5-1995

A New Home for the Philadelphia Orchestra

Avril Farnsworth

❑A NEW HOME FOR THE PHILADELPHIA ORCHESTRA

Philadelphia, PA

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Thesis Prep- Fall

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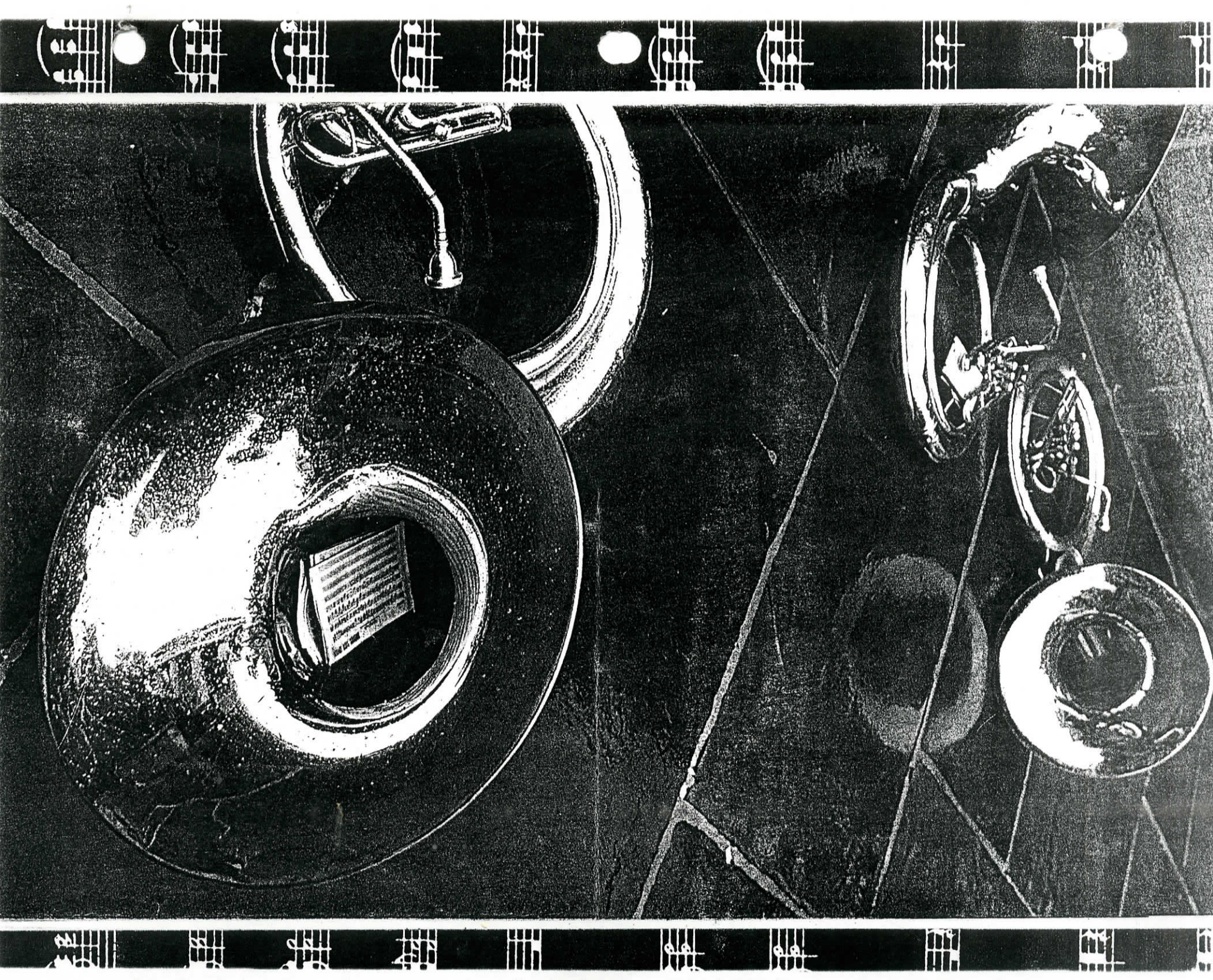

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INTRODUCTION

INTRODUCTION[1]

Philadelphia is a city that presents a bold and confident vision of growth as it moves into the 21st century. It is a city that faces the future with over 300 years of history and experience.

Center city's potential as a place to visit is unrealized. The downtown area has an abundance of theater, museums, galleries, hotels, and restaurants, but a shortage of proper facilities of the proper size in the proper location is robbing Center City of its potential as a center for hospitality, entertainment and culture. For example, the internationally renowned Philadelphia Orchestra does not have its own home in the city but instead has been performing in the Academy of Music, which was originally designed in 1851 for opera performances.

Philadelphia's efforts to strengthen its downtown artistic attractions are centered on a mile long stretch along Broad Street, dubbed the "Avenue of the Arts". This theme was originally developed in the early 1960's as a design project assigned to master's degree students at the University of Pennsylvania School of Architecture. Years later, in 1977, some prominent businessmen, art leaders, and city officials decided that something ought to be done to put the spotlight on South Broad Street as a cultural corridor of the city.

South Broad Street has become significant as a cultural event within the city fabric. It maintains its celebrated role as a monumental public place and its legacy of significant historical buildings.

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[1]The City Planning Commission. **Plan For Center City**. January 1988.

❑ THESIS STATEMENT:

Due to Philadelphia's position as a cultural center, there is a need to build upon the idea of the Avenue of the Arts as a **cultural event within the urban fabric** by celebrating the role of the Philadelphia Orchestra as a **monumental symbol to the city.**

The **idea of monument** must first be defined in order to explore correlation to this thesis. Alfred Koetter best defines this idea in *Monumentality and the American City*; "a monument is a symbolic property of the city at large, a civic holding and a visible system of reference, explaining not only the city's past but also its form and the disposition of its public structure."

❑ INTENT:

The intent of this thesis will be to interpret the cultural event of the orchestra into contemporary terms; to explore the idea of architectural promenade and how it relates to the spatial experience; to elucidate the idea of cultural monument as an event within the existing city fabric. I would also like to investigate the possibilities of utilizing structure, acoustics and support systems in such a manner as to create partially flexible spaces in the hall, adjusting to the scale of the performing orchestra. I will do this through the analysis of both successful and unsuccessful concert halls built in the past.

PROJECT SCOPE

PROJECT SCOPE

❑ PROGRAM:

The vehicle to this thesis is developing a new home for the Philadelphia Orchestra, thus Philadelphia's first concert hall. There is a need for a monumental symbol to celebrate one of the most prominent orchestra's in the United States.

❑ PROGRAM SELECTION[1] :

1. Currently, Philadelphia is one of the few cities without a dedicated symphony hall. The Orchestras of Boston, New York, Pittsburgh, Baltimore, Washington, Cleveland, Detroit, Dallas, San Francisco, London, Toronto, Berlin, Minneapolis, Amsterdam, Vienna, etc., each have a concert hall at their disposal.

2. Philadelphia is the most underserved major city in the nation in terms of performing arts programming. Of the fifteen largest cities in the United States, Philadelphia is the last in the number of performances, tickets sold and facility seats for the performing arts. Comparisons with seven other major cities are shown in the table below.

3. Philadelphia has a total of 14,525 seats compared to 24,362 in Boston, 28,668 in Baltimore and 25,977 in Detroit. Because of its lack in venues, many national and international symphonic orchestras, dance companies, popular music performers and Broadway shows never make it to Philadelphia or must be accompanied at a reduced scale in the Forrest or Shubert, which seat less than 2,000 each.

4. The 2,929-seat Academy of Music is the city's only formal performance hall of over 2,000 seats.

5. The over scheduled Academy forces the Pennsylvania Ballet and the Philadelphia Opera Company into inefficient schedules, hampering growth and impeding success.

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[1] Urban Partners and Kise Franks & Straw, Inc.. **South Broad Street Economic and Cultural Development Plan.** November 1991.

❑ OVERALL SITE CRITERIA:

1. It must be located near a cultural center of the city.
2. It should be at a central location within the city, convenient to social facilities.
3. It must have adequate access by both public and private transportation.
4. It must have adequate parking.
5. It should be a site that is aesthetically pleasing.
6. The site should be close to the center of tourist and transient intersections.
7. It should be in close proximity to hotels and motels.
8. It must have suitable physical characteristics for the site and sufficient land area.

❑ SITE SELECTION:

The stretch of South Broad Street is known as "the Avenue of the Arts". South Broad Street is an excellent location to capture a wide regional audience and to give even more visibility to the performing art community in Philadelphia.

The performing arts district will be within walking distance of the convention center, the new hotels along Market Street and the proposed City Hall visitor's center. The location offers plenty of parking in the evening when offices are closed and it is easily accessible to city residents and suburbanites by means of public transit, commuter rail and PATCO lines.

The idea of building a new concert hall for the Philadelphia Orchestra is almost as old as the Orchestra itself, founded in 1900. Since 1908 sites such as Rittenhouse Square and the Pennsylvania Academy of Fine Arts at Broad and Cherry Streets have been selected as potential settings for the new home. Today, however, with the establishment of the "Avenue of the Arts" theme, it is most appropriate to select a site along South Broad Street.

❑ SITE: On the southwest corner of Spruce and Broad Street.

Historic districts and prominent buildings located near the proposed site include the following:

BROAD STREET HISTORIC DISTRICT
- **Girard Trust Bank-** bank
- **Fidelity**-office
- **Land Title Buildings**-office
- **Union League-**institution
- **University of the Arts-**institution
- **Academy of Music-**cultural facility
- **Shubert Theater-**cultural facility
- **Bellevue Stratford-**hotel
- **Ridgeway Library**- library
- **Peace Circle Mission**

EAST CENTER CITY HISTORIC DISTRICT
- **Walnut Street Theater**-cultural facility
- **Victory Building**

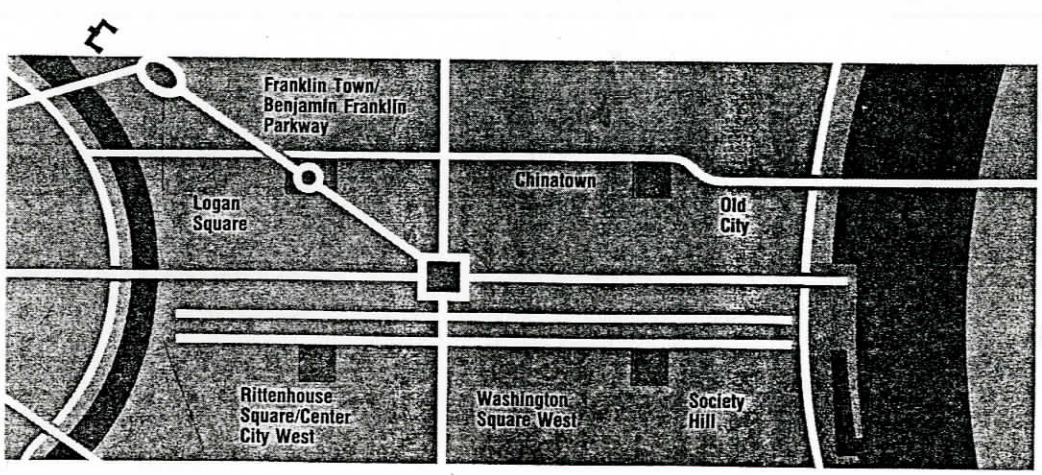
WASHINGTON SQUARE WEST HISTORIC DISTRICT- a dense residential district.
- **Portico Row-**grand townhouses

CENTER CITY WEST HISTORIC DISTRICT-commercial streets.

RITTENHOUSE HISTORIC DISTRICT-a residential environment including distinctive home and remarkable apartment buildings.

WASHINGTON AVENUE HISTORIC DISTRICT- a concentration of early 20th century manufacturing lofts and warehouses.

Center City Neighborhoods



ARCHITECTURAL ISSUES

ARCHITECTURAL ISSUES

❑ PROGRAMMATIC: ~~PROGRAMMATIC:~~ Technical

1. The most important technical concern to the concert hall is **acoustics**.

The outer enclosure to the hall is important as an acoustic barrier to exterior noise. the form of the auditorium must be derived relative to the scale of the performing orchestra and the audience seating. Therefore to achieve acoustic quality, the auditorium must be incorporated with a flexible ceiling canopy and height -adjustable stage and seating area.

The loudness of the reverberant sound in a hall decreases proportionally as the seating area of the audience and the amount of the other sound absorbing material in the room are increased.[1]

2. The **mechanical systems** should be located away from the auditorium, preferably on or below grade, but not on the auditorium roof. Supply and return air should be low velocity and duct work should be in such a configuration as to diffuse noise.

3. **Structure** of the building will depend on the requirements of the equipment utilized on the extent of the flexibility required. Special structure will be required for the auditorium where lighting, acoustics and mechanical alterations are necessary. Large spans can be used in the auditorium to allow for flexibility.

❑ SOCIAL:

1. **The proposed new concert hall will place the Orchestra in a performing space shaped solely for music as well as commemorate its status as one of the major orchestras in the world.** Currently, it is one of the few cities without a dedicated symphony hall.

2. The **scale of the hall** must be adjustable to allow an appropriate degree of **acoustical intimacy**. Acoustical intimacy is determined by the initial-time-delay gap- the difference in the time of arrival of the direct sound and the first reflected sound.

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[1] Beranek, Leo L. **Music, Acoustics & Architecture**. John Wiley & Sons, Inc., New York. 1962.

- FORMAL:

1. It is not so much the aesthetic appearance and architectural expression of the space that sets the criteria in designing a music hall. Rather **it is the visual, auditory and physical criteria as a whole that can be arranged to achieve the best overall fit in emphasising a particular desired quality of in an acoustic space.**

2. **The concert hall must be self-financing and, therefore, must seat as many as possible without sacrificing acoustic quality.** The most successful music halls are generally those that seat less than 2,000 people (see *Table A* on following page).

Table A
Large Venues in Philadelphia and Other Cities
(Over 2,000 seats)

City	1988 SMSA population	# of large Venues: Total large venue seats	# of public perform-ances	Seats per million pop	Perform-ances per million pop
Chicago	6,203,100	6: 19,967	798	3,219	129
Philadelphia	**4,909,700**	**1: 2,929**	**293**	**597**	**60**
Detroit	4,396,400	6: 18,383	874	4,181	199
Boston	3,725,500	4: 12,030	576	3,229	155
Baltimore	2,367,400	2: 5,035	356	2,127	150
Toronto	2,192,721	4: 10,960	1,063	4,998	485
Cleveland	1,863,900	4: 11,332	494	6,080	265
San Francisco	1,606,500	5: 14,108	552	8,728	344

CONCEPTS

CONCEPTS

❑ THEATER BUILDING TYPES:

There are three types of designs applicable to a large theater: **proscenium theater**, a **concert hall** or a **multi-purpose hall**.

1. A **proscenium theater** is designed for staged events such as opera, ballet, drama or musicals. It generally has a proscenium arch framing the stage, an orchestra pit, an overhead fly and stage wings to hide scenery and an array of back stage spaces, special lighting equipment and appropriate mechanical systems.

   The Academy of Music modeled after LaScala in Italy, is a large proscenium theater, originally designed for opera and other staged musical events. It is listed among the world's great opera venues in Michael Forsyth's Building for Music (MIT Press, 1985.) While it is possible for an orchestra to play in a proscenium hall, as is currently done in the Academy of Music through use of a movable acoustical shell, the sound is somewhat dissipated by the stage house and side stages and not reflected directly to the audience, lowering the acoustic quality of the performance.

2. A **concert hall** is designed to enhance sound, and usually places the audience and musicians in a single, acoustically unified space which combines the immediate, live sound of the performers with controlled resonance. The proscenium arch is done away with and backstage spaces are not provided for scenery, severely limiting the ability to stage scenic events. Philadelphia does not have a concert hall.

3. A **multi-purpose hall** tries to accommodate all uses and, because of this compromises both on acoustics for music and on stage facilities for scenic productions. While there are successful halls of this type, they are used in situations where demand does not warrant separate facilities for stage and concert events.

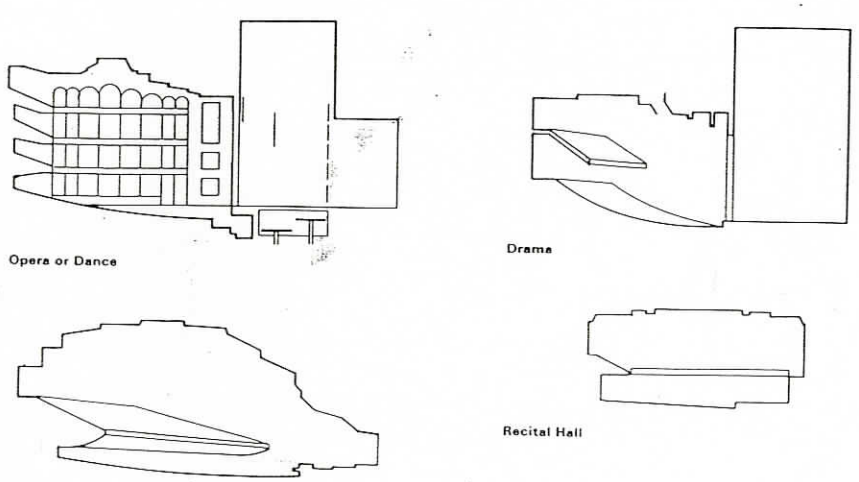


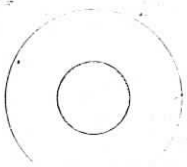
Fig. 6 Four kinds of single-purpose rooms.

ANCIENT

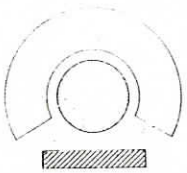
MODERN

CLASSICAL
?B.C.-400 A.D.

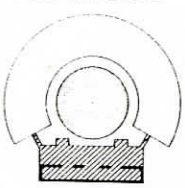
PRIMITIVE



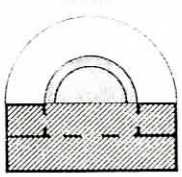
GREEK CLASSICAL



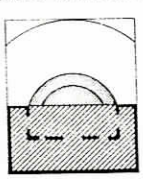
GRECO-HELLENISTIC



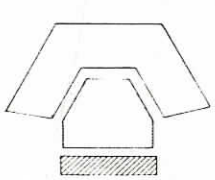
ROMAN



GRECO-ROMAN ODEUM

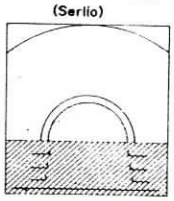


GREEK ARCHAIC (IKRIA)

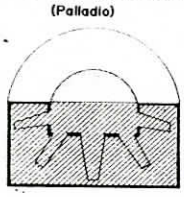


LATE
RENAISSANCE
1550 — 1650

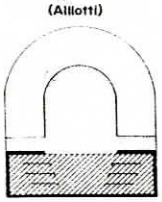
SINGLE VISTA STAGE
(Serlio)



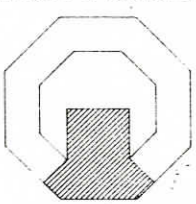
MULTIPLE VISTA STAGE
(Palladio)



PROSCENIUM STAGE
(Alliotti)



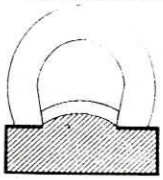
THEATER of SHAKESPEARE



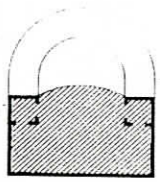
GRANDE SALLE

BAROQUE
NEO-BAROQUE
1650 — 1870

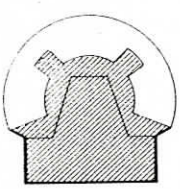
HORSESHOE-SHAPED AUDITORIUM
PROSCENIUM STAGE



THEATER OF THE
RESTORATION

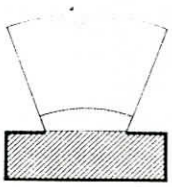


PARTIALLY ENVELOPING
AUDITORIUM
THRUST STAGE

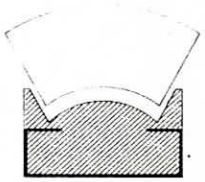


CONTEMPORARY
1870 — 1970

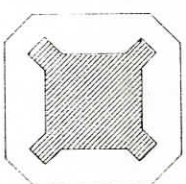
FAN-SHAPED AUDITORIUM
PROSCENIUM STAGE



FAN-SHAPED AUDITORIUM
PROSCENIUM, APRON,
CALIPER STAGE

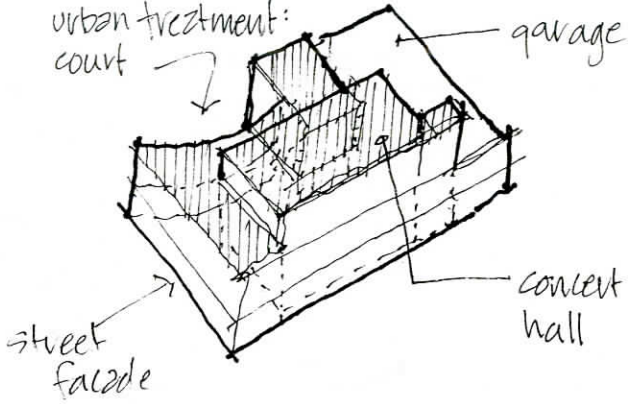


FULLY ENVELOPING
AUDITORIUM
IN-THE-ROUND STAGE



NO SCALE

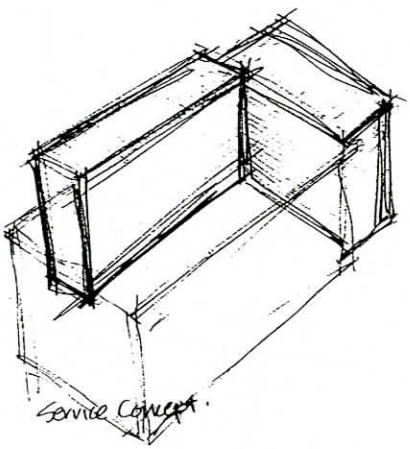
THEATER PROTOTYPES

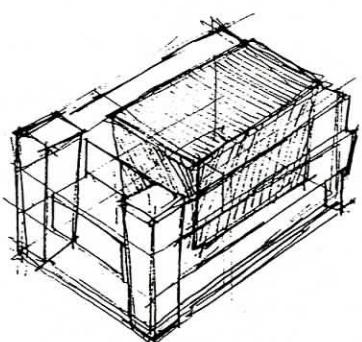


- Venturi's Proposal:

Organizational Concept.
like an auditorium, the building should be based on similar concept:

- the ambulatory as a connector into auditorium; it is like the stairs
- the plinth of the stage to separate from seating zone, is like the into foyer
- stage is like the public lounges viewed from the street,
- the production is like the offices.
- adjustable ceiling is like the varied roof datum.

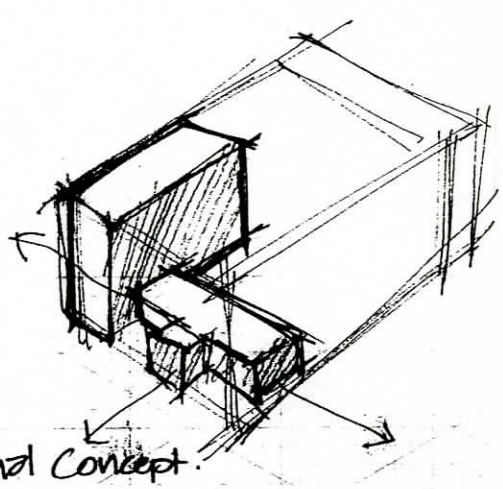



Organizational Concept

Formal Concept -
create a transition from exterior to interior, by use of an intermediary zone, allowing inside and outside to interpenetrate - mediation of street and interior.

Service concept -

- there is an intention to keep services and poche elements to party walls due to the conditions that it is difficult to get natural light in these areas (away from hall to avoid unwanted noise.)



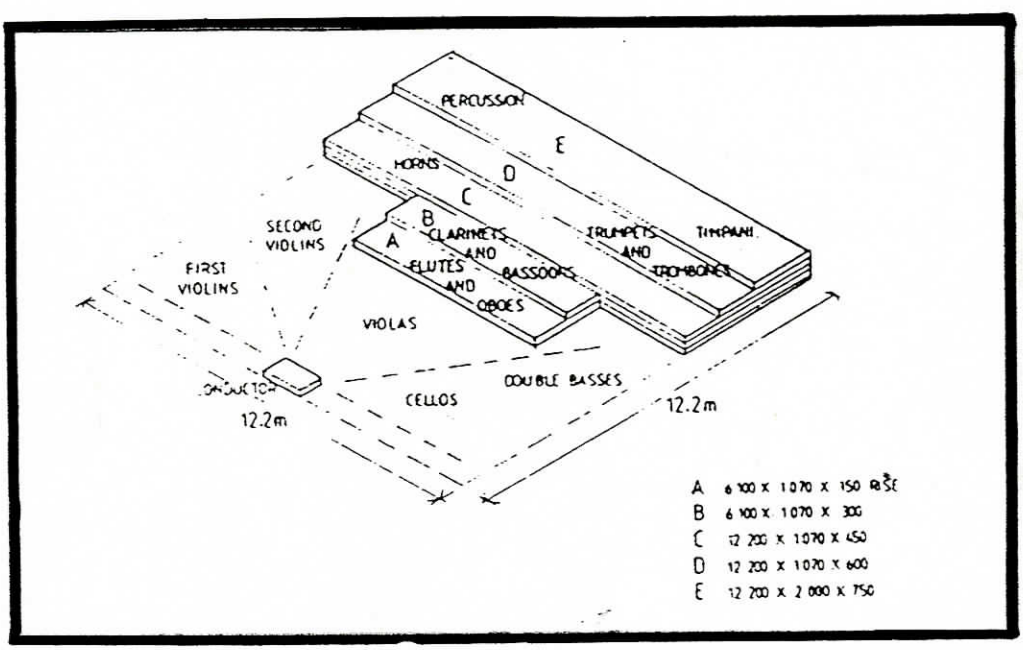
DESIGN CHECKLIST

For Acoustic Control

- ❑ 1. Define list of **uses**.
- ❑ 2. Define **auditorium type** and **seating capacity**.
- ❑ 3. Define **secondary uses**.
- ❑ 4. Consider whether external consultants necessary.
- ❑ 5. Formulate brief to specialists.
- ❑ 6. Consider **design development techniques**- (simple models at 1:50, 1:10 or 1:1 scale and computer analysis).
- ❑ 7. Group **ancillary accommodation** to buffer performance spaces from external noise.
- ❑ 8. Set ambient **noise control standards** for external and services noise (e.g. *NR 20*).
- ❑ 9. Determine **basic hall shape**- (rectangular, near-square, polygonal, fan shape, courtyard).
- ❑ 10. Determine form of **orchestra setting**- (end bay, erected shell, unsegregated).
- ❑ 11. Determine **seating** forms and rakes- (balconies, vineyard steps and boxes).
- ❑ 12. Consider whether electro-acoustics or physical methods of altering the **acoustics** are necessary.
- ❑ 13. Check **reverberation time, volume of hall, proportions** (length:width and height:width).
- ❑ 14. Determine **quality of surfaces**- their disposition for reflection, diffusion and absorption.
- ❑ 15. Check that there are strong **lateral reflections** and initial **sound envelopment characteristics**.
- ❑ 16. Consider the correct public address, speech reinforcement, and **sound reproduction systems** to suit the natural acoustics and answer the brief.
- ❑ 17. Carry out commissioning and make detail changes as **fine tuning**, if necessary by acoustic test concerts.

Performance Space[1] Orchestra set-ups are usually as compact as practicable, in order to hear each other, see each other, and share sheet music. Stage area averages 16-20 square feet per musician and proscenium widths range from 55-80 feet. For various groups, this amounts to:

- Ensemble or band, 30-50 musicians, 800-900 s.f..
- Medium orchestra, 50-80 musicians, 1200-1500 s.f.
- Medium orchestra and chorus, 50-100 voices, 1800-2300 s.f.
- Symphony orchestra, 80-125 musicians, 2000-2400 s.f.
- Symphony and large chorus voices, 2800-3500 s.f.



[1]DeChiara. Time Saver Standards for Building Types; 3rd Edition. McGraw-Hill Publishing Co.. 1990. p.423

	LOAD'G DOCK	PRODUCTION	CONCESSIONS	CANTEEN	MUSIC LIBRARY	OFFICES	GREEN ROOM.	PRIV. RESTROOMS	PRIV. RECEPT.	STORAGE	DRESS'G RMS.	STAGE	AUDITORIUM	GALLERIES	LOUNGES	LOBBY	COATROOM	BOX OFFICE	FOYER.
FOYER			O										O	O		X	O	X	
BOX OFFICE													O	O	O	O	X		
COATROOM			O											O	O	X			
LOBBY			O																
LOUNGES														X					
GALLERIES									O		O		X						
AUDITORIUM							O			O	O	X							
STAGE	O	O																	
DRESSING RMS	O	O					X	X	O	O									
STORAGE		O					X												
PRIV. RECEPT								O											
PRIV. RESTRMS.				O		O													
GREEN ROOM.	O	O																	
OFFICES			X	O	X														
MUSIC LIBRARY																			
CANTEEN																			
CONCESSIONS																			
PRODUCTION	X																		
LOAD'G DOCK																			

MATRIX — ORCHESTRA HALL

X - direct connection
O - circular connection.
- no connection.

❑ DEFINITION OF TERMS

◆*Symphony*

Derived from the Greek words *sym* meaning "together and *phonos*, meaning "sound"; more specifically, a work for orchestra in multiple movements.

◆*Symphony Orchestra*

An ensemble consisting of multiple strings plus an assortment of woodwinds, brass, and percussion instruments. In ancient Greece, the term referred to the area in front of the stage employed by the dramatic chorus for dancing and singing, but by the Middle Ages the term had come to refer to the stage itself. by the mid- 18th century, it came to mean the actual performing body, as in current usage. Nevertheless, the term also still denotes the aggregation of seats placed at ground level in front of the stage in theaters and concert halls.

GLOSSARY OF MUSICAL TERMS

Baroque Era: Period in European music ca. 1600-1750. Significant composers during the Baroque period were Philippe Rameau, George Frideric Handel, Alessandro Scarlatti, Giovanni Gabrieli, Antonio Vivaldi, Johann Sebastian Bach and Henry Purcell.

Brass Section: Wind instruments which originally were made entirely of brass. These include trumpets, French horns, trombones and tuba.

Cadenza: The part of a concerto when the soloist plays unaccompanied in a virtuosic and improvisatory style. Cadenzas usually come toward the end of a concerto movement.

Classical Era: Period in European music ca. 1750-1815. Significant composers were Franz Joseph Haydn, Wolfgang Amadeus Mozart and Ludwig van Beethoven.

Concertmaster: The first violin player and leader of all string players. The concertmaster walks onto the stage at the beginning of a concert and indicates that the orchestra should begin tuning. He is responsible for signaling for silence prior to the conductor's appearance. He shakes hands with the conductor to receive thanks on behalf of the orchestra at the end of a performance.

Concerto: An orchestra composition featuring a solo instrument. Passages showcasing the virtuosity of the soloist are set against orchestral passages. A concerto is usually in three movements.

Contemporary Music: Music composed ca. 1910 through the present. Contemporary composers include Ralph Vaughan Williams, Samuel Barber, Ottorino Respighi, Igor Stravinsky, Sergei Prokofiev, Dmitri Shostakovich and Leonard Bernstein.

Conductor: Director of a performing group responsible for coordinating the performers in meter, dynamics and mood.

Meter: The pattern of time indicated by the conductor's beat.

Movements: Divisions of a musical piece. In performances, movements are usually separated by a brief pause, during which the audience does not applaud.

Overture: A brief instrumental introduction to a larger work such as an opera.

Percussion Section: Instruments that produce sound by being struck such as a timpani, snare drum, xylophone, bells and gongs. May also include a variety of devices and unusual instruments for special sound effects.

Post-Romantic Era: Period in European music history ca. 1870-1910 that included nationalist schools of music. Significant composers include Gustav Mahler, Richard Strauss, Sergei Rachmaninoff, Nicolai Rimsky-Korsakov, Antonin Dvorak, Jean Sibelius and Claude Debussy.

Program Music: Music influenced or inspired by a visual, literary or philosophical source. Program music was very popular in the 19th century with the Romantic composers.

Romantic Era: Period in European music ca. 1815-1870. Romantic composers include Hector Berlioz, Robert Schumann, Johannes Brahms, Richard Wagner, Franz Liszt, Frederic Chopin and Giuseppe Verdi.

Rondo: One of the most fundamental designs in music, the rondo is a structure for a series of sections — the first of which recurs between subsidiary sections before returning to conclude, or round off, the composition.

Scherzo: A classic movement-type often found in symphonies. Generally the movement is swift and light in character and commonly in triple time.

Sonata Form: The most important principal musical form from the Classical period to the 20th century. Consists of a two-part tonal structure, articulated in three main sections. The first is called the 'exposition.' The second is the 'development' where material from the first section is developed modulating among one or more keys. The final section announces a return to the main theme and key.

String Section: Instruments which have strings that vibrate when a bow is drawn across them. These include violins, violas, cellos, double basses. The larger the string instrument, the lower the sound.

Suite: A group of pieces extracted from a larger work, especially an opera or ballet, such as *Carmen Suite* or *Nutcracker Suite*.

Symphony: A multi-movement orchestral composition alternating fast and slow movements. Usually, a symphony has four movements.

Tempo: The speed of the music. Different terms written at the beginning of a piece indicate how fast or slow the music should be played. These terms are often printed on the program page to indicate separate movements. Some words that describe tempo are:

Largo (broad)
Lento (slow)
Adagio (slow, at ease)
Moderato (moderate)
Allegro (fast)
Presto (very fast)

Theme: A musical idea that can be the basis of a piece.

Wind Section: Generally refers to all woodwind instruments: flutes, piccolo, oboe, English horn, clarinets, bassoon and contrabassoon.

PROGRAM

❑ PROGRAM LISTING

SPACE	*SQUARE FEET*	*TOTAL*
HALL		
■AUDITORIUM (*2,700 persons*)	25,000	**25,000**
■BOX OFFICE AND QUEUE		
Queue	300	300
Box Office (4 windows)	150	150
Manager (private)	125	125
Staff	200	200
Work Area	4 @ 100	400
Circulation	-	200
Total	-	**1,375**
■FOYER	A.R.	-
■MAIN LOBBY	A.R.	-
■GALLERIES	A.R.	-
■AMBULATORIES	A.R.	-
■LOUNGE (MAIN FLOOR)	3,800	**3,800**
■LOUNGE (UPPER FLOORS)		
-Lounges	3 @ 2,000	6,000
-Service Area	3 @ 400	1,200
Total	-	**7,200**
■DONOR'S LOUNGE		
-Lounge	2,250	2,250
-Bar	100	100
-Pantry	100	100
-Storage	150	150
-Coat Area	100	100
-Restroom	300	300
-Intercirculation	-	200
Total	-	**3,200**
TOTAL		**40,575**

STAGE AREA

■PLATFORM		
-Platform	2,500	2,500
-Vestibule	3,000	3,000
-Chorus Seating	1,000	1,000
-Offices	3 @ 100	300
Total	-	**5,800**
■PRODUCTION		
-Office	120	120
-Shops	3 @ 350	1,050
-Storage	100	100
Total	-	**1,270**
■STAGE DOOR/ LOBBY		
-Vestibule	200	200
-Lobby	300	300
Total	-	**500**
TOTAL		**7,570**

MUSIC FACILITIES

■MUSIC LIBRARY		
-Distribution Room	100	100
-Work Room	800	800
-Storage	500	500
Total	-	**1,400**
■MUSICIANS LOUNGE		
-Lounge	2,000	**2,000**
■MUSICAL DIRECTOR'S SUITE		
-Suite	500	**500**
■DRESSING ROOMS		
-Soloist	4 @ 200	800
-Concert Master	300	300
-Conductor	2 @ 200	400
Total	-	**1,500**

■MUSICIANS LOCKER ROOM		
-Men (60 persons)	2,000	2,000
-Women (60 persons)	2,000	2,000
-Toilet	5 @ 50	250
Total	-	**4,250**
■USHER'S AREA		
-Change Rooms	2 @ 250	**500**
■STORAGE		
-Instrument Storage	2,000	2,000
-Furniture and Equipment Storage	1,500	1,500
Total	-	**3,500**
■ORCHESTRA SHOP		
-Shop	200	200
-Office	75	75
-Storage	150	150
Total	-	**425**
TOTAL		**14,075**

ADMINISTRATION

■PERSONNEL OFFICE	3 @ 100	**300**

SERVICE

■CONCESSIONS		
-Office	120	120
-Storage	350	350
Total	-	**470**
■FOOD SERVICE		
-Kitchen	600	600
-Dishwashing	300	300
-Beverage Room	60	60
-Storage	140	140
Total	**1,100**	**1,100**
TOTAL		**1,570**
GROSS BUILDING AREA		**63,790 +**

❑ PROGRAM DESCRIPTION

ORCHESTRA HALL

■AUDITORIUM *25,000 SF*

Due to the varying sizes of orchestral performances, both on stage and in the audience, the hall will be designed to accommodate flexibility of acoustic projection, the performing platform and the audience seating.

The concert hall should be the spatial locus of the building, connected to the public spaces by the ambulatories and the backstage spaces by the platform. The concert hall must be acoustically isolated from all adjoining spaces and activities.

■FOYER *SF A.R.*

The foyer serves as the threshold between the public spaces of the hall and the concert room making the transition from the street to the concert hall.

■MAIN LOBBY *SF A.R.*

Functionally, the lobby serves to disperse the audience to the seating levels. Experientially, the lobby is formal welcoming area to the concert hall. Pre-concert activities include waiting for friends, checking coats, moving to the ambulatories, and watching other people. The lobby should have views to both the upper levels, the main lounge, and the exterior.

■LOUNGES

MAIN FLOOR *3,840 SF*

The lounge is used primarily for a public place of gathering and entertaining for the **general concert-goer** to meet friends, partake in light refreshments, and watch other people before the performance and at intermission time.

UPPER FLOORS *7,200 SF*

Before concert and during intermission, **patrons** will consume light refreshments and gather with friends. Each lounge should accommodate the number of people seated at that level.

DONOR'S LOUNGE *3,000 SF*

Before concert, during intermission, and after concert, the Donors' serves as the gathering place for **patrons who subscribe to its services**. Food and bar service will be available. The Donors' Lounge should be located off the orchestra level, at the box level, or in the basement.

**During non-performance use, the lounges may be used for small receptions and ceremonies.*

■GALLERIES *SF A.R.*

Galleries serve as multi-purpose lobbies at each of the upper levels in which concert-goers circulate to seating areas, meet friends, watch other people, and take refreshments. Galleries should be connected visually and physically to the main lobby.

■AMBULATORIES *SF A.R.*

The ambulatories serve as a quiet connection between the lobbies and the concert room. The design of this space should take into consideration the importance of this space as a portal -- the critical link between the public space and the concert room.

STAGE AREA

■PLATFORM *7,075 SF*

The platform will be used for performing and rehearsing music. The acoustics and flexibility are very important. It must be a flexible platform, consisting of stage lifts for different assemblies to perform. In the surrounding areas, musicians congregate prior to performances, uncase their instruments, and warm-up. The platform area should be surrounded by wings so that the musicians can easily and conveniently enter the platform.

■CHORUS SEATING *2,000 SF*

The chorus will perform vocal parts during programs as required. Audience will watch in rush seating during performances with no chorus. The chorus should have a clear vision to the podium and the musical director. Since they are situated behind the orchestra, there will be special accomodations to the flexibility of adjusting platform hieght appropriately.

■PRODUCTION *1,270 SF*

Constructing miscellaneous stage equipment such as riser platforms, repairing sound equipment and stage lighting, and storing platform related equipment. Area should be located in basement away from concert hall.

■STAGE DOOR/ LOBBY *500 SF*

Movement of traffic from the street to the back stage area including package drop-off, waiting for friends, and security control.

MUSIC FACILITIES

■MUSIC LIBRARY *2,350 SF*

This library is reserved primarily for storing music scores. Librarians prepare and proof scores by incorporating notes and bowing instructions and place music in folders for each stand. The music library should be divided into two areas, a work area for the preparation of scores and a storage area. The Orchestra currently stores between 3,000 and 4,000 conductor's scores, 5,000 sets of scores and 140 file drawers of choral scores. These scores are filed in 11-12' sections of movable compact shelving.

■MUSICIAN'S LOUNGE *2,000 SF*

This lounge enables musician's to relaxation and release from the pressure of performing active relaxation. It will include activities such as ping pong or billiards, quiet activities of conversation, reading and smoking.

■MUSICAL DIRECTOR'S SUITE *500 SF*

The Maestro reviews scores, plans future seasons, interviews musicians,meets with various people, and performs paper work. He will also receive and greet well wishers before and after concerts as well as change into concert clothes.

■CONDUCTOR'S DRESSING ROOMS *3 @ 200 SF*

Dressing, study, preparing for concerts, and meeting with orchestra members.

■SOLOIST ROOMS / INDIVIDUAL PRACTICE ROOMS *4 @ 200 SF*

Guest soloists dress, practice, and receive visitors. When no soloists are using these rooms, individual musicians will practice in them and small groups will hold meetings.

■MUSICIANS LOCKER ROOM *4,200 SF*

Musicians prepare for performances by changing from street clothes to concert attire, personal hygiene, and maintaining instruments.

■USHER'S AREA *500 SF*

Ushers receve assignments for each concert in the office and change into uniforms in locker room. Area needs to be located in close proximity to the main lobby area.

■STORAGE AREA

INSTRUMENT *2,000 SF*

Storing large instruments. Practicing, warming up, tuning and maintaining instruments. Studio/ storage areas must serve multiple functions as practice rooms and work areas for maintaining and storing instruments. Each studio should be acoustically isolated from stage area and have appropriate acoustical conditions for good practice environment.

FURNITURE AND EQUIPMENT *1,500 SF*

Storing items used in the building for social and conference functions. Area should be located near the front of the house service elevator to facilitate changeover of lounge activities.

ORCHESTRA SHOP

■GENERAL STORE *600 SF*

Volunteers will sell paraphernalia relating to *The Philadelphia Orchestra* and classical music. The shop will operate during times when the hall is not in use for performances.

ADMINISTRATION AND SERVICE

■PERSONNEL OFFICE *350 SF*

The personnel manager is responsible for maintaining the scheduling of the orchestra during rehearsals, concerts, and recording sessions as well as travel. The office should be located near the maestro's suite and be easily accessible from musician's areas.

■CONCESSIONS *470 SF*

Administering concession sales and distributing supplies during events, storing supplies, liquor, and snack foods.

■FOOD SERVICE *1,100 SF*

Final on-site preparation of and service of food to events in main lounge, Donor's Club, and upper lounges. The food service area must have direct access from the loading dock to the lounges via service elevator and corridors.

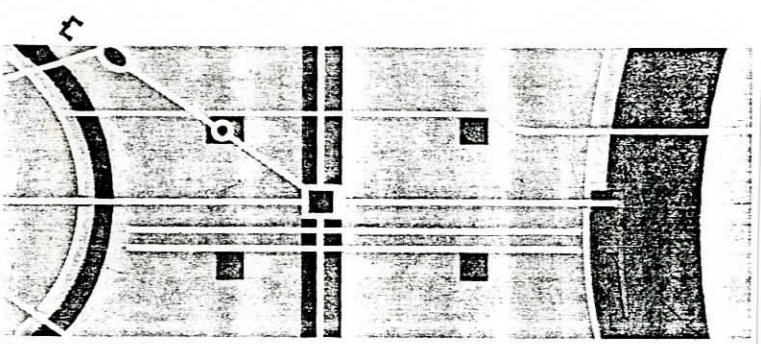
SITE

HISTORY[1]

❑PHILADELPHIA, PA

The original plan for Philadelphia called for two monumentally scaled intersecting boulevards and 5 public squares to organize and orient the public and commercial life of the city. Throughout the 18th and 19th centuries the two great boulevards, Market Street and Broad Street, have gone through continuous transformations. At the turn of the twentieth century, the Benjamin Franklin Parkway was added to the original plan, diagonally intersecting the orthoganal city grid. Many major cultural institutions now line the parkway and has grown to join the other two boulevards in regional prominance.

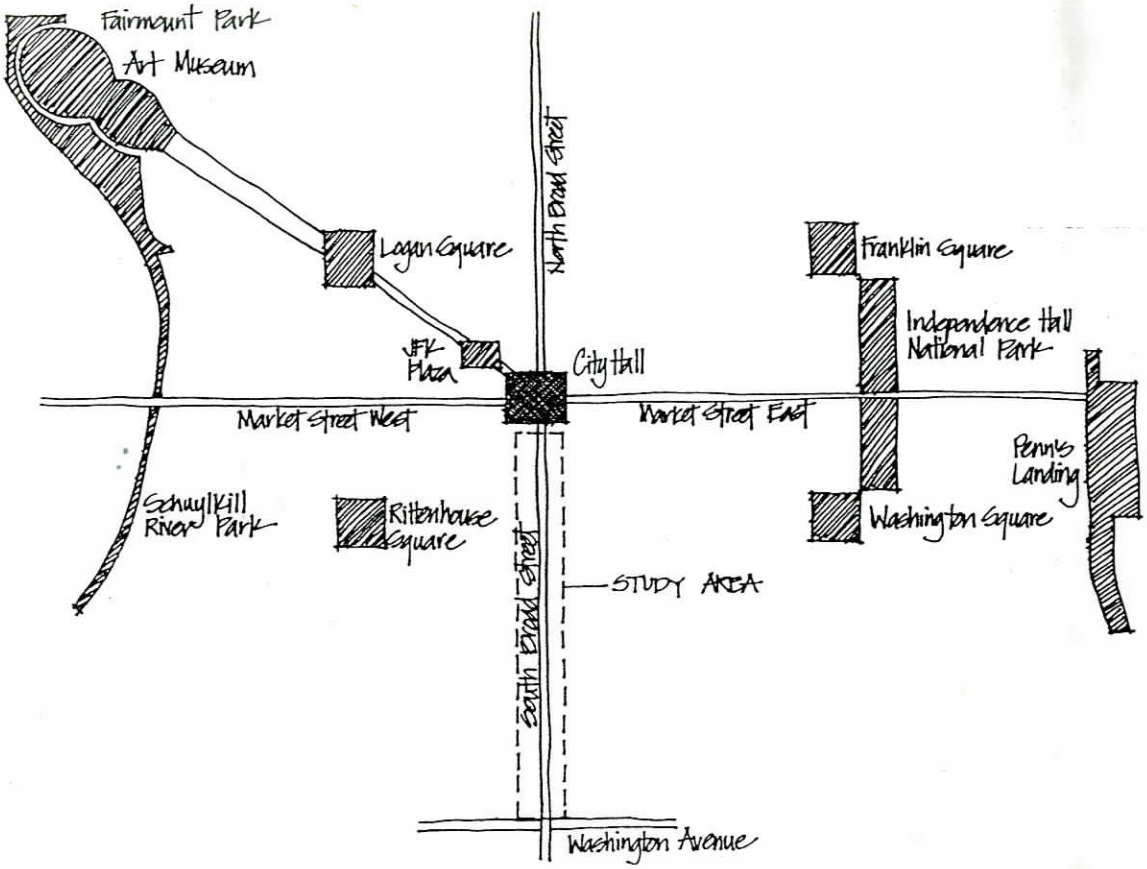
Beginning in the 1950's, East and West Market Streets were completely reshaped. The city's rejuvination project included the removal of the old elevated rail lines and the "Chinese Wall"[2] , to spur the development of a major office district extending west on Market Street and JFK Boulevard. In the 1980's the construction of a new generation of skyscrapers has linked this district to the Parkway in the vicinity of Logan Square. On East Market Street, extensive modernization of the transportation system, a reconstructed streetscape, and significant public developments have been complimented by major private investment in retail facilities. The completion of the Convention Center in the 1990's should spur a new generation of hotels, office and related developments.



[1] Excurpts from **South Broad Street: A Vision for the 1990's.** Central Philadelphia Development Corporation. December, 1990.

[2] The "*Chinese Wall*" referred to the old viaduct that intersected the city on Market Street that was prominently used during the industrial period.

I. HISTORIC SOUTH BROAD STREET



A Monumental Public Place

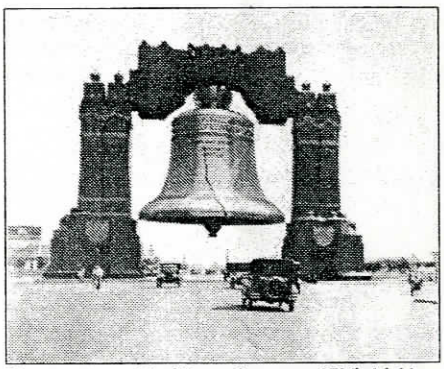


Photo courtesy of the Library Company of Philadelphia

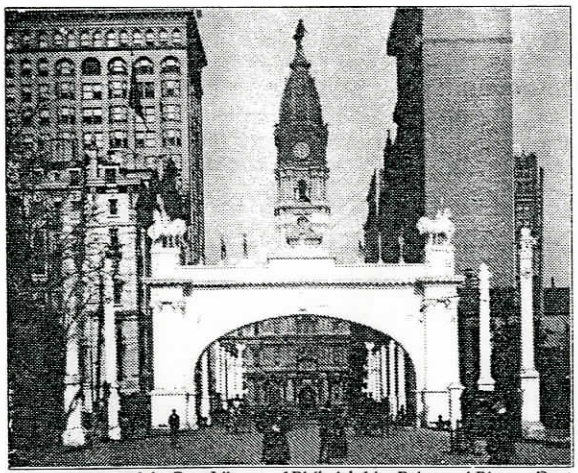


Photo courtesy of the Free Library of Philadelphia, Print and Picture Dept.

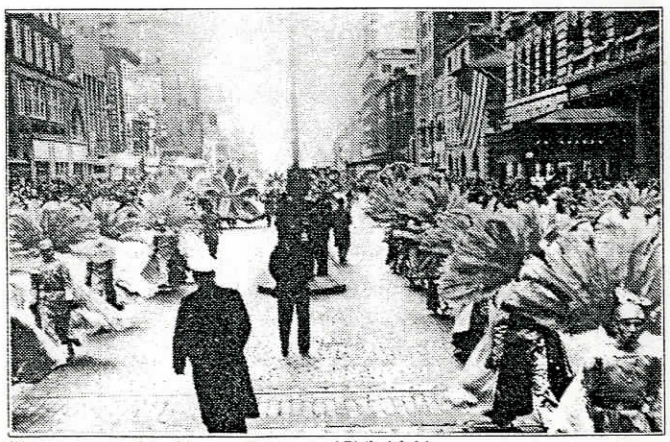
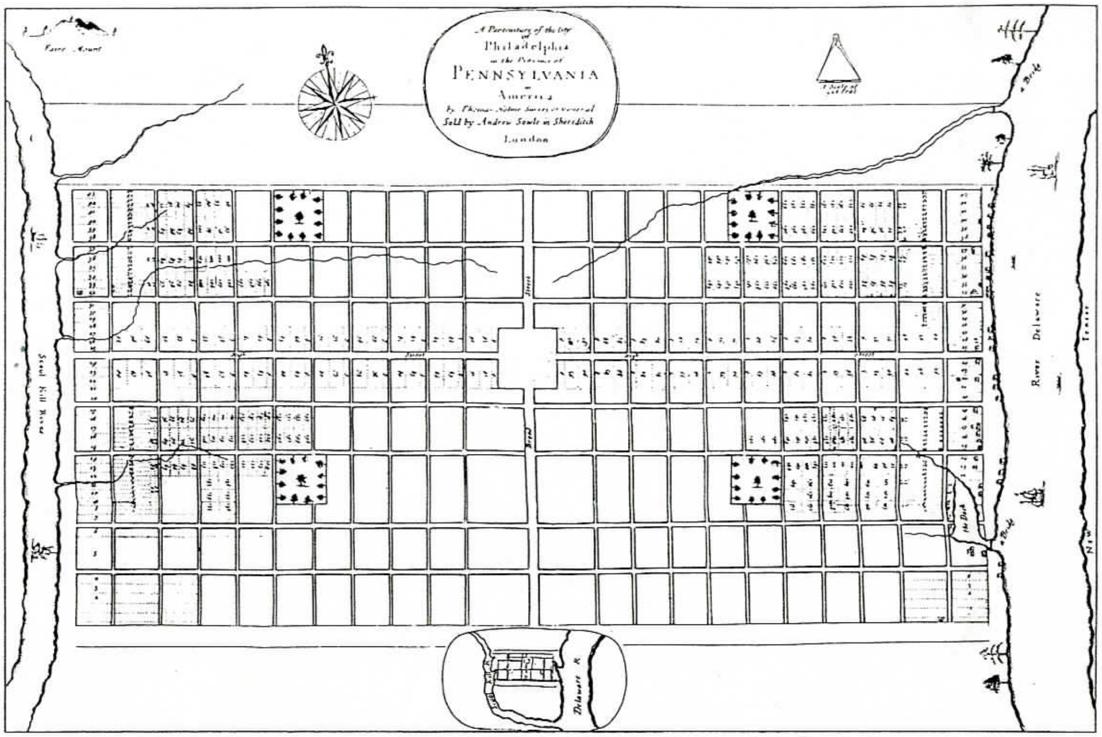
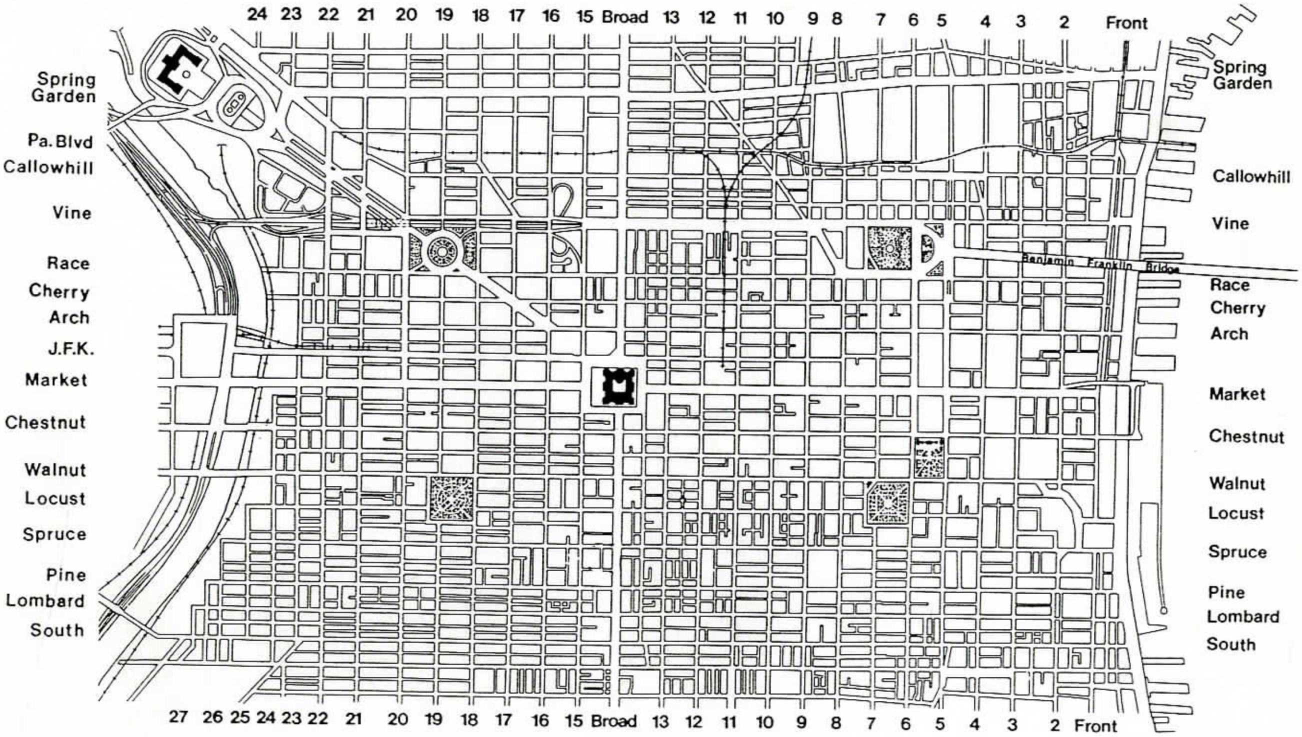


Photo courtesy of the Library Company of Philadelphia

Pictured above is the Court of Honor, 1898 Peace Jubilee, erected on Broad from City Hall to Walnut Street to observe the end of the war with Spain. Upper right is Broad Street south of Oregon Ave, the site of the 1926 Philadelphia world's fair. The 80-foot Liberty Bell was the entrance to the Sesqui-Centennial Celebration of the Declaration of Independence. Lower right is the Mummers' Parade, January 1, 1950, at Broad and Walnut Streets. The annual parade has been held on Broad Street since 1901.


PENNSYLVANIA
Sold by Andrew Sowle in Shoreditch
London


24 23 22 21 20 19 18 17 16 15 Broad 13 12 11 10 9 8 7 6 5 4 3 2 Front
Spring Garden
Pa. Blvd
Callowhill
Vine
Race
Cherry
Arch
J.F.K.
Market
Chestnut
Walnut
Locust
Spruce
Pine
Lombard
South
Spring Garden
Callowhill
Vine
Benjamin Franklin Bridge
Race
Cherry
Arch
Market
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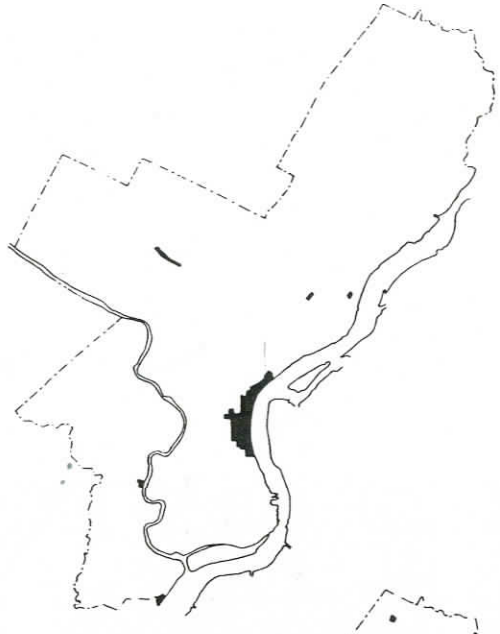
Pine
Lombard
South
27 26 25 24 23 22 21 20 19 18 17 16 15 Broad 13 12 11 10 9 8 7 6 5 4 3 2 Front



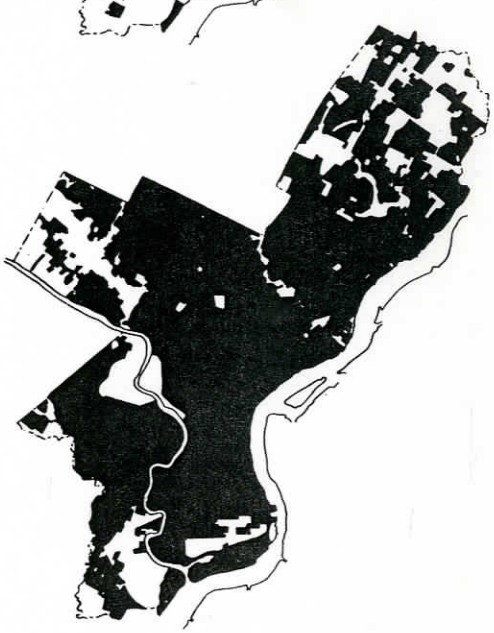
1800

1850

1900

1920

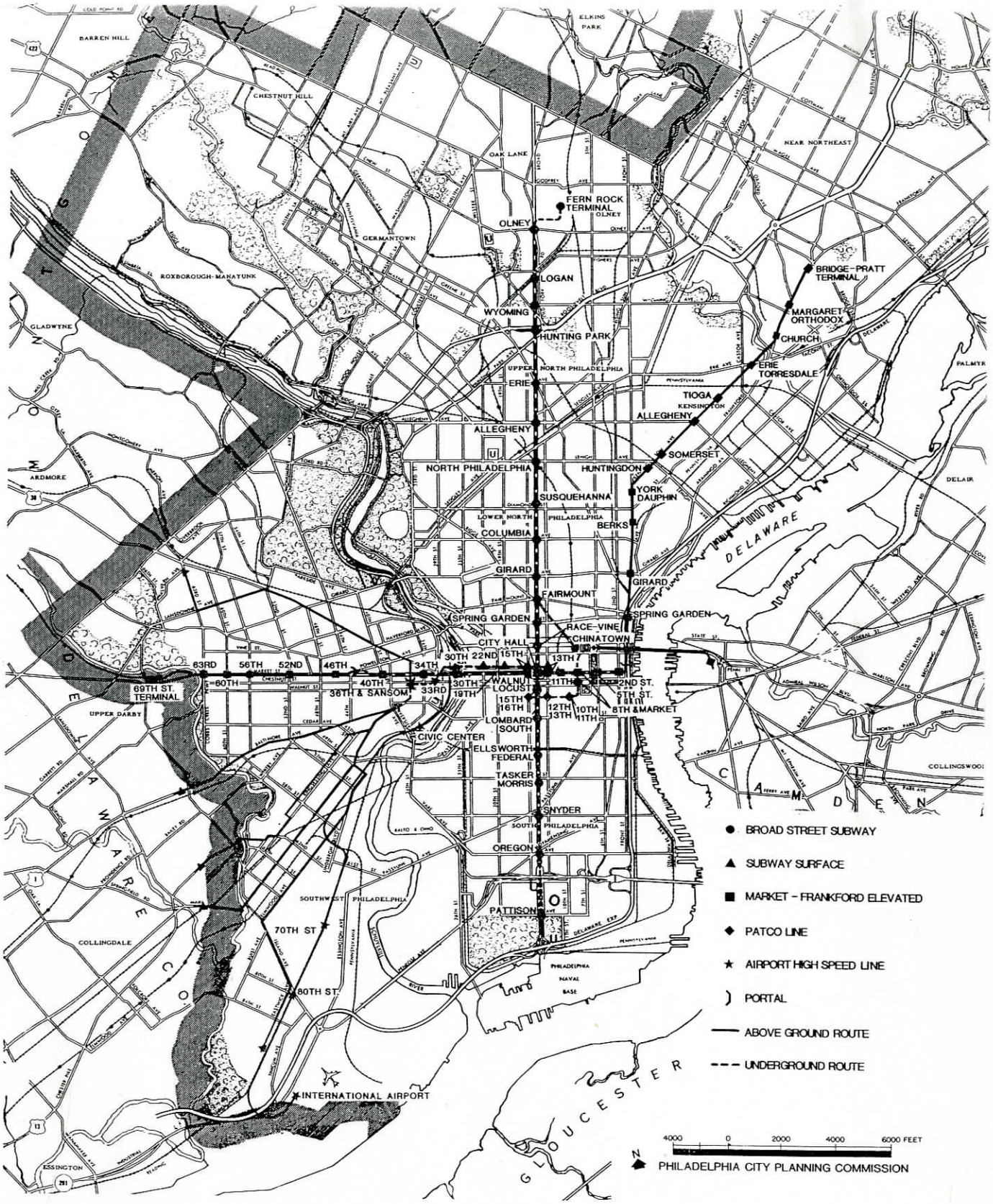
1945



1960

PHILADELPHIA CITY PLANNING COMMISSION - MARCH 1960

SITE DOCUMENTATION


BARREN HILL
CHESTNUT HILL
ELKINS PARK
OAK LANE
NEAR NORTHEAST
FERN ROCK TERMINAL
OLNEY
GERMANTOWN
ROXBOROUGH-MANAYUNK
LOGAN
BRIDGE-PRATT TERMINAL
MARGARET ORTHODOX CHURCH
WYOMING
HUNTING PARK
GLADWYNE
UPPER NORTH PHILADELPHIA
ERIE
ERIE TORRESDALE
TIOGA
KENSINGTON
ALLEGHENY
SOMERSET
ARDMORE
NORTH PHILADELPHIA
HUNTINGDON
SUSQUEHANNA
YORK DAUPHIN
LOWER NORTH PHILADELPHIA
BERKS
COLUMBIA
DELAWARE
GIRARD
FAIRMOUNT
SPRING GARDEN
RACE-VINE
CHINATOWN
CITY HALL
63RD
56TH
52ND
46TH
34TH
30TH
22ND
15TH
13TH
69TH ST. TERMINAL
60TH
40TH
36TH & SANSOM
33RD
19TH
WALNUT
LOCUST
11TH
2ND ST.
5TH ST.
8TH & MARKET
15TH
16TH
12TH
13TH
10TH
11TH
UPPER DARBY
LOMBARD SOUTH
CIVIC CENTER
ELLSWORTH-FEDERAL
TASKER MORRIS
SNYDER
SOUTH PHILADELPHIA
OREGON
SOUTHWEST PHILADELPHIA
PATTISON
70TH ST.
COLLINGDALE
80TH ST.
PHILADELPHIA NAVAL BASE
INTERNATIONAL AIRPORT
ESSINGTON
GLOUCESTER
CAMDEN
COLLINGSWOOD
DELAIR
PALMYR
BROAD STREET SUBWAY
SUBWAY SURFACE
MARKET - FRANKFORD ELEVATED
PATCO LINE
AIRPORT HIGH SPEED LINE
PORTAL
ABOVE GROUND ROUTE
UNDERGROUND ROUTE
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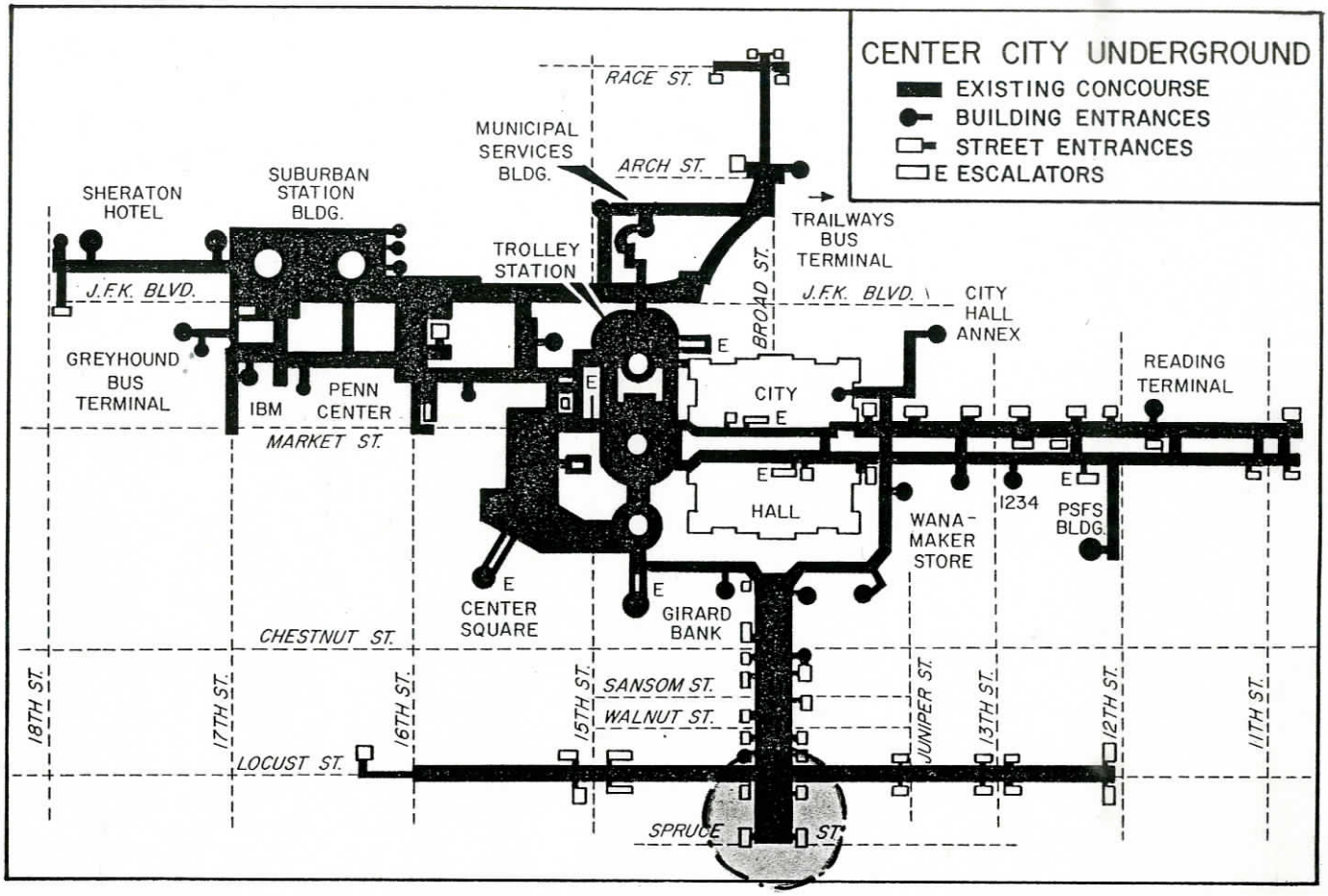
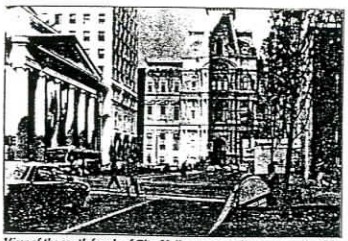
N
PHILADELPHIA CITY PLANNING COMMISSION


CENTER CITY UNDERGROUND
EXISTING CONCOURSE
BUILDING ENTRANCES
STREET ENTRANCES
E ESCALATORS
RACE ST.
MUNICIPAL SERVICES BLDG.
ARCH ST.
SHERATON HOTEL
SUBURBAN STATION BLDG.
TROLLEY STATION
TRAILWAYS BUS TERMINAL
BROAD ST.
J.F.K. BLVD.
J.F.K. BLVD.
CITY HALL ANNEX
GREYHOUND BUS TERMINAL
IBM
PENN CENTER
MARKET ST.
CITY
READING TERMINAL
HALL
WANA-MAKER STORE
1234
PSFS BLDG.
CENTER SQUARE
GIRARD BANK
CHESTNUT ST.
18TH ST.
17TH ST.
16TH ST.
15TH ST.
SANSOM ST.
WALNUT ST.
JUNIPER ST.
13TH ST.
12TH ST.
11TH ST.
LOCUST ST.
SPRUCE ST.

1.



View of the south facade of City Hall, an extraordinary example of the French Second Empire style. Built over a 30-year period, from 1871 to 1901, City Hall is the largest municipal building in the country.

2.

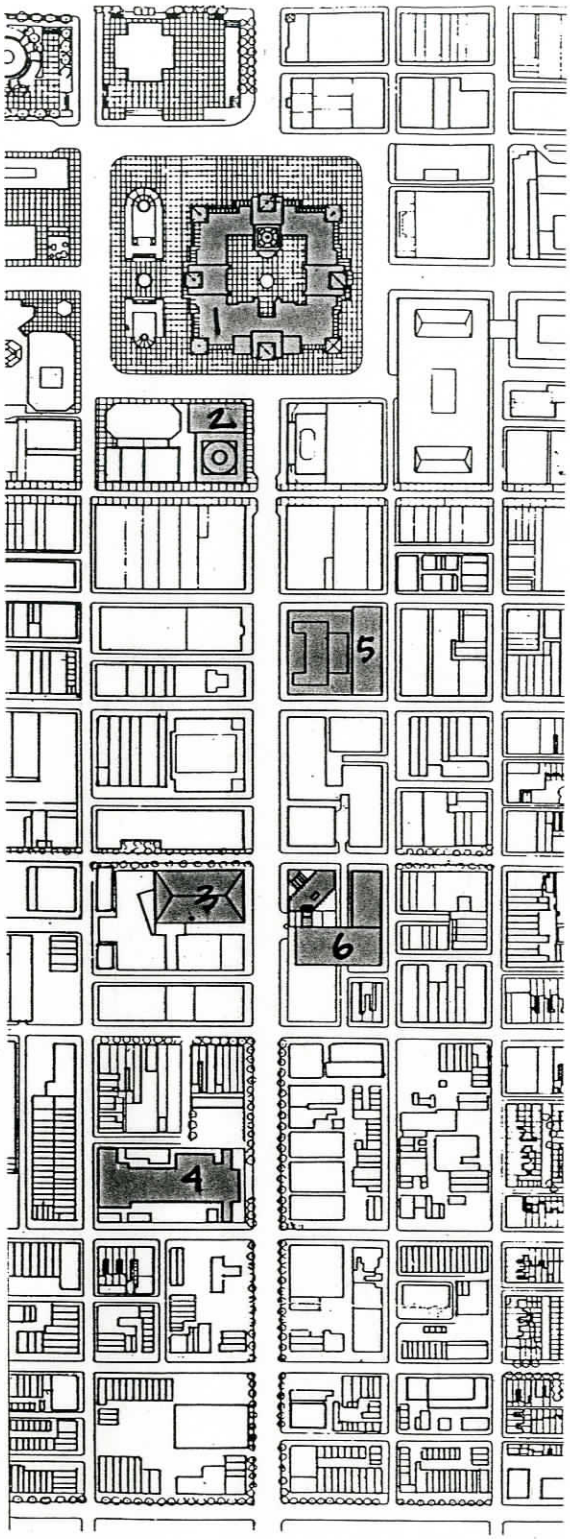
At Broad and Chestnut is the Beaux-Arts, neoclassical Girard Trust building (1908). The white marble office building, shown to the right, was added to the Girard in 1923.

3.

The Academy of Music at Broad and Locust was modeled after La Scala opera house in Milan. Opened in 1857, the Academy is the oldest music hall in the country still serving its orginal purpose.

4.

The Greek Revival-style University of the Arts building at Broad and Pine Streets opened in 1826 as the Pennsylvania Institution for the Deaf and Dumb. The university has occupied the site since 1893.



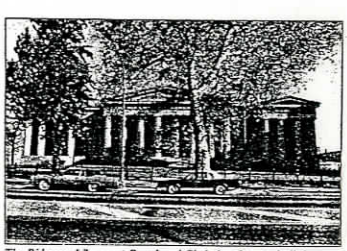
5.

The Fidelity Building, between Sansom and Walnut, was built as one of the city's largest and most luxurious office buildings.

6.

Hershey Hotel, Southeast Corner of Broad and Locust Streets, 19

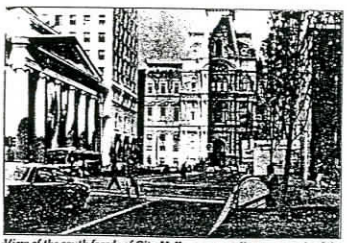
7.



The Ridgway Library at Broad and Christian Streets, built between 1873 and 1878 to house the Library Company of Philadelphia, was modeled after the Greek Parthenon.

Rittenhouse Square:
Center City West
Washington Square West
Society Hill

1.



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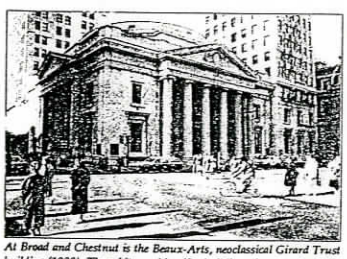

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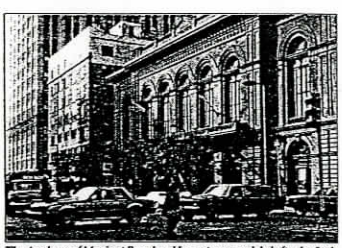

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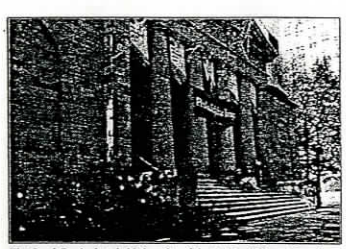
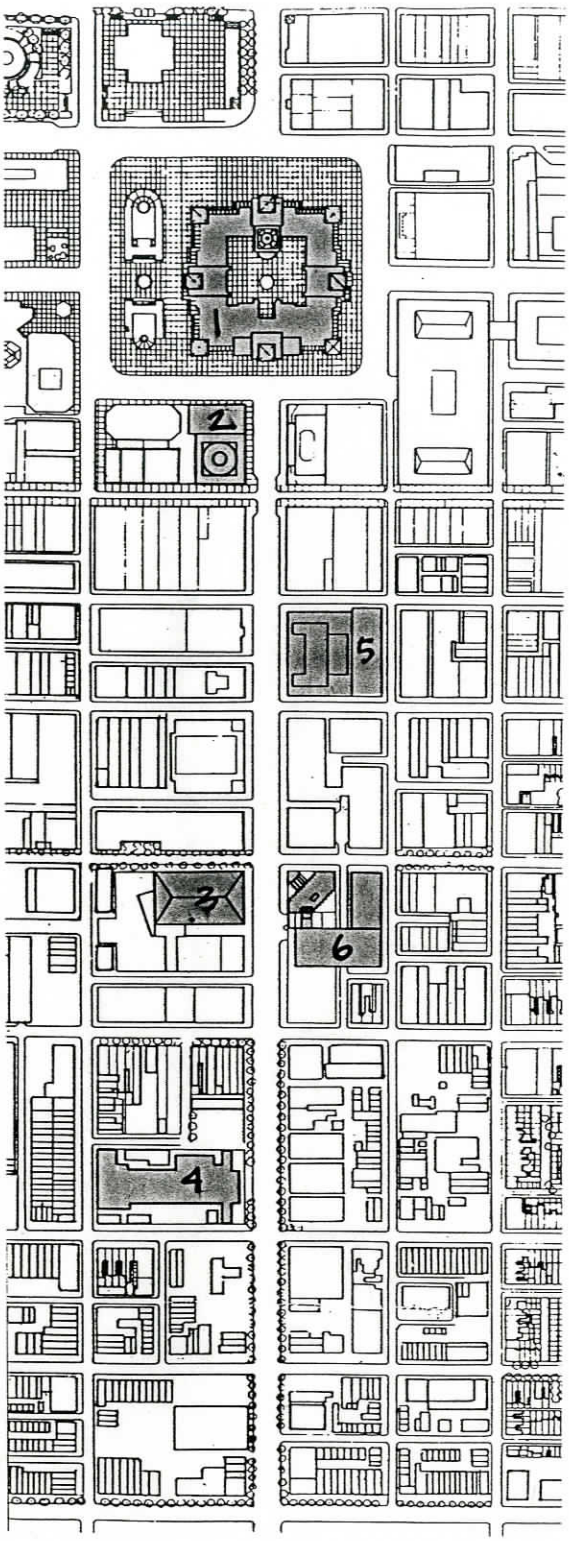
4.



The Greek Revival-style University of the Arts building at Broad and Pine Streets opened in 1826 as the Pennsylvania Institution for the Deaf and Dumb. The university has occupied the site since 1893.



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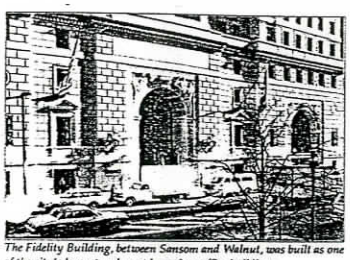
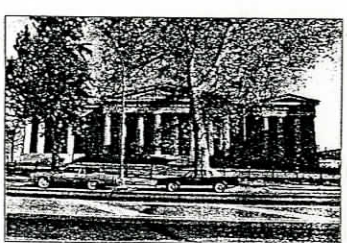


The Fidelity Building, between Sansom and Walnut, was built as one of the city's largest and most luxurious office buildings.

6.

Hershey Hotel, Southeast Corner of Broad and Locust Streets, 19

7.



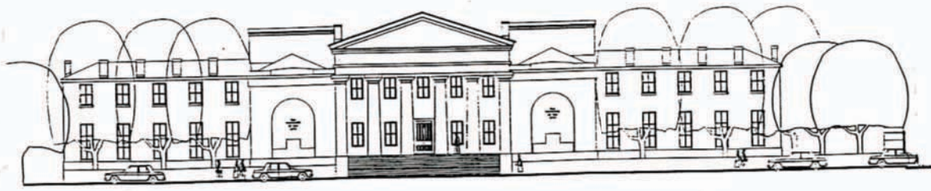
The Ridgway Library at Broad and Christian Streets, built between 1873 and 1878 to house the Library Company of Philadelphia, was modeled after the Greek Parthenon.

South Broad and Spruce Streets, Looking North, 1987

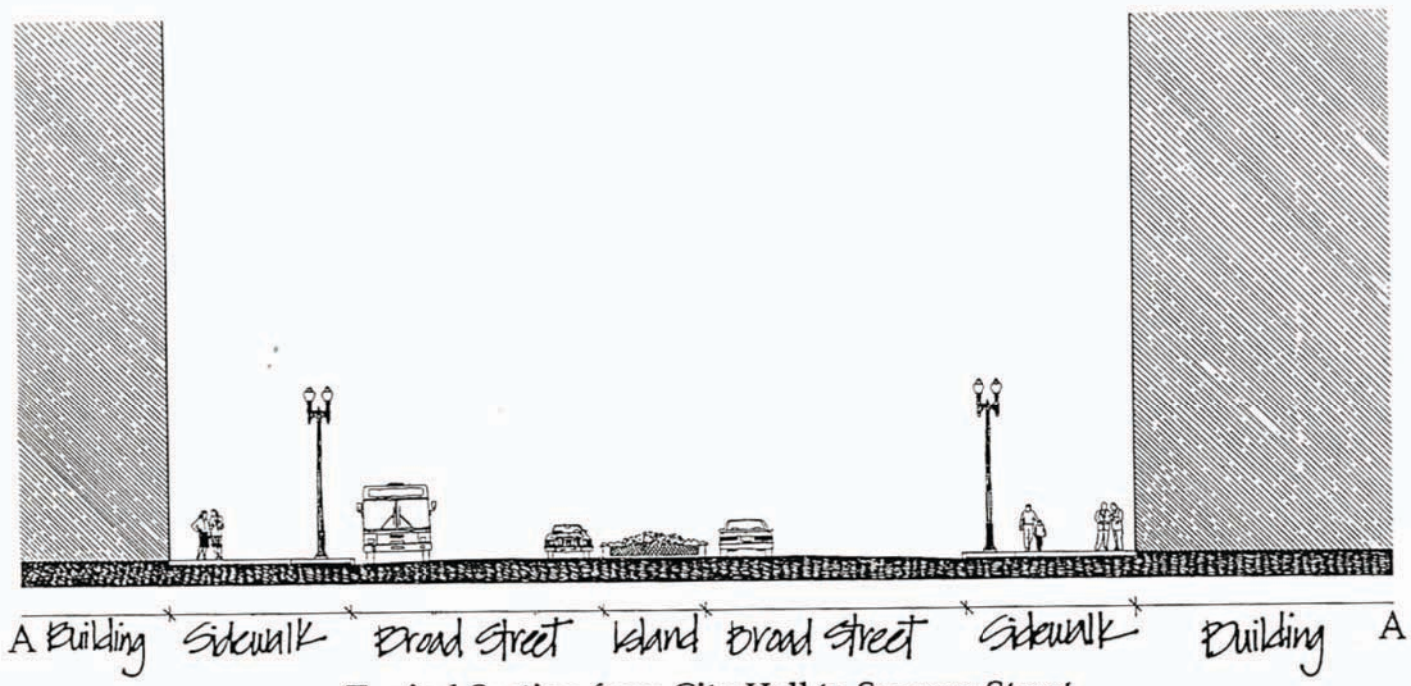
Left to right: 260 South Broad Street (offices); Shubert Theatre undergoing renovation as the University of the Arts Theatre; Academy of Music; 230 South Broad Street (offices); Bellevue-Stratford Hotel undergoing conversion to offices, shops and a smaller hotel; City Hall. On the right, at Locust Street, Philadelphia Hershey Hotel.

Southwest view of site.

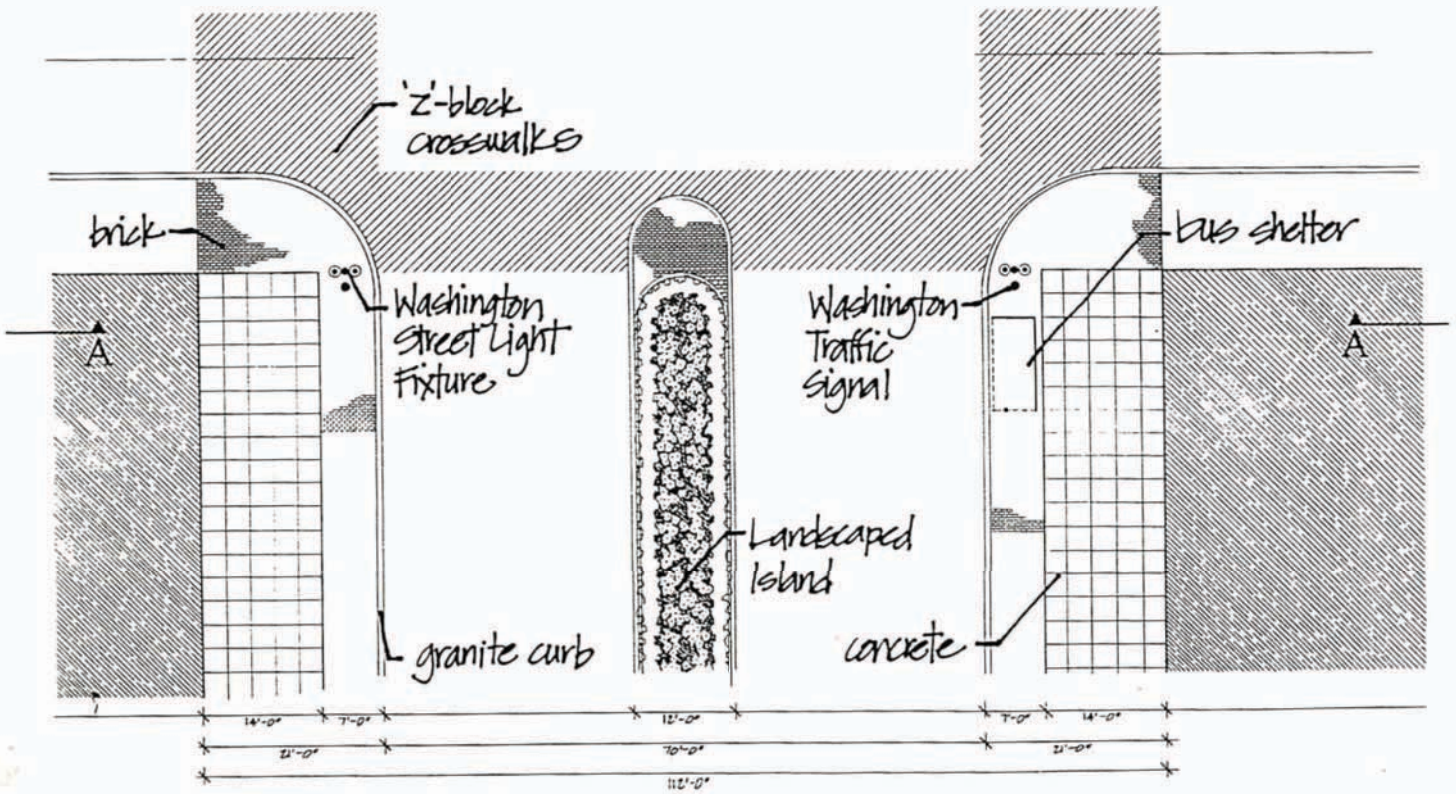
Northwest view of site.



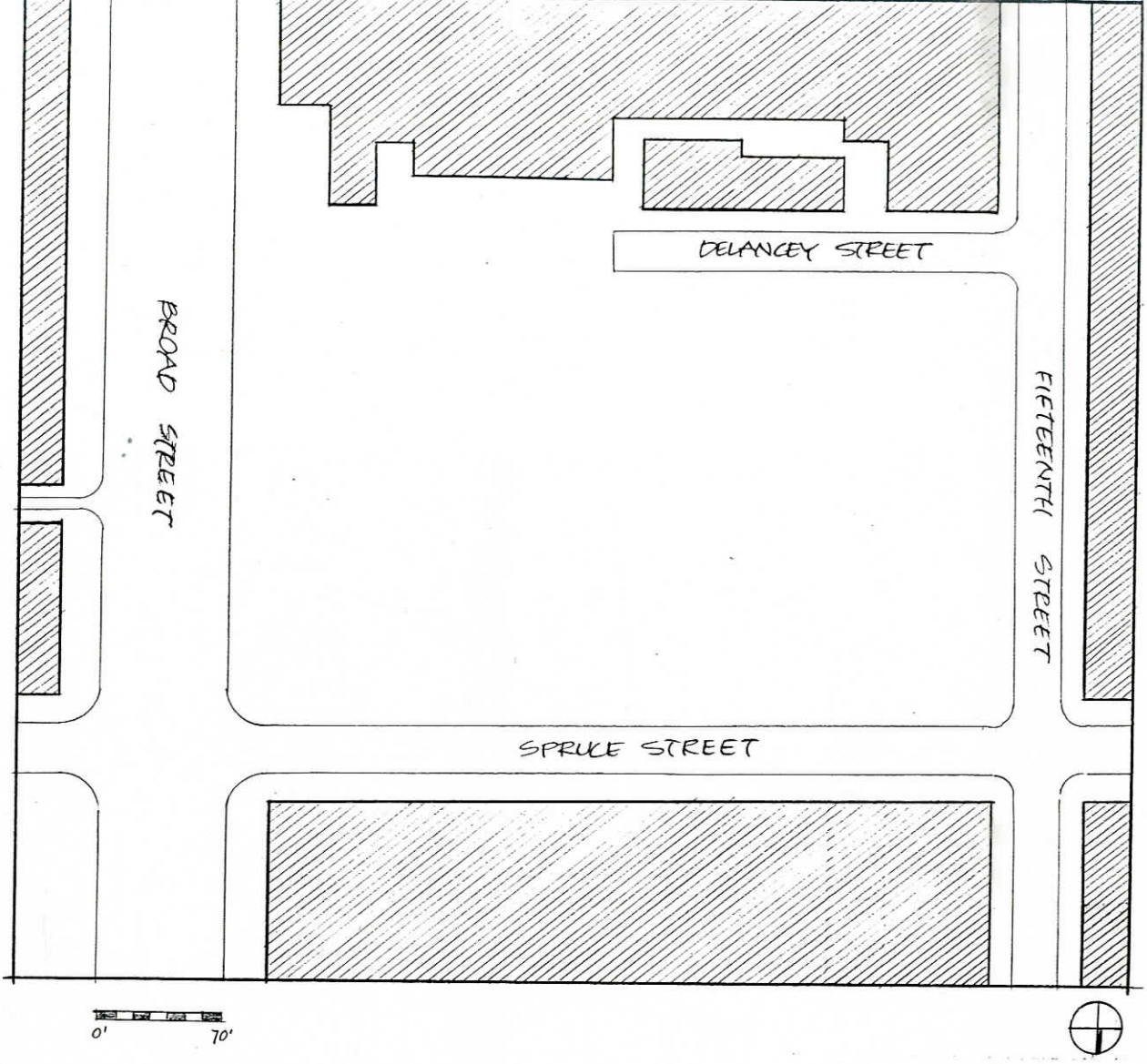
BROAD STREET ELEVATION

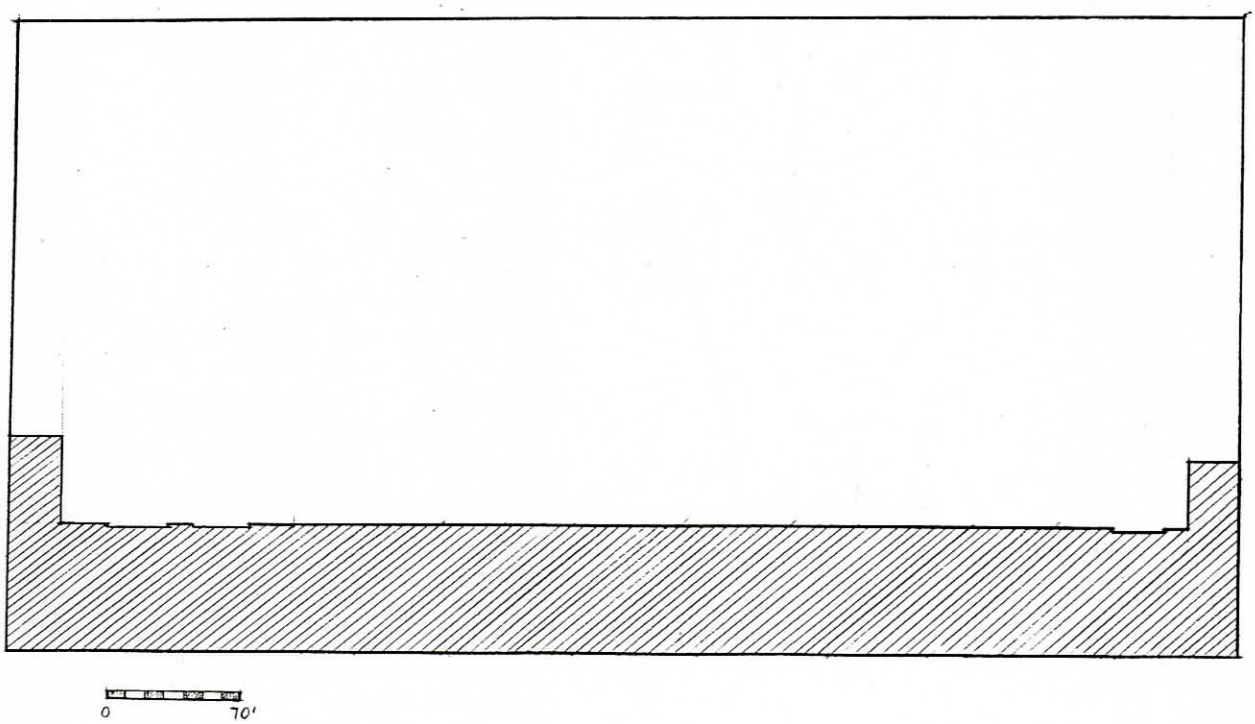


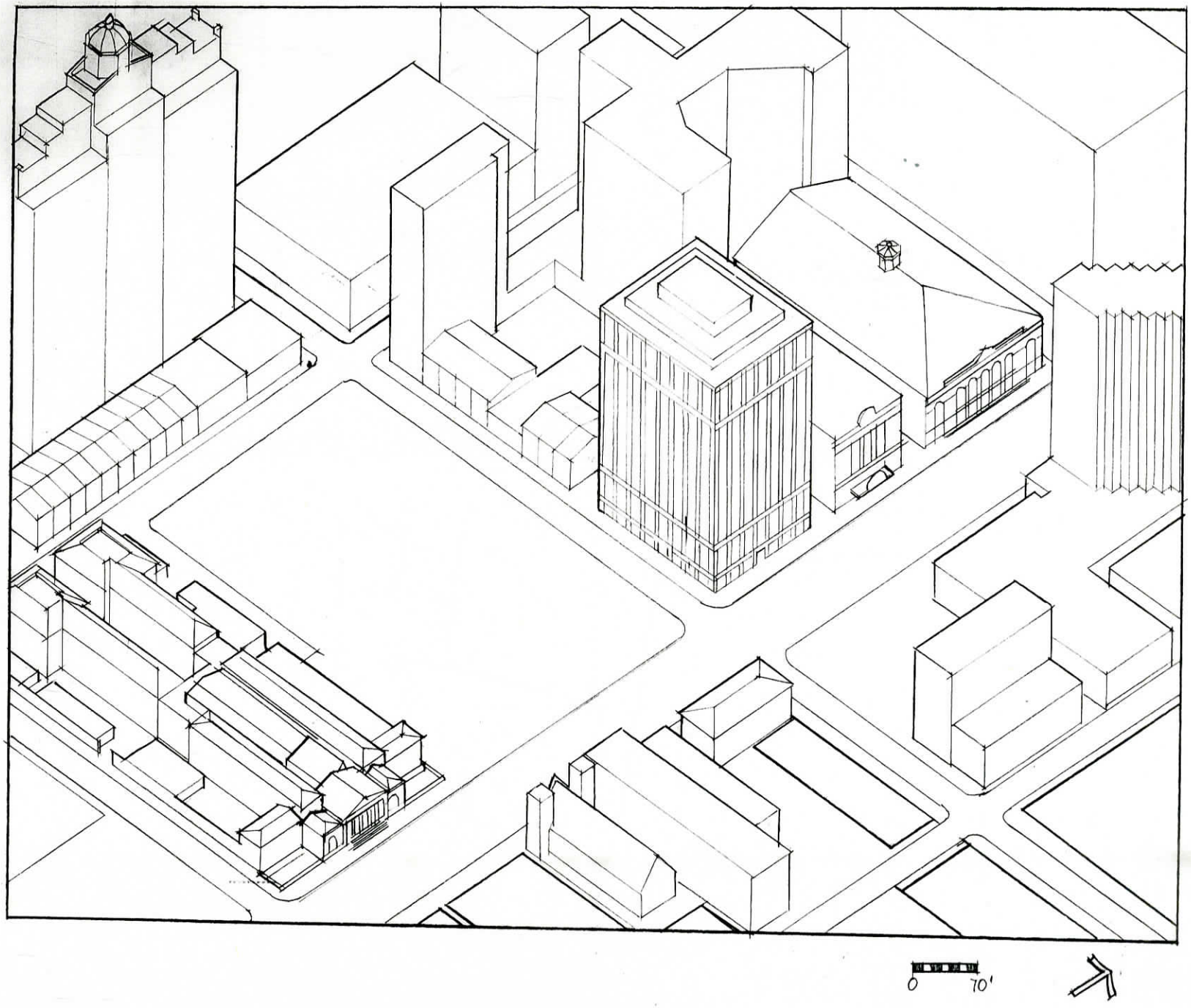
Typical Section from City Hall to Sansom Street



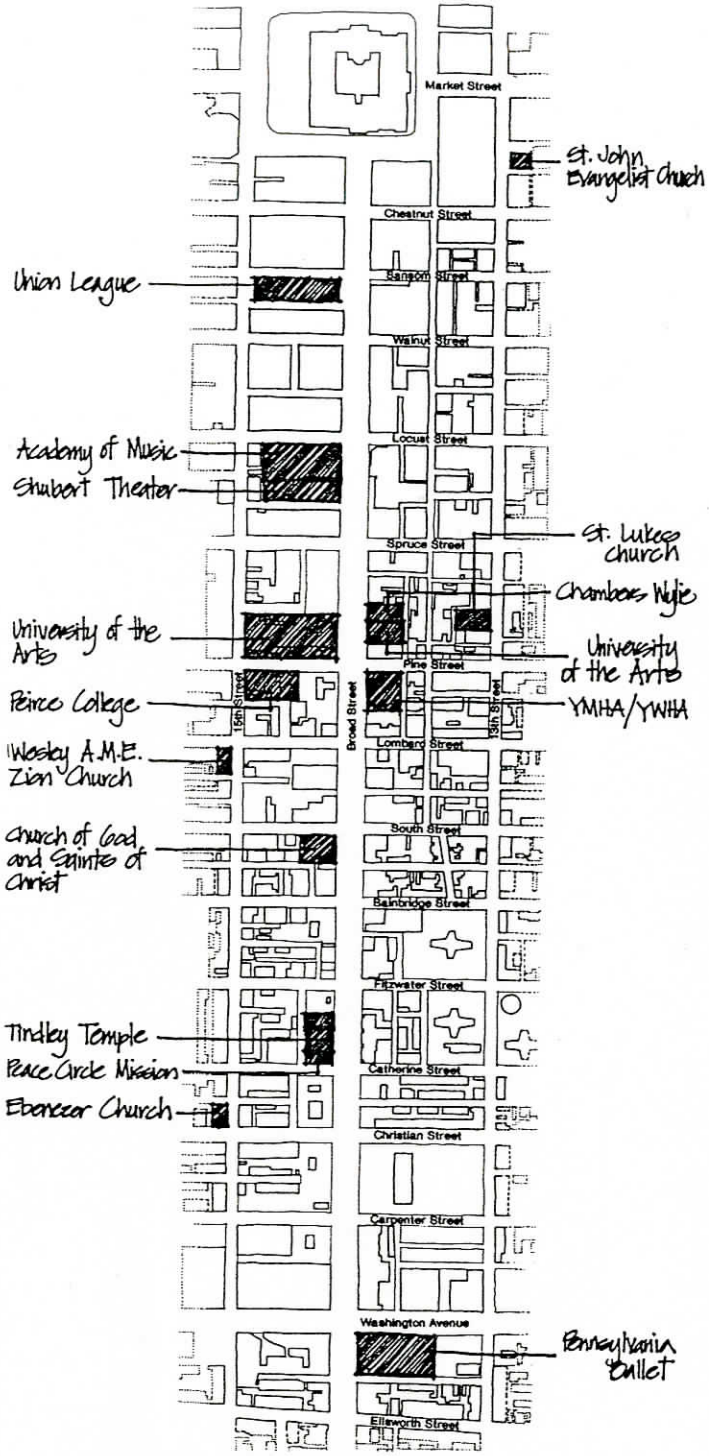
Typical Plan from City Hall to Sansom Street


DELANCEY STREET
BROAD STREET
FIFTEENTH STREET
SPRUCE STREET
0'
70'

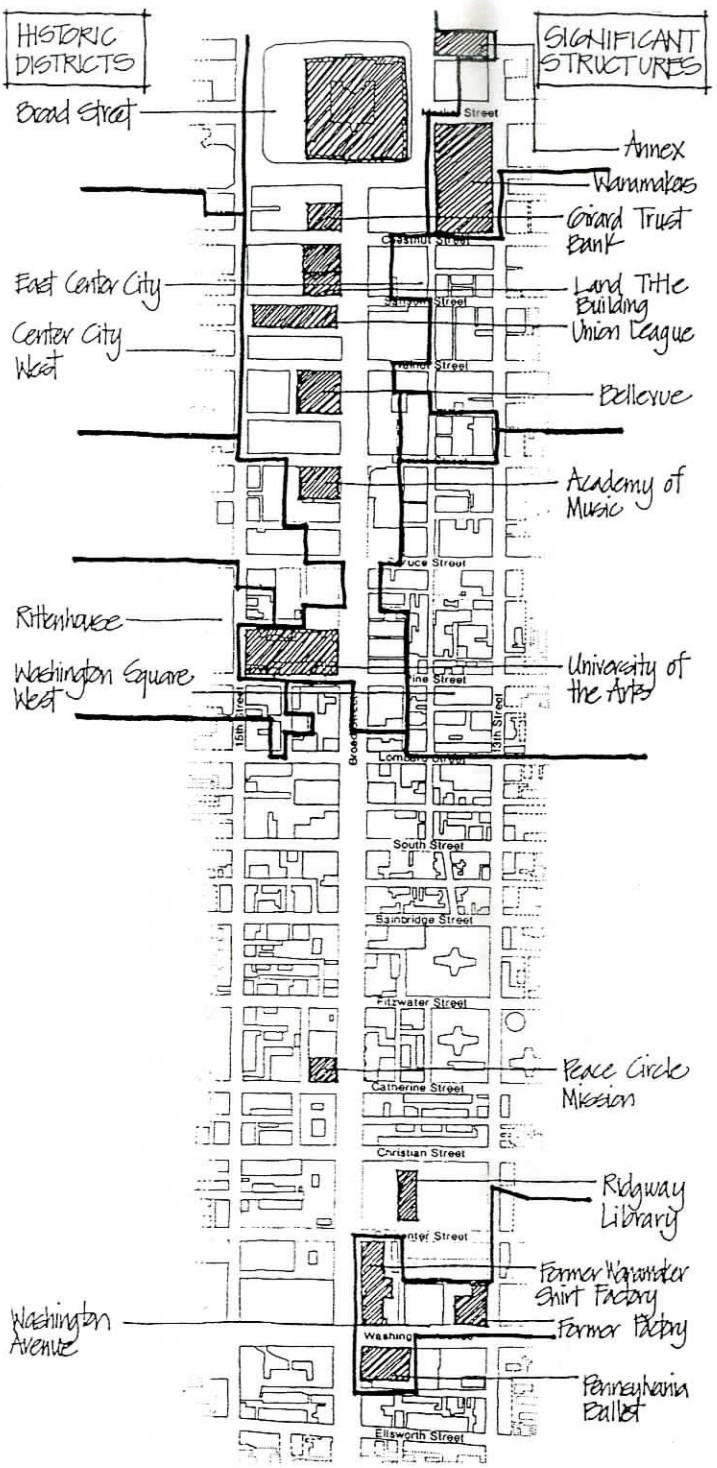

0
70'


0
70'

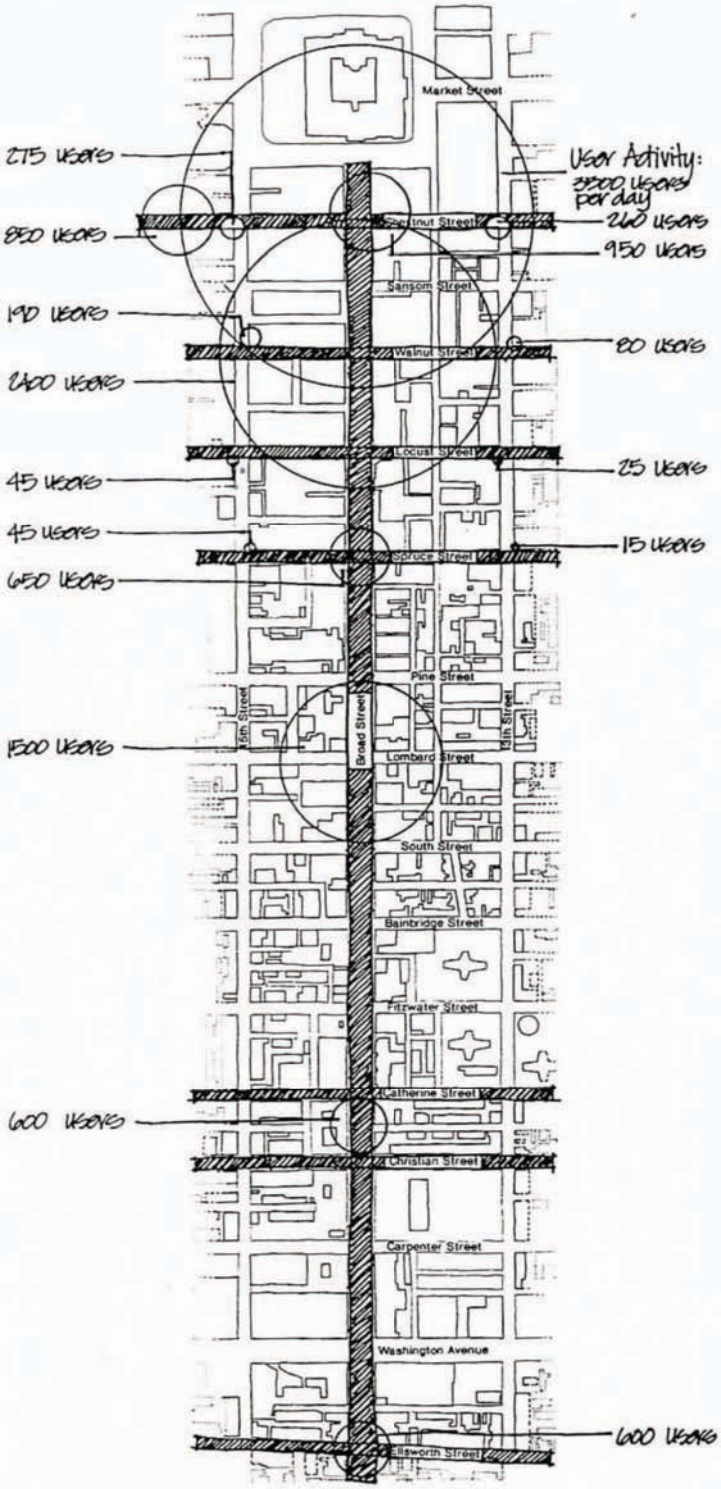
SITE ANALYSIS



Arts, Education, and Institutions

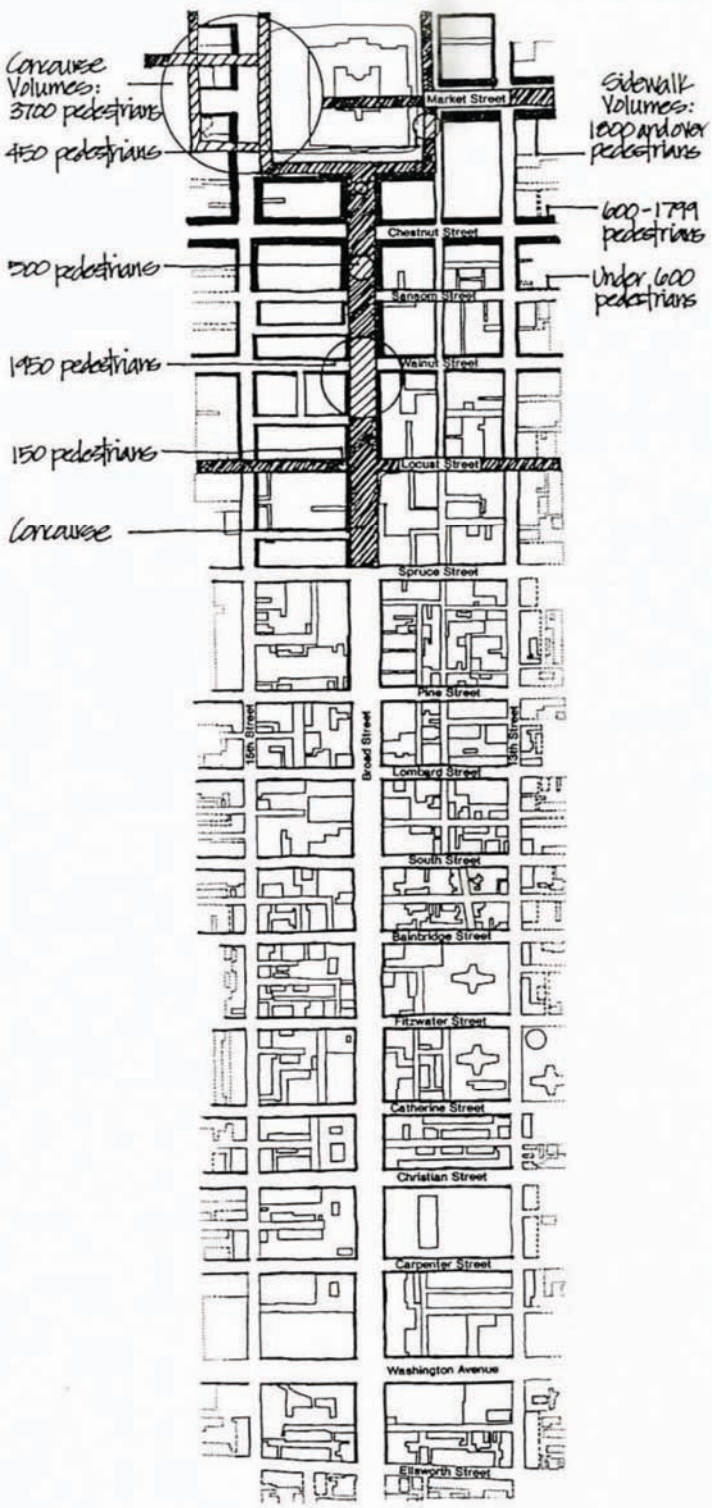


Historic Districts and Significant Structures



Surface

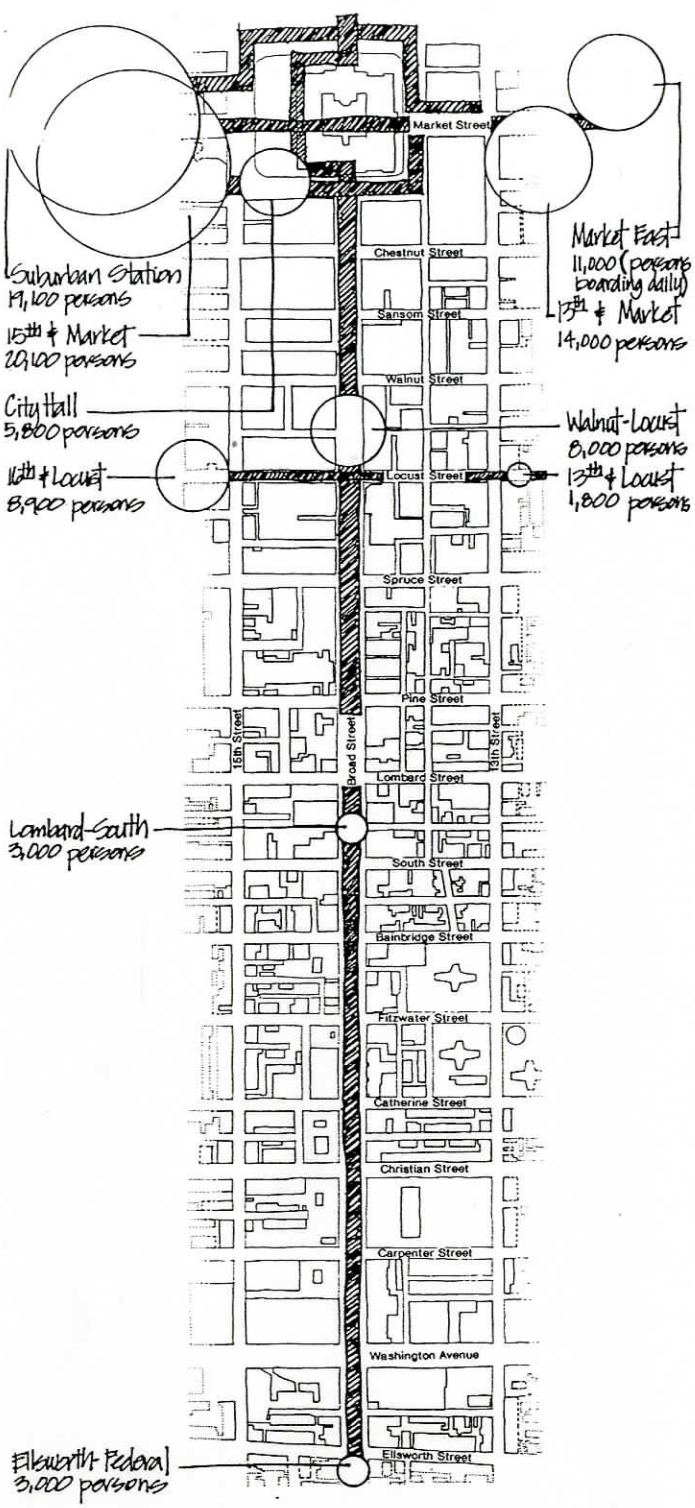
South Broad is a major destination and transfer point for surface transit routes and between surface routes and rail. The "C" bus on Broad is the city's major north-south route. Six east-west routes intersect Broad Street at Chestnut. Other intersecting east-west routes run along Locust, Spruce, Lombard-South, Catherine-Christian, and Ellsworth Streets. Although each day 8,000 people arrive or leave South Broad by bus, shelters are virtually non-existent.



Pedestrian

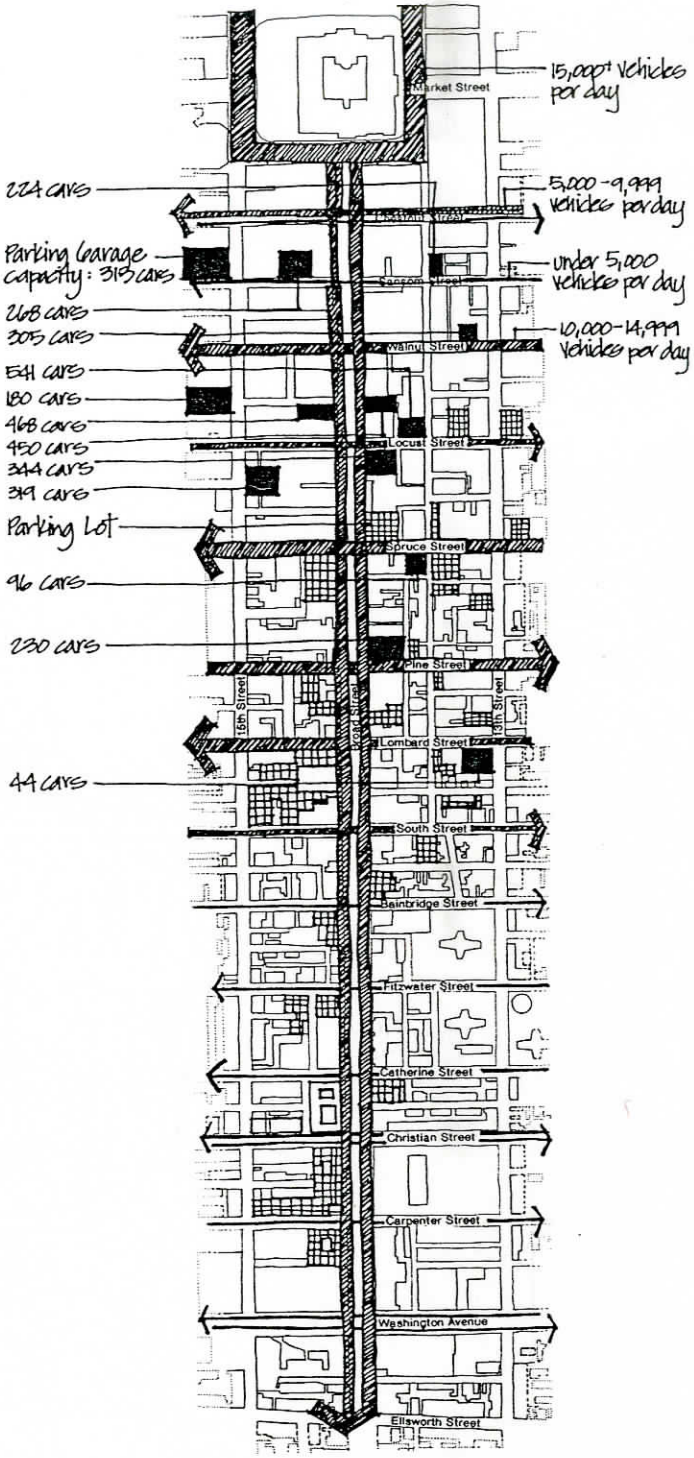
South Broad Street's gracious sidewalks, typically 21 feet wide, provide comfortable space for this important pedestrian artery. Transit activity contributes greatly to sidewalk and concourse traffic, especially north of Locust. Below Spruce foot traffic drops to a virtual trickle, reflecting the decreased intensity of adjacent land uses. South of Lombard, pedestrians must beware of cars entering and exiting service stations and restaurants.

South Broad Street, Artery of the City



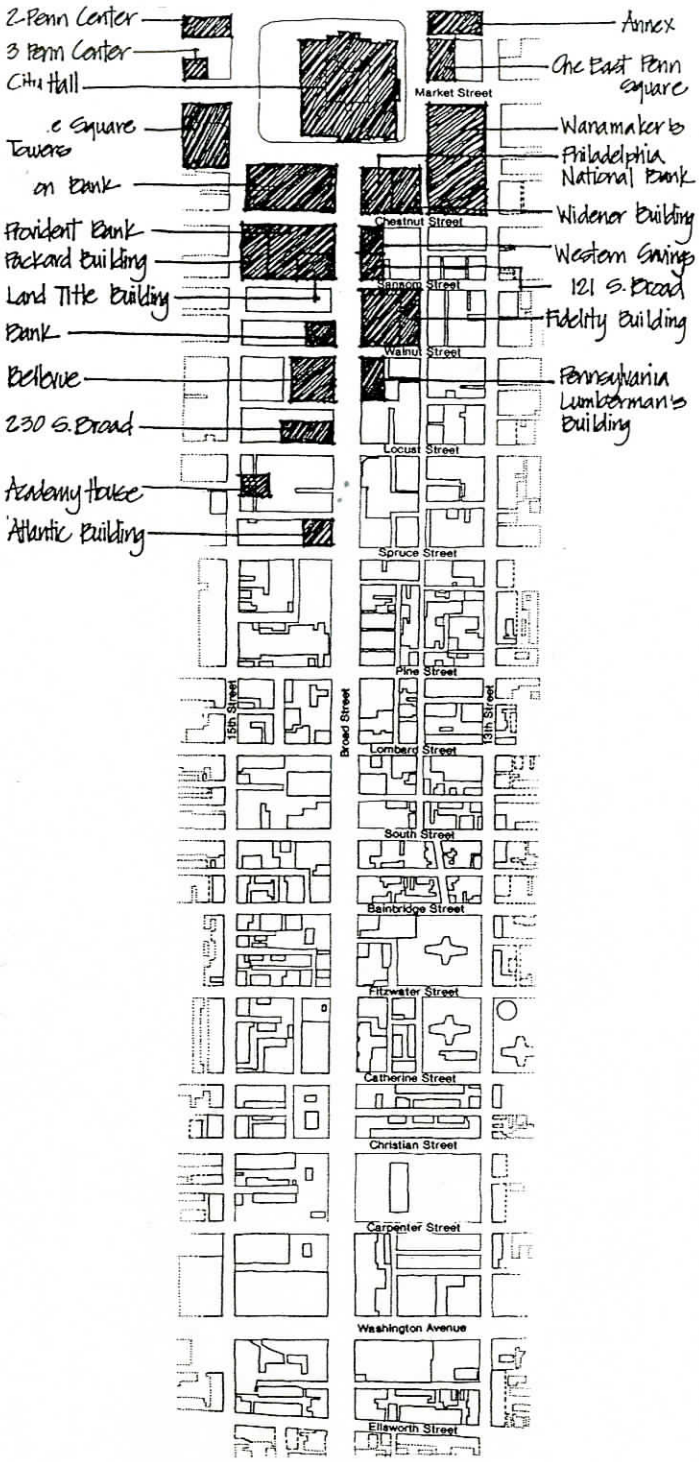
Subsurface

Over 20,000 people a day board Broad Street subway stations at City Hall, Walnut-Locust, Lombard-South and Ellsworth-Federal. Links to the regional rail and other subway lines add 75,000 boardings daily. The concourse provides a direct underground link among all systems. While all cars have been replaced on this subway line, first developed in the 1920s, the concourse has greatly deteriorated and subway entrances are rying states of disrepair.

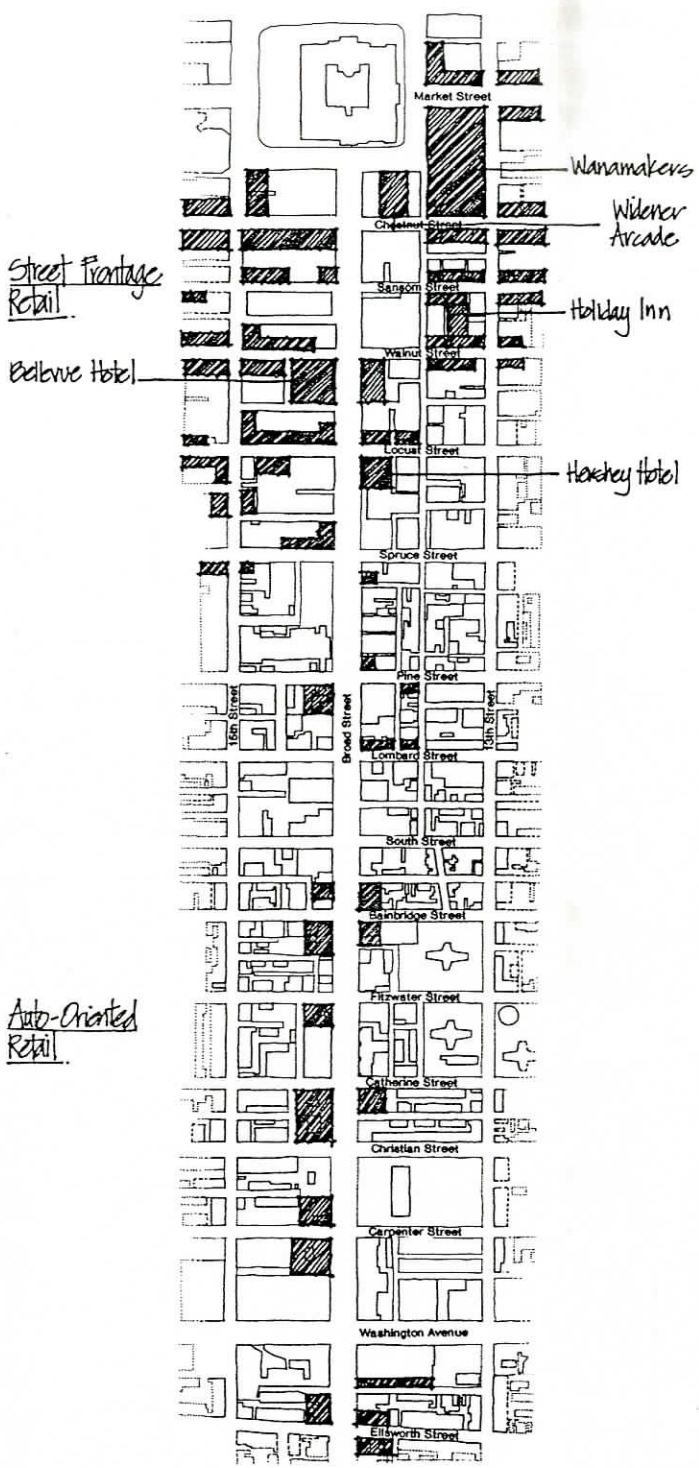


Vehicular

South Broad Street, State Highway Route 611, is a major vehicular artery. Over 20,000 vehicles a day pass Broad and Chestnut. Major parking garages on Broad, Sansom, and 15th Streets support South Broad institutions. The street's wide median allows taxi and limousine standing, emergency vehicle parking, pedestrian refuge at crossings as well as abuse of short term parking and "U" turn capability.

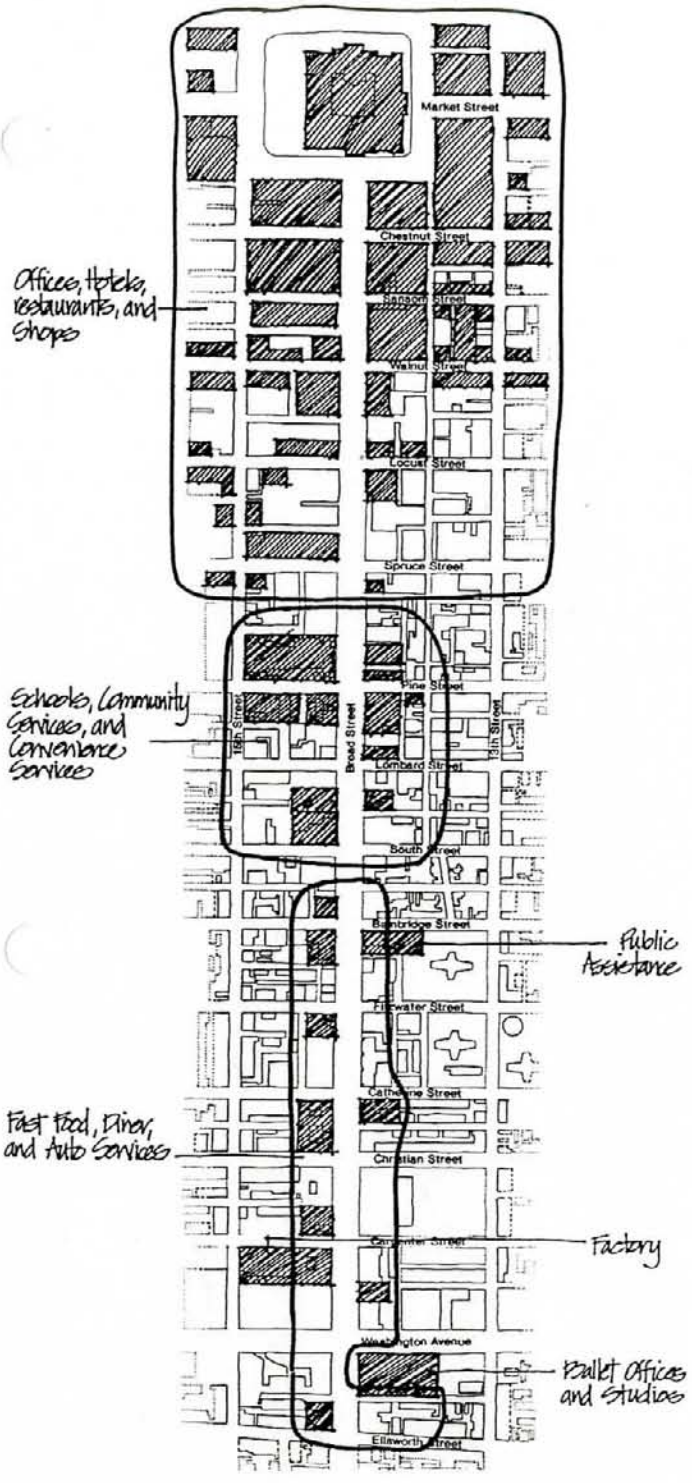


Office



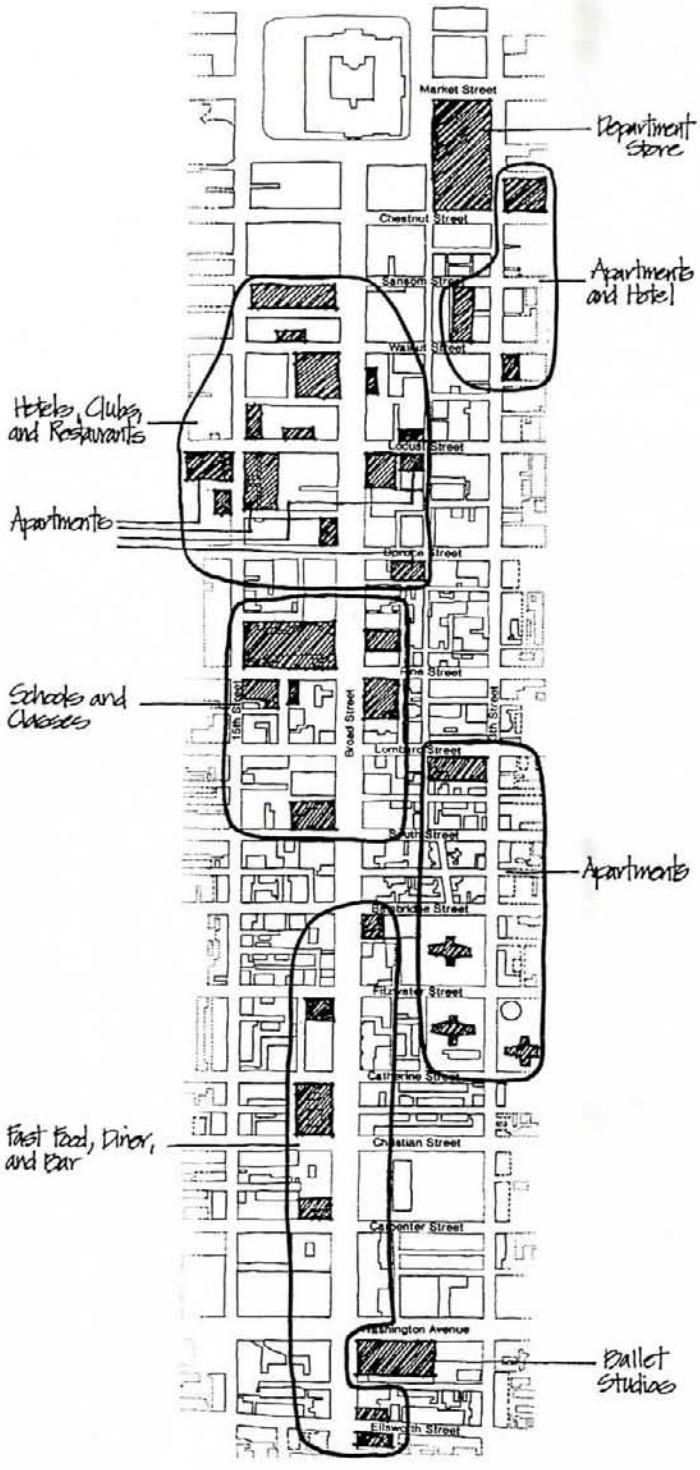
Retail/Hotel

South Broad Street Day and Night



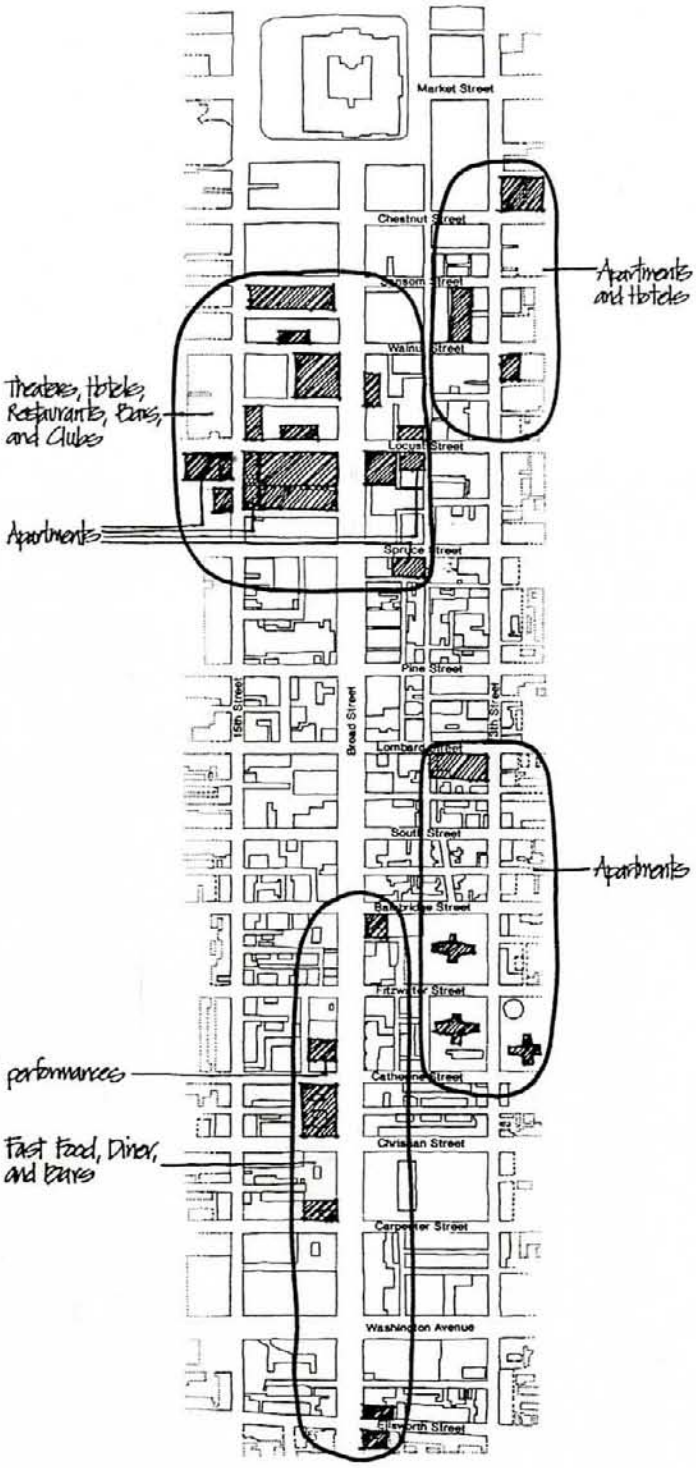
Business Day

During the business day the office core is very busy. Workers and visitors crowd the banks, hotels, shops and dining establishments. The educational centers are open and active, as are the auto-oriented services below South Street. The theaters and churches are quiet.



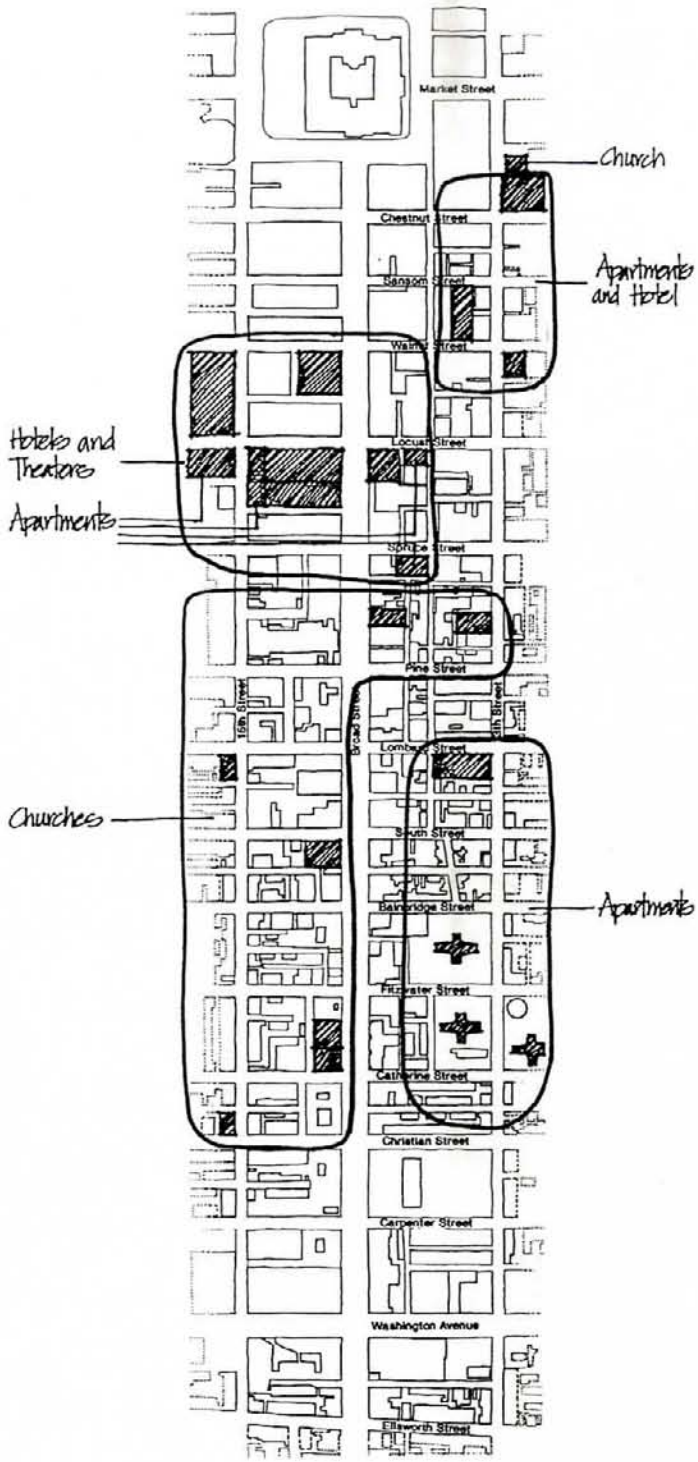
Early Evening

In the early evening, the offices and banks close the business day, darkening Broad and Chestnut. The hotels and restaurants near Walnut and Locust and the fast food establishments below South are busy. The schools hold evening classes. The presence of high-rise residences near 15th and Locust, on Spruce, and off Fitzwater Street becomes noticeable.



Evening

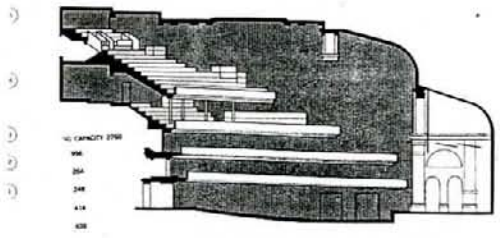
Later in the evening, after 7:30, the theaters turn on their lights. The hotels and most of the bars and restaurants near Locust Street are open and busy. Some of the fast food and service stations remain open. Broad and Chestnut is quiet, the schools are closed, and long stretches of Broad Street are deserted.



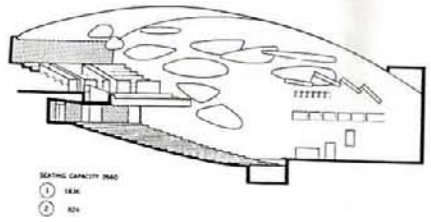
Sunday

Sunday is a special day on South Broad. The large churches attract regional worshipers. Local apartment and townhouse dwellers are at home. Theaters hold a matinee , but few bars or restaurants outside the hotels are open. By early evening the street is nearly still.

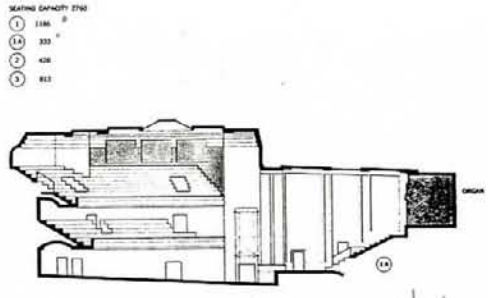
PRECEDENTS



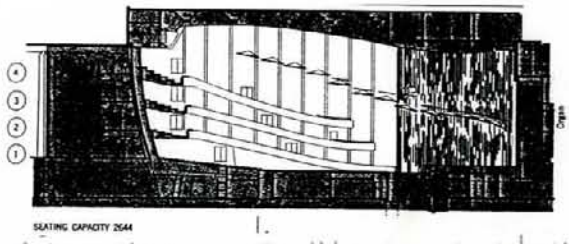
· New York, Carnegie Hall



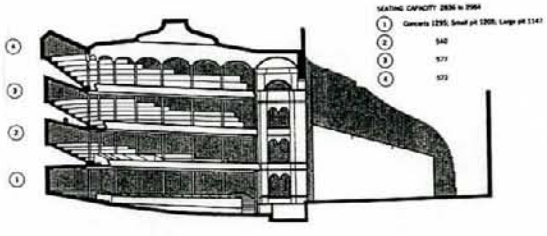
· Caracas, Aula Magna.



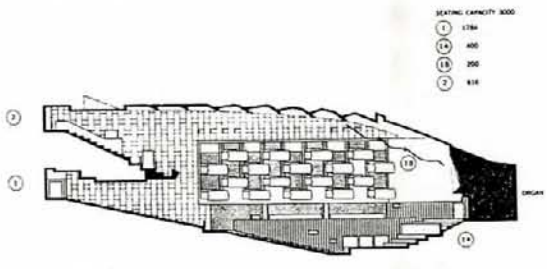
: Edinburgh, Usher Hall



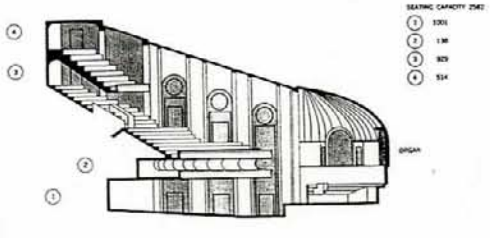
· New York, Philharmonic Hall



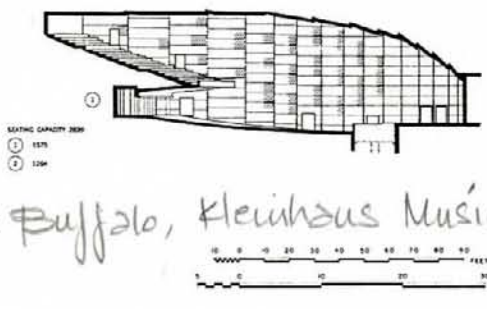
· Philadelphia, Academy of Music



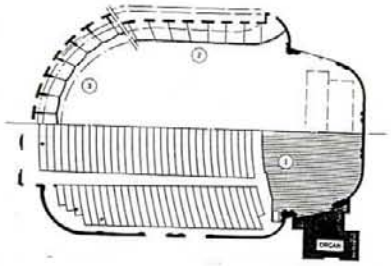
· London, Royal Festival Hall



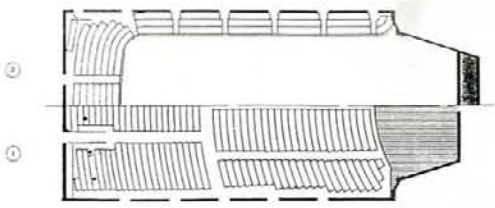
· Chicago, Orchestra Hall



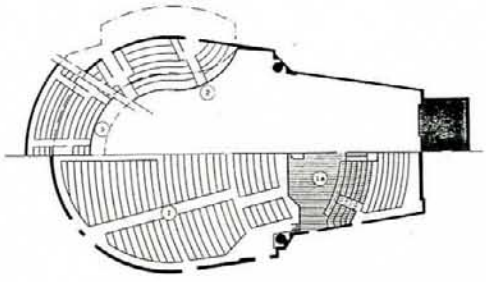
· Buffalo, Kleinhans Music Hall



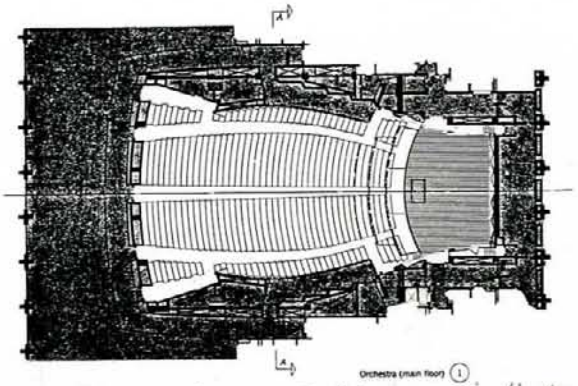
New York, Carnegie Hall



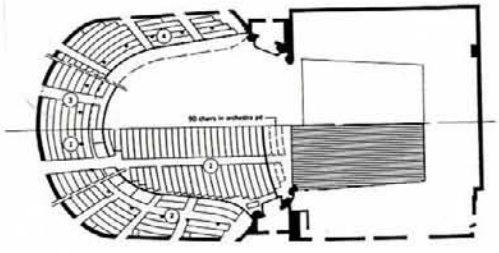
Boston, Symphony Hall



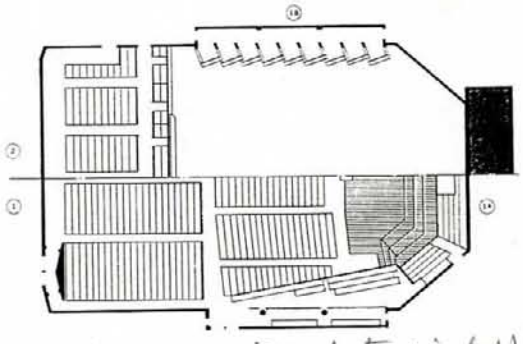
Edinburgh, Usher Hall.



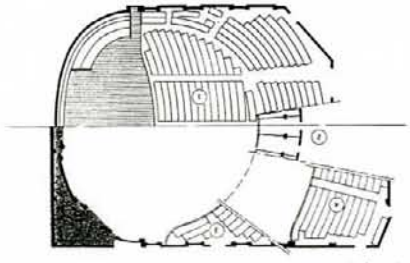
New York, Philharmonic Hall



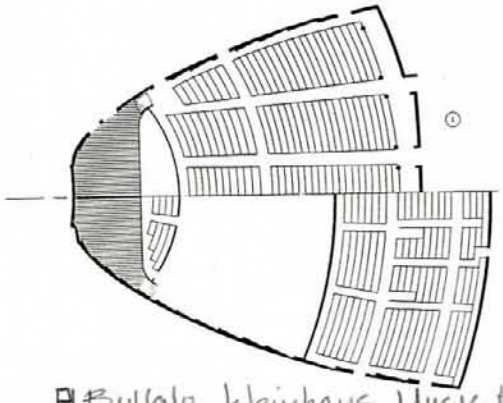
Philadelphia, Academy of Music



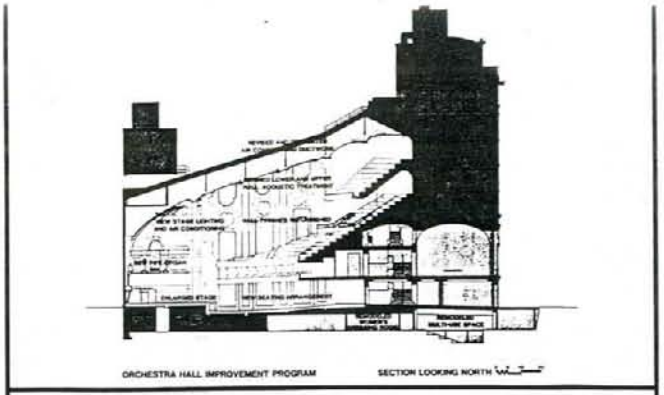
London, Royal Festival Hall

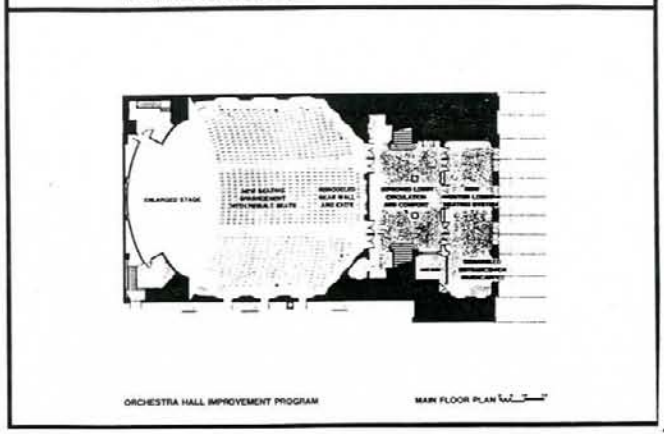


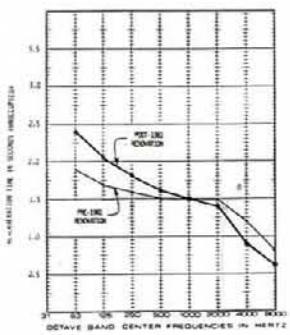
Chicago, Orchestra Hall

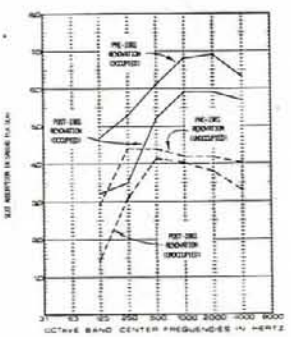


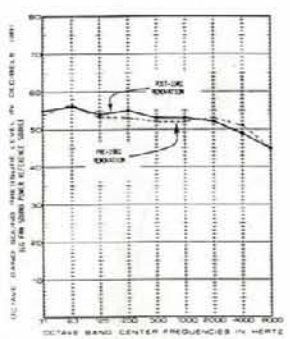
Buffalo, Kleinhans Music Hall











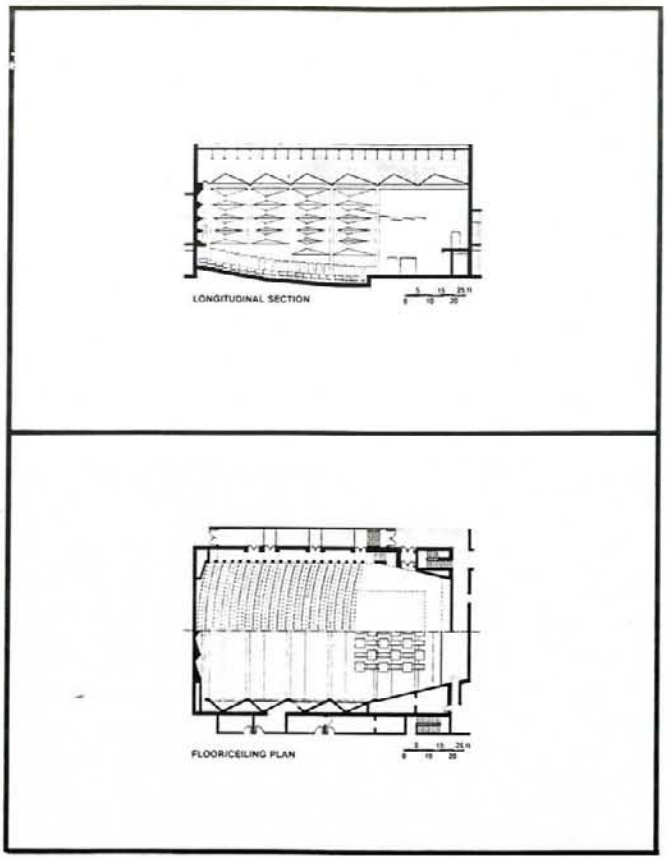
ORIGINAL ARCHITECT:	Daniel Burnham and Co.; Chicago
ARCHITECTS: (1966 & 1981 REMODELLINGS)	Harry Weese Associates; Chicago (1966) Skidmore,Owings & Merrill; Chicago (1981)
ACOUSTICAL CONSULTANTS: (1966 & 1981 REMODELLINGS)	Bolt Beranek & Newman, Inc.; Cambridge, Mass. (1966) R. Lawrence Kirkegaard & Associates; Lombard, Illinois (1981)

Orchestra Hall has been the home of the Chicago Symphony Orchestra since 1904. Designed by Architect Daniel Burnham under the direction of Music Director, Theodore Thomas, the hall has had a mixed and colorful history. Serious acoustical deficiencies were apparent from shortly after its opening. Responding to these deficiencies produced a number of changes over the years, primarily within the stage area and "shell" over the stage.

These changes culminated in 1966 when, under Bolt Beranek and Newman's direction, much of the plaster ceiling was replaced with perforated aluminum screen to allow sound to access the volume beyond in an attempt to increase reverberation time during performances. The volume that was added to the hall unfortunately included extensive areas of porous plaster and clay tile masonry and became impeded with ductwork. To stabilize reverberation during rehearsals, upholstery was added to balcony and gallery. The net effects of the 1966 remodelling were essentially no increase in occupied reverberation time, major reduction in unoccupied reverberation time (eliminating the hall's use for recording purposes), and a general perception among musicians that "all the sound that passed through the perforated ceiling was lost from the room".

The 1981 acoustics remodelling explored a number of reconfigurations of stage and "sending end" of the hall, including expansion over the alley, raising the roof over the gallery, consolidating the chorus seating and centralizing the organ. The actual remodelling followed a much reduced scope. It consisted of reducing absorption of main floor seating; hardening all "upper hall" surfaces; relocating ductwork to open the upper hall volume; adding sound-diffusing plaster shaping to rear wall surfaces; providing tandem sound doors to control exterior noise; eliminating excess absorption within boxes, organ chambers, and surfaces surrounding the orchestra; and the draperies at the rear of the orchestra level seating.

ORCHESTRA HALL
CHICAGO, ILLINOIS U.S.A.
RENOVATION COMPLETED - 1981



Capacity : 700 seats

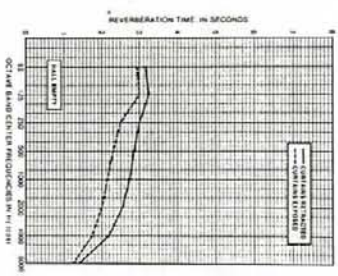
Volume : 7,350 m³ (260,000 cf)

Seating Area : 390 m² (4,200 sf)

Reverberation Time* : 2.2 sec (unoccupied min.)
2.8 sec (unoccupied max.)

Albeit on the small side, a true concert hall. A happy marriage between a traditional concept and contemporary form, developed specifically to "bathe" the audience in strong, intimate, multidirectional sound.

Architects : Harold E. Collard and Max L. Call, AIA
Acoustician: Rein Pirn, FASA, Bolt Beranek and Newman Inc.



ARCHITECT: Harold E. Collard and Max L. Call;
Idaho Falls, Idaho

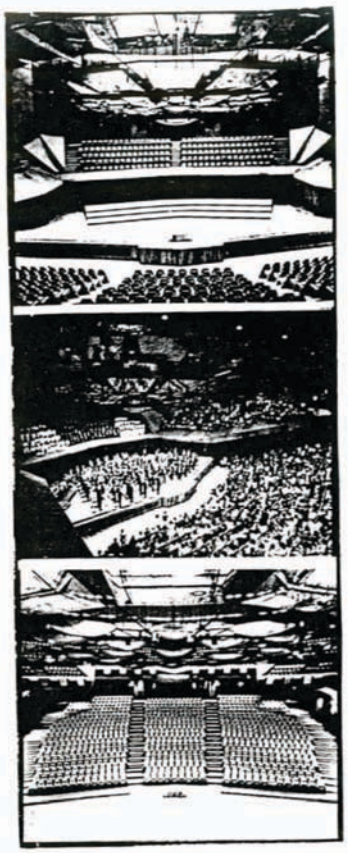
ACOUSTICAL CONSULTANT: Bolt Beranek and Newman, Inc.;
Cambridge, Massachusetts
Rein Pirn, FASA

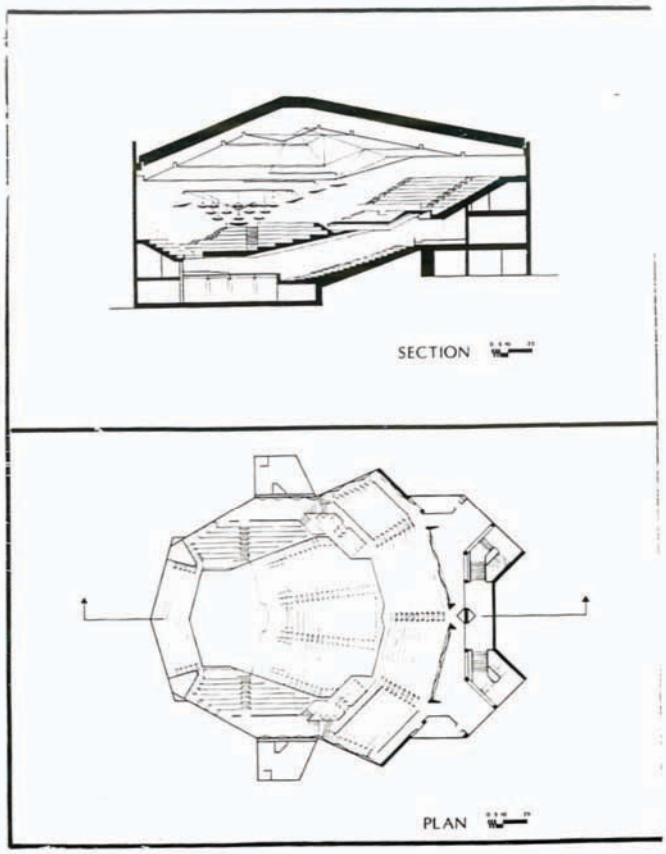
The Ruth H. Barrus Concert Hall, with 700 seats, is the largest of three auditoriums in the new Eliza R. Snow Center for the Performing Arts on the campus of Ricks College. The others are the Drama Theatre, seating 500, and a smaller Recital Hall.

The mandate given to the architect and acoustician was to design halls of uncompromising acoustical quality in an essentially traditional idiom. Hence, the Concert Hall's rectangular form. The design incorporates large-scale wedges on both side walls, which, in combination with the wall splays, supply the audience with strong lateral sound. The rear wall is similarly broken up to further encourage diffusion. A heavy curtain can be drawn to cover the rear wall when reduced reverberation is desired. The principal finishes are brick and plaster.

Considering that a "wet" sound was expected -- to also accommodate an organ which is about to be installed -- the results are most gratifying. The principal user, Dr. LaMar Barrus, writes: "The orchestra sounds absolutely superb in the hall..... It really is an exciting experience to be bathed in sound, with the sound totally surrounding you." Can lateral sound be overdone? Based on this experience, perhaps not.

RUTH H. BARRUS CONCERT HALL
RICKS COLLEGE, REXBURG, IDAHO
COMPLETED 1980





ACOUSTIC DATA

VOLUME OF HALL (V): 1,111,000 ft^3

SEATS IN AUDIENCE (N_A): 2300 seats

AUDIENCE SEATING AREA (S_A): 15,000 ft^2

ORCHESTRA AREA (S_O): 2600 ft^2

REVERBERATION TIME: 2 sec.
Mid-frequency - Occup.

INITIAL TIME DELAY GAP: 16 msec.

$S_T = S_A + S_O$: 17,600 ft^2

S_A / N_A: 6.5 ft^2/pers.

V/S_T: 63

ARCHITECT: U.N.A.M. Architectural Team

Francisco de Pablo
Orso Nunez Ruiz Velasco
Arcadio Artis Espriu

ACOUSTICAL CONSULTANT: Jaffe Acoustics, Inc.;
Norwalk, Connecticut

The Sala Nezahualcoyotl is part of a larger complex of cultural facilities on the campus of the University of Mexico. The Mexican facility, like Amsterdam's Concertgebouw, features a performing area backed by a bank of seats to be occupied by a chorus or spectators, as the occasion demands. Flanking balconies extend from the main auditorium to embrace the stage, completing the "surround" concept. Underneath the stage is an acoustically reverberant moat, the first application of such a device in a concert hall.

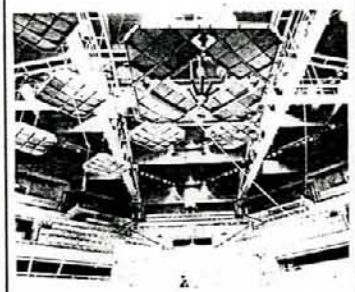
Circular acrylic reflectors are suspended above the orchestra area to provide the required short initial time delay gap. The extensive area of the overhead articulation system enables soloists and chamber groups to perform comfortably in the space.

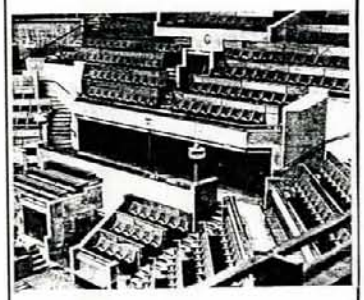
The center orchestra seating terrace has a wood floor over an air space while all the balcony floors are concrete. The ceiling and walls are a combination of wood, plaster and concrete.

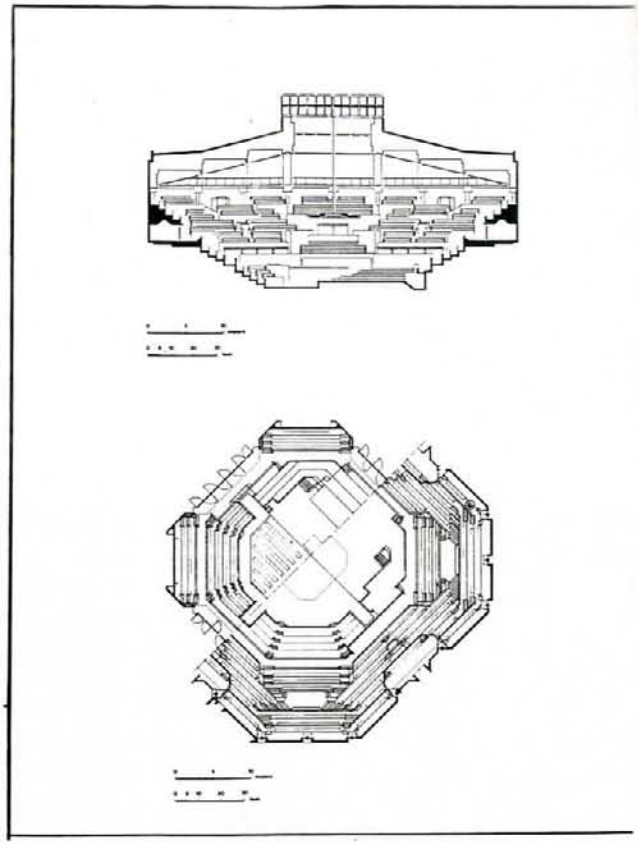
SALA NEZAHUALCOYOTL

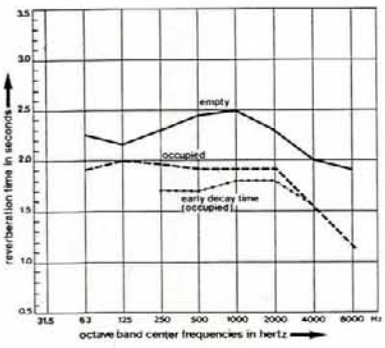
MEXICO CITY, MEXICO

CONSTRUCTION COMPLETED — 1976









ARCHITECT: Herman Hertzberger; Amsterdam

ACOUSTICAL CONSULTANTS: Institute of Applied Physics, TNO; P. A. de Lange; L. G. Booy

The octagonal hall has its platform on one side, and steep stands on all sides, providing excellent sight. The obvious disadvantage of this shape is the large proportion of listeners behind and beside the orchestra. The acoustical consultants finally agreed to the overall shape on the condition that all their recommendations would be accecpted.

The main attention was directed towards the creation of a desired pattern of reflections, namely the lateral ones. To this end, we suggested to interrupt the stands by vertical planes at different heights. We also introduced a number of platform reflectors.

The ceiling (thick plywood) is diffusing, providing oblique reflections. The floor and the vertical planes of the stands are concrete.

A 1:20 model was built in order to check on reflection patterns and on the effects of the 6 + 1 reflectors (2.6 x 2.6 m^2 and 5.6 x 5.6 m^2). They are suspended at 10m and 9m respectively above the stage. A measurement of RT in the model filled with nitrogen gave a value of 2.3 s.

The necessary steps were taken to fulfill NC20 for air conditioning and outside noise (mark the 9.5 x 9.5 m^2 rooflight, insulated against aircraft and rain noise).

The hall is praised by both musicians and music critics for its acoustics.

V = 17020 m^3 N_A = 1550 seats S_T = 1230 m^2 (seated area)

concert hall
music center vredenburg, utrecht
the netherlands

TOTAL VOLUME . 22,000 m³

2,000 SEATS, upholstered with reflective back

CONSTRUCTION:

STAGE - wooden

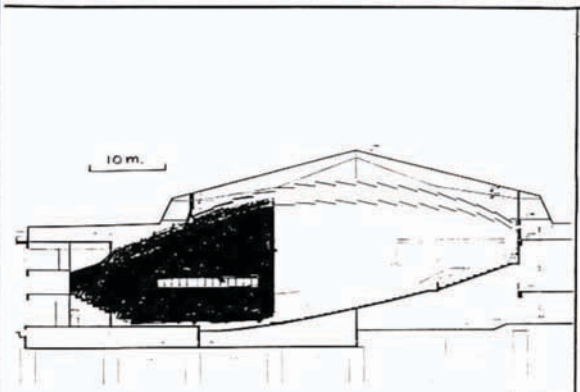
REAR WALL : absorbant

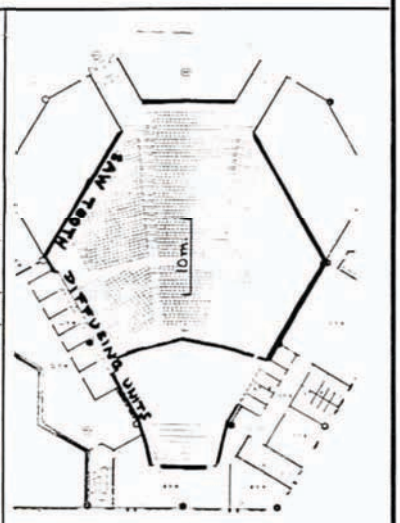
SIDE WALLS : the first part is covered with diffusing units. The lower ones are tilted down. to provide early sound to the seats and the upper ones are tilted up to increase reverberated energy. The second part is saw-tooth shaped

CEILING : diffusing

SIDE WALL and CEILING: plaster 7cm thick

Salle Erasme: 2000 places





This hall is multi-purpose, but primarily designed for symphonic music.

REVERBERATION TIME:

f	RT
40	3
100	3
150	2.6
200	2
500	2
1000	2
2000	2
4000	1.8

ARCHITECT: City Hall Technical Services

ACOUSTICAL CONSULTANT: Roger Lamoral (Bureau d'Etudes Lamoral); Boulogne/S/, France

Prof. Lothar Cremer, Advisory Consultant; (West Berlin)

This multipurpose hall is mainly a concert hall and has been designed so. Reverberation time is not adjustable and sound reinforcement system has to be used carefully in the case of conferences.

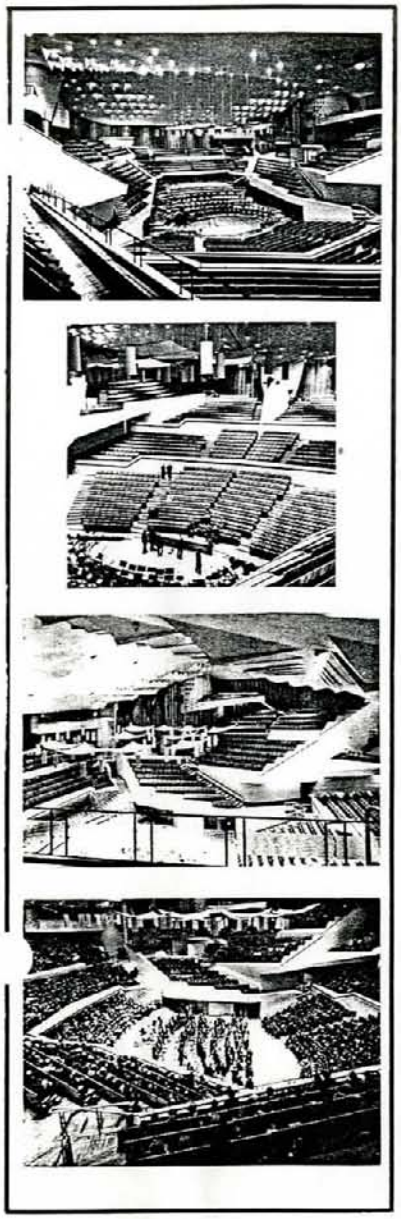
Concerts are given regularly by Alain Lombard and the Strasbourg Symphonic Orchestra, which has a great reputation.

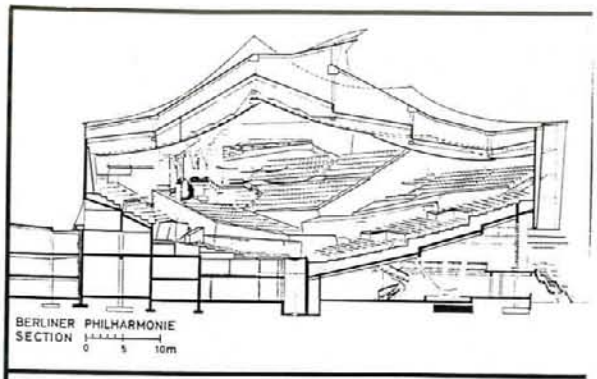
Unanimously, Auditorium Erasme 2000 is considered as among the very best in the world.

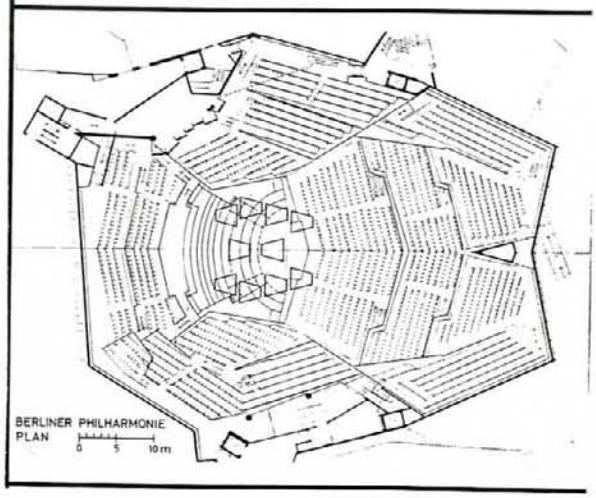
STRASBOURG FRANCE

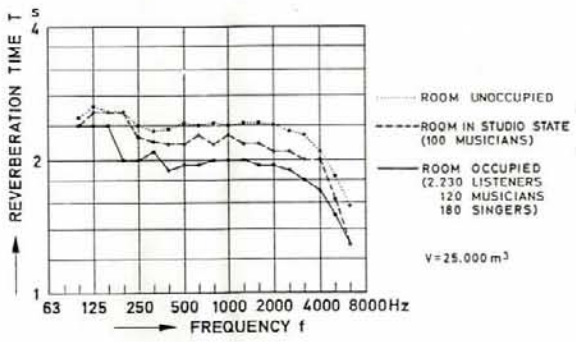
PALAIS DE LA MUSIQUE ET DES CONGRES

GRAND AUDITORIUM ERASME 1975









ARCHITECT: Hans Scharoun

ACOUSTICAL CONSULTANTS: Lothar Cremer and Collaborators; Berlin (West)

Scharoun's chief desire to surround the musicians everywhere by audience was not quite new. At least in several halls the places provided for the chorus were sold if no singers needed them. But no doubt his concept provided many more seats lateral to and behind the orchestra than the largest chorus would occupy.

This concept has the chance to avoid large distances between sound-source and listener and includes many seats which profit by the strong reflections from the near ceiling.

On the other hand, some shortcomings are inevitable. Especially difficulties were to be expected on account of the directional characteristics of some instruments and also visually of the singers.

But Scharoun insisted on his idea and promised to do everything that would be helpful to compensate this disadvantage. For the consultant, this was an extraordinary challenge and chance.

He succeeded that the architect agreed to a convex tentlike ceiling, to reflectors ("clouds") below it, and to a subdivision of the audience by vineyardsteps. But Scharoun did not only agree to these means, he also developed them to an architectonic masterpiece.

BERLINER PHILHARMONIE
BERLIN (WEST)
1963

Concert Halls

Year completed	Name	Architect	Volume ft³ (m³)	Seats	Reverberation time (sec.) (Source)
1887	Amsterdam, Concertgebouw	A. L. van Gendt	663,000 (18,700)	2,206	2.2 (Geluk)
1888	Berlin, (Old) Philharmonie	Franz Schwechten	635,400 (18,000)		1.9 (E. Meyer, Jordan)
1891	New York, Carnegie Hall	William B. Tuthill	857,000 (24,300)	2,760	1.7 (Beranek)
1893	London, Queen's Hall	T. E. Knightly	423,600 (12,000)	2,026	1.3 (Parkin et al.)
1894	Toronto, Massey Hall	Charles Badgley and George M. Miller	567,800 (16,100)	2,774	1.9 (Bolt, Beranek, and Newman)
1900	Boston, Symphony Hall	McKim, Mead, and White	662,000 (18,740)	2,631	1.8 (Beranek)
1905	Chicago, Orchestra Hall	Daniel H. Burnham	536,000 (15,170)	2,582	1.3*
1914	Edinburgh, Usher Hall	Stockdale Harrison and Sons, and H. H. Thomson	565,000 (16,000)	2,760	1.75 (Parkin)
1929	Brussels, Palais des Beaux Arts	Baron Victor Horta	442,000 (12,500)	2,150	1.42 (Beranek)
1940	Buffalo, Kleinhans Music Hall	Eliel Saarinen and E. J. and W. A. Kidd	644,000 (18,220)	2,839	1.32 (Beranek)
1951	London, Royal Festival Hall	London County Council (Sir Robert Matthew and J. Leslie Martin)	775,000 (22,000)	3,000	1.5 (Parkin)
1960	Salzburg, Neues Festspielhaus	Clemens Holzmeister	547,500 (15,500)	2,158	1.55 (Schwaiger)
1963	Berlin, (New) Philharmonie	Hans Scharoun	864,900 (24,500)	2,218	1.95 (ITA)
1966	Rotterdam, de Doelen Hall	E. H. and H. M. Kraaijvanger, Rein Fledderus	953,100 (27,000)	2,222	2.15 (de Lange)
1976	New York, Avery Fisher Hall	Johnson and Burgee	665,000 (18,800)	2,631	1.8 (Harris)
1982	London, Barbican Concert Hall	Chamberlin, Powell, and Bon	665,000 (18,850)	2,000	1.9 (Arup Associates)
1982	Toronto, Roy Thomson Hall	Arthur Erickson	1,000,000 (28,300)	2,812	1.5–2.5 (Bolt, Beranek, and Newman)

CODES/ STANDARDS

Types of Layouts

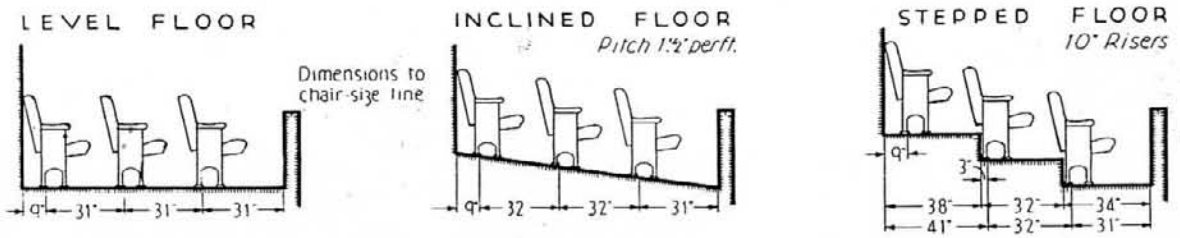
Rows These may be straight across entire theater, side banks may be canted, or entire rows may be curved. Advantages of each type are shown in Fig. 2. Min. radius for curved rows, due to seat construction, is 20 ft. Center for radii of rows and center of screen or stage need not coincide, although this is the ideal case. When rows are curved, a sloping auditorium floor should be a compound curve or amphitheater type to prevent tilted side seats.

Aisles These may be straight or curved, parallel or radial. Aisles should run at right angles to rows to eliminate "pockets."

Combinations of row and aisle types commonly used are shown in Fig. 2.

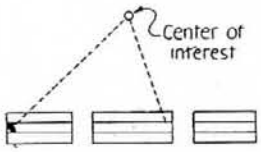
Continental Seating, most commonly used abroad, involves use of rows with unlimited number of seats. Local codes in this country often either prohibit its use or impose many restrictions. However, existing examples have proved safe and comfortable due to increased back-to-back seat spacing (up to 42 in.) which is essential to scheme. Larger than usual side aisles or foyers and many side exits are required.

Code Requirements These govern (1) maximum number of seats in a bank, (2) aisle width, (3) crossovers (not uniform). Usual requirements are: (1) no seat more than seven seats from an aisle; (2) min. aisle width of 3 ft, increasing by varying factors in relation to length of aisles. (3) Requirements for crossovers, not uniformly subject to codes, vary. Consult local authorities.

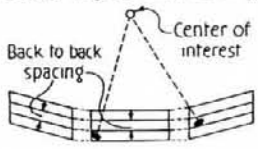


MINIMUM SPACINGS FOR VARYING FLOOR CONDITIONS

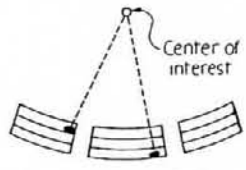
Based on stock sizes with 5⅛" pitch back



STRAIGHT ROWS
Uncomfortable for spectators at side, unequal stress on seats and backs

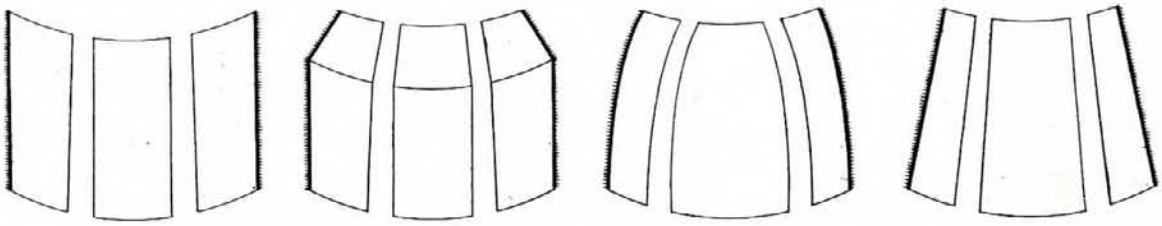


STRAIGHT, CANTED SIDE-BANKS
Same defects as straight rows though to less degree. Note that rows do not line up. Steps if required in aisles will be unsafe



CURVED ROWS
Recommended for comfort, ease of vision and safety

TYPES OF ROWS



STRAIGHT *(poorest type)*

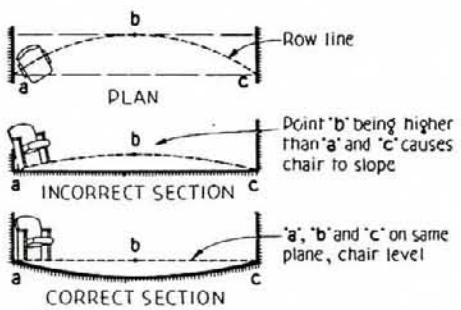
COMPOUND

CURVED

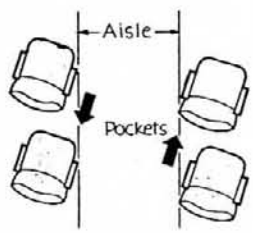
FAN *(ideally best)*

COMMON THREE-BANK LAYOUTS

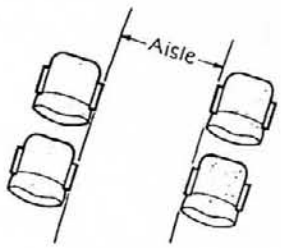
see also "Continental Seating" in text



SIDE RAKE *(Curved Rows)*



Aisles cutting diagonally across rows produce dangerous "pockets" and waste space



Curved or straight radial aisles reduce number and size of "pockets"

DIRECTION OF AISLES

Fig. 2

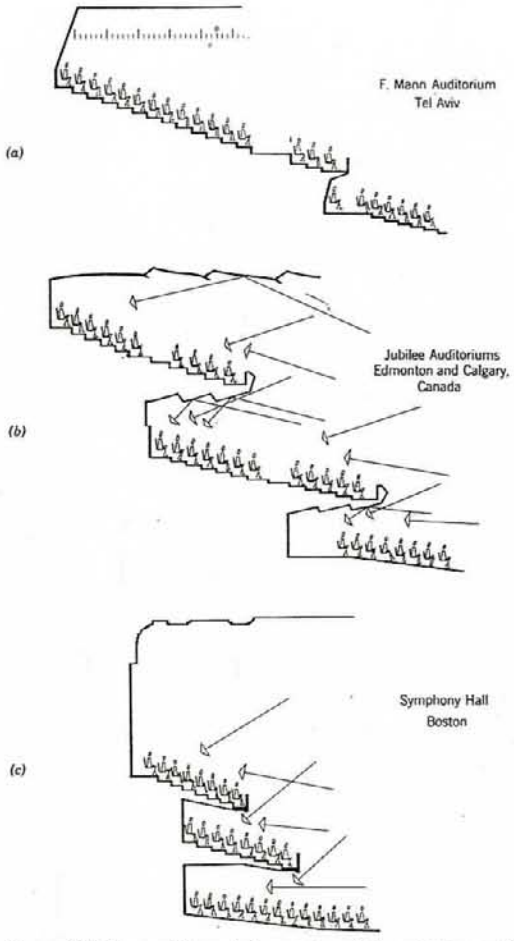


Figure 12.5. Three satisfactory balcony designs: (*a*) excellent, no overhang; (*b*) very good, little overhang and wide openings; (*c*) center balcony is good except for last three rows, which do not receive sound from the upper part of the hall.

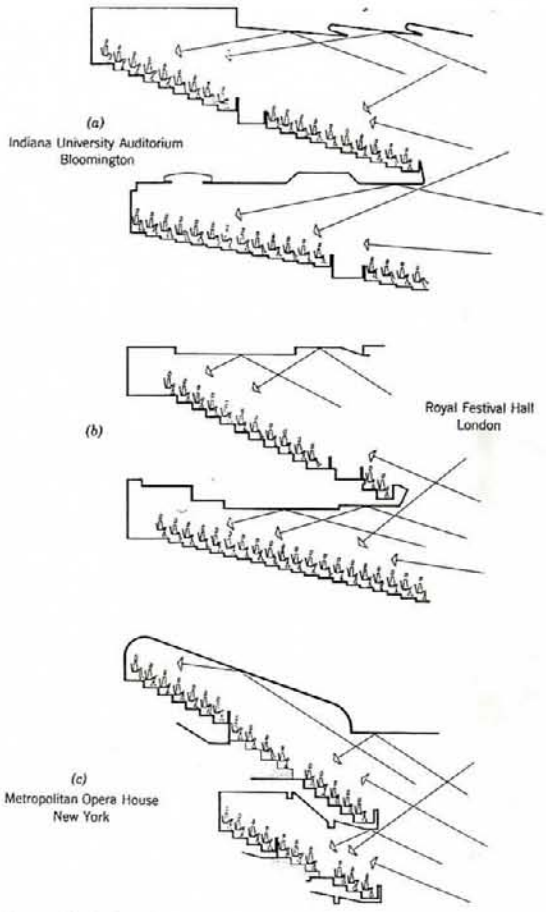


Figure 12.6. Three fair balcony designs: (*a*) fair, large overhang; (*b*) fair, large overhang and small opening; (*c*) lower balcony is poor, receives little sound from upper hall and opening is small.

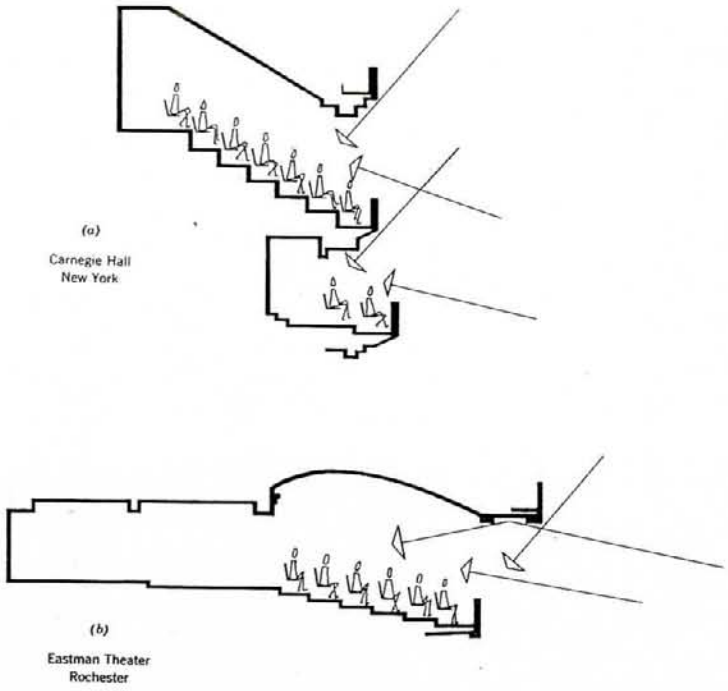


Figure 12.7. Two poor balcony designs: (*a*) upper balcony is poor, receives little sound from upper hall and opening is small; (*b*) poor balcony, very small opening and

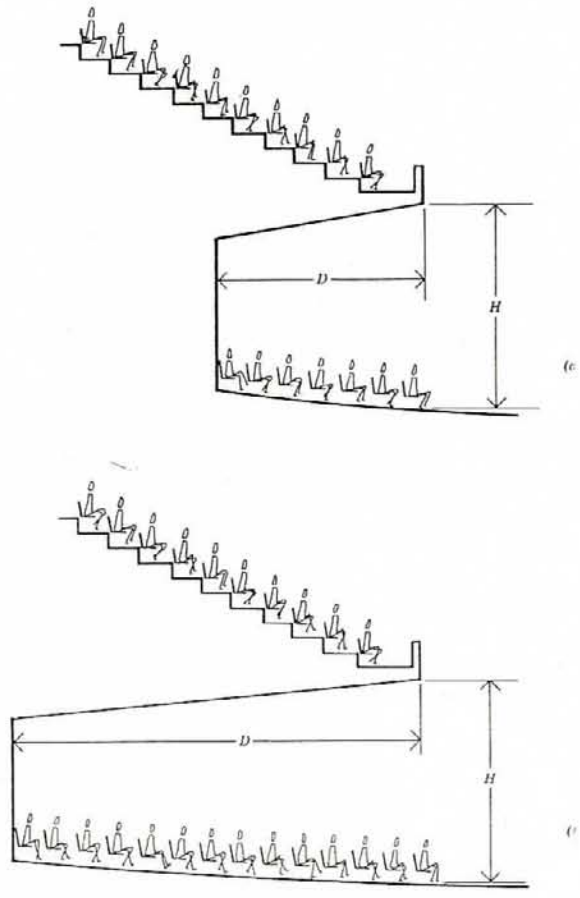
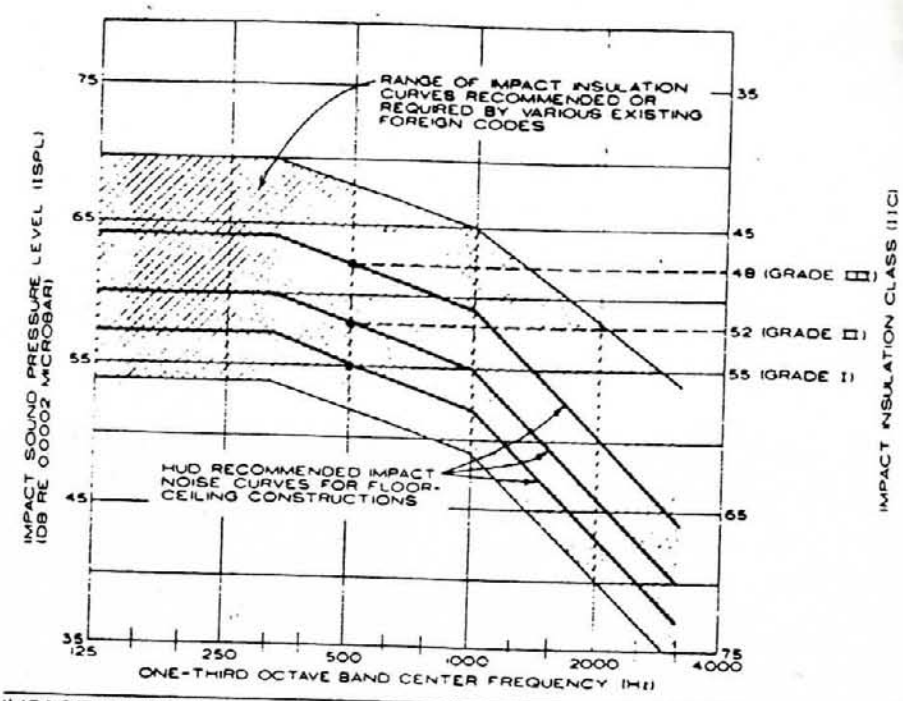
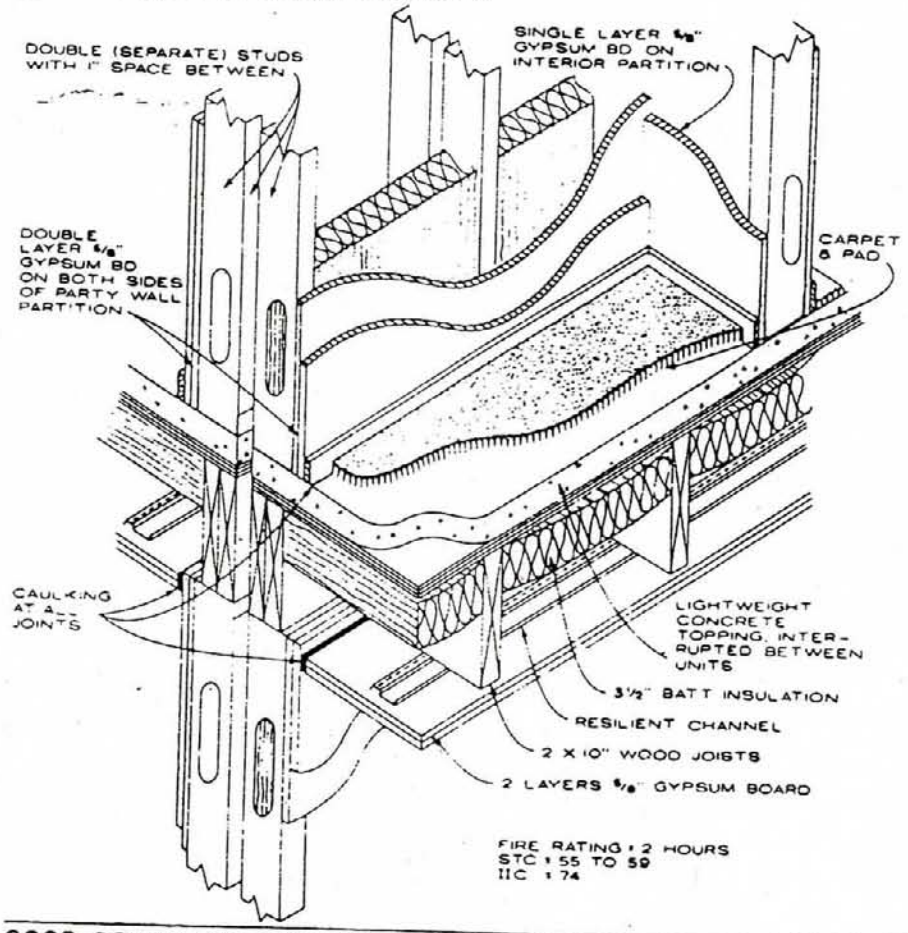


Figure 12.8. Recommended designs for excellent balconies: (*a*) In a concert h should not exceed *H*. (*b*) In an opera house, *D* should not exceed 2*H*. Note th



IMPACT NOISE INSULATION CRITERIA



GOOD SOUND ISOLATION CONSTRUCTION

SOUND INSULATION CONSTRUCTION

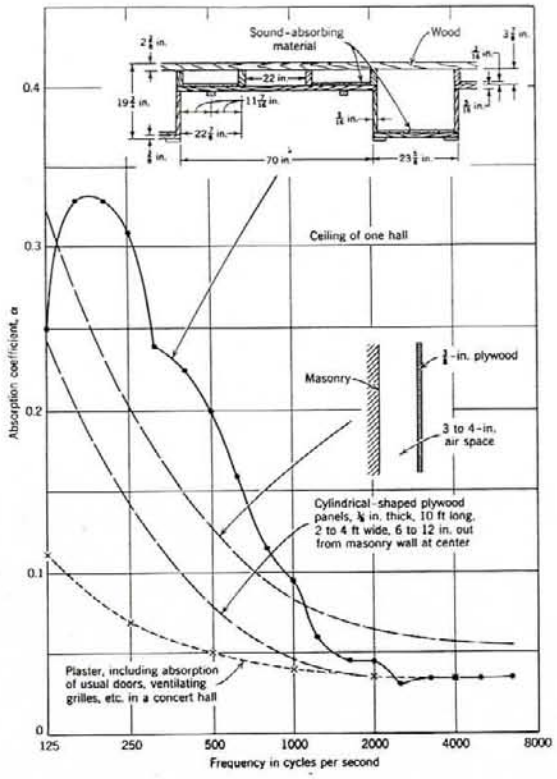


Figure 10.2. Sound-absorption coefficients for walls and ceilings made of thin wood (¾ inch to ⅝ inch thick) or plaster.

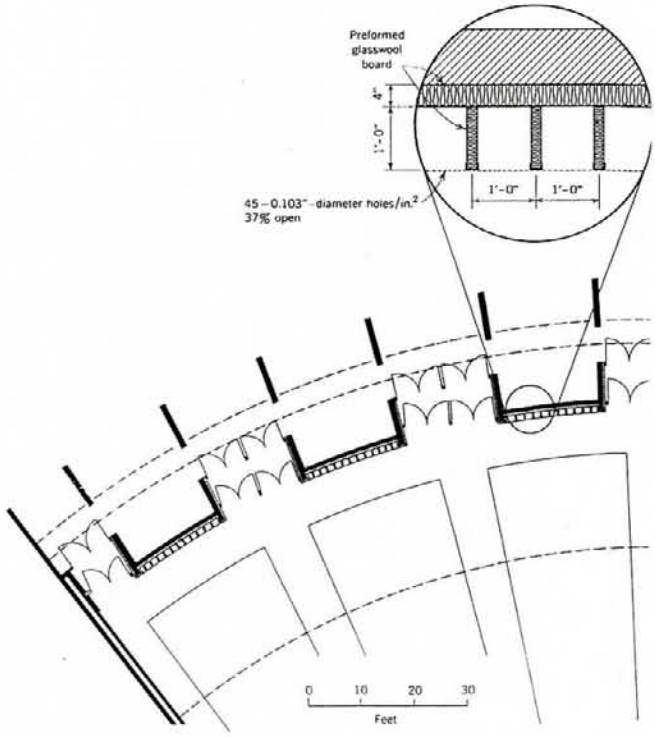
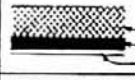
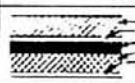
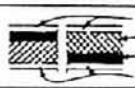
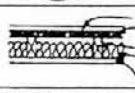
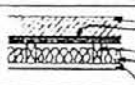
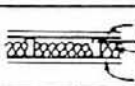
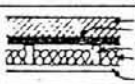
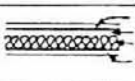
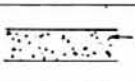
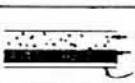
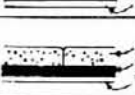
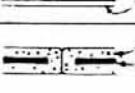


Figure 12.1. To prevent echo, a highly absorbing surface was created at the rear of the Aula Magna, Caracas, an auditorium with a long circularly curving rear wall whose focal point is on the stage. Sound-absorbing material is also inserted in the perforated metal faces of the doors.

SOUND PROOF CONSTRUCTION

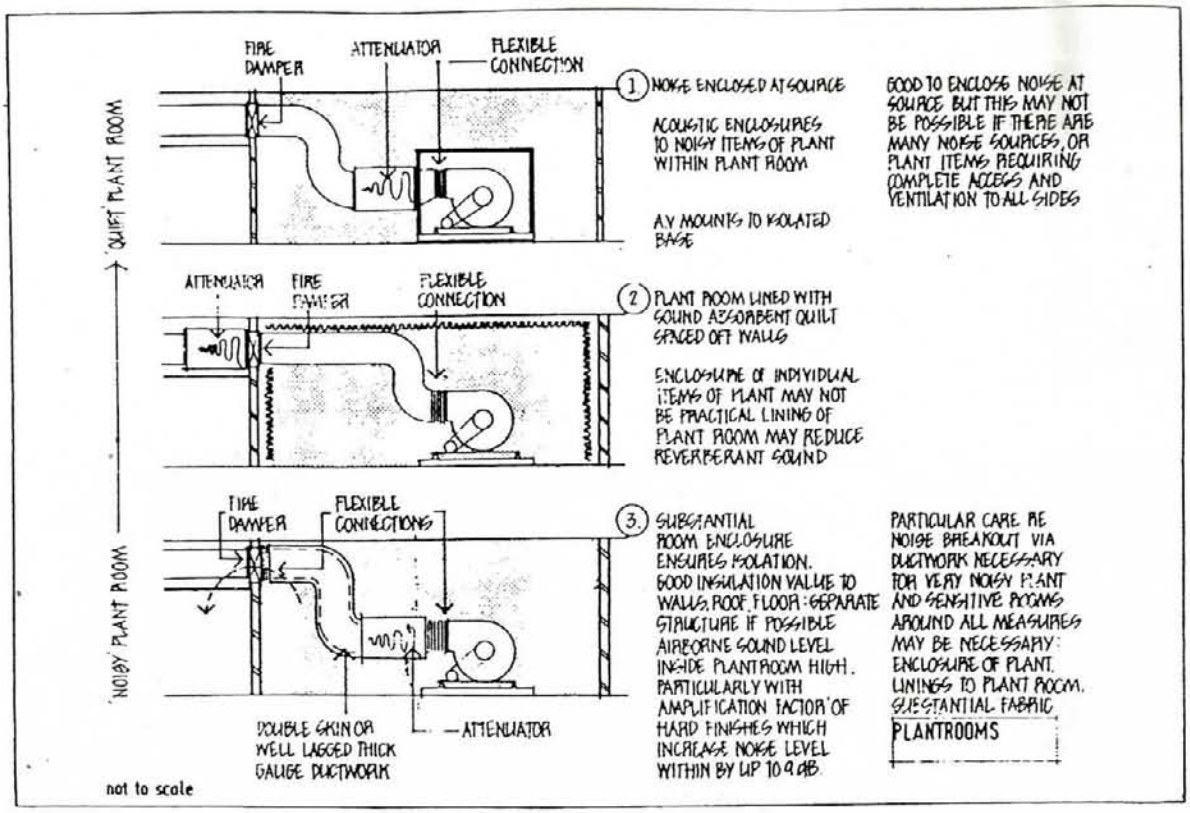
Exterior Wall Assemblies

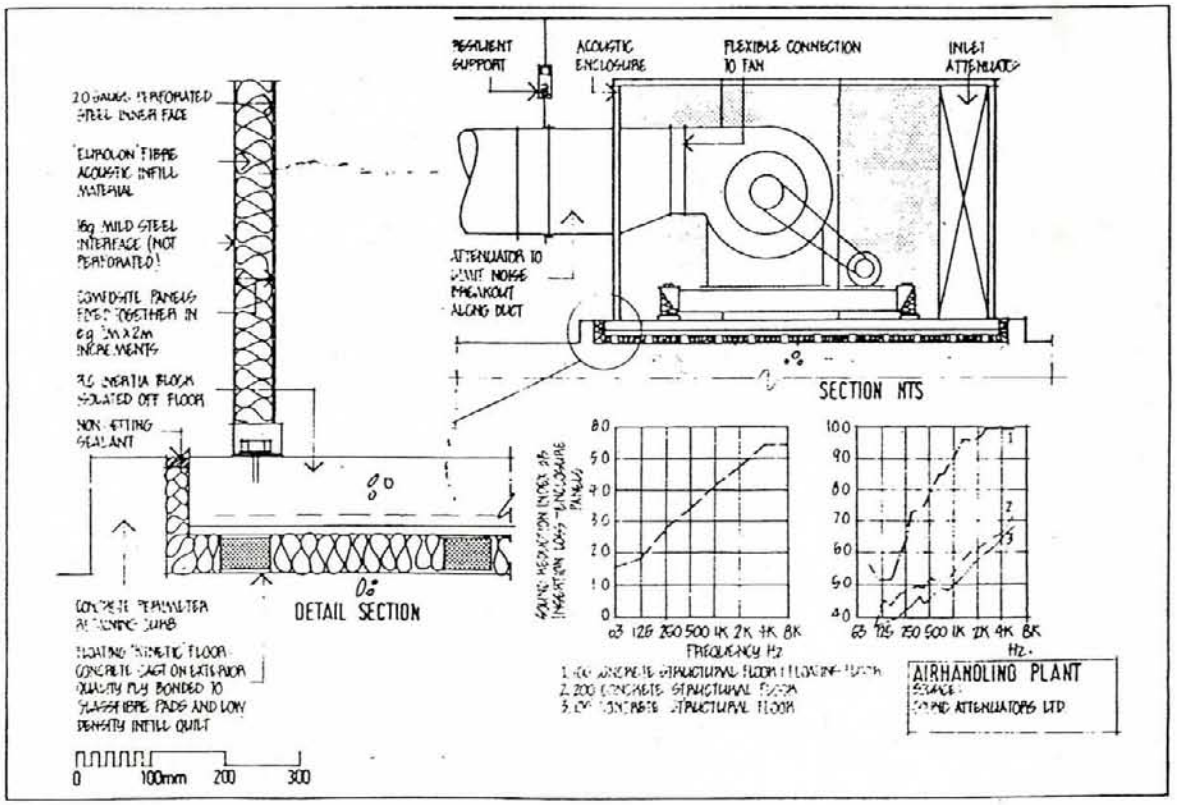
EXTERIOR WALL ASSEMBLIES FOR ADDITIONAL INFORMATION CONSULT MANUFACTURERS' LITERATURE AND TRADE ASSOCIATIONS		WALL THICKNESS (NOMINAL) (IN.)	HEAT TRANSMISSION COEFFICIENT (U-FACTOR) (BTU/HR·SQ FT·°F)
C.M.U.		8 12	0.56 0.49
C.M.U. (INSULATED)		8 + 12 +	0.21 0.20
C.M.U. AND BRICK VENEER (INSULATED)		4 + 4 + 4 + 8 +	0.19 0.18
CAVITY		4 + 2 + 4 4 + 2 + 8	0.12 0.11
C.M.U. AND STUCCO (INSULATED)		8 +	0.16
WOOD STUD		4 6	0.06 0.04
BRICK VENEER		4 + 4	0.07
METAL STUD		4 5	0.06 0.04
BRICK VENEER		4 + 4	0.07
INSULATED SANDWICH PANEL		5	0.05 See manufacturers' literature
CONCRETE		8 12	0.68 0.55
CONCRETE (INSULATED)		8 +	0.13
CONCRETE AND BRICK VENEER (INSULATED)		4 + 8 +	0.13
PRECAST CONCRETE		2 + 4 +	0.99 0.85
PRECAST CONCRETE SANDWICH		5	0.14

GLASS			
SINGLE GLAZING		¼	
DOUBLE GLAZING		¾	Clear/tinted 1.1 Reflective 0.8-1.1
TRIPLE GLAZING		1¼	Clear/tinted 0.5-0.6 Reflective 0.3-0.6

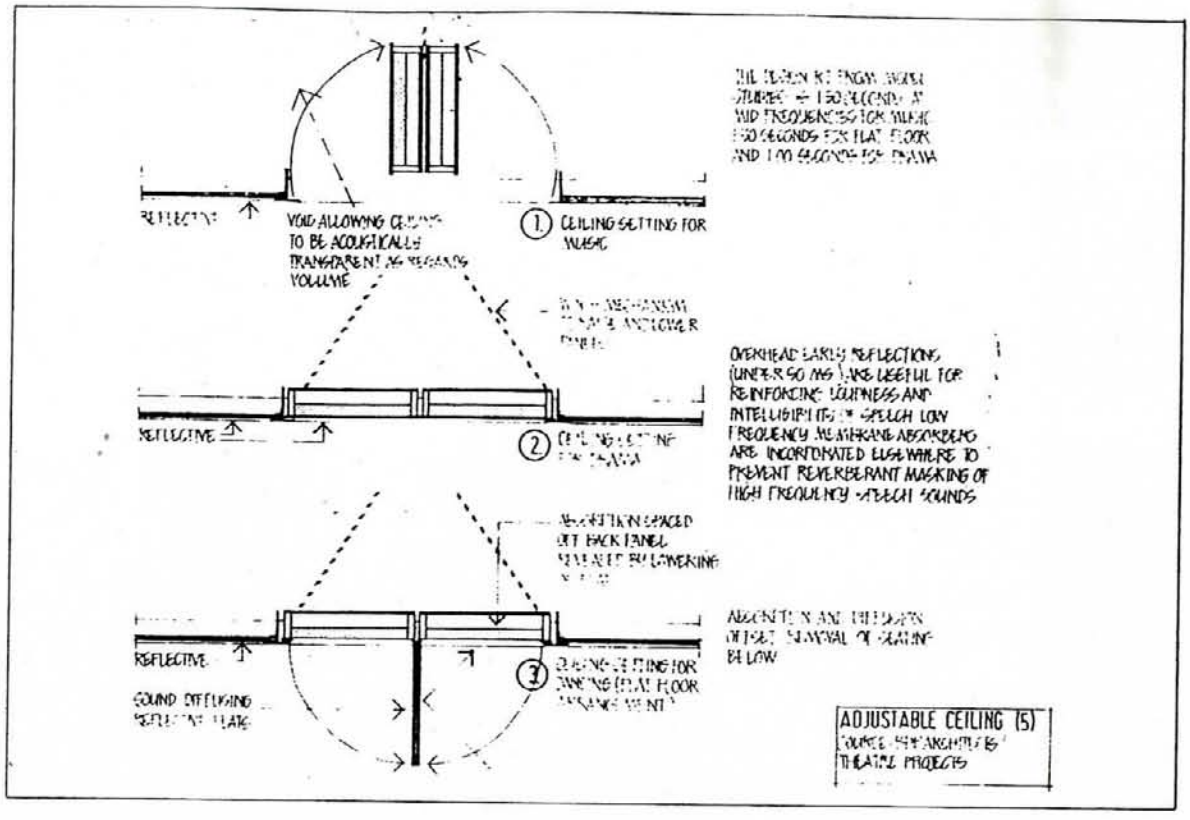
Roger K. Lewis, AIA, and Mehmet T. Ergene, Architect; Roger K. Lewis, AIA & Associates, Washington, D

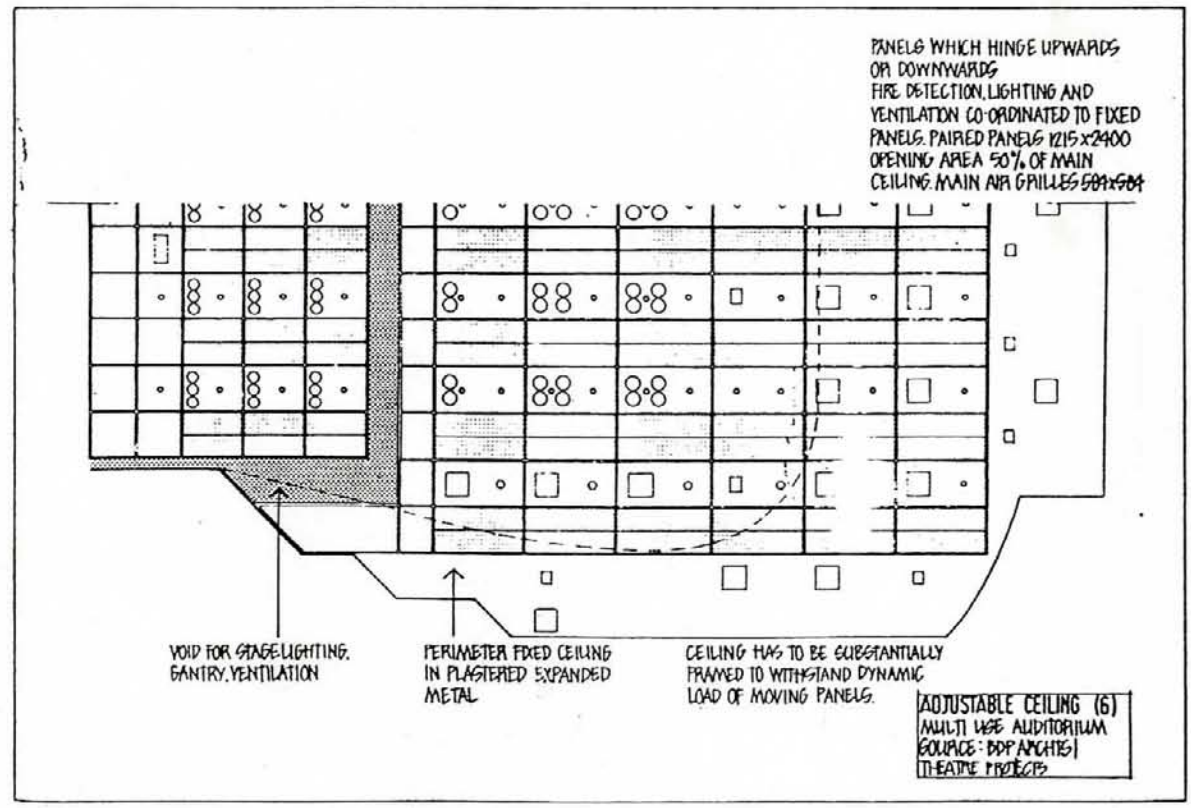
EXTERIOR WALL ASSEMBLIES



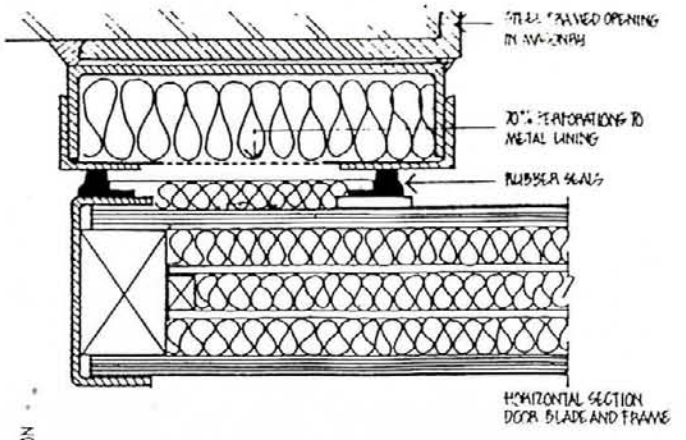


AIR HANDLING UNITS





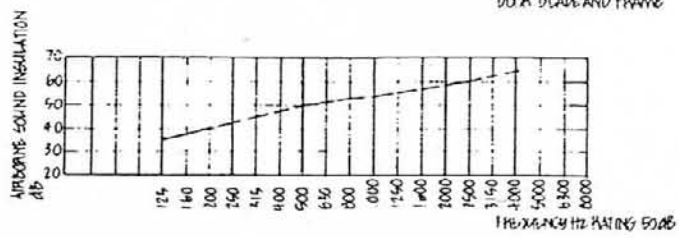
ADJUSTABLE CEILING

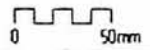


HORIZONTAL SECTION DOOR BLADE AND FRAME

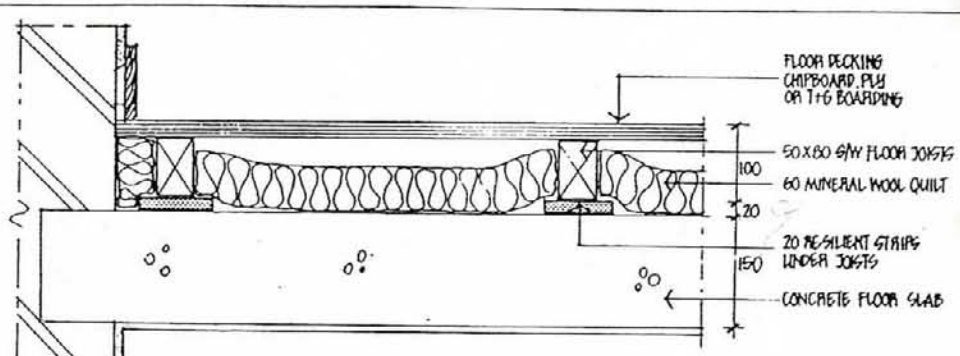
DOOR OPENING : 1540 X 2090 HIGH
OPERATION : ELECTRICAL. AS DOOR CLOSES, DROPS AND MOVES 45° TOWARDS FRAME TO SEAL AT SILL AND FRAME
SEALS : RUBBER GASKETS
DOOR : 90mm THICK. 18mm ROCKWOOL CORE. 10mm PLYWOOD AND 2mm STEEL SHEET EITHER SIDE

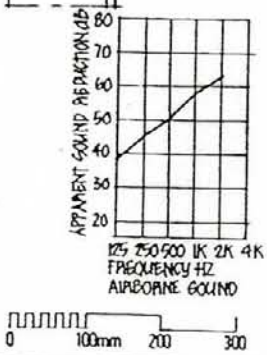
STC : PERFORMANCE THROUGH THE FREQUENCY RANGE. ALTHOUGH LOW FREQUENCY PERFORMANCE LESS THAN FOR THE 1/2 STUDIO DOOR ILLUSTRATED

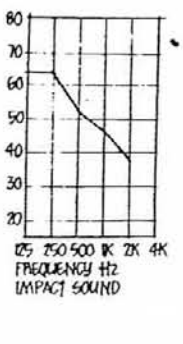




STUDIO DOORS
SOURCE: RESEARCH INSTITUTE FOR ENVIRONMENTAL HYGIENE, DELFT. NARKINS







GOOD FOR IMPACT SOUND ISOLATION OR UPPER LEVEL NOISE SOURCE. BECAUSE OF FLANKING IT IS NOT WORTH GOING TO THE TROUBLE OF TRIPLE FLOOR CONSTRUCTION (ie. FLOATING FLOOR/STRUCTURAL SLAB/SEPARATE CEILING SUSPENSION) UNLESS ISOLATING WALLS TO SUCH ELEMENTS ARE ALSO USED. WEIGHT 350 Kg/m²

FLOORS
SOURCE: H.V. INSTITUTE AMSTERDAM

STUDIO DOOR AND FLOOR DETAIL

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Beranek, Leo Leroy. Music, Acoustics and Architecture. John Wiley and Sons, New York, 1962.

2. Berry, Wallace. Form in Music. Prentice- Hall Inc., New Jersey. 1986.

3. Borish, Jeffrey. *"The Basics of Concert Hall Acoustics"*. **High Fidelity**, July 1989. Vol. 39, pp. 40- 47.

4. Central Philadelphia Development Ccrporation. South Broad Street: A Vision for the 1990's. Philadelphia: December 1990.

5. Forsyth, Michael. Building for Music. Columbus: Ohio State University Press, c1984.

6. Geerdes, Harold. Planning and Equipping Music Facilities. New York: Music Educators National Conference, c1975.

7. Izenour, George. Theater Design. New York: McGraw Hill Book Co., c1988.

8. Izenour, George. Theater Technology. New York: McGraw Hill Book Co., c1972.

7. Koetter, Alfred. "*Monumentality and the American City*".

8. Lord and Templeton. Detailing for Acoustics. London: Architectural Press, c1983.

9. The Philadelphia Planning Commission. Plan for the City. Philadelphia: January 1988.

10. Stockhausen, Karlheinz. Form and Space. Pennsylvania: Theodore Presser Co., . c1986.

11. Urban Partners and Kise Franks & Straw, Inc.. South Broad Street: Economic & Cultural Development Plan. Philadelphia: November 1991.

12. "*What Are Some of Your Favorie Halls to Play?*" **Musical America**, Vol. 112, Jan./ Feb. 1992. Pp. 13, 33-37.

13. Wister, Francis Anne. Twenty- Five Years of the Philadelphia Orchestra (1900-1925). Philadelphia: Edward Stern and Co., c1925.