

# The Subsoil Network of Bridges and Vaults which Cover the Esgueva River Crossing the Town of Valladolid, Spain

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Valladolid was founded on the banks of the Esgueva River, between the two branches which flow into another river, The Pisuerga. Owing to the town growth, both branches (of the Esgueva), the North and the South, finally crossed the town. It was necessary to build lots of bridges span the branches to link the different zones of the town.

Among the bridges which were used for joining the town, in the northern branch were the following: de Chirimías, de La Virgen, del Palo, de la Antigua, de los Gallegos, de Platerías, del Val and de San Benito. In the southern branch: del Espolón Viejo, del Arco del Campo Grande, del Rastro, de los Panaderos, de los Herreros, de la Niña Guapa, de la Puerta de Tudela, etc. (fig.1)

Nowadays, the remains of a bridge inside a small pond can still be seen among the buildings of the Valladolid University, around the zone of Prado de la Magdalena<sup>1</sup>. It may be Chirimías Bridge. (fig.2)



Figure 1. Ground plan of Valladolid 1799. It can be observed both branches of the Esgueva River.

They run from East to West and flow into the river Pisuerga, running from North to South.

(Valladolid Municipal Archive)



Figure 2. Remains that it could be Chirimías Bridge. (Author's photograph)

In last centuries, the Esgueva branches were an efficient drainage system. This was perfectly adapting to the street outline. In the nineteenth century, the town started to have its own drainpipe network and then, it was necessary to design some outlines of much more reasonable streets against the winding that followed the course of the Esgueva branches. This added the fact of the copious overflows that flooded the town centre. Around 1848 the City Council took the decision on roofing both branches that crossed the town centre. So, there was a better use of spaces which emerged with this decision.

From this date, roofing and channelling projects of the Esgueva, were carried out. The one hand the Northern or interior branch construct must be finished around 1890, when the General Drainage Project of Valladolid was written, it is said that this branch all-covered crosses all the town. On the other hand, the Southern or outer branch was just covered in same sections<sup>2</sup>. This branch work sites were finished later on. While the roofing of the Esgueva were made, the drainage intakes of the buildings were respected. In some parts of the town the new drainage network hadn't been constructed yet, so the sewage went on running the subsoil.

When roofing and channelling of the Esgueva work was finished at the end of the nineteenth century and at the beginning of the twentieth, a new artificial branch was designed and constructed which gathered water from both branches and goes along the edge of the town and floods into the

Pisuerga. In spite of all, these work sites were made, the Esgueva's rises went on causing serious flooding in the city centre of Valladolid while the river flow was controlled. Until this moment, when the river flow increased in an substantial way and it couldn't poured through underground flows, this followed its primitive outside course, and flooded some streets such as: Esgueva, Solanilla, Portugalete, Cantarranillas, Miguel Iscar and other streets until the first third of the twentieth century<sup>3</sup>.

## **ESGUEVA'S CHANNELLING CONSTRUCTION**

The projects for the Esgueva's channelling were carried by the municipal architects since this job was created. This can be noticed in the buildings dossiers of Valladolid Municipal Archive.

The constructions are carried out with rough stone foundations and in some cases wooden piles, tie bars and walls made of ashlar or rubble ashlar to the channelling and brick vaults or ashlar vaults to cover the riverbed. It is usually used brick in longitudinal vaults, in sardinel brick vaults and for bridges were built in stone voussoir. The last part of the construction were entirely made of stone at the end of the nineteenth century.

Nowadays, there are only left some documents of the Northern Branch as the "Expediente de posturas de piedra labrada para el Puente titulado de El Val"<sup>4</sup> (Dossier of stonework positions to build the bridge called El Val). In this Dossier stonemasons make some proposals to build the mentioned bridge and besides the conditions according to the constructs how to be built. Among the proposals stand out those referred to stone, this was dated on October 12<sup>th</sup>, 1788: "Ha de ser la Piedra de Sillería de la Cantera de Castronuevo en esta forma: Los Sillares para pies derecho an de tener de alto pieymedio, de largo una vara ó tres pies, y a lo menos dos pies a tizón..."<sup>5</sup> (The ashlar stone must be from Castronuevo's quarry in this way: right-feet blocks of stone must have 1.5 feet in height, three feet in length and at least two feet in header).

As an project example that was made by a brick factory, we found the "Acta de contrata de ladrillo para cubrir el trozo de cauce del Río Esgueva á la parte accesoria de la iglesia de la Antigua"<sup>6</sup> (Contract deed to cover the section of the Esgueva next to the Antigua Church) dated on February 17<sup>th</sup>, 1851. This document contains of the fact that a bricklayer foreman was outsourced to build sardinel brick vaults, in the called part annexe by 1550 pesetas.

In these papers there are only documents which were used to contract the worksites but it doesn't seem to appear a previous project with a report, budget, and plans. However, in the "Proyectos para Tres Mercados de hierro"<sup>7</sup> (Project to three Iron Market) dated on January 8<sup>th</sup>, 1878 written by the Municipal Architect, Joaquín Ruíz Sierra, it can be seen the section of Portugalete's market that it will be built in the same name square, and where a casting pillar row which is holding the iron truss of the roofing and one of the lines is holding up in the channelling walls of the Esgueva. These

walls raise to reach the level where the pillars are held up. **(fig.3)** So, this must mean that a building dossier could exist to explain how and where the worksites were built.

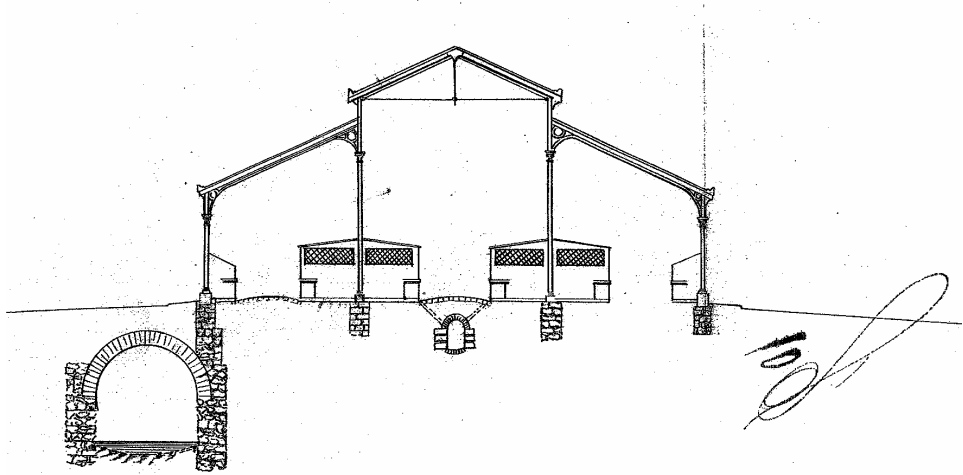


Figure 3. Plan of the “project for three iron markets” by Municipal Architect, Joaquín Ruiz Sierra. (Valladolid Municipal Archive)

About the Southern branch, in the Local Archive, more channelling constructs have been founded. The projects have been written by the Municipal Architects successive, and the dossiers have more documentation: report, plans, calculation sections, budget, conditions, plot and the final reception deeds. The localized dossiers are:

“Proyecto de encauce de un trozo de Esgueva desde la mitad de la calle de las Parras hasta el Puente de la Virgencilla”<sup>8</sup> (Project of channelling of a section of the Esgueva from the middle of Parras street to the Virgencilla Bridge). This one written by the Municipal Architect, Martín Sarazibar, and dated on February 10<sup>th</sup>, 1862, to cover 80 metres in riverbed, with masonry walls, and brick vault of bat and half in thickness made of wooden curved mould at the price of 837.2 pesetas linear metre, and the construction cost is 66 976 pesetas. **(fig.4)**

There was a section neither channelling nor covering in Parras Street. During this year it was projected “Un lavadero parte cubierto y parte descubierto”<sup>9</sup> (a washing place, in part covered and exposed in the other), so the river went on using as a public washing place. This project was signed by the Municipal Architect Martin Sarazibar.

Between 1862 and 1873 the Esgueva’s channelling dossiers are followed through in the Rastro area. Nowadays, this is one of the principal streets in the city centre, Miguel Iscar Street.

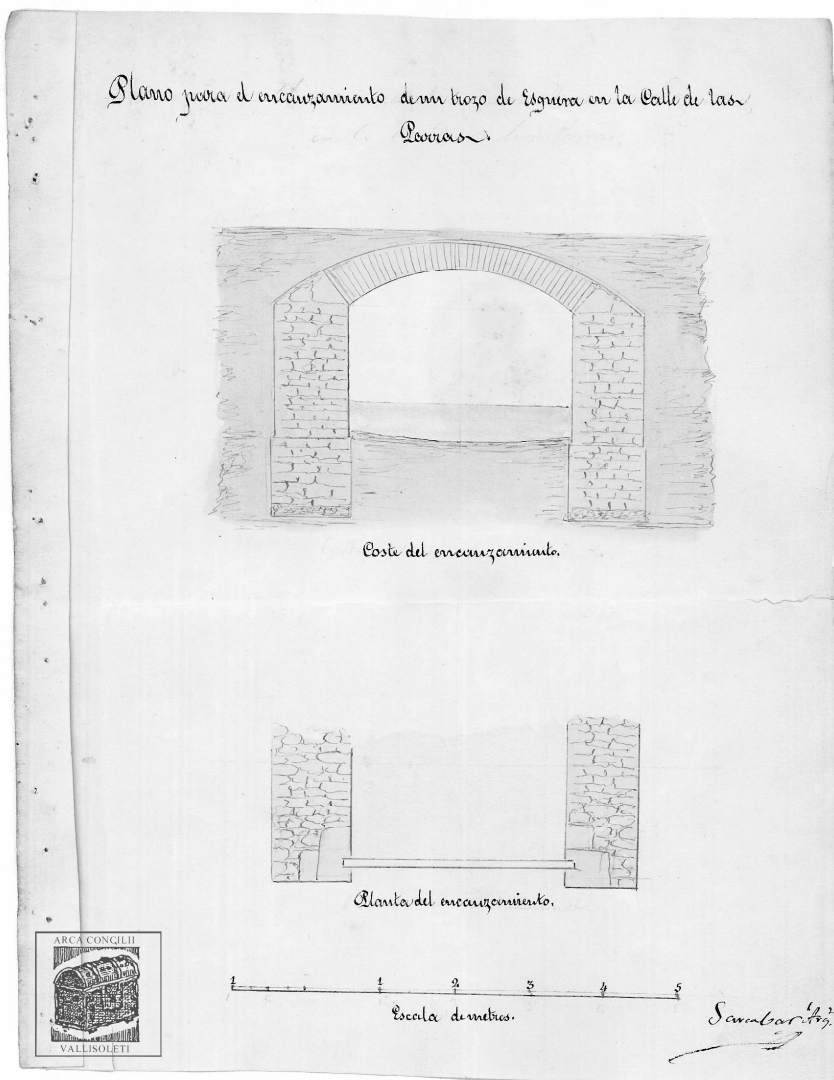


Figure 4. Plan to channel a section of Esgueva at Parras Street (Municipal Archive)

From February 18<sup>th</sup>, 1862 it is the “Proyecto y condiciones para las obras del encauzamiento de Esgueva en el Rastro”<sup>10</sup> (Project and conditions for Esgueva’s channelling construction in the Rastro area). That was studied by the Construction Committee. On February 25<sup>th</sup>, 1862, about the same project, it is presented the “Ynforme ó memoria del encauzamiento de la Esgueva en la parte del Rastro y proyecto de una nueva edificación en la ciudad de Valladolid”<sup>11</sup> (Report or

memorandum of Esgueva's channelling in the Rastro Area and the project of a new construction in the town of Valladolid). The Local Corporation architect, Martín Saracíbar, hints in this report that the channelling makes from the Rastro bridge to Santiago Street doesn't have the suitable design and it has been built without the precise solidity. The architect proposes a new plan, that is, building a riverbed with 1 metre wider and 75cm higher. The pillars would change to 0.90m into 2m wider. The brick vault would change its height from 45 to 60cm too. **(fig.5)** A linear metre cost 2 382.1 pesetas and the 240 metres construction cost is 571 082.42 pesetas. He also proposed an alignment reorganization of bordering streets to avoid problems with the future buildings. **(fig.6)** In the "Condiciones bajo las cuales se han de ejecutar las obras" (Conditions according to the worksites how to be built) It is described the rules of making channels and vaults for the majority of the analysed dossiers, in which this architect is the author.

Las mezclas para las mamposterías se pondrán de dos partes de arenas de miga pasadas por zaranda, y una de cal, haciéndolas con quince días de anticipación a su empleo, vatiéndolas y rebatiéndolas tanto al hacerlas como al gustarlas. Para la fábrica de ladrillo se compondrá en las mismas proporciones, pero la arena será cernida".

Se abrirán los cimientos á la profundidad de un metro, hechando en todas las partes que el terreno no sea firme, una capa de hormigón compuesto de mezclar piedra menuda y una quinta parte de cal viva: apisonándolas fuertementes hasta que resulte el espesor de 30cm en toda su superficie.

Sobre los expresados cimientos se levantarán las mamposterías arregladas á las dimensiones que el plano manifiesta, y ejecutándolas con piedras calizas de las canteras de Villanubla, crecidas, bien enlazadas, macizadas y sentadas con abundancia de ripio, continuando hasta la altura de los salmeres, que estos y las primeras iladas de las bóvedas serán de sillerías picotadas de las mismas canteras sentadas con mezclas y mas lechadas de cal. El resto del arco será de ladrillo benito sentado a hueso y des espesor de dos hastas pasándolo de llana por la parte inferior y superior.

En los muros de encauzamiento se dejarán acometidas y con vertientes a la Esgueva todas las alcantarillas y sumideros actuales, y los demás que se consideren necesarios.<sup>12</sup>

(The mixture for masonries will be made of two parts of clay sand sift through sieve, and a part of lime. These must be made fifteen days before using, beating when the mixture is made not only but also using. To make brick the mixture will be composed of equal proportions but the sand will be sifted sand.

It will be opened foundations at one meter deep, throwing in all of the places where the

ground is not solid, a concrete layer made of tiny stones and a fifth part of quicklime: compacting it strongly till 30 cm. thickness throughout this area.

Over these foundations mentioned above will be raised masonries according to plan dimensions, and will be made of limestone from Villanubla's quarries, well compacted and permanent with a lot of sneck, continued until springeres line. These and in the first rows vaults will be made of ashlar whose are extracted from these mentioned quarries, and mixing and more lime whitewashes. The rest of the arch will be made of benito brick sited at bone and two bats in thickness which is lent a hand by lower and upper parts.

At the channelling walls will leave connections and dumping to the Esgueva river caves all the current sewers and gullies, and others that could be considered necessary.)

In September 1873, another Local Architect, Joaquín Ruiz Sierra, summoned a "Expediente para contratar en subasta la construcción de un muro de ala en el encauzamiento del Esgueva del Rastro"<sup>13</sup> (Dossier to put up for an auction a outsourcing to build a wall at the Rastro Esgueva's channelling.) to strengthen worksites previously made in that area, whose achievement was authorized by Worksite Commission.

In July 1876, Joaquín Ruiz Sierra, signs the Bridges Project in the South section of the Esgueva River, in Niña Guapa and Tudela Streets, to create Circular Square<sup>14</sup>. (fig.7)

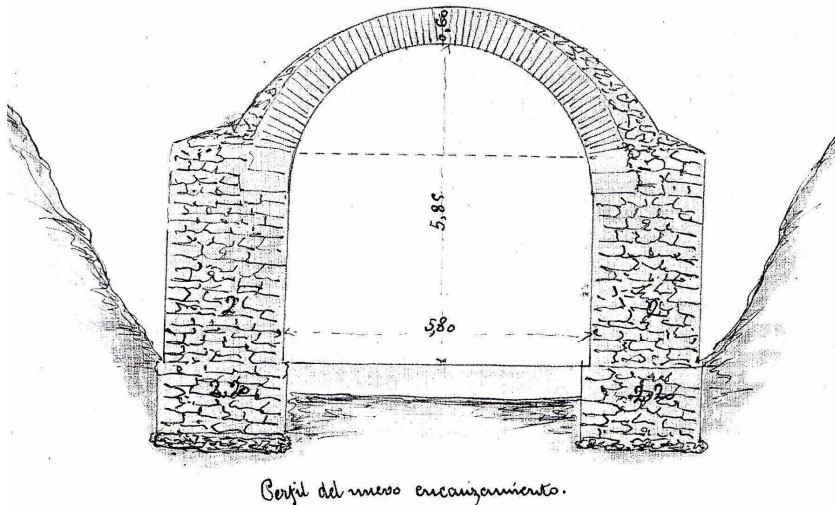


Figure 5. Section of the plan for building at Rastro area. (Municipal Archive)

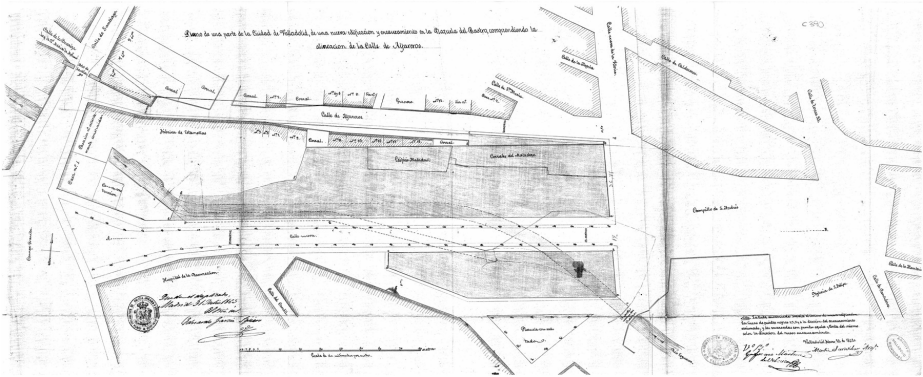


Figure 6. Plan of the new design of the channelling and alignment reorganization (Valladolid Municipal Archive)

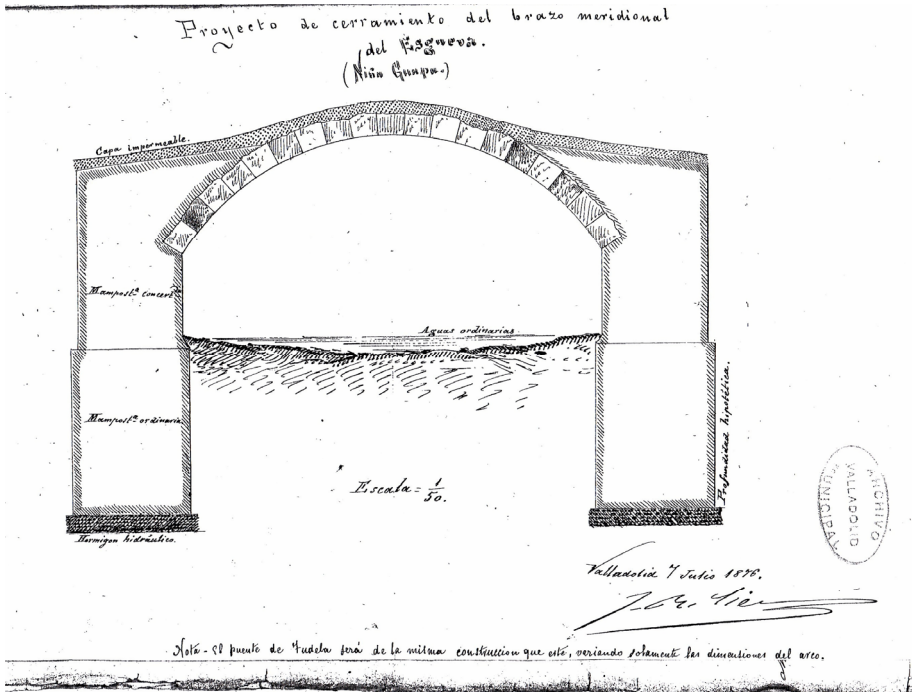


Figure 7. Section of Niña Guapa's Bridge (Valladolid Municipal Archive)



The conditions for the execution of this worksite are now different, because they are referred to hydraulic lime and concrete. The source's quarry for the stone is not be précised, but it is determined its conditions: "La sillería sera de piedra dura sin pelos, blandones, coqueras pasantes ni otros defectos; se labrará de fino en sus juntas y paramentos y se sentará con mortero, sin cuñas de ninguna clase" (The ashlar will be made of hard stone without strand, soft, bore, and no others flaws; it will be carved with broached stonework at joints and mantles, and will be firmed, without any wedges.)

The last vault will be made of stone voussoir:

Las dovelas serán: boquilla = 0<sup>m</sup>40, espesor o arista = 0<sup>m</sup>35, longitud mínima = 0<sup>m</sup>50. La sillería apilastrada se sujetará a las dimensiones que se fijen, siempre que no exceda ninguna pieza de medio m<sup>3</sup>. La sillería común se empleará en hiladas corridas, labrándose y cuajando las juntas 0<sup>m</sup>20 de fondo lo menos.

the voussoirs will be: (lampholder – nozzle – nozzle joint) 0.40m, thickness or groin = 0.35m, minimum in length= 0.50m. The ashlar with stack aspect will be determined by established dimensions while the pieces is not half meter cubic over. The common ashlar will be used to course rows, carving and covering the joints 0.20m depth at least.

In November 1879, the Local Architect, Joaquín Ruiz Sierra, carries out the "Proyecto de cerramiento del brazo meridional del Esgueva en una longitud de 16m agua arriba del Puente del Espolón Viejo" (Project for enclosure of the Esgueva Southern section in a depth of 16m upstream of the Espolon Viejo Bridge) and the "Proyecto de puente sobre el brazo septentrional del río Esgueva para la nueva avenida del Matadero Público"<sup>15</sup> (Project of Bridge over the Esgueva Northern section for the new Avenue of the Public abattoir). In the Bridge Project the vault is made of stone voussoirs, but in the covering of 16 meters the vault is made of bricks again one more time.

In 1883, the Local Architect, J Benedicto, carries out the project for "la construcción de un muro de mampostería en la margen derecha (aguas abajo) entre los puentes de las Chirimias y el de la Virgencilla"<sup>16</sup> (the building of masonry on the right part (downstream) between Chirimias and the Virgencilla bridges). The constructions delayed by lack of budget and these ones weren't approved and started.

Dated in 1884 is the "Expediente para la construcción de un Puente sobre el río Esgueva en el sitio titulado de los Vadillos"<sup>17</sup> (Dossier for the construction of a bridge over the Esgueva in the place called Los Vadillos). This bridge replaces another situated in the same location because the Municipal Architect, J. Benedicto, says: "cuya reparación por su mal estado sería muy costosa y no presenta además la condiciones de amplitud necesarias" (the repair of its bad condition will be very expensive and besides it doesn't have the necessary conditions in width).

In July, 1889, the mentioned J. Benedicto, signs the “Proyecto para la construcción de los muros y embovedamiento para encauzar y cubrir el río Esgueva en una longitud de veinte metros desde el Puente de Argales aguas abajo”<sup>18</sup>. (Project for the construction of the walls and vault to cover and channel the Esgueva in 20 metres length from the Argales bridge to downstream). The dossier contains a full documentation of the project that includes: a report that justifies the dimensions of the vault and the necessary walls. First of all, a load study: The weight of materials and the extra load that will be “La carga de una muchedumbre apiñada” (the weight load of a gathered crowd). That is  $400\text{kg/m}^2$  and after that it is related to the numerical and graphical calculations realized, project, administrative and economic specifications, budget by chapter, work measurements, detailed prices, price and budget by articles, construction and tender cost.

During the execution’s work a modification was realized to build a piling on the right side made by piles from 3,5 to 4,5 metres in length with heads from 18 to 22cm and 12 by lineal metre. This will be made of local wooden included socket and wrought iron ferrule. This will be inserted by machine.

In that year, the named architect wrote the project to channel the Esgueva at the Provincial Hospital back. In this project, J. Benedicto, included calculations about vault and tie bar dimension. **(fig.8)**

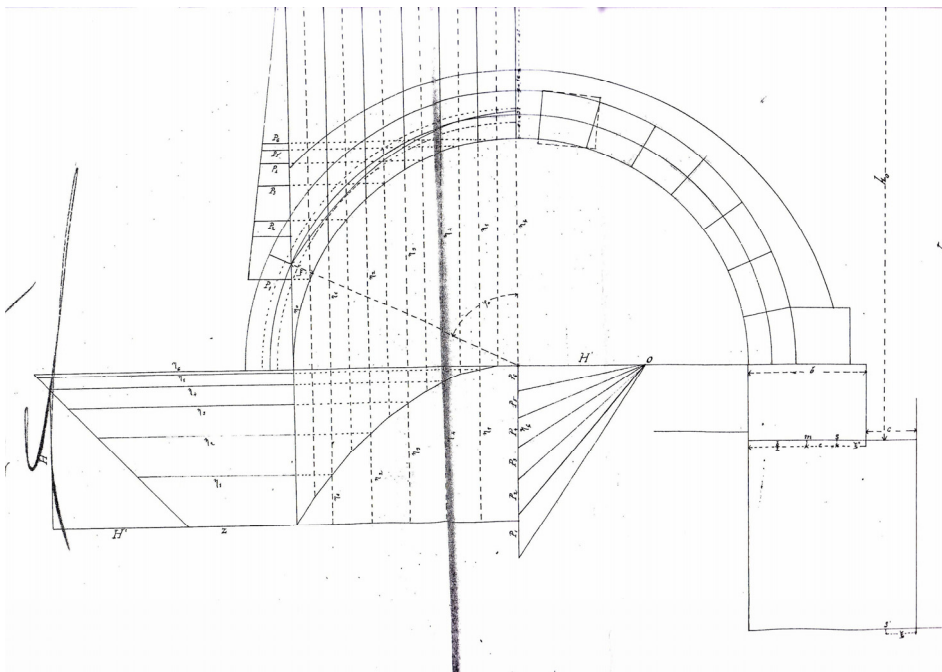


Figure 8. Graphic calculation (Estimate) of the section to cover the Esgueva (Municipal Archive)

## **CURRENT STATE**

All this network has remained in the town subsoil and often comes to light. It is destroyed when a new building makes several floors in the basement. Nowadays, the approach protects the most ancient constructions. About the buildings which are going to be demolished. Studies are made to keep documentation of one of the most important municipal works that were made in Valladolid and monopolized a great part of municipal works-budget during nearly a century.

Works already finished or that are being to carry out at the moment, in land lots below the ancient channellings of the Esgueva's branches, flow and they let the brick walls exposed which were built in due time. These brick walls were made either to build bridges for crossing the riverbed or to cover and build vaults. This mentioned riverbed with the purpose of closing or hiding and so, make passable its surface that covers.

The remains that we have checked, are a loyal reflection of historic, graphic documents and other texts we have found, which we are studying in our current researches.

### **Costanilla Bridge below Platerias Street, land lots of the current numbers, 5, 7, 9, 11, 13 y 15.**

There are historical vestiges of this bridge from the twelfth century. It was located opposite Azoguevo's door and used to take the Simancas Road. There are also survived the remains of covering vaults of the riverbed, were made in later times.

Nowadays there are remains have left exposed due to the works make in these land lots to build multi-storey buildings. We have confirmed the presence of vaults that bore the bridge and another vaults were also made to cover the riverbed.

All seem to indicate that the most ancient construction is this, which is made of stone and is the original bridge to cross the riverbed. The brick vaults are later works executed to repair slight damages in the original and in the works of covering the riverbed.

The bridge is composed of two arches. The Southern measures 6,15m and is wider than the other one that is 3,30m. The bridge vaults are made of ashlar limestone, segmental arch-shaped. The thickness of the brick sardinel vault is about 50cm. Both arch supports are made of masonry limestone and make up the foundation on the ground.

Annexe to the mentioned construction, but dated later, it is another work. This one consists of four vaults, of a single ring course, are made of solid brick in a sardinel bond style. The two outer vaults are built on segmental arch-shaped and the two inner on round arch. The ring course thickness is the

size of the brick rope which are made of, that is about 30cm. The size of the used bricks is 30x14x4cm but these bricks are handmade so sometimes the sizes are not exact.

From the four vaults, the two outer are the most opening. If we call n°1 vault to the Northernmost location and n°4 to the Southernmost, the number one vault has a 1.95m in span. On the one hand it holds on a masonry wall and on the other on a brick arch. And this one, at the same time, it holds on a limestone masonry plinth. The second and third vaults are built with a round arch, and they have 1.5m in span. They are held on the same fulcrum, a mixed bond arch composed of solid brick. The lateral hold are built of brick plinths. The fourth vault, with 2.60m in span, has some similar characteristics to the first vault: masonry wall on the outer side and brick wall on the inner. (fig.10)

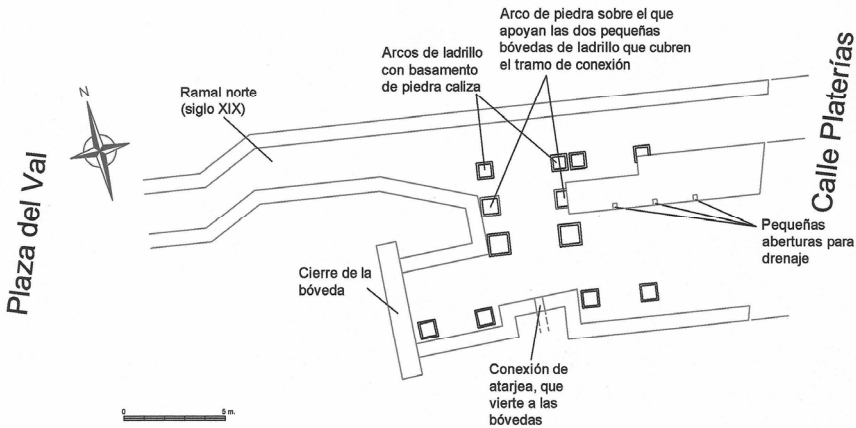


Figure 9. Ground current floor plan of the remains of Costanilla-Platerías Bridge. (STRATO Plan)

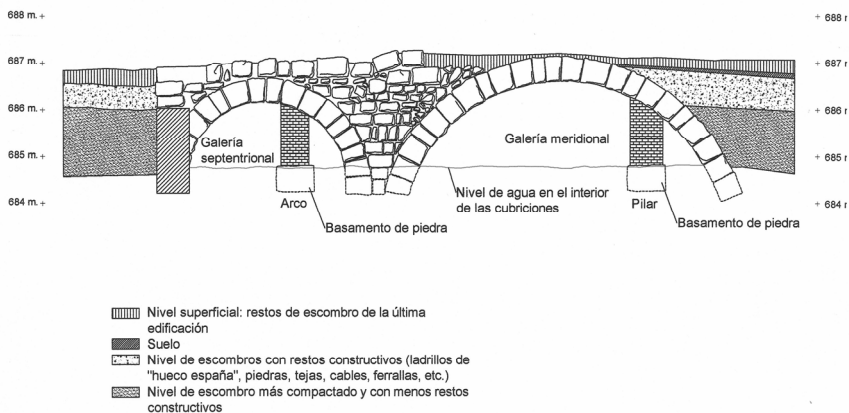


Figure 10. A drawing of the section of the bridge. Detail of ashlar limestone arches. (STRATO Plan)



Figure 11. The Costanilla bridge: one of the arches. View from the basement of a newly-made building (Author's photograph)

### **Bridge below Bajada de la Libertad. Laud lots of the current numbers 15 to 17. Carnicerias Bridge**

Another of the examples which still exists of this main work of bridges, channelling and covering the branches of the Esgueva, is the one that flows crossing the street called Bajada de la Libertad. This section borders on the bridge and abuts on the works mentioned before. Crossing the Cantarranillas towards Val Square. Nowadays, the section that we are commenting on, it is placed below the roadway of this mentioned street, and also a duelling built at the beginning of twenty century, traditional structure, brick loadbearing walls, masonry and framework of pillars, and wooden beam. This building is been demolishing in 2006 to build a new dwelling because of this archaeological studies have been carried out with the purpose of dating the still existing construction, and to make the suitable topographical and photographic survey showed evidence of the conditions in which vaults are.

In order to make this research an upper part of the vault has been demolished to access. Inside it can observe a free zone about 14m in length. From these, 4m belongs to the width bridge.



Figure 12. Current state of what may be Carnicerías Bridge (Author's photograph)

The construction has T-shaped, the room has a size of 10x2.5m, covered by a solid brick vault. In a extreme it is located the bridge, centred with regard to axis, and perpendicular to the room, made of ashlar lime stonework. The room below the bridge has a size of 10x4m

The maintenance conditions of the construction is very good, and the damages only harm to extremes. In one of these ones has been enclosed with solid brick. The reason could be to close water main course and so this keeps slit away within the land lot limits where it is. Watching the scene, it can be guessed the construction goes on much further than this wall. On the other extreme, the wall is made of reinforced concrete, at last times, during public drainage improvement works. These works blocked the riverbed to protect drainage main of landslides.

The vault of the riverbed was built with a round brick vault, a bat and a half brick bend placed at sardinel style. The average thickness vault is about 50cm. Seeing the courses we can appreciate that they are placed, alternately, in a header and stretcher course, obtaining in this way the accurate brickwork joint and bond. The vault holds on rubble ashlar walls to preserve the brickwall of the water contact.

At the end is the bridge vault situated below Bajada de la Libertad Street. The vault is segmented and is made of limestone ashlar. The abutments of the vault are of limestone masonry. The bridge

was probably erected in the XIV century, previous to the covering and channelling of the riverbed. In the confluence of both constructions, it is appreciated that they have been built in different periods. It is observed at the brick vault, the ending of quoing and tothing stone without any union or capping with the bridge vault. In the support zone crests have been built by very irregular limestone masonry, that up to a point make easy the transition from anz area to another one, improving the flooding water through the riverbed.

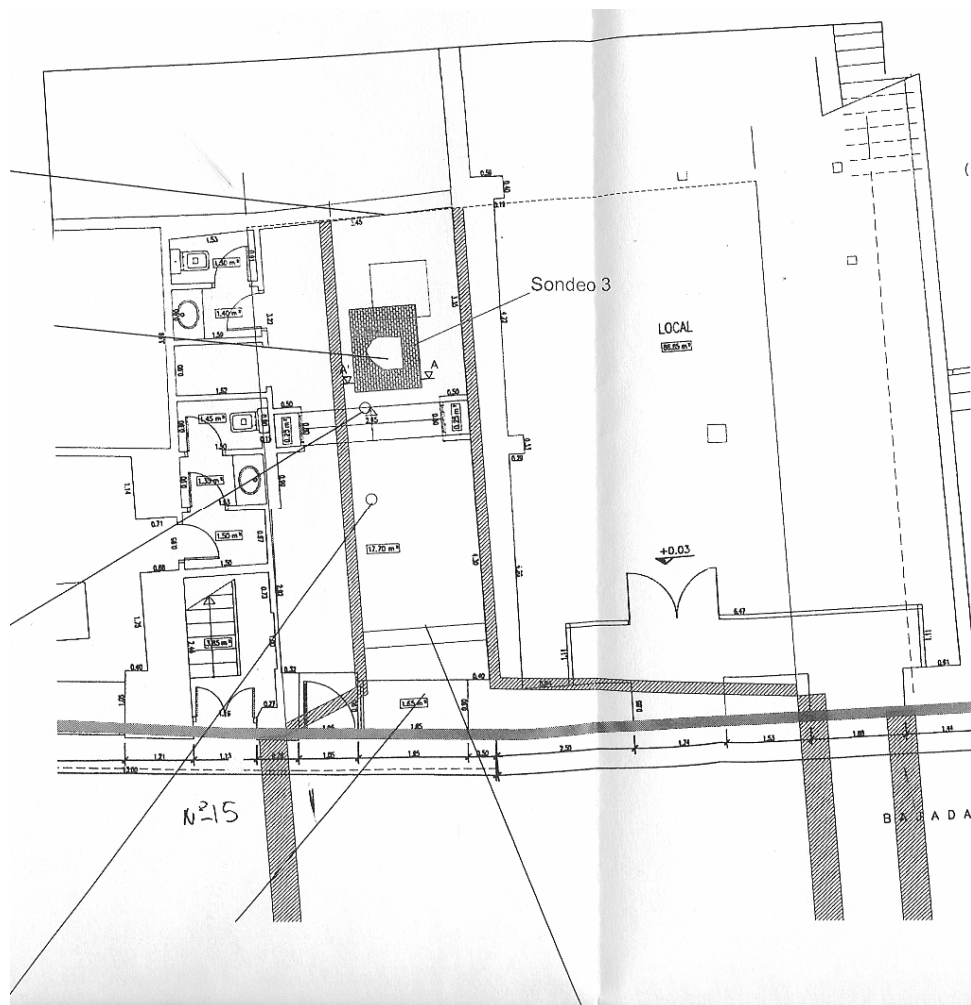


Figure 13. Ground Plan up-to-date of Carnicerías Bridge. (Author's plan)

## CONCLUSION

The conclusions of this research are the following:

- A wide underground network still exists below Valladolid's subsoil, from the Esgueva's ancient riverbed.
- For a long time, this channelling has been the natural intake system of the town, acting as a municipal sewer. These are current deeds which include the right of use of domestic waste to the Esgueva.
- The current weft of this main is a great unknown. Due to this, the network is being damaged little by little. Besides, this is interfering in many works both buildings, municipal drainage and paving.
- The natural riverbed goes on flooding and the water still floods below subsoil where it affects to basements, garages and foundations buildings.

## REFERENCES

- 1 – J.D. del Val. "Un puente sin río", Diario de Valladolid, December 5<sup>th</sup>, 2005.
- 2 – M. Antonia Virgili, 1979. Desarrollo Urbanístico y Arquitectónico de Valladolid (1851-1936)
- 3 – In 1924 the water ran through a great Valladolid zone, being one of the worst flood.
- 4 – Valladolid Municipal Archive (VMA), Box 368, paper 39
- 5 – It is written as the original paper.
- 6 – VMA Box 379
- 7 – VMA Buildings Licence. Paper 540
- 8 – VMA Box 390 Dossier 67
- 9 – VMA Box 389 Dossier 20
- 10 – VMA Box 319 Dossier 147
- 11 – VMA Box 390 Dossier 1
- 12 – VMA Box 390 Dossier 1
- 13 – VMA Box 312 Dossier 181
- 14 – VMA Box 313 Dossier 193
- 15 – VMA Box 314 Dossier 56
- 16 – VMA Box 355 Dossier 84
- 17 – VMA Box 317 Dossier 121
- 18 – VMA Box 319 Dossier 121