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RESTRUCTURING OF THE PALAVELA AND CONSTRUCTION OF FIGURE SKATING AND SHORT-TRACK FACILITY

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I. PALAZZO A VELA - TORINO

1. Preamble

In 1958 a call for bids was announced by Soc. SAMIA of Turin for the "design-supply" of an exhibition site for "Moda e costumi" (Fashion and dress).

The basic design for the Samia tender was drawn up by Architects Annibale and Rigotti. They proposed a building resting on six mainstays.

The tender was awarded to the company Gastone GUERRINI with a new design by Prof. Ing. Franco LEVI of the Polytechnic of Turin.

The new structure was a "sail vault", or a dome vault, so called because it resembled a wind-filled sail, resting on three mainstays, as can now be seen.

The Palazzo a Vela was built from 1959 to 1961 in the "ITALIA '61" area, between Corso Unità d'Italia and via Ventimiglia.

2. Structural properties of the Palazzo

- hexagonal roofing inside a circle 150m in diameter
- the roof vault is a self-bearing shell made from reinforced concrete and prestressed reinforced concrete resting on three points
- the three mainstays are situated at the tips of a basic equilateral triangle
- distance between mainstays: 130m
- height at crown of arches: 29.00m
- covered area (in plan at level 0.00): 14,625 sq.m
- full roofing area: 16,600 sq.m
- closed volume: 332,000cm

The foundations of the three mainstays are made of self-sinking caissons having a cellular cubic structure with underlying bulb created through subsequent injections of concrete.

Size of the foundation caissons: (13.00 x 13.00 x 12.00)m sunk in a natural recess of sand and gravel.

The vault consists of three embedded arches, having a very variable section, situated 120 degrees apart:

- the arches vary from 1.00m at the springer to 75.00m at the crown
- in relation to the base triangle, the arches protrude from the crown (the tip) by 37.50m
- in cross-section the vault (or the three arches) consists of two slabs, going around the whole roofing, linked by continuous longitudinal and transverse ribbing
- gross thickness of vault: 130cm
- the vault consists of two slabs each having a thickness of 6cm and of a accessible air space of 118cm

The arches support the steady loads.

Each of the cylindrical surfaces (polycentric curves) making up the vault run, in the plane joining two mainstays, along two 4° curves that cross at the crown of the vault and are symmetrical in relation to the crown section.

In relation to the sides of the base triangle, the tips of the three arches at the crown protrude by 37.50m, for this reason the beams of the crown's spandrel walls (placed 120 degrees apart at the centre of the vault) are prestressed.

The entire upper slab of the roofing is prestressed transversely (according to the lines of the arches) using ∅ 10mm Dyvidag bars in a given position.

Total weight of the vault unladen: 16,000 tons.

Max. horizontal thrust at base of the mainstays: 4,300 tons.

These horizontal thrusts are absorbed by continuous base rods along the sides of the equilateral triangle.

The rods are made of reinforced concrete beams with prestressed, post-tensioned reinforced concrete lines, placed 80cm below level 0.00.

Formwork was removed by lifting up the entire structure using hydraulic jacks placed at the base, at the three mainstays, with the parallel tautening of the three base rods (prestressed reinforced concrete) and beams (prestressed reinforced concrete) of the crown's spandrel walls.

The building is in practice a large prestressed structure built in the 1950s, an example of the "durability of prestressed reinforced concrete" over time.

Over the years the structure has not deteriorated at all.

3. Structural checks

Ing. Arnaldo De Bernardi, who in the period 1959/61 worked with Prof. Franco Levi on the building's construction, was subsequently appointed by the City of Turin to supervise ten-year structural checks on the building.

In 2001 the City of Turin asked the engineer to carry out one final structural check before deciding whether to include the building among facilities chosen to host the 2006 Winter Olympics.

Extensive and painstaking checks were carried out in all structural sections, in particular in the prestressed zones, using state-of-the-art tests: "gamma-ray photography of the heads of prestressed reinforced concrete lines" - "N.D. (nondestructive) reflectometric measurements"

Testing of carbonation and compression of concrete.

In view of the wholly positive results of checks, the engineering expert was able to certify that the structures of the "Palazzo a vela" were statically suitable to all legal intents and could be used for future planned activities.

The PALAZZO was thus included among facilities to be considered for the 2006 Winter Olympics.

Following the call for bids announced by Agenzia Torino 2006 for the tender: *RESTRUCTURING OF PALAVELA AND CONSTRUCTION OF FIGURE SKATING AND SHORT-TRACK FACILITY,* Ing. De Bernardi formed an ATP (Associazione Temporanea Professionisti, a Joint Venture, or Syndicate, of Professionals), inviting a group of Turin-based Professionals and the Hon. Arch. GAE AULENTI.

The tender was awarded to this ATP group on 4 June 2002.

II. RESTRUCTURING OF THE PALAVELA AND CONSTRUCTION OF FIGURE SKATING AND SHORT-TRACK FACILITY

1. Structural works involved in construction of the new facility

The new facility is a closed and covered stadium (for air conditioning purposes). The stadium is elliptical and has a central "pool".

Structural works in reinforced concrete:

- insulated and continuous reinforced concrete foundation plinths on bored piles
- special intervention on bulkhead sections of piles close to (for protection) underground prestressed reinforced concrete base rods of the existing Palavela
- bearing structures in elevation (pillars – partition walls - brickwork) in normal reinforced concrete
- central "pool" 60x30m (for the ice needed for sporting activities) in reinforced concrete with special self-levelling non-shrinking concrete
- three tiers of seats (for whole stadium) at the levels:
    - 1st tier 0.00 to + 4.00
    - 2nd tier +4.00 to + 8.00
    - 3rd tier +8.00 to +14.60

- Bearing structures of seat tiers are made from brickwork in elevation and reinforced concrete pillars cast in place, and support beams made from prefabricated reinforced concrete.
- the large steps of the 1st and 3rd tiers are made from prefabricated reinforced concrete
- the 2nd tier (level +4.00 to +8.00, spectator zone) is a removable metal structure (as required by the tender specifications for post-Olympic activities)
- the floors of the various levels are solid slabs in reinforced concrete or "sandwich"-type floors (predalle slabs, polystyrene layer and upper slab, with floor joist centre distance of 60cm),
- all staircases, both prefabricated and cast in place, are full slabs in reinforced concrete
- reinforced concrete underground ducts for technical services
- connection finishing and other works in reinforced concrete or steel

Metal structures:

- 2nd tier metal structure from level +4.00 to +8.00 (subsequently to be removed).
- steel roofing for whole stadium with three-dimensional spatial structure roughly at level +17.00
- height from node axis to node axis: 3.40m
- span of structure along major axis: 117.00m
- span of minor axis: 96.00m (European record)
- metal-section beam at the crown, along the whole perimeter of the stadium at a height of +17.00, sustaining the metal roofing,
- large metal section beam having a span of 53.00m along the VIP side, collaborating with the roofing structure
- secondary metal structures for technical services.

All of the above structures do not touch the original roofing of the Palazzo at any point. In other words, the two structures, the "original sail roofing" and the "new structures for the Olympic facility", are completely independent.

The "sail" vault must be able to adjust freely and continuously to thermal effects. At the crown indeed the structure moves – on a vertical plane – by 2mm for every one degree change in temperature.

XX WINTER OLYMPIC GAMES - AGENZIA TORINO 2006

RESTRUCTURING OF PALA VELA AND CONSTRUCTION OF FIGURE SKATING AND SHORT-TRACK FACILITY

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2. Architectural Report

2.1. Design Objectives

For the cities and regions that have hosted the Olympic Games, this event has always represented an opportunity for reflection and analysis of the condition of their architecture, with consequent proposals for modification, expansion, and reconsideration of part of the built area and part of the plans for work on the city itself.

Remodeling of the Palazzo a Vela, which is necessary so that the structure satisfies the functional and safety requirements for hosting the Figure Skating and Short Track events during the Winter Olympic Games to be held in Turin in 2006, is intended to modify not only the building itself and its functions, but also the character of the structure. The Olympic event always triggers a process of requalification of parts of the territory and city, correlated with transformations and development of the infrastructures that remain, as a public "investment," in addition to the Olympic event itself.

The Palavela attracts special attention and wonder due to its formal character and size: the building, with a hexagonal base inscribed in a 150 meter diameter circle, is comprised by a vaulted reinforced concrete structure built on three arches that are rotated 120 degrees with respect to each other and anchored to the ground at three of the six vertices of the hexagon.

It is difficult to grasp the "limit" between architecture and engineering in this work. What strikes us here is the enormous interior space: we are confronted with an unusual form of architecture that resists division and fragmentation, a finite space whose power resides in its unity and almost abstract nature. It is definitely a city landmark, a genuine "monument."

The call for tenders defined two principal objectives: restoration of the Palavela and accommodation inside it for the Olympic specialties of Figure Skating and Short Track competition, with stands containing a total of 8,000-10,000 seats, ancillary and service spaces, and subsequent post-Olympic use of the facility as a polyvalent structure operated by the City of Turin, with construction of an intermediate slab floor to increase its functionality and versatility and permit its eventual division into two independent spaces.

The overall project also had to satisfy all functional, quality, and safety requirements during the Olympic as well as post-Olympic phases.

This project confronted us with two general and diametrically opposed considerations: construing the Palavela as a closed envelope with the consequent and necessary subdivision and fragmentation of the interior space into those intended for the required functions, or preservation of the spatial unit, with construction of a “building inside a building,” with its own formal characteristics that are structurally independent from the existing vaults but depending on its geometry.

We decided that the second approach was the only feasible one given the architecture of the Palavela and respect for its characteristics. Any form of internal subdivision would have compromised perception of the vaults and their unity, contradicting the intentions of the original design.

We thus set ourselves the objective of leaving the reinforced concrete structure visible and recognizable, with it becoming an element of visual reference from inside and out.

The functional and distribution requirements of the tender, the need to have different entrances for the authorities and the public, the differentiated distribution of seating, the needs arising from post-Olympic use, the building operating costs (reduction of the interior volume), and the fire alarm and extinguisher requirements struck us as being in harmony with the decision to operate inside the Palavela with a new, finished, autonomous, and independent building.

The building is comprised of two adjoining structures with roofs at different levels and joined by a reticular roofing system.

The decision to construct the new stadium with roofs at different levels stems directly from the geometry of the existing vault, which makes it possible to achieve greater heights only at the central sections of the arches on which the vault is constructed.

Approaching its supports, increasingly limited heights are possible, and the plan must necessarily depart from them.

This results in an asymmetrical building in a building that has its own axial configuration, which engages in a dialogue with it and reveals different views from its different angles.

This asymmetry is particularly evident and also characterizes the interior of the stadium, where the two areas dedicated to the public and Olympic families are clearly distinguishable, being delimited by diagonal walls painted fire red that penetrate from outside.

People passing by on Via Ventimiglia see two different façades, characterized by corner, non-frontal views: an initial, more compact façade with a constant height, marked by the sequence of external stairs that are visible when moving from south to north along the road. But when passers-by are traveling from north to south, they see the complexity of the different volumes that comprise the north block and its relation with the wider structure of the public seating tiers.

The stadium is made of reinforced concrete, but we established a strong contrast between the central nucleus that is painted fire red and the projecting portions, which are left gray in order to imitate the effect that is usually achieved by the play of light and shade generated by the sun shining on buildings, which is instead blocked here by the vault.

2.2. Access to the Facility and External Distribution

The structure is sited in such a way as to assure access and maneuvering by rescue vehicles and the possibility of evacuation towards adjacent areas.

The exit routes are distributed along all four sides. Egress is assured by a walkway on the perimeter.

Access by service and rescue vehicles is also assured at the public entrance level (elevation +0.00) and the ice skating rink level (elevation -1.75) by means of a driveway with a maximum slop of 7%.

The points of access to and egress from the facility are determined by the subdivision into exit sectors envisaged for the public:

Public Sector 1

Public Sector 2

Athletes

Olympic Family and Media

Technical Facilities

Spectators going to Sectors 1 and 2 access the gated area of the facility from Via Ventimiglia.

The Sector 1 spectators access the facility at level 0.00 by surmounting the existing change in level with a dual system of symmetrical, stepped ramps paved in asphalt with stone curbs that channel the public towards the entrances.
A ramp for disable persons that is also directly accessible from Via Ventimiglia is provided on the south side of the stepped ramp.
A bridge entrance leads directly from Via Ventimiglia to the first level of the facility, at an elevation of + 4.00.
Sector 2 spectators reach the facility by passing through the road running perpendicular to Via Ventimiglia that crosses the southern side of the park adjoining the Palavela area.
The entrances for Athletes, the Olympic Family, the Media, and facility management are all located on the adjoining parking lot on the north side of the building.
The driveways are connected to the indoor parking lots of the area for a total of 40 cars and 27 minibuses.

A 3.50 meter wide asphalted ring road surrounds the building and connects the sectors. The outdoor areas not used for the driveways and parking lots are landscaped.
The area adjoining the building, delimited by the asphalted ring road, is paved with artificial stone slabs.
Three pools of water are planned for installation at the base of the three supporting points of the vault, with underwater spotlights being used to illuminate the vault. The pools also prevent the public from approaching the vault at its lowest points.

2.3. The Figure Skating and Short Track Building

The main structure of the two flanking structures that comprise the building was constructed with parallel MASONRY BAFFLES that contain the floor slabs and prefabricated seating tiers and articulate the main spaces, and with PERIMETER WALLS enclosing it.
The baffles are fabricated in exposed reinforced concrete and protected with a transparent acrylic paint finish. The enclosing perimeter walls are also fabricated in reinforced concrete and then painted with RAL 3013 red acrylic sealing paint.
Near the corners of the building, the external walls are angled by 45 degrees and penetrate the interior of the stadium, thereby defining the two main blocks: public tiers on one side and Olympic Family tiers on the other.

The stands, which have different widths and heights and are divided into sectors, with three tiers on the Olympic Family, Media, and Athletes side and three tiers on the public side for a total of 8,285 seats, with space for 50 disabled persons, were constructed with exposed prefabricated cement components, except for the second tier of the public stands at a height of + 4.00, which instead consists of a temporary metal structure that can be removed in future to permit construction of the intermediate floor slab envisaged for multi-functional use of the building after the Olympics.

The roof consists of a steel reticular spatial structure with a maximum height of 3.40 meters. It is treated with zinc and traversed by metal catwalks with grilled walkways that accommodate the technical services for the large hall: the lighting system, sound broadcasting system, and scoreboard.

The roof is also crisscrossed by the ventilation ducts for the rink, covered in shiny sheet metal.

The sound absorbing and sound insulated roofing insulation at the top of the reticular structure is comprised of a sequence of two layers of sound insulation, air chamber, and external insulated panel in painted sheet metal for heat insulation.

The air recirculation ducts for the large hall run inside the roof insulation. On the side facing the hall, the acoustic panels are finished with perforated aluminum sheets. The ventilation exhaust intake ducts for the large hall run inside the roof insulation.

The other roofs of the building, specified at different heights, are normal flat roofs with insulation and waterproofing or structural glass with heat insulated aluminum frames.

A system for illuminating the vault of the Palavela is envisaged for the roofs.

2.4. Entrances and Functional Distribution

Public Sectors 1 and 2 on the ground floor are directly accessed from the large Hall envisaged on the south side, where, in addition to the lavatories and food services, spaces are planned for information services, sales, and a public first aid station. The first tier of the public sector is accessed directly from the hall through the vomitories positioned opposite the entrances along the main access and the side corridors.

The hall floors are paved in artificial stone.

The acoustical drop ceilings, which conceal the electric cable and air conditioning ducts and house the lighting, sound, and fire extinguishing systems, are made of perforated sheets of aluminum.

The lavatory floors and walls are covered in white 10 x 10 single fired tiles.

The same finishing is also envisaged on the top two floors.

Starting at an elevation of 0.00, the hall located at + 4.00 is accessed directly from the stairs located on the south end and from the diagonal stair located on the northeast. This hall is also accessible by means of the eight elevators for disabled persons and stretchers.

The entrance hall communicates directly with Via Ventimiglia by means of the planned bridge. The hall distributes the various accesses to the second tier of the stands and houses the same services planned for the ground floor.

The second floor is reached instead by means of the external stairs in reinforced concrete (south / southeast / southwest) and the eight elevators.

This floor will also be equipped with lavatories, a public first aid station, a food services storeroom and two food service areas positioned symmetrically inside the diagonal walls on the south and roofed with structural glass in heat-insulated aluminum frames.

The entrance for athletes and trainers passes through the two diagonal walls on the northeast corner that lead directly to the ice skating rink.

The entrance to the gymnasium is from the mixed zone, where journalists can interview athletes at the end of competition, with a glass roof, first aid station for athletes, and drug control station (Blue / Red Medical Station).

An interior corridor connected with the mixed zone distributes the service areas dedicated to the athletes: the six dressing rooms equipped with bathrooms, showers, massage / warm-up rooms, sauna, and trainers' dressing room.

The spaces dedicated to the athletes have rubber flooring, and the drop ceilings are made of plaster panels painted with white water based paint. The walls are painted white. The lavatories and showers are finished with single-fired white tiles. The drop ceilings of the mixed zone have perforated aluminum sheets instead.

A flight of rubber covered steps leads from the dressing room through the mixed zone to the ice skating rink.

The athletes can access the Olympic Family block at an elevation of + 4.00 from the main entrance. This block houses the press offices and interview rooms. A 200-seat stand is envisaged for athletes at the 0.00 level.

The entrances for the Olympic Family, the Media, ISU / Judges, and the public in the stands at the elevation of + 8.00 (sponsors, media, etc) planned for the north façade of the building lead to three large food service areas, enclosed by a roof and external wall made of structural glass with dark green aluminum frames. The interior walls are made of plaster board with insulation and painted with white water based painted. The flooring is in artificial stone.

The Olympic Family representative offices are located adjacent to the media lounges and ISU – judges. These offices include the office of the ISU President and other offices connected with athletic activity, protocol, and scoring management.

Following these is a corridor that leads to the judges' dressing rooms, lavatories, and entrances to the Olympic Family and athletes' tiers.

The office zones adjacent to the lounges are divided by plaster board walls that can be removed after the Olympics in order to restore the single large spaces.

Two interior side stairs with a triangular plan and elevators for disabled persons lead from level 0.00 to the corridor lined with the media spaces: press room, interview room, and an open space office.

The press room will be equipped with 200 tables for the media, complete with online connections.

The walls dividing these spaces are made of plaster board painted with white water based paint, and these, just like the walls of the Olympic Family zone, can be removed subsequently to restore the single large space.

Plans call for raised flooring with square panels. The drop ceilings are in perforated aluminum sheets.

The corridor leads to two side zones reserved for the lavatories and technical plant spaces and media stand, which is to be equipped with 264 tables for journalists, complete with online connections.

The two staircases and elevators for disabled persons inside the towers lead from the ground floor to the + 8.00 level, which is glass roofed and equipped with lavatories for the public, a food service area, and dressing rooms and lavatories for the food service personnel.

The hall leads to the tiers at the + 8.00 level dedicated to the media, sponsors, etc.

As in the other areas, the hall flooring is in artificial stone.

The scoreboard and sound system operator booth are located on the sides of the stand at the + 8.00 level. At the + 11.08 level, two other spaces are planned for the lighting system operator and TV directors, in addition to two technical spaces.

2.5. Plant and Storeroom Management

The entrance to the facility management spaces is located on the northwest side of the building.

Two staff dress rooms are planned at the 0.00 level. The dressing room floor and walls are tiled and the drop ceiling has plaster panels.

The triangular stairwell next to the entrance leads to the facility management, security office, CED office, and workshop at the + 4.00 level.

A floating floor with rubber surface is planned for the offices, with white painted walls and drop ceilings with white painted plaster panels.

The storerooms, located on the northwest, are directly connected to the asphalted ring road planned for the exterior of the building, at a level of 0.00. The storerooms have driveway access.

The ice polishing machine storeroom is planned to be built next to the warehouse.

2.6. Characteristics of the Mechanical Plant

Plans call for the thermal fluid, water, and refrigeration plants necessary to satisfy the requirements of the sports complex, as follows: formation of the ice skating rink surface, air conditioning, production and distribution of hot and cold water for the lavatories, and fire sprinkler systems.

The primary sources of power necessary for operating the facilities are both thermal and electrical: the thermal energy is furnished by the city distance heating network through a substation that can provide about 5,000 kW of thermal energy at a maximum temperature of 70° C, with a plant return temperature limit of 55° C. Electric power, obtained from the transformer station serving the Palavela, with a capacity of about 2,000 kW, is mainly used to power the refrigeration units of the rink cooling plant and the air conditioning systems, in addition to other plants including the thermal substations, the central units of the air conditioning system, the dehumidification systems, and the fire extinguishing system.

Potable water is provided by the municipal distribution network, with a hook-up that guarantees a flow of about 50 liters a second.

The planning choices made to define the air conditioning plants were aimed at realizing the best conditions for the activities envisaged during the Olympic phase and the possibility of reconverting and modifying the facilities for different use of the building at a later time. It will also be possible to move and reuse elsewhere the specific plants installed for the Olympics.

The air conditioning plants are independent for each different zone: tiers and stands; ice skating rink; media rooms; lounge; lavatories and spaces for the athletes, referees, and judges; technical offices and spaces.

The environmental conditions produced by the air conditioning plants will vary and be regulated independently for each zone, thereby satisfying the need to assure optimum conditions in each zone for the activity performed by its occupants. A suitable temperature for athletic activity (10-12° C) and a particularly low level of humidity can be guaranteed to prevent the formation of condensation and mist near the surface of the ice skating rink. The plant is comprised by two air conditioners with a chemical dehumidifier that can discharge up to 80,000 cubic meters per hour. In the seating tier zones, the air conditioning plant assures ventilation and temperature and humidity control and optimum levels for occupant comfort. The air conditioning outlets consist of grates incorporated in the tier structure, while the stale air is sucked out through ducts in the roof. The total flow of air channeled through the tiers is 240,000 cubic meters per hour.

Special attention was devoted during the design phase to the placement of the air conditioning plant components in respect of the architectural choices and noise emission control both inside and outside the Palavela. The 17 air conditioning units are positioned partly on the roof terraces of the building and partly in the technical service spaces under the tiers at a level below the rink level. All ducts and piping for the air conditioning plants are located in technical spaces or corridors inside the drop ceilings and are not visible, while the central refrigeration unit is located in a technical structure outside the building.

The plant for preparation and maintenance of the ice surface of the skating rink is comprised by a series of steel pipe coils laid in the sub-floor of the rink.

The ice can be several centimeters thick. It is formed and maintained by circulating a solution of water and glycol through the coils at a temperature of –12° / –8° C. The ice is formed by using distilled water. The temperature of the ice can be regulated according to the requirements of the sports activity.

Refrigeration is provided by two refrigeration units (one of which is a reserve unit) that can be activated on a parallel basis during formation of the ice to reduce the ice preparation times.

3. Ice production plant for rink

Ice will be produced by a plant consisting of:

- refrigeration system
- pumping sub-station
- rink

The refrigeration system and the pumping substation, connected to the rink level by preinsulated underground piping, are situated outside the building, on the north-western side.

The sheltered refrigeration system produces the refrigerating power required to cool the water-glycol mixture. It consists of two air-condensed liquid refrigerators.

The temperature of the glycol-water mix may be adjusted, according to the surface temperature of the ice rink surface deemed to be suitable for the activity performed, within a range of -2 to -5°C. The rink temperature is monitored by 8 sensors, whose temperature element is placed in the concrete a short distance from the surface. Relative data are sent to a control panel situated in the refrigerating system.

The rink stratigraphy is as follows:

- Mixed sand-gravel rolled bed having a thickness of 30cm
- Concrete slab, having a thickness of 20cm, with double mesh 12 / 20 x 20.
- Layer of foam-glass (insulator) having a thickness of 10cm
- Damp-proofing with double covering
- PVC insulating sheet.
- TNT sheet.
- Slab, having a thickness of 15cm incorporating the structure, designed to support the coils, cooled water coils and the overlying framework.

The above stratigraphy permits the expansion of the monolithic system making up the rink surface (130mm) in relation to the slip plane; expansion vis-à-vis the rink surface is absorbed via ad hoc expansion joints situated on the edges of the rink. The creation of a monolithic system making up the rink surface, having a total thickness of 130mm, is also necessary and indeed indispensable for preventing the cracking or breakage of the rink surface (also being the slip plane).

The biggest difficulties were encountered when laying the 32,000 ml of coils for the water-glycol mix, due to the amount of welding (around 5,000 points) and the shortage of available time, and when laying the final slab, in a single cast and without the presence of structural joints.

For the cast, a specialist firm in the casting of skating rink surfaces was hired, and a special mix of admixtured concrete was used so as to prevent any sort of cracking due to shrinkage.

4. Post-olympic activity

The future use of the new structures in the post-Olympic period has already been agreed with the city of Turin.

The main request was the possibility of constructing (after the Olympics) a new floor at level +8.00 in order to have two levels of use throughout the area.

Future uses include, in general, sporting activities, a swimming pool in the skating rink area, exhibitions, conferences, concerts, spa-related activities, etc.

The structures have thus been prepared for the subsequent construction of a new floor at level +8.00, with a permitted overload capacity of 6.00/10.00 KN/sq.m.