

---

# CHITROLEKHA

## JOURNAL ON ART AND DESIGN

---



Virtual Reconstruction, a Museological Practice for 19th Century Railway Architectural Heritage

### INTERACTIVE ARTICLE COVER

---

#### About the Journal



---

<b>Journal DOI</b>	<a href="https://doi.org/10.21659/cjad">https://doi.org/10.21659/cjad</a> 
<b>Journal Home</b>	<a href="http://www.chitrolekha.com">www.chitrolekha.com</a> 
<b>Included in</b>	ProQuest, Art Full-text (H.W. Wilson), EBSCO, Google Scholar

---

#### About the Issue







---

<b>Issue</b>	<b>Volume 6, Number 1, 2022</b>
<b>Collection</b>	<b>Contemporary Global Museological Practices</b>
<b>Issue Editor</b>	Soma Ghosh
<b>Issue DOI</b>	<a href="https://doi.org/10.21659/cjad.61">https://doi.org/10.21659/cjad.61</a> 
<b>TOC</b>	<a href="https://chitrolekha.com/nsv6n1">https://chitrolekha.com/nsv6n1</a> 

---

#### About the Article

---

<b>Title</b>	<b>Virtual Reconstruction, a Museological Practice for 19th Century Railway Architectural Heritage</b>	
<b>Author/s</b>	<b>José Armando Pérez Crespo</b>	
<b>Affiliation</b>	University of Guanajuato	
<b>Author ID</b>	<a href="https://orcid.org/0000-0002-8122-5097">0000-0002-8122-5097</a> 	
<b>Funding</b>	<b>No funding received. Published free of any charge.</b>	
<b>Article DOI</b>	<a href="https://doi.org/10.21659/cjad.61.v6n104">https://doi.org/10.21659/cjad.61.v6n104</a> 	<b>Pages:</b> 1-11
<b>Full-text HTML</b>	<a href="https://chitrolekha.com/v6n104">https://chitrolekha.com/v6n104</a> 	
<b>Full-text PDF</b>	<a href="https://chitrolekha.com/ns/v6n1/v6n104.pdf">https://chitrolekha.com/ns/v6n1/v6n104.pdf</a> 	
<b>Article History</b>	<b>First Published: 30 June 2022</b>	
<b>Copyright</b>	<a href="https://www.aestheticsmedia.com">Aesthetics Media Services</a> 	
<b>Licensing</b>	<a href="https://creativecommons.org/licenses/by-nc/4.0/">Creative Commons Attribution Non-Commercial 4.0</a> 	

---

This Open Access article is published under a Creative Commons Attribution Non-Commercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For citation use the DOI. For commercial re-use, please contact [editor@rupkatha.com](mailto:editor@rupkatha.com).

# Virtual Reconstruction, a Museological Practice for 19<sup>th</sup> Century Railway Architectural Heritage

José Armando Pérez Crespo

University of Guanajuato (Universidad de Guanajuato – UGTO).

Email: armando.perez@ugto.mx Orcid id: 0000-0002-8122-5097

---

## Abstract

In the context of theoretical and exhibition practices of contemporary museums and in the immersive field of communication and historical heritage, this study provides a virtual reconstruction of the architectural heritage of a defunct 19<sup>th</sup> century American railway station derived from the historical infrastructure of independent Mexico. Traditional construction systems, as well as their historical roots and architectural morphology, are re-evaluated toward understanding and ratifying the three-dimensional modeling and the knowledge-generating potential of the architectural heritage, in computational tools and for a global audience, tapping into 21<sup>st</sup> century museological advances.

**Keywords:** virtual reconstruction, railway heritage, museological practice.

## Introduction

This study aims at recognizing the 19<sup>th</sup> century architectural heritage of a defunct railway station due to changing needs of its population. Currently, through computer technology, its virtual reconstruction by three-dimensional (3D) architectural modeling exemplifies an exhibition typology in line with the new museological practices of the 21<sup>st</sup> century while fostering integrative learning of the target audience by enabling them to experience interactive museology. Therefore, as an essential infrastructure for its economic development, historical aspects of the independent Mexico railway are first retrieved and identified, subsequently focusing on understanding the architectural-building elements that shaped the station. Lastly, its traditional vernacular architecture is shown in 3D. This study adopts qualitative and exploratory approaches, identifying the morphological characteristics of the object of study, and describing its heritage for contemporary and universal society, using an innovative visual computational technique. The first two inputs aimed at exposing a digital artistic example, in line with the didactic principles of creative virtual museums, as argued by Santibáñez Velilla (2006, p. 160):

Creativity results from personal potential and a transformative attitude. The communication capacity of virtual museums and the motivation that they arouse are essential for creative people to express themselves. Creativity encompasses, on the one hand, originality and, on the other, novelty, the invention or creation of something new. Every creative process entails strategies and resources that favor this process in three ways: communication, information, and evaluation.

## Historical aspects of the needs of a national railway system

Given the need for providing the country with an efficient and safe communication system, railway stations and their networks were built in the 19<sup>th</sup> century, in addition to a series of infrastructures for transit, including bridges, and tunnels, as well as homes for railway workers. Regarding this modern building plan and its homes, Verdejo Gimeno and López Patiño (2015, p. 1772) state that “although home construction by railway companies was first mentioned in 1885, the first 16 section houses would not be built at the Almorchón train station until 1882,” in the province of Badajoz, Spain. The authors also described the modest, sober, and repetitive character of these hubs (ibid. p. 1773). These European architectural criteria were transferred to America and applied to late 19<sup>th</sup> century stations in Mexico, as shown by the ruins of these houses found in the federal area occupied by the station in present-day Salamanca, Mexico (Figure 2). In addition, these stations branched into substations with a building for passengers, a cargo area, water, oil and fuel tanks, warehouses, and houses for their employees (Carregha Lamadrid, 2010, pp. 7-8). As in other cities in Mexico, these functional spaces were most likely built for the town in question.



Figure 1. “LA VILLA DE SALAMANCA” (Salamanca Town) cadastre, drawn by 1<sup>st</sup>-year Mining students, [...] Sánchez Ponce, Rafael [...] de León and Alejandro Mendoza, under the supervision of Professor Juan N. Contreras, undated. Image courtesy of the Cartography Department of the National Museum of Mexican Railroads (*Museo Nacional de los Ferrocarriles Mexicanos* – MNFM) (2018).

Located in the central region of Mexico, the Guanajuato Railway was transferred to the North American company Ferrocarril Central Mexicano (Mexican Central Railroad), which was responsible for its administration, after its construction. This policy was declared by Mr. Manuel M. Moreno, who Rojas Garcidueñas (2014, p. 150) states that the governor of Guanajuato (Francisco Z. Mena) "General Mena was a native of León. Of his administrative management, his active intervention in the construction of the railway between Celaya and León, with a branch to Guanajuato, passing through Salamanca, Irapuato and Silao, stands out." This demonstrates the presence of a railway infrastructure plan, under the official decree dated December 21, 1877. Prior to this decree, the existence of the station is also corroborated by the document *Carta General y Mapa de México* (General Map of Mexico), under the section "líneas y conexiones" ("lines and connections") as follows: "[...] three stations exist between the cities of Celaya and Irapuato: Guaje, Salamanca and Chico; [...]", in a Congressional act and agreement in 1884 (Archivo Histórico de Ferrocarriles Nacionales de México, 2018). Figure 1 shows the location of the railway station on the "Camino de fierro de Celaya a León" (Railroad from Celaya to León), under the nomenclature "S," northeast of the settlement.

### **Virtual reconstruction of architectural heritage**

In the Declaration of Amsterdam of 1975, architectural heritage is defined as follows: "[...] includes not only individual buildings of exceptional quality and their surroundings but also all areas of towns or villages of historic or cultural interest [...]" (López Merino, 2020, p. 89). In population settlements, industrialization has had a universally threatening impact on the vernacular architectural heritage in recent centuries. In less "polluted" locations on the planet, heritage struggles to survive the continuous introduction of new materials and construction techniques (Barbero Barrera & Maldonado Ramos 2013, p. 103) in the words of the same author (p. 89).

The following unifying meanings of vernacular architecture were identified:

[...] autochthonous (born or originated in its present location), popular (belonging to or related to people), and traditional (following ideas, norms or customs of the past) [...]. (Tillería González, 2010, p. 12).

Nevertheless, over time, the 19<sup>th</sup> century Salamanca railway station became an imaginary, historical, and representative entity of the past while simultaneously lacking identity for its population. This was confirmed by Lanuza (2008, p. 24), who noted the similar condition of the territories of the former railway in Santiago de Chile, and in the thoughts of the writer Walter Benjamin: "[...] the author presents a conception of the past as the 'was', recognizing its non-current condition, its expiration that confronts the modern and linear conception of progress."

Although some photographs of the railway station have survived, they show a physical deterioration with limited sharpness. The cultural heritage is exhibited in the silence of its memory, in a necessary awareness, as illustrated by Garré (2001, p. 7): "The cultural heritage, reflected in

the urban architectural heritage, is, for each community, a memory of its past, its conscience as a community, and defines an identity, relating it to that past from the present." This may encourage society, leading to emerging actions, such as reviving, with other technological and computational means, the representation of the architectural object, a process that could be affected. For an optional virtual reconstruction Girbés Pérez suggests "The problem arises when our object of study no longer exists, and its documentation is very scarce" (2017, p. 185). Conversely, a three-dimensional digital architectural representation will expand the cultural heritage understanding of the recipient. Following Navarro Delgado and Fonseca Escudero (2017, p. 220), Donnelly (1984) states: "[...] both digital techniques and the proposed methods facilitate the universal right of access to culture by allowing all lay people to participate in the design." Thus, digital modeling is a means of virtual spatial reconstruction, a simplifying approach to the problem of non-existent heritage, and an adequate museological resource:

In this way, each new model can be addressed not only from a professional architecture or archaeology viewpoint but also by the entire community in general, becoming a tool for understanding and valuing the heritage of a community, bringing individuals to the reality that they seek to know, offering them an exact vision of the space and facilitating their perception while saving efforts and resources (Fraile, 2015, p. 74).

As postulated by Fernández Ruíz (2002) in Piquer Cases et al. (2015, p. 259), digital models combine these qualities in their versatility in recognizing basic elements of architectural language, as a starting point in heritage research, namely geometry, light, color, texture, space, function, and context, which enrich the receptors' learning. For this reason, the museological practice that addresses the audience can rely on digital communication tools, as indicated by EVE Museums and Innovation (*EVE Museos e Innovación*):

Currently, fueled by a computer-centric digital culture, museums are transforming into multifunctional places where information and content is delivered to offline, online, and in-person visitors. [...] In the context of art museums, the importance of visualizing digital art and reconstructing the subject of art is reflected mainly at two levels. The first consists of using computers as a technical and visualization means to transform already surpassed experiences and paradigms, thereby enabling us to enjoy a new world of art. The second encompasses new forms of knowledge represented by computer art itself, which constantly inspire us to think about its relevance to other disciplines (2022).

Hence, the practice of (museological) exhibition of an artistic theme today requires breaking the traditional presentation paradigm. As argued by Santacana (2006, p. 129): "Faced with this static conception of museology, the artistic proposals themselves are increasingly dynamic. Observing the different trends of visual and plastic arts developed in recent decades enable us to understand the changes that art has undergone [...]"; showing a cultural bivalence where the patrimonial object also becomes an exhibition medium, as occurred in computer art.

## Categorization and identification of architectural elements of the heritage building

According to the generic classification of the historical monument and its function, the railway station is identified as civil architecture and as a land transport terminal (González Avellaneda, Hueytletl Torres, Pérez Méndez, Ramos Molina, & Salazar Muñoz, 1988, p. 17). Considering its time, some of its construction materials and techniques were foreign, albeit combined with traditional, popular, or vernacular methods in the masonry substructure and in the partition superstructure used in the horizontal and vertical reinforcement of adobe and tepetate walls (ibid. p. 125, see Figure 2). The most common materials in the architectural-building elements for a 19<sup>th</sup> century building are listed in Table 1. These references help to understand and appreciate the digital modeling of the station.

**Table 1**

*Materials used in vernacular construction systems (CS) of the 19<sup>th</sup> century*

Wall CS (p. 136):	
Materials	<ul style="list-style-type: none"> <li>• Stone baseboard, in the first room, from the base of the wall upwards, with plastering.</li> <li>• Overlapping tepetate block, plastered (Figure 2).</li> <li>• Clay partition as reinforcement of the tepetate block, plastered.</li> <li>• Cornice or upper trim moldings, partition wall construction, plastered, or apparent stone block (Figure 5, item (a)).</li> </ul>
Column CS (p. 149):	
Materials	<ul style="list-style-type: none"> <li>• Prismatic support or enclosure pedestal for column embedding.</li> <li>• Metal column with a painted circular section, possible with a capital with ornamental plant motifs forged in steel (Figure 5, item (c)).</li> <li>• U-shaped steel plate for wooden structural beams (Figure 5, item (c)).</li> </ul>
Ceiling -Roof- CS (p. 147):	
Materials	<ul style="list-style-type: none"> <li>• Tepetate load-bearing and partition walls with lime-sand plastering.</li> <li>• Grade timber beam on the upper edge, in short, load-bearing walls.</li> <li>• Structural timber beam resting on grade beams.</li> <li>• Boards covering the roof area, perpendicular to the structural beams.</li> <li>• Mixes and infills for brickwork and alum and lime waterproofing.</li> </ul>



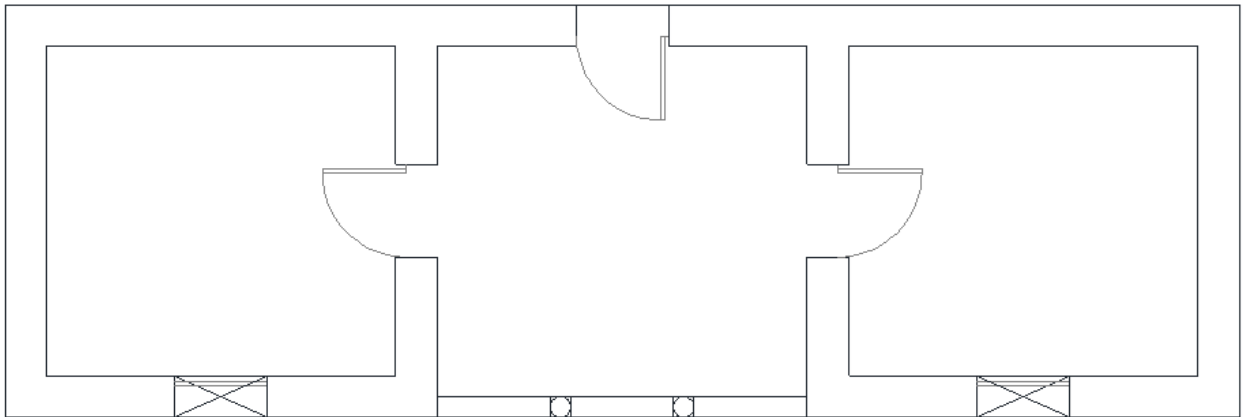
**Figure 2.** In the federal area, belonging to the National Railways of Mexico (*Ferrocarriles Nacionales de México* – FNM), the site shows a vestige of late-19<sup>th</sup> -century vernacular dwellings, currently in a fragile state of conservation. Source: the author (2020).

### **Morphological-conceptual description of the railway station**

Of the spatial components of the railway station, the concept illustrated in Figure 3 is considered according to the definition of a plan drawing: “[...] the most basic organizing principle that expresses our architectural design. It is the scheme, concept, or main idea that explains better than anything the character and appearance of our design” (Bermúdez, 2013). In this case, this is a rectangular building with dimensions estimated at 4.00 x 12.00 x 6.00 linear meters (side, front, and height, respectively). In the plan, there are three similar regular spaces. On the north facade and in the center, a portico or reception hall, in front of the main road, the hall communicates through its side openings to two spaces, which likely functioned as warehouses. A third front span, south, includes a secondary railway. The lateral facades are windowless, as shown in Figure 4.



**Figure 3.** The old, late-19<sup>th</sup> -century railway station as a rectangular prismatic space with its main facade to the north, facing the "*Camino de fierro de Celaya a León*" ("Railroad from Celaya to León"), the machine is oriented to the west (city of León). Historical photograph, courtesy of Mr. Juan José Rodríguez Chávez (2020), official chronicler.



**Figure 4.** Plan drawing of the old, late-19<sup>th</sup> -century railway station. The area is distributed from a central hall that connects to two lateral spaces. The dimensions of the three spaces are estimated at 4.00 x 4.00 meters. Source: the author (2022).



### General details of 3D modeling

Using the Maya software (Autodesk Inc.), the digital artist María Daniela Guerrero Contreras (2021) virtually reconstructed the station for architectural heritage revaluation and for museological purposes. The software tools enabled the dimensioning and geometrization of the basic elements: walls, columns, beam and roof. The scale was one unit per linear meter, also considering the average height of the human figure in statistical data on the 19<sup>th</sup> century, generating volumes and openings for doors and windows. In another phase, the station was rendered with typical textures and colors, based on images similar to those shown and of surviving 19<sup>th</sup>-century buildings. Figure 5 shows a view of the building, with its north or main facade, where subsection (a) shows the cornice based on a partition with staggered shapes; the image corresponds to the upper trim of the facade of the Salamanca Theater Juan Valle, whose origins date back to 1882 (Rojas, 2014, pp. 187-188). (b) shows a detail of a wall trim of a typical building of Guanajuato, a World Heritage city (United Nations Educational, Scientific and Cultural Organization, 1988), (c) shows a portico with circular metal columns, which support a horizontal beam, in a craft store of the community of Santa Rosa, in the Guanajuato mountains; “d” shows a stone window jamb and a symmetrical lowered arch, in the former *hacienda* of San Gabriel de Barrera, industrial heritage of colonial Mexico.

The resulting 3D modeling file was subsequently exported to the game-rendering engine of Unity Technologies, whose set of intuitive tools and workflows facilitate interactive 3D content (Nieto Acevedo, López Quintero, & González Clavijo, 2016, p. 86). This digital art content is versatile in terms of its video presentation, generating an emotional experience with virtual reality glasses, thus representing museological and innovative solutions for the 21<sup>st</sup> century.



**Figure 5. 3D virtual reconstruction of a typical 19<sup>th</sup> century railway station (Guerrero Contreras, 2021), with architectural elements that illustrate its morphology. a) cornice, b) wall finish, c) metal column, d) window opening. Museology supported by computer technology results in an inclusive and emotional learning for the audience. Source of photographs a, b, c, d: the author (2020).**

## Conclusion

Remembering the defunct railway station entailed recognizing its historical context by identifying the establishment of a terrestrial communication system, related to the Second Industrial Revolution. This architectural infrastructure was erected in the vernacular constructive knowledge, in a cultural heritage that responded to the use of native materials combined with craftsmanship to give shape and dimension to the space, a form that functionally met the needs of users. Similarly, to understand the construction systems, flimsy vestiges were observed in the area occupied by the railway building site, and in other traces and signs of the material used in the region. Ultimately, 3D computational modeling projected an envisioned revaluation in the emerging and virtual recovery of architectural heritage, making available to contemporary society information that illustrates and describes geometry, texture, color, and function, with a stimulating receptive potential, linked to everything that reflects times, places, and traditions of the people, thereby becoming an innovative museological practice of the 21<sup>st</sup> century.

## Declaration of Conflict of Interests

The author(s) declared no potential conflicts of interest.

## Funding

No funding has been received for the publication of this article. It is published free of any charge.

## References

- Archivo Histórico de Ferrocarriles Nacionales de México. (2018). *Carta General y Mapa de México. Acta y acuerdo del Congreso 1884*. Centro Nacional para la Preservación del Patrimonio Cultural Ferrocarrilero. Recuperado el 2018
- Bermúdez, J. (2013). *Sobre el partido arquitectónico*. Academia:  
[https://www.academia.edu/5051638/Sobre\\_el\\_Partido\\_Arquitect%C3%B3nico](https://www.academia.edu/5051638/Sobre_el_Partido_Arquitect%C3%B3nico)
- Carregha Lamadrid, L. (2010). Tierra y agua para ferrocarriles en los partidos del Oriente potosino, 1878-1902. *Mirada Ferroviaria. Revista Digital* (11), 3-17.  
[https://museoferrocarrilesmexicanos.gob.mx/sites/default/files/adjuntos/mirada\\_ferroviana\\_12\\_digital.pdf](https://museoferrocarrilesmexicanos.gob.mx/sites/default/files/adjuntos/mirada_ferroviana_12_digital.pdf)
- EVE Museos e Innovación. (2022). *Museos y su Dinamización Digital*.  
<https://evemuseografia.com/2022/04/21/museos-y-su-dinamizacion-digital/>
- Fernández Ruíz, J. (2002). Criterios y método para la modelación digital del patrimonio arquitectónico. *EGA* (7), 73-78.
- Fraile, M. (2015). Tecnología digital una posible herramienta de la conservación del patrimonio arquitectónico. *Revista Pensum*, 1 (1), 70-82.  
<https://revistas.unc.edu.ar/index.php/pensu/article/view/12748>

- Garré, F. (2001). Patrimonio arquitectónico urbano, preservación y rescate: bases conceptuales e instrumentos de salvaguarda. *Revista del Centro Nacional de Conservación y Restauración* (5), 5-22. Obtenido de <https://www.sistemamid.com/panel/uploads/biblioteca/7097/7128/7129/83490.pdf>
- Girbés Pérez, J. (2017). Análisis y reconstrucción virtual. El mercado de Rufaza del arquitecto José María Manuel Cortina Pérez. *Expresión Gráfica Arquitectónica*, 22 (31), 184-193. DOI: 10.4995/ega.2017.8874
- González Avellaneda, A., Hueytletl Torres, A., Pérez Méndez, B., Ramos Molina, L., & Salazar Muñoz, V. (1988). *Manual Técnico de Procedimientos para la Rehabilitación de Monumentos Históricos en el Distrito Federal*. (D. d. Historia, Ed.) Distrito Federal, México. <https://reconstruir.org.mx/wp-content/uploads/2017/11/manual-tecnico-procedimientos.pdf>
- Guerrero Contreras, M. D. (2021). Tesis Profesional de Licenciatura en Artes Digitales. Universidad de Guanajuato. *Estación de ferrocarril del siglo XIX en el bajo guanajuatense: reconstrucción hipotética y virtual*. Salamanca, Guanajuato, México.
- Lanuzza R., F. (2008). Ruina, alegoría y anamnesis. El ejercicio de la memoria sobre la des-aparición del ex ferrocarril de cintura de Santiago. *Revista de Arquitectura*, 14(18), 20-28. doi: <https://ultimadecada.uchile.cl/index.php/RA/article/view/28162>
- López Merino, G. L. (2020). Valoración y autenticidad del patrimonio arquitectónico: el componente inmaterial. *Revista ONOBA*(08), 87-100. doi: <http://dx.doi.org/10.33776/onoba.v8i0.3684>
- Navarro Delgado, I., & Fonseca Escudero, D. (2017). Nuevas tecnologías de visualización para mejorar la representación de arquitectura en la educación. *ACE Architecture, City, and Environment*, 12 (34), 219-238. doi:10.5821/ace.12.34.5290
- Nieto Acevedo, Y. V., López Quintero, J. F., & González Clavijo, C. C. (2016). Recorrido virtual en tercera dimensión de la sede principal en una universidad en Bogotá. (U. N. UNAD, Ed.) *Revista Especializada en Ingeniería*, 10, 83-93. <https://pdfs.semanticscholar.org/699c/6334746ea326cde2b4721467ca255234d961.pdf>
- Piquer Cases, J., Capilla Tamborero, E., & Molina Siles, P. (2015). La reconstrucción virtual del patrimonio arquitectónico y su aplicación metodológica. *EGA Expresión Gráfica Arquitectónica*, 20 (25), 258-267. doi: <https://doi.org/10.4995/ega.2015.3674>
- Planoteca del Museo Nacional de los Ferrocarriles Mexicanos. (Abril de 2018). Plano levantado La Villa de Salamanca. Puebla de Zaragoza, Puebla, México.
- Rodríguez Chávez, J. J. (2020). Estación de ferrocarril del ferrocarril en Salamanca Guanajuato. (J. A. Crespo, Entrevistador) Recuperado el 2020
- Rojas Garcidueñas, J. (2014). *Salamanca. recuerdos de mi tierra guanajuatense. Edición comentada por Benjamín Arredondo*. Raíces.
- Santacana, J. (2006). Bases para una museografía didáctica en los museos de arte. (U. d. Barcelona, Ed.) *Enseñanza de las Ciencias Sociales* (5), 125-133. Obtenido de : <https://www.redalyc.org/articulo.oa?id=324127625012>
- Santibáñez Velilla, J. (2006). Los museos virtuales como recurso de enseñanza-aprendizaje. *Comunicar Revista Científica de Comunicación y Educación*(27), 155-162. <https://www.revistacomunicar.com/ojs/index.php/comunicar/article/view/C27-2006-24>
- Tillería González, J. (2010). La arquitectura sin arquitectos, algunas reflexiones sobre arquitectura vernácula. (U. A. Chile, Ed.) *AUS* (8), 12-15. doi:<https://doi.org/10.4206/aus.2010.n8-04>

United Nations Educational, Scientific and Cultural Organization. (1988). *UNESCO World Heritage Convention*. Ciudad histórica de Guanajuato y minas adyacentes:  
<https://whc.unesco.org/es/list/482#top>

Verdejo Gimeno, P., & López Patiño, G. (2015). El sistema constructivo de las viviendas ferroviarias. Hacia la economía y la optimización constructiva. En E. T. Instituto Juan de Herrera : Universidad Politécnica de Madrid (Ed.), *Actas del Noveno Congreso Nacional y Primer Congreso Internacional Hispanoamericano de Historia de la Construcción*, 3, págs. 1771-1779. Segovia.  
<https://dialnet.unirioja.es/servlet/libro?codigo=580318>

---

José Armando Pérez Crespo, PhD in Art Studies, University of Guanajuato (*Universidad de Guanajuato* – UGTO), Mexico; Associate Professor of the Bachelor's Degree in Digital Arts, Engineering Division, Irapuato-Salamanca Campus; member of the National System of Researchers (Sistema Nacional de Investigadores – SNI) of the National Council of Science and Technology (Consejo Nacional de Ciencia y Tecnología en México – CONACYT); research lines: art and new media, architectural heritage landscape, and education.

---