

Practice, Empiricism and Science Inside the Corpo Degli Ingegneri Pontifici. The Activity of Giuseppe Della Gatta in the District of Ancona (1817-1836)

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ABSTRACT: In 1817 Pope Pio VII passed an administrative reform which reorganized the sector regarding waters and roads in the Papal States. In this reform, he established the institution of the "Corpo degli Ingegneri Pontifici di Acque e Strade" resuming the organization of the *Bureau des Ponts, arges et travaux publics* appointed to control the management of roads, waters and buildings in Rome and in entire Papal States during the Napoleonic occupation. After examining the 345 *curricula* presented in 1817 for a competition to select 83 engineers to form the new Corps, and following the activity of Giuseppe Della Gatta, recruited as head of the District of Ancona, this study wants to stress the contemporary presence of empiricism and science in the training/professional career and daily practice of the engineer. Consequently, the study tests in detail works realized by Della Gatta in Ancona's port, and on bridges, roads, coasts and buildings of that province.

INTRODUCTION

On 23 October 1817, by *motu proprio*, Pope Pius VII promulgated an administrative reform - conceived by his Secretary of State Cardinal Ercole Consalvi - which reorganized the sector regarding waters and roads in the Papal States. The main feature of this reform was the institution of the "Corpo degli Ingegneri Pontifici di Acque e Strade".

This body resumed the organization of the *Bureau des Ponts, arges et travaux publics* appointed to control the management of roads, waters and buildings in Rome and in the entire Papal States during the Napoleonic occupation.

The *motu proprio* of 1817 devoted to the *Istituzione e regolamento del Corpo degli Ingegneri Pontifici di acque e strade* the whole third part into which it had been divided, dealing, in title VI, *Istruzione e scuole*, with the setting up of a scholastic structure for the preparation of papal engineers. The model for this school was based on the *École des Ponts et Chaussées*, founded in Paris in 1747 by Charles Trudaine and Jean Perronet, the first in Europe to be in charge of training engineers to be employed in the context of the State Administration's technical departments.

The initial recruitment was carried out by a competition for eighty-three engineers, launched by Cardinal Consalvi on 24 October 1817, which attracted three hundred and forty-five candidates. Their *curricula* were duly verified and examined, and on 31 January 1818 Consalvi signed the first *Elenco degli Ingegneri Pontifici di Acque, e Strade distribuiti per ciascun servizio, a cui si trovano destinati, e loro rispettive attribuzioni*. Just two years later, on January 1st 1820, the cardinal sent Viviano Orsini, Chairman of the Road Service, the final *Pianta del Personale di Servizio di Acque, Strade e Fabbriche* with the names of the engineers selected and the posts and offices assigned to them.

An analysis of the *curricula* provides a meticulous picture of the candidates' training, highlighting the quality of their theory studies, carried out with celebrities of the scientific world, including the mathematicians François Jacquier (1711-1788), Gioacchino Pessuti (1743-1814), Giuseppe Calandrelli (1749-1827), Andrea Conti (1777-1840), Giuseppe Oddi (1759-1840), who also specialized in mechanics and hydraulics, and the physicist-chemist Feliciano Scarpellini (1762-1840).

With regard to the candidates' professional activities prior to the competition, there was a substantial preponderance of Romans acceding to both appointments and assignments within the State administration and the

curial hierarchy. The importance assigned to training, especially if carried out under professionals of unquestioned renown, emerges from the candidates' certificates, among which a fair number, by way of example, state that they had assisted the hydraulic engineer Andrea Vici (1743-1817). Vici's ten-year activity had not been interrupted by the French government and, on the contrary, his technical competence had been recognized in monitoring and managing the water supply and the navigability of the rivers, and he had been assigned the post of chief engineer for road, bridge and navigation and harbor works, in the two departments of the Tiber and the Trasimeno.

The distinguished *curriculum* presented to the competition in 1817 by the seventy-one-year-old lieutenant-colonel of the Papal Navy, Giuseppe Castagnola, provides an almost exaggerated example of a training and professional profile gained, like those of many younger candidates, within the armed forces.

The absence of Giuseppe Castagnola, lecturer in hydrography since 1767, among the candidates selected, depends exclusively on his death, although his merits must have impacted the acceptance of his son Luigi's application, to whom, as a 2nd class engineer, were entrusted the works of the harbour of Civitavecchia and its district.

While the *curriculum* of Luigi Castagnola (ca. 1777-?) is based on the Navy, otherwise is the training profile of the Roman Giuseppe Della Gatta (ca. 1779-1836), he too one of the candidates selected from the 1817 competition and incorporated in the Papal Corps as an 'ordinary second class engineer'.

A year younger than Luigi, Della Gatta took over the management of the Ancona district, assisted by the aspirant engineer Luigi Orioli, with the special mandate of harbour maintenance, a duty that was, however, subordinate to the Chief Engineer for *Cameralli* Hydraulic Works, Ludovico Linotte.

Following the activity of Giuseppe Della Gatta, this paper aims to stress the contemporary presence of empiricism and science in the training/professional career and daily practice of engineers. Consequently, the study entails detailed tests of works realized by Della Gatta at the port of Ancona, and on bridges, roads, coastal areas and buildings of that province.

GIUSEPPE DELLA GATTA: TRAINING AND PROFESSIONAL CAREER

From his 1817 application, Della Gatta's schooling does not appear to have been specifically technical. Indeed, having passed his 'academic certificate' at the end of his humanities course in Rome at the Collegio Calasanzio, he won two prizes at the Accademia del Nudo on the Capitol and studied architectural theory and practice with the architect Giuseppe Barberi (1746-1808).

At the same time, he had brilliantly passed his physics and mathematics examinations at the Collegio Romano, studied military architecture and acquired knowledge in both theory and practice in bridge and road works and contract works, and road building and maintenance. A familiarity achieved under the architect Giuseppe Camporese (1761-1822), who had selected him as his assistant "in the most arduous professional operations, carried out not only in the countryside of the Papal States, but also abroad".

It was, however, under the French administration that Della Gatta's experience in public works grew, having obtained – also thanks to the intercession both of the son of Giuseppe Barberi, Paolo Emilio, and of the architect Andrea Vici – the appointment of Engineer of Bridges and Roads, seconded to the Navy, and the assignment of directing and managing hydraulic and civil works at the two harbours of Civitavecchia and Anzio. During his early years with the Papal Corps, Della Gatta almost certainly had the chance of vying with his colleague Luigi Castagnola in perfecting the machines used for dredging the two ports of Civitavecchia and Ancona. Documentation for this is provided by the drawing *Piano di una Piatta per trasportare i grossi scogli* (*Plan of a Barge for the Transport of Large Rocks*), dated Civitavecchia 24 March 1819, signed both by Luigi Castagnola, Ordinary Engineer in charge of the hydraulic works at the port, and by Engineer Della Gatta.

The Papal authorities' attention to the commercial development of the Adriatic port, re-established as a free port in 1823, led to the constant maintenance of the seabed, breakwaters and wharfs, documented by routine 'piani di esecuzione' and drawings concerning the sounding of the seabed (Fig. 1), an activity carried out by Della Gatta from 1818 to 1836, the year of his death, making attempts to procure the modernization of both the machinery available and the premises connected with harbour activities.

As early as spring-summer 1818, he signed numerous reports relating to the materials needed for repairing the 'pontoni', platforms equipped for draining and dredging the harbour seabed. Besides repairs to existing tools, the engineer engaged in inventing more up-to-date machinery, such as: the machine for dredging the Ancona harbour seabed to free it from the hardest sediment in the stretches neighbouring the 'Portelle' and 'Moletti', designed in 1820 (Fig. 2); the vessel used for collecting sludge, invented in 1822 and, again, the implement for demolishing a rock on the Ancona harbour seabed, conceived in 1829 (Fig. 3).

As early as 1818, the repair of the machinery, started in April, was followed in May by a schedule for restoration works on the piers between the bastions of S. Primiano and S. Agostino. The rebuilding of the wharfs was essential owing both to their function as commercial landings, and to the integrity of the adjoining buildings and city walls. In this specific case, by way of example, Della Gatta planned the make-good of the ruined parts, through the following phases:

a) using a 'Barcaccia' (longboat) the slabs of Istria stone that had fallen into the water were recovered for reuse, after being newly squared;

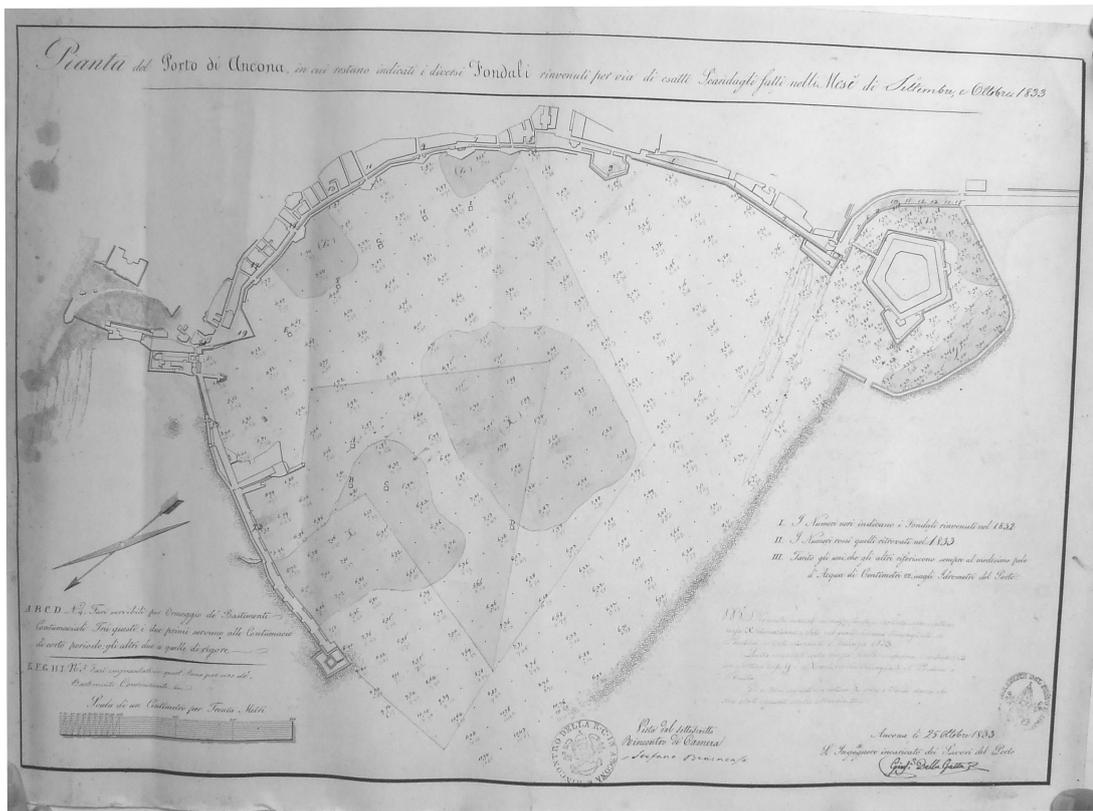


Figure 1: Giuseppe Della Gatta, 25 October 1833, Pianta del Porto di Ancona in cui restano indicati i diversi Fondali rinvenuti per via di esatti Scandagli fatti negli Mesi di Settembre e Ottobre 1833; (ASAn, Archivio Comunale di Ancona, b. 6280)

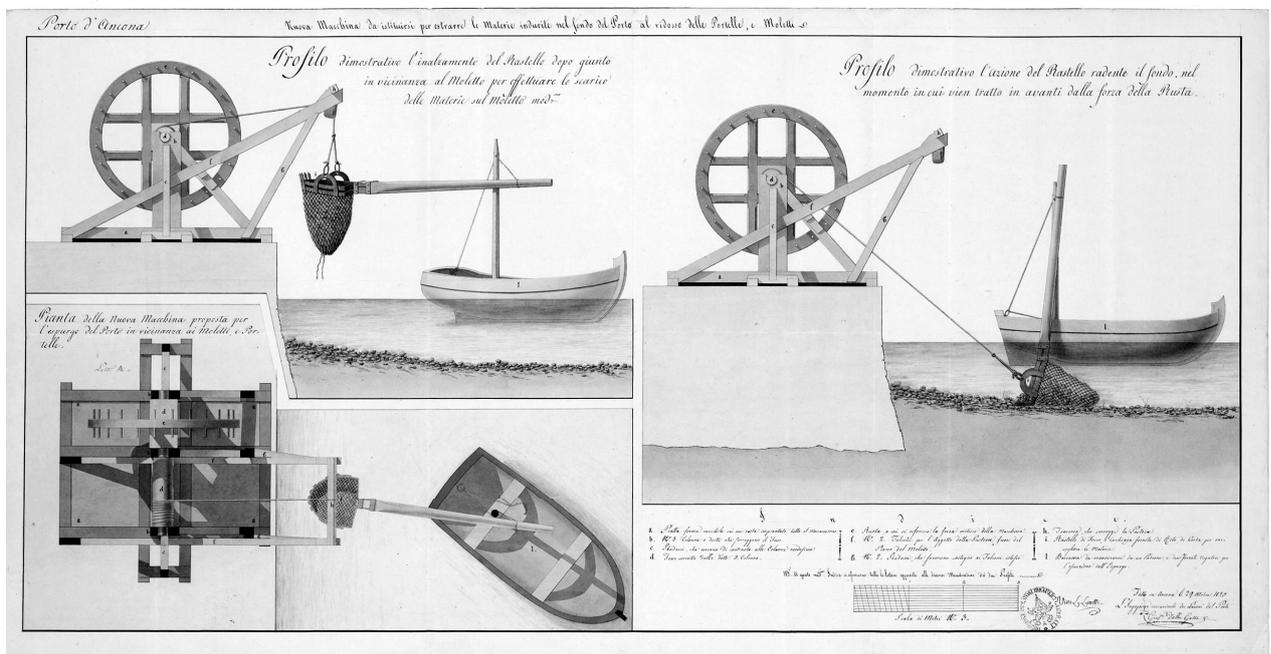


Figure 2: Giuseppe Della Gatta, 29 October 1820, Nuova Macchina da istituirsi per estrarre le materie indurite nel fondo del Porto al ridosso delle Portelle e Molette; (ASR, Disegni e Pianta, coll. I, cart. 128, n. 40)

b) using an iron 'Rastrellone' (rake), acting as a plough guided by two men, placed on a boat and equipped with winches and a pole, the seabed was cleared of all obstacles along a line parallel to the stretch of the wharf involved;

c) having cleared the seabed, he continued by creating 'Paratie' (bulkheads), built using piles or 'Gradizze' linked by double 'Traversoni' (crosspieces) and 'Tiranti' (tie-beams), plastering the internal face with 'Tela bat-

tuta' . Subsequently, they were filled with 'fine' aggregate, lime and pozzuolana compacted in layers with a 'Mazzabecco' (hand rammer).

To anchor this reinforcing to the existing structure, prior cuts were made in the latter in the form of connecting 'denti' (teeth). Once set, the work was completed by installing the slabs of Istria stone to define the 'ciglio' (edge) and with cobblestones for the level part.

Della Gatta's interventions on harbour architecture are of little importance. Of these, in 1819, he completed the construction on the Molo Clementino of the new health office, in front of which, two years later, he built a wharf to make the landing of vessels safer. The Molo Clementino was an extension of an artificial branch toward the sea, beyond the Arch of Trajan, created by Luigi Vanvitelli at the request of Pope Clement XII (1730-1740). Vanvitelli's project, featuring an imposing pentagonal lazaretto, was started in the early thirties of the eighteenth century, and continued in 1746 with the creation of the circular breakwater in front of the lazaretto and slowly completed under the direction of the architect Carlo Marchionni and his son Filippo during the pontificate of Clement XIV (1769-1774).

In 1820, Della Gatta drafted the plan for the building of a boat-shed, i.e. a small dockyard, located on the beach known as Ciaccio: by making a cut in the inner harbour, vessels could transit from the new dockyard to the canal that surrounded Vanvitelli's lazaretto.

The lazaretto underwent continuous maintenance interventions, and in May 1824 Della Gatta designed, and then implemented, an extension of the so-called 'dirty' lazaretto, meaning the extant building at "Baluardino al Nord-Ovest del Lazzaretto" where infected people quarter in contumacious.

Besides harbour operations, the engineer was also responsible for the efficiency of the town's defences – or rather, customs installations – which had almost wholly disappeared. These ringed the town, running toward the sea along the artificial gulf, situated between the lazaretto and the Molo Clementino, and continuing along the latter up to the light house (Fig. 4). Gates, wickets, ramparts and walls subject to tides and bad weather were subject to constant and routine maintenance. Particularly effective, by way of example, was the engineer's reaction to the abundant rainfall at the end of September 1823. The rainfall had caused considerable damage to Porta Pia, the town's monumental gate, built by Filippo Marchionni in homage to Pope Pius VI between 1787 and 1789; located in front of the bridge giving access to the lazaretto, it was protected by the bastion of S. Lucia, which no longer exists (Fig. 5).

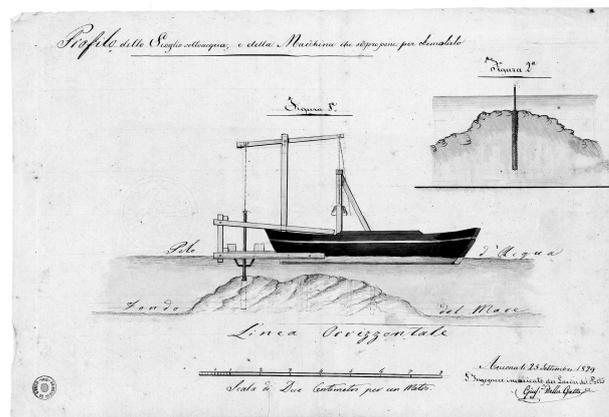


Figure 3: Giuseppe Della Gatta, 25 September 1829, Profilo dello Scoglio sottacqua e della Macchina che si propone per demolirlo; (ASR, Disegni e Piante, coll. I, cart. 128, n. 46)



Figure 4 (left): Ancona, Molo Clementino. Portion of walls with in the foreground the Arch of Trajan and behind the Arch of Clement XII; (photo by author); Figure 5 (right): Ancona, gulf with background Porta Pia and lazaretto; (photo by author)

The engineer verified that during the said excavations, wooden props had been installed with a view to constructing ambulatories that would leave the Roman substructure visible. These temporary works, abandoned for years, were found to be completely rotten. Della Gatta indicated two different solutions for consolidation: the first consisted of backfilling the excavation with compacted layers of soil and building a retaining wall at its mouth (letter "A" on the plan); the second solution – which he preferred – envisaged the construction of seven pillars (united by a curtain wall) on which four arches would support a barrel vault, whose inner side would rest on the ruin (cf. Fig. 6).

The engineer was responsible for the *fabbriche camerale*, and also kept himself busy in maintaining and making several major transformations both to the fourteenth century Apostolic Palace of Ancona (of the Government), transformed various times and seriously damaged during the Second World War, and to the no-longer-existent Santa Palazia, part of which, starting from 1820, he adapted as a prison.

For the Papal Engineer, transforming parts of or whole buildings into prisons, as well as their continual maintenance, constituted a major task, also because it extended over the whole district. This is demonstrated by the numerous surveys he made, as early as 1820 to 1825, including the prisons of Montecarotto, Staffolo, Filottaro, Arcevia, Iesi, Montemarciano, Montalboddo, Offagna. His surveys were, moreover, subject to checks made by inspectors, as in the case of the prison of Montecarotto, a small town located on the spur between the upper valley of the River Misa and that of the Esino. Della Gatta's 1823 design was criticized by the architect Giuseppe Valadier, then Inspector of the Fabbriche Camerale (Fig. 8).

Still more demanding for the engineer was, however, the public works sector relating to the control of roads and waters in a given area, such as the portion of the Marche monitored by Della Gatta, characterised by torrents with irregular flows. Rivers that, like the Esino, the Musone and the Misa, flow close and almost parallel to each other from west to east, debouching into the Adriatic, with their wide alluvial valleys.

During his entire mandate, the Papal Engineer directed works of "grosse riparazioni" (important repairing) along the provincial Clementina road and some of its branches. The road, built by Clement XII as part of his plan for upgrading the port of Ancona, aimed at improving communications with the hinterland and at boosting commercial traffic with the seaport. Its route described a link from the Flaminia, reaching first Fabriano and then, following the Esino valley, the towns of Iesi and Chiaravalle as far as the sea.

Road conditions worsened during the winter months, when the waters of the various torrents burst their banks and flooded the carriageway, damaging the provincial and state wooden bridges. Such damage was often linked to the 'pennelli' (groynes) installed to safeguard the river banks, whose position, moreover, was often against the interests of the various owners of the farmland bordering on the watercourses.

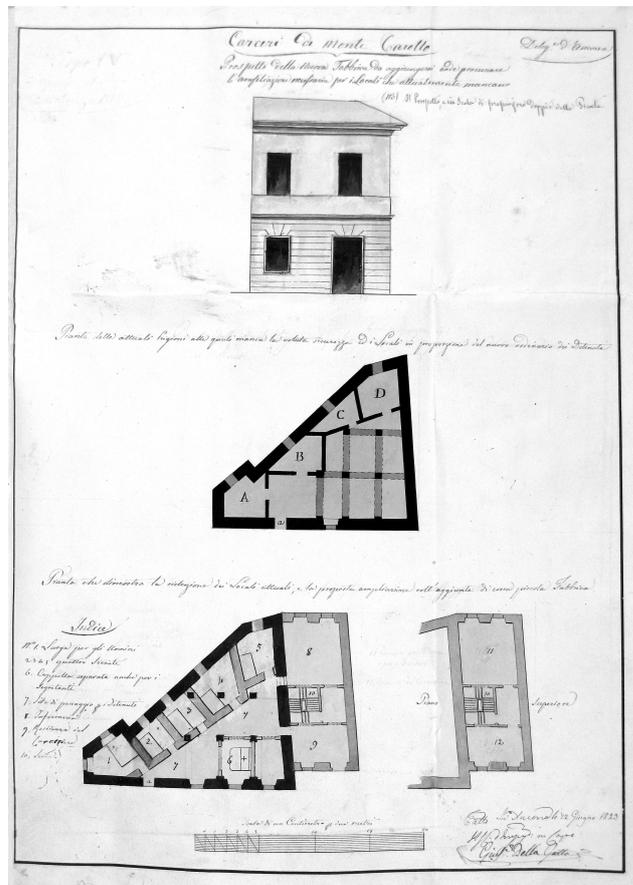


Figure 8: Giuseppe Della Gatta, 22 June 1823, plan attached to Piano di Esecuzione per la riforma, ed ampliamente delle Carceri di Monte Carotto, compresa la costruzione di un nuovo Corpo di Fabbrica necessario per l'Infermeria, e per l'Abitazione del Carceriere; (ASR, Computisteria Generale, div. I, b. 3, f. 17)

In this connexion, particularly demanding for Della Gatta, was the control of the River Esino whose course descends from Monte Cafaggio through gorges and channels, lapping first of Iesi and then Chiaravalle, then opening into a wide valley bottom as far as the Adriatic sea, slightly to the south of Rocca Priora.

Between the end of 1820 and early 1821, Della Gatta signed the order to raise the groyne by roughly 1.4 m on a 53 m stretch safeguarding the right embankment of the bridge on the River Esino, in the township of Falconara, close to the mouth, and surveyed the course where it flanked the provincial road between Iesi and Macerata.

In his survey, the engineer marked the various palisades constructed along the river's course, accurately identifying the names of the landowners who had raised them to protect their lands. Such precision was an answer to the numerous disputes among the various landowners, and in particular between Count Vincenzo Tosi and the Pasquinelli brothers, which arose in the same year 1821. Indeed, in September of that year, Della Gatta again verified by means of an on-the-spot survey that, contrary to previous orders, the three 'cavalli' belonging to the Tosi palisade, had not been removed. These frameworks oriented the sweep of the river seriously damaging the Pasquinelli lands.

Unconnected with private interests, on the other hand, was the engineer's intervention on the turbulent final section of the River Esino, situated at the mouth at 'Gran Ponte', portion of Strada Nazionale Flaminia, i.e. the coastal stretch between the towns of Rocca Priora and Fiumesino.

In various projects between 1824 and 1829, Della Gatta reinforced the palisades and groyne so as to prevent flooding toward the left head of the wooden bridge, which comprised 57 arches and was 255 m long.

Indeed, the left bank showed an "enormous corrosion", seriously threatening the bridge's support and, thus, its stability.

To the north of the Esino, the River Misa jeopardised the conditions of the provincial road running between Arcevia and Senigallia, serving also the towns of Montalboddo, Montenovio, Serra de' Conti and others along its various branches. To the south, on the other hand, it was the River Musone that made necessary continual repairs to the bridges crossing it. The turbulence of this watercourse was also undermining the stretch of cliffs, already subject to tidal action, close to the mouth, i.e. at the town of Numana on the southern slope of Monte Conero.

Starting from 1829 and at least up to 1834, Della Gatta planned and ascertained the works of 'ricarica' (reinstating) the cliffs, that is, reinforcing them with ballast of various sizes. In May 1834 he presented a plan to consolidate the stretch of cliff between the foot of the Colle and the cliff known as 'Sassone'. In the attached blueprint, the engineer highlighted the state of the cliff, showing the original layout of the municipal road between Numana and Loreto, one of its earlier diversions and the current dangerous condition owing to the progressive erosion of the coast (Fig. 9).

CONCLUSIONS

Della Gatta's career – here outlined – reconstructs a picture of the multiple responsibilities assigned to technicians belonging to the Papal Engineering Corps during the two decades following the 1817 competition: a spasmodic and onerous activity, entrusted to a numerically limited corps, an organism in which ordinary engineers, not always assisted by trainees, were continually transferred throughout the various areas of the State, often acting as chief engineer, albeit without proper recognition. This role, however, they covered with great commitment, with pragmatism, but essentially with their specific technical skills and thorough familiarity with the territory.

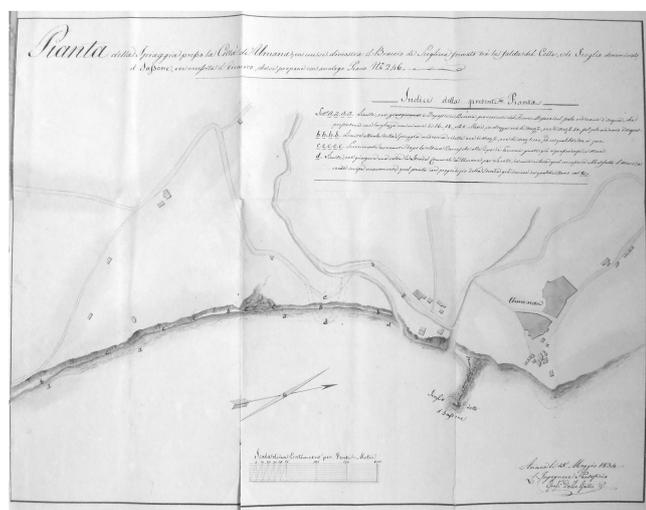


Figure 9: Giuseppe Della Gatta, 15 May 1834, Pianta della Spiaggia presso la Città di Umara in cui si dimostra il Braccio di Scogliera formato tra la falda del Colle e lo Scoglio denominato il Sassone, ove necessita il ricarico; (ASAn, Prefettura del Metauro e delegazione di Ancona, titolo XVI, rubrica 3, b. 1048)

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ASR, Disegni e Piante, coll. I, cart. 128.

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