SPEED RAMP PARKING AND ARCHITECTURAL WALL PANEL

The investor benefits from the economic advantage of the structure.

OPEN, HIGH VISIBILITY SPACES
Due to the great span the car park is bright, has high visibility and is safe. Drivers do not get the anxiety often caused by the dark buildings.

COMFORTABLE DRIVING EXPERIENCES
Thanks to the wide and only slightly inclined ramps maneuvering is easy and the turns are clearly visible. It is a pleasure to drive.

FAST CONSTRUCTION
The construction period is short due to the use of precast concrete elements. The number of technical subcontractors involved is low and the procedures are simple.

SUSTAINABLE – ECONOMICAL STRUCTURE
Taking advantage of the prefabrication process the use of raw materials is rational. The panels themselves are watertight with integrated wearing-course. There is no need for supplementary build-up layers therefore resources and time can be saved.
**INTRODUCTION OF THE SPEED RAMP PARKING**

Speed ramp garages that are constructed using precast reinforced concrete elements are very common in the United States. The main characteristics, without attempting to be comprehensive, are explained below, highlighting the effectiveness of the system. A practical feature in organizing the car park’s traffic flow is the parking ramp system as the cars park and also drive on the 16-meter-wide aisle. The ramp is not a detached element of the building, thus the ratio of net to gross space increases. The garage is constructed without intermediate columns, has a slightly inclined ramp, the spaces and turns are clearly visible and driving is dynamic, comfortable and easy. The precast concrete facade wall panels give the building an appealing look. Thanks to the panels, which are produced under rigorous quality control in the factory and assembled on the site, the construction is fast and quality assured. The elements are prestressed, which process eliminates the development of cracks, the members become watertight. There is no need for further insulation layers. The car park can be constructed in any climate, even in tropic or arctic environments, using the same procedure.

**Sustainable - Economical:**
In today’s fast-paced and at times wasteful economy it is important that we use our energy and raw material resources in a rational and economical manner. The speed ramp garage with its cost-conscious approach to material is a prime tool for such efforts:
- rational and economical use of traditional building materials
- structural system supporting sustainable architecture
- low energy consumption
- a shift of paradigm in European precast production
- elements manufactured in a factory environment
- guaranteed quality and long lasting panels
- watertight, salt- and weather-resistant prestressed double-T deck members eliminate the need for expensive insulation or build-up
- decorative facades thanks to the load bearing architectural wall panel
- fast construction and low maintenance costs
- favorable investment and reasonable operational costs
- good rate of return and little risk

**Layout:**
The precast elements and building structures used for the speed ramp garage are:
- columns - on the facades and at the ramp turns
- load bearing inner wall panels
- spandrels
- prestressed double-T members (ramp and slabs)
- inverted T cross-section beams
- staircases and stiffening walls
- precast stair flights

**Internal space and its properties**
- 16-meter-wide open areas (ample space)
- convenient angle of view for CCTV cameras ensure a great sense of security
- slightly inclined parking ramps (3-5%)
- dynamic traffic and easy maneuverability
- prominently high square-meter per parking space index

In case of a gross 2335m² level area:
- number of parking spaces: **102**
- m² / parking space index: **22.9**

**CONFIGURATION AND CHARACTERISTICS OF THE TRADITIONAL GARAGE WITH INTERMEDIATE COLUMNS**
Where structures are constructed by traditional, cast-in-place methods, configuring wide spans and large open spaces is either costly or not possible. Therefore, a 7.85 or 8.25 grid of intermediary columns is necessary, making the internal space congested and reduce visibility. Maneuvering in such a cramped space is challenging and the low visibility leads to a minimized sense of security. The ramps are positioned in narrow sections and are not easy to approach due to the small turning radius, which makes them not only difficult to drive onto, but increases the risk of accidents. Furthermore, the additional wearing-course and insulation layers are expensive, the number of required work sessions is high and the construction is slow. The maintenance costs of the building are high in the long run.

In case of a gross 2340m² level area:
- Number of parking spaces: **96**
- m² / parking space index: **25.8**
THE COMPLETED STRUCTURE IS THE COMPLETED BUILDING! - The construction of the speed ramp parking garage

The structure of the speed ramp parking garage is entirely made up of precast reinforced concrete panels. Depending on the architectural concept, not only steel or wooden canopies but any additional structures can be attached to the building. Construction of the joints is simple.

1. columns, [facades, at ramp ends]
2. spandrels, architectural wall panel, facades
3. prestressed double T members, parking ramp; rough top surface
4. longitudinal stiffening walls, stiffening
5. inverted T beam, over bridging at ramp ends
6. staircase cores, pedestrians, structural stiffening
7. transversal stiffening walls, structural stiffening

The structural panels can be attached by using either high performance mortar or anchor connection or by welding at site. The columns are connected to the foundation with column shoe. Foundation work is straightforward on favorable grounds, but use of piles is also a possibility. The joint between the double-T members should be filled out with watertight caulking, creating a ramp letting the water run to the drainage canals. As the structural panels themselves are watertight and the top surface of the double-T is provided with an integrated wearing-course layer, the application of further insulation and build-up is not necessary. The top floor, which is exposed to weather conditions the most, can receive a resin layer to withstand the effects of temperature change, UV radiation and snow plowing. Solar panels can also be installed on the roof slab.

An important trait of the system is that the structural joints are visible after the completion of the building and as a result if any kind of imperfection or damage appears it becomes immediately visible and can be repaired at a low cost. The caulking between the double-T panels should be changed after defined maintenance periods to be specified by the manufacturer. As a matter of fact the structure does not require any further maintenance.

Erecting the structure is quick and simple thanks to the precast elements. A 400 parking space capacity parking garage can be fully completed in a lead-time of 3-4 months. From the point of view of the investors it is important that the number of subcontractors involved is low thus project management is simple and complex administration or paperwork can be avoided.

The same structural principle, with horizontal (not inclining ramps) slabs can be used for office or commercial buildings.

Completed examples from the USA

As is evident from the below examples, it is possible to build a speed ramp car park as a greenfield investment or as an urban project. It is crucial to point out that the system is the most efficient with a minimum of 150-200-parking space capacity and a relatively regular plan. However, a lower capacity and diverse floor plan is also possible, but in such cases the return rate needs to be inspected accordingly.