GAM
GALLERIA CIVICA D'ARTE MODERNA E CONTEMPORANEA TORINO

Requalification, restyling, securing and development of the GAM, Galleria Civica d'Arte Moderna e Contemporanea di Torino.

FONDAZIONE TORINO MUSEI

Fondazione Compagnia di San Paolo

Planning guidance document

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With the collaboration of:

Fondazione per l'architettura di Torino

Summary

1 Foreword

This Planning Guideline Document has been prepared in compliance with Annex I.7 of Legislative Decree no. 36 of 31 March 2023.

The document defines the guidelines for the drafting of the technical and economic feasibility project (PFTE) and is an integral part of the documentation for the assignment of the public tender for the architectural and engineering services related to the planning of the intervention and the professional services connected with its implementation.

The project for the regeneration of the GAM - Galleria Civica d'Arte Moderna e Contemporanea di Torino, the first contemporary art gallery founded in Italy and holder, together with its sister gallery in Rome, of most of the entire national artistic heritage of the 19th and 20th centuries, stems from the urgent need for the overall restoration of the building, one third of which is unfit for use by the public and the remainder of which requires necessary adaptation works.

We believe that this pressing need can trigger an exceptional opportunity to restore the Museum to its natural international standing, strengthening its reputation, prestige and role, with a vision that is sensitive to the issues that dominate today's global debate and also utopian, capable of pre-empting and fulfilling the expectations of a wide range of stakeholders.

This is an opportunity to try to regenerate the avant-garde spirit that characterised the birth of the current GAM building, rethinking the concept of architectural innovation: from respect for the original futuristic design to a sustainable and absolutely avant-garde project, which will once again be recognised and enhanced in a new interpretation of urban space. The new Museum will be an authentic *agora*, an open, recognisable and accessible physical and cultural lung, capable of reshaping the entire block and generating a new vision and perception of this part of the city.

The new GAM will have to make green-innovation, the driving force of global economic development, its calling card, applying certified protocols during both the design and construction stages, to ensure that the highest ecological and energy targets are met.

At the same time, the new GAM, will have to be an example of the Museum of the Future. Much more than just a cultural institution, it will be a pioneer of change and innovation in the artistic and cultural sector, a place that celebrates creativity, diversity and inclusion, inspiring current and future generations to explore, discover, and actively contribute to building a better world through art and innovation.

Achieving these goals will make it possible to restore an old and prestigious institution to the public, while making it an example of a vision of the future, where the principles of environmental sustainability and energy saving are combined with the enhancement of historical identity, where the experience gained during years of historical-artistic research benefits from technological tools, where new models of museum use based on inclusion and accessibility are experimented with, where taking care of the artworks can always be a new chance to open up further paths of knowledge to the public, using new media to share updated information on a heritage that is as current as it is antique.

Faced with the choice between an extraordinary maintenance operation and the reopening of the parts of the museum that are currently inaccessible and the possibility of restoring the museum to the avant-garde splendour of its first inauguration, Fondazione Torino Musei has decided to concentrate on this second path, clearly having to rely on national resources. Considering a complete restoration, the total financial cost will be in excess of 27 million euro.

Since February 2023, a fruitful dialogue has been ongoing with the Ministry of Culture and, at the beginning of 2024, an application for access to the national funds envisaged in the Strategic Plan for Major Cultural Heritage Projects (PSGPBC) of the Ministry of Culture was submitted through the Regional Secretariat of Piedmont for the amount of 15 million euro.

At the same time - with the generous conceptual and financial support of the Compagnia di San Paolo Foundation - it has launched a process to design the new building via a suitable international design competition based on lots.

The design competition, as illustrated in paragraph 10.1 hereunder, is divided into two phases, and those admitted to the second phase will be asked to develop the design

proposal by breaking up the overall work into independent lots, to be implemented according to the resources that will become available as time goes by.

From the vision that originates in the PFTE, the designer will be required to use technical skill and wisdom to devise the best breakdown into lots, to envisage a progression of the works that can reconcile the priority needs established by the client with the levels of structural criticality that emerge during the design phase, and to maintain the museum structure in operation and available for use throughout the duration of the works.

2 General goals

2.1 Analysis of the context

The City of Turin's extraordinary collections of modern and contemporary art are housed in a building that was erected in the 1950s, with a courageous futuristic vision, to a design by two young architects from Ferrara, Carlo Bassi and Goffredo Boschetti. It was a time of post-war reconstruction and in a climate of rebirth, projected towards economic recovery and major transformations, culture also played an important role in Italy's relaunch within the Western Bloc.

The Gallery was opened in 1959 and soon became one of the symbols of Turin's culture and architecture in the world. During the 1980s, however, certain limitations imposed by the original design began to become apparent, leading to its closure in 1983. These limitations included the presence of architectural barriers, sloping walls that complicated the display of works, exhibition spaces that were no longer adequate to the growth of the collections, and the need to adapt the building to the new fire prevention regulations. 1983 was a fateful year for the city, with a fire breaking out at the Cinema Statuto, resulting in the tragic death of sixty-four people, leaving an indelible mark on the memories of the period and representing a watershed event in the laws on fire prevention in Italy.

A long-term refurbishment project was launched, running from 1988 to 1993, about thirty years after the inauguration, with different goals compared to those that had characterised the first building. The GAM underwent a major transformation: the

architectural barriers were removed, the exhibition areas were extended, the skylights on the roofs were blacked out, modern cooling, air treatment and vapour production systems were installed, new telephone and data networks were installed, the electrical and lighting systems were modernised, and intrusive fireproofing and heavy interior and exterior doors and windows were introduced, detracting from the lightness of the original design.

New signs of the decline of the building-installation system have begun to appear over the last decade. The floors/ceilings have begun to crumble, the insulation envelope is deteriorating, the exterior doors and windows are deteriorating and allowing rainwater to seep in on the basement level. The wiring, heating and plumbing systems are ageing, the microclimate in the exhibition spaces is becoming hard to regulate and control, and there is a general loss of efficiency in a complex that has become particularly energy-hungry. The second floor, where the permanent 19th century collections were on display, remained closed to the public from December 2018 to October 2024 due to structural inaccessibility caused by floor panel detachment. The Conference Room, also declared unfit for use due to non-conformity of the wiring and the collapse of the ceiling, has also been closed to the public since December 2018. This is strong evidence which can no longer be ignored, and which demands the attention of decision-makers: GAM needs an overhaul.

Wanting to offer a quick overview of what will be examined in further detail later on, it can realistically be argued that the building-plant system that houses the GAM has a thirty-year life cycle and that the current cycle, which is the second, has now come to an end.

This makes it urgent to acknowledge the structure's state of degradation and to undertake a new project, with long-term goals and in an international context profoundly different both from that which characterised the first construction and that of the first renovation. In this new season that is opening up for GAM, the architectural renovation will have to bring something new into the surrounding urban space, a sort of “piazza” strongly

connected with the outside and accessible and negotiable from the outside, opening up new scenarios for the use of the Museum's spaces and cultural offerings.

In the hope that the new 30-year cycle, which is likely to bring the GAM to the completion of its first century of life, is approached with the same courage and ambition as was implemented by those who conceived its birth in the early 1950s.

2.2 The position of the GAM di Torino in the historical context, in the current situation and in the future

The birth of the first modern building designed specifically for a museum collection and function placed the Galleria d'Arte Moderna di Torino in an almost unique position on the national scene. Together with the Galleria Nazionale d'Arte Moderna di Roma, it became one of the reference points for the presentation of the most recent and advanced experiences in contemporary art, especially from an international perspective. The best French, British and American artistic experiences were presented in major exhibitions.

While the exhibitions “Pittori d’Oggi. Francia Italia” were held between 1951 and 1961, still in another venue, our museum hosted exhibitions on Robert and Sonia Delaunay, Hans Richter, Francis Bacon, Franz Kline, and then Sutherland, Hartung, Motherwell, Nevelson, New York’s New-Dada and Pop Art, Yves Klein and Picabia, through to the Peggy Guggenheim Collection.

On the Italian front, the exhibitions dedicated to artists such as Giacomo Balla, Felice Casorati, Osvaldo Licini, Lucio Fontana and Alberto Burri were no less important. In such a favourable scenario, Turin matured one of the highest quality international experiences, that of Arte Povera (of which the GAM has an important collection), presented in the museum for the first time, in the exhibition entitled “Conceptual Arte Povera Land Art”, 1970.

In the last forty years, the GAM has ceased to be a lone reference point in the city and in the national context, as there are now many museums - or perhaps it would be better to say centres - of contemporary art in Italy, most of them with a very recent history. Without leaving Turin area, the Castello di Rivoli, Fondazione Sandretto Re Rebaudengo and Fondazione Merz, to name just a few, have sprung up over time.

Today, the GAM, in fulfilling its function, with its 160 years of history, has to "listen" to the stimuli coming from its collection: of absolute national relevance and with a marked international orientation, as confirmed by the recent exhibition "A collection without borders", dedicated to the museum's contemporary acquisitions over the last 25 years. It produces exhibitions of 19th and 20th century art, contemporary art in all its forms and photography exhibitions, always within the framework of that didactic - and, of course, scientific - and inclusive openness highlighted in the introduction.

3 The Role of Fondazione Torino Musei

Fondazione Torino Musei was created on 26 July 2002 in response to a proposal by the City of Turin, which entrusted the new organisation with the management of the civic museum structure in order to promote its rich artistic heritage and enter into agreements and collaborations, also of a financial nature, with public and private institutions.

Turin became the first Italian city to apply Article 35 of the 2002 Budget Law, which introduced the possibility for local authorities to create non-profit foundations to which to entrust the management of cultural services in line with modern and functional administrative and organisational structures. In addition to the City, as First Founder, the following Founding Members are represented on the Board of Directors: Regione Piemonte, Fondazione Compagnia di San Paolo and Fondazione CRT.

The five cultural lines represented by the Foundation are:

- GAM - Galleria Civica d'Arte Moderna e Contemporanea
- Palazzo Madama - Museo Civico d'Arte Antica
- MAO - Museo d'Arte Orientale
- Artissima, Italy's most important contemporary art fair
- Luci d'Artista, exhibition of lighting installations created by artists.

Fondazione Torino Musei employs over 160 people, with a budget of around 13 million euros for the management of three museum structures, in addition to the Photo Archives, the Art Library and Società Artissima s.r.l., responsible for the management of the annual international contemporary art fair.

The Foundation provides in full autonomy for the conservation, maintenance and promotion of the artistic heritage it has received or subsequently acquired: it is an organisation capable of enhancing every identity, with a consequent accentuated "specialisation of services" and an organic system logic capable of achieving a unitary policy - where possible.

Relations between the Foundation and the City of Turin are governed by a Convention that identifies the ways in which the City exercises support, guidance and control functions with full respect for the Foundation's organisational, financial and cultural management autonomy.

Some of the main development and enhancement strategies that the Foundation intends to implement in the management of the museums are:

- autonomous organisation of the museums with regard to the conservation and protection of the artistic and architectural heritage granted by the Municipal Authority, the management and promotion of human resources and the increase in revenues from so-called "own" assets;
- an effective promotion activity capable of highlighting the permanent collections of each museum, increasing public attendance and accessibility to the museums;
- the promotion of inclusion, accessibility and education;
- adequate information and communication with all of the Foundation's stakeholders;
- strengthening of the Foundation's museum operations in the area, through the design and implementation of cultural and territorial communication projects;
- artistic and cultural initiatives aimed at boosting the museums' prestige at national and international level, also by enhancing the Foundation's artistic heritage;
- identification of new ways of using museum collections and services that are innovative and engaging for the public, starting with the development of digital activities;

- attention to extraordinary maintenance operations aimed at the protection, conservation and optimisation of historic buildings, currently used as museum premises, based on the principles of environmental sustainability and energy saving.

In pursuing the goal of a general redevelopment of historic museum buildings, Fondazione Torino Musei, together with Fondazione Compagnia di San Paolo and the Superintendence for Archaeology, Fine Arts and Landscape for the Metropolitan City of Turin, is investing in the philological restoration of the various structural and architectural components of the GAM Galleria d'Arte Moderna e Contemporanea di Torino, accompanying it with a firm commitment to innovation, increasing public accessibility and sustainability.

3.1 Stakeholders and their involvement

The GAM regeneration project will undoubtedly have a significant social, environmental and urban impact on the City of Turin.

The City is one of the main stakeholders, in its dual role as owner of the building and the art collections it houses. The City is also a founding partner and main financier of the Foundation, to which it has entrusted the management of the Museum. The building is subject to a protection restriction, issued in 2017 by the Ministry of Culture, which means that any maintenance work must be submitted to the Superintendence, another main stakeholder, for approval.

The main subjects involved in this project are the territorial organisations like the Città di Torino, Regione Piemonte, Fondazione Compagnia di San Paolo, Fondazione CRT the Superintendence and, given the national relevance of the operation, also the Ministry of Culture.

Other organisations will also be involved in various capacities, and these include

- Local businesses and organisations;
- Suppliers of Fondazione Torino Musei;
- Friends of Fondazione Torino Musei;

- Fondazione De Fornaris;
- Artists and collaborators;
- Members of the local, national and international public;
- Employees of Fondazione Torino Musei.

The main financial backer will be given ample space and visibility, conveying communication through press releases, website graphics, museum graphics and social channels.

4 Background

4.1 Urban context and connections

The building that houses the GAM is currently located in the district known as Crocetta, within the City's first administrative ward. It was created from the unification of two areas, once known as District 1 Centre and District 2 Crocetta. The municipal territory has been split into wards since 1984 and Turin is currently divided into eight administrative macro-areas (until 2016 there were ten). What is now called "Centro Storico" is the primitive core of the urban layout, the original city, while Crocetta, geographically further south, once represented the territory outside the walls. Building on the land began in the 17th century, but it was not until the 20th century that it took on the residential characteristics that distinguish it today.

Borgo Crocetta, which for centuries was a suburb of Turin, originally developed mainly around the church of the Beata Vergine delle Grazie, now better known as "Chiesa della Crocetta". The nickname "Crocetta" originated from the fact that the parish was run for a long time by the religious order of the Trinitarian Fathers, whose symbol was a small red and blue hooked cross against a white background ("crocetta" being the Italian for small cross).

A large piece of land between the burgeoning Borgo Crocetta and the city centre, not far from the current location of the GAM, was occupied by the military Parade Ground (Piazza d'Armi) between 1872 and 1909, replacing the two old Parade Grounds located further

north. The area, used at the time for drills and parades, stood where Turin Polytechnic stands today, along with the pedestrian area in front of it, where three new roads, namely Corso Duca d'Aosta, Corso Trento and Corso Trieste, were traced between 1903 and 1937, and a residential complex characterised by eclectic and Art Nouveau architecture was built. The villas and small buildings extend as far as the streets that define the perimeter of the GAM to the north, via Magenta and via Fanti. The Mauriziano hospital, located on what was once Corso Stupinigi, later to become corso Turati, also represents, together with the Politecnico, one of the areas of the district not designated for residential use.

Not far from the Galleria d'Arte Moderna, the OGR, the Officine Grandi Riparazioni, an imposing factory for the repair of railway vehicles, built at the end of the 19th century, has recently been transformed. The complex occupied about 190,000 m^2 and employed 2,000 people. Following its closure in the early 1990s, abandonment and decay led to plans for its demolition. In 2013, Fondazione CRT purchased the H-shaped building of about 20,000 m^2 from Ferrovie dello Stato and, through Società OGR-CRT, launched the functional and structural redevelopment, restoring it to the status of a multifunctional space, a venue for visual and performing arts, as well as catering. Since then, exhibitions, performances, concerts, theatre and dance events and virtual reality experiences have been hosted in the impressive spaces. This was followed by an incubator for start-ups, creative industries and smart data, and a hub for scientific and technological research.

As far as transport links and accessibility are concerned, the GAM is located along two main roads: Corso Vittorio Emanuele II and Corso Galileo Ferraris, which run from East to West and from South to North, respectively. Both provide a quick link with the city limits and direct access from the surrounding road networks, including the orbital road around Turin. While the building does not have its own car park with reserved parking spaces, there are numerous possibilities for parking thanks to the width of the main roads and the dense network of side streets. Porta Nuova and Porta Susa railway stations are just 700 metres and slightly less than a kilometre away, respectively.

From both stations, the metro line, which has been running on these sections since 2007, covers the distance in just one stop, taking advantage of the East-West section. The Re

Umberto and Vinzaglio stations conveniently serve the Galleria, not only for those arriving by train but also from other parts of the city. An overground transport service supplements and completes the accessibility of the structure which, as already mentioned, is not far from the city centre, from which it can be reached along a route covered almost entirely by archways.

4.2 Historical Background

The collections of the Galleria Civica d'Arte Moderna e Contemporanea di Torino are housed at its headquarters in Via Magenta, 31, in a building designed in the 1950s by architects Carlo Bassi and Goffredo Boschetti and inaugurated in 1959. However, the origins of this prestigious civic collection are much older. Turin was the first city in Italy to promote a public collection of modern art in the 19th century, which, together with the collection of ancient art, was to form the first nucleus of its Civic Museum, inaugurated in 1863 and housed in via Gaudenzio Ferrari 1.

Figure 4-1- Aerial picture of the GAM from Google Earth

The modern art collection was moved to new premises at Corso Galileo Ferraris, 32, in 1895, where it remained until 1942, when the building was irreparably damaged by bombing. The new premises were rebuilt on that same lot during the decade that followed. Bassi and Boschetti's project, winner of the national competition announced in

1951, sets the volume of the gallery diagonally in relation to the front on the Corso and defines its interior layout in accordance with the most advanced museographic techniques. A free plan, skilful use of filtered and natural light (made possible thanks to the planimetric development according to the heliothermal axis, diagonal with respect to the orthogonal mesh of the block) and neutrality of the spaces to favour the observation of the artworks are among the main qualities of the building, which develops vertically through three juxtaposed volumes. The gallery underwent extensive renovation between 1989 and 1993, significantly changing the character of the original project: new volumes were built on the basement level to house temporary exhibitions, technical rooms, storage areas and a frame workshop. Ceilings were built in the inner parts of the wings of the exhibition areas in order to provide them with new rooms, and continuous sections of sloping ceiling were built in the area of the roof lights, which were covered. The building was freed from architectural barriers but also became heavier compared to the lightness of the original design, with the introduction of imposing interior and exterior doors and windows, also to comply with the fire regulations updated at the time. The caretaker's quarters overlooking Via Vela on the corner with Via Fanti were also built.

A new operation, which began in 1993 and ended in 1999, redefined the exhibition spaces: the second floor was assigned to the 19th century collections; the first floor to those of the 20th century. The railings surrounding the building are the work of the artist Enrico Paulucci.

4.3 Land registry references

The GAM occupies the entire block of approximately 7500 square metres, located between Corso Galileo Ferraris, Via Magenta, Via Vela and Via Fanti, within Turin's Ward 1. The building is registered at the provincial land registry of Turin, sheet 1284, plot 137, subaltern 2. In addition, the small caretaker's house, an independent building unit with its own entrance at no. 14 Via Vela, is registered under subaltern 3, on the same sheet and plot.

Figure 4-2 Map excerpt from the Municipality of Turin's geoportal

4.4 Museum collections

The GAM is the oldest museum institution in Italy dedicated to modern and contemporary art and, as such, is the ideal place to implement the awareness that preserving and exhibiting works of art is a central and essential mission, but not sufficient to interpret the new functions of the museum today. The collections consist of around 50,000 works of art, comprising paintings, sculptures, installations, graphics, photography and artistic videos. The museum's most important collections are illustrated below.

4.4.1 The 19th Century

The Museum was established by the Civic Administration in 1860 and opened in 1863. The birth of the collection was immediately supported by acquisitions of not only local but national works, thanks to the generous efforts of the newly-established Ministries of State of the unified Italy, as well as the royal house of Savoy. The works, acquired at local and national exhibitions, are all contemporary art.

Figure 4-3 - Second floor, after the 2024 Zero Lot intervention

4.4.2 The 20th Century

During the first part of the 20th century, this process was institutionalised, and indeed strengthened by the decision to regularly acquire artworks at major national events: the Venice Biennale, the Quadriennale d'Arte Nazionale, as well as regional events of course. Paintings and sculptures by leading artists on the Italian scene were added to the collection.

The decision to expand the collections at the major events of the time was confirmed and, indeed, enriched, after the Second World War, when the collection opened up to the international scene (it was the only civic museum in Italy). In addition to the Venice Biennale, many foreign works were selected at the famous "Pittori d'Oggi. France Italy", held in Turin between 1951 and 1961. The first acquisitions from the more avant-garde-sensitive private galleries also arrived.

4.4.3 The Contemporary Collection

The GAM di Torino is one of the few Italian museums that regularly acquires works to expand its collections. While the City can only obtain donations today, the Museum boasts the support of two other institutions which perform this task under statute. These are the Fondazione Guido ed Ettore de Fornaris, which celebrated its 40th anniversary in 2022, and the Fondazione per l'Arte Moderna e Contemporanea CRT, established in 2000. The former works exclusively in favour of the GAM, focusing on acquisitions from the end of the 18th century to the present day. The latter has specialised in the acquisition of Italian and foreign works from the post-World War II period to the most pressing current events. It can undoubtedly be said that, between the City and these two Foundations, the Museum boasts the most important collection of Italian art and, as far as international art is concerned, it is unrivalled at national level.

Figure 4-4 - First floor, after the 2024 Zero Lot intervention

4.4.4 The Video Library

Established in the late 1990s, it represents one of the Museum's most important engines of knowledge and vision. With its 1330 artistic videos, together with a similar number of video documentaries on art, it represents the most important centre for this kind of research at national level, as well as being internationally recognised as the second most important video library in Europe.

Figure 4-5 - A picture of the Video Library at the GAM

4.4.5 The Art Library

Established with a view to offering full accessibility to scholars and researchers to coincide with the inauguration of the Galleria d'Arte Moderna project in 1959, it was intended to be an essential, qualifying instrument of a modern museum, which has always been active in research. It is the most important specialised and specialist library in Northern Italy.

Its collections - all of which are catalogued and accessible online - now exceed 140,000 items, and it collects more than 100 specialised journals.

Figure 4-6 - Reference Area of the Art Library

4.4.6 The Photographic Archives

Its collections include over 350,000 phototypes of documentary and historical value in relation to the Civic Museum, along with its buildings and art collections, and it also possesses substantial historical collections of considerable importance.

Figure 4-7 - The offices of the Photographic Archives

4.5 Exhibition spaces

GAM (Gallery of Modern Art) displays its permanent collections on the first and second floors, with its audio and video collection located in the basement. On the second floor, a space is dedicated to the "Living Deposit" (*Deposito Vivente*), and between the Collection and the Deposit, there is a room called the "room of rest".

On the first floor, the "Short Wing" (*Manica Corta*) - originally an extension of the 20th-century collection - has been designated since 2011 as a space for temporary exhibitions, generally focusing on 19th and 20th-century art. Additionally, a portion of the first floor exhibition space, which until the first semester of 2024 was reserved for the 20th-century Collection, has been selected to host temporary exhibitions by international contemporary artists from October to March/April. During the remaining months, this space will be used to expand the first floor's Permanent Collection.

Finally, the basement houses the "contemporary space", dedicated to temporary exhibitions of contemporary artists, and a video library with a screening exhibition room.

The Short Wing, Exhibition Space

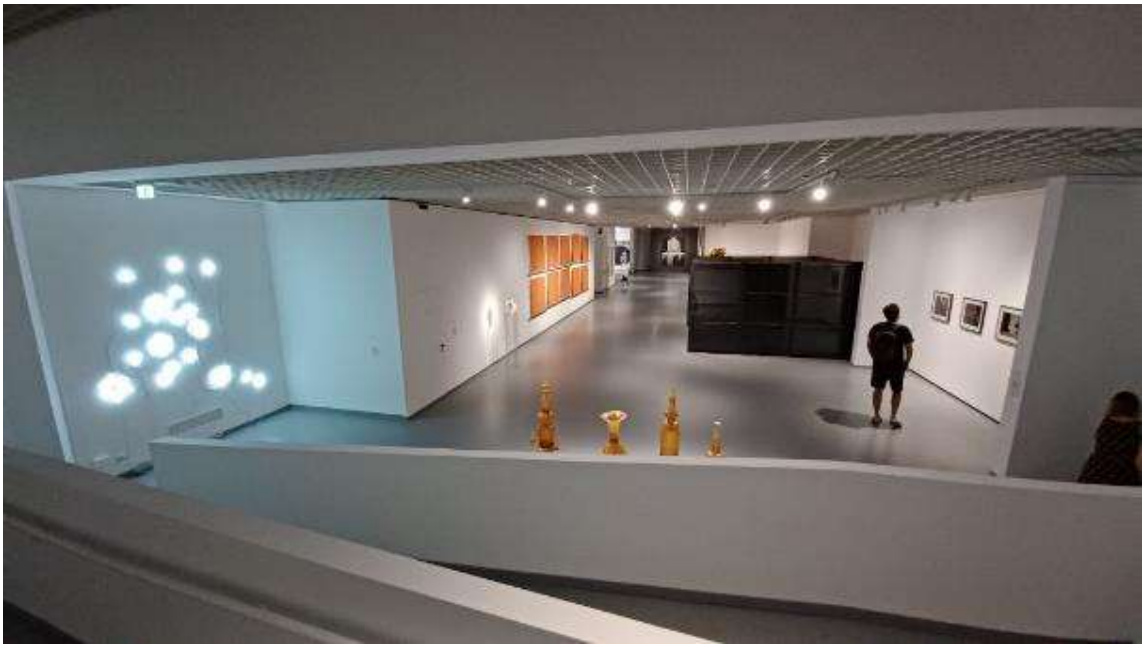

Figure 4-9 - Underground Project, displaying the Contemporary collection

The table below indicates the size of the spaces described in this section.

Surface	Area [m²]
Second floor, 19th century collections	1,059
First floor, 20th century collections	1,200
First floor, short wing	700
Basement, Contemporary collections	880
Basement, Video Library	200

4.6 Museum services

4.6.1 Educational Department

A large area of the ground floor has been dedicated to museum education workshops. This is a very important facility, which is one of the main hubs for museum users, created in a museum that pioneered these experiences in Italy, and which now, at national level, is at the forefront of inclusion for the most varied disabilities.

Figure 4-10 - One of the classrooms in the Educational Area

4.6.2 Auditorium

This too was created as part of the 1959 project, with the aim of implementing the museum's means of communication to the community in accordance with best practice.

It had a capacity of 300 seats and was often used by the City and by public and private organisations.

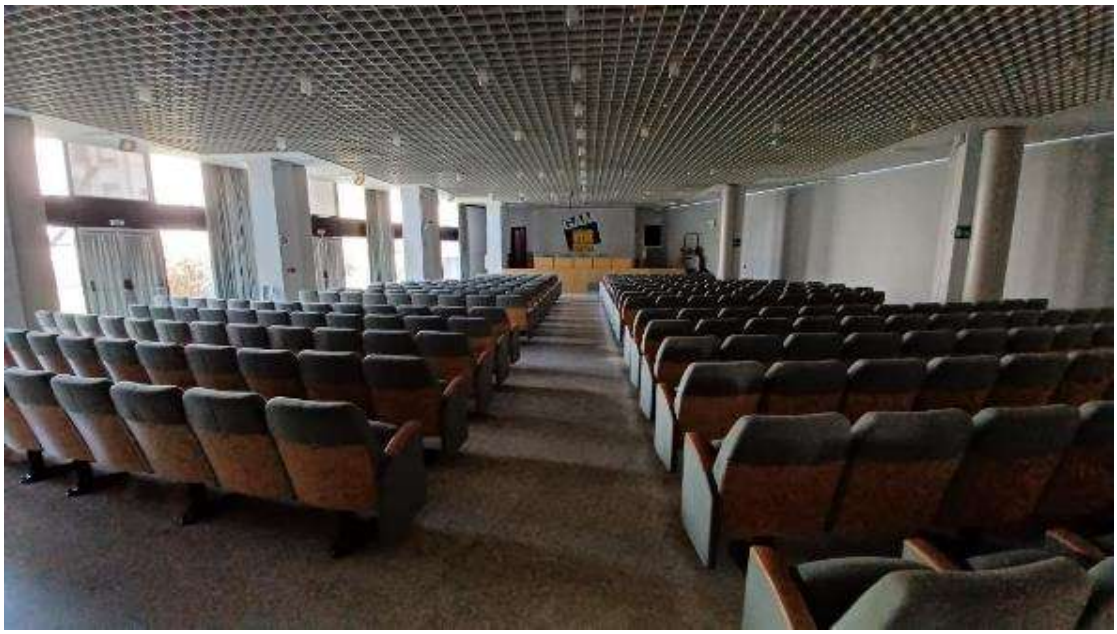

Figure 4-11 - Conference Hall, closed to the public since December 2019

4.6.3 The Café

Opened during the 1993 refurbishment in what was originally the foyer of the Conference Hall, it also has an independent entrance, which faces Via Vela. A pavilion is set up in the outdoor area for use as a summer terrace.

Figure 4-12 - Café interior, closed to the public since 2020

4.6.4 The Bookshop

Opened in the early 2000s, as it had not been included in either the 1959 museum or the 1993 refurbishment, it is housed by a structure added to the original museum layout (under third-party management).

Figure 4-13 - The entrance to the Bookshop

4.6.5 The Caretaker's House

With its own entrance from Via Vela, it consists of a kitchen, two bedrooms and a toilet. It was formerly occupied by a caretaker.

Figure 4-14 Exterior of the former Caretaker's House

4.7 Attendance figures

The table below shows the attendance figures for 2018-2023, including exhibitions, and details of the main temporary exhibitions held during the same period.

YEAR	TOTAL VISITORS	OF WHICH, SCHOOLS	DAYS OPEN
2023	**180,229**	12.7%	317
2022	**153,636**	13.3%	317
2021*	***84,700***	*11.8%*	*221*
2020*	***66,633***	*9.0%*	*137*
2019	**185,216**	13.5%	318
2018	**187,736**	10.9%	319

(*) Reduced opening due to Covid

Table 4.1 – Visitors to GAM from 2018 to 2023

YEAR	TEMPORARY EXHIBITION TITLE	DATES	VISITORS
2023	*Hayez. L'officina del pittore romantico*	from 17/10/2023*	**39,378***
2022/2023	*Hic sunt dracones*	02/11/2022-12/03/2023	**20,123**
2022/2023	*Ottocento. Collezioni GAM dall'Unità d'Italia all'alba del Novecento*	07/10/2022-03/09/2023	**83,868**
2022	*World Press Photo*	30/04-18/09/2022	**27,484**
2021/2022	*Fattori. Capolavori e aperture sul '900*	14/19/2021-20/03/2022	**42,341**
2021/2022	*Una collezione senza confini. Arte Internazionale dal 1990*	03/11/2021-18/09/2022	**83,578**
2020	*Helmut Newton. Words*	30/01-01/11/2020	**34,847**
2019/2020	*Cavalli, costumi e dimore: la riscoperta della Fiera di Saluzzo di Carlo Pittara*	19/12/2019-01/11/2020	**40,055**
2019	*Giorgio De Chirico. Ritorno al futuro*	19/04-25/08/2019	**42,390**
2018/2019	*I Macchiaioli. Arte Italiana vero la modernità*	26/10/2018--24/03/2019	**101,694**
2018	*Renato Guttuso. L'arte rivoluzionaria nel cinquantenario del '68*	23/02-24/06/2018	**54,414**

Table 4.2 – Major exhibitions from 2018 to 2023

4.8 Measurements and intended uses

The complex develops through three building bodies, as shown in the plans annexed hereto (Annexes 1a - 1f): the main building, dedicated to the permanent collections, offices and classrooms for educational services, consisting of three floors above ground and a basement (plus a lower basement where the heating and air-conditioning systems are located). The two smaller buildings, juxtaposed to the first, are the short wing, destined to house temporary exhibitions, and the building which, from the ground floor to the second floor, houses, in order: the conference hall and Café, the Art Library and the Photographic Archives. The configuration of the block is completed by the caretaker's house, already mentioned in the previous paragraph, which was added to the complex during the refurbishment in the early 1990s.

Level	Intended use	Area [m²]
Second above ground	Vertical and horizontal links	275
Second above ground	Toilets	5
Second above ground	Technical rooms	100
Second above ground	Public services	141
Second above ground	Exhibition spaces	1059
	Subtotal of second level above ground	*1580*
First above ground	Vertical and horizontal links	332
First above ground	Toilets	22
First above ground	Technical rooms	318
First above ground	Public services	206
First above ground	Exhibition spaces	1912
First above ground	Storerooms	269
First above ground	Offices	18
	Subtotal of first level above ground	*3077*
Ground	Vertical and horizontal links	497
Ground	Toilets	82
Ground	Technical rooms	99
Ground	Public services	1339
Ground	Storerooms	8
Ground	Offices	374
Ground	Internal services	128
	Subtotal of ground level	*2525*
Basement	Vertical and horizontal links	864
Basement	Toilets	74
Basement	Technical rooms	607
Basement	Public services	109
Basement	Exhibition spaces	1089
Basement	Storerooms	2242
Basement	Offices	35
Basement	Internal services	199
	Subtotal of basement level	*5218*
Lower basement	Technical rooms	449
Lower basement	Vertical and horizontal links	60
Lower basement	*Subtotal of lower basement level*	509
	Total	*12909*

Table 4.3 - Surface areas and intended use for each level

Intended use	Area [m²]
Exhibition spaces	4061
Storerooms	2519
Vertical and horizontal links	2027
Public services	1795
Technical rooms	1572
Offices	427
Internal services	326
Toilets	183
Total	*12909*

Table 4.4 - Reclassification of the surface areas by intended use

5 Conditions of the venue

5.1 Building and structural component

5.1.1 Roofs

The building is characterised by extensive flat roofs, stretching over approximately 4,600 m². Between 2021 and 2022, major extraordinary maintenance work was carried out to completely renovate the stratigraphy, with a project based on the UNI 8178-2 standard for waterproofing "Construction - Roofing - Part 2: Analysis of the elements and functional layers of continuous roofs and design indications for the definition of technological solutions". The roofs were also equipped with a lifeline system, which is indispensable for their maintenance. The construction components of the lifeline comply with EN 795:2012 type A and type C, CEN/TS 16415:2013 type A and type C and UNI 11578:2015 type A and type C. The flexible anchor line must be suitable for use by four operators at the same time, suitably trained and equipped with the appropriate PPE.

The previous covering, installed in the early 1990s with a bituminous plastomeric membrane self-protected with slate chips, had been subject to a survey in 2020 due to leakage problems and also in consideration of the fact that it was 30 years old. The study revealed numerous criticalities: loss of physical-mechanical properties of the membrane, incorrect adhesion between the layers, with consequent creeping of the sealing element, mechanical damage to the membrane, welding discontinuities in the drainage channels. Samples of the insulation revealed that the layer was completely soaked with water in a significant number of areas.

Figure 5-1 Satellite view of the GAM in 2020 before intervention on the roofs

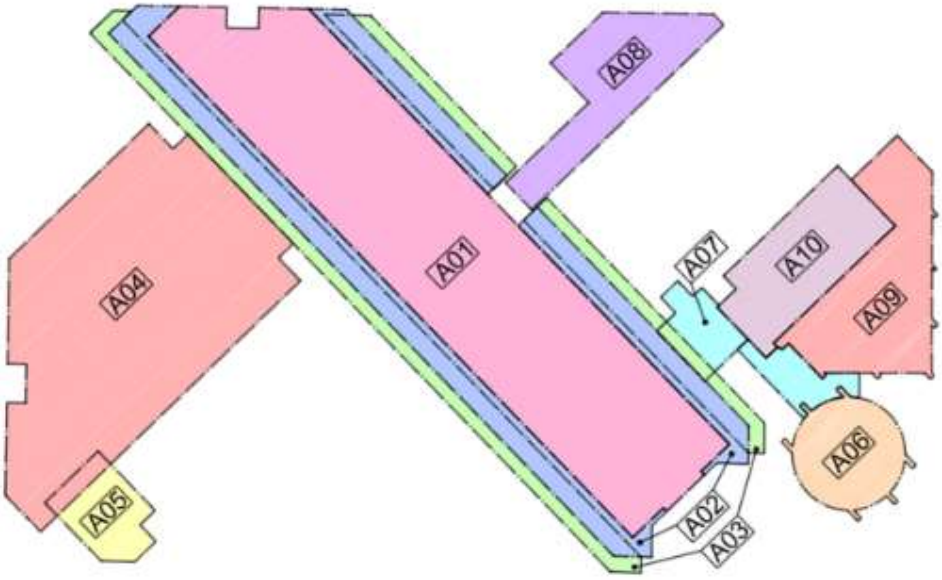

Figure 5-2 Division of the roofs into 10 terraces

Before the extraordinary maintenance work, the stratigraphy was as follows:

- - support (flat concrete and sloping sheet metal);
- - 4 mm bituminous sheathing to insulate against vapour;
- - first layer of 40 mm thick Fesco Board S insulation;
- - second layer of 40 mm thick Fesco Board S insulation;

- first layer of 4 mm bitumen polymer membrane waterproofing;
- second layer of 4.5 kg bitumen polymer membrane waterproofing, self-protected with slate chips.

All the areas where the layer of insulation was soaked with water underwent complete replacement of the stratigraphy, as follows:

- - support (flat concrete and sloping sheet metal);
- - 4 mm bituminous sheathing to insulate against vapour;
- layer of insulation consisting of 80 mm thick PolyIso foam, with both sides coupled with fibreglass mat;
- 400 g/m2 thick thermally bonded polypropylene compensation layer;
- non-woven control layer made of 120 g/m2 carbon-fibre-modified fibreglass mat;
- 2.0 mm layer of TPO waterproofing membrane.

Where, on the other hand, the above-mentioned survey found the insulation to be sound, the intervention envisaged an overlay, resulting in the following new stratigraphy:

- - support (flat concrete and sloping sheet metal);
- - 4 mm bituminous sheathing to insulate against vapour;
- - first layer of 40 mm thick Fesco Board S insulation;
- - second layer of 40 mm thick Fesco Board S insulation;
- first layer of 4 mm bitumen polymer membrane waterproofing;
- second layer of 4.5 kg bitumen polymer membrane waterproofing, self-protected with slate chips;
- 400 g/m2 thick thermally bonded polypropylene compensation layer;
- non-woven control layer made of 120 g/m2 carbon-fibre-modified fibreglass mat;
- 2.0 mm layer of TPO waterproofing membrane.

The new roof is guaranteed by a posthumous “Replacement and Laying” policy with a duration of ten years (until 2032). The policy covers the necessary expenses for the complete or partial restoration of the insured works damaged due to incorrect installation or the use of defective products that render the works unfit for the purpose for which they

were intended. The policy also covers the costs of finding the fault as well as any scaffolding that may be necessary to carry out the repairs.

5.1.2 Outer casing

When the building was refurbished in the early 1990s, the original cladding of the façade was removed and replaced with an envelope consisting of panels made up of made of two electrically welded grids, with a square mesh of approximately 6x6 cm, spaced out using inclined diagonals, according to two opposing layouts, and with a 3 cm thick layer of polyurethane foam inside, to provide insulation. The panels were fixed to the bare wall structure of the building and rendered with cement mortar and plastered with a plastic granular compound consisting of a mixture of white cement, powdered quartz and coloured pigments. Thirty years after their application, some portions of these walls are in poor condition, with large areas showing signs of severe deterioration. The insulation is partially exposed, due to the deterioration of the finishing and skimming layer, the effects of the weather and the natural decay of the materials. Cracks and other discontinuities are present in the cladding, which lacks elastic properties, and tends to flake and turn to dust.

5.1.3 Horizontal load-bearing structures, collapse and seepage

The GAM is affected by design and construction choices that were popular in Italy from after World War II until the early 1980s. Two types of horizontal structures coexist in it: the predominant one, dating back to the first building in the 1950s, consisting of mixed brick and concrete ceilings, and the more recent one, installed during the major refurbishment in the early 1990s to expand the exhibition areas, and characterised by prefabricated *predalles* sheets. The brick and concrete ceilings are at risk of collapse, i.e. the potential detachment of the lower sides (bottom) of the ceiling filler bricks. The diagnosis is the result of two investigative campaigns conducted between 2018 and 2019 and in 2021. The first inspection's outcome was dramatic and led to the drastic decision to close at the end of 2018 the second floor to the public, which at the time was designated for exhibiting 19th-century paintings and sculpture collections.

During 2024, through works planned in the *Zero Lot*, the second floor was secured by applying an anti-panel detachment net directly to the floor slab and reopened to the public.

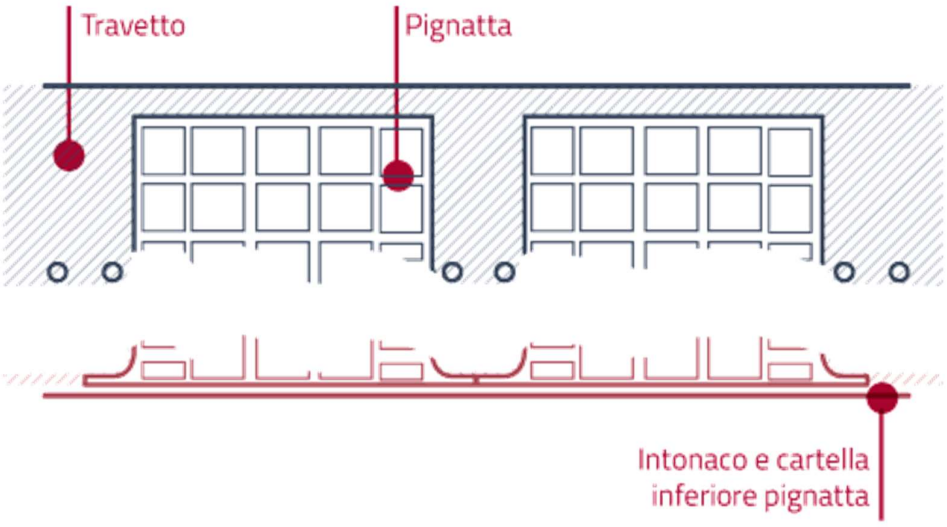

Figure 5-3 Diagram showing an example of a section of the brick and concrete ceiling with the underside detached

Figure 5-4 Photograph taken during the diagnostic campaign in 2018

Whilst the risk of the collapse has only recently been investigated and diagnosed, a second, older problem has marked the structures housing the Gallery since immediately after its second inauguration in 1993. The new open ceiling, covering the basement areas used as exhibition spaces and carrying the loads of the soil and plants, as well as the floors in the entrance area, has never offered adequate resistance to the infiltration of rainwater. During violent thunderstorms, considerable amounts of water have also entered through the emergency exits of the current "Contemporary Collection" space.

5.1.4 Terraces

The exhibition rooms have a total of eight terraces, two of which on the south side of the long wing and large in size. Over the years, each of the terraces has presented various problems due to the infiltration of rainwater which, in some cases, has entered the exhibition rooms, posing a risk to the safety of the works and resulting in the lifting of the wooden floors.

Figure 5-5 Water damage on the intrados of a terrace at the GAM

In 2018, Fondazione Torino Musei carried out an emergency intervention on the balcony of the second floor of the entrance in via Magenta, which was affected by dangerous detachments of materials directly over the public thoroughfare. The original flooring was completely removed, the underlying waterproofing was replaced and the water drainage systems were redefined. Carried out with the utmost urgency, this work solved the dangerous detachment of plaster from the intrados of the terrace.

Similarly, all the other terraces will have to undergo this kind of major work, which is particularly urgent on the large terraces on the south side, where water seeps into the museum during heavy storms. The building's terraces are starting to show the first infiltration problems. This is compounded by the deterioration of the continuous aluminium window frames, which no longer guarantee watertightness, especially during heavy storms accompanied by winds.

5.1.5 Vertical connections: outside stairs

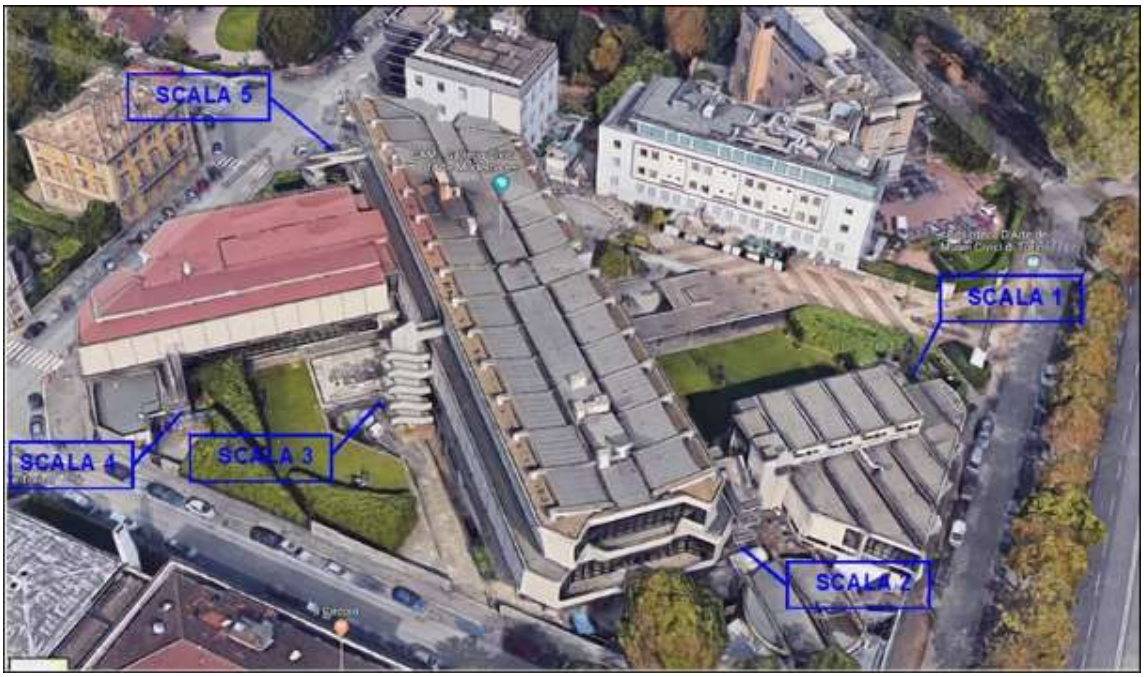

Figure 5-6 Aerial view of the GAM's five reinforced concrete outside stairs

The redevelopment and upgrading work carried out in the 1990s introduced five outside staircases for use as emergency exits. All of the same type, they are made of concrete, with a reinforced concrete structure and an "exposed" finish. The stairs have walkways

connecting the various floors, on a central support structure also made of reinforced concrete, with steel handrails and glass parapets on the landings. An extraordinary maintenance operation carried out between 2020 and 2021 made it possible to repair three of the five staircases, those that presented the most worrying conservation conditions, indicated in figure 5-6 as “Staircase 3”, “Staircase 4” and “Staircase 5”. The staircases excluded from the intervention presented the following degraded conditions:

1) flaking of the paint protecting the concrete, particularly evident on the intrados of the ramps and on the front walls of the landings, with rot caused by humidity;

2) cracks and widespread deterioration of the concrete of the ramps, landings, parapets and at the base of the load-bearing partitions on each ramp, with localised detachment of various parts and presence of exposed rusted reinforcements;

3) localised chipping of the stone treads finishing the stairs on the ramps;

4) state of localised deterioration of the glass parapets of the landings, with the presence of rust and deterioration of the glass-bearing profiles and the iron handrail throughout.

Figure 5-7 Staircase 1, serving the Library and Photographic Archives

Figure 5-8 Flaking of the paint protecting the concrete

Figure 5-9 Deterioration of the landings and glass parapets

Figure 5-10 Detachment of concrete and shifting of the stair treads

The problems observed stem essentially from the use of small concrete covers during the construction phase, which were insufficient to protect the iron reinforcements and also to protect the structures from direct exposure to rain and freeze-thaw cycles: the humidity and exposure to the air (carbon dioxide) of the concrete cover, which no longer protected the concrete, caused the typical effects of carbonatation of the material.

5.1.6 Windows

The refurbishment carried out in the 1990s profoundly altered the architecture of the complex, with the introduction of heavy glass windows with aluminium frames, using the technology of the time, which did not have profile sections compatible with the original design of the building that could meet the required performance in terms of both thermal transmittance and fire resistance. The laminated glass is formed by coupling two panes of 6.0 mm glass with a 0.76 mm thick polyvinyl butyral resin sheet in between.

	Area [m²]		
Level	**Exterior**	**Interior**	
Basement	219	113	
Ground	992	568	
First	341	376	
Second	194	232	**Total**
Total	**1746**	**1289**	**3035**

Table 5.1 Surface development of the interior and exterior glass-aluminium windows

5.1.6.1 Exterior windows

They are mainly on the ground floor, developing over a surface area of almost 1000 m², and to a lesser extent on the other levels, including the basement. These large, glazed surfaces are unable to compensate for the difference in outdoor and indoor temperatures. Consequently, they generate a cold surface on the inside, on which the humid air in the exhibition halls condenses heavily, causing widespread damage to the flooring and perimeter wall plasterwork. In borderline conditions, the effects of perimeter infiltration could occur on the lower floor. Moreover, the poor performance in terms of thermal transmittance causes the dispersion of resources for the maintenance of internal microclimatic conditions. Measurement of these parameters could confirm the dispersion of heat outwards in winter and cool air in summer.

Figure 5-11 Effects of the lack of thermal compensation of windows on the floor

5.1.6.2 Interior windows and REI compartmentation

Many rooms are compartmented with metal windows and doors fitted with special fireproof glass. While all the floors have exterior emergency staircases, the central staircase is also considered as an escape route and, in relation to the length of its development, from the highest floor to the ground floor and then outside, it was made smoke-proof by fitting a series of REI 60 glass panels as access filters to each floor beyond the compartmentation of the staircase. In the original design by Bassi and Boschetti, the staircase was architecturally designed in such a way as to lead, on each floor, to a large atrium for access to the exhibition areas, from which it could be seen and appreciated as a whole. The fire compartmentation introduced in the 1990s disfigured this arrangement and enclosed the staircase between imposing window frames, with heavy black surrounds.

The project presented to the Fire Department in 2011 met the need for the historical and functional upgrading of the staircase, eliminating the glazing on the ground, first and second floors, with the consequent alteration of the building's escape routes. The large atriums on each floor, freed from the barrier of the existing windows and doors, were to allow a regular and smooth flow of visitors to the exhibition areas, and also provide a prelude to the themes of the exhibition routes by displaying a few works. In this configuration, the staircase would no longer be smoke-proof. It would, however, be separated from the exhibition areas by REI60 structures, forming a "protected area" rather than a smoke-proof one. Consequently, it would not be used as an escape route for the second floor, but only for the first floor. In this way, from all points of the exhibition halls, it would be possible to reach:

- a safe place (outside stairs) along routes never more than 45 m long;

- a protected place (central staircase) and, from here, for the first floor only, a

safe place (outside the building) along routes never more than 60 m long.

On 15 February 2012, with protocol 5285/PV, file no. 5301, the Provincial Command of the Turin Fire Department approved the project, pursuant to Article 3 of Presidential

Decree 151/2011, but the alterations envisaged in the project have yet to be implemented.

5.1.6.3 Entrance lobbies

The exterior doors and windows also include the large glass lobbies, which are the main access routes to the ticket office, offices and lift foyer in the building housing the Library and Photographic Archives. These very heavy doors have worn mechanical parts that no longer work properly, making it hard to open and close them, and they also require frequent maintenance and safety work.

5.1.7 Outside paving, footpaths, green areas

The GAM is set in a space that is not completely saturated by construction. Even the extension obtained with the basement rooms and the closure of the inner courtyards in the early 1990s left green areas on the ground and a large roof garden on top of the basement area. There are no notable trees, but bamboo hedges geometrically design the flowerbeds and hide the view of the technological systems serving the building.

A large part of the footpaths make use of the stone materials from the original construction inaugurated in 1959, defining solid paths that are partly accessible to the public.

These are joined by the Arena Paolini, as the artist's installation inaugurated in 2001 is commonly known, and this too is defined by a stone surface. Less noble materials, such as tiles, characterise the outdoor area of the café behind Via Fanti.

5.1.8 Interior flooring

The original interior flooring of the building inaugurated in 1959 is no longer visible, except in a few spaces, such as the stairs and some connecting areas, probably the entrance hall and a few basement rooms. A uniform wooden surface, laid like a "ship's deck", covers all the exhibition spaces, except for the large basement exhibition space (Contemporary Collection), which has a resin floor recently laid over an underlying layer of stone, dating back to the early 1990s. The operation was carried out to overcome the porosity of the material, which is not suitable for the large amount of footfall typical of an

exhibition space. The wood on the various floors has undergone some maintenance work over the years, most intensively in the so-called “short wing” in 2010.

5.1.9 False ceilings

When the building was reopened in 1993, blocking out the natural light sources on both walls and ceiling, every level was invaded by air conditioning and security systems, with the installation of new electrical conduits and special ducts. All of this was concealed by an aluminium sheet false ceiling, a practical solution, which took advantage of the considerable height to accommodate light fittings, initially with diffused light.

Later, the same frame began to accommodate electrified tracks for the positioning of direct light sources. With the intervention carried out in 2010, an inspectable plasterboard ceiling was introduced into the Exhibition Area to serve an integrated system of indirect ambient lighting (Barrisol) and accent lighting, again on tracks but this time built in. Service rooms and offices, on the other hand, are currently equipped with ordinary mineral fibre false ceilings on metal frames, which partly incorporate the lighting system.

During the *Zero Lot* intervention in 2024, the second floor's suspended ceiling was removed, the floor slab was secured against panel detachment risk, and left exposed.

5.2 Systems engineering component

5.2.1 Building Management System

GAM's systems engineering supervision system was implemented in 2001 and is based on the SCADA (Supervisory Control and Data Acquisition) platform by Citect, now Schneider Electric, Citect SCADA version V6.00. It has not undergone any major upgrades since its initial implementation. Consequently, it has an application setting, as well as hardware equipment (server, client, control units, PLC, field), typical of the time and so particularly obsolete.

The main functions of the system are fire detection, anti-intrusion, video-surveillance, emergency exit management, AHU systems management, evaporation tower and boiler room management, cooling unit management, electrical cabin management.

Figure 5-12 - Systems supervision screenshot

The system combines products from different suppliers using standard and open communication protocols wherever possible. For some proprietary sub-assemblies, appropriate communication drivers had to be developed. The system architecture envisages the use of two I/O Servers connected in a 100Mbps LAN network with the following subsystems: fire detection, anti-intrusion, emergency exit management, CCTV and video recording, technology management and boiler room.

5.2.2 Electrical systems

The electrical wiring system was completed in 1993 and has undergone some extensions and upgrades since then. In 2017, the system was surveyed to obtain new certification. The survey resulted in a partial Declaration of Compliance, which excluded three areas: the exhibition area in the basement (Contemporary), the exhibition area on the second floor (19th century) and the conference hall. The Foundation commissioned the design and implementation of renovation works for the exhibition areas excluded from the Declaration of Compliance and declared the conference hall closed to the public. Upon completion of the work, a Declaration of Compliance was issued for the new systems.

5.2.2.1 Transformer Cabins

GAM has one MV cabin and one LV cabin, in two separate technical rooms, both built in 1983, while the transformers date back to 1990. The components installed on the medium- and low-voltage electrical panels are made by ABB. Everything installed in the GAM cabin is obsolete according to ABB. The installation does not comply with CEI 0-16, the standard introduced by the Authority for Electricity and Gas with Resolution ARG/elt/119-08.

5.2.2.2 Ordinary lighting

The ordinary lighting system is controlled by the electrical panels on each floor. Control is achieved with cut-off switches on the panels and control units positioned in the various rooms throughout the building. The light fittings vary in terms of type, age, technical characteristics and performance.

The following solutions prevail in the exhibition areas:

- adjustable spotlights mounted on tracks fitted on the ceiling, in order to provide precise lighting for the artworks depending on the exhibition set up;
- rectangular ceiling lights with asymmetrical optics, always useful for the precise illumination of the artworks depending on the exhibition set up;
- waterproof light fittings, installed along the perimeter walls of the first floor. These are fixed and not modular or adjustable

In the connecting areas, at the Café and the Bookshop the lighting consists of:

- recessed light fittings in the false ceiling on the ground floor, round in shape and varying in size, for lighting the passageways;
- wall-mounted sconce light fittings, for indirect lighting directed towards the wall/ceiling;
- waterproof light fittings, complete with bulbs, for lighting the technical rooms, staff toilets and ground floor corridor.

Recessed square ceiling lights complete with bulbs and antiglare dark light optics are used in the offices.

5.2.2.3 Emergency lighting

The emergency lighting system on the floors in question relies entirely on a dedicated power supply system, originating from an emergency lighting panel, powered by a rectifier complete with batteries. The operating voltage of this system is 110V.

The light fittings dedicated to emergency lighting are of the S.E. type, powered by the rectifier unit in the event of a power failure on the emergency lighting panel.

As far as the emergency lighting is concerned, this is provided in the form of light fittings connected to the same panel, but operating 24/7. These are positioned along the escape routes and are labelled with appropriate pictograms indicating the escape routes to be followed in the event of an emergency.

5.2.3 Lift systems

GAM has five lifts and one goods lift, all of which are hydraulic and were registered in 1993. In these almost 30 years of operation, they have sustained a considerable number of rides and suffered numerous failures, including long periods out of service.

5.2.4 CCTV

The system presents elements of hardware and software obsolescence, with a coexistence of analogue and digital technologies, due to adaptations in 2011, following the first installation in 1993. Technological limitations related to the age of the components are particularly evident in terms of resolution, night vision, coverage of the spaces inspected and general reliability.

The current configuration consists of 56 Sony Ipela PTZ mobile cameras (with cat.6 wiring on three dedicated switches and separate 12V power supply cabling), seven analogue cameras of which three are mobile with analogue control and monitors (wired with RG57 coaxial cable and converted to digital by two Axis multi-channel converters) and five Axis minidome fixed optics cameras (with cat.6 wiring), managed by a server with two virtual machines (35 + 32 channels) NVR 6.0 and two display workstations.

5.2.5 Sound diffusion (EVAC)

The GAM has just one area used for public performance activities, the conference hall, which was closed in 2018. In general, the building is served by a public address system for evacuation, which, while being in working order, undergoing maintenance and regular checks, is not fully audible in some peripheral areas. This deficiency is currently offset by management and organisational measures.

5.2.6 Boiler room

Located in the lower basement, following the refurbishment in 1993 it was equipped with three Ferroli diesel-fuelled boilers, registered in 1989, each with a capacity of 465 kW. In addition to heating in winter, it was designed to produce vapour to regulate the microclimate in the exhibition rooms and storage rooms. In 2007, the GAM was linked up to the city's district heating system.

5.2.6.1 Heating

The GAM has been heated by the district heating system. The GAM has been district heating since 2007. Two Alfa Val M10 MFG61PL plate heat exchangers with a nominal heat output of 800 kW each have been installed in the boiler room.

5.2.6.2 Humidification

The residual use of boilers for the centralised production of vapour made it possible to reduce the installed power when it became necessary to modernise the plant in 2019, due to both the obsolescence of the machinery and the need to comply with regulations on atmospheric emissions. The three 465 kW Ferroli boilers were replaced with two 402 kW each Unical BAHR'UNO HPO 600, combined with two Baltur BT 55 DSG burners with a minimum nominal heat output of 350 kW and a maximum nominal heat output of 38.28 kW.

To improve microclimate management performance in the short wing, on the first floor, where the exhibitions are housed, the GAM's AHU numbers 10 and 11 were disconnected from the central system in 2018 and equipped with Carel's independent electric resistance vapour humidifier.

5.2.7 Mechanical systems

The whole system that manages the museum's HVAC is in a very poor condition today. Only one of the three cooling units in the cooling room is in service. The air handling units are not always able to guarantee the temperature and relative humidity levels required by conservators and curators. The pumping systems and evaporating towers, which have no inverters, are particularly energy-intensive and plagued by corrosion. Lastly, most of the distribution networks are hung from the ceilings, with non-certified systems, and it will be necessary to dismantle them in order to secure the ceilings against the risk of collapse.

5.2.7.1 Cooling units

GAM's cooling room was designed to house three double compressor cooling units, each with a cooling capacity of 558 kW. The three machines were used alternately, as a primary, a secondary and a backup unit. The progressive degradation of the system, together with the "cannibalisation" of the machines, brought the plant to 2019, when only one malfunctioning cooler, installed in 2006, was still in operation. The malfunctioning unit was replaced in 2019 with a new Trane RTWSD 160 SE cooling unit, which uses R134a coolant and has a nominal cooling capacity of 582 kW. The absence, however, of a secondary unit and a backup unit, as envisaged in the initial project, means that the primary unit cannot take rest periods, and a single working unit, however recently manufactured, cannot offer adequate guarantees of continuity, in a service that is vital to the maintenance of microclimatic conditions in the exhibition halls and storage rooms.

5.2.7.2 Evaporation towers

The current evaporation towers, made of painted steel, present widespread corrosion problems, which have been counteracted by various interventions to restore the evaporation water tank. The soundproofing panels and air fans, which had also been completely degraded by corrosion, were also replaced. The three towers are over thirty years old and are extremely energy-intensive, each being equipped with 11 kW fans, with non-modulating on-off activation, as well as being "open-circuit", resulting in higher consumption of evaporation water.

5.2.7.3 Pumping systems

In addition to that stated in the previous paragraph, as with the rest of the system, ageing requires continuous repairs to both the electrical and mechanical parts. The cooling circuit is served by four 11 kW pumps with on-off activation, with no modulation.

5.2.7.4 Air handling unit

The museum's conditioning systems are all air-operated. There are 20 air handling units, which have been in uninterrupted operation since 1992. They are all connected to the centralised vapour production system for humidification, served by the two oil-fired boilers installed in the heating plant. An additional AHU which was introduced more recently (2016) serves the Drawings and Prints Room. Each area is served by one or more AHUs. Air is delivered through the ceiling and taken up through the wall at floor level. A similar solution is used in the ticket hall, from which the public enters the museum. Some transit and/or service rooms are equipped with fan coils.

The central air handling units are located inside the building, in technical rooms close to the areas served. They have been unreliable for some years and have been subject to frequent repairs, with prolonged periods out of service. Some condensation tanks have been punctured by rust and their repair or replacement is difficult, with no guarantee of results. The humidification systems of the AHUs are out of production and no longer available on the market. The regulation and control systems are out of production and no longer available on the market. The fans and distribution systems no longer guarantee correct air balancing in terms of both quantity (flow rate) and quality (external air intake and filtration systems).

The dehumidification system is not particularly efficient during the drier periods of the year. The following table lists the machines and their intended use.

AHU 6/6	Second floor exhibition rooms
AHU 3	Second floor exhibition rooms
AHU 4	Second floor exhibition rooms

AHU 12	Ground floor conference hall
AHU 13	Ground floor offices
AHU 14	Ground floor atrium

AHU 5	First and second floor library and photographic library
AHU 6/6	First floor exhibition rooms - long wing
AHU 8	First floor exhibition rooms - long wing
AHU 9	First floor exhibition rooms - long wing
AHU 10	First floor exhibition rooms - short wing
AHU 11	First floor exhibition rooms - short wing
AHU 21*	First floor Drawings and Prints Room

AHU 15	Ground floor classroom
AHU 16	First floor archives library
AHU 17	First floor archives
AHU 18	First floor video library
AHU 19	First floor plaster room
AHU 20	First floor exhibition rooms

Table 5.2 - List of AHUs at the GAM and the spaces served

5.3 Energy consumption / vectors

Due to its age and type of construction, but also due to the specific use of most of the indoor areas, where the artworks are exhibited (museum) or housed (storerooms), the GAM can be described as particularly energy-intensive

	F1	F2	F3	Total
Jan	49,499	27,301	50,212	127,012
Feb	48,929	27,098	42,351	118,379
Mar	55,334	30,076	48,163	133,573
Apr	46,867	27,694	51,395	125,956
May	53,355	30,789	52,606	136,751
Jun	58,066	33,813	57,546	149,426
Jul	62,361	37,023	59,426	158,810
Aug	57,392	33,232	58,481	149,105
Sept	53,317	29,967	46,839	130,123
Oct	51,269	28,585	44,186	124,039
Nov	47,365	26,082	43,544	116,991
Dec	45,490	25,550	50,040	121,079
Total	629,245	357,209	604,789	1,591,243

Table 5.4 - Average monthly consumption [kWh] of electricity at the GAM in 2015-2023

The building uses three energy vectors:

- - electricity, with an average annual consumption of 1.59 GWh;
- - district heating, with an average annual consumption of 2.1 GWh;
- - oil, with an average annual consumption of 57,000 litres.

Jan	332
Feb	254
Mar	249
Apr	208
May	136
Jun	136
Jul	63
Aug	69
Sept	71
Oct	6
Nov	232
Dec	346
Total	2,103

Table 5.5 - Average monthly consumption [kWh] of district heating at the GAM in 2015-2021

5.4 Fire prevention

The building is subject to fire prevention certification issued by the Provincial Fire Department. The codified activities for which the GAM has a valid Fire Prevention Certificate (Annex 2) are as follows:

- **72.1.C**, with expiry in 2027, buildings subject to protection in compliance with Legislative Decree no. 42 of 22 January 2004, intended to contain libraries and archives, museums, galleries, exhibitions and displays, with a validity of ten years;
- **49.1.A**, with expiry in 2027, units for the production of subsidiary electricity using endothermic engines and cogeneration plants with a total capacity of 25 to 350 kW, valid for five years;
- **74.3.C**, with expiry in 2027, systems for the production of heat powered by solid, liquid or gaseous fuel with a potential in excess of 700 kW, valid for five years.

The marked connotation of regulatory and fire protection compliance that characterised the refurbishment completed in 1993 led to the interposition of closed spaces between

the stairs and the access to the exhibition rooms. An attempt was made at transparency, but the imposing black frames and increasing opacity of the glass (due to an irreversible degenerative process) now have quite a negative impact on the Museum's architecture.

The fire prevention project, which was approved at the end of the works and on the basis of which the certificate was issued, sees the double main staircase providing access to the various museum areas as a fundamental escape route that is protected from both the action of fire and smoke. The staircase is therefore compartmented with REI-type doors and windows, and access to each floor is via smoke-proof filters.

This protection system, which has remained unchanged since then, now shows clear signs of obsolescence in several parts. In particular, the use of the opening parts of the doors and windows has worn away their mechanical and sealing elements. The difficulty of maintenance work is amplified by the fact that the fire resistance and smoke seal certification systems have changed today and are much stricter than they were thirty years ago. As a result, for existing compartmentation systems it is not possible to replace parts without compromising the original certification. This is the reason, for example, why some windowpanes, which are opaque, cannot be replaced.

Then there is the sealing and compartmentation of the systems that pass through the stairwells, where over time, for various reasons relating to maintenance, as well as changes, there are original compartmentation techniques and technologies that can no longer be certified unless they are completely replaced.

5.4.1 The 2011 fire prevention project

At the end of 2011, the Foundation submitted a request to the Turin Fire Department for examination of a project (Annex 5) that was to meet two requirements of the museum:

1) historical and functional enhancement of the central staircase for access to the exhibition areas on the ground, first and second floors with consequent alteration of the building's escape routes;

2) addition of a new storage area for artworks in the basement with an adjoining consultation area (which was actually realised inside the Drawing and Prints Room).

The refurbishment carried out in the early 1990s was inspired by fire regulations from previous years, which had been updated and extended to historic buildings with Ministerial Decree 569 of 20 May 1992, when work was nearing completion. The presence of rooms used for public entertainment certainly directed the design towards overabundant risk containment measures, extended to the entire building.

The central staircase, which leads to the exhibition rooms from the ground floor to the first and second floors, was particularly affected by this prudential approach. While all the floors had exterior emergency staircases, the central staircase was also considered as an escape route and, in relation to the length of its development, from the highest floor to the ground floor and then outside, it was made smoke-proof by fitting a series of REI 60 glass panels as access filters to each floor beyond the compartmentation of the staircase.

These restrictive measures are still in place today and the staircase is enclosed in a rigid compartmentation system, detracting from its original appearance. This nullifies the valuable architectural feature according to which the staircase was architecturally designed in such a way as to lead, on each floor, to a large atrium for access to the exhibition areas, from which it could be seen and appreciated as a whole.

The 2011 project envisaged the elimination of the REI glass compartmentations of the staircase on the ground, first and second floors, in order to restore the large atriums to each level, allow the regular and smooth flow of visitors to the exhibition areas and also offer new spaces in which to expand the artistic exhibition.

In this configuration, the staircase was no longer smoke-proof. It will, however, be separated from the exhibition areas by REI60 structures, forming a “protected area” rather than a smoke-proof one. Consequently, it will not be used as an escape route for the second floor, but only for the first floor.

The project was approved by the Provincial Command of the Fire Department on 15 February 2012, with protocol no. 5285/PV, file no. 5301. Subsequently, as mentioned in the opening paragraph, only the component relating to the Drawings and Prints Room was implemented. To date, no work has been carried out on the fireproofing of the staircase leading to the exhibition floors.

6 Subject of the competition

6.1 Area of intervention

The area covered by the competition (shown in Fig. 6-1 for the ground floor) for which a technical-economic feasibility project is required, is defined in Annex 3.

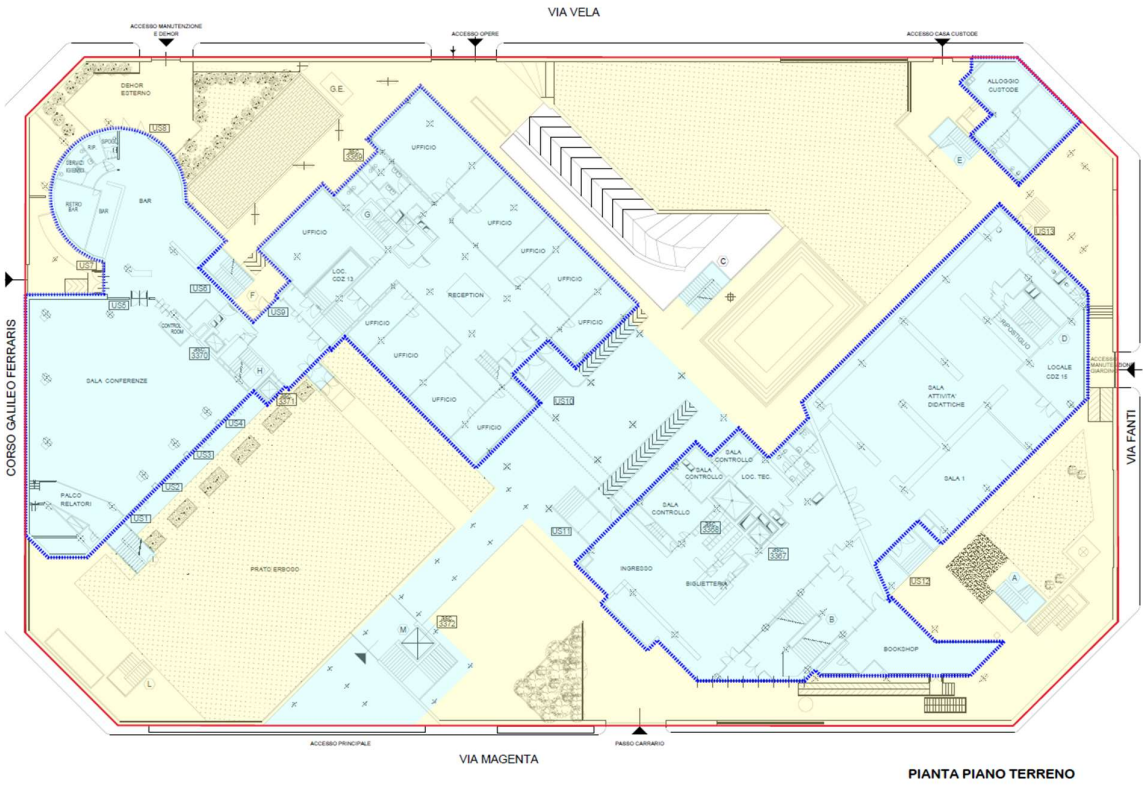

Fig. 6-1 - Perimeter of the competition area, on the ground floor

This area is made up of two areas of intervention within the red perimeter:

- Area 1, buildings
- Area 2, outdoor areas.

Area 1 is divided into two distinct sub-areas:

- Sub-Area 1A, corresponding to the main part of the building that currently houses the GAM and the corresponding covered arcades.

  Within this area, competitors are asked to develop a technical-economic feasibility project for the creation of a single large exhibition complex dedicated to modern and contemporary arts, which contemplates the renovation of the exhibition spaces and the development of additional services/accessories to the museum activities, following the indications and provisions outlined in Chapter 7 below.
  Moreover, the design of the interior layouts and furnishings of the new Museum is required, while for the exhibition areas this design is limited to the lighting components.
  The technical-economic feasibility project must also cover the building envelope as a whole and the general revamping of the systems engineering.

  The ground floor of Sub-Area 1A is to be considered a priority in relation to the implementation of the functional programme.

- **Sub-area 1B**, corresponding to the remaining parts of the building for which the current uses and the functional adequacy of the environments are confirmed and for which the technical-economic feasibility project need only concern the maintenance aspects of the systems and structural components.

It is specified that the perimeter of sub-areas 1A and 1B is not binding and may be considered flexibly in relation to the development of the project proposal as long as it is consistent with the estimate of the works described in chapter 9 below.

Area 2, concerning the areas outside the building mainly laid out as green areas covering the basement, for which competitors are asked to assess a reorganisation of the surface and street furnishings, including furniture and lighting, and the transformation into a quality public space integrated with the Museum and its collections. The design choices, as specified in chapter 7, will have to consider the existing accesses and the current railings/boundary of the lot, in order to make the outdoor spaces a safe and easily accessible, permeable place for meeting and socialising, a rightful and fully-fledged part of the Museum. It should be noted that, within Area 2, the spaces that are related to the priority functions expressed in Area 1A are of fundamental importance.

Competitors must assess the implementation of the project by subsequent phases and intervention lots, with reference to the different functional uses of the areas covered by the Competition, and to the different forms, timing and methods of the relative financing.

6.2 Restrictions

6.2.1 Protective restrictions

With provision D.C.R. no. 104 of 11 June 2018 (Annex 4), pursuant to Article 13 of Legislative Decree no. 42/2004, the Ministry of Cultural Heritage subjected the building that houses the GAM and its appurtenances and open areas, as well as the art collections, book and multimedia collections, archives, and historical and photographic collections it contains, to protection. The measure recognises the cultural significance of the building and its strongly marked identity, in relation to the history of art and culture, as well as its being a prominent testimony to urban culture and the city's institutions.

A communication from the Superintendence for Archaeology, Fine Arts and Landscape for the Metropolitan City of Turin is also annexed hereto (Annex 8), with some guidelines for the design.

6.2.2 The 2024 Zero Lot

Pending the launch of the more comprehensive regeneration project, an initial nucleus of works, not covered by the subject of the competition and defined as Lot Zero, will be carried out. It will be completed by the autumn of 2024 and will take the form of targeted temporary renovation work on the premises using the logic of stripping, in preparation for and anticipation of the future building site, conducted in the foyer and on the first floor, accompanied by the important reopening of the second floor, where a living deposit will also be located.

The main area of intervention concerns the securing and reopening of the second floor, after being closed to the public for years. The second floor of the GAM is an essential exhibition space to accommodate the extraordinary breadth of the Collections and to foster the development of the museum's renewed curatorial and artistic proposition.

6.2.3 Coexistence of the construction site and open/live museum

One of the fundamental goals of the regeneration project is that, during the implementation of the works, the museum will always be able to be open to the public. For this reason it is necessary to develop the project in such a way that it can be implemented in independent functional batches and that, during the development of these batches, the part of the museum that has not yet been redeveloped is active and functional, and, as the redevelopment proceeds, the parts that have already been completed are activated.

From the Fire Department's point of view, it is therefore necessary to develop the refurbishment activities in phases, according to a time schedule spanning several years, so that successive and independent functional lots are created from the point of view of fire prevention, in line with the indications of the Command Headquarters issued with note 5555 of 16 April 2012.

For the management of fire safety, the Contracting Authority has its own Fire Safety Manager (RTS), with whom the project team will have to liaise throughout the development phase of the PFTE through a qualified interlocutor capable of proposing a project development strategy that makes it possible to achieve the goals described above. The RTS will also be the professional who, acting on behalf of the Contracting Authority, will undertake the role of fire safety certifier. The project team will have to implement a plan for the development of the fire safety authorisation process through its fire safety professional which allows the certifier to:

- renew the procedure for the notification of commencement of works (SCIA) and the Fire Prevention Certificate (CPI)currently in force during the development of the site for the parts of the museum that remain open but have not yet been upgraded;
- submit partial SCIAs for each lot as the lots are completed;
- submit the final SCIA upon completion of al the regeneration works.

Within the group of designers, the professional who will be in charge of developing fire prevention matters, in addition to possessing proven experience in the sector of historical

buildings and museums, must be registered in the Ministry of the Interior's lists pursuant to Art. 16 paragraph 4 of Legislative Decree 139/06.

The project must cover the entire regeneration process, and consequently all its functional lots, in such a way as to be a guide for all the subsequent levels of executive design and implementation of the works, as well as a reference for interaction with the Fire Department for the shared development of the authorisation process over time.

7 Design indications

The description of the building-installation system given in chapter 5 leaves no room for doubt: in order to continue to operate, the GAM needs to be upgraded, refurbished and made safe, both in terms of its construction and system engineering components. The action will have to be extended to all the spaces, indoors and outdoors, and to all the facilities present.

The lengthy phase of the Technical-Economic Feasibility Project, which will also include the energy diagnosis and seismic vulnerability assessment, both to be carried out by the Contracting Authority, will also provide the space to redefine the uses and their optimisation in an exchange between the design team and the museum management. The above with the overall aim of concentrating the design proposals on understanding and capitalising on the building transformations that the museum complex has undergone over time, distinguishing materials, structures and spaces ascribable to the original project by architects Goffredo Boschetti and Carlo Bassi, from those added later, with the intention of appreciating and philologically recovering the peculiar aspects that characterised the original project, particularly in terms of space, lighting and colour.

7.1 Actions for an ideal Museum. Museum Concept.

The GAM intends to be an architecturally open museum, interacting with the outside world and the city: just as the building represented an innovative sign within the city and urban fabric at the time of its conception, the current project will also have to imprint a new character on the block where it stands. The current perception of the museum complex will have to be transformed, shifting from the image of an impregnable fortress or *hortus conclusus* that it conveys today to the reality of a true "piazza", open and usable, visible and recognisable, a space that is strongly identifiable and attractive in terms of its architectural, urban planning, social and cultural dimensions.

The design proposals will have to guarantee this permeability also visually, through architectural, functional and distribution choices, with particular reference to the outdoor areas and functions accessible also to non-visitors, such as the café, the bookshop, the

conference room, the Art Library, the Photographic Archives and Video Library, and the offices.

The spaces of the GAM must be as transformable as possible for multi-purpose use. This flexibility can be expressed both in the design of the exhibition spaces and more generally in the services to the public, offering the opportunity to adapt and convert the spaces as required. The idea of a POLYPHONIC GAM will exist above all within spaces with transformable functions.

The art of the present has changed the language and relationship with space. Exhibitions are not only about works to be "hung on the wall" but very often about installations in relation to space. Consequently, the exhibition space will have to provide enough room to display important contemporary works from the collection, which are difficult to show due to their large size. The reorganisation of the exhibition space will have to consider both the exhibition needs of groups of works from the nineteenth- and twentieth-century permanent collection, and the requirements for temporary exhibitions, optimising the areas currently used for connection where possible.

The centrality of the museum's works of art and cultural and exhibition proposals must be supported and strengthened by effective technological solutions both in the management of spaces and collections (access, microclimatic control, etc.) and in the information and communication devices present in the various areas of the structure (reception, services, etc.), also with the aim of facilitating and amplifying the visitor experience.

The solutions identified will have to consider the protective restrictions and, where possible, functionally and aesthetically enhance the distinctive and characterising elements of the original project with which the museum was built. Examples of this include:

- using natural light to the benefit of the fruition and perception of the works on display, and compatibly with their conservation requirements, also envisaging the restoration and adaptation of skylights where feasible;

- evoking the stylistic coherence of the rooms, recovering and arranging the furniture and furnishings from the 1950s in their natural interaction with the architectural setting;

- reproposing the Main Staircase open onto the Foyer to reveal the original design in which it was the pivot around which the exhibition floors revolved and opened up.

The design proposals will have to contemplate expedients and solutions to guarantee universal accessibility, both physical and cognitive, to all the spaces and functions of the new Museum, also adopting the appropriate Architectural Barrier Elimination Plans (PEBA). With this in mind, it will be helpful to provide comfortable areas (quiet spaces) where users of the museum can read, write and rest, both within the exhibition itinerary and in relation to the areas frequented by non-visitors, in order to characterise the museum as a welcoming place, a generator of discovery, knowledge and individual well-being.

Generally speaking, the perception of the new Museum will be related to the ability to re-establish a more coherent reading of the architectural characteristics of the historic container and a renewed balance between the building and the space around it. This perception will, of course, also be conditioned by the choices made regarding the finishing of the surfaces, the choice of new fixtures, and the revision and eventual elimination of superfluous elements that are not indispensable from a functional and regulatory point of view.

7.2 The Museum of the Future 4.0

The new GAM will offer an innovative, stimulating, cutting-edge, engaging and memorable visitor experience for audiences of all ages, physical, cognitive and sensory abilities, education, culture and sensitivities, a vital place where art and technology come together to educate, entertain and inspire.

With the precise intent of touching the heart and mind of every visitor, the GAM will be a living organism, a pulsating hub where the visitor experience is perceived from the areas outside and bordering on the museum, continuing seamlessly into the reception areas,

where the visitor is introduced to the GAM universe through intuitive paths that guide them from the ticket office to the various facilities on offer.

The most advanced digital technologies will have to be used wisely, with a balanced and respectful approach to the works on display. They can enrich and enhance the visitor experience, the engagement and participation of the public, and provide insights and new interpretative perspectives, without, however, distracting from the works themselves. It is essential that the works remain the focus of attention and that technology be used in a discreet and complementary manner.

The new GAM, Museum of the Future, will be much more than just a cultural institution, it will be a pioneer of change and innovation in the artistic and cultural sector place that celebrates creativity, diversity and inclusion, inspiring current and future generations to explore, discover, and actively contribute to building a better world through art and innovation.

The renewed GAM must aspire to become a point of reference in the panorama of international cultural institutions, inspiring them to incorporate innovative technologies and inclusive principles into their practices and programmes.

7.3 Intended uses and services

Garden and outdoor spaces

The accessibility of the GAM's outdoor spaces will have to be rethought. The previously mentioned vision of the new museum as a "piazza" or agora, open to the enjoyment of the visitors, inhabitants and tourists in the city, will have to be expressed in solutions capable of favouring free access and circulation by people, the use of public services, and interest in the museum's exhibition and cultural proposals. This will require the elimination of the various "barriers" that currently hinder access to the museum space both physically and visually. Solutions aimed at mitigating and/or altering the perception of the access perimeter, strongly marked by the presence of the railings, will be examined with particular interest.

The green areas surrounding the building, together with the furnishing elements, will have to be redesigned and redeveloped, accentuating the way they complement the building and favouring year-round enjoyment of the garden. Freed from the uncontrolled growth of bamboo and other plants and shrubs, which obstruct the view of the museum from the outside, these areas will continue to display artwork outdoors and can be supplemented with seating and meeting spaces and a possible patio connected to the café/catering services.

Reception area

Visitors to the GAM should be greeted at the entrance by an information desk from which they can access the ticket office, cloakroom and lockers, and other public facilities, including those serving school groups.

Exhibition spaces

The new areas will have to be characterised by transparency and permeability between indoor and outdoor areas, aspects that will be conditioned by the design choices adopted for the work on the doors and windows.

The premises will provide a place and time for the different performative spaces and languages of art: spaces for performance, dance, etc. will have to be provided alongside the exhibition and multifunctional areas.

The distribution of the exhibition areas must envisage a balance between permanent and temporary exhibitions with their respective visitor routes, and allow the choice of visiting the permanent collections, the temporary exhibitions, or both; with this in mind, the exhibition areas must be provided that can be accessed independently, also envisaging the compartmentation of the entrances.

The GAM also includes several large-scale installations in its collection. It is important for the exhibition spaces to be able to display these installations, particularly on the second level, in the most appropriate manner and in compliance with the criteria (of lighting, use, conservation, safety for the works) necessary to guarantee the best possible presentation in all respects.

The spaces must be characterised by flexibility, adaptability to display, architectural purity, modularity of space.

Specifically, they must also include closed exhibition areas, for exhibition projects that may require an unlit, isolated, closed environment, dedicated to introspection, as well as dedicated environments for site-specific works.

Educational services

Educational activities aimed at different groups of users, particularly schools of all levels, are central to the Museum's vocation as a civic body in close contact with the city. For this reason, suitable spaces for workshop activities are required, with provision for participation by at least three groups at the same time.

Café/catering

The Café is essential for making the GAM a meeting place also for those who are not visiting the Museum. The Café, with catering for at least 40 to 50 people, must be visible from the outside and from the garden, and assume a function of connection and interaction with the surrounding urban space, as independent in its operation as possible, while interfacing with the city, as was originally the case.

The idea of creating an internal refreshment bar for visitors near the reception area should also be considered.

Bookshop

The bookshop, together with the café/restaurant, should be an attraction for visitors and non-visitors alike, who will be able to purchase books, catalogues and also specially selected objects and merchandising. The space should be designed so that it is visible at the start of the visit and intercepts the visitor itinerary at the end of the tour.

Rest areas

The exhibition route, and the Museum space in general, should be equipped with welcoming and relaxing rest areas to allow visitors to take a break or rest during the visiting experience.

Video Library

The Video Library should be transformed into an international research, study and consultation engine, as should the Library. A distinctive and unique collection hub in the national museum scene, it will have to be placed in a dedicated area, equipped with functional technology that allows both simultaneous viewing and the possibility of monitoring possible interference between the videos presented. The video library will be a space to be enhanced, perhaps even finding a new location.

Besides being consultable and usable within the Video Library, the video art collection may also be partly set up within the exhibition routes, so the rooms should also include the possibility of setting up video art works.

Storerooms

The design choices proposed will have to be aimed at maintaining the current location, size and distribution. The storage spaces will have to be rethought and implemented in consideration of flexibility, security, logistics and handling of even large works, with particular attention to compliance with thermo-hygrometric parameters.

Offices

It is necessary to increase the number of workstations for the Museum's staff: there are currently about 25 workstations and there are plans to have at least 40 in the future Museum, also with a view to extending the space available for curators and researchers.

Conference hall

The design of a multifunctional hall is required. It should be adaptable to different types of events and attendance, with audio, video and lighting equipment and with the possibility of easily adapting and modulating (dimensionally and functionally) according to the event hosted. It should also be equipped to attract private events and with routes that allow it to be used independently of the Museum.

Art Library and Photographic Archives

Qualifying and distinctive components of the GAM from the earliest stages of the Museum's life and, as such, known nationally and internationally for the specificity of the

heritage preserved and for the organic interaction with the Museum's collections, the Library and the Photographic Archives must maintain their current position, which was one of the pivotal elements of the museum project in the 1950s. They will be one of the most representative nuclei of the Museum's research and documentation capacity. These spaces will have to be upgraded in terms of storage/archive capacity and in terms of the accessibility of the collections preserved through reading and multimedia consultation stations.

The Drawings and Prints Room can also be located within these spaces, with a dedicated consultation area that guarantees the different handling and study criteria typical of this specific type of artefact.

Caretaker's house

Currently semi-abandoned and used as a service space for several purposes, it could fulfil a defined function (e.g. it could be repurposed as a space available to guests of the GAM), taking into account the fact that it has direct access from the outside and that it can be made independent of the museum in terms of access.

Accesses

The entrances to the museum can be rethought with the aim of facilitating external and internal circulation, proposing solutions that can reconcile safety, spaces and artworks with the requirements of openness and usability.

7.4 Building and structural component

The goal is compatible with the design principles described in chapter 8, particularly those related to the development and philological recovery of the distinctive aspects of the original Bassi and Boschetti design.

7.4.1 Roofs

The extraordinary maintenance of the waterproofing carried out on the roofs of the GAM between 2021 and 2022 has given the museum a proven and highly reliable system, capable of guaranteeing the correct drainage and disposal of rainwater and perfect watertightness for at least ten years.

This large, flat surface might suggest the implementation of photovoltaics. This design choice, if endorsed by the approval of the Protection Agency, should be developed in compliance with UNI 8178-2 "*Construction - Roofing – Part 2: Analysis of the elements and functional layers of continuous roofs and design indications for the definition of technological solutions*", in order to keep the ten-year posthumous policy valid and safeguard the recently completed work.

7.4.2 Outer casing

The project may envisage the complete removal of the cladding, added during the refurbishment of the building in the 1990s.

The design choices must favour solutions that recover and optimise the spatial and chromatic aspects that characterised the original project, ensuring:

- compliance with current fire prevention regulations;
- the proper thermal insulation of the building;
- stable thermo-hygrometric conditions inside;
- the containment of energy expenditure;
- the reduction of pollutant emissions into the atmosphere.

7.4.3 Horizontal load-bearing structures

The project will have to guarantee the safety of all the GAM's brick and concrete floors, irrespective of the level of risk of collapse detected during the diagnostic surveys conducted in recent years.

7.4.4 Terraces

The impermeable layers of the terraces need to be restored and efficient water regimentation systems need to be designed. The parapets need a complete overhaul. The undersides of the balconies need to be secured to prevent the risk of plaster and baseboard becoming detached.

7.4.5 Vertical connections: outside stairs

It is necessary to extend the renovation work, already carried out on three stairwells, to the remaining two emergency staircases: Staircase 1 and Staircase 2 (ref. Figure 5.6).

7.4.6 Doors and windows

7.4.6.1 Exterior doors and windows

The complete replacement of the door and window frames installed in the 1990s must be envisaged. The right compromise between safety requirements, thermal insulation, preservation and optimisation of the building must be found.

Any new doors and windows must favour a solution that echoes the original design of the doors and windows in terms of materials, design and the relationship between structure and mirroring.

7.4.6.2 Interior doors and windows and REI compartmentation

It is necessary for the design team to consider the project already approved by Turin Fire Department, addressed in paragraph 5.4.1 (Annex 5).

7.4.6.3 Entrance lobbies

The entrance areas must be designed in such a way as to guarantee the correct visitor flow, in compliance with the requirements of energy saving and microclimate management and the legal requirements in terms of fire safety, escape routes and accessibility.

The project must favour technological solutions with lower running costs.

7.4.7 Green areas and outdoor spaces

The renovated GAM will have to transmit values of inclusion, welcome and accessibility to its public and to the townspeople in general, also via a revamping of the outdoor areas, the entrance canopy and the railings. The project must encourage greater openness and permeability towards the neighbourhood and convey the sense of a museum that is alive and vital and that arouses the curiosity of passers-by and invites them to approach.

The outdoor areas of the GAM will continue to display and promote artworks and installations.

7.4.8 Interior flooring

The least extensive intervention involves the restoration of those portions of parquet flooring on the first and second exhibition floors that have been damaged by condensation

on the cold surfaces of the windows and doors. However, depending on the outcome of the preliminary study contained in the PTFE, the intervention could be extended or include a complete renovation.

7.4.9 False ceilings and lighting technology

The counteraction of collapse must envisage an intervention that will inevitably entail the removal of all the false ceilings and all the electrical, mechanical and special systems hanging from the ceiling.

The false ceilings will also be closely related to the choice of lighting technology, functional to the different types of works on display, adaptable and versatile with respect to the layouts, integrated with systems supervision and easy to maintain.

The designers must combine the need to contain energy consumption with the need to equip the museum with high quality lighting technology, with a strongly innovative connotation, respectful of preservative restrictions while being capable of enhancing the variety of works exhibited in the museum. A return to the contribution of natural light, excluded from the intervention in the 1990s, during which the large ceiling lights designed by Bassi and Boschetti were blocked out, can also be considered.

7.5 Systems engineering component

7.5.1 Building Management System

The new systems engineering supervision system will be essential for the operation, security and maintenance of the systems. It will have to help implement energy cost containment policies and their monitoring. It will have to incorporate tools for managing the microclimate in the exhibition halls - if this is not carried out by dedicated software - the principles of which can be found in paragraph 8.1.6 below. Fire and burglar alarms must be displayed on the Internet, with the appropriate security measures, so that they can be managed from the control centre at Palazzo Madama, where the surveillance systems of the museums of Fondazione Torino Musei converge at night.

7.5.2 Electrical systems

With the exception of the areas that were recently upgraded in 2017 - the area on the second floor where the 19th-Century Collections are exhibited, and the area in the basement which houses the Contemporary Collections - all the other portions of the electrical system, which were approved at regulatory level with the Declaration of Compliance mentioned in paragraph 5.2.2, are nevertheless so obsolete that they must be completely redesigned.

7.5.2.1 Transformation cabins

As pointed out in paragraph 5.2.2.1 above, the LV and MV cabins are currently one of the elements in the worst and most obsolete condition in the museum's entire systems engineering component. They will have to be rethought, adapted to the new distribution requirements, loads and electrical absorption, and consumption monitoring indicated in the preliminary design phase.

7.5.3 Lift systems

An intervention that considers a thirty-year perspective must also include the renovation of the lift and goods lift systems that currently serve the Gallery, with a number, capacity and dimensions that are at least equal to those already existing.

The features and location of the lifts will have to consider not only the functional aspects of usability of the spaces by the public and the movement of the artworks, but also the safety of people with disabilities. From this point of view, a coordinated assessment by the design team is required, with strategies for escape, the location of static safe places and access by rescue teams.

7.5.4 Detecting and extinguishing fires

The new fire detection and extinguishing system must be designed in compliance with the regulations in force and in keeping with the project submitted to the Fire Department. The control of the system must be interfaced with the BMS. The positioning of the fire extinguishers must consider the exhibition requirements and the flexibility of use of the space. Where the need for automatic fire extinguishing in the storerooms is confirmed, it will be necessary to carefully choose the most appropriate extinguishing solutions for the

artworks, and to carefully position networks and nozzles in relation to racks and canvas support systems.

7.5.5 Security Management and CCTV

The external perimeter of the museum complex is currently equipped with passive protection (fencing walls and gates) and active protection (perimeter barriers connected to the anti-intrusion system). The new design will have to give the outdoor spaces a different image and make usability in order to make them more accessible to the public. This design goal will have to be combined with the security of the building and the works it contains so as not to compromise the current level of protection but rather increase it. This is also to allow the museum to host temporary exhibitions including those with loans from external collections, guaranteeing all the functions of the indoor and outdoor spaces necessary for the preparatory activities (arrival of artworks, unloading, facility reporting operations, etc.).

The design choices must take the principles of risk assessment into due consideration, identifying and analysing the risks related to intrusion and the consequent strategic actions to be developed in the project to contain or mitigate them.

The CCTV system is also critical to the management of security in the museum and needs to be modernised, to improve performance in terms of camera resolution, nocturnal visibility or low light conditions, and to improve surveillance, especially in outdoor and perimeter areas. Additionally, with a view to zero-light filming, particularly sophisticated cameras would allow the indoor spaces to be left in the dark during the night, saving energy and undoubtedly helping to preserve the artworks.

By exploiting new technologies, the same system could be used to manage room occupancy levels and attendance statistics.

Lastly, as already described for the BMS in paragraph 5.2.1, the systems of the Foundation's museums must be able to communicate with each other and be consulted remotely, so that they can be managed from the Palazzo Madama control centre, where the surveillance systems converge at night.

7.5.6 Sound diffusion (EVAC)

Shortcomings in terms of the performance of the current EVAC system, described in paragraph 5.2.5 above, also with a view to a possible review of the museum's intended use and the spaces to be used for public entertainment, as well as the upgrading of fire safety, make it necessary to redesign the system and adapt it to the needs expressed by the project.

7.5.7 Energy production and humidification

A project that has the ambition of making a complex that is currently particularly energy-intensive green, must aim to realise construction and systems engineering interventions that prioritise energy-environmental sustainability without significantly altering the original spirit of the buildings and their appearance.

It is also necessary to consider that the complex is located in the city centre, in an area with a high population density and in a city which, due to the morphology of the surrounding area, presents significant issues related to the accumulation of gaseous pollutants in the atmosphere.

In relation to these considerations, and the inevitable compromises that must be made between architectural/town planning requirements and environmental sustainability, we have identified three key principles that guided the development of the basic concepts of the building-systems engineering components:

a) limiting interventions that distort the spirit of the buildings;
b) limiting the concentrated and localised production of pollutants;
c) maximising the energy efficiency of conversion systems.

These three factors must determine the architecture of energy systems.

The on-site production of electricity (thanks to photovoltaic systems) and thermal energy (solar heating) will have to be carefully assessed so as not to compromise the aesthetics and shape of the building, as shall the use of innovative high-performance solutions for the thermal insulation of the building envelope.

The second point (b), suggests limiting, or avoiding, the adoption of systems that involve the on-site conversion of fossil fuels.

The line of development that appears most promising for optimising the environmental energy sustainability of the complex and maximising the energy efficiency of the conversion systems (point c) is to aim for widespread electrification of the end uses of energy. Besides being consistent with the concepts and restrictions outlined above, this strategy is also one of the guidelines recommended by national and European energy transition policies.

However, in order to make full and sustainable use of this measure, solutions that maximise the exploitation of electricity produced from renewable sources and enable optimal integration of the buildings' energy system with the "Smart Grid" must be implemented (both to improve environmental sustainability and "economic sustainability", paving the way for the effective exploitation of a real-time electricity market in the future).

One possible solution to pursue these goals is Energy Flexibility, an approach that is also recommended by energy transition policies. An important in-depth study and design response will also have to be developed with regard to environmental humidity control technologies. This in-depth design will have to offer a solution capable of combining the need to guarantee the correct conservation of the works with the need to contain system operating costs.

7.5.8 Mechanical systems

These are the systems that contribute mainly to the museum's energy requirements and therefore constitute the space that lends itself best to efficiency and cost reduction measures. At the same time, they represent the technological core that is vital for the proper conservation of the artworks and which becomes critical when it is unable to deliver regular and consistent performance.

The technological renewal of the mechanical systems and the control system will guarantee the best temperature and relative humidity conditions, as well as their stability,

in all rooms where the artworks are housed, whether they that be for exhibition or storage.

Visitor comfort will also be pursued through the containment of the air velocity in the room, while air flow, recirculation and filtering will have to be calibrated to ensure high levels of air quality while containing energy expenditure.

Geometry and positioning of the distribution networks, diffusers and extractor fans will have to be designed with extreme care in order to conceal these systems from the view of visitors and ensure that they do not obstruct or interfere with the exhibition space.

7.5.8.1 Cooling units

The project will have to give the museum a new, high-efficiency, highly efficient cooling plant, adequately sized to guarantee the microclimatic performance indispensable for the conservation of the artworks and the comfort of visitors, as well as their continuity over time.

7.5.8.2 Air handling unit

After 30 years of operation, 20 of GAM's air handling units require complete renewal. The designers will have to confirm or revise the number of AHUs, the areas covered by each one and the location of the technical rooms.

The choice between central management of vapour production or its peripheral management on the AHU will be particularly strategic for containing energy consumption and controlling the ambient microclimate. Each of the two options also has an impact on the type of energy carrier used, as a switch to local vapour production would require the abandonment of oil and the decision to avoid the possible transformation of the thermal power plant to gas in favour of electricity.

8 Design principles

8.1.1 Foreword

One of the key goals of the GAM regeneration project is to keep the museum alive and active throughout the works. For this reason it is necessary to develop the project in such a way that it can be implemented in independent functional batches and that, during the development of these batches, the part of the museum that has not yet been redeveloped is active and functional, and, as the redevelopment proceeds, the parts that have already been completed are activated.

Based on this, the technical-structural intervention subject to design must inspire a broader reflection on the theme of innovation, inclusion and accessibility of spaces.

The project is based on principles of environmental sustainability and energy saving, architectural innovation and technology, and aims to activate new models of museum use that are inclusive, engaging and attractive to the public.

On a technical level, all the fragilities of the building-systems engineering component are now manifest and are described in detail in chapter 5 above. At the same time, it must first be noted that the property is subject to protection pursuant to Part II of Legislative Decree 42/2004, and subsequent amendments, with provision expressed by D.C.R. no. 104 of 11/06/2018. This means that the design team will not be able to disregard an in-depth historical-critical analysis of the documentary, iconographic and descriptive sources, which is an essential starting point for the development of an adequate redevelopment project for a listed cultural asset.

However, the opportunity offered by this project is enormous, and exploiting it for the sole purpose of renovating, securing and restoring full accessibility to one of Italy's most important museums seems somewhat limiting. This, on the other hand, is an opportunity to reposition the museum internationally, strengthening its reputation and its role, with a vision that is sensitive to the issues that dominate the global debate today while also being utopian, capable of pre-empting the expectations of that wide audience of stakeholders that will take it, in this new thirty-year life cycle, until at least 2050. With this in mind, it is essential for the design activity itself, and not just the product of the

design at the end of the work, to have a strong innovative connotation. Innovation must be the root onto which the strong elements of this project are grafted: environmental sustainability, BIM-oriented design, an in-depth feasibility phase to investigate seismic vulnerability and for energy diagnostics, scrupulous management of the microclimate in the exhibition and storage areas, high standards of visitor comfort, careful application of minimum environmental criteria.

8.1.2 Conservation and restoration of a modern listed building.

The restoration of the GAM could be part of a recent and widespread trend of interest, which animates the discussion and debate between architects and art historians. Restoration applied to modern architecture, in particular to those 20th century buildings that made a break with the tradition of previous periods and became strongly representative of the aesthetic taste, techniques and construction materials of the period in which they were built.

The study must aim to gain an understanding of the building transformations that the museum complex has undergone over time, distinguishing materials, structures and spaces ascribable to the original project by architects Goffredo Boschetti and Carlo Bassi, from those added later, with the intention of appreciating and philologically recovering the peculiar aspects that characterised the original project, particularly in terms of space, lighting and colour. Particular care must be paid to the preservation of the original volumes and structures and therefore to the integration of the original parts recovered with the valuable parts built at a later date, ensuring harmony and consistency in the operational choices and particularly in the architectural materials and finishes.

8.1.3 The rebirth of the GAM through green innovation, the new engine of global economic development.

Environmental issues are at the centre of international debate and government action.

For decades, economic development, with its positive effects on social welfare, levels of employment and the prosperity of nations, has relied on technological innovation and the indiscriminate exploitation of energy resources, particularly non-renewable ones, while

environmental degradation has progressively increased, at the risk of compromising the situation for future generations.

The impact of economic growth on the environment is well known: global warming, air and water pollution, progressive scarcity of water resources, deforestation, loss of biodiversity, soil degradation. New policies to stimulate growth, including the NRRP, are based on goals that are compatible with environmental protection. The imperative goal to meet today's needs without compromising the well-being of future generations is sustainable development, achievable through green innovation.

EU leaders have approved a binding target for European countries of a net domestic reduction in greenhouse gas emissions of at least 55% compared to 1990 values by 2030. The EU's long-term goal is even more ambitious: a climate-neutral Europe by 2050. This means that between now and 2050, the EU will have to drastically reduce its greenhouse gas emissions and find ways to offset any which are unavoidable. Achieving zero net emissions will benefit people and the environment and limit global warming.

The EU has adopted legislation in several areas to implement its international climate change commitments. EU countries have set binding emission targets for key sectors of the economy to substantially reduce greenhouse gas emissions. A strong signal in this sense is also seen in the most important of the six missions envisaged in the NRRP, the M2, "*Green Revolution and Ecological Transition*": this alone absorbs resources amounting to Euro 69.9 billion out of the total of Euro 235 billion envisaged in the investment plan, confirming that Italy's energy policy is strongly oriented towards renewables, a sector that is experiencing considerable growth in the country.

The new GAM will have to be designed to align with and, if possible, go beyond the medium- and long-term environmental goals defined by the European Community.

An effective tool for reaching the goals and certifying their achievement is the application of the LEED protocol in combination with the GBC Historic Building protocol based on the historical importance of the building.

LEED/GBC HB certification is a globally recognised symbol of the achievement of sustainability and envisages four levels of certification:

- Certified/base: if a total number of points between 40 and 49 are achieved;
- Silver: if a total number of points between 50 and 59 are achieved;
- Gold: if a total number of points between 60 and 79 are achieved;
- Platinum: if a total number of points between 40 and 80 are achieved.

The GAM regeneration project must have the requirements to aspire, at least, to classification in the upper part of the 60-79 point Gold level range. In order to pursue this goal, the Contracting Authority will appoint its own general co-ordination team to handle:

- the general co-ordination of the certification process;
- The Commissioning process (appointing a Commissioning Authority);
- verification and validation of projects from an energy and sustainability perspective;
- communication and education on environmental sustainability issues related to the project.

The design team will therefore have to be structured in such a way as to guarantee the development of the project in compliance with the set goals as well as a qualified and collaborative interface with the Contracting Authority's team.

The 2030 Agenda, signed on 25 September 2015 by the governments of the 193 Member States of the United Nations, and approved by the UN General Assembly, consists of 17 Sustainable Development Goals framed within a broader programme of action consisting of associated 169 targets, to be achieved in the environmental, economic, social and institutional spheres by 2030.

The prerequisites envisaged in the LEED/GBH HB protocol are reflected in some of the targets included in the 2030 Agenda. Four case studies that could be applied within the GAM regeneration project are presented below.

Goal 3: health and well-being. Target 3.9: by 2023, reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.

In this case, the LEED/GBC HB indoor environmental quality category has numerous credits and prerequisites that serve directly to reduce exposure to hazardous chemicals

and air pollution. In particular, the minimum performance requirement for indoor air quality establishes strict requirements for ventilation and air quality monitoring according to international standards.

Goal 6: clean water and sanitation. Target 6.4: by 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity, and substantially reduce the number of people suffering from water scarcity

The LEED/GBC HB water efficiency category offers three requirements and four credits specifically geared towards reducing water use and increasing water efficiency. For example, the indoor water use reduction requirement requires the installation of water-efficient appliances, fittings and fixtures designed to significantly reduce water use and counteract its increasing scarcity.

Goal 7: affordable and clean energy. Target 7.2: by 2030, increase substantially the share of renewable energy in the global energy mix.

Energy and Atmosphere, the largest LEED/GBC HB category in terms of total credit opportunities, offers numerous ways to reduce energy consumption and the economic and environmental damage associated with fossil fuels. One such strategy can be found in credits awarded for renewable energy production, which encourage the purchase or leasing of renewable energy systems such as photovoltaic solar roofs.

Goal 11: Sustainable Cities and Communities. Target 11.c: support least developed countries, including through financial and technical assistance, for sustainable and resilient buildings utilizing local materials.

The "materials and resources" category presents options for the procurement, storage and disposal of construction materials in order to limit negative environmental impacts before, during and after the construction phase. The "raw material procurement" category favours the use of products quarried, manufactured and purchased within 100 miles of the project site, reducing carbon emissions and supporting local industry.

8.1.4 Furthering of feasibility phase

The Technical-Economic Feasibility Project will have to provide a solid foundation on which to develop the subsequent details of the project. To emphasise the absolute centrality and importance of this phase, the Contracting Authority intends to grant the design team up to four months to finalise the PFTE presented in the competition phase. The following studies will be of particular importance: the energy diagnosis of the building (delivered by the Contracting Station), the pre-assessment for LEED/GBC HB certification (delivered by the Contracting Station) and the seismic vulnerability check (delivered by the designer).

8.1.4.1 Energy diagnosis

Due to its age and type of construction, but also due to the specific use of most of the indoor areas, where the artworks are exhibited (museum) or housed (storerooms), the GAM can be described as particularly energy-intensive The building uses three energy vectors:

- electricity, with an average annual consumption of 1.59 GWh;
- district heating, with an average annual consumption of 2.1 GWh;
- oil, with an average annual consumption of 57,000 litres.

The decree of the Ministry of Economic Development dated 21 December 2017, which came into force on 1 January 2018, defines energy-intensive companies as those which, in addition to certain requirements relating to the sector in which they operate, have an average annual consumption of at least 1 GWh. For the thermal component, the GAM uses district heating, with an average annual consumption of 2 MWh. Lastly, the vapour for the microclimatic regulation of the exhibition rooms and art storage rooms is produced using approximately 60,000 litres/year of oil.

In consideration of this and of the advanced average age of the systems, significant margins for increasing the energy efficiency of the building-plant system can be imagined.

The energy diagnosis will be developed by the Contracting Authority and delivered to the design team at the start of the contract so that it can be taken into account in the finalisation of the PFTE.

Within the design team, the professional in charge of energy matters, besides possessing proven experience in the field, must be a certified EGE.

8.1.4.2 LEED/GBH HB Pre-assessment

The pre-assessment document analyses the feasibility of applying environmental sustainability certification protocols to the GAM redevelopment project.

Indeed, the Contracting Authority intends to approach the redevelopment with the aim of achieving high standards in terms of environmental sustainability. This document will be supplied to the professionals admitted to the second phase of the competition and will contain all the indications concerning the implementation of the various credits and any specific recommendations, both for the design phase and the construction phase, which will have to be envisaged in the development of the redevelopment process.

Within the design team, the professional in charge of developing sustainability certification, besides possessing proven experience in the field, must be a certified LEED AP. This professional will be responsible for all pre-requisite development activities and credits related to the design phase.

8.1.4.3 Seismic vulnerability check

A number of structural fragilities have occurred, with the collapse of the ceilings and the deterioration of some reinforced concrete structures, as in the case of the five outdoor staircases. At the same time, government action to promote earthquake prevention policies has been intensified at national level. For listed heritage in particular, the Ministry of Culture has also expressed its position on several occasions.

Examples include Circular no. 15 of 30 April 2015, "*Provisions regarding the protection of the architectural heritage and mitigation of seismic risk*", which calls for a greater awareness of the risk and attention to extraordinary maintenance works that, even when they do not concern load-bearing elements, may directly or indirectly affect the structural

behaviour of the building. In such cases the project may be an opportunity to detect structural weaknesses and local seismic vulnerabilities that already exist and are not directly related to the planned intervention.

The structures must be adapted in accordance with the performance requirements established by NTC2018.

8.1.5 BIM-oriented design approach

Going beyond the mere need to comply with legislative obligations, the Contracting Authority considers it strategic and advantageous, within a large-scale redevelopment project, to ask the designers to employ the BIM method, as this adds further innovation to the project and facilitate the subsequent maintenance of the building.

For this purpose, a dedicated specification (Annex 7) has been finalised and will be included in the technical documentation accompanying the public selection of the designer.

It is important for the team of professionals to see Business Information Modelling (BIM) as a real process rather than a technology to be employed. A BIM system represents an added value compared to the traditional database, because it favours the principles of information sharing and collaboration between all the parties involved in the process. The 3D models built should constitute a holistic basis for the knowledge of the building during the entire life cycle of the work: from the design to the execution of the works, to the update as-built. At the end of the works, the delivery of the BIM project to the Foundation will greatly facilitate the maintenance and monitoring of the renovated building: the information system will make it possible to manage the scheduling of regular inspections, the history of repairs and replacement of elements, the monitoring of the microclimate, occupancy levels, energy consumption, the updating of the document archive associated with the building and installations, etc.

8.1.6 High efficiency, reliability and rigour in microclimate management and control

The correct conservation and protection of the artworks are indispensable elements in the mission of a museum, while the performance that the mechanical systems are able to

provide, their flexibility and adaptability in terms of regulation, and the ability to supervise and effectively govern these systems are decisive for their implementation.

It is also true that the reputation and international credibility of a museum that aspires to obtain prestigious loans of artworks for the realisation of successful exhibitions depends significantly on the institution's ability to guarantee and certify adequate thermo-hygrometric conditions in the exhibition spaces and in its in-house storerooms.

In some of the GAM's rooms, especially during unfavourable outdoor weather conditions, the systems are not always able to ensure stable microclimatic conditions and, as is well known, fluctuations in relative humidity or temperature can cause damage to our artistic heritage. In the GAM redevelopment project, the subject of microclimate management must be treated with absolute skill and meticulousness by the designers. It will be necessary to explore the new potential offered by research in the field of artificial intelligence and study its possible application in the new Gallery. The advantage of this form of innovation could be the application, for the first time in a museum environment, of predictive algorithms, which, starting with the analysis of short-term and historical data sets, are able to intercept trends in temperature and relative humidity and pre-empt their adaptive adjustment in the environment.

It will be necessary to provide a widespread network of field sensors to detect air quality indices, occupancy levels and microclimate parameters in real time in support of these advanced systems.

8.1.7 Visitor comfort

All design choices will also have to be oriented towards fostering the best visitor experience for the Gallery's public. From the moment of arrival on the footpath, it will be important to seduce and stimulate the visitor's attention, through the clever enhancement of the external areas, the crossing of which precedes entry to the museum. All the reception areas will have to be redesigned, with an avant-garde vision: the ticketing and entrance areas to the museum services, cloakrooms, and the access atriums to the various exhibition levels, currently filter zones, as envisaged in the current fire prevention

certificate, but subject to possible new implementations (see paragraph 5.4.1 in this regard).

Visitor comfort must also be guaranteed and maximised through a rigorous air quality control system, which ensures healthy environments, monitors and reduces CO2, PM10, PM2.5, VOC and bacteriological levels, monitors and regulates temperature and relative humidity according to crowding levels, the outdoor climate and the type of artwork on display, and guarantees adequate ventilation and air exchange. In allegorical terms, the visitor entering the new GAM should perceive that sense of wellbeing and oxygenation one feels when walking through a high-altitude forest on a pleasant spring day.

When drawing up the project, just as much attention will have to be paid to improving acoustic and lighting comfort, as well as to reducing electromagnetic pollution.

In order to achieve these goals, it will be important to design HVAC systems that are correctly sized, with high performance levels and high filtering capacity, which exploit highly efficient renewable sources. It will also be necessary to implement an extensive network of field sensors, as mentioned in the previous paragraph, dedicated to monitoring and regulating the microclimate in exhibition halls and storage rooms. The choice of building materials, such as sealants, adhesives, paints, flooring and composite wood products, will also have to be carefully weighed to exclude the use of products and chemicals that may give off significant amounts of odourless but harmful airborne substances, such as volatile organic compounds.

8.1.8 Application of minimum environmental criteria

In order to reduce the environmental impact of the redevelopment of the GAM, the Contracting Authority requires that the design documentation be drawn up in consideration of the technical specifications and contractual clauses contained in the Minimum Environmental Criteria (CAM) set out in the Ministerial Decree of 23 June 2022 "*Minimum environmental criteria for the entrusting of design services for building interventions, for the entrusting of construction works for building interventions and for the joint entrusting of design and construction works for building interventions*." (CAM Edilizia) (Official Journal no. 183 of 6 August 2022).

However, many of the audits required for LEED/GBC HB certification (ref. paragraph 8.1.3) also satisfy the checks demonstrating the adoption of the CAM. Consequently, designers must take care to integrate the two protocols, avoiding any duplication of effort while ensuring that there no areas of verification and regulatory compliance are left uncovered.

According to the Ministerial Decree of 26 June 2015 "Application of the methods for calculating energy performance and definition of the prescriptions and minimum requirements for buildings" the intervention is classified as a first level major renovation for which the following definition is given: "besides involving over 50% of the total gross dispersing surface area of the building envelope, the intervention also includes the renovation of the heating system for the winter and the summer air-conditioning service throughout the entire building."

It should also be noted that the GAM is listed under Legislative Decree 42/2004, as it is of cultural interest pursuant to articles 10 c. 1 and 12 of the aforementioned decree.

Audits must therefore be conducted for all the criteria pertinent to the type of intervention, considering the limits of applicability and exemptions granted for existing listed buildings.

9 Financial limits and estimated intervention costs

9.1 Valuation of works

The table below provides a summary of the amounts for each of the categories of works, pursuant to Ministerial Decree 17/06/2016.

Classification pursuant to Ministerial Decree 17/06/2016	Code description	Amount
E.22	Maintenance, restoration, conservative and redevelopment operations on buildings and elements of historical and artistic interest	€ 6,000,000
IA.02	Heating systems - air conditioning, air treatment - Mechanical fluid distribution systems - Solar heating system	€ 4,400,000
IA.04	Electrical installations in general, lighting, telephone, security, fire detection, photovoltaic, complex building and construction installations - structured wiring - fibre optic installations - individual laboratory equipment and pilot systems	€ 3,800,000
S.03	Reinforced concrete structures or parts thereof - Relative structural checks - Scaffolding, rigging and provisional structures lasting more than two years	€ 2,500,000
E.19	Furnishings with elements purchased on the market, Gardens, Playgrounds, Squares and outdoor spaces open to the public	€ 800,000
E.18	Furnishings with unique elements, Urban parks, Equipped playgrounds, Historic gardens and squares, Landscape and environmental redevelopment of urban areas	€ 500,000
Total		€ 18,000,000

Table 9.1 - Overall value of works

9.2 Economic framework of the project

ECONOMIC FRAMEWORK OF THE PROJECT			
A		**Works**	
	A1	E.22 Maintenance, restoration, conservative and redevelopment operations on buildings and elements of historical and artistic interest	6,000,000.00
	A2	IA.02 Heating systems - air conditioning, air treatment - Mechanical fluid distribution systems - Solar heating system	4,400,000.00
	A3	IA.04 Electrical installations in general, lighting, telephone, security, fire detection, photovoltaic, complex building and construction installations	3,800,000.00
	A4	S.03 Reinforced concrete structures or parts thereof - Relative structural checks - Scaffolding, rigging and provisional structures lasting more than two years	2,500,000.00
	A5	E.19 Furnishings with unique elements	800,000.00
	A6	E.18 Furnishings with elements purchased on the market, Gardens	500,000.00
	A	**Total works**	**18,000,000.00**
B		**Amounts available to the contracting authority**	
	B1	Unforeseen events, amicable agreements and technical advisory board, allocations in connection with the amendments referred to in articles 60 and 120, paragraph 1, letter a)	1,900,000.00
	B2	Expenses for the handling of artworks and their storage in an external air-conditioned warehouse	800,000.00
	B3	Technical expenses related to PFTE design (first place prize included)	655,688.91
	B4	Technical expenses related to overall executive design	493,124.11
	B5	Expenses for PFTE and executive design verification	296,000.00
	B6	Expenses for technical-administrative testing during construction, static testing, energy certification certificate	260,000.00
	B7	Works management, operational management, safety	925,287.76
	B8	Incentive pursuant to art. 43 of Legislative Decree 36/2023 and subsequent amendments	360,000.00
	B9	Expenses for notifications	200,000.00
	B10	Resources for surveys, essays, load tests and expert opinions during the design phase	160,000.00
	B11	Expenses for laboratory tests and technical inspections envisaged in the Special Tender Specifications	90,000.00
	B12	Expenses for tender commissions (design and works)	80,000.00
	B13	Awards for those admitted to the short list final positions ranking 2-5	120,000.00
	B14	Technical expenses for tender (online platforms, advertising, etc.)	30,000.00
	B	**Total amounts available**	**6,370,100.78**
C		**Social security charges and taxes**	
	C1	VAT on works (excluding item A5)	1,720,000.00
	C2	VAT on work carried out in-house, special agreements and unforeseen events	190,000.00
	C4	Social security charges	113,204.03
	C5	VAT on A5, technical costs, social security charges and other items subject to VAT at a rate of 22%.	1,105,127.06
	C	**Total social security charges and taxes**	**3,128,331.09**
D			
	D	**TOTAL PROJECT AMOUNT**	**27,498,431.87**

Table 9.2 – Comprehensive economic framework of the project

9.3 Economic framework Lot 1

The Contracting Authority has arranged the procedures for the economic coverage of an initial contribution of Euro 7.5 million and, at the same time, activities are underway to obtain funding to cover all the works envisaged in this Planning Guidance Document.

The first tranche of resources is used to launch the design competition and to have the winning professional complete the overall PFTE procedure.

The PFTE must establish the breakdown of the intervention into work lots. This segmentation must be based on the resources actually available and must combine the redevelopment needs identified as priority (please see Sub-Area 1A and its interfaces with Area 2, pursuant to Paragraph 6.1) by Fondazione Torino Musei and the museum management, with the urgent need to update the various technological elements, which will stem from the design phase.

In this paragraph, on the basis of hypothetical elements, which may be updated or confirmed during the design phase, a number of categories of works have been identified with the relative allocation of amounts, for a total of Euro 4 million of works.

As a result of this valuation and the selected categories of works, professional fees have been calculated for the completion at executive level of the design of the first lot and for the execution of the works.

ECONOMIC FRAMEWORK OF THE PROJECT			
A		**Works**	
	A1	E.22 Maintenance, restoration, conservative and redevelopment operations on buildings and elements of historical and artistic interest	1,400,000.00
	A2	IA.02 Heating systems - air conditioning, air treatment - Mechanical fluid distribution systems - Solar heating system	800,000.00
	A3	IA.04 Electrical installations in general, lighting, telephone, security, fire detection, photovoltaic, complex building and construction installations	500,000.00
	A4	S.03 Reinforced concrete structures or parts thereof - Relative structural checks - Scaffolding, rigging and provisional structures lasting more than two years	300,000.00
	A5	E.19 Furnishings with unique elements	500,000.00
	A6	E.18 Furnishings with elements purchased on the market, Gardens	500,000.00
	A	**Total works**	**4,000,000.00**
B		**Amounts available to the contracting authority**	
	B1	Unforeseen events, amicable agreements and technical advisory board, allocations in connection with the amendments referred to in articles 60 and 120, paragraph 1, letter a)	375.000,00
	B2	Expenses for the handling of artworks and their storage in an external air-conditioned warehouse	200.000,00
	B3	Technical expenses related to PFTE design (first place prize included)	655.688,91
	B4	Technical expenses related to executive design for lot 1	162.069,26
	B5	Expenses for overall PFTE and executive design verification for lot 1	150.000,00
	B6	Expenses for technical-administrative testing during construction, static testing, energy certification certificate	70.000,00
	B7	Works management, operational management, safety for lot 1	294.905,35
	B8	Incentive pursuant to art. 43 of Legislative Decree 36/2023 and subsequent amendments	80.000,00
	B9	Expenses for notifications	60.000,00
	B10	Resources for surveys, essays, load tests and expert opinions during the design phase	140.000,00
	B11	Expenses for laboratory tests and technical inspections envisaged in the Special Tender Specifications	23.000,00
	B12	Expenses for tender commissions (design and works for lot 1)	80.000,00
	B13	Awards for those admitted to the short list final positions ranking 2-5	120.000,00
	B14	Technical expenses for tender (online platforms, advertising, etc.)	30.000,00
	B	**Total amounts available**	**2.440.663,52**
C		**Social security charges and taxes**	
	C1	VAT on works (excluding item A5)	350.000,00
	C2	VAT on work carried out in-house, special agreements and unforeseen events	37.500,00
	C4	Social security charges	61.306,54
	C5	VAT on A5, technical costs, social security charges and other items subject to VAT at a rate of 22%.	560.333,41
	C	**Total social security charges and taxes**	**1.009.139,95**
D			
	D	**TOTAL AMOUNT FOR LOT 1**	**7.449.803,47**

Table 9.3 – Economic framework of the first lot of works

10 Design implementation methods

10.1 Public Selection of the Professional

For the technical design services and for those relating to the supervision of works and coordination of safety, Fondazione Torino Musei intends to launch an open, public tender procedure, a design competition in two stages with comparison.

At the end of phase one, on the basis of CVs, qualifications and presentation of previous project experience similar to the GAM intervention, a technical committee will select a short list of professional firms or a group of professionals.

In phase two, those admitted will develop a simplified technical and economic feasibility project and a qualified technical committee will select the winner.

10.2 Design

The design must be developed on two levels: technical economic feasibility project (PFTE) and executive design.

10.3 Minimum composition of the design team

The design team must include at least the figures described below. In particular, the Contracting Authority, in consideration of the conservation order imposed on the building, intends to combine the role of the architect in charge of the restoration design with that of coordinator of the working team and of the person in charge of the integrated design.

Role	**Qualifications**
Professional responsible for the design, responsible for the integration of specialist services and coordinator of the work team	Five-year or specialist degree in Architecture. Registered in the appropriate professional register of architects, section A.
Professional responsible for structural design	Five-year or specialist degree in Engineering. Registered in the appropriate Professional Register of Engineers, section A, Civil and Environmental engineering sector. or Five-year or specialist degree in Architecture. Registered in the appropriate professional register of architects, section A.
Professional responsible for energy diagnosis	Technical diploma or degree, with professional qualification as an expert in energy management (EGE), and holder of certification according to UNI CEI 11339.

Role	Qualifications
Professional responsible for the application of the LEED sustainability protocol	Five-year or specialist degree in Architecture. Registered in the appropriate Professional Register of architects, section A. Holder of LEED AP BD+C certificate. or Five-year or specialist degree in Engineering. Registered in the appropriate Professional Register of Engineers, section A, Civil and Environmental engineering sector. Holder of LEED AP BD+C certificate.
Professional responsible for the BIM process (multidisciplinary BIM coordinator)	A diploma as a surveyor or a three-year, five-year or specialist degree in Architecture or Engineering or an equivalent degree, enrolled in the appropriate professional register, or a diploma as an industrial expert, enrolled in the appropriate register, within the scope of the specific skills. Holder of certification in compliance with UNI 11337-7 and UNI/PdR 78:2020.
Professional qualified as a geologist	Five-year or specialist degree in Geological Sciences. License to exercise the profession and registration in the Professional Register for at least five years.
Professional responsible for Safety Coordination during the Design Phase (CSP)	A three-year, five-year or specialist degree in Architecture/Engineering or equivalent, or a diploma as Surveyor or Industrial Technician, registration in the appropriate professional register where necessary. Licensed to act as Safety Coordinator in the design and execution phase in compliance with Title IV, Legislative Decree 81/2008 and subsequent amendments.
Professional responsible for the design of mechanical and plumbing systems	Five-year or specialist degree in Engineering. Registered in the appropriate Professional Register of Engineers, section A, Civil and Environmental engineering sector. or Five-year or specialist degree in Architecture. Registered in the appropriate professional register of architects, section A.
Professional responsible for the design of electrical and special systems	Five-year or specialist degree in Engineering. Registered in the appropriate Professional Register of Engineers, section A, Civil and Environmental engineering sector. or Five-year or specialist degree in Architecture. Registered in the appropriate professional register of architects, section A.
Professional responsible for the application of minimum environmental criteria	Diploma or degree in a technical field, holder of certification on energy and environmental aspects of buildings issued by a conformity assessment body in compliance with ISO/IEC 17024.
Professional responsible for fire safety	Diploma as a Surveyor or three-year, five-year or specialist degree in Architecture or Engineering or equivalent degree, registered in the appropriate professional register. License pursuant to Ministerial Decree 05/08/2011 no. 151 as a Fire Safety Professional and registered in the appropriate list of the Ministry of the Interior pursuant to article 16 of Legislative Decree no. 139 of 08/03/2006.
Professional responsible for the landscape design of urban green areas	Five-year degree or master's degree in Architecture/Landscape Architecture. Registered in the appropriate Professional Register of Architects, section A architecture or landscape architecture sectors..
Professional with expertise in museum layouts	Technical diploma or degree, expert in museum layouts and installations (lighting, security and protection of artworks) and in the application of ICT (Information and Communication Technology) and multimedia for museum activities.

Role	Qualifications
Professional with expertise in acoustics	Technical diploma or degree, qualified technician in acoustics pursuant to article 2, paragraph 6, of Law no. 447 of 26 October 1995, enrolled in the National List of persons qualified to exercise the profession of competent technician in acoustics (Legislative Decree no. 42/2017)
Young professional (mandatory for subjects participating in R.T.)	Degree in Architecture or Engineering, registration in the appropriate professional register for less than five years from the date of publication of the competition notice

Table 10.1- Minimum composition of the design team

10.4 Project verification and validation

The professional service relating to the verification of the project pursuant to article 42 of Legislative Decree 36/2023 is not included in the services covered by the tender and will be entrusted through a specific selection procedure among UNI CEI EN ISO/IEC 17020 accredited companies.

10.5 Professional services to be performed

The group of professionals that will oversee the performance of the work must include at least the figures described in the table below.

Role	Qualifications
Director of works	Five-year or specialist degree in Architecture. Registered in the appropriate professional register of architects, section A.
Professional responsible for fire safety works and relative certifications	Diploma as a Surveyor or three-year, five-year or specialist degree in Architecture or Engineering or equivalent degree, registered in the appropriate professional register. License pursuant to Ministerial Decree 05/08/2011 no. 151 as a Fire Safety Professional and registered in the appropriate list of the Ministry of the Interior pursuant to article 16 of Legislative Decree no. 139 of 08/03/2006.
Safety Coordinator in the Execution Phase (CSE)	A three-year, five-year or specialist degree in Architecture/Engineering or equivalent, or a diploma as Surveyor or Industrial Technician, registration in the appropriate professional register where necessary. Licensed to act as Safety Coordinator in the design and execution phase in compliance with Title IV, Legislative Decree 81/2008 and subsequent amendments.
Professional responsible for the BIM process (manager)	A diploma as a surveyor or a three-year, five-year or specialist degree in Architecture or Engineering or an equivalent degree, enrolled in the appropriate professional register, or a diploma as an industrial expert, enrolled in the appropriate register, within the scope of the specific skills. Holder of certification in compliance with UNI 11337-7 and UNI/PdR 78:2020.
Professional responsible for the application of the LEED sustainability protocol	Five-year or specialist degree in Architecture. Registered in the appropriate Professional Register of architects, section A. Holder of LEED AP BD+C certificate. *or*

Role	Qualifications
	Five-year or specialist degree in Engineering. Registered in the appropriate Professional Register of Engineers, section A, Civil and Environmental engineering sector. Holder of LEED AP BD+C certificate.
Professional responsible for the application of minimum environmental criteria	Diploma or degree in a technical field, holder of certification on energy and environmental aspects of buildings issued by a conformity assessment body in compliance with ISO/IEC 17024.

Table 10.2 - Minimum composition of the team of professionals for the execution of the works

However, due to the complexity of the works covered by the contract and to the variety of technical specialisations required, the Contracting Authority deems it appropriate to identify, right from the procedure to select the professionals, a number of operational managers, described in the table below.

Role	Qualifications
Operational director of structural works	Five-year or specialist degree in Engineering. Registered in the appropriate Professional Register of Engineers, section A, Civil and Environmental engineering sector. or Five-year or specialist degree in Architecture. Registered in the appropriate professional register of architects, section A.
Operational directors of electrical and special systems	Five-year or specialist degree in Engineering. Registered in the appropriate Professional Register of Engineers, section A, Civil and Environmental engineering sector. or Five-year or specialist degree in Architecture. Registered in the appropriate professional register of architects, section A.
Operational director of mechanical and plumbing systems	Five-year or specialist degree in Engineering. Registered in the appropriate Professional Register of Engineers, section A, Civil and Environmental engineering sector. or Five-year or specialist degree in Architecture. Registered in the appropriate professional register of architects, section A.

Table 10.3 - Operational directions for the execution of works

10.6 Commissioning

The professional services relating to static testing, technical functional plant testing and technical-administrative testing of the project pursuant to article 116 of Legislative Decree no. 36/2023 is not included in the services covered by the tender and will be entrusted through a specific selection procedure among qualified professionals.

10.7 Calculation of fees

For the calculation of the professional fees and related expenses and additional charges, the services and tariffs for public works as per Ministerial Decree 17/06/2016 have been

used. A 20% discount was applied to the amounts thus determined. A portion of the resources freed up through the discount applied to the PFTE design will be allocated to establishing the prize pool for the competition.. See Annex 6 for details of fees.

11 Annexes

Document name	File name
Lower basement floor plan	Annex 1a TAV01 Piano secondo interrato.pdf
Basement floor plan	Annex 1b TAV02 Piano primo interrato.pdf
Ground floor plan	Annex 1c TAV03 Piano terra.pdf
Ground floor plan – Outdoors	Annex 1d TAV04 Piano terra esterno.pdf
First floor plan	Annex 1e TAV05 Piano primo.pdf
Second floor plan	Annex 1f TAV06 Piano secondo.pdf
Certificate of periodical renewal of fire safety compliance of 09-08-2022	Annex 2 Rinnovo CPI 2022.pdf
Competition perimeter tables	Annex 3 Tavole perimetro concorso.pdf
Protection measure D.C.R. 104/2018	Annex 4 Provvedimento di tutela GAM 2018.pdf
Examination of 2011 fire prevention project	Annex 5 Esame del progetto 2011.pdf
Calculation of fees	Annex 6 Parcelle.pdf
BIM information specifications	Annex 7 Capitolato informativo BIM.pdf
Turin Superintendence design guidelines	Annex 8 Linee guida Soprintendenza 29102021.pdf
Photographic survey	Annex 9 Rilievo fotografico.zip
Video survey	Annex 10 Video GAM.avi

Table 11.1 - List of annexes to the Planning Guidance Document

12 Phase one time schedule

The following time schedule describes the main preliminary phases, from the design competition to the inal commissioning of the works in phase one. It is expected, therefore, that approximately two years will elapse from the publication of the design competition to the assignment of the works.

Year	Year 1												Year 2												Year 3												Year 4											
Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Design competition																																															
Design assignment – Direction of Works - Safety																																															
Preparation of the PFTE																																															
Project audit assignment																																															
Audit and validation																																															
Reports and authorisations on the PFTE																																															
Approval of the PFTE																																															
Preparation of the Executive Design – Lot 1																																															
Audit and validation																																															
Approval of the Executive Design – Lot 1																																															
Works assignment procedure Lot 1																																															
Adjudication of works Lot 1 – commencement of work site																																															
Execution of works Lot 1																																															
Completion of works and opening to the public – Lot 1																																															
Commissioning Lot 1																																															

Figure 12-1 - Time schedule from the design competition to the final commissioning of the works