FHR-8-300 (11-78)

This nomination consists of 20 pp.

United States Department of the Interior
Heritage Conservation and Recreation Service

National Register of Historic Places Inventory—Nomination Form

See instructions in *How to Complete National Register Forms*
Type all entries—complete applicable sections

For HCRS use only
received JUN 8 1983
date entered 9/29/83

1. Name

historic Hacienda "Santa Elena"

and/or common same

2. Location

street & number 2.3 Kms. north of hwys. 2 & 165 intersection and 0.7 Kms. west on lighthighway road to property ___ not for publication

city, town Toa Baja ___x___ vicinity of congressional district N/A

state Puerto Rico code 72 county Toa Baja code 0930

3. Classification

Category	Ownership	Status	Present Use	
___ district	___ public	___ occupied	___ agriculture	___ museum
XX building(s)	XX private	XX unoccupied	___ commercial	___ park
___ structure	___ both	___ work in progress	___ educational	___ private residence
___ site	**Public Acquisition**	**Accessible**	___ entertainment	___ religious
___ object	___ in process	XX yes: restricted	___ government	___ scientific
	___ being considered	___ yes: unrestricted	___ industrial	___ transportation
	N/A	___ no	___ military	XX other: abandoned

4. Owner of Property

name Gerardo Fonalledas

street & number Box 758, Hato Rey Station

city, town Hato Rey ___ vicinity of state Puerto Rico, 00919

5. Location of Legal Description

courthouse, registry of deeds, etc. Toa Baja Registry of Deeds

street & number

city, town Toa Baja state Puerto Rico

6. Representation in Existing Surveys

title Hacienda Azucarera Santa Elena Sugar Mill Ruins, 1790-1910 has this property been determined elegible? ___ yes XX no

date 1977 XX federal ___ state ___ county ___ local

depository for survey records National Architectural and Engineering Record

city, town Washington, D.C., 20243 state

7. Description

Condition		Check one	Check one
___ excellent	___ deteriorated	___ unaltered	XX original site
___ good	XX ruins	XX altered	___ moved date _____
___ fair	___ unexposed		

Describe the present and original (if known) physical appearance v. Continuation sheets

I. HISTORIC BACKGROUND

Hacienda "Santa Elena" is located in Toa Baja, 25 Kms. west of San Juan and 5 Kms. south the Atlantic Ocean, on the west bank of Toa or La Plata River. The terrain is comprehended within the low, alluvial lands of the northern coastal valley which soil formations are due to seasonal floodings that carry rich mineral deposits from the central mountain range washed down by the largest rivers found in Puerto Rico. La Plata or Toa is one of these.

Since the early days of Spanish colonization (15th century) the area of Toa was mentioned as agriculturaly rich. It was originally inhabited by Taino Indians whose manioc and corn fields and fruit trees caught the attention of the conquistadors. After the collapse of the first colonial policy --gold mining carried out by the indians-- by mid-1500's, the Spaniards resorted to subsistence agriculture, while the colonial capital of San Juan was turned into a formidable military bastion in order to protect Spanish trading routes and the Spanish Main. Nevertheless, the Toa valley became a major "hato" or cattle grazing ranch under the direct supervision of Spanish royal officers.

In a report commissioned by Emperor Philip II in 1582, the Toa lands were described as very fertile in which there were established three sugar mills (one hydraulic and two horse-driven). It was pointed out that besides sugar, ginger was a major commodity widely cultivated by the rural inhabitants. Thus, as a result of its demand in contemporary European markets, ginger would partially become the core of agricultural production side by side with leather production (a well established trade since early 1500's since it was extensively used by the Spanish emperial troops in the main continent). (1)

The expanding ginger cultivation infringed upon agricultural subsistence production. In 1613 the Capital's Town Hall Aldermen filed a report in the Colonial Governor's Office which complained about the "harm done /to the land/ by excessive ginger cultivation". The report also mentioned that the Toa's sugar planters had large tracts of land dedicated to cattle grazing. The brief document gives the impression that the area seemed to have been rather well developed for its times and relatevely wealthy since it was requested from the Governor that an "Alcalde Mayor" or Senior Major be appointed to punish and detain the wave "of frequent misdemeanors and thefts that are committed in the villages by the Bayamón and Toa river banks". (2)

By mid-1600's ginger, sugar, and leather were the most important items produced by the colonial planter. Sugar production in the vecinity of San Juan was centered in 7 plantations by 1647: 4 on the Bayamón River, 2 at the Toa and 1 in Loysa. Therefore, out of the 3 sugar mills or "trapiches" that existed in Toa in 1582, only 2 survived at the beginning of the second half of the 17th century. (3)

8. Significance

Period	Areas of Significance—Check and justify below				
___ prehistoric	___ archeology-prehistoric	___ community planning	___ landscape architecture	___ religion	
___ 1400–1499	___ archeology-historic	___ conservation	___ law	___ science	
___ 1500–1599	XX agriculture	___ economics	___ literature	___ sculpture	
___ 1600–1699	XX architecture	___ education	___ military	___ social/ humanitarian	
XX 1700–1799	___ art	___ engineering	___ music		
XX 1800–1899	___ commerce	___ exploration/settlement	___ philosophy	___ theater	
XX 1900–	___ communications	XX industry	___ politics/government	___ transportation	
		___ invention		___ other (specify)	

Specific dates 1790-1910's **Builder/Architect**

Statement of Significance (in one paragraph)

Hacienda "Santa Elena" is the only extant late 18th century industrial building in Puerto Rico and the only extant in the Caribbean which illustrates an advanced form and design of the early classic types of sugar making mills in the Western hemisphere, as described. These innovations refer to the internal location of a cattle driven vertical mill on the second floor of a double room industrial space while using an elevated platform for the cattle, the profusion of arches and pilasters in the encasing walls and the internal basket three centered arches which permitted to built a high roof without apertures for ventilation. It is also a unique site in terms of the traditional colonial architecture in Puerto Rico of late 18th century. Nevertheless, the site is a radical departure from the contemporary overwhelming military and religious designs, although it adapted some of their fundamental elements for industrial or secular needs, particularly, the brick and massive pilasters. These two elements were expanded and reorganized at "Santa Elena" to create an unusual industrial space uniquely characterized by high quality brick construction, ample and wide spaces controled by a rythmic horizontal arrangement of arches and pilasters and a vertical space shaped by parallel basket arches and a shallow pointed roof. Also reveals unusual attention to external/internal decorative elements and internal/external arrangement of architectural spaces for industrial purposes, and a predetermined conception of proportioned shapes and dimensions.

9. Major Bibliographical References

v. attached Continuation sheets

10. Geographical Data

Acreage of nominated property 1.5 to 2.0 acres

Quadrangle name Vega Alta (Puerto Rico) Quadrangle scale 1:20,000

UMT References N18°27'08" E66°15'29"

	Zone	Easting	Northing		Zone	Easting	Northing
A				B			
C				D			
E				F			
G				H			

Verbal boundary description and justification

v. attached Continuation sheet

List all states and counties for properties overlapping state or county boundaries

state		code		county		code	
state	none	code		county		code	
state		code		county		code	

11. Form Prepared By

name/title Dr. Benjamín Nistal-Moret, Historian & Consultant for Historical Affairs in Historic Preservation

organization Independent (based in NYC & P.R.) date 19 August 1980

street & number 38 West 75th St., Apt. 1R telephone (212) 787-0621

city or town New York state New York

12. State Historic Preservation Officer Certification

The evaluated significance of this property within the state is:

___ national X state ___ local

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the Heritage Conservation and Recreation Service.

State Historic Preservation Officer signature

title State Historic Preservation Officer date June 2, 1983.

For HCRS use only Determined Eligible

I hereby certify that this property is included in the National Register DOE/OWNER OBJECTION

Keeper of the National Register

Between 1650's and 1750's the region excelled in sugar, ginger, cattle grazing, and leather production. But, the absence of a socio-economic integration and planning policy caused by the old Spanish empirial military policy directed to strictly maintain the Island as a pasive/protective stronghold against foreign intervention or threat, impaired maximum agricultural development. At the beginning of the 18th century the War of Spanish Succession toppled the aging Habsburgs policies and were replaced by the enlightened French Bourbonic Dinasty. The French physiocratic thought and practice, for example, found its way into Spanish politics by way of Ferdinand VI and Charles III. The new Spanish reformism had its repercussions in Puerto Rico. In 1757 a land reform began to take place as a direct consequence of a Royal charter which established the Barcelona Trading Co. as a new exchange trading mechanism between Spain and its colonies. The reform had special significance for the region surrounding the old City Capital since its port was commissioned as the major trading post for the Barcelona Co.

The 1757 reform was based on the transformation of land proprietary rights. Since colonization times land was the Crown's sole property and only through royal concessions and conditions could an individual cultivate it. The property rights began to be transfered to individuals as long as they would work the lands producing those goods and staples beneficial to the Crown, the Company and the Colony. Therefore, for the exchange of proprietary rights taxes were to be paid and certain dues would be given to colonial officers. Land was seen, then, as a productive property in its modern meaning. Thus, for the first time land was fenced in according to official dispositions: the old wide opened cattle grazing grounds were confined to protect the new land to be cultivated in "sugar, tobacco, cotton, cocoa, coffee, ginger, and other minor products". (4) Toa Baja was singularly affected by this new development since it was located within the limits --administrative, economic, and judicial-- of the Capital City.

This early stage of reformism could be labeled as "transitional inasmuch the nomadism of the cattle grazing industry was intermingled with agriculture to give way, later on, to the appearance and development of sedentary agriculture." The so-called transitional period took up speed and momentum during the course of the century's lasts three decades which signified the conversion of Puerto Rico into a major sugar "bowl". (5)

It also became evident that besides Bourbonic reformism, capital was needed to develop the land. The King's confidant Field Marshall Alejandro O'Reilly stressed in 1765 that it was of outmost importance for any future development in the Colony to increase the reform's pace, but added that "I consider indespensable that men of means establish themselves in order to built up sugar mills". (6) This idea was echoed in 1775 by Fernado Miyares when he wrote that the lands of Toa were

"very appropiate for sugar cane" production. Their quality and fertility, he argued, were so high that with little capital "considerable number of sugar plantations could be establish" notwithstanding that some existed.(7) The Toa lands increasingly became famous and cherished by their generosity. An observer in 1776 said that the Toa river banks could produce "all kinds of fruits" and goods. He was not far from truth.(8) In that year there were already established 162 "estancias" (plantations and farms) and 6 "hatos". The land was planted in sugar cane (138 acres, holding the fifth place on the entire Island), plaintain (306 acres), coffee (19,700 trees), and cotton (1380 trees). Toa Baja was the second most important producer of mascabado sugar (31,740 Kgs) and corn (82,800 Kgs) of the Colony. It also hold fourth place in molasses production. It was significant that agriculture went hand in hand with product quality. In 1782 one "hacendado" or sugar planter produced "the best sugar and rum of all the Island" as a result of either "the enlightened character of the owner or the best quality of the land". (9)

> It was during this time that Santa Elena was built. If the land was famous for its fertility, that same land perpetuated itself in a grandiose, unique, man-made structure. Both were points and counterpoints of a single orchestration: one produced the green sweet sugar cane, the other turned it into the dark sugar, the brown molasses, and the translucent rum. Thus the lands of Santa Elena, scissored by La Plata River, asserted its green quality through its untiring, tropical, generating capacity. At the same time it was crowned by a brick and plaster structure of powerful and magnificent simplicity which somehow recalled the religious intimacy and serenity of the arcade of the St. Tomas Aquinas Dominican Convent and the overwhelming arched and vaulted militarism of St. Cristopher Castle in the Old Walled City of San Juan. (10)

II. THE ACTUAL RUINS

"Santa Elena"was built in 1790 by Juan Rijus Feduchi, an unidentified individual of French or Italian ascendency or possibly o French emigré from Saint Domingue, six years before the completion of San Juan fortifications and seven years before the English attack on Puerto Rico. In late 1820's the property was sold to a man named Dr. Figueras and in the late 1890's to Jaime Fonalledas.

During the course of a seventy year period beginning in the late 1830's the original factory went through several structural alterations as a consequence of technological and mechanical changes introduced in the sugar making process in both stages of sugar cane grinding and evaporation of sugar juices. Between the 1790's and the 1830's the mill was a vertical, possibly wooden, oxen or mule driven "ingenio". It was transformed into a steam mill between 1830 and 1839. Since the first steam engine was introduced in Puerto Rico (Ponce) in 1831, it can be asserted that "Santa Elena" was one of the first Puerto Rican "haciendas" to be partially mechanized.

The introduction of steam technology by Dr. Figueras implied, by necessity, the alteration of the original structure, as it will be demonstrated later. Other minor and less important alterations were made in the late 1890's when Jaime Fonalledas became its last owner. Notwithstanding the structural changes, an eyewitness said of "Santa Elena" in 1902 1902 that it "still preserves all its old architecture, whose formidable masonry walls, which belong to the old factory, reflects the colosal sugar industry of last century". (11) In this sense, Jerónimo Fonalledas, son of Jaime Fonalledas and brother of the present owner, asserted in 1977 that the actual old structure did not differ substantially from the one he saw in the 1910's when he was a child. (12) His assertion was corroborated by a site photo made in early 1910's prior to the 1918 earthequake which destroyed the new section of the building constructed on the north facade after the 1830's. The old stack also collapsed. But the 1790 "ingenio", although badly shaken, still stands in situ.

For industrial reasons the structure is north oriented having its main entrance on the south facade. (13) The east and west facades are practically identical in design and execution; although, the only major difference is found on the west facade where two "buttresses" are found. The north facade substantially differs from the south facade where a ramp ascends towards the second floor where the main used to be located.

The brick structure is a two story manufacturing establishment 96ft x 49ft x 25 to 30 ft high. The ramp is 56ft x 13ft wide. Both east and west facades are divided in seven rectangular elevations (from ground level to parapet). Each elevation is subdivided in two square bays and each bay is vaulted by an arch. The arches rest on pilasters --which also act as partial frames for the adjacent elevations-- while each elevation's bays are formed by a belt course --located half way each elevation-- that embraces the entire building. Half way each pilaster, a subsidiary or secondary cornice is found that serves as both resting points for the arches and a unifying decorative member since the elements forming the belt course and the secondary cornice are repeated and further develop in the bold and solid brick main cornice that also embraces the entire building. It used to be terminated in a simple parapet formed by rectangular bays --in a horizontal position-- and a square

protruding medallion. This corresponds to the top section of the pilasters while the rectangular bays pertain to the elevations of the facades. It should be pointed out that the outside elevations on each facade are larger than the other internal five while the fourth or central elevation is boarded up for structural reasons.

In general terms, the horizontal lines of the structure possessan interesting vertical rhythm --a b a ab-- as far as the decorative elements are concerned. The pilaster-elevation-bay arrangement also posses a deliberate rhythmic movement: a (a1) a b a b a b a b a b a b a b a (a1) a. This architectural organization of spaces and shapes is repeated on the south facade which is formed by three vertical elevations (6 bays) of equal dimensions. In the east and west facades the parapet inverted the order of things: what used to be vertical in the facades was placed horizontally. Thus, the main cornice-parapet arrangement synthesizes all the elements of the building.

There three structural tensions present on the facades: the outside pulling forces of the external arches of the elevations at the corners of the building, the settling force of the central elevation and the upward movement of the intermediate elevations. These tensions are heldtogether and control by the horizontal lines of the secondary cornice, the belt course, the main cornice and the parapet. Thus the heavy horizontal lines are softened by the sinuous rythms of the arches interplaying with the elevations, square bays, pilasters, and decorative elements. This graceful movement is repeated on the south facade. There are significant traces of them in the north facade.

The ramp's walls grow from a point near the main cornice in a downward direction as they are part of the central elevation pilasters. The steep inclination of the walls is modified by a perpendicular cut which alters the horizontal line of vision thus permitting a slow descending that ends at the ramp's entrance on ground floor. Its entrance was designed as a wide-mouth funnel or cup shape that ends in a tuft. In this way a structural relationship was created between the main cornice, the south facade's central pilasters and the ramp's lateral walls

The space left under the ramp was adapted to industrial needs as it will be demonstrated. Three equal square rooms were created (10ft 5in). The central space serves as a connecting hall with the other two. The entrances to these are through an arch --equal in size to those on the facades-- which directly rests on ground level.

The original access to the building was located on the second floor. It served an industrial need since it was on the second floor of the south room that the old circular platform of the old vertical sugar mill used to be.

The floor plan is a rectangle roughly divided into two equal squares (44ft) by a solid brick wall which has two connecting passways to the north room. The dividing wall coincides with the boarded up central elevations of the east and west facades already described. Two

parallel three-centered or basket arches --44ft in span of brick and plaster lacking a keystone-- connect the south wall and the center wall. The same spatial division is repeated in the north room with a minor difference: thenorth room's arches are slightly smaller due to the fact that the ramp on the south room served as pilaster and buttress. That is, the absence of a ramp on the north facade required the reduction of the arches' span as larger brick pilasters had to be attached to the inside of the north room walls to absorb weight and pressure.

The arches --which impart a distinctive basilica impression to the floor plan-- had a specificstructural function since they hold the roof in place. The tops of the basket arches are above the top of the main cornice, but are lower than the top of the parapet. The south facade, on the other hand, was not terminated on a parapet but it was skillfully transformed into a simple tympanum which still preserves traces of the parapets elements. Inside and along the lateral walls of the building --at a mid point between the top of the main cornice and that of the parapet-- and along the sides of the arches' tops a number of iron flat hooks (in situ) served to hold the rectangular roof beams in place (some still in situ). That is, the original roof used to be a very shallow pointed roof (possibly covered with roof tiles), discreetly concealed by the parapet and the tympanum. There are traces of the tympanum on the north facade.

The basket arches show the transformation introduced in the 1830's "ingenio" as the result of its partial mechanization. The introduction of steam technology and machinery in a structure not designed for such purpose required its adaptation. It was carried out with exquisite care thus revealing that the builder was, to a considerable extent, "a man of letters". The south room arches were reinforced with two solid brick square columns decorated with similar elements of the main cornice. On the north room --which contained the machinery-- the arches were extensively remodeled and reinforced to absorb the vibrations created by the engine, flywheel, and horizontal iron crushers. The old brick arches each was remodeled into three smaller ones. These were made from cast iron having a slight resemblance of English Tudor four centered arches. The height of the cast iron arches is aproximately half the brick ones. The builder filled the space left with brick following the same pattern of the old mill. The new arches rest on cast iron flutted columns further reinforced with tie rods. All the new alterations were expertly done: they carefully considered, respected, and followed the building's original excellence of design and building materials and craftmanship.

All the present elements indicate that the old structure was a magnificent building expressly designed for industrial purposes and uniquely characterized by a remarkable airy transparency created by arches, wide sprawling opened spaces controled by well thought out decorative elements and orderly placed pilasters to which was added

the impressive results of the basket arches.

III. THE ORIGINAL SITE

During the course of three years (1977-1980) "Santa Elena" was submitted to a careful structural analysis and systematic research. The long and deliberate documentation process prior to nomination was gearedto establish without reasonable doubt the importance and significance of the site in terms of the Western hemisphere technological development as it was related to sugar making processes and architectural development. (14)

"L'ancienne méthode" of sugar making was described --graphically and literarilly-- by Doutrone de la Couture in his classic Précis sur la canne published in Paris (1790) the same year "Santa Elena" was built. The mill proper or "trapiche" consisted of a circular platform for the oxen or mules and a wooden or iron three roller vertical crusher somewhat sunken and/or below the platform surface. The purpose of this design was clear: the crushing process was to be a constant operation uninterrupted by the pulling cattle. The access to the crushers was provided by apertures under the circular platform. The crushing process required two additional subsidiary industrial spaces: a sugar cane "plaza" and a cattle pen. The first also served as bagasse collector. In Doutrone's graphic design the pen was attached to the platform by means of a small ramp for the cattle to ascend to it while another was provided opposite the first for the cattle to descend. The sugar cane "plaza" had direct access to the "trapiche". (15) Dutrone as well as other sources state that the "trapiche" had to be installed above ground level of the boiling house in order to make maximum use of the laws of gravity in the absence, obviously, of pumps to carry the sugar cane juices to the receivers and vats or "pailas" in the boiling house.

Dutrone's stupendous drawings and designs were not original at all. In 1657 a remarkable book was published in London titled A True and Exact History of the Island of Barbados by Richard Ligon. The sugar making process of that period --140 years before Dutrone's publication-- the structural spaces which contained the "trapiche", and the boiling house were discussed and illustrated. On this respect, there are two major differences between both authors as far as illustrations and descriptions are concerned. First, Doutrone isolated the mill from the boiling house. (There are several West Indian examples of such type: e.g., "Annaberg" and to a less degree "Reef Bay" in St. Johns). In Ligon's arrangement, the "trapiche" was contained within the same structure which sheltered the boiling house; furthermore, Ligon clearly described and illustrated the fact that the "trapiche" was located in a higher position than the boiling house, thus, the necessary ladder or stairway which he showed on his plans. (16)

Secondly, Doutrone's design shows a double Jamaica or French

train of boilers each having five vats. Ligon placed only one elaboration train also with five "pailas". Doutrone train is a single fire, that is, one single furnace with its own air flue, ash collector, and two furnace doors opening to the fire chamber which ran, without further dampers along its way and sides, to the stack. Ligon, on the contrary, put additional dampers under each "paila" connecting them to a fire trench located outside the boiling house adjacent to the train. Doutrone also left space for the fire trench. In this particular instance, "Annaberg" is an excellent example which clearly illustrates the fire trench, dampers, and a French train as a variation of the "1'ancienne méthode" of sugar making. ("Reef Bay" is a less dramatic example due to its adaptation to steam technology).

"Santa Elena" is a unique variation of the same "ancienne méthode" theme. It can be ascertain that it is the only extant Caribbean sugar mill from late 18th century which corresponds to the so-called "old system" of sugar making as opposed to the "nouvelle méthode" also described and illustrated by Doutrone. The new system was based on Ligon's description; although the floor plan was altered,it was generally followed, and innovations were made particularly in the furnaces and location of these. (17)

A careful analysis of "Santa Elena" south wall and room reveals several unique characteristics: (1st) a line of rectangular holes (aprox. 5in x 7in.) on the west, south, and east walls about 8ft to 9ft above actual ground level almost at the same height of the ramp's door that used to connect with the old factory second floor; (2nd) a boarded up door which used to connect the south room with the north room underneath the ramp, and (3rd) two doorways are located in the dividing wall at the center of the building which provide access to the north room. There is structural evidence on the actual floor which indicates that these passways had steps in a going-down direction. This finding was corroborated by Gerónimo Fonalledas who stated that the north room original floor --as he saw it in the 1910's-- was about 5ft or more below the actual concrete floor. (This means that the fluted column's bases in the north room are partially visible).

The above stated details mean that a circular wooden platform existed in the south room --approx. 25ft to 30ft in diameter and raised from the ground about 7ft-- which was sustained by wooden beams inserted in the walls. The access to the platform was through the actual ramp. In this way a free movement of oxen or mules around the platform and up/down the ramp was achieved which permited a constant crushing process. This arrangement implied that the "trapiche" had to be located at the center of the south room at ground level. The crushers were fed from the sugar cane "plaza" which was actually the small north room underneath the ramp. The cattle pen was, then, the small south room:the one closest to the funnel-shape ramp's entrance. This particular shape had a functional purpose indeed: it facilitated the cattle movement from

and to the pen avoiding a congestion of animals at the entrance of the ramp. In other words, a walk-on-your-right flow seems to have been considered at the time of construction.

It was argued in 1977 that "Santa Elena" pertained to the "nouvelle méthod" or new system of sugar making as developed in the Caribbean at the end of the 18th century. This is not the case at all. A book was published in London in 1790 --the same year as Dutrone's-- titled A Descriptive Account of the Island of Jamaica by William Beckford. One particular section is of relevance:

> The boiling-house and the curing-house are connected together; and those built in the form of a T, are, I think, the most commodious: the horizontal line represents the first /the boiling house/; and the perpendicular, the last /or the curing or purging house/ (18)

Beckford also provided the general dimensions of a typical boiling and curing house as "fifty fee long by thirty wide, and a curing-house eighty in length and a proportionable breath". He further stated that these dimensions "will give sufficient room " for the manufacturing of sugar. (19)

Beckford's descriptions of designs and dimensions of industrial spaces are present in Doutrone's illustrations of a typical T-shape "nouvelle méthode" type sugar mill. Furthermore, both did not located the "trapiches" inside the main manufacturing structure. An existing example of the "nouvelle" system --under restoration-- is "Nigua" in Saint Domingue. (20). Now, if Ligon's typical layout and design is compared with "Santa Elena" the results are important: Ligon is a 93ft long factory while "Santa Elena" is 96ft;

The boiling room at "Santa Elena" used to be the north room. As stated before it followed Ligon's layout although the evidence tend to indicate that it only had one French train located on the west section of the room. If the room is carefully analyzed, both inside and outside, two major structural problems show up which have to be explained in the contect of sugar making and not in terms of the structure itself.

First, is the "buttresses" question on the west facade. It is clear that the original structure did not require any facade supporting element since no reasonable structural fault or intrinsic need has been found which might indicate so. If the "buttress" closest to the northwest corner is examined it will be found that it was not such thing. It was, indeed, an arch that supported something or formed part of a long lateral passage or walkway. The other "buttress" bears very close resemblance to the first. Furthermore, along and above the belt course on the same corner several holes are located similar to those on the south room. These also served to hold beams in place which rested,

as beams, in other supporting elements. Therefore, if these two problems are considered together to which the extremely importatnt fact is added of one flue (in situ) located on the same corner, then, the conclusion can be reached that this is actually the fire trench of the "ancienne méthode" French train. The "Plans de Sucrerie et the Fourneaux suivant l'ancienne méthode" by Doutrone perfectly illustrates this argument. If, on the other hand, an argument favorable to the "nouvelle méthode" is considered, it has to be discarded off hand after the analysis of Ligon's drawings, Beckford's T-shape description, and Doutrone's illustrations. The best example is, without question, Doutrone's "Plans de Sucrerie et de Purgerie suivant la nouvelle méthode" and "Plans des Fourneaux suivant la nouvelle méthode". That is, "Santa Elena" could not conceivably be a "modern" sugar mill. The reason is simple: there were not architectural and industrial spaces provided for at the time of the construction at the end of the 18th century.

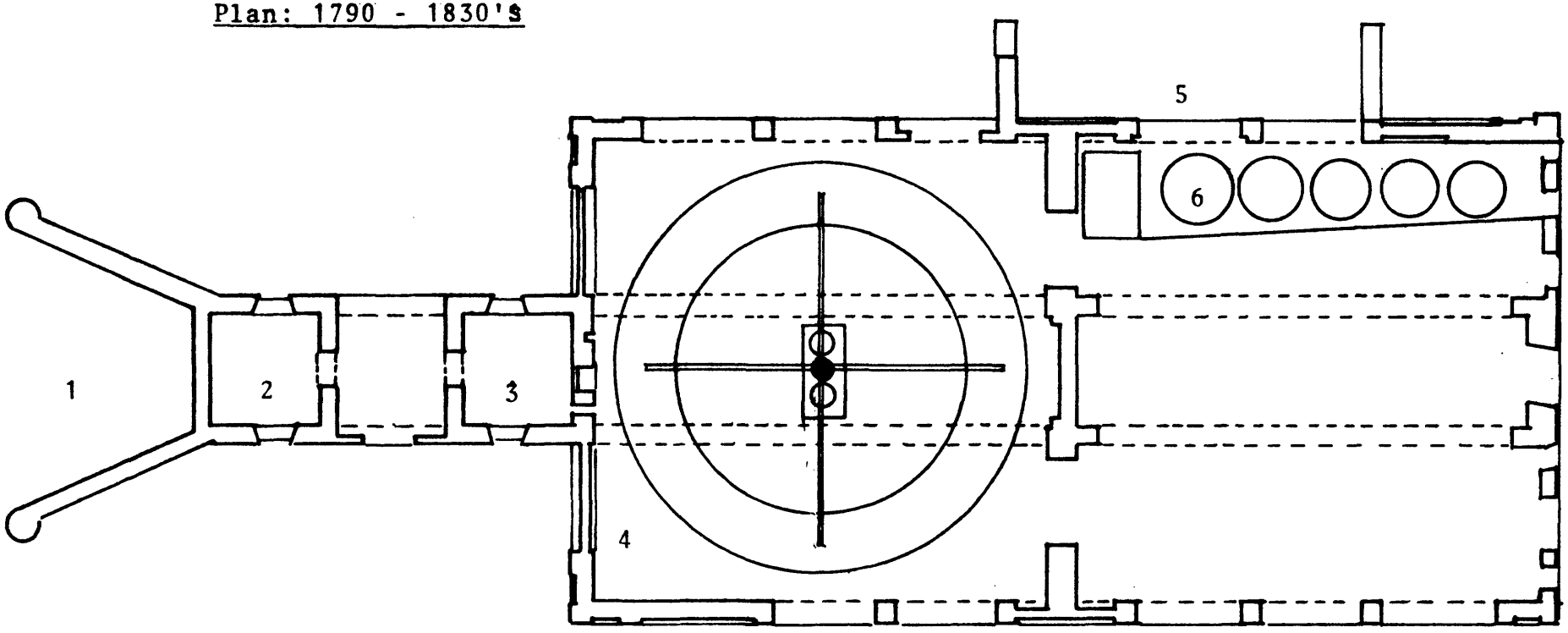
In other words, "Santa Elena" was built in 1790 following an old method of sugar making disposition of spaces which respond to a classic system developed or implemented in the Caribbean since late 16th century. But, two innovativeelements were introduced: first, it enclosed an elevated "trapiche" within the main industrial building; and second, rearranged the "plaza" and cattle pen in relation to the "trapiche". But, and this is peculiar, retained the single-fire French train (since no further evidence has been retrieved which might indicate that there were more dampers on the fire trench).

* * *

Gerónimo Fonalledas' verbal account of the site proved, as stated before, of enormous value. Based on his recollections the 1977 HAER Recording team was able to draw an "Approximate machinery location plan". Both the interview and plan confirms now --after further research and documentation-- most of the initial conjectures about the "old "Santa Elena" (1790-1830's) and the "new Santa Elena" (1830's-1910's); for example: the boiler of the new steam machine was installed in the old embankment of the single-fire French train, and a new French train was built north of the north room, among other things as already stated. Based on all these questions and answers, finally, the "ancienne" layout of "Santa Elena" is conceived in the following manner:

v. following page.

Plan: 1790 - 1830's



1. Entrance to ramp
2. Cattle pen
3. Sugar cane "plaza"
4. Vertical mill
5. Fire trench
6. French train

Drawn by Benjamín Nistal-Moret
after a drawing by HAER (1977)

(not at scale)

The author stated in his 1977 report to HAER:

But one question remains unanswered /even until today/,i.e., why were the Hacienda and the building named after Santa Elena. Historically, Santa Elena was a Roman empress who lived during the 3rd and 4th centuries and was mother to Constantine the Great. She was converted to Christianity in early 4th century. Traditionally, she has been associated with the findings of Christ's Cross and Nails in Jerusalem. In terms of art "she is shown as an empress, with crown and emperial mantle, and usually with the Cross and the Crucifixion nails." A painting /or tapestry/ depicting "Santa Elena" actually hung between two partially engaged columns in the North room niche. The columns have a Corinthian base, half fluted shaft, and a Doric-type capital and rest on an undecorated corbel. The painting is missing from its original place but the metal rod from where the painting hung is still in place. Finally, the church like /or basilica/ resemblance of the structure was accentuated by a curious fact: the tolling of a 500 lbs. bell --missing-- probably used for calling the slaves of the entire region, since the tolling could be heard as far as the towns of Bayamón and Vega Baja, each one almost ten miles away.

NOTES

1 "Memoria de Melgarejo", Boletín Histórico de Puerto Rico, Vol. I. pp.75 ss.

2 Catálogo de las Cartas y Peticiones del Cabildo de San Juan Bautista de Puerto Rico en el Archivo General de Indias. Siglos XVI-XVIII, p. 144-5.

3 "Memoria de Torres Vargas", Boletín Histórico, Vol IV, p.260.

4 Actas del Cabildo de San Juan de Puerto Rico (1751-1760), pp.161-5 166-172.

5 "Memoria de Alejandro O'Reilly", en Alejandro Tapia Biblioteca Histórica de Puerto Rico (San Juan: 1945), pp.526-555.

6 Benjamín Nistal-Moret, El Pueblo de Nuestra Señora de la Candelaria y del Apostol San Matías de Manatí, 1800-1880. Its Ruling Classes and the Insitution of Black Slavery (SUNY at Stony Brook, Ph.D. dissertation, 1978), p.48

7 "Memoria de Miyares" en Crónicas de Puerto Rico (1493-1955) (San Juan: 1969), p.187-8.

8 Bibiano Torres, La Isla de Puerto Rico, 1765-1800 (San Juan: 1968), p.22 ss.

9 Abbad y Lasierra, Historia Geográfica Civil y Natural de la Isla de San Juan Bautista de Puerto Rico (1782), (San Juan: 1970), p.122.

10 Benjamín Nistal-Moret, Hacienda Santa Elena: Sugar Mill Ruins (Washington DC; NAER, 1977), pp.13-4

11 J. Ferreras Pagán, Biografía de las riquezas de Puerto Rico, Vol.I (San Juan: 1902), p.17

12 Interview taped on 3 August 1977 and filed with HAER's report.

13 Throughout 19th and 18th centuries records the affirmation is made that the wind blows from NE -- SE direction. Thus, placing windows towards that point and Jamaica or French trains opposite them ventilation was assured. This explains why "Santa Elena" trains, those of 1790 and 1830's were placed on the west facades.

14
As a result of the British attack on Puerto Rico (1796) a massive destruction of primary documents occured in San Juan. Therefore, no substantial primary evidence seem to survive for the area of Toa Baja. Secondary, but contemporary sources were consulted as well as eyewitnesses who might provide some general clues as to the appearance of the structure by late 19th or early 20th centuries. Sources from other Caribbean areas were scrutinized. These steps plus the information provided by Gerónimo Fonalledas proved of great value. Most of the Caribbean sources were found in the New York Public Library (Rare Book Collection, Science and Technology Section, Periodicals, and Main Sections) and the New York Historical Society. Finally, site inspections were made in other West Indian islands, especially in St. Johns and St. Croix, and reports from St. Domingue, Haiti, and Cuba were studied. Another source of information was Manuel Moreno-Fraginals author of the classic The Sugarmill with whom the site was visited in 1978.

15
V. Graphic and Supporting Materials, Items I, II, and III ("Santa Elena" HAER drawings, Recording Team's field photographic recording --this is not HAER official photo recording--, and Doutrone's drawings)

16
V. Graphic and Supporting Materials, Item IV (Ligon's drawings).

17
V. Graphic and Supporting Materials , Item III (last drawings)

18
William Beckford, A Descriptive Account of the Island of Jamaica, Vol.II (London: 1790), p. 28.

19
Ibid., p.29

20
V. Graphic and Supporting Materials, Item V ("Nigua" drawing)

United States Department of the Interior
Heritage Conservation and Recreation Service

National Register of Historic Places Inventory—Nomination Form

Major bibliographical references

Baker, J., An Essay on the Art of Making Muscovado Sugar (Jamaica, 1775)
Bekford, W., A Descriptive Acount of the Island of Jamaica (London,1790)
Clark, W., Ten Views in the Island of Antigua (London, 1823)
Collection of pamphlets, circulars, on sugar and sugar industry, 1834-1907 (New York Public Library)
Deer, N.F., The History of Sugar (London, 1949) 2 vols.
Dutrone de la Couture, J.F., Précis sur la canne (Paris, 1790)
Leon, J.A., On Sugar Cultivation in Louisiana, Cuba, etc.,(London, 1848) 2 vols.
Ligon,R., A True and Exact History of the Island of Barbados (London,1657)
Moreno Fraginals, M., El ingenio (La Habana, 1978)
Moreton, J. Manners and Customs in the West Indian Islands (1790)
Peterking, J., A Treatise On Planting... (St. Cristopher: 1790)
Roughley, T., The Jamaica's Planter's Guide (London, 1823)

NOTE: This bibliography does not include approximately 50 other entries which were consulted in addition to the previous 12. Most of those not listed pertain to 19th and 20th centuries sugar technology, history, socio-economic problems, etc. in the Western hemisphere as well as to similar questions in the European continent.

Geographical data

Verbal boundary description and justification:

The nominated acreage extends in a uniform geometric (rectangular) tract of land around the building. This tract should contain the outside north section of the building extending beyond the ruins of the 1830's mill. (v. HAER's "Santa Elena" Recording, sheet #3: Plan, 1830's - 1910's)

See telephone report of 7/22/83

The nominated acreage excludes the ground surface in which the ruins are found.

The 2 acres of nominated land will provide the ruins enough breathing space while at the same time provides and keeps the basic floor plan of the ruins.

The property boundary line of "Hacienda Santa Elena" is shown as a red line on the accompanying HAER 1977 recording of the site (sheet 1 of 5).

GRAPHIC AND SUPPORTING MATERIALS:

1. Vega Alta Quadrangle

2. NAER 1977 Recording of "Hacienda Santa Elena. Sugar Mill Ruins. ca. 1790-1910" drawing copies (5 aheets)

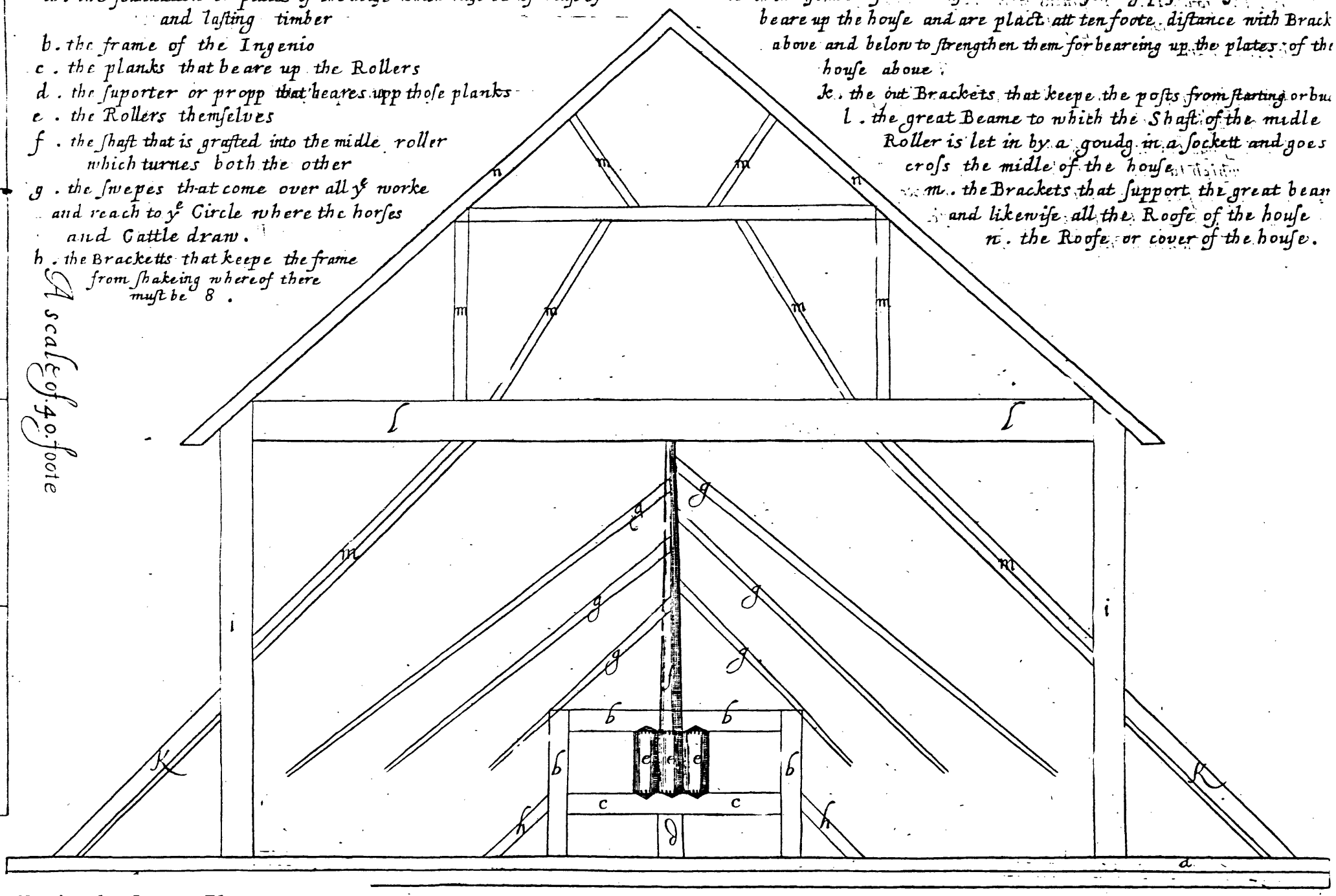
3. Doutrone de la Couture, J.F., Precis sur la canne (1790) drawing copies (5 sheets)

4. Ligon, R., A True and Exact..., (1657) drawing copies (2 sheets)

5. Drawing copy from "Nigua" Sugar Mill in St. Domingue.

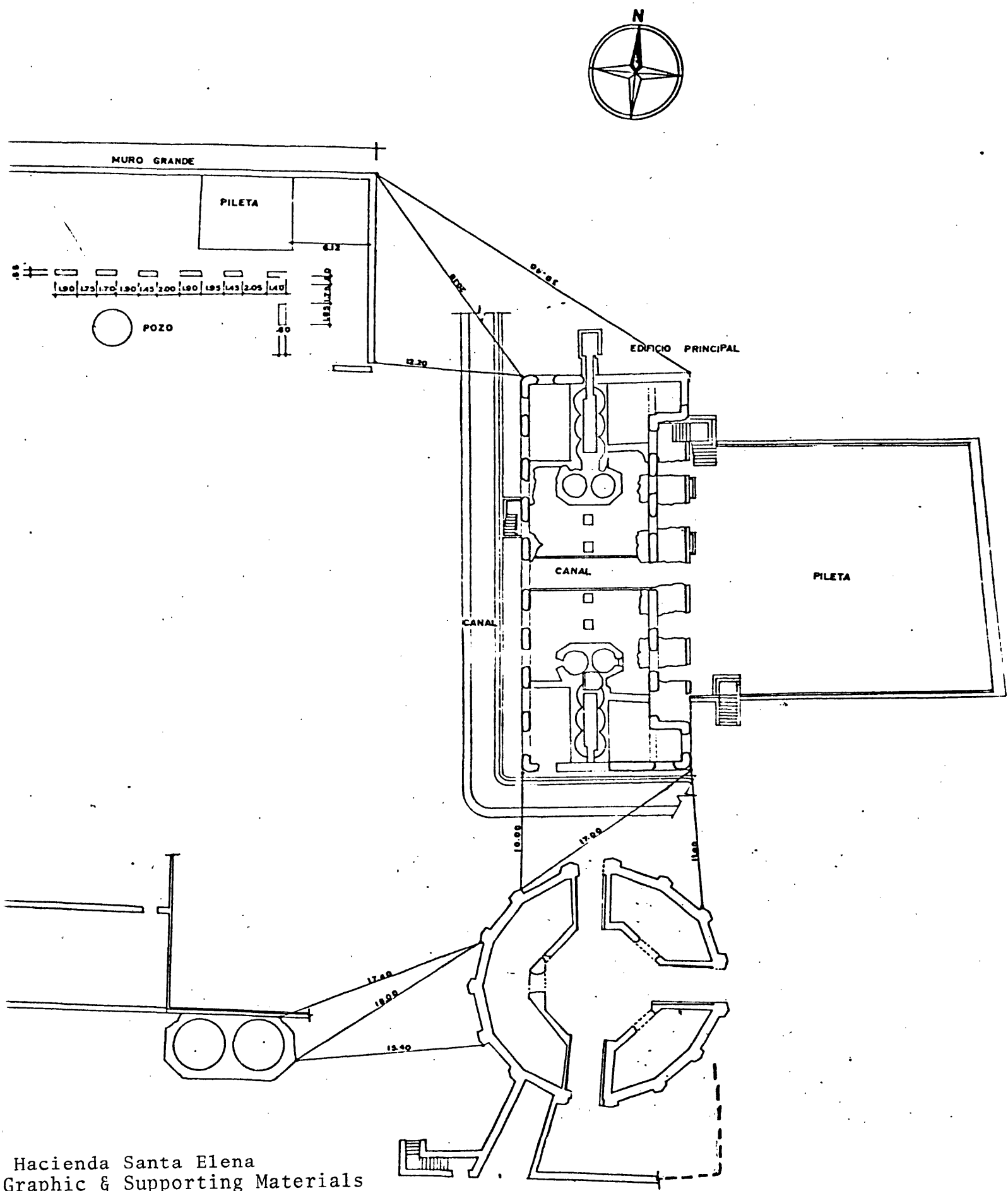
6. ca. 1900 Photo east facade Hacienda "Santa Elena" from Jaime Bagué, Del ingenio azucarero patriarcal a la central azucarera corporativa (Mayaguez, 1968)

7. HAER Recording Team Field Photos from Santa Elena (1977) (21 photos)



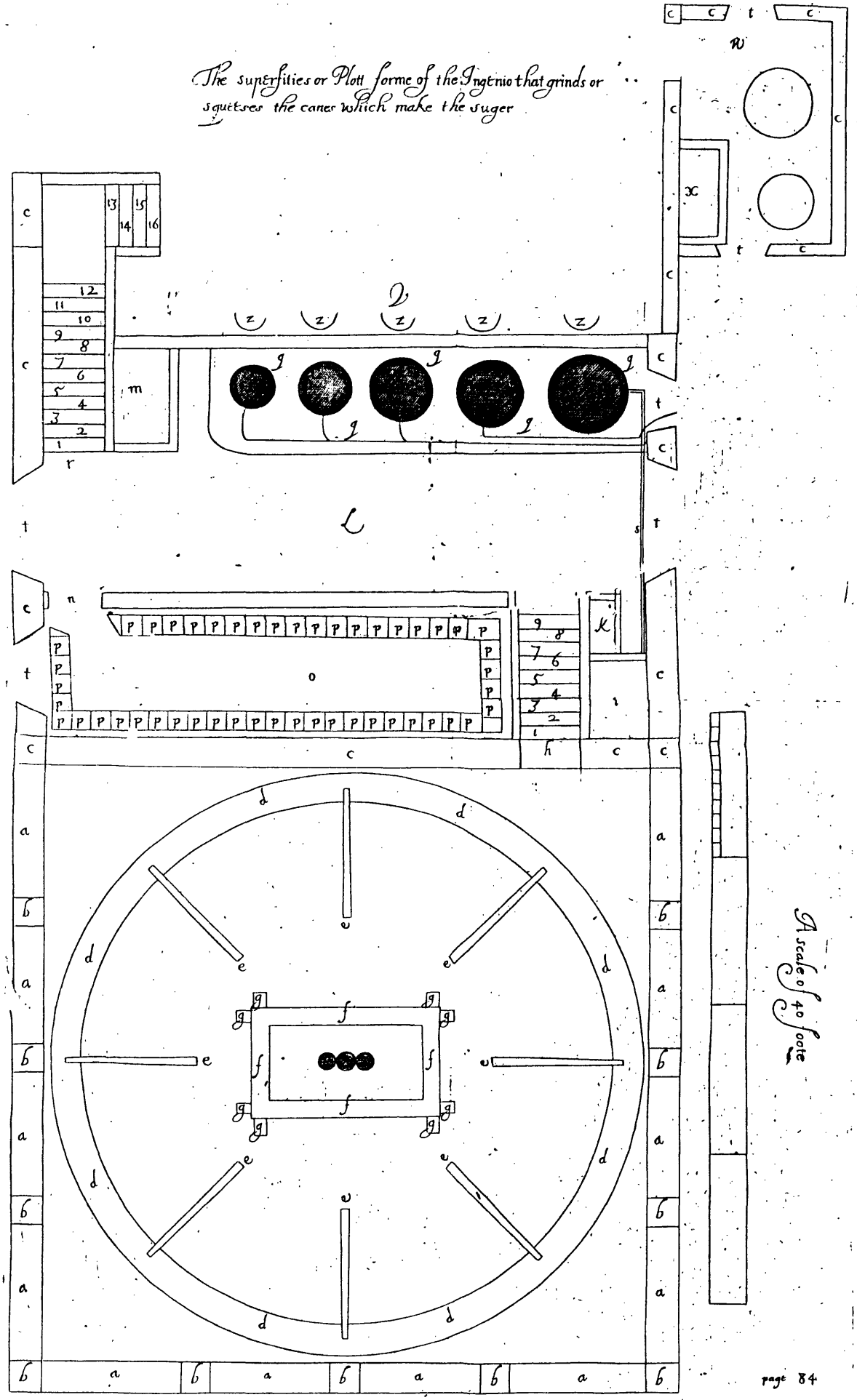
Hacienda Santa Elena
Graphic & Supporting Material:
Ligon's drawings
(2 sheets

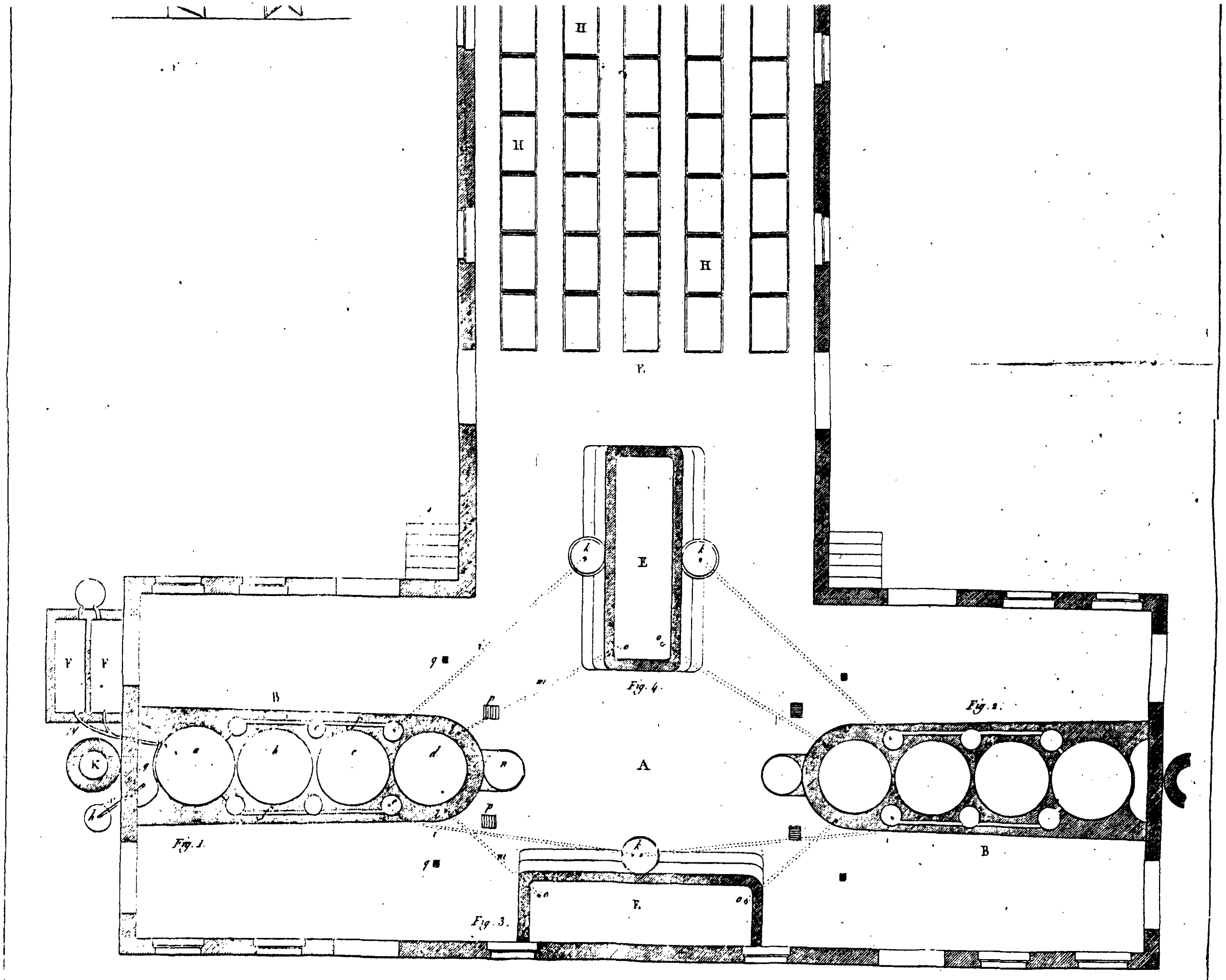
Ligon 1/2



Hacienda Santa Elena
Graphic & Supporting Materials
Hacienda "Nigua" plan
(1 sheet)

The superfities or Plott forme of the Ingenio that grinds or squeesses the canes which make the suger





Plans de Sucrerie et de Purgerie suivant la nouv.lle Méthode.

Gravé par M. Helué

Doutrone 2/5

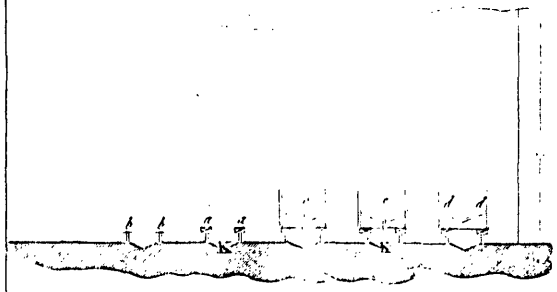
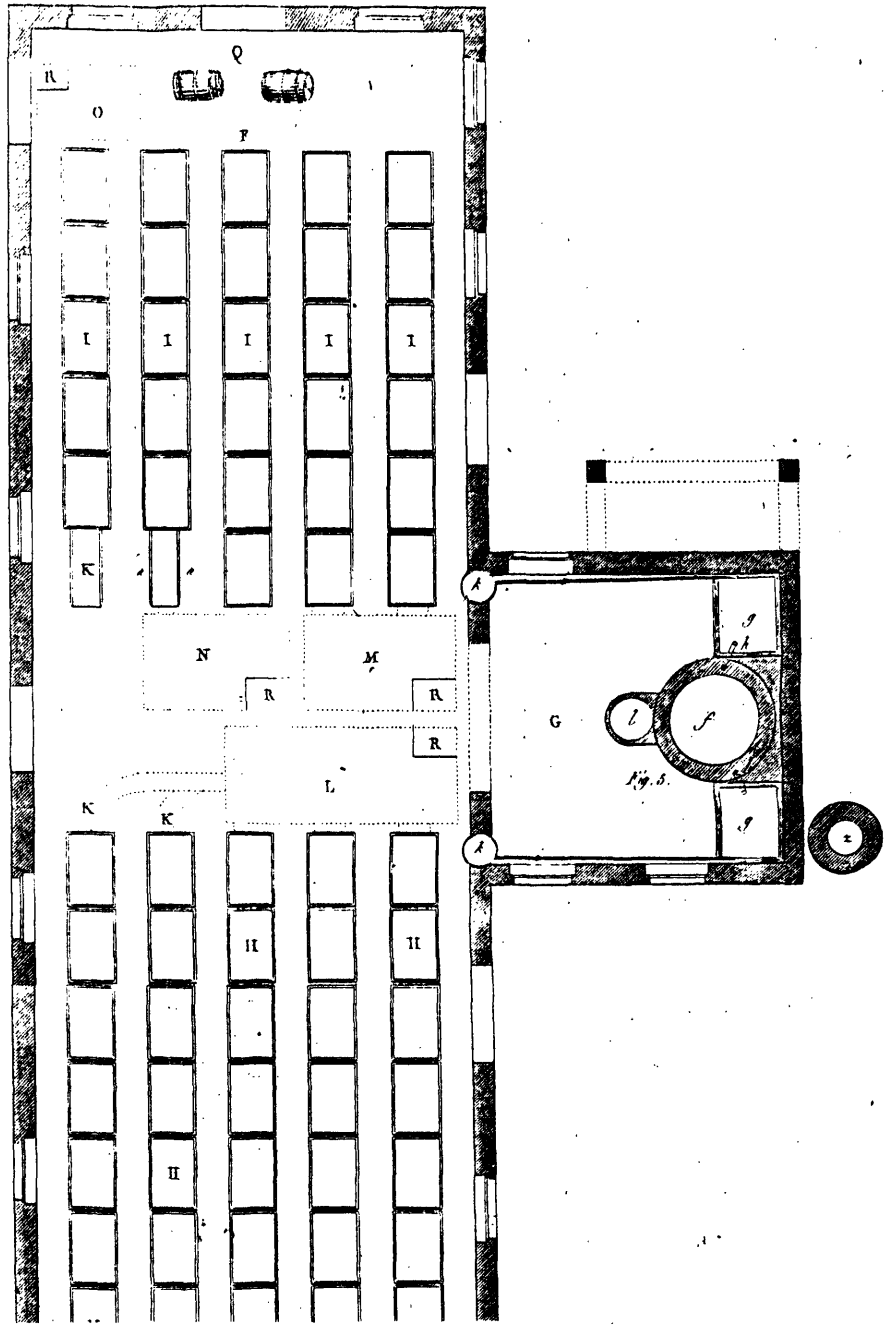
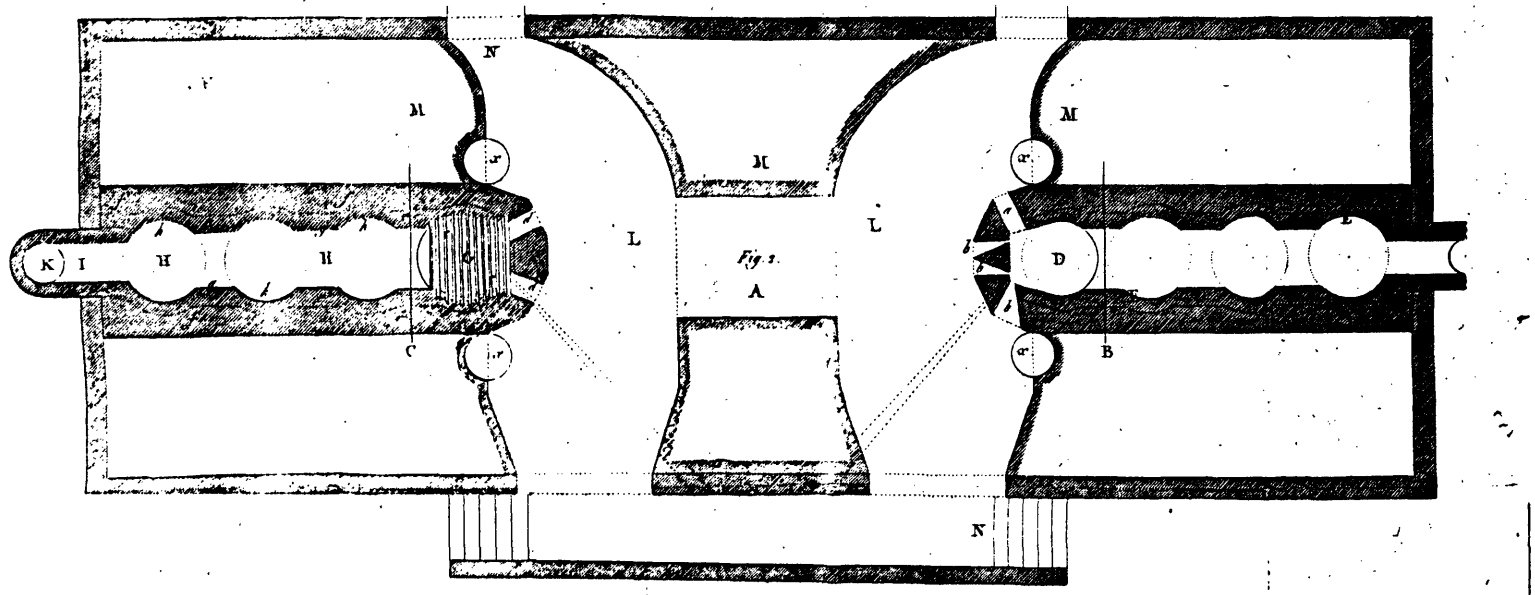
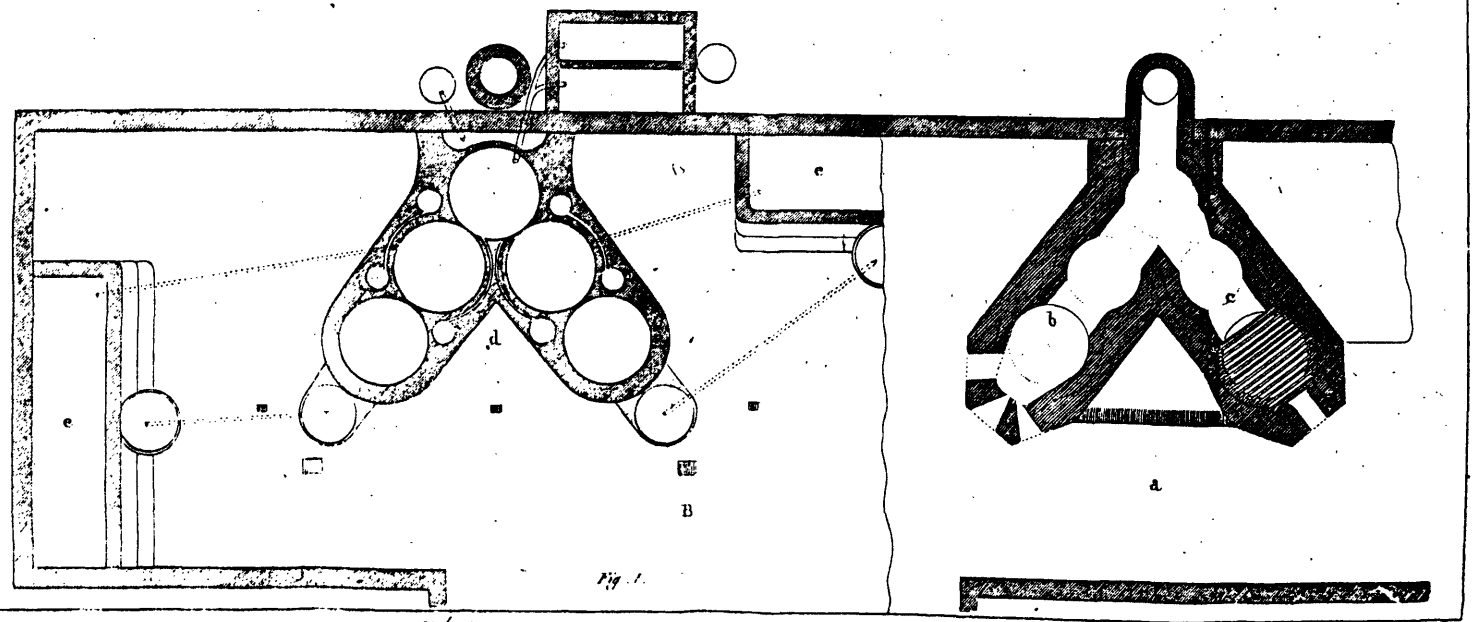


Fig. 6.

Fig. 7.







Plains des Fourneaux suivant la nouvelle Méthode.

Gravé par M. Helias

Doutrone 4/5

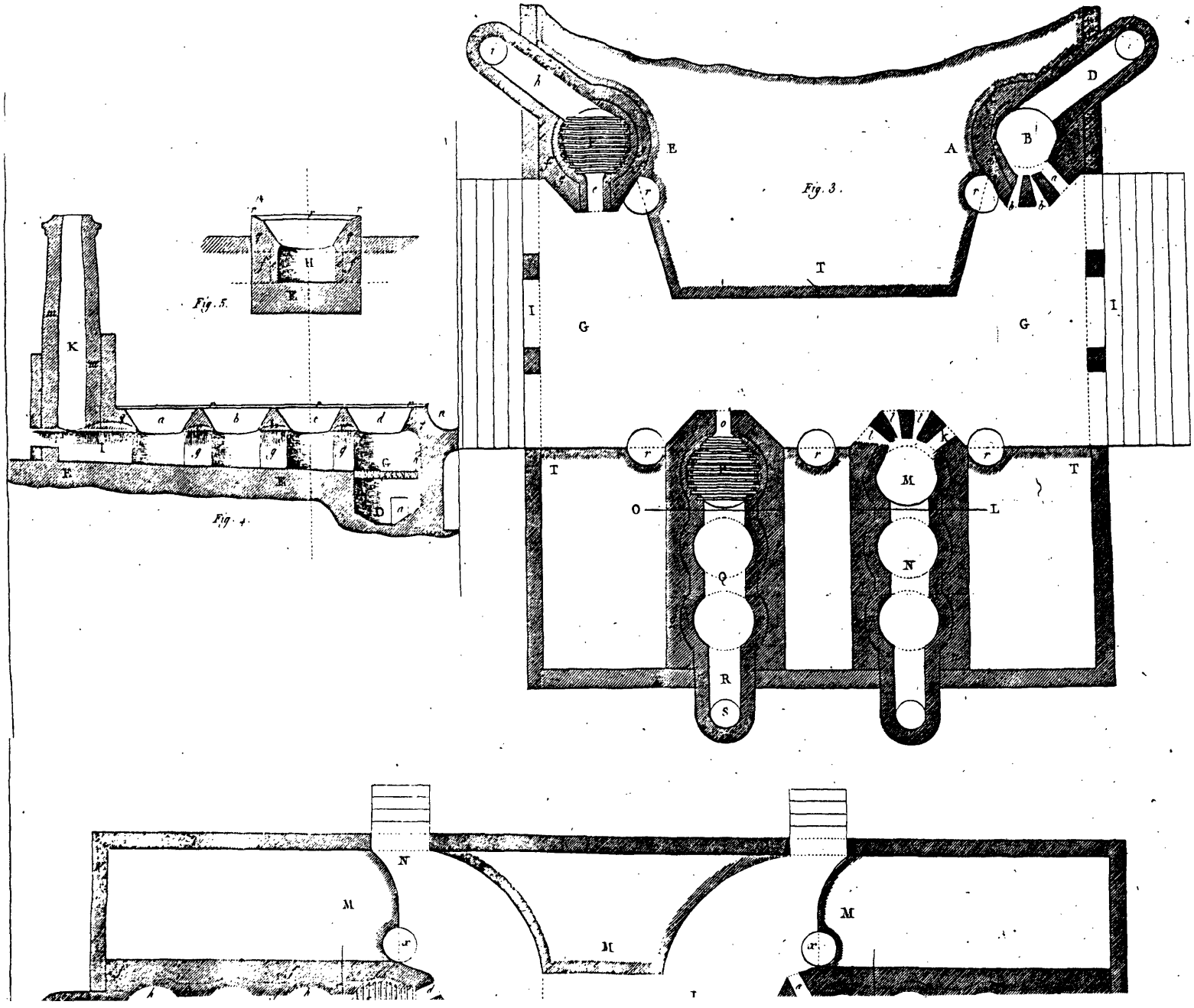


Fig. 3.
Fig. 4.
Fig. 5.

Hacienda Santa Elena
Graphic & Supporting Materials
East Facade 1900's photo from
Jaime Bagué, Del ingenio azucarero...
(1 sheet)

Exterior de la Hacienda Santa Elena, la fábrica de azúcar mascabado mas antigua de Puerto Rico, tal y como trabajaba en el año 1900. En la plaza pueden apreciarse unos cuantos volquetes para traer la caña al ingenio. Estos eran las carretas llamadas "de tumba". (Foto. Obsequio de la Sucesión Fonalledas).