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left side: *F. Nadal and A. Nobajas Imago Mundi* 72: 1, 2020

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Bottom of page: Professor Francesc Nadal is Professor in Human Geography in the Department of Geography, University of Barcelona. Correspondence to: F. Nadal, University of Barcelona, Departament de Geografia, Montalegre 6, 08001, Barcelona, Spain. Tel.: (34) 93 4037847. E-mail: fnadal@ub.edu. ORCID: orcid.org/0000-0001-9777-5336 DrAlexandre Nobajas is Lecturer in Human Geography and GIS in the School of Physical and Geographical Sciences, Keele University. Correspondence to: A Nobajas, School of Physical and Geographical Sciences, Keele University, Keele ST5 5BQ, UK. Tel: 44 (0) 1782 734962. E-mail: a.nobajas@keele.ac.uk. ORCID: orcid.org/0000-0002-9670-0188

Cartography and Urban Planning: The City Plan of Barcelona by Miquel Garriga i Roca (1856–1862)

Francesc Nadal and Alexandre Nobajas

ABSTRACT: Due to the passing of Spanish laws that promoted the creation of urban cartography and the need to redevelop an overcrowded city, the Barcelona City Council commissioned the architect Miquel Garriga i Roca in 1856 to create a municipal plan. During the following six years he compiled what is known as the Plan of Barcelona, a collection of cartographical documents that depicts with unprecedented levels of detail how Barcelona appeared right after the demolition of the city walls. This paper explains how and why the maps were commissioned, how they were made, and the resultant cartographical output.

KEYWORDS: urban cartography, urban planning, historic cartography, Barcelona, nineteenth century, Miquel Garriga i Roca, *quarterons*, Plan of Barcelona.

After offering, in 1855, to produce the City Plan of Barcelona as an independent architect, Miquel Garriga i Roca was commissioned in the following year by the Barcelona City Council to carry out a detailed cartographical survey of the city. With this contract the Council aimed to comply at last with the mapping regulations established by royal decree on 25 July 1846. The Council also needed detailed geographical information about the city that could then be used to update Barcelona’s urban space. Since 1847 a number of attempts at creating the required plan had been made, but for various reasons nothing had proved satisfactory, although the multiple surveys generated a wealth of cartographical documentation relating to the city.

 Thus it was not until the beginning of the 1860s that the City Council found itself for the first time equipped with a corpus of detailed cartography and a modern urban plan for their city similar to those already existing in other European cities of the time, such as Paris, Madrid and Genoa. The aim in this article is to trace the long gestation of the plan eventually produced for Barcelona’s project of general urban reform and to highlight the contribution one architect in particular, Garriga i Roca, made to the city’s urban reform (Fig 1).

*A Decade of Plans*

From as early as 1782 the Barcelona City Council had been attempting to improve the quality of the urban fabric of their city. One aspect of their redevelopment projects was the partial realignment of existing streets and the creation of new streets and squares. The focus was on the urban space located within the recently demolished city walls and, consequently, Les Rambles, Princesa Street, and the squares of Sant Jaume and Pla de Palau, but a large number of detailed plans relating to individual plots were also drawn up.[[1]](#endnote-1) Despite these new layouts, though, the intramural maze of narrow, winding, medieval streets that made urban movement difficult and the environment unhealthy persisted.[[2]](#endnote-2)

 Conscious of the need to improve the situation, the liberal leaders of Spain introduced a series of laws for urban reform in all major cities. The first of these was the Compulsory Purchase Law of 17 July 1836 that stated that any remodelling of a city centre required ~~the drawing up of~~  a list of the assets to be expropriated. This would seem to imply the existence of some sort of street plan showing the plots containing the affected buildings.[[3]](#endnote-3) Thereafter followed the municipal laws of 14July 1840 and 8January 1845, both of which permitted city councils for the first time to create and execute plans for changing the layout of their city centres.[[4]](#endnote-4) However, despite granting planning power, the laws provided no procedures for applying them. This lack of regulation was partly solved by another Royal order, enacted on 25July 1846, which required city councils to survey their urban areas on the large scale of 1:1,250 and produce a general plan for the redevelopment of their city’s streets and squares.[[5]](#endnote-5)

 This last Royal order had been inspired by the Napoleonic law of 16September 1807 regarding urban planning.[[6]](#endnote-6) The cartographical model was the *Plano geométrico de Madrid*, surveyed between January 1840 and September 1847 by the civil engineers Juan Merlo, Fernando Gutiérrez and Juan de Ribera.[[7]](#endnote-7) The Madrid plan consisted of a single sheet plan of the capital, drawn at a scale of 1:1,250, accompanied by 580 sheets at a scale of 1:312.5.[[8]](#endnote-8) Thus began a new period in the history of urban cartography in Spain, characterized by the increasing role of city councils in overseeing a type of work that until then had been carried out principally by military engineers.

 When the Royal decree of 25 July 1846 was promulgated, the Barcelona City Council found itself without a plan complying with the new regulations. The best cartographical document available at the time was the *Plano geométrico de la ciudad de Barcelona* created four years before by the city’s architect, Josep Mas i Vila (1779–1855) at a scale of 1:4,000. Mas i Vilas’s plan, however, did not meet the requirements of the Royal order—it was not based on triangulation and the scale of the map was too small to the detail needed for planning the realignment of the old city’s streets.[[9]](#endnote-9)

 Accordingly, the City Council embarked on a decade of works, initiatives and cartographic projects in order to comply with the Royal directives. Nothing ran smoothly. A series of adverse circumstances delayed the production of a satisfactory plan, bringing work to a stop or forcing the cancellation of whatever initiative was in hand. Cost was one factor. When in October 1852 the architects Francesc Daniel Molina and Josep Oriol Mestres submitted the proposal they had been drawing up over the last three months—which included a city plan (at 1:1,250), street plans (at 1:100), their suggestions for new street alignments, and four separate district plans (at 1: 300)—the Council found the estimated total cost of 250,000 billon reals excessive.[[10]](#endnote-10) In May 1854, the mayor of Barcelona established a commission, led by the municipal architect Antoni Rovira i Trias (Barcelona, 1816–1889), with the purpose of creating the city plan at a lower cost. A few weeks later, on 14 June, the architect presented a proposal to buy mathematical instruments (theodolites, chains and other items) costing 5,000 billon reals.[[11]](#endnote-11)

 Another factor was the cholera epidemic that ravaged Barcelona late in 1854, leading to 6,500 deaths in Barcelona alone and putting a stop to the commission’s activities. But even before this public health disaster, overriding political instability had repeatedly hindered municipal intentions to create the City Plan of Barcelona. Between September 1847 and July 1856, Barcelona’s City Council had had eleven mayors, which meant that most municipal governments had neither lasted long nor had any one of them enjoyed a much political support. As a consequence, none was particularly interested in carrying out an ambitious urban policy as expensive as creating and effecting a general plan for the realignment of the streets and squares of Barcelona.

 Perhaps the most untimely episode occurred in 1856, just as Garriga i Roca was in the process of agreeing with Barcelona City Council to take over the production of the Plan of Barcelona survey as he had suggested at the end of the previous year. Negotiations fell apart when a new government was installed (see below), and the city was occupied by the Spanish army in an attempt to quash violent protests and all work on the Plan of Barcelona was held up for another two years.

 When Garriga i Roca proposed to the Barcelona City Council that he should take charge of the required cartography, he was ignoring the fact that earlier in 1855 another Catalan cartographer, the civil engineer Ildefons Cerdà, had already started work on his own *Plano de los alrededores de Barcelona* as part of his attempt to modernize Catalonian urban cartography.[[12]](#endnote-12) Although Cerdà’s map represented an innovation in cartographical technique, strictly speaking it was not an urban plan since only the agrarian land and small villages outside the city were represented; his specific objective was to map the environs of Barcelona in order to plan its future urban growth. However, Cerdà’s triangulation and use of contours to show relief were assets when it came to deciding road alignments and both placed his work above anything done so far by Catalan and Spanish cartographers.[[13]](#endnote-13)

# *Garriga i Roca, Cartographer*

Miquel Garriga i Roca (el Masnou, 1808–Barcelona, 1888 was no novice in urban cartography when he made his offer to the Barcelona Council in 1855 (Fig. 1). He had studied architecture at the Llotja School of Barcelona between 1834 and 1837, and it was there that his cartographical training had begun.[[14]](#endnote-14) A year later, in 1838, he obtained the official title of architect from the Real Academia de Bellas Artes de San Fernando of Madrid. From the beginning of his professional career, he had shown particular interest in cartography, creating, for example, three different types of plan between 1840 and 1847 for the el Masnou City Council.[[15]](#endnote-15)

 Garriga i Roca had been a private investor in the development of the first railway line constructed in the Iberian Peninsula, which linked Barcelona and Mataró.[[16]](#endnote-16) The line was the first of a series of projects that would spur the urban growth of a number of towns, including Barcelona, el Masnou and Mataró. The railway project was completed in 1848, when he was busy, on Treasury orders, on a cadastral survey of el Masnou. Two years later he was commissioned by the Town Council of Martorell, a place located about 30 kilometres northwest of Barcelona, to produce a plan (the *Plano geométrico de la villa de Martorell*). It has to be said, though, that like all Garriga i Rocca’s mapping up to this date, the Martorell plan was a far cry from modern cartographical achievement; for example, it lacked triangulation and contour lines. In this respect, though, his work was no different from that of any Catalonian architect of the 1840s.

*Garriga i Roca’s Plan of Barcelona*

The new plan of Barcelona might have been long in the making but at least, with Garriga i Roca in charge, it represented a new step in the mapping of the city. Any cartographical commission created by the City Council was bound to be competitive, and Garriga i Roca took care to present his project to fullest advantage, not least by promising to complete the work within a year and for a lower price than that demanded some years previously by his competitors. Whereas he anticipated the total cost of his plan to amount to 250,000 billon reals—the same as that estimated in 1852 by Molina and Mestres— he was offering much more for the same cost, notably information on the supply of drinking water and the sewerage and gas networks. His proposal was well received by the City Council, and on the 17April 1856, two sums of 125,000 billon reals each were earmarked to defray expenses incurred in the creation of the Plan of Barcelona.[[17]](#endnote-17)

 As already noted, local political circumstances had halted completion of the agreement between the City Council and Garriga i Roca. Not wishing to remain idle, Garriga i Roca had used the delay to carry out a number of topographical projects related to the main plan. Among these, the *Plano geométrico de la ciudad de Barcelona, su circunvalación y sus afueras* (at 1:1,250) developed between September and October 1857, should be mentioned. To create it, Garriga i Roca designed a six-sided polygon around the city’s old town whose sides served as base lines for all measurement. Later, in 1859, he was able to use these measurements in his triangulation for the Plan of Barcelona.

 The first steps towards the Plan of Barcelona were at last taken at the end of June 1858, when another change of government brought the reformist Liberal Union party to power. Almost immediately, in July, theMadrid government appointed Josep Santa-Maria as mayor of Barcelona. Here was a progressive leader who instantly became interested in Garriga i Roca’s proposal. The final stages of the interrupted negotiations leading to the contract for a geometric plan of Barcelona coincided with the approval on 9December 1858 of a Royal ordinance stating that Barcelona was no longer a military zone and giving a green light for unlimited expansion of the city. Once that was achieved, the City Council could turn its attention back to the redevelopment of the old city and its medieval core.[[18]](#endnote-18) For this, the work already carried out by Garriga i Roca in connection with his various surveying projects, such as the one resulting in the *Plano geométrico de la ciudad de Barcelona, su circunvalación y sus afueras* (1857), was of crucial importance. Finally, after a few technical and economic modifications, the contract between the Barcelona City Council and Garriga i Roca for the Plan of Barcelona was signed on 14January 1859.

 Although commonly referred to as the Plan of Barcelona, the outcome was not a single map but a collection of inter-related cartographical documents that can be classified as nine different types. The first three, signed off by Garriga i Roca as completed on 1 July 1859, consist of (a) five triangulation plans at the scales 1:2,000 and 1:5,000, (b) a 1:1,000 topographical map with 0.5 metre contour lines titled *Plano de Barcelona con el trazado del relieve del terreno y construcción del mismo* (the first map to represent Barcelona’s built up area with contour lines for relief), and (c) four maps representing each of Barcelona’s districts at a scale of 1:500.

 The second batch of documents, signed by Garriga i Roca on 1 March 1861, are the most important since they represent the bulk of the work carried out by him and his team of surveyors. They comprise two types of documents, the first being 118 map sheets at a scale of 1:250 commonly known as *quarterons*, and a second group consisting of 90 geometric floor plans of public buildings at a scale of 1:100 (FIG nos to be decided later). The term *quarteró*—*quarterons* in the plural—refers to large-scale manuscript maps of sections of the city showing the individual plots, with and without buildings. These sections were smaller than the neighbourhoods in an administrative sense, but covered a greater area than a plan of a block (*insula)* containing several buildings. Initially unnumbered, theywere subsequently given a complex geographical reference system. The *quarterons* are not cadastral maps, since they had no tax purpose, but an integral element of urban mapping for a well-defined objective: to provide geographical information of the highest quality essential for the drawing up of a general plan for the re alignment of streets and squares.

 Some months later, on 1 September 1861, Garriga i Roca signed another batch of four urban maps at a scale of 1:500, which include the promised information about water, sewage and gas supplies. Thus, between March and September 1861 he had delivered to the City Council all the cartographical documentation that had been agreed on. From then to the end of 1862, however, Garriga i Roca continued to be busy, completing other cartographical work for the Barceloneta neighbourhood and adapting the finished plans to the new guidelines issued by the Spanish Government on 19 December 1859.

 In August 1862, he signed two more sets of cartographical material, the first a collection of maps related to the Barceloneta neighbourhood that included a 1:2,000 topographical map and an urban property map on a scale of 1:300 on 15 sheets. Another document, consisting of a single map at the scale of 1:2,000, is the *Plano topográfico-geométrico de la Ciudad de Barcelona y proyecto de reforma general.* This had contour lines at one-metre intervals and showed individual urban plots. It also set out Garriga i Roca’s proposal for the reform of the urban centre (Figs. 00 (ex fig 2) and new detail showing contour lines). Finally, on 10 November, in conjunction with the architect Josep Fontserè, he signed 29 transverse profiles of different streets in the city. In completing his handing over of the entire bundle of cartographical documents to Barcelona City Council on 10 December 1862, Miquel Garriga i Roca brought his cartographical work on the Plan of Barcelona to a conclusion. This protracted, two-stage, process of submission explains the common confusion of dates in the modern literature and why the Plan of Barcelona is sometimes referred to as dating from 1861 (when the first documents were signed) and sometimes as dating from1862 (when the last maps were delivered and the overall project concluded).

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# *Garriga i Roca’s Legacy*

The most impressive of the cartographical material Garriga i Roca produced as part of his city plan for Barcelona were the *quarterons*, the plans of urban sections of the city plotted at 1: 250, and the individual building plans. The *quarterons* contained the most detailed and accurate planimetric portrayal of the urban area to that date and in addition to showing the plot outline they gave the age of each building on it.[[19]](#endnote-19) This information was essential for remodelling the city since it allowed the part of the city having buildings in the worst condition, where expropriation would be the most economical method of urban renewal, to be identified (Figs. 00 and 00). Garriga i Roca also created a series of geometric floor plans at a scale of 1:100 for the city’s public and religious buildings. Of the more than 90 that he drew, only 23 have so far been located in local archives (Fig. presently fig 5). However, all the floor plans are shown as an integral part of the *quarterons*, albeit at a reduced scale of 1:250, which does not allow all the original details to be seen.

 For the modern scholar, the value of the large-scale *quarterons* is that they offer exceptionally detailed information about the streets and plots of nineteenth-century Barcelona in areas now changed beyond all recognition.[[20]](#endnote-20) Not only do we see the street layout as it was surveyed, precisely and accurately, but we can also see on the plans the whole urban landscape from the rich inventory of fountains, squares, patios, gardens, canals, jails, railway stations, schools, churches, post offices and much more, almost all accompanied by their place-names.[[21]](#endnote-21) The relevance of this historical data is not confined to historians and researchers. The *quarterons* are of interest to modern companies and public administrators who need to increase their knowledge of the city’s past in order to make better-informed decisions in the context of twenty-first century concerns for the urban environment as well as the efficient running of a modern city. They can be used by lawyers, for example, to settle property boundary disputes or by developers to budget for the possibility of having to deal with archaeological remains on newly acquired plots.

 Our own experience has suggested how, by combining nineteenth-century Catalan maps with current digital cartographic databases, new information can emerge about topics such as changes in land use, population density, urban street networks and public spaces.[[22]](#endnote-22) The *quarterons* can be similarly revealing. By integrating them into a Geographical Information System (GIS), the geometrical quality of Garriga i Roca’s work can be assessed and compared with the current cadastral geographical database, an exercise that exposes the high quality of his later work, especially when compared with that of his earliest plans (Fig. 6). [[23]](#endnote-23) This level of accuracy shows the vast technical improvements that Catalan map-making experienced around the middle of the nineteenth century; the geometrical aspects of other cadastral maps created during those decades do not match nearly so well with the modern cartographic database..[[24]](#endnote-24)

 Paradoxically, in contrast to today’s interest in all aspects of Garriga i Roca’s Plan of Barcelona, his plan for street realignment had little impact at the time. It was not adopted by the City Council for the modernization of Barcelona’s streets and squares since it was considered overly ambitious.[[25]](#endnote-25) Some years later, with the passing of a new expropriation law in 1879, the City Council invited tenders for another project for remodelling the area by then known as the Old City, Garriga I Roca together with Gaietà Buïgas, another architect, presented a new plan. This too was found unacceptable by the City Council, for reasons that remain unclear pending further research, although it is known is that the project included no new or updated mapping of the urban area.

 Eventually, in 1889, after protracted administrative procedures in Madrid the winning project was announced. Instead of Garriga i Roca and Gaietà Buïgas’s plan of 1880, the City Council had selected a design by the architect Àngel Josep Baixeras i Roig (Barcelona, 1834–1892). Even now, though, implementation of the improvements advocated by Baixeras i Roig was partial and slow in coming. Only three new streets (Via Laietana and the avenues Cathedral-Cambó and Drassanes) were created, instead of the entire old city being remodelled. By the time the first effective steps in carrying out the new plan were being taken, in 1908, Garriga i Roca had been dead for twenty years.[[26]](#endnote-26) Nevertheless, the city architect of the day, Pere Falqués i Urpí, made use of the *quarterons* Garriga i Roca had produced between 1859 and 1861 when expropriating buildings affected by the construction of one of the most ambitious concepts of Barcelona’s intra-mural refurbishment. This was a new street, the Gran Via A (now Via Laietana), which connected the newly developed Eixample district with the harbour. Its construction required the demolition of hundreds of buildings and the displacement of thousands of people.[[27]](#endnote-27)

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Notes and References

MAL: I have been wondering all through these notes if the references to unpublished documents are correctly presented. The titles should not be italicized, surely, as for books? Inverted commas, perhaps? CDS

1. Marina López, ‘Plànols municipals d’alineació. Barcelona en el context europeu, segles XVIII–XIX’, *Treballs de la Societat Catalana de Geografia* 77 (2014): 109–31; Marina López, ‘Els plànols d’alineació de carrers a Barcelona, 1772–1817’, in *Estudis sobre la cartografia de Barcelona, del XVIII al XXI: els mapes d’una ciutat en expansió*, ed. Ramon Grau and Carme Montaner (Barcelona, Ajuntament de Barcelona and Institut Cartogràfic i Geològic de Catalunya, 2014), 74–93. [↑](#endnote-ref-1)
2. Ferran Sagarra, *Barcelona, ciutat de transició (1848–1868). El projecte urbà a través dels treballs de l’arquitecte Miquel Garriga i Roca* (Barcelona, Institut d’Estudis Catalans, 1996), 121–41; Marina López, ‘La política urbanística a Barcelona. Una década decisiva, 1851–1860’, in *Cerdà i Barcelona. La primera metròpoli, 1853–1897*, ed. Marina López (Barcelona, Museu d’Història de Barcelona, 2010), 14–25. [↑](#endnote-ref-2)
3. López, ‘La política urbanística a Barcelona’ (see note 2), 14–25. [↑](#endnote-ref-3)
4. Ricardo Anguita, ‘La planimetría urbana como instrumento para la transformación de la ciudad en el siglo XIX: la incidencia de los planos geométricos de población en España’, *Boletín del Instituto de Estudios Giennenses* 169 (1998): 567–70; Francesc Nadal, ‘Reformismo liberal y cartografía urbana municipal en la España del siglo XIX’, in *Historia de la cartografía urbana en España: modelos y realizaciones*, ed. Luis Urteaga and Francesc Nadal (Madrid, Instituto Geográfico Nacional, 2017), 357–86. [↑](#endnote-ref-4)
5. Anguita, ‘La planimetría urbana’ (see note 4), 570; Mariano Calvo y Pereyra, *Arquitectura legal: tratado especial de las servidumbres legales y sus aplicaciones en las construcciones civiles* (Madrid, Carlos Bailly-Ballière, 1873), 383–408; Martín Bassols, *Génesis y evolución del derecho urbanístico español (1812*–*1956)* (Barcelona, Editorial Montecorvo, 1973), 99–127. [↑](#endnote-ref-5)
6. Anguita, ‘La planimetría urbana’ (see note 4), 571. [↑](#endnote-ref-6)
7. Alonso Mora Palazón, ‘El plano de Madrid de 1849, declarado Plano oficial de la villa’, *Boletín del Instituto de Estudios Giennenses*, 169 (1998): 553–62; Javier Ortega Vidal, ‘Los planos históricos de Madrid y su fiabilidad topográfica’, *CT/Catastro* 39 (2000): 77–79. [↑](#endnote-ref-7)
8. The reason for such an unconventional scale, with its decimal point, is that the survey was conducted before the metric system had become obligatory in Spain and surveying was still based on traditional units. In the case of the Madrid plan, these convert to a metric scale of 1:312.5. In fact, though, when this is reduced four-fold, the scale works out at 1:1,250. [↑](#endnote-ref-8)
9. MS Ayuntamiento de Barcelona, Expediente relativo al levantamiento del plano geométrico de la población y sus arrabales (Barcelona, Arxiu Municipal Contemporani de Barcelona, 1847–1866, RAP 987 3/1 peça 1), 38–39 [manuscript containing information from the City Council regarding the City Plan of Barcelona’s surveying]. [↑](#endnote-ref-9)
10. Ibid., 65. A billon real was a royal coin made from a silver and copper alloy. In the mid-19th century the average daily wage of a surveyor in Barcelona was 30–40 billon reals and the salary of an engraver was 16 billon reals, so 250,000 billon reals was a high amount. See Francesc Nadal, Luis Urteaga and José Ignacio Muro, *El territori dels geòmetres. Cartografia parcel·lària dels municipis de la província de Barcelona (1845*–*1895)* (Barcelona, Institut d’Edicions de la Diputació de Barcelona, 2006), 47–49. [↑](#endnote-ref-10)
11. MS Ayuntamiento de Barcelona,Expediente relativo al levantamiento del plano geométrico … ~~de la población y sus arrabales~~ (see note 9), 116. [↑](#endnote-ref-11)
12. Carme Montaner, *Mapes i cartògrafs a la Catalunya contemporània (1833–1941). Els inicis i la consolidació de la cartografia topogràfica* (Barcelona, Rafael Dalmau editor and Institut Cartogràfic de Catalunya, 2000), 47–49; Ramon Grau, ‘Conèixer per transformar. L’empresa cartogràfica d’Ildefons Cerdà, 1854–1865’, in Grau and Montaner, *Estudis sobre la cartografia de Barcelona* (see note 1), 94–119. [↑](#endnote-ref-12)
13. Between 1823 and 1827, while occupying Barcelona in its attempt to restore the Bourbon’s absolutist regime in Spain, the French army had produced a detailed map of the military area of the city on a scale of 1:1,000 that included contour lines. The military importance of this map, however, meant it was kept secret, and the Catalan cartographers did not know of its existence. See Francesc Nadal and Carme Montaner, ‘El Lever-nivelé de la place de Barcelone (1823–1827): un gran salt qualitatiu en la representació cartogràfica de l’espai barceloní’, in *Mapes i control del territory a* *Barcelona. Vuit estudis*, ed. Ramon Grau and Carme Montaner(Barcelona, Ajuntament de Barcelona and Institut Cartogràfic i Geològic de Catalunya, 2016), 44–67. [↑](#endnote-ref-13)
14. Garriga i Roca’s teacher was the architect Josep Casademunt. Casademunt had introduced ‘Monge’s method of orthographic projections’, developed by the French mathematician Gaspard Monge (1746–1818), to Catalonia, where it was found to be of great use in surveying and map making. Josep M. Montaner i Martorell, *La modernització de l’utillatge mental de l’arquitectura a Catalunya (1714*–*1859)* (Barcelona, Institut d’Estudis Catalans, 1990), 697; Sagarra, ‘Barcelona. Ciutat de transició’ (see note 2), 51. [↑](#endnote-ref-14)
15. The first of these maps was the *Plano iconográfico del pueblo del Masnou con espresión de los nombres de las calles*, made in 1840 on the orders of the Town Hall, which wanted to regulate the growth of the urban centre. In 1844, Garriga i Roca produced a second version of the plan updating the urban data. Later, in 1847, in order to fulfil the Royal order of 25 July 1846, he made a third plan, the *Escenografía e iconografía o plano geométrico del pueblo del Masnou*. See Albert Garcia i Espuche and Manuel Guàrdia i Bassols, *La construcció d’una ciutat: Mataró, 1500*–*1900* (Mataró, Patronat Municipal de Cultura de Mataró and Editorial Alta Fulla, 1989), 179–80 and 339–40; Francesc Nadal, ‘Miquel Garriga i Roca i el plànol de Barcelona, (1856–1862)’, *Quaderns del Seminari d’Història de Barcelona* 26 (2011): 23–24. [↑](#endnote-ref-15)
16. Nadal, Urteaga and Muro, *El territori dels geòmetres* (see note 10), 51–53. Mataró, which lies 50 kilometres northeast of Barcelona, was an important manufacturing centre at the time of the construction of the railway line. [↑](#endnote-ref-16)
17. MS Ayuntamiento de Barcelona, ‘Expediente’ (see note 9), 121–24. [↑](#endnote-ref-17)
18. Glòria Santa-Maria Batlló, *Decidir la ciutat futura. Barcelona 1859* (Barcelona, Museu d’Història de Barcelona, 2009), 39–42. The expansion of the city was based on the urban project designed by Cerdà and in whose realization he was working between 1855 and 1859. Garriga i Roca had also submitted a plan for the expansion of the old centre but this was disqualified from consideration because he missed the deadline owing to the death of one of his children. [↑](#endnote-ref-18)
19. Alexandre Nobajas, ‘Historical cartography as a tool to study urban change. The case of Garriga i Roca *quarterons*’, *Treballs de la Societat Catalana de Geografia* 77 (2014): 205–20. [↑](#endnote-ref-19)
20. Since the production of the Plan of Barcelona the city’s old town has undergone significant changes. Large religious buildings have been demolished, the city has been bombed on several occasions, and it has been changed by urban reforms such as the opening of the Via Laietana and the Rambla del Raval. The Plan of Barcelona provides a window on to the details of the city’s past. See Miquel Fernandez, ‘El asedio al Raval: una aproximación al pasado y presente de las transformaciones urbanísticas del barrio barcelonés’, *Oñati Socio-Legal Series* 1:2 (2011): 1–25. [↑](#endnote-ref-20)
21. Nobajas, ‘Historical cartography (see note 19)’, 205–20. [↑](#endnote-ref-21)
22. Alexandre Nobajas and Francesc Nadal, ‘From historical map to online 3D recreation: the 1861 cadastral map of Horta (Barcelona)’, *Cartography and Geographic Information Science* 42:3 (2015): 211–23. [↑](#endnote-ref-22)
23. For an example of one such technical excersise see <http://darreramirada.ajuntament.barcelona.cat> developed by the Barcelona’s City Council in 2015 (accessed 18 Aug 2019). [↑](#endnote-ref-23)
24. Nobajas, ‘Historical cartography’ (see note 19), 205–20. [↑](#endnote-ref-24)
25. Joan Molet i Petit, ‘Entre conservació i modernització: l’esventrament del centre urbà’, *Barcelona Quaderns d’Història* 8 (2003): 241–43. [↑](#endnote-ref-25)
26. Adolfo Florensa ‘Cartografia local. Planos de reforma interior de Barcelona’, *Memorias de la Real Academia de Ciencias y Artes de Barcelona* 19 (1961): 521–26; Joan Fuster, Antoni Nicolau and Daniel Venteo, eds., *La construcción de la Gran Barcelona: l’obertura de la Via Laietana 1908–1958* (Barcelona, Museu d’Història de Barcelona, 2001), 5–187. [↑](#endnote-ref-26)
27. Pere Falqués i Urpí, *Reforma y mejora del interior de Barcelona. Planos de adaptación para la apertura de las tres grandes vías A-B-C* (Barcelona, Arxiu Contemporani Municipal de Barcelona, 1907, P.C. Caixa 33). [↑](#endnote-ref-27)