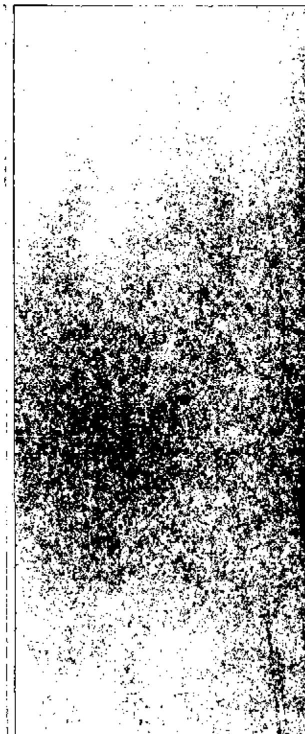
HISTORIC ARCHITECTURE BRANCH

historic structure report

administrative and architectural data

december 1976



PERRY'S VICTORY AND INTERNATIONAL PEACE MEMORIAL

MEMORIAL COLUMN AND PLAZAS

NATIONAL MONUMENT / OHIO

United States Department of the Interior / National Park Service

D-1127

Historic Structure Report
Memorial Column and Plazas
Administrative and Architectural Data
Perry's Victory and International Peace Memorial
Ohio

by

DALTON-DALTON-LITTLE-NEWPORT

June 4, 1976

HISTORIC PRESERVATION DIVISION
DENVER SERVICE CENTER
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

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APPENDIXES (in Volume II)

NOTE: AFTER THE FIRST DRAFT OF THIS REPORT WAS REVIEWED, TWO OF THE APPENDIXES WERE COMBINED, THEREBY ELIMINATING APPENDIX I.

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ILLUSTRATION ACKNOWLEDGEMENTS

Grateful acknowledgement to the following sources for permission to reproduce the pictures listed below:

6-21, 110, Archives of the National Park Service (Herbster Collection, c. 1913-1920); 93, 103, National Park Service, 1975; 4-5, purchased at the Visitor Information Center, 1975.

All other pictures, Dalton•Dalton•Little•Newport, 1975.

AUTHORITY

This report is being prepared under the auspices of the Denver Service Center of the National Park Service, United States Department of the Interior, in accordance with Work Directive No. 4-0048-75-02.

Statement of Significance

STATEMENT OF SIGNIFICANCE

September 10, 1813, a United States fleet under the command of Commodore Oliver Hazard Perry sailed from Put-in-Bay on South Bass Island in Lake Erie and decisively defeated a British squadron under Captain Robert H. Barclay. The action had far-reaching effects on the War of 1812 and the future of the United States: it gave the Americans control of Lake Erie, enabling General William Henry Harrison's troops to sail from Put-in-Bay in October and defeat the British at the Battle of the Thames, resulting in the capture of Detroit.

These successes enabled the United States to hold the Old Northwest upon the conclusion of peace by the Treaty of Ghent in 1814. Just three years later, the Rush-Bagot Agreement was signed, limiting the number of warships to be retained on the Great Lakes. It was the first step toward permanent disarmament of the 4,000-mile boundary between the United States and Canada.

The park and its great Doric column thus not only commemorate the great naval victory; they also memorialize the principle of maintaining peace among nations by arbitration and disarmament, a principle long symbolized by the unfortified boundary between two great North American neighbors.

The Memorial Column[1], culminating a commemorative effort begun nearly a century before, was built 1912-15 during centennial activities honoring the naval victory and the principle of peace. The events leading to construction of the column and the actual construction are historically significant, and the column itself is an historic structure.

Rising 352 feet above Lake Erie, the granite memorial is the most massive Doric column ever built, a shaft second in size only to the Washington Monument. The observation gallery at the top affords a spectacular view of the battle scene, the international boundary line and Put-in-Bay, as well as the shorelines of Ohio, Michigan and Canada.

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[1]The Memorial Plazas were completed in 1924-26 as an integral part of the design.

Administrative Data

ADMINISTRATIVE DATA

PROJECT IDENTIFICATION

The project provides for the structural, architectural, and mechanical investigation of the Memorial Column and Plazas, Structure No. 2, within the grounds of the Perry's Victory and International Peace Memorial, Put-in-Bay, Ohio. The purpose of the report is to provide information valuable to the preservation at standard of this structure.

The Memorial Column stands on a narrow isthmus separating the east and west portions of South Bass Island in Lake Erie, Put-in-Bay Township, Ottawa County, Ohio. It is located near the center of the 25.64 acres of Memorial grounds.[1]

ORDER OF SIGNIFICANCE AND PROPOSED LEVEL OF TREATMENT

The Memorial Column is shown on the List of Classified Structures as a structure of the first order of significance and preservation/limited restoration is proposed as the appropriate level of treatment. Perry's Victory and International Peace Memorial is included on the National Register of Historic Places.

ANTICIPATED DEVELOPMENT WORK

Since its construction and later acquisition by the National Park Service, weather damage and lack of proper maintenance and repair due to insufficient funding have resulted in extensive deterioration of the structures.

Treatment must be directed toward preservation of the column, plazas, the heating-dehumidification system, and the bronze plaques throughout the column; restoration of the incised lettering in the rotunda; and partial restoration of the lantern, lantern floodlights, ground floodlights, elevator, and other interior items such as handrails.

PROPOSED USE, OPERATIONS AND MANAGEMENT REQUIREMENTS

Use of the structure is and will continue to be two-fold: visual and functional.

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[1]See Location Plans "A," "B," and "C" (Illustrations 1, 2, and 3) and views of the Memorial Column in Illustrations 4 and 5.

The Memorial Column provides an impressive effect. Since its construction, it has remained a striking monument to Perry's victory and to continuing international peace along the undefended border between the United States and Canada. The 352-foot column provides visitors arriving by boat or plane with a spectacular approach. It has been used continually as an aid for navigation.

The Memorial Column not only presents an imposing scene from a distance, but it also serves a number of necessary functions in carrying out the interpretive mission for which it was constructed.

From the observation gallery near the top of the Column, visitors may view the site of the Battle of Lake Erie, the historic harbor of Put-in-Bay and other geographic points of interest in the vicinity of South Bass Island. The elevator within the Column provides safe movement of persons between the observation gallery and the base of the Column.

The many plaques, both cast and incised, the historical displays, and other audio and visual aids which have been adapted to the memorial rotunda and the lower elevator landing give the visitor further information. The enclosed nature of the rotunda, elevator landings, elevator, and observation gallery furnish areas where personal contacts on a one to one basis can be effected by the Memorial staff.

The plazas at the base of the Column are the scene of more formal interpretive programs during the summer months. The space under the upper plaza includes public restrooms and houses the temperature-humidity control equipment.

It is required for the operation and management of the structure that:

1. The structure be preserved in, and where necessary be restored to, its structural and functional state as when acquired.

2. Information be obtained and funds allotted for the maintenance of the structure in a preserved condition at standard.

3. All treatment required be carried out in compliance with both legal requirements and National Park Service policies for the preservation of historic structures.

RELATED DOCUMENTS

There are no documents which pertain specifically and only to the Memorial Column. The Statement for Management of Perry's Victory and International Peace Memorial delineates, among others, the following objectives:

1. Establish control which will insure that all development in the area be visually and ecologically compatible with the unique setting and design of the Memorial Column.

2. Develop an active program of maintenance and preventive maintenance to insure that the Memorial Column and terraces, seawalls, grounds, and related resources are properly and economically maintained to meet established standards.

The Interpretive Prospectus for the area calls for the continuing use of the Memorial Column as the center of park visitor activities.

Revision of the 1965 Master Plan and the 1970 Interpretive Prospectus are contemplated in Fiscal Year 1977.

SPECIAL USE PERMITS

United States Coast Guard

Issued in 1953 and renewed periodically, automatically renewable until 1995. Allows permitee to operate navigation lights on the penthouse; maintain lights, conduit from penthouse to base of column and underground cable to Park boundary.

Village of Put-in-Bay

Issued for period July 1, 1972 - July 1, 1977. Allows permitee to maintain 2" underground water line which runs from Park boundary to the column, between the north seawall and Ohio Highway 357.

Ohio Edison Company

Issued for period June 30, 1970 - June 30, 1990. Allows permitee to maintain a 3-wire underground electric cable from the Park boundary to the column. The cable runs alongside the 2" water line, above.

LEGISLATIVE HISTORY

June 2, 1936

Public Law 631 authorized establishment of Perry's Victory and International Peace Memorial National Monument, to be administered by the National Park Service, United States Department of the Interior.

July 6, 1936

President Franklin D. Roosevelt established the National Monument by Proclamation.

February 2, 1960

An additional 6.6 acres at the northeast side of the Monument were donated to the United States by private citizens.

October 26, 1972

This Act redesignated the area Perry's Victory and International Peace Memorial, authorized the purchase of not more than four additional acres of land with appropriated funds, and authorized the appropriation of $370,000 for acquisition of this land.

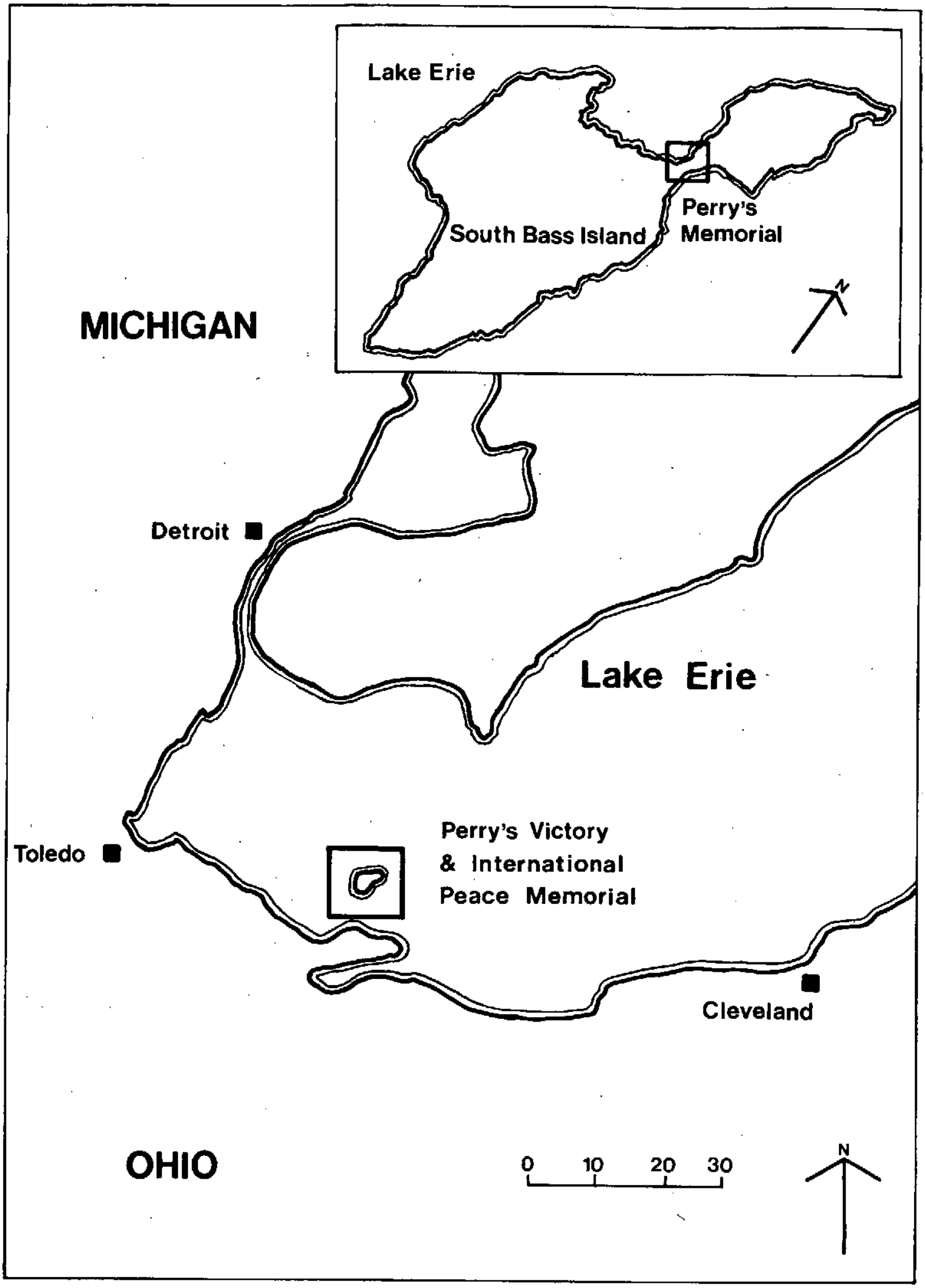

ILLUSTRATION 1. Location Plan A.

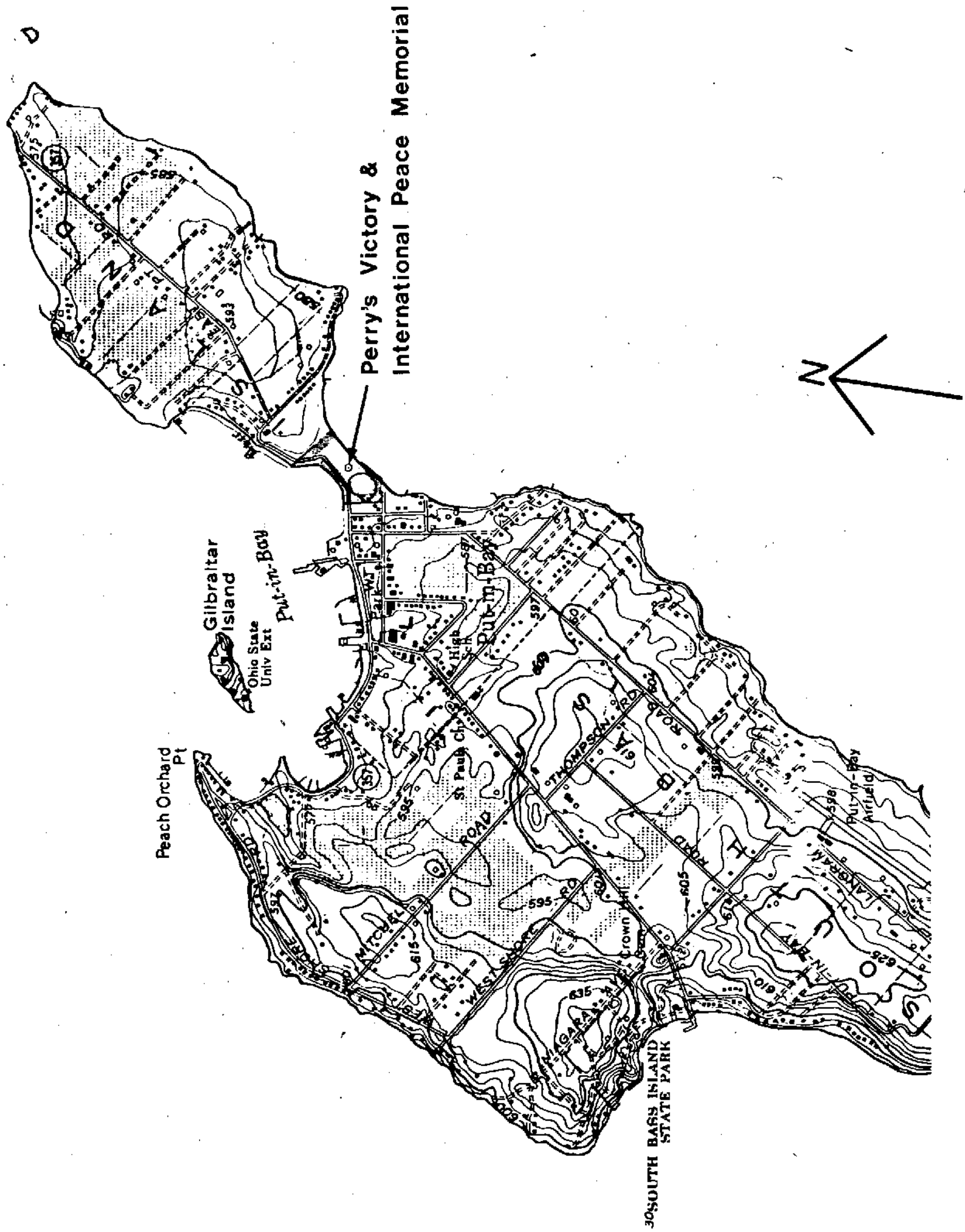

ILLUSTRATION 2. Location Plan B.

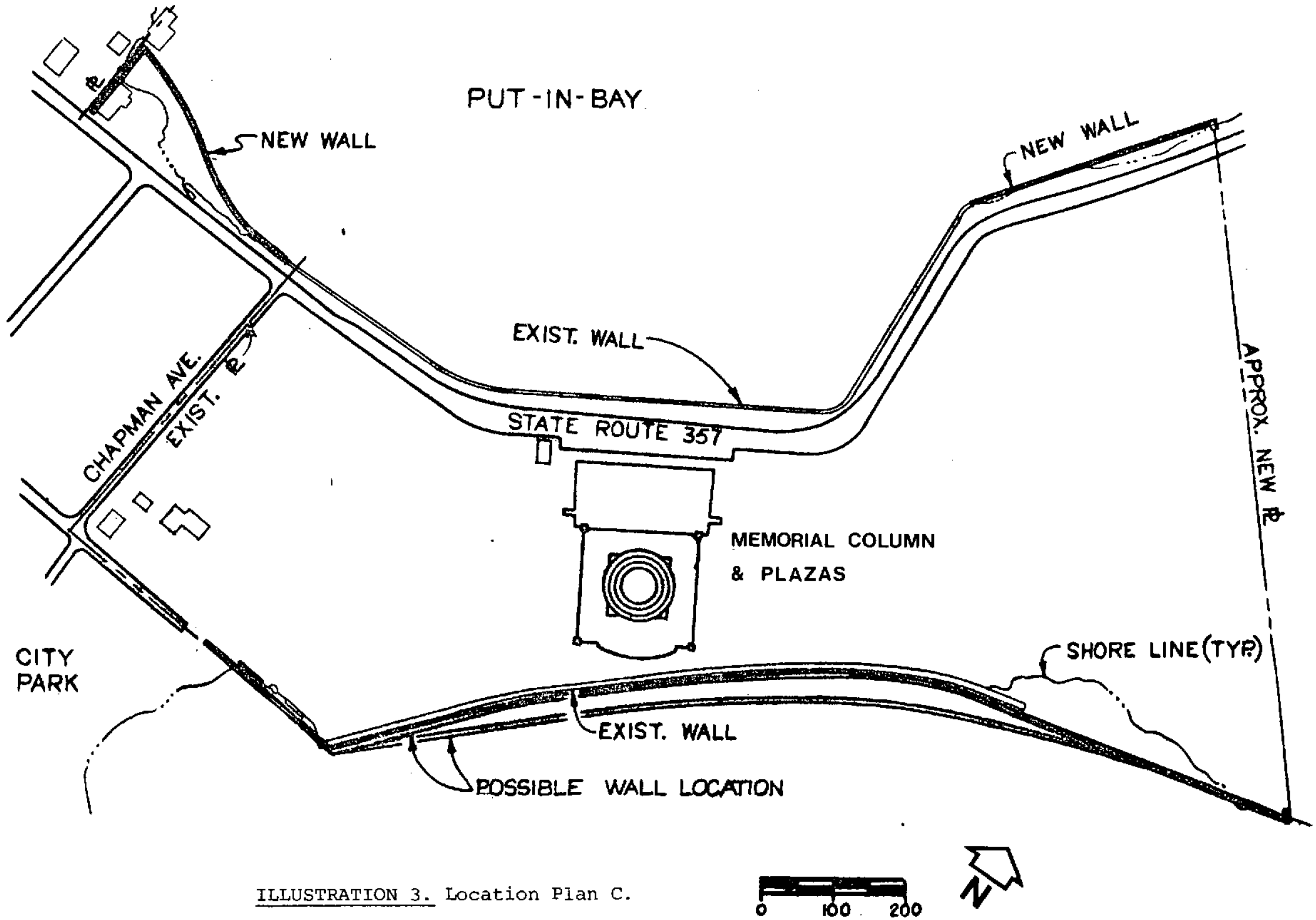

ILLUSTRATION 3. Location Plan C.

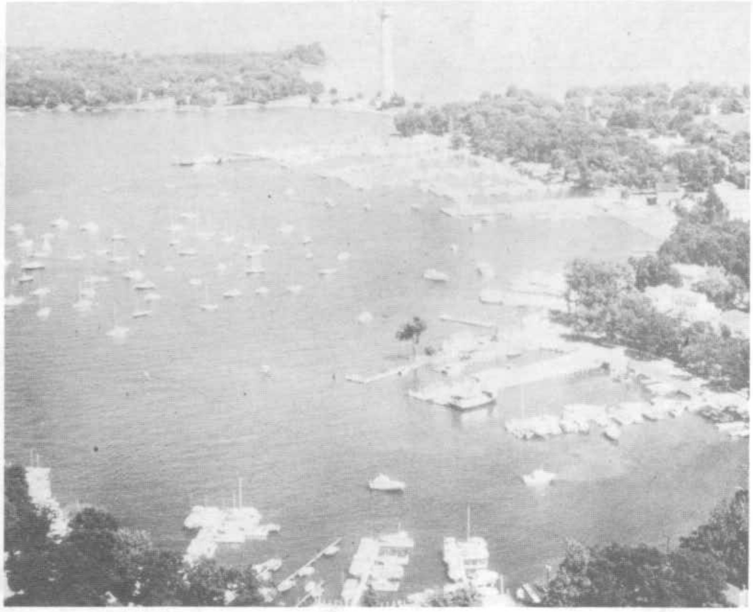

ILLUSTRATION 4. Perry's Victory and International Peace Memorial at Put-in Bay.

ILLUSTRATION 5. Memorial column and plazas.

Historical Background of the Memorial and Its Construction

HISTORICAL BACKGROUND OF THE MEMORIAL AND ITS CONSTRUCTION[1]

"South Bass Island is one of a group of islands lying at the western end of Lake Erie. It is divided by an isthmus into two parts. The isthmus has been selected by the Inter-State Board as the site of the Perry Memorial, and a tract of about fourteen acres...has been purchased to provide a reservation about the Memorial.

"Enclosed between South Bass and the adjoining Gibraltar Island is a sheet of water known as Put-in-Bay, where Commodore Perry's squadron lay before the battle and to which it returned with the captured British ships. From the high bluffs of Gibraltar Island a look-out was kept for the opposing fleet, and when sighted, battle was joined about eight miles to the northwestward. After the victory, troops under command of General William Henry Harrison were brought in Perry's ships to South Bass Island, where they were drilled and whence they took their departure for the Battle of the Thames and the capture of Detroit. The site of the monument is, therefore, a center of great historic interest.

"South Bass and adjacent islands are much frequented by summer visitors, and the village of Put-in-Bay adjoining the site of the Memorial is the centre of such traffic."[2]

Early efforts to establish a monument to Perry's victory of September 10, 1813 were scattered and uncoordinated, with numerous designs and locations proposed and plaques, markers and statues erected at various places around Lake Erie. Interest gradually focused on Middle Bass, South Bass and Gibraltar Islands. By 1852 the first organized movement started, proposing Gibraltar Island as a site, it being in the vicinity of the American fleet's starting point and of the burial place of the U.S. and British officers killed in the battle. The location was also pushed by property owners on the island.

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[1]This statement is based on Alfred Mongin's exhaustive and profusely illustrated study, A Construction History of The Perry's Victory and International Peace Memorial, National Park Service, typescript, August 10, 1961. 392 pages, including 79 photos, maps and drawings.

[2]Program of a Competition For The Selection of An Architect To Design and Supervise Construction Of The Perry Memorial At Put-In-Bay, Ohio, issued by The Inter-State Board of Perry's Victory Centennial Commissioners, October 11, 1911.

The momentum died, to be succeeded by creation in 1858 of the Perry Monument Association, which included governors, military and naval officers and other prominent men from various states, local personages, and representatives from cities bordering Lake Erie. Interest again centered on Gibraltar Island. In 1864 Jay Cooke, a nationally known financier, acquired Gibraltar Island and erected a monument. His brother Henry was part owner of the Sandusky Register which continued to promote Gibraltar.

After the Civil War, however, enthusiasm grew for a memorial at Put-in-Bay village, coinciding with South Bass Island's growing importance as a resort. The September 10 battle anniversary rivaled Labor Day as a popular holiday. The burial site in the village park of the officers killed in the battle gave added weight. The Register called for erection of a hollow column, in 1867 the Perry Monumental Association was formed, and fund raising started. Twelve Congressional bills were introduced to create a monument--without success--between 1890 and 1903.

With the approach of the 1913 centennial, a Perry's Victory Centennial Commission was established in 1908, largely through the efforts of Webster P. Huntington, a journalist and promotional genius from Columbus. Huntington would continue as executive officer of commissions creating and administering the Memorial for thirty years.

At Put-in-Bay September 10, 1910, the Interstate Board of Perry's Victory Centennial Commissioners was formed, adding to the Ohio group commissioners from the States of Pennsylvania, Michigan, Illinois, Wisconsin, Kentucky, Rhode Island, and New York.[3]

A monument design by Cleveland architect and civil engineer John Eisenmann was presented and unanimously adopted at this first meeting. It proposed the isthmus as the site, and included "practical" elements such as an aquarium, lighthouse beacons, naval and weather observatories, and a wireless station as well as items such as fountains and viewing balconies. The design was later used (by Webster P. Huntington who "discovered" Eisenmann) in lobbying efforts before state legislatures to gain appropriations.

Two distinct objectives were formulated by the Interstate Board: the centennial observance in 1913, and erection of a suitable memorial. Three U.S. Commissioners were added to the Board by Public Law 463, March 3, 1911, which also provided for a $250,000

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[3]Minnesota subsequently joined the Board.

Federal appropriation conditional on a requirement by President Taft that the Board consult with the newly formed National Commission of Fine Arts on the memorial design. By now a physical memorial was the central idea of the Centennial celebration.

September 11, 1911, Frank Miles Day, a nationally known architect from Philadelphia was retained by the Board as Professional Adviser for selection by competition of a design and architect for the Perry Memorial. Day was a past president of the American Institute of Architects, former chairman of its Committee on Competitions, and had served as a juror on competitions for several Federal buildings.

Day recommended the National Commission of Fine Arts as the jury of award. Assistant Secretary of the Commission was Arno B. Cammerer, later to become Director of the National Park Service. The Commission consisted of prominent architects, painters, sculptors and a landscape architect (see Extract of Program Of a Competition on pp.13-18). On September 25, Day met informally with members of the Commission in New York and obtained their agreement to act as jury. Their action was historic: this was to be the first architectural competition judged by the Commission.

The program for the competition prepared by Day was revised by him and the Building Committee October 11 and publication authorized. At this meeting the Board also provided that designs already made public could still be submitted. On October 16 a news release, shown below, was authorized. Following the news release is an extract from the program.

"The Building Committee of the Perry Memorial announces a competition for the selection of an architect for the Memorial which will be erected at Put-in-Bay, South Bass Island, Lake Erie, near the place where Perry's victorious action was fought. The Memorial will commemorate not only the victory but the subject of one hundred years of peace between the United States and Great Britain.

"It will consist of a lofty shaft with a museum of historic relics at its base standing in a reservation of fourteen acres. $600,000 will be expended upon the construction of the commemoration shaft and museum. The reservation will be designed as a suitable setting for the Memorial.

"The program, which conforms to the principles approved by the American Institute of Architects, has been so drawn under the direction of the Committee and Mr. Frank Miles Day, adviser to the Committee, that the problem presented is a most attractive one. Competitors will have the fullest scope for their artistic imagination. The prize of the competition will be the appointment as architect to design and superintend the construction of the Memorial. There are also to be three premiums for the authors of the designs placed next to the winner.

"The Building Committee will be advised in making its awards by a jury of well known experts.

"Architects desiring a copy of the program which sets forth the conditions of participation should make application to Mr. Webster P. Huntington, Secretary to the Building Committee, Federal Building, Cleveland, Ohio."

EXTRACT

PROGRAM OF A COMPETITION

FOR THE SELECTION OF AN ARCHITECT TO DESIGN

AND SUPERVISE THE CONSTRUCTION OF

THE PERRY MEMORIAL AT

PUT-IN-BAY, OHIO

The Memorial

The erection of the Perry Memorial constitutes an important part of the celebration of the Centennial Anniversary of the War of 1812-15. It is intended to commemorate the victory of Commodore Oliver Hazard Perry and the officers and men under his command at the Battle of Lake Erie, and as a memorial to the hundred years of peace between Great Britain and the United States.

The Commissioners

Commissioners representing the United States and the States of Ohio, Pennsylvania, Michigan, Illinois, Wisconsin, New York, Rhode Island, Kentucky and Minnesota, acting under authority of Congress and the Legislatures of the several States, have united themselves in an organization bearing title 'The Inter-State Board of Perry's Victory Centennial Commissioners,' hereinafter called 'The Inter-State Board.'

Appropriations which will be expended under the authority of the Inter-State Board have been made as follows: The United States, $250,000; the State of Ohio, $83,000; the State of Pennsylvania, $75,000; and the State of Minnesota, $50,000. It is confidently expected that each of the other States which have appointed Commissioners will make an appropriation at the next session of their Legislatures. Other States may perhaps join in the movement.

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The Building Committee

The Inter-State Board has appointed a Building Committee consisting of

George H. Worthington, Cleveland, Ohio, Chairman;
Colonel Henry Watterson, Louisville, Ky.;
Lieutenant-General Nelson A. Miles, Washington, D. C.

The Building Committee has appointed Webster P. Huntington, Federal Building, Cleveland, Ohio, as its secretary, and it has appointed Frank Miles Day, Past President of the American Institute of Architects, to advise it in the preparation of this program and in the conduct of the competition. The Inter-State Board having delegated to the Building Committee full authority to establish for it and in its name a competition for the selection of an architect to design and supervise the construction of the Perry Memorial, and to recommend a design and architect to the Inter-State Board, the Building Committee, by virtue of that authority, establishes the competition herein described.

The Competition

The competition will be open to applicants of established reputation. Applications, to receive consideration, must be addressed to the Building Committee of the Perry Memorial, care Webster P. Huntington, Secretary, Federal Building, Cleveland, Ohio, and they must be received not later than November 14th, 1911. The Building Committee, having considered such applications, will reply to all, notifying those whom they deem qualified to enter the competition. As the winner of the competition will be appointed the architect of the Memorial, the Building Committee will select those who are to take part in it with the greatest care, and will include among them only architects in whose ability and integrity they have absolute confidence and to any one of whom they are willing to entrust the work.

This program constitutes an agreement between the Inter-State Board on the one hand and each participant in the competition and the appointed architect, severally, on the other, to the terms of which agreement each architect submitting a design gives assent by such submission.

Communications regarding the competition should be addressed to Frank Miles Day, 925 Chestnut Street, Philadelphia, Pa. They must be in writing and they may be anonymous.

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The Prize and the Premiums

The prize of the competition will be the commission to design and supervise the construction of the Memorial. This prize will be awarded in the manner and upon the terms hereinafter set forth. Three premiums of respectively $1250.00, $1000.00, and $750.00, will be awarded in the manner hereinafter set forth. No competitor, other than those who may be awarded the prize and premiums, will receive any remuneration for taking part in the competition.

The Site

South Bass Island is one of a group of islands lying at the western end of Lake Erie. It is divided by an isthmus into two parts. The isthmus has been selected by the Inter-State Board as the site of the Perry Memorial, and a tract of about fourteen acres has been purchased to provide a reservation about the Memorial.

Enclosed between South Bass and the adjoining Gibraltar Island is a sheet of water known as Put-in-Bay, where Commodore Perry's squadron lay before the battle and to which it returned with the captured British ships. From the high bluffs of Gibraltar Island a look-out was kept for the opposing fleet, and when sighted, battle was joined about eight miles to the northwestward. After the victory, troops under command of General William Henry Harrison were brought in Perry's ships to South Bass Island, where they were drilled and whence they took their departure for the Battle of the Thames and the capture of Detroit. The site of the monument is, therefore, a center of great historic interest.

South Bass and adjacent islands are much frequented by summer visitors, and the village of Put-in-Bay adjoining the site of the Memorial is the centre of such traffic.

A large part of the site is marsh, but at its northern end the land is perhaps six feet above the mean water level. The variation of the water level is about four feet. The whole area of the reservation is underlaid by firm rock at no great depth. For the purposes of this competition, the following assumptions are made: First, that solid rock underlies the site in a plane five feet below the mean water level; second, that the roads shown on the survey line in a plane four feet above mean water level; third, that the site is treeless.

The Problem

As the Committee desires to receive a well studied general scheme and not a design perfected in detail, and as it wishes to leave to each competitor entire freedom to work out his ideas, it avoids giving detailed instructions as to the location or planning of the several buildings.

The Memorial will consist primarily of a shaft* of considerable height, bearing, as an aid to navigation, if the designer wishes to include it, a light of the first order. The shaft must have a stairway, an elevator and a convenient outlook for the public from a high level.

There is also to be a Museum of Historic Relics, which should be a hall of fine proportions and of a floor area of not less than three thousand square feet and not more than five thousand square feet. Suitable provision should be made for lavatories and janitor's services, and for an office for the curator.

The Shaft and the Museum may be grouped, combined or separated in whatever way may appear best to the competitor.

The remains of a number of officers and sailors, both of the British and American fleets, are interred on the island. They will be reinterred within the walls of the Memorial. The competitor may suggest, either in his design or in the written description, such special memorial to them as he may deem fit.

It is intended that the reservation shall afford a suitable setting for the Memorial, but this does not mean that the whole area must be treated in a formal manner. A curving road runs along the western or bay shore. Its line may be changed, and it may be widened, but no part of the reservation or of the road may be shown as extending further into the bay or the lake than the present shore line. The bay and lake must be so connected as to provide for the convenient passage of boats of the life saving service. The earth excavated from such connection and any extensions of it may, if desired, be utilized in raising the level of the site, but competitors who desire to

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*The word shaft is not used in a technical sense and it is not to be taken as indicating a desired type of design.

show the Memorial as rising directly from the water may do so. It is important that adequate circulation should be provided within the buildings and in the reservation generally.

The Inter-State Board has limited the Building Committee to an expenditure of six hundred thousand dollars ($600,000) upon the construction of the Memorial, not including the improvement of the reservation.

For the purposes of this competition, it is assumed that the expenditure upon the improvement of the grounds will be confined to one hundred thousand dollars ($100,000), and competitors are advised to design such improvement with due regard to the economy thus indicated.

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The Advisory Commission

The Commission of the Fine Arts appointed by the President of the United States in accordance with an Act of Congress, and consisting of Daniel H. Burnham, Chairman, Daniel C. French, Thomas Hastings, Frederick Law Olmsted, Charles Moore, Cass Gilbert, and Francis D. Millet, will advise the Building Committee as to the making of awards. The Commission will select one design as being the most satisfactory solution of the problem submitted and will recommend to the Building Committee that its author be appointed as architect. The Commission will name, in order of merit, three other designs as worthy of the three premiums.

Awards

On receiving the report of the Commission of the Fine Arts, the Building Committee will carefully examine the designs submitted and will recommend to the Executive Committee of the Inter-State Board an award of the prize and premiums.

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The Architect

The selection of an architect as herein provided constitutes an engagement to design and supervise the construction of the Perry Memorial under the conditions set forth in the statement of the American Institute of Architects, entitled "Professional Practice of Architects and Schedule of Proper Minimum Charges," a copy of which is hereto attached, save only that his payment for the services mentioned in the first paragraph thereof shall be as there stated, six per cent (6%), and not a higher charge as mentioned for monuments, etc., in the second paragraph.

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Although it is expected that the prize drawings will afford a basis for the design of the completed work, yet it is to be understood that the Committee may, after making the award, determine upon the inclusion in the Memorial of features not named in this program, and may for this or other reasons require that the problem be restudied by the architect.

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Approved and signed by the Building Committee, October 11th, 1911.

GEORGE H. WORTHINGTON, Chairman
HENRY WATTERSON
NELSON A. MILES

Witness:
WEBSTER P. HUNTINGTON,
Secretary

Approved on behalf of the Inter-State Board of the Perry's Victory Centennial Commissioners, October 11th, 1911.

GEORGE H. WORTHINGTON,
President-General

Witness:
WEBSTER P. HUNTINGTON,
Secretary-General

This program has received the approval of the American Institute of Architects, through its Standing Committee on Competitions, R. Clipston Sturgis, Acting Chairman.

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Eighty-two architects from 19 cities, including 42 from New York, were admitted to the competition; 54 designs were received. All 52 federal and state commissioners of the Inter-State Board were invited to view the designs, which were hung in the new National Museum of the Smithsonian Institution. The designs were judged by the Commission of Fine Arts, January 25 and 26, 1912, and it selected the design by Joseph Henry Freedlander and Alexander Duncan Seymour, Associated Architects, New York City. The Commission's choice was unanimously endorsed by the Building and Executive Committees.

Freedlander and Seymour, graduates of the Massachusetts Institute of Technology and Columbia University, respectively, also attended the Ecole des Beaux Arts in Paris: Freedlander was one of the first three Americans to receive its Diplome in architecture. Both native New Yorkers, they continued to practice there independently following the end of their association in 1917. Freedlander had already established his reputation, both in executed buildings and in competitions. His role as architect for the Perry Memorial would continue until the dedication of July 31, 1931.

The winning design consisted of a long elevated plaza running northeast-southwest, with the column in the middle, and monumental steps down to the shore of Put-in-Bay. At the southwest end of the plaza was to be placed a symbolic sculpture group and colonnade; at the northwest end, a museum. However, in the constructed Memorial these elements were omitted and a much smaller plaza provided.

The parcels comprising the 14-acre isthmus site were assembled and purchased by the State of Ohio between July 1911 and May 1912, and ceded by the State to the United States in May, 1913.

The architects completed rough working drawings for estimating by March 11, and visited the site May 12, 1912. By this point Frank Miles Day, Freedlander and the Commission of Fine Arts were agreed: the column was the central motif. Freedlander's design facilitated this "separability" of segments.

The Pennsylvania appropriation of $60,000 approved at this time was conditional on transfer of the Memorial and site to the United States, thus assuring eventual Federal control.

Specifications were ready by May 20, 1912 and included the following:

Foundations - to bedrock.

Exterior Stone - light granite,[4] pink cast to counteract bluish effect from sky reflection; tooled vertically to yield brilliant texture.

Walls - concrete backing behind granite, finished with light colored face brick.

Rotunda - limestone walls and domed ceiling, granite steps, marble floor.

Stairs, Rotunda to Lower Elevator Lobby - granite, with white tile walls, ceiling and wainscot of upper landing.

Interior of Column Shaft - light colored face brick.

Walls of Lower and Upper Elevator Landings - cement finish.

Floors of Lower and Upper Elevator Landings - red quarry tile.

Stairs in Column Shaft - reinforced concrete, steel pipe rails.

Entrance Doors, Handrails, Elevator Enclosures, Light Fixtures, Window Grilles (Penthouse) - bronze.

Elevator - Otis Elevator Company.

The architects obtained and presented to the Building Committee on June 4, 1912, four "estimates", or bids for construction of the column only ranging from $329,851 to $427,000. The bids did not include the electrical installation or the bronze lantern, which were handled later under separate contracts. On the same day the Building and Executive Committees voted to award a contract to the low bidder, J. C. Robinson and Son of New York City. The Executive Committee also approved the tombolo, or isthmus site, and stipulated that title to the Memorial be eventually conveyed to the United States.

Freedlander and Seymour engaged the service of the following consultants:

Sprague and Henwood, Scranton, Pennsylvania -Soil borings
Judson and Wagar, Sandusky, Ohio - Site survey
Boller, Hodge and Baird, New York City - Structural Engineers
Pattison Brothers, New York City - Electrical Engineers

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[4] The Milford Pink granite actually selected is still quarried at Milford, Massachusetts.

Site investigations revealed that the dolomite bedrock ran irregularly from 10 to 20 feet below lake level, not the even five feet below lake level stated in the competition program. Also, the isthmus between bay and lake was found to be 100 feet narrower than originally given. These discrepancies caused a delay in the preparation of the architects' drawings, including a substantial narrowing of the plaza. A large additional payment would also be due the contractor for extended concrete foundations.

The revised plans included all electrical units in the column, since the museum which had been designed to contain them would not be built under this contract. As stated by the Executive Committee on September 9, 1912: "This column has been officially declared by the Inter-State Board as the Perry Memorial, and the plaza and adjunct buildings are accessories thereto."

The contract was awarded to J. C. Robinson and Son and announced at the town park in Put-in-Bay the next day, September 10, the battle anniversary. Freedlander and Seymour, however, prepared plans and specifications and obtained estimates for the complete ambitious original scheme - as modifed by borings and survey data - hoping it could one day be carried out. Dimensions were:

Total length of the memorial plaza 758'-0"
Total width of the memorial plaza 458'-8"
Plaza 12'-0" above mean high water

Museum:[5]

Length 85'-0"
Width 65'-8"
Height above Terrace 43'-10"

Colonnade:[6]

Length 95'-6"
Width 44'-8"
Height above Terrace 35'-11"

Column:

Height 317'-3"
Base 45'-0" diameter

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[5]To be on Terraces 3'-0" above main plaza.
[6]To be on Terraces 3'-0" above main plaza.

Neck 35'-6" diameter
Thickness of wall at base 9'-3"
Thickness of wall at neck 4'-0"
Width of abacus 47'-0" square

Bronze Tripod on top of Column:

Height 22'-10"
Diameter at widest portion 17'-4"
Weight approximately 8 tons

The site was cleared June 24 - September 18 under a separate contract between the Inter-State Board and John H. Feick of Sandusky, Ohio. Robinson promptly started moving in equipment, building a dock, railroad, electric power plant and storehouse, installing a winch, setting up a derrick, and filling the marsh. Young Roy Robinson, the partner in charge, remarked sardonically that "conditions on this island are much the same as those which confronted Robinson Crusoe."

This work and excavation and installation of the sheet piling, or cofferdam, for the column foundation were completed December 24, 1912. After inspection, the structural engineer Henry W. Hodge recommended that the rock bed be roughly stepped off to avoid a steep incline. Robinson was then anxious to start placing concrete immediately, but was refused permission by the architects due to approaching severe weather.

Spring 1913 found the contractor removing accumulated water and mud and repairing the cofferdam. By late June the concrete cylinder foundation, about 9-1/2 feet thick, had been poured approximately 22 feet above bedrock to the future upper plaza level, and the first course of granite started.

Work was slowed by the July 4 cornerstone-laying ceremonies and the battle centennial ceremonies of September 10 and 11. Throughout the summer the work was also somewhat impeded by the half million visitors attracted by promotional and commemorative events and fund-raising activities. However, the latter certainly benefited from the attraction furnished by the partially built column itself, which comprised the sixth granite course and a partially completed rotunda by early September.

Of special historic preservation interest was the appearance of the brig Niagara to which Perry transferred during the battle. Raised from the lake bottom where she had been scuttled a century before, the ship was reconstructed and during the summer sailed to Lake Erie cities with an escorting fleet.

To accommodate the tourist activity, South Bass Island promoters proposed an electric railway across the reservation. Architect Freedlander vigorously objected to this inappropriate scheme, and it was dropped.

In his opening address at the centennial ceremonies on September 10, 1913, President-General Worthington said significantly:

> "We are dedicating today the uncompleted Perry Memorial, but we contemplate its ultimate building in accordance with the original design, including the proposed historical museum and the beautiful colonnade intended to represent the spirit of human progress toward international peace."

The Master of Ceremonies was Governor Cox of Ohio; the featured speaker was former President William Howard Taft, who had been named an honorary vice-president of the Ohio Commissioners in 1909, during his Presidency of the United States. The principal Canadian representative was J. A. MacDonald, editor of the Toronto Globe. All speakers stressed peace among the United States, Britain and Canada as the keynote and meaning of the Memorial. This spirit was in marked contrast to the chauvinistic and bellicose fervor of the early efforts to create a memorial in the 1850s and 1860s.

The next day a casket containing the remains of the three American and three British officers killed in the battle was conveyed to the column and placed in a crypt deep below the rotunda floor. Their final resting place was later noted by a bronze marker. Services were conducted by the Bishop of Rhode Island and the Venerable Arch-Deacon and Rector of St. Paul's Church, Toronto. This reinternment ceremony actually constituted the first act of dedication of the Memorial column to its avowed purpose.

Following are the names of key personnel involved with the column project:

Otto G. Herbster - The leading photographer of Put-in-Bay, Herbster's photos[7] for J. C. Robinson and Son were official records of construction progress, on which certifications for payment to the contracter were made by the architects' representative.

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[7]An extensive collection of Herbster's construction photos exists in the records of Perry's Victory and International Peace Memorial and some are included in this report; see Illustrations 6-23.

Charles E. Sudler - Architects' representative (Clerk of the Works).

Henry Bell - Contractor's general superintendent.

Construction of the column required considerable ingenuity and improvisation by the contractor. A wooden tower was erected inside the shaft, supported by the steel elevator shaft framing and by heavy wood struts and steel guy ropes anchored into pockets in the concrete shaft. Long booms hinged to the tower supported cables which hoisted up concrete and the granite blocks. Concrete was fed from the mixer on the ground into a chute through the hollow concrete foundation cylinder and thence into the hoisting bucket which was pulled up the shaft interior. Thus, holes had to be kept open in the rotunda floor and domed ceiling until concrete work was completed.

As the column construction advanced, the tower rig was dismantled and reinstalled higher up. About 60 feet of shaft wall could be constructed with each setting. Lateral bracing to the elevator framing was provided by the concrete stairs. Pockets left from the tower anchorage were filled with concrete and then covered with face brick, which was practically vitrified and highly nonabsorptive.

Equal resourcefulness was required in setting the granite blocks, which actually proceeded in conjunction with the concrete placement. Each ring, or course of granite consisted of 30 blocks about four and one-half feet high and approximately seven feet across the flute, or exterior concave surface, the 30 blocks in a course forming 20 flutes. Seventy-eight vertical courses formed the exterior of the shaft proper, approximately 282 feet high, the granite blocks weighing from two to five tons.

As each ring, or course of granite was set, wood segmented forms were placed inside it and the space between filled with concrete. Each block was anchored to the concrete with two heavy metal hooked bars. Alternate courses of granite were thick and thin, producing a locking or keying action into the concrete backing.

The shaft interior had a constant diameter above the lower elevator landing of 27'-6", while the wall thickness decreased from 9'-3" at the plaza to 4'-0" at the top, with the exterior swelling out slightly in the column's rise, to produce classical entasis.

Robinson's method aroused wide interest among engineers and contractors, and was the subject of a detailed article entitled "Building a Granite Shaft 300 Feet High: The Perry Memorial," which appeared in the July 23, 1914 issue of <u>Engineering News</u>.

Even more complicated were the construction of the capital and the rotunda. At the capital, heavy beams were bracketed from the tower; they supported substantial falsework which in turn supported the granite blocks composing the curved section of the capital, or echinus. The inside face of the stone was cut to form dovetails, or keys, which, with steel reinforcing, locked the concrete to the stone. Cantilevered from and above this construction was the abacus, or capital proper, 47 feet square and 7'-8" deep which actually formed the observation gallery. The echinus and abacus together were approximately 18 feet deep. Granite blocks weighed between two and four and one-half tons.

The capital, completed August 31, 1914, was the subject of another interesting article in Engineering News (see above) entitled "Reinforced-Concrete Cap of Perry Memorial Column" by Howard C. Baird, of the consulting structural engineering firm of Boller, Hodge and Baird.

Robinson's[8] problem in dealing with the rotunda--about 20 feet high and 26 feet in diameter--is best described in the first article cited above from Engineering News: it "involved special work, on account of the limestone side facing, the two spiral stairways in the wall, and dome, and four deep reinforced concrete girders over the dome which carry the staircase columns above.... The walls were concreted (in several stages) after setting both granite and limestone and building the forms for the spiral stairways between. The thin stonework of the dome was laid on centering and keyed up, and then backed with concrete...." in a header and stretcher arrangement of the stone blocks, similar to the thick-thin alternation of granite blocks in the outer shaft wall. The problem was made even worse due to the fact that holes in the dome and floor of the rotunda had to be kept open for operation of the concrete hoist, until concrete placement was completed in October 1914.

Following the delays of the 1913 summer, rapid progress was made, with 24 granite courses set by December 16; 38 by February 20, 1914; and 78 by early July. Completion as of September 2, 1914 stood as follows:

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[8]Roy Robinson expressed concern and made some interesting observations about the rotunda and other elements, including cracks in the column, in correspondence in 1955 with Superintendent Joseph R. Prentice.

Column as a whole	- 90% (approx.)
Granite and concrete	- 97% (approx.)
Face brick interior	- 85% (approx.)
Concrete stairway	- 75% (approx.)

At the annual meeting September 10, 1914, the Inter-State Board set aside $122,000[9] for plazas and landscaping, affirming its intent to complete the original design concept recommended by the National Commission of Fine Arts; however, the plaza had been reduced to 267 feet northwest-southeast by 160 feet northeast-southwest. The Board still honored Freedlander's desire that the plaza ensure an architectural base for the column and provide space for exercises and ceremonies accommodating large assemblages. The final plaza design, showing the first segment near the column in relation to future additions including the museum and colonnade, is shown in Freedlander and Seymour Drawing No. 10, revised October 10, 1913 to reflect corrections shown on Judson and Wagar survey drawing of June 22, 1912. The architects' detailed working drawing, dated August 4, 1914 and titled "The Terrace," includes only the center segment actually built.

A contract was awarded October 27 to Stewart Engineering Corporation of New York, which commenced levelling and filling of the plaza areas and continued with construction of the concrete understructure of the upper plaza through the winter of 1914-15. The concrete girders, beams and columns were filled with cement and carborundum rubbed as were the column interior stairs. The monumental carved granite urns and pedestals at the four corners of the upper plaza were also completed under this contract. However, paving of the upper plaza was not accomplished due to lack of funds, which also prevented completion of landscaping. The plaza's concrete slab was merely covered with crushed stone until it was paved 1924-25[10] with sandstone and brick, under a federal appropriation which also provided for sandstone paving of the lower plaza in 1926. The Stewart contract was completed in June 1915.

While the shaft construction was going on, fabrication of the 22-foot high, eight-ton ornamental bronze lantern was also proceeding at the architectural bronze foundry of The Gorham Company

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[9]Reduced by $20,000 in May, 1915; this mainly affected landscaping and planting.

[10]Architect Freedlander stated in a letter of April 26, 1938 that the native sandstone was intended to be temporary, to be replaced "in the near future" by permanent granite paving. This was Freedlander's reason why the concrete slab under the paving was not waterproofed. See Appendix C.

in Providence, Rhode Island. It was inspected there August 11 by Architect Freedlander and two of the Commissioners. Following completion of the elevator penthouse, scaffolding for lantern erection started in December; the installation was completed in February, 1915.

Twelve incised limestone wall panels were installed intermittently in the rotunda, beginning in October 1913 and proceeding through the winter of 1914-15. The panels bore the names of the U.S. ships, and of the enlisted men on each who were wounded or killed in the battle.

Four bronze commemorative plaques[11], cast by The Gorham Company's Architectural Bronze Division, were installed in the lower elevator lobby in November 1914. About this time the bronze and alabaster chandelier was hung from a circular ornamental bronze disc in the rotunda ceiling.

Completion of the elevator installation in late May 1915 was impeded by troubles with the electrical current from the island's generating station. An underground electric transmission cable was installed in this period.

The column was opened to the public with no particular ceremony on June 13, 1915. 22,000 paid visitors took the elevator ride to the observation gallery by the September 16 closing.

At one time consideration was given to placing a statue of Perry in the center of the rotunda. The plan was finally discarded by the Inter-State Board September 10, 1915, for financial reasons: Architect Freedlander concurred for aesthetic reasons. In 1918 a marble slab with bronze letters (by Gorham) was set in the rotunda floor, identifying the last resting place of the six officers in the crypt beneath.

Public Law 344, March 3, 1919 authorized President Woodrow Wilson to accept for the United States the Memorial property which had been ceded by the State of Ohio in May, 1913. The act created Perry's Victory Memorial Commission to administer the Memorial and report periodically to the Secretary of the Interior. A colorful letterhead was designed for the Commission.

1920-22 saw the installation of metal screening at the lower elevator shaft, and replacement of the iron railings in the lobby by bronze railings.

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[11] These plaques were collectively titled "Roster of the Fleet in the Battle of Lake Erie."

In 1914 Charles Sudler, the architects' representative, had expressed concern over the lack of lightning protection. Unfortunately nothing was done, and the column was damaged in July 1920. Subsequently, a consultant from the National Bureau of Standards devised an arrestor system which was considered technically adequate and aesthetically acceptable. It was inspected and approved by the architect in September 1923.

The 1915 column illumination proved unsatisfactory and was replaced by floodlights in August 1928 "after exhaustive study and fund-raising efforts." (Repairs and replacements were made in 1941.) Improved electric service was assured in May 1929 with the laying of a submarine electric cable from the mainland by the Ohio Public Service Company.

The 1928 report of the Commission spoke of "a practically completed memorial." Webster P. Huntington, the Memorial's indefatigable promotor, who became President of the Commission August 20, 1929, pushed for a formal dedication of the Memorial, which he viewed as completed. No serious public efforts were made to add the museum and colonnade originally proposed by Freedlander and Seymour.

Dedication ceremonies on July 31, 1931 included the unveiling of four bronze tablets mounted in the doorways of the rotunda. They were designed by Freedlander, who was also present at the ceremonies. Inclusion of the tablets had actually been first considered in 1913, then deferred. Two of the tablets contained statements made in June 1913 by Presidents Taft and Wilson; a third bore a statement by Henry Watterson, prominent in the Inter-State Board; and the fourth contained a statement on peace and the text of the Rush-Bagot Agreement of 1817.

Thanks largely to Huntington's promotion, the ceremonies were carried on an hour-long broadcast by the National Broadcasting Company. Principal speaker and chairman of the program was former U.S. Supreme Court Associate Justice John H. Clarke, long an active supporter of the Memorial.

Upon completion of the Memorial it became evident protection would be needed from fierce lake storms, and to prevent regression of the land on the southwest side of the column to marsh. A seawall was constructed on the northwest, or bay shore in 1916; rebuilt (covering the original wall) in 1934-35. The lake, or southeast side seawall, was built in 1925 by John A. Feick, who had cleared the Memorial site in the summer of 1912. Repairs were later made, but no major reconstruction. The road along the bay shore was also paved in 1925. In 1929 Feick built two other structures, a frame utility building now used as the park headquarters, and a summer visitor kiosk which later was moved to the village park as a summer information booth.

In 1939 Otis Elevator Company, which had provided the first elevator in 1915, installed a new elevator, retaining some of the original machinery. To facilitate reaching the elevator machine room at the top of the penthouse, a steel ship ladder was erected from the upper elevator landing.

The 1928 floodlight system was repaired, and some parts replaced in 1941. In 1949 the penthouse roof was waterproofed and flashed; the penthouse and parapet walls repointed; the gallery floor re-sloped and waterproofed; and the bronze urn rehabilitated. The comfort station under the northeast side of the plaza was constructed in 1950. About the same time the underground electric cable was replaced and a transformer installed. In 1952 the column shaft was cleaned and repointed; however, the results were not satisfactory. A new bronze exterior door was installed in the penthouse in 1953. The elevator structure and pit were reinforced and repaired in 1955. A combined heating and dehumidification system was added in 1960-61. The column shaft was cleaned in 1963 by a special sandblasting process, and all joints raked, repointed, and sealed and the shaft waterproofed. Repairs to both plazas, steps and retaining walls (including a waterproof membrane under the upper plaza paving) were scheduled for 1964, but not accomplished due to lack of funds.

At the sesquicentennial observance September 10, 1963, two commemorative bronze plaques bearing statements by President John F. Kennedy and Prime Minister Lester B. Pearson were placed in the south doorway of the rotunda.

In 1971 a prefabricated metal, gable-roofed visitor information station, about 10 feet by 15 feet was erected near the west corner of the lower plaza as a temporary expedient. It is totally out of character with the memorial column.

An important project is now underway for the repair, reconstruction and extension of the north and south seawalls by the consulting firm of Dalton•Dalton•Little•Newport of Cleveland. (This project made use of a 1949 study by the U.S. Army Corps of Engineers.) The project will also include filling and grading to provide drainage away from the column, and an underground lawn sprinkler system. Construction drawings and specifications and an environmental assessment have been approved and the project awaits construction funding. The south wall will be undertaken initially, and construction should take about a year. The south side receives the greater impact from lake storms.

Cracks and staining of both the exterior and interior of the column, partial disintegration of the plazas and deterioration elsewhere have occurred over the years. These conditions are analyzed later in this report.

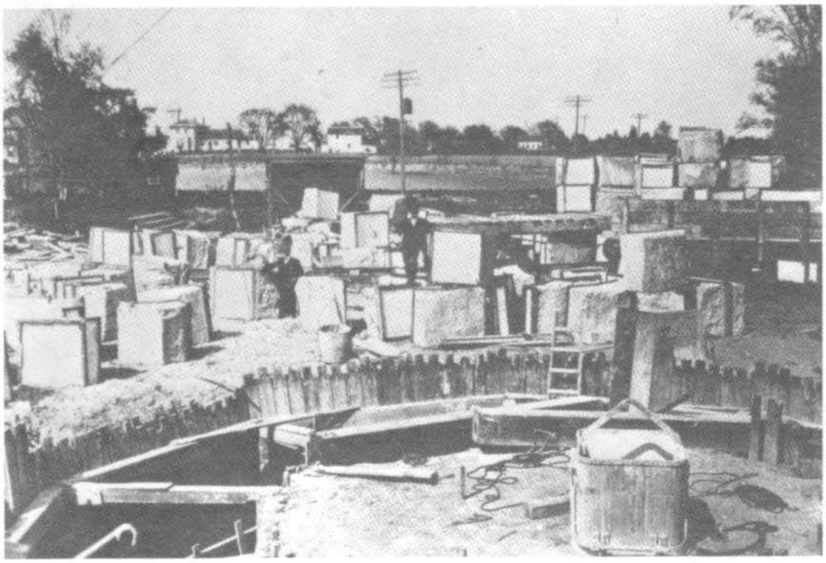


ILLUSTRATION 6. View of the repaired coffer dam, ready for forms and subsequent pouring of concrete to form the ring-shaped foundation, to extend to bedrock approximately 10 feet below foreground surface level. Bucket on center core island of excavation is to be employed to transport concrete up shaft to be raised from that spot as column construction advanced upward.

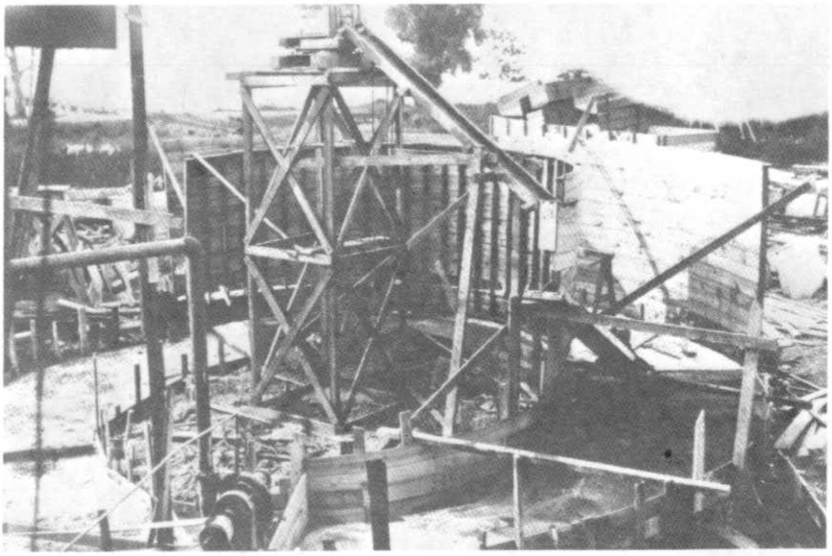


ILLUSTRATION 7. Pouring the ring-shaped foundation for the memorial column. The lower segment from bedrock to grade has been poured. Forms are being erected for pouring the upper segment from grade to the present plaza level, June 1913.

ILLUSTRATION 8. Memorial column construction progress, Aug. 15, 1913. Indiana Limestone framing interior doors and wall slabs of rotunda in place. Workman setting iron strap under granite block of partially completed fourth ("D") course of granite.

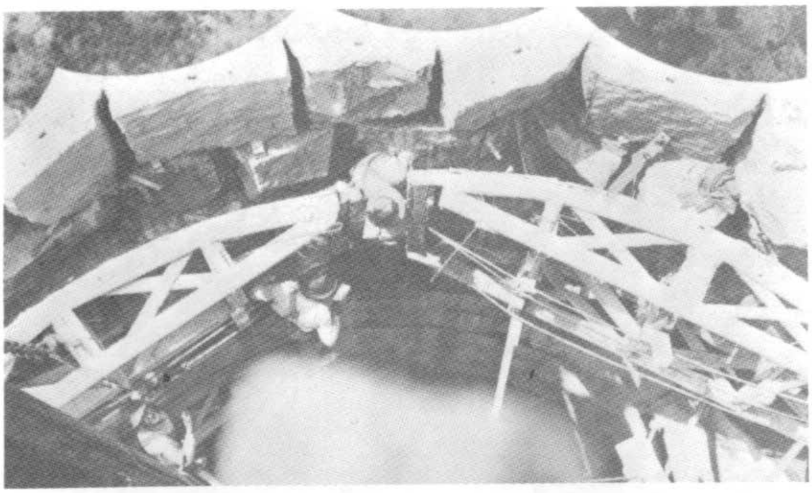


ILLUSTRATION 9. Memorial column construction progress, Sept. 15, 1913. Photo shows the elliptical vaulted dome of rotunda in lower story of tower. View of stone vaulting before concreting.

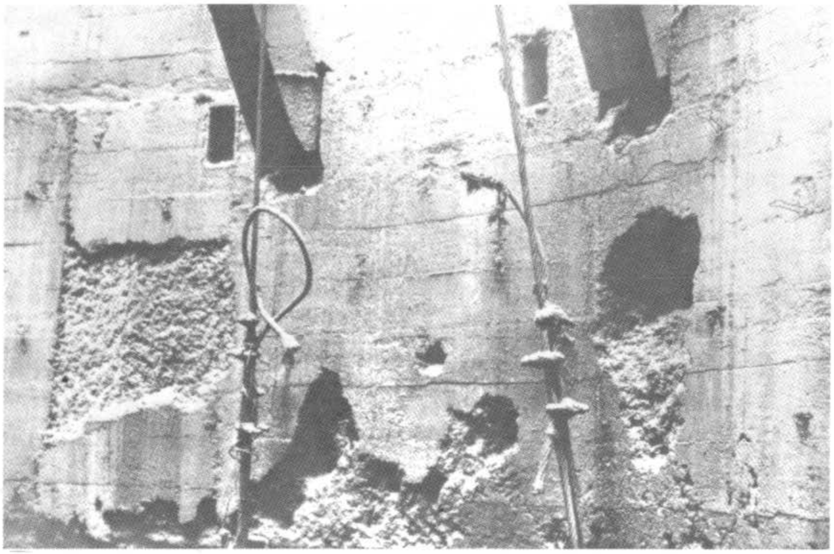


ILLUSTRATION 10. Legs for the boom seats, set into the finished concrete wall, notches having been cored out for that purpose. Steel ropes are guys to the derrick tower anchored in the concrete below camera level.

ILLUSTRATION 11. Scars remaining on the inner surface of concrete walling the column well from placing and removing the derrick support system, and partially set brick veneer for the interior finish of the column interior.

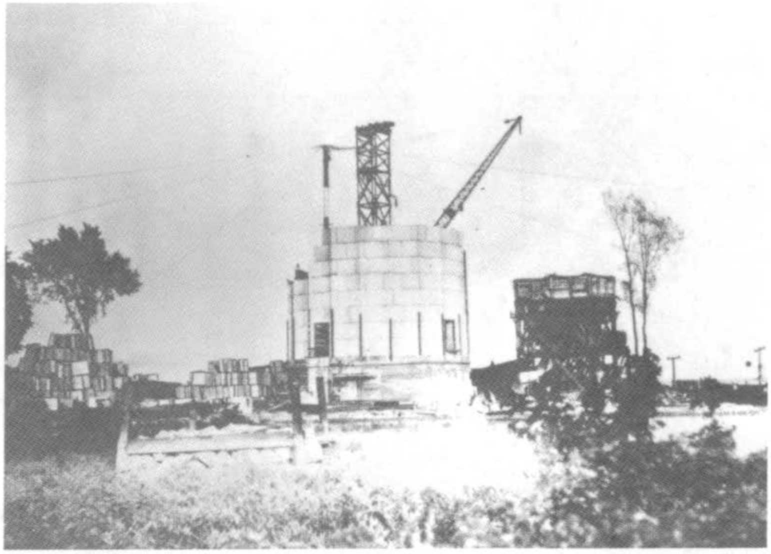


ILLUSTRATION 12. Setting of 6th, 7th and 8th courses of granite ashlar during construction of the memorial column, Sept. 1913. View is east. Concrete mixing hopper is south from the column.

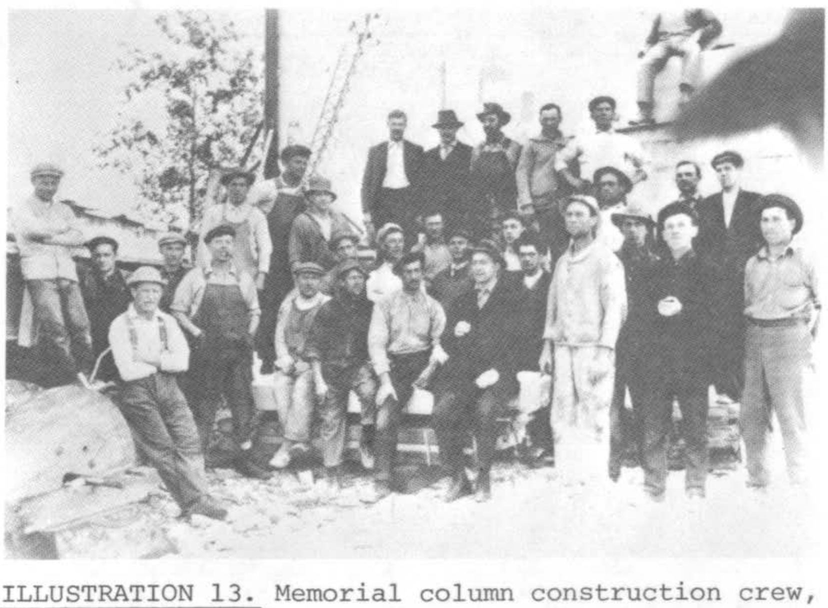


ILLUSTRATION 13. Memorial column construction crew, c. Sept. 15, 1913. Far left front, wearing derby, smoking cigar, arms folded, Mark Dunn, chief rigger. Fourth from right, first row, in light-colored clothes, soft hat, cigar in right hand, Henry Bell, the contractor's general foreman. Seated to Bell's immediate right, dark suit, is the timekeeper, name unknown.

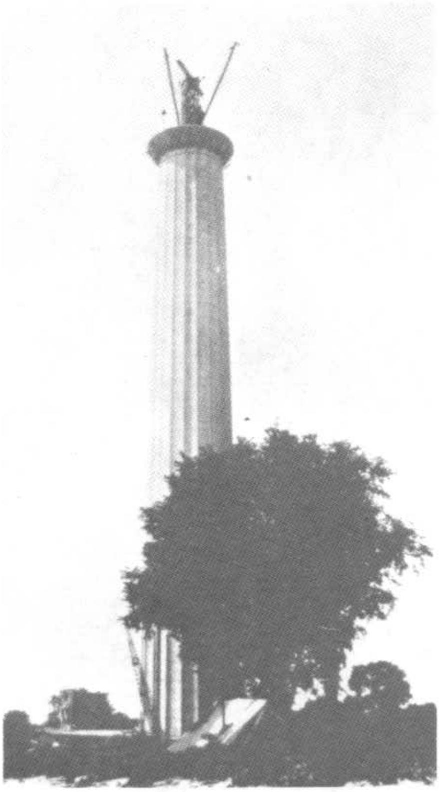


ILLUSTRATION 14. The column exterior and echinus for the cap structure (capital) completed, July 1914.

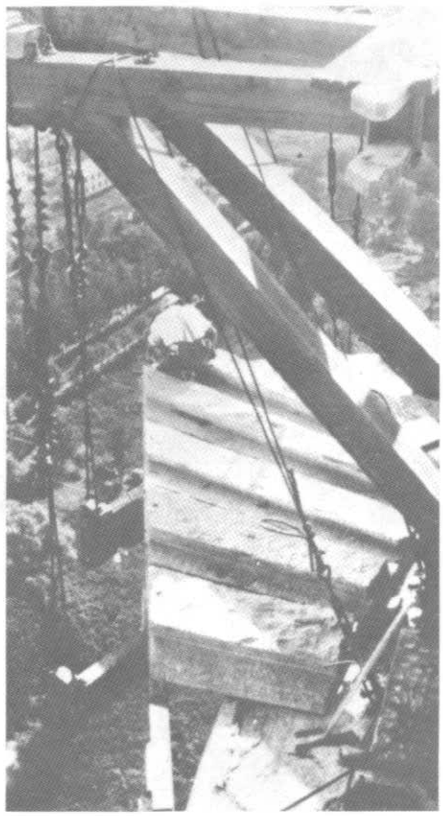
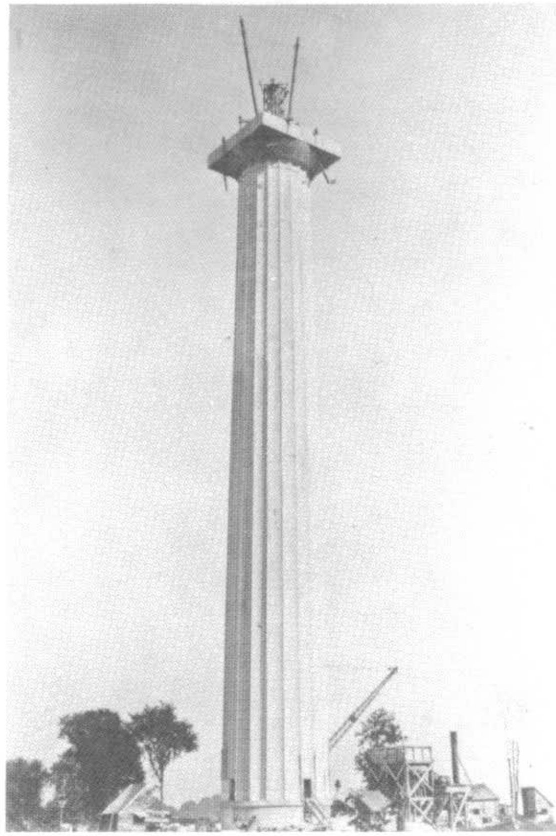


ILLUSTRATION 15. Setting the facing stones on falsework to form the soffit for the capital (cap structure) of the column, July-August 1914.

ILLUSTRATION 16. The cap structure was completed August 31, 1914.



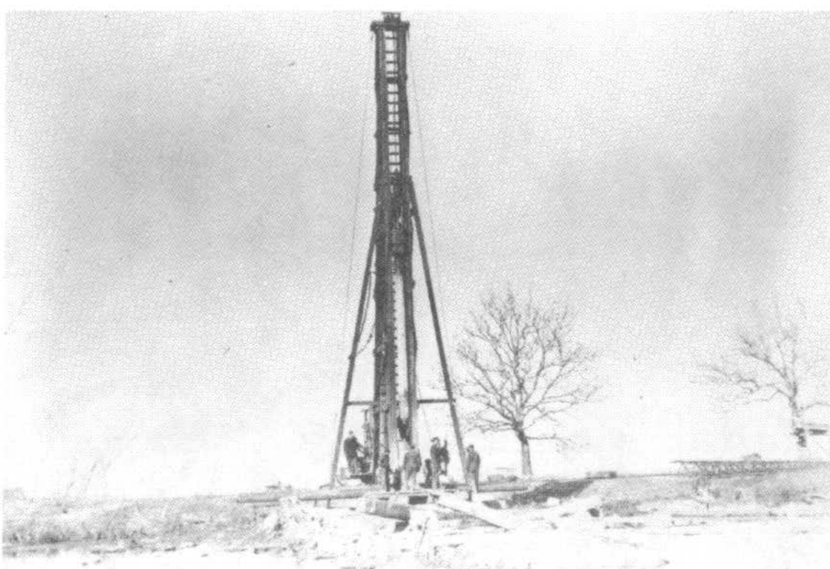


ILLUSTRATION 17. Pile driver in operation sinking casings for concrete "McArthur Pedestal" type piles as plaza construction was begun by Stewart Construction Company in fall of 1914.

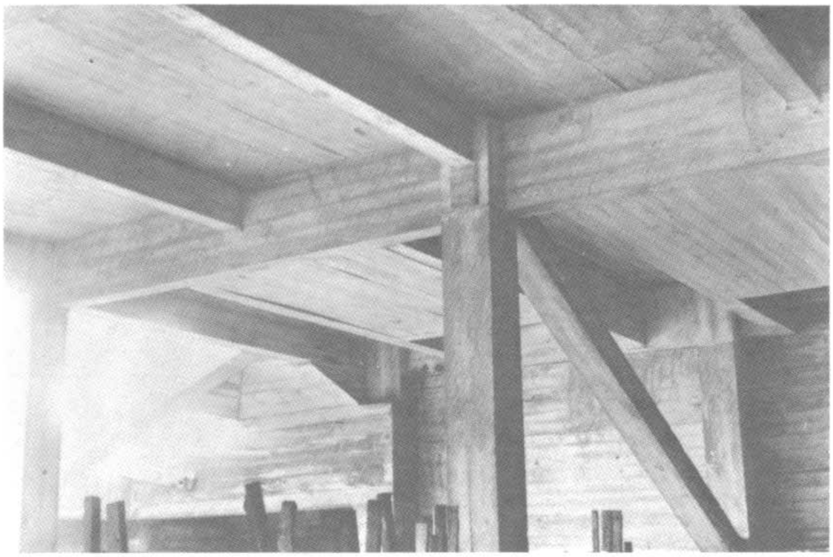


ILLUSTRATION 18. Underside of the plaza, north corner, upon removal of the wooden pouring forms for the reinforced concrete structure and prior to setting the broad stairway risers upon the forms to left of photo.

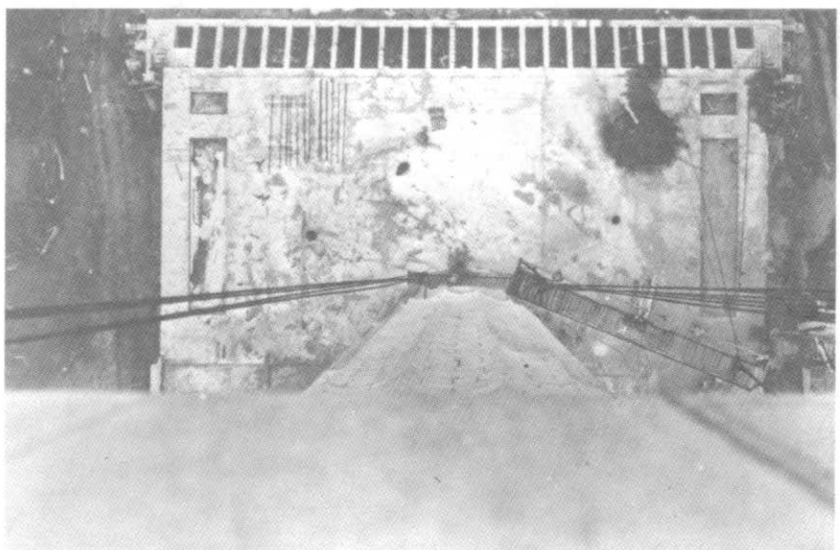
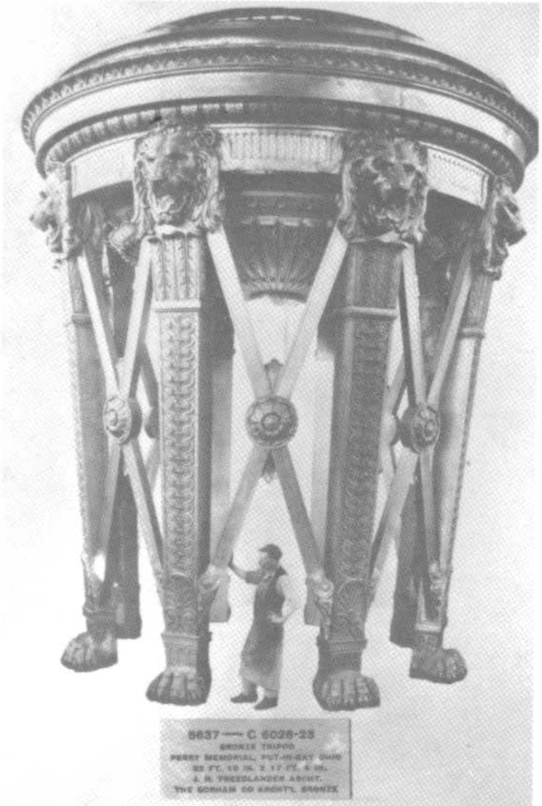


ILLUSTRATION 19. Bird's-eye view of the plaza construction, bay front, c. December-January 1914-15.

ILLUSTRATION 21. Bronze lantern to surmount the memorial column, upon completion at foundry of The Gorham Company, Architectural Bronze Division, Providence, Rhode Island, August, 1914.



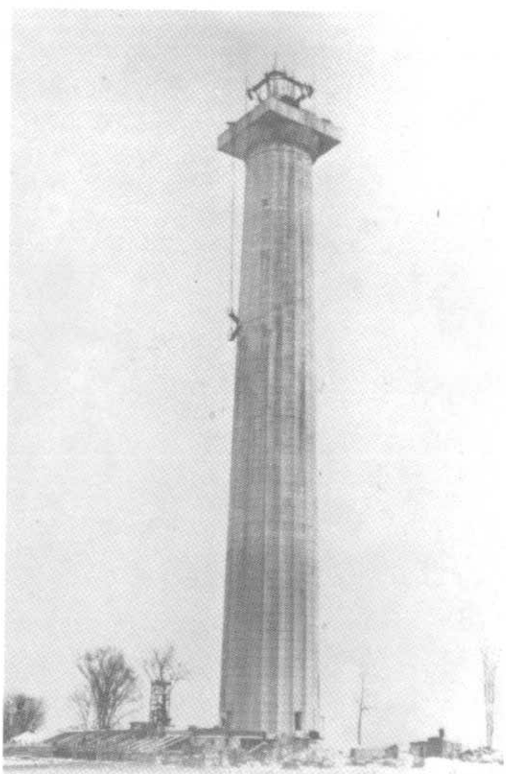


ILLUSTRATION 20. Scaffold for the lantern and framework for the plaza, c. Dec. 1914.

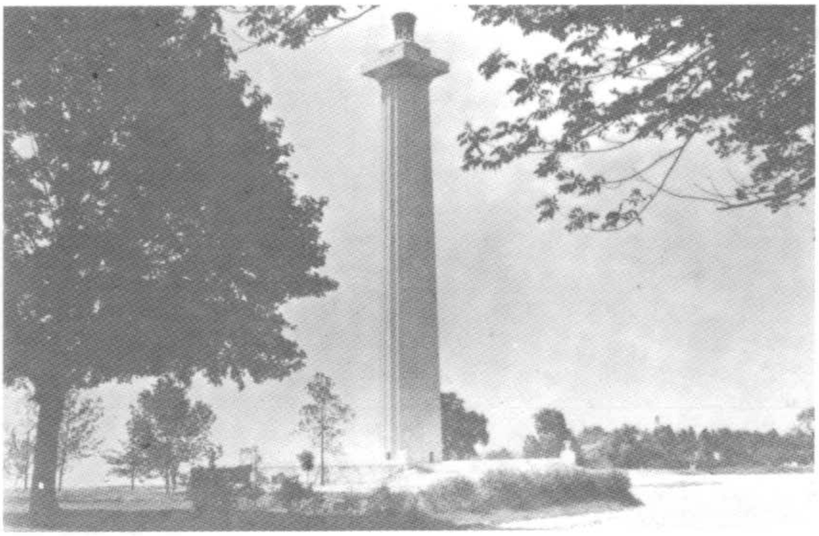


ILLUSTRATION 22. The completed memorial column, c. 1915-1920. View is due south.

ILLUSTRATION 23. THE MEMORIAL COLUMN (December 24, 1937)
". . .enhanced by its reflection in the rippling waters"--Joseph Henry Freedlander

Architectural Data

ARCHITECTURAL DATA SUMMARY AND CONSOLIDATED CONSTRUCTION COST ESTIMATE

ARCHITECTURAL DATA SUMMARY
AND CONSOLIDATED CONSTRUCTION COST ESTIMATE

INTRODUCTION

The Perry's Victory and International Peace Memorial at Put-in-Bay, Ohio, must be repaired and improved if the Memorial is to be restored to its original historic architectural design and condition.

The following Historic Structure Report was prepared by the firm of Dalton•Dalton•Little•Newport of Cleveland, Ohio. An interdisciplinary team of architects and engineers conducted a comprehensive examination of the plazas, column, observation gallery, penthouse, bronze lantern, and mechanical and electrical equipment at the Memorial and analyzed the collected data. These findings are presented in the Architectural Data section of this Historic Structure Report. Each chapter in this section contains a detailed discussion of a particular architectural/engineering element. Existing conditions are described, and specific recommendations to ensure the structural integrity and sufficiency of the column, plazas, mechanical, plumbing, and electrical systems and to preserve and/or restore the architecture are included, as are the approximate cost estimates for this work.

The structures involved include a 300-foot high monumental Doric column of granite, concrete and brick; an elevated plaza of reinforced concrete paved with sandstone and brick; granite steps leading to a sandstone plaza on-grade; and related mechanical, plumbing, and electrical equipment. At the base of the column is a memorial rotunda finished in limestone and marble, with granite steps leading to an elevator landing. An elevator shaftway flanked by concrete stairs terminates at an observation gallery forming the column capital. At the observation gallery level is the elevator penthouse, and above the penthouse is a large bronze and glass lantern containing a ring of lights. The column was finished in 1915, paving of the plazas in 1926, and five banks of floodlights were set around the upper plaza in 1928. In the basement space below the upper plaza, public restrooms were added in 1950, an electric transformer vault in 1950, and a mechanical room serving a heating and dehumidification system in 1960-61.

PRIMARY RECOMMENDATIONS

Deterioration of the column and plazas is due primarily to water infiltration and/or condensation. Therefore, the column and plazas must be waterproofed, made weathertight, and condensation controlled. The required structural repairs must be completed, the finishes cleaned and repaired or replaced, and the mechanical, plumbing, and electrical systems reconditioned and expanded to suit the level of visitor use.

Architectural and Structural Considerations

Chapters 1 through 8 address the architectural and structural integrity of the Memorial. Calculations reveal that the foundation and shaft are structurally safe. The primary cause of the slow but very obvious deterioration of the structure is water infiltration and/or condensation. Therefore, the most important recommendation is to properly waterproof (in ranked order of importance) the upper plaza, the penthouse roof, and the observation gallery floor. Equally important is re-sealing all joints, cracks, and faults in the granite blocks of the column shaft, column capital, and penthouse walls, using a recommended method of installing joint sealant. Reinstalling the sandstone and brick pavers on the upper plaza is an integral part of the waterproofing, and the cleaning of all granite blocks of the column shaft, column capital, and penthouse is an integral part of the joint sealant system.

A vapor barrier with its protecting concrete floor should then be installed in the basement space below the upper plaza. This will prevent the ground moisture and vapor from penetrating the underside of the upper plaza concrete structural system and causing subsequent deterioration. A by-product of this installation would be usable basement space. However, the configuration and architectural nature of the basement space, when coupled with the fact that it could flood in storms of 100-year frequency, indicate that it can be used only for maintenance space or storage.

Over the years, dampness in the core has led to staining and discoloration. The most conspicuous problem is in the memorial rotunda. The rotunda has a very special historical significance and every effort should be made to preserve this interior architectural space. Once waterproofing has been completed, this limestone and marble interior should be restored to as near an original condition as is possible. Other stained and discolored areas (ranked in order of importance) are the granite stairs from the memorial rotunda, the lower elevator landing, and the upper elevator landing. These spaces are used by visitors as entrances and exits to the observation gallery, and their present appearance gives evidence of deteriorated surfaces and finishes.

The lower plaza paving has settled approximately four inches and poses a safety hazard for the visitor. It is recommended that the lower plaza be raised to its original elevations to protect the public.

The present access for maintenance to the bronze lantern at the top of the Memorial is not safe. A proposed new hatch in the penthouse roof and a permanent ladder that will move into position would improve safety conditions for the National Park maintenance personnel.

The operation of the elevator is discussed in Chapter 9. The existing elevator equipment is clean and in good operational condition; however, the equipment should be safety tested. The recommendations are to provide power door operators and to change to two-stop collective automatic control in order to decrease loading and unloading time at each elevator landing and to permit carrying more people per hour. This will increase visitor access to the observation gallery but will not do away with all waiting in line at peak visitor times.

Mechanical, Plumbing, and Electrical Considerations

Chapters 10 through 12 deal with the mechanical, plumbing, and electrical systems. The mechanical system of heating and dehumidification, installed in 1960-61, has had a significant role in controlling the moisture in the column shaft. However, the system does not function at maximum potential because the town water supply restricts water usage that is essential to the operation of this equipment. The mechanical system should be upgraded to improve its operational performance by operating at full capacity. Installation of an adequate and reliable water supply system that is separate from the town water supply and enclosure of the equipment in the column shaft will permit it to operate 24 hours a day. This will provide additional dehumidification and heating that is required for the column shaft. Installing a heating system in the rotunda will provide heat for extended visitor use beyond the summer season and will provide condensation control. The final step in controlling condensation is the expansion of the system to condition the air in the basement space below the upper plaza.

The plumbing systems and fixtures are essentially adequate for current demands. However, some repairs are required to maintain the systems. The major problem has been the need to filter the town water supply to provide drinkable water. The replacement of the filter system with one that will be trouble-free will meet this need.

The existing electrical distribution system is relatively adequate for present and future use. However, some repairs are required to insure safe and reliable operation.

Excessive moisture has caused a certain amount of deterioration in the electrical equipment. The basement space and the transformer vault are very damp and wet, and this has led to the rusting of enclosures and corroding of electrical connections. This damage can be repaired at a minimal cost.

The existing lightning protection system of the Memorial, while adequate at one time, is not presently acceptable. The system should be updated.

The banks of floodlights which provide exterior illumination of the column need repair to insure safe and reliable operation, and some modifications are required to eliminate the blinding glare to nighttime visitors. Replacing the existing obsolete lighting fixtures with H.I.D.-type luminaires would conserve energy and offer future systemwide reliability. Although the existing incandescent fixtures in the bronze lantern on top of the column are in good condition, replacement of these fixtures with H.I.D.-type luminaires would provide increased lighting ouput with a decrease in energy consumption.

The lack of emergency lighting in the column shaft interior is potentially dangerous. The installation of a battery-powered emergency lighting system is recommended.

Finally, we recommend installing an historically and aesthetically acceptable system of nighttime illumination of the plazas and the approach steps.

Other Considerations

Other items which affect the visitors' appreciation of the historic significance of the Memorial also deserve attention. Examples of this level of rehabilitation include restoring the natural dark bronze finish of architectural bronze doors, elevator enclosures and other bronze items. Simply designed bronze signs, located at the entrance and exit granite stairs, are necessary to inform the public and to facilitate the proper flow of traffic. They appear appropriate and should establish the design criteria for other necessary control signs.

An important issue which must be addressed is that of complying with Federal recommendations for provisions for the handicapped. For example, access to the elevator poses a critical problem in this regard. Access to the elevator is from the plaza above the memorial rotunda, and is accessible only via circular stairs.

Although not discussed in the report proper, the visitor center should be mentioned. A prefabricated metal, gabled-roofed visitor information station, about 10 feet by 15 feet, was erected in 1971 near the northwest corner of the lower plaza. This station is temporary, and it is totally out of character with the memorial column. It is hoped that an interpretative center can be erected to the west of the memorial column, and this temporary structure removed. A new center would provide a better museum-style display space for photos, maps, and flags now displayed in the lower and upper elevator landing in the column shaft. These public spaces could then be returned to the simple, formal spaces, as intended in the original design.

OTHER PROPOSED WORK AT THE MEMORIAL

Construction documents are being prepared (under a separate contract) for the rehabilitation and extension of the north seawall, the reconstruction of the south seawall, and rehabilitation of the grounds. Completion of this work will protect the column and plazas from Lake Erie storms. The project includes filling and grading to provide drainage away from the column and plazas and installing an underground lawn sprinkler system. The equipment for the lawn sprinkler system will be located in the basement space below the upper plaza, and the space available is adequate. The lawn sprinkler water supply system will be completely separate from the water supply of the Memorial. The coordination of this planned sprinkler system construction with the work proposed in this report is discussed in Chapters 11 and 12. The plumbing and electrical systems can readily accommodate the proposed new construction. The repair work to concrete foundation walls (discussed in Chapter 7) might best be undertaken when the south seawall and grounds are rehabilitated, because both projects will require some regrading at the concrete foundation walls.

COST ESTIMATES

The estimate of approximate cost of the work recommended for various elements is found at the end of each chapter. This establishes the base estimate. Optional work is represented by alternate costs (either in place of or in addition to work recommended). The following consolidated construction cost estimate is a summary of the totals of each chapter.

CONSOLIDATED CONSTRUCTION
COST ESTIMATE

Summary of Totals of Each Chapter

Chapter 1. Column Foundation	(Included in Chapter 5)		
Chapter 2. Column Shaft	$ 98,600		
Chapter 3. Column Capital (Observation Gallery) and Penthouse	50,800		
Chapter 4. Bronze Lantern	17,300	Alternate Addition	$ 2,000
Chapter 5. Upper Plaza and Granite Steps	366,100	Alternate Addition	112,000
Chapter 6. Lower Plaza	100,000	Alternate Addition	40,000
Chapter 7. Upper Plaza Walls and Planting Boxes	37,200		
Chapter 8. Memorial Rotunda	6,000	Alternate Addition	21,200
Chapter 9. Elevator	90,300		
Chapter 10. Heating and Dehumidification System	116,000	Alternate Addition	202,000
Chapter 11. Plumbing Systems	5,000		
Chapter 12. Electrical Systems	53,900	Alternate Deductions	(5,800)
Total	941,200		371,400
General Conditions	124,300		
Add 10% for Contingency	106,100±		37,100
Grand Total Base Estimate	$1,171,600	Alternate Estimate	$408,500

Note: Alternate proposals can adjust the base estimate up or down dependent upon items selected.

CHAPTER 1. COLUMN FOUNDATION

CHAPTER 1. COLUMN FOUNDATION

INTRODUCTION

The column foundation consists of a ring of approximately 543 cubic yards of mass concrete, approximately 9'-6" thick, which rests upon rock 10' to 20' below mean lake level. The concrete was poured into wooden sheetpiling forms which went to rock and formed a cofferdam. The core of the ring was unexcavated, but the core of the upper portion which extends from ground level to plaza level was void and was later filled with earth.

ANALYSES

The concrete of the column foundation was tested for compressive strength using the Windsor Probe Test; but because the concrete was hard, the probe would not penetrate. Our conclusion was that the concrete strength exceeds 7500 psi and is therefore more than adequate.[1] The concrete was in very good condition, except for stains (24, 26, 27).[2] The stains are probably caused by constant moisture and aging; these two conditions are "ideal" curing conditions for concrete. An excavation made on the south side of the foundation indicated that water (lake level) is just ± 15" below the lip of the concrete foundation base (25). There is no waterproofing evident and none is required, since concrete survives well under water. Also, since no interior space exists below grade in the column base, the walls do not need waterproofing. Although original drawings indicate that a waterproofing membrane should be at the top of the column foundation, none is evident (24, 26, 27).[3]

Based upon existing drawings and our observations, we have calculated the total weight of the column, including the lantern, capital, shaft and the foundation (28) as approximately 36,800 kips. According to the drawings and the construction history, the foundation is a concrete ring, with a 45-foot outside diameter and a 26-foot inside diameter, set on rock. The soil pressure on the rock due to the weight of the column is 34.7 kips per square foot. A wind pressure on the column of 30 pounds pressure per square foot (recommended by the Ohio Building Code for structures 100-500 feet in height) produces an additional 9.4 kips per square foot pressure. Therefore, the maximum soil pressure under

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[1]See Appendix E.

[2]See Illustrations 24, 26, and 27; all numbers included parenthetically in the text are references to appropriate Illustrations.

[3]See Appendix C.

the column due to its own weight and due to the wind is 44.1 kips per square foot. Construction history indicates that "the underlying rock was found to be hard and homogeneous,"[4] in which case the allowable bearing value is 80 kips per square foot (taken from the Ohio Building Code). We also determined the safety factor against overturning for the column (28) as 8.7, which is significantly more than the 1.5 safety factor generally required for buildings. Results of our analyses indicate the column foundation is very safe.

RECOMMENDATIONS

Excavation at the column foundation and at a typical column footing indicates that the condition of the exterior of the foundation below ground level is good, and no repairs are required. Above ground level, the concrete needs only to be cleaned and minor flaws patched. The access holes into the column foundation (from the original construction) should be sealed with concrete--particularly if this space is to be utilized for occupancy of any sort in the future. Methods of cleaning and patching are presented in Chapter 5.

COST ESTIMATE

An estimate of the cost of the work recommended in this chapter is presented in Chapter 5.

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[4] A Construction History of the Perry's Victory and International Peace Memorial.

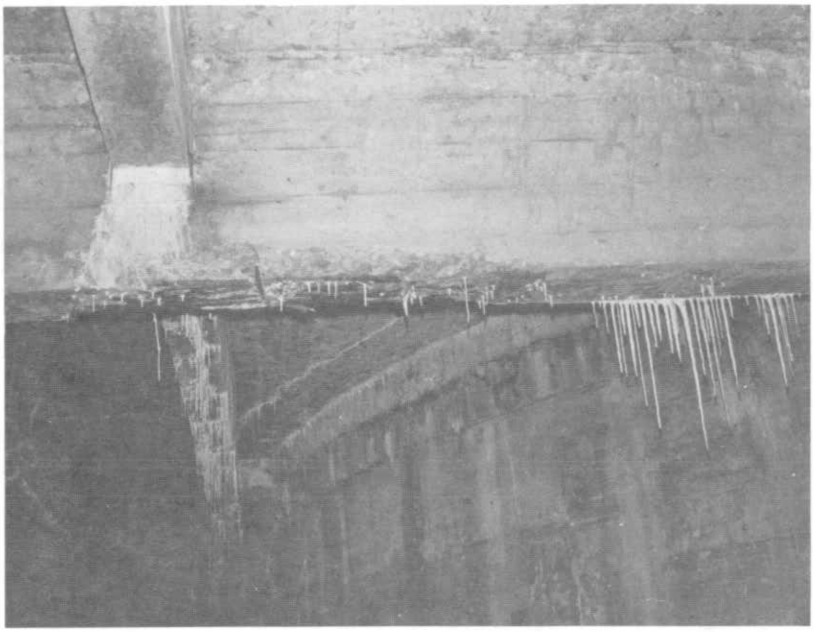


ILLUSTRATION 24. Top of column foundation at approximately southeast side, just below upper plaza.

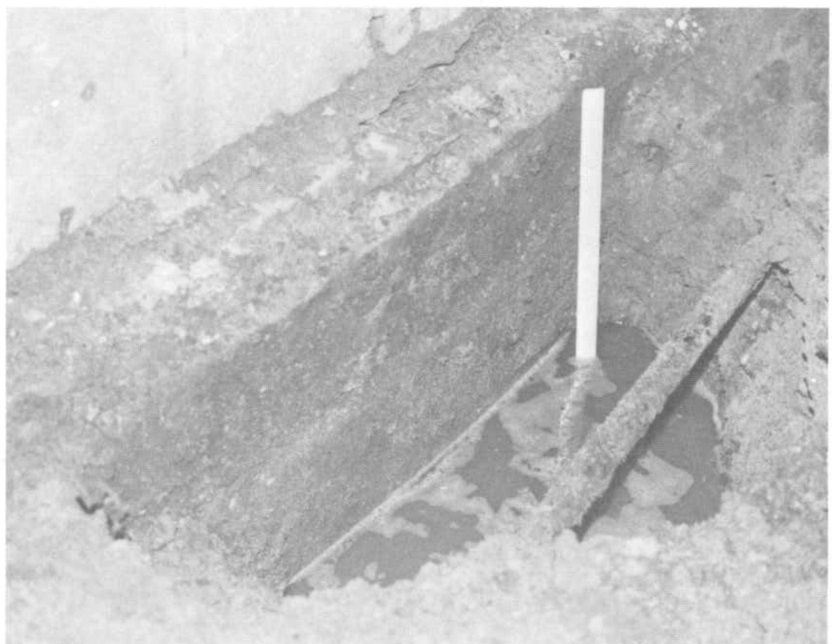


ILLUSTRATION 25. Bottom of column foundation at approximately southeast side, just below grade.

ILLUSTRATION 26. Top of column foundation at approximately northwest side, just below upper plaza.

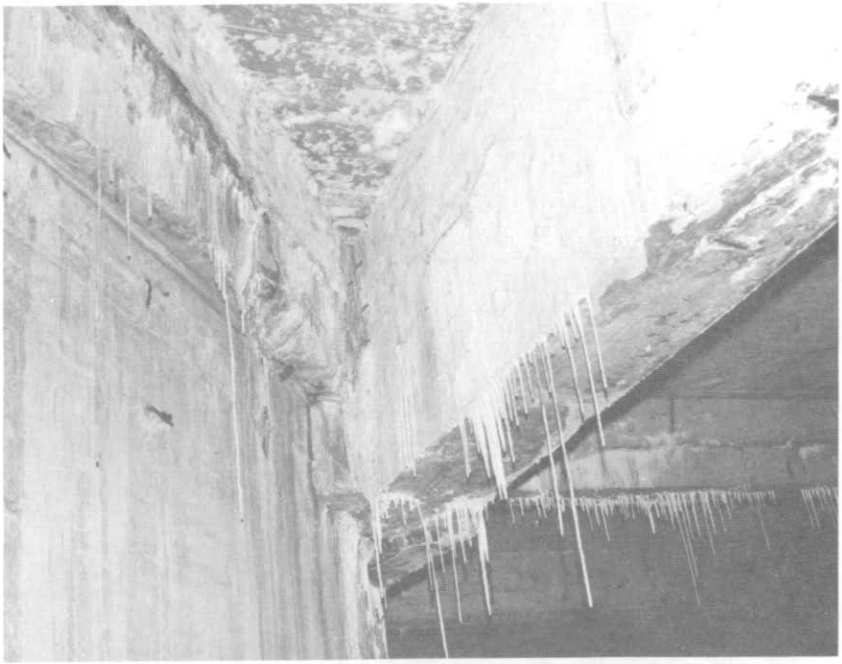
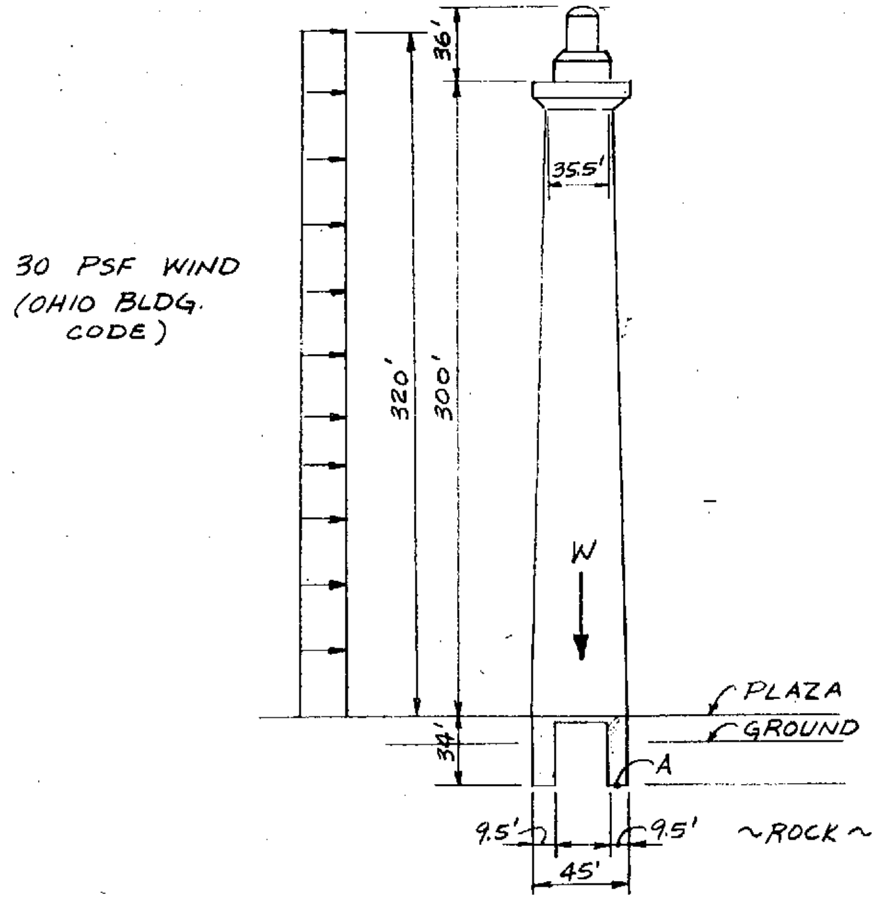


ILLUSTRATION 27. Top of column foundation at approximately northeast side, just below upper plaza.



WEIGHT OF COLUMN = 36800^K

MOMENT AT POINT "A" : WIND : $.030 \times 320 \times (45+35.5)/2 \times 194 = 74962^{\prime K}$

COLUMN WEIGHT : $36800 \times 17.75 = 653200^{\prime K}$

SAFETY FACTOR AGAINST OVERTURNING : $\dfrac{653200}{74962} = \underline{\underline{8.71}}$

PRESSURE UNDER FOUNDATION DUE TO WEIGHT OF COLUMN + WIND :

(A_{FOUND} = 1060 SF , S_{FOUND} = 7949 CF)

$$f = \frac{W}{A} \pm \frac{M_w}{S} = 34.7 \pm 9.4 = \begin{cases} 44.1 \text{ KSF} < 80 \text{ KSF O.K.} \\ 25.3 \text{ KSF} \end{cases}$$

ILLUSTRATION 28. Calculation sheet for determining pressure under foundation and safety factor against overturning.

CHAPTER 2. COLUMN SHAFT

CHAPTER 2. COLUMN SHAFT

EXTERIOR

Observations of Exterior Granite Blocks

The exterior of the column shaft is made of granite blocks from a quarry at Milford, Massachusetts. The blocks are approximately 3'-6" x 3'-6" exposed face and vary in thickness from 2'-0" to 3'-0". The column has 20 flutes, each approximately 7'-0" wide, and 78 courses of granite blocks that are 279'-0" high before the column capital begins (29). The column shaft interior is a constant diameter of 27'-6" and the exterior tapers from a diameter of 45'-6" at the base to a diameter of 35'-6" at the top, with the exterior curving out slightly as the column rises to produce classical entasis. The column walls are 9'-0" thick at the base and taper to 4'-0" at the top. Careful visual examination of the column was possible with binoculars and with the telescopic lens of the camera used to record existing conditions.

Several types of flaws were evident. These may be categorized as: major cracks which are running for more than several granite courses in length (31); minor cracks which are only one to several granite courses in length (33); spalling of the face of the granite blocks (33); improperly sealed joints (32); and efflorescence (30).

The major crack on the south side of the shaft is the most serious flaw. It corresponds to a major crack on the interior of the shaft in the brick and concrete (54).[1] This crack is thought to be completely through the shaft wall--brick, concrete and granite--for most of its length. It was most likely caused by internal stresses such as shrinkage and temperature change in the wall of the shaft. The wall of the shaft has no expansion joints which would allow for the expansion and contraction caused by these internal stresses. The resultant crack acts as an expansion joint and therefore should be treated as such. The granite side of the crack should be treated in the same manner as all the other joints in the granite block, described below.

The minor cracks could also have been caused by internal stresses. It is also possible that some blocks were damaged during construction and/or by ice or calcium carbonate buildup behind the blocks

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[1]See Face Brick Lining of Column Shaft following in this chapter.

creating some "pressure points" which caused weakened blocks to crack. These cracks should also be treated as any other joint.

Close inspection revealed that all major and minor cracks had been sealed (30). The cracking seems to have stabilized since the shaft was rehabilitated in 1963.

Spalling of the face of the granite blocks, seen in dark splotch-like markings, is caused by moisture which has been trapped behind the blocks. As trapped moisture reaches the face of the block, minute particles of granite are loosened and fall. This action can be permanently halted only by elimination of the trapped water.

The efflorescence seeping through cracks and joints in the granite is calcium carbonate, which is the result of leaching of the calcium hydroxide formed during hydration of cement and subsequent carbonation and evaporation. The presence of a large amount of calcium carbonate is indicative of major leaching deterioration. Water, which reaches the concrete through faults and improperly sealed joints, passes through the concrete and is dissolving some of the soluble calcium hydroxide and other solids, probably causing the concrete to disintegrate along these waterways. Since the concrete is very thick, it is unlikely that the structural integrity of the column is seriously affected by this action. The structural adequacy of the column materials--granite, concrete and brick--is good. For a summary of the laboratory test analyses, see Appendix E.

Calculation of Stresses

The stresses due to the weight of the monument and due to the wind have been checked at the critical section of the shaft. The critical section, located at the elevation of the lower elevator landing level, consists of two circular rings; the inside ring has a 25'-6" inside diameter and 1'-8" thick wall, the outside ring has a 45'-0" outside diameter and a 2'-11" thick wall (granite included).

Openings for four doors (4'-0" wide each) have been subtracted from the area of the inside ring. The weight of the monument is assumed to be 31,339 kips, and the movement due to the wind (30 psf) 54,338 foot-kips. The compression stress due to the weight alone is 350 psi, the wind causes 72 psi tension or compression; therefore, stresses at this point range from a maximum of 422 psi to a minimum of 278 psi.

The above calculation has been performed at the theoretical critical section. Above or below the critical section, the stresses would be much lower. At the bottom of the foundation the compression stress due to the weight is 241 psi, and compression stress due to the wind is 65 psi tension or compression. At this point, therefore, maximum stress is 306 psi and minimum stress is 176 psi. These stresses are rather low and well within the allowable limit of the concrete or the granite.

Conclusion

Improperly sealed joints, cracks, and faults are the principal reason water penetrates the column. Portions of joints were observed with loose or missing pieces of sealant. Sealant also oozes out beyond the face of the granite in many instances, allowing water washing down the face of the blocks to be directed into a faulty joint. In order to seal the column from further water penetration the following recommendations are made:

a) Rake out all joints, cracks, and faults to solid mortar or to a depth of at least one inch. All joints deeper than one inch should be pointed to within one inch of the surface with a mortar mix comparable to the original material.

b) Cracks, faults, and the entire column face should be treated with heavy-duty restoration chemicals such as Sure-Kleen and a 2500 psi waterblast wash. In particular areas a light sandblasting might have to be utilized to remove stubborn spots.

c) Pack joints with polyurethane only.

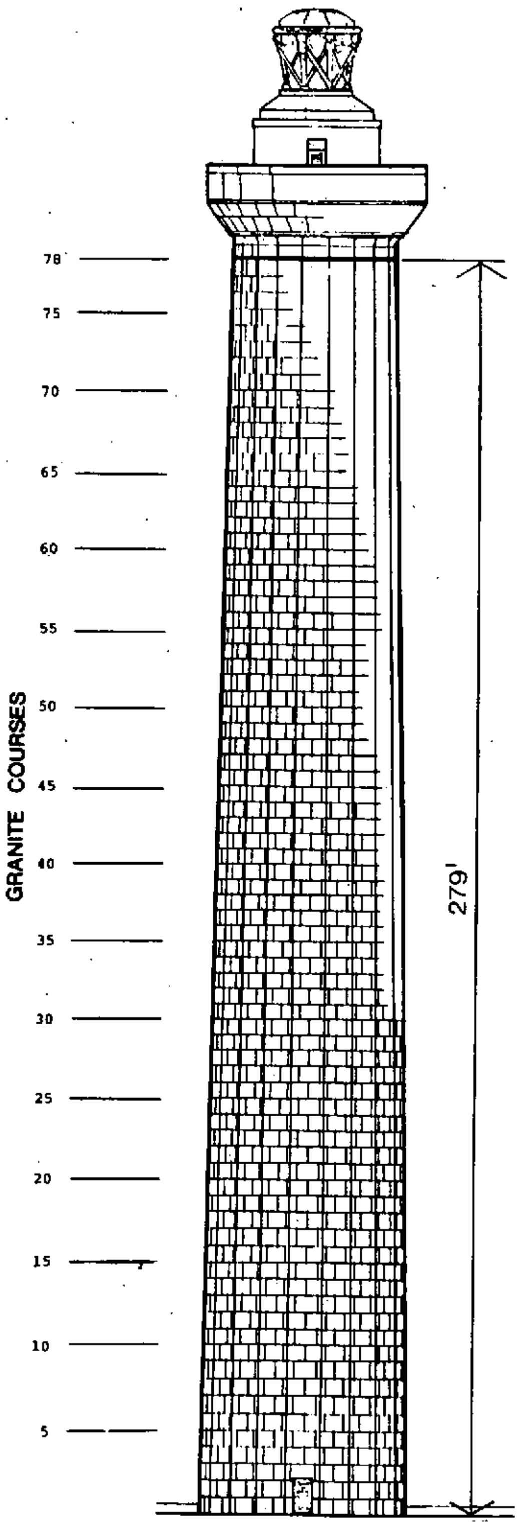
d) Seal all joints, cracks, and faults with a two-component polysulfide sealant FS TT-S-00227, Class A, Type 2 (non-sag) such as Lasto-Merk by Tremco Manufacturing Company, the depth of the joint sealant should not exceed 1/2 the width or be less than 1/4". Custom-mix sealants are available to assure a color match (Dr. Stone, Thiokol, personal communication). Although a mortar mix assures a perfect color match it is not watertight and the original problem will re-occur in short order.

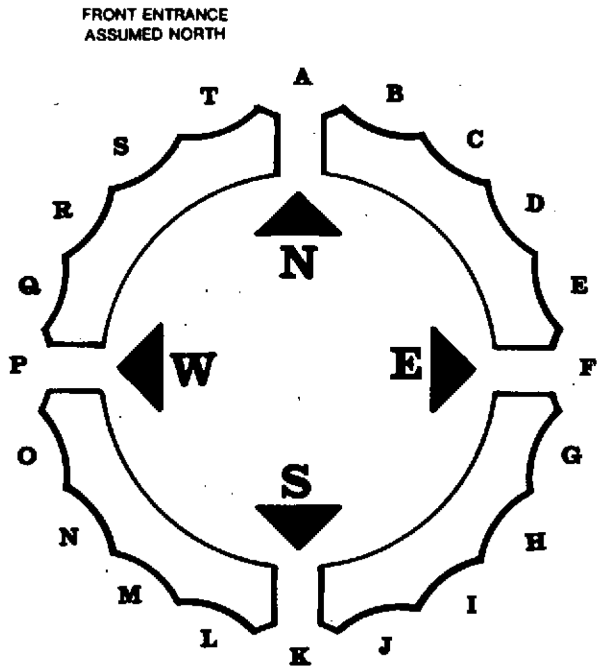
e) Do not treat column with silicon water repellent.

Bronze Doors

The entrance and exit to the Memorial is through four doors into the column shaft at the upper plaza level (34, 35). The doors and frames are bronze, with an exterior finish of a dark-brown natural bronze patina. The doors and frames present a good appearance and require only cleaning and waxing. The interior surface of these doors and frames is discussed later in this chapter in Architectural Bronze Metalwork, and the repairs required are discussed in Chapter 8, Entrances.

COLUMN SHAFT EXTERIOR ELEVATION





FLUTE LOCATIONS A through T

ILLUSTRATION 29. Diagram of column shaft-plan and elevation showing flutes and courses. Major cracks occur at approximately flutes L & M from the 10th to the 23rd and from the 34th to the 60th course.

ILLUSTRATION 30. Detail of major crack on lower part of southwest side of column and some typical efflorescence.

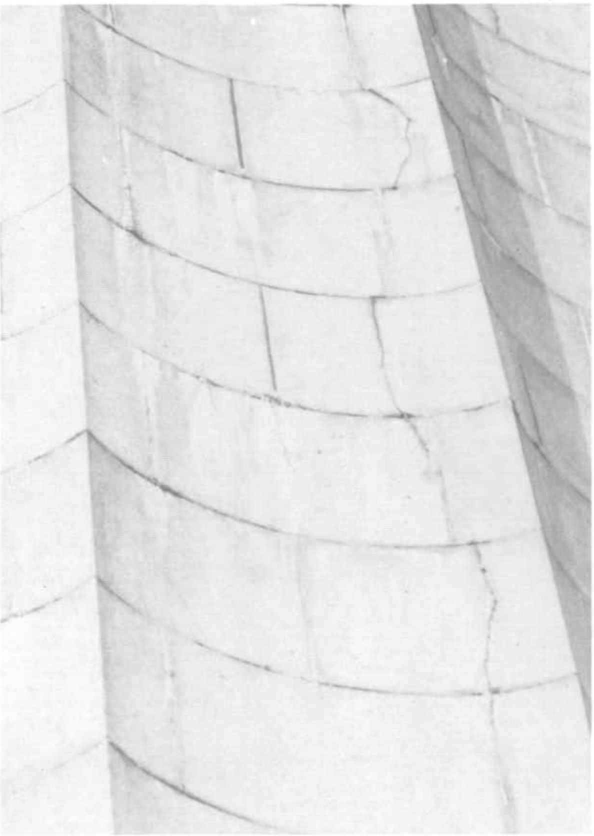
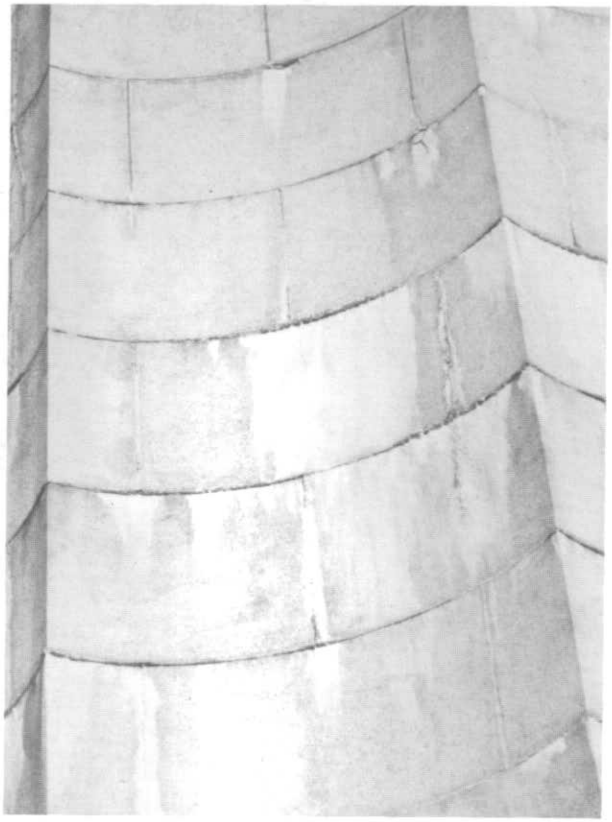


ILLUSTRATION 31. Overview of lower part of southwest side of column showing extent of major crack at flute M, courses 10 through 23.

ILLUSTRATION 32. Typical detail of efflorescence and improperly sealed joints.



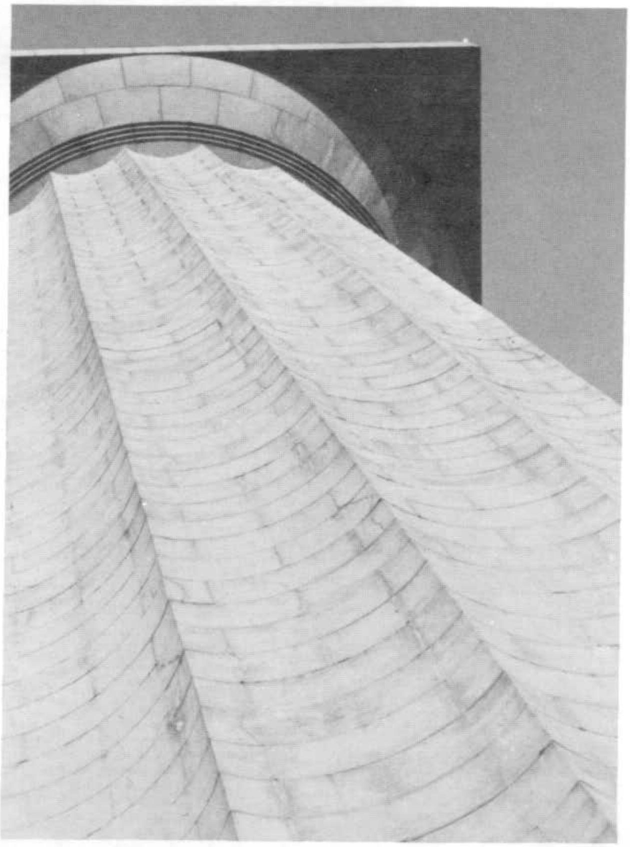


ILLUSTRATION 33. Overview of west side of column showing some typical minor cracks and spalling of face of granite block. Column capital with observation gallery above is at top of photo.

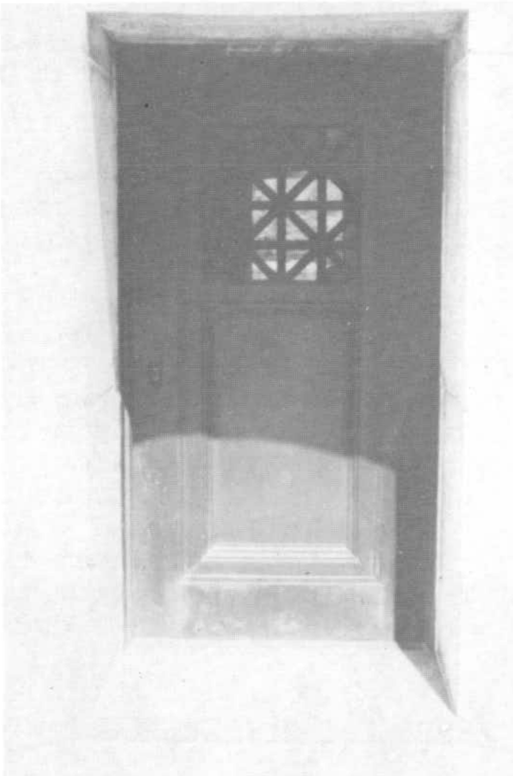


ILLUSTRATION 34. View of exterior of sliding west door to the column from the upper plaza. This is typical for the north and east doors.

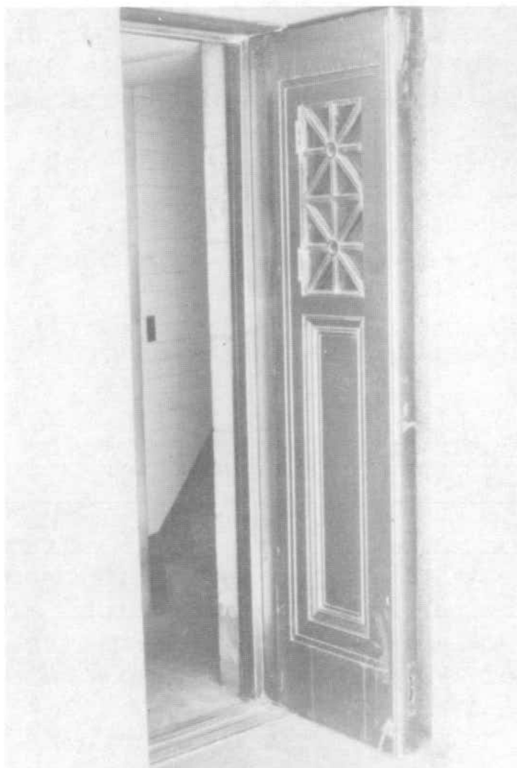


ILLUSTRATION 35. View of the north pair of swinging doors to the column shaft taken from the upper plaza and showing the interior surface of one door in the open position.

INTERIOR

Concrete Stairs

The stairs which run from the lower elevator landing level to the upper elevator landing are constructed of reinforced concrete approximately 2-1/2" thick for the treads and risers, integrally poured concrete stringers 4" thick, and concrete landings 3" thick (36, 37). This stairway is approximately 3'-0" wide and rises 24'-0" in four runs and landings in each complete square made by the stairs. The stairs are not used by the public except as an emergency exit from the observation gallery at the top of the column. The round nosing of the tread is protected by metal safety treads (38, 39). In many cases, these original safety treads are missing and have either been replaced by more recent types or not been replaced at all, in which case the tread was treated with a cement wash (37). Most of the treads without the metal safety tread occur at the first several runs down from the upper elevator landing. The missing and/or dissimilar treads should be replaced with matching type.

The total run of concrete stair from lower elevator landing level to upper elevator landing level appears to be in sound structural condition with only minor shrinkage cracks apparent. However, in several locations in the upper runs, there is evidence of concrete spalling at bottom of stringers, exposing reinforcing steel (40). This spalling occurs in the vicinity of the point where the elevator guide rails are fastened to the stringer. The concrete may have been damaged during fastening of the holding clips for the elevator guide rails. These damaged areas should be repaired by removing all loose concrete and the corrosion around steel reinforcing and replacing missing concrete with epoxy-type concrete. The compressive strength of the concrete of the stair was tested using the Windsor Probe Test; the results are in Appendix E.

Supporting Concrete Columns

The concrete stairs are supported by four octagonal reinforced concrete columns of 16" diameter, with 3/4" and/or 5/8" diameter vertical rods for reinforcement. These columns, which run the full height of the shaft, are supported by the approximately five foot deep concrete beams spanning the rotunda space immediately below (41, 42). These columns are braced by the outer stringers of the stair, and by 6" x 6" reinforced concrete struts, running diagonally from the columns into a seat pocket in the shaft wall, one strut at each stair landing. These columns appear to be in good condition. Some light spalling which appears throughout is the result of the "bagged-on" or rubbed finish applied after the stripping of the forms in order to dress up the concrete. Hairline horizontal cracks which appear occasionally are the result of shrinkage and/or opening of pour joints. These cracks should be pressure grouted. The 6" by 6" struts have in some cases moved in their seat pockets, causing some spalling of face brick liner of shaft around pockets. The strength of the concrete for these columns was tested using the Windsor Probe Test; the results are in the Appendix E.

Stair Railings

The railings encircle the outer edge of the concrete stairs from the lower elevator landing to the upper elevator landing and consist of 1" diameter pipe top rails and verticals, with 3/4" diameter pipe infill rails (43). The railing is 4'-0" high, with 1'-0" between parallel rails and approximately 4'-0" between vertical pipe posts. At each landing these rails are fastened to the concrete columns by flanges. At the foot of each vertical pipe post a flange fastens the railing to the concrete stringer. The total assembly is sturdy and in good repair, except for worn and/or chipped paint. It is recommended that the railing be painted.

Elevator Steel Framing and Metal Screen

The steel framing of the elevator shaft is basically composed of four steel 6" by 6" corner angle struts which are braced by the concrete stair stringer plus miscellaneous other steel. These struts begin at the elevator pit above the rotunda and rise to the underside of the elevator equipment platform. Two beams, connected to the concrete octagonal columns, support the machine beams and the equipment platform (44, 45). The elevator equipment platform is reached by a steel ship-ladder-type stairway from the upper landing level and is partitioned from the public by a wire-mesh door and partition. This ladder and partition were added in 1939 as part of the replacement elevator construction. The elevator machine platform is perforated steel plate (185). The total elevator shaft, open and exposed to the stairs, is protected by 5'-2" high wire mesh panels installed in 1920 (36, 37). With the exception of a few bent wire mesh panels, all of the steel framing and metal screens appear in good condition, requiring only spot cleaning and general painting.

Equipment Platform

Two components of the heating and dehumidification system are located within the column shaft on an equipment platform one level above the lower elevator landing (192-198). This platform was constructed for this express purpose when the equipment was installed in 1960-61 (191) to control the condensation within the column shaft. Although this equipment is an ahistorical intrusion and produces noise that is disturbing to the interpretative talks given by the Park Service personnel, the heating and dehumidification system is vitally necessary in order to preserve the column. For a complete discussion of the system components, the system operation, and the recommendations for system improvement, see Chapter 10.

Face Brick Lining of Column Shaft

The face brick lining of the shaft extends from approximately 10'-0" above the lower elevator landing floor approximately 240'-0" up to a granite ring just below the column capital (46). This buff Kittaning face brick is practically vitrified and highly nonabsorptive. The brickwork mortar is a Portland cement mixed with some lime. Wire loops are formed in the concrete to tie brick in, and a cement mortar wash fills the void between brick and concrete (47, 48). Four types of deficiencies were noted: white stains (49, 50), i.e., calcium carbonate stains; red-brown stains (49), probably calcium carbonate tinted by iron oxide from metal material remaining in concrete since original construction; spalling of face of brick under and/or around 6" x 6" concrete stair struts (51), most likely due to contraction of the strut causing the brick face in contact with the strut to spall; and vertical cracks (52).

These cracks are most probably related to the fact that concrete ring of the shaft moves (expands and contracts) more than the brick facing. Three possible reasons for this are:

a) the exterior temperature variation is greater than the interior temperature variation,

b) the expansion coefficient for the concrete is greater than that of the brick, and

c) the length over which the expansion takes place (particularly the circumference) is larger for the concrete than for the brick.

Since the concrete shaft and the brick lining are tied together (by mortar and wire loop ties), the brick follows the movement of the concrete. This action exerts a very large force on the brick, causing it to break. Assuming a 50°F seasonal temperature variation inside the shaft, these cracks in the brick could be expected to be as wide as 1/8 inch.

It is evident that the concrete shaft itself has vertical cracks (47, 48). Any place in the concrete shaft there is a crack, there will most likely be one in the brick facing. The brick is thin and can tolerate less movement than the concrete. The cracks are probably the result of shrinkage (no reinforcing was provided in the concrete) and the time differences in curing (the thickness of the wall is the notable factor here). As water from outside seeped into these small cracks, the freezing and thawing process enlarged the cracks.

The skin temperature on the exterior of the shaft varies more than on the interior. This causes stresses in the concrete. Since reinforcing or expansion joints were not provided in the original construction, nature provided the cracks, which act as expansion joints. Therefore, some of these cracks should be treated as expansion joints--either repaired in a manner which will allow some movement in the future or not repaired at all. Since the shaft interior is not open to public view and since the cracks in the brick are not impairing the structural integrity of the column, no work need be done to the brick. However, scrubbing with water and an appropriate chemical would prove adequate for removal if that is deemed necessary. If the joints of the column are sealed properly, this prevents water from entering concrete, and efflorescent staining should cease.

Granite Stairs

Interior granite stairs are found in several places: the principal locations are the entrance and exit runs from the rotunda to the lower elevator lobby; secondary locations are at the upper elevator landing running up to the observation gallery and in the rotunda at each of the four doorways. Structurally, all granite steps are in good condition. However, they are badly stained and dirty (58, 59, 60), particularly the stair marked as an exit from the lower elevator landing to the rotunda. All granite steps should be cleaned by a proprietary pre-diluted, hydrofluoric acid or ammonium bifluoride cleaner applied by skilled experienced operatives only. An alternate method, or another cleaning measure to be used if the first results are not satisfactory, would be the use of heavy-duty restorative cleaning (cf. p. 48). This must be done by skilled experienced operatives, and the glazed tile base needs to be properly protected.

Glazed Tile Walls

Commencing at the foot of the granite steps at the rotunda level, white-glazed 3" x 6" tile with a green-glazed 3" x 6" tile base extends up the stairway walls and arched ceiling to the lower elevator landing level and forms a 10'-0" high wainscot of 6" x 6" tile totally around the lower elevator landing level. This wainscot has a crack on the south side (63) which appears to be a continuation of the southside crack in the column. The general appearance of this wainscot is marginal to poor. There are many areas of fine crazed and chipped tile edges. Holes have been drilled for inserts to support displays. Deposits of calcium carbonate (efflorescence) are evident, especially on the tile directly in front of the elevator door (63). The walls of the exit stair are very poor. The exit stair is in the general vicinity of the major column crack on the south side and is therefore subject to more efflorescence due to a high level of water penetration. Efflorescence, crazing, cracking, and chipping are very apparent, the latter three particularly on the exterior wall of the stair (59, 60). The platform level, midway down on the stair, is in the worst condition. The entrance stair, while not in good condition, is considerably better than the exit stair.

Rehabilitation will require scraping and washing all calcium carbonate buildup from wall and ceiling tiles. The first level of cleaning should be with a cleaner of water, ammonia and commercial detergent such as Tide applied with stiff bristle brushes. The second level of cleaning is a dilute solution 10 percent of muriatic acid used by skilled experienced operatives. Badly cracked or spalled tile should be replaced and the entire tile area grouted with white grout.

Quarry Tile Floors

The upper and lower elevator landing level floors and the upper landing level wall base are red quarry tile (62, 64). In all cases the quarry tile is in good condition with only very minor cracks, stains and/or spalling evident. At the lower elevator landing, the juncture of the wall and floor show signs of staining, probably from efflorescence and/or chemical saturated fluids from the dehumidifying equipment on the mezzanine level directly above. These floors require cleaning. As noted above, the first level of cleaning should be with a cleaner of water, ammonia and commercial detergent such as Tide applied with stiff bristle brushes. The second level of cleaning is a dilute solution 10 percent of muriatic acid used by skilled experienced operatives.

Architectural Bronze Metalwork

Excluding all painted metal (items such as stair railings [65, 36, 37] and elevator steel), all architectural metalwork is bronze. This includes all doors (except service type) to the exterior (89, 88), grilles in doors and louvers (89), the 3" diameter handrail from the rotunda to the tops of the granite steps and into the lower elevator landing (60, 61, 62), light fixtures (62)[2], all plaques (62, 64, 90, 235, 258, 178, 180), and the partitions around the elevator shaft at the upper and lower elevator landings. In most cases, the bronze has been allowed to form its natural patina as it ages. The exceptions are the metal partitions around the elevator shaft at the upper and lower elevator landings (62, 64), the stair handrails from the rotunda to the lower elevator landing, the inside face of the bronze doors at the south of the rotunda (35), and the inside face of the doors to the observation gallery. No reference was found to indicate that the bronze on these particular items was originally intended to be bright, so it is assumed that they were not. Therefore, for historical accuracy, consideration should be given to allowing these items to form a natural bronze patina to match all other bronze.

The interior architectural bronze should be cleaned and treated to encourage the natural patina and dark-brown color and then sealed to preserve this finish. This work can be done only by skilled and experienced workmen who are specialists. The method used by Architectural Arts Foundry, Cleveland, Ohio, is as follows:

1. Clean all bronze with a proprietary mixture of nitric and sulfuric acid.

2. Obtain a light-brown to dark-brown color as desired by a proprietary mixture of sodium polysulfide and ammonium hydroxide or selenious acid and sodium hydroxide. The timing of the treatment sets the darkness of the color.

3. Those areas generally not handled should be sealed with clear acrylic; areas that are handled or touched (e.g., handrails and door hardware), should be waxed.

Temporary Structures

There are three areas where "temporary" structures were built in the column shaft several years ago. The smallest is an enlargement of the closet at the upper elevator landing. This structure was constructed of wood framing and plywood surfaces. It is not visible to the public eye, but can be seen if one descends the stair (45).

Just below the upper elevator landing is one of the "temporary" platforms which completely enclose the shaft from brick column

[2]See Emergency Lighting Column Shaft in Chapter 12.

wall to stair rail. It is constructed of 2" x 4" beams with a 3/4" plywood decking (67, 68). The total structure is supported on very minimal bearing points along its outer edge on the granite ring and by a compression collar of 2" x 4" wood members with long bolts around the four octagonal concrete columns. This platform was constructed as a work platform when the interior walls of the penthouse were painted.

A third "temporary" structure is a platform two levels above the lower elevator landing. It is constructed of lightweight steel angles and wire mesh with a 1/4" plywood decking laid loosely on top of the mesh (69, 70). It also encloses the shaft from brick to stair rail. This platform was constructed by laying plywood on a horizontal existing wire mesh enclosure and was designed to prevent access to the column shaft by the public on the lower elevator landing below. It is used as a storage area for supplies used in maintenance work.

Structurally, the two platform constructions are very marginal; historically, they are an intrusion. Further, they are constructed of combustible material, and the use of combustible material is a violation of the Ohio Building Code. The use of combustible construction material and the storage of combustible maintenance materials shall not be permitted in a space that is the emergency exit for the public from the top of the column. It is recommended they be removed. Storage space should be provided in the basement space below the upper plaza as recommended in Chapter 5.

ILLUSTRATION 36. View of typical stair run and platform showing original safety treads. Mesh screen panels separate the stair run from the elevator shaftway.

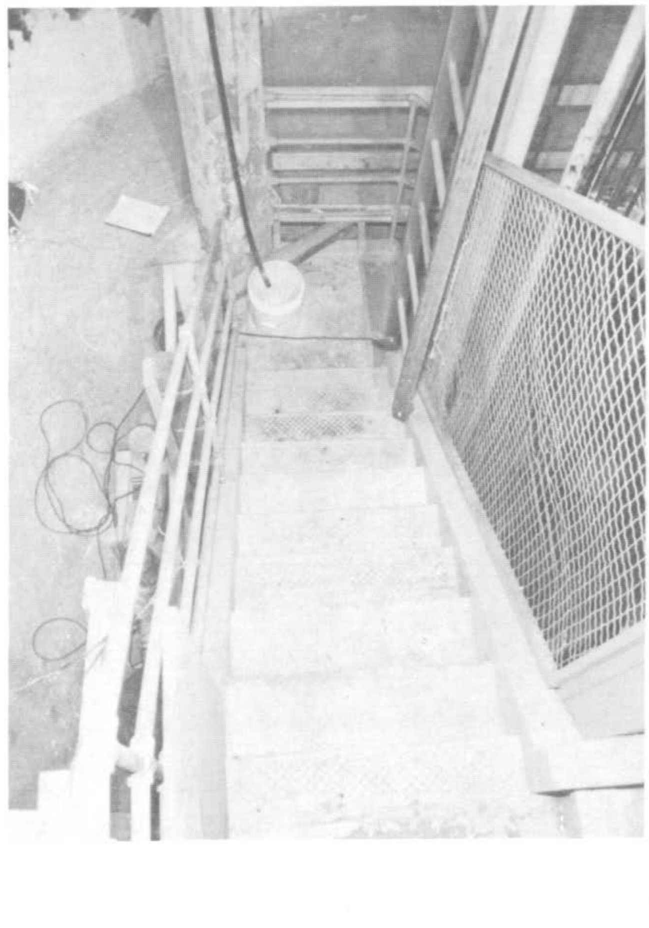


ILLUSTRATION 37. View of uppermost stair run and platform showing replacement safety tread and treads with cement wash only.

ILLUSTRATION 38. View of stair tread and riser showing the typical existing safety tread with round nosing in good condition.

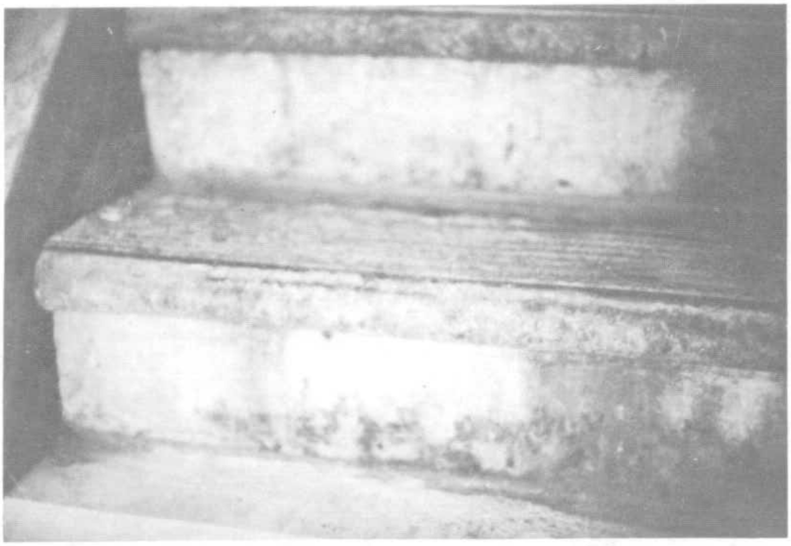


ILLUSTRATION 39. View of stair tread and riser showing the safety tread that has deteriorated due to moisture.

ILLUSTRATION 40. View of underside of stair showing spalled concrete and exposed reinforcing steel.

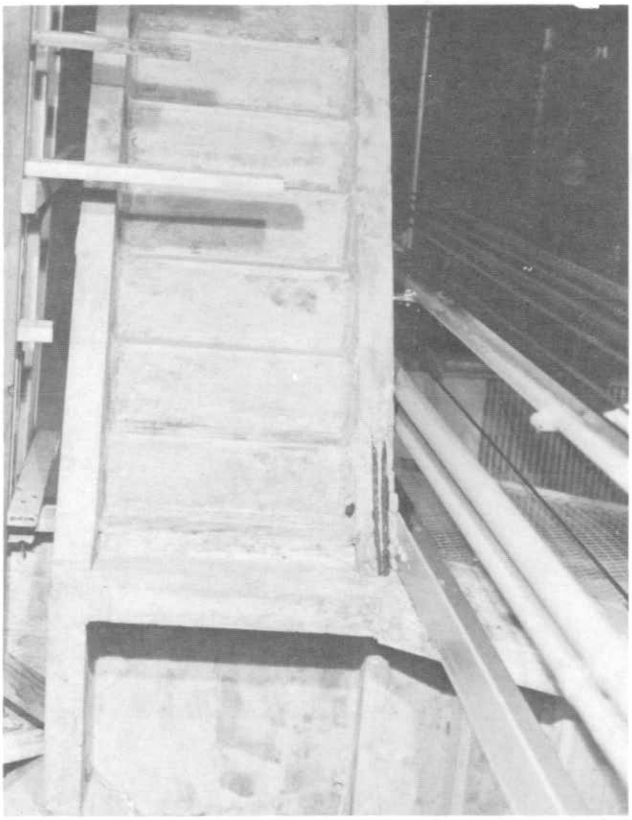


ILLUSTRATION 41. View of underside of upper elevator landing showing typical octagonal column and backside of concrete wall at landing level.

ILLUSTRATION 42. Typical view looking down column shaft showing octagonal column and column bracing into brick wall.

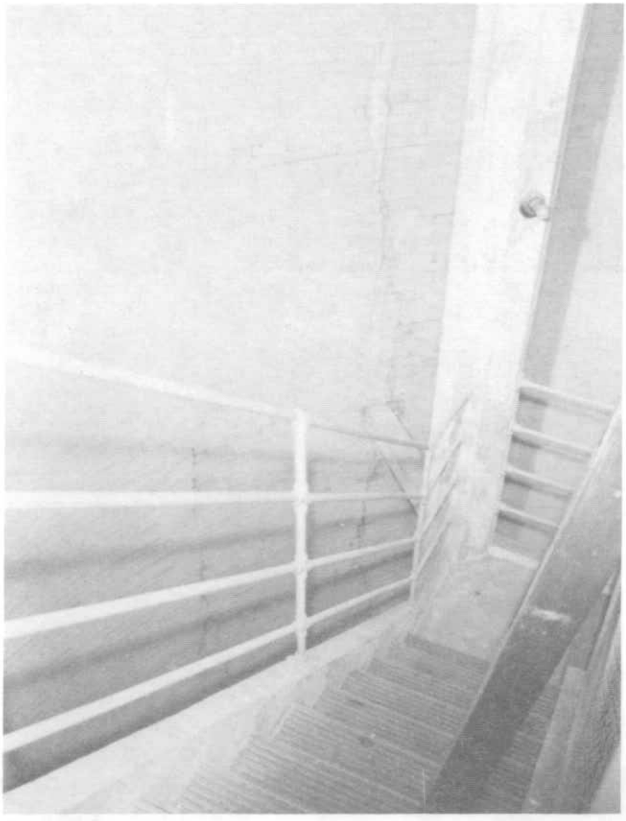
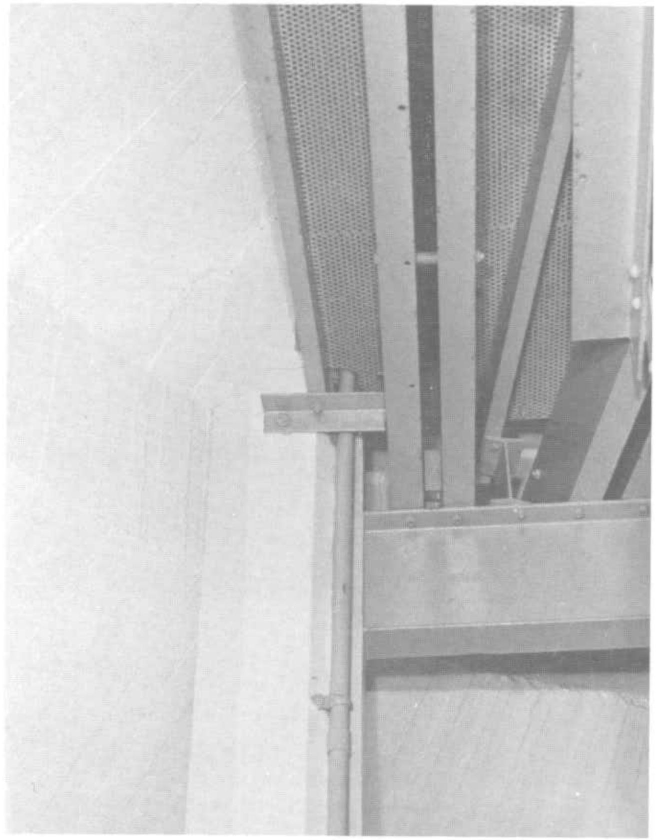


ILLUSTRATION 43. Typical view of stair run showing handrails and original lighting fixture for general illumination of shaft interior.

ILLUSTRATION 44. Detail view of underside of elevator machine platform.



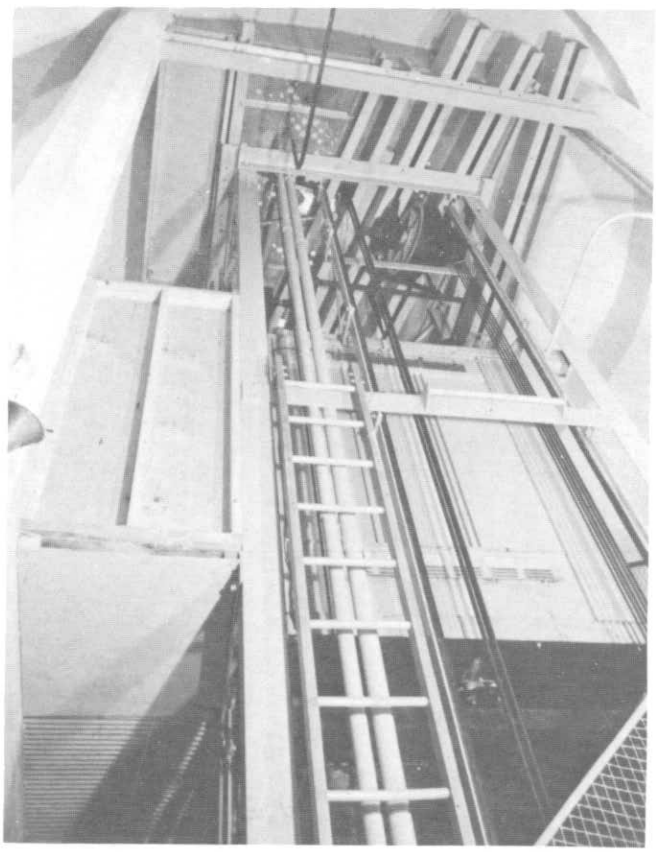


ILLUSTRATION 45. General view at upper elevator landing of upper part of elevator steel. Note wood structure which is an extension of the original closet.

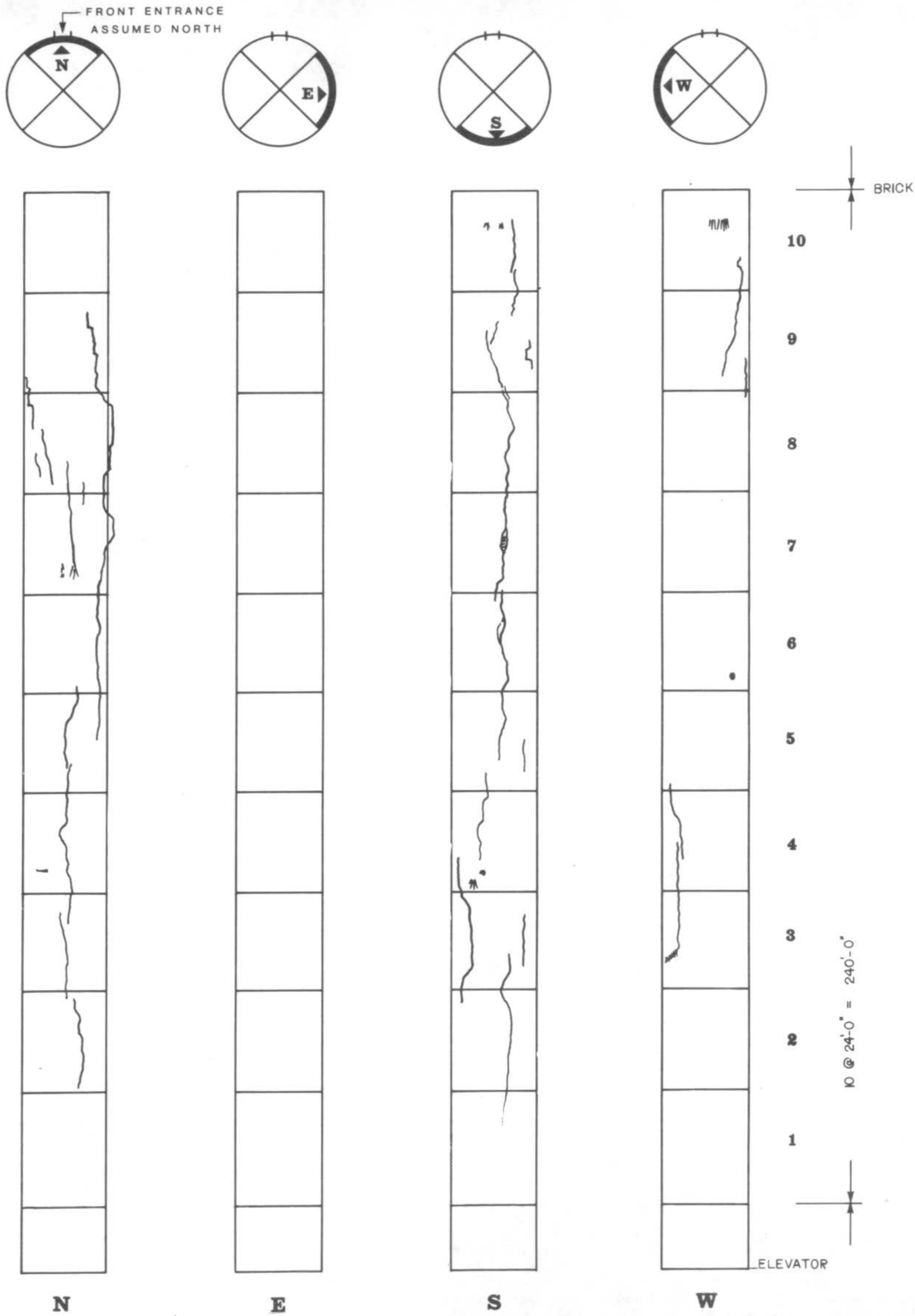


ILLUSTRATION 46. Diagrammatic plan and elevations of brick interior of column shaft showing approximate locations of cracks in brick lining. Horizontal lines in diagrams indicate every fourth stair landing level.

ILLUSTRATION 47. Detail view showing structural concrete with major crack; brick and mortar with wire loop, minimum depth of crack.

ILLUSTRATION 48. Detail view similar to Illustration 47, above, but also showing chunk of wood embedded in concrete which is an example of foreign matter which may be a cause of brown stains.

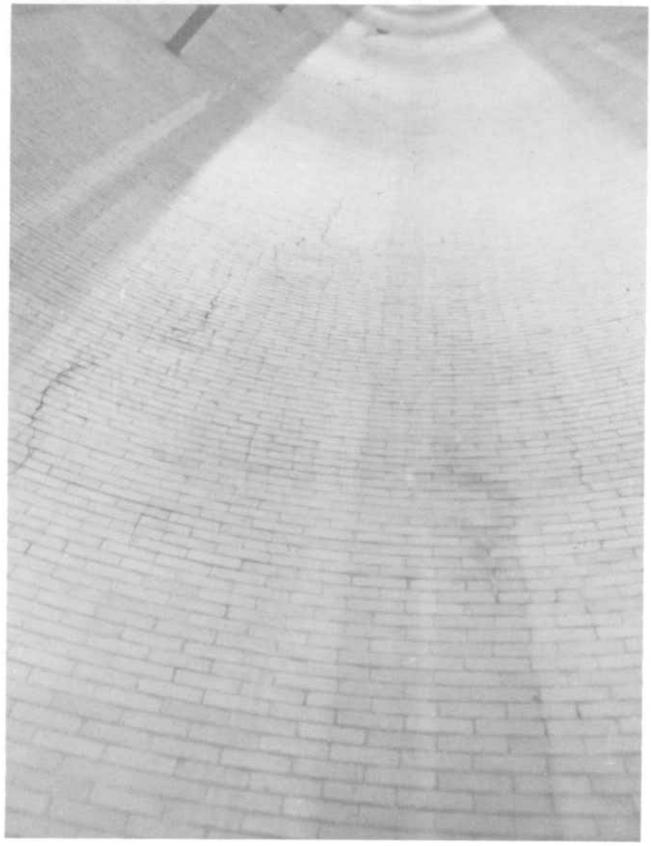
ILLUSTRATION 49. Typical efflorescence and brown stains which occur throughout shaft.

ILLUSTRATION 50. Detail of a major efflorescent stain, located in west quadrant at level 3.

ILLUSTRATION 51. Detail of spalled brick at 6" by 6" concrete column brace and face of brick.

ILLUSTRATION 52. Detail of typical crack in brick lining of column shaft. Nails are a device to measure possible changes in dimension of crack width.

ILLUSTRATION 53. Overall view of column shaft at south quadrant showing major crack.



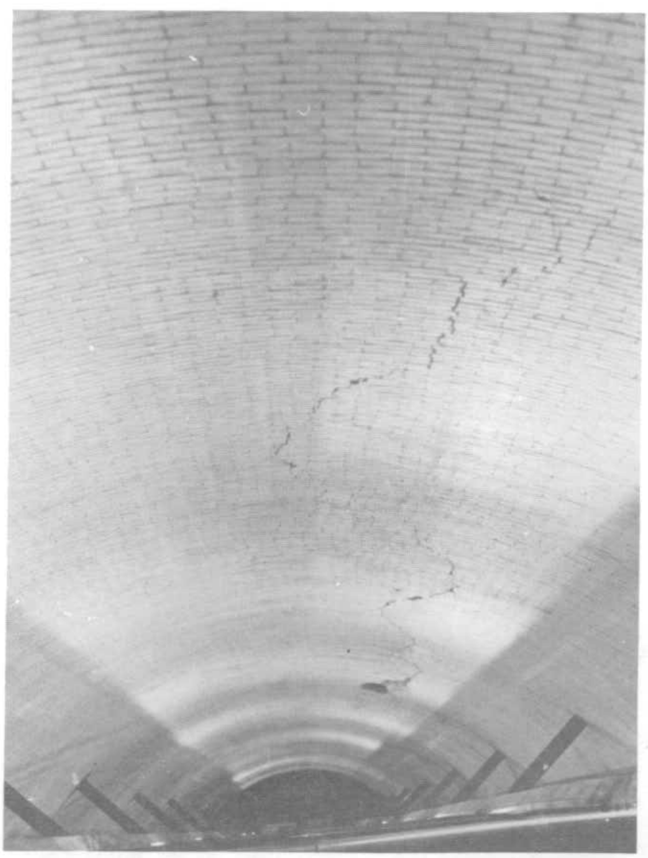


ILLUSTRATION 54. Overall view down column shaft at south quadrant showing major crack.

ILLUSTRATION 55. General view of brick crack in north quadrant of column shaft at approximately level 5.

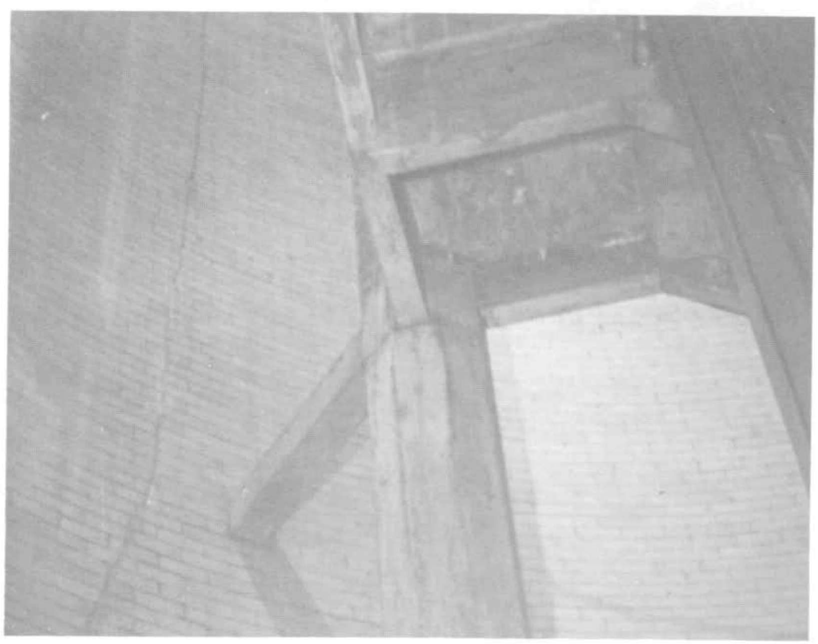


ILLUSTRATION 56. General view of brick crack in north quadrant of column shaft at approximately level 7.

ILLUSTRATION 57. View of stair entrance to lower elevator landing from mid-level platform looking down to rotunda level.

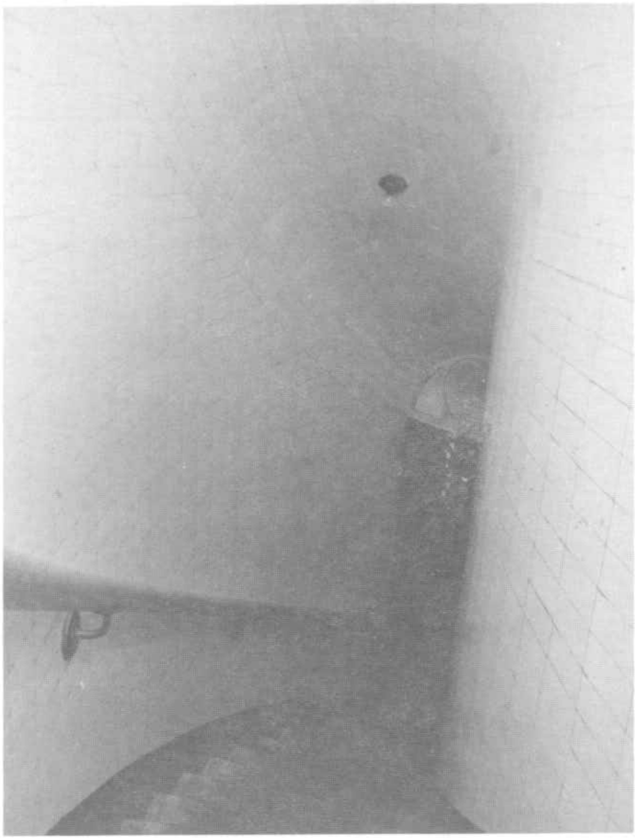


ILLUSTRATION 58. View of same entrance as Illustration 57 , but from rotunda level looking up.

ILLUSTRATION 59. View of exit stair from elevator landing down to rotunda level from mid-level platform.

ILLUSTRATION 60. View of same stair as Illustration 59 , but from rotunda level looking up.

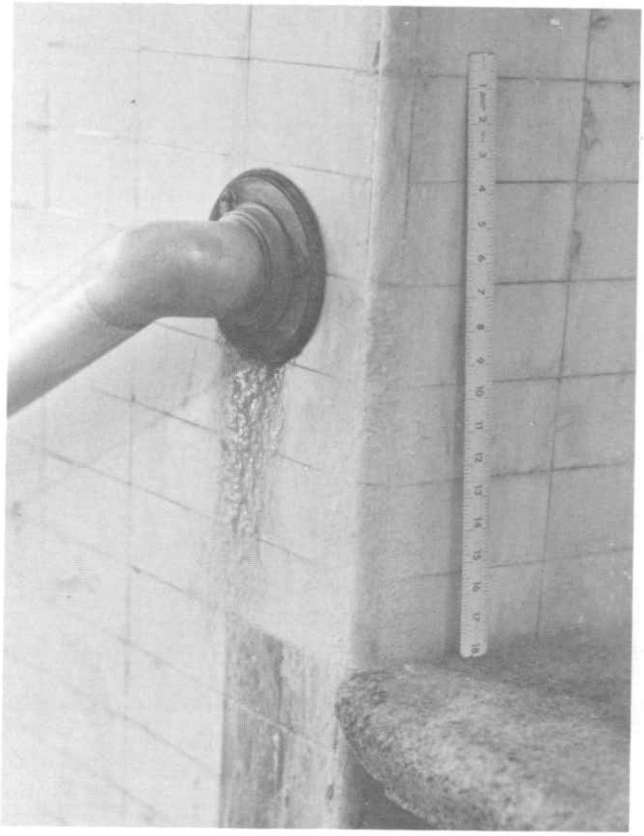


ILLUSTRATION 61. Detail view of existing condition at mid-level platform of exit stair from lower elevator landing.

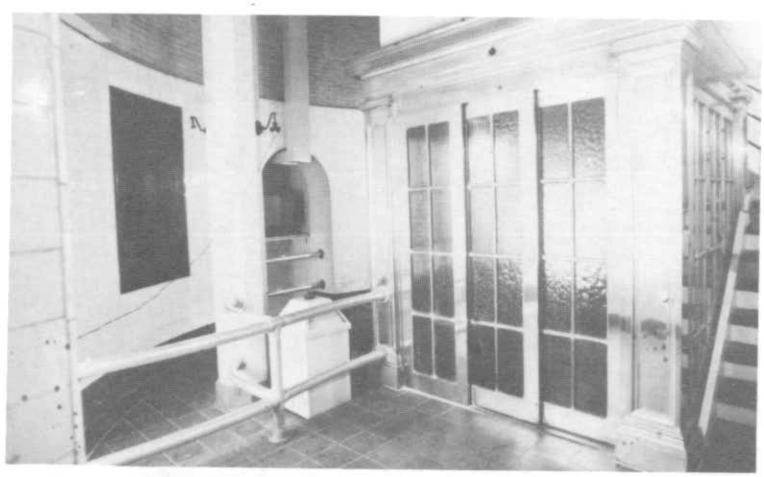


ILLUSTRATION 62. General view of lower elevator landing looking from the northwest towards the northeast.

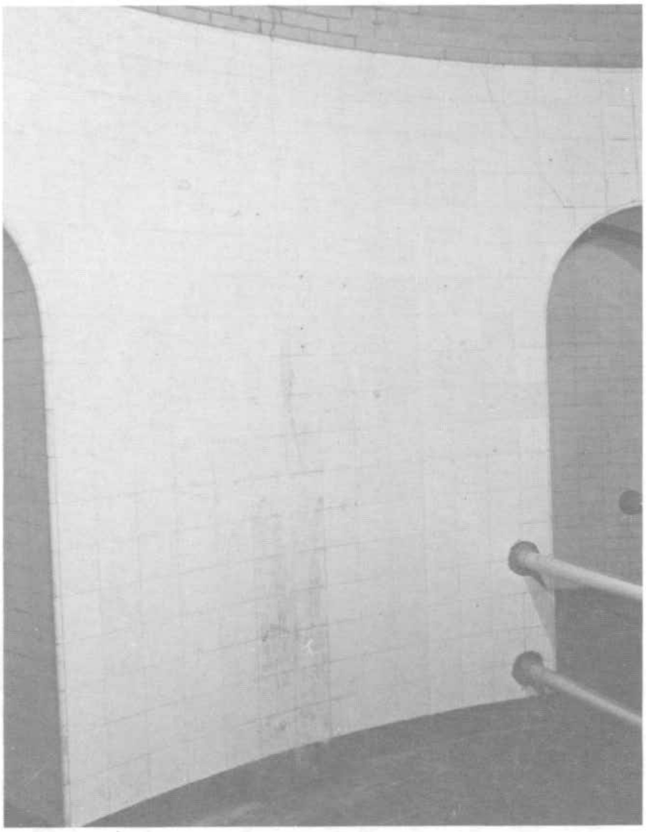


ILLUSTRATION 63. View of typical glazed tile walls, quarry tile floor and bronze handrails at north wall of lower elevator landing.

ILLUSTRATION 64. General view of east side of lower elevator landing.

ILLUSTRATION 65. View of the foot of the exit stair from column shaft at the upper elevator landing showing sign, bronze plaque on tile wall in the background and the entrance turnstile.

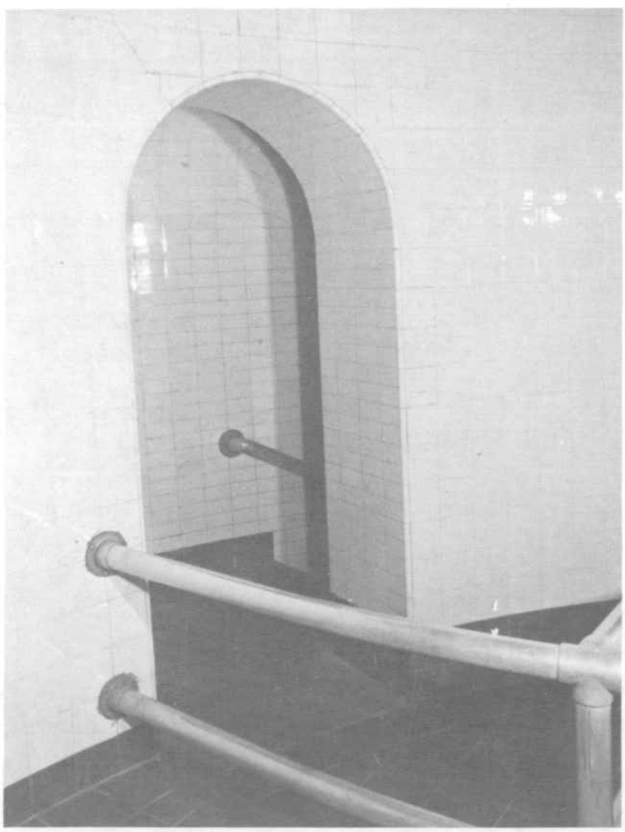


ILLUSTRATION 66. View of the top of the entrance granite stairs at the upper elevator landing showing the bronze railing.

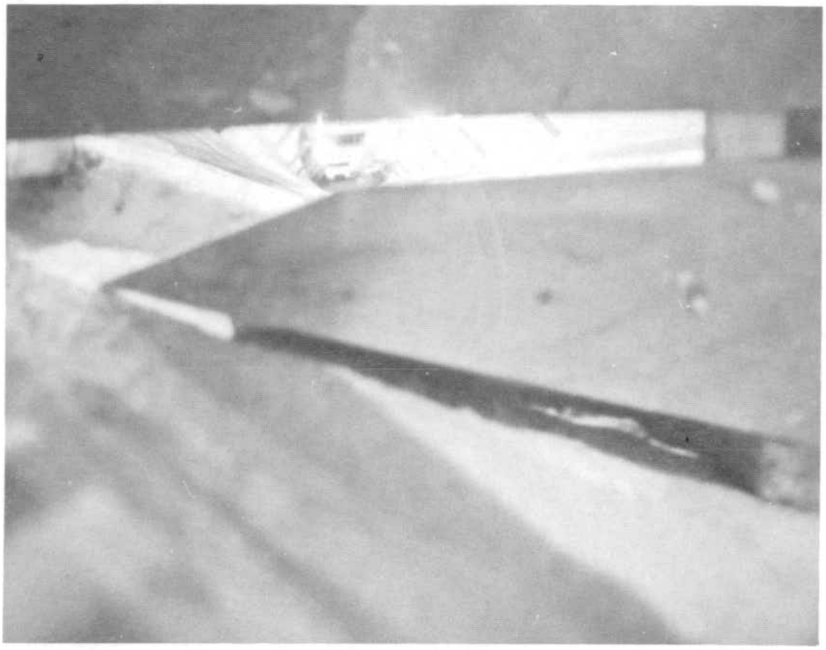


ILLUSTRATION 67. Detail view looking down on end of 2" by 4" beam bearing on granite ledge. View is looking through a joint in the plywood deck.

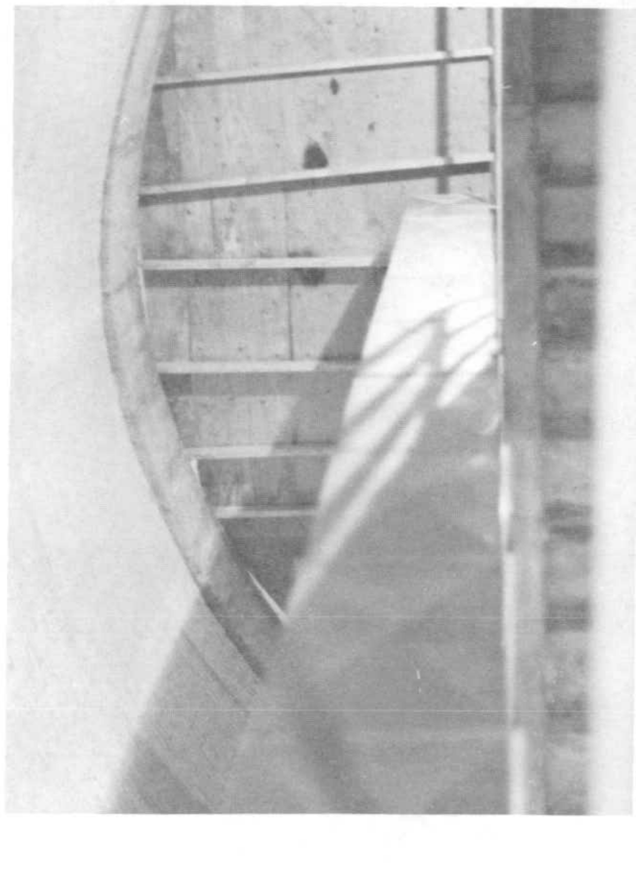


ILLUSTRATION 68. Partial view of underside of "temporary structure" platform located one level below upper elevator landing.

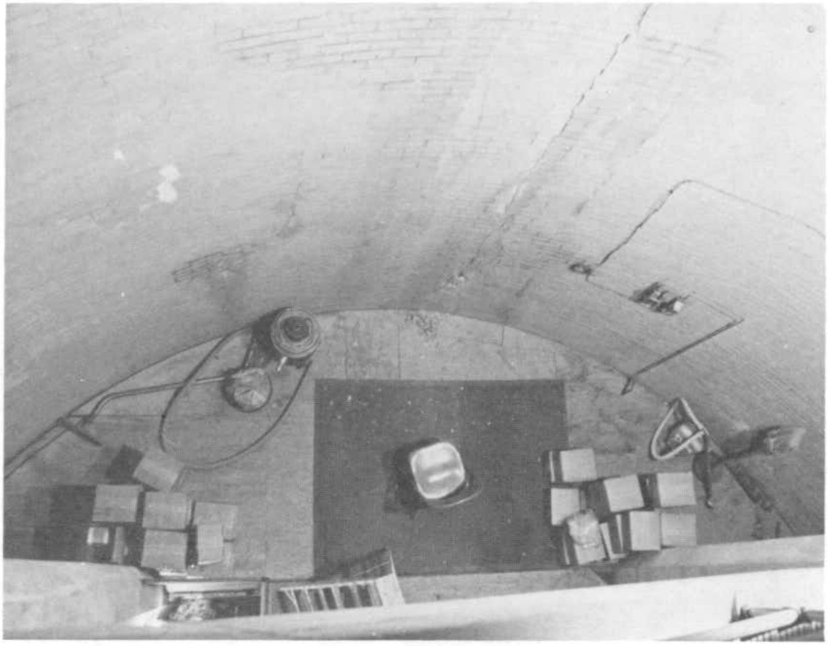


ILLUSTRATION 69. Partial view of "temporary structure" at the second level above lower elevator landing.

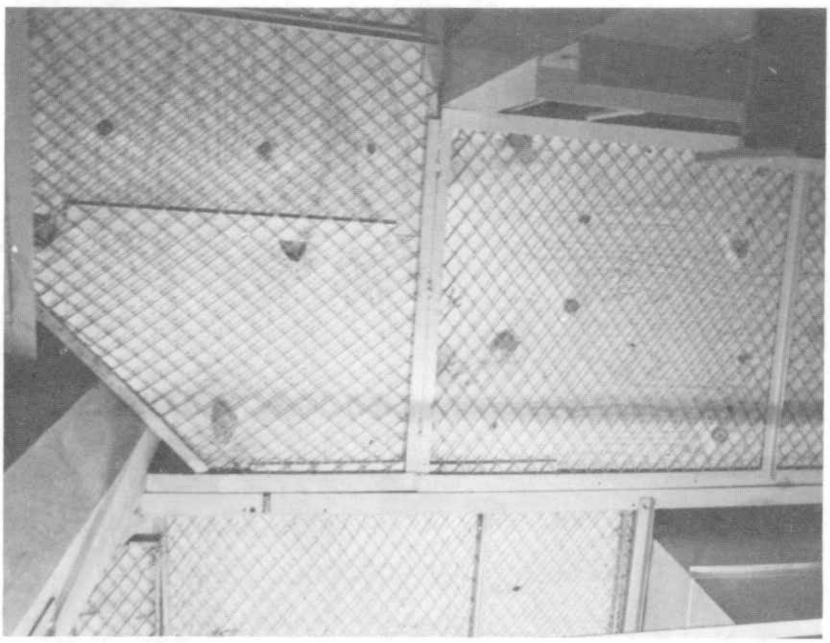


ILLUSTRATION 70. Partial view of underside of same platform as Illustration 69.

COST ESTIMATE

An estimate of the approximate cost of the work recommended in this chapter is as follows:

1.	Cleaning and sealing column granite blocks from plaza level to 78th course	$ 60,000
2.	Cleaning exterior of bronze doors	300
3.	Installation and/or replacement of approximately 15 percent of stair safety treads	3,000
4.	Concrete patching of stair and columns at various locations	800
5.	Painting of all stair rail, elevator steel and metal screens	6,400
6.	Cleaning of face brick lining in column shaft	20,300
7.	Cleaning of all interior granite steps	800
8.	Cleaning and grouting of glazed tile and replacement of approximately 100 square feet of tile	1,200
9.	Cleaning of quarry tile floors	600
10.	Cleaning, treating, and sealing of all exterior bronze	5,000
11.	Removal of all temporary structures	200
	TOTAL	$ 98,600

CHAPTER 3. COLUMN CAPITAL (OBSERVATION GALLERY) AND PENTHOUSE

CHAPTER 3. COLUMN CAPITAL, (OBSERVATION GALLERY), AND PENTHOUSE

INTRODUCTION

The column capital and penthouse begins at the groove immediately above the 78th course of granite ending the column shaft, immediately below the through-wall course of granite (71). In classical terms the groove is the necking, the outward curving section under the observation gallery is the echinus, and the observation gallery parapet wall represents the classical abacus (67). The column capital and penthouse area is a reinforced concrete structure faced with granite stones which are mechanically keyed to the concrete.

The penthouse interior contains the upper elevator landing which is located two steps below the observation gallery floor. Access to the top of the emergency exit stair in the column shaft is through a wooden partition door from the upper elevator landing. Access to the elevator machine platform above the elevator shaft is through a wire mesh partition door and up a ship-ladder. The elevator machine platform above is visible to the public (186).

COLUMN CAPITAL

When viewed through binoculars, the exterior sides of the parapet walls, or abacus, appears in good condition except for one fracture visible in the northwest corner of the west face. This corner had been damaged by lightning and subsequently repaired. The fracture is on the bottom of the first block. It appears as a small triangular piece which could work loose and fall. A swing scaffold would need to be placed over the side to reach this point for additional detailed investigation. This work is beyond the scope of this report and should be made a part of the repair construction contract. The joints between the granite blocks of the parapet walls appear to require joint sealant treatment, as recommended in Chapter 2 in Column Shaft.

The granite facing of the column shaft above the necking and the curved section of the echinus appear in good condition, when observed with binoculars. The joints between the granite blocks appear to require joint sealant treatment, as recommended in Chapter 2 for the column shaft.

The capstone and inside surface of the parapet walls are in good condition (72, 73). The copper flashing under the capstone, thought to be installed in 1949, is in good condition. Throughout the parapet, all joints require joint sealer treatment as recommended in Chapter 2.

Conduits which run along the south, west, and north walls near the floor service utility lights located under the aluminum maps at each corner. Lightning arrester bars and points are on top of the parapet. It was reported that four quartz floodlights were mounted on the inside surface of the parapet walls, apparently to light the face of the penthouse walls. The floodlights have been removed and are now in maintenance storage; when or why the floodlights were removed is not known. These electrical items are discussed in Chapter 12.

OBSERVATION GALLERY

The granite stones which form the gallery floor are in good condition except for unsightly dripping from caulking sealings (74). The joints of these granite paving stones need repair. In 1949, the gallery floor was removed and a waterproofing membrane installed to help prevent water infiltration into the shaft. The stones were then replaced in their original pattern, and five expansion joints provided. These joints, filled with a black tar-like substance, are unsightly.

Drainage of surface water off the gallery floor is through a 6" drain in the southwest corner. This drain is simply a hole cored through the capital allowing the water to fall to the plaza 300' below (75), with a channel chiseled into this paving to allow for better flow of water to the drain. A lead pipe which once lined the drain hole is gone. In the original design, a drain was included at the southwest corner of the penthouse, sleeved through the penthouse wall, and piped down the elevator shaft. This drain in the gallery floor was apparently covered in 1924 and is believed to have been filled and covered over by the 1949 waterproof membrane. The drain still functions in the sense that it serves as a relief point for water trapped under the membrane through seepage and/or condensation. Water exits through the pipe sleeved in the penthouse wall, is collected in a water bucket, and is manually disposed of (77).

The existing floor drain and drain pipe should be replaced. The new floor drain should be furnished with an integral seepage pan and clamping collar to accept the waterproofing membrane and flash it directly into the drain body. The drain pipe would enter the column shaft and be piped downward, following the course of the original installation. The drain hole cored through the gallery deck and emerging from the underside should be filled and patched to remove all evidence of having been in existence. Refer to Chapter 11 for information about protection against freeze-up.

The membrane waterproofing is 25 years old, and should be replaced. With all joints properly sealed and a new "Uniroyal System" membrane installed, the penthouse should be watertight.

Junction of Floor with Parapet and Penthouse Walls

The granite stones of the parapet and penthouse walls and the paving stones of the gallery floor are in good condition. Over the years, several types of sealants have been used in the stone joints. Proper sealing of the floor/wall junction is critical; however, water may still get below the membrane waterproofing under the gallery floor via the stone joints in the walls and then down the backside of the stones and the surface of the structural concrete. To stop water infiltration, the following steps should be taken: 1) Remove stone floor and base material, 2) Apply a 3M liquid waterproof membrane to the entire floor and base, 3) Replace all stone pavers and base into original position and pattern, and 4) Repeat the waterproofing of entire surfaces with 3M waterproofing.

PENTHOUSE EXTERIOR

Exterior Surface of Penthouse Walls

As noted above, the granite stones are in good condition, but the joints are in poor condition. Water is evidently getting behind the stones and freezing, causing the face blocks of the penthouse walls to move--in some cases, the blocks are as much as one inch out of plane with the adjacent blocks (76). This is unsightly and also makes sealing the joints difficult. These blocks should be removed and re-set. Over the years, several different joint compounds have been used. The various colors of the compounds used have contributed to the unsightly appearance of the walls. Opened joints are in evidence throughout (78, 82, 83). Joints between the granite blocks of the penthouse walls require joint sealant treatment as recommended in Chapter 2 for the column shaft.

Junction of Penthouse and Roof

The square penthouse is roofed by a round cupola-like truncated cone made of granite stones and topped with a concrete roof slab with round glass inserts. Around the square top of wall are lightning arrester bars and points. At two corners of the penthouse are Coast Guard navigational lights with guard rails. These lights are discussed in Chapter 12.

A sloping metal flashing has been installed at the juncture of the square and round forms. Originally, this juncture had a continuous gutter, but it was filled with concrete in 1924 and flashed with metal. The sloping metal flashing was installed in 1949. The granite stones are in good condition, but the joints are in poor condition (82, 83, 84). Several types of jointing compounds have evidently been used with a black tar-like substance most prevalent (84, 85). Much of the concrete roof slab has been mopped with this compound, and only the four quadrants of vault lights with the glass inserts are not mopped. The lightning arrestor cables, tied to the bronze lantern at two points, penetrate this slab. The glass inserts, which serve to admit daylight into the elevator machine platform, are nearly all cracked and/or crazed (80, 81). Perhaps the original plan was to give some daylight to the upper elevator landing (the original elevator machine platform was smaller and constructed of metal bars which admitted more daylight to the landing). However, admitting daylight is not a critical factor and since the roof of the penthouse is not visible to the public, it is recommended that the roof be cleaned and sealed with a 3M waterproofing. It is further recommended that an operable hatch (with a plexiglas dome to admit some daylight) be installed to permit maintenance personnel to get to the penthouse roof from the elevator machine platform, as discussed in Chapter 4. A ladder could then be installed to give access directly to the lantern above, eliminating the need to carry a ladder up to the penthouse roof.

Bronze Louvers

The east, west, and south walls of the penthouse have openings approximately 4' wide by 3' high, which serve as ventilation louvers (sometimes referred to as windows). These bronze louvers are operable manually to an open or closed position. The exterior is concealed by a bronze grille; additional grillwork below conceals a blind louver pocket. All grilles are in good condition, having achieved a dark bronze patina. At the south side a conduit servicing the Coast Guard navigational lights passes through the louver and rises on the face of the penthouse wall. The bronze requires only cleaning and waxing.

Bronze Doors

A pair of bronze doors on the north side of the upper elevator landing lead to the observation gallery (89, 88). A glazed transom above the doors is covered on the exterior by a decorative bronze grille matching that concealing the ventilation louvers. Structurally, the doors, jambs, transom and grille are in good condition. The door handles are missing from the west leaf, and the interior door handle is missing from the east leaf. These items should be replaced. A block of wood slipped through a handle pull is used to bolt doors closed (89). A proper latching device is needed to hold the doors closed, and weatherstripping would prevent heat loss in the winter. The exterior bronze finish has not weathered evenly and is streaked greenish-black. The interior bronze is polished to a high lustre, but only up to

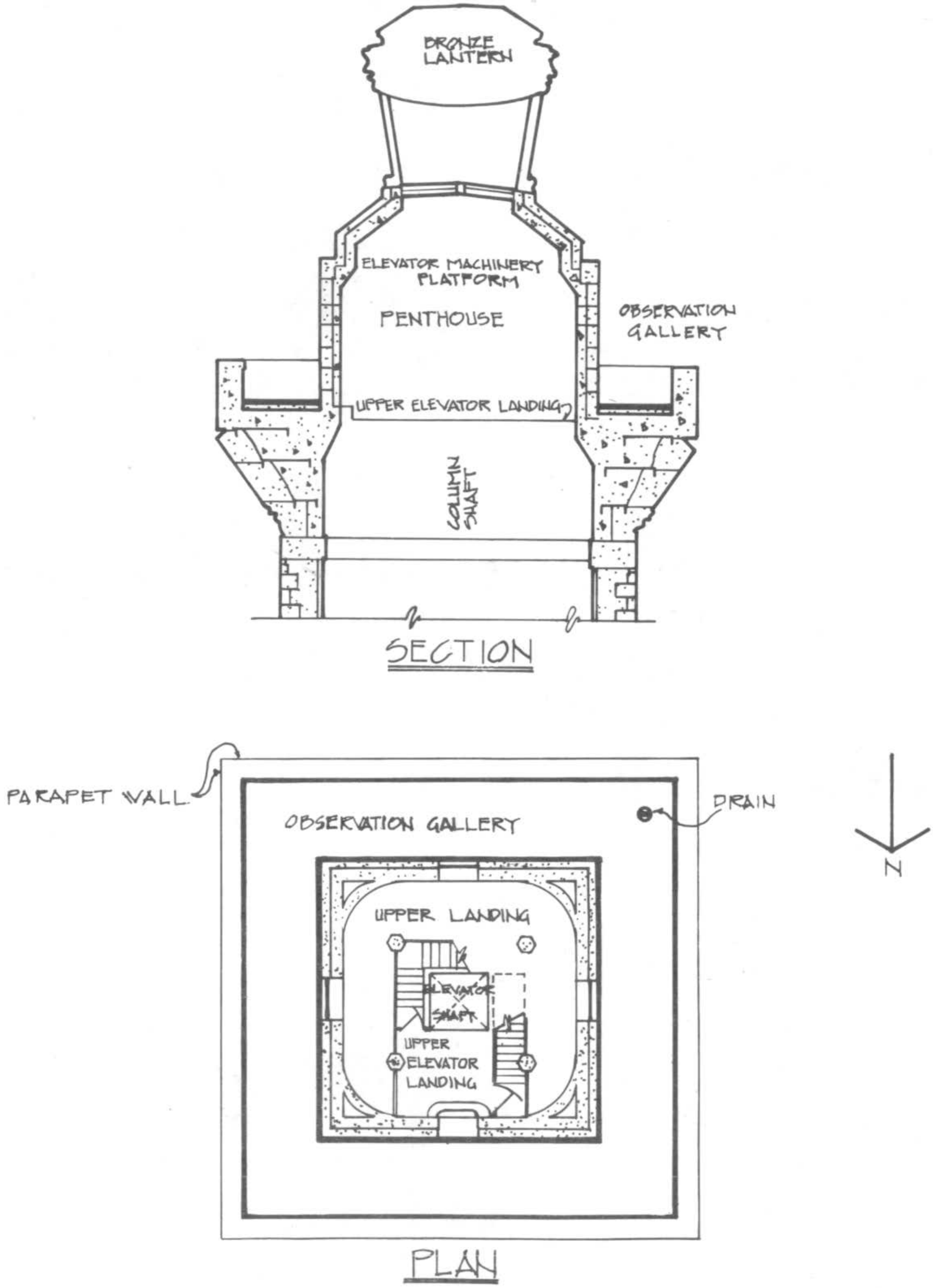


ILLUSTRATION 71. Plan and section of observation gallery and penthouse.

ILLUSTRATION 72. View towards northeast of parapet walls around observation gallery. Metal map of battle appears at corner.

ILLUSTRATION 73. View of parapet wall on north side of observation gallery. Bench, conduits at floor and wall intersection, and cap flashing are not part of original construction.

ILLUSTRATION 74. Plan view of southwest corner of observation gallery.

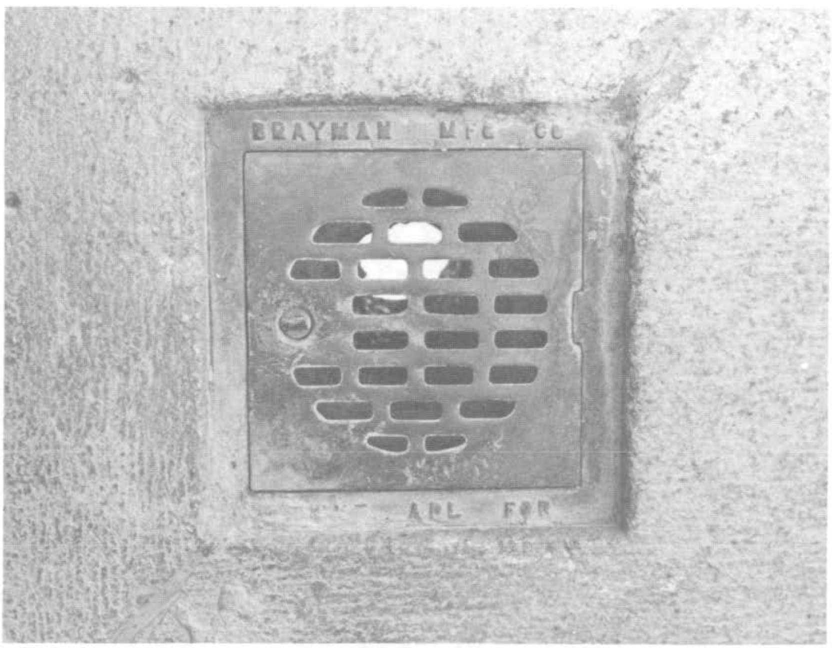


ILLUSTRATION 75. Detail of drain in southwest corner of observation gallery.

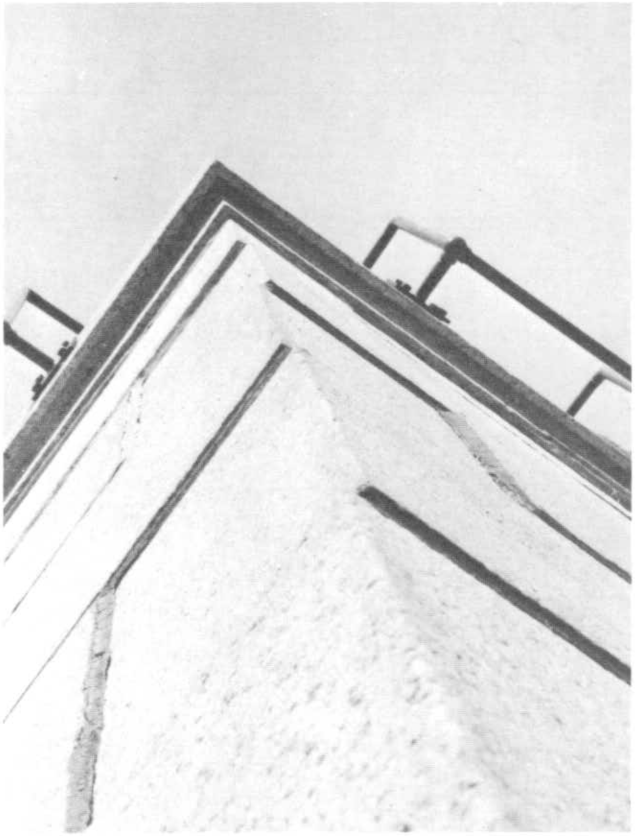


ILLUSTRATION 76. View of exterior of northeast corner of penthouse cornice showing shifted granite blocks, extra wide sealant joints and handrails from navigational lights.

ILLUSTRATION 77. View of interior of penthouse at the southwest column showing pipe from original floor drain of observation gallery. Peeled paint is the result of moisture penetration.

ILLUSTRATION 78. Detail at cornice of penthouse indicating sealant failure. Pipe railings were added with navigational lights at later date.

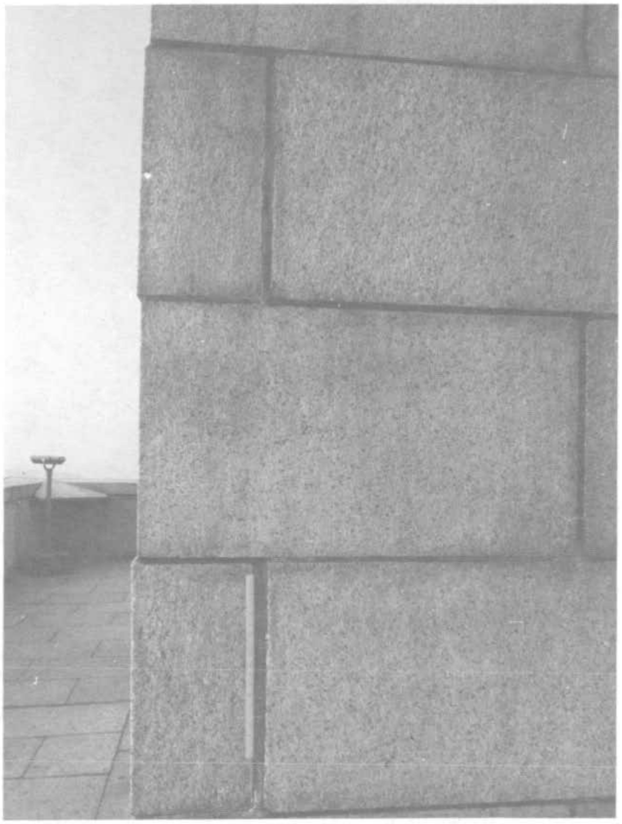
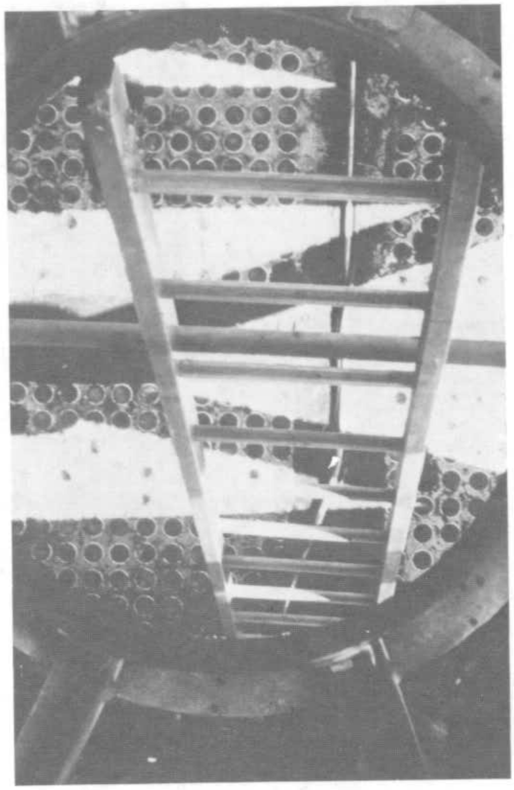


ILLUSTRATION 79. View toward southeast of observation gallery and detail of northeast corner of penthouse.

ILLUSTRATION 80. View of top of penthouse looking down from lantern access port showing vault lights. Note ladder and pipe support.



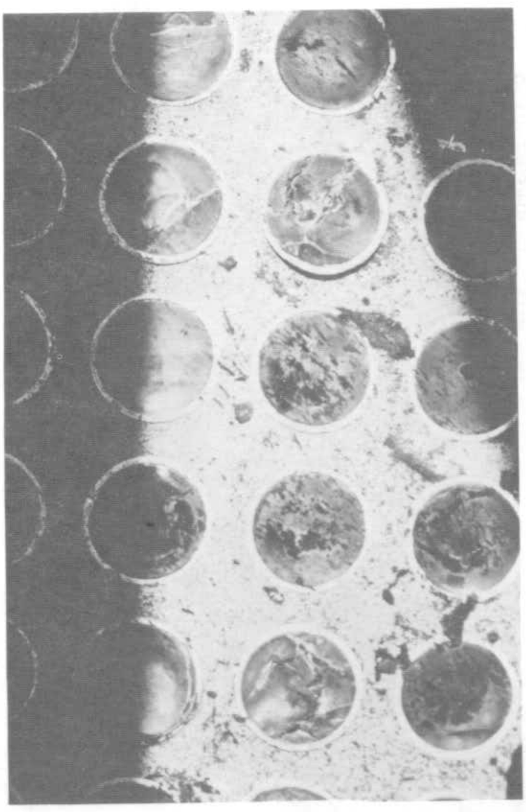


ILLUSTRATION 81. Detail of vault lights showing cracking and crazing of glass inserts.

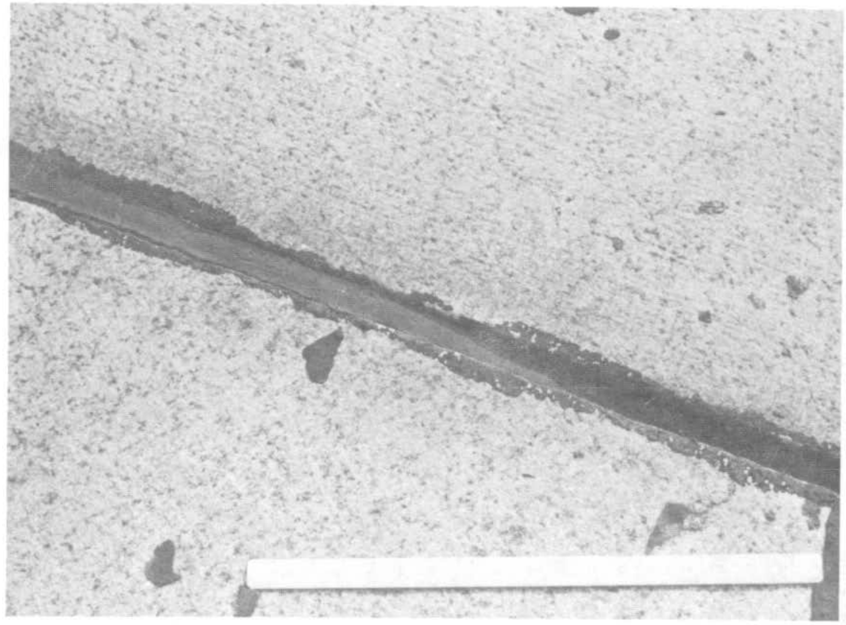


ILLUSTRATION 82. Detail of typical failure of sealant in joint on top of the penthouse.

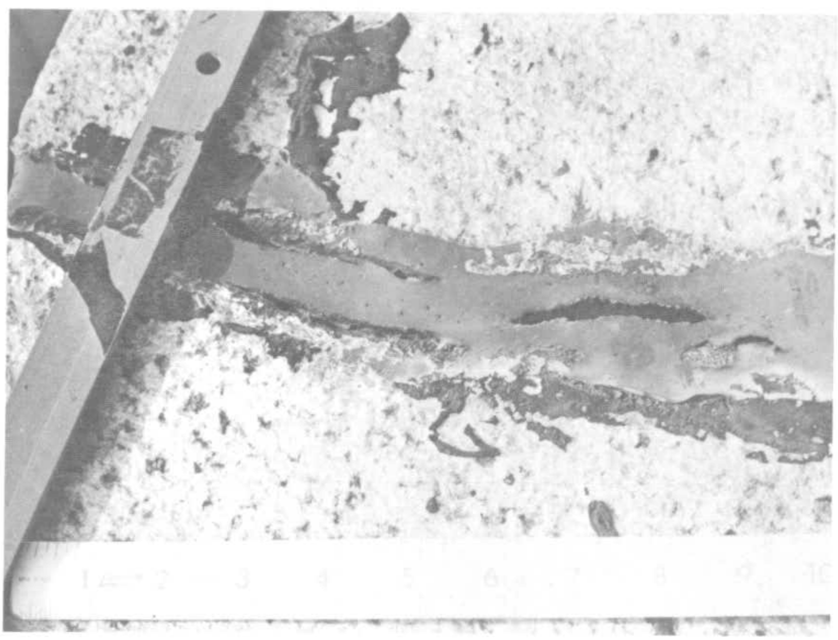


ILLUSTRATION 83. Detail of another typical failure of sealant in joint on top of the penthouse.

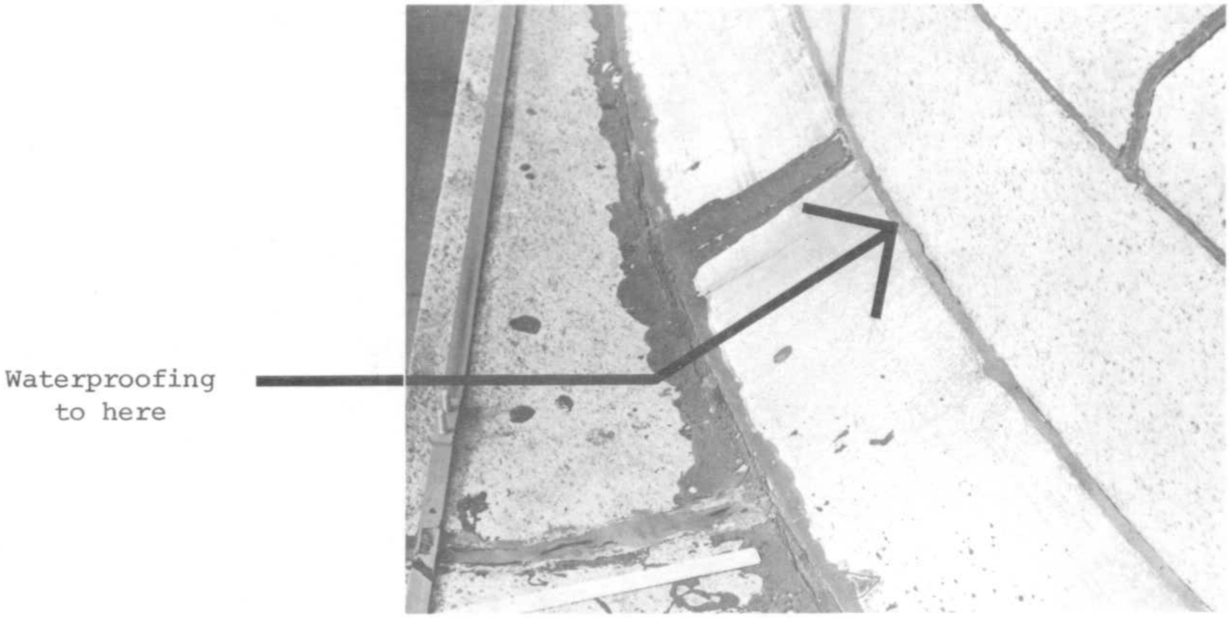


ILLUSTRATION 84. Detail of intersection of penthouse wall and round cupola-like truncated cone roof.

ILLUSTRATION 85. Detail of typical joint indicating improper removal of previous sealant prior to installation of new sealant. Metal bar is part of the lightning grounding system.

doorhead; the rest of the frame is not polished. All bronze should be treated to bring it to a dark bronze finish as discussed in Chapter 2. Joints around all door and louver frames should be cleaned and new sealant installed.

PENTHOUSE INTERIOR

Upper Elevator Landing

The walls of the upper elevator landing are 7'-0" high painted panelled partitions, with a bronze head rail and quarry tile base (86). The partition on the west side is obscured from sight by the ship-ladder to the elevator machine platform above (87). Behind the panelled door on the west side of the elevator landing entrance is the "temporary" wooden structure constructed to enlarge the storage closet (see Chapter 2) (45). The concrete north wall was probably originally meant to have a panelled wainscot similar to the 7'-0" high partition on the east side of the landing (86). Although available original drawings do not detail this area, our observations (inserts in the concrete wall, thickness of the base and bronze head rail) lead us to believe that was the original intent. Therefore, for appearance, it is recommended that this panelled wainscot be installed.

The ship-ladder type stair to the elevator machine platform and its wire mesh enclosure were installed in 1939 as part of the replacement elevator (91, 87) in the space of the upper elevator landing. This stair is an intrusion into the public space of the elevator landing. It is unsightly and occupies space necessary for proper flow of traffic at the elevator entrance. However, there is no other practical way to provide access to the elevator machine platform for maintenance. To remove and replace this utility stair with an architectural stair appears to be not warranted. Therefore, the only recommendation is to paint the stair and the elevator shaft metalwork.

The bronze enclosure for the elevator is discussed in Chapter 2 under the heading of Architectural Bronze Metalwork. The elevator doors and frames are discussed in Chapter 9 (90).

Penthouse and Upper Column Shaft Walls

The surfaces above the granite through-wall course were covered with cement plaster, apparently specified in the original construction as a finish material to hide the rough concrete. As this plaster started to flake, it was scraped off circa 1948-50, and the walls were covered with a shiny black sealer, apparently as waterproofing. The present light-colored glossy paint was applied in 1969, and it too is peeling, probably due to water migration from the exterior.

? *
SEE ALSO page 92

* SEE FREEDLANDER SPECIFICATION, May 20, 1912. SEE MONGIN, P. 131, TOP

The temporary wooden platform (discussed in Chapter 2) was erected for the painting operation in 1969. The penthouse exterior should be made watertight as recommended in this chapter. It is recommended that, for appearance, the existing paint and black sealer be removed and the concrete surface cleaned by sandblasting. The concrete surface should be painted with a breathing-type latex paint such as Pratt and Lambert vapex flat wall paint.

COST ESTIMATE

An estimate of the approximate cost of the work recommended in this chapter is as follows:

1.	Cleaning and sealing of column capital and penthouse	$ 26,000
2.	Membrane waterproofing on observation gallery floor	12,000
3.	Membrane waterproofing on penthouse roof	1,800
4.	Access hatch and ladder at penthouse roof	1,700
5.	Resetting of granite blocks in penthouse wall	1,600
6.	Replacement of floor drain and pipe	4,300
7.	Cleaning of exterior bronze doors and louvers	300
8.	Replacement of door hardware and installing sealant at frames	400
9.	Installation of wainscot on north interior wall of upper elevator landing	400
10.	Cleaning and repainting interior concrete walls of penthouse	2,300
	TOTAL	$ 50,800

ILLUSTRATION 86. View of northeast corner of upper elevator landing.

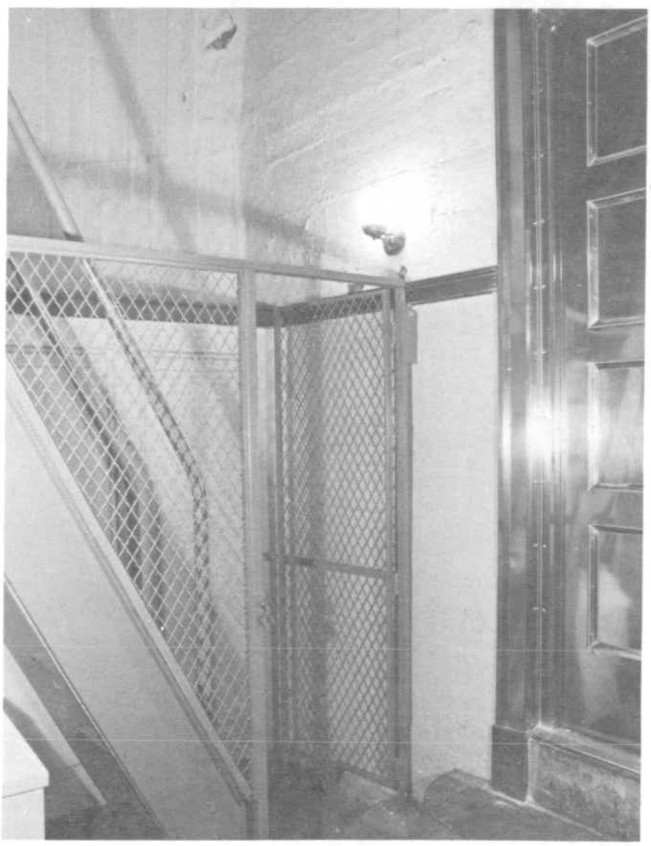


ILLUSTRATION 87. View of north wall of upper elevator landing showing bronze door to observation gallery.

ILLUSTRATION 88. View of northwest corner of upper elevator landing. Ship-ladder type stair leads to elevator machine platform above.

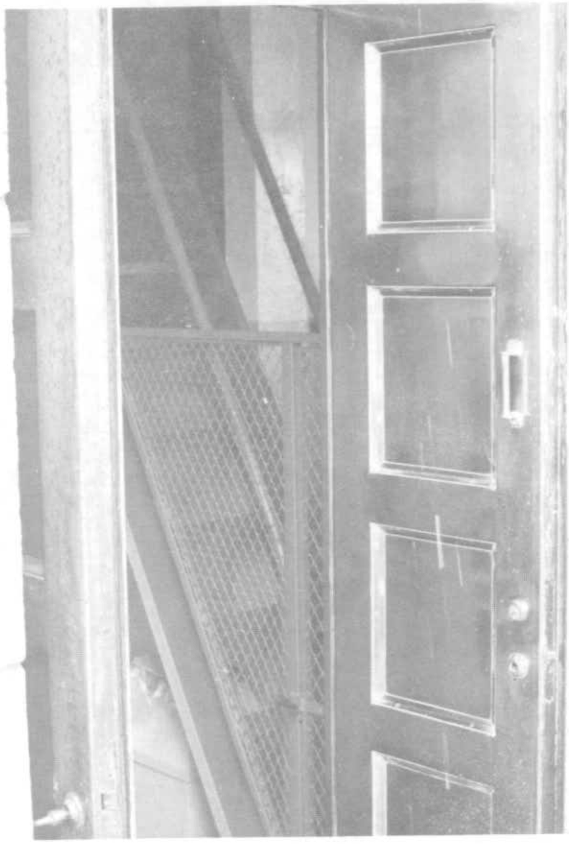


ILLUSTRATION 89. View of bronze door from observation gallery indicating faulty or missing hardware, lack of weather-stripping and dissimilar finish of bronze.

ILLUSTRATION 90. View of south wall of upper elevator landing showing bronze elevator enclosure and panelled partitions. Note panelled door to energency exit stair in open.

ILLUSTRATION 91. View of ship-ladder stair from upper elevator landing up to elevator machine platform above.

CHAPTER 4. BRONZE LANTERN

CHAPTER 4. BRONZE LANTERN

INTRODUCTION

The bronze lantern, sometimes referred to as the "bronze urn," is a lens-shaped structure supported by eight legs attached to the top of the column penthouse (92). The lantern and the supporting legs are approximately 18'-0" high. The lantern consists of bronze castings with sculptured and flat bronze sheets, reinforced with steel and roofed with glass (93). The eight legs have sculptured lion feet at the bottom and lion heads at the top (94, 95). Some time after installation, a number of the original flat bronze sheets cracked and subsequently were patched with an additional layer of bronze sheet (96). Stainless steel sheet metal screws were used for this corrective work and for replacement of a number of original machine screws.

ACCESS

Access to the enclosed portion of the lantern is from the observation gallery floor. Gaining access is awkward, and in the presence of strong wind, dangerous. First, a ladder must be dragged to the top of the penthouse roof. A pipe is then inserted between opposing cross-bracing of the lantern legs nine feet above the penthouse roof, and the ladder leaned against it. A recommendation which would eliminate the need to carry a ladder to the penthouse roof is discussed in Chapter 3.

In the center of the convex sculptured sheet bronze bottom of the enclosed portion of the lantern is a 24" diameter access port (99). The port is covered with a 20 gauge improvised sheet metal cover. The cover is adequate and need not be replaced. However, it is rusty and should be painted to match the bronze patina and to inhibit further rusting.

The original access hatch was removed by maintenance personnel because it was heavy and difficult to open. Maintenance personnel indicate that the original hatch is still on the park grounds. As an option, the original hatch cover could be reinstalled if the two latching devices were replaced with a single hinge, single latching device and a counter balance system to assist the operator in opening the cover. At present, the operator must stand on a ladder nine feet above the penthouse roof and use two hands over his head to operate the two latching devices on the cover. Once it is released, the full weight of the cover is in the hands of the operator. If the original hatch cover is reinstalled, opening the cover will be easier and safer than using the improvised cover.

INTERIOR AND EXTERIOR

The interior of the enclosed portion houses thirty-seven incandescent fixtures mounted in a circle at the rim of the enclosure (98). These fixtures and other electrical items relating to the lantern are discussed in Chapter 12. Steel members which provide a framework for the enclosed structure are galvanized and in good condition (100, 101). Some of the connecting bolts and rivets show signs of rust, and these should be cleaned and spot painted with rust-inhibiting paint. The lantern is roofed with 1/2" thick sandblasted (opal) glass sections formed to the curvature of the lens shape of the enclosure and supported with galvanized steel members. Over 50 percent of the original glass segments are broken and have been replaced in various ways with plexiglas. The plexiglas itself has deteriorated and shattered, but has remained cohesive. The caulking into which the glass was set has dried and spalled (102). The joints in the original glass occur above structural supporting members, and, to eliminate uncontrolled leaking and icing, galvanized sheet metal gutters are suspended below all members with joints to channel rainwater to the outside at the rim (100). Waterproofing the lantern itself is not essential except to prevent the formation of ice during freezing and thawing winter cycles.

Visual inspection of lantern interior and exterior showed no signs of new cracks in the metalwork or any other signs of stress. The cover plate (97) was removed, and a typical leg-to-foot attachment of the lantern to the penthouse was examined. Two 4" x 4" angles back-to-back are fastened to a base plate and to another piece of angle by rivets. Angles, rivets, baseplate, and anchor bolts were in good condition. It is recommended that these eight connections each be painted with a preservative treatment to inhibit rusting action. As this is done, each leg-to-foot connection may be examined.

It is recommended that the entire glass dome be rehabilitated by replacing the broken glass and plexiglas segments with new 1/2" plexiglas to match the original. If the lightning arrester problem is corrected (see Chapter 12), there will not be a corona across the glass and the tendency towards cracking will be reduced.

The clips which now hold the glass or plexiglas in place should be replaced, or at least supplemented, by continuous bronze (or anodized aluminum) strips acting as glass stops with a sealant tape between the metal and the glass. The frames which hold the plexiglas will float in a sub-frame assembly which will provide 3/4" per frame to accommodate the high coefficient of expansion (1-1/2" in either direction per glazed section).

COST ESTIMATE

An estimate of the approximate cost of the work recommended in this chapter is as follows:

1.	Cleaning and spot painting of steel and spraying of preservative treatment		$ 1,300
2.	Replacement of glass segments in dome, with new glass including continuous metal stops		16,000
3.	Same as (2) but with plexiglas	(Alternate) 17,000	
4.	Reinstall original hatch cover with new hardware	(Alternate) 1,000	
	TOTAL		$ 17,300

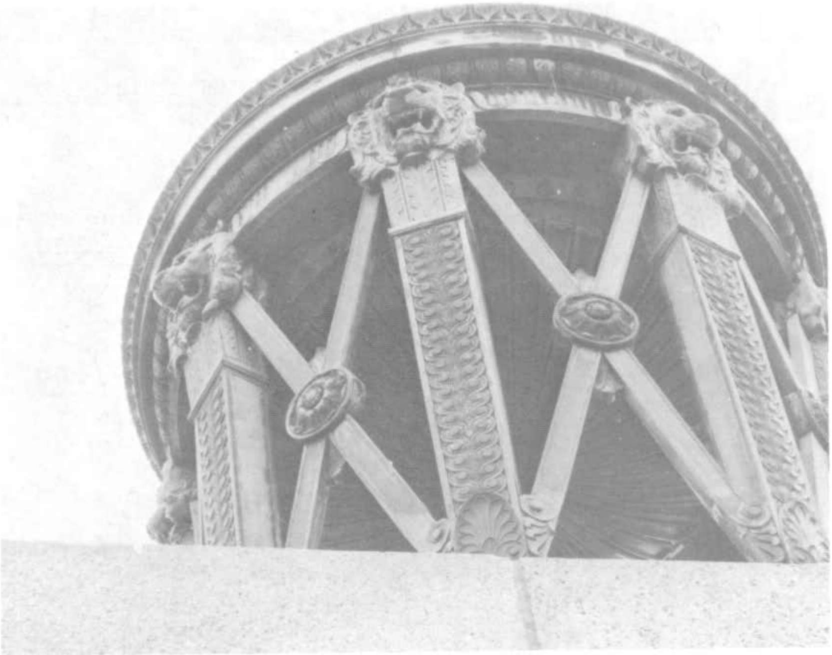


ILLUSTRATION 92. Bronze lantern on top of the penthouse, as seen from observation gallery.

ILLUSTRATION 93. View looking down on top of the glass dome, as seen from outside of bronze lantern.

ILLUSTRATION 94. Detail of top cornice of bronze lantern.

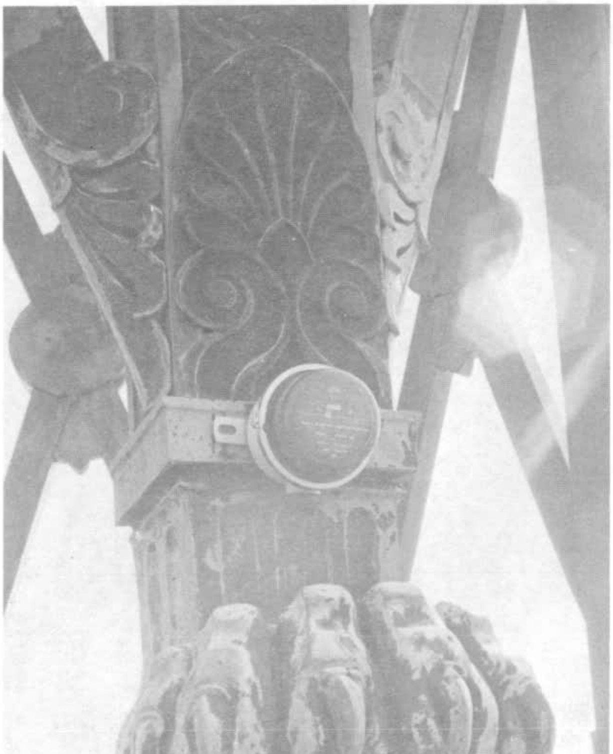


ILLUSTRATION 95. Detail of lion's foot at base of bronze lantern. Round item attached to foot is a photoelectric cell which activates navigational lights.

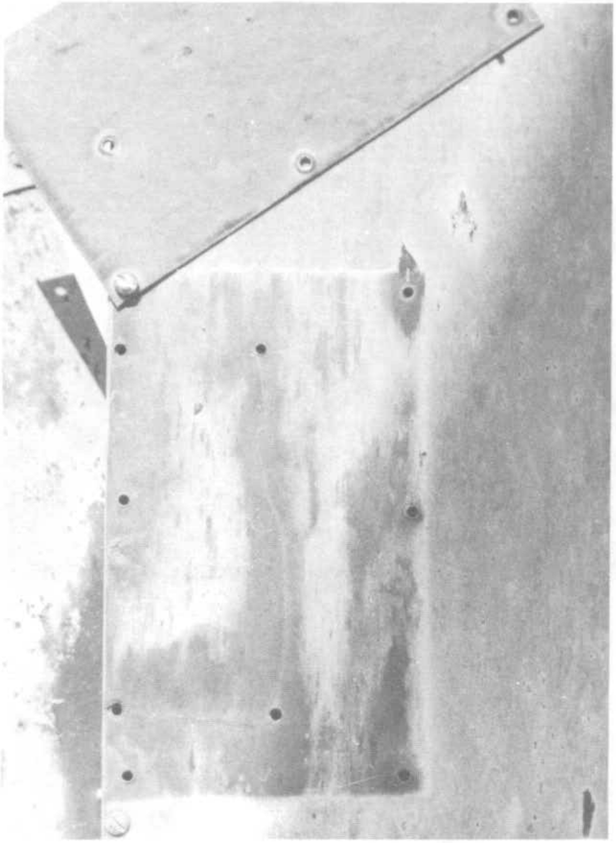


ILLUSTRATION 96. View of previous crack with cover plate removed.

ILLUSTRATION 97. View of connection of steel structure of bronze lantern to penthouse.

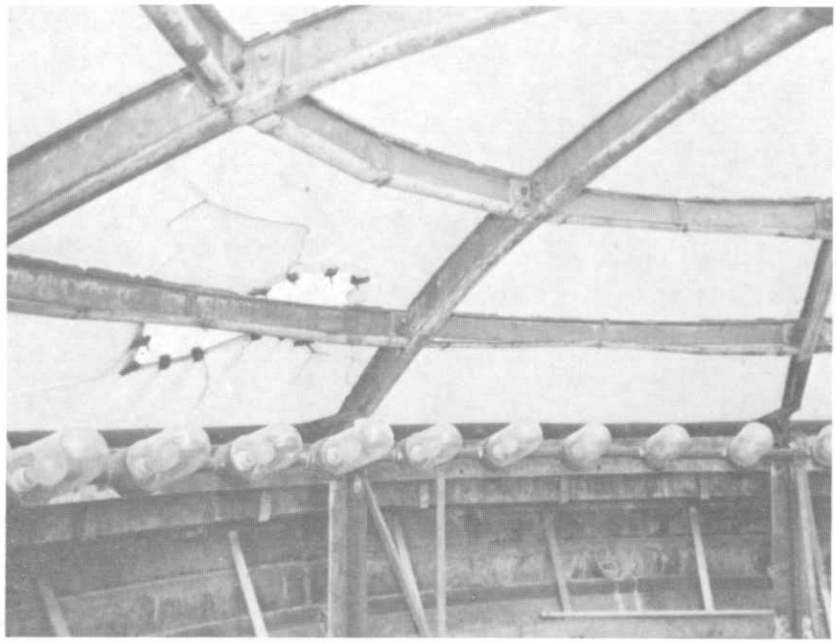


ILLUSTRATION 98. View inside of bronze lantern looking at skylight and light fixtures.

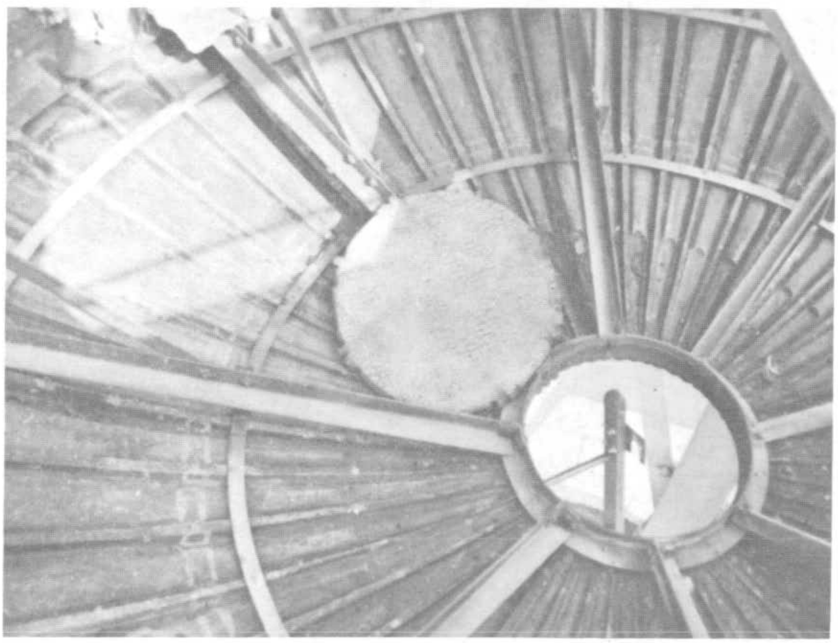


ILLUSTRATION 99. View inside of bronze lantern looking down at access hole used to enter the lantern.

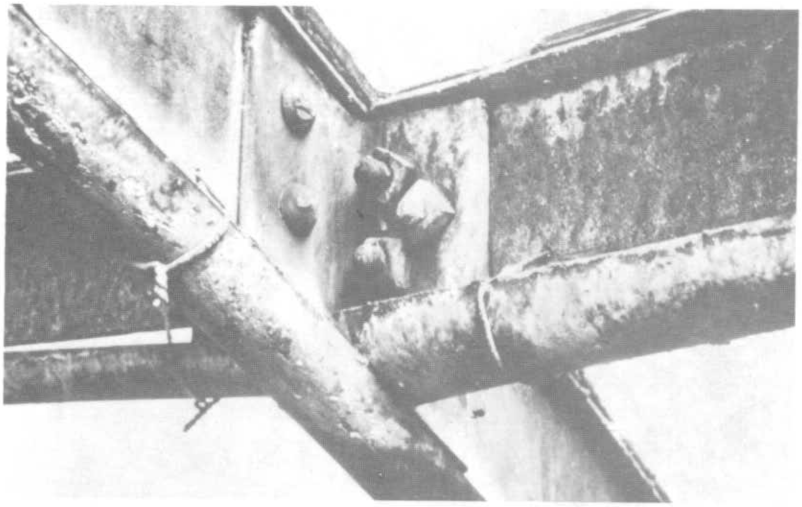


ILLUSTRATION 100. Detail of intersection of sky-light steel and gutters to collect water from condensation and/or infiltration.

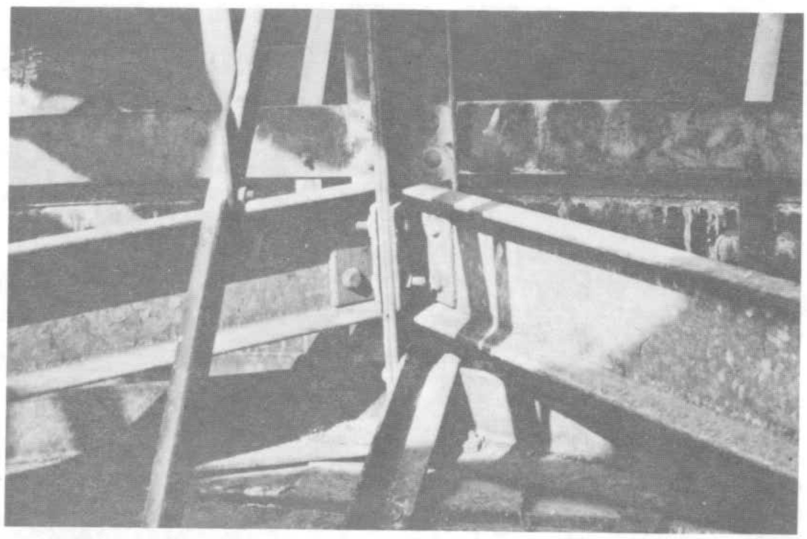


ILLUSTRATION 101. Detail of steel bracing inside of bronze lantern.

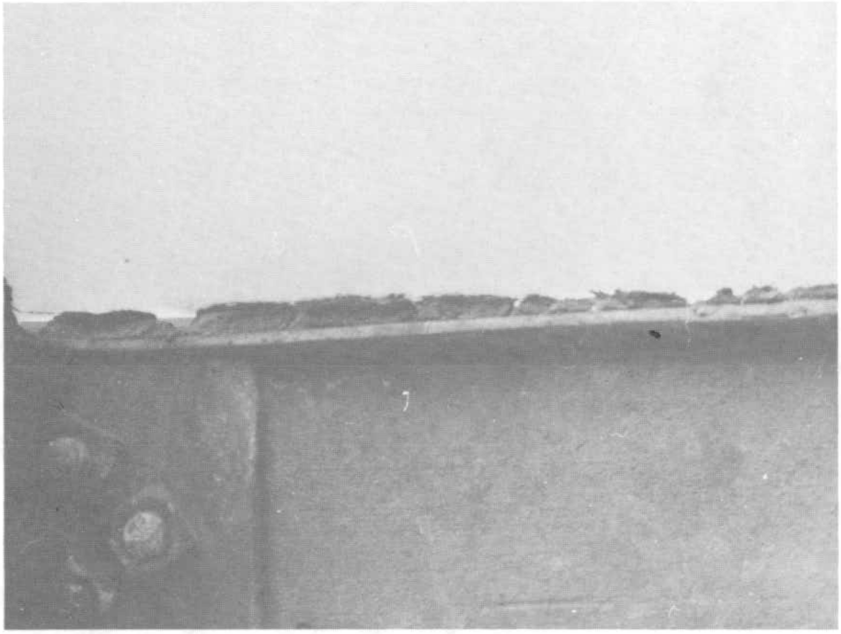


ILLUSTRATION 102. Detail of skylight glass and steel frame intersection. Note deteriorated caulking and openings in joint.

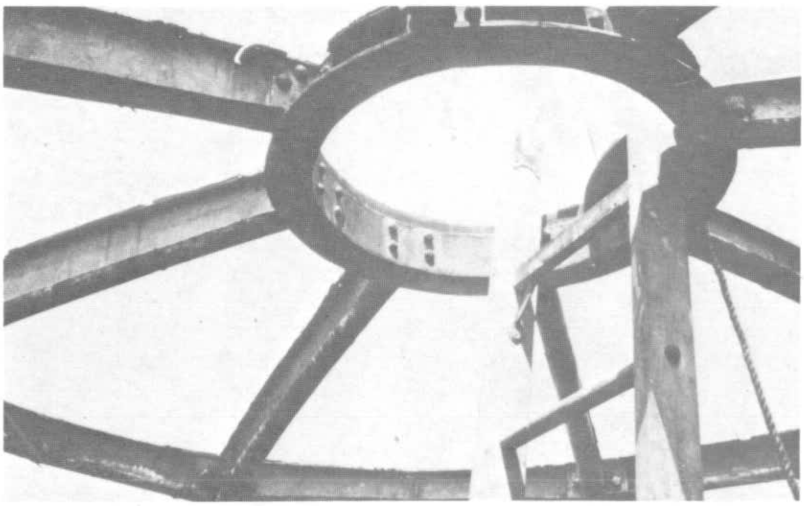


ILLUSTRATION 103. Detail of top of skylight from inside showing access hole to top of skylight.

CHAPTER 5. UPPER PLAZA AND GRANITE STEPS

CHAPTER 5. UPPER PLAZA AND GRANITE STEPS

EXISTING CONDITIONS/STRUCTURAL SYSTEM

Upper Plaza

The upper plaza is an approximately 160' by 175' area around the base of the memorial column. It is framed over a basement space by reinforced concrete slabs, beams, and columns. The slab is covered with a paving pattern of sandstone pavers and brick (104-107). Originally, the upper plaza was to be paved with granite paving, but sandstone and brick were installed in 1924-25 as a temporary paving.[1] We investigated the material above the concrete slab and in places removed the sandstone pavers in order to determine what materials are between the paving and the concrete slab (108, 109). A weak concrete material was found directly on top of the concrete structural slab. This weak concrete material may be a deteriorated portion of the concrete slab or, as is more likely, a filler added to slope the plaza for drainage.

A number of holes exist through to the underside of the slab in various locations. Measurements indicate that the slab varies in thickness from six to nine inches. The top of the slab is not waterproofed and has been continually exposed to freezing and thawing water. The top of the slab has deteriorated and possibly weakened.

The reinforced concrete slabs span about 7'-10-1/2" between beams. The reinforcement is 3/8" twisted square bars at 6" on center (110, 111). There is also a distribution reinforcing perpendicular to the span. A reinforced concrete beam runs east-west at 7'-10-1/2" on center. Every other beam runs into a column, the remaining beams being picked up by a beam on the column line which runs north-south.[2] A typical beam is 8" wide, 14" deeper than the slab and is reinforced by three 1-1/2" square bars with 3/8" stirrups. The reinforced concrete columns are 16" square and have eight 7/8" bars with stirrups at 7" on center (112). Generally, there is a 10'-9" distance between the bottom of the slab and the top of the pile cap at each column. Historical documentation indicates each column is supported by piles.[3] We partially unearthed one of the pile caps, and it was in good condition. Most of the caps are partially exposed, above grade

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[1]See Appendix C.

[2]See Appendix-B for framing plan and section.

[3]*A Construction History of the Perry's Victory and International Peace Memorial.*

or water level. Visual investigation shows no evidence of any settlement, cracking, or any other deficiency. The results of the Windsor Probe Tests made on some columns can be found in Appendix E.

In the east-west direction at the center line of the shaft on both sides there is a double beam (123). This appears to have been intended as an expansion joint between the beams, but it has never served this purpose. This is not the best location for the expansion joint, and a double column should have been constructed to provide separate support for each beam.

When viewed from below, the upper plaza framing appears covered by stalactites (114, 115). These deposits of calcium carbonate, washed out from the concrete because of the absence of waterproofing, are present almost everywhere throughout the underside of the upper plaza structure.

Water seeping through the concrete corrodes the steel reinforcing bars in the slab and supporting beams (123-128). As the steel reinforcing bars rust, they swell and spall the concrete. There is evidence of this continuing process in many places from below the upper plaza structure.

Three sides of the upper plaza have a reinforced concrete retaining wall, with diagonal bracing beams. The bottom of this wall is braced at each column line against the top of the adjacent column. With few exceptions, the walls and bracings are in very good condition. In some areas, where pipes penetrate the wall, water can seep in and deteriorate the wall.

There is a lack of waterproofing around the area where the column shaft penetrates the upper plaza structure. Deposits of calcium carbonate are evident on the side of the column shaft below the upper plaza (124).

Granite Steps

The granite steps on the south side of the upper plaza are supported by reinforced concrete beams only (121, 122); there is no concrete slab beneath the granite steps. There are many open joints between the stones in the granite steps. Some granite steps are not fixed, and the bedding for the stone has deteriorated. Underneath the wall which supports the lower side of steps, earth has been removed, probably by the action of water (122). This could undermine the stability of the south side of the lower plaza.

Approximately three-fourths of the ground in the basement space below the upper plaza is under water. Comparing the level of the water in this basement space with the present lake level, we found the two are approximately the same. The water level varies with the lake conditions as indicated in the drawing in Appendix B.

Electrical Room

An electrical room is located at the west side of the basement space below the upper plaza. The three brick walls surrounding this room are cracked. The wall foundations are settling because they do not rest on piles.

Structural Capability

The existing load carrying capability of the plaza slab has been calculated. The following assumptions served as a basis for this calculation (116, 117, 118, 119).

1. Concrete strength f'_c-5350 psi (see Appendix E); in the structural calculation f'_c = 4000 psi has been used.

2. Steel strength fy = 30,000 psi. (According to the steel specification, the ultimate strength was to be 60,000 to 70,000 psi, with the elastic limit to be half that.)[4]

3. Slab thickness varies from 6" - 9" (based upon observation). The structural calculation is based on a 6" slab.

4. 3/8" cold twisted square bars are used at the bottom of the slab, spaced at 6" on center. (Based on observation, this might be a conservative assumption, since the bars can be 7/16" or 1/2" square also. It is difficult to determine the actual size of bar at the areas of corrosion.)

5. The total thickness of the plaza structure varies from 10-1/2" to 15" (from bottom side of slab to top of sandstone paver).

6. Ultimate strength theory was used for the structural computation, with load factors of 1.4 (dead) and 1.7 (live).

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[4] A Construction History of the Perry's Victory and International Peace Memorial.

The structural calculation shows the live load carrying capacity of the upper plaza slab varies from 100 to 150 pounds per square foot. In order to achieve this carrying capacity, the slab has to be repaired (see Recommendations/Structural System below). The load carrying capacity of the beams and columns have been checked; assuming three 1-1/2" square bars at the bottom of each beam, the result is that the beam can carry more than 200 pounds per square foot of live load, based on the maximum positive moment carrying capacity.

The shear carrying capability of the beam could not be determined, because there is no information about the existing bent-up bars. For this same reason the negative moment carrying capacity of the beams could not be determined (110). If we assume that the 3/8" stirrups are spaced 6" on center, then these beams can carry 100 psf live load, not including the additional shear carrying capacity of the bent-up bars. However, the columns are capable of carrying even greater loads. The safe live load carrying capacity of the plaza structure is at least 100 pounds per square foot; in some areas it is more. Our discussion of load carrying capacity applies only to those places where the structure is in good condition.

RECOMMENDATIONS/STRUCTURAL SYSTEM

To ensure structural soundness, all corroded, spalled, or otherwise deteriorated areas must be repaired. The most important repair is waterproofing. As long as water seeps through the concrete, corrosion, spalling, deterioration, and subsequent weakening of the plaza will continue. The paving must be removed, the top of slab cleaned and patched, and waterproofing installed. The paving would then be replaced, using existing paving where possible or entirely new paving.

The structure also requires cleaning and repairing from below (120). Stalactites must be removed. At the damaged, or spalled areas, all unsound concrete must be chipped away to sound aggregate. The exposed surface should be sandblasted to a clean surface and bright reinforcing rod. At this point the effective remaining area of bar could be determined. If more than 10 percent of the bar area is missing, then the original bar should be cut out and replaced with an equal area of new bar. (Caution must be exercised, for the remaining [uncut] steel must be capable of carrying the dead load or else the beam should be shored during repair.) The concrete has to be chipped back far enough so that a good lap-splice can be made. Then the sound concrete and reinforcing steel should be coated with an epoxy adhesive and the area then grouted to size and shape using at least 4000 psi concrete. All major and minor spalls should be repaired as outlined above.

Each crack in excess of .002" wide should be repaired by a structural bonding process using epoxy adhesives, such as Concresive Epoxy AE 1380 by Adhesive Engineering Company. The crack shall be free from all loose material, sandblasted 3" each side, and a surface seal material applied to the face of the crack. The entire crack shall be injected with the adhesive material in steps. After the injection adhesive has cured, the surface seal shall be removed and the face of the crack finished flush with the adjacent concrete. After all the above recommendations have been executed, the upper plaza may be considered structurally sound.

The next recommendation is to remove the moisture entirely from the basement space below the upper plaza to prevent a reoccurrence of the stalactites and further damage to concrete from rusting reinforcing bars and spalling concrete. A concrete slab and vapor barrier floor system should be installed over the entire area. If a minimum of 7'-0" were allowed for headroom at the lowest point of the structure--the bottom of planters--a floor system could be installed approximately 3'-0" above the existing water level.[5] This floor system should rest upon an engineered fill and would be constructed as follows:

1. Filling the area with engineered fill.

2. Placing a 3" concrete mud slab over fill.

3. Installing a vapor barrier over mud slab.

4. Placing a 5" reinforced concrete slab over vapor barrier.

5. Providing relief outlets and sump pump system in the floor system in the event the lake water level should rise above the new floor elevation.

After utility spaces are partitioned with masonry walls, this new space should be served by the heating and dehumidification systems as described in Chapter 10. The plaza drains, planting box drains and mechanical room sump pump drain, currently unconnected, must then be connected to a storm drain system (132). Upon completion of these items, this space will be dry and the future deterioration of columns, beams and slab supporting the upper plaza will be prevented.

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[5]See Appendix B for floor construction and approximate water levels.

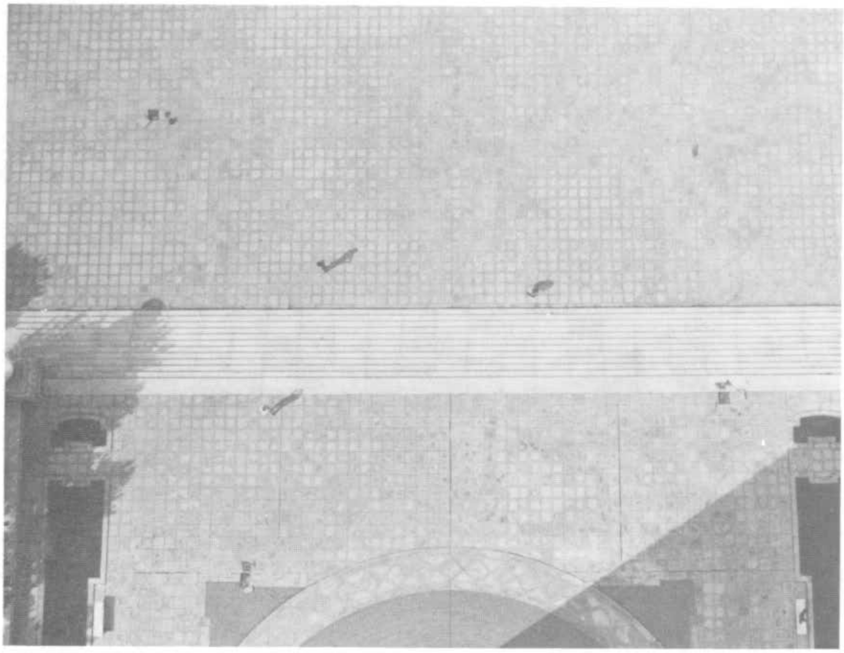


ILLUSTRATION 104. Plan view of north side of upper plaza showing granite steps to lower plaza.

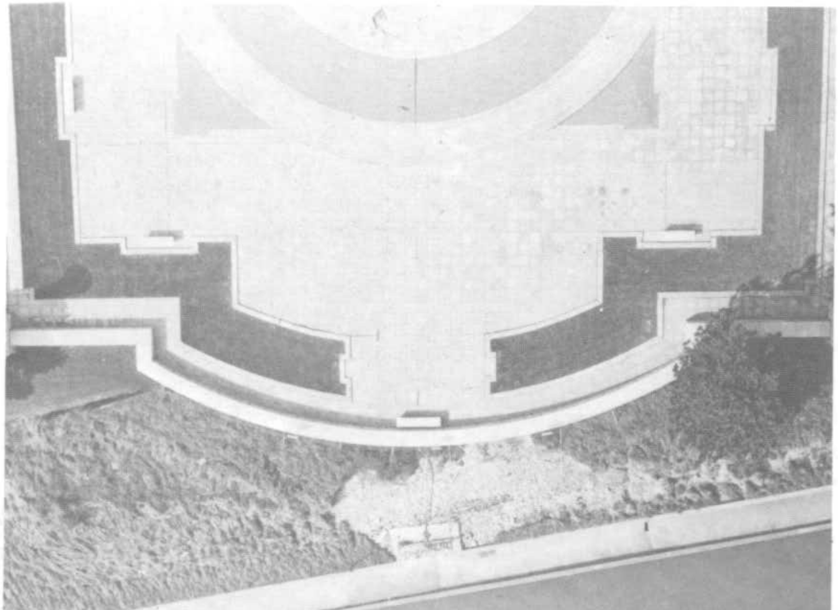


ILLUSTRATION 105. Plan view of south side of upper plaza showing erosion of earth between seawall and memorial.

ILLUSTRATION 106. Plan view of west side of upper plaza showing areaway to electric vault room and one set of floodlights.

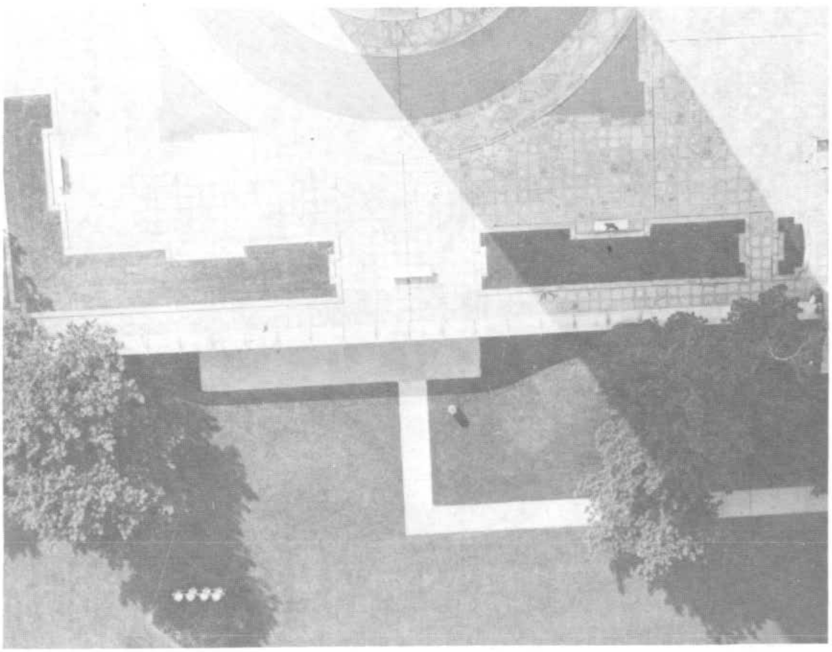


ILLUSTRATION 107. Plan view of east side of upper plaza showing walkway to public rest rooms and maintenance area.

ILLUSTRATION 108. Detail view of edge of granite paver at foot of column. Note lack of waterproofing on the top of the slab.

ILLUSTRATION 109. Detail view of sandstone paver, setting bed, fill slab and top of structural concrete slab.

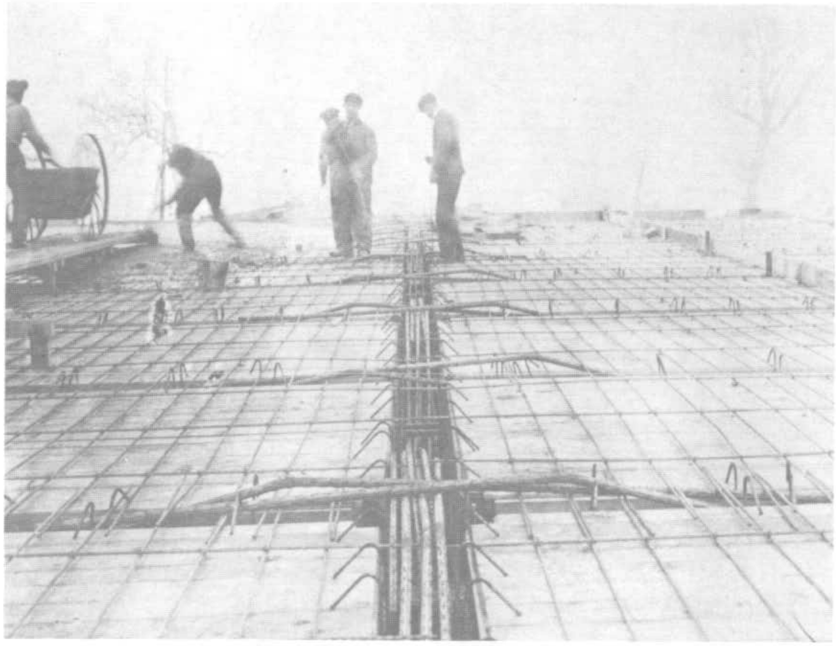


ILLUSTRATION 110. Photo from NPS file showing reinforcing steel in slab and beams.

ILLUSTRATION 111. View of underside of upper plaza slab showing rusting condition of steel and spalled concrete.

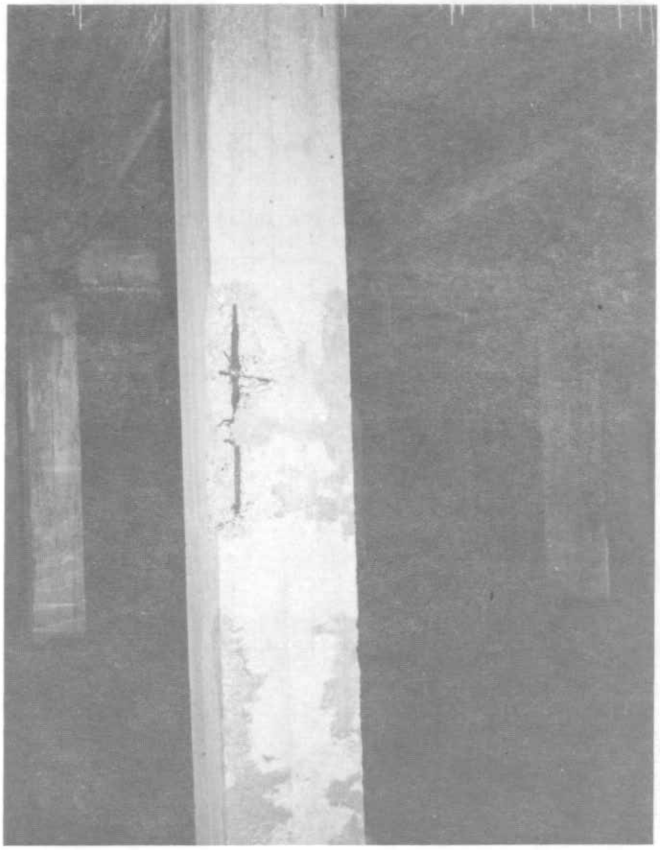


ILLUSTRATION 112. View of spalled concrete condition at a typical column.

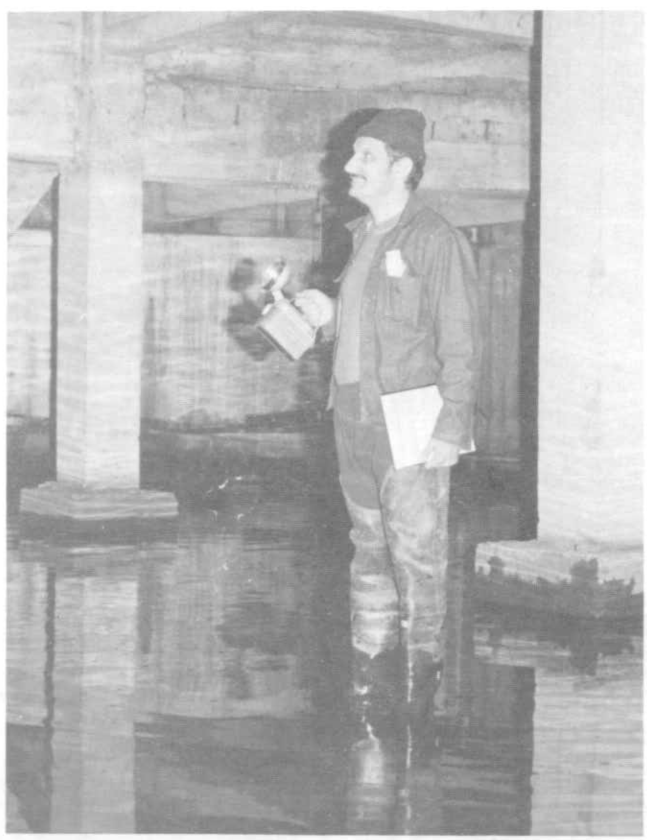
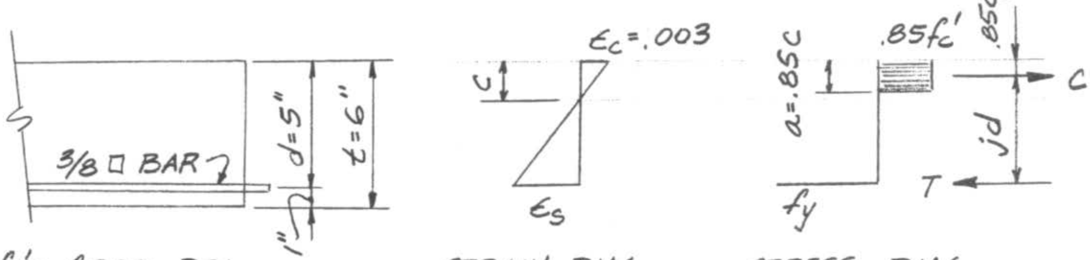


ILLUSTRATION 113. View of typical condition of standing water which covers about 75 percent of basement space below upper plaza.

ILLUSTRATION 114. Typical condition of stalactites at underside of upper plaza slab and beams.

ILLUSTRATION 115. Detail view of typical beams to column intersection showing stalactites at various stages of formation.

LOAD CARRYING CAPACITY OF SLAB



STRAIN DIAG.   STRESS DIAG.

$f_c' = 4000$ PSI

$f_y = 30$ KSI

$t = 6"$, $d = 6 - 1 = 5"$, $A_s = (3/8)^2 \times \frac{12}{6} = .281\ \square"/'$
(6" SPACING)

TENSION FORCE: $T = A_s f_y = .281 \times 30 = 8.438\ ^{K}/_{'}$

COMPRESSION FORCE = TENSION FORCE

$C = .85 f_c' \times .85c \times b = .85 \times 4 \times .85 \times c \times 12 = 8.438 = T$

FROM THIS EQUATION $c = .243"$

CHECK IF STEEL STRAIN EXCEEDS YIELD STEEL STRAIN:

$\epsilon_{ys} = f_y / E_s = 30/29000 = .00103$ ← YIELD STEEL STRAIN

$\epsilon_s = \epsilon_c (d-c)/c = .003 \times 4.757/.243 = .0586 > .00103$

THEREFORE $f_s = f_y = 30$ KSI

MOMENT ARM $jd = d - .85c/2 = 5 - .85 \times .243/2 = 4.90"$

$M_u' = Tjd/12 = 3.44\ ^{K'}/_{'}$ ← MAX. MOMENT CAPACITY OF SLAB

MOMENT DUE TO LOAD: $M_u = \frac{w l^2}{8} = \frac{w \times 7.875^2}{8}$

$M_u' = M_u$

FROM THESE $w = 444$ PSF

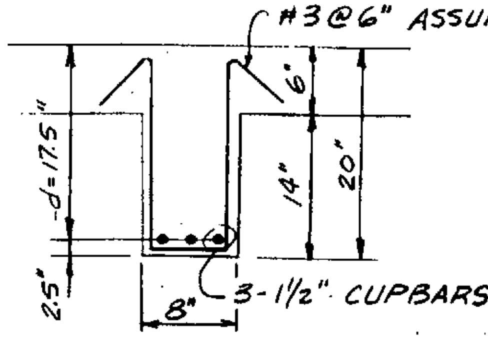
MAX. TOTAL THICKNESS 15" $\quad$ 263 $= \frac{15}{12} \times .15 \times 1.4$ = DEAD LOAD (LOAD FACTOR)

181 PSF / 1.7 = 106 PSF

MAXIMUM LIVE LOAD CARRYING CAPACITY OF SLAB: 100 PSF

ILLUSTRATION 116. Calculation sheet for determining load carrying capacity of upper plaza slab.

LOAD CARRYING CAPACITY OF BEAMS BASED ON POSITIVE MOMENT



EFFECTIVE WIDTH OF SLAB

SMALLEST OF: $20.5 \times 12/4 = 61.5''$
$8 \times 6 \times 2 + 8 = 104''$
$7.875 \times 12 = 94.5''$

$b = 61.5''$

$A_S = 3 \times 1.5^2 = 6.75 \square''$

$\rho = A_s/bd = 6.75/61.5 \times 17.5 = .00627$

$.75\,\rho_b = .75 \times .85^2 \times \frac{4}{30}\ \frac{87}{87+30} = .0537 > \rho$ O.K.

$a = A_s f_y / (.85 f_c' \times b) = 6.75 \times 30/(.85 \times 4 \times 61.5) = 0.968''$

$M_u' = A_s f_y (d - a/2)/12 = 287.1^{\,1k}$

$M_u = \frac{w\,20.5^2}{8}$; $M_u' = M_u$

$w = 5.466$ KLF
$\underline{.163}$ $= .667 \times 1.167 \times .15 \times 1.4$ WEIGHT OF BEAM
5.303 KLF / 7.875 = 673 PSF TOTAL LOAD
$\underline{263}$ DEAD LOAD
410 PSF/1.7 = 241 PSF

MAXIMUM LIVE LOAD CARRYING CAPACITY OF BEAMS BASED ON POSITIVE MOMENT: 240 PSF

ILLUSTRATION 117. Calculation sheet for determining load carrying capacity of upper plaza beams based on positive moment reinforcing.

LOAD CARRYING CAPACITY OF BEAMS BASED ON SHEAR

ASSUME 2-#3 STIRRUPS AT 6" C/C , $f_y = 30000$ PSI

NEGLECT THE INCREASE OF SHEAR CARRYING CAPACITY
DUE TO THE BENT UP BARS

SEE PREVIOUS SHEET FOR RELATED SKETCH & CALCS.

$v_u - v_c = A_v f_v / b_w s = .22 \times 30000/(8 \times 6) = 137.5$ PSI

SHEAR CARRIED BY CONCRETE $v_c = 2\sqrt{f_c'} = 2\sqrt{4000} = 126$ PSI

$v_u = 137 + 126 = 263$ PSI

$V_u = v_u \times \phi \times b_w \times d = .263 \times .85 \times 8 \times 17.5 = 31.3^k$

CRITICAL SHEAR d AWAY FROM FACE OF COLUMN:

$V = \omega \times (20.5/2 - 8/12 - 17.5/12) = 31.3^k$

$\omega = 3.852$ KLF
$\underline{.163}$ = 1.4 x WEIGHT OF BEAM
3.689 KLF

TOTAL LOAD 3.689 / 7.875 = 468 PSF
1.4 x DEAD LOAD $\underline{263}$
205 PSF / 1.7 = 121 PSF

THEREFORE THE MAXIMUM LIVE LOAD CARRYING CAPACITY OF THE BEAM: 120 PSF

ILLUSTRATION 118. Calculation sheet for determining load carrying capacity of upper plaza beams, based on shear reinforcing.

LOAD CARRYING CAPACITY OF COLUMNS

$t = 16''$, $A_s = 8 \times (7/8)^2 = 6.125^{\square''}$, $\rho = .0239$

$k = 1$, $l_u = 10.75'$ REF. ACI 10.11

$\beta_d = 0$, $f_c' = 4000$ PSI (APPENDIX SHOWS 7300 PSI)

$E_c = 57000\sqrt{4000} = 3600$ KSI

$I_g = 16^4/12 = 5461$ IN^4

$E_s = 29000$ KSI, $I_{se} = 6 \times (7/8)^2 \times 6.5^2 = 194$ IN^4

$EI = 3600 \times 5461/5 + 29000 \times 194 = 9560000$ K-IN^2

$P_c = \pi^2 EI / (k l_u)^2 = \pi^2 \times 9560000 / (10.75 \times 12)^2 = 5670^k$

TOTAL LOAD BASED ON 100 PSF LIVE LOAD : 170
263

$P_u = 140^k = 15.75 \times 20.5 \times 433$ PSF

$$\delta = \frac{1}{1 - \frac{P_u}{\phi P_c}} = \frac{1}{1 - \frac{140}{.7 \times 5670}} = 1.0365$$

MIN. ECC. $M_2 = .1\ h\ P_u = .1 \times 16 \times 140 = 224^{k''}$

$M_c = \delta M_2 = 1.0365 \times 224/12 = 19.4^{\prime K}$

$ECC. = 19.4/140 \times 12 = 1.66''$

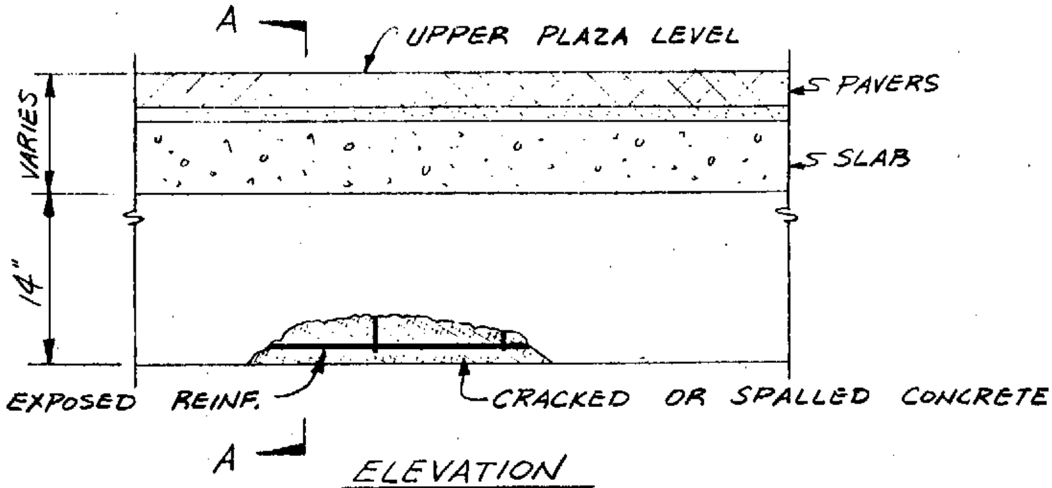
$P_u = 640/2 = 320^k > 140^k$ O.K.

FROM CRSI $f_y = 60$ KSI, $e = 2''$
AT PLAZA $f_y = 30$ KSI

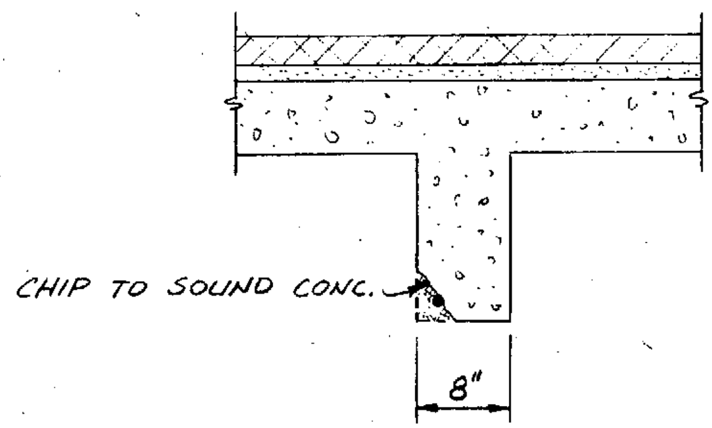
<u>THE LOAD CARRYING CAPACITY</u> OF THE STRUCTURE IS EQUAL TO THE SMALLEST OF THE LOAD CARRYING CAPACITIES OF THE SLAB, BEAM, AND COLUMN WHICH IS

<u>100 PSF LIVE LOAD</u>

<u>ILLUSTRATION 119.</u> Calculation sheet for determining load carrying capacity of columns.



ELEVATION
SCALE : 3/4" = 1'-0"



SECTION A-A
SCALE : 3/4" = 1'-0"

METHOD OF REPAIR :

1. CHIP TO SOUND CONCRETE
2. SANDBLAST TO EXPOSE A CLEAN SURFACE
3. DETERMINE IF BAR SPLICE IS REQUIRED
4. IF SO, CHIP CONCRETE BACK FAR ENOUGH TO MAKE LAP SPLICE (USE SAME BAR AREA AS EXISTING WITH GR 60 STEEL, LAP LENGTH TO BE DETERMINED ACCORDING TO ACI 71)
5. APPLY EPOXY BONDING AGENT TO EXPOSED CONCRETE & STEEL
6. FILL WITH 4000 PSI CONCRETE

ILLUSTRATION 120. Sketch of new beam patch.

However, this basement space will be subject to flooding during storm conditions on Lake Erie of 100 year frequency. The principal flood problem in Put-in-Bay is high water levels of Lake Erie created by a combination of abnormal still water levels compounded by wind setup from the northeast.[6] The architectural shape of the space created by the low head room, small column spacing, projecting overhead beams and girders, and diagonal support beams at the perimeter restrict the use of this space. The difficulty of creating an architectural public entrance to this space that will not conflict with the original design of the memorial column and plazas is a further restriction. The existing mechanical and electrical spaces with their equipment, piping, ductwork and cable also restrict the use of the space. Because of these restrictions, the recommended use is for maintenance and storage space only, and adequate storm relief and drainage system must be installed for these areas.

EXISTING CONDITIONS/EXTERIOR SURFACE

Upper Plaza

The original drawings for the plaza called for 4" thick granite pavers; however, sandstone and brick pavers were installed in 1924-25. Therefore, the sandstone and brick may be considered the historic fabric and should be retained or replaced in kind. The sandstone pavers (varying from approximately 30" x 30" to 20" x 20" and 3-1/2" thick) may be considered in fair condition. All are stained, but this condition is inherent in the nature of the material when used as pavers. Approximately 25 percent of the sandstone pavers will have to be replaced. The jointing of the sandstone paving is in very poor condition. The condition of the brick pavers is marginal. When all pavers are removed so that the new waterproof membrane (similar to the "Uniroyal System") may be applied to the top of the structural slab, all existing brick pavers should be discarded and new ones which match the originals installed in exactly the same paving pattern (130). It is imperative that the upper plaza be waterproofed with a membrane and the drains installed properly. When the plaza pavers are reset it is recommended that expansion joints be provided for every 400 square foot of paving surface, from the top of pavers through the fill slab to the top of the new membrane waterproofing. These expansion joints should be 3/4" wide, backed with a filler, and sealed. A similar expansion joint should occur at the intersection of walls and curbs with the plaza pavers (136). The existing drains shall be replaced with new drains that have double drainage flanges and weepholes to provide for surface drainage and for membrane waterproofing drainage.

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[6]U.S. Army, Corps of Engineers, Great Lakes 100-Year Open Coast Flood Level, Detroit District, December 1974.

Granite Steps

The main granite steps extend across the total length of the north side of the upper plaza (104). There are twelve risers of 6" height and eleven treads of 1' - 3" width plus a top landing tread of approximately 3'-0" (141, 142). The granite stone steps span approximately 6'-0" and are supported by sloped and stepped concrete beams (144). The condition of the granite is good, with only one major chip near the west end at the first riser (143).

RECOMMENDATIONS/EXTERIOR SURFACE

Upper Plaza

The recommended technique for waterproofing the upper plaza is as follows:

a. Remove all pavers and store usable sandstone and granite pavers for re-use.

b. Remove filler slab down to top of structural slab.

c. Prepare top of structural slab by cleaning entire surface and pressure grouting any cracks.

d. Install new double flange drains.

e. Apply Uniroyal-type liquid membrane waterproofing and 1/8" protection board.

f. Apply asphaltic insulating thermal-setting fill to required elevations for proper drainage of plaza.

g. Apply two layers of 1/8" protection board atop fill.

h. Apply 3/4" bituminous rolled setting bed.

i. Apply a neoprene tack coat on top of setting bed.

j. Reset pavers (all pavers should be cleaned to remove dirt which may prevent bonding).

k. Fill joints of brick and sandstone pavers with mortar and fill expansion joints with sealant.

This same technique is applicable if new granite pavers are installed instead of the sandstone and brick pavers.

Granite Steps

As with all other granite, chemical cleaning is recommended. In the first riser the granite step with the major chip should be cut square and a new piece of granite bonded in place.

The first and second steps in the third row of stones from the west are loose and/or irregularly settled (142). These must be leveled and the setting bed regrouted.

All joints between the stones of the granite should be raked back to solid mortar or to a depth of at least one inch (cf Chapter 2, p. 48), a backup filler of polyurethane inserted and all joints sealed with two-component polyurethane sealant for foot traffic joints (145). This shall be a polyurethane-based, two-part elastomeric sealant complying with FS--TT-5-00227, Class A, Type 2 (non-sag) such as Pecora NR-100 by Pecora Chemical Corporation. This would help eliminate water penetration through steps to the underside of the plaza.

The first riser of the granite steps is greater than 6" due to the settlement of the lower plaza (142, 143). Raising the level of the lower plaza as recommended in Chapter 6 would correct this condition.

ADDITIONAL RESTORATION ITEMS

Additional restoration is advisable. The two inoperative precast concrete cylinder type drinking fountains which were added on the east and west sides of the upper plaza (139, 166) should be removed. A new drinking fountain should be installed outside the public restrooms as recommended in Chapter 11. The exposed pipe in the northeast corner of the upper plaza is the only source of water for irrigation of the planting boxes. This should be replaced with new hose-bibbs as recommended in Chapter 11. The four light fixtures on the upper plaza paving should be removed and replaced with new plaza lighting as recommended in Chapter 12. The two temporary safety fences installed in the upper plaza walls should be removed as soon as construction permits, as recommended in Chapter 7. Granite pavers at the fluted base of the column shaft form a circle around the column. One of the pavers on the east side of the column is oil-stained (138). This stain should be removed as recommended in Granite Stairs, Chapter 2.

As a temporary safety measure, a concrete ramp has been installed at the north door to the column shaft to eliminate the one step at this entrance and exit door (137). This ramp should be replaced with a sloping stone threshold at the recessed door to provide a safe entrance and exit and to more nearly recreate the original design objective for this door. The three other doors into the column shaft will also require new stone thresholds to match this door.

COST ESTIMATE

An estimate of the cost of the recommendations made in this chapter is as follows:

1.	Cleaning and patching of all concrete structure in basement space below upper plaza		$ 105,000
2.	Installation of new concrete slab on engineered fill with vapor barrier and flood relief and drainage		125,000
3.	Removal of all existing paving; patching and waterproofing of slab; cleaning and resetting of usable paving and replacement of deteriorated paving with new material matching existing		132,000
4.	Same as (3.) above, except replacing all paving with granite	(Alternate) 244,000	
5.	Cleaning of granite steps, repair of chipped stone step, resetting some granite steps and sealing of all joints of granite steps		1,600
6.	Removal of drinking fountains, lights on upper plaza; concrete ramp at north door and the stain on the granite paver on east side of column and installing four new stone thresholds at doors to column shaft		2,500
	TOTAL		$ 366,100

ILLUSTRATION 121. Detail view of granite steps from underside showing stepped beam supports for granite steps.

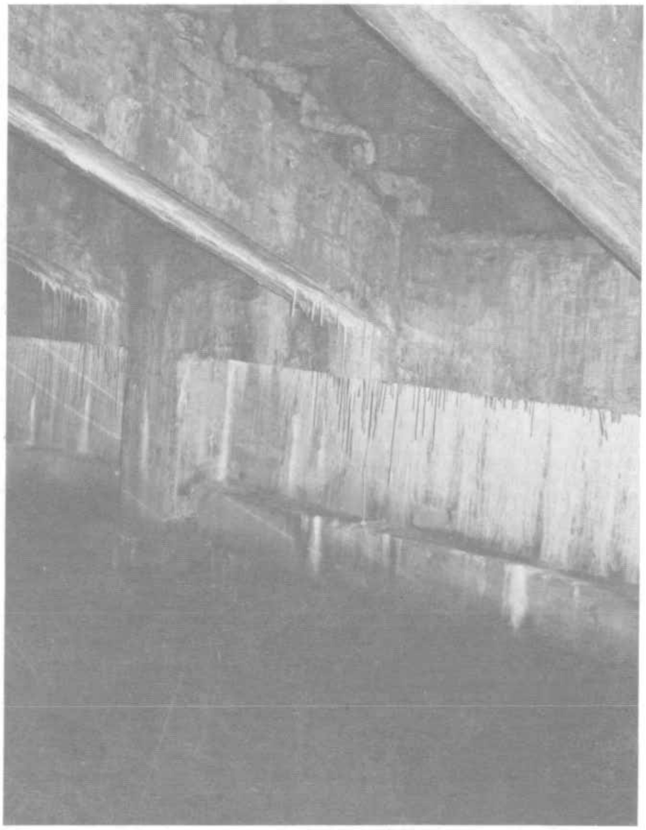

ILLUSTRATION 122. General view of stepped, sloping beams supporting granite steps.

ILLUSTRATION 123. View of double beam on east-west center line of column.

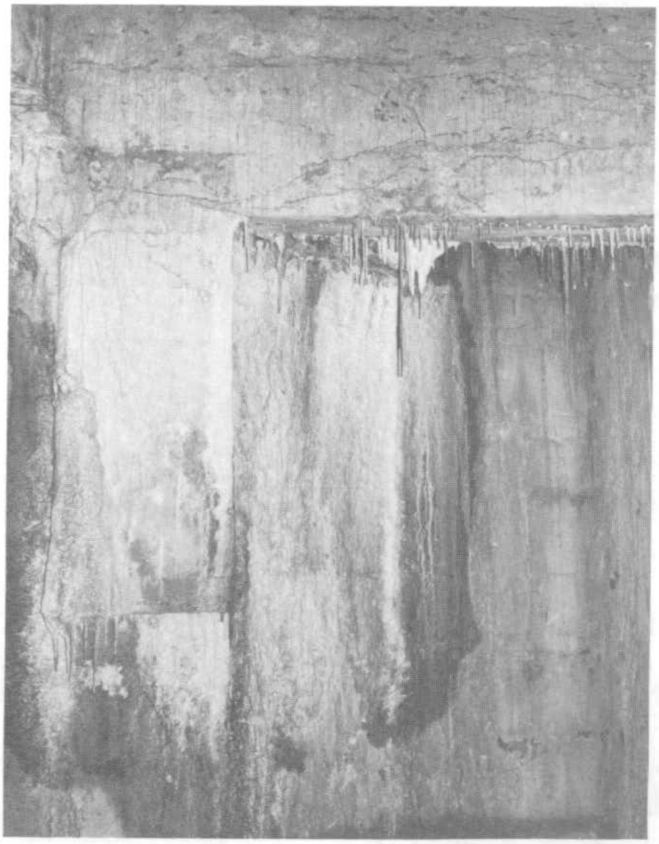

ILLUSTRATION 124. Detail view of heavy efflorescence at concrete shaft, below upper plaza.

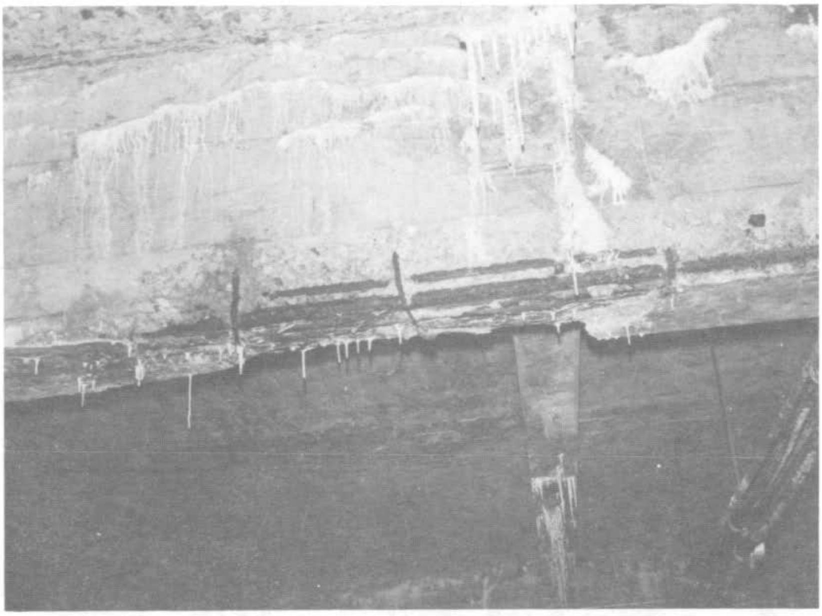

ILLUSTRATION 125. Detail of typical beam with rusting bars and spalled concrete.

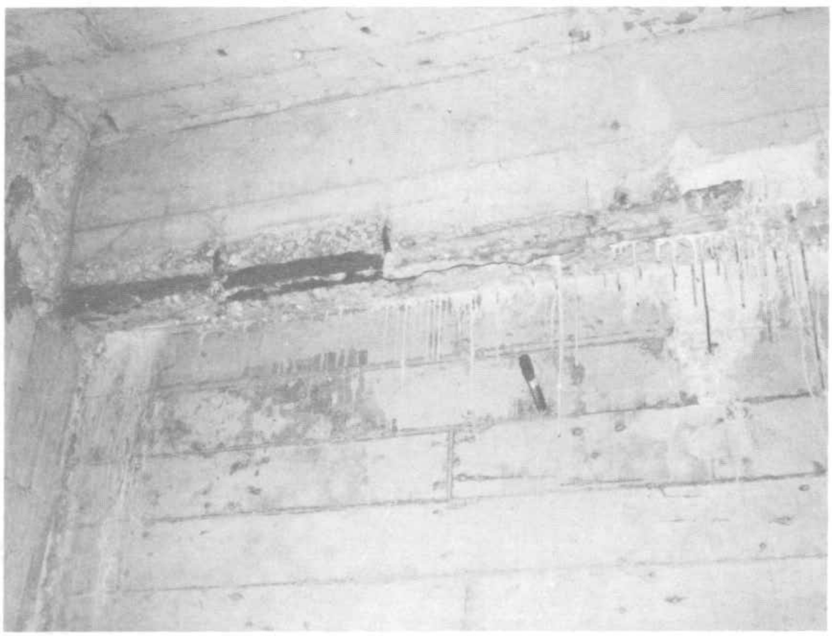

ILLUSTRATION 126. View of beam at outer wall showing rusting bars, spalled concrete and cracks of concrete about to spall from rust buildup behind.

ILLUSTRATION 127. View of a typical beam with crack formed by rusting steel bars behind.

ILLUSTRATION 128. View of a typical beam after rust has caused concrete to spall.

ILLUSTRATION 129. Detail view of condition of concrete fill slab and setting bed below sandstone and brick pavers of upper plaza.

ILLUSTRATION 130. General view at northeast quadrant of upper plaza showing deteriorated joints, cracked and spalled sandstone pavers and brick paving inlay pattern.

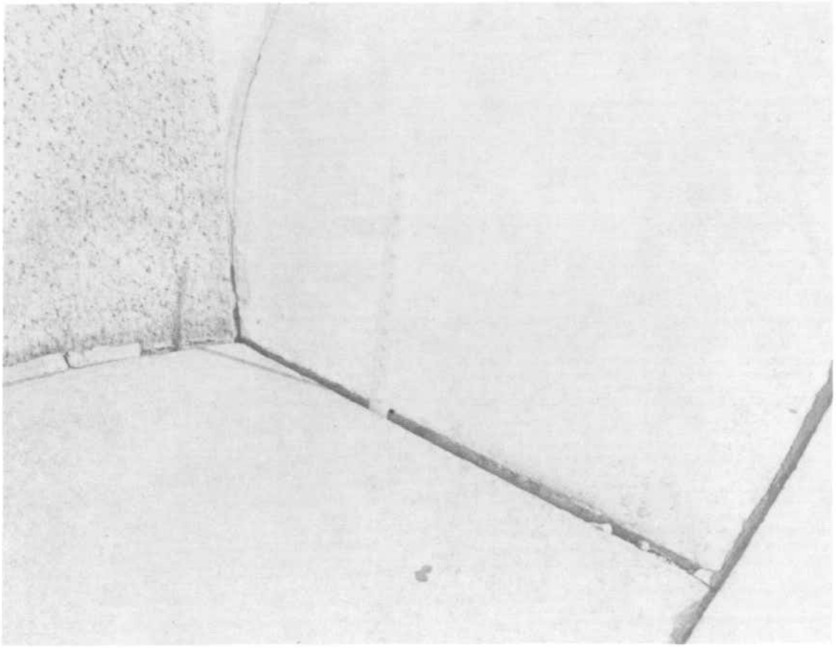

ILLUSTRATION 131. Detail of joint condition at base of column. Note lack of mortar or sealant for full depth of joint.

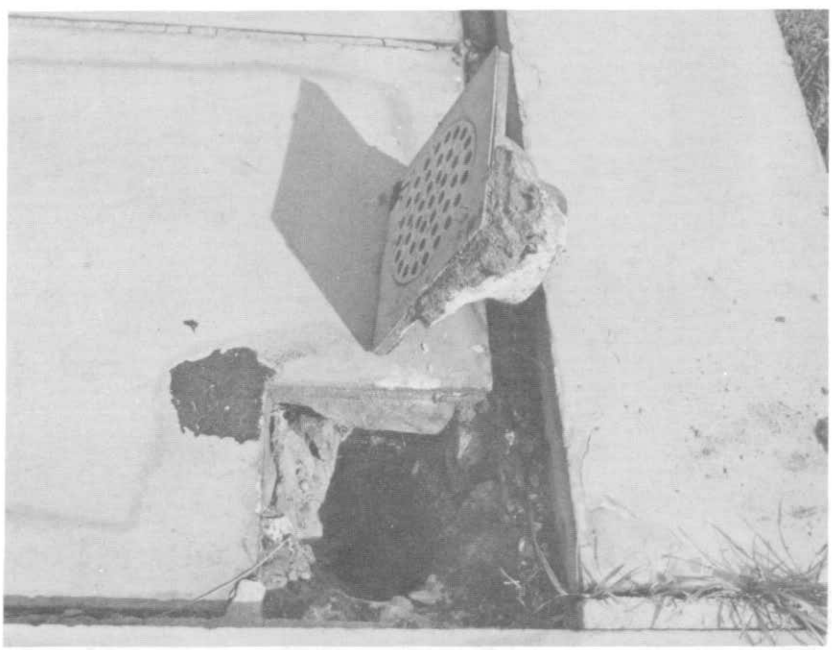

ILLUSTRATION 132. View of drain at corner of planter at south end of upper plaza. Note that drain is not connected to any pipe system. Water simply falls to basement space below upper plaza.

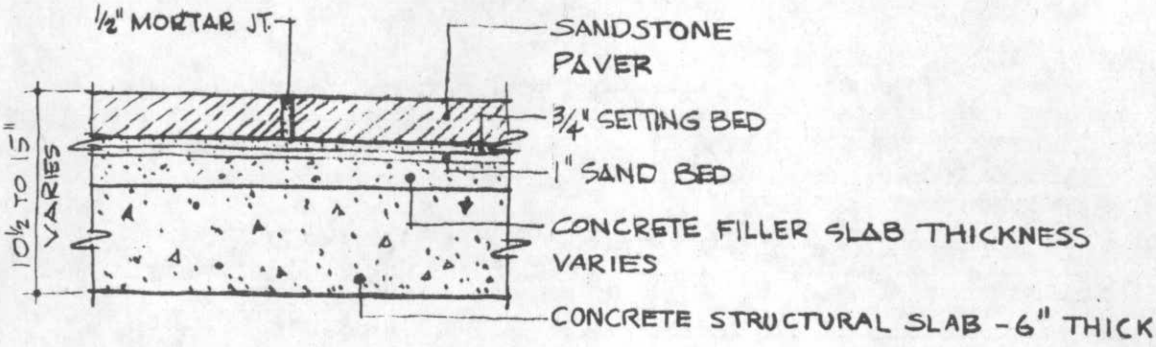

ILLUSTRATION 133. Sketch of existing construction of upper plaza at typical paving and structural slab.

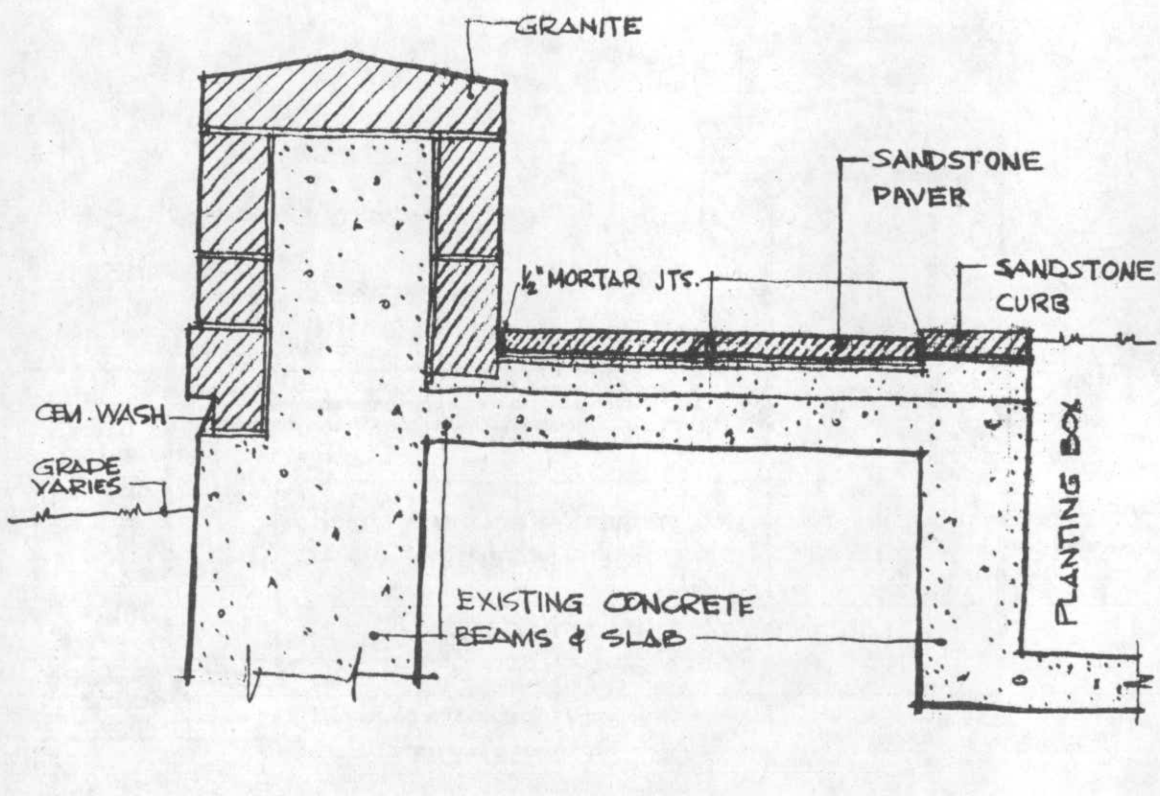

ILLUSTRATION 134. Sketch of existing construction of upper plaza at typical granite wall and curb.

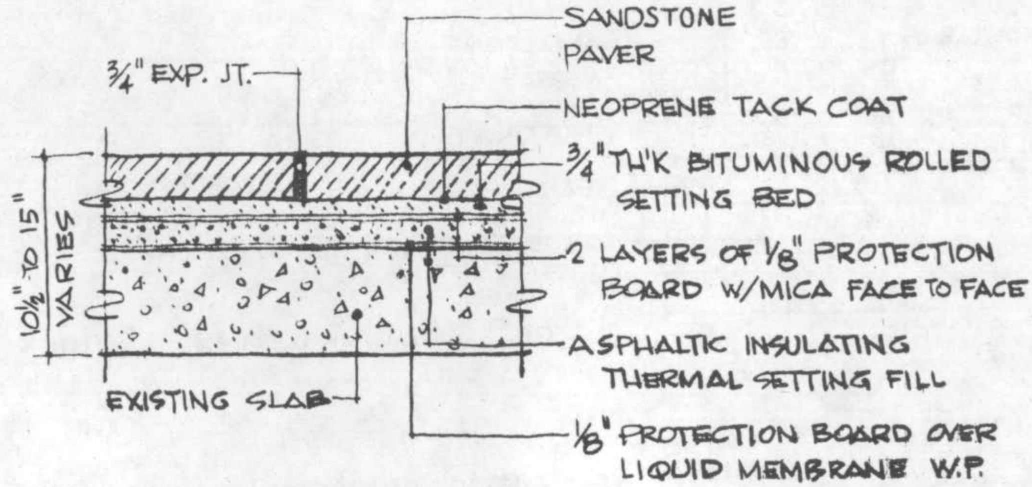

ILLUSTRATION 135. Suggested detail of upper plaza waterproofing and typical expansion joint.

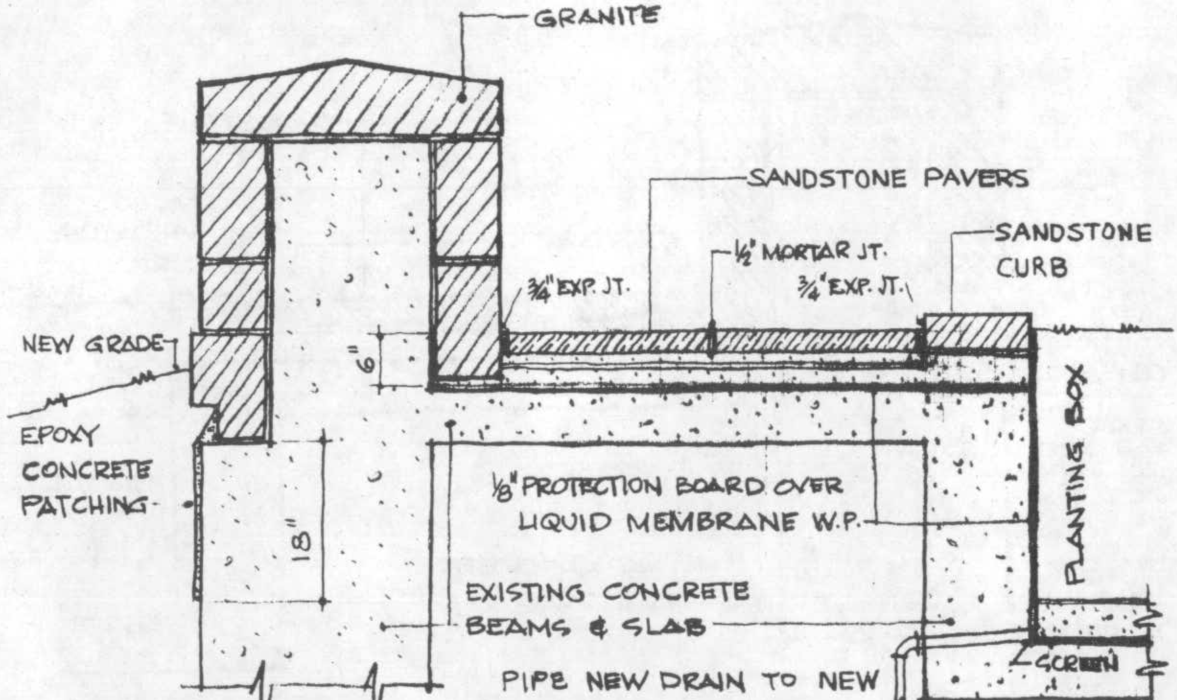

ILLUSTRATION 136. Suggested detail of expansion joints along all walls and curbs of upper plaza.

ILLUSTRATION 137. View of sloped concrete ramp at north entrance door.

ILLUSTRATION 138. View of oil-type stain in granite paver at east side of column. Cause of stain unknown.

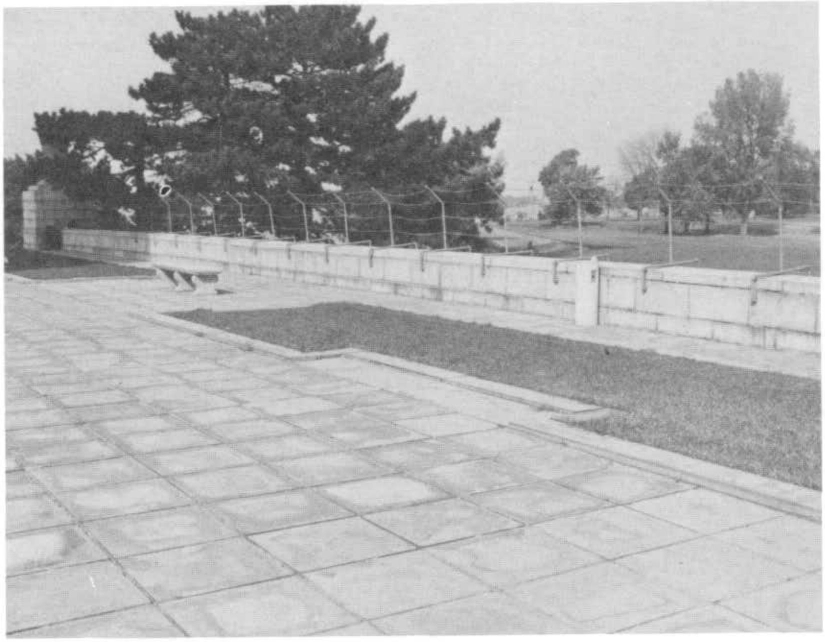

ILLUSTRATION 139. General view of east side of upper plaza. Note precast cylinder at wall which is a drinking fountain not in use.

ILLUSTRATION 140. Detail view of top tread of granite steps at upper plaza and typical setting bed condition under sandstone paver.

ILLUSTRATION 141. View of west end of granite steps. East end is similar, but opposite.

ILLUSTRATION 142. View along lower risers of granite steps looking toward the west. Note settling of lower plaza and misaligned steps.

ILLUSTRATION 143. View along lower risers of granite steps looking toward the east. Note chipped stone and poor joints.

ILLUSTRATION 144. Detail view at underside of granite stair showing sloped and stepped support beam.

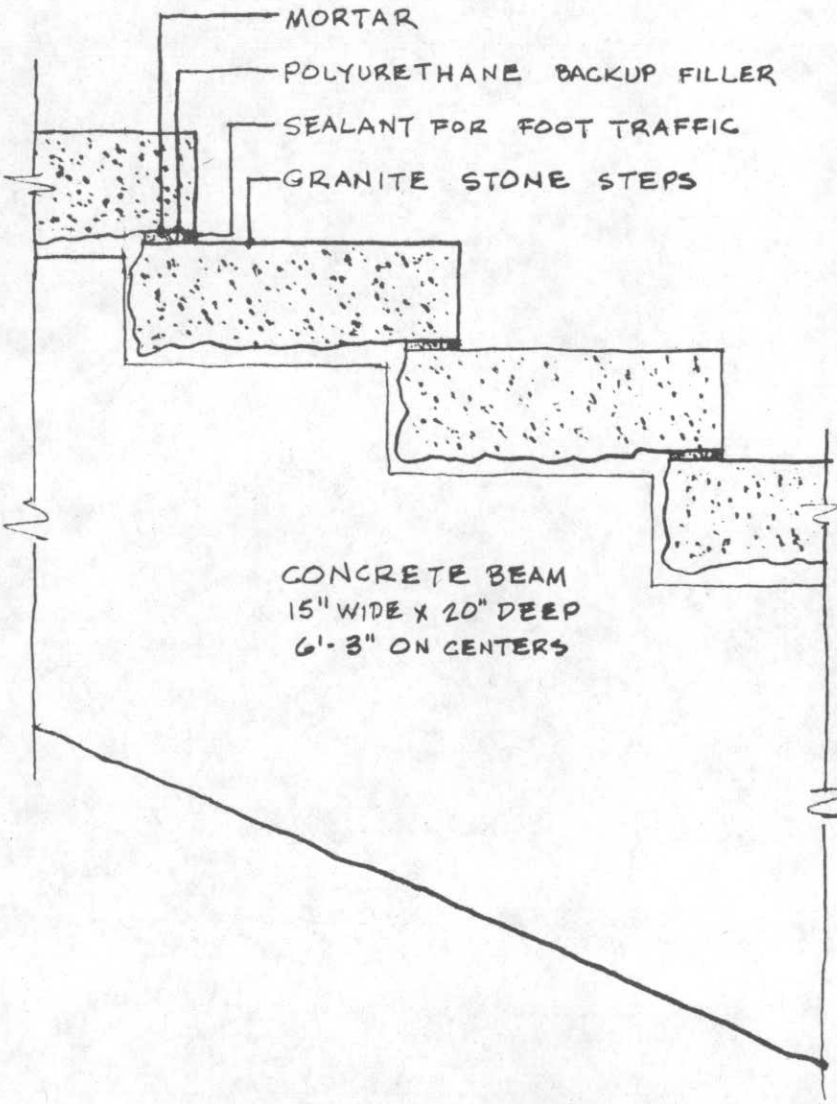

ILLUSTRATION 145. Sketch of granite steps.

CHAPTER 6. LOWER PLAZA

CHAPTER 6. LOWER PLAZA

INTRODUCTION

The lower plaza, approximately 180' long and 80' wide, is an area of the plaza extending from the main granite steps on the south to within a few yards of the public road and separated from it by a grass strip on the north.[1] The plaza is enclosed on its east, north, and west sides by granite curbing approximately 2'-0" wide (146). At the northwest corner of the lower plaza, concrete steps approximately 15'-0" wide with four risers descend to a concrete sidewalk. The southeast and southwest corners also have several risers down to walks. The entire lower plaza is paved with sandstone blocks two feet square by 2-1/2" thick laid on top of a 3" slab on-grade with a setting bed of approximately 1-3/4" thickness. The slab rests on a crushed stone base.

The plaza slopes to the north for drainage of surface water. Although there are no drains on the lower plaza, the original drawings indicate five drains along the north curb. The lower plaza was originally planned as "beach gravel" and could not have surface drained; therefore, drains were needed.

OBSERVATIONS

The plaza paving was completed in 1926; at present, all the paving is stained (147), and many pavers are cracked. Approximately 30 percent of the paving will need to be replaced. Although the sandstone pavers were intended to be a temporary paving to be replaced, when funds became available, with granite at least 4" thick, the sandstone pavers should be replaced in kind (cf. p. 122).

The entire lower plaza has settled approximately four inches (148-153)--the first riser of the main granite steps is 10" rather than 6" in height. This condition is hazardous and unsightly (142, 143). The granite curbing on the east, north, and west sides has several inches of exposed rough-cut granite, and several sandstone pavers are inclined because one edge of paver is on the rough cut while the other edge has settled (151).

RECOMMENDATIONS

It is recommended that the lower plaza be raised to its original elevations (154). This could be achieved by removing the pavers and scraping off the setting bed (approximately 1-3/4") down to the

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[1]See drawings in Appendix A.

top of the concrete slab. A concrete filler slab should then be poured over the existing slab to the proper elevation.

Since the lower plaza rests on-grade, it need not be waterproofed the way the upper plaza is, because the upper plaza has usable space below.

After the filler slab is poured to the proper elevations and pitch for drainage, the sandstone pavers could be reset in a conventional manner, using a 3/4" cement mortar setting bed upon 1" of sand bed.[2] An expansion joint of 3/4" should be allowed for approximately every 400 square feet, extending to the top of the filler slab. All joints along curbs and/or steps should be treated as expansion joints. All other typical joints in the paving should be mortar joints.

COST ESTIMATE

An estimate of the cost for the work recommended in this chapter is as follows:

1.	Removal of all existing paving, addition of filler slab, cleaning and resetting of usable paving and replacement of deteriorated paving with new material		$ 100,000
2.	Same as above, except replacing all paving with granite	(Alternate) 140,000	
	TOTAL		$ 100,000

[2]See Chapter 5 for discussion on alternate paving with new granite pavers for the upper plaza. If this alternate is accepted, the upper and lower plazas both must be so treated to be architecturally and historically correct.

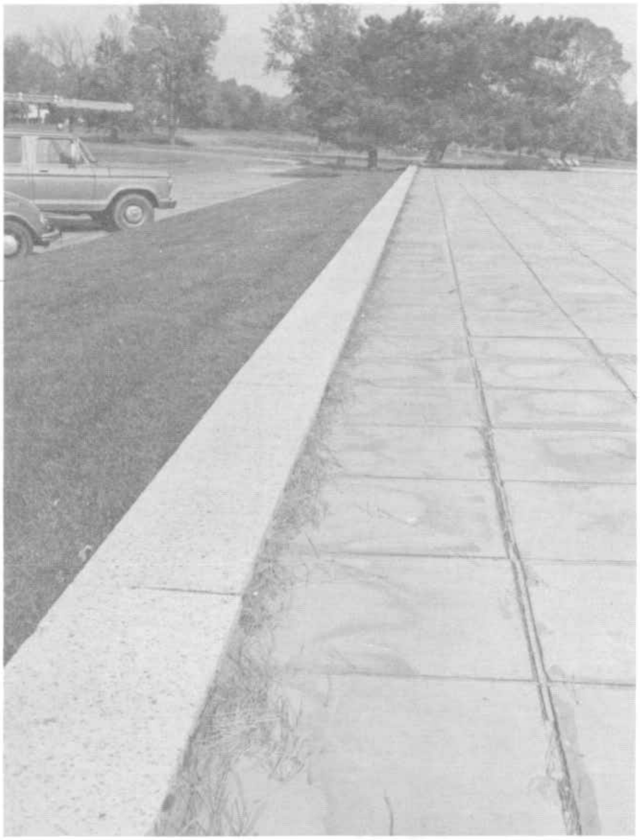

ILLUSTRATION 146. View of north edge of lower plaza, looking toward east.

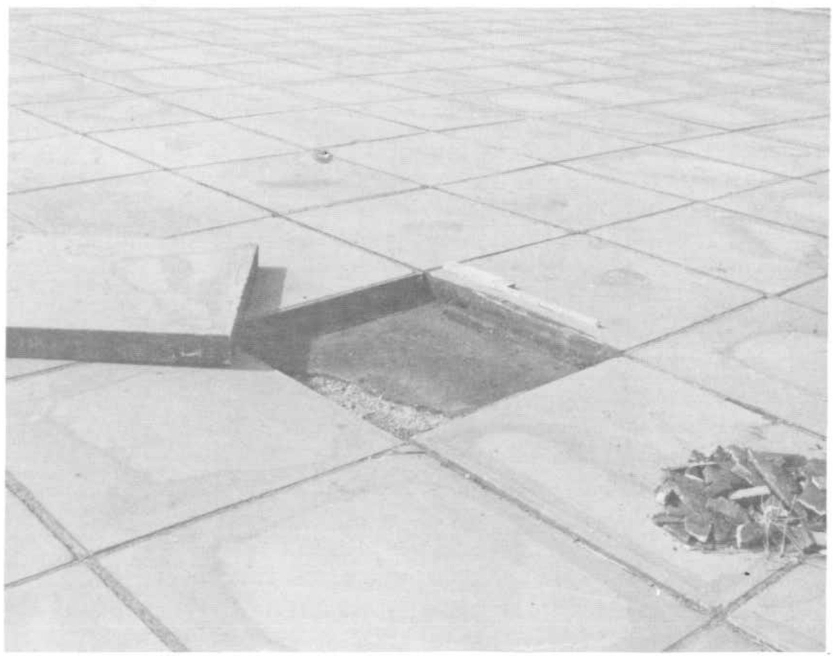

ILLUSTRATION 147. General view of lower plaza sandstone pavers showing typical stained condition.

ILLUSTRATION 148. Detail view at east end of granite steps showing inclined pavers due to settling of lower plaza.

ILLUSTRATION 149. Detail view at east edge of lower plaza showing inclined pavers and flat pavers. Note rough cut of bottom edge of curbstone.

ILLUSTRATION 150. Detail view showing granite curb at the top of a conctete grade beam. Note that the top of the paver is about 2" below its original level, indicated by the line of rough to smooth granite.

ILLUSTRATION 151. Detail view showing how the sandstone paver edge rests upon rough granite and/ or concrete edge of grade beam.

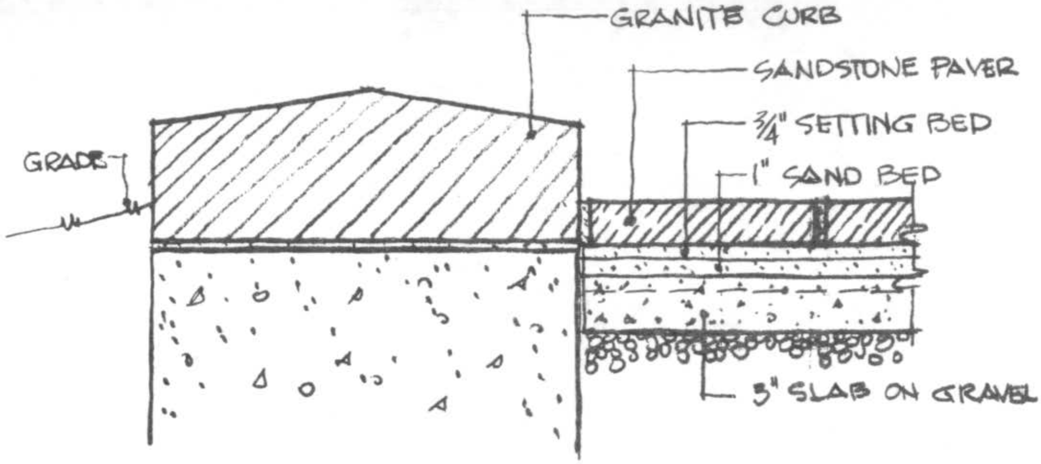

ILLUSTRATION 152. Sketch of existing construction of lower plaza as originally installed.

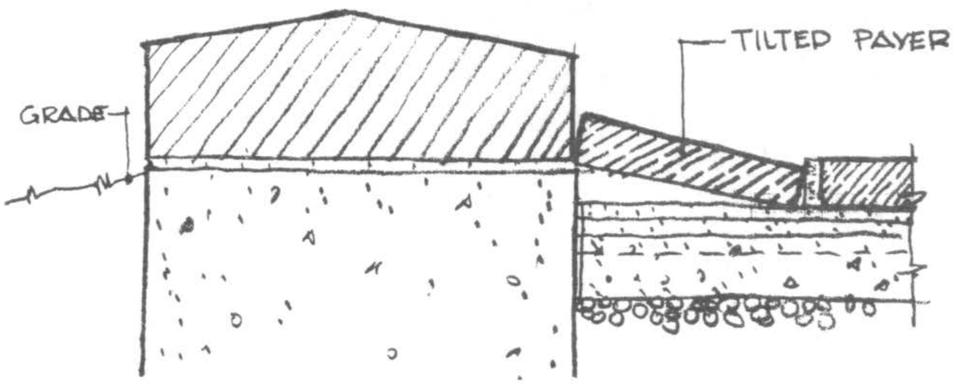

ILLUSTRATION 153. Sketch of existing construction of lower plaza as settled.

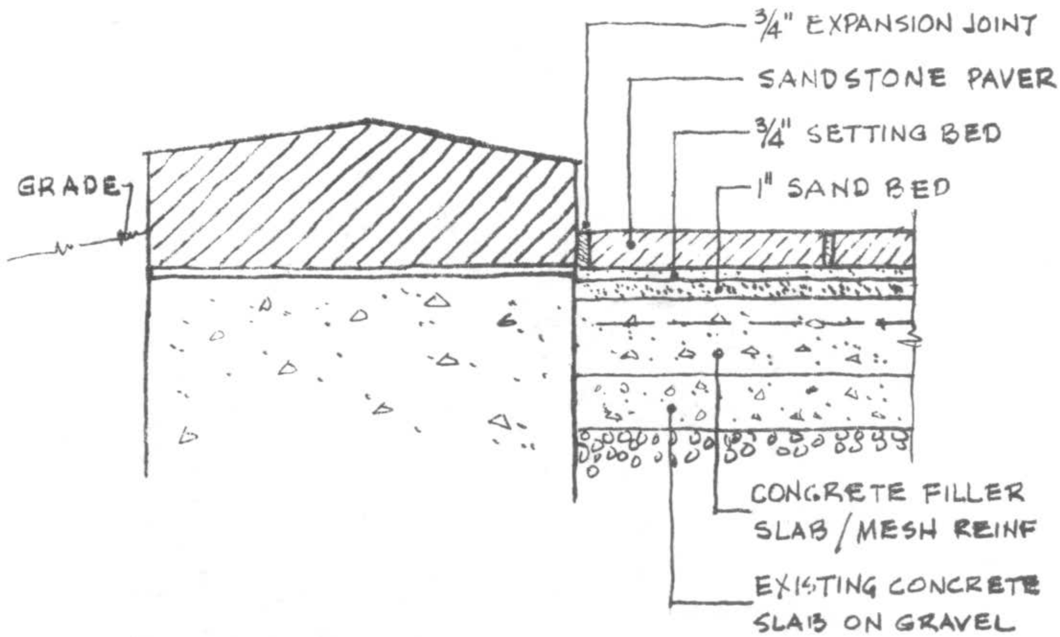

ILLUSTRATION 154. Sketch of revised construction of lower plaza with new concrete filler slab to raise paving to original elevations.

CHAPTER 7. UPPER PLAZA WALLS
PLANTING BOXES

CHAPTER 7. UPPER PLAZA WALLS AND PLANTING BOXES

GRANITE WALLS

Enclosing the upper plaza on the east, south, and west sides from plaza surface to top of coping stone are granite walls 2'-6" high (105, 106, 107, 134). The granite blocks are approximately 8" thick and encase a structural concrete wall of approximately 1'-6" thickness. The condition of the stone, except for surface dirt and minor chipping, is very good. One major problem, however, is evident for all of these granite walls--the horizontal and vertical mortar joints are extremely poor and in some cases entirely devoid of mortar (155-158). These joints must be scraped clean of all mortar, and to assure an identical finish, the granite cleaned by the same chemical methods used on the column granite as recommended in Chapter 2. Proper cleaning will permit proper bonding of mortar in joints. The mortar material should match as closely as possible the original mortar color.

Improper mortar joints probably cause some granite blocks to shift out of line with the face of adjacent blocks (159). Water has penetrated behind the blocks, frozen, and caused the pressure which has shifted the blocks. Cracks in the blocks, and there are only a few, should be treated as follows. There are only three chipped blocks, one in the west wall and two in the south wall (160). The smaller chips may be patched with a mix of clear epoxy mortar and granite fines which match the color and vein. Larger chips may require dutchman (cutting wedges or slivers of granite and gluing them in place); or, a section adjacent to the chip may be removed and then replaced in kind. Replacing the stones is not warranted. The best estimate is that the cost ($3-5 thousand each) is prohibitive, and furthermore, the corrective measures described are very satisfactory. Other defects in the block are of a very minor nature and do not warrant repair.

SAFETY FENCES

"Safety fences" have been installed on the upper plaza granite walls. The south fence is a temporary wire mesh fence, which was erected because of the erosion caused by the damaged seawall (163, 164). Soil erosion left a drop of approximately 12 feet from the top of the granite wall to the grade below. The south fence also restricts public access to the damaged seawall area. The east fence, a more permanent structure made of galvanized pipes and reinforcing rods welded together, straddles the top of the granite retaining wall (165, 166). It protects the public from a drop of approximately 15 feet from the public restroom area of the upper plaza to the pavement below. The retaining wall at the public restrooms on the east side is 2'-6" high and 2'-10" wide. In itself, it is not enough of a barrier to protect the public. These fences intrude upon the beauty of the Memorial and should be removed at the earliest possible time.

A new railing on top of the east granite wall is recommended. This protective railing shall be a minimum of 42" high above the upper plaza. It should be recognized that this railing, while needed, will not be historically correct. The public restrooms were not located under the upper plaza in the original design, but the restrooms became necessary, as did the mechanical room. Access to these spaces created the need for the railing. Design of the new railing should be in harmony with the design of the other original architectural bronze metalwork of the Memorial.

CONCRETE FOUNDATION WALLS

The granite walls described above rest upon concrete foundation walls. Most of these walls are below grade and, on the interior side, form the walls of the basement space below the upper plaza. Two areas of wall are exposed to weather. On the south side this is due to erosion (105) and, on the east side, to a deliberate modification of grade to allow for access to public restrooms and the mechanical room (107, 165). This area has been altered from the original design by the public restrooms installed in 1951 and the mechanical room added in 1961. Examination indicates the exterior wall faces are structurally sound. Occasional efflorescence is evident, but this will presumably be corrected when the upper plaza is waterproofed. When the seawall is repaired and the eroded soil replaced on the south side, as proposed in another contract, this wall will not be visible. The east wall, however, will remain visible to the public. It has been painted green and is adequate in appearance.

The main problem with the concrete walls occurs at the point where the granite block terminates and the concrete begins (157, 161-164). At this intersection, the concrete is cracked and spalled. The problem is not one of structural integrity but one of appearance, waterproofing, and conformance to historical standards. The original design drawings indicate that all granite blocks were to extend a minimum of 4" below the adjacent grades. That this was indeed done is evident because a stain can still be seen in the granite where it was in contact with the soil.

To remedy this situation, all loose concrete must be removed and repaired using an epoxy type concrete. The first course of the granite, which is in contact with the concrete, has been cut back to form a recess which was filled with a sloping concrete surface, presumably to form a wash to help waterproof the intersection (134). This wash should be replaced. After repair of the wash and the concrete surfaces, which should extend to approximately 18" below the existing grades contiguous with the walls (136), the grades should be restored to their historically correct original grade.

Building up the grade elevations may require some special treatment of the grade around trees so that their bases are not covered.[1] Waterproofing the face of the concrete foundation walls below grade does not seem warranted. Repair work discussed above might best be undertaken when the south seawall and grounds are rehabilitated, because that project will require some re-grading, as will the repair work.

PLANTING BOXES

Several planting boxes of various lengths are located at the east, west, and south sides of the upper plaza (105-107). These are 10'-0" wide, are filled with 3'-0" of earth and planted with grass. Sandstone curbstones 1'-0" wide border these areas (167, 170). No evidence of waterproofing or drainage of these planting boxes could be found (168). When the upper plaza is waterproofed, these planting boxes should also be waterproofed using the same technique (171). The bottom of each box must be sloped to drain and drains installed. These drains must then connect to a piping system which in turn would tie into a storm system designed to remove surface water from the upper plaza drains.[2]

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[1]Refer to the Environmental Statement in Appendix D.

[2]The technique for waterproofing the upper plaza is discussed in Chapter 5; surface water drainage for the upper plaza is also discussed in Chapter 5. Installing drains is discussed in Chapter 11.

COST ESTIMATE

An estimate of the approximate cost of the work recommended in this chapter is as follows:

1.	Removal of mortar in all joints of granite walls and repointing with new mortar	$ 1,800
2.	Cleaning of all granite	2,100
3.	Repair of chipped granite	200
4.	New bronze railing at wall above public restroom entrances	18,400
5.	Patching of concrete surfaces	1,400
6.	Restoration of original grades	3,100
7.	Waterproofing and drainage of planting boxes	10,200
	TOTAL	$ 37,200

ILLUSTRATION 155. Detail view of typical mortar joints in granite retaining walls indicating poor condition of joints.

Illustration 156. Detail view of typical mortar joints in retaining walls. Note that daylight may be seen through horizontal joint indicating a lack of mortar.

ILLUSTRATION 157. Partial view of southeast corner of retaining wall and lantern base. Note condition at intersection of concrete and granite.

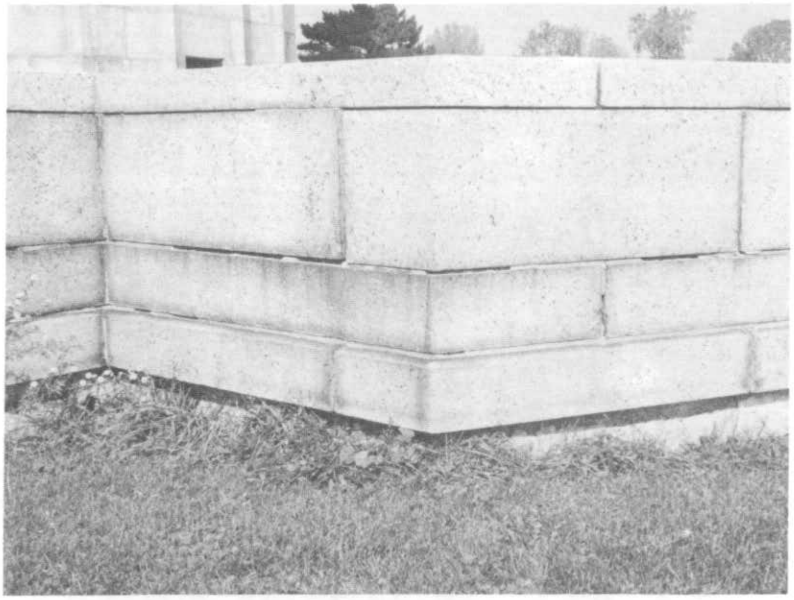

ILLUSTRATION 158. Partial view of southwest corner of retaining wall. Note lack of mortar in joints.

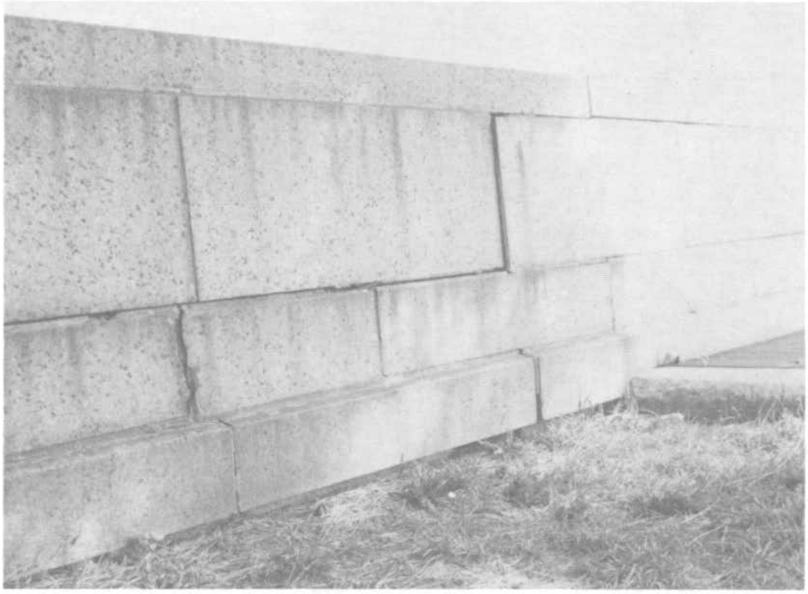

ILLUSTRATION 159. Partial view of west retaining wall of upper plaza. Note shifting of granite block face. Areaway at right is access to electric vault in basement.

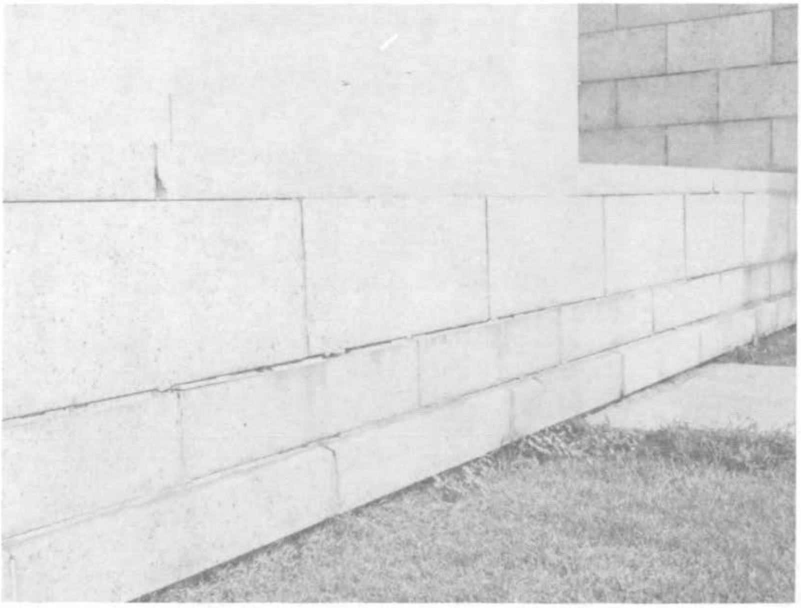

ILLUSTRATION 160. Partial view of west retaining wall showing poor mortar joints and chipped coping stone. Concrete pad at right is thought to be from former electrical transformer.

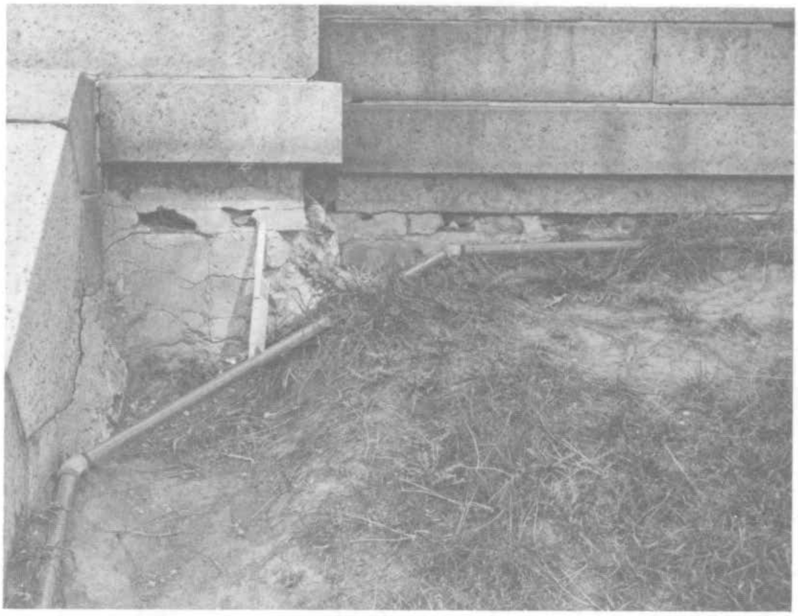

ILLUSTRATION 161. Detail view at northwest corner of retaining wall at junction of main granite steps showing deterioration of concrete. Pipe is water line for hose-bibb.

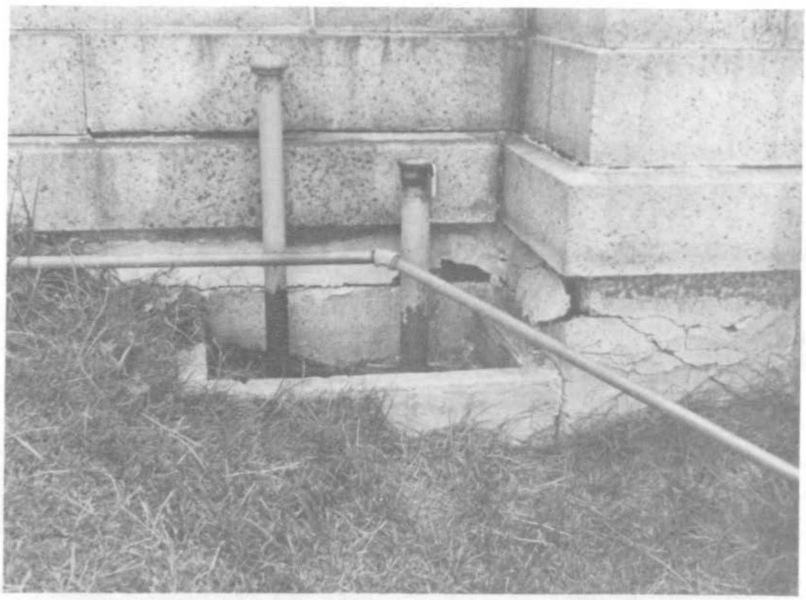

ILLUSTRATION 162. Detail view at northeast corner of retaining wall at junction of main granite steps. Horizontal pipe is water line for hose-bibb. Vertical pipes are supply and vent pipes for fuel oil storage tanks in basement.

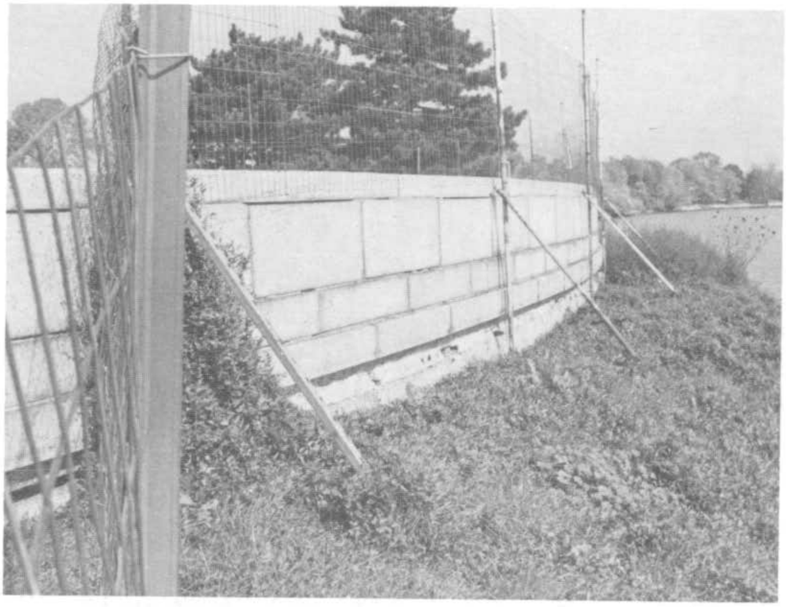

ILLUSTRATION 163. Partial view of south retaining wall of upper plaza showing temporary "safety fence."

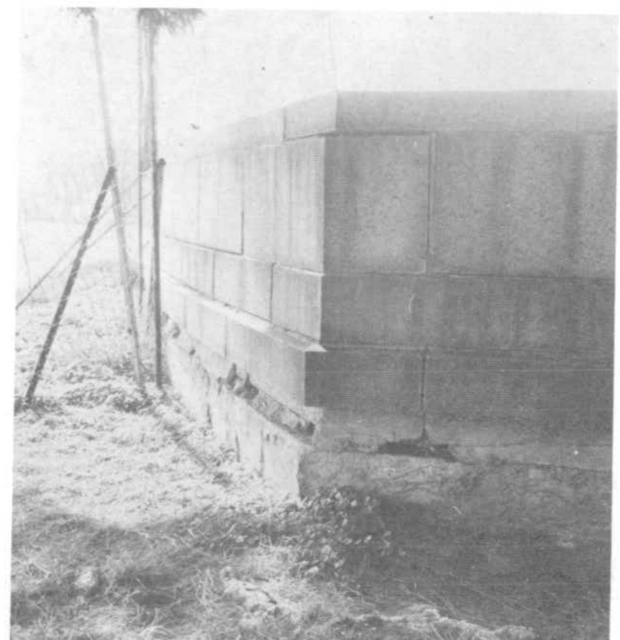

ILLUSTRATION 164. View of southeast corner of retaining wall showing concrete deterioration and lowered grade.

ILLUSTRATION 165. View of exposed concrete wall at east side. Public rest rooms are on right and doors to maintenance room are on left.

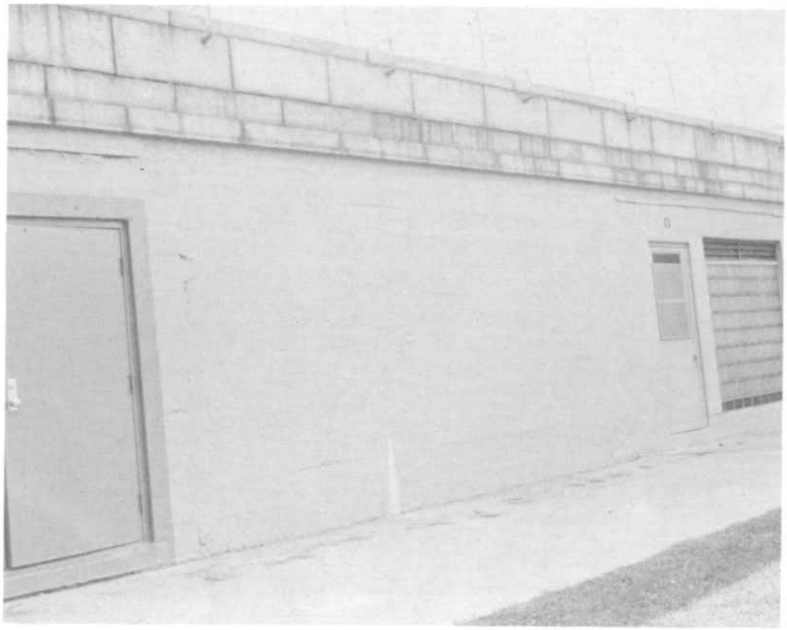

ILLUSTRATION 166. Partial view of east wall of upper plaza showing "safety fence." Concrete cylinder is the base of a drinking fountain no longer in use.

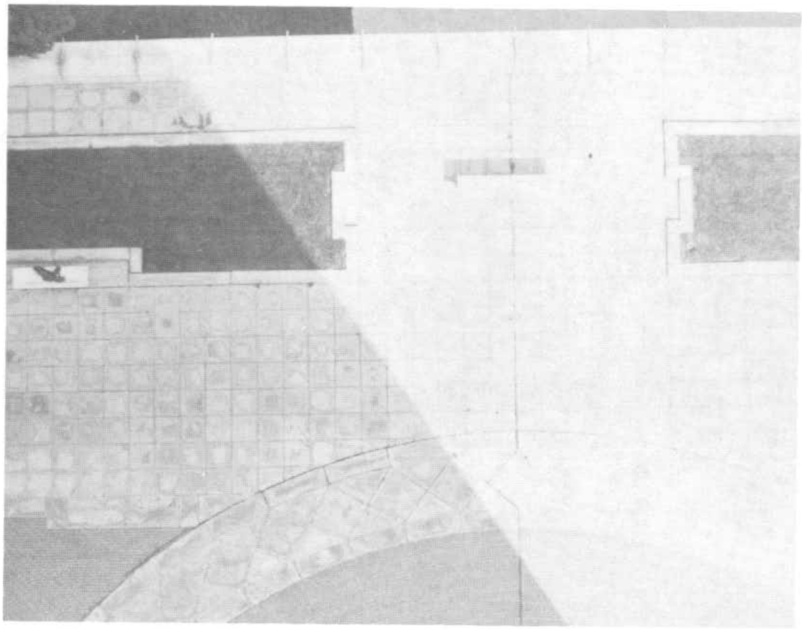

ILLUSTRATION 167. Partial view of east side of upper plaza showing typical planting boxes.

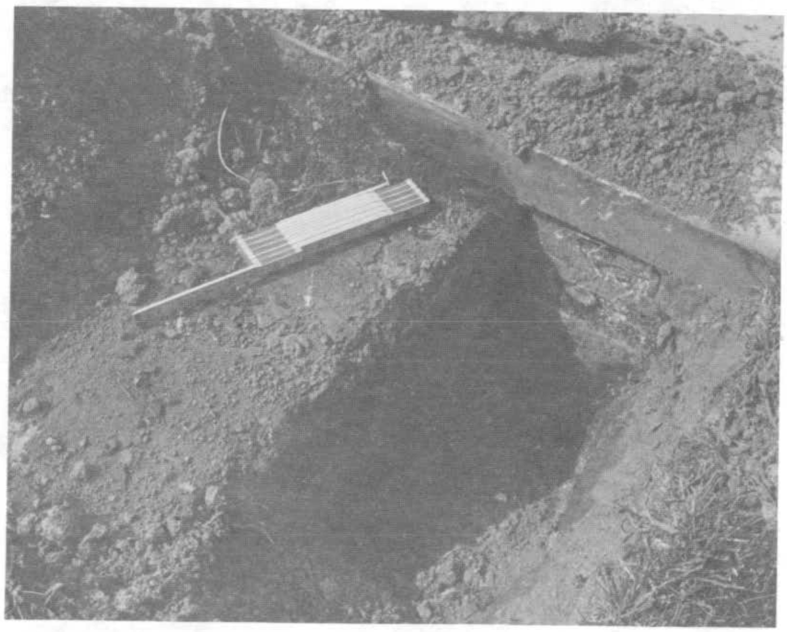

ILLUSTRATION 168. Detail view of a typical corner of a planting box showing curbstone, concrete fill and structure concrete slab below. Note that no waterproofing is evident.

ILLUSTRATION 169. General view of underside of a planting box slab which is typically in the same plane as the bottom of the beam. Note that no drains were evident. Dark stain is probably seepage through bottom of box.

ILLUSTRATION 170. General view of upperside of a typical planting box. Note poor joints between sandstone pavers and sandstone curbstones. See Illustration 171 for section through planting box and recommended waterproofing.

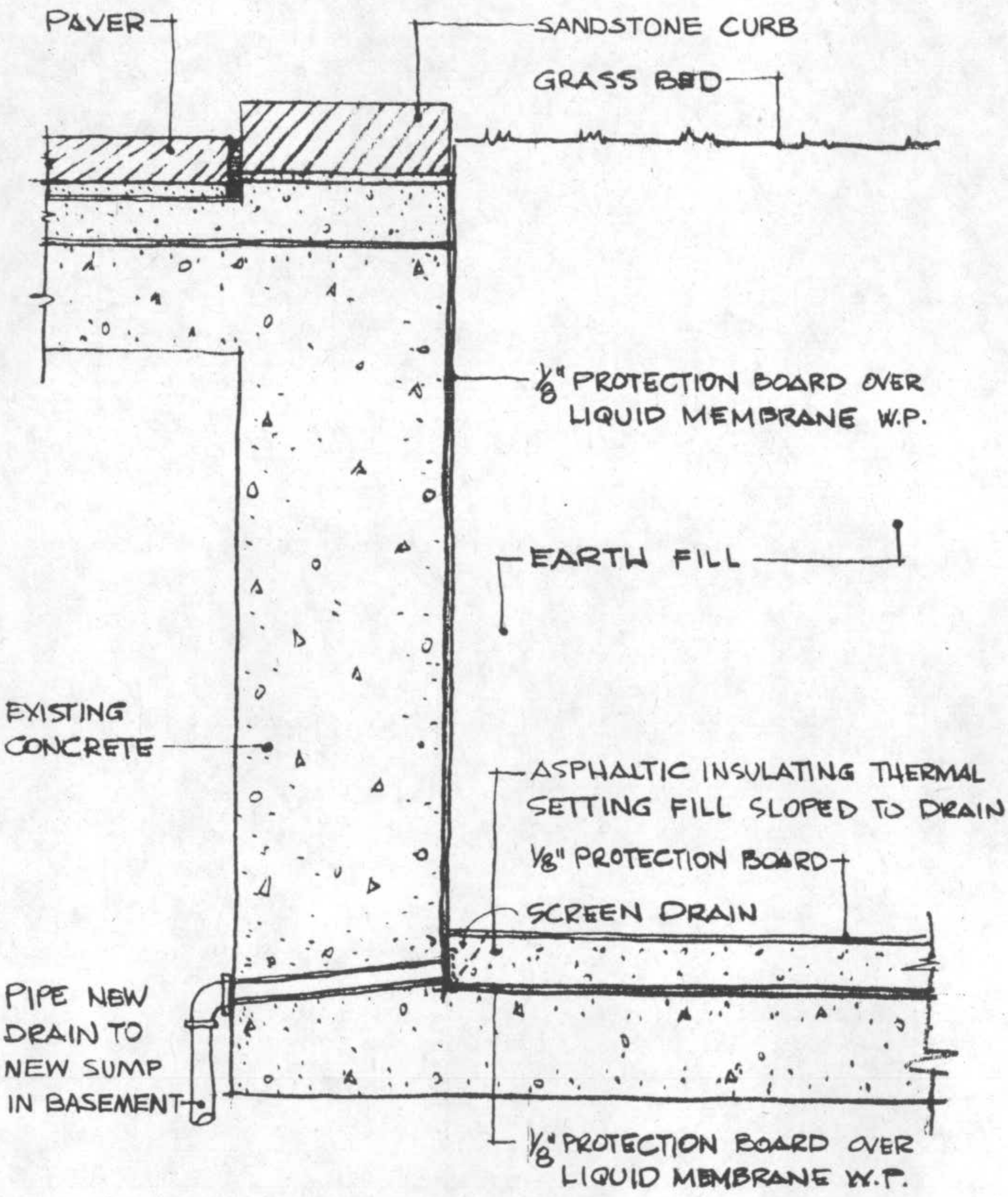

ILLUSTRATION 171. Details of recommended planting box waterproofing and drainage.

CHAPTER 8. MEMORIAL ROTUNDA

CHAPTER 8. MEMORIAL ROTUNDA

INTRODUCTION

The memorial rotunda is a circular room 25'-6" in diameter (172). It serves as the public access point to the interior of the column (173-176), with ingress normally from the upper plaza through a sliding bronze door on the north side of the column, facing the main granite steps. The domed ceiling of the rotunda, approximately 20'-0" high at its apex, is a concrete structure faced with limestone blocks. The walls are limestone above a marble base approximately 1'-9" high. Directly above the marble base, the limestone is incised with a decorative motif and above this are twelve limestone commemorative panels bearing the names of the ships and crewmen who took part in the events commemorated by this Memorial. The floor is Tennessee marble set in a circular pattern. In the center is a stylized compass of inlaid Italian marble (178). At the south end of the room are a pair of swinging bronze doors and the granite stairs which lead to the lower elevator landing above the rotunda.[1] There are also sliding bronze doors at the east and west ends of the room. All doors are three steps above the rotunda floor and are set back in niches.

CEILING AND WALLS

The domed ceiling, made of limestone, has a major stain between the south and west niches (177), with efflorescence and iron oxide staining evident. Immediately above the stained area, in the crawl space accessible from the elevator pit, the floor was wet. Quantities of a damp powder-like substance were found and when tested in the laboratory were identified as calcium carbonate and iron oxide.[2] The location of the major stain coincides with the location of the major crack in the column shaft; therefore, water may be readily infiltrating the column in the area above this stain, leaking into and forming puddles in the crawl space above the rotunda, and later penetrating the concrete and limestone.

This water and/or dampness, in addition to producing the splotch-like staining and efflorescence, has caused some of the limestone blocks (which may inherently contain iron oxide) to "rust." This theory is supported by the fact that only certain blocks show this rust-like stain, some more than others, but always defined by the mortar joint (177). This type of stain most likely penetrates the entire limestone block and therefore cannot be removed by cleaning. An attempt may be made to remove the stains by a cleaning process using poultices of Wyandot detergent left in place for 24 hours. However, iron oxide staining is very difficult to remove. If the stains persist, the only remedy will be to remove the damaged

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[1]Granite stairs are discussed in Chapter 2.
[2]See Appendix E.

limestone facing blocks and replace them with new limestone facing blocks. Assuming the water infiltration is stopped by the proper sealing of the joints on the exterior of the column, as recommended in Chapter 2, and the damp crawl space above the rotunda kept dry, as recommended in Chapter 10, the stains should not reoccur. Whatever decision is reached, it is imperative that the interior of the rotunda ceiling be thoroughly dry. After the interior is thoroughly dried and dehumidified, seal with 3M waterproofer along with the floor above.

The limestone commemorative panels have been stained by the same source of water as the rotunda ceiling (177); in fact, it is the same stain, extended to the commemorative panels. Two panels are marred; the balance are in good condition. The damaged panels may possibly be cleaned by the use of the poultice cleaning method. If the two stained limestone commemorative panels cannot be cleaned, an option is to replace them with new limestone panels that are an exact copy of the originals.

FLOOR

In general the marble floor and marble wall base are in good condition. The base has several flaws on its lower half, probably caused by water and/or ice damage (178). The rotunda floor has a history of being flooded. It is approximately 18" below the level of the upper plaza, and water infiltrates from the plaza and the column shaft. Contrary to the intent indicated in the original drawings, which portray waterproofing extending six feet beyond the column and indicate waterproofing six feet below the upper plaza slab, there is no waterproofing. Either method would have effectively prevented water infiltration. When the upper plaza is waterproofed according to the recommendations in Chapter 5 and the membrane turned up at the column shaft and properly sealed at the intersection of the granite blocks and paving stones, the problem should be solved. It is also necessary, of course, to stop the infiltration of water into the column shaft, and this is discussed in Chapter 2.

Condensation also contributes to moisture on the marble floor of the rotunda. This could be controlled by completing the work on the heating and dehumidification system and the radiant heating system in the rotunda floor, as recommended in Schemes I and III, respectively, in Chapter 10.

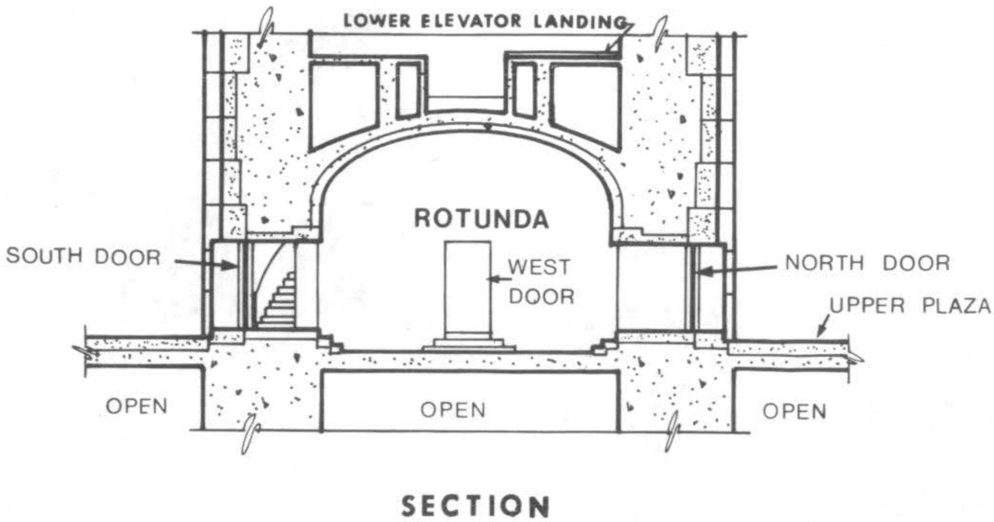
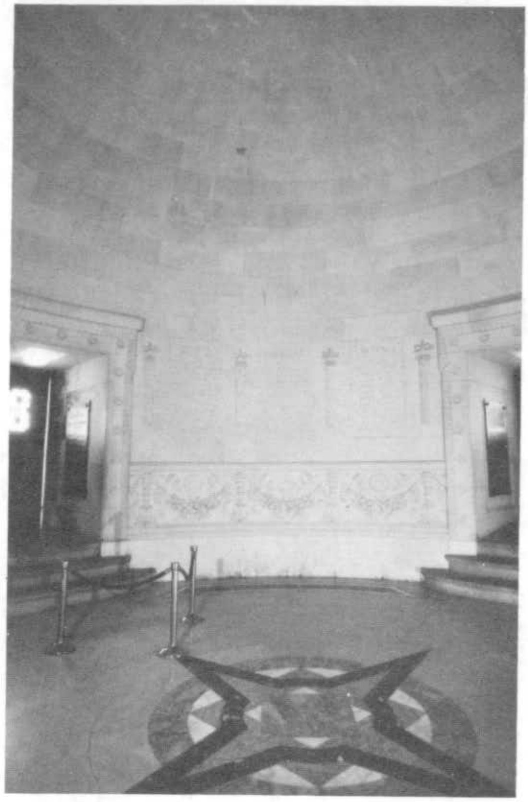


ILLUSTRATION 172. Sketch of section through memorial rotunda.

ILLUSTRATION 173. General view of northeast quadrant of rotunda.



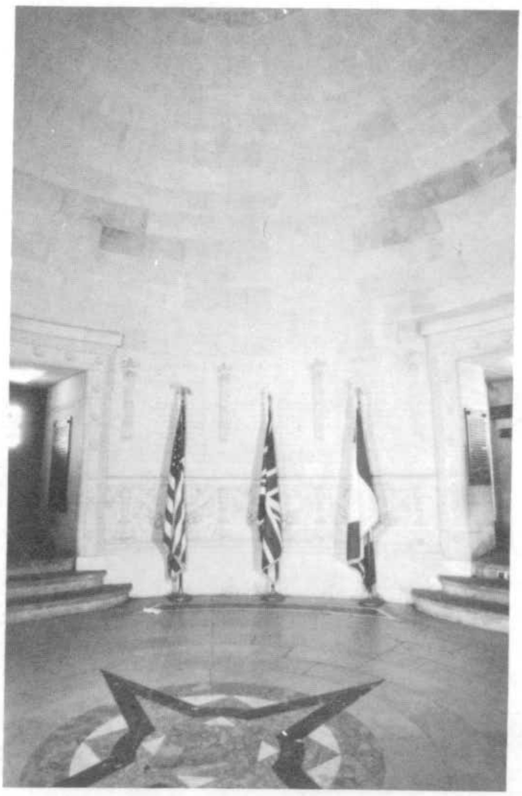


ILLUSTRATION 174. General view of southeast quadrant of rotunda.

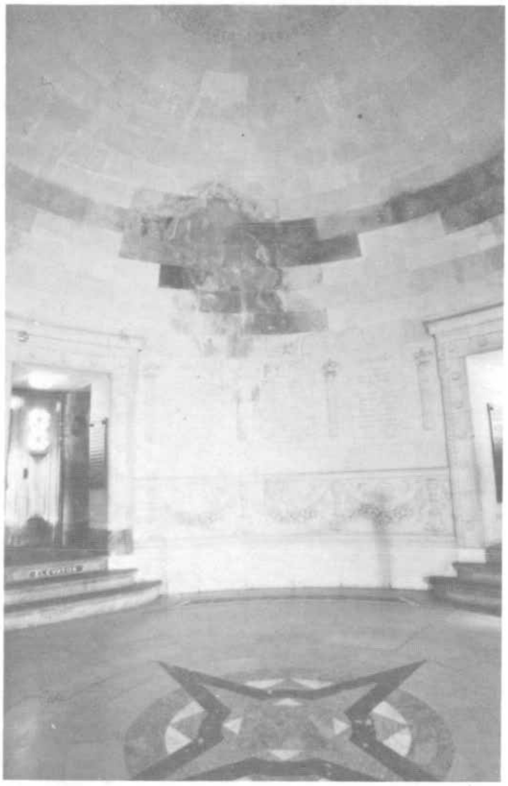


ILLUSTRATION 175. General view of southwest quadrant of rotunda.

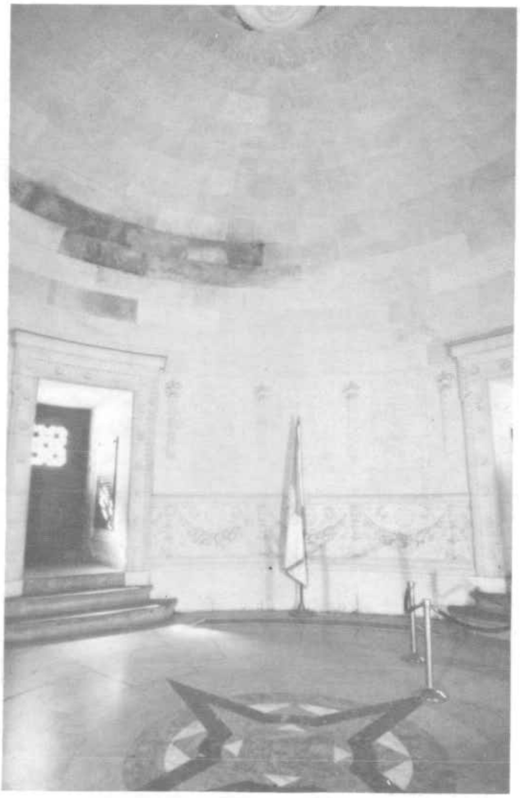


ILLUSTRATION 176. General view of northwest quadrant of rotunda.

ILLUSTRATION 177. Detail view of stained limestone blocks and memorial engravings on southwest wall of rotunda.

ILLUSTRATION 178. Detail view of decorative marble inlay of rotunda floor.

The rust stains on the marble floor are from flag bases and velvet rope stanchions. A cleaning method using a Wyandot poultice for 24 hours might remove these stains. If cleaning fails, the exposed surface of the marble will need to be rehoned or the marble replaced when the floor and base are removed and re-laid to install the rotunda heating system.

ENTRANCES

The four entrance niches located on north, east, south and west sides of the rotunda are in good condition. The granite steps and limestone walls of the north and south niches show more wear than the east and west because they are used more often. Except for general cleaning, no work needs be done to these niches.

Each niche contains a ceiling-mounted lighting fixture consisting of a simple 12" round by 4" deep white glass dome without trim (182). They are not the original fixtures. There is no record of the original fixture design, and these fixtures are neat, attractive, and in good condition. Therefore, it is recommended that no work be done on these fixtures.

Each niche contains a bronze door with a glass light and bronze grille. The north, east, and west doors are sliding doors which have their pockets concealed in the column shaft. The pair of bronze doors at the south side are hinged, probably because this serves as the required exit from the column. The inside face of the south door is polished, which seems incongruous since none of the other doors are polished. The north door, which is the principal entry, requires repairs and a new doorstop. At present, the door can slide beyond the pocket, making retrieval difficult. The bronze frame of this door is not fastened properly and is somewhat corroded (181, 182). All other doors and frames appear sound.

All bronze requires cleaning, color treating and sealing as discussed in Architectural Bronze Metalwork in Chapter 2. In addition, it is recommended that all doors be weatherstripped to minimize air infiltration. Care must be taken to do this in an unobtrusive manner. Finally, all door frames should have all existing sealant removed and new sealant installed to make them weathertight.

BRONZE PLAQUES

In the north, east and west niches of the rotunda entrances are two bronze plaques mounted on the stone walls of each niche. In the south niche the two plaques are aluminum, finished in dark bronze. All these plaques are in very good condition, and only require cleaning with a proprietary non-acidic detergent and a protective coating with a clear acrylic sealer (179-182).

The two original plaques are located at the north door. On the west side of the north door the plaque is for the Federal Government, the States and their Commissioners Engaged in the Erection of this Memorial. On the east, the plaque is for the Inter-State Board of the Perry's Victory Centennial Commission and includes the Architect.

At the dedication ceremonies on July 31, 1931 four bronze plaques were unveiled. Two were at the east door. On the north side of the east door, the plaque contains a Statement by President William H. Taft and on the south, a Statement by Henry Watterson of the Inter-State Board.

The two others were at the west door. On the north side of the west door the plaque contains a statement by President Woodrow Wilson and on the south, a statement on peace and the text of the Rush-Bagot Agreement of 1817.

At the south door are located two aluminum plaques dated 1963. On the east, the plaque contains a statement by President John F. Kennedy and on the west, a statement by Prime Minister Lester B. Pierson for 150 years of peace.

CHANDELIER

The chandelier which presently hangs at the center of the domed rotunda is a copy of the original alabaster and bronze fixture (183, 184). The original fixture shattered in 1968 when it was dropped while being lowered for maintenance. The pieces were glued together so that a mold could be cast from which the present fixture was made. A translucent plastic material was used to better simulate the original chandelier. The glued-together original is said to exist at the Memorial, but cannot be safely reinstalled. The present fixture is operational, of good appearance, and requires no attention.

As an option, the original chandelier could be copied in alabaster and bronze. This exact copy, made of materials to match the original, could be installed in place of the plastic material copy now in the rotunda.

GENERAL COMMENT

The memorial rotunda is the most important interior architectural space of the Memorial. The rotunda is the visitor's introduction to the central feature of the Memorial--the column--and should set the tone of his experience for all that follows. This is a hallowed place, dedicated to the men whose names appear on the walls and to those who are buried beneath the floor. This architectural space deserves the utmost consideration to insure that its special historical meaning is not lost.

Accordingly, the rotunda should be as completely free as possible of all objects not in the original design. At present there are metal stanchions and a velvet rope, used to prevent children from skipping down the three entrance steps and slipping on the marble floor when it is damp. With proper heating and dehumidification, as recommended in Chapter 10, the need for this safety device would be eliminated. The flags on standards do not appear to be an intrusion and should remain, set between the commemorative limestone panels. Discreet bronze signs are located at the entrance and exit granite stairs. These appear to be necessary to inform the public and to facilitate the proper flow of traffic up and down the stairs. One white container for disposal of smoking materials is at the north entrance door. This appears to be necessary; however, a bronze container would be more appropriate.

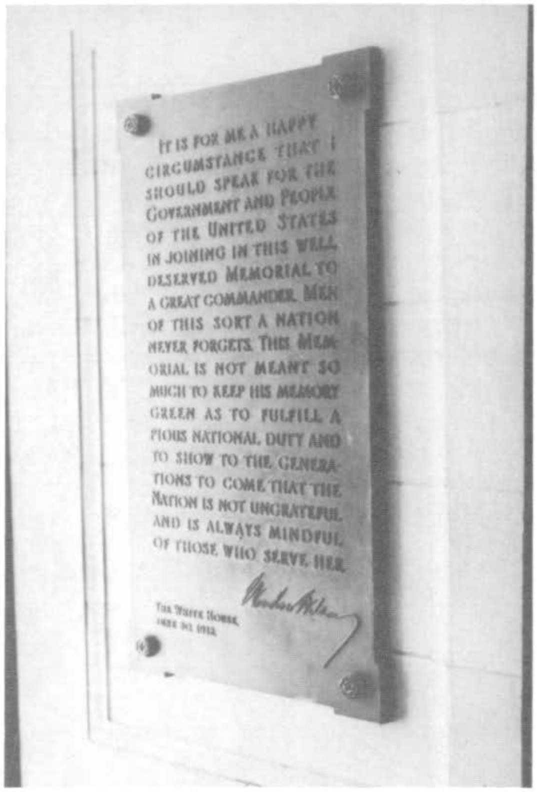
The above items are more properly the province of the National Park System management and interpretive programs than of this report, which addresses preservation and restoration of this structure.

COST ESTIMATE

An estimate of the approximate cost of the work recommended under this chapter is as follows:

1.	Removal of stain on ceiling by poultice		$ 900
2.	Removal of stain on ceiling by removing and replacing limestone facing	(Alternate) $ 1,700	
3.	Cleaning of all marble and limestone by poultice method		2,200
4.	Replace two commemorative panels	(Alternate) $ 4,500	
5.	Cleaning, treating, and sealing of interior of all bronze doors		1,900
6.	Repair of door frame and hardware of north door and weatherstripping of all doors		1,000
7.	Replace chandelier	(Alternate) $ 15,000	
	TOTAL		$ 6,000

ILLUSTRATION 179. View of a bronze plaque in the niche at the west entrance door, which is typical for the north and east entrance doors.



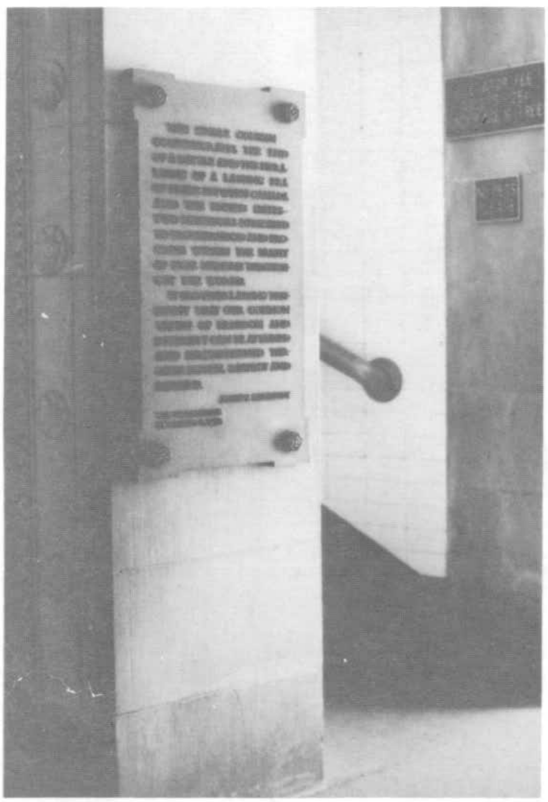


ILLUSTRATION 180. View of a bronze plaque in the niche at the south entrance door. Note the bronze signage on the wall at the entrance stair.

ILLUSTRATION 181. Detail view of north door frame showing corrosion and missing frame screws.

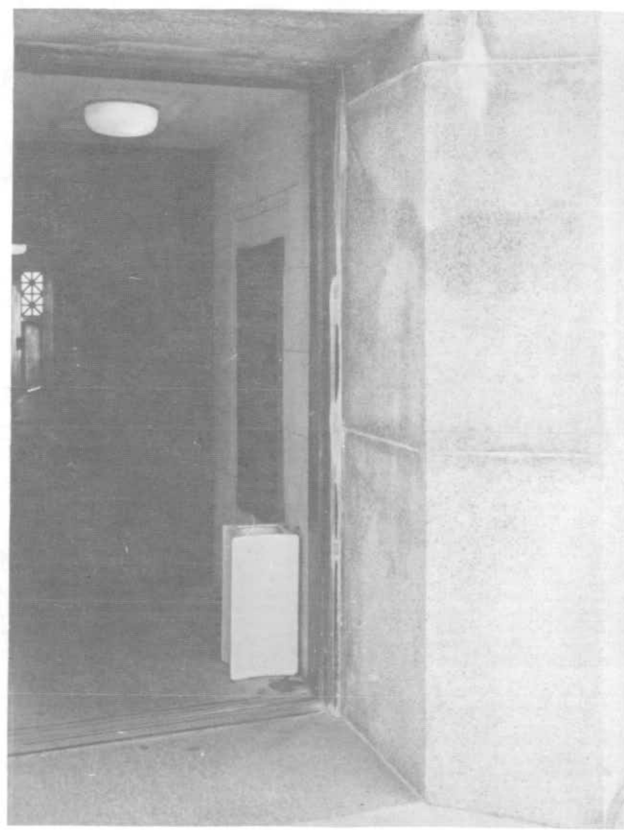


ILLUSTRATION 182. General view of north entry door. Note light fixture at ceiling of niche.

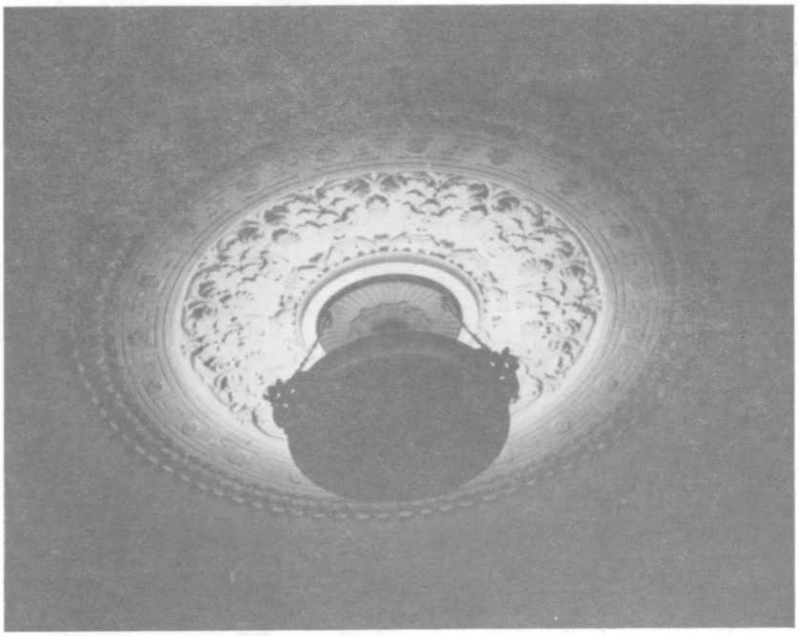


ILLUSTRATION 183. General view of chandelier of rotunda. This fixture is a copy of the original.

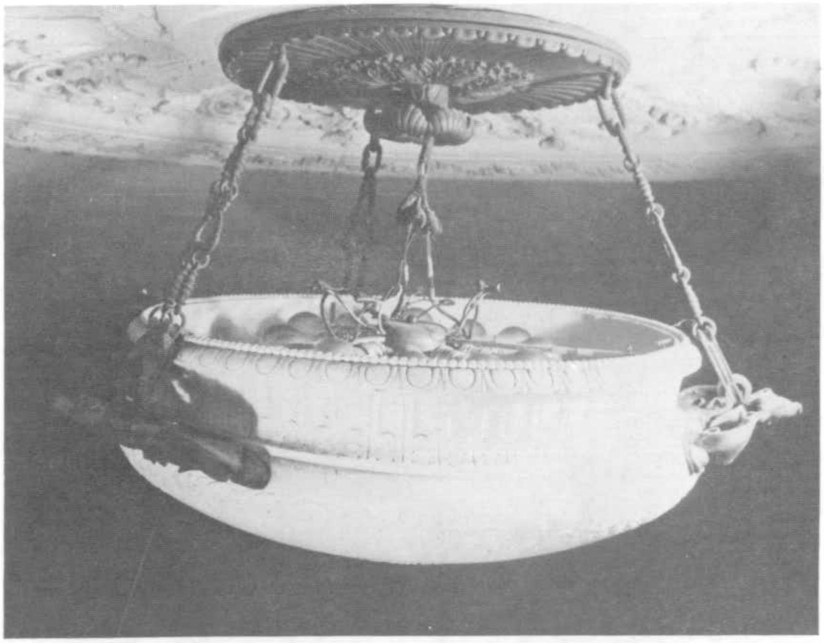


ILLUSTRATION 184. Detail view of chandelier at apex of rotunda ceiling.

CHAPTER 9. ELEVATOR

CHAPTER 9. ELEVATOR

INTRODUCTION

The elevator currently operating at the Memorial was installed in 1939 by the Otis Elevator Company, replacing the original Otis equipment. The system is a cable type with a machine platform at the top of the shaftway, a 3'-6" deep pit at the bottom, and a load carrying capacity rated at 2500 pounds with a speed of 325 feet per minute. The elevator shaftway is open to the column interior, separated from the stairway which surrounds it by wire mesh screen panels approximately 5'-0" high following the stair run (36, 45). The elevator has only two stops--the lower elevator landing level one floor above the rotunda and the upper elevator landing level at the observation gallery level within the penthouse at the top of the memorial column. In an emergency the cab may be stopped anywhere, and a short ladder would give access to the cab from the stairs. The ladder is necessary since the cab does not open at a stair platform, but rather only at a stair run (36).

SAFETY AND OPERATION

In order to determine if corrective action is needed to improve the safety and operation of the elevator, it is recommended that a full-load type safety inspection be performed as soon as possible by a qualified inspector. This inspection is best performed by the elevator maintenance company that has been servicing the equipment. This inspection shall comply with ANSI A17.2-1973 and shall meet the State of Ohio requirements for such tests. Extreme caution must be exercised during testing to assure that the rotunda below the elevator pit is not damaged in the event the elevator fails to stop properly. The full-load test is required by the State of Ohio to be performed every five years. Records at the Memorial office indicate that this test was last performed in April 1967; it is, therefore, overdue.

CARRYING CAPACITY

In order to determine if the elevator carrying capacity can be increased, either by allowing additional passenger load or by increasing the operating speed, the Otis Elevator Company has inspected the equipment at the site and reviewed their drawing records. Several steps can be taken to increase hourly capacity, and these suggestions are outlined in Appendix F. The main requirement is extending the elevator pit, which would, in turn, require raising the lower landing level 4'-2" above the existing floor (the pit cannot be deepened due to the rotunda below). If however, the lower landing level is left intact and the elevator shaft extended down to the rotunda level, a deeper elevator pit would be more readily achieved. If the public were to enter the elevator at the rotunda level, exit at the level above, (present lower landing level), walk down the stairs, and leave via the south doors, passenger transfer time would decrease. In addition, the handicapped might be more readily accommodated using a rotunda-level elevator landing. Another associated benefit would be the fact that a direct piping and/or duct route could be achieved from the basement to the shaft, thereby simplifying mechanical service to the shaft.

Obviously, acting upon these suggestions would adversely affect the historical and architectural integrity of the Memorial. We do not recommend that they be implemented. The raison d'etre of the Memorial is not speedy movement from one level to another. The number of visitors is not so great as to result in interminable waiting periods for elevator service, and in any case, a certain amount of waiting is associated with visits to a number of historic places.[1] Therefore, this relatively minor inconvenience is generally considered to be outweighed by the benefits received and by the adverse effects of changing the system.

Consideration was given to allowing visitors to walk down the stairs from the observation gallery in order to increase visitor capacity. The stairs are in 6'-0" vertical runs between landings and are around four sides of the elevator shaft (36, 37). Approximately 30" wide, the stairs do not meet the required minimum width for a public stair in the Ohio Building Code, and furthermore, the narrow width does not permit those using the stairs to pass each other comfortably. The 1" pipe stair railing does not meet the requirements of the Ohio Building Code and OSHA (41, 43). The elevator shaft and the moving cab inside are separated from the stair by wire mesh screens approximately 5'-0" high, and those visitors using the stairs could get their hands into the moving equipment. The Coast Guard navigational lighting equipment transformer obstructs the top stair landing. The dehumidification equipment is adjacent to a lower stair run. All of the items noted above could conceivably be changed to meet Ohio Building Code and OSHA requirements, except the 30" width of the stairs. Another adverse factor is that the landings offer no opportunity for the public to rest on the 256' descent. Therefore, it is recommended that the public not be permitted to use this stair except as an emergency exit when the elevator is not operative.

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[1]See Appendix G.

RECOMMENDATION

Adding power door operators and changing to two stop collective automatic control will decrease the loading and unloading time required at both the lower and upper elevator landings, thereby increasing the carrying capacity of the elevator. An additional asset is that an elevator operator is not necessary: the passengers can operate the elevator, and when there are few visitors the employment of an elevator operator will not be required. This option might best be implemented at some future date, when age and deterioration dictate replacement of the elevator equipment.

This change will require the replacing the existing elevator cab and hoistway doors and frames (62, 90). Rebuilding the existing cab at the site will require too much field work at the remote site to be economical and will require closing the elevator for several weeks during the visitor season. Therefore, the recommendation is that a new cab be built in the shop and erected quickly in the field. To meet the design criteria of the Memorial, the new hoistway doors and frames will be bronze, a simple design compatible with the existing bronze elevator enclosures at the two elevator landings. The cab interior, too, will be simple in design, with laminated plastic wall material and bronze fittings and trim. New ceiling lighting and cab ventilation will be provided. New electronic cab position indicators will be included at the two elevator landings. Special emergency service is also included in this change.

This installation would not meet the code of the State of Ohio, which requires the hoistway and machine room to have a two-hour fire-rated enclosure and 1-1/2 hour fire-rated hoistway doors. The existing shaftway does not meet these requirements, however, and the existing elevator machinery is not being changed. Since this is a Federal project, we assume the installation discussed above would not have to be changed to meet the State of Ohio Code.

In addition, the existing oil buffer in the elevator pit is a short design type and cannot be changed because of the existing size of the elevator pit. The new controller will have to be a low profile type to fit on the existing elevator machinery platform. These two items also will require a waiver by the State of Ohio, Department of Industrial Relations to permit the change to be made.

RELATIONSHIP OF ELEVATOR AND HEATING AND DEHUMIDIFICATION SYSTEM

Operation of the elevator has no adverse effect on the heating and dehumidification system. Conversely, the heating and dehumidification system is probably the prime reason for the excellent condition of the structural steel and mechanism of the elevator assembly (185, 187). Under the present conditions and considering the obvious beneficial effects of its open construction, it would be preferable not to seal off the elevator machine platform and shaft and to continue to take advantage of the heated and dehumidified air being circulated. Raising the inside temperature to a minimum of 60° F during the winter months, as outlined in Chapter 10, may eliminate the problem of peeling paint on the penthouse walls.

SOUND LEVEL DATA

The sound level data taken was recorded from a General Radio sound level meter utilizing the "A", "B" and "C" weighted scales. The noise generated by the elevator equipment is tabulated below. This noise does not interfere with the guides' interpretative talks and presents no real problem.

Noise Source - Electric Generator in Elevator Equipment Platform

Meter Position	dB"A"	dB"B"	dB"C"
Upper Elevator Landing	74	76	76
One Level Below	66-68	72	72-74

COST ESTIMATE

An estimate of the approximate cost of the work recommended under this chapter is as follows:

1.	Full-load safety test	$ 300
2.	Change to two-stop collective automatic control with power door operators	90,000
	TOTAL	$ 90,300

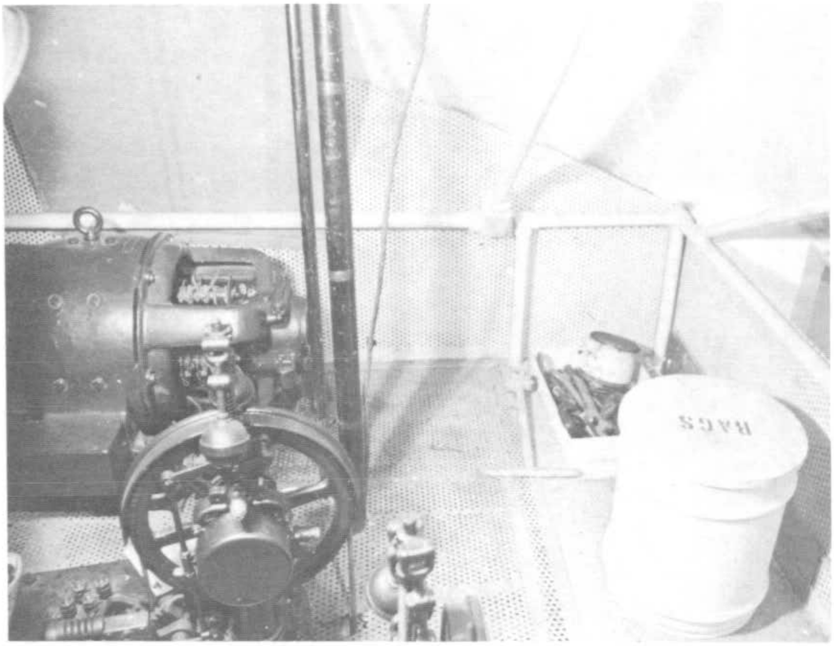


ILLUSTRATION 185. General view of elevator machine platform. Note clean appearance of equipment.

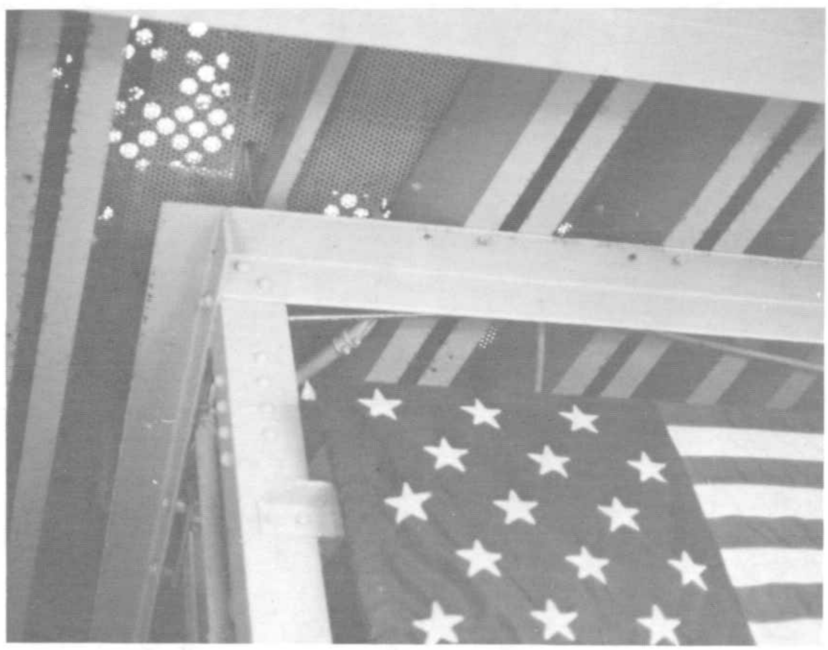


ILLUSTRATION 186. View of underside of elevator machine platform. Note perforated plate floor and glass vault lights above.

ILLUSTRATION 187. General view of elevator machine platform showing clean appearance of equipment.

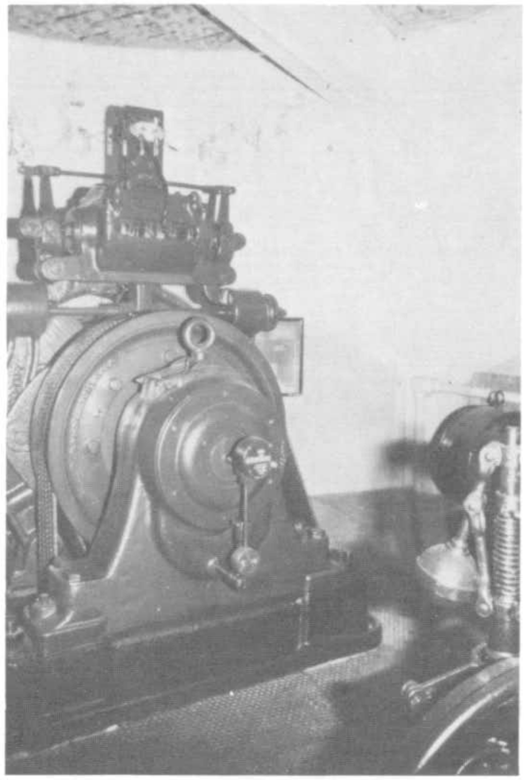


ILLUSTRATION 188. View of Otis Elevator cab showing clean appearance.

CHAPTER 10. HEATING AND DEHUMIDIFICATION SYSTEM

CHAPTER 10. HEATING AND DEHUMIDIFICATION SYSTEM

INTRODUCTION

The existing heating and dehumidification system was installed during the winter of 1960-61 in an effort to correct a serious condensation condition within the column shaft. Research of records and interviews with past and present operating personnel have revealed that prior to the installation of this equipment, the original design of this column did not include any provision for heating the interior of the column shaft.

SYSTEM DESCRIPTION

The components comprising the heating and dehumidification system are in two locations. One group is installed within the column shaft on an equipment platform (constructed for this purpose) one level above the lower elevator landing; the other is housed in a mechanical equipment room (constructed for this purpose) located in the basement space below the upper plaza. The components of the system are described below.

Steam Generation Equipment

This includes an oil-fired cast iron steam boiler with oil burner and boiler controls, condensate receiver with pump, fuel oil storage tanks, oil feed, fill and vent pipe, boiler breeching and induced draft fan.

Dehumidification Equipment

The system utilizes a "Kathabar Spray-cel" unit for the dehumidification process. "Kathabar" is a trade name for a chemical absorption process using a liquid lithium chloride solution called "Kathene" as the moisture absorbent. The Kathabar Spray-cel consists of three separate sections: a conditioner section, a regenerator section and a solution tank with a pumping unit.

Air Distribution Equipment

This equipment includes the supply air and return air fans, supply and return air ductwork, interconnecting ductwork between the two fans and the conditioner section of the Kathabar unit, and scavenging air duct for the regenerator section of the Kathabar unit. Steam coils are furnished with the ductwork for pre-heating the scavenging air and dehumidified air systems. Air filters are included in the dehumidified air system.

System Piping

This comprises the interconnecting piping required for circulating steam, Kathene solution, condensate and cooling water between the two equipment component groups and the steam boiler. The cooling water for the dehumidification process is obtained from the municipal water service supplying the site.

Automatic Temperature and Humidity Controls

This is primarily a pneumatic system of components with electrical interlocks to the pump and fan motors. The system includes an instrument air supply, with a motor-operated compressor and air receiver, pneumatically operated steam and water control valves, temperature and humidity sensors with controllers, interconnecting instrument air lines, electrical wiring and a central control panel.

SYSTEM OPERATION

The components on the equipment platform circulate and condition the air within the column shaft. This group consists of the conditioner section (196) of the Kathabar unit, the supply (197) and return (192) air fans and the ductwork (189, 190) for distributing the air throughout this space. Humidity and temperature controllers (194) are mounted on the interior wall of the column shaft adjacent to this equipment, and the sensors (193) for the controllers are attached to this same wall but one level above the equipment platform. The components in the basement space below the upper plaza include the steam generation equipment (199, 200, 208), the instrument air supply, main control panel, the regenerator section (201) of the Kathabar unit and the Kathene solution tank with pumping unit.

In operation, the Kathene solution is pumped from the solution tank (203) to flooding nozzles, which spray the solution over two coils: 1) the cooling water coils, which are located within and form an integral part of the conditioner section (196) and 2) over steam heating coils, which are an integral part of the regenerator section (201). By means of the return air fan (192), the air within the column shaft will pass through the spray coils in the conditioner section of the Kathabar unit and come into intimate contact with the Kathene solution. The air releases its moisture to the solution and then passes on through the supply duct (189, 190), and back to the column shaft space, while the solution flows back to the solution tank. The air leaving the Kathabar conditioner section becomes drier as the temperature of the Kathene solution is reduced. The humidity sensor located on the column shaft wall controls the flow of cooling water through the cooling coils and regulates the temperature of the

Kathene solution, which in turn controls the moisture content of the conditioned air to maintain humidity controller set point.

The scavenging air supply enters the regenerator section (201) and comes into contact with the heated Kathene solution which flows over the steam-heating coils. In contrast to the conditioner section, the Kathene here releases its moisture to the scavenging air in direct relation to the rise in solution temperature. The moisture-laden scavenging air is exhausted outdoors, and the concentrated solution flows back to the solution tank for recirculation. The fan circulating the scavenging air is an integral part of the regenerator section (201).

The dehumidification system is manually started and stopped. The automatic temperature and humidity controls are energized on system start-up. The boiler controls are also interlocked to operate with the system start-up.

OBSERVATIONS

The following summary of existing equipment and space conditions are based on visual observations of the column, plaza areas, and equipment. Moisture penetration of the column shaft is apparent as the walls, ceiling, and portions of the floor are stained; however, during site inspection, condensation was not evident on any wall surfaces.

Measurements of the dry bulb and wet bulb temperatures were made utilizing a sling psychrometer. Sound level data was recorded from a General Radio sound level meter utilizing the "A," "B," and "C" weighted scales.

Temperature and Humidity Data

The data below was recorded with the dehumidification system operating, but without the cooling water for regulating the Kathene solution temperature. The entry doors to the rotunda level were closed, thus confining the air to within the column shaft.

Point of Reading	Time	Dry Bulb (°F)	Wet Bulb (°F)	Relative Humidity (%)	GR/#
Outside on Plaza	11:00AM	72	64	65	76
Outside on Plaza	1:45PM	74	65	61	78
Rotunda Floor Level	2:00PM	70	61	60	66
Rotunda Floor Level	3:00PM	70	59	51	57
Rotunda Floor Level	4:10PM	72	71	51	62
Lower Elevator Landing	3:00PM	74	60	42	55
Lower Elevator Landing	4:00PM	74	60	42	55
At Wall Station Level	3:00PM	72	59	46	54

The data below was recorded during a period when the dehumidification system had been shut down.

Point of Reading	Time	Dry Bulb (°F)	Wet Bulb (°F)	Relative Humidity (%)	GR/#
Outside on Plaza	8:45AM	64	60	80	71
Outside on Plaza	4:15PM	69	63	71	77
Rotunda Floor Level	9:00AM	65	60	75	70
Rotunda Floor Level	4:30PM	67	62	75	75
Lower Elevator Landing	9:00AM	70	62	62	70
Lower Elevator Landing	4:30PM	70	63	69	75

Sound Level Data

The data tabulated below was recorded during a period when the dehumidification system was in operation and considered as the noise source.

Meter Position	dB"A"	dB"B"	dB"C"
Rotunda Floor Level	66	66	72
Lower Elevator Landing	78	82	86
At Return Air Fan	84-87	85-88	88-89
At Supply Air Fan	82	85	88

Equipment Operation

Discussion of the equipment operation with the Park Service maintenance personnel revealed the following:

a) The dehumidification equipment is operated in the evenings and during the winter months. The circulating water for the cooling coils has been shut down because of the limited water supply available from the municipal water department. There have been occasions when the water usage was excessive and the community water supply was depleted, to the point that a request was made to shut down the cooling water system.

b) The system is not operated when the tour guide is escorting visitors within the column because the noise interferes with the tour guide's presentation.

c) Operation of the system in the winter has been helpful in control of frost in the upper portion of the column.

d) A dial hygrometer calibrated to read the relative humidity in percent and an alcohol-type dry bulb thermometer are mounted on the south side of the elevator structural steel between the lower elevator landing and the equipment platform. Readings are logged twice daily. However, comparison of temperatures and the relative humidity readings reveal a discrepancy between the dial hygrometer and the sling psychrometer relative humidity measurement. The dry-bulb thermometer readings check out.

Equipment

Conditioner Section of the Kathabar Unit (195, 196): This unit appears sound and bears evidence of good maintenance. The steam and condensate piping serving the steam pre-heat coil show signs of corrosion where the insulation has been removed. The Kathene solution piping and the cooling water piping are corroded slightly where joined to the equipment.

Supply (197) and Return (192) Air Fans: Both the supply and return air units have had the shaft bearings replaced. The condition of the scroll case and the motors appears to be good.

Ductwork (198): The ductwork shows signs of deterioration due to corrosion near the point of the flexible connection with the fan. The canvas comprising this flexible connection is torn, and air is escaping from the system at this point.

Boiler (199): The boiler exhibits evident signs of leakage. The casing is badly torn and eroded. The insulation is exposed at two large areas. The lower part of the boiler is badly corroded, and the base is continually wet.

Condensate Receiver and Pump (200): The condensate receiver, pump, and attached piping appear to be in good condition. The receiver could use a coat of paint.

Kathabar Regeneration Section (201): The exterior painted surface of the unit is stained, streaked, and shows signs of the corrosive action of Kathene solution leaking from the adjacent solution pumping tank. The steam and condensate piping show signs of corrosion (202, 204). The pipe insulation is torn and ripped, exposing sections of pipe. Any new insulation in this area should utilize a metal jacket to protect the insulation. At several places, the pipe is encrusted with a lime-like deposit.

Apparently, this is the result of seepage dripping down from the upper plaza onto the pipe and equipment. The original ductwork (201) for exhausting the scavenging air has been replaced with a stainless steel material. This unit has been reliable in operation and requires only minimal service. Corrosion of the metallic components seems to be the most prevalent problem. Overall, the unit is appraised as being in fair condition.

Kathene Solution Tank (201, 203): The Kathene solution tank is in poor condition. The original tank has been replaced, and this replacement tank is badly corroded. Kathene solution is leaking onto the equipment room floor keeping it continually wet. The pump shaft, shaft coupling, and the shaft bearing are all in an advanced state of corrosion. The tank and pumping unit should be replaced. The attendant piping, fittings and insulation also show evidence of severe corrosion (202).

Air Compressor (200): The instrument air supply reservoir and compressor unit are in good condition. No problems have been reported with this equipment.

Mechanical Room Unit Heater: A "Singer" electric unit heater with wall-mounted thermostat serves the mechanical room. The general condition of this unit appears to be good, although the wall-mounted thermostat shows some signs of corrosion. During the site inspection, an attempt was made to cycle the unit heater by adjusting the set point of the thermostat. The power to the unit heater was apparently off, because the unit heater did not respond.

Fuel Oil Storage Tanks (205, 206): The fuel oil storage tanks and supporting bases appear to be in good condition, although the tanks could use a coat of paint. The tanks need to be protected against the water seepage and dripping from the upper plaza. The protection can be provided by waterproofing the upper plaza as described in Chapter 5.

This installation in our opinion is not in strict compliance with National Fire Protection Association Codes 30 and 31; however, this is a matter subject to interpretation.

Adjacent Areas (207, 208): The basement space beneath the upper plaza, except for the location of the fuel oil storage tanks, septic tank, a paint locker and access to piping and plumbing, is not utilized. Standing water is present over approximately 70 percent of this area. A planked catwalk was "jerry-built" over the water. The system piping in this area was fully insulated and the condition of material was not inspected; however, piping entering the column base shows evidence of severe corrosion at this point. The hangers and supporting steel are badly rusted (209, 210).

WATER SUPPLY SURVEY

Discussions of the equipment operation with the Park Service maintenance personnel revealed a critical situation with regard to the available water supply for optimum results from the dehumidification system. A survey of the municipal water system is reported below.

The municipal system draws its water from the lake on the south-east side of the island. Pumping equipment consists of:

1) Centrifugal Pump
   American Marsh - Size 2
   150 GPM at 151 ft. head.
   Electric Motor Drive - 1750 RPM.

2) Centrifugal Pump
   Worthington - 3 - UP - 1
   400 GPM at 210 ft. head.
   Gasoline Engine Drive.

3) Deming three plunger electric-motor driven pump. Pumping capacity data not available, but the Superintendent advises that it exceeds the capacity of the gasoline-driven pump.

A 30,000 gallon elevated storage tank is located near the village square. An automatic chlorination system comprises the only treatment to the water supply. There is no filtration plant outside of an in-pipe strainer basket. Summer water usage equals 100,000 to 200,000 GPD; winter water usage is 15,000 GPD. Summer water temperature averages 76 to 77°F. A deep drilled well is available for emergency supply.

CONCLUSIONS

From the data gathered during the site inspection, a review of selected Park Service records, and interviews with past and present operating personnel, it is apparent that the installation of the dehumidification system has had a significant role in controlling the effects of moisture within the memorial shaft. The following observations are submitted for reference in an analysis of conditions at the memorial:

1) Condensation was not evident on any wall surfaces at the time of inspection.

2) The structural steel comprising the elevator shaft does not bear any evidence of rust or peeling paint, which would indicate a moisture condition in the air space (186).

3) The elevator equipment room does not exhibit any of the symptoms associated with moisture or dampness; however, some of the paint on the walls in this portion of the memorial interior are peeling.

4) The dehumidification equipment apparently removes approximately 12 grains of moisture per pound of air without benefit of cooling water circulating through the system (see tabular information on temperature and humidity on preceding pages). This represents about 25 percent of the total system capacity.

5) According to Park Service records, the following summer high and winter low temperatures were observed and logged:

Date	Outside	Inside
June 9, 1974	85° - 87°	79°
July 14, 1974	95° - 95°	80°
July 28, 1974	89°	80°
Feb. 10, 1975	17° - 19°	48°

6) Per calculations based on winter outdoor conditions of 0°F and a 15 MPH wind and a 60°F inside temperature, the following figures have been determined:

Heat Loss (BTUH):

Transmission Loss - 27.5 x Pi x 300 x .14 x 60° = 217,712

Infiltration - 1800CFM x 1.08 x 60° = 116,640

TOTAL LOSS: 334,352 BTUH

Inside Wall Surface Temperature:

$$60° - \frac{.20}{1.65} \quad (60° - 0°) = 52.73°F.$$

Dew Point Temperature:

60°F at 30 Percent Relative Humidity = 30°F. D.P.

60°F at 40 Percent Relative Humidity = 36°F. D.P.

7) From climatic data published by the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE), using the one percent column at Sandusky, Ohio, the summer design temperatures are as follows:

   92° Dry Bulb
   76° Wet Bulb
   70° Dew Point
   110 Grains per pound of air.

Based on these observations, our determination is that the dehumidification system has had a beneficial effect in containing the condensation produced when warm moist air comes in contact with a cold surface. Park Service records during February 1974 indicate the low was -1°F; at time of observation the temperature was 17°F, and 19°F when logged, and inside temperature was 48°F, which is well above freezing. Prior to the equipment installation the column shaft walls would be frozen during the winter months and would not be completely thawed until midsummer. During this period warm air rising through the shaft would leave the walls wet. Providing additional heat within the column to maintain a 60°F inside temperature would result, per our calculations, in a wall surface temperature of approximately 53°F when it is 0°F outside. At these conditions the moisture content of the inside air at 60°F would have to be at 78° percent R.H. before condensation would occur. The bronze louvers in the penthouse walls, discussed in Chapter 3, Penthouse Interior, should be closed during the winter season to conserve heat.

Our findings indicate that this equipment need not be enlarged. The system does not operate at its maximum potential because equipment operation is affected by the need to conserve water and to deactivate the system during guided tours.

The basement space under the upper plaza could be treated by adding additional air handling units to distribute the air within this space. An increase in the capacity of both the regenerating unit and the steam boiler would be needed to accommodate the increased load.

The present system can readily be expanded to provide heating for extended visitor use in the spring and fall seasons. The memorial rotunda would require its own heating system for this purpose.

The noise problem created by equipment operation must be solved if the system is to be functional during the extended spring and fall seasons, when heating will be required. Reducing the noise will also permit optimum use of the system during the summer months.

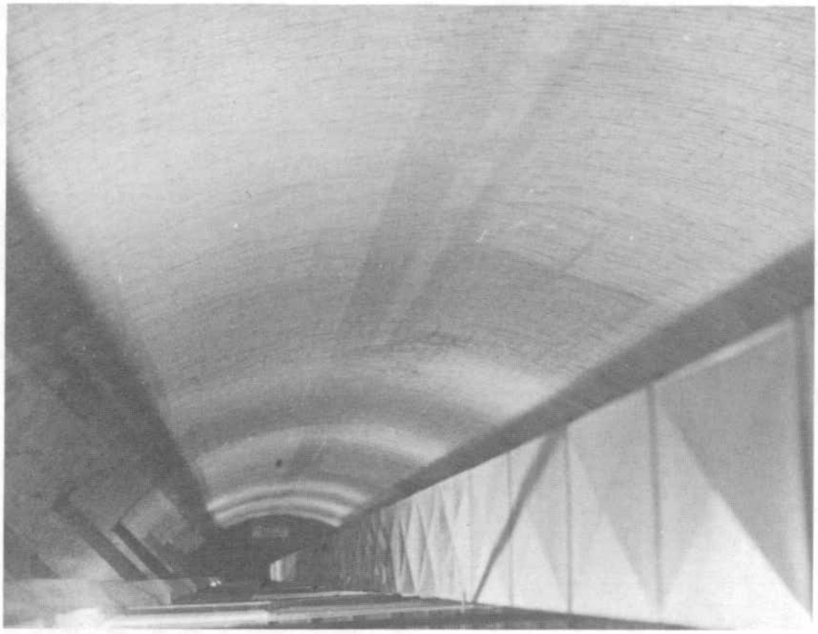
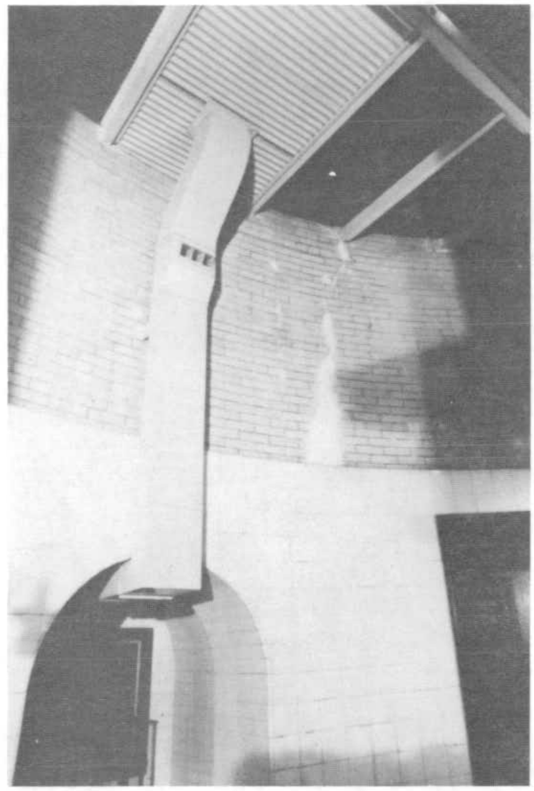


ILLUSTRATION 189. View of supply air duct within the column shaft. Photo taken from an upper level looking down.

ILLUSTRATION 190. View of the return air duct within the column shaft looking up.

ILLUSTRATION 191. View of supply air duct at lower elevator landing and the underside of the equipment platform supporting the dehumidification equipment.



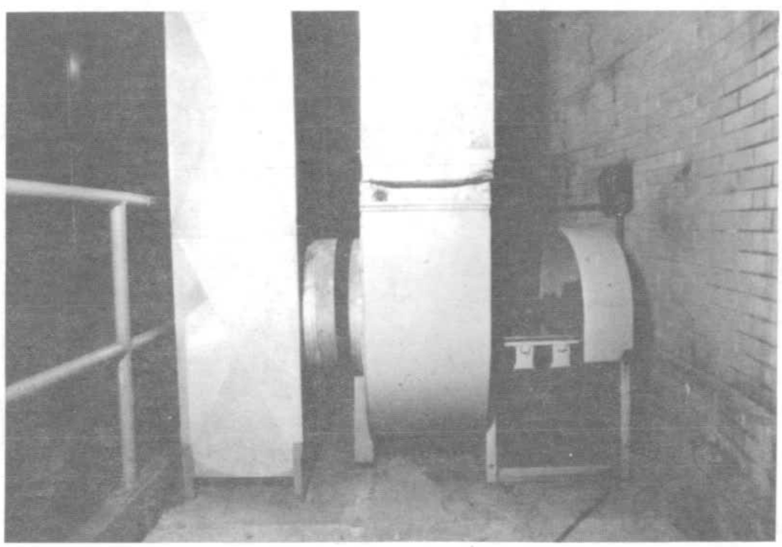


ILLUSTRATION 192. View of return fan and return air duct arrangement. Mounted on the equipment platform.

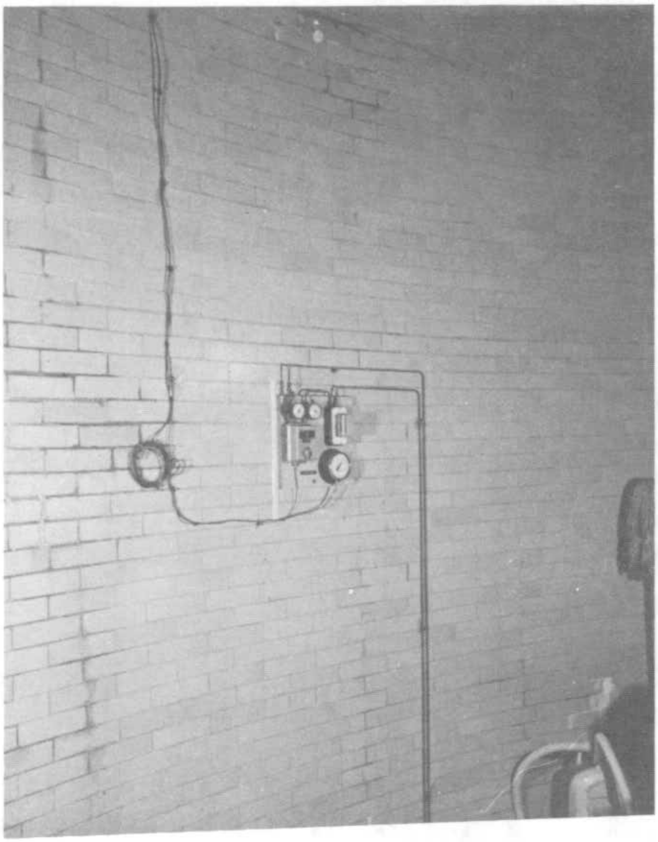


ILLUSTRATION 193. Showing arrangement and location of the averaging bulb temperature sensor and the humidity sensor on the interior column wall one level above the equipment platform.

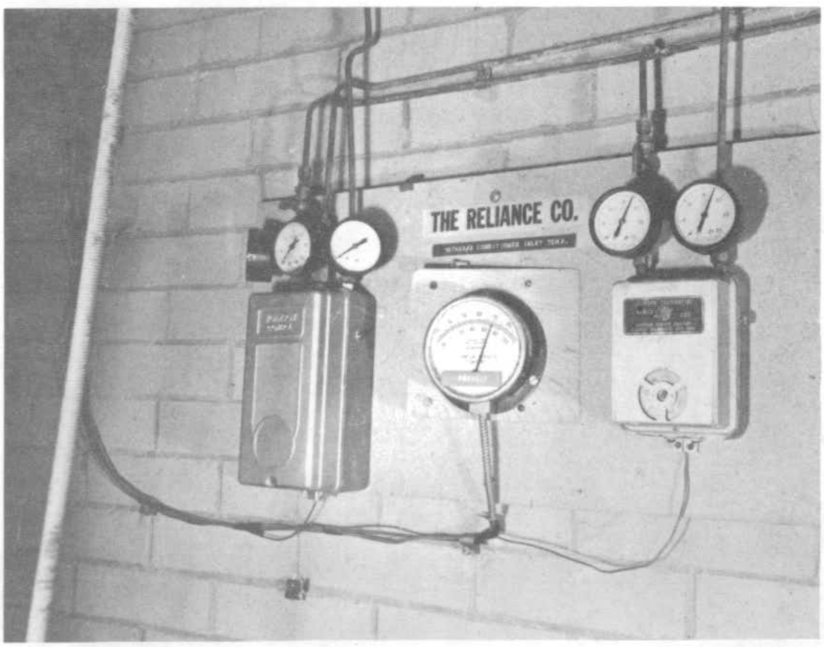


ILLUSTRATION 194. Humidity and temperature controllers located on the interior column wall adjacent the dehumidification equipment. See Ill. 196.

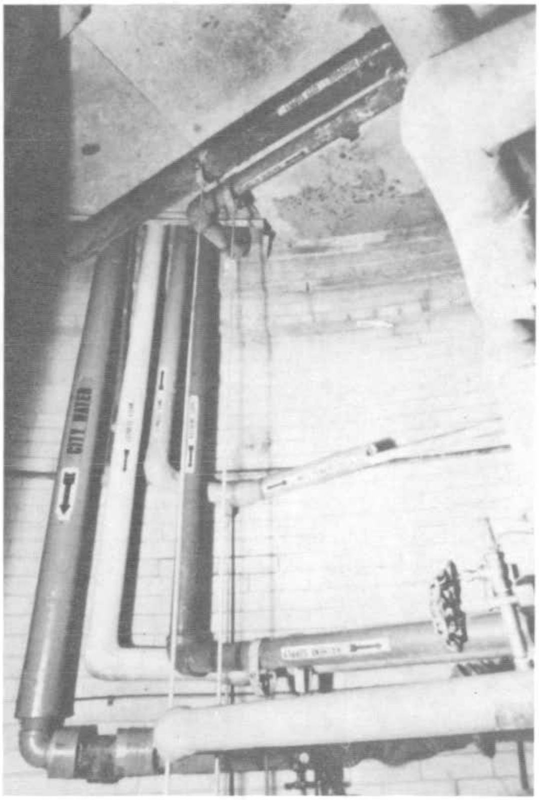


ILLUSTRATION 195. Showing condition and location of piping serving the dehumidification equipment. The pipe penetrates the equipment platform that supports the equipment located one level above the lower elevator landing. Note the condition of the insulation on the pipe in the center of the photo.

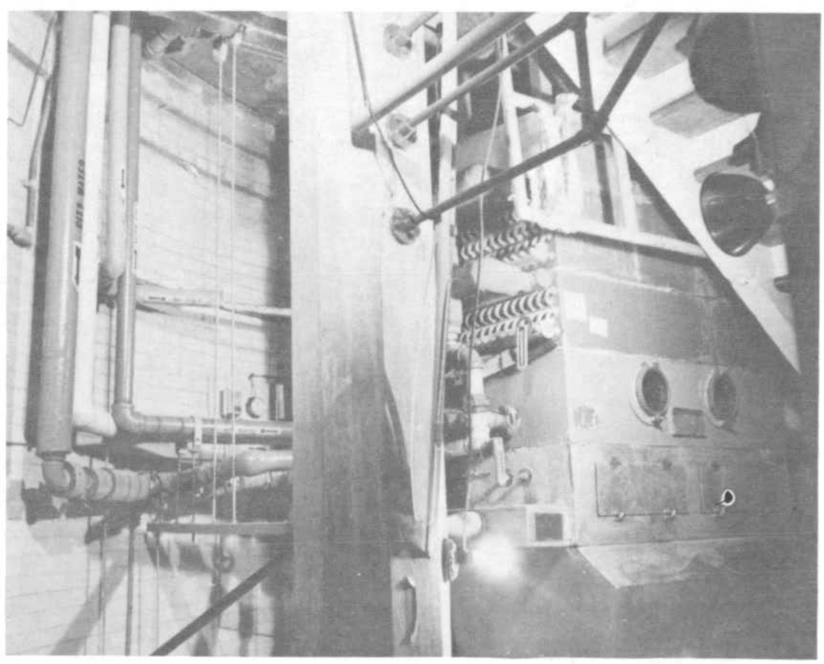
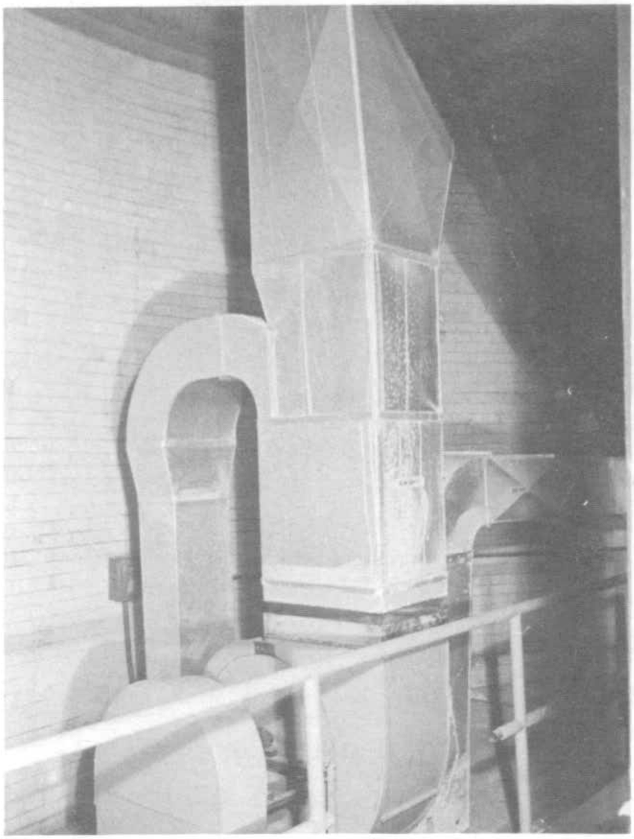


ILLUSTRATION 196. View of the conditioner section of the Kathabar unit, with piping and partial view of the master controls on the wall. See Illustration 194.

ILLUSTRATION 197. Supply air fan and duct arrangement. The curved branch take-off serves the lower elevator landing and the stairway to the memorial rotunda. See Illustration 191.



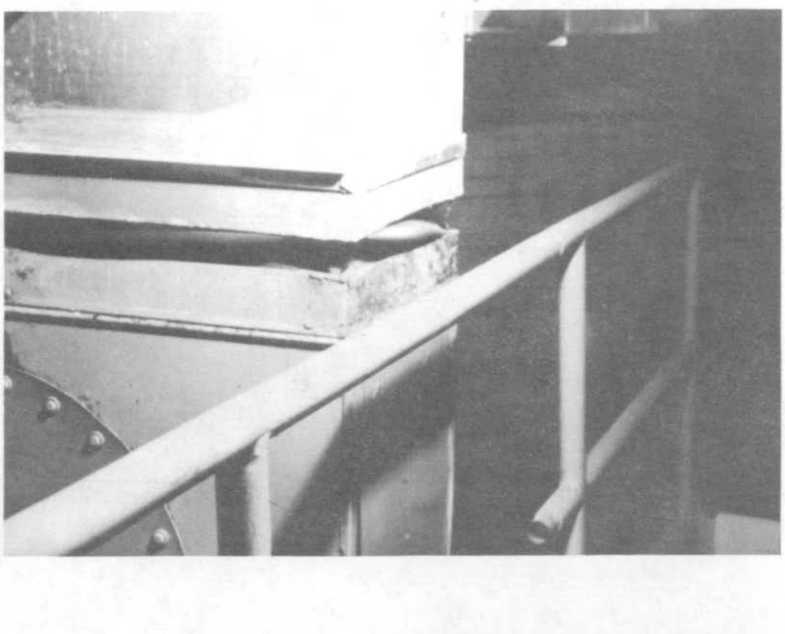


ILLUSTRATION 198. Close-up view of the supply air fan showing condition of flexible connection and slight corrosion of the metal.

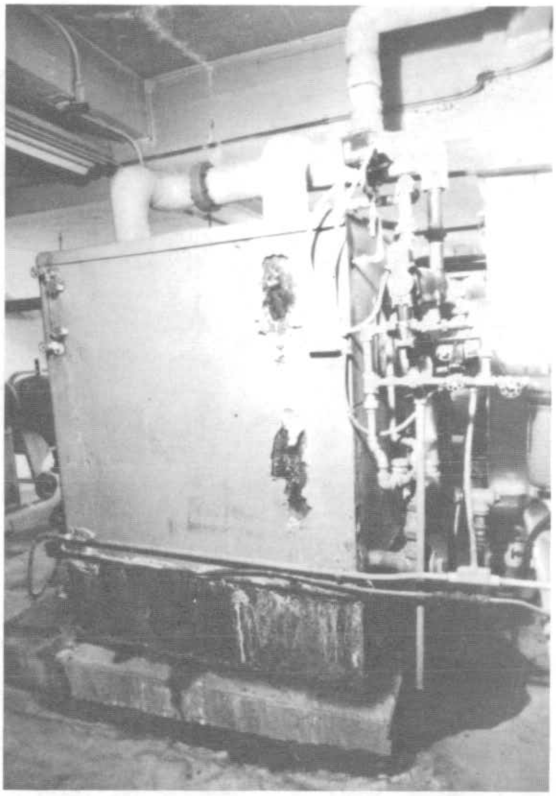


ILLUSTRATION 199. View of the boiler showing the poor condition of the insulated casing. Note the corrosion and moisture at the base of the boiler.

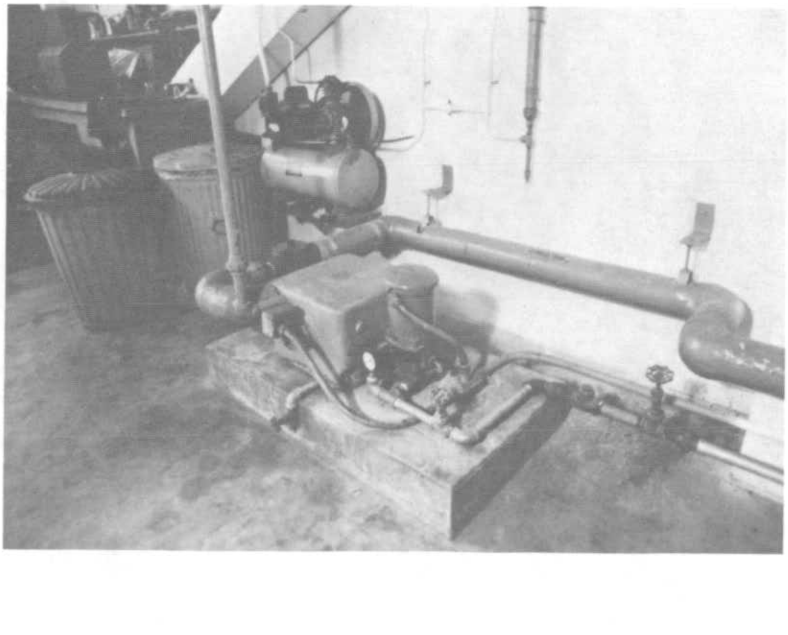


ILLUSTRATION 200. Condensate receiver and return pump. The condition of this unit and connecting piping is good. The air compressor and receiver in the background serves the automatic temperature controls for the system.

ILLUSTRATION 201. The Kathene solution tank is in the foreground with the regenerating section behind it. The tank, pumping equipment and piping in this area are all in poor condition. Scavenging air duct work is shown on top of the regeneration section. Note the controls mounted on the wall behind the solution tank. These controls serve the steam valve supplying steam for regeneration and preheat of the scavenging air.

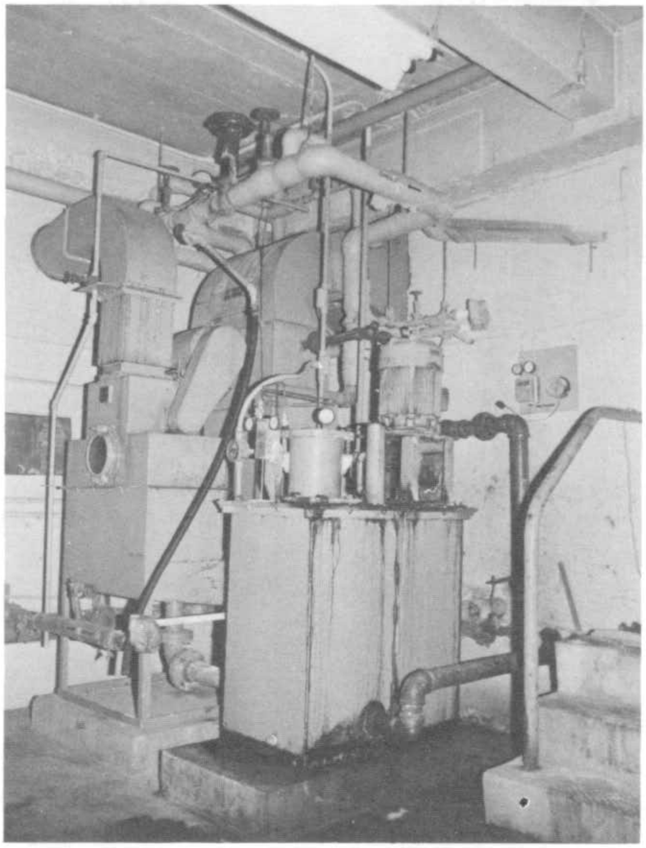


ILLUSTRATION 202. Closeup of piping located between the Kathene solution tank and the regenerating section showing the effects of corrosion.

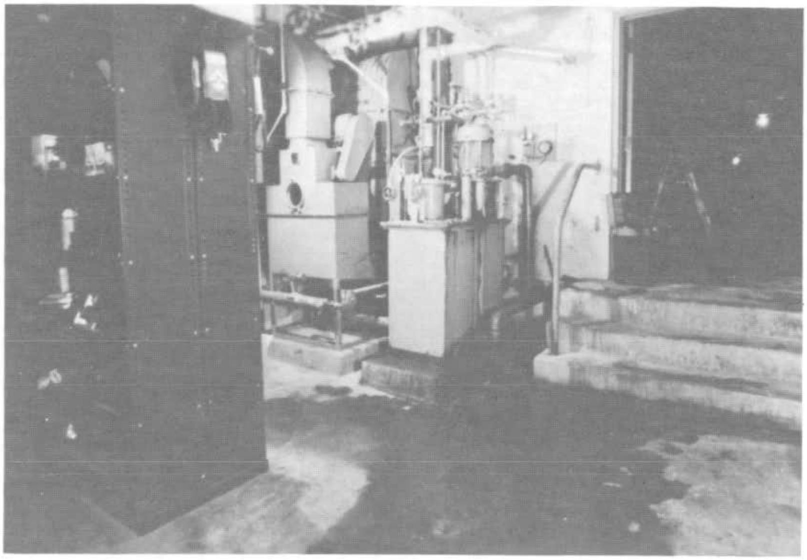


ILLUSTRATION 203. Kathene solution leaking from the tank keeps the floor continually wet.

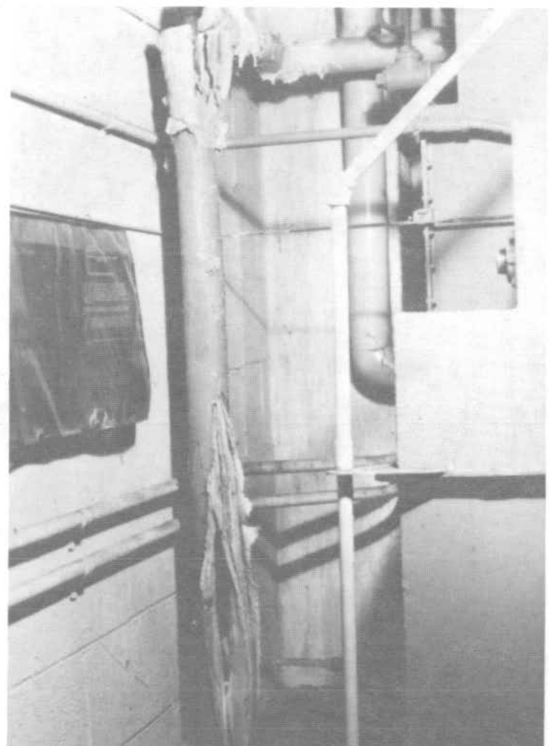


ILLUSTRATION 204. Steam pipe adjacent to the regenerating section. Note the lime-like deposit on the pipe at the top of the photo.

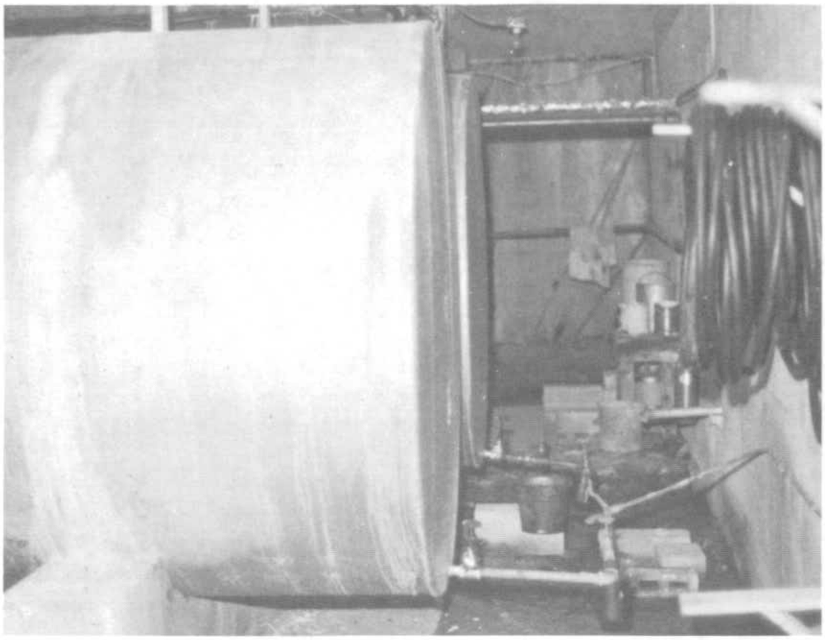


ILLUSTRATION 205. View of the fuel oil storage tanks. Note the pipe stubbed out from the wall immediately below the coiled hose is the discharge pipe from the sump pump in the equipment room located behind this wall.

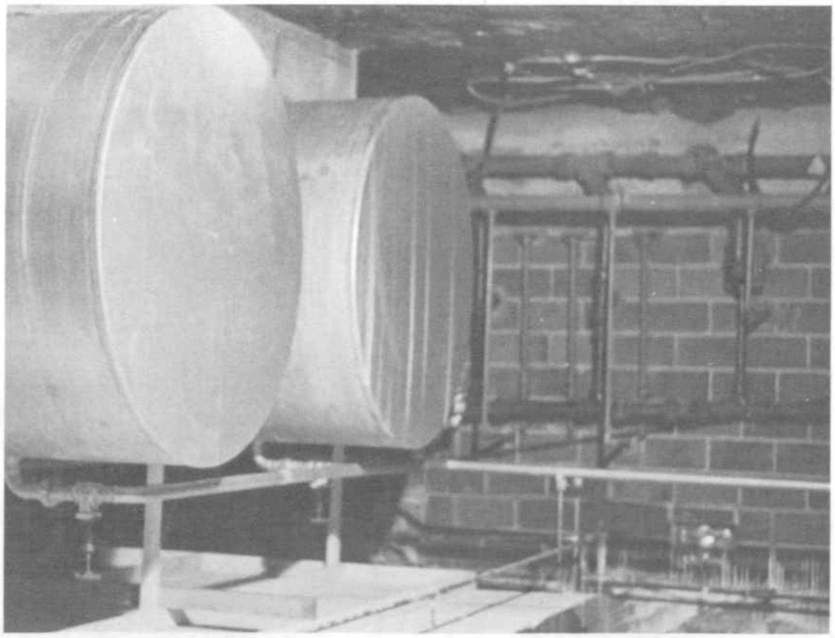


ILLUSTRATION 206. View of the fuel oil storage tanks and the fill lines. The wall in the background supports the soil and waste pipe serving the toilets.

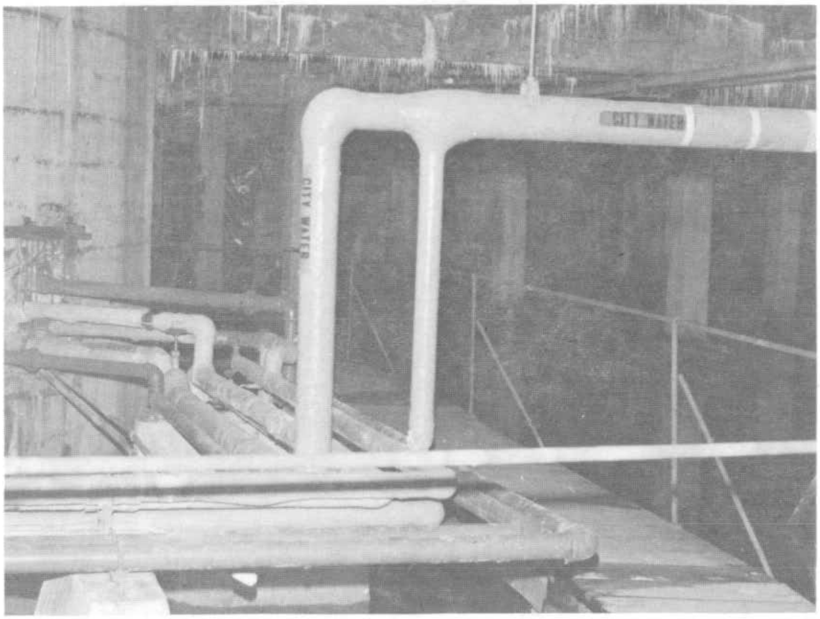


ILLUSTRATION 207. Overall view in the basement space near the north wall of the column shaft base. Note the catwalk above the standing water that covers approximately 70 percent of this area. The pipe at the left of the photo extends upward through the shaft wall to serve the dehumidification equipment located on the equipment platform above the lower elevator landing. Also see Illustrations 209 and 210.

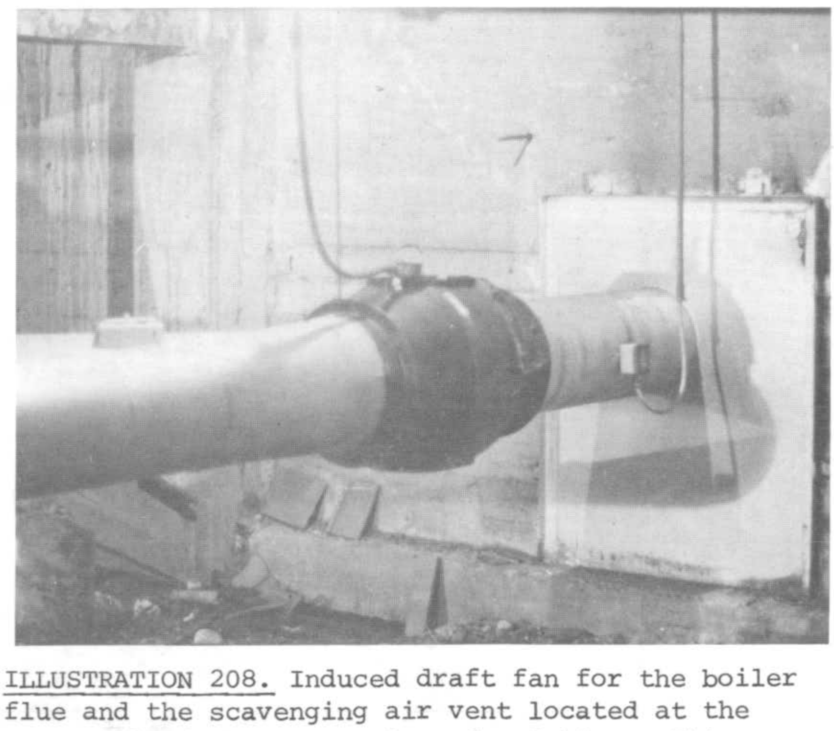


ILLUSTRATION 208. Induced draft fan for the boiler flue and the scavenging air vent located at the east wall of the upper plaza foundation. This vent passes through the wall and emerges from the embankment outside. Terminating at a built-up masonry box covered with a metal grate flush with the slope of the embankment.

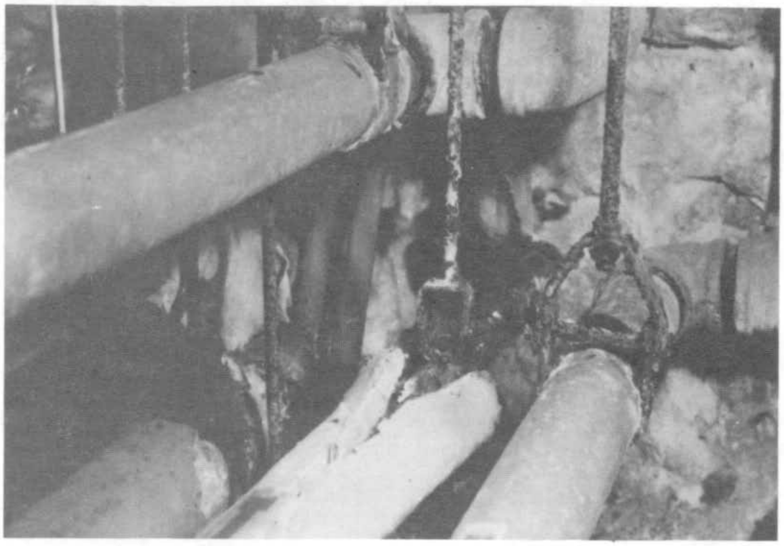


ILLUSTRATION 209. Close-up of pipe and hangers at the column shaft base. Note the poor condition of the hangers, pipe and insulation.

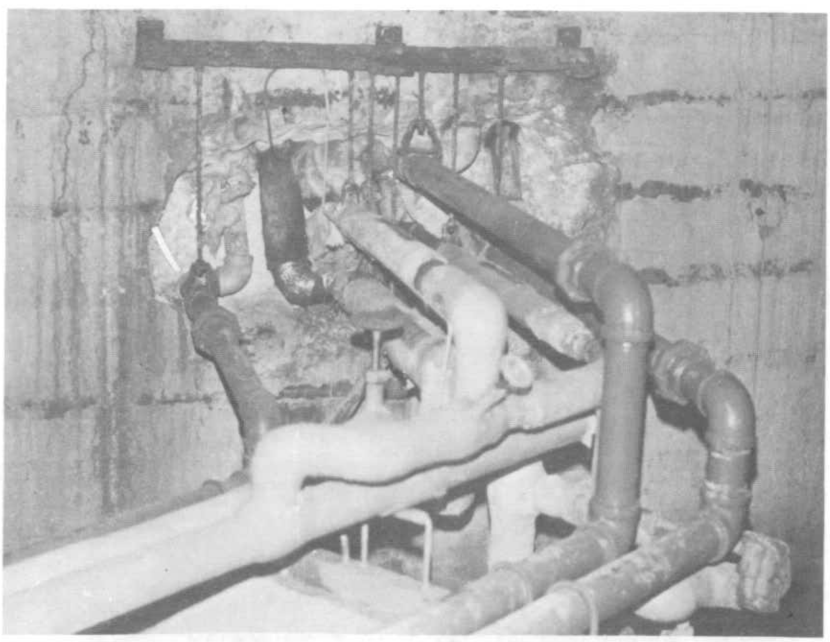


ILLUSTRATION 210. View of piping entering the base of the column shaft.

RECOMMENDATIONS

Three courses of action are available to address the problems outlined above. These plans are: upgrade of the existing system to improve its operational performance, expand the existing system by installing additional equipment to dehumidify the basement area below the upper plaza, and expand the system to provide heating for extended visitor use during the spring and fall seasons. The plans are discussed below.

Scheme I - Upgrading of Existing System to Operate at Full Capacity

1) Install a reliable cooling water supply system to insure that the Kathabar equipment will function at its maximum capability. Water for this purpose can be drawn directly from the lake, and after passing through the dehumidification equipment, water could be discharged into the lake.

   An alternate source would be a well drilled on the premises near the Memorial; however, tests should be made to determine the flow that could be expected of a well at the site. The existing system requires 90 GPM to operate at its maximum capability, and additional water capacity will be required if the system is expanded to condition the basement space. Well water, with its lower temperature during the summer months, could be used both for cooling as well as dehumidification.

   Construction of a pump room connected to the existing mechanical room will be required to house the pumping, filtering and water treatment equipment that will comprise the water cooling system. The drilled well alternate would require less space for this equipment, as a submersible pump could be installed within the well casing.

   Note that a sprinkler system drawing its water from the lake for watering the lawn is currently in the construction document phase under another contract. The suggested cooling water system would be separate and independent of the sprinkler system.

2) Install a "reheat" steam coil in the duct between the leaving air side of the Kathabar spray cell conditioner and the supply air fan. This coil would be sized to maintain an inside air temperature of 60°F minimum during the winter months. Additional boiler capacity will not be required to

serve this coil. An alternate would be to install four electric unit heaters, at different levels in the column shaft, to maintain a uniformly distributed 60°F minimum inside temperature.

3) Install a new boiler, complete with trim, safety controls and burner to replace the existing boiler.

4) Install a new Kathene solution tank and pumping equipment to replace the existing tank. The tank and pumping equipment should be constructed of materials resistant to the corrosive action of the Kathene solution.

5) Engage the services of the equipment manufacturer to furnish and install the necessary parts and perform necessary minor repairs to bring the existing Kathabar regenerating unit into an A-1 operating condition. Equipment performance should be comparable to that of the new component units in the system.

6) Test and thoroughly inspect all existing pipe for reliability and operational performance. Remove all corroded and defective piping and replace with new pipe to insure that the piping will not be a weak link in the upgraded system. Pipe insulation should have a jacket that can withstand the abuse that the existing insulation has undergone.

7) Thoroughly inspect and test the control system components. Replace or repair the temperature, humidity, and level controllers, the control valve operators, and the control valve bodies that may be found to require attention.

8) Extend a branch of the supply duct down into the elevator pit. This duct would hug the elevator steel on the side opposite the passenger doors within the existing closet space and pierce the landing floor.

9) Increase the air volume and duct size of the branch supplying air to the lower memorial rotunda (191).

10) Install an acoustically insulated enclosure to house all dehumidification equipment located on the mechanical platform above the lower elevator landing. This enclosure would contain the noise and permit operation of the system without interfering with the tour guide's lecture. This enclosure would serve as a plenum for the return air fan, with sound traps installed in the openings required for the air intake. The existing return air duct suspended within the column shaft could be removed.

11) The acoustical treatment in item 10 may inpose a higher static pressure demand on the air distribution system. The existing supply and return air fans will have to be evaluated against the new service conditions. The decision to replace or revamp the fans will be made at that time.

Scheme II - Expansion of System for Conditioning the Basement Space Below the Upper Plaza

1) Install a Kathabar dehumidification unit with supply and return air fans and ductwork to distribute the conditioned air throughout the basement space. The equipment selected should maintain the relative humidity below 54°F dew point temperature during the summer seasons and at a 40 percent maximum relative humidity during the winter months. Final design and sizing of the equipment required will be contingent upon the architectural scheme and proposed use of this basement space. Visitor use will impose additional loads on the equipment.

2) Install in the supply air duct a steam heating coil sized to maintain a minimum of 68°F inside the basement space during the winter months. An alternative to the steam coil would be electric unit heaters spaced throughout the basement space perimeter to provide a uniform distribution of heat at 68°F.

3) Increase the regenerating capacity of the Kathabar system and the associated Kathene solution tank and pumping unit to compensate for the additional load created by the basement unit. This can be done by adding modular components tied into the existing equipment.

4) Increase the capacity of a new boiler to provide the additional steam required by the regeneration process and the space heating load. This increased capacity will also affect the condensate handling equipment.

5) Modify the existing venting equipment to accommodate the increased boiler and scavenging air capacities.

6) Modify the existing instrument air supply system to include the additional automatic temperature and humidity controls required for the expanded facilities.

7) Enlarge the existing mechanical room to provide space for the additional equipment needed for this expansion. Access to the exterior will be required to obtain the necessary quantities of scavenging, ventilation and combustion air into the space.

8) Modify the existing cooling water system to provide the increased water capacity required for the expanded dehumidification syytem.

Scheme III - Expansion of System to Provide Heat for Extended Visitor Use in Spring and Fall Seasons

Heating needed for extended visitor use during the spring and fall seasons will be required only in the rotunda; the interior temperature of the shaft from the lower elevator landing up will be maintained at 60°F by the dehumidification equipment. This temperature should be adequate as it is assumed visitors will be suitably attired for the season.

An unobtrusive method of heating the rotunda would be to install radiant heating in the floor to offset the infiltration and transmission heat losses. The present marble floor would be carefully removed to expose the sub-base which would be prepared for the piping comprising this system. The marble floor would then be replaced to its original level. The heating medium would be hot water mixed with an ethylene glycol solution to prevent freezing. A steam convertor would be used to heat the glycol-water solution, which would then be pumped through the system. A slight increase in the boiler capacity might be required to serve this system. Properly designed, this system could also operate during the entire winter season to prevent any condensation or frosting of the walls by keeping the inside surface walls of the rotunda above the dew point temperature.

Alternative schemes for heating the rotunda space would be to install several wall or floor mounted cabinet unit heaters or a baseboard type radiation system. Either would introduce obtrusive heating units that would hide portions of the limestone base and carved panel wainscot of the rotunda; therefore, these systems are not recommended.

Record Keeping

The current practice is to record only inside temperatures. Records should include outside temperatures and should note whether dehumidification equipment was operating at the time the temperatures were logged. A sling psychrometer (or instruments designed for the purpose) should be used to obtain both dry-bulb and wet-bulb readings. Both readings will permit the operating efficiency of the equipment to be traced for future evaluation of the system.

The existing dial hygrometer, located on the stairway leading to the equipment platform, should be recalibrated or replaced; its accuracy is questionable.

COST ESTIMATE

An estimate of the approximate cost of the work recommended under this chapter is as follows:

SCHEME I Upgrading of Existing System to Operate at Full Capacity.		$ 100,000
SCHEME II Expansion of System for Conditioning the Basement Space Below the Upper Plaza.	(Alternate) 202,000	
SCHEME III Expansion of System to Provide Heat for Extending Visitor Use in Spring and Fall Seasons		16,000
	TOTAL	$ 116,000

CHAPTER 11. PLUMBING SYSTEMS

CHAPTER 11. PLUMBING SYSTEMS

OBSERVATIONS

The following is a summary of the observations of the existing conditions of the plumbing systems.

Toilet Room Fixtures

The urinals, water closets, and lavatories are themselves in good condition, but flush valves at urinals and water closets leak and the chrome finish is dull and tarnished. Both lavatories in the men's room and the right-hand lavatory in the women's room drain slowly, but the problem is worse in the men's room. Toilet seats are in good condition. New hinges and accessory hardware will be needed to secure the seats to the bowls.

Basement Space Below the Upper Plaza (211, 212, 213)

The sanitary sewerage, waste piping, vent piping and water supply piping serving the toilet rooms appear sound, solid, and their condition excellent.

The water supply serves primarily the toilet room fixtures and the dehumidification unit. A filter tank with disposable filter cartridges was installed in the line; however, this installation has proven unsatisfactory because seaweed and mud in the water supply clog the cartridges. This filter tank is not currently used.

While some corrosion is evident in the piping, especially in the dresser couplings, the overall condition of the piping is good. There are no operating drinking fountains at the Memorial.[1]

Drains

As previously noted, the original drain in the observation gallery floor has been covered, but still functions to relieve water trapped beneath the waterproofing membrane. Water passes through the column wall and via a length of hose to a bucket for manual disposal (216). A floor drain remains at the southwest corner of the observation gallery, but has been reworked so that water falls free from the top of the monument to the

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[1]Cf. Illustrations 139, 140 and note the Additional Restoration Items discussed in Chapter 5; see also Illustrations 165, 166.

plaza below. In the winter this floor drain freezes over, and salt is poured into the drain to minimize plugging due to ice buildup.[2] The upper plaza drains are located at the two corners of the south perimeter (215). These direct surface water into the basement space directly beneath the upper plaza area.[3]

Sump Pump (205)

A small submersible pump is located on the mechanical equipment room floor. This pump discharges directly into the basement space outside the room by means of a short pipe stubbed through the wall.

Septic Tank (211)

Discussion of septic tank performance with the Park Service maintenance personnel indicated that this system has been problem-free. The exposed concrete tank and influent and vent piping were visually inspected and found sound and solid.

RECOMMENDATIONS

Toilet facilities at the Memorial are essentially adequate for current demands. The existing fixtures can remain, with only minor maintenance repairs required. New hinges for the toilet seats will be needed, and the leaking flush valves and lavatory drains repaired.

The city water supply has been a problem, and therefore the present filter system has not performed as planned. Replacing the existing unit with a pressure-type sand filter would provide more efficient and trouble-free filtration. If the filter medium is permanent, it would of course not require replacement; the only requirement would be a periodic manual backwash. The filter should be sized to suit the flow demand of the plumbing system.

Installing public drinking fountains is optional; a possible location is outside the restrooms. Incorporating the recommended sand filter into the water system would improve the water quality for drinking fountains.

The proposed underground sprinkler system being provided in another contract must be completely independent of the potable

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[2]Cf. Illustrations 75, 77 and see Observation Gallery in Chapter 3.

[3]See Structural Systems/Recommendations in Chapter 5 and Illustration 171 in Chapter 7.

water system serving this site. It is presently being planned as a separate system. A system of hose-bibbs should be installed on the upper plaza, incorporated into the sprinkler system, to provide irrigation water for the planting boxes. The hose-bibbs should be located in a manner which minimizes the need to lay them across the upper plaza when they are being used to irrigate the planting boxes.

An electric trace should be installed at the floor drain located on the observation gallery to eliminate the need to pour salt into the drain as a protection against freezing.

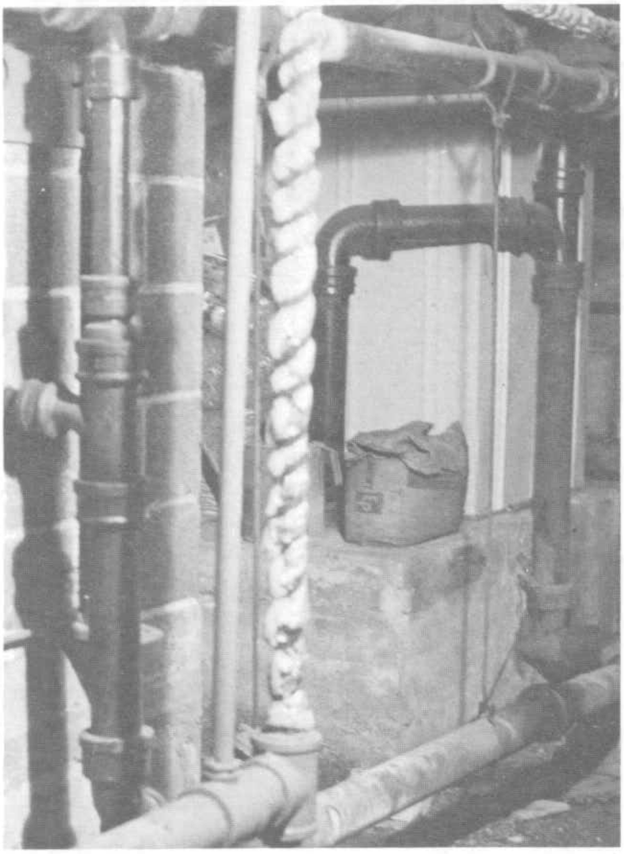
The plaza drains and sump pump system appear to be satisfactory for the present. However, incorporating architectural and structural changes to the basement space below the upper plaza would require modifications consistent with the final design and function of this space.

COST ESTIMATE

An estimate of the approximate cost of the work recommended in this chapter is as follows:

1.	Repairs to toilet facilities	$ 3,500
2.	Add pressure sand filter to water line	1,200
3.	Install electric trace to observation gallery floor drain	300
	TOTAL	$ 5,000

ILLUSTRATION 211. Close-up of plumbing near the septic tank. A paint locker is shown on top of the septic tank.



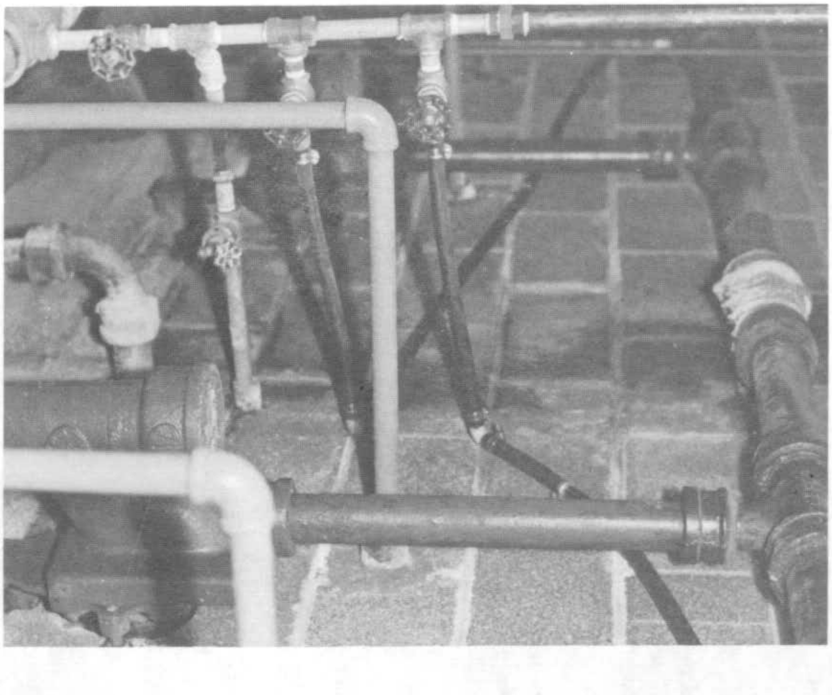


ILLUSTRATION 212. Close-up of plumbing serving the toilet rooms.

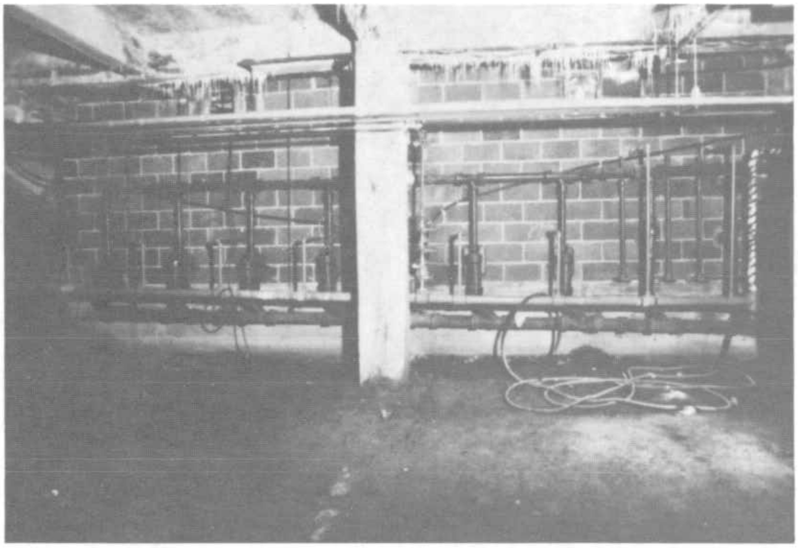


ILLUSTRATION 213. View of the basement area behind the toilet rooms showing the plumbing serving those rooms.

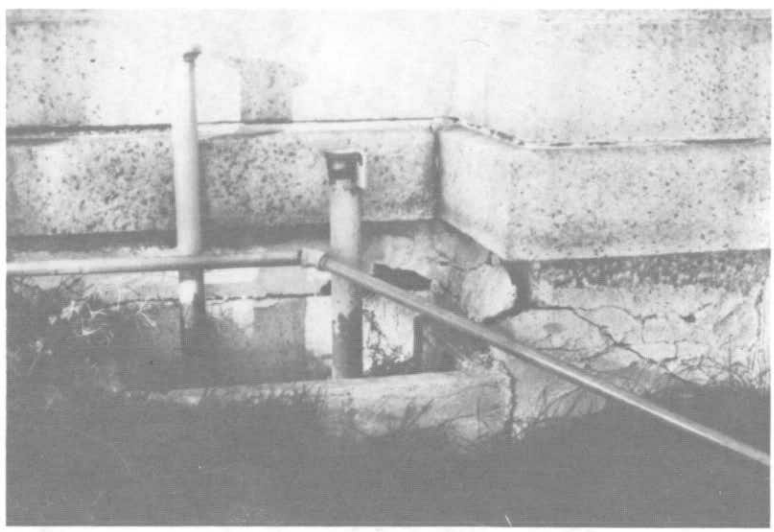


ILLUSTRATION 214. Close-up of the fill and vent terminals for the fuel oil tanks. The horizontal pipe is a waterline serving the hose-bibbs located about the plaza perimeter. This water pipe was designed as an underground line but emerges exposed and unprotected at several places throughout its run.

ILLUSTRATION 215. Close-up of floor drain serving the upper plaza surface.

ILLUSTRATION 216. View of interior rainwater conductor serving the observation deck. The floor drain on the deck has been reworked for a free fall to the outside. However, during heavy rains, water will flow from this pipe into the bucket.

CHAPTER 12. ELECTRICAL SYSTEMS

CHAPTER 12. ELECTRICAL SYSTEMS

DISTRIBUTION SYSTEM

Introduction

The incoming electrical service to Perry's Victory and International Peace Memorial is from the Ohio Edison Company. The overhead transmission lines from Ohio Edison Company are terminated on a pair of wooden poles on Delaware Avenue to the southwest side of the Memorial. The first pole has an Ohio Edison Company locked overhead disconnect switch; the second has lightning arrestors, PTs and CTs, and the Ohio Edison Company electric meter.

A transition is made from overhead to underground service by means of a pole-mounted service entrance pothead and underground cable into the transformer vault room on the west side of the Memorial below the upper plaza. The underground cable terminates in the transformer vault room in another pothead and connects to an oil circuit breaker mounted on an angle iron frame.

Incoming service to the Memorial is 7200 volt (primary) and connected through the oil circuit breaker to three 37.5 KVA 120/240 volt, one-phase transformers. The electrical connection to the transformers is 7200 volt primary (Delta) to three one-phase secondaries (Wye) to produce 120/208 volt three-phase, four-wire service to the Memorial. These transformers feed one 400 amp 120/208 volt, three-phase, four-wire main distribution panel located in the transformer vault room. This main distribution panel sub-feeds:

1. A 200 amp floodlighting panelboard located in the transformer vault room and controlled by a time switch in the lower elevator lobby with two 100 amp contactors. These time-switch controlled 100 amp two-pole circuits feed five ground level banks of floodlights and one bronze lantern lighting panel in the upper elevator machine platform.

2. A general lighting panelboard located at the lower elevator lobby for general illumination of the rotunda, elevator lobbies, and column stairway lighting.

3. The lighting panelboard and Kathabar system located in the mechanical room.

Observations

The accompanying one-line diagram and legend (217, 218) should be used as a point of reference in the report of observations, conditions, and recommendations. Numbers circled in the text and illustration refer to items of electrical distribution equipment discussed in this report. The test report of High Voltage Maintenance Corporation is included as Appendix H.

1 Ohio Edison Overhead Service Entrance: The lateral pole arrangement for the incoming service entrance area at the southwest side of the Memorial is the property of the Ohio Edison Company; the second pole, however, is the property of the National Park Service. The first pole, which has the Ohio Edison disconnect, is in poor condition and should be replaced upon the request of the National Park Service to the utility company. The second pole, with the PTs, CTs, and meter, is in satisfactory condition and can be retained (219, 220).

2 3 4 Underground Incoming Feeder and Potheads: The underground service entrance cable and potheads from the Ohio Edison Company service area to the transformer vault room are in relatively good to fair condition.[1] Considering the age of the cable and its extremely wet underground location, we recommend the cable be retested in one year. At that time, the rate of deterioration can be established and a timetable for replacement suggested. The potheads appear to be in good electrical and mechanical condition. Because the service entrance pothead is enclosed in the transformer vault room, the terminals and insulators need to be cleaned and tape insulated to prevent birds or rodents from causing an arc over (221). This underground feeder and potheads are the property of the National Park Service.

5 Main Oil Circuit Breaker: The main oil circuit breaker located in the main transformer vault room was visually and electrically examined (222). Visual inspection indicates the need for cleaning and painting the oil circuit breaker and its supporting steel framework; the extremely damp and wet location causes rusting (225). The oil pan was lowered, and an oil sample was taken and tested. The oil is still in good and usable condition. The main contacts inside are in good condition but the bushings inside at the top are corroded and need cleaning (223, 224). The operating mechanism for the mechanical and electrical tripping did not work properly when tested. Technicians from the High

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[1]See High Voltage Maintenance Corporation test data in Appendix H, pp. 9, 10.

Voltage Maintenance Corporation freed the linkages so mechanical tripping is now possible, but the oil circuit breaker will not operate electrically. Since the oil circuit breaker provides electrical protection of the three transformers, it is recommended that the unit be completely overhauled electrically and mechanically to insure proper operation, safety, and reliability. It is also recommended the bushings be cleaned, tightened, and properly insulated to prevent bird or rodent arc over. The oil circuit breaker is the property of the National Park Service.

6 Main Substation Bus: The main substation bus, located in the transformer vault room, feeds the three transformers from the oil circuit breaker. The bus is in good electrical and physical condition but the insulators should be cleaned and all connections should be tightened to insure proper operation. This open style copper bus arrangement is the property of the National Park Service (226).

7 Main Transformer Bank: The main transformer bank located in the transformer vault room consists of three 37.5 KVA, 120/240 volt, one-phase, three-wire transformers with the secondaries connected (in Wye configuration) to produce 120/308 volt, three-phase, four-wire service to the Memorial. Upon visual inspection, we noted that all three transformer exteriors were dirty and rusted. They should be thoroughly cleaned and painted. Some of the high voltage bushings are leaking and should be cleaned, regasketed, tightened, and properly insulated. The unused secondary terminals are not insulated at all, and this poses a shock hazard to those working in the transformer vault room (227, 228). Oil samples taken from each of the three transformers were tested and found to be in good electrical condition. The Megger test indicates the good condition of Transformers Nos. 1 and 2. Transformer No. 3 is in fair condition.[2] Its low megohm reading at 0.5 KVDC probably indicates that cleaning and properly insulating the bushings is needed to insure reliability. We recommend that this transformer be retested in one year. These three transformers are the property of the National Park Service.

8 Main 120/208 Volt Feeder: The main feeder from the three transformers in the transformer vault room, which terminates in a main 400 amp distribution panel, appears to be in good operating condition. The conduit that encloses the feeder conductors should have vertical supports to the transformer room ceiling (226).

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[2]See High Voltage Maintenance Corporation test data, Appendix H, pp. 11-13.

(9) Main 120/208 Volt Three-Phase Distribution Panelboard: The main 120/208 volt three-phase panelboard is located in the transformer vault room on the wall opposite the incoming service oil circuit breaker and the transformer bank. This panelboard serves as the main distribution center for subfeeding the floodlighting panelboard, the mechanical room panelboard, the lighting panelboard at the lower elevator landing, and the elevator feeder to the elevator machine platform (229, 230). The panel was dismantled, and all breakers were checked for trip time (3x overcurrent seconds) and instantaneous operation.[3] All breakers were in acceptable operating condition, except for the 100 amp three-pole circuit breaker feeding the boiler room panel. This breaker has a faulty trip on the "c" phase. Replacement of the breaker is recommended for proper electrical protection of the mechanical room feeder and panel. The interior and exterior of this main distribution panelboard should be cleaned, and the bus bar and breaker connections should be cleaned and tightened for proper conductivity, feeder protection, and system reliability. Inside and outside, the panel is dirty and rusted; after a thorough cleaning it should be painted with a rust-resistant paint.

(10) Lighting Panelboard (at Lower Elevator Landing): The lighting panelboard is flush mounted in a cupboard-type door at the lower elevator landing (235, 236). The branch circuits from this panelboard are used to feed the elevator lobby lighting, the light inside the elevator, the column stairway lighting, and the control power for the time switch that controls the outside floodlighting. This panel was found to be in good and adequate electrical condition for the present. Panel replacement is probably necessary for future long-term usage because push-button type breakers and other replacement parts are no longer available. The feeder to this panelboard from the main distribution panel was found to have a low megohm reading for the "c" phase.[4] This reading indicates the connections need to be cleaned and tightened; retesting then may obtain better and more accurate results.

(11) Mechanical Room Panelboard: The mechanical room panelboard is located in the mechanical room and old maintenance shop on the east side of the Memorial (234). The branch circuits are used to feed the lighting in the mechanical room and the public restrooms. Control power and a subfeed are also taken from this

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[3]See High Voltage Maintenance Corporation test data, Appendix H, p. 16.

[4]See High Voltage Maintenance Corporation test data, Appendix H, p. 6.

panel for the Kathabar dehumidification system. Although this panel is in good operating condition, spare capacity for future additions is limited. The feeder to this panel, from the main distribution panelboard in the transformer vault room, was tested and found to be in good condition for present and future use.[5]

12 Elevator Feeder and Disconnect Switch: The elevator disconnect switch is located on the elevator machine platform above the upper elevator landing (237). The feeder to the disconnect switch is fed from a 100 amp, three-pole circuit breaker in the main distribution panel in the transformer vault room. The feeder, exposed cable in the basement area, is run in conduit into the column shaft area and in exposed conduit up the elevator shaft supporting steel to the disconnect switch. The switch itself is in good and usable condition, but its location does not allow proper maintenance and operation (the National Electric Code requires a minimum of 2'-6" clear space in front). It is recommended that a removable or hinged section of side screening at the handrail side be provided for accessibility. The feeder to the disconnect switch was Megger tested and found to be in acceptable operating condition.[6]

13 100 Amp Three-Pole Space: This 100 amp three-pole circuit breaker space is in the main 208 volt distribution panel (231). In the future it could be used for the irrigation system (added in another contract). There is not enough spare capacity here, however, for the extension of the Kathabar system[7] or for the proposed conditioning of the basement space.[8]

It is the last available feeder breaker space left for other possible future expansion of the electrical distribution system.

14 Floodlighting Panelboard: The main floodlighting panelboard is located in the transformer vault room and is subfed from the main 208 volt distribution panel via a 200 amp three-pole circuit breaker (230, 232). This panelboard contains six 100 amp two-pole breakers to feed five outdoor lighting floodlight bank panels and the lantern lighting panel at the elevator machine platform level. All breakers in this panelboard were tested for trip time (3x overcurrent seconds) and instantaneous operation

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[5]See High Voltage Maintenance Corporation test data, Appendix H, p. 6.

[6]Ibid.

[7]See Chapter 10, Recommendations, Scheme I.

[8]See Chapter 5, Recommendations/Structural System.

and were found to be in acceptable operating condition.[9] The panelboard enclosure itself is rusted and should be cleaned and painted inside and out with a rust-resistant paint.

15 100 Amp Three-Pole Contactors-Floodlighting: The two floodlighting contactors are wall-mounted next to the floodlighting panelboard in the transformer vault room (233). The covers were removed and the contactor mechanisms inspected. The contacts should be replaced; the enclosures should be cleaned of rust inside and out and then painted.

16 Time Switch: The time switch, located in a closet on the lower elevator landing, is used to control the outside floodlighting (236). The 120 volt control power is taken from the lighting panelboard in the same area. Controlled circuit conductors are run down into the main transformer vault room to control the two lighting contactors. Visual inspection indicates the time switch is adequate for its present use, although the main contacts should be cleaned.

17 Lantern Lighting Panel: The lantern lighting panelboard is surface mounted at the upper elevator machine platform and fed from the floodlighting panel in the transformer vault room (239, 240). The feeder to this panelboard is time switch, contactor controlled. Four 15 amp one-pole circuits from this panelboard feed up into the lantern for incandescent lighting of the glass dome. An additional circuit is used for the display map lighting at the observation gallery level. Some unused circuits at one time were used to illuminate the gallery level with quartz flood lighting, which has since been removed. The breakers in this panel do not operate properly (with a crisp movement of the handles), and the enclosure is rusted and dirty. The panel and breakers may require replacement. The feeder to the lantern lighting panelboard was Megger tested and found to be in acceptable and usable condition.[10]

18-21 Floodlighting Bank Feeders: The outside building floodlighting consists of thirty-four 1000 watt, 120 volt incandescent lighting fixtures mounted in five floodlighting banks located at the outside perimeter of the plazas. The banks of floodlights at the northwest, northeast, southwest, and southeast have seven fixtures per bank; the south floodlight bank has six.

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[9]See High Voltage Maintenance Corporation test data, Appendix H, p. 15.

[10]See High Voltage Maintenance Corporation test data, Appendix H, p. 5.

At each location, the fixtures are mounted on a fabricated steel framework and fed by a 100 amp two-pole time-controlled circuit from the floodlighting panelboard. Cables from the transformer vault room are exposed in the basement area and then buried directly to each floodlight bank. The cable to each floodlight bank is terminated in an exposed eight-circuit 120/240 volt A.C. panelboard mounted on the steel framework. One circuit feeds each individual fixture at that particular floodlighting bank. The locally mounted panelboards were visually inspected, and the circuit breakers were found to have weak and deteriorated springs (248). This is unsafe electrical protection for the lighting branch conductors to the lighting fixtures. The panel enclosures are rusted inside and out. Although enclosures are raintight, they should be weatherproof. The former is an improper application; the condition of the enclosures indicates they should be replaced. The panelboards, except for the south floodlight bank, are located too close to grade level, and recent flooding of the grounds has contributed greatly to their rapid deterioration. To minimize damage by weather and vandalism, each panelboard should be replaced with a heavy-duty marine type panelboard with bolted covers. The feeders to the panelboards were Megger tested[11] and all were found to be in fair and usable condition except for the feeder to the northeast floodlight, which should be replaced.[12]

ELEVATOR CONTROL PANELBOARD

The elevator control panelboard is located on the north side of the elevator machine platform (238). The equipment on this panelboard was in acceptable working order, but all contacts and connections should be cleaned and tightened for proper reliability. Some of the interconnecting wiring has brittle and damaged insulation and should be replaced.[13] An inventory of spare parts should be developed to insure availability. The serial number and type is recorded in the Otis Elevator Information Section.[14]

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[11]See High Voltage Maintenance Corporation test data, Appendix H, p. 5.

[12]See High Voltage Maintenance Corporation test data, Appendix H, p. 4.

[13]Ibid.

[14]See High Voltage Maintenance Corporation test data, Appendix H, p. 7, 8.

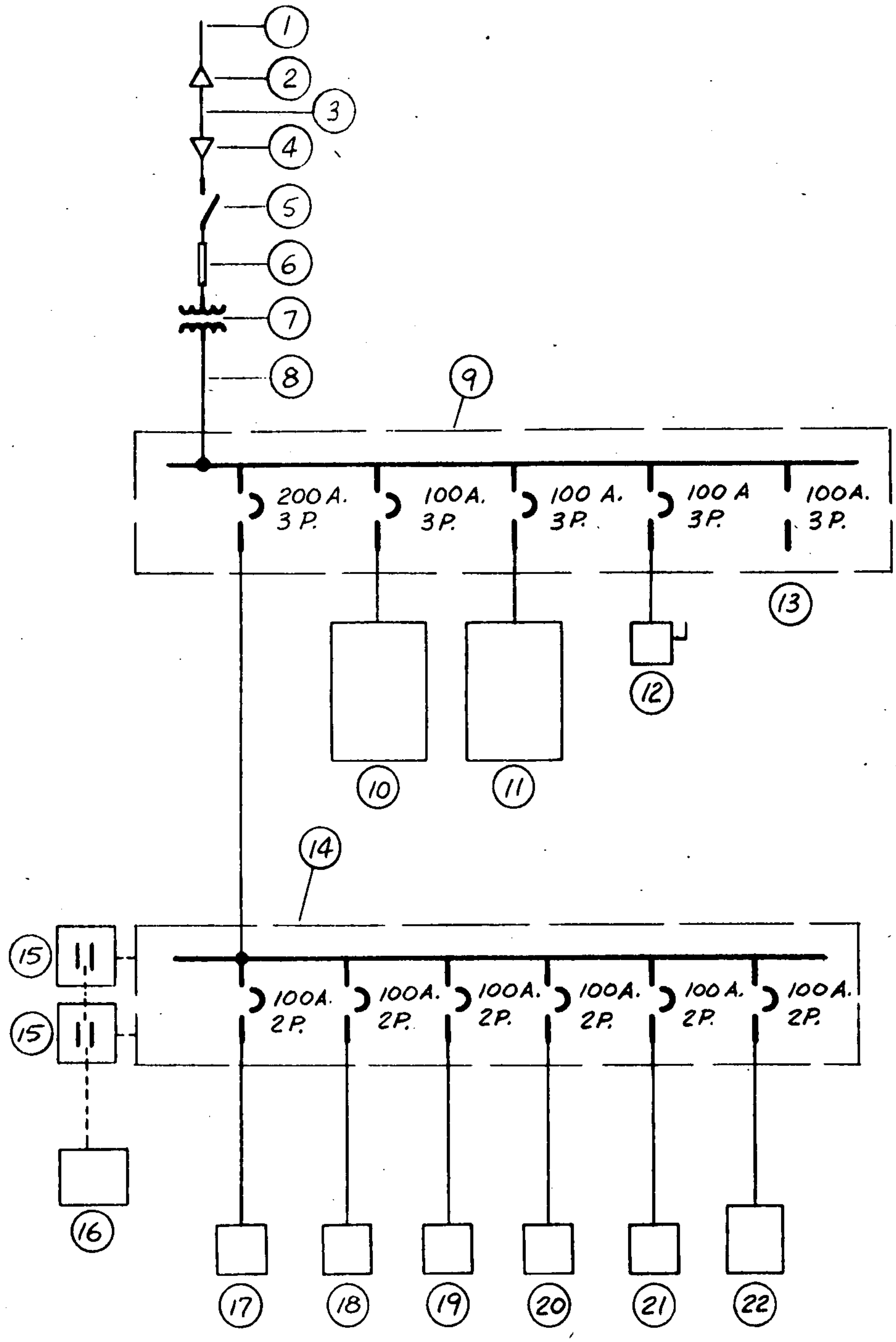

ILLUSTRATION 217. Distribution system one line diagram.

DISTRIBUTION ONE LINE DIAGRAM LEGEND

ITEM	DESCRIPTION	TEXT ILLUSTRATIONS	H.V.M. PHOTOS*
1	OHIO EDISON OVERHEAD SERVICE FROM SOUTHWEST CORNER POLE	219	1
2	POLE MOUNTED POTHEAD AT SOUTHWEST CORNER		1
3	UNDERGROUND 7200 VOLT FEEDER TO TRANSFORMER VAULT		
4	WALL MOUNTED POTHEAD IN TRANSFORMER VAULT ROOM	221	3
5	OIL SWITCH IN TRANSFORMER VAULT ROOM	222, 223, 224, 225	4a, 4b 4c, 4d
6	MAIN SUBSTATION BUS	226	5a
7	(3)-37.5 KVA 120/240 VOLT, 1ø, 3W. TRANSFORMERS	227, 228	5a, 5b
8	3 PHASE, 4 WIRE FEEDER TO MAIN 208 VOLT PANELBOARD	226	5a
9	MAIN 208 VOLT 3-PHASE PANELBOARD IN TRANSFORMER VAULT ROOM	229, 231	6
10	LIGHTING PANELBOARD AT LOWER ELEVATOR LANDING	235, 236	11
11	MECHANICAL ROOM PANELBOARD AND KATHABAR SYSTEM FEEDER	234	
12	ELEVATOR DISC-SWITCH AT ELEVATOR MACHINE PLATFORM	237	
13	100 AMP. 3-POLE SPACE	231	6
14	FLOODLIGHTING PANELBOARD	226, 230, 232	
15	(2) 100 AMP. FLOODLIGHTING CONTACTORS	233	7
16	FLOODLIGHTING TIME SWITCH AT LOWER ELEVATOR LANDING	236	11
17	LANTERN LIGHTING PANELBOARD AT ELEVATOR MACHINE PLATFORM	239, 240	
18	SOUTHWEST BANK OF FLOODLIGHTS FEEDER, AND PANELBOARD		
19	NORTHWEST BANK OF FLOODLIGHTS FEEDER, AND PANELBOARD	250	8a
20	SOUTHEAST BANK OF FLOODLIGHTS FEEDER, AND PANELBOARD		
21	NORTHEAST BANK OF FLOODLIGHTS FEEDER, AND PANELBOARD	249	
22	SOUTH BANK OF FLOODLIGHTS FEEDER, AND PANELBOARD	251	

*See High Voltage Maintenance Corporation photos in Appendix H.

ILLUSTRATION 218. Distribution system one line diagram. (Legend)

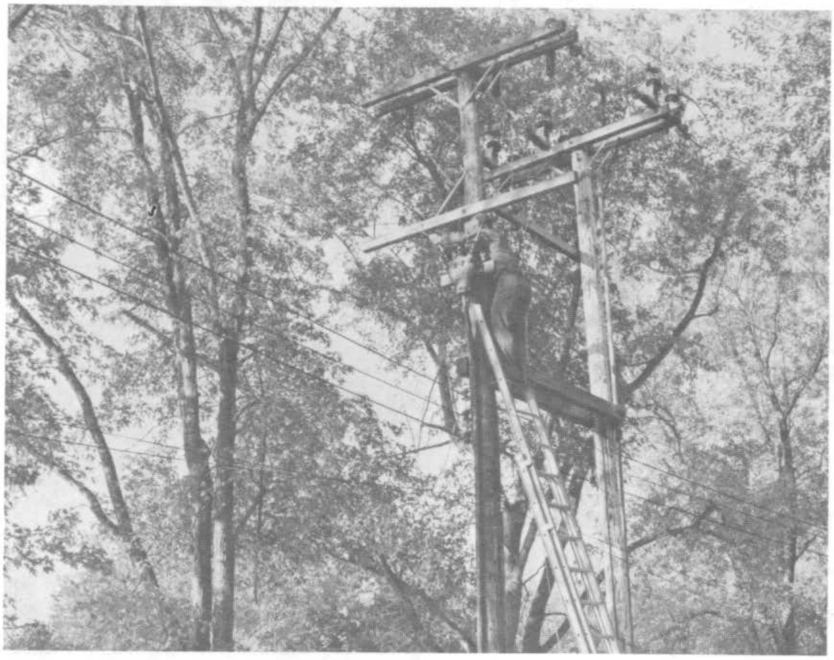

ILLUSTRATION 219. Lateral pole arrangement at southwest corner of memorial.

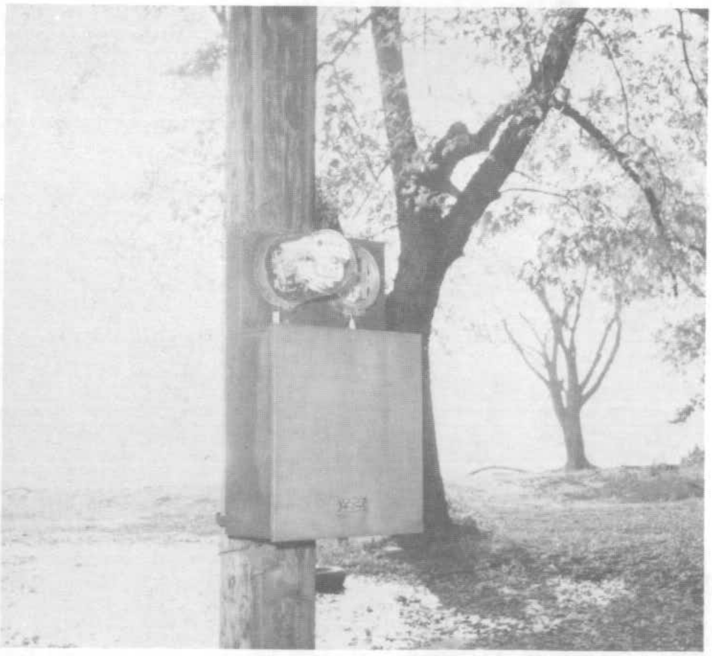

ILLUSTRATION 220. Ohio Edison Company Electric Meter.

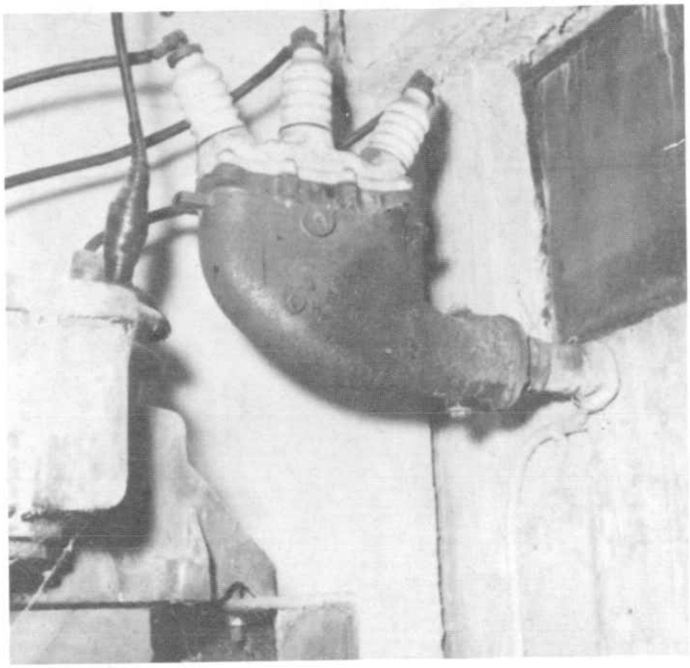

ILLUSTRATION 221. Incoming service wall mounted pothead. Note: Terminals should be tape insulated to prevent an arc over.

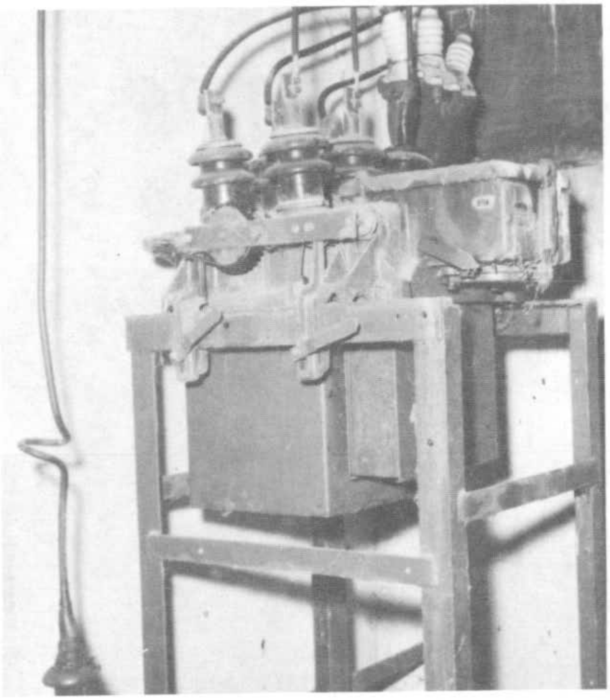

ILLUSTRATION 222. Incoming service oil circuit breaker.

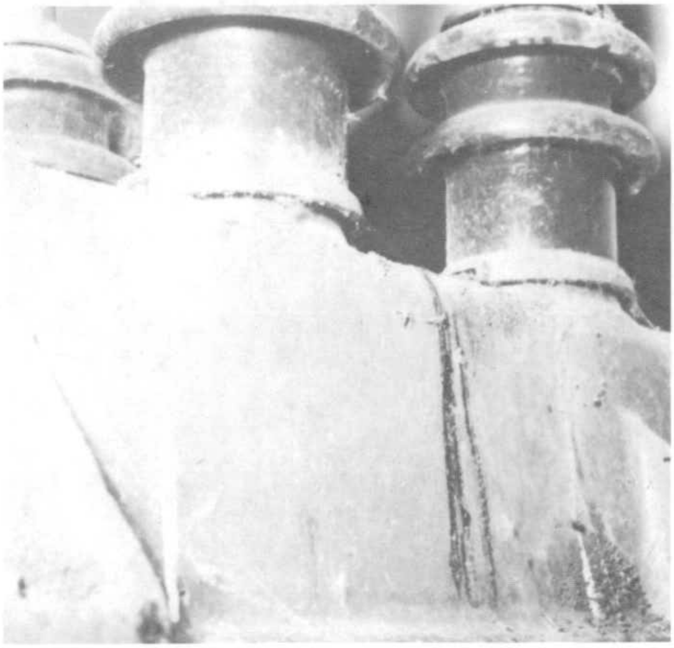

ILLUSTRATION 223. Main oil circuit breaker - insulators require cleaning.

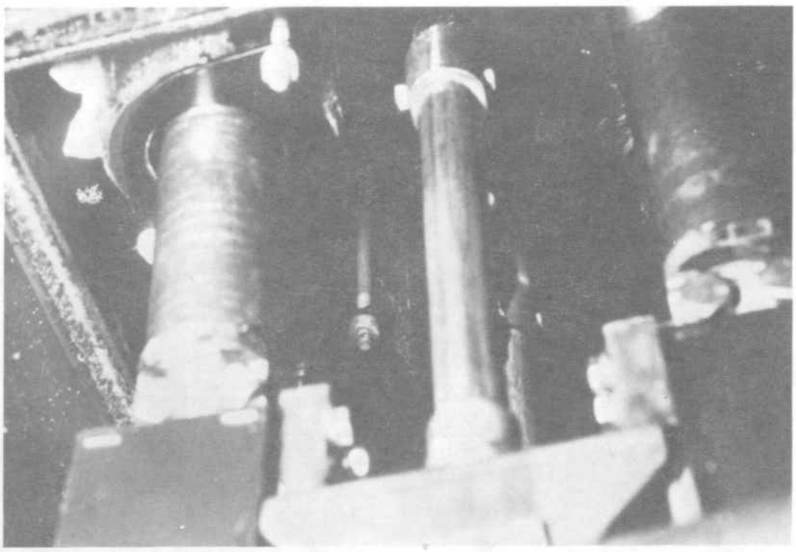

ILLUSTRATION 224. Main oil circuit breaker with oil pan lowered. Bushings inside should be cleaned.

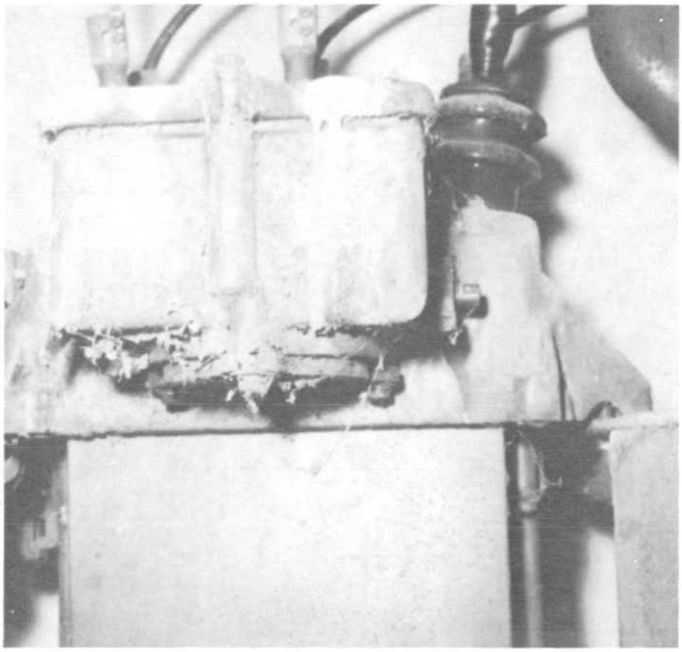

ILLUSTRATION 225. Main oil circuit breaker enclosure requires cleaning and painting.

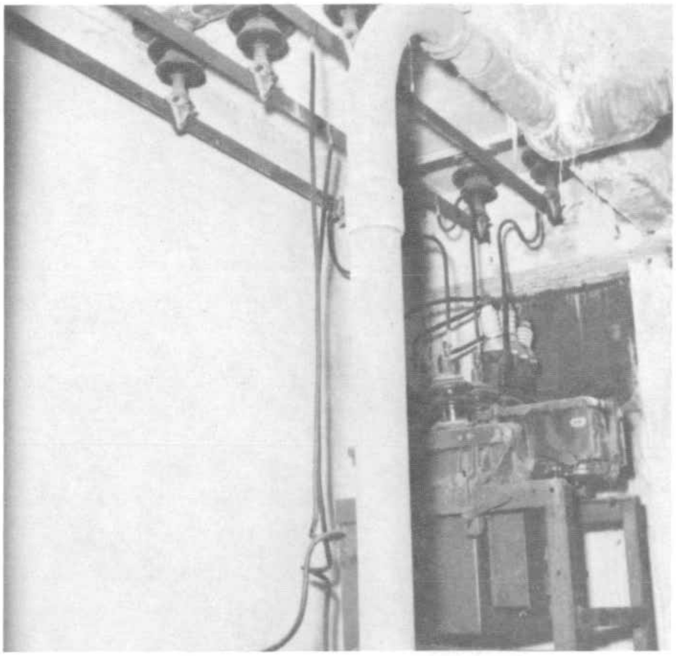

ILLUSTRATION 226. High voltage overhead exposed bus bars and main 120/208 volt feeder conduit.

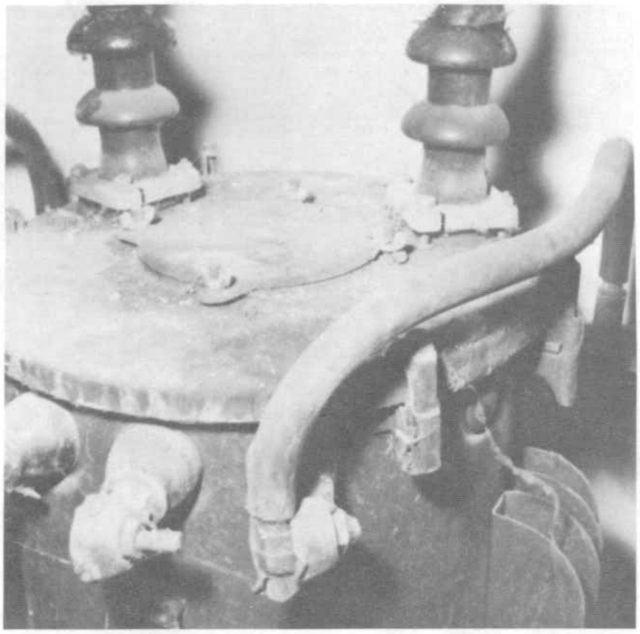

ILLUSTRATION 227. Typical transformer top. High voltage bushings are leaking and enclosures should be cleaned and painted.

ILLUSTRATION 228. Main transformer bank. Note: Terminals in front should be tape insulated.

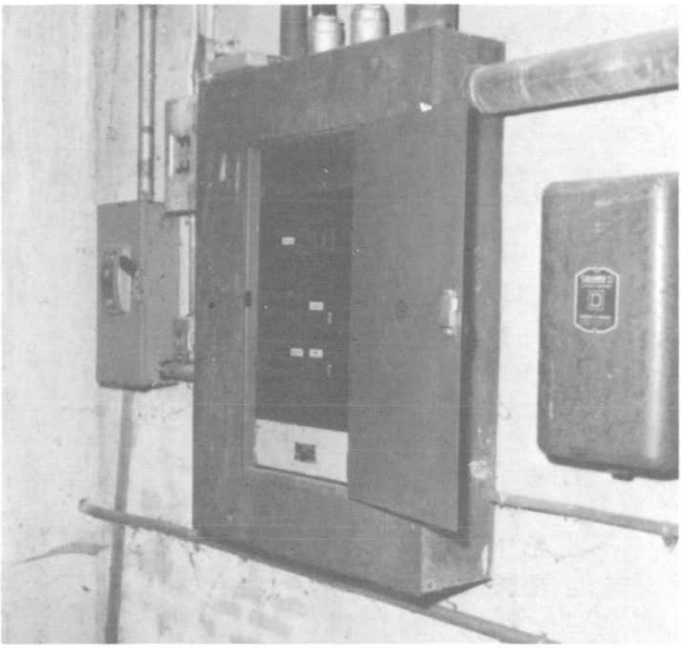

ILLUSTRATION 229. Main 120/208 volt 3-phase panelboard.

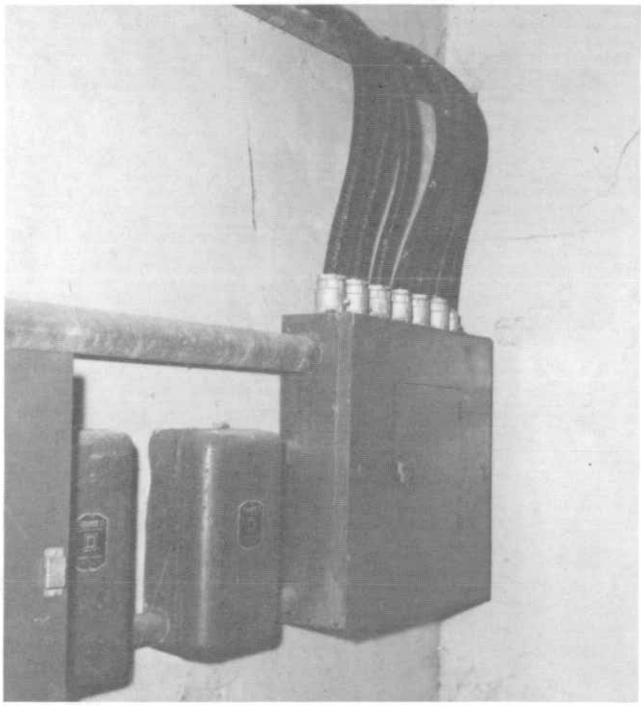

ILLUSTRATION 230. Floodlighting panelboard and contactors.

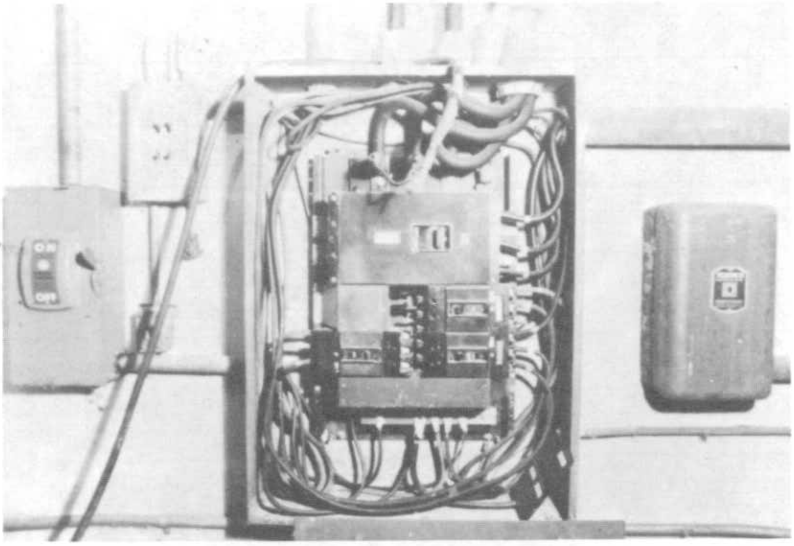

ILLUSTRATION 231. Main 120/208 volt panelboard with front cover removed. Enclosure should be cleaned and painted inside and out.

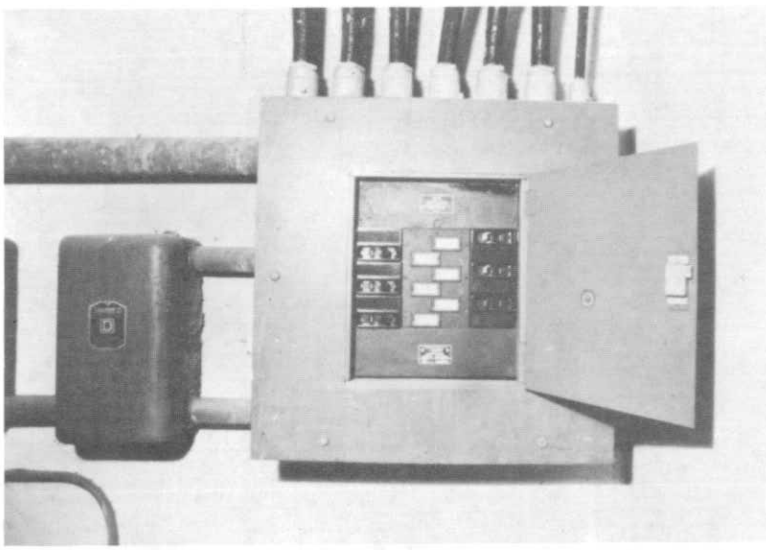

ILLUSTRATION 232. Floodlighting panelboard with door opened.

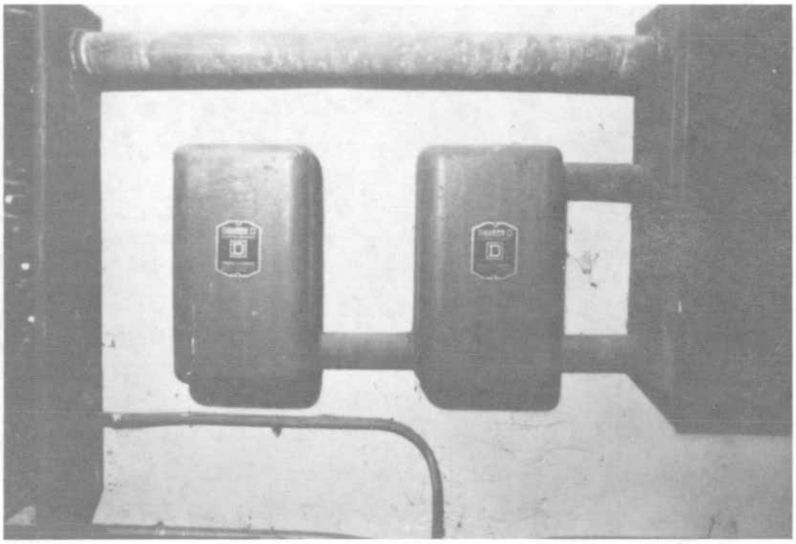

ILLUSTRATION 233. 100 amp 3-pole lighting contactors.

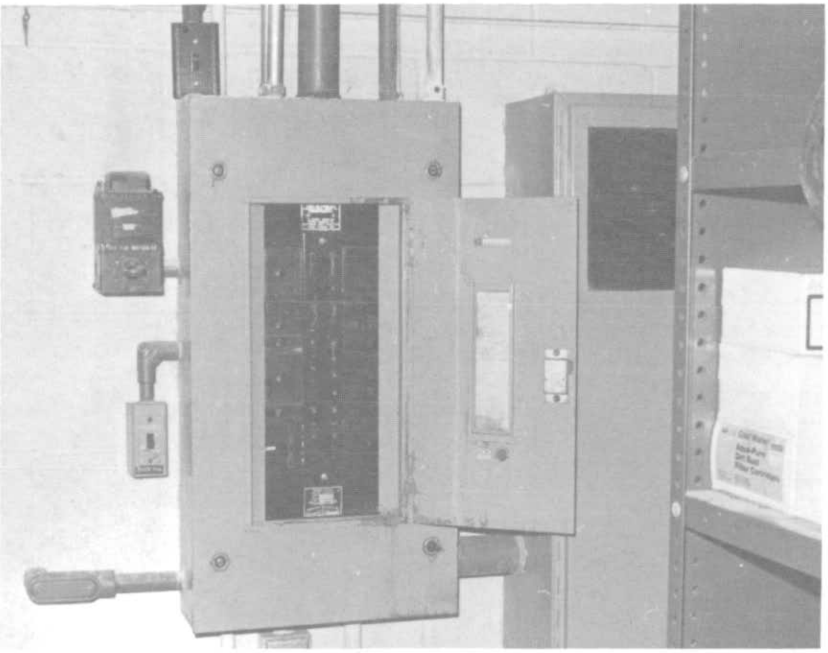

ILLUSTRATION 234. Mechanical room panelboard with door open.

ILLUSTRATION 235. Lower elevator landing panel location.

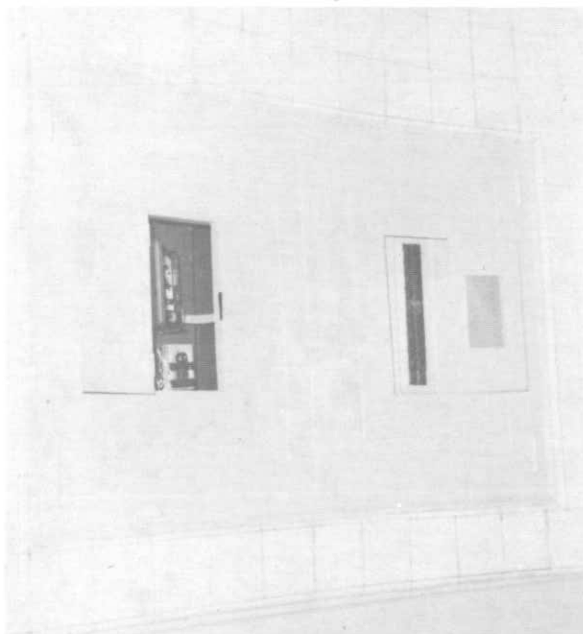

ILLUSTRATION 236. Time switch (at left) and lighting panel (at right) at lower elevator lobby.

ILLUSTRATION 237. Elevator disconnect switch at elevator machine platform. Note: Screening at left should have opening to provide access.

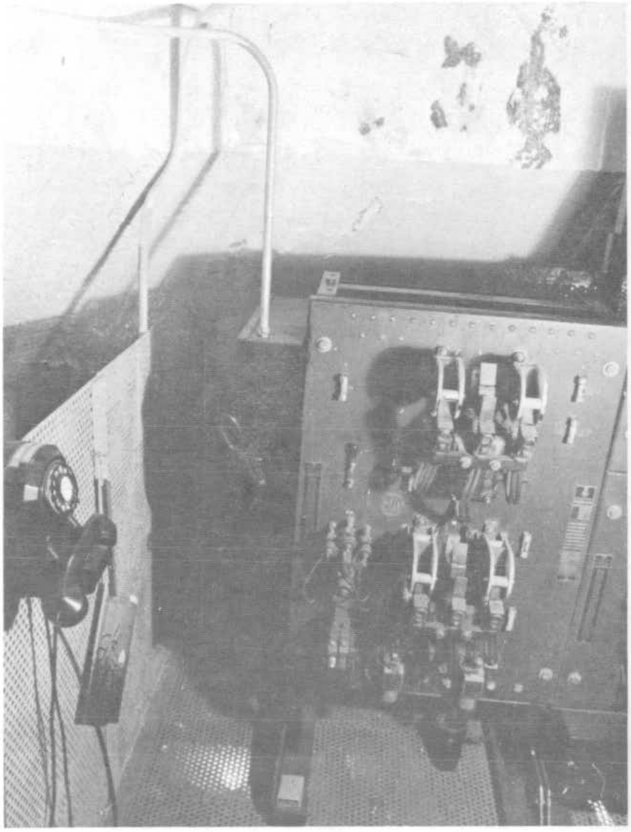

ILLUSTRATION 238. Elevator control panelboard.

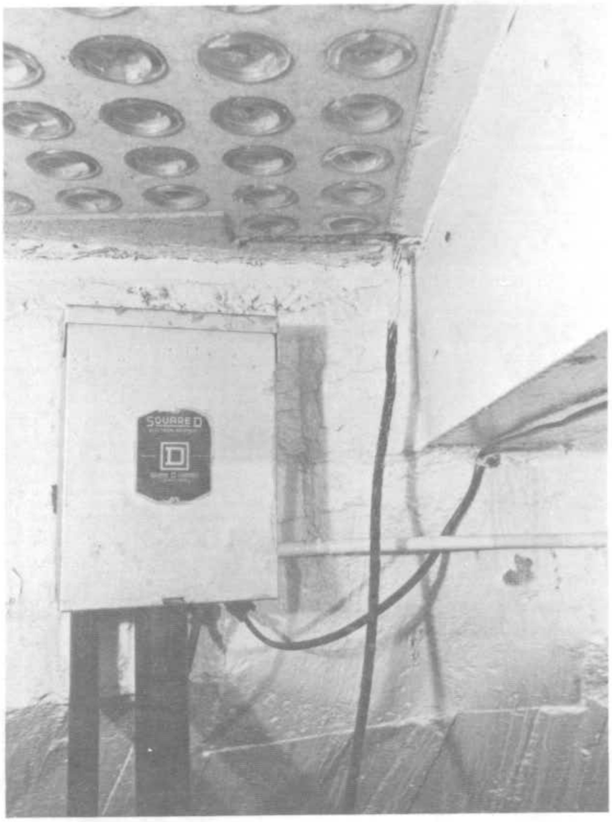

ILLUSTRATION 239. Lantern lighting panel at elevator machine platform.

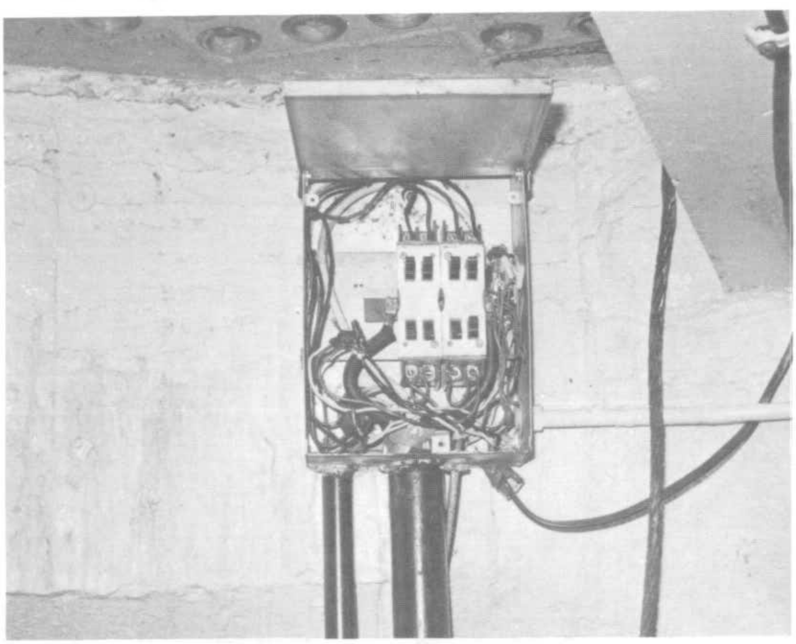

ILLUSTRATION 240. Lantern lighting panel with cover open. Note: Bare cable at right for lightning protection grounding of the lantern base.

ELEVATOR MOTOR GENERATOR SET

The elevator motor generator set was examined and insulation resistance tests were run on the elevator motor (D.C.), the generator exciter, and the A.C. Drive Motor.[15] High Voltage Maintenance Corporation recommends that the commutator, brush holder boxes, and all connections be cleaned and tightened.[16]

TRANSFORMER VAULT ROOM - GENERAL

The transformer vault room is located below the upper plaza on the west side of the Memorial. This room has an access door into the basement area and one to the electrical equipment pit extending outside of the basement wall. The equipment pit has a ladder for exterior access and a steel grating cover which is kept locked. The only other access to the basement area is through the mechanical room on the east side of the Memorial. Under these conditions, the transformer vault room serves as a ventilation passage for the entire basement area below the upper plaza. The high lake level condition has caused flooding, and the basement area is extremely damp and wet. This air passes through the transformer vault room and has contributed greatly to the rusted and corroded condition of the electrical equipment and wiring. It is therefore recommended that once the electrical equipment has been cleaned and painted, the inside and outside doors be closed and locked and the transformer vault room separately ventilated to the outside. The concrete walls, ceiling, and floor should be sealed and waterproofed to prevent further water infiltration from the upper plaza.[17]

LOW VOLTAGE FEEDERS - IN BASEMENT

The existing wiring from the distribution equipment in the transformer vault room is a system of exposed multiconductor tray-type cables suspended on an angle iron support system fastened to the roof structure of the basement. These cables are feeders to the floodlight banks, the elevator, and the interior lighting panels. The cables are in a wet, cave-like basement location. Calcium carbonate stalactites that result as water leaks through the upper plaza slab are constantly dripping water and calcium carbonate solution onto the cables (241). This had had a deteriorating

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[15]See High Voltage Maintenance Corporation test data, Appendix H, p. 7.

[16]See High Voltage Maintenance Corporation test data, Appendix H, p. 4.

[17]See Chapter 5, Electrical Room.

effect on all the tray-type exposed cables installed in the basement area. Further, the tray cable is improperly supported on the angle iron supports (242). According to the National Electric Code, a tray cable should be physically supported its entire length to prevent high stress concentrations and damage to the cable insulation and outer covering. It is recommended that an approved ladder-type cable tray system be installed and the defective feeders replaced. The feeder cables that were tested and found to be in adequate condition should have the outer coverings repaired with a vinyl-type tape where these jackets have been damaged. The incandescent lighting fixtures hanging from the bottom of the angle support system should be moved and independently suspended. In addition, the feeder in conduit which supplies the boiler room panel should be moved and independently supported from the tray system.

LIGHTNING PROTECTION SYSTEM

The existing Memorial lightning protection system is in two parts. The first is the bronze lantern lightning protection and grounding; the second is the observation gallery and the elevator penthouse. Four 6-inch air terminals are fastened to the access hatch of the glass skylight at the very top of the lantern (243) and are grounded through the steel framework of the lantern when the hatch is bolted in place. The base of the lantern is grounded in two places by a copper "down" conductor which is wrapped around two of the legs, goes through the penthouse roof to a bolted connection to the elevator structural support steel. The elevator steel above the rotunda area is then, theoretically, grounded (by means of a disconnected drain pipe) to a ground rod in the basement.

The problems with this system start here, at the top. The four lightning points at the top hatch are not long enough. They should be 18 to 24 inches long instead of 6 inches. There should be a minimum of six air terminals at the base projection of the lens-shaped roof of the lantern to produce a "cone-like" shield across the glass (247). These air terminals would be visible from the observation gallery. Fastening air terminals to the structural steel of the lantern is an acceptable method of grounding; however, grounding the base by wrapping the "down" conductors around two lantern legs is an unacceptable wiring method for this application (244). It is not a positive connection, and it unfortunately makes the decorative bronze sheet metal of the lantern legs the current-carrying conductor. The "down" conductors (two are required by the National Electric Code) should be an approved bolted or cadweld type connection to the structural steel inside the lantern legs (245). Using the elevator structural steel inside the column as a "down" conductor is an acceptable wiring method; however, this steel ends above the rotunda and is not properly referenced to ground (earth potential) into the basement area. The ground conductors that do exist are not connected to the ground rod visible in the basement area. The grounding of the elevator support steel that does exist is actually through the damp and wet concrete of the rotunda, the column, and to the column support footers in the basement. This is not acceptable. To insure proper reference to earth potential (ground), there should be two approved Code-size "down" conductors from the elevator support steel at the rotunda area to two ground rods and/or the municipal water supply pipe in the basement space. The high resistance (due to the insufficient air terminal length), the number of air terminals, and connections to earth potential (ground), produce a high corona and heating effect across the glass of the skylight, causing it to break and crack.

The existing lightning protection of the observation gallery and the elevator penthouse consists of 1/4" x 1-1/2" solid aluminum bar stock (246) run exposed approximately two inches from the edge of both the observation gallery perimeter and the elevator penthouse roof. Each aluminum grounding bus has one-inch air terminals fastened to it and is grounded to the elevator support steel by a single conductor. As previously noted, the elevator steel is not properly grounded at the rotunda level; furthermore, the ground conductors from the aluminum grounding buses are not of sufficient size for this purpose. The use of the aluminum bus as a conductor material is acceptable, but there should be two grounding conductors (as specified by National Electric Code) from each grounding bus system at the observation gallery and at the elevator penthouse to a positive and acceptable grounding system in the basement area. Some of the aluminum bus-to-bus connections were loose and corroded. All these connections should be thoroughly cleaned and bolted together with stainless steel bolts.[18]

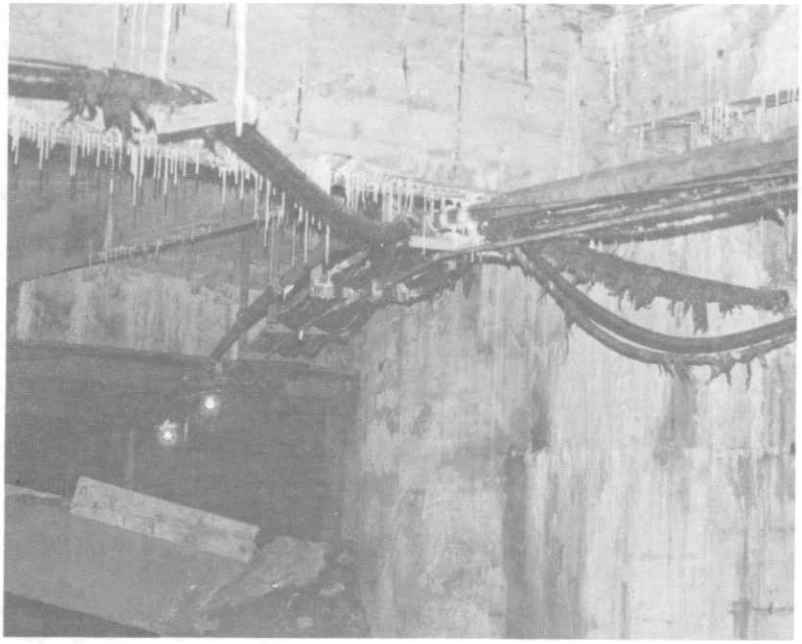
GROUND FLOODLIGHTS

Observations

The floodlighting for the exterior illumination of the column consists of five banks of floodlights located at grade level around the base of the Memorial. There are thirty-four 1000 watt, 120 volt incandescent lighting fixtures mounted in banks of floodlights, with seven fixtures per bank at the northwest, northeast, southwest and southeast locations and six at the

[18]For further information on the lightning protection system of the Memorial, refer to the report of the Western Reserve Lightning Rod Company, which is included in Appendix J.

ILLUSTRATION 241. Low voltage feeder runs in basement. Note damaged outer coverings.



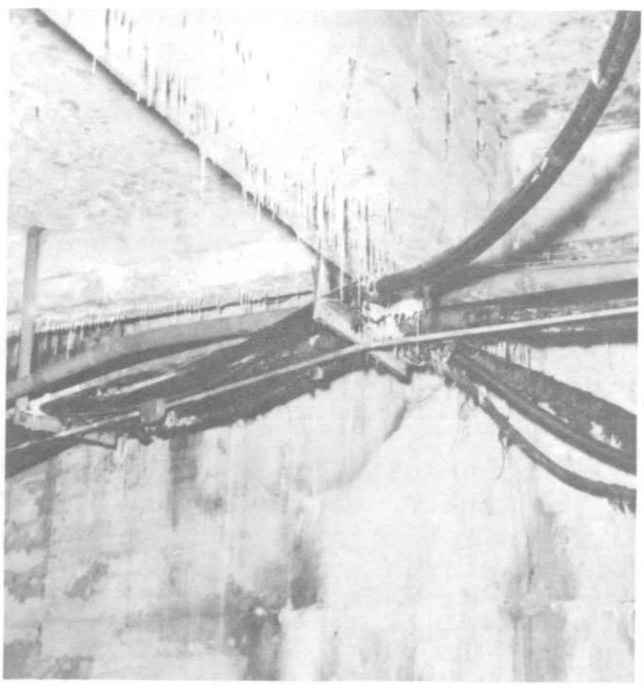


ILLUSTRATION 242. Low voltage feeder cables. Note improper cable supports.

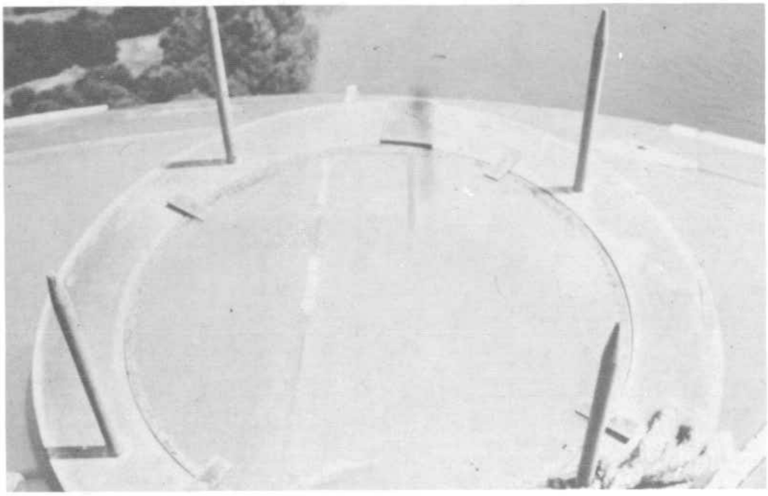
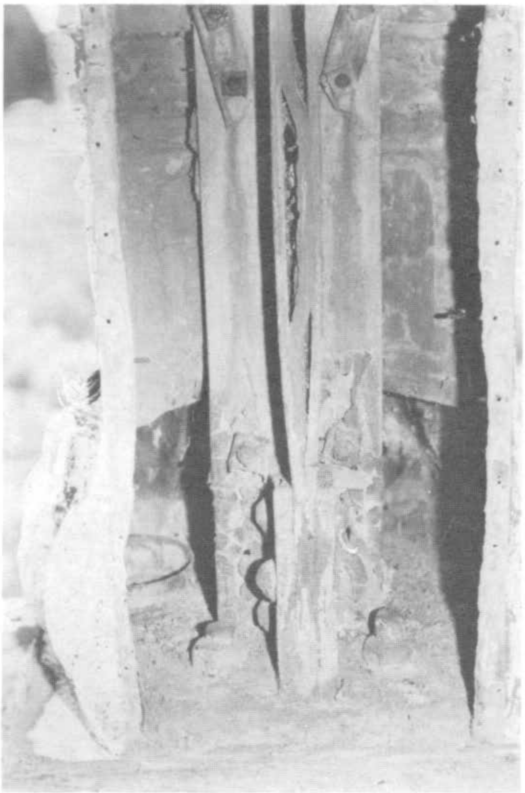


ILLUSTRATION 243. Lightning points on top of lantern hatch.

ILLUSTRATION 244. Typical (unacceptable) grounding of lantern base.

ILLUSTRATION 245. Grounding "down" conductors should be a bolted or cadwell type connection to structural steel inside lantern leg.



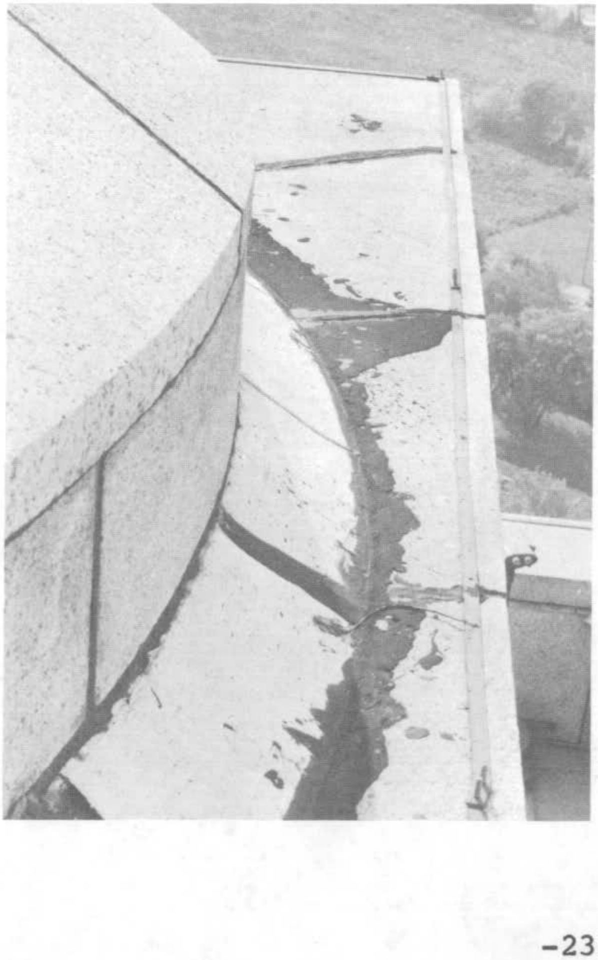


ILLUSTRATION 246. Typical lightning bus at elevator penthouse.

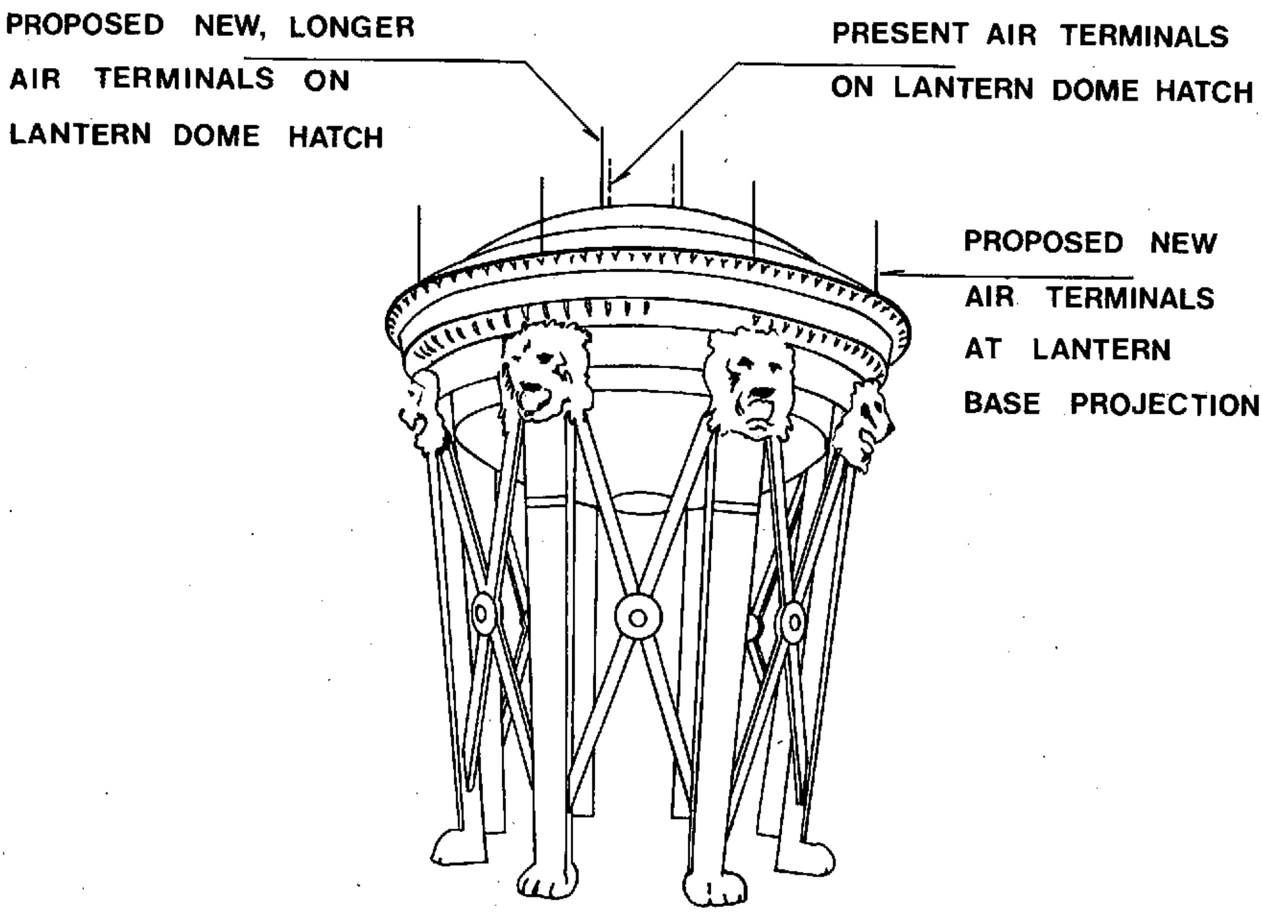


ILLUSTRATION 247. Drawing of bronze lantern with proposed air terminals.

south. These fixtures were installed in 1928. It is impossible to obtain replacement parts for these fixtures.

The original lenses of the fixtures are the clear type, but due to the unavailability of parts, twelve of the thirty-four lenses are replacement types that do not match the original (249, 250). Three of twelve are the diffused-type lens, the others are the coarse-stippled type. Six of the original clear lenses are cracked or broken, and one of the replacement coarse-stippled type lenses is cracked. Cracks in the lenses allow moisture to collect inside, and the water vapors tend to cause early lamp failures. In summary, of the 34 lenses in use, 18 are unsuitable for functional or historic purposes (250) either because they are not the original type or because they are cracked and broken. Since replacement lenses are not available, a mold would have to be made at a cost of approximately $5,000 (see Ground Floodlights cost estimate at end of this chapter) to produce new lenses. This mold would be the property of the National Park Service and would have to be stored and shipped by the National Park Service to a lens manufacturer whenever new lenses were needed.

The lighting fixtures in each bank location are mounted on a fabricated steel framework which at the present time is located too close to the grade level. The high water level of the lake in recent years has sometimes flooded the lower rows of fixtures at the northwest, northeast, southwest and southeast locations, making it necessary for maintenance personnel to dismantle and clean out some of the fixtures before they could be put back into proper operating condition. Some of the wiring has had to be replaced because of defective branch circuit breakers in the locally mounted panels. These breakers are not protecting the conductors safely when the fixtures accumulate water and moisture. The floodlights are readily accessible to unauthorized persons who vandalize the fixtures or turn them out of adjustment. To restrict access, maintenance personnel have had to install a steel brace from each fixture base to the fabricated steel framework.[19]

Recommendations

To retain the existing banks of floodlights for present and future lighting of the Memorial, certain repairs and alterations will have to be made to insure safe and reliable operation. The fixtures themselves require complete refurbishing. The aluminum housings should be dismantled and thoroughly cleaned, possibly by sandblasting, and all adjustment screws and fasteners repaired or

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[19]See Appendix H, Photo 8a.

replaced for proper lamp-to-reflector adjustment. The fabricated steel support frames will have to be raised to keep water out of the lower rows of fixtures and the circuit breaker boxes. The circuit breaker boxes are in poor condition and do not serve to safely protect the branch conductors (248). They should be replaced. A mold will have to be specially made to produce lenses for present and future use. It should be noted that any replacement part necessary for refurbishing or routine maintenance of the fixture will have to be specially made since manufacturer's replacement parts are no longer available. To minimize damage caused by vandalism and/or normal tourist use, a fence should be installed around each bank of floodlights.

Another problem is that visitors leaving the upper and lower plazas at night via the steps receive a blinding glare from the northwest and northeast floodlights. This glare can be reduced by raising these two banks of floodlights to a level equal to or higher than the upper plaza level; however, this remedy may be objectionable from an historical standpoint. Another remedy would be to move the lights to the rear (south) of the Memorial. This is not an ideal solution because it will cause a dark spot (shadow) on the front of the column. The present locations were selected for an even distribution of light on the front, and changing them can cause a shadowing effect on the column shaft. The southwest and southeast locations require the use of the south floodlight bank for an even distribution, and, likewise, the northwest and northeast (if moved back), would require an additional bank of floodlights to the north on the upper plaza.

Alternate Exterior Illumination of the Column

The use of incandescent fixtures for exterior building floodlighting is very inefficient. The present system has thirty-four 1000 watt incandescent fixtures requiring 34.0 Kwh (kilowatts per hour) of electrical energy. More effective and efficient illumination can be provided with an H.I.D. (high intensity discharge) type light source. The metal halide type lamp was selected here for comparison instead of mercury vapor or high pressure sodium type lamps because of its superior natural color rendition. The 1000 watt incandescent lamp presently used has a lumen output of 19,800; in comparison, a metal halide lamp of 1000 watts has a 82,500 lumen output. The incandescent 1000 watt lamp has a lamp life of approximately 800 hours, while the metal halide has a lamp-life of 10,000 hours. The metal halide lamp will last up to 12.5 times longer than the presently used incandescent. From an energy conservation standpoint, the existing 34 incandescent fixtures that consume 34.0 Kwh of electrical energy could be replaced with 12 metal halide luminaires that consume only 13.2 Kwh. The metal halide luminaires, while consuming 61 percent less electrical energy (252), can produce equal or better lighting level and light distribution than at present.

Our sample calculation assumed four lighting locations--at the northwest, northeast, southwest, and southeast--at 90 degree positions to one another. At each location, three 1000 watt metal halide luminaires would be mounted on poles slightly higher than the upper plaza and 150 feet from the base of the column. The photometrics used for calculation were those of a Holophane "Vectorflood," which is a round "can-type" luminaire with a self-contained ballast. The three luminaires at each location would be aimed at different points up the column. The bottom luminaire selected would have a beam spread of 111 degrees by 60 degrees and be aimed approximately 16 degrees up from the horizontal axis (254). The center and top luminaires would have a beam spread of 47 degrees by 47 degrees and would be aimed at 40 degrees and 56 degrees up from the horizontal axis (255, 256). An initial average level of 5.9 footcandles could be attained while the maintained or mean average footcandle level would be 4.9 (253). This level of illumination can be raised or lowered by locating the poles closer to or farther away from the base of the column. To attain an even illumination level over the whole column, aiming would be done in the field by "fine adjusting" the aiming points. If H.I.D.-type luminaires replace the existing incandescent system, a computer-type lighting study should be made to evaluate different types of luminaires, wattages, distributions, locations, and aiming points to achieve the best results.

Conclusions

A new H.I.D. floodlighting system can be an advantage in terms of energy conservation, efficiency, economics, and future systemwide reliability. The existing incandescent floodlighting system can be retained, but the required refurbishing of the existing fixtures, the manufacturing of a mold for new lenses, the fences to protect the lighting banks, the relocation of two banks of floodlights to avoid the glare problem, and the new panels and wiring necessary for safe operation may do more to harm the historic value of the Memorial than would a change to a more efficient H.I.D.-type illumination.

BRONZE LANTERN LIGHTS

Observations

The existing lighting of the bronze lantern consists of thirty-seven 100 watt incandescent fixtures reflecting upward through the glass skylight-type dome at the top of the Memorial. The lights are Crouse-Hinds, "1" Condulets with 100 watt incandescent lamps, clear glass globes, and gaskets. (The glass globes and gaskets are the original type supplied with the fixtures.) The fixtures are mounted in a ring around the inside perimeter of the lantern (98). The lantern lighting panel at the elevator machine platform supplies four 15 amp, one-pole circuits to power the lantern lights. The panel is controlled by the same time switch used with the exterior ground bank of floodlights. The existing fixtures are in good and usable condition for present and future use.

Recommendations

Because of the inaccessible location (particularly in bad weather) and the difficulty involved in changing the lamps in the incandescent fixtures and maintaining them electrically, the bulbs should be replaced with 100 watt extended-life type lamps. The existing lamps have a lamp life of 750 hours. The extended life lamps have a lamp life of 2,500 hours, which is three times longer, although they deliver 16 percent less light lumen output.

Alternate Lantern Illumination

Consideration should be given to replacing the existing incandescent installation with H.I.D.-type luminaires. Because it offers the best color rendition, a 175 watt (200 watt with ballast) metal halide lamp was chosen as an example. The metal halide lamp has a lumen output of 14,000 initial and 10,300 mean average, with a lamp life of 7,500 hours. For even light distribution it is assumed that eight metal halide luminaires be used, spaced in the center of the eight existing glass panel sections of the skylight. These metal halide luminaires would produce a 26 percent greater light output with ten times the lamp life of the existing incandescent fixtures and 51 percent more lumen light output with three times the lamp life of the aforementioned extended life incandescent lamps. The metal halide luminaires not only would increase the lighting level and last three to ten times longer, but also would consume 56 percent less electrical energy. The metal halide type luminaires could be wired to the existing circuits presently used for the incandescent fixtures with no apparent problems.

BRONZE LANTERN FLOODLIGHTS - REMOVED

There were at one time four 250 watt quartz floodlights located at the corners of the observation gallery. They illuminated the penthouse roof and the bottom of the lantern. Installed in the early 1950s, these lights were removed sometime in the early 1960s probably because of the blinding glare to visitors in the observation gallery at night. The quartz floodlights that have been removed were fed from circuit breakers in the lantern lighting panel which are now left as spares (see 17 Lantern Lighting Panel).

EMERGENCY LIGHTING - COLUMN SHAFT

Observations

The existing column shaft stairway lighting consists of bronze lamp holders with screw-in 100 watt incandescent lamps, column-mounted at each stairway landing (257, 258, 259). Each of the four poured concrete columns for the support of the column shaft contains a vertical conduit run feeding the stairway lights on that particular column. Each conduit run is fed by its own circuit breaker in the lower elevator landing. The circuit breakers are labeled "northeast," "northwest," "southeast," and "southwest" according to the column row of lighting each supplies. The circuit breakers are 15 amp one-pole, and each feeds approximately 1,100 watts of stairway lighting. The existing lighting system provides an adequate amount of light and distribution for safe use of the stairway.

Recommendations

A power failure at any time leaves the stairway in complete darkness, and it would therefore be dangerous to use in an emergency. An emergency power system should be installed to operate the stairway lights in the event of a power failure. The most economical standby power system to install without damaging the historical value of the stairway would be a "zoned" type battery/contactor combination power supply. This system would require a monitoring panel at the lower elevator landing, located inside or flush-mounted in one of the cupboard type cabinets that already exist. The batteries and contactors would be wired into the lighting circuits after the existing circuit breakers so that each zoned circuit could be fused, monitored, and switched separately. Under normal operation, the A.C. circuits supply power to the lights and hold the contactors in a bypass position. Upon an A.C. failure on any individual zone or all zones, the contactors would be transferred to supply D.C. battery power to energize the lights. When normal A.C. power is restored in the individual zone or all zones, the contactor would reopen and disconnect the emergency battery supply. This system would require the use of four zones, wired to the northeast, northwest, southeast and southwest columns. These measures would maintain safe illumination and have little if any effect on the historic quality of the stairway.

Conclusions

The present column-mounted bronze lampholders with incandescent lamps are adequate for future use on a battery standby system. The bronze finish is corroded. If the present appearance is objectionable, the bronze finish could be cleaned and a clear acrylic coating applied to retain the finish.

PLAZA LIGHTING

Observations

The existing illumination for the approach steps and the upper and lower plazas at night is inadequate. There is no "designed-in" lighting of these areas except for four floor-mounted 100 watt incandescent fixtures located in the corners of the upper plaza. The only other lighting is the light spillage from the northwest and northeast banks of floodlights and the illumination they produce causes a blinding glare to those leaving the plazas and using the stairs.

Recommendations

A separate lighting system should be provided to illuminate the upper and lower plazas and steps. Pole-mounted 250 watt metal halide luminaires should be installed around the plaza walls, with six lighting poles along each side of the Memorial plazas and steps. This would provide a minimum illumination level for safe access to and from the Memorial at night and would also prove vandal-resistant. Another method of lighting the plazas and stairways would be to install bollard-type luminaires. This is a 3'-6" high and 9" round cylinder type luminaire with an H.I.D. lamp source. They are floor-mounted and can be installed around the column on the upper plaza and on the lower plaza to provide a safe glare-free illumination of these areas.

COAST GUARD NAVIGATIONAL LIGHTS

Observations

There are two navigational lights mounted on the northeast and southwest corners of the penthouse roof. They were installed under a periodically renewable permit issued in 1953 to the Coast Guard with a duration until 1995.[20] These two lights are approximately seven feet high with cast housings and vertical cylindrical

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[20] See Special Use Permits in ADMINISTRATIVE DATA.

lenses (261). The navigation light fixtures were probably originally designed for natural gas operation, but were converted to electrically operated incandescent lamps for installation on the Memorial. Guard rails are installed around each light for maintenance and safety purposes. The electrical service to the navigational lights is completely independent from the electrical service entrance that supplies power to the Memorial. The feeder originates at a utility company pole with meter on the southwest side of the Memorial and is run underground into the basement space below the upper plaza. From the basement space, the feeder is run in conduit above the rotunda and up (exposed) on the elevator structural steel to a control cabinet. The control cabinet and transformer are located on the first stair landing down from the upper elevator landing. A photocell mounted on one of the bronze lantern legs is used to control a contactor in the control cabinet to turn the lights "on" at night and "off" in the day (95). The controlled lighting circuits are taken from the control cabinet up through the elevator machine platform and penthouse roof to the navigational lights.

Recommendations

The navigation lights, the feeder, photocell and control cabinet are the property of and maintained by the Coast Guard. Since this system is not owned, operated, or maintained by the National Park Service and is not directly part of the Memorial, no separate electrical tests or inspections were made on the electrical integrity of this system. It is therefore recommended that the Coast Guard be required to test and submit test data of this system to insure proper and safe operation in the future.

Conclusions

At times, the Coast Guard navigational lights have been found detrimental to the historic and monumental values of the Memorial. However, in addition to serving as "a convenient outlook for the public from a high level,"[21] the Memorial was to serve navigational purposes. The scope of work for the original design states: "The Memorial will consist of a shaft of considerable height, bearing, as an aid to navigation, if the designer wishes to include it, a light of the first order."[22] It is assumed that at that time (1911) the Memorial was to be an aid to navigation primarily for watercraft. Today, in addition to the heavy watercraft usage in this area, commercial airline routes use this area, and an air field (less than one and one-half miles away) is used by both

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[21] See the Extract, Program of Competition in HISTORICAL BACKGROUND OF THE MEMORIAL AND ITS CONSTRUCTION.
[22] Ibid.

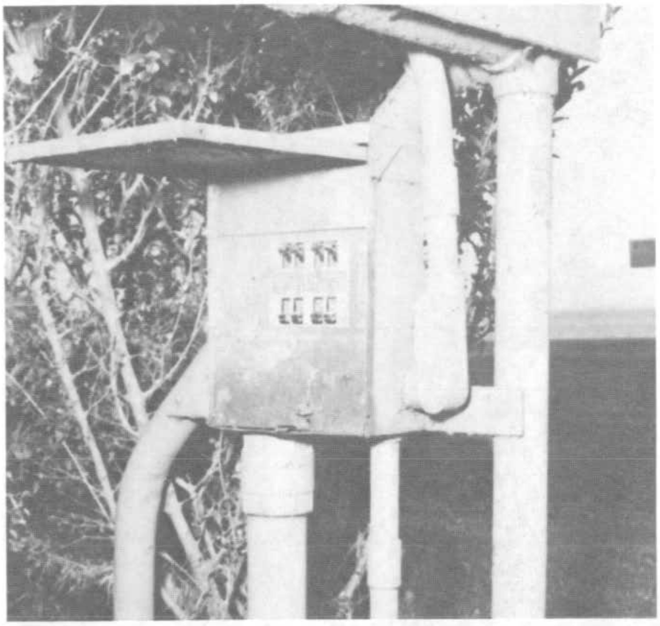


ILLUSTRATION 248. Typical floodlight bank branch circuit panelboard.

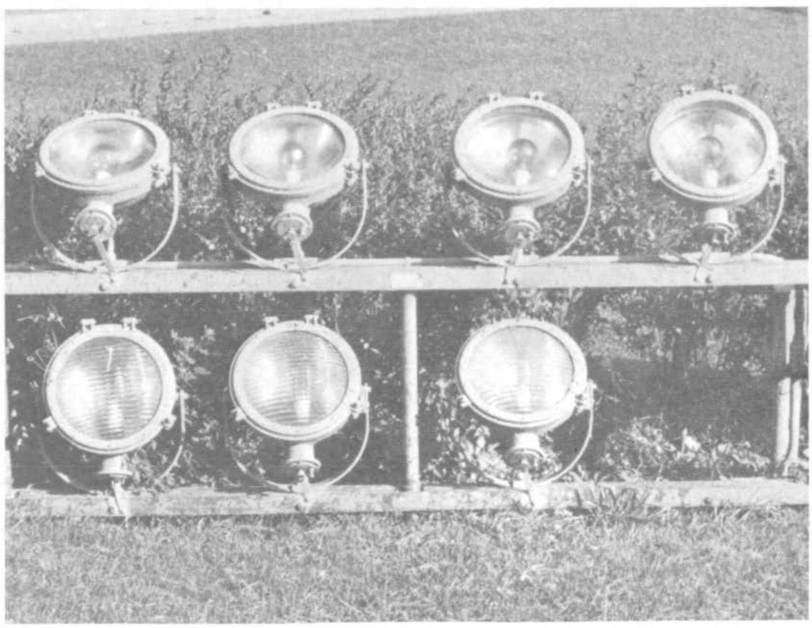


ILLUSTRATION 249. Northeast floodlight bank. Note stippled replacement lenses in bottom row.

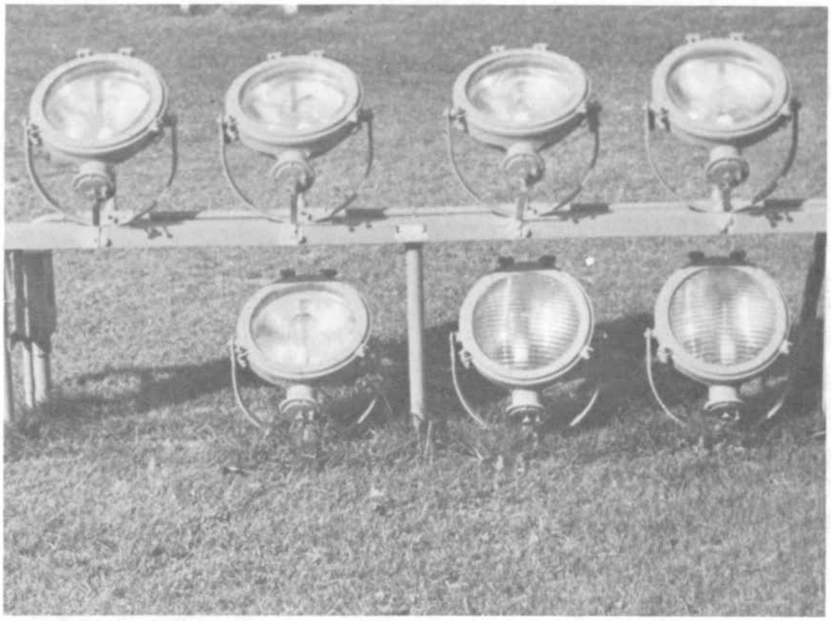


ILLUSTRATION 250. Northwest floodlight bank. Note cracked lens at top row, second from right, and stippled replacement type lenses bottom row.

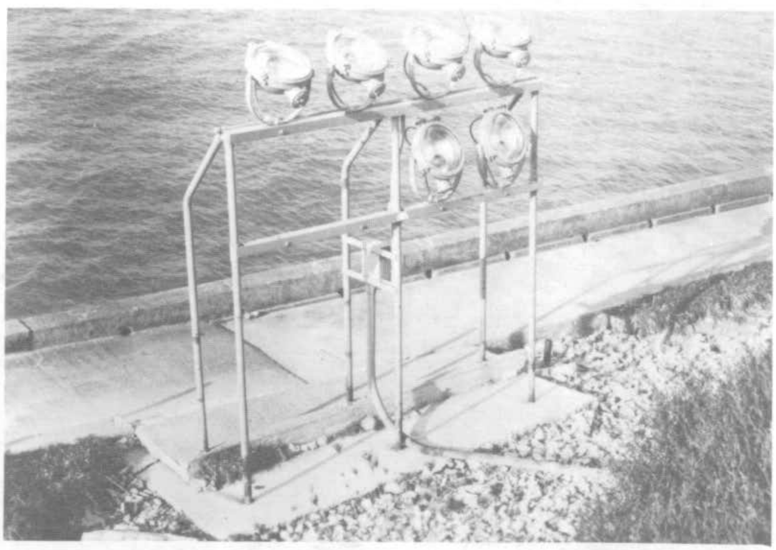


ILLUSTRATION 251. South floodlight bank.

SEE FOOTNOTE	COMPARED SPECIFICATIONS	EXISTING 1000 WATT INCANDESCENT	1000 WATT METAL HALIDE
	No. of lamps required	34	12
1	Lumens per lamp (INITIAL)		100,000
1	Lumens per lamp (AVERAGE)	19,800	82,500
1,3	Total available lumen output	674,000	990,000
1	Rated hours - lamp life	800	10,000
1	Cost of replacement lamps (EA.)	$ 18.00	$ 76.50
4	Cost of replacement lamps (TOTAL)	$612.00	$918.00
2,5	Cost of lamps/hour (TOTAL)	$ 0.765	$ 0.092
6	Electric energy required per lamp	1000 WATTS	1100 WATTS
7	Electric energy required - TOTAL	34.0 Kwh	13.2 Kwh
8	Amount of saved energy	———	20.8 Kwh
9	Percent of saved energy	———	61%
	Extended lamp life	———	12.5 : 1

FOOTNOTES:

1. Based on SYLVANIA LAMP ORDERING GUIDE 75-1.
2. Cost shown is actual lamp cost per operating hour only and does not include electrical energy consumption.
3. No. of lamps x Lumens per lamp.
4. No. of lamps x Cost of replacement lamps (EA.).
5. Cost of replacement lamps (TOTAL) ÷ Rated hours (lamp life).
6. Values for H.I.D. lamps + ballast.
7. No. of lamps x Electrical energy required per lamp. (Kwh = Kilowatts per hour)
8. Incandescent required energy - H.I.D. required energy.
9. Amount of saved energy ÷ Incandescent required energy.

ILLUSTRATION 252. Table of compared specifications between existing incandescent floodlighting to an H.I.D. lamp source.

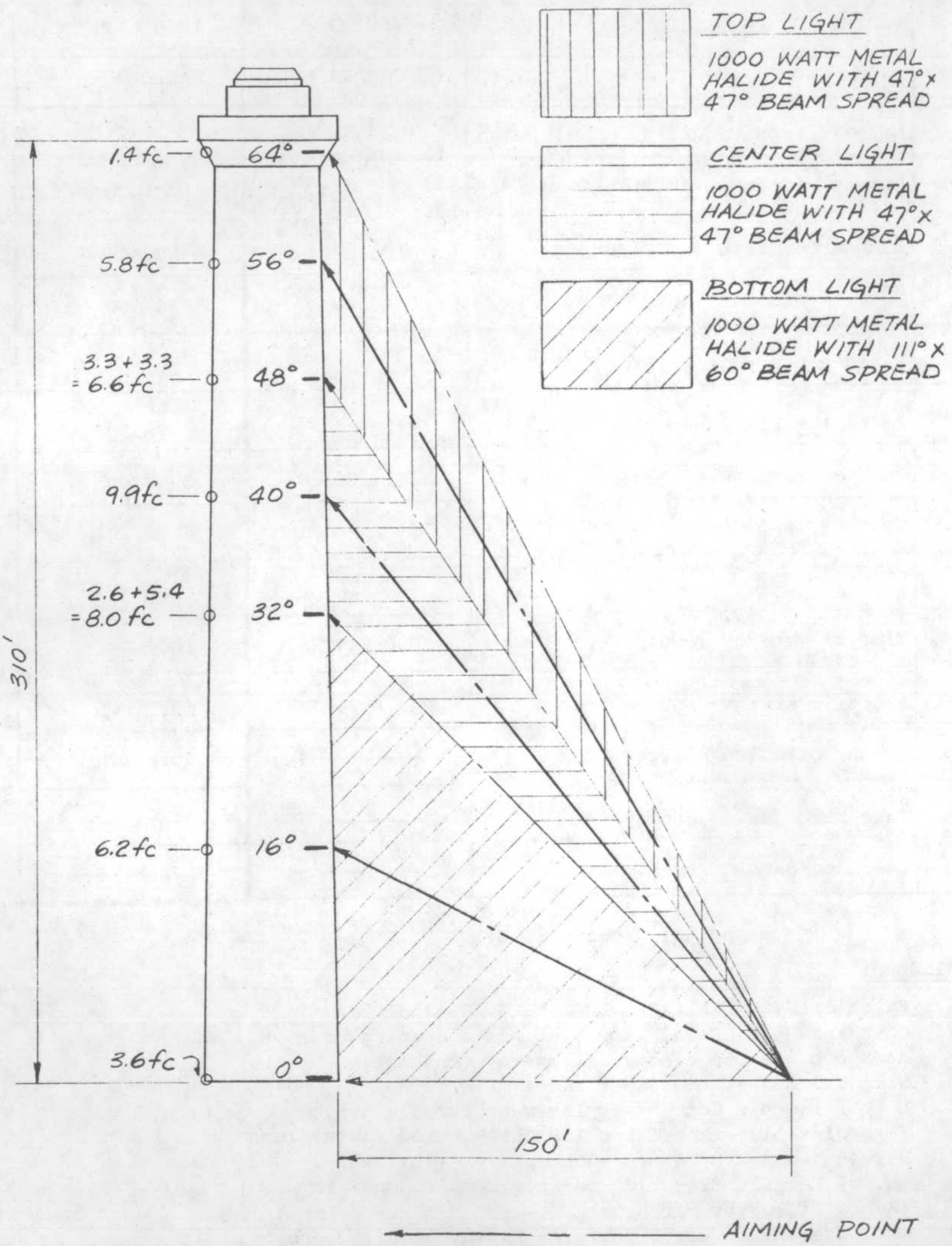


ILLUSTRATION 253. Sample lighting distribution of an H.I.D. type floodlighting luminaires.

$$fc = \frac{(\text{CANDLEPOWER @ ANGLE})(\cos^3 \phi)}{d^2}$$

$$fc \text{ @ } 0° \ (-16°) = \frac{92000 \times .888}{150^2} = 3.6 \ fc$$

$$fc \text{ @ } 16° \ (0°) = \frac{152000 \times 1.0}{156^2} = 6.2 \ fc$$

$$fc \text{ @ } 32° \ (+16°) = \frac{92000 \times .888}{176^2} = 2.6 \ fc$$

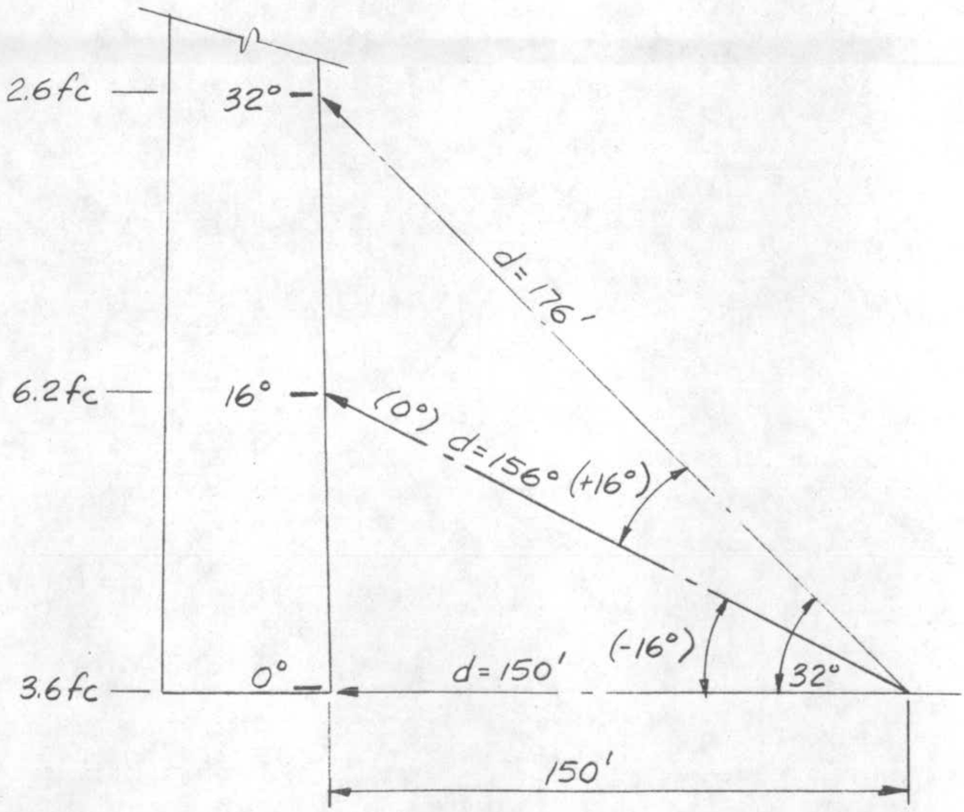


ILLUSTRATION 254. Sample H.I.D. luminaire calculation: bottom light, 1000 watt metal halide with 111^{o} x 60^{o} beam spread.

$$fc = \frac{(\text{CANDLEPOWER @ ANGLE})\,(\cos^3 \phi)}{d^2}$$

$$fc \text{ @ } 32^\circ\ (-8^\circ) = \frac{172000 \times .971}{176^2} = 5.4\ fc$$

$$fc \text{ @ } 40^\circ\ (0^\circ) = \frac{380000 \times 1.0}{195^2} = 9.9\ fc$$

$$fc \text{ @ } 48^\circ\ (+8^\circ) = \frac{172000 \times .971}{224^2} = 3.3\ fc$$

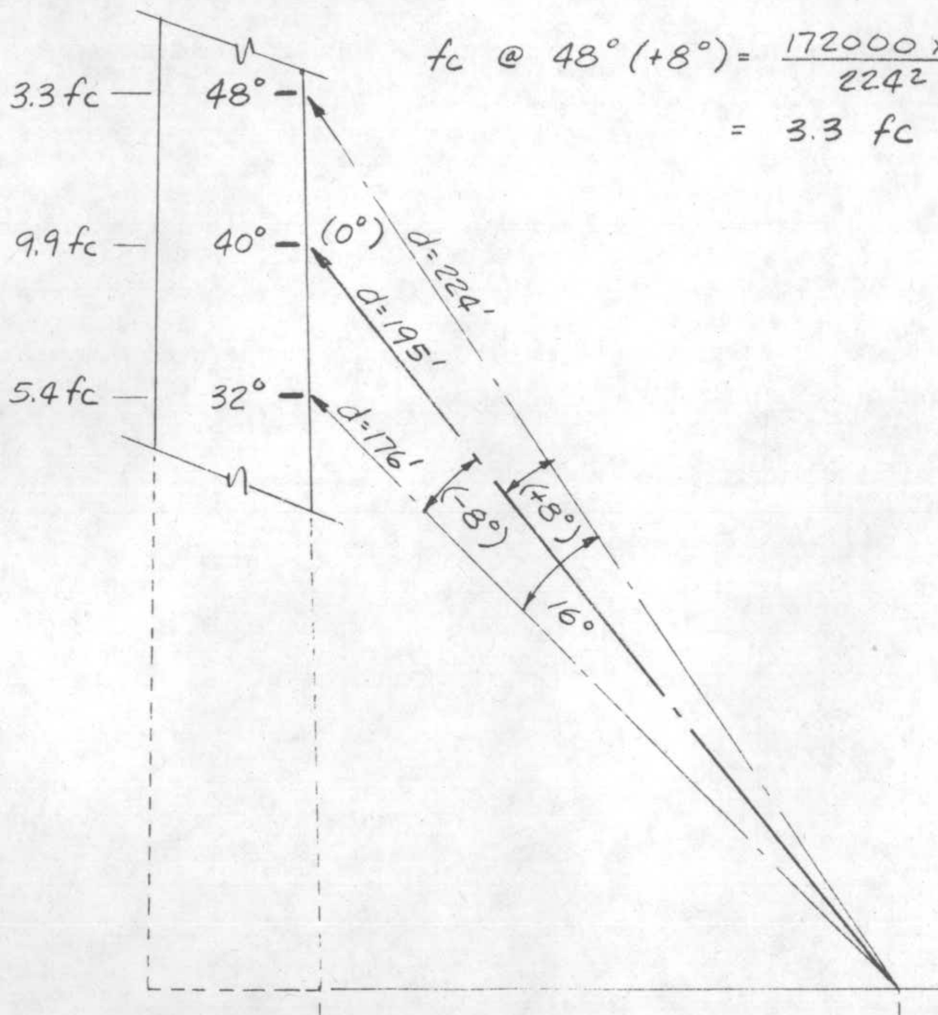


ILLUSTRATION 255. Sample H.I.D. luminaire calculation: center light, 1000 watt metal halide with $47^\circ \times 47^\circ$ beam spread.

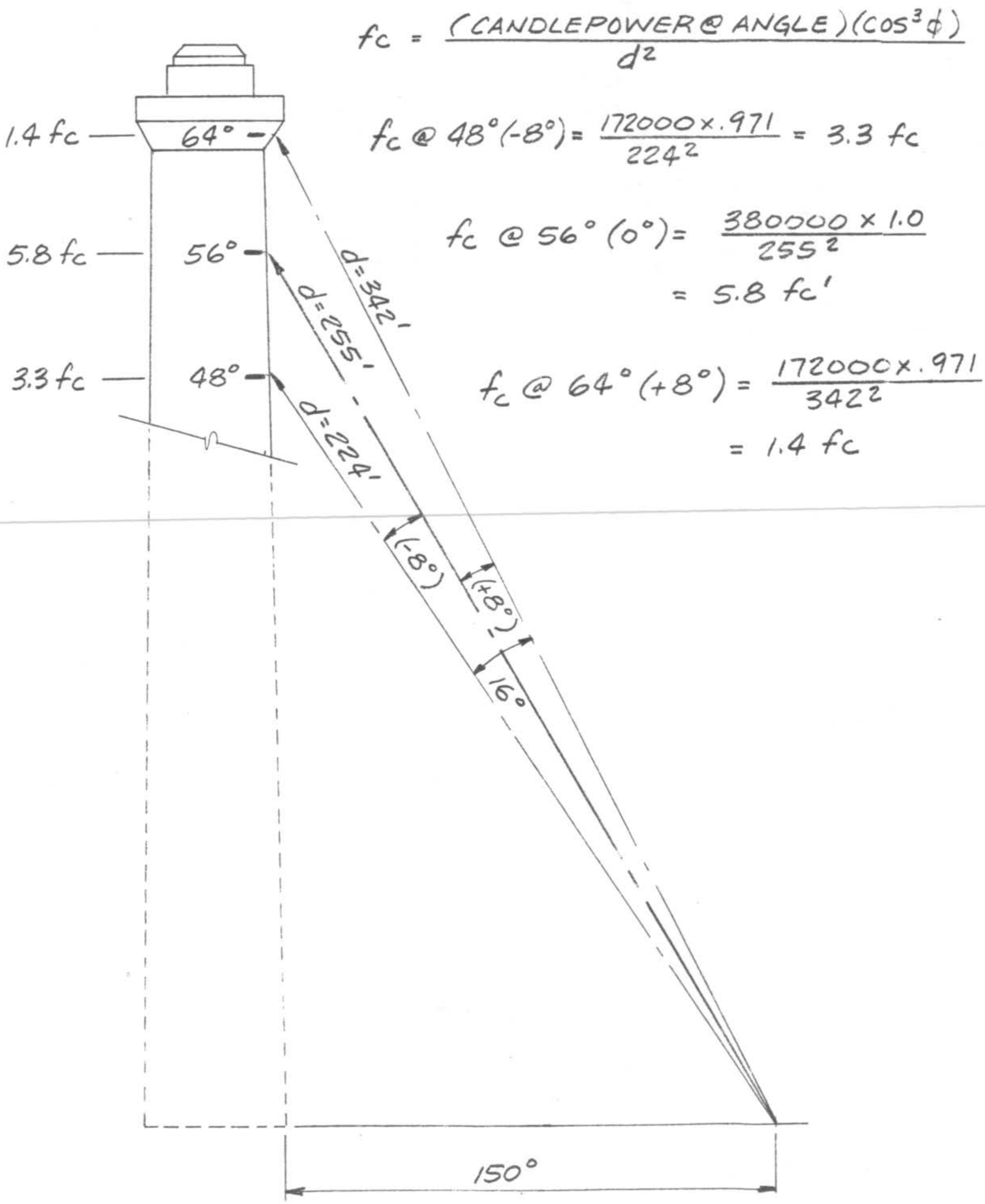


ILLUSTRATION 256. Sample H.I.D. luminaire calculation: top light, 1000 watt metal halide with 47^O x 47^O beam spread.

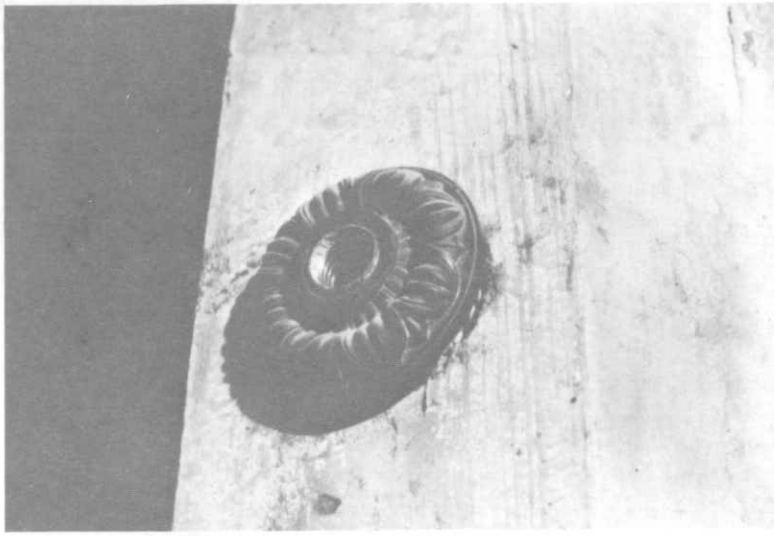


ILLUSTRATION 257. Typical bronze lamp holder for column stairway lighting.

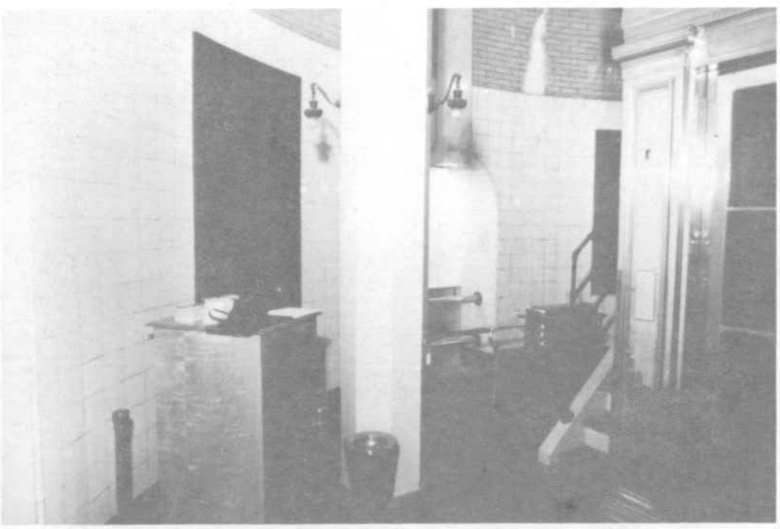


ILLUSTRATION 258. Lower elevator landing. Note column-mounted bronze lamp holders.

ILLUSTRATION 259. East side of lower elevator landing.

ILLUSTRATION 260. Existing elevator. Note emergency battery lighting unit in rear.

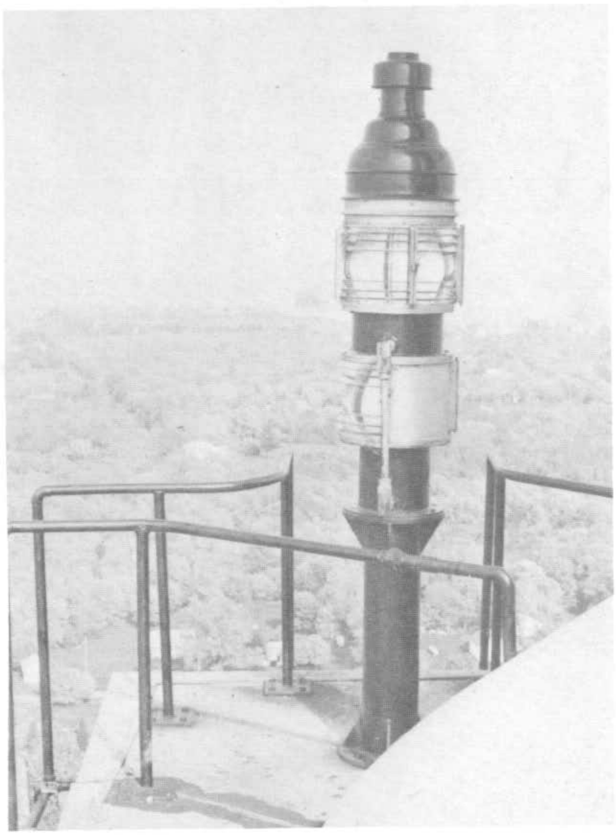


ILLUSTRATION 261. Typical navigation light mounted on the penthouse roof.

private and commercial light aircraft. As the highest point for miles around, the Memorial will have to be considered for use as a navigational aid. If the present lights are judged detrimental (because of their size and location) to the historic and monumental values of the Memorial, it is suggested that the National Park Service discuss with the Coast Guard replacing the lights with smaller, less obtrusive navigational lighting fixtures. The illumination of the bronze lantern skylight and/or floodlighting the column shaft is scheduled only on a limited basis (one hour per night) and present lighting is not satisfactory for navigational light and could not be considered adequate.

COST ESTIMATE

An estimate of the cost of the work recommended under this chapter is as follows:

Distribution System

1.	Clean potheads, insulators, and tape insulate	$ 150
2.	Cleaning, painting and overhauling of oil circuit breaker	600
3.	Cleaning of overhead exposed bus work	150
4.	Cleaning, taping, painting and repair of leaking bushings on three transformers	600
5.	Cleaning and painting of enclosures and cleaning of bus connections of main 120/208 volt panelboard and floodlighting panelboard	600
6.	Cleaning and tightening of connections of elevator control panelboard and elevator motor generator set	500
7.	Miscellaneous work in transformer vault room	400
	Subtotal	$3000

Note: It is recommended that the work shown above be done by a company specializing in maintenance, testing and repair of electrical equipment rather than by a "new construction type" electrical contractor.

8. Repair of feeder cable jackets by taping and addition of additional cables supports to existing — 3000

Note: This can be done by an electrical contractor or a company specializing in maintenance and testing.

9. Hinging of the screening at the elevator disconnect switch — 100

10. Cleaning of time switch — 25

11. Replacement of five floodlight panelboards at $500.00 each — 2500

12. Replacement of feeder to northeast floodlight — 2500

13. Installation of new ladder-type cable tray support system — 2500

Total $13,625

<u>Lightning Protection System</u>

1. Updating of lightning protection system including
   - longer points on top
   - additional points around perimeter of lantern
   - proper connections at lantern base to elevator steel
   - reconnecting observation gallery ground points to grounding system, and
   - connection to two grounding paths in basement space.

Total $6000

Note: It is recommended that this work be done by an approved lightning protection specialist.

Ground Floodlights

1.	Reconditioning of existing floodlights	
-	Mold for lenses[23]	5000
-	Replacement lenses - 18 at $40 each	720
-	Replacement lamps - 34 at $18 each	612
-	Refurbishing of housings - 34 at $225 each	7650
-	Cleaning and painting of steel framework - 5 at $400 each	2000
-	Replacement of internal wiring - 5 at $100 each	500
-	Raising of steel framework - 4 at $1200 each	4800
-	Provide fences - 4 locations at $500 each	2000
	Subtotal	$23,282
-	Replacement of 5 floodlighting panelboards at $500 each (See distribution system estimates)	2500
-	Replacement of feeder to northeast floodlight (see distribution system estimates)	2500
	Total	$28,282
2.	Installation of H.I.D. floodlighting system	
-	Luminaires - 12 at $260 each	3120
-	Poles for 3 heads - 4 at $355 each	1420
-	Lamps - 12 at $76.50 each	918
	Subtotal	$5458
-	Installation of lighting poles with concrete bases - 4 at $1500 each	6000
-	Wiring to transformer vault room (Assuming #10 direct burial cable)	
-	800 feet at $2.00 per foot installed	1600
-	Rewiring to existing panels	500
	Total	$13,558 (Alternate)

---

[23]Price of mold for lenses is based on approximate direct cost of producing a mold, including materials and labor, by the Holophane Co., division of Johns-Manville Corporation, for similar sizes and types of lenses presently in production.

Bronze Lantern Lights

1.	Replacement of bronze lantern lights with H.I.D. luminaires - 8 fixtures at $300 each (installed)	Total	2400 (Alternate)

Emergency Lighting - Column Shaft

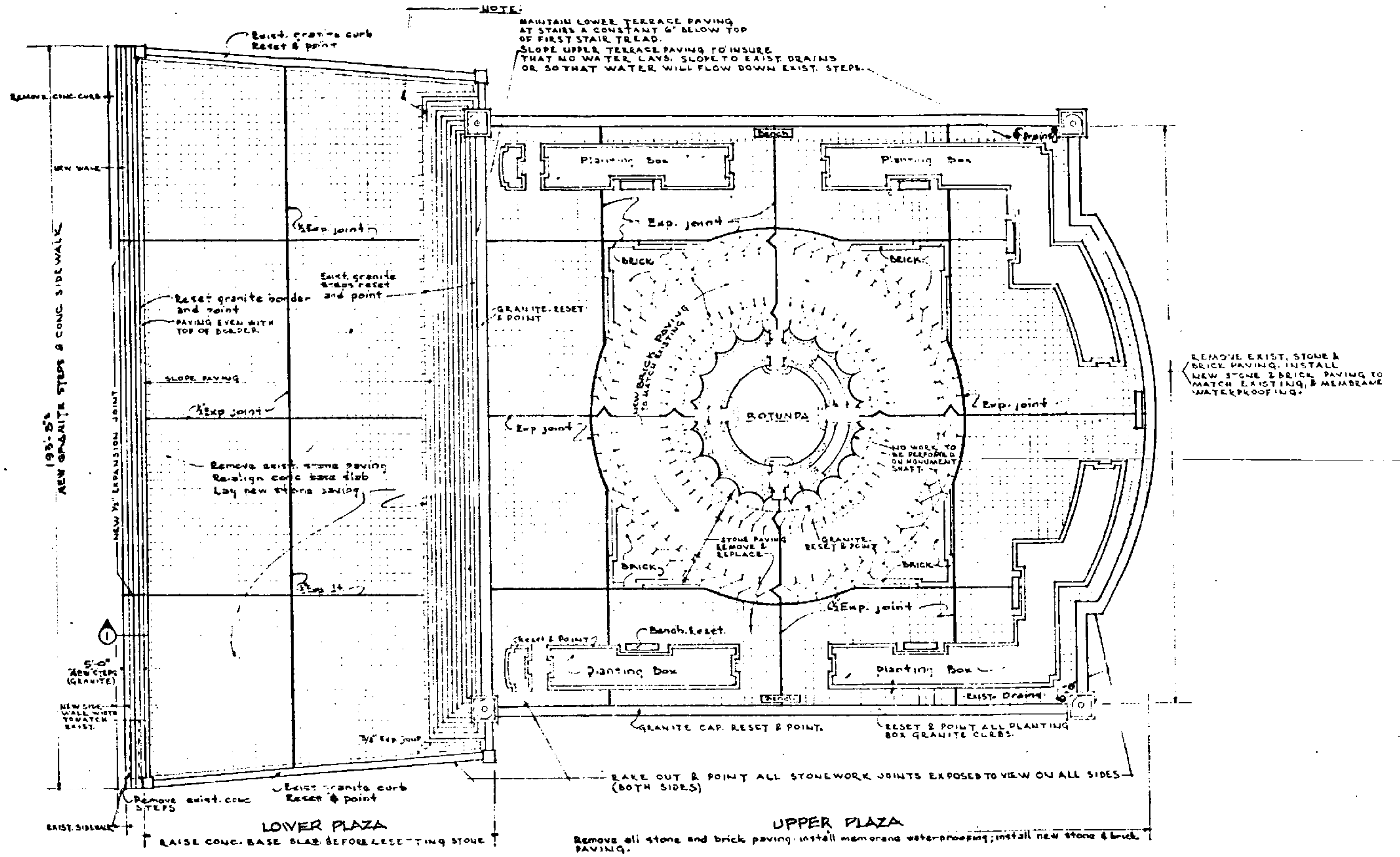
1.	Installation of zoned battery unit for emergency lighting	Total	6000

Plaza Lighting

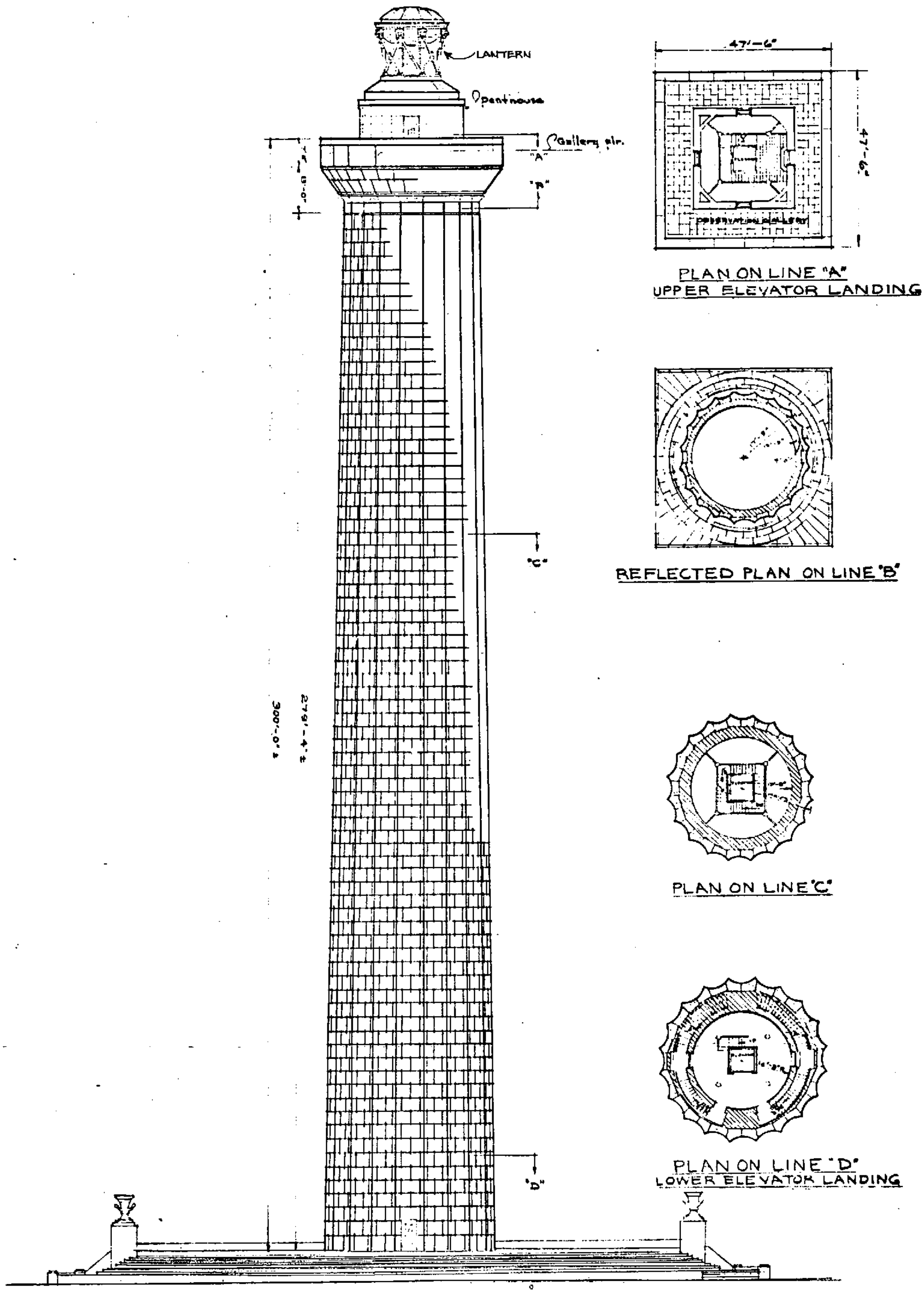
1.	Installation of plaza lighting using twelve pole-mounted H.I.D. luminaires		
	- Luminaires with poles (installed)		4800
	- Concrete bases		2400
	- Wiring		1000
		Total	$8200 (Alternate)
2.	Installation of plaza lighting using Bollard type luminaires		
	- Luminaires (installed)		4000
	- Wiring		2500
		Total	$6500 (Alternate)
		TOTAL	$53,907

Appendixes

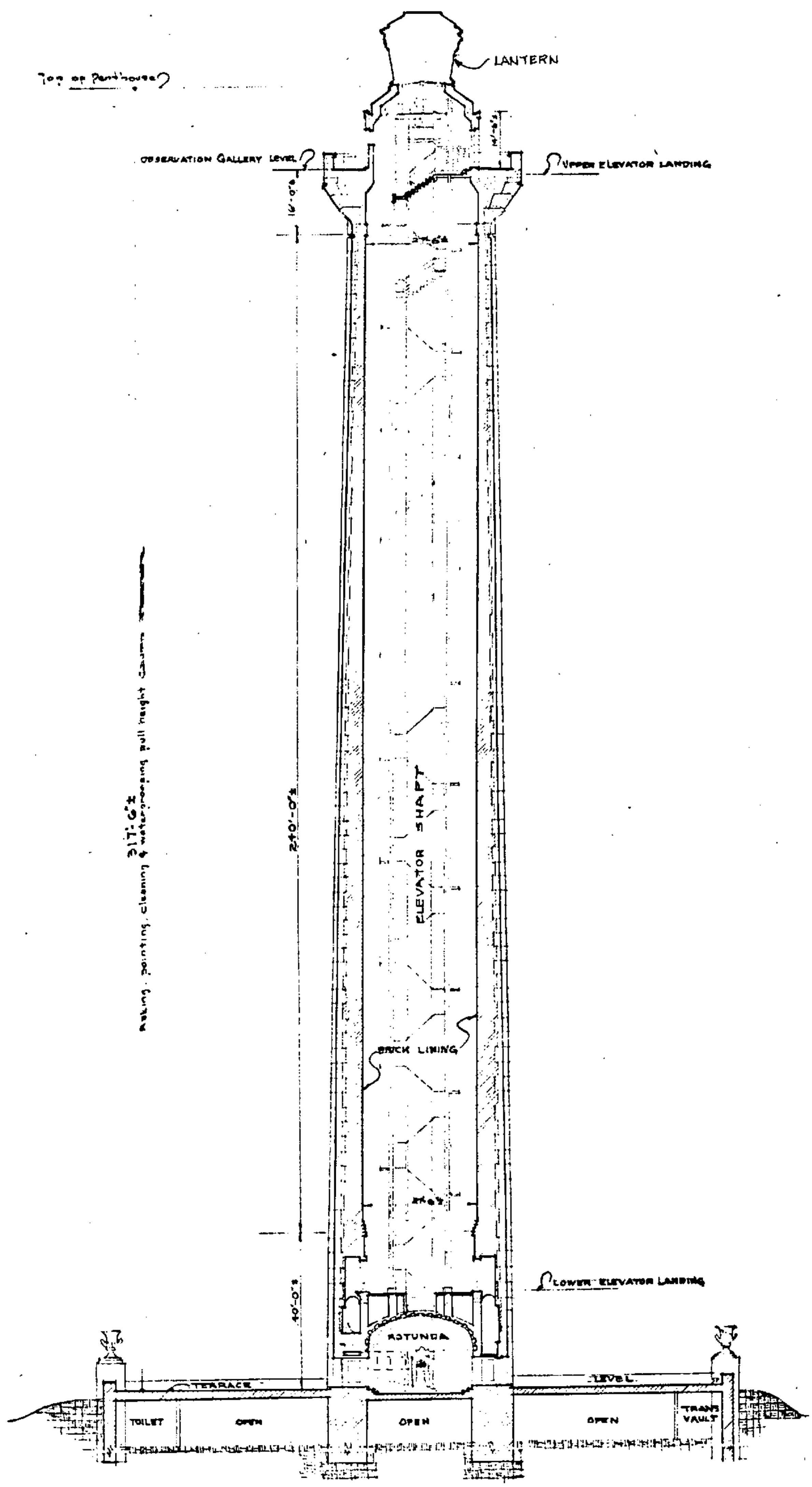
APPENDIX A: PLANS, ELEVATION, AND SECTION OF THE COLUMN AND PLAZAS



Plan of Column and Plazas



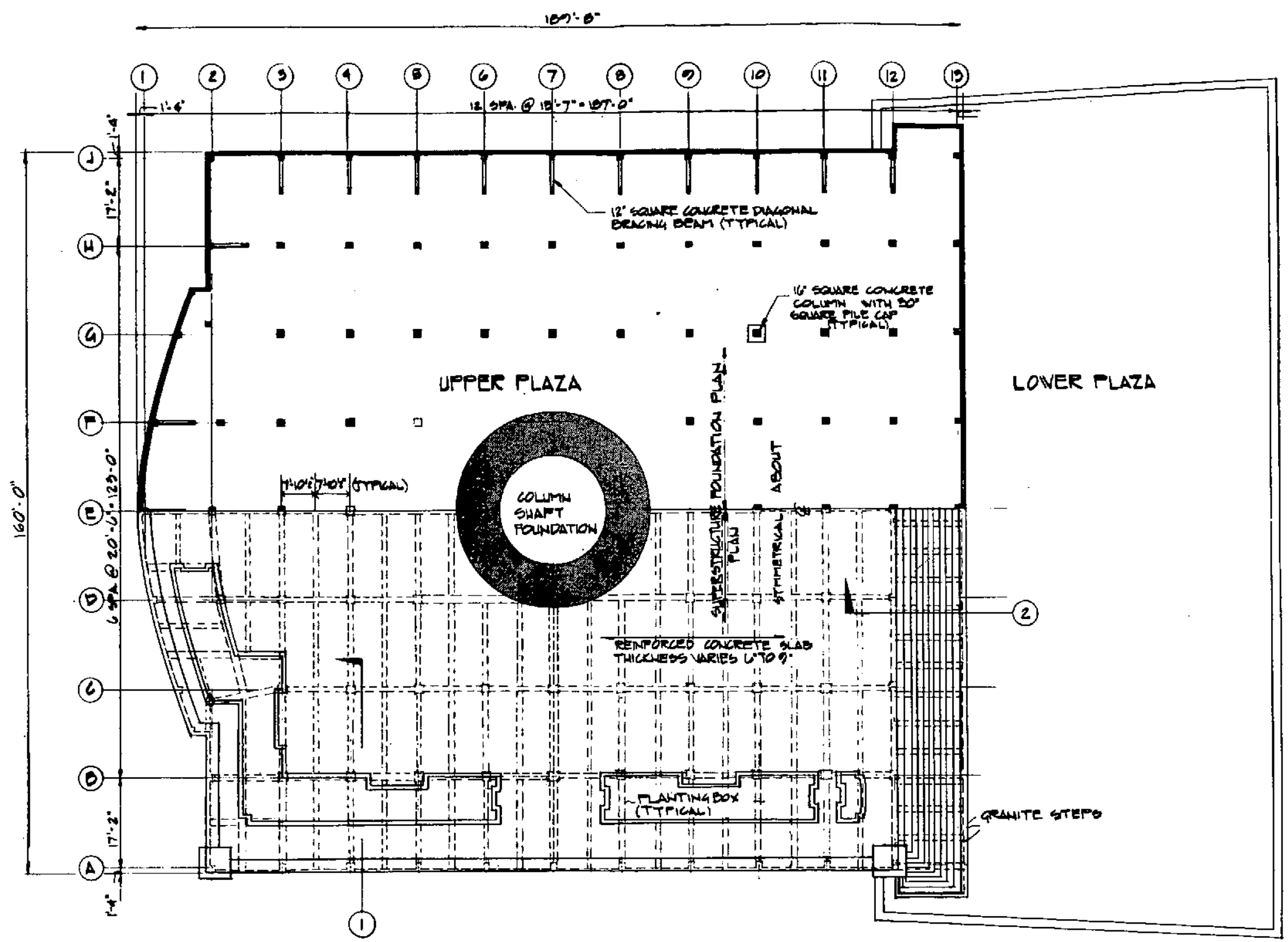
Plans and Elevation of Column



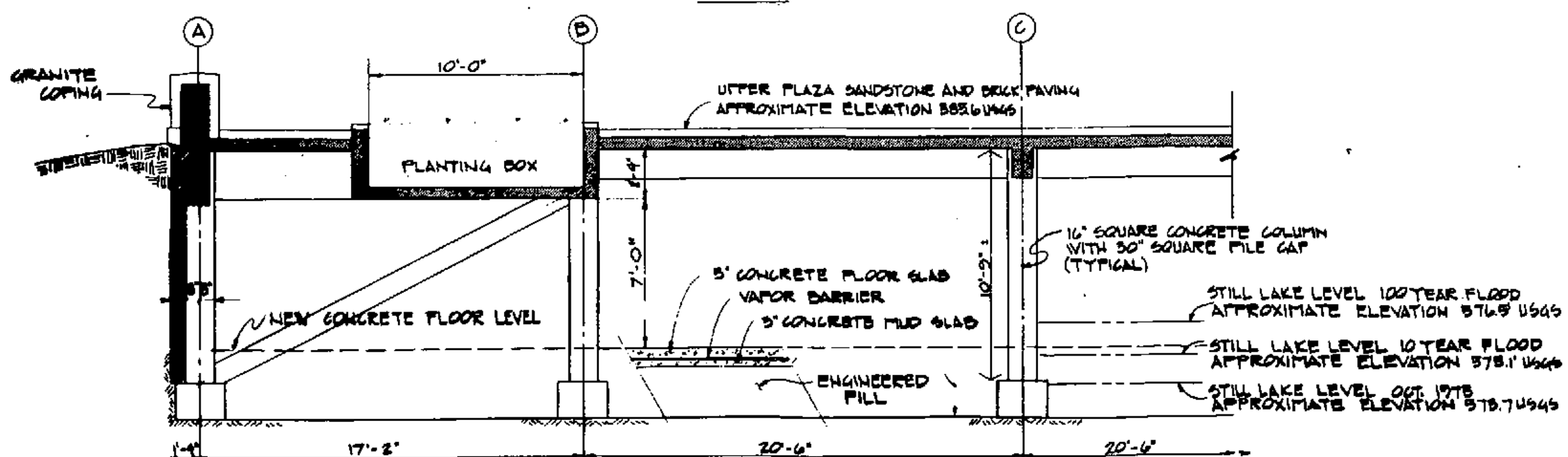
Section of Column and Upper Plaza

APPENDIX B: UPPER PLAZA AND LOWER PLAZA PLANS AND SECTIONS

UPPER PLAZA AND LOWER PLAZA PLANS AND SECTIONS

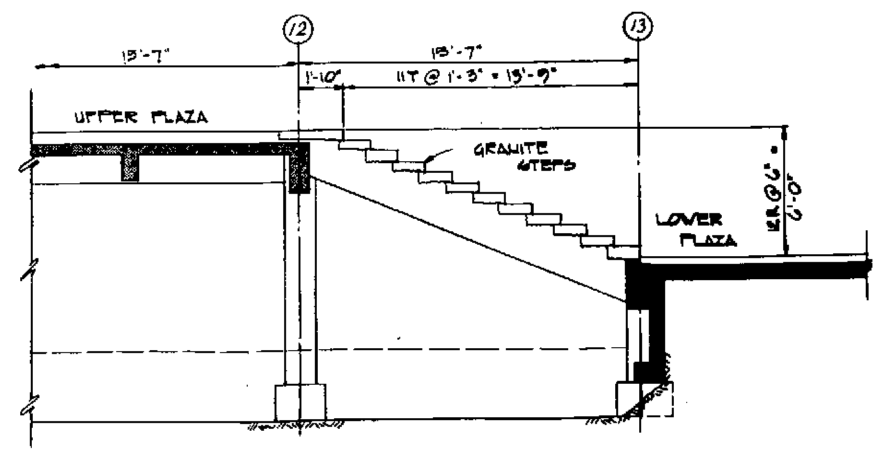


PLAN



NOTE:
DIMENSIONS SHOWN ARE BASED ON OLD DRAWINGS AND FIELD MEASUREMENTS, NONE OF THEM ARE NECESSARILY CORRECT

SECTION 1



SECTION 2

GPO 838-576

APPENDIX C: LETTER OF JOSEPH H. FREEDLANDER, ARCHITECT, APRIL 26, 1938

R. Dreen Seymour
with J. Freedlander

JOSEPH H. FREEDLANDER
ARCHITECT
681 Fifth Avenue
New York

April 26, 1938.

Mr. F. E. Whitehouse,
National Park Service,
Richmond, Va.

Dear Mr. Whitehouse:

Referring to our conversation the other day when you were in the office I find on looking over the drawings of the terrace of the Perry Memorial that the concrete slab under the paving was not waterproofed inasmuch as said paving of native sandstone was intended as a temporary one only and was to be replaced in the near future, by a permanent paving of granite, in conjunction with the completion of the Memorial.

As you have seen on the drawings, the waterproofing is extended some six feet beyond the perimeter of the column in order to form a connection for the waterproofing which was to extend under the granite paving throughout the entire area of the completed terrace.

With kind regards,

Very truly,

Joseph H. Freedlander

JHF:KO

C-1

APPENDIX D: ENVIRONMENTAL STATEMENT

ENVIRONMENTAL STATEMENT
FOR PERRY'S VICTORY AND INTERNATIONAL
PEACE MEMORIAL

From Seawall Improvements and Grounds
Rehabilitation Report
by
Dalton•Dalton•Little•Newport

Reinstating the original grade adjacent to the monument's base will have no significant effect on vegetation or other environmental features. Care should be exercised in placing fill material near trees so as to avoid suffocation of root systems. This can be avoided easily by use of tree wells. Important plant species in the ephemeral marsh identified in the <u>Environmental Assessment for Seawall Improvements and Grounds Rehabilitation</u> will not be affected by the proposed action because the marsh is approximately 100 feet west of the monument's base. Also, dust from sandblasting of the column will not affect vegetation both because vegetation near the monument consists primarily of grass and deciduous trees, and because frequent rains and seaspray will wash away any dust.

Solution of the underlying limestone, particularly along existing fractures, has allowed for piping of water through the bedrock and probably has accounted for the settlement of soils near the base. Piping should not have a noticeable effect on the stability of newly placed soils in the short term. However, piping is expected to continue over time and eventually may recreate the existing conditions. Reconstruction of the south seawall should prevent any repetition of soil erosion by lake action such as has occurred in the past. Placing fill near the monument base before reconstruction of the seawall could involve renewed soil erosion which would both smother benthos near the wall and cause turbidity, and would defeat the purpose of the proposed project.

APPENDIX E: HERRON TESTING LABORATORIES, INC.
REPORT AND ADDENDUM

HERRON TESTING LABORATORIES, INC.
5405 SCHAAF ROAD • CLEVELAND, OHIO 44131 • 216/524-1450
CONSULTATION AND TESTING SINCE 1911

17 November 1975

Dalton-Dalton-Little-Newport, Inc.
3605 Warrensville Center Road
Cleveland, Ohio 44122

<u>Attention: Mr. L. Budai</u>

SUBJECT: TESTING AND INSPECTION OPERATIONS
PERRY'S VICTORY AND INTERNATIONAL PEACE MEMORIAL
PUT-IN-BAY, OHIO

Herron Project No. I-5073
Report No. 1 - 15 and 16 October 1975

At the request of Dalton-Dalton-Little-Newport, Inc., Architects and Engineers, of Cleveland, Ohio, we visited the subject project where we met with Mr. P. Grieco, Project Manager, and Mr. L. Budai, Structural Engineer for Dalton-Dalton-Little-Newport, Inc. While on the site, we conducted Windsor Probe tests on the hardened concrete of the project structure, located reinforcing steel, and collected samples of materials. All tests were conducted at designated areas or if inaccessible, in alternate areas selected by representatives of Dalton-Dalton-Little-Newport, Inc.

<u>Windsor Probe Testing</u>

Using the triangular method, or single probe method, we conducted tests on typical column, floor slab, main shaft, walls and beams of the structure for compressive strength determinations.

We found through our tests that other methods will have to be employed on the main shaft and interior and exterior wall surfaces due to the age, aggregate make up, and hardness of the concrete in the structure. All other Windsor Probe test results will be found on page 6 of this report. All tests were conducted in accordance with the manufacturer's established procedures and ASTM specification C-803-75T.

Reinforcing Steel

Using a packometer, we were able to locate the reinforcing steel in columns, beams, floor slab, and walls. We were unable, with this instrument, to give the exact size of the reinforcing in these locations.

Using a yellow crayon, we marked the spacing of the reinforcing steel on typical floor, column, wall, and beams employed in the structure.

Material Samples

We obtained samples of material of the structure at designated areas. These samples were identified and labeled, and were returned to our laboratory where they were submitted to T. Webster, P. E., and laboratory personnel for analysis and determination.

SUMMARY OF LABORATORY TESTING

COMPRESSION TESTING OF BRICKS

Width	Length	Area	Failure/Load	PSI
3.00"	4.15"	12.45 sq. in.	120500	9680
2.85"	2.80"	7.98 sq. in.	132000	16540

MOH'S HARDNESS OF GRANITE: 6 (No evidence of deterioration.)

CHEMICAL ANALYSIS OF MORTAR BETWEEN BRICKS

	Per Cent by Weight
Acid Insoluble:	30.80
Soluble Silica:	7.86
Calcium Oxide:	29.69
Magnesium Oxide:	1.10

CONSTITUENTS BY VOLUME

	Per Cent by Volume	Ratio
Portland Cement:	24.1	1.00
Sand:	23.7	0.76
Calcium Carbonate:	7.0	0.34

SUMMARY OF LABORATORY TESTING (cont'd.)

CHEMICAL ANALYSIS OF BEDDING MATERIAL

	Per Cent by Weight
Acid Insoluble:	15.72
Soluble Silica:	3.18
Calcium Oxide:	36.54
Magnesium Oxide:	3.63

CONSTITUENTS BY VOLUME

	Per Cent by Volume
Portland Cement:	9.7
Sand:	12.1
Calcium Carbonate:	27.7

All white and gray material deposits taken from faults and ceilings were found to be calcium carbonate of varying degrees of pureness. The sample from above the rotunda ceiling was contaiminated with iron oxide. The presence of these deposits indicates a leaching of water through the concrete.

Calcium carbonate is formed when water leaches through cracks, along improperly treated construction joints, or through areas of segregated or porous concrete. This water passing through the concrete dissolves some of the readily soluble calcium hydroxide (formed during hydration of the cement) and other solids and in time may cause serious disintegration of the concrete. Many concrete structures bear evidence of this action by the presence of white deposits, or "efflorescence" on their surface. This results from leaching of the calcium hydroxide and subsequent carbonation and evaporation.

The presence of a "large" amount of calcium carbonate would be indicative of a major leaching deterioration. The presence of iron oxide in another sample probably indicates the rusting of some reinforcing steel.

HERRON TESTING LABORATORIES, INC.
R. D. Brooks, Inspector

by:

Ted E Webster

TED E WEBSTER, P. E.
Geotechnical Engineer

John E. Adams

JOHN E. ADAMS
Supervising Inspector

:1

3cc: Dalton-Dalton-Little-Newport, Inc.

HERRON TESTING LABORATORIES, INC.

Consultation and Testing

5405 EAST SCHAAF ROAD - CLEVELAND, OHIO 44131

Phone: 524-1450

Client: Dalton-Dalton-Little-Newport, Inc.	Address: 3605 Warrensville Center Road, Cleveland, OH		Phone No.
Project Name: Perry Victory and International Peace Memorial	Project Location: Put-In-Bay, Ohio		Job Phone No.
Job Number: I-5073	Date: 11/17/75	Test Date: 10/15 & 16/75	By: R. D. Brooks

TEST LOCATIONS:

1. Column, Line C-8, approximately 4½' from base (Plaza Basement)
2. Upper Plaza floor slab (bottom surface) between Lines 4 and 5 and Lines C and D
3. Beam, between Lines 4 and 5 and between Lines C and D
4. Upper level platform, main column, southeast face, 3½' above deck
5. Upper level platform, stairway stringer, south side, 3' above deck, platform level

AMERICAN CONCRETE INSTITUTE 214-65 STANDARDS OF CONCRETE CONTROL TABLE 2

Class of operation	Coefficients of variation for standard control concrete			
	Excellent	Good	Fair	Poor
General Construction	Below 10.0%	10.0 - 15.0%	15.0 - 20.0%	Above 20.0%

Test Area	Type	Agg.	Moh's No.	Cure Days	Probe & Power Load Certification Number	Ht. of Probe Cage (Av. - 3 Probes)	Comp. Strength (psi)
1	N. A.	Mix	4.5	N. A.	24328	2.150 full power	7300
2	N. A.	Mix	4.5	N. A.	24328	1.875 full power	5350
3	N. A.	Mix	4.5	N. A.	24328	1.875 full power	5350
4	N. A.	Mix	4.5	N. A.	24328	2.200 full power	7675
5	N. A.	Mix	4.5	N. A.	24328	2.325 full power	8565

HERRON TESTING LABORATORIES, INC.
5405 SCHAAF ROAD • CLEVELAND, OHIO 44131 • 216/524-1450
CONSULTATION AND TESTING SINCE 1911

20 November 1975

Dalton-Dalton-Little-Newport, Inc.
3605 Warrensville Center Road
Cleveland, Ohio 44122

Attention: Mr. L. Budai

REF: TESTING AND INSPECTION OPERATIONS
PERRY'S VICTORY AND INTERNATIONAL PEACE MEMORIAL
PUT-IN-BAY, OHIO

HTL, Inc. Project No. I-5073
Report No. 1 - 15 and 16 October 1975
Letter of Transmittal Dated: 17 November 1975

In our above referenced report we stated that, "We found through our tests that other methods will have to be employed on the main shaft and interior and exterior wall surfaces due to the age, aggregate make up, and hardness of the concrete in the structure."

We wish to elaborate on that statement. This statement was made in reference to the tower shaft concrete. A number of Windsor test probes were attempted to determine the strength of concrete in the shaft; however, these tests met with failure. The reason that these tests failed was that the concrete was simply too hard. Refusal of the probe to even enter the concrete indicates hardness that correlates to a compressive strength of at least approximately 7,500 psi.

In order to obtain accurate compressive strength values and to determine if the strengths are consistent through the total thickness of the walls, it would be necessary to obtain core samples of the concrete and return them to the laboratory where a test machine with sufficient capacity could break them. For analysis purposes at this time, it may be assumed that the concrete in the areas of the Windsor Probe tests has a minimum compressive strength of at least approximately 7,500 psi. Obviously, strength variations should be anticipated and appropriate safety factors applied.

If we can be of further service, please contact us.

HERRON TESTING LABORATORIES, INC.

Ted E Webster, P. E.
Geotechnical Engineer

TEW/lk

Original + 2cc: Dalton-Dalton-Little-Newport, Inc.

APPENDIX F: OTIS ELEVATOR COMPANY REPORT

Otis Elevator Company
1744 Payne Avenue
Cleveland, OH 44114
216 621-9400

Otis

October 27, 1975

Mr. Paul Grieco
Dalton, Dalton, Little & Newport
3605 Warrensville Center Road
Cleveland, Ohio 44122

RE: Perry Monument
Put-In-Bay, Ohio

Dear Paul:

We have inspected the elevator equipment at the Perry Monument and there are several things that could be done to carry more people per hour.

The elevator driving machine is capable of moving the load at 500 feet per minute, rather than 325 feet per minute, as it is now. To alter this, we would require a pit 8'-2" deep, which would mean raising the lower landing 4'-2", as well as changing some control equipment and changing the buffers in the pit. This increase in speed would reduce the round trip time by about 37 seconds.

We would further recommend that power door operators be added and the operation changed to two stop collective automatic control.

With these changes, my calculations indicate the round trip time, including loading and unloading at both terminals, to be 148 seconds.

If the average load during peak periods is 15 passengers, it would handle 360 passengers in each direction, per hour. This is based upon normal elevator lobby conditions, without too much interference by waiting passengers for the exiting of the passengers.

There was some discussion about adding another stop below the top landing so that the people going down would walk down one level to wait for the elevator. This would reduce the congestion at the top landing, but would require time for the door to close, acceleration and deceleration to reach this next landing, and time to open the doors at this landing. This would add 9 seconds, which may or may not make up for the time lost due to congestion at the top floor. I believe stanchions and a rope at the top floor to keep the waiting passengers on one side and leaving the other side open for exiting passengers would keep the passenger transfer time to a minimum.

ATTN: Mr. Paul Grieco

RE: Perry Monument
Put-In-Bay, Ohio

Otis

The busiest day in July of this year had 1,797 visitors. Assuming one half of these were at the monument during the three hours from 12:30 p.m. to 3:30 p.m., this would average 300 passengers per hour. Since the elevator could handle 360 passengers per hour, it would handle this demand over the three hours. Since people would arrive in groups, rather than spread out evenly over the three hours, there still would be some waiting for the elevator.

We are putting together the prices to arrive at an approximate cost to make the changes mentioned above.

This would not, however, meet the State Code, as the State Code requires that the hoistway and machine room have a two hour fire rated enclosure and 1 1/2 hour fire rated hoistway doors. Since this is a Federal project, I would assume it would not have to be changed to meet the State of Ohio Code.

I will be on vacation the remainder of this week. If you wish to speak to anyone on this matter before my return, please contact Mr. Brian McLaughlin at 621-9400, Extension 17. He will be happy to answer your questions until I return on Monday, November 3rd.

Very truly yours,

OTIS ELEVATOR COMPANY

George Strelow
be

George Strelow
Sales Representative

GS:be

cc.: Mr. Brian F. McLaughlin, Service Representative, Cleveland Office

APPENDIX G: NATIONAL PARK SERVICE ELEVATOR INFORMATION

Elevator Information

Perry's Victory & International Peace Memorial

Peak loads on elevator occur between 12:30 P.M. and 3:30 P.M. during Summer months (esp. July & August). During this time one round trip is made every 3 to 4 minutes, rarely exceeding 16 round trips per hour. Approximately 15 adults are taken up and 17 down each time. There can sometimes be a line of people on busy days of about 75 waiting to go up and about 30 waiting to go down.

1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
79,090	83,292	87,041	85,958	78,848	90,846	94,899	90,322	90,635	107,355

PEVI-7/70

CUMULATIVE & COMPARATIVE VISITATION

Month APRIL 1975

DATE	TOTAL VISITS DAY	TOTAL VISITS MONTH	TOTAL VISITS YEAR 1975	DAY	TOTAL VISITS MONTH	TOTAL VISITS YEAR 1974
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
S 19	34	34	34	4	4	4
Su 20	0	34	34	44	48	48
21	4	38	38	84	132	132
22	2	40	40	0	132	132
23	0	40	40	0	132	132
24	0	40	40	2	134	134
25	0	40	40	0	134	134
S 26	63	103	103	0	134	134
Su 27	54	157	157	81	215	215
28	0	157	157	79	294	294
29	76	233	233	34	328	328
30	0	233	233	28	356	356
31						
+ 20%	47	280	280	71	427	427

Daily elevator ascents recorded and 20% added at end of month for plaza and grounds visitation

1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
79,090	83,292	87,041	85,958	78,848	90,846	94,899	90,322	90,635	107,355

CUMULATIVE & COMPARATIVE VISITATION

PEVI-7/70

Month July 1975

DATE	TOTAL VISITS DAY	TOTAL VISITS MONTH	TOTAL VISITS 19648 YEAR (23,578)	TOTAL VISITS 1974 DAY	TOTAL VISITS 1974 MONTH	TOTAL VISITS 1974 YEAR
1	759	759	20407	777	777	20,251
2	703	1462	21,110	482	1259	20,733
3	381	1843	21,491	535	1794	21,268
H 4	1178	3021	22,669	830	2624	22,098
S 5	1585	4606	24,254	1202	3826	23,300
SU 6	1219	5823	25,471	S 1649	5475	24,949
7	723	6546	26,194	SU 1297	6772	26,246
8	1033	7579	27,227	673	7447	26,921
9	1167	8746	28,394	650	8097	27,571
10	755	9501	29,149	807	8904	28,378
11	719	10220	29,868	726	9630	29,104
S 12	1062	11282	30,930	667	10297	29,771
SU 13	1075	12357	32,003	S 1312	11609	31,083
14	754	13111	32,759	SU 1265	12874	32,348
15	936	14047	33,695	647	13521	32,995
16	1015	15062	34,710	1059	14580	34,054
17	811	15873	35,521	965	15545	35,019
18	786	16659	36,307	574	16,119	35,593
S 19	655	17314	36,962	548	16,667	36,141
SU 20	1117	18431	38,029	S 1336	18,003	37,477
21	1473	19904	39552	SU 1797	19,800	39,274
22	916	20820	40468	824	20624	40,098
23	1169	21989	41,637	643	21,267	40,741
24	507	22,496	42,144	980	22,247	41,721
25	764	23260	42,908	905	23,152	42,626
S 26	1502 24762	~~24757~~	44,410	669	23,821	43,295
SU 27	1426	26188	45,836	S 1285	25106	44,580
28	873	27061	46,709	SU 1771	26877	46,351
29	1055	28116	47,764	864	27,741	47,215
30	1174	29298	48,938	1057	28798	48,272
31	838	30128	49,776	917	29715	49,189
+ 20%	6,026	36,154	59,731	5,943	35,658	59,027

Daily elevator ascents recorded and 20% added at end of month for plaza and grounds visitation

APPENDIX H: HIGH VOLTAGE MAINTENANCE CORPORATION REPORT

HIGH VOLTAGE MAINTENANCE CORP.
CLEVELAND • DAYTON • INDIANAPOLIS

Please reply to:
7255 INDUSTRIAL PARK BLVD.
MENTOR, OHIO 44060
PHONE: (216) 942-7671

November 5, 1975

Dalton, Dalton, Little and Newport, Inc.
3605 Warrensville Center Road
Shaker Heights
Ohio 44122

Attention: Mr. John Geyer

Gentlemen:

I have enclosed the inspection and testing report of the recently completed Perry Monument electrical distribution system survey. The summary sheet outlines our findings and recommendations.

Thank you very much for once again permitting High Voltage Maintenance to supply you with our specialized service. If there should be any questions about these reports, please call.

Very truly yours,

P. R. Herbert
P. R. Herbert
Vice-President

PRH/jab
Enclosure

HIGH VOLTAGE MAINTENANCE CORP.
CLEVELAND • DAYTON • INDIANAPOLIS

Please reply to:
7255 INDUSTRIAL PARK BLVD.
MENTOR, OHIO 44060
PHONE: (216) 942-7671

ELECTRICAL DISTRIBUTION SYSTEM SURVEY

PERRY MONUMENT

DALTON, DALTON, LITTLE AND NEWPORT, INC.

Shaker Heights, Ohio

October, 1975

CHARTER MEMBER

SPECIALIZING IN THE TESTING AND MAINTENANCE OF POWER DISTRIBUTION SYSTEMS

REPORT SUMMARY

1. Ohio Edison Service Area

   One of the two support poles (the one farthest from the transformer) should be replaced.

2. Underground Feeder Cable

   This cable from the Ohio Edison service to the basement transformer and switchroom is in fair operating condition.

3. Basement Transformer and Switchroom

   This room serves as a ventilating corridor for the extremely damp basement. This door should be closed, and the basement should be separately ventilated to prevent rusting and possible arc over on the bus, panelboards, and switchgear.

4. Service Entrance Pothead

   This service entrance pothead should be cleaned, and the connections should be taped to prevent birds or rodents from causing an arc over.

5. Main Oil Circuit Breaker

   The main oil circuit breaker is in extremely dirty and rusted condition. The operating mechanism did not work correctly when tested. The unit was put in mechanically operative condition.

   This breaker requires a complete mechanical and electrical overhaul to perform reliably. The line and load terminals of this breaker should be tape insulated to prevent bird or rodent arc over. The entire breaker should be cleaned and all rust removed. The breaker and mounting stand should be painted with a rust inhibiting paint.

6. Main Substation Bus

   The open style copper bus bars should be checked for connection tightness, and all insulators should be cleaned.

7. Three Phase Transformer Bank

   All three transformers should be cleaned, rust removed, and painted with a rust resistant transformer paint. All transformer bushings should be cleaned and the connections tightened, and the primary bushings should be re-taped. The right side transformer tested fair; re-test in one year.

8. <u>Main Three Phase and Single Phase Panelboards</u>

These panelboards should be vacuum cleaned internally, all cable connections should be tightened, and the cabinets should be dismantled, cleaned of rust <u>inside</u> and outside, and painted with a rust resistant panelboard paint. All bus connections should be dismantled, cleaned, lubricated with conducting grease, and torqued for proper connection tightness. The Boiler Room 100-AMP, 3-pole, circuit breaker should be replaced.

9. <u>Outdoor Floodlighting</u>

All outdoor lighting distribution panels located on each of the five lightstands should be replaced with a heavy-duty, marine type, enclosed panelboard. The existing panelboards are severely rusted. The northeast floodlight feeder tested bad; all others tested marginal or fair.

10. <u>Low Voltage Feeder Cables</u>

The cables for floodlighting, elevator, and interior lighting are inadequately supported and exposed to damage and high stress concentrations at the support point. A cable tray and conduit system should be installed to continuously support these circuits. As an alternative, a stress spreading support plate should be installed at all attachment points. The outer jacket should be repaired with vinyl type tapes where the severe jacket damage and rotting are noted.

11. <u>Elevator Control Panelboard</u>

The elevator control panelboard should be cleaned, all contacts burnished, and all connections tightened. All solenoid and contactor coils should be painted with an insulating paint, and all interconnecting control wiring with brittle or damaged insulation should be replaced. All backboard connections should be cleaned and tightened. A complete inventory of replacement parts should be developed, and a spare parts locker should be installed at the panelboard location.

12. <u>Elevator Motor Generator Set</u>

This motor generator set should have the commutator section vacuumed, the brush holder boxes and connections cleaned, and the brush shunt connections checked.

13. <u>Lighting Panelboard</u>

This lighting panelboard is adequate for its present use. Possible future parts replacement problems may suggest the installation of a new panelboard during any present electrical modernization program.

INSULATION RESISTANCE TEST

(500-VOLTS)

CUSTOMER Dalton, Dalton, Little & Newport, Inc. JOB # C-0470

LOCATION Perry Monument - Outdoor Spotlight Feeders

SOUTHWEST FLOODLIGHTS

Hot = 7 megohms
Neutral = Grounded

NORTHWEST FLOODLIGHTS

Hot = 37 megohms
Neutral = Grounded

SOUTHEAST FLOODLIGHTS

Hot = 7.25 megohms
Neutral = Grounded

NORTHEAST FLOODLIGHTS

Hot = .2 megohms @ 200V.
Neutral = Grounded

SOUTH BANK FLOODLIGHTS

Hot = 51 megohms
Neutral = Grounded

URN AND UPPER FLOODLIGHTS

Hot = 31 megohms
Neutral = Grounded

CABLE INSULATION RESISTANCE TEST

(500-VOLTS)

CUSTOMER Dalton, Dalton, Little & Newport, Inc. JOB # C-0470

LOCATION Perry Monument

(ALL READINGS IN MEGOHMS)

	AØ	BØ	CØ
BOILER ROOM FEEDERS	300	300	250
LOWER LEVEL LIGHTING PANEL	29	95	2
ELEVATOR SWITCH	100	100	100

OTIS ELEVATOR INFORMATION

CUSTOMER Dalton, Dalton, Little & Newport, Inc. JOB # C-0470

LOCATION Perry Monument

ELEVATOR MOTOR D. C.

Serial # 157663	96 RPM	240-Volts	75-AMPS
Sales # 132958	Frame Parts		5404-111-2
Type 70	Armature		5401-111-10
19.5 H.P.	Field Coils		5402-111-5
	Brushes & Holders		5278-111-7

\- - - -

Insulation Resistance Test at 500-Volts = 5.75 megohms

GENERATOR EXCITER

Serial # 157360	1200 RPM	240-Volts	21-AMPS
Sales # 132958	Frame Parts		5430-111-7
Type 1-FA	Armature		5424-111-3
Output 5KW Cont.	Field Coils		5341-111-1
Temp. Rise - 50°C.	Brushes & Holders		5278-111-25

\- - - -

Insulation Resistance Test at 500-Volts = 13 megohms

A. C. DRIVE MOTOR

Serial # 157358	1200 RPM	230-Volts	65-AMPS
Sales # 132958	3-Phase	60-Cycle	Delta
Type 7½	Bearing Part		5459-111-4
Output 25 HP Cont.	Stator		5315-111-45
Temp. Rise - 50°C.	Rotor		6060J2

\- - - -

Insulation Resistance Test at 500-Volts = 180 megohms

SHEET 1 of 2

OTIS ELEVATOR INFORMATION

LARGE GENERATOR (FOR ELEVATOR MOTOR)

Serial # 157359	1200 RPM	240-Volts	62.5-AMPS
Sales # 132958	Frame Parts		5461-111-5
Type 1B14G1	Armature		2057-A1
Output 15KW Cont.	Brushes & Holders		6134-A1
Temp. Rise - 50°C.	Field Coils	5300-111-5	A219B2

\- - - -

Insulation Resistance Test at 500-Volts = 5 megohms

ELEVATOR CONTROLLER

Serial # 120608	230-Volts	3 Wires	60-Cycles
Sales # 132958	Wiring Diagram	A5806	
Type 53-C-2	Cont. Less Spools & Res.	1433-1V-4	

SHEET 2 of 2

No.	1
DATE	10-15-75

CABLE OVERPOTENTIAL TEST

CABLE IDENTIFICATION AND LOCATION
PERRY MONUMENT
INCOMING FEEDER FROM SERVICE TRANSFORMER

MFG.	
TYPE	SPECIFICATION No.
INSULATION TYPE	
RATED 7.2 KV OPERATING	SIZE

NEUTRAL	
GROUNDED	
UNGROUNDED	

SHEATH	
SHIELDED	X
UNSHIELDED	

CONDUCTOR	
SINGLE	
MULTIPLE	X

INSTALLATION	
AERIAL	
DIRECT BURIAL	
METALLIC CONDUIT	X
NON-METALLIC CONDUIT	

LOCATION CONDITION	
DRY	
WET	X
CORROSIVE	
HOT	

APPROX. CABLE LENGTH	
YEARS OF SERVICE	
DATE OF CABLE INSTALLATION	

MFG. D.C. TEST VOLTAGE	
TEST TYPE AND FACTOR	MAINTENANCE
TEST VOLTAGE TO BE USED	25KV

TEST RESULTS	
GOOD	
ACCEPTABLE	X
REPLACEMENT RECOMMENDED	

THIS CABLE HAS DETERIORATED SINCE NEW.
WE ADVISE RE-TEST IN ONE YEAR

TEST # 1
DATE 10/15/75

POWER CABLE TEST DATA

OVERPOTENTIAL TEST MICRO-AMPS			
KILOVOLTS	PHASE A	PHASE B	PHASE C
	LEFT	MIDDLE	RIGHT
2.5	50	35	65
5.0	70	55	80
7.5	75	60	85
10.0	75	65	85
12.5	85	65	85
15.0	105	65	90
17.5	115	70	100
20.0	90	70	100
22.5	90	75	100
25.0	90	75	105
DIELECTRIC ABSORPTION TEST MICRO-AMPS			
TIME AT TEST KV	PHASE A	PHASE B	PHASE C
30 SECONDS	90	75	120
60 SECONDS	90	75	105
90 SECONDS	75	75	100
120 SECONDS	75	75	95
3 MINUTES	65	75	85
4 MINUTES	65	65	75
5 MINUTES	65	60	75
6 MINUTES	65	65	70
7 MINUTES	65	55	65
8 MINUTES	60	55	60
9 MINUTES	60	55	60
10 MINUTES	55	50	55
POLARIZATION INDEX $\frac{1 \text{ MIN.}}{10 \text{ MIN.}}$	$\frac{90}{55} = 1.636$	$\frac{75}{50} = 1.50$	$\frac{105}{55} = 1.909$
LEAKAGE CURRENT AT FULL TEST VOLTAGE AFTER 10 MINUTES	55 MICRO AMPS	50 MICRO AMPS	55 MICRO AMPS
DISCHARGE TIME DOWN TO 15 KV	7 SEC.	8 SEC.	7 SEC.
VOLTAGE AFTER 1 MINUTE DISCHARGE	0.3 KV	0.6 KV	0.6 KV

CABLE IDENTIFICATION

TEMPERATURE
DRY 70°F
WET 63°F

HUMIDITY
68 %

VOLTAGE INCREMENTS
2.5 KV

STABILIZATION TIME
1.0 MIN.

INSTRUMENT DAMPING
☐ ON ☒ OFF

KV SCALE
25 ☒
50 ☐
☐

MICRO-AMP SCALE
2.5 ☐
25 ☐
250 ☐
2500 ☐
500 ☒

TEST EQUIPMENT USED
AR HIPOT

OPERATOR
J. DAVIS

WITNESS
C. LOOMIS

RETURN CONNECTION	
	METERED — ALL
	BY-PASS —

Sheet No. 1 of 3

Transformer Inspection Report

Test Report No. ______

Customer: PERRY MONUMENT — Date: 10-15-75 — Project No. ______

Address: PUT IN BAY OHIO — Air Temp.: 70°F — Rel. Humidity: 68%

Owner/User: ______ — Date Last Inspection: ______

Address: ______ — Last Inspection Report No. ______

Equipment Location: MAIN VAULT

Owner Identification: LEFT TRANSFORMER

Nameplate Information

Manufacturer: WESTINGHOUSE — KVA: 37.5 — Phase: 1 — Cycle: 60

Serial No.: 4997626 — Type: S — ~~Form~~ STYLE: 1191157A — Class: ______

Primary Voltage: 7200/12470 Y 1φ △ ☒ or Y ☐ — Rated Current: ______ Amperes

Secondary Voltage: 120/240/208 1φ △ ☐ or Y ☒ — Rated Current: ______ Amperes

Coolant: Oil ☒ Askarel ☐ Air ☐ Nitrogen ☐ Other ☐

Coolant Capacity: ______ — Temp. Rise: 55°C — Impedance: 2.5%

No Load Tap Changer Voltages: 100%, 95.5%, 91.0%, 86.5%

Gauges and Counters

Oil Temp. ______ — Max. Temp. ______ — Reset Gauge ______ — Oil Level: NORMAL

Pressure ______ — LRC Counter ______ — Tap Setting: #1 100%

Visual Inspection

Bushings: DIRTY — Connections: OK — Paint: NEEDED — Other: ______

Load Tap Changer: ______ — Leaks: NONE

Fans and Controls: ______ — Gas Regulator: ______ — Grounds: OK

Winding Insulation Resistance Test (Megohms)

	KVDC	1 Min.	10 Min.	P.I.
Primary to Ground, Sec. Guarded	5	120M		
Secondary to Ground, Pri. Guarded	0.5	120M		
Primary to Secondary, Ground Guarded	5.0	120M		

Turns Ratio Test

Nameplate Primary Volts	Tap Position	Connection H – H – X – X –	Connection H – H – X – X –	Connection H – H – X – X –	Calculated Ratio
7200	A 1	59.9930			60.00
	B 2				
	C 3				
	D 4				
	E 5				

Tap Changer Left in Position 1 at 7200 Volts.

Oil Tests:

Avg. Dielectric Strength 35 KVAC — Neut. No. (mg KOH/gm) .05 — Type of Coolant OIL

ASTM No. ______ — Power Factor ______ — IFT 34.1 GOOD

Transformer Inspection Report

Sheet No. 2 of 3

Test Report No. ______

Customer: PERRY MONUMENT — Date: 10-15-75 — Project No. ______

Address: PUT IN BAY OHIO — Air Temp.: 70° F — Rel. Humidity: 68%

Owner/User: ______ — Date Last Inspection: ______

Address: ______ — Last Inspection Report No. ______

Equipment Location: MAIN VAULT

Owner Identification: MIDDLE TRANSFORMER

Nameplate Information

Manufacturer: WESTINGHOUSE — KVA: 37.5 — Phase: 1 — Cycle: 60

Serial No.: 4997613 — Type: S — STYLE Form: 1191157A — Class: ______

Primary Voltage: 7200/12470 1Φ △ [X] or Y [ ] — Rated Current ______ Amperes

Secondary Voltage: 120/240 1Φ △ [ ] or Y [X] — Rated Current ______ Amperes

Coolant: Oil [X] Askarel [ ] Air [ ] Nitrogen [ ] Other [ ]

Coolant Capacity: ______ — Temp. Rise: 55°C — Impedance: 2.5%

No Load Tap Changer Voltages: 100% 95.5% 91% 86.5%

Gauges and Counters

Oil Temp. ______ Max. Temp. ______ Reset Gauge ______ Oil Level: NORMAL

Pressure ______ LRC Counter ______ Tap Setting: #1 100%

Visual Inspection

Bushings: DIRTY — Connections: OK — Paint: NEEDED — Other: ______

Load Tap Changer: ______ — Leaks: NONE

Fans and Controls: ______ — Gas Regulator: ______ — Grounds: OK

Winding Insulation Resistance Test (Megohms)

	1 Min.	10 Min.	P.I.
Primary to Ground, Sec. Guarded 5.0 KVDC	950		
Secondary to Ground, Pri. Guarded 0.5 KVDC	55		
Primary to Secondary, Ground Guarded 5.0 KVDC	2000		

Turns Ratio Test

Nameplate Primary Volts	Tap Position	Connection H – H – X – X –	Connection H – H – X – X –	Connection H – H – X – X –	Calculated Ratio
7200	A 1	59.993			60.00
	B 2				
	C 3				
	D 4				
	E 5				

Tap Changer Left in Position 1 at 7200 Volts.

Oil Tests:

Avg. Dielectric Strength 35 KVAC — Neut. No. (mg KOH/gm) 0.08 — Type of Coolant OIL

ASTM No. ______ Power Factor ? — IFT 34.2 GOOD

Transformer Inspection Report

Sheet No. 3 of 3

Test Report No. ______

Customer PERRY MONUMENT Date 10-15-75 Project No. ______

Address PUT IN BAY OHIO Air Temp. 70°F Rel. Humidity 68%

Owner/User ______ Date Last Inspection ______

Address ______ Last Inspection Report No. ______

Equipment Location MAIN VAULT

Owner Identification RIGHT TRANSFORMER

Nameplate Information

Manufacturer WESTINGHOUSE KVA 37.5 Phase 1 Cycle 60

Serial No. 4997617 Type S ~~Form~~ STYLE 1B1157A Class ______

Primary Voltage 7200/12470 1Φ △ [X] or Y [ ] Rated Current ______ Amperes

Secondary Voltage 120/240 1Φ △ [ ] or Y [X] Rated Current ______ Amperes

Coolant Oil [ ] Askarel [ ] Air [ ] Nitrogen [ ] Other [ ]

Coolant Capacity ______ Temp. Rise 55°C Impedance 2.5%

No Load Tap Changer Voltages 100% 95.5% 91.0% 86.5%

Gauges and Counters

Oil Temp. ______ Max. Temp. ______ Reset Gauge ______ Oil Level NORMAL

Pressure ______ LRC Counter ______ Tap Setting #1 100%

Visual Inspection

Bushings DIRTY Connections OK Paint NEEDED Other ______

Load Tap Changer ______ Leaks ______

Fans and Controls ______ Gas Regulator ______ Grounds OK

Winding Insulation Resistance Test (Megohms)

		1 Min.	10 Min.	P.I.
Primary to Ground, Sec. Guarded 5.0 KVDC		120		
Secondary to Ground, Pri. Guarded 0.5 KVDC	FAIR *	9		
Primary to Secondary, Ground Guarded 5.0 KVDC		120		

* RE-TEST IN ONE YEAR

Turns Ratio Test

Nameplate Primary Volts	Tap Position	Connection H – H – X – X –	Connection H – H – X – X –	Connection H – H – X – X –	Calculated Ratio
7200 100%	A 1	59.992			60.00
	B 2				
	C 3				
	D 4				
	E 5				

Tap Changer Left in Position #1 at 7200 Volts.

Oil Tests:

Avg. Dielectric Strength 35 KVAC Neut. No. (mg KOH/gm) .05 Type of Coolant OIL

ASTM No. ______ Power Factor ______ IFT 35.7

HIGH VOLTAGE MAINTENANCE CORP.

CLEVELAND • DAYTON • INDIANAPOLIS

OIL CIRCUIT BREAKER
[redacted] LIQUID TEST REPORT

CUSTOMER PERRY MONUMENT CITY PUT IN BAY STATE OHIO

SUBSTATION NAME/
LOCATION MAIN VAULT GROUND [X] ROOF [ ] POLE [ ]

OWNER IDENTIFICATION INCOMING OCB INDOOR [ ] OUTDOOR [ ]

NAMEPLATE INFORMATION

Manufacturer WESTINGHOUSE Primary Volts 7500 (OIL) GALLONS (ASK) 17.5 GAL

Serial No. 18Y338 [redacted] [redacted] CURRENT 600 AMP

[redacted] Phase/Hertz 3 ϕ 60 CY Type & Class FO22-A

Bushings Top Bottom
Connections OK
Fans & Controls —
Grounds OK

Liquid Temp. —
Max. Temp. —
Liquid Level OK
P/V —

T.C. Pos. & Type
Top Valve Size
Bottom Valve Size
Other Access WINDLASS OK

LEAKS NONE

Inspected & Tested By:
TIM DAVIS

		220 440 Power	De-energized Energized	Comments	
DATE	DIELECTRIC	ACID No.	I.F.T.	COLOR	CLASS
10/28/75	40 KV	.01	35.9	0.5	GOOD

MOLDED CASE CIRCUIT BREAKER
TEST RESULTS

DATE 10-16-75 JOB #

LOCATION PERRY MONUMENT MAIN VAULT PANEL FLOOD LITES PANEL

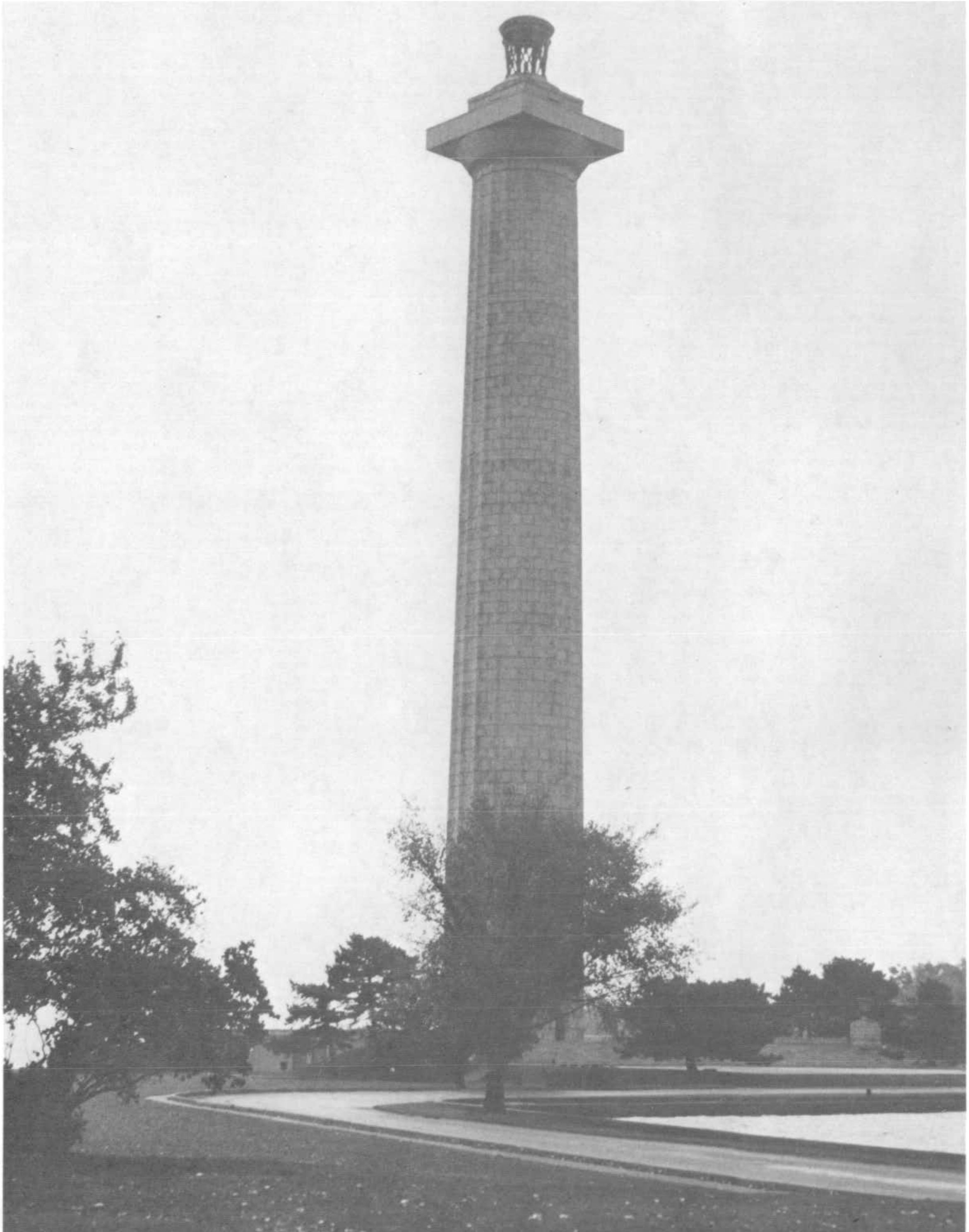
	CIRCUIT	MFG	POLE	AMP SIZE	FRAME	TRIP TIME 3X OVERCURRENT SECONDS A	B	C	INSTANTANEOUS OPERATION A	B	C	INSPECTION CONNECTIONS CABLE	BUS	AUX TRIP	OPER-ATION	OPERATES AS SPECIFIED YES	NO	TEST BY
B	SOUTH WEST	WEST	2	100		12.3			1200			OK	OK	—	OK			CL
W	NORTH WEST	WEST	2	100		9.1			1100			OK	OK	—	OK			CL
R	SOUTH EAST	WEST	2	100		9.3			1100			OK	OK	—	OK			CL
BB	NORTH EAST	WEST	2	100		11.2			1200			OK	OK	—	OK			CL
WW	SOUTH BANK	WEST	2	100		14.6			1100			OK	OK	—	OK			CL
RR	URN + UPPER	WEST	2	100		10.7			1000			OK	OK	—	OK			CL
	~~[illegible]~~																	

MOLDED CASE .RCUIT BREAKER
TEST RESULTS

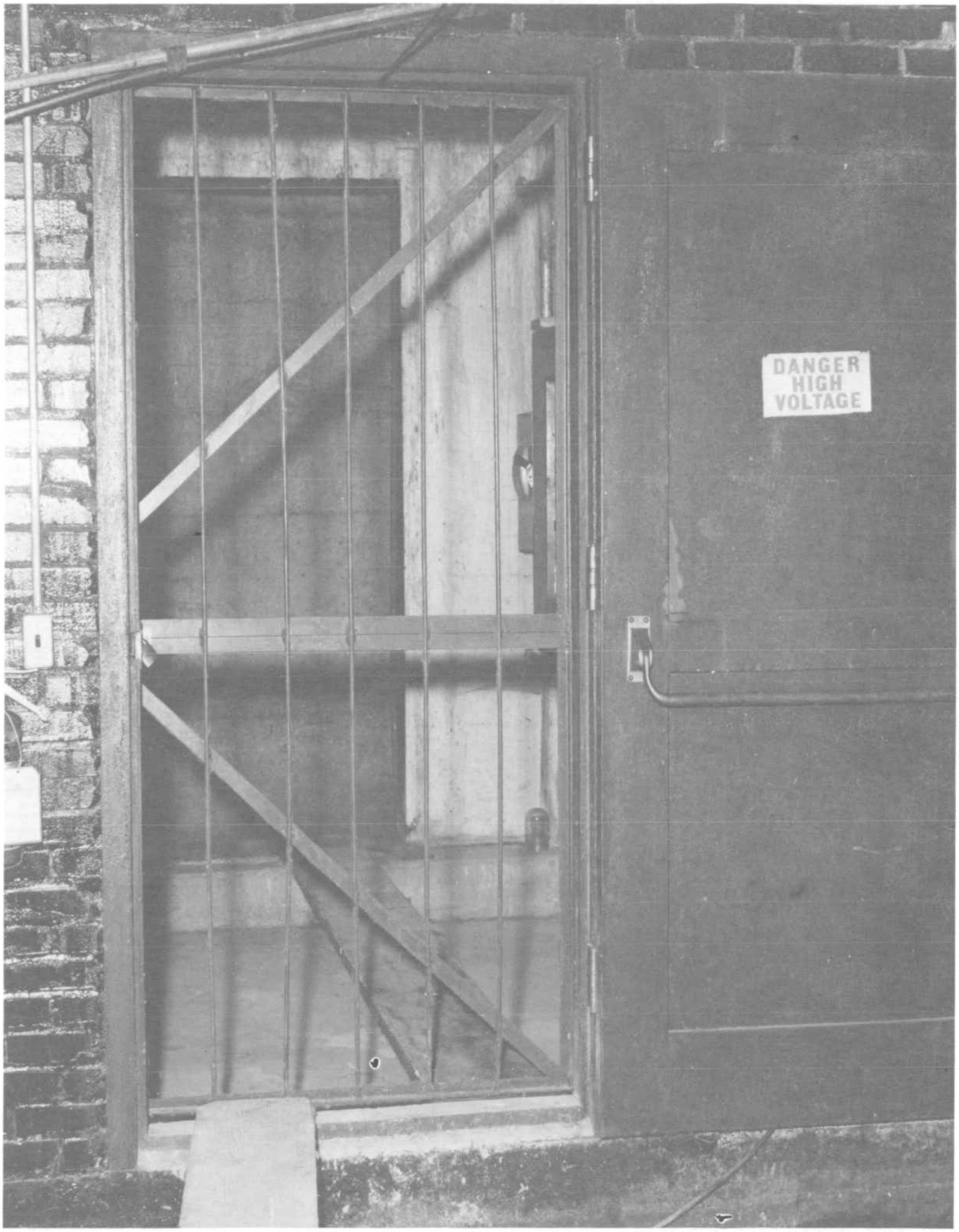
DATE 10-16-75 JOB #

LOCATION PERRYS MONUMENT MAIN VAULT PANEL TRANSFORMER DIST. PANEL

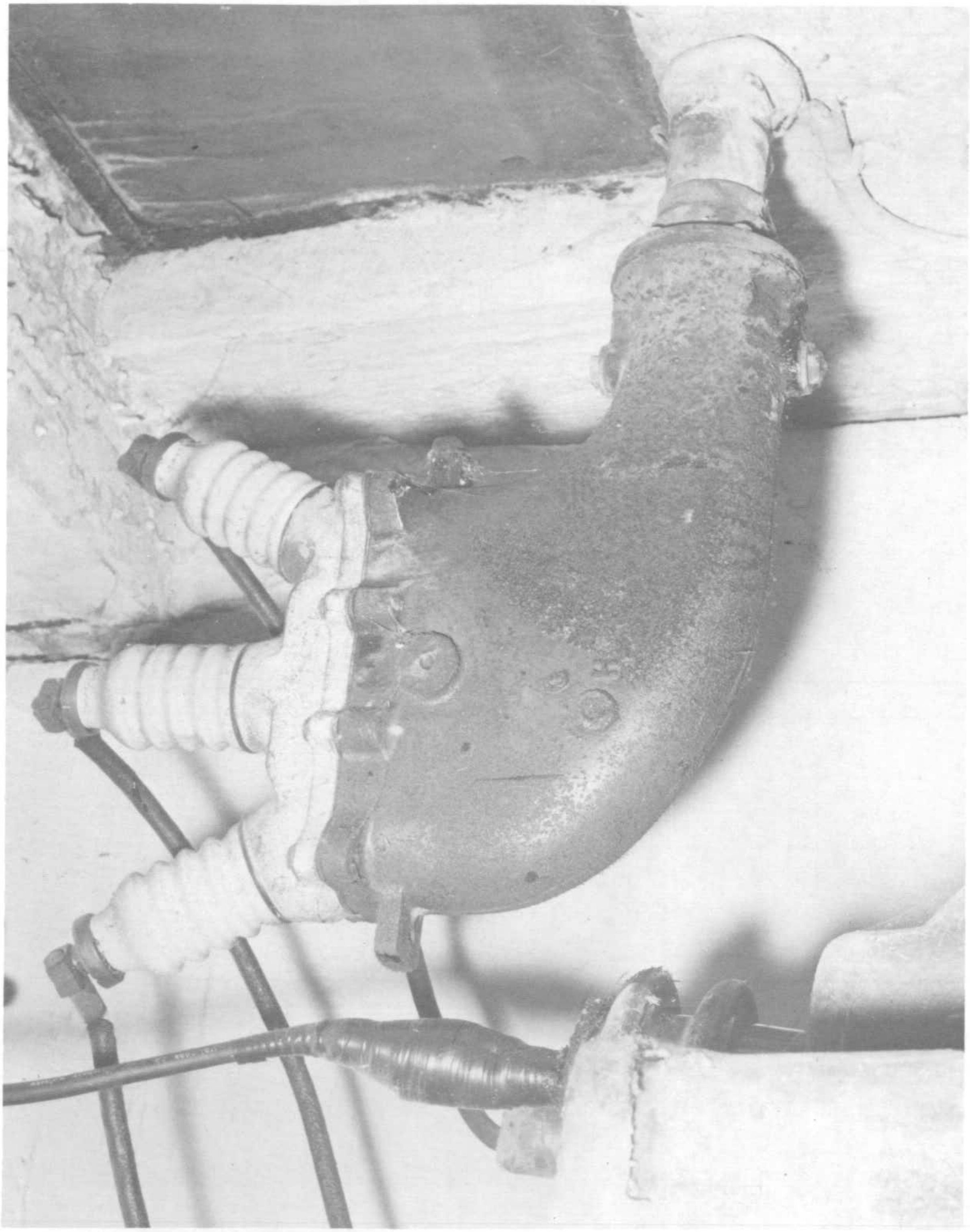
CIRCUIT	MFG	POLE	AMP SIZE	FRAME	TRIP TIME 3X OVERCURRENT SECONDS A	B	C	INSTANTANEOUS OPERATION A	B	C	INSPECTION CONNECTIONS CABLE	BUS	AUX TRIP	OPER-ATION	OPERATES AS SPECIFIED YES	NO	TEST BY
MAIN FLOOD LIGHTS	WEST	3	200	K	49.6	58.5	52.8	2000	2000	2000	OK	OK	—	OK			J.D.
	INST. ON	HIGH.															
G ELEVATOR SWITCH	WEST	3	100		6.3	12.5	13.2	900	1000	1000	OK	OK	—	OK			CL
O LOWER LEVEL LIGHTING PANEL	WEST	3	100		5.8	8.3	9.9	1000	1000	1000	OK	OK	—	OK			CL
B BOILER ROOM	WEST	3	100		10.4	9.6	2.9 NO GOOD.	—	—	—	OK	OK	—	BAD			CL



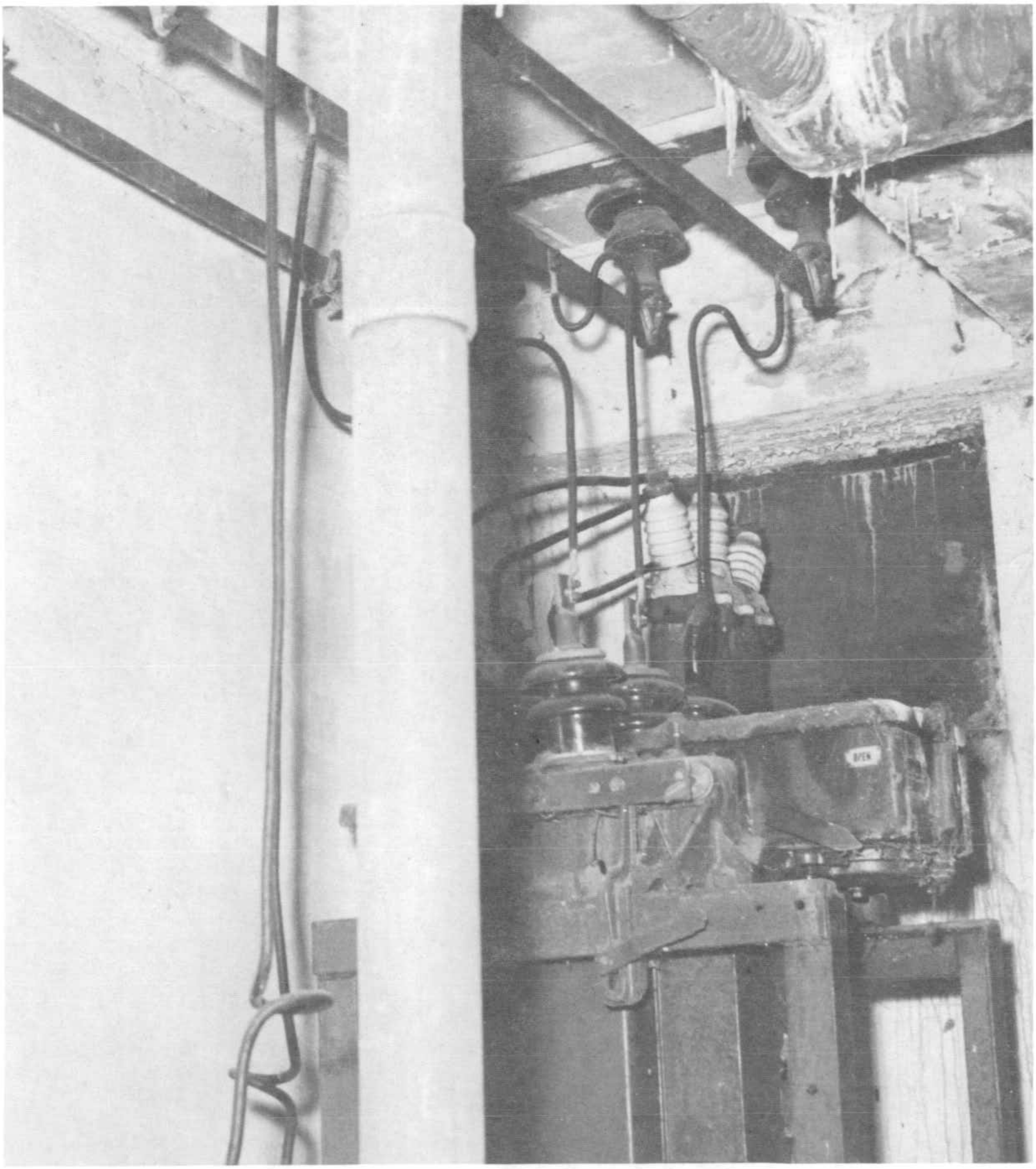
1. OHIO EDISON SERVICE The pole farthest from the transformer is in poor condition and should be replaced.



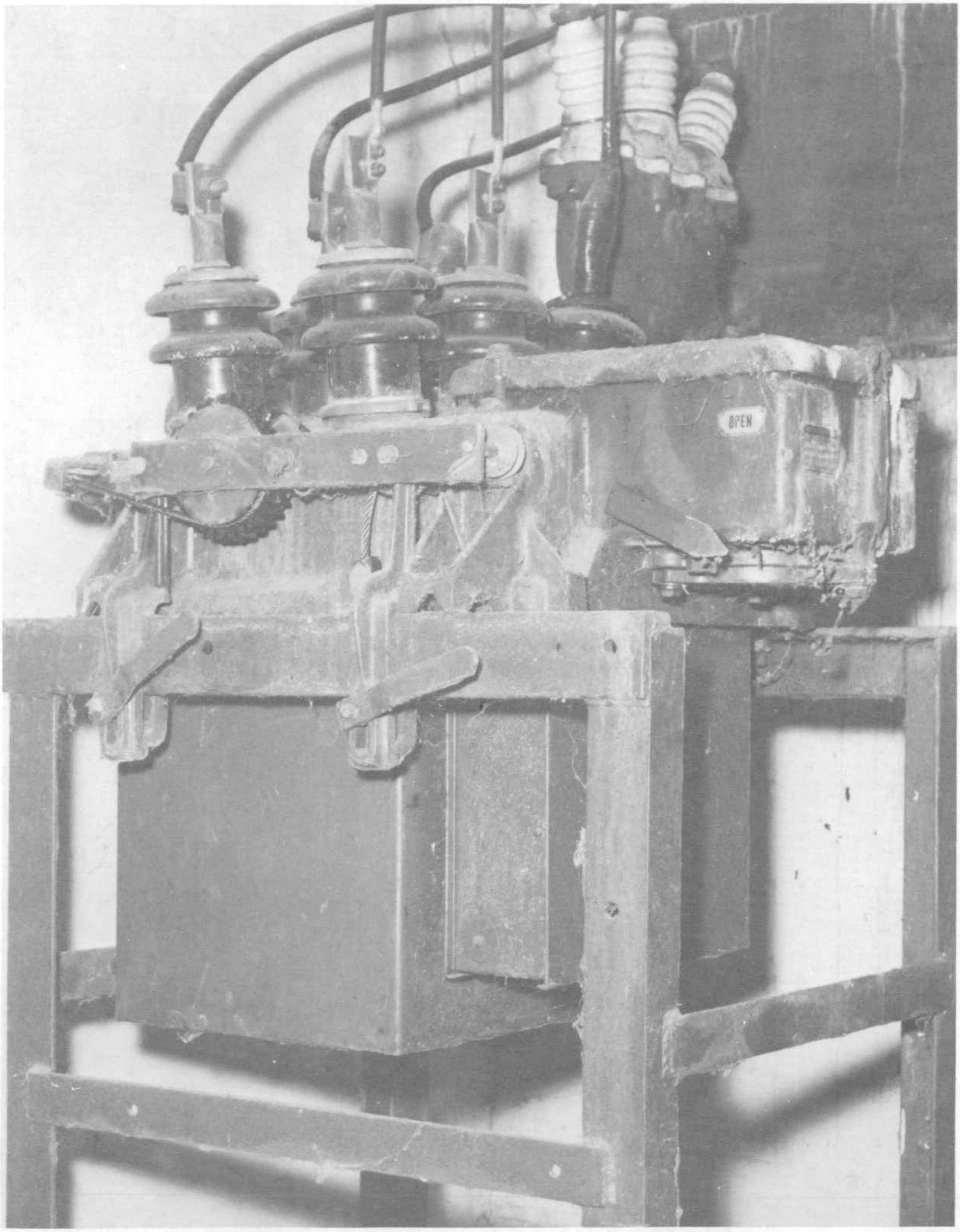
2. BASEMENT TRANSFORMER & SWITCHROOM This room serves as a ventilating corridor for the extremely damp basement. This door should be closed, and the basement should be separately ventilated to prevent rusting and possible arc over on the bus, panelboards, and switchgear.



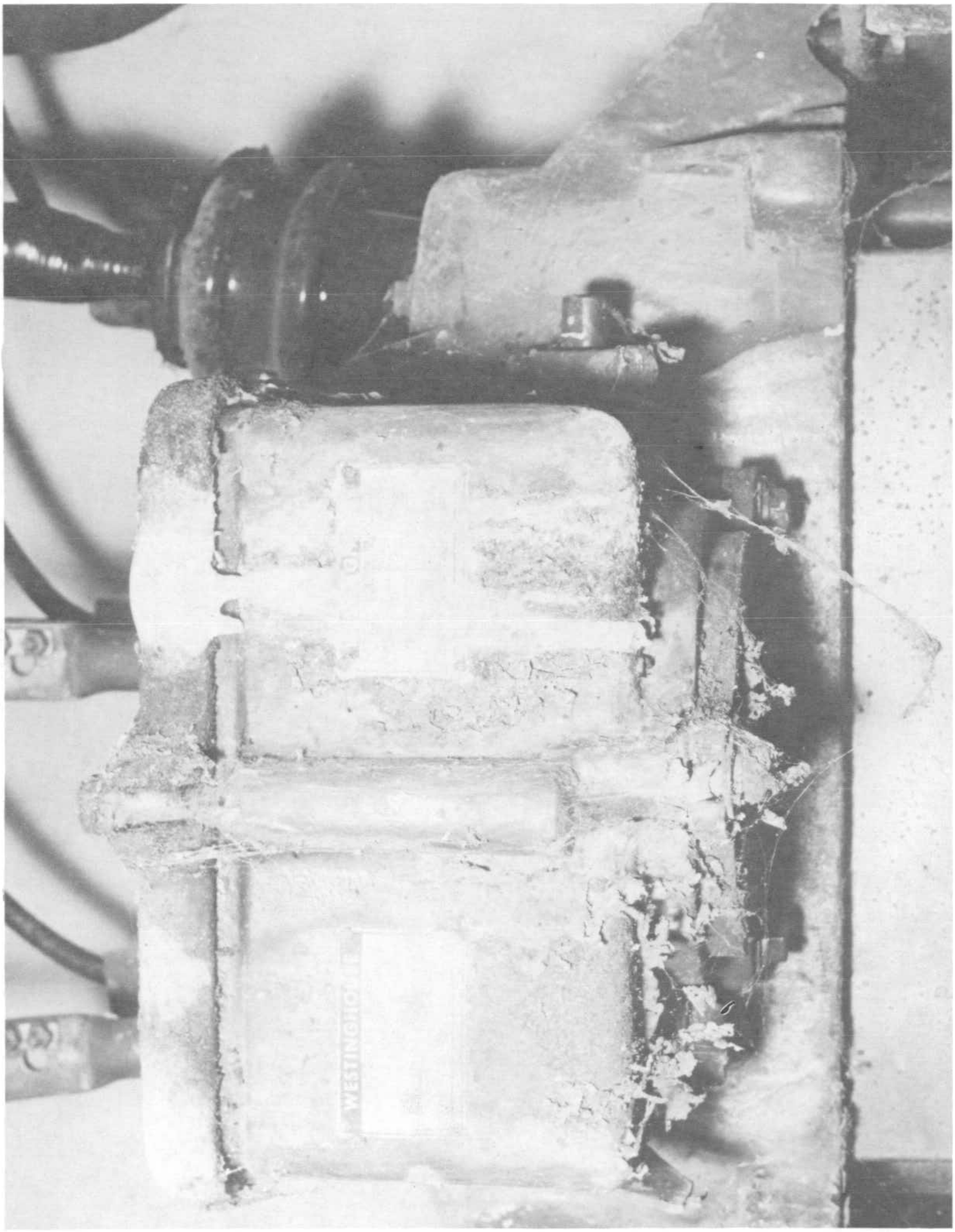
3. <u>SERVICE ENTRANCE POTHEAD</u> This service entrance pothead should be cleaned, and the connections should be taped to prevent birds or rodents from causing an arc over.



4a. MAIN SERVICE OIL CIRCUIT BREAKER This oil circuit breaker is in extremely dirty condition externally. The operating mechanism did not work due to rusting; we loosened the mechanism to permit proper tripping. This unit requires a complete mechanical and electrical cleaning and overhaul. The ceiling mounted bus and bus insulators should be cleaned and all connections tightened.



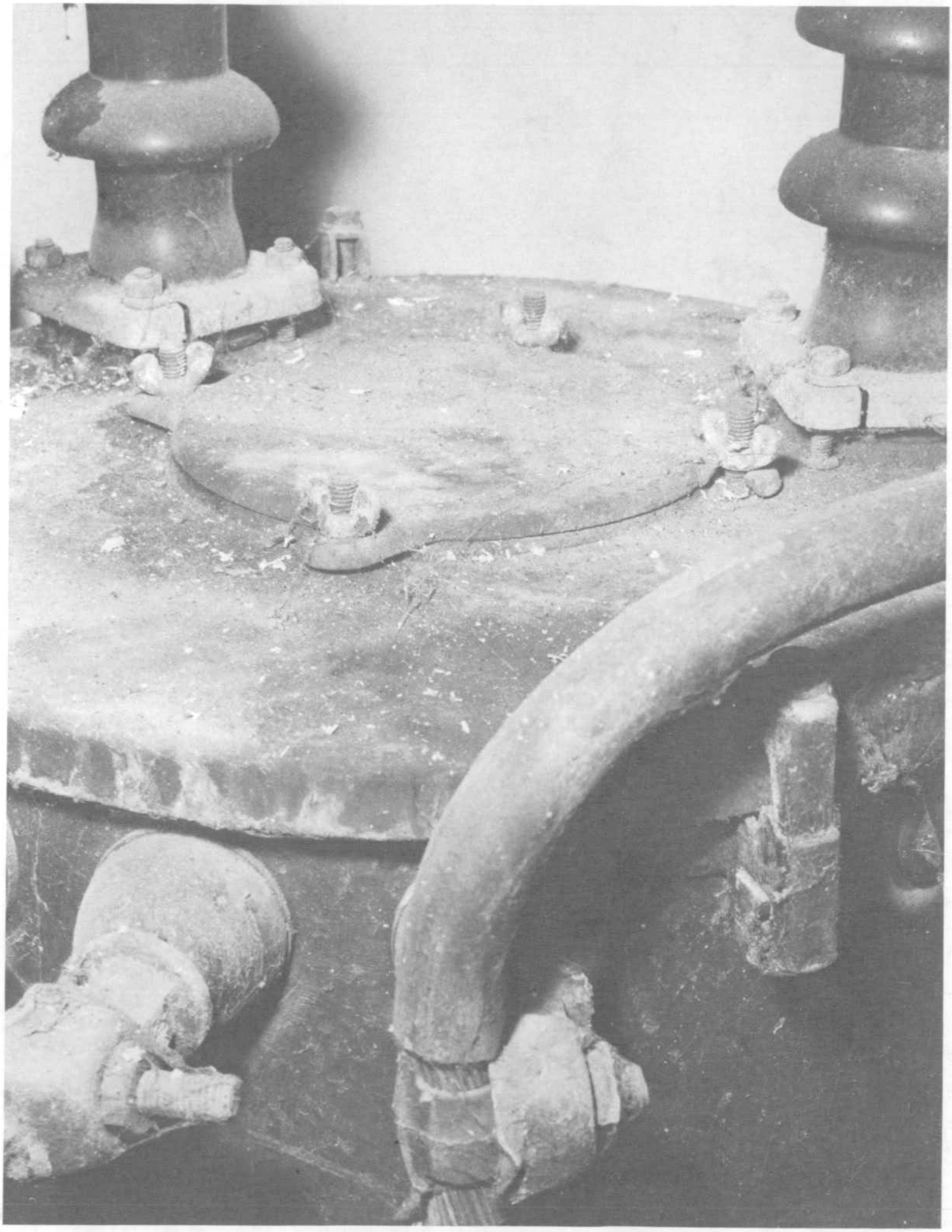
4b. MAIN OIL CIRCUIT BREAKER The line and load terminals of this oil circuit breaker should be taped to prevent bird or rodent arc over.



4c. MAIN OIL CIRCUIT BREAKER The entire housing and support framework of this oil circuit breaker should be cleaned and painted with a rust resistant paint.

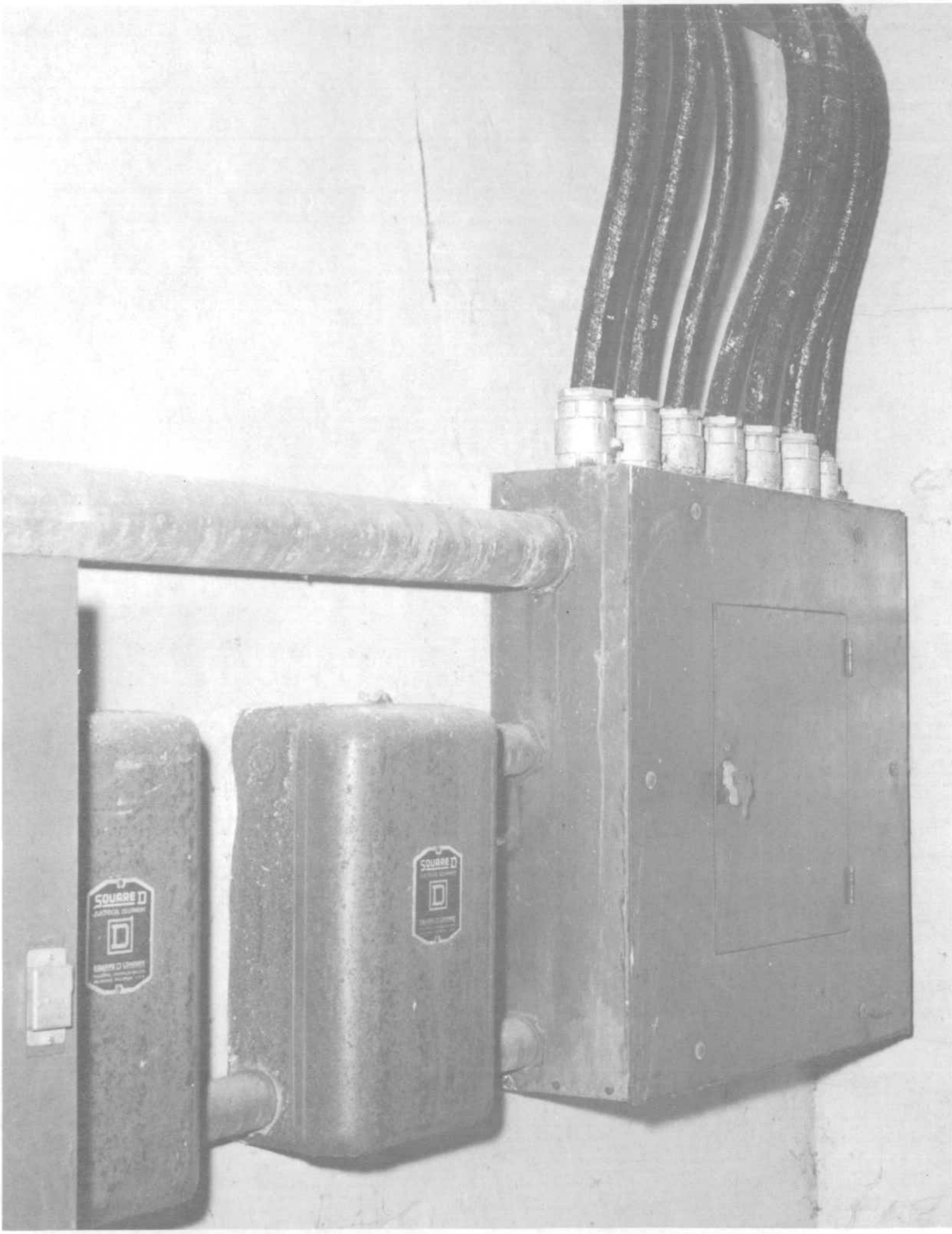
4d. MAIN OIL CIRCUIT BREAKER The extremely dirty bushings should be cleaned, and the connections tightened and insulated.

5a. 3-PHASE TRANSFORMER BANK These transformers should be cleaned, rust removed, and painted with a rust resistant transformer paint. The right side transformer tested fair. We recommend a re-test in one year.

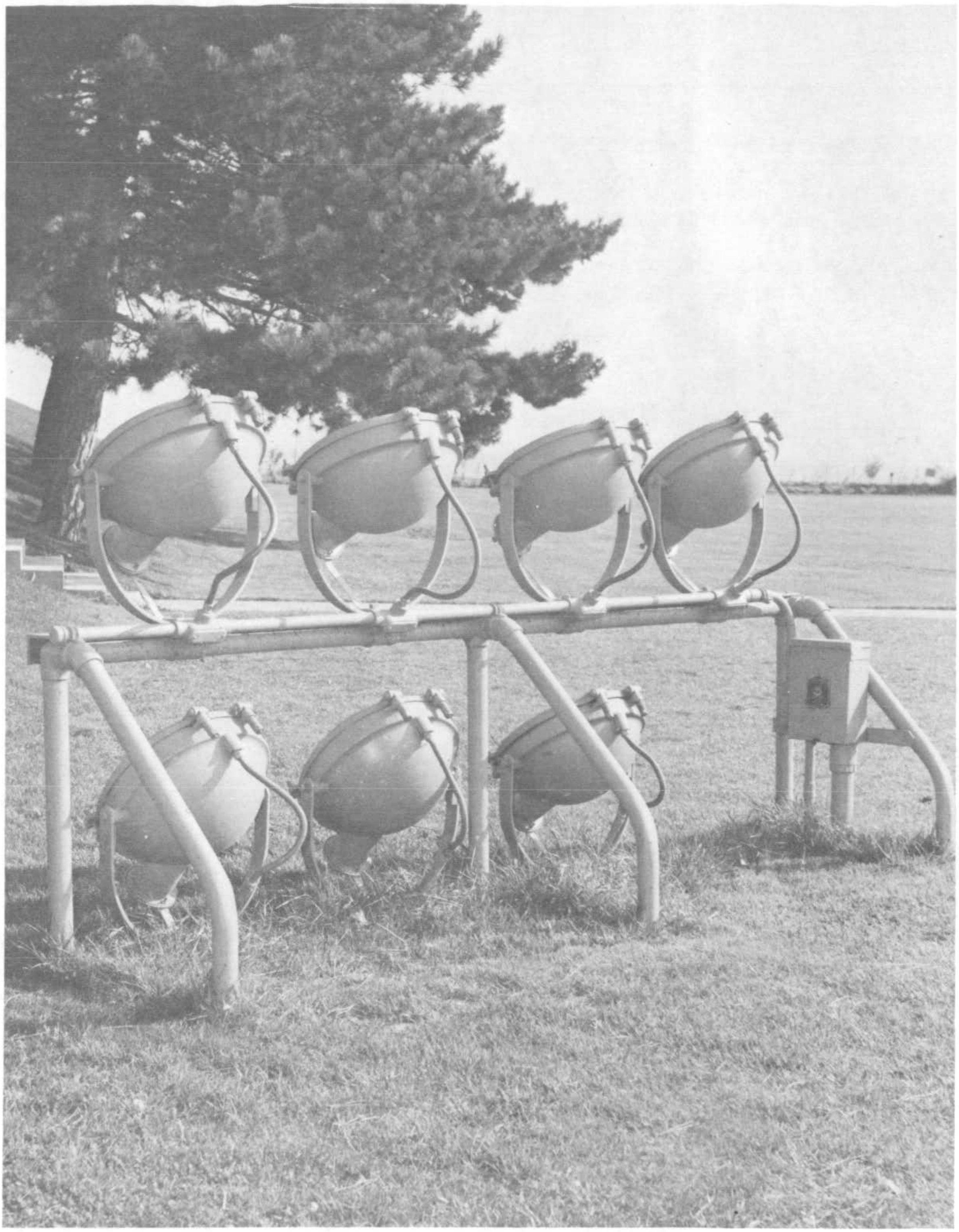


5b. TRANSFORMER The high voltage transformer bushings should be cleaned, and the connections should be reinsulated. (NOTE WET BUSHINGS FROM INSULATING MATERIAL LEAKAGE.) The low voltage bushings should be cleaned and tightened.

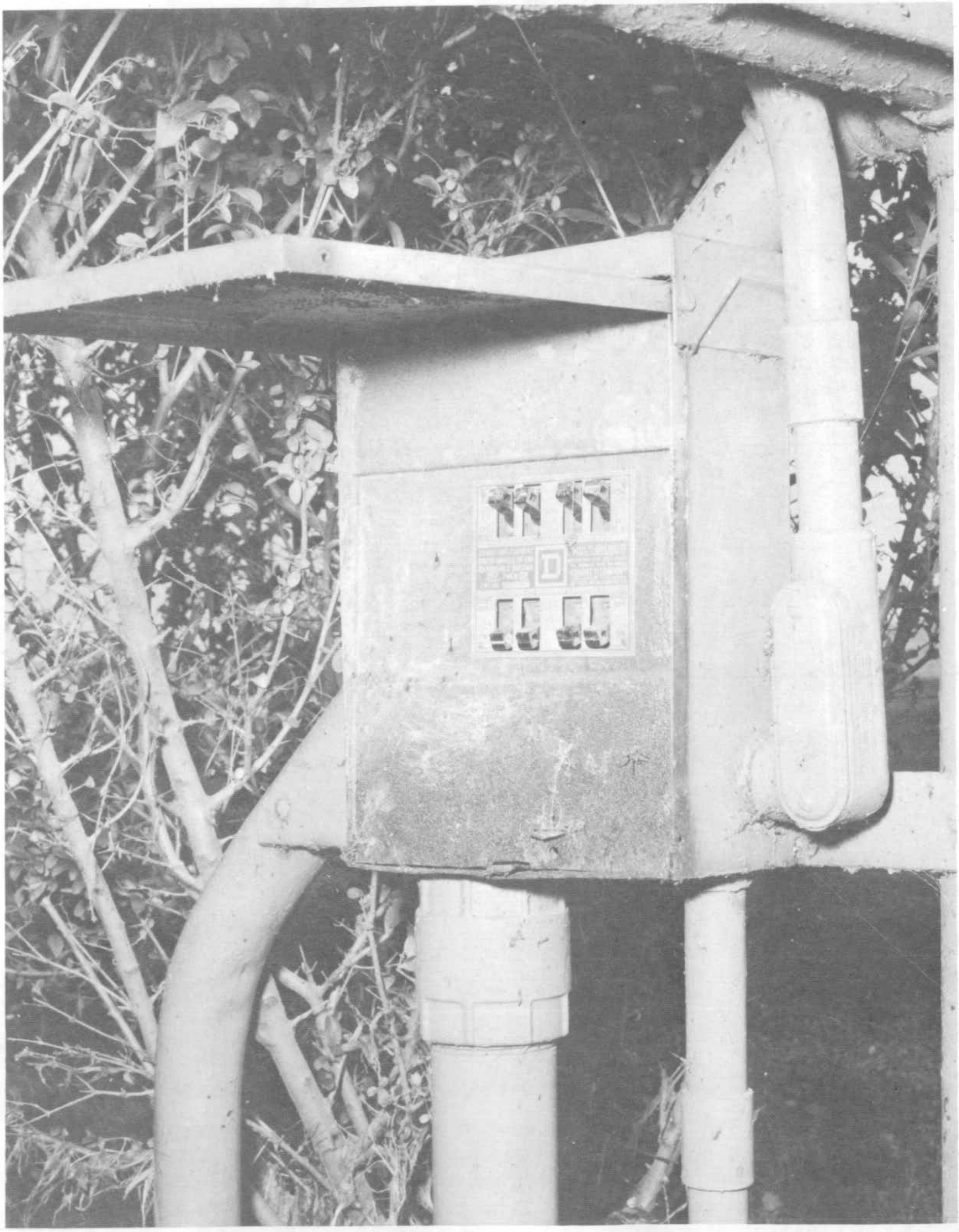
6. MAIN 208-VOLT 3-PHASE PANELBOARD This panel board should be vacuum cleaned internally, all cable connections should be tightened, and the cabinet chould be dismantled and cleaned of rust inside and outside and painted with a rust resistant panelboard paint. All bus connections should be dismantled, cleaned, lubricated with conducting grease, and torqued for proper connection tightness. The Boiler Room 100-AMP, 3-pole, circuit breaker is bad and should be replaced.



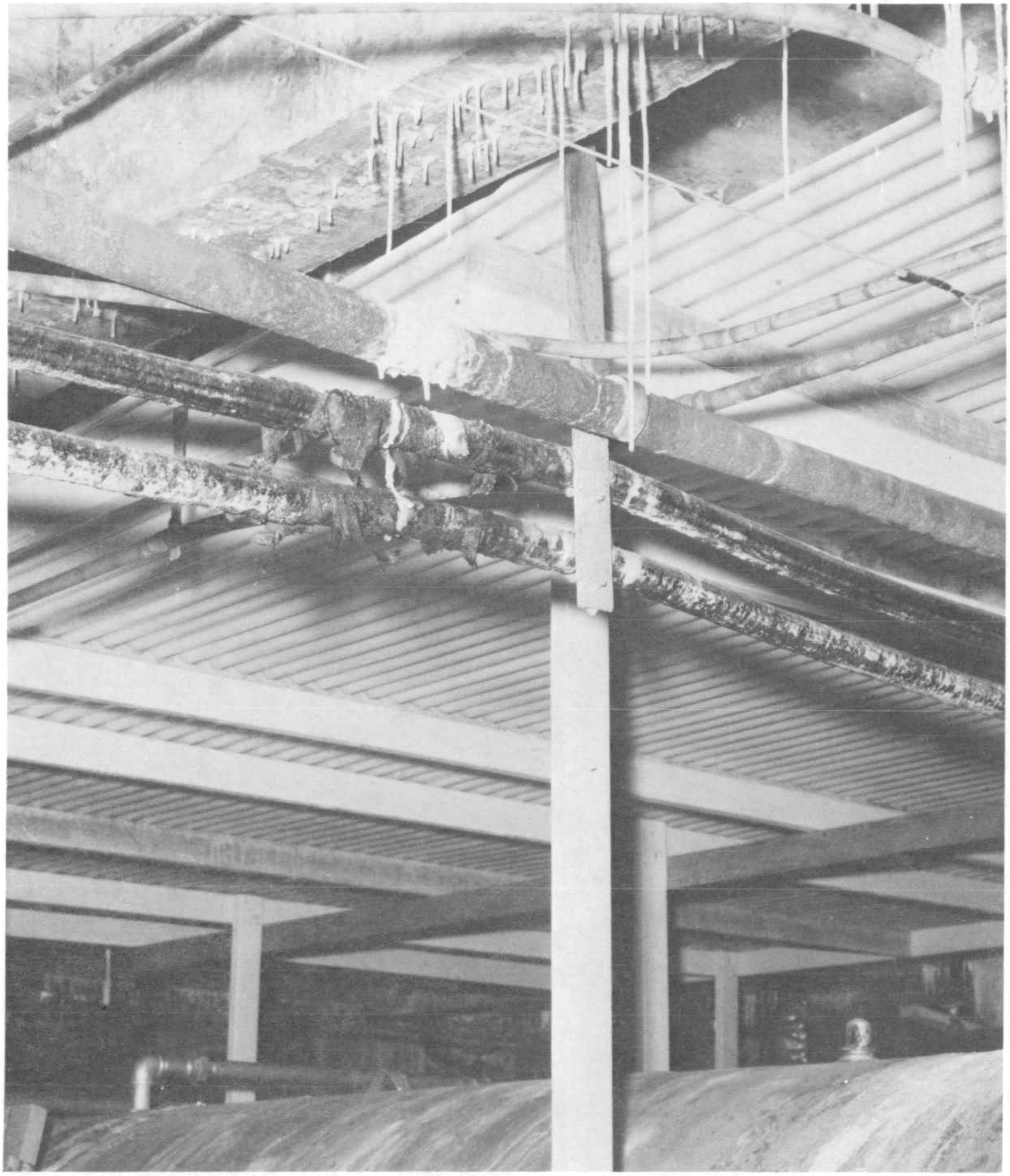
7. <u>MAIN 120-VOLT PANELBOARD</u> This panelboard should be vacuum cleaned internally, all cable connections should be tightened, and the cabinet should be dismantled and cleaned of rust <u>inside</u> and outside and painted with a rust resistant panelboard paint. All bus connections should be dismantled, cleaned, lubricated with conducting grease, and torqued for proper connection tightness.



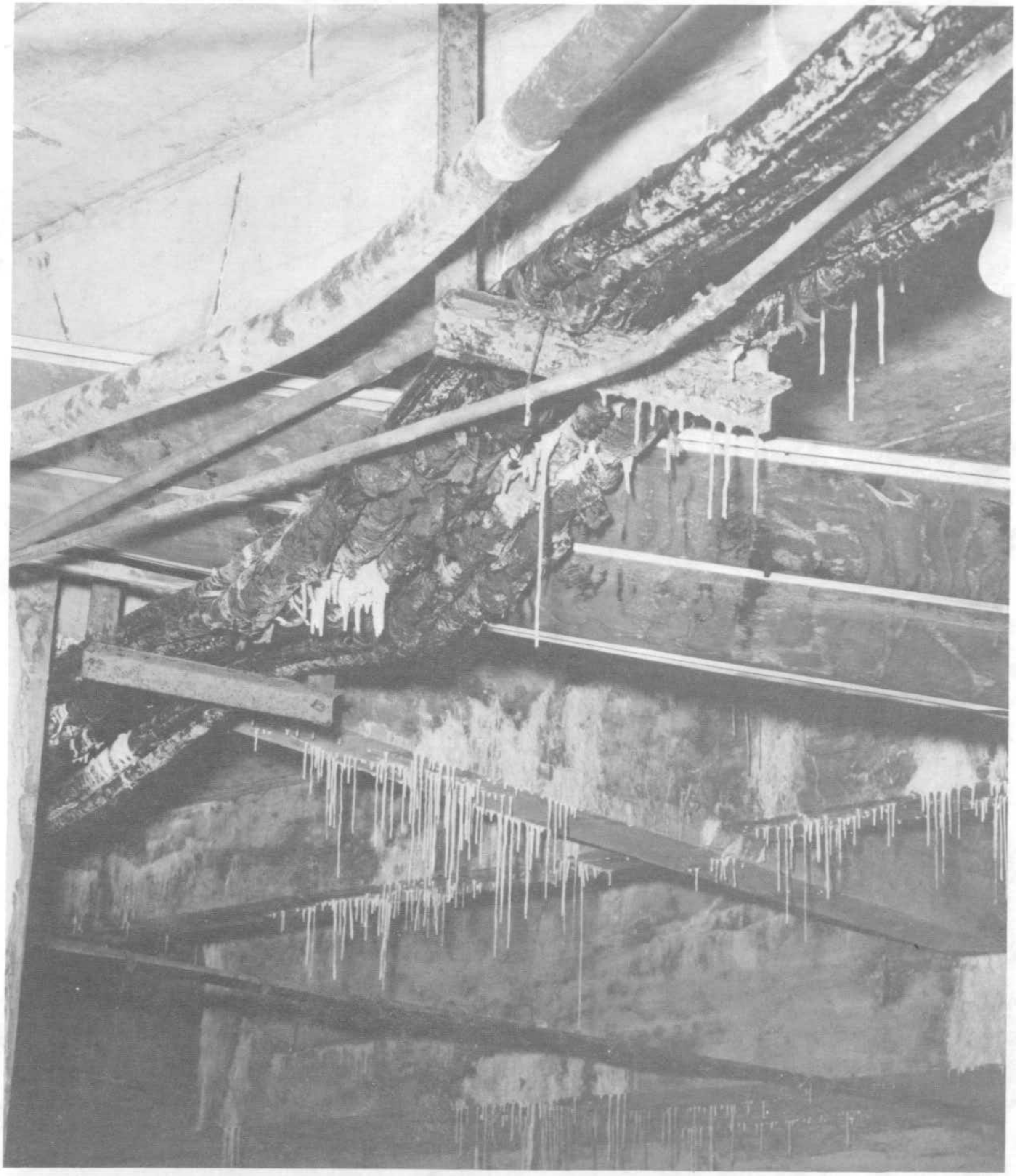
8a. OUTDOOR FLOODLIGHTING The outdoor floodlighting distribution panelboard should be replaced with a heavy-duty outdoor enclosure type panelboard. The existing panelboards are severely rusted. (SEE PHOTOGRAPH 8b.) The northeast floodlight feeder tested bad. All other floodlight feeders tested marginal or fair.



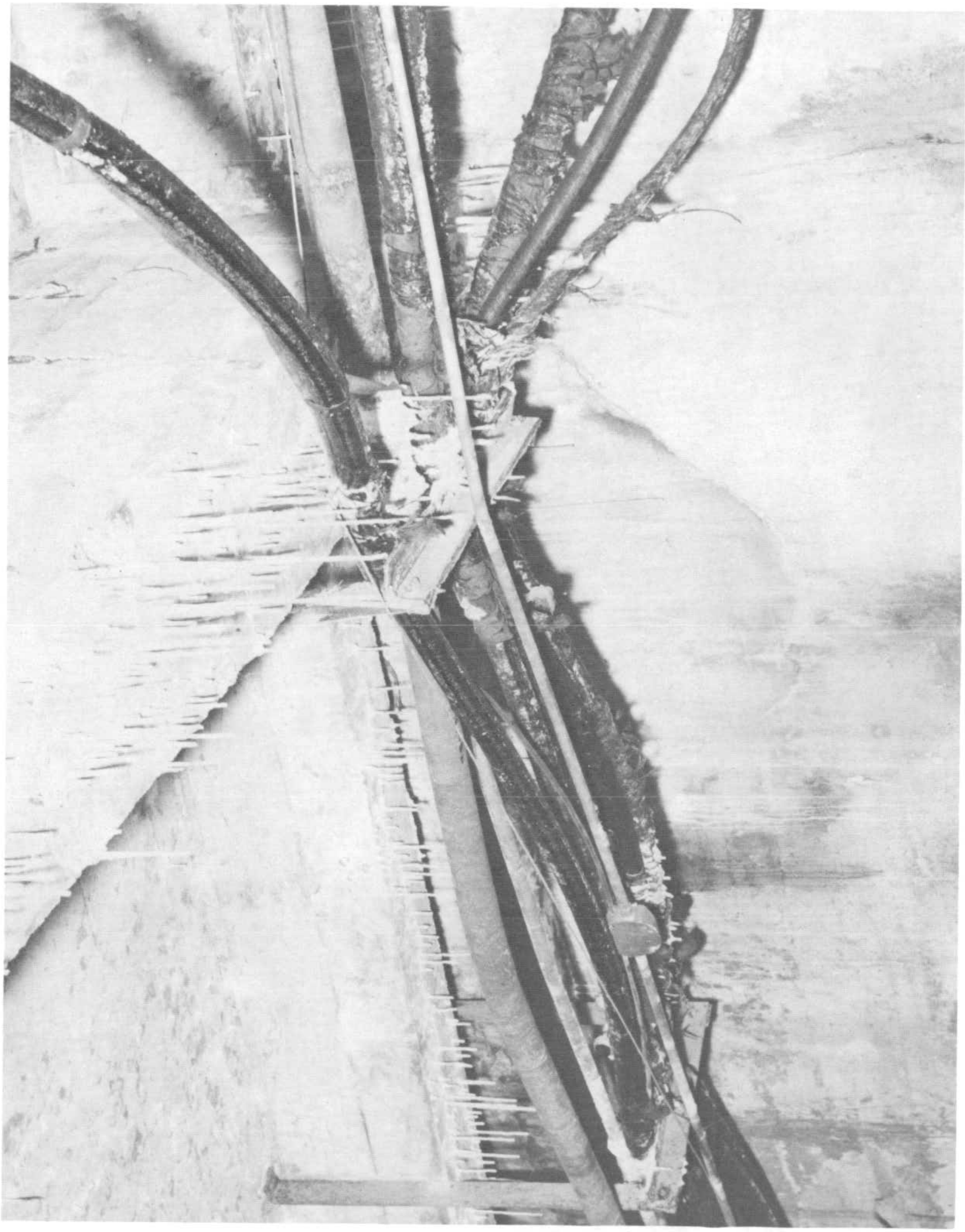
8b. OUTDOOR FLOODLIGHTING PANELBOARD The extremely rusted condition of this panelboard warrants its replacement as noted in comments on photograph 8a.



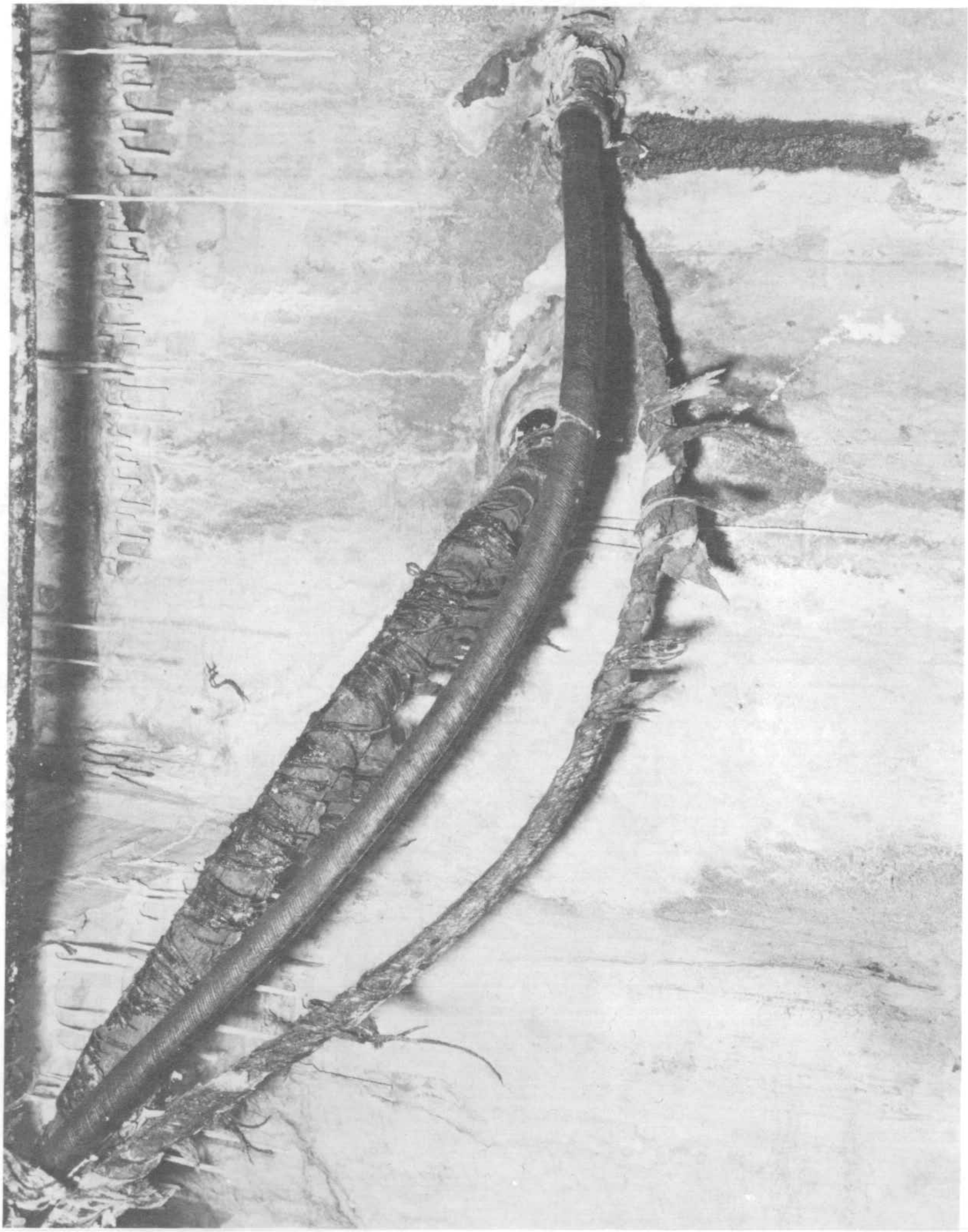
9a. BASEMENT CABLE The cables for floodlighting, elevator, and interior lighting are inadequately supported and exposed to damage and high stress concentrations at the support point. A cable tray and conduit system should be installed to continuously support these circuits. As an alternative, a stress spreading support plate should be installed at all attachment points. The outer jacket should be repaired with vinyl type tapes where the severe jacket damage and rotting are noted.



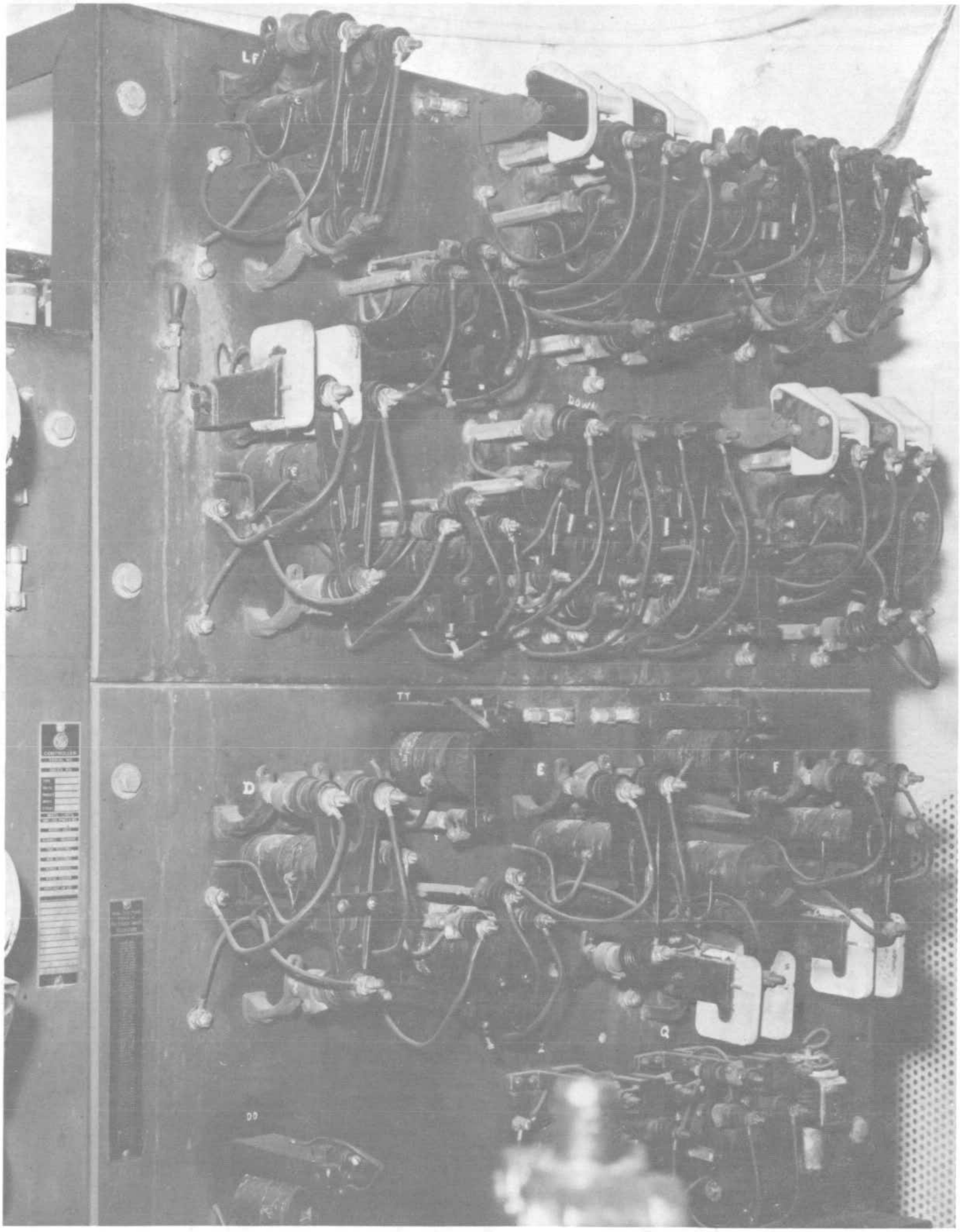
9b. BASEMENT CABLE See 9a.



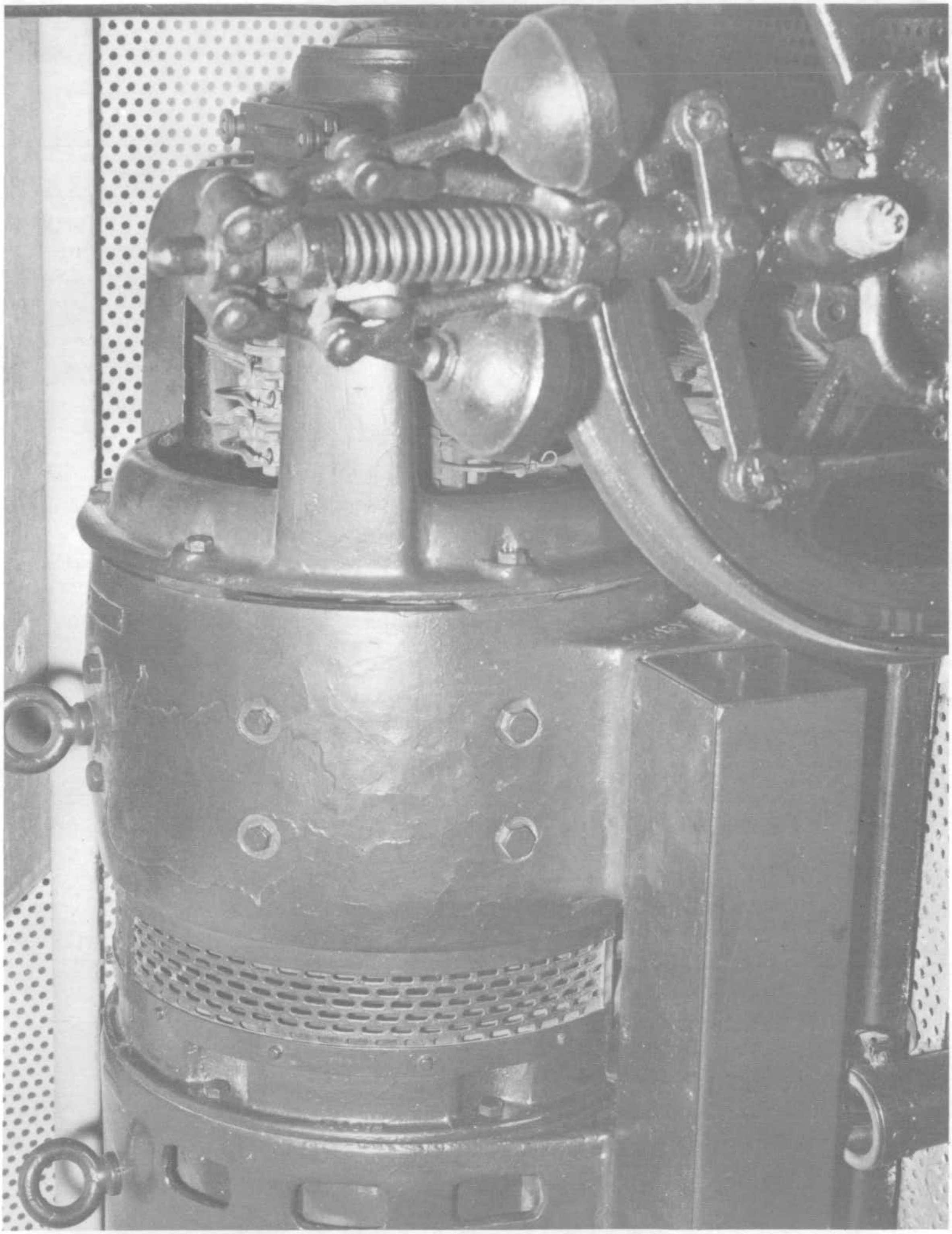
9c. BASEMENT CABLE See 9a.



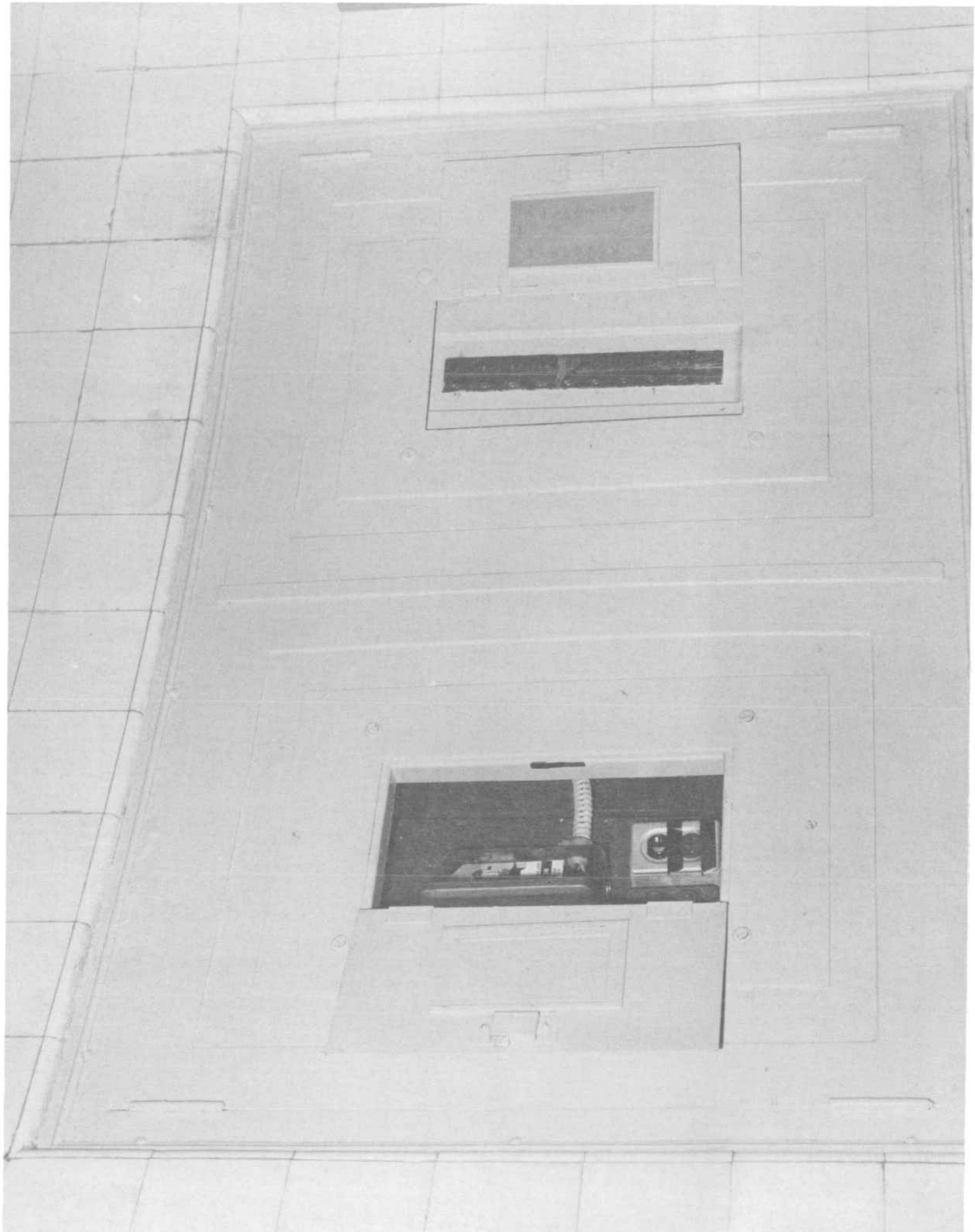
9d. BASEMENT CABLE See 9a.



10a. ELEVATOR CONTROL PANELBOARD The elevator control panelboard should be cleaned, all contacts burnished, and all connections tightened. All solenoid and contactor coils should be painted with an insulating paint, and all interconnecting control wiring with brittle or damaged insulation should be replaced. All backboard connections should be cleaned and tightened. A complete inventory of replacement parts should be developed, and a spare parts locker should be installed at the panelboard location.



10b. ELEVATOR MOTOR GENERATOR SET This motor generator set should have the commutator section vacuumed, the brush holder boxes and connections cleaned, and the brush shunt connections checked.



11. LIGHTING PANELBOARD This lighting panelboard is adequate for its present use. Possible future parts replacement problems may suggest the installation of a new panelboard during any present electrical modernization program.

APPENDIX J: WESTERN RESERVE LIGHTNING ROD COMPANY REPORT

WESTERN RESERVE LIGHTNING ROD CO.

complete lightning rod service designed for you

November 21, 1975

Dalton-Dalton-Little-Newport, Inc.
3605 Warrensville Center Road
Cleveland, Ohio 44120

Re: Inspection of Lightning Protection
on Perry Monument
<u>Preliminary Report</u>

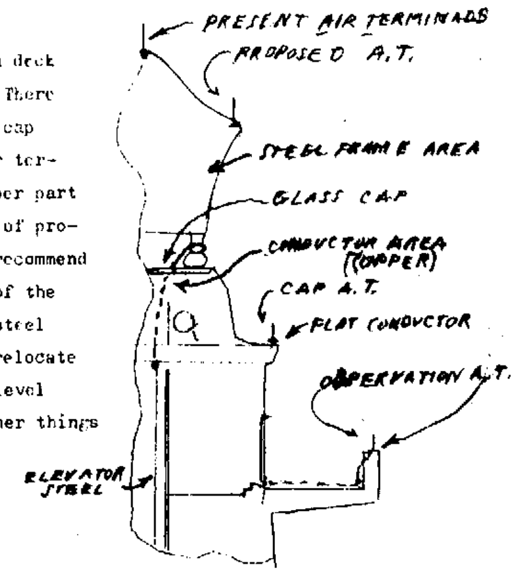
Gentlemen:

A visit was made to the site, along with pictures and background information on the above project. Our report is as follows:

Please keep in mind the height of the monument and the fact that lightning strikes 90 times within a half-mile radius of this area. The monument was started in 1912 and according to records, lightning protection was installed in 1923 after the monument had been struck and damaged. Ironically, this was the same year Underwriters' Laboratories issued their first code of lightning protection. There have been nine code changes since that date.

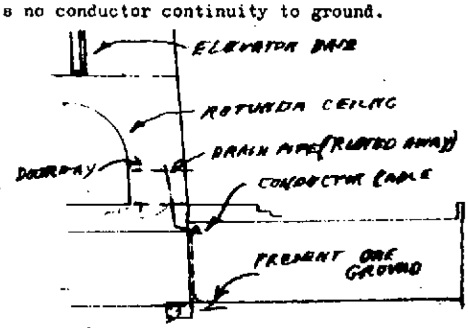
Some of the material is according to today's code requirements. However, there is not enough and what there is, is disconnected. There are four major parts of lightning protection system: 1.-Air terminals. 2.-Conductor material. 3.-Ground Points. 4.-Interconnection of metal parts.

1. There are air terminals at the observation deck level that are broken and need renewing. There are air terminals right above this at the cap level which are in place. There are 4 air terminals located at the very top, at the upper part of the skylight. Due to lack of any cone of protection coverage at this height, I would recommend air terminals around the base projection of the skylight. These could be mounted to the steel framework in this area. You may want to relocate the air terminal on the observation deck level at a different spot to take safety and other things into consideration.



2. Conductor material on the observation deck sandstone parapet edge and the cap level have $\frac{1}{4}$ x $1\frac{1}{4}$" bar stock conductor mounted 2 inches in from the outer edge. This is approved conductor, however, the joints are loose and corroded at several places. The bar stock is connected to a circuit at deck level composed of 3/8" round copper solid conductor by a small stranded wire which is not according to code. This in turn connects the platform deck conductor to the metal threshold in the doorway. There are 2 problems in this area. First, there is no apparent connection to the elevator steel, only a conductor as far as the threshold and this is too small of a conductor. There also should be 2 paths to ground(two way path). The bar stock conductor at the cap level is in the same condition except the air terminals are intact and there are two apparent conductors through the roof. However, there is no connection inside to the steel that shows. The air terminals on the top of the monument lantern are mounted to the steel framework. However, the steel framework conductors at the base of the lantern (2) wrap loosely around the outer brass skin and do not connect to the steel at this area. These two conductors do go in and tie to the steel framework of the elevator shaft. According to Underwriters' Laboratories code, metal framework can be used as a conductor if sufficient size and continuity are present. At this time, the continuity test or resistance test was not made. It is doubtful if it would substitute for the conductor under the size of material needed. The steel framework ends at the rotunda ceiling. At this location the conductor connects from the steel to the drain line which follows down to the basement area under the main deck of the monument entrance. This drain line was rusted away, therefore, there is no conductor continuity to ground.

3. Ground location. This was visually checked and the conductor cable from the rusted away soil pipe down the wall to the present ground is apparently still in the same condition as when it was installed. There should be 2 down conductors from the elevator steel according to code requirements and this was not found.



4. Common grounding or interconnection to metal parts. This has been partially adhered to, due to the use of metal parts as substitutes for the system.

Finally the system has broken air terminals; loose, disconnected, non-code conforming conductors; lack of proper bonding between conductors (8 sq. inches bonding surface required); lack of conductors; no grounds (2 locations needed) and no interconnection of necessary metal such as, electrical ground, water pipe, stairway, and so forth. There is no doubt the structure has been struck and lightning protection is in poor condition. The structure is bound to have been damaged.

Sincerely yours,
WESTERN RESERVE LIGHTNING ROD CO.
Homer Pound
Homer Pound, President

HP:tm

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REPRODUCIBLES OF ORIGINAL DRAWINGS - MEMORIAL COLUMN AND PLAZAS, 1912-1913

"The following drawings are located in the plan files of the Denver Service Center, National Park Service, Denver, Colorado."

Drawing No. 370/25,900 - 48 Sheets

Sheet No.		Orig. No. of Dwg.
Structural Drawings		
1.	Topographic Survey/Test Boring Locations - Judson and Wagar, 6/22/12	10
2.	Test Borings - Sprague and Henwood, 8/12/12	10A
3.	Sketch of Waterproofing - J.C. Robinson and Son	
4.	Detail of Column Rotunda - Boller, Hodge and Baird, Struct. Eng./Freedlander and Seymour, 8/10/12	24
5.	Ground Floor Slab, J.C. Robinson and Son	
6.	Reinforcement of Column Cap - Boiler, Hodge and Baird/ Freedlander and Seymour, 8/10/12	23
7.	Detail of Column Cap - Boller, Hodge and Baird/ Freedlander and Seymour	46
8.	Reinforcing of Column Lookout (Penthouse) - Boller, Hodge and Baird/Freedlander and Seymour, 8/10/12	21
9.	Framing Details, Elevator Machine Floor - J.C. Robinson and Son	
9A.	Detail of Column Stairs - Boller, Hodge and Baird/ Freedlander and Seymour, 8/10/12	22
Architectural - Plane, Elevations and Sections		
10.	The Terrace - Freedlander and Seymour, 8/4/14	1
11.	Plans, Elevation and Sections of Column - Freedlander and Seymour, 8/10/12	12
12.	Elevation of Column - Freedlander and Seymour, 9/10/12, with Contractor's (J.C. Robinson and Son) Notes	27
Architectural Details		
13.	Plans, Partial Elevations and Sections - J.C. Robinson and Son	
14.	Details of Rotunda - Freedlander and Seymour	
15.	Rotunda - Marble Floor and Base - J.C. Robinson and Son, 7/22/13	27A
16.	Rotunda - Marble Floor and Base - Norcross Co., Contract "G"	1
17.	Rotunda - Marble Floor and Base - J.C. Robinson and Son	
18.	Rotunda - Marble Floor - Freedlander and Seymour, 9/22/13	204
19.	Rotunda - Part Plan and Elevation - Adam Groth and Co., Job #176	3
20.	Rotunda - Part Plan and Elevation - Adam Groth and Co., Job #176	4

Sheet No.		Orig. No. of Dwg.
21.	Rotunda - Details of Marble Floor and Base - J.C. Robinson and Son	
22.	Details of Granite Bench, Stairwell Between Rotunda and Lower Elevator Landing - J.C. Robinson and Son	
23.	Details of Bronze Cabinet for Electric Panel Board, Lower Elevator Landing	
23A.	Revised Drawing for Concrete Walls and Tile Wainscot in Elevator Landing and Staircases - Freedlander and Seymour, App. by Boller, Hodge and Baird, 3/10/13	12A

Electrical Drawings

24.	Electric Work - Vertical and Plan Sections of Shaft - Freedlander and Seymour, 8/9/12	16
25.	Elevator Layout - Partial Vertical Section and Plan Sections of Shaft - Pattison Bros., Elec. Eng., 7/25/12	

Erection Drawings

26.	Details of Derrick - J.C. Robinson and Son	
27.	Plan of Supports for Forms for Column Capital - J.C. Robinson and Son	
28.	Construction Tower - C.E. Sudler, October 1913	
29.	Temp. Bracing of Tower - J.C. Robinson and Son	
30.	Tower Bracing Details - J.C. Robinson and Son	2
31.	Tower Bracing Details - Timbers - J.C. Robinson and Son	4
32.	Tower Bracing Details - Iron Straps - J.C. Robinson and Son	
33.	Boom End Detail (Tower) - J.C. Robinson and Son	
34.	Boom Head Detail (Tower) - J.C. Robinson and Son	
35.	Belt Conveyor and Platform - J.C. Robinson and Son	
36.	Forms for Reinf. Con. Stair Columns - J.C. Robinson and Son	
37.	Forms for Reinf. Con. Stairs - J.C. Robinson and Son	1
38.	Forms for Reinf. Con. Stairs - J.C. Robinson and Son	2
39.	Forms for Reinf. Con. Stairs - J.C. Robinson and Son	3
40.	Forms for Reinf. Con. Stairs - J.C. Robinson and Son	4
41.	Forms for Reinf. Con. Stairs - J.C. Robinson and Son	5
42.	Full Size Details - Reinf. Con. Stair Forms - J.C. Robinson and Son	6
43.	Full Size Details - Reinf. Con. Stair Forms - J.C. Robinson and Son	7

Historical Drawings - Not Constructed

44.	Electric Work - Freedlander and Seymour	
45.	Piling and Foundation Plan for Colonnade Terrace - J.C. Robinson and Son	
46.	Heating and Vacuum Sweeping Work - Freedlander and Seymour, August 1912	20

BLUEPRINTS OF CONSTRUCTION DRAWINGS: 1922-1946
MEMORIAL COLUMN AND PLAZAS

NPS-DSC No.			Orig. No.
NM-PVIPM 5643	- Layout and Landscaping, Greening - Landscaping Co., Oct. 1921		5643
6010	- Elevator General Plan (Prel.), Otis Elevator Co.,	1/5/39	- 132958-1
6010A	- Elevator General Plan - Erection Print,	2/13/39	- 132958-1
6011	- Elevator, General Plan of Penthouse and Upper Landing, Otis Elevator Co.,	1/16/38	- 132958-2A
6011A	- Erection Print, Identical Print to Above, With Notes,	2/13/39	- 132958-2A
6012	- Elevator Car, Otis Elevator Co.,	1/10/39	- P-11284-2
6012A	- Elevator Car, Otis Elevator Co.,	1/10/39	- 132958-100
6013	- Elevator Car Button Control,	1/19/39	- P-11284-3
6014(1)	- Elevator Car, Light Fixture,	7/27/39	- K-1740-1
6014(2)	- Elevator Car, Light Fixture,	7/27/39	- K-1740-3
6016	- Elevator Wiring Diagram,	2/20/39	- 132958-EM
6017	- Ship Ladder and Wire Screen to Elevator Machine Room, Mack Iron Wire Works,	1/31/39	- 7881-82
6017A	- Ship Ladder and Wire Screen to Elevator Machine Room, Mack Iron Wire Works, Revised,	3/24/39	- 7881-82
6018	- Elevator Oil Buffer,	1/25/39	- 6136-C
9002(1)	- Pole Top Operated Switch, J.R. Kearney Corp.,	8/26/46	- 6002-9
9002(2)	- Oil Type Circuit Breaker, Westinghouse Electric Co.,	5/14/41	- 45-A-352
9002(3)	- Circuit Breaker: Housing and Wiring Combinations,	7/23/48	- 6-A-1285
9002(4)	- Floodlight Projector - Bill of Material,		- 765274
9002(5)	- 750-1000 Watt Floodlight Projector, General Assembly,	12/29/26 - 8/18/33	- 768-1280
9002(6)	- 100-200 Watt Floodlight Projector, General Assembly,	10/4/27 - 1/16/31	- 768-1384
370-100B:	Alterations and Repairs to the Column (Penthouse and Walks, New Drain, Close Old Gutter), Freedlander Dwg.,	11/10/22	- 100"B"

NATIONAL PARK SERVICE CONSTRUCTION DRAWINGS: 1938-1965
MEMORIAL COLUMN AND PLAZAS

NM-PV			
2008	1 Sheet	Comfort Station -	3/8/50
2008A	2 Sheets	Comfort Station -	5/15/50
2018	1 Sheet	Base Lines for Laying 7200 Volt Line -	7/24/51
2020	2 Sheets	Rehabilitation: Monument Shaft -	6/10/52
2022	1 Sheet	Replacement of Penthouse Door -	4/21/53
3003	6 Sheets	Dehumidification of Shaft (George S. Rider Co.) -	10/12/60
3004	2 Sheets	Exterior Rehabilitation - Monument Shaft -	10/31/62
3007	1 Sheet	Rehabilitation of Upper and Lower Terraces -	6/16/64
3008	1 Sheet	Utility and Communication Plan (Part of Master Plan) -	7/8/65
5300	1 Sheet	Electric Passenger Elevator -	11/18/38
5302	3 Sheets	Waterproofing Penthouse and Gallery -	4/29/47
5302A	1 Sheet	Waterproofing Gallery Floor -	4/14/49
5303	2 Sheets	Transformer Vault - Sheet 1 Schematic Electrical Wiring Diagram - Sheet 2 -	1/14/47
5307	1 Sheet	Topographic Base Map (Part of Master Plan) -	December '47
5308	1 Sheet	Black Line Print, Titled: "Sketch for Change Order #3 Contract # I-21np-171 10/23/50" Shows meter box at west corner of park, for future connection to city water main; also 3" water line from meter box to valve at southwest side of upper terrace. All of the above marked in red pencil.	January '48
5308A	1 Sheet	Utilities -	Drawn January '48 Approved 6/18/53

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The Department also has major responsibility for American Indian reservation communities and for people who live in island territories under U. S. administration.

NPS 1127