



ALLPLAN in Practice | Structural Engineering

THE GATE OF HEROES: A MODERN LANDMARK IN BUCHAREST'S URBAN TRANSFORMATION

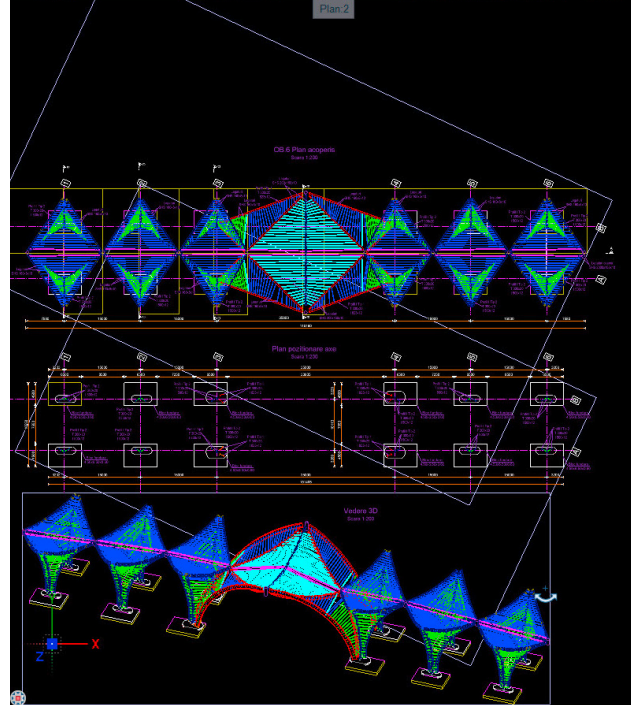
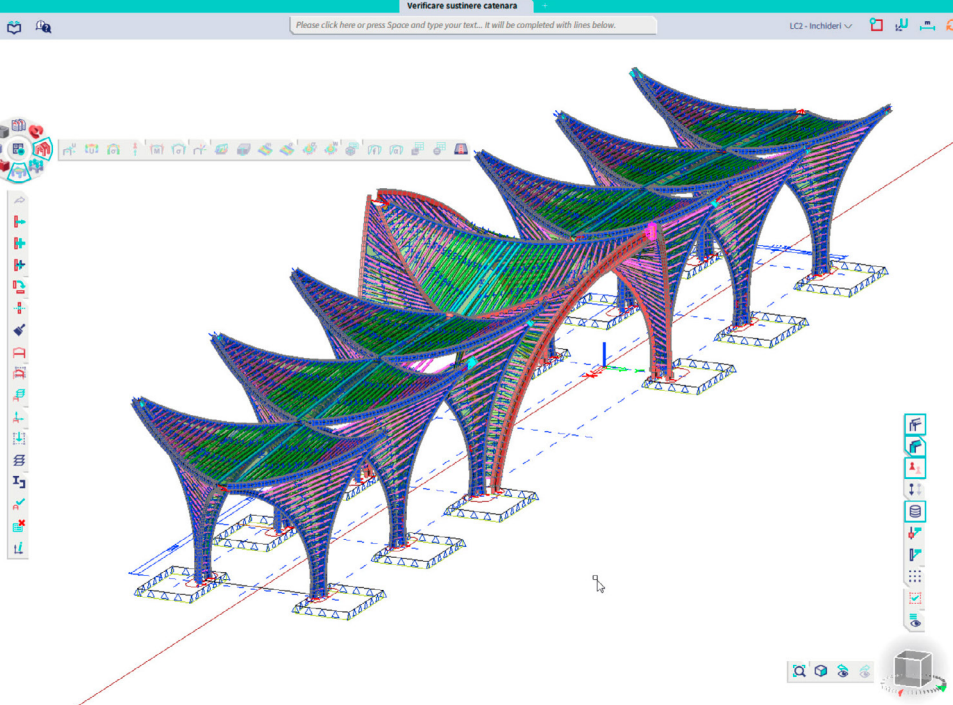
A forgotten tunnel in Bucharest was transformed into a celebrated civic space and symbol of renewal with the help of ALLPLAN and cutting-edge BIM workflows.

In 2023, Bucharest's Sector 4 faced a familiar urban dilemma: congested traffic, unsafe pedestrian conditions, and a cityscape dominated by aging infrastructure. Among the most problematic areas was the boulevard surrounding Belu Cemetery, where two four-lane roads intersected with no dedicated crossings. The result was increased safety risks from the frequent pedestrian crossings and a disconnected tram-metro system.

Determined to improve mobility and modernize the cityscape, the local government launched a bold revitalization project. The centerpiece of this

effort was the "Gate of Heroes," a striking steel canopy designed to shelter pedestrians, connect transportation modes, and honor national heritage. In addition to solving traffic and safety issues, the initiative also aimed to improving public transport connectivity for the area by seamlessly integrating five tram lines with direct access to the Eroii Revoluției metro station.

To bring this complex vision to life, the team at Terifiant Prod SRL consulted by Structural Glass Design SRL provided detailed input and leveraged BIM-based workflows to coordinate fabrication,



The integrated workflow between SCIA Engineer (left) and ALLPLAN (right) enabled seamless coordination between structural analysis and detailed modeling.

reinforce structural safety, and deliver against an exceptionally tight construction timeline. Powered by ALLPLAN, their approach helped overcome the project's many constraints, turning a forgotten tunnel into a civic symbol of progress.

Building above the unknown

Early in the project, one of the first challenges emerged: a disused pedestrian tunnel lay hidden beneath the construction zone. Originally built decades ago and long out of use, the tunnel had little to no reliable documentation. Before any foundations could be laid, the team had to digitally reconstruct the tunnel using laser scans.

This model became the reference point for foundation planning and highlighted several structural limitations – such as thin parapets and unknown load-bearing capacity – that needed to be addressed. Furthermore, excavations revealed previously unmapped abandoned cables and structures, requiring careful handling on site and prompting several design adjustments to avoid clashes and ensure safety. Adding to the complexity was that a deep foundation was not feasible due to plans for a future metro line within the next five years.

ALLPLAN's terrain import tools and parametric foundation modeling enabled the team to identify viable zones for load transfer. The solution involved limiting the foundations to two narrow strips of soil, anchored indirectly to retaining walls. The canopy itself was designed as a fully demountable structure as a forward-thinking measure for the future metro development.

PROJECT INFORMATION AT A GLANCE

- > **Focus:** Urban infrastructure and public space design
- > **Software used:** ALLPLAN, SCIA Engineer
- > **Client:** Bucharest City Hall
- > **Project scope:** BIM coordination, structural design, foundation and steel detailing
- > **Start of construction:** 2023
- > **Planned completion:** Commissioning May 2024

With the existing constraints mapped out in a centralized model, the team could move forward with confidence, aligning structural design with a realistic view of the terrain beneath.

Aligning architecture and structure

The team's attention then turned to the structure itself – transforming a dramatic architectural vision into a buildable steel canopy. Inspired by the expressive forms of Santiago Calatrava, the Gate of Heroes featured inclined steel arches spanning tram lines, doubling as supports for overhead cables and eliminating the need for poles.

Translating this vision into an efficient, fabrication-ready design required close coordination between architects, structural engineers, and steel fabricators. Many components – such as the gussets and stiffeners—served dual structural and aesthetic purposes, and most connection points required custom detailing and in-situ welding.



Temporary supports and on-site welding ensured stability and precision during the installation of over 600 unique canopy elements – all completed within a three-month construction window.

ALLPLAN's 3D modeling capabilities and detailed visualization tools played a critical role here—enabling the team to simulate the complex junctions in advance, coordinate steel detailing across disciplines, and identify where on-site flexibility would be needed. This helped reduce uncertainty during erection and ensured alignment between design intent and practical execution.

The team also used associative views and 3D reinforcement modeling to precisely align foundation cages with incoming steel structures. The clash detection between anchor bolts and rebar cages was also helpful for preventing costly on-site conflicts. Once the model was completed, reinforcement drawings were generated in just two days using ALLPLAN's automated features.

The seamless integration with SCIA Engineer and other programs via IFC meant each stakeholder could work within their preferred tools while staying synced through the central ALLPLAN model. The result was a visually striking structure grounded in solid engineering.

Communicating the vision and coordinating teams

As the design progressed, clear communication became essential—particularly across disciplines and with stakeholders less familiar with 3D modeling. With a complex, sculptural steel canopy and

constrained site conditions, ensuring everyone had a shared understanding of the structure was critical to keeping the project on track.

ALLPLAN's visualization capabilities made that possible. The project team produced a wide range of views, schedules, and model exports to support coordination. For instance, isometric views and rendered perspectives helped communicate intent clearly, while DWG exports ensured compatibility with teams still working in 2D. The model was also exported to Google Earth, allowing reviewers to better understand the structure in its real-world context.

These tools helped bridge gaps in technical knowledge, align expectations across teams, and keep the project moving forward—despite its complex geometry and fast-paced timeline.

Accelerating design-to-fabrication time

With the design finalized, the team faced its biggest constraint: time. Five active tram lines passed through the construction site, and the only permitted shutdowns aligned with school holidays—giving the steel contractor just three months to fabricate and assemble more than 600 uniquely shaped elements totaling over 300 tons of steel.

The key to success was precise coordination. Using ALLPLAN's BIM model as the single source of truth,



The completed Gate of Heroes canopy. The sculptural steel structure now serves as a visual landmark and multimodal transit hub for the area.

Terifiant Prod SRL managed the exchange of geometry, loads, and detailing across multiple platforms. Joint design was completed in another program, which received load data via BIM Link directly from SCIA Engineer. All concrete formwork drawings were generated directly from the 3D model in ALLPLAN.

Throughout fabrication and assembly, ALLPLAN's clear documentation and BIM-based communication tools helped avoid delays. Even as changes were made late in the process—such as adjustments to scaffold reactions—the digital workflows allowed the team to quickly simulate construction stages and finalize engineering checks. For the reinforcement, having all the details in the CDE made it easier for the contractor to identify rebar types and placements directly on site—streamlining construction and reducing errors.

The compressed timeline demanded precise coordination between production and assembly. Construction phases were meticulously planned to maintain a continuous workflow and minimize risk. The steel arches—among the most complex elements—were prefabricated off-site to reduce on-site welding and ensure dimensional accuracy. Structural stability measures, including temporary scaffolding and additional ground-anchored cables, were deployed to stabilize the arches during erection. Because the steel arches initially behaved

as cantilevers, pulling cables were used to reduce deflection and gradually align the structure with its final design geometry.

Ultimately, every element was delivered and installed on schedule—an achievement made possible by strong planning, integrated tools, and a collaborative, model-based approach.



"ALLPLAN made it possible to coordinate complex geometry, steel detailing, and tight construction timelines within a single BIM workflow. Without it, this level of precision and collaboration would have been impossible."

Ciprian Popa, Founder,
Structural Glass Design SRL

The customer

Terifiant Prod SRL is a multidisciplinary engineering consultancy based in Romania. With a strong focus on structural engineering, BIM modeling, and digital workflows, the company supports complex architecture and infrastructure projects across the region. Their team combines technical precision with advanced modeling tools to help deliver safe, efficient, and visually impactful designs.

About ALLPLAN

ALLPLAN is a global provider of AEC software with BIM solutions for architecture, structural engineering, detailing, fabrication and construction. True to our "design to build" claim, we provide tools that enable earlier data-driven design decisions, support digital fabrication and leverage information throughout the entire construction process. Integrated cloud technology further optimizes interdisciplinary collaboration on building and infrastructure

projects. Our innovative workflows empower architects, engineers, and construction professionals to deliver their projects more productively, safely, and eco-consciously.

Around the world, over 700 dedicated employees continue to write the ALLPLAN success story. Headquartered in Munich, Germany, ALLPLAN is part of the Nemetschek Group – a pioneer for digital transformation in the construction sector.

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