Architecture and Social Reform at the End of the Ancien Régime

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The Ideal City of Chaux
1780–1804

I had been traveling for two years to educate myself, when I learned, in Lyons, that the government had opened up extensive works in a part of Franche-Comté. This province offers a vast quarry for natural history, commerce, and industry. (43)

Physiocratic Regionalism

The Development of Franche-Comté

Though planned in response to a specific program, the Saline de Chaux took its place in the 1770s, as the contract with the entrepreneur Monclar had clearly intimated, within a general policy of opening up the province of Franche-Comté to expanded industry and trade. Annexed to France only a century earlier, with an independent population, customs, and parliament, the region was nevertheless both economically and strategically important: its forests supplied a growing iron industry, while its proximity to the Swiss cantons gave it military significance.1 The breaking down of linguistic barriers, the connection of its roads and rivers to the French network, the encouragement of new production would, the government believed, strengthen the borders as well as stimulate competition with Geneva. Accordingly, the administration of Trudaine and Turgot and later that of Calonne actively supported the development of the eastern provinces: the highway system was improved and extended, canals for shipping and the transport of timber were projected and begun, and state financing was advanced for new industries.

From as early as 1744, in conjunction with the survey of France begun by the astronomer and cartographer César-François Cassini of the Paris Observatory, and with the encouragement of the elder Trudaine, the old Comté de Bourgogne was surveyed and mapped by the Ponts et Chaussées; the chief engineer of the province, Jean Querret, presented the results to Cassini and the Académie Royale des Sciences in 1748. In a later memorandum Querret noted that roads were necessary for communication and commerce; they should be "beautiful, secure, easy, and practical.”2 Problems of safety, upkeep, and ease of travel were interlinked:
It is not enough for the roads to be short, straight, linked together, convenient, and well maintained; they must also be safe, pleasant for travelers, and disengaged from the woods on either side, which could serve as a place of ambush and retreat for the thieves that the present circumstances make it all the more necessary to fear. Even more than in peace time the number of those uprooted from the cultivation of the land and accustomed to dissipation could lead to trouble. . . . This is why it is important to cut back the woods that border the roads to a certain distance.4

At the height of the Seven Years' War, fears of brigandage were plausible enough; the corvée, or mandatory service on the roads, had virtually ceased to function (Turgot even attempted briefly to suspend it in Franche-Comté); many roads were impassable in the winter and the majority of the watercourses were blocked. Indeed, only the roads directly dependent on the salines were in good repair; a report of 1776 found them to be "the finest and best maintained of the roads despite the continual passage of vehicles carrying wood and salt."4

Under Querret's leadership, the Ponts et Chaussées tried to improve conditions, training a corps of young engineers for service in the region. Ten years later in 1774, in his capacity as Contrôleur Générale and Directeur des Bâtiments du Roi, the Abbé Terray commissioned a painting from Claude-Joseph Vernet, The Construction of a Great Road, to celebrate their success: a chief engineer, perhaps Perronet, is seen inspecting the completion of a road through the mountainous Jura, in a picturesque landscape that Ledoux would later evoke as the site of his ideal city.4

Equally important for commerce were the rivers and canals, the canaux de flottage for the delivery of timber from the high forests to the sawmills. In a long report, submitted a year after the completion of the Saline de Chaux, the engineer Philippe Bertrand proposed a systematization of the waterways of Franche-Comté. He found the need for navigable routes acute. Only the Saône could handle boats of any size, and these had to be hauled by men or horses; iron and stone, together with fragile goods such as wine and glass, had to be carried overland, where they were subject to excessive tolls. The other rivers—the Doubs, the Ognon, the Loué, and the Dain—could only accommodate floating timber and, rarely, barges. The Doubs, obstructed with sawmills and at its junction with the Saône completely blocked by silt and flotsam, conveyed no boats at all. Bertrand suggested the construction of a new canal, three and a half leagues long, joining the Doubs to the Saône. The results would, he claimed, be felt immediately:

Not only will this new stretch of canal carry the navigation of the Rhône and Saône to Dôle and thence to Besançon; but the region strongly urges that navigation be possible through to Alsace, and that there a canal should be built to join with the Rhine, which would unite Holland to the Mediterranean and which would, by means of the Canal de Bourgogne already undertaken to join with the Seine, render Franche-Comté the center of commerce for the three seas and make it the most magnificent establishment possible to glorify among any of the most flourishing nations.5

Supporting these projects to open up the eastern provinces were the strong economic doctrines of Jacques Turgot and his circle, derived from the programs for agricultural reform and free trade advanced by the Physiocrats in the 1750s.6 As originally formulated by François Quesnay and elaborated by Honoré-Gabriel de Mirabeau, Physiocracy envisaged a return to an entirely natural economy, based on farming and the use of raw materials. As opposed to the nonproductive activities of commerce and financial speculation, which were sterile and without natural foundation, these products of a fertile earth were, the doctrine ran, the only bases of real wealth.

Quesnay, personal physician to Madame de Pompadour, was interested in agricultural practice as well as medicine and wrote a number of articles for Diderot's Encyclopédie, including the influential essays "Farmers," "Corn," "Men," and "Taxation." Extending his knowledge of physiology to the social world, he drew up an economic "table" that described the flow of wealth and exchange in terms of circulation: against monopolies and protective tariffs, he supported free trade, internally to France and externally. His followers included Pierre-Samuel Dupont de Nemours, who published Quesnay's major writings in 1767,6 and the Abbé Nicolas Baudeau, as well as Turgot and Trudaine de Montigny. Their philosophy specifically benefitted Nemours, of society brought to mean utilization of circulation of goods network. Quips every win works, as agricultural "Men," as well as both projects Physiocras forms of the Activity, this is .

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philosophy was premised on the belief that “nature,” and specifically economic nature, was an all-pervasive and all-beneficent force: their hope was, in the words of Dupont de Nemours, “to join the natural right of men, the natural order of society, and the natural laws most advantageous for men brought together in society.”

In methodological terms, this meant using all the tools of analytical reason to construct a model of natural economy, a “model” of natural flows, the circulation of wealth and goods, along the lines of the circulation of blood in the human body. The free circulation of goods necessitated a well-functioning communication network: Quesnay and his followers supported transportation of every kind, and urged the development of canal and road works, especially in isolated rural areas, in order to bring agricultural produce to the markets. Quesnay, in his article “Men,” supported the canal between the Sâone and the Loire as well as a project for piping water to every house in Paris—both projects that had been resisted by the water carriers. Physiocratic opposition to monopoly interests fought all forms of dirigeisme by the state and closed guilds; in the words of the Abbé Baudeau, “liberty, total liberty, perfect immunity, this is the fundamental law.”

Opposed to the concentration of wealth and luxury in the towns and arguing for a “return to the countryside,” the Physiocrats extended their criticism to the aesthetic realm, against “trifling ornamentation” as wasteful of resources better used to further agriculture. Quoting Cicero on the happiness of the farmer, Quesnay lauded the “worthy inhabitants of the countryside” and espoused rural festivals that celebrated productive virtues in place of the artificial amusements of the towns. In his article on farmers he concluded,

*It is the riches of farmers that fertilize the earth, multiply livestock, that attract and fix the inhabitants of the countryside and that are the strength and prosperity of the nation. Manufactures and commerce, supported by the disorders of luxury, accumulate men and riches in the big towns, oppose themselves to the amelioration of goods, devastate the countryside, inspire disgust for agriculture, augment the expenses of individuals excessively, destroy the sustenance of families, oppose the propagation of men, and enfeeble the state.*

Commercial profit was thus criticized, as contributing to the movement of money rather than to the enrichment of primary resources; free trade and a natural level of prices was preferable to the monopoly of a dirigiste state. Certain machines were admitted into Quesnay’s system, notably those which, like the taffeta looms in Lyons, acted to reduce the cost of labor; but the emphasis was predominantly rural and entirely pre-Industrial Revolution in outlook.

Turgot, while adopting the substance of this doctrine, had extended it in significant ways. First, what had been for Quesnay a rigid, geometrical diagram of a system—the productive “circle” that began and ended in nature—was historicized and given a flexible, progressive dynamic. In his initial discourses, read at the Sorbonne while still a student, Turgot insisted on the inevitability of progress, which in his terms included a measure of commercial development. Second, like Diderot, Turgot was as favorable to the artisan and his métier as he was to the farmer. Third, Turgot held that industries, if founded on the transformation of natural raw materials, might be admitted into the system if their profits were, so to speak, returned to the soil. While Intendant de Limousin, Turgot had tried to put his theories into practice, notably in his support for the development of roads and waterways; and his appointment as Contrôleur Général in 1774 had seemed to many liberal economists the opportunity, finally, to put Physiocracy to the test. In the event, Turgot’s abortive attempts to free the price of grain, suspend the corvée, and attack the entrenched monopolies of the corporations and the State proved the ruin of his career. But in the brief interval between 1774 and 1776, the considerable support that Turgot found from Trudaine and Malesherbes inspired the hope for a regeneration of agriculture and trade on the English model.

Joined to Turgot’s circle by his friendship with the Abbé Delille, Ledoux adopted its reformist optimism with enthusiasm and made out of it his own heterogeneous program for rural development. From Trudaine and Perronet and the younger members of the Ponts et Chaussées in Franche-Comté, he derived his understanding of the necessary in-
From the "late" Physiocracy of Turgot and Dupont de Nemours and its vulgarization by the Abbé Baudeau and Jacques-Pierre Briott de Warville, he conceived the agricultural foundations of his imaginary town as well as its peculiar institutional supports. Finally, Ledoux found in the Abbé Delille a theoretical and aesthetic mentor who combined a commitment to agrarian reform with its idealization in pastoral poetics.

From Saline to New Town

In this context, Ledoux's claim that, from the outset, he had envisaged the Saline de Chaux as the industrial nucleus of a new town that would form the center of such regional development is entirely credible. "I presented the projects for a town together with the growth to which it was susceptible," he stated in describing the incredulous reception of his first plans for the salin by the contractors and tax agents; he recorded the words of his clients on seeing his "grand views": "Temples, public baths, markets, houses of commerce, of games, etc., etc. . . . What a mass of incoherent ideas!" But clearly Ledoux had not designed these institutions in 1774, nor, as the chronology of the building campaign demonstrates, did he necessarily conceive the salin with any future extension in mind—the theatrical part was, after all, complete in itself. Nevertheless, as Jacques Cellier recorded, Ledoux very possibly presented the idea of such a new town to the Trudaine-Turgot administration, which might well, in turn, have accepted in principle the notion of government-sponsored housing.17 Ledoux himself implied that he had been inspired by the failure of the government's plans for the new town of Versoix on the shores of Lake Geneva, projected in the 1760s by the Secretary of State for Foreign Affairs, the Duc de Choiseul. Writing in 1802, Ledoux was clear as to his own intentions: "Here the town is built," and to avoid any ambiguity he added, "The Town of Chaux. The project for building Versoix had been abandoned. M. the Duc de Choiseul having left the Ministry" (Prospectus, 9).

The plan for Versoix, or La Nouvelle Choiseul as it was originally called, had first been conceived in 1762 as a military and economic challenge to a Geneva weakened by revolution. Sponsored by Choiseul himself, together with the Chevalier de Jaucourt and Fabry, the work of building the port was started five years later, on the completion of the port road between Lyons and the site of the new town; an engineer was then appointed and construction began on the town proper. On the disgrace of Choiseul in 1770, however, plans for the town were suspended. Nevertheless, despite the opposition of Trudaine and the obstructionism of Terray, the town was backed by an important group of philosophes, led by Voltaire and Malesherbes, who argued for the establishment at Versoix of religious tolerance.18 In 1775 the engineer Jean Querret proposed completing the work based on a new plan; and the Comte de Vergennes, the new Foreign Secretary, envisaged that the town, while not large, might become "the center of export for all our merchandise coming from the south for Switzerland, Germany, and even a part of Italy."19 The town was only finally abandoned at the end of 1782.

Querret's plan, drawn up and engraved, significantly enough, by François-Noël Sellier in 1774, transformed the older version, which had been envisaged as a traditional Renaissance "ideal city" within fortifications that might have been planned by Sébastien le Prestre Vauban, into a more modern settlement whose walls were replaced by encircling boulevards and rond-points. Querret retained the square, camplike plan of the first scheme, but rendered circular its one central square and supplemented it with four rectangular, neighborhood squares each corresponding to one of four entrances to the town, three from the land, one from the lake. The surrounding boulevard took the form of an octagon, truncated by the port, its points marked by semicircular places, in the manner advised by Laugier or Patte; the town was served from the hinterland by a canal that entered from the northwest into a circular basin and ran axially along the middle of the main boulevard to the port. This centralized new town, planned both as a reinforcement of the frontiers and as a philosophic experiment in liberty of religion and trade, at precisely the same time as Ledoux's commission for Chaux, engraved by his own engraver, and competing with it for Trudaine's support, cannot but have influenced his own design.
Ledoux’s ambitions were also no doubt supported by the work of his fellow academician, Charles De Wailly, at Port-Vendres on the southwest coast. This port, strategically and commercially useful for access to the Mediterranean and the Atlantic, had been enlarged between 1773 and 1775; throughout the War of American Independence work continued on the building of a church and public monuments. De Wailly, commissioned in 1779 to design an obelisk in honor of the king, took the opportunity to draw up a more comprehensive plan for an entire new town planned radially around two semicircular basins. It was presented, like the plan for Chaux, in an elaborate bird’s-eye view: The great obelisk stands in front of a chapel in the form of an antique temple; to either side of the central hôtel de ville and stock exchange stand a convent and the parish church, this latter modeled on the Pantheon.† In the event, only the obelisk and its surroundings were built, on a reduced plan that replaced the temple/chapel with a maritime warehouse, between 1782 and 1783.

The influence of both these projects on Ledoux’s ambitious extension of the saline into a new town is suggested by a map in the Bibliothèque Nationale of the saline, the Forest of Chaux, and the planned new access roads. Undated and unsigned, this drawing was thought by Herrmann as of too small a scale to have served as a basis for the engraved “Map of the Surroundings of the Saline de Chaux,” and it has escaped the notice of subsequent commentators. Entitled “Plan of the Forest of Chaux, of the saline, the graduation building, the canal, and the roads projected in this forest for the service of the saline,” it shows the Loire River, the villages of Arc and Senans between the village of Chissey to the west and the Château de Roche to the east, and the entire Forest of Chaux to the north, ringed by the communities of Dôle, Orchamps, Fraisans, and Saint Vir. The routes through this forest are drawn according to the old grid of allées as shown, for example, on Querrec’s map of 1748. In these respects, the map shows the “surroundings” of the saline precisely as drawn in Ledoux’s published engraving, and, despite Herrmann’s claim, in equal detail, but simply extending to a larger area. More interesting, however, is that the saline is shown as built, but with the complete oval of the town of Chaux drawn in red and surrounded by a ring boulevard, thus denoting the land to be reserved for what would be taken up by the barracks and hôtel de ville of the new town, yet prior to the planning of the individual buildings. Further, also in red, superimposed on the existing routes, an axial road leads to the Loire to the south and to the forest to the north, as in the engraving. Beyond the confines of the engraving, and in the center of the forest, this north-south route ends in a rond-point with a pyramidal obelisk at its center. From this point three roads, marked in red across the old grid, radiate out to Dôle, to Orchamps, and to Saint Vir, thus connecting the new town to the outside world in a radial pattern that extends its internal planning principles to the territory.

All the internal evidence points to this plan being drawn up sometime between the plans for the saline as built and the final engraving published in L’architecture, and the plan seems, stylistically, to date from before the Revolution. It was no doubt prepared according to Ledoux’s design and suggests that the doubling of the semicircle of the saline to form the oval containing the barracks and hôtel de ville might have occurred earlier than generally thought, perhaps even between 1776 and the early 1780s. One is tempted to see in this schematic plan the project Cellérié tells us was presented to Turbot before 1776. This first, almost pragmatic map of the proposed new town became the basis of the idealized version finally published in L’architecture, first in the “Perspective View of the Town of Chaux” and then in the engraved “Map of the Surroundings of the Saline de Chaux,” a rendering that, as Herrmann correctly observes, has itself undergone two stages of development.

The map in the Bibliothèque Nationale seems then to represent an intermediate version of Ledoux’s projects for the new town, one corresponding to the “Perspective View of the Town of Chaux.” This would be expanded with the addition of a second band of housing in the second state of the plate showing the surroundings of the saline. It was no doubt this expansion, added sometime between 1795 and 1802, to which Ledoux refers when, optimistically, he stated in the Prospectus that he was then in the process of developing the plans for a
Plan of the Forest of Chaux, showing the siting of the saline, the graduation building, canal, and the routes projected in the forest for the service of the saline. Undated, but probably around 1780. Drawing from the Bibliothèque Nationale, Cartes et Plans, GeC 9779.

...second town: "I will execute in a second town what I have conceived in the first: there one will see the luxury of ideas reproduce themselves on the antique volume of nature" (Prospectus, 25). Such a hypothesis would at once bear out Ledoux's claims that the project for the town was conceived and presented to the administration while the saline was still being built and, at the same time, confirm Helen Rosenau's sense that the formalization of the terrace housing in the "Map of the Surroundings" dates from a later period.22

If this is so, then the parallel between Ledoux at Chaux and De Wally at Port-Vendres becomes telling: it places Ledoux within a general current of new-town speculation, tied to the reinforcement of the frontiers, the encouragement of trade, and the more generic project of "mapping" the space of the realm. This mapping, as Bruno Fortier has shown, held within its own techniques the project of interpreting and utilizing the territory through the establishment of roads, canals, ports, agricultural colonies, and of course, new towns.23

Ledoux's first signed proposal for the town of Chaux, envisaged as an extension of the saline, was recorded on the first state of the "Map of the Surroundings of the Saline de Chaux." The plan is compact and enclosed within the oval formed by the doubling of the Saline de Chaux; the saline is shown as built and still enclosed by its wall and surrounding ditch. This detail reinforces the assumption of an early date for this scheme; for in his insistence on continually revising his idealized designs, Ledoux would have, at a later stage, added rear porches to the factory buildings. The semicircle of buildings to the north that exactly mirrors that of the saline is
Ledoux, "Map of the Surroundings of the Saline de Chaux." Engraving by Dupuis from Ramée, Ledoux, pl. 115.

Legend:
A. Parish church
B. Law courts
C. Town hall
D. Barracks
E. Private houses
F. Esplanade
G. Road to Besançon
H. Road to the saline
I. Public baths.

Detail of the map showing the Town of Chaux.
similarly enclosed by a wall, with barracks corresponding to the workers’ pavilions of the saline and an hôtel de ville taking the place of the gatehouse. To the east and west on the cross axis of the oval are public squares with simple buildings, entered through peristyles, labeled the Parish Church and the Law Courts, respectively. Other institutions, such as the Public Baths, are indicated only by letter. Around the oval formed by the barracks and saline runs a tree-lined boulevard that provides circulation for a town whose center, so to speak, is inaccessible. This ring road services the private houses of the town, which are planned in reticulated patterns around courtyards and gardens, the layout differing, no doubt for reasons of orientation, from south to north. These terraces, with their geometries reminiscent of the crescents and terraces of George Dance, Jr., and John Wood in England, are themselves enclosed by a peripheral boulevard, designated, in reference to the “fortified” nature of this military border town, “The Rampart.” The only roads leading to the town from the surrounding countryside are the two main axial routes: one running south-north, from the Loûe River to the Forest of Chaux and Besançon beyond; the other, west-east, less pronounced and simply a regularization of the road between Arc and Senans. Ledoux left unchanged the land of the region, its houses, the Château de Roche and its water mill, the ferry downstream, the parish church of Senans, the foresters’ clearings, as well as the graduation building and its accompanying, later idealized, cottage. The impression is of a plan conceived, probably sometime between 1779 and 1785, to rival that of Versoix, with similar graphic conventions and institutional program to those of Querret.

A second version of the new town, however, depicted in the “Perspective View of the Town of Chaux,” reveals a very different conception: the closed, geometric character appropriate to a garrison was replaced by a more open, almost picturesque aspect that doubtless reflected the influence of the new fashion for landscapes and gardens composed according to English precedents. The central oval of saline and barracks remains in place, but enlivened by clouds of smoke from the factory and by troops assembled in their parade ground. The developed design for the Church to the east and the first scheme for a Market replacing the Law Courts to the west occupy the public squares; visible to the rear are the Public Baths and what seems to be a first project for the Stock Exchange. The regular terraces of housing, however, are gone; and in their stead, old and new buildings are mingled as in a picture by Hubert Robert. Neo-Palladian villas similar to the one Ledoux designed for the Chevalier de Manney of Salins stand next to rambling farmsteads, monasteries, and warehouses. A building with a domed, semicircular addition seems to indicate a school, in the manner of Gondouin’s auditorium for the École de Chirurgie. Villages, marked by chapels, parish churches, and farms, are scattered through the Forest of Chaux, which recedes to the distant horizon. The aesthetic is that of the Abbe Delille’s popular evocation of the landscape garden, Les jardins of 1782, significantly subtitled “the art of embellishing landscapes.”

This view, certainly one of the most striking and beautifully executed plates of L’architecture, was engraved by Pierre-Gabriel Berthault. He was also responsible for the perspective views of the Public Baths and the graduation building of the saline, which confirm in their style the early date of the aerial perspective. The view of the graduation building also depicts the cottage of the carpenter in charge of the pumps as built (and indeed as it still exists), prior to Ledoux’s post-Revolutionary redesign. A second aerial view of the town, taken from the southwest and showing the definitive project for the Market, drawn after 1784, obviously used Berthault’s first view as a basis; it too shows the Public Baths and the first scheme for the Stock Exchange, but it handles the perspective less confidently and was evidently given to a less competent engraver whose knowledge of the plans for the saline and baths was confined to Berthault’s version.

A third version of the town plan, which Ledoux described in his text as a town with “sixteen streets that converge toward a common center,” that is, a radial town with allées expanding into the countryside in the manner of Karlsruhe, was perhaps the latest to be conceived. Its form is indicated by a late state of the engraving of the “General Plan of the Saline as Built,” a state that appears in none of the pre-Revolutionary collections of Ledoux’s engravings. As Jo-
Ledoux, "Perspective View of the Town of Chaux." Engraving by Berthault from Ramée. Ledoux, pl. 116.
Ledoux, Market of Chaux, perspective view. Engraving from Rameau, Ledoux, pl. 145.
hannes Langner has shown, this version, printed for the first time in *L'architecture*, was superimposed on an original plan of the saline, engraved by Sellier around 1776, that bears no trace of the later ideal town nor of the doubling of the semi-circle into an oval. On this plan — proof of the original theatrical concept of the saline — Ledoux marked the lines of nine of the sixteen radial roads, tree-lined boulevards that seem to extend the lines of the paths between the workers' buildings, themselves now formalized into miniature avenues. Between these radials Ledoux simply noted the sites for the "mass of the houses of the town." To the original state, drawn before the rejection of the first scheme of the Director's Building and showing the ground-floor plan also as engraved by Sellier in 1776, Ledoux added porticoes to the rear of the factory buildings and to the front and rear of the Director's Building, as it would be drawn in the idealized version of Coquet and Bovet's perspective view. Finally, no doubt sometime around 1800, Ledoux added the reticulated housing and encircling boulevard to the "Map of the Surroundings of the Saline de Chaux."

In the text of *L'architecture* all these versions were entitled to form a single all-embracing vision of the ideal city. Its nucleus was still the saline and the barracks; actually oval, but assimilated by Ledoux to the "elliptical" course of the sun, its generic form was circular, thus mimicking the Physiocrats' economic metaphor of the circle of production. Even as Quesnay, preoccupied throughout his life by the circle and circulation, was convinced, as Ronald Meek has put it, that "in nature everything is intertwined, everything moves through circular courses which are interlaced with one another," so Ledoux took the imagery of the circle to represent the genesis and expanding influence of his city: "Everything is circular in nature; the stone that falls into the water propagates infinite circles; centripetal force is incessantly countered by a rotary motion; the air and the seas move in perpetual circles." (223). Ledoux transferred this image, used to justify the form of his theater, to the town of Chaux, which he spoke of as "an immense circle," with a form "as pure as that described by the sun." And he compared the foundation of Chaux to the mythical formation of the Milky Way by a drop of milk falling from Juno's breast, replacing, in the case of Chaux, milk with salt water: "Here a drop of water suspended in the air acquires a progressive value in falling, and founds the city" (69).

Sustaining this economic foundation, Ledoux imagined a complete repertory of industrial and agricultural institutions generating a new commercial center, linked to the rest of France and to the world by the completed network of roads and canals envisaged by the Ponts et Chaussées.

The line intersecting the diameter [of the saline] crosses the Loire, immense waters, the town, the forest, the Doubs, the Geneva canal, the Swiss pastures; to the left lie the Meuse, the Meuse, the Rhône, the port of Antwerp, and the North seas carry the first and much desired fruits of our commerce and arts to the very deserts of Siberia. (72)

Echoing the memoranda of the Ponts et Chaussées to the letter, Ledoux depicted the completion of the canal network begun by Daniel Trudaine:

*Here the Dôle canal is married to the Yonne; ... its children roll their waters to the south seas; ... There, the Doubs petitions the Meuse in order to join with the Rhine. The port of Antwerp is open and divides with hardworking Batavia the precious fruits of commerce; ... You see the Rhône canal, that of Iverdun, which carry to Lake Bienne the marine timber taken from Switzerland and Savoy; ... you see the Arve, cut over a short distance, ease transportation from the Pays du Gex, from Bugey, Chatogne, Chablais. (74)*

In the last years of the eighteenth century, with the completion of the Canal du Centre by Emiliand Gauthier in 1793 opening the route from the Loire to the Saône, the completion of the Doubs-Saône canal in the same year, and the extension of the Canal du Languedoc opening the route from the Mediterranean to the Bay of Biscay, such a dream was less utopian. (77)
INSTITUTIONS OF SOCIAL REFORM

This expanding vision was accompanied, from the very early 1780s, by Ledoux's designs for an equally expansionist institutional infrastructure for his city. Following his grand statements to Trudaine and Targot, Ledoux gradually assembled detailed plans for, as he was to claim on the title page of L'architecture, a "collection that brings together all the designs used in the social order." After the group of institutions designed between 1780 and 1785, and depicted in the engravings discussed above—the Church, the Public Baths, the two projects for the Market, and the first scheme for the Stock Exchange—came a second group of institutional designs for Chaux, which can be dated with some confidence between 1785 and 1789. These carry the marks of a more abstract style, associated with that of the barrières, and may be related to Boullée's "visionary" designs from the same years; they respond equally to programs either set by the Académie or proposed by Calonne before his dismissal in 1787. For the most part, they were engraved by Coquet, Edme Bovinet, and Pierre-Nicolas Ransonnette. This later group included the Cemetery of Chaux, whose sphere clearly echoed Boullée's Cenotaph to Newton of 1784, and which corresponded in style exactly to Ledoux's spherical House of the Agricultural Guards for Maupertuis. According to the evidence of the other houses for the new village of Maupertuis on the estate of the Marquis de Montesquieu—the plans for which were drawn on the same sheet as those for a number of barrières—this engraving must be dated between 1785 and 1787. Coquet and Bovinet also drew the bird's-eye view of the Cannon Foundry, designed, according to Ledoux's account, following a prospectus envisaged by Calonne between 1785 and 1787; Bovinet drew the view of the Bridge over the Louie River, apparently stimulated by Calonne's request in 1787 for variations on Perronet's design for the bridge leading from the Place Louis XV, then in construction. These last two perspectives include other designs that seem to have been drawn up in the mid-1780s: the Grange Parée, the small hôtellerie, the commercial buildings, the double houses under triple arcades, the barrel-vaulted Worker's House (seen both in the aerial perspective of Maupertuis and in the left background of the view of the bridge of boats). From this intermediate period, identified as much by their style as by Ledoux's preoccupation with the design of fabriques for Maupertuis and Bournerville, may be dated the "rustic" workshops and houses for the woodcutters, coopers, sawyers, forest guards, and charcoal burners. Two more communal institutions, the Cénobie and the phallic-planned Oikéma, linked to the House of Pleasure for Montmartre, should also be added to those designs conceived, if not actually engraved, before the Revolution.

A third and final group of ideal projects, easily joined by their abstract style and repeated motifs as well as by their more purely "utopian" programs—the product of Ledoux's post-Revolutionary reveries—must be dated between 1793 and 1802, that is, between Ledoux's release from prison and the publication of the Prospectus for L'architecture. These include at least twelve of the country houses, mostly engraved by Van Maelle and his collaborators Simon and Maillet; the rural buildings, the portiques, or warehouses, and the Cour de Service; the Hospice, the House of the Surveyors of the Louie River, the House of Education, the Hunting Lodge, and the Stock Exchange; the two recreational buildings, the Monument to Recreation and the House of Games; and the suite of moralizing monuments, from the Pacifique, the House of Union, and the Temple of Memory, to the Panaréthion.

The stylistic differences among these three groups of designs parallel, despite the unifying intent of his text in L'architecture, Ledoux's changing social and political interests over this long period of time and, equally, reflect the particular nature of his private and public commissions year by year. Ledoux's initial interest, following that of his patrons in the Intendance du Commerce, was economic and regionalist. Thus the debates over freedom of worship for Veroix together with the discussions over the proper form for the Cathedral of Sainte-Geneviève, left incomplete by the death of Soufflot, inspired the Deist and multi-alièd Church of Chaux. Ledoux's involvement in the planning of new hospitals in Paris from 1773 and his arguments against the centralization of health care on the side of the conservative Phy-
siocrats, led to an extension of his medical interests, represented by the Public Baths of Chaux—equally inspired by his visit to the baths of Aix and his discovery of the healing properties of the waters of Salins. The Market of Chaux, a response to an Académie program, was also directly a result of Calonne’s renewed interest in the development of regional centers for the distribution of produce; likewise, the Cannon Foundry was an expression of Calonne’s support of industry based on the exploitation of natural raw materials, conflated with a more strategic and defensive aim. In the mid-1780s, with Ledoux’s reengagement in the planning of the estate of Maupertuis, his commission for the fabriques in the park of Bourneville, and his involvement with circles of agronomes, his focus shifted slightly to practical proposals for the reform of agriculture and the housing of the rural poor. After the Revolution, when Ledoux was preoccupied with salvaging a destroyed reputation, his projects became more concerned with the moral, if not the moralizing, role of institutions, joining the idea of a social world united by brotherhood and communal values—a mingling of Freemasonic and Rousseauian ideals—to an architectural, symbolic program that would serve to institutionalize the new order.

Whether designed specifically for the town of Chaux or following an actual program and only later assimilated into the all-embracing ideal city, these projects formed in Ledoux’s mind an exemplary gamut of types, set, in his ever-expanding vision, in the fertile and picturesque landscapes of Franche-Comté. They were to be the instruments of reform and happiness for the region’s rough but natural population of peasants, workers, and farmers—restored to their true nature by a combination of Rousseauian educational principles, paternalist coercion, and architectural representation and enriched by the wise application of Physiocratic and agronomic doctrines. In this sense, the “ideal” town of Chaux never lost its grip on reality. The complex dialogue between existing social conditions and their architectural reformulation was, in Ledoux’s ultimately realist vision, never far removed from the way of life he observed in the countryside; the architect interrogated this intractable and stubbornly rooted tradition to reveal its “essential” forms, which he then endowed with new meaning through their architectural display.

RELIGIOUS FESTIVITIES

Ledoux’s project for the Church of Chaux was perhaps the first institution not connected to the saline itself to be joined to the enlarging plans for the town of Chaux. Designed after 1781 and probably engraved between 1783 and 1784, the church took its place beside other contributions to large-scale religious architecture following Soufflot’s death in 1780 and developed in the context of the Académie program for a “Cathedral” of 1781. Inevitably, given the fierce debate over the successive plans for the still incomplete Sainte-Geneviève and the theoretical contributions of historians and critics from Laugier to Le Roy, these were all in some way designed as implicit criticisms of Soufflot’s monumental precedent, while at the same time recognizing it as a point of departure, the prototype, so to speak, of the Enlightenment churchar
temple. Thus both the prize-winning design by Louis Combes and the idealized project for a “Metropole” by Boullée, which have often been compared with Ledoux’s scheme for the Church of Chaux, followed the Greek-cross plan of Soufflot’s first project for Sainte-Geneviève in 1757; but where Soufflot added an almost freestanding temple front, with its giant Corinthian order, as an entry portico, Combes and Boullée stressed the equality of the cross with four pediments of porticoes. Combes joined these to continuous colonnades surrounding the building, thus preserving the purity of the geometric cross; Boullée emphasized the plain surface of the enclosing wall, setting his colonnades into the geometric solid. Reinforcing the absolute symmetry, both designs placed the altar in a central position beneath the dome, in Boullée’s scheme raised on a kind of circular, stepped pyramidal and reached by long flights of stairs around the crossing. Both adopted a dome on a high colonnaded drum, according to the precedents of Michelangelo’s Saint Peter’s or Wren’s Saint Paul’s; both used the lantern above the dome as the single strongest source of light for the interior, reversing Soufflot’s “Gothic” taste for colonnades flooded with light.
Ledoux, Church of Chaux, perspective view. Engraving by the Varin brothers from Ramée, Ledoux, pl. 140.

from the surrounding walls, to provide a somber, enclosed volume dramatically lit from above.

Ledoux's church design followed many of these ideas from the original model, but with significant differences. His plan was a pure Greek cross, with pedimented porticoes (Tuscan in the perspective view, Corinthian in the cross section); the altar stood in the center, raised on a square pyramid of steps and lit from above; the surrounding walls were blank.

There, however, the resemblances ceased. In its three-dimensional development, in its scale, and in its references to classical precedent, Ledoux's project departed radically from the model set by Soufflot and "corrected" by Combes and Boulé. Elaborating the sectional characteristics of the chapel in the Director's Building at Chaux, Ledoux transformed the naves along the axis of entry into continuous stairs, forming a pyramidal approach to the main altar. The naves were roofed by barrel vaults, coffered, and lit from above, supported on a straight entablature and high Ionic columns. The eight side "aisles," or chapels, each with its own altar, were set in giant niches, enclosed by huge semicircular arches, reminiscent of the prosenium of the Besançon theater. To either side, beneath the two sides naves that remained horizontal at the level of the crossing, Ledoux introduced entries to the crypt below. Here, a central altar was surrounded by squat, baseless Tuscan columns and covered by a low vault. On this level, the side chapels led out to the four corners of the cross, which were taken up by walled cemeteries.

From the outside, the church, while imposing in scale for a parish the size of Chaux, was entirely lacking in the grand inflation of Boulé's project. Without the high, colonnaded drum supporting the dome, Ledoux's design seems to
Ledoux, Church of Chaux, plans of first floor and crypt. Engraving by Delaivre from Ramée, Ledoux, pl. 138.

Ledoux, Church of Chaux, section. Engraving by Seller from Ramée, Ledoux, pl. 139.
refer less to Christian precedents, whether in Rome or London, and more directly to the Roman Pantheon, a general allusion to the antique that was reinforced by the continuous bas-reliefs surrounding the whole church on the level of the cemetery wall.

Such formal differences between the projects of Ledoux and those of Boullée and Combes point to deeper divisions, both on the level of aesthetic intention and liturgical program. For Boullée, the church, or “basilica,” was the occasion to explore a work that would exhibit the character of the highest sublime in keeping with its dedication to the worship of the Supreme Being. His design was matched against the grand images of immensity provided by Saint Peter’s, spaces that suggested the sense of infinity suited to the subject, while implying the terror and awe associated with the “contemplation of the Creator.” Paraphrasing Longinus, with overtones of Edmund Burke, Boullée defined the idea of the sublime and its architectural representation in terms of a grandeur that is both beautiful and horrifying: “A volcano vomiting flames and death is a horribly beautiful image.” Again following Burke, Boullée suggested that the sense of immensity most suitable to the grandeur of a temple dedicated to the infinite might be rendered by the use of successive colonnades subjected to the dramatic play of light and shade. The architect, model of the Creator in his ability to “say fiat lux,” might plunge the cathedral in shadow to inspire religious fear or flood it with light to inspire joy, according to the nature of the celebration. Two perspectives show, in turn, the interior of the temple “au temps de la Fête-Dieu” and the same “au temps des Ténèbres.”

Ledoux certainly shared in Boullée’s celebration of the grand sublime and the effects of light and shade, writing of the shadows cast by the torches and the severity of the orders as appropriate to a funeral procession. But for him the monument as a whole was dedicated less to absolute grandeur than to the celebration of the rhythms of daily and yearly life, to the consecration of the social order of Chaux. His project firmly established the realm of the sacred in plan and section, but without removing it from the experience of the citizen. Against Boullée’s endless colonnades, high, cloud-painted domes, incommensurable distances, apparently infinite surfaces, and innumerable masses of worshipers, Ledoux proposed a stable center for civic ritual.

Standing at the center of the active, festive life he envisaged for the population of Chaux, the church, for Ledoux, was also a didactic instrument for conveying the principles of a rational, Deistic religion that would inform the individual and social morality of the city. Its walls were covered with bas-reliefs that traced the history of religions and the great actions of society: “There the spectator is perfec ted by his own sensations; he sees from nearby a bas-relief that surrounds the building; he is directly enlightened. . . . It retraces for his eyes the history of the most distinguished men.”

These lessons were to be supplemented by a continuous celebration of the stages of life, in Ledoux’s imagination at once a formalization of the traditional fêtes of birth, marriage, and saints’ days in the villages of the ancien régime and a remodeling of the grand aristocratic and monarchical festivals of Paris and the towns. On the one hand, the village celebrations lacked a clearly defined program, a universally agreed timetable; on the other, the feux d’artifice and pomps funèbres were showy and ultimately “useless.” Civilized luxury and self-interest had denatured the original, natural festivals dreamed by Rousseau, of which rustic games were the distorted echo. “The egoism of governments has disfigured the origins . . . only to sustain at great cost a pyrotechnics, that frivolous art whose brilliance strikes the ear, dazzles the eyes, disappears, and says nothing to the heart.” In place of this individual and isolated display, Ledoux proposed a new system of the fête. Admitting that “public customs require illusory fêtes” and that popular credulity could be made to work toward moral order, that “passions of every kind” could be agents of perfectibility if associated in the mind with the practice of virtue, Ledoux called for a natural sequence of “celebrations of the calendar,” a kind of festive almanac tied to everyday life.

*Why not adapt public fêtes to all the interesting aspects of life? Births, marriages, even burials present so many united interests that it is difficult to conceive how they are confined in the tacit custom of...*
a civil act. Insofar as the public expression of all the interests awakened by these moments can be of general utility, who could be estranged from so many advantages felt by the virtuous masses? (156)

The very number of births and marriages occurring each day would suffice to make such festivals continuous: “How many ways there are of obtaining that pure gaiety that constitutes the virtuous man and how many ways of effacing his misery!” (156). Like architecture itself, the festival would act on the sensations, provoking the strongest feelings of pleasure, gratitude, and sorrow, purifying and developing the social and moral instincts of the population.

As we have seen, Ledoux planned the Church of Chaux to receive these ceremonials, setting aside separate and specific altars for each kind of service—baptism, marriage, and death. In this way he replaced the single altar, which mingled all types of worship indifferently, with appropriately decorated and positioned monuments, each contributing to the effect of the ceremony. In the perspective view, Ledoux showed a public procession emerging from the main door of the church while funeral cortèges disappear into the crypt at the sides. He arranged the section in a slightly different manner, to balance the processional to the central altar from the front of the church with a similar descent to the crypt from the rear. On the main floor, eight side altars supplemented the free-standing table in the sanctuary beneath the dome; in the crypt a similar number of chapels offered services for the dead. Such specialization followed the populace to the grave: in the corners of the plan separate burying grounds were identified for men, women, boys, and girls.

Complementing the Church, and completing the ritual equipment of the new town was, of course, the Cemetery itself, designed like the Church according to a program developed, in the Académie and outside, during the mid-1780s. The program for the Cemetery of Chaux, probably drawn up in 1785, was suggested by a number of proposals in the early 1780s for closing the Parisian cemeteries and replacing the human remains in the disused quarries of Montrouge, closed since 1778. The Cemetery of the Innocents, the largest and most problematic of the urban burial grounds, was closed
in September 1780. In 1782 an anonymous author (one Villedieu) proposed a Project for Catacombs for the city of Paris, adopting for this purpose the quarries that are found both in the outskirts and surroundings; this proposal was put into effect in December 1785, when the bones from the Innocents cemetery were exhumed and transferred to the quarries to the south of the city. The resulting ossuary was popularly named “The Catacombs.” The idea of using the quarries especially appealed to the contemporary interest in antique forms of burial and fascination with the catacombs of Rome and Naples. Quatremère de Quincy, writing in 1788, while arguing against the principle of the common cemetery that “confounded and annihilated without distinction all men in the same abyss of oblivion,” nevertheless found catacombs useful enough to serve as cemeteries: “It is very true that almost all the great towns have in their proximities cavities resulting from the working of the quarries, which seem still to wait such a function to become useful”—he insisted that here he was speaking above all as an economist and not as an artist.

Ledoux himself was well aware of the hygienist arguments, noting that “the selection of site for a cemetery is not unimportant; its evil influences must be relegated to the highest solitudes of the air; . . . the inhabitants must be preserved from the desolating effect of the north wind, which carries corruption and the illnesses that follow with it” (193). Later, in the text for L’architecture, Ledoux transferred the notion of the Parisian quarries to Chaux, imagining that the quarries used for building stone for the new city would be filled in with the new cemetery: three levels of catacombs below ground level, arranged along radial tunnels that led into a vast central sphere, half-below and half-above ground. Ledoux gave first a functional explanation, speaking of how he had “covered the extent of the land excavated by the extraction of stones with an immense vault . . . to obtain at the top the evaporation of the mephitic odors of a cemetery” (195). This raison d’être was, however, subsumed within a larger symbolic meaning enclosed by the sphere. Ledoux clearly linked his form to other necropolitan symbols such as the pyramid: “Everyone knows that the kings of Egypt, in order to occupy
the leisure of their slaves, ... built the pyramids at great
cost. ... The idea of the flame that tapered (Σπὶζον) under
the pressure of the air determined their form. Do you think
that the earth cedes to them in grandeur?" (194) Ledoux
selected the sphere over the pyramid not only for its more
universal connotations but also for its more egalitarian
implications. He spoke of the "opulence" that "had as its aim only
a sepulcher disdainful of humanity" (194) in the pyramid, an
evidently hierarchical form, destined for the burial of a single
prince; the spherical Cemetery of Chaux, by contrast, would
display the remains of all the citizens, brought back to equal-
ity by death on a "common bier" (193).

The religious ceremonies of burial and memorial, Ledoux
wrote, would take up the center of the building, lit from
above by the heavens; the spectacle of the burning braziers,
the smoke from the cremations, endowed the cemetery with
the aspect of a mysterious netherworld. Indeed the symbol-
ism of earth and nature, embodied in the half-sunken sphere,
was evidently also an evocation of Hades and Heaven. Ledoux
spoke of the "two stairs, cut into this imperishable mass of
rock," that "descend into the antipodes of the world," and saw
the eternal cycle of life, death, and burial as informed by the
activities of cremation: "The dead are purified to excite the
living to virtue" (193).

Ledoux's project for the Cemetery of Chaux has often
been compared to another essay in spherical geometry, that of
Boullée's Cenotaph to Newton of 1784. A symbolic monu-
ment of the earth itself, Boullée's sphere was also designed, at
least in its second version, as a giant planetarium, where, at
night, an artificial sun would illuminate a three-dimensional
diagram of Newton's principle and, by day, light would per-
colate through holes in the dome to produce the effect of the
stars. A number of sources have been adduced by historians
for this dramatic design. As summarized by Pérouse de
Montclos, they have proposed Boullée's concept of the sphere
as a primary geometrical form, the essence of architecture; an
"autobiographical" play on the similarity between the name
Boullée and the word boule, or ball, which would make the
cenotaph a direct substitution of Boullée for Newton; different
projects for spherical tomb monuments in the Middle
Ages and Renaissance; the spherical tomb of Archimedes de-
scribed by Cicero; allegories of scientific representations of
the moon seen through telescopes; a pictorial play on the
Mongolfier balloon, first flown in 1784; and a reference to
antique temples described as cosmological models, with
domes covered in stars and circular architraves decorated with
the signs of the zodiac. Pérouse de Montclos himself con-
vincingly argues the relationship of the earlier of the two
drawings, that of 1784, to accounts of buried, spherical
Druidical temples and suggests that, in fact, the "planetari-
um" scheme was first designed, like the spherical projects of
Jean-Jacques Lequeu some years later, as a kind of universal
Masonic lodge, only being joined to the Newton Monument
program of the Academie from expediency a year later in
1785. A comparison of the drawings reveals two distinct
schemes: The first shows a cubic altar and worshiping priest
dedicated to the religion of the central sun; the altar, emanat-
ing light, as if from some Rosicrucian underground tomb, is
surrounded by a cosmic diagram displaying not the Newton-
ian but the Copernican universe. The second scheme, how-
ever, replaces the altar with a sarcophagus, Newton's tomb.
Pérouse de Montclos examines a series of accounts of spherical
tombs and temples associated in the eighteenth century
with the primitive religions or Zoroaster, Mithras, and the
Drauids, all connected with the symbolic and initiatory rep-
ertories of Freemasonry; most convincing is the spherical, un-
derground "Druidic" temple depicted by the eighteenth-
century architect and antiquarian Beaumesnil. In this respect
Ledoux's design for the Cemetery of Chaux seems even more
closely linked than Boullée's Newton monument to this half-
buried Druidic temple. It posited even more extremely the
idea of negativity, of the absence of light, of the absolute void
as a sublime image of finitude.

Ledoux's design seems calculated to follow the precepts
of Boullée's own funerary architecture, exemplified in a series
of "Temples of Death" imagined at the time of Napoleon's
expedition to Egypt. For these cemeteries, loci of the ter-
rible sublime, Boullée created what he thought of as new
genres of architecture: a "buried architecture" fashioned out
of the principle that "the skeleton of architecture is the abso-
Etienne-Louis Boullée, Cenotaph for Newton: 1764 drawing, section showing daylight effect of artificial sun; 1785 drawing, section showing night effect of apertures in pattern of the stars. From the Bibliothèque Nationale, Cabinet des Estampes, Ha 57, pls. 9, 8.
lately bare wall” and an architecture composed entirely of shadows, a negative architecture where all the positive elements of construction—columns, pediments, and the like—were traced on the façade in dark cutouts of their absence: “It seemed to me impossible to conceive of anything sadder than a monument composed of a plane surface, naked and stripped, made of a material that absorbs the light, absolutely deprived of details and whose decoration is formed by a painting of shadows delineated themselves by shadows still more somber.”

Like Boulée, and taking his cue from Burke, Ledoux found in the bare, undecorated sphere, inside and out, “an image of nothingness” that “presented to the eye neither woods nor meadows, valleys nor rivers, and even less the benefits of the sun that vivifies nature” (195).

Like Boulée’s, Ledoux’s sphere was also a direct evocation of the terrestrial sublime: “This round machine, is it not sublime?” (194) he asked. And the universal sublime into which the souls of the departed merged—“See this sublime harmony that composes the parts of this vast picture”—was illustrated in Ledoux’s startling vision of the “Elevation” of this cemetery, depicting the earth and the planets lit by the rays of the sun. This “astronomical” image, evoking Ledoux’s excitement over the recent discoveries of the astronomer William Herschel and the parallel temptation of the heavens represented by the balloon flights of 1783–84, was apparently of Ledoux’s own invention, a pictorial fantasy that confirmed his claim to artistic skills as developed as those of Boulée. Its inclusion in an architectural treatise as one of only three such “allegorical” plates would seem to imply a theater of action for architecture as vast as the imagination might envisage.

**THERAPEUTIC MONUMENTS**

Ledoux’s attitude toward the institutionalization of social problems was initially Physiocratic. The Abbé Baudeau and Dupont de Nemours had consistently argued against the increasing tendency for poverty, illness, criminality, and immortality to be “solved” by means of specific institutions—workhouses, hospitals, and prisons—that were supposed to render the poor and idle virtuous, healthy, and productive.

In their view, the era of what Michel Foucault has called “the great confinement” in the *hospital-general* of the late seventeenth and eighteenth centuries had only succeeded in creating centers of poverty and sickness, the breeding places of what they were supposed to cure. Their sharpest polemic was reserved for the architects of projects to replace the old Hôtel-Dieu by giant, centralized facilities. Bernard Poyet’s five-thousand-bed hospital projected for the Île des Cygnes was the most monumental symbol of this kind of solution, and was criticized both for its architectural display—its resemblance to the Colosseum—and for its anticommutarian implications. The Physiocrats argued instead for small, decentralized hospices, each run along the lines of religious centers of charity, and for a medicine that emphasized home care within the family and neighborhood. A myth of an “organic society” lost by the decline of religious morality, the increase of state interference, and the dissolution of stable, self-knowing communities pervaded their discourse. Ledoux, who as a practicing architect had no scruples in taking on commissions for prisons and who had, with Chalgrin, served on an initial commission following the fire at the Hôtel-Dieu in 1773, was, in his utopia, able to deny these institutions in favor of more “natural” environmental and social remedies. Thus in Chaux there would be no institutions that simply incarcerated and isolated the criminal, the sick, the poor: there would be no prison because “the newborn town . . . will perhaps be inhabited by less criminal men”; there would be no hospitals, not only because, as Ledoux wrote of the workhouse or hospice, “a specialized asylum for poverty is so humiliating for moral equality” (215), but also because the surroundings were so healthy. Crimes and indigence would be unknown in this city of egalitarian charity, where “each individual is known” (127).

“At first sight,” he wrote, paraphrasing his report in favor of replacing the Hôtel-Dieu with four, smaller hospices, “hospitals offer a great good; England has increased their number, France has concentrated them too much. There are few men who cannot be employed in occupations useful
Ledoux, "Elevation of the Cemetery of the Town of Chaux," Engraving by Boyvinet from Ramée, Ledoux, pl. 142.

either to themselves or to the government. If one wishes to follow this principle, one will see that there will be fewer destitute" (215).

In place of a hospital, Ledoux proposed the institution of the Public Baths, a favorite among his roster of social building types. When imprisoned under the Terror, he would repurpose the design, suggesting its use by the French armies and its patriotic nature. In L’architecture he lamented that such "constructions sheltering miseries presented great difficulties in execution"; sickness was hardly a political force, for "miseries have no other expression than silence and the pent-up cry of sadness" (167). Nevertheless the establishment of a number of watering places dedicated to curing the sick—among them he cited that of Spa in Belgium, which despite its "affluence and corruption" was a useful precedent—gave him hope that the overspill salt waters of Chaux might be put to good use: those of Salins had been used for centuries. Salt water had long been known for its healing properties for the skin; those living far from the sea, however, "suffer without hope," unable to afford the voyage. Economically, as well as medically, his scheme would "unite all the respective interests with those of the government." Drawing from the text of his letter to the Revolutionary authorities in 1794, he avowed that the "use of these baths can be considered one of the surest means to counter the deterioration of health; it is a gift provided by the gods of the earth. Experience proves that they hasten the cure of wounds more effectively than the common surgical remedies. No one is ignorant of the fact that saline baths are suitable for all ages, for ardent, bilious, melancholic, and nervous temperaments; for women subject to convulsions, to those who experience suppurations; they are useful for nervous illnesses, rheumatism, sciaticas, venereal and cutaneous illnesses; for scurvy, impurities of the blood, and for dis-
cases spread by contact devastating our armies; the substances found in salt water provide an aperient action to the tissue of the skin. (168)

To this end, the Public Baths should be built “at the center” of the town, “for those whose misfortune does not allow them to pay for special care” (168). Set at the edge of the forest, and beside a canal that would supply the water, drawn from the aqueduct between Salins and Chaux, the establishment contained a circular central bathing hall for the public, with a plain, top-lit dome, open to “dissipate harmful vapors,” and a surrounding gallery of baseless Doric columns. Individual rooms reached from an external corridor opened into this gallery, while laundries, drying rooms, wood stores, and apartments for the concierge were deployed in the arms of the Greek cross that, enclosed by a square podium, framed the interior and exterior promenades. The entire establishment was heated by furnaces distributing hot air through a system of vents. This was, in every respect, Ledoux’s final answer to the hospital debate that took place between 1772 and 1789. He concluded wryly, no doubt aware of his proscription as hospital architect for the Duc de Praslin’s charitable campaign of 1787, “The architect who proposes a useful monument is not always crowned by success” (167).

But Ledoux’s preoccupation with the institution of the baths was not, by the 1780s, novel in itself. An antiquarian interest in the grand plans of the Roman baths, evoked in the measured drawings of the Baths of Diocletian by Peyre, De Wailly, and Moreau-Desproux prepared in 1757 and exhibited at the Salon of 1771, was supported by an increasing awareness of the benefits to health of contemporary baths. A long tradition of “taking the waters” was thus allied to a fascination with the compositional grandeur of the antique examples. In England, James Wood had literally joined the two concerns, remodeling the Roman baths at Bath in 1724; while in France, the bathing places at Vichy, Plombières, Aix-en-Provence, Mont-Dore, Evaux-les-Bains, and Digne had been enlarged or reconstructed between the end of the seventeenth century and the late 1760s. In Franche-Comté, the engineer Ledoux, Public Baths of Chaux, plan of first floor, section, and perspective view. Engravings from Ramée, Ledoux, pls. 146, 147, 148 (pl. 148 by Berthault, pl. 147 by Sellier).
Querret had, on the orders of de Lacroix, reconstructed the baths of Luxeuil-les-Bains between 1762 and 1768. Thus the Académie program of 1774 for "Public Mineral Water Baths" confirmed a developing trend. Its specifications were monumental, designed to encourage projects as splendid as those of Rome:

_These baths will consist of buildings decorated with porticoes that will establish covered communications between the various parts and serve as promenades for those who take the waters. There will be a chapel, decorated and sufficiently large, two large rooms for the baths (the one for men, the other for women of the people), smaller rooms and private chambers in which men and women of substance and of the Third Estate will take baths. All these rooms will be vaulted and rise to the entire height of the building. On the rest of the site will be disposed the dwellings, for those who come to take the baths as well as for the governors, concierge, and those serving its police and administration; these buildings, as well as a theater and tennis court will only be indicated in their massing on the general plan, which will also show the promenades and pools suitable for fêtes._

Daniel Rabreau has analyzed the winning design, by Mathurin Cruyce, in terms of the "stylistic exercise" posed by the subject, fulfilled in Cruyce's design by the planning of the large rectangular monument divided into multiple rooms and crowned by a low central dome. But while the plan displayed an attempt to rival that of a Roman baths, the elevation, with its blank walls decorated by clearly marked bas-reliefs, and the bare surface of the dome showed a consciousness of social appropriateness already registered in the program with its baths for the people and its provision of a complete roster of community services for worship and recreation: "The citizen who takes the cure finds in this vast enclosure all the necessities for bodily hygiene and spiritual life._" 46

Ledoux, who was no doubt stimulated by this competition as much as by many others, took this social aspect even more seriously, trimming the stylistic extravagance of the Grand Prix designs to create a suitable expression for "silence and the concentrated cry of sadness." The lack of openings, the restricted planning, reflected in his terms, "the decoration of a building intended for the cure of contagious diseases [that] should be submitted to the humiliation of a custom degraded in public opinion and efface itself before the eyes in the fear of being seen"(169).

Architecturally, Ledoux was perhaps less influenced by the restorations of De Wally and Peyre or the monumental designs of Cruyce than by actual projects for regional baths. Those at Aix-en-Provence, for example, must have had a special significance for Ledoux, whose mission to study the state of the old Palais de Justice in 1776 had been conducted in the guise of a journey undertaken for reasons of health, that is, to take the celebrated waters of the town. The baths at Aix, built on the ruins of the old Roman baths, were begun under Louis XIV in 1705 by the architect Laurent Vallon. Vallon projected, in the description of the historian Jean-Jacques Gloton, "a public pump room in the form of a rotunda, built entirely in carefully cut stone, with its Doric order alternating with blind bays and surmounted by a large semihemispherical cupola, lit from the top by a fine oculus, like the Roman Pantheon._" At the time of Ledoux's visit, this structure was still unfinished and open to the sky, an eighteenth-century ruin some already thought dated from Roman times. In September 1780 the sculptor Gilles Cauvet, in conjunction with the plan for a Place de la Rotonde suggested by Jean de Boisgelin in 1776, drew up a plan for rebuilding the baths on a free-standing site outside the town. His design followed the tradition of Vallon, with a large, circular pool at the center, eighteen smaller baths for the sick, apartments for the director, a hostelry, and gaming rooms. It would not be unlikely that Ledoux's project for Chaux, was, in the first instance, prepared as a "restoration" of Vallon's classical "restoration," as a counterproject to the more monumental and impractical scheme of Cauvet. Whether or not this was so, his design certainly seems to echo the pseudo-Roman foundation of Aix, thus reinforcing Serge Conard's assertion that the projects for Aix and those for Chaux were intimately linked, programmatically and even geographically tied by an axis that formed one side of a great triangulation between Chaux, Aix, and Paris._45
ECONOMIC PROGRAMS

For the more traditional forms of socially coercive institutions, Ledoux substituted forms of economic support. The Market, returned to its primary function as the center of agricultural wealth, also became a center for the instruction and charitable sustenance of the poor. The Stock Exchange, besides functioning as a commercial and industrial financial center, also acted as a distributor of benefits to the needy. Both were recognized, in Ledoux’s terms, to preserve the dignity of those they helped; both, it was hoped, would transform the normal system of supply and exchange into instruments of equalization and general enrichment.

The Market, first conceived as a variation of Le Camus de Mézière’s Halle au Blé for Paris of 1763 and utilizing a similar combination of cylindrical drums and porticoes to that of the Barrière Saint-Martin, was dramatically expanded after 1784 to equal the Saline de Chaux in size and complexity. Surrounded by a wide moat, some six hundred feet square, with separate courtyards for each kind of produce, it stood as a kind of market city in its own right. At the center of the plan, rising above the surrounding buildings, was a large, roofed store for wheat, rye, barley, oats, lentils, and acorns. Covered passages led out on each side to the four large open markets for wine; fruit and vegetables; wood, coal and iron; and livestock. At the corners of the plan were four smaller courts for fish, meat, poultry and game, and cloth and linen, each court surrounded by covered porticoes and store-rooms. The market was entered through four gates across the moat on the main axes, each containing a small inn or hostel. Ledoux described the measures taken to ensure ventilation and sanitary conditions, especially for the slaughterhouses.

They are made salubrious by the north winds and by the moving water that runs unceasingly in the ditches. Precautions against fire, which fertilize the resources of art, offer abundant water supplies, deep drinking troughs, open aqueducts, preserved against concentrated putrefaction. The steepness of the slopes is so far developed that it rapidly washes away those heterogeneous materials and the putrid disorder that follows stagnation. (165)

The aim of this establishment was both economic and moral. Its economic functions were to be overseen by an independent company, set up at the behest of a wise government that wished to centralize the distribution of agricultural products in the frontier region of the northeast. A solution to the incessant and politically disastrous scarcities of the second half of the eighteenth century and a containment of the corruption and speculation over prices that attended the bad harvests, the Market departed from strict Physiocratic principles and extended the logic of “natural riches” to their rational exploitation and repartition. Completely free trade was abandoned in favor of a just distribution of profits.

The centralization of all the functions offers great advantages: the administration is less costly, the oversight more active; products of every kind flow from all sides, exportation becomes easier, the way to restrain the activities of greed, of containing them in the rigorous principles of political economy, is to permit exchange only so far as the warehouses are full and exceed demand. . . . One can ensure inexpensive food for the poor as well as support the sale of the rich traders’ produce. (162)

Based on his belief that “agriculture, commerce, and the arts are primary riches,” Ledoux privileged the honest capitalist, backer of necessary credit: “Without credit,” he admitted, “there is no trade.” Such a merchant was to be compared to the earth, inexhaustible source of wealth, as he supported agriculture with loans and profits from its harvests. In contrast, the financial speculator who invested only outside the country or the stockbroker dealing in the inflated price of paper reaped a mere “illusory asset” (162)—a perfect paraphrase of the Physiocratic position.

But the Market also served a moral function in Ledoux’s imagination. He drew the picture of “Roman charity,” symbolized by the erection of colonnes lactaires in ancient herb markets, asylums for abandoned children; an equally charitable government oversearing the Market of Chaux would emulate antiquity by erecting four monuments “that would appeal to the national interest and awaken fraternal charity.” Each would be inscribed with an appropriate maxim reminding the public of their duties to the young and old: “To aban-
Ledoux, Market of Chaux, plan and section. Engravings by Sellier from Ramée, Ledoux, pls. 143, 144.
londed children"; "For the education of orphans"; "For periods of enforced unemployment and for unforeseen accidents that prevent work"; "To ensure the security of old age, the tranquility of retirement" (165). Ledoux put forward his project, derived from his reading of an article in *La bibliothèque britannique*, an experiment that would abolish begging, "the shame of the government," thus linking his architecture to the entire reform of the poor laws, as ineffective in France as in England. And indeed, he claimed, the planning of the Market itself would have beneficial results for public charity, as, beneath its multiple arcades, merchants and farmers would gather to discuss the principles of social morality.

This economization of morality would be in Ledoux's scheme continued by the activities of the Stock Exchange of Chaux. First depicted in the "Perspective View of the Town of Chaux" in the mid-1780s, it was redesigned after the Revolution as a square "temple" consisting almost entirely of open porticoes on the main floor and covered arcades in the plinth, surrounding the central salle d'assemblée, itself open, as a kind of cela, at the roof. Ledoux defined the nature of this institution as against the conventions of the day: "What does one understand by a Stock Exchange? In large cities it is a monument that ought to attest to the purity of morals; in a town founded by philosophy, it is a gathering of chosen men who deal in good faith, either in real materials or in exchanges." (126) An improvement on the companies founded, and often collapsed, to encourage trade in Europe and the East—the corporations of Hamburg, Russia, Greenland, the East Indies, and Turkey—this association would be bound to standards of absolute virtue and honesty. None of its financial undertakings would be at the expense of national or public interest—"gold is not exchanged for poverty"—none would be dictated by any one government or interest. It would act as the economic heart of the new city and thereby form its chief political and social strength. Its principal business would be the regulation and encouragement of foreign trade: "This assembly covers the seas with numerous vessels, levies taxes, establishes prices, regulates the interests that will be tempted to speculate on vile monopolies" (127). No secret deals, no monopolistic policies could restrict its actions as it operated as a great clearing house and export company for French products: "Already you tend to Monopotapa . . . our pictures, sculptures, cloths from Lyons, our artistic masterpieces."

The architecture of the Stock Exchange would reflect and support this probity. Built out of pierres durables, with stone courses as level and regular as the morals they would shelter, as equal as the invariable procedures of the institution, it would be decorated by inscriptions and bas-reliefs illustrating its principles.

There one does not read those placards produced in such numbers by a self-interested corruption to charm the leisure of the idle; one reads on these incommutable walls everything that can elevate the public mind—a merchant who builds a charitable monument with the unexpected returns on his investment or the symbol of the arts placed on a scale with commerce, carried by the figure of abandoned agriculture. (127)

In this set of correspondences, both symbolic and iconographic, emerge the first principles of an *architecture parlementaire* that endows the architect with the status of an acknowledged legislator, one who "knows that he must awaken feelings in order to generate productive seeds . . . awaken desire with models that strike the eyes."

Supporting this economic expansion Ledoux imagined a vast industrial development growing up in the environs of the more traditional salines. Constructed according to the model of the ironworks, foundries, and blast furnaces being installed to the southeast at Le Creusot, the Cannon Foundry had like Chaux itself a double function of defense and production. This foundry would take its place beside other factories—glassworks, porcelain factories, textile *manufactures*—that would compete with the clockmaking industry of Switzerland and even the ironworks of Birmingham: "The cross axis of the Saline joins the routes to Arc and Senans, the forges of Roche, the paper mills, the polishing mills; what activity! Some polish the steel, chase the brass, blow the crystal, others cast the molten metal that sustains the rights of nations" (72). Raw materials would be mined from the
The earth is opened up on all sides and its fertile flanks produce coal, iron, brass, pyrites" (74). The initial incentive for Ledoux's designs for the Cannon Foundry was the renewed interest of the Minister de la Marine, Sartines, in establishing a cannon forge first at Indret, near Nantes, between 1777 and 1780, then at Le Creusot in Burgundy in 1782. At Le Creusot, a society under the leadership of the artillery officer Ignace-François de Wendel employed the English ironmaster William Wilkinson and the French engineer-architect Pierre Toulouze. The works comprised two blast furnaces and four reverberating furnaces, together with extensive buildings for other trades and housing for the workers. The first large-scale iron foundry constructed on modern principles in France, it was, by 1785, an object of interest for the government. Calonne, reversing the policy of Jacques Necker, advanced funds for the operation of Wilkinson's first factory at Indret, and, in 1786, succeeded in transferring the royal glassworks from Sèvres to Le Creusot, thus enlarging the industrial complex considerably. Louis Daubenton described the works as one of the wonders of the world: "Formerly impassable mountains are leveled daily to make sites for establishments as interesting as they are useful, and while their bowels are excavated for that inexhaustible mine of high quality that activates machines of all kinds, one sees this mountain covered with furnaces, pumps, and steam engines." Ledoux, who cited a "prospectus" conceived and dictated by "a minister of probity," a characteristic he applied elsewhere to Calonne, drew up a plan for a large cannon foundry dedicated to the manufacture of arms for the eastern armies. "Cannons are necessary to impose reason," noted Ledoux, trying to justify the warlike nature of such a factory in the utopian realm of Chaux: "The inhabitants of Chaux, by the confluence of rivers that transport abundant supplies, will provide the armies of the east with the means to join their interests with those of the government" (240).

Four giant, pyramidal blast furnaces marked the corners of the square plan of the factory, workshops for carpentry, joinery, chiseling, casting, locksmithing, cartwright’s work, and the production of hand weapons were ranged along the sides. Four two-story workshops housing the forges intersected at the center of the factory in the building of the ironmaster, director of the foundry. A canal and subsidiary basins provided water throughout the works, which was finally surrounded by a defensive ditch.

Bovinet's engraving of the Cannon Foundry shows a veritable cité industrielle, with the foundry at the center, its blast furnaces in full operation, a collection of houses for merchants, artists, cabinetmakers, wholesalers, and artisans of all kinds, warehouses, porticoes, and workshops all set on a level plain presumably at some distance from the center of Chaux. The small canal opened up between the watermill of Roche and the graduation building of the saline is aggregating as the center of commercial development for the ideal city: "a hundred porticoes are built on the banks of the Roche."

RURAL ARCHITECTURE

If you return to the cultivation of the precious earth those ungrateful souls who belittle it, even though it has showered them with its prodigality, how many powerful levels would thereby be created to overcome inactivity and move industry forward; how many outlets would be opened for the economy! (74)

THE REFORM OF THE FARM

The theoretical models of the Physiocrats provided a formal basis for understanding economic processes and, by their moral commitment to agrarian cultivation and the extraction of raw materials, supported an ideology of rural reform; but it is in the practical experiments and exemplary farming of the enlightened landowners and scientists of the second half of the century that we find the programmatic roots of the rural architecture that so preoccupied Ledoux from the 1770s on. While the economists confined their speculation to the pure realms of political economy, concerning themselves with the reform of taxes, the redistribution of land, and the methodological techniques for economic analysis, the agronomes, largely under the influence of their English counterparts, concentrated on the businesses and methods of farming. Their emphasis was practical, utilizing findings from botany, chem-