

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES  
EVALUATION/RETURN SHEET

REQUESTED ACTION: ADDITIONAL DOCUMENTATION

PROPERTY NAME: ASM Headquarters and Geodesic Dome

MULTIPLE NAME:

STATE & COUNTY: OHIO, Geauga

DATE RECEIVED: 1/20/12 DATE OF PENDING LIST:  
DATE OF 16TH DAY: DATE OF 45TH DAY: 3/06/12  
DATE OF WEEKLY LIST:

REFERENCE NUMBER: 09000849

REASONS FOR REVIEW:

APPEAL: N DATA PROBLEM: N LANDSCAPE: N LESS THAN 50 YEARS: N  
OTHER: N PDIL: N PERIOD: N PROGRAM UNAPPROVED: N  
REQUEST: N SAMPLE: N SLR DRAFT: N NATIONAL: N

COMMENT WAIVER: N

\_\_\_ACCEPT \_\_\_RETURN \_\_\_REJECT \_\_\_\_\_DATE

ABSTRACT/SUMMARY COMMENTS:

**Additional Documentation Approved**

RECOM./CRITERIA Accept

REVIEWER Edson Beall

DISCIPLINE History

TELEPHONE \_\_\_\_\_

DATE 3-2-12

DOCUMENTATION see attached comments Y/N see attached SLR Y/N

If a nomination is returned to the nominating authority, the nomination is no longer under consideration by the NPS.

Ref # 09000849 OHPO

listed 10/22/2009



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 National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form*. 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 certification comments, entries, and narrative items on continuation sheets (NPS Form 10-900a).**

### 1. Name of Property

Historic name ASM Headquarters and Geodesic Dome

Other names/site number Materials Park

### 2. Location

street & number 9639 Kinsman Road

not for publication

city of town Materials Park

vicinity

State Ohio code OH county Geauga code 055 zip code 44073

### 3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended,

I hereby certify that this X 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 X meets      does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance:

     national   X   statewide      local

Barbara Pover  
Signature of certifying official

September 1, 2009  
Date

Department Head, Inventory & Registration  
Title

Ohio Historic Preservation Office, Ohio Historical Society  
State or Federal agency and bureau

In my opinion, the property      meets      does not meet the National Register criteria.

Signature of commenting official

Date

Title

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

     determined eligible for the National Register

     determined not eligible for the National Register

     removed from the National Register

other (explain:) **Additional Documentation Approved**

Erin H. Beall  
Signature of the Keeper

3-2-12  
Date of Action

**5. Classification**

**Ownership of Property**  
(Check as many boxes as apply)

- private
- public - Local
- public - State
- public - Federal
- private

**Category of Property**  
(Check only one box)

- building(s)
- district
- site
- structure
- building(s)
- object

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

Contributing	Noncontributing	
1		buildings
0		sites
1		structures
		Objects
		buildings
2	0	<b>Total</b>

**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  
Subcategory: Organizational  
-Professional Association

**Current Functions**  
(Enter categories from instructions)

Commerce/Trade  
Subcategory: Organizational  
-Professional Association

**7. Description**

**Architectural Classification**  
(Enter categories from instructions)

Modern Movement

**Materials**  
(Enter categories from instructions)

foundation: Reinforced concrete  
walls: Glass curtain walls  
roof: Asphalt  
other: Steel construction

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**Narrative Description**

(Describe the historic and current physical appearance of the property. Explain contributing and noncontributing resources if necessary. Begin with a **summary paragraph** that briefly describes the general characteristics of the property, such as its location, setting, size, and significant features.)

**Summary Paragraph**

Situated just off of Ohio Route 87, approximately twenty miles east of Cleveland in the rural landscape of Novelty, Ohio, is Materials Park. This site is home to the headquarters of ASM International (formerly known as the American Society for Metals), as well as the “world’s largest open-work geodesic dome”,<sup>1</sup> designed by T.C. Howard of the architecture and engineering firm Synergetics, Inc. The headquarters building, which is semi-circular in shape and aligned with the western perimeter of the dome, contains 50,000 sq. ft. of floor space and features Modern design elements including floor-to-ceiling windows throughout all three stories, and extensive and varied use of metals in construction and detail. The dome and headquarters building, both constructed in 1959, are structurally independent of one another. Together they create the innovative design vision of its architect John Terence Kelly and represent a prominent example of Modern Architecture.

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**Narrative Description**

See section 7 continuation pages.

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<sup>1</sup> Carey, Allison. “What’s the Deal with... The Geodesic Dome?” *Plain Dealer* 15 October 2007: B3

**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 patterns of our history.
- B Property is 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.

**Areas of Significance**

(Enter categories from instructions)

Architecture  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Period of Significance**

1958-1959  
\_\_\_\_\_  
\_\_\_\_\_

**Significant Dates**

1959  
\_\_\_\_\_  
\_\_\_\_\_

**Significant Person**

(Complete only if Criterion B is marked above)

\_\_\_\_\_  
\_\_\_\_\_

**Cultural Affiliation**

\_\_\_\_\_  
\_\_\_\_\_

**Architect/Builder**

Kelly, John Terence  
\_\_\_\_\_  
Synergetics, Inc., Howard, T. C., Uyanik, M. E.  
\_\_\_\_\_  
Fuller, Richard Buckminster  
\_\_\_\_\_

**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 old or achieving significance within the past 50 years.

**Period of Significance (justification)** – period of significance reflects the construction of the property

**Criteria Consideratons (explanation, if necessary)** – N/A

**Statement of Significance Summary Paragraph** (provide a summary paragraph that includes level of significance and applicable criteria)

See section 8 continuation pages.

**Narrative Statement of Significance** (provide at least one paragraph for each area of significance)

See section 8 continuation pages.

**Developmental history/additional historic context information** (if appropriate)

**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 file (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: \_\_\_\_\_

See section 9 continuation pages.

Historic Resources Survey Number (if assigned): \_\_\_\_\_

**10. Geographical Data**

**Acreage of Property** Approx. 25  
(do not include previously listed resource acreage)

**UTM References**

(Place additional UTM references on a continuation sheet)

1	<u>17</u>	<u>474894</u>	<u>4589967</u>	3	<u>17</u>	<u>475155</u>	<u>4589618</u>
	Zone	Easting	Northing		Zone	Easting	Northing
2	<u>17</u>	<u>475155</u>	<u>4589974</u>	4	<u>17</u>	<u>475048</u>	<u>4589537</u>
	Zone	Easting	Northing		Zone	Easting	Northing

**UTM – 5. 17 474893 4589598**

**Verbal Boundary Description** (describe the boundaries of the property)

See section 10 continuation pages – Exhibit 1.

**Boundary Justification** (explain why the boundaries were selected)

The boundary includes the building proper, the dome and the garden area important in the historical context and significance of the nominated property and as described under Criterion C.

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**11. Form Prepared By**

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name/title Anke Schreiber/Senior Vice President  
organization The Chesler Group, Inc. date May 1, 2009  
street & number 3050 Prospect Avenue telephone 216-431-9100  
city or town Cleveland state OH zip code 44115  
e-mail aschreiber@cheslergroup.com

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**Additional Documentation**

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Submit the following items with the completed form:

- **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. Key all photographs to this map.
- **Continuation Sheets**
- **Additional items:** (Check with the SHPO or FPO for any additional items)

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**Photographs:**

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Submit clear and descriptive black and white photographs. The size of each image must be 1600x1200 pixels at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map.

**Name of Property:** ASM Headquarters and Geodesic Dome

**City or Vicinity:** Russell Township, OH

**County:** Geauga **State:** OH

**Photographer:** Chika Aizu  
The Chesler Group, Inc.  
3050 Prospect Avenue  
Cleveland, OH 44115

**Date Photographed:** March and April 2009

**Description of Photograph(s) and number:**

Photo #	View
001	Building West façade (main) with dome and general site
002	Northern Dome pylon (camera facing Southwest)
003	Southern Dome pylon (camera facing North)
004	Eastern Dome pylon (camera facing West)
005	Detail of Southern Dome pylon base
006	Exterior courtyard between North wing and Center Section —Guest Plaza
007	Detail of stainless sun screen (main façade)
008	Detail of lower courtyard dome pylon between Center Section and South Wing
009	Exterior West elevation and lower level façade
010	Detail of green roof (camera facing South)
011	Lobby area (camera facing North)
012	Detail of wooden panel (outside conference room South of lobby)
013	Main stairs at 1 <sup>st</sup> floor
014	1 <sup>st</sup> floor catwalk (camera facing South)

- 015 2<sup>nd</sup> floor hallway and offices (camera facing North)
- 016 2<sup>nd</sup> floor library enclosure (camera facing Northeast)
- 017 Detail of 2<sup>nd</sup> floor office plaster and glass wall (camera facing North)
- 018 Detail of 2<sup>nd</sup> floor suspended ceiling fascia
- 019 Detail of copper work at 2<sup>nd</sup> floor elevator
- 020 Detail of copper screen at 2<sup>nd</sup> floor utility room
- 021 Lower level cafeteria (camera facing Southwest)

**Printer Paper and Inks:**

Manufacturer recommended paper and ink for photograph printing were used for black and white prints.

Paper: HP Premum Plus Photo Paper

Ink: HP Vivera inks 96 & 97

See Photograph continuation page for historic photos

**Paperwork Reduction Act Statement:** This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C.460 et seq.).

**Estimated Burden Statement:** Public reporting burden for this form is estimated to average 18 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, PO Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Project (1024-0018), Washington, DC 20503.

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Materials Park:

Materials Park is an estate of approximately forty-five acres, located south of Route 87 with its own postal code. Materials Park, however, is also commonly referred to as the geodesic dome or ASM's headquarters and its Mineral Garden. The landmark dome is strikingly visible between the green grassy elevations of the Ohio country when driving on the main road. A winding access road off Route 87 leads into a valley where the dome and headquarters building have been built on a Garden Piazza, 400-ft in diameter, between the rolling acres of countryside. (Photo 001) At the center of the Piazza, underneath the dome, is a sunken Mineral Garden, 100-ft. in diameter, and featuring over sixty-six specimens of raw mineral ores from around the world and over seventy-five varieties of perennials, shrubs, and flowering trees. The estate is surrounded by wetlands and woods of Geauga Park District's 902-acre park, the West Woods, protecting local natural resources such as Ansel's cave or Silver Creek and its watershed, extensive wetlands, and mature forest. Most of this land was originally the property of ASM and was recently sold to the Park system.

Geodesic Dome:

The dome at Materials Park stands for groundbreaking and innovative architectural ideas as well as mastery in design and craftsmanship. It does not serve any specific purpose rather it is a giant metal structure somewhat sculptural in character. The futuristic spaceship look of the dome construction offsets in a unique way with the rural setting of Ohio's countryside. It creates unexpected spatial effects and relations with the sky above, the adjacent building as well as natural surroundings. The dome covers the semi-circular headquarters building beneath, whereby its lower circular base gives clearance just above the roofline of the building. Two pylons, one at the guest plaza and the other at the courtyard of the lower level cafeteria, have been incorporated as part of the building design, structurally independent from the building but yet creating an intertwining effect, thus establishing an artistic connection to one another. (Photos 006, 008) This is an important aspect of the overall design – the dome and building are both essential parts to the architectural concept. (Photo 002)

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The geodesic dome—"Space Lattice"—patented by R. Buckminster Fuller, designed by his firm Synergetics, Inc., is the largest open-air geodesic dome and stands 103 feet, or 11 stories high, is 274 feet in diameter, and weighs 80 tons.<sup>2</sup> The dome is constructed of 65,000 parts—approximately 12 miles of 4 inch and 6 inch, Type 6061-T6 extruded aluminum welded in a hexagon pattern. Its design consists of two identical domes, 30 inches apart, one within the other, to achieve stability with a minimum number of members at each joint. The two domes are linked by 4-inch tubing at the corner of each hexagon cell, which are reinforced by radial tension rods. The large scale of the geodesic dome is a creative symbol of future, invention and strength, and is designed to withstand an 8-inch coating of ice and 500 mph strong winds. The sphere or partial sphere design encompasses largest volume with least surface. Geodesic design in concept utilizes minimum amount of materials to form largest volume and an immensely strong and stable structure. This dome represents Fuller's philosophy and "his belief that humanity must be able to do more with less if it is to prosper in the years ahead"<sup>3</sup>, envisioning a structure of greater strength by using lighter weight material.

The dome requires no internal supports and is an engineering marvel in and of itself for the sheer weight that it is able to support on a minimal of five pylons. The five pylons are t-type trusses of 6 inch aluminum tubing, equally spaced at 72 degrees, four of which rest on concrete piers, the fifth resting on steel. The entire weight of the dome is balanced on five points where a pylon and a pier meet. Concrete filled steel pilings were driven into varying depth, up to 77 feet below the ground surface, for three of the five pylons to achieve the necessary support of the weight. A tension ring at 18 feet beneath ground level, 272 feet in diameter with a 136-foot raise serves as an essential element in keeping the dome structurally sound by linking the five pylons to resist the outward thrust of the dome. The tension ring consists of four 1 ½ inch No. 11 reinforcing bar rods, which required some 300 man-hours of welding. The stress on the tension ring is calculated to be 125,000 lbs.

<sup>2</sup> Dunbar, Wilbur L.. "Ohio's 11-Story Geodesic Dome Seems to Float." *New York Times* 1 June 1969: XX15.

<sup>3</sup> Podolak, Janet. "A Legend Under a Nearby Dome." *News-Herald* 6 Nov. 2005.

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The dome construction began with assembling the hexagon units on the ground at the site with the major parts being extruded aluminum tubing and tension rods, joints for each hexagon corners, and articulated base sections. These parts were bolted together to form small sections and then five pylons were formed. First, the five pylons with their bridges were erected. From then on, hexagonal cells were lifted and placed upward from all points of its circular base using multiple cranes (HIST 001 & 002). Finally, the center and final section of the dome was fitted atop to complete the design (HIST 003). The construction involved companies such as Kaiser Aluminum & Chemical Co., Halethorpe, MD, supplying aluminum; North American Aviation Corp's Columbus Division as fabricator, Mak Construction Co., Cleveland as erector, working under direction of Gillmore-Olson Co., general contractor.

ASM Headquarters Building:

The exterior and interior of the office building conveys the ideas of the American Modern movement in architecture during the 1950s. The architectural key elements of this period - steel and glass - reflect simplicity, minimal detail, clean lines, geometric shapes and volume and are all found in ASM's headquarter building. Mr. Kelly stated during an interview for AIA Cleveland Chapter in 1988 that he had "great belief in Frank Lloyd Wright and exploring new ideas, not Mr. Wright's, my own."

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*1. Exterior Description*

The semi-circular design of the headquarters building wraps along two-fifths of the exterior perimeter of the dome, allowing two of the dome's five support pylons to come down into the interior courts of the building. (Photo 006) The headquarters' footprint north to south is divided into three sections which can be described as the north wing, center section and the south wing. These three sections are distinguished by the two court or bay areas which also enclose the dome supports. The building's center section is located between these two courts. In general, ASM's headquarters consists of three levels: two main floors and a ground level. The principal building is comprised of the two upper floors. Because the ground or basement level is nestled into the hillside elevation, it is not visible from the approach of the building. This level is only visible from the west parking and service areas. (Photo 009)

Overall, reinforced concrete with a special emphasis on the use of glass and metals such as steel, bronze, copper, aluminum, titanium, and tungsten are the fundamental architectural design elements of the building. The ASM headquarters was constructed of reinforced concrete slabs. According to records, about 1,200 truckloads of concrete for the floors and walls were required. Further, ASM mandated that the concrete work for the foundation, the decks, walls, floors etc. was subject to a rigid testing program throughout the project with strict performance requirements of 15% above recommended strength.

The entire headquarters, primarily the upper two levels, is constructed of glass curtain walls. (Photo 004) John Terence Kelly's idea was a glass enclosed building with maximum light and open views extending to the woods, fields and sky. This concept has allowed for an immense transparency between the architectural design of the building and its surroundings. It represents a vivid expression of Modern architecture accomplished by use of volume, plane, line and silhouette. The use of glass as principal element for the building walls creates unexpected and unique spatial effects. The distinctive curved shape of the building required mastery in framing and glazing techniques as none of the frames are set in a 90-degree angle. About 36,000

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pounds of extruded aluminum was utilized for the framing. The exterior glass curtain wall amounts to approximately 20,870 square feet of ¼ inch polished glass plate. In some areas of the first floor main section, glass has been butted directly into the structural concrete, without moldings, which is another unique aspect of the glass wall construction. Further, throughout the building, but primarily on the top floor the exterior glass wall panes of offices are divided with a lower section that has a manually operable window to allow for ventilation.

The main façade, which comprises the western elevation of the building's top level, features a giant stainless steel "sun shield" – 13 feet high and 390 feet wide. (Photo 007) This screen also wraps around the end sections of the building but is not part of the glass walls surrounding the two building courtyards. (Photo 005) It spans across the entire western exposure to provide protection from the sun and to control interior lighting and temperature without obstructing the view. In fact, this stainless steel curtain only allows direct light into the west elevation at 4:30 pm on December 21 each year, when the sun is at its lowest point in the horizon. Records further note that for the first time a stainless steel curtain of this size was used in construction.<sup>4</sup> "The stainless steel was selected by the architect because of its serviceability and for its aesthetic properties."<sup>5</sup> The outer surface of this sun shade has a satin finish, while the inner surface is a soft gold. The exterior also has 4,000 louvers, coined "eyelashes", approximately 14 inches x 16 inches, and 18 inches in distance from the glass curtain walls. "Both the sunscreen itself and the 'eyelashes' were spot-welded to it at the site."<sup>6</sup>

Further, the east exterior glass walls facing the Mineral Garden as well as the glass walls flanking the court yards are covered by metal solar shades that have been added after the period of significance and were not originally intended by the architect. It appears that these sliding screens were installed about 1974/1975 with an

<sup>4</sup> "Two Geodesic Domes." *Architectural & Engineering News* (March 1960): 12-16.

<sup>5</sup> "Two Geodesic Domes." *Architectural & Engineering News* (March 1960): 12-16.

<sup>6</sup> "Two Geodesic Domes." *Architectural & Engineering News* (March 1960): 12-16.

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extruded aluminum channel attached on top and bottom of each window. The large steel gridded solar shades, roughly five feet by ten feet in size, were then inserted and are moveable.

The hemispherical shape of the office building spans north to south. It conforms to a 168 degree semi-circle with a 240 feet outer and 140 feet inner radius. It is 53 wide and contains 50,000 square feet of space. The inner radius of the building is oriented directly due east towards the Mineral Garden. The far southern end of the headquarters is stepped down roughly three feet to accommodate the southern globe. The entire exterior perimeter of the first floor is surrounded by concrete flat work. Along the center section of the inner arch, the concrete flat work extends out east to a similar bull nose concrete knee wall. This knee wall is approximately three feet high and constitutes the beginning of the circular mineral garden area under the dome. All walkways from the northern inner building arch slope east into the garden.

The main public entrance is located on the first floor level (Exhibit 4) on the northwest corner of the center wing with a circular drive for visitor parking. The open, concrete court between the north and center section of the building is the guest plaza and allows for an unobstructed view east into the Mineral Garden underneath the dome and the woods as backdrop. It has an airy appearance, and this largely open court leads from the outer promenade to the Mineral Garden. It is flanked by the north and center section of the building. There is no physical connection between the two wings on the first floor level here. Rather the top floor bridges these two sections and provides continuity to the second floor office space. The cat walk is held up by so called Lally columns, the main structural element of the office building. Further, one of the five pylons of the geodesic dome is erected in the center of the guest plaza giving it a dramatic and futuristic look.

The floor plan of the top level (Exhibit 5) of the ASM office building stretches approximately twelve feet beyond the footprint of the first floor creating a roof like overhang above the perimeter walkways of the first floor main level. This design makes for a "floating" experience of the top floor. Lally columns holding the overhang and give the exterior of the first floor its typical characteristic. On each concrete and steel support are

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half inch steel conduits with straps to the pillar, bent in a ninety degree angle with frosted white, cantilevered eight inch globe lights at the end. The globe fixtures throughout provide for a decorative exterior lighting element. The columns as well as the conduit are painted in light gray. The exposed underside of the top level is laminated with steel plating that has been painted the same color as the structural support columns. The lower edge of the top floor overhang is matched with identical steel plating acting as a cover molding against the underside. The roofline has been built in similar style and also functions as a drip edge around the entire perimeter of the building.

The north section, representing the northern end of the semi-circle of the building, has no basement or ground level. Its first floor still is utilized as ASM's reference library area. It is on grade to the visitor parking lot and the northern and eastern pylons. The center and the south wing are atop the ground level. (Exhibit 3) A curved concrete deck continues along the western elevation of both these sections on the main level featuring a green roof ending south into the adjacent hillside. (Photo 010) The roof deck stretches west over the cafeteria and laboratory section of the ground level. This deck extends approximately thirty feet out from the building terminating in a concrete bull nose retaining wall. It is comprised of concrete flatwork and three rectangular grass areas separated by walkways. A two feet wide swath of river stone between the grass and outer concrete flatwork has been added to drain rain water off the deck. According to owner records, waterproofing as well as concrete work was undertaken 1992 and 2001. Below the entire deck extends the service area with an asphalt parking lot. This area is shielded from view from the upper green level by the four foot bull nose concrete knee wall. Further, the green roof offers a spectacular view west above the hills of the Ohio country.

In addition, the deck overlooks the southern exterior courtyard at the ground level between the center and south wing, approximately 85 feet by 52 feet in size. Yet another of the five dome pylons is a central element to it. This is the only pylon of the geodesic dome that rests on a steel girder system, which extends from the lower courtyard up as base floating the dome's truss at the first floor level. (Photo 008) A bull nose concrete wall

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around the yard perimeter of the deck, approximately four feet in height, creates a raised flower bed alongside the building and serves as protective barrier for the remaining sides. Concrete walkways flanking north and south allow for full view of the pylon footing and the landscaped area below. This courtyard accessible from the cafeteria also features a goldfish pond. Lastly, the signature exterior frosted globes found on the Lally columns are repeated here as well. The globe fixtures are attached to steel conduits and extend out horizontally between the first and lower level of the yard area. Unlike at the visitor court plaza, the floor plan of this bay connects here the center and south wing on the first as well as the second floor. The first floor catwalk, approximately four feet wide, however is made entirely out of glass walls and therefore opens up the view into the Mineral Garden East. (Photo 014)

The ground level of the ASM building is facing westward on the property. It is built into the hillside and does not extend north to south along the foot print of the entire building. It roughly ends with the north end of the center section. However, it expands all the way west underneath the first floor roof deck and therefore has a wider footprint than the above two levels. In general, its exterior character is different from the upper levels as its glass walls facing west are shielded by a concrete arcade that wraps outside throughout this level. Seven arches in different sizes and shapes open up to the glass wall curtain behind it. The walkway behind the arch is illuminated with small white globe lights mounted to the frames of the exterior glass curtain wall. This level has a separate asphalt parking lot off the access road and two employee entrances - one with a loading dock on its northerly perimeter and one on its south end. According to owner records, waterproofing and concrete work was performed in 1991 for this area of the building.

Another of Kelly's innovative exterior architectural details are the flaring roof drainage 12-gauge stainless steel "gargoyles." This represents a Modern attempt to an ancient way of dealing with water – for example this form of drain was found in medieval churches. Ten "gargoyles" cast rainwater from the second floor into a circular, roughly six feet in diameter, gravel filled catch basin of the grass roof or terrace on the first

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floor moving water off the flat roof into the storm water system. Eight others further route rainwater to catch basins at the lower level.

Natural light floods the interior of the building not only through the floor-to-ceiling windows on all three levels; architect Kelly designed fourteen bubble clear, plastic skylights stretching north to south along the eastern roof perimeter. Originally each skylight was accompanied by a special Shepherd's Crook fixture intended to illuminate the exterior roof surface rather than to shine through the skylights. However, these fixtures were removed by the owner during various roof repairs over the years as they deteriorated and the skylights were leaking. Also the original clear skylight covers have been replaced with opaque ones. Further, according to the owner's records the original flat roof, #8 river stone over built up tar roof, was replaced in 2007 with an asphalt built up roofing system on insulated lightweight concrete roof deck over existing concrete deck.

## 2. Interior Description

The public entrance of the ASM building is at the northwest corner of the headquarters' center section. A small all glass enclosed entry vestibule with an intercom directs visitors south through an interior foyer door into the main lobby. Right across from the interior entrance is the reception. This area is elevated by about 3 feet and steps adjacent east and west, lead down to the soft seating area which stretches north to south. (Photo 011) The reception area is a centered, built-in, square walnut laminate enclosure. It is attached to one of the two matching floor to ceiling shelving units that have been built around the two structural columns on the main level of the lobby seating area.

The western lobby elevation along the seating area is comprised of a walnut paneled wall which is part of a designed space to accommodate the single, three stop, hydraulic elevator and the floating main stairway. Moreover, this elevator and stair inset creates a separate hallway along the outer glass curtain wall on the building's Westside which leads north into the guest vestibule. The lobby's wood detail was added during an owner renovation in 1988. However, the floor to ceiling wall mahogany paneling along the hallway east wall of

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the nearby assembly room is an original architectural design detail. It is made up of one by eight mahogany plywood boards with mahogany backing and blocking. (Photo 012)

The lobby ceiling features still the original lighting, which is made up of 136 tiny 7-watt incandescent exposed surface mount bulbs with a 4-inch circular spun brass reflective escutcheon, and spans across the entire lobby. Kelly's idea was to expose metals into the smallest detail like the tungsten filaments of the clear bulbs. This unique ceiling design creates a floating ceiling effect that is intensified by the reflections in the glass of the curtain wall. This feature is remarkable from the inside as well from outdoors. This ceiling theme continues in ASM's library across the lobby in the north wing.

The glass panes installed along the eastside of the main lobby and the glass to glass cat walk, which connects the center section with the executive offices at the south end of the building, are butted directly into the brushed gray concrete knee walls without using moldings. Along the entire perimeter of the knee wall runs a heat fin tubing system which radiates heat along the glass to prevent convection. This system is held up by brackets and is simply and effectively guarded by a two by six dimensional perimeter wood handrail at a 15 degree angle. The fin tubing is found along all the of glass curtain walls throughout the building, approximately 30 inches above the floor, except for the library were it is located near the floor, and comprised of 1,500 feet of linear copper fin tub heating elements. This is another of John Terence Kelly's visionary architectural and practical design details.

The architectural theme of floating elements is also repeated in Kelly's interior stair design. (Photo 013) The main stairway in the lobby is suspended by the height of the building on slender stainless steel rods, 5/8" in diameter, spaced approximately 14 inches apart. The landings as well as the steps are polished stainless steel accented by brass handrails. This effect is further emphasized by the north and south wing steel stairs floating vertically through the corridor; whereby the stringer channels and the midway landings are spaced away from the wall creating an open view through and around the stairs upward and downward. The bull nose treads of both these stairs are wrapped with mosaic linoleum, the stringers and spindles are painted white and handrails

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are made of solid cast brass. The north stair is boxed in by original extruded aluminum frames with tempered ¼ inch glass. The second floor enclosure of the north stair separates the offices from the library below. (Photo 016) Further, the historic stainless steel door with Kelly’s signature hardware remained an intact part of the enclosure. Because, all stairs have open risers the feeling of floating vertically in space while walking up the stairs is further intensified.

The first floor meeting room directly off the entrance lobby still has the original stainless steel and brass entry doors. They are double doors with glass sections and fitted with half inch by one inch stainless steel stops. The levers are cast brass with simple spherical rosettes. “Created by Kelly, these levers possess virtual thinness and a graceful flow of line, imparting to the handle a crisp, classic appearance in keeping with the linear characteristics of the building.”<sup>7</sup> All of the interior doors are made of stainless steel and most of them are intact. However, all of the original exterior doors have been replaced with modern, extruded aluminum doors. The conference room itself was updated in 1988 with a 2x2 acoustical tile ceiling and hanging florescent fixtures.

The executive office wing, which is located at the southern end on the first floor of ASM’s office building, was remodeled in 1988. The scope included a complete update of the reception area with dropped drywall and acoustic tile ceiling. Further the reception area concrete supports and perimeter walls were laminated with acoustic fabric. Also, the original Board of Trustees room was converted into two separate offices. However, its original double entry stainless steel doors have been preserved.

The entire second floor was designed for and still accommodates ASM’s various operating departments. John Terence Kelly’s original plans only intended glass walled offices wrapped along the east perimeter of the building leaving the remainder as open work space. (Photo 015) The historic office partitions are made up of simple one by six painted white wood construction with brass stops to contain large sheets of clear glass. This allows for a full view out into the Mineral Garden and the dome. The bottom section of each office glass wall is divided into two parts – a crank style aluminum window to provide air circulation from the corridor and a

<sup>7</sup> ASM. “ASM Press Kit: Major Architectural Features.” ca. 1959/1960

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simple glass panel. The offices are separated by plaster walls with glass glazing from the end, approximately four feet in width, to mullions or the support columns. (Photo 017) Kelly “did not wish to break up the horizontal ‘floating’ line of the offices by a row of separate cubicles. Nor did he wish to hide the columns supporting the roof slab.”<sup>8</sup> An interesting aspect is also the use of circular split diffusers to accommodate the plaster walls between the original offices. Additional offices were built along the Western elevation and more partitions were added in some of the historic East offices after the period of significance—a date is unknown. Similar design and materials were used for the new construction; however the custom brass stop of the glass walls has been replaced with a wood one. Further painted plywood or drywall has been used instead of plaster. The office space of selected departments was renovated over several periods. The second floor administrative area underwent renovations during the 1970’s, 1980’s as well as the 1990’s.

Kelly specifically designed the walls as a combination of plaster and glass between the offices, so the unique fascia of the second floor dropped ceiling is exposed and continuously visible from the Mineral Garden when looking up. This bronze edged acoustical plaster ceiling floats the entire second floor perimeter and is another unique architectural detail of Kelly’s work. The ceiling has been lowered by about 14 inches and is fastened to the main ceiling support creating a decorative panel, flowing with curved shape that follows the building’s footprint, and accented by a bronze edge. (Photo 018) The bronze edge suspended ceiling is also found around the kitchen and cafeteria area. Parts of the original floating ceiling are also intact in the large storage space across the cafeteria.

The south wall of the elevator shaft on the second floor is laminated with an ornamental copper screen set in a brass frame. (Photo 019) The same style copper doors, floor to ceiling, about 10 feet in height, and approximate the width of the stair envelope, are found on each landing of the main stairway providing utility closet space. (Photo 020) Only the second floor door set is still in its original condition while the others have

<sup>8</sup> ASM. “ASM Press Kit: Major Architectural Features.” ca. 1959/1960

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been covered with acoustical fabric after the period of significance. The ornate copper sheets mimic the steel eyelash screen of the façade providing ventilation at the same time.

Kelly achieved maximum simplicity, a Modern design principle, by the repetition of spherical forms in various details of the building. A prominent feature throughout are the nearly 1,000 light fixtures. Kelly incorporated large, about three and a half foot diameter, spherical recessed Plexiglas florescent fixtures throughout the second floor ceiling. In addition brass canister lights are mounted along the hallway outside the second floor original offices. These canister lights were also installed around the lower level ceiling edge but have been replaced. White globe pendants, parts of the original design layout of the second floor, now hang in rather random spots since office partitions were added over the years around them. The ASM dining room features twelve 45 inch circular dry-walled ceiling openings, recessed 12 inches, with centered 8 inch white globes. In addition, the original, spherical recessed lights with magnifying Plexiglas covers in ASM's storage area at the lower level are only partially intact. Also, parts of Kelly's dropped bronze fascia ceiling were further dropped and updated with contemporary fixtures.

The lower level consists of educational labs and offices, the commercial kitchen and cafeteria along with its operation, a mail and storage facility, mechanical and electrical rooms, the IT department and miscellaneous meeting rooms. The cafeteria and kitchen as well as the lab and classroom area wrap along the glass curtain wall of the western elevation. (Photo 021) In addition, Kelly achieved maximum lighting and openness by constructing glass walls around the entire perimeter of the lower exterior courtyard and therefore, minimizing the basement feel of the area entirely. The lower level mail and storage stretches along the north end as well as the east side of the building. The southern part of the basement houses a large boiler room. Mechanical and electrical rooms are also found on the northern side.

The educational department was renovated in 1988 creating ASM's advanced training center. This area was completely modernized using original design elements such as the use of glass windows for the arched, dry walled hallway walls of the labs and classrooms and a dropped ceiling in circular shape extending in a sweep

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from the lower level lobby into the main laboratory. The cafeteria area was updated in 1989 maintaining the signature bronze fascia ceiling and original recessed lights by only re-plastering the existing soffit. Other updates include the conference room and the IT area at the southern lower level perimeter in 2008. The new offices south of the courtyard were made of glass partitions to mimic Kelly's original office designs. Further, numerous mechanical upgrades were undertaken by ASM. Initially, the building had no HVAC as there was no budget left. Air conditioning was added about ten years later, around 1970. Since then upgrades to the system have been performed in 1993 and 2001. The boiler was modernized in 1999 as well.

Mineral Garden:

The William Hunt Eisenman Garden is a public garden that rests underneath the dome. It is 100 feet in diameter and seven feet deep, and is centered on the 400 foot garden piazza, part of a 600 foot garden area encompassed by an outer circular concrete walkway that ends in the eastern hillside. (Photo 003) The garden's inner circle displays about 66 specimens of mineral ores all labeled for visitors.

Kelly's original garden evolved from a simple concept. It was a Japanese style rock garden. Ore specimens, donated by companies worldwide, were arranged in circular display on quartz gravel. The garden opened with about 48 minerals with plans to expand to about 300. In its center was also a jet fountain rising to 60 feet. (HIST 009) Indeed, Kelly had big plans for the garden, including adding a stainless steel y-bridge, three feet wide and 100 feet in length. Additionally, he envisioned four more fountains and for the quartz gravel to be cemented. However, this plan was never realized. (HIST 019) Instead, the original garden opened to the public with ore specimens highlighted on the quartz gravel and with a few plantings, drawing attention to the natural resources available to man.

In general, the garden represents the third principle element comprising Kelly's original ASM building concept, besides the dome and headquarters. Kelly carefully laid out a natural setting in which he "designed the new building to fit into the countryside, creating a 'garden environment' that complemented the symbolism of

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the structure.”<sup>9</sup> According to Kelly he intended for the building “to subordinate the architecture to the landscape—thereby emphasizing this man-made garden in the order of nature.”<sup>10</sup> At the same time, landscaped plantings, are intended to “harmonize the surrounding forest and meadowland terrace with the immediate building area”<sup>11</sup>. This is achieved, as towards the outskirts of the garden the layout is “loose, scattered as in nature”. It gradually becomes “more formalized as it arrives within the architectural confines of the Mineral Garden and the building proper, as in terraces, planting boxes and pools.”<sup>12</sup>

The garden was redesigned in 1999 and continues the original ideas of Kelly, Buckminster Fuller and Eisenman. The garden retained its existing shape and dimensions. However, the grading, paving, irrigation, drainage, and plantings were all enhanced. Additional walkways were added to increase accessibility for visitors. The ores were relocated to the flower beds where they rest today.

The updated garden features a great variety of perennials including asters, daisies, lilies, phlox, black-eyed susans, poppies, and ivy; and flowering shrubs and trees such as dogwoods, azaleas, hydrangeas, junipers, rhododendrons, and lilacs.<sup>13</sup>

Among the many trees in the Mineral Garden is Malus Newton, an apple tree directly descended from the one under which Isaac Newton supposedly discovered the Law of Gravity. This tree was donated to ASM in 1968 by the National Bureau of Standards (now known as the National Institute of Standards and Technology) in Washington, D.C.

Within the garden, too, is a fountain sculpture, 16 feet in height, entitled “ASM Singularity” made from copper, titanium and stainless steel. It was created by the late internationally renowned, contemporary sculptor and painter Eric Orr. Circular shapes are continued in the perimeter walkways and knee walls, creating raised flower beds around the center fountain and embedding the mineral display.

<sup>9</sup> ASM. “ASM Press Kit: Major Architectural Features.” ca. 1959/1960

<sup>10</sup> ASM. “ASM Press Kit: Major Architectural Features.” ca. 1959/1960

<sup>11</sup> ASM. “ASM Press Kit: Major Architectural Features.” ca. 1959/1960

<sup>12</sup> ASM. “ASM Press Kit: Major Architectural Features.” ca. 1959/1960

<sup>13</sup> Knight and Stolar. “Landscaping Plans.” 1998.

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The granite memorial to William H. Eisenman, located on the eastern hillside, is engraved with the inscription, “Make no little plans; they have no magic to stir one’s blood. Make big plans; aim high in hope and work, remembering that a noble, logical diagram once recorded will never die.” This speaks to Eisenman’s desire for ASM’s work as a scholarly engineering society, as well as the principal ideas that went into the creation and design of Materials Park.

The 1999 renovations built upon Kelly’s original design intent and served to further integrate the ores and minerals into the plantings of the garden and the surrounding nature. The overall integrity of the site design remained unchanged. It further highlights how man can use the resources found in nature to build architectural marvels, and reinforces the connection between the headquarters building and dome and the surrounding environment.

Alterations

In general, the exterior and interior of headquarters building as well as the geodesic dome have been scarcely altered since their construction in 1958, and possess a high degree of historic integrity. No major additions have been performed on the principal exterior of the building other than the installment of the sliding metal solar screens along the entire second floor inner arch of the building and the western bay windows about 1975. The only major upgrade to the building on the outside has been the roof replacement in 2007. The immediate areas around the building have been improved but historic qualities have been retained. Most noteworthy improvements are the Mineral Garden redesign in 1999 and various waterproofing and concrete work in the early 1990’s and in 2001.

The historic qualities and detail in most parts of the building interior have remained intact. Original stairs, offices, doors, hardware, fixtures and other architectural detail have been kept in extraordinary condition. The first floor upgrades of the guest lobby, conference room and executive area do not impede the overall

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historic integrity. Further, the second floor office additions primarily along the Western perimeter greatly imitate the original design down to the hardware. Moreover, all light fixtures are of original design and only a few have been removed on the top floor. The educational area in the basement was completely modernized to keep up with technological changes. However, curved hallway walls with glass windows and the circular shape of the dropped ceiling of the main laboratory carefully contemplate the fundamental design principles. The glass office additions for IT and kitchen staff in the lower level continue Kelly's ideas as well. Other changes in the lower level do not impair the historic feel as they are of secondary nature as far as the overall design importance.

Maintenance on the dome structure was performed in 1983 and 1992. It has remained in remarkable shape.

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*Summary*

The ASM world headquarters building and geodesic dome structure in Materials Park have historical architectural design and engineering significance under Criterion C. These resources possess significance for the individuals involved in conception, design, and construction, and the distinctive characteristics of the type of design used. Specifically, the Modern features that characterize the ASM International Headquarters Building and geodesic dome are significant in that they reflect the design philosophies of John Terence Kelly, a prominent Cleveland Modern architect, R. Buckminster Fuller, a world-renowned mathematician, philosopher, engineer, and inventor of the geodesic dome, as influenced by the vision of William H. Eisenman, one of ASM's founding members and long-time National Secretary. These design features, when contextualized by their setting in Materials Park, gain even greater significance because they reflect broader trends in American industry and man's use and understanding of his environment and the materials found within it. The architecture of the building in combination with the dome expresses an aesthetic ideal that reflects trends in design and philosophy caused by broader historical and social trends during the period between the American Industrial Revolution and the resultant Information Revolution. The structures found in Materials Park also reflect the goals and mission of ASM International, the organization for which they were constructed. Furthermore, this particular dome is rare amongst Fuller's domes because, unlike most other functional domes, it was never intended to be a covered structure. Rather, it serves a purely aesthetic purpose. This dome, too, was considered the world's largest openwork dome at the time of construction conveying spectacular design and craftsmanship. John Terence Kelly designed the ASM Headquarters building and the geodesic dome was designed by Thomas C. Howard<sup>1</sup> with M. E. Uyanik, engineer, both of Synergetics, Inc. in Raleigh, NC.

<sup>1</sup> Wilbur L. Dunbar, "Ohio's 11-Story Geodesic Dome Seems to Float," *The New York Times*, Sunday, June 1, 1969. and [www.bfi.org/about-bucky/buckys-big-ideas/geodesic-domes](http://www.bfi.org/about-bucky/buckys-big-ideas/geodesic-domes).

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Chartered as a non-profit corporation by the State of Ohio, ASM International (formally American Society for Metals) is Everything Material®, the society is dedicated to serving the materials science and engineering profession. Through its network of 36,000 members in 100 countries worldwide, ASM provides authoritative information and knowledge on materials and processes, from structural to nanoscale. As an engineering and scientific society, ASM is led by members, guided by member needs and fueled by member participation. ASM shares information and ideas through international conferences and expositions, seminars and local chapter meetings or publications such as Advanced Materials & Processes and the renowned ASM Handbook series and online ASM Global Community.

ASM benefits the global materials community by providing scientific, engineering and technical knowledge, education, networking and professional development. Materials scientists and engineers improve the performance of systems that enhance our quality of life. As the central authority on the development, processing and application of materials, ASM strives to be the world's leading resource for the advancement of materials knowledge in education, industry and society.

ASM International can trace its roots back to the nascent years of the American Industrial Revolution. During the early 1900s the trade of the blacksmith in the United States was not well organized. Expertise and trade secrets were passed down from father to son, which was not a very practical way of emitting knowledge. Out of this imminent need, William P. Woodside, a blacksmith from Detroit, formed the Steel Treating Club in 1913. This group consisted of thirteen steel-treaters from the Detroit area who came together to share information in light of the emerging automotive industry. Woodside, who had worked for some time as a steel salesman, traveling from one steel-treater to another, realized that many of the craftsmen were unaware of the techniques being used by other steel-treaters, including those that could ease their labor and cut their work time in half. Exchanging information made the work easier and more efficient for everyone involved. This transfer of knowledge in the trades, as made necessary by the Industrial Revolution, cleared the cloud of mystery that had previously dominated the manufacturing world, and exchange of information occurred to a greater degree than ever before.

Woodside encouraged workers as well as engineers to join his organization as he felt that there was tension between the two professional groups. Even though other metallurgists' societies existed at the time, none of them was in collaboration between workers and engineers. In 1915, Woodside's Club named itself Steel Treating Research Club of Detroit to highlight its new mission. The society was incorporated under Steel Treating Research Society in 1918. Around this time, a great interest in the creation of local chapters throughout the United States developed. The Chicago Chapter, known as American Steel Treating Society, was one of the early national chapters organized. However, rivalry between Detroit and Chicago grew and by 1919 both chapters competed against each other. A unified organization was essential to effectively fulfill the society's mission and in 1920 their differences were reconciled. Further, the same year, Cleveland became the choice for

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the location of the society's headquarters, a compromise since no agreement could be reached on Detroit or Chicago. Offices were opened near Downtown and work continued under a new name – American Society for Steel Treating (ASST). In 1921, the society grew significantly--from a handful of founding members to 3,237 members in 31 chapters nationwide. The conceptual ideas of the society: education, networking and exchange of information were well perceived. Further, during the 1920s the society expanded its focus from steel to all metal manufacturing processes. Consequently, by 1933 ASST changed its name to American Society for Metals (ASM) to reflect the broader focus. Further, Bill Eisenman, who had joined the Chicago section as a business manager and had worked passionately on promoting new chapters across the country, became National Secretary for ASM.

The society continued its innovative vision with the second Metal show in Philadelphia in 1920. The initial convention was held by the Chicago chapter a year earlier and was one of a kind in the United States at that time. Manufacturers could display latest technical innovations, participate in “metallurgical sessions”<sup>2</sup> and sell their products. The Metal show was nationally organized as an annual event for the next 53 years. A milestone of ASM's work in the international metal field was the first World Metallurgical Congress (WMC) held in 1951 in Detroit among 510 delegates from 39 countries, establishing ASM's worldwide reputation in metals science. The five week long conference allowed participants to tour “leading U.S. plants, institutions and laboratories”<sup>3</sup> and ended with National Metal Exposition and technical seminars of the WMC. The second World Metallurgical Congress was held in Chicago in 1957. In 1988, the World Materials Congress in Chicago celebrated the 75<sup>th</sup> anniversary of the society with the largest conference in ASM's history. “Nearly 12,000 registrants from 50 countries attended more than 330 technical sessions.”<sup>4</sup>

Since its inception the society emphasized the importance of publishing information and making it readily available to its members. First reference documents were printed as ring binder brochures. *Proceedings* and *Journal*, publications by the Detroit and Chicago chapters, later merged into one journal titled *Transactions*, a forerunner of ASM's *Metal Progress*, a well-respected technical publication in the metalworking industry. *Metal Progress* first was published in 1930. ASM has continued its monthly magazine, which is now distributed under the name *Advanced Materials & Processes*. In addition, ASM is a sponsor of various other engineering journals. ASM is also known as the world's largest publisher of metals engineering books. The first edition of *Metal's Handbook*, ASM's prominent series of reference books was initially published in 1924 as 116

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<sup>2</sup> “A History of the American Society for Metals.” 1963: 5.

<sup>3</sup> “A History of the American Society for Metals.” 1963: 7.

<sup>4</sup> “ASM History.” *ASM International*. <http://asmcommunity.asminternational.org/portal/site/asm/AboutASM/History/>.

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loose data sheets and, as William Eisenman announced during the society's Annual Meeting in 1923, "'recommended practices' for heat treating."<sup>5</sup> The first hard bound edition was printed in 1929. In 1948 the seventh edition had a collection of 1,444 pages and was the final single volume handbook. The eighth edition of the handbook begun in 1957 and was published in 1961 as *Volume 1 Metals Handbook*. The multivolume series of reference books for metallurgists originated "to keep up with rapidly changing technologies"<sup>6</sup>. It featured various topics in articles, tables, illustrations, definitions and page indexes, and today remains one of ASM's largest and most important projects. Currently ASM offers twenty four volumes of its handbook as well as two ASM Desk Editions, which are also available as electronic versions on the Web.

Early on ASM identified the importance of bibliographical documentation to most efficiently allow for the open exchange of knowledge and information. Therefore, in 1955 the society started a pilot program with the Center for Documentation and Communication at Western Reserve University in Cleveland to explore the viability of computer searching. This program, Metals Information, was a groundbreaking step in the pre-era of computer technology and became operational in 1960. In 1968, ASM merged its abstract publication with the Institute of Metals in the U.K. - creating a partnership of two technical societies to serve a worldwide community through materials information services. ASM has carried on its cutting edge technology focus over the years and especially in 2006 with the investment in its Global Community Information Network, a large online database.

In the past 35 years, ASM presented 119 Historical Landmark Awards around the world. It is one of the society's most prestigious recognitions. "The purpose of the ASM Historical Landmark Award is to preserve our materials heritage and to make people all over the world more aware of the many pioneering milestones of materials technology."<sup>7</sup> It identifies sites that have played an important role in the discovery, development, and growth of metals, metalworking, and engineering materials. The ASM International Headquarters Building and Geodesic Dome was chosen as the award recipient for 2009 for symbolizing "the enduring fellowship of materials professionals, advancing humanity's progress through their work with engineered materials."<sup>8</sup>

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<sup>5</sup> "ASM Handbook Celebrates 75 Years of Providing 'Information that Works.'" *Advanced Materials & Processes* 153.2 (Feb. 1998): 37.

<sup>6</sup> "ASM Handbook Celebrates 75 Years of Providing 'Information that Works.'" *Advanced Materials & Processes* 153.2 (Feb. 1998): 37.

<sup>7</sup> "Superalloys pioneer ATI Allvac recognized as ASM Historical Landmark." *Advanced Materials & Processes* 166.4 (Apr. 2008): 65.

<sup>8</sup> "ASM Historical Landmark Award 2009 Citation: ASM International Headquarters Building and Geodesic Dome, Materials Park, Ohio." 2009.

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Member education has always been the primary focus of the society. Therefore, it launched the ASM Foundation for Education and Research (now ASM Materials Education Foundation) in 1952 to promote education and scholarship. Additionally, ASM's Metals/Materials Engineering Institute and its Academy for Metals and Materials were founded in the mid 1950s and 1960s respectively. ASM has successfully managed to remain a vital provider of knowledge and education throughout its long history. It has continuously reevaluated its mission adapting to changes in technology and science. ASM became ASM International, The Materials Information Society, in 1986, highlighting its geographic boundaries beyond the United States and expanding its "technical scope beyond metals to include other engineered materials and processes such as composites, plastics, ceramics and electronic materials."<sup>9</sup> ASM International has remained a key player in the ever-changing materials industry by proactively redefining the society's vision and goals.

Cleveland, Ohio became a thriving manufacturing center in the mid-1800s, with steel as one of its central industries. Numerous canals and railroad lines allowed for easy access to and transportation of iron ore from northern Minnesota and coal from southern Ohio, Pennsylvania, and West Virginia, while Lake Erie allowed for the movement of vast amounts of materials needed for the manufacturing of steel. ASM's headquarters office opened in Cleveland in the 1920s where it served society members in both Cleveland and other industrial cities including Detroit, Chicago, and Pittsburgh through continuing to collect and publish information on the use, properties, and preparation of both ferrous and non-ferrous metals used in manufacturing. By 1940, ASM bought the Norton Mansion on Euclid Avenue and for the next twenty years the society's main office was located on Euclid Avenue in Cleveland. During that time ASM saw "an increase in activities associated with growth of membership to 30,250 and local staff of 105 that five separate buildings were occupied by A.S.M. activities."<sup>10</sup> Consequently, the Board of Directors determined that a centralized operation was necessary to support the continued success and growth of the society.

During ASM's annual meeting in 1954, William H. Eisenman, first National Secretary for ASM, announced "five great steps to progress"<sup>11</sup> – plans for a new Headquarters Building, development of the Metal Engineering Institute, Metallurgical Seminars, Metal Research Institute and the Metal Science University. These five objectives show that ASM had reached an importance that was never felt before. It was able to grow and expand at a fast pace and its headquarters design was the visual expression of ASM's ideas and vision of its

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<sup>9</sup> "ASM History." *ASM International*. <http://asmcommunity.asminternational.org/portal/site/asm/AboutASM/History/>. Accessed Mar. 2009.

<sup>10</sup> "Moving Day for the American Society for Metals." *Metal Progress* (Sept. 1959): 64-C.

<sup>11</sup> Eisenman, William H. "A.S.M.'s New Headquarters." *Metal Progress* (May 1958): 69.

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future at the time. The new ASM building “was at once an office building and a symbol”<sup>12</sup>, for it embodied the aspirations of man and his ingenuity while reflecting what he was already able to do with the materials in his environment, both of which fell within ASM’s scope and mission and so were reflective of the organization’s goals. This innovative thinking has been part of ASM’s strategy and allowed for ASM to become a pioneer in the metals and later materials field.

In 1956, William H. Eisenman donated 100 acres of land from his summer estate in Novelty, Ohio to the society with the stipulation that the new headquarters building be constructed there. At the time, the new location of the ASM headquarters was undecided and contested between Cleveland’s urban and suburban setting. Moreover, Eisenman explained: “it became apparent that a sufficient area of land to house the ‘A.S.M. of Tomorrow’ in built up areas would be impossibly expensive”<sup>13</sup>. After Eisenman’s death in 1958, the society bought about 400 acres from his estate in 1961 including Eisenman’s summer residence known as Sunnimoor Farmhouse. In addition, ASM purchased some smaller parcels of surrounding land during the 1960s and in 1981. There were no concrete plans for the site development in the long run and as a result most of the land was sold the Geauga Park District for conservation in 1995. The farm house, a local landmark registered with the Geauga County Historical Society, was sold separately as well.

“The concept of a new headquarters as an inspiring symbol of the Society’s intention to serve the metal industry was Eisenman’s alone.”<sup>14</sup> He hoped to develop and build a structure that represented ASM and its aspirations, as well as the metallurgical world as a whole. He was looking for a building that would “embody the wonderful world of metals, would express the soaring opportunities of metals engineers, would harmonize with the beautiful landscape, and would serve functionally the headquarters staff.”<sup>15</sup> He felt that “this new administration building is the culmination of 40 years of service to the American Society for Metals. Yet it is truly the first state of the A.S.M. of Tomorrow.”<sup>16</sup> The building had to reflect ASM’s history as a metals engineering society while representing the possibilities that the future held for ASM and materials engineering as a whole. Eisenman searched for a project architect for about one year and it was in the designs of Cleveland architect John Terence Kelly that ASM found its and Eisenman’s vision manifested (HIST 004).

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<sup>12</sup> “A History of the American Society for Metals.” 1963: 20.

<sup>13</sup> Eisenman, William H. “A.S.M.’s New Headquarters.” *Metal Progress* (May 1958): 67.

<sup>14</sup> *Dedication September 14, 1960: The National Headquarters of the American Society for Metals*. Russell Township: American Society for Metals, 1960.

<sup>15</sup> Eisenman, William H. “A.S.M.’s New Headquarters.” *Metal Progress* (May 1958): 67-69.

<sup>16</sup> Eisenman, William H. “A.S.M.’s New Headquarters.” *Metal Progress* (May 1958): 67-69.

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Construction of the highly anticipated headquarters began in April of 1958. ASM staff of about 175 moved into its new building in August of 1959. At that time, the site was named "Metals Park". Later it changed to "Materials Park" with its own postal code to reflect appropriately ASM's broader identity. Sadly, Mr. Eisenman did not live to see Metals Park complete. He passed away shortly after construction began in May of 1958. The building was dedicated in his memory September 1960 and the William Hunt Eisenman Award was established by the society the same year. In the early 1960's the society stated that "ASM leaders feel that the metallurgist and metallurgical engineer are best equipped to lead the way toward the emerging complex of disciplines called 'materials engineering'. A World Society for Materials? Perhaps, but not just yet. What you will see for the immediate future is an ever-expanding, ever-more-influential Society dedicated to advancing the knowledge of metals and related materials."<sup>17</sup> This kind of forward thinking is the fundamental concept of ASM's headquarters. The design of Metals Park remains a significant milestone in the history of ASM and its future. "The building's bold design embodies the initiative and strength visualized by its founders."<sup>18</sup> ASM headquarters and dome fascinated not just the metallurgical industry. Visitors from Ohio, the U.S. and from abroad have come to see the imaginative and unique structure since groundbreaking. By 1966, approximately 250,000 people had visited the ASM site.

The design of the headquarters building emphasized the essence of Modern Architecture during the 1950s-experimental designs as characterized by simplicity, beautiful geometry described by clean lines, minimal detail and the abundant use of concrete, glass and steel. John Terence Kelly's designs derived from a combination of Modern elements from various branches. Kelly was inspired by colleagues such as Walter Gropius, Mies van der Rohe and Frank Lloyd Wright. He blended different architectural styles with his own ideas to create a remarkable Modern structure that could not be pin-pointed as a distinct style because it was uniquely his own. He formulated a synthesis of natural and man-made resources that extended beyond the architecture of the building. Kelly created spatial relations between the building, dome and its surroundings (HIST 005). The transparency of glass curtain walls – a minimalist solution popularized by Mies van der Rohe - built open, light and airy spaces blurring the lines between the physical boundaries of the building and the outdoors and creating a new dimension. Kelly favored the philosophy of Frank Lloyd Wright known as organic architecture as well, whereby the relationship between the architecture and its surroundings is of particular importance. Kelly experimented with organic forms such as the semicircular building shape, spherical forms and the dome design.

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<sup>17</sup> "A History of the American Society for Metals." 1963: 23.

<sup>18</sup> *Dedication September 14, 1960: The National Headquarters of the American Society for Metals.* Russell Township: American Society for Metals, 1960.

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Kelly also emphasized technology and new construction as found in the glass glazing of some of the first floor walls that has been butted directly into the concrete, or in his huge, 390 feet long by 13 feet high, stainless steel sunshade along the top main façade, which was the first of its kind ever constructed in a large size like this.<sup>19</sup> According to a press release by the Stainless Steel News Bureau ca. 1958, the stainless steel sunshade “was designed only after exhaustive solar studies were made based on a report prepared by the School of Architecture of Princeton University that was sponsored by the Committee of Stainless Steel Producers. For every daylight hour throughout the year this unusual screen will effectively control both the temperature and the lighting of the building except at exactly 4:30 P.M. on December 21, when the sun will be at its lowest point in the sky.”<sup>20</sup>

At the same time, ASM’s identity, with the focus on metals of any kind, was incorporated into the fundamental building concept. The “national headquarters was designed to symbolize the world of metals, from the raw elements of the earth to the achievements of man’s imagination in the use of these elements. The symbolization is intended as a dramatic educational display of the wonderful things man has been and will be able to do with the metals with which he works. From the metal-bearing ores in the Mineral Garden to the surmounting Geodesic Dome, metals are everywhere and everything in Metals Park.”<sup>21</sup> It was intended to “focus attention on this new period and on the amazing strides being made by man as he utilizes his mineral resources.”<sup>22</sup>

Project architect Kelly understood ASM’s unique and innovative qualities and reflected these values by choosing an ultra-contemporary building and dome design. Modern stylistic elements carry through the interior design as well, for example, use of metals throughout to reflect ASM’s work as an organization, minimal and simple office designs with predominantly neutral colors, open floor space, modern furniture and avant-garde, spherical fixtures. A description of the building interior reads: “A blending in furniture and fixture design of contemporary and traditional concepts imparts a classic simplicity pleasing to the eye. The subdued use of colors enhance the rich tones of nature outside. Occassionally, a bright decorative hue forms a keyed accent for contrast to the metals that mark the interior.”<sup>23</sup>

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<sup>19</sup>“Two Geodesic Domes.” *Architectural & Engineering News* (March 1960): 12-16.

<sup>20</sup> Dowling William D. “4,000 ‘Eyelashes’ Will ‘Blink’ Only Once a Year on New Headquarters Building of the American Society for Metals” *Stainless Steel News Bureau* c. 1959.

<sup>21</sup> “A History of the American Society for Metals.” Draft from Western Reserve Historical Society Archives. 1963.

<sup>22</sup> “ASM Press Kit: American Society for Metals New Headquarter Building Facts and Figures.” 1959.

<sup>23</sup> “ASM Press Kit: Major Architectural Features.” ca. 1959/1960.

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ASM set groundbreaking trends in the field of metals and materials, reaching a peak by the 1950s. The Modernism of the building is the most appropriate expression of the society at that time. "Modern Architecture has emerged against a setting of major social and technological transformations"<sup>24</sup> expressed by the use of non-traditional design elements such as shapes and materials. "The modern movement was a revolution in social purpose as well as in architectural forms."<sup>25</sup> Modern architecture experimented with new materials, construction processes and built with advanced engineering techniques. "The engineer emerged as an important role model for the architect."<sup>26</sup> So, it is no surprise that Kelly, a Modern architect, best understood the society's mission.

John Terence Kelly was a noteworthy architect and native of Elyria Ohio. He was a very private man who wrote and spoke little about his career. Few know of his accolades, including working closely for some time with famed U.S. Modern architect Phillip Johnson in New York City, teaching at Western Reserve University's Cleveland School of Architecture, or studying under the famed modernist Walter Gropius at Harvard University.<sup>27</sup>

He attended Carnegie Institute of Technology for his bachelor's degree in architecture, where he studied with other talented artists and designers at the time such as Andy Warhol. He earned his master's degrees in architecture in 1951 and landscaping in 1952 from Harvard University. After traveling and studying in Europe under the Charles Eilott Norton fellowship from Harvard and Fulbright scholarship, Kelly returned to Cleveland.

He started out his Cleveland work as one of the chief designers at the firm Outcalt-Guenther-Rode-Bonebrake with other prominent modern architects. The architectural climate of Cleveland at the time was ultra-conservative, and he and his co-workers were often challenged by city officials in their design and construction ideas.<sup>28</sup> Kelly was very reluctant to compromise his design ideas, which occasionally put him in conflict with employers, clients, and co-workers. He always strived to remain true to his design philosophies. He was described as an architect "who would rather design than sleep, and would rather starve than compromise his ideals."<sup>29</sup>

Despite these conflicts, his work in Cleveland did not go unappreciated. He was awarded the 1968 Cleveland Arts Prize for Architecture, given to "those visionary individuals who take our aspirations and give

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<sup>24</sup> Curtis, William J. R. *Modern Architecture since 1900*. 3<sup>rd</sup> ed. London: Phaidon Press, 1996. 13.

<sup>25</sup> Curtis, William J. R. *Modern Architecture since 1900*. 3<sup>rd</sup> ed. London: Phaidon Press, 1996. 15.

<sup>26</sup> Robbin, Tony. *Engineering A New Architecture*. New Haven: Yale UP, 1996. ix.

<sup>27</sup> Interview with Michael Benjamin, Architect, Cleveland, Ohio, 29 June 2009.

<sup>28</sup> Gibans, Nina Freedlander. *Cleveland Goes Modern: Design for the Home 1930-1970*. n.p. 2007.

<sup>29</sup> Vanac, Mary. "John Kelly, Famed Architect, was WWII Vet, Elyria Native." *Plain Dealer* 24 Dec. 2007: B5.

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them form—in stone and glass and wood and steel—urging us both to meet our future and to save the best parts of our past.”<sup>30</sup> He was and still is a well-respected member of the architectural community and influenced the local architects that he worked with.<sup>31</sup> He and his work were also given national recognition. Twice he was asked to be an AIA Fellow, both times turning down the position. Many of his designs were highlighted and honored in national publications such as *Architectural Record* (1962), *Architectural Forum* (1960), and *Progressive Architecture* (1959). Kelly was also nationally known for his work on the ASM dome and headquarters building<sup>32</sup>, which was featured in *Architectural Forum* (1960) and *Architectural Record* (1959).

In 1954, Kelly opened his own office in Cleveland. His earliest work included a Master City Plan for the village of Vermillion, and the White residence in Hudson, (REF 001) where Kelly demonstrated his sensibility to a structure’s surroundings by integrating a contemporary house into one of the historically important villages of Ohio, while maintaining harmony with nearby old Colonial houses.<sup>33</sup> Kelly’s “hexagonal ‘space-age’”<sup>34</sup> AIA House for the 1960 Home and Flower Show presented his ahead-of-time ideas and his ambition to educate the public—still remembered for its uniqueness after thirty-some years later. The McDonald residence (1964) (REF 002) in Elyria, which was featured in Carole Rifkind’s *A Field Guide to Contemporary American Architecture*, a reference guide that takes a look at the evolution of American architecture, and the Ford House (1962) in Huntington Valley were two of Kelly’s most notable residential works. Kelly was also known as the architect for the Walden community in Aurora, a unique naturalistic development that started out in 1970 and expanded for a period spanning multiple decades. He designed Walden’s Inn and Spa, “the only AAA five-diamond inn and spa in the Midwest”<sup>35</sup> and most homes at Walden. It was in these homes, according to fellow architect and long-time friend Michael Benjamin, that Kelly began to develop a residential style that featured steeply pitched roofs and large areas of glass.<sup>36</sup>

On the whole, however, Kelly’s architectural ideas didn’t follow a distinct style. Rather, he envisioned a particular design that was client-and site-specific.<sup>37</sup> While Kelly did ascribe to some Modernist aesthetics and studied prominent Modern architects like Frank Lloyd Wright, Mies van der Rohe, and Walter Gropius, he always strove to create something unique and original with each new project.

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<sup>30</sup> *Cleveland Arts Prize*. <http://clevelandartsprize.org/>. Accessed Mar. 2009.

<sup>31</sup> Interview with Nina Gibans, Local Historian, Cleveland, Ohio, 29 June 2009.

<sup>32</sup> “John Kelly to Design Cleveland AIA House.” *Lancaster* 12 Oct. 1959: 26.

<sup>33</sup> “Five ‘Good Neighbor’ Houses of Contemporary Design.” *Architectural Record* 126 (Nov. 1959): 185-191.

<sup>34</sup> Lubinger, Bill. “Model House Filled with Design Ideas.” *Plain Dealer* 20 Feb. 1993: 5.

<sup>35</sup> Theiss, Evelyn. “Lose Track of Time Inside Spa Walden: The Point is to Feel Relaxed While Getting a Massage or Scrub.” *Plain Dealer* 18 Feb. 2009: E3.

<sup>36</sup> Interview with Michael Benjamin, Architect, Cleveland, Ohio, 29 June 2009.

<sup>37</sup> Interview with Nina Gibans, Local Historian, Cleveland, Ohio, 29 June 2009.

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However, there are a few distinguishable themes and principles in his work. In a 1955 *Plain Dealer* interview, Kelly explained that underlying his designs were the beliefs that “each design problem demands its own reasoned solution”, and “building materials should be used to express their beauty and function.”<sup>38</sup> These ideas are expressed both in his residential and commercial works, including the ASM headquarters.

Kelly could best be described as a purist. He favored good, simple, strong designs and good, clean lines. His decorations were minimal, but he paid severe attention to detail, often hand-designing details such as door hardware or fixtures himself.<sup>39</sup> He could not be called strictly a minimalist, for he included some details that served no function other than decoration. The ASM dome, in fact, is one such detail, in that it was never intended to be covered or serve a functional purpose, but rather had a strictly aesthetic intent.

Kelly also created contextual structures. Like his White Residence in Hudson and the ASM Headquarters and Geodesic Dome, he wanted his buildings to become a part of their surroundings. His structures would often blend the interior and exterior environments through the use of large glass curtains and walls and the use of organic lines and forms that characterize his work.

Throughout Kelly’s 60-year career, he designed and/or built numerous structures including corporate offices, storefront buildings, city plans, gardens, senior homes, condominiums, and homes in Ohio, Massachusetts, Toronto, Florida, West Virginia, Wisconsin, and Virginia. “Considered by some to be a successor of Frank Lloyd Wright,”<sup>40</sup> Kelly’s architectural approaches in exploring new ideas, integrating a structure as a part of its surroundings, and showcasing building materials’ forms and functions were expressed throughout his work including the ASM Headquarters Building.

The majority of his work was in Ohio, as Kelly believed he had a duty to Cleveland, declining an offer from R. Buckminster Fuller to work with him on his international projects, instead saying that “Cleveland needed his talents more.”<sup>41</sup> His work in Cleveland was primarily residential, and the ASM Headquarters Building, one of Kelly’s few commercial projects, was and is one of his most prominent and nationally-recognized works.

The building and dome are of outstanding and exceptional architectural quality designed to satisfy the needs of a client while still fulfilling Kelly’s architectural vision. Kelly was able to maintain his innovative design ideas for the project with the exception of one compromise as he mentioned during his 1988 AIA Interview, which he “really didn’t like—and it was powerless to stop...”<sup>42</sup> He had originally intended for

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<sup>38</sup> Vanac, Mary. “John Kelly, Famed Architect, was WWII Vet, Elyria Native.” *Plain Dealer* 24 Dec. 2007: B5.

<sup>39</sup> Interview with Michael Benjamin, Architect, Cleveland, Ohio, 29 June 2009.

<sup>40</sup> Vanac, Mary. “John Kelly, Famed Architect, was WWII Vet, Elyria Native.” *Plain Dealer* 24 Dec. 2007: B5.

<sup>41</sup> Binder, Janet. “Groundbreaking Architect Kelly Still Designing at 80.” *Connection* (Spring 2003): 7.

<sup>42</sup> AIA Interview with John Terence Kelly, 1988

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the giant sunscreen to be copper. As he explains in the interview: “I was summarily summoned to the Duquesne Club in Pittsburgh and told in not uncertain terms over a very short, polite lunch by one of the leading steel executives in the country at that time that certainly I would to make that screen out of stainless steel because they support the institute. So it became stainless steel. Which I think is too bad in retrospect.”<sup>43</sup>

Kelly also referred to the ASM Headquarters Building as “the kind of challenge for which an architect will wait a lifetime.” He believed that an architect’s job was “to synthesize his society’s thoughts and actions in terms of building”, and in ASM he saw a client who “not only encourages creative design, but who has shown patience while one evolves the design to a state of working perfection.”<sup>44</sup> He sought to design a structure for ASM that would symbolize man’s power of transmuting raw metals into soaring expressions of art, science, and engineering wonder. At the same time, he wanted a structure that would complement the beautiful, tranquil, majestic quality of the site; something that would stand as a positive statement of man in nature.

Kelly sketched out his architectural interpretation on a piece of paper—“a partial horizontal line with a concave shape in the middle and back to a horizontal line and then put a semi-circle over it. And in my mind I immediately saw the horizon where man is, the scooped out void in the center represented to me the minerals that man uses and through his technology uses things like a dome or a lattice over a garden.”<sup>45</sup> To achieve this end, he created a site and building design for ASM with four components: a garden piazza, a sunken mineral garden, the building proper, and an open-air geodesic dome. It was a stroke of genius on Kelly’s part to include the dome which served no functional purpose, only aesthetic, for in doing so he created more than just an office space in the Modern style; he created an entire concept unique to the site. For assistance with the geodesic dome, Kelly turned to R. Buckminster Fuller and his geodesic dome concept.

In addition to being an inventor, engineer, architect, mathematician and philosopher, Fuller was also a humanitarian who believed in the survival of mankind against whatever odds through ingenuity. He is quoted as having said, “We’re at the point where humanity has the option to make it.”<sup>46</sup> He also strongly believed that “man’s environment plays a large role in the development of human nature, which in turn affects man’s environment” and so “decided to improve upon our environment.”<sup>47</sup>

<sup>43</sup> AIA Interview with John Terence Kelly, 1988

<sup>44</sup> Kelly, John Terence. “Observations by John Terence Kelly.” Cleveland, n.d.

<sup>45</sup> “John T. Kelly Interview by Stanley Garfinkel: Cleveland Architects.” 23 July 1987.

<sup>46</sup> “A Man Who Believed in Mankind: R. Buckminster Fuller: 1895-1983.” *Time* (11 July 1983): 71.

<sup>47</sup> Yarnall, William. *Dome Builder’s Handbook No.2*. Philadelphia: Running Press, 1978. 14.

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In his early thirties, Fuller found himself redeemed from thoughts of self-destruction by a personal vision in which he told himself “You do not have the right to eliminate yourself. You belong to the Universe.”<sup>48</sup> Following that episode, he dedicated his life to the principle that, to prosper in the years to come, humanity must learn to “do more with less”. This belief led to his development of the geodesic dome, for which he received a patent in 1954. He believed that the dome could solve the world’s housing crisis as it was the strongest manmade structure that did not require internal support, and was the lightest, most efficient and cost effective structure that could be made in metal.<sup>49</sup>

Fuller, born and raised in Milton Massachusetts, entered Harvard University in 1913, from where he was later twice expelled. Although Fuller held no formal education in architecture or engineering, he received a total of 28 US patents and 47 honorary doctorates<sup>50</sup> and numerous awards, including the Gold Medal award from the American Institute of Architects. After the revelation that saved his life, Fuller decided to “dedicate(s) himself as an individual to the service of humanity”<sup>51</sup>, beginning with his 1928 invention of air-deliverable and mass-producible dwelling units, Dymaxion House—“A house on a mast.” Dymaxion House was widely exhibited and published and this invention bought Fuller his first fame.<sup>52</sup>

Although the first geodesic dome was built for the Carl Zeiss Planetarium in 1922 in Germany, Fuller is regarded as the inventor of geodesic dome, who independently developed and popularized the domes in the United States in 1950s.<sup>53</sup> Fuller was also the first to apply “the word geodesic to this type of...framework.”<sup>54</sup>

The basic form of the dome comes from nature and is based on principles of tension and compression. “Nature often employs geodesic structure for maximum strength and protection”.<sup>55</sup> For example, the eye balls of tiny single cell ocean organisms are geodesic, enabling them to withstand deep sea pressures. So, the dome is a truly organic design. Fuller’s geodesic domes use pyramid-shaped tetrahedrons to attain great strength without internal supports and to cover more space with less material than any other building ever designed. The

<sup>48</sup> “A Man Who Believed in Mankind: R. Buckminster Fuller: 1895-1983.” *Time* (11 July 1983): 71.

<sup>49</sup> “Introduction to Buckminster Fuller.” *Buckminster Fuller Institute*.

[http://bfi.org/our\\_programs/who\\_is\\_buckminster\\_fuller/introduction\\_to\\_buckminster\\_fuller](http://bfi.org/our_programs/who_is_buckminster_fuller/introduction_to_buckminster_fuller). Accessed Apr. 2009.

<sup>50</sup> “R. Buckminster Fullers 28 Patents.” *Buckminster Fuller Institute*. <http://bfi.org/node/75>. Accessed Apr. 2009.

<sup>51</sup> Sieden, Lloyd Steven. *Buckminster Fuller’s universe: an appreciation*. New York: Plenum Press, 1989. 422.

<sup>52</sup> Kelly, Sean. et al. “Global Outlook.” *Artforum* (Nov. 2008)

<sup>53</sup> “What are Geodesic Domes?” *WiseGeek*. <http://www.wisegeek.com/what-are-geodesic-domes.htm>. Accessed Apr. 2009.

<sup>54</sup> “Geodesic Domes and Charts of the Heavens.” *Tela Communications*. <http://www.telacomunications.com/geodome.htm>. Accessed Apr. 2009.

<sup>55</sup> Baldwin, J. *Bucky Works: Buckminster Fuller’s Ideas for Today*. New York: Wiley, 1996. 69.

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geodesic dome is unique among structures in that every part of it works together synergistically to give it strength. For this reason, Kelly's use of the geodesic dome for ASM's new headquarters was seen as an appropriate symbol of the different members and chapters of ASM – each integral part providing knowledge to strengthen the whole.

Buckminster Fuller co-founded Synergetics, Inc. in 1955 to research and design commercial structures. The history of Synergetics, Inc. is the history of Buckminster Fuller's realization of his geodesic dome transformed into commissions and designs. Fuller's connections with the men associated with Synergetics, Inc. begins in 1949. James Fitzgibbon was an architect and a professor at North Carolina State College in 1949. Buckminster Fuller was teaching nearby at Black Mountain College the summer of 1949, experimenting with new design ideas, such as geodesic domes. Fitzgibbon invited Fuller to guest lecture that fall at NC State College. Fuller's lectures were so inspiring, he began small study groups. T. C. Howard was one of the design students in Fuller's group. Fuller's ideas intrigued the faculty as well. Duncan Stuart, Manuel Bromberg and James Fitzgibbon began collaborating with Buckminster Fuller outside of the school. They began experimenting and designing under Fuller's company Fuller Research Foundation. Fitzgibbon quit teaching and opened an office in Raleigh, NC, Skybreak Corporation, to work on Fuller projects full time. Fuller never lived in Raleigh. He began lecturing around the world. Fitzgibbon became his executive vice president. Duncan Stuart was the mathematician. T. C Howard was one of the designers.<sup>56</sup>

Fuller invited T.C. Howard and two other students to intern the summer of 1952 in New York where Fuller was living at the time. George Nelson provided Fuller with office space. They had been commissioned to build a small geodesic dome for the Museum of Modern Art (MOMA). George Nelson was to provide the interior furnishings for the MOMA dome. Fuller was contacted by the Ford Motor Company about covering their Ford Rotunda originally built for the 1933 World's Fair and later moved to Dearborn, Michigan. Fuller quit working on the MOMA project and had his team start designing the Ford Rotunda dome. T.C. Howard helped build a model for Fuller to present to the Ford Foundation. They liked the design and commissioned Fuller to cover the Rotunda with a dome using the octet truss design. It was built in 1953, with T.C. Howard as the designer.

With the construction of the Ford Rotunda Dome, came more interest in light weight portable structures and domes. The U. S. Marine Corps wanted domes to be lifted by helicopters and moved as shelters. In 1954, Fuller founded Geodesics, Inc. to handle the military designs. James Fitzgibbon was put in charge of the Raleigh based company. In 1955, Synergetics, Inc was formed by the same group of designers in Raleigh for commercial work. Fuller was President and Fitzgibbon was executive Vice President of both companies. T.C.

<sup>56</sup> The information about the history of Synergetics, Inc. and relationship with R. Buckminster Fuller prepared by Katrina Howard Fairley, sent by email to Barbara Powers, May 4, 2011. [www.bfi.org/about-bucky/buckys-big-ideas/](http://www.bfi.org/about-bucky/buckys-big-ideas/).

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Howard was Vice President in charge of design and was the primary designer for Synergetics, Inc. Buckminster Fuller used the work of the original Fuller Research Company to obtain a patent for the geodesic dome. The patent was granted to Fuller in 1954. Geodesics, Inc. and Synergetics, Inc. were Fuller's original licensees. All geodesic dome designs had to show Buckminster Fuller's patent number.

Fuller became more popular and began working with other companies around the world. In 1958, he stepped down as president and sold his shares of stock in Synergetics, Inc. to James Fitzgibbon, T.C. Howard and J. F. Barnwell. Fitzgibbon became president of the company. The same time the ASM Dome was being built. T.C. Howard had just graduated from NC State College with a B. S. in nuclear engineering and he had become a licensed architect. The engineering firm and construction company Gillmore-Olson was hired to construct the ASM geodesic dome; Gillmore-Olson contracted with Synergetics, Inc. to design the dome. T.C. Howard was the ASM project designer and architect for Synergetics, Inc.; the consulting engineer was Dr. M. E. Uyanik and Synergetics, Inc.'s field representative during construction was architect James T. Quinn.

Fitzgibbon stepped down as president of Synergetics, Inc. in 1968 when he left the company to teach at Washington University in St. Louis, Mo. T. C. Howard took over. Barnwell took charge of Synergetics, Inc's leasing and manufacturing company, Charter Industries, Inc. T.C. remained president and primary designer, architect, and engineer of Synergetics, Inc. until he retired and closed Synergetics, Inc. in 2006.

Thomas C. Howard was born July 24, 1931 in Denver, NC. His father was a construction contractor. Howard learned and worked on construction projects from an early age. He attended North Carolina State College, now NCSU in the school of design from 1949 to 1953. T. C. Howard was drafted in 1953-1955 in the Army. In 1955, working at Synergetics full-time and going to school, Howard switched majors to Nuclear Engineering. He graduated in 1958 with a B. S. in Nuclear Engineering also passing the Architectural exam. Some of T.C. Howard's geodesic dome designs for Synergetics, Inc. are: the 1956 U.S. Government portable geodesic domes, Kabul, Afghanistan (100 foot dome); 1958 Union Tank Car Geodesic Dome, Baton Rouge, LA (384 foot welded steel dome, largest clear span structure at the time); 1960 The Climatron, Missouri Botanical Garden (175 foot greenhouse dome, first use of Plexiglas); 1962 Seattle World's Fair, Ford Motor Company Pavilion, the "Cube Cloud" and the "Bubbleator" exhibit in the Century 21 center and the Boeing Spacearium; 1964 New York World's Fair, "Tower of Light" Pavilion, the Assembly Pavilion tented dome (later converted to the NY Queens Zoo Aviary); and 1972-4 Poliedro de Caracas, Venezuela (469 foot dome sports arena, largest clear span structure at the time).<sup>57</sup>

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<sup>57</sup> Email correspondence to Barbara Powers from Katrina Howard Fairley, March 1, 2011.

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The first commercial application of Fuller's geodesic dome was for Ford Motor Company's Rotunda at Dearborn, Michigan in 1953 (REF 003)—an aluminum frame with a plastic skin spanning 93-foot in diameter. In the mid-1950s, the application of the Fuller dome expands into military-use for the U.S. Marine Corps and the U.S. Air Force. The Marine Corps used air-delivered domes for temporary shelter (REF 004), while the geodesic "radomes" (REF 005) were used as offensive weapons by the Air Force at the Arctic perimeter. The use of the geodesic dome was monumental in both applications for its mobility by helicopter and structural stability. The radomes were "designed to protect delicate radar from the extremely harsh weather conditions in a non-metallic structure."<sup>58</sup> During this period, the geodesic dome also served as a symbol of superior American capitalism and democracy over communism.<sup>59</sup>

Fuller's Union Tank dome (REF 006) built in 1958 in Baton Rouge, Louisiana, is also important in that it was the largest geodesic dome of this period. Union Tank Car Company built this steel 384-foot dome to house its railway cars for repair and repainting. "Fuller noted that the entire cathedral of Seville could fit comfortably inside the Baton Rouge dome, yet the completed structure weighed only as much as four of the more than one hundred stone columns that made up the structure in Seville."<sup>60</sup> Fuller's most famous and beautiful dome was USA Pavilion at the 1967 Montreal Expo (REF 007), a 250-foot three-quarter geodesic sphere with transparent skin of acrylic panels, which later was burned by an accidental fire and left the dome to be an open lattice dome. The pavilion housed a multilayered structure of exhibitions on American culture and attracted World's Fair attendance in a record of 5.3 million people in six months and "was an unequalled monument to the American Century."<sup>61</sup>

Two geodesic domes based on Fuller's design are listed on the National Register of Historic Places. The R. Buckminster Fuller and Anne Hewlett Dome Home (REF 008) in Carbondale, IL where the Fullers resided from 1960 to 1971, was built under license by Al Miller of Pease Woodworking Co. in 1960. This dome was the only dome home the Fullers lived in and a prototype for numerous dome homes to follow.<sup>62</sup> The Citizens State Bank, also referred to as Gold Dome Bank, (REF 009) in Oklahoma City, Oklahoma, was built in 1958 by Donald Richter of Kaiser Aluminum, a former pupil of Fuller. Kaiser was one of Fuller's early licensees and

<sup>58</sup> Gorman, Michael John. *Buckminster Fuller: Designing for Mobility*. Italy: Skira, 2005. 126.

<sup>59</sup> Gorman, Michael John. *Buckminster Fuller: Designing for Mobility*. Italy: Skira, 2005. 126.

<sup>60</sup> Gorman, Michael John. *Buckminster Fuller: Designing for Mobility*. Italy: Skira, 2005. 132.

<sup>61</sup> Kelly, Sean. et al. "Global Outlook." *Artforum* (Nov. 2008)

<sup>62</sup> Gatlin, William M. "Fuller, R. Buckminster and Anne Hewlett Dome Home." National Register of Historic Places Nomination. Cape Girardeau, Missouri, 2005.

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also the supplier of aluminum components for the Ford Dome. The “gold-colored, anodized aluminum geodesic dome”<sup>63</sup> was used as a roof for the bank facility. Following Fuller’s 1954 patent, in just seven years, by 1961, “over two thousand geodesic domes are (were) produced by over one hundred companies which have been licensed by Fuller.”<sup>64</sup> Today, more than 300,000 geodesic domes exist<sup>65</sup> in various forms including playground equipment, sports arenas, exhibition halls, homes, museums, and weather stations. Fuller’s domes can be found throughout the world.

The geodesic dome at Materials Park is unique, however, for its “Space Lattice” design that consists of two identical domes 30 inches apart, one within the other to achieve stability. The dome is constructed of about 12 miles of 4 inch and 6 inch, Type 6061-T6 extruded aluminum in a hexagon design. The dome stands 103 feet, or 11 stories, high, is 274 feet in diameter, and weighs 80 tons. It is also the largest dome of its kind in the world.<sup>66</sup> It is made up of 65,000 parts. It is designed to withstand an 8 inch coating of ice and 500 mph winds. It is supported by a minimal five pylons – an engineering marvel – up to 77 feet below ground surface. A tension ring links the five pylons to resist the outward thrust of the dome. The tension ring, located 18 feetbeneath ground level, consists of four 1 ½ in. No.11 reinforcing bar rods. These bar rods required some 300 man-hours of welding, and the stress on the tension ring is calculated to be 125,000 lbs. “The erection procedure for the dome involved placing and bolting of the ‘bridges’ between the pylons and then lifting the hexagons, in horizontal sections, into place with booms.”<sup>67</sup>

The dome design was further special and unusual because it was built to never be covered or enclosed. Its purpose was “purely aesthetic and symbolic”<sup>68</sup>. Unlike most of Fuller’s other domes, it was not a functional structure intended to provide shelter. Rather, it was designed as a sculptural element that helped to fully integrate the building and gardens in Kelly’s concept for the overall ASM Headquarters site plan. “Perhaps it could be considered a tremendous architectural detail—probably the largest ever.”<sup>69</sup> The dome, with its sculptural rather than functional value, together with the building is a one of a kind design. The ASM dome, one of the early commercial applications of the geodesic dome, was and is considered an immense accomplishment of construction and metals-engineering at the time, “since a perfect sphere is most difficult to achieve.”<sup>70</sup> It fascinated “laymen as well as experts in architecture and the construction industry”<sup>71</sup> equally. According to both

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<sup>63</sup> Savage, Cynthia. “Citizens State Bank.” National Register of Historic Places Nomination. Pocasset, Oklahoma, 2002.

<sup>64</sup> Sieden, Lloyd Steven. *Buckminster Fuller's universe: an appreciation*. New York: Plenum Press, 1989. 429.

<sup>65</sup> “The Wonder of Geodesics.” *Authentic Business*. <http://www.authenticbusiness.co.uk/archive/geodesics/>. Accessed Apr. 2009.

<sup>66</sup> Dunbar, Wilbur L.. “Ohio’s 11-Story Geodesic Dome Seems to Float.” *New York Times* 1 June 1969: XX15.

<sup>67</sup> “ASM Press Kit: American Society for Metals New Headquarter Building Facts and Figures.” 1959.

<sup>68</sup> “Two Geodesic Domes.” *Architectural & Engineering News* (March 1960): 12-16.

<sup>69</sup> “Two Geodesic Domes.” *Architectural & Engineering News* (March 1960): 12-16.

<sup>70</sup> “Two Geodesic Domes.” *Architectural & Engineering News* (March 1960): 12-16.

<sup>71</sup> “Two Geodesic Domes.” *Architectural & Engineering News* (March 1960): 12-16.

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Thomas T.K. Zung, one of Fuller's former architectural partner<sup>72</sup>, and Allen Ray Putnam, ASM's Managing Director after Eisenman's death who oversaw the completion of the construction for ASM, this dome was "Fuller's favorite dome"<sup>73</sup> as represented in Fuller periodical visits during (HIST 006) and after construction<sup>74</sup> and his last visit just over a year before his death in 1983.<sup>75</sup>

To Fuller, this dome was representative of "a new industrial world forming" as "for here the notion of doing more with less...is dramatized by the dome's open structure which is pure system integrity...the dome was fabricated by the most powerful of the aircraft corporations."<sup>76</sup> To Kelly, it stood as a "forthright statement of the advances made in the alloying sciences, and as a realization of Fuller's concept of advancing technology's over-all trend to invisibility."<sup>77</sup> To Eisenman, the dome was representative of the ASM of tomorrow and of the metallurgical world. The five support pylons represented education, research, engineering, production, and management, all of which support the whole metals industry. The lacy structure of the space lattice resting atop the pylons symbolized how intimately connected all of those facets of the metals industry are. Starting at any one point on the structure, one is able to get to any other point by either direct or devious route. They are all inextricably linked together and dependent upon one another.

The dome and headquarters building also stand as symbols of man's mastery over his mineral resources and modern metals technology. Throughout history, man has been defined by his use of the materials in his environment, and the artifacts and structures he leaves behind to reflect changing trends in materials technology. The raw materials in the Mineral Garden are a reminder of the resources man can find within his environment, while the structure and building serve to remind of the achievements man has made through advancements in technology due to the spread of knowledge – one of ASM International's continued foci.

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<sup>72</sup> Giovanetti, Rego, Communications Officer, ASM International, Materials Park, Ohio. Phone Interview with Thomas T.K Zung, 24 June 2009.

<sup>73</sup> Carey, Allison. "What's the Deal with...The Geodesic Dome?" *Plain Dealer* 15 October 2007: B3.

<sup>74</sup> "Kelly, Sean. et al. "Global Outlook." *Artforum* Nov. 2008: Cover Photo.

<sup>75</sup> Putnam, Allen Ray. "The Evolution of ASM...ASM Historical Perspective." Slide presentation excerpts. ca. 1988. Email correspondence to Barbara Powers from Katrina Howard Fairley stated that ASM consulted with Synergetics, Inc. over the years to inspect the geodesic dome. T.C. Howard would often be seen climbing the 11 story dome. Fuller's Cleveland partners had held a memorial service Fuller at the ASM Headquarters since it had been Fuller's favorite dome. Howard, unaware of the memorial, was inspecting the dome at the time; was introduced by Putnam as the designer of the ASM dome.

<sup>76</sup> Fuller, Buckminster. *Buckminster Fuller: Anthology for the New Millennium*. Ed. Thomas T.K. Zung, New York: St. Martin's Press, 2001. 41.

<sup>77</sup> Fuller, Buckminster. *Buckminster Fuller: Anthology for the New Millennium*. Ed. Thomas T.K. Zung, New York: St. Martin's Press, 2001. 38.

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The structures found at Materials Park are also representative of the design philosophies of the men involved. Kelly worked to design a structure that expressed ASM's organizational philosophies and at the same time reflected his architectural ideas. He succeeded in creating a structure that was ahead of its time and that borrowed from Modern design principles while still remaining a style that was uniquely his own.

Fuller's humanist philosophies about mankind's ability to survive through working with rather than against one another and the surrounding environment are also reflected in the design of the dome – a design borrowed from nature that relies upon synergy, balance, and each individual part contributing to the integrity of the whole. In terms of efficiency, too, Fuller's ideas were ahead of its time, and is significant in that as realized by the design work of Synergetics, Inc., it serves as an example for sustainable design ideas being used in design and construction today.

Eisenman can be credited for the remarkable vision that encouraged the building's bold design. His faith in metals and materials engineering and his desire to reflect the ASM of the future in the new headquarters were key forces driving the concept for the new site and building.

The progress that ASM International has made in the past fifty years and the changes that it has undergone are strongly tied to and representative of broader trends in American trade, manufacturing, and commerce. ASM, with its beginnings in steel manufacturing information, was closely tied to the Industrial Revolution. Today, its focus still lies on publishing, consolidating and sharing information to further improve the standards of materials engineering, design, processing, and fabrication, thus improving the standard of life through the dissemination of knowledge. This idea of shared knowledge to improve the quality of our lives is deeply reflective of the Information Revolution in which we live today.

It is very rare that the lineage of an organization can trace American history as well as ASM International's can. It is even rarer that this lineage can be so clearly traced in a single building and site design. William H. Eisenman showed his perspicacity by commissioning a structure that reflected not only ASM, but also broader trends in metallurgy. Kelly's one-of-a-kind design ideas, in conjunction with the geodesic dome helped to create a site that is of significant historical importance, for it represents the work and design ideas of local architect Kelly, internationally-known inventor and philosopher, Fuller, architect T.C. Howard, engineer M.E. Uyanick, as well as the history and mission of the ASM International, which has been so closely linked to American history and development. Eisenman therefore brought about a design, with the help of Fuller and Kelly, that encapsulated a transition era in American history. The combined ideas and efforts of these men came together to create a structure that serves to define an era in American history whose results are still in effect today.

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Architecture and design reflect broader social and cultural trends. Form follows culture, and architecture serves as a cultural instrument. In this way, the structures found at Materials Park, Ohio and their concept and design are historically significant in that they are outstanding representations of Modern architecture and the ideas that it embodied. More importantly, however, they reflect the ideas and philosophies of the men involved in the design and conception. It is within these philosophies, as represented by the structure, that one can truly get a sense of the ingenuity, optimism, inspiration, and enterprising spirit that defined America during the Industrial Revolution, and continue to define the nation today as it moves forward into the future.

The ASM headquarters and dome remains an important local landmark with historical significance. The significance lies in its concept and how that represents the work and philosophies of the men involved in its design, as well as ASM's goals and mission as an organization. The headquarters building is an unusually well-preserved example of Modern architectural styles, while the dome stands out amongst Fuller's other domes for its sheer size and its intent as an aesthetic rather than functional structure, making it very rare. These structures come together with the surrounding environment and gardens to create an overall design concept that is completely unique to the ASM International Headquarters.

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Exhibit 1

Boundary Description – Aerial area map to scale with parcel boundaries documenting historically significant structures- ASM Headquarters, Geodesic Dome and garden area with Mineral Garden- in relation to overall property. Boundary for nominated property is identified by thick solid line.

Exhibit 2

Site Plan

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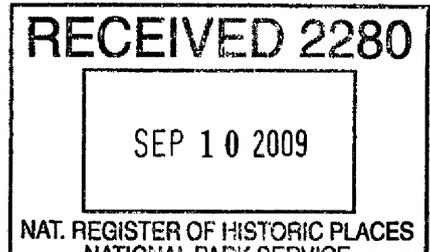
Historic Photographs

- | Photo #  | View   |
|----------|--|
| HIST 001 | Construction workers connecting a dome section   |
| HIST 002 | Middle section of the dome being erected with cranes   |
| HIST 003 | The center and final section of the dome being lifted to complete the dome   |
| HIST 004 | William H. Eisenman(left) and John Terence Kelly(right) viewing a concept sketch   |
| HIST 005 | John Terence Kelly's conceptual sketch   |
| HIST 006 | Buckminster Fuller(2 <sup>nd</sup> from right), Kelly(2 <sup>nd</sup> from left) and others overseeing construction of the dome  |
| HIST 007 | Aerial view of the dome and building on completion of construction   |
| HIST 008 | View of building's inner arch  |
| HIST 009 | View of original mineral garden  |
| HIST 010 | View of guest plaza and West façade during construction  |
| HIST 011 | Guest plaza  |
| HIST 012 | Original garden level work space across cafeteria  |
| HIST 013 | Cafeteria  |
| HIST 014 | 1 <sup>st</sup> floor hallway North view towards main lobby area   |
| HIST 015 | Office space second floor  |
| HIST 016 | Garden Level cafeteria hall with sweeping hanging ceiling-fascia edged in bronze   |
| HIST 017 | Second floor uninterrupted sweep of hanging ceiling by use of glass from end of plaster partitions to mullions and/or to columns |
| HIST 018 | Second floor office partitions   |
| HIST 019 | Kelly's original garden concept  |

Reference Photographs: Other works of Buckminster Fuller and John Terence Kelly

- | Photo # | View   |
|---------|--|
| REF 001 | The White Residence, Hudson, Ohio<br>Source: Kelly, John Terence. <i>Work of the Office of Architect John Terence Kelly</i> . Lithograph, U.S.A. 1960. 4.                              |
| REF 002 | McDonald House; Elyria, Ohio 1961<br>Source: Rifkind, Carole. <i>A Field Guide to Contemporary American Architecture</i> . New York: Dutton, 1998. 13.                                 |
| REF 003 | Ford Dearborn Rotunda with Fuller's dome in place, 1953<br>Source: Gorman, Michael John. <i>Buckminster Fuller: Designing for Mobility</i> . Italy: Skira, 2005. 125.                  |
| REF 004 | U.S. Marine Corps helilifting a 55-foot Dome, 1954<br>Source: Gorman, Michael John. <i>Buckminster Fuller: Designing for Mobility</i> . Italy: Skira, 2005. 135.                       |
| REF 005 | Radome, Long Island, New York, 1955<br>Source: Gorman, Michael John. <i>Buckminster Fuller: Designing for Mobility</i> . Italy: Skira, 2005. 143.                                      |
| REF 006 | Union Tank Car Dome, Wood River, Illinois<br>Source: <a href="http://i30.photobucket.com/albums/c330/Barndad/dome1.jpg">http://i30.photobucket.com/albums/c330/Barndad/dome1.jpg</a> . |
| REF 007 | Montreal Expo '67 dome<br>Source: Gorman, Michael John. <i>Buckminster Fuller: Designing for Mobility</i> . Italy: Skira, 2005. 173.   |
| REF 008 | Fuller in his dome home, Carbondale, Illinois<br>Source: Gorman, Michael John. <i>Buckminster Fuller: Designing for Mobility</i> . Italy: Skira, 2005. 10.                             |
| REF 009 | Citizens State Bank, Oklahoma City, built by Kaiser Aluminum<br>Source: Gorman, Michael John. <i>Buckminster Fuller: Designing for Mobility</i> . Italy: Skira, 2005. 165.             |

United States Department of the Interior  
National Park Service



849

# 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 National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form*. 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 certification comments, entries, and narrative items on continuation sheets (NPS Form 10-900a).

### 1. Name of Property

Historic name ASM Headquarters and Geodesic Dome

Other names/site number Materials Park

### 2. Location

street & number 9639 Kinsman Road  not for publication

city of town Materials Park  vicinity

State Ohio code OH county Geauga code 055 zip code 44073

### 3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended,  
I hereby certify that this X 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 X meets     does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance:

    national   X   statewide     local

Barbara Power  
Signature of certifying official

September 1, 2009  
Date

Department Head, Inventory & Registration Ohio Historic Preservation Office, Ohio Historical Society  
Title State or Federal agency and bureau

In my opinion, the property     meets     does not meet the National Register criteria.

\_\_\_\_\_  
Signature of commenting official Date

\_\_\_\_\_  
Title State or Federal agency and bureau

### 4. National Park Service Certification

I, hereby, certify that this property is:

- entered in the National Register
- determined eligible for the National Register
- determined not eligible for the National Register
- removed from the National Register
- other (explain:)

for  
Signature of the Keeper Date of Action  
Edson W. Beall 10-22-09

**5. Classification**

**Ownership of Property**  
(Check as many boxes as apply)

- private
- public - Local
- public - State
- public - Federal
- private

**Category of Property**  
(Check only one box)

- building(s)
- district
- site
- structure
- building(s)
- object

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

Contributing	Noncontributing	
1		buildings
0		sites
1		structures
		Objects
		buildings
2	0	<b>Total</b>

**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

Subcategory: Organizational

-Professional Association

**Current Functions**  
(Enter categories from instructions)

Commerce/Trade

Subcategory: Organizational

-Professional Association

**7. Description**

**Architectural Classification**  
(Enter categories from instructions)

Modern Movement

**Materials**  
(Enter categories from instructions)

foundation: Reinforced concrete

walls: Glass curtain walls

roof: Asphalt

other: Steel construction

**Narrative Description**

(Describe the historic and current physical appearance of the property. Explain contributing and noncontributing resources if necessary. Begin with a **summary paragraph** that briefly describes the general characteristics of the property, such as its location, setting, size, and significant features.)

**Summary Paragraph**

Situated just off of Ohio Route 87, approximately twenty miles east of Cleveland in the rural landscape of Novelty, Ohio, is Materials Park. This site is home to the headquarters of ASM International (formerly known as the American Society for Metals), as well as the “world’s largest open-work geodesic dome”,<sup>1</sup> designed by R. Buckminster Fuller. The headquarters building, which is semi-circular in shape and aligned with the western perimeter of the dome, contains 50,000 sq. ft. of floor space and features Modern design elements including floor-to-ceiling windows throughout all three stories, and extensive and varied use of metals in construction and detail. The dome and headquarters building, both constructed in 1959, are structurally independent of one another. Together they create the innovative design vision of its architect John Terence Kelly and represent a prominent example of Modern Architecture.

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**Narrative Description**

See section 7 continuation pages.

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<sup>1</sup> Carey, Allison. “What’s the Deal with...The Geodesic Dome?” *Plain Dealer* 15 October 2007: B3

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 patterns of our history.
B Property is associated with the lives of persons significant in our past.
[X] 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.

Areas of Significance

(Enter categories from instructions)

Architecture

Period of Significance

1958-1959

Significant Dates

1959

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 old or achieving significance within the past 50 years.

Significant Person

(Complete only if Criterion B is marked above)

Cultural Affiliation

Architect/Builder

Kelly, John Terence

Fuller, Richard Buckminster

Period of Significance (justification) – period of significance reflects the construction of the property

Criteria Consideratons (explanation, if necessary) – N/A

**Statement of Significance Summary Paragraph** (provide a summary paragraph that includes level of significance and applicable criteria)

See section 8 continuation pages.

**Narrative Statement of Significance** (provide at least one paragraph for each area of significance)

See section 8 continuation pages.

**Developmental history/additional historic context information** (if appropriate)

**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 file (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: \_\_\_\_\_

See section 9 continuation pages.

Historic Resources Survey Number (if assigned): \_\_\_\_\_

**10. Geographical Data**

**Acreage of Property** Approx. 25  
(do not include previously listed resource acreage)

**UTM References**

(Place additional UTM references on a continuation sheet)

1	<u>17</u>	<u>474894</u>	<u>4589967</u>	3	<u>17</u>	<u>475155</u>	<u>4589618</u>
	Zone	Easting	Northing		Zone	Easting	Northing
2	<u>17</u>	<u>475155</u>	<u>4589974</u>	4	<u>17</u>	<u>475048</u>	<u>4589537</u>
	Zone	Easting	Northing		Zone	Easting	Northing

**UTM – 5. 17 474893 4589598**

**Verbal Boundary Description** (describe the boundaries of the property)

See section 10 continuation pages – Exhibit 1.

**Boundary Justification** (explain why the boundaries were selected)

The boundary includes the building proper, the dome and the garden area important in the historical context and significance of the nominated property and as described under Criterion C.

**11. Form Prepared By**name/title Anke Schreiber/Senior Vice Presidentorganization The Chesler Group, Inc.date May 1, 2009street & number 3050 Prospect Avenuetelephone 216-431-9100city or town Clevelandstate OHzip code 44115e-mail aschreiber@cheslergroup.com**Additional Documentation**

Submit the following items with the completed form:

- **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. Key all photographs to this map.
- **Continuation Sheets**
- **Additional items:** (Check with the SHPO or FPO for any additional items)

**Photographs:**

Submit clear and descriptive black and white photographs. The size of each image must be 1600x1200 pixels at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map.

**Name of Property:** **ASM Headquarters and Geodesic Dome****City or Vicinity:** **Russell Township, OH****County:** **Geauga** **State:** **OH****Photographer:** **Chika Aizu**  
**The Chesler Group, Inc.**  
**3050 Prospect Avenue**  
**Cleveland, OH 44115****Date Photographed:** **March and April 2009****Description of Photograph(s) and number:**

Photo #	View
001	Building West façade (main) with dome and general site
002	Northern Dome pylon (camera facing Southwest)
003	Southern Dome pylon (camera facing North)
004	Eastern Dome pylon (camera facing West)
005	Detail of Southern Dome pylon base
006	Exterior courtyard between North wing and Center Section —Guest Plaza
007	Detail of stainless sun screen (main façade)
008	Detail of lower courtyard dome pylon between Center Section and South Wing
009	Exterior West elevation and lower level façade
010	Detail of green roof (camera facing South)
011	Lobby area (camera facing North)
012	Detail of wooden panel (outside conference room South of lobby)
013	Main stairs at 1 <sup>st</sup> floor
014	1 <sup>st</sup> floor catwalk (camera facing South)

- 015 2<sup>nd</sup> floor hallway and offices (camera facing North)
- 016 2<sup>nd</sup> floor library enclosure (camera facing Northeast)
- 017 Detail of 2<sup>nd</sup> floor office plaster and glass wall (camera facing North)
- 018 Detail of 2<sup>nd</sup> floor suspended ceiling fascia
- 019 Detail of copper work at 2<sup>nd</sup> floor elevator
- 020 Detail of copper screen at 2<sup>nd</sup> floor utility room
- 021 Lower level cafeteria (camera facing Southwest)

**Printer Paper and Inks:**

Manufacturer recommended paper and ink for photograph printing were used for black and white prints.

Paper: HP Premum Plus Photo Paper

Ink: HP Vivera inks 96 & 97

See Photograph continuation page for historic photos

**Paperwork Reduction Act Statement:** This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C.460 et seq.).

**Estimated Burden Statement:** Public reporting burden for this form is estimated to average 18 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, PO Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Project (1024-0018), Washington, DC 20503.

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Materials Park:

Materials Park is an estate of approximately forty-five acres, located south of Route 87 with its own postal code. Materials Park, however, is also commonly referred to as the geodesic dome or ASM's headquarters and its Mineral Garden. The landmark dome is strikingly visible between the green grassy elevations of the Ohio country when driving on the main road. A winding access road off Route 87 leads into a valley where the dome and headquarters building have been built on a Garden Piazza, 400-ft in diameter, between the rolling acres of countryside. (Photo 001) At the center of the Piazza, underneath the dome, is a sunken Mineral Garden, 100-ft. in diameter, and featuring over sixty-six specimens of raw mineral ores from around the world and over seventy-five varieties of perennials, shrubs, and flowering trees. The estate is surrounded by wetlands and woods of Geauga Park District's 902-acre park, the West Woods, protecting local natural resources such as Ansel's cave or Silver Creek and its watershed, extensive wetlands, and mature forest. Most of this land was originally the property of ASM and was recently sold to the Park system.

Geodesic Dome:

The dome at Materials Park stands for groundbreaking and innovative architectural ideas as well as mastery in design and craftsmanship. It does not serve any specific purpose rather it is a giant metal structure somewhat sculptural in character. The futuristic spaceship look of the dome construction offsets in a unique way with the rural setting of Ohio's countryside. It creates unexpected spatial effects and relations with the sky above, the adjacent building as well as natural surroundings. The dome covers the semi-circular headquarters building beneath, whereby its lower circular base gives clearance just above the roofline of the building. Two pylons, one at the guest plaza and the other at the courtyard of the lower level cafeteria, have been incorporated as part of the building design, structurally independent from the building but yet creating an intertwining effect, thus establishing an artistic connection to one another. (Photos 006, 008) This is an important aspect of the overall design – the dome and building are both essential parts to the architectural concept. (Photo 002)

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The geodesic dome—"Space Lattice"—designed by R. Buckminster Fuller is the largest open-air geodesic dome and stands 103 feet, or 11 stories high, is 274 feet in diameter, and weighs 80 tons.<sup>2</sup> The dome is constructed of 65,000 parts—approximately 12 miles of 4 inch and 6 inch, Type 6061-T6 extruded aluminum welded in a hexagon pattern. Its design consists of two identical domes, 30 inches apart, one within the other, to achieve stability with a minimum number of members at each joint. The two domes are linked by 4-inch tubing at the corner of each hexagon cell, which are reinforced by radial tension rods. The large scale of the geodesic dome is a creative symbol of future, invention and strength, and is designed to withstand an 8-inch coating of ice and 500 mph strong winds. The sphere or partial sphere design encompasses largest volume with least surface. Geodesic design in concept utilizes minimum amount of materials to form largest volume and an immensely strong and stable structure. This dome represents Fuller's philosophy and "his belief that humanity must be able to do more with less if it is to prosper in the years ahead"<sup>3</sup>, envisioning a structure of greater strength by using lighter weight material.

The dome requires no internal supports and is an engineering marvel in and of itself for the sheer weight that it is able to support on a minimal of five pylons. The five pylons are t-type trusses of 6 inch aluminum tubing, equally spaced at 72 degrees, four of which rest on concrete piers, the fifth resting on steel. The entire weight of the dome is balanced on five points where a pylon and a pier meet. Concrete filled steel pilings were driven into varying depth, up to 77 feet below the ground surface, for three of the five pylons to achieve the necessary support of the weight. A tension ring at 18 feet beneath ground level, 272 feet in diameter with a 136-foot raise serves as an essential element in keeping the dome structurally sound by linking the five pylons to resist the outward thrust of the dome. The tension ring consists of four 1 ½ inch No. 11 reinforcing bar rods, which required some 300 man-hours of welding. The stress on the tension ring is calculated to be 125,000 lbs.

<sup>2</sup> Dunbar, Wilbur L.. "Ohio's 11-Story Geodesic Dome Seems to Float." *New York Times* 1 June 1969: XX15.

<sup>3</sup> Podolak, Janet. "A Legend Under a Nearby Dome." *News-Herald* 6 Nov. 2005.

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The dome construction began with assembling the hexagon units on the ground at the site with the major parts being extruded aluminum tubing and tension rods, joints for each hexagon corners, and articulated base sections. These parts were bolted together to form small sections and then five pylons were formed. First, the five pylons with their bridges were erected. From then on, hexagonal cells were lifted and placed upward from all points of its circular base using multiple cranes (HIST 001 & 002). Finally, the center and final section of the dome was fitted atop to complete the design (HIST 003). The construction involved companies such as Kaiser Aluminum & Chemical Co., Halethorpe, MD, supplying aluminum; North American Aviation Corp's Columbus Division as fabricator, Mak Construction Co., Cleveland as erector, working under direction of Gillmore-Olson Co., general contractor.

ASM Headquarters Building:

The exterior and interior of the office building conveys the ideas of the American Modern movement in architecture during the 1950s. The architectural key elements of this period - steel and glass - reflect simplicity, minimal detail, clean lines, geometric shapes and volume and are all found in ASM's headquarter building. Mr. Kelly stated during an interview for AIA Cleveland Chapter in 1988 that he had "great belief in Frank Lloyd Wright and exploring new ideas, not Mr. Wright's, my own."

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*1. Exterior Description*

The semi-circular design of the headquarters building wraps along two-fifths of the exterior perimeter of the dome, allowing two of the dome's five support pylons to come down into the interior courts of the building. (Photo 006) The headquarters' footprint north to south is divided into three sections which can be described as the north wing, center section and the south wing. These three sections are distinguished by the two court or bay areas which also enclose the dome supports. The building's center section is located between these two courts. In general, ASM's headquarters consists of three levels: two main floors and a ground level. The principal building is comprised of the two upper floors. Because the ground or basement level is nestled into the hillside elevation, it is not visible from the approach of the building. This level is only visible from the west parking and service areas. (Photo 009)

Overall, reinforced concrete with a special emphasis on the use of glass and metals such as steel, bronze, copper, aluminum, titanium, and tungsten are the fundamental architectural design elements of the building. The ASM headquarters was constructed of reinforced concrete slabs. According to records, about 1,200 truckloads of concrete for the floors and walls were required. Further, ASM mandated that the concrete work for the foundation, the decks, walls, floors etc. was subject to a rigid testing program throughout the project with strict performance requirements of 15% above recommended strength.

The entire headquarters, primarily the upper two levels, is constructed of glass curtain walls. (Photo 004) John Terence Kelly's idea was a glass enclosed building with maximum light and open views extending to the woods, fields and sky. This concept has allowed for an immense transparency between the architectural design of the building and its surroundings. It represents a vivid expression of Modern architecture accomplished by use of volume, plane, line and silhouette. The use of glass as principal element for the building walls creates unexpected and unique spatial effects. The distinctive curved shape of the building required mastery in framing and glazing techniques as none of the frames are set in a 90-degree angle. About 36,000

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pounds of extruded aluminum was utilized for the framing. The exterior glass curtain wall amounts to approximately 20,870 square feet of ¼ inch polished glass plate. In some areas of the first floor main section, glass has been butted directly into the structural concrete, without moldings, which is another unique aspect of the glass wall construction. Further, throughout the building, but primarily on the top floor the exterior glass wall panes of offices are divided with a lower section that has a manually operable window to allow for ventilation.

The main façade, which comprises the western elevation of the building's top level, features a giant stainless steel "sun shield" – 13 feet high and 390 feet wide. (Photo 007) This screen also wraps around the end sections of the building but is not part of the glass walls surrounding the two building courtyards. (Photo 005) It spans across the entire western exposure to provide protection from the sun and to control interior lighting and temperature without obstructing the view. In fact, this stainless steel curtain only allows direct light into the west elevation at 4:30 pm on December 21 each year, when the sun is at its lowest point in the horizon. Records further note that for the first time a stainless steel curtain of this size was used in construction.<sup>4</sup> "The stainless steel was selected by the architect because of its serviceability and for its aesthetic properties."<sup>5</sup> The outer surface of this sun shade has a satin finish, while the inner surface is a soft gold. The exterior also has 4,000 louvers, coined "eyelashes", approximately 14 inches x 16 inches, and 18 inches in distance from the glass curtain walls. "Both the sunscreen itself and the 'eyelashes' were spot-welded to it at the site."<sup>6</sup>

Further, the east exterior glass walls facing the Mineral Garden as well as the glass walls flanking the court yards are covered by metal solar shades that have been added after the period of significance and were not originally intended by the architect. It appears that these sliding screens were installed about 1974/1975 with an

<sup>4</sup> "Two Geodesic Domes." *Architectural & Engineering News* (March 1960): 12-16.

<sup>5</sup> "Two Geodesic Domes." *Architectural & Engineering News* (March 1960): 12-16.

<sup>6</sup> "Two Geodesic Domes." *Architectural & Engineering News* (March 1960): 12-16.

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extruded aluminum channel attached on top and bottom of each window. The large steel gridded solar shades, roughly five feet by ten feet in size, were then inserted and are moveable.

The hemispherical shape of the office building spans north to south. It conforms to a 168 degree semi-circle with a 240 feet outer and 140 feet inner radius. It is 53 wide and contains 50,000 square feet of space. The inner radius of the building is oriented directly due east towards the Mineral Garden. The far southern end of the headquarters is stepped down roughly three feet to accommodate the southern globe. The entire exterior perimeter of the first floor is surrounded by concrete flat work. Along the center section of the inner arch, the concrete flat work extends out east to a similar bull nose concrete knee wall. This knee wall is approximately three feet high and constitutes the beginning of the circular mineral garden area under the dome. All walkways from the northern inner building arch slope east into the garden.

The main public entrance is located on the first floor level (Exhibit 4) on the northwest corner of the center wing with a circular drive for visitor parking. The open, concrete court between the north and center section of the building is the guest plaza and allows for an unobstructed view east into the Mineral Garden underneath the dome and the woods as backdrop. It has an airy appearance, and this largely open court leads from the outer promenade to the Mineral Garden. It is flanked by the north and center section of the building. There is no physical connection between the two wings on the first floor level here. Rather the top floor bridges these two sections and provides continuity to the second floor office space. The cat walk is held up by so called Lally columns, the main structural element of the office building. Further, one of the five pylons of the geodesic dome is erected in the center of the guest plaza giving it a dramatic and futuristic look.

The floor plan of the top level (Exhibit 5) of the ASM office building stretches approximately twelve feet beyond the footprint of the first floor creating a roof like overhang above the perimeter walkways of the first floor main level. This design makes for a "floating" experience of the top floor. Lally columns holding the overhang and give the exterior of the first floor its typical characteristic. On each concrete and steel support are

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half inch steel conduits with straps to the pillar, bent in a ninety degree angle with frosted white, cantilevered eight inch globe lights at the end. The globe fixtures throughout provide for a decorative exterior lighting element. The columns as well as the conduit are painted in light gray. The exposed underside of the top level is laminated with steel plating that has been painted the same color as the structural support columns. The lower edge of the top floor overhang is matched with identical steel plating acting as a cover molding against the underside. The roofline has been built in similar style and also functions as a drip edge around the entire perimeter of the building.

The north section, representing the northern end of the semi-circle of the building, has no basement or ground level. Its first floor still is utilized as ASM's reference library area. It is on grade to the visitor parking lot and the northern and eastern pylons. The center and the south wing are atop the ground level. (Exhibit 3) A curved concrete deck continues along the western elevation of both these sections on the main level featuring a green roof ending south into the adjacent hillside. (Photo 010) The roof deck stretches west over the cafeteria and laboratory section of the ground level. This deck extends approximately thirty feet out from the building terminating in a concrete bull nose retaining wall. It is comprised of concrete flatwork and three rectangular grass areas separated by walkways. A two feet wide swath of river stone between the grass and outer concrete flatwork has been added to drain rain water off the deck. According to owner records, waterproofing as well as concrete work was undertaken 1992 and 2001. Below the entire deck extends the service area with an asphalt parking lot. This area is shielded from view from the upper green level by the four foot bull nose concrete knee wall. Further, the green roof offers a spectacular view west above the hills of the Ohio country.

In addition, the deck overlooks the southern exterior courtyard at the ground level between the center and south wing, approximately 85 feet by 52 feet in size. Yet another of the five dome pylons is a central element to it. This is the only pylon of the geodesic dome that rests on a steel girder system, which extends from the lower courtyard up as base floating the dome's truss at the first floor level. (Photo 008) A bull nose concrete wall

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around the yard perimeter of the deck, approximately four feet in height, creates a raised flower bed alongside the building and serves as protective barrier for the remaining sides. Concrete walkways flanking north and south allow for full view of the pylon footing and the landscaped area below. This courtyard accessible from the cafeteria also features a goldfish pond. Lastly, the signature exterior frosted globes found on the Lally columns are repeated here as well. The globe fixtures are attached to steel conduits and extend out horizontally between the first and lower level of the yard area. Unlike at the visitor court plaza, the floor plan of this bay connects here the center and south wing on the first as well as the second floor. The first floor catwalk, approximately four feet wide, however is made entirely out of glass walls and therefore opens up the view into the Mineral Garden East. (Photo 014)

The ground level of the ASM building is facing westward on the property. It is built into the hillside and does not extend north to south along the foot print of the entire building. It roughly ends with the north end of the center section. However, it expands all the way west underneath the first floor roof deck and therefore has a wider footprint than the above two levels. In general, its exterior character is different from the upper levels as its glass walls facing west are shielded by a concrete arcade that wraps outside throughout this level. Seven arches in different sizes and shapes open up to the glass wall curtain behind it. The walkway behind the arch is illuminated with small white globe lights mounted to the frames of the exterior glass curtain wall. This level has a separate asphalt parking lot off the access road and two employee entrances - one with a loading dock on its northerly perimeter and one on its south end. According to owner records, waterproofing and concrete work was performed in 1991 for this area of the building.

Another of Kelly's innovative exterior architectural details are the flaring roof drainage 12-gauge stainless steel "gargoyles." This represents a Modern attempt to an ancient way of dealing with water – for example this form of drain was found in medieval churches. Ten "gargoyles" cast rainwater from the second floor into a circular, roughly six feet in diameter, gravel filled catch basin of the grass roof or terrace on the first

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floor moving water off the flat roof into the storm water system. Eight others further route rainwater to catch basins at the lower level.

Natural light floods the interior of the building not only through the floor-to-ceiling windows on all three levels; architect Kelly designed fourteen bubble clear, plastic skylights stretching north to south along the eastern roof perimeter. Originally each skylight was accompanied by a special Shepherd's Crook fixture intended to illuminate the exterior roof surface rather than to shine through the skylights. However, these fixtures were removed by the owner during various roof repairs over the years as they deteriorated and the skylights were leaking. Also the original clear skylight covers have been replaced with opaque ones. Further, according to the owner's records the original flat roof, #8 river stone over built up tar roof, was replaced in 2007 with an asphalt built up roofing system on insulated lightweight concrete roof deck over existing concrete deck.

## 2. Interior Description

The public entrance of the ASM building is at the northwest corner of the headquarters' center section. A small all glass enclosed entry vestibule with an intercom directs visitors south through an interior foyer door into the main lobby. Right across from the interior entrance is the reception. This area is elevated by about 3 feet and steps adjacent east and west, lead down to the soft seating area which stretches north to south. (Photo 011) The reception area is a centered, built-in, square walnut laminate enclosure. It is attached to one of the two matching floor to ceiling shelving units that have been built around the two structural columns on the main level of the lobby seating area.

The western lobby elevation along the seating area is comprised of a walnut paneled wall which is part of a designed space to accommodate the single, three stop, hydraulic elevator and the floating main stairway. Moreover, this elevator and stair inset creates a separate hallway along the outer glass curtain wall on the building's Westside which leads north into the guest vestibule. The lobby's wood detail was added during an owner renovation in 1988. However, the floor to ceiling wall mahogany paneling along the hallway east wall of

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Geauga County, OH

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the nearby assembly room is an original architectural design detail. It is made up of one by eight mahogany plywood boards with mahogany backing and blocking. (Photo 012)

The lobby ceiling features still the original lighting, which is made up of 136 tiny 7-watt incandescent exposed surface mount bulbs with a 4-inch circular spun brass reflective escutcheon, and spans across the entire lobby. Kelly's idea was to expose metals into the smallest detail like the tungsten filaments of the clear bulbs. This unique ceiling design creates a floating ceiling effect that is intensified by the reflections in the glass of the curtain wall. This feature is remarkable from the inside as well from outdoors. This ceiling theme continues in ASM's library across the lobby in the north wing.

The glass panes installed along the eastside of the main lobby and the glass to glass cat walk, which connects the center section with the executive offices at the south end of the building, are butted directly into the brushed gray concrete knee walls without using moldings. Along the entire perimeter of the knee wall runs a heat fin tubing system which radiates heat along the glass to prevent convection. This system is held up by brackets and is simply and effectively guarded by a two by six dimensional perimeter wood handrail at a 15 degree angle. The fin tubing is found along all the of glass curtain walls throughout the building, approximately 30 inches above the floor, except for the library were it is located near the floor, and comprised of 1,500 feet of linear copper fin tub heating elements. This is another of John Terence Kelly's visionary architectural and practical design details.

The architectural theme of floating elements is also repeated in Kelly's interior stair design. (Photo 013) The main stairway in the lobby is suspended by the height of the building on slender stainless steel rods, 5/8" in diameter, spaced approximately 14 inches apart. The landings as well as the steps are polished stainless steel accented by brass handrails. This effect is further emphasized by the north and south wing steel stairs floating vertically through the corridor; whereby the stringer channels and the midway landings are spaced away from the wall creating an open view through and around the stairs upward and downward. The bull nose treads of both these stairs are wrapped with mosaic linoleum, the stringers and spindles are painted white and handrails

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are made of solid cast brass. The north stair is boxed in by original extruded aluminum frames with tempered ¼ inch glass. The second floor enclosure of the north stair separates the offices from the library below. (Photo 016) Further, the historic stainless steel door with Kelly's signature hardware remained an intact part of the enclosure. Because, all stairs have open risers the feeling of floating vertically in space while walking up the stairs is further intensified.

The first floor meeting room directly off the entrance lobby still has the original stainless steel and brass entry doors. They are double doors with glass sections and fitted with half inch by one inch stainless steel stops. The levers are cast brass with simple spherical rosettes. "Created by Kelly, these levers possess virtual thinness and a graceful flow of line, imparting to the handle a crisp, classic appearance in keeping with the linear characteristics of the building."<sup>7</sup> All of the interior doors are made of stainless steel and most of them are intact. However, all of the original exterior doors have been replaced with modern, extruded aluminum doors. The conference room itself was updated in 1988 with a 2x2 acoustical tile ceiling and hanging florescent fixtures.

The executive office wing, which is located at the southern end on the first floor of ASM's office building, was remodeled in 1988. The scope included a complete update of the reception area with dropped drywall and acoustic tile ceiling. Further the reception area concrete supports and perimeter walls were laminated with acoustic fabric. Also, the original Board of Trustees room was converted into two separate offices. However, its original double entry stainless steel doors have been preserved.

The entire second floor was designed for and still accommodates ASM's various operating departments. John Terence Kelly's original plans only intended glass walled offices wrapped along the east perimeter of the building leaving the remainder as open work space. (Photo 015) The historic office partitions are made up of simple one by six painted white wood construction with brass stops to contain large sheets of clear glass. This allows for a full view out into the Mineral Garden and the dome. The bottom section of each office glass wall is divided into two parts – a crank style aluminum window to provide air circulation from the corridor and a

<sup>7</sup> ASM. "ASM Press Kit: Major Architectural Features." ca. 1959/1960

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simple glass panel. The offices are separated by plaster walls with glass glazing from the end, approximately four feet in width, to mullions or the support columns. (Photo 017) Kelly “did not wish to break up the horizontal ‘floating’ line of the offices by a row of separate cubicles. Nor did he wish to hide the columns supporting the roof slab.”<sup>8</sup> An interesting aspect is also the use of circular split diffusers to accommodate the plaster walls between the original offices. Additional offices were built along the Western elevation and more partitions were added in some of the historic East offices after the period of significance—a date is unknown. Similar design and materials were used for the new construction; however the custom brass stop of the glass walls has been replaced with a wood one. Further painted plywood or drywall has been used instead of plaster. The office space of selected departments was renovated over several periods. The second floor administrative area underwent renovations during the 1970’s, 1980’s as well as the 1990’s.

Kelly specifically designed the walls as a combination of plaster and glass between the offices, so the unique fascia of the second floor dropped ceiling is exposed and continuously visible from the Mineral Garden when looking up. This bronze edged acoustical plaster ceiling floats the entire second floor perimeter and is another unique architectural detail of Kelly’s work. The ceiling has been lowered by about 14 inches and is fastened to the main ceiling support creating a decorative panel, flowing with curved shape that follows the building’s footprint, and accented by a bronze edge. (Photo 018) The bronze edge suspended ceiling is also found around the kitchen and cafeteria area. Parts of the original floating ceiling are also intact in the large storage space across the cafeteria.

The south wall of the elevator shaft on the second floor is laminated with an ornamental copper screen set in a brass frame. (Photo 019) The same style copper doors, floor to ceiling, about 10 feet in height, and approximate the width of the stair envelope, are found on each landing of the main stairway providing utility closet space. (Photo 020) Only the second floor door set is still in its original condition while the others have

<sup>8</sup> ASM. “ASM Press Kit: Major Architectural Features.” ca. 1959/1960

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been covered with acoustical fabric after the period of significance. The ornate copper sheets mimic the steel eyelash screen of the façade providing ventilation at the same time.

Kelly achieved maximum simplicity, a Modern design principle, by the repetition of spherical forms in various details of the building. A prominent feature throughout are the nearly 1,000 light fixtures. Kelly incorporated large, about three and a half foot diameter, spherical recessed Plexiglas florescent fixtures throughout the second floor ceiling. In addition brass canister lights are mounted along the hallway outside the second floor original offices. These canister lights were also installed around the lower level ceiling edge but have been replaced. White globe pendants, parts of the original design layout of the second floor, now hang in rather random spots since office partitions were added over the years around them. The ASM dining room features twelve 45 inch circular dry-walled ceiling openings, recessed 12 inches, with centered 8 inch white globes. In addition, the original, spherical recessed lights with magnifying Plexiglas covers in ASM's storage area at the lower level are only partially intact. Also, parts of Kelly's dropped bronze fascia ceiling were further dropped and updated with contemporary fixtures.

The lower level consists of educational labs and offices, the commercial kitchen and cafeteria along with its operation, a mail and storage facility, mechanical and electrical rooms, the IT department and miscellaneous meeting rooms. The cafeteria and kitchen as well as the lab and classroom area wrap along the glass curtain wall of the western elevation. (Photo 021) In addition, Kelly achieved maximum lighting and openness by constructing glass walls around the entire perimeter of the lower exterior courtyard and therefore, minimizing the basement feel of the area entirely. The lower level mail and storage stretches along the north end as well as the east side of the building. The southern part of the basement houses a large boiler room. Mechanical and electrical rooms are also found on the northern side.

The educational department was renovated in 1988 creating ASM's advanced training center. This area was completely modernized using original design elements such as the use of glass windows for the arched, dry walled hallway walls of the labs and classrooms and a dropped ceiling in circular shape extending in a sweep

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from the lower level lobby into the main laboratory. The cafeteria area was updated in 1989 maintaining the signature bronze fascia ceiling and original recessed lights by only re-plastering the existing soffit. Other updates include the conference room and the IT area at the southern lower level perimeter in 2008. The new offices south of the courtyard were made of glass partitions to mimic Kelly's original office designs. Further, numerous mechanical upgrades were undertaken by ASM. Initially, the building had no HVAC as there was no budget left. Air conditioning was added about ten years later, around 1970. Since then upgrades to the system have been performed in 1993 and 2001. The boiler was modernized in 1999 as well.

Mineral Garden:

The William Hunt Eisenman Garden is a public garden that rests underneath the dome. It is 100 feet in diameter and seven feet deep, and is centered on the 400 foot garden piazza, part of a 600 foot garden area encompassed by an outer circular concrete walkway that ends in the eastern hillside. (Photo 003) The garden's inner circle displays about 66 specimens of mineral ores all labeled for visitors.

Kelly's original garden evolved from a simple concept. It was a Japanese style rock garden. Ore specimens, donated by companies worldwide, were arranged in circular display on quartz gravel. The garden opened with about 48 minerals with plans to expand to about 300. In its center was also a jet fountain rising to 60 feet. (HIST 009) Indeed, Kelly had big plans for the garden, including adding a stainless steel y-bridge, three feet wide and 100 feet in length. Additionally, he envisioned four more fountains and for the quartz gravel to be cemented. However, this plan was never realized. (HIST 019) Instead, the original garden opened to the public with ore specimens highlighted on the quartz gravel and with a few plantings, drawing attention to the natural resources available to man.

In general, the garden represents the third principle element comprising Kelly's original ASM building concept, besides the dome and headquarters. Kelly carefully laid out a natural setting in which he "designed the new building to fit into the countryside, creating a 'garden environment' that complemented the symbolism of

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the structure.”<sup>9</sup> According to Kelly he intended for the building “to subordinate the architecture to the landscape-therby emphasizing this man-made garden in the order of nature.”<sup>10</sup> At the same time, landscaped plantings, are intended to “harmonize the surrounding forest and meadowland terrace with the immediate building area”<sup>11</sup>. This is achieved, as towards the outskirts of the garden the layout is “loose, scattered as in nature”. It gradually becomes “more formalized as it arrives within the architectural confines of the Mineral Garden and the building proper, as in terraces, planting boxes and pools.”<sup>12</sup>

The garden was redesigned in 1999 and continues the original ideas of Kelly, Buckminster Fuller and Eisenman. The garden retained its existing shape and dimensions. However, the grading, paving, irrigation, drainage, and plantings were all enhanced. Additional walkways were added to increase accessibility for visitors. The ores were relocated to the flower beds where they rest today.

The updated garden features a great variety of perennials including asters, daisies, lilies, phlox, black-eyed susans, poppies, and ivy; and flowering shrubs and trees such as dogwoods, azaleas, hydrangeas, junipers, rhododendrons, and lilacs.<sup>13</sup>

Among the many trees in the Mineral Garden is Malus Newton, an apple tree directly descended from the one under which Isaac Newton supposedly discovered the Law of Gravity. This tree was donated to ASM in 1968 by the National Bureau of Standards (now known as the National Institute of Standards and Technology) in Washington, D.C.

Within the garden, too, is a fountain sculpture, 16 feet in height, entitled “ASM Singularity” made from copper, titanium and stainless steel. It was created by the late internationally renowned, contemporary sculptor and painter Eric Orr. Circular shapes are continued in the perimeter walkways and knee walls, creating raised flower beds around the center fountain and embedding the mineral display.

<sup>9</sup> ASM. “ASM Press Kit: Major Architectural Features.” ca. 1959/1960

<sup>10</sup> ASM. “ASM Press Kit: Major Architectural Features.” ca. 1959/1960

<sup>11</sup> ASM. “ASM Press Kit: Major Architectural Features.” ca. 1959/1960

<sup>12</sup> ASM. “ASM Press Kit: Major Architectural Features.” ca. 1959/1960

<sup>13</sup> Knight and Stolar. “Landscaping Plans.” 1998.

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The granite memorial to William H. Eisenman, located on the eastern hillside, is engraved with the inscription, "Make no little plans; they have no magic to stir one's blood. Make big plans; aim high in hope and work, remembering that a noble, logical diagram once recorded will never die." This speaks to Eisenman's desire for ASM's work as a scholarly engineering society, as well as the principal ideas that went into the creation and design of Materials Park.

The 1999 renovations built upon Kelly's original design intent and served to further integrate the ores and minerals into the plantings of the garden and the surrounding nature. The overall integrity of the site design remained unchanged. It further highlights how man can use the resources found in nature to build architectural marvels, and reinforces the connection between the headquarters building and dome and the surrounding environment.

Alterations

In general, the exterior and interior of headquarters building as well as the geodesic dome have been scarcely altered since their construction in 1958, and possess a high degree of historic integrity. No major additions have been performed on the principal exterior of the building other than the installment of the sliding metal solar screens along the entire second floor inner arch of the building and the western bay windows about 1975. The only major upgrade to the building on the outside has been the roof replacement in 2007. The immediate areas around the building have been improved but historic qualities have been retained. Most noteworthy improvements are the Mineral Garden redesign in 1999 and various waterproofing and concrete work in the early 1990's and in 2001.

The historic qualities and detail in most parts of the building interior have remained intact. Original stairs, offices, doors, hardware, fixtures and other architectural detail have been kept in extraordinary condition. The first floor upgrades of the guest lobby, conference room and executive area do not impede the overall

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historic integrity. Further, the second floor office additions primarily along the Western perimeter greatly imitate the original design down to the hardware. Moreover, all light fixtures are of original design and only a few have been removed on the top floor. The educational area in the basement was completely modernized to keep up with technological changes. However, curved hallway walls with glass windows and the circular shape of the dropped ceiling of the main laboratory carefully contemplate the fundamental design principles. The glass office additions for IT and kitchen staff in the lower level continue Kelly's ideas as well. Other changes in the lower level do not impair the historic feel as they are of secondary nature as far as the overall design importance.

Maintenance on the dome structure was performed in 1983 and 1992. It has remained in remarkable shape.

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*Summary*

The ASM world headquarters building and geodesic dome structure in Materials Park have historical architectural design and engineering significance under Criterion C. These resources possess significance for the individuals involved in conception, design, and construction, and the distinctive characteristics of the type of design used. Specifically, the Modern features that characterize the ASM International Headquarters Building and geodesic dome are significant in that they reflect the design philosophies of John Terence Kelly, a prominent Cleveland Modern architect and R. Buckminster Fuller, a world-renowned mathematician, philosopher, engineer, and inventor of the geodesic dome, as influenced by the vision of William H. Eisenman, one of ASM's founding members and long-time National Secretary. These design features, when contextualized by their setting in Materials Park, gain even greater significance because they reflect broader trends in American industry and man's use and understanding of his environment and the materials found within it. The architecture of the building in combination with the dome expresses an aesthetic ideal that reflects trends in design and philosophy caused by broader historical and social trends during the period between the American Industrial Revolution and the resultant Information Revolution. The structures found in Materials Park also reflect the goals and mission of ASM International, the organization for which they were constructed. Furthermore, this particular dome is rare amongst Fuller's domes because, unlike most other functional domes, it was never intended to be a covered structure. Rather, it serves a purely aesthetic purpose. This dome, too, was considered the world's largest openwork dome at the time of construction conveying spectacular design and craftsmanship.

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Chartered as a non-profit corporation by the State of Ohio, ASM International (formally American Society for Metals) is Everything Material®, the society is dedicated to serving the materials science and engineering profession. Through its network of 36,000 members in 100 countries worldwide, ASM provides authoritative information and knowledge on materials and processes, from structural to nanoscale. As an engineering and scientific society, ASM is led by members, guided by member needs and fueled by member participation. ASM shares information and ideas through international conferences and expositions, seminars and local chapter meetings or publications such as Advanced Materials & Processes and the renowned ASM Handbook series and online ASM Global Community.

ASM benefits the global materials community by providing scientific, engineering and technical knowledge, education, networking and professional development. Materials scientists and engineers improve the performance of systems that enhance our quality of life. As the central authority on the development, processing and application of materials, ASM strives to be the world's leading resource for the advancement of materials knowledge in education, industry and society.

ASM International can trace its roots back to the nascent years of the American Industrial Revolution. During the early 1900s the trade of the blacksmith in the United States was not well organized. Expertise and trade secrets were passed down from father to son, which was not a very practical way of emitting knowledge. Out of this imminent need, William P. Woodside, a blacksmith from Detroit, formed the Steel Treathers Club in 1913. This group consisted of thirteen steel-treaters from the Detroit area who came together to share information in light of the emerging automotive industry. Woodside, who had worked for some time as a steel salesman, traveling from one steel-treater to another, realized that many of the craftsmen were unaware of the techniques being used by other steel-treaters, including those that could ease their labor and cut their work time in half. Exchanging information made the work easier and more efficient for everyone involved. This transfer of knowledge in the trades, as made necessary by the Industrial Revolution, cleared the cloud of mystery that

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had previously dominated the manufacturing world, and exchange of information occurred to a greater degree than ever before.

Woodside encouraged workers as well as engineers to join his organization as he felt that there was tension between the two professional groups. Even though other metallurgists' societies existed at the time, none of them was in collaboration between workers and engineers. In 1915, Woodside's Club named itself Steel Treaters' Research Club of Detroit to highlight its new mission. The society was incorporated under Steel Treating Research Society in 1918. Around this time, a great interest in the creation of local chapters throughout the United States developed. The Chicago Chapter, known as American Steel Treaters' Society, was one of the early national chapters organized. However, rivalry between Detroit and Chicago grew and by 1919 both chapters competed against each other. A unified organization was essential to effectively fulfill the society's mission and in 1920 their differences were reconciled. Further, the same year, Cleveland became the choice for the location of the society's headquarters, a compromise since no agreement could be reached on Detroit or Chicago. Offices were opened near Downtown and work continued under a new name – American Society for Steel Treating (ASST). In 1921, the society grew significantly--from a handful of founding members to 3,237 members in 31 chapters nationwide. The conceptual ideas of the society: education, networking and exchange of information were well perceived. Further, during the 1920s the society expanded its focus from steel to all metal manufacturing processes. Consequently, by 1933 ASST changed its name to American Society for Metals (ASM) to reflect the broader focus. Further, Bill Eisenman, who had joined the Chicago section as a business manager and had worked passionately on promoting new chapters across the country, became National Secretary for ASM.

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The society continued its innovative vision with the second Metal show in Philadelphia in 1920. The initial convention was held by the Chicago chapter a year earlier and was one of a kind in the United States at that time. Manufacturers could display latest technical innovations, participate in “metallurgical sessions”<sup>1</sup> and sell their products. The Metal show was nationally organized as an annual event for the next 53 years. A milestone of ASM’s work in the international metal field was the first World Metallurgical Congress (WMC) held in 1951 in Detroit among 510 delegates from 39 countries, establishing ASM’s worldwide reputation in metals science. The five week long conference allowed participants to tour “leading U.S. plants, institutions and laboratories”<sup>2</sup> and ended with National Metal Exposition and technical seminars of the WMC. The second World Metallurgical Congress was held in Chicago in 1957. In 1988, the World Materials Congress in Chicago celebrated the 75<sup>th</sup> anniversary of the society with the largest conference in ASM’s history. “Nearly 12,000 registrants from 50 countries attended more than 330 technical sessions.”<sup>3</sup>

Since its inception the society emphasized the importance of publishing information and making it readily available to its members. First reference documents were printed as ring binder brochures. *Proceedings* and *Journal*, publications by the Detroit and Chicago chapters, later merged into one journal titled *Transactions*, a forerunner of ASM’s *Metal Progress*, a well-respected technical publication in the metalworking industry. *Metal Progress* first was published in 1930. ASM has continued its monthly magazine, which is now distributed under the name *Advanced Materials & Processes*. In addition, ASM is a sponsor of various other engineering journals. ASM is also known as the world’s largest publisher of metals engineering books. The first edition of *Metal’s Handbook*, ASM’s prominent series of reference books was initially published in 1924 as 116

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<sup>1</sup> “A History of the American Society for Metals.” 1963: 5.

<sup>2</sup> “A History of the American Society for Metals.” 1963: 7.

<sup>3</sup> “ASM History.” *ASM International*. <http://asmcommunity.asminternational.org/portal/site/asm/AboutASM/History/>.

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loose data sheets and, as William Eisenman announced during the society's Annual Meeting in 1923, "recommended practices' for heat treating."<sup>4</sup> The first hard bound edition was printed in 1929. In 1948 the seventh edition had a collection of 1,444 pages and was the final single volume handbook. The eighth edition of the handbook begun in 1957 and was published in 1961 as *Volume 1 Metals Handbook*. The multivolume series of reference books for metallurgists originated "to keep up with rapidly changing technologies"<sup>5</sup>. It featured various topics in articles, tables, illustrations, definitions and page indexes, and today remains one of ASM's largest and most important projects. Currently ASM offers twenty four volumes of its handbook as well as two ASM Desk Editions, which are also available as electronic versions on the Web.

Early on ASM identified the importance of bibliographical documentation to most efficiently allow for the open exchange of knowledge and information. Therefore, in 1955 the society started a pilot program with the Center for Documentation and Communication at Western Reserve University in Cleveland to explore the viability of computer searching. This program, Metals Information, was a groundbreaking step in the pre-era of computer technology and became operational in 1960. In 1968, ASM merged its abstract publication with the Institute of Metals in the U.K. - creating a partnership of two technical societies to serve a worldwide community through materials information services. ASM has carried on its cutting edge technology focus over the years and especially in 2006 with the investment in its Global Community Information Network, a large online database.

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<sup>4</sup> "ASM Handbook Celebrates 75 Years of Providing 'Information that Works.'" *Advanced Materials & Processes* 153.2 (Feb. 1998): 37.

<sup>5</sup> "ASM Handbook Celebrates 75 Years of Providing 'Information that Works.'" *Advanced Materials & Processes* 153.2 (Feb. 1998): 37.

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In the past 35 years, ASM presented 119 Historical Landmark Awards around the world. It is one of the society's most prestigious recognitions. "The purpose of the ASM Historical Landmark Award is to preserve our materials heritage and to make people all over the world more aware of the many pioneering milestones of materials technology."<sup>6</sup> It identifies sites that have played an important role in the discovery, development, and growth of metals, metalworking, and engineering materials. The ASM International Headquarters Building and Geodesic Dome was chosen as the award recipient for 2009 for symbolizing "the enduring fellowship of materials professionals, advancing humanity's progress through their work with engineered materials."<sup>7</sup>

Member education has always been the primary focus of the society. Therefore, it launched the ASM Foundation for Education and Research (now ASM Materials Education Foundation) in 1952 to promote education and scholarship. Additionally, ASM's Metals/Materials Engineering Institute and its Academy for Metals and Materials were founded in the mid 1950s and 1960s respectively. ASM has successfully managed to remain a vital provider of knowledge and education throughout its long history. It has continuously reevaluated its mission adapting to changes in technology and science. ASM became ASM International, The Materials Information Society, in 1986, highlighting its geographic boundaries beyond the United States and expanding its "technical scope beyond metals to include other engineered materials and processes such as composites, plastics, ceramics and electronic materials."<sup>8</sup> ASM International has remained a key player in the ever-changing materials industry by proactively redefining the society's vision and goals.

Cleveland, Ohio became a thriving manufacturing center in the mid-1800s, with steel as one of its central industries. Numerous canals and railroad lines allowed for easy access to and transportation of iron ore from northern Minnesota and coal from southern Ohio, Pennsylvania, and West Virginia, while Lake Erie

<sup>6</sup> "Superalloys pioneer ATI Allvac recognized as ASM Historical Landmark." *Advanced Materials & Processes* 166.4 (Apr. 2008): 65.

<sup>7</sup>"ASM Historical Landmark Award 2009 Citation: ASM International Headquarters Building and Geodesic Dome, Materials Park, Ohio." 2009.

<sup>8</sup> "ASM History." *ASM International*. <http://asmcommunity.asminternational.org/portal/site/asm/AboutASM/History/>. Accessed Mar. 2009.

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allowed for the movement of vast amounts of materials needed for the manufacturing of steel. ASM's headquarters office opened in Cleveland in the 1920s where it served society members in both Cleveland and other industrial cities including Detroit, Chicago, and Pittsburgh through continuing to collect and publish information on the use, properties, and preparation of both ferrous and non-ferrous metals used in manufacturing. By 1940, ASM bought the Norton Mansion on Euclid Avenue and for the next twenty years the society's main office was located on Euclid Avenue in Cleveland. During that time ASM saw "an increase in activities associated with growth of membership to 30,250 and local staff of 105 that five separate buildings were occupied by A.S.M. activities."<sup>9</sup> Consequently, the Board of Directors determined that a centralized operation was necessary to support the continued success and growth of the society.

During ASM's annual meeting in 1954, William H. Eisenman, first National Secretary for ASM, announced "five great steps to progress"<sup>10</sup> – plans for a new Headquarters Building, development of the Metal Engineering Institute, Metallurgical Seminars, Metal Research Institute and the Metal Science University. These five objectives show that ASM had reached an importance that was never felt before. It was able to grow and expand at a fast pace and its headquarters design was the visual expression of ASM's ideas and vision of its future at the time. The new ASM building "was at once an office building and a symbol"<sup>11</sup>, for it embodied the aspirations of man and his ingenuity while reflecting what he was already able to do with the materials in his environment, both of which fell within ASM's scope and mission and so were reflective of the organization's goals. This innovative thinking has been part of ASM's strategy and allowed for ASM to become a pioneer in the metals and later materials field.

In 1956, William H. Eisenman donated 100 acres of land from his summer estate in Novelty, Ohio to the society with the stipulation that the new headquarters building be constructed there. At the time, the new

<sup>9</sup> "Moving Day for the American Society for Metals." *Metal Progress* (Sept. 1959): 64-C.

<sup>10</sup> Eisenman, William H. "A.S.M.'s New Headquarters." *Metal Progress* (May 1958): 69.

<sup>11</sup> "A History of the American Society for Metals." 1963: 20.

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location of the ASM headquarters was undecided and contested between Cleveland's urban and suburban setting. Moreover, Eisenman explained: "it became apparent that a sufficient area of land to house the 'A.S.M. of Tomorrow' in built up areas would be impossibly expensive"<sup>12</sup>. After Eisenman's death in 1958, the society bought about 400 acres from his estate in 1961 including Eisenman's summer residence known as Sunnimoor Farmhouse. In addition, ASM purchased some smaller parcels of surrounding land during the 1960s and in 1981. There were no concrete plans for the site development in the long run and as a result most of the land was sold the Geauga Park District for conservation in 1995. The farm house, a local landmark registered with the Geauga County Historical Society, was sold separately as well.

"The concept of a new headquarters as an inspiring symbol of the Society's intention to serve the metal industry was Eisenman's alone."<sup>13</sup> He hoped to develop and build a structure that represented ASM and its aspirations, as well as the metallurgical world as a whole. He was looking for a building that would "embody the wonderful world of metals, would express the soaring opportunities of metals engineers, would harmonize with the beautiful landscape, and would serve functionally the headquarters staff."<sup>14</sup> He felt that "this new administration building is the culmination of 40 years of service to the American Society for Metals. Yet it is truly the first state of the A.S.M. of Tomorrow."<sup>15</sup> The building had to reflect ASM's history as a metals engineering society while representing the possibilities that the future held for ASM and materials engineering as a whole. Eisenman searched for a project architect for about one year and it was in the designs of Cleveland architect John Terence Kelly that ASM found its and Eisenman's vision manifested (HIST 004).

<sup>12</sup> Eisenman, William H. "A.S.M.'s New Headquarters." *Metal Progress* (May 1958): 67.

<sup>13</sup> *Dedication September 14, 1960: The National Headquarters of the American Society for Metals*. Russell Township: American Society for Metals, 1960.

<sup>14</sup> Eisenman, William H. "A.S.M.'s New Headquarters." *Metal Progress* (May 1958): 67-69.

<sup>15</sup> Eisenman, William H. "A.S.M.'s New Headquarters." *Metal Progress* (May 1958): 67-69.

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Construction of the highly anticipated headquarters began in April of 1958. ASM staff of about 175 moved into its new building in August of 1959. At that time, the site was named “Metals Park”. Later it changed to “Materials Park” with its own postal code to reflect appropriately ASM’s broader identity. Sadly, Mr. Eisenman did not live to see Metals Park complete. He passed away shortly after construction began in May of 1958. The building was dedicated in his memory September 1960 and the William Hunt Eisenman Award was established by the society the same year. In the early 1960’s the society stated that “ASM leaders feel that the metallurgist and metallurgical engineer are best equipped to lead the way toward the emerging complex of disciplines called ‘materials engineering’. A World Society for Materials? Perhaps, but not just yet. What you will see for the immediate future is an ever-expanding, ever-more-influential Society dedicated to advancing the knowledge of metals and related materials.”<sup>16</sup> This kind of forward thinking is the fundamental concept of ASM’s headquarters. The design of Metals Park remains a significant milestone in the history of ASM and its future. “The building’s bold design embodies the initiative and strength visualized by its founders.”<sup>17</sup> ASM headquarters and dome fascinated not just the metallurgical industry. Visitors from Ohio, the U.S. and from abroad have come to see the imaginative and unique structure since groundbreaking. By 1966, approximately 250,000 people had visited the ASM site.

The design of the headquarters building emphasized the essence of Modern Architecture during the 1950s-experimental designs as characterized by simplicity, beautiful geometry described by clean lines, minimal detail and the abundant use of concrete, glass and steel. John Terence Kelly’s designs derived from a combination of Modern elements from various branches. Kelly was inspired by colleagues such as Walter Gropius, Mies van der Rohe and Frank Lloyd Wright. He blended different architectural styles with his own ideas to create a remarkable Modern structure that could not be pin-pointed as a distinct style because it was uniquely

<sup>16</sup> “A History of the American Society for Metals.” 1963: 23.

<sup>17</sup> *Dedication September 14, 1960: The National Headquarters of the American Society for Metals.* Russell Township: American Society for Metals, 1960.

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his own. He formulated a synthesis of natural and man-made resources that extended beyond the architecture of the building. Kelly created spatial relations between the building, dome and its surroundings (HIST 005). The transparency of glass curtain walls – a minimalist solution popularized by Mies van der Rohe. - built open, light and airy spaces blurring the lines between the physical boundaries of the building and the outdoors and creating a new dimension. Kelly favored the philosophy of Frank Lloyd Wright known as organic architecture as well, whereby the relationship between the architecture and its surroundings is of particular importance. Kelly experimented with organic forms such as the semicircular building shape, spherical forms and the dome design.

Kelly also emphasized technology and new construction as found in the glass glazing of some of the first floor walls that has been butted directly into the concrete, or in his huge, 390 feet long by 13 feet high, stainless steel sunshade along the top main façade, which was the first of its kind ever constructed in a large size like this.<sup>18</sup> According to a press release by the Stainless Steel News Bureau ca. 1958, the stainless steel sunshade “was designed only after exhaustive solar studies were made based on a report prepared by the School of Architecture of Princeton University that was sponsored by the Committee of Stainless Steel Producers. For every daylight hour throughout the year this unusual screen will effectively control both the temperature and the lighting of the building except at exactly 4:30 P.M. on December 21, when the sun will be at its lowest point in the sky.”<sup>19</sup>

At the same time, ASM’s identity, with the focus on metals of any kind, was incorporated into the fundamental building concept. The “national headquarters was designed to symbolize the world of metals, from the raw elements of the earth to the achievements of man’s imagination in the use of these elements. The symbolization is intended as a dramatic educational display of the wonderful things man has been and will be able to do with the metals with which he works. From the metal-bearing ores in the Mineral Garden to the

<sup>18</sup>“Two Geodesic Domes.” *Architectural & Engineering News* (March 1960): 12-16.

<sup>19</sup> Dowling William D. “4,000 ‘Eyelashes’ Will ‘Blink’ Only Once a Year on New Headquarters Building of the American Society for Metals” *Stainless Steel News Bureau* c. 1959.

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surmounting Geodesic Dome, metals are everywhere and everything in Metals Park.”<sup>20</sup> It was intended to “focus attention on this new period and on the amazing strides being made by man as he utilizes his mineral resources.”<sup>21</sup>

Project architect Kelly understood ASM’s unique and innovative qualities and reflected these values by choosing an ultra-contemporary building and dome design. Modern stylistic elements carry through the interior design as well, for example, use of metals throughout to reflect ASM’s work as an organization, minimal and simple office designs with predominantly neutral colors, open floor space, modern furniture and avant-garde, spherical fixtures. A description of the building interior reads: “A blending in furniture and fixture design of contemporary and traditional concepts imparts a classic simplicity pleasing to the eye. The subdued use of colors enhance the rich tones of nature outside. Occassionally, a bright decorative hue forms a keyed accent for contrast to the metals that mark the interior.”<sup>22</sup>

ASM set groundbreaking trends in the field of metals and materials, reaching a peak by the 1950s. The Modernism of the building is the most appropriate expression of the society at that time. “Modern Architecture has emerged against a setting of major social and technological transformations”<sup>23</sup> expressed by the use of non-traditional design elements such as shapes and materials. “The modern movement was a revolution in social purpose as well as in architectural forms.”<sup>24</sup> Modern architecture experimented with new materials, construction processes and built with advanced engineering techniques. “The engineer emerged as in important role model for the architect.”<sup>25</sup> So, it is no surprise that Kelly, a Modern architect, best understood the society’s mission.

<sup>20</sup> “A History of the American Society for Metals.” Draft from Western Reserve Historical Society Archives. 1963.

<sup>21</sup> “ASM Press Kit: American Society for Metals New Headquarter Building Facts and Figures.” 1959.

<sup>22</sup> “ASM Press Kit: Major Architectural Features.” ca. 1959/1960.

<sup>23</sup> Curtis, William J. R. *Modern Architecture since 1900*. 3<sup>rd</sup> ed. London: Phaidon Press, 1996. 13.

<sup>24</sup> Curtis, William J. R. *Modern Architecture since 1900*. 3<sup>rd</sup> ed. London: Phaidon Press, 1996. 15.

<sup>25</sup> Robbin, Tony. *Engineering A New Architecture*. New Haven: Yale UP, 1996. ix.

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John Terence Kelly was a noteworthy architect and native of Elyria Ohio. He was a very private man who wrote and spoke little about his career. Few know of his accolades, including working closely for some time with famed U.S. Modern architect Phillip Johnson in New York City, teaching at Western Reserve University's Cleveland School of Architecture, or studying under the famed modernist Walter Gropius at Harvard University.<sup>26</sup>

He attended Carnegie Institute of Technology for his bachelor's degree in architecture, where he studied with other talented artists and designers at the time such as Andy Warhol. He earned his master's degrees in architecture in 1951 and landscaping in 1952 from Harvard University. After traveling and studying in Europe under the Charles Eilot Norton fellowship from Harvard and Fulbright scholarship, Kelly returned to Cleveland.

He started out his Cleveland work as one of the chief designers at the firm Outcalt-Guenther-Rode-Bonebrake with other prominent modern architects. The architectural climate of Cleveland at the time was ultra-conservative, and he and his co-workers were often challenged by city officials in their design and construction ideas.<sup>27</sup> Kelly was very reluctant to compromise his design ideas, which occasionally put him in conflict with employers, clients, and co-workers. He always strived to remain true to his design philosophies. He was described as an architect "who would rather design than sleep, and would rather starve than compromise his ideals."<sup>28</sup>

Despite these conflicts, his work in Cleveland did not go unappreciated. He was awarded the 1968 Cleveland Arts Prize for Architecture, given to "those visionary individuals who take our aspirations and give them form—in stone and glass and wood and steel—urging us both to meet our future and to save the best parts of our past."<sup>29</sup> He was and still is a well-respected member of the architectural community and influenced the

<sup>26</sup> Interview with Michael Benjamin, Architect, Cleveland, Ohio, 29 June 2009.

<sup>27</sup> Gibans, Nina Freedlander. *Cleveland Goes Modern: Design for the Home 1930–1970*. n.p. 2007.

<sup>28</sup> Vanac, Mary. "John Kelly, Famed Architect, was WWII Vet, Elyria Native." *Plain Dealer* 24 Dec. 2007: B5.

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local architects that he worked with.<sup>30</sup> He and his work were also given national recognition. Twice he was asked to be an AIA Fellow, both times turning down the position. Many of his designs were highlighted and honored in national publications such as *Architectural Record* (1962), *Architectural Forum* (1960), and *Progressive Architecture* (1959). Kelly was also nationally known for his work on the ASM dome and headquarters building<sup>31</sup>, which was featured in *Architectural Forum* (1960) and *Architectural Record* (1959).

In 1954, Kelly opened his own office in Cleveland. His earliest work included a Master City Plan for the village of Vermillion, and the White residence in Hudson, (REF 001) where Kelly demonstrated his sensibility to a structure's surroundings by integrating a contemporary house into one of the historically important villages of Ohio, while maintaining harmony with nearby old Colonial houses.<sup>32</sup> Kelly's "hexagonal 'space-age'"<sup>33</sup> AIA House for the 1960 Home and Flower Show presented his ahead-of-time ideas and his ambition to educate the public—still remembered for its uniqueness after thirty-some years later. The McDonald residence (1964) (REF 002) in Elyria, which was featured in Carole Rifkind's *A Field Guide to Contemporary American Architecture*, a reference guide that takes a look at the evolution of American architecture, and the Ford House (1962) in Huntington Valley were two of Kelly's most notable residential works. Kelly was also known as the architect for the Walden community in Aurora, a unique naturalistic development that started out in 1970 and expanded for a period spanning multiple decades. He designed Walden's Inn and Spa, "the only AAA five-diamond inn and spa in the Midwest"<sup>34</sup> and most homes at Walden. It was in these homes, according to fellow architect and

<sup>29</sup> *Cleveland Arts Prize*. <http://clevelandartsprize.org/>. Accessed Mar. 2009.

<sup>30</sup> Interview with Nina Gibans, Local Historian, Cleveland, Ohio, 29 June 2009.

<sup>31</sup> "John Kelly to Design Cleveland AIA House." *Lancaster* 12 Oct. 1959: 26.

<sup>32</sup> "Five 'Good Neighbor' Houses of Contemporary Design." *Architectural Record* 126 (Nov. 1959): 185-191.

<sup>33</sup> Lubinger, Bill. "Model House Filled with Design Ideas." *Plain Dealer* 20 Feb. 1993: 5.

<sup>34</sup> Theiss, Evelyn. "Lose Track of Time Inside Spa Walden: The Point is to Feel Relaxed While Getting a Massage or Scrub." *Plain Dealer* 18 Feb. 2009: E3.

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long-time friend Michael Benjamin, that Kelly began to develop a residential style that featured steeply pitched roofs and large areas of glass.<sup>35</sup>

On the whole, however, Kelly's architectural ideas didn't follow a distinct style. Rather, he envisioned a particular design that was client-and site-specific.<sup>36</sup> While Kelly did ascribe to some Modernist aesthetics and studied prominent Modern architects like Frank Lloyd Wright, Mies van der Rohe, and Walter Gropius, he always strove to create something unique and original with each new project.

However, there are a few distinguishable themes and principles in his work. In a 1955 *Plain Dealer* interview, Kelly explained that underlying his designs were the beliefs that "each design problem demands its own reasoned solution", and "building materials should be used to express their beauty and function."<sup>37</sup> These ideas are expressed both in his residential and commercial works, including the ASM headquarters.

Kelly could best be described as a purist. He favored good, simple, strong designs and good, clean lines. His decorations were minimal, but he paid severe attention to detail, often hand-designing details such as door hardware or fixtures himself.<sup>38</sup> He could not be called strictly a minimalist, for he included some details that served no function other than decoration. The ASM dome, in fact, is one such detail, in that it was never intended to be covered or serve a functional purpose, but rather had a strictly aesthetic intent.

Kelly also created contextual structures. Like his White Residence in Hudson and the ASM Headquarters and Geodesic Dome, he wanted his buildings to become a part of their surroundings. His structures would often blend the interior and exterior environments through the use of large glass curtains and walls and the use of organic lines and forms that characterize his work.

Throughout Kelly's 60-year career, he designed and/or built numerous structures including corporate offices, storefront buildings, city plans, gardens, senior homes, condominiums, and homes in Ohio,

<sup>35</sup> Interview with Michael Benjamin, Architect, Cleveland, Ohio, 29 June 2009.

<sup>36</sup> Interview with Nina Gibans, Local Historian, Cleveland, Ohio, 29 June 2009.

<sup>37</sup> Vanac, Mary. "John Kelly, Famed Architect, was WWII Vet, Elyria Native." *Plain Dealer* 24 Dec. 2007: B5.

<sup>38</sup> Interview with Michael Benjamin, Architect, Cleveland, Ohio, 29 June 2009.

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Massachusetts, Toronto, Florida, West Virginia, Wisconsin, and Virginia. “Considered by some to be a successor of Frank Lloyd Wright,”<sup>39</sup> Kelly’s architectural approaches in exploring new ideas, integrating a structure as a part of its surroundings, and showcasing building materials’ forms and functions were expressed throughout his work including the ASM Headquarters Building.

The majority of his work was in Ohio, as Kelly believed he had a duty to Cleveland, declining an offer from R. Buckminster Fuller to work with him on his international projects, instead saying that “Cleveland needed his talents more.”<sup>40</sup> His work in Cleveland was primarily residential, and the ASM Headquarters Building, one of Kelly’s few commercial projects, was and is one of his most prominent and nationally-recognized works.

The building and dome are of outstanding and exceptional architectural quality designed to satisfy the needs of a client while still fulfilling Kelly’s architectural vision. Kelly was able to maintain his innovative design ideas for the project with the exception of one compromise as he mentioned during his 1988 AIA Interview, which he “really didn’t like—and it was powerless to stop...”<sup>41</sup> He had originally intended for the giant sunscreen to be copper. As he explains in the interview: “I was summarily summoned to the Duquesne Club in Pittsburgh and told in not uncertain terms over a very short, polite lunch by one of the leading steel executives in the country at that time that certainly I would to make that screen out of stainless steel because they support the institute. So it became stainless steel. Which I think is too bad in retrospect.”<sup>42</sup>

Kelly also referred to the ASM Headquarters Building as “the kind of challenge for which an architect will wait a lifetime.” He believed that an architect’s job was “to synthesize his society’s thoughts and actions in terms of building”, and in ASM he saw a client who “not only encourages creative design, but who has shown

<sup>39</sup> Vanac, Mary. “John Kelly, Famed Architect, was WWII Vet, Elyria Native.” *Plain Dealer* 24 Dec. 2007: B5.

<sup>40</sup> Binder, Janet. “Groundbreaking Architect Kelly Still Designing at 80.” *Connection* (Spring 2003): 7.

<sup>41</sup> AIA Interview with John Terence Kelly, 1988

<sup>42</sup> AIA Interview with John Terence Kelly, 1988

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patience while one evolves the design to a state of working perfection.”<sup>43</sup> He sought to design a structure for ASM that would symbolize man’s power of transmuting raw metals into soaring expressions of art, science, and engineering wonder. At the same time, he wanted a structure that would complement the beautiful, tranquil, majestic quality of the site; something that would stand as a positive statement of man in nature.

Kelly sketched out his architectural interpretation on a piece of paper—“a partial horizontal line with a concave shape in the middle and back to a horizontal line and then put a semi-circle over it. And in my mind I immediately saw the horizon where man is, the scooped out void in the center represented to me the minerals that man uses and through his technology uses things like a dome or a lattice over a garden.”<sup>44</sup> To achieve this end, he created a site and building design for ASM with four components: a garden piazza, a sunken mineral garden, the building proper, and an open-air geodesic dome. It was a stroke of genius on Kelly’s part to include the dome which served no functional purpose, only aesthetic, for in doing so he created more than just an office space in the Modern style; he created an entire concept unique to the site. For assistance with the geodesic dome, Kelly turned to R. Buckminster Fuller, designer of the dome himself.

In addition to being an inventor, engineer, architect, mathematician and philosopher, Fuller was also a humanitarian who believed in the survival of mankind against whatever odds through ingenuity. He is quoted as having said, “We’re at the point where humanity has the option to make it.”<sup>45</sup> He also strongly believed that “man’s environment plays a large role in the development of human nature, which in turn affects man’s environment” and so “decided to improve upon our environment.”<sup>46</sup>

<sup>43</sup> Kelly, John Terence. “Observations by John Terence Kelly.” Cleveland, n.d.

<sup>44</sup> “John T. Kelly Interview by Stanley Garfinkel: Cleveland Architects.” 23 July 1987.

<sup>45</sup> “A Man Who Believed in Mankind: R. Buckminster Fuller: 1895-1983.” *Time* (11 July 1983): 71.

<sup>46</sup> Yarnall, William. *Dome Builder’s Handbook No.2*. Philadelphia: Running Press, 1978. 14.

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In his early thirties, Fuller found himself redeemed from thoughts of self-destruction by a personal vision in which he told himself “You do not have the right to eliminate yourself. You belong to the Universe.”<sup>47</sup> Following that episode, he dedicated his life to the principle that, to prosper in the years to come, humanity must learn to “do more with less”. This belief led to his development of the geodesic dome, for which he received a patent in 1954. He believed that the dome could solve the world’s housing crisis as it was the strongest manmade structure that did not require internal support, and was the lightest, most efficient and cost effective structure that could be made in metal.<sup>48</sup>

Fuller, born and raised in Milton Massachusetts, entered Harvard University in 1913, from where he was later twice expelled. Although Fuller held no formal education in architecture or engineering, he received a total of 28 US patents and 47 honorary doctorates<sup>49</sup> and numerous awards, including the Gold Medal award from the American Institute of Architects. After the revelation that saved his life, Fuller decided to “dedicate(s) himself as an individual to the service of humanity”<sup>50</sup>, beginning with his 1928 invention of air-deliverable and mass-producible dwelling units, Dymaxion House—“A house on a mast.” Dymaxion House was widely exhibited and published and this invention bought Fuller his first fame.<sup>51</sup>

Although the first geodesic dome was built for the Carl Zeiss Planetarium in 1922 in Germany, Fuller is regarded as the inventor of geodesic dome, who independently developed and popularized the domes in the United States in 1950s.<sup>52</sup> Fuller was also the first to apply “the word geodesic to this type of...framework.”<sup>53</sup> The basic form of the dome comes from nature and is based on principles of tension and compression. “Nature

<sup>47</sup> “A Man Who Believed in Mankind: R. Buckminster Fuller: 1895-1983.” *Time* (11 July 1983): 71.

<sup>48</sup> “Introduction to Buckminster Fuller.” *Buckminster Fuller Institute*.

[http://bfi.org/our\\_programs/who\\_is\\_buckminster\\_fuller/introduction\\_to\\_buckminster\\_fuller](http://bfi.org/our_programs/who_is_buckminster_fuller/introduction_to_buckminster_fuller). Accessed Apr. 2009.

<sup>49</sup> “R. Buckminster Fullers 28 Patents.” *Buckminster Fuller Institute*. <http://bfi.org/node/75>. Accessed Apr. 2009.

<sup>50</sup> Sieden, Lloyd Steven. *Buckminster Fuller’s universe: an appreciation*. New York: Plenum Press, 1989. 422.

<sup>51</sup> Kelly, Sean. et al. “Global Outlook.” *Artforum* (Nov. 2008)

<sup>52</sup> “What are Geodesic Domes?” *WiseGeek*. <http://www.wisegeek.com/what-are-geodesic-domes.htm>. Accessed Apr. 2009.

<sup>53</sup> “Geodesic Domes and Charts of the Heavens.” *Tela Communications*. <http://www.telacommunications.com/geodome.htm>. Accessed Apr. 2009.

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often employs geodesic structure for maximum strength and protection”.<sup>54</sup> For example, the eye balls of tiny single cell ocean organisms are geodesic, enabling them to withstand deep sea pressures. So, the dome is a truly organic design. Fuller’s geodesic domes use pyramid-shaped tetrahedrons to attain great strength without internal supports and to cover more space with less material than any other building ever designed. The geodesic dome is unique among structures in that every part of it works together synergistically to give it strength. For this reason, Kelly’s use of the geodesic dome for ASM’s new headquarters was seen as an appropriate symbol of the different members and chapters of ASM – each integral part providing knowledge to strengthen the whole.

The first commercial application of Fuller’s geodesic dome was for Ford Motor Company’s Rotunda at Dearborn, Michigan in 1953 (REF 003)—an aluminum frame with a plastic skin spanning 93-foot in diameter. In the mid-1950s, the application of the Fuller dome expands into military-use for the U.S. Marine Corps and the U.S. Air Force. The Marine Corps used air-delivered domes for temporary shelter (REF 004), while the geodesic “radomes” (REF 005) were used as offensive weapons by the Air Force at the Arctic perimeter. The use of the geodesic dome was monumental in both applications for its mobility by helicopter and structural stability. The radomes were “designed to protect delicate radar from the extremely harsh weather conditions in a non-metallic structure.”<sup>55</sup> During this period, the geodesic dome also served as a symbol of superior American capitalism and democracy over communism.<sup>56</sup>

Fuller’s Union Tank dome (REF 006) built in 1958 in Baton Rouge, Louisiana, is also important in that it was the largest geodesic dome of this period. Union Tank Car Company built this steel 384-foot dome to house its railway cars for repair and repainting. “Fuller noted that the entire cathedral of Seville could fit comfortably inside the Baton Rouge dome, yet the completed structure weighed only as much as four of the

<sup>54</sup> Baldwin, J. *Bucky Works: Buckminster Fuller’s Ideas for Today*. New York: Wiley, 1996. 69.

<sup>55</sup> Gorman, Michael John. *Buckminster Fuller: Designing for Mobility*. Italy: Skira, 2005. 126.

<sup>56</sup> Gorman, Michael John. *Buckminster Fuller: Designing for Mobility*. Italy: Skira, 2005. 126.

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more than one hundred stone columns that made up the structure in Seville.”<sup>57</sup> Fuller’s most famous and beautiful dome was USA Pavilion at the 1967 Montreal Expo (REF 007), a 250-foot three-quarter geodesic sphere with transparent skin of acrylic panels, which later was burned by an accidental fire and left the dome to be an open lattice dome. The pavilion housed a multilayered structure of exhibitions on American culture and attracted World’s Fair attendance in a record of 5.3 million people in six month and “was an unequaled monument to the American Century.”<sup>58</sup>

Two geodesic domes based on Fuller’s design are listed on the National Register of Historic Places. The R. Buckminster Fuller and Anne Hewlett Dome Home (REF 008) in Carbondale, IL where the Fullers resided from 1960 to 1971, was built under license by Al Miller of Pease Woodworking Co. in 1960. This dome was the only domehome the Fullers lived in and a prototype for numerous dome homes to follow.<sup>59</sup> The Citizens State Bank, also referred to as Gold Dome Bank, (REF 009) in Oklahoma City, Oklahoma, was built in 1958 by Donald Richter of Kaiser Aluminum, a former pupil of Fuller. Kaiser was one of Fuller’s early licensees and also the supplier of aluminum components for the Ford Dome. The “gold-colored, anodized aluminum geodesic dome”<sup>60</sup> was used as a roof for the bank facility.

Following Fuller’s 1954 patent, in just seven years, by 1961, “over two thousand geodesic domes are (were) produced by over one hundred companies which have been licensed by Fuller.”<sup>61</sup> Today, more than 300,000 geodesic domes exist<sup>62</sup> in various forms including playground equipment, sports arenas, exhibition halls, homes, museums, and weather stations. Fuller’s designs can be found throughout the world.

<sup>57</sup> Gorman, Michael John. *Buckminster Fuller: Designing for Mobility*. Italy: Skira, 2005. 132.

<sup>58</sup> Kelly, Sean. et al. “Global Outlook.” *Artforum* (Nov. 2008)

<sup>59</sup> Gatlin, William M. “Fuller, R. Buckminster and Anne Hewlett Dome Home.” National Register of Historic Places Nomination. Cape Girardeau, Missouri, 2005.

<sup>60</sup> Savage, Cynthia. “Citizens State Bank.” National Register of Historic Places Nomination. Pocasset, Oklahoma, 2002.

<sup>61</sup> Sieden, Lloyd Steven. *Buckminster Fuller’s universe: an appreciation*. New York: Plenum Press, 1989. 429.

<sup>62</sup> “The Wonder of Geodesics.” *Authentic Business*. <http://www.authenticbusiness.co.uk/archive/geodesics/>. Accessed Apr. 2009.

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The geodesic dome at Materials Park is unique, however, for its “Space Lattice” design that consists of two identical domes 30 inches apart, one within the other to achieve stability. The dome is constructed of about 12 miles of 4 inch and 6 inch, Type 6061-T6 extruded aluminum in a hexagon design. The dome stands 103 feet, or 11 stories, high, is 274 feet in diameter, and weighs 80 tons. It is also the largest dome of its kind in the world.<sup>63</sup> It is made up of 65,000 parts. It is designed to withstand an 8 inch coating of ice and 500 mph winds. It is supported by a minimal five pylons – an engineering marvel – up to 77 feet below ground surface. A tension ring links the five pylons to resist the outward thrust of the dome. The tension ring, located 18 feet beneath ground level, consists of four 1 ½ in. No.11 reinforcing bar rods. These bar rods required some 300 man-hours of welding, and the stress on the tension ring is calculated to be 125,000 lbs. “The erection procedure for the dome involved placing and bolting of the ‘bridges’ between the pylons and then lifting the hexagons, in horizontal sections, into place with booms.”<sup>64</sup>

The dome design was further special and unusual because it was built to never be covered or enclosed. Its purpose was “purely aesthetic and symbolic”<sup>65</sup>. Unlike most of Fuller’s other domes, it was not a functional structure intended to provide shelter. Rather, it was designed as a sculptural element that helped to fully integrate the building and gardens in Kelly’s concept for the overall ASM Headquarters site plan. “Perhaps it could be considered a tremendous architectural detail—probably the largest ever.”<sup>66</sup> The dome, with its sculptural rather than functional value, together with the building is a one of a kind design.

The ASM dome, one of the early commercial applications of the geodesic dome, was and is considered an immense accomplishment of construction and metals-engineering at the time, “since a perfect sphere is most difficult to achieve.”<sup>67</sup> It fascinated “laymen as well as experts in architecture and the construction industry”<sup>68</sup>

<sup>63</sup> Dunbar, Wilbur L.. “Ohio’s 11-Story Geodesic Dome Seems to Float.” *New York Times* 1 June 1969: XX15.

<sup>64</sup> “ASM Press Kit: American Society for Metals New Headquarter Building Facts and Figures.” 1959.

<sup>65</sup> “Two Geodesic Domes.” *Architectural & Engineering News* (March 1960): 12-16.

<sup>66</sup> “Two Geodesic Domes.” *Architectural & Engineering News* (March 1960): 12-16.

<sup>67</sup> “Two Geodesic Domes.” *Architectural & Engineering News* (March 1960): 12-16.

<sup>68</sup> “Two Geodesic Domes.” *Architectural & Engineering News* (March 1960): 12-16.

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equally. According to both Thomas T.K. Zung, Fuller's former architectural partner<sup>69</sup>, and Allen Ray Putnam, ASM's Managing Director after Eisenman's death who oversaw the completion of the construction with Kelly and Fuller, this dome was "Fuller's favorite dome"<sup>70</sup> as represented in Fuller periodical visits during (HIST 006) and after construction<sup>71</sup> and his last visit just over a year before his death in 1983.<sup>72</sup>

To Fuller, this dome was representative of "a new industrial world forming" as "for here the notion of doing more with less...is dramatized by the dome's open structure which is pure system integrity...the dome was fabricated by the most powerful of the aircraft corporations."<sup>73</sup> To Kelly, it stood as a "forthright statement of the advances made in the alloying sciences, and as a realization of Fuller's concept of advancing technology's over-all trend to invisibility."<sup>74</sup> To Eisenman, the dome was representative of the ASM of tomorrow and of the metallurgical world. The five support pylons represented education, research, engineering, production, and management, all of which support the whole metals industry. The lacy structure of the space lattice resting atop the pylons symbolized how intimately connected all of those facets of the metals industry are. Starting at any one point on the structure, one is able to get to any other point by either direct or devious route. They are all inextricably linked together and dependent upon one another.

The dome and headquarters building also stand as symbols of man's mastery over his mineral resources and modern metals technology. Throughout history, man has been defined by his use of the materials in his environment, and the artifacts and structures he leaves behind to reflect changing trends in materials technology.

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<sup>69</sup> Giovanetti, Rego, Communications Officer, ASM International, Materials Park, Ohio. Phone Interview with Thomas T.K Zung, 24 June 2009.

<sup>70</sup> Carey, Allison. "What's the Deal with...The Geodesic Dome?" *Plain Dealer* 15 October 2007: B3.

<sup>71</sup> "Kelly, Sean. et al. "Global Outlook." *Artforum* Nov. 2008: Cover Photo.

<sup>72</sup> Putnam, Allen Ray. "The Evolution of ASM...ASM Historical Perspective." Slide presentation excerpts. ca. 1988.

<sup>73</sup> Fuller, Buckminster. *Buckminster Fuller: Anthology for the New Millennium*. Ed. Thomas T.K. Zung, New York: St. Martin's Press, 2001. 41.

<sup>74</sup> Fuller, Buckminster. *Buckminster Fuller: Anthology for the New Millennium*. Ed. Thomas T.K. Zung, New York: St. Martin's Press, 2001. 38.

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The raw materials in the Mineral Garden are a reminder of the resources man can find within his environment, while the structure and building serve to remind of the achievements man has made through advancements in technology due to the spread of knowledge – one of ASM International’s continued foci.

The structures found at Materials Park are also representative of the design philosophies of the men involved. Kelly worked to design a structure that expressed ASM’s organizational philosophies and at the same time reflected his architectural ideas. He succeeded in creating a structure that was ahead of its time and that borrowed from Modern design principles while still remaining a style that was uniquely his own.

Fuller’s humanist philosophies about mankind’s ability to survive through working with rather than against one another and the surrounding environment are also reflected in the design of the dome – a design borrowed from nature that relies upon synergy, balance, and each individual part contributing to the integrity of the whole. In terms of efficiency, too, Fuller’s design was ahead of its time, and is significant in that it serves as an example for sustainable design ideas being used in design and construction today.

Eisenman can be credited for the remarkable vision that encouraged the building’s bold design. His faith in metals and materials engineering and his desire to reflect the ASM of the future in the new headquarters were key forces driving the concept for the new site and building.

The progress that ASM International has made in the past fifty years and the changes that it has undergone are strongly tied to and representative of broader trends in American trade, manufacturing, and commerce. ASM, with its beginnings in steel manufacturing information, was closely tied to the Industrial Revolution. Today, its focus still lies on publishing, consolidating and sharing information to further improve the standards of materials engineering, design, processing, and fabrication, thus improving the standard of life through the dissemination of knowledge. This idea of shared knowledge to improve the quality of our lives is deeply reflective of the Information Revolution in which we live today.

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It is very rare that the lineage of an organization can trace American history as well as ASM International's can. It is even rarer that this lineage can be so clearly traced in a single building and site design. William H. Eisenman showed his perspicacity by commissioning a structure that reflected not only ASM, but also broader trends in metallurgy. Kelly's one-of-a-kind design ideas, in conjunction with Fuller's ingenious geodesic dome helped to create a site that is of significant historical importance, for it represents the work and design ideas of local architect Kelly, internationally-known inventor and philosopher, Fuller, as well as the history and mission of the ASM International, which has been so closely linked to American history and development. Eisenman therefore brought about a design, with the help of Fuller and Kelly, that encapsulated a transition era in American history. The combined ideas and efforts of these three men came together to create a structure that serves to define an era in American history whose results are still in effect today.

Architecture and design reflect broader social and cultural trends. Form follows culture, and architecture serves as a cultural instrument. In this way, the structures found at Materials Park, Ohio and their concept and design are historically significant in that they are outstanding representations of Modern architecture and the ideas that it embodied. More importantly, however, they reflect the ideas and philosophies of the three men involved in the design and conception. It is within these philosophies, as represented by the structure, that one can truly get a sense of the ingenuity, optimism, inspiration, and enterprising spirit that defined America during the Industrial Revolution, and continue to define the nation today as it moves forward into the future.

The ASM headquarters and dome remains an important local landmark with historical significance. The significance lies in its concept and how that represents the work and philosophies of the men involved in its design, as well as ASM's goals and mission as an organization. The headquarters building is an unusually well-preserved example of Modern architectural styles, while the dome stands out amongst Fuller's other domes for its sheer size and its intent as an aesthetic rather than functional structure, making it very rare. These structures

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come together with the surrounding environment and gardens to create an overall design concept that is completely unique to the ASM International Headquarters.

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Page 1

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Exhibit 1

Boundary Description – Aerial area map to scale with parcel boundaries documenting historically significant structures- ASM Headquarters, Geodesic Dome and garden area with Mineral Garden- in relation to overall property. Boundary for nominated property is identified by thick solid line.

Exhibit 2

Site Plan

National Register of Historic Places Continuation Sheet

ASM Headquarters and Geodesic Dome

Geauga County, OH

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Photographs

Page 1

Historic Photographs

Photo #	View
HIST 001	Construction workers connecting a dome section
HIST 002	Middle section of the dome being erected with cranes
HIST 003	The center and final section of the dome being lifted to complete the dome
HIST 004	William H. Eisenman(left) and John Terence Kelly(right) viewing a concept sketch
HIST 005	John Terence Kelly's conceptual sketch
HIST 006	Buckminster Fuller(2 <sup>nd</sup> from right), Kelly(2 <sup>nd</sup> from left) and others overseeing construction of the dome
HIST 007	Aerial view of the dome and building on completion of construction
HIST 008	View of building's inner arch
HIST 009	View of original mineral garden
HIST 010	View of guest plaza and West façade during construction
HIST 011	Guest plaza
HIST 012	Original garden level work space across cafeteria
HIST 013	Cafeteria
HIST 014	1 <sup>st</sup> floor hallway North view towards main lobby area
HIST 015	Office space second floor
HIST 016	Garden Level cafeteria hall with sweeping hanging ceiling-fascia edged in bronze
HIST 017	Second floor uninterrupted sweep of hanging ceiling by use of glass from end of plaster partitions to mullions and/or to columns
HIST 018	Second floor office partitions
HIST 019	Kelly's original garden concept

Reference Photographs: Other works of Buckminster Fuller and John Terence Kelly

Photo #	View
REF 001	The White Residence, Hudson, Ohio Source: Kelly, John Terence. <i>Work of the Office of Architect John Terence Kelly</i> . Lithograph, U.S.A. 1960. 4.
REF 002	McDonald House; Elyria, Ohio 1961 Source: Rifkind, Carole. <i>A Field Guide to Contemporary American Architecture</i> . New York: Dutton, 1998. 13.
REF 003	Ford Dearborn Rotunda with Fuller's dome in place, 1953 Source: Gorman, Michael John. <i>Buckminster Fuller: Designing for Mobility</i> . Italy: Skira, 2005. 125.
REF 004	U.S. Marine Corps helilifting a 55-foot Dome, 1954 Source: Gorman, Michael John. <i>Buckminster Fuller: Designing for Mobility</i> . Italy: Skira, 2005. 135.
REF 005	Radome, Long Island, New York, 1955 Source: Gorman, Michael John. <i>Buckminster Fuller: Designing for Mobility</i> . Italy: Skira, 2005. 143.
REF 006	Union Tank Car Dome, Wood River, Illinois Source: <a href="http://i30.photobucket.com/albums/c330/Barndad/dome1.jpg">http://i30.photobucket.com/albums/c330/Barndad/dome1.jpg</a> .
REF 007	Montreal Expo '67 dome Source: Gorman, Michael John. <i>Buckminster Fuller: Designing for Mobility</i> . Italy: Skira, 2005. 173.
REF 008	Fuller in his dome home, Carbondale, Illinois Source: Gorman, Michael John. <i>Buckminster Fuller: Designing for Mobility</i> . Italy: Skira, 2005. 10.
REF 009	Citizens State Bank, Oklahoma City, built by Kaiser Aluminum Source: Gorman, Michael John. <i>Buckminster Fuller: Designing for Mobility</i> . Italy: Skira, 2005. 165.



**Legend**

-  Contours 10ft
-  Wetlands
-  Parcels

**NATIONAL REGISTER BOUNDARY MAP**

— **APPROX BOUNDARY NOMINATED SITE**




The Chesler Group, Inc.

**ASM Headquarters and Geodesic Dome**  
Materials Park, Geauga County, Ohio



EXHIBIT 1

EXHIBIT 2  
 SITE PLAN  
 Asm Headquarters & Geodesic Dome, Geauga Co., OH  
 SECTION 10  
 PAGE 3

NO. REV. DATE	DESCRIPTION
1	ISSUED FOR PERMIT

DATE: 1/78

**KNIGHT & STOLAR INC.**  
 PLANNING CONSULTANTS & LANDSCAPE ARCHITECTS  
 1511 SANDER DRIVE  
 CLEVELAND, OHIO 44130  
 TELEPHONE: (216) 861-0000  
 FAX: (216) 861-0000

**ASM WORLD HEADQUARTERS**  
 ASM MATERIALS PARK  
 OHIO, 44073

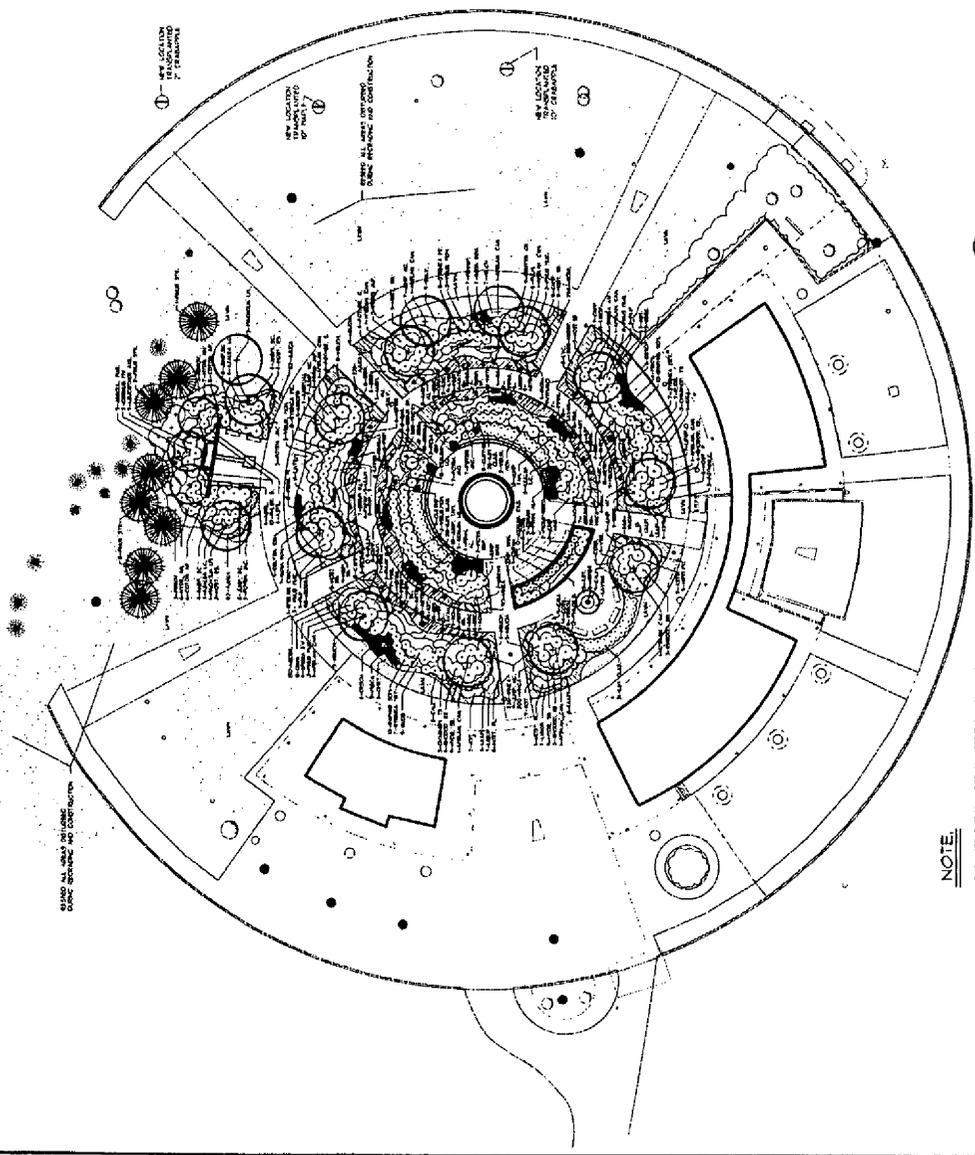
**PLANTING PLAN**

DATE: 1/78  
 PROJECT NO.: 881  
 DRAWING NO.: 881-100

**9814-8**

PLANT LEGEND

SYMBOL	PLANT NAME	PLANT CODE
1	AMERICAN BIRCH	CLIP 101
2	AMERICAN HORNBEAM	CLIP 102
3	AMERICAN SWEETGUM	CLIP 103
4	AMERICAN YEW	CLIP 104
5	AMERICAN WHITE BIRCH	CLIP 105
6	AMERICAN WHITE PINE	CLIP 106
7	AMERICAN WHITE SPRUCE	CLIP 107
8	AMERICAN WHITE FIR	CLIP 108
9	AMERICAN WHITE CEDAR	CLIP 109
10	AMERICAN WHITE JUNIPER	CLIP 110
11	AMERICAN WHITE DOGWOOD	CLIP 111
12	AMERICAN WHITE OAK	CLIP 112
13	AMERICAN WHITE PINE	CLIP 113
14	AMERICAN WHITE SPRUCE	CLIP 114
15	AMERICAN WHITE FIR	CLIP 115
16	AMERICAN WHITE CEDAR	CLIP 116
17	AMERICAN WHITE JUNIPER	CLIP 117
18	AMERICAN WHITE DOGWOOD	CLIP 118
19	AMERICAN WHITE OAK	CLIP 119
20	AMERICAN WHITE PINE	CLIP 120
21	AMERICAN WHITE SPRUCE	CLIP 121
22	AMERICAN WHITE FIR	CLIP 122
23	AMERICAN WHITE CEDAR	CLIP 123
24	AMERICAN WHITE JUNIPER	CLIP 124
25	AMERICAN WHITE DOGWOOD	CLIP 125
26	AMERICAN WHITE OAK	CLIP 126
27	AMERICAN WHITE PINE	CLIP 127
28	AMERICAN WHITE SPRUCE	CLIP 128
29	AMERICAN WHITE FIR	CLIP 129
30	AMERICAN WHITE CEDAR	CLIP 130
31	AMERICAN WHITE JUNIPER	CLIP 131
32	AMERICAN WHITE DOGWOOD	CLIP 132
33	AMERICAN WHITE OAK	CLIP 133
34	AMERICAN WHITE PINE	CLIP 134
35	AMERICAN WHITE SPRUCE	CLIP 135
36	AMERICAN WHITE FIR	CLIP 136
37	AMERICAN WHITE CEDAR	CLIP 137
38	AMERICAN WHITE JUNIPER	CLIP 138
39	AMERICAN WHITE DOGWOOD	CLIP 139
40	AMERICAN WHITE OAK	CLIP 140
41	AMERICAN WHITE PINE	CLIP 141
42	AMERICAN WHITE SPRUCE	CLIP 142
43	AMERICAN WHITE FIR	CLIP 143
44	AMERICAN WHITE CEDAR	CLIP 144
45	AMERICAN WHITE JUNIPER	CLIP 145
46	AMERICAN WHITE DOGWOOD	CLIP 146
47	AMERICAN WHITE OAK	CLIP 147
48	AMERICAN WHITE PINE	CLIP 148
49	AMERICAN WHITE SPRUCE	CLIP 149
50	AMERICAN WHITE FIR	CLIP 150
51	AMERICAN WHITE CEDAR	CLIP 151
52	AMERICAN WHITE JUNIPER	CLIP 152
53	AMERICAN WHITE DOGWOOD	CLIP 153
54	AMERICAN WHITE OAK	CLIP 154
55	AMERICAN WHITE PINE	CLIP 155
56	AMERICAN WHITE SPRUCE	CLIP 156
57	AMERICAN WHITE FIR	CLIP 157
58	AMERICAN WHITE CEDAR	CLIP 158
59	AMERICAN WHITE JUNIPER	CLIP 159
60	AMERICAN WHITE DOGWOOD	CLIP 160
61	AMERICAN WHITE OAK	CLIP 161
62	AMERICAN WHITE PINE	CLIP 162
63	AMERICAN WHITE SPRUCE	CLIP 163
64	AMERICAN WHITE FIR	CLIP 164
65	AMERICAN WHITE CEDAR	CLIP 165
66	AMERICAN WHITE JUNIPER	CLIP 166
67	AMERICAN WHITE DOGWOOD	CLIP 167
68	AMERICAN WHITE OAK	CLIP 168
69	AMERICAN WHITE PINE	CLIP 169
70	AMERICAN WHITE SPRUCE	CLIP 170
71	AMERICAN WHITE FIR	CLIP 171
72	AMERICAN WHITE CEDAR	CLIP 172
73	AMERICAN WHITE JUNIPER	CLIP 173
74	AMERICAN WHITE DOGWOOD	CLIP 174
75	AMERICAN WHITE OAK	CLIP 175
76	AMERICAN WHITE PINE	CLIP 176
77	AMERICAN WHITE SPRUCE	CLIP 177
78	AMERICAN WHITE FIR	CLIP 178
79	AMERICAN WHITE CEDAR	CLIP 179
80	AMERICAN WHITE JUNIPER	CLIP 180
81	AMERICAN WHITE DOGWOOD	CLIP 181
82	AMERICAN WHITE OAK	CLIP 182
83	AMERICAN WHITE PINE	CLIP 183
84	AMERICAN WHITE SPRUCE	CLIP 184
85	AMERICAN WHITE FIR	CLIP 185
86	AMERICAN WHITE CEDAR	CLIP 186
87	AMERICAN WHITE JUNIPER	CLIP 187
88	AMERICAN WHITE DOGWOOD	CLIP 188
89	AMERICAN WHITE OAK	CLIP 189
90	AMERICAN WHITE PINE	CLIP 190
91	AMERICAN WHITE SPRUCE	CLIP 191
92	AMERICAN WHITE FIR	CLIP 192
93	AMERICAN WHITE CEDAR	CLIP 193
94	AMERICAN WHITE JUNIPER	CLIP 194
95	AMERICAN WHITE DOGWOOD	CLIP 195
96	AMERICAN WHITE OAK	CLIP 196
97	AMERICAN WHITE PINE	CLIP 197
98	AMERICAN WHITE SPRUCE	CLIP 198
99	AMERICAN WHITE FIR	CLIP 199
100	AMERICAN WHITE CEDAR	CLIP 200



**NOTE:**

1. DATA SHOWN ON THIS PLAN IS BASED ON DATA NOT SHOWN.
2. CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD.
3. EXISTING UTILITIES - THE EXISTING UTILITY DATA SHOWN IS FOR INFORMATION ONLY. CONTRACTOR SHALL VERIFY ALL UTILITIES IN THE FIELD.
4. ROUTING OF UTILITIES - ALL EXISTING PLANT INTERFERENCE IN THE FIELD SHALL BE REMOVED OR RELOCATED AS DIRECTED BY THE ARCHITECT.
5. EXISTING UTILITIES - CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD.
6. EXISTING UTILITIES - CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD.
7. EXISTING UTILITIES - CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD.

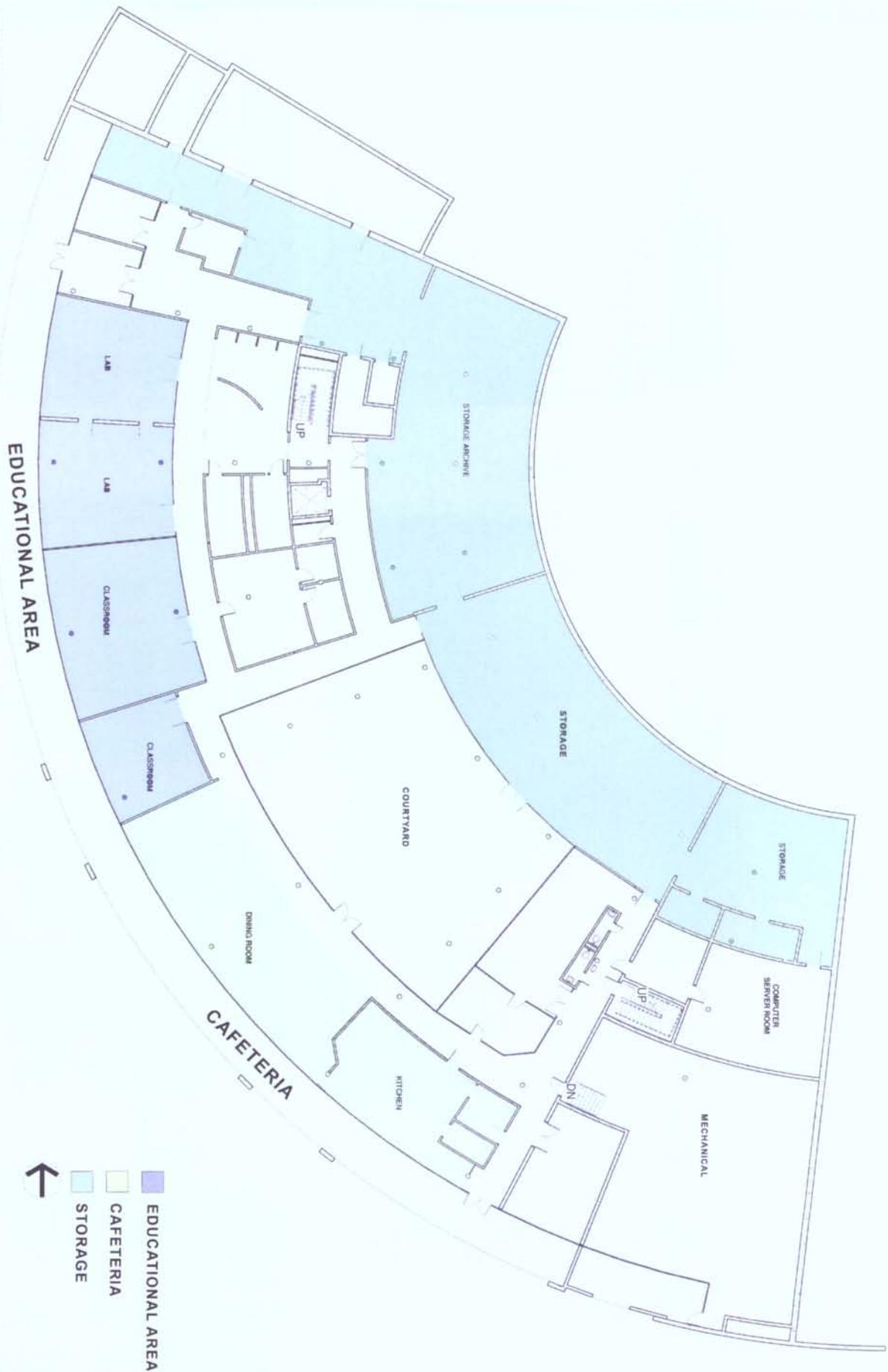
**LEGEND**

- PROPOSED TREES
- PROPOSED SHRUBS
- PROPOSED BIENNIAL PLANTS
- PROPOSED PERENNIALS
- PROPOSED LAWN
- EXISTING TREES TO BE REMOVED
- EXISTING UTILITY STRUCTURE
- PROPOSED UTILITY STRUCTURE
- PROPOSED TRENCH LOCATION

ASIM Headquarters and Geodesic Dome, Georgia Co., OH

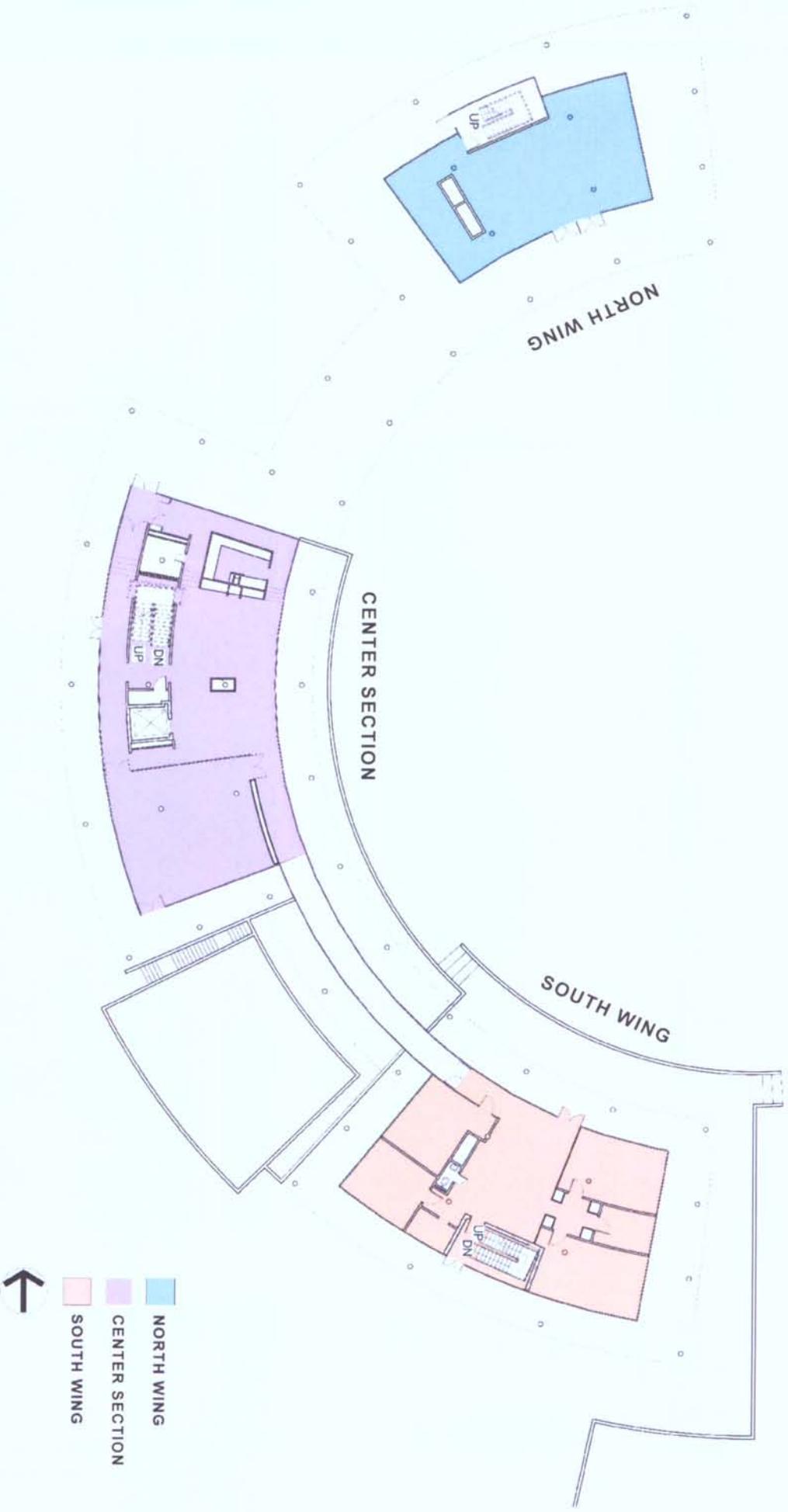
URS  
ARCHITECTURE  
LLP

THE CHESLER GROUP  
ASIM HEADQUARTERS

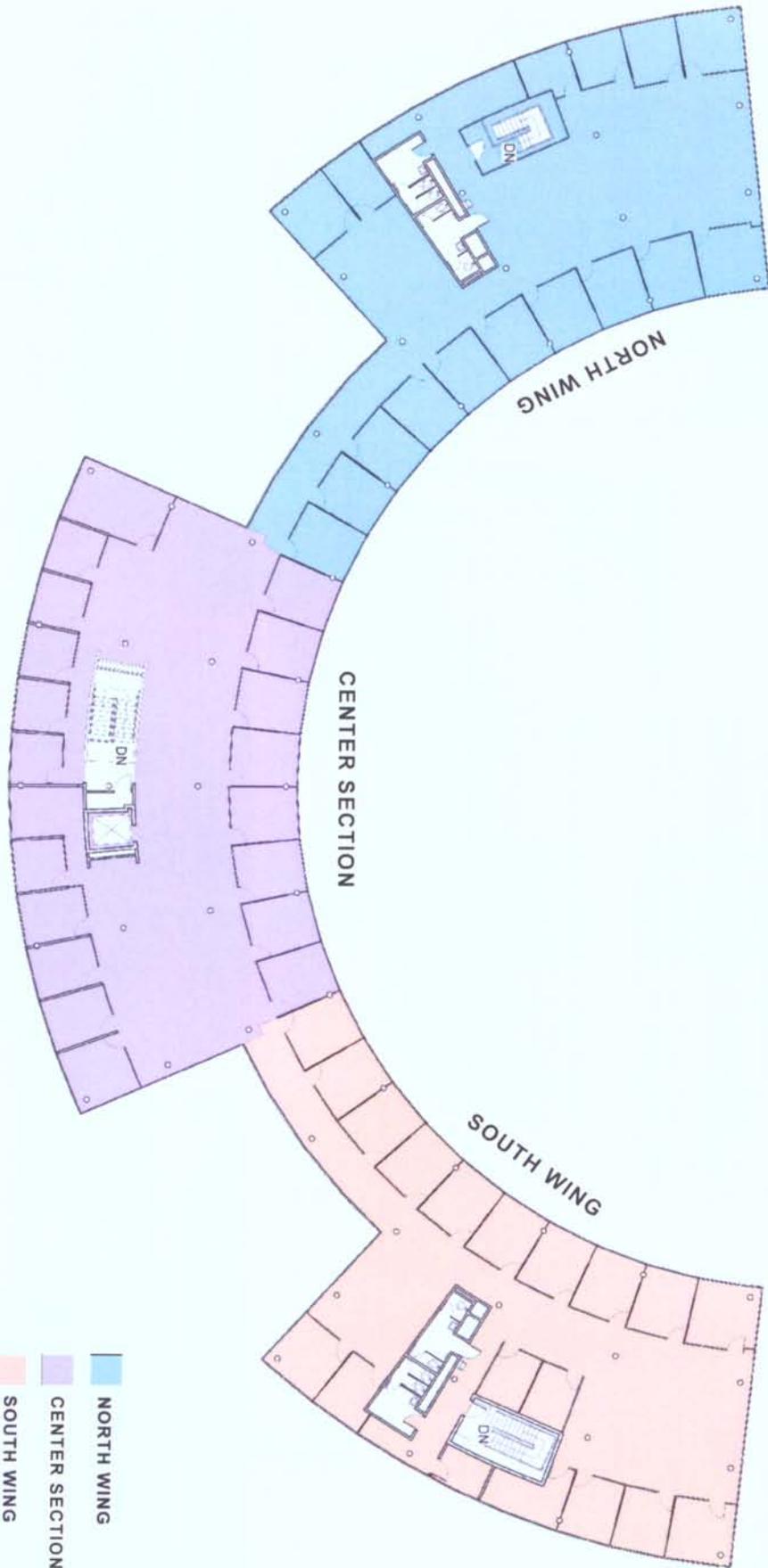


EXISTING GARDEN LEVEL PLAN

S2006

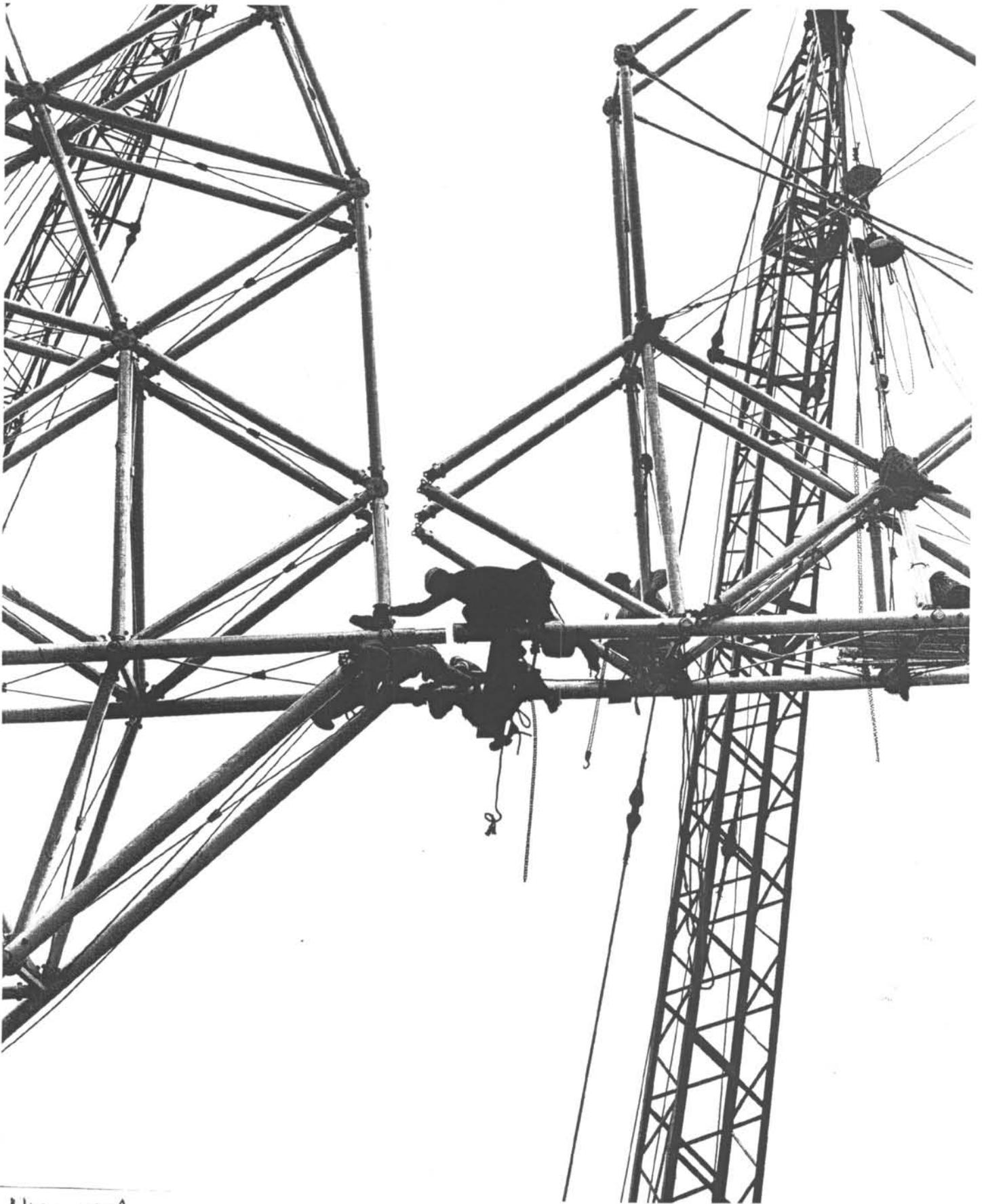


ASM Headquarters and Geodesic Dome, Georgia Co, GA



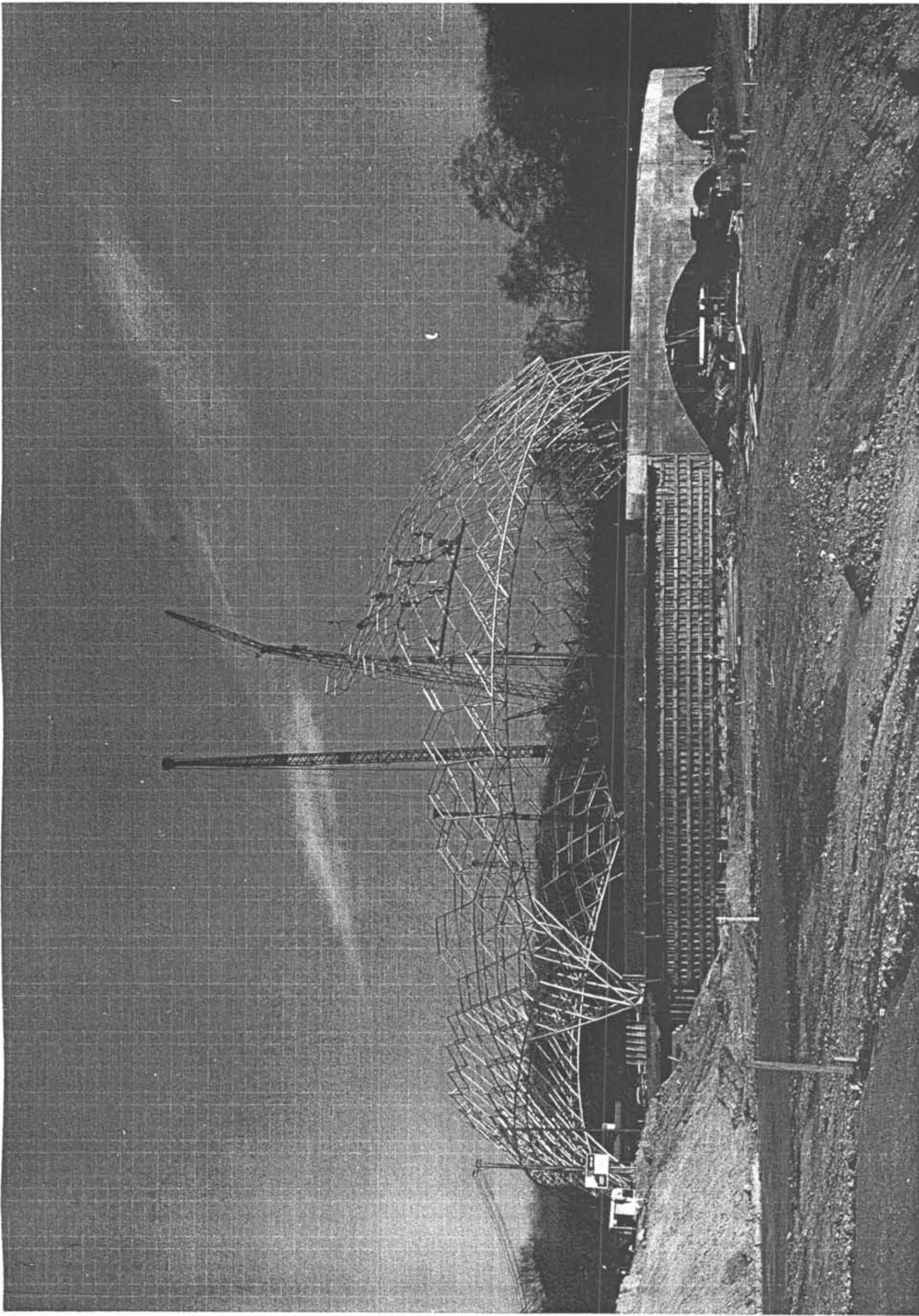
ASIM Headquarters and Geodesic Dome, Georgia Co, Olt





HIST 001

ASM Headquarters  $\frac{1}{2}$  Geodesic Dome, Geauga Co., OH



The Gillmore - Olson Co.  
Engineers & Builders

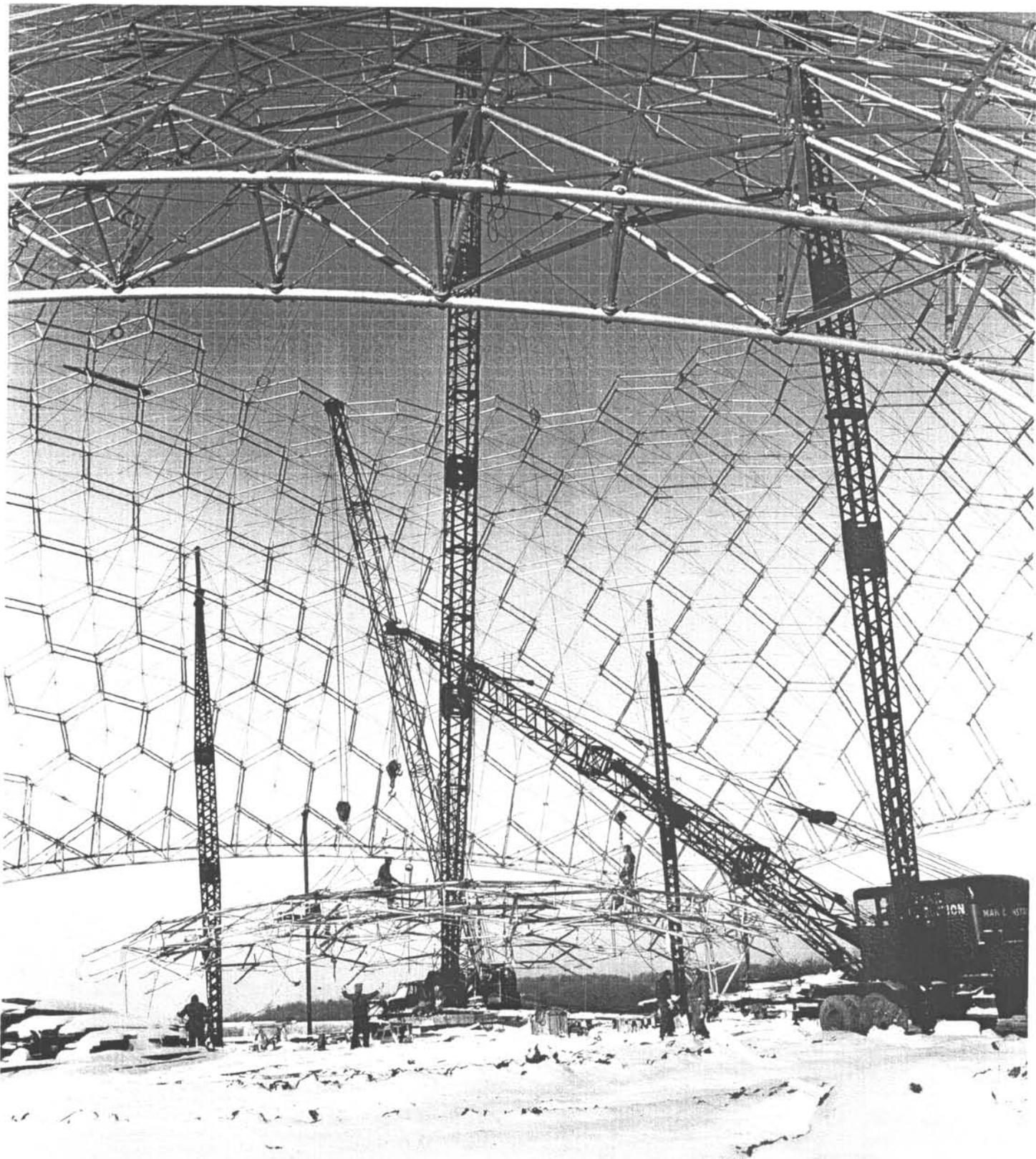
AMERICAN SOCIETY FOR METALS  
HEADQUARTERS BLDG.

Date *11-4-58* View *S*

Kelly & Kress & Assoc.  
Architects

HIST 002 |

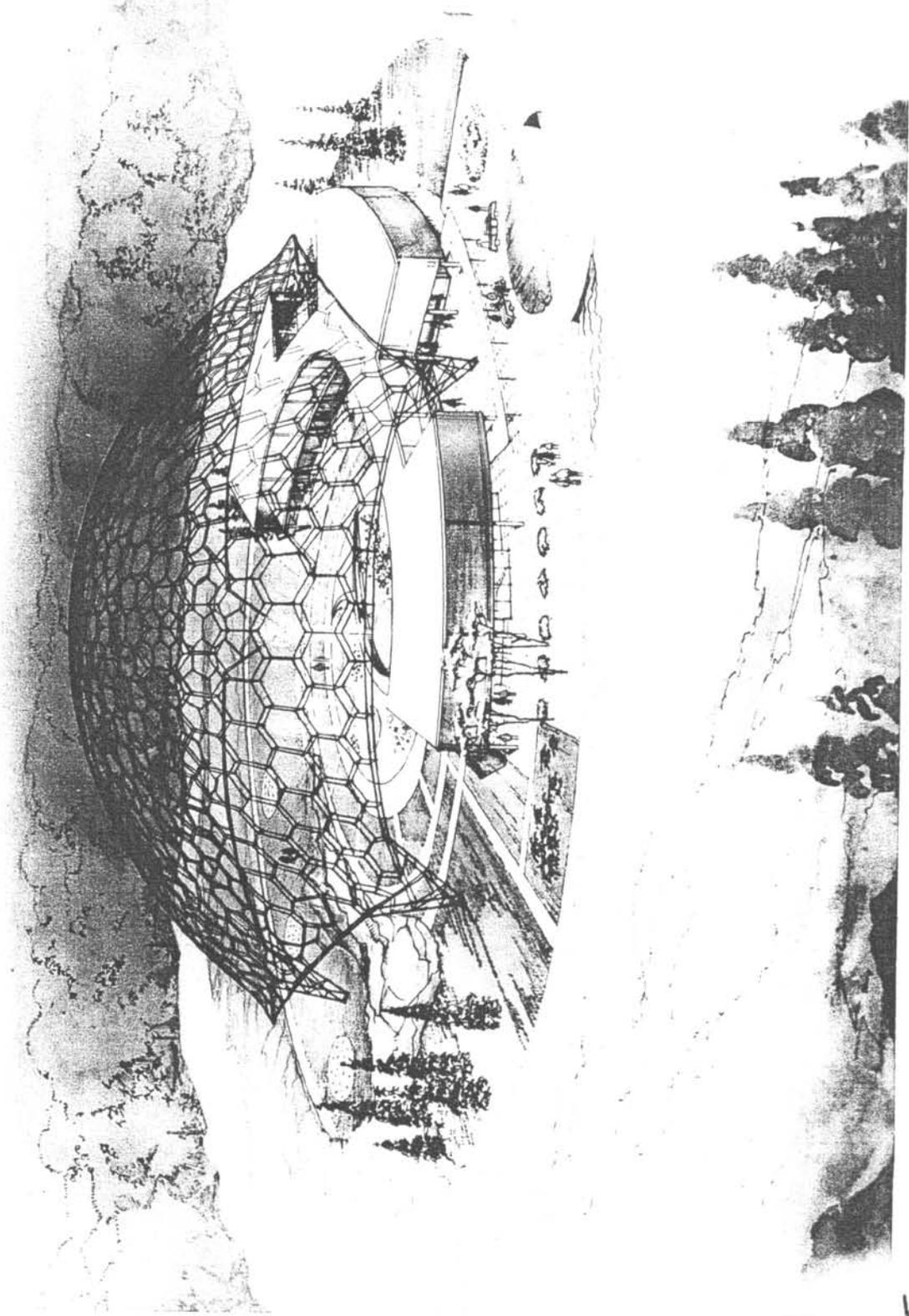
Asm Headquarters & Geodesic Dome, Geauga Co., OH



HIST 003

148

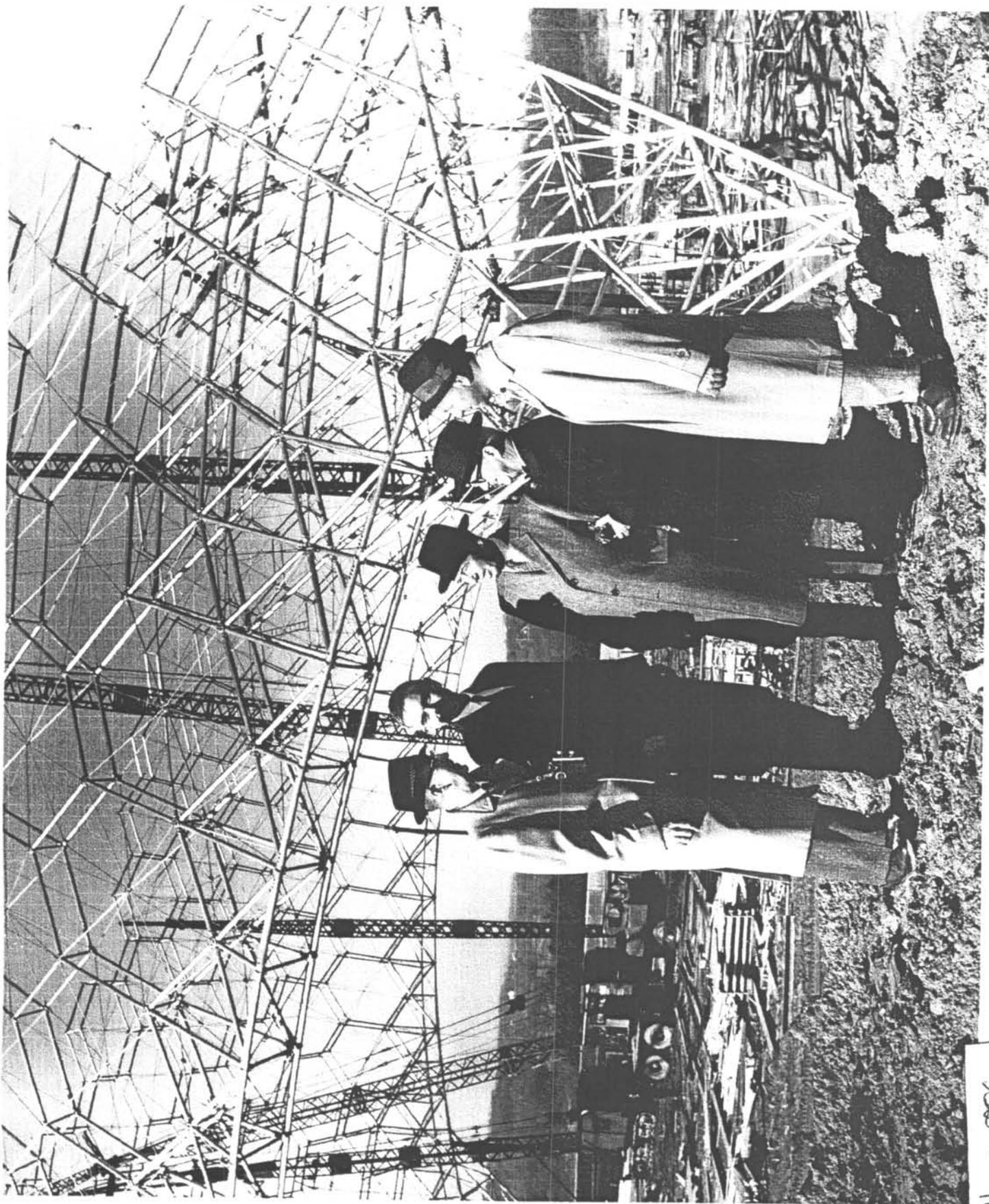
ASM Headquarters & Geodesic Dome, Geaug Co., OH



005

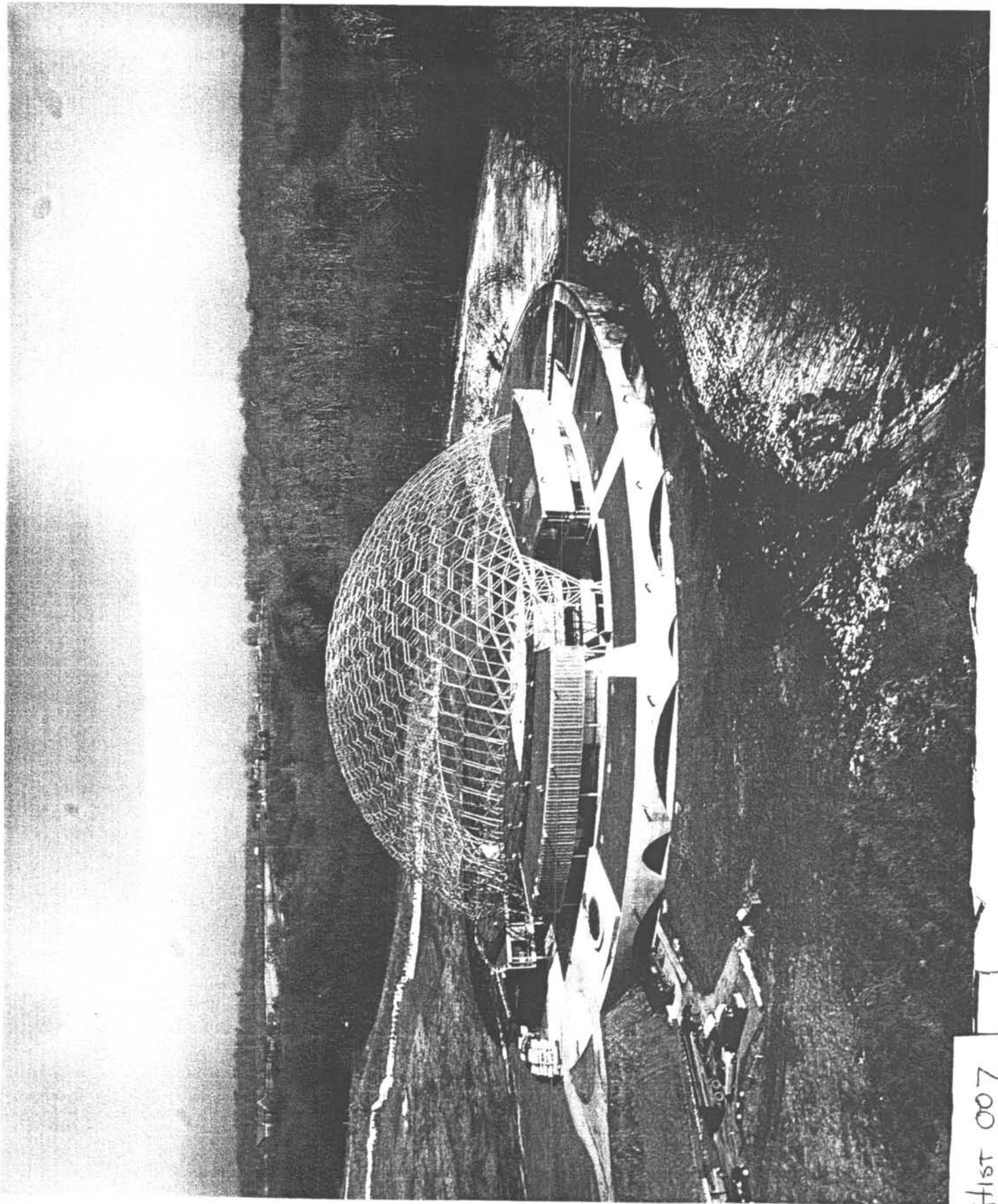
ASm Headquarters : Geodesic Dome, Geauga Co, OH

H151 005



HIST 0006

ASm Headquarters & Geodesic Dome, Geauga Co, OH



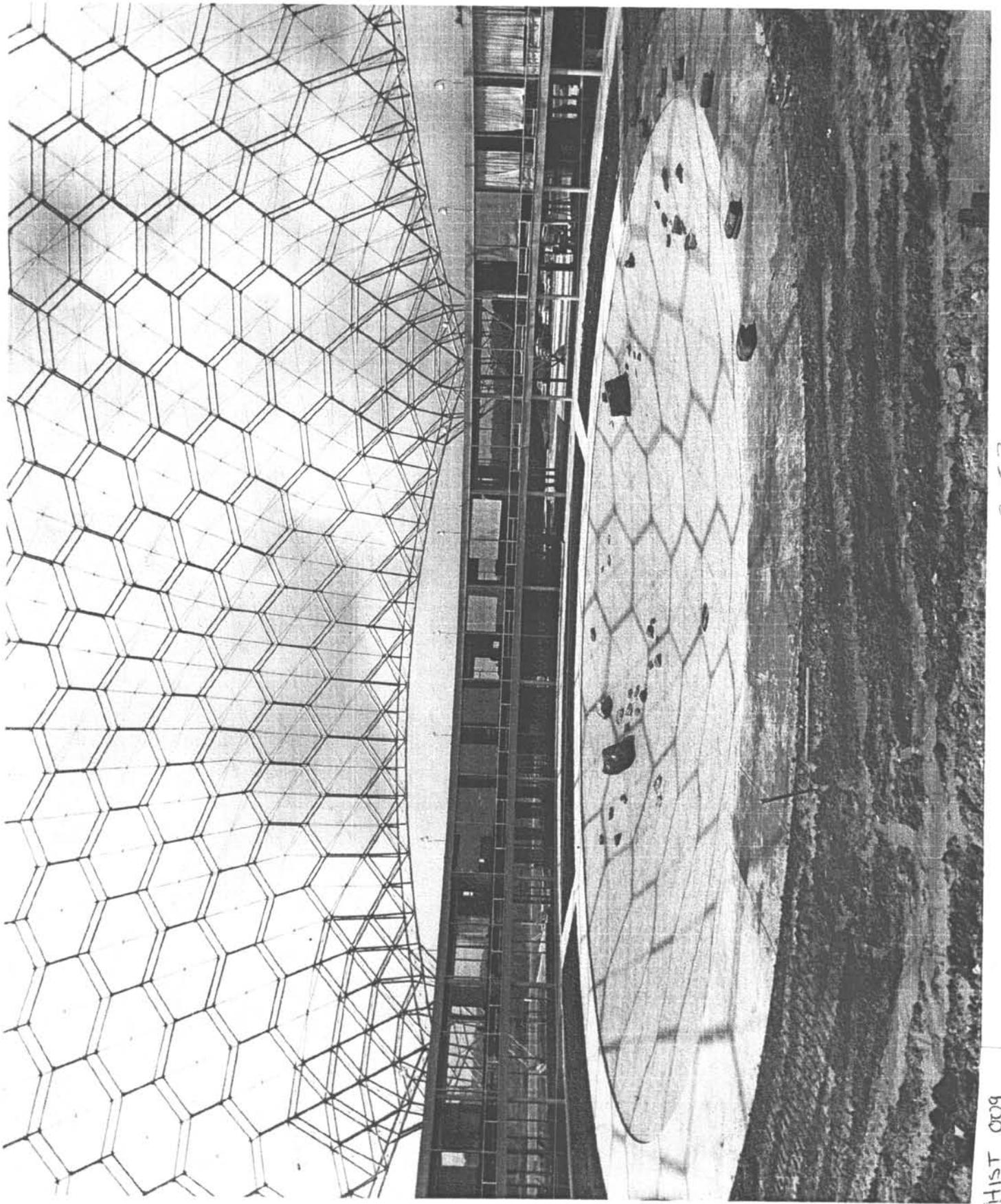
H1st 007

ASM Headquarters & Geodesic Dome, Geauga Co., OH

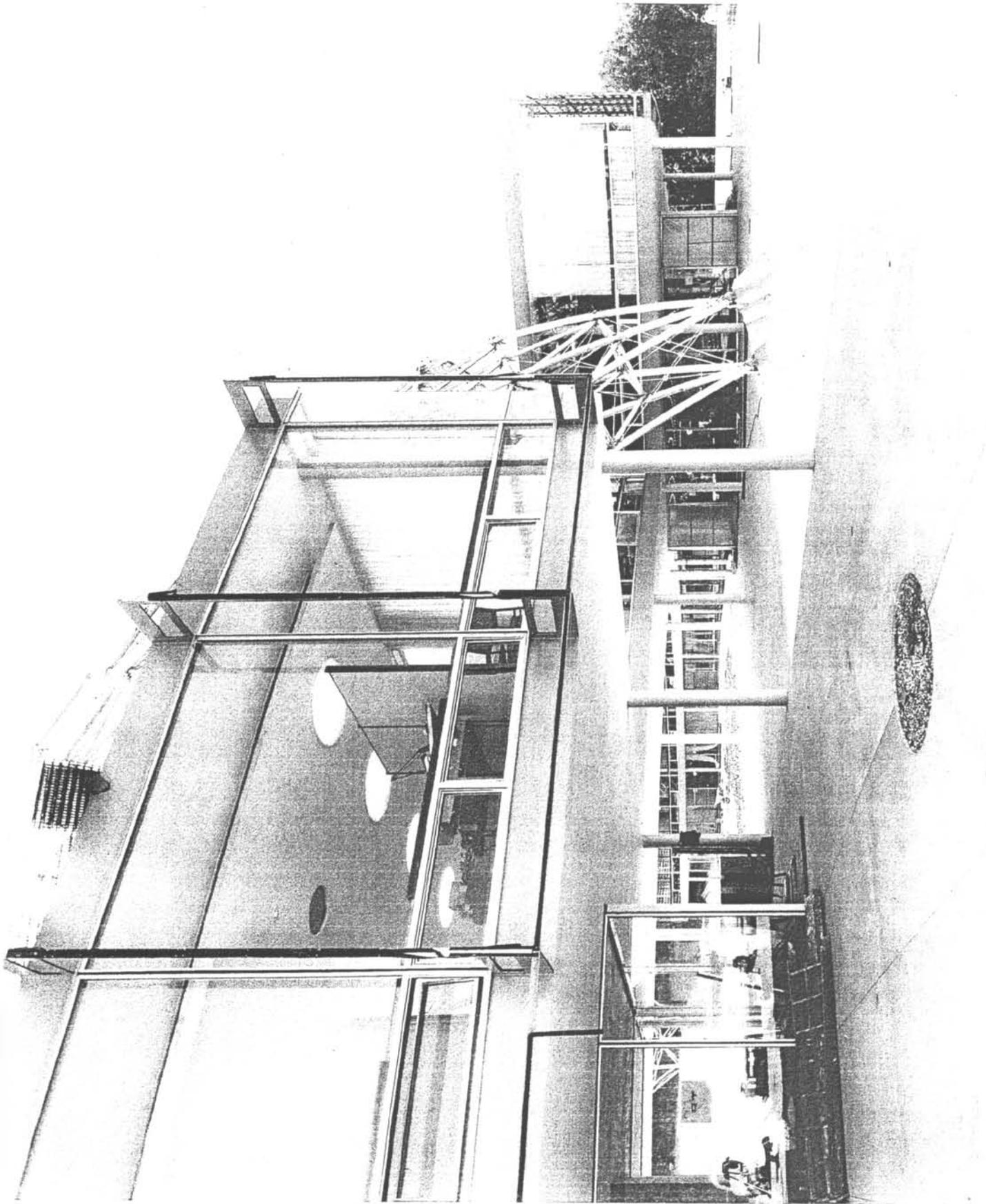


HIST 008

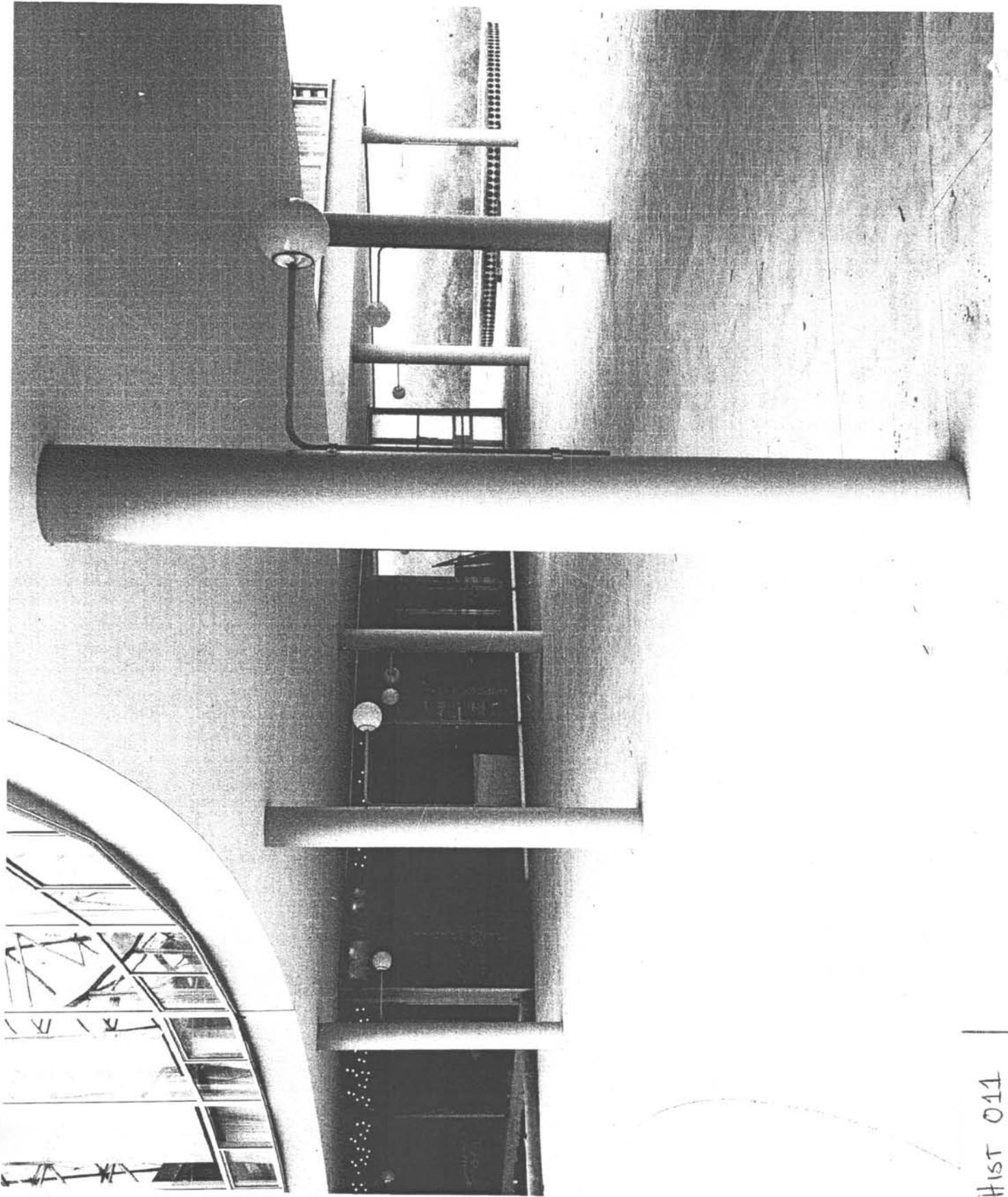
ASM Headquarters & Geodesic Dome, Geauga Co., OH



ASM Headquarters : Geodesic Dome, Geauga Co, OH



H-15T 010 ASM Headquarters & Geodesic Dome, Georgia Co., OH



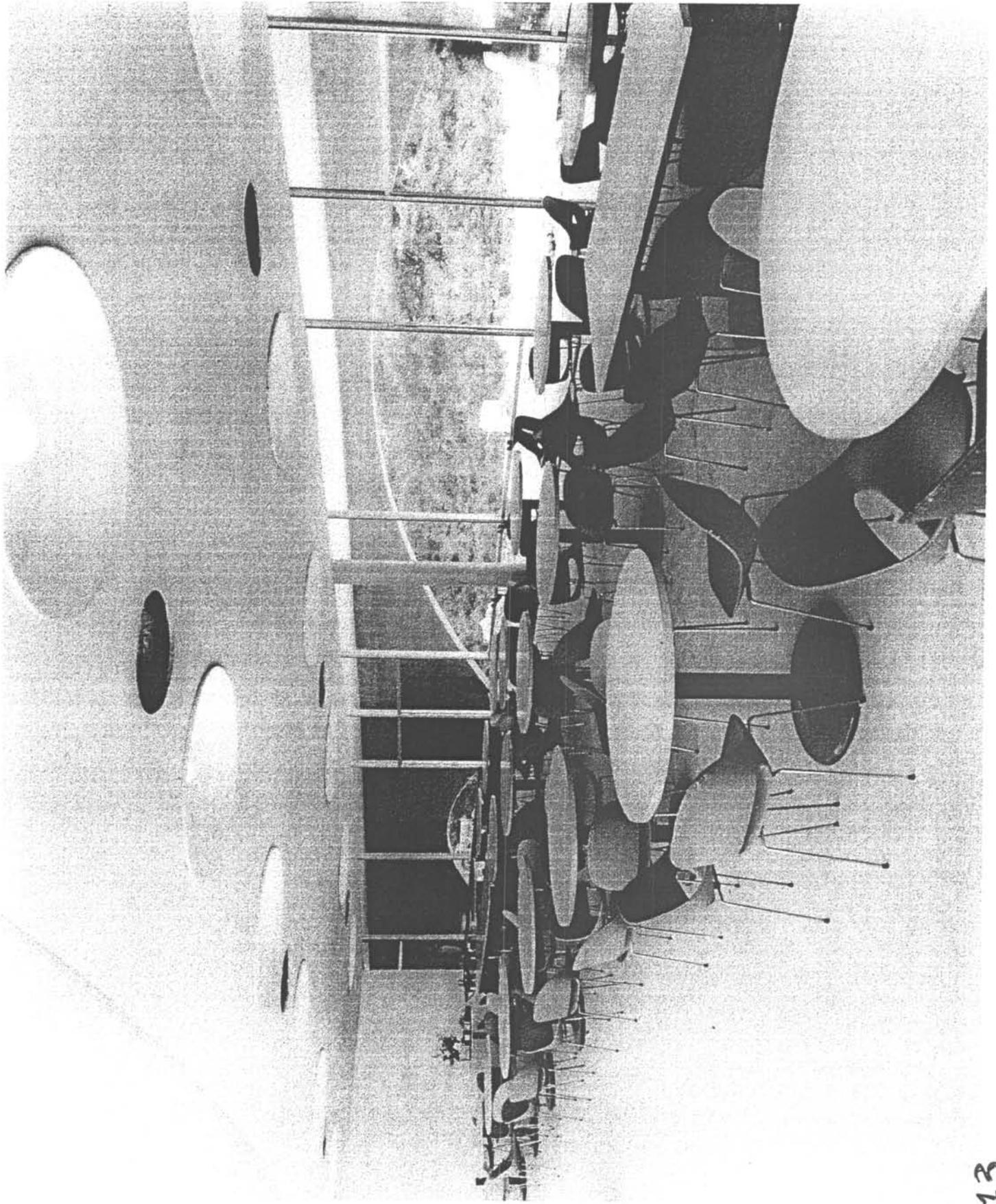
HIST 011 |

ASM Headquarters | Geodesic Dome, Georgia Co., OH



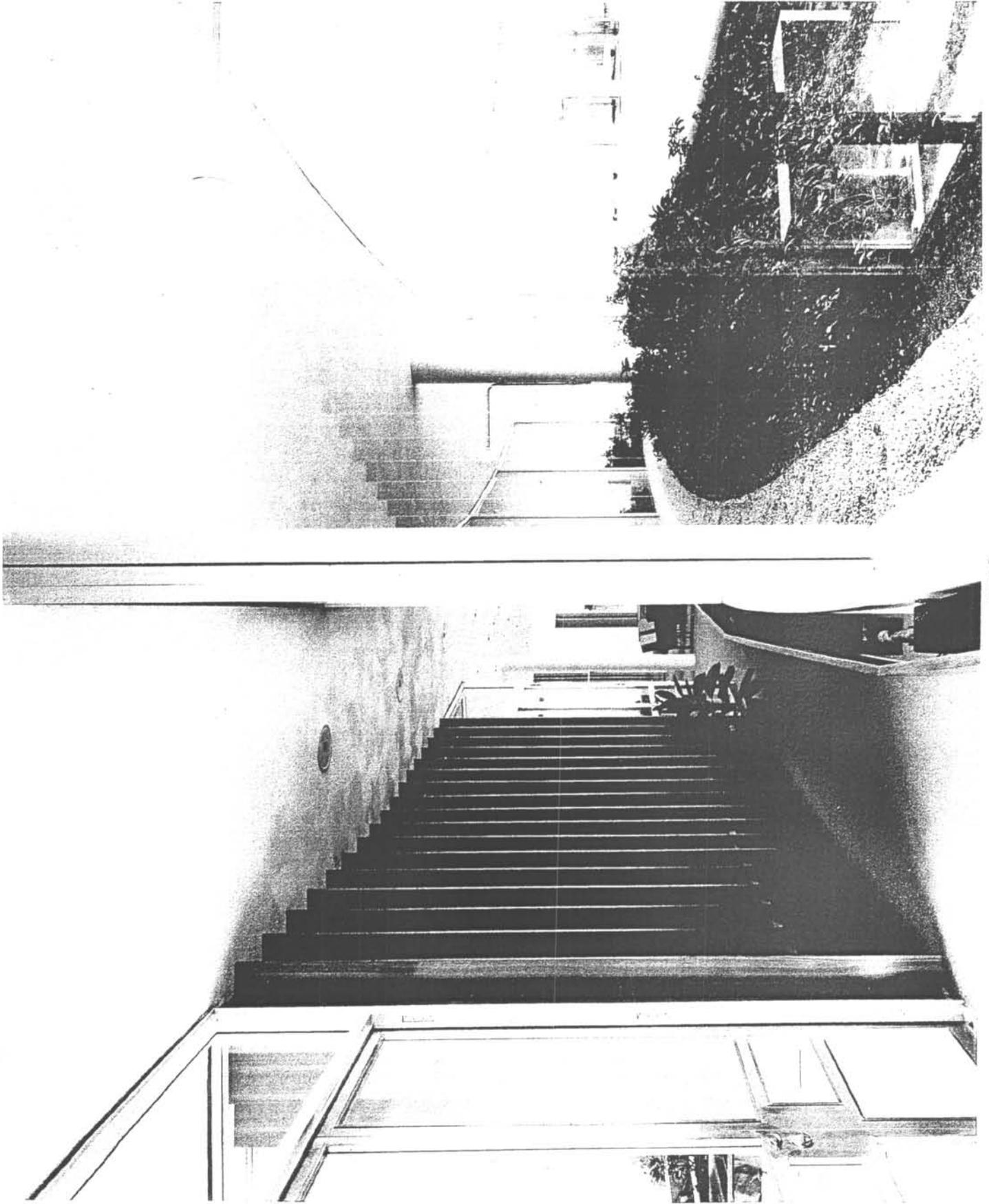
HIST 012

ASM Headquarters & Geodesic Dome, Geauga Co., OH

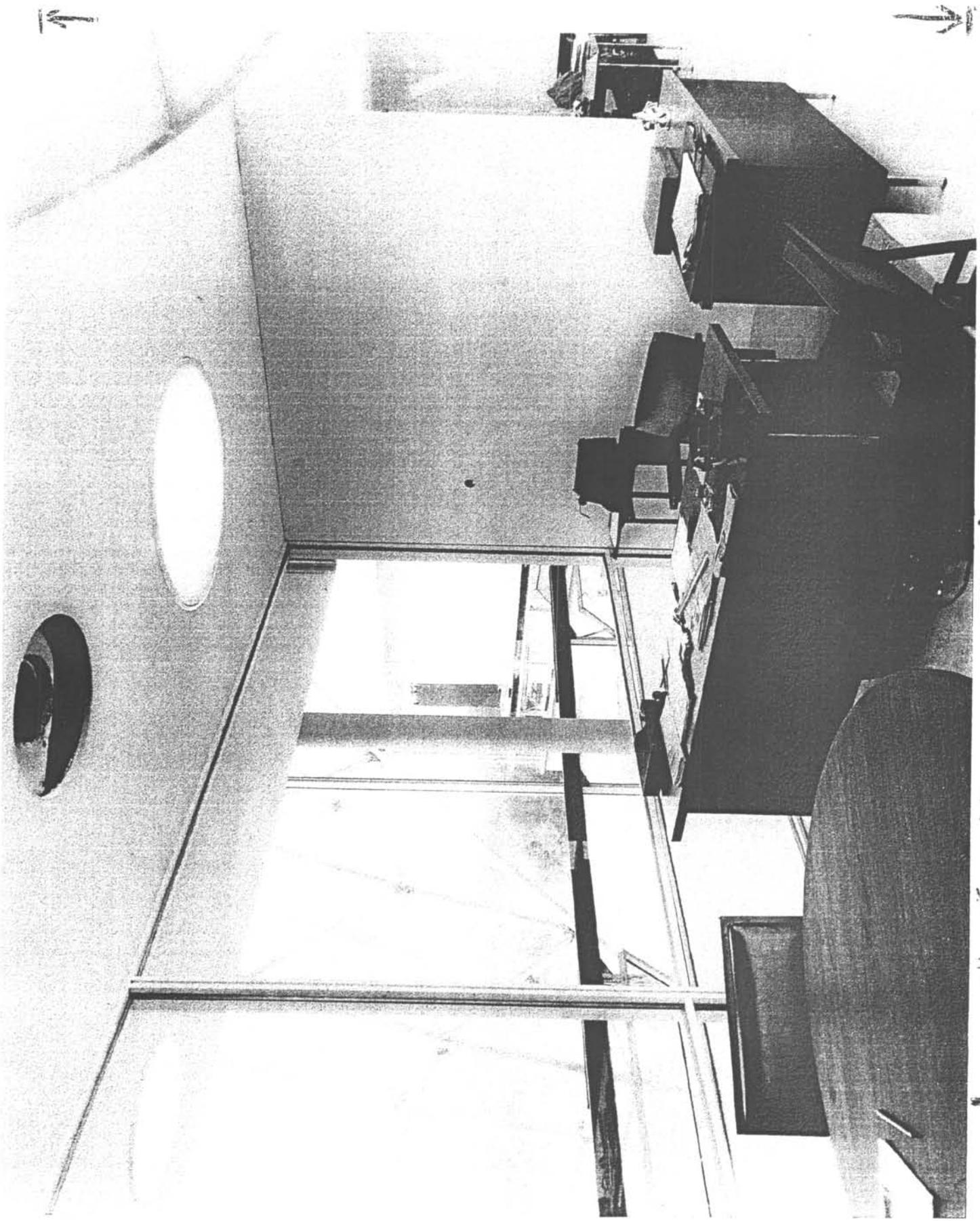


ASM Headquarters : Geodesic Dome  
Geauga Co., OH

HST 013



HIST 014 <sup>397</sup> ASM Headquarters & Geodesic Dome, Geauga Co., OH

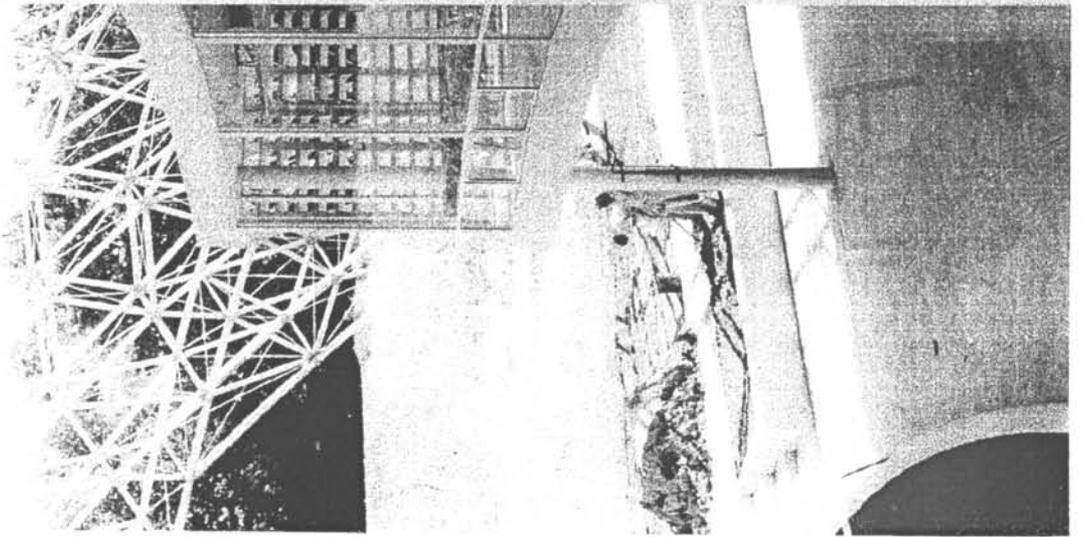
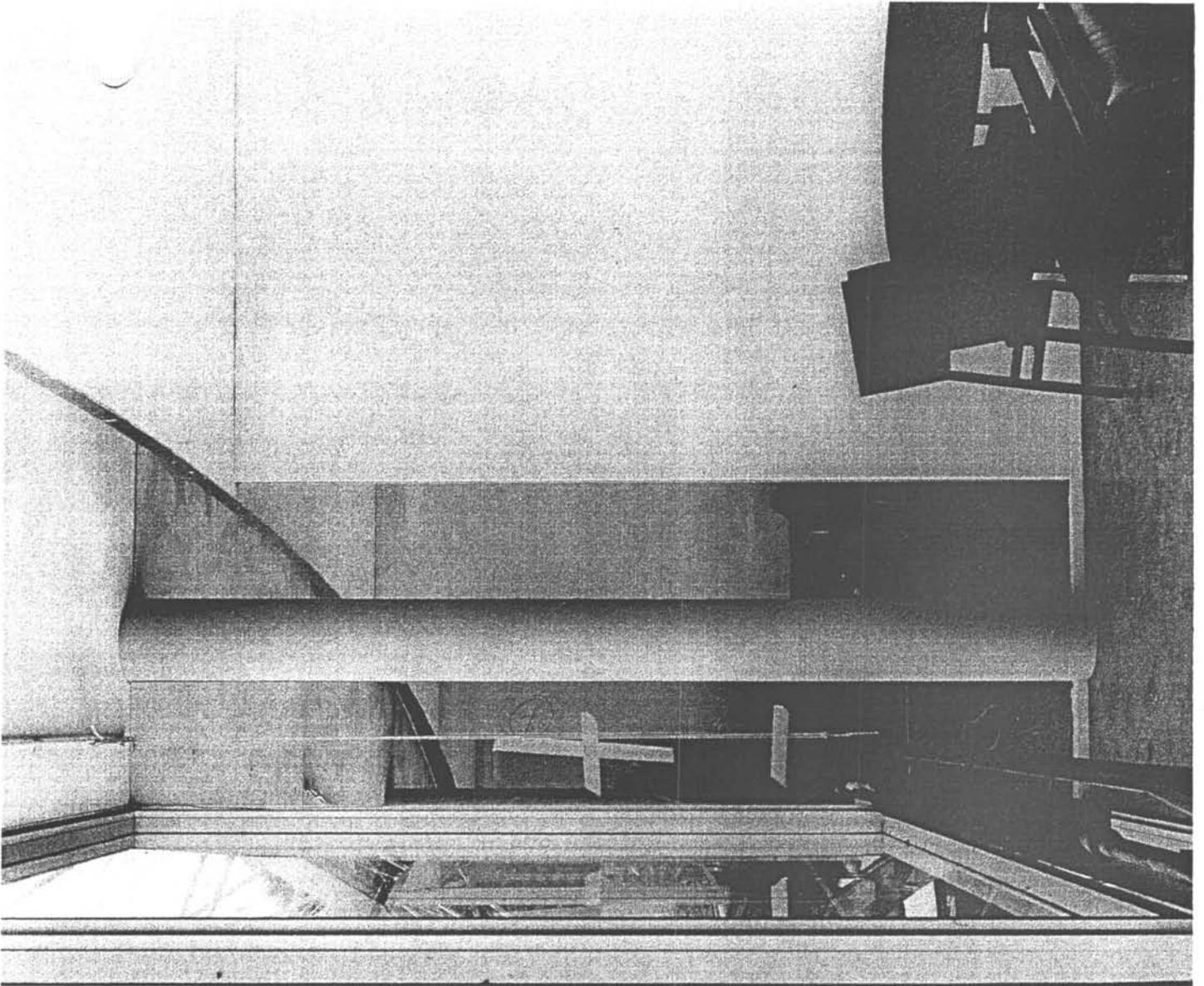


HIST 015  
4/14/66 2:30 PM  
ASM Headquarters & Geodesic Dome, Georgia Co, OH  
1-2-66 4-24-66 4-25-66



HIST 016

ASME Headquarters & Geodesic Dome, Deauga Co., OH



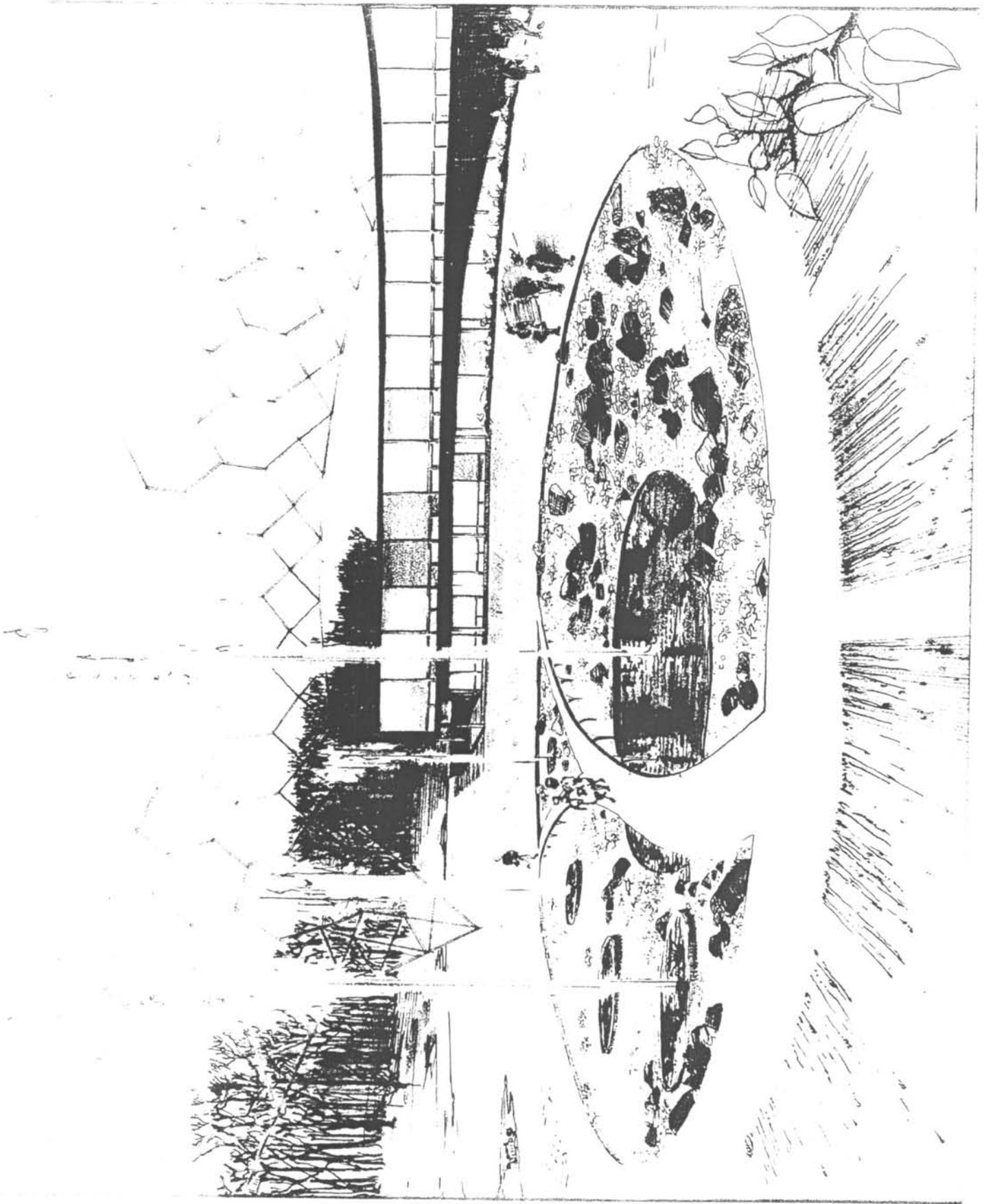
ASM Headquarters : Geodesic Dome, Geauga Co., OH

HIST 017

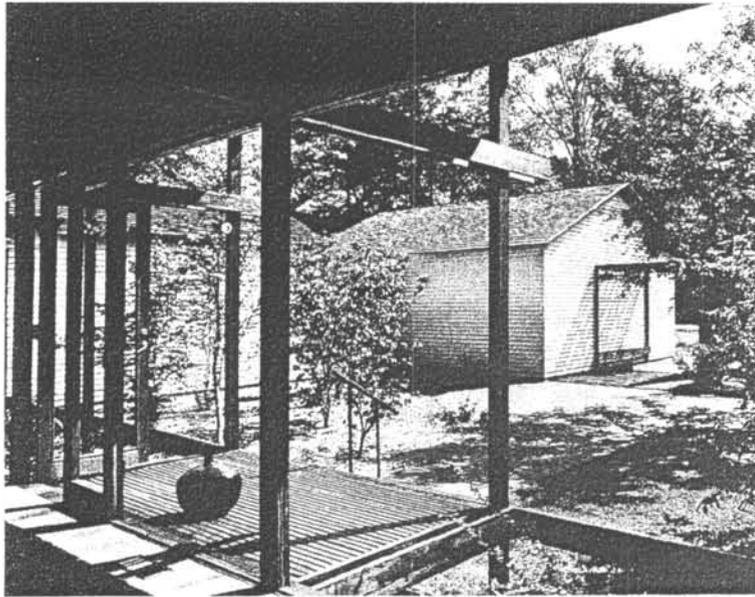


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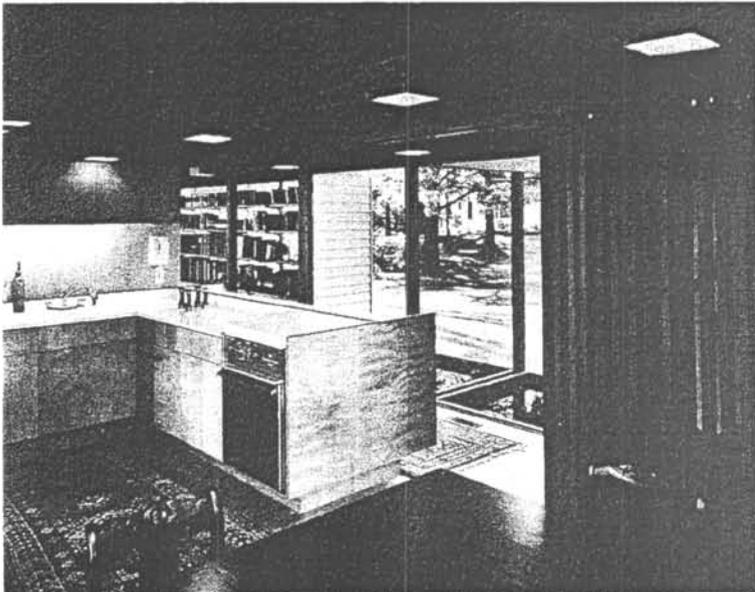
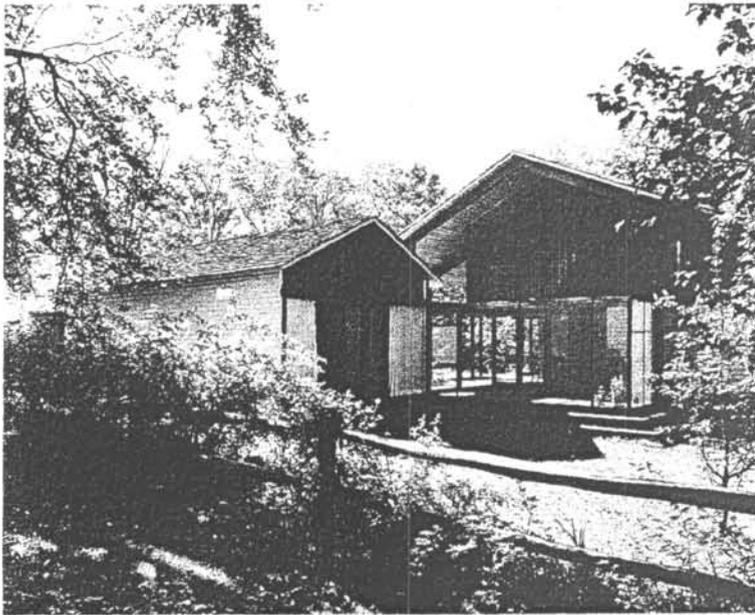
ASM Headquarters : Geodesic Dome, Geauga Co. OH



H15T 019 ASM Headquarters & Geodesic Dome, Geauga Co. OH

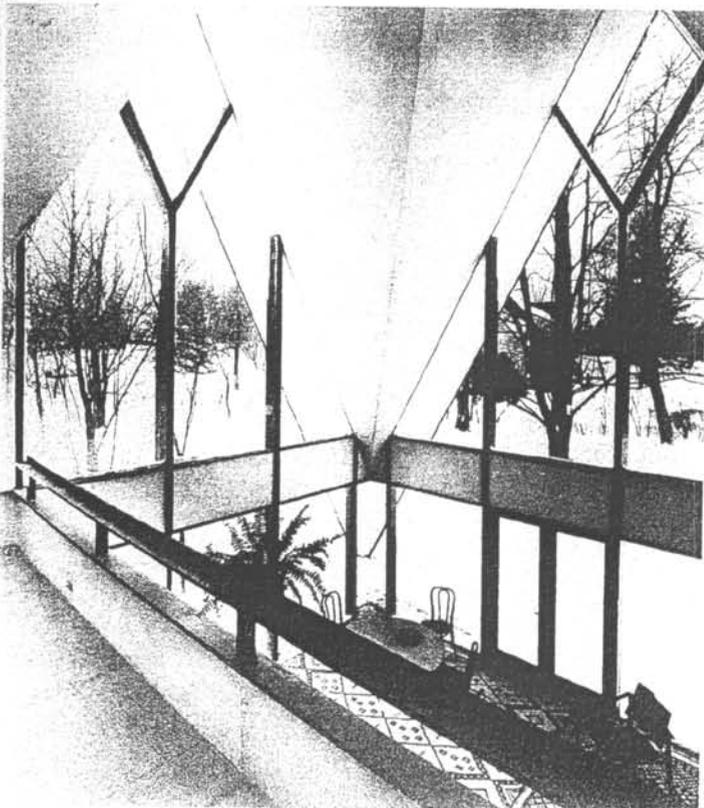
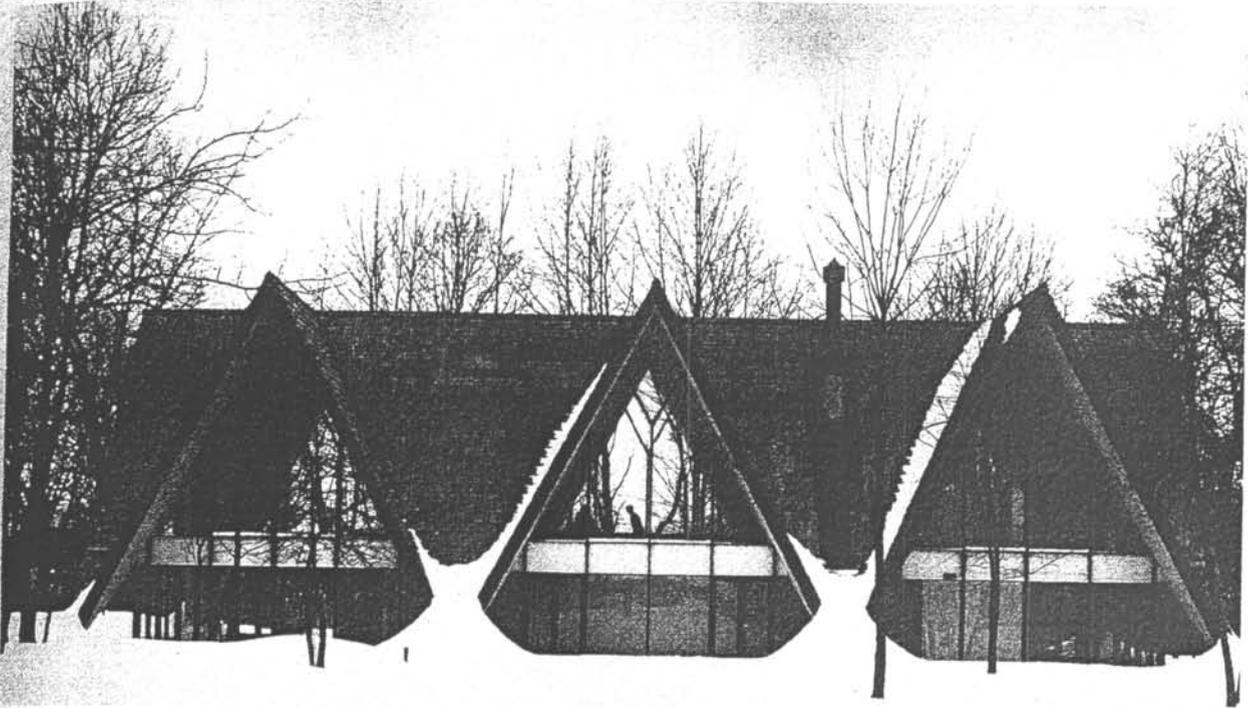


THE  
WHITE  
RESIDENCE  
SON • OHIO



ASM Headquarters  
↳ Geodesic Dome,  
Geauga Co., OH

REF 001



10, 11 McDonald house; Elyria, Ohio. John Terrence Kelly, 1961. Photos: Ed Nano.

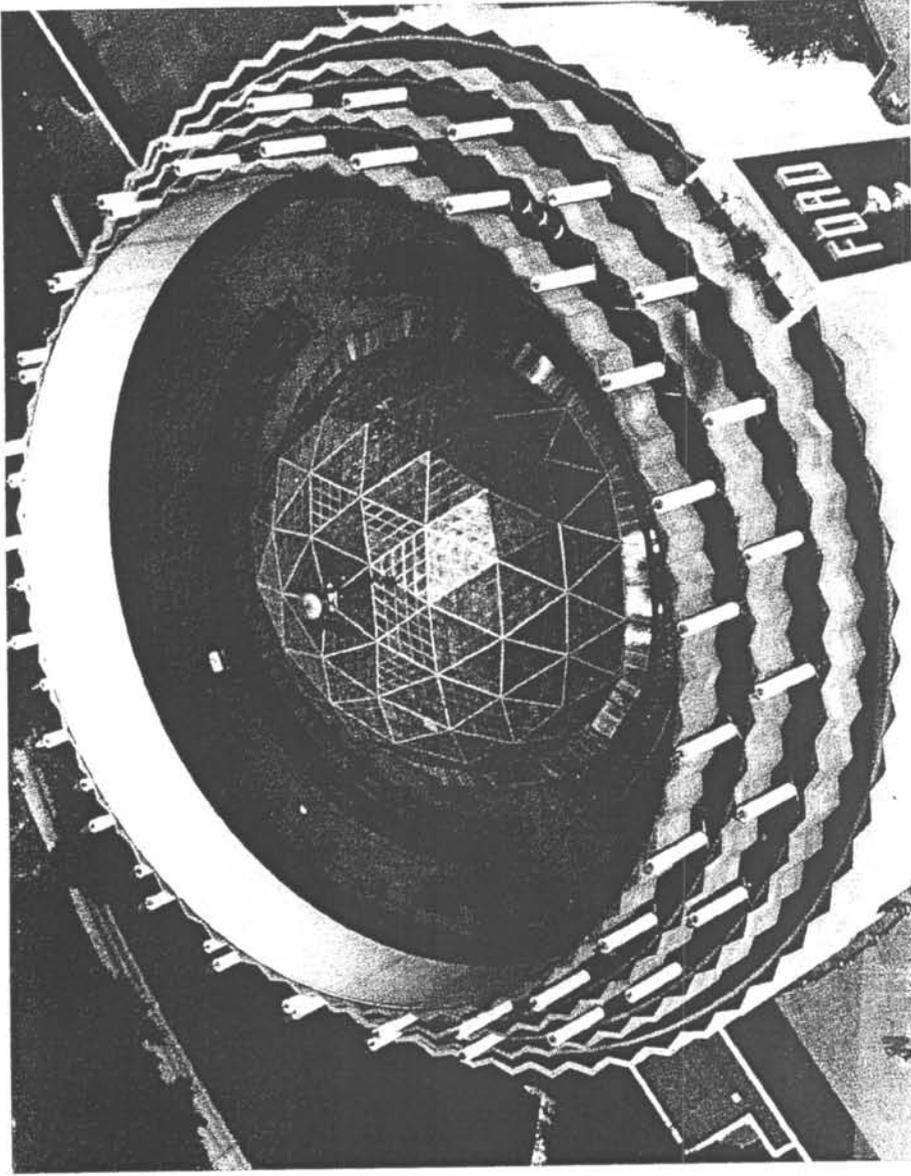
[EXTERIOR] Resting on eight points anchored in concrete piers, the dwelling is constructed of intersecting wood A-frames, the pointed gables entirely filled with glass.

[INTERIOR] The A-frame provides economical two-story space.

REF 002

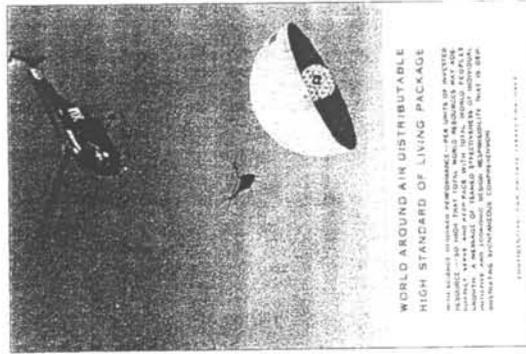
ASM Headquarters & Geodesic Dome  
Geauga Co., OH

The Ford Dearborn Rotunda, with Fuller's dome in place, 1953



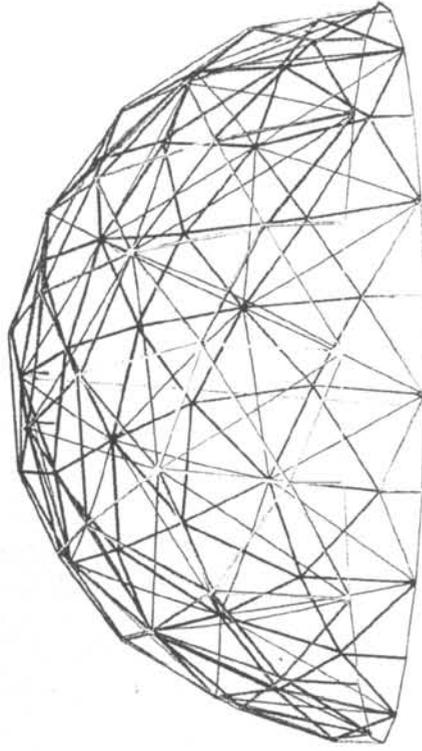
REF 003 Asm Headquarters & Geodesic Dome,  
Geauga Co., OH

U.S. Marine Corps helilifting a 55-foot dome, 1954



WORLD AROUND AIR DISTRIBUTABLE  
HIGH STANDARD OF LIVING PACKAGE

Air deliverable housing, Fuller's life-long dream, 1954



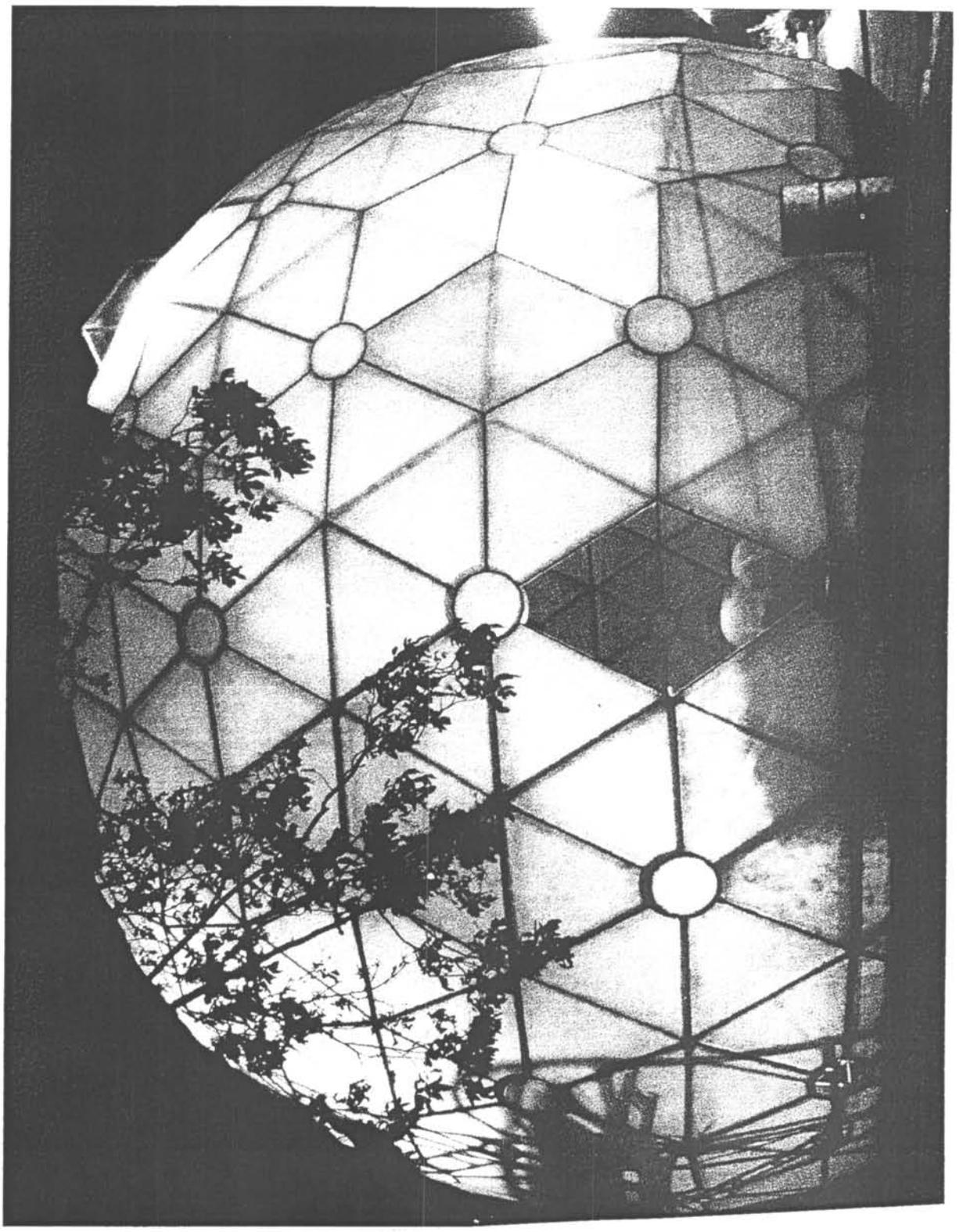
REF 004

ASM Headquarters & Geodesic Dome, Georgia Co., OH

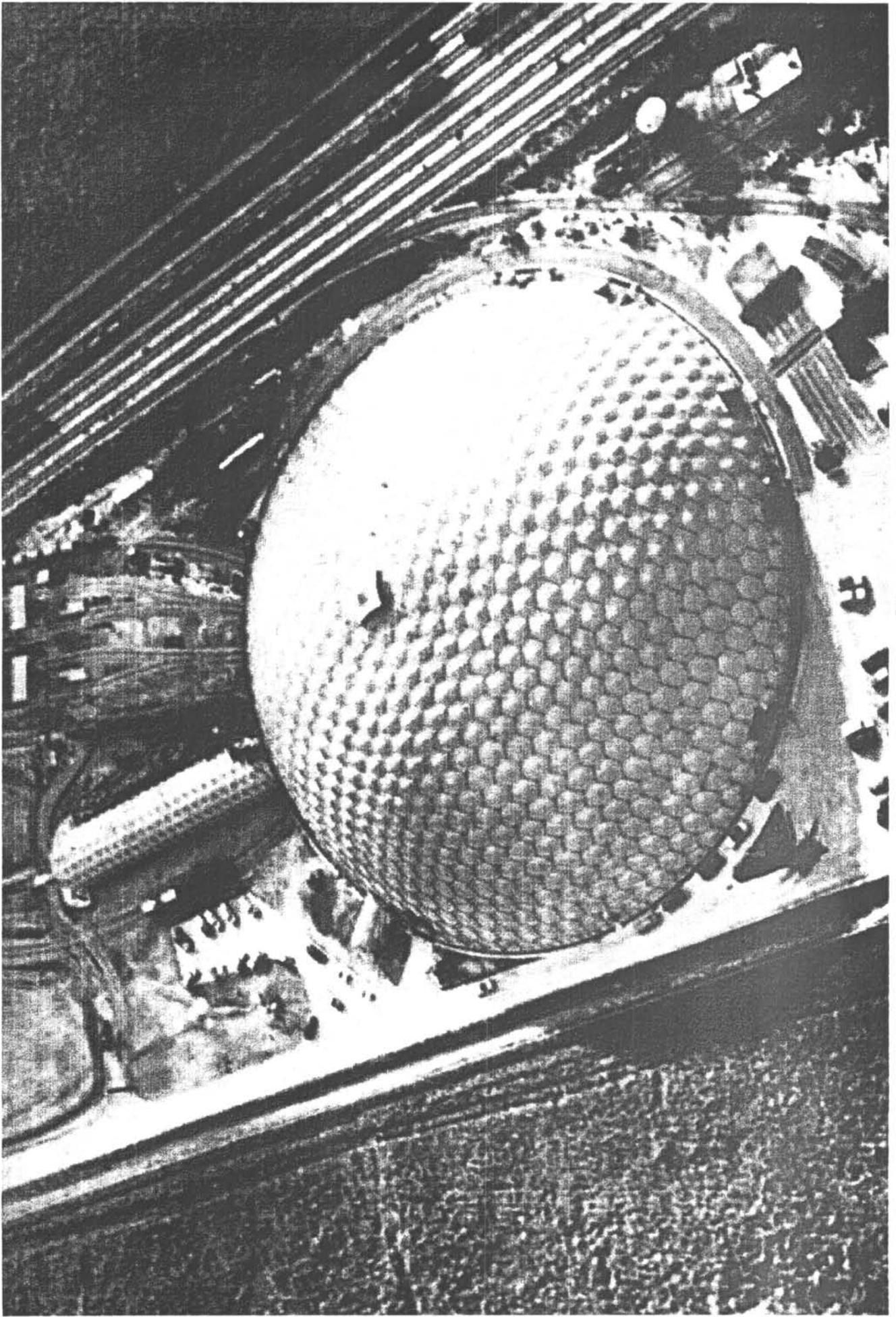
ASM Headquarters & Geodesic Dome, Georgia Co., Orit

Radome, Long Island, New York, 1955

6. THE GEODESIC DOME



REF 005

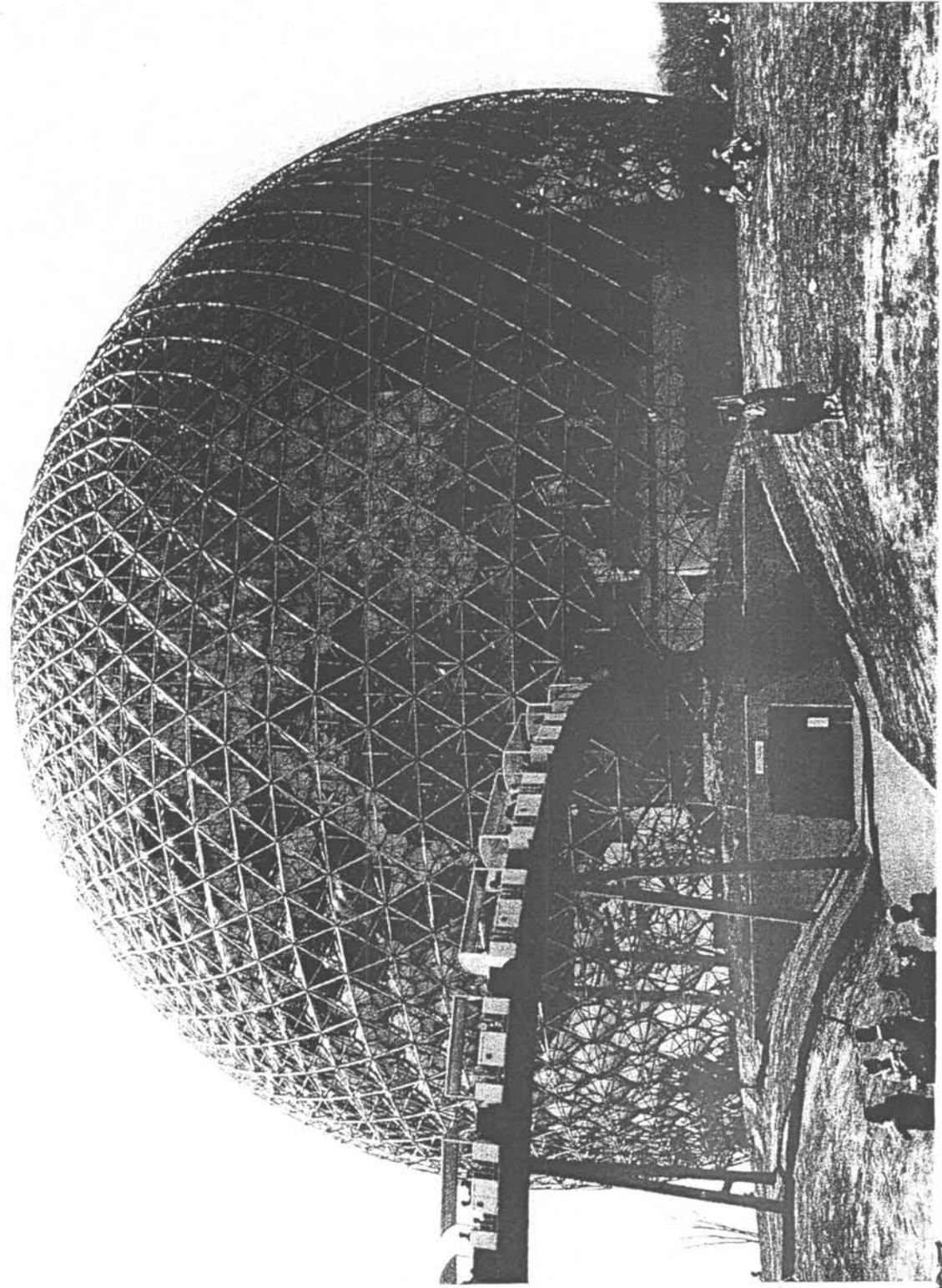


REF 006 ASM Headquarters & Geodesic Dome, Geauga Co., OH

Asm Headquarters & Geodesic Dome  
Geauga Co., OH

Montreal Expo '67 dome

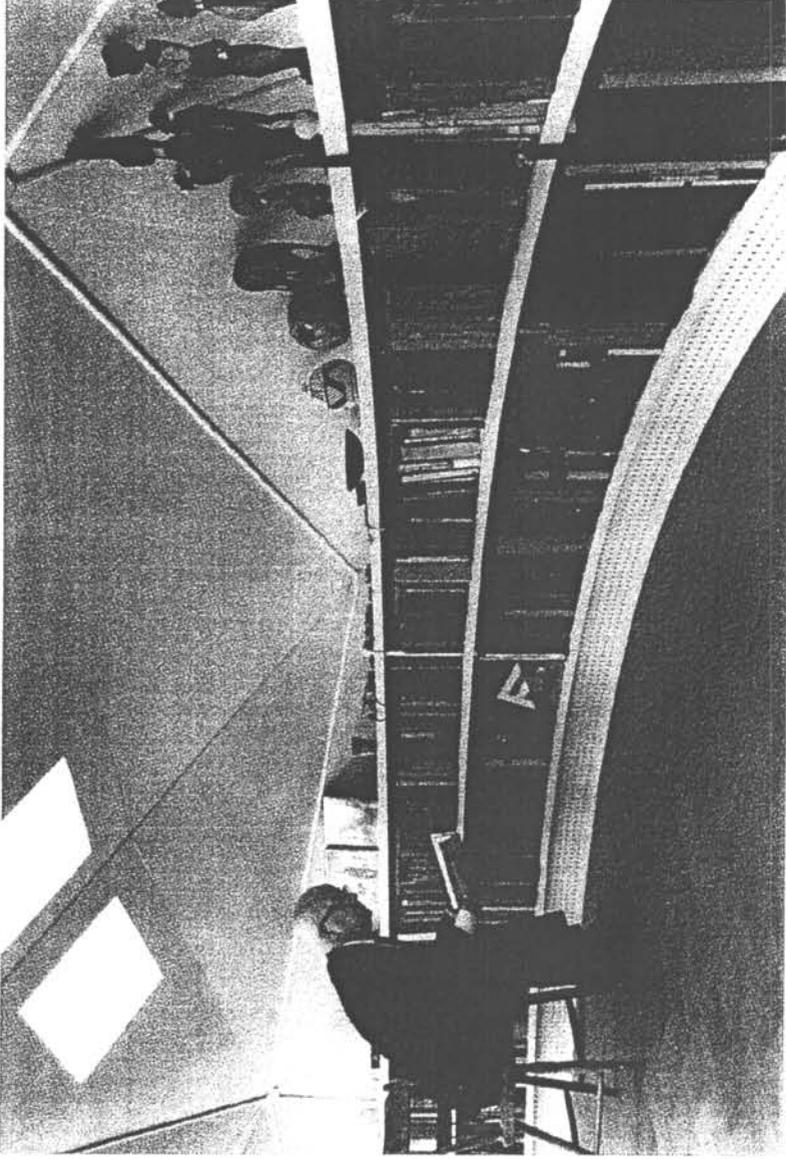
6. THE GEODESIC DOME



REF 007

INTRODUCTION

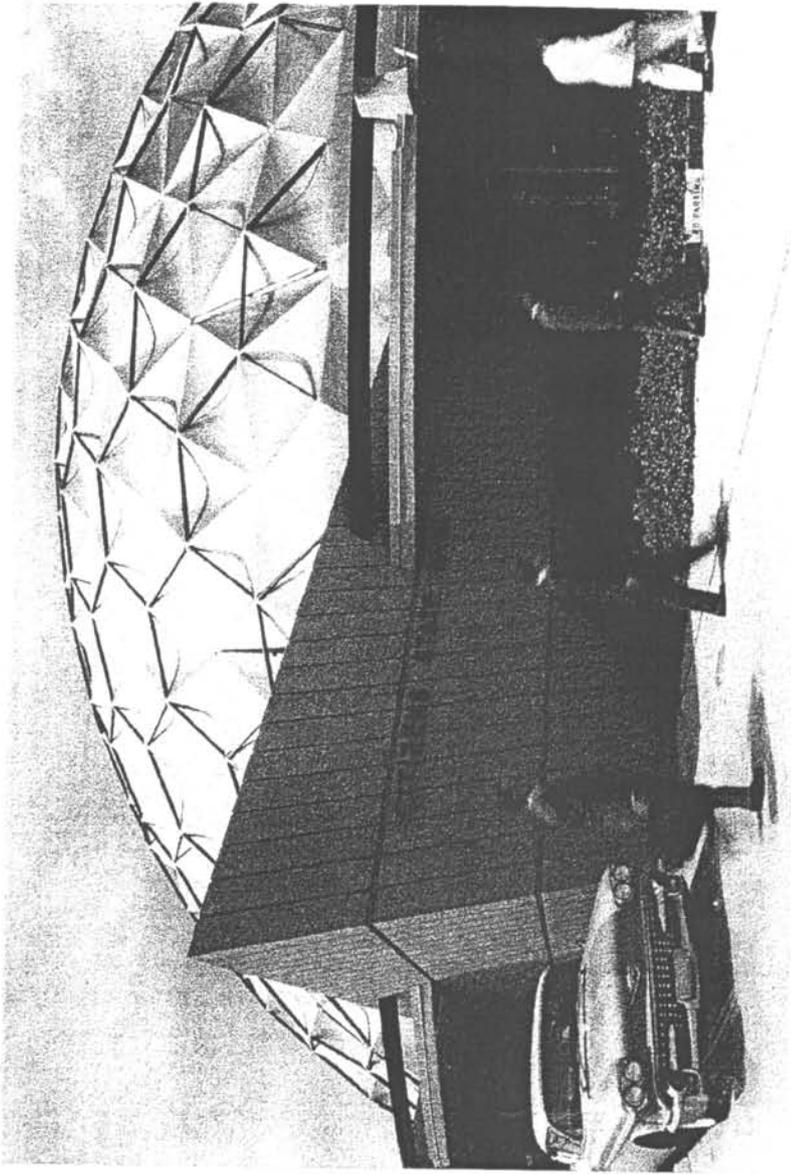
Fuller in his dome home, Carbondale,  
Illinois



REF 008

ASM Headquarters : Geodesic Dome, Georgia Co., OH

Citizens State Bank, Oklahoma City, built by  
Kaiser Aluminum



REF 009

ASM Headquarters ; Geodesic Dome, Georgia Co., OH





























Welcome to  
Materials Park.  
The Home of  
Team ASM



**STOP**  
**Do Not Put**  
**Your**  
**Unwanted**  
**Stuff in This**  
**Area**







1) ZISC  
2) PIPED  
3) IMPROV  
Date: 10/27  
NATALIE WEN  
Tech Manager



<EXIT



