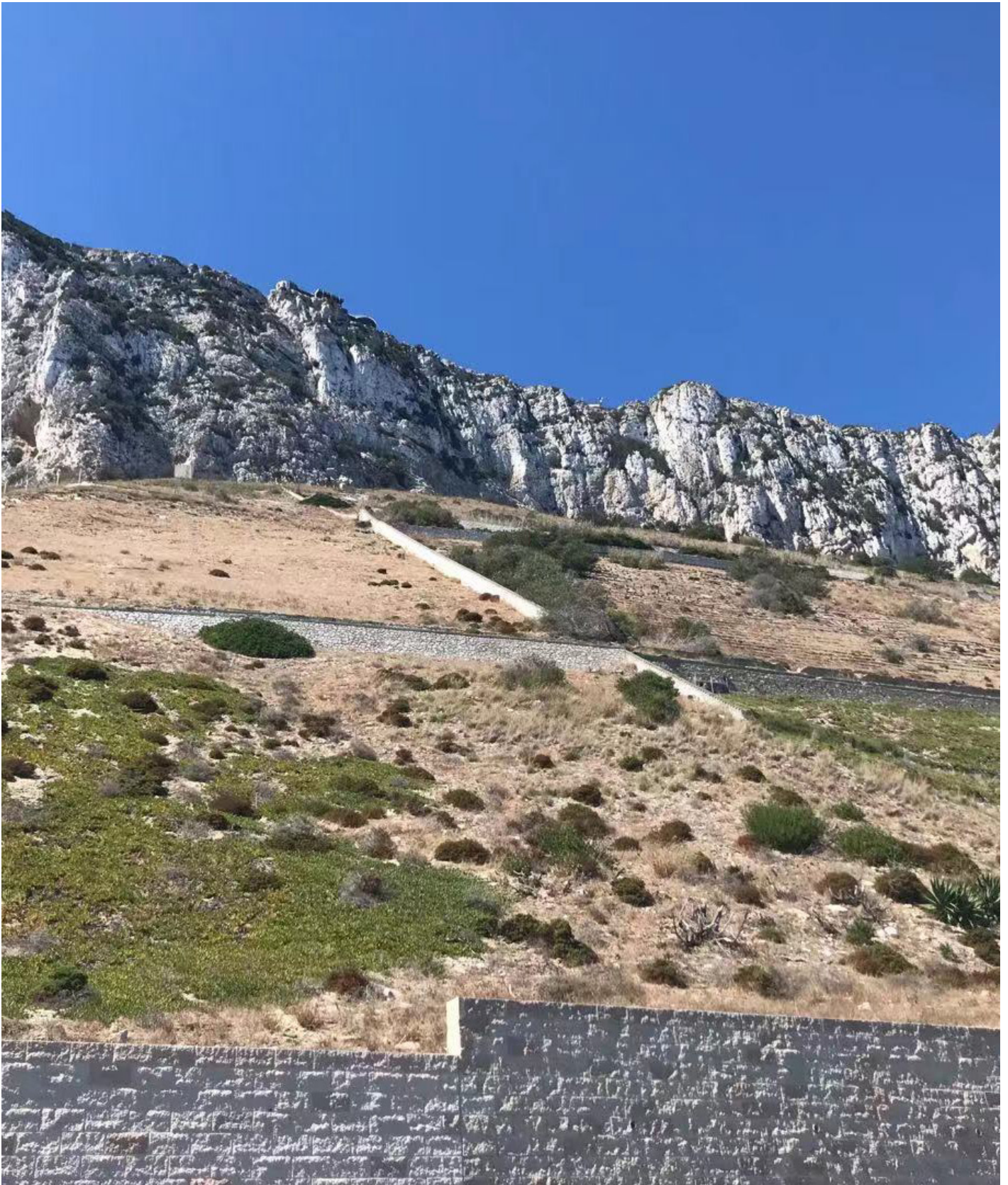
0 100 200 m

Aerial photograph

Elevation of “Water Catchment” and its surroundings

Data from Google Earth, 2019





Site Photograph

View from road below "Water Catchment"

Photo by Zhichao Tu



Site Photograph

Water Collector in "Water Catchment"
before demolition

[Online Resource](#)

Individual Discourse

Spirituality in Gibraltar follows its own local logic. Around the base of the rock, in the dense town and port, cultures mix and intersect and negotiate in streets and buildings. The compression reinforces the difference of certain beliefs, a fierce shared sense of coexistence as well as a multi-faith and Gibraltarian identity.

Above the settlement, they make designs in, on and around the Rock. Technologies, structures, and spaces from different centuries have erected a vibrant vein of the Rock, as if the Rock is evolving by itself.

Developed trajectories of both tunnels and religions are similar, they can reflect and compensate each other, allowing both contradiction and similarities co-exist simultaneously.

This project describes the phrased relocation of the multi-faith cemetery from the settlement to the slopes and tunnels of the Rock. Vegetation as a new symbol of second life of the deceased replaces crosses and tombs gradually, being beneficial to local environment.

Precedent Studies

The first project designed by Enric Miralles is Igualada Cemetery that challenges the traditional notions of what makes a cemetery, conceptualizing the poetic ideas of a cemetery for the visitors to begin to understand and accept the cycle of life as a link between the past, present, and future. Cemetery no longer is a place where the dead live, but becomes a place brings the living and the dead closer together.

When we were born, we come with nothing; and when we die, we leave with nothing. The way we see and understand cemetery should response to the way we experience life and death. It is a humble process to say hello and goodbye to your life. The Igualada Cemetery is in a sense an organic architecture that integrates into the natural landscape as an extension of the hills. Here, architecture is not the protagonist, nor is the landscape, but the vivid fusion of architecture and landscape.

The Montjuic hill in the south of Barcelona has a long history of death. Many times, cemeteries reflect almost exactly where they were found. Just as a city in a city sometimes mimics the social dynamics above, this cemetery covers 57 hectares of land and was originally designed as a symmetrical grid, replicating the layout of the Eixample district, which was also constructed at the same time. That era was also the heyday of Catalan modernism, when the city's richest residents erected spectacular mausoleums, sculptures, and crypts on the cemetery. It is a home to some of the most prominent figures to be associated with Barcelona and Catalan culture since the 19th century.

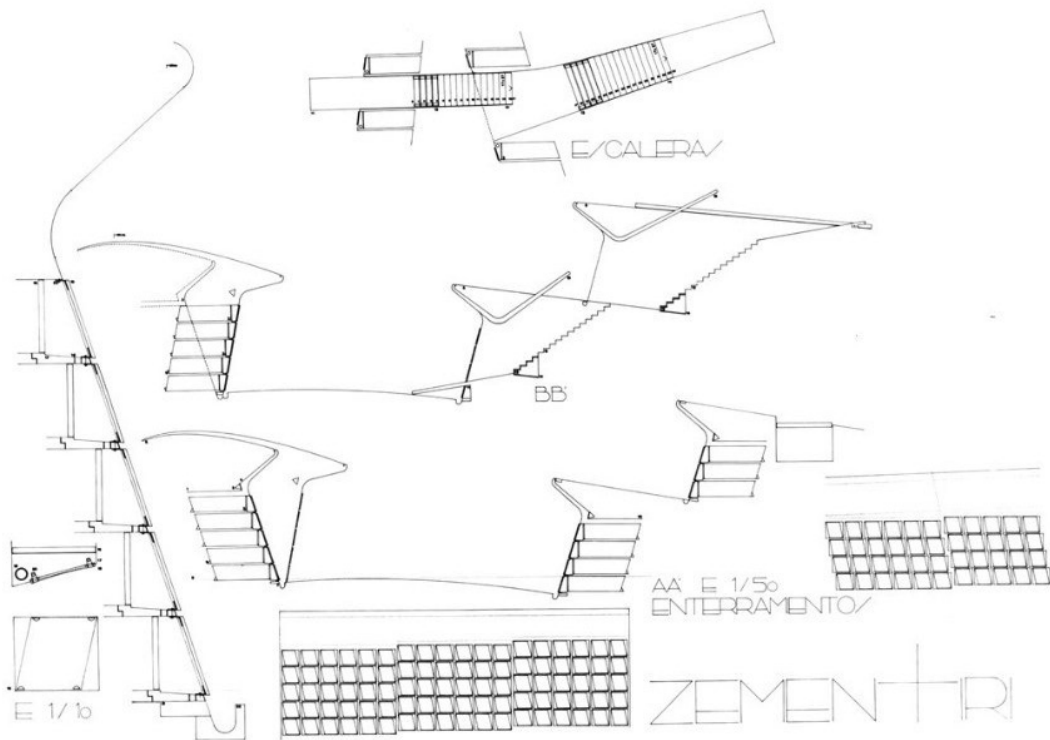
Stepped space design does not block sight, everyone who comes with his families and friends for participating in the funeral rituals can enjoy the nice views of the sea that can soothe their sad mood. Started from the bottom of the hills and ended at the top of hills, the process when people are climbing matches the changing of their emotional feelings.

The third one is a practice of sharing the sacred. Religious and cultural conflicts are decreasing, and seeking common ground while shelving differences is the theme of the future. The contemporary interpretation of this complex, multifaceted and dynamic field brings both challenges and great opportunities. From the built environment, the status quo reveals space and time strategies

through which sacred places in conflict can retain their usual lifestyle. The three main controversial holy sites-all along Jerusalem-Hebron Axis 10-are examples of this phenomenon. Within each of them, the architecture plays an important role to mark the space negotiation and propose the shared (if controversial) performance of the divine. The discourse and customs associated with these holy sites are characterized by a unique network of objects, images, gestures and meanings that readjusts political and cultural relations.

Capsula Mundi is a culturally broad project that envisions a different approach to thinking about death. This is an egg-shaped pod, an ancient and perfect form made of biodegradable materials, where the remains of our loved ones are buried. The ashes will be kept in small oval bio-ash caskets, and the corpses will be placed in fetal positions in larger pods before the capsules are buried underground as seeds. A tree chosen by the deceased in his life will be planted on it as a memory of the deceased and leave a legacy for future generations and the future of our planet. As the tree grows, family and friends will continue to care about it. The cemeteries will be renewed, instead of the cold gray landscapes we see today, they will grow into vibrant woodlands.

The project reconsiders the future position of the cemetery in favor of communicating with the Gibraltar's Rock and establishing a clear connection with the surrounding urban environment. This design is not viewed a majestic religious building, nor is it an icy gray cemetery landscape, but it is seen as an identifiable object that embodies Gibraltar's special identity in the peninsula.



Site Photograph and Hand Drawing

Enric Miralles, Lgualada Cemetery

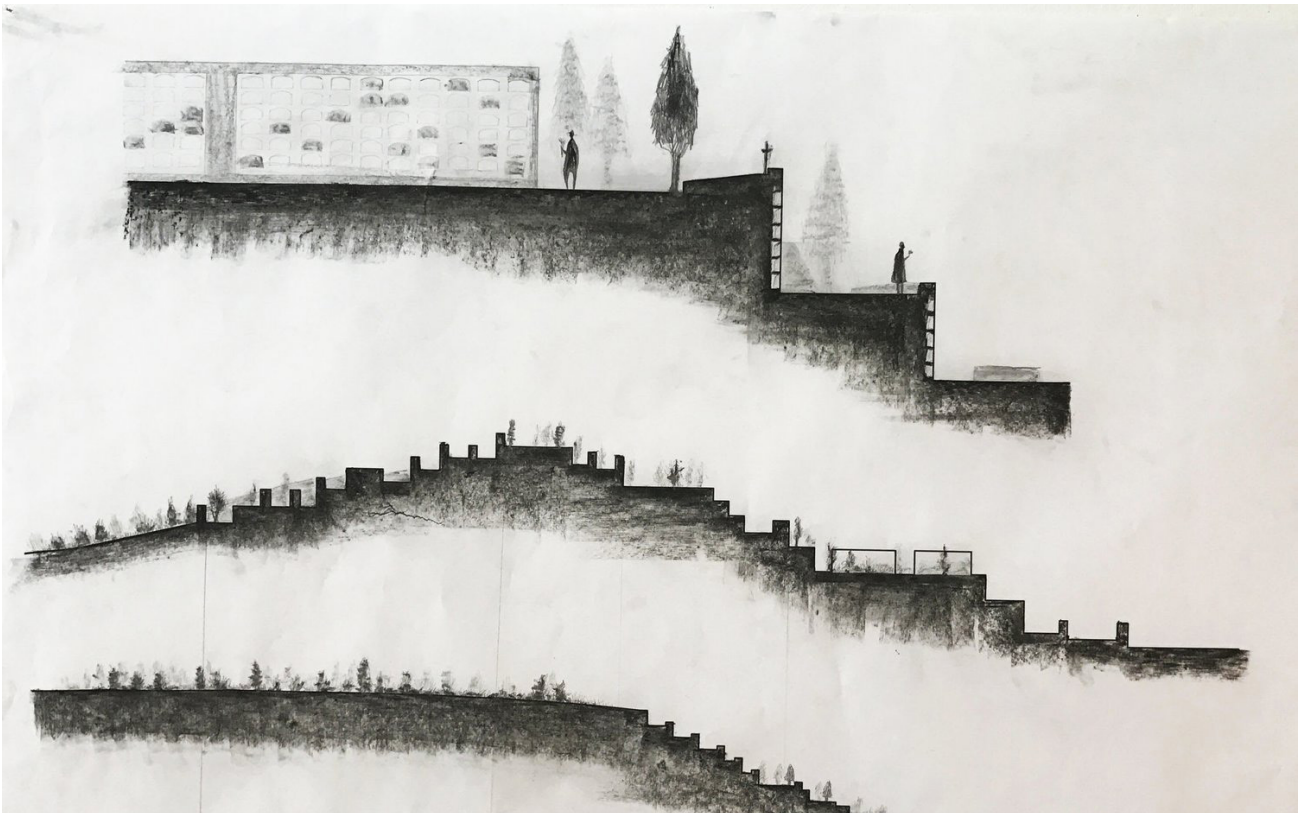
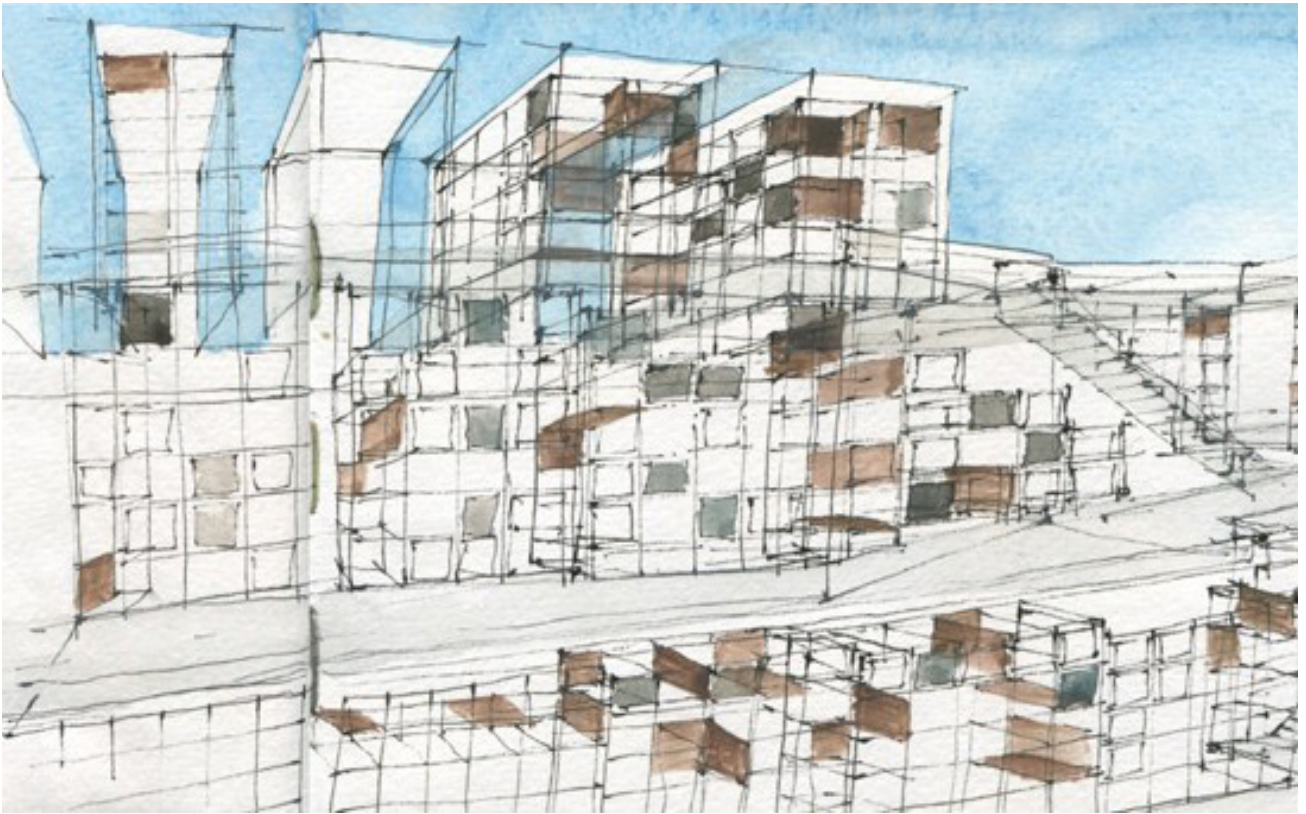
Online Resource



Site Photographs

Barcelona cityscape with Montjuïc Cemetery in foreground

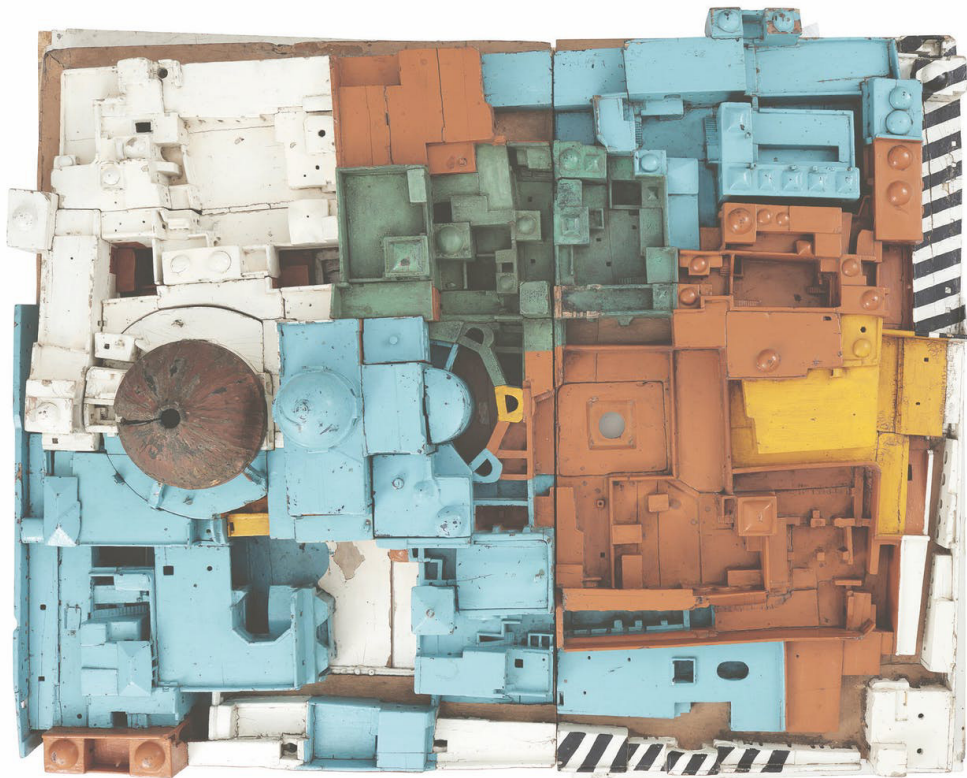
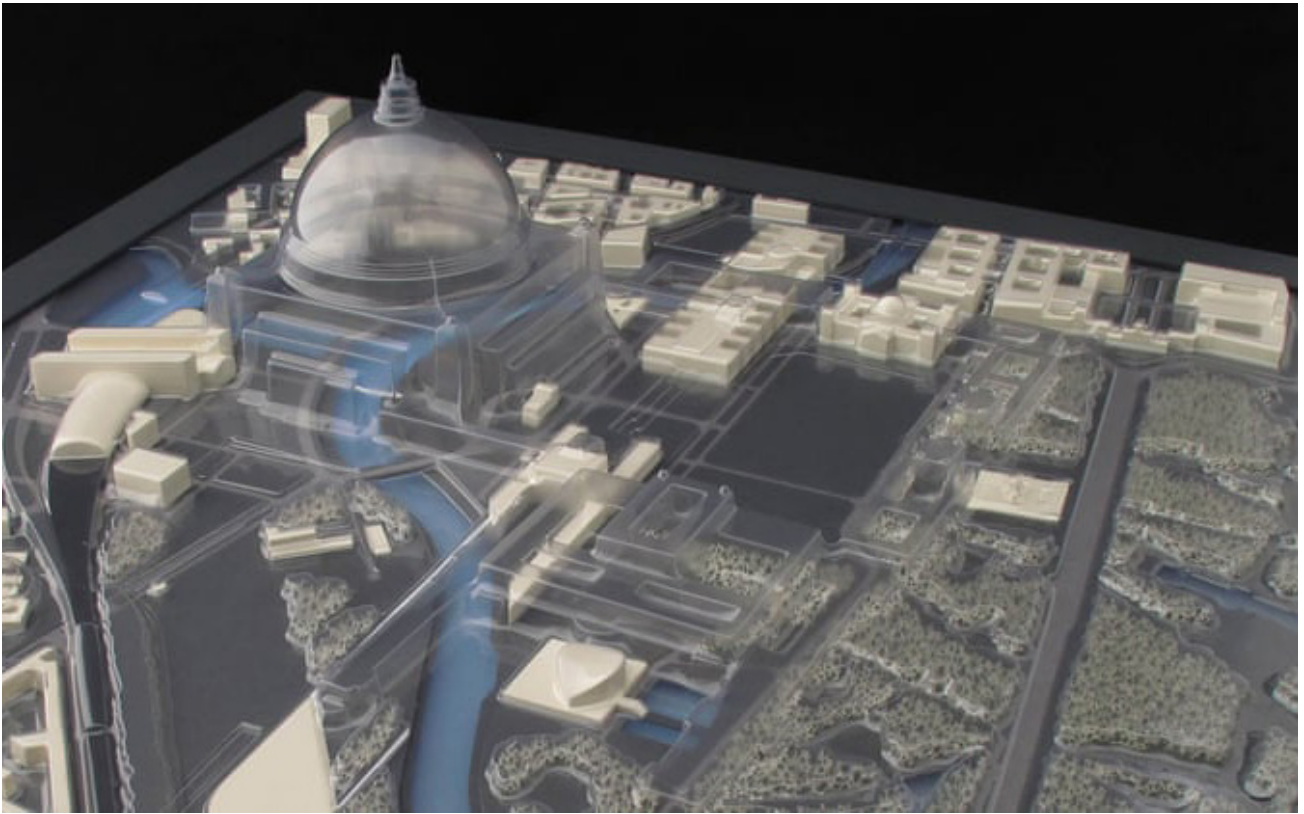
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Hand Drawings

Harkness Hall, Montjuic Cemetery, and
Kroon Hall

Drawn by Christina Zhang

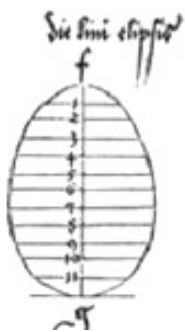
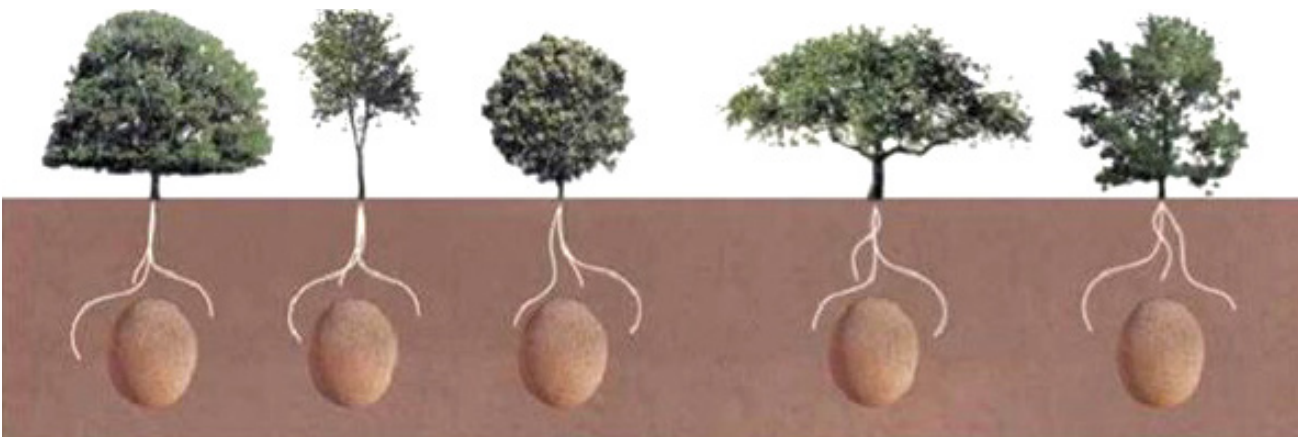


Edgar Guzmanruiz's sculpture
superimposes a transparent mold of
Germania over Berlin

Photo by Yomayra Puentes-Rivera

Conrad S. Schick, model of the church
of holy Sepulchre and surrounding,
Jerusalem, 1862

Photo by Adi Gilad



Photograph and Diagram of Changing Process

"Capsula Mundi, new coffin" which is organic pods for burial converting the human body in a tree nutrient

Designed by Anna Citelli designers

Visualized Evidence

As a bridge between the dead and the living, the cemetery has always been closely related to the development and evolution of the city.

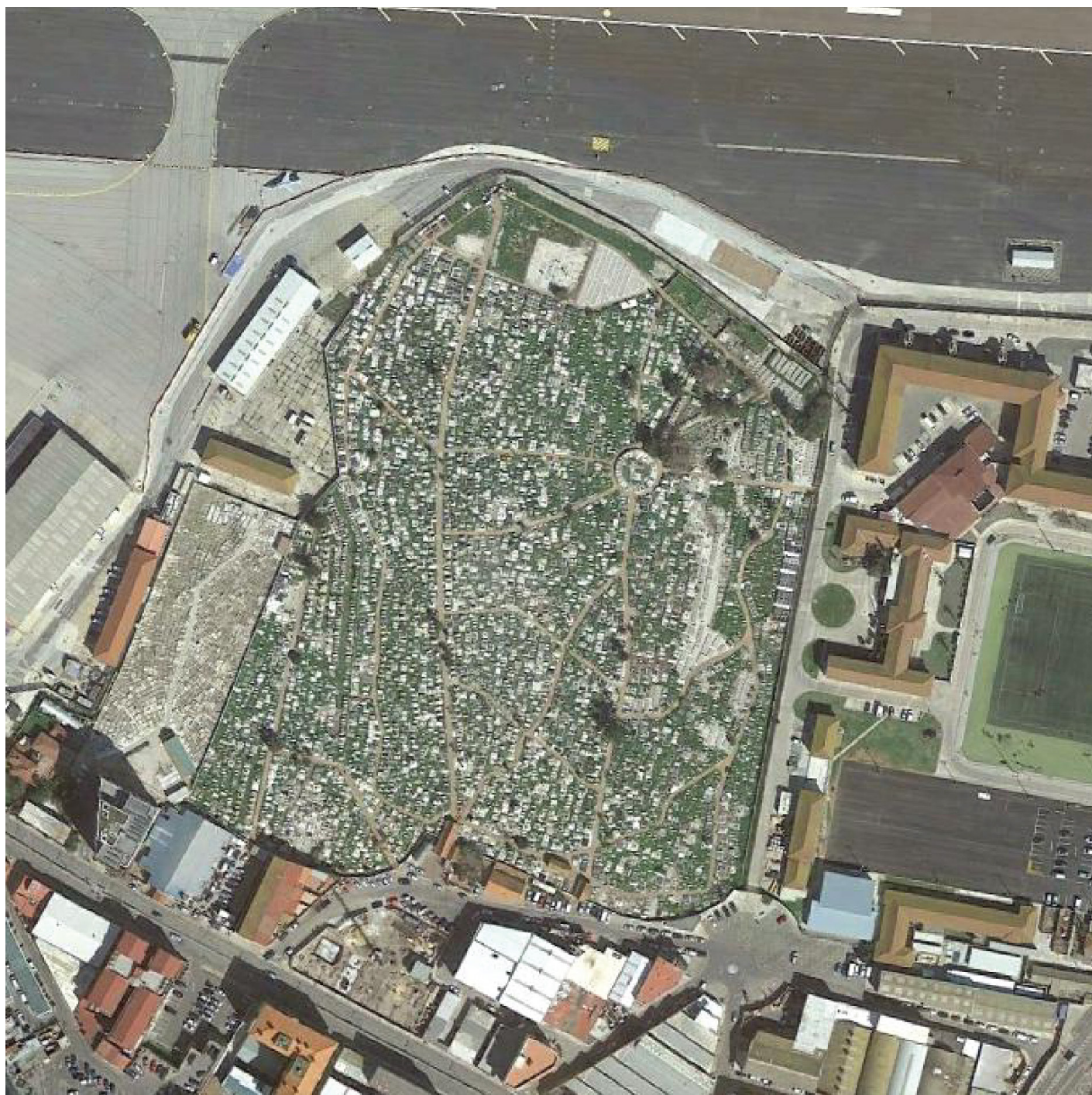
In the context of limited urban area, conflicts and communications between different religions often occur in this small peninsula. But the living space of each religion has been squeezed since before, such as relocation, abandonment and merger

The first aspect is substantiated by the existing cemetery currently in use that are meeting a series of problems such as crowdedness and noise. These issues are threatening the sustainable development of valuable city's land, which needs attention.

Considering the location of Gibraltar and connecting network being built, religious activities will be more diverse and intense which is the second aspect to make Gibraltar embrace the future in a multi-religious context.

The third aspect, which has existed in the long history of Gibraltar, is to use different technologies and structures to make incursions into the Gibraltar's Rock, from Neanderthal caves 50,000 years ago to modern tunnels dug by British troops. It consists of replacement, demolition, overlapping, and reinforcement—these activities have happened in both religious evolution and mining excavations throughout the time.

The project recognizes Gibraltar's "hybrid" status and is expected to integrate with new and different communities in the future. This transitional and self-developed period is similar with the way people make incursion into the Gibraltar's Rock.



0 50 100 m

Aerial photograph

Plan of the "North Front Cemetery" and
its surroundings

Data from Google Earth, 2019



Historic Model of the Gibraltar's Rock and Location of the North Front Cemetery

The North Front Cemetery is a historical cemetery located in the British Overseas Territory of Gibraltar. Also known as the Gibraltar Cemetery and the Garrison Cemetery, it is the only graveyard still in use in Gibraltar. It is also the only Com-

monwealth War Graves Commission (CWGC) Cemetery in Gibraltar.

The graveyard was initially divided into five sections. In addition, to those for members of the Church of England, and Presbyterian, Wesleyan, and Catholic Churches, there was a fifth section for those of other denominations. In May 1848, Jews' Gate Cemetery on Windmill

Hill was closed to burials. After that closure, a sixth section, for Jews, was established in North Front Cemetery. In the 21st century, only three sections are present, Christian, Jewish, and unconsecrated.

The North Front Cemetery is also a military cemetery, and includes the graves of those who died in the World Wars.



Photograph of Current Situation

View from inside the cemetery (city of the dead and living)

Photo by Zhichao Tu

Demographics of Gibraltar 2018

As of 1 January 2019, the population of Gibraltar was estimated to be 32,459 people. This is an increase of 0.27% (88 people) compared to population of 32,371 the year before.

- * 461 live births
- * 265 deaths
- * Natural increase: 196 people
- * Net migration: -107 people
- * 16,310 males as of 31 December 2018
- * 16,149 females as of 31 December 2018

Gibraltar Population 2019

During 2019 Gibraltar population is projected to increased by 89 people and reach 32,548 in the beginning of 2020. The natural increase is expected to be positive, as the number of births will exceed the number of death by 196.

Population Change Rates in 2019

- * 1 live births average per day (0.05 in an hour)
- * 1 deaths average per day (0.03 in an hour)
- * -0 emigrants average per day (-0.01 in an hour)

Religion in Gibraltar

Religion	Number of followers	Percentage of total population
Catholic	28,861	88.8%
Islam	1,300	4.0%
Religiously Unaffiliated	943	2.9%
Judaism	683	2.1%
Hinduism	585	1.8%
Other	130	0.4%

<i>Top</i>	<i>Bottom</i>	Data from Online, 2019
<i>Demographics of Gibraltar's population in 2018 and 2019.</i>	<i>Demographics of religion followers in Gibraltar.</i>	

Completeness of Body

* Muslim

(avoid injuring the body especially autopsies / 24 hours / not using caskets, just burying in the ground, where the body becomes part of the soil)

* Judaism

(embalming and cremation are forbidden to keep the body completed / 24 or 48 hours or refrigerate)

* Catholicism

(creation after funeral mass)

* Hinduism

(cremation at noon)

Religion Rituals in General

* Judaism

Funeral Home
Auditorium

Cemetery

* Muslim

Home

Cemetery

* Hinduism

Home

Crematorium — — — — — River

* Catholicism

Home
Funeral Home
Auditorium

Auditorium

Crematorium — — — — — Linggu Tower

Cemetery

* Christianity

Home
Funeral Home

Crematorium — — — — — Linggu Tower

Cemetery

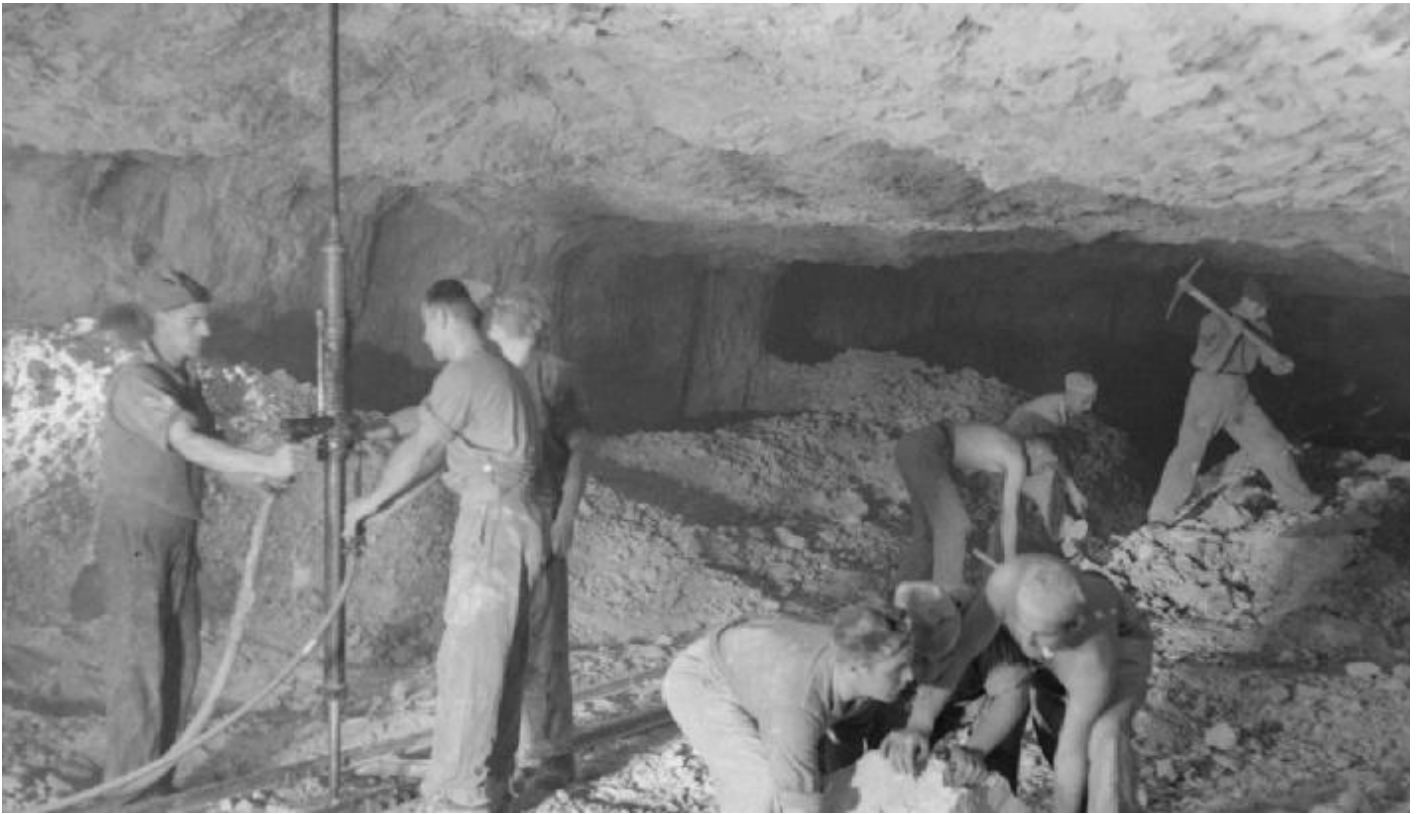
Top

Bottom

Data from Online, 2019

Specific requirement for the completeness of body in some religions.

Diagram for showing some overlapping ritual processes held at the same facilities.



Historical Image of Manual Excavation

Royal Engineer's tunnellers using a water pressure drill to clear solid rock inside the Rock of Gibraltar, 1 November, 1941

Online Resource

Historical Image of Machinery Excavation

Excavation of the cavernous REME factory chamber, 1941

Online Resource

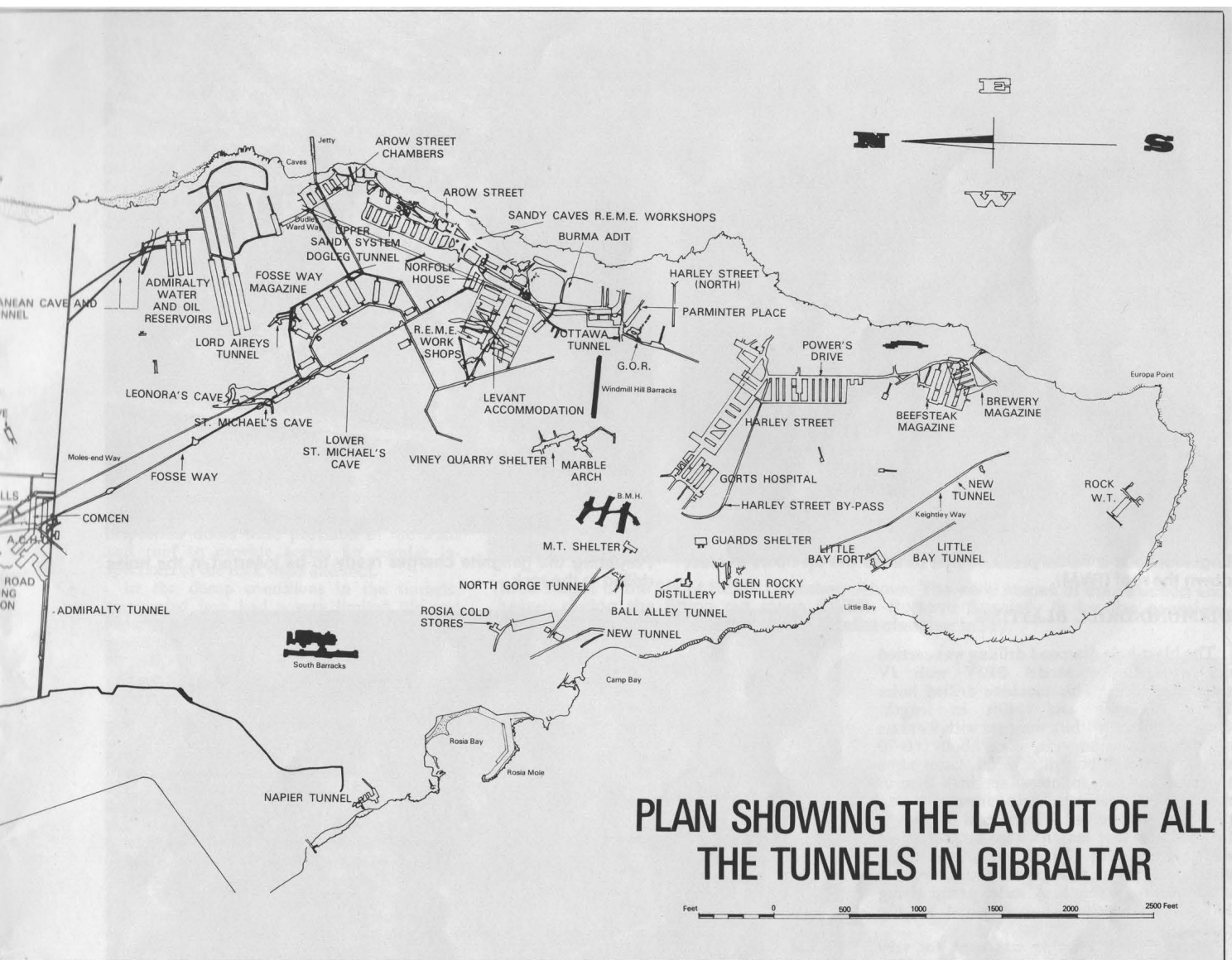


Tunnel Photographs

Exhibition of Excavation Process

Reconstruction showing members of
the Soldier Artificer Company digging
the Upper Gallery

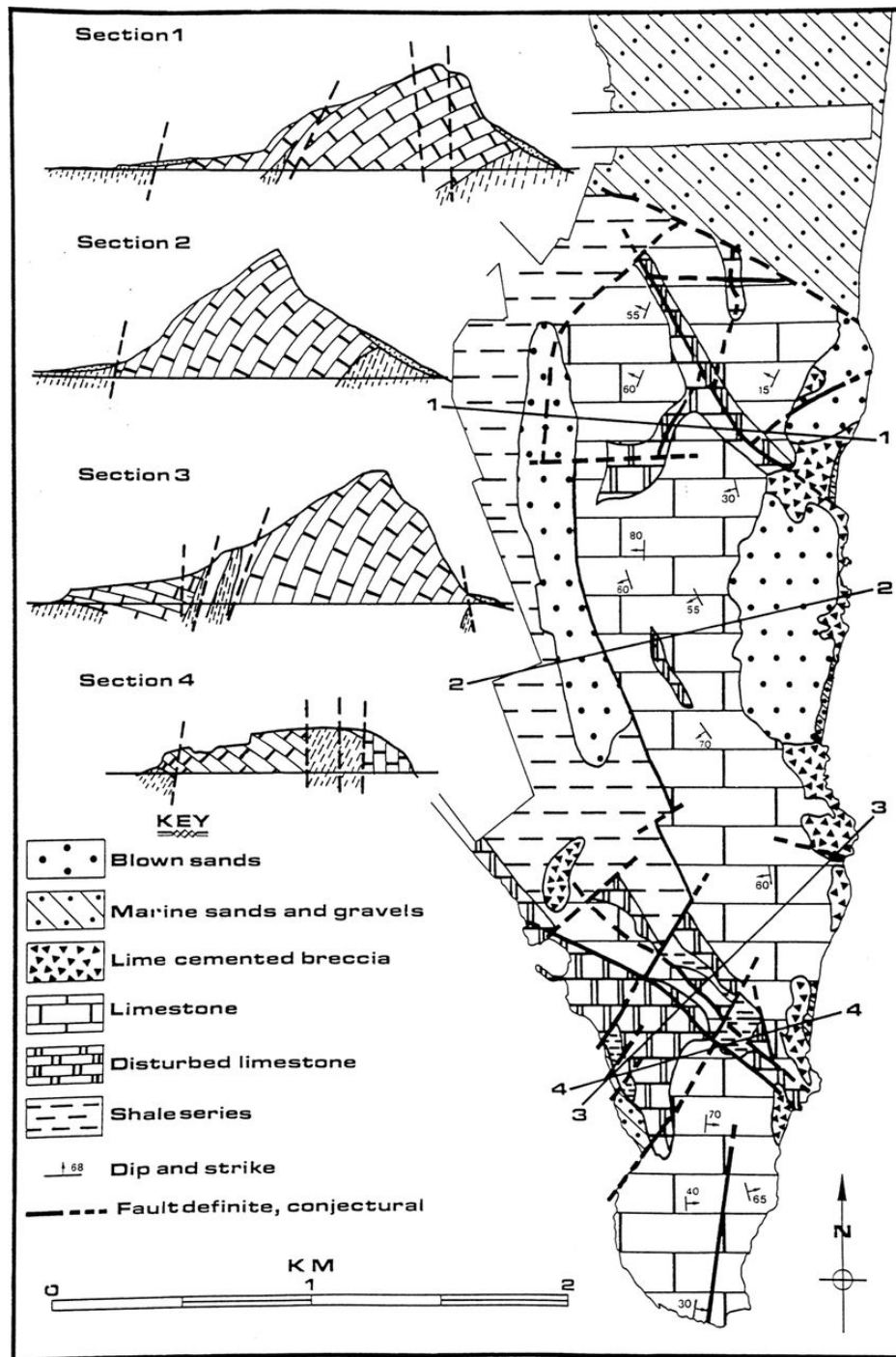
Online Resource



Map of Tunnels in Gibraltar

Plan showing the layout of all the tunnels in Gibraltar

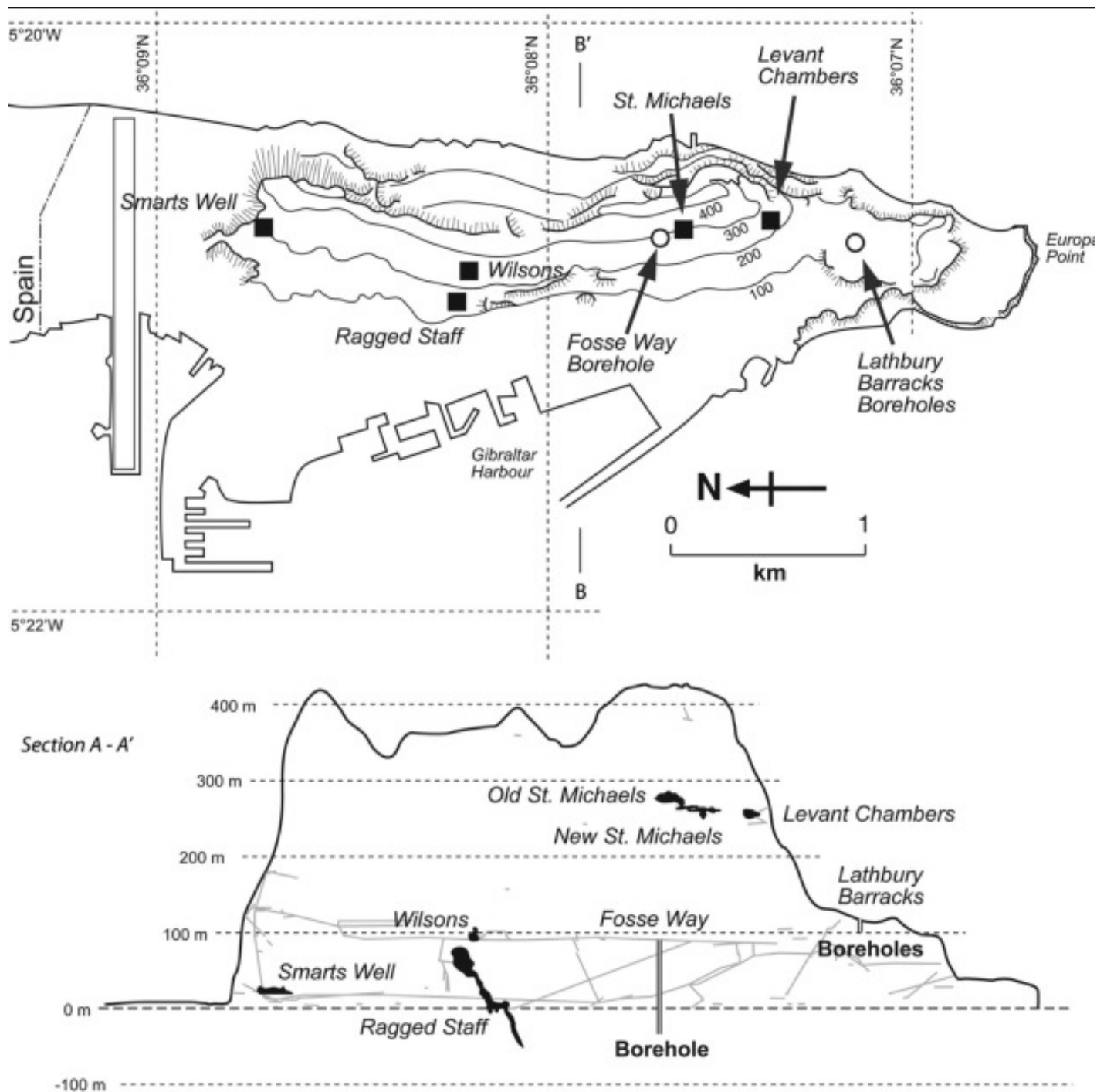
Online Resource



Classification of Rock's Formations

Geological Map of Gibraltar, after Greig (1943a, unpublished) (From Rose & Rosenbaum, 1989a)

Online Resource



Map and Section of Tunnels

Geological Map of Gibraltar

Online Resource



New Type of Urn

Bios Urn is much more than an urn — it's a catalyst for life. It is made by using 100% biodegradable materials, and is respectful to the environment in all the ways possible. Built with a special capsule that meets the needs of any type of tree, it's the perfect medium to allow for the proper growth of a tree or plant when planted with the remains of your loved one.



Photograph

Gibraltar's Family-Owned and Locally
Managed Funeral Services Planner

Online Resource

Architectural References

The project focuses on the relation between excavations and funerary rituals, and tries to show their connection in a new cemetery. This argument is substantiated by an analytical study of funerary rituals of different religions, focused specifically on spaces created by various excavation methods throughout the centuries, a choice determined by the rich and sustainable relation between the flux and the Gibraltar.

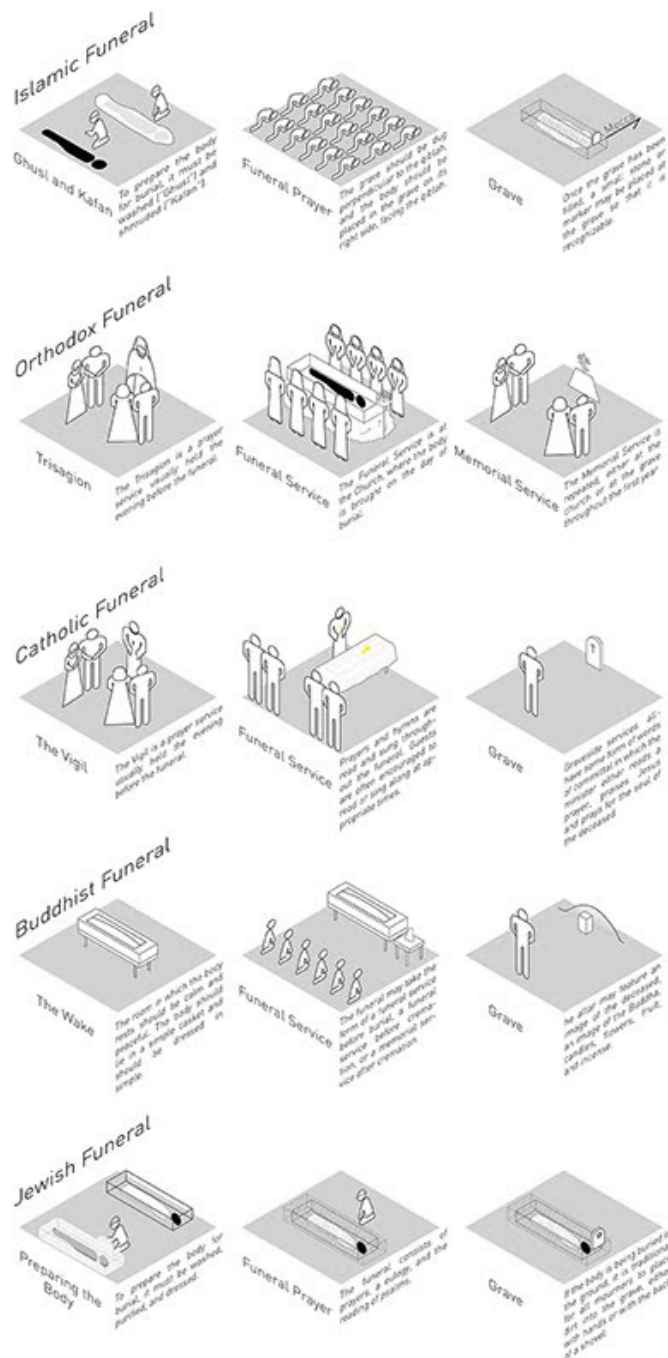
Different religions have different funerals. The processes are similar, but there are also different requirements. There is a need to find a balance between these diverse religious cultures, not only in keeping with the current state of Gibraltar, but also to embrace a new trend in future development and achieve sustainable improvement.

The development process of religion and its contradiction in relation to time are consistent with the nature of tunnels in Gibraltar that have been replaced, developed and abandoned.

An architecture of cemetery in the Rock ought not to employ the imported classical order, but rather develop a language which emerges from its own multi-cultural context. Yet, the concept of classical order is not completely unfamiliar to Gibraltar's culture. The concept of classical order was accepted when the city was established. Over time, flexibility and integration were valued, and tomb resources were re-planned.

This humble and specific type defines an architecture of cemetery not based on the imposition of a higher order, but rather on the emersion and legitimation of a local language. Not an architecture characterized by the idea of isolation, or even opposition, but one characterized fundamentally by the idea of inclusiveness.

Whether it is religious culture or invasion into the Rock, they will develop together in this peninsula.



System Diagram of Funerary Rituals of Different Religions

Burial Practices, The National Pantheon of Kazakhstan

Drawn by Lara Lesmes, Fredrik Hellberg, Tachapol Tanaboonchai, Suthata Jiranuntarat and Wachira Leangtanom

Online Resource

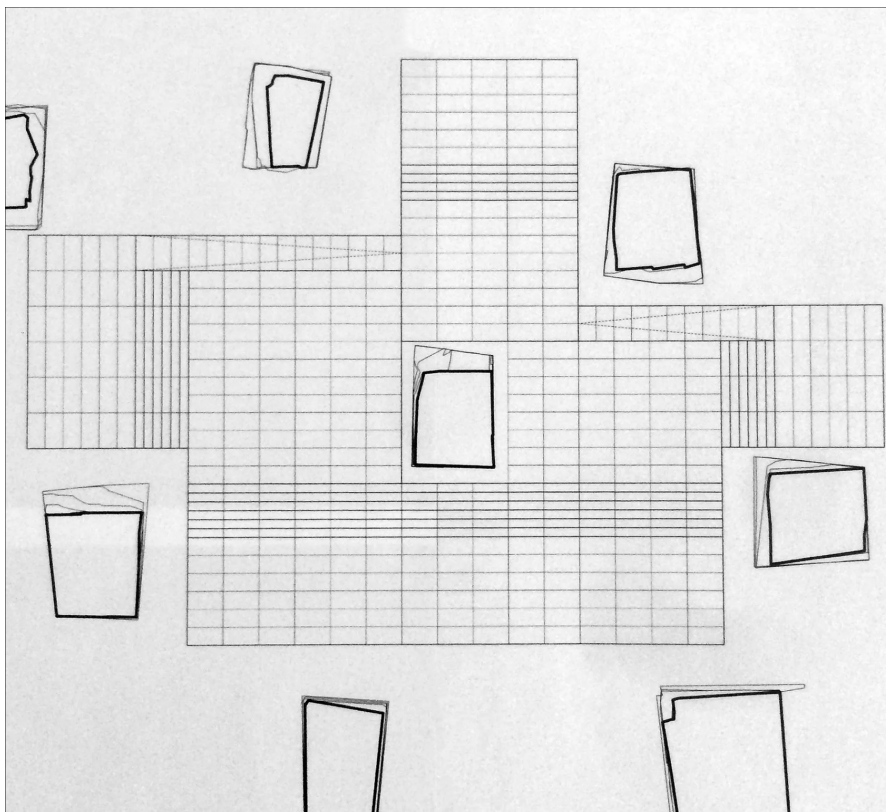
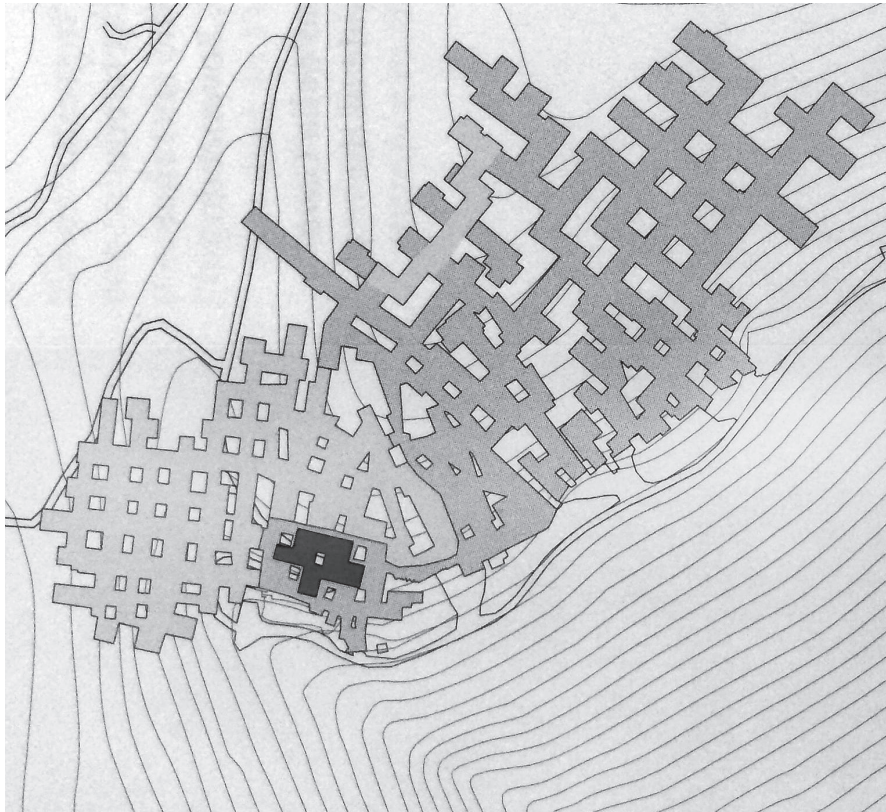


Site Photographs

David Chipperfield Architects, Cava
Arcari

Photos by Marco Zanta

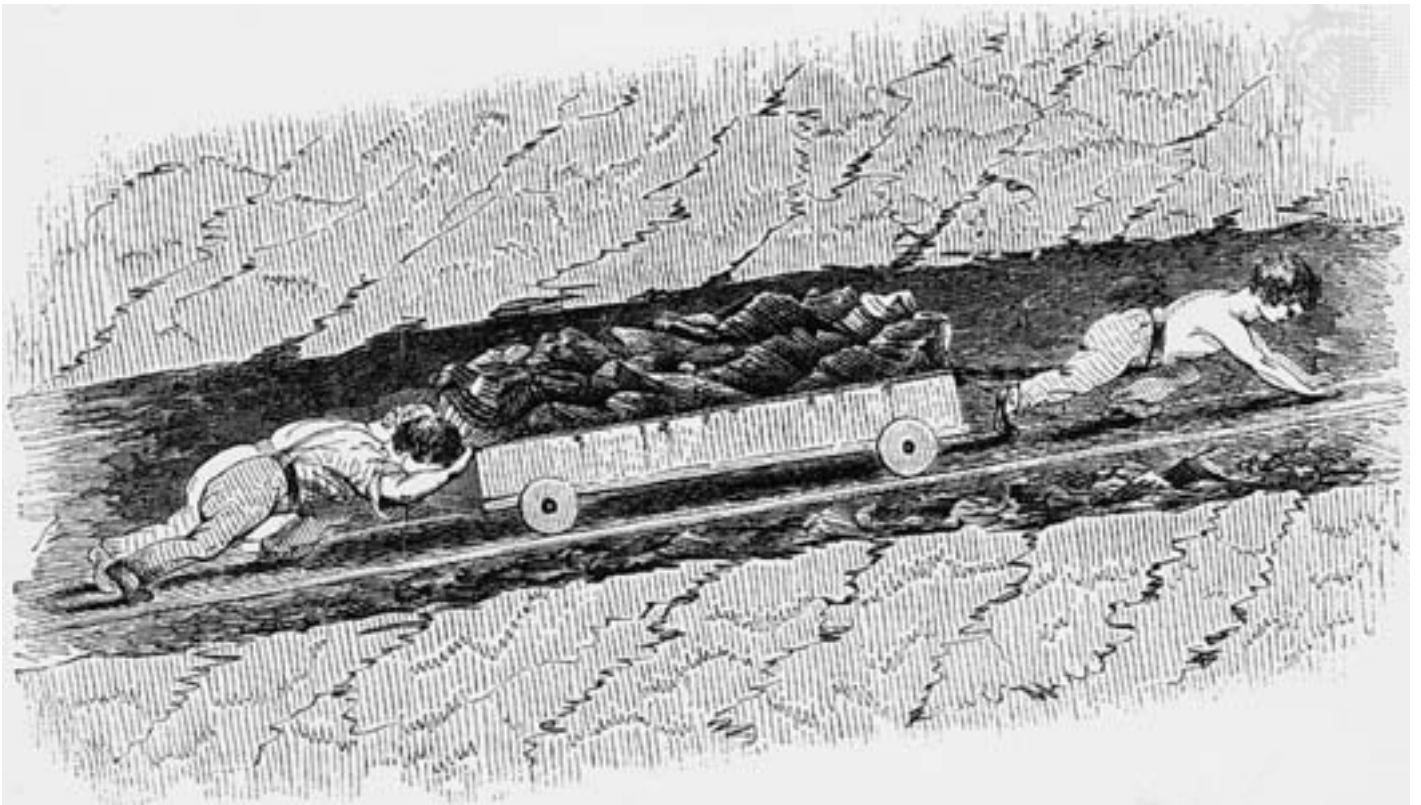
Online Resource



Site Drawings

David Chipperfield Architects, Cava
Arcari

Online Resource



Hand Drawing

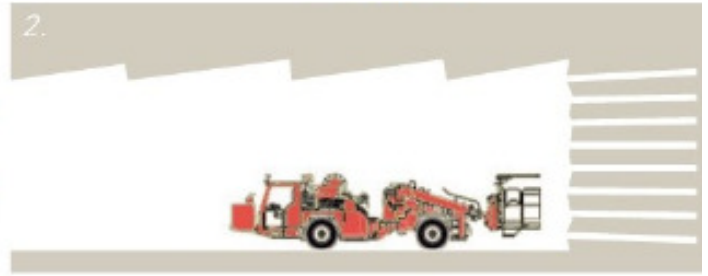
Three young children hurrying a loaded wagon in a mine, 1842

Online Resource

Drilling



Betting



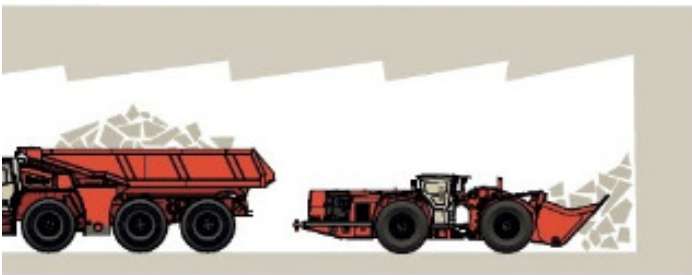
Demolition



Ventilation



Stowage & Transport



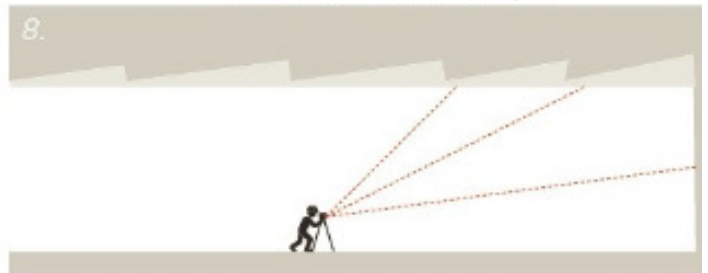
Scaling



Reinforcement



Measurement & Bowling



System Diagram of Excavation Process

Steps of excavation to make incursions into the rock

Online Resource



Site Photograph

New Rosshäusern Tunnel: crown drive
with a pipe umbrella in the Rock

Quelle/credit: BLS AG

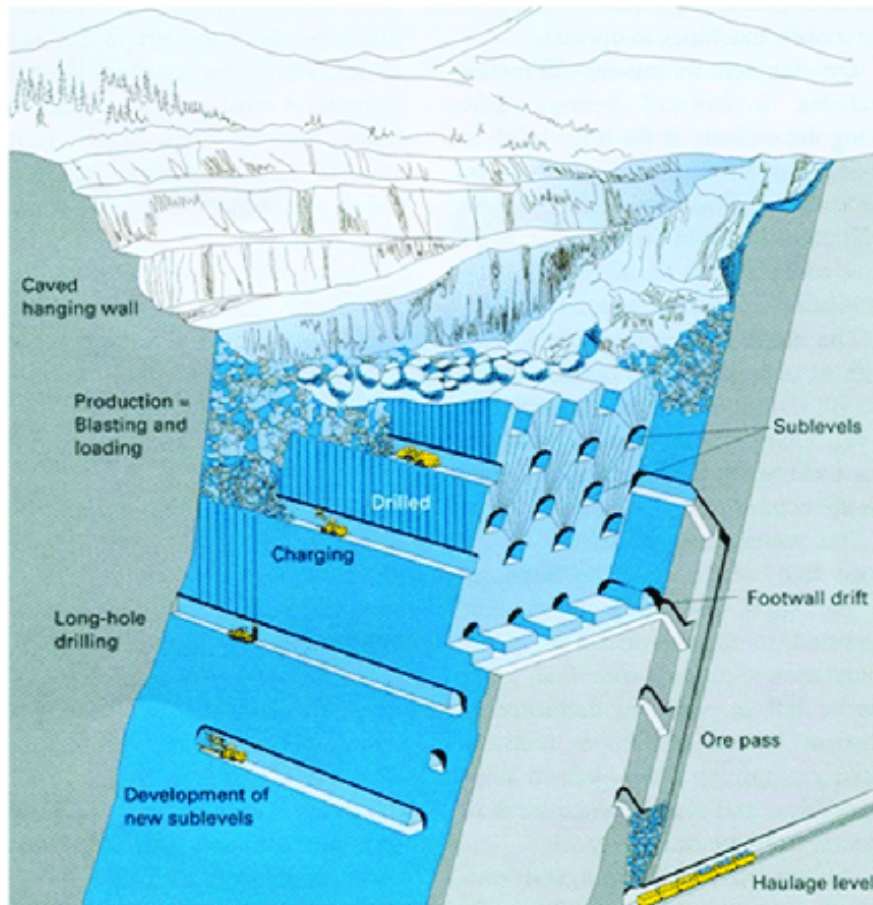
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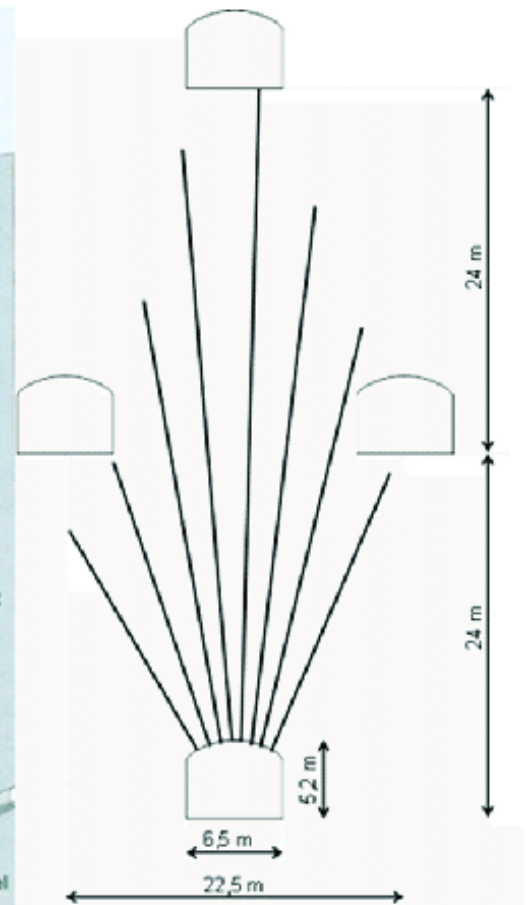
Site Photograph

Cutting and covering tunnels in modern way

Online Resource



(a)



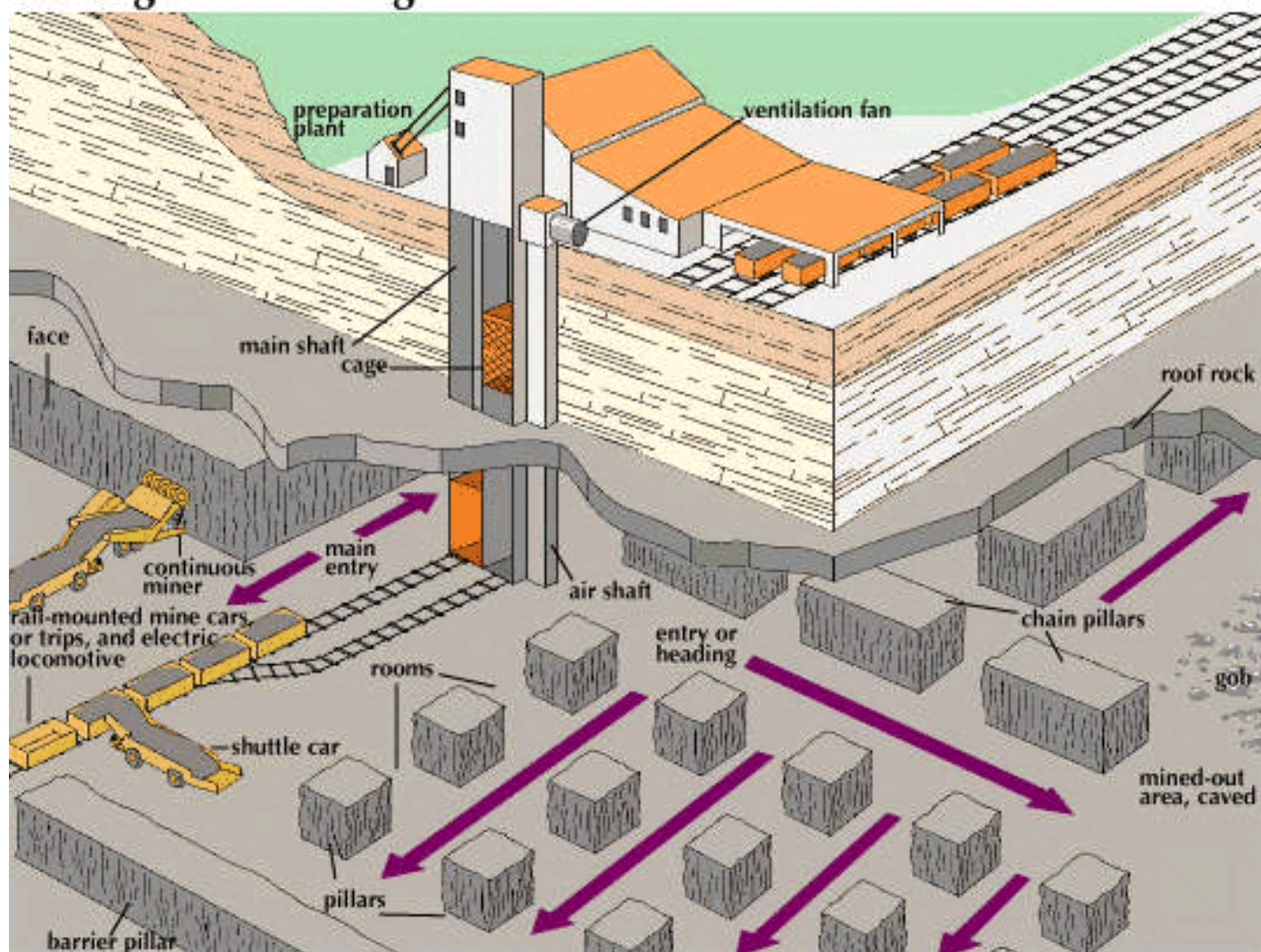
(b)

Site Drawing

Sublevel caving development and
production layout

Online Resource

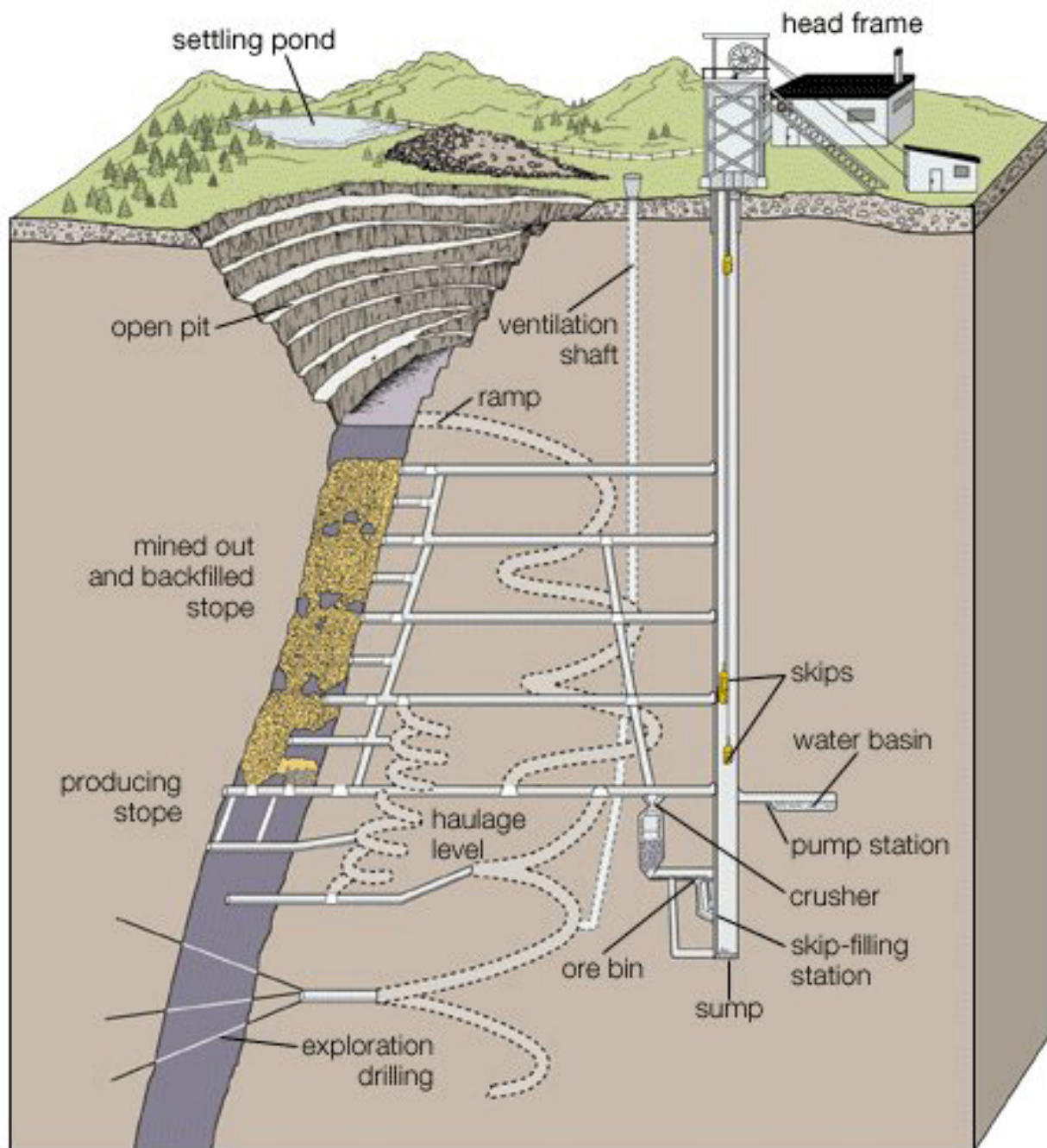
Mining Coal Underground



Site Drawing

Mining coal underground

Online Resource



Site Drawing

H. Hamrin, guide to underground mining methods and applications (Stockholm: Atlas Copco, 1997)

Online Resource



Site Drawing

Propulsion pechnology for mining
infrastructures underground

Online Resource

Expert Conversation

Interview with Alain Navarro from WSRM Architects

WSRM Architects, established in 1992, is the longest running private architectural in Gibraltar.

Crematorium- A multifunctional complex comprising of a crematorium, a ceremonial hall and an environmental clinical waste disposal facility

1. What are the religious objects served by this cremation place?

This project serves every religion in Gibraltar, except for some religions with specific requirement for funeral such as Judaism banning its believers to choose cremation. In addition, clinical waste can also be disposed in this facility which is a multifunctional complex.

2. Compared with the way of burial, the use of crematorium is more in line with the needs of modern society. However, the crematorium will emit a lot of polluting gas during the process of use. How do you consider this problem and make design?

There is a melting pot inside the building, and all the waste will be placed into it and collected for recycling. The body will also turn into ashes through high temperature.

3. Is the proposal of this crematorium project related to the increasingly limited area of the North Front cemetery?

Interview with Administrative Secretary from Gibraltar Jewish Community

Jewish Community in Gibraltar is a small community, in existence from the mid 18th century. They offer many opportunities to their members to actively involve themselves in maintaining and developing the quality of Jewish religious, social, educational and cultural life. It has support networks to cater for their members from cradle to grave, which enable people to enrich their lives.

1. How are the mortality rate and age structure of the Jewish people living in the Gibraltar?

2. In comparison to the traditional rituals in the culture of Judaism, are there any differences in Gibraltar

because of realities and special circumstances?

Jews' Gate Cemetery

Interview with Gibraltar Tourist Board - General Public Information Office

1. After abandoning Jews' Gate cemetery, what are the differences between it and the North Front Cemetery in terms of the role? Mainly for historical reservation and tourist attraction?

North Front Cemetery

Interview with on-site teams maintaining the cemetery and the superintendent

1. How are the daily maintenance activities and management rules in relation to different religions?

2. Is the North Front Cemetery the only operational cemetery in Gibraltar? what if the capacity of it reaches the maximum?

3. Considering the location of the North Front Cemetery situated near airport and city town, are there any relocation thoughts that can make the spatial quality better for all of them?

4. Are there any conflicts in the cemetery between different religions in terms of the funerary rituals, area ratio, usable land?

5. Are there any overlapping processes of funerary rituals between different religions in the North Front Cemetery in terms of the similarities and distinctions?

GBC News' Interview with John Cortes MP from Environment Minister

The Hon. Dr. John Emmanuel Cortes, MBE, is an ecologist, zoologist, Justice of the Peace and Gibraltarian MP, member of the Gibraltar Socialist Labour Party, working on a new law for the North Front Cemetery.

Reporter:
The state of the cemetery has been under the spotlight over the last few years with government facing criticism for neglecting the area. Emotion recognizing the need for improvement

was passed in Parliament in November 2016, but results have only just materialized.

John Cortes:

I'm truly sorry taken this long, it wasn't the intention but I'm very pleased that now we finally have it on track. Alameda Gardens are assisting there in advice obviously. I've got a little bit of personal knowledge of this as well, so there'll be some planting which I think will be mainly flowering shrubs and so on that will add to the total to the beauty of the area which it can be in the solemnity of other cemetery. It's going to be an ongoing program.

Reporter:

So why the need for the awarding of this contract was this something that be on-site team that couldn't provide?

John Cortes:

Those different teams of the cemetery, there was one team which is no longer there and the person who look after the graves and so on voluntarily were helping out for a period of time and I am really grateful to them, because under the guidance of the superintendent which is an excellent job there. They were doing the best that they could but clearly it wasn't enough because of the demands of the site.

Reporter:

But this was never part of the responsibilities of the on-site team, the group of seven which have specific rows.

John Cortes:

The on-site team will be dealing with digging, opening the graves, dealing with funerals and the other maintenance work and so on. That will continue and there'll be a separate contract, obviously they will all be coordinated with the superintendent, but that several contract will concentrate on keeping the cemetery planted areas tidy and in gradually increasing the amount of landscaping and beauty of the area.

The North Front Cemetery is the burial ground for around 90,000 people, a unique setting which features around 7 kilometres of paths and includes 800 war graves. There are particular challenges to maintain the cemetery here in Gibraltar to access the plots, the team here need to break the floor. But it's not something that can be fixed straight away. The need to wait for the ground to settle before they can tackle the area once again.

A map has been erected at the entrance to the cemetery to make it easier to

find a way around with species of flora and fauna found also highlighted. Other future developments will include the creation of the cemetery authority and database.

All contributing towards making the cemetery a place that the community can be proud of.



Pictorial-Narrative

One of the methods provided by the new cemetery to deal with corpses

A brief prayer ceremony is carried out in the biodegradation room, and the remain will be placed in a degrading box to become nutrient soils. Relatives will sprinkle these soils in different corners of the Rock to make it part of the Rock.

Description

I wish I could tell her how it all turned out—that we're better now, more accepting. One foot after the other I shuffle against the rock, leaving the light behind as I descend into her darkness.

Spirituality in Gibraltar follows its own local logic.

Around the base of the Rock of Gibraltar, in the dense town and port, cultures mix, intersect, and negotiate in the streets and buildings. Nowadays, the demographic complexity of this small peninsula is composed of 88.8% Christians, 4.0% Muslims, 2.9% with unconfirmed religious affiliation, 2.1% Jews, 1.8% Hindus, 1.0% Buddhists, 1.0% following a folk religion, and 1.0% following other religions. Through churches, mosques and synagogues, many religions have found a place here. Sometimes highly traditional in their symbolism, sometimes not, these communities reach a balance to form the dynamics of the peninsula.

The compression reinforces the difference of certain beliefs, the fierce shared sense of coexistence, as well as the multi-faith Gibraltarian identity—some cultural practices are reinforced while others are reinvented. Gibraltar is a carrier of a uniquely mixed culture between continents. Unlike other territories in Europe, its uncertain existence and extreme compression has an intense religiosity, where commitment to religious orthodoxies is inflected by a commitment to a common Gibraltarian identity.

If you look at the ground plan of the North Front Cemetery in Gibraltar, the feeling of uncertainty will become stronger. Most of the land is occupied by Christian believers, mainly Catholics, and the rest is for other religions. The only cemetery currently in use, it is located at the junction of the airport and city center—not only is it limited by the invasive expansion of the city and the influence of the airport's runway, but also by the local government's neglect. It is fragile and lacks a sense of spiritual sublimation for both the dead and the living despite occupying some of the highest value land since its establishment. Most importantly, it is now reaching its maximum capacity, resulting in a low quality, crowded, and unsustainable space in the future development of Gibraltar.

This is a project that explores the notion of the potential coexistence of different religions, and questions the role of the cemetery in Gibraltar's context. Because of its special location

and connecting network still being built, religious activities will be even more intense and diverse in Gibraltar in the future. People coming from Africa and Asia with different beliefs will reinforce the original complexity, challenging the inclusivity of Gibraltar both in architectural and urban contexts. Compared with the complex and ever-changing characteristics of the city, the state of the Rock is more eternal and has always been a symbol of spirit and reality for locals, not just for the past and present, but also for the future.

Above the settlement, they made designs in, on, and around the Rock, and different technologies and structures from different centuries have been erected against its vibrant veins. The first tunnel was hand-built using slow, laborious, but durable excavation methods, the advantage of which was that the damage to the surrounding rock was minimal, resulting in very stable tunnels that are still easily accessible today. Early tunnels were simple man-made holes, but later tunnels (especially those excavated during World War II) became more elaborate, built more quickly using explosives and machinery, many of which are large enough to accommodate truck-sized vehicles.

It seems that too many explosives have caused the surrounding rocks to break away in large quantities, and some tunnels need to be supported by anchors, welded mesh, pillars, arches, or tunnel linings. From prehistoric burial chambers undergoing hi-tech archaeological research to World War tunnels reinvented as tourist destinations, and from man-sized caves to large tunnels enabling transport to pass through, incursions into the rock such as reinforcement, renovation, and extension are made according to available technologies for the rituals and requirements of the day. Large, bifurcating chambers are analogous to the way in which religious culture is created in the space below—these gestures in the rock have built up possibilities for coexistence.

The theme of this project focuses on the contradiction between a permanent cemetery and an upgraded city in Gibraltar, proposing a new rock cemetery with shared resources for different religions, introducing newly ecological methods for saying goodbye to the deceased in the future. Instead of occupying the most valuable plot of reclamation land, placing a new cemetery inside the Rock is more reasonable, and relates to the spiritual sustenance of the locals. The project assesses the phased relocation of the

multi-faith cemetery from its untenable site on flat ground and airport-adjacent prime real estate, to a steeply sloping, east-facing site of defunct water catchment systems. Now barren land, it is the basis for both reassessing the spirituality of the Rock, and for reinventing ways in which spaces are made in, on, and of it.

A cemetery is a place to move forward, with darkness and light, sadness and hope. Funeral rituals start the inside the Rock and end on its slope, corresponding to the emotional change of the participants. In a religiously neutral cave offering space for ceremonies, counseling, grief, memorial, and spirituality, there are shared and unique places where each religion can find its identity and beliefs through the ambiguous spaces created by excavation.

The funeral procession enters from the west side of the mountain, a highly dense area of the city, and passes through a long, dim tunnel reinforced by metal structures to begin the first part of the funeral ceremony. Washing, wrapping, and other processes are performed in a hidden space formed by rock pillars, creating a quiet and respectful atmosphere. Then, the rails once used to transport excavated stones are reused, with minecarts cleverly serving as transport tools for coffins.

A new spirit is introduced through religious furniture in the caves. The pillar structure makes it possible for large-scale activities such as gatherings, strengthening the solemnity and washing the mind. The characteristic sacred space in each religion can be constructed through different excavations where believers can find a sense of belonging and identity.

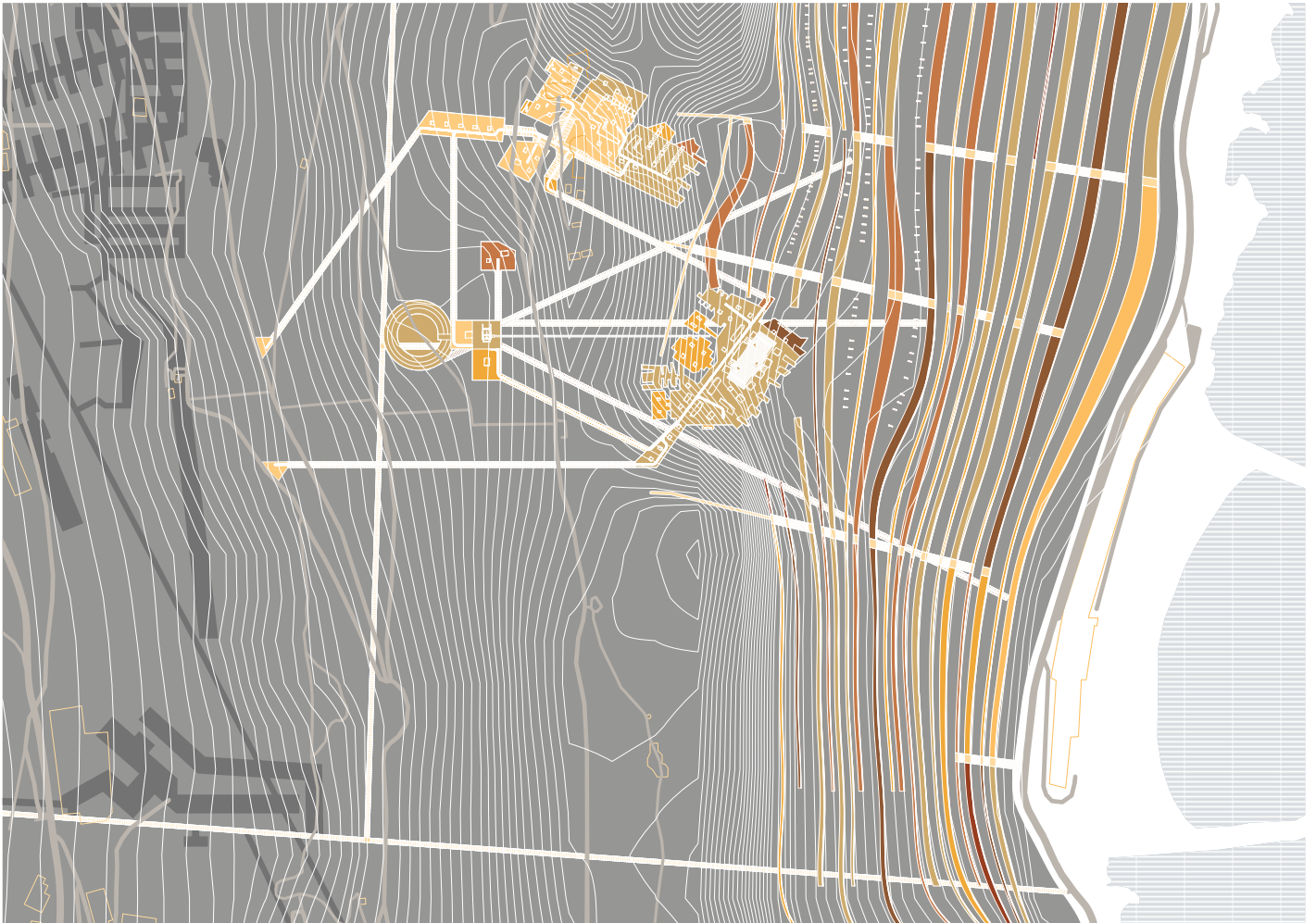
One of the ecological ways for saying goodbye to the deceased is placing them in a degrading chamber to create organic soils rich in nutrients through the accelerated decomposition of organic matter. Light slowly begins to penetrate and gradually illuminates the tunnel to the burial place, alleviating participants' pain and arousing hope. The growth of a plant gives the dead a new life for people to grow up with, as if the departed never left.

Not only does this make use of architecture established during conflicts, but it also can negotiate between different identities through spatial events and programming possibilities. What happens to the cave inside the Rock mirrors the logic of the natural

development of religious culture and city. The textures of the caves will be enriched because of the merging of both historical and modern excavation methods; arches in old tunnels will be reinforced by adding new supporting structure full of industrial memories, and new column networks made with modern techniques provide more possibilities for upcoming users.

Replacement, demolition, overlapping, and reinforcement—these activities have happened in both religious evolution and mining excavations throughout time. They can complement and understand each other under the protection of the Rock, and the funeral rites can be seen as a journey through these places which follow their processes, decisions, and actions. As times change, religions will influence and change each other, making contradictions and similarities co-exist, and a new green burial culture will be more widely accepted than ever before.

By excavating the heart of the Rock, its natural texture ties the project seamlessly back into its landscape. The cemetery is, in a sense, organic architecture that integrates into the natural landscape as an extension of the Rock of Gibraltar. Vegetation as a new symbol of second life gradually replaces crosses and tombs and are beneficial to the local environment. The process is slow but full of energy, comparable with the high speed of urban development. Life does not end but continues in another way.

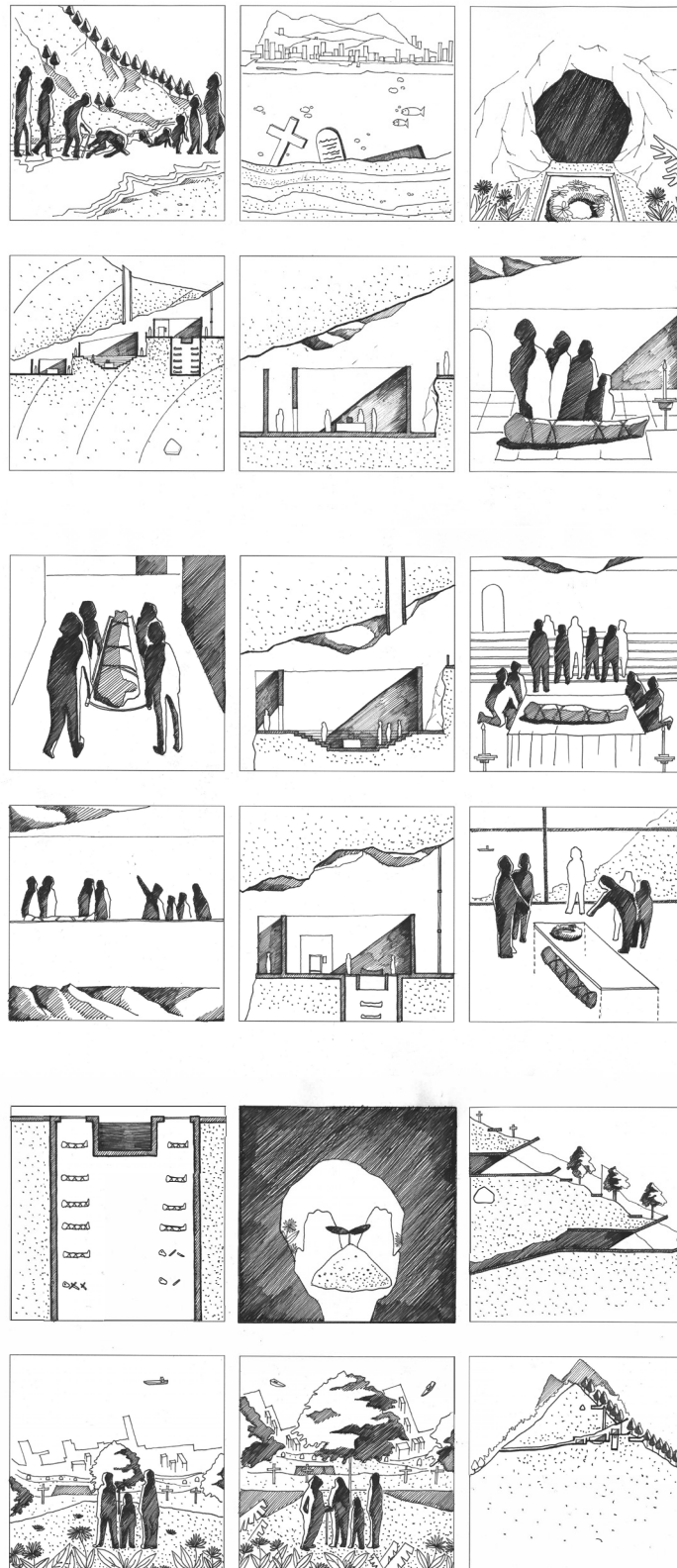


0 50 100 m

Masterplan Drawing

Drawing showing the layout of the new cemetery in the Gibraltar's Rock and its relation with the urban environment

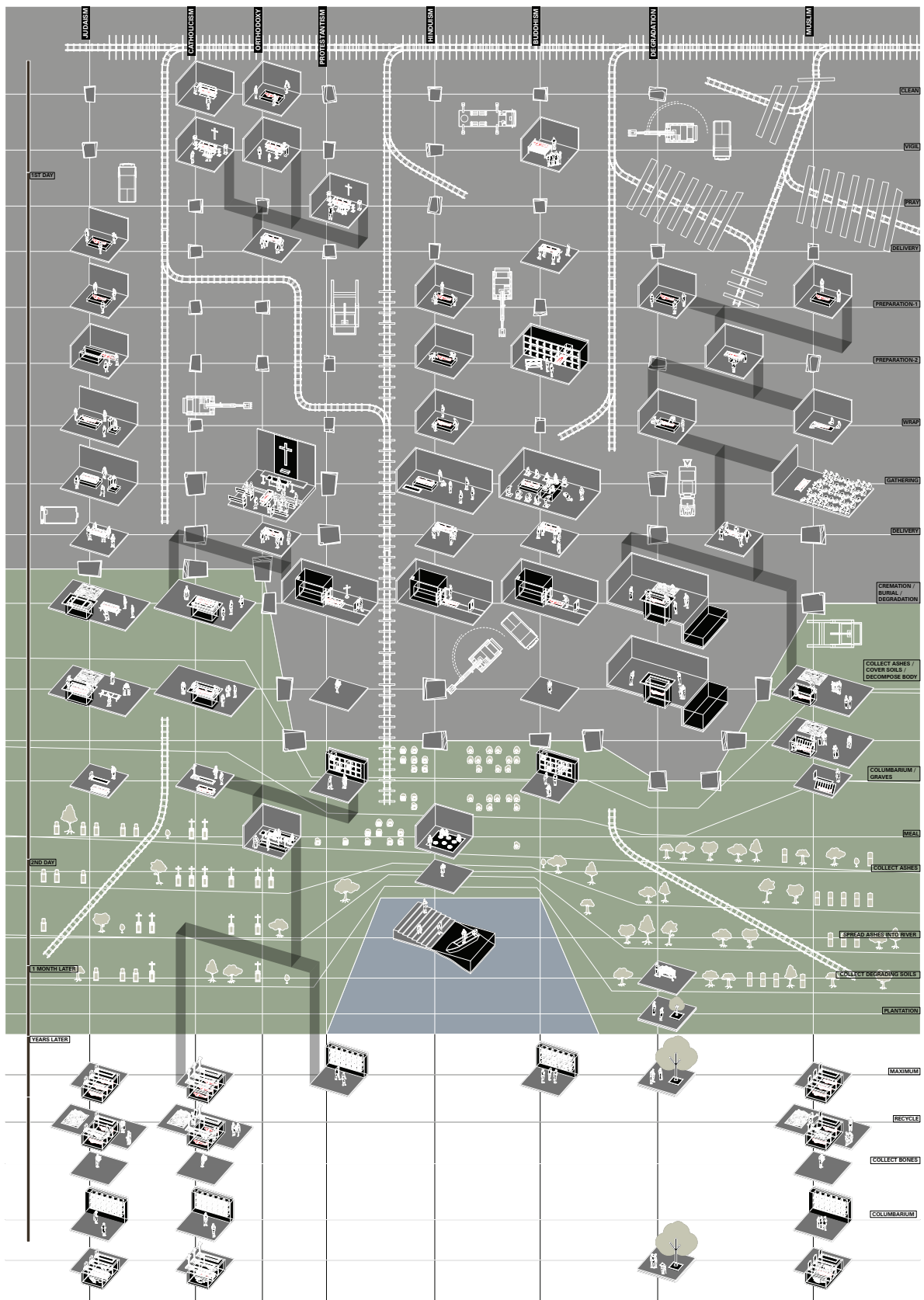
Drawn by Zhichao Tu



Hand Drawings

Storyboard for funerary rituals that starts from the west side of the Rock and ends from the east side of the Rock

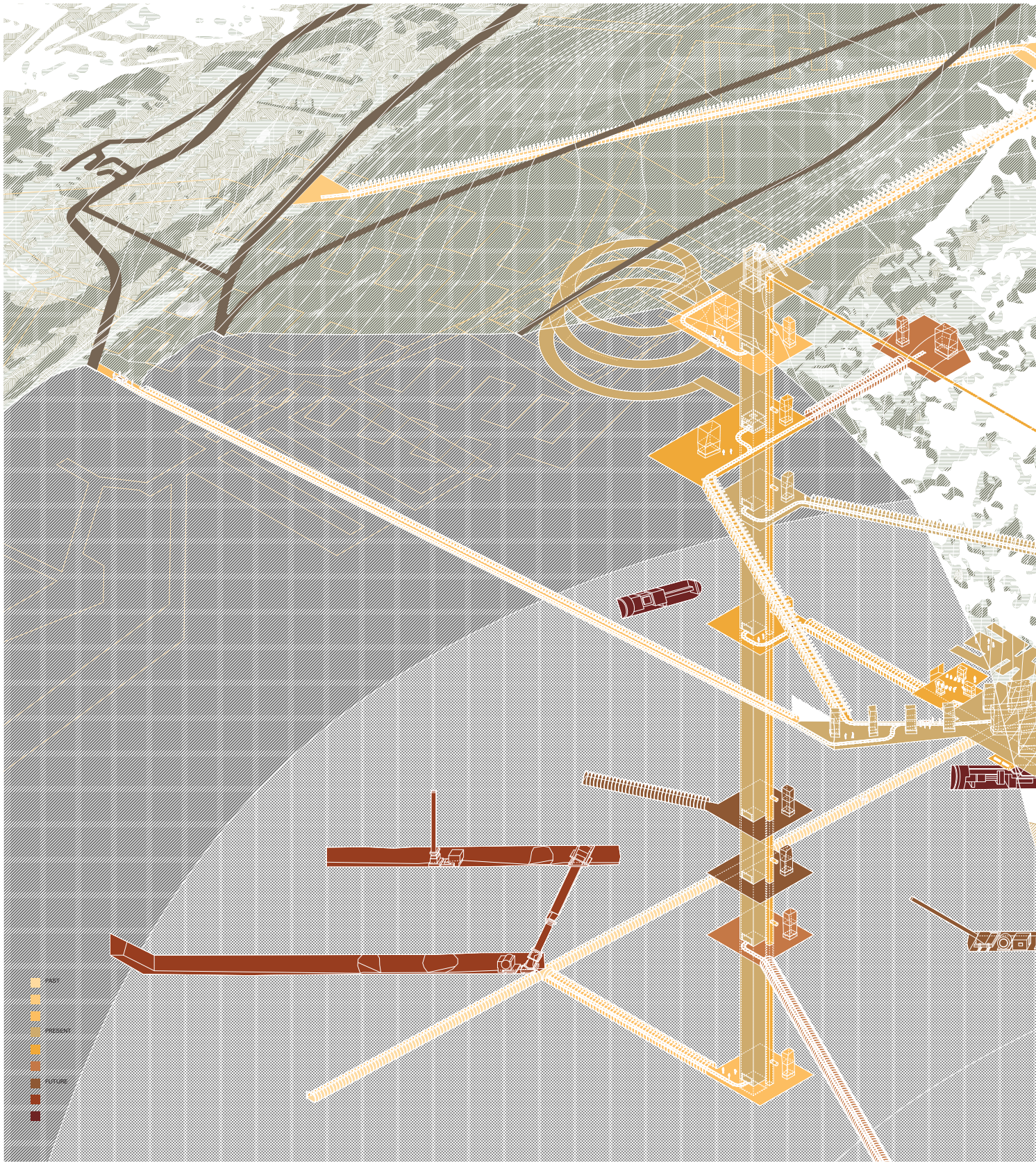
Drawn by Zhichao Tu



System Diagram of Funerary Rituals of Different Religions

Drawing displaying the differences and the similarities between different religions in relation to the excavation methods

Drawn by Zhichao Tu

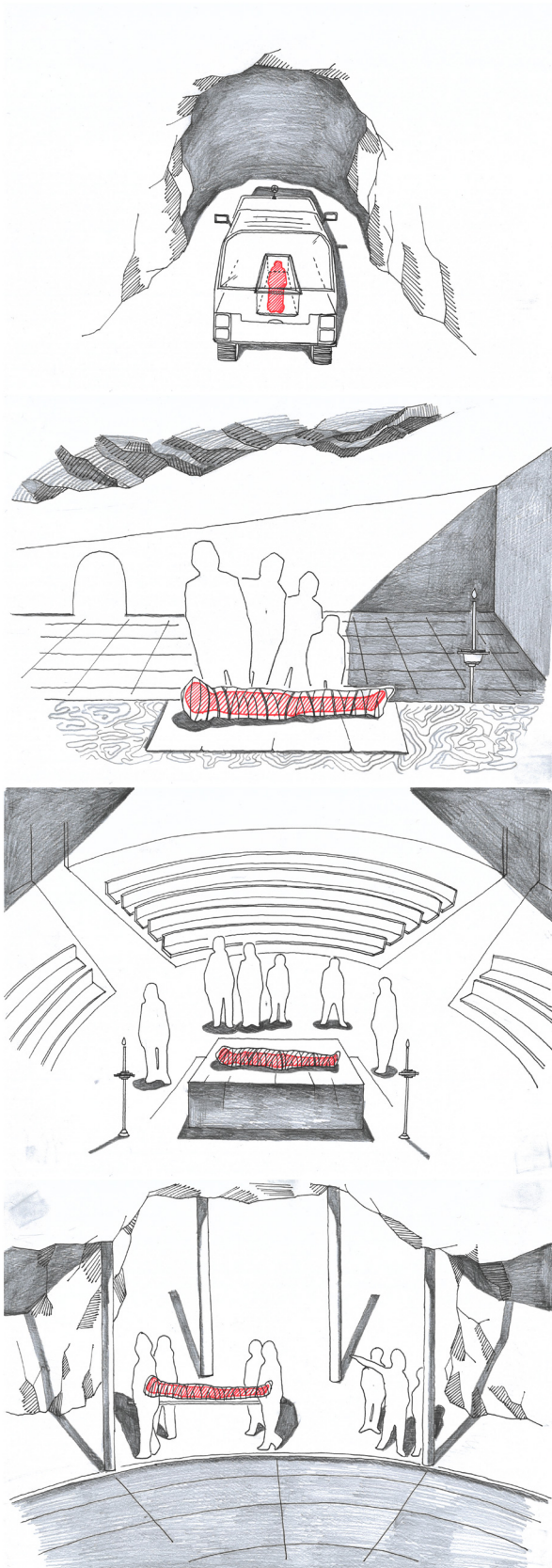




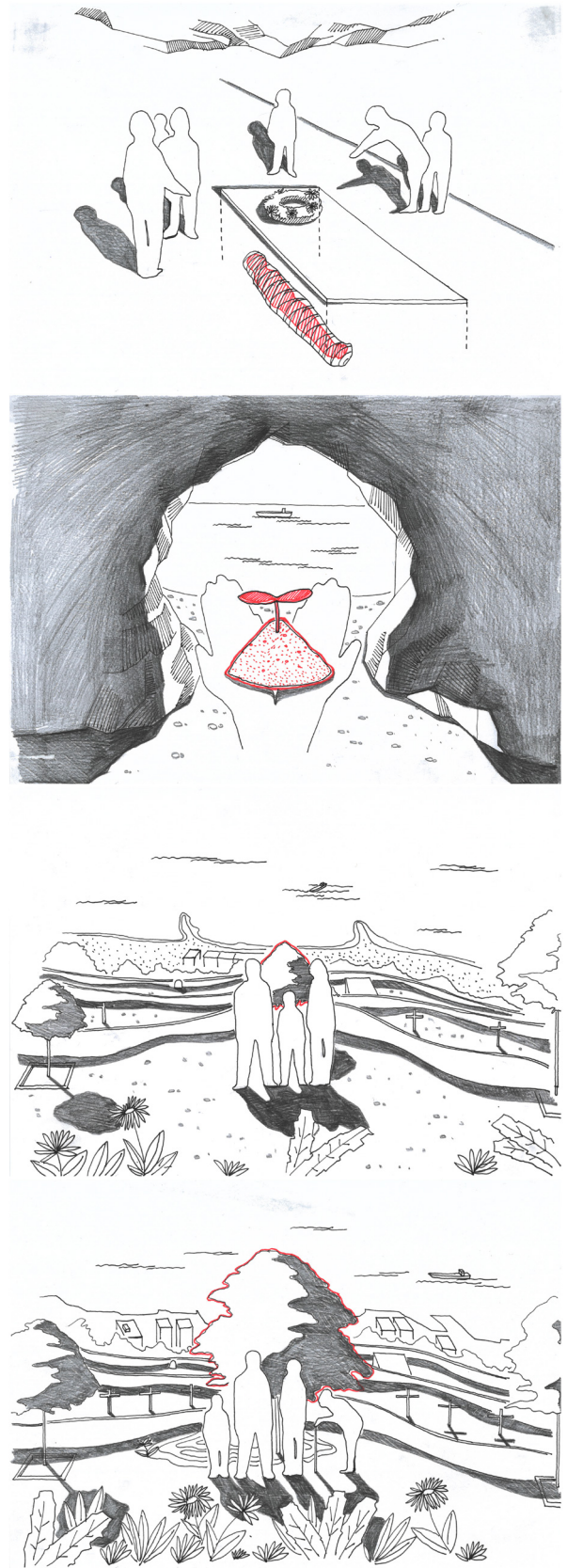
Isonometric Drawing

Isonometric diagram showing the relation between the inside and the outside of the new cemetery

Drawn by Zhichao Tu

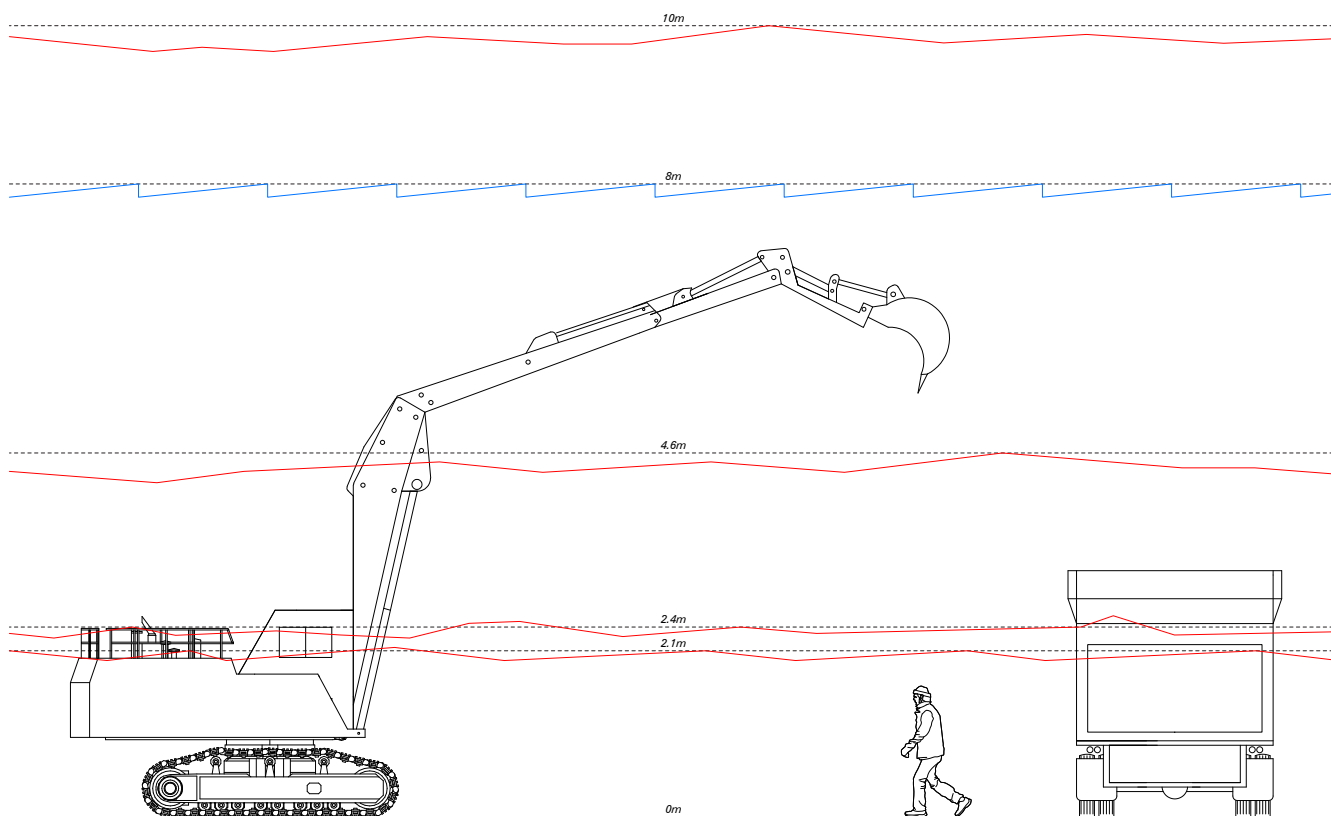
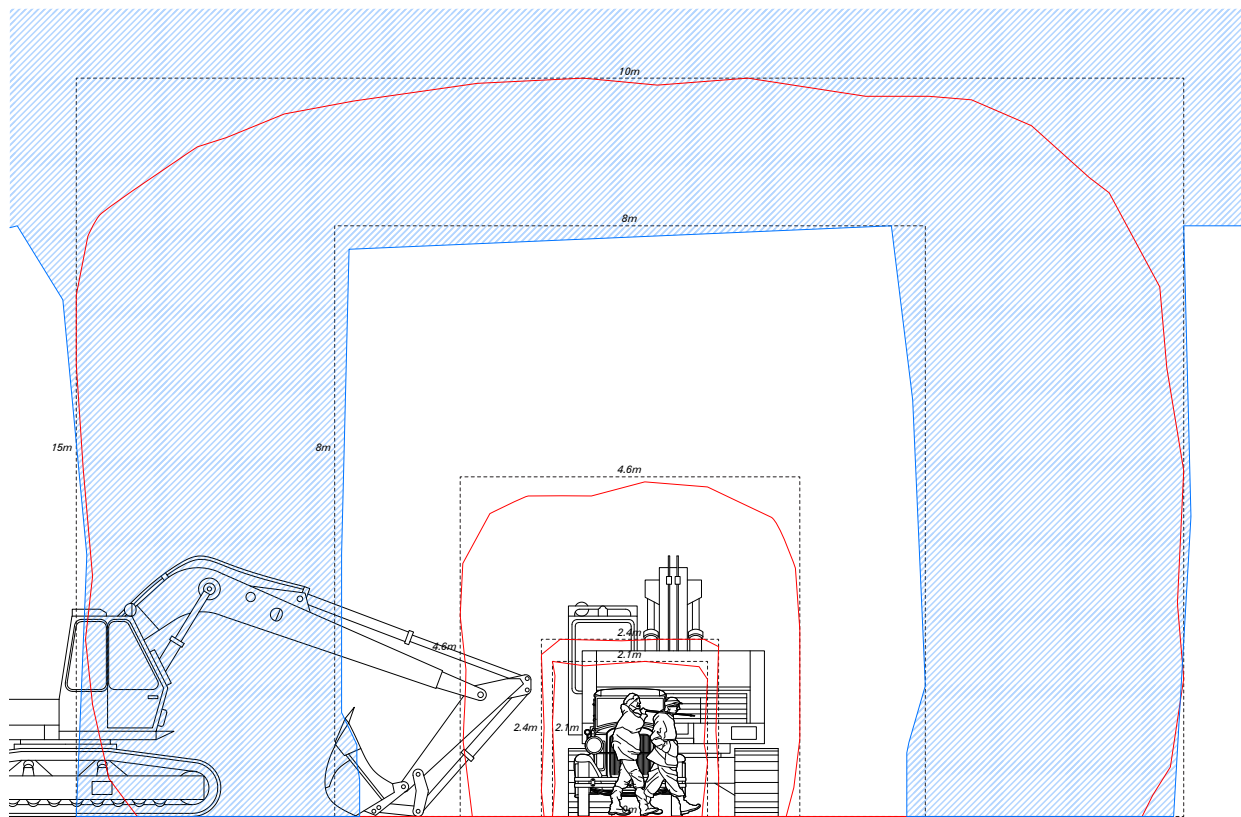


Hand Drawings



Storyboard for funerary rituals that starts from the west side of the Rock and ends from the east side of the Rock

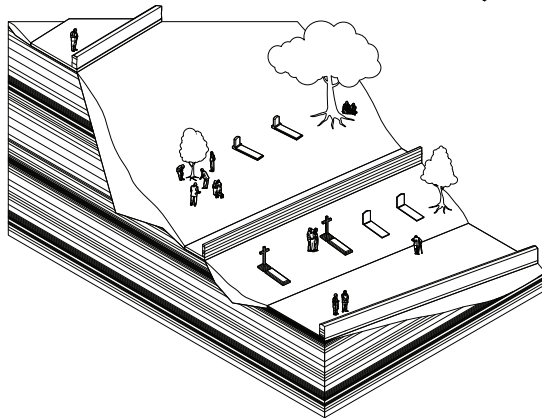
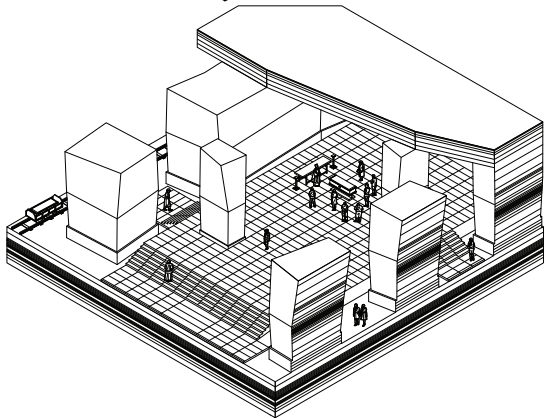
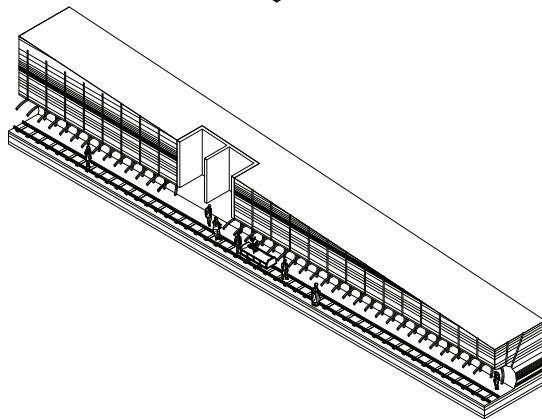
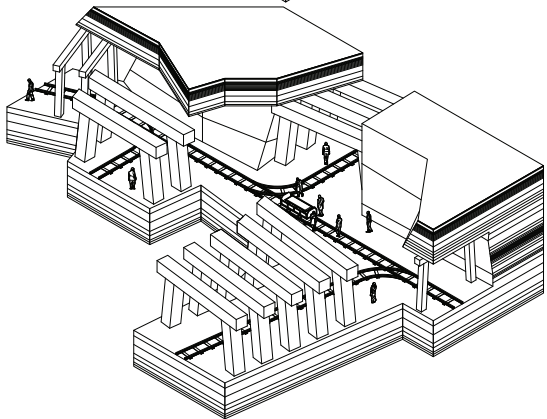
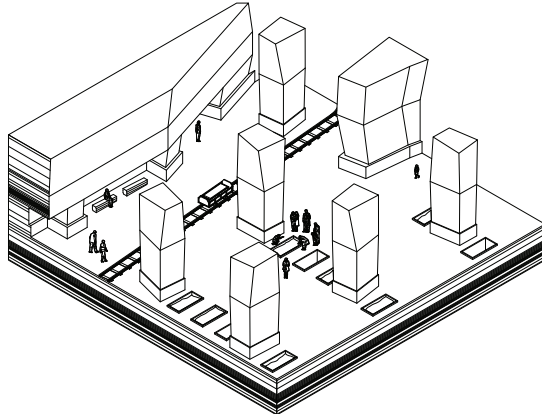
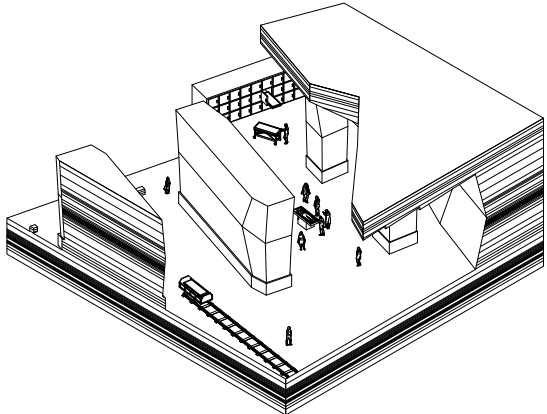
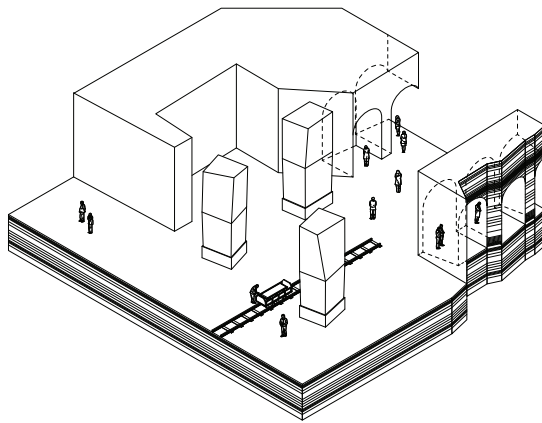
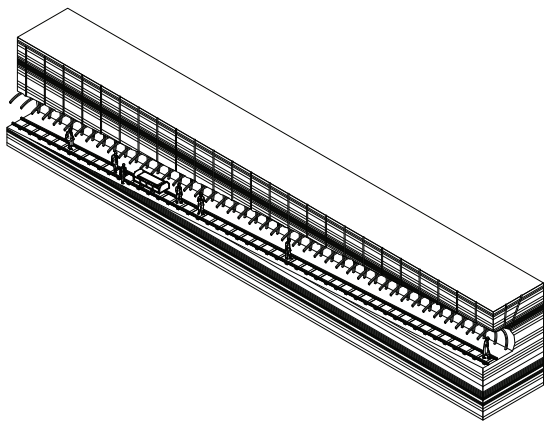
Drawn by Zhichao Tu



Spatial Comparison Diagrams

Developments of excavation methods
related to the various shapes of space

Drawn by Zhichao Tu



Isonometric Drawings

Spatial relationship of funerary rituals

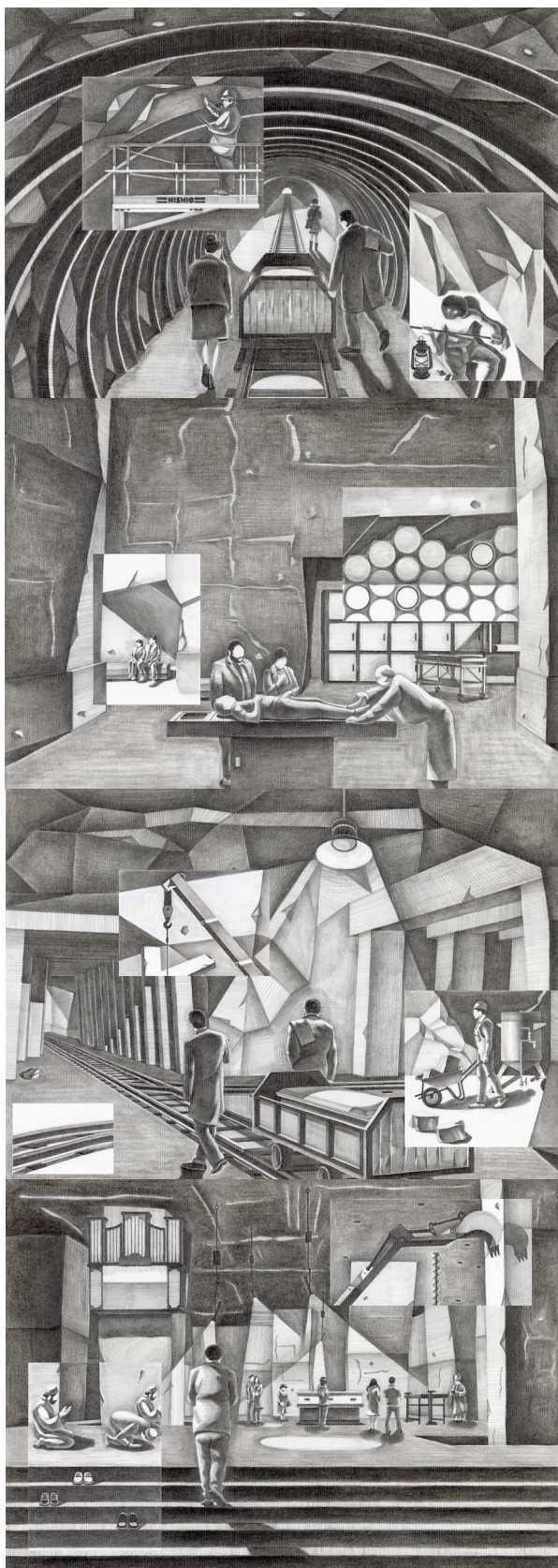
Drawn by Zhichao Tu



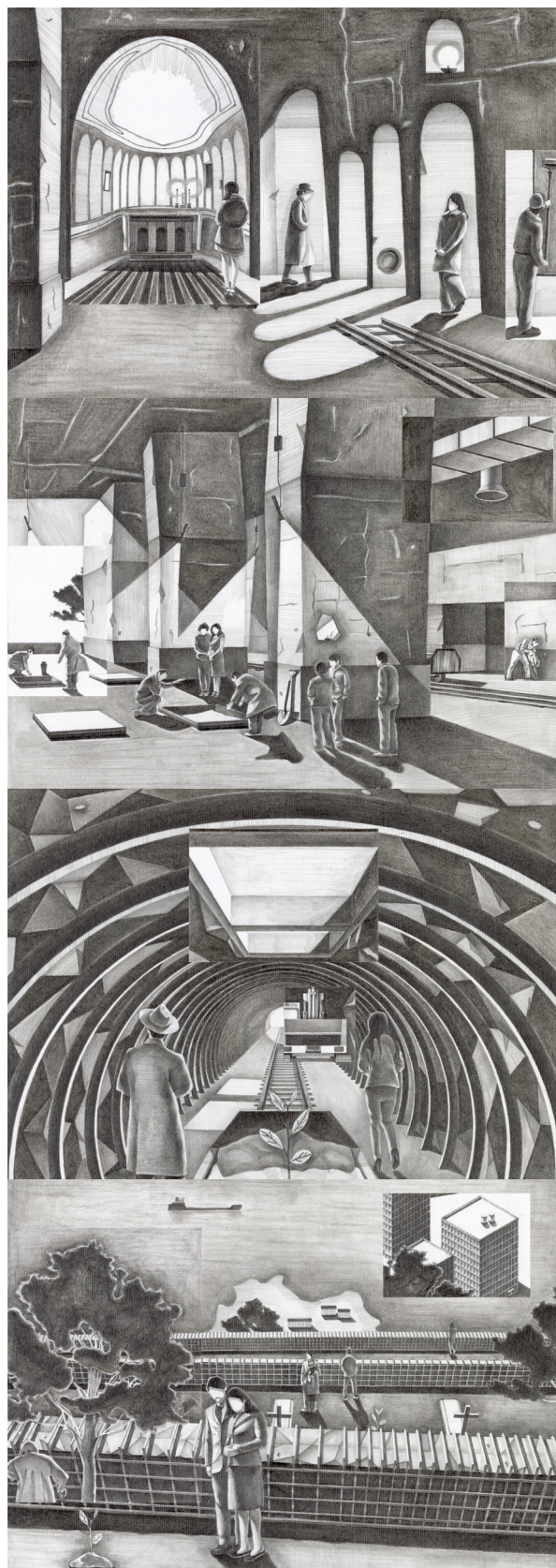
Image Drawings

Different steps of funerary rituals

Drawn by Zhichao Tu



Hand Drawings



Different steps of funerary rituals

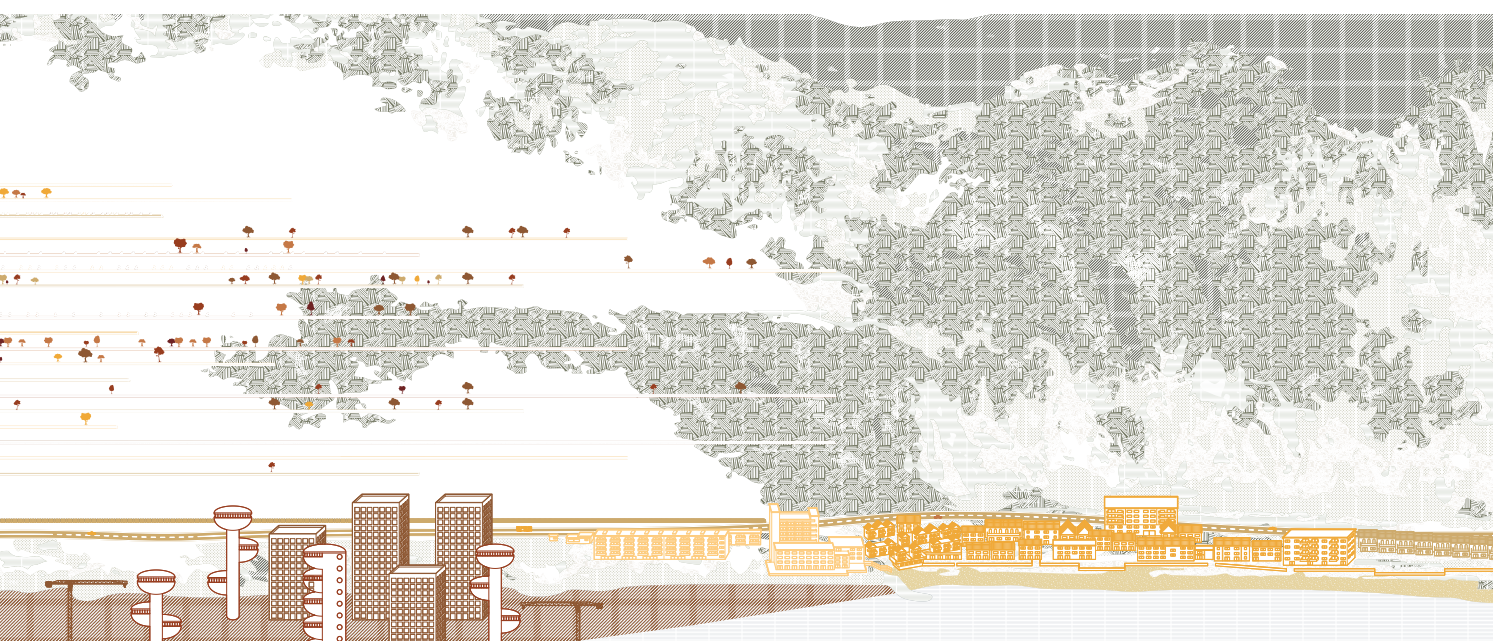
Drawn by Zhichao Tu



Soapstone Models, Scale 1:100

Models showing the materiality and the texture of the rock related to religious spirit

Made by Zhichao Tu



Elevated Drawing

Elevation of “Water Catchment” and project, analyzing the developing relationship between the new cemetery and the urban expansion

Drawn by Zhichao Tu

Bibliography

PDF e-book

Statistics Office, HM Government of Gibraltar, "Census of Gibraltar 2012," PDF e-book, under "Population Tables."

Department of the Environment and Climate Change, HM Government of Gibraltar, "Gibraltar Nature Reserve Management Plan," PDF e-book.

Tim Brown, "The making of urban 'healthier': the transformation of cemeteries and burial grounds in late-Victorian East London," *Journal of Historical Geography*, no.42 (2013) 12-23, <http://dx.doi.org/10.1016/j.jhg.2013.05.001>.

Andy Clayden, Trish Green, Jenny Hockey, Mark Powell, "Cutting the lawn - Natural burial and its contribution to the delivery of ecosystem services in urban cemeteries", *Urban Forestry & Urban Greening*, no.33 (2018) 99-106, <http://dx.doi.org/10.1016/j.ufug.2017.08.012>.

Wahyu P. Hariyono, "Vertical Cemetery," *Procedia Engineering*, no.118 *2015(201-214, 10.1016/j.proeng.2015.08.419.

Bradley W. Benmoshe, "Rethinking the urban cemetery innovative and sustainable design for memorializing our deceased loved ones," University of Florida, PDF e-book.

Chris Park, "Religion and Geography," Chapter 17 in Hinnells, J. (ed) *Routledge Companion to the Study of Religion*, London: Routledge, PDF e-book.

Video

GBC News. "Cemeteries Bill Command Paper published." YouTube. Video File. June 1st, 2015. <https://www.youtube.com/watch?v=7d06i5CzwXU>.

GBC News. "Cemetery works underway - 09.08.17." YouTube. Video File. August 9th, 2017. <https://www.youtube.com/watch?v=IX6ZN6VFqI8>.

GBC News. "Cemetery management programme announcement to be made shortly says Government." YouTube. Video File. June 2nd, 2017. <https://www.youtube.com/watch?v=XbxYIQ9YK9c>.

ToutParisEnVideo. "Paris - les Catacombes (full HD)." YouTube. Video File. January 13rd, 2014. https://www.youtube.com/watch?v=k7-b_1t2OAM.

Website

Eyleen Gomez, "Path cleared for cemetery maintenance," In *Local news, News, GIBALTAR CHRONICLE*, last modified August 15, 2017, <http://chronicle.gi/2017/08/path-cleared-for-cemetery-maintenance/>.

"Culture of Gibraltar," *Countries and their Cultures*, accessed May 1, 2019, <https://www.everyculture.com/Ge-I/Gibraltar.html>.

"Mass Times," *Gibraltar Catholic Youth*, accessed May 15th, 2019, <https://www.gibraltarcatholicyouth.org/>.

"Places of Jewish Interest," *Gibraltar Jewish Community*, accessed June 1st, 2019.

"The North Front Cemetery," *Gibraltar Jewish Community*, accessed June 1st, 2019.

Charlie Hintz, "Colma, California's Town of the Dead," *Cult of Weird*, last modified February 1st, 2016, <http://www.cultofweird.com/death/colma-california-cemeteries/>.

"Gibraltar Demographics Profile 2018," *index mundi*, accessed June 6th, 2019, https://www.indexmundi.com/gibraltar/demographics_profile.html.

"Gibraltar Population 2019," *World Population Review*, accessed June 14th, 2019, <http://worldpopulationreview.com/countries/gibraltar-population/>.

"Green Valley - FUNERAL SERVICES," accessed June 20th, 2019, <http://greenvalleyfuneralservices.com/>.

HELEN T. GRAY, "How Different Religions Bury Their Dead," *The Wichita Eagle*, last modified May 13rd, 2011, <https://www.kansas.com/living/religion/article1063828.html>.

"Guide to Religious Funerals," *FUNERAL GUIDE*, accessed June 18th, <https://www.funeralguide.co.uk/religious-funerals/>.

"How common is cremation?" *The Economist*, accessed June 20th, <https://www.economist.com/graphic-detail/2012/10/31/ashes-to-ashes>.

Sobaan Mohammed, "How to Have an Islamic Funeral," *wiki How*, last modified May 31st, 2019, <https://www.wikihow.com/Have-an-Islamic-Funeral>.

"52 Beautiful Ideas Of What To Do With Ashes: Advice From A Widow," *Cremation Institute - Expert Advice On Cremation*, accessed June 28th, 2019, <https://cremationinstitute.com/what-to-do-with-ashes/>.

do-with-ashes/.

"Cemetery Relocation," *New South Associates - PROVIDING PERSPECTIVES ON THE PAST*, accessed June 29th, 2019, http://newsouthassoc.com/?page_id=953.

Kate Meyers Emery, "5 REASONS FOR RELOCATING AN ENTIRE CEMETERY," *Bones Don't Lie*, last modified September 6, 2011, <https://bonesdontlie.wordpress.com/2011/09/06/5-reasons-for-relocating-an-entire-cemetery/>.

Shami Sivasubramanian, "6 innovative ways to dispose of dead bodies," *SBS*, JUN 21, 2008, <https://www.sbs.com.au/topics/science/humans/article/2016/06/21/6-innovative-ways-dispose-dead-bodies>.

Matt Dayhoff, "Cemetery overcrowding around the world", a *Journal Star* photo blog, <http://blogs.pjstar.com/eye/2014/10/22/cemetery-overcrowding-around-the-world/>.

John Lawrence Mero, William Andrew Hustrulid, George B. Clark, "Mining," *Encyclopaedia Britannica*, <https://www.britannica.com/technology/mining>.

Afterword: Reflection of Project in Relation to Discourse

The project aims at examining the relevance of the idea of order in architectural discourse. Like other public buildings, cemetery have been historically designed as part of ensembles, being considering as the death mirror of city. They represent a coherent meaning of life that shows a relation between the live and the death.

Thus because of the cultural diversity and limited land area, the proposal of a new kind of cemetery cannot be limited to a single religion. It must consist of a typological toolkit for the design of new cemetery in Gibraltar that results in an ideal co-existence of different religions. The new type must become a new architectural order that represents the recognizable presence of the state in the Gibraltar's Rock.

The structure of the project mirrors the logics of the natural development of the city and tunnels inside the Rock. Replacement, demolition, overlapping, reinforcement, these images happen in both religious evolution and mining excavation throughout the time. They can complement each other and understand each other under the protection of the Rock.

Due to the problem of secondary use of the cemetery, it is unable to adapt to the sustainable development of the city. Therefore, this project attempts to provide a feasible way to solve this repetitive social problem and to examine the relation between spirit and nature.

The design of the new cemetery hopes to be a place full of spiritual yearning sublimation and that is not limited to the design of a series of spaces that contain both natural and artificial textures, but includes the redefinition of the cemetery on a territorial level as well as a performance of natural power of the Gibraltar's Rock.