Frank Preusser & Associates, Inc.

US Department of the Interior
National Park Service
National Center for
Preservation Technology and Training
Publication No. 1996-04

Deterioration and Preservation of Porous Stone Royal Presidio Chapel, Monterey, California

Final Report to NPS/NCPTT

NPS Grant Number MT-0424-4-NC-14

February 1996

Historic American Building Survey, # 38-P147-3, 1934

Funding for this report was provided by the National Park Services National Center for Preservation Technology and Training. NCPTT promotes and enhances the preservation of prehistoric and historic resources in the United States for present and future generations through the advancement and dissemination of preservation technology and training.

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Acknowledgments

This project was made possible through a grant from the National Center for Preservation Technology and Training (NPS Grant Number MT-0424-4-NC-14).

The historical architectural assessment was funded by the San Carlos Parish.

We want to thank Mark Gilberg from the National Center for Preservation Technology and Training for his continued interest in the project and for his patience when changes to the project were requested.

We are grateful to Bruce Kibby and the City of Monterey Historic Preservation Commission for their support.

We greatly appreciate the interest and support from Father Joseph Occhiuto, Kathy Modugno and the staff of the San Carlos Parish.

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Summary

The goal of this research project was to study the deterioration of porous stone in the marine environment of the Pacific Coast, and to develop and test appropriate preservation methods, using the facade of the Royal Presidio Chapel as a case study.

Visual inspection of the Chapel indicated that lateral movements, meteoritic and ground water, and soluble salts are the main causes of deterioration of the Chapel's facade and walls.

A small section of the foundation was excavated, using proper archaeological techniques. The foundation consists of stone rubble with mud mortar.

A total of 27 samples of stone, mortars, renderings, patching and repair materials, salt efflorescence, and paint were taken and analyzed. In an attempt to locate the quarry from which the facade stones were extracted, we visited thirteen quarries and took stone samples which were subsequently characterized in the laboratory.

The facade contains two types of stone of differing resistance to weathering and stability against salt crystallization. No previous preservation studies of these two stone types are known to the project team.

A variety of soluble salts were identified. While the sulfates are concentrated on the surface, there is a remarkable increase of the chloride and nitrate concentration towards the interior of the wall. No explanation for this phenomenon could be found. High concentrations of hygroscopic salts were found in all samples.

Patching and repair mortars consisted of Portland cement based mortars or proprietary mixtures. Their excessive hardness and reduced permeability for water has led to separation and spalling of many of these repairs.

A hydrologic evaluation demonstrated that ground moisture, leading to rising damp, is the result of landscape irrigation or other applied water, not due to a high water table.

The paint was removed from part of the facade to study the distribution of the two types of stone, and of the various patching and repair mortars. A paint remover was identified that can be used for paint removal on the facade.

No chemical consolidation experiments on the deteriorated stone of the facade was attempted. An explanation for this departure from the original proposal is given elsewhere in this report.

The scientific studies were accompanied by historic research. Historic photographs were identified and duplicated, to document changes in architectural features and the state of preservation of the Chapel.

Recommendations for future studies and immediate and future interventions, designed to slow down the deterioration, are given at the end of this report.

Introduction

The exterior of the Chapel shows numerous signs of active deterioration, such as vertical and horizontal cracks, peeling paint, spalling of repair patches, and tidelines, indicating rising damp. Very little was known about the materials and construction details of the Chapel. Since there are historic structures with similar problems along the Pacific Coast, the preservation planning for the Royal Presidio Chapel provided an ideal opportunity to scientifically study the deterioration problems in a more fundamental way.

Historical Chronology

The Royal Presidio Chapel (San Carlos Presidio Church) was designed and built in the 1790's. A historical chronology (Kimbro 1996) is attached as Appendix I. Additional information can be found in Appendix II (Crosby 1995, p. 6 - 7). A selection of historic photographs from the Historic American Building Survey are attached as Appendix VI.

Examination and Analysis

The project was initially scheduled in the following phases:

- Excavation of a small section of the chapel's foundation
- Initial visual examination of the building, its foundation, and the facade; extraction of the first set of samples for laboratory analysis.
- Laboratory analysis of samples.
- Second site visit and extraction of additional samples if needed.
- Third site visit to undertake test treatments.
- Historic research throughout the project.

As the project developed, the following tasks were added:

- Three field trips to local stone quarries.
- Paint removal from the lower part of the facade.
- Installation of crack monitors.

No test treatments were undertaken (see p. 15)

Visual Examination

Throughout its 200 year history the Royal Presidio Chapel has undergone several changes in architectural elements and treatments of the exterior (rendering, patching, paint) and the interior. This study was to concentrate on the main stone facade, and a Historic Structures Report was planned as soon as funding was available . We felt, however, that we could not look at the facade in isolation, but had to look at the whole building at the

[1]Meanwhile funding has been secured and the development of the HSR is in progress.

beginning of the project. Therefore, a historical architect (Tony Crosby) was invited to participate in the first site visit[2]. His report is attached as Appendix II.

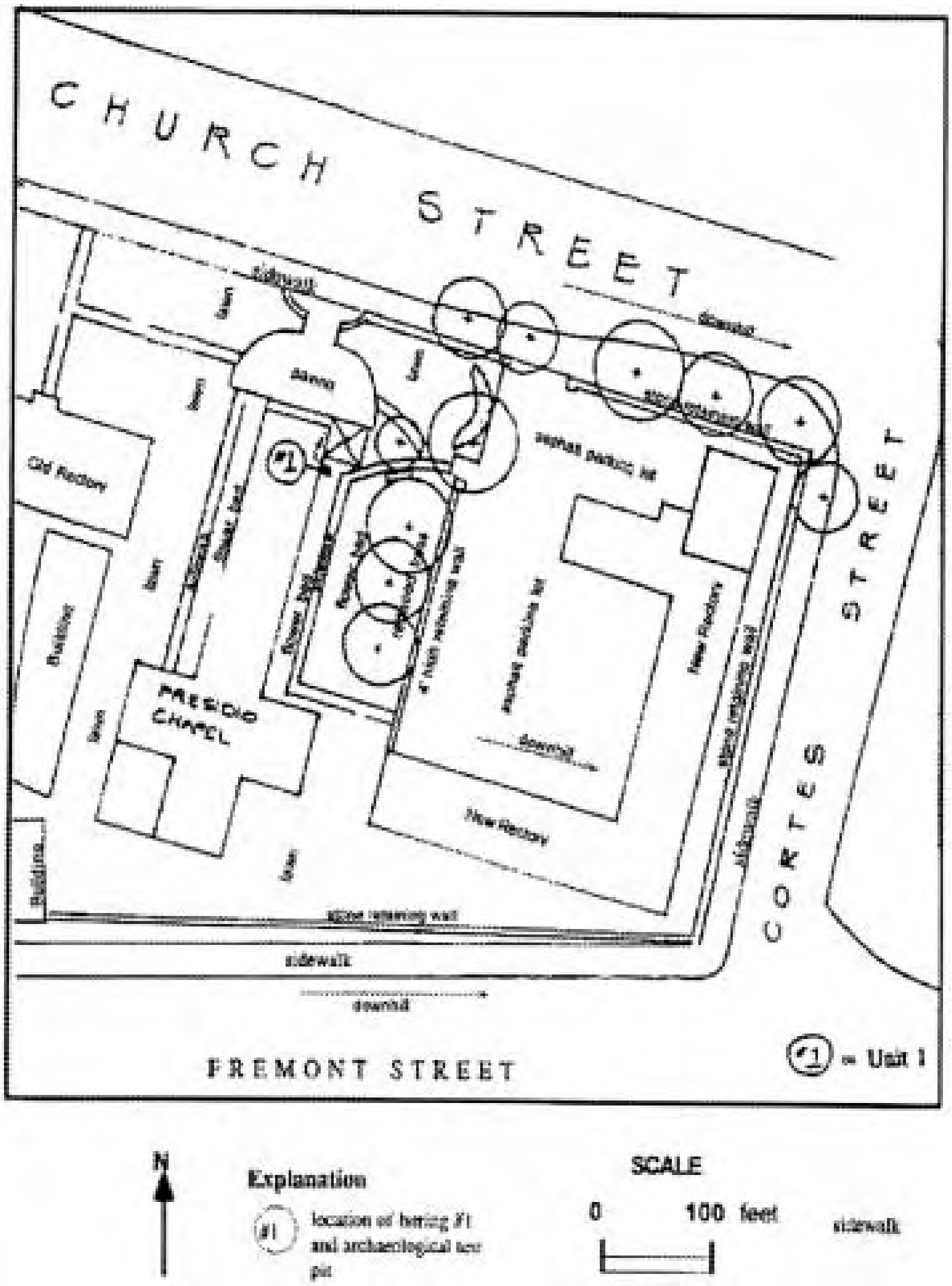

Figure 1: Site Map, from Nolan (1996)

[2]The historic architect's contributions were supported by the San Carlos Parish.

The first site visit took place on November 18-20, 1994. Participating team members were T. Crosby, R. Edwards, E.E. Kimbro, F.D. Preusser, Ch.A. Simpson-Smith, and J. Twilley. During this visit the structure was inspected from the ground with the naked eye and binoculars, and from a 100' boom-truck. The findings were documented photographically and in field notes. Figure 1 is a site map (from Nolan 1996).

Since the Chapel has been painted fairly recently (ca. 1989), direct observations could only be made in areas where paint, rendering or repair patches had been lost, or where the surface texture revealed different materials under the paint. The following observations were made during this inspection:

Cracks

Numerous cracks are visible on the outside of the East and West walls of the Chapel, and in the upper portions of the bell tower. Cracks are also visible on the inside of the east wall. These cracks have developed or widened since the interior of the church was painted the last time (1969?), since the paint in some places is stretched (like rubber) across the cracks. The interior cracks do not correlate directly with the exterior cracks, although both crack patterns could reflect differential movement between the nave wall and the tower. For a detailed discussion of the cracks and the structural performance of the masonry, see Appendix II (Crosby 1995) p. 13 - 19.

Water Damage

Water can cause damage to porous construction materials through dissolution of cementing materials, dissolution and re-crystallization of soluble salts, freeze-thaw cycles, hydration and dehydration of salts, transformation of minerals (e.g. kaolinization), hygric expansion and contraction of components, and support of biological activities. Its sources can be meteoritic (rain), ground water, and atmospheric (relative humidity).

Tidelines[3] on all walls of the Chapel indicate the presence of <u>rising damp</u> (see figures 2 and 3). The concrete apron, installed in the nineteenth century, was probably meant to mitigate the problem, but most likely only increased the height of the zone of evaporation. This is not a new problem, since similar tidelines can already be seen on historic photographs dating from 1934. No signs of rising damp are visible in the interior of the church, except on the west wall of the transept, where the confessionals had to be removed due to the moisture problem. At this point the terrain slopes towards the church and the concrete apron and walkway are cracked, allowing surface water to gain access to the base of the wall. It is also suspected that a similar problem exists along the east wall of the transept[4].

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[3]Horizontal lines of deterioration at the zone of evaporation of the rising water.

[4]Verbal communication from Father Joe Occhiuto. If there is a moisture problem it may be caused by the flower beds and/or water run-off from the roof.

Figure 2: Tideline on West Wall

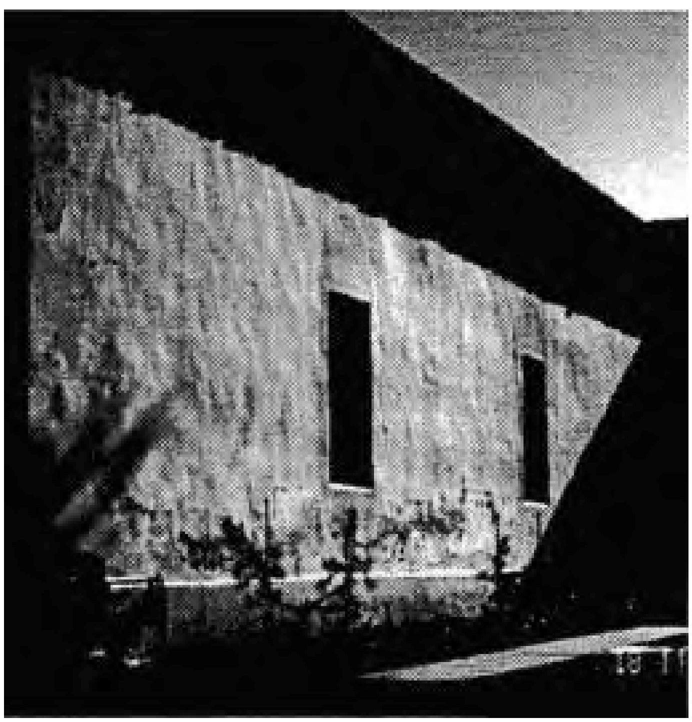

Figure 3: Water Damage (runoff, wind driven rain, and rising damp)

Damage patterns at higher elevations of the building can be associated with water run-off from the roof (see figure 3)[5], caused by the removal of the rain gutters sometime after 1934, and wind driven rain.

Patchlike deterioration at higher elevations (above tideline) indicate water penetration from wind driven rain, and salt damage.

Soluble Salts

In some areas of exposed stone salt efflorescence could be observed and the overall damage patterns indicate the action of salts.

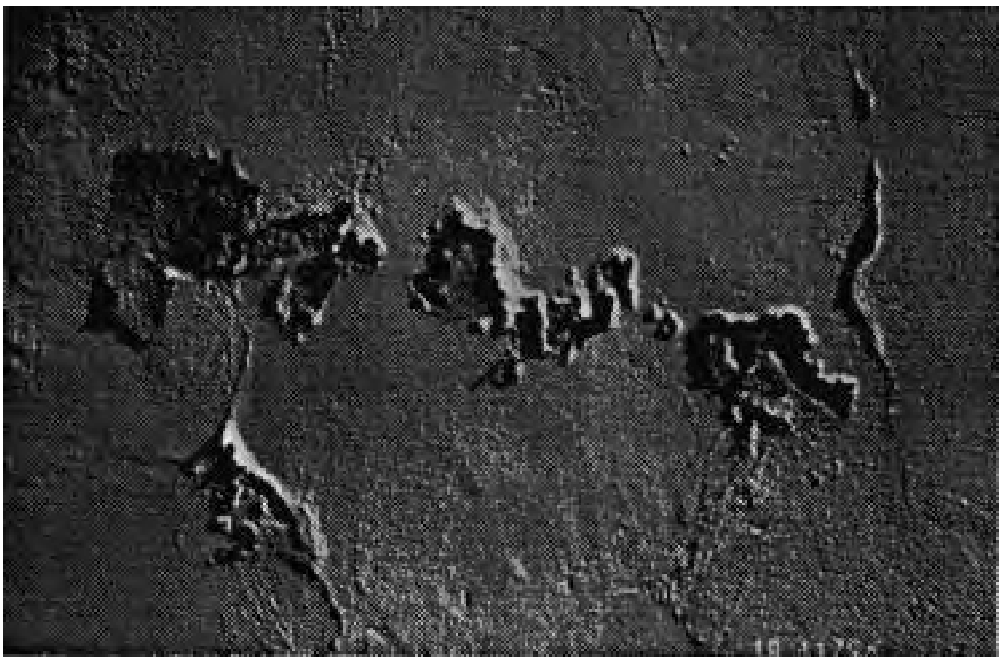

Figure 4: Peeling Paint Due to Salt Pockets in Rendering

Incompatible Repair Materials

Extensive repairs have been made in the past to the rendering and sculpted parts of the facade. Most of these have been done with cement based or other extremely hard materials. Due to the different hardness, water permeability, and thermal expansion coefficients, many of these areas show delamination (from the stone or underlying rendering) and spalling (see figures 5 and 6).

Tree Roots

The roots of the tall redwood trees east of the chapel have penetrated the foundation. Flower beds lie along the east and west walls, and shrubs and bushes have been planted,

[5]Rain gutters can be seen in photographs taken in 1934.

which may cause a problem in the future by rooting into the foundation, and by retaining moisture.

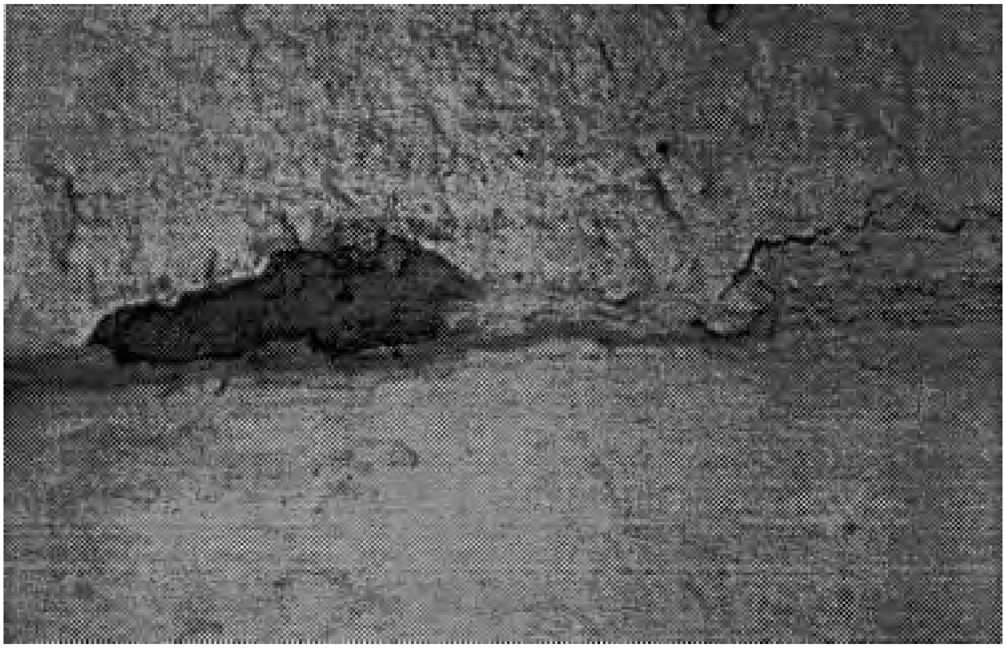

Figure 5: Spalling of Cement Patch adjacent to Lime Based Rendering

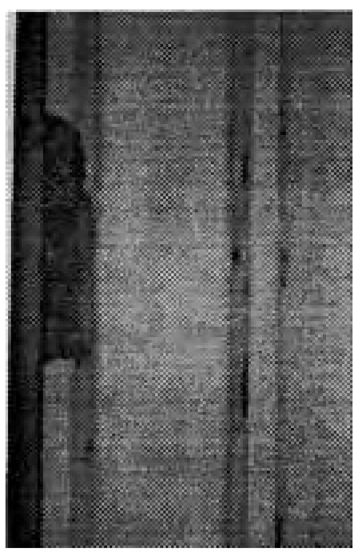

Figure 6: Spalling of Cement Repair

Sampling and Laboratory Analyses

After thorough examination and some test drillings with a $^1/_4$" drill, 26 samples of salt efflorescence, stone, mortars, renderings, and paint were taken during the first site visit.

A listing and description of the samples and the sampling locations can be found in Appendix III (Twilley 1996), pages 15 - 18.

On May 18, 1995, a $1^1/_4$" drill core was taken for additional analyses.

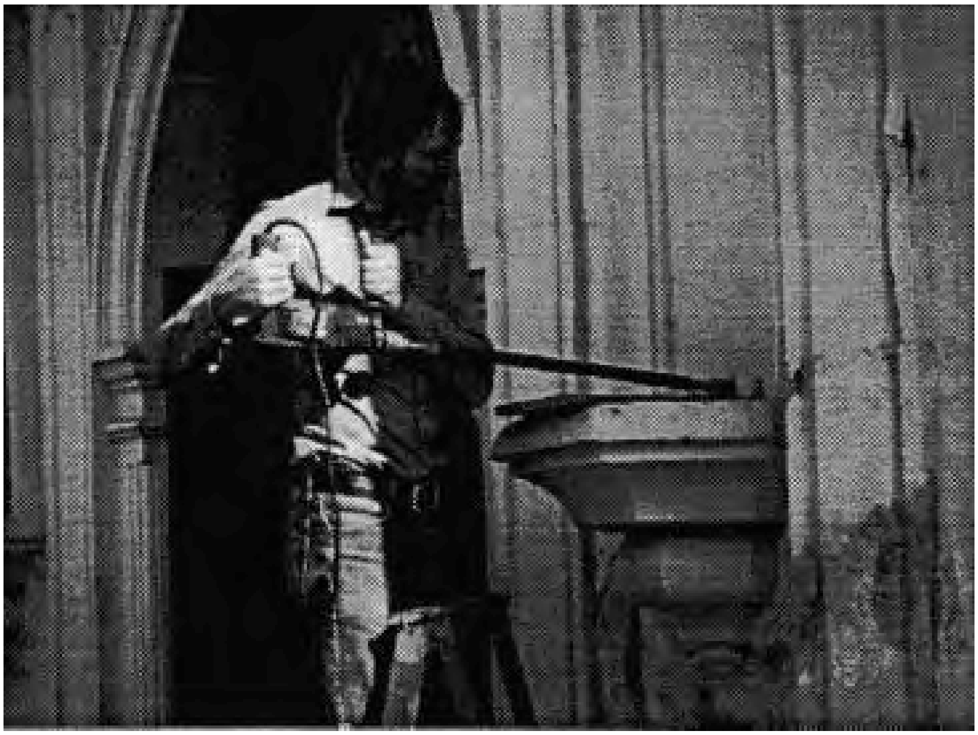

Figure 7: Drill Coring

In the following the results are summarized, for more detailed information please refer to Appendix III.

Stones

Two types of stones exist in the facade with differing resistance to weathering and salt crystallization. Both are shale, the more durable stone is lithified by dolomitization, the less resistant stone is characterized by the absence of dolomite and the loss of calcite. It also has a much greater porosity.

In an attempt to locate the source of the stones used for the facade, historical research to identify quarries was performed, and thirteen quarries in the Carmel Valley were visited and visually inspected. Where the rock resembled the facade stones, samples were collected for laboratory comparison. Location of the original quarry would have allowed us to extract sufficient samples for the testing of a variety of stone consolidants. Unfortunately none of the quarries we were able to identify and visit was the source of the stone of the Chapel[6]. A map of the quarry sites can be found in Appendix III.

[6]Stones from quarry locations SL1 and 175 might however be suitable for the evaluation of chemical consolidants.

Mortars and Rendering

Analysis has shown that the original mortars of the facade are lime-bound sand mortars, while the analysis of two pockets of mud interior wall filling failed to show the presence of significant lime binder in the mud.

Figure 8: View of the Wall Construction behind The Facade From the Interior Stone Rubble and Lime Mortar

The facade pointing mortar and the mortar removed from deep within the wall by core drilling are similar in grainsize distribution to each other and different from two other samples, including a sample removed from the attic (see below). They possess weight fractions of sand which increase linearly up to and beyond the coarsest screen mesh used (0.85 mm). They possess a high lime content which is slightly overestimated due to the inclusion of coarse beach sand which includes detrital shell fragments. A few grains of material which are thought to be bone fragments were also noted.

The fragment removed from the attic, on the other hand, has a higher sand content with a pronounced grain size maximum near 0.35 mm. This sand includes minute granules of the same dolomitized shale which is seen in the more weather-resistant facade blocks. Finally, the later rendering from the west wall contains a fine, well-sorted sand with a sharply peaked grainsize distribution maximum near 0.2 mm and hair reinforcement.

Patching Materials

Exploratory removal of paint has revealed that there are numerous areas of small fills and some areas where a patching material has been spread thinly over zones of surface erosion. Several different patching materials are visually distinguishable. There are several areas where damaged profiles have been reconstructed using a Portland cement-based mortar. These fills are typically quite hard. When applied over areas where the original cause of the damage was salt re-crystallization, they are usually detaching due to the continuation of that same process.

Other patching materials were found which are probably modern proprietary mixes intended for rapid repair of cement-based plasters in salt-free conditions. One of these was a light yellow colored material which was typically applied in a layer from one to four millimeters in thickness over broad areas of the surface. This material was quite hard and often poorly attached to the sandy surface of the stone beneath. When freshly broken it presented a crystalline, sparkling fracture. Another material of unusual appearance was similarly hard but white in color. This was found beneath the yellow material in some locations. A yellow paint layer separated the two materials.

Soluble Salts

Salts were sampled from visible efflorescence, and extracted from deteriorated stone samples, fill mortar, rendering, and drill cores.

The following salts were identified[7] by X-ray diffraction analysis:

Thenardite, Na_2SO_4
Mirabilite, $Na_2 SO_4 .10H_2O$
Gypsum, $CaSO_4.2H_2O$
Konyaite, $Na_2Mg(SO_4) .5H_2O$
Epsomite, $MgSO_4 .7H_2O$

In most cases the extractions yielded certain easily crystallizable phases along with a hygroscopic syrup of other ingredients. The latter were difficult to maintain in a dry condition for X-ray diffraction analysis. In order to further clarify the species present in the poorly crystallizable salt extracts electron microprobe analysis was carried out on the deliquescent residue. In general these analyses demonstrated that the hygroscopic material was rich in magnesium chloride

In addition, all samples contained high concentrations of nitrates. Nitrite was detected only in the 3” deep sample and only at the threshold of detectability at 1 ppm.

Sulfates were concentrated at the surface and sulfate levels were near the limit of detection of 200 ppm on all interior stone extracts.

Chloride and nitrate concentrations increased inside the stone in a linear relationship with the depth of the sample (see figure 9).

The reason for this increase is remarkable and remains unknown. One explanation would be that at one time gun powder was stored inside the Chapel. Historic research indicates

[7]For details about the analytical techniques used, and the specific sampling locations see Appendix III, p. 7-9

however that this is very unlikely, as historical sources indicate that the powder magazine was located some distance away from the Presidio compound.[8].

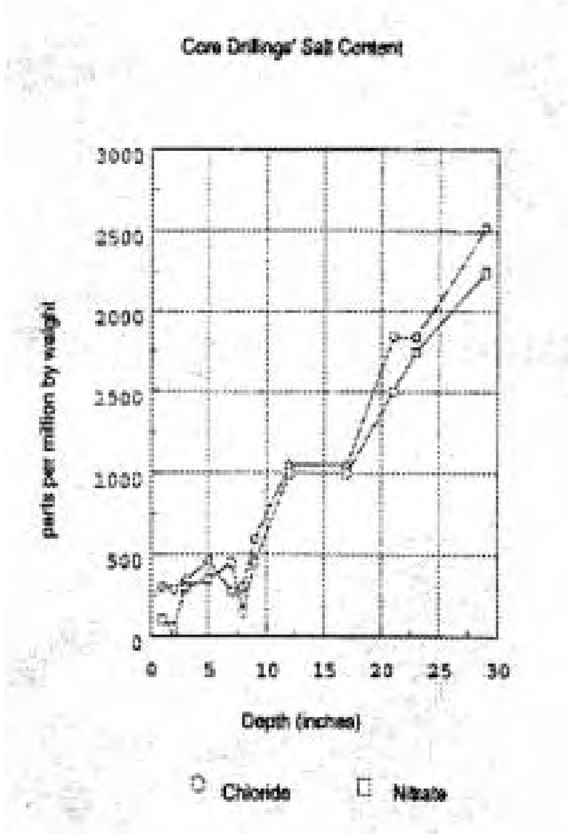

Figure 9: Chloride and Nitrate Concentrations vs. Depth, from Twilley (1996)

Paints

All of the paints encountered appear to date to the 20th century, based on the pigment composition. No lead or cadmium based pigments were found. This is significant since the paint will have to be removed for future conservation treatments.

Archaeological Test Excavation

We felt it important to be able to examine a short section of the Chapel's foundation. Since the site is archaeologically sensitive the excavation was carried out by historical archaeologists. Their excavation report is attached as Appendix IV (Simpson-Smith 1995). A 1 meter by 2.06 meter unit was excavated down below a hardened surface and the foundation (approx. 55 cm) at the eastern wall of the Chapel (see site plan, figure 1).The foundation consists of stone rubble with no apparent mortar[9]. The foundation is penetrated by roots from the tall redwood trees.

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[8]Verbal communication from Edna E. Kimbro.

[9]This may indicate the use of mud mortar or soil.

The soil was wet[10], in some zones saturated with water:

Table 1: Soil moisture content

Depth in cm	% Moisture	Comment
53 - 66	11.2	dark brown soil
77 - 92	12.3	dark brown soil
92 -105	12.6	clay, gray-beige
1 05-1 1 9	17.8	clay, gray-beige
119-126	24.4	yellow, rocky, granular
1 26-1 36	16.2	yellow, rocky, granular
1 36-1 43	12.4	yellow, rocky, granular
158- 166	8.9	yellow, rocky, granular
205-213	26.4	yellow, rocky, granular

Hydrological Analysis

Since moisture plays a significant role in the deterioration of the facade and the walls of the Chapel, Nolan Associates was asked to undertake a hydrological evaluation. Their report is attached as Appendix V (Nolan 1996).

During soil drilling high water contents were observed only in the uppermost soils, with relatively dry sediments below 4 feet. The boring was drilled in September of 1995, prior to any significant winter rains. The moisture observed in the upper soils is therefore attributed to landscape irrigation or other applied water. Water levels measured several days after major rainfall events again showed significant water levels only in the upper piezometer.

The ground falls away rather dramatically to the south and southeast, and more gradually to the north, the east and the northwest. The only exception is west of the west transept where there is a negative slope toward the building from the school (see figure 10)

Paint Removal

During the project it was decided that it was necessary to remove the paint from part of the facade

- to determine the relative quantities of the two types of stone;
- to estimate the amount of patching and past repairs;
- to develop a method for paint removal for the future restoration.

[10]Auger Samples taken Nov./Dec. 1994

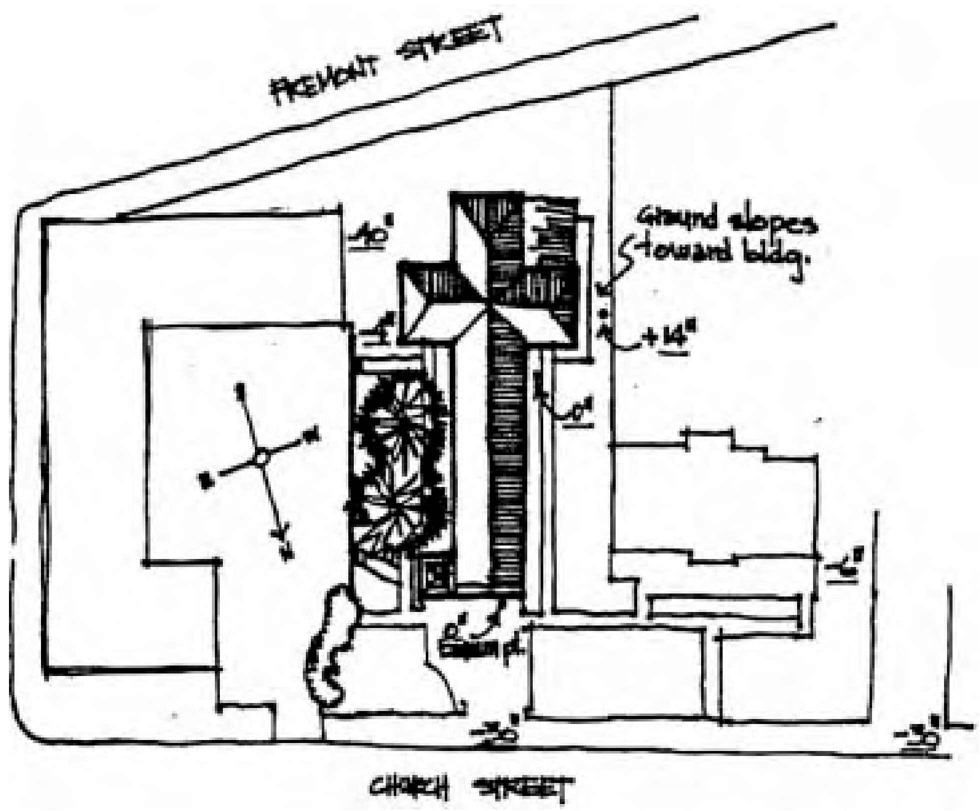

Figure 10: Sketch site plan. The numbers are the distances in inches above or below the data point at the front door sill. From Crosby (1995)

First experiments were undertaken by Edna E. Kimbro, using a methylene chloride based paint stripper[11]. The result of this test cleaning was unsatisfactory. It was therefore decided to experiment with an alkaline paint stripper[12]. This time the paint removal was expedient and successful. In addition the health and environmental hazard was greatly reduced. Figure 11 shows the base of the pilaster to the right of the door. Note the extensive repairs with cement and caulking material.

Crack Monitoring

A total of seven crack monitors[13] were installed in November 1995, three on the inside and four on the outside. To date no movement has been recorded.

Wall Moisture Monitoring

At one point we considered the installation of sensors to monitor the moisture inside the walls. After finding high concentrations of hygroscopic salts, increasing with depth, it

[11]Jasco Speadomatic Paint Remover
[12]Peel Away #1
[13]ELE International Calibrated Crack Monitor CT-165

was concluded that these measurements most likely would yield no meaningful information. Wall moisture monitoring was therefore not undertaken.

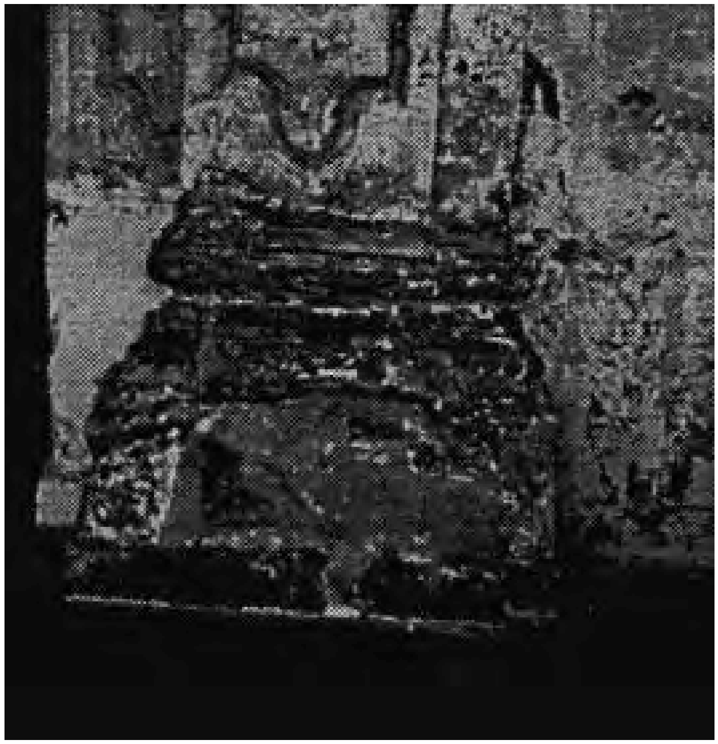

Figure 11: Pilaster Base after Paint Removal

Chemical Consolidation of Deteriorated Stone

At the time of the proposal it was anticipated that chemical consolidation experiments would be undertaken, either on stone extracted from the quarry, or on a small area of the facade itself.

The more resistant of the two stones does not necessarily need chemical strengthening (consolidation). The weak stone however definitely needs to be consolidated. We considered two types of consolidants, a water compatible epoxy resin (applied in iso-propanol) and a silane based consolidant without water repellency. For a selective consolidation of the weak stone blocks only, Preusser believes that only the silane should be considered. The silane would add strength without changing basic stone properties such as water permeability and thermal and hygric expansion coefficients too significantly. This is considered important because the properties of the consolidated weak stone should not differ significantly from those of the unconsolidated stronger stone.

Since we were unable to locate the quarry, only testing on the facade itself remained as a possibility[14]. After removing paint from a relatively large area of the lower part of the facade (west of the door), only very small areas of the weak stone had been exposed, too small for meaningful experiments[15]• Furthermore the weak stone had a very high moisture content, most likely too high for good penetration and controlled curing of a silane based consolidant. Prior to *in situ* consolidation experiments the facade, or a much larger portion thereof, will have to be cleaned and allowed to dry out as much as possible.

Therefore no consolidation experiments were undertaken at this time.

Conclusions

The deterioration of the facade and walls of the Royal Presidio Chapel is caused by the following factors:

- Inherent vice; one of the two stone types used in the construction of the facade has a low resistance to weathering and the effects of soluble salts.
- High concentration of soluble salts. While the hygroscopic salts appear to not directly contribute to the surface deterioration, they may contribute to the action of crystallizable salts by keeping the moisture content of the stone high.
- Irrigation close to the building, leading to water saturation of the soil and rising damp.
- Negative slope of the towards the building west of the west transept directs surface water towards the building from the heavily irrigated lawns to the west.
- Water runoff from the roof due to removal of rain gutters, leading to direct damage, water saturation of the soil and rising damp.
- Cracks in paint, rendering, and walls allow penetration of water into the walls.
- Concrete walkways adjacent to the walls prevent evaporation of soil moisture, forcing it instead to rise in the walls.
- Concrete apron around the base of the building forces the rising damp higher into the wall by preventing evaporation at lower elevations.
- Incompatible, hard and impermeable, patching and repair materials force the zone of evaporation to the inside of the wall, leading to damage caused by salt crystallization.

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[14]Stones from quarries SL1 and 175 might however be suitable for at least preliminary testing of consolidants.

[15]Blocks of weak stone may still be under the extensive patches of cement and other proprietary patching materials.

- Incompatible paint system with low liquid water and water vapor permeability, causes salt crystallization and resulting deterioration to take place under the paint, in the rendering or the stone.

- Roots of tall Redwood trees penetrate the foundation, which as they grow in diameter may cause damage to the foundation.

Recommendations

There are a variety of measures that can be taken to reduce the rate of deterioration of the facade, the walls, and the interior of the Chapel. Some of them can be implemented immediately, some in the near future, and some will require a longer preparation time and some additional research and experimentation.

<u>Changes in Landscaping</u>

Landscape irrigation in proximity to the building should be immediately discontinued. There should be no flower beds and shrubs directly adjacent to the walls. Alternative landscaping with drought resistant plants and a drip irrigation system should be considered.

The Redwood trees should be removed to prevent serious damage to the building by their roots.

The lawn west of the structure should be regraded to slope away from the building and appropriate drainage installed, to protect both the Chapel and the school from surface water.

The concrete walkways directly adjacent to the building should be replaced with different, water permeable, materials and moved away from the building. The concrete apron should be removed.

<u>Roof Drainage</u>

Rain gutters should be installed again, and the collected water needs to be channeled away from the site.

<u>Removal of Paint, Patching. and Repair Materials</u>

The modern paint and the incompatible patching and repair materials should be removed[16]. This will allow to establish the extent of the deterioration, the relative quantities of the two stone types, and to undertake limited consolidation experiments.

[16] Funding is presently sought for the removal of the paint from the facade.

Consolidation of the Weak Stone

Stones from quarry SL1 and/or 175 could be used for laboratory studies of selected stone consolidants. The best candidates can then be applied to a small test area(s) on the facade itself. After successful completion of laboratory and field tests, chemical consolidation of the weak stones of the whole facade can be undertaken.

Restoration

Any restoration should only be undertaken once all major sources of deterioration have

been eliminated.
Restoration of heavily deteriorated stone surfaces and sculpted parts of the facade should be undertaken with repair mortars of appropriate strength and porosity. A lime mortar with or without the addition of small amounts of Portland cement and colorants will probably be suitable. Anchoring with stainless steel or titanium pins may be necessary in some cases.

Plastering and Painting

Special consideration has to be given to the selection of the appropriate plaster and paint systems.

Since no technology exists, that allows to extract the soluble salts from the walls, the plaster and paint should be considered sacrificial in order to protect the underlying stone. This requires a good water and water vapor permeability for the plaster and a good water vapor permeability for the paint. The paint should also not be film forming.

The application of a restoration mortar[17] to the lower parts of the building (to 1 foot above the zone of evaporation[18]) should be considered.

The plaster should be equal or lower in strength relative to the stone. A lime mortar with some addition of Portland cement would probably be a good choice.

Maintenance

Continued maintenance of the building and its surroundings are a key issue prior to and after the restoration. Guidelines should be developed for the landscaping and for the regular inspection and maintenance of the building. A special fund should be established for this specific purpose.

Frank Preusser
2-29-96

[17] A restoration mortar is designed to act as a "reservoir" for soluble salts, and has a life expectancy of 10+ years.
[18] After removal of the concrete apron a new, lower zone of evaporation will establish itself.

Bibliography

The Appendices contain individual bibliographies which are not duplicated here.

Crosby (1995)	"Trip Report, Initial Architectural Conservation Inspection and Analysis - November 18, 19, 20, 1994", April 12, 1995
Kimbro (1996)	"Royal Presidio Chapel Chronology", February 1996
Nolan (1996)	"Hydrological Evaluation, Royal Presidio Chapel (San Carlos Cathedral), City of Monterey, Monterey County, California", February 12, 1996
Preusser (1995)	"Interim Report", February 1995
Twilley (1996)	"Analysis of Stone Conservation Problems at the Royal Presidio Chapel, Monterey, California", February 20, 1996
Simpson-Smith (1995)	"Archaeological Test Excavation Adjacent to the Eastern Exterior Foundation, San Carlos Cathedral, Royal Presidio Chapel, Monterey, California", May 1995

Photo Credits

All photos in the main text are from Frank D. Preusser

Appendices

I E. E. Kimbro, "Royal Presidio Chapel Chronology", Feb. 1996

II T. Crosby, 'Trip Report, Initial Architectural Conservation Inspection and Analysis - November 18, 19, 20, 1994", April 12, 1995

III J. Twilley, "Analysis of Stone Conservation Problems at the Royal Presidio Chapel, Monterey, California", February 20, 1996

IV Ch.A. Simpson-Smith, R. Edwards, "Archaeological Test Excavation Adjacent to the Eastern Exterior Foundation, San Carlos Cathedral, Royal Presidio Chapel, Monterey, California'" May 1995

V J.M. Nolan, "Hydrological Evaluation, Royal Presidio Chapel (San Carlos Cathedral), City of Monterey, Monterey County, California", February 12, 1996

VI Historic American Building Survey 1934, Historic Photographs

Appendix I

Edna E. Kimbro

ROYAL PRESIDIO CHAPEL CHRONOLOGY AND BIBLIOGRAPHY
Revised October 1, 1995

Preface

The following historical and architectural chronology and bibliography is a work in progress. It is continually being updated to reflect knowledge about the building derived from largely secondary sources. Intensive primary archival research will commence upon funding of the Historic Structure Report.

1791 February 26, Fages to Romeu reported that a church with its spire *(espadana)* had been begun so that the former one could be removed (Howard 1976:26). The former adobe chapel was located north of the present structure.

June 15, Manuel Ruiz, master stone mason, started work on the Royal Presidio Chapel (Howard 1976:26). Father Presidente of the Missions Fermin Lasuen said of Ruiz: “He began to work at the Royal Presidio of Monterey on June 14, ‘91, and continued there by order of the governor, Don Pedro Fages, until September 20, ‘92. On that date he came to this mission of San Carlos in virture of a higher order from His Excellency Count Revilla Gigedo, Viceroy of New Spain, who gave orders that the skilled workers should be distributed through the missions in order to teach the Indians. When the master-worker arrived here [Carmel}there was no supply of material awaiting him, and the period of heavy rains had set in” (Kenneally I 1965:323). Lasuen, writing December 10, 1794, goes on to request a year and one half extension of Ruiz’ contract in order that he can finish Cannel mission church and properly instruct his Indian apprentices.

August *6-9.* Instructions addressed to Arguello about building the church (Provincial State Papers, Ms., Bancroft Library X:42 in Howard).

Governor Fages’ report indicates that the first story chapel walls were up by August when he left Monterey (Schuetz-Miller Ms.:141). A sketch of the presidio from the south by Jose Cardero, artist with the Malespina Expedition shows the building quite advanced in 1791. Malespina expedition visited Monterey with artist Jose Cardero who sketched the construction of the Royal Presidio Chapel showing it to the south of the then extant adobe, thatched roofed chapel (Van Nostrand 1968:28).

1792 Design of facade by Manuel Ruiz, master mason at Monterey (Howard 1976:82). This elevation is extant in the *Archivo General de la Nacion* in two versions.

March 1, Viceroy orders work on church suspended until further orders (State Papers, Sacramental, Ms., Bancroft Library iv:1 in Howard).

March 13, Antonio Velasquez, Director of the Real Acadamia de San Carlos, Mexico City designed an elevation for the chapel facade (Letter of Velasquez, March 26, in Howard 1976:27). This elevation is not extant but one assumes that the facade as constructed represents the changes made by Ruiz in conformance with the Velasquez design. Mardith Schuetz-Miller indicates that this *diseno* included the design of the tower and *espandana* extant today citing a report of Governor Fages of August 12, 1793 (Schuetz-Miller Ms.: 439). Mardith Schuetz-Miller and Norman Neuerburg are in seeming agreement that the point of having the design reviewed was to ensure that the design was appropriately neoclassical (i.e. up to date), and not overly baroque and old fashioned.

April 4, Viceroy sent an elevation for the church, made by the directors of the Royal Academy of San Carlos, Mexico City (State Papers, Sacramental, Bancroft Library iv: 112).

November 27, Artisans for Presidio Church chosen: Santiago Ruiz (master mason), with journeymen: Salvador Rivera and Pedro Alcantara (Lasuen to Arguello, 27 November 1792 in Howard 1976:28). Apparently, Santiago Ruiz assumed direction of the project about this date (Schuetz-Miller Ms.:263).

December 21, Father Presidente of the Missions Fermin Lasuen reported that Manuel Ruiz and two journeymen masons arrived at Carmel Mission to begin construction of its new church which did not get underway until July of 1793 (Schuetz-Miller Ms.: 455).

1792-94 Sunday, December 2, George Vancouver visited Carmel Mission and said that the natives were hard at work on the new church-in 1792 (Bancroft 1:686-687). Bancroft speculates that Vancouver may have actually seen it on his third visit in 1794 because other sources (Lasuen) indicate that it was not started until later because there were no materials ready (Bancroft 1:687). Frances Rand Smith quotes Vancouver about the stone material used for this Carmel Mission church: “The former material appeared to be of a very tender friable nature scarcely more hard than indurated clay; but I was told, that on its being exposed to the air, it soon becomes hardened, and it is an excellent stone for the purpose of building. It is a light straw colour, and presents a rich and elegant appearance in proportion to the labor bestowed upon it. It is found in abundance at no great depth from the surface of the earth; the quarries are easily worked, and it is I believe the only stone the Spaniards have hitherto made use of in building...The lime they use is made from sea shells, principally from the ear shell, which is of a large size and in great numbers on the shores; not having as yet found any calcareous earth the would answer this essential purpose” (Smith 1921:27).

1793 Construction of the chapel was near completion in November, with neophyte laborers finishing the facade and roofing the building in December (Schuetz-Miller Ms.:142).

1794 Chapel measures 30 x 120 feet constructed of sandstone from Carmel (Crouch 1962:2). The chapel is actually constructed of Monterey Shale. Only the facade is sandstone. Lime for mortar is said to have originated at Corral de Tierra citing local tradition (Howard 1976:14). The chapel was later plastered over (Crouch 1962:3). The cost of construction was reportedly 1500 pesos (Howard 1976:13). It is known that Manuel Ruiz continued to work on the project from correspondence of Father Presidente of the Missions Fermin Lasuen at Carmel Mission (Schuetz-Miller Ms.:438).

1795 January 25, the chapel was dedicated by Father Presidente Lasuen (Geiger in Howard 1976:28). November 18, 1795, Laseun wrote to the Margues de Branciforte, the Viceroy in Mexico, giving particulars about master mason Ruiz’ activities building the Royal Presidio Chapel and the Carmel Mission church and asking for another extension of the mason’s contract:

> This Mission of San Carlos of Monterey [Carmel] was able to proceed to build a beautiful church, the need of which has long been felt, solely because it was granted the privilege of having a master-mason and stonecutter. This expert arrived there towards the end of the year ‘92, but there was no supply of material on hand for him, and the season of heavy rain had already set in. For this reason it was not possible to lay the first stone until July 7, ‘93. From that date on, the work proceeded without intermission. Many oxen and wagons have been employed in it. Much iron has gone into it, and much labor, too.

> The church is not so well advanced, however, that it would be possible to complete it by June, '96, when the extension granted to the expert comes to an end; but it could be completed by that date in '97. From this it is obvious that he could have completed it if he had worked here for the four years of his contract (Kenneally I 1965:360).

Lasuen clearly thought that the governor had overstepped himself in having the mason build a church for the Presidio instead of training mission neophytes in masonry. This is clear from his complaining November 25, 1795 to his superiors:

> I suspect that our governors did not regard it as proper that I should be entrusted with the locating of the artisans engaged at the expense of the Royal Treasury to work for four years in these missions and to instruct the Indians in the crafts they knew. Be that as it may, this was the decision of the central government at the beginning of the year '90, and I was not informed until the end of '92, after the expert who began and is working on, our church had been working more than a year and a half at the neighboring presidio (Kenneally I 1965:361).

Lasuen continues that there were mishaps during the construction of the mission church such as the death of thirteen or fourteen yoke of oxen and relates that:

> Furthermore, the expert admits that the work itself has been requiring more labor than he had expected, and he had not wished to forego it because of his own good name, because it gave an opportunity for more thorough training for his apprentices, and because they had finally discovered a first-rate quarry for the purpose (Kenneally I 1965:362).

This reference to finally finding a good quarry suggests that before they were having trouble finding a good quarry, as when the Royal Presidio Chapel was under construction.

1797 Toribio Ruiz was to repair the roof of the chapel (California Archives, Bancroft Library v. 25:384 in Howard 1976:28).

1801 Chapel described as in ruinous condition (Bancroft Vol. 1:143 in Howard 1976:29).

1811 A baptistry was to be constructed (Archives of the Archbishop, Bancroft Library, 11:84 in Howard 1976:29). Location is unclear. It may have been located in one of the two shed-roofed rooms resembling transepts which were removed in 1858 when the crossing extant today was built. The chapel has no real baptistry today. An alcove constructed probably in the 1956, houses the lavabo originally in the sacristy, but it has not been used as a baptistry in recent memory. The cramped dark windowless space is lit by a single exposed light bulb.

A document dated April 17, 1811 from Fray Estevan Tapiz at San Luis Rey to the Padres of the Mission of San Carlos says:

1829 Alfred Robinson mentioned the "chapel-dome" and towering flag staff of the presidio (Howard 1976:31). This is the only reference to a dome found. The earliest sketches do not show a dome.

1835 Funeral of governor Jose Figueroa in chapel with remains lying in state in the vacant room fronting the sacristy on the gospel side. This would appear to be in the east addition or shed-roofed transept (Howard 1976:32). June 20, the Royal Presidio Chapel was transferred from military to municipal care (Bancroft III 1886:674). October, burial place chosen for foreigners, which may have been in proximity to chapel.

1837 Abel Du Petit Thouars visited Monterey as a part of the his voyage on the Venus. His observations suggest that there was no priest resident in Monterey. He said that Friar Real came to Monterey to do the furneral service at the presidio church of one Durand and took the body to bury at the Mission. Du Petit Thouars and his party stayed at the big house of David Spence. He mentioned the bell tower of the Presidio Chapel and said there were no public buildings but it. He also mentioned that some houses had second stories (DuPetit Thouars :3-10).

1840 November 12, "Padre Gonzales" [sic] asks Mariano G. Vallejo for gift of the Royal Presidio Chapel to be used as the town church (Howard 1976:51 citing Bancroft III 1886:669 citing Vallejo Documentos CB 33:1547, Bancroft Library). This would represent a transfer from municipal oversight to church responsibility. The original document dated November 12, 1840, was authored by Father Jose Antonio Gonzales-Rubio, a Zacatecan Franciscan, at Mission San Jose, President of the northern missions. Mngr. James Culleton had the document translated. It mentions that the dowry of the chapel had ceased some time past and the washing of the linens, repairing of the furnishings and other items which had deteriorated more and more could be assumed by the Reverend Father Minister of Monterey (Fr. Real) who could accept the church in the name of Gonzales-Rubio. He mentioned making an exact inventory of the furnishings and said that the interior would be beautifed and repaired. Culleton says that the document contained the following marginal note signed by M. G. Vallejo: "Give the order to the commander of the Monterey Company and a transcript to the Reverend Father for his knowledge." Gonzales-Rubio prefaced his request by noting that the community at Monterey was growing but lacked the means to build a new decent church, but could maintain and decoratethe existing one.

1842 Visitor Duflot de Mofras mentioned plans to reconstruct the chapel (Howard 1976:32). Duflot de Mofras visiting Monterey said of the Royal Presidio Chapel: "Plans, however, have been made to reconstruct the church, which, although in a weakened condition, is still standing" (Wilbur 1937:212). Another visitor, Sir George Simpson reported that part of the church was decaying and another part was unfinished, which may have been a side room shown in sketches by Hutton, Gillou, Miller and Sully (Howard 1976: 32).

1845 February 14, Marcelino Escobar granted Father Real (of Carmel) land west of the Royal Presidio Chapel for a "Casa Cural," or rectory. This suggests that some time between 1840 and 1845, ownership or authority over the Royal Presidio Chapel was transferred to the aCatholic church (Monterey County Recorder, Solares de Monterey A:56).

1847 May 6 and 15, William Rich Hutton made sketches of the chapel (Howard 1976:34). These indicate that there were shed-roofed additions on the east and west sides of the chapel near the rear. Charles Gillou sketched the chapel from the same perspective.

1848 William Ryan described the chapel interior as whitewashed with niches on either side of the nave for statues (Howard 1976:34). The niches were uncovered by Harrie Downie in the 20th century and restored in 1942. Ryan's Personal Adventures in Upper and Lower California includes a description of the interior of the chapel:

As soon as I found myself again at liberty, I renewed my excursion into the town, my first visit being to the church, which stood near our quarters. It is a small edifice, strongly built, and of simple style; the only ornaments consisting of a few mouldings over the gothic porch, and on each side of it a niche, intended to contain the statue of a saint, the walls in the interior are white-washed over, and were, when I saw them, extremely dingy and dirty. They are ornamented with paintings, very indifferent copies of celebrated originals; one of thos representedthe passion of Christ; another the temptation of St. Anthony. The latter was full of grotesque and grinning spectres, interspersed with females in a state of classic nudity, but whose blandishments I think it argued the best possible taste on St. Anthony's part to resist. I also noticed a very beautiful figure of the lifeless body of the Saviour, enclosed in a glass case; I was, however, not a little surprised at the barbarous tast that had directed the arrangement of the accessories. The figure lay on a stiff and ungraceful couch, formed of the richest and most costly stuffs, but so thick and modern in design as immediately to dissipate all those serious ideas which the real beauties of the work were calculated to inspsire. It was just such an effect as might be produced by draping one of the old Greek models in satin and Brussels lace. But this was not the only incongruity observable. The virgin was represented in modern attire, with a bunch of artificial flowers in her hand, and the altar itself was decorated with all the primitive colours, without the slightest attempt at blending or harmony. There was an organ-loft, but the only musical instrument that it contained was a huge drum, on which I found written in English, "This is the drum belonging to the Ontario, which made such a noise in the South Seas."

On attending service on the following Sunday, I must confess I was not a little startled at the character of the musical selections, with which the devotions of the congregation (almost exclusively composed of females) were enlivened. The instruments consistedof a guitar, a violin, and a flute; and, during the usual pauses in the ritual, were alternately entertained with the piquant air of "Yankee Doodle," and the solemn national anthem of "Hail, Columbia." I could not but admire the inimitable self-possession of the French consul, whose features were screwed up into an absorbed and intense devotional expression, which, by the unnatural rigidity of the facial muscles, was evidently assumed to keep down the latent explosion that he had temporarily succeeded in smothering. Surrounding the church are the remains of an extensive adobe, or mud building, which formerly servied for the purposes of a mission. The secenery in the neighbourhood is of an exceedingly pleasing and evern picturesque character. Close to the church, and running out in the direction of the bay, lies a large and beautiful sheet of water, shut mat one side by some steep but verdant hills, studded here and there with cottages.

...In strolling through the woods, I stumbled upon a small cemetery, intended, I presumed exclusively for foreigners, there being but few, if any, Spanish names inscribed upon the tombstones. Here lay the remains of a greatmany of the crew of the Columbus vessel of war; and a feeling of sadness stole over me when I reflected that, 1 ike those poor fellows, I might be destinedto lay my bones in some sequestered and lonely nook like this, thousands of leagues distant from my family and friends (Ryan 1850:81-86).

1849 Visitor Bayard Taylor described a small parlor organ in the church (Howard 1976:35). His observations are as follows:

I attended the Catholic Church in Monterey one Sunday, to hear good old Padre Ramirez. The church is small and with scanty decorations; the nave and gallery are both crowded by the California families and Indians. Near the door hung opposite

> pictures of Heaven and Hell—the former a sort of pyramid inhabited by straight white figures, with an aspectof solemn distress; the latter enclosed in the expanded jaws of a dragon, swarming with devils who tormented their victims with spears and pitchforks. The church music was furnished by a diminutive parlor organ, and consisted of a choice list of polksas, waltzes, and fandango airs. Padre Ramirez preached a very excellent sermon, recommending his Catholic flock to follow the example of the Protestants, who, he said, were more truly pious than they, and did much more for the welfare of their church. I noticed that during the sermon several of the Californians disappeared through a small door at the end of the gallery. Following them, out of curiosity, I found them all seated in the belfry and along the coping of the front, composedly smoking their cigars (Taylor 1949:133).

Lieutenant Sully sketched the chapel. His sketch like those of Hutton, Gillou, and later Miller, depict a roofed open enclosure behind the bell tower with a cross inside. This is perhaps a small cemetery?? Howard refers to it as a horse stall.

1850 The Royal Presidio Chapel was made San Carlos cathedral by Bishop Joseph S. Alemany (Crouch 1970:3).

1855 Two or three American style mirrors were reportedly suspended high above the altar with a statue of the Crucifix and one of the Virgin located behind glass in nichos about half way down the church (niches are said to have been restored by Downie in 1942). The statues were reportedly of the movable type *(imagenes de vestir?)* (Howard 1976:35). October 2, 1855 E. D. Townsend visited the church and described the interior:

> There is here, one of those queer old churches of adobe, [sic] which are seen in every town or mission established by native Californians. This is not one of the most imposing of the churches, but it is interesting from its appearance of antiquity. Not that I suppose it to be really very ancient, but its style of architecture and state of repair, give it the air of centuries ago. The altar trimmings and pictures, are very cheap, common and tawdry. Two or three large yankee looking glasses, with mahongany frames, are suspended high above the altar—for what purpose it would be hard to divine. There are two images larger than life, one of the Crucifixion, the other of the Virgin, behind glass windows, and set in nitches in the wall about midway in the Church. They are intended to be life-like representations, but are really ghastly looking objects. They seem to be made so as to admit of changes in their positions, the arms and limbs being movable, and perhaps miracles are wrought by them for the benefit of the faithful (Edwards 1970:97-98)

1856 Henry Miller produced a drawing of the church with shed roofed addition on the east side similar to the Hutton and Sully sketches (Miller 1856). Some sources say that the church was remodeled extensively in this year; however, other evidence supports a date of 1858-59 for this effort (see below).

1858 September 24, Church purchased land from James Stokes immediately behind the Royal Presidio Chapel, apparently to accommodate enlargement of the church. When San Carlos Church was enlarged with transepts, a crypt was built with funding by Francisco Pacheco (Crouch 1970:3). Pacheco's daughter Isadora was married there October 25, 1859 and Pacheco himself died March 9, 1860 and was buried in the crypt (Shumate 1980:5).

Bones were reportedly disinterred when the transept footings were dug (ca. 1858) at the rear of the church (Downie in Howard 1976:36). The Campo Santo is said to have been at the rear, which was collaborated by the finding of bones when Fremont Street was widened in 1937 (Howard 1976:36). An 1847-56 burial ground in front of the church is thought to have been moved at this time (Howard 1976:36). The cross planted in the ground in front of the church shown in the Miller sketch of 1856 supports this contention.

Harrie Downie reportedly thought that the carved stone portals of the transepts originated at Cannel as side altars (Howard 1976:86). Long narrow Gothic stained glass windows are thought to have been added in the nave by Fr. Comellas at this time (Howard 1976:86). The church is said to have been renovated with a new altarpiece by an Italian artisan named Frascinine of redwood with plaster of Paris *(yesso)* surfacing (Couch 1970:11). Maria Antonia Field recalled that "Paulo Fasanini, an Italian artist, made a beautiful work of the altar and background in gilt and cream." She thought it was replaced in 1940 [sic] "when the church was put back more to its original lines" and that Downie had saved the Fasanini work (Field 1954:41). The early front entry doors were replaced at this time (Howard 1976:36). The 1811 baptistry was reportedly removed from the west side of the nave (Howard 1976:36).

In the register of baptisms for 1855-1872, at the end of the entries for 1858, there is an item in the handwriting of Father A. D. Casanova dated June 25, 1880 (in Spanish) which says that in 1858 the Rev. Juan B. Comellas had the transcepts *(los cruceros)* built and the whole building replastered, put on the shingled roof for a total cost of $14,000 (registers in Archives, Diocese of Monterey).

1859 Pacific Sentinel, January 22, 1859, p.2, c.2, reported that the Catholic Church at Monterey was renovated by contractors Waters, Pierce and Beck with new pews and altar. The interior was re-plastered with a hard finish and the exterior was proposed to be replastered in the coming year as well as fencing of the lot and landscaping. The church was re-dedicated on January 16, 1859 (with 6 men and 6 women named as godparents or *padrinos)* by Father Juan Comellias with a sermon in Spanish. Cannon were fired, a brass band played and a feast for 200 followed in the rectory. The cost of the renovation was given at $10,000 with much funding provided by Don Francisco Pacheco.

1860 The earliest known photograph of the Royal Presidio Chapel shows the building before the exterior was replastered. It shows where the original shed-roofed transepts were filled in and the new transepts constructed to the rear, all apparently using lime instead of mud mortar. It also shows two blocked up windows on the west side of the nave, one large and a small one up high.

1874 The whale bone pavement was installed in front of the church (Casanova in Culleton 1951:35).

1876 Fr. Casanova had the "new " walls of the church and sanctuary strengthened with six strong anchors, plastering and oil painting the exterior of the church at a cost of $400 (Casanova in Culleton 1951:36).

1881 Elmo Wildwood writing for Elliott and Moor's History of Monterey County described the Cathedral:

> The approach to the church is curiously paved with the disjointed vertebrae of whales caught in the harbor. The facade is highly ornamented, after the old Spanish style, and its curious bell tower painted with warm buff is exceedingly picturesque seen from a little distance. The interior, though cold, rude and plain, is possessed of one considerable attraction--a very old picture, an

importation, representing the Court of Heaven, hanging just under the choir. The effect seems somewhat marred by the attitude of the angelic herald resting upon the crowns of two cherubs. But for their estatic expression, one would think the hopeless innocents were being trampled back to the Stygian realms below. The faces are all exceedingly natural, characterized by truthfulness and individuality of expression, and wear the holy calm of exaulted lives (Elliott 1881:122).

1887 Fr. Casanova had work done on the roof of the bell tower (Casanova in Culleton 1951:39). Photos taken ca. 1865 and Ca. 1875 indicate that a shed roof protected the tower and bells at an earlier date (Howard 1976:83,85).

1893 The pyramidal tiled roof is said to have been built over the bell tower (Newcomb 1925:270). This and the installation of electricty, and the gothic windows are said to have been Father Mestres' projects (**Monterey Peninsula Herald**, May 18, 1975: n.p. MPL). Actually, the gothic windows were added in 1858, judging from historical photographs as early as ca. 1860. Before 1920 Father Mestres is said to have had Juan Martorel build the stone wall around the property using stone from the old Washington Hotel; the shrine on the corner was built by Carob Abbe in 1932 Crouch 1970:15). It is dated 1933.

1894 This is the more likely date of the changes made by Father Mestres who first came in 1893 and was photographed with the building as it was under Father Casanova. Newspaper research will clarify this point. Mestres was later re-photographed in front of the building as he had modifed it. The date of 1894 is given in the caption of an historical photograph formerly in the collection of Louis Slevin, who collected the photographs around the turn of the century. Also photographs in a souvenir publication published in different versions in 1893 and 1894 suggest that the modifications dated to the latter year. Mestres also made significant changes to the interior including replacing the light mid-Victorian chancel railing characterized by delicate turned balusters with a heavy dark stained railing in contemporary taste. He added side niches at the corners of the crossing. Photographs with him at the altar indicate the time period. (Mestres was rector from 1893-1930).

1904 Architect William Weeks designed the new rectory west of the chapel.

1922 Art historian Mary Holway noted that "One of the best examples of this primitive type [of Spanish Colonial statuary] is the draped statue of the Mater Dolorosa preserved behnd glass in the sanctuary of the Presidio Church at Monterey. "This observation coincides with one made by Sir George Simpson made in 1842 about a statue of the virgin behind glass in a niche in a side wall of the nave.

1925 Architectural historian Rexford Newcomb wrote: 'The interior of the church has been completely modernized and is consequently not of great interest" (Newcomb 1925:274). He also referred to the pyrimidical roof on the tower as new.

1930s Whalebone pavement of the forecourt of the church was replaced with cement by Father Durkin after 1934 (Culleton 1951:40). Other sources say the 1940s (Crouch 19 70:3).

1934 The Historic American Building Survey measured and recorded the building with the whalebone pavement.

1935 The church was re-roofed with barrel tiles (**Monterey Peninsula Herald**, November 12,
1938:n.p. MPL). The Martha Cooper memorial organ was installed (Monterey Peninsula Herald, July 24, 1938:n.p. MPL). It is not known if the roof gutters were removed at this time for certain.

1936 Historian George Tays wrote a report on the Royal Presidio Chapel, State Registered Landmark No. 105, which contains a number of serious errors relating to architectural history.

1938 The Index of American Design team found traces of two shades of red paint in crevices of the transept portals (Crouch 1970:6; **Monterey Peninsula Herald**, July 24, 1938: n.p. MPL).

1942 The tile floor was installed in church interior (Crouch 1970:23). The crypt beneath the floor was openTed and showed evidence of flooding. It was permanently sealed with concrete (Crouch 1970:12). The crypt was said to have been opened once 25 years earlier when a musty odor was noticeable (**Monterey Peninsula Herald**, February 19, 1942: n.p.MPL). The wood ceiling was replaced at this time. According to the same source, restoration of the altar was in the hands of the Monterey Guild and the old statues were to be replaced. The walls were re-plastered, the gothic windows filled in and squared, and new Spanish style doors made by Harry Downie were installed. The work was reportedly done by Al Megna and P.F. Welborn, contractors (**Monterey Peninsula Herald**, June 3, 1942:n.p.). Harrie Downie discovered the original niches for the statues in the nave at this time and reopened them. Traces of the original color scheme similar to those found by the Index of American Design on the portals of the transept were found (Monterey Peninsula Herald, May 18, 1975:n.p. MPL). The lavabo now in an alcove near the narthex of the church was moved to that location from behind the altar where the HABS drawings showed it (Crouch 1970:6).

Re: the two carved stone portals of the transept. I believe they were originally used on the interior of the building at the entrances to the two shed roofed additions forming a kind of transept (see 1847 and 1856 sketches by Hutton and Miller). This would explain their coloration (two shades of cinnabar red) being similar to that of the interior. They bear no resemblance to altars, instead resemble the interior door surrounds at Cannel Mission, also attributed to master mason Manuel Ruiz.

Generally it is thought that the 1942 work included removal of the confessionals shown in the HABS drawings, erection of the narthex wall and the altar rear wall (Father Occhiuto oral communication 1994). However, it now appears that the narthex wall and altar wall were part of the 1956 work by Harrie Downie. City building permits may clarify these points or consultation of parish accounts located in Fresno.

1956 "In 1956 work was done to modernize the interior ... "(**Monterey Peninsula Herald**, December 13, 1967, clipping Colton Hall Collection). This was during Harrie Downie's tenure and may be the date when the current heating system was installed and the green dado was painted, judging from its current condition. It is possible that the narthex wing walls and the altar wall were built at this time rather than in 1942. I suspect this because of the use of gypsum board in the construction of the altar niches visible from the rear. There is evidence in the space behind the altar today that it was lath and plastered at one time. The window high in the rear wall appears to have been designed to allow light to shine through the upper register of the 1858 altarpiece as shown in an interior photograph of the altar with Father Mestres taken in later years.

1961 The Royal Presidio Chapel was declared a National Historical Landmark. Frederick J. Blersh painted the rear altar decorations, just before the dedication (Crouch 1970:11).

1962 October 12, the National Landmark Plaque was dedicated at the Royal Presidio Chapel (**Monterey Peninsula Herald**, October 13, 1962:n.p.).

1969 The forecourt of the church was paved with brick in a herring-bone pattern laid in cement mortar and the interior and exterior of the church were repainted (Crouch 1970:3). The green dado may date from this episode.

1985 A complaint was received by the NPSWRO about the non historical qualities of the interior of the Royal Presidio Chapel including removal of the chancel rail; NPSWRO responded that the fundamental significance of the building remained unaltered and that liturgically driven alterations to the interior were the business of the Bishop, not NPS. -

1988-89 The exterior of the Royal Presidio Chapel was coated with a paint incompatible with the stone facade and the rendered side walls and irrigation system installed in beds adjacent to the side walls of the nave.

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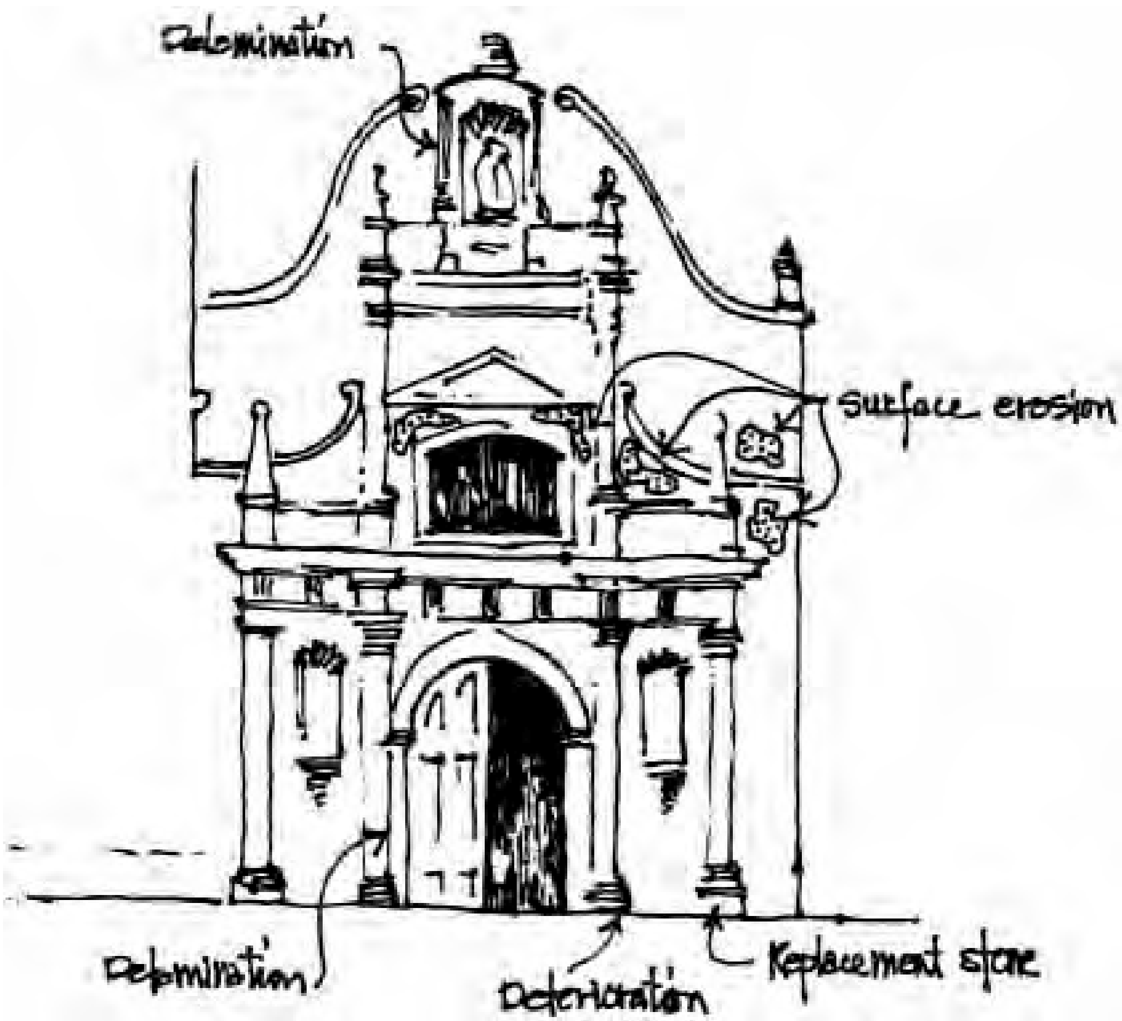
Appendix II

TRIP REPORT, INITIAL ARCHITECTURAL
CONSERVATION INSPECTION AND ANALYSIS
NOVEMBER 18, 19, 20, 1994

ROYAL PRESIDIO CHAPEL, MONTEREY, CALIFORNIA



Anthony Crosby, Consultant, Architectural Conservation
Denver, Colorado, April 12, 1995

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INTRODUCTION

This trip report presents information from an inspection which took place on November 18, 19, and 20 in conjunction with the stone conservation project, currently underway. The purpose of this site visit was to provide an overview of the condition of the structure from the perspective of the architect, and to begin the initial phases of a comprehensive building analysis to be incorporated into the future historic structure report.

The conservation team on this initial site visit and analysis was Frank Preusser, Conservation Scientist and Principal Investigator for the stone conservation project, John Twilley, Conservation Scientist and assistant to the principal investigator, Edna Kimbro, Architectural Conservator and Historian, and myself, Anthony Crosby, Consultant, Architectural Conservation. Future aspects of a comprehensive conservation analysis of the Royal Presidio Chapel and site will incorporate many other disciplines and professionals to provide recommendations for the preservation of this important structure into the future. This more comprehensive analysis will continue as the stone conservation project progresses throughout 1995 and into 1996 and with the development of the historic structure report, which will actually begin when funding is in place later in 1995.

The actual process for me to begin the development of an understanding of the condition of the building was to:

(1) photographically record the structure and site with small format black and white photography (35mm)
(2) document and collect field information on videotape

(3) record the major changes in the structure since the completion of the drawing of the Historic American Building Survey (HABS) in 1934

(4) begin the process of developing an understanding of the building's present condition and the factors that are causing deterioration

This latter step, number (4), was the most important as it would form the basis the major thrust of a more comprehensive analysis.

GENERAL DESCRIPTION

Building and Site

The Royal Presidio Chapel is in the form of a Latin cross in plan with a single aisle nave, transept, and apse, oriented along an approximate north-south axis. The sacristy is located between the west transept and the apse and a bell tower is located immediately adjacent to the front of the chapel on the east side. The overall length of the chapel including the nave and apse is 137 feet, and the width at the transept is approximately 66 feet, including the walls, which are each 2 feet 9 inches thick; the interior dimension of the nave is 20 feet 4 inches wide, with an overall width of 27 feet 4 inches. The tower is approximately 13 feet on each side. Figure 1 is a sketch of the plan of the chapel based upon the 1934 HABS floor plan. The height of the exterior walls is approximately 22 feet. The gable, or ridge roof, is covered with roofing tiles as is the pyramidal roof of the tower. The nave roof abuts the stone facade on its north and is hipped at the apse; a ridge roof at the same elevation of the nave roof is also hipped at the exterior transept walls. The most significant feature of the chapel is its stone facade (Figure 2).

The entire building is constructed of stone masonry of several types of sedimentary stones which exhibit different decay resistant qualities. More detail of the specific stone types are included in an interim report by the stone conservation principal investigator, Dr. Frank Preusser. The exterior and interior surfaces of the stone masonry have combinations of lime plasters, Portland cement type hard renderings and patches and surface paints and coatings.

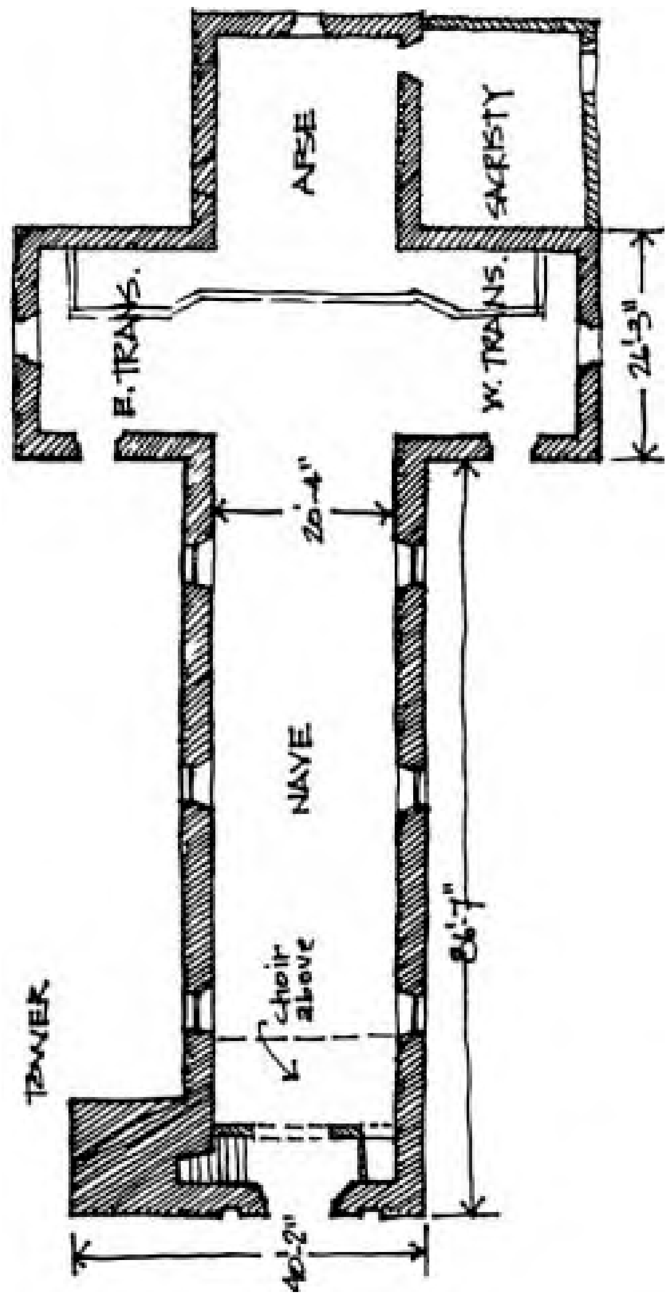


Figure 1: Sketch plan of the Royal Presidio Chapel based upon the 1934 HABS drawings

Figure 2: View of the front facade of the Chapel. The well executed architectural sculpture is one of the most outstanding features of the structure.

Figure 3 is a reproduction of the site plan developed in 1934 by the Historic American Building Survey. The immediate site is bounded on the north by Church Street, on the south by Fremont street, on the east by Cortez Street and on the west by a drive from Church Street on the west side of the Parish House. The ground falls away rather dramatically to the south and southeast, and more gradually to the north, the east and the northwest. The only exception is west of the west transept where there is a negative slope toward the building from the school. The chapel is surrounded on the south, east, and west sides by gardens or lawn and on the north by a paved area. Sidewalks extend along either side to the north doors of the transepts and around the west side of the west transept to the sacristy. Several large Redwood trees are east of the nave. The most obvious site changes are the addition of other site feature such as parking lots and building which have been added since that time.

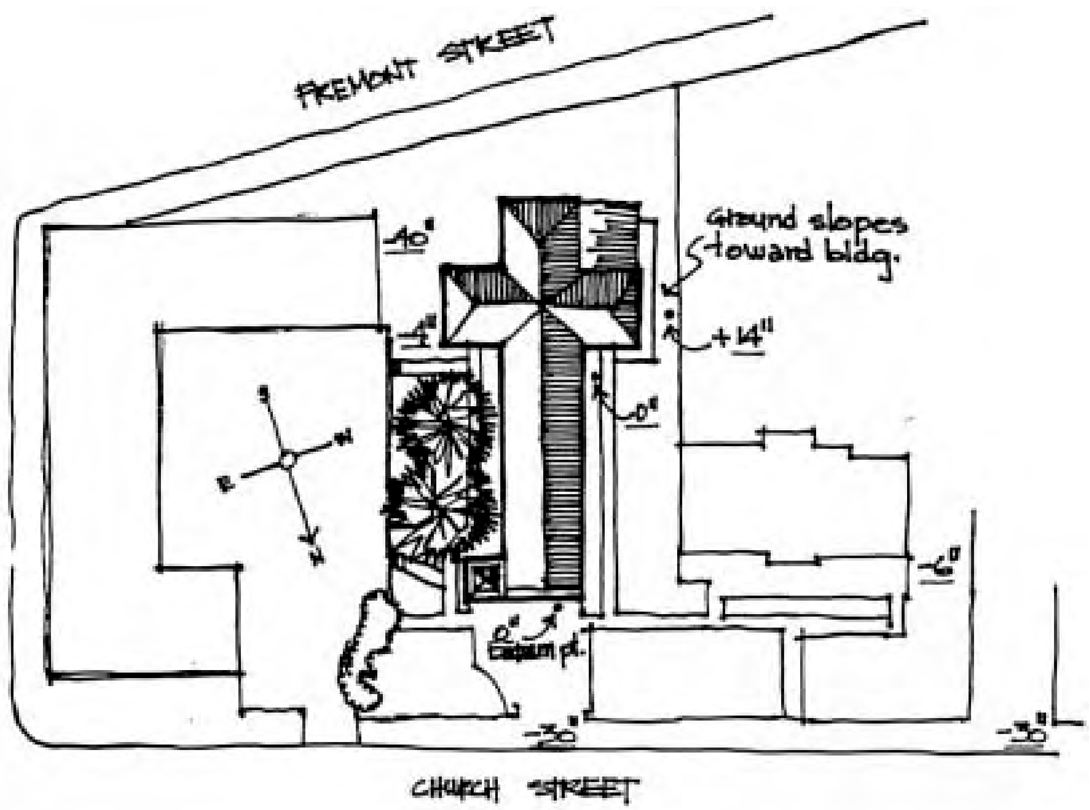


Figure 3: Sketch site plan based on the 1943 HABS drawings. The red numbers are the distances in inches above or below a data point at the front door sill.

In association with an archeological investigation that exposed a portion of the foundation along the exterior of the east nave wall, there was an attempt to locate bedrock. The depth of a boring was slightly more than two meters. It appears that a contiguous strata of fractured rock exists approximately one meter below the present ground surface. Based upon the rock ledge that is exposed in the cut on Fremont Street this was somewhat expected. A thorough investigation in the future is necessary to develop a comprehensive understanding of the subsurface conditions.

Basic Changes since 1934 Documentation

The Chapel has undergone several changes since it was documented by black and white photography and drawings in 1934. The changes consist of (1) a major alteration of the sacristy, (2) the removal of the lancet windows in the nave walls and replacement with rectangular windows, (3) the addition of a window in the east apse wall, (4) the replacement of the shingle roof with a tile roof, (5) the removal of the gutters and down spouts from the roof and (6) interior alterations to the choir and the north end of the nave. These were the most significant changes to the building. There have been significant changes on the site as well with the addition of the parking lot and buildings east of the chapel and the school immediately to the west.

The existing roof system was constructed in 1935. This includes entire system of rafters, collar beams, diagonal braces, wall plates, sheathing, and a partial bond beam. It is likely that the wood shingle was also installed at this time. The 1935 construction is documented by a note written on one of the structural members over the crossing of the nave and the transepts.

There have been other changes to the building such as the application of rendering on both the interior and the exterior surfaces, paints, and other surface treatments, and the installation or changes to the mechanical, electrical, and plumbing systems. There have also been other changes to the site with changes in the gardens and ground cover and the growth of trees which were not present in 1934.

Some of the alterations have no doubt had more of an affect on the building, both positive and negative, than have others. While several are discussed briefly in this report, a more thorough evaluation will be developed in the historic structure report.

INSPECTION AND INITIAL CONDITION ASSESSMENT

This portion of the trip report is a description and brief discussion of my observations during the two and one-half days of actual site work at the Royal Presidio Chapel. Final conclusions, and consequently, any specific recommendations were not developed and are not presented here. Based upon the present observations, areas for further research are identified that will eventually lead to specific recommendations directed to the long term preservation of the Chapel.

Introduction to Factors of Decay

In the broadest terms, all materials and combination of materials, whether natural or made by man will eventually decay or break down into their most elemental components. “Ashes to ashes and dust to dust” has as much meaning to the buildings of man as it does to man himself. However, continual care of the materials and systems that compose a building such as the Royal Presidio Chapel will prolong dramatically of those materials and systems for many generations; the fact that the Chapel is nearly 200 years old lends credence to that observation. But decay is occurring presently and the goal of any preservation project is to identify the causes and the effects of decay and develop measures to eliminate or to mitigate them.

The two most important potential causes of decay of the Chapel are moisture and lateral forces caused by strong ground motion. One, ground motion, can be quick acting, while the other, moisture, is slower acting. One is a direct cause, while the other, moisture, primarily acts in conjunction with other phenomenon. Ground motion can also have a long term accumulative effect, such as that of vibration of the ground by automobile traffic. In some cases, the causes of the ground motion may be eliminated, in other cases, strengthening measures are required. These strengthening measures are based upon an understanding of the geometry of the building and the characteristics of the potential motion. Moisture, however, is more complicated.

In addition to having specific and direct effects, such as the mechanical erosion of a surface, moisture establishes an environment for other causes to operate. One of these other causes is biodeterioration, by bacteria, fungi, algae, and lichens which can destroy both organic and inorganic materials such as wood and stone. The growth of trees and other larger vegetation can also be the source of biodeterioration. Another moisture-related cause is the transportation and concentration of destructive soluble salts, which, on crystallization, can expand and fracture the strongest stone. Still another moisture related mechanism is the effect of air born pollutants. Some air born particles such as sulfur, nitrogen, and hydrogen oxides are themselves destructive in the presence of moisture. Others, such as inert soils, can contribute to the growth or micro - organisms.

Moisture gains access to stone masonry by the penetration of rain water through cracks and fissures in the stone, mortar joints, renderings, and coatings and through capillary action. Intermittent moisture such as rain fall will not penetrate significantly into the stone itself and that which does will quickly evaporate once the rain has stopped. If, however, the mortar joints are not maintained or cracks have formed in plasters and paint coatings, moisture can penetrate into the masonry mass. Capillary action can also draw moisture into the mass of the masonry if the capillary source is relatively constant. In normal evaporative processes the moisture, after it gains access to the masonry, will move to an exterior surface and evaporate. But regardless of the source of the moisture, rendering such as hard cement stuccos, or coatings that are relatively non-permeable can stop or severely restrict evaporation, leaving water in the masonry to cause problems. Any porous building material such as stone should remain porous and that quality should not be significantly compromised.

Moisture can also affect the stability of a building by reducing the capacity of the bearing soils, or by causing soils to expand when becoming wet and to shrink when drying. In these cases, the results is often differential settlement. Damp soils can also be an environment for the growth of trees and tree roots which can cause displacement to the stone foundation. Destructive soluble salts found in the soils can also dissolve and be drawn up into the stone by capillary action.

This brief explanation is intended as a background for the condition discussion which follows. Some of these issues of decay are known to be relevant to the Royal Presidio Chapel - others may also prove relevant as the specifics of the cause and effect relationships of deterioration are better understood.

Site and Subsurface Conditions

As noted on Figure 4, and briefly discussed in the general description of the building and site, the surface drainage is positive, or away from the building except at the west transept. Here, the ground slopes toward the building (Figure 4a). The effect of this on the building is obvious as the interior and exterior surfaces of the north end of the west transept wall has some surface moisture damage (Figure 4b). The sidewalk to the sacristy entrance abuts the west wall at this same location and continues to the north door of the transept. The sidewalk immediately adjacent to the building exacerbates the moisture problems. The concrete walk is relatively impervious and prevents normal evaporation from the soil. The moisture is then forced up into the masonry wall. As the hard parging on the lower portion of the exterior surface restricts evaporation, the primary damage from the evaporating moisture is on the interior wall surface and above the parging. The effect of the sidewalk can also be seen on the greater deterioration of the left side of the transept door pilaster (Figure 5).

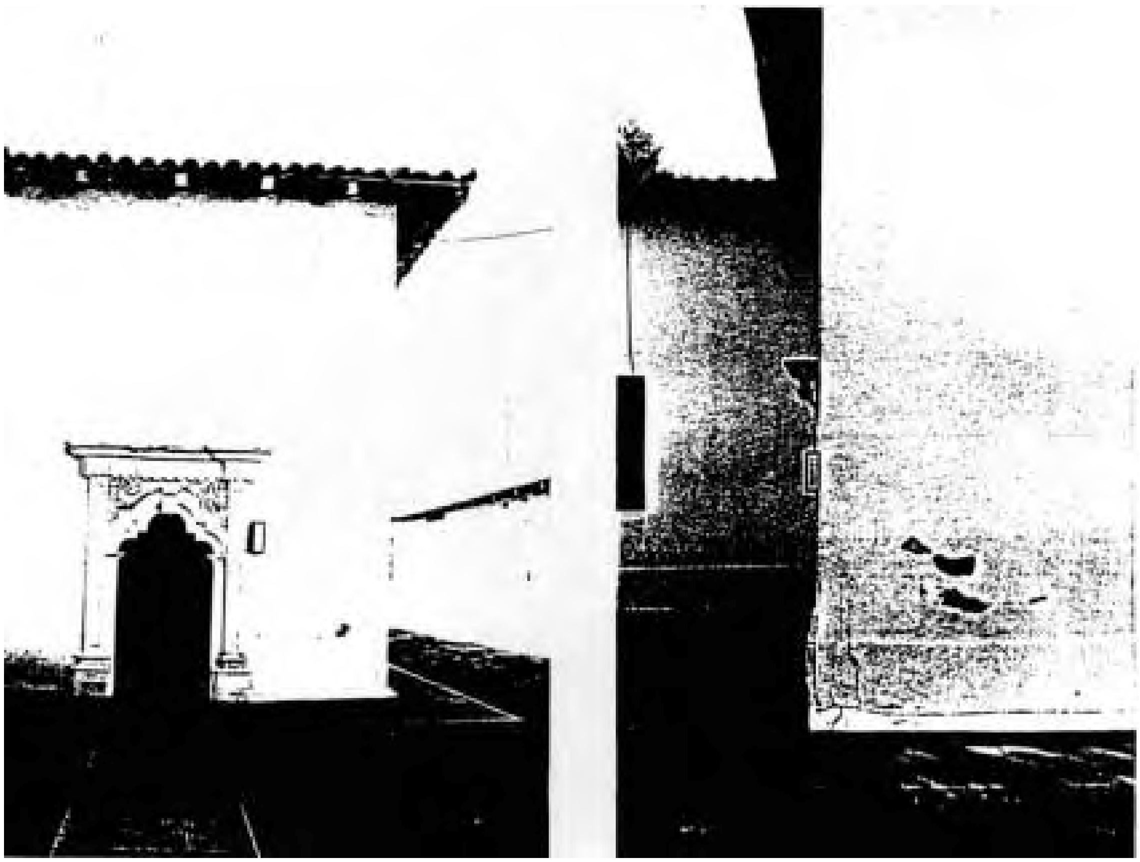


Figure 4a and b: Views of the northwest corner of the west transept showing the sidewalk, the ground slope, and some of the decay.

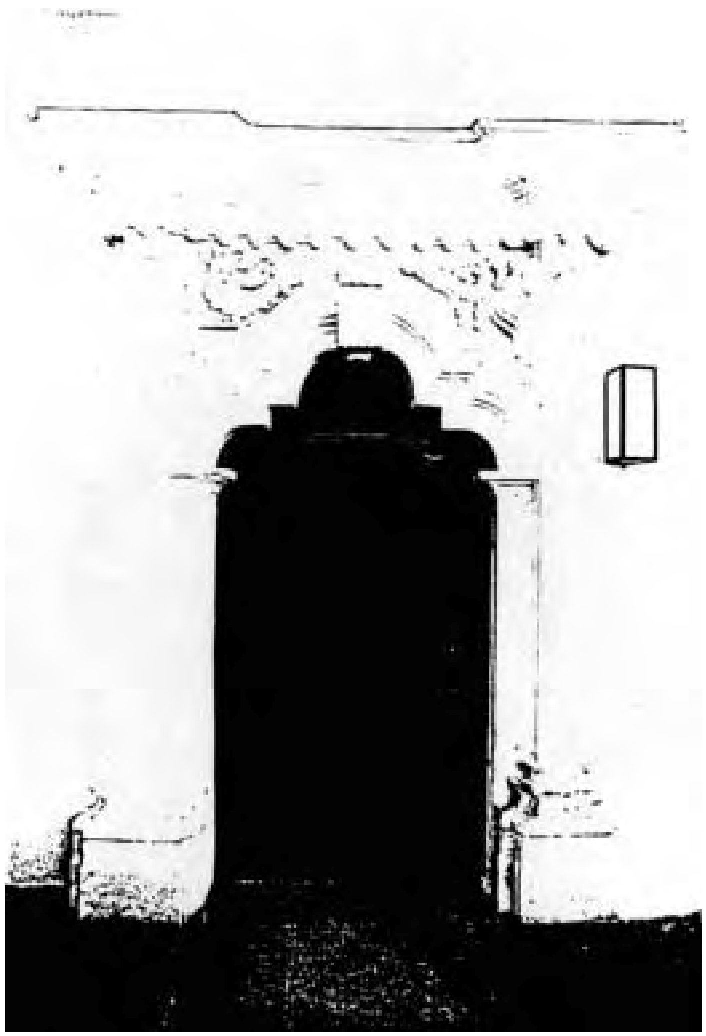


Figure 5: The sidewalk to the left of the west transept door appears to force moisture up into the left pilaster base, causing more decay. Compare the left base with the right.

The specific subsurface moisture conditions are not known, but the moisture content of the soils from the boring at the east nave wall suggests that there may be a perched water table or something approaching that at approximately one meter below the ground level. A hydrological study is planned for the immediate future and should more clearly define the actual conditions. Table A gives the moisture contents at several depths. It is interesting that there is a dramatic increase in the moisture content at the level of what may be the equivalent of bedrock and then a decrease in the moisture content until another high moisture content at approximately two meters. The high moisture at the two-meter depth could reflect a fracture in the stone through which water flows.

Table A: Soil moisture contents from samples taken near the east nave wall in November 1994.

Depth in cm	% Moisture	Comment
53 - 66	11 .2	dark brown soil
77 - 92	12.3	dark brown soil
92 -105	12.6	clay, gray-beige
105-119	17.8	clay, gray-beige
119-126	**24.4**	yellow, rocky, granular
126-136	16.2	yellow, rocky, granular
136-143	12.4	yellow, rocky, granular
158-166	8.9	yellow, rocky, granular
205-213	**26.4**	yellow, rocky, granular

Standing water that has been observed standing in the Chapels crypt, or even the high moisture observed in the samples, could be a source for capillary moisture that could be wicked up into the masonry walls. With both the reported and the observed high amounts of moisture more effects of capillary moisture would be expected. However, the only clear example is at the west transept, and possible along the exterior surface of the west nave wall. In addition to the hydrological study, information on internal wall moisture contents will be necessary before there can be an understanding of the effect of the subsurface moisture.

Structural Performance of Masonry

The masonry walls of the main nave vary in thickness from 3' -6" to 3' - 9". The walls of the transepts and the apse, or sanctuary, are 2' - 9° thick. This difference in wall thickness reflects two different building periods. The only location where the actual masonry is visible to any degree is from the attic of the rear of the front facade; this masonry has never been plastered. From what can be seen in the attic, from historic photographs, and from the HABS drawings, the exposed masonry could best be described as rough ashlar, with the stone roughly shaped and laid in irregular courses. It is not known whether or not the entire thickness of the walls are of a similar quality masonry. The portions of the building such as the front facade and the transept doors are obviously different as these areas have well shaped, carved stones set in even mortar joints. A reinforced concrete beam extends along the top of the nave walls, but is not continuous.

The overall structural condition appears to be relatively good. From what was observed, and determined by measurements, the masonry walls are relatively plumb, except where there is an apparent intentional battering of the end walls of the transepts. The crack pattern on the wall surfaces was mapped and compared with cracks which were shown on the 1934 drawings. In some cases some of the cracks which existed then, still exist. Other cracks seem to relate to the replacement of the lancet windows, which occurred in 1942. Still others have developed at the juncture of two dissimilar surface renderings such as the lime plasters and the harder cement plaster on the exterior surface of the west nave wall. None of these particular cracks are of structural concern, although the cracks which have developed between the lime plasters and the cement plasters may become a point where moisture can enter the masonry mass. However, there is a pattern of cracks on the east nave wall that do not relate to dissimilar materials or stress points of previous or new wall openings.

Figures 6a and 6b are sketches of the east and west exterior elevations showing the existing cracks. The crack patterns appear to be fairly random except at either end of the east nave wall. At these two locations the cracks consistently extend on a diagonal up from left to right at the north end near the bell tower and right to left at the south end. A large crack over the south nave window extends completely through the wall and can be seen on the interior wall surface as well. Other cracks exist on the interior wall surface on the north end near the juncture with the bell tower, although they do not directly reflect the pattern on the exterior surface.

The similar patterns at either end of this wall are consistent with differential movement between the middle portion of the wall and the ends. Either the ends of the walls have settled, or moved down, or the middle portion has moved up and the ends have remained in place. The latter scenario could occur if the soils under the major portion of the wall have expanded, or tree roots have extended under the wall and lifted it. However, the most likely scenario, and more consistent with the concentration of the crack patters only at the ends of the walls, is that the ends have settled. Further analysis will be part of the historic structure report.

A crack located at the northwest corner of the west transept extents from the sidewalk up into the base of the wall. In addition to contributing to moisture at the base of the wall under the sidewalk, this particular crack, while appearing to be relatively minor, may also reflect foundation or subsurface problems.

The other portion of the Chapel where structural cracks, opposed to surface cracks, were observed is along the upper portions of the bell tower at the cornice immediately below the pyramidal tile roof (Figure 7). These cracks could be caused by a number of things such as thermal expansion, the differential loading from the bells, mechanical system, or roof, but further analysis is necessary here as well.

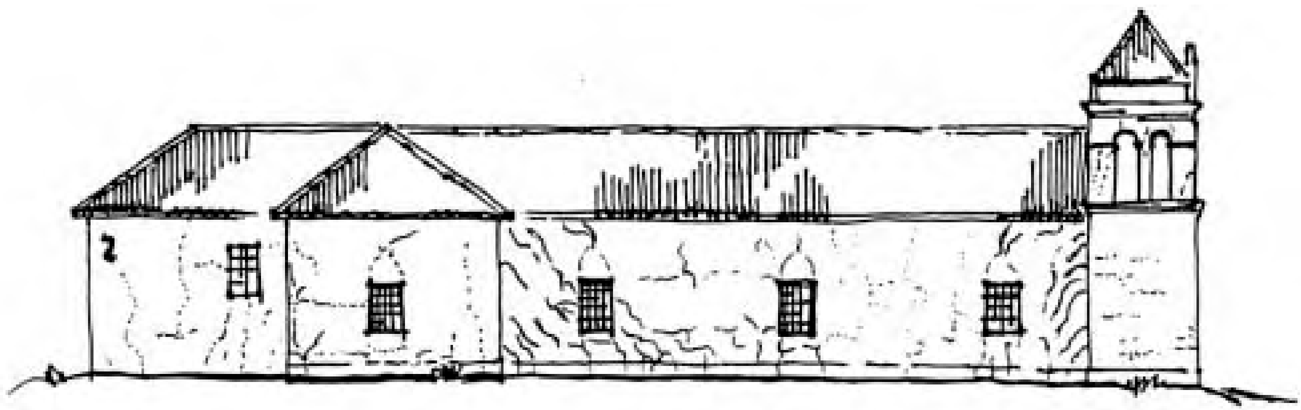


Figure 6a: East wall elevations showing existing crack patterns. The pattern at either end of the east wall are consistent with structural movement.

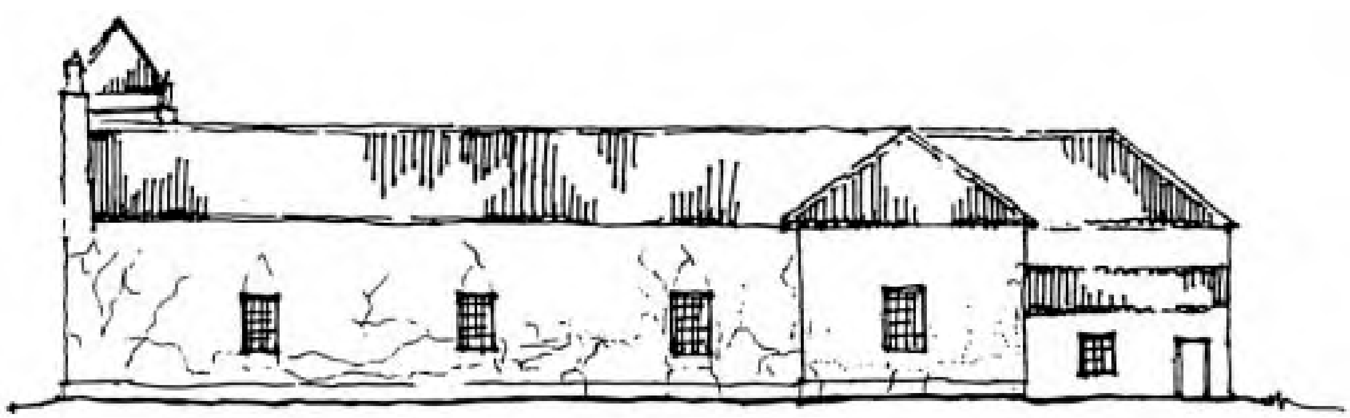


Figure 6b: West wall elevation showing existing crack patterns. The pattern does not appear to reflect structural movement

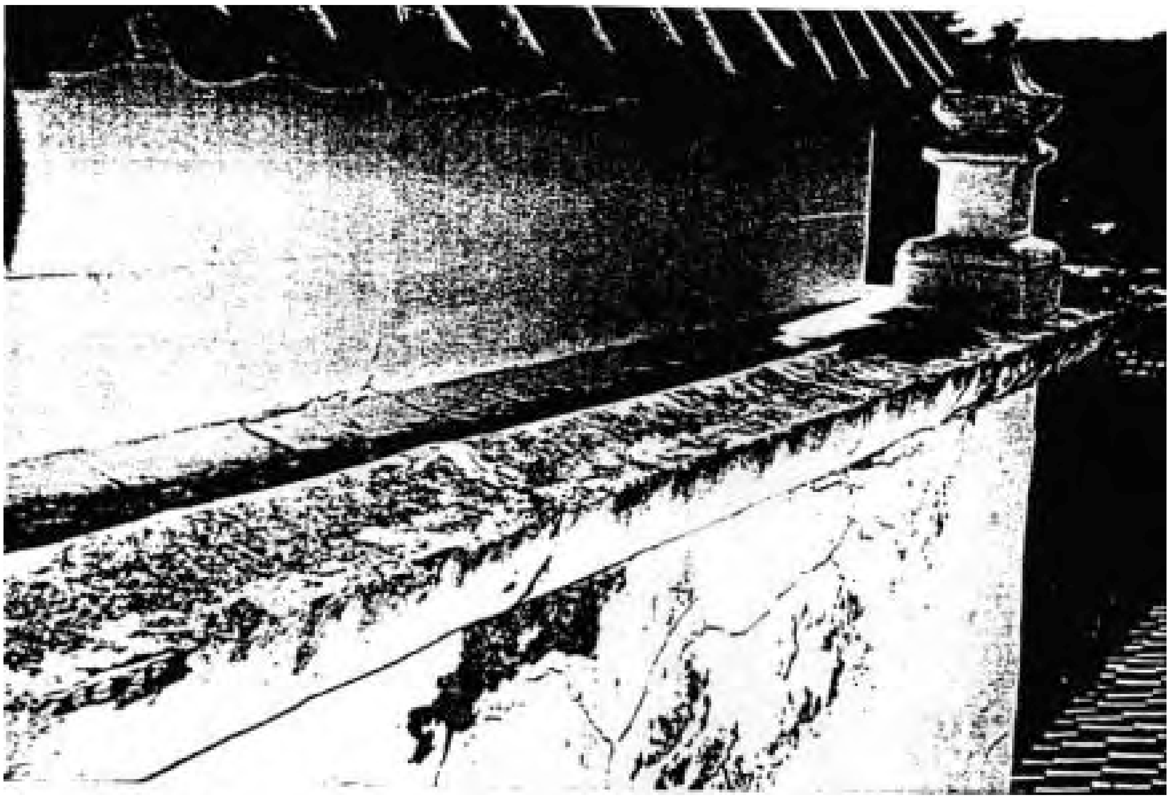


Figure 7: Oblique view of the west cornice of the bell tower. The cracks occur at approximate third points.

A series of structural tie rods are located in the end walls of the transepts and the south apse wall. Anchor plates on the exterior wall surfaces also indicate that there may be one, or perhaps two, tie rods connecting the east and west nave walls at the ceiling line. Most if not all of these appear in the 1934 drawings. No particular evidence of strain at the "s" shaped wall plates was observed. Another tie rod which does not appear in the 1934 drawings extends from the southeast corner of the east transept to the east transept window jamb and placed close to the exterior surface. The specific function of this tie rod is unclear.

Masonry Walls and Facade

The building facade, as observed from an extended-boom "cherry picker" and from the ,attic space, appears to be structurally sound and in reasonably good condition. However, there are conditions that are contributing to decay currently and will result in more accelerated decay if not addressed with a reasonably short time. Specific treatments suggestions will be based upon the finding of the stone conservation project.

The entire facade has either been plastered or painted and the only actual exposed stone is a portion of the Virgin of Guadalupe. The top surface of the parapet and the rear, or south side, has been plastered in recent years with a relatively hard plaster, but it appears to be functioning well (Figure 8).

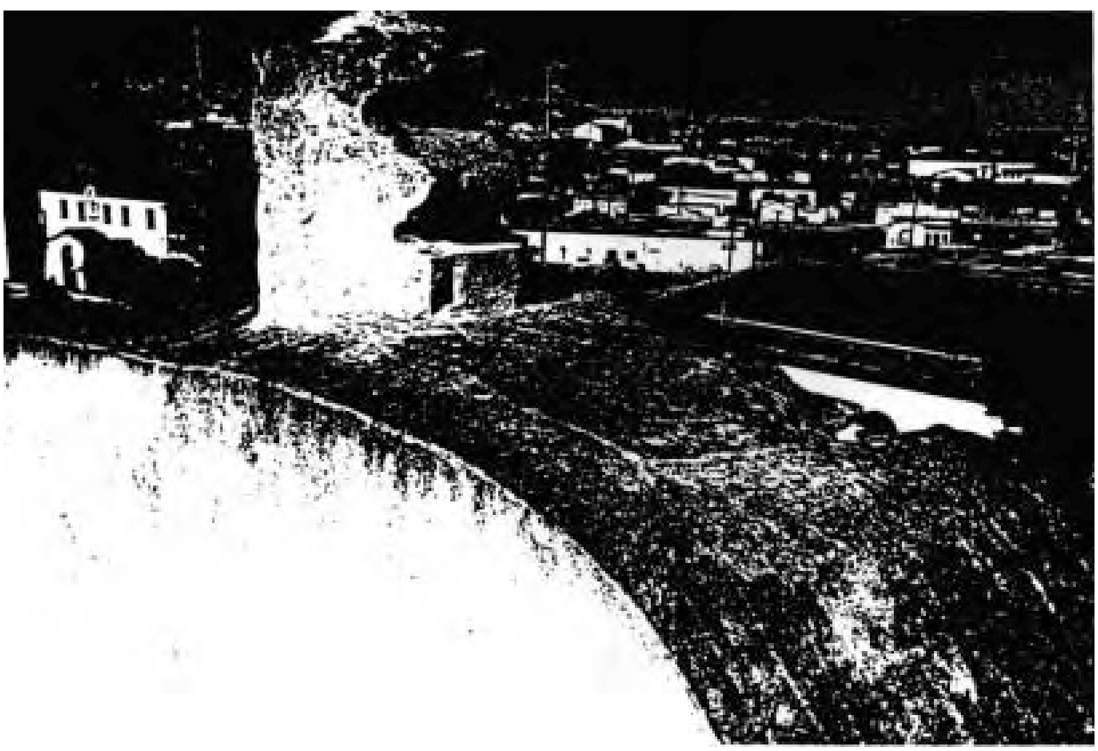


Figure 8: An oblique view of the top of the semi-circular facade parapet from the southeast.

Several hair-line cracks exist, but they do not appear to be providing a path for moisture. This plaster has also been coated with what appears to be a sealer, most of which has worn away.

There do not appear to be any structural or separation cracks at the intersection of perpendicular surfaces such as at the carved stone cornices or at mortar joints. The actual configuration of the stones in the facade was not examined, but it appears that the carved features are integral with the undecorated masonry, and, unless there was a natural cleavage plane at the intersection, there would be no joint (Figure 9).

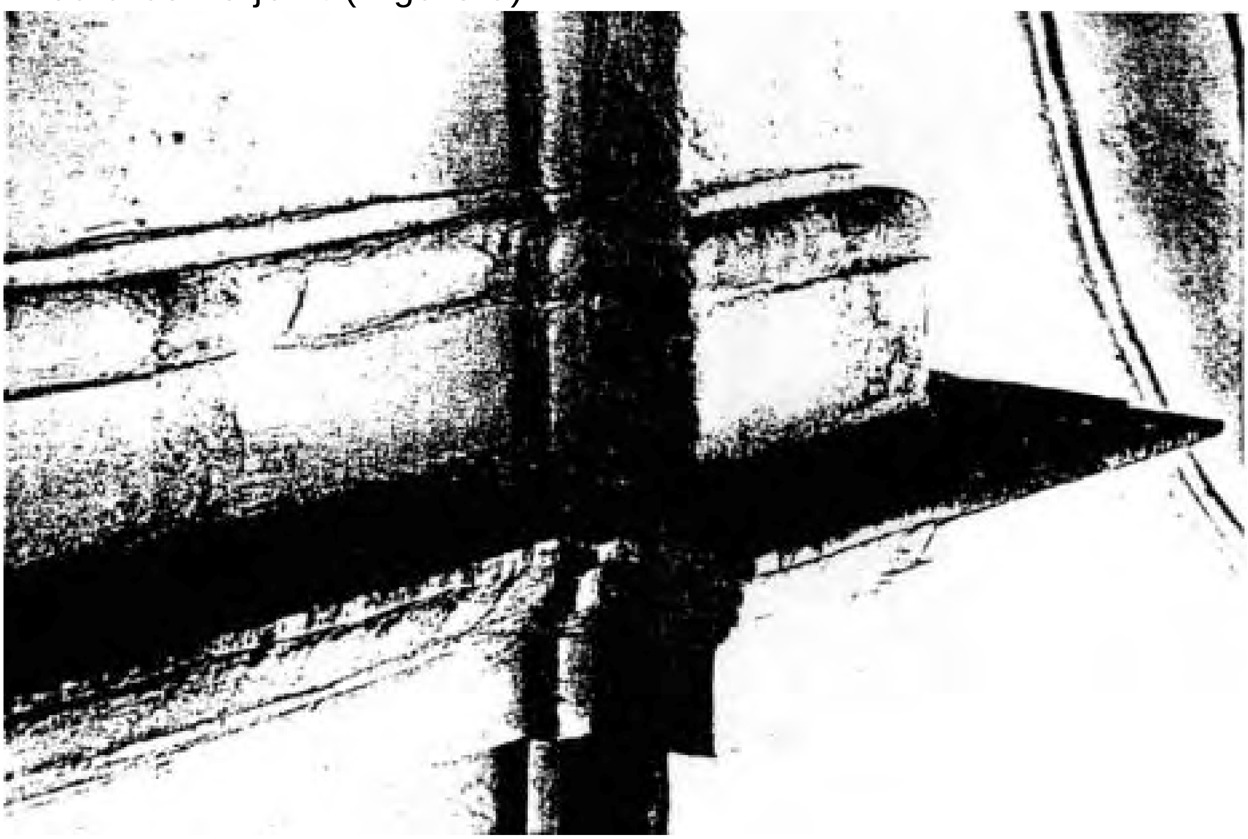


Figure 9: Detail of the front facade showing the intersection of the vertical wall plane and the stone cornices, pilasters, and moldings.

Cracks do exist at what appears to be the juncture of the original stone sculpture and later repairs. These vertical delamination cracks occur at various locations on the facade, normally on the outside face of a projecting element such as a pilaster (Figure 10). Other surface cracks existing in the paint films provide access for moisture penetration.

Figure 10: Oblique detail of the area of the facade near the Virgin of Guadalupe showing the delamination of the outside edge of the pilasters on either side of the niche.

The penetration of moisture, probably in association with air-born dust has provided an environment for the growth of micro-organisms at the top of the parapet, particularly above the volutes, at the interface with the capping plaster (Figure 11). Their growth in encouraging more separation at this critical point, allowing more moisture to penetrate. The result is the continual delamination of the upper portion of the volute molding.

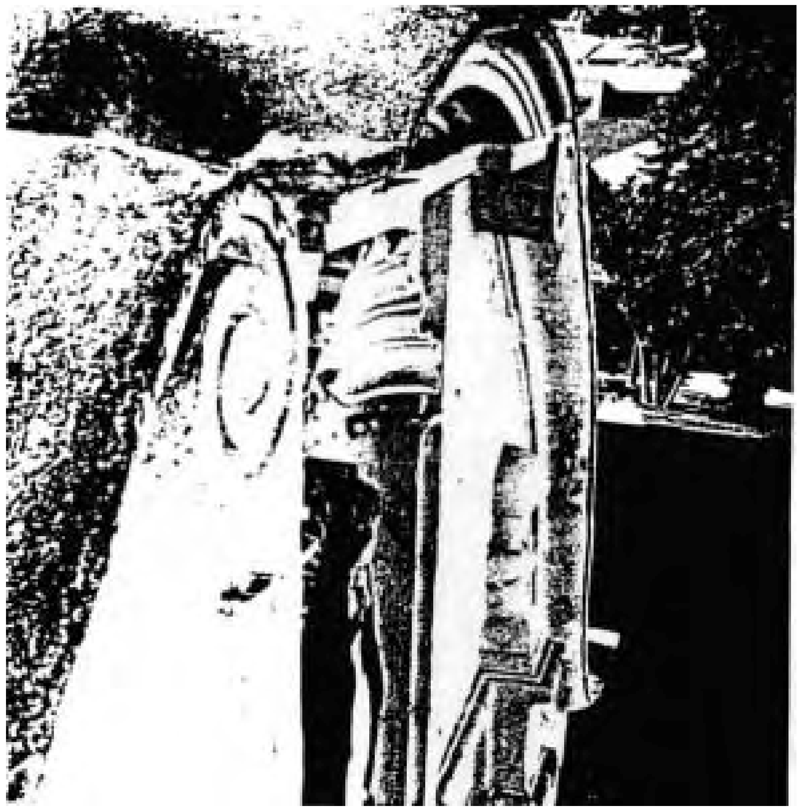


Figure 11: An oblique view of the upper part of the facade and the juncture of the volute and the parapet cap. Note the rust and gold lichen at the interface.

There have been repairs to various elements of the facade over the years. The edges of some of the pilasters mentioned above is an example. It also appears that the west volute was replaced, or extensively repaired, in the past. The painted surface made the identification of more repair difficult. There are several areas where the stone surface seems to have eroded differentially. One of these area is over the segmental arch of the choir window, another is above the pediment, which is above the same window, and a third area is to the left of this center piece, under the engaged “C” scroll. Figure 12 is a sketch of the facade with these areas identified. A strong raking light across the entire facade will probably reveal other similar areas.

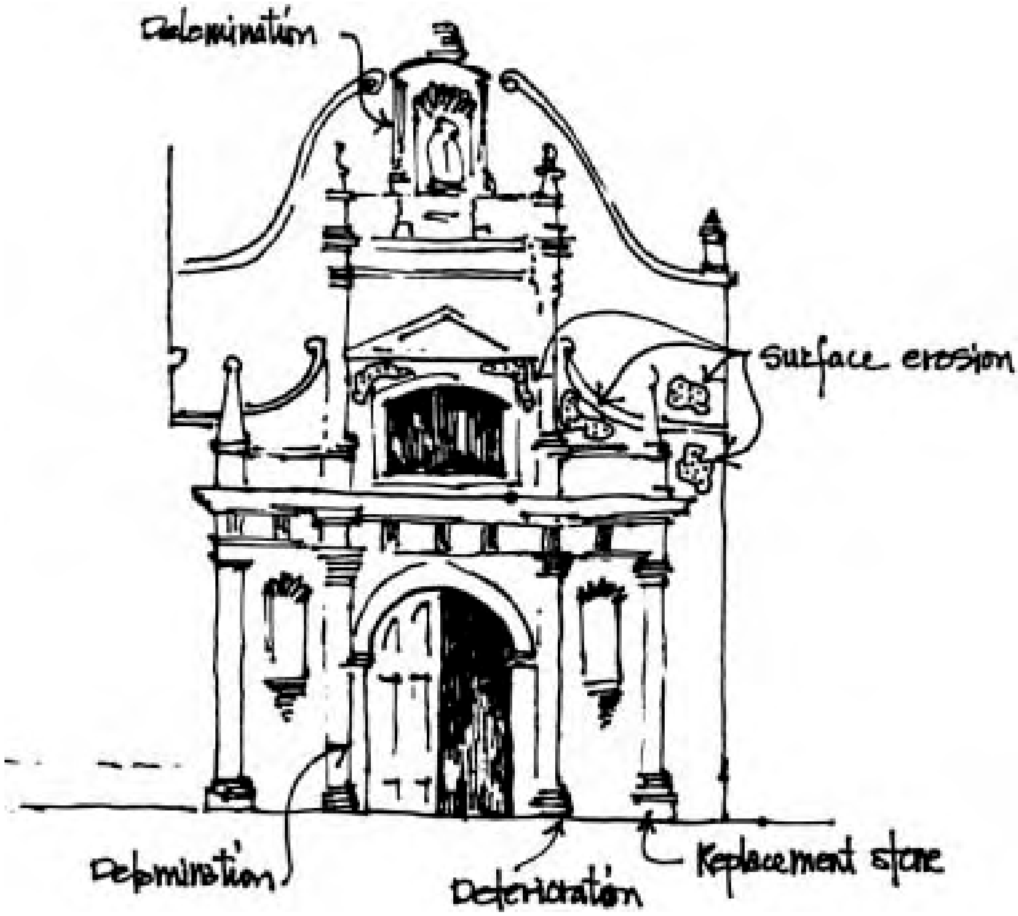


Figure 12: Sketch of the front facade showing the locations of various conditions observed during the inspection.

The feature which has eroded the most, or probably more accurate, where the erosion is the most obvious, is the statue of the Virgin of Guadalupe. Figures 13 and 14 show the present condition of this important feature. The surrounding rays are eroded badly, although on some of the less eroded ones, some earlier red paint is still visible. Even more severely eroded in the base of the sculpture with the figure of the angel completely unrecognizable. The areas of exposed stone that are not covered with the recent blue or white paint are all severely eroded and similar erosion has occurred on the figure herself, but the extend is obscured by the paint. There is both mechanical erosion as well as the delamination of parts of the stone; the delamination is most obvious at the base. Erosion is obviously continuing as the amount of erosion at the juncture of the sculpture and the wall, since the wall was last painted, can be clearly and accurately measured

It is also obvious that the sculpture has been repaired. The face of the Virgin, as well as the hands, appears to be composed of a tinted stucco to approximate the appearance of the unpainted stone. The low relief of the garments compared to that of the rays and possibly even the crown also hint at rather extensive repair. The HABS drawing of the sculpture shows considerable more detail than exists today. Earlier detail photographs also show more detail, although a comprehensive comparison of graphic documentation to more clearly understand the amount and perhaps an idea of the rate of deterioration has not been done.

The extend of erosion of the Virgin of Guadalupe may not be any greater than on similar stones of similar detail. It may be that because a substantial portion of it is unpainted, the amount of erosion is simply more obvious.

The two transept doorways have also eroded and been repaired; Figure 6 clearly shows some areas which have eroded rather severely. When the present condition is compared with a detail of this same doorway documented by a HABS photograph in 1934, the amount of decay and subsequent repair becomes more clear (Figure 15). A direct comparison using the actual photographs rather than the copy will provide an even better approximation of the rate of decay as well as an idea of the extend of repair which probably occurred to all of the architectural sculpture.

Perhaps the most noticeable distractions on the exterior of the Chapel are the areas of flaking and peeling paint. In itself, the flaking paint is of no particular concern. However, it may well be a precursor to a much greater problem. The worst area is on the west nave wall, high on the wall at the extreme north end and then lower along the wall, immediately above a hard cement type rendering (Figure 16). While the problem appears to be directly associated, the cause is from two different moisture actions.

Figure 13: An overall view of the Virgin of Guadalupe. The amount and the extend of erosion is obvious.

Figure 14: A detail of the base of the Virgin of Guadalupe clearly showing the delamination of the stone, surface spalling and general surface erosion. Note the evidence of red paint on the rays and the still fine detail of the hair of the angel.

The flaking paint on the extreme north is caused by rainwater running from the roof and concentrating at that point, It was not a problem when there was a gutter system on the roof, but it seems to have always been a problem when no gutter system existed. Historic photographs taken in the late nineteenth and the early twentieth centuries show a very similar discoloration.

The area of flaking on the lower portion of the wall is most probably the results of rising damp. In this case water has gained access to the wall, risen vertically through capillary action, and then has evaporated above a more impervious layer of exterior parging. Through cycles of wetting and drying and the deterioration of the plaster substrate by the deposition of soluble salts, the paint has either flaked off, or simply deteriorated in place.

Figure 15: A copy of a 1934 HABS photograph of the west transept doorway shows some areas of decay that have subsequently been repaired.

Figure 16: A partial view of the north end of the west nave wall showing flaking paint along the north edge of the wall and above the base of the wall.

Another very noticeable area of flaking paint is on some upper areas of the bell tower, particularly on the west bell tower wall. Some of the problem can be seen in Figure 8. The actual cause in this area is probably a combination of water gaining access to the plaster through cracks in the cornice, and by additional water flowing across the surface of that portion of the wall.

Roof and Roof Drainage

The entire roof system was replaced in 1935 and with the construction of the new roof, the reinforced concrete beam was added to the nave walls. The ceiling joists and beams that existed in

1935, remain in place today. The pitch of the present roof also appears to be the same as the pitch of the roof it replaced.

The ceiling joists over the transept are 3' X 9 1/2" on 32' centers, but those over the nave, from the transept north to the facade are hand hewn and 10" X 8" on 39" centers, approximately. There is a single row of X 3" diagonal bridging in the center of the transept crossing joists. The larger ceiling beams extend approximately 22" beyond the interior face of the interior walls; they bear on what were probably the original corbels, which in a few cases can be seen projecting through the wall directly under the roof eaves. The original corbels were cut off at the face of the wall and those which are visible on the interior now are simply attached to the sawn ends of the originals.

Adobes are used for blocking between the beams and are 10" wide, 4" thick and perhaps as long as 18". They were white washed in place and the white wash extends down past the existing ceiling boards.

As was mentioned previously there is a roof drainage condition at the north end of the west wall which is contributing to deterioration of the vertical wall surface (Figure 16). Another problem area which has resulted from the concentration of roof water at one particular point is the southwest corner of the bell tower at the juncture with the roof. Flashing against the west side of the tower directs all rain water from that portion of the roof to drain from the roof at the corner. Both the flashing and the actual design of the roof drainage at this point will be investigated further.

The flashing at the juncture of the nave roof and the south side of the semi-circular parapet of the facade appears from an observation above the roof to possible be problematic. However, from the vantage point of the attic, it appears to be functioning. The entire roof system appears to be functioning well as no obvious water leaks or extensive water stains were observed.

CONCLUSIONS

This initial site visit and condition assessment took place on November 18, 19, and 20, 1994 and was intended to provide an overview from the discipline of architectural conservation and historic architecture during the stone conservation project. It was also intended to begin the process of determining the specifics of the cause and effect relationships which are, or have been, or may in the future result in deterioration. A clear understanding of these issues is necessary before a comprehensive preservation plan can be developed and before specific treatments can be proposed.

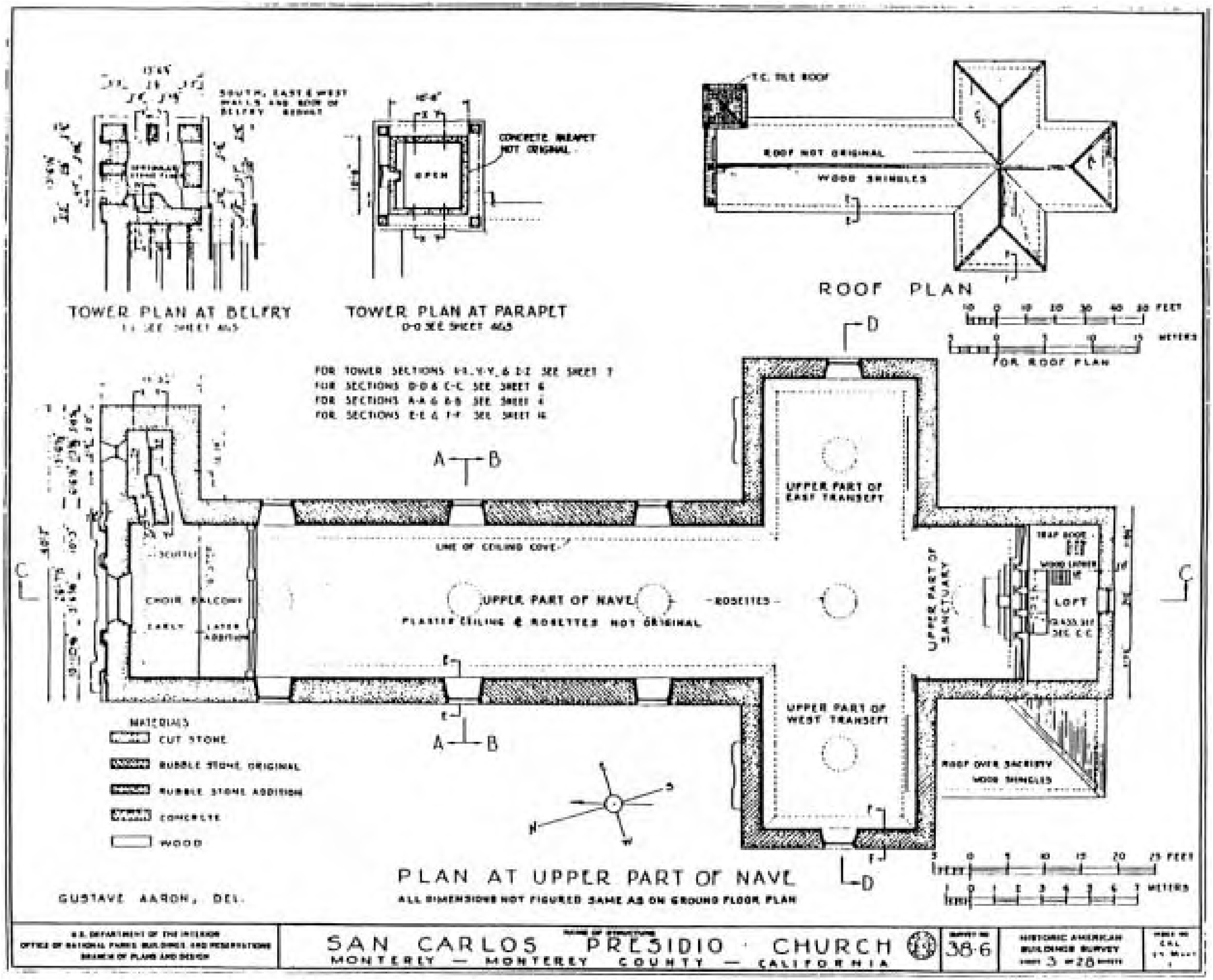
Some initial questions were answered and many questions were raised during the investigation; these will be explored more during the development of the historic structure report. Issues related to the building evolution were not addressed during this initial phase, except as might relate to the preservation of the building systems and materials. The history and evolution of the Royal Presidio Chapel and site will be an important subject of the later report.

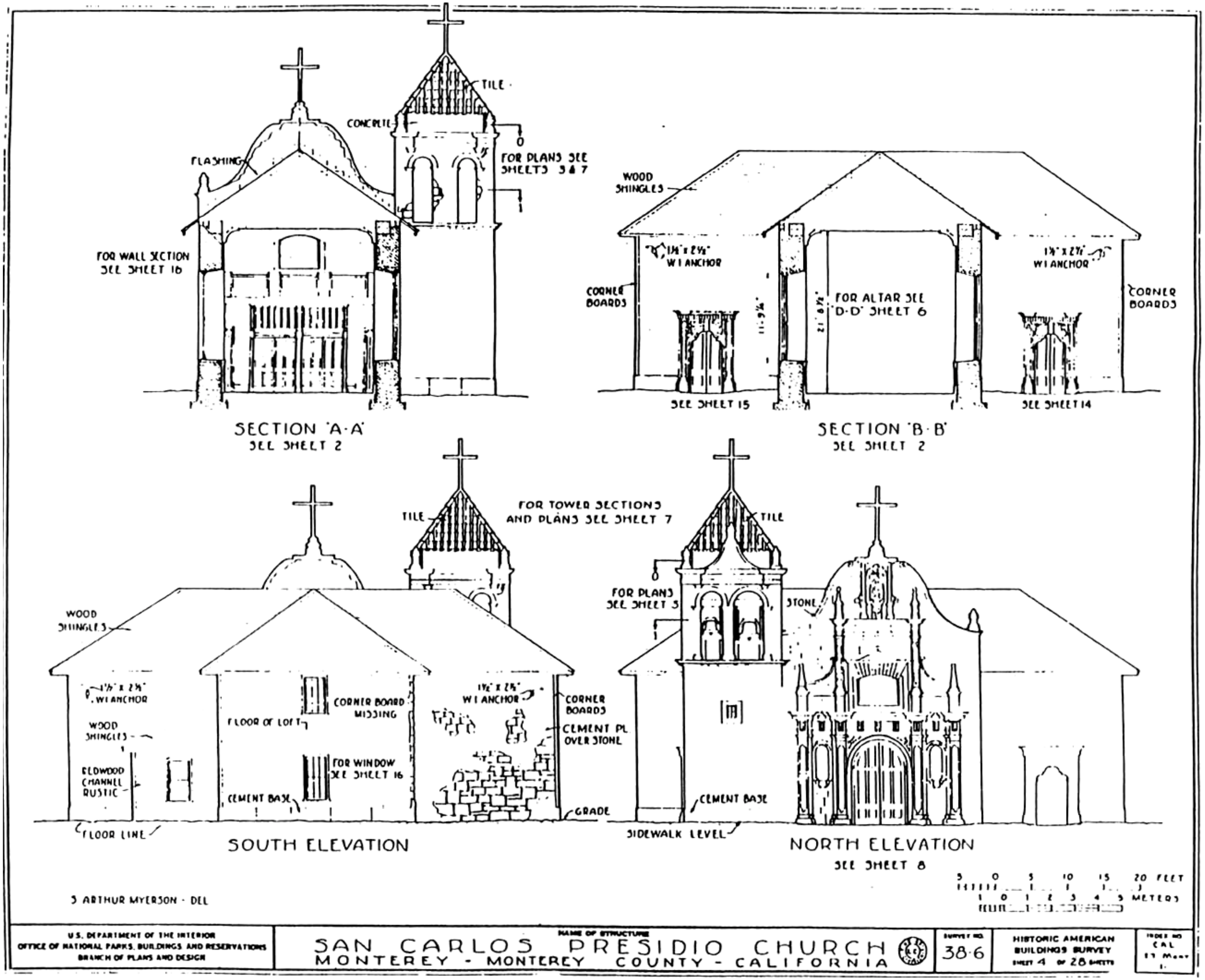
The Royal Presidio Chapel has obviously been well maintained in the recent past and is well cared for presently. The structure is in good structural condition, although there are issues that need to be addressed and more consideration for other issues which may be more significant problems than those that are currently evident. The most pressing immediate need is a hydrological study to more clearly define the subsurface conditions. This should be undertaken as soon as possible. The information is critical to the work of the conservation scientist involved in the stone conservation project and to the discipline of architectural conservation.

Another important issue is being addressed as part of the stone conservation project and will be addressed further during additional architectural investigations. That issue is the extent, the characteristics, and the effect of the renderings and coatings on the masonry wall surfaces. Some of these surface treatments are presently contributing to deterioration and some made well be concealing even more significant deterioration.

Still another issue which will be addressed as a part of the historic structure report is the structural integrity of the Chapel. A structural engineering analysis and additional architectural analysis will look at the extent of possible problems that have already been identified such as the east nave wall, and potential problems associated with seismic events or other sources of ground motion.

APPENDIX - Copies of selected 1934 Historic American Building Survey drawings.


TOWER PLAN AT BELFRY
TOWER PLAN AT PARAPET
CONCRETE PARAPET NOT ORIGINAL
OPEN
ROOF PLAN
ROOF NOT ORIGINAL
WOOD SHINGLES
FOR ROOF PLAN
METERS
FEET
FOR TOWER SECTIONS X-X, Y-Y, & Z-Z SEE SHEET 7
FOR SECTIONS D-D & C-C SEE SHEET 6
FOR SECTIONS A-A & B-B SEE SHEET 4
FOR SECTIONS E-E & F-F SEE SHEET 16
UPPER PART OF EAST TRANSEPT
LINE OF CEILING COVE
CHOIR BALCONY
EARLY
LATER ADDITION
UPPER PART OF NAVE
ROSETTES
PLASTER CEILING & ROSETTES NOT ORIGINAL
UPPER PART OF SANCTUARY
LOFT
UPPER PART OF WEST TRANSEPT
ROOF OVER SACRISTY
WOOD SHINGLES
MATERIALS
CUT STONE
RUBBLE STONE, ORIGINAL
RUBBLE STONE ADDITION
CONCRETE
WOOD
PLAN AT UPPER PART OF NAVE
ALL DIMENSIONS NOT FIGURED SAME AS ON GROUND FLOOR PLAN
GUSTAVE AARON, DEL.
SAN CARLOS PRESIDIO CHURCH
MONTEREY — MONTEREY COUNTY — CALIFORNIA
38-6
HISTORIC AMERICAN BUILDINGS SURVEY
SHEET 3 OF 28 SHEETS


TILE
CONCRETE
FOR PLANS SEE SHEETS 3 & 7
FLASHING
FOR WALL SECTION SEE SHEET 16
SECTION 'A-A'
SEE SHEET 2
WOOD SHINGLES
1¼" x 2½" W I ANCHOR
CORNER BOARDS
FOR ALTAR SEE 'D-D' SHEET 6
SEE SHEET 15
SEE SHEET 14
SECTION 'B-B'
SEE SHEET 2
TILE
FOR TOWER SECTIONS AND PLANS SEE SHEET 7
WOOD SHINGLES
1½" x 2½" W I ANCHOR
WOOD SHINGLES
REDWOOD CHANNEL RUSTIC
FLOOR OF LOFT
CORNER BOARD MISSING
FOR WINDOW SEE SHEET 16
CEMENT BASE
CEMENT PL OVER STONE
GRADE
FLOOR LINE
SOUTH ELEVATION
FOR PLANS SEE SHEET 5
STONE
CEMENT BASE
SIDEWALK LEVEL
NORTH ELEVATION
SEE SHEET 8
5 0 5 10 15 20 FEET
1 0 1 2 3 4 5 METERS
S. ARTHUR MYERSON - DEL
U.S. DEPARTMENT OF THE INTERIOR
OFFICE OF NATIONAL PARKS, BUILDINGS, AND RESERVATIONS
BRANCH OF PLANS AND DESIGN
NAME OF STRUCTURE
SAN CARLOS PRESIDIO CHURCH
MONTEREY - MONTEREY COUNTY - CALIFORNIA
SURVEY NO.
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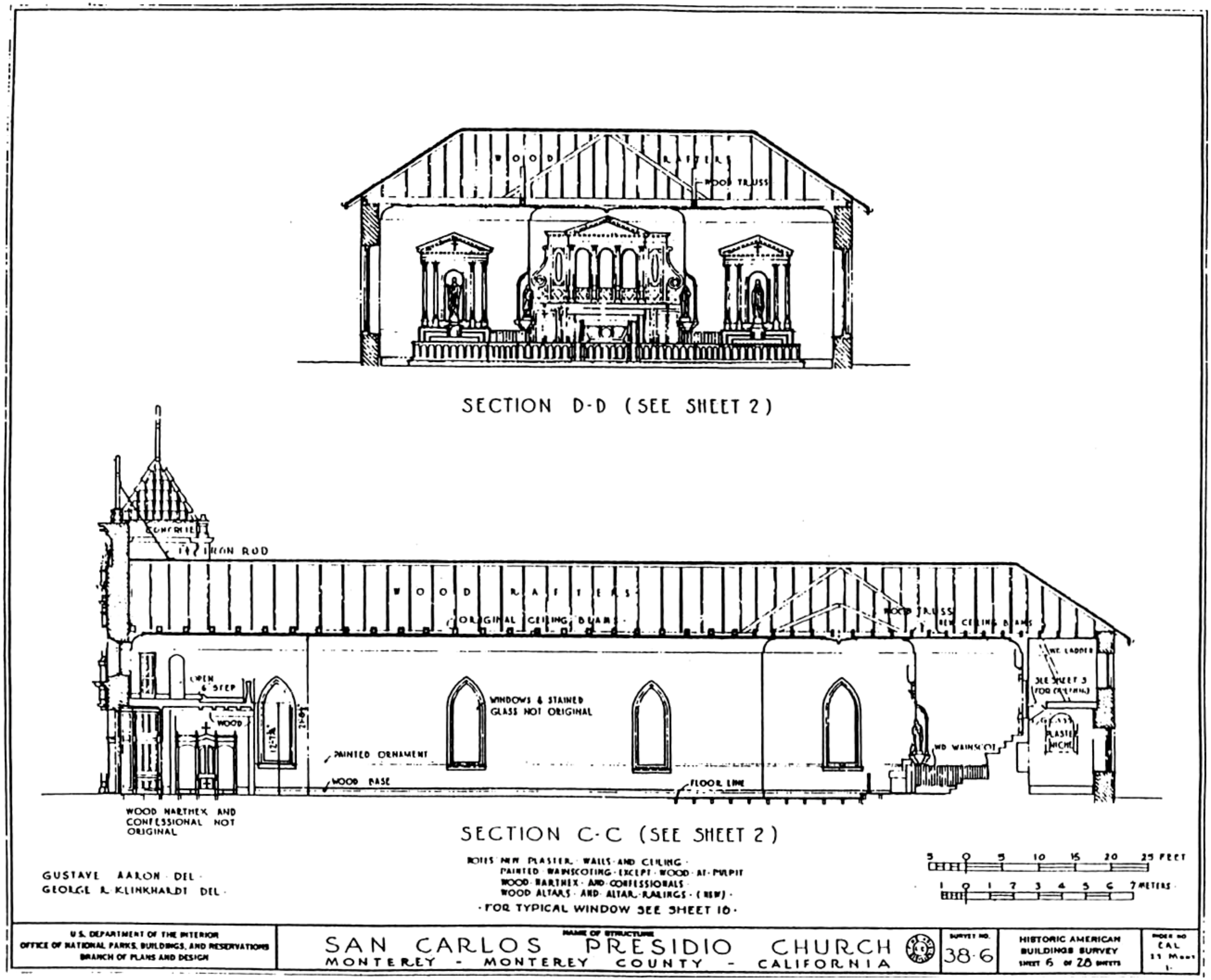
WOOD RAFTERS
WOOD TRUSS
SECTION D-D (SEE SHEET 2)
CONCRETE
IRON ROD
WOOD RAFTERS
ORIGINAL CEILING BEAMS
WOOD TRUSS
NEW CEILING BEAMS
WINDOWS & STAINED GLASS NOT ORIGINAL
PAINTED ORNAMENT
WOOD BASE
FLOOR LINE
WOOD
WD WAINSCOT
SEE SHEET 3
PLASTER NICHE
WOOD NARTHEX AND CONFESSIONAL NOT ORIGINAL
SECTION C-C (SEE SHEET 2)
NOTES NEW PLASTER WALLS AND CEILING
PAINTED WAINSCOTING EXCEPT WOOD AT PULPIT
WOOD NARTHEX AND CONFESSIONALS
WOOD ALTARS AND ALTAR RAILINGS (NEW)
FOR TYPICAL WINDOW SEE SHEET 10
GUSTAVE AARON DEL
GEORGE R. KLINKHARDT DEL
5 0 5 10 15 20 25 FEET
1 0 1 2 3 4 5 6 7 METERS
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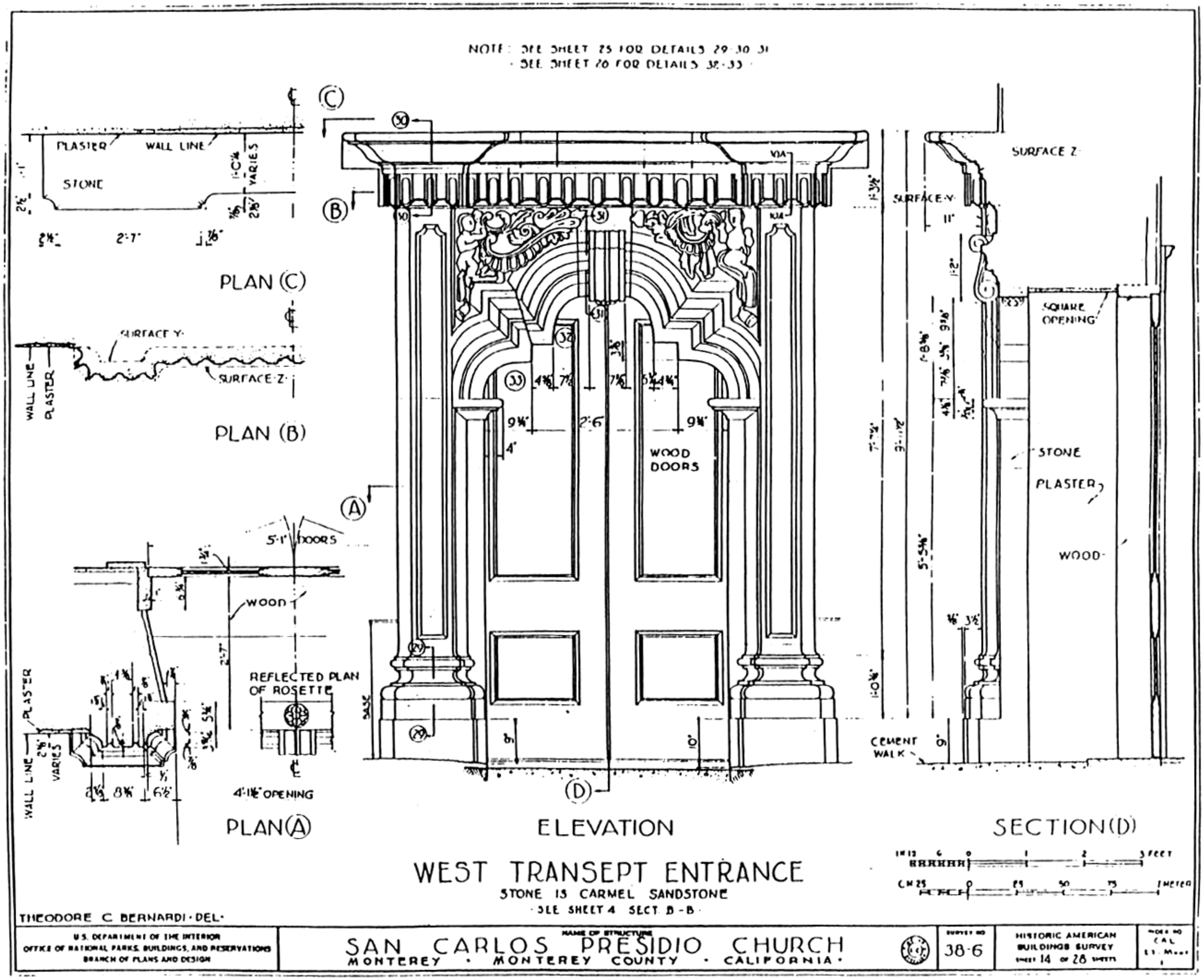
NOTE: SEE SHEET 25 FOR DETAILS 29-30-31
· SEE SHEET 26 FOR DETAILS 32-33 ·
PLAN (C)
PLASTER
WALL LINE
STONE
VARIES
PLAN (B)
SURFACE Y
SURFACE Z
WALL LINE
PLASTER
PLAN (A)
5'-1" DOORS
WOOD
REFLECTED PLAN OF ROSETTE
4'-1½" OPENING
ELEVATION
WOOD DOORS
SECTION (D)
SURFACE Z
SURFACE Y
SQUARE OPENING
STONE
PLASTER
WOOD
CEMENT WALK
WEST TRANSEPT ENTRANCE
STONE IS CARMEL SANDSTONE
· SEE SHEET 4 SECT. B-B ·
THEODORE C. BERNARDI · DEL ·
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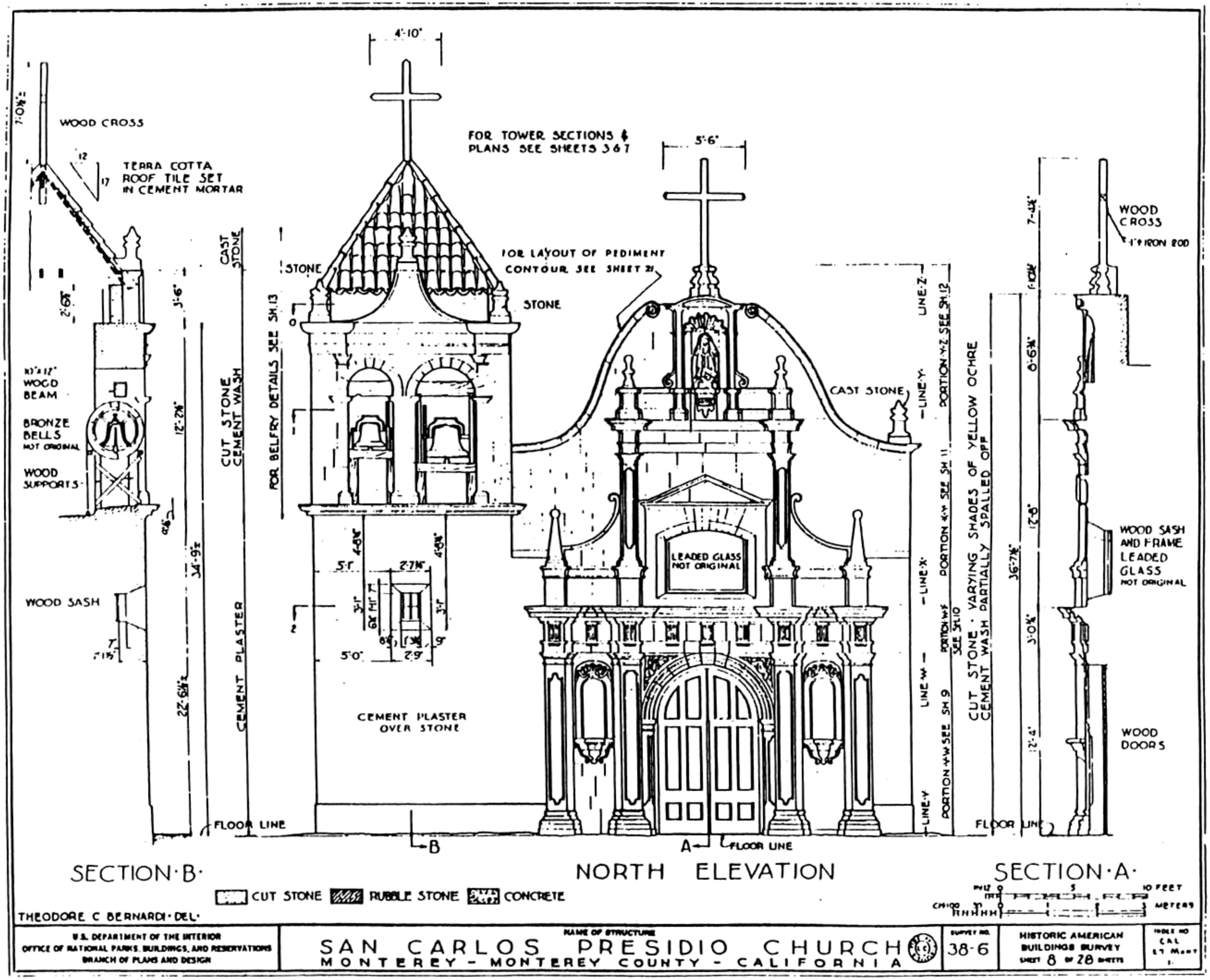

4'-10"
5'-6"
WOOD CROSS
TERRA COTTA ROOF TILE SET IN CEMENT MORTAR
FOR TOWER SECTIONS & PLANS SEE SHEETS 3 & 7
FOR LAYOUT OF PEDIMENT CONTOUR SEE SHEET 21
STONE
CAST STONE
10"x12" WOOD BEAM
BRONZE BELLS NOT ORIGINAL
WOOD SUPPORTS
WOOD SASH
CUT STONE CEMENT WASH
FOR BELFRY DETAILS SEE SH. 13
CEMENT PLASTER
CEMENT PLASTER OVER STONE
LEADED GLASS NOT ORIGINAL
LINE-Z
LINE-Y
LINE-X
LINE-W
PORTION Y-Z SEE SH. 12
PORTION X-Y SEE SH. 11
PORTION W-X SEE SH. 10
PORTION V-W SEE SH. 9
CUT STONE · VARYING SHADES OF YELLOW OCHRE CEMENT WASH PARTIALLY SPALLED OFF
1"Ø IRON ROD
WOOD SASH AND FRAME LEADED GLASS NOT ORIGINAL
WOOD DOORS
FLOOR LINE
SECTION·B·
NORTH ELEVATION
SECTION·A·
CUT STONE
RUBBLE STONE
CONCRETE
10 FEET
METERS
THEODORE C BERNARDI·DEL·
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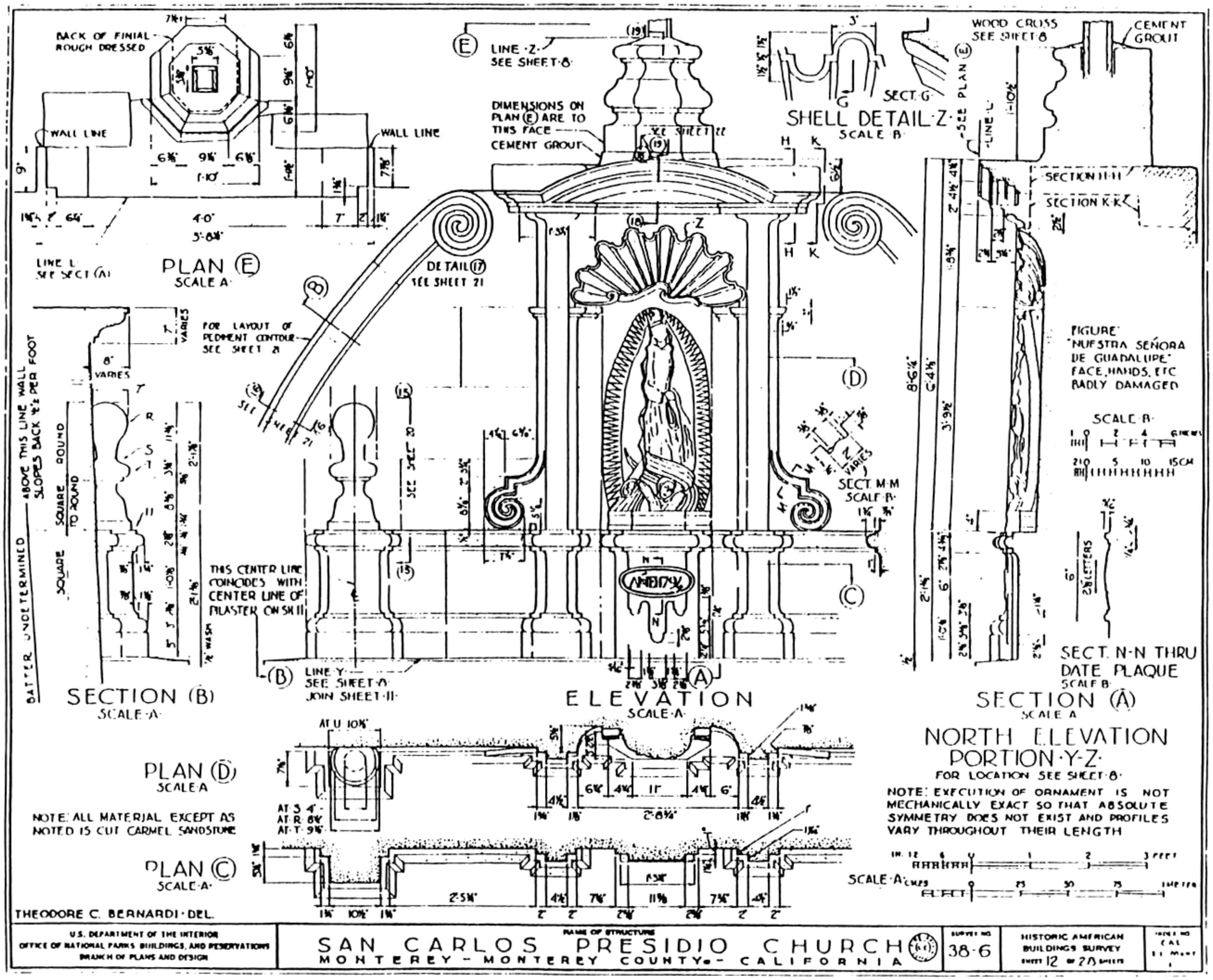
PLAN (E)
SCALE A
BACK OF FINIAL ROUGH DRESSED
WALL LINE
LINE L SEE SECT (A)
LINE Z SEE SHEET 8
DIMENSIONS ON PLAN (E) ARE TO THIS FACE
CEMENT GROUT
SHELL DETAIL Z
SCALE B
SECT G
WOOD CROSS SEE SHEET 8
CEMENT GROUT
SECTION H-H
SECTION K-K
DETAIL (17) SEE SHEET 21
FOR LAYOUT OF PEDIMENT CONTOUR SEE SHEET 21
ABOVE THIS LINE WALL SLOPES BACK 1/2" PER FOOT
BATTER UNDETERMINED
FIGURE "NUESTRA SEÑORA DE GUADALUPE" FACE, HANDS, ETC BADLY DAMAGED
SECT M-M
SCALE B
THIS CENTER LINE COINCIDES WITH CENTER LINE OF PILASTER ON SH 11
LINE Y SEE SHEET 8 JOIN SHEET 11
SECTION (B)
SCALE A
ELEVATION
SCALE A
SECTION (A)
SCALE A
SECT. N-N THRU DATE PLAQUE
SCALE B
NORTH ELEVATION PORTION Y-Z
FOR LOCATION SEE SHEET 8
NOTE: EXECUTION OF ORNAMENT IS NOT MECHANICALLY EXACT SO THAT ABSOLUTE SYMMETRY DOES NOT EXIST AND PROFILES VARY THROUGHOUT THEIR LENGTH
PLAN (D)
SCALE A
NOTE: ALL MATERIAL EXCEPT AS NOTED IS CUT CARMEL SANDSTONE
PLAN (C)
SCALE A
THEODORE C. BERNARDI DEL.
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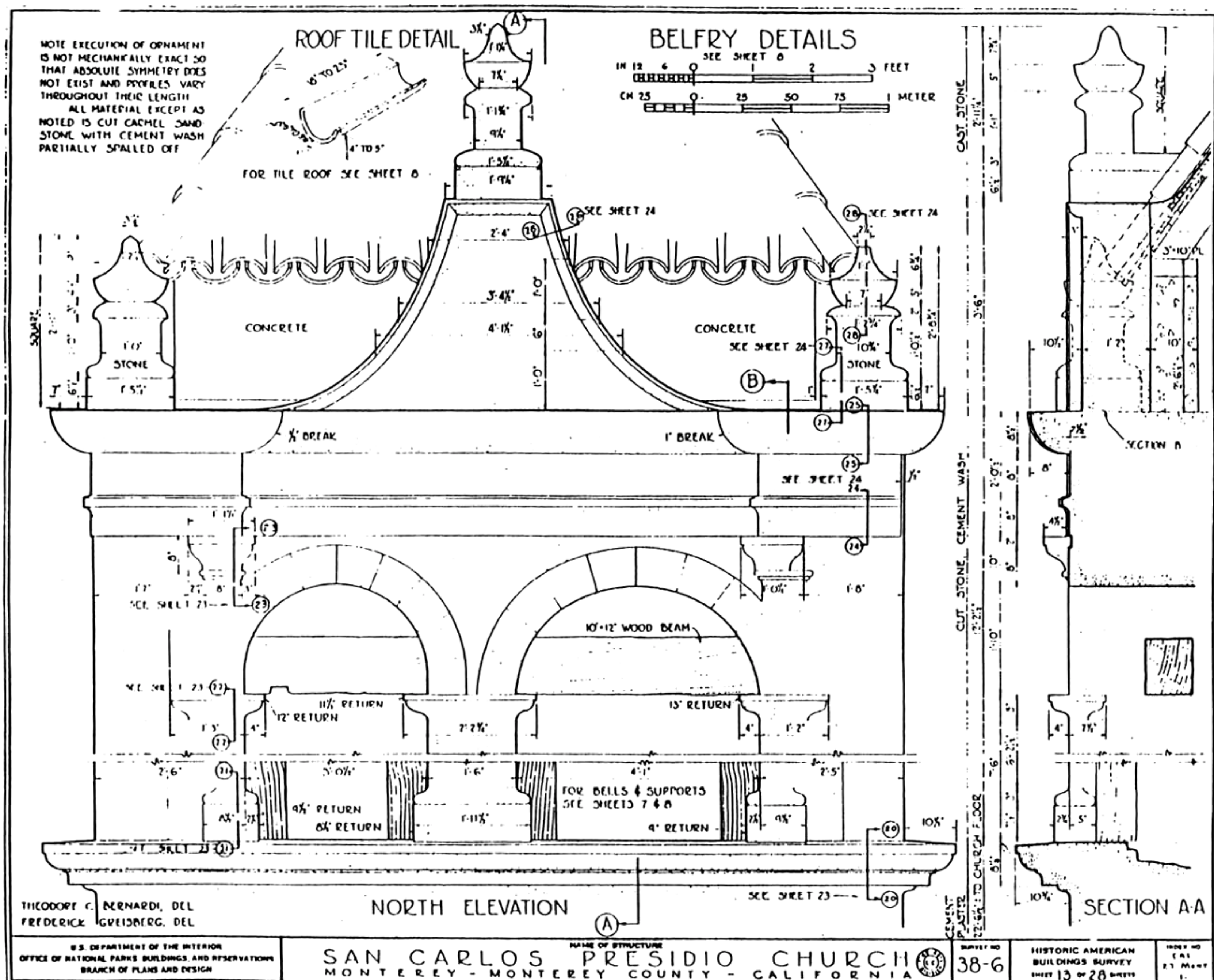

NOTE EXECUTION OF ORNAMENT IS NOT MECHANICALLY EXACT SO THAT ABSOLUTE SYMMETRY DOES NOT EXIST AND PROFILES VARY THROUGHOUT THEIR LENGTH
ALL MATERIAL EXCEPT AS NOTED IS CUT CARMEL SAND STONE WITH CEMENT WASH PARTIALLY SPALLED OFF
ROOF TILE DETAIL
FOR TILE ROOF SEE SHEET 8
BELFRY DETAILS
SEE SHEET 8
CONCRETE
STONE
FOR BELLS & SUPPORTS SEE SHEETS 7 & 8
10"×12" WOOD BEAM
NORTH ELEVATION
SECTION A-A
CAST STONE
CUT STONE, CEMENT WASH
THEODORE C. BERNARDI, DEL
FREDERICK GREISBERG, DEL
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Appendix III

Analysis of Stone Conservation Problems at the Royal Presidio Chapel, Monterey, California

John Twilley
Conservation Scientist

February 20, 1996

SUMMARY

Investigation of the stone deterioration problems affecting the Royal Presidio Chapel of Monterey has demonstrated that the stone type involved is one on which little if any formal investigation has previously been carried out within a conservation context. This siliceous shale with a high content of amorphous silica differs in certain fundamental ways from the main classes of stone such as marbles, limestones, granites, sandstones and volcanic tuffs which have been extensively studied as building materials in the U.S. and abroad. On-site investigations followed by laboratory analysis have been used to characterize the stone, to identify destructive salts present in the facade and to screen potential quarry sites both for historical purposes and for laboratory consolidation test samples. The results have shown that two categories of stone exist in the facade with differing resistance to the affects of sulfate salt recrystallization. The basis for the lies in the lithification of the sediments comprising the shale by dolomitization, in the case of the more weather-resistant stone, and the absence of the dolomite plus the loss of calcite from the less durable one. Quarry samples have not been found to be identical to the stone of the facade. However stones possessing the constituent whose consolidation behavior is the least known, amorphous silica, are available for laboratory evaluation of the consolidant application procedure and subsequent destructive testing. Analysis has shown that the original mortars are lime-bound sand mortars while the analysis of two pockets of mud interior wall filling failed to show the presence of significant lime binder in the mud. Analysis of water extracts from a core drilling demonstrated the presence of significant levels of hygroscopic chlorides and nitrates within the wall which increase as a function of depth over more than 30 inches. While not directly associated with damage to the facade, these hygroscopic salts may play a role in facilitating the redistribution of the more destructive sulfates through the facade by maintaining an elevated moisture level within the stone pores. Paints, some of which would have to be removed in order to fully assess the distribution of fills and prior damages to the facade, were analyzed for the twin purposes of identifying any health threat due to lead content and in order to learn their age. All of the paints encountered appear to date to the 20th century due to their pigment composition. A wide variety of masonry patching materials were encountered, some of which are being expelled from the losses they are intended to fill due to their excessive hardness and lack of permeability to water-borne salts. Analysis of these patches has demonstrated that most are modern materials of proprietary composition.

FACADE STONE

OBSERVATIONS

The stone of the facade is nearly entirely obscured by multiple layers of paint. At the outset of this investigation it was not known whether the stone facade was originally painted or bare. It was clear however that numerous fills and surface renderings exist beneath the paint which are not original. All elevations of the building which could be of interest in terms of the condition and weathering of the stone were examined from the ground, from a lift and from the bell tower.

No historical information exists on the nature of the construction of the walls. For example, whether the full thickness of the facade was comprised of ashlar, of ashlar facing over a stone rubble core, or of ashlar over adobe was not known at the outset. Obvious damage to the stone was apparent mostly in losses to the carved profiles of the tablets and the loss of sharpness in scrollwork. It soon became apparent that areas which are currently experiencing cleavages around raised profiles and bumps (some of which are rising out of flat regions of the stone surface) are, in fact, repaired areas of prior salt damage where the repair material is being rejected by subsequent salt recrystallization. It was also noted that in a few locations the paint itself was detaching from a stone surface due to the pressure of growing salt crystals which were emerging without disruption of the stone (Figure 24). Repair materials in several different shades were noted through the damaged paint. It was soon realized that a difference in surface roughness under the paint corresponded to a few large areas near knee level which have been coated with a slurry of patching mortar.

SAMPLING

Samples of the stone were taken during the first site visit in areas which were observed to have resisted the effects of salt and in areas which were severely disaggregated beneath the paint. In this attempt it was learned that the stone was of such a consistency that an air-cooled diamond core drill was largely ineffective for sampling due to the tendency of the fine, damp cutting waste to cake and seize the drill bit. One area of hard material along the raised profile of a tablet was revealed to be a grey portland cement mortar build-up in an area of prior loss. The stone beneath severely disaggregated areas was typically too weak to drill so that attempts to extract a 1/2" core for petrographic study resulted in the removal of irregular pellets and copious powdery material. Subsequently in a second visit, a 1-1/4" carbide tipped core drill was used to sample the facade to a depth of 30" for purposes of obtaining samples for physical analysis and to learn the composition of the wall interior. This drilling was done dry, with frequent interruptions to remove cutting debris.

The stone at this location (behind the niche to the west of the entrance) was of the harder, more durable variety and the attempt was successful. It revealed that the ashlar block was 29.6cm in thickness. Behind this the drill entered a region of irregular stone chunks bound with lime mortar. The drill intercepted an inclined mortar joint obliquely so that for the remainder of the distance mixed debris of mortar and stone chips resulted from the drilling. A fragment cut from a mollusk shell larger than the drill hole was removed as well. The full length of the solid part of the core is shown reassembled in Figure 1. During the second visit, interior work going on behind the exterior niche revealed that the interior wall beneath the renderings is comprised of irregular chunks of stone set in lime mortar. It seems clear, therefore, that the entire thickness of the wall at this point, though greater than the length of the core drilling, may be represented as ashlar backed by mortared stone rubble.

TESTING

X-ray Diffraction

Samples of stone from a sound block (sample # 16: rightmost proper pilaster, center left of tablet) and a dissaggregated one (sample #17: second right proper pilaster, right tablet edge) were analyzed by x-ray diffraction to determine their mineralogical composition. The results showed that the more durable contains the crystalline phases quartz, calcite, calcian dolomite, and a small amount of feldspar. The less durable, by contrast, contains quartz and a similar level of feldspar but only traces of carbonates (Pattern I). A similar proportion of the three principle phases was later found to be present on the rear side of the block penetrated by the core drill suggesting that the presence of the carbonates is a consistent feature of the more durable blocks.

Due to the prevalence of silt-sized and finer material which possessed a low birefringence in the petrographic analyses described below, further tests were undertaken to ensure that poorly crystallized clays were not overlooked in the analysis. Since such material would respond differently than the amorphous silica to consolidant treatment and since clays sometimes possess high capacities for cation and water exchange which is accompanied by volume distortions, the identity of the finest fraction of the stone was considered to be a high priority.

To this end samples of the durable and poorly resistant stones were pulverized, sonicated and segregated by levigation. The suspended fractions were freed of calcite and simultaneously saturated with sodium by digestion in a pH 5 sodium acetate buffer overnight (Brindley and Brown, 1980; Moore and Reynolds, Jr. 1989). (No effervescence was observed from the poorly weather-resistant stone as befits its relative lack of carbonate fossils.) The purpose of such manipulation is to lock the basal plane spacings of any cation-exchangeable clays at the same distance by substituting all positions with the same cation and thereby to sharpen the diffraction pattern, increasing the detectability of such phases. However, X-ray diffraction performed on the dried fines did not reveal any previously undetected phases. Finally, the buffer treated fines were dehydrated at 110 degrees Celsius and diffraction was performed once again without effect.

Petrography

The fractured end of the 1/2" sound core (#16) is shown at 3.6x magnification in Figure 2. Petrographic thin sections were prepared from each end of this core to evaluate the structure and near-surface weathering affects. It is immediately apparent that this stone possesses a number of microfossils, most of them foraminifera (Figures 3 and 4, 3.6x and 5.4x respectively, between crossed polars). At 50x magnification it can be seen that the forams are sometimes infilled by secondary single-crystal calcite (Figure 5, crossed polars). Staining of the thin section with alizarine red reveals the distribution of calcite (Figure 6, 25x, crossed polars) and the fact that none of the calcite resides in the groundmass of fine brown material. It is associated only with the fossil material and overgrowths on that material (Figure 7, 50x with partially crossed polars). Within the fine-grained material very tiny rhombohedra may be observed which are not stained by the calcite-selective alizarin. Figure 8 shows some typical rhombs against the sloping surface of a quartz grain (500x between crossed polars).

By contrast, the thin section prepared from one of the more solid fragments of the less durable stone sampled at location 17 reveals greater porosity and a lack of the microfossils (Figure 9, 3.6x, partially crossed polars).A detail at 50x depicts one of very few fragments of sparry calcite to be found in this section (Figure 10, crossed polars). Figure 11 (at 500x with partially crossed polars) shows the more typical condition of voids and isotropic matter. In both cases the light brown mass of fine-grained material fails to exhibit optical behavior characteristic of any of the phases identified in x-ray diffraction or of clay.

SEM

The electron microscope reveals an abundance of foraminifera in the sound stone. Comparison of Figures 12 and 13 (secondary and backscattered electron images at 44x respectively) reveals that most of the large scale porosity is internal to the calcitic forams and that some of these are completely infilled by sparite. Similar views of sample number 17 do not reveal any recognizable fossil material and, in fact, suggest that the large scale porosity is due to the loss by dissolution of such fossils formerly present (Figures 14 and 15). At 400x the rhombohedra visible in the more durable sample are apparent both inside and surrounding the foram tests (Figures 16 and 17). Elemental analysis demonstrates that these are magnesium-containing. They may be understood to be micritic dolomite which is serving the role of a binder in this stone. Figure 17, a backscatter electron image, gives an impression of the extent to which dolomite rhombs have filled in the space occupied by porous silica fines. No such feature was observed in the poorly weather-resistant stone.

Fracture cross sections are informative of the degree of bonding between the minerals in the stone by how the stone separates. Figure 18 at 1 600x reveals fractures which pass both through and around the foram tests. In Figure 19 at 1 400x a foram test is seen to formerly have been anchored by dolomite rhombs bridging the space to the adjacent sediment grains and by fine siliceous matter. Figure 20 at 2400x shows a typical area of fine siliceous matter where closely interlocked authigenic dolomite rhombs now take up a greater percentage of the volume than sediments do.

The dramatic difference in the less durable stone is apparent in Figures 21 and 22 at magnifications similar to Figures 12 and 13 above. In this material no foram tests remain, only the hollow voids left by their dissolution. No dolomite rhombs can be found and those detrital sand grains which exist are held together only by the matrix of fine siliceous matter.

No evidence of the formation of quartz overgrowths was found on the small proportion of detrital quartz which occurs in these two stones. The formation of overgrowths by epitaxial deposition of silica from solution is one of the principle means by which siliceous sediments are frequently transformed into sandstone of high strength. No evidence for this sort of lithification process was found in either stone type despite the presence of abundant silica in a porous and readily available form.

Energy dispersive x-ray spectrometry of the overall specimen surface in Figure 13 yields Spectrum 1 which corresponds well with the information derived from diffraction analysis. When focused upon the fine-grained matrix containing dolomite rhombs, the proportion of magnesium increases and aluminum, associated with detrital feldspars in this stone, diminishes (Spectrum 2). Were the fine-grained material rich in clays, one would expect the proportion of the aluminum to increase in such an area. Analysis of the foram tests confirms that they have not undergone dolomitization (Spectrum 3). Likewise the sparite infillings within some of the tests are confirmed to be unmodified calcite (Spectrum 4). It is interesting to note in Figure 13 that the infillings possess a slightly higher average atomic number than the tests themselves due to their single crystal, as opposed to polycrystalline, makeup. Many detrital grains are feldspars such as the plagioclase in Spectrum 5. It may be noted that among the detrital sand grains there are a few with sharply demarcated zones of brightness due to differing average atomic number. These are feldspars containing fragments of both plagioclase (low Z areas, Spectrum 6) and orthoclase (high Z areas, Spectrum 7).

For the stone of poor durability, represented by sample 17, the dissolution of carbonates has left negative casts of the forams formerly present. The absence of calcite may be demonstrated by probing the interior wall of such a cast in a fractured sample. The resulting spectrum includes only silica (Spectrum 8).

Physical Analysis

Physical tests have been carried out on the more durable material in accordance with RILEM procedures for the characterization of building stones. The stone used for these tests was derived from the 1-1/4" core removed from the west niche of the facade and therefore represents unweathered material. Unfortunately the less durable stone was too easily crushed for sound test samples to be prepared from the material that was available. Physical properties of the stone were found to be as follows:

Bulk Density - 2.13 g/cc
Real Density- 2.63 g/cc
Porosity Accessible to Water- 19.10%
Saturation Coefficient- 0.79

From comparison of the petrographic samples prepared from each type of stone it may be projected that the less durable type differs by having a greater overall porosity, a greater proportion of large voids due to the dissolution of bioclasts whose vacancies have not been filled in, and possibly by having retained greater fine porosity (which has become partially filled in the more durable stone by micritic dolomite). The less durable stone almost certainly possesses a bimodal pore-size distribution due to the clast dissolution voids at the high end of the dimensional scale.

LITERATURE SURVEY

A literature search was conducted in order to learn what was known about the occurrence of dolomitization in the "shales" of the Monterey region and to better understand the regional geological processes. The Monterey Shale covers a vast region of the central and southern California coast which is of great economic importance for the oil deposits which it contains, particularly to the south of the area of our interest. However, this motivation for its study has led to few results that are of direct benefit to the present project. Although referred to as a "shale" the mineralogy is atypical for shales in that the fine sediments contain little clay. Instead, the rocks of this formation contain a large fraction of fine silica in various crystal forms and are properly referred to as siliceous shales. When harder than the examples with which we are dealing in the Presidio Chapel they are referred to as porcelanites and cherts.

The origin of this silica is debated. The principle origins of most fine silica in sediments are diatoms and sponge spicules. However these are distinctively shaped and easily recognized. There are diatomite deposits, some of which have been commercially worked, in the Monterey area but their extent is quite limited relative to the deposits of undistinguished silica-rich sediments and poorly lithified rocks. Usually in the process of dissolution and reprecipitation silica which starts out in an amorphous state (as employed by sponges and diatoms) transforms first to cristobalite or opal and subsequently to quartz. The dilemma posed by the Monterey Formation is that large quantities of amorphous silica, which presumably is little metamorphosed, nonetheless lack a recognizable biogenic origin. A volcanic origin has been proposed whereby large quantities of fine silica-rich ash are supposed to have settled into the sea along with the obvious carbonates from foraminifera. However, little direct evidence seems to exist for this scenario.

Diatomaceous shales in the formation often have very low specific gravities in the range of 0.8 to 1 .0 (Bramlette, 1946) due to their porosity. Such stone would probably not have been selected for building by a mason. Galliher (1932) has attempted to describe the building stones derived from local sources in Monterey and has published a few photomicrographs. He has not attempted to differentiate carbonate minerals in the materials studied, however, to disclose whether any dolomitized stones were included. His Figure 23 is of some interest as it seems to show that the bulk density (“lump specific gravity”, lower case d in the Figure) of the quarry samples are all lower than that which we measured at 2.13. On the other hand his values for the specific gravity of the mineral matter (which we may take to be synonymous with Real Density) are very close to ours at 2.63 for all examples except the ones from his Santa Lucia Quarry location 1. As for the porosity values, Galliher has not provided information on the test procedure that would allow them to be reliably compared to ours. If we may assume that his samples were infiltrated under vacuum then his porosity percent by volume would correspond to our “Porosity accessible to water”. Only one of his samples, R-7, is as low as our value of 19.1%. The overall conclusion that can be drawn from this comparison is that the stone chosen for the facade which is of the more durable variety is superior in certain respects to the stones commercially available to Galliher in this century.

It is an intriguing fact that this stone has undergone the deposition of micritic dolomite which is not a diagenetic replacement of the calcareous fossils it contains. Dolomite in this form has not been commented upon in any of the references examined. Dolomite that has been studied in some detail is thought to be a replacement after calcite in calcite-rich strata (Friedman and Murata, 1979)

QUARRY SAMPLES

LOCATIONS

Armed with information about the mineralogical and petrographic structure of the two stone types in the facade we sought to use this information to verify anecdotal information about the location of the stone source for the original construction. To have identified a natural exposure of the stone would have led to important information about the long term natural weathering of the stone in the absence of a paint coating and would have provided stone for experimentation with consolidants which could have been subjected to destructive analysis after treatment. The sites listed by Galliher and quarries marked on U.S.G.S. maps from earlier this century were, with one inaccessible exception, visited and sampled by at least one member of this project. In addition, samples from the scarp exposed on the south side of the Carmel river were examined by sampling fallen blocks. Ultimately these were proven not to contain the levels of calcite and dolomite found in the more durable of the two stones of the facade.

X-RAY DIFFRACTION

Pattern II shows the diffraction results for samples from locations SL1 and SL2 of Galliher’s designations and quarries 172, 173 according to Hart (1966). They all have in common the fact that the dominant crystalline phase is quartz with the exception of location 172 where cristobalite is the predominant form of silica (Pattern III). Sample 173A is light tan while 173B is nearly white and much harder. A feature which is not apparent in the normalized plots of Pattern II is that the proportion of amorphous silica varies considerably from sample to sample as inferred from the variations of intensity in the quartz peak.

The location that is often referred to as the “quarry” for the Chapel is at the base of the south slope above the floodplain of the Carmel River. When taken to this site we could not discern any excavation or, for that matter, any stones of significant size. This was partially due to brush cover but it may also be due to the “quarry” consisting only of a location where blocks of convenient size had tumbled to the base of the slope in the past. It is quite apparent that a stratum of weather-resistant stone extends for several thousand yards along the south slope above the river. Though far above the river plain when near the coast, this stratum dips to the east until it vanishes into foliage at river level inland. Such a weather resistant exposure may have suggested itself as a source of building stone. The natural erosion of the weaker strata below may have delivered boulders of convenient size to the base of the slope where they could be carted away without much labor. This formation remains a potential source for the stone which remains unmatched at present.

SEM

Electron microscopy of fracture sections of the field samples revealed that, at least in the area sampled, locations SL1 and 175 share the similarity with the deteriorated facade stone that they contain only voids where formerly calcitic clasts were present. Sample 172 (lower) lacks both carbonate clasts and coarse dissolution porosity. It comes closest to what might be termed a porcelanite. A sample retrieved from below the scarp on the south side of the Carmel River retains its carbonate fossil material.

In terms of porosity and mineralogical makeup the stone examined from SL1 and 175 could be suitable for testing the curing behavior of consolidant that might be selected for the facade. (That from quarry 172 has been excluded on the basis of its cristobalite content.)

SALT EFFLORESCENCE

MICROCHEMICAL AND SELECTIVE ION ELECTRODE TESTS

Based upon the visible evidence that salts were responsible for part of the damage to the facade, an attempt was made to measure the levels of salts that are present in the wall itself. For this purpose semiquantitative measurements were made using indicator test strips (Merck Quants) for ammonium, sulfate, nitrate and nitrite, and turbidimetry with barium chloride for sulfate (Yellow Springs Instrument Corp.- reagents, Bausch and Lomb- Spectronic 20). For these tests the drilling waste from the core sampling of the wall was extracted with deionized water and analyzed. Although it was not possible to preserve the samples of rock dust in strict accordance with depth of the drill, a clear trend was nonetheless apparent for chloride and nitrate.

Chloride ion was measured using a silver chloride specific ion electrode. The quantities found were back-calculated to be expressed in terms of parts-per-million by weight of stone. Figure 23 depicts the results for chloride and nitrate graphically. Sulfate levels were near the limit of detection of 200 ppm on all interior stone extracts. Nitrite was detected only in the 3” deep sample and only at the threshold of detectability at 1 ppm. The increase in chloride and nitrate content as a function of depth in the wall is remarkable and remains unexplained.

For samples of efflorescence from the surface of the stone or disintegrated stone suspected of containing salts, the diphenylamine / sulfuric acid microchemical test was used to indicate the presence of both carbonate (by gas evolution) and nitrate (by color development). Carbonates were not encountered. The nitrate response was ranked as weak +, moderate + +, strong + + +, or intense + +++.

Sample		Nitrate Result
#6:	Disintegrating stone, left (facing) volute under west niche	+ +
#7:	Outermost disintegrating stone, west pilaster adj. to door at chest height	+ + + +
#8:	Inner disintegrating stone, " " "	+ + + +
#19:	Decomposing fill mortar, facade rt. of westmost pilaster near tablet top (This repair has an informative stratigraphy: wall; decomp. mortar fill; ochre yellow paint; thin screed of portland cement; paint)	+ + + +
#21	Sand from west wall eroded render under northmost window 4.5' a.g.l.	+ + + +

In view of the strong response it was decided to perform extractions on salt containing samples, and to isolate the salts in dry form for x-ray diffraction analysis along with those efflorescent salts that could be collected independently.

X-RAY DIFFRACTION

Samples of efflorescent salts were analyzed by x-ray diffraction with the following results:

#1) Westmost pilaster at chest height, right (facing) edge of front: efflorescence displacing paint over sound stone (Figure 24).
-Thenardite (ICDD #37-1465) Na_2SO_4

#2) Westmost pilaster at chest height, left (facing) side edge: efflorescence displacing paint over sound stone.
-Thenardite (ICDD #37-1465) Na_2SO_4

#5) Westmost pilaster at chest height: efflorescence from upper margin of paint loss over sound stone, (6" above numbers 1 and 2).
-Thenardite (ICDD #37-1465) Na_2SO_4 and Mirabilite (ICDD #11-647) $Na_2SO_4 10H_20$

#10) Lintel over statue of Virgin, upper surface: Salt and stone grains
-Quartz, minor Gypsum (ICDD #33-311) $CaSO_4 2H_20$ plus minor unidentified phase

#13) Rear of second course of stone, left door jamb: salt accumulated beneath paint.
-Konyaite (ICDD #35-649) $Na_2Mg(S0_4)5H_20$ plus Epsomite (ICDD #36-419) $MgSO_4 7H_20$

#14) Missing second mortar joint at rear, left door jamb: salt accumulation
-Epsomite (ICDD #36-419) $MgSO_4 7H_20$

In most cases the extractions yielded certain easily crystallizable phases along with a hygroscopic syrup of other ingredients. The latter were difficult to maintain in a dry condition for diffraction identification. In order to further clarify the species present in the poorly crystallizable salt extracts electron microprobe was carried out on the deliquescent residue. In general these results demonstrated that the hygroscopic material was rich in magnesium chloride. Electron probe elemental analysis results are listed after diffraction phases in order of decreasing abundance. It should be remembered that nitrate is present in all of these samples as well.

#6) Left scroll under west niche: disintegrating stone. (Extract was noticeably yellow and dried tacky.)
-Gypsum (ICDD #33-311) $CaSO_4 2H_20$
-(Spectrum 9) S (in excess of gypsum stoichiometry), Cl, Mg, Ca, Na: Implies MgCl + $MgSO_4$, minor Nitrate

#7) Second Pilaster from right, chest height: Outermost salt-laden disintegrating stone.
-Gypsum (ICDD #33-311) $CaSO_42H_20$ plus Halite (ICDD #5-628) NaCI
-S (in excess of gypsum stoichiometry), Cl, Mg, Ca, tr Na (Spectrum 10): Implies MgCI + $MgSO_4$, Nitrate

#8) West pilaster adjacent to door, chest height: deteriorated stone.
-Cl, Mg, minor S, Ca (Spectrum 11): Implies MgCI, Nitrate

#19) Facade, right and above location of spall #18: Decomposing old fill mortar.
-Gypsum (ICDD #33-311) $CaSO_42H_20$, trace unidentified phase
-S. CI, Ca, Mg (Spectrum 12): Implies MgCl, Nitrate (Compare S/Ca intensity here with other spectra. This one comes closest to the proportions expected for gypsum. Others have excess S.)

#21) West wall, poorly sorted sand from eroded rendering 4.5' a.g.l., under northmost window.
-Gypsum (ICDD #33-311) $CaSO_42H_2O$, trace unidentified phase
-CI, Mg, tr Ca (Spectrum 13): Implies MgCl, Nitrate, but CI in excess of stoichiometric amount requires counterion that is undetectable by microprobe. The only common cation that fits this description is ammonium ion, however tests for this ion (Merck Quants indicator strips) have demonstrated that none is present. An organic cation is possible.

CONCLUSIONS ON CAUSATIVE EFFECTS OF STONE DETERIORATION

Salt recrystallization is associated with all deteriorating stone in the facade. The only salts that were actively efflorescing were sulfates of magnesium and sodium, however, a broader group are present in all areas of deteriorating stone tested. Surprisingly the levels of chloride and nitrate increase with depth from the wall surface. It seems, however, that these are not necessarily playing an active role in the salt recrystallization damage as they cannot be induced to crystallize at 50% R.H. without a significant increase above room temperature and then only slowly. They may play an indirect role by maintaining a film of moisture throughout the pore structure of the stone. Such an elevated moisture level may then facilitate the redistribution of the destructive sulfates by maintaining damp conditions up to higher elevations above ground level than would otherwise prevail.

The origins of the salts are not entirely clear. The nitrate, in particular is hard to explain in building walls unless saltpeter had been spilled there. While sodium chloride and magnesium sulfate are the two dominant salts in seawater, the elemental analysis indicates that sodium is not very prevalent in the salt extracts. If they had their origin in ocean salt it is conceivable that over time a kind of refining or selection process has gone on whereby the sodium and sulfate ions have been removed as the easily crystallizable minerals thenardite and mirabilite, leaving magnesium chloride behind in the wall.

It is quite important to note that the dolomitized, calcite-containing stone appears to be quite resistant to salt damage since heavy efflorescence has been found over perfectly sound areas. The large pore volume is not per-se the cause of vulnerability to salt damage. Any consolidant selected for treatment of the weak areas will have to leave this porosity unchanged in the sound stone.

MORTARS AND RENDERING

SAMPLING

Areas of the original mortar were sought out in various locations in order to learn about the material choices of the artisans. Pointing mortar containing apparent lime lumps which appeared to be original was sampled from the right side of the eastmost pilaster at chest height. A fragment was also recovered by the Consulting Historical Architect from the attic. These were subjected to wet chemical analysis by the method of Jedrzejewska (1960) which has been demonstrated to be reliable for traditional mortars (Stewart and Moore, 1982). The sand recovered from the analysis was sieved in order to obtain information on particle size distribution and to make intercomparisons among the sands used.

X-RAY DIFFRACTION

#22) Eastmost pilaster, original pointing mortar with white lumps. Lumps analyzed.
-calcite. The diffraction pattern has a unique and heretofore unobserved feature in any diffraction pattern from this laboratory. There is a broad tail on the high-angle side of every diffraction line from the calcite. Precisely what causes this is unclear but it suggests that some soluble species in the mortar has influenced the lattice spacing of some of the calcite resulting from the re-carbonation of the lime. Magnesium substitution could account for such a shrinking of the lattice: appears to be re-carbonated lime.

#23) Mortar from attic, rear of facade at pendentive above choir window level, in stone relieving arch. Soft, porous white lumps removed from mortar and analyzed.
-Calcite, quartz and trace of unidentified phase: The lumps appear to be re-carbonated lime.

COMPOSITION AND GRAIN SIZE ANALYSIS

In addition to the samples above two others were analyzed by wet methods. The wet analyses reported are the average of three determinations:

#20) Rendering mortar fragment from west wall (probably not original) in eroding area, 4.5’ a.g.l., 6’ south of window nearest to facade.

#24) Mortar from the interior of the wall removed by core drilling.

	Sand	Fines	Lime
#20	86.0%	4.5%	9.5%
#22	62.2%	10.7%	27.0%
#23	76.0%	8.0%	16.1%
#24	72.5%	5.5%	21.9%

The grain size distributions are shown in Figure 25. The observations which may be drawn from this are the following. The facade pointing mortar and the mortar removed from deep within the wall by core drilling are similar in grainsize distribution to each other and different from the other two including the sample removed from the attic. They possess weight fractions of sand which increase linearly up to and beyond the coarsest screen mesh used (0.85mm). They possess a high lime content which is slightly overestimated due to the inclusion of coarse beach sand which includes detrital shell fragments. A few grains of material which are thought to be bone fragments were also noted (large white fragment in Figure 26, 3.6x). The fragment removed from the attic, on the other hand, has a higher sand content with a pronounced grain size maximum near 0.35mm.

This sand includes minute granules of the same dolomitized shale which is seen in the more weather-resistant facade blocks (small tan grains in Figure 27, 3.6x). Finally, the remodelling rendering from the west wall contains a fine, well-sorted sand with a sharply peaked grainsize distribution maximum near 0.2mm and the hair reinforcement mentioned previously (Figure 28, 3.6x).

MUD MORTARS

SAMPLING

The first mud extracted from the wall was discovered from a hollow behind a loose fragment of 1/2" thick, grey rendering on the facade west of the entrance. The exact interior structure of the wall is unclear at this point. It has been noted that the facade between the westmost pilaster and the northwest corner stands forward of the plane defined by the wall between the pilasters and that this feature is not reflected on the east side of the facade. The forward thickening of the wall does not extend up the entire height but terminates at a line a little above the cornice surmounting the entrance. It seems possible that this is a non-original reinforcement of the wall in which the mud was found.

The second mud deposit was found beneath the area where the previously analyzed sample of rendering was removed from the remodeled west wall.

COMPOSITIONAL ANALYSIS

The wet analysis described above was applied to samples of the mud mortar but led to the conclusion that there was no significant lime binder content. Bits of white material in the mud are believed to be weathered shell or bone fragments present in the sediments naturally.

PATCHING MATERIALS

Exploratory removal of paint has revealed that there are numerous areas of small fills and some areas where a patching material has been spread thinly over zones of surface erosion. Several different patching materials are visually distinguishable. There are several areas where damaged profiles have been reconstructed using a portland cement-based mortar. These fills are typically quite hard. When applied over areas where the original cause of the damage was salt recrystallization, they are usually detaching due to the continuation of that same process. Such an area is represented by the small core drilling made at location #15 (at the right side of the pilaster adjacent to the door on the east side - third course of ashlar from the ground).

Other materials were found which are probably modern proprietary mixes intended for rapid repair of cement-based plasters in salt-free conditions. One of these was a light yellow colored material which was typically applied in a layer from one to four millimeters in thickness over broad areas of the surface (Figure 29). This material was quite hard and often poorly attached to the sandy surface of the stone beneath. When freshly broken it presented a crystalline, sparkling fracture. Another material of unusual appearance was similarly hard but white in color. This was found beneath the yellow material in some locations. A yellow paint layer separated the two materials.

X-RAY DIFFRACTION AND PETROGRAPHIC ANALYSIS

X-ray diffraction of the yellow patching material described above revealed calcite, dolomite and portlandite $Ca(OH)_2$ as the crystalline phases. This result was not very satisfying as the combination of calcite and portlandite could result from the incomplete re-carbonation of a lime mortar, however dolomite has never been described as the product of the setting of any mortar no matter what the magnesium content. Furthermore the great hardness and crystallinity of this material is completely at odds with the typical consistency of a lime mortar. A petrographic thin section was prepared in order to study the distribution of phases in this mortar. It revealed that the sparkling material visible in the fractured samples was a dolomite sand prepared by crushing sparry dolomite and sieving to select a narrow range of particle sizes. Around this was a fine-grained matrix of binder phase which required further study. (The thin section is shown at 40x in transmitted light, with and without polarizers, in Figures 30 and 31 respectively. It may be noted that the yellow color is confined to the binder phase and that isotropic, presumably amorphous, material can be clearly seen intruding into an air void.) This binder was isolated free of the sand, determined to contain the calcite and portlandite detected previously and then calcined at 400 degrees Celsius in the hope of converting any hydrous, poorly crystalline phases to a form that might make them more readily detectable by X-ray diffraction. The resulting pattern contained only the lines of calcite and a trace of quartz, the portlandite having become carbonated by this time. We can only conclude from this that the manufacturing process leading to the lime, and perhaps the addition of soluble ingredients which are undetectable today, lead to lime-based patching material with an unusual degree of hardness and density. The role of the dolomite, if any, in the setting of this markedly hard material is unclear and undocumented in the cement industry literature as far as this writer is aware.

The hard white patching material referred to above was found to contain calcite, quartz sand and a phase similar to hydrocalumite (ICDD #19-202) which may be the result of the interaction of soluble magnesium salts known to be present in the stone on aluminum hydroxide gel resulting from the setting of a high aluminate portland cement mortar. A number of such compounds which may be produced by the interaction of magnesium salt solutions on gibbsite ($Al(OH)_3$) are known to possess similar diffraction patterns.

Throughout the study of the patching materials evidence for the use of magnesium oxychloride cements (“Sorel Cements” or “Meyer’s Cement”) was sought after. Their presence could have indicated a source of the ubiquitous hygroscopic magnesium chloride found in extracts of the damaged stone. However none of the patching materials yielded evidence for the crystalline phases that would be expected to be principle ingredients of such a cement. Evidence for their use on the Presidio facade and their role as a source of destructive salts is, therefore, lacking.

PAINTS

SAMPLING

Paint samples were taken to investigate the color history of the facade and to attempt to relate the application of paints to the sequence of application of patching materials. In addition the analysis of paints (which would have to be removed in order to bring about the application of consolidant to unsound areas of stone) for their lead content and potential health hazard to workers was undertaken.

X-RAY FLUORESCENCE ANALYSIS

Elemental analysis of three paint layers demonstrated an absence of lead pigments. Further investigation suggests that they all date to the 20th century due to the presence of high levels of titanium (presumably titanium white) in the lowest of the three layers. Barite is another white pigment identified in the layers.

CONCLUSIONS

The deterioration of the ashlar stone found in the facade of the Presidio Chapel is. largely confined to one of two siliceous shales which may be differentiated by the broad distinctions that it lacks lithification due to formation of authigenic dolomite and that it contains a significantly increased proportion of large voids due to the loss of carbonate tests in the sediments. The inherent vulnerability of this stone has been demonstrated by the effects of sulfate salt recrystallization which is a causative factor in the deterioration of the facade. The distribution of these sulfates, which are largely confined to the surface of the stone, has probably been influenced by the presence of highly hygroscopic magnesium chlorides which may always be isolated from damaged areas . Elevated levels of chloride may be found increasing with depth into the wall up to a depth of at least 30 inches. A source of the salts has not been clearly identified, however the widespread use of magnesium oxychloride cements for repair work can be ruled out as the source. Other potential explanations for the salts found include: the segregation of sea salt, a mixture predominating in sodium chloride and magnesium sulfate perhaps intrinsic to one of the building materials, by cyclical efflorescence and loss of sodium sulfate to the surface; and the interaction of lime in the mortar of the facade with sea salt whereby sulfate is immobilized by precipitation as gypsum with residual magnesium and chloride remaining as dissolved species.

Consolidation schemes for the stone should take into account the high content of very fine, poorly crystallized silica in these stones, the presence of carbonates in the more durable of the stones, and the necessity of maintaining a high degree of the stones' intrinsic porosity which has, until now, protected the more durable stone even in the presence of salts.

Conservation Scientist

Note on photomicrographs: All color views refer to the nominal magnification of the optical system and do not take into account the enlargement for reproduction here.

Appendices:

- Sample Inventories
- Samples Locations
- Quarry Locations

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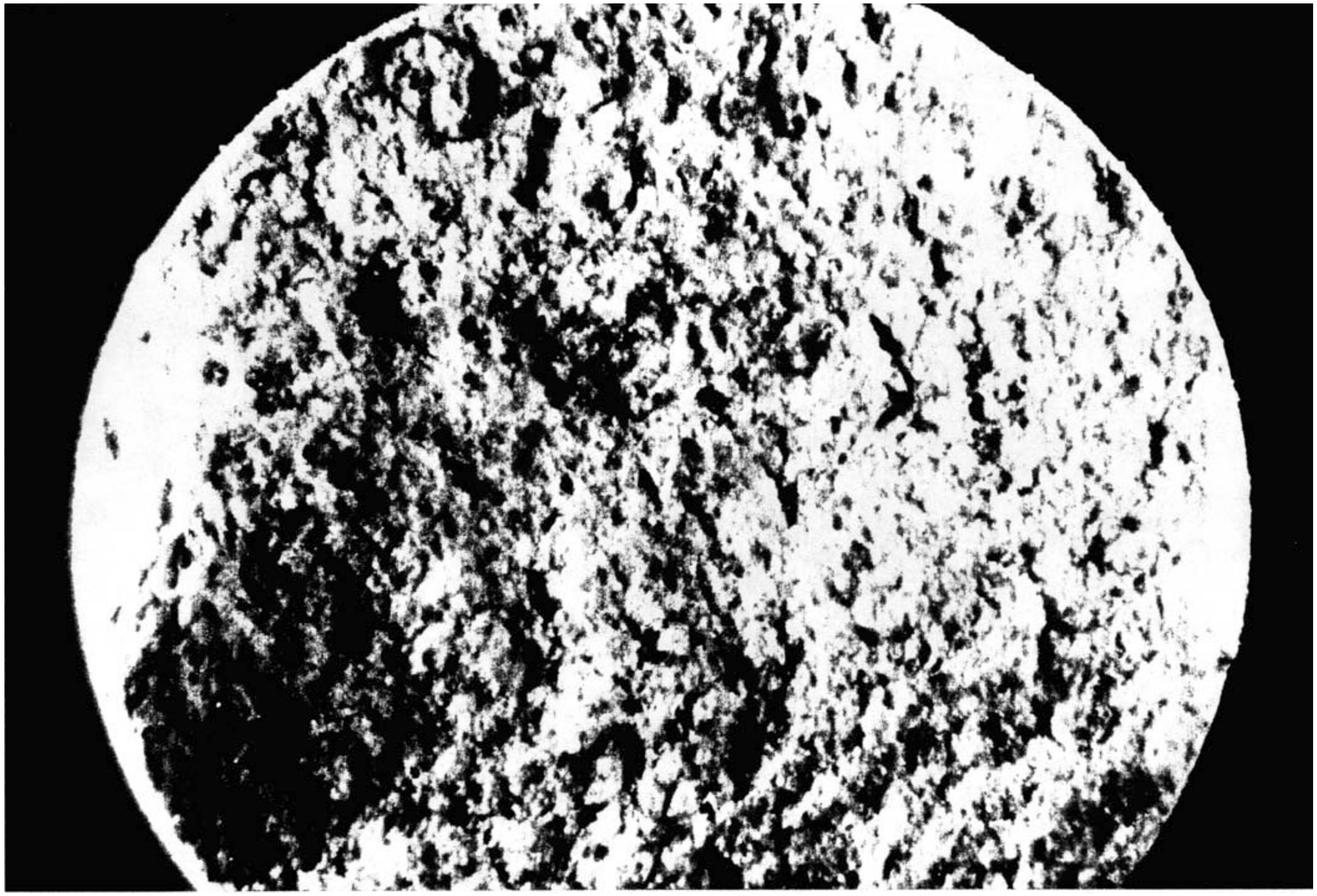

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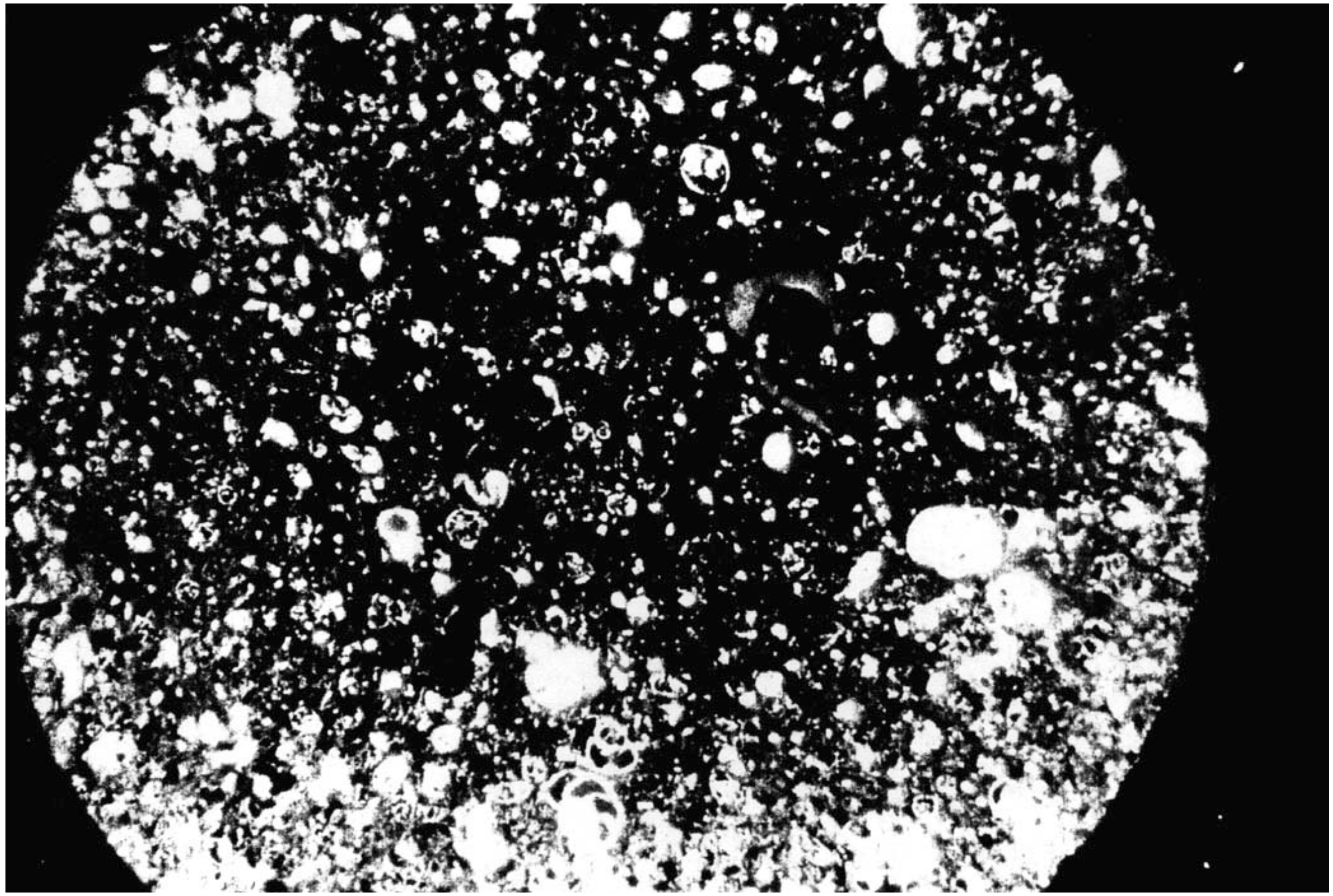

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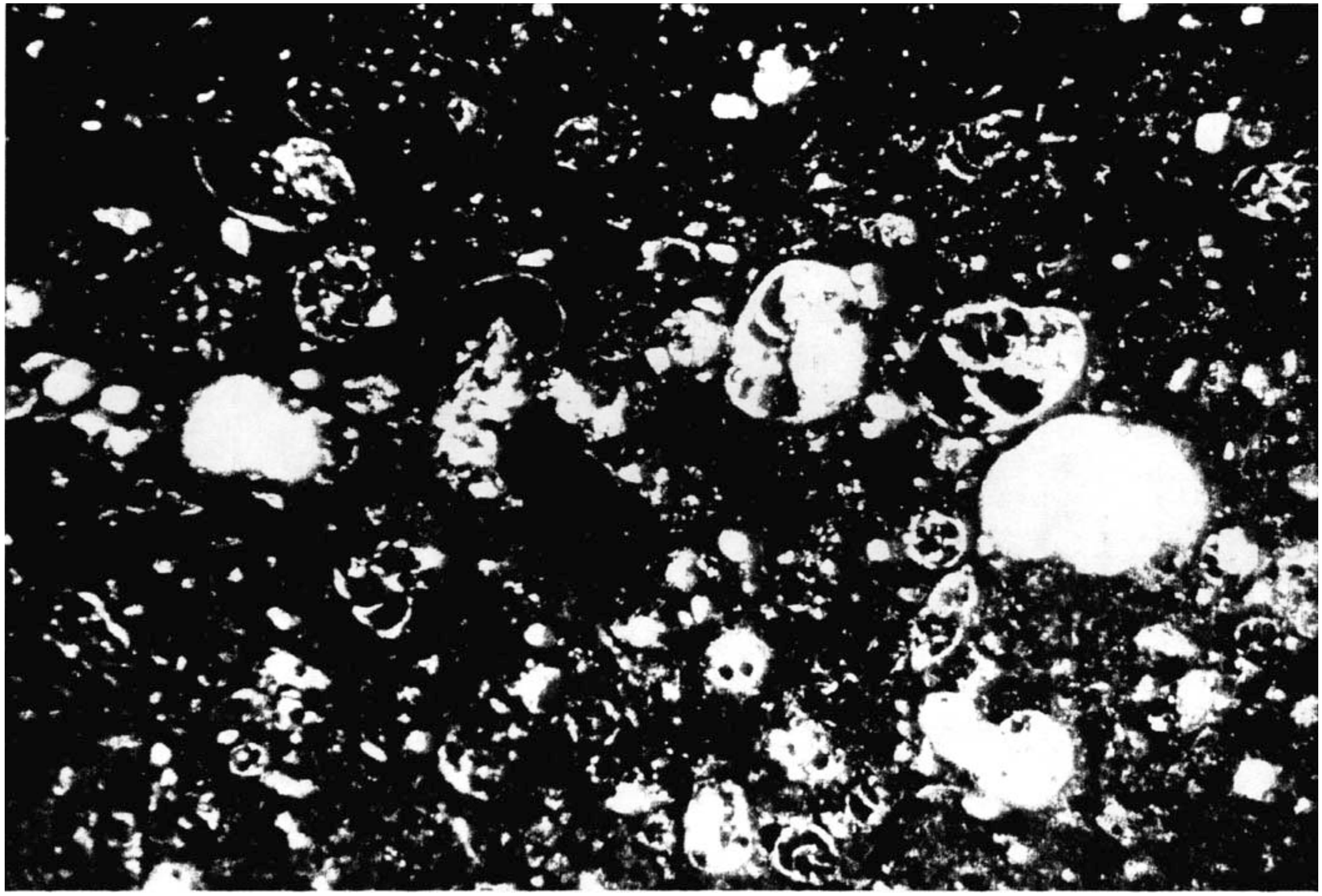

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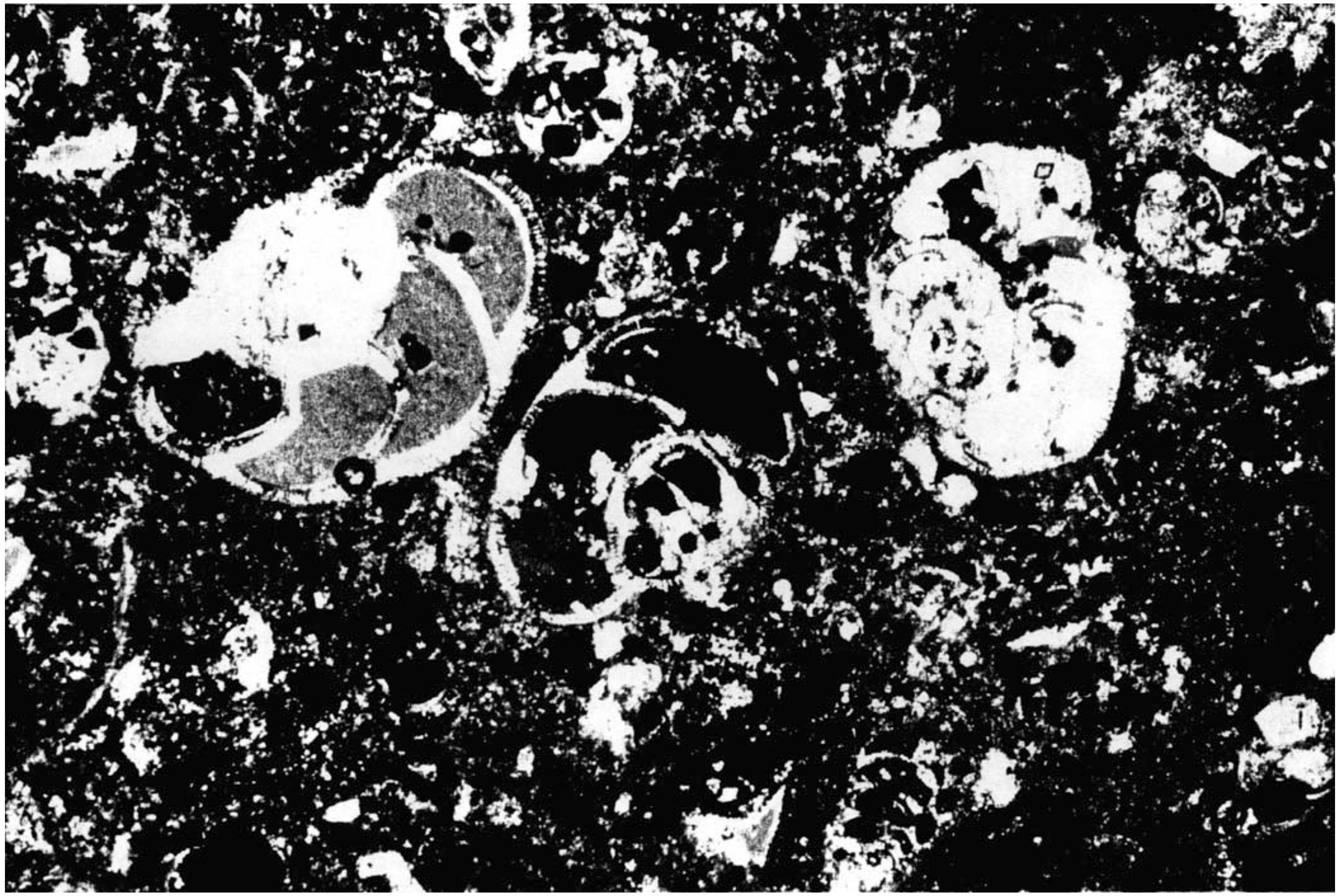

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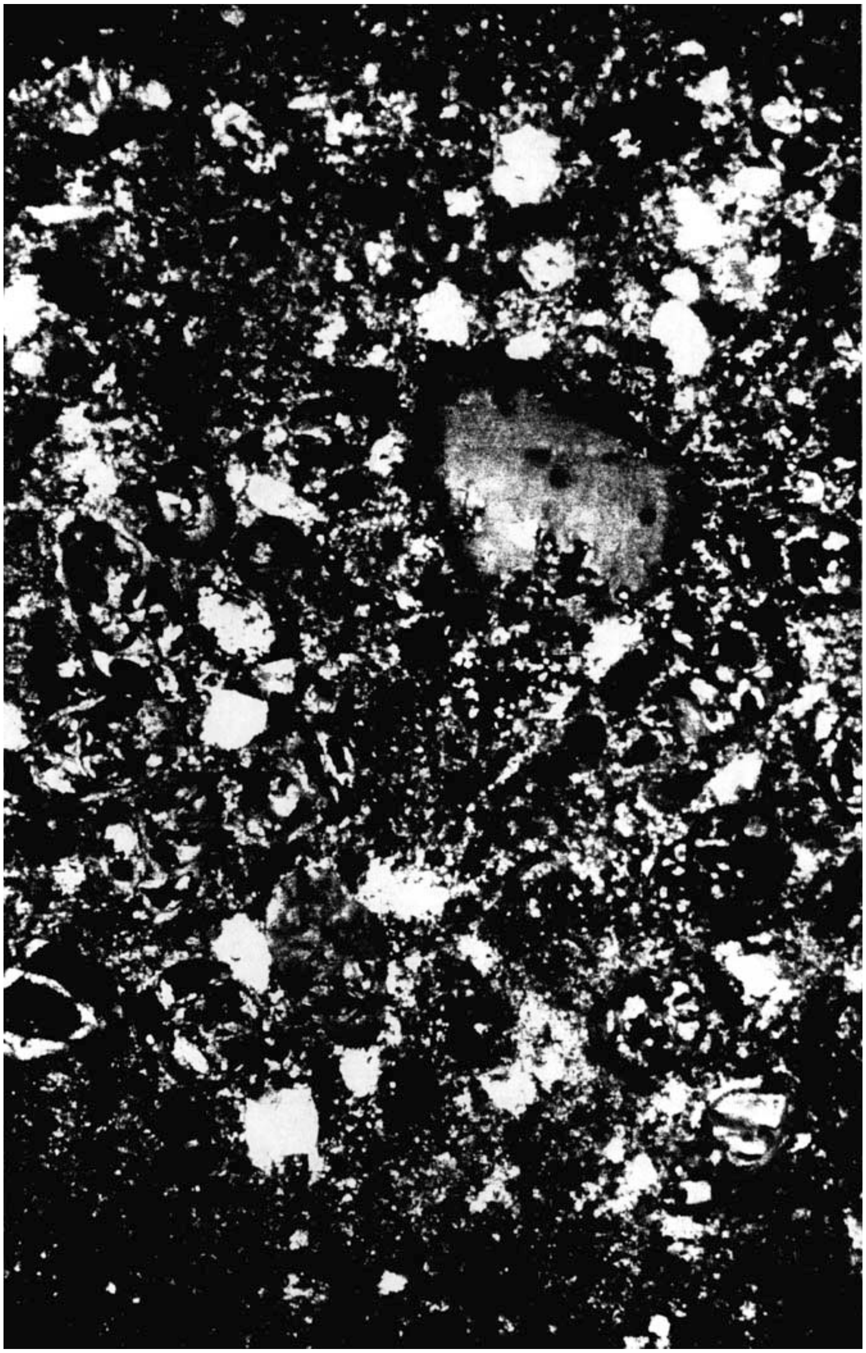

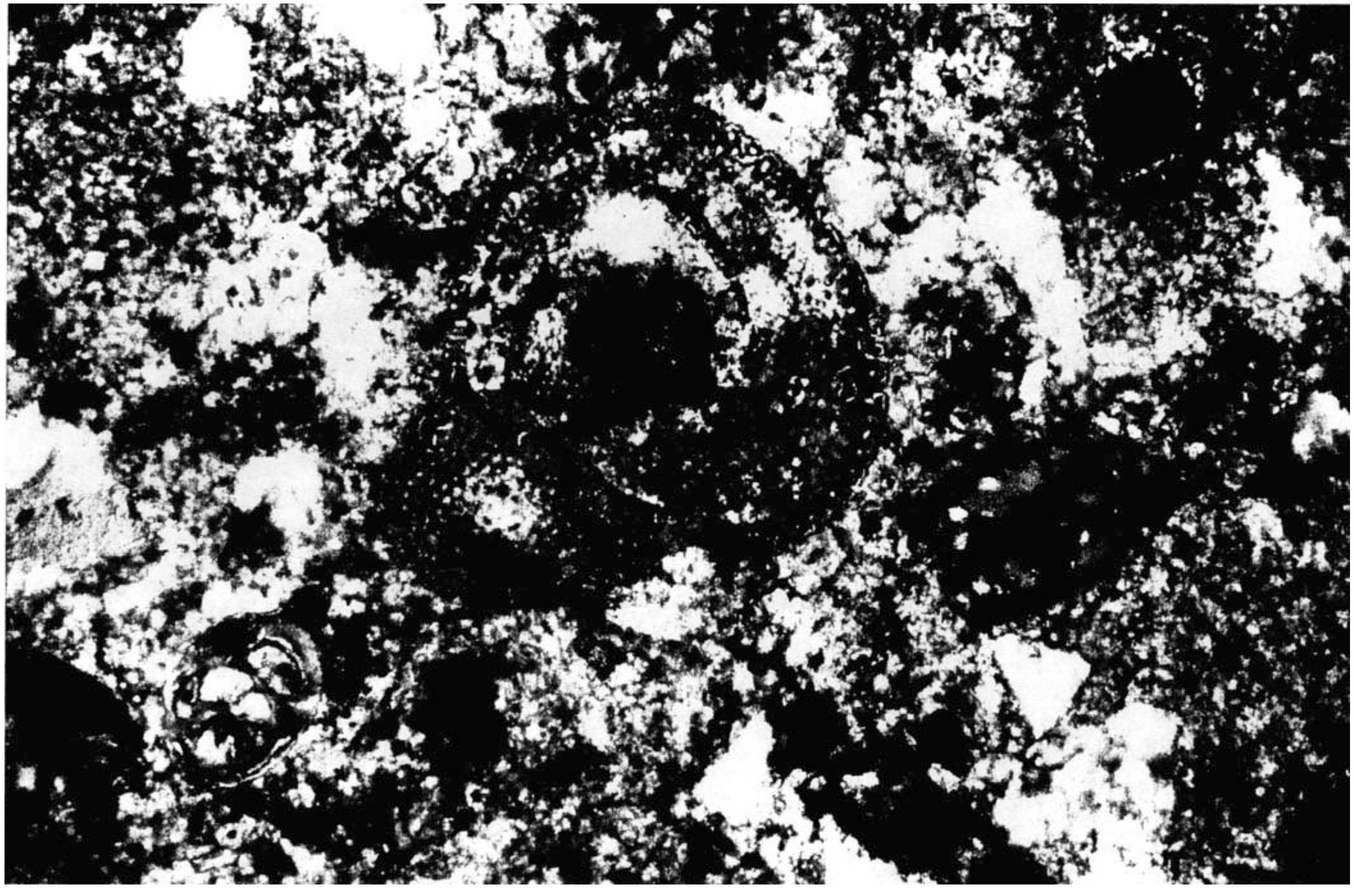

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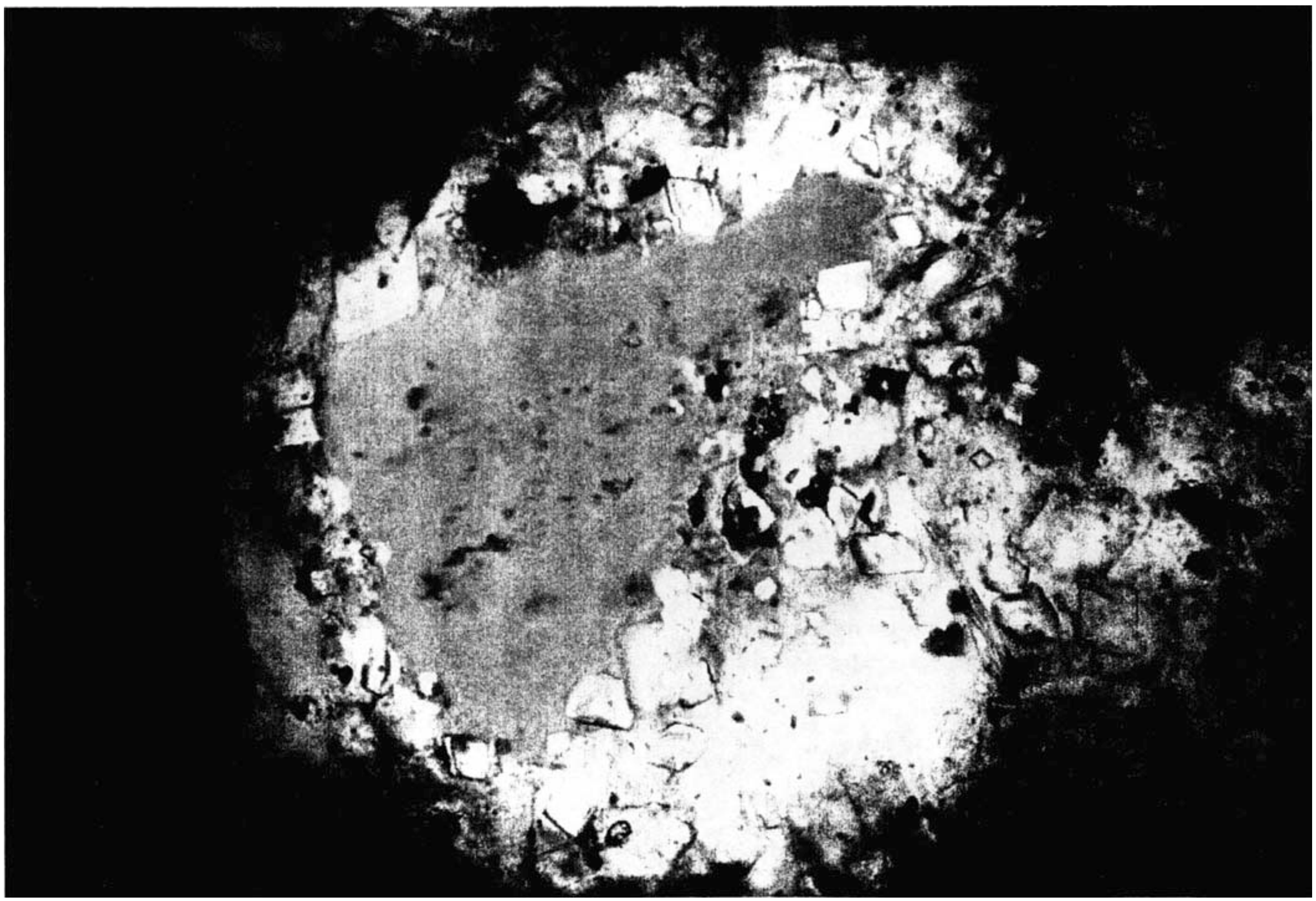

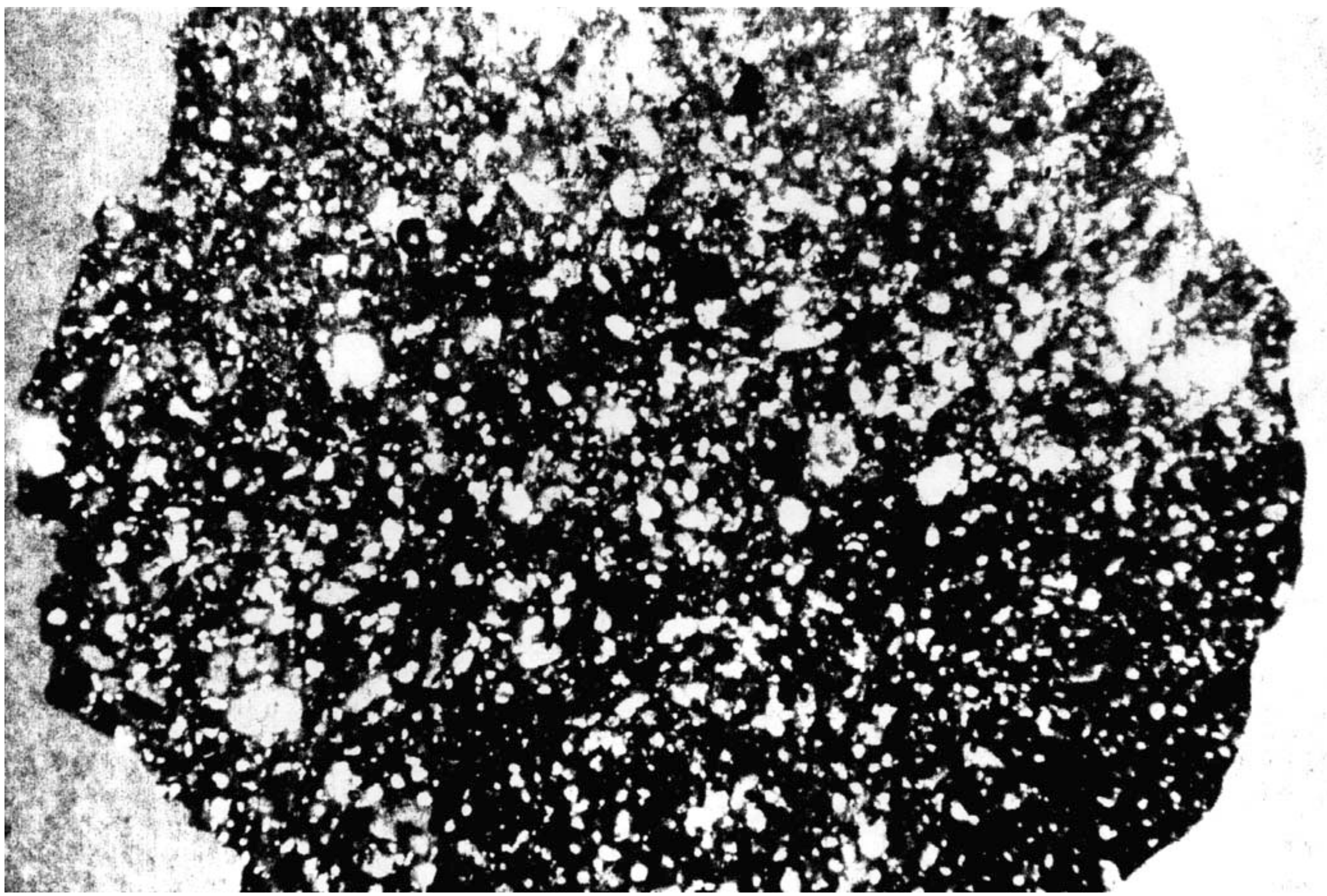

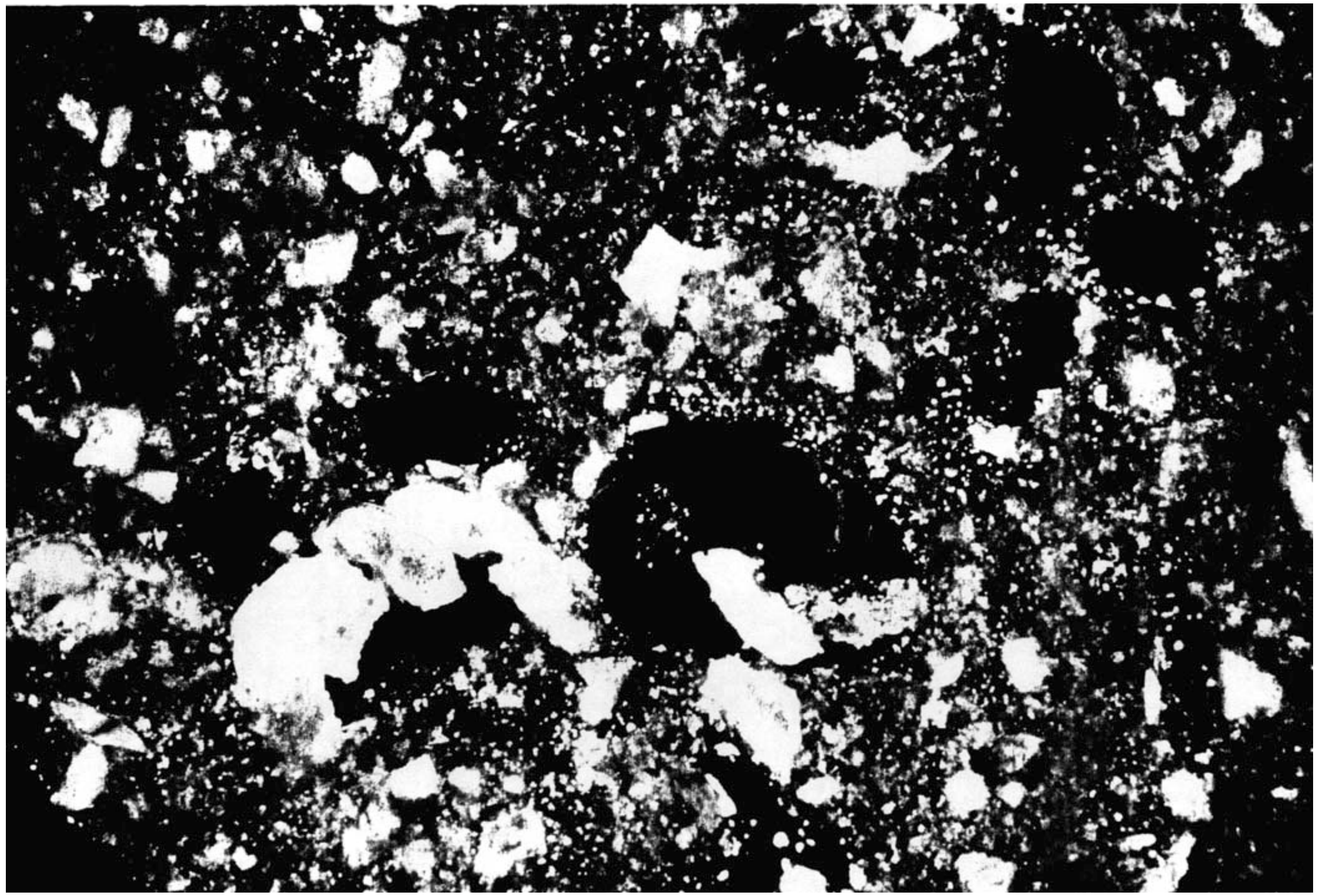

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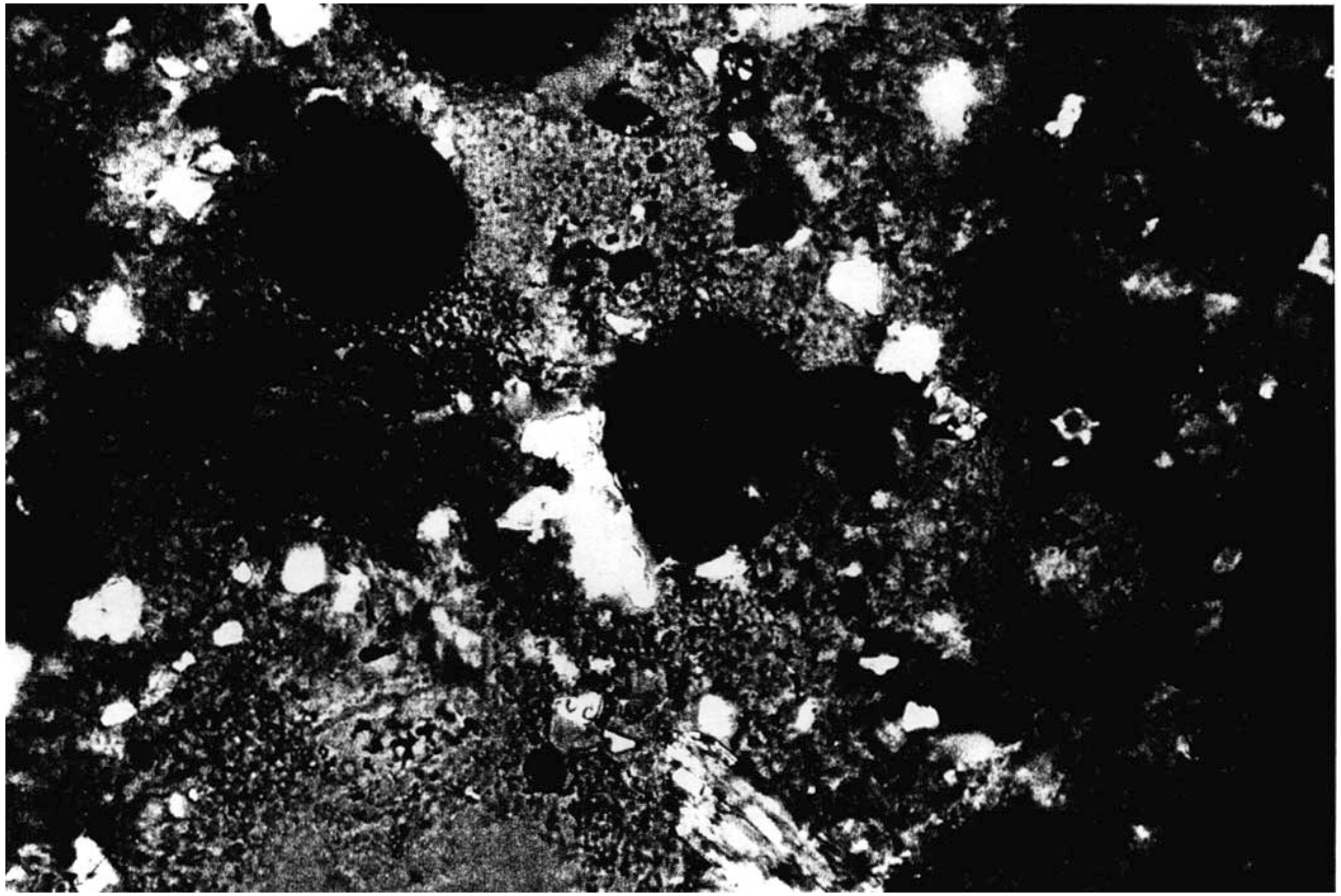
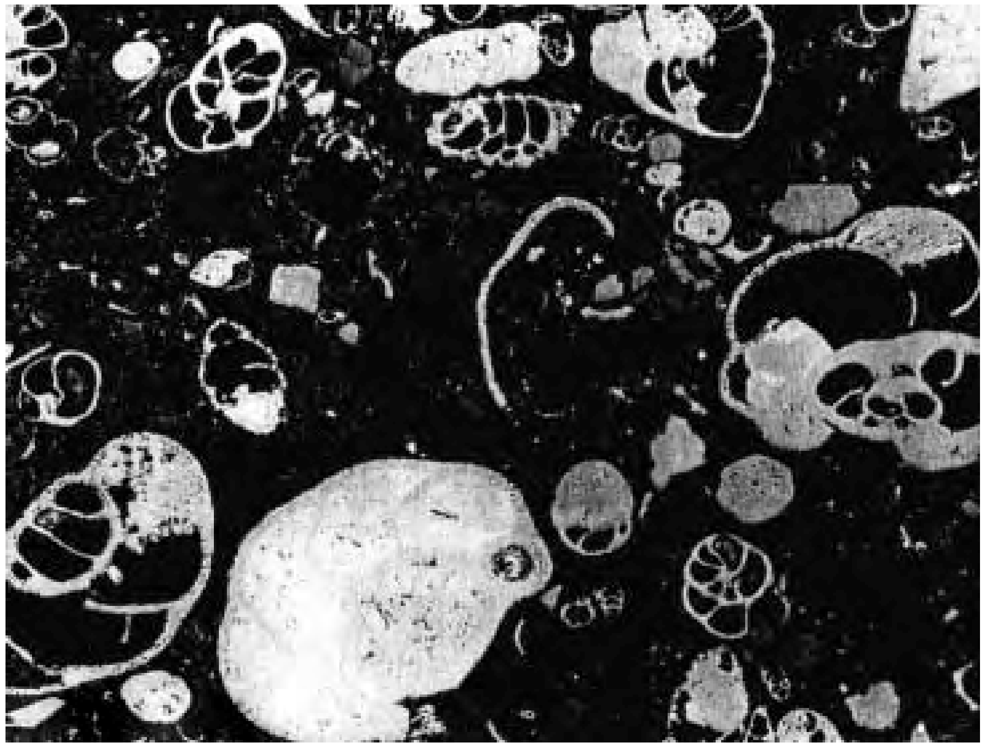
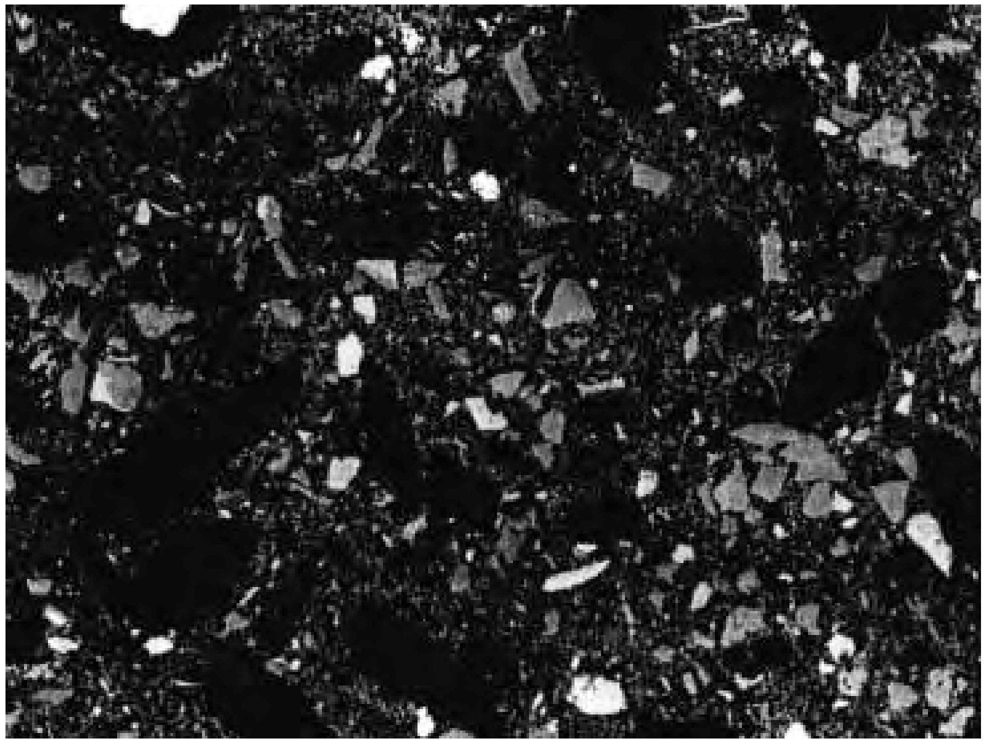
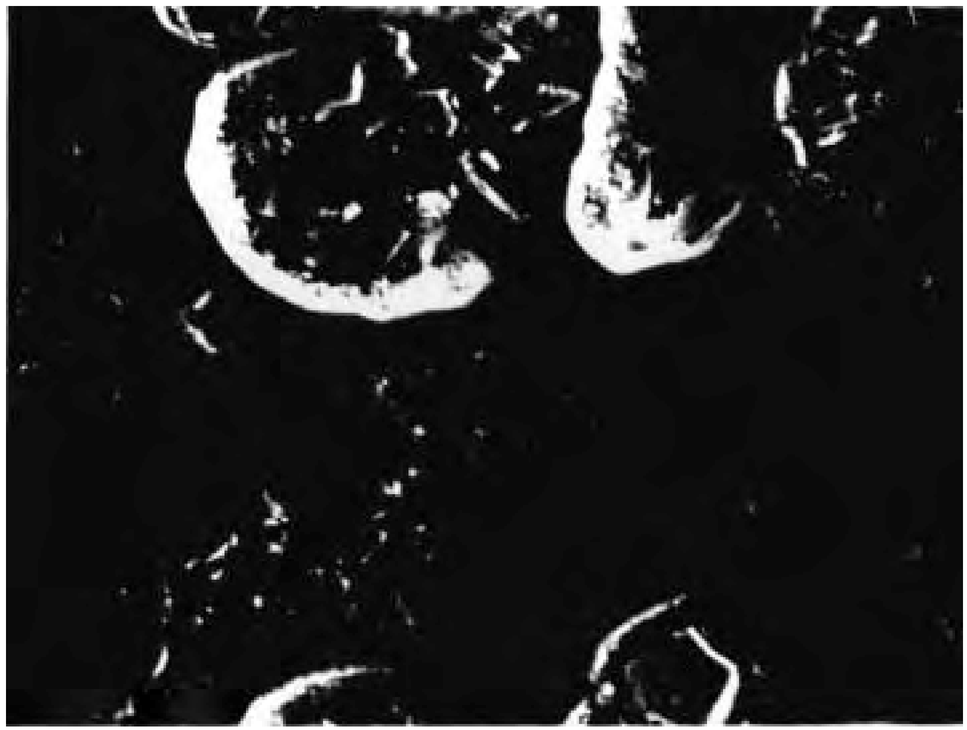
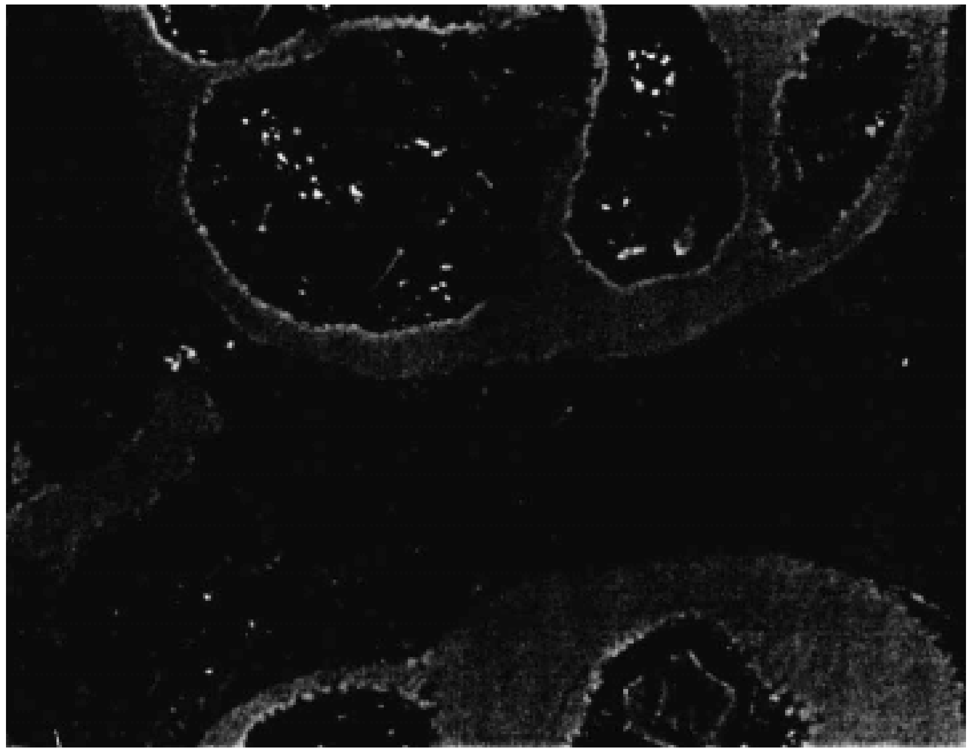
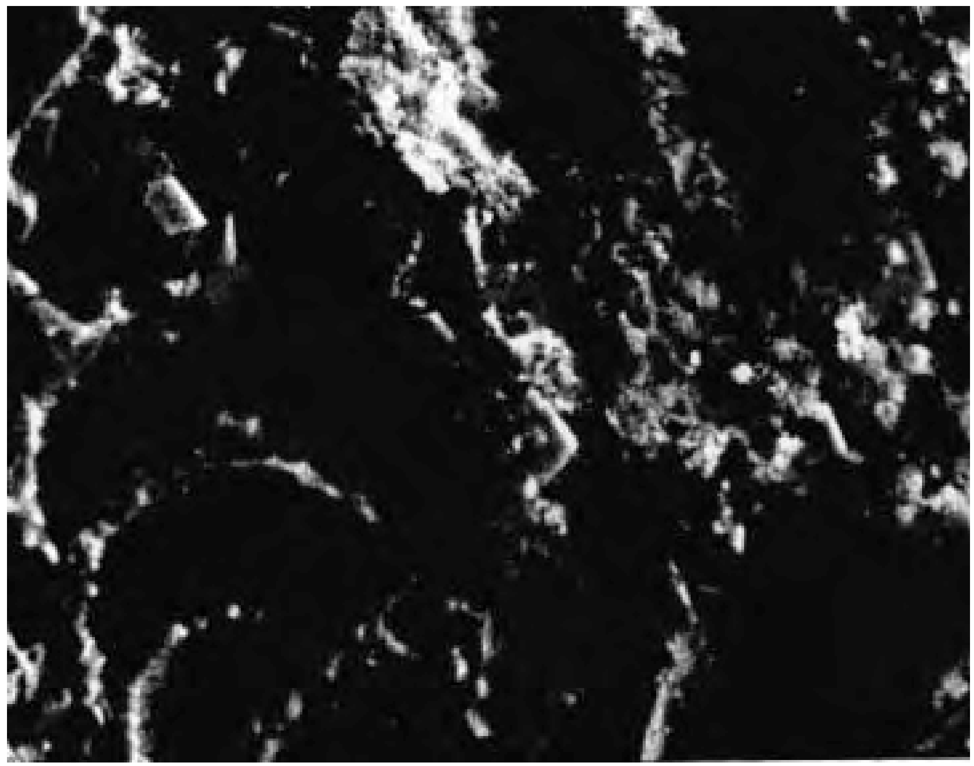


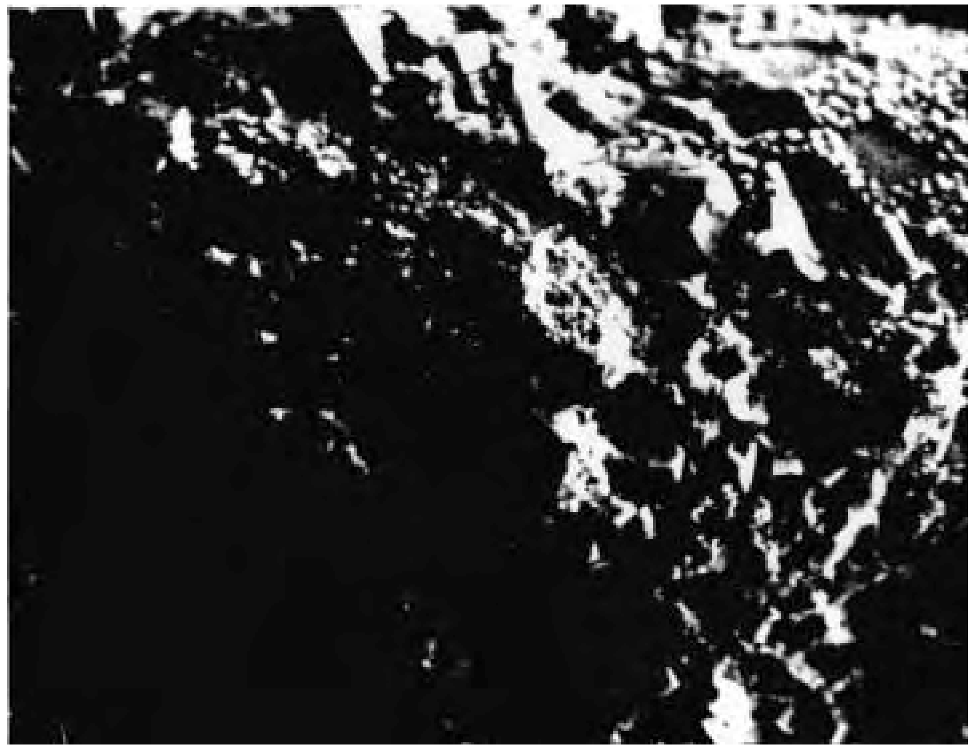


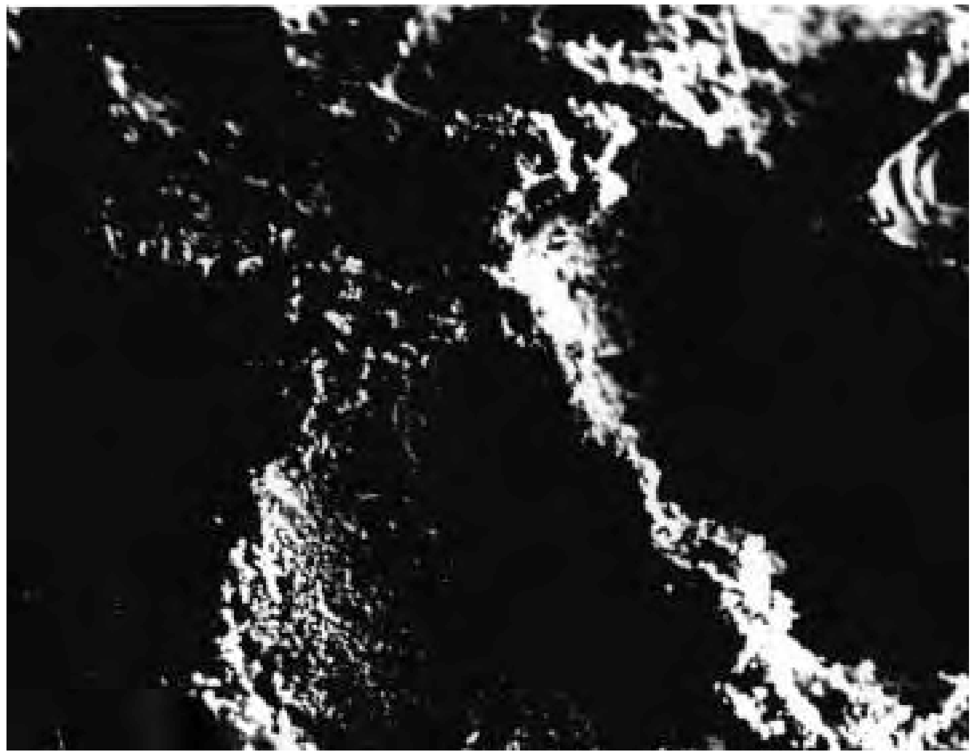


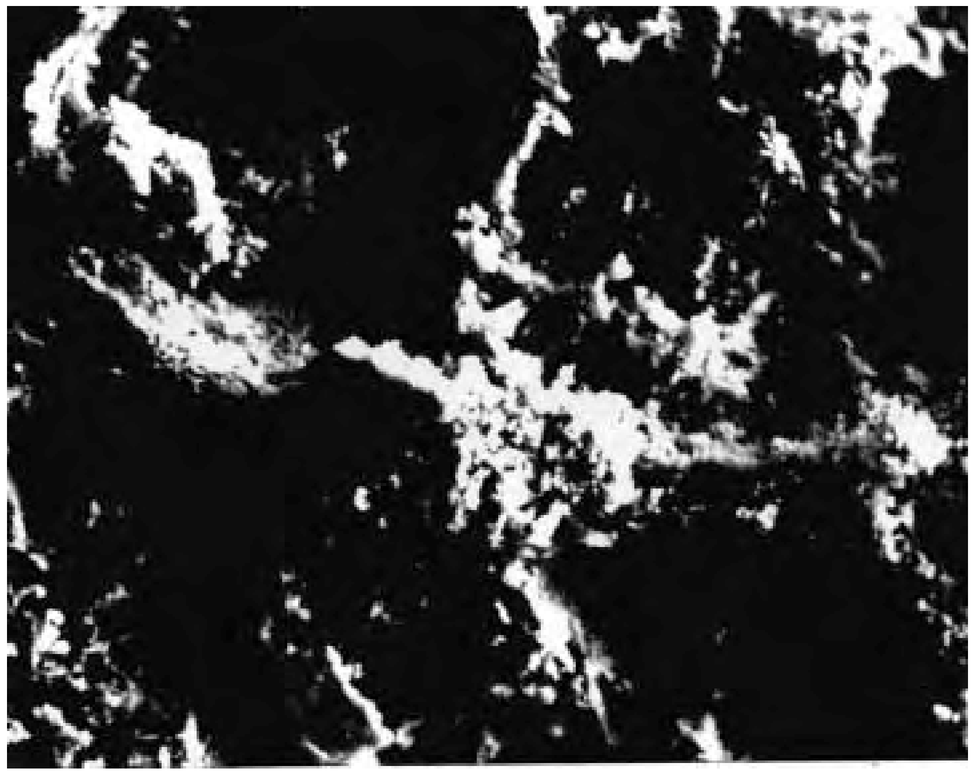






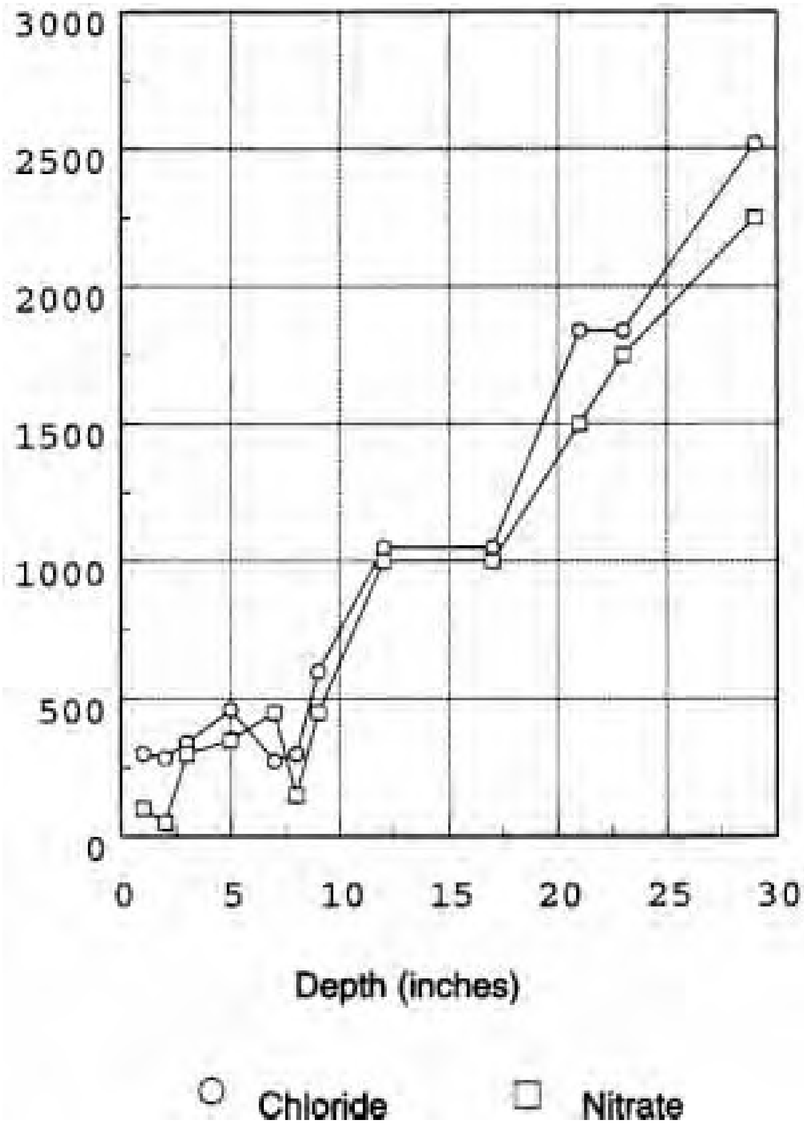


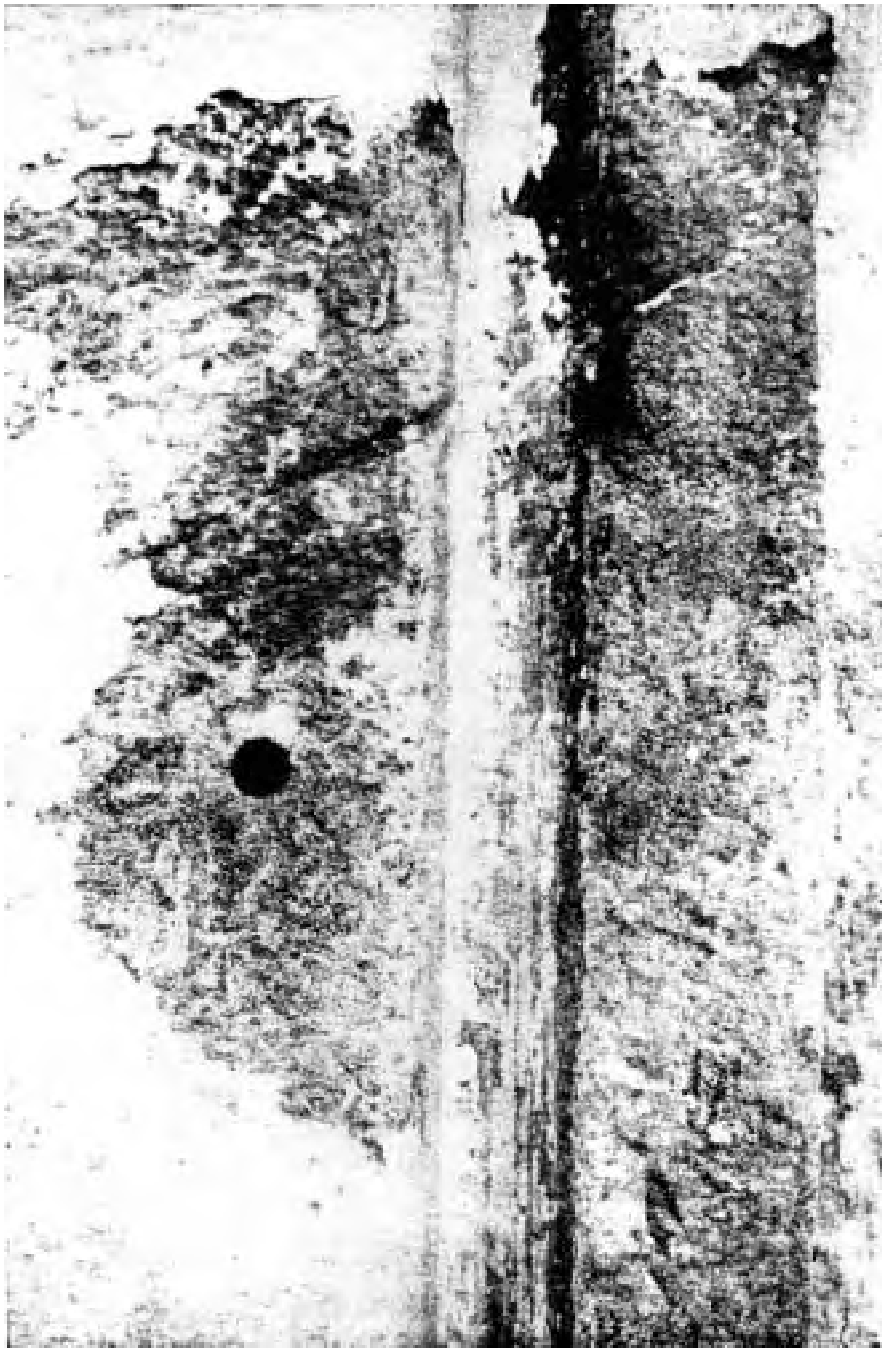




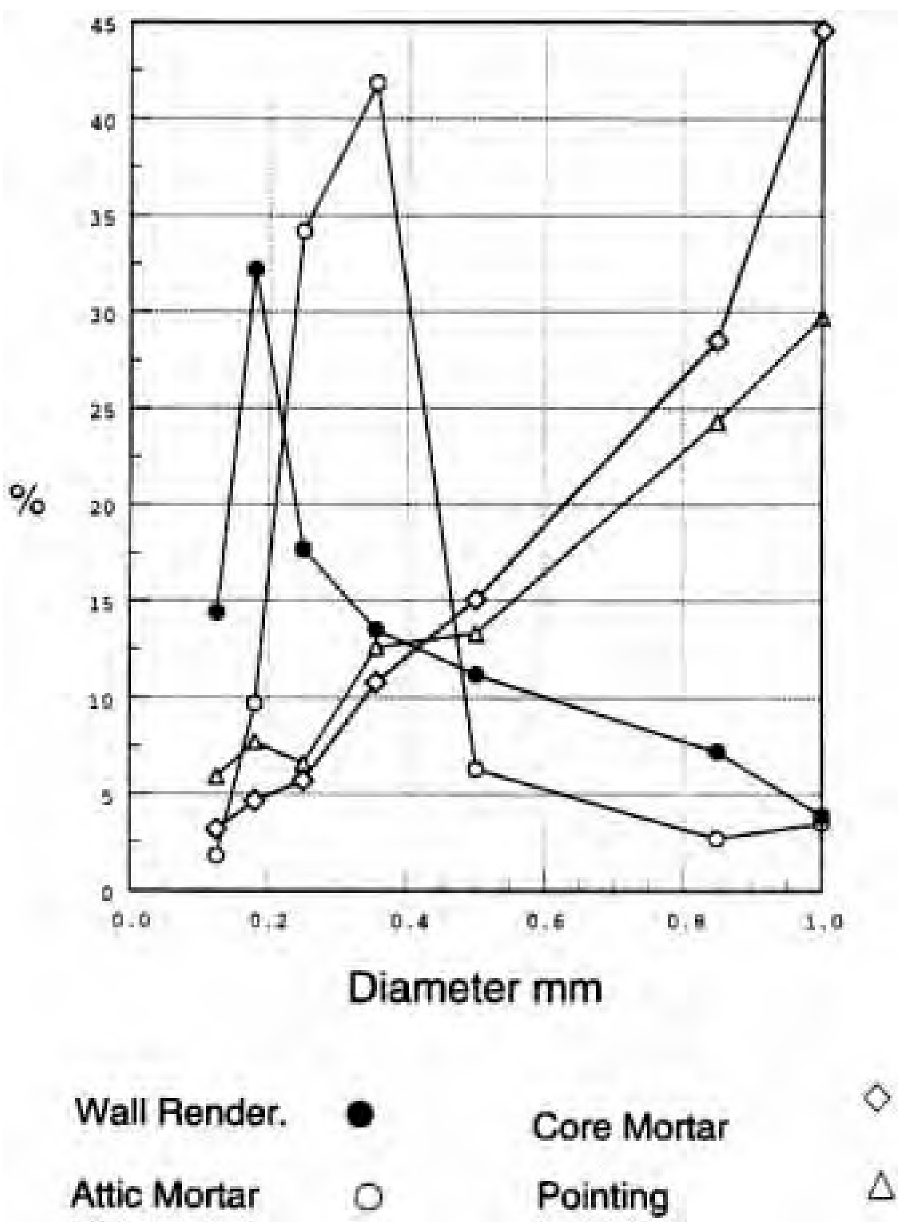
Core Drillings' Salt Content
Depth (inches)

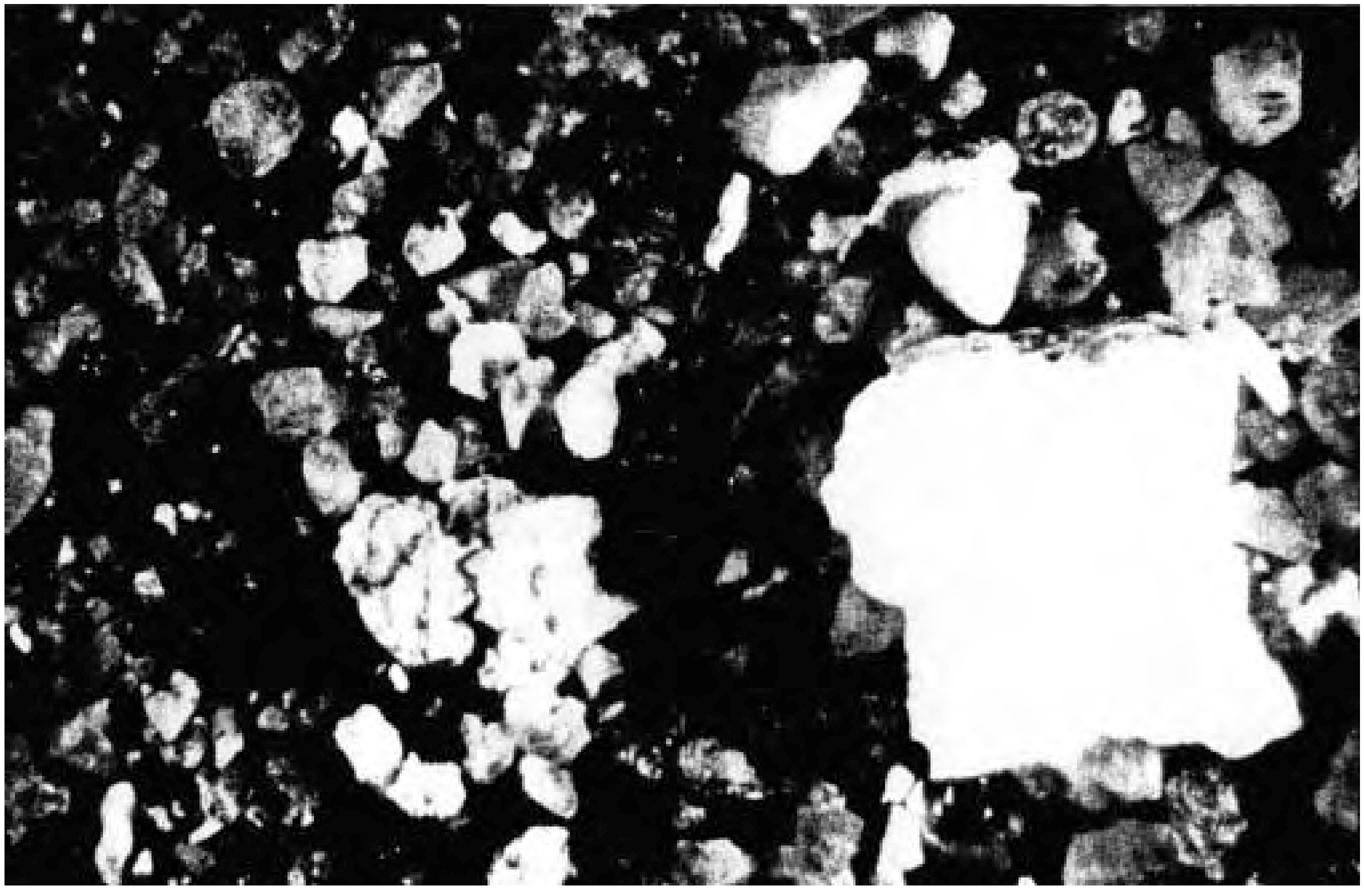
parts per million by weight

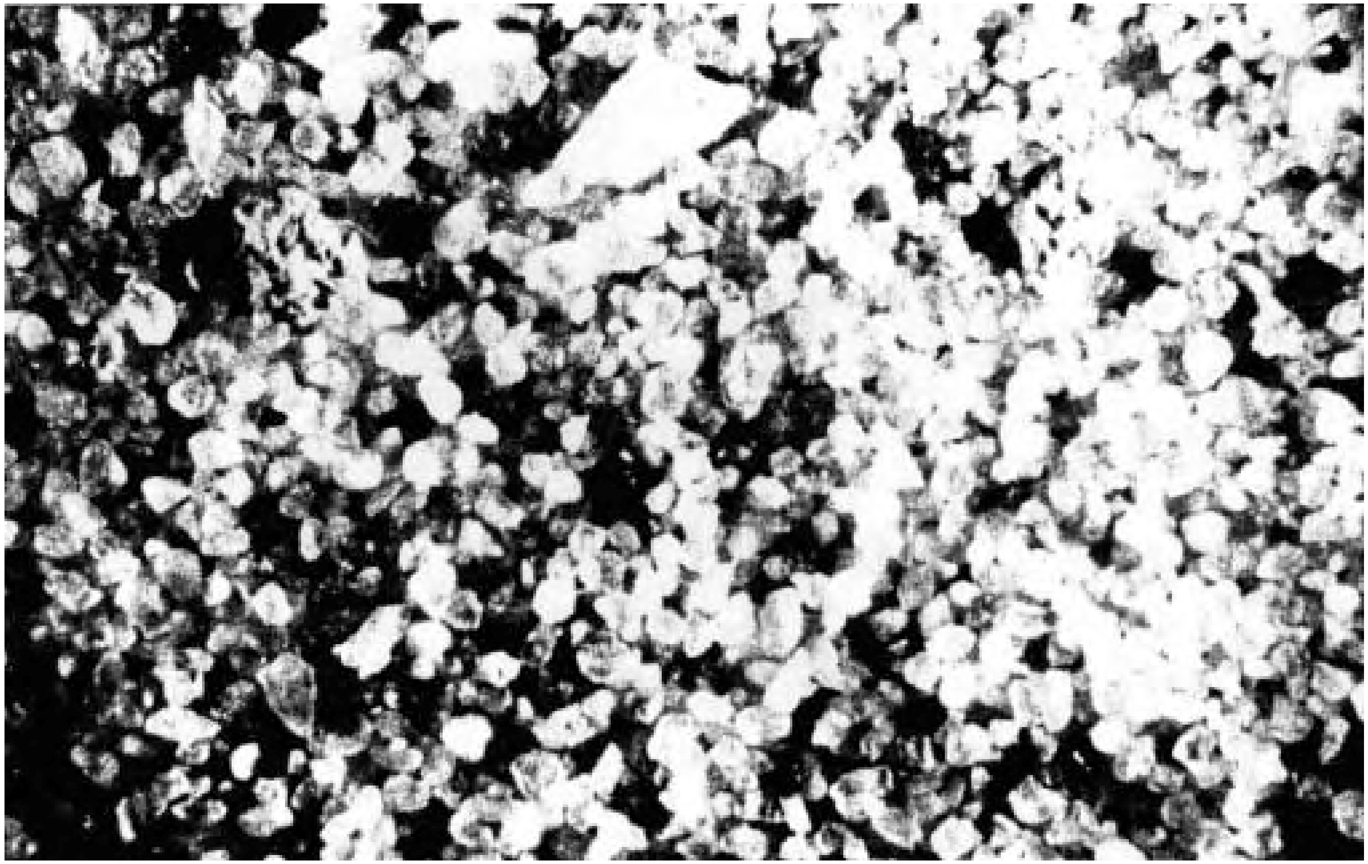


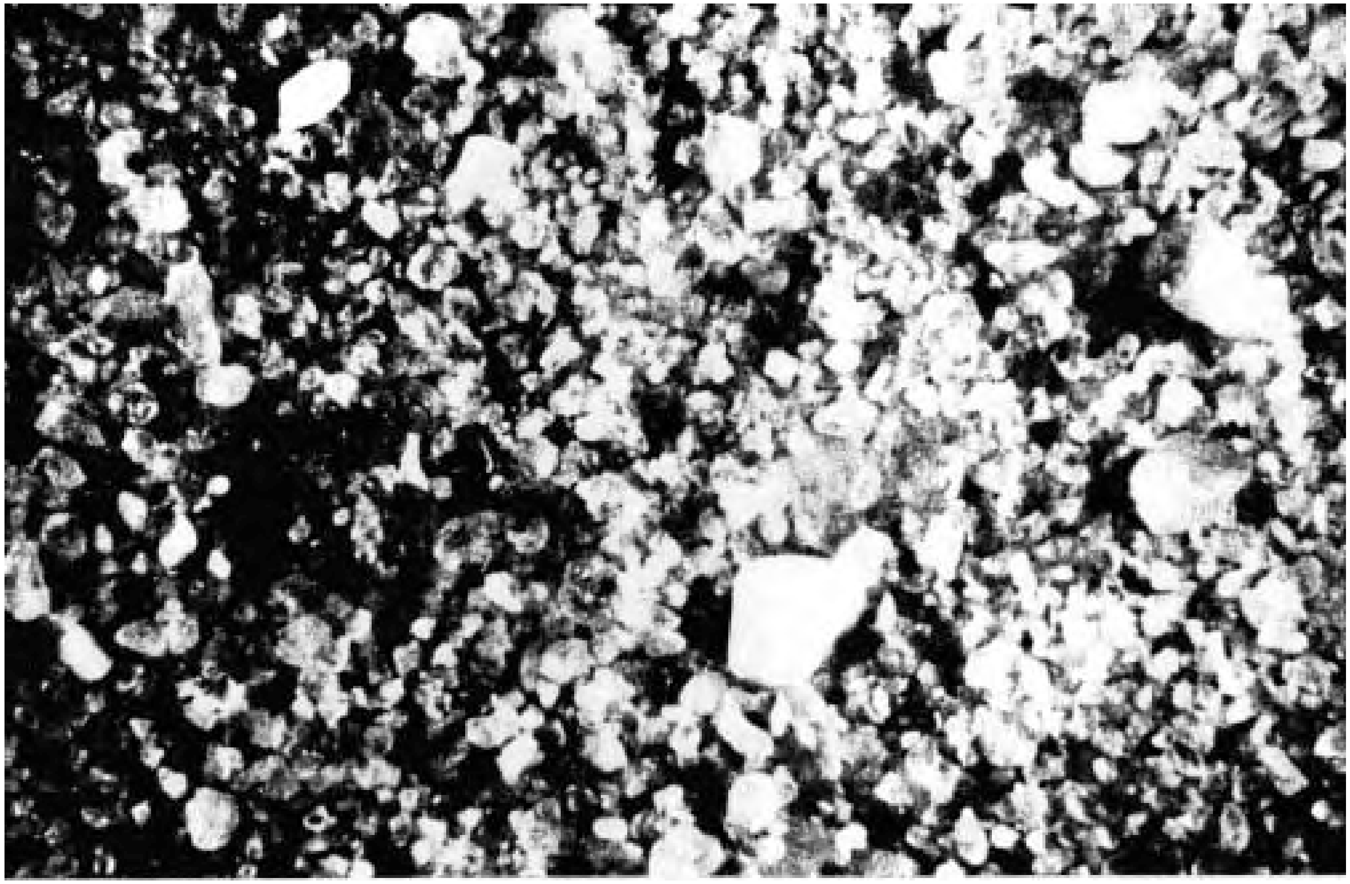


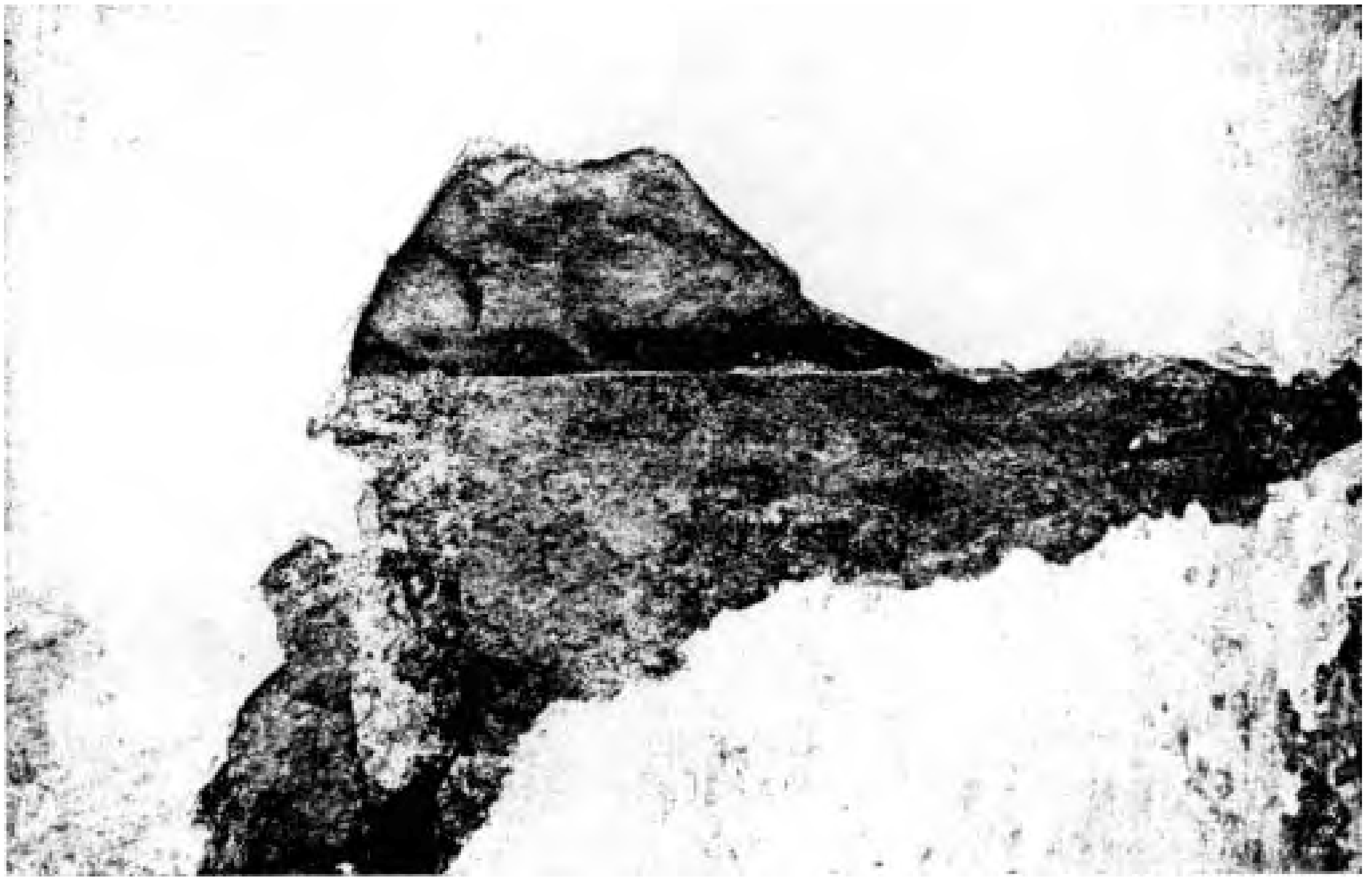
Sand Size Fractions

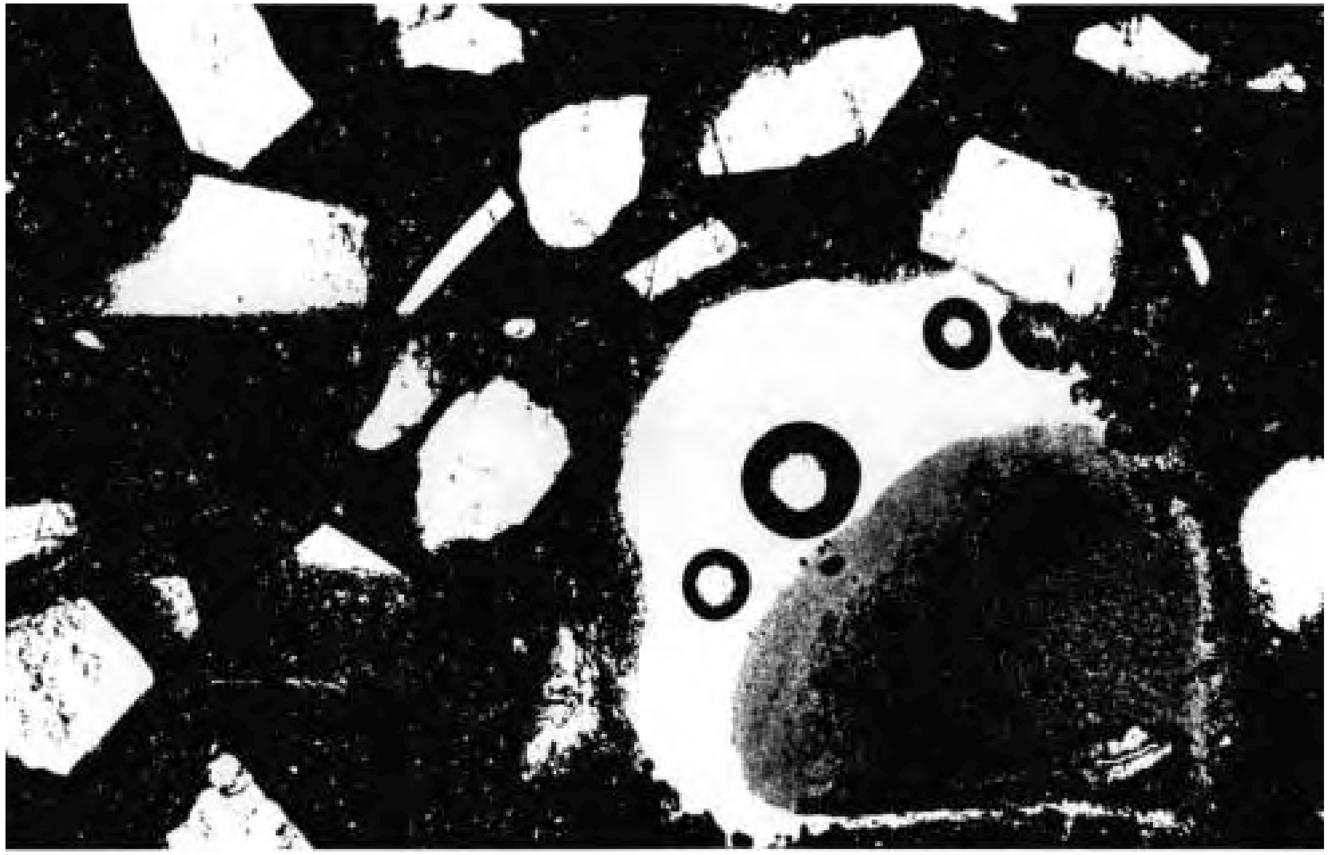




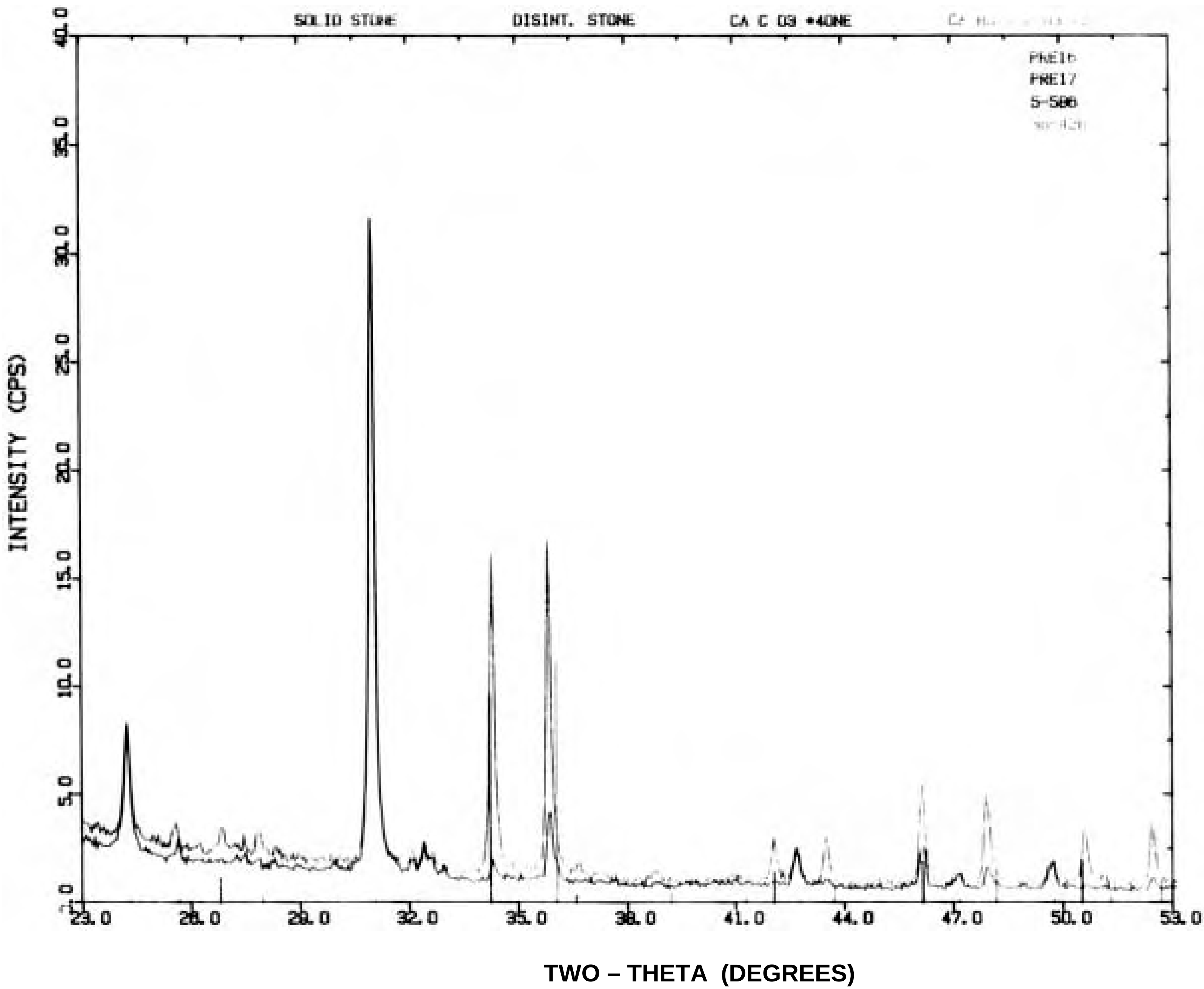




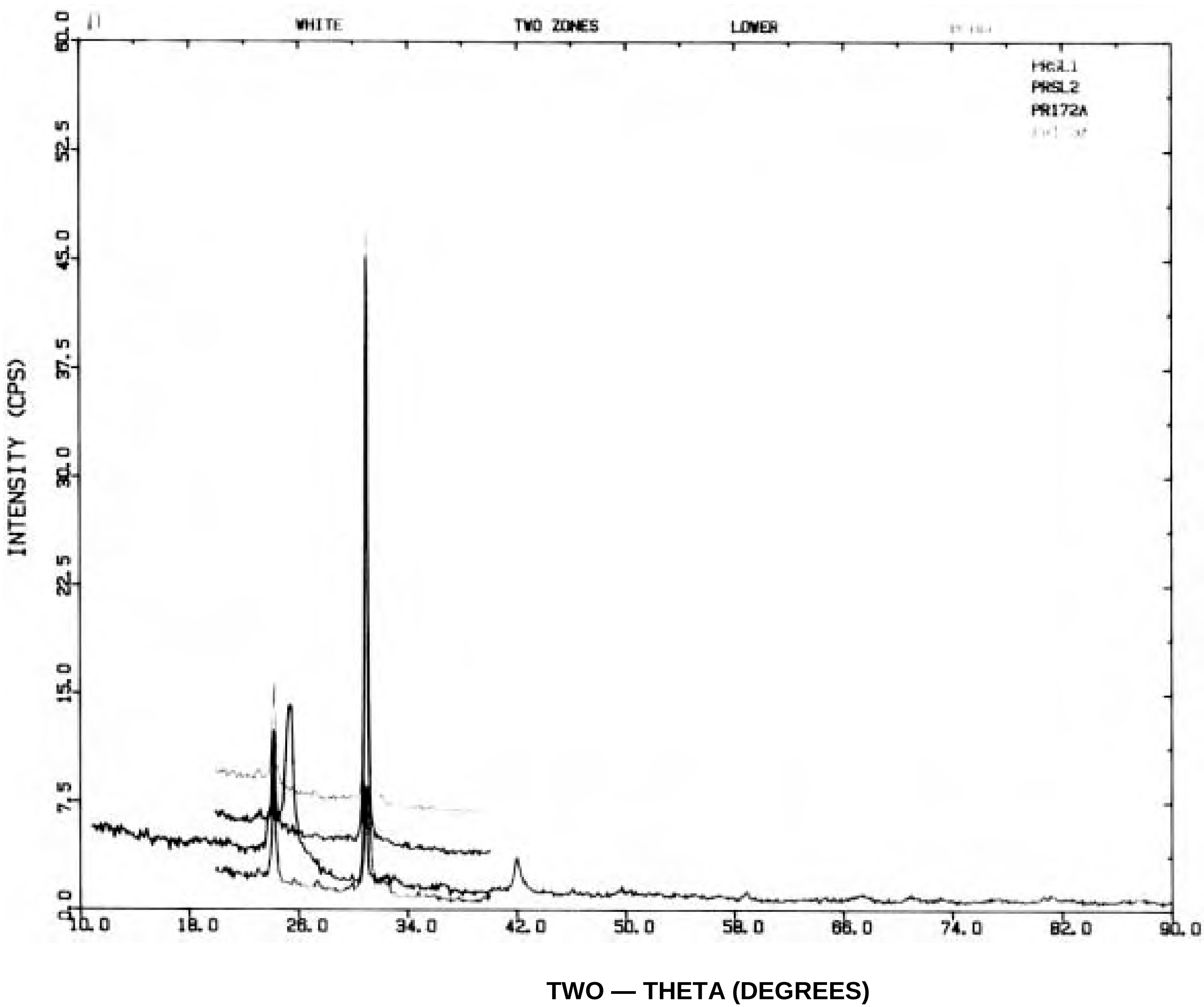




Pattern I

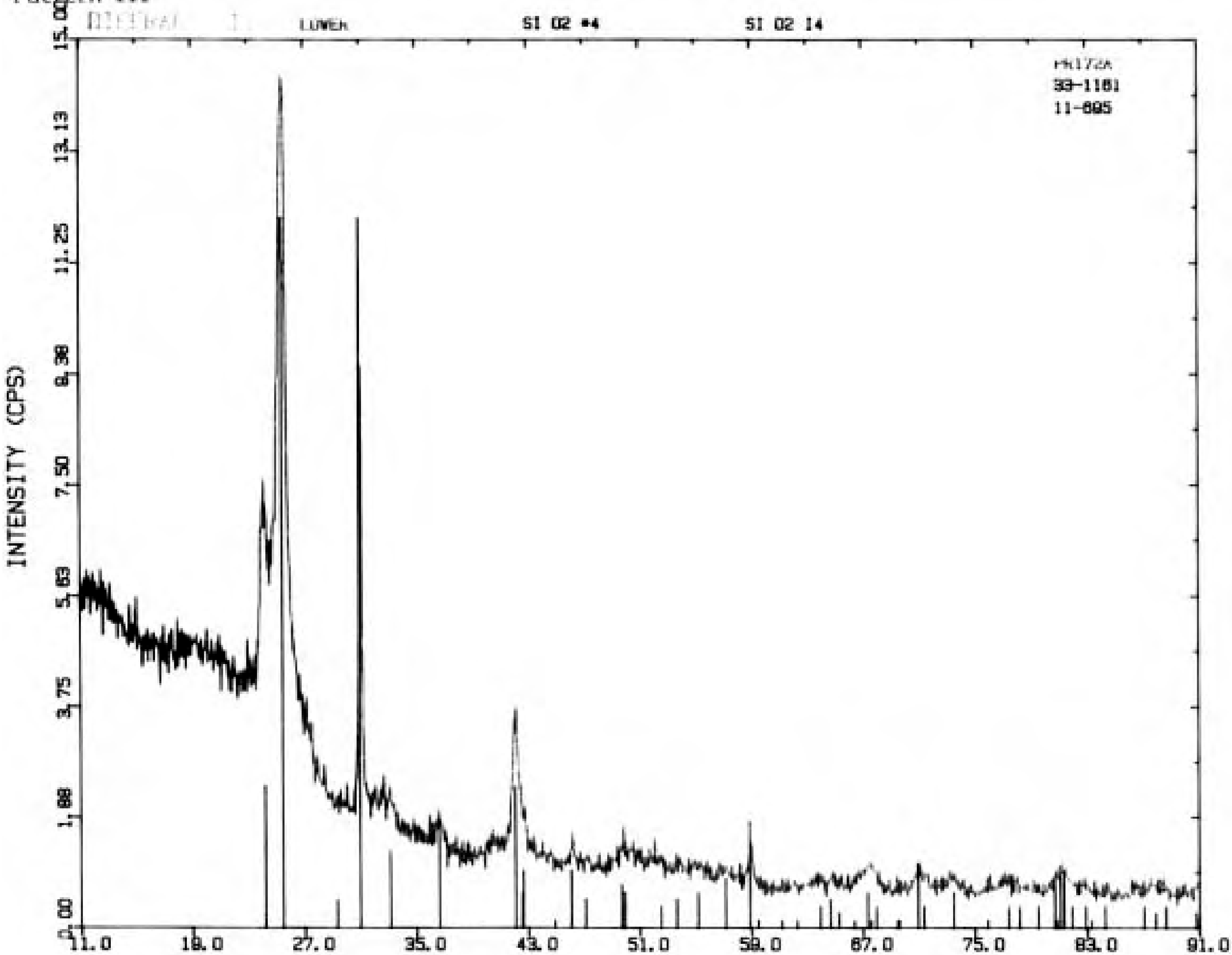

SOLID STONE
DISINT. STONE
CA C O3 *4ONE
PRE16
PRE17
5-586
INTENSITY (CPS)
0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
23.0
26.0
29.0
32.0
35.0
38.0
41.0
44.0
47.0
50.0
53.0
TWO – THETA (DEGREES)

Pattern II


WHITE
TWO ZONES
LOWER
PRSL2
PR172A
INTENSITY (CPS)
60.0
52.5
45.0
37.5
30.0
22.5
15.0
7.5
0.0
10.0
18.0
26.0
34.0
42.0
50.0
58.0
66.0
74.0
82.0
90.0
TWO — THETA (DEGREES)

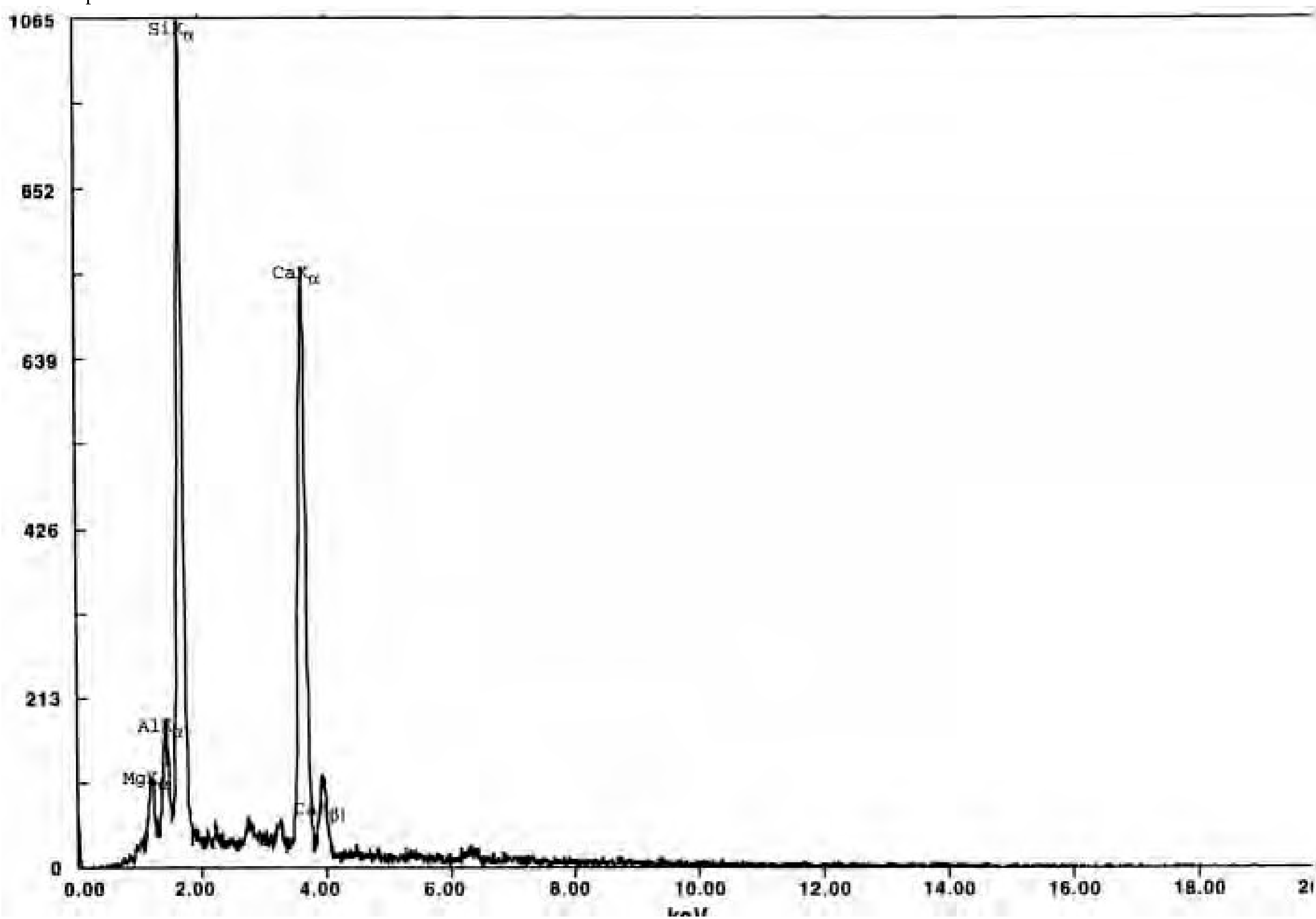
Pattern III

Pattern III



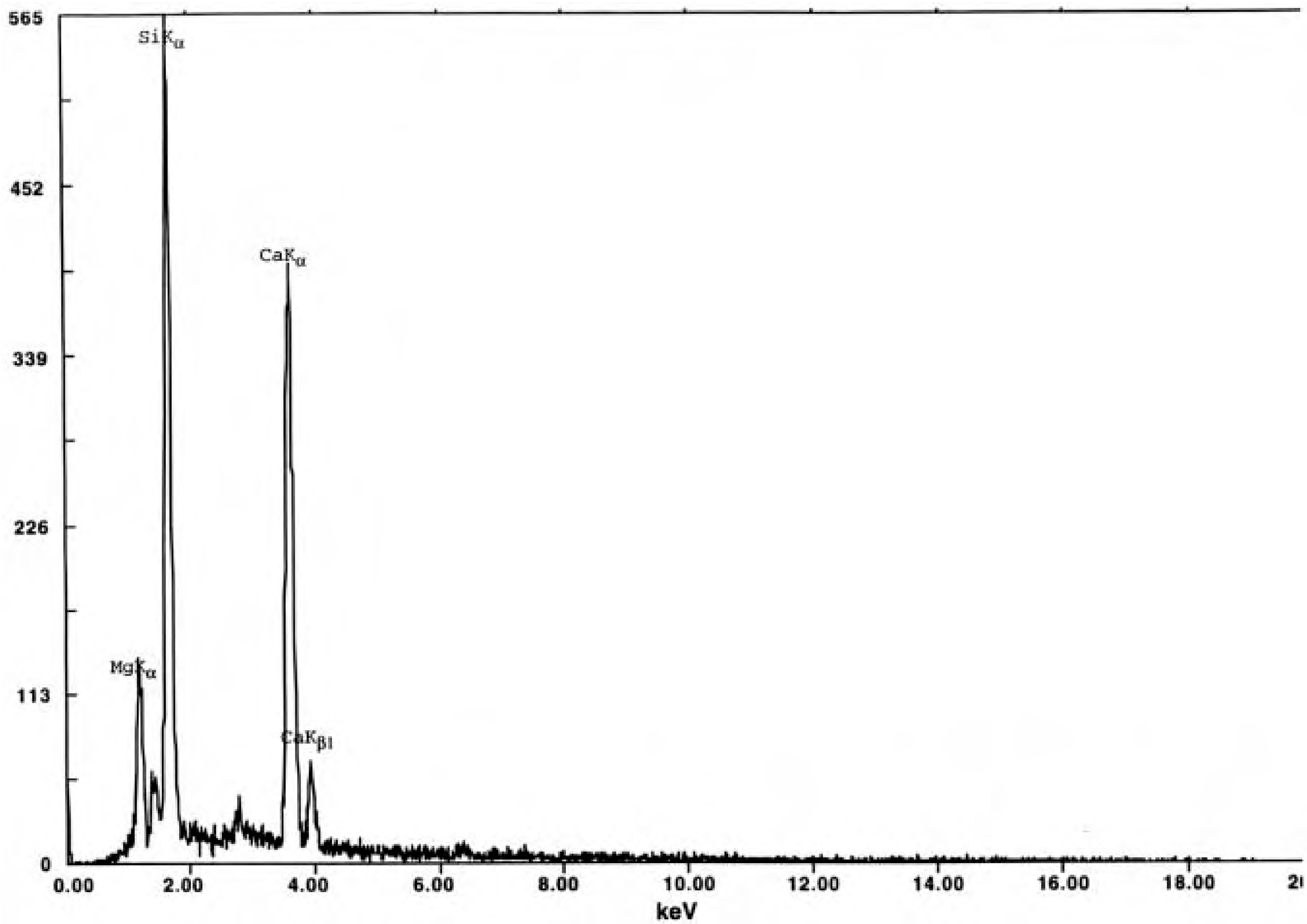
TWO — THETA (DEGREES)

Spectrum 1



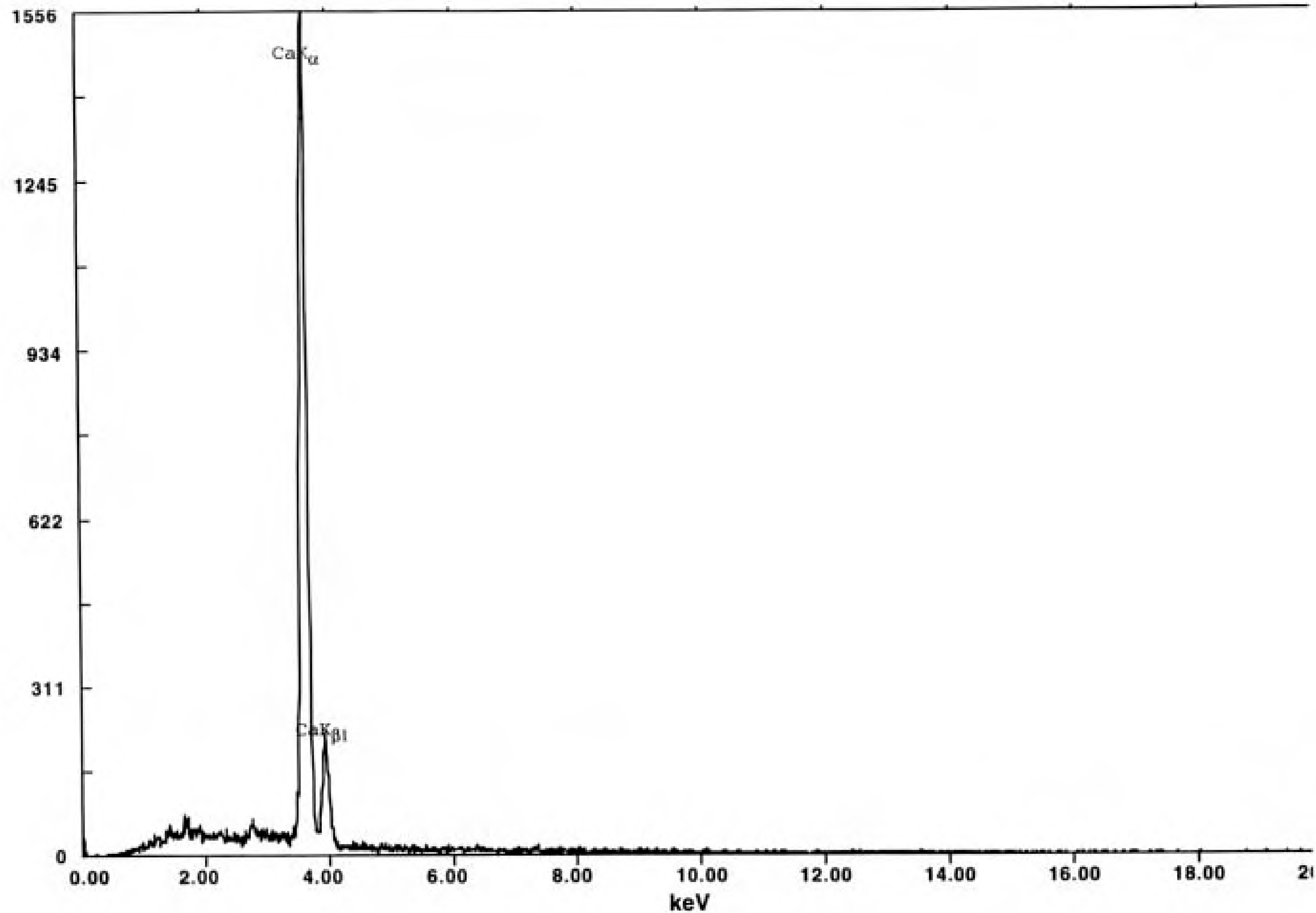
#16, Over all

Spectrum 2



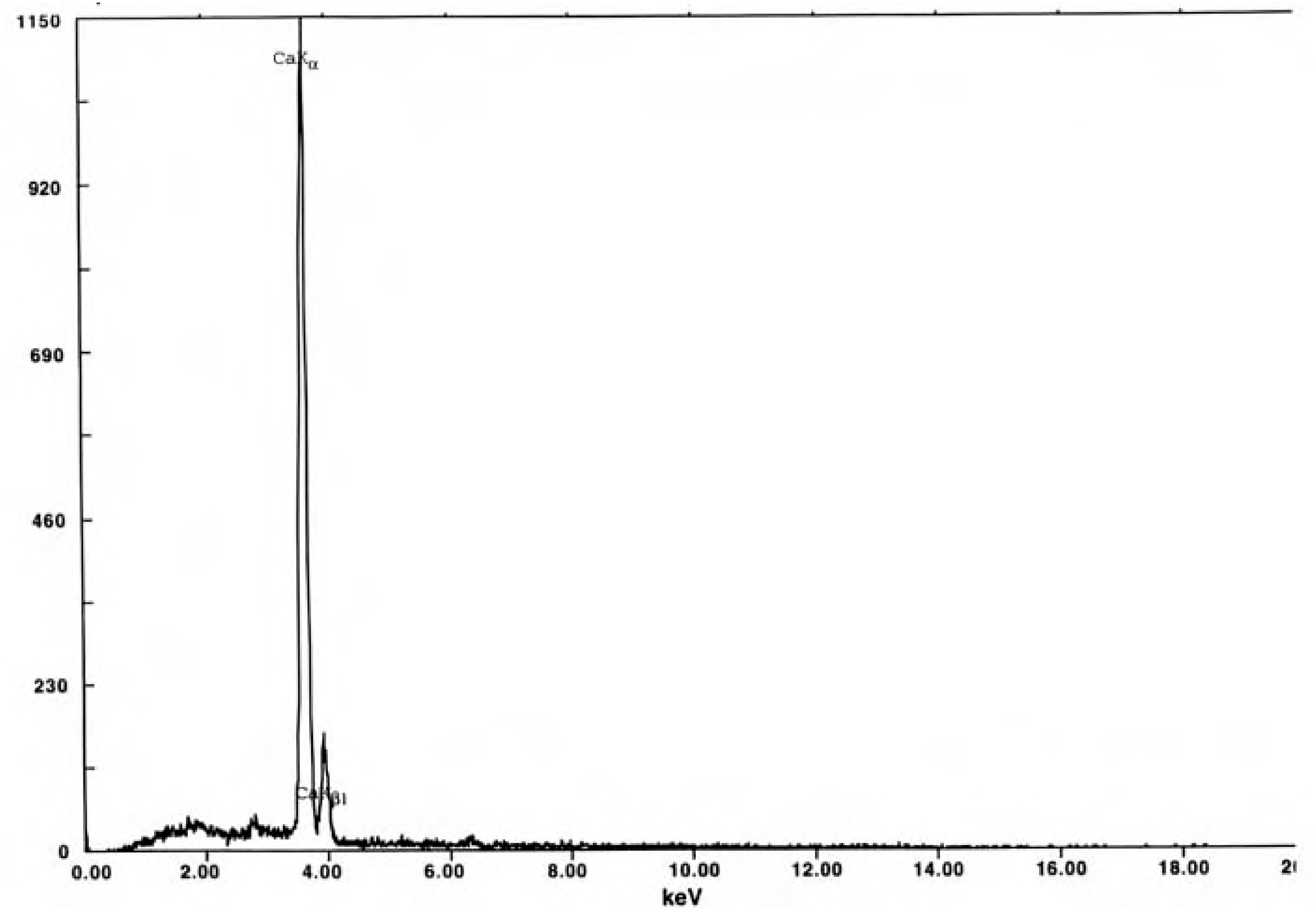
#16 Intergranular Matrix with Dolomite Rhombs

Spectrum 3

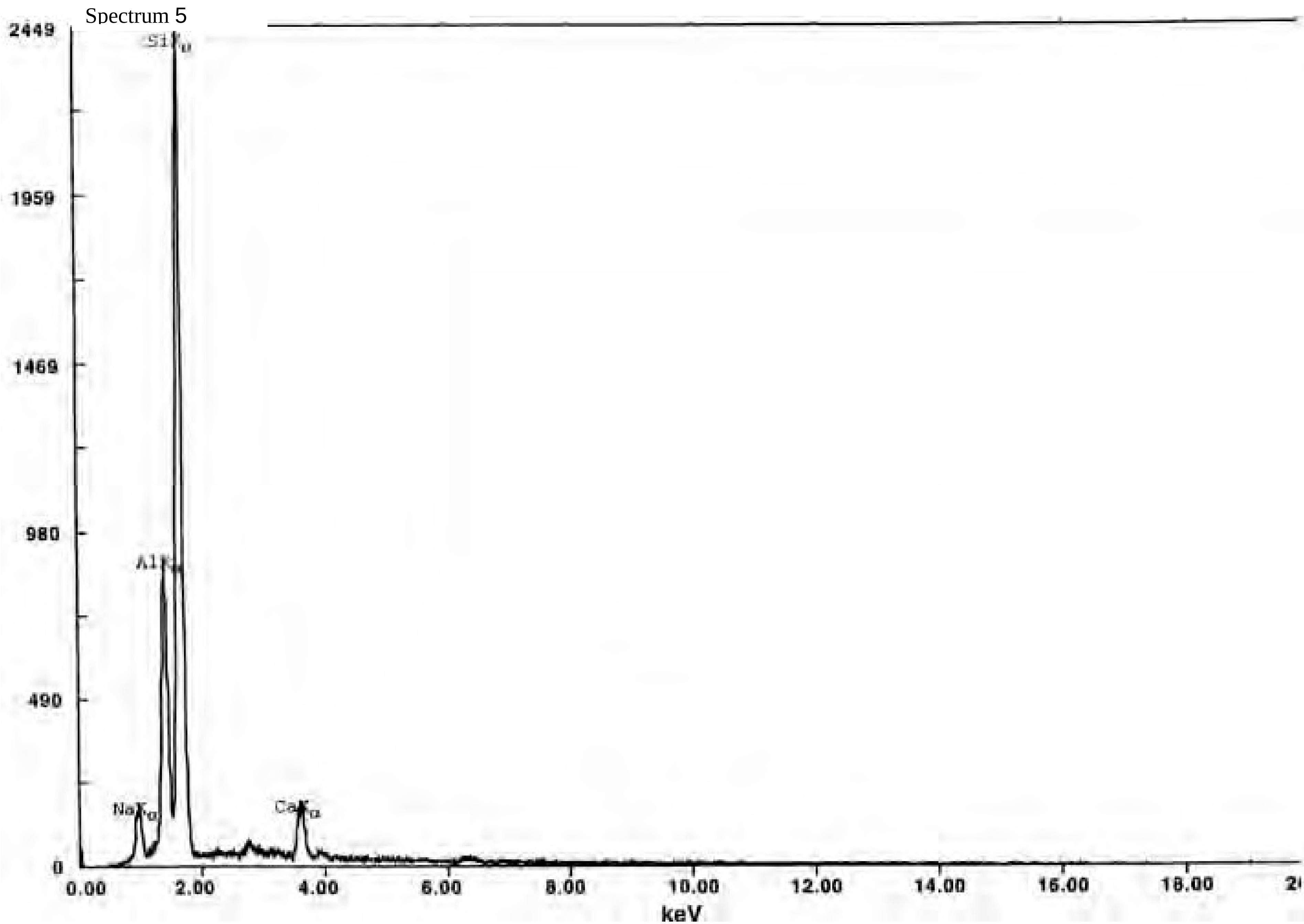


#16, Foram test

Spectrum 4

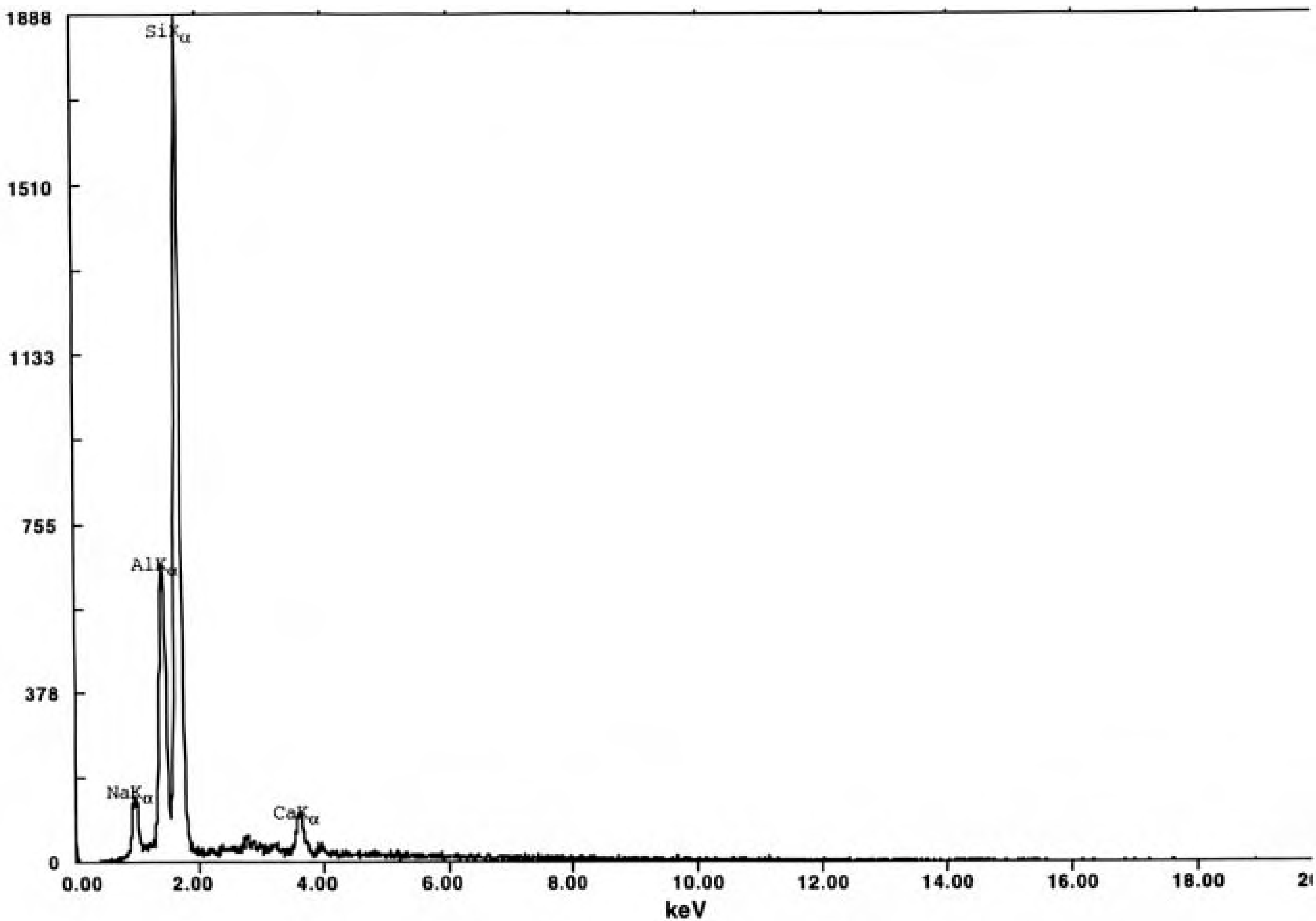


#16, Denser Diagenetic Calcite Inside Foram test



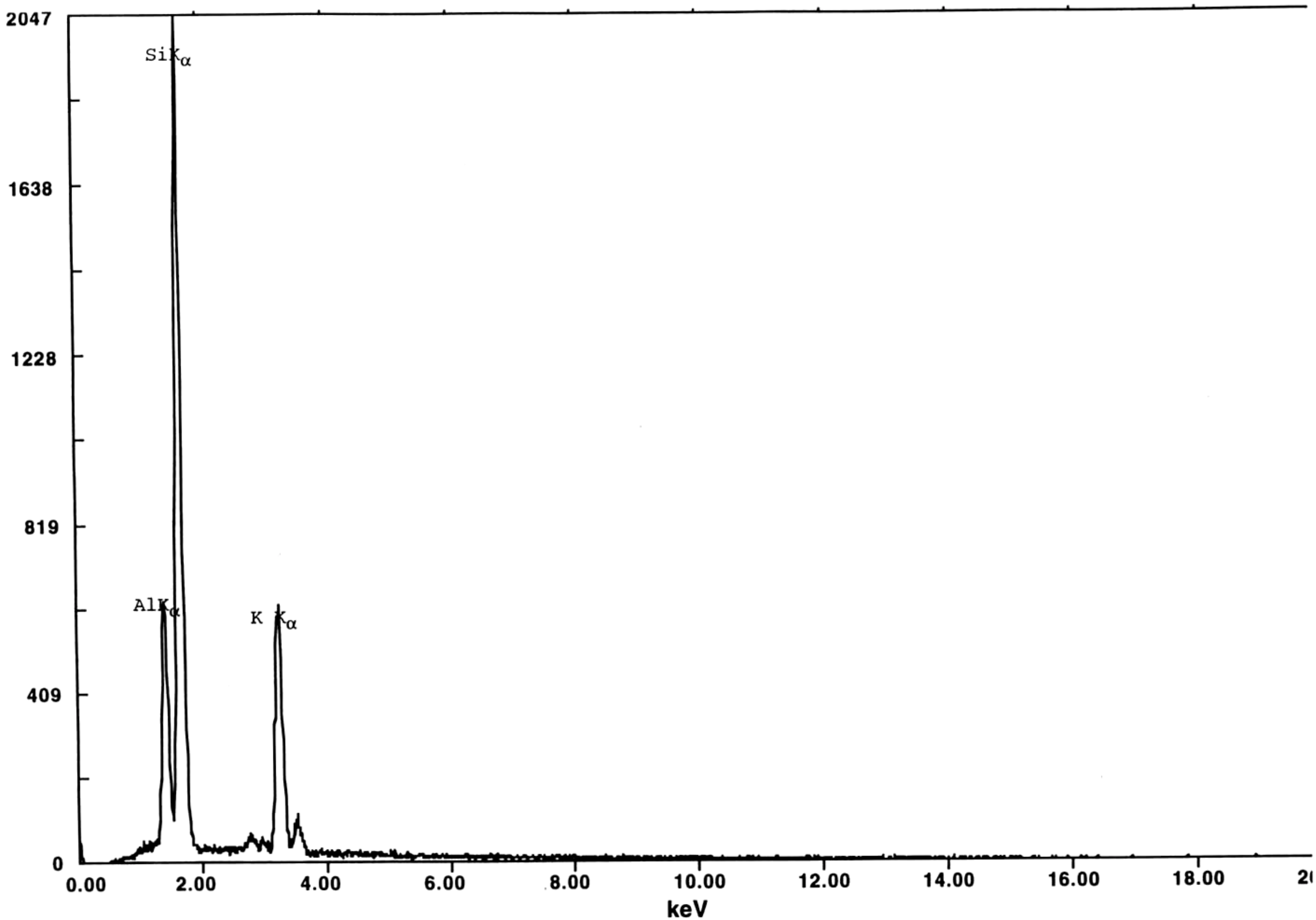
#16 Fine Detrital Feldspar Sand, l00micron

Spectrum 6



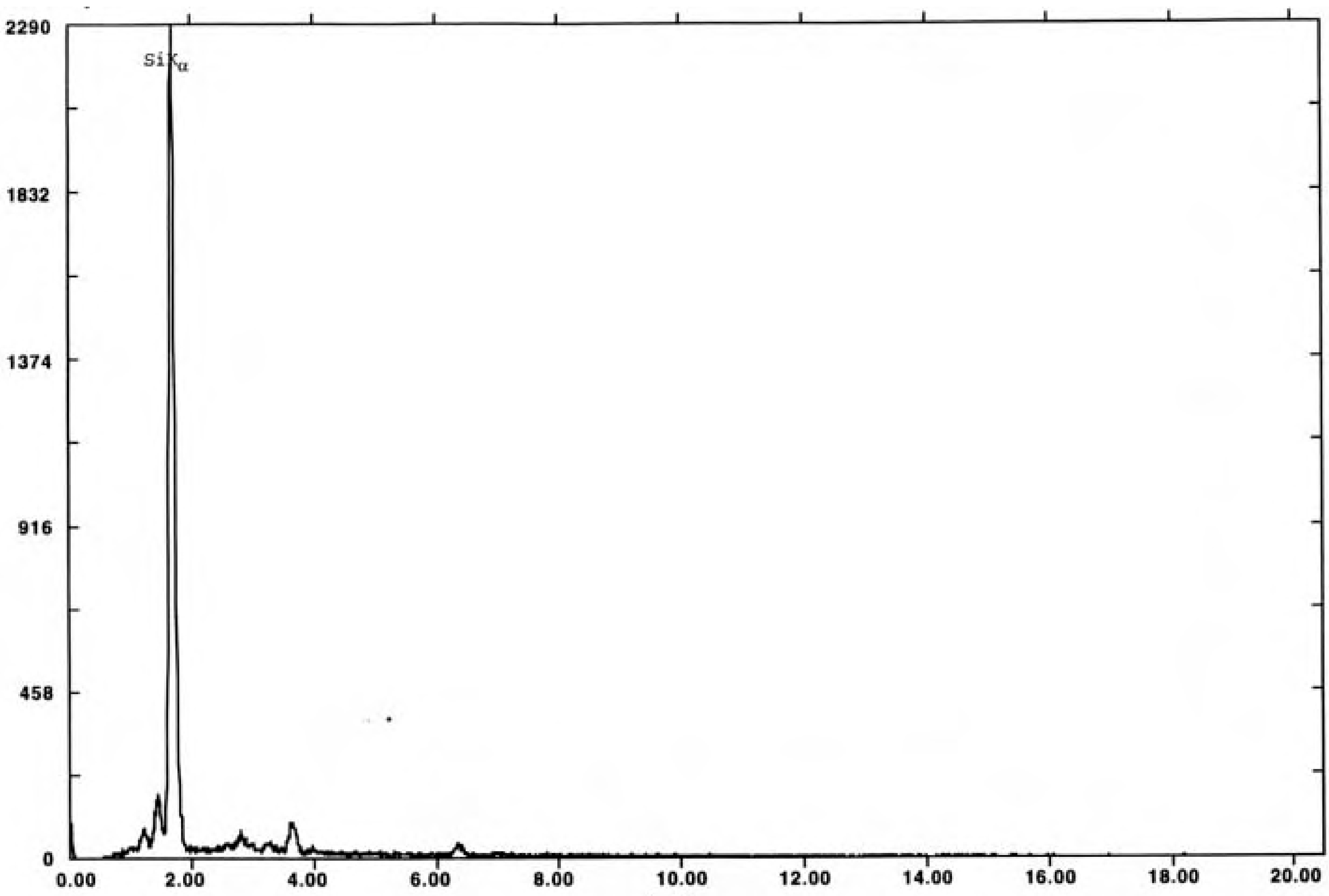
#16, Detrital Feldspar Sand, Low Z side

Spectrum 7



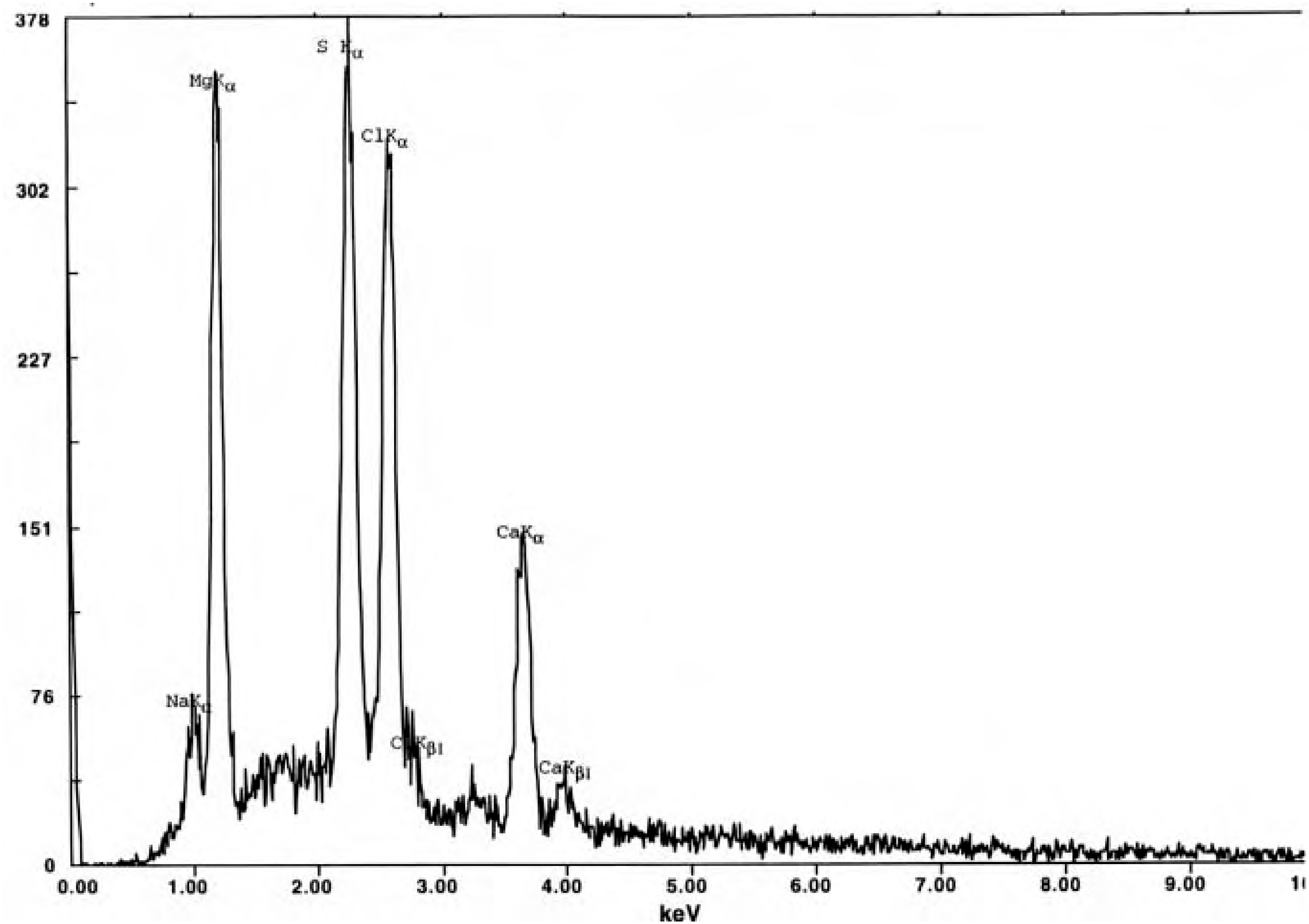
#16, Detrital Feldspar Sand, High Z side

Spectrum 8



Clast cavity wall, #17

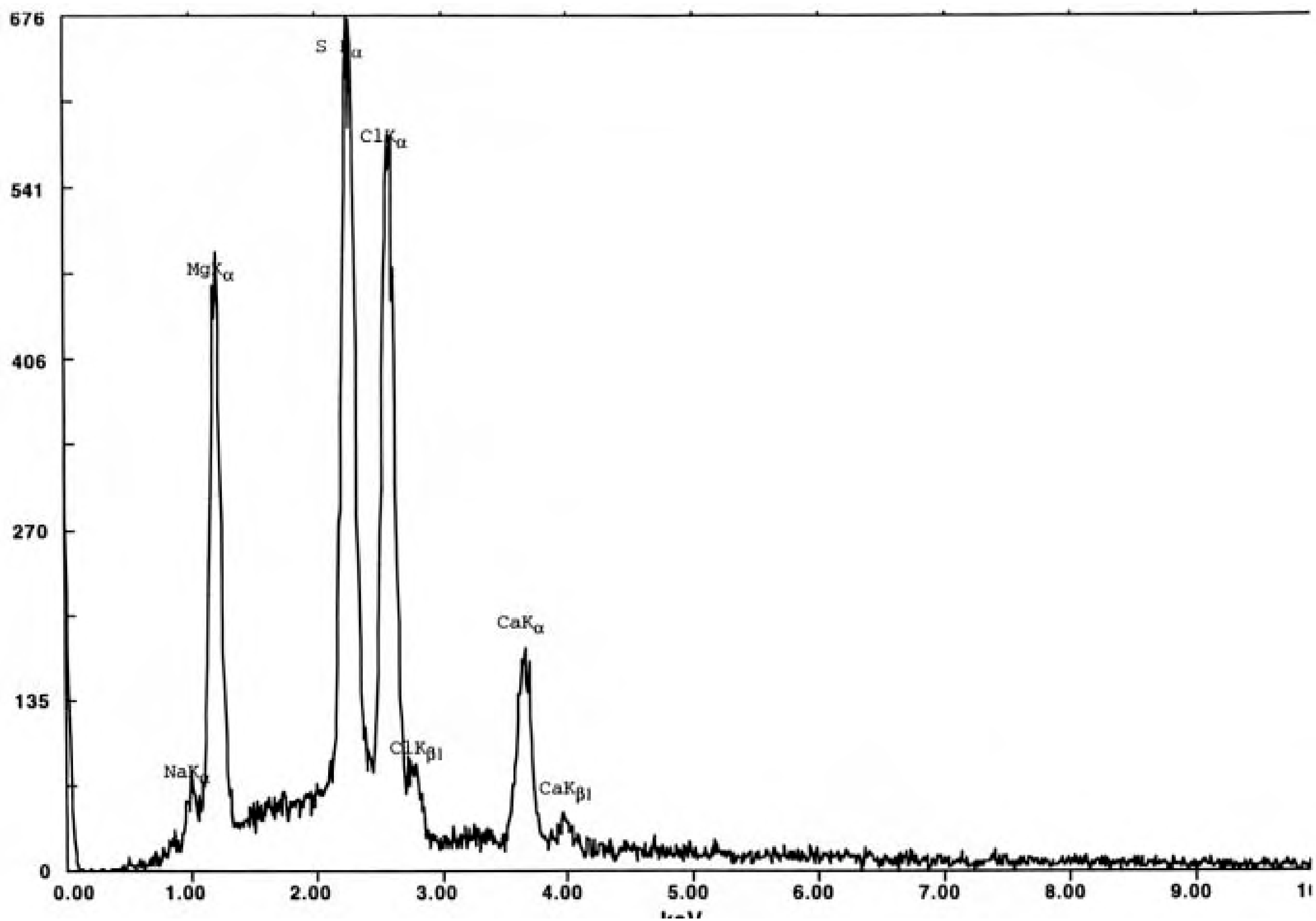
Spectrum 9



Salts

Pre6, Salts

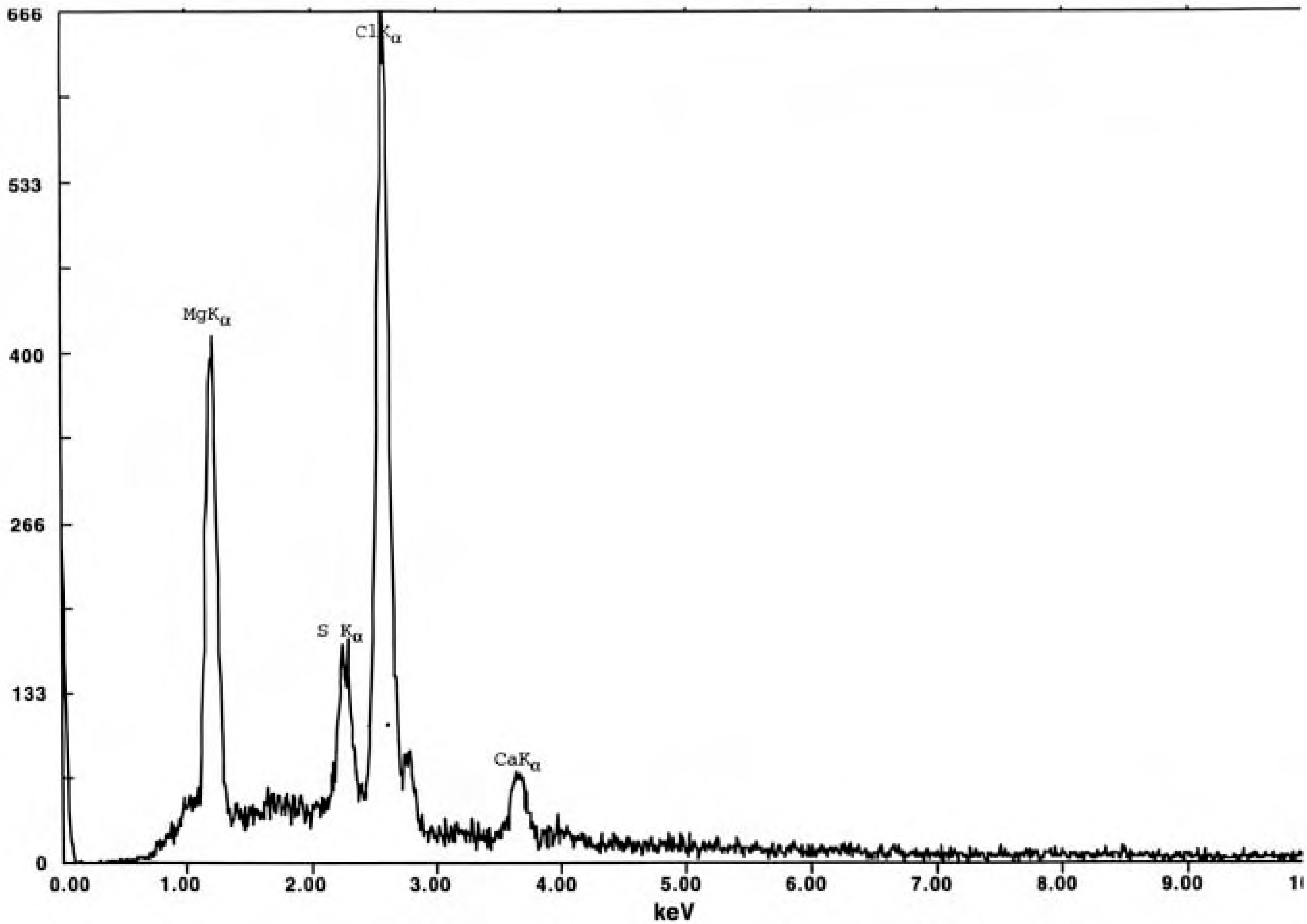
Spectrum 10



Salts

Pre7, Salts

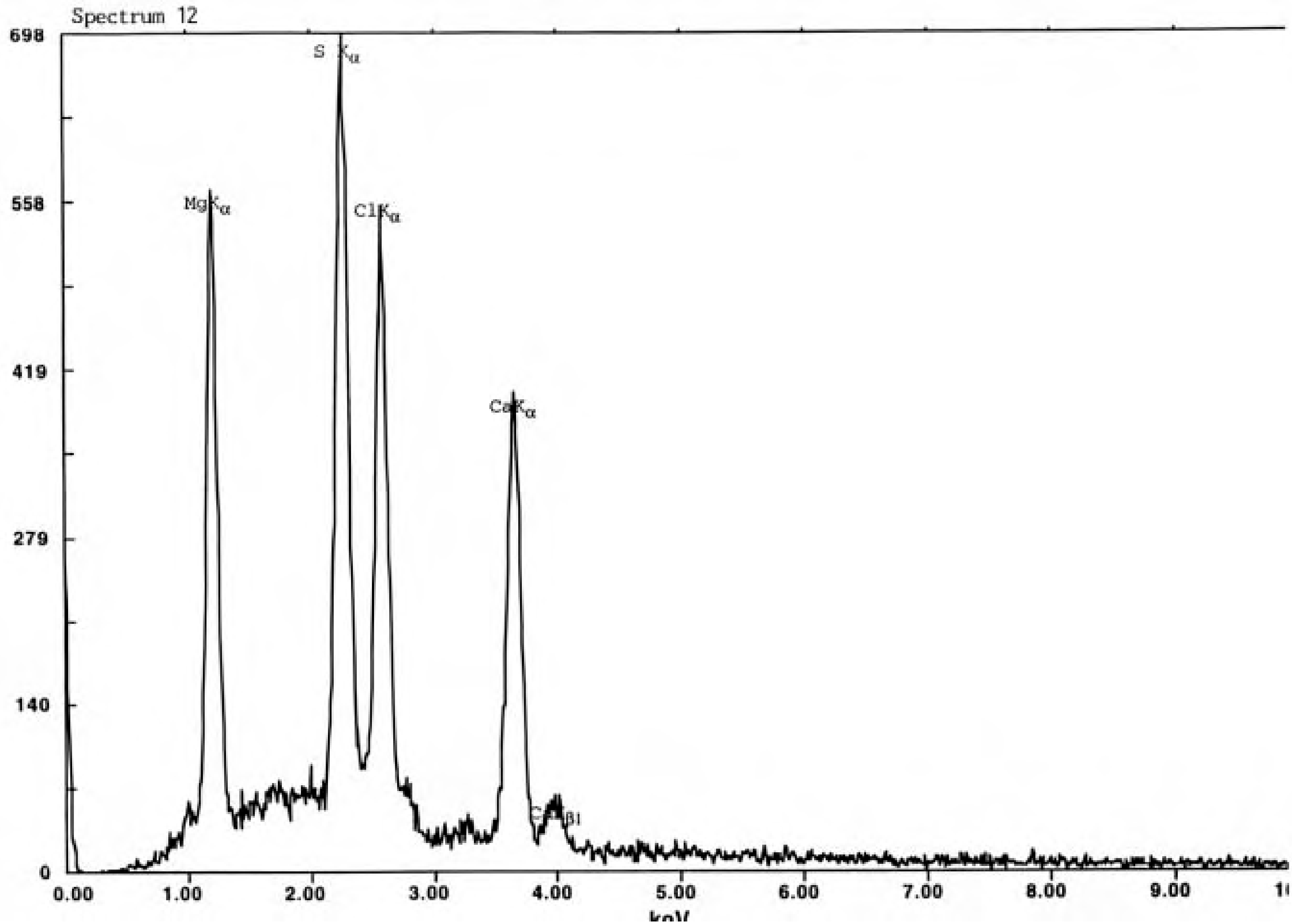
Spectrum 11



Salts

Pre8, Salts

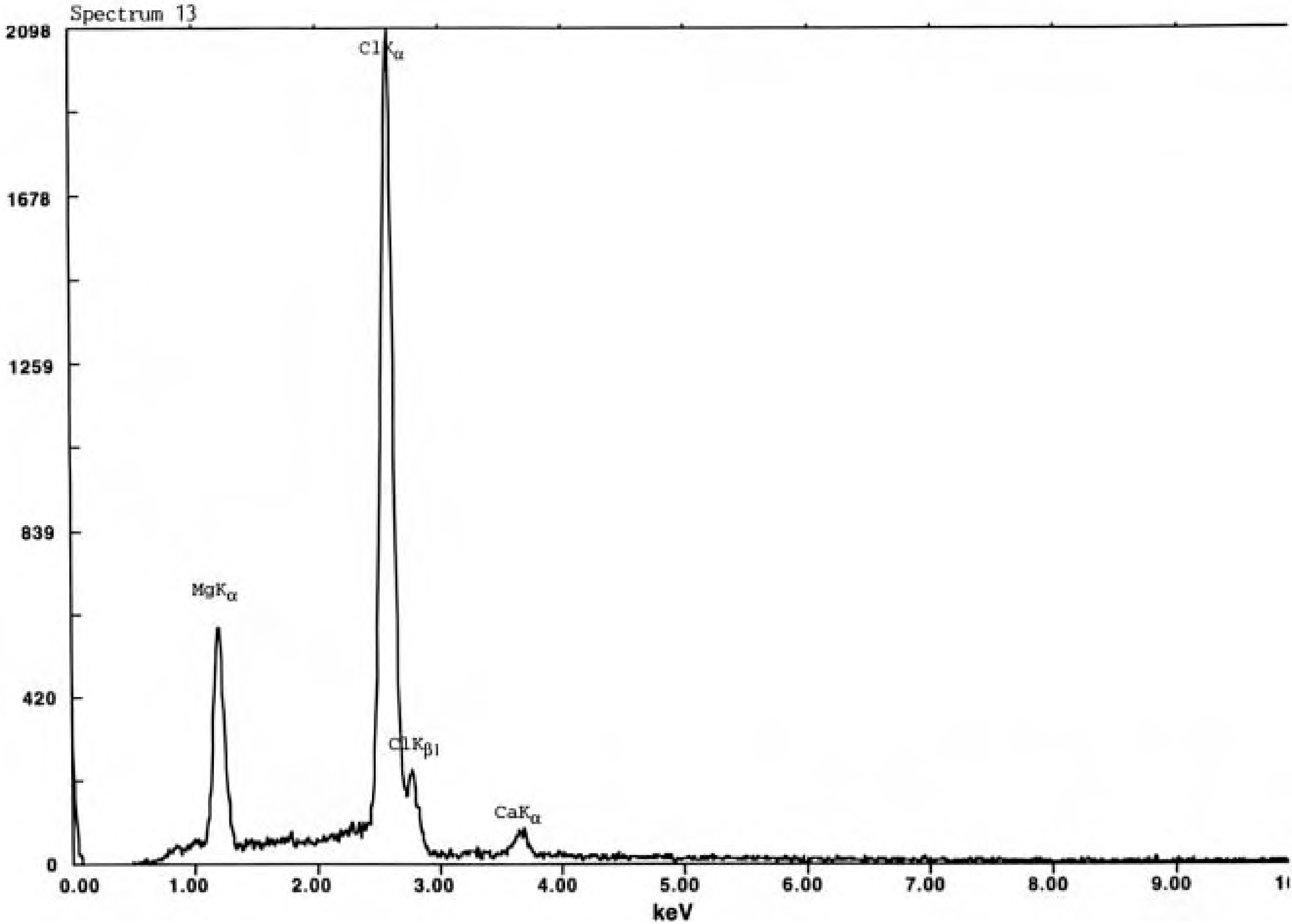
Spectrum 12



Salts

Pre 19, Salts

Spectrum 13



Salts

Pre21, Salts

Note: Compositions listed are descriptive initial visual observations only.

Sample Inventory November 18-19, 1994

(All locations are referred to the viewer's left or right)

1) Rightmost pilaster at chest height, right edge of front: efflorescence displacing paint over sound stone.

2) Rightmost pilaster at chest height, left side edge: efflorescence displacing paint over sound stone.

3) Rightmost pilaster at chest height: first and second of three paint layers atop stone. First is yellow/cream colored and cohesive, 2nd is white and powdery, c/b limewash.

4) Rightmost pilaster at chest height: Second and 3rd of three paint layers, the last is yellow/cream colored and cohesive.

5) Rightmost pilaster at chest height: Efflorescence from upper margin of paint loss over sound stone (6" above #s 1&2).

6) Left volute under right niche: Disintegrating stone.

7) Second pilaster from right, chest height: Outermost salt-laden disintegrating stone.

8) Second pilaster from right, chest height: Deteriorated stone.

9) Second pilaster from right, right edge, approx. 1 meter above ground: Disintegrating stone.

10) Lintel over statue of Virgin, upper surface: Salt and stone grains.

11) Cracking sill beneath right bell, stone fragments: smaller has light coating (c/b salt, c/b phosphate, c/b natural vein.

12) Rightmost pilaster, left edge, rupture above pedestal in adjacent niche: dissaggregated masonry material w/o observable salt.

13) Rear of second course of stone, left door jamb: salt accumulated beneath paint.

14) Missing second mortar joint at rear, left door jamb: salt accumulation.

15) Left pilaster adjacent to door, right side of tablet, third course up, core fragments of p.c. mortar repair over damaged stone.

16) Rightmost pilaster, center left of tablet: sound stone core drilled from solid stone in area of salt-lifted paint.

17) Second pilaster right, adj. to door: mushy yellow stone, core fragments and dust, approx. 3" from disintegrating area.

18) Rightmost pilaster, right tablet edge: fragment of hard stone atop swollen, dissaggregated area.

19) Facade, right and above location 18: decomposing old fill mortar. Sequence at this location is: stone; decomposing fill mortar; yellow ochre paint; thin screed of p.c., paint

20) West wall, approx 2 meters south of first window: mortar rendering fragment 4.5' above g.l., from eroding area.

21) West wall, poorly sorted sand from eroded render 4.5' above g.l., under first window for salt extraction.

22) Leftmost pilaster, right side, chest height, pointing mortar with apparent lime lumps. S/b original.

Samples taken by Tony Crosby:

23a) Attic, rear of facade at pendentive above choir window level, in stone relieving arch: mortar.

23b) Attic, stone fragment

from lift:

A) Paint lifting from top of n.w. corner of bell tower.

B) Slurry coating with lichen from top of facade parapet.

Sample Inventory

Presidio Chapel, Monterey, May 18, 1995

Field Stone:

-Modern quarry on development land: Fine grained cream colored “shale” with macrofossils (fish)
-Boulder of unknown source at Defense Language Institute: Calcareous sandstone with colorless, sharp-edged sand.
-Spall from Green and Green bell monument in Carmel: Sandstone, possibly calcareous, with mixed detrital sand including micas
-Boulder beneath scarp on south side of Carmel River above “artichoke” field: Limestone with foraminifera

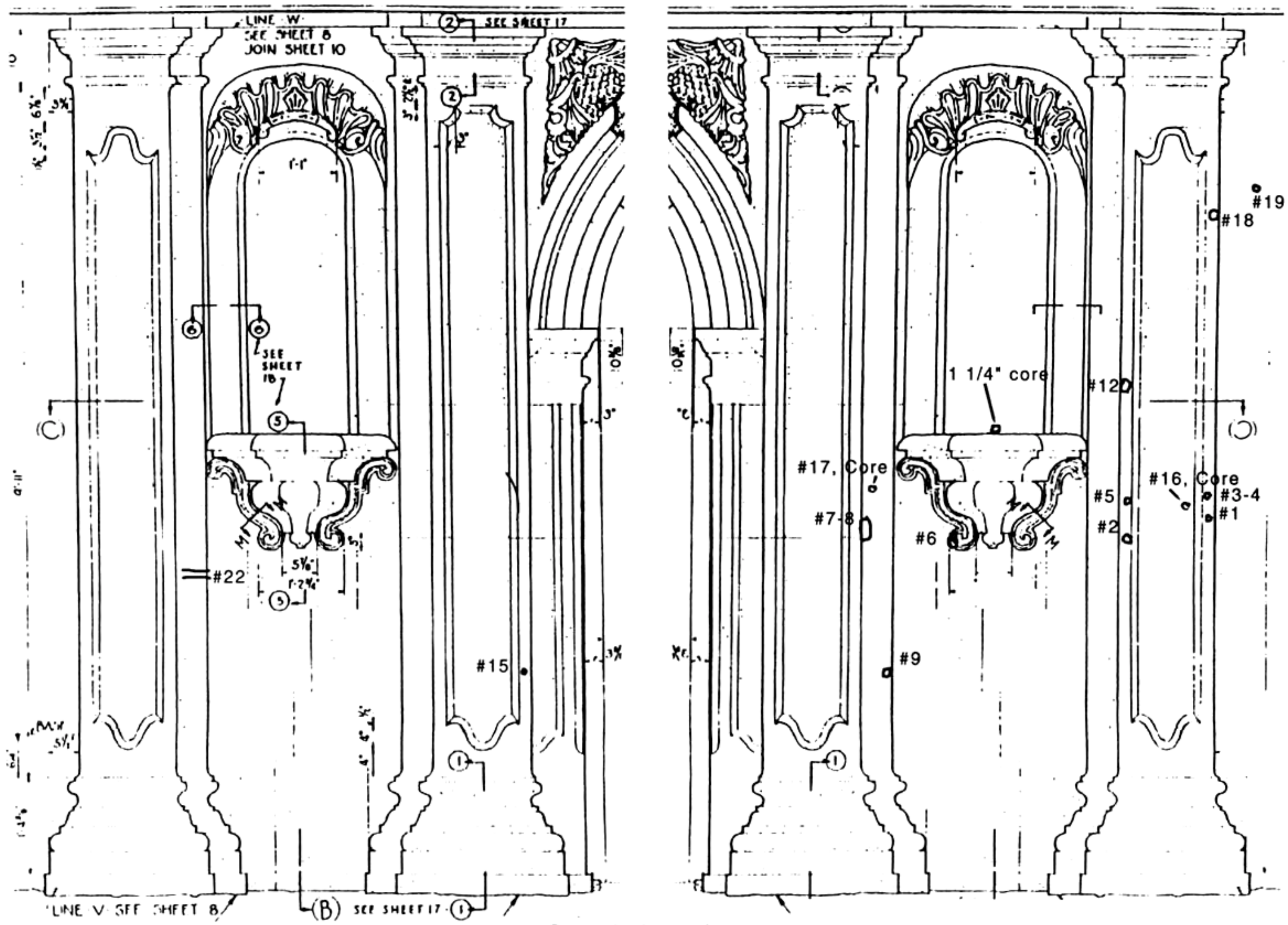
Core and Related samples from niche west of entrance:

Segments:
#1: 4.4cm
#2: 4.7cm
#3: 4.3cm
#4: 4.5cm
#5: 4.7cm
#6: 5.0cm (total stone thickness: 29.6 cm)
#7: mortar fragments

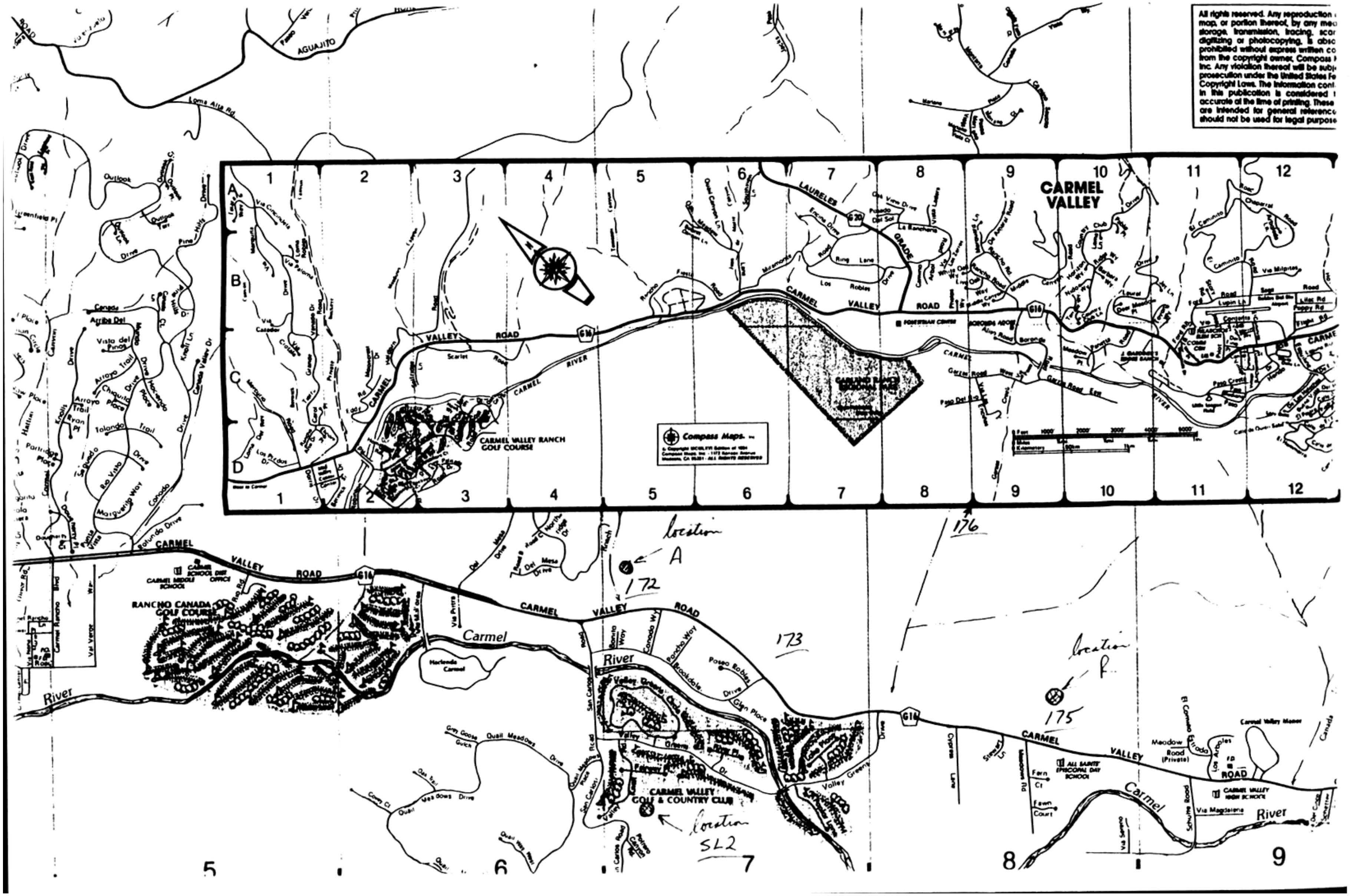
Drilling Meal:
1 inch
1-2 inches
2-3 inches
3-5 inches
5-7 inches
7-8 inches
8-9 inches
9-12 inches
13 inches: large shell fragments in mortar
13-16 inches (mortar granules)
16-21 inches
21-26 inches
27-30 inches

Miscellaneous:

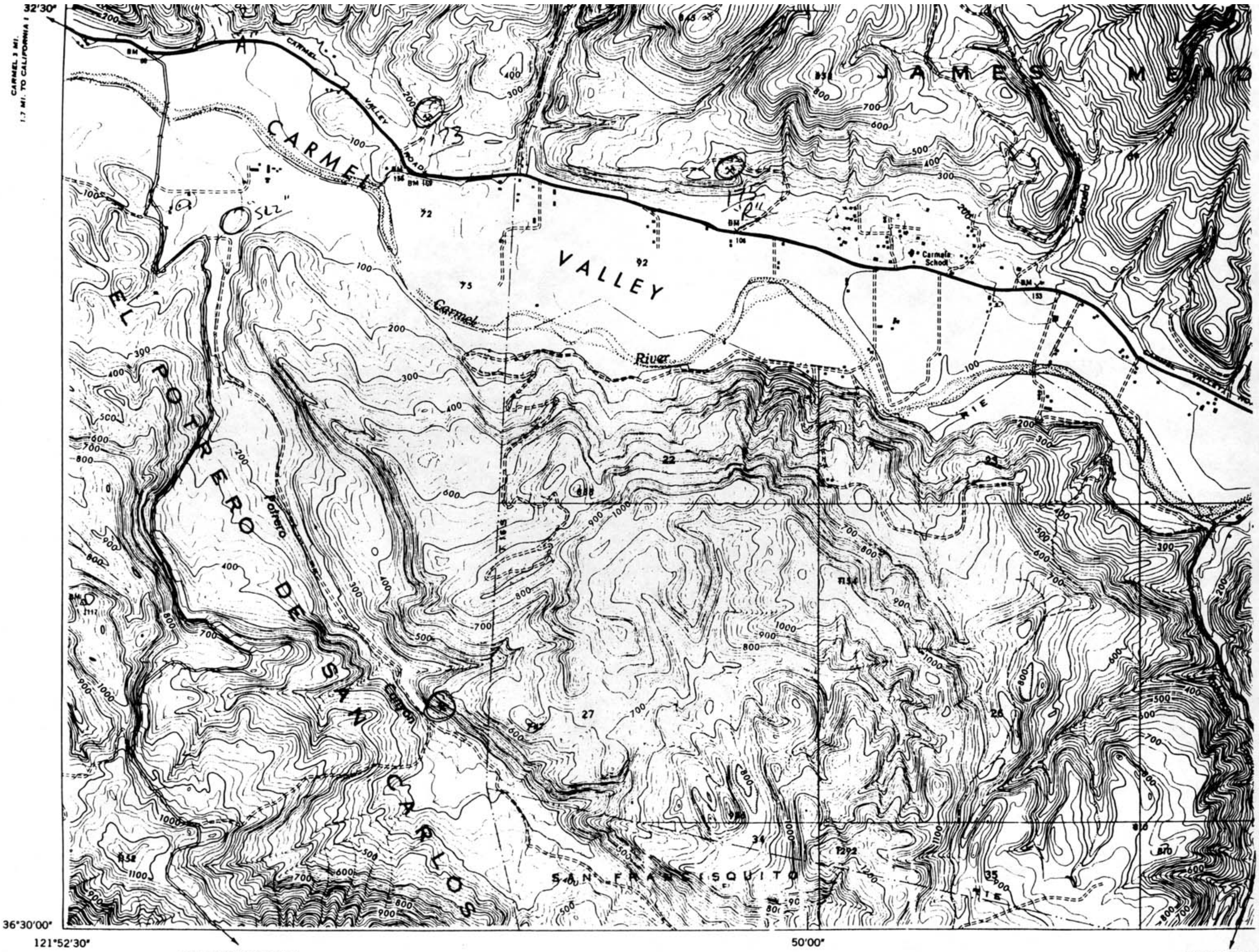
-Hard, white, surface patch material: Graded silica sand in white portland cement?
-Hard Blond surface patch material: Possible marble dust in a yellow unknown matrix, including fragment of remolded tablet margin and associated efflorescence
-Mud mortar? from hollow behind 1/2 “ grey rendering on facade west of entrance (within possible wall thickening near corner)
-Mud Mortar from west wall beneath previously sampled damaged ochre colored sand rendering with probable lime granules



Sample Locations



CARMEL VALLEY
CARMEL VALLEY ROAD
G16
LAURELES GRADE
G20
CARMEL VALLEY RANCH GOLF COURSE
Compass Maps, Inc.
RANCHO CANADA GOLF COURSE
CARMEL MIDDLE SCHOOL
Carmel River
Hacienda Carmel
CARMEL VALLEY GOLF & COUNTRY CLUB
ALL SAINTS EPISCOPAL DAY SCHOOL
CARMEL VALLEY HIGH SCHOOL
Carmel Valley Manor
location A
172
173
location R
175
176
location SL2



A.M.S. V895

SCALE 1:24,000

Appendix IV

Archaeological Test Excavation
Adjacent to the Eastern Exterior Foundation
San Carlos Cathedral
Royal Presidio Chapel
Monterey, California

for
City of Monterey
Planning Department
Historic Preservation Commission

by

Charlotte A. Simpson-Smith
Rob Edwards
Archaeological Associates of Central California

Grant Agreement No. MT-0424-4-NC-14

May 1995

UTMG: ^{5}994600/^{40}50480 zone 10
AREA: ˜ 1 acre
KEYWORDS: **Spanish Colonial Presidio, Spanish Presidio Chapel, corridor/pavement construction technique,ceramics, Harris matrix**

ABSTRACT

The purpose of this investigation was to provide limited (2 meters x 1 meter) visual and physical access to the San Carlos Cathedral foundation so that engineers and conservators associated with the Stone Conservation Project could determine the foundation condition and location relative to the bedrock.

Nine days of archaeological field work took place on November 11-14, 16-18, 22 and December 3. The excavation exposed and recorded fourteen artifact bearing strata. Most strata (except 1 and 10) were in a secondary deposit context. These strata overlay a Spanish Period feature, a possible walkway or floor that postdates the foundation construction. This feature appears to be a prepared pavement composed of several layers,i.e, fist-size siltstone cobbles covered with clay mixed with small siltstone fragments, then a layer of lime mortar/plaster. It is quite possible the pavement was finished with floor tile, as many floor tile fragments were recovered. Limited archival information (photos and sketches, e.g. Hutton's Plate XXIX Church at Monterey, 1847, Henry Miller 1856) suggests the possibility of a floor or pavement associated with a shed roof structure on the eastern side of the chapel. There is, however, no reference to there having been a paved walkway or floor in that location.

Many interesting artifacts were recovered. Unfortunately, the scope and budget of this project limited the analysis to a cursory identification. Geological interpretation' of the auger samples revealed bedrock at greater than 1 meter and perhaps 2 meters from the present surface (Kimbro, personal communication).

It is strongly recommended that all subsurface work related to the chapel should be done in consultation with a Society of Professional Archaeologist (SOPA) so that the construction history of this significant chapel might be expanded. It is important that a fuller understanding and appreciation for the richness of this cultural heritage might be conveyed to the interested public. Subsequent archaeological investigations associated with the Spanish Royal Presidio should consider the special analysis of this collection of excavated materials and those from the Greenwood and Associates (1979) and Archaeological Consulting (1979) as an inclusion of future scope of work.

All materials and data relative to this investigation are currently on file at Cabrillo College Archaeological Archive, Aptos, California.

[1]Subsequent to the archaeological investigation, project leader Edna Kimbro had the auger samples looked at by geologists who made the determination that indeed, bedrock had been reached and surpassed (Kimbro, personal communication).

Table of Contents

PROJECT HISTORY

In November 1994 the authors were contacted by Ms. Edna Kimbro, San Carlos Cathedral Project Leader. The City of Monterey’s Historic Preservation Commission received a grant (Grant Agreement No. MT-0424-4-NC-14) from the National Center for Preservation Technology and Training to investigate and report;, with recommendations, the condition of the foundation of the San Carlos Cathedral located in the Spanish Royal Presidio (See the Map Appendix, Pg D-2). Concern had been voiced of the poor condition of the exterior of the chapel The surface is exfoliating and exposing surfaces which appears to be suffering from excess moisture. This moisture appears to be causing deterioration of the walls and depositing evaporated salts.

The archaeological goal of this project was to excavate a unit, one x two meter rectangle (using proper archaeological methods) adjacent to the eastern exterior foundation (See the Map Appendix, page D-3), verbally report the archaeological findings to, and advise the Project Team at the time of their field work (November 19, 1994).

The geographical limit of the report will be confined to the San Carlos Cathedral portion of approximately one acre parcel.

Mapping was accomplished by Rob Edwards and Charr Simpson-Smith (see Vitae in Appendix A, page 1-12). The field excavation crew included Charr Simpson-Smith, crew leader, and four archaeological field technicians (graduates of the Archaeological Certificate Program), Christopher Corey, Keith Hamm, Dawn Hubbs and Cathy Phipps.

REGIONAL SETTING

Natural Environment

The Royal Presidio Chapel is located on the Monterey Peninsula, the southern lip of the Monterey Bay. The Gabilan and Santa Lucia Mountains, part of the central coast ranges, rim the southern bay area’s extensive alluvial plains (Gordon 1977). The Point Pinos headland is made up of coarse granite boulders. The beaches to the south, Pacific Grove along a geological wedge known as the Salinian block. This block of mainly granite and metamorphic rocks is about 300 miles (485 kilometers) long and 30 miles (50 kilometers) wide, and is bounded on either side by faults, the San Andreas and the Sur-Nacimiento (ibid).

The climate of the Monterey Bay Area is strongly affected by the Pacific Ocean. It's closeness moderates the temperature to cool summers and moderately warm winters. It is also very foggy near the beach in the late spring and early summer time mornings and evenings.

The soils of the study area on the Monterey peninsula have been defined as belonging to the Narlon Series. This soil is described as the

> "somewhat poorly drained soils that formed on uplands in soft marine sediments (USDA 1978). In a representative profile the surface layer is gray, medium acid loamy fine sand about 3 inches thick. The subsurface layer is white, mottled, medium acid and slightly acid loamy fine sand 10 inches thick. The subsoil is light brownish gray, gray and light gray mottled, very strongly acid clay 40 inches thick. The substratum is mottled white, extremely acid weathered sandstone.

These soils provide nutrients for the Coastal prairie-scrub mosaic vegetation community and the nearby Coastal cypress and pine forest located in the steeper, interior areas of the Monterey Peninsula (Küchler 1977:937)

> **Coastal prairie-scrub** ***(Braccharis, Dantonia-Festuca)*** In this complex mosaic, coastal prairie is distinguished from coastal scrub. Farther inland, the scrub disappears and only the prairie prevails.
>
> Coastal prairie - <u>Structure</u>: Dense graminoid community of perennial bunchgrasses, about 50 cm tall when in flower, with a lower layer of annual and perennial forbs, about 10 cm high. The coverage usually approaches 100%. <u>Dominants</u>: Oatgrass *(Danthonia californica)*, red fescue *(Festuca rubra).*
>
> Coastal scrub - <u>Structure</u>: Open to dense, broad-leaved evergreen shrub community, about 1.5 m high. Evergreen and/or deciduous subshrubs, vines, perennial forbs and graminoids form a dense lower layer, about 30-50 cm high (Küchler 1977:938).

Lake El Estero with its marsh habitat is located adjacent to the Spanish Colonial Presidio on the east. In prehistoric and early historic times this was rich in fresh water resources, such as water fowl, small mammals, insects and vegetation such as tale grasses and bulbs.

The Monterey Bay shoreline is a short walk of about .4 of a mile to the north. This would have made marine resources available to the Presidio.

Cultural Environment

Most archaeological researchers seem to agree that the Monterey Bay area has a rich and deep cultural heritage (Pilling 1948, Pritchard 1968, Jones 1978, Patch 1979, Dietz and Jackson 1981, Milliken 1981, Breschini 1983, Dondero et al 1984, Moratto 1984, Dietz 1985, Williams 1993). Generally, the history in its broadest sense has involved four groups of people. The earliest peoples are sometimes referred to as the "Hokan speakers" by linguists (Levy 1978). There is no agreed upon time of entry into the area for these people. The proposed dates range from 7,000 to 10,000 years ago with the earliest dates based upon archaeological evidence from Scotts Valley in Santa Cruz County (Cartier, 1993). They were followed by incursions of new people, especially the "Penutian speakers," sometime after 5,000 years ago (Breschini and Haversat 1993). This was probably to escape the results of the drying altithermal experienced in the Great Basin. (Archaeologists are currently working on models to identify these different peoples archaeologically.) In 1767 peoples of the Spanish Crown and Church set up the Presidio (and, for a short time, mission) in Monterey. This included soldiers, clergy, and Native Americans from Baja missions. Most recently European and Asian American peoples have come to live in the Monterey Bay area.

The Spanish Royal Presidio at Monterey is of particular significance. It functioned as the capital of Alta California during the Spanish and Mexican periods.

> "The presidio chapel and tiny amount of remains that are visible today, represent the tip of an iceberg. An important chapter in the history of early California lies buried beneath the streets and businesses of the modern town. The remains of the first Monterey, long neglected and forgotten, can be argued to have greater overall significance than most prehistoric sites, and standing buildings, found in California. They are a precious resource that once destroyed, cannot be duplicated, or repaired (Williams 1993)."

PREVIOUS ARCHAEOLOGICAL RESEARCH

In early 1950 the lot to the east of the Presidio Chapel was leveled for the construction of a new rectory. Foundations of what Harry Downie, Curator for the Archdiocese of Monterey, identified as the third church (1773) were accidently exposed. These were subsequently measured and recorded by Downie, but no archaeological exploration was undertaken. In February of that year the site was visited by Robert Heizer and Arnold Pilling. Pilling completed an archaeological site record noting the bulldozed area. He also indicated the bulldozed materials were transported from the area of the new rectory across Church street to level the football field. Piling collected some exposed ceramics and deposited them on file at Berkeley's UCAM, file UCAS-63.

The Presidio Chapel was designated to the Register of National Historic Landmark by the U.S. Department of the Interior in 1961 and the facade listed on the National Register of Historic

Places in October of 1966 (NPS 1976:66). The site is also recorded with the State of California as Historic Landmark No.105 (Department of Parks and Recreation 1979:66).

The earliest documented archaeological research for the Spanish Presidio site is work done by the Monterey County Archaeological Society and other local community members under the direction of amateur excavator Donald M. Howard in the 1970s. This included exposure of the Presidio footings near the previous location of the wooden San Carlos School. The NE corner of the Presidio's defense wall was located by Howard in '71-'72 near the NW boundary line of the USO (currently the YMCA, Howard 1976:18). The ceramics recovered from this excavation are reported upon in the Volume III, Number 4 issue of the Monterey County Archaeological Society Quarterly in an article entitled "Mexican Majolica at the Presidio of Monterey" by Ron May (1974:1). Footings exposed during the bulldozing of the parking lot to the west of the YMCA were also recorded by Howard (Howard 1971:3).

In 1979 Greenwood and Associates under the field direction of E. Breck Parkman put test units where the new San Cabs Social Hall now stands (Parkman 1979). In a brief letter report, Parkman indicates the 147 "grocery-size bags" of materials recovered from the excavation were left with the Archdiocese "until such time as it can arrange for the appropriate scientific analysis of it..." and "... on your assurance that the subsequent phases will be performed as soon as possible. 2" He acknowledged the difficulty in defining the archaeological deposit without proper scientific analysis of the sample, but indicated:

> .we believe that the upper 50 centimeters of the deposit occurring within the project area's actual zone of impact (i.e., foundation grading) are highly disturbed. This observation is based on three factors: 1) an analysis of the deposits stratigraphic profile; 2) admittedly cursory impression of the artifactual and ecofactual constituents of the deposit; and 3) the historic record.

Archaeological Consulting of Salinas developed a scope of work in 1979 in conjunction with the relocation of the existing parish social hail to a parcel adjacent to the western fence of the Armed Forces YMCA (formerly USO) building, the site of the NE corner of the Presidio Defense Wall located by Howard (Breschini 1979). Subsequent archaeological work was performed by Ms. Jan Whitlow Hoffman. It consisted of hand excavation of the foundation trenches. Unfortunately again, funding to complete the analysis and write up was not forthcoming by Archdiocese. These collections are yet unanalyzed and unreported (Breschini, personal communication).

In the fall of 1991 the Cabrillo College Archaeological Technology Program provided students who cleaned and profiled the outdoor exhibit sidewalls at the Monterey YMCA (formerly USO). The exhibit shows a portion of the Eastern Perimeter Defense Wall exposed by Howard in '71-

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[2] Currently, these collections are being curated at Archaeological Consulting in Salinas along with the materials recovered from their 1979 excavations for the Archdiocese.

‘72 (Bagwell 1992:19, Hoods 1992)3. The cleaning and profiling recovered some ceramic artifacts which were subsequently analyzed by Ron May (May 1992, see report in the Appendix H page 2).

In late fall of 1993 Archaeological Associates of Central California[4] were contracted by the California American Water Company (CALAM) to mitigate the impact of a water line already under excavation to the archaeological deposits within the Presidio boundary. The mitigation plan included profile drawings of the walls of the newly excavated trench and a re-opened trench in Church Street (from Figueroa Street to Abrego Street) and sampling of the various features exposed in the trench sidewalls (Edwards, Simpson-Smith, and Lönnberg 1994). Recovery included: 1) a large sample of ceramics and fauna! material from seven features, 2) the documentation of the location of the Governor’s house foundations, and 3) the location and recording of several north/south aligned wall foundations. The ceramic analysis by Costello (1994) of Feature 21 revealed the suggestion

> …that this deposit dates to about the first two decades of the 19th century. The repertoire of artifact types is demonstrated as typical of contemporary Hispanic archaeological collections and includes types from New Spain, China, and England. Locally-produced earthenware are virtually absent from Feature 12 (sic), suggesting that there was no local pottery industry at the Presidio at this time. The deposit predominantly includes cooking vessels, although finer table wares are also present.

RESEARCH DESIGN

Howard defined the primary research question which continues today, i.e, the problem of the inconsistent historical documentation which disagree on the exact size and location of various features of the Presidio over time (Howard 1971:2, 1976:8). Howard’s work focused on an architectural point of view and proposed the archaeological data to be used to infer individual building use, as well as to test the differing historical documentation. His book, California’s Lost Fortress is a good synthesis of the archival information according to Edna Kimbro findings (personal communication). Research questions such as: 1) where are Presidio related features located, 2) who used them, and 3) how were they used, are the basis for the on-going studies at the Presidio in general, and this investigation in particular.

The goal of this investigation was to provide limited (2 meters x 1 meter) visual and physical access to the San Cabs Cathedral foundation so that engineers and conservators associated with

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[3] This work was reported upon in a poster session at the Annual Meeting of the Society for California Archaeology held at Asilomar in the spring of 1992.

[4] After the initial stages, a contract between CalAm and the Cabrillo College Archaeological Technology program was negotiated. The remainder of the salvage was carried out under difficult weather circumstances.

the Getty Conservatory could determine the foundation condition and location relative to the bedrock. This research at the Chapel, however small in size, was carried out in a way to add evidence to this on-going research design.

METHODS

Review of the various archival sources (Howard 1971, 1976; Kimbro personal communication) did not reveal evidence to predict any archaeological features other than those possibly associated with the construction or repair of the chapel foundation. However, hand excavation of the 1 meter by 2.065 meter unit was recommended and ultimately excavated. The unit was placed on the eastern side of the Chapel. It was excavated using a long-handled, pointed-nose shovel, trowel, hand hoe, hand mattock, ice pick, dustpan and whisk broom. Soil was removed in stratigraphic levels employing the Harris Matrix (Harris 1979) to track the various strata. At the end of each stratum records were completed and photographs taken to document the excavation.

The excavation strategy was to remove the soil (by stratum) in the lager portion of the unit leaving the soil immediately adjacent to the foundation (assumed to be the contents of the foundation construction trench) to be removed last, generally working from east to west.

An optical transit was used to take readings of the unit placement relative to other permanent and identifiable features such as the bell tower, and to reference points established in conjunction with the CalAm water/utility line work in Church Street.

The excavated soil and materials were put through 1/4” screen mesh. Then materials remaining in the mesh were hand sorted in the field. Siltstone pieces were noted in the stratum records, but not collected, even though technically they could be considered artifacts, i.e. used as construction materials for the foundation and pavement (FEAs 1 and 2). The collections were transported in labeled bags to the laboratory at Cabrillo College for subsequent cleaning, identification, and cataloging. The total collection will be temporarily curated in the Cabrillo College Archives until a final depository is determined.

At the completion of the unit excavation (most of the unit floor was at 55 centimeters below ground surface) a 4” auger unit was placed about 1.50 m east from the foundation (FEA 2) and excavated through culturally sterile soil to 2.17 meters below the surface. Solid bedrock was not encountered in this excavation.6 Samples were taken to the lab for Munsell Color reading and additional analysis. This additional analysis which determined the content of water by weight of the samples was completed by Edna Kimbro (see report in Appendix, page G-1). Sectional drawings of the unit’s northern sidewall and the exposed foundation (PEA 2) were made. Matrix

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[5] The foundation (FEA 2) turned out to be located .06 m to the west of the upper exterior wall.

[6] However, there is a geological interpretation of the water density and color that may have bedrock existing at approximately 119 cm below datum (Kimbro, personal communication).

samples were taken from the northern sidewall for Munsell Color reading. To close the exposure, the area adjacent to the foundation (FEA 2) was covered with a plastic tarp then partially backfilled with sterile sand in an attempt to keep moisture from gathering near the foundation. The remainder of the unit was filled in with the screened dirt from the excavation.

The field personnel included one crew leader and four archaeological technicians, with the Principal Investigator visiting the site regularly. Two technicians were used to process the materials in the laboratory during the same time period.

REPORT OF FINDINGS

Material Summary

Because of the financial limitations on this project the artifacts were only afforded cursory identification. The following is a summary of those artifacts by material category.

Ceramic: Of the total of 128 shards, 98 are from New Spain of Mexico (Mexican Lead-Glazed Wares, Majolica: Aranama, San Elizario Polychrome, Puebla Blue-on-White, and plain) ; 7 are from China (porcelain and procelaneous stoneware; 3 from England (White Improved Earthenware White Ware, and White Ware transferprint; and 16 are probably local mission wares.

Structural Ceramic: There are 265 roof tile fragments (7996.22 gm), 67 floor tile fragments (454 gm) and 126 brick fragments (1000.7 gm).

Lime plaster mortar: There are 117 gm of lime plaster/mortar.

Glass: There are 54 bottle/jar shards (37.7 gm) and 15 shards of window pane (25.2 gm).

Metal: There are 17 corroded ferrous nails? (79.7 gm) one of which looks to be a cut nail.

Shell: There are 281.32 gm of unidentified shell and 3.7 gm of *Haliotis*.

Faunal: There are 178 unidentified non-fish bone (558.6 gm) and 8 fish (4.6 gm).

Lithic: There is one chert flake (0.1 gm).

Charcoal: There are 42.2 gm of charcoal.

Human remains: There were no human remains.

Harris Matrix Summary by Stratum (see Harrix Matrix, page 9)

Principles of archaeological stratigraphy was written by Dr. Edward Harris (1979) and provides a practical approach to archaeological stratigraphy, as distinct from geological stratigraphy. It is particularly helpful for use on historic archaeological sites that exhibit continued use and alteration for two hundred plus years, such as the Presidio Chapel.

> As various societies passed from one form to another, as the nomad gave way to the town dweller, with each increase in the material development of human culture, there was an accompanying increase in the density of complexity of stratigraphic depositions in archaeological contexts. With each great change, such as the industrial revolution of recent centuries, the stratigraphic signature of human life became less geological and more man-made. Stratigraphically speaking, it is from a very early point in human history that geological principles of stratigraphy were no longer applicable to man-made stratification: it is from that early time that a claim for 'archaeological stratigraphy' as a separate, earth-forming process, cannot be refuted (Harris 1989:xii).

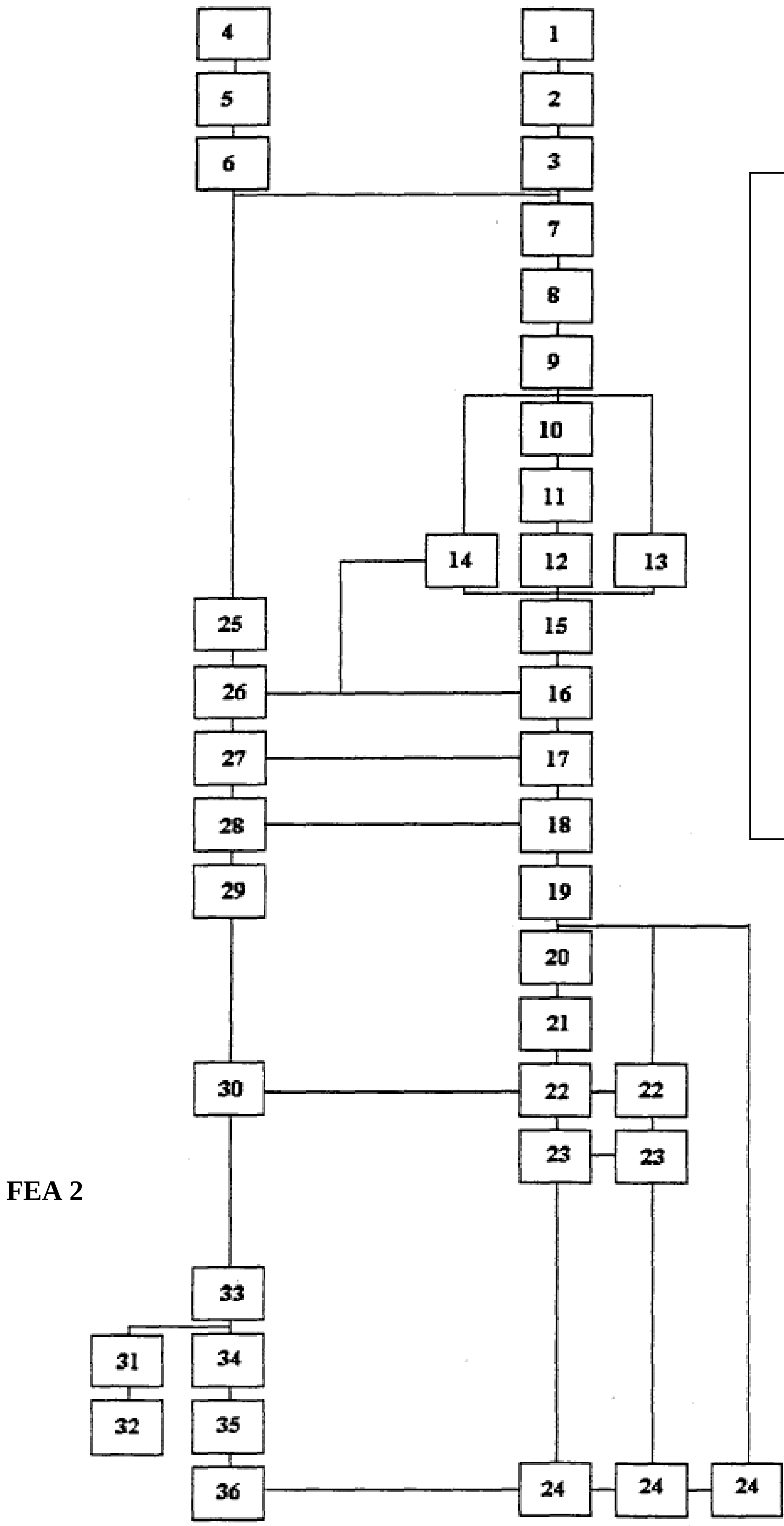
Thirty-five strata were identified in the excavation of the unit (see Harris Matrix, page 9). Of these thirty-five, fourteen contained artifacts. The unit was not excavated to bedrock. It was terminated with the exposure of a possible corridor pavement (PEA 1, stratum 20, 21, 22 and 30) and the chapel foundation (FEA 2) to the west. All non-interface strata contained varying amounts of tree roots, most likely from the Redwood trees which line the east side of the current walkway. The final exposure of the foundation (PEA 2) shows evidence of these roots (including one of . 14-.20 min diameter) extending into the mortar between the foundation stones (see photographs A and B in Appendix C, page 1).

The following is a description of each stratum; its size, location relative to other stratum, matrix and the materials recovered. An interpretation of the strata follows the stratum summary.

<u>Stratum One</u>: This shallow horizontal stratum is composed of redwood duff and a very small amount of soil (about 1 centimeter below datum). The soil is a black sandy loam, Munsell reading of 10YR 2/1.

<u>Stratum Two</u>: This is assigned to a horizontal interface. It is physically below Stratum One and above Stratum Three.

<u>Stratum Three</u>: It is a horizontal stratum of deposition. It too contains large amounts of organic duff along with feldspar (a gardening nutrient). The soil was very wet. Lab reports Munsell



HARRIS MATRIX

UNIT 1

San Carlos Cathedral
CA-MNT-27 1 H
Monterey, California

Archaeological Associates of
Central California

November 1994

reading of 10YR 2/1, black sandy loam. This stratum was physically under Stratum Two and above Stratum Four. It appears to be a disturbed gardening soil mix.
Associated artifacts include fired roof tile, red brick fragments, window pane (slightly yellow in color) 1 shard of undifferentiated Majolica ceramic, clear bottle glass, plastic fragments, aluminum foil, cellophane wrapper and undifferentiated shell fragments.

Stratum Four: This is assigned to a vertical interface. It is a shallow trench dug for a cement apron around the foundation at the soil surface. It is physically under Strata Five and Six and above Stratum Twenty-Six. This trench measures .06 m x 1.0 m x .005 to .01 m

Stratum Five: This shallow horizontal stratum of deposition is composed of brown sand, Munsell reading of 10YR 4/3. This stratum ranges from .10 m deep at the southwest to .05 m at the northwest edge of the unit. it is probably a mixture of Stratum Eight and sand brought in as a base for Stratum Six.

This stratum contains fired roof tile fragments, brick fragments, a ferrous wire nail, a fragment of haliotis shell, and concrete fragments.

Stratum Six: This horizontal stratum is the concrete apron applied to the foundation at the soil surface, sloped downward away the wall and foundation. The southwestern surface was about .15 m above the soil surface and the northwestern about 0.05 m.

Stratum Seven: This is assigned to the horizontal interface immediately under Strata Three, Five, and Six, and physically above Stratum Eight. It runs the full size of the unit, 1 m x 1.7 m.

Stratum Eight: This is a horizontal stratum of deposition about 1 meter by 1.8 meters and ranging in thickness from .14 m in the SE, .195 min the SW, .23 m in the NW to .155 m in the NE. The soil matrix was composed of black sandy loam, Munsell reading 10YR 2/1. This appears to be at least a secondary deposit, possibly a third or even fourth. It is physically under Stratum Seven and above Stratum Nine.

It contains many pieces of siltstone, fired roof tile, fired red brick, miscellaneous shell, bone (burned and unburned), window pane and bottle glass fragments, charcoal fragments, 8 shards of Mexican Lead-Glazed ceramic, 1 shard of transferware, 1 shard of handpainted white ware, two shards of Majolica - Aranama tradition, 1 shard of undifferentiated Majolica ceramic and 1 shard of mission ware.

Stratum Nine: This is a horizontal interface under Stratum Eight and above Strata Ten, Thirteen and Fourteen.

Stratum Ten: This is a horizontal stratum and is almost devoid of artifacts. The matrix is composed of gray sandy soil, Munsell reading 10YR 5/1. The area is about .56 m^2 and ranges in thickness from .06 m to .08 m. It is centrally located in the unit extending to the northeastern corner. During excavation it appeared to be a slurry or mudcoat puddle, possibly left from a construction/repair phase. This stratum is physically under Stratum Nine and above Stratum 11. The screening did recover two fired roof file fragments and one undifferentiated shell fragment.

Stratum Eleven: This is a horizontal interface between Strata Ten and Twelve.

Stratum Twelve: This is a horizontal stratum of deposition which appears to be minimally a secondary deposit. This stratum covered approximately the same area as Stratum Ten, about .56 m^2 located in the center to northeastern portion of the unit. It was kept distinguished from Stratum Thirteen and Fourteen because of the superposition of Strata Ten and Eleven over this stratum and not over Thirteen and Fourteen. The soil matrix is dark gray sandy loam, Munsell reading 10YR 4/1 and ranges in thickness from 7 to 15 centimeters. It is physically above Stratum Fifteen and correlated with Strata Thirteen and Fourteen.

It contains a variety of burned and unburned items, e.g. fish and non-fish bone, charcoal, 17 shards of Mexican Lead-Glaze ceramic, 1 shard of Chinese stoneware, 1 Chinese porcelain shard, 3 plain Majolica shards, 3 shards of Puebla Blue on White ceramic, 1 San Eli.zario polychrome shard, 5 shards of Aranama Tradition Majolica, 8 shards of mission ware, fired roof tile and 1 chert flake.

Stratum 13: This is a horizontal stratum of deposition. It looks similar to Stratum Twelve but with the omission of the superpositioned Strata Ten and Eleven. It ranges in thickness from 7 to 11 centimeters. It is located in the eastern and southeastern portion of the unit (and therefore is not seen in the north wall profile). It is physically under Stratum Nine and above Stratum Fifteen. it is associated with Strata Twelve and Fourteen. This soil matrix is gray sandy loam, Munsell reading 10YR 5/1.

It contains fish and non-fish bone, fired roof tile, 10 fragments of undifferentiated shell, fragments of plaster/lime mortar, charcoal, 3 badly corroded ferrous nails (1 could possibly be identified as a cut nail), and 1 badly corroded ferrous button. Ceramics included: 5 shards of Mexican Lead-Glaze; 1 plain Majolica; 1 San Elizario polychrome; 3 Aranama Tradition Majolica; 1 Puebla Blue on White, and 1 shard of mission ware.

Stratum Fourteen: It is a horizontal stratum of deposition and, like Stratum Thirteen, looks similar to Stratum Twelve. The matrix is described as gray sandy loam, Munsell 10YR 5/1 and is located in the western portion of the unit (west of centrally located Stratum Twelve). It is separated from Twelve by a krotovina (rodent hole) containing many small (thumb-sized or smaller) roots running generally north/south in the unit. It is physically over Stratum Seventeen and is correlated with Strata Twelve and Thirteen.

It contains fired roof tile, charcoal bone (burned and non-burned), heat-altered aqua bottle glass fragments, 6 shards of Mexican Lead-Glazed ceramic, 2 plain Majolica ceramic shards, 1 Aranama Tradition shard, 1 Puebla Blue on White shard, and 1 Chinese porcelain shard.

Stratum Fifteen: This is a horizontal interface physically under Strata Twelve, Thirteen, and Fourteen and above Stratum Sixteen. (Subsequent analysis of the section drawings and the artifacts indicates this should probably be broken into two, i.e, Fifteen-A, a Horizontal interface physically under Strata Thirteen and Fourteen and above Stratum 16 east of the krotovina;Fifteen-B, a Vertical feature interface above Stratum Sixteen west of the krotovina.

Stratum Sixteen: This is a horizontal stratum of deposition. It is very compact, requiring a hand mattock to remove. It is a dark gray silty sand, Munsell reading 10YR 4/1 with many small siltstone inclusions up to 15 centimeters in diameter. It covers an area of approximately 1 m x 1.8 m. It ranges in thickness from 10 to 21 centimeters. It appeared to extend across the unit.

The materials in this stratum include: fired roof tile, bone, shell fragments, lime plaster/mortar, 1 corroded ferrous nail and charcoal. The ceramics include: 2 Brunido Ware shards, 2 plain Majolica shards, 1 San Elizario polychrome shard, 4 shards of Aranama Tradition Majolica and 1 shard of mission ware.

Stratum Seventeen: This is a horizontal interface immediately under Stratum Sixteen and above Stratum Eighteen.

Stratum Eighteen: This is a horizontal stratum of deposition. The matrix is gray silty sand, Munsell 10YR 5/1 extending 1 m x 1.6 m across the unit ranging in thickness from .07 to .11 m. It is physically under Stratum Seventeen and above Stratum Nineteen. Because of the similar aqua bottle fragments found in this and Stratum 28, these two strata will be correlated. This is probably the result of the method used to excavate the unit, i.e., a small berm (about .2 m) was left unexcavated against the foundation while the majority of the unit was excavated, intending to isolate the original trench contents from the foundation construction.

The materials in this stratum include: fired floor and roof tile fragments, bone, charcoal, undifferentiated shell fragments, aqua bottle glass fragments, lime plaster/mortar and shell fragments. Ceramics include: 2 shards of Mexican Lead-Glaze ware, 2 Mission ware shards, 1 plain Majolica shard, 1 Aranama Tradition Majolica, 1 Puebla Blue on White shard, and 1 San Elizario polychrome.

Stratum Nineteen: This stratum is a horizontal interface physically above Strata Twenty, Twenty-Two and Twenty-Four. It too measures about 1 m x 1.6 meters.

Stratum Twenty: This horizontal stratum of deposition appears to be composed of light gray lime mortar/plaster, Munsell reading 10YR 7/1 (see photographs in Appendix C, page 1). This stratum, where present, appears to be about 2 centimeters thick and is immediately above Strata Twenty-One and Twenty-Two, another Horizontal Interface and then a siltstone/cobble with a clay binder layer. This layer was sampled only. It does not appear to contain artifacts. It is defined as the top coarse remains of the pavement (FEA 1)in the unit. It is evident with this stratum exposure that the pavement is not complete. There are large gaping spaces in the central and southern portion of the unit that only expose Strata Twenty-Two and Twenty-Four.

The sample, when processed, did contain 1 fragment of charcoal.

Stratum Twenty-Ones. This is the horizontal interface between Strata Twenty and Twenty-Two. It, too, is missing over much of the unit.

Stratum Twenty-Two: This is a horizontal stratum of deposition. It is immediately under Stratum Twenty-One and above Twenty-Three. It is composed of fist-sized cobbles of siltstone with a clay siltstone chips binder. It contains no visible artifacts. It was not removed, but is in fragile condition after the exposure to the feet of the archaeologists and engineers/conservators.

Stratum Twenty-Three: This is a horizontal interface. It is physically under Stratum Twenty-Two and above Twenty-four.

Stratum Twenty-Four: This horizontal stratum of deposition is exposed in generally the center portion of the unit, where Strata Twenty, Twenty-One, Twenty-Two and Twenty-Three have previously been disturbed/removed. It is a very dark gray silty sand, Munsell 10YR 3/1. It was only sampled by auger. It appeared to be void of artifacts. This Stratum surface ranged from .515 to .555 m below the surface datum in the Northeast corner. A sample of this stratum is included in the auger excavation series.

Stratum Twenty-Five: This was excavated as a vertical feature interface for the construction trench for the foundation (FEA 2). The top elevation is at the surface and extends to .62 m below the surface datum. It is physically adjacent to Stratum Nineteen. Upon later study of the northern sidewall the actual line of a construction trench is not visible. Interpretation is that subsequent to the construction and abandonment of the foundation (FEA 2) and the pavement (FEA 1) these features were covered with soil and materials in minimally secondary deposit. A vertical feature interface for the construction of the pavement feature (FEA 1) should more properly begin about .55 m below the surface, at the base of the pavement (FEA 1).

Stratum Twenty-Six: This was excavated as a vertical feature stratum, but later consideration (see note in Stratum Twenty-Five) appears to be a continuation of Stratum Sixteen. The soil matrix is very dark gray silty sand, Munsell reading 10YR 3/1. It was excavated as one stratum extending from the surface to .40 m below the surface. It extends westward to the foundation of the exterior chapel wall (FEA 2).

Materials screened from this stratum include both fired floor and roof tile, bone, undifferentiated shell fragments, lime plaster/mortar, dark green bottle glass fragments and a chrome plated nonferrous bubble line level case. The ceramics include: 1 Mexican Lead-Glaze shards, 1 plain Majolica shard, 1 decorated Chinese Porcelain shard, 1 Aranama Tradition shard and 2 shards of mission ware.

Stratum Twenty-Seven: This is a horizontal interface that seems to distinguish Stratum Twenty-Six from Twenty-Eight, possibly the bottom of what looks like a trench that was dug to expose the foundation, after it and the pavement (FEA 1) had been covered (see Section Drawing in Appendix D, page 4).

Stratum Twenty-Eight: This is a horizontal stratum of deposition immediately adjacent to the foundation (FEA 2) approximately .40 to .47 m below the surface. It appears to be correlated with Stratum Eighteen. It is physically above Stratum Twenty-Nine and under Stratum Twenty-Seven. The soil matrix is composed of gray silty sand, Munsell reading 10YR 5/1.

Materials screened from this matrix include: fired floor tile fragments, aqua bottle fragments (similar to those found in Stratum Eighteen). 1 shard of Mission ware; 1 plain shard of Majolica; and 2 shards of Puebla Blue on White Majolica.

Stratum Twenty-Nine: This is a horizontal interface physically under Stratum Twenty-Eight and above Stratum Thirty. It correlates with (probably a continuation of) Stratum Nineteen, the current surface of the pavement (FEA 1). There is one fired floor tile in the north sidewall of the unit that would appear to be continued within this stratum. It hints of the pavement having been originally tiled. The tile was left in place and can be seen in the photographs taken at the end of the excavation (see Appendix C, page 1)

Stratum Thirty: This is a horizontal stratum of deposition. It correlates with Stratum Twenty-Two. It does not contain the correlate to Stratum Twenty, the lime mortar/plaster layer. It was probably disturbed/removed during the subsequent exposure of the foundation (see note with Stratum Twenty-Five and Twenty-Six for explanation). It is composed of a gray/tan clay and siltstone chips about .03 m thick. There were no artifacts in this stratum.

Stratum Thirty-One: This is a upstanding feature interface, the foundation (FEA 2).

Stratum Thirty-Two: This is a vertical stratum of deposition. The matrix is dark grayish brown sand, Munsell reading 10YR 4/2. It is immediately adjacent to the foundation (FEA 2) and may represent an in situ construction trench backfill (see photograph B, Appendix C, page 1).

The small portion of soil removed did contain artifacts: 2 shards of Puebla Blue on White ceramic.

Stratum Thirty-Three: This is a horizontal interface between Strata Thirty-Two and Thirty-Four.

Stratum Thirty-Four: This is a horizontal stratum of deposition composed of black silty sand, Munsell reading 10YR 2/1 approximately .02 m thick. The very small sample removed contained no artifacts.

Stratum Thirty-Five: This is a horizontal interface between Strata Thirty-Four and Thirty-Six.

Stratum Thirty-Six: This is a horizontal stratum of very dark gray sand, Munsell 10YR 3/1. It correlates with Stratum Twenty-Four. As with Stratum Twenty-Four this stratum constitutes the end of the excavation.

HARRIS MATRIX INTERPRETATION and SEQUENCE

Interpretation

While there is no documentary evidence of a pavement such as a walkway or floor next to the chapel in either the brief archival search prior to the excavation nor the more in-depth search subsequent to the excavation, there does seem to be such a pavement (FEA 1). The finding of such a feature would seem to indicate that the soil surface at the time of the foundation construction was about .45 m (17-3/4 inches) below its present level. Because of the limits of the test unit size the exact dimensions the pavement (FEA 1) are still unknown.

Some possible explanations for the pavement (FEA 1) could range from a simple narrow paved walkway between the front/north and rear/south of the chapel to the possibility of a room pavement or floor. This could relate to the shed-roof structure depicted in both the Henry Miller 1856 sketch (Miller 1856, 1990:17) and 1847 drawing by William Rich Hutton (Van Nostrand 1968 :Plate XXIX see Appendix F, pages 8, 10), even though this structure has been interpreted as the "horse stall for the priests (Howard 1976:84)."

Because the excavation strategy proved to be built on the false premise, i.e. that the construction foundation trench extended up to the top of today's surface, subsequent examination of the sidewall sections and artifacts suggests several of the strata should be correlated as a part of a continuous layer. These are Strata Sixteen and Twenty-Six, Seventeen and Twenty-Seven, and Eighteen and Twenty-Eight.

Stratum Fifteen should be separated into two, i.e., Fifteen-A, a Horizontal interface physically under Strata Thirteen and Fourteen and above Stratum Sixteen east of the krotovina; Fifteen-B, a vertical feature interface above Stratum Sixteen west of the krotovina.

Sequence

It appears that after the construction of the chapel foundation (FEA 2), the pavement (FEA 1) was constructed. Its construction technique looks similar to that defined at Mission Santa Cruz in the exposure of the corridor of the Convento in the summer of 1993, i.e. a leveled surface topped with a coarse of fist-sized cobbles and clay/siltstone binder topped with lime mortar and floor tile (Simpson-Smith and Edwards, in process).

Prior to the pavement abandonment, most of Strata Twenty, Twenty-Two and the hypothetical fired floor tile were removed, possibly as salvage for re-use at some other location. Following the pavement abandonment, fill material from another context (Strata Eleven through Eighteen) was placed over the pavement surface (FEA 1). This filling in was followed by a construction phase which involved a mudcoat slurry (Stratum Ten) such as at the time of the addition of the long narrow Gothic stained glass windows (1858), the plastering and oil painting of the exterior (1876), the construction of the pyramidal tiled roof over the bell tower (1893) or the latest change to the windows by Harry Downie (1942).

The fact that Stratum Ten appears to be cut off to the west and a possible chrome-plated non-ferrous bubble level was found at the bottom of Stratum Fourteen seem to indicate that a hole was dug adjacent to the foundation (FEA 2) and refilled with Stratum Fourteen, possibly in an earlier attempt to check the foundation's condition. This was completed before the deposition of Stratum Eight, which appears to be continuous across the entire unit.

The location of the pavement (FEA 1) is indeed significant on two counts. It begins to fill in missing pieces on the chapel construction chronology and it hints at the probability of additional existing undocumented features such as this, associated with the chapel over it's long history.

The auger series excavated at the end of the field work through the sterile strata can be correlated with the strata noted in the CalAm trenches in Church Street (Edwards, Simpson-Smith and Lönnberg 1994). This can possibly add to the initial Harris Matrix, thus allowing for the construction of a matrix that would eventually include the entire Presidio site. Such a sequence could be of value to place the various archaeological work into a common context for a better understanding of the site through time.

PROPOSED MANAGEMENT ACTIONS

The Archdiocese should consult with a landscape architect with the understanding of the problems inherent with adobe structures and ground water. It would seem to be necessary to make some minor and major shifts in landscaping next to the chapel. A minor change would be to remove the beautiful flowering shrubs and water/sprinkler lines between the foundation and the walkway immediately. A shallow drain should be established at least until the Cathedral roof gutters are re-established. From the root exposure in the unit excavation and the filling in of the crypt[7] with roots it is clear that the large redwood trees along eastern side of the chapel and terrace should be removed.

The tree removal, and indeed, most subsurface alterations should minimally be monitored by a professional archaeologist to allow for the recording and evaluation of all archaeological features encountered. In the long term, all subsurface work on the parcel (and within the boundaries of the Presidio) should be done in consultation with a professional archaeologist. If the recommendation of the Conservators is to expose the foundations for repair, such plans should involve a SOPA professional archaeologist to advise on impacts to the potential and known cultural resources.

The materials recovered from this excavation which were only given a cursory identification, those from the Greenwood and Associates excavation (1979, see page 5) and Archaeological Consulting (1979) should be included in the scope of work for future archaeological investigations at the Monterey Royal Presidio.

[7] Consult Kimbro's report on the building chronology (Appendix F page 2).

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1979 Letter report to Mr. Serafino Bianchini, AIA re:interim and master architectural site plans for the grounds of the San Carlos Cathedral in Monterey on file at the Cabrillo College Archaeological Archive, Aptos.

Cartier, Robert (editor)

1993 **The Scotts Valley Site: CA-SCR-177**, a monograph published by the Santa Cruz Archaeological Society.

Costello, Julia

1994 "Analysis of Ceramics Recovered from a Utilities Trench Near the Presidio of Monterey" in *Final 1994 Report: The Profiling and Monitoring of a California American Water Company Trench Through a Portion of the Historic Spanish Presidio and Adjacent to the Thomas O. Larkin House in Monterey, California*. Prepared for California American Water Company, Monterey on file at the Cabrillo College Archaeological Archive, Aptos.

Crouch, Dora P.

1970 "The Royal Presidio Chapel: History, Architecture and A Self-Guided Tour" Privately printed, Monterey. On file at the Cabrillo College Archaeological Archive, Aptos.

Culleton, James

1951 Father Casanova's Account Book 1868-1890. **Academy Scrapbook**. Vol II, No.1 (July).

Department of Parks and Recreation

1979 California Historical Landmarks, Sacramento.

Dietz, Stephen

1985 Draft Final Report, Archaeological Test Excavations, CA-MNT-101, CA-MNT-298, CA-MNT-299, and El Castillo at the presidio and City of Monterey, Monterey County, California. Report prepared for Jones and Stokes Associates, Inc., Sacramento.

Dietz, Stephen and Thomas L. Jackson

1981 Report of Archaeological Excavations at Nineteen Archaeological Sites for the Stage 1 Pacific Grove-Monterey Consolidation Project of the Regional Sewerage System. Report Prepared for Engineering-Science, Inc. Berkeley.

Dillon, James
1976 National Register of Historic Places Inventory Nomination Form. U.S. Department of the Interior, National Park Service.

Edwards, Robert
1969 "Use of the Universal Transverse Mercator Grid for Archaeological Survey," in American Antiquity, April

Edwards, Rob and Charlotte A. Simpson-Smith
1995 Holy Cross/Santa Cruz Mission Test Excavations, Summer 1993, in process.

Edwards, Rob, Charlotte A. Simpson-Smith and Allan Lönnberg
1994 Final Report: The Profiling and Monitoring of a California American Water Company Trench Through a Portion of the Historic Spanish Presidio and Adjacent to the Thomas 0. Larkin House in Monterey, California. Prepared for California American Water Company, Monterey.

Godden, Geoggrey, A.
1964 Encyclopedia of British Pottery and Porcelain Marks. Schiffer Publishing, Ltd., Exton, PA.

Gordon, Burton L.
1977 **Monterey Bay Area: Natural History and Cultural Imprints**, The Boxwood Press, Pacific Grove, California. 2nd edition.

Haidich, John
1994 Scrapbook of clippings photocopied from collection of Monterey Public Library (MPL).

Harris, Edwards
1979 **Principles of Archaeological Stratigraphy** Academic Press, San Diego.

Hoods, Holly
1992 Poster "Historic Preservation at the Historic Monterey Royal Presidio", presented at the Society for California Archaeology Annual Meeting, 1992, Asilomar, on file at the Cabrillo College Archaeological Archive, Aptos.

Howard, Donald M.
1971 "Archaeological Investigation of the Royal Presidio of Monterey," In *Monterey County Archaeological Society Quarterly*, Vol I, Number 2, December.

1976 **California's Lost Fortress: The Royal Presidio of Monterey**. Antiquities Research Publications, Carmel.

Howard, Donald M. (continued)

1981 **Bastions by the Bay: New Documentation of the Royal Presidio of Monterey**. Angel Press. Monterey

Kimbro, Edna
1994,5 Personal Communications

Küchler, A. Will
1977 “The Map of the Natural Vegetation of California” in *Terrestrial Vegetation of California* edited by M. Barbour and J. Major, Wiley-Interscience Publication, New York.

Levy, R.
1978 Costanoans. In, *Handbook of North American Indians, Vol.8: California*. R. Heizer, Ed. Smithsonian Institution. Washington, D.C.

May, Ronald V.
1974 “Mexican Majolica at the Presidio of Monterey: A Tool for Dating Certain Stratigraphy,” in *Monterey County Archaeological Society quarterly, Vol.111, Number 4, July*.

1992 “Comments on CA-MNT-271 (YMCA) Collection,” manuscript on file at the Cabrillo College Archaeological Archive, Aptos.

Miller, Henry
n.d. **Account of a Tour of the California Mission and Towns 1856: The Journal and Drawings of Henry Miller.** Bellerophon Books. Santa Barbara.

Milliken, Randall
1981 Ethnohistory of the Rumsen. In, *Report of Archaeological Excavations at Nineteen Archaeological Sites for the Stage 1 Pacific Grove-Monterey Consolidation Project of the Regional Sewerage System,* Stephen A. Dietz and Thomas L. Jackson, eds. Report prepared for Engineering-Science, Inc. Berkeley.

Patch, Dorothy
1979 The Paleoecology of Elkhorn Slough: Implications for Human Subsistence. Senior Thesis, University of California, Santa Cruz.

Pilling, Arnold
1948 Archaeological Survey of Northern Monterey County. University of California Archaeological Survey Manuscript 106.

Simpson-Smith, Charlotte A.
1992 “Royal Spanish Presidio, Monterey California (CA-MNT-271H) Site Visit 8/15/92” unpublished notes on file at the Cabrillo College Archaeological Archive.

Simpson-Smith, Charlotte A. and Rob Edwards
1995 Test Excavations at Mission Santa Cruz, Holy Cross Church in process. Manuscript on file at Cabrillo College Archaeological Archive, Aptos.

Stanley, Richard G.
1982 Rocks and Landforms. In, *The Natural History of the UC Santa Cruz Campus* eds. Sheridan F. Warrick, Publication No. 11, Environmental Field Program, University of California, Santa Cruz.

U.S. Department of Interior
1976 **The National Register of Historic Places**, William J. Murtagh, Keeper of the National Register, National Park Service, Washington, D.C.

Williams, Jack S.
1985 “Archaeological Evidence of Spanish Military Policy in Northern New Spain.” In *Comparative Studies in the Archaeology of Colonialism*, edited by Stephen Dyson: Chapter 6 (115-125), British Archeological Review, Oxford.

Williams, Jack S. (continued)
1993 **The Presidio of San Carlos de Monterey: The Evolution of the Fortress -Capital of Alta California.** The Center for Spanish Colonial Archaeology, Technical Publication Series, Number 1, Tubac.

APPENDICES

VITAE

ADDRESSES

Cabrillo College	Home
6500 Soquel Drive	P.O. Box 310
Aptos, CA 95003	Soquel, CA 95073
(408)479-6294	(408)476-7568

PERSONAL

Born October 6, 1938
Social Security No. 443-34-9405
Married, August 1961 (two children)
Honorable Discharge, U.S. Marines, 1962

EDUCATION

- A.A. - City College of San Francisco, 1961
- B.A. - San Francisco State College, 1966
- M.A. - University of California, Davis, 1969
- Additional Graduate Study:
  - 1966-1971 - University of California, Davis
  - 1975 - University of California, Santa Cruz
  - 1991 - UC Berkeley Ext. Intro to GIS
  - 1993 - Vesira PC ARC/INFO training
  - 1994 - U of Nevada, Reno GIS and Archaeology

PRESENT POSITIONS

Fall 1971-present - Cabrillo College Instructor in Anthropology, except for January 1974 - July 1975 (National Endowment for the Humanities Fellowship)

Fall 1978 - Spring 1979 (personal leave as President and Principal Investigator for The Gavilan Foundation - a non-profit Cultural Resource Management and research organization)

Spring - Fall 1987 (Sabbatical leave).

1972-present Environmental Advisor in archaeology, Santa Cruz County Planning Department.

1992-present Director Archaeological Technology Program.

1992-present Occupational Education Council
Chairperson

PROFESSIONAL CERTIFICATION

Board of Governors, California Community Colleges-Life Credential in Anthropology, 1971

Society of Professional Archaeologists
-Accredited expertise in Archaeological Field Research, Theoretical or Archival Research, Archaeological Administration, Cultural Resource Management, Museology, and Teaching (1976).

PROFESSIONAL MEMBERSHIPS

American Anthropological Association (1970- present)

Society for American Archaeology (1963-present).
-Committee on Public Archaeology (1975-80)
-Committee on Cultural Resource Management Standards, Airlie House Session

Society for California Archaeology
(1966-present)
-Founding Member
-Vice-President (1969-1970)
-President (1975-1976)
-Past President (1977, 78, 79)
-Secretary (1982-1983)
-Various committees over the years
-Regional Coordinator (1971-1982)

Society of Professional Archaeologists
(1976-present)
-Standards Board Alternative (1978-1979)

California Mission Studies Association
(1983-present)
-Founding Member

California Geographic Information
Association (1994-present)
-Institutional Member

SPECIALIZATIONS
Teaching, Public Archaeology; Cultural Resource Management; Areas: California; Micronesia, and Andean South America.

HONORS AND GRANTS
California Community College - Employer Based Training Grant in GIS (1993/'94)
• Carl Perkins Fellow, Vocational Leadership Academy of the California Community College Chancellor's Office (1993)
• Vocational Retraining Grant - California Community College Chancellor's Office (1993)
• Skaggs Foundation Grant - Public Archaeology, Mission Santa Cruz (1987)
• Cabrillo College Faculty Grant (1987)
• Underwood Foundation Award Grant - Public Archaeology (1986)
• Skaggs Foundation Grant - Public Archaeology, Mission Santa Cruz (1986)
• Skaggs Foundation Grant - Public Archaeology, Mission Santa Cruz (1985)
• Santa Cruz Historical Society - Research Grant (1985)
• Santa Cruz Historical Society - Public Education Grant (1983)
• Santa Cruz Archaeological Society - Public Education Grant (1983)
• Santa Cruz Historical Society, Certificate of Commendation (1983)
• California Association of Community Colleges, Great Teachers Seminar (August 1983)
• Santa Cruz Historical Society, Certificate of Commendation (1981)
• National Science Foundation, Chatauqua Grant (1978-1979)
• National Science Foundation Instructional Equipment Grant (1975-1977)
• Santa Cruz Archaeological Society, Special Service Award (1975)
• American Philosophical Society Research Grant (1975)
• National Endowment for Humanities Fellowship (1974-1975)
• National Defense Education Grant (1974)
• National Science Foundation, Chatauqua Grant; Training in NEPA and CEQA requirements for EIS/EIR (1973-1974)
• Ford Foundation Travel Grant, South America (1970)
• University of California Regents Grant (1970)

SELECTED PUBLICATIONS AND PROFESSIONAL MANUSCRIPTS

1968 Archaeological Survey of the Point Reyes National Seashore. Submitted to National Parks Service, San Francisco

SELECTED PUBLICATIONS AND PROFESSIONAL MANUSCRIPTS continued

1969 *The Prehistory of the Pui 'Mak Wintun, Thomes Creek, Tehama County, California, Including a Suggested Chronological Model of the Northern Sacramento Valley Region Prehistory* Masters Thesis, University of California, Davis

1969 Archaeological Use of the Universal Transverse Mercator Grid. *American Antiquity* 34(2): 180-182

1969 Salvage Anthropology: Report of Committee on Dos Rios Dam. Submitted to Legislative Committee, State of California. Published by the Society of California Archaeology.

1971 *Syllabus on Archaeological Field Methods* Published by Cabrillo College, Aptos (1972, 1974, 1978, 1990)

1972 Archaeological Settlement Patterns of the Coast Miwok. In: Archaeology of Point Reyes National Seashore, California. *Occasional Paper of the Treganza Museum of Anthropology 6.* San Francisco State College.

1973 The Hartnell-Cabrillo College November 1972 Archaeological Field Reconnaissance of the Nacimiento River, Monterey County. *Robert E. Schenk Archives of California Archaeology*, Paper No. 59. San Francisco State University

1973 Alternative Realities in Archaeology; Introduction to Archaeological Theory, a one-hour video production, Cabrillo College

1974 Evaluation of the Archaeological Resources of the Coastal Zone of Monterey; Santa Cruz, and San Mateo Counties, California: part of the Technical Report on Recreation prepared for the Central Coastal Regional Commission of the California Coastal Zone Conservation Commission (with Rey Tretheway and Gary S. Brescbini). Submitted to Central Coastal Regional Commission of the California Coastal Zone Conservation Commission

1975 Prehistoric Cultural Resources at Hunter Liggett Military Reservation. Submitted to the President's Advisory Council on Historic Preservation

1977 Guidelines for Preparation and Evaluation of Archaeological Reports (with K. Anderson, H. Davis, M.B. Schiffer, S. South, G. Vivian). Chp III in: C.R.McGimsey and H.A.Davis,eds., *The Management of Archaeological Resources: The Airlie House Report.* Special Publication of the Society of American Archaeology

1979 Recommendations for Procedures, Guidelines and Archaeological Consultant Qualifications. Submitted to Santa Clara County

1979 FAUBA: A Past Waiting for a Future, Tol Island, Truk Lagoon, Micronesia. A Preliminary Preservation and Development Plan. Submitted to Office of Historic Preservation, Trust Territories of the Pacific (with Julie Olsen Edwards)

1980 Archaeological Data Program; Inundation Studies at Chesbro Reservoir. Submitted to National Park Service, Santa Fe (with Jean Stafford and Diane Gifford)

1984-present Anthropology and Education. Column series, *Newsletter of the Society for California Archaeology*

1986"Looking for a 'Lost Adobe' of Santa Cruz Mission with Ground Penetrating Radar," Paper presented at the Annual Meetings of the Society for California Archaeology held at Santa Rosa, California (with Charlotte Simpson-Smith)

1987 "The Media Blitz and Archaeology: What's In It for You?" in an Occasional Paper by the **Urban Archaeological Center**, City of Baltimore, edited by Elizabeth Anderson comer (with Arlyn Osborne-Golder)

1990 "Preliminary Cultural Resources Reconnaissance of the Jenson Ranch Project, Madera County, California." Manuscript on file at the South Central Information Center of the California Archaeological Inventory, California State University, Bakersfield, CA (with Charlotte Simpson-Smith)

1991 "Archaeological Excavations at CA-SCR-160, University of California Santa Cruz," Manuscript on file at the Northwest Information Center of the California Archaeological Inventory, Sonoma State

SELECTED PUBLICATIONS AND PROFESSIONAL MANUSCRIPTS continued

University, Rohnert Park, CA (with Charlotte Simpson-Smith)

1994 Discussant Panel "Partnerships Between Academe and Private Consulting Firms" Society for California Archaeology Annual Meetings, Ventura

1994 Invited panelist "GIS and Education" GIS/LIS Conference, Tucson, AZ.

OTHER PROFESSIONAL MANUSCRIPTS

Over three hundred Environmental Impact Reports or Archaeological Survey manuscripts for various agencies at the Federal, State, Regional, County and City level and a number of private planning and environmental firms.

CHARLOTTE A. SIMPSON-SMITH

EDUCATION: Cabrillo College, Archaeological Technology Program Certification, A.S. in Archaeology; B.A. Anthropology, University of California, Santa Cruz (All But Thesis); ESRI Certification: PC ARC/INFO - Introduction, '93; Graduate Seminar GIS and Archaeology, U. of Nevada, Reno (4/'94)

MANAGEMENT EXPERIENCE:

Office Manager and Archivist, Cabrillo College Archaeological Archive, 1982 - present

Teaching and Laboratory Instructional Assistant (18 Anthro 3 field classes; 8 Arche 4 Excavation classes with laboratory; 1 Excavation only, 2 Arche 5 classes, Laboratory Techniques Class; 4 Arche 2 classes, Advanced Archaeological Survey; 3 Arche 3 classes, Archival Data Management, Cabrillo College Archaeological Technology Program 1983 - present

Geographic Information Systems Specialist Community College Chancellor's Office Grant for Employer-Based Training - Arche 180:GIS and Cultural Resources, Pilot Project '93-'94) and Arche 80: GIS, the PC ARC/INFO Method Fall, 1994.

Consulting Archaeological Technician including, but not limited to the following:

Field Administrative Assistant Historic Structure Report and Documentation, Rancho San Cabs, September and December 1992. Greenwood and Associates, Pacific Palisades.

Laboratory Director, Rancho San Cabs, CA-MNT-1484, 1485, 1486, 12 archaeological technicians for 6 weeks, July and August 1991. Archaeological Consulting.

Survey Crew Leader, Rancho San Carlos, 15 surveyors, November 1990 to May 1991 (20,000 Acres, 48 prehistoric and 28 historic sites located). Archaeological Consulting.

Volunteer Archaeological Technician examples, but not limited to the following:

GIS Specialist, Standards Development Committee for the California Historical Resources Information GIS Environment, June 1994 to present.

Survey Crew Leader (avocational field crew of 15), Merle Ranch, Monterey County, Santa Cruz Archaeological Society survey October 1991.

Co Chairperson, SCAS Strategy Team - Excavation CA-SCR-177, 125 volunteer excavators/day for four days (field crew 125 + not including visiting dignitaries, public and media), May 1983, and May 1987.

Office Manager, Regional Office, California Archaeological Inventory, Cabrillo College, 3 staff 1981 - 1982.

TECHNICAL SKILLS: IBM PC-MS DOS computer proficient -

- **Windows:** Microsoft 3.1
- **Word Processing:** WordPerfect 5.1,
- **Spreadsheet:** Lotus 123,
- **Database:** DBase 4,
- **GPS:** PFBasic 2.0, PFinder 2.1 (Trimble Navigation software for GPS data manipulation) Beta tester,
- **GRAPHICS:** AutoCAD 12, AutoArchitecture 12, and
- **GIS Programming:** PC ARC/INFO 3.4 for DOS, ArcView I.

GPS receiver, Pathfinder Basic and Polycorder (Trimble Navigation)

Theodylite Transit and Stadia

Brunton Hand Transit

EXPERIENCE: 12 years Consulting Archaeological Technician

ORGANIZATIONS: Santa Cruz Archaeological Society
Society for California Archaeology
California Mission Studies Association

AWARDS: Santa Cruz Archaeological Society 1983
Society for California Archaeology 1984
Scotts Valley Historical Society 1985

RECENT MANUSCRIPTS:

Simpson-Smith, Charlotte A.

1994 “LABORATORY MANUAL” Arche 5, Fall 1994

1994 “Current and Future Uses of Geographic Information system Data Presented at the ‘Geographic Information Systems in Archeology’ Seminar”, April 18-19, Anaheim, California.

“Pilot GIS Projects Procedures Manuals: Santa Cruz County Cultural Resources and Spooner/Big Gulp THP Cultural Resources” Cabrillo College Archaeological Technology Program sponsored by an Employer-Based Training Grant Chancellor’s Office California Community College, June 1.

ADDRESS P.O Box 544 (mailing), 10300 Alba Road (residence)
Ben Lomond, CA 95005

TELEPHONE (408) 336-2047 (residence)
(408) 479-5014 (Cabrillo College Arch. Tech. Program Office)

Simpson-Smith, Charr and Rob Edwards

1986 “Sand Hill Bluff Visit and C^{14} Sampling, 8/26/86,” Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

1987 “New Techniques for an Old Site or How to Search for King Solomon’s Temple in Santa Cruz.”

1986-1987 Annual Report of the Cabrillo College Archaeological Program, on file at the Cabrillo College Archaeological Archive.

“Obsidian Sourcing,” 1986-1987 Annual Report of the Cabrillo College Archaeological Program, on file at the Cabrillo College Archaeological Archive.

1995 “Holy Cross/Santa Cruz Mission Church Excavation (in process).

Simpson-Smith, Charlotte, et al

1990 “Preliminary Cultural Resources Reconnaissance of West Cliff Drive Repair, City of Santa Cruz, Santa Cruz County, California,” Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

Simpson-Smith, Charlotte, et al (continued)

"Preliminary Cultural Resources Reconnaissance of APN 37-10-13 and Portions of APN 37-10-8, -12, Soquel, Santa Cruz County, California," Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

"Preliminary Cultural Resources Reconnaissance of APNs 027-251-03, -07, -10, -11, -12 and APN 027-240-03, The Proposed 17th Avenue Swim Center, Santa Cruz, Santa Cruz County, California," Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

1982 "Archaeological Reconnaissance Survey of the 'Ruins,' near Scotts Valley, Santa Cruz County, California," Manuscript on file at the Northwest Information Center of the California Archaeological Inventory, Sonoma State University, Rohnert Park, CA.

1983 "Archaeological Salvage Project 323 Rigg Street, City of Santa Cruz, California: CA-SCR261," on file at the Northwest Information Center of the California Archaeological Inventory, Sonoma State University, Rohnert Park, CA.

1983 "A Cultural Resources Predictability Study for the Land Management Agencies of the City of Scotts Valley, California," on file at the Northwest Information Center of the California Archaeological Inventory, Sonoma State University, Rohnert Park, CA.

Edwards, Rob and Charlotte A. Simpson-Smith

1984 "Cultural Resources Evaluation of the Faculty For-Sale Housing, 7-97330," on file at the Northwest Information Center of the California Archaeological Inventory, Sonoma State University, Rohnert Park, CA.

"Archaeological Evaluation of the Southern Pacific Railroad Bulldozing Project Southwest side of Harkins Slough, CA-SCR-153, Watsonville, Santa Cruz County, California," Manuscript on file at the Northwest Information Center of the California Archaeological Inventory, Sonoma State University, Rohnert Park, CA.

"Phase Two: Surface Reconnaissance and Subsurface testing for the Faculty-For-Sale Housing Project, 7-97330," Manuscript on file at the Northwest Information Center of the California Archaeological Inventory, Sonoma State University, Rohnert Park, CA.

1985 "Cultural Resources Research of Two Parcels at 308 Hill Street Capitola, California." Manuscript on file at the Northwest Information Center of the California Archaeological Inventory, Sonoma State University, Rohnert Park, CA.

Rob Edwards and Charlotte A. Simpson-Smith continued

"Summary Report on Archaeological Monitoring for 308 Hill Street, Capitola, California." Manuscript on file at the Northwest Information Center of the California Archaeological Inventory, Sonoma State University, Rohnert Park, CA.

1986 "Looking for a 'Lost Adobe' of Santa Cruz Mission with Ground Penetrating Radar," Paper presented at the Annual Meetings of the Society for California Archaeology held at Santa Rosa, California.

1987 "Ground Penetrating Radar and the Lost Adobe." Annual Report 1986-1987 of the Cabrillo College Archaeological Program, Manuscript on file at the Cabrillo College Archaeological Archive.

"San Hill Bluff Dating." Annual Report of the Cabrillo College Archaeological Program, on file at the Cabrillo College Archaeological Archive.

1987 "An Early Building at Mission Santa Cruz," paper presented at the California Mission Studies Association Fourth Annual Conference held in Santa Clara California.

"Excavation Report Spring and Summer Excavations of Cabrillo College at Santa Cruz Mission State Historic Park's 'Angled Adobe'," Manuscript on file at the Northwest Information Center of the California Archaeological Inventory, Sonoma State University, Rohnert Park, CA.

1988 "Surface Survey and Subsurface Testing of CA-SCL-330, Santa Clara County, California." Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

"Surface Survey and Subsurface Testing of CA-SCR-160, University of California Santa Cruz, California," Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

"Preliminary Archaeological Reconnaissance Cottage and Holohan Roads, Left Turn Project County of Santa Cruz Public Works Department," Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

1989 "Report of the Spring 1988 Excavations of Cabrillo College at Wilder Ranch State Park, CA-SCR-38/123, P796." Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

Rob Edwards and Charlotte A. Simpson-Smith continued

“The Mapping and Non-Exclusive Comprehensive Survey of a Portion of the Parcel A.P.N. 49-16-5 containing the ‘Jose Joaquin Castro Adobe/San Andreas House,’ CA-SCR-209H in Santa Cruz County, California.” Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

“Archaeological Reconnaissance and Evaluation of the David and Pat Harding Property, 919 Walnut Street, Santa Cruz, California,” Manuscript on life at the Northwest information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

“Preliminary Archaeological Reconnaissance and Historical Archival Research for the Proposed Parking Development at Campus Facilities, University of California, Santa Cruz,” Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

“Preliminary Archaeological Reconnaissance for the City of Santa Cruz Landfill Modification, County of Santa Cruz, CA,” Manuscript on life at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

“Brief Report of Site Preparation Activities at Ca-SCR-160 at the University of California Santa Cruz,” Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

1990 “Preliminary Cultural Resources Reconnaissance of the Jenson Ranch Project, Madera County, California.” Manuscript on file at the South Central Information Center of the California Archaeological Inventory at California State University, Bakersfield, CA.

“Porter Street Bridge Widening Preliminary Archaeological Reconnaissance, Santa Cruz County, California,” Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

“Preliminary and Secondary Subsurface Archaeological Reconnaissance of Coast Auto Supply and Dismantling, APN 18-371-03, Santa Cruz County, California,” Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

“Preliminary Cultural Resources Reconnaissance of a Parcel on Vine Hill School road, APN 023-121-15, in the City of Scotts Valley, CA,” Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

Rob Edwards and Charlotte A. Simpson-Smith (continued)

1991 "Archaeological Excavations at CA-SCR-160, University of California Santa Cruz," Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

1994 "The Profiling and Monitoring of a California American Water Company Trench Through a Portion of the Historic Spanish Presidio and Adjacent to the Thomas O. Larkin House in Monterey, California" manuscript n file at the Cabrillo College Archaeological Archive, Aptos.

Edwards, Robert L. Charlotte Simpson-Smith, and Nancy Del Grande
1988 "Looking for Solomon's Temple at Mission Santa Cruz," Paper presented at the Fifth Annual Conference of the California Mission Studies Association held at Mission San Fernando Rey de Espana.

"Use of Infrared Thermography at Mission Santa Cruz Area, CA-SCR-217H/T" Paaper presented at the Society for California Archaeology Annual Meeting.

Edwards, Rob, Nancy Del Grande, and Charlotte Simpson-Smith
1988 "Recent Remote Sensing at Mission Santa Cruz California Using Infrared Thermography," Paper presented to the Society for Historic Archaeology and Underwater Archaeology Annual Meeting held at Reno Nevada.

Kimbro, Edna, Charlotte Simpson-Smith, and Rob Edwards
1991 "A report on the Preliminary Field Reconnaissance Archival Potential, and an Evaluation of the Potential Historic Cultural Resources for the El Rio Mobile Home Cooperative 2120 North Pacific Avenue, City of Santa Cruz, California, "Manuscript on file at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University, Rohnert Park, CA.

ARTIFACT CATALOG

A.A.C.C - EXCAVATION 11/94
SAN CARLOS CATHEDRAL - MONTEREY SPANISH PRESIDIO
CA-MNT-271H GENERAL CATALOG

CATALOG_NU	STRATA	CLASS CODE	MATERIAL	OBJECT - ONE	OBJECT - TWO	QUANTITY
00001	10	22 architecture	6101 hispanic period tile	08 roofing		1
00002	1	22 architecture	6101 hispanic period tile	08 roofing		1
00003	1	21 kitchen	9000 glass undif.	03 bottles, jars		1
00004	3	22 architecture	6101 hispanic period tile	08 roofing		9
00005	3	22 architecture	6101 hispanic period tile	08 roofing		10
00006	3	22 architecture		06 construction mater	01 brick	25
00007	3	10 miscellaneous artifacts	2001 fish, undif	00 shell, undif.		6
00008	3	20 unidentified historic material	8000 metal undif.	01 undifferentiated		1
00009	3	20 unidentified historic material	9000 glass undif.	01 window glass		3
00010	3	21 kitchen	9000 glass undif.	03 bottles, jars		3
00011	3	20 unidentified historic material	9000 glass undif.	01 undifferentiated		1
00012	3	20 unidentified historic material	9000 glass undif.	01 undifferentiated		1
00013	3	21 kitchen	6121 majolica plainic, undif	01 table service		1
00014	5	22 architecture	6101 hispanic period tiledif	08 roofing	01 roofing tile	1
00015	5	22 architecture	6101 hispanic period tiledif	08 roofing	01 roofing tile	1
00016	5	22 architecture	6101 hispanic period tiledif	08 roofing	01 roofing tile	5
00011	5	22 architecture	0000 unidentified or misc.	06 construction mater		10
00018	5	20 unidentified historic material	0000 unidentified or misc.	01 undifferentiated		1
00019	5	22 architecture	8000 metal undif.	02 nails		1
00020	5	22 architecture	0000 unidentified or misc.	11 paint, accessories		5
00021	5	20 unidentified historic material	0000 unidentified or misc.	01 undifferentiated		1
00022	5	20 unidentified historic material	9000 glass undif.	01 undifferentiated		1
00023	5	20 unidentified historic material	9000 glass undif.	01 undifferentiated		1
00024	5	10 miscellaneous artifacts	3183 haliotis sp.	01 undifferentiated		1
00025	8	05 plant, fiber, wood, and other	5100 charcoal	05 charcoal		7
00026	8	22 architecture	0000 unidentified or misc.	06 construction mater		53
00027	8	04 shell artifacts	3000 shell, undif	99 miscellany		31
00028	8	04 shell artifacts	3000 shell, undif	99 miscellany		12
00029	8	03 bone artifacts	2000 bone, undif	00 bone, undif		15
00030	8	03 bone artifacts	2000 bone undif.	00 bone, undif		1
00031	8	22 architecture	8000 metal undif.	02 nails		6
00032	8	22 architecture	8000 metal undif.	02 nails		1
00033	8	20 unidentified historic material	8000 metal undif.	99 miscellany		1
00034	8	01 flaked stone artifacts	0210 chert undif	01 chunk		2
00035	8	22 architecture	9000 glass undif.	01 window glass		5
00036	8	22 architecture	9000 glass undif.	01 window glass		1
00037	8	22 architecture	9000 glass undif.	03 bottles, jars		1

CATALOG_NU	STRATA	CLASS CODE		MATERIAL		OBJECT - ONE		OBJECT - TWO		QUANTITY
00038	8	22	architecture	9000	glass undif.	03	bottles, jars			1
00039	8	22	architecture	9000	glass undif.	03	bottles, jars			1
00040	8	22	architecture	9000	glass undif.	01	window glass			2
00041	8	21	kitchen	6150	Mexican lead-glaze, undif.	01	table service			1
00042	8	21	kitchen	6150	Mexican lead-glaze, undif.	01	table service			1
00043	8	21	kitchen	6155	Mexican lead-glaze, bi. or br.	01	table service			1
00044	8	21	kitchen	6155	Mexican lead-glaze, bi. or br.	01	table service			1
00045	8	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00046	8	21	kitchen	6151	Mexican lead—glaze, plain	01	table service			1
00041	8	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00048	8	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00049	8	21	kitchen	6110	mission ware-glaze, undif.	01	table service			1
00050	8	21	kitchen	6322	wh.ware, trans. print, ware, fl	01	table service			1
00051	8	21	kitchen	6543	Chinese porc., dec., undif.ndif	01	table service			1
00052	8	21	kitchen	6132	aranama tradition	01	table service			1
00053	8	21	kitchen	6311	wh.ware, hand-paint.,mono.undif	01	table service			1
00054	8	21	kitchen	6132	aranama tradition	01	table service			1
00055	8	21	kitchen	6543	Chinese porc., dec., undif.ndif	01	table service			1
00056	8	21	kitchen	6121	majolica plain	01	table service			1
00051	8	21	kitchen	6300	whiteware vitrious china, undif	01	table service			1
00058	8	21	kitchen	6542	Chinese porc., plainhina, undif	01	table service			1
00059	8	22	architecture	6101	hispanic period tile	08	roofing			59
00060	8	22	architecture	6101	hispanic period tile	08	roofing			45
00061	8	22	architecture	6105	modern low fire earthware	06	construction mater	01	brick	101
00062	10	22	architecture	6101	hispanic period tile	08	roofing	01	roofing tile	1
00063	10	22	architecture	6101	hispanic period tile	08	roofing	01	roofing tile	1
00064	10	04	shell artifacts	3000	shell, undif	00	shell, undif.			0
00065	12	22	architecture	6101	hispanic period tile	08	roofing			0
00066	12	22	architecture	6101	hispanic period tile	08	roofing			0
00067	12	22	architecture	6101	hispanic period tile	08	roofing			6
00068	12	03	bone artifacts	2000	bone undif.	00	bone, undif			52
00069	12	03	bone artifacts	2001	fish, undif	00	bone, undif			1
00010	12	03	bone artifacts	2000	bone, undif	00	bone, undif			21
00071	12	22	architecture	8000	metal undif.	02	nails			4
00072	12	05	plant, fiber, wood, and other	5100	charcoal	05	charcoal			22
00013	12	04	shell artifacts	3183	haliotis sp.	00	shell, undif.			11
00074	12	22	architecture	0000	unidentified or misc.	06	construction mater			10

CATALOG_NU	STRATA	CLASS CODE		MATERIAL		OBJECT - ONE		OBJECT - TWO		QUANTITY
00075	12	01	flaked stone artifacts	0210	chert undiff.	02	flake			1
00016	12	21	kitchen	9000	glass undif.	03	bottles, jars table			3
00017	12	21	kitchen	6155	Mexican lead-glaze, bl. or br.	01	service			1
00018	12	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00079	12	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00080	12	21	kitchen	6155	Mexican lead-glaze, bl. or br.	01	table service			1
00081	12	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00082	12	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00083	12	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			.1
00084	12	21	kitchen	6155	Mexican lead—glaze, bl. or br.	01	table service			1
00085	12	21	kitchen	6151	Mexican lead—glaze, plain	01	table service			1
00086	12	21	kitchen	6155	Mexican lead—glaze, bi. or br.	01	table service			1
00087	12	21	kitchen	6151	Mexican lead—glaze, plain	01	table service			1
00088	12	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00089	12	21	kitchen	6155	Mexican lead—glaze, bi. or br.	01	table service			1
00090	12	03	bone artifacts	2000	bone, undif	00	bone, undif			1
00091	12	21	kitchen	6155	Mexican lead-glaze, bl. or br,	01	table service			1
00092	12	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00093	12	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00094	12	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00095	12	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00096	12	21	kitchen	6110	mission ware-glaze, plain	01	table service			1
00097	12	21	kitchen	6110	mission ware	01	table service			1
00098	12	21	kitchen	6110	mission ware-glaze, plain	01	table service			1
00099	12	21	kitchen	6110	mission ware-glaze, plain	01	table service			1
00100.	12	21	kitchen	6110	mission ware-glaze, plain	01	table service			1
00101	12	21	kitchen	6110	mission ware-glaze, plain	01	table service			1
00102	12	21	kitchen	6110	mission ware-glaze, plain	01	table service			1
00103	12	21	kitchen	6110	mission ware-glaze, plain	01	table service			1
00104	12	21	kitchen	6123	puebla blu. -on-wh. undif.	01	table service	03	plate	2
00105	12	21	kitchen	6442	Chinese stoneware, dec.	01	table service	03	plate	1
00106	12	21	kitchen	6131	san elizario poly.	01	table service			1
00107	12	21	kitchen	6123	puebla blu.—on-wh.	01	table service			1
00108	12	21	kitchen	6541	Chinese porc., undif.	01	table service			1
00109	12	21	kitchen	6121	majolica plain	01	table service			1
00110	12	21	kitchen	6121	majolica plain	01	table service			1
00111	12	21	kitchen	6121	majolica plain	01	table service			4

CATALOG_NU	STRATA	CLASS CODE		MATERIAL		OBJECT - ONE		OBJECT - TWO		QUANTITY
00112	12	21	kitchen	6123	puebla blu.-on-wh..	01	table service			1
00113	12	21	kitchen	6132	aranama tradition.	01	table service	03	plate	1
00114	12	21	kitchen	6132	aranama tradition.	01	table service			1
00115	12	21	kitchen	6200	earthenware undiff.	01	table service			1
00116	12	21	kitchen	6132	aranama tradition.	01	table service			1
00117	12	21	kitchen	6132	aranama tradition.	01	table service			1
00118	12	21	kitchen	6132	aranama tradition.	01	table service			1
00119	12	21	kitchen	6123	puebla blu.-on-wh..	01	table service			1
00120	14	22	architecture	6101	hispanic period tile	08	roofing			16
00121	14	05	plant, fiber, wood, and other	5100	charcoal	05	charcoal			1
00122	14	03	bone artifacts	2000	bone, undif	00	bone, undif			11
00123	14	03	bone artifacts	2000	bone, undif	00	bone, undif			3
00124	14	21	kitchen	9000	glass undif.	03	bottles, jars			2
00125	14	21	kitchen	6151	Mexican lead-glaze, plain	01	table service		.	1
00126	14	21	kitchen	6155	Mexican lead-glaze, bi. or br.	01	table service			1
00127	14	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00128	14	21	kitchen	6155	Mexican lead-glaze, bl. or br.	01	table service			1
00129	14	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00130	14	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00131	14	21	kitchen	6132	aranama traditione undif.	01	table service			1
00132	14	21	kitchen	6121	majolica plainware undif.	01	table service			1
00133	14	21	kitchen	6541	Chinese porc., undif.	01	table service			1
00134	14	21	kitchen	6121	majolica plainware undif.	01	table service			1
00135	14	21	kitchen	6123	puebla blu.-on-wh. undif.	01	table service			1
00136	13	22	architecture	6101	hispanic period tile	08	roofing			3
00137	13	22	architecture	6101	hispanic period tile	08	roofing			54
00138	13	03	bone artifacts	2000	bone, undif	00	bone, undif			24
00139	13	03	bone artifacts	2001	fish, undif	00	bone, undlf			1
00140	13	04	shell artifacts	3000	shell, undif	00	shell, undif.			9
00141	13	04	shell artifacts	3000	shell, undif	00	shell, undif.			10
00142	13	22	architecture	0009	plaster	06	construction mater			12
00143	13	05	plant, fiber, wood, and other	5100	charcoal	05	charcoal			1
00144	13	22	architecture	8000	metal undif.	02	nails			3
00145	13	24	clothing	8000	metal undif.	02	buttons			1
00146	13	21	kitchen	6155	Mexican lead-glaze, bl. or br.	01	table service			1
00147	13	21	kitchen	6155	Mexican lead—glaze, bl. or br.	01	table service			1
00148	13	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1

A.A.C.C - EXCAVATION 11/94
SAN CARLOS CATHEDRAL - MONTEREY SPANISH PRESIDIO
CA-MNT-271H GENERAL CATALOG

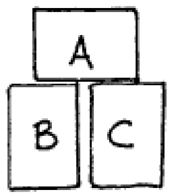
CATALOG_NU	STRATA	CLASS CODE			MATERIAL	OBJECT - ONE		OBJECT - TWO		QUANTITY
00149	13	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1
00150	13	21	kitchen	6151	Mexican lead-glaze, plain	01	table service table			1
00151	13	21	kitchen	6151	Mexican lead-glaze, plain low fire	01	service table service			1
00152	13	21	kitchen	6100	earthware undif.	01				1
00153	13	21	kitchen	6121	majolica plain	01	table service			5
00154	13	21	kitchen	6131	san elizario poly.	01	table service			1
00155	13	21	kitchen	6132	aranama tradition	01	table service			0
00156	13	21	kitchen	6132	aranama tradition	01	table service			1
00151	13	21	kitchen	6132	aranama tradition	01	table service			1
00158	13	21	kitchen	6123	puebla blu.—on-wh.	01	table service	03	plate	1
00159	16	22	architecture	6101	hispanic period tile	08	roofing			19
00160	16	22	architecture	6101	hispanic period tile	08	roofing			24
00161	16	03	bone artifacts	2000	bone, undif	00	bone, undif			23
00162	16	03	bone artifacts	2000	bone, undif	00	bone, undif		•	2
00163	16	04	shell artifacts	3000	shell, undif	00	shell, undif.			4
00164	16	22	architecture	0009	plaster	06	construction mater			4
00165	16	22	architecture	8000	metal undif.	02	nails			1
00166	16	05	plant, fiber, wood, and other	5100	charcoal	05	charcoal			1
00167	16	21	kitchen	6162	Mexican pottery, other	01	table service			1
00168	16	21	kitchen	6110	mission ware-glaze, plain	01	table service			1
00169	16	21	kitchen	6121	majolica plain	01	table service			5
00170	16	21	kitchen	6121	majolica plain	01	table service			2
00171	16	21	kitchen	6162	Mexican pottery, other	01	table service			1
00172	16	21	kitchen	6131	san elizario poly. undif.	01	table service			1
00173	16	21	kitchen	6132	aranama tradition	01	table service			1
00174	16	21	kitchen	6132	aranama tradition	01	table service			1
00175	16	21	kitchen	6132	aranama tradition	01	table service			1
00176	16	21	kitchen	6132	aranama tradition	01	table service			1
00117	18	22	architecture	6101	hispanic period tile	08	roofing			4
00178	18	22	architecture	6101	hispanic period tile	09	flooring			24
00119	18	03	bone artifacts	2000	bone, undif	00	bone, undif			14
00180	18	05	plant, fiber, wood, and other	5100	charcoal	05	charcoal			15
00181	18	22	architecture	0009	plaster	06	construction mater			74
00182	18	04	shell artifacts	3000	shell, undif	00	shell, undif.			1
00183	18	04	shell artifacts	3000	shell, undif	00	shell, undif.			11
00184	18	21	kitchen	9000	glass undif.	03	bottles, jars			4
00185	18	21	kitchen	6151	Mexican lead-glaze, plain	01	table service			1

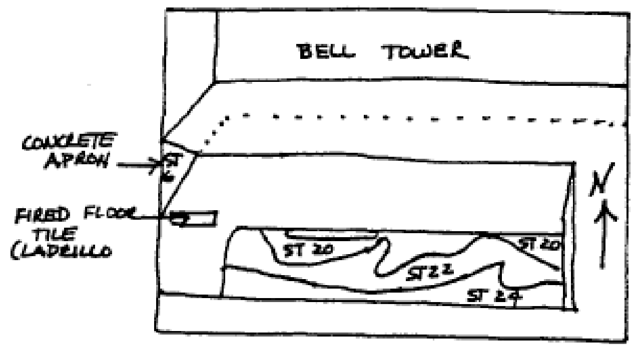
A.A.C.C - EXCAVATION 11/94
SAN CARLOS CATHEDRAL - MONTEREY SPANISH PRESIDIO
CA-MNT-271H GENERAL CATALOG

CATALOG_NU	STRATA	CLASS CODE	MATERIAL	OBJECT - ONE	OBJECT – TWO	QUANTITY
00186	18	21 kitchen	6151 Mexican lead-glaze, plain	01 table service		1
00187	18	21 kitchen	6110 mission ware	01 table service		1
00188	18	21 kitchen	6110 mission ware	01 table service		1
00189	18	21 kitchen	6121 majolica plain	01 table service		3
00190	18	21 kitchen	6132 aranama tradition	01 table service		1
00191	18	21 kitchen	6123 puebla blu.-on-wh.	01 table service		1
00192	18	21 kitchen	6131 san elizario poly.	01 table service		1
00193	20	22 architecture	0009 plaster	06 construction mater		4
00194	20	05 plant, fiber, wood, and other	5100 charcoal	05 charcoal		1
00195	18	21 kitchen	6121 majolica plain	01 table service		1
00196	26	22 architecture	6101 hispanic period tile	08 roofing		2
00197	26	22 architecture	6101 hispanic period tile	09 flooring		6
00198	26	03 bone artifacts	2000 bone, undif	00 bone, undif		8
00199	26	04 shell artifacts	3000 shell, undif	00 shell, undif.		3
00200	26	22 architecture	0009 plaster	06 construction mater		2
00201	26	21 kitchen	9000 glass undif.	03 bottles, jars		4
00202	26	28 shop, industrial	8000 metal undif.	01 shop tools		1
00203	26	21 kitchen	6155 Mexican lead-glaze, bl. or br.	01 table service		1
00204	26	21 kitchen	6110 mission ware-glaze, plain	01 table service		1
00205	26	21 kitchen	6110 mission ware-glaze, plain	01 table service		1
00206	26	21 kitchen	6121 majolica plain	01 table service		1
00207	26	21 kitchen	6132 aranama tradition	01 table service		1
00208	26	21 kitchen	6543 Chinese porc., dec., undif.	01 table service		1
00209	28	22 architecture	6101 hispanic period tile	09 flooring		37
00210	28	21 kitchen	6110 mission ware	01 table service		1
00211	28	21 kitchen	6121 majolica plain	01 table service	03 plate	1
00212	28	21 kitchen	9000 glass undif.	03 bottles, jars		34
00213	32	21 kitchen	6123 puebla blu.-on-wh.	01 table service		1
00214	32	21 kitchen	6123 puebla blu.-on-wh.	01 table service		1
00215	0	03 bone artifacts	2000 bone, undif	00 bone, undif		3
00216	0	22 architecture	6101 hispanic period tile	08 roofing		3
00217	1	10 miscellaneous artifacts	0000 unidentified or misc.	99 miscellany		20
00218	1	10 miscellaneous artifacts	0000 unidentified or misc.	99 miscellany		20

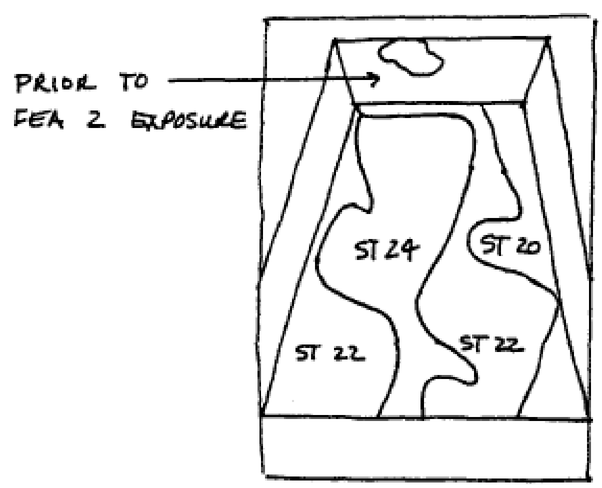
PHOTOGRAPHS AND LOG

Photo Sheet Explanation

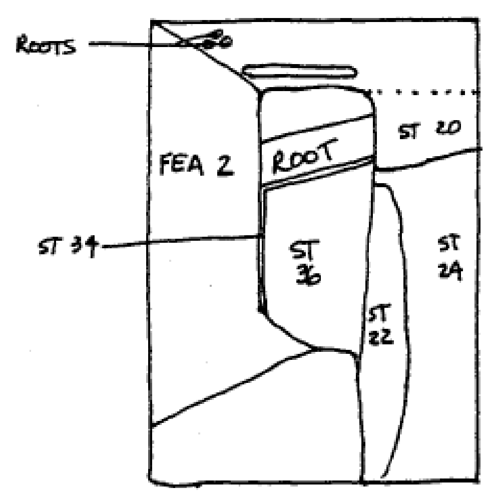




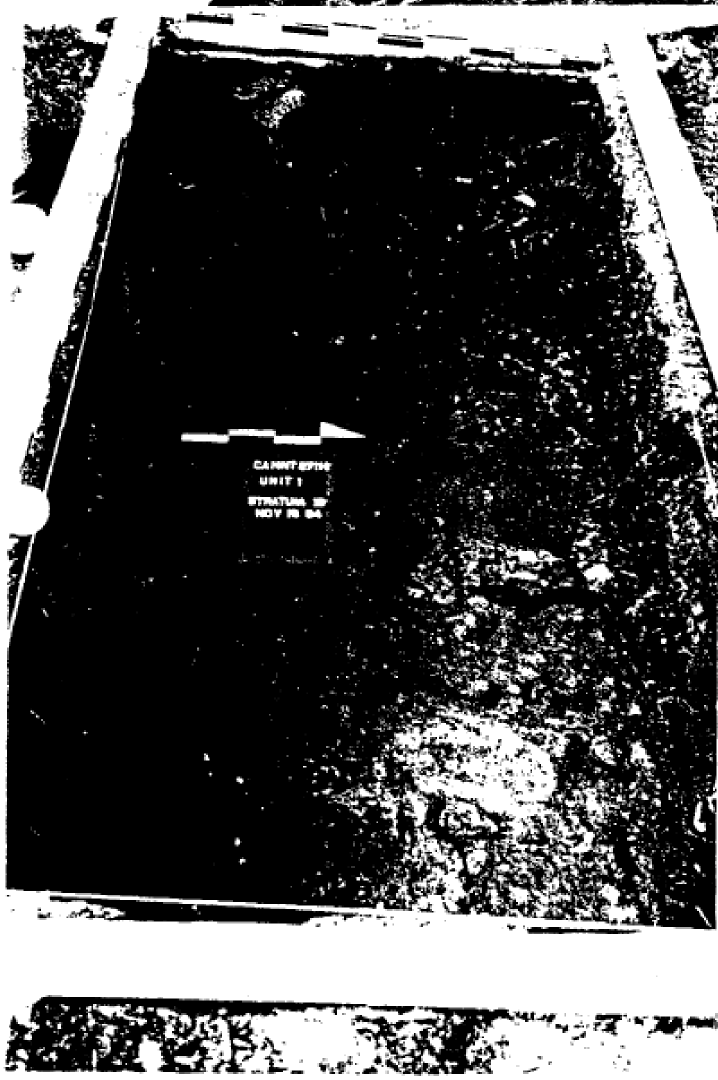
A. Roll 3, exposure 1, Unit 1, Northwall. This photo shows the northwall after the completion of the exposure, before the auger excavation with the strata identification tags in place. Stratum Twenty, lime mortar can be seen along the juncture of the sidewall and the floor of the unit. The fired floor tile near the foundation can also be seen to the left in the photo. The top of the photo shows the roots that were removed from the unit during the course of excavation. The exposed portion of the concrete apron can near the yellow flagging tied to the unit nail.

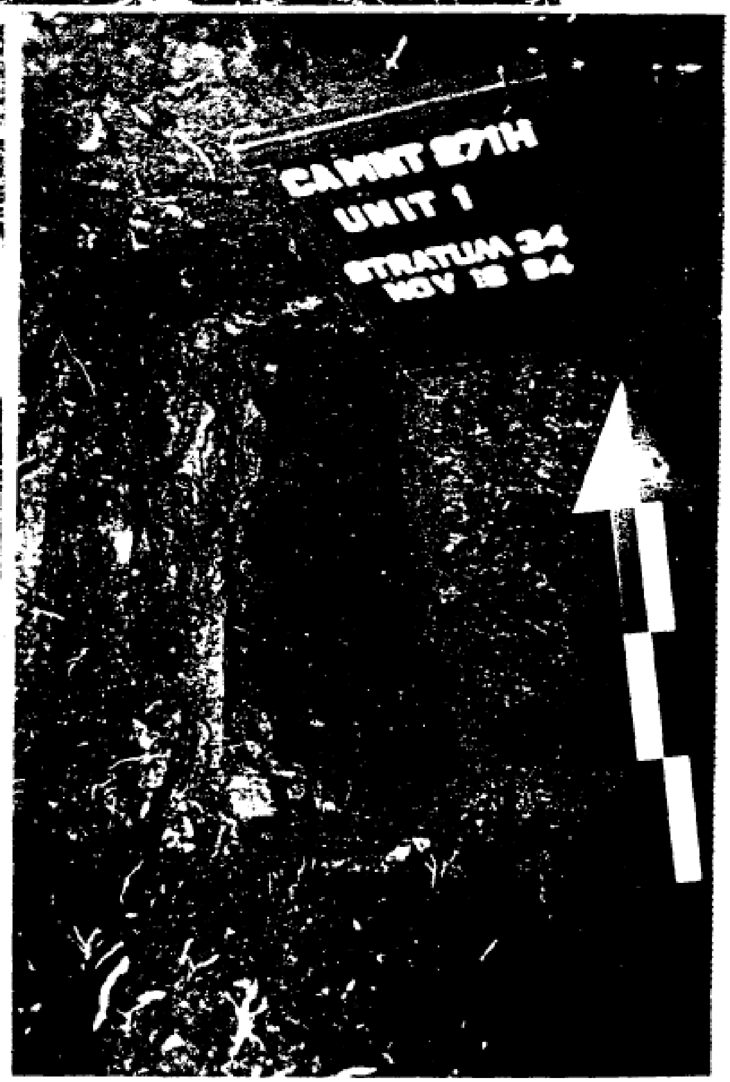


B. Roll 2, exposure 2, Unit 1, Bottom of Stratum 18. This photo shows the extent of the pavement (FEA 1) and its exposed courses.



C. Roll 2, exposure 19, Unit 1, Bottom of Stratum 34. This is a bird's eye view down into the exposure next to the foundation (FEA 2). Note the fired floor (ladrillo) tile adjacent to the foundation. Also, the redwood root in the very bottom of the unit going under the foundation (FEA2).




UNIT 1
STRATUM 34

PHOTOGRAPH RECORD

CALIFORNIA Department of Parks and Recreation
Office of Historic Preservation

Primary #
Trinomial/HRI # CA-MNT-271 H

Page 2 of 4

Roll Two

Property or Project Name/Temporary No.:
Camera Format: Pentax 35mm
Lens Size:
Film Type and Speed: Color print 400 ASA 35mm
Year: 1994 - Roll Two
Negatives kept at:

Mo.	Day	Time	Exp./Frame	Subject/Description	View Toward		Accession #
11	16	12:50p.	0.	Charr Simpson-Smith, Unit 1	W		
			1.	Charr Simpson-Smith, Unit 1	W		
			2.	Charr Simpson-Smith, Unit 1	N		
			3.	Backdirt pile, Unit 1	W		
			4.	Charr Simpson-Smith, Unit 1	W		
			5.	Charr Simpson-Smith, Unit 1	N		
			6.	Unit 1, bottom of unit, bottom St. 18	N		
			7.	Unit 1, bottom of unit, bottom St. 18	N		
			8.	Unit 1, bottom of unit, bottom St. 18	W		
			9.	Unit 1, foundation area st. 25, bottom st. 18	W		
			10.	Unit 1, stratum 26			
			11.	Unit 1,			
11	16	4:30p	12.	Unit 1, bottom St. 28, corner	NW corner		
			13.	Unit 1, bottom st. 28, corner	NW corner		
			14.	Unit 1, bottom St. 32, close-up	NW		
			15.	Unit 1, bottom St. 32,	NW		
		4:41p.	16.	Unit 1, bottom st. 32	W		
		4:41p.	17.	Unit 1, bottom st. 32	W		
			18.	Unit 1, bottom st. 34	NW		
			19.	Unit 1, bottom st. 34	NW		

PHOTOGRAPH RECORD

CALIFORNIA Department of Parks and Recreation
Office of Historic Preservation

Primary #
Trinomial/HRI # CA-MNT-271H San Carlos Cathedral

Roll Three

Property or Project Name/Temporary No.:
Camera Format:
Lens Size:
Film Type and Speed: ASA 400 Gold
Year: 1994
Negatives kept at:

Mo.	Day	Time	Exp./Frame	Subject/Description	View Toward		Accession #
			0. (*)	Unit 1, Charr Simpson-Smith	N		
11	17	11:15a.	1.	Unit 1, north wall, strata tags in place	N		
		11:23a.	2	Unit 1, north wall, overall shot	N		
			3.	Unit 1, north wall, overall shot	N		
		11:51a.	4.	Unit 1, north wall w/vertical-horizontal grid	N		
		12:35p.	5.	Unit 1, north wall w/ vertical-horizontal grid	N		
			6.	Unit 1 close-up, NW portion of N wall w/tags			
			7.	Unit 1 close-up, East portion			
		12:37p	8.	Unit 1 close-up, st. 20, possible lime mortar, N wall			
		12:49p	9.	Unit 1, West Wall, foundation (using flash)			
			10	Unit 1, West Wall, foundation (using flash)			

(*) didn't develop

PHOTOGRAPH RECORD

CALIFORNIA Department of Parks and Recreation
Office of Historic Preservation

Primary#
Trinomial/HRI # CA-MNT-271H
San Carlos Cathedral

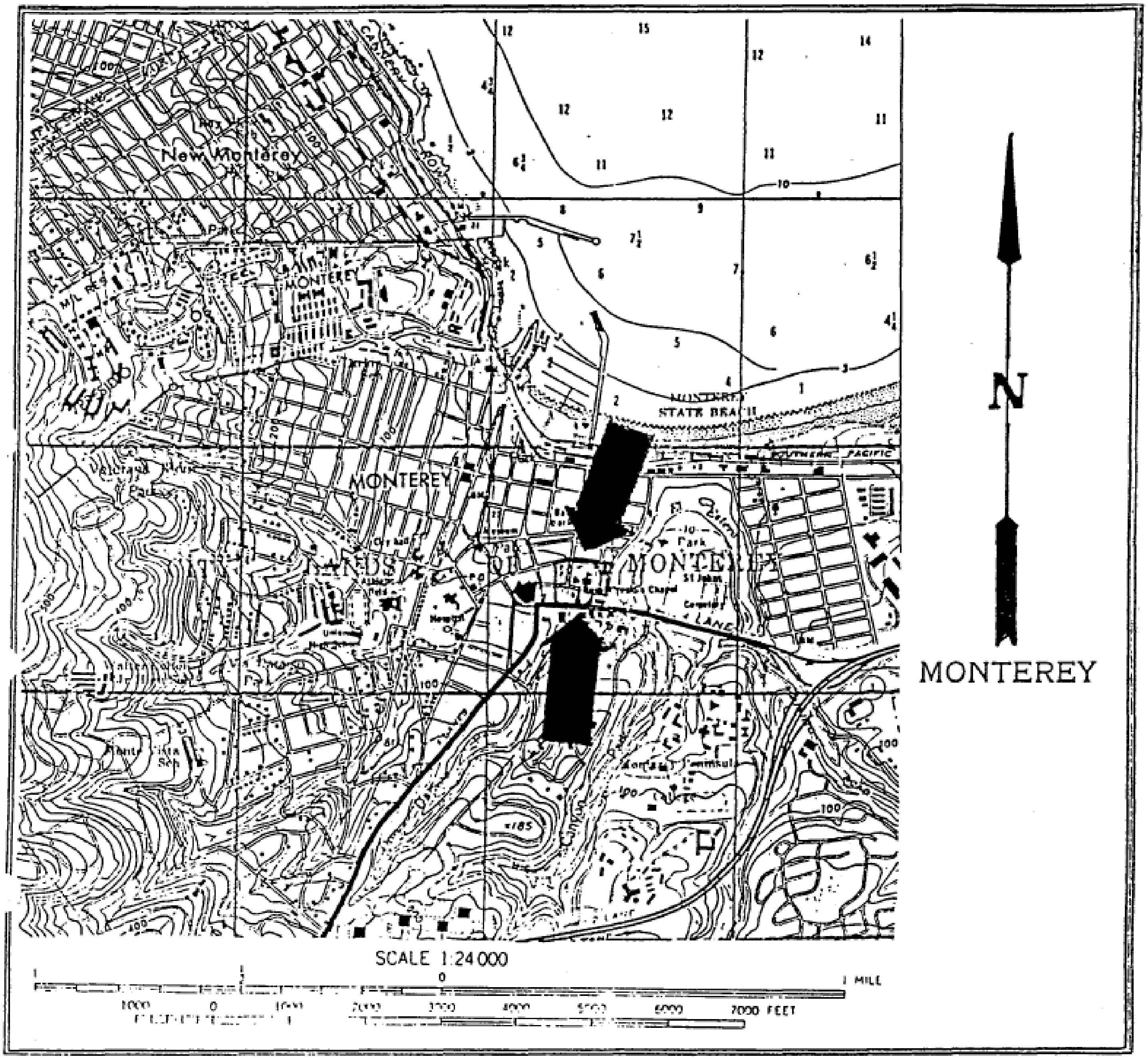
Page 4 of 4

Roll 4

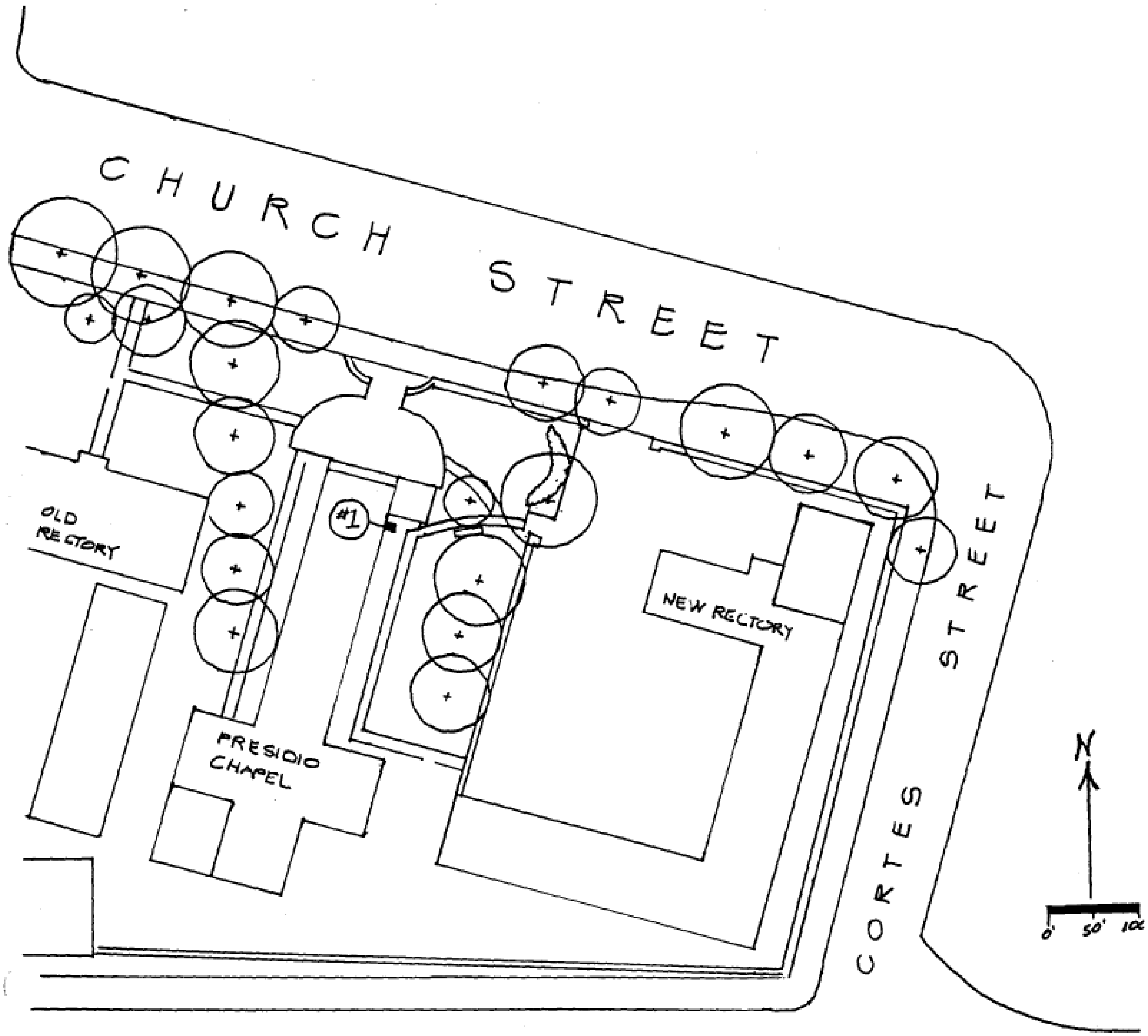
Property or Project Name/Temporary No.:
Camera Format:
Lens Size:
Film Type and Speed: Color ASA 400
Year: 1994
Negatives kept at:

Mo.	Day	Time	Exp./Frame	Subject/Description	View Toward		Accession #
11	22	9:12a.	0.	Unit 1 - Foundation	W		
11	22		1.	Unit 1 - Foundation	W		
11	22		2.	Unit 1 - Close-up w/east Cathedral wall	W		
11	22		3.	Unit 1 - Close-up w/o sign " "	W		
11	22		4.	Unit 1 - overview of auger holes + samples	NE		
11	22		5.	Unit 1 - overview of auger holes + samples	NE		
11	22		6.	Unit 1 - view of east wall + soil samples	NE		
11	22		7.	Unit 1 - overview w/auger hole, tarp, samples	N		
11	22		8.	Unit 1 - backfilled, looking at Cathedral wall	NW		
11	22		9.	Unit 1 - overview of backfiled unit " "			

MAP AND SECTION DRAWINGS

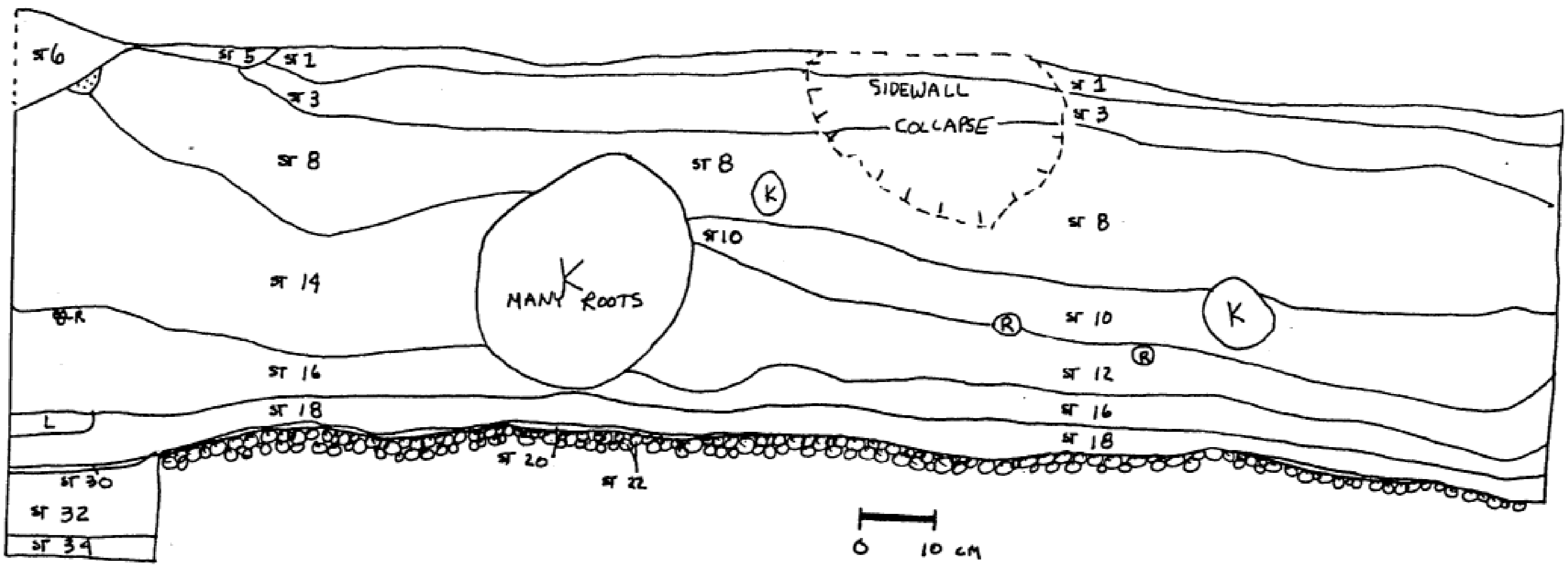


USGS 7.5 MINUTE MONTEREY QUAD MAP
1947, photorevised 1968



#1 = Unit 1

UNIT 1 LOCATION MAP
BASE MAP BY S. BIANCHINI, April 1978



LEGEND:
K = Krotovina (rodent hole)

L = Ladrillo fired floor tile

R = Roots

ST = Stratum

= Siltstone cobble

SECTION DRAWING: NORTH SIDEWALL UNIT 1

CERAMIC CATALOG AND REPORT

Comments on the Ceramic Collection from Unit 1
San Carlos Cathedral Excavation
November/December 1994

Preface

The initial brief examination[8] of the San Carlos collection employed the techniques refined by Costello and reported in **Analysis of Ceramics Recovered from a Utilities Trench Near the Presidio of Monterey** (Costello 1994) done for the Cabrillo College Archaeological Technology Program. This following analysis techniques description and wares definition are taken directly from the report (Costello 1994:1-3, 20-21).

Recovered Ceramic Types

The ceramic wares recovered are initially grouped by where they were manufactured: New Spain (later Mexico), China, the Ca4fornia missions, England, and the United States. The general identifier "Europe" is used where wares such as porcelain are clearly not Chinese, but it is not known if they are from France or England. It also is used where wares are not from China, Mexico, or Alta California, but cannot be identified as to their origins.

Within each of these "origin" categories, specific types of wares can be identified that reflect temporal changes, economic variables, functional variables, and stylistic preferences.

New Spain and Mexican Wares

Three categories of Mexican ceramics are commonly identified on Hispanic sites in California: Majolica, Mexican Lead-Glazed, and Brunido.

Majolica *Majolica, an earthenware covered with a tin-opaqified lead glaze. It was introduced into Spain by the Arabs. New World typologies have been developed over the past decades and are now in common use (Goggin 1968, Lister and Lister 1974, 1976, 1977, 1982). The majolica types of northern New Spain and Alta California have been further refined and dated by Barnes (1972), May (1972, 1976), and Barbola-Rolland (1983).*

Two major stylistic traditions of majolica have been identified: Puebla Blue-on-White, which was replaced in popularity by Aranama. The former includes vessels decorated in various shades of blue over a white background while the latter encompasses the colorful polychromes which appeared slightly later...

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[8] Unfortunately, because of the budgetary constraints of this project the level of interpretation is therefore limited.

<u>Mexican Lead-Glazed</u> These mold and wheel-made earthenware (also referred to as "galera" wares) are covered with a clear lead glaze that is sometimes tinted green or red with the addition of metallic oxides such as copper or iron. They are less expensive than majolica and often associated with utilitarian cooking wares, although handpainted jarros and other hollow wares were also made for the table. Broadbrush black (or brown) motifs are common and overglaze elements are sometimes added.

<u>Brunido</u> These highly burnished earthenware are from the vicinity of Tonolá, Jalisco, continuing a tradition that stretches back to Pre-Columbian times. Production dates are from the 1600s to present (Frierman 1982:55-56). The wares can be slipped (usually red) and handpainted in several colors, they are not glazed. Forms include some hollow vessels that are burnished on both the interior and exterior, and closed jar forms that have unfinished interiors.

Chinese Wares

Chinese porcelains and stonewares were first introduced into Alta California by European ships returning from the Far East. Excavations at Drake 's Bay near San Francisco provide evidence of Capt. Drake 's visit in 1579 and the wreck of Cermeño 's ship in 1595 (von der Porten 1972, 1974, 1984). Following the establishment of the Spanish colony in 1769, Chinese wares were imported with more regularity and are typical components of Hispanic-period ceramic collections. Later English and Yankee traders continued importing porcelains in return cargos from the Orient, exchanged for sea otter pelts.

Mission Pottery

The term Mission Pottery or Mission Ware has been used to describe the low-fired earthenware recovered from Hispanic sires in Alta California. Being inexpensive and fragile, it is assumed that they were locally-produced, manufactured relatively close to where they are recovered. There is a tradition of pottery-making in Southern California prior to the arrival of the Spanish. Here separation of "Mission Pottery "from "Tizon Brown" wares can be problematical, hinging on techniques of manufacture and clay analysis (Evans 1969; Love and Risnick 1983). In central and northern California, where ceramic technologies were meager or nonexistent prior to the arrival of the Spanish, these simple earthenware can more reliably be associated with Hispanic innovations.

English Wares

English ceramics were manufactured cheaply and in astounding quantities, beginning in the mid 18th century. Merchants carried them to trading ports around the globe where they were immediately popular with local consumers. The ceramics were more durable than local earthenware, competitively priced, and appealingly "modern ' in style and decoration. Their rapid adoption has left a "whiteware" horizon in 18th and 19th century sites world wide.

Various improvements were made in the bodies of clays during the late 18th and early 19th centuries. The comparatively soft pearlwares and whitewares were gradually overshadowed by the more durable group of ceramics referred to generically as "white improved earthenware (WIE). Under this name are grouped "stone china," "Ironstone," and "white granite;" all semi-vitreous, white-bodied wares which were plain, or had molded or transfer printed designs. WIE first appeared in about 1800, was shipped to the U.S. by the 1840s, and was the dominate type in use from the 1850s until the end of the century (Miller 1991:9-10).

Ceramic Catalogue Codes
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Material used for body type:

ERT	*earthenware*
PCL	*porcelaneous stoneware*
POR	*porcelain*
STN	*stoneware*
WIE	*white improved earthenware*
WW	*white ware*

Color of clay body

Decoration technique:

ANL	*annular ware*
BND	*Brunido ware*
BUR	*burnished*
DCL	*decal*
GLZ	*glazed*
HDP	*handpainted*
MAJ	*majolica*
MLD	*molded*
MLG	*Mexican Lead-Glazed*
SEW	*Shell edged ware*
SLP	*slip*
TFP	*tranferprint*
UND	*undecorated*

Secondary decoration description:

ARN	*Aranama Polychrome (majolica)*
BLK	*black*
BLU	*blue*
BRN	*brown*
CLR	*clear*
GLD	*gold*

GRN	*green*
GRY	*gray*
HDP	*handpainted*
LAV	*lavender*
PLY	*polychrome*
PNK	*pink*
PBW	*Pueblo Blue on White (majolica)*
PUR	*purple*
RED	*red*
TAN	*tan*
WHT	*white*
YEL	*yellow*

General Shape of Vessel:

CLD	*closed*
DEC	*decorative*
DOL	*doll*
OPN	*open*
FLT	*flat*
PIP	*clay smoking pipe*

Type of Vessel.

BOT	*bottle*
BWL	*bowl*
COM	*comal, flat Mexican Frying dish*
COK	*cooking vessel, exterior blackening*
CRK	*crock*
DPT	*deep plate*
DSH	*serving dish*
EXT	*Brunido Ware: only exterior of vessel burnished*
FIN	*Brunido Ware: interior and exterior burnished*
HDL	*handle*
JAR	*jar*
JUG	*jug*
LID	*lid*
OTH	*other*
PLT	*plate*
PIP	*smoking pipe*
POT	*teapot, etc.*
PTR	*platter*
SCR	*saucer*
TLE	*flat construction tile*
VAS	*vase*
UKN	*unknown*

Country/place of manufacture:

MAJ	*majolica - always handpainted*
MEX	*Mexican lead-glazed; always handpainted*
MIS	*Mission period pottery; locally made*
CHI	*Chinese ceramics; always hand painted*
JAP	*Japanese ceramics; probably transferprinted porcelain*
ENG	*England*
USA	*United States*
E/A	*England or America*

A.A.C.C.

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CATALOG_NU	STRATA	FRAG_TYPE		COLOR		QUANTITY	COMAGENTS
00013	3	02	fragment	13	white	1	ERT TAN MAJ WHT UKN UKN MEX
00049	8	31	rim fragment	53	brown pred.	1	ERT BRN UND UND UKN COK MIS — MIS
00052	8	31	rim fragment	63	white pred.	1	ERT PNK MAJ ARN UKN UKN MEX ARN
00043	8	02	fragment	03	brown	1	ERT PNK MLG HOP UKN UKN MEX - MLG
00044	8	31	rim fragment	53	brown pred.	1	ERT PNK MLG HOP UKN UKN MEX - MLG
00041	8	31	rim fragment	03	brown	1	ERT PNK MLG UND UKN COK MEX — MLG
00042	8	02	fragment	03	brown	1	ERT PNK MLG UND UKN COK MEX - MLG
00045	8	02	fragment	53	brown pred.	1	ERT PNK MLG UND UKN COK MEX — MLG
00048	8	02	fragment	53	brown pred.	1	ERT PNK MLG UND UKN COR MEX — MLG
00046	8	02	fragment	53	brown pred.	1	ERT PNX MLG UND UKN COK MEX - MLG
00047	8	02	fragment	53	brown pred.	1	ERT PNK MLG UND UKN UKN MEX - MLG
00054	8	02	fragment	63	white pred.	1	ERT RED MAJ ARN UKN UKN MEX — GUANAJUATO
00056	8	02	fragment	13	white	1	ERT TAN MAJ WHT UKN UKN MEX
00058	8	02	fragment	13	white	1	POR WHT GLZ UND UKN UKN CHI — POR
00051	8	02	fragment	63	white pred.	1	POR WHT HOP BLU UKN UKN CHI — POR
00055	8	02	fragment	02	blue	1	POR WHT HOP BLU UKN UKN CHI - POR
00053	8	02	fragment	63	white pred.	1	WIE WHT GLZ GLD UKN UKN ENG
00057	8	02	fragment	13	white	1	WIE WHT GLZ WHT UKN UKN ENG — WIE
00050	8	02	fragment	52	cobalt blue pred	1	WW WHT TFP BLU UKN UKN ENG - WW
00109	12	02	fragment	13	white	1	
00111	12	02	fragment	13	white	4	3-ERT TAN MAJ WHT UKN UKN MEX; 1-ERT PNK MAJ WHT UKN UKN MEX
00102	12	31	rim fragment	03	brown	1	ERT BRN UND UND UKN COK MIS - MIS - HEAT ALTERED
00098	12	02	fragment	03	brown	1	ERT BR!! UND UND UKN COK MIS - MIS - HEAT ALTERED
00103	12	02	fragment	03	brown	1	ERT BRN UND UND UKN UKN MIS — MIS - HEAT ALTERED
00101	12	02	fragment	03	brown	1	ERT BRN UND UND UKN UKN MIS - MIS - HEAT ALTERED
00100	12	02	fragment	03	brown	1	ERT BRN UND UND UKN UKN MIS - MIS - HEAT ALTERED
00099	12	02	fragment	03	brown	1	ERT BRN UND UND UKN UKN MIS - MIS - HEAT ALTERED
00096	12	02	fragment	03	brown	1	ERT BRN UND UND UKN UKN MIS - MIS - HEAT ALTERED
00097	12	31	rim fragment	51	black pred.	1	ERT GRY UND UND UKN COK MIS - HEAT ALTERED
00115	12	31	rim fragment	63	white pred.	1	ERT PNK MAJ ARN UKN UKN MEX — ARN
00118	12	31	rim fragment	63	white pred.	1	ERT PNK MAJ ARN UKN UKN MEX - ARN
00117	12	02	fragment	63	white pred.	1	ERT PNK MAJ ARN UKN UKN MEX - ARN
00114	12	02	fragment	63	white pred.	1	ERT PNK MAG ARN UKN UKN MEX - ARN
00116	12	02	fragment	63	white pred.	1	ERT PNK MAG ARN UKN UKN MEX - ARN
00104	12	02	fragment	63	white pred.	2	ERT PNK MAJ PBW FLT PLT MEX - PBW - HEAT ALTERED
00110	12	31	rim fragment	13	white	1	ERT PNK MAJ WHT UKN UKN MEX
00084	12	31	rim fragment	53	brown pred.	1	ERT PNK MLG HOP UKN COK MEX — MLG - HEAT ALTERED

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CATALOG_NU	STRATA	FRAG_TYPE	COLOR	QUANTITY	
00089	12	31 rim fragment	53 brown pred.	1	ERT PNK MLG HOP UKN UKN MEX — MLG
00080	12	02 fragment	53 brown pred.	1	ERT PNK MLG HOP UKN UKN MEX - MLG
00077	12	02 fragment	10 tan	1	ERT PNK MLG HOP UKN UKN MEX — MLG
00091	12	31 rim fragment	53 brown pred.	1	ERT PNK MLG HOP UKN UKN MEX — MLG
00086	12	31 rim fragment	53 brown pred.	1	ERT PNK MLG HOP UKN UKN MEX - MLG
00079	12	02 fragment	53 brown pred.	1	ERT PNK MLG UND UKN COK MEX — MLG
00081	12	02 fragment	53 brown pred.	1	ERT PNK MLG UND UKN COK MEX - MLG
00092	12	02 fragment	53 brown pred.	1	ERT PNK MLG UND UKN COK MEX — MLG
00083	12	02 fragment	53 brown pred.	1	ERT PNK MLG UND UKN UKN MEX - MLG
00095	12	02 fragment	53 brown pred.	1	ERT PNK MLG UND UKN UKN MEX - MLG
00094	12	02 fragment	53 brown pred.	1	ERT PNK MLG UND UKN UKN MEX - MLG
00093	12	02 fragment	53 brown pred.	1	ERT PNK MLG UND UKN UKN MEX - MLG
00087	12	02 fragment	53 brown pred.	1	ERT PNK MLG UND UKN UKN MEX - MLG
00088	12	02 fragment	53 brown pred.	1	ERT PNK MLG UND UKN UKN MEX - MLG
00082	12	31 rim fragment	53 brown pred.	1	ERT PNK MLG UND UKN UKN MEX — MLG
00085	12	02 fragment	53 brown pred.	1	ERT PNK MLG UND UKN UKN MEX — MLG - GREEN GLAZE
00078	12	02 fragment	10 tan	1	ERT PNK MLG UND UKN UKN MEX - MLG - HEAT ALTERED
00112	12	02 fragment	63 white pred.	1	ERT RED MAG PBW UKN UKN MEX — PBW
00113	12	02 fragment	63 white pred.	1	ERT TAN MAG ARN FLT PLT MEX — ARN
00107	12	02 fragment	63 white pred.	1	ERT TAN MAJ PBW UKN UKN MEX - PBW
00119	12	02 fragment	52 cobalt blue pred	1	ERT TAN MAG PBW UKN UKN MEX - PBW
00106	12	02 fragment	63 white pred.	1	ERT TAN MAJ PBW UKN UKN MEX — SAN ELIZARIO
00105	12	33 base fragment	63 white pred.	1	PCL WHT HOP BLU FLT PLT CHI
00108	12	02 fragment	13 white	1	POR WHT BLZ UND UKN UKN CHI - POR
00156	13	31 rim fragment	13 white	1	ERT PNK MAJ ARN FLT COK MEX - ARN - HEAT ALTERED
00155	13	31 rim fragment	13 white	0	ERT PNN MAJ ARN UKN UKN MEX - ARN
00154	13	02 fragment	13 white	1	ERT PNK MAJ PBW UKN UKN MEX — SAN ELIZARIO
00146	13	02 fragment	03 brown	1	ERT PNK MLG HOP UKN COK MEX - MLG
00150	13	02 fragment	03 brown	1	ERT PNN MLG HOP UKN UKN MEX - MLG
00151	13	02 fragment	03 brown	1	ERT PNK MLG UND UKN COK MEX - MLG
00149	13	02 fragment	03 brown	1	ERT PNK MLG UND UKN UKN MEX - MLG
00147	13	31 rim fragment	03 brown	1	ERT PNK MLG UND UKN UKN MEX — MLG
00148	13	02 fragment	03 brown	1	ERT PNK MLG UND UKN UKN MEX - MLG
00157	13	31 rim fragment	13 white	1	ERT TAN MAJ ARN UKN UKN MEX - ARN
00158	13	31 rim fragment	13 white	1	ERT TAN MAG PBW FLT PLT MEX — PBW
00153	13	02 fragment	13 white	5	ERT TAN MAG WHT CLD UKN MEX
00152	13	31 rim fragment	03 brown	1	ERT TAN UND UND UKN COK MIS

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CATALOG_NU	STRATA	FRAG_TYPE		COLOR		QUANTITY	COMMENTS
00132	14	02	fragment	13	white	1	ERT PNK MAJ WHT UKN UKN MEX
00126	14	31	rim fragment	03	brown	1	ERT PNK MLG HOP UKN UKN MEX - MLG
00128	14	02	fragment	03	brown	1	ERT PNK MLG HOP UKN UKN MEX - MLG
00125	14	31	rim fragment	03	brown	1	ERT PNK MLG UND UKN COK MEX - MLG
00129	14	02	fragment	03	brown	1	ERT PNK MLG UND UKN UKN MEX - HW
00130	14	02	fragment	03	brown	1	ERT PNK MLG UND UKN UKN MEX — MLG
00127	14	02	fragment	03	brown	1	ERT PNK MLG UND UKN UKN MEX - MLG - GREEN GLAZE
00135	14	02	fragment	13	white	1	ERT RED MAJ PBW UKN UKN MEX - PBW
00131	14	31	rim fragment	13	white	1	ERT TAN MAJ ARN UKN UKN MEX — ARN
00134	14	02	fragment	13	white	1	ERT TAN MAJ WHT UKN UKN MEX
00133	14	31	rim fragment	13	white	1	POR WHT GLZ UND UKN UKN CHI - POR
00168	16	31	rim fragment	03	brown	1	ERT BRN UND UND UKN COK HIS — HIS - HEAT ALTERED
00167	16	02	fragment	03	brown	1	ERT GRY BND UND UKN COK MEX — BND — HEAT ALTERED
00176	16	02	fragment	63	white pred.	1	ERT PNK MAJ ARN UKN UKN MEX - ARN
00173	16	02	fragment	63	white pred.	1	ERT PNK MAJ ARN UKN UKN MEX — ARN
00174	16	02	fragment	63	white pred.	1	ERT PNK MAJ ARN UKN UKN MEX — ARN
00175	16	02	fragment	63	white pred.	1	ERT PNK MAG ARN UKN UKN MEX — ARN
00172	16	02	fragment	63	white pred.	1	ERT PNK MAJ PBW UKN UKN MEX — SAN ELIZARIO
00170	16	02	fragment	63	white pred.	2	ERT RED MAJ WHT CLD UKN MEX
00171	16	02	fragment	60	tan pred.	1	ERT TAN BUD HDP UKN FIN MEX — BND
00169	16	02	fragment	63	white pred.	5	ERT TAN MAJ WHT UKN UKN MEX
00189	18	02	fragment	13	white	3	2-ERT TAN MAJ NUT UKN UKN MEX; 1-ERT PNK MAJ WHT UKN UKN MEX
00188	18	02	fragment	03	brown	1	ERT BLR UND UND UKN UKN HIS — MIS - HEAT ALTERED
00187	18	31	rim fragment	03	brown	1	ERT GRY UND UND UKN COK MIS - HIS - HEAT ALTERED
00185	18	31	rim fragment	03	brown	1	ERT PNK MLG UND UKN UKN MEX - MLG
00186	18	31	rim fragment	03	brown	1	ERT P11K MLG UND UKN UKN MEX - MLG - HEAT ALTERED
00190	18	02	fragment	13	white	1	ERT TAN MAG ARN UKN UKN MEX ARN
00191	18	02	fragment	13	white	1	ERT TAN MAJ PBW UKN UKN MEX - PBW
00192	18	02	fragment	13	white	1	ERT TAN MAG PBW UKN UKN MEX - SAN ELIZARIO
00195	18	02	fragment	13	white	1	ERT TAN MAJ WHT UKN UKN MEX
00204	26	02	fragment	53	brown pred.	1	ERT BRN UND UND UKN COK HIS - MIS - HEAT ALTERED
00205	26	02	fragment	53	brown pred.	1	ERT BRN UND UND UKN COK HIS — MIS - HEAT ALTERED
00207	26	31	rim fragment	53	brown pred.	1	ERT PNK MAJ ARN UKN UKN MEX ARN
00203	26	31	rim fragment	53	brown pred.	1	ERT PNK MLG HDP UKN UKN MEX - MLG
00206	26	02	fragment	13	white	1	ERT TAN MAG WHT UKN UKN MEX
00208	26	31	rim fragment	63	white pred.	1	POR NUT HDP BLU UKN UKN CHI - POR
00210	28	02	fragment	51	black pred.	1	ERT GRY UND UND UKN COK MIS - HIS - HEAT ALTERED

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CATALOG_NU	STRATA	FRAG_TYPE		COLOR		QUANTITY	COMAGENTS
00211	28	02	fragment	63	White pred.	1	ERT TAN MAJ WHT FLT PLT MEX
00214	32	02	fragment	63	white pred.	1	ERT TAN MAJ PBW UKN UKN MEX - PBW
00213	32	02	fragment	63	white pred.	1	ERT TAN MAJ WHT UKN UKN MEX
						128	

ROYAL PRESIDIO CHAPEL CHRONOLOGY

BY

Edna Kimbro

November 17, 1994

ROYAL PRESIDIO CHAPEL CHRONOLOGY

1791 February 26, Fages to Romeu reported that a church with its spire (espadana) had been begun so that the former one could be removed (Howard 1976:26). The former adobe chapel was located north of the present structure.

June 15, Manuel Ruiz, master stone mason, started work on the Royal Presidio chapel (Howard 1976:26).

August 6-9. Instructions addressed to Arguello about building the church (see Provincial State Papers, Ms., Bancroft Library X:42).

Fages' report indicates that the first story chapel walls were up by August when he left Monterey (Schuetz-Miller Ms.:141). A sketch of the presidio from the south by Jose Cardero, artist with the Malespina Expedition shows the building quite advanced in 1791.

1792 Design of facade by Manuel Ruiz, master mason at Monterey (Howard 1976:82). This elevation is extant in the Archivo General de la Nacion in two versions.

March 1, Viceroy orders work on church suspended until further orders (see State Papers, Sacramental, Ms., Bancroft Library iv:1).

March 13, Antonio Velasquez, Director of the Real Acadamia de San Carlos, Mexico City designed an elevation for the chapel facade (Letter of Velasquez, March 26, in Howard 1976:27). This elevation is not extant but one assumes that the facade as constructed represents the changes made by Ruiz in conformance with the Valesquez design.

April 4, Viceroy sent an elevation for the church, made by the directors of the Royal Academy of San Carlos, Mexico City (see State Papers, Sacramental, Bancroft Library iv:112).

November 27, Artisans for Presidio Church chosen: Santiago Ruiz (master mason), with journeymen: Salvador Rivera and Pedro Alcantara (Lasuen to Arguello, 27 November 1792 in Howard 1976:28). Apparently, Santiago Ruiz assumed direction of the project about this date (Schuetz-Miller Ms.:263).

December, Master Mason Manuel Esteban Ruiz was transferred to Carmel to work on the mission church near the Rio Carmelo (Schuetz-Miller Ms.:259).

1793 Construction of the chapel was near competion in November, with neophyte laborers finishing the facade and roofing the building in December (Schuetz-Miller Ms.:142).

1794 Chapel measures 30 x 120 feet constructed of sandstone from Carmel (Crouch 1962:2). Lime for mortar is said to have originated at Corral de Tierra (Howard 1976:14). The chapel was later plastered over (Crouch 1962:3). The cost (of plastering or construction??) was reportedly 1500 pesos (Howard 1976:13).

1795 January 25, the chapel was blessed by Father Presidente Lasuen (Geiger in Howard 1976:28).

1797 Toribio Ruiz was to repair the roof of the chapel (California Archives, Bancroft Library v. 25:384 in Howard 1976:28).

1811 A baptistry was to be constructed on the chapel (Archives of the Archbishop, Bancroft Library, 11:84 in Howard 1976:29).

1829 Alfred Robinson mentioned the “chapel-dome” and towering flag staff (Howard 1976:31).

1842 Visitor Duflot de Mofras mentioned plans to reconstruct the chapel (Howard 1976:32). Another visitor, Sir George Simpson reported that part of the church was decaying and another part was unfinished, which may have been a side room shown in sketches by Hutton and Miller (Howard 1976: 32).

1847 May 6 and 15, William Rich Hutton made sketches of the chapel (Howard 1976:34). These indicate that there were shed roofed additions on the east and west sides of the chapel near the rear.

1848 William Ryan described the chapel interior as whitewashed with niches on either side of the nave for statues (Howard 1976:34).

1849 Visitor Bayard Taylor described a small parlor organ in the church (Howard 1976:35).

1850 The Royal Presidio Chapel was made San Carlos cathedral by Bishop Joseph S. Alemany (Crouch 1970:3).

1855 Two or three American style mirrors were reportedly suspended high above the altar with a statue of the Crucifix and one of the Virgin located behind glass in nichos about half way down the church (niches are said to have been restored by Downie in 1942). The statues were reportedly of the movable type (imagenes de vestir?) (Howard 1976:35).

1856 Henry Miller produced a drawing of the church with shed roofed addition on the east side similar to the Hutton sketches (Miller 1856). Some sources say that the church was remodeled extensively in this year; however, other evidence supports a date of 1858 for this effort (see below).

1858 September 24, church purchased land from James Stokes immediately behind the Royal Presidio Chapel, apparently to accommodate enlargement of the church. When San Carlos Church was enlarged with transepts, a crypt was created with funding by Francisco Pacheco (Crouch 1970:3). Pacheco's daughter Isadora was married there October 25, 1859 and Pacheco himself died March 9, 1860 and was buried in the crypt (Shumate 1980:5).

Bones were reportedly disinterred when the transept footings were dug (ca. 1858) at the rear of the church (Downie in Howard 1976:36). The Campo Santo is said to have been at the rear, which was collaborated by the finding of bones when Fremont Street was widened in 1937 (Howard 1976:36). Art 1847-56 burial ground in front of the church is thought to have been moved at this time (Howard 1976:36).

Harrie Downie reportedly thought that the carved stone portals of the transepts originated at Carmel as side altars (Howard 1976:86). Long narrow Gothic stained glass windows are thought to have been added in the nave by Fr. Comellas at this time (Howard 1976:86). The church is said to have been renovated with a new altarpiece by an Italian artisan named Frascinine of redwood with plaster of Paris (yesso) surfacing (Couch 1970:11). The early front entry doors were replaced at this time (Howard

1976:36). The new so-called Romanesque altarpiece may have been introduced and the 1811 baptistry removed from the west side of the nave at the same time (Howard 976:36).

1874 The whale bone pavement was installed in front of the church (Casanova in Culleton 1951:35).

1876 Fr. Casanova had the “new “ walls of the church and sanctuary strengthened with six strong anchors, plastering and oil painting the exterior of the church at a cost of $400 (Casanova in Culleton 1951:36).

1887 Fr. Casanova had work done on the roof of the bell tower (Casanova in Culleton 1951 :39). Photos taken ca. 1865 and ca. 1875 indicate that a shed roof protected the tower and bells at an earlier date (Howard 1976:83,85).

1893 The pyramidal tiled roof was built over the bell tower (Newcomb 1925:270). This and the installation of electricty, and the gothic windows are said to have been Father Mestres' projects (Monterey Peninsula Herald, May 18, 1975: n.p. MPL). Before 1920 Father Mestres is said to have had Juan Martorel build the stone wall around the property using stone from the old Washington Hotel; the shrine on the corner was built by Carob Abbe in 1932 Crouch 1970:15).

1925 Architectural historian RexfordNewcomb wrote: ‘The interior of the church has been completely modernized and is consequently not of great interest” (Newcomb 1925:274). He referred to the pyrimidical roof on the tower as new.

1930s Whalebone pavement of the forecourt of the church was replaced with cement by Father Durkin after 1934 (Culleton 1951:40). Other sources say the 1940s (Crouch 19 70:3).

1934 The Historic American Building Survey measured and recorded the building.

1935 The church was re-roofed (Monterey Peninsula Herald, November 12, 1938:n.p. MPL). The Martha Cooper memorial organ was installed (Monterey Peninsula Herald, July 24, 1938:n.p. MPL)

1936 Historian George Tays wrote a report on the Royal Presidio Chapel, State Registered Landmark No. 105, this year (BL).

1938 The Index of American Design team found traces of two shades of red paint in crevices of the transept portals (Crouch 1970:6; Monterey Peninsula Herald, July 24, 1938: n.p. MPL).

1942 The tile floor was installed in church interior (Crouch 1970:23). The crypt beneath the floor was opened and showed evidence of flooding. It was permanently sealed with concrete in 1942 (Crouch 1970:12). The crypt was said to have been opened once 25 years earlier when a musty odor was noticeable (Monterey Peninsula Herald, February 19, 1942: n.p.MPL). According to the same source, restoration of the altar was in the hands of the Monterey Guild and the old statues were to be replaced. The walls were replastered, the windows made square, and new doors made by Harry Downie were installed. The work was reportedly done by Al Megna and P.F. Welborn, contractors (Monterey Peninsula Herald, June 3, 1942:n.p. MPL). Harrie Downie discovered the original niches for the statues at this time and reopened them. The lavabo in an alcove was moved there from the sacristy at the rear of the church (Crouch 1970:6).

Re: the two portales of the transept. I believe they were originally used on the interior of the building at the entrances to the two shed roofed additions forming a kind of transept (see 1847 and 1856 sketches by Hutton and Miller. This would explain their coloration being similar to that of the interior. They bear no resemblance to altars.

Generally it is thought that the 1942 work included removal of the confessionals shown in the HABS drawings, erection of the narthex wall and the altar rear wall (Father Occhiuto oral communication 1994).

1961 The Royal Presidio Chapel was declared a National Historical Landmark. Frederick J. Blersh painted the rear altar decorations, before the dedication (Crouch 1970:11).

1962 October 12. the National Landmark Plaque was dedicated at the Royal Presidio Chapel (Monterey Peninsula Herald, October 13, 1962:n.p. MPL).

1969 The forecourt of the church was paved with brick in a herring-bone pattern and the interior and exterior of the church were repainted (Crouch 1970:3).

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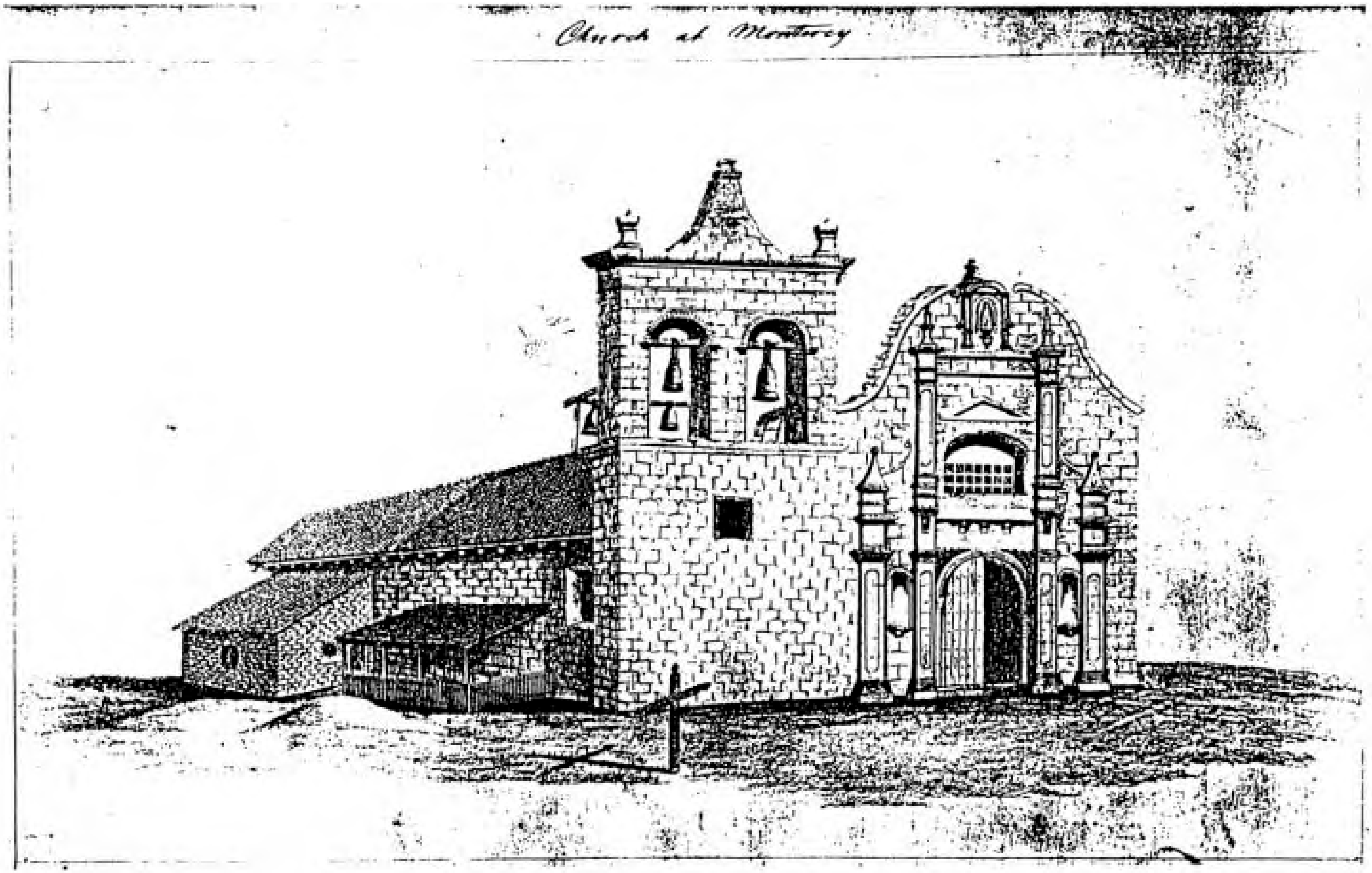


Henry Miller
1856

San Carlos de Monterey
founded June 3, 1770

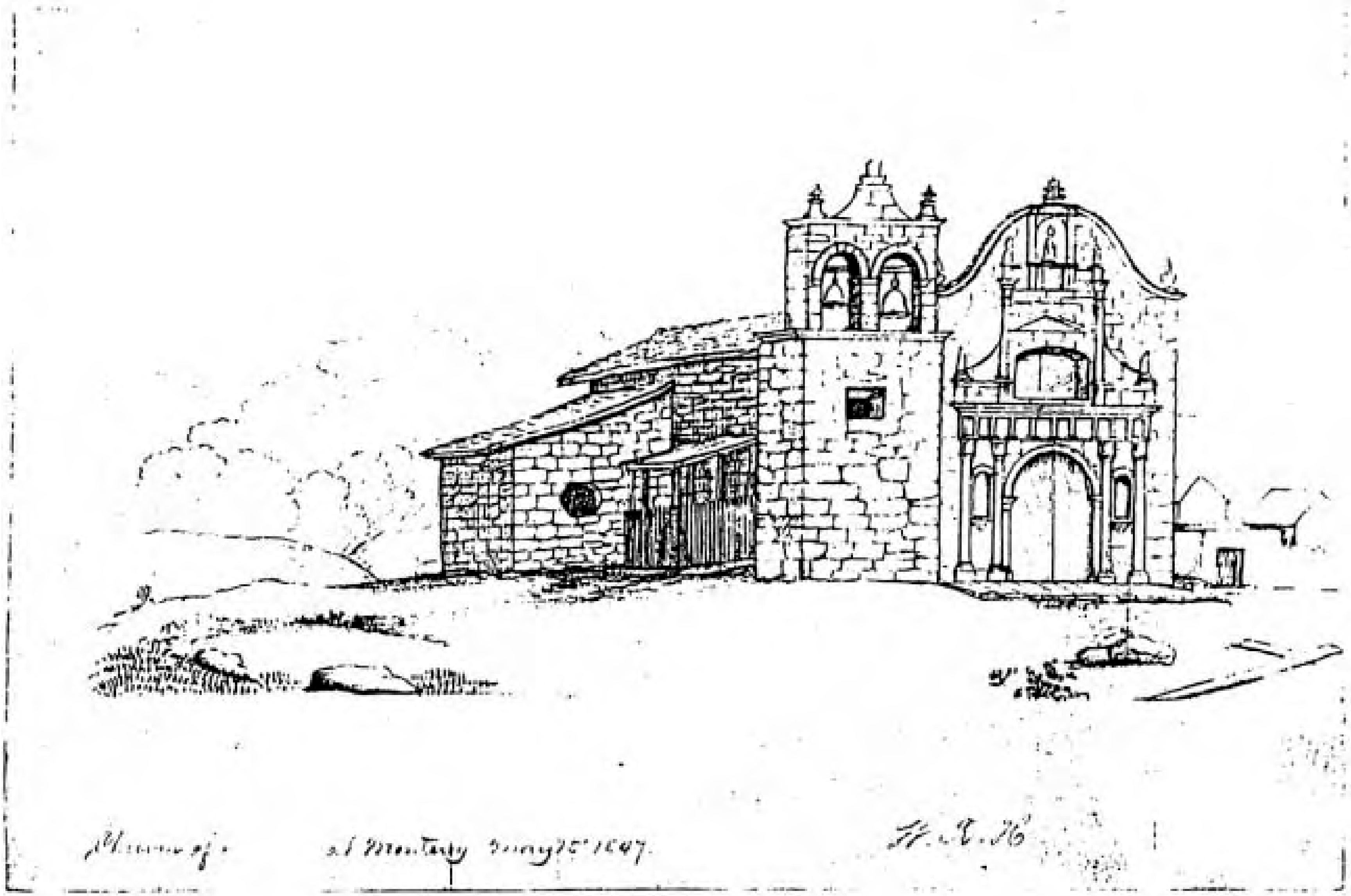


***Plate* XXIX. CHURCH AT MONTEREY, 1847**

AUGER READINGS AND SAMPLE ANALYSIS

CA-MNT-271H
AUGER SAMPLES - UNIT 1
A.A.C.C. - NOV/DEC 1994

LOT #	SAMPLE #	MUNSELL	DEPTH	H_2O CONTENT BY WEIGHT[9]
48	1	10YR 3/1[10]	53-66 CM[11]	11.2%
49	2	10YR 3/1	66-77.5 CM	-
50	3	10YR 3/2	77.5-92 CM	12.32%
51	4	10YR 3/4	92-105 CM	12.61%
52	5	10YR 5/3	105-119 CM	17.83%
53	6	10YR 5/4	119-126 CM	24.42%
54	7	10YR 6/4	126-136CM	16.178%
55	8	10YR 6/4	136-143CM	12.35%
56	9	10YR 6/4	143-150 CM	-
57	10	10YR 6/4	150-158 CM	-
58	11	10YR 6/4	158-166 CM	8.94%
59	12	10YR 6/4	166-172 CM	-
60	13	10YR 6/4	172-180 CM	-
61	14	10YR 5/2	180-187CM	-
62	15	10YR 6/2	187-196 CM	-
63	16	10YR 6/6	196-205 CM	-
64	17	10YR 6/4	205-213 CM	26.4334%
65	18	10YR 6/4	213-217 CM	-

9 Analysis completed by Edna Kimbro.

10 Readings were taken on wet samples.

11 Depth was determined from the surface using a line level at the datum in the SE corner of Unit 1.

COMMENTS ON CA-MNT-271 (YMCA) COLLECTION

BY

Ron May

Comments on CA-MNT-271H (YMCA) Collection by Ronald V. May

1. I-A-7.213. Mexican Galera Ware table bowl.

2. I-C-5. 241.1-0. Chinese Export Porcelain. Nanking style. The very crude execution of this specimen's design elements on this serving platter indicate the last half of the 19th century. Generally, Nanking was one of the finer export porcelains sold to the British and American traders between 1795 and 1880. Of course, some deal may have been cut in 1795 to sell off crude and poorly executed porcelain at bargain basement prices. This material is reported to have been so cheap in any form that it often served as ship's ballast. There is one tale that rather than wash it, the cooks just dumped it overboard with the scraps.

3. I-B-5.267.l-0. British Cream Ware. This is a ring foot of a bowl. The clear lead or alkaline glaze pools green where the foot and body go together. Generally, Cream Ware dates to the 1770-1820 period. I have no information to change that date.

4. I-B-5.272.I-0. American Fiesta Ware. Yellow bowl. This style of bright colored glazed table ware dates to the 1920s to 1930s.

5. I-A-7.260.I-0. Mexican Tonalá Polychrome. This probably was a water pitcher. It was made by native Mexican people employed in the colonial trade. The fine clays burnished to a high polish evaporated in just the right balance to keep water relatively cool.

6. I-B-5.233.I-0. British Pearl Ware. Hand-painted dish.

7. I-B-5.277.I-0. Japanese Transfer-print. I suggest that you ask Mary Maniery or Julia Costello to look at it.

8. I-C-5.217.I-0. Oriental Porcelain. I do not know this piece, but suggest that either Julia or Bobby Greenwood look at it.

9. I-A-7.234.I-0. Mexican Majolica. Blue Ground Tradition. Tumacacori Polychrome. Mark Barnes proposed three time-distinct variants, but Jack Williams challenges this seriation. I suggest a date of 1815 to 1835.

10. I-A-7.220.I-0. Mexican Galera Ware. Culinary wares. There are four distinct vessels with stove-soot on the basal side, suggesting cooking. A small vessel, perhaps a chocolate pitcher, also has soot. Three other large vessels lack soot. A small bowl shard without soot was also present.

11. I-C-5.278.I-0. American. Electrical insulator. The date is 1900 plus or minus ten. These items were often used or re-used through the Great Depression, so the late 1930s is also possible.

12. I-B-5.263.I-0. British or American. White Ware. This is a handpainted plate shard. I would date it from 1820 up to 1870.

13. 1-C-5.268.I-0. British. Parian or Cameo Porcelain. This could be a figurine or doll part. I suggest a date of 1840 to 1900.

14 I-B-5.270.I-0. British or American. White Ware or Pearl Ware. I believe this to have been an English bowl that would have dated between 1820 and 1870.

15. I-B-5.222.1-0. British Pearl Ware. Annular Ware. This is a wide cup or bowl shard. Ivor Noel Hume, "A Guide to Artifacts of Colonial America," (Alfred A. Knopf: New York, 1969) would date this to 1795-1820. I suggest 1820 to 1870.

16. I-C-5.264.I-0. Chinese Export Porcelain. Over-glaze. These two porcelain shards are roughly from the 1780 to 1835 period. If they fluoresce lavender under short-wave ultra violet light, then I would be wrong and they would be British Bone China.

17. I-C-5.245.I-0. Oriental Porcelain. Molded plate. I suggest that Julia Costello or Bobby Greenwood look at it.

18. I-B-5.265. Three groupings:

    A. British Pearl Ware. Of the five shards, the large and odd-shaped one is a serving dish fragment. Of the three darker, or "Flow Blue" plate brims, one is a replica of Nanking-style Chinese Export Porcelain. I suggest a date of 1795 to 1825 for these three. The other two comprise a Flow Blue plate brim and a brim/shoulder of soup plates. The same date applies to all of group A.

    B. British or American. White Ware. These two plate shards would date from 1820 to 1870.

    C. British Transfer-print Ware. Sepia-colored transfers tend to date from 1820 to 1840.

19. I-B-5.159.I-0. British Transfer-print Ware. Maroon-colored plate base. I suggest a date of 1820 to 1840.

20. 1-B-5.274.I-0. British or American Transfer-print Ware. Two small plate shards. Floral elements appeared in the 1820s, but grew in greater popularity at the expense of Greco-Roman designs in the last quarter of the 19th century.

21. I-B-5.243.1-0. British or American Transfer-print Ware. Same comment as for 20 above.

22. I-B-5.223.I-0. Mexican Majolica. Aranania Tradition. Monterey Polychrome. These are soup plate shards. This type dates from 1810 to 1835. You need to change your catalogue card.

23. I-A-7.219.I-0. Mexican Majolica. Puebla Tradition. San Elizario Polychrome. These are soup plate shards. This type dates from 1750 to 1800.

24. 1-A-7.235.I-0. Mexican Majolica. Puebla Tradition. Wavy Rim Blue-on-white soup plate from the 1790-1810 period. San Elizario Polychrome soup plate from 1750 to 1800.

25. I-A-7.244.I-0. Two groupings:

    A. Mexican Majolica. Aranama Tradition. Monterey Polychrome. This is a soup plate shard. Date is from 1810 to 1835.

    B. Puebla Tradition. Puebla Green and Yellow-on-white. In my thesis and elsewhere, I have written that world events pressed behavioral change on the frontiers of Spanish Mexico in the 1790 to 1810 period. Both potters experimented with polychrome colors, such as had been common in the 17th century, and people in colonial markets became bold enough to purchase polychrome types instead of blue-on-white types. I suspect this to have been both from foreign competition, as well as world events stimulating behavioral change throughout the colonies. It is as though some global effect were manifest in ceramic change. For Spanish architectural interpretation, significant quantities of these polychromes in strata above significant quantities of blue-on-white Majolica in strata below should indicate significant events in the site under study.

26. I-B-5.266. Mexican Majolica. Puebla Tradition. Several distinct observations:

A. San Elizario Polychrome. 1750-1800. One plate brim.

B. Puebla Blue-on-white. 1700-1800. Two plate brim shards.

C. Wavy Rim Blue-on-white. 1790-1810. One plate rim.

D. Wavy Rim Blue-on-white. 1790-1810. One cup shard.

E. Blue Ground Tradition. Tumacacori Polychrome. 1810-1835. Two plate shards.

27. I-A-7.221. Mexican Majolica. Puebla Tradition. These soup plate shards are too small to be certain, but may have been from Wavy Rim Blue-on-white or San Elizario Polychrome. Best guess date is 1750-1800.

28. I-A-7.215. Mexican Galera Ware. Three jar shards and two bowls. One vessel has a distinct ring foot, an unusual feature for this variety of native Mexican ceramics. These are culinary vessels, but do not exhibit cooking soot.

29. I-A-7.242. Mission Brown Pottery. I have had my hypotheses criticized on the origin of these crude ceramics. So, I will only repeat that neophytes probably made the ceramics. The stone-burnishing is non-native in California, but is known for late 19th century Arizona people and, of course, the Tonalá Polychrome. Perhaps the potters copied the Tonalá water pitchers.

30. I-B-5.273.I-0. British or American. White Ware. Hand-painted plate shards. They date from the 1820-1870 era.

31. I-B-5.280.I-0. Mexican Majolica. Puebla Tradition. San Elizario Polychrome. The date is 1750-1800. One plate brim shard.

32. I-B-5.275. British or American. White Ware. Brown transfer-print floral elements. Brown may be mid-19th century, but the floral elements trend to the lt quarter of the 19th century.

33. I-B-5.237. British White Ware. “Gaudy Welsh” style of British hand-painted bowls. This probably dated in the 1820-1840 era, but could go into the 1 850s.

34. I-B-5. 269. British. Cream Ware. Also known as “Queen’s Ware.” The wheat-stalk pattern dates this plate shard from 1775 to 1820.

35. I-C-5.279. Porcelaneous Stoneware. Although this could have been a ceramic furniture drawer pull, I suspect it is a bottle stopper. There are numbers “177” on the inside. I propose a date of 1875-1900.

36. I-C-5.44.ll-0. Oriental Porcelain. I suggest that you pass this one on to Bobby Greenwood.

37. 1-C-5.62.ll-0. Oriental Porcelain. Same comment as for the above specimen.

38. 53. Oriental Porcelain. This shards is too small for anyone to identify.

39. 50. Chinese Export Trade Porcelain. Canton Blue-on-white. The general date is 1795 to 1835 for serving platters of the fine quality workmanship exhibited on this specimen.

40. I-A-7.47. Mexican Galera Ware. Culinary vessels. The shards represent six vessels: chocolate pitcher, a jar, a cassauela, a European-style plate, and an unknown vessel. Only the jar exhibits cooking soot.

41. I-A-7.61.ll-0. Mexican Galera Ware. Comal. This is an unusual vessel style in California, in spite of the fact that these skillets are used in modern recreations of California Mission interpretations. They are more common in Arizona and New Mexico sites.

42. I-A-7.64.ll-0. Mexican Galera Ware. Each is a distinct vessel: two large bowl shards, a chocolate pitcher shard, and an unknown vessel that appears to have contained an acidic sauce that dissolved some of the lead glaze.

43. I-B-5.57.II-0. British or American. White Ware. Decorative dish or bowl. This could be a variant of Annular Ware, but I am not familiar with it. It could date to the 1820-1850 period.

44. I-A-7.II-0. British Pearl Ware. British bowl with ring foot. The maroon floral design suggests a mid-19th century date, or later. I suggest 1820 to 1860.

45. I-B-5.49J1-0. British. White Ware. Annular Ware. Bowl shard. This is similar to #56. I propose a date of 1820 to 1860.

46. I-B-2.56.ll-0. British. Annular Ware. Cup or bowl shard. Mocha-style design. The date might be closer to 1820-1840, based on the mocha element. If truly linked, then #49 could be tighter dated.

47. I-A-7.60.ll-0. British or American. White Ware. Transfer-print Ware. Serving dish. I suggest a date of 1820 to 1840.

48. I-A-7.63.II-0. British or American. White Ware. Transfer-print Ware. The same comment as for #60.

49. I-B-5.43.ll-0. British or American. White Ware. Transfer-print. The same comment as for #60 and #63.

50. I-B-5.52.II-0. British. Pearl Ware. Transfer-print Ware. Plate. This is the Flow Blue, which dated 1795 to 1820, but could have been a bit later in California.

51. I-B-5.55.ll-0. British or American. White Ware. Bowl or cup shard. This is Gaudy Welsh, which generally dated to the 1820-1840s.

52. I-A-7.67.II-0. This is a full range of ceramics:

A. Mexican Majolica. Cup wall. 1770-1845.

B. Mexican Majolica. Plate shard. 1770-1845.

C. British. Cream Ware. Bowl shard. 1780-1820.

D. British. Cream Ware. Plate shard. 1760-1820.

E. British. Pearl Ware. Bowl shard. 1780-1820.

F. British. Pearl Ware. Bowl shard. 1780-1820.

G. British or American. White Ware. Mug wall. Post-1820.

H. British or American. White Ware. Plate shard. Post-1820.

I. British or American. White Ware. Serving bowl wall shard. Post-1820.

J. British or American. White Ware. Plate shard. Scalloped rim. Post-1820.

K. American. Stone Ware. White Ware. Two serving bowl shards. 1840-1877.

L American. Stone Ware. White Ware. Serving plate shard. 1840-1877.

53. I-A-7.59.II-0. Mexican Majolica. Blue Ground Tradition. Tumacacori Polychrome. Plate shard. The date is 1815 to 1845.

54. I-B-5.65.II-0. Mexican Majolica. Puebla Tradition. Puebla Blue-on-white or San Elizario Polychrome. This is a floral element from a plate shard. 1750-1800.

55. I-A-7.54.II-0. Mexican Majolica. Cup wall shards. The “green” tint was caused by a fire in contact with copper/brass/bronze that transferred copper sulphide to the vessel.

56. I-A-7.45.II-0. Mexican Majolica. Puebla Tradition. San Elizario Polychrome. Plate shard. 1750-1800.

57. I-A-7-46.II-0. Mexican Majolica. Puebla Tradition. Puebla Blue-on-white. Cup shard. 1700-1800.

58. I-B-5.58.II-0. Mexican Majolica. Puebla Tradition. San Elizario Polychrome. Plate rim. 1750-1800.

59. I-B-2.51.II-0. Mexican Majolica. Puebla Tradition. San Elizario Polychrome. Plate bottom. Central medallion in the base; two black legs terminating in blue dots; probable bird. 1750-1800.

60. I-A-7.48.II-0. Mexican Majolica. Puebla Tradition. Puebla Blue-on-white or Wavy Rim Blue-on-white or San Eli.zario Polychrome. Plate base and ring foot. There are also two separate vessels represented in base rims.

A single undecorated Majolica cup shard represents the “amarillo” or plain grade. This grade of Majolica was usually reserved for local trade to Mexican Indians and not shipped to colonial areas, as it is not market competitive.

61. I-B-5.7.III-0. Oriental porcelain or porcelaneous stoneware. The blue pattern is not known to me. This is another specimen that you might send to Bobby Greenwood for inspection.

62. I-B-5.III-0. Mexican Majolica. Plate. Three shards.

63. I-A-7.3.III-0. Group:

A. Mexican Majolica. Four plate shards.

B. Mexican Majolica. Puebla Tradition. Puebla Green. Green and yellow variant of Puebla Blue-on-white. 1790-1810. Cup. Two shards.

C. British or American. White Ware. Saucer or berry dish. Two shards.

D. British or American. White Ware. Shard core without glaze attached.

64. I-C-5.4.III-0. Two varieties:

A. Oriental. Porcelain. White cup/vase/decanter.

B. British or American. White Ware. Chip too small for vessel identification.

65. I-A-7.1.III-0. Mixed lot:

A. Mexican Majolica. Aranama Tradition. Type not possible due to size. Small plate.

B. Mexican Majolica. Puebla Tradition. Puebla Blue-on-white. Too small for vessel identification.

C. British. Pearl Ware. Blue Shell Edge. Plate lip chip. 1795-1820.

D. British or American. White Ware. “Gaudy Welsh” or hand-painted English. Small bowl or cup. 1820-1860.

E. British or American. White Ware. Transfer print. Vessel not identifiable. Post-1820.

66. I-A-7.9.III-0. Mexican Indian. Tonalá Polychrome. Burnished pottery from Mexico. This generally was procured for the colonial market as water vessels and pitchers.

67. I-A-7.8.III-0. Mexican. Galera Ware. There are at least three distinct vessels in this lot. Four shards are too small to interpret.

A. Chocolate pitcher. Three shards.

B. Bowl. Two shards.

C. Cooking vessel. Stove/oven with soot-stain.

68. I-A-4.90.III-0. Mexican. Calera Ware. This is unusually well-decorated table ware bowl. If this is contemporary with the rest of the collection, it ought to be used in an exhibit or published.

•69. I-A-7.2.III-0. Mexican. Calera Ware. This is another very nice, and unusual, bowl shard. The green caste to the glaze is reminiscent of the varieties reported by Mark Barnes in the Sonora/Arizona trade route. It is quite unusual in southern California.

70. I-A-7.10.III-0. Mexican. Galera Ware. Large bowl shard.

71. I-A-7.6.III-0. Mission Brown Pottery. This crude ceramic might have been made by coil-paddle-anvil, but I cannot be certain. I still believe that some southern California neophytes were transferred north and may have been the source of this form of pottery. They would have had to have a tradition of mining residual clays from local sources, cleaning the clays, souring the clay, and then building coils and thinning them with a pebble inside and paddle outside. To believe my detractors, divine inspiration caused neophytes to suddenly create pottery.

There is a piece of white "stucco" or shell in the core of one of the shards.

72. I-B-2.1. (no other #). Mexican Majolica. Puebla Tradition. Wavy Rim Blue-on-white. Plate. One shard. 1790-1810.

73. I-B-1.l4. (no other #). Mexican Majolica. Puebla Tradition. San Elizario Polychrome. This is a very unusual and crude plate shard. Its oddity is unique in all the collections that I have examined.

1750-1 800.

74. I-A-7.15. (no other #). Mexican. Galera Ware. Bowl. One shard.

75. I-B-5.35. Mixed Lot:

A. Mexican Majolica. Puebla Tradition. Not type specific due to size. Soup plate. Two shards.

B. Stone Ware. Culture and vessel not known. One shard.

C. British. Cream Ware. Bowl shard. This light yellow glaze is attributed to the 1762-1780 era.

D. British or American. Pearl Ware. Bowl. One shard. 1779-1820.

E. British or American. White Ware. Plate. Two shards. 1820-1860.

F. American. White Ware. Ironstone (synonymous with Stone China). Cup. One shard. 1840-1900.

G. Small rock.

76. I-B-5.37. British or American. Transfer-print. Chip of unknown vessel. 1795-1820.

77. I-A-7.12. Mixed lot:

A. Mexican Majolica. Plate. Two shards. 1750-1850.

B. Mexican Majolica. Puebla Tradition. San Elizario Polychrome. Plate. One shard.
1750-1800.

Appendix V

Geology • Hydrogeology

Nolan Associates
331 Harrison Avenue, Santa Cruz, CA 95062
Tel/Fax 408-423-7006 email: jmnolan@aol.com

February 12, 1996

Mr. Frank Preusser
6434 Pat Ave.
West Hills, California 91307

Re: Hydrologic Evaluation
Royal Presidio Chapel (San Carlos Cathedral)
City of Monterey
Monterey County, California

Dear Mr. Preusser:

As authorized, we have completed our evaluation of the geologic and hydrologic setting of the Royal Presidio Chapel, Monterey, California. The purpose of our site investigation was to evaluate soil moisture conditions affecting the stone and mud mortar foundation and walls of the chapel. Our study addressed drainage at the site and investigated the shallow groundwater regime through an exploratory soil boring drilled adjacent to the chapel.

Our scope of services included the following tasks:

1. Review of historic maps and aerial photographs of the site to evaluate pre-development topography, hydrology and groundwater conditions in the area.

2. Geologic and hydrologic reconnaissance of the area evaluate the existing groundwater regime.

3. Hand augering of one 6” diameter boring in the area of a previous archaeological test excavation adjacent to the northeastern exterior foundation of the Presidio Chapel and installation of a dual completion piezometer in the boring to provide for future monitoring of groundwater conditions.

4. Preparation of a brief report summarizing our findings and recommendations.

Site Description

The subject site is an historical chapel associated with the Royal Presidio of Monterey. It is situated in the City of Monterey on a narrow, gently seaward sloping coastal plain at the northeastern edge of the Monterey Peninsula (Figure 1, Site Location Map). The site is located at an elevation of about 25 to 30 feet above mean sea level. North and west of the chapel, the terrain is relatively level; to the east ground drops rapidly in elevation towards an incised stream drainage flowing into El Estero, a slough bordering the Monterey Bay (Figure 1).

The area around the subject site is largely built up with commercial development, including of large areas of impermeable surface associates with buildings and pavement. Runoff from streets is collected by storm drains. Figure 2 depicts the chapel and surrounding grounds. The ground surface on the west side of the chapel slopes towards the chapel at a gentle grade. This area is landscaped with irrigated lawn. Between the lawn and the chapel is a sidewalk and irrigated flower bed (Figure 2). On the east side of the chapel, the ground is approximately level, but drops about 4 to 5 feet to an adjacent parking lot at a brick retaining wall along the west edge of the parking lot. The area adjacent to the eastern side of the chapel consists of irrigated flower bed, with several large redwood trees growing between the parking lot and the chapel (Figure 2). The chapel roof plan is unguttered and all runoff from the roof spills onto the ground.

Regional Geologic Setting

The subject property is situated on the northern flank of the Santa Lucia Mountains, in the central portion of the Coast Ranges Physiographic Province of California. The Coast Ranges Province consists of a series of coastal mountain chains paralleling the pronounced northwest-southeast structural grain of central California geology. The study region is underlain by a large, northwest-trending, fault bounded, elongate prism of granitic and metamorphic basement rocks, known collectively as the Salinian Block. The Salinian Block is separated from contrasting basement rock types to the northeast and the southwest by the San Andreas and the Sur-Nacimiento fault systems, respectively. Overlying the granitic and metamorphic basement rocks is a sequence of dominantly marine sediments of Cretaceous to Pliocene age and non-marine sediments of Pliocene to Pleistocene age, all of which show evidence of uplift and deformation. In the study area, bedrock is formed by siliceous shale and siltstone of the Monterey Formation, of Miocene age. The geologic map for the area (Clark et al, 1974) depict& the bedrock at the study site as being overlain by older alluvium, of Quaternary age (Figure 3, Local Geologic Map).

Throughout the late Cenozoic Era (approximately the past 25 million years), central California has been dominated by tectonic forces associated with lateral or “transform” motion between the North American and Pacific crustal plates, producing a complex system of northwest-trending faults (the San Andreas Fault system). These faults show horizontal displacements measured in tens to hundreds of miles. The region continues to be characterized by moderate to high rates of tectonic and seismic activity.

Local faults of potential significance to the project include the San Gregorio and Navy-Tularcitos faults. The Navy-Tularcitos fault is thought to trend offshore into Monterey Bay about 1 mile east of the chapel. The strongest ground shaking to have affected the area in historic times was the 1906 San Francisco earthquake and two magnitude 6.1 earthquakes that occurred in Monterey Bay in 1926. The San Gregorio fault, located 8 miles southwest of the site, is considered capable of a magnitude 7.5 to 8.0 earthquake and could produce severe shaking at the chapel site. There has not been a event of this magnitude on the San Gregorio in historic time.

Site Geologic Setting

As described above, bedrock in the area is shale and siltstone of the Monterey Formation. Overlying the Monterey Formation under the chapel is a layer of ancient beach and nearshore marine deposits. Boring 1, excavated near the southwest corner of the chapel (located on Figure 2; boring log depicted on Figure 4) showed 7.8 feet of relatively unconsolidated deposits overlying Monterey Formation bedrock. These deposits consisted of approximately two feet of surficial soil overlying silty and clayey fine to medium grained sands. Although the Clark et al (1974) depict the site as being overlain by older alluvium (Figure 3), the sediments in the boring are indicative of a marine origin. The marine sediments were deposited on a wave cut bedrock terrace formed at a time when sea level was higher relative to the land than now. Such bedrock terraces are formed by wave erosion and are analogous to the modern beach and nearshore platform. The older marine terraces, like the present offshore zone, tend to be very flat bedrock “benches” with an even, approximately 1-1/2 degree seaward tilt and a relict sea cliff along their shoreward margin. East of the chapel, the bedrock platform has been partially dissected by stream erosion associated with El Estero slough.

The Monterey peninsula is cut by a series of progressively older wave cut platforms that rise up the flank of the peninsula in stair step fashion (McKittrick, M.A., 1988). The oldest and highest of these terraces is inferred to be about 500,000 years in age. The terrace underlying the Royal Presidio Chapel is the “first emergent” terrace in the area, that is, the first terrace recognized above the modern shoreline. It is estimated to be 80,000 to 120,000 years in age, corresponding to last major interglacial high sea level stand before the present.

Our exploratory boring was drilled through 1-1/2 to 2 feet of backfilled soils left by an archeological test excavation. This location was chosen so as avoid disturbing any archeological deposits. However, because of the prior disturbance, we were not able to document the nature of the upper two feet of native soils in the area. Based on review of the archeological findings from the test pit, we infer that the upper 1.6 feet of the native soil in the area of the boring is older fill that has been placed on what was the original grade at the time the chapel was constructed.

Below the 1.6 to 1.7 foot depth of the archeological pit, we observed a soft, dark grayish brown (3/2-2/1 10YR) silty sand interpreted as a buried “A” soil horizon. The A horizon graded downwards into a pale brown (7/3 10YR) fine to medium grained sand with trace to some clay, becoming clayier and denser downwards. The clayey sands showed some soil structure and the clays in these sediments are considered to be at least partially of secondary origin, deposited by percolating rainwater from higher up in the soil profile. A distinct change in soil texture was encountered at about 7.8 feet, interpreted as the top of weathered bedrock. Firmer, less weathered bedrock was encountered at 8.6 feet, where the auger met refusal. The sediments encountered in the uppermost part of the boring were very moist to wet, and became drier with depth until the top of bedrock was encountered.

We collected two relatively undisturbed soil samples from bedrock by driving a 3” 0. D. modified California sampler with a free falling 40 lb. weight dropped a distance of 18”. We recorded blow counts for these samples by recording the number of blows necessary to drive the sampler a set distance (generally 12”). The blow count is an approximate measure of the density of the sediments being sampled. Sample S-1-1 (Figure 4) was driven 12” with 23 hammer blows. Sample S-1-2 required 50 blows to advance it 4” (sampling was suspended after 50 blows). Sample S-1-1 was taken at a depth of 2.6 to 3.2 feet, below the grade of the adjacent foundation. The blow count associated with this sample indicates very low density sediments. In general, sediments of this density would be considered too loose to support a building like the Presidio Chapel without significant settlement. Given the age of the structure, however, it is probable that the soils directly under the foundation have been consolidated long ago by the building loads and are now in equilibrium.

Hydrogeologic Setting

The Monterey Formation bedrock in this area is considered a non-water bearing formation. This description is not meant to imply that the Monterey Formation rocks are impermeable or that they do not contain any water, but that the rate at which they transmit water is so low that a well drilled into this bedrock will appear to be dry, or will yield so little water that it will not function as a well. In general, where the Monterey Formation is used to produce water, the water is transmitted through fractures in the rock and not the rock itself. In contrast, terrace deposits such as those resting on top of the Monterey Formation in the vicinity of the chapel are often moderately to highly permeable to water, although the clay content of the sands under the chapel appears to restrict the permeability of these sediments.

The permanent water table under the chapel is probably at or slightly above the water level in the adjacent El Estero slough, a few feet above sea level. However, marine terraces cut on relatively impermeable bedrock such as that at the study site tend to form perched water tables, where percolating rain water collects in the terrace sediments on top of low permeability bedrock and flows along the bedrock terrace surface until it exits where the terrace is exposed in a sea cliff or incised stream drainage. Such water tables are referred to a “perched” water tables because they form many feet or tens of feet above the permanent water table. The water levels in a perched aquifer tend to fluctuate greatly with seasonal rains; they may dry out completely during extended dry periods and can rise to the ground surface during extended periods of rain. The bedrock terrace surface is exposed along Fremont Street on the south side of the chapel and along Cortes and Church Streets to the east and northeast of the chapel (Figure 2). Since the bedrock surface drops in elevation eastward towards the slough, ground water flow in the terrace sediments is assumed to be easterly. Any water perching on bedrock under the chapel should drain out of the terrace exposures to east.

In considering the source of moisture affecting the chapel, we considered three potential moisture sources: 1) percolating rain or irrigation water saturating the surficial soils, 2) a rising perched groundwater table on the top of bedrock, or 3) a spring surfacing under or around the structure. Each of these possibilities is mitigated by different means. We observed no evidence in our field reconnaissance or in review of historic aerial photos or literature for a spring or similar water source at the site. We did observe a water issuing from a crack in the sidewalk at the intersection of Church and Cortes Streets on Jan. 27, following heavy rains. We could not be certain whether this spring was natural drainage from the terrace sediments or a leaking drainpipe under the sidewalk. It was not flowing earlier in the season and, in our opinion, is not related to the problems with the chapel.

In order to develop a clear understanding of predominant source of moisture affecting the foundation of the chapel, we installed a dual completion piezometer in our exploratory boring. Figure 5 depicts the piezometer design. As can be seen on the figure, the boring contains two separate piezomenters separated by an impermeable seal. The lower piezometer monitors water levels between a depth of 6.2 and 8.2 feet. It is sealed off from overlying strata by a cement mortar plug. The upper piezometer monitors water levels between 2.2 and 3.6 feet depth.

We took four water level readings from the piezometers through January 27, 1996, including a measurement at the time the boring was drilled. Rainfall this year has been below normal. As of Feb. 1, cumulative rainfall for the season was 7.01 inches, compared to a long term average for that date of 13 inches. Therefore, the following conclusions are based on limited observations taken during an uncharacteristically dry year.

Water Level Observations

During drilling, we observed high water contents only in the uppermost soils encountered in the boring, with relatively dry sediments below 4 feet. The boring was drilled in September of 1995, prior to any significant winter rains. The moisture observed in the upper soils is therefore attributed to landscape irrigation or other applied water. Table 1 summarizes the water level reading taken from the piezomenters. Water levels measured on 12/16 and 1/27 were taken several days after major rainfall events. We measured significant water levels only in the upper piezometer at the last reading.

TABLE 1: SUMMARY OF WATER LEVEL MEASUREMENTS

DATE	WATER LEVEL, UPPER PIEZOMETER (height above bottom of piezometer/depth below ground)	WATER LEVEL, LOWER PIEZOMETER
10/5/95	trace	dry
12/16/95	0.l'/-3.5'	trace
1/20/96	trace	dry
1/27/96	0.91-2.7'	dry

Conclusions

Based on the forgoing observations, we are of the opinion that the moisture affecting the foundation of the building is derived principally from percolating surface water perching in the upper three and one-half feet of soil. This conclusion is indicated by the piezometer data, which showed free ground water at a shallow depth, while the deeper soils remained dry. The shallow soil layer consists of relatively loose, permeable, silty sand. The underlying clayey sand does not permit water to percolate readily downward. There does not appear to be a perched water table at the top of the Monterey Formation bedrock, although the winter water table data are limited due to the short monitoring period and the dry winter season in 1995-96.

There are three visible sources of surface water in the area of the chapel: 1) direct rainfall; 2) runoff from the roof of the church; and 3) landscape irrigation. We observed a sprinkler system serving the lawns to the west of the chapel and the flower beds adjacent to the chapel on the east and west. The importance of landscape irrigation in the groundwater regime is indicated by the nearly saturated condition of the surface soils found in soil boring at the end of the summer dry season. At that time of year, these soils should have been dry as toast.

Recommendations

1. Install gutters on the chapel and conduct all runoff from the roof away from the chapel by lined ditches or closed pipe.

2. Re-grade the flower beds next to the chapel to have a positive slope away from the chapel and install a lined gutter along the sidewalks around the chapel to capture the water flowing from the beds and conduct it away from the building. The lined gutter may take the form of a shallow

concrete v-ditch, embedded plastic channel with a grate, or other conveyance that will prevent ponding of water along the sidewalk.

3. Re-landscape the flower beds next to the church with xerophilic vegetation or convert the irrigation system to drip irrigation.

4. Install a lined gutter along the edge of irrigated lawn facing the chapel to capture excess irrigation water and conduct it away from the chapel. We noticed a depression in the lawn adjacent to the sidewalk. This depression permits excess irrigation water to pond and percolate into the soil.

5. An additional measure that could be employed would be to place a subsurface drain along the edge of the lawn facing the chapel to intercept subsurface water percolating downward from the lawn irrigation. The sub-drain should consist of a drainrock filled trench at least 18 inches deep and six inches wide, with a 3" diameter or larger perforated pipe placed in the gravel, perforations down, at least three inches above the bottom of the trench. The drain rock should be wrapped in filter fabric or should consist of specially graded drain material designed to filter out fine grained particles. Due to the archeological sensitivity of the area, we realize that excavation for a sub-drain may not be feasible or desirable. At a less archaeologically sensitive site, sub-drains would be the primary mitigation measure, both along the lawn and adjacent to the chapel foundation, probably in combination with application of a water proof coating to the below grade portion of the foundation.

This concludes our report. Please contact us if you have any questions or comments.

Sincerely,
Nolan Associates

Jeffrey M. Nolan
Principal Geologist
Certified Engineering Geologist #1537

attachments: Figure 1
Figure 2
Figure 3
Figure 4
Figure 5

REFERENCES

Aerial Photos

date	flight line	frames
10-24-45	9820	1-84,85
10-5-76	DNOD-AFU-C	70,71

All listed photos are available for inspection at the UC Santa Cruz Map Library.

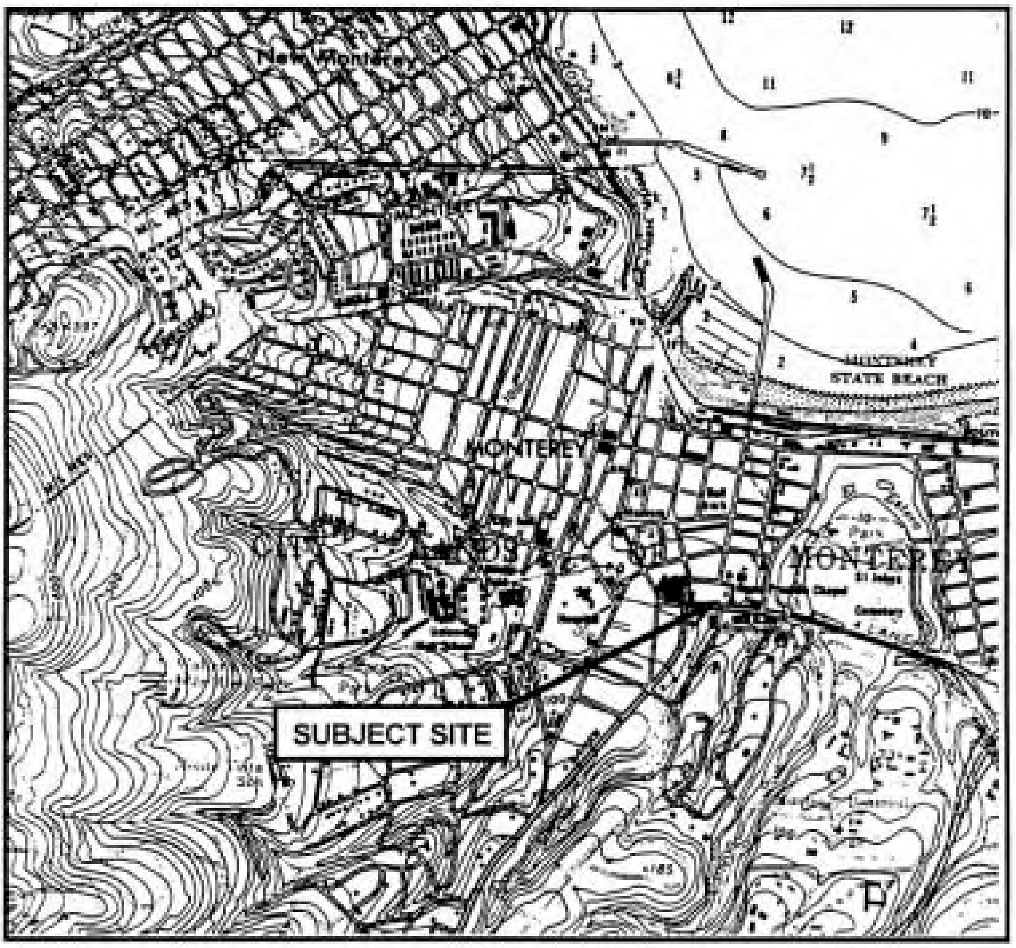
Literature

Clark, J.C., Dibblee, T.W., Jr., Greene, H.G., and Bowen, 0.E., Jr., 1974, Preliminary geologic map of the Monterey and Seaside 7.5-minute quadrangles with emphasis on active faults: U.S. Geological Survey Miscellaneous Field Studies Map MF-577, 2 plates, scale 1:24,000.

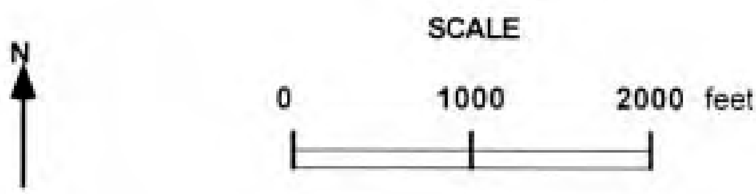
Dupre, W.R., 1990, Maps showing geology and liquefaction susceptibility of Quaternary deposits in the Monterey, Seaside, Speckles, and Carmel Valley Quadrangles, Monterey County, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-2069, 2 map sheets, scale 1:24000

McKittrick, M.A., 1988, Elevated marine terraces near Monterey, California: Tucson, University of Arizona, M.S. thesis, 46 p.

Rosenberg, L.I., and Clark, J.C., 1994, Quaternary faulting of the greater Monterey Area, California. National Earthquake Hazards Reduction Program Final Technical Report, Award #l434-94-G-2443, Dec. 1994. 27 p., 4 plates.



Map Reference: US Geological Survey Monterey 7-1/2' topographic quadrangle



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LOCATION MAP

Royal Presidio Chapel

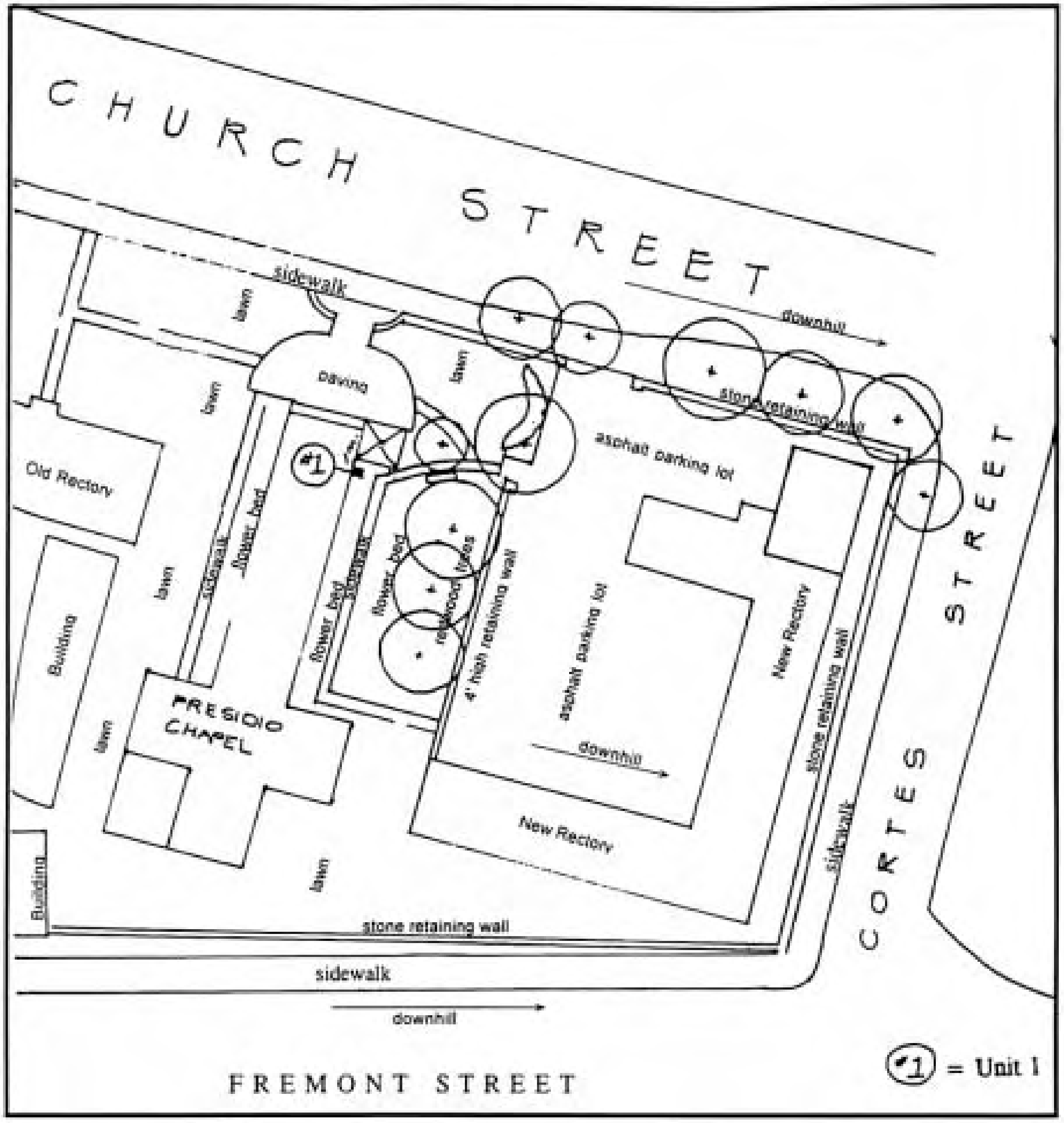
Monterey, California

FIGURE #

1

JOB #

96mt-002



N

Explanation

(#1) location of boring #1 and archaeological test pit

SCALE

0 100 feet

sidewalk

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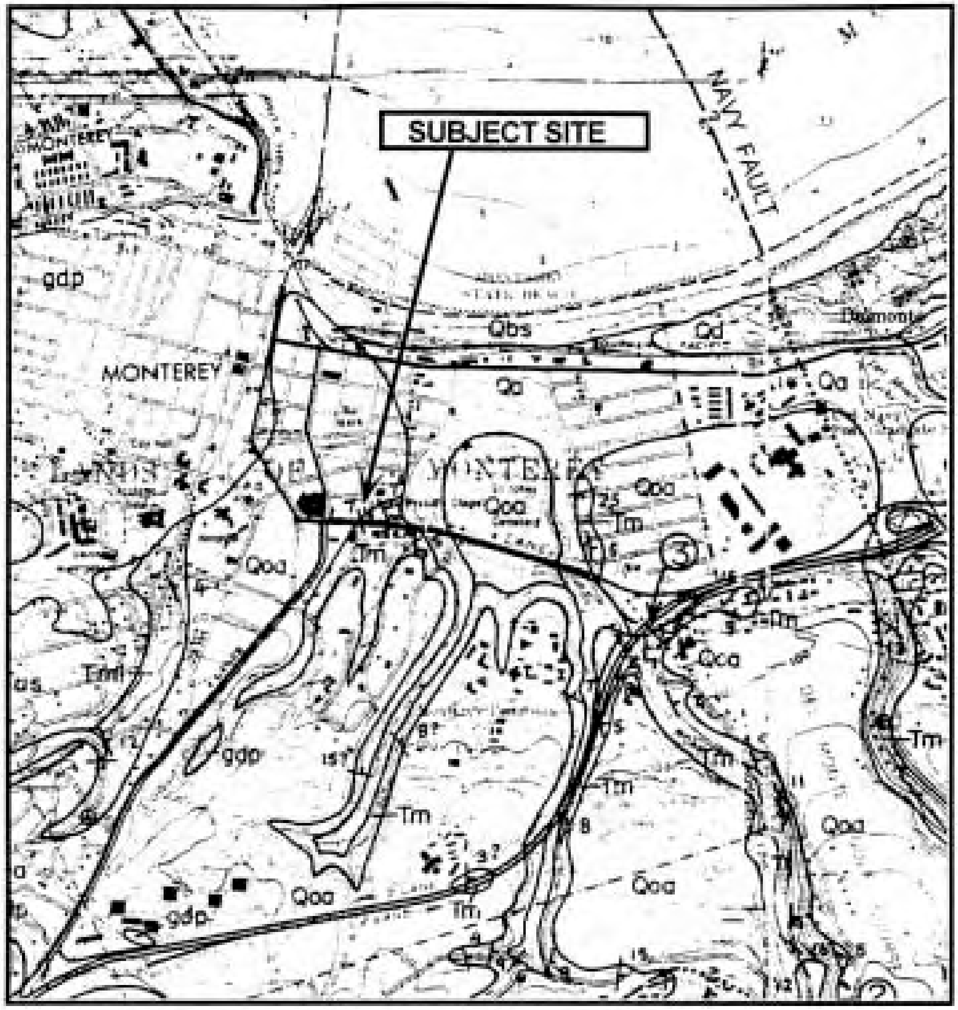
SITE MAP

Royal Presidio Chapel

Monterey, California

FIGURE # 2

JOB # 96mt-002



Map Reference: Clark et al. 1974

EXPLANATION

Qbs	beach sand (modern)
Qd	dune sand (modern)
Qa	recent alluvium
Qoa	older alluvium
Tm	Monterey Formation (Miocene)
gdp	granodiorite (Cretaceous)

geologic contact, dashed where approximate dotted where inferred

strike and dip of bedding

fault, dashed where approximate, dotted where inferred

N

SCALE

0 1000 2000 feet

contour interval 20'

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LOCAL GEOLOGIC MAP

Royal Presidio Chapel

Monterey, California

FIGURE #

3

JOB #
96mt-002

BORING LOG

Boring number 1 — Date: 9/14/95
Boring diameter 6" — Logged by: JMN

Depth	Sample	Symbol	SOIL DESCRIPTION	Blows per foot 60 ft.-lbs.	LAB DATA
1			dark grey brown silty fine sand with clay, moist, moderately plastic, micaceous. rare small rounded shale pebbles, coarse grained sand sized particles disseminated throughout (test pit backfill)		
2			light yellowish brown sand (fill)		
			medium greyish brown (10yr 3/2-2/1) silty fine sand, soft, slightly moist contains few angular chips of monterey formation shale. color lightens downward, becomes less silty [A horizon]		
3	I		light grey brown fine sand with some silt, soft, friable. layer of Monterey Formation pebbles at 3.5' [AB horizon]	23/12"	
4	I		very pale brown (10yr 7/3) variegated with ochre color, silty sand with some clay [B horizon, developed on marine sand]	50/4"	
5	B		pale brown to light yellowish brown (10yr 7/3 to 6/4) some variegated ochre color staining, fine sand, with some clay dense, poorly graded. some small pebbles of Monterey Fm. grades denser downwards, light yellowish brown		
6–7	B, B		hard drilling, pale yellow (2.5y 7/4) sand with clay, very dense, small to medium angular blocky peds w/ common, moderately thick clay films on ped faces and clay bridges between grains. very hard drilling, almost reached refusal		
8	B		Weathered bedrock(?), olive yellow (2.5y 6/6) very fine sandy siltstone, easier drilling but till quite dense, shows decrease in clay content		
9			auger bottomed on hard layer of Monterey Formation bedrock consisting of light olive brown v(2.5y 5/4)ery fine grained sandy siltstone.		
10			Bottom of hole at 8.6 feet		
11					
12					
13					

SYMBOLS

I Drive Sample

B Bag Sample

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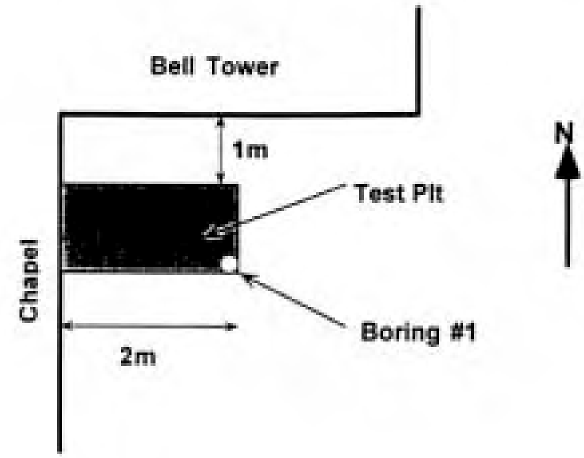
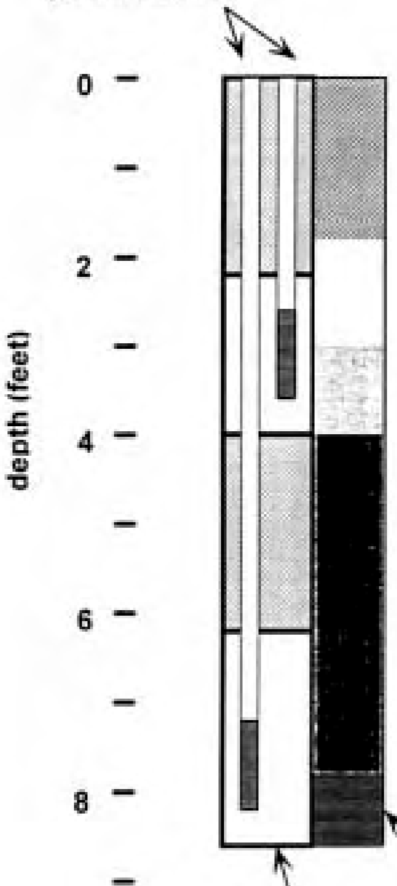
LOG of BORING #1
ROYAL PRESIDIO CHAPEL
CITY OF MONTEREY
Monterey County, California

FIGURE # 4
JOB # 96MT002

Piezometer Location





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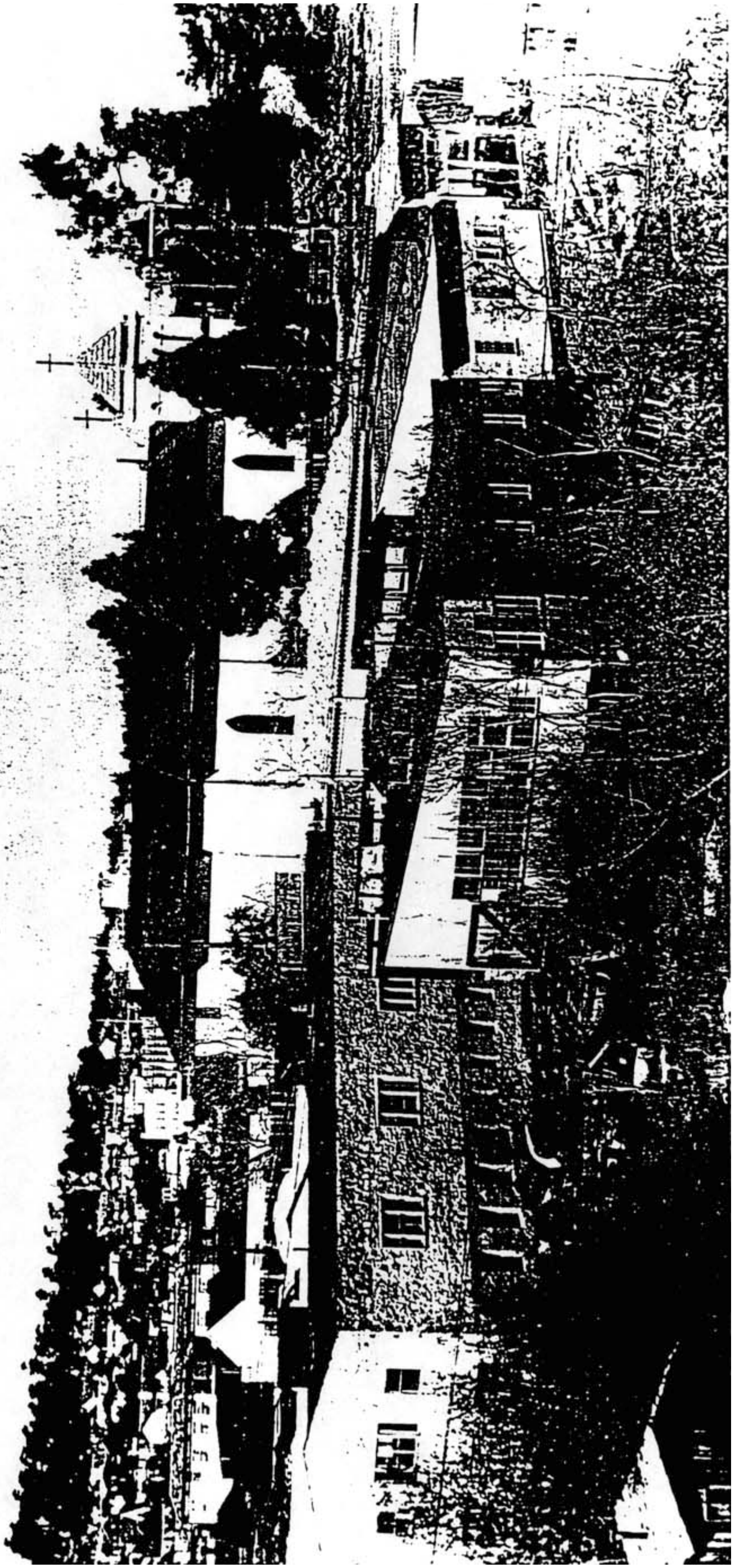
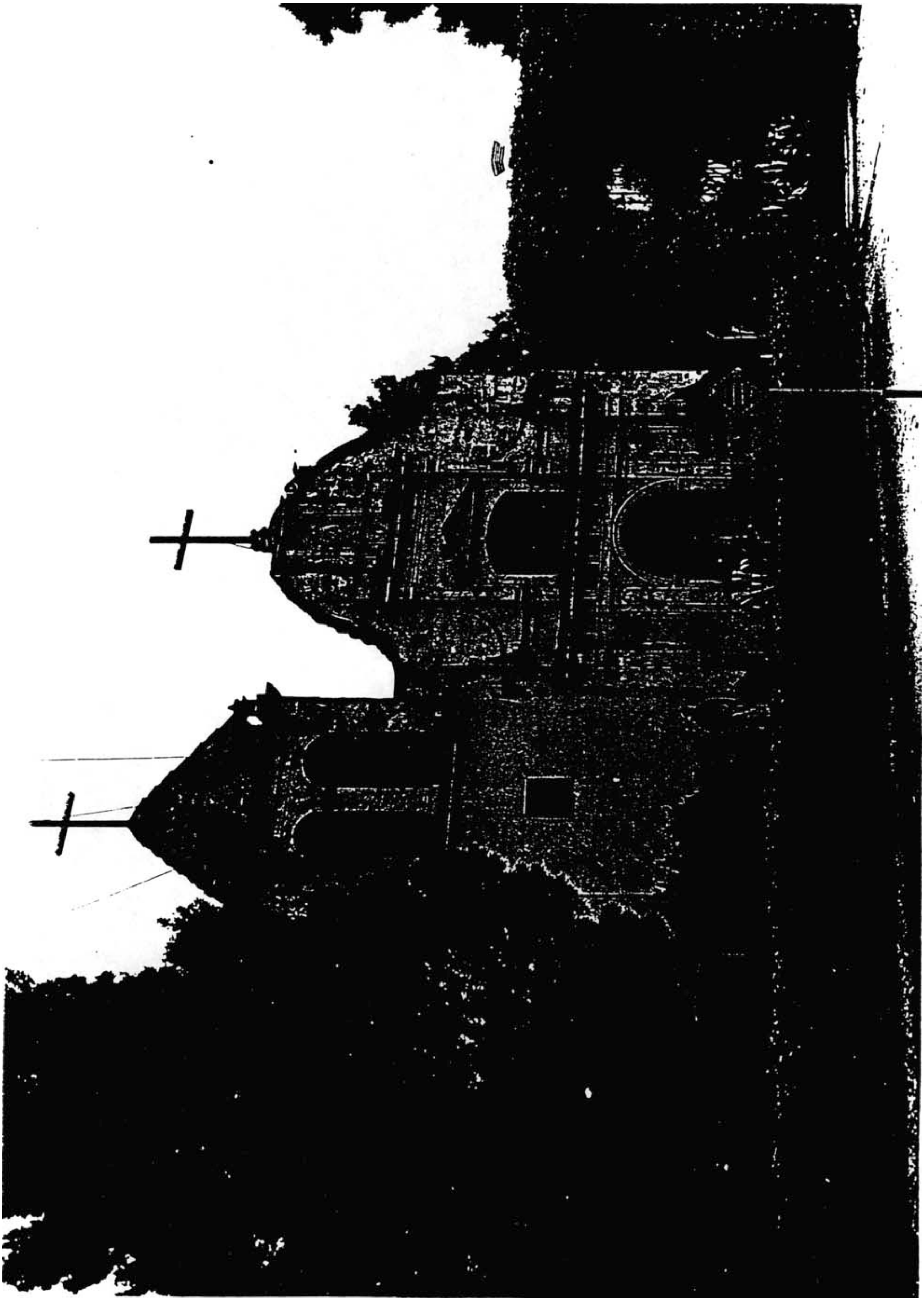
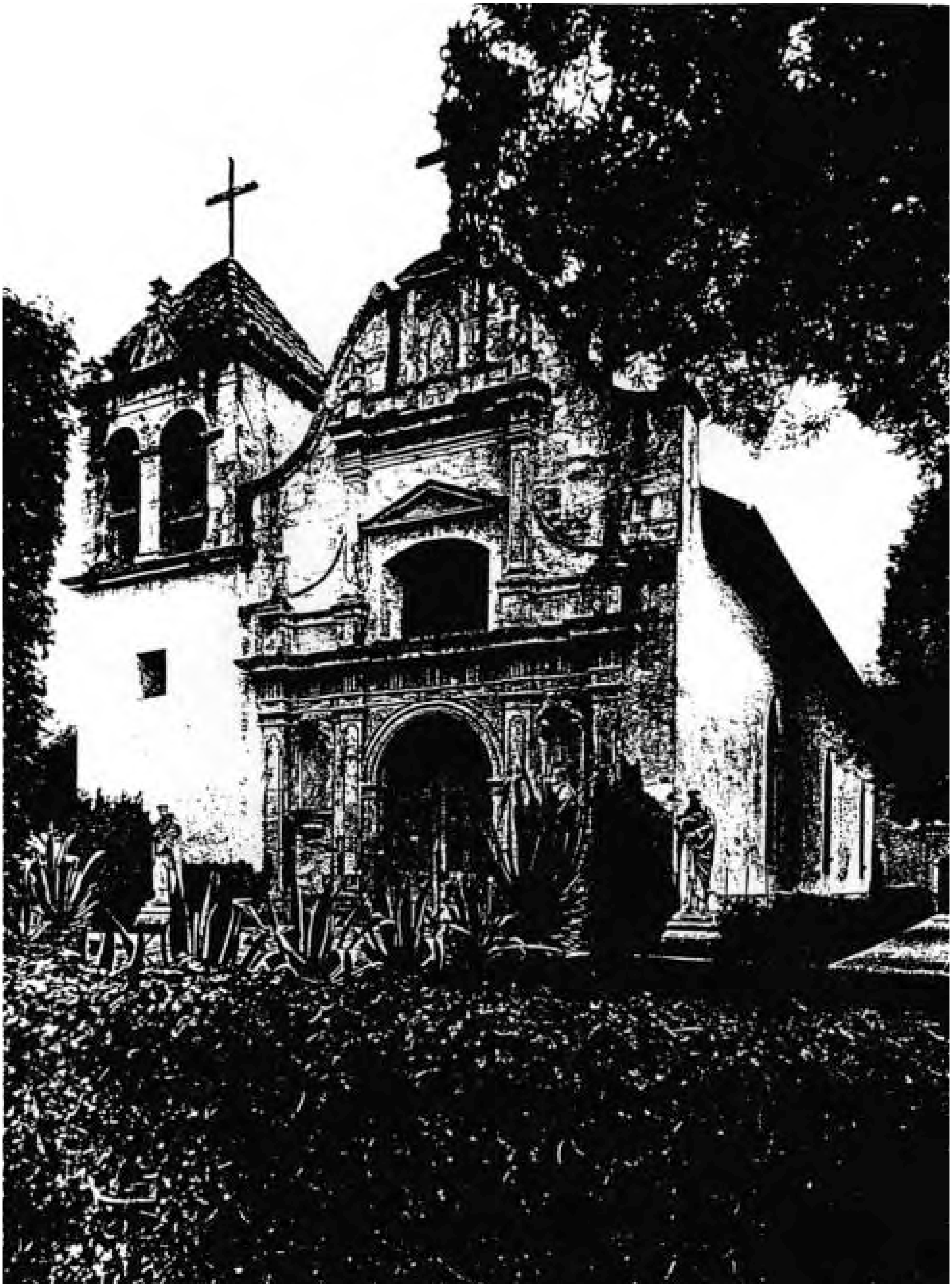
PIEZOMETER DETAIL
Royal Presidio Chapel
Monterey, California

FIGURE # **5**
JOB # 96mt-002

Appendix VI



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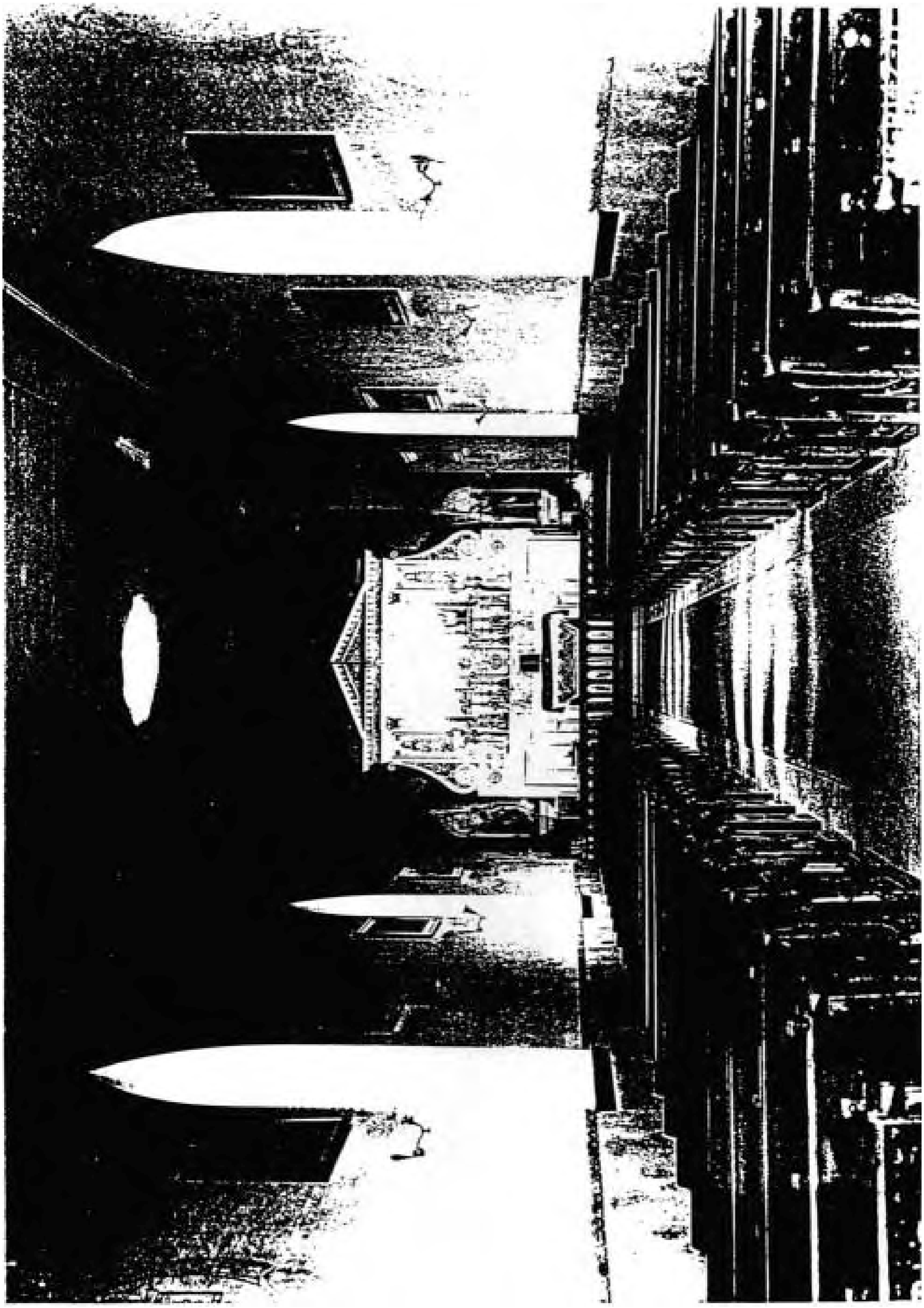
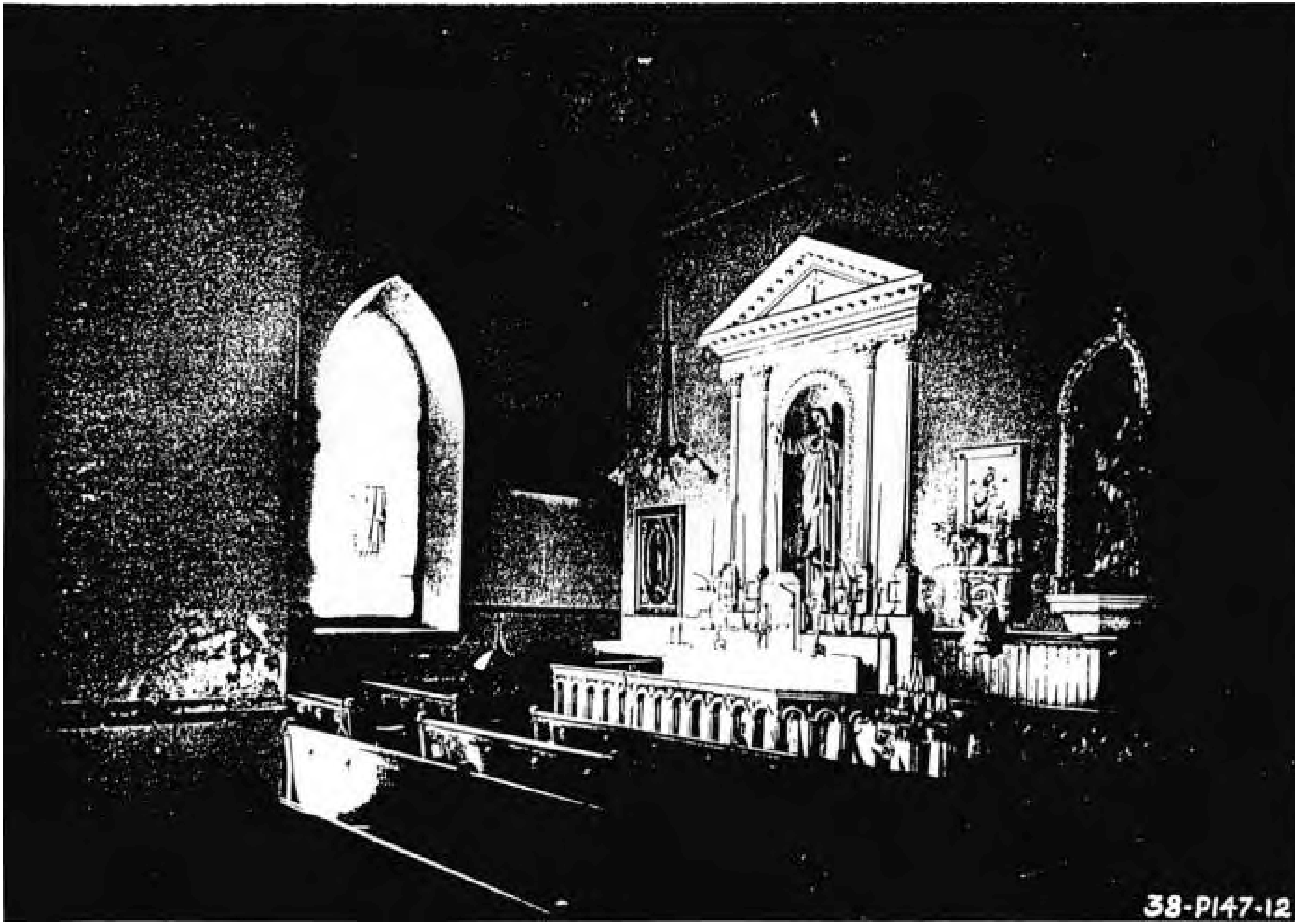
38-P147-


38-P147-8


38-P147-9

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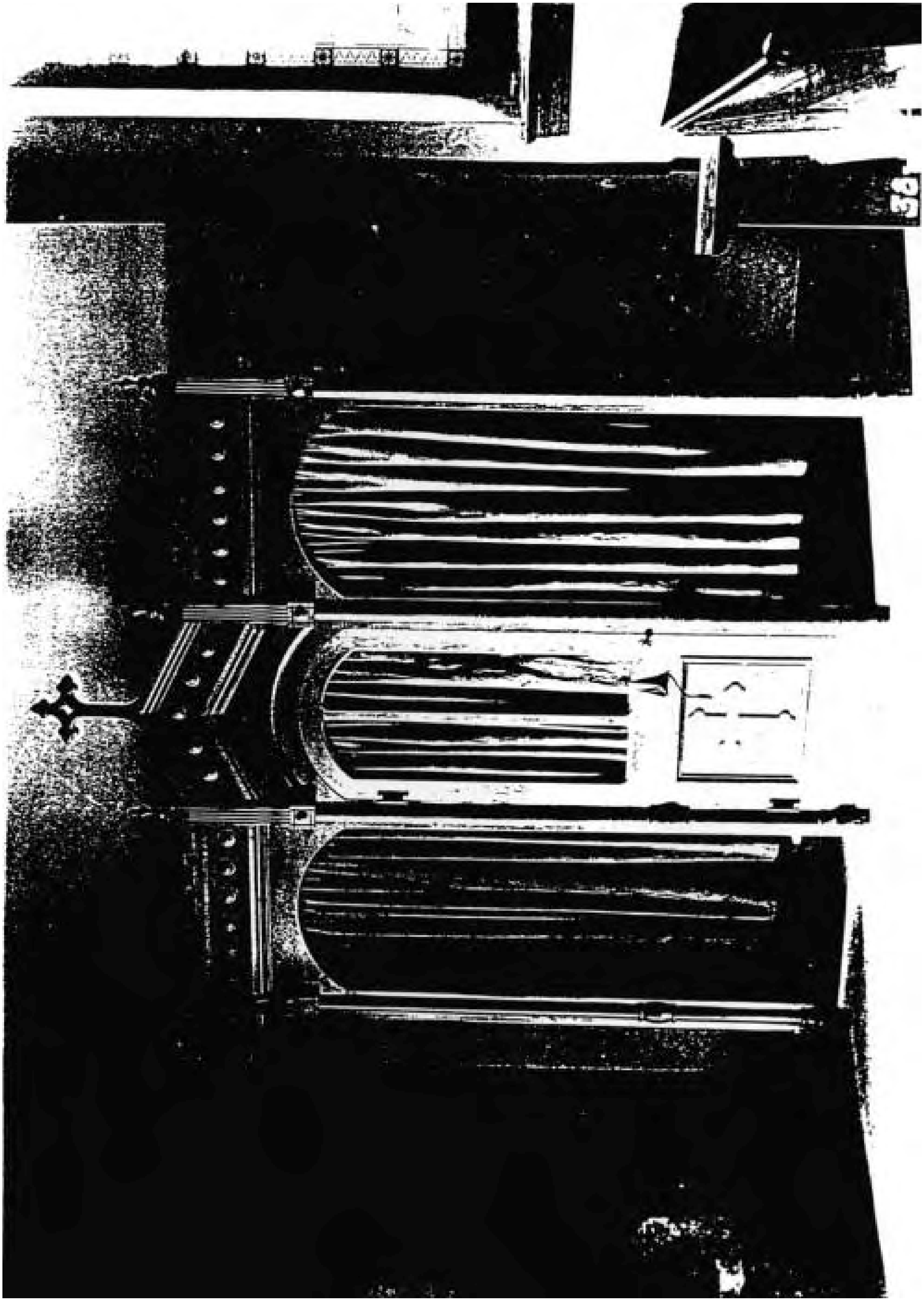


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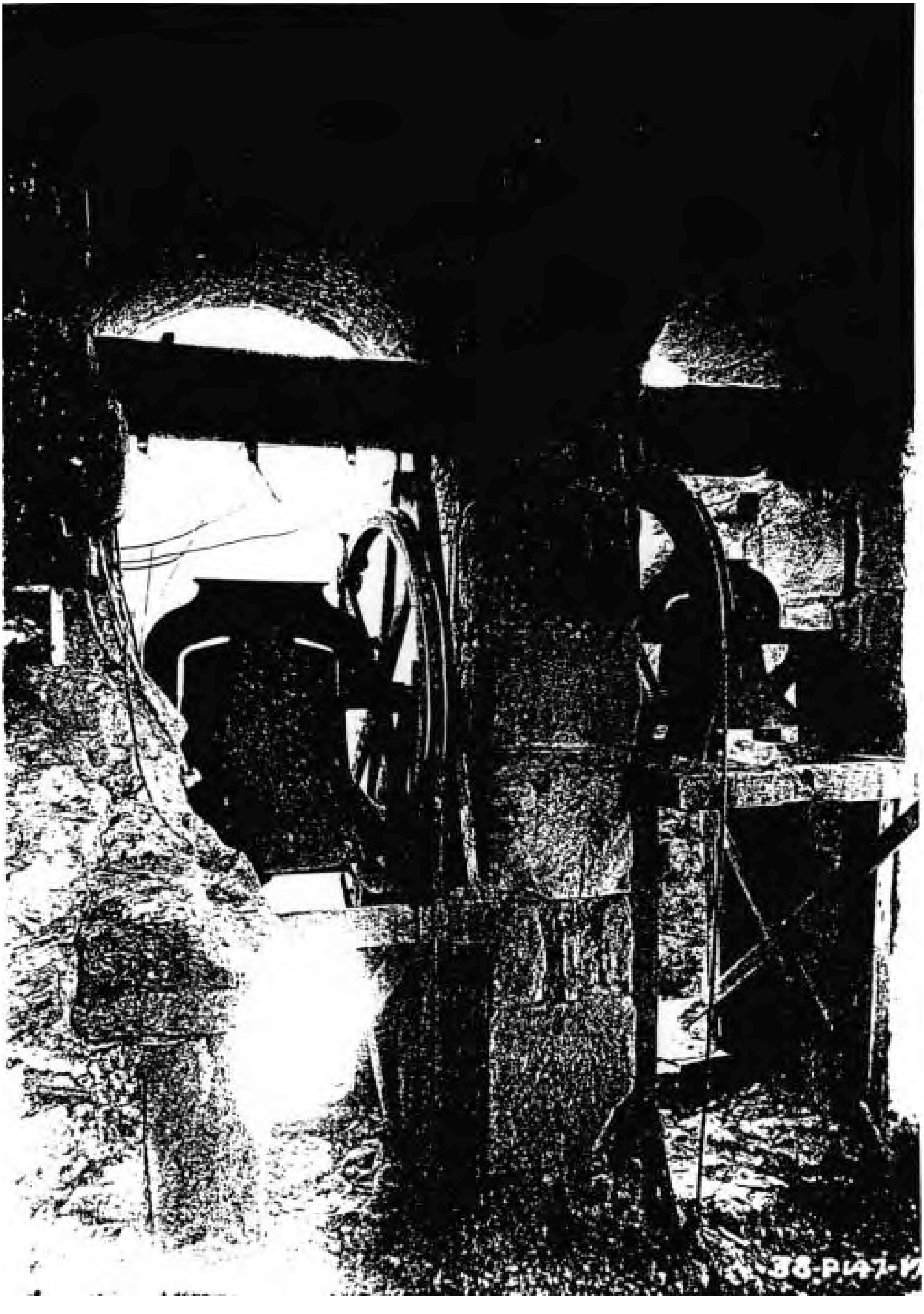
38·P147·15


38-P147-16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