

Church
Chapel
1956

CHURCH AND CHAPEL FOR NEWTON COLLEGE
Newton, Massachusetts

A thesis submitted in partial
fulfillment of the requirements
for the degree of Master in
Architecture at Massachusetts
Institute of Technology

Submitted: 31 August, 1956

By: {

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To:

Lawrence B. Anderson
Head, Department of Architecture
M.I.T.

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CHURCH AND CHAPEL FOR NEWTON COLLEGE
Newton, Massachusetts

by: ~~William J. Rasch, Jr.~~

Submitted to the Department of Architecture and Planning in partial fulfillment of the requirements for the degree of Master in Architecture on 31 August 1956.

ABSTRACT

The charge of producing form which expresses the religious mood in a fresh way by using contemporary knowledge is one of the most challenging problems of architecture. The purpose of this thesis is to study a Catholic Church and Chapel with their specific liturgical and functional requirements in relation to an existent campus and proposals for a future plan.

Arch. Jan. 9, 1957

Thesis supervisor: Lawrence B. Anderson
Head, Department of Architecture
Massachusetts Institute of Technology

I wish to express my gratitude for helpful assistance, criticism, and advice to Dean Pietro Belluschi, Professor Lawrence B. Anderson, Professor Eduardo Catalano, Professor Robert B. Newman, Professor Albert Bush-Brown, and Professor Ernest N. Gelotte.

I should also like to thank Mother Superior Eleanor Kenny and Mother Elizabeth Sweeney of Newton College for giving their time and assistance so generously.

216 Beacon Street
Boston 16, Massachusetts
31 August, 1956

Dean Pietro Belluschi,
Department of Architecture and Planning,
Massachusetts Institute of Technology,
Cambridge, Massachusetts.

Dear Dean Belluschi:

In Partial fulfillment of the requirements for the degree of
Master in Architecture, I respectfully submit my thesis
entitled:

"Church and Chapel for Newton College".

Sincerely,

William J. Rabon, Jr.

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GENERAL DISCUSSION

" For God, to me it seems
is a VERB,
not a noun, proper or improper,
is the ARTICULATION,
not the art, objective or subjective,
is LOVING,
not the abstraction "Love", commanded or entreated;
is KNOWLEDGE DYNAMIC,
not legislative law,
not proclamation law,
not academic dogma, nor ecclesiastic canon.
Yes, God is a verb,
the most active,
connoting the vast harmonic
reordering of the universe
from unleashed chaos of energy,
and there is born unheralded
a great natural peace,
not out of exclusive
pseudo-static security
but out of including, refining, dynamic balancing.
Naught is lost,
Only the fake and non-existent are dispelled."*

* "No More Second Hand God" by
R. Buckminster Fuller,
Student Publications, N.C.S.C.
Volume 4, Number I, Fall 1953

The architect cannot disregard the belief of others about the nature of God, nor can he violate his own beliefs and integrity. Rather, he must seek, together with the client, a solution satisfying to both, for architecture is an art of collaboration between these two parties. Nothing that serves to embellish human life can achieve that purpose unless it is accepted by the men for whom it is meant.

The church is for today. It must satisfy and fulfill the needs of modern man: the need for shelter, warmth, and security, which is as timeless as man himself; and the need of man to live at the height of the civilization he has produced through his ability to perceive, create, and initiate.

In this age of heightened social responsibility and deep psychological exploration, advances in psychology, biology, and sociology enable us to better understand the whole man. Emotions and feelings, and subjective interests and values play as large a part in our multi-dimensional world as the objective environment. The Church must express to the beholder these most significant and worthy needs of man: the urge toward community life, the desire for what is true and genuine, the desire to advance to the essential, the desire for clarity and intelligibility, and the longing for peace and warmth. Selfless, super-personal desires and needs of man, such as these, are the true essence of religious feeling. From this vantage point, religion seems the timeless effort of mankind to become aware of super goals and values and the struggle to extend their effect.

Today most persons still regard morality as the

peremptory right of the Church. One is glad that religion strives to work for the realization of the great moral principle. However, moral imperative is not only a matter for the Church, it is man's most precious traditional heritage. Morality does not merely mean the demand to renounce some of the joys of life, but is also a social interest in a more complete and happier life for man. It follows that differences between groups and individuals should not only be tolerated but looked upon as enrichment of existence. This is the quintessence of true tolerance. Without such a broad tolerance, there can never be a question of true morality.

In past ages the religious forms produced were the inevitable expression of the spiritual attitude and belief of the age. History shows the remarkable degree of richness and variety that the medieval artist gave to his age.

Since the official recognition of Christianity by Constantine, religious and spiritual beliefs have been expressed in many ways. Justinian's Hagia Sophia is an almost organic symphony of forces, stresses, thrusts and weights in balance, as man between good and evil. It is the spiritualization of matter, the hollow mountain crowning a whole city, dominating a grand vista.

The Gothic cathedral derived out of the Roman invention of the diagonal thrust system as ingenuity was applied to masonry and wood construction. The upward thrust of Gothic vaulting and spires are symbolic expression of the yearning of the religious spirit for the ultimate. The broken lines are expressive of the Christian concept of the

discontinuities of life, of contrast between man and God.

Beginning with the Renaissance and progressing slowly through the centuries came increasing realization of the visual world. Realism together with that realization produced a general dropping off of spiritual values paralleled by a gradual rise of material values. Progressively with some exceptions, notably the Baroque, spirituality was neglected more and more until the nineteenth century when religious art began its retrogression. Secular art meanwhile found new impetus through impressionism, new engineering concepts, and the arts and crafts movement.

Since the middle of the nineteenth century, religious architecture has passed through Greek, Renaissance, Romanesque, and Gothic revivals: through eclecticism eventually to contemporary architecture.

Today some still seek to use architecture of the past as symbols in themselves. The number of those representing this attitude is steadily diminishing as our architecture reaches for maturity.

Our present task seems to be that of producing form to express the religious mood and the needs of man in a fresh way. Achievement of this task revolves about an understanding of the nature of man, for he is the ultimate arbiter. With different innate capabilities, man may base his faith on logic, mysticism, intuitive belief, or some combination. The Church building must satisfy this many-faceted man, and his needs for an orderly world, for esthetic satisfaction, for a response in his environment to his feelings, his

emotions, his interests. The determinant becomes the human requirement of beauty and order, and abstract, timeless symbolism becomes an integral part of design. The objectification of the achievement of these goals must retain the artistic integrity of the artist and yet through sympathetic understanding of the richness and complexity of traditional life, he must translate this richness into patterns in the vernacular of modern buildings, native to the scene, and in resonance with this way of life. Wide acceptance of contemporary church architecture hinges upon the development of this kind of many-sided architecture.

THE CLIENT

BACKGROUND

In 1946 Newton College of the Sacred Heart was begun by the Religious of the Sacred Heart with the approbation and encouragement of Archbishop Richard J. Cushing of Boston. The College offers a four-year course for women leading to a Bachelor of Arts or a Bachelor of Music.

The Religious of the Sacred Heart founded the Boston Academy of the Sacred Heart in 1880, and in 1926 transferred this school to Newton as the Newton Country Day School of the Sacred Heart. On September 8, 1945, the Schrafft estate, adjoining the Country Day School, was purchased for the purposes of the proposed college. On February 2, 1946, the home of Mr. Henry Harriman was acquired, and to it in 1949 the Rutherford estate was added. A corporation was formed on March 19, 1946, to which was granted by the General Court of the Commonwealth of Massachusetts, on recommendation of the Board of Collegiate Authority, a charter giving "authority to grant and confer all degrees such as are usually conferred by colleges in the Commonwealth of Massachusetts, except degrees in medicine and law."

Affiliation with the Catholic University of America was obtained in 1946, and in 1951, renewed and extended.

The first Freshman Class was received in September 1946, with the plan of admitting one additional class each succeeding year until a regular four-year college should be in operation. Thirty-four Seniors received their B. A.'s at the first Commencement Exercises of the College in June 1950. Present enrollment is three hundred. It is expected that

maximum future enrollment will be about five hundred.

The Society of the Sacred Heart was founded in Paris in the year 1800 by Saint Madeleine Sophie Barat for the education of girls. The first foundation in America was made in 1818 by Blessed Philippine Duchesne, one of Saint Madeleine Sophie's first companions.

At present on all the continents, the Society has schools and colleges which share the advantages of an international educational institution. The Mother House is in Rome, where it is customary for the members of the Society to spend a period of time as a normal part of their training. The young religious are also sent to houses of study in various American and foreign university centers.

Newton College of the Sacred Heart derives its principles from the tradition of Catholic culture. Those responsible for this college share the position of all Catholic educators, who believe that man has a supernatural destiny. The aim of developing the natural powers and gifts of a woman in such a way as to fit her for her duties in life with reference to her supernatural destiny determines the character of the curriculum. The students follow courses in Sacred Scripture, Theology, and Liturgical Music; and daily Mass and attention to the changes in the liturgical cycle are looked upon as normal factors in their training.

PROGRAM

A. CONCEPT OF THE LITURGY

The Catholic Church believes in the Divine Presence, Holy Eucharist, within its Tabernacle and that the Church edifice is set apart in a special way, because of its consecration and special purpose.

The Church may have several functions. Its liturgical, sacramental function should be a primary design factor, while extra liturgical functions are secondary, but not unimportant. In the Sacramental system of the Church, Baptism, as initiation and rebirth of the new man, and the Eucharist, as the Supreme Function of all redeemed men, are the two foci around which others are grouped. In this particular Church, Baptism is excluded. The chief aim of the Church is to shelter the faithful so that they may attend the Mass, pray, and otherwise participate in the Sacred Rites.

B. PHYSICAL REQUIREMENTS

1. THE CHURCH

For programming purposes the church may be divided into the following parts.

a) Sanctuary: The area wherein the ministers function during the mass. It shall contain the following elements:

(1) Altar: The table on which the Holy Sacrifice is offered. It deserves first consideration in the design. The permanent altar is required to be of natural stone

and immovable. The table and its support is considered as one. Foundations of the altar must bear directly on the earth. The altar may have a canopy whose main function is to provide the altar with an architectural form that will accentuate its prominence and visually mark it with honor and distinction--not specifically required.

- (2) Altar Rail: It is designed to separate the sanctuary from the body of the Church. The faithful kneel here to receive communion.
- (3) Credence Table: The credence is a small table or shelf on which the sacramental elements are placed before consecration.
- (4) Sedilia: The celebrant, deacon, and subdeacon sit on this bench at intervals during high mass.
- (5) Ambry: It is a place of safekeeping for storage of the three holy oil stocks.
- (6) Lamp: The Sanctuary lamp burns continuously before the tabernacle to indicate the Holy Eucharist.
- (7) Pulpit

b) Body of the Church:

- (1) Nave: Participants should be arranged in the nave so that they form one group to which the priest may direct his attention. Seating capacity is to be five hundred.

Open back pews will be used so that the floor is not obstructed visually from the entrance. Aisles should be so located as to permit easy access to the sanctuary for processions and for the faithful to approach the communion rail. A particular characteristic of this church is that on certain occasions the student body will form a procession from the multi-purpose room to the nave.

- (2) Perimeter Areas: They shall provide the following:
- (a) Side Altar: This altar is used to celebrate the Solemn Mass on the Second Day of Forty Hours Adoration and serves also as a repository of the Blessed Sacrament on Maundy Thursday and Good Friday morning.
 - (b) Stations of the Cross: They are non-sacramental, and on the historical level are meditation, subjective representation, while the Mass is actio, objective sacramental re-presentation. They are fourteen points for the devotion of contemplating the passion of Christ.
 - i) Condemnation by Pilate.
 - ii) Receiving of the Cross.

- iii) The first fall.
 - iv) Meeting with Mary.
 - v) Simon of Cyrene.
 - vi) Saint Veronica.
 - vii) The second fall.
 - viii) Meeting with women of Jerusalem.
 - ix) The third fall.
 - x) Christ stripped of his garments.
 - xi) Nailing to the Cross.
 - xii) Dying on the Cross.
 - xiii) Mary receiving the body of Christ.
 - xiv) The body of Christ laid in the tomb.
- c) Narthex: The narthex is used on Holy Saturday for the blessing of the New Fire. Holy water stoups should be at the entry doors.
- d) Choir: Choir consist of seventy to eighty persons. Facilities include space for pipe organ.
- e) Priest's Sacristy: This room serves the Church and occasionally the Chapel. It shall provide space for the following:
- (1) Vestment storage case.
 - (2) Closet for storage of capes, cassocks, etc.
 - (3) Safe for Sacred Vessels.
 - (4) Sacrarium (basin which drains to the ground).
 - (5) Enclosed Wash Basin.
 - (6) Holy water stoup.
 - (7) Storage for antependiums.

f) General Sacristy: This room is used for robing by altar boys, choir, and other lay persons involved in the ceremonies, and as a work space in connection with maintenance of the sanctuary and its appointments. It should provide the following:

- (1) Cabinet for cassocks and surplices.
- (2) Cabinet for vases, candelabra, candles, etc.
- (3) Cabinet for cloth items.
- (4) Cabinet for ceremonial accessories.
- (5) Sink and work counter.
- (6) Wash basin.
- (7) Water closet.

g) Other Facilities:

- (1) Multi-purpose room: should be approximately the size of nave.
- (2) Two bedrooms with baths for visiting priests: generally, services are held by a priest from Boston College.
- (3) Covered passage from Barat House to Church and Chapel is requested.
- (4) Service facilities.
- (5) Toilet facilities.

2. THE CHAPEL

The Chapel should contain an altar and seating for sixty persons. It is primarily a meditation room although used by the Nuns for saying "Office."

3. BELL FACILITY

4. GARDENS

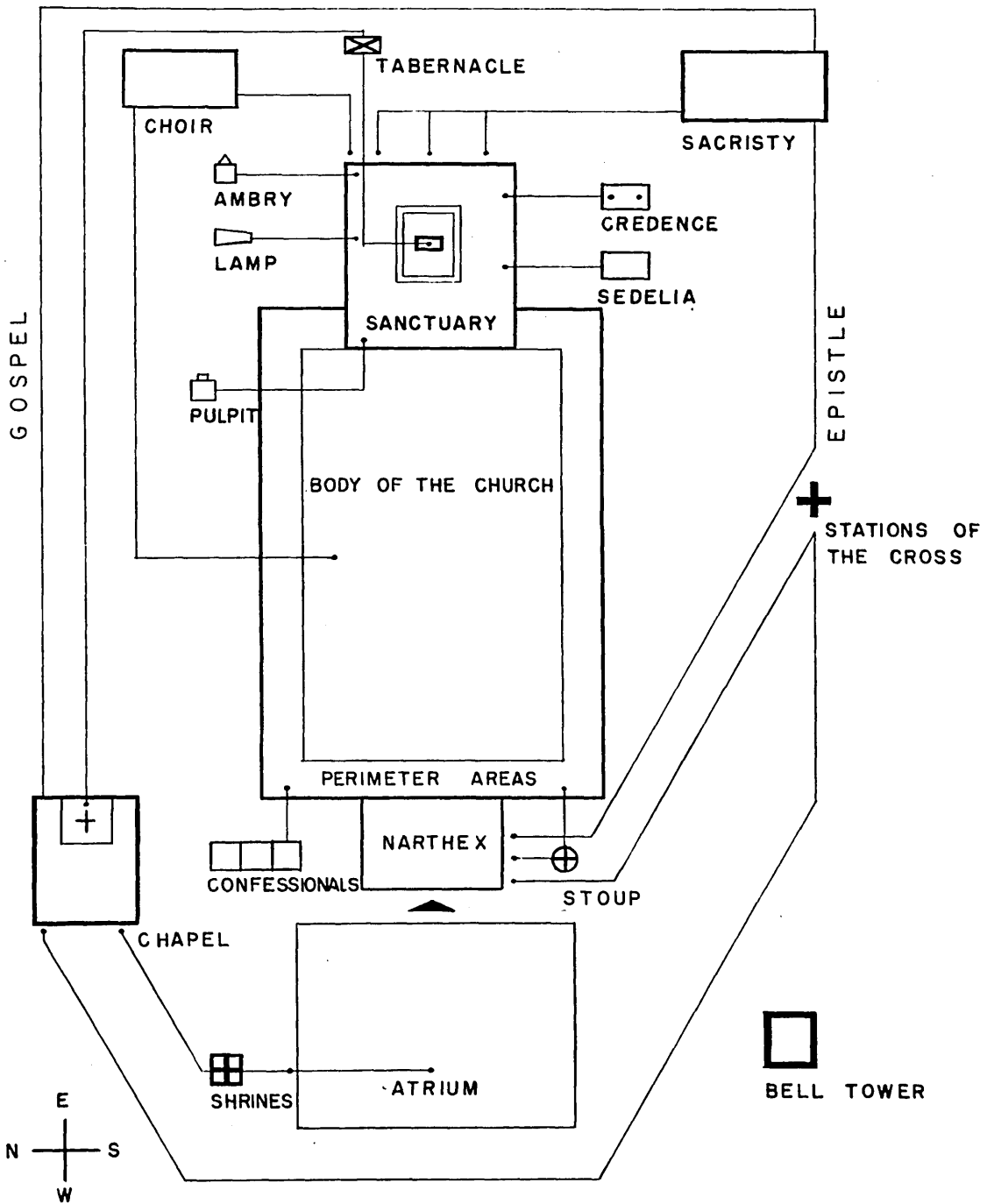
The Nuns request a small garden for their private use and a large garden for use by both the Nuns and students.

C. SERVICES

Services are primarily of three types.

- | | | |
|----------------|-----------|--------------------------------------|
| 1. MASS | weekdays | 7:15 a.m.
8:00 a.m. |
| | Sundays | 7:00 a.m.
9:00 a.m. |
| CONFSSIONALS | weekdays | 4:30 - 6:00 p.m. |
| | Saturdays | 4:30 - 6:00 p.m.
7:30 - 9:00 p.m. |
| 2. BENEDICTION | Sundays | 5:00 p.m. |
| 3. OFFICE | weekdays | 6:30 a.m. |
| | | 12:00 noon |
| | | 5:00 p.m. |

The "Office" is a ceremony of about fifteen minutes duration for the Nuns, consisting mainly of the chanting of psalms.



FUNCTIONAL RELATIONSHIP OF ELEMENTS

THE SITE

The Newton College campus is located in Newton, Massachusetts, seven miles from the center of Boston. The land belonging to the college consists of approximately forty acres bounded by Center Street, Mill Street, Colby Street, and a park. Mill Street is four blocks north of Commonwealth Avenue and generally parallel.

Boundaries formed by Center Street and Colby Street adjoin privately owned land with only a few residential buildings present. The west boundary of the campus adjoins a public park and the Mill Street boundary is a typical residential street of frame and brick houses on its south side.

The plot of forty acres has a major topographical division running east-west from approximately one hundred and forty feet north of Barat House. The division expresses the essential nature of the site--two planes, one fifty feet above the other.

Other than the sculptural quality of the land, nature has provided generous and beautiful landscape elements in the large trees that cover most of the campus.

The following buildings are existent on the campus. See plan, page twenty-two, for locations.

- I. Barat House - built in Georgian style, is used as nunnery, infirmary, and dormitory.
2. Stuart House- constructed in 1946, is used as the administrative and classroom building,

3. Hardey House - of typical New England frame construction, it serves as a dormitory.
4. Dormitory - built in 1951.
5. Duchesne House - copy of a French chateau; the library is housed here.
6. Quonset - houses the athletic facilities.
7. Tea House - New England frame house; it serves as a dormitory.
8. Garage - constructed during same period as Barat House; the science laboratories are located here.

The college has scheduled the Church and Chapel for immediate construction, to be followed closely by construction of other badly needed buildings.



Garage

Barat
House

Stuart
House

T H E S I T E



CLIMATE ANALYSIS

Metropolitan Boston can be classed as generally wet in winter and humid in summer. However, it does have much more winter sunshine than most other areas of its latitude.

A typical day described by the A. I. A. Regional Climate Analysis "would be a very clear, dry, a rather calm day when the sun brings up the temperature sharply during daylight hours and radiation into the clear sky at night drops the temperature abruptly, as is the customary procedure in the desert areas." *

The following information has proved helpful in designing:

ROOF AND WALLS. Substantial insulation is required to reduce heat loss in winter through roof and walls. Minimum design temperature for wall insulation in this area is set at 10°F. during winter. In the summer roof and wall temperatures may rise to 150°F., depending upon reflectivity, conductivity, and thermal capacity. This results in excessive drying stress. Roof and walls are subjected to extremes of dryness and continual dampness. Surface materials are damp during most of winter because of frequent rains, wet snow, little sun, and low evaporation rate.

OPENINGS. Large windows seem desirable for winter light and solar effect but should be double glazed or have storm sash. Entrances should have vestibule and be recessed or otherwise protected against cross winds in winter.

* "Regional Climate Analysis - Boston Area", Supplement to the A.I.A. Bulletin, March, 1951

FOUNDATION AND BASEMENT. Basement windows should face south to admit maximum sunlight, making it more cheerful and partially controlling dampness. Underground walls need exterior waterproofing. Artificially high water-table may form in early spring due to frozen substrata. Drainage should therefore be away from basement walls.

CONCLUSION. Data indicates a compact plan, taking all possible advantage of winter sun, better-than-average insulation and vapor sealing, winter humidification and mandatory good site drainage.

HOUSE BEAUTIFUL



CLIMATE CONTROL GUIDE

SOLAR

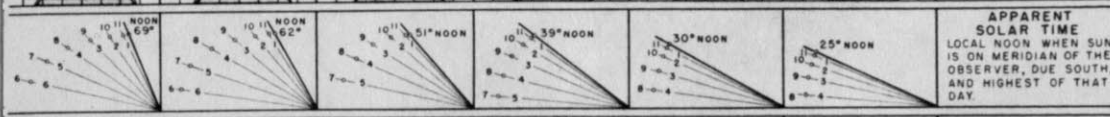
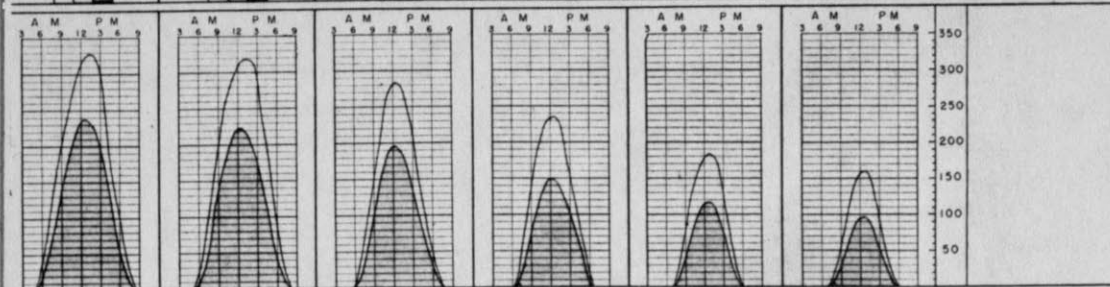
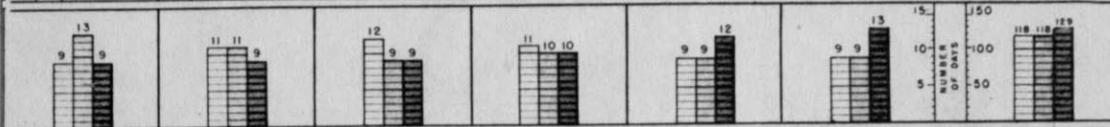
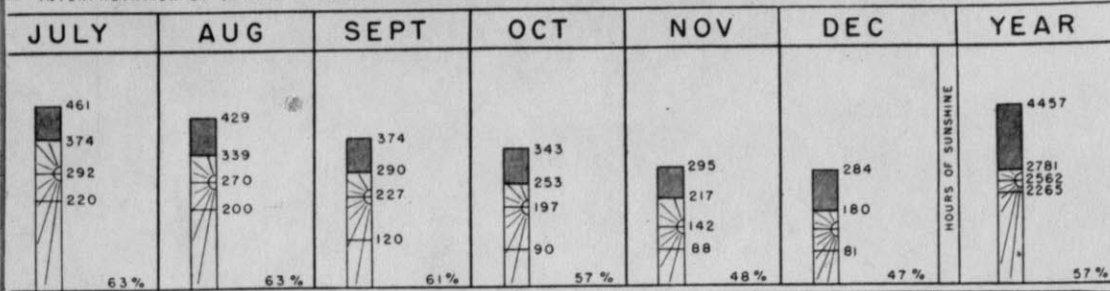
BASED ON U.S. WEATHER BUREAU DATA

	JAN	FEB	MAR	APR	MAY	JUNE
D HOURS OF SUNSHINE AND AVERAGES, EXTREMES, AND AVERAGES, MOST POSSIBLE, MAX. POSSIBLE, AVERAGE, LEAST POSSIBLE	295 208 144 91	297 218 166 114	371 291 213 158	401 343 227 106	452 347 267 160	455 390 283 183
E CLEAR AND CLOUDY DAYS AVERAGE CONDITIONS	13 9 9 9	10 10 10 10	12 10 9 9	11 10 9 9	12 10 9 9	11 9 9 9
F SOLAR HEAT AVERAGE 8 U.S. PER HOUR AT 57 MINUTAL SURFACE ONE FOOT SQUARE	100 150 200 250 300	100 150 200 250 300	100 150 200 250 300	100 150 200 250 300	100 150 200 250 300	100 150 200 250 300
G SUN HEIGHT APPROXIMATE MID-MONTH ELEVATIONS THROUGHOUT THE DAY	07° NOON 10° 15° 20° 25° 30° 35° 40° 45° 50° 55° 60° 65° 70° 75° 80° 85° 90°	35° NOON 10° 15° 20° 25° 30° 35° 40° 45° 50° 55° 60° 65° 70° 75° 80° 85° 90°	46° NOON 10° 15° 20° 25° 30° 35° 40° 45° 50° 55° 60° 65° 70° 75° 80° 85° 90°	58° NOON 10° 15° 20° 25° 30° 35° 40° 45° 50° 55° 60° 65° 70° 75° 80° 85° 90°	67° NOON 10° 15° 20° 25° 30° 35° 40° 45° 50° 55° 60° 65° 70° 75° 80° 85° 90°	77° NOON 10° 15° 20° 25° 30° 35° 40° 45° 50° 55° 60° 65° 70° 75° 80° 85° 90°
H HOURLY DIRECTION OF SUN APPROXIMATE MID-MONTH DIRECTIONS	452 N 728	531 N 658	606 N 612	641 N 521	714 N 439	738 N 422
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1 NIGHT TO 6 A.M.						
2 MORNING 6 A.M. TO NOON						
3 AFTERNOON NOON TO 6 P.M.						
4 EVENING 6 P.M. TO MIDNIGHT						

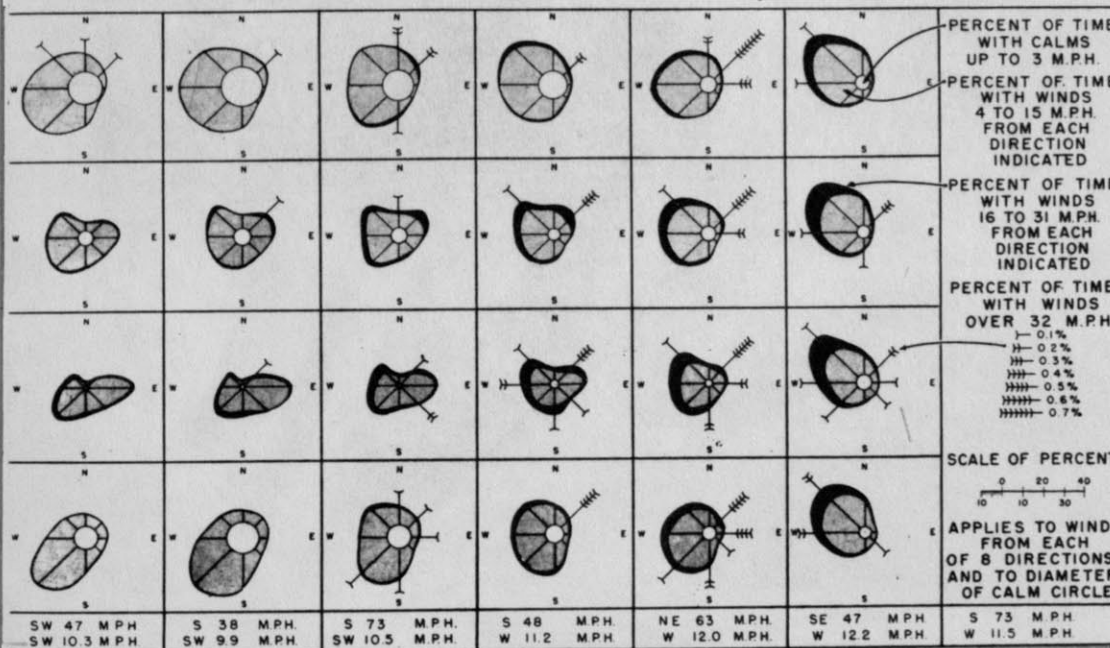
ANALYSIS

INTERPRETATION BY DR PAUL A SIPLE - JANUARY 1951

BOSTON AREA BOSTON, MASS



ANALYSIS

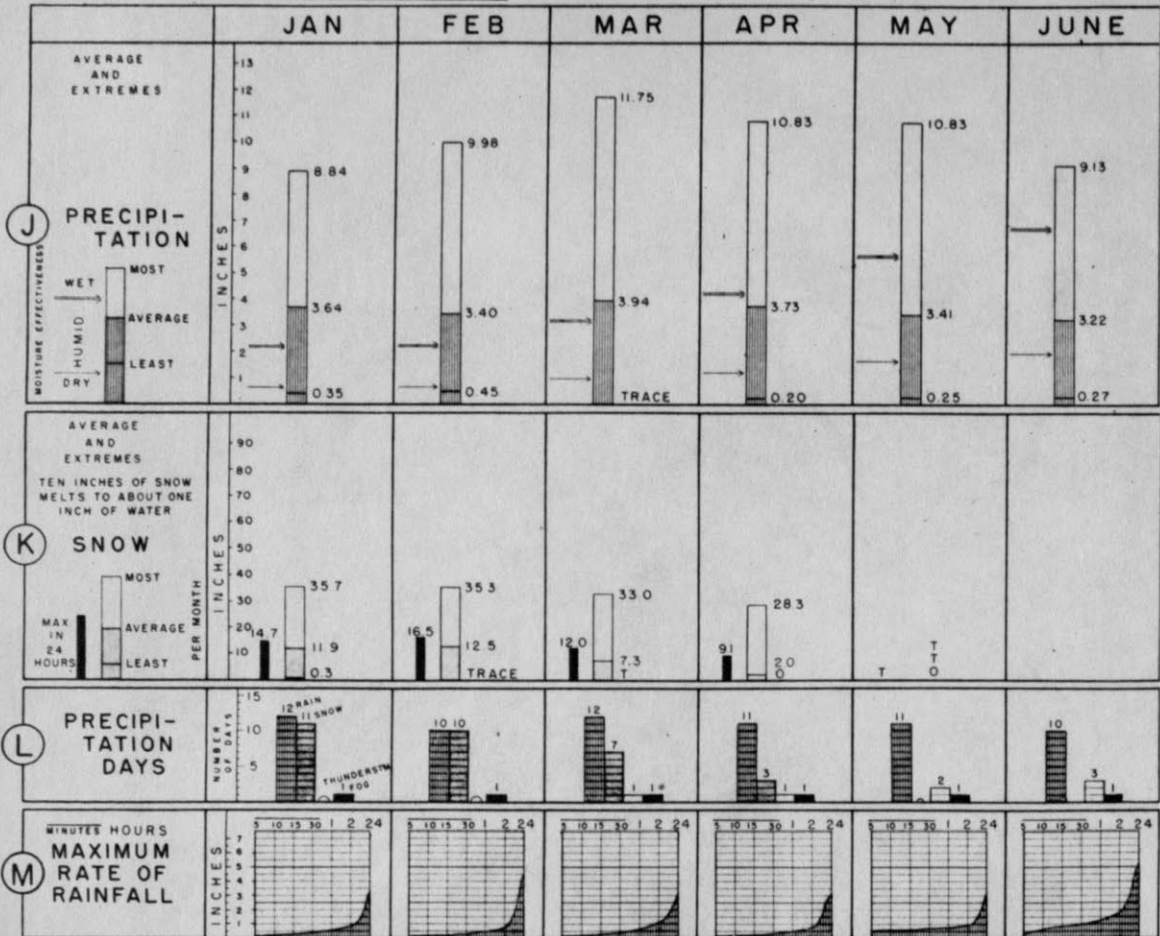




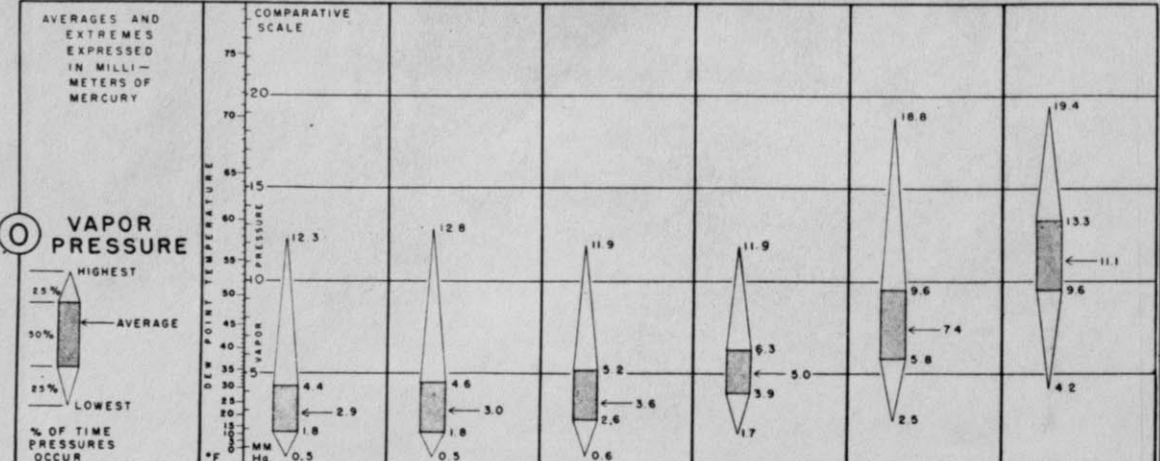
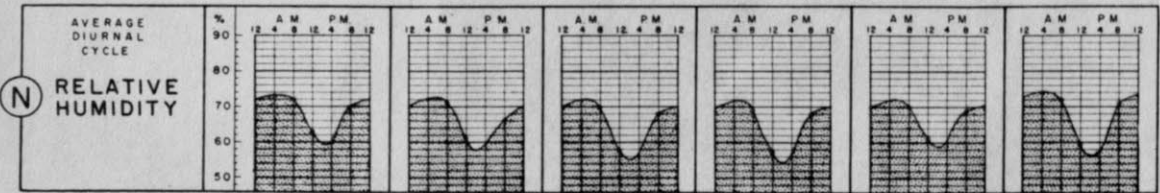
HOUSE BEAUTIFUL
CLIMATE CONTROL GUIDE

PRECIPITATION

BASED ON U.S. WEATHER BUREAU DATA



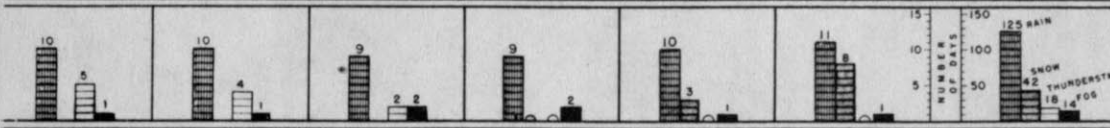
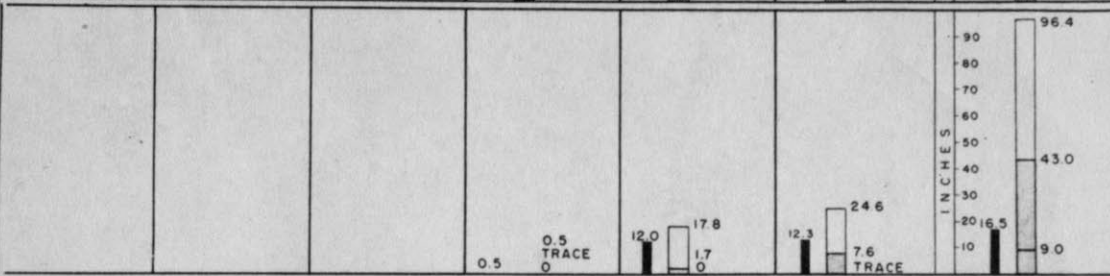
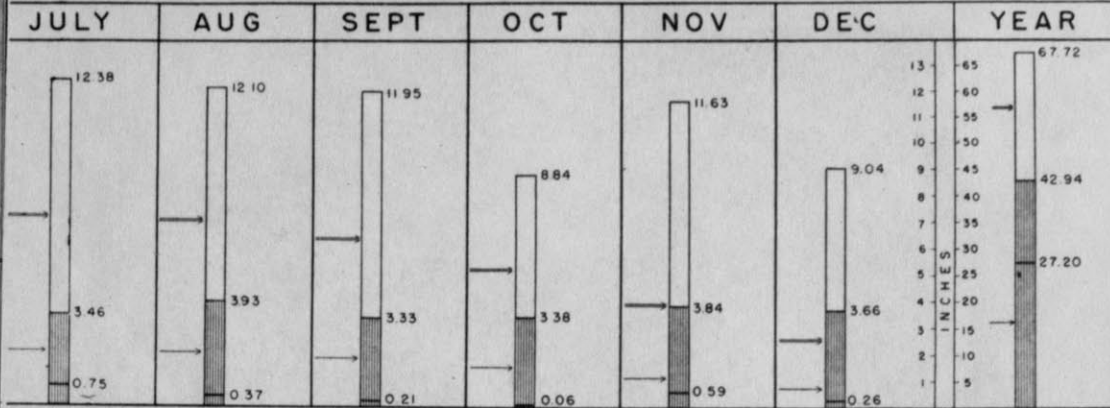
HUMIDITY



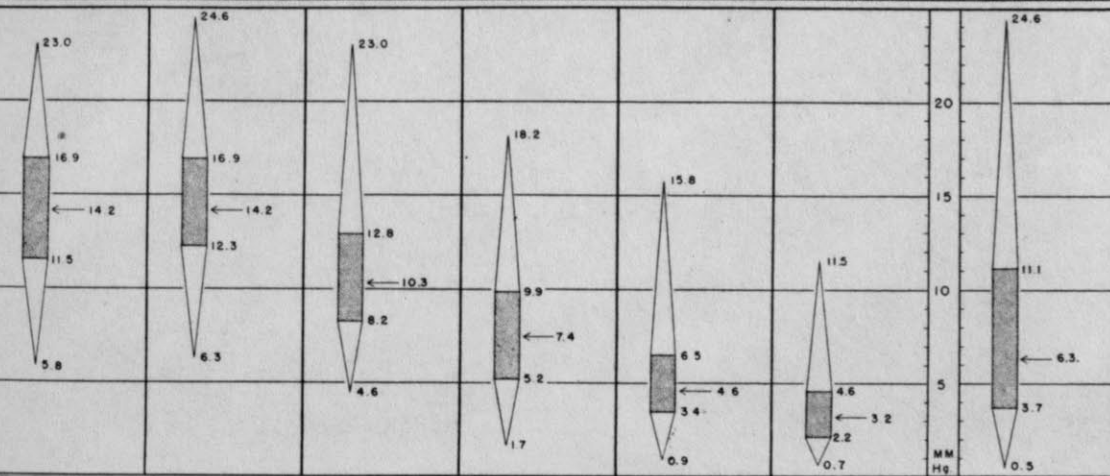
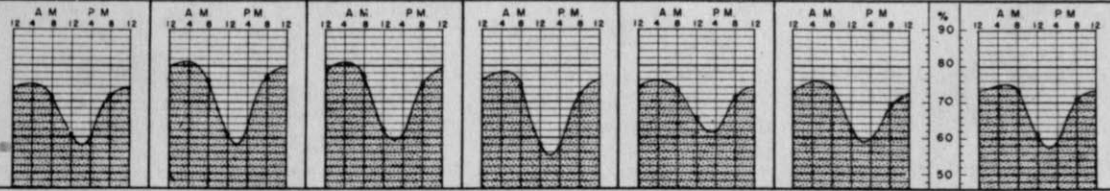
ANALYSIS

INTERPRETATION BY DR PAUL A SIPLE - JANUARY 1951

BOSTON AREA
BOSTON, MASS



ANALYSIS



THE PROPOSAL

THE IDEA

The prime objective of this thesis is to design a Church and Chapel. However, the author found this impossible to do without considering the educational idea, the overall campus plan, and the atmosphere to be produced.

Alfred North Whitehead has said, "the mind is never passive, it is perpetual activity, delicate, receptive, responsive to stimulus. You cannot postpone its life until you have sharpened it. Whatever interest attaches to your subject matter must be evoked here and now; whatever powers you are strengthening in the pupil must be exercised here and now; whatever possibilities of mental life your teaching should impart must be exhibited here and now." * This is the golden rule of education--education is life, not education for life. Newton College is part of a strong Catholic educational tradition and, as such, this has direct bearing on our current thought because this tradition is an integral and prime contributing part of campus life. The plan, buildings, and atmosphere cannot divorce themselves from this heritage, but they can add, alter, and give new direction to this tradition in new rhythm and patterns. It is hoped that the atmosphere which will be achieved in future planning on this campus will be one where the creative instinct is aroused, encouraged, and developed in faculty and students. Planning envisions a three dimensional interplay of spaces which adds to the richness of the planning conception.

* Whitehead, A. N., THE AIMS OF EDUCATION, Mentor, 1955, New York

The buildings initiate this interplay of space through their form, mass, proportion, and color. The spatial volumes of the open spaces must be in optimum balance with the buildings to achieve this overall conception.

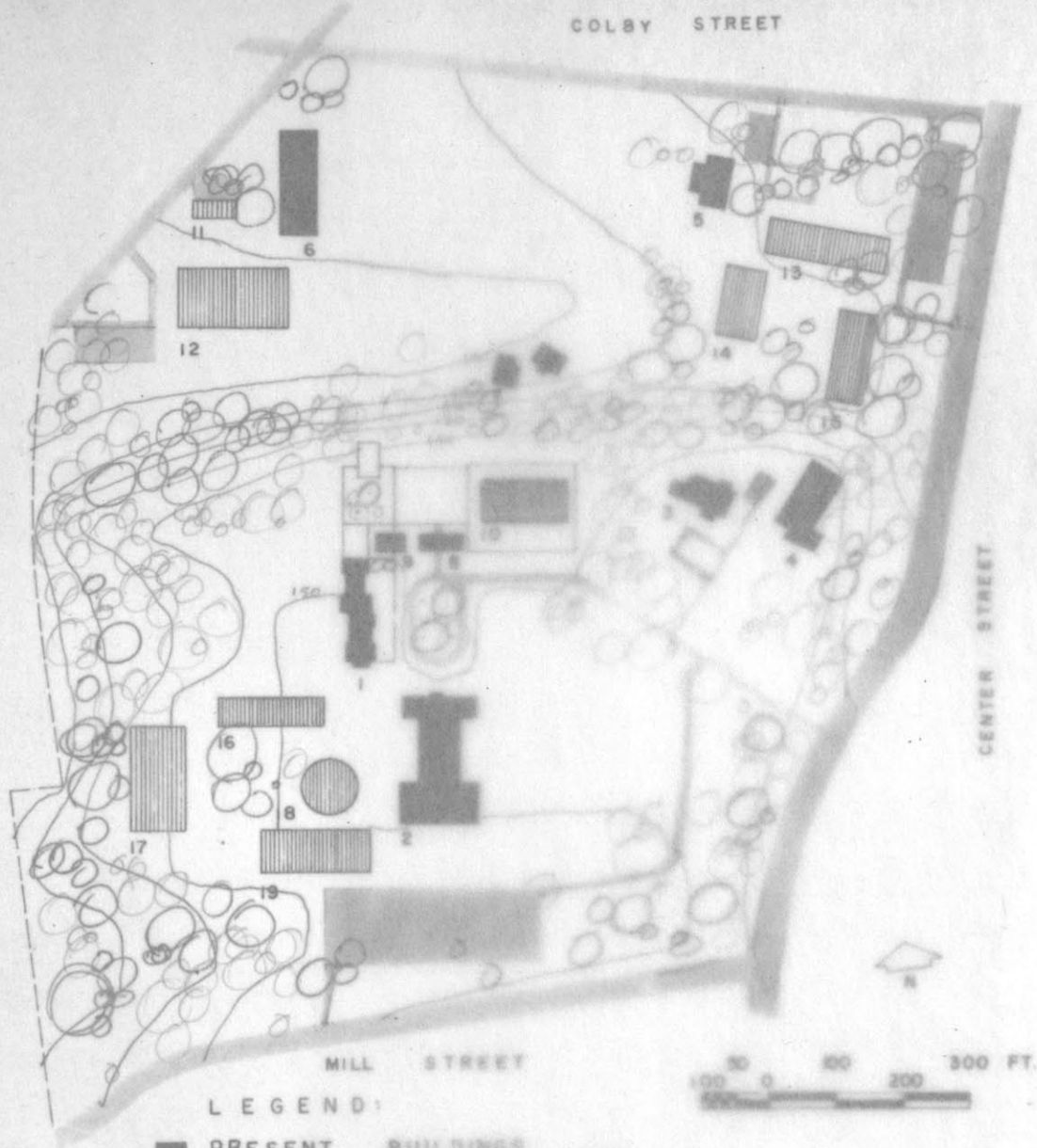
Conception of the Church and Chapel is based on three major thoughts:

1. A rectangular open space with a plaza around which Stuart House, Barat House, the Church, Chapel, and gardens are organized. This open space and plaza provide a proper setting for the Church and Chapel and visually connect the campus.
2. A pattern of intercommunicating courts, plazas, and buildings.
3. A master plan which organizes and gives impetus to the idea. For purposes of this thesis, only basic decisions regarding the master plan have been made.

CAMPUS MASTER PLAN

The dynamic of the intercommunicating open spaces was considered a prime design factor in doing the master plan. The vertical movement, necessitated on this site, is planned to add richness and quality to the spaces. The open space related to the Church and Chapel becomes the hub of movement of the campus and unifies the overall composition. From this central space walkways presenting a variety of colorful perspectives lead to the academic campus, the housing, and the playing fields.

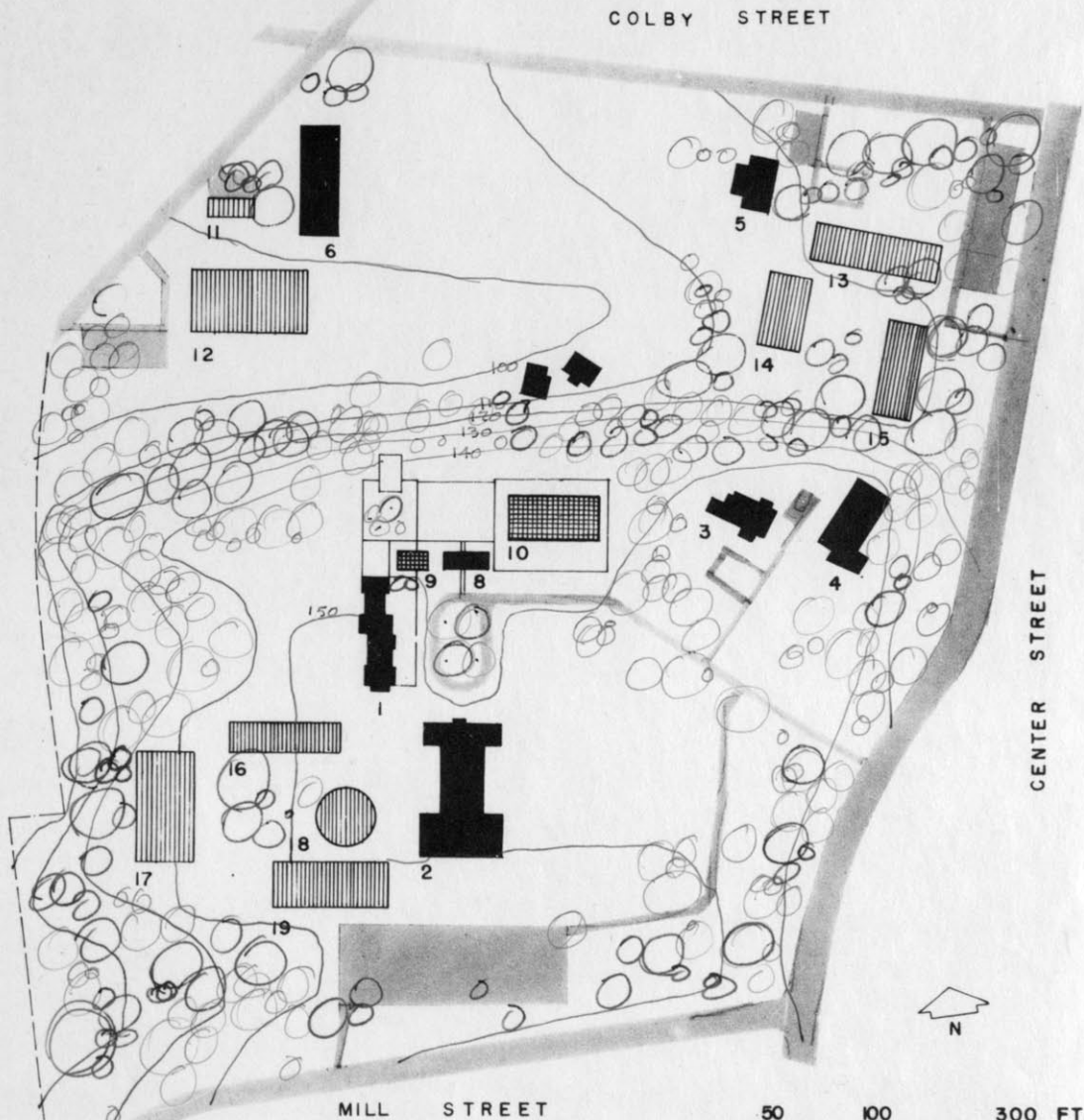
The proposed physical plant has been organized into zones. The academic quadrangle, southwest of Stuart House,



LEGEND:

- PRESENT BUILDINGS
 - 1 BARAT HOUSE - NUW'S QUARTERS
 - 2 STUART - ADMINISTRATION, CLASSROOMS
 - 3 HARDEY HOUSE
 - 4 DORMITORY
 - 5 DUCHESNE HOUSE
 - 6 QUONSET
 - 7 TEA HOUSE - TO BE REMOVED
 - 8 GARAGE
- ▨ IMMEDIATE CONSTRUCTION
 - 9 CHAPEL
 - 10 CHURCH
- ▤ FUTURE CONSTRUCTION
 - 11 POWER HOUSE
 - 12 GYMNASIUM
 - 13 DORMITORY
 - 14 "
 - 15 "
 - 16 SCIENCE BUILDING
 - 17 LIBRARY
 - 18 THEATRE
 - 19 ARTS BUILDING

PRELIMINARY CAMPUS STUDY



LEGEND:

- PRESENT BUILDINGS
 - 1. BARAT HOUSE - NUN'S QUARTERS
 - 2. STUART - ADMINISTRATION, CLASSROOMS
 - 3. HARDEY HOUSE
 - 4. DORMITORY
 - 5. DUCHESNE HOUSE
 - 6. QUONSET
 - 7. TEA HOUSE - TO BE REMOVED
 - 8. GARAGE " " "
- ▨ IMMEDIATE CONSTRUCTION
 - 9. CHAPEL
 - 10. CHURCH
- ▤ FUTURE CONSTRUCTION
 - 11. POWER HOUSE
 - 12. GYMNASIUM
 - 13. DORMITORY
 - 14. "
 - 15. "
 - 16. SCIENCE BUILDING
 - 17. LIBRARY
 - 18. THEATRE
 - 19. ARTS BUILDING

has the library, science building, liberal arts building, and the theater grouped about it. The grouping is connected to the central open space by a plaza running west from the north side of Stuart House.

The housing is located in the northeast sector of the campus, at the lower level, and is conceived of as being designed in such a way as to establish new opportunities for rich social experience and thus aid in developing social maturity. Accordingly, the housing should be living quarters and not merely dormitories.

The athletic facilities and playing fields are presently located on the northwest campus and will remain there. A new gymnasium will be constructed here, also, the new power house.

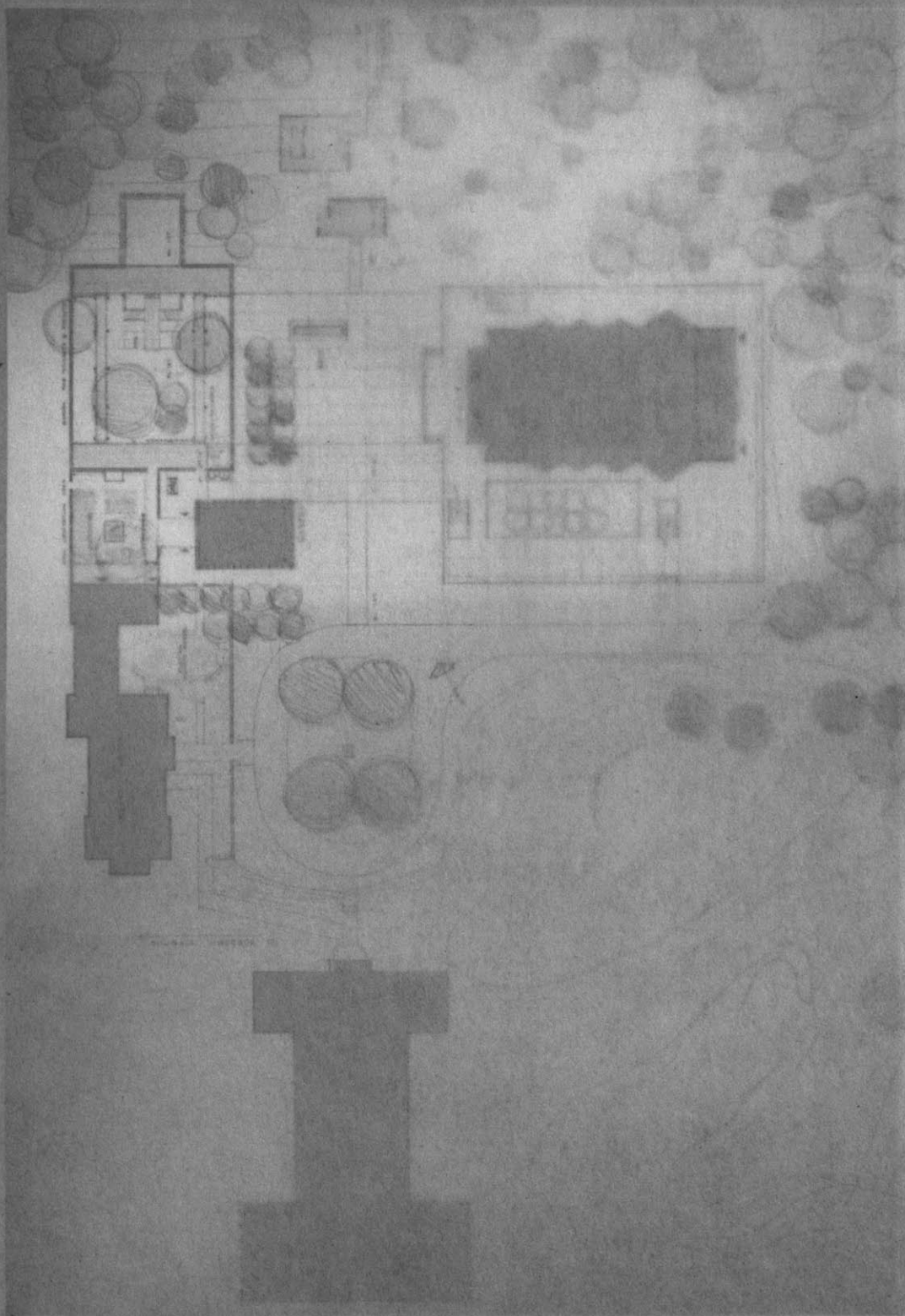
Automobile and pedestrian traffic have been separated with the major parking area located south of Stuart House. A smaller parking area is located near the housing. Presently, because of the size of the campus and its minimum automotive traffic, the existing roads are also used as walkways. In view of many factors--expense, location of existent and proposed buildings, quality of the land, and minimum traffic--the road ending in a turn-around at Barat House and Stuart House has been retained.

The Church and Chapel are scheduled for immediate construction. Consequently, the garage will be removed and the two science rooms temporarily relocated in Stuart House. Tea House is in poor condition and will be removed later when additional housing becomes available. Construction of

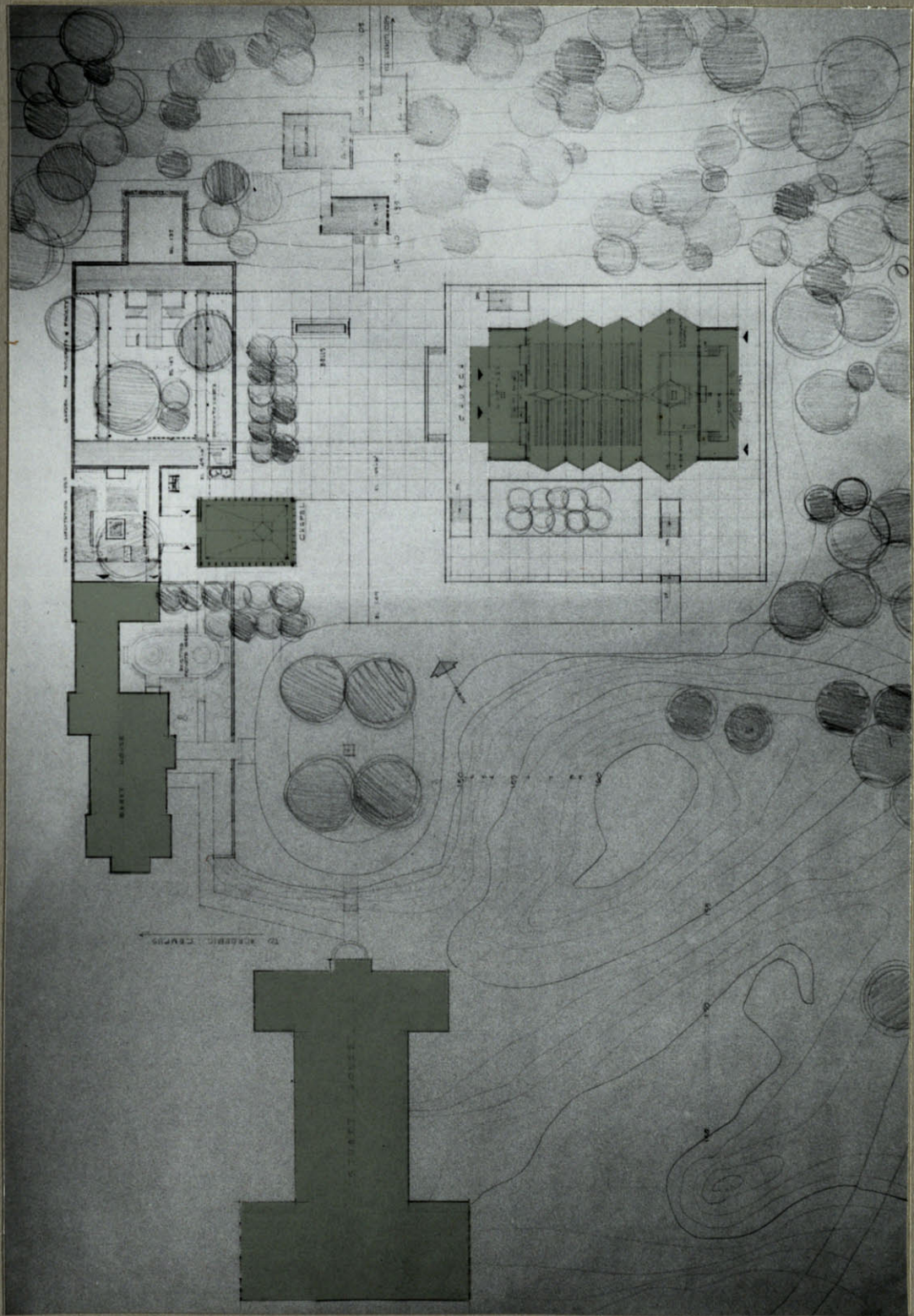
the academic buildings and the housing will begin after construction of the Church and Chapel. Additional athletic facilities compose the final stage.

OPEN SPACES

Two major courts dominate the south campus. The space related to the academic area is thought of as a center of activity. It connects by a smaller, pivot space, to the second court. The second court, related to the Church and Chapel, is conceived of as a restful prelude to the Academic court and a proper setting for the Church buildings. This space, with a small plaza, is bounded on the south by the north facade of Stuart House, which rests on a level six feet above the plaza. The Stuart House facade serves to stop visual movement at the south end of this space and turns it west into the academic group. There are four low, spread-out apple trees in this area which, together with the gentle rising hill to the east, generate a wonderful sense of quiet enclosure. Facing north from Stuart House one sees a long vista to the north, overlooking the lower campus. A lacework bell tower serves as a focus here. Terraces and stairs connect the plaza with the lower campus. The west side of this space is bounded by a brick wall with a strong rhythmical pattern of stiffeners. The partially recessed Chapel further articulates the wall. Its recessment causes visual advancement-recession along the Chapel's sparkling wall. Added stimulation is derived from partially perceiving the space about the Chapel but not obtaining a full visual realization. The podium of which the Church rests serves to further define the space and



PRELIMINARY PLAN STUDY



allows little dissipation of the feeling of enclosure east-erly along the road. Elements above, to the sides, and below this space all work together to give it a wonderful sense of enclosure. The peaceful atmosphere of this space should induce the students to make use of it during their more leisurely moments.

Visual and physical movement is planned for to make the space come alive and meaningful as a frame of reference and a transition space to the Church. Within the space, objects stand, defining boundaries, establishing reference points, modeling it into perceptible parts which relate to the whole. Through this space, generated by design, move the people, for whom it was created in orderly patterns. As the people move through the space, objects above them, beside them, enclosing them, or underfoot--advance and recede--move sideways or backwards--become large or small in patterned sequence. As a counterpoint, the static objects in the landscape move, trees sway, and leaves vibrate, and clouds move across the sky. The composition is in constant motion.

THE GARDENS

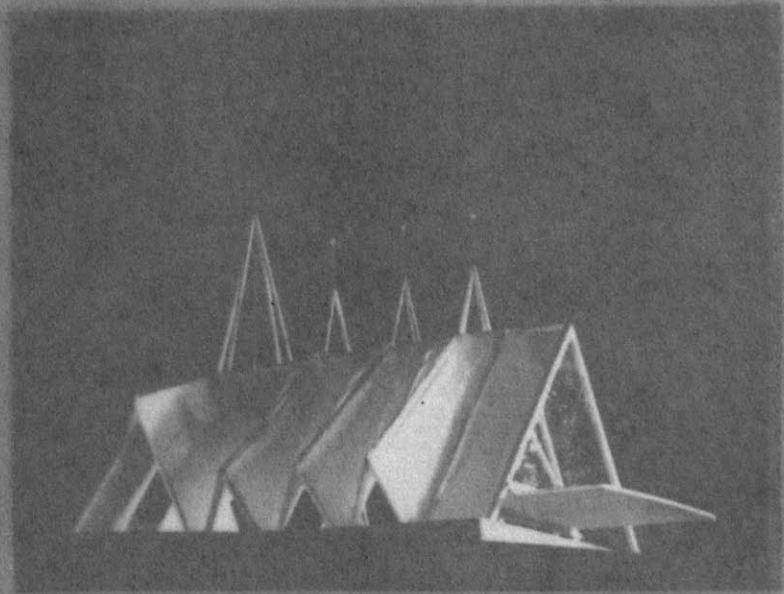
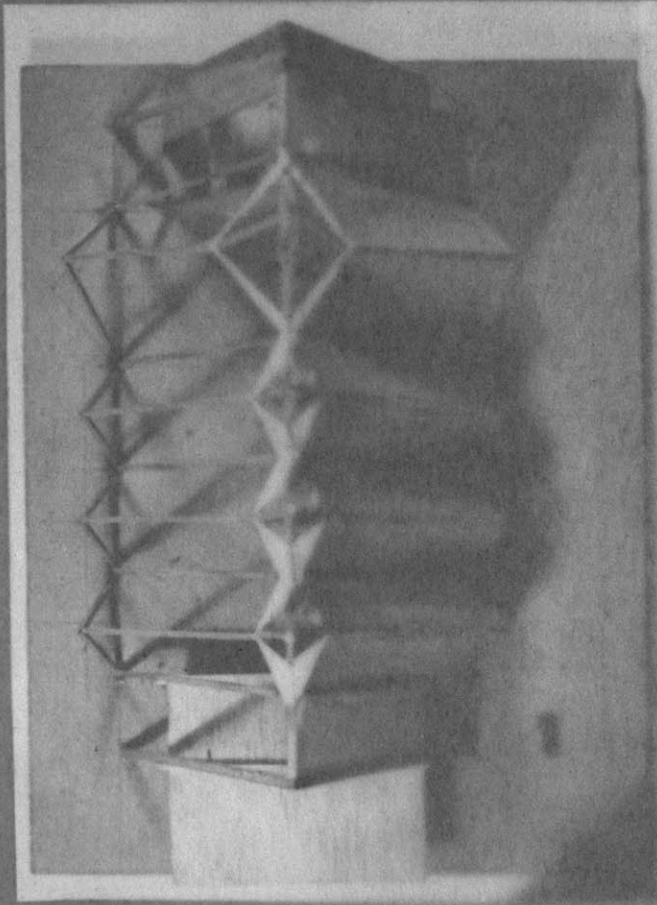
The north end of Barat House, the nunnery, opens upon a small garden for use by the nuns only. A living room located in this end of Barat House is opened onto a terrace facing the garden. From it one steps down into the garden to move about, stop, and move again. A covered passage leading from this room opens into the narthex of the Chapel and further, within the large garden, stairs lead down to an underground tunnel connection with the Church.

Both gardens are three dimensional compositions of spaces whose division and subdivision, and horizontal and vertical planes confine and mould the space and movement patterns.

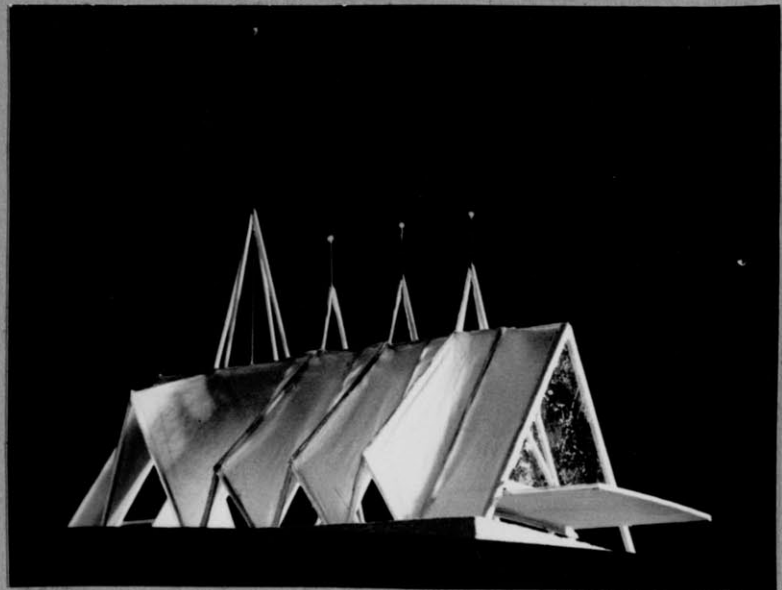
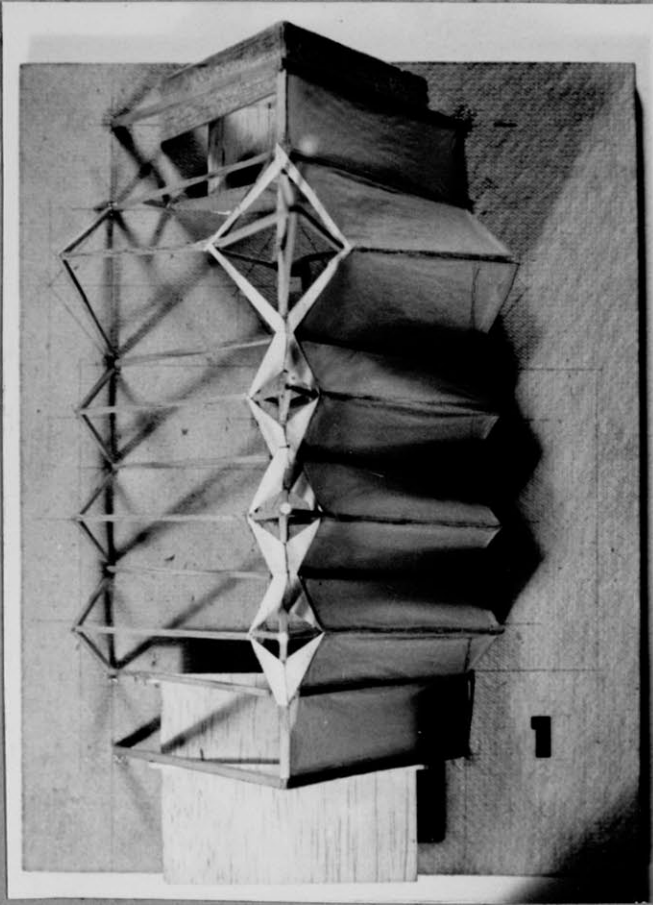
Spaces in the larger garden are defined by using screens of moulded plywood, landscape elements, and an ambulatory which gives a strong sense of order. The elements channel visual and physical movement in and around and into deep forward and backward penetration. As one walks along the ambulatory, images advance and recede, water bubbles, students converse, and the space is made alive. The north and south portions of the ambulatory are widened, providing space for seats. The east and west portions are just above the ground and invite one to step down at any point and stroll through the garden. As one moves, textures change underfoot and are felt, stones are a little uneven, the walk softer and pebbly, the grass verdant and springy underfoot. The change in movement pattern here is a tactile pattern as well as a visual one.

THE CHURCH

The challenge of designing this Catholic Church lies not so much in the two dimensional concept of space arrangement since this is more or less determined at an early stage by the liturgical requirements. Its challenge is in the volume designed to address the faithful in a theme of spiritual awakening that emphasizes the joy, the hope, and the upward elan of religious belief. It is oriented to both the mysteries of the unseen world and to the spiritual needs



PRELIMINARY STUDY MODEL
FOR CHURCH



of this life.

The space is conceived of as being a total unified space, modulated by a gentle inward-outward, expansion-contraction of the lateral walls and articulated further by the lanterns piercing the roof with half their volume and giving a subtle play of light on the ceiling surfaces of concrete. The structure is formed of hyperbolic paraboloids arranged in a strong rhythmical pattern. The outside surface of this concrete shell is sprayed with vaporized copper after the method used by Boroni in Venezuela. This copper surface will be treated with a caustic soda turning it a soft green in harmony with the slate roof of Barat House and the green shingles of Stuart House.

The form of the Church has been primarily influenced by the following design considerations.

1. The proximity of the worshiper to the altar was an important consideration. In the Catholic Church the worshipers' role in the ceremony is that of participant. It is most desirable that the faithful be aware of the minute-to-minute progression of the mass. To achieve this, it was deemed important to keep the farthestmost worshiper no more than twenty pews from the altar and to elevate the altar as much as possible.
2. The narthex must serve as a transitional space to the main body of the Church. It is from here that processions by the student body originate. Consequently, the multi-purpose room is below the nave

with access to the narthex.

3. This Church is not just a parish Church without a baptistery. The choir of nuns and students is here of great importance. They have been elevated and placed behind the altar to allow for maximum audience participation.
4. The multi-purpose rooms, sacristies, etc., have been located below, thereby giving the freedom to design the Church and surrounding spaces with the strongest order.
5. For the form to exist harmoniously in these surroundings, it must have a certain lyrical quality.
6. The relationship of the building to the sky gave rise to the stained glass lanterns which articulate the skyline and give added symbolic expression to the interior.
7. A study of the relationship of the Church to the ground as seen from above and below indicates it should be on a podium. The four foot high walls of this base are of precast units whose form is such that the shadows produced reiterate in a secondary pattern the primary rhythm of the church.

The transitional character of the narthex is designed to make the progress of the faithful a religious experience from the moment of entry. Upon entering the narthex, a low pierced wall intercepts the vision. The person senses the

space beyond and sees the progression of ceiling lanterns, getting ever lighter, moving toward the altar end of the Church.

The vertically strong nave opens up on a large vista leading to the altar and symbolizes the pilgrimage to God. It ends at the brillinatly lit, elevated altar. The nave, by its spatial conception, establishes for the devout the relationship between God and man--"progression along the way." This effect is achieved principally through the measured repetition of the vertically rising elements and the windows they contain. The windows are of German antique stained glass and predominately of a wide range of warm blues and greens accented by a few brighter colors. They are positioned by a lacework of deep members. Glass in the windows and lanterns progressively gets lighter and lighter, bay by bay, until the sanctuary is reached, at which point the lateral windows are allowed to admit a very strong source of indirect light. The lanterns which pierce the roof follow the same progression and serve further to articulate the ceiling surfaces with light. The final, largest lantern terminates over the altar, focusing the attention of the faithful here and giving added emphasis, honor, and dignity to the altar itself. The lanterns are not a primary source of artificial light.

The elevated altar of dark marble is viewed against a light, neutral background. Strong colors for the altar and vestments, in accord with the five major liturgical seasons, serve to increase the visual effectiveness of the sacred

action at the altar. Generally, the colors are neutral throughout with the vestments, tapestry, lanterns, and stations of the cross as accents.

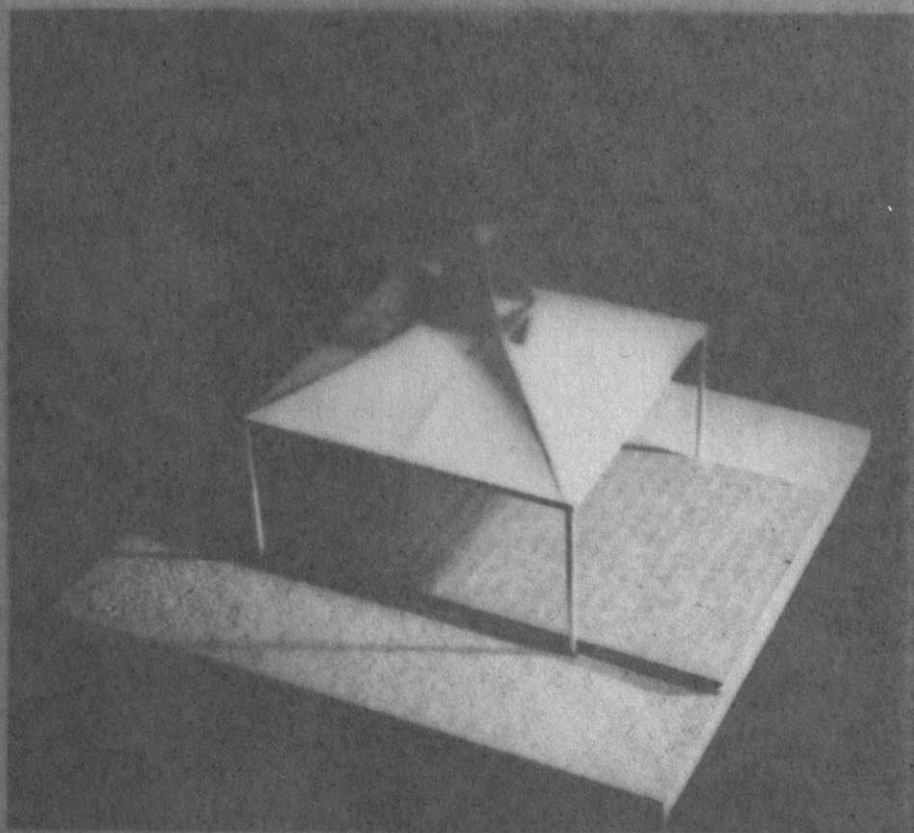
The stations of the cross, in keeping with the simplicity and clarity of the Church and its related decoration, are designated by simple crosses, placed at irregular intervals, in the lacework filling the windows on the lateral sides.

THE CHAPEL

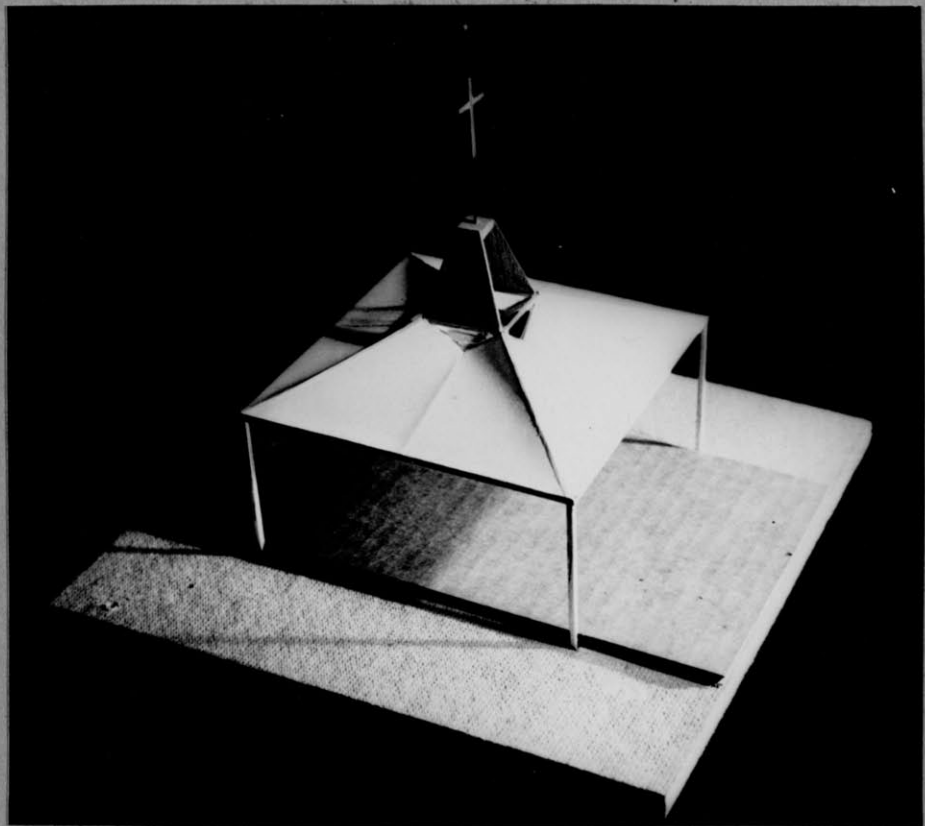
The Chapel is thought of as a place of seclusion and interior recollection. Although used by the nuns for saying "Office," its primary purpose is as a meditation room. Accordingly, the atmosphere is restful with low light intensity.

The Chapel can be approached from three directions. The main entry court serving both the chapel and the large garden is on the north side. It is sheltered by a roof with a single opening to admit sunlight to play upon a sculptural work placed below. The nuns have a private access from the west and the south access is through an uncovered court.

Walls of the chapel are of precast concrete blocks which admit indirect light through vari-colored pieces of glass. This light gives a delicate, vibrant sparkle to the interior. The ceiling is formed of ruled surfaces, in concrete, supported at four corners, with a strong emphasis in the center over the altar. This structural emphasis serves as a source of daylight and houses fixtures for artificial light. The altar is of concrete and placed on a two-step predella.



PRELIMINARY STUDY MODEL
FOR CHAPEL ROOF



SURVEY OF SURFACES

These drawings are included because they formed a vital part in the Church and Chapel design process. The forms illustrated cannot be considered apart from the "individual unity--structure, space." They are shown isolated for purposes of study.

Generally the drawings represent only rough approximations of the form and dimensions of elements, and primarily demonstrate statical stability. Most of the drawings are of ruled surfaces originated by the displacement of a straight line Generatrix on two Directrice lines which are not in the same plane. Although many generatrix-directrice combinations have been surveyed here, there probably exist many more.

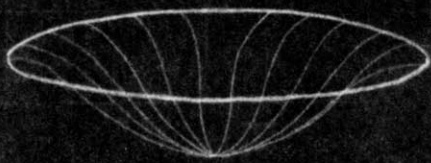
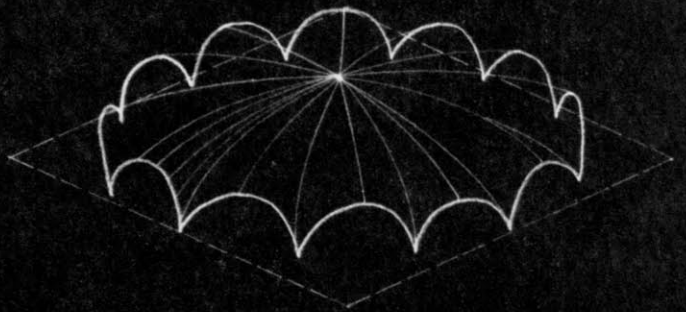
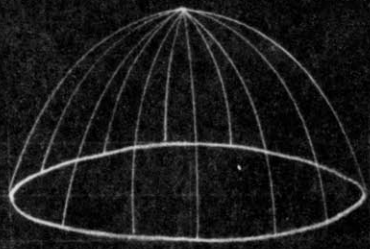
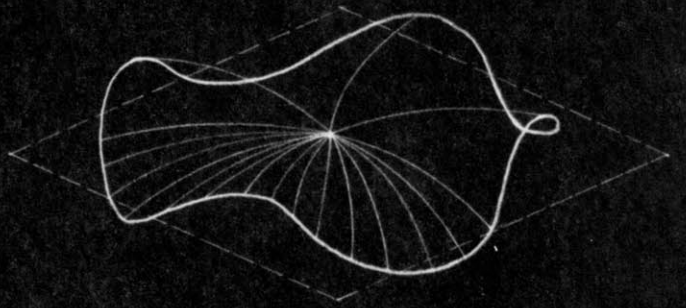
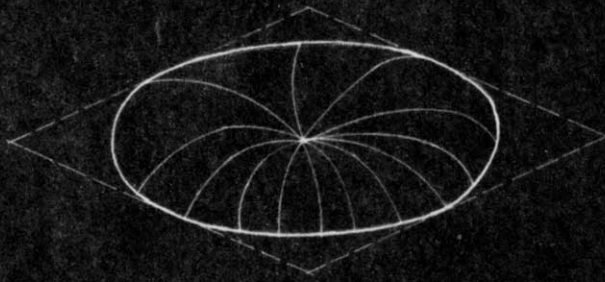
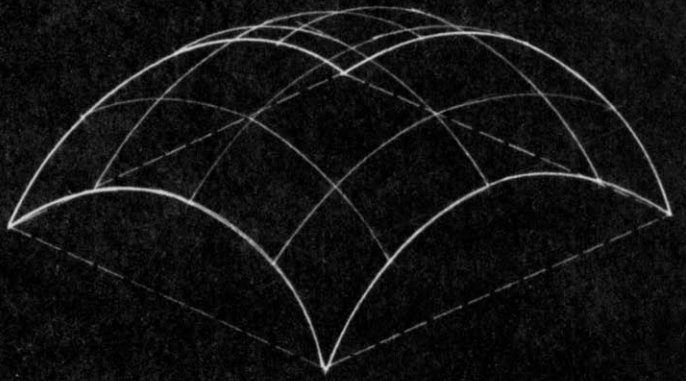
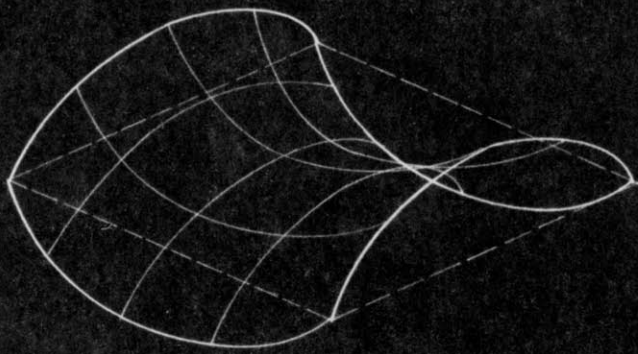
Page 1: shows DOUBLE CURVE SURFACES with no straight line elements. They are forms complete in themselves.

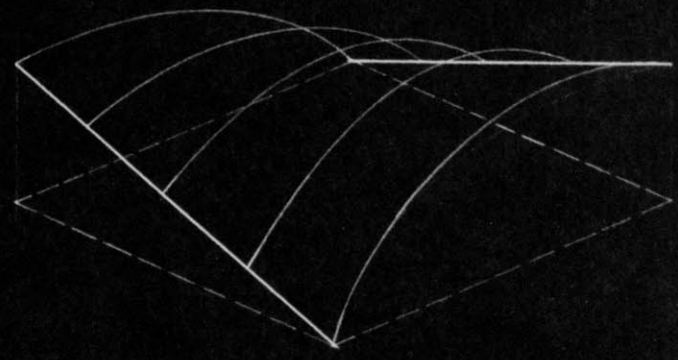
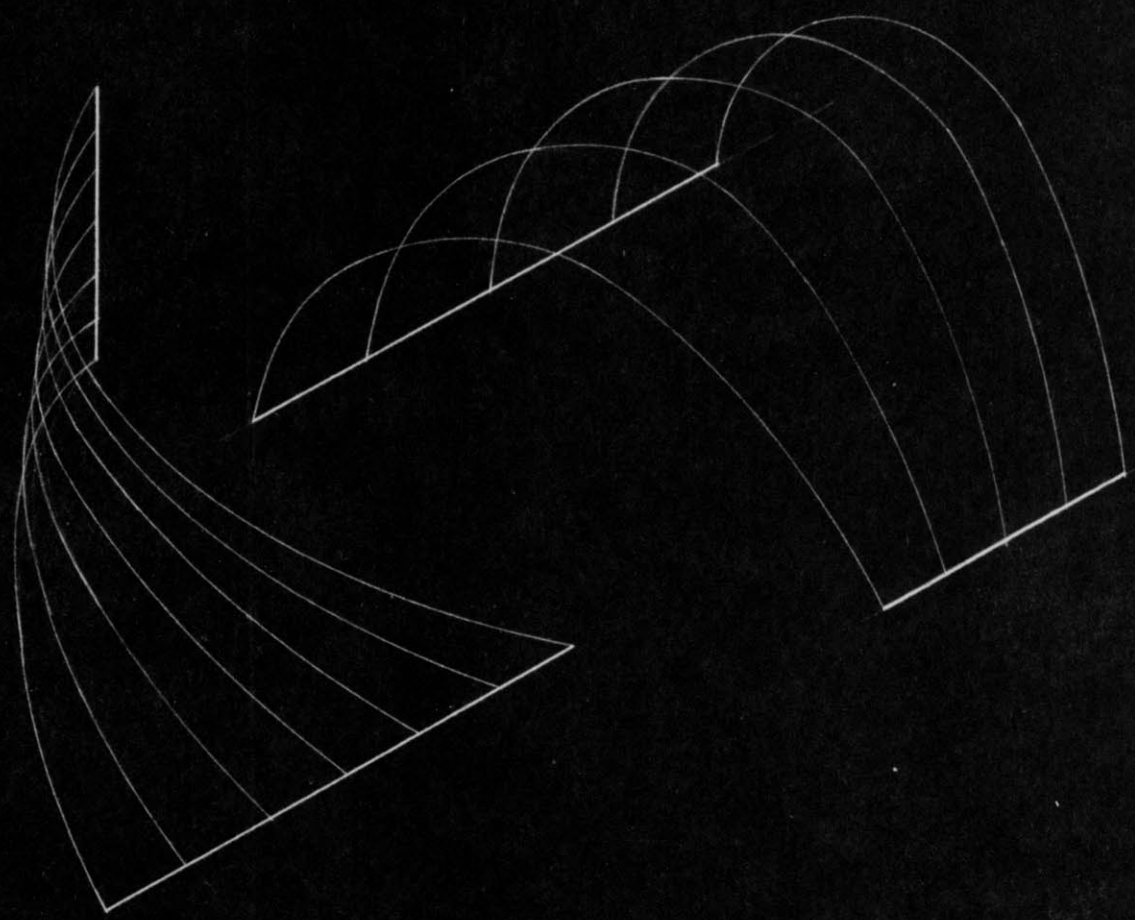
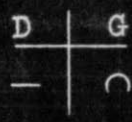
Pages 2-7: show RULED SURFACES formed by a single system of straight lines. Most of the drawings represent elements that must be used in combination.

Page 8: shows the application of RULED SURFACES to "A frame" construction.

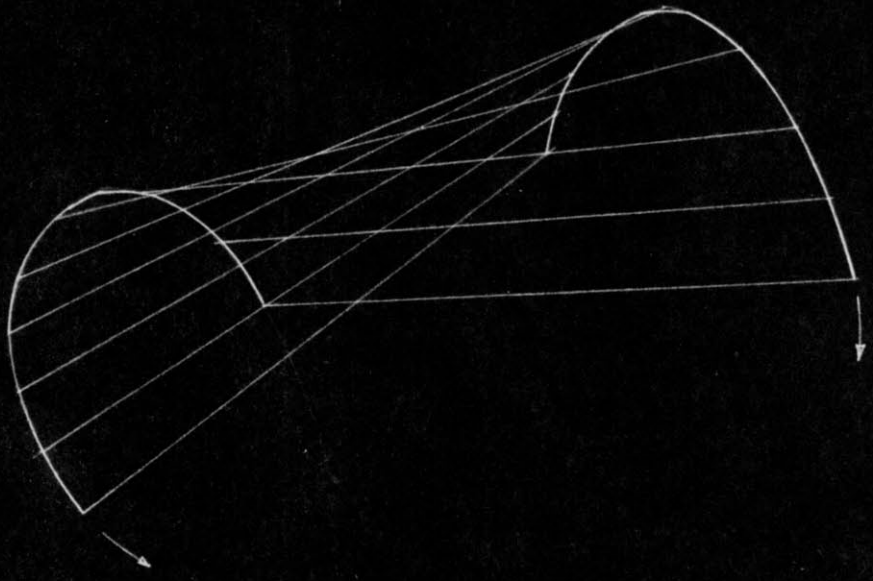
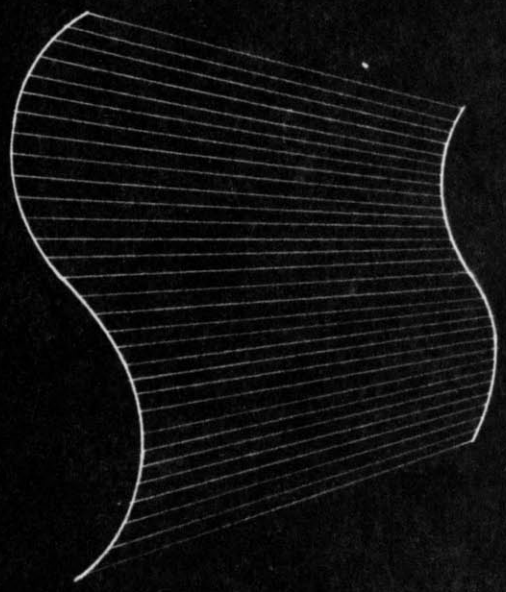
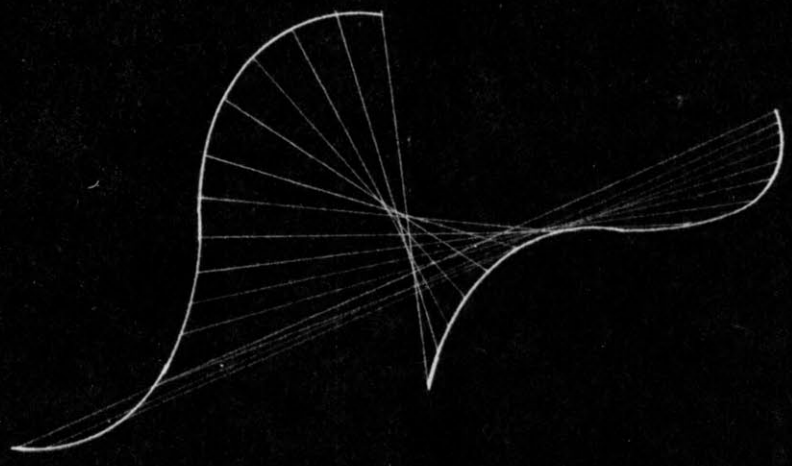
Pages 9-11: are a study of BAY SYSTEMS utilizing both ruled and plane surfaces.

I should like to acknowledge the contributions of my former classmates at N.C.S.C., who made an initial survey of ruled surfaces in 1955 under the direction of Professor Eduardo Catalano.

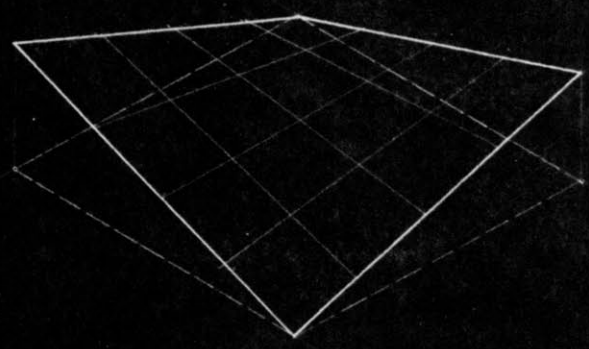


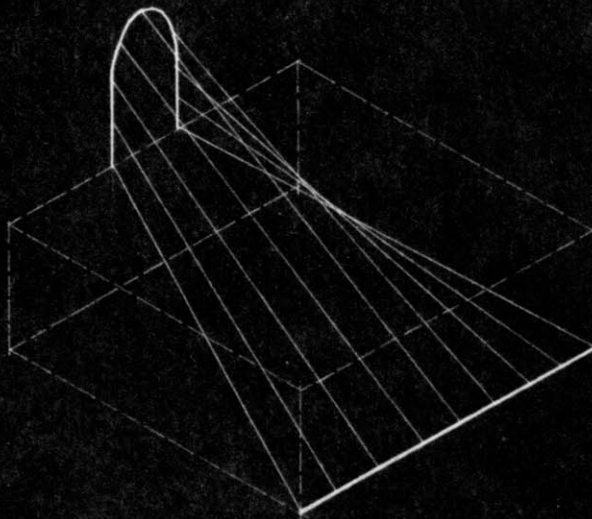
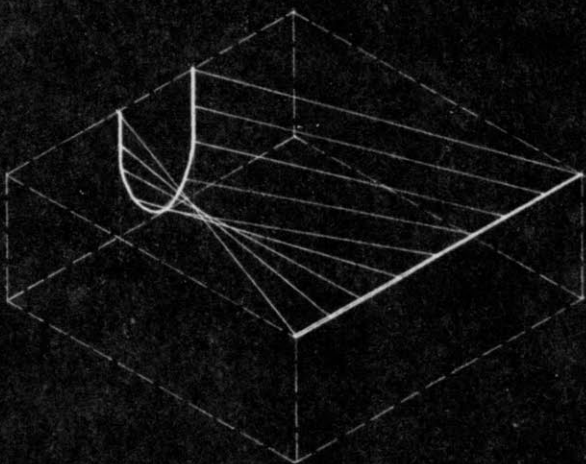
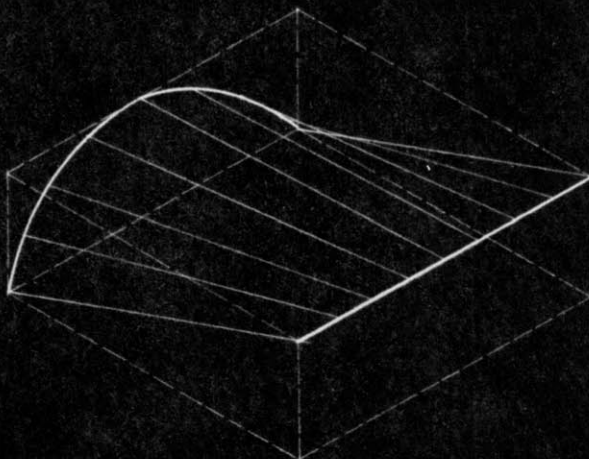
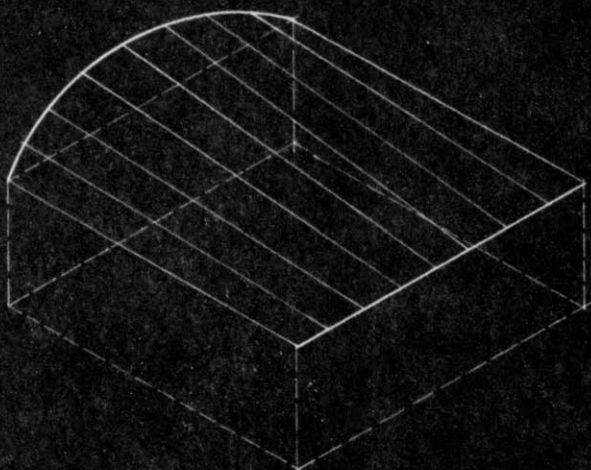
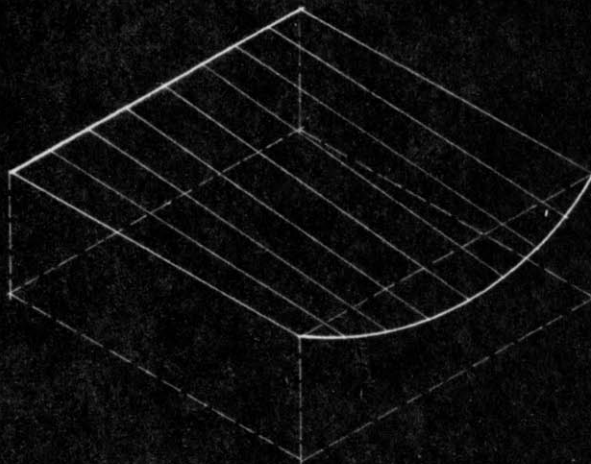
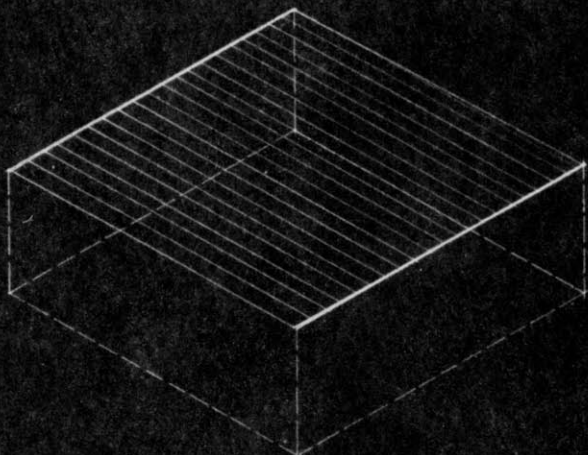


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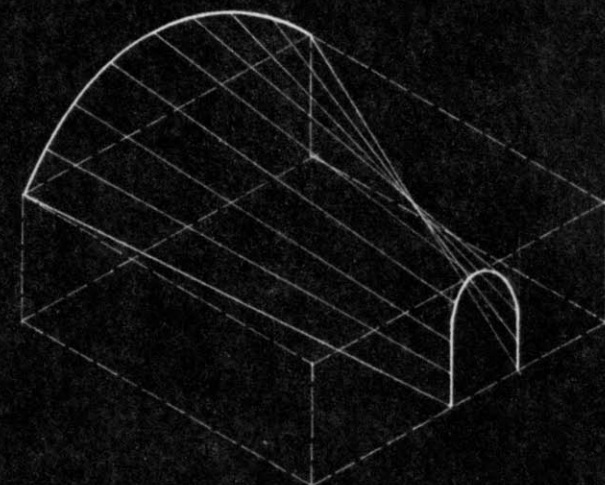
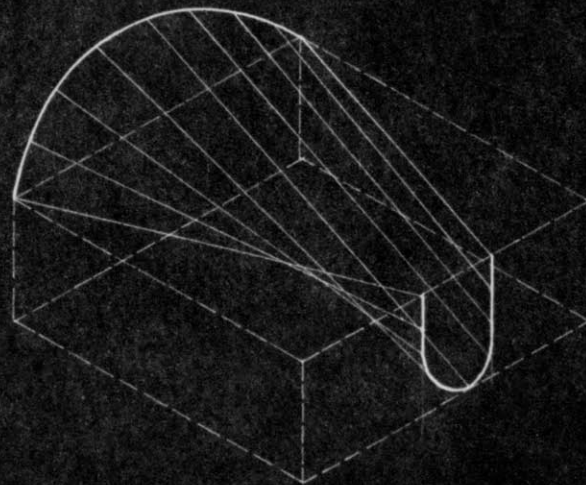
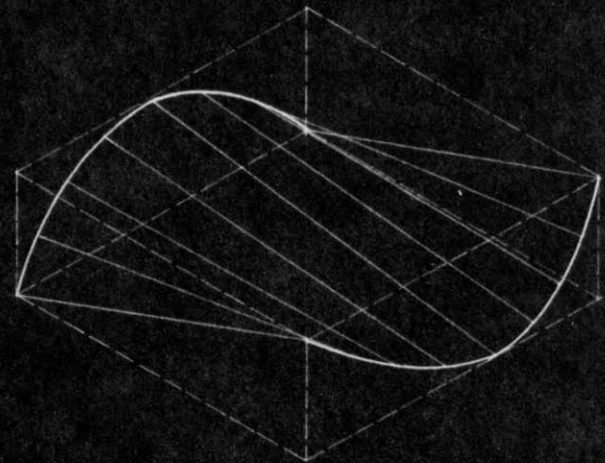
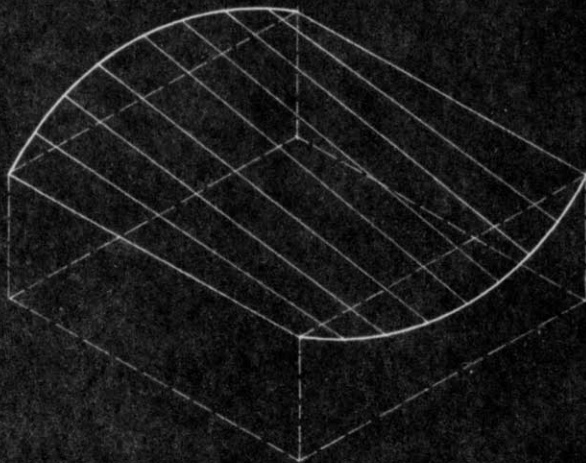
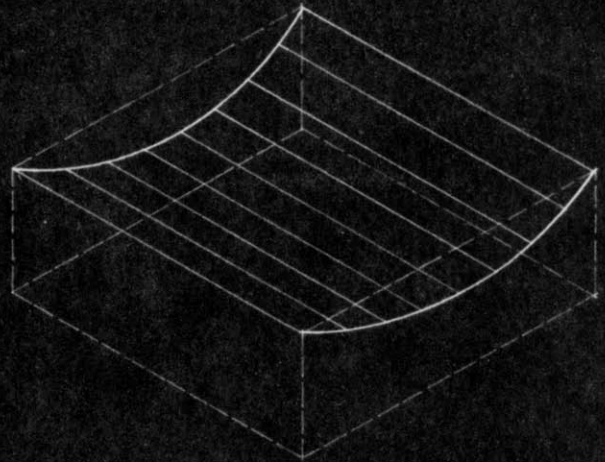
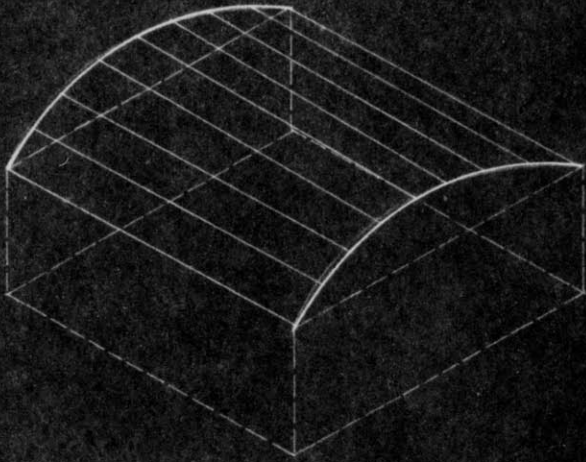


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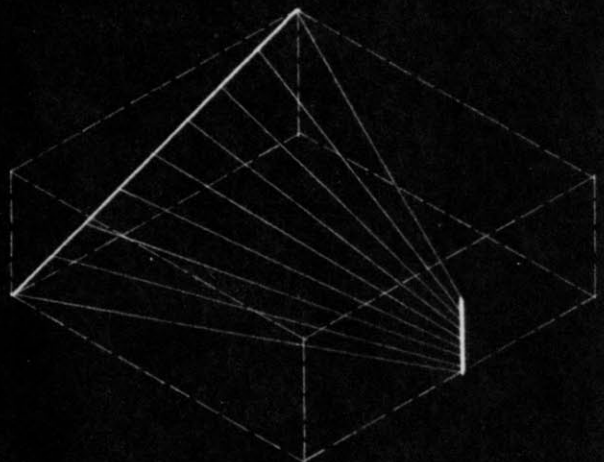
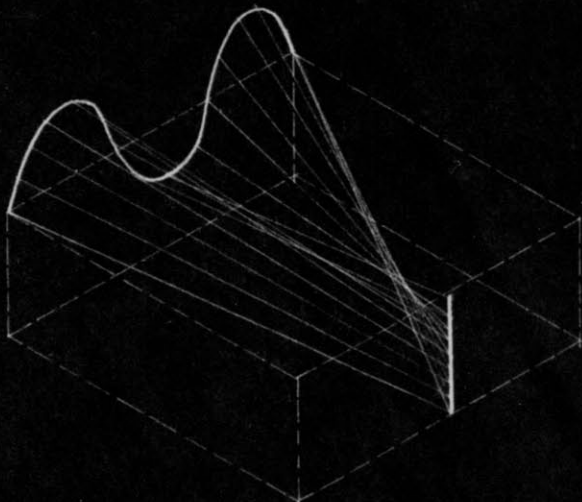
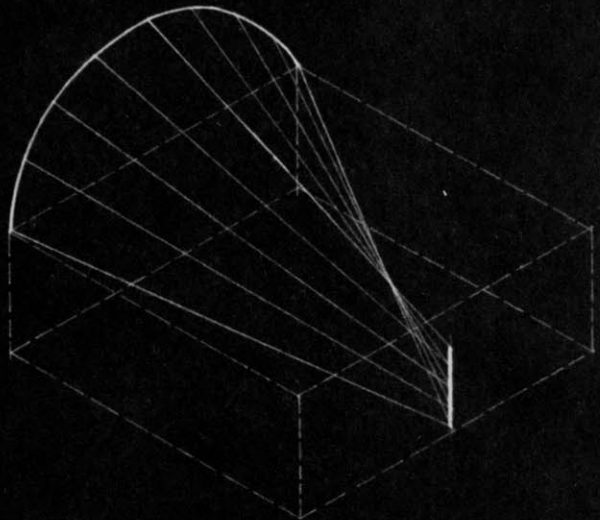
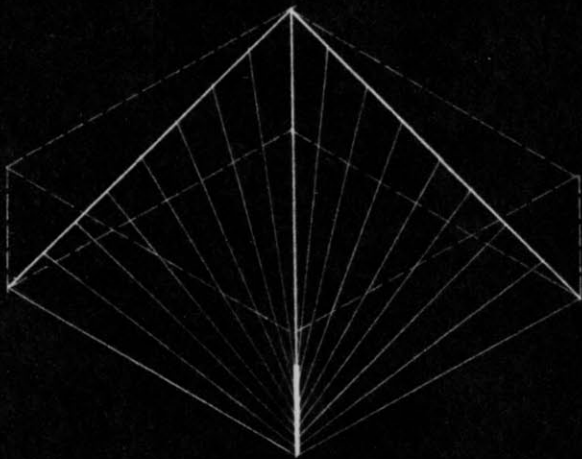
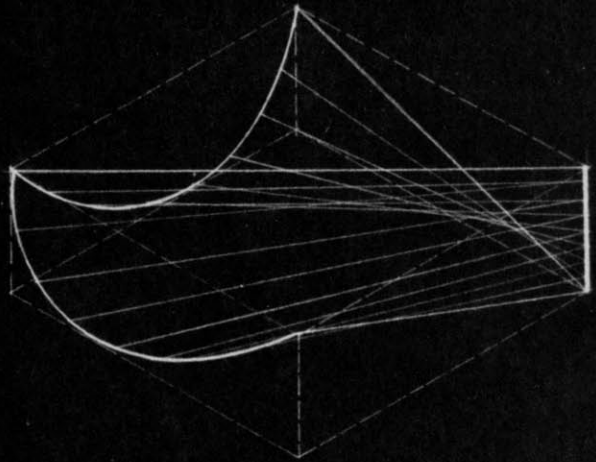
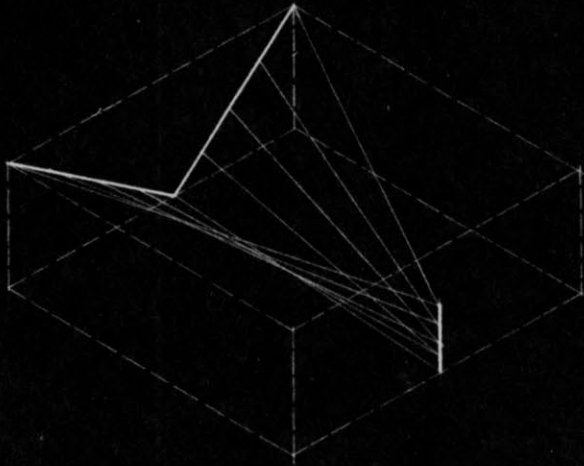




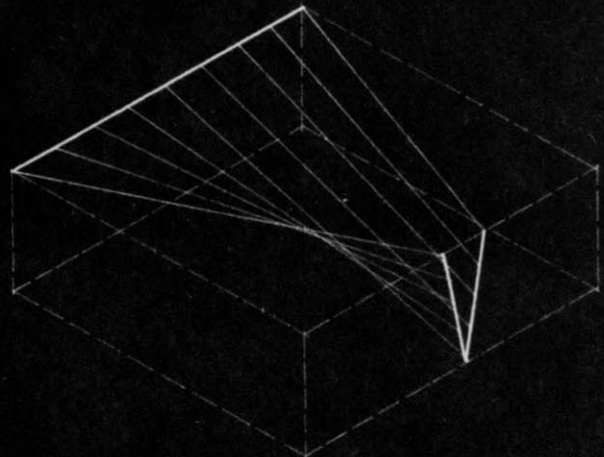
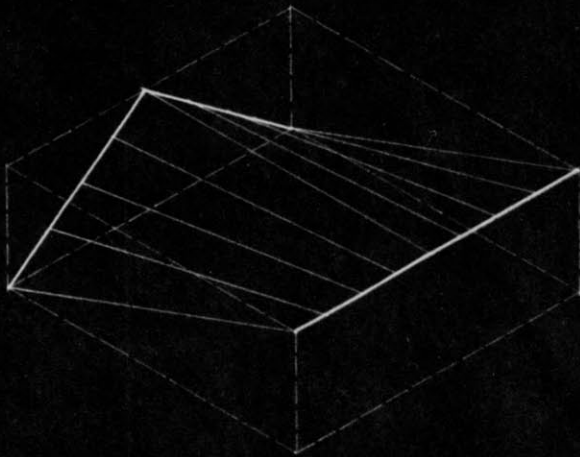
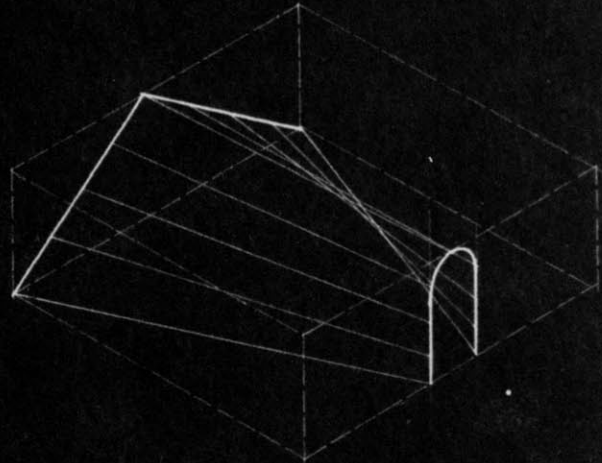
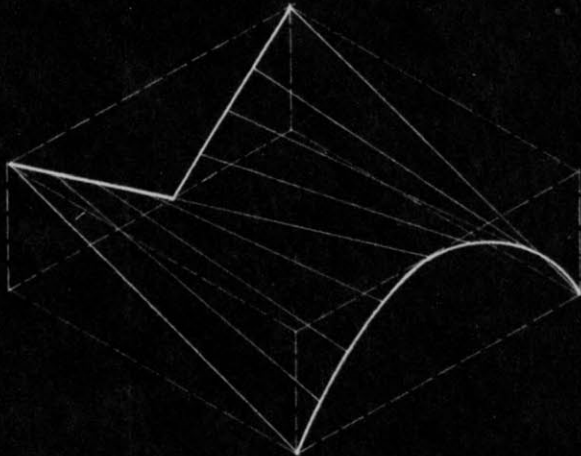
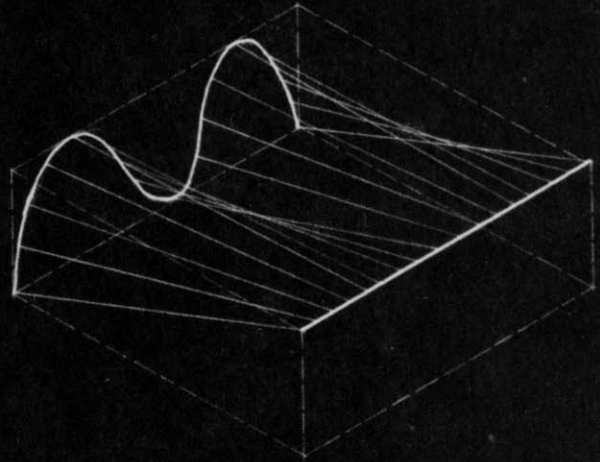
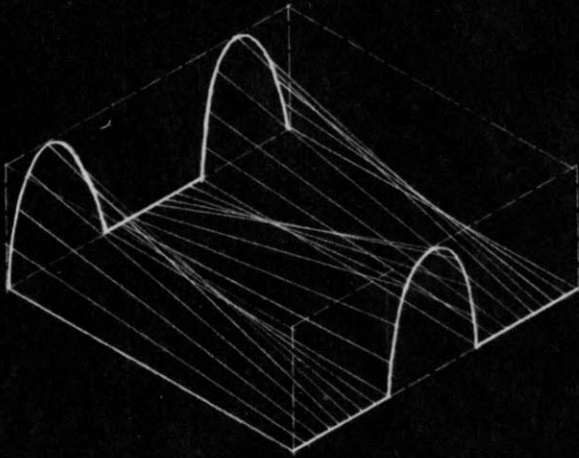
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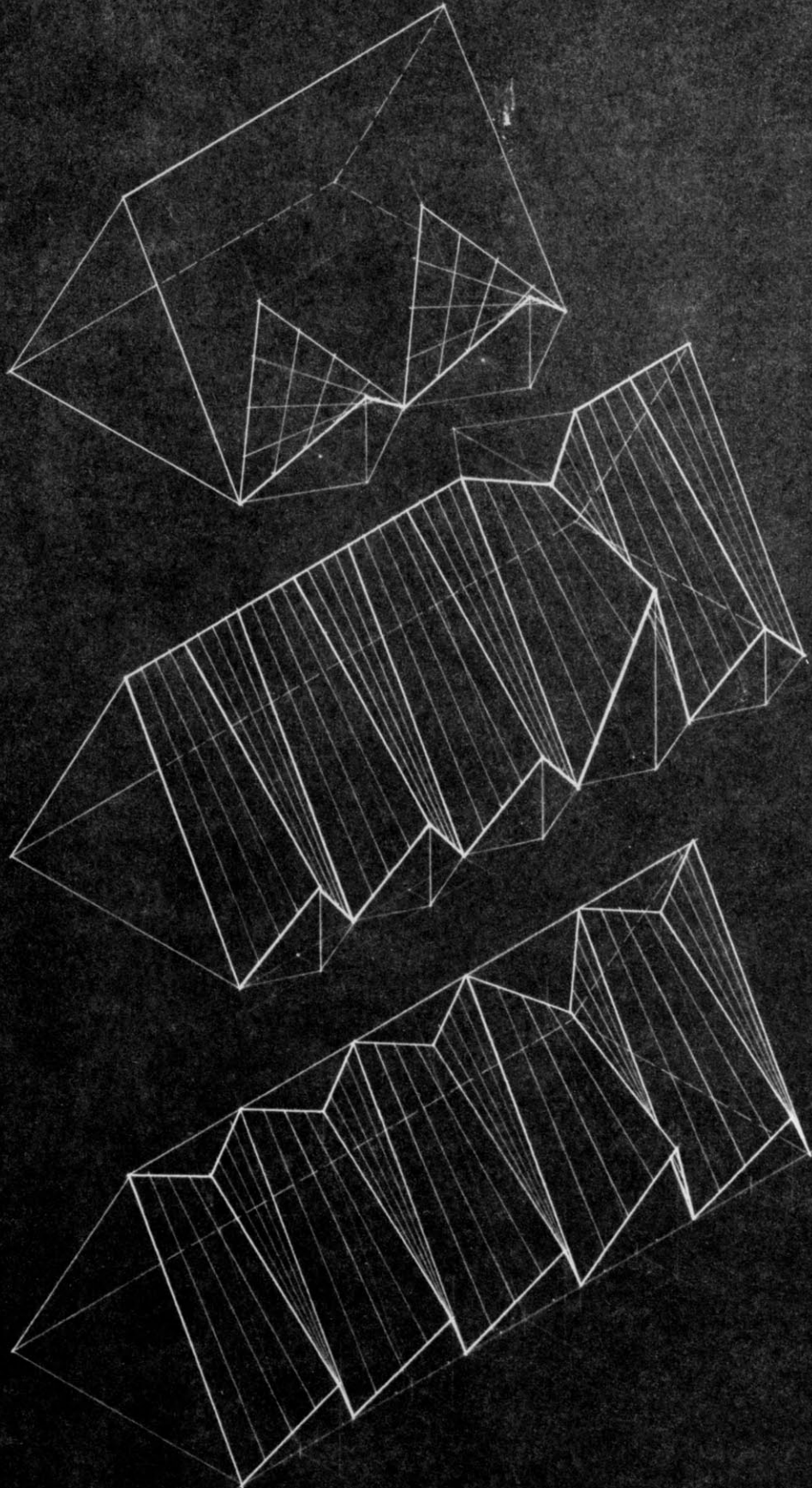
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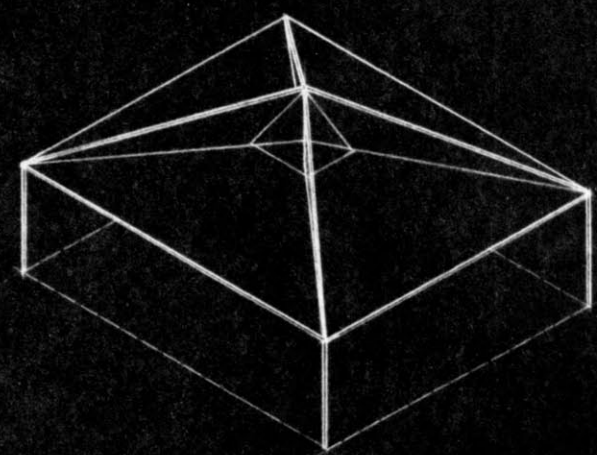
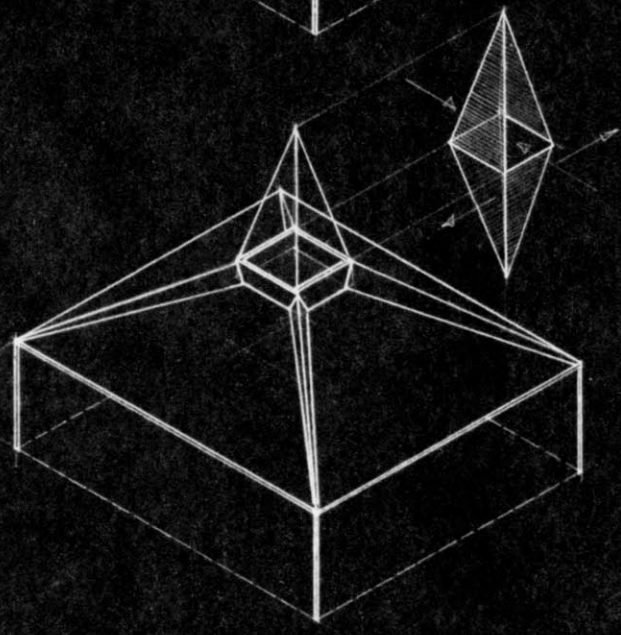
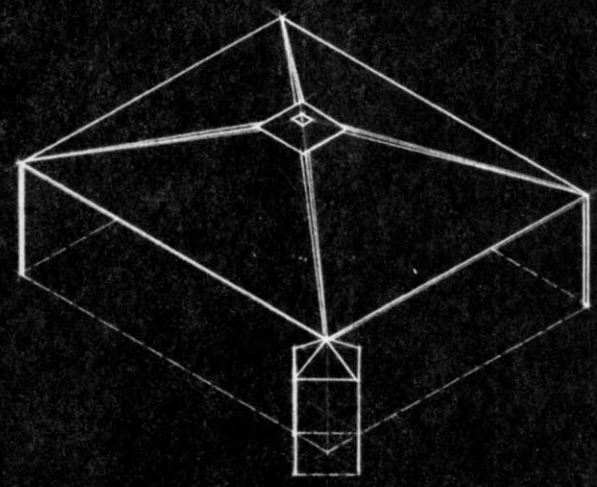
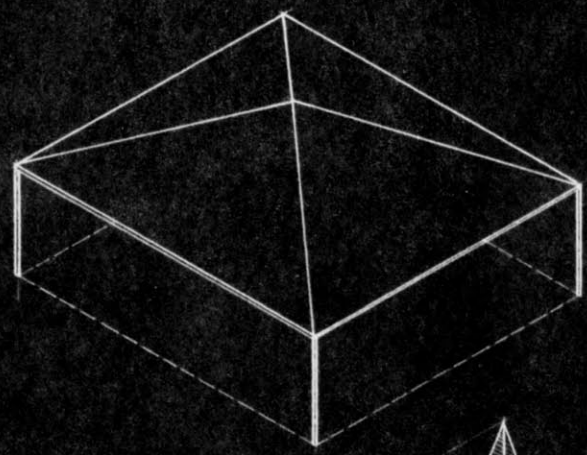
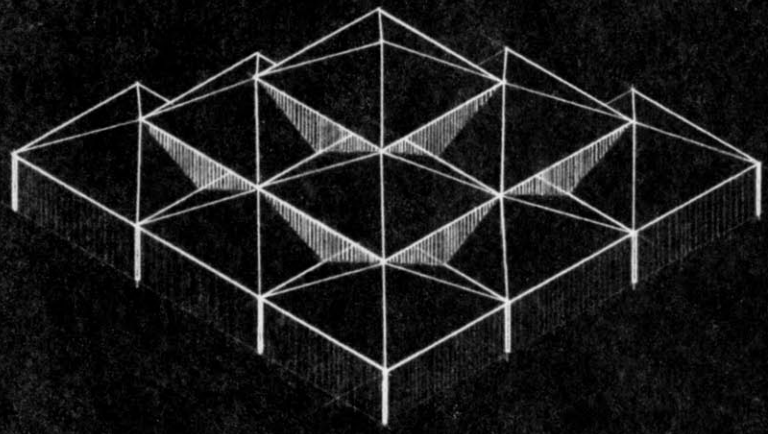


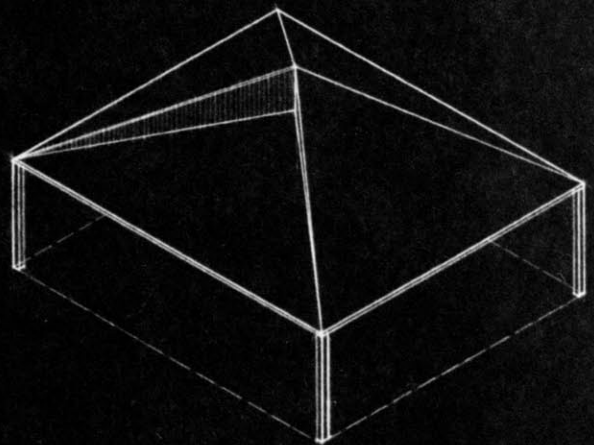
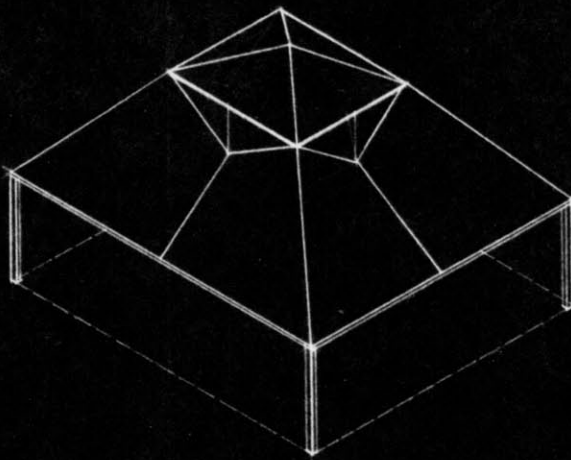
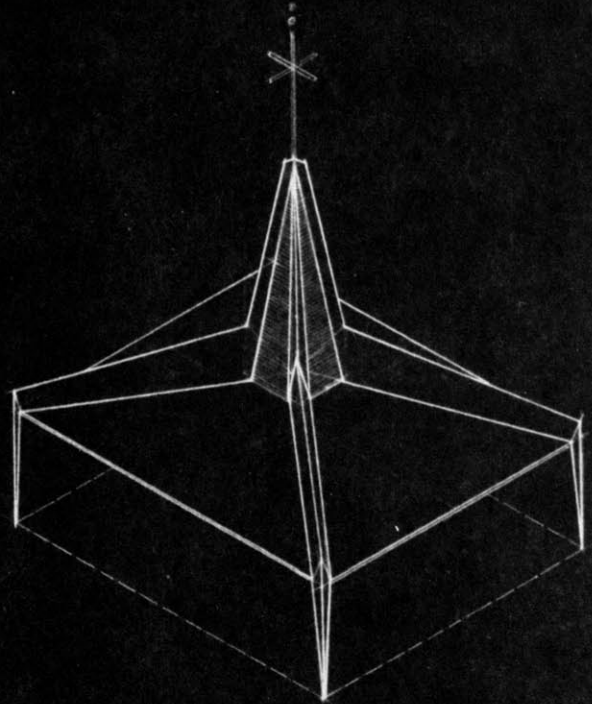
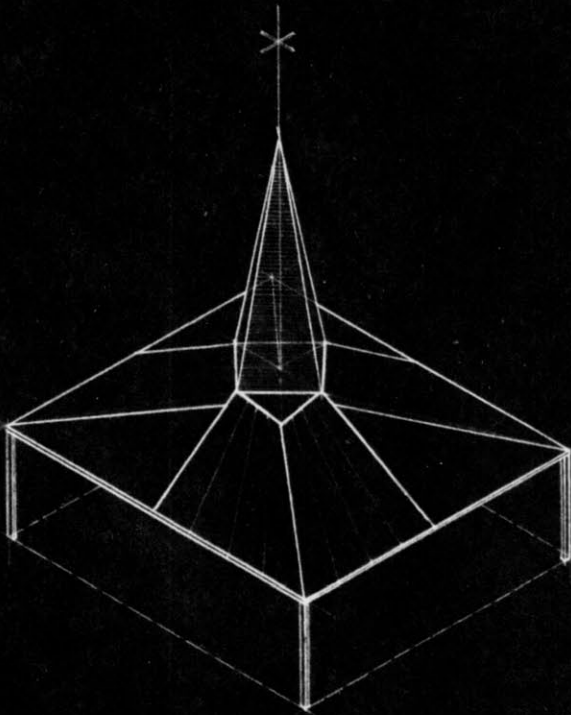
Application of hyperbolic
paraboloids to "A" frame
construction.

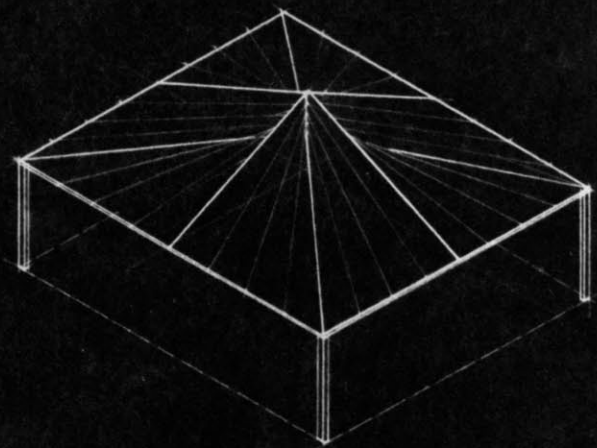
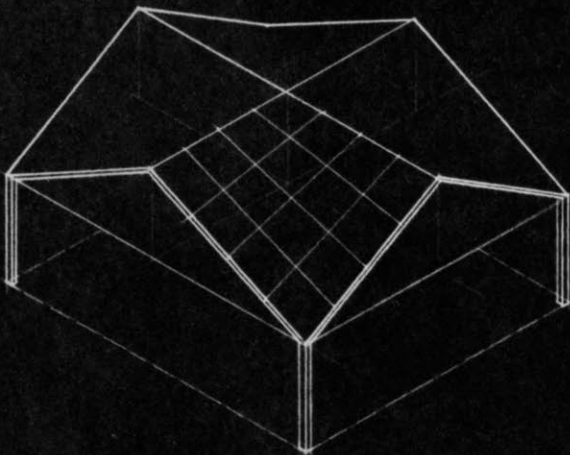
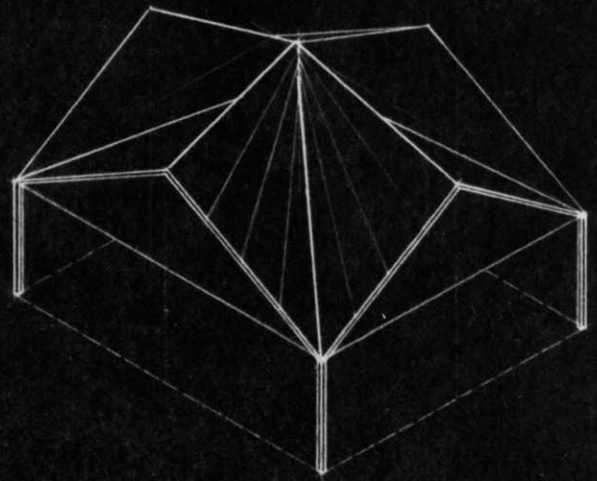
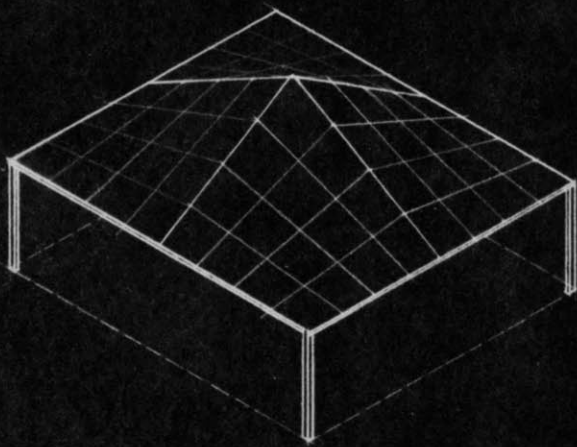


SURVEY OF BAY SYSTEMS WITH PLANES AND RULED SURFACES

This system requires additional tension and compression members making it literally a truss.







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