Beirut Grain Silos

IDENTITY, MEMORY, PLACE



Emmanuel Durand

...what remains at the site of the blast is more or less reminiscent of a monolith – in the sense of Paul Virilio's 'monolith' – a massive structure that survived an explosion, but still stands and has since become a monument. G. Sawaya

1



The day Beirut exploded, the silos remained.

PREAMBLE

On August 4, 2020, one of the biggest non-nuclear explosions in history took place in Beirut harbor, generating a blast wave which radiated through the capital. This explosion left more than 220 people killed,6000 injured, and 300 000 homeless.

The lasting image of news coverage that shook countries all around the world, was the crumbling grain silos that absorbed the blast.

Soon, the silos became the iconic image of that Tuesday evening.

Their possible demolition revealed a society torn between amnesia and the need to preserve so as never to forget.

The 4th of august tragedy will remain in the History and culture of the nation's psyche. The silos, and all the heritage buildings that were affected, will be the visual representative of this memory and will be tied to the Lebanese nation's history.

Beirut as a locus for the collective memory instead of the collective amnesia cannot be achieved without turning to common landmarks and memories of the cities, the grain silos amongst others.

"How to mourn what no longer has a place", Jeanine Altounian, l'effacement des lieux.

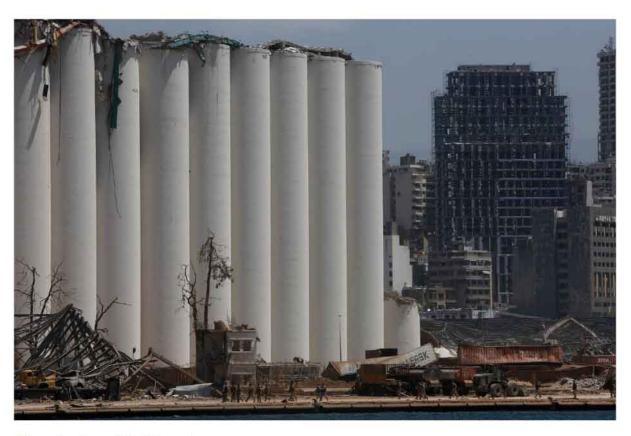
Demolishing the silos, changing the landmark, and creating a physical void, will give the impression of an absence of space enhancing psychological amnesia.

The most important meaning of this structure lies in what it symbolizes throughout its history.

We, a group of 24 Heritage experts, are concerned that the demolition of this modern architectural heritage, a witness of the August 4th explosion and the guarantor of the preservation of collective memory, will accelerate the forgetting of this tragic event which marked an entire generation and will erase the memory of the space.

Preserving this building, could be part of the process of memorialization and should be a part of the post-disaster recovery plan.

This report is intended to mobilize the rescuing of the silos and their transformation into a memorial, by articulating the agreed significance of the site, understanding the historic development of the silos, defining and outlining their significance (why they are important and to whom), showing similar international examples and stating the various types of threats to which the silos are exposed, and the consequences of their demolition on the nation's psyche.



"The city doesn't tell its past,

Getty

but it contains it like lines of hand, written in the corners of the streets, the gratings of the windows,

the artifacts,

and the ruins,

every segment marked in turn with scratches,

indentations,

scrolls"

Italo Calvino, Invisible Cities

Location of the silos

The grain silos are located on the pier of the port of the Lebanese capital – Beirut, between two basins.



Source ABC



getty images



New Scientist

Historical Brief of the silos

- September 16, 1968: The construction of the grain silos at the port of Beirut was launched during the term of President Charles El-Helou. It was the idea of the Palestinian banker Yousef Beidas intending for the silos to become the core of a regional distribution center, capitalizing on Beirut's advantage in logistics, marketing and modern finance at the time.
 - The construction project of the grain silos was the fruit of national and international collaboration. The design was developed by the Danish company *kampsax*, the Swedish agri-consult *malmö*, and the Lebanese structural engineer Jacques Nasr. Following an international competition, the construction execution was tasked to the Czech firm *Průmstav* who cooperated with *Strojexport*, led by the Lebanese structural engineer Rodolph Elias. The grain handling system was designed and installed by the Swiss group *Bühler*. The Kuwait Fund for Arab Economic Development covered the project cost of nearly \$2.8 million.
- 1970: the building was completed and put into operation with 42 cylindrical silos and a capacity of 2,500 tons of grain per cylinder.
- War 1975-1990: The silos were well-preserved and maintained for almost 50 years, even after witnessing two wars and withstanding multiple missile attacks.
- 1997: the structure underwent restoration and expansion works: 6 cylinders of the same storage capacity were added by Kettaneh Construction, increasing the silos' total capacity to more than 120,000 tons of grain.
- 2000- 2002: Another restoration campaign was carried out to address the concrete
 carbonation. During this campaign, the internal walls of the outer rows of the silos
 were increased by 12 cm. The silos were first managed by the CEGP (Conseil Exécutif
 des Grands Projets) till 2002, when the CEGP merged into CDR (Council for
 Development and Reconstruction). Adding the extra concrete coating and
 reinforcement layer to the outer silos decreased the extent of damage in the silos after
 the blast.
- August 4th 2020: A massive explosion struck the port of Beirut, causing severe damage
 all over the city. The grain silos, standing at 85 meters from the blast epicenter, took
 the brunt of the impact and absorbed the shockwaves from reaching the populated
 areas along the western coast of Beirut in full force. East-facing concrete cylinders
 collapsed at the spot, yet west-facing ones remain partially standing. The image of the
 crumbling grain silos was shared around the globe as a symbol of the tragedy that hit
 Beirut on that day.

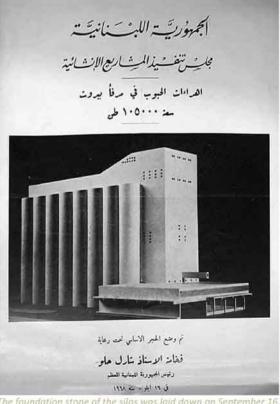
The site of the silos became an assembly point for the families of the victims and the Lebanese demanding justice following the August 4th blast. People expressed their grief and anger and commemorated the victims on the fence of the site. Most of the media

coverage and statements related to the Beirut's explosion took place in front of the grain silos.

- March 18th 2022: 18 months after the explosion, the Minister of Culture, Mohammad Mortada, issued a decree No. 49/2022 to include the grain silos building in the general inventory of heritage buildings, thus preventing any action that would alter its current condition except after the prior approval of the Minister of Culture on the works to be performed and the means and materials intended to be used. The statement issued by the Minister of Culture considered that after the explosion of August 4, the silos had become part of the heritage of humanity, a symbol embodying the image of a city aggrieved by the explosion, which necessitates preserving it and transmitting it to future generations.
- April 14th 2022 the Lebanese Cabinet issued a decree to demolish the silos and to erect
 a new monument to commemorate the victims. This intensified the anger of the
 families of the victims and the Lebanese people wanting to preserve the silos as a
 memorial to the August 4th tragedy.

Numerous campaigns to save the silos are being launched since then.





The foundation stone of the silos was laid dawn on September 16, 1968 during the presidency of Charles El-Helou. Source: Beirut Port Brochure.

Architectural Significance of the silos

"Lebanon presents one of the interesting 'laboratories' of the different tendencies and movements of this past century, starting with Modernism and its gradual assimilation, to Postmodernism and more current trends, in a context that presents a fertile field for experimentation. The questions of meaning, context, relations to place and tradition, have all played a part in the development of architecture in Lebanon, without necessarily achieving their desired goals, especially in the current climate of globalization. The loss of material identity that many regions around the world have experienced is reflected in the case of Lebanon, exacerbated here by political and social conflicts."

In Lebanon, and the Middle East in general, modernity has been accepted and rejected in equal fervor. Adding another layer of history to the existing multitudes has proved, at times, problematic and antagonistic, even violent. In the built environment those who took up modernity with passion left a Modern Movement (Momo) architectural heritage of immense proportions in Lebanon, which has often been fought over and eventually, as is the consequence of so many battles and stalemates in Lebanon, left to rot.





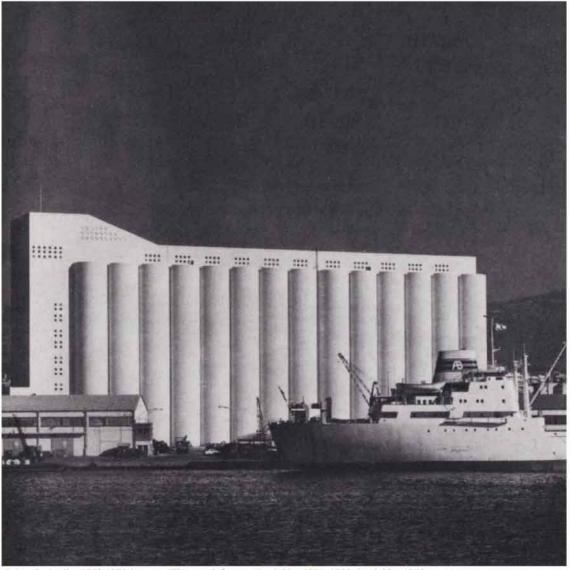


The general theme of Modern Movement (Momo) embraces and problematizes two types of considerations:

- On the one hand, the challenges that international architecture of the years 1950-1970 had to face when the operations of conception and execution were realized in different contexts (functional and technical challenges due to climatic imperatives; logistical challenges linked to the characteristics of the local culture of construction; strategic challenges in relation to the specific political and economic situation in the developing countries).
- On the other hand, the specific creative opportunities that the internationally active agencies were able to seize abroad and of which also their local production took advantage (treatment of prestige programs and ambitious operations with partners open to avant-garde Experimentations).

In this context, we cannot separate **Beirut grain silos** from all that era. Designed by Danish and Swedish companies (Kampax and Malmo) and built "**from a distance**" by a Czech company (prumstav) in cooperation with strojexport, led by Lebanese civil engineer Rodolph Elias.

Beirut grain silos were the largest in the Middle East, and they were a prominent architectural landmark on Beirut's waterfront. A symbol of modernist architecture in the city, which was established at the time to coincide with the Arab world and the region.



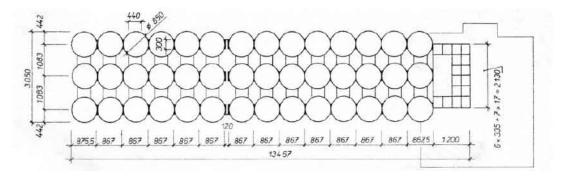
Beirut Grain silos 1968-1970 Source : Jiří Hemr, Průmstav Pardubice 1951-1986, Pardubice 1986.

THE CHARACTERISTICS AND VALUES OF BEIRUT GRAIN SILOS

International characteristics

Standardization (trame, repetitive cell)

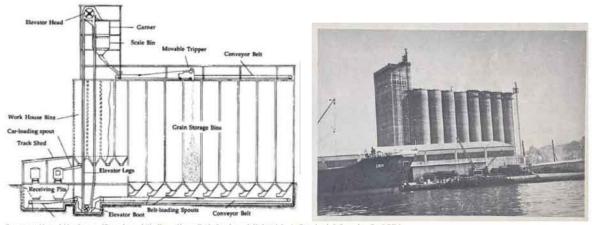
Standardization has been an essential tool to define architectural techniques and designs that outline what good architecture is expected to be in the modern world.



Plan of the structure of reinforced cylinders. Source: Karel Kerhart, 'Stavba obilniho sila v Bejrútu', published in Inženýrské Stavby 3, 1971. P. 113.

Typical solutions (grain elevator silos)

Not only did the construction of the silos greatly increase the grain storage capacity in Beirut, but it also increased the traffic capacity at the port by 10%, permitted to unload boats 8 times faster and generated significant savings on the cost of handling, storage, and losses of imported cereals.



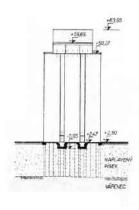
Source: Karel Kerhart, 'Stavba obilniho sila v Bejrūtu', published in Inženýrské Stavby 3, 1971

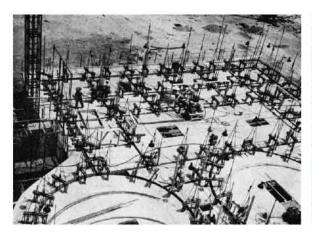
Technical optimization (piles, wellpoints system and sliding formworks)

Because of their location on the pier of the port between two basins, the silos were built on 3287 reinforced piles (30x30 cm, 16m deep) in an alluvial layer of sand. With challenging geotechnical conditions, numerous difficulties had to be overcome both during the pile-driving process and throughout the construction itself. The largest share of construction work consisted of reinforced concrete, where almost 25,000 m³ of concrete was processed. over half of this amount was processed into **sliding formwork**.

A wellpoints' dewatering system consists of a series of shallow wells, known as wellpoints, which are installed at a pre-determined depth and appropriate spacing around an excavation













Source: Karel Kerhart, 'Stavba abilního sila v Bejrútu', published in Inženýrské Stavby 3, 1971.

Brutalist architecture and monolithic shape

Robust typology behind the monolithic structure and minimalist constructions that showcase the bare building materials and structural elements.



L Keserwani

"The large modernist construction, white, clean, with clean solid lines, stood straight in the port, with its back to the sea and facing Beirut. Like a Phoenician wall that protects it from all attackers. Like the columns of Baalbeck, vestiges of a rich and prestigious ancient time...Every time I took the coastal road, and I saw it, it gave me a feeling of 'home', of belonging.

It reassured me.

Ever since I was born, it stands upright and firm like the mountain of Sannine. It is even present on postage stamps.

These silos where we store the wheat that feeds the country are nurturing like a mother» J. Keserwani, OLJ

Contextual and regional characteristics

The biggest silos in the middle east (1968)

Beirut's grain silos were originally constructed to bear a storing capacity of 105,000 tons of grain. the original capacity of the silos consisted of 42 cylindrical silos with a capacity of 2,500 tons of grain per cylinder. after restoration work took place in 1997, 6 cylinders of the same storage capacity per cylinder were added, thus the silos' total capacity was increased to 120,000 tons of grain.

Local materials:

The basic materials for the production of concrete were of local origin. As the only rock in the country, limestone gravel had relatively little strength and a large amount of dust. Fine sand was either from sea alluvium or crushed limestone. However, Portland cement of local production was of excellent quality. A specific prescribed type of cement, resistant to seawater's effects, was supplied to produce concrete for the piles and the foundations.

Local work execution and workforce:



Source: Karel Kerhart, 'Stavba obilního sila v Bejrůtu', published in Inženýrské Stavby 3, 1971.

Local context and landmark:

This **MONOLITH** building which is easily noticed, and is used to judge one's position or the position of other buildings or features (Port of Beirut).



The harbor and the silos, March 2019, Megaphone after Anthony Rehayel





"Once, they were symbols of promise. The Beirut blast turned them to monuments of despair", Nabih Boulos, Los Angeles Times

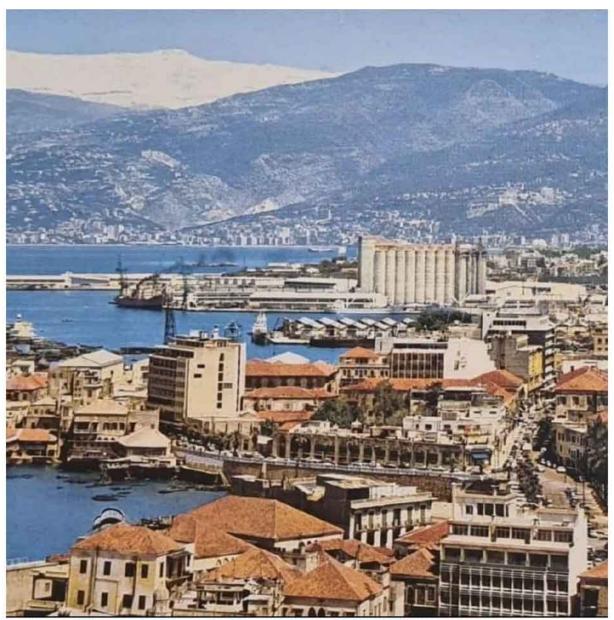
Picture thenationalnews.com

Symbolic Significance

A landmark for the Beirutis before the explosion, and a silo for their grains

Before the explosion the silos were a landmark for the city of Beirut, and a familiar object in the Beirutis daily life scenery. Those cylinders presided over Beirut's port for 50years and held much of Lebanon's grain – a landmark in a city that had lost many of them to civil war or pitiless development (Nabih Bulos).

"They were the gate of Beirut. You saw them from the sea, the air, whenever you would go from one side of the city to the other. They were like the pyramids, <u>like the Eiffel Tower of Beirut</u>. Every time I passed them, I would think how lucky we were to have this sentinel, these silos, protecting us." L. Ziade Los Angeles Times



A LANDMARK is a physical object that serves as a PUBLIC REFERENCE POINT Kevin Lynch

· A reminder of the golden era

"The silos, as a visible structure, were a reminder of how organized and pro-active Lebanon was in its early days," A. Jabr Los Angeles Times

"The grain silos at the port of Beirut are considered to be a notable civil engineering work that was created under demanding conditions and that has achieved high recognition for its excellent quality." Gioia Sawaya, designboom

A survivor of the Lebanese wars

The silos witnessed the atrocity of the war when clashes took place in areas adjacent to the harbor. Nearly 90% of the buildings witnesses of the Lebanese war has been erased.



Battles scenes next to the harbor, 1978 Megaphone from Anfeh Social Media

A savior of the lives of the Beirutis when hit by the shock of the explosion

The silos, located less than 85 meters from the blast's epicenter, acted as a shield for the western part of the city and saved thousands of lives and buildings.



"The monolith that shielded the city during 2020's port blast" Gioia Sawaya

"I like to compare them to three ranks of soldiers. Those in the first line are all dead, those in the second line have been damaged, those in the third have held on. " Emmanuel Durand

A manifestation of the collective memory of the Lebanese people

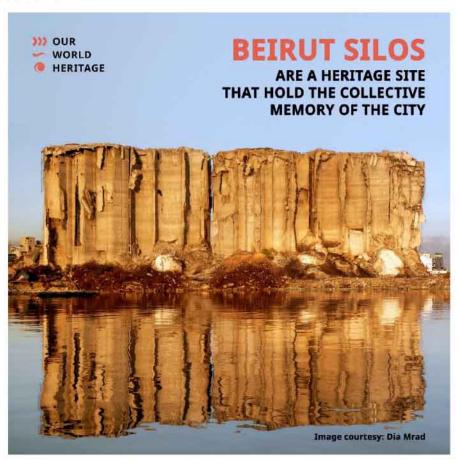
The decision to demolish the silos has raised questions about how best to remember that Tuesday evening. The silos became a wakeup call with the collective memory they carry, in a country used to collective amnesia.

"People have an emotional connection to the silos. After the explosion, the attachment with the structure increased," G. Sawaya. Los Angeles Times

"I want the silos to remain as they are so that we can see what has been done to us every day... It's not just about my father, we are all concerned." Tatiane, daughter of a victim, OLJ

"To remove them goes beyond the erasure of collective memory. It is perpetuating murder" S. Frem

"The silos hold the collective memory of the city and are a reminder of the atrocity of the explosions. The decision to remove such a significant place of memory can't be taken without the involvement of the civil society.", J. Kallas - Our World Heritage Association OWH



Our world Heritage Page

A carrier of the challenging decision in a country where collective amnesia prevails

The post-war reconstruction of Beirut was a tabula rasa project that erased the center of Beirut, holder of the memories of the Lebanese people. These generations have nothing now to share with the new post-war generations regarding their capital center.

This concept established the collective amnesia approach for all the projects dealing with existing buildings.

"We are witnessing a paradigm shift within Lebanese society which wants to break with the culture of amnesia, and the silos are best able to account for the magnitude of what happened that day ", C. Moubarak, architect OU

"By many concerned Beirutis', the post war destruction of a huge area of the center, and the core and memory of their city, left an even deeper scar than the war;" Y. El Chami

A manifestation of a "disaster memory"

Disaster memory memorials often serve as a prevention tool to trigger reflection on disaster awareness. Remembering past disasters offers significant value at the community level.

In the case of the silos, the memories will be of a manmade disaster; they will not only inform people's knowledge of the responsibility of the state to deal with the safety of its citizens, but it also influences their interpretation of risks and accountability, once in the recovery phase.

The memory of the August 4th manmade disaster will be conveyed in public life through the silos-memorial.

"Cultural memory ensures that meanings and interpretations of disasters are recorded and handed down from generation to generation... it provides people with an explanation, enabling them to mitigate trauma." H.de Jong



If the silos of Beirut could talk...

REUTERS/Mohamed Azakir

A ruins-witness

In its "Urban Declaration of Beirut" the Order of Architects and Engineers formulated the need to preserve the destroyed silos as "ruins-witness". Although the Lebanese capital has many notable scars of the conflicts it has gone through, such as the bullet-riddled hotel Holiday Inn or the bubble-shaped cinema The Egg, there is no memorial, on the model of that of Hiroshima for example, in which the public could come to meditate, get information or simply stroll.

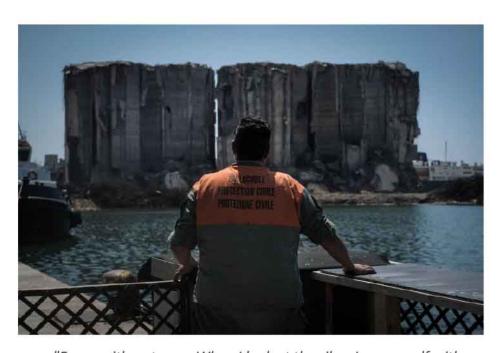
"The silos are not only a witness of the August 4th disaster, but on the tragedy of destruction upon which Beirut's history is based." DARAJ

"I could take my children there, ten years from now, and show them where their grandfather worked" T. Hasrouty, daughter of a victim.

An architecture with an "emotional power"

The silos <u>preserved</u> in their <u>post-explosion</u> state <u>elicits</u> such <u>powerful</u> emotions since August 4th; they hold a balance between meaning and aesthetics while keeping August 4th, Beirut, and its people being memorialized. The Silos are now <u>evoking</u> the <u>unspeakable</u>, and they should remain as so. The silos won't only show the extent of the explosion but they will reflect personal experiences and emotions without which the process of the recovery on an urban or people level won't be complete.

"...today, with its sturdy concrete columns, the silos still partially stand, monumentally and monolithically robust at ground zero." G. Sawaya



"For me, it's not over. When I look at the silos, I see myself with my friends here" Elias, silo employee for thirty years. OLJ

João Sousa

Similar International Projects

Coventry Cathedral, England

The ruins of the medieval building stand as a testament to the destruction of the Second World War; The tower, spire, and outer wall of the church survived the bombing, but the rest of this historic building was destroyed. After the war, the cathedral was not rebuilt on site but left in ruins as a testament to the futility of war.

The building has international significance as a place of Christian worship and Post-War resurrection and reconciliation.

People visit the Cathedral as tourists; some come to pray, attend a service or light a candle; others seek information about the building, its art and architecture, and the people who are commemorated there. (https://www.coventrycathedral.org.uk/)



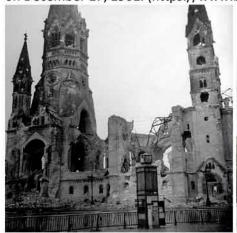


• Kaiser Wilhelm Memorial Church, Berlin

The Kaiser Wilhelm Memorial Church on Breitscheidplatz is one of Berlin's most famous landmarks. The ruin of the old church has been converted into a war memorial. Its striking ruin now rises into the sky as a memorial for peace between nations.

The original West Tower was partially destroyed during a bombing by the Allied Forces in 1943. During the post-war years, the church's ruins became a symbol of Berlin rising from the ashes of the war.

On March 1957, the architect Egon Eiermann won a competition with his design, which proposed the complete demolition of the ruin and envisaged a completely new building. However, the question of the ruin's future led to a <u>serious public debate and ended with a compromise</u>: the partially destroyed corpus of the church tower, about 68 meters high, was preserved as a war memorial. The tower ruin was joined by a four-part building ensemble including an octagonal nave, a hexagonal bell tower, a square chapel, and a foyer. After almost four years of construction, the rebuilt church was consecrated on December 17, 1961. (https://www.berlin.de/)





Hiroshima Peace Memorial (Genbaku Dome), Japan Inscribed as a World Heritage Monument in 1996

The Hiroshima Peace Memorial (Genbaku Dome) was the only structure left standing in the area where the first atomic bomb exploded on 6 August 1945. Through the efforts of many people, including those of the city of Hiroshima, it has been preserved in the same state as immediately after the bombing. Not only is it a stark and powerful symbol of the most destructive force ever created by humankind; but it also expresses the hope for world peace and the ultimate elimination of all nuclear weapons. Inside the property, all the structural elements of the building remain in the same state as immediately after the bombing, and are well preserved. In the last three conservation projects (1967, 1989-1990, and 2002-2003), minimum reinforcement with steel and synthetic resin was used to preserve the condition of the dome as it was after the atomic bomb attack. The Hiroshima Peace Memorial (Genbaku Dome) stands in its original location and its form, design, materials, and substance.

It is designated as a historic site under the Japanese 1950 Law for the Protection of Cultural Properties and is managed by Hiroshima City under the guidance of the Hiroshima Prefectural Government and the Government of Japan. Financial and technical support is available from the Government of Japan. (whc.unesco.org)





Kesennuma Köyö high school in Japan

City Memorial Museum telling the story of the 3/11 great east Japan Earthquake

Kesennuma City opened a Memorial Museum and turned the old school building of Kesennuma Koyo High School, which was heavily damaged by the tsunami <u>and left in ruins</u>, into a <u>memorial hall to share</u> the memories and lessons from the earthquake.

The memorial has attracted attention as a facility that will continue to convey the fearsome power of earthquakes and tsunamis to future generations.

Steel frames are exposed, and broken windows remain as they are. Scattered debris litter the ground, including iron, wood, and even objects like electrical appliances. The ocean breeze carries the scent of the sea in through the window, almost as a reminder that the building stands only 500 meters away from it and of the fearsomeness of the tsunami.





Threats

Structural stability

The Silos need to be perceived as 2 different blocks: the northern block and the southern one, built on different periods, and with around 1.20-meter joint between them.

The actual structural condition and behavior of the two blocks are different.

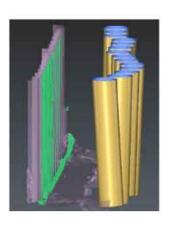
"It is possible to demolish the north silos and keep the southern one. And that it could be a good compromise among all stakeholders, by removing the biggest risk (the North Block tilt) and reducing the footprint of a dangerous area, while also giving more chance to Memory...As long as the existing safety area is maintained, demolition is not a priority compared with other challenges within the port of Beirut".

Interim reporting on structural health monitoring graphic documents and faq. Version 3.0. march 7th, 2022

"Analysis of the structural response of Beirut port concrete silos under blast loading the results indicated that the pile foundation cannot be reused to build news silos"

Analysis of the structural response of Beirut port concrete silos under blast loading, S.A. Ismail, W. Raphael, E. Durand, F. Kaddah, F. Geara







interim reporting on structural health monitoring graphic documents and faq. Version 3.0. march 7th, 2022
Displacement of the silos in the direction of the blast, Ismail et al. / Research on Engineering Structures & Materials.

Demolition

On March 18th, the Minister of Culture, Muhammad Al-Murtada, issued a decision to include the silos Building in Beirut Port in the general inventory of historical buildings, thus preventing "any action that would change its current status except after the prior approval of the Minister of Culture on the works to be performed and the means and materials intended to be used."

The statement issued by the Minister of Culture considered that:

"After the explosion of August 4, the silos had become a symbol embodying the image of a city afflicted by the explosion, which necessitates preserving it and bequeathing it to future generations."

Less than one month later, the government instructed the Council for Development and Reconstruction (CDR) on April 14th, 2022 to destroy the grain silos in the port of Beirut.

"The CDR was tasked with supervising the destruction of the wheat silos at the port of Beirut. The Ministry of Culture, for its part, was tasked with erecting a memorial on the spot"

Replacement with a new memorial - sculpture

Already 4 various sculptures have been installed in the area adjacent to the silos to commemorate the victims of August 4th. None of them was welcomed by the victims' families or the Beiruti. What is worth noting, the sculptures are always being photographed with the silos in the background. This shows that a simple sculpture is never enough to tell the story behind the tragedy, and that the silos are the best witness and carriers of what happened on August 4th, 2020.





Source: Politics taday,



ource: National catholic report



Source: alarabia.com

C.Abdulmasih

The consequences of the demolition of the silos on the nation's psyche

"With the silos destroyed, everything became possible, nothing would prevent Beirut from sinking into darkness," L. Ziade (Los Angeles Times).

· Erasing "the place"

Demolishing the silos will erase the memory of the place before the mourning is even over and the justice is served. This locus or place is indeed recalling tragic events, but erasing it will prevent the victims' families to mourn. "How to mourn what no longer has a place", J. Altounian, l'effacement des lieux.

And without the place, the truth can simply be distorted.

"Repressing" the history

Demolishing the silos will erase part of the history of Beirut; its modern era, the war, the 21st century new technicity and the explosion of August 4th. This tragedy needs to be translated into the language of the other in order to be inscribed in the world; erasing the silos will implicate to translate the tragedy and inscribe it in the world through another memorial which will never fill the message given by the silos themselves.

And repression is the unconscious defense mechanism, same as the denial which involves a refusal to accept reality, thus blocking external events from awareness.

. Blocking the "transmission" from generation to generation

History won't be able to be handed down from generation to generation without this tangible object. And it is through such memorials that the heirs of a mass crime can subjectivize and transmit their history.

"Living the impossibility to think about the erasure of a world that I felt with anguish and disorientation during a return to the country of the ancestors. such an experience of the <u>obliteration</u> of a world has nothing original for many heirs of survivors", states a descendant of genocide when visiting "a place that was erased".

In addition, the silos will constitute for future generations a landmark between two moments: before and after the explosion. This landmark will allow them to better situate the traumatic event in time and space, to better represent it, and integrate it into the family memory of the families of the victims and, for the people, into the collective memory. Otherwise, the story of the explosion will remain like a ghost.

We must keep the "place" for our descendants.

Blocking the healing process and the reborn

"A mother with an erased history cannot "welcome" a new child" J. Altounian

The healing process, much needed by the city of Beirut and the Beiruti themselves, cannot be done if the traces of history are being erased. Neither the city, nor its children can "hold" the newborn – new generation – new inhabitants. It will remain forever an unhealed wound.

The silos fulfill a particular function of the work of mourning which supports the chronological discontinuity of its material (ruins, remains) by a process of remembrance/ commemoration. the silos will then appear as the reserve of a long history and events, conversion of physical matter into a metaphysical consciousness, participating in the removal of the weight of the trauma.



Out of Suffering have emerged the strongest souls; The most massive characters are seared with **scars**. Gebran Khalil Gebran.

Sophie Woeldgen

The Team of Heritage Experts

Bachir Khoury, Chady Rizk, Chady Sawaya, Claudine Abdulmasih, Dany Feghali, Ghina Sabalbal, Grace Rihan, Hassan Dankar, Joanna Azzi, Joe Kallas, Karim Mhanna, Lara Maalouf, Marc Yared, Maroun Hoshayme, Maroun Khadra, Marie-line Farah, Nathalie Chahine, Nohra Abi Rizk, Paula Abou Harb, Pierre Ghanem, Randa Saba, Roland Haddad, Romy Feghali, Wassim Naghi

References

- amann; sina (2022): Beirut port silos. Interim reporting on structural health monitoring graphic documents and faq. version 3.0. March 7th, 2022.
- Bulos, Nabih (2021): Beirut explosion turned grain silos into monuments of despair. In Los Angeles Times, 8/4/2021. Available online at https://www.latimes.com/world-nation/story/2021-08-04/beirut-blast-anniversary-grain-silos-symbol, checked on 4/22/2022.
- Ismail, Sahar; Raphael, Wassim; Durand, Emmanuel (2021): Case study of the Beirut port explosion using 3D laser scan and nonlinear finite element model. In *Res. Eng. Struct. Mater.* DOI: 10.17515/resm2021.286st0428.
- Sawaya, Gioia (2021a): Beirut Grain Silos. In Hidden Architecture.
- Sawaya, Gioia (2021b): Beirut's grain silos: the monolith that shielded the city during 2020's port blast. In *Designboom*, 2/4/2021. Available online at https://www.designboom.com/architecture/beiruts-grain-silos-the-monolith-that-shielded-the-city-02-04-2021/, checked on 4/22/2022.
- Temsah, Yehya; Jahami, Ali; Al Timani, BAssam; Aouad, Charles (2020): Beirut Explosion.
 Structural Assessment of the Explosion Magnitude. Beirut Arab University.
- Wassim Raphael; Sahar Ismail; Emmanuel Durand; Fouad Kaddah; Fadi Geara (2021): Analysis
 of the structural response of Beirut port concrete silos under blast loading. In *Archives of Civil*Engineering 1.XVII (3), p. 619.
- https://www.facebook.com/MegaphoneNews/videos/5084146581667101/?extid=WA-UNK-UNK-UNK-AN_GK0T-GK1C
- https://www.lorientlejour.com/article/1296851/le-gouvernement-charge-le-cdr-de-detruire-les-silos-du-port-de-beyrouth.html
- https://www.lorientlejour.com/article/1270276/si-les-silos-de-beyrouth-pouvaient-parler.html
- https://www.thenationalnews.com/world/beirut-explosion-legendary-palestinian-banker-envisaged-silos-that-shielded-his-adopted-city-from-more-destruction-1.1061359
- Helena de Jong and Anne van Tilborg (Netherlands Defence Academy), The role of memories of disaster
- https://whc.unesco.org/en/list/775
- https://www.lorientlejour.com/article/1228698/joe-kesrouani-pleure-de-rage-pour-son-silonourricier.html
- Janine Altounina, l'effacement des lieux, Hors collection, puf, 2019



Dia Mrad