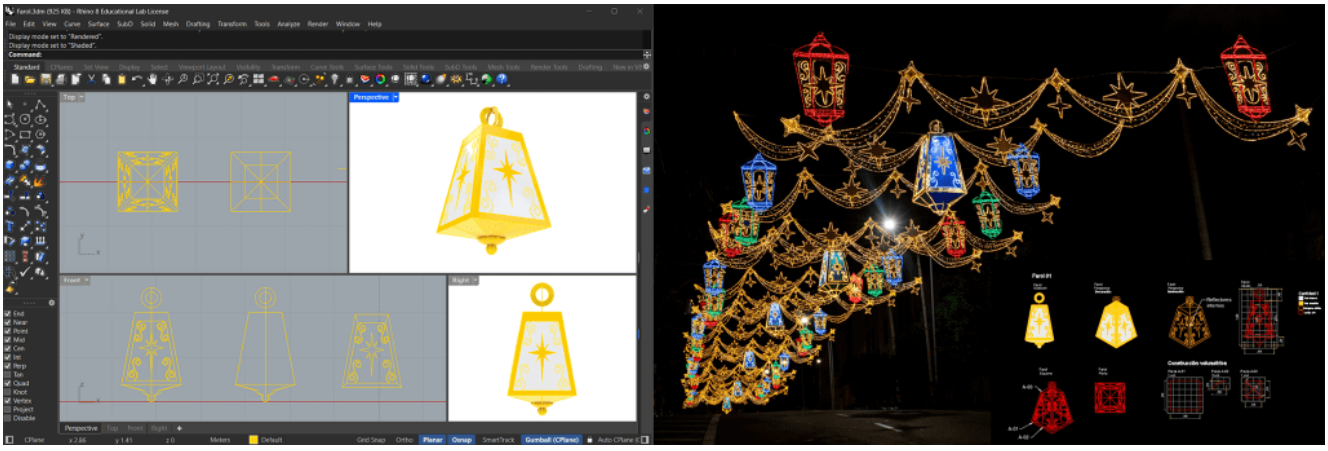
Christmas Sparks in Envigado: City-Scale Lighting Through Digital Design

In Colombia, Christmas lighting is not treated as a temporary decoration but as an urban-scale design and engineering project with deep cultural relevance. In Envigado, Antioquia, this responsibility has been led for several years by Noj Estudio, a multidisciplinary practice working across architecture, design, and visual communication. For the 2025 season, the studio developed *Destellos de Navidad*, a project that combined traditional festive imagery with a technically demanding production process centered on digital modeling and fabrication workflows.

The conceptual direction for 2025 focused on continuity with local tradition while introducing an Art Nouveau aesthetic defined by fluid geometries, curved lines, and references to natural forms. Translating this language into a system of large-scale illuminated structures required precise control over geometry, dimensions, weight, and constructability. Rhino became the primary environment where these constraints were resolved simultaneously.



The project extended across 21 zones, covering more than 10.5 kilometers of streets, parks, and rural areas.

FROM HAND SKETCHES TO CONSTRUCTIBLE GEOMETRY

The design process began with hand sketches and analog studies, which were rapidly translated into digital prototypes in Rhino 3D. This transition allowed the team to validate proportions at real scale, test spatial relationships within streets and parks, and evaluate how individual elements would be perceived along pedestrian routes.

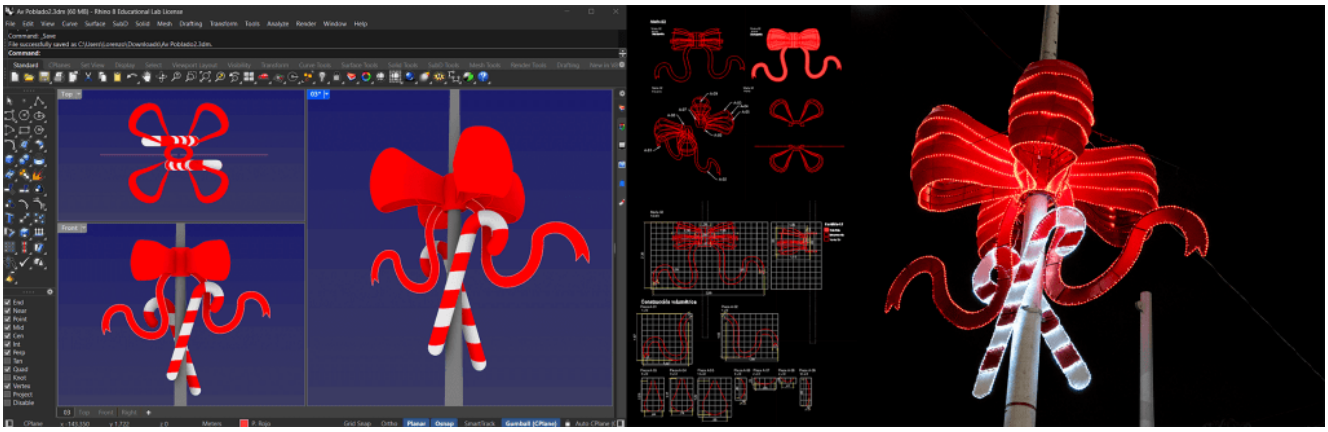
The tallest Christmas tree in Envigado’s history exceeds 26 meters in height and is located in the main park.

Rather than treating Rhino only as a visualization tool, Noj Estudio used it to define the actual construction logic of the project. Volumetric lanterns, color-changing elements, and oversized musical instruments integrated into traditional street crossings were modeled with exact dimensions to support metalworking processes such as cutting, bending, and welding. Flat and curved panels were resolved digitally to ensure that each component could be fabricated accurately and assembled efficiently on-site.

STRUCTURAL COORDINATION & LOAD VERIFICATION

One of the key technical challenges of the 2025 edition was the integration of new volumetric elements into existing public lighting infrastructure. Using Rhino, the team calculated updated weights for each decorative object and evaluated the additional loads that municipal light poles would need to support. This information was critical for coordination with engineers and public lighting supervisors, ensuring safety and regulatory compliance without compromising the visual intent.

The project's complexity was amplified by the number of stakeholders involved. Design proposals were reviewed not only by technical teams but also by municipal authorities, cultural representatives, and community stakeholders. Rhino models were used extensively in coordination meetings to communicate geometry, scale, materials, and installation logic clearly and unambiguously. The ability to navigate, annotate, and extract data from the 3D models was essential for aligning expectations across disciplines.



The project extended across 21 zones, covering more than 10.5 kilometers of streets, parks, and rural areas.

CITY-SCALE MODELING & FABRICATION DOCUMENTATION

A major milestone for 2025 was the design and construction of the tallest Christmas tree in Envigado's history, exceeding 26 meters in

height and located in the main park. At this scale, Rhino was used not only by the design team but also by fabrication coordinators, structural engineers, and installation supervisors. The municipality acquired Rhino licenses and underwent rapid training through educational resources, allowing public-sector teams to interact directly with the model, extract technical information, and validate construction decisions.

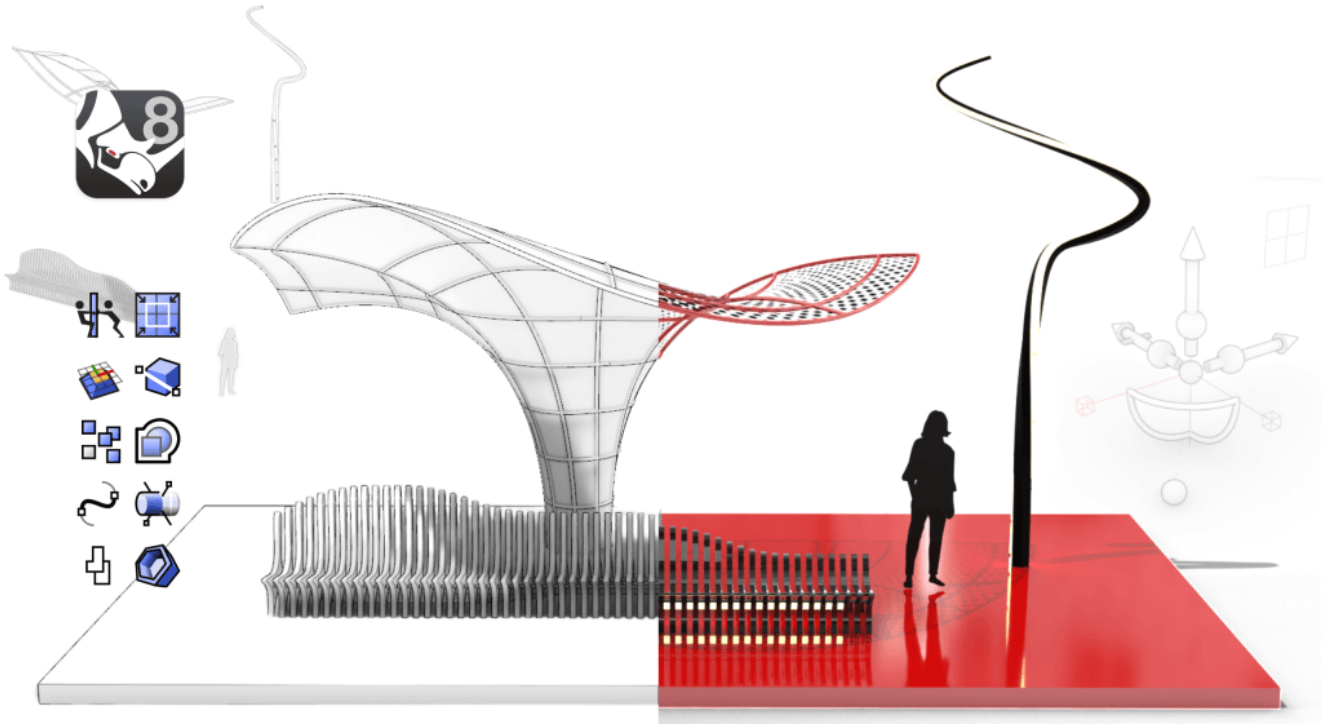
The project extended across 21 zones, covering more than 10.5 kilometers of streets, parks, and rural areas.

Rhino's interoperability played a central role in producing fabrication-ready documentation for metalworking workshops. The complex curved profiles derived from the Art Nouveau language were translated into steel structures with high geometric fidelity, minimizing interpretation errors between design intent and physical execution.

MODELING STRATEGY & VISUALIZATION WORKFLOW

Unlike previous editions where parametric tools such as Grasshopper were used to systematize certain elements, the 2025 project relied primarily on direct modeling in Rhino. This decision responded to the

artisanal nature of the design, where each piece required individual geometric attention rather than algorithmic repetition. Core Rhino tools for surface modeling, solid construction, annotation, and layer management were central to this workflow.



See Also

RHINO 8 INTERMEDIATE

Once the technical models were finalized, selected elements were processed using generative AI visualization tools to produce high-quality renderings and immersive virtual walkthroughs. These outputs supported public presentations and stakeholder reviews but remained secondary to the precision of the Rhino models that governed fabrication and assembly.

The project extended across 21 zones, covering more than 10.5 kilometers of streets, parks, and rural areas.

IMPLEMENTATION & INSTALLATION SCALE

The lighting installation was officially inaugurated on November 21, 2025, in Envigado’s main park. The project extended across 21 zones, covering more than 10.5 kilometers of streets, parks, and rural areas. In total, the installation includes over 12,000 decorative figures, approximately 7,000 linear meters of decorative fabric, and more than 15 tons of metal structures.

From a technical perspective, *Destellos de Navidad* demonstrates how Rhino can operate as a central coordination tool for complex, temporary urban installations. Its role extended from early conceptual modeling to structural coordination, fabrication documentation, and cross-disciplinary collaboration, supporting a project that combines cultural expression with precise industrial execution.

The tallest Christmas tree in Envigado’s history exceeds 26 meters in height and is located in the main park.

CREDITS

Design – Noj Estudio
Director and Principal Architect: Julián Oquendo
Design Team: Yeraldin Gil, Lorenzo Mesa, Lina María Arroyave Ceballos, Cristián Agudelo

Municipality of Envigado, Antioquia
Mayor: Raúl Cardona

Contracting and Construction – Enviaseo
Estefanía Uribe, General Manager
Carolina Márquez, Director of Public Lighting
Roberto Salas, Christmas Lighting Coordinator