A1 DESCRIPTION OF THE INFRASTRUCTURE

A1.1BASIC FUNCTIONS AND FIGURES

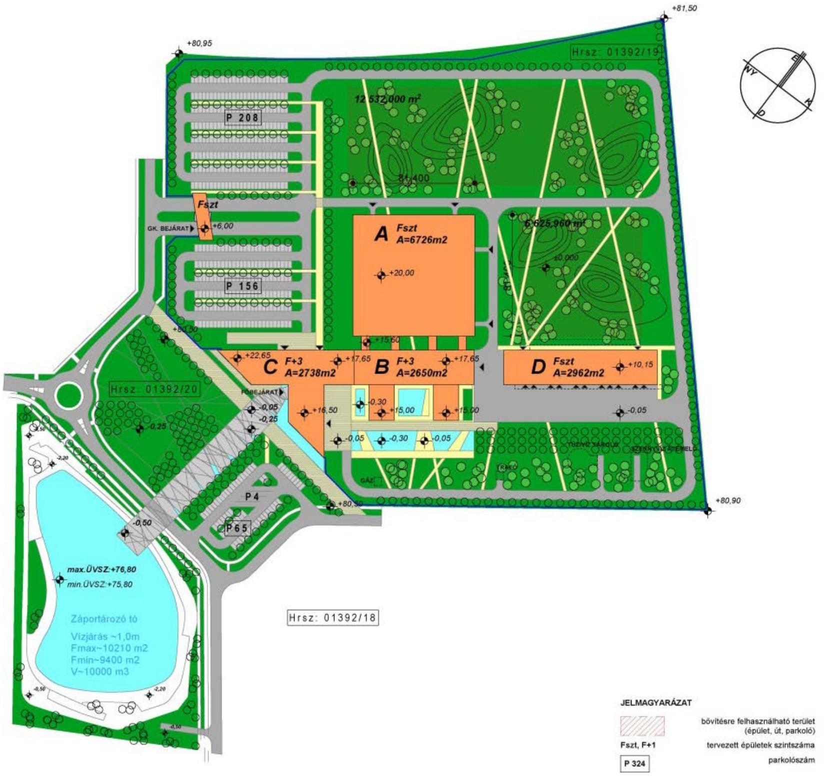

Fig. A1.1 The layout of the infrastructure (by ARTONIC Kft., 2012)

Building A

- Functions:
  - laser halls, target areas, visitor paths
  - air-locks, laser workshops, storage rooms, machinery levels
- Footprint: 6 726.4 m^2
- Gross total area: 10 334.8 m^2
- Gross internal area: 6 209.2 m^2
- Building height: 20.0 m

Building B

- Functions:
  - entry control area in the entrance hall, service entrance
  - internal hallways, visitor paths
  - workshops, laboratories, passage to Building A, engineering levels
- Footprint: 2 650.0 m^2
- Gross total area: 9 007.0 m^2
- Gross internal area: 7 936.0 m^2
- Building height: 17.5 m

Building C

- Functions:
  - entrance hall to reception
  - conference hall, library, cafeteria, offices
- Footprint: 2 738.0 m^2
- Gross total area: 8 607.4 m^2
- Gross internal area: 7 391.4 m^2
- Building height: 18.5 m

Building D

- Functions:
  - Maintenance rooms, storage rooms, workshops, social premises, other offices - and storage areas
  - security staff premises
  - Waste storing and handling premises
- Footprint: 2 962.0 m^2
- Gross total area: 3 195.0 m^2
- Gross internal area: 2 926.0 m^2
- Building height: 10.15 m

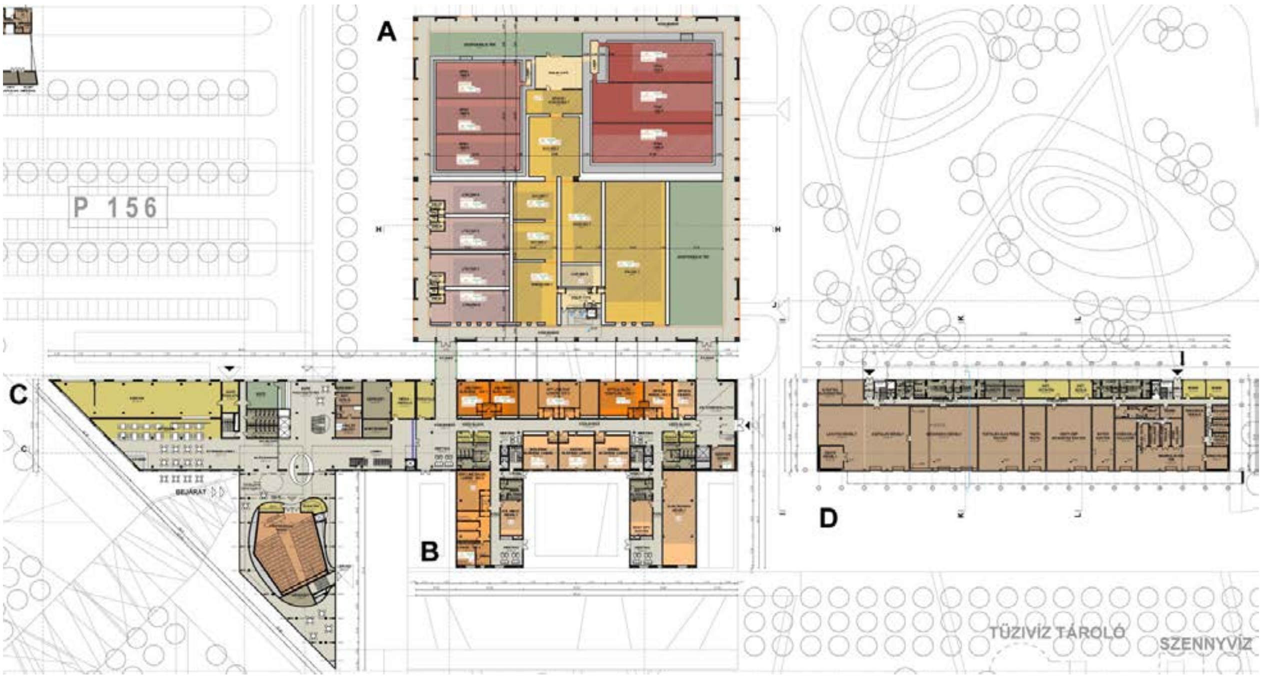

Fig. A1.2 Ground floor layout of the buildings (by ARTONIC Kft., 2012)

A1.2 DESCRIPTION OF BUILDING 'A'

Programme and rationale

"The ELI-ALPS, the Hungarian facility of the ELI (Extreme Light Infrastructure) international project is an ultra short pulse superlaser, power density of which is thousand times higher than other lasers around the world, supporting basic and applied researches. The primary mission of ELI-ALPS is the creation of pulses of in attosecond range (10^{-18}s), which makes it possible to examine quick handling physical (chemical) processes."

Building 'A' is the main technological building of ELI-ALPS, in which several, high-power pulsed lasers operated parallel to each other and the tools for physics experiments based on these are installed. The main components of the system (technological equipment) in the order of the technology are the following:

- Lasers
- Beam delivery
- Secondary sources
- Target areas
- Technological auxiliaries
- Server engineering

These areas, technologies must be formed with a high level of separation from each other and their environment providing anti-vibration foundation and stable environmental conditions for the experiments and their instruments, as these systems require extreme accuracy. Also, it has to be noted that "Some of the components of the laser systems to be installed in the building are still under development, thus their space and power requirements can be estimated with an error margin of about 25%."

Concept - location

As the "heart" of the whole investment, building A is located at the centre of the site, to be protected from the burdens of its closer and further environment (vibrations, acoustic effects, water, weather loads etc.). Accordingly, all instruments imposing mechanical/dynamical burden – interfering with the experiments – will be outside of the building. Building B is connected to building A, and gives place for those service functions, which impose such a burden or the direct contact of which is not required for the operation.

The axis of the building is parallel to the one of building B, to which it is functionally connected with four "umbilical cords", which connects the mechanical supplies. Its installation is independent from the orientation as, basically, it gives a building physics buffer shell to the functions it contains.

Its passenger and material distribution are also conducted through building B, but also the occasional delivery directly to it in some industrial door.

Designing programme, functions

The airspace of the building is determined by the requirement of the systems and the applicable regulations. The building is a long-span hall space - built of reinforced concrete and steel structural elements -, the frame of which has a foundation separate from the laser technology area requiring vibration control. Based on the "house in the house" principle, we grouped spaces of various technological, technical (e.g. clean room) requirements inside an outer shell - giving building physics separation - (on a shared vibration-free base plate) based on the functional relationship of the experimental systems. These are placed in separate boxes

- according to the above list -, the mechanical supply of which was rendered from a separate level, disconnected from machinery bridges because of the great demand for flexibility indicated by the experimental nature. The machinery bridges are based on the frame of the outer shell, so they do not influence the vibration-discharged base plate (the power supplies serving the lasers directly, and the vacuum burdens the frame of the buffer shell).

Other technical specifications:

Rate of optical cleanness according to ISO standard:
see for different rooms in section A1.7

Vibration:
The guaranteed vibration class of floor of laboratories for building "A" shall comply with VC-D (6μm/s) according to ASHRAE.

Cooling water:
At least industrial graded cooling water is guaranteed in laboratories and the engineering bridge over them with the following conditions: >15 l/min, 3-5 bar, ±0.5°C stability within 13-15°C, chlorine content <200 mg/l, particle size <100 μm. The required number of connecting points of cooling water and their locations should be included in detailed feasibility study.

Cranes-logistics:
Cranes is built with load capacity of 2000 kg into the laboratory rooms covering he whole THz room.

Accessibility:
The THz laboratory can be accessed through cargo doors of 3.00 x 3.00 m^2 from within and outside the building, the height difference is lower than 2 cm everywhere.

Available space for THz laboratories:
The THz laboratory has a footprint of 11.40m x 12.5m (width x height), the inner height of the room is 5.00m. The floor is covered with conductive resin. Floor plan is presented on the last page and is also attached at high resolution.

Gas supply:
The attached floor plan specifies the gas supply service points for each room. In general,
Compressed air: 10 bar, oil free, HEPA-filtered, dew point <10°C
Argon: 10 bar, quality 5.0
Nitrogen: 10 bar, quality 5.0
Neon: 10 bar, quality 5.0

Pre-vacuum system:
0.1 mbar

Fire system: The THz laboratory has an ingergen gas fire system, optical smoke sensors, audible alarm signal appears 60 second prior to operation, equipped with manual transmitter buttons for raising and suppressing fire alarm.

<u>Climatic conditions of laboratories:</u>
Laboratory temperature 21°C (±0.5°C), relative humidity 35±5%

<u>Service areas:</u>
All the sound, oscillation and heat sources (typically heat exchangers, power supplies, control units) are placed in the utility rooms to be developed on the so-called engineering bridges of the building, over the laser laboratory rooms.

A1.7 MARKS AND SYMBOLS ON BUILDING A LAYOUT DRAWINGS

#Persons: Maximum number of person allowed is #
Heat/vapor: Temperature/Vapor parameter
Critical: Critical parameter
Extr. Critical: Extremely critical

Nuclear Vent. Option: Nuclear ventilation feature

*xx-ISO **k** (7/8):* Ambient air cleanness according ISO ***k*** class
(e.g. less than 1.0X10E***k***/m3 particles with 0.1um or larger diameter….for room xx)