Comune di Milano

MILANO IN CRESCITA PIZZIGONI

CONCORSO INTERNAZIONALE DI PROGETTAZIONE SCUOLE

Preliminary Design Document

CONTENTS

PREFACE

Buildings used, conceived and lived as relationship spaces at any time of the day: real civic centres. That is how we dream that schools can be in Milan. Open spaces for the area where the environments become educations and welcoming for the youngest citizens.

It is at school that both younger and older children spend most of their day time, like in a second home. That is why these buildings must be safe, practical and beautiful. Beauty is inherent to education.

Milan has a considerable amount of experience in school constructions, accrued in particular during the demographic boom years (1960s and 1970s): during this period, 230 structures were built, on the rationalist type-project pattern that, while within the limits of dedicated resources and limited realisation times that, knew how to effectively respond to the city's growth, often anticipating the 1975 national technical standards with a fair level of quality.

This historical patrimony is now obsolete for many reasons: a large part of the schools were built with prefabricated parts with a 30-year life, the structures often contain materials that have been found to be harmful to health over the years (asbestos and artificial glass fibres(and the overall maintenance of the buildings is becoming less and less sustainable. For these reasons, the city's administration has set up a gradual replacement programme for the oldest school buildings.

The goals of the projects can be summarised into three macro-topics: the practical quality of the spaces, the building’s technological performance and the redevelopment of the context.

The practical quality of the spaces can be traced to a new pedagogical approach aimed at making the school a living environment first and foremost, the educating community location, a learning environment that is open to changes in teaching models and able to encounter personal development processes, so that each student feels acknowledged, supported and valued for their uniqueness. Furnishing these new environments to aid relational conviviality and flexibility of use for these spaces are elements that can drive new teachings styles, consistently with the most indications, including those from MIUR (Italian Ministry of Education, University and Research). A renewed relationship with nature, that is earth, sky and light, is just as important for learning.

As part of the technological performance, we expect that the new building is state-of-the-art in its choice of materials (bio-architecture, circularity, sustainability), in the energy field (nearly zero

energy building), in structure safety (seismic resistance) and maintainability (building management system).

Lastly, the role of the school as a public building in an urban context deserves special attention: reconstructing a school building inevitably takes on the matrix characteristics for a broader redevelopment, both concerning the quality of the architecture and pertinent spaces, and for the renewed usability and openness with the local area, also for using the structures for extra-scholastic activities (sports hall, library, cultural appointments etc). In today's urban realities, alongside the architecture and its own function, the new school building acts as a stimulant for social renewal and favours inclusion and participation policies.

The project can also be the opportunity to identify a new school model that is repeatable in other urban contexts in Milan, which require similar substitution-redevelopment interventions.

There are several reasons to conclude that thinking about the new school deserves an international design competition, to pursue the highest quality in architecture and at the same time to make Milan an attraction point in Milan and overseas, that is able to gather contributions from architects all over the world.

Laura Galimberti

Councillor for Education and Learning at Milan City Council

1 MAIN GOALS OF THE COMPETITION

The goals that the City Administration intends to pursue with the design competition for the New Junior High School in Via Pizzigoni 9 are to return the junior high school "C.Colombo" to its original location, which has been hosted since 2014 in the Via De Rossi complex further to the result of surveys which confirmed the presence of asbestos in some of the construction materials, and above all to tangibly intervene on the area's social fabric through the work which, together with the adjacent local library, nursery school and primary school., will heavily redevelop the entire surrounding urban context. The **objective** of the competition is also a **cultural one**, as it is aimed at pursuing the best quality in school building design, in terms of pedagogical approach, technical-functional requisites and architectural expression, consistently with the city council's strategic goals for its current term of office.

The area of Via Pizzigoni no. 9 is one of the sites included in the urban context of the city of Milan for which the city council has decided to start up an international design competition procedure, to commence a renewal/substitution process of the building that was once a junior high school and is now decommissioned, and also a conservation/redevelopment process of the buildings which house the nursery school, the primary school and the local library. Designers are called upon to optimise the design, complying with the criteria that guide bodies and institutions which provide the various sources of funding, and that characterise the renewed concept of school spaces with a vision of quality and innovation. In particular, the offer of **innovative spaces** for education are required, suitable for the most recent indications issued by the Ministry for Education, University and Research; a **flexible and autonomous use** of the various functions inserted into the new school buildings; enhancement of suburban and non-suburban areas through the realisation of **extra-scholastic activity centres**, aimed at creating local social activity centres; an increase in **energy efficiency** aimed at creating NZEB (*Near Zero Energy Building*) buildings; BIM design, as a need for the gradual implementation of legislation but also as a strategy aimed at the future management/scheduled maintenance of the buildings.

The intervention must not be limited to designing a building with a precise architectural identity that can answer modern functional and educational needs, but must also and above all be a reference "**model**" for the future construction of new schools in the Milan area, in particular concerning the repeatability of typological-distribution, construction and performance solutions.

The competition is divided into two separate areas, aimed at housing on one side the new school complex, and on the other the redevelopment of the surrounding buildings. Certainly,the creation of a new junior high school, with annexed facilities (auditorium, sports hall, library etc) that can also be used by residents in non-school hours, intended as a place for the promotion of culture in

the broadest sense of the world, for aggregation, cohesion and social inclusion, could be a strategically important action for the purpose of the broader redevelopment of the area.

The designer is therefore asked to **rethink the area of Via Pizzigoni 9** , providing for the complete demolition and reconstruction of the junior high school building, designing it as a part of a **combined school hub** that includes the three levels of schooling (nursery school, primary school and junior high school) and that together with the local library and the new planned facilities, will take on a central cultural role in the urban context, offering new potential for the urban and social development of the area.

The **goal** is **to transform the area into an identity-creating and aggregating location open to the local inhabitants,** with the aim of expanding opportunities and occasions for the use of public spaces and therefore increasing the level of safety. These are the reasons why it is necessary to equip the new school with suitable indoor and outdoor spaces for social relations, such as an auditorium, sports hall, library, training and information spaces, play and sports areas. Spaces that, thanks to their use by activities not exclusively scholastic, will favour access to culture and sports for the whole community, encouraged to explore, use and frequent the new spaces provided for the area by the city council at various times of the day.

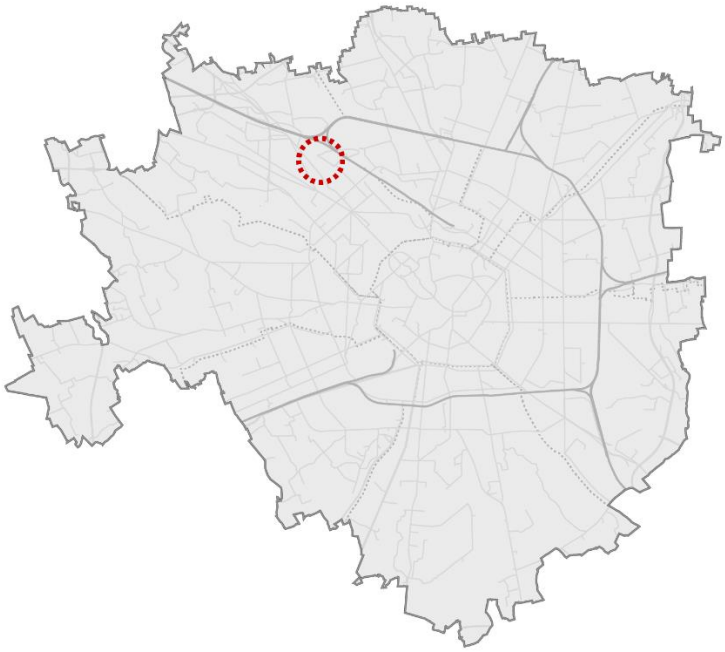
From this viewpoint, the new junior high school is an opportunity to reflect on project solutions that involve the nearest context, including the surrounding public open spaces, and also the primary school and nursery school that may each reciprocally use their relative facilities. In this sense, the design of the **connecting spaces** between the various educational areas take on **an important role**, as well as the outdoor spaces adjacent to the school building used for outdoor activities.

2 SITUATION

2.1 THE URBAN CONTEXT[1]

The project area stands in the North West area of the city of Milan, alongside Via Giuseppina Pizzigoni no. 9, at the crossroads with Via Rosina Ferrario Grugnola, in the Villapizzone area of the city which is a part of Municipal Area 8.

The area is mainly developed along Via Console Marcello and is bordered to the North and East by the railway, to the West by Viale Carlo Espinasse and to the South by Via Cesare Ajraghi. Together with the outlying areas of Garegnano, Cagnola, Portello, Villapizzone forms the NIL (Local Identity Centre) number 71 as identified in the current Territorial Zoning Plan (PGT).



From a demographic point of view, the resident population is currently distinguished by a heavy multi-ethnical component, mainly foreigners of Chinese, Philippine and Egyptian origin, which is reflected in the area's social and cultural variety.

[1] For further information, please consult Annex 5.3 "Further information on historical-urban aspects"

2.2 CURRENT PROJECT DEVELOPMENT CAPABILITIES IN THE CONTEXT

PGT

The area of intervention is a part of a **mainly residential fabric** and stands opposite the ERP area that stands between Via Console Marcello and Via Pizzigoni and with the ERP area Quartiere Mangiagalli. The nearby context of Villapizzone, that expands to the west of the project area, is and will be the location of building and open space regeneration interventions.

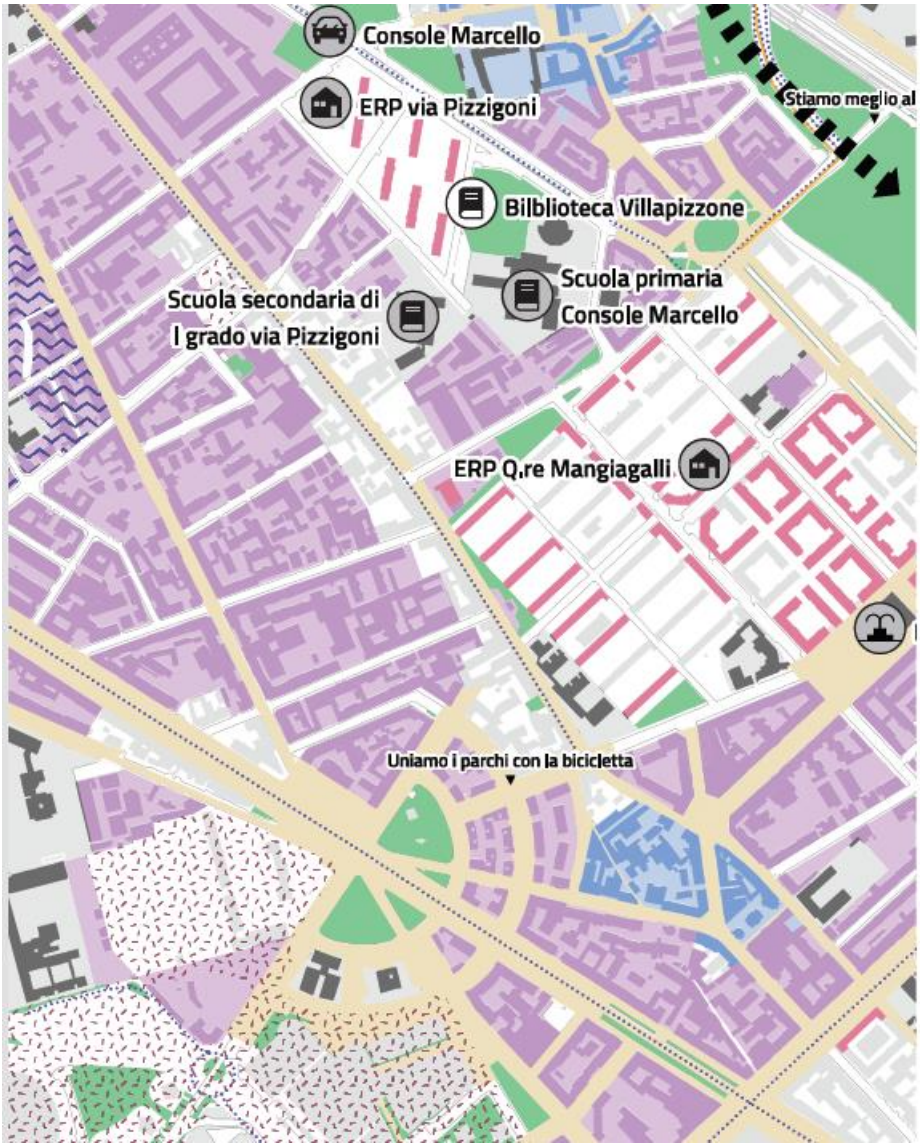


Fig.1. Extract of the "Atlas" of the planned interventions around the competition area, as governed by the Territorial Zoning Plan for Milan 2030.

The realm of intervention is part of a densely inhabited urban fabric in which it is necessary to increase the safety of the weak catchment area and improve the use of urban functions and services (residential, commercial, recreational, etc) preferring them to the circulation of vehicles.

PUMS

The sustainable Urban Mobility Plan approved by City Council Resolution no. 38 of 12.11.2018 has set itself the objective of creating safety, liveability and quality of public spaces, at the same time guaranteeing efficiency conditions on the mobility system. Making movement (using any means of transport) safe is therefore the common thread connecting the plan's specific actions.

Fig.2.

Sustainable Urban Mobility Plan: Extract from Diagram 6 – Cycling Mobility (source: PUMS Milan – 2018)

3 IDENTIFICATION OF COMPETITION CONTEXT

The area of intervention occupies an exclusive surface area of pertinence of Milan City Council of approximately 9,085 m², with vehicle and pedestrian access all located on Via Pizzigoni. It is a part of a broader urban context, situated between Via Varesina to the South West and Via Console Marcello to the North East, dedicated to the local school and cultural services.

Fig.3. Air view of the urban area inside which the area included in the competition falls

In the area, distinguished by the presence of public green areas, in addition to the junior high school in Via Pizzigoni, the subject of this competition, there are also a primary school, a nursery school in Via Console Marcello, and a small local library along Via Rosina Ferrario Grugnola; buildings all designed by the architect Arrigo Arrighetti, who worked for Milan City Council from 1940 to 1979, holding important positions such as Director of Building Projects Department and Director of the City Planning Department. Arrighetti was the author of several public works created throughout the city from the 1950s to the 1970s (schools, residential buildings, sports buildings, libraries, social services, municipal offices, municipal swimming pools, subway stations etc).

The planned interventions consist of:

- **reclamation** and disposal of items containing asbestos and A.G.F. (Artificial Glass Fibres) in the existing school building in Via Pizzigoni, 9;

- **demolition** of the existing school building in Via Pizzigoni, 9;
- **construction** of new buildings that will house the junior high school.

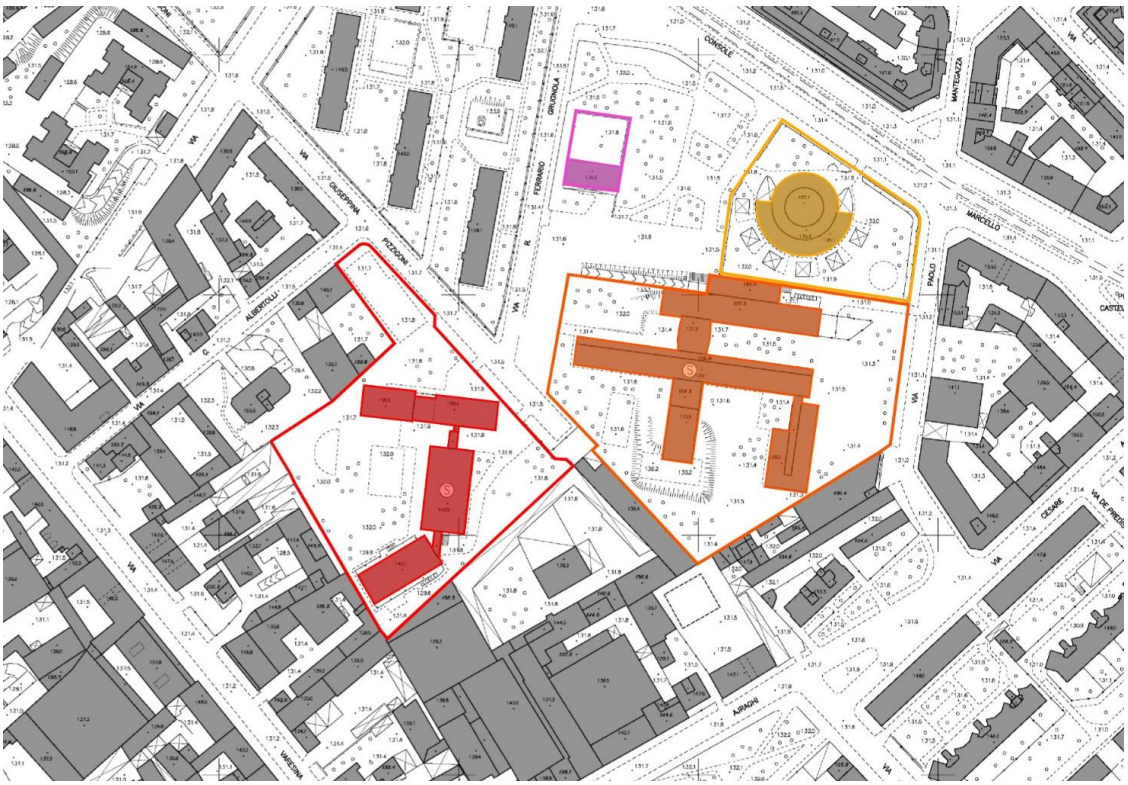


Fig.4. Aerial photograph plan of the area involved in the competition, showing the local library (purple colour) and the nursery schools (yellow colour), primary school (orange colour) and junior high school (red colour), with respective outdoor areas of pertinence.

3.1 CURRENT STATUS[2]

The nursery school, located on the corner of Via Console Marcello and Via Paolo Mantegazza, is a single-storey building from 1959, with a circular footprint, surrounded by a fenced-in allocated garden.

The primary school, the original centre of which was later extended, dates back to 1956, and is located to the south, further back than the nursery school and is set on a footprint together with buildings oriented in a north-south direction used as classrooms and a central, orthogonal body, which is the main body of the school, also housing the entrance and the sports hall at the opposite ends.

[2] For further information, please consult Annex 5.3 "Further information on historical-urban aspects"

The library alongside Via Rosina Ferrario Grugnola, built in 1958, comprises a small rectangular pavilion bordered by large windows and a winding brick wall that extends into the outdoor space, partly bordering the outdoor spaces next to the entrance and the allocated garden.

Fig.5. Historical photo of the nursery school in Via Console Marcello (source: Bodino C. by Arrigo Arrighetti architect, Milan 1990)

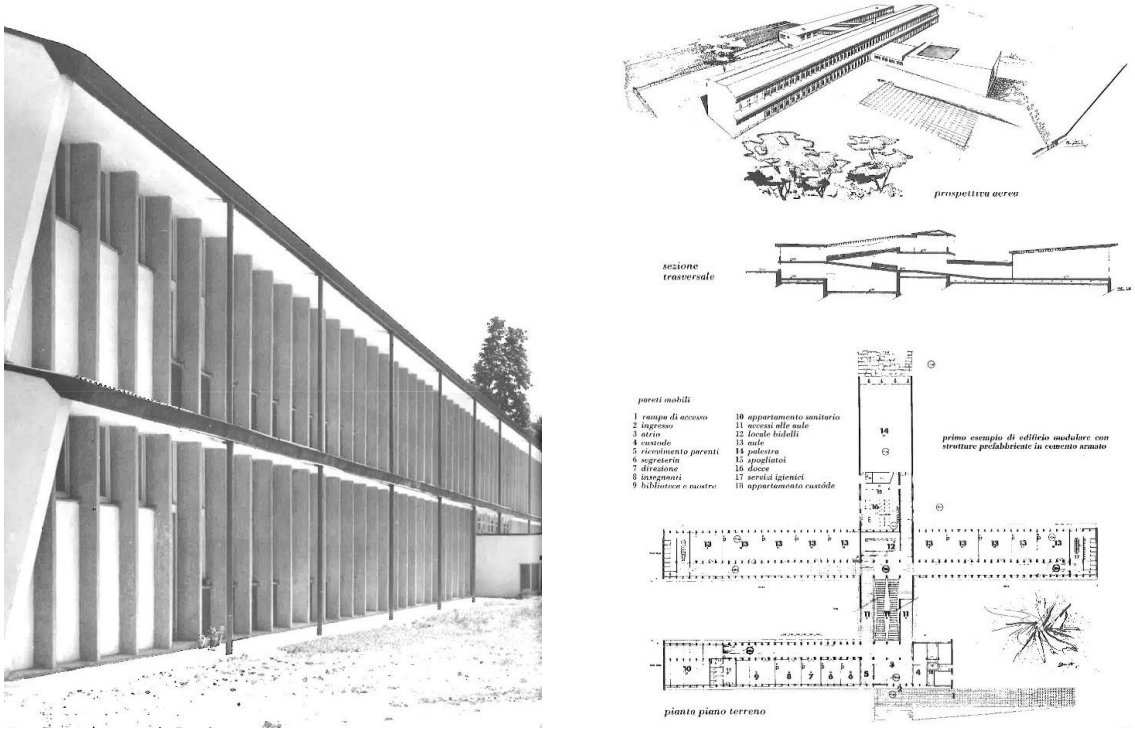


Fig.6. Historical photo of the south façade of the primary school classrooms and drawings of an initial version of the project (source: Bodino C. by Arrigo Arrighetti architect, Milan 1990)

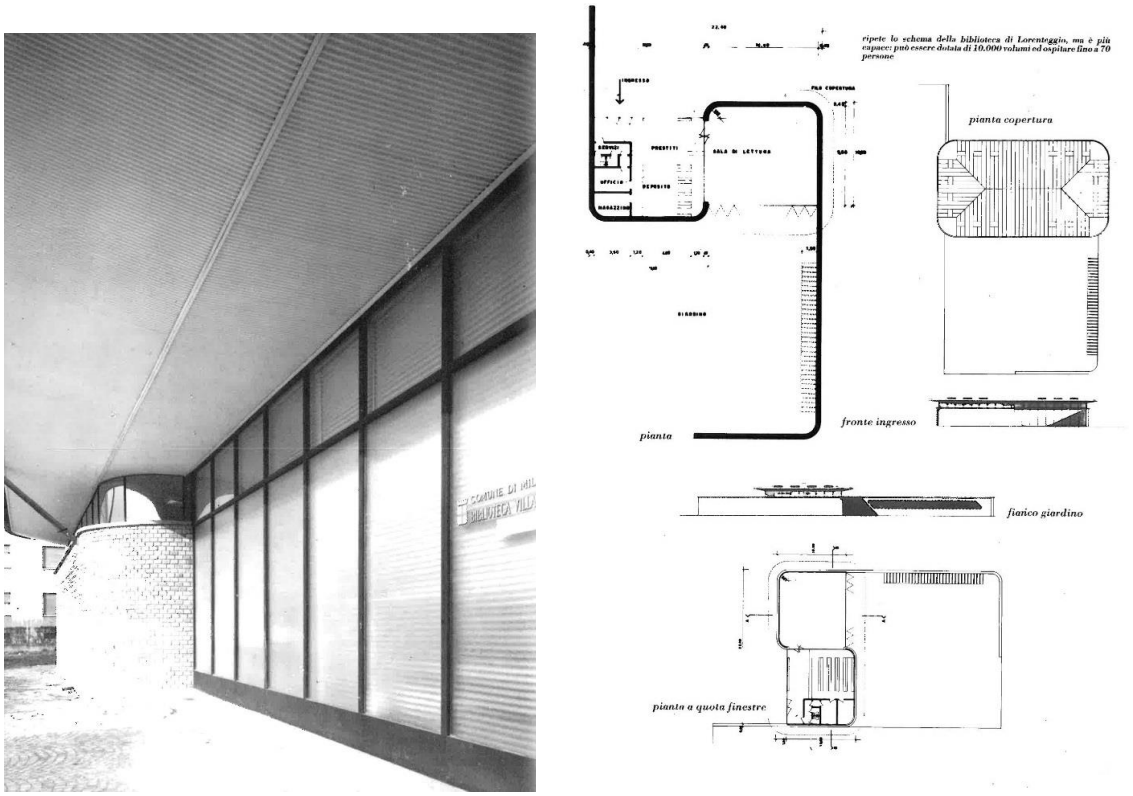
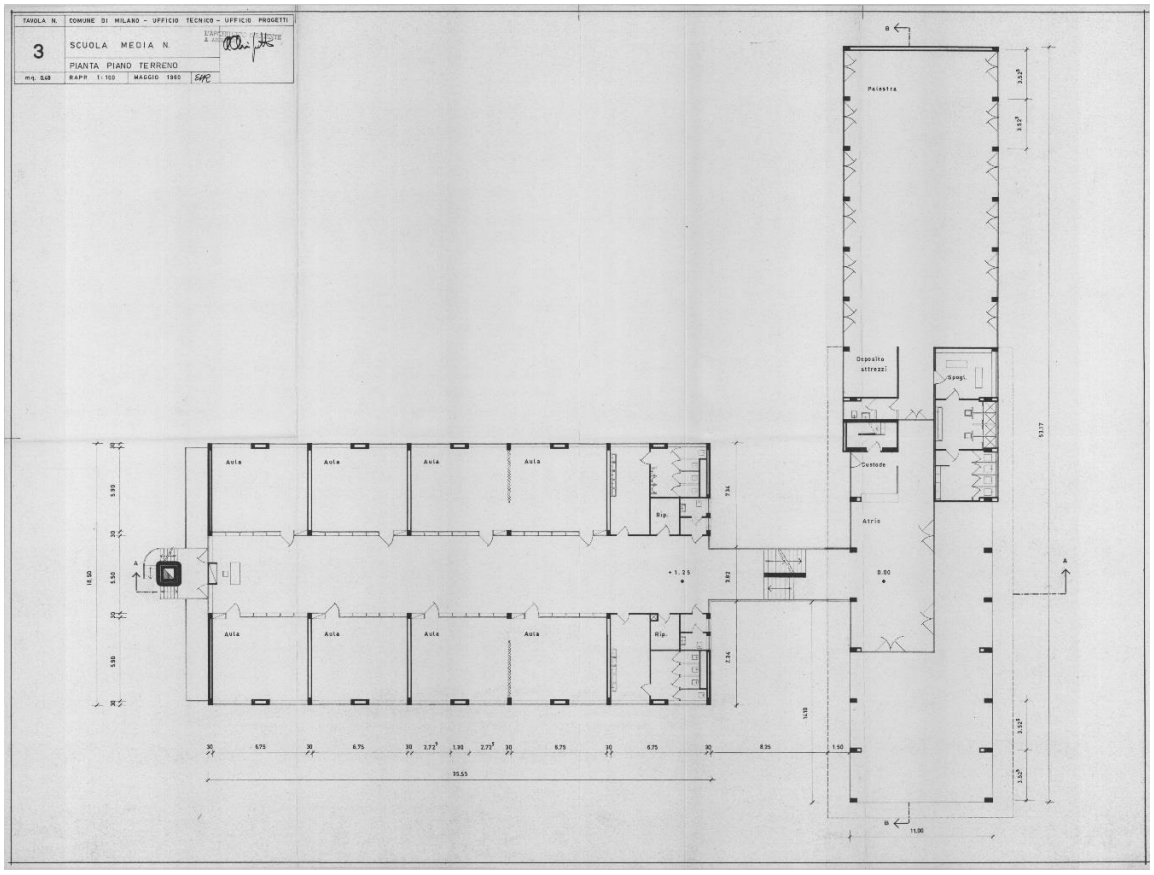


Fig.7. Historical photo of the library entrance and project drawings (source: Bodino C. by Arrigo Arrighetti architect, Milan 1990)

The junior high school, that stands on the plot of land that is the subject of this call for participation and which will be completely demolished, was built using the "f.e.a.l." prefabricated system in 1962, based on Arrighetti's "model" project, and was later extended in 1971, becoming a part of the complex transformation process that was ongoing in that period in Milan, in order to address the detected urgency to provide outlying city areas with schools and communal services that were heavily lacking, given the growing demographics in the area.

The structure of the existing building, essential comprising three separate buildings that are connected by linking corridors, is industrialised in nature, built using a "f.e.a.l." prefabricated system on a reinforced concrete foundations and vertical structures with a metal framework. The construction solution was used to build several schools in the city of Milan, which all had a limited life period of approximately 30/40 years, which should have been progressively replaced over the years with more suitable structures.

The building is now abandoned, after the school closed in 2014, except for the building constructed during the school's extension. 8 classes of the primary school in Via Console Marcello are temporarily using this building.



Figs. 8-9 General map and layout of the ground floor of the Arrighetti project for the junior high school (City of Milan Archive)

At the origin of this emergency provision was in particular the verification of the existence, proven by special tests carried out on several occasions, of hazardous building materials, including asbestos and Artificial Glass Fibres. The presence of this material, found in the floors of the school classrooms, together with the presence of underground fuel tanks and the aged prefabricated parts and general deterioration of the property, made worse by recent episodes of illegal occupation, has made it anti-economical to proceed with reclamation and consequent redevelopment of the existing structure.

The existing buildings, which will be cleared and then demolished, also have two underground fuel tanks to power the central heating system. The tanks - the position of which is shown on the maps in Annex 3.6 “tank survey” - must be cleared and removed before the new construction work commences.

Therefore, the City Council, given the current situation of the building, and also considering the general goal to be pursued, that is of providing the city with suitable, safe and comfortable school structures, has considered it necessary to plan a clearance and demolition intervention on the existing school buildings, with a subsequent new building of a new, innovative school structure,

that combines the technical-architectural design with an educational-social project, paying special attention to environmental sustainability and technological construction and system innovation.

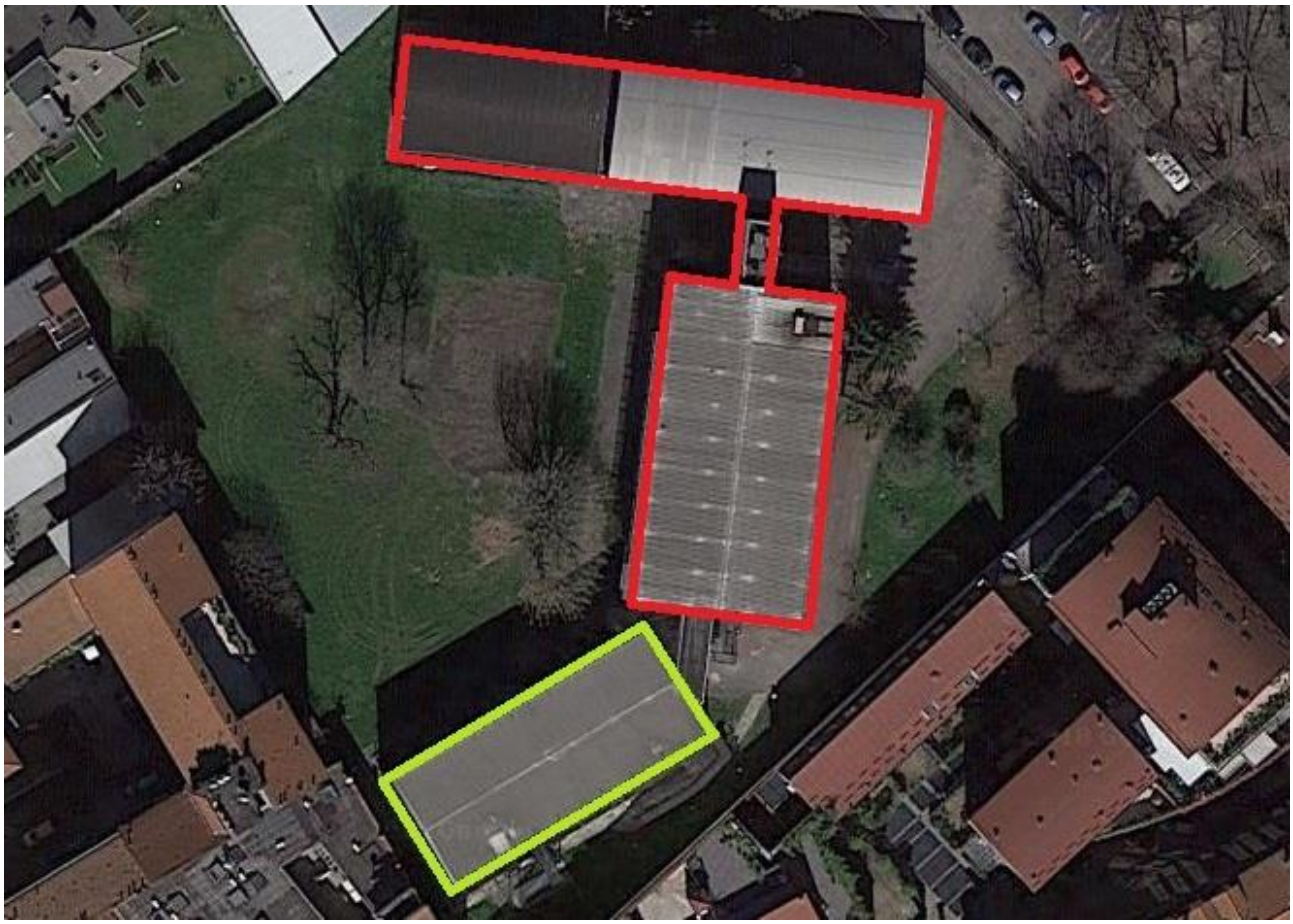


Fig.10. View of the current building in the lot: in red the abandoned buildings, in green the currently used ones

Fig.11. Photographs that show the current state of deterioration of the building referred to in this report.

3.2 ACCESSIBILITY

With regard to accessibility, the area of Villapizzone is served by a station of the same name, located at the point where the Milan-Turin line and the railway loop join up. The station is served by suburban trains (lines S5, S6 and S11) and by regional trains managed by Trenord. Just a short

distance away, there is also Bovisa station and Certosa station, which is in the Musocco area. With reference to urban road connections, the plot that will house the new junior high school is adequately served by the local ATM public transport system.

In a range of about 250 metres from Via Pizzigoni there are ATM tram and bus stops of the overground services:

- Tram 12 Roserio - Viale Molise (Urban Line): Via Console Marcello
- Tram 19 Piazza Castelli - Lambrate FS M2 (Urban Line): Via Console Marcello
- Bus 57 - N57 Cairoli - Q.to Oggiaro (Suburban Line): Via Varesina

In a range of about 500 metres from Via Pizzigoni there are ATM tram and bus stops of the services:

- Tram 1 Greco – Roserio (Urban Line): Via Espinasse
- Tram 14 Cimitero Maggiore - Lorenteggio (Urban Line): Viale Certosa
- Bus 69 Molino Dorino M1 - Gallaratese - Piazza Firenze (Suburban Line): Viale Certosa

Vehicle access to the project area is currently guaranteed by Via Giuseppina Pizzigoni and Via R. Ferrario Grugnola, at the intersection of which there is a ground level public car park for about 50 cars.

In the area, there is also a cycling path along Via Varesina while Via Console Marcello is identified in the network of priority cycling routes in the PUMS (Urban Sustainable Mobility Plan) as it connects the northern suburban areas with tracks outside Milan to aid work commutes and free time travel.

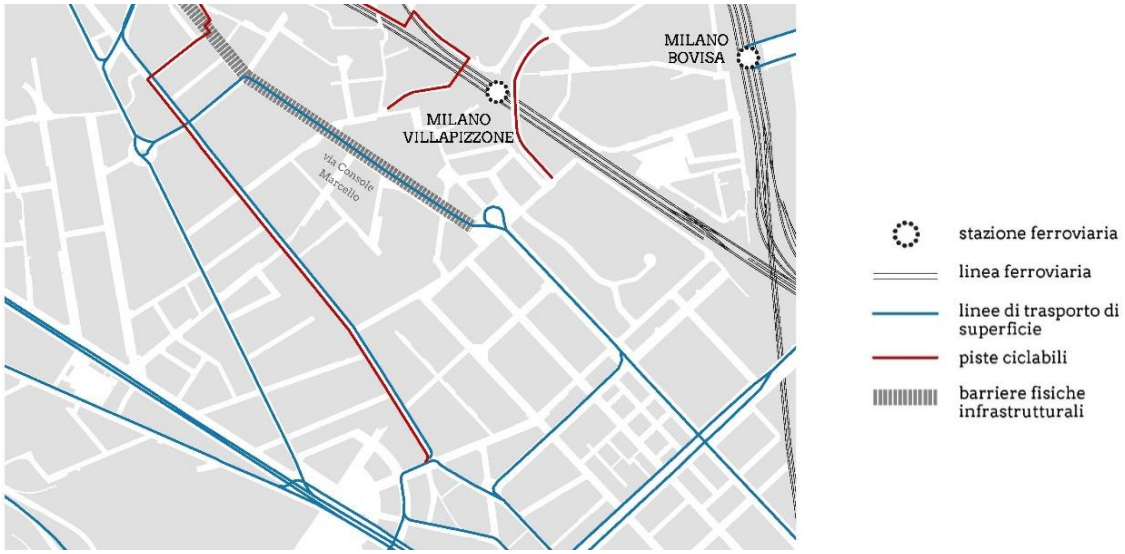


Fig.12. Diagram of area accessibility

3.3 DELIMITATIONS OF THE AREAS OF INTERVENTION

The area that is the subject of the competition is set out in the technical document 3.2 "Diagram with delimitation of competition area" and is separated into two subareas of intervention:

- *Delimitation 1*: **Red colour**

The areas for which the competitors are called upon to produce a **technical-economic feasibility project** are shown in red. This is the area allocated to hosting the project for the new junior high school, the directly connected outdoor spaces and the outdoor spaces in relation to the new school environment.

The following must be included inside this perimeter:

- **Area 1A** : the footprint of the new building and connected outdoor areas, including furnishing and lighting (painted in). The connection area between the areas annexed to the new-build junior high school and the already-existing schools (particularly the primary school);
- **Area 2A**: the part dedicated to car parking that requires attention to remove any interferences between the various itineraries (cycling path, pedestrian paths, roads) and where new trees will be planted;
- **Area 2B_2C**: The outdoor surface area outside the area directly pertinent to the school, considered to be the public space at the school entrance temporarily dedicated to pedestrian entrance (during the day, during school opening hours) guaranteed with the availability of speed bumps;
- **Area 3A**: the dedicated surface area to roads to be rethought and redesigned for the new project.

The depth of project study must be suitable for the project idea that the competitor intends to submit. The project must set out in detail the outdoor area that are functionally connected to the new building and the larger ones that are strategically connected to both the new school building and to the surrounding equipped park area, keeping in mind the delimitation boundaries.

- *Delimitation 2*: **Green colour**

As part of this area, according to the "**guidelines**" the project must be developed for the areas adjacent to the primary school and nursery school, and the local library, with relative lighting and urban furnishing. This is with the purpose of defining an overall picture of synergical and integrated intervention of the entire schools complex, together with the project layout of the Delimitation 1 area.

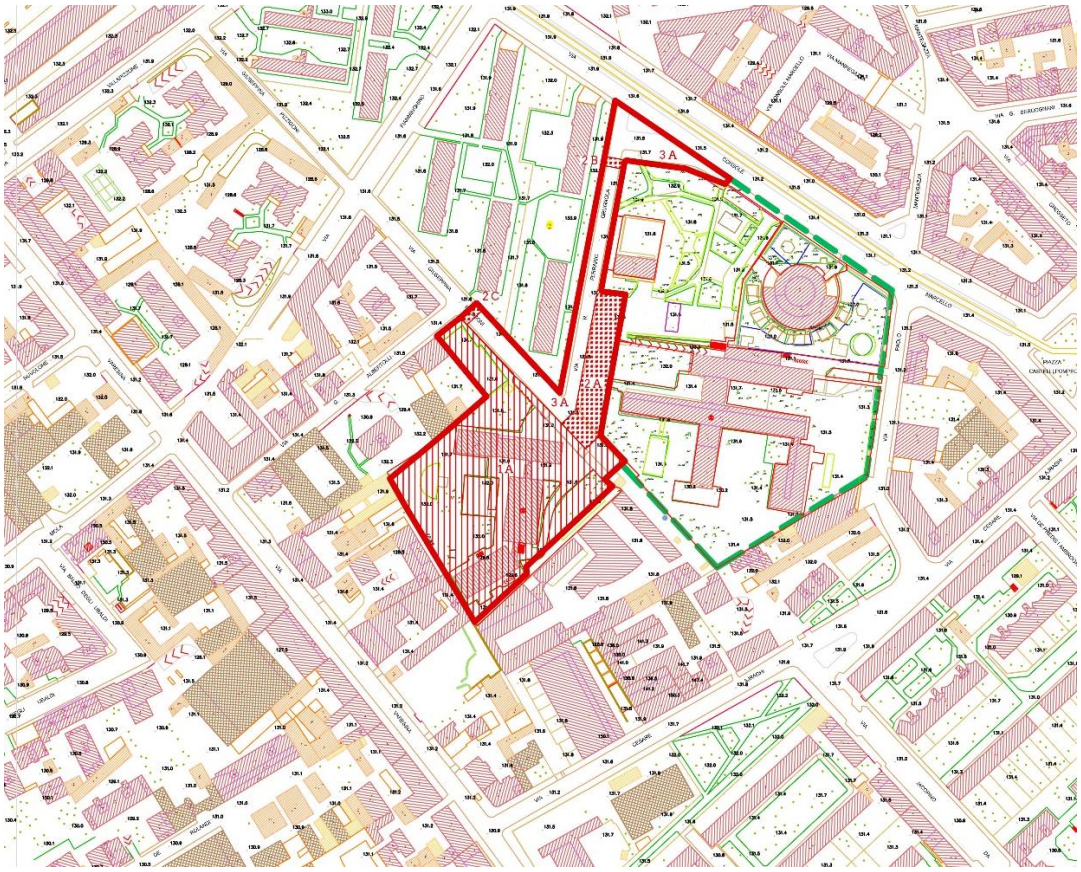


Fig.13. Aerial view of the subject of the competition, where Perimeter 1 (in red) and Perimeter 2 (green) are shown)

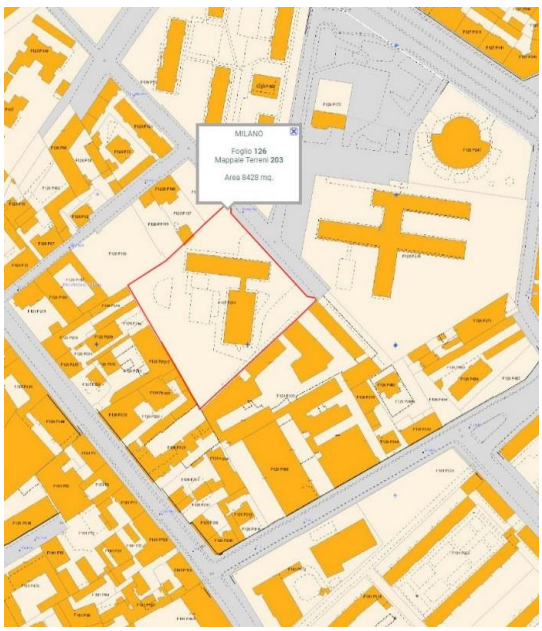
3.3.1 Perimeter 1

The area involved in the call for participation inside the *Red delimitation area* has an overall surface area of **13,764 m²**.

The area includes:

- Area **1A** (= area directly connected to the school) borders on the north west, south west and south east sides with mainly residential building plots; the only parts facing the streets are the ones along Via Pizzigoni, to the north east, where the pedestrian and vehicle entrances stand. The area to the east meets the green delimitation (guidelines) and it is at this point that it can connect with the already-existing school hub (primary school and nursery school);
- areas **2A, 2B, 2C**, allocated respectively to a tree-lined car park and to part of an equipped road with the placement of speed bumps (to modify road traffic during school opening hours) ;
- - area **3A** allocated to road footprint;

Fig.14. Air view of the junior high school area that is the subject of the project with delimitations



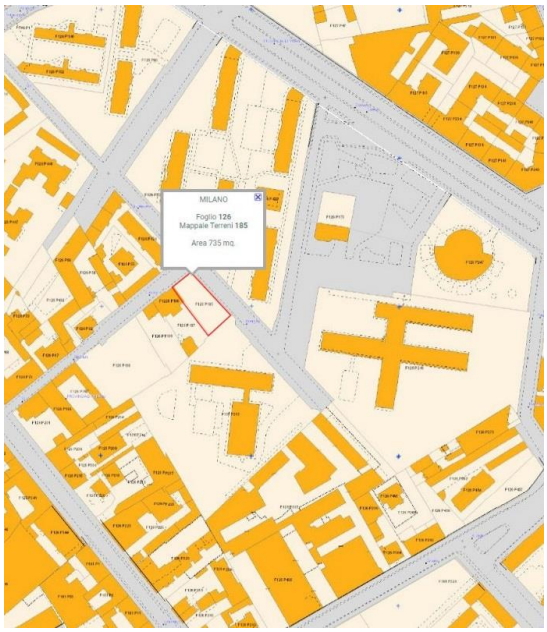


Fig.15. Cadastral map of the project area as set out in Sheet 126, Land Maps 203 and 185

3.3.2 Perimeter 2

The area that is the subject of the call for participation in the *green delimitation* is the area for which the definition of guidelines for the design is required and has a surface area of approximately **24,122 m².** The delimitation includes: the nursery school, the primary school and the local library, with respective outdoor areas of pertinence.

3.4 PROJECT INPUTS AND RESTRICTIONS

3.4.1 THE NEW SCHOOL HUB

From a pedagogical point of view, the changes made in the changeover from industrial society to society of knowledge also have an effect on the school educational system, that now requires methods, scenarios of use, instruments and diversified spaces.

The increasingly ever-present technology in communication processes in social and educational contexts requires new attention in defining spaces, equipment and the possibilities of transformation and adaptation of school environments for educational programmes and the possible changes in educational needs. In this scenario, project attitudes and solutions are to be sought that provide suitable degrees of flexibility of school spaces, accompanied by the search for structural and constructive modularity that allows a reconfiguration of the spaces based on the activities to be carried out and the need to respond to changes in organisational and distribution needs over time, with regard to educational programmes. All this without renouncing a comfortable connotation of the spaces, where students can "be happy at school", develop cooperative attitudes and ties that help the active involvement and participation of each person in a collective group.

The project solutions must take into consideration the most recent national and international research on the learning methods and potential in school spaces. One of these is the research path of the *Istituto Nazionale di Documentazione, Innovazione e Ricerca Educativa* (INDIRE) that led to the proposal of the model **1+4 spazi educativi per il nuovo millennio,** where "**1**" is the group space, the multifunctional learning environment of the group-class, the evolution of the traditional classroom that opens onto the school and the world. An environment with flexible spaces connected with other school environments. And where "**4**" are the complementary school spaces, no longer subordinate, for the daily teaching environments: the gathering place, the informal space, the individual area and the area for exploration[3].

[3] For more information, please see the research project "school architecture" and the attached volume 8.3 "Educational spaces and school architecture: international ideas and guidelines" (http://www.indire.it/progetto/architetture-scolastiche/).

Fig.16. Manifesto "1+4 spazi educativi per il nuovo millennio" (Istituto Nazionale di Documentazione, Innovazione e Ricerca Educativa - INDIRE)

To sum up, the project solutions must take into consideration the guidelines expressed by the **Guidelines for school building as set out in the Interministerial Decree of 11 April 2013** and respond satisfactorily to the following **purposes and objectives** already expressed by the Ministry for Education, University and Research in the Call for Participation entitled "**Bronchoscopy di idee per la realizzazione di #scuoleinnovative**" in 2016:

- realisation of innovative educational environments;
- Environmental, energy and economic sustainability, i.e. speed of construction, recyclability of basic materials and parts, high energy performance, use of renewable fuels, ease of maintenance;
- Presence of usable green spaces;
- relationship with natural environment, landscape and reference context also in an educational sense;
- Opening of the school to the local area, as the school must become a place of reference for the community;
- Permeability and flexibility of spaces;
- Attractiveness of spaces to combat school dispersion;
- concept of the building as an educational tool aimed at developing technical and sensory skills;
- presence of spaces for the professional collaboration and individual work by teachers;

- Concept and creation of spaces for individual well-being and social connection.

The project must follow the basic project lines for:

- reclamation and disposal of items containing asbestos and A.G.F. (Artificial Glass Fibres) in the existing school building in Via Pizzigoni, 9;
- **demolition** of the existing school building in Via Pizzigoni, 9;
- The construction of new buildings, functionally corresponding to the school regulations and to the new "good school" requisites, that are high-performing with the adoption of advanced technologies that, in addition to fully corresponding to current anti seismic, acoustic, energy reduction laws, also follow the occurring developments and trends in various areas.

The city council has carried out a report on the school buildings involved in the area of intervention, regarding the monitoring of items containing asbestos pursuant to current safety laws, and the following situation has been identified:

Name of building	**Census report**	**Presence of asbestos**	**Presence of hazardous Artificial Glass Fibres**
Junior high school Via Pizzigoni, 9	no.1105. of 21.05.2018	Excavation waste in the loose stone foundation adjacent to the C.T. – floor slabs	Insulation in C.T. And adjacent rooms - mobile walls - false ceilings
Junior high school Via Pizzigoni, 9	of 03.09.2012 and subsequent monitoring site inspections	Vinyl flooring - tile glue - floor slabs	-

Once the existing buildings have been cleared, they will be completely demolished.

The design must also take into consideration the connection between the future junior high school and the surrounding public spaces/buildings, reinforcing the sense of unity of the site, also through proposing settlement and morphological solutions that enhance the architectural quality of the pre-existing buildings.

The area where the new school complex will be built must be totally enclosed with a perimeter fence equipped with anti-syringe barriers. The pedestrian and vehicular routes must be paved, while the rest of the area must be made into green areas with parts dedicated to play and outdoor physical exercise.

3.4.2 MOBILITY AND GREEN AREAS

The designers must produce a Technical-Economic Feasibility project for the area reserved for the school and the areas immediately surrounding it.

The latter (Via Pizzigoni) require a **safe mobility development** project that helps project solutions that limit the risks connected with the possible intersection of different types of journeys, such as pedestrian, cycling, vehicle, as much as possible.

Pedestrian mobility must be favoured compared to vehicle circulation, in the sections of road on Via Pizzigoni from the intersection with Via Albertolli and Via Grugnola up to the intersection with Via Console Marcello, including the area currently used as a car park in Via Grugnola. The existing vehicle entrance on Via Pizzigoni must be maintained. At the ends of the roads, there must be some traffic regulation interventions, with some traffic bollards (e.g. Pilomat(that can establish a no through road and temporary parking restriction area on the access roads to the school during school activities (car free road). There should be some disabled parking on the car free road.

On **Via Grugnola**, in the section between the current final part of the car park and Via Console Marcello, considering that the latter plays a role of one of the main accesses to the complex that includes the nursery school, primary school and library, we require a forecast for a **redevelopment for area 30** (improvement of pedestrian facility, moderation of vehicle speed), bearing in mind the "kids-friendly" types of mobility such as bicycles and tricycles.

It is necessary to provide for the total redevelopment of the roads and pedestrian paths (extraordinary maintenance of paving) and, if required, extending the public lighting system along the pedestrian paths.

There are precious **trees** inside the competition area that must be conserved, trees that can be moved using a transplant procedure and others that can be be compensated for, therefore can be cut down.

Generally, speaking, the existing trees must be maintained as far as possible, and new ones can also be planted.

Trees should also be used in the grey areas of the car park placed at the intersection between Via Pizzigoni and Via Grugnola, so as to improve the continuity and perception of green areas among the project areas and the area that is the subject of the guidelines.

Existing trees must be maintained, as far as is possible, and new ones can be planted, with a view to the **general improvement of the quality and consistency of green areas.** If some trees and plants are removed, approximate agronomic indications are requested about any transplant or removal, which anticipates any agronomic report required subsequently by the REGULATIONS FOR THE USE AND PROTECTION OF PUBLIC AND PRIVATE GREEN AREAS. If removed, the project must provide for suitable compensation with suitable replacement species of plants. Any trees that must be safeguarded and which cannot be transplanted or cut down are shown in the diagrams and maps attached. General guidelines are available as part of the documentation provided, for the design of the furnished green areas and the correct evaluation of the future routine maintenance. The guidelines have been drawn up by the Parks, Agriculture and Urban Furnishing Department (see Annex)

3.4.3 THE SPACES AROUND THE SCHOOL

The competitors are asked to reflect on the following topics:

- Giving priority to aspects linked to the usability and facility of travelling through the open spaces, to safety;
- Taking care of and protecting the existing trees according to the indications provided in the technical document *3.3-Current Status Diagram*;
- using specific trees and bushes that are characteristic of the Milan urban landscape, easy to maintain and suited to public spaces, as integrations of existing trees. We would like to remind you that management costs of public green areas in Milan including the cleaning of areas is 2.00 Euro/m²/year;
- The existing services must have connections that can ensure maximum usability and continuity with the future school, also via cycling/pedestrian paths;
- The green area will have public lighting, mainly positioned along the paths and paved pedestrian areas, to integrate and rationalise the existing lighting;
- Completing, partly replacing and extraordinarily maintaining paving, borders and plants with the aim of recovering and enhancing the existing green sections. Any hypotheses for changing large areas of paving must also be evaluated by the competitors from an economic point of view;
- Urban furnishing (seats, benches, waste baskets, speed bumps, parapets etc) must of the same type already used in Milan's parks and public gardens;
- Using long-lasting and easy to maintain materials, in continuity with existing materials and also materials planned for the new school area, in order to guarantee adequate continuity

when transitioning between the two areas. Also thinking of types of flooring material that can easily be restored after part demolition and restoration works due to repairs on subservices;

- the existing children's play area could be transferred to a different position than its original one, in order to plan a larger and more suitable space.

4 PROJECT FUNCTIONS AND REQUISITES

The building complex that will house the future junior high school and its facilities must have suitable architectural attention and a number of general requisites that will be especially important for the efficacy of the project itself The main factors to consider in the design of the new building are **energy limitation, safety, acoustic well-being, interactivity and social aggregation**, intended as use of the structures in out-of-school hours.

Once the clearance and demolition of the existing building have been carried out, the new building must be designed in full observance of the NTC 2018 in seismic area 3 and, above all, must be classified in NZEB class with regards to energy limitation. With the Design Competition, the city council intends to search for the **most modern and high-performing project solution** in relation to the ones that are the current technologies available on the market, especially regarding energy limitation.

The architecture of the new building must look to the future both in terms of design and in terms of the use of cutting-edge materials and technologies, at the same time connecting with the existing context, in particular with regard to the presence of the nursery school and primary school close by.

The work must comprise a high level of **functional flexibility, potential transformability and plant implementability**. Functional flexibility means a design that allows both the definition of spaces the use of which can be organised for various activities (e.g. offices, meeting rooms, classrooms, laboratories, etc) and excellent transformability over time when faced with newly-occurring necessities.

Proposals that foresee innovative distribution solutions will be rewarded, ones that, by the easily reversible and non-permanent separation of groups of classrooms into independent centres, allow the future division of the complex into two schools of different levels, if necessary, each of which has its own entrance and internal distribution, possibly equipped with communal collective spaces.

The choice of technologies and building and finishing materials must be made by the above-stated concepts, taking care to guarantee suitable living comfort and high energy and environmental characteristics.

Aside from the functions that will take place in the building, the designer's common thread must be “the school in relations” as the educational trend that the 2013 School Building Guidelines assumed as its functional objective to direct new construction.

For this purpose, as far as possible, **ample space must be given to the horizontal connections**, where the corridors can be used as both aggregations places and as places for various types of temporary educational activities.

The building will have the requisites provided for in current legislation on town-planning, construction, plant and equipment safety, fire prevention (on this matter, the evolution towards performance legislation rather than prescriptive legislation, also for school buildings, is highlighted), lightning and bad weather prevention, heat and acoustic insulation performance, and legislation on the elimination of architectural barriers.

4.1 MORPHOLOGY OF BUILDING COMPLEX

The building complex of the junior high school can have a maximum size of 3,028 m², amounting to 1/3 of the overall surface area of the relative lot (9,085 m²); all outside the future building and its strict area of pertinence will come under the guidelines project.

With regard to the morphological aspect, the school building can be separated into several buildings, considering the fact that allocations of use such as sports hall and library, which can also be used by the local community in out-of-school hours, it is preferable to dedicate spaces and relative separate entrances from the ones strictly connected to school activities.

The building cannot have more than three stories above ground; an underground level is permitted, if necessary, to be allocated exclusively to storerooms and technical areas.

From the composition and architectural point of view, the **building** must have its own identity and recognisability, that make it a **reference point for the local area**.

4.2 RECOGNISABILITY, IDENTITY AND RELATIONS WITH THE CONTEXT

The designer's intention must be to manage to provide the new junior high school with a strong architectural identity. The **building** in question **must be easily visible** from the approaching roads, whether arriving on foot, by bicycle or by car, considering the fact that all the lot entrances are located on Via Pizzigoni and the closest main road is Via Console Marcello.

The complex must be **permeable**, easily identifiable in its various parts, and also the **entrance routes from the surrounding areas must be easily identifiable**, in order to aid the user's orientation and movement.

The designer must pay special attention to the study of pedestrian paths and external connections, and connections with the other adjacent school buildings, the existing library and the surrounding public spaces. In particular, it is necessary to evaluate the connection mode between the new

junior high school lot and the primary school lot, considering that the end part of Via Pizzigoni borders with a residential lot that currently has access on that road.

It is essential to plan **a main entrance for the school that opens onto the public connection spaces with the other schools**, while the entrances to the sports hall, auditorium and possible library must be separate and easily identifiable from the outside, in order to avoid interferences between the various allocations of use.

Once entering the building, all the departments will be clearly "legible" in order to naturally guide the user along their path, to reduce the number of signs required to a minimum.

The building's new image must conjure up that of a friendly and culturally alive place without "psychological" entrance barriers, whose aim is to promote the meeting of ideas and people, exchange, learning and creativity, especially regarding the activities that can be carried out by local citizens in out-of-school hours. The designer is therefore invited to reflect on the topic of the building in relation to its time of use and the perception, in the eyes of those visiting the area, of a building alive "7 days a week", even if not always in its totality.

In line with the goals set nationally to open up the school to the local territory, the school centre must be designed as a place of reference for the community, and must configure as a **civic centre** that can bring quality to the surrounding urban fabric and act as an "engine" for the territory. Overcoming the idea of a school as a place where "lessons are held" in favour of a concept that sees the school as an expression of the community, the schools are configured as active parts of an alliance with the territory, that can provide a full range of curricular, extracurricular and citizens' activities (INDIRE, *Research Report. Educational spaces and school architectures: international ideas and guidelines*. Indire, Firenze 2015).

In addition to enriching the school service with further activities for the citizens, this concept means overcoming the layout of the school complex as a physically isolated and self-referential block that creates a break in the urban fabric. The new physical **permeability** must be clearly calibrated with the need to protect many of the spaces dedicated to education. We therefore suggest that competitors consider the organisation and distribution of the various areas making up the new school also in accordance with the appropriate degree of being open to the city. This analysis will translate into spaces distinguished by various thresholds of separation/permeability towards the surrounding area. In particular, the collective functions, such as the auditorium and the sports hall must be considered as true service facilities for the area, easily and autonomously accessible compared to other school functions.

The new **openness with the city** must be clearly calibrated with the need to protect many of the spaces dedicated to education. We therefore suggest that competitors consider the organisation and distribution of the various areas making up the new school (primary school, junior high school, collective functions such as the auditorium etc) also in accordance with the appropriate

degree of contact with the city. This analysis will translate into spaces distinguished by various thresholds of separation/permeability towards the surrounding area. In particular, the collective functions, such as the auditorium and the sports hall must be considered as true service facilities for the area, easily and autonomously accessible compared to other school functions. The areas of pertinence to the schools must be protected by a dual fence, where the distance between the two barrier parts prevents the passage of any object from the outside to the inside of the school fence. Given the difficulty of maintaining the cavity area, we recommend the use of barriers (e.g. Hedge) that make it inaccessible from the outside and that improve the visual aspect.

4.3 CONTINUITY AND PERCEPTION OF THE ENVIRONMENTS BETWEEN OUTDOORS AND INDOORS

Some of the most interesting pedagogical directions work on the horizontal sharing of educational experiences and the physical transparency of school environments; we must also consider that the outdoor spaces always become a more educational element in the students' growth path. The topic of internal/external relations and more generally with the context is not, in these areas of though, a relationship of closure, but of communication, also of the visual kind, between the various parts of the school complex and between the school and the territory that it is a part of.

There are several examples in Milan of schools located in densely urbanised contexts or with a less dense urbanisation where it is possible to have a direct visual relationship with some school environments (e.g. classrooms) or with the school's outdoor areas. In this case too, we believe that all visual relations between indoor and outdoor school environments (educational spaces, outdoor classrooms, etc) and the surrounding buildings should not be precluded a priori. On the other hand, it is possible to imagine that through artificial wings for the indoor parts (shading systems for the windows) or natural wings for the outdoor parts (trees), this relationship can be modulated according to need.

The designer must pay special attention to the characteristics of **continuity and integration between the building's indoor spaces the reserved outdoor spaces, public urban spaces and private outdoor spaces.** The "indoor/outdoor" relationship can be translated into a number of precise architectural choices; for example by emphasising the transparency or permeability of some parts to allow a partial view of the spaces and indoor activities, structuring these spaces without interruption between inside and outside, by using the same materials for pedestrian paths that - from the outside - could continue inside the building. It will be possible to create "hybrid spaces" that can be used partly inside and partly outside.

The green area, that must be a basic principle for the design, can be used as an element of integration and continuity of the building with the urban context and can penetrate the interior of the constructed space (also with greenhouses, conservatories) or "incorporate it" through the use of innovative technology (e.g. green roof).

The designer must pay attention to aspects of "green building" in relation to a new way of building the constructed environment. Topics relating to energy, saving energy resources, using renewable energy sources, ecology and reducing environmental pollution must all be considered. The aim - now consolidated globally - is to significantly limit, or totally eliminate, the building's negative impact on the environment and users, harmonising with the context that it is part of as much as possible. It will be possible to foresee passive building strategies and evaluation protocols and environmental energy improvement.

Another **fundamental aspect** of the project in this type of building is certainly that of **natural lighting**: sunlight, if correctly controlled, in fact, can be a great resource for creating visual comfort for the junior high school users, but if neglected, can turn into a disturbing elements for teachers and students. To create maximum ease for users and to reduce electricity running costs the designer must pay the utmost attention to the phenomena of direct sunlight on the transparent parts of the building, studying optimal solutions for sun ray refraction or for controlling the light.

4.4 ORGANISATION OF SPACES AND PATHS[4]

The internal organisation and distribution of school activities must be clear and well-structured, according to the provisions of the Ministerial Decree 18 December 1975.

The new school, considered to be the extension of the lot, can contain 17 classes pursuant to the afore-stated Decree, for a total of 510 students, considering a maximum number of 30 students/class (25 standard students + 5 more available places).

The number of people in the school is completed by about 70 teaching staff and about 20 auxiliary staff (reception, offices, collaborators etc).

When designing the building, it is necessary to bear in mind the orientations expressed by the 2013 guidelines for building schools. In particular, it is necessary to consider the possibility of

[4] For more information about the functional programme, please refer to the Annex **"Project Indications - new School complex Via Pizzigoni"**

modifying the configurations of teaching spaces (for example imagining that some classrooms can be joined together or separated by mobile walls). The connecting elements (corridors and foyers) must have characteristics that can also be used for educational activities or further study activities to be carried out in small groups.

4.4.1 MEASUREMENTS: BINDING DATA AND FUNCTIONS

TYPE OF SCHOOL/CAPACITY	Junior High School
No. classrooms/sections	17
No. students per classroom/section	25
Max no. students per classroom/section	30
Max. total number of pupils	**510**
No. teaching staff	**Approx 70**
No. auxiliary staff (reception, offices, collaborators, etc..)	**Approx 20**
Maximum hypothetical crowding	**approx 600**
N.B.	For all school environments, suitable escape routes must be planned, in accordance with current legislation.

GENERAL LOT DATA VIA PIZZIGONI 9 (Delimitation 1) (Min. Decree 18 December 1975 - Updated technical regulations on school building, including the indexes of educational, construction and urban functionality, to be observed when carrying out school construction work)	
Gross Lot Via Pizzigoni, 9	9,085 m²
Gross Maximum Indoor area (1/3 Lot Surface area)	3,028 m²

JUNIOR HIGH SCHOOL STANDARD (Min. Decree 18 December 1975)	
Minimum surface area of reserved lot	8,925 m²
Gross surface area m²/pupil* (approximate value)	8.1/8.5 m²
Global net surface area index m²/pupil**	6.35/6.8 m²
Recommended number of floors above ground	1/2
Maximum number of floors above ground	3.
Lower ground level floors	Use solely for storerooms and/or technological systems

(*) Ref. Min. Decree 18 December 1975 - Table 3/B – GROSS SURFACE AREAS BY SECTION, CLASS AND STUDENT

(**) Ref. Min Decree 18 December 1975 - Table 7 – STANDARD SURFACE AREA INDEXES: JUNIOR HIGH SCHOOL

The school must include the following mandatory minimum environments:

MINIMUM FUNCTIONS AND REQUISITES	
Classrooms	n.17
Ordinary laboratories	no.6.
Psychomotor skills laboratory	n.1
No. 1 soundproofed	Music laboratory
Toilet block	as per legislation (divided by students, teaching staff and auxiliary staff)
Canteen/Refectory Divided into: • lunch area • Clearing area • Tableware washing	Yes, organised to work over 2 sittings: 270 meals at the same time.

• Storeroom • Changing rooms • Toilets	
No. 1 management and control area	reception/info point with fire prevention visuals/management, placed close to the school entrance)
no. 1 Principal's	Office (1 VDT station)
Administration offices	no.15 VDT stations (offices with 2/3 VDT stations each)
No. 1 waiting room	(With 5 chairs for the Secretary's office/Principal's office)
Administration Archive	No. 1
Meeting room/auditorium	No. 1 multifunctional space for 150 people, for large educational activity groups, shows, assemblies, parents' meetings, full teachers' meeting, auditorium for local area etc. It will also have the necessary areas for it to function outside of school hours. Plan for independent entrance from outside and sectioned plants and systems. While solutions that provide for an independent meeting room/auditorium are preferable, in the event of a specific project need, the meeting room can be combined with the refectory, that must therefore have suitable functional characteristics.
No. 1 staff room	with room for 50/60 teachers, with the possibility of holding sets of drawers for teachers, allocating 2 drawers per teacher.
Teaching staff archive	(including the administration archive and staff room)
No. 1 school nurse's station	(With waiting area and additional service spaces, as per legislation)
No. 1 reading room/media library	(Space for reading and multimedia projections, usable also by local community as required. Plan for independent entrance from outside and sectioned plants and systems)
No. 1 Library	(Possibility of use by local area in non-school hours too, with sections plants and systems and access from outside. FirePrevention requisites)
No. 1 type B2 sports	(With regulatory fields for non-competitive activity and with

hall (CONI)	stands for the spectators with approximately 100 seats. Also for use by local community with opening outside of school opening hours)
no. 2 sets (M/F) of changing rooms for students/athletes	(each with 1 disabled toilet)
No. 1 set of changing rooms (M/F) for teachers/referee	(each with 1 disabled toilet)
No. 1 Sports Hall first aid room	(With toilet and waiting area, as per legislation)
No. 1 storeroom/equipment	store
Parking spaces reserved for employees	The school will be "car-free", with disabled parking and bicycle stands to a proportion of about 1/3 of employees and students from the junior high school.
Green areas and outdoor sports activity areas	n.1 sports court (basketball and volleyball)
Waste areas	number and size according to current legislation
Electrical transformation cabin	Yes, according to legislation

There must be a **sheltered link between school and sports hall**, while for the outdoor spaces, an area will be created for outdoor sports activities, with a basketball/volleyball court, an area for the so-called "educational vegetable garden", green spaces (if possible with areas enclosed within the school, such as patios and interior courtyards) and "anti-syringe mesh along the lot's perimeter fence.

For more details about the functional programme, please refer to the document "**Guidelines for Preliminary Design - new Junior High School C. Colombo - Via G. Pizzigoni, 9**".

Depending on these indications, the designer must conceive a project where the hierarchies of space and paths are such as to make internal circulation and department organisation

immediately understandable. The building design must provide for clear legibility of each part and their connections.

The internal paths must be short, easily identifiable, easily and directly accessible to everyone, clearly identifiable from the front entrance, in order to allow simple, and immediate sense of bearings.

The paths for students, teaching staff, the auxiliary staff and external users must be differentiated; there must be adequate vehicular access, that is independent and does not interfere with the pedestrian access, the service vehicle (in particular with regard to the canteen service managed by Milano Ristorazione) and emergency vehicle access.

Proposals will be rewarded that enhance the **flexibility of spaces depending on their use**, with the possibility of delimiting real parts of the building to create "islands" that are dedicated to temporarily hosting different functions from the standard ones connected with educational activity. Internal distribution and articulation must therefore allow suitable division of the space, to allow diversified use over time of the various parts of the complex, especially for a worthwhile differentiation of systems and plants.

In particular, the school complex must provide for possibility that **some spaces** (sports hall, auditorium, library) **can be used totally independently from the rest of the school,** as "civic spaces" by the area's inhabitants, also in times/days when the school is closed.

The **plants and systems** must be **separate and sectionable** by allocation of use (school, refectory, sports hall, auditorium, library etc), in order to guarantee an independent function, according to the following working hours:

SCHOOL	Educational Spaces	Winter heating and summer cooling Basic activation: Mon-Fri from 7 am to 4 pm
	Administration spaces	Winter heating and summer cooling Basic activation: Mon-Fri from 7 am to 4 pm
	Refectory	Winter heating and summer cooling Basic activation: Mon-Fri from 10 am to 3 pm
SPORTS HALL		Winter heating only Basic activation: Mon-Fri from 7 am to 4 pm Opening for non-school activities: Mon-Fri from 6 pm to midnight Saturdays-Sundays from 9 am to midnight
LIBRARY		Winter heating and summer cooling Basic activation: Mon-Fri from 7 am to 4 pm Opening for non-school activities: Mon-Fri from 5 pm to 8 pm; Saturdays and Sundays from 10 am to 8 pm.
MEETING ROOM/		Winter heating and summer cooling

AUDITORIUM	Basic activation: Mon-Fri from 7 am to 4 pm Opening for non-school activities: Mon-Fri from 5 pm to 8 pm; Saturdays and Sundays from 10 am to 8 pm.

4.5 MATERIALS AND FINISHES

The materials must be high-performing but also simple, long-lasting and practical. For example, when deciding on the windows, the **functional and aesthetic values** and the **technological** implications for the indoor climate (plant and energy cost), as well as the **management and maintenance** costs will be evaluated.

The designer must conceive the project by recalling all specific materials that they intend to use for the various parts of the building complex, with an eye on the construction technologies linked to building times, long-lasting effect, environmental sustainability and maintenance thereof. On this matter, the predisposition for the building to be clean and maintained thus both internally and externally must be given the utmost consideration, so that it can stay "like new" as long as possible, also discouraging any act of vandalism.

Inside the environments, the finishing materials will strongly affect the school's quality and atmosphere: the colour and characteristics of the surfaces, rough or smooth, hard or soft, opaque or shiny; the way of absorbing or reflecting light, the sound that they reverberates or absorb, or that they emit on touch, being struck or trod on; the ageing, resistance to use and abrasion. These and other properties of the materials are the basis of the **perceptive experience** of the indoor space and profoundly involve the sensory nature of the people using it.

Through a careful choice of materials, lights, colours, the new school complex must be designed with the aim of reinforcing the perception of safety of the building itself and the surrounding spaces by the local area.

The designer must therefore identify the most suitable materials for the various areas of the building, evaluating both the aesthetic and practical values, considering all the inherent values of the materials themselves (e.g. sound absorption) and the best way that they can be used. They must pay particular attention to preventing fires and the choice of materials, furnishings and optimal finishes for each allocation of use. The designer must bear in mind the current legislation on Minimum Environmental Criteria (M.E.C.) for all the above-stated aspects.

4.6 SET-UP AND FURNISHINGS

The cultural paradigms of contemporary societies are continually transforming and school, which is one of the most involved institutions in this change is constantly transforming too. The new

educational and pedagogical trends are experimented worldwide in new learning environments, where the spaces are designed according to a precise, shared pedagogical project. The structuring of the educational space and arrangement of the furniture, desks and teacher's desk directly influences both learning and the students' well-being.

In designing new schools, it is necessary to reason based on a pedagogical model that is shared with the teachers who will inhabit that school, in terms of learning environments and that gradually overcomes the logic of classrooms with parallel rows of desks with the teacher's desk at the front. There must be the possibility inside the classroom to have the students experiment with different styles of learning, because every student learns differently depending on their own sensory channel. For this reason, it is preferable to design **classroom-laboratories** with furniture that is suitable for activities that must be carried out and the preselected educational model, so that the formal configuration of educational environments meets the teachers' didactic needs. The three elements: structure, furnishings and actions must be in an interactive relation with each other, so that there is coordination between them. This is why it is fundamental that the design of the school space involves a sharing of the meaning of some basic concepts: flexibility, affordance and semantotopics.

Any indications about the choice of the furnishings must consider the following aspects:

- The furnishing must be flexible to allow for the settings being modified according to the teacher's didactic and methodological needs;
- they must have an affordance that "invites" the students to have actions and behaviour that is suitable for the context and their educational and learning goals;
- Through furnishings, it is possible to share the meaning of use that they have, so that it is understood by everyone.

The school's furnishing solutions are therefore an added value for supporting the pedagogical project, for creating the organicity of spaces and to guarantee the required practicality of the environments. Also, as is said for school environments, the furniture and fittings will provide maximum **flexibility** for making the spaces as versatile as possible; think, for example, of the temporary use of some areas of the school for meetings, events, conferences or even parties.

Therefore when designing the buildings, it is necessary to take into account the possibility of preparing and furnishing the environments, developing distribution solutions that provide for the use of "standard" furniture and "customised" furniture, however excluded from the design appointment and the costs of the work as set out in this design competition. The project for the interior spaces, therefore, must guarantee the space to be able to place furniture such as:

- Seats for adults and children;
- Benches, desks and table for teachers' and children's activities and for reading and consultation;
- Single/two sided shelving;

- container boxes;
- Containers with drawers;
- bases and mattresses for resting;
- Games, equipment, furnishings required for educational activities.

4.7 THE ARCHITECTURE OF SYSTEMS AND PLANTS IN THE BUILDING COMPLEX

The architecture and size of the plants and systems in the building may be an added value for the building's realisation, having observed the legislative restrictions for functional and operational safety.

The main project criteria of the plants and systems in the new junior high school are:

- Energy supply and connection to network plants: the buildings must have several supplies of energy with separate meters, for each type of facility (School, Milano Ristorazione, etc.). The supplies must be provided according to the indications given by the public network providers. As it is possible there is a new to supply electricity in medium voltage, there must be an energy delivery and reception cabin. It must be architecturally integrated with the building project and with external systems, it cannot be underground, it must be positioned on the border with the public space and directly accessible from it.
- electrical and lighting systems: the environments that are the subject of the design must be classified, pursuant to current legislation, in order to define protection measures for direct and indirect measures provided for by technical regulations. The electrical system must be designed with preferably "star-shaped" and "zone" architecture, meaning the environments and spaces with the same allocation of use or function by zone.

  Given the public's growing sensitivity towards electrical mobility, the project must also evaluate the possibility of positioning charging stations for electrical bikes and the same attention must be given to charging vehicles;
- Automations serving the building: the project must include the presence of automatic external gate-opening systems, with anti-crushing safety systems and a system which provides direct visual surveillance or a video system in the gate porter's lodge.
- Radio-television systems and aerials: the project must include the installation of DVB and SAT television reception channels; the meeting room which also acts as an auditorium must have a projection system.
- Electronic systems: electronic systems, such as fieldbuses and regulation systems, must use open systems that use standard protocols.
  The structure must have both landline and WI-FI LAN network systems.

- Summer and winter air-conditioning/heating systems: the structure project must correspond to the current legislation on the limitation of buildings' energy needs. The developed plant and system solution must favour the adoption of systems that guarantee, with equal environmental conditions in indoor spaces, the highest possible energy saving. Proof of the project solution's validity must be provided by the calculation methods provided for in current legislation.
- Ventilation and aeration systems of areas: this type of system must be designed adopting the same criteria used for heating and air-conditioning systems;
- Person/item hoisting systems: should it have several floors above ground, the building must be fitted with systems for overcoming architectural barriers;
- Fire protection systems: the structure must have fire protection systems in accordance with current legislation.

4.8 RESILIENCE, CIRCULARITY AND SUSTAINABILITY

Projects are required that have an environmental sustainability approach involving the entire process from design to execution and its subsequent management and maintenance, in relation to the foreseen life cycle.

In this context, the building process sustainability is closely connected to an increasingly flexible, integrated design at all stages, the development of which is addressed with the aid of suitable computer systems, such as BIM (Building Information Modelling), able to accompany it during design, construction, management and maintenance in accordance with a principle of coordination and continuity of information on the building organism.

ENVIRONMENTAL SUSTAINABILITY

The designer must develop a project proposal that looks into aspects linked to "*green building*", as a sustainable way to build the constructed environment.

Topics relating to energy, saving energy resources, using renewable energy sources, ecology and reducing environmental pollution must all be considered. The aim - now consolidated globally - is to significantly limit, or totally eliminate, the building's negative impact on the environment and the individual, harmonising with the context that it is part of as much as possible. It will be possible to foresee passive building strategies and evaluation protocols and environmental energy improvement. The competitors' project proposals must be aimed at identifying LEED certification goals, to be achieved during the process of subsequent project phases, the tender procedure for awarding the works and the actual realisation of the work.

The project must provide significant proposals about the following topics:

- Energy consumption: the new school will configure as a NZEB - Nearly Zero Energy Building - building, and therefore a broad use of renewable energy sources must be planned, inside a high-performing shell and typical solutions for the school organism that corresponds to external factors (exposure, ventilation etc). From this viewpoint, the constructed building must be a tangible and innovative example of the integrated use of available technologies, in application of national and European regulations on building safety and energy efficiency.
- Bio-climatic design: study of typological solutions and performance of technological systems that best correspond to the site's environmental and climatic characteristics, and that also produce conditions of well-being inside the buildings, by standardising the systems' power. These objectives must be pursued, therefore, by means of an informed study of the site and in the use of available resources.
- Bio-construction: the project must take into consideration the item being built and the informed use of construction materials and techniques that have a low impact on the environment, and also the people who will use the building, therefore dealing with the physical and mental well-being of people in relation to the buildings and places where the former will be situated.
- Building automation design: the quality of the building automation design aimed at creating "smart" buildings must be taken into consideration, allowing a coordinated, integrated and computerised management of technological systems and plants (air-conditioning, distribution of water, gas and energy, security systems), of computer networks and communication systems, in order to improve management flexibility, comfort, safety, energy-saving in the buildings and to improve the quality of living and working in the buildings.
- Quality of indoor air: the quality of indoor air must be one of the factors to which the utmost attention must be given when choosing the furnishings and fittings, but also the types of air-conditioning and/or ventilation systems.
- Rainwater management: rainwater collection and distribution systems must be planned, to allow an integrated use of said water, also in relation to reducing the impacts of climate changes. The projects should aim towards the proposal of *nature-based solutions* that contribute to observing current regional legislation on invariance of water.
- Land permeability: pursuant to Ministerial Decree of 11.10.2017 - Minimum environmental criteria for the awarding of design and work services for the new construction, renovation and maintenance of public buildings, observing point 2.2.3, the design "must provide for a permeable land surface of at least 60% of the project surface area (e.g. green surfaces,

paving with open grids or grilles etc); it must provide for at least 40% of the surface not built upon being green and 20% of the total surface area of the plot; in the public green areas, it must guarantee at least 20% tree coverage with native species, favouring plants that have mainly entomophile reproduction strategies or that can produce amounts of pollen which are distributed by insects".

RESILIENCE AND BUILDING CIRCULARITY

The project must also provide architectural and construction solutions involving "resilience" and "building circularity", intended as the buildings' capacity to withstand particular, unexpected natural and climate disasters, but also adapt to climate changes that are already happening and the possible need to transform the building for different uses. Aspects connected with extreme weather such as wind and rain, but also flooding, fires and the increase in global temperatures must all be taken into consideration.

The possibility of using construction solutions that provide for the use of parts made from recycled materials, consistent with the dismantling and end-of-life optimisation principle, made with construction standardisation and industrialisation, that provide for the use of factory prefabrication (off-site building) and on-site assembly, must be taken into consideration. This will mean significant savings of time and money during the building's life cycle, starting with the construction phase and ending with demolition, implemented using "dismantling" processes and the consequent recovery of reusable building parts.

Said innovations in the realm of construction and building management will find their logical application together with integrated processes and the use of advanced computer tools such as BIM, that can aid the industrialisation of the entire construction process (Modern Methods of Construction - MMC) and subsequent (Building Management System – BMS). The integration of suitable building monitoring and management systems and its plants and systems is a decisive factor to ensure efficiency.

5 FINANCIAL LIMITS AND ESTIMATION OF WORK COSTS

In the figures shown below, the categories making up the interventions included in the competition are listed in the tables provided, that highlight the classification of interventions and correspondences between:

- Classification pursuant to Presidential Decree 207/2010;
- Classification pursuant to Law 143/1949 as amended;
- Classification pursuant to Ministry of Justice Decree 17/06/2016.

The estimate of maximum costs for creating the new junior high school and its area of pertinence and as set out in Area 1A, Area 2A and Area 2B_2C is quantified at € 16,000,000.00 (VAT included). The quota referring to the works is set at 11,875,810.16 Euro (VAT excluded), including outsourced safety costs, amounting to 100,000.00 Euro (VAT excluded).

Cost of works	Classification Presidential Decree 207/2010	Classification Law 143/1949.	Classification by Ministry of Justice Decree of 17/06/2016
5,829,372.66.	OG1	IC	E.08
100,000.00.	OS24	IA-IB	E.17
35,000.00.	OS24	IC	E.18
115,000.00.	OG3	VIA	V.01
1,265,875.00.	OG1	IG	S.03
200,000.00.	OS3	IIIA	IA.01
100,000.00.	OS4	IIIC	IA.03
700,000.00.	OS28	IIIB	IA.02
1,531,750.00.	OS30	IIIC	IA.03
500,000.00.	OG12	IC	E.20
1,398,812.50.	OS23	IC	E.20

TOTAL COST OF WORKS: **€ 11,775,810.16**

OUTSOURCED SAFETY COSTS: **€ 100,000.00**

TOTALLING: € 11,875,810.16

The forecast maximum cost for redesigning the area allocated for the road footprint, as per Area 3A, is quantified at € 856,806.96 (VAT included). The quota regarding the works is set at €

782,352.94 Euro (VAT excluded), including outsourced safety costs, amounting to € 22,352.94 (VAT excluded).

Cost of works	Classification Presidential Decree 207/2010	Classification L 143/1949	Classification Min. Justice Decree of 17.06.2016
€ 745,000.00	OG3	VIA	V.01
€ 5,000.00	OS10	VIA	V.01
€ 10,000.00	OS24	I/A	E.17

TOTAL COST OF WORKS: € **760,000.00**

OUTSOURCED SAFETY COSTS: € **22,352.94**

TOTALLING: € 782,352.94

6 REGULATORY FRAMEWORK

Below is a list of the main technical and procedural laws to use as a reference for the design of the work as named in the competition.

The list provided is indicative, with competitors having the burden of observing all applicable Italian technical legislation for the intervention, also in relation to the nature and specific details of the project choices.

Schools

- Min. Decree 18 December 1975 - Updated technical regulations on school building, including the indexes of educational, construction and urban functionality, to be observed when carrying out school construction work)
- Guidelines approved by the MIUR on 11 April 2013 regarding "Technical framework regulations containing the minimum and maximum indicators of urban functionality, construction also referring to energy efficiency and saving and production from renewable energy sources, and essential didactics for guaranteeing suitable and homogeneous project guidelines of reference for the entire nation".
- Regional Administration Decree N0. VII/20588 of 11.02.2005 on the "Definition of minimum structural and organisational requisites for authorisation of social services for young children - (further to the administration committee's opinion).

Sports Halls

- CONI Regulations (Resolution no.149 of 6 May 2008 as amended) for indoor sports halls, defined in point B) "working sports facilities";

Building procedures

- Leg. Decree no.50 - 18.04.2016 - Public contracts Code as amended;
- Presidential Decree no. 207 - 05.10.2010 as amended for the parts not yet in effect;
- Presidential Decree no. 380 - 06.06.2001 as amended. - Consolidated text of legislative and regulatory provision on building matters;
- Min. Decree 17.06.2016 – Approval of fee tables commensurate to the quality level of designs adopted pursuant to article 24, paragraph 8 of the Legislative Decree no. 50 of 2016.

Safety in the workplace

- Leg. Decree no.81 of 09/04/2008 - "Implementation of article 1 of Law no. 123 of 3 August 2007, no. 123, on safeguarding health and safety in the workplace" as amended as set out in Leg. Decree no.106 of 03/08/2009; in law no. 136 of 13/08/2010; in Leg. Decree 50/2016.

Local Regulations

- Milan City Council Building Regulations;
- Milan City Council Health and Safety Regulations;
- Regulations on use and protection of public and private green areas;
- Regulations on the city of Milan's integrated water service.

Green roofs

- Requisite Sheet no. 6 in annex B to the Building Regulations;
- UNI Standard 11235-2015.

Invariance of Water

- Regional Regulation no. 7 – 23.11.2017 - Regulation containing criteria and methods for observing the principle of invariance of water, pursuant to article 58 bis of the regional law 11 March 2005, no. 12 (Territorial governance law)

Structures

- Technical Construction Regulations as amended;
- 02.02.2009 - Ministerial memorandum no. 617 ;
- Min. Decree 17.01.2018 - "Update of technical construction regulations";
- 22.12.2005 - Lombardy Regional Administration Resolution no. 8/1566 - Implementation of the Consolidated Text no. 380 of 06.06.2001 "Structural and Anti-seismic amendment";
- Regional Law no. 12 - 11.03.2005- "Prevention of Geological, Hydrogeological and Seismic risks" as amended, as set out in the Regional Law no. 5 of 10/03/2009, for the parts not yet in effect
- Law no. 1086 of 05.11.1971 - "Technical legislation governing reinforced, normal and precompressed concrete and metal structures".

Acoustics

- Lombardy Regional Administration Law no. 13 of 10.08.2001 - Lombardy Regional Administration Laws on acoustic pollution;
- Prime Minister's Decree 05.12.1997 - Determination of passive acoustic requisites in buildings;

- Law no. 447 as amended of 26.10.1995. - Framework law on acoustic pollution;
- Prime Minister's Decree 01.03.1991 - Maximum exposure limits in living environments and the external environment.

Energy limitation

- 12.01.2017 no. 176 DECREE BY THE EXECUTIVE MANAGER OF THE ORGANISATIONAL UNIT - «Amendment of provisions regarding building energy efficiency regulations and relative certification of energy performance as replacement of provisions approved with decrees no. 6480/2015 and no. 224/2016»;
- Lombardy Regional Administration Resolution VIII/5018 of 22.12.2008 - Decisions regarding building energy certification in implementation of Leg. Decree 192/2005 and articles 9 and 25 of Lombardy Regional Law 24/2006;
- Leg. Decree no. 311 of 29.12.2006 - Corrective and additional provisions to legislative decree no. 192 of 19.08.2005 (Implementation of directive 2002/91/EC regarding building energy performance);
- Lombardy Regional Administration Law no.24 - 11.12.2006 - Legislation on the prevention and reduction of atmospheric emissions for the protection of health and the environment;
- Presidential Decree No, 412 of 26.08.1993 - Regulation containing rules for the design, installation, running and maintenance of heating systems in buildings with the purpose of limiting energy consumption, as implementation of article 4 paragraph 4 of law no. 10 of 9/1/1991;
- Law no. 10 as amended of 9.01.1991. - Rules for the implementation of the national energy plan for the national use of energy, energy saving and development of renewable sources of energy.

Minimum Environmental Criteria (MEC)

- Decree 11 January 2017 - Adoption of minimum environmental criteria for interior furnishings, building and textile products;
- Decree 5 February 2015 - Minimum environmental criteria for the purchase of urban furnishing items;
- Decree 13 December 2013 - minimum environmental criteria for awarding management services of public parks, for the purchase of soil conditioners, ornamental plants and irrigation systems, and the supply of electrical and electronic office equipment.
- Min. Decree 11 October 2017 - minimum environmental criteria for awarding design and work services for the new construction, renovation and maintenance of public buildings.

Infrastructures and transport

- Leg. Decree no. 285 as amended of 30 April 1992
- Leg. Decree no. 495 as amended of 16 December 1992
- Ministry of Infrastructures and Transport Decree of 5.11.2001
- Ministry of Infrastructures and Transport Decree of 22.04.2004
- Ministry of Infrastructures and Transport Decree of 19.04.2006

Eliminating architectural barriers

- Presidential Decree 503 - 24.07.1996 - Regulations containing rules for the elimination of architectural barriers in public buildings, spaces and facilities;
- Min. Decree Public Works 14.06.1989 n.236 - Technical instructions required to guarantee accessibility, adaptability and visibility of private buildings and subsidised public residential building, for the overcoming and elimination of architectural barriers;
- Lombardy Regional Administration Law no. 6 of 20.02.1989 - Regulations regarding the elimination of architectural barriers and technical implementation instructions;
- Law no. 13 of 9 January 1989 - Provisions for aiding the overcoming and elimination of architectural barriers in private buildings.

Safety and fire prevention

- DECREE 12 April 2019 - Amendments to the decree 3 August 2015, containing the approval of technical fire prevention regulations, pursuant to article 15 of the legislative decree no. 139 of 8 March 2006
- Min. Decree 21.03.2018 – "Application of the fire prevention regulations for buildings and constructions used as schools of any type, level and order, and also buildings and constructions used as nurseries, in the Official Journal no 74 of 29.03.2018;
- Presidential Decree no. 151 of 01.08.2011 - Regulations containing the simplification of fire prevention procedure rules, in line with article 49 paragraph 4-quater, decree-law no. 78 of 31 May 2010, converted with amendments, by Law no. 122 of 30 July 2010;
- Min. Decree 07.08.2012 - Decree of Ministry of Home Affairs - "Provisions for the submitting of applications concerning fire prevention procedures and the documentation to be attached thereto, pursuant to article 2, paragraph 7 of the Presidential Decree no. 151 of 1 August 2011";
- Min. Decree 3.8.2015 - Technical regulations on fire prevention, pursuant to article 15 of Leg. Decree no. 139 of 8 March 2006;

- Ministry of Home Affairs Decree 19.08.1996 - Technical Regulations for fire prevention in the design, construction and running of entertainment and public spectacle structures;
- Min. Decree 06.03.2001 - Amendments and integrations to Min. Decree 19.8.1996;
- Ministry of Home Affairs Memorandum no.1 of 23.01.1997 - Clarifications and guidelines for application of the Ministerial Decree 19.8.1996;
- Min. Decree 18.3.1996 - Safety regulations for the construction and running of sports facilities;
- Min. Decree 26.8.1992 - Fire prevention regulations for school building;
- Min. Decree 16.07.2014 - Technical fire prevention regulations for the design, construction and running of nurseries;
- Min. Decree 22.2.2006 - Technical fire prevention regulations for the design, construction and running of buildings and/or areas used as offices;
- Min. Decree 15.9.2005 - Technical fire prevention regulations for lift and hoisting system shafts located in activities that are subject to fire prevention controls;
- DCPREV note to protocol no.1324 of 07.02.2012 - Guide to the installation of photovoltaic systems;
- Note to protocol no. 6334 of 04.05.2012 - Clarification to note of 07.02.2012 to DCPREV protocol no.1324 - Guide to the installation of photovoltaic systems;
- Min. Decree 20.12.2012 - Technical fire prevention regulations for the active protection systems against fires installed in activities that are subject to fire prevention checks;
- Ministry of Home Affairs Decree 03.11.2004 - Provisions for the installation and maintenance of devices for opening doors installed along escape routes, regarding safety in the event of fire;
- Decree 06.12.2011 - Amendment to Decree 3 November 2004 regarding the installation and maintenance of devices for opening doors installed along escape routes, regarding safety in the event of fire;
- Min. Decree 30.11.1983 - Terms, general definitions and graphic symbols used in fire prevention.
- Memorandum no. 4 of 1.04.2002 - Guidelines for the evaluation of fire prevention safety in workplaces where disabled subjects are present;
- Min. Decree 09.03.2007 - Fire resistance of buildings in activities subject to controls by the national fire service and LC P414-4122 of 28-3-2008 for clarifications;
- Ministry of Home Affairs Decree of 16.02.2007 - Classification of fire resistance of construction products and elements used in construction work;
- Min. Decree 10.03.2005 amended by Min. Decree 25.10.2007 - Fire reaction categories for construction products to be used in works for which a safety requisite in the event of fire is prescribed;

- Min. Decree 15.03.2005 - Fire reaction requisites of construction products installed in activities governed by specific technical fire prevention provisions based on the European classification system;
- Min. Decree 9.5.2007 - Directives for implementation of an engineering approach to fire prevention safety; Memorandum Letter protocol no. 4921 of 17 July 2007 (first application guidelines); Memorandum Letter protocol no. DCPST/427 of 31 March 2008 (Transmission of guidelines for the approval of projects and data sheet drawn up by the Observatory);
- Min. Decree 10.03.1998 - General safety criteria for managing emergencies in the workplace;
- Leg. Decree no. 81 of 9.4.2008 coordinating - Consolidated Text on health and safety in the workplace, coordinated with amendments made by Leg. Decree no. 106 of 3 August 2009 and subsequent provisions;
- Leg. Decree no. 758 of 19.12.1994 - Amendments to the sanctions rules on work matters; Memorandum Letter protocol no. 14005 of 26/10/2011 (Fire prevention and fire prevention safety surveillance in the workplace); Memorandum no. 3 MI.SA. (96) 3 prot. no. P108/4101 sub. 72/C.1.(18) of 23/1/1996 (Competences and fulfilments by the national fire service - C.N.VV.F.);
- Min. Decree No. 261 of 22.2.1996 - Regulations containing rules on fire prevention surveillance services by fire services at places of entertainment and spectacle" and various provisions on fire prevention surveillance services;
- Memorandum letter 13061 of 06.10.2011 - Regulations containing rules for fire prevention procedures, in accordance with article 49 paragraph 4-quater, decree law no. 78 of 31 May 2010, converted with amendments by law no. 122 of 30 July 2010. First applicational guidelines.
- Ministry of Home Affairs Decree 07.01.2005 - Technical and procedural rules for the classification and approval of portable fire extinguishers
- Ministry of Home Affairs Memorandum P741/4101 of 07.06.2001 - Remote transmission of clarifications regarding fire prevention activities.
- UNI EN standard 1992-1-2 - Designing concrete structures – Part 1-2 – General Rules - Structural fire prevention design;
- UNI VVF10779 - UNI EN 12845 - HYDRANT NETWORK
- Vertical regulations for single activities subject to fire prevention control.

Estimations

- Regional price list of public works 2019 - LOMBARDY REGION - vol. 1.1, 1.2, 2.1, 2.2, e vol. TECHNICAL SPECIFICATIONS

- Measurement and Evaluation Regulations contained in the additional part in volumes 1.1, 1.2, 2.1 and 2.2 the Regional Price List as above

And also:

- Leg. Decree no.17 of 27.01.2010 - Implementation of the directive 2006/42/CE, regarding machinery that amends the directive 95/16/CE regarding lifts;
- Presidential Decree no. 459 of 24.07.1996 - "Machinery Directive", limited to articles not abrogated by Leg. Decree no.17/2010;
- Min. Decree of 01.04.2004 - Environment and Protection of Territory - Use of eco-active materials;
- Leg. Decree no. 152 of 03.04.2006 - Consolidated Environment Text;
- Min. Decree no. 37 of 22.01.2008 - Regulations regarding implementation of article 11-quaterdecies, paragraph 13, letter a of law no. 248 of 2 December 2005, containing the reorganisation of provisions on the installation of systems and plants inside buildings, as amended;
- Presidential Decree no. 462 of 22 October 2001 - Regulations for the simplification of procedures for reporting lightning protection and earthing installations and devices for electrical systems and hazardous electrical systems;
- CEI Standard 81-10/2 (EN 62305-2) – Evaluation of Fulmination Risk;
- UNI Standard 8612 - Regulations for motorised gates for various types of constructions;
- UNI Standard 8725 - Regulations for lifts in residential buildings;
- UNI Standard 9801 - Regulations for fixed hoisting systems for disabled subjects;
- CEI Standard 648 - 11/17 - Electrical system regulations;
- ISO Standard 9001 - Regulations for certifying quality systems;
- Specific UNI standards for particular performances provided for by project processes or materials.

The project will be completed by opinions as provided for by law. For example, but not limited thereto, ATS, VVF, CONI, Superintendency, etc.