COMSAT Laboratories

MIPH# M:13-59

22300 Comsat Drive
Clarksburg, MD 20871-9469

Constructed in 1968-1969

Private Access

COMSAT Laboratories is located in Clarksburg, Maryland, 34.41 miles northwest of the White House[1], just east of and overlooking I-270. Designed by the world-renowned master architect Cesar Pelli, COMSAT Laboratories was an early and iconic example of the High Technology design that came to define technology research corridors in Montgomery County and elsewhere in the nation. The building complex, a virtual "machine in the garden,"[2] popularized several elements of the High-Tech design that dominated the late twentieth century. The building's transparent, futuristic form, resting lightly upon a pastoral landscape, symbolized the necessary, but complicated relationship of technology amid nature. The building cannot be separated from a naturalistic setting, but neither can a building representing the future meld unnoticed into the landscape. Its streamlined exterior, which Pelli likened to "airline construction and esthetics," established a new design vocabulary for High Technology industries. From the interior, the principal spaces were designed to give employees the best views of the surrounding pastoral landscape. Although COMSAT Laboratories has had additions and alterations, they have occurred on the eastern and southern ends of the complex. The public facades are practically unchanged from their appearance in 1969.

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[1] Distance calculated by Mapquest at www.mapquest.com, (accessed 10-23-04).
[2] This idea was popularized in a major scholarly text in 1964; Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (New York: Oxford, 1964).

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The United States would not have become the world leader in artificial communication satellites were it not for the work undertaken at COMSAT Laboratories. Real-time international phone communication and international, live television broadcast - aspects of global communication technology that we take for granted today - were pioneered by the scientists, researchers, and technicians at COMSAT Laboratories in the 1960s and 1970s. The building at 22300 Comsat Drive that housed the Research and Development (R&D) functions of COMSAT since 1969 stands as an icon of avant-garde global research and the harbinger of the "high technology corridor" that came to define upper Montgomery County, thus making it significant under Criterion A as a building and site associated with events that have made a significant contribution to broad patterns of our history in communications, engineering, and industry. The building is unquestionably one of the purest "high-technology" architectural statements in Maryland, a product both of the work that went on there and the aesthetic intention of its designer. Regarding the first point, the serene, futuristic COMSAT Laboratories reflects the decisive American step to not only to surpass the Russians in space, but also simultaneously to apply space technology to global, civilian communications. Regarding the second point, COMSAT Laboratories is an early work of Cesar Pelli, a living "master architect" with a worldwide practice and reputation, thereby making it significant also under Criterion C. The building not only laid the groundwork for future High-Tech architecture (which consistently employed aluminum skins and metal-based glass curtain walls) but most certainly set the stage for the development of I-270 as Montgomery County's high technology corridor. For these reasons, COMSAT Laboratories exceeds the minimum requirements for listing on the National Register of Historic Places and meets the threshold for exceptional significance (Criterion Consideration G), even though the building and site are less than 50 years old.

M:13-59

The following National Register of Historic Places form was prepared for inventory documentation purposes only; the property has not been nominated to the National Register.

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name COMSAT Laboratories

other names

2. Location

street & number 22300 Comsat Drive ☐ not for publication

city or town Clarksburg ☐ vicinity

state Maryland code MD county Montgomery code 031 zip code 20871-9469

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this ☐ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. I recommend that this property be considered significant ☐ nationally ☐ statewide ☐ locally. (☐ See continuation sheet for additional comments).

Signature of certifying official/Title Date

State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. (☐ See continuation sheet for additional comments).

Signature of certifying official/Title Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby, certify that this property is: Signature of the Keeper Date of Action

☐ entered in the National Register.
  ☐ See continuation sheet.
☐ determined eligible for the National Register.
  ☐ See continuation sheet.
☐ Determined not eligible for the National Register.
☐ removed from the National Register.
☐ other (explain):

5. Classification

Ownership of Property
(Check as many boxes as apply)

- [x] private
- [ ] public-local
- [ ] public-State
- [ ] public-Federal

Category of Property
(Check only one box)

- [x] building(s)
- [ ] district
- [x] site
- [ ] structure
- [ ] object

Number of Resources within Property
(Do not include previously listed resources in the count)

Contributing	Noncontributing	
1		buildings
1		sites
		structures
		objects
2		Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing)

N/A

number of contributing resources previously listed in the National Register

N/A

6. Function or Use

Historic Functions
(Enter categories from instructions)

Commerce/Trade/Bussiness/office building
Industry/Manufacturing facility and communications facility

Current Functions
(Enter categories from instructions)

Commerce/Trade/Bussiness/office building
Industry/Manufacturing facility and communications facility

7. Description

Architectural Classification
(Enter categories from instructions)

Modern Movement

Materials
(Enter categories from instructions)

foundation Concrete
walls Metal/Aluminum and Glass

roof Other: Metal/Aluminum, Tar & Gravel
other

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets)

Description Summary:

COMSAT Laboratories (1968-69) is located in Clarksburg, Maryland, 34.41 miles northwest of the White House[1], just east of and overlooking I-270. Designed by the world-renowned master architect Cesar Pelli, at that time Director of Design for Daniel, Mann, Jackson, Mendenhall (DMJM), COMSAT Laboratories was an early and iconic example of the High Technology design that came to define technology research corridors in Montgomery County and elsewhere in the nation. The building complex, a virtual "machine in the garden,"[2] popularized several elements of the High-Tech design that dominated the late twentieth century. The building's transparent, futuristic form, resting lightly upon a pastoral landscape, symbolized the necessary, but complicated relationship of technology amid nature. The building cannot be separated from a naturalistic setting, but neither can a building representing the future meld unnoticed into the landscape. The landscape is a character-defining features of COMSAT Laboratories, since it contributes greatly to the physical character of the resource. In terms of its plan, COMSAT Laboratories featured lineal design with spaces deployed along a central spine for circulation, flexible planning and separation of laboratory spaces, separate mechanical penthouses providing services to each wing, and provision for expansion of the complex. Its streamlined exterior, which Pelli likened to "airline construction and esthetics," established a new design vocabulary for High Technology industries. The principal facades were enclosed by a tight, flush aluminum and glass skin, a glittering membrane that stretched continuously over and around the structure. Two kinds of windows contributed to the machine-like effect: floor to ceiling glazing along the spine and catwalk in clear glass separated by thin aluminum mullions, and, in the laboratory wings, smaller rectangular office windows of solar glass and curved corners, set flush with the aluminum skin and sealed with a neoprene gasket. Pelli designed the complex for views: with its western glass corridor, serving as a secondary connector between the administrative and laboratory wings, COMSAT Laboratories was designed to be seen from the highway, a "light-looking, high-tech form sitting on a pristine landscape," representing the future promise of the communications technology that would enable individuals worldwide to see a man walking on the moon.[3] From the interior, the principal spaces were designed to give employees the best views of the surrounding pastoral landscape. Although COMSAT Laboratories has had additions and alterations, they have occurred on the eastern and southern ends of the complex. The public facades are practically unchanged from their appearance in 1969.

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[1] Distance calculated by Mapquest at www.mapquest.com, (accessed 10-23-04).
[2] This idea was popularized in a major scholarly text in 1964; Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (New York: Oxford, 1964).
[3] Cesar Pelli, Email communication with the Historic Preservation Section, 21 September 2004.

General Description:

Site Plan and Landscaping

COMSAT Laboratories is located in Clarksburg, Maryland, 34.41 miles northwest of the White House, just east of and overlooking I-270 and north of W. Old Baltimore Road on more than 150 acres of pastoral, gently rolling land.[4] Although the original 210 acres of property was bounded to the west by a major interstate highway, it was otherwise surrounded by dairy farms and open countryside in the late 1960s.[5] The building complex was placed toward the western boundary of the site, where its striking high-tech massing would be visible from cars passing along I-270 (then I-70 S). It is accessible from Comsat Drive, which runs north from W. Old Baltimore Road about 1500 feet, then splits to form a service drive that runs along the east side of the complex, rejoining Comsat Drive north of the complex and just below where the drive curves to the east to join Shawnee Lane.

COMSAT Laboratories is situated about 1800 feet north of W. Old Baltimore Road and roughly 1000 feet east of I-270. The central spine of the complex is oriented north-south. To the south of the complex, the service drive provides access to 350 parking spaces for employees. Three additional driveways provide vehicle access to the loading docks and service areas on the east side of the complex. Another driveway, from Comsat Drive, provides a more formal access route to the main entrance, under a porte cochère motif formed by the projecting exhibition pavilion, and terminating in a visitor parking lot of 50 spaces to the north of the entrance. The land is gently rolling, peppered with maples, sycamores, and beech trees on the northern sides of the complex; when COMSAT was constructed, it was wooded with trees to the south, southeast, and southwest. The area to the east of the employee parking lot today hosts several large white satellite dishes, tilted every which way.

The landscaping, designed by Pelli and landscape architect Lester Collins, takes advantage of the natural features of the still rural site. Pelli intentionally placed the space-age design of his building in the center of a pastoral landscape, heightening the contrast between the machine-like building and the natural Maryland countryside. The minimal landscaping is indigenous to the area, consisting of small groupings and occasional strategic plantings of native trees that blend in with the surrounding farmland. No formal plantings or gardens embellish the complex. Today the large expanse of fields surrounding the complex and separating it from I-270 is tractor-mown. Additions to the south and east of the complex have resulted in a reduction in the amount of wooded acreage on the site. The four courtyards within the complex continue the theme of maintaining the natural features of the rural surrounds. They contain a sprinkling of native trees among mown field grass but are otherwise unplanted.

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[4] Although the original documentation lists the acreage of the COMSAT property as 210 acres, the Maryland Department of Assessments and Taxation lists the current property land area as 154.24 acres. See Maryland Department of Assessments and Taxation, Real Property Data Search4 Website at http://sdatcert3.resiusa.org/rp_rewrite/, under 22300 Comsat Drive (accessed 10-23-04).

[5] "Aluminum Membrane Envelops Satellite Laboratory," 76; "Technological Imagery: Turnpike Version," 70.

Original Plan

The original structure as constructed in 1968-69 included 254,000 square feet of floor space. According to current property records, the enclosed space has grown to 525,996 square feet. The original program was specified in a *Progressive Architecture* design award citation:

> "a building complex to house all functions necessary to research, develop, and produce communications satellites. Basic program elements were: laboratories, research offices, spacecraft assembly area, administration offices, building and mechanical services. Other requirements: allowance for future expansion of facilities and services; flexible laboratory spaces; flexible mechanical and power distribution system; consideration of present and future spacecraft dimensions; parking for 350 employees and 50 visitors."[6]

As it turned out, the United States government and interested parties decided that it made the most economical and political sense to have the new satellites constructed by existing private industries, with COMSAT Laboratories providing all the research, development, and testing necessary to enable and support these production activities. The Comsat Laboratories building that fostered this global, commercial satellite industry consisted of a complex of spaces connected by a central corridor acting as a spine and facilitating circulation. The spine was oriented from north to south. Distributed to the west of the spine were four wings separated by three interior grassy courtyards. The northernmost wing contained administrative offices, as well as a mainframe computer on the first floor. The other three wings, identical from the outside, were configured similarly. Rows of office cubicles lined both the north and south exterior walls of each wing on both the first and second stories. The offices were separated from interior laboratory space by long corridors running the length of each wing. On each floor, the laboratory space--which was equipped with workbenches, sinks, and other infrastructure needed for global communications work—contained minimal permanent interior dividers so that personnel could configure the labs according to need. Because each lab wing was separated from the others by a courtyard, wings could assume different functions and work and change independently of one another. The first wing, for example, sheltered Wet Chemistry; the second hosted Microwave Communications, and the third housed the Research and Development of Spacecraft. To the west, the four wings were connected by a secondary corridor spanning on two stories the entire western façade. Five feet wide and lined with windows, these "catwalks" provided additional circulation between the wings. For security reasons, the courtyards were and are off limits to visitors.

Distributed to the east of the spine was a more complex set of spaces. From north to south, these included a roughly square wing that contained the lobby, a library, the auditorium, dining area, and a kitchen appendage to the south. This wing was divided from the next by an L-shaped courtyard. Originally open on the east side, but now enclosed by an addition, this is the courtyard that is accessible to employees. South of this courtyard was a

[6] *Progressive Architecture* Design Awards 1968 Citation: COMSAT Laboratories (n.p.).

short storage wing and loading dock. This was divided by a corridor from a longer wing that contained machine shops, plating, and maintenance facilities. Immediately adjacent was an assembly space. The southernmost wing, attached to the assembly space and configured as a long horizontal wing that paralleled the central spine, was the environmental test laboratory (ETL). The ETL was the largest space in the complex. It consisted of a warehouse with a 50-foot high ceiling and was equipped with a ten-ton crane used for the testing of satellites and antennae. The western half of the warehouse featured an enclosed second story-level balcony with windows from which the crane operators and other employees could look into the testing area. The testing space was furnished until recently with a huge vacuum chamber that simulated space conditions of 300 degrees below zero, and an anechoic chamber, a quiet room complete with cones designed to absorb both energy and satellite communications signals. Another function that took place in the ETL space involved the use of high-powered amplifiers to pump the sound of the space shuttle into the room in order to shake up the satellite components. These tests, along with tests on propulsion methods and rocket fuel efficiency, were undertaken to "space qualify" components of spacecraft and satellites. The 10,000-pound freight elevator used to reach the ETL from the main corridor is intact.

Crucial to the organization of the COMSAT complex was the central spine, a continuous glass corridor that terminated on the northern end in a dramatic cylindrical glassed-in two-story exhibition pavilion connected to the main complex by a canopy. The southernmost end of the spine led out to the employee parking lot. Pelli conceptualized the spine as a "line or street" that would organize a whole complex of functions in rectangular masses deployed to either side.[7] In addition, the spine served as the "common room, meeting place, or room away from work" for the building's scientists and employees.[8] The long, linear glass corridor takes advantage along its length of views, both to the surrounding countryside and to the internal courtyards. The secondary glass corridor to the west completed circulation among and between the administrative and laboratory wings and unified the design linearity of the complex, making the main façade, visible from the highway, appear continuous. Future expansion of COMSAT Laboratories was planned for by extending the central spine to the south to link additional building components.

Beneath the three laboratory wings to the west of the central spine, there is a basement floor containing boiler and chiller rooms, and other mechanical services, including back-up generators for the mainframe computer, an electrical services hub, a photo lab, a print shop, and a vault. Above the second story of various wings of the building were penthouse spaces housing mechanical equipment. Each laboratory wing, for example, had an independent set of mechanical services, threaded vertically in the hollow walls separating the corridors from the interior laboratory spaces. Above the ETL, the roof was equipped with caps for anchoring satellite dishes; several crown the roof still today at the southeast corner of the complex.

Additions and Alterations

[7] Kautz, "Cesar Pelli's COMSAT Laboratories," 23.
[8] *Progressive Architecture* Citation, n.p.

Since the original building was constructed in 1968-69, several additions and alterations have occurred. Two additions were made to the east side of the complex in the 1970s: a 6,000 square foot warehouse and an additional 1,000 square feet for the storage of hazardous chemicals.[9] In 1980, the architectural firm of Hellmuth, Obata & Kassabaum (HOK) was hired to prepare a master plan for further expansion of COMSAT Laboratories at the Clarksburg site. Following their plan, a "fifth wing" of 100,000 square feet (now known as the "fourth wing") was built in 1981-82 at the southwest corner of the complex. This four-story addition prompted the extension further south of the central spine and supplemented the office and laboratory space of the existing wings. Later on, a second phase of the HOK plan was implemented. The northeast wing was expanded and reconfigured to house a new cafeteria on two levels, the Development Engineering Division, and additional space for design and drafting, metal and carpentry, and shipping and receiving, in the Spring of 1982. A new Etching and Plating building was added to make printed circuit boards. An industrial wing was constructed adjacent to the ETL, the Model Shop building was expanded to the east, and a service court was defined on the east side of the campus, surrounded by Etching and Plating to the west, Shipping and Receiving to the east, and the new wing containing the Development Engineering Division. A 2000 square foot garage and grounds building was placed just outside the loop service road to the southeast.

Despite the fact that Pelli's original scheme for expansion was not implemented, nor was his firm called upon to design the additions, COMSAT Laboratories retains most of the integrity of Pelli's design. During the construction of the "fifth wing," Pelli's horseshoe shaped metal canopy at the south end of the central spine was removed and replaced by a new entrance. The public facades of the building, however—the north and west faces—are essentially unaltered. The west façade of the four-story HOK wing at the southern end of the building is distinct enough as a block that it does not detract from a clear reading of the original Pelli structure.

Exterior Description

Four basic ideas governed Pelli's exterior design for the COMSAT Laboratories. 1) The building was to be a "machine in the garden." 2) It featured a linear composition, with the principal spaces deployed to either side of a central spine. 3) Pelli used glass and aluminum and skin tectonics to produce the distinctive streamlined expression and shape of the complex. 4) All of these elements had practical dimensions but also projected the stated purpose of COMSAT Laboratories: "to be a place where research, experimentation, and construction of telecommunication satellites takes place."[10] The following description will touch on each of these ideas and will focus on the principal facades that give the complex its character: the north and west faces of the building.

Linear Composition

In composition, the original COMSAT Laboratories consisted of rectangular masses deployed on either side of a central spine/corridor running north-south. Tightly enclosed in a sleek and apparently seamless glass and

[9] COMSAT Laboratories, *Clarksburg Construction Program*, Hellmuth, Obata & Kassabaum, P.C., 1980.
[10] Pelli, "Architectural Form and the Tradition of Building," 29.

aluminum skin, the complex almost seems to hover above the indigenous Maryland countryside. Each mass—four regularly spaced wings to the west and four variously shaped and oriented wings to the east—was topped by a mechanical penthouse. The effect of the complex is of a space-age linear city isolated in a pastoral landscape. The contrast between the structure's mechanistic and forward-looking composition and the unspoiled fields and woods surrounding it was purely intentional. That machine in the garden motif prevailed whether viewing the complex from without or viewing the surrounding countryside through a series of transparent walls and walkways from within.

Construction Methods and Materials

The complex was constructed on "concrete spread footings with steel rigid frame construction in both directions."[11] The frame is completely internal, with concrete infill floors of metal decking cantilevering ten feet to the exterior walls."[12] The walls throughout were of a unitized construction based on a five-foot module. The principal elevations were of two types: 1) glass walls separated by thin, bright aluminum mullions for the corridors, lobby, library, cafeteria, rotunda, and northeast elevation, and 2) insulated aluminum panels with punched, rounded windows for the offices. Walls for the service, assembly, and testing spaces on the east side of the complex were of corrugated metal panels.[13]

The roof was built up with a vermiculite concrete finish. As the cross-section of the building shows, mechanical services were provided to the laboratory wings through symmetrical vertical shafts between the internal laboratories and the corridors on either side. Because each wing has its own mechanical penthouse, long ductwork runs could be avoided. All laboratories are served by a double duct system and office areas with an induction system and individual automatic temperature controls in each room. The basement area underneath laboratory wing contains equipment for 1,300 tons chiller capacity and 500 HP boiler capacity.[14]

Skin Tectonics

On the north and west facades as well as the central spine, western catwalk, and interior court elevations, glass and aluminum wall panels meld to form a tight, flush skin that appears to wrap around the roof and the corners.[15] The effect is airplane-like and it gives COMSAT Laboratories its sleek, futuristic aspect. There are three types of wall and window configurations that need to be described. The more straightforward consists of floor to ceiling glazing in clear glass separated by thin, bright aluminum mullions. The glazing is absolutely flush with the mullions. This treatment—on the northeast wing, exhibit pavilion, and central spine—affords a

Citation, n.p.
[12] Kautz, 8.
[13] Citation, n.p.
[14] "Aluminum Membrane," 77.
[15] Kousoulas and Kousoulas, *Contemporary Architecture in Washington, D.C.*, 252.

tremendous transparency offering excellent views to the exterior countryside and the interior courts. At the roofline, a curved aluminum parapet continues the effect of a taut skin wrapping over each element.

The second configuration—which applies to the exteriors and internal court elevations of the four western wings—is more complex. Still in a unitized design of five-foot modules, these walls consist of insulated anodized aluminum panels with smaller "punched" windows in 5/8 inch bronze tinted solar glass. The windows have curved corners and are set flush on the exterior side into an extruded aluminum sash. The exterior window edges where the sash member is attached to the aluminum panel are sealed by a continuous neoprene gasket.[16] On the office interiors, the openings are set back from a ledge, and resemble airline windows. These flat, glazed modules have been adapted "to accommodate special reinforcing and anchorage." Since a certain degree of thermal expansion was anticipated, "slotted panel attachment holes in the vertical steel support members provide for this movement." Each five-foot module is attached vertically, but not horizontally, to its neighboring panel; a special extruded "T" gasket seals the joint, when compressed by the panel installation. The panels are insulated with glass fiber and internal vapor barrier."[17] Completing the effect of High-Tech skin, the walls are topped by a curved aluminum faced panel forming a parapet. Behind the parapet, the walls are continuously flashed; the parapet panels are then "set into a continuous aluminum channel."[18]

The third window and wall configuration is that of the dramatic western catwalk that stretches from the curved northwest corner of the administrative wing across all three laboratory wings. This is the façade visible from I-270 and responsible for communicating the High-Tech imagery of the complex to the public. The catwalk provides five-foot wide corridors on both the first and second stories that served as a secondary means of circulation (secondary to the central spine) for moving people and materials between the administrative and laboratory wings. Continuing the five-foot modular construction, the catwalk is comprised of two rows of ribbon windows of clear glass separated by thin, flush aluminum mullions divided by a horizontal row of aluminum panels between the stories. The top of the catwalk is crowned by the same curved aluminum parapet found on the other exterior and court facades. Below, however, the catwalk rests on a podium at each wing, but forms a bridge suspended across each courtyard space. This bridge-like effect, with curved aluminum panels reaching from the bottom of the glazing to underneath the catwalk, contributes powerfully to the High-Tech imagery of the complex and especially the sense that the structure is hovering aircraft-like and luminous over the beautiful Maryland countryside. The catwalk closed the courtyards but allowed them to remain visually open to those looking in from outside and to those looking outside from their office windows or from the glazed central spine.

Cesar Pelli was careful to specify materials and construction techniques and fittings for his window/wall configurations in order to maintain a streamlined, futuristic exterior design. To create a skinlike effect, he ·ipulated the direction and seamlessness of joints as well as the horizontality and continuity of line for each

[16] "Aluminum Membrane,' 77.
[17] "Technological Imagery," 74.
[18] Ibid.

façade. Windows formed continuous bands while the aluminum skin turned over, under and around in a continuous wrapping of complex volumes.[19] Depending on the angle and the light conditions, one might take in the building as "a single streamlined shape and sometimes like a sequence of courts and wings."[20] The overall effect, however, was clearly a celebration of the promise of technological achievement.[21]

Interiors

Visitors not affiliated with COMSAT enter the building by walking past the glazed, cylindrical exhibition pavilion topped by a bold aluminum cornice and connected to the front entry by an aluminum canopy, forming a porte cochère. The interior of the pavilion was used for the display of global communications technology. Inside the main entrance to the complex, the lobby opens up into a two-story space, featuring a dramatic freestanding staircase to the south, fitted with a white metallic tubular railing that curves at the intermediate landing, reminiscent of an ocean liner. The lobby was originally sparsely furnished with modern chairs and tables and the occasional plant. It contains a painted wall mural (1978) by Terry P. Rogers, which shows COMSAT employees from the late 1970s undertaking the technical work of creating parts for and testing antennae and satellites. Sheer curtains protected the lobby from southern and western light streaming through the floor to ceiling curtain walls. The dominant color was white: white walls and ceiling, white staircase rails, and white 9-inch vinyl asbestos tiles. The lobby had a ceiling of acoustical tiles. Overall, the design effect was High Tech but utilitarian.

The central spine was a glass curtain wall corridor with balconies with railings designed like those in the lobby overlooking the corridor at the second story. The floors were a shiny linoleum. The corridor allowed tremendous views into the courtyards to the west and through the nearly transparent catwalk to the countryside beyond. The most dramatic design element in the glass corridor was a glazed, curved stair tower projecting into the first courtyard. These elements are all intact in the present building.

Wing 0, the first wing to the west, narrower than the other three, houses administrative offices. The principal two spaces of the administrative wing are more richly furnished than any other office spaces in the complex. The main conference room is wood paneled and furnished with high quality wooden office furniture. The overall effect is to produce a men's club-like atmosphere. Secondary and tertiary spaces in this wing are furnished with standard modular office furnishings. In the laboratory wings, the offices lining both the first and

[19] Special Cesar Pelli issue, *A&U*, Tokyo, July 1985, 29.
[20] McCoy, "Planned for change."
[21] Pelli, *A&U*, 29.

second floors were identical cell-like spaces with standard issue office furnishings: desks, chairs, shelves, and filing cabinets.

Of the wings to the east of the central spine, the most dramatic contained the Environmental Test Laboratory. A cavernous space, the ETL contained a roughly three story "high bay" on the eastern side and a lower bay to the west, topped by an enclosed second story balcony for observing activities in the high bay. An industrial space, the ETL contained a rolling crane and a freight elevator.

At the south end of the central spine is the employee entrance to the complex. The original entrance featured a long, horseshoe-shaped canopy ending from the rear entrance, past the end of the ETL wing and out toward the employee parking lot. This canopy is no longer extant.

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

- ☐ **A** Property is associated with events that have made a significant contribution to the broad pattern of our history.
- ☐ **B** Property associated with the lives of persons significant in our past.
- ☒ **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ **D** Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply)

Property is:

- ☐ **A** owned by a religious institution or used for religious purposes.
- ☐ **B** removed from its original location.
- ☐ **C** a birthplace or grave.
- ☐ **D** a cemetery.
- ☐ **E** a reconstructed building, object, or structure.
- ☐ **F** a commemorative property.
- ☒ **G** less than 50 years of age or achieved significance within the past 50 years.

Area of Significance
(Enter categories from instructions)

Architecture
Commerce
Communications
Engineering
Politics/Government
Science

Period of Significance

1967, 1968-1969

Significant Dates

Significant Person
(Complete if Criterion B is marked above)

Cultural Affiliation

Architect/Builder

Cesar Pelli

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets)

9. Major Bibliographical References

Bibliography
(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets)

Previous documentation on files (NPS):

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested
- ☐ previously listed in the National Register
- ☐ previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey #________
- ☐ recorded by Historic American Engineering Record #________

Primary location of additional data:

- ☐ State Historic Preservation Office
- ☐ Other State agency
- ☐ Federal agency
- ☐ Local government
- ☒ University
- ☐ Other

Name of repository: University of Maryland, School of Architecture, Planning and Preservation

Summary Statement of Significance:

The United States would not have become the world leader in artificial communication satellites were it not for the work undertaken at COMSAT Laboratories. Real-time international phone communication and international, live television broadcast - aspects of global communication technology that we take for granted today - were pioneered by the scientists, researchers, and technicians at COMSAT Laboratories in the 1960s and 1970s. The building at 22300 Comsat Drive that housed the Research and Development (R&D) functions of COMSAT since 1969 stands as an icon of avant-garde global research and the harbinger of the "high technology corridor" that came to define upper Montgomery County, thus making it significant under Criterion A as a building and site associated with events that have made a significant contribution to broad patterns of our history in communications, engineering, and industry. The building is unquestionably one of the purest "high-technology" architectural statements in Maryland, a product both of the work that went on there and the aesthetic intention of its designer. Regarding the first point, the serene, futuristic COMSAT Laboratories reflects the decisive American step to not only surpass the Russians in space, but also simultaneously to apply space technology to global, civilian communications. Regarding the second point, COMSAT Laboratories is an early work of Cesar Pelli, a living "master architect" with a worldwide practice and reputation, thereby making it significant also under Criterion C. COMSAT Laboratories represents the International Style in its design parti as well as the "high-tech" architecture that came to define the corporate "campus". As such, it is the most easily identifiable building along the I-270 corridor in Montgomery County.

The building is Maryland's only commercial building by Cesar Pelli and one of only four buildings by Cesar Pelli standing in metropolitan Washington. The only other Maryland example is a Bethesda residence designed in the 1990s. Virginia is the site of Cesar Pelli's Reagan Washington National Airport structure, completed circa 1995; an elegant but less conspicuous office building addition was designed by Pelli for the Investment Building at 1900 K Street.[22] COMSAT Laboratories holds an important place in Cesar Pelli's body of work according to highly respected architectural critics and to Cesar Pelli himself. After COMSAT's 1967 design, Pelli went on to make an international reputation for himself by continuing to design "High Tech" buildings that picked up on COMSAT's origins and defied current norms. Design ideas introduced at COMSAT and honed on later buildings include: 1) Buildings sheathed in newer materials that exhibited tighter building skins. 2) Buildings where the extent of glass curtain-wall technology was stretched. 3) Buildings where the core designs are focused around the standpoint of circulation. 4) Certain buildings that perpetuated the notion of the machine in the garden.

In 1995, as a result of his consistently excellent architectural works, Cesar Pelli was awarded the American Institute of Architect's Gold Medal, the honor of being judged the most accomplished architect in the world. In written response to questions posed by the Historic Preservation Section of the Montgomery County Historic Preservation Commission, Cesar Pelli stated that he felt the most significant aspect of COMSAT Laboratories is

[22] Benjamin Forgey, "Alluring Curves: Cesar Pelli's K Street Beauty is a Welcome Sight," *Washington Post*, August 3, 1996, C 1.

its standing as "a very early example of high-technology design; an architectural direction that has become very strong, perhaps dominant, in the last 20 years." Cesar Pelli affirmed that his design was an important, successful investigation in "esthetics, technology and building planning," and that it served as a model to him for several future projects.[23] The building not only laid the groundwork for future High-Tech architecture (which consistently employed aluminum skins and metal-based glass curtain walls) but most certainly set the stage for the development of I-270 as Montgomery County's high technology corridor. For these reasons, COMSAT Laboratories exceeds the minimum requirements for listing on the National Register of Historic Places and meets the threshold for exceptional significance (Criterion Consideration G), even though the building and site are less than 50 years old.

[23] Cesar Pelli to Historic Preservation Section, memorandum, September 21, 2004.

Resource History and Historic Context:

> *On September 10, 1969, Comsat Laboratories engineers and scientists were able to move into what was then the world's first research facility dedicated to communications satellite technology. The residents of Clarksburg, Maryland, a small village at the crossroads of the new I-270 highway and Route 121 had witnessed the construction for more than two years of what for many was a Space Age Wonder. Although the list of Comsat Laboratories' accomplishments is extensive, the following . . . examples were vital: Comsat Labs personnel designed and flight qualified an experimental re-boost package on a 90-day schedule for installation in the Space Shuttle equipment bay to repair a satellite stranded in low, unusable orbit in 1990. The whole country watched as astronauts recovered the stranded satellite because of the work at Comsat Labs. The Lab personnel also developed the echo canceller, which provided the first commercially acceptable voice service over a satellite circuit. Finally, they developed the nickel hydrogen battery, which doubled the lifetime of satellites, a major economic achievement.*

Recollections of Paul Schrantz, Former Vice President, Satellite Systems and Consulting, COMSAT Laboratories.

> *The influences that were most in my mind at that time were not as much architectural, but aircraft construction and esthetics . . .. I was pushing the envelope of avant-garde ideas of the moment . . .. Perhaps the most significant aspect of this building is that it is now a very early example of high-technology design; an architectural direction that has become very strong, perhaps, dominant, in the last 20 years.*

Cesar Pelli, speaking of the COMSAT Laboratories building he designed in 1967.

As stated in the Summary Paragraph of Section 8, the COMSAT Laboratories building in Clarksburg is "exceptionally significant" both from historical and architectural perspectives.[24] The fact that it exemplifies the advent of the civilian global communications age makes it exceptionally significant from an historical perspective under the themes of commerce, engineering, science, and politics/government. In addition, the distinction of being a very early example of "High-Tech" architecture and a pivotal early work of Cesar Pelli's that went on to influence his future, award-winning work, make the building exceptionally significant from an architectural perspective under the same themes and that of architecture.

Pelli himself noted that the success of the design came despite the incredibly short period of time allotted for its design. COMSAT labs was designed in a month-and-a-half and construction on the building was started only five months after Daniel Mann Johnson and Mendenhall (DMJM, the firm for whom Cesar Pelli worked) was

[24] Language from the National Register of Historic Places, Bulletin 15, "How to Nominate Buildings to the National Register of Historic Places," a general model of preservation designation criteria.

engaged. Specifically, the linear organization of the building reappeared in several later commissions (think of Washington National Airport) as did the "unitized construction" of its walls (i.e., the idea of a repeatable module, which at COMSAT, was five feet).

The Trail-Blazing Client: COMSAT and its Laboratories

The Origin of Artificial Commercial Satellites

The idea of artificial commercial satellites emerged with Arthur C. Clarke, a flight lieutenant in the Royal Air Force during World War II. In July 1945, Clarke submitted an article to *Wireless World* titled "The Future of World Communications." In it, he described the notion of artificial satellites, pointing out that if they orbited the earth at approximately 22,000 miles above the equator, they would take exactly one day to revolve around the earth. This starting point would make them appear to be stationary, or geosynchronous. [25] Clarke went on to postulate that these artificial satellites could be ferried to space by rockets. They would function there as manned space stations. Clarke suggested that just three such artificial satellites at specific longitudes could provide the capability for worldwide communication with extremely little power, most of it solar. For his thesis, Clarke received a $40 payment from the magazine. The irony of this small compensation is that Clarke accurately predicted the advent of the artificial communications satellite system, a billion-dollar industry.

Artificial commercial satellites, which Clarke dubbed "comsats," were initially developed for the American arsenal of the American-Soviet space race. Thus, comsats were a product of the Cold War. The space race began in earnest on October 4, 1957, when the Soviet Union successfully launched Sputnik I, the first artificial satellite. The United States responded the following year with its own launch of Explorer I, an artificial satellite that led to the discovery of magnetic radiation belts surrounding Earth. Building upon this success, President Eisenhower signed the National Aeronautics and Space Act in 1958, creating a government agency to spearhead these efforts. In 1959, Eisenhower announced:

> With regard to communication satellites, I have directed the National Aeronautics and Space Administration to take the lead within the executive branch both to advance the needed research and development and to encourage private industry to apply its resources toward the earliest practicable utilization of space technology for commercial civil communications requirements.[26]

President Kennedy's and Johnson's Contributions

[25] See Michael Tedeschi *Live Via Satellite* by Anthony (Washington, D.C: Acropolis Books, Ltd.), 1989. The exact altitude for a three-way, geosynchronous orbit for global communications turned out to be 22,300 miles, a number intentionally used as COMSAT Laboratories' Clarksburg address. (Comsat is located at 22300 Comsat Drive.)
[26] U.S. Department of State, *Department of State Bulletin*, January 16, 1961, p. 77.

But it was the Kennedy Administration that established the *commercial* satellite industry. In 1961, Kennedy gave a speech to a joint session of Congress outlining a three-point space program that included: 1) landing a man on the moon during the 1960s, 2) developing rocket engines to launch satellites into the outer atmosphere, and 3) creating a global communications satellite system. The latter two points were crystallized with the President's signing of the Communications Satellite Act on August 31, 1962.

After much deliberation, the administration decided that a publicly initiated private corporation would best serve a global communications satellite system. COMSAT, the entity created to develop artificial commercial satellites, became the first privately owned, profit-seeking corporation chartered by Congress. During the years 1961 to 1962, President Kennedy was directly involved in the creation of COMSAT. Even prior to the enactment of the 1962 legislation, Kennedy lobbied skeptical members of Congress, insisting that global satellite communications would be most achievable through the framework of a privately owned, Congressionally chartered corporation. The President contended that a statute was "required to provide an appropriate mechanism for dealing effectively with this subject – a subject which, by nature, is essentially private enterprise in character but of vital importance to both our national and international interests and policies."[27] His brother, attorney general Robert F. Kennedy, also promoted the notion, claiming that the statute authorizing COMSAT was necessary because of the already large public investment in spacecraft and the greater assurance it provided that technology would be shared globally. Attorney General Kennedy summarized COMSAT as playing a "unique and important national role in our overall foreign relations and space effort."[28]

The 1962 Communications Satellite Act gave the President of the United States the right to continuously review all aspects of the corporation and to "exercise such supervision over relationships of the corporation with foreign governments . . . ."[29] President Kennedy was directly involved in the selection of several of COMSAT's first executives and board members. President Kennedy named as President his former Under Secretary of the Air Force Dr. Joseph Charyk, and nominated COMSAT's first Board of Directors on October 15, 1962. Directors included heads of large research-oriented companies (such as the President of California's Kaiser Corporation), attorneys, and the Vice-President of United Auto Workers-CIO in Detroit. A close friend, Philip L. Graham, the President of the *Washington Post* media group, acted as chair; in her widely read memoirs, his wife Katherine recalled her husband' s involvement with COMSAT at the President's request while Graham was publisher of *The Post*:

> In October, Phil took on a job that changed both our lives and sped us up even more. He accepted an invitation from President Kennedy to serve as an incorporator of the Communications Satellite Corporation, known as COMSAT, with the understanding that he would be elected to head it, and in mid-October he was appointed chairman of the group.

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[27] Lloyd D. Musolf, *Uncle Sam's Private, Profitseeking Corporations: COMSAT, Fannie Mae, Amtrak, and Conrail.* Lexington, Mass.: Lexington Books, 1983, p. 18.
[28] *Ibid*, p. 23.
[29] *Ibid*, p. 20.

> COMSAT was a groundbreaking public/private organization, half government, half-telephone company. Getting it launched – in essence, translating an exciting vision into a working, financially viable organization – was a full-time job, requiring massive organizational skills, infinite tact and patience, and a huge amount of time and energy. It was not what Phil needed at that time, but it was what he wanted – an irresistible temptation to be engaged in an exciting venture that would, in fact, alter the shape of the world.[30]

One of the first tasks of the American board members, people like Leo Welch, retired chairman of the Standard Oil Company of New Jersey, and Dr. Charyk, was to meet with European and Canadian business and political leaders to hammer out exactly how the new technology could be developed within the framework of a single, international system. The system was put in place to have COMSAT (the United States' agent) and INTELSAT (the international body) as the two primary entities overseeing product development that related to the United States' commercial market. By 1967, INTELSAT would be composed of 58 nations with the U.S.-owned COMSAT owning over 50% of its stock.

Well-known and politically connected people were a part of COMSAT Laboratories from the beginning. Phillip Graham would become a frequent visitor to COMSAT laboratories over the years, along with Barry Goldwater. After Kennedy's assassination, Lyndon Johnson appointed Clark Kerr (a university president), George Meany (union leader), and Frederick Conner (ex-chairman of the board of a major corporation) to the Board of Directors in September 1964. Lyndon Johnson took up the charge of overseeing the global telecommunications industry. On July 23, 1964, COMSAT announced that it would bring live television images of the 1964 Olympics from Tokyo to the United States acting on a request by the State Department. In another significant early advancement, President Johnson placed the first formal international commercial telephone call via the Early Bird satellite to political leaders across the Atlantic Ocean on June 28, 1965. Also known as Intelsat I, it established the first transatlantic satellite communications service, since its stationary orbit facilitated its use by stationary ground receivers. Other satellites were in orbit over all parts of the earth, resulting in the global network of satellites, which provided the worldwide coverage of the lunar landing.

A Laboratory Building Tailored to the Satellite Revolution

COMSAT was officially incorporated on February 1, 1963. Its headquarters were initially located at 3100 Macomb Street in Northwest D.C., in "Tregaron," a stately mansion designed by Charles Platt, the architect of the Freer Gallery of Art, whose previous owners included the former ambassador to the Soviet Union, Admiral Joseph Davies and his wife, heiress Marjorie Merriweather Post. In 1964, COMSAT moved its offices from Cleveland Park to a more central location, at 1900 L Street, N.W. The technical staff and satellite control center were located at 2100 L Street, N.W. In June 1968, the headquarters were once again moved, to L'Enfant Plaza. In 1967, COMSAT decided to build separate laboratories and Clarksburg, Maryland, 30-odd miles north of the

[30] Katherine Graham, *Personal History (*New York: Vintage Books), 1997, 295.

city, was selected. It would be the laboratories – not the headquarters - that ultimately would symbolize the futuristic nature of the corporation.

COMSAT was responsible for developing a global satellite communications system, the acquisition and maintenance of ground stations around the world, and the development of new satellite technologies. In 1964, the company joined forces with similar organizations in seventeen countries to create the International Telecommunications Satellite Consortium, or INTELSAT, in the hope of creating a global commercial communications network. COMSAT established a strong presence in other parts of the United States and in countries throughout the world. By December 1966, its tracking, telemetry and command station at the Paumalu, Hawaii Earth Station entered commercial service. Similar facilities were erected in Etam, West Virginia and Cayey, Puerto Rico (both placed in service in January 1969), as well as in Fucino, Italy; Andover, Maine; Jamesburg, California; and Carnavon, Australia.

By 1967, the "FCC reduced COMSAT's ownership interest in the U.S. stations from 100 percent to 50 percent, with the remaining 50 percent to be divided variously among other U.S. international carriers."[31] In May 1967, COMSAT "commenced full commercial operations" and realized its first profits by the end of the year.[32] By 1970, the INTELSAT system provided "much of the world's transoceanic telephone and record communications."[33]

The Board recruited the top scientists from around the world to fill key positions at COMSAT Laboratories. A huge proportion of the staff had earned their doctoral degrees in math, engineering, and physics.

From the beginning, COMSAT played a pioneering role in the advancement of the global communications industry.[34] The significance of COMSAT Laboratories' contributions to science and technology cannot be overstated. Every single satellite that COMSAT or INTELSAT contracted had, at a minimum, its design reviewed and its components tested at COMSAT. Always focused on research and development for the global communications satellite system, the company awarded the contracts to actually build artificial satellites to allied private companies from the earliest days of the venture. This arrangement proved beneficial to all involved, for AT&T, RCA, Hughes Aircraft (now Boeing) and the like all had huge stakes in the success of the commercial satellite industry. At the company's first stock offering on May 26, 1964, the following "authorized carriers" were allowed to buy stock prior to the June 2nd public offering: AT&T, International Telephone & Telegraph, RCA-Communications, Press Wireless (owned by the New York Times, New York Herald-Tribune and Time, Inc.), and General Telephone & Electronics. News reports indicate that by June 2nd, the

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31 *Comsat at 10*, 18.
32 Ibid., 20-21.
33 *Comsat at 10*, forward, no. pag.
34 For a thorough history of COMSAT, see Anthony Michael Tedeschi, *Live, Via Satellite*: The Story of COMSAT and the Technology that Changed World Communication, Washington, D.C.: Acropolis Books, Ltd., 1989.

company had "attracted so much publicity, glamour and general awe that several thousand people rushed to their brokers clamoring for the stock."[35]

COMSAT had multiple, well-organized divisions that focused on satellite design and testing. COMSAT Laboratories was responsible for transmission system design and analysis, interference analysis, system architecture development, system design evaluation, traffic and protocol modeling, network simulation, terrestrial user interfaces, and specification development. In sum, COMSAT Laboratories undertook every aspect relating to satellite design short of physically building the satellite. COMSAT's early goals were to develop high-orbit and medium-orbit artificial satellites. For the latter, COMSAT worked with AT&T, RCA, Thompson Ramo Wooldridge, and ITT.

The first contract to build an experimental-operational synchronous satellite for high altitude was let by COMSAT in the spring of 1965 to Hughes Aircraft. The resulting first commercial satellite in geosynchronous orbit designed specifically for commercial use was dubbed the "Early Bird" (later known as INTELSAT I). This high-orbit satellite had the capacity to provide up to 240 high-quality telephone voice circuits or black-and-white television, facsimile, and other types of messaging. The impact of the Early Bird's capacity to project live television images from around the world to Americans in their homes was enormous. On May 3, 1965, The Today Show became one of the first television shows in history to broadcast images live from the Hague, Brussels, Paris, Rome, and London via the Early Bird satellite. Because of its incredibly ambitious and successful program, the Early Bird's launch on April 6, 1965 established COMSAT as the world leader in global satellite telecommunications. Following the Early Bird there was the Lani Bird, which provided telephone circuits between the United States and Hawaii and was successfully launched in early 1967 (dubbed INTELSAT II).

COMSAT needed a building for the research, development, and production of communications satellites. This program raised many challenges. The spaces had to fulfill highly specialized functions, but had to adapt to new technologies. Furthermore, the entire structure had to be able to be expanded easily to accommodate future functions. The frenetic pace of the space race required all plans to be prepared in five months. The design phase lasted only one month, with the remaining four months devoted to the preparation of construction documents. The $7.8 million budget was also fairly limited, requiring a simple, functional design. The structure was completed on time and within the budget, the original building costing $ 9,257,793, including lab equipment.[36]

COMSAT's satellites continued to make television images available to viewers from the far reaches of the globe. By 1969, COMSAT's research and testing work was all being done out of its new Clarksburg facility, which had been built to house 300 employees in 250,000 square feet of space. On July 20, 1969, both COMSAT and INTELSAT broadcast the televised image and voice of Neil Armstrong as he took his famous

[35] "Stock of Satellite Corporation Stuns Experts with Sharp Rise," *New York Times* (August 7, 1964), p. 33.
[36] "Imagery," 71.

strides on the surface of the moon. Successes like these resulted in COMSAT's receiving an Emmy award for significant achievement in television research and development.

A continuing avenue of research for COMSAT Laboratories was the refinement of ground earth stations, or antennae, to increasingly smaller sizes. The company developed not only satellite dishes that could be stowed away in suitcases, but also flat plate antennae that could be mounted on walls or patios. COMSAT also refined the capability of one antenna to access simultaneously multiple satellite transmissions. The Torus Antenna, located today on the east lawn of COMSAT Laboratories, is an example of such an antenna.

COMSAT Laboratories also had an entire department devoted to the creation of antennae, or satellite dishes, for space, ground, and mobile applications. The mobile satellite dishes created for these purposes provide clear communications between ships to each other and ships to shore, not only for the defense industry, but also for maritime and luxury cruise industries. The most famous sea-related COMSAT satellite user was Jacques Cousteau, who used the company's products on his ship, the Calypso, in 1975-76 and came to Clarksburg to speak before COMSAT's employees.

Other signature innovations developed by COMSAT Laboratories include: videoconferencing, direct TV, the echo suppressor and echo canceller, and the hydrogen-nickel oxide battery that extended satellite battery operating power enormously. In 1997, COMSAT Laboratories was inducted into NASA's Space Technology Hall of Fame for its Advanced Communications Technology Satellite (ACTS) program. The Laboratories holds over 100 patents and has an additional 70 or so that have been filed. These patents cover the following technologies: asynchronous transfer mode (ATM), Frame Relay, and Internet Protocol (IP) via satellite; modem, coding, and encryption; voice and video encoding; voice and video encoding; flat plate and phased-array antennas; microwave filters and components; space-qualified batteries; multiple-access techniques and synchronization; C, X, and KU-band active phased arrays for reconfigurable multiple-beam satellites; and onboard digital signal processing. The Hubble space shuttle batteries were developed and tested at COMSAT and spacecraft that encounter problems were diagnosed at COMSAT via Destructive Physical Analysis, or DPA.

The significance of the Laboratories' contributions to global communications is enormous. As an indicator of the company's impact, the Library of Congress, Motion Picture Division, will be accessioning the company's video stockpiles to its archives after transferring them to film. The Smithsonian's Air and Space Museum also has expressed interest in an exhibit on the company's achievements.

COMSAT Laboratories as Harbinger of Development along the Interstate-270 Corridor

On the last day of 1973, the front page of the *Washington Post* featured an article entitled "I-70S: How Cow Country became Corridor City." The introduction read as follows:

> In the late 1940s, Maryland State Roads Commission engineers drew a line on a Montgomery County map with a new high-speed road nearly 23 miles long between North Bethesda and the Frederick County border. The land on either side of that line was then mostly a rural expanse of dairy farms broken only by a few relatively small towns like Rockville, Gaithersburg and Germantown. The strip of Montgomery County is much different today. In the more than two decades since state road engineers designated the path of their new highway - now Interstate 70 S, six lanes wide in some places - it has become the backbone of a bustling corridor city of some 130,000 residents, plus 720 private businesses and nine federal agencies with 37,800 jobs. Where cow had grazed and barns had dotted the countryside, there are now corporate offices for firms like IBM and Comsat and sprawling federal campuses for agencies like the National Bureau of Standards and the Atomic Energy Commission.[37]

COMSAT Laboratories, located at the northernmost section of the "corridor city," was a major benchmark in changing the face of upper Montgomery County. And as Montgomery County stepped into the twenty-first century, the "High Technology Corridor," the beginnings of which are discussed next, "housed more than 500 major companies, rivaling California's Silicon Valley and Boston's Route 128 in many ways."[38]

Before it was relocated and widened (in five stages, in a southerly direction, from 1953 to 1960), U.S Route 240, from Frederick to Washington, was known as the Washington National Pike; in 1959, it was renamed Interstate 70-S. The I-70 S (now Interstate 270) corridor was designed to link Frederick in a *southerly* direction with Rockville, but quickly emerged as a way for Washington government and industry to move *northward* from the capital. Its unique strategic location was reinforced with the completion of the Beltway (I-495) in 1964.[39]

The idea of radial growth corridors for the Capital Region, separated by wedges of low density housing and open space, was expounded in the 1961 *Policies Plan for the Year 2000* prepared by the National Capital Planning Commission and National Capital Regional Planning Council. This diagrammatic proposal focused on European-style "finger plan" growth, with radial corridors of new town centers separated by undeveloped natural wedges and low density housing, was only partially implemented, and at a much reduced scale. It nonetheless informed development along I-70S.

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37 Kenneth Bredemeier, "I-70S: How Cow Country became Corridor City," *Washington Post*, December 31, 1973, A1.

38 Jane Sween and William Offutt, *Montgomery County: Centuries of Change*, Sun Valley, California: American Historical Press, 1999, 142. Among companies which moved to the corridor after COMSAT, the authors mention the Marriott Corporation, the Food and Drug Administration, NOAA, the Nuclear Regulatory Commission and Computer Data Systems. An earlier, albeit far less spectacular, High-Tech concentration in the state of Maryland can be found in Howard County's tiny town of Clarksville, located approximately half-way between Baltimore and Washington and easily accessible from route 29. It is where Johns Hopkins University moved its Applied Physics Laboratory (engaged in guided missile research) in 1954, designed by Voorhees, Walker, Smith and Smith and expanded five years later. In 1958, using the same architects and a nearby location, W.R. Grace & Company (based in Florida) opened a 96,000 square-foot industrial chemical research center, consisting of laboratory buildings and supporting facilities.

39 In the early 1960s, projects to continue I-70S beyond the Capital Beltway (I-495) toward the District of Columbia were banned by Congress.

However, Cold War policies seem to have played a more significant role in shaping the I-270 corridor than utopian planning diagrams. With the notion that a single nuclear bomb could devastate central Washington, D.C., the United States government began spreading out its agency headquarters as early as 1945. The construction of the Naval Surface Warfare Center at White Oak in Silver Spring in the eastern part of the county signaled the first of these Cold War moves. Erected for the most part before 1954, the White Oak complex employed some of the world's top scientists and was located not only for its convenient distance from the capital, but because the partially wooded site provided uniform magnetic fields.

Over the course of the next ten years, upper Montgomery County - less populated and more affordable than the Bethesda-Silver Spring-Wheaton areas - would become a highly desirable location for high-technology government agencies with either or both an interest in a campus setting and a preference for headquarters close to, but outside of, the city's core. In November 1957, President Eisenhower dedicated a new $13.3 million headquarters for the new Atomic Energy Department at Germantown near the interchange between State Route 118 (Germantown Road) and Route 240. The agency, which counted 1600 employees at the time, was responsible for all aspects of nuclear research, both for weaponry and civilian industries.

The buzz around AEC's move to "cow country" triggered, and necessitated, new zoning and planning strategies, as well as provision for new sewers and public schools. In 1956-57, the County Council commissioned to Planning Consultant Dorothy A. Muncy, Ph.D. a report listing sites ranging from 100 to 300 acres that would be appropriate for "prestige" industrial compounds scattered in upper Montgomery County. Among the sites meeting "the requirements of terrain, access to transportation and to existing and planned public utilities," two were located at the Clarksburg interchange, where COMSAT would elect to build its headquarters a decade later.[40] At the request of the County Council, Hugh Pomeroy, the planning director for Westchester County, N.Y., issued a guide for a 52-square mile area north of Rockville, embracing Germantown and Gaithersburg. Pomeroy's report also called for "designated sites for possible industries" and "extensive lands for public recreation."[41]

In July 1956, the National Bureau of Standards (presently National Institute of Standards and Technology) purchased a large tract of land four miles south of AEC, close to the interchange between Routes 240 and 124 (presently Quince Orchard Road), just south of what was then the Gaithersburg town boundary. In early 1957, the General Service Administration announced that plans for new office and research facilities had been entrusted to Voorhees, Walker, Smith and Smith, a "firm specializing in large research centers."[42]

In the word of its director, Dr. Allen V. Astin, NBS was moving away from its once pastoral site on Connecticut Avenue and Van Ness Street in the District of Columbia "for the same reason our predecessors chose the

[40] Jeff O'Neill, "'Prestige' Industry Zone Urged," *Washington Post*, November 27, 1957, A 11.
[41] "County Growth Guide Offered," *Washington Post*, May 29, 1957, B4.
[42] "GSA Names Designers for Standards Center," *Washington Post*, January 25, 1957, B4.

present headquarters in 1901 - a rural area that's accessible to the city." NBS' second in command added: "We must be in an area that's reasonably free from industry … as smoke, noise and vibration would affect seriously the precise weights and standard measurements we must make."[43] Construction started in 1959, first with the nuclear radiation facility and second with laboratories to measure the weight and thrust of U.S. satellites. From 1963 to 1967, NBS gradually moved into its new 550-acre campus, which cost tax payers $ 115 million. Its presence was undoubtedly an incentive for COMSAT's purchase of acreage a few miles further north.

Slightly further south of NBS, development started at the crossing of Shady Grove Road and I-70s in the late 1950s and became the talk of the town when developer Sam Eig decided to erect a 26-story apartment tower amidst the links of the Washingtonian Golf Course. Designed by Loewer Sargent and Associates and completed in 1966, the Washingtonian Towers (a second identical structure was planned but not built) followed the model of the "tower in the park" dear to Le Corbusier, the modernist master architect. It served as a stunning (albeit architecturally unremarkable) vertical marker for sprawling low-rise commercial and corporate structures clustering on the Gaithersburg section of the I-70S corridor. In addition to the Bureau of Standards, Eig's tower was near the office building (designed by Curtis & Davis, in association with Donald B. Coupard), which the International Business Machines Corporation opened in 1966, to "unite about 1200 IBM employees scattered at nine leased sites in Rockville and Bethesda." [44] The Washington Towers was also in close proximity to sites recently purchased by the Bechtel Corporation and Eastman Kodak.[45] In 1968, while COMSAT was under construction, IBM announced the erection of an even larger adjacent office structure, designed by the Architects Collaborative, the Boston firm founded by modernist master Walter Gropius. Despite the fact it had been designed by two firms with a distinguished track record, the resulting opaque and formless compound offered none of the elegance and excitement provided by Cesar Pelli's design for COMSAT Laboratories.[46]

Prior to the erection of COMSAT Laboratories, there was only one significant industrial and corporate compound located north of the Atomic Energy Commission site. It was built for Fairchild Industries (or Fairchild-Hiller) in Germantown. While Fairchild was in the business of airplane manufacturing and, later, satellite and related electronics work, it is COMSAT Laboratories that holds the distinction of being the first private building on the corridor to use a completely High-Tech esthetic for its architecture. Fairchild's is an industrial plant largely devoid of exterior architectural interest. It consists of a pod-like development of four buildings on the west side of I-270, anchored by two surface parking lots and a private short takeoff & landing (STOL) runway of 600 feet. Unlike COMSAT, which is light and airy, the square Fairchild buildings are low to the ground and opaque.

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[43] Herry Kluttz, "Bureau of Standards Is Going Back to Its Pastured Peace of Early Days," *Washington Post*, November 30, 1958.
[44] "Plans Set for IBM Gaithersburg Unit," *Washington Post,* May 31, 1965, D10. IBM purchased the site in 1962.
[45] John B. Willmann, "Sam Eig Hits New Peak In Apartment Living," *Washington Post*, April 2, 1966, F7. the full-scale implementation of Washingtonian Center - a mixed-use development - was undertaken in the 1980s and 1990s.
[46] "New Area IBM Facility to Employ 1200," *Washington Post*, June 6, 1968, C8.

When COMSAT moved to Clarksburg, this unincorporated community had less than 2,000 residents and zoning prescribed minimal residential lots of two acres. In 1967, a preliminary master plan prepared for M-NCPPC by Marcou, O'Leary and Associates called for "industrial strip development along 70S, small lot subdivision zoning and garden apartments and town houses. Public Park space is to be provided by the projected Little Seneca Regional Park which takes the southern end of the planning area." Additionally the plan recommended the widening of I-70S to six lanes and the construction of "rapid transit lines at least as far as Germantown."[47] Adopted in the 1968, the *Clarksburg and Vicinity Master Plan* was more realistic: it was meant to guide Clarksburg's growth "from its present rural character to a small town rather than a Corridor City." In fact, land use recommendations in the 1968 Master Plan were not fully realized because "public policy discouraged the extension of public water and sewer service … in order to encourage development south of Clarksburg, in Germantown or Gaithersburg." Many zoning changes were not adopted, and the new master plan of 1994 is striving to preserve a "town scale of development" as well as farmland and historic resources.[48]

Suburban and Exurban Corporate Design in the United States

Pelli's Comsat stands squarely in the camp of outstanding research commissions undertaken by master architects of the Modern Movement. Architects approached these projects in a manner of ways, depending upon the program. If laboratories were located in the same compound as head offices, they could be fairly lavish and spectacular. A case in point is the research tower (1945-1949) Frank Lloyd Wright designed adjacent to the Johnson Wax Administration Building (1936-39) in Racine, Wisconsin. If erected separately, laboratories were generally built economically and adopted streamlined, mechanical forms; however, both corporate clients and designers were aware that highly qualified lab workers demanded pleasant and hospitable surroundings and decent services, such as a well-lit cafeteria. After World War II, companies involved with state-of-the-art technology started to establish office and research centers in the far suburbs or the countryside. Decentralization was dictated by security reasons; to minimize land cost; and for the benefits of employees, who enjoyed restful surroundings and worked close to their suburban homes.

Eero Saarinen, Cesar Pelli's long-time employer, played a considerable role in giving form to the corporate and research campus. Monumental and dignified, a Versailles for high technology, his General Motors Technical Center in Warren, Michigan (1948-56) is an epochal work, which inspired many laboratory designers to group rectangular wings along open landscaped courtyards, to use angular profiles and crisp detailing in metal and glass. It included a glazed elevated breezeway, which anticipated COMSAT's catwalks.[49] At GM, Saarinen used a standard module for all the buildings, and "embraced a new thin-skin technology based on car-manufacturing techniques. Technical innovations included development of a thin, porcelain-faced sandwich

[47] Thomas W. Lippman, "Clarksburg Seen Housing 75,000 Residents in Future", Washington Post, June 1, 1967, E 4.
[48] Maryland-National Capital Park and Planning Commission, *Approved and Adopted Clarksburg Master Plan & Hyattstown Special Study Area,* 1994.
[49] Reproduced in Allan Temko, *Eero Saarinen,* New York: Braziller, 1962, p. 19, fig.24.

panel serving as both exterior skin and interior finish … and the use of neoprene gaskets for all window glazing, modeled on the system used for the installation of car windscreens."[50]

An elegant interpretation of the GM model was IBM's Engineering & Development Laboratory in Poughkeepsie, N.Y., designed by Elliott Noyes and Associates and completed in 1956: it featured a two-story glass bridge connecting the wings. [51]Another is the research lab and office building designed by Skidmore, Owings and Merrill for Wyeth in Radnor, PA.[52] The Thomas J. Watson Research Center (1956-61), which Saarinen designed for IBM in Yorktown Heights, N.Y., was a crescent-shaped structure - one side entirely glazed, the other principally of stone - where circulation was rejected at the periphery. Although this extraordinary "machine in the garden" was not a direct inspiration for COMSAT Laboratories, it certainly emboldened Cesar Pelli to leave the beaten paths of laboratory design. One new direction he decided not to take was the "fortress look" adopted by some companies, out of programmatic or functional necessity or for budgetary or aesthetic reasons. Opaque, "brutalist" exteriors were rarely pleasing to the eye; one exception was Philadelphia architect Vincent Kling's award-winning Molecular Electronic Division for Westinghouse Electric Corporation, located in Maryland's Anne Arundel County, within view of the Baltimore-Washington Parkway.[53]

The Designer, Cesar Pelli, and his Associates

For its new laboratories, COMSAT hired Daniel, Mann, Jackson, Mendenhall (thereafter referred to as DMJM) headquartered in Los-Angeles, in great part because of the familiarity of this large architecture and engineering (A/E) firm with space race-related programs and its excellent track record in project management. COMSAT also gained the services of a uniquely cosmopolitan and gifted architect, in the person of DMJM's Director of Design for domestic operations, Cesar Pelli.[54]

Cesar Pelli was born in San Miguel de Tucuman, Argentina, in 1926 and earned a Diploma of Architecture from the National University of Tucuman in 1949, where his schooling was influenced by the teachings of the French architect Le Corbusier and the Congrès Internationaux d'Architecture Moderne (CIAM).[55] The following year, while in the employ of a government organization, he married Diana Balmori, a landscape architect who has achieved professional prominence in the United States. In the late 1940s, Argentina boasted a sizable number of progressive and talented architects, aware of the pitfalls of functionalism and yearning for a more humanistic and contextual form of modernism. Pelli stressed that he enjoyed the "great intellectual effervescence"

[50] Peter Papademitriou, 'Saarinen, Eero', *The Grove Dictionary of Art Online*, (Oxford University Press, Accessed 25 October 2004), <http://www.groveart.com>
[51] See *Architectural Forum*, February 1957, 111.
[52] See *Buildings for Research*, New York City: F.W.Dodge Corporation, 1958, 105-110.
[53] "Miniature Circuits," *Progressive Architecture*, November 1964, 158-161. See also "Turreted Modules for Ultra-fine Manufacturing," *Architectural Record,* July 1964, 165. The design received and Award of Merit from the Baltimore Association of Commerce and Baltimore Chapter of the AIA.
[54] DMJM also had a Director of Engineering.
[55] Cesar Pelli, "Transparency - Physical and Perceptual," *A+U* 71 (November 1976), 77

surrounding his studies.[56] In the *Contemporary Architects* encyclopedia, Pelli acknowledges to have been influenced by several of his professors: Jorge Vivanco (1912-1990, a member of the avant-garde Grupo Austral), Eduardo Sacriste (1905), who was the leading modernist figure in Tucuman, and the renown Italian architect Ernesto Rogers (1909-69 BBPR).[57]

In 1952, Cesar Pelli moved to the United States to study at the University of Illinois at Urbana-Champaign, from which he received a Master of Science degree in Architecture two years later. Upon graduation, he found employment as Associate Architect for Eero Saarinen and Associates, one of the country's most prestigious firms, based in Bloomfield Hills, Michigan. Pelli acted as project designer for two masterworks: the TWA Terminal (1956-62) at Idlewild (now John F. Kennedy) Airport, New York, and for the Samuel B. Morse and Ezra Stiles colleges (1958-62) at Yale University. The two designs have apparently little in common, the "expressionist" airport building reminiscent of a bird in flight, the dormitories evoking "the image of a medieval community of scholars."[58] Working for such a protean employer, Pelli learned how to be both demanding and pragmatic:

> Never directly committed to the International Style, Saarinen' s systematic, almost engineer-like insistence on analyzing the nature of a project suggested the possibility of an autonomous architecture for each building, a concept of "the Style for the Job". He sought to direct contemporary technology in diverse architectural expressions to the advancement of the symbolic and environmental content of that tradition through the exploration of special architectural vernaculars for each project.[59]

In 1961, Saarinen died unexpectedly and Kevin Roche, a longtime employee, took charge of the office, which was named after him five years later. Cesar Pelli realized it was time "to make his own architectural decisions."[60] In 1964, he moved to Los Angeles to become Director of Design at DMJM, in the company of another former Saarinen employee, Anthony Lumsden, who was born and trained in Australia and became his assistant. The pace at which essentially utilitarian projects needed to be delivered was dramatically faster than for Saarinen's prestige commissions, and construction budgets were far less generous, but Pelli rose to the challenge and enjoyed having so many in-house services, and a close relationship with DMJM's engineering department.

DMJM finds its origins in 1945, when architects Philip Daniel, a graduate of the University of Southern California, and Arthur Mann, trained at the Beaux-Arts Institute of Design and the Chouinard Art School, established an office in Santa Maria, California. They were soon joined by S. Kenneth Johnson, another USC architecture graduate. In 1947, sensing major opportunities for work in this city, the young firm moved to Los

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[56] Pelli interviewed by Michael Crosbie, in *Cesar Pelli : selected and current works* Mulgrave, Victoria : Images Pub. Group, 1993, 7.
[57] Muriel Emanuel, ed., *Contemporary Architects*, New York : St. Martin's Press, 1980, 613.
[58] Peter Papademitriou, 'Saarinen, Eero'
[59] Ibid.
[60] Cesar Pelli, quoted in Esther McCoy, "Reflections on Cesar Pelli," *A+U*, July 1985, 15.

Angeles, as did one of their professional acquaintances, civil engineer and UC-Berkeley graduate Irvan Mendenhall. The Daniel, Mann & Jackson firm officially merged with that of Mendenhall in 1949.

In its first years, DMJM produced its share of public schools, necessitated by Southern California's migratory and baby boom: grouping elementary, junior, and senior high schools. The sprawling plant for Culver City, illustrated by *Architectural Record* in November 1951, as well as the Seaside School in Torrance, published by *Progressive Architecture* in September 1952, demonstrate a good command of the modernist syntax. However, the multi-disciplinary A/E firm had greater ambitions and began attracting a variety of significant public and corporate clients. DMJM specialized in large scale construction, as evidenced by its "Wonder Palace" convention center in Anaheim.

DMJM's involvement with space age activities started in 1954, with the construction, in Santa Susana, Calif., of a rocket engine test stand for the U.S. Atomic Energy Commission. On the same site, the firm also built an atomic accelerator and facilities for the storage and disposal of radioactive waste. In 1958, DMJM (in joint venture with The Rust Engineering Co., Leo A. Daly Co., Architects and Engineers and Hanger-Silas Mason Co., Inc., engineers and Contractors) was asked to establish "design criteria for all U.S. training and operational bases for the Titan I missile program."[61] DMJM designed several launch pads, including at Cape Canaveral, as well as the Donald W. Douglas Engineering Development Center in Huntington Beach, a compound of nine buildings on 245 acres built for the Missile and Space Systems Division of the Douglas Aircraft Company. [62]

As "DMJM became more and more involved in the design of missile bases, it became apparent to the firm that it needed to provide itself with capabilities for research and development work in the fields of the missile themselves, and the related sciences." It decided to acquire an existing company, Systems Laboratories, Inc., that performed "research, consulting work, and development work in aeronautics, nucleonics, missile systems, automatic control and computer systems, physics, chemistry, mathematics, and similar fields." Other major commissions included master plans for several U.S. Air Force bases, urban renewal proposals for several cities in California (including Santa Monica and Sacramento) and a flood and water supply study on behalf of the Southern California Rapid Transit District. DMJM was also involved in the design of zoological parks, including the Great Flight Cage at the National Zoo in Washington, D.C. In addition, many commissions for corporate offices and public works (road or flood control) came its way.[63] In 1960, as DMJM had "performed professional services for well over $ 2 billion of construction," the partnership was transformed into a corporation, which extended its reach to industrial engineering (statistics, electronics) and real estate activities.[64]

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[61] Clinton A. Page, "Names [The firm of Daniel, Mann, Johnson and Mendenhall] *Architecture and Engineering Record* 9 (June 1967), 104.
[62] "Space Industries' Demanding Criteria," *Architectural Record* (July 1964), 169.
[63] In 1969, DMJM prepared a study for an industrial airpark sponsored by the Commissioners of Prince George's County. See Lawrence Meyer, "Bowie Airpark Cost Put at $ 58 Million," *Washington Post,* November 7, 1969, B4.
[64] "Office organization and procedures for present-day practice: organization for efficient practice 2: Daniel, Mann, Johnson and Mendenhall, archts. & engrs.," *Architectural Record* 127 (June 1960), 190.

By the time the COMSAT commission was under construction, DMJM had offices in Washington, D.C, San Francisco, Portland, Las Vegas, as well as in Hawaii, Venezuela, Vietnam, England, Thailand and Indonesia.

Before hiring Pelli and Lumsden, DMJM's reputation was based less on design excellence than on the diversity and quality of its services. Pelli's designs earned DMJM many accolades from the architectural press and profession. In 1966, the "megastructural" Urban Nucleus for Sunset Mountain Park in Santa Monica (commissioned by the Sunset International Petroleum Corporation, but never built) received a First Design Award from the magazine *Progressive Architecture* - the highest distinction granted in this prestigious, peer-reviewed competition and the only award of this kind given that year. The city's spectacular renderings found their way (with a very positive description) to the prestigious French journal *L'Architecture d'Aujourd'hui* in 1967. *Progressive Architecture* also published Pelli's and Lumsden's colorful and glamorous vaulted interiors for the Jewelers Center on Beverly Hills' Wiltshire Boulevard, Pelli's powerful entrance for the Third Street Bunker Hill Tunnel, and the Worldway Postal Center at Los Angeles International Airport, completed in late 1968 (this project received an Honor Award from AIA Southern California). The well respected Italian magazines *Lotus* and *Domus* also published Pelli's work for DMJM, as it was akin to that of young European architects they championed; issues illustrating his designs also showed work by Renzo Piano or Richard Rogers, who were to achieve international fame with their winning design for the Centre Georges Pompidou in Paris.

In the manufacturing and research facility for Teledyne Systems Co., erected in Northridge, in California's San Fernando Valley, and completed in 1967, Pelli "rehearsed" his design for COMSAT Laboratories. The Teledyne lab was reviewed by the noted California critic Esther McCoy in the July-August 1968 issue of *Architectural Forum.* McCoy praised Pelli's "controlling hand" which insured aesthetic success despite successive cost trimmings. Located in an agricultural setting (a 36-acre citrus grove, which Pelli was able to safeguard almost completely) along a highway, the structure comprised 165,000 square feet of offices and assembly labs for microelectronics elements, and was built at a cost of $ 2,850,000, including landscaping. The plan was controlled by a circulation spine, a wide corridor acting as informal meeting space, which was lined with continuous reflective glass on one side; as many of Teledyne's activities were classified, the workspaces were lit indirectly with interior corridor windows. In this project, Pelli began exploring ideas of spatial flexibility inherent to the electronics industry. McCoy quoted Pelli:

> It is seldom possible to predetermine growth, and the problem is how to plan for undetermined growth without throwing the architecture away.

McCoy rightly perceived the lineage between ideals of pioneering modernists - such as the German architect Walter Gropius at the Fagus Factory (1911-12) in Alfeld an der Leine and Bauhaus buildings (1925-26) in Dessau - and Pelli's concern "with the development of tools for flexible solutions for the present," his differentiation between skin and support, and his use of standardized parts. This philosophy and the idea of building a "complex" as opposed to a "building," Pelli confided to McCoy, was foreign to many of his U.S. colleagues. McCoy's article concluded: "Commonsense architecture is lifted above dullness and it becomes the means through which the city is refreshed."[65] In 1968, Teledyne Systems Laboratories received an Honor Award from the American Institute of Steel Construction.

In 1969, while COMSAT Laboratories was nearing completion, Cesar Pelli left DMJM to become partner in charge of design at Victor Gruen Associates, a Los Angeles firm internationally known for its pioneering work in shopping center design.[66] That same year, he won the International Architectural Competition for the United Nations City in Vienna, Austria (unbuilt). In his designs for the San Bernardino City Hall (1969-72), the Columbus Commons (1970-73), the US Embassy office in Tokyo (1970-75), and the Pacific Design Center in Los Angeles (1975, nicknamed the Blue Whale), Cesar Pelli perfected his "investigation of the gestural and sculptural possibilities of the cladding, particularly the nature of glass as a transparent and reflective material."[67] In 1977, Cesar Pelli moved East to became Dean of the School of Architecture at Yale University, a coveted academic position he held until 1984. At the same time he launched his own practice in New Haven. Very large and prestigious commissions came his way at an increasingly faster pace, marking the skyline of major cities the world over: in New York City, the Museum of Modern Art extension and residential tower (1978-84), and the World Financial Center and Winter Garden (1982-87); in Charlotte, N.C., the Bank of America Corporate Center; in Minneapolis, the Wells Fargo (formerly Norwest) Center; in London's Canary Wharf district, One Canada Square (completed 1991), Britain's tallest building at the time of its construction; in the Hague, Netherlands, the Zurich Tower; in Tokyo, headquarters for NTT Shinjuku (1990-95) and the Mori Tower; in Osaka, the NHK Osaka Headquarters and Broadcast Center; in Hong Kong, the Cheung Kong Center; in Buenos Aires, the Edifico República (1993-96) and Bankboston Argentina Headquarters; and in Kuala Lumpur, the twin 1483-foot high Petronas Towers, the world's tallest buildings at the time of their completion in 1997.

Pelli's firm received many commissions for healthcare and research facilities, such as the Lerner Research Institute in Cleveland and Yale University's Boyer Center for Molecular Medicine; and for departments of physics, astronomy, mathematics, engineering and computing sciences at the Institute for Advanced Study in Princeton (1989-93), the University of Washington-Seattle (1989-94), Trinity College in Hartford, CT, and the University of Houston. A recent area of expertise has been performing arts centers. Several master plans - for Bilbao, Fukuoka in Japan, and Cordoba in Argentina - have also come Cesar Pelli's way. A crowning achievement of his firm has been the Washington National Airport (1990-97).

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[65] Esther McCoy, "Planned for Change: Cesar Pelli Designs an Adaptable Electronics Plant," *Architectural Forum* 129 (July-August 1968), 102-107.

[66] At DMJM, Pelli's position was filled for the next 25 years by Lumsden, who brought to completion the Federal Aviation Agency Building, initially planned by Pelli, a radical exercise in "light weight sculptural surface" in reflective glass and aluminum, "where the building goes over the top, the building comes under the bottom, and also goes around the corner" (Lumsden, quoted in Ross, "The Development of an Esthetic System at DMMJ," *Architectural Record*, May 1975, 117). In the 1970s, DMJM produced striking high rise office structures in Los Angeles and bold, linear designs for a academic campuses, including the Community College of Baltimore, Harbor Campus, as well the Holyoke (Massachusetts) and Northlake (near Dallas, Texas) Community College.

[67] Gavin Macrae-Gibson, "Pelli, Cesar," *The Grove Dictionary of Art Online,* (Oxford University Press, Accessed 15 October 2004), <http://www.groveart.com>

Cesar Pelli's firm was the recipient of many professional awards, including the extremely prestigious firm award from the American Institute of Architects in 1989.[68] As an individual, he was awarded the Arnold Brunner Memorial Prize from the National Institute of Art and Letters in 1978 and was elected Associate of the National Academy of Design in 1978. Receiving the Gold Medal of the American Institute of Architects in 1995 placed Cesar Pelli at the very top of his profession. In 2001-2002, his work was the subject of an extensive retrospective exhibition organized by the National Building Museum in Washington, D.C.

Other persons associated with the design and construction of COMSAT laboratories were DMJM's S. Kenneth Johnson (Partner-in-Charge) and Philo Jacobsen (Design Associate). The general contractor was J.W. Bateson (presently Centex Bateson Construction Company, Inc.) based in Dallas, which had already built a large section of the National Bureau of Standards between 1963 and 1965.[69] The landscape architect for COMSAT Laboratories was also highly accomplished and respected among his peers: Lester Collins (1914-1993) received a master's degree from the prestigious Landscape Architecture program at Harvard University in 1942, which he also directed before moving to Washington, D.C. in 1954, where he lived until 1981. His office (named for a time Collins, Simonds and Simonds) was involved with urban, campus,and school design, as well as with projects for public parks and private gardens from Maine to Florida, some close to his Georgetown residence. Among his most important projects were the redesign of the sunken Hirshhorn Sculpture Garden at the Smithsonian Institution (completed in 1981), Inisfree, "a 1,000-acre public garden with oriental overtones in New York state," and the plan for the new town of Miami Lakes in Florida.[70] Mr. Collins spent time in Kyoto, Japan on a Fulbright fellowship and was elected Fellow of the American Society of Landscape Architects.

Pelli's Forward-looking Design Concepts

Cesar Pelli evaluates his design for COMSAT Laboratories as "a successful investigation in esthetics, technology and building planning."[71] He also recalls that the "influences that were most in my mind at that time were not as much architectural, but aircraft construction and esthetics (…) I was pushing the envelope of avant-garde ideas of the moment." Indeed, COMSAT Laboratories reflects Pelli's emerging, and enduring commitment to "an architecture that celebrates life," that emphasizes "perception, lightness and change," that "is not in the empty building but in the vital interchange between building and participant."[72] Reflecting on the COMSAT commission, Pelli also confides:

[68] A list of awards can be consulted at www.cesar-pelli.com
[69] "Dallas Firm Gets Big Area Contract," *Washington Post,* August 16, 1963, B6. Bateson also built the Nimitz Library at the U.S. Naval Academy (John Carl Warnecke architect, 1970-73).
[70] http://www.jgarden.org/biographies. Patricia Dane Rogers, "Appreciation; Even Mother Nature Bowed to Lester Collins," *Washington Post*, July 29, 1993, T 10. Marion Lynn Clark, "The 10-point Lester Collins garden plan," *Washington Post*, April 11, 1971.
[71] E-mail interview with Cesar Pelli by Historic Preservation Section, September 21, 2004.
[72] Cesar Pelli, *Contemporary Architects*, 614

> Perhaps the most significant aspect of this building is that it is now a very early example of high-technology design; an architectural direction that has become very strong, perhaps dominant, in the last 20 years.[73]

According to the renowned critic and historian Reyner Banham, "High Tech" is a "stylistic term applied to the expressive use of modern technology, industrial components, equipment or materials in the design of architecture, interiors and furnishings." [74] This denomination was first used in print in 1977 (a decade after COMSAT Laboratories was designed) and was popularized the following year by Joan Kron and Susan Slesin in a book entitled *High-Tech: The Industrial Style and Source-book for the Home*. Arguing that "the industrial aesthetic in design …is one of the most important design trends today," Kron and Slesin cited a number of buildings, most notably the Centre Georges Pompidou (1971–7) in Paris.

According to Banham, High Tech finds philosophical and aesthetic roots in London's Crystal Palace, built for the Great Exhibition of 1851 and one of Pelli's favorite buildings. This movement is "linked to the prestige of recent advanced engineering, as represented by space-vehicles for example"[75]; it challenges concepts of compactness and pure geometry expounded by the Modern Movement's most famous exponents, Walter Gropius, Le Corbusier and Ludwig Mies van der Rohe. Instead, it borrows ideas and imagery from less well-known futurist, expressionist and constructivist architects. Banham saw High Tech as an essentially British movement, coming of age with the Reliance Controls Factory at Swindon, Wiltshire, completed in 1967 (the factory's designers, Richard Rogers and Norman Foster have become, like Cesar Pelli, internationally known and appreciated). Generally imbued with optimism, either whimsical or serene, High Tech became a viable alternative to Post-Modern Classicism, a movement often characterized by nostalgia and irony. While "PoMo" has few followers at present, High Tech has adapted to new imperatives of sustainability and still inspires many young architects throughout the world, as evidenced, for instance by the *Light Construction* exhibit held at the Museum of Modern Art, New York, in 1996.

Three major concepts associated with the High Tech ethos and esthetic inform Cesar Pelli's design for COMSAT Laboratories: first, the "machine in the garden"; second, linear composition; and, third, "skin tectonics." A fourth, superimposed, theme, is also of crucial importance: transparency.

The "Machine in the Garden"

Cesar Pelli passionately wanted the COMSAT complex "to feel as a man-made object carefully placed on a natural area."[76] He therefore interpreted and rejuvenated the modernist idea of placing a self-referential, free-

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E-mail interview with Cesar Pelli by Historic Preservation Section, September 21, 2004.

[74] Reyner Banham, "High Tech," *The Grove Dictionary of Art Online*, (Oxford University Press, Accessed 15 October 2004), <http://www.groveart.com>

[75] Cesar Pelli. "Joseph Paxton's Crystal Palace," *A + U (Architecture and urbanism)*, n.2(113), February 1980, 3-14.

[76] Original programmatic language from Cesar Pelli, 1967. Obtained from Cesar Pelli Associates, New Haven, Connecticut.

standing "object-piece" in an unspoiled landscape, an idea that finds one of its most striking and endearing illustrations in Le Corbusier's Villa Savoye (1930) in Poissy.[77] In the United States, the concept of the "machine in the garden" began to take hold with the advent of suburban sprawl. An early example, albeit far from avant-garde in its styling, is Bethesda's Naval Hospital, which opened in 1942 - a pristine, mirage-like, construction on a sea of emerald grass.

Enhancing the dialectic between "nature" and "culture" - between Clarksburg's pastoral setting and the laboratories' mechanistic character - was of the utmost importance for Cesar Pelli:

> Although the structure will not blend with nature, it is set up not against it but rather working with it. The landscape will retain the existing look of the Maryland countryside with no exotic plants or manicured areas. The courts will be fully planted and each court will be different in density of trees and earth forms.[78]

Cesar Pelli specified the saving of isolated mature trees, including maple, sycamore, and beech woods. Aided by landscape architect Lester Collins, he deliberately sought to place the building halfway within a small forest so that the trees could be experienced from much of the building and screen the south parking lot and receiving yard. The landscape plan avoids long straight rows of trees or any formal plantings in favor of small groupings and strategically placed trees, indigenous to the area. Historical photographs indicate that the grass was tractor-mown from the beginning. (A test to leave part of the landscape in a more wild state did not have good results.) Despite being mown, the landscape is decidedly pastoral, not manicured.

Cesar Pelli wanted to carry into the interiors the machine aesthetic, what he called the "'advanced technology' man-made quality of the exterior," and to avoid all hand crafted elements and materials. With the exception of occasional and "carefully segregated" wall paneling in wood, as in the conference rooms, white reigned supreme inside COMSAT Laboratories: it had white walls and ceilings, white steel staircase rails, and white 9" vinyl asbestos tiles.[79] The interior has references to ocean liners, including the north lobby's white-pipe rail stair and the corridor's mezzanine railing. These types of allusions had been popularized in the 1920s by Le Corbusier.

Linear Composition

Cesar Pelli also explained that the "complex and differentiated functions of the laboratories are organized along a public spine that allows each of the constituting elements to take a form suitable for its need, and to grow and

[77] A historical landmark, this house is presently owned by the French Ministry of Culture.
[78] Original programmatic language from Cesar Pelli, 1967. Obtained from Cesar Pelli Associates, New Haven, Connecticut.
[79] Cesar Pelli memorandum to Ben Frank Worley, October 20, 1967. The display cases in the main corridor, fabric banners, and red replacement vinyl floor tiles are all additions from the 1980s.

change independently of the rest of the building."[80] The sequence of captioned diagrams included in an original memorandum show his systematic and thoughtful consideration of programmatic and aesthetic needs. As indicated by the first diagram, the plan is generated by a "basic circulation" through a central spine, entered on one side by visitors and on the other by employees. Since COMSAT Laboratories is a "complex" as opposed to a discrete "building," this longitudinal corridor is its "most important space":

> This is the common room, the meeting room, the room away from work. It should therefore have its own life in the plan. It should not be a leftover. It deserves the best views and the better materials.

Adding rectangular unit blocks of varying sizes on either side of the spine, diagram # 2 clearly shows how "the complex is an aggregate of spaces off a main circulation line." Diagram # 3 superimposes "secondary circulation lines," including the ubiquitous catwalk that is viewed from I-270. Diagram # 4 locates mechanical services in one of the blocks and through the spine, making them "flexible, capable of growth and easy to service." Diagrams # 5 and 6 indicate the occurrence of "predetermined growth" on the lower side of the spine (visible from I-270), by repeating existing units at regular intervals, and the free development of "undetermined growth" in the back of the spine. The final diagram shows how views, both to the surrounding countryside and to internal landscaped courts, were afforded from the central spine and the catwalk.

Although the facade along I-270 is finite at its northern and more public end, with its exhibition rotunda / porte cochère motif, the overall composition rejects traditional notions of centralized spatial hierarchy. In this regard, it relates to utopian projects of "linear cities" envisioned by Soviet Constructivists in the 1920s, by Los Angeles architect Richard Neutra in "Rush City, Reformed" (1923-27), and explorations by European contemporaries of Cesar Pelli, in particular the Italian architects Giancarlo De Carlo, Vittorio Gregotti and members of the Superstudio group. The lobby is integral to the glazed spine "rather than the usual wall-in sanctuary."[81] Glass walls sheath the primary corridors, lobby, library, and cafeteria. The importance of the western glass corridor, the "catwalk" that is seen from I-270, was twofold: 1) it served as a connector between all of the laboratory wings, and 2) it closed the landscaped courts, but its distinctly glazed, narrow presence allowed the courts to remain visually open from the central spine. Pelli's program noted: "From the exterior, and depending on the light conditions, the building will sometimes look like a single streamlined shape and sometimes like a sequence of courts and wings."[82] To stress linearity, Cesar Pelli specified the direction of joints: "We want to maintain continuity on the lines and surfaces (for example, the long fascia on the balcony in the main corridor should not be interrupted with any applied element or strong joints.) Long lines of light should align perfectly. Floor and ceiling tile should have the pattern direction running with the long axis of the space."[83]

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[80] Special Cesar Pelli issue, *A + U*, Tokyo, July 1985, 29.
[81] McCoy, "Planned for change"
[82] Ibid.
[83] *Ibid*

Skin Tectonics

Cesar Pelli also clearly explains how he enclosed COMSAT Laboratories "in a skin of aluminum and glass" independent of the structural frame:

> The windows of the private offices are "punched holes" in the aluminum panels. The windows in the public and common spaces form continuous bands. The aluminum skin turns over, under and around in the three dimensional planes, suggesting a continuous wrapping of the complex volume and making visible its role independent from the structure.
>
> I arrived at the decision to design the modular skin of aluminum and glass not only because of its intellectual and aesthetic appeal but also because of the suitability of its character to the purpose of the building: to be a place where research, experimentation and construction of telecommunication satellites takes place.[84]

While designing the project, Cesar Pelli specified:

> The glass walls should be as flush as possible. . . . The same quality of flushness, of everything in one plane, is also needed in the aluminum walls. Actually the character of tight skins is not only important in each material but also as they come together: we want the aluminum to be flush with the glass and with the concrete, avoiding all unnecessary reveals. The joints in the aluminum wall should be as tight and crisp as we can get them.[85]

In the same way as the "machine in the garden" concept and linear composition inform COMSAT's site plan and interior layout, respectively, the facades are direct expressions of the use of aluminum in thin prefabricated panels and slender, geometrical, mullions. Without aluminum, COMSAT Laboratories would not have looked so light and elegant. Using facade elements in aluminum was not unprecedented, though. Three of the most spectacular designs of the interwar period - the Cathedral of Learning in Pittsburg (Day and Klauder, 1925), the Chrysler (William van Alen, 1930) and Empire State (Shreve, Lamb and Harmon, 1931) Buildings in New York City - used "cast- or pressed-sheet aluminum spandrels (…) set into a masonry back up."[86] A benchmark in the popularization of all-aluminum, non load-bearing, facades was a research and engineering building in Milwaukee, designed by Chicago architects Holabird and Root. Upon completion, it was published in the December 1931 issue of *Architectural Record,* with the following introduction:

[84] Cesar Pelli, "Architectural Form and the Tradition of Building" A+U, 1985, 29.
[85] Memorandum from Cesar Pelli to Ben Frank Worley, 20 October 1967. Obtained from the office of Cesar Pelli & Associates, New Haven, Connecticut.
[86] Stephen J. Kelly, "Aluminum," in Thomas Jester, ed., *Twentieth-century building materials: history and conservation* (New York, 1995), 47. The Empire State Building's aluminum spandrel panels were 4 feet 6 tall and 5 feet wide.

Aluminum, as one of the metals and alloys which can be easily formed into many shapes and patterns and which eliminate many maintenance items from the consideration of costs, has these characteristics to recommend its use in architecture:

1. Availability in quantity and in all forms known to metal working.
2. Uniform physical and chemical properties.
3. Lightness (aluminum and aluminum alloys weigh only one-third as much as the other metals commonly employed in architecture).
4. Workability.
5. Comparative low costs as a raw material.
6. Reasonable freedom from attacks by the elements.
7. Strength (…)
9. Finish in varying shades of gray and with different surface textures
10. Plating and coloring.[87]

However, in all the above-mentioned examples, aluminum was used in conjunction with other, non-metallic, materials and/or was ornamented. The French inventor-manufacturer Jean Prouvé (1901-1984), whom Cesar Pelli credits as his source of inspiration for COMSAT Laboratories, was the first to propel this material into the mainstream of Modernism. [88] According to noted historian Jean-Louis Cohen, his plain-looking facade panels for the Maison du Peuple (Beaudouin et Lods architects, 1936–9), in Clichy near Paris, "completely revolutionized" curtain-wall techniques."[89] In his foundry in the Lorraine region, Prouvé, who was "fascinated by the thin shells used in the car and aviation industries," produced prototypes for steel and aluminum components, metal furniture, and lightweight housing units. He "established a range of construction possibilities using stamped or folded sheet-metal, which allowed him to cover vast surfaces both elegantly and cheaply." Prouvé's panelized aluminum facades for the Fédération du Bâtiment (Gravereaux and Lopez, architects, 1951) and an apartment building in Square Mozart (Lionel Mirabeau architect, 1953), both in Paris, and for an

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[87] Harold W. Vader, "Aluminum in Architecture," *Architectural Record* 70 (December 1931), 459.
[88] (9/21/04)
[89] Jean-Louis +Cohen, "Prouvé, Jean," *The Grove Dictionary of Art Online*, (Oxford University Press, Accessed 15 October 2004), <http://www.groveart.com> The panels were executed with the help of structural engineer Vladimir Bodiansky, who would later collaborate with Le Corbusier

exhibition hall (Paul Herbé and Maurice Gauthier architects, 1951) in Lille all anticipate those used at COMSAT Laboratories.[90]

After World War II, the glass curtain wall became the signature of International style architects and many transparent facades were detailed with aluminum mullions, forming elegant patterns. A good example is the United Nations Secretariat Building (1947-53) in New York City, by Harrison and Abramovitz. Completed in 1948, the Equitable Building (Pietro Belluschi architect) employed war production surplus and borrowed from aircraft manufacturing methods to devise a minimalist but supremely elegant curtain wall of low aluminum spandrels and large glass panes. This epochal International Style design was an eye opener for many architects and manufacturers.

Indeed, the Aluminum Company of America played a crucial role in giving aluminum an architectural edge. As early as 1931, ALCOA had sponsored the revolutionary "Aluminaire House" (A. Lawrence Kocher and Albert rey architects), "constructed with aluminum-pipe columns carrying a steel floor deck and clad with thin aluminum panels fixed to the frame with aluminum screws and washers." [91] After the war, ALCOA commissioned several designs to Harrison and Abramovitz showcasing its products. Completed in 1948, the administration building for the Davenport, Iowa, plant producing rolled sheets and plates was a "gleaming package" in a rural setting. Its facade alternated ribbon windows and cast aluminum panels, measuring 4 ft x 7 ft 3 ¼ in., which were bolted to the steel frame and then placed against precast concrete panels.[92] Completed in 1953, the head office in Pittsburgh was a skyscraper entirely sheathed with one-story high prefabricated panels. Each panel comprised a diamond-shaped sculptural spandrel in aluminum (anodized and pressed) and a punctured window with rounded corners, which anticipated those at COMSAT laboratories: "Rather than resting on a masonry parapet wall, the panels could be bolted to the structural frame. Aluminum's light weight meant the panels could be quickly hoisted into place and assembled with a minimum of heavy equipment."[93] At the same time, techniques to manufacture anodized aluminum "by building up the natural aluminum oxide coating in an electro-chemical bath" were perfected. Used also at COMSAT, anodic coating possessed an "outstanding resistance to atmospheric corrosion."[94]

[90] "Eléments de façade en aluminium étudiés et réalisés par les ateliers Jean Prouvé," *L'Architecture d'Aujourd'hui*, February 1955, 2-3.
Dennis P. Doordan, "From precious to pervasive : aluminum and architecture," in Sarah Nichols, *Aluminum by design* (Pittsburgh, Pa. : Carnegie Museum of Art ; New York : Harry N. Abrams, 2000), 97.
[92] "New Alcoa administration building at the Davenport plant is a gleaming package," *Architectural Forum* June 1949, 76-80.
[93] Doordan, 104.
[94] Kelly, "Aluminum," 48.

However, in the late 1960s, sharp angles were all the rage among American architects working for large corporations and only their most adventurous European and Japanese colleagues were venturing into sleek, High-Tech curvatures.[95]

Cesar Pelli (who also wanted aluminum on the Environmental Test Laboratory, but settled for painted corrugated steel due to budgetary constraints) explains that the purpose of the aluminum skin was not only esthetic. It certainly gave the building "an exciting technological look appropriate to its purpose," but it also "served the needs of COMSAT that required that the building be built in an extremely short time" and by keeping out signals that might interfere with the technology being developed inside.[96] COMSAT Laboratories featured other state-of-the-art technical characteristics, such as dropped ceilings sheltering large service areas, and automatic temperature control in each office. In true High-Tech mode, Pelli made sure that technical, economical, and aesthetic concerns harmonized and sustained each other: for instance, the separate mechanical penthouses shorten the length and width of ducts while relieving the monotony of horizontal lines and enlivening the silhouette. COMSAT was also a landmark achievement in fast track design.[97] Cesar Pelli ventured that the speed with which the building was designed accounts for at least a part of its success story:

> "It's an interesting footnote that this adventurous design of the COMSAT Building was produced in an incredibly short period of time. I completed the design in one and a half months and the building started construction five months after DMJM was engaged."[98]

Critical Fortune and Posterity

COMSAT Laboratories was in the limelight as early as its plans were made public. In 1968, it received a citation in the prestigious *Progressive Architecture* annual design award, which was in its fifteenth year. This was indeed an outstanding accomplishment: out of 671 submissions, only 12 were selected for awards or citations. That year, the jury was chaired by Lawrence B. Anderson, Dean of the School of Architecture and Planning at MIT, and included Gunnar Birkerts (a former Saarinen employee) and Romaldo Giurgola, two highly respected architects, as well as the maverick structural engineer Falzur Khan, the man behind Chicago's Sears Tower. Their comments were reproduced in *Progressive Architecture*:

> - The wall impresses me, the skin of the building.

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[95] In particular the facades of COMSAT Laboratory are related to those of the Olivetti training school designed by British architect James Stirling in 1968 and built in 1971-72. The "wraparound" metallic look of COMSAT Laboratories is not unprecedented, as it was already present in Art Deco diners.
[96] E-mail interview with Cesar Pelli, September 21, 2004.
[97] One of the more well-known "fast-track" designed buildings in American history is the Pentagon, which was designed in just a few months. That building is not only listed on the National Register of Historic Places, but is a National Historic Landmark as well.
[98] Ibid.

- It's a very rational building. The different functions in the whole building are expressed quite well by the different materials in the wall system.

- Very superior plan, organization, and a fine cross-section for providing mechanical services for the laboratories.[99]

A photogenic building, which had no parallel in the United States, COMSAT Laboratories was extensively published in magazines targeted to a specialized, but diverse, audience. In December 1968, *Architecture & Engineering News*, a technically-oriented publication, gave a well informed account of its aesthetic and constructional characteristics. In August 1970, *Progressive Architecture* did not hesitate to devote a second article to COMSAT, with the attention-grabbing title "Technological Imagery: Turnpike Version." The article congratulated Pelli for devising "elements - organization, expansion, capabilities, and skin treatment - which elevate COMSAT to an 'image' building at less-than-image-price:"

> Because the plan is fundamentally quite simple, it was relatively easy to allow things to occur where they wanted to. Stairs are where stairs should be, and they are boldly expressed. The same happens for offices, laboratories or loading dock - nothing is slighted, little is in excess. There is no hint of a temple about this building, and therein lies one of its greatest strengths.[100]

The fact, as stated by *Progressive Architecture,* that COMSAT Laboratories had "broken out of supercontrolled haute architecture, within the visual tradition" led to its publication in Japan and Italy, two countries which, at the time, were at the cutting edge of architectural theory and practice.

COMSAT Laboratories was the summation of Cesar Pelli's tenure at DMJM and represents an important breakthrough in his career. Dear to the heart of its designer, it has been extensively featured in the first three monographs devoted to Cesar Pelli. The special issue published in 1985 by the trend-setting Japanese journal *A+U (Architecture and Urbanism)* included an essay by critic John Pastier, with the following comments on COMSAT Laboratories:

> It is Pelli's first built example of a metal skin, and its lightness, tautness and continuity embody his views of external walls as pure enclosing membranes freed from structural duties. This was also a major concern of the architectural culture of the period, as was the notion of expandability and capacity for change, effected here by open-ended spines serving individual functional modules. Purpose too is nicely

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[99] "Clarksburg, Maryland." *Progressive Architecture.* v. 49, January, 1968, 125. Cesar Pelli would earn another citation from *Progressive Architecture* in 1977, for the Winter Garden at the World Financial Center and a design award, in 1987, for his extension to the Pacific Desi[gn] Center.
[100] "Technological Imagery," 72.

served by a High-Tech wrapping for a High-Tech use, and by a rational layout in which the main spine articulates zones of research and production.[101]

In a 1990 monograph, Pastier maintained that the Teledyne and COMSAT laboratories "became architectural metaphors for logical planning and orderly growth."[102]

Reflecting the optimistic and experimental state of mind of the late 1960s, Pelli's design for COMSAT Laboratories anticipates that of another Modern Master, also at the beginning of his career: Richard Meier's Bronx Developmental Center, designed in 1970 and completed in 1977 boasted a linear layout and a panelized, aluminum skin (placed lengthwise, however), which had a clear anodized finish and was punctured by gasketed and rounded windows. It had ocean liner details in the transparent lobby, and glazed bridges linking separate wings. The Bronx Developmental Center received many accolades when it was first completed, but was partially demolished in 2002.[103] Richard Meier, himself an AIA Gold Medal recipient, has made slick, square panels (clad in white enamel) and large glazed surfaces, in the "COMSAT vein," his trademark. COMSAT Laboratories emboldened young architects who deemed sterile either a nostalgic return to pre-modern forms or pure "Miesian" geometry. For instance, Chicago's Stanley Tigerman used Alcoa's aluminum facade panels and "zipper-gasketed windows" to build a space age home (completed 1975) in Glencoe, complete with a domed observatory.[104]

The sleek skin, metal, and glass aesthetics reigned almost supreme in England in the 1970s, and has remained a strong direction among British architects. In his authoritative survey on *High Tech Architecture*, Colin Davies illustrates Sir Norman Foster's amenity building for the Fred Olsen shipping line in the London Docks (1971), as a "sleek skin of glass and Neoprene." Two examples of light, curved metallic "machines in the garden" comparable to COMSAT, also found in Davies' book, are Foster's Sainsbury Centre for Visual Arts (completed 1977) at the University of East Anglia, Norwich and Nicholas Grimshaw's Office and Workshop for Ladkarn Ltd. (completed 1985) in London.[105]

Cesar Pelli noted that elements of COMSAT's design were used in later buildings: "The lineal organization of the COMSAT Building reappeared in several of my buildings, and so did the unitized construction of its walls."[106] He explored the idea of lining separate and movable pavilions along a luminous corridor in two experimental house designs: one drawn at the request of the organizers of the prestigious Venice Biennale, in 1976; the other for a "Houses for Sale" exhibition presented at the trendy Max Protecht / Leo Castelli Gallery

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[101] John Pastier, "Cesar Pelli: The Architect as Servant," 86.
[102] John Pastier, "The Evolution of an Architect," 15
[103] See Suzanne Stephens, "Bronx Development Center, New York, N.Y., Architecture cross-examined," *Progressive Architecture* 58 (July 1977), 43-54.
[104] See Joan Kron and Susan Slesin, *High-Tech: The Industrial Style and Source-book for the Home*, New York:C.N. Potter, 1978, 19.
[105] Colin Davies, *High Tech Architecture*, New York: Rizzoli, 1988, 19, 58-6, 98-99
[106] *Ibid*

Galleries in October 1980.[107] The concept (humanized by details such as hipped roofs and trellises) became a reality in a 1979 commission for a large house in Montgomery County, one of the very few private residences ever designed by Cesar Pelli.[108] The four-story garden hall Pelli added to New York's Museum of Modern Art (1978-84) retained the luminous and linear quality as well as the ocean liner atmosphere of the COMSAT Laboratories. The corporate campus for Owens Corning World Headquarters (1994-96) in Toledo, Ohio is an "assemblage of component parts linked together by glass-enclosed connectors."[109]

One cannot understand Pelli's Ronald Reagan Washington National Airport without knowing COMSAT Laboratories. The user-friendly airport concourse was conceived like the Laboratories' spine with its views to the landscape (in this case, the airfield and the Potomac River), thus celebrating life.

In sum, one cannot study Cesar Pelli's contribution to world architecture without being fully aware of his groundbreaking work at COMSAT. The work of all master architects is an evolving process; as cultural resource historians, we have an obligation to preserve not only works of their mature years, but also their youthful, forward looking experiments – especially those that were deemed successes from a functional and aesthetic standpoint.

107 Special Cesar Pelli issue, *A + U*, Tokyo, July 1985, 47-49 and 90-93.
108 Michael Webb, "Architecture: Cesar Pelli," *Architectural Digest* 47 (July 1990), 124-129, 178.
109 www.cesar_pelli.com/textOnly/projects

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http://www.cesar-pelli.com

MATERIALS FROM CESAR PELLI & ASSOCIATES ARCHITECTS

Photographs of:
Original plans
Original models
Original renderings

Correspondence

Materials from COMSAT Laboratories Building Management Company, Emcor Facilities Services

Original construction photographs taken by Stewart Bros. For Bateson Construction Company, circa 1969

10. Geographical Data

Acreage of Property 150 acres

UTM References
(Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing		Zone	Easting	Northing
1				3			
2				4			

☐ See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet)

11. Form Prepared By

name/title Isabelle Gournay, Ph.D., Associate Professor, School of Architecture, Affiliated Faculty, Historic Preservation Program, University of Maryland and Mary Corbin Sies, Ph.D., Associate Professor, Department of American Studies,Affiliated Faculty, Historic Preservation Program, University of Maryland.

Organization University of Maryland, School of Architecture, Preservation & Planning date 1-31-05

street & number School of Architecture, University of Maryland telephone 301-405-6384

city or town College Park state MD zip code 20742

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location.

A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional Items
(Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of SHPO or FPO)

name LCOR Incorporated

street & number 6550 Rockville Spring Drive, Suite 280 telephone 301-897-0002

city or town Bethesda state Maryland zip code 20817

Verbal Boundary Description and Boundary Justification:

See attached GIS map as description. It shows the associated tax parcel of the property, with its legal boundaries.

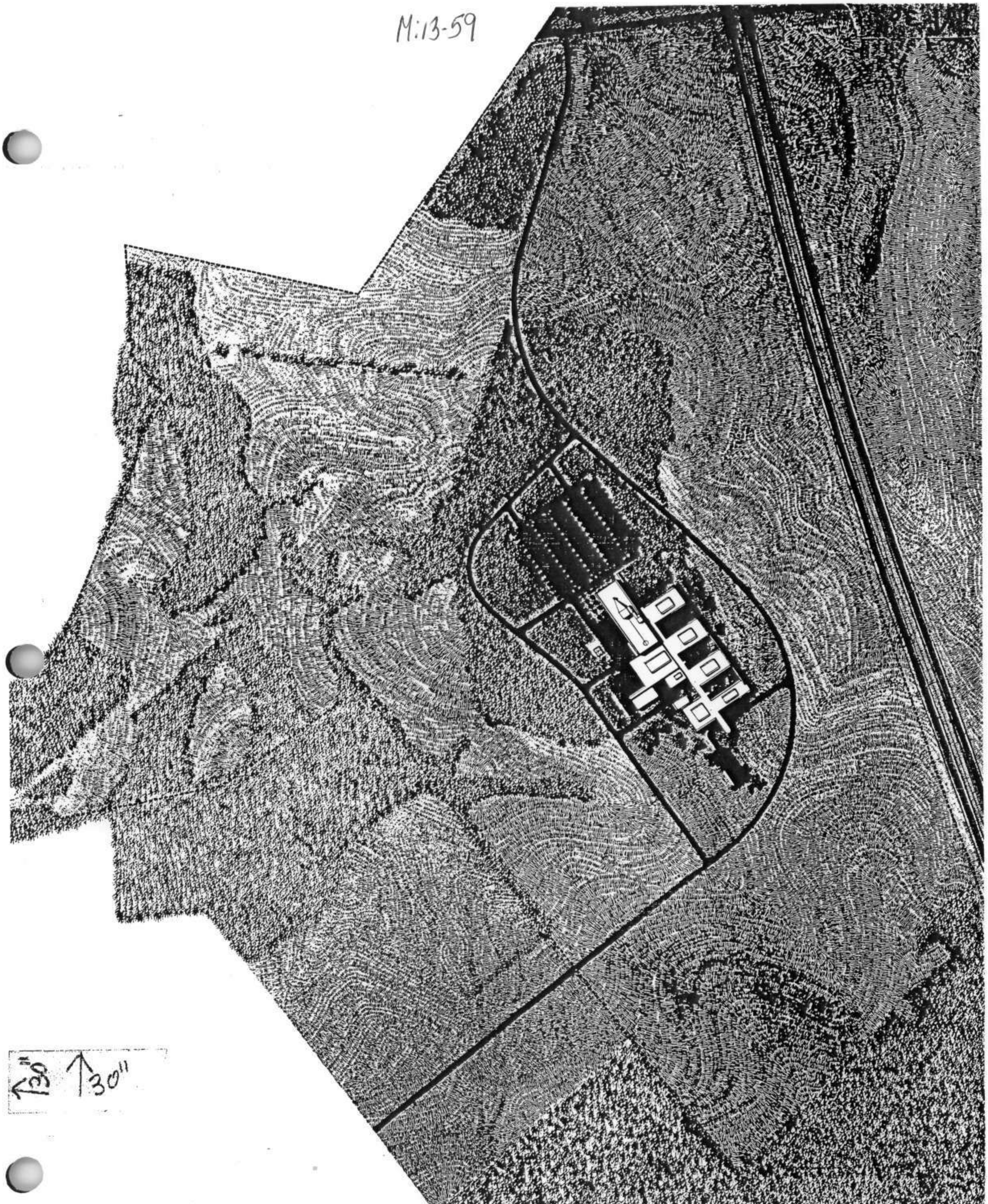
M:13-59

COMSAT Laboratories, 22300 Comsat Drive, Clarksburg

M:
MIHP ~~MC~~-13-59

Plate 1
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Map
Source: M-NCPPC

M:13-59

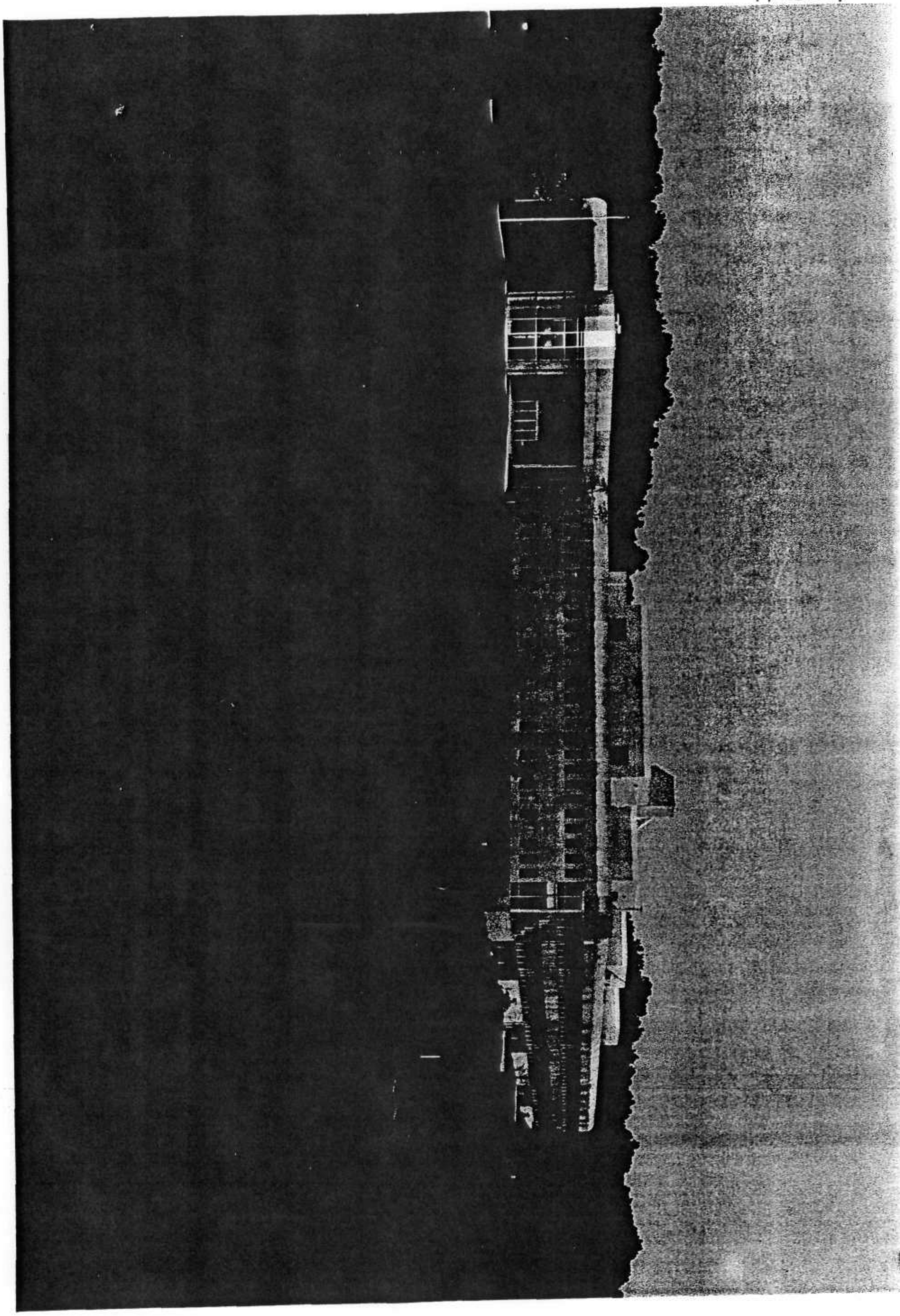


↑30" ↑30"

MIHP ~~MC~~ M:-13-59

Plate 2
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Site plan (Cesar Pelli for DMJM architect), prepared 1967
Source: Cesar Pelli & Associates Architects

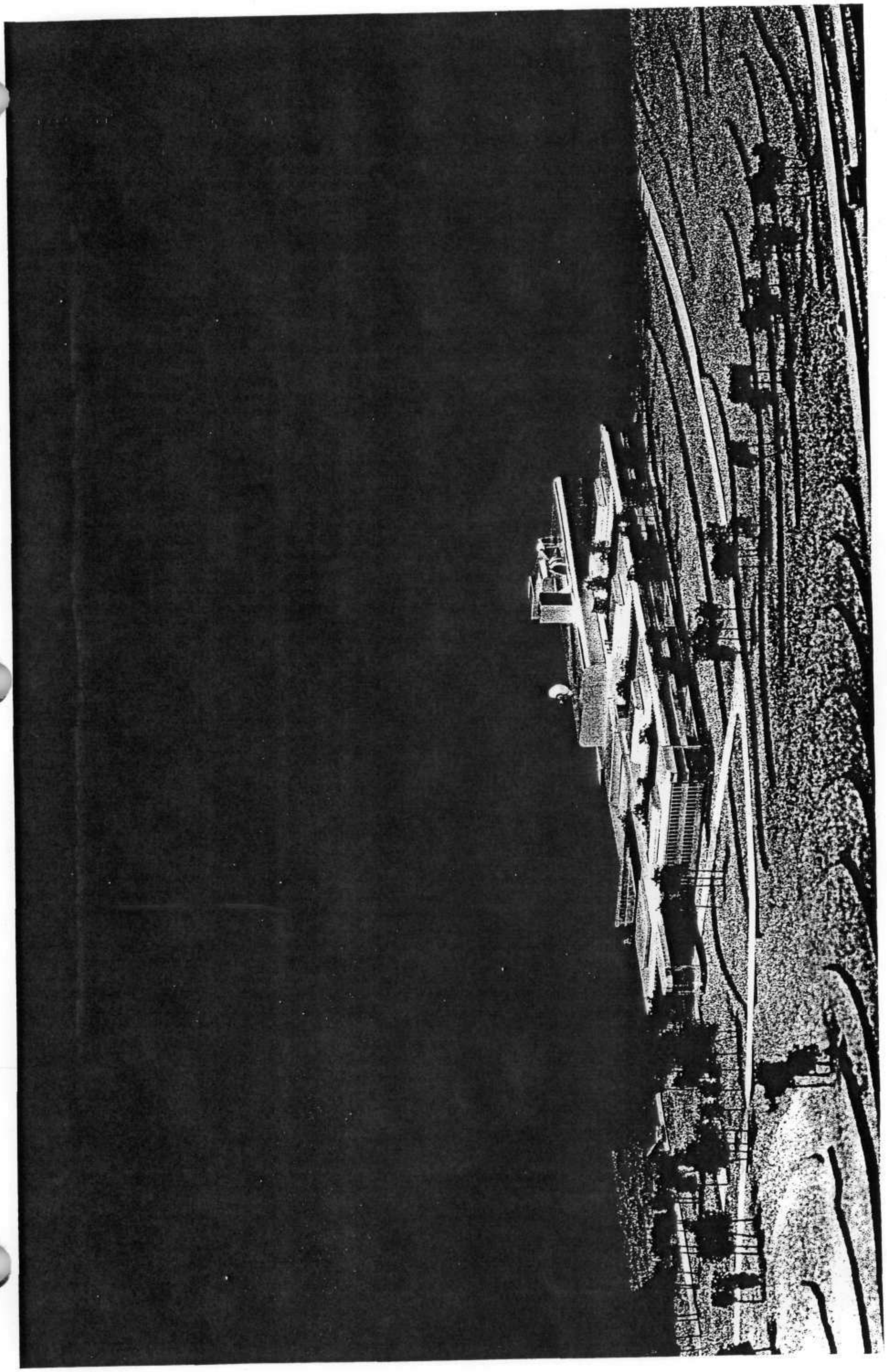
M:13-59



M:
MIHP ~~MC~~-13-59

Plate 3
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Western facade from I-270, taken c.1970
Source: Cesar Pelli & Associates Architects

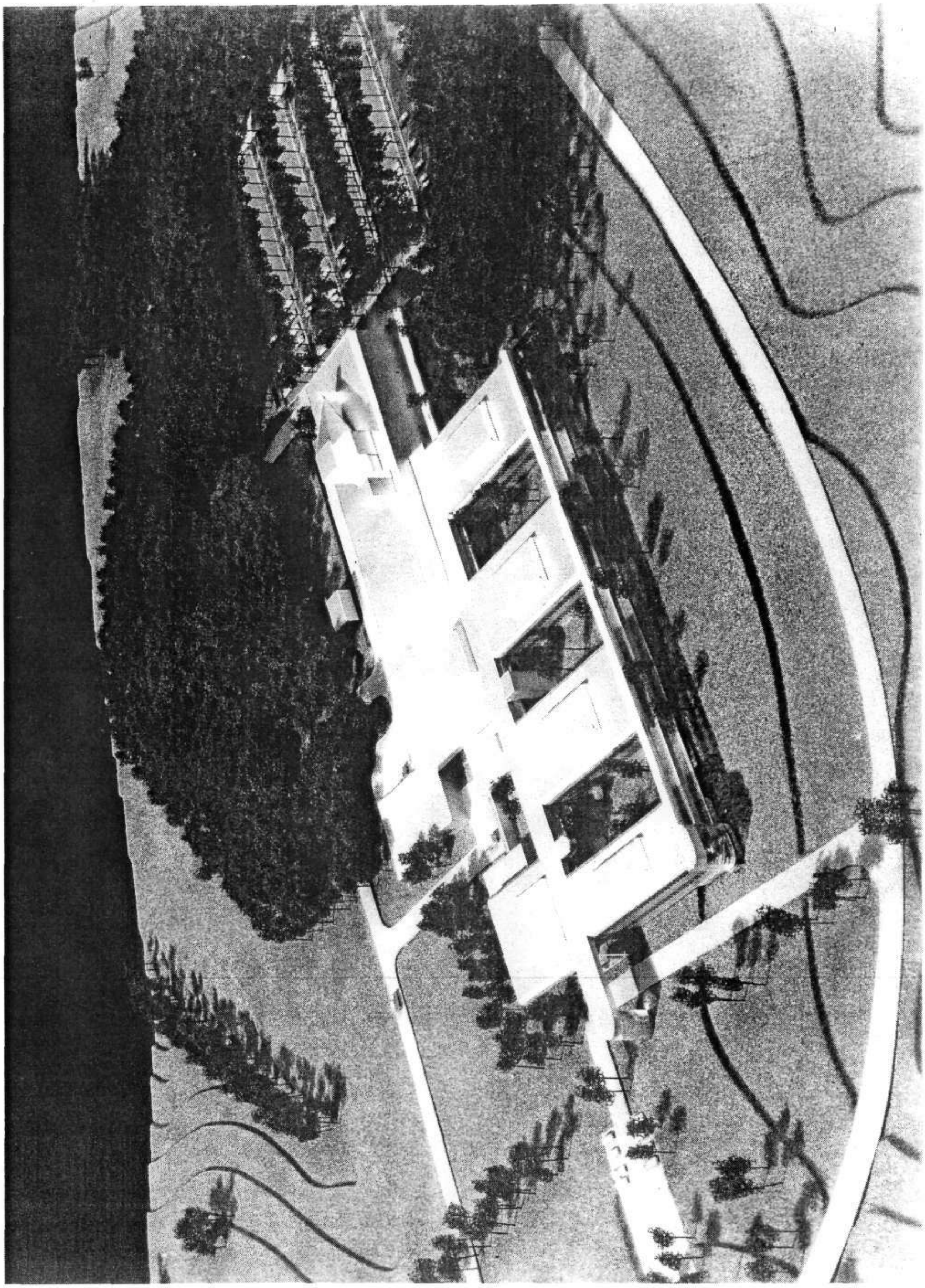
M:13-59



M:
MIHP ~~MC~~-13-59

Plate 4
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Photograph of model showing topography, taken 1967
Source: Cesar Pelli & Associates Architects

M:13-59



MIHP ~~MC~~ Mi-13-59

Plate 5
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Photograph of model, taken 1967
Source: Cesar Pelli & Associates Architects

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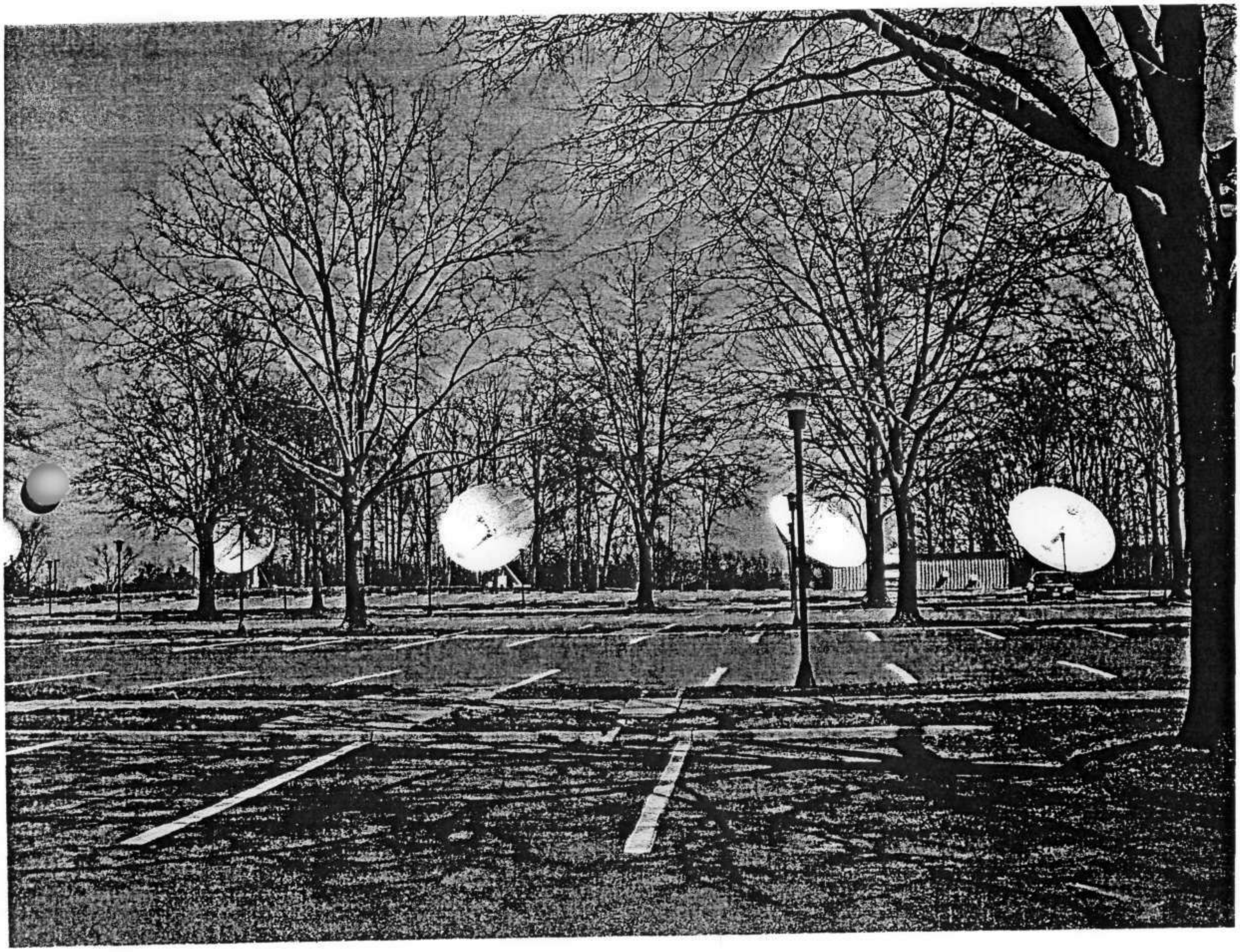
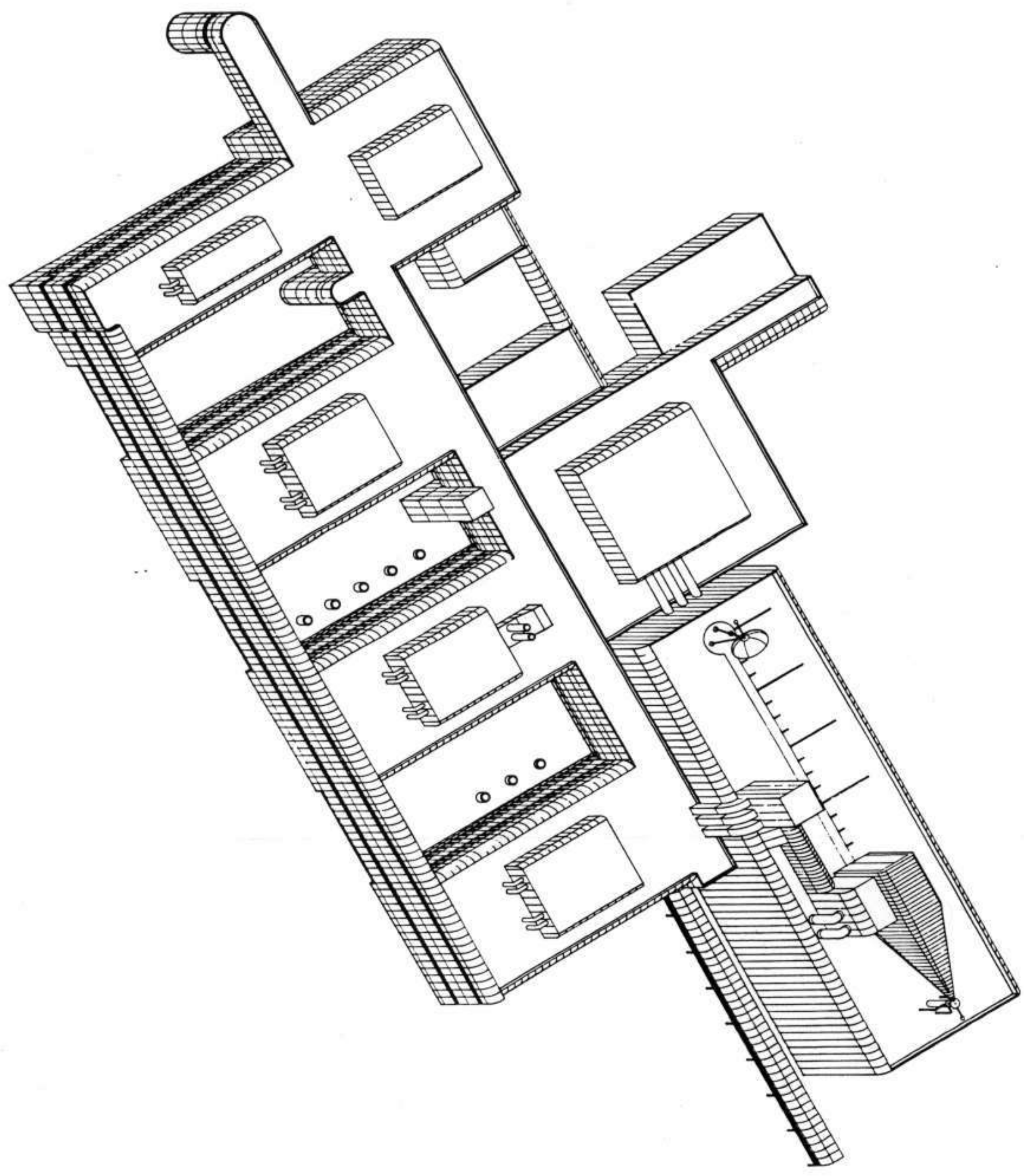


MIHP ~~MC~~ M:-13-59

Plate 6
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Satellites behind the east side of the parking lot, photograph taken 2002
Source: Mary Corbin Sies

M:
MIHP ~~MC~~-13-59

Plate 7
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Axonometric View of exterior, delineated 1967
Source: Cesar Pelli & Associates Architects



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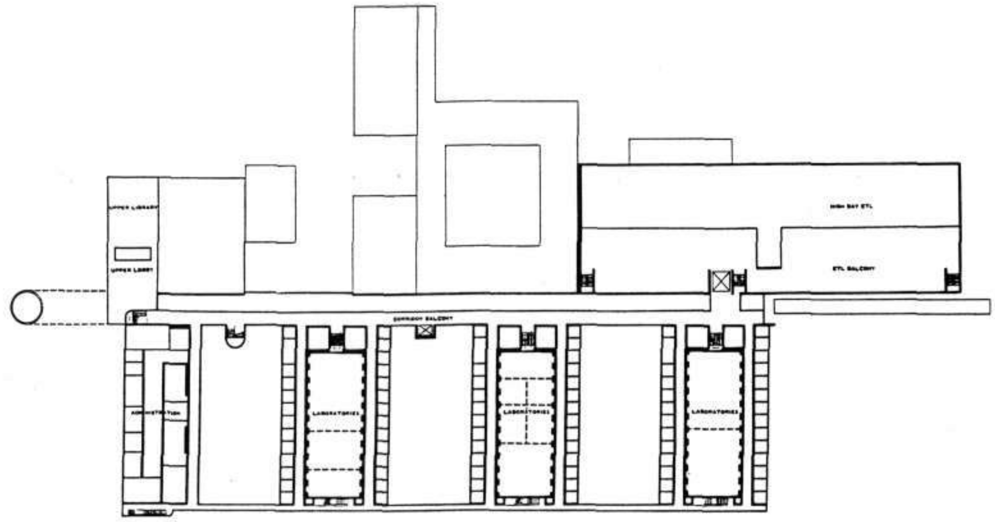
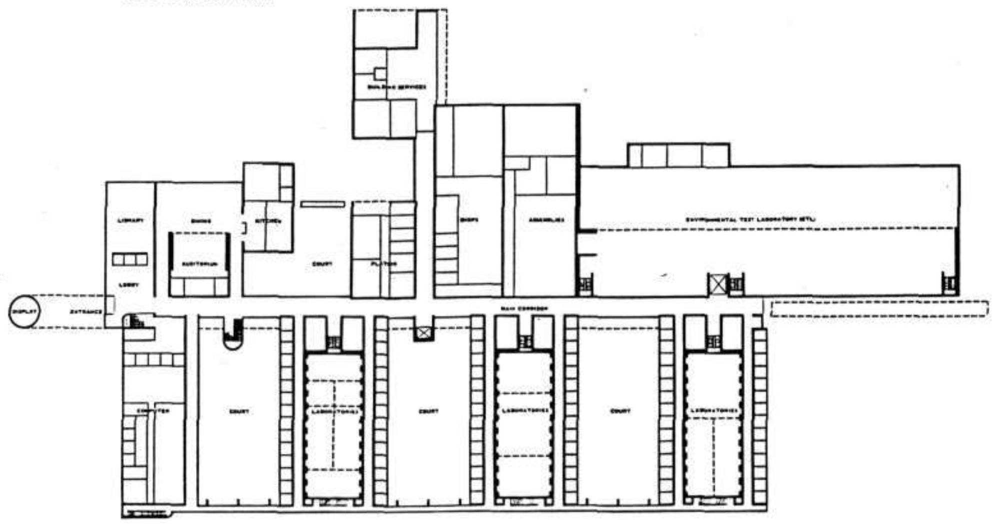
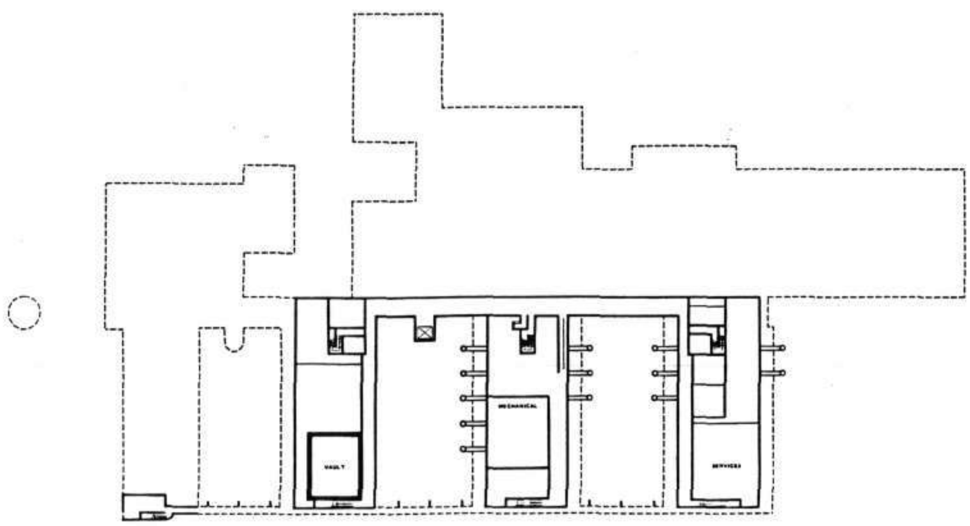


SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT PLAN

7

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Plate 8
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Floor plans, delineated 1967
Source: Cesar Pelli & Associates Architects

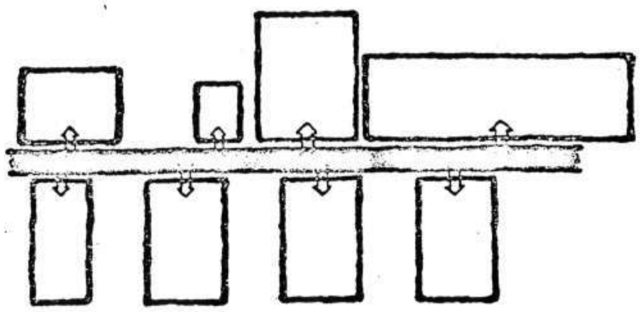
PLAN

The plan is generated by the circulation.

Basic Circulation

There are spaces and there are circulation lines.

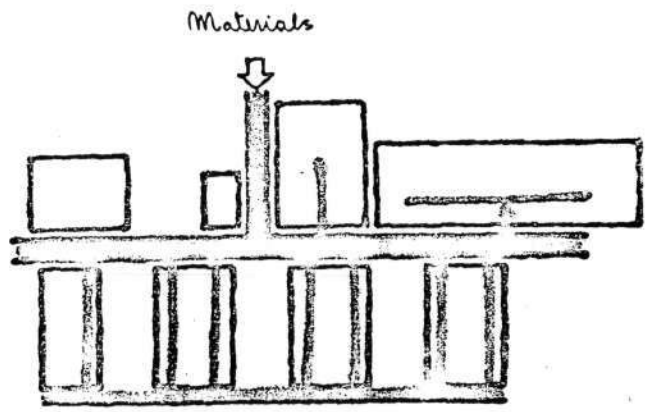
The complex is planned as an aggregate of spaces off a main circulation line.



Corridor and Spaces

Secondary circulation lines complete the network.

The circulation is for people and for materials.



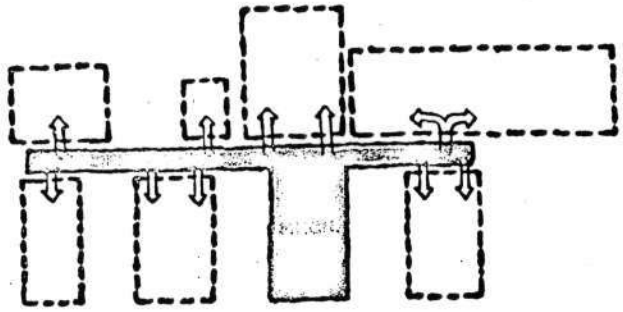
Other Circulation

8c

M:
MIHP ~~ME~~-13-59

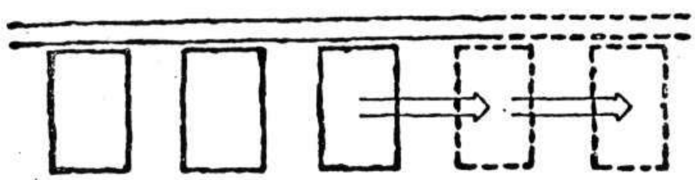
Plate 9a
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Diagrammatic plans, delineated 1967
Source: Cesar Pelli & Associates Architects

Mechanical services follow the same pattern and are therefore flexible, capable of growth and easy to service.



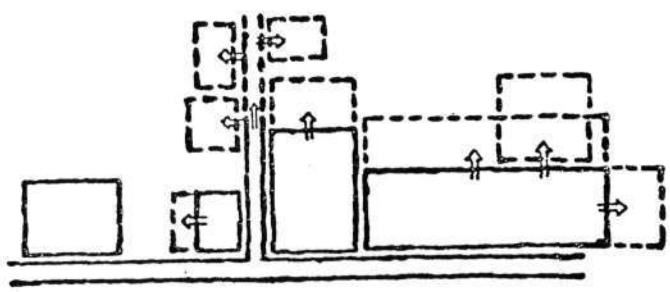
Service distribution

Some functions will expand in a predetermined order. Its needs are clear; growth can be anticipated.



Predetermined growth

Some functions will need expansion but the specific future needs cannot be foreseen. The plan is purposely not composed and it is therefore unfinished, open ended.



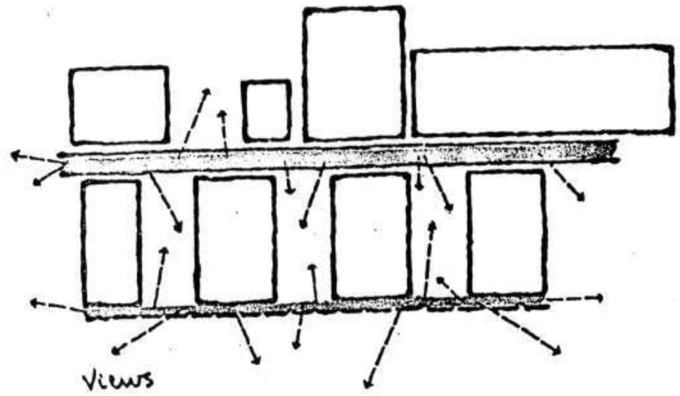
Undetermined growth

MIHP M-13-59

Plate 9b
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Diagrammatic plans, delineated 1967
Source: Cesar Pelli & Associates Architects

M:13-59

A complex is different from a building. In a complex, the corridor is the most important space. This is the common room, the meeting room, the room away from work. It should therefore have its own life in the plan. It should not be a leftover. It deserves the best views and the better materials.

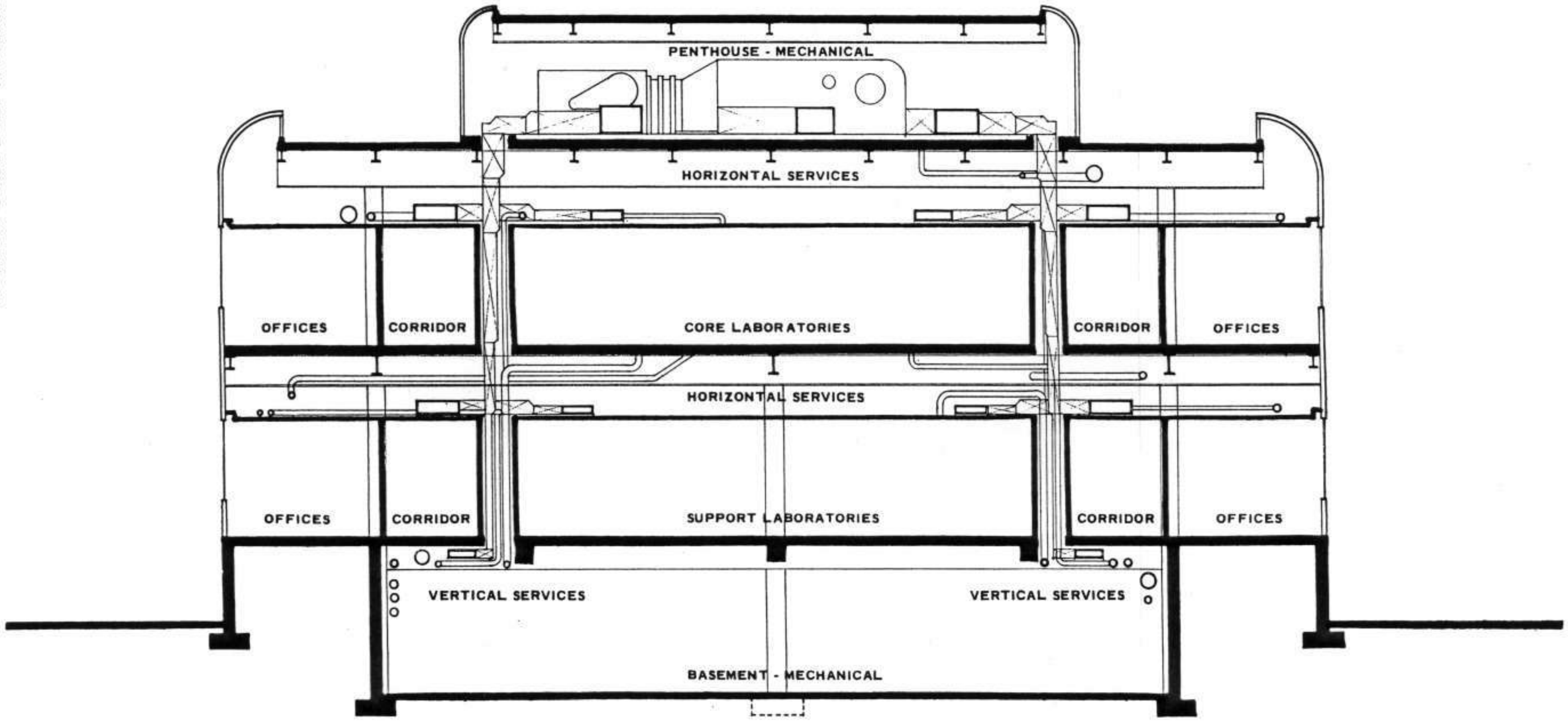


MIHP ~~MG~~ M: 13-59

Plate 9c
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Diagrammatic plan showing "views," delineated 1967
Source: Cesar Pelli & Associates Architects

MIHP M: ~~MC~~-13-59

Plate 10
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Transverse section across laboratory wing, delineated 1967
Source: Cesar Pelli & Associates Architects



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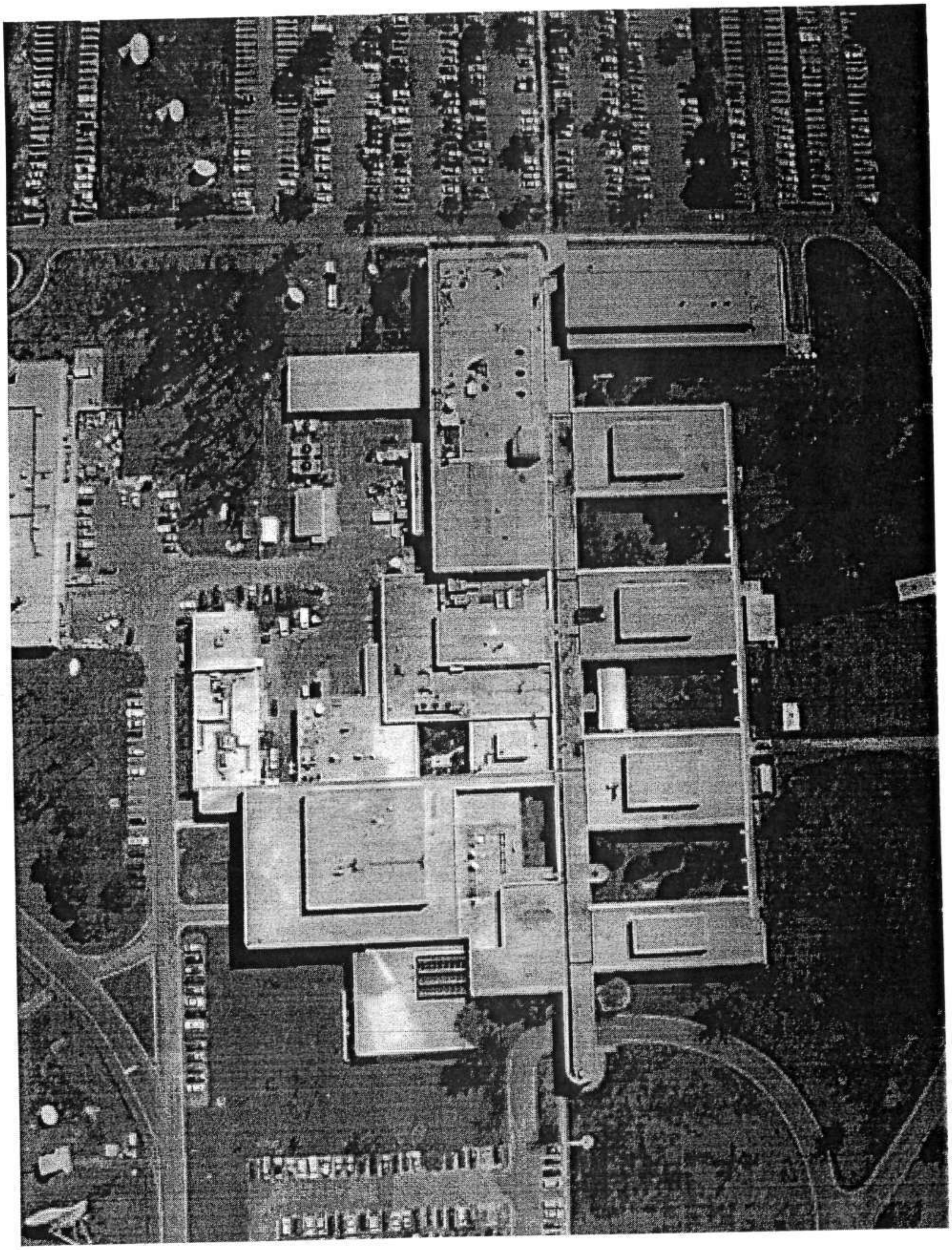
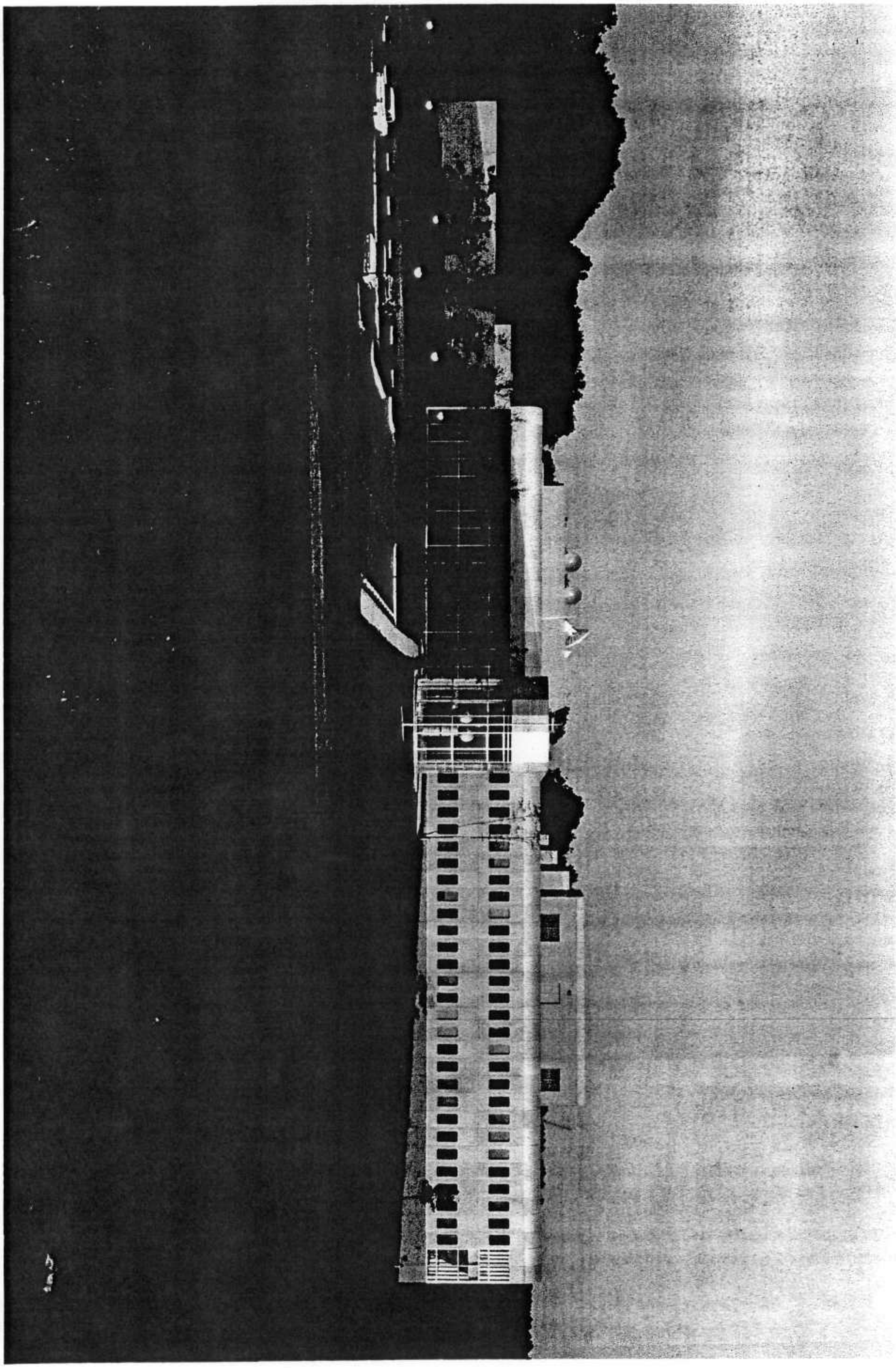


MIHP ~~MC~~ M:-13-59

Plate 11
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Aerial view showing additions to original structure,
photograph taken c. 2004
Source: www.COMSAT-Legacy.org

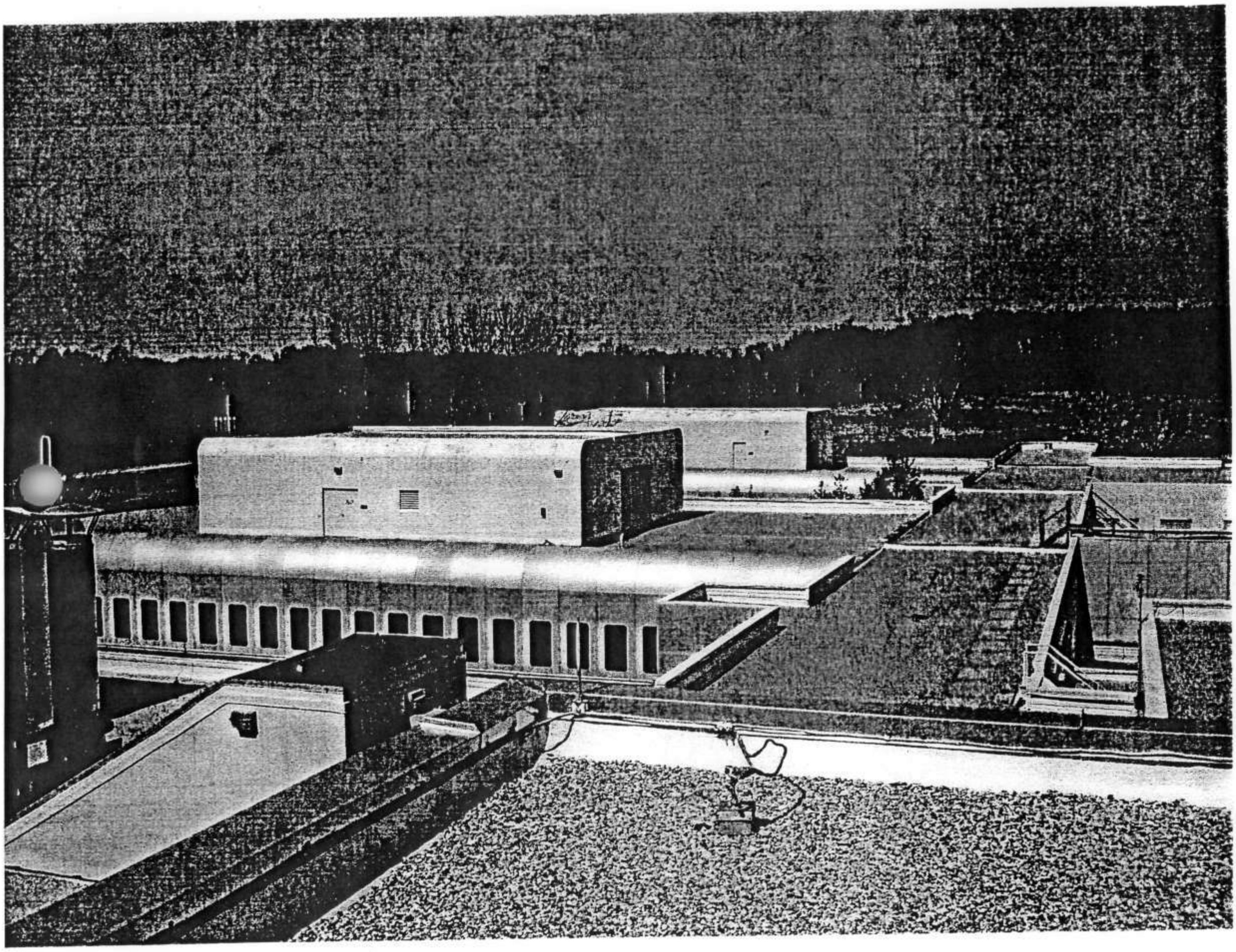
M:13-59



MIHP M~~C~~-13-59

Plate 12
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
North Facade, COMSAT Laboratories, photograph taken
2002
Source: Mary Corbin Sies

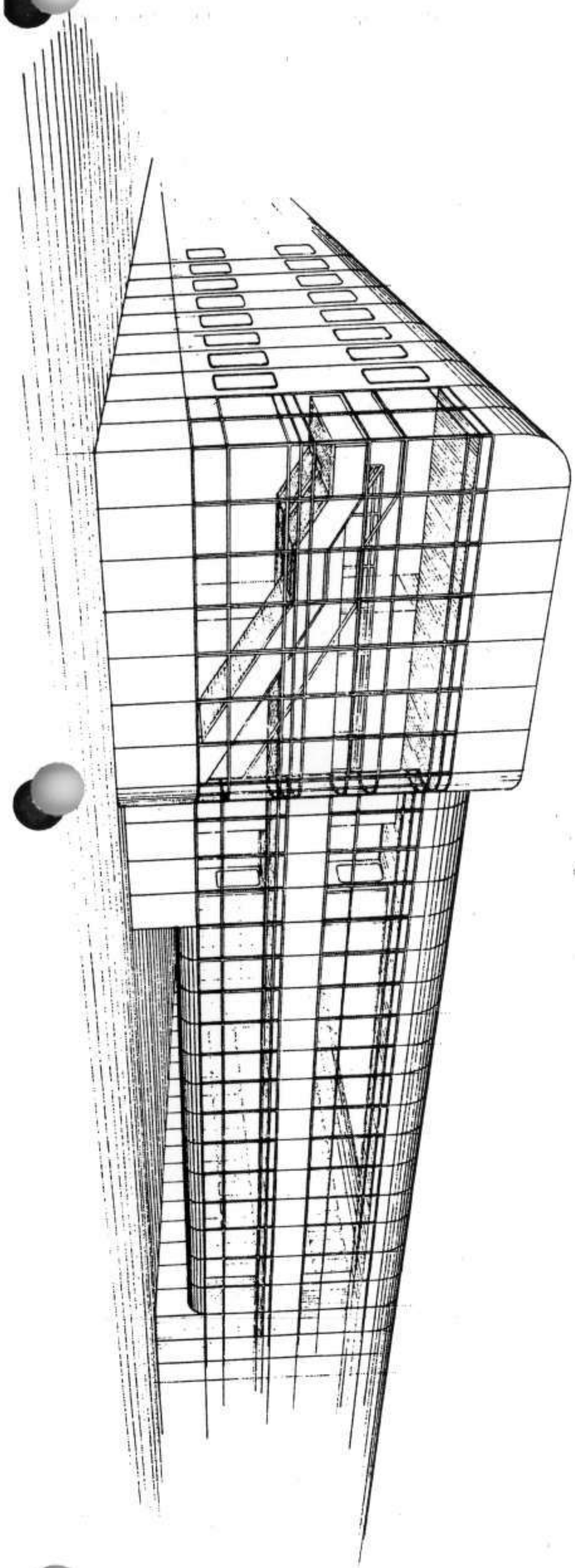
M: 15-39

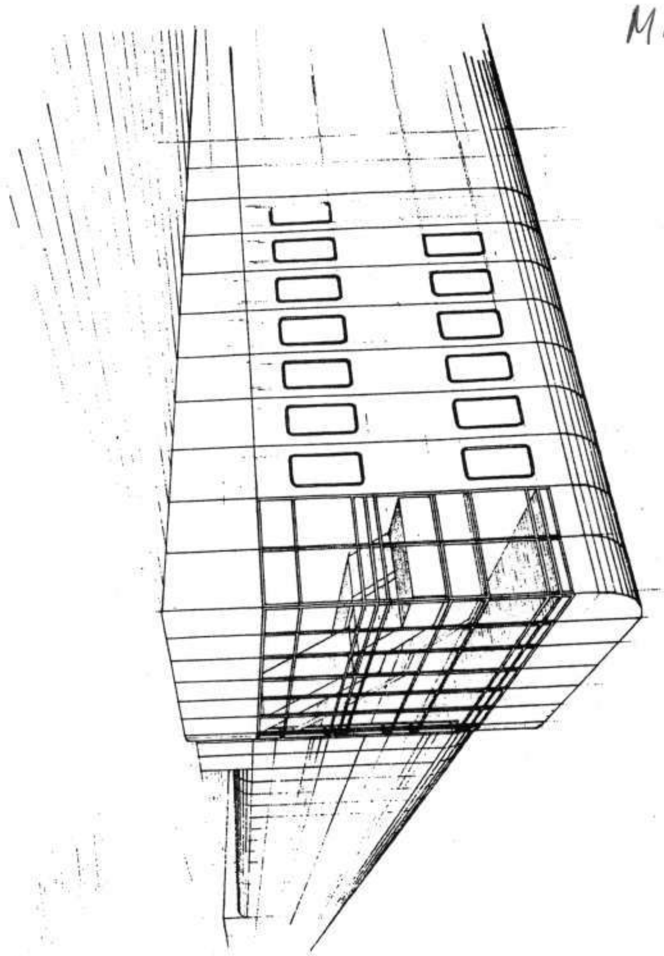


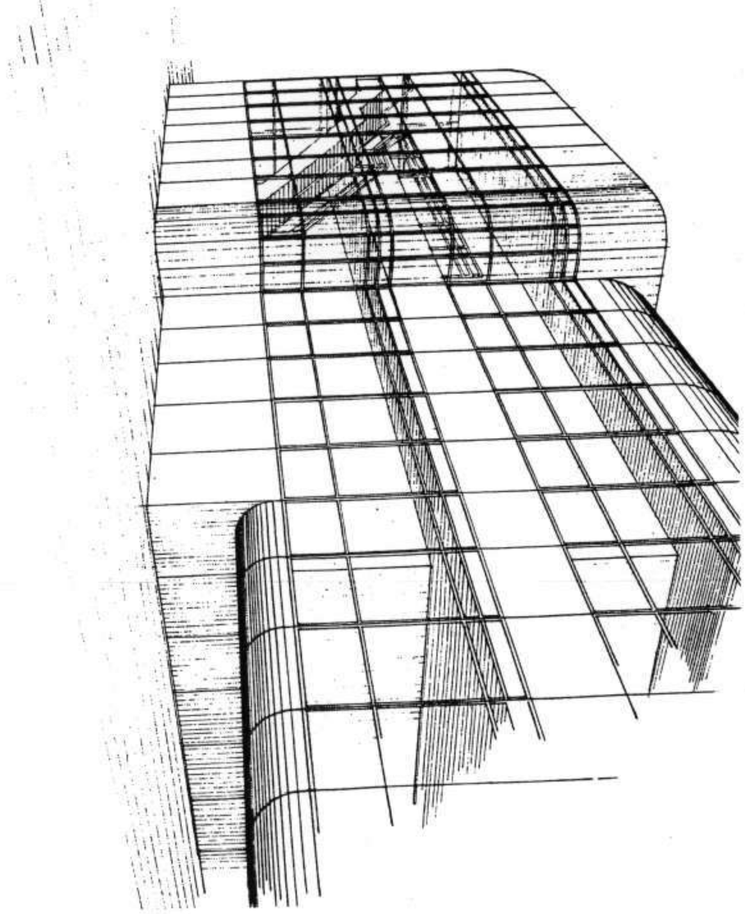
MIHP M: ~~MC~~-13-59

Plate 13
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Penthouses above laboratory wings
Source: Mary Corbin Sies

M:13-59







14

MIHP ~~MC~~ M:-13-59

Plate 14
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Facade studies for the office wing and the catwalk,
delineated 1967
Source: Cesar Pelli & Associates Architects

14

M:13-59

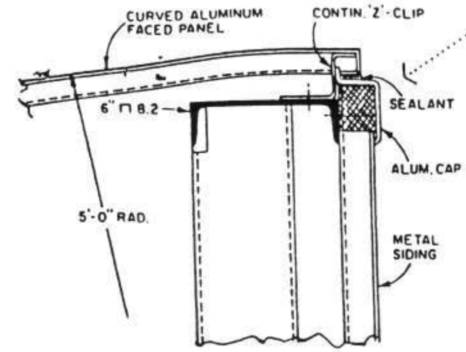
MIHP ~~MC~~ M:-13-59

Plate 15
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Interior glass staircase projecting into the courtyard from the spine between the administrative wing and the first office wing.
Source: Mary Corbin Sies

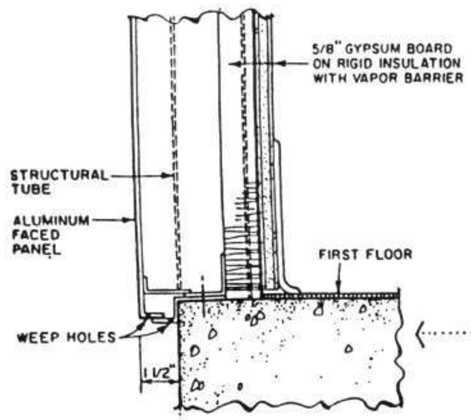
M:13-59

MIHP M:~~MC~~-13-59

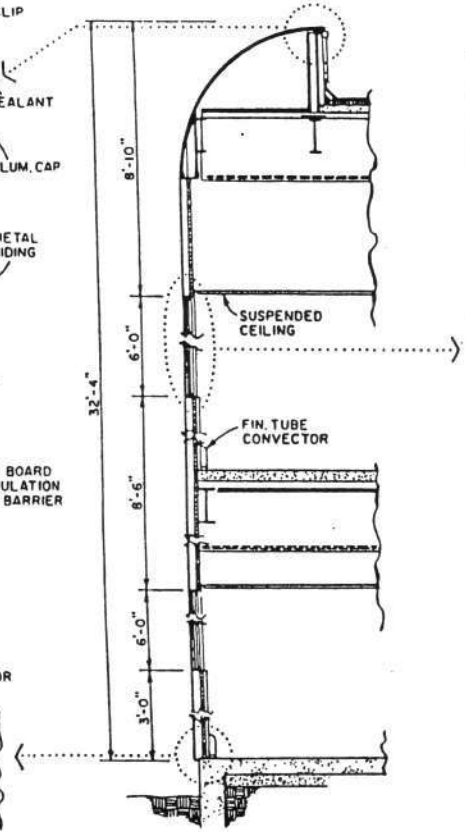
Plate 16
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
View from the central spine through the landscape to the catwalk, 2002.
Source: Mary Corbin Sies



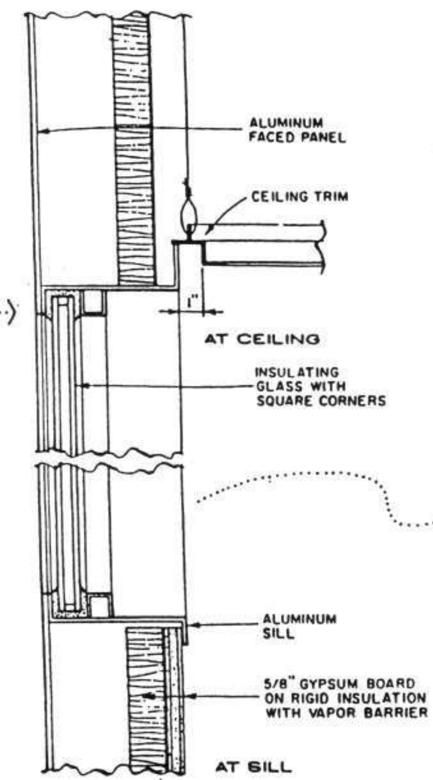
TYPICAL PARAPET DETAIL



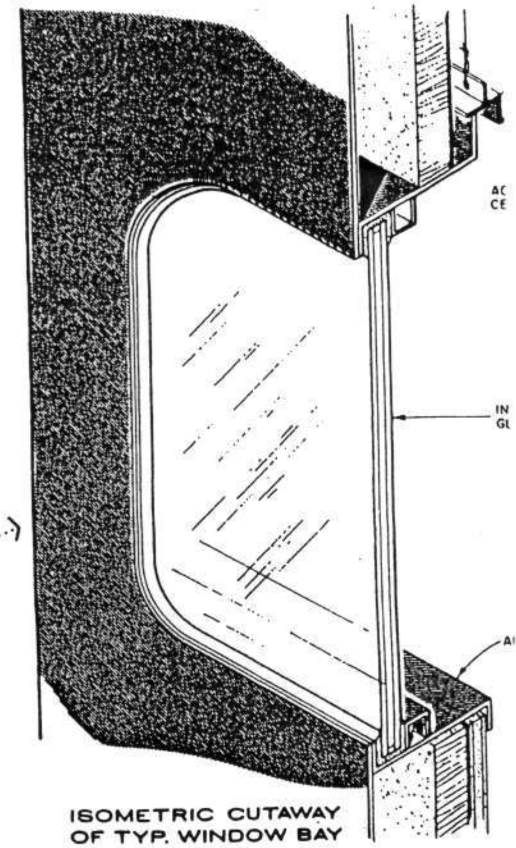
TYPICAL BASE DETAIL



VERTICAL SECTION AT ·A·



VERTICAL DETAILS


ISOMETRIC CUTAWAY OF TYP. WINDOW BAY

M: 13-59

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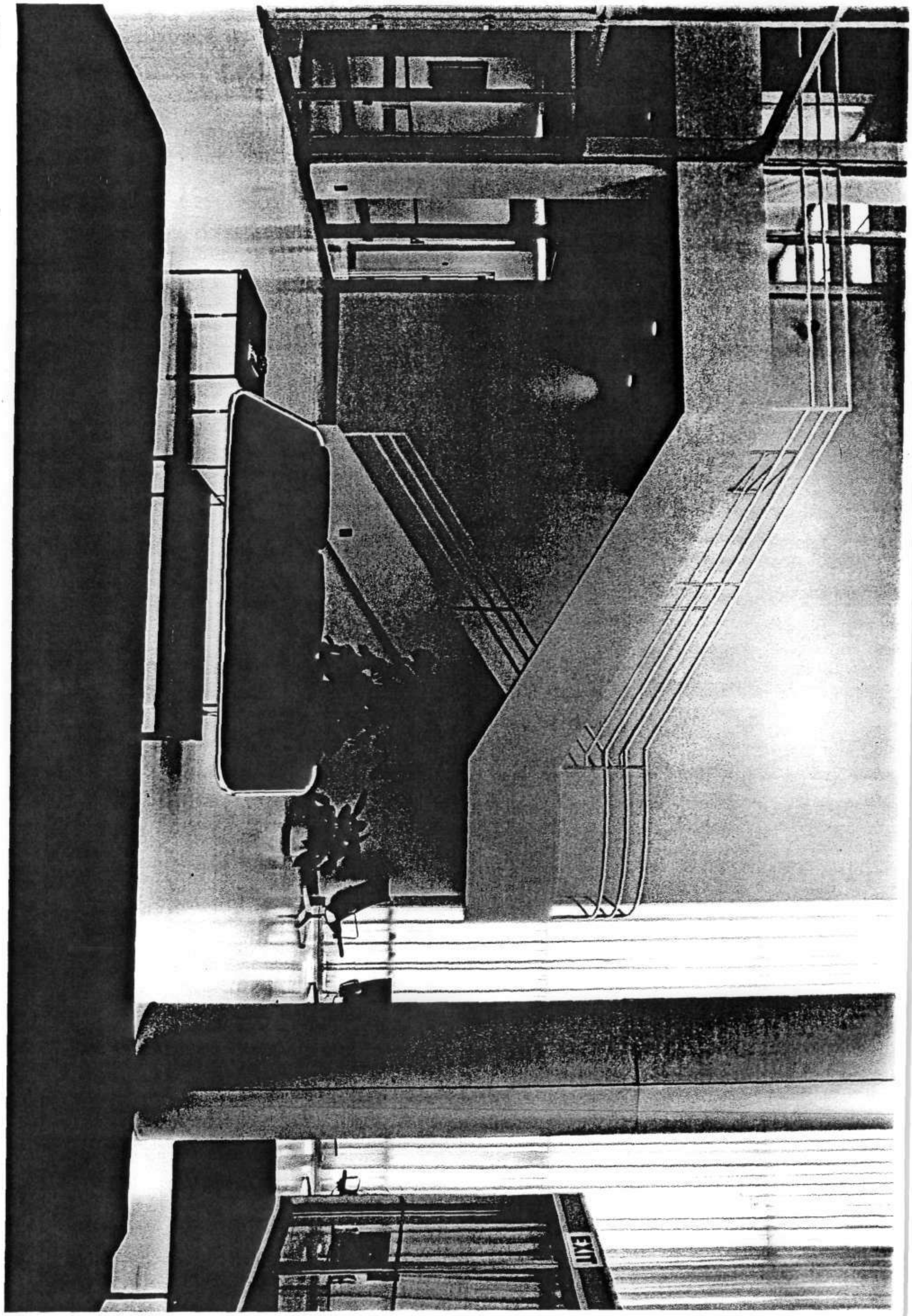
MIHP ~~MC~~-13-59

Plate 17
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Construction details for parapet, base, and wall section,
delineated 1967-68
Source: Cesar Pelli & Associates Architects

M:13-59



18

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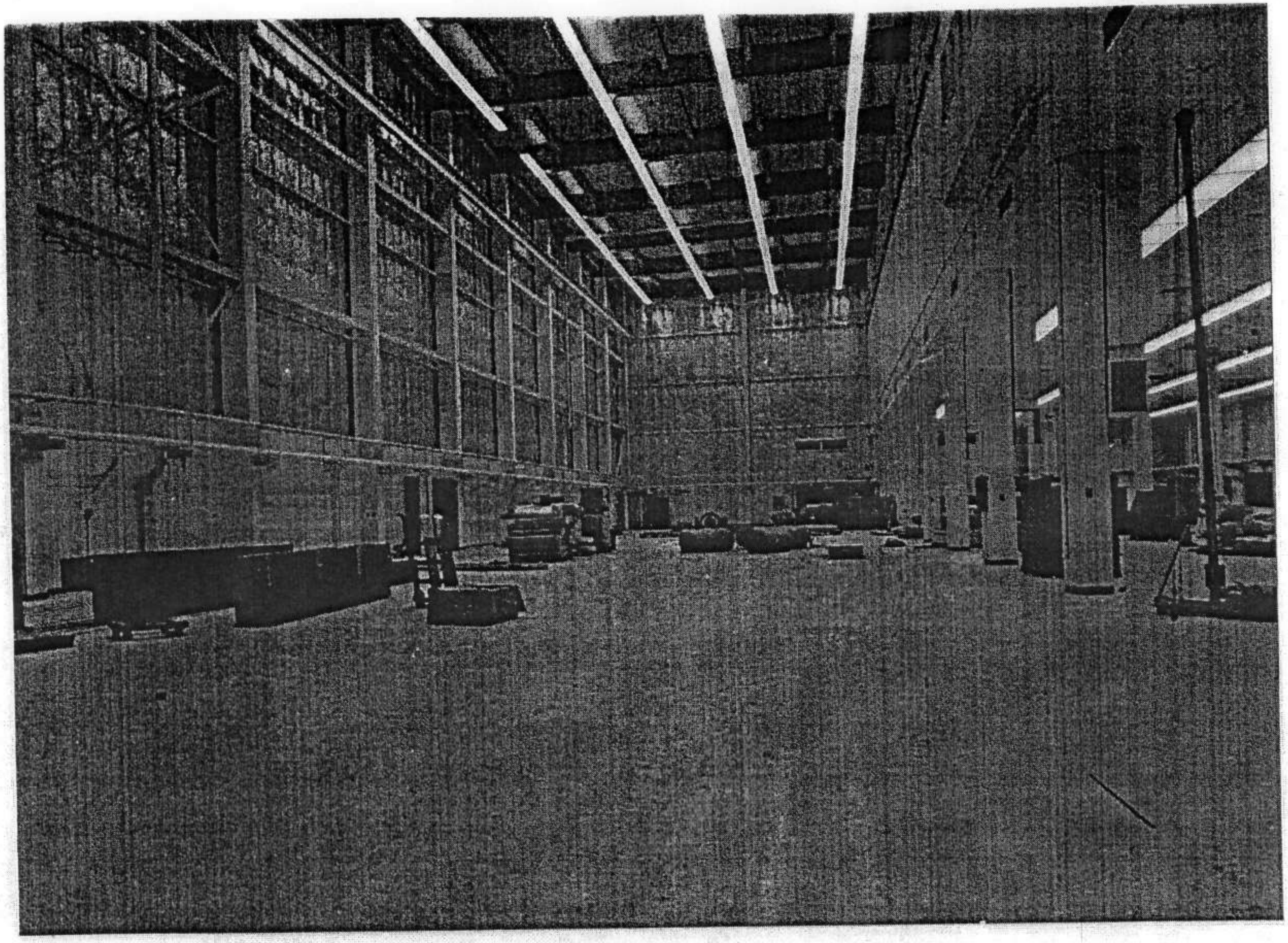
Plate 18
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Photograph of lobby, taken c.1970
Source: Cesar Pelli & Associates Architects

M:13-59

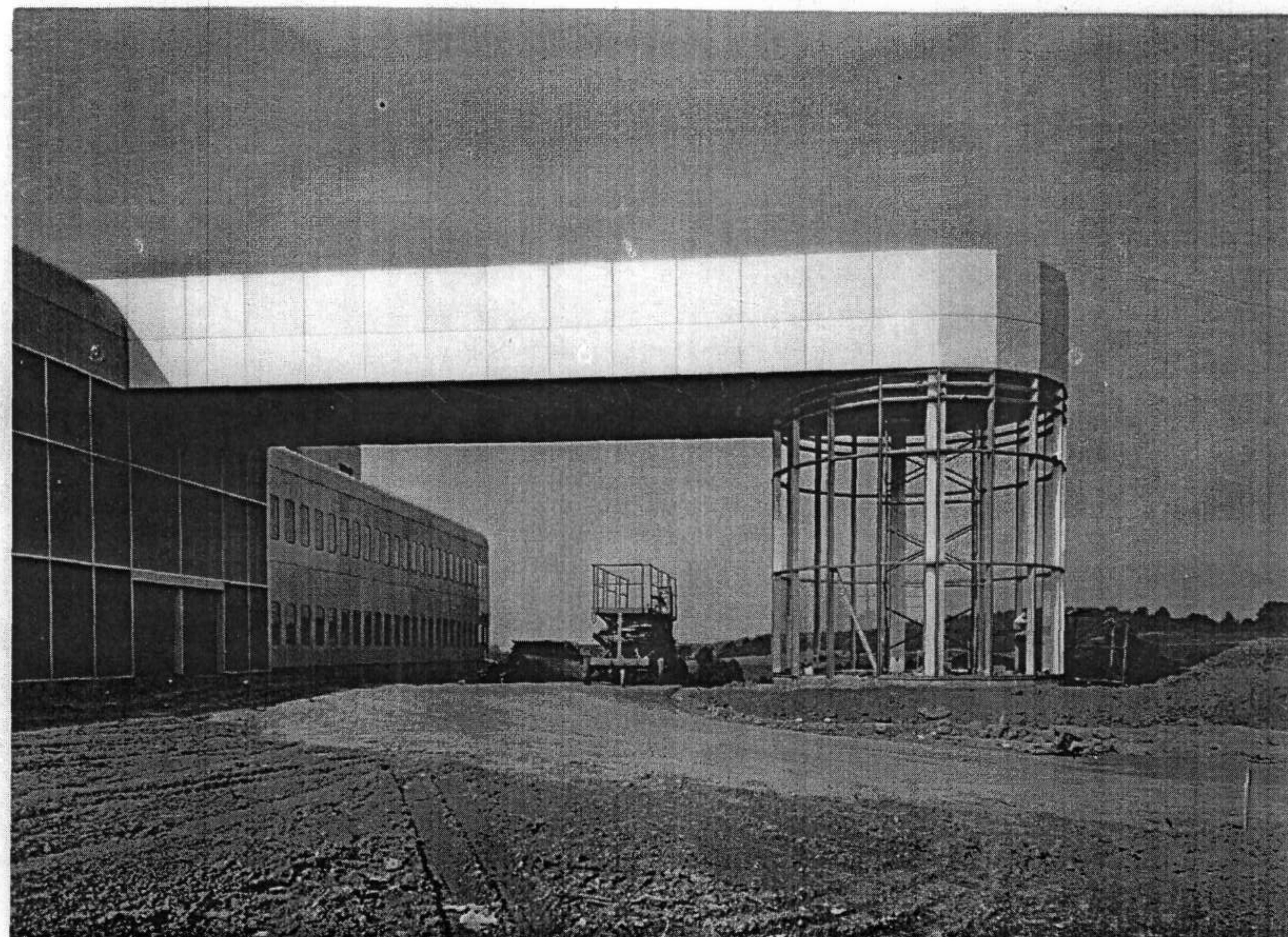


COMSAT LABORATORIES
CLARKSBURG, MARYLAND
J. W. BATESON COMPANY, INC., CONTRACTOR
HIGH BAY AREA LOOKING SOUTH
OCTOBER 3, 1969

NO. 139

M:
MIHP ~~MC~~-13-59

Plate 19
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Photograph of the Environmental Test Laboratory upon completion, taken October 3, 1969
Source: John Gerace, Emcor Facilities Services and Mike Smith, LCOR Incorporated



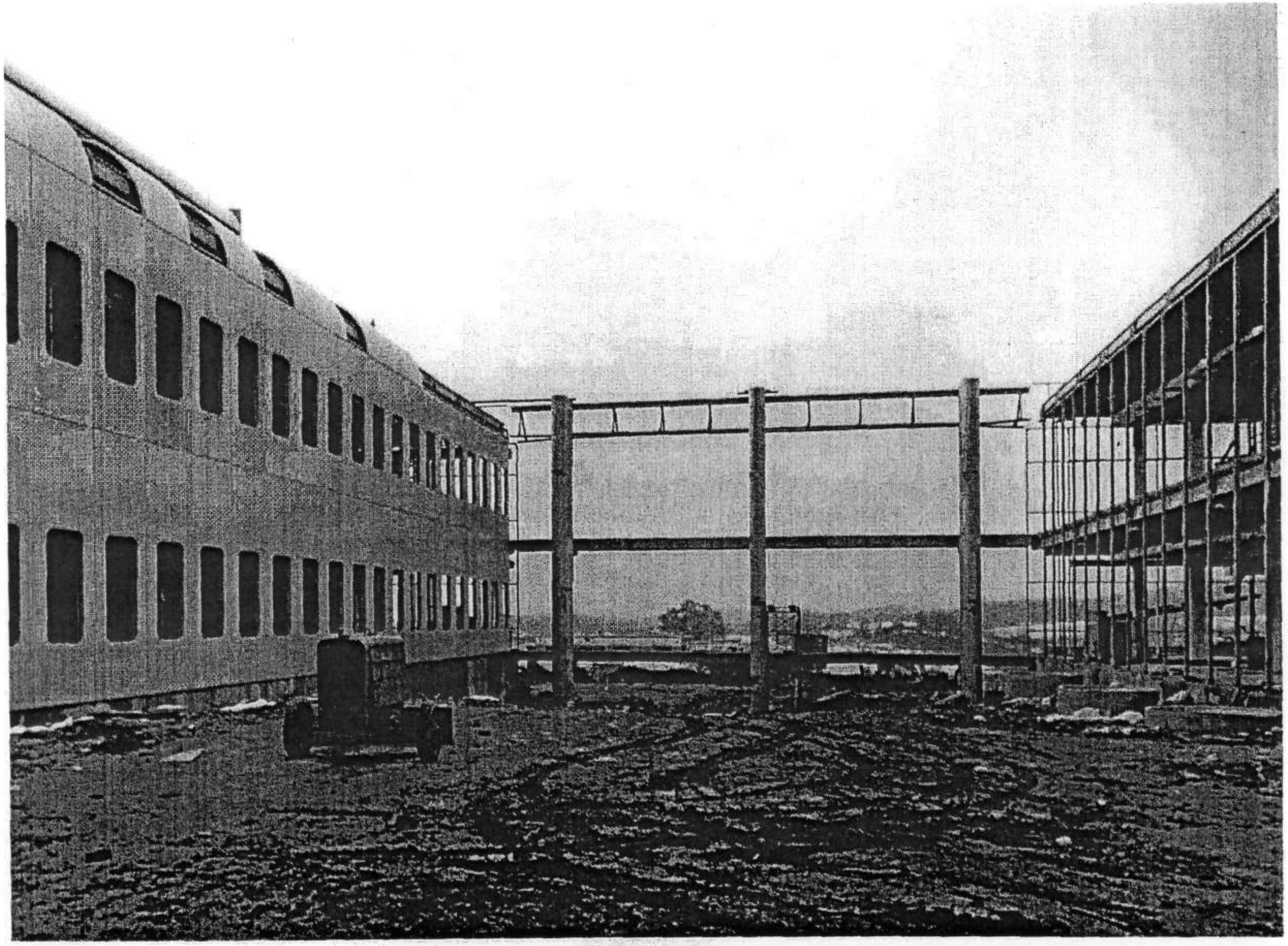
COMSAT LABORATORIES
CLARKSBURG, MARYLAND
J. W. BATESON COMPANY, INC., CONTRACTOR
DISPLAY AREA
JULY 3, 1969

NO. 117

M:13-59

M:
MIHP MC-13-59

Plate 20
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Construction photograph of the exhibition pavilion and
northern facade, taken July 3, 1969
Source: John Gerace, Emcor Facilities Services and
Mike Smith, LCOR Incorporated



COMSAT LABORATORY
CLARKSBURG, MARYLAND
J. W. BATESON COMPANY, INC., CONTRACTOR
COURT BETWEEN WINGS 2 AND 3 LOOKING WEST
NOVEMBER 15, 1968

NO. 63

M:13-59

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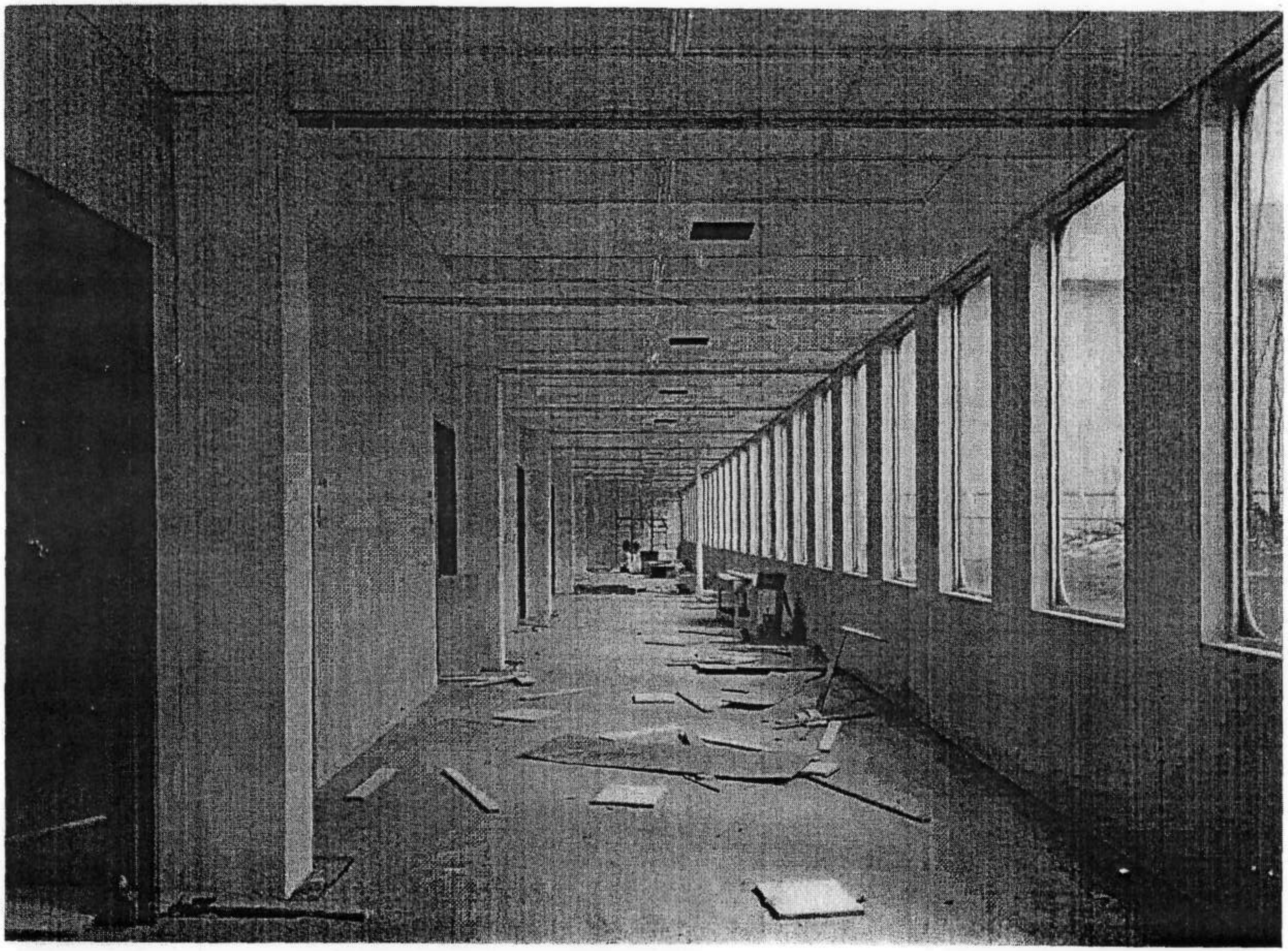
MIHP ~~MC~~-13-59

Plate 21
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Construction photograph of the catwalk and wings, taken
November 15, 1968.
Source: John Gerace, Emcor Facilities Services and Mike
Smith, LCOR Incorporated

M:13-59



COMSAT LABORATORIES
CLARKSBURG, MARYLAND
J. W. BATESON COMPANY, INC., CONTRACTOR
WING 3, 1ST FLOOR
FEBRUARY 27, 1969

NO. 86

M:
MIHP ~~ME~~-13-59

Plate 22
COMSAT Laboratories, 22300 COMSAT Drive,
Clarksburg, Montgomery County
Construction photograph of office spaces, taken
February 27, 1969.
Source: John Gerace, Emcor Facilities Services and
Mike Smith, LCOR Incorporated

M:13-59

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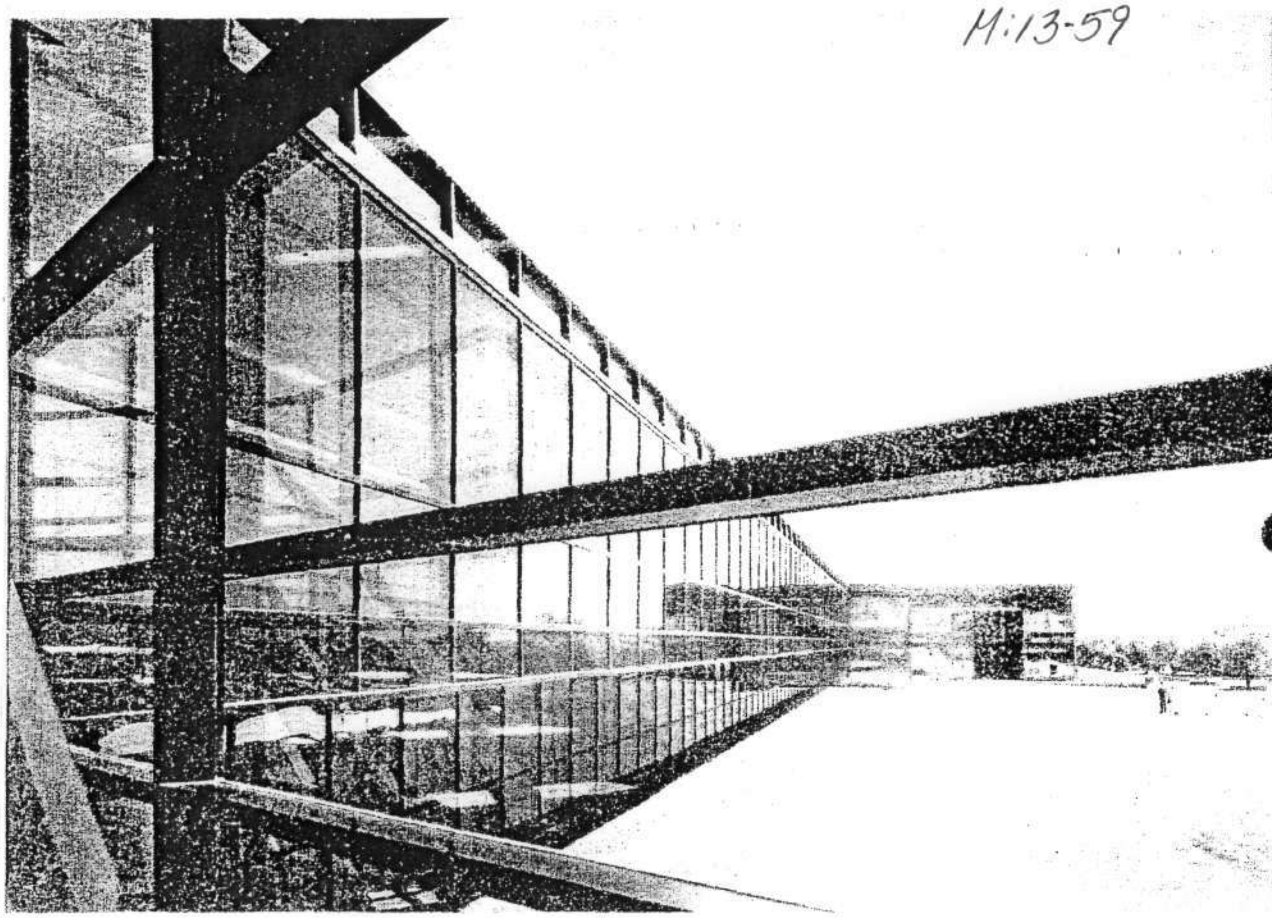
MIHP ~~MC~~-13-59

Plate 23
President Kennedy signing the Communications Satellite Act in August 1962 that established COMSAT.
Source: www.COMSAT-legacy.org

M:13-59



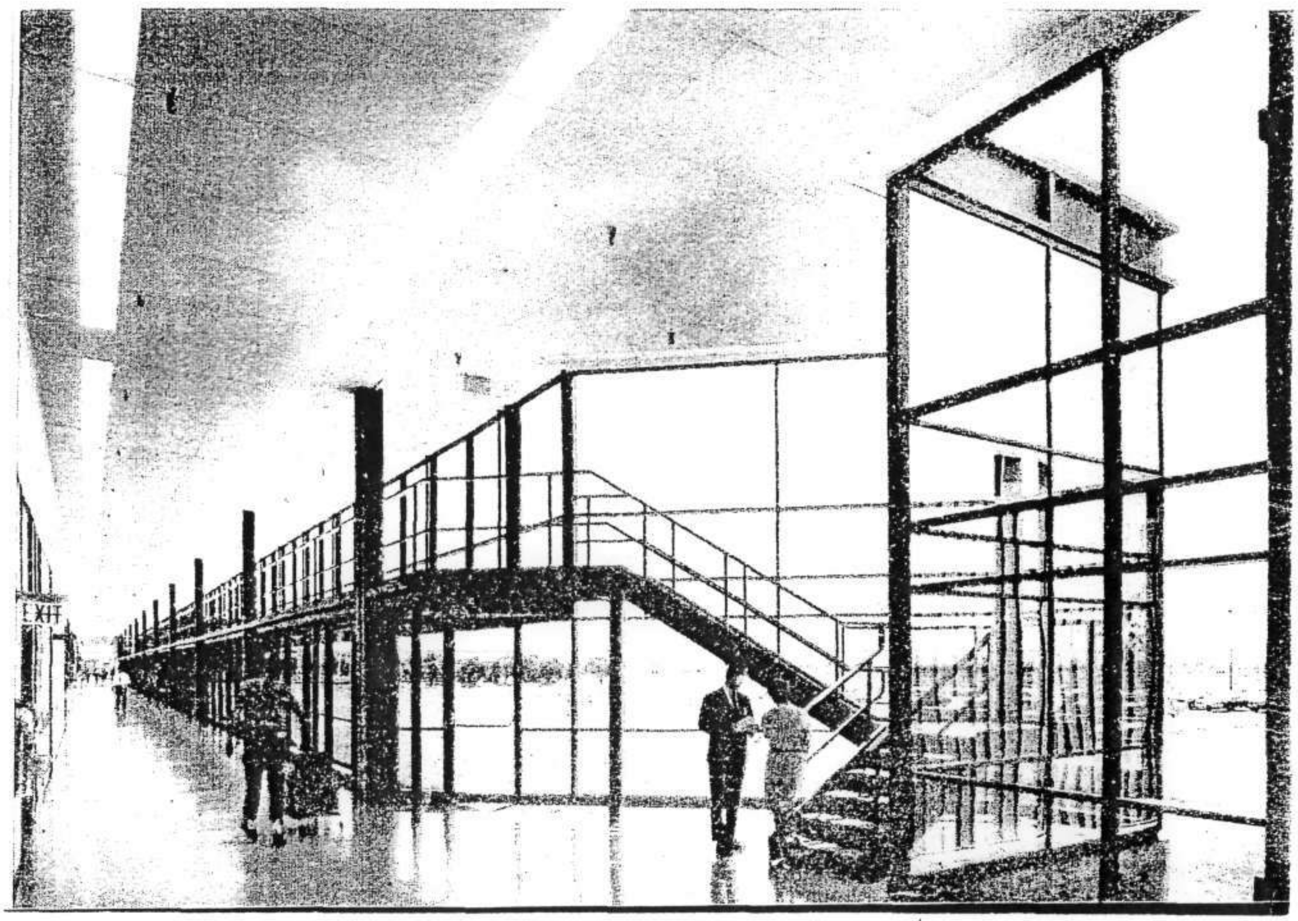


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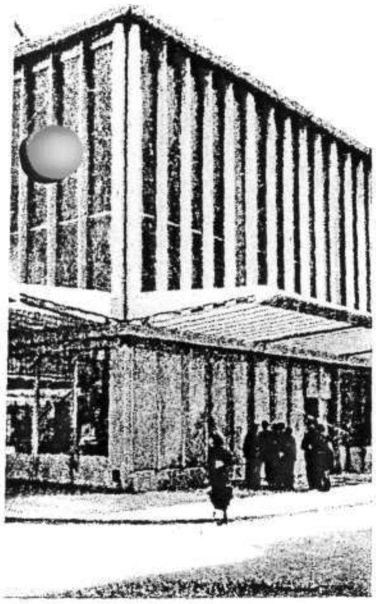
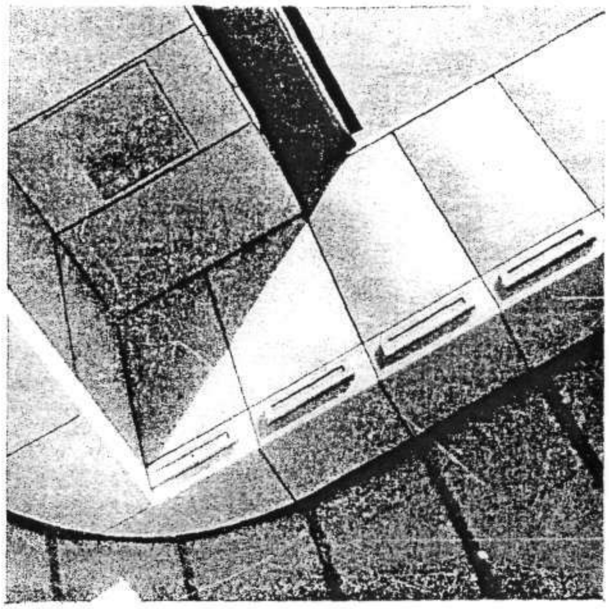
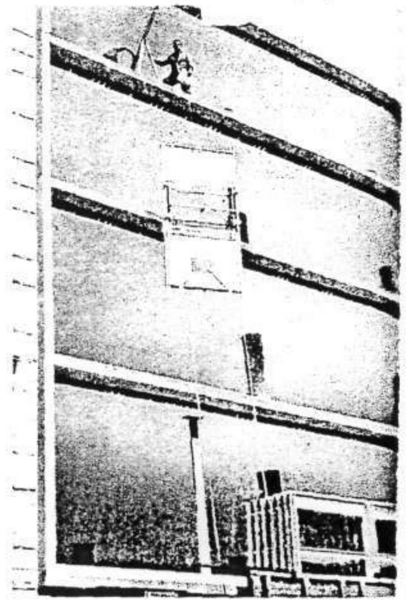
Plate 24
Cesar Pelli for DMJM, Teledyne Laboratories,
Northridge, California, completed 1967
Source: *Architectural Forum,* July-August 1968.







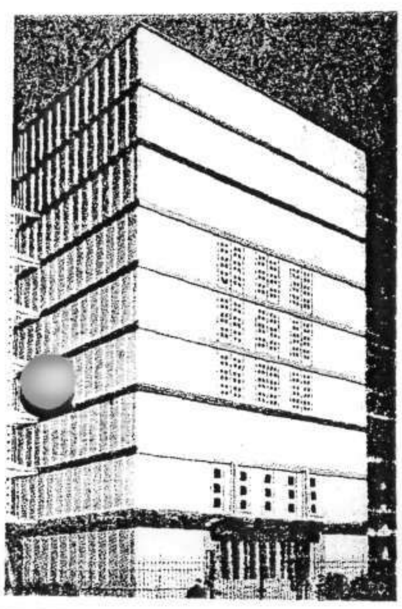
25

ÉLÉMENTS DE FAÇADE EN ALUMINIUM ÉTUDIÉS ET RÉALISÉS PAR LES ATELIERS JEAN PROUVÉ

1	2	3	4
			5
6	7	8	9

1 et 2. 1937. Le marché couvert de Clichy utilisé comme marché, sal… et cinéma ; façade principale et détail intérieur montrant le toit ouv… Beaudouin et Marcel Lods, architectes. 3 et 4. 1951. Fédération du B… Lapérouse à Paris ; mise en place des éléments de façades préfabriqu… de la façade sur le jardin, Gravereaux et Lopez, architectes. 5. 1955 … d'habitation, square Mozart à Paris, Lionel Mirabaud, architecte. 6. … de la Foire de Lille, Paul Herbé et Maurice Gouthier, architectes. 7 … *Panneaux de revêtement vus de l'intérieur et de l'extérieur*, étudiés … semble d'habitation de Bron-Parilly, Grimal et Gagès, architectes, et … le groupe d'habitation de *Saint-Jean-de-Maurienne, Blanc, architect*… Préfecture de Nevers, M. Robert, Architecte.

Ces diverses études ont fait l'objet de publications dans nos précéden… Marché couvert de Clichy, n° 3-4, 1940, page 40. Fédération du Bâtim… décembre 1951, page 58, et n° 47, février 1953, page 73. Imme… *Mozart à Paris, ce numéro, page 80. Palais de la Foire de Lille*, n° 3… page XXIX, et n° 38, décembre 1951, page 53.



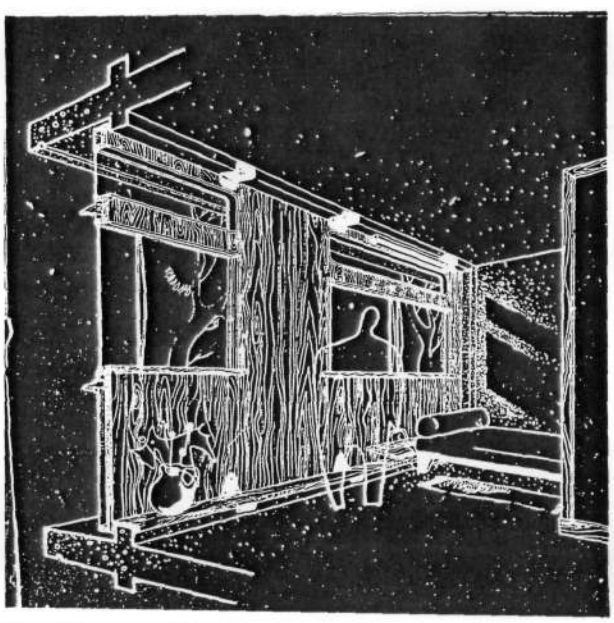


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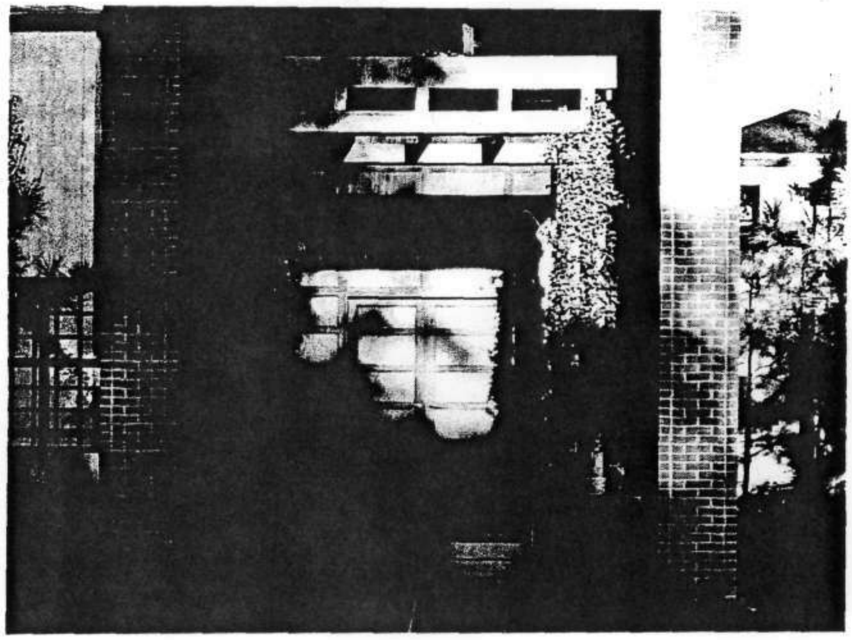
Plate 25
Examples of prefabricated aluminum panels devised by Jean Prouvé
Source: *L'Architecture d'Aujourd'hui*, February 1955

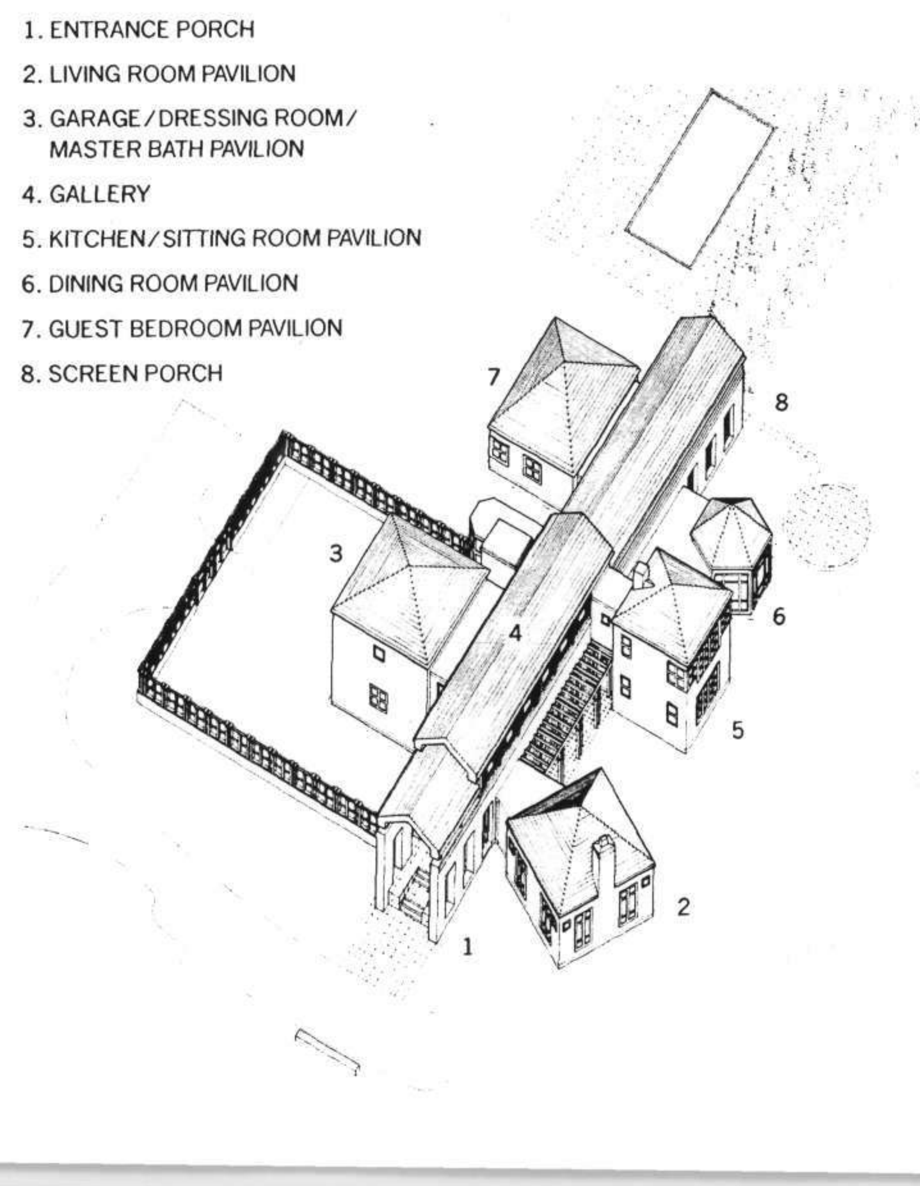
M: 13-59

e Maryland resi-
of a complex of
ı interior street—
nant space," says
E: Set amid Vir-
gned "to take ad-
views," he adds.

ometric drawing.
, archetypal. The
re primary forms
ed together
elli explains.



ABOVE: "A trellis provides an element of scale and enclosure above the French entrance doors," says Pelli. The entrance end of the gallery is a teak-and-opaque-glass wall framed by the brick side walls and capped by the angled roof gable. "The roof appears as if it is floating and creates a clerestory to light the interior," he adds.

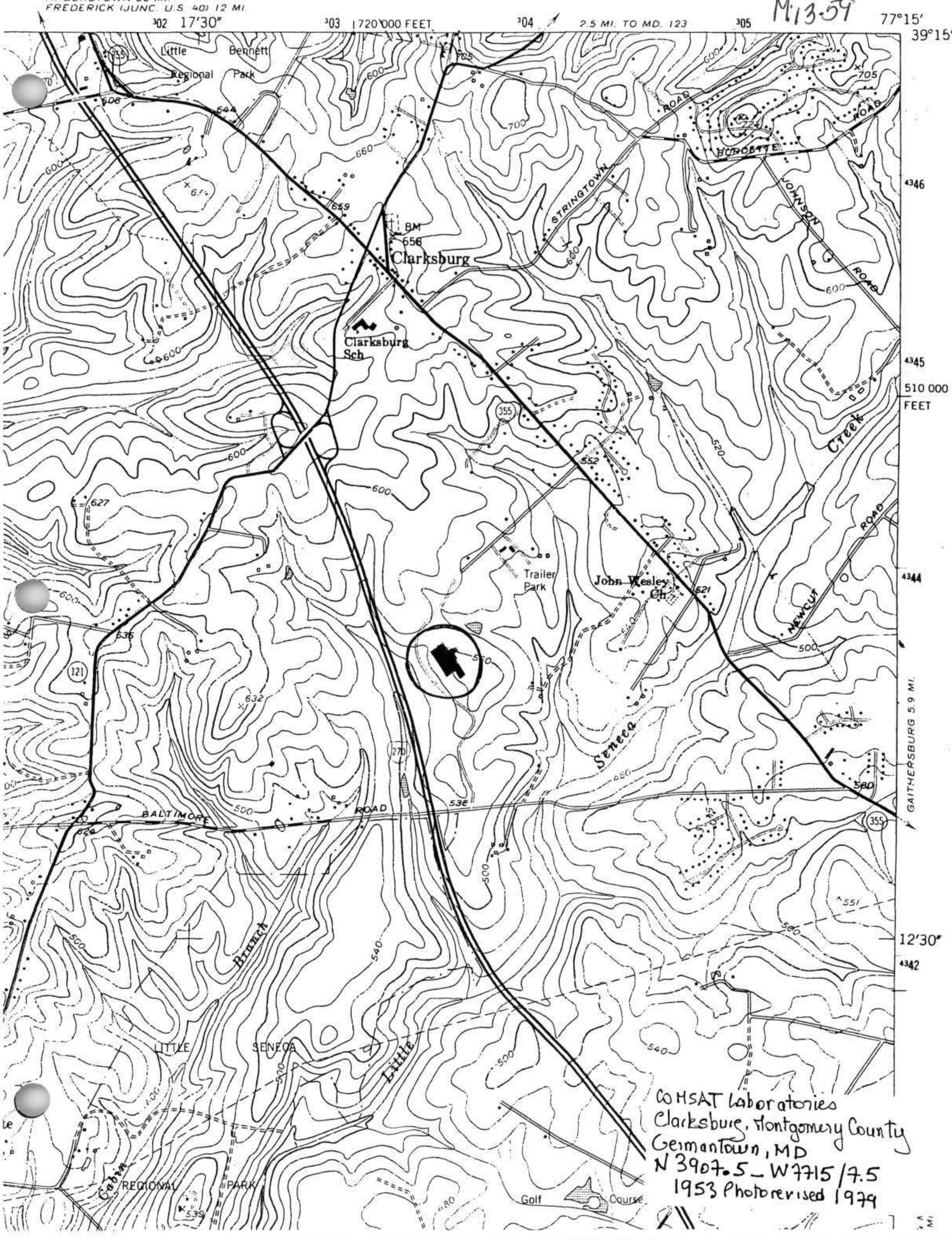


COURTESY CESAR PELLI & ASSOCIATES INC.

Mi:
MIHP ~~MC~~-13-59

Plate 26
Axonometric view, House (Cesar Pelli architect),
Montgomery County, Maryland, delineated c. 1986
Source: *Architectural Digest,* July 1990.

7.5 MINUTE SERIES (TOPOGRAPHIC)



M: 13-59

COMSAT Laboratories
22300 Comsat Drive
Clarksburg, Montgomery County

Isabelle Gournay

January 2003

Maryland Historic Trust

Western facade facing I-270 showing
catwalk and office wing

#1

01/23/05 20022< 2>001 +00+00+00+00 000000

M: 13-59

Comsat Laboratories
22300 Comsat Drive
Clarksburg, Montgomery County

Isabelle Gournay
January 2003

2002< 4>002 +00+00+00-02 000000
01/23/05

Maryland Historic Trust

Western facade facing I-270 showing catwalk and office wing (detail)

#2

M: 13-59

Comsat Laboratories

22300 Comsat Drive

Clarksburg, Montgomery County

Isabelle Gournay

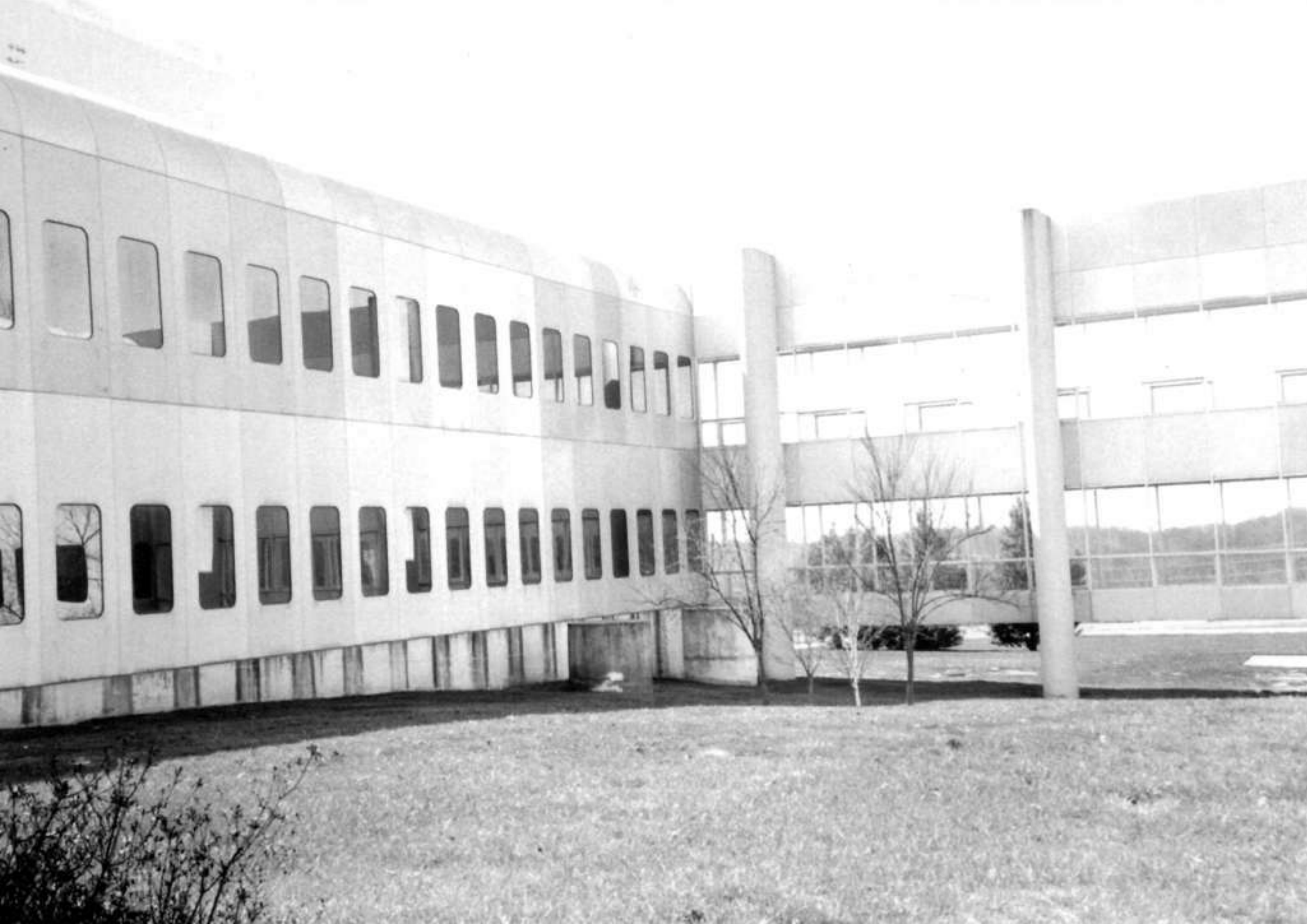
January 2003

Maryland Historic Trust

Northern facade and exhibition pavilion

#3

01/23/05
2002×
5×001 +00+00+00+00 000000



M: 13-59

COMSAT Laboratories
22300 Comsat Drive
Clarksburg, Montgomery County

Isabelle Gournay
January 2003

Maryland Historic Trust
View from central spine through the landscape to the catwalk

#4

M: 13-59

ComSAT Laboratories
22300 Comsat Drive
Clarksburg, Montgomery County

Isabelle Gournay
January 2003

Maryland Historic Trust

Exterior view of Wing 4 from the south

#5

M:13-59

COMSAT Laboratories

22300 COMSAT Drive

Clarksburg, Montgomery County

Isabelle Gournay

January 2003

Maryland Historic Trust

Exterior view of Wing 4, view from the west

#6

01/23/05 3/003 +00+00+00+00 000000

M: 13-59

COMSAT Laboratories

22300 COMSAT Drive

Clarksburg, Montgomery County

Isabelle Gournay

Order No. [illegible] Seq. No. 5

January 2003

Maryland Historic Trust

Interior of the lobby

#7

M:13-59

COMSAT Laboratories
22300 COMSAT Drive
Clarksburg, Montgomery County

Isabelle Gournay
January 2003

Maryland Historic Trust
Office Interior

#8

M:13-59

COMSAT Laboratories
22300 COMSAT Drive
Clarksburg, Montgomery County

Order No. 0009181 Seq. No. 4

Isabelle Gournay
January 2003

Maryland Historic Trust
Stairwell between office wings
(interior)

#9


EXIT

M: 13-59

COMSAT Laboratories
22300 Comsat Drive
Clarksburg, Montgomery County

Isabelle Gournay
Order No. 0009161 Seq. No. 2
January 2003

Maryland Historic Trust
Interior of Cat walk

#10