Columbia University
Master of Science in Real Estate Development
Architectural Design
Reading Architectural Drawings
Introduction – Documentation
WHY DRAWINGS? (DOCUMENTS)

1. DESCRIBE THE PROJECT (GRAPHIC)
   - LOCATION
   - SIZE
   - LAYOUT
   - IMAGE
   - CONSTRUCTION
   - FINISH/FURNISH, etc.

2. A LEGAL INSTRUMENT FOR
   - OWNERS
   - ARCHITECTS
   - ENGINEERS
   - CONTRACTORS
   - SUPPLIERS
   - TENANTS
   - MUNICIPALITY
   - FINANCIAL INST.
   - CONSULTANTS
   - LEASING AGENTS
   - terms
   - conditions
   - specifications
   - instructions
   - level of quality
   - sequences
   - performance

+ WRITTEN SPECIFICATIONS
TYPES OF DRAWINGS - PARTIAL LIST

SITE
- Location
- Zoning
- Requirements
- Phasing
- Topography
- Utilities
- Parking
- Access

BLDG.
- Conceptual Design Development
- Contract Documents
- Specifications
- Floor Plans
- Roof Plans
- Ceiling Plans
- Sections - Cross
- Elevations
- Details
- Structural
- Mechanical
  H.V.A.C. Lit.
- Shop Drawings
- Perspectives
- Furnishings
- Technical - etc, etc.
- Leasing
- Construct. Sequences
Required Documents

Construction documents

Bidding documents

Typical project manual

Bidding requirements
- Invitation to bid
- Instruction to bidders
- Information available to bidders
- Bid forms and attachments
- Bid security forms

Contract forms
- Agreement
- Performance bond
- Payment bond
- Certificates

Contract conditions
- General conditions
- Supplementary conditions

Specifications
- Divisions 1 through 16

Drawings

Addendum

Contract modifications

When owner-contractor agreement is signed, these become Contract documents.
AIA Document B141

Standard Form of Agreement Between Owner and Architect

1987 EDITION

THIS DOCUMENT HAS IMPORTANT LEGAL CONSEQUENCES. CONSULTATION WITH AN ATTORNEY IS ENCOURAGED WITH RESPECT TO ITS COMPLETION OR MODIFICATION.

AGREEMENT

made as of the day of in the year of

Nineteen Hundred and

BETWEEN the Owner:

(Name and address)

and the Architect:

(Name and address)

For the following Project:

(Include detailed description of Project; location, address and scope)

The Owner and Architect agree as set forth below.
The average architecture firm passes 20 percent of its gross revenues through to consultants and joint venture partners.

As shown in the pie chart, a very substantial share of the pass-through revenues collected by the firms in the 1993 AIA firm survey were distributed to mechanical, structural, and electrical engineers.
Types of Drawings
drafting
Drawing done with the aid of such instruments as T-squares, triangles, compasses, and scales, esp. for the systematic representation and dimensional specification of architectural and engineering structures. Also called mechanical drawing.

object line
A solid line representing a contour of an object.

dashed line
A broken line consisting of short, closely spaced strokes, used esp. to represent object lines that are hidden or removed from view.

dotted line
A broken line consisting of a series of closely spaced dots, sometimes used in place of a dashed line.

centerline
A broken line consisting of relatively long segments separated by single dashes or dots, used to represent the axis of a symmetrical element or composition.

grid
A rectangular system of lines and coordinates serving as a reference for locating and regulating the elements of a plan.

construction drawings
The portion of the contract documents showing in accurate graphic or pictorial form the design, location, dimensions, and relationships of the elements of a project. Also called contract drawings, working drawings.
Plan/section/elevation views are the primary architectural drawings. They are orthographic in nature; the observer’s line of sight is perpendicular to both the drawing plane and the principal surfaces of the building viewed. Conversely, the drawing surface is parallel to the major surfaces of the building.

The greatest advantage of using orthographic drawings is that all facets of a form parallel to the drawing surface are represented without foreshortening or distortion. They retain their true size (to scale), shape, and proportion.
The floor plan and the building section (see pages 42-43) are both sections or cuts: the plan is cut horizontally; the building section, vertically. Whereas in working drawings (for the purpose of construction) plans and sections show the way buildings are put together, in design and presentation drawings the primary purpose of floor plans and building sections is to illustrate the forms and relationships of positive and negative spaces, and the nature of defining elements and surfaces.

The floor plan is a sectional view looking down after a horizontal plane has been cut through a building and the top section removed.

The horizontal section is generally cut through all major vertical elements and all door and window openings. Usually this cut is about 4' above the floor, but this can vary slightly, depending on what you want to illustrate.

Floor plans are normally drawn at a scale of \( \frac{\frac{1}{4}}{10} \) or \( \frac{\frac{1}{2}}{10} \), but for large buildings and complexes the scale can be smaller. The larger the scale of the floor plan, the more detail has to be shown to give the drawing credibility (see pages 32-33).
As the scale of a drawing increases, the amount of detail required to give the drawing credibility also becomes greater. This attention to detail is most critical when drawing the thicknesses of those materials that are cut in plan. Careful attention should be paid to wall and door thicknesses, wall terminations, corner conditions, and stair details. A general knowledge of building construction therefore is necessary to execute large-scale plan drawings.
SYMBOLS REPRESENTING DOORS

Typically, Architectural Drawings will use these symbols to represent a door in Plan:

- INTERIOR DOOR
- INTERIOR OPENING
- EXTERIOR DOOR
- DOUBLE DOOR

Older/Simplified Architectural Drawings manytimes will use this alternate set of symbols to represent doors:

- INTERIOR DOOR
- INTERIOR OPENING
- EXTERIOR DOOR
- DOUBLE DOOR

The Doors above are common hinged doors, and are represented as shown. There are various other types of doors which commonly appear on plans which have the following symbols and uses:

- OVERHEAD DOOR (GARAGE/LOADING DOOR)
- BIFOLD DOOR (CLOSETS)
- TRAVELLING DOOR (KITCHENS)
- REVOLVING DOOR (LOBBIES/ENTRANCES)

- SLIDING GLASS DOOR (EXTERIOR PATIOS)
- SLIDING DOOR (CLOSETS)
- POCKET DOOR (BATHROOMS/SMALL AREAS)
- ACCORDION DOORS/PARTITIONS (DIVIDE LARGER SPACES)
SYMBOLS REPRESENTING WINDOWS

Typically, Architectural Drawings will use one of these symbols to represent a window in Plan:

- WINDOW (on Arch. Plan)
- WINDOW (on Marketing Plan)
- WINDOW (Code/Zoning Plan)
- WINDOW (on Marketing)
- VENT

There are multiple types of windows which are commonly used in buildings such as:

- DOUBLE HUNG
- CASEMENT
- FIXED GLASS
- OPEN
- INTERIOR PASS THRU OPENING (no glass)
- AWNING

In addition to single windows, there are a number of other window systems commonly used:

- CURTAIN WALL (Office Towers/ Large Commercial Buildings)
- NULLED WINDOWS/ MULTI WINDOW UNITS (several single window units joined together)
- STOREFRONT WINDOW UNIT (almost always including an integrated door unit)
Typically, architectural drawings will use these symbols to represent stairs:

- **Straight Staircase**
- **Sissor Stairs** (Fire stairs)
- **Stairs w/landing**
- **Spiral Staircase**
On Plans, Elevators are represented in one of two different ways:

This is an Elevator Shaft

This is an Elevator Shaft

The Elevator exits on this side

The Elevator exits on this side

A Typical Large Elevator Core
Containing Elevators, Stairways and Mechanical Shafts

A Typical Elevator Bank

The Elevator Core occupies the center of a typical building.
In using plan/section/elevation drawings to represent architecture, we are in fact utilizing an abstract method to represent reality.

Although these four objects have different forms, the plan views for all of them (looking straight down) are identical. Because of this, the relationship between plan, section, and elevation views is critical for the description and comprehension of what we are drawing. When utilizing plan, section, and elevation drawings to describe architecture, we must see them as a series of related views, all of which contribute to the understanding of what we are drawing.
The **building section** is a horizontal view of a building after a **vertical plane** has been cut through it and the front section removed.

**Design sections**, unlike **construction-drawing sections**, should always be continuous, using jogs in the cutting plane only when absolutely necessary. The intent of **building design sections** is to illustrate the greatest number of relationships between significant interior spaces; they look toward the most significant ends of these spaces. One section is usually not sufficient to achieve this unless the building is extremely simple. (Remember that the building section is only part of a series of related views.)
Axonometric Drawings
Elevations and Sections
Session II – Types of Drawings
Site Analysis

Zoned for residential use

Low density to preserve most trees

Drainage

Lake approx. 25 acres steep slopes (unpolluted)

Access point to lake

Slow permeability unstable wet soils

Extensive native vegetation with heavy undergrowth steep slope wild-life habitat - retain in natural state

Good view over lake

Several large oaks

Use natural areas as pedestrian greenways

Oak hammock

Out-parcel extensive tree growth future development is undecided

Traffic level & both roads

Traffic light

Undeveloped possible future residential

Provide pedestrian linkage and traffic light. Elementary school site

122 Street North

Existing flood criteria established at 8'-0' M.S.L.
BUFFER TO ADJACENT PROPERTY

CLUSTER LOW DENSITY TO SAVE TREES

CURVED ROAD FOR CHANGING VISTAS AND SLOWER TRAFFIC MOVEMENT

ACCESS TO LAKE

MORE INTENSIVE DEVELOPMENT IN LESS SENSITIVE AREAS

200' MIN

BUFFER

BUFFER

CONTINUOUS GREENWAY AS LINKAGE SYSTEM

ACCESS TO SCHOOL

CONCEPT PLANNING
Preliminary Planning

PRELIMINARY PLAN

COMMUNITY CENTER AS FOCAL POINT

GREENWAY

PROPERTY LINE

LAKE
Site Plan Terminology

contour line
An imaginary line joining points of equal elevation on a surface, or its representation on a topographic plan or map.

contour interval
The difference in elevation represented by each contour line on a topographic plan or map.

grading plan
A plan showing the proposed finish contours and elevations of the ground surface of a construction site.

roof plan
A plan showing the top view of a building, esp. the form of its roof.

site plan
A plan showing the form, location, and orientation of a building or group of buildings on a site, usually including the dimensions, contours, landscaping and other significant features of the plot. Also called plot plan.

area plan
A plan showing the principal elements of a design project in the wider context of its surrounding environment.
Birdseye Site Rendering
Office Tower Details

sections

9.3

9.4

typical floor plan

9.5

9.6

structural detail

exterior wall assembly
Exterior Wall Sections

- Cast Stone Trim
- Shaded area indicates existing construction
- Semi-rigid insulation typ @ each spandrel
- Lateral restraint anchor typ @ each floor
- Vapor retarder, typ.
- Single hung alum window
- Composite masonry wall
- 8" CMU backup w/ masonry cell insulation, typ. Unless noted otherwise
- GWD laminated to CMU backup
- Veneer strap anchor at cast stone trim typ
- 1'-1/2"
- 1'-6"
- 7'-0" MO
- 2'-4½"
- 4 x 1'-0" Nelson DBA welded to exg STL beam
- 32" O.C. GROUT CMU cell solid typ at each floor
- Cut & patch conc @ DBA, typ.
- Susp. GWB CL'G
- GWB JAMB RETURN BEYOND
Architectural Models
3D Computer Model Animation
### MASTERSECTION DIVISIONS AND SECTIONS

Master Outline Specifications Table of Contents, AIA Master Systems (1992)

This outline, based on the MASTERFORMAT developed by the Construction Specifications Institute, is used by AIA Master Systems for its Master Outline Specifications. (The MASTERSECTION outline is more detailed. For comparison, see its Division 1 on page 718.)

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Division 16—ELECTRICAL

Not included in Master Outline Specifications
Session III – Design Process
Involvement:
Client
Community
Finance
Consultants

Process Continuum

THE CLIENT SUPPORT CIRCLE
William T. Coleman, AIA

We architects and builders have, for centuries, focused our energies on design and construction projects, a growing number of building owners have a different view. For them, the process of operating and managing buildings is ongoing. For the client, the project does not end at move-in since this is only the beginning of the process of managing the facility. Thus, the project involvement process is a circular one in which postconstruction and predesign are linked. This circle offers a framework for guided services for architects.
Depending on the project, facilities planning and programming may encompass a wide variety of human, physical, and external factors. Here is one list:

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</tbody>
</table>
+ Good access to shopping center.
+ Private space located away from Main Street.
- Access to restaurant is through private space.
- Public space isn't accessible to parking & sidewalk.
- Major circulation is through semi-private space.

+ Good access to shopping center.
+ Private space located away from Main Street.
+ Access to restaurant is through semi-private space.
+ Good access from public space to parking & sidewalk.
+ Major circulation is through public space.
Schematic Planning Sketches

New Town
Palliser Street
 RSA
 Convention Centre
 NHSOT School
 Greyfriars

University
HOLYROOD
PARK

Peripheral

Institutional
Cultural
Centre

Convention
Centre
Retail
Entertainment

Institutional Centre
Cultural Centre
Retail
Masterplanning – Phase 1
MERRILL LYNCH

Lobby Perspective

99 HUDSON STREET
JERSEY CITY, NEW JERSEY

Schematic Perspective

FOX & FOWLE ARCHITECTS, P.C.

11.01.00
Schematic Building Section
M-1
Height 4 stories or 55’ max.
Maximum FAR 2.0
Maximum Building Coverage 0.5
40’ front yard setback from road CL
Parking Office 2/1000 sq’
Shop 1/3 employees

W-4
Height 6 stories or 72’ max.
Maximum FAR 2.0
Maximum Building Coverage 0.5
40’ front yard setback from road CL
Parking Office 2/1000 sq’
Shop 1/3 employees
Zoning Boundaries

- M-1
- M-2
- C-2
- W-4
- W-4
- M-2
Proposed Site

Total Acreage
Approx. 6.7
Proposed Site with Additional Front Parcel

Total Acreage
Approx. 8.4
Setbacks
Scheme One

Fabrication Building
75,000 gsf

Office Building
25,000 gsf

Requires additional parcel to achieve proper truck dimensional criteria and employee parking,
Total Site is approx. 8.4 acres.
Scheme Two
Views From Site
Scheme Two
Views Toward Site
Technically, these parcels are not required to meet building coverage zoning requirements. A 100,000 gsf building requires 4.6 acres at 50% coverage. The site indicated in green is 6.14 acres.
This scheme does not require the additional parcel. Total site is approx. 6.7 acres.
Massing Concept “A”
The metal fabrication shop and the office area for is composed as a single architectural mass. The massing is articulated to express the different programmatic functionality.

Massing Concept “B”
The metal fabrication shop and the office area are designed as separate inter-penetrating architectural forms. The office building and the shop area maintain close adjacency relationships.

Massing Concept “C”
The metal fabrication shop and the office area are composed as separate and distinct architectural masses. The massing of the office area is designed to take advantage of the views to the river.
Massing Concept “C”

For this study, massing concept “C” was chosen to explore the building architectural expression and conceptual program organization.
Program

Shop Area 71,000 gsf
45’ structural bays
315’ x 225’
Lunch room
Locker/lavatories
Foreman Office
Parts storage
Finished product storage
Level One Office @ 12,500 gsf

Bridge Connection into overlook of shop area
Vertical circulation area (multi-story glass lobby with ornamental stair)
Office work area
Level Two Office @ 11,000 gsf

Program
Level Two Office work area

Vertical circulation area (multi-story glass lobby with ornamental stair)
Multi-height area w/ adjacent meeting rooms that over-look
Dock Area (15 dock bays)
Vertical circulation connects to upper level access to viewing area.
Technically, these parcels are not required to meet building coverage zoning requirements. A 100,000 gsf building requires 4.6 acres at 50% coverage. The site indicated in green is 6.14 acres.
Ground Level
Level One
Level Two
Upper Level
Defining the Project – Stacking Diagram

ARCHITECTURAL AREA AND VOLUME OF BUILDINGS

AIA Document D101, Architectural Area and Volume of Buildings, provides a generally accepted set of definitions for establishing building area and volume. For example, an exterior balcony contributes one-half of its floor space to the total net assignable area, while an enclosed entrance is counted at its full floor area.

- Duct space (1/2)
- Bulkhead or penthouse (full)
- Parapet (0)
- Open roof (0)
- Sun shades (0)
- Typical floors (full)
- Interstitial space
- Floor (full)
- Mechanical space (full)
- Balcony (full)
- Upper space (0)
- 2nd floor (full)
- Auditorium (full)
- 1st floor (full)
- Canopy area (1/2)
- Enclosed entrance (full)
- Open plaza (0)
- Basement (full)
- Sub-basement (full)
- Pipe space less than 6 feet (1/2)
- Pipe space 6 feet or higher (full)
- Foundations (0)
Defining the Project – Thermal Control

**FIGURE 3.5.** Stack effect in tall buildings.

**FIGURE 3.6.** Heat gains and losses in buildings.
Session IV – Developing the Plans

Schematic Design
Design Development
Working Drawings
Site Design Development - Hadera

land use and topography

development site plan
Elevations - Hadera
Sample Project – BEFORE Renovation
Sample Project – AFTER Renovation
The Typical Document Set:

**Divisions:**
- **A- Architectural**
- **Ex- Existing**
- **X- Building/ Fire Code Plan**
- **S- Structural**
- **D- Demolition**
- **P- Plumbing**
- **C- Civil/Site work**
- **E- Electrical**
- **M- Mechanical**

**Sections:**
- **A0- Building/ Fire Code Review Plan**
- **A1- Plans**
- **A2- Exterior Elevations**
- **A3- Sections**
- **A4- Details**
- **A5- Stairways/ Elevators**
- **A6- Interior Elevations**

**Sheets:**
- **A1.0- Foundation Plan/Basement Plan**
- **A1.1- First level/ Ground level**
- **A1.2- Second level**
- **A1.3- Third level**
- **A1.4- Fourth level**

These numbers are located in the lower right hand corner of the drawing, alike this sheet. In this way a plan can quickly be referenced.
As the scale of a drawing increases, the amount of detail required to give the drawing credibility also becomes greater. This attention to detail is most critical when drawing the thicknesses of these materials that are cut in plan. Careful attention should be paid to wall and door thicknesses, wall terminations, corner conditions, and stair details. A general knowledge of building construction therefore is necessary to execute large-scale plan drawings.