WELCOME TO: ARCH 2330,
BUILDING TECHNOLOGY III

BIM construction drawings

Photo: Maud Aptekar © 2009

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WELCOME TO:
ARCH 2330
BUILDING TECHNOLOGY III

A.Aptekar : Section: 9619
Tuesday 8:30 - 11:25 AM (V811)
Thursday 8:30 - 11:25 AM (V811)

P.King: Section: 9620
Wed 8:30 - 11:25 AM (V834B)
Friday 8:30 - 11:25 AM (V834B)

R.Bryce : Section: 9621
Monday 2:30 - 5:25 AM (V834B)
Thursday 2:30 - 5:25 AM (V811)

J.Sherman: Section: 4148
Monday 6:00 - 8:55 AM (V811)
Thursday 8:30 - 11:25 AM (V833)

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Introduction

- Prof. Alexander Aptekar EMail: AAptekar@CityTech.Cuny.Edu
- Office Hours : Tuesdays 12:00-1:00 pm Thursdays 4:30-5:30pm and by appointment

- Prof. Paul King EMail: APKing@CityTech.Cuny.Edu
- Office Hours : Wednesday 12:00-1:00 pm Friday 11:30-12:30pm and by appointment

- Prof. Robert Bryce EMail: RBryce@CityTech.Cuny.Edu
- Office Hours : by appointment

- Prof. Justin Sherman EMail: JSherman@CityTech.Cuny.Edu
- Office Hours : by appointment

- Our offices are in V205-209.

- 4 CREDITS: 1 Classroom Hour and 6 Lab Hours

- **Prerequisites:** ARCH 1200 (Architectural Drawing II) with a grade of C or higher and ARCH 1240 (Materials in Architecture II)

Note: ARCH 1290 (Architectural CADD) can be substituted for one of the above classes under some circumstances.

- **Pre- or co-requisites**: ARCH 2370: Environmental Systems for Architects

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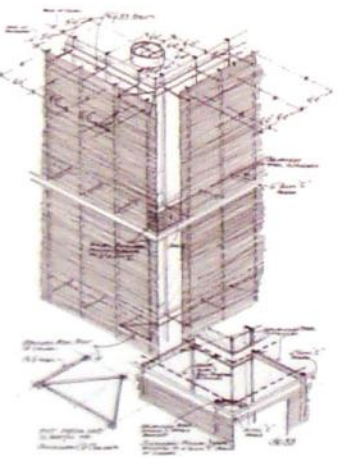

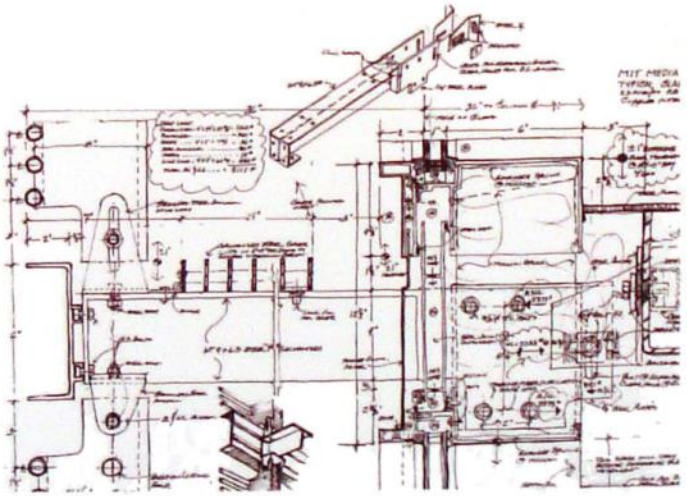

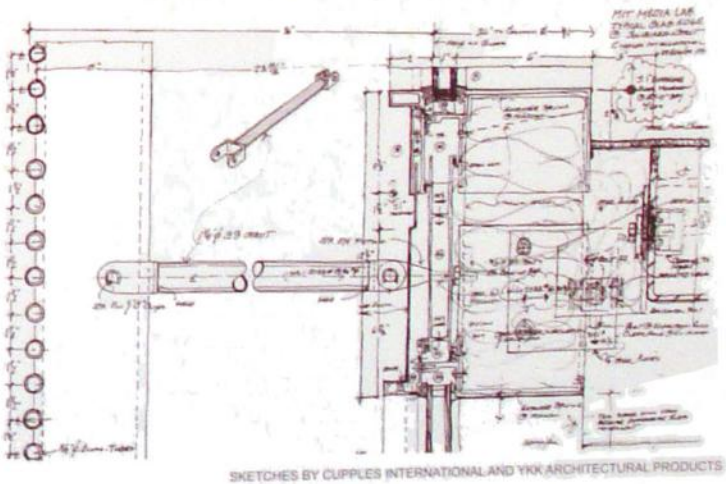

Building technology exhibition 2010; MIT Media Lab, architect Fumihiko Maki

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Course Description:

- This course studies the development of building systems as they occur during the design development phase of architecture. Using case study research methods, students analyze factors, such as building assemblies and systems, codes and government regulations, human ergonomics, and sustainability, that affect building construction and use. Their solutions to these issues are integrated into their final building design solutions. The student creates a series of reports and a set of construction drawings using both analog methods (hand sketching and drawing) and digital tools including traditional CAD software and Building Information Modeling techniques.

- Course Context: This is the third course in the required sequence of four building technology sequence.

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Media-ICT, Barcelona Architect: Cloud 9

http://www.worldbuildingsdirectory.com/project.cfm?id=3711

Texts:

- **Required Texts:**
- Class readings on relevant sections will be posted weekly on either Blackboard or the OpenLab website
- Allen, Edward and Joseph Iano. Fundamentals of Building Construction / Materials and Methods.
  John Wiley and Sons, 2008.
- Ching, Francis. Building Construction Illustrated. John Wiley and Sons, 2008.

- **Recommended Text:**
- Ramsey, Charles George, Harold Reeve Sleeper, and Bruce Bassler. Architectural Graphic Standards: Student Edition (Ramsey/Sleeper Architectural Graphic Standards Series). John Wiley and Sons, 2008.
- James Vandezande, Eddy Krygiel, and Phil Read. Autodesk Revit Architecture 2013 Essentials: Publisher: Sybex; 1 edition (May 1, 2012)

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Course Policies:

- **Attendance Policy:** No more than 10% absences are permitted during the semester. For the purposes of record, two lateness are considered as one absence. Exceeding this limit will expose the student to failing at the discretion of the instructor.

- **Course Structure:** Lectures & lab work. Assignments include sketching, a series of reports, class presentation, , quizzes and set of design development level construction drawings. Digital tools learned in prior building technology courses are reinforced and enhanced.

- **Grading:**

50%	Individual Computer Based Drawings (Comprehensive Drawing Set)
15%	Case Studies, Presentations, Research
15%	Studio Lab Assignments
15%	Sketching assignments & redlines
5%	Class Participation

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Course Policies:

- **Academic Integrity:**

- Students and all others who work with information, ideas, texts, images, music, inventions and other intellectual property owe their audience and sources accuracy and honesty in using, crediting and citation of sources. As a community of intellectual and professional workers, the college recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and is punishable by penalties, including failing grades, suspension and expulsion.

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Media-ICT, Barcelona Architect: Cloud 9

Course Policies:

Learning Objectives

Upon successful completion of this course, the student will:

- **Understand** the process and requirements of developing a design from a schematic concept into design development drawings. (Knowledge)
- **Execute** work through a collaborative process (Gen Ed)
- **Generate** clear and concise talking points to guide oral presentations of lab assignments. (Gen Ed)
- **Understand** the advantages and limitations of BIM (building information modeling) as a tool for design development and project delivery. (Skill)
- **Apply** knowledge of materials and methods of construction, including sustainable principles, to the development of details and assemblies. (Skill)
- **Sketch** and **draft** details in orthographic and 3-D views in analogue and digital media. (Skill)
- **Design** and **analyze** exterior wall system based on environmental performance.
- **Apply** knowledge of professional construction drawing standards for page composition, title blocks, annotation, and schedules. (Skill)
- **Develop** a professional quality coordinated, edited, and organized set of design development documents for a given building design using BIM and CAD. (Skill)

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Course Policies:

Assessment

To evaluate the students' achievement of the learning objectives, the professor will do the following

- **Review** students' drawing and modeling work where students must exhibit their visual representation skills (2-D and 3-D). (Los: 6, 8, 9)
- **Assess** the students' use of professional vocabulary during oral presentations.(Lo:3)
- **Review** the effectiveness of student team organization and their management of the project work by frequent meetings. (Lo: 2)
- **Inspect** student submissions for the efficient and effective use of BIM tools. (Lo: 4)
- **Confirm** the proper coordination of the students' submitted drawing sets. (Lo: 9)
- **Review** the quality and accuracy of the students' submitted analogue and digital models of construction assemblies (Los: 6, 7)
- **Review** the effectiveness of the design and the accuracy of the analysis of the environmental performance of the submitted exterior wall system. (Los: 5, 7)
- **Compare** the content and quality of final submission of the design development set to a specific professional standard. (Los 1, 8, 9)

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Course Policies:

- **Term Project / Weekly Assignments:** Each student is responsible for turning in an assignment even if absent the day the assignment is given. It is the student's responsibility to have the email address or telephone number of another student in the class, or to speak with the instructor when absent. Late assignments will be *downgraded 1/3 grade for each class date* they are late. If the assignment deserves an **A-**, but was delivered *two classes late*, the student will receive a **B**. (**A- to B+ to B**)

- **Course Requirements:** Students should expect to spend at least 10 hours per week outside of class time preparing assignments by hand and at the computer. The computer lab is open weekdays and on Saturdays and Sundays during the semester. Hours are posted after the first week of classes. Due to our revised curriculum and greater use of computer labs, open lab hours have been greatly reduced. Remember to plan accordingly and *print all assignments the day before your class meets*.

- **Deadline note:** Unless otherwise instructed assignments will be due and must be posted on Blackboard in advance of class meetings at least 12 hours prior to the class's official start time. If class begins 8:30 AM then assignment must be posted by 8:30 PM the night before.

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bim-software-for-hvac-and-plumbing-design-511865

Blackboard:

Login : http://portal.cuny.edu/portal/

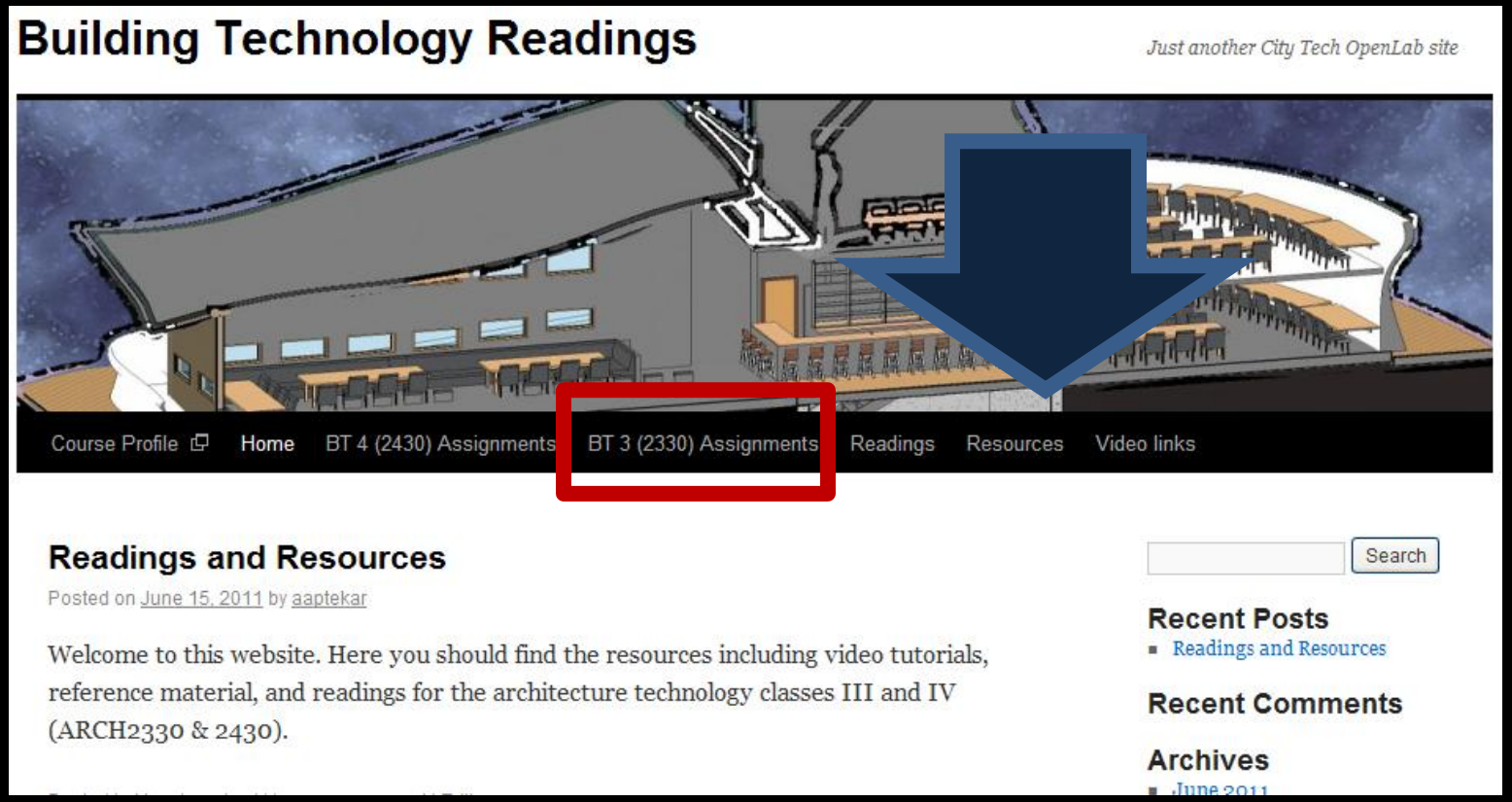
Student Blackboard and CUNY Portal:
Location: G-604
Walk-in, no registration required
Basic student instruction will be provided in how to get the portal ID and use Blackboard for class assignments.

The schedule of classes can be found at:
http://websupport1.citytech.cuny.edu/studentworkshops.html

January 30, Wednesday: 1:00pm- 2:00pm
February 2, Saturday: 12:00pm - 1:00pm
February 4, Monday: 2:00pm - 3:00pm
February 13, Wednesday: 1:00pm - 2:00pm
February 23, Saturday: 11:00am - 12:00pm
[Later dates are available]

Open Lab:

Login: http://openlab.citytech.cuny.edu/



Overview

Week One: Class 01

Lecture: Course Introduction:

a. Introduction and course outline.
b. File naming and protocols
c. Course project and development process
d. Sketching, drafting and CAD techniques
e. Introduction/review of basics AutoCAD
f. AutoCAD XREF and sheet set up
g. abbreviations list and graphic symbols

Lab [Computer Topics]:

a. Create a cover sheet listing
b. Create scaled environs drawing.
c. Develop Titleblock with your company logo and corporate contact information.
d. Add abbreviations list
e. Add graphics symbol and hatching keys.
f. Post completed sheet as a pdf and as a drawing file by the assigned deadline & add description.

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Media Arts and Sciences Building, Maki and Associates, MIT, Cambridge, Mass. 2010

Photo: Alexander Aptekar © 2010

File naming and protocols

All file names should include student's name (last then first), assignment number, assignment name, and date. All work must be submitted using the same version of Revit or AutoCAD that is installed in the lab. If you have a newer version configure your "Save_as" settings.

Individual Assignment Examples:
Last_First_##_AssignmentName_MMDDYY.extension
Wright_Frank_01_Grid_092312.pdf or Wright_Frank_01_Grid_092312.rvt
Only files named properly will be accepted. Other formats will be rejected and considered as not submitted.

Group Assignment Examples:
GroupNumber_##_AssignmentName_MMDDYY.extension
Group.01_01_Grid_092312.pdf or Group.01_01_Grid_092312.rvt

GroupMemberNames_##_AssignmentName_MMDDYY.extension or
Wright.Sullivan.Meis.Corbusier_01_Grid_092312.pdf or Group.01_01_Grid_092312.rvt

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File naming and protocols

As the semester progresses you will be required to maintain and hand in a *running archive* of *all* your work, including sketches, group assignments, etc. This archive is the primary source used for grading. At the end of the semester you will submit a *final* archive. File name for the archive is to include course number, course section, semester, professor's name, project name, drawing title, your name (last then first) and due date.

Examples:
ARCH2330_Section#_Semester_ProfessorsName_Lastname_Firstname_duedate.dwg
ARCH2330_9619_Fall12_Prof.Smith_Trubin_Alex_102212.dwg (due date = mmddyy)

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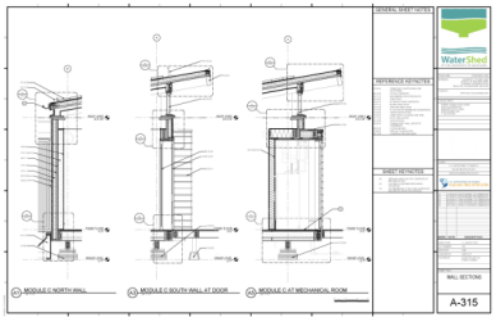
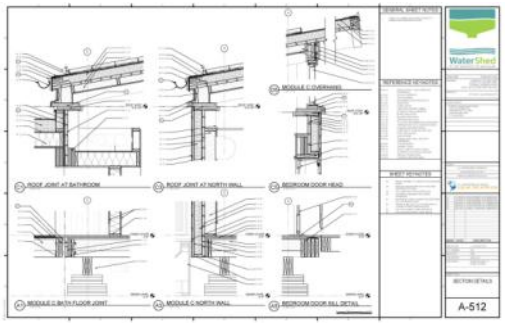
Course project and development process

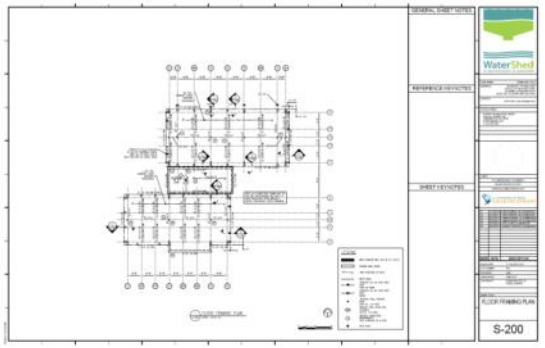
The semester project will be a Multi-story steel framed University use building .

As in the architectural office, this course requires you the student to complete a variety of tasks in order to accomplish the ultimate project - a set of construction drawings for a commercial steel framed high rise building with a curtain wall enclosure. The schedule is complex and demanding- just like the professional office.

The project will concentrate on the creation of Approximately 30 sheets of construction drawings (CD's) conforming to industry standards and course requirements.







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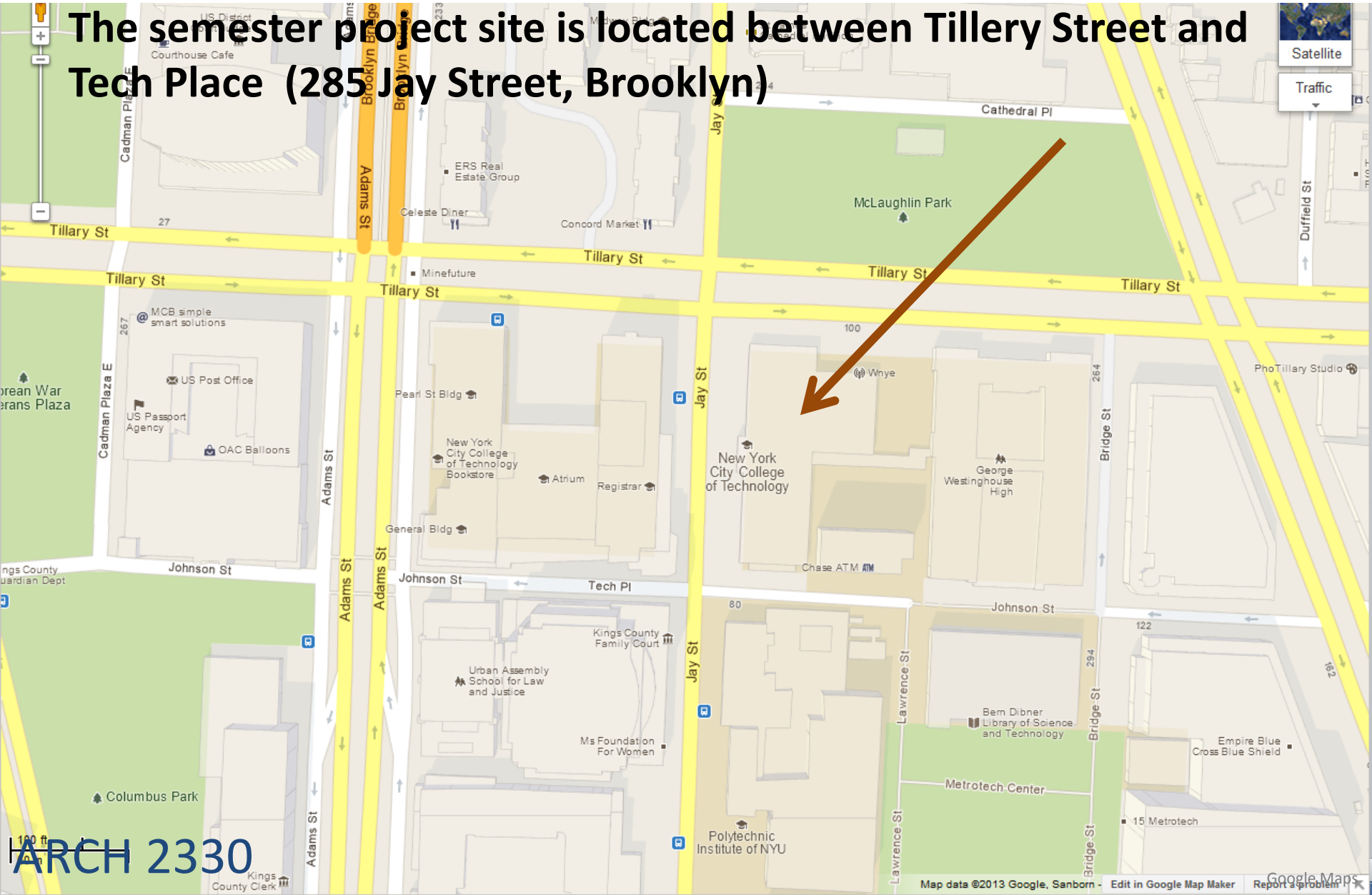
Course project and development process

The semester project site is located between Tillery Street and Tech Place (285 Jay Street, Brooklyn)

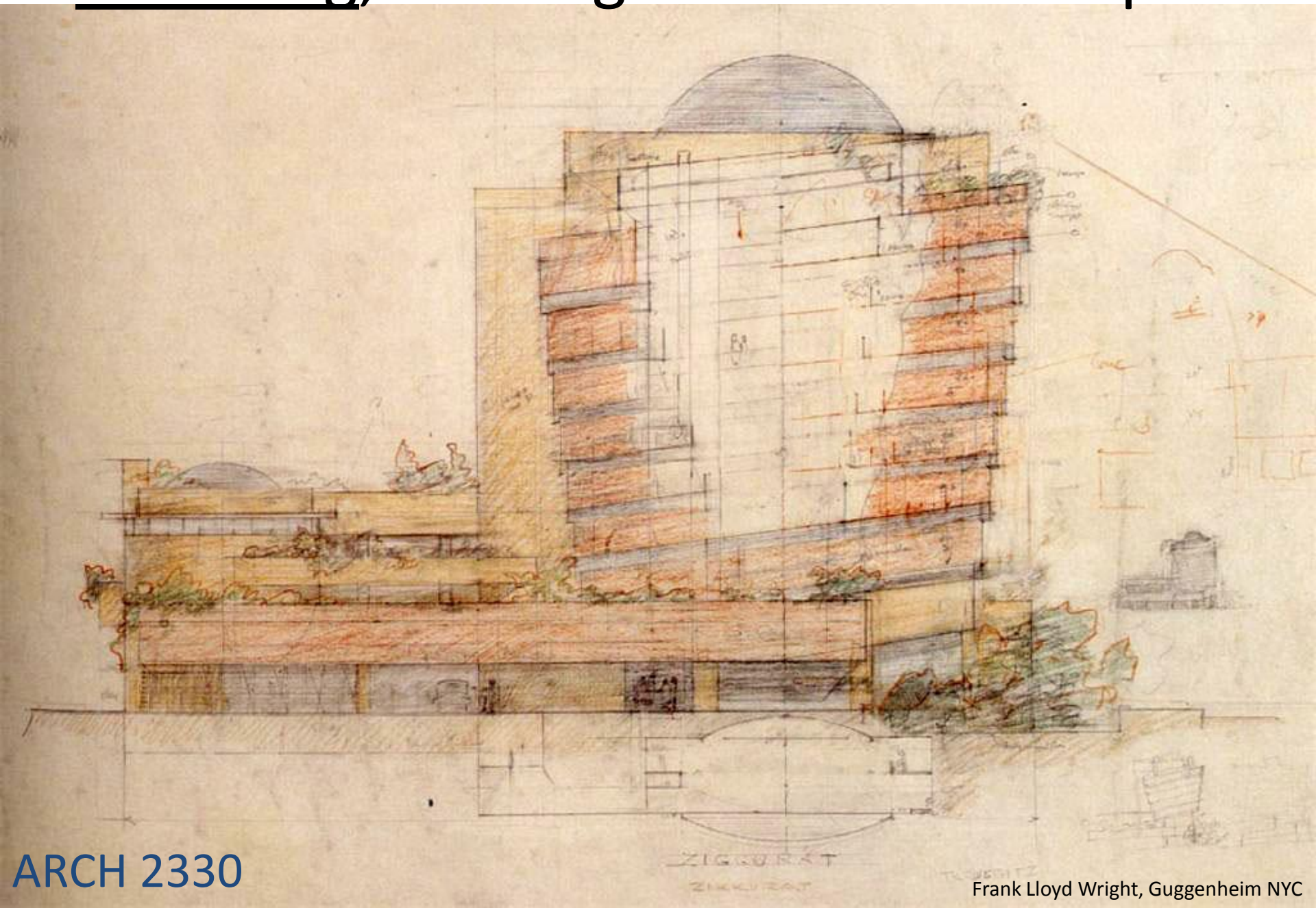


Klitgord building

ARCH 2330

http://www.brooklyneagle.com/articles/construction-begin-soon-city-tech%E2%80%99s-new-klitgord-building

Sketching, drafting and CAD techniques



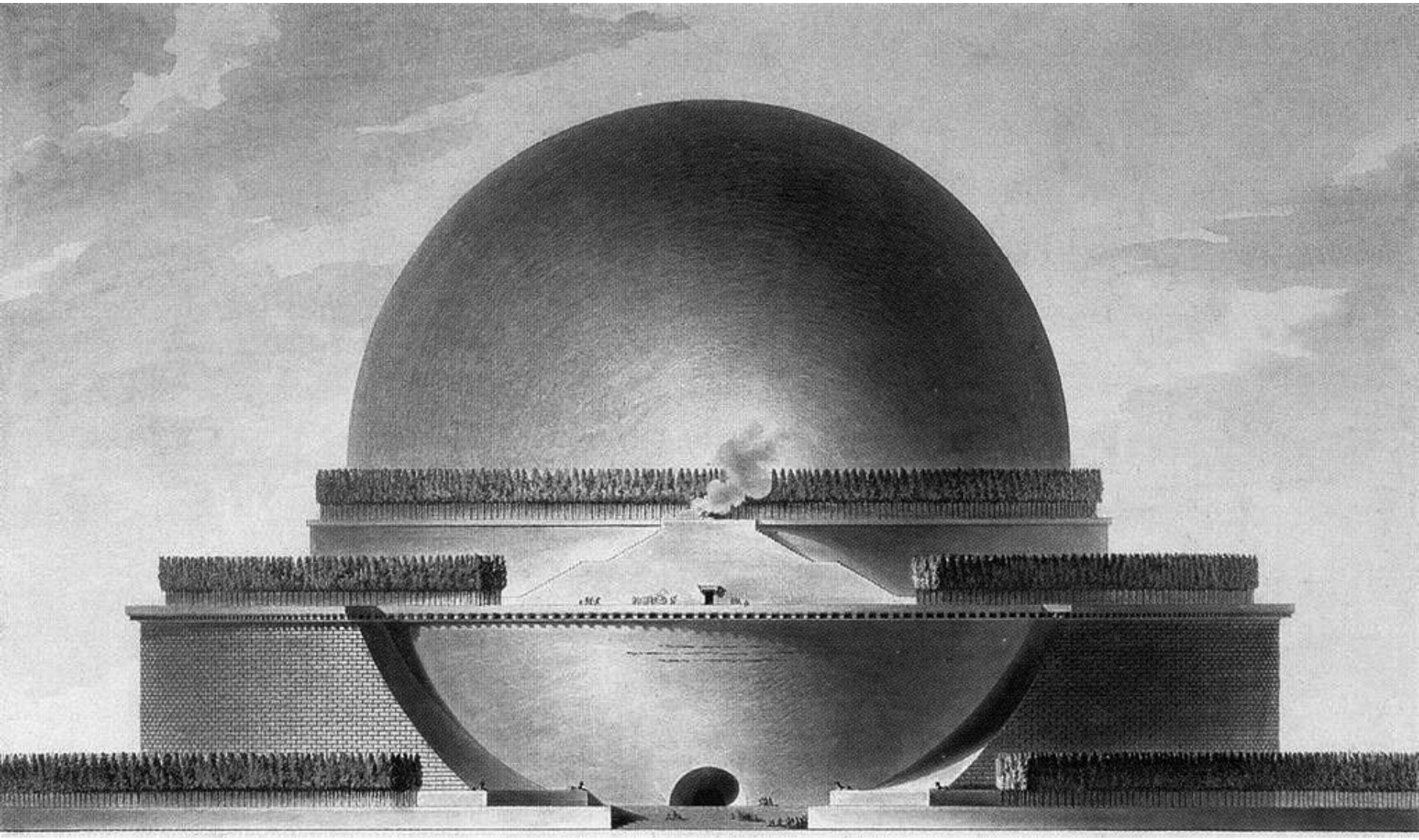
ARCH 2330

Frank Lloyd Wright, Guggenheim NYC

Giovanni Battista Piranesi, 1720 – 1778.

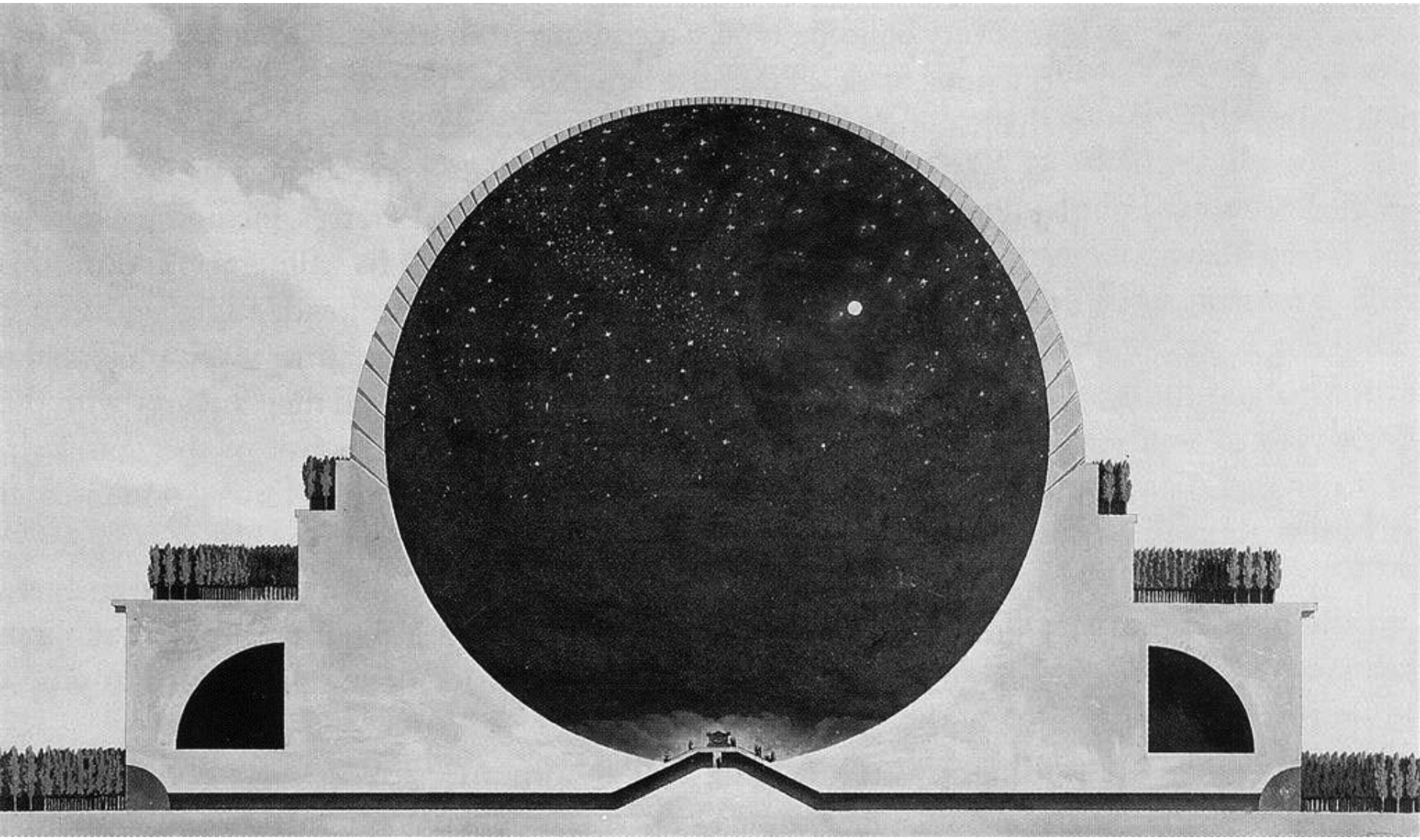
ARTstor - SCALA, Florence / ART RESOURCE, N.Y.

Étienne-Louis Boullée, France, 1728–1799



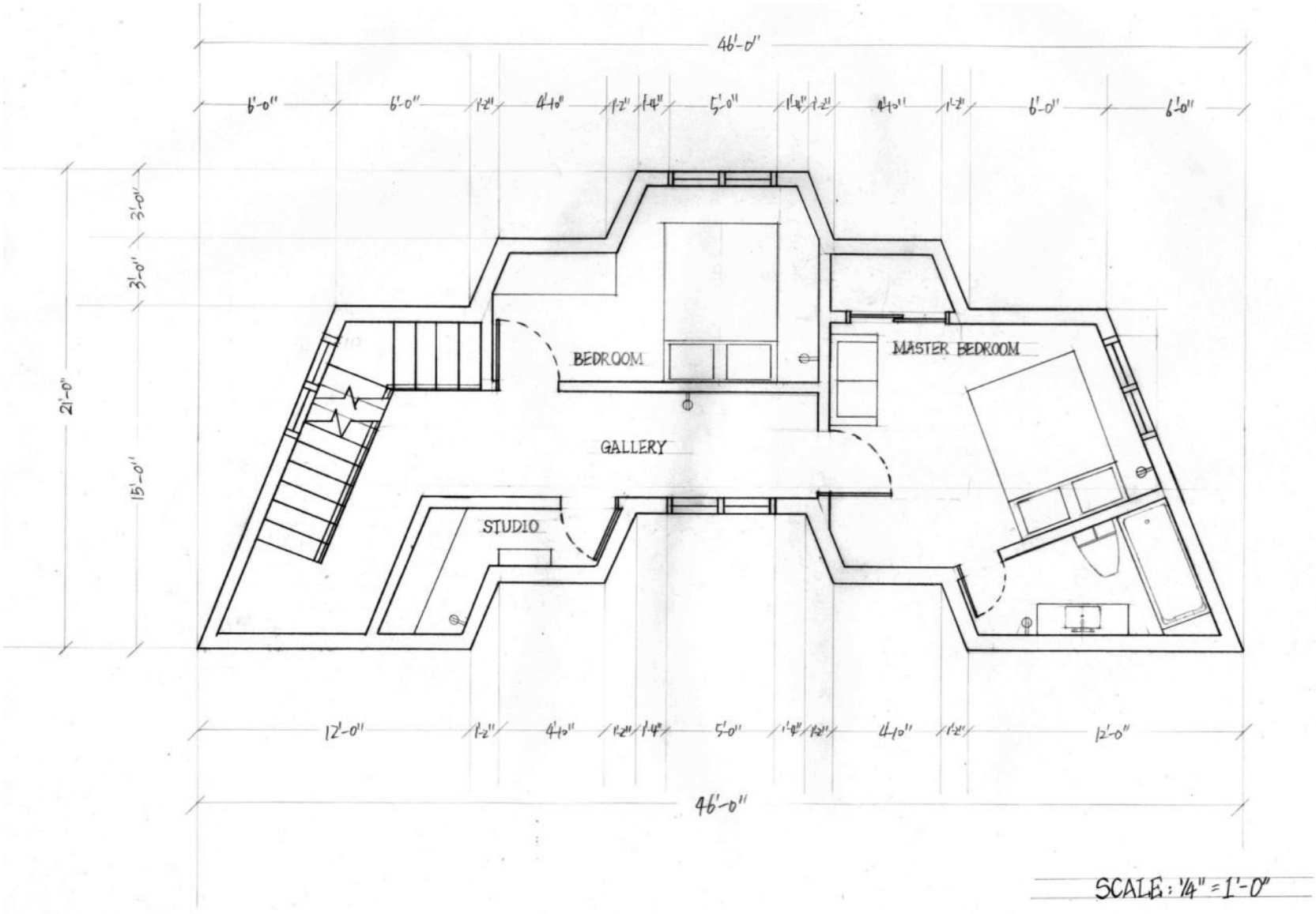
ARTstor - CCNY Teaching Collection

Étienne-Louis Boullée, France, 1728–1799



ARTstor - CCNY Teaching Collection

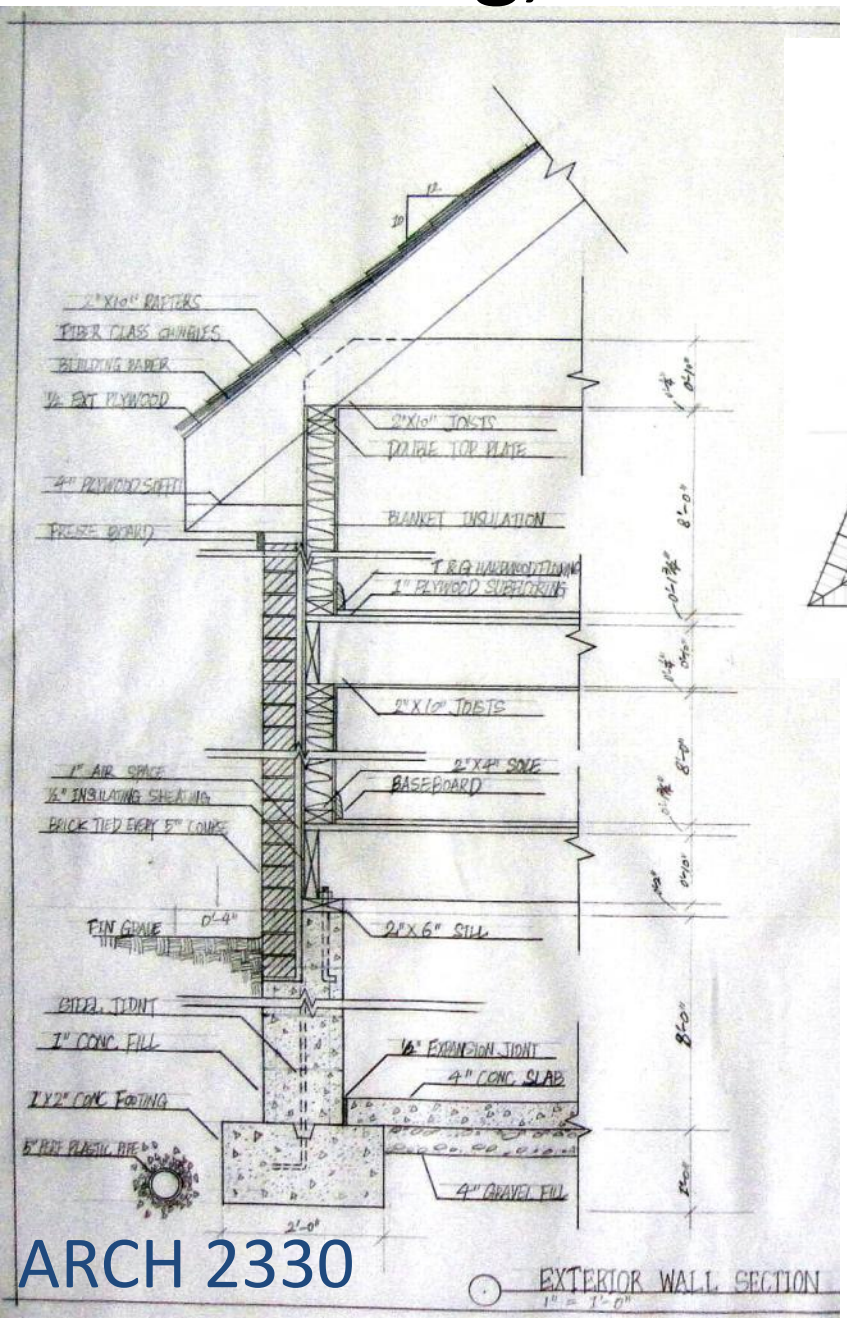
Sketching, drafting and CAD techniques

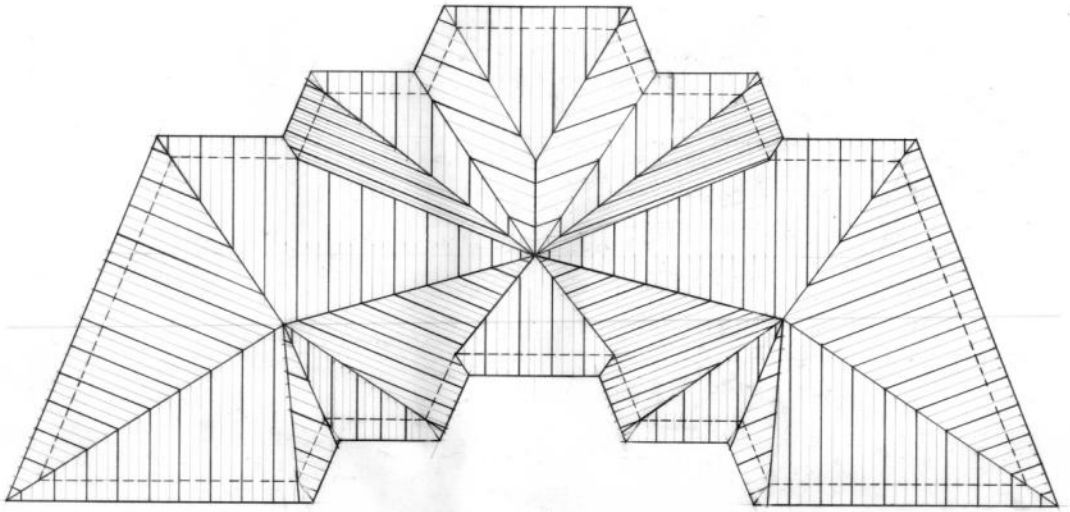


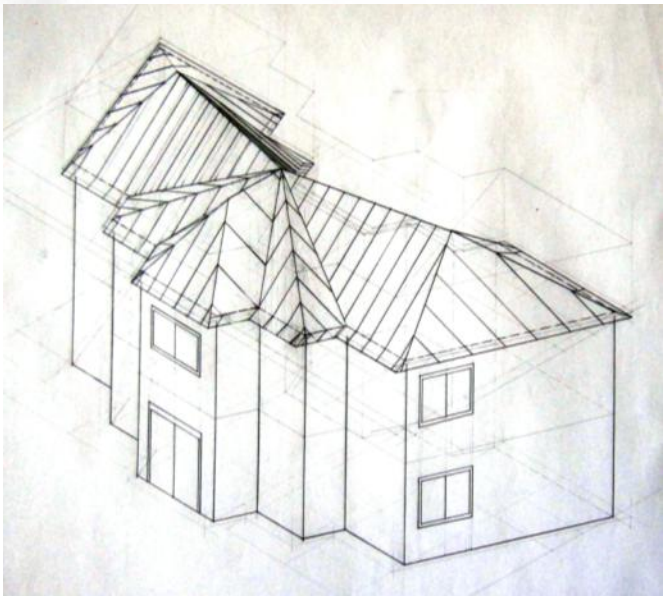
ARCH 2330

Yuhui Ouyang, hand drafted plan

Sketching, drafting and CAD techniques



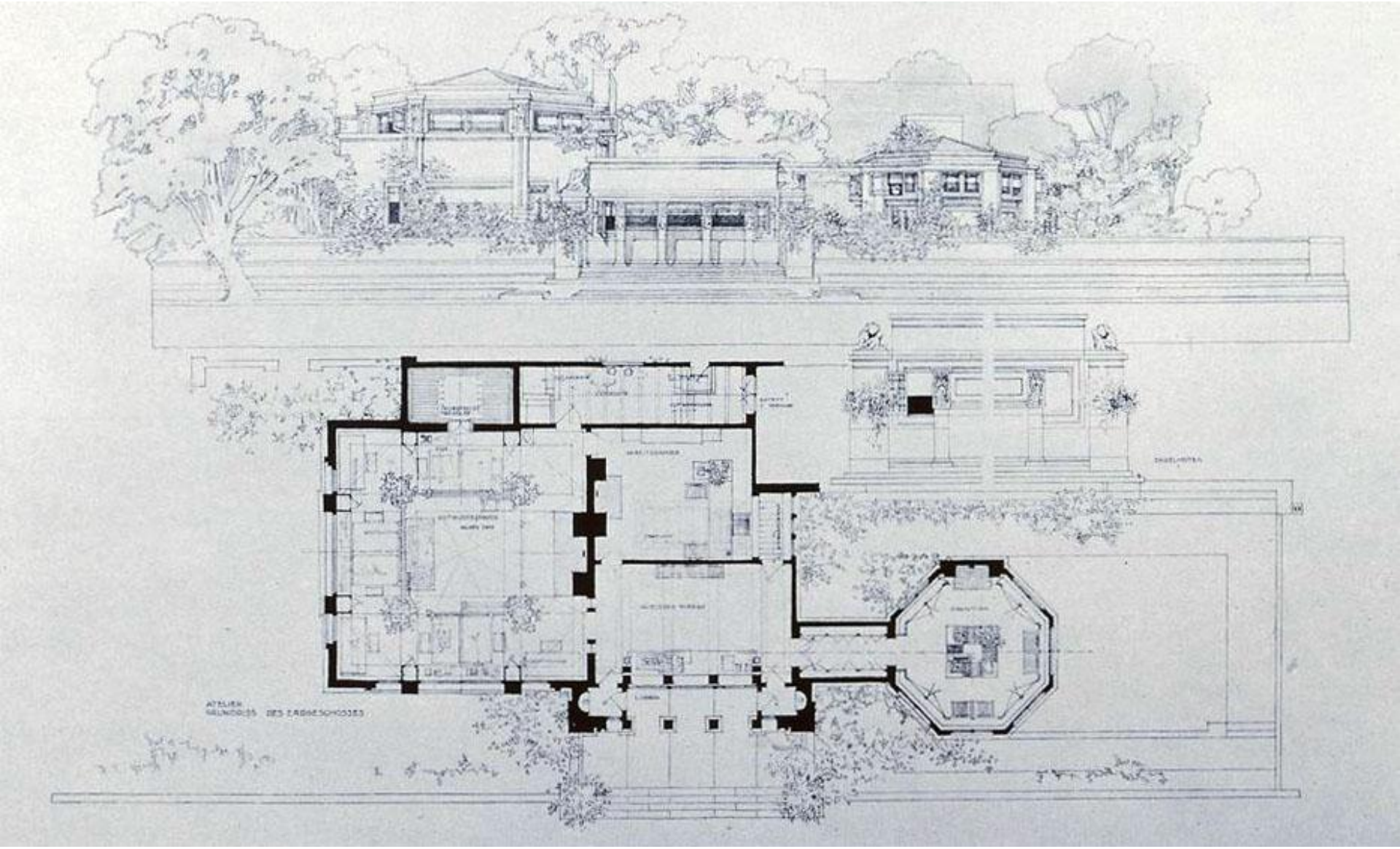




ARCH 2330

Yuhui Ouyang, hand drafted

Sketching, drafting and CAD techniques



ARCH 2330

ARTSTOR.ORG: Oak Park: Wright, F.L. House & amp; Studio ground plan

Sketching, drafting and CAD techniques

Edgewater (Vela Town Homes)

Arquitectonica

Photo: Alexander Aptekar © 2007

Edgewater (Vela Town Homes)

Arquitectonica

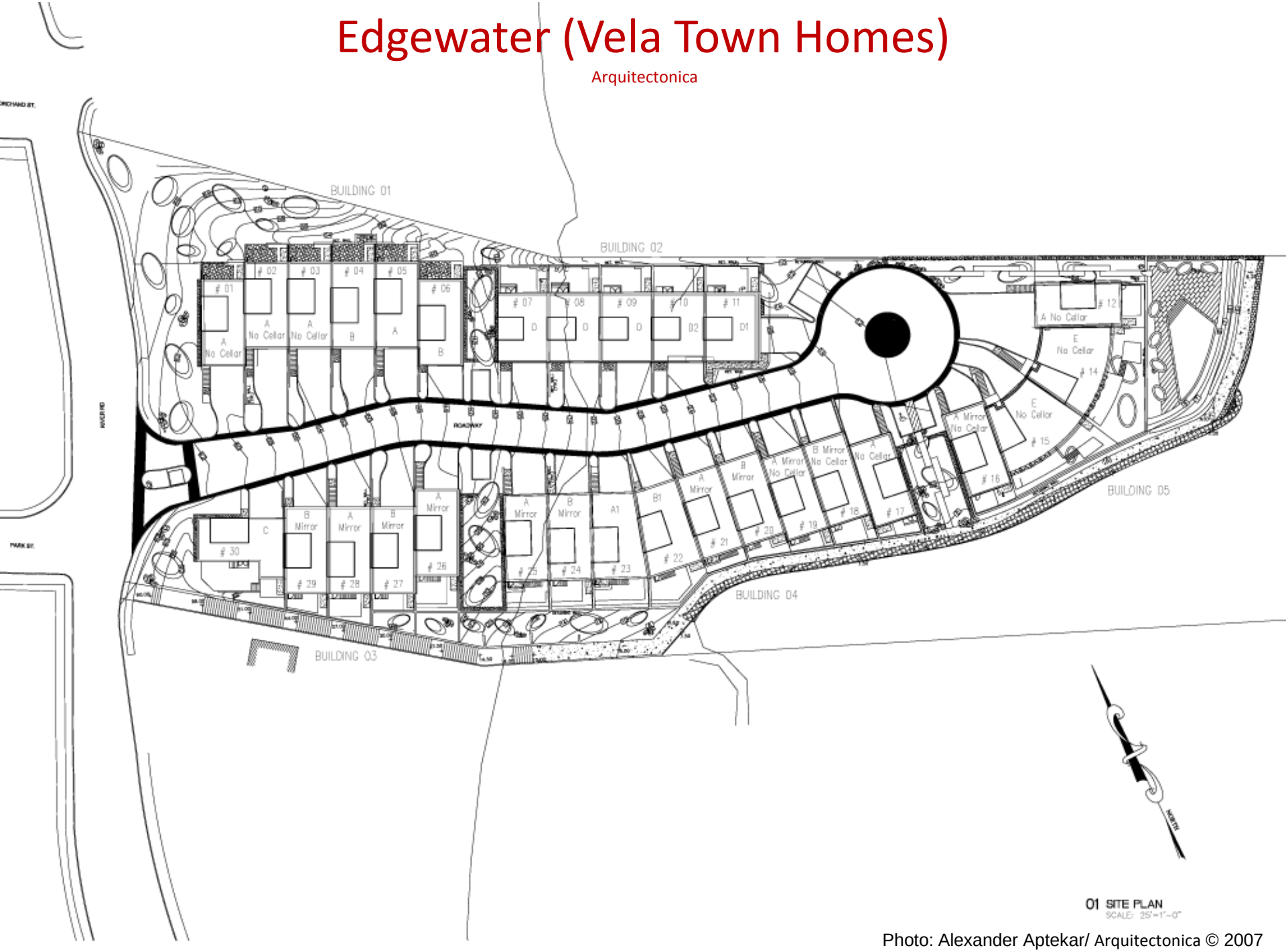
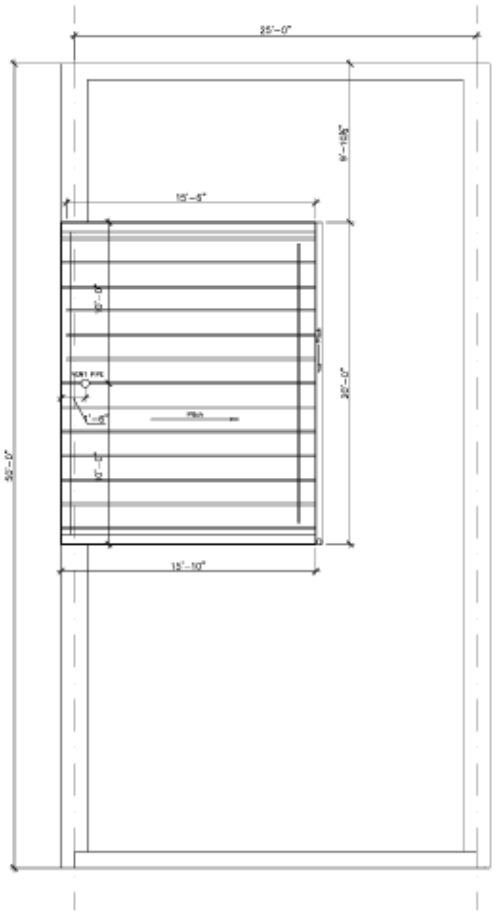


Photo: Alexander Aptekar/ Arquitectonica © 2007

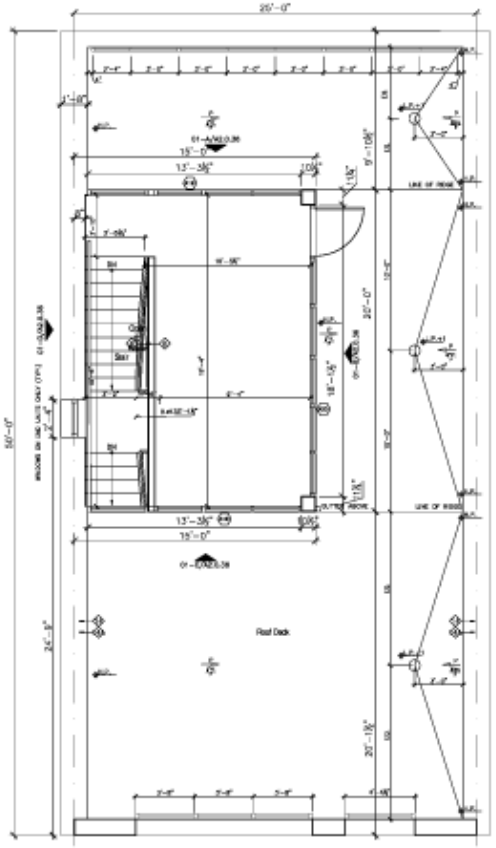
Edgewater (Vela Town Homes)

Arquitectonica



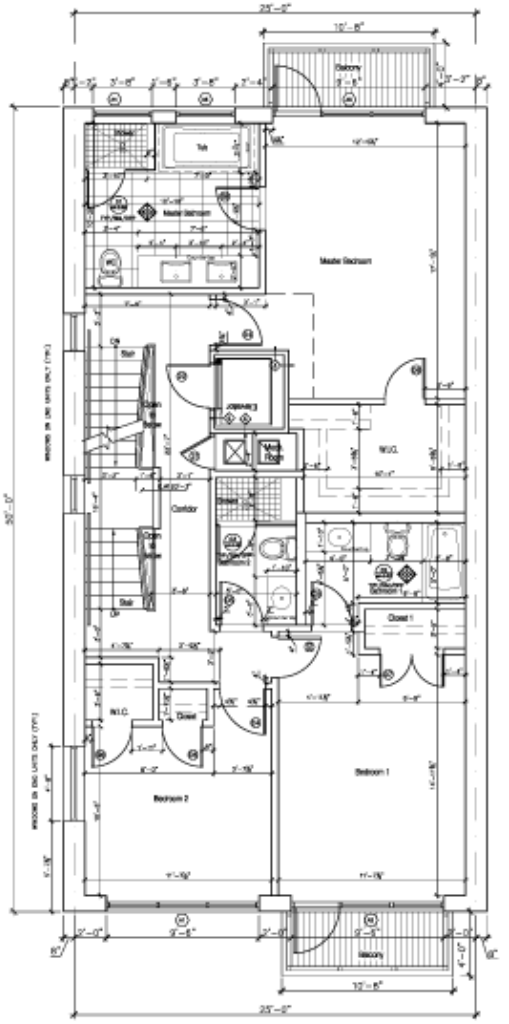
03 UNIT "A" STAIR BULKHEAD ROOF PLAN

SCALE: 1/4"=1'-0"



02 UNIT "A" ROOF PLAN W FRONT AND W/O REAR WALLS

SCALE: 1/4"=1'-0"



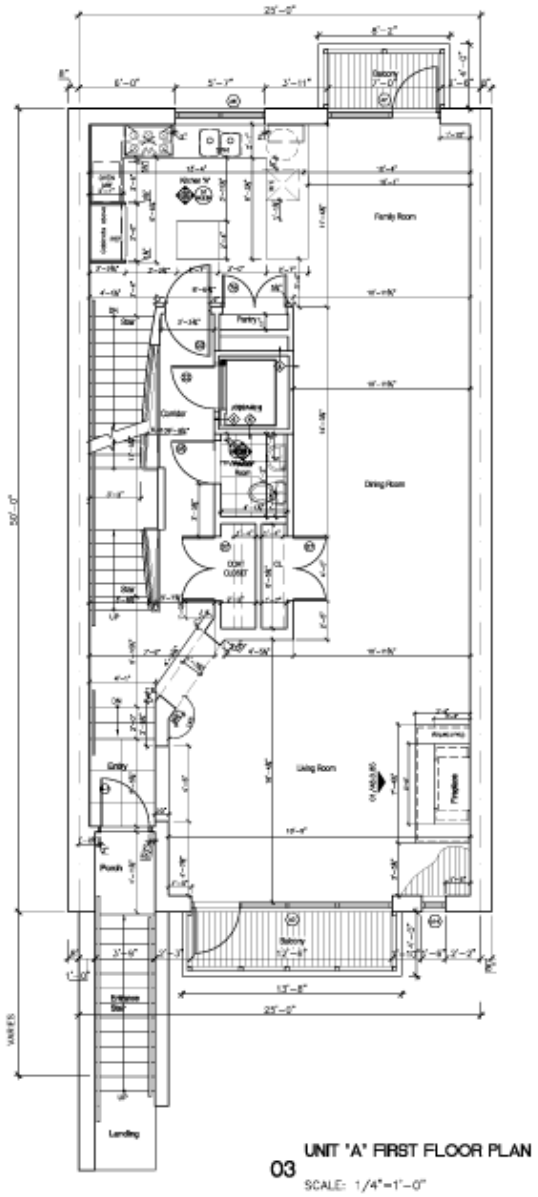
01 UNIT "A" SECOND FLOOR PLAN

SCALE: 1/4"=1'-0"

Photo: Alexander Aptekar/ Arquitectonica © 2007

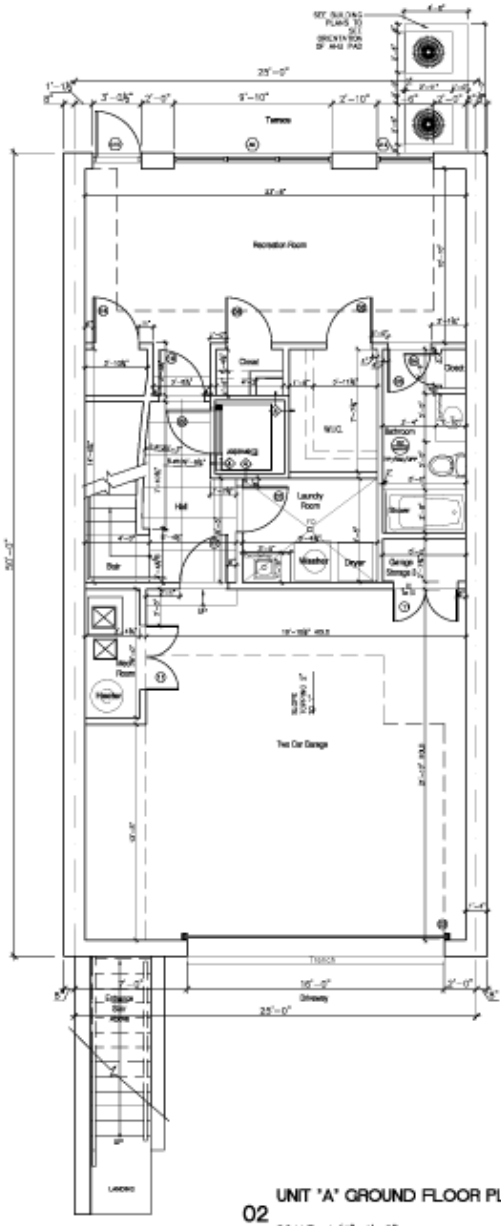
Edgewater (Vela Town Homes)

Arquitectonica



03 UNIT 'A' FIRST FLOOR PLAN

SCALE: 1/4"=1'-0"



02 UNIT 'A' GROUND FLOOR PLAN

SCALE: 1/4"=1'-0"

Photo: Alexander Aptekar/ Arquitectonica © 2007

Edgewater (Vela Town Homes)

Arquitectonica

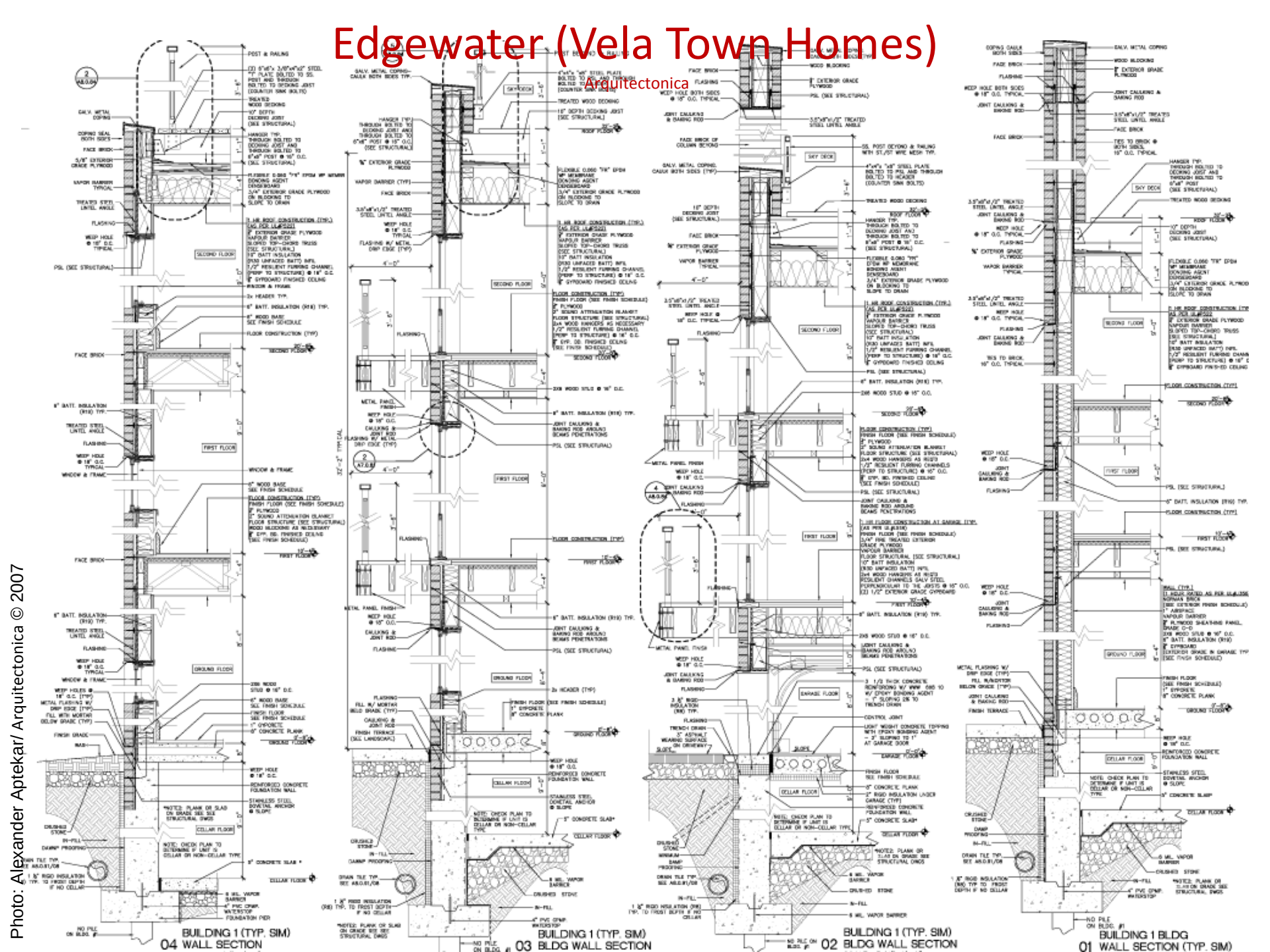


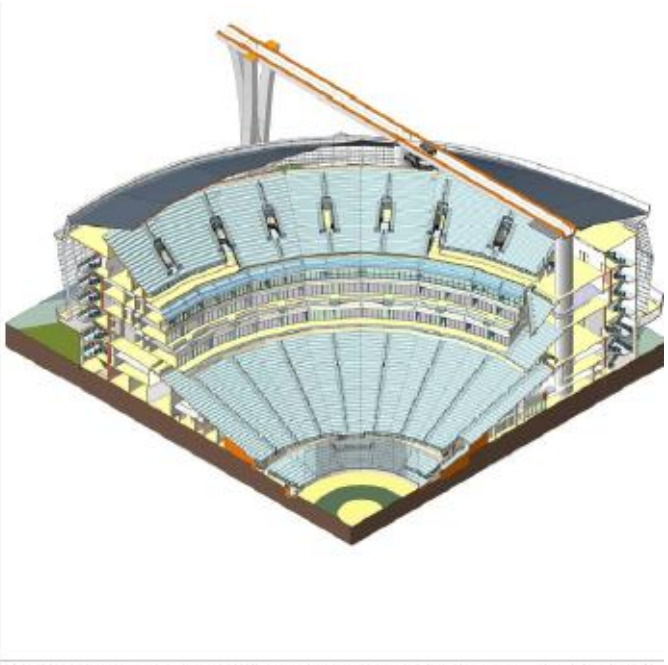
Photo: Alexander Aptekar/ Arquitectonica © 2007

BIM

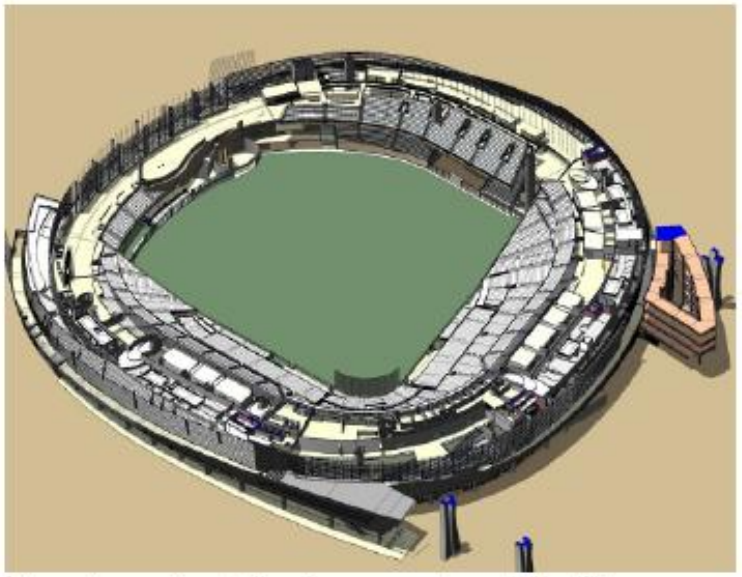
Building Information Modeling or BIM

A Building Information Model (Model) is a digital representation of physical and functional characteristics of a facility. As such, it serves as a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life cycle from inception onward.

http://images.autodesk.com/adsk/files/04_competitiveadvantage-huntmoss.pdf



Cutaway view of the home plate seating. Image courtesy of Hunt/Moss.



Floor plan sectional view. Image courtesy of Hunt/Moss.

Prepared by Alexander Aptekar © 2013

BIM

BIM is a integrated multi-disciplinary performance model to encompass the building geometry, spatial relationships, geographic information, along with quantities and properties of the building components. This BIM concept was developed and popularized between 2000 and 2004.

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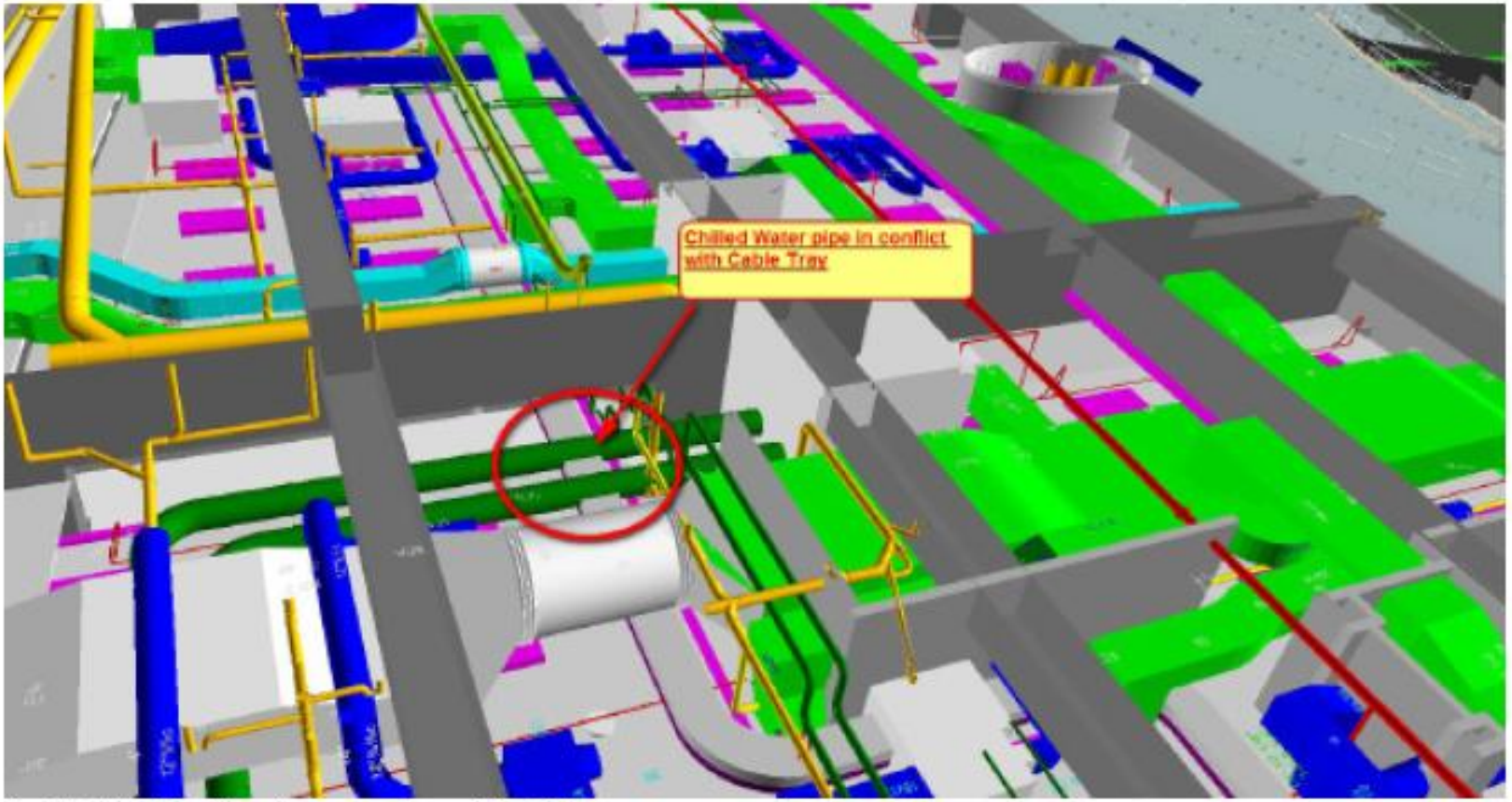

http://images.autodesk.com/adsk/files/04_competitiveadvantage-huntmoss.pdf

Conflict identification. Image courtesy of Hunt/Moss.

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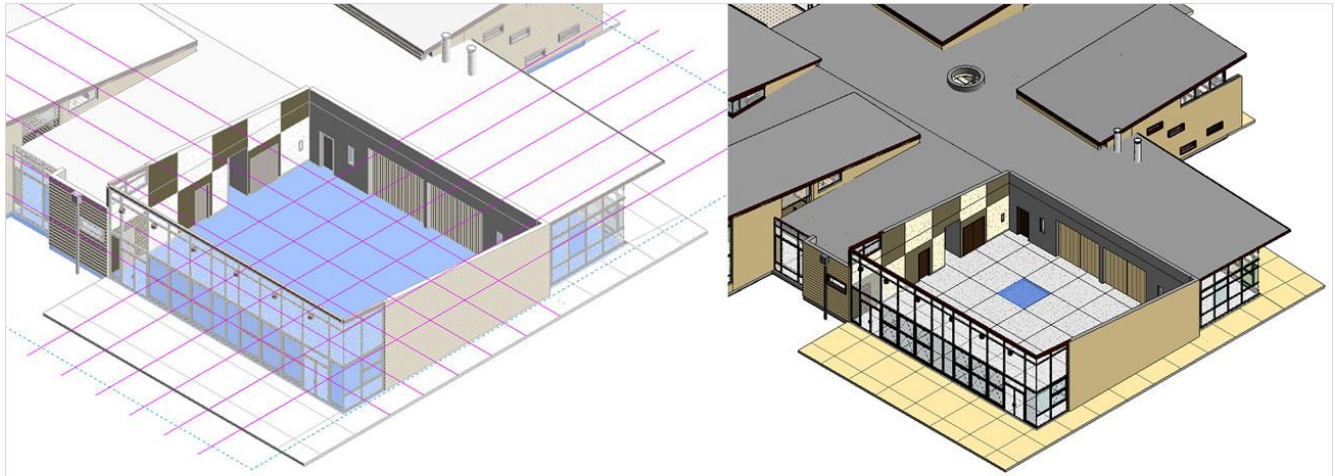
BIM

BIM design tools define objects parametrically. That is, the objects are defined as parameters and relations to other objects, so that if a related object changes, this one will also. Parametric objects automatically re-build themselves according to the rules embedded in them.



Part Schedule

Original Family	Original Type	Area	Volume
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	70 SF	47 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	191 SF	127 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	70 SF	47 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	70 SF	47 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	194 SF	129 CF
Floor	Concrete 8"	197 SF	132 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	201 SF	134 CF
Floor	Concrete 8"	5404 SF	3603 CF
Floor	Concrete 8"	1304 SF	869 CF
Floor	Concrete 8"	1690 SF	1126 CF
Floor	Concrete 8"	1690 SF	1126 CF
Floor	Concrete 8"	64 SF	43 CF
Floor	Concrete 8"	64 SF	43 CF
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Floor	Concrete 8"	1690 SF	1126 CF
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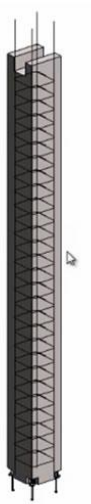
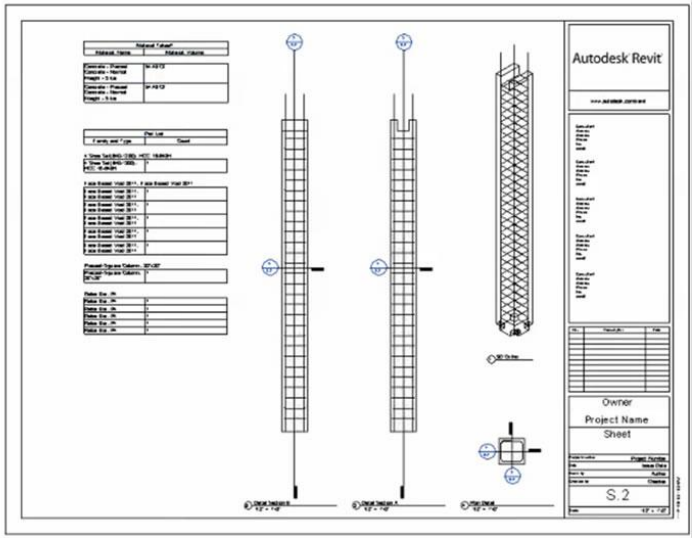


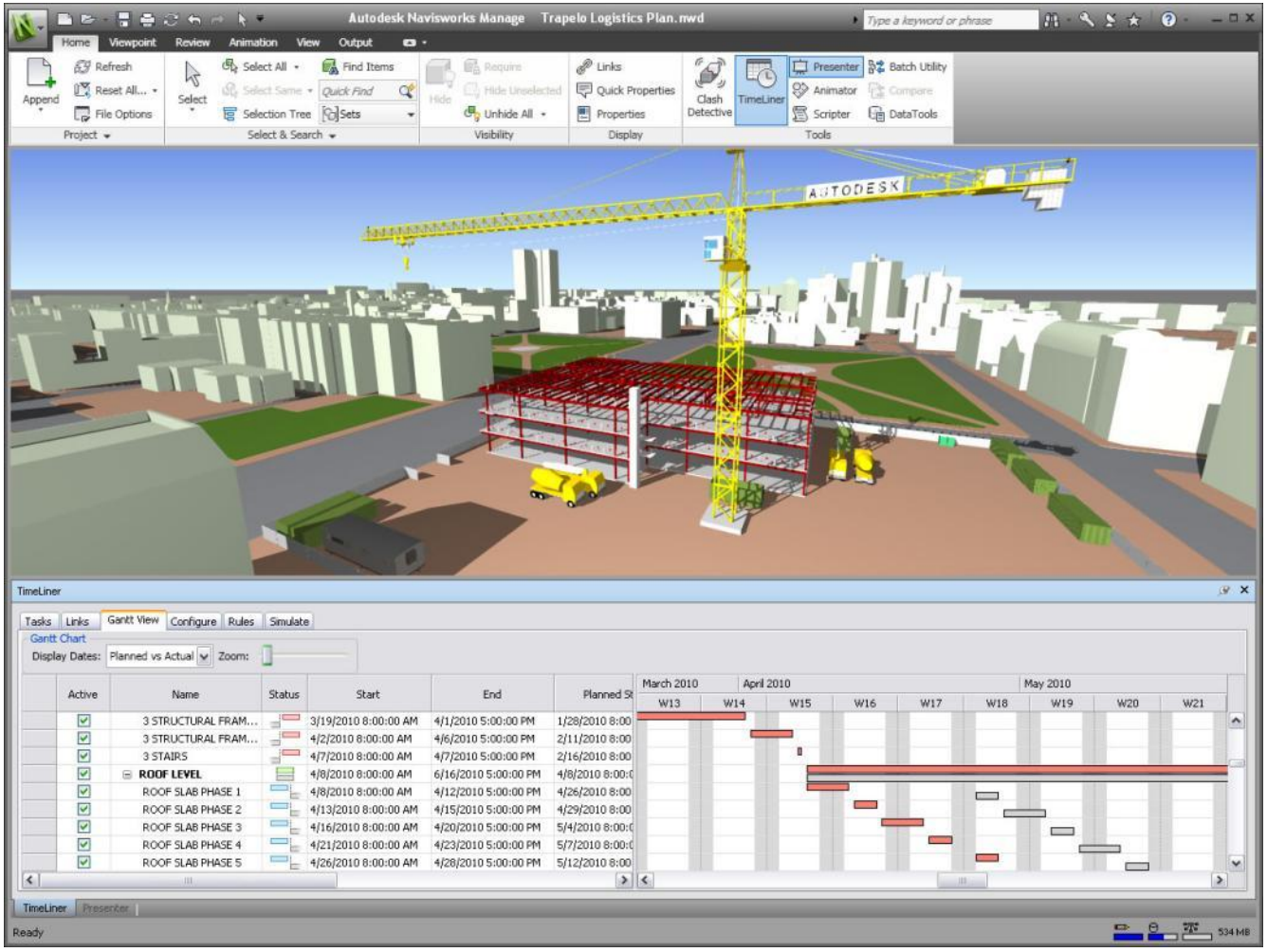


http://usa.autodesk.com/adsk/servlet/limage?siteID=123112&imageID=16584053&id=16106450

Prepared by Alexander Aptekar © 2013

BIM

4D BIM manages projects through time. It include information that can inform and analyze project phasing, tenant sequencing, and construction scheduling.



http://dynamic.ziftsolutions.com/clients/autodesk/assets/navisworks/images/navisworksfamily2011_4d_scheduling_large_1280x960.jpg

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BIM

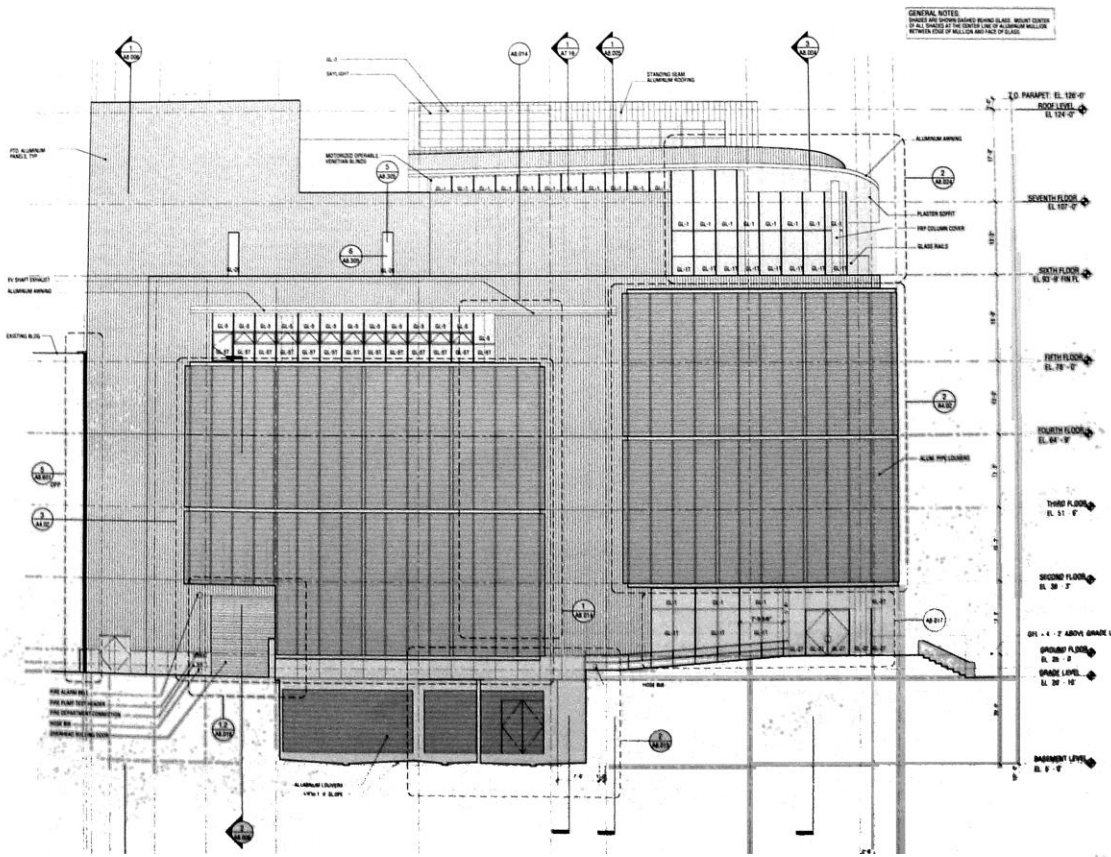
Building Information Modeling is the development and use of a multi-faceted computer software data model to not only document a building design, but to simulate the construction and operation of a new capital facility or a recapitalized (modernized) facility. The resulting Building Information Model is a data-rich, object-based, intelligent and parametric digital representation of the facility, from which views appropriate to various users' needs can be extracted and analyzed to generate feedback and improvement of the facility design.

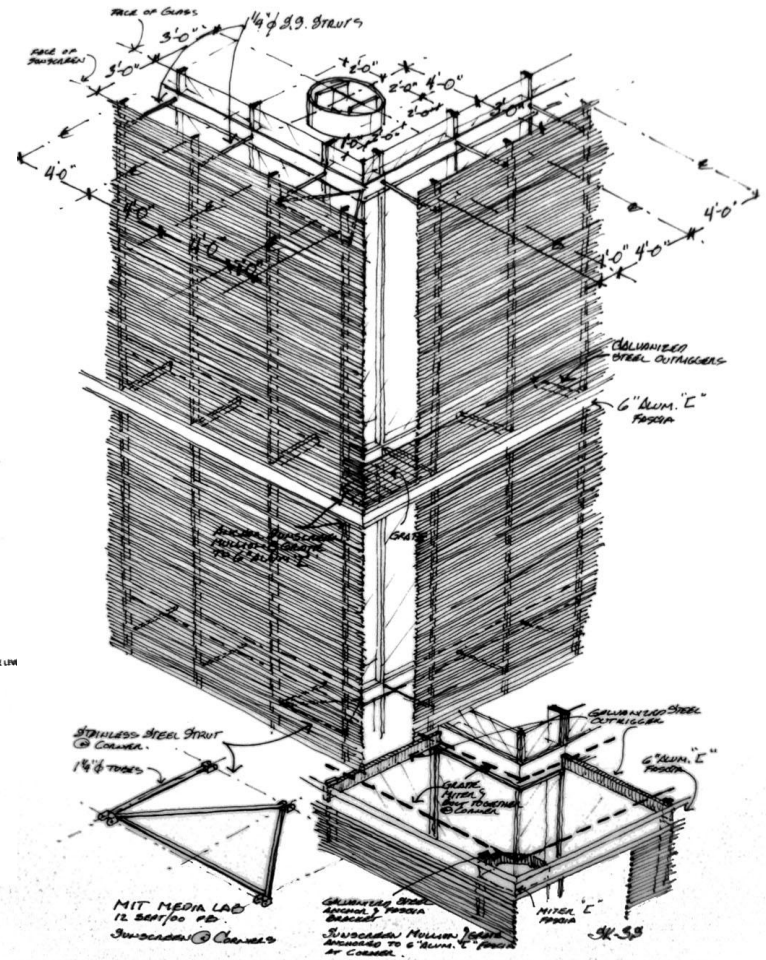
Definition by;
US General Service Administration

http://www.gsa.gov/

Prepared by Alexander Aptekar © 2013

building documentation



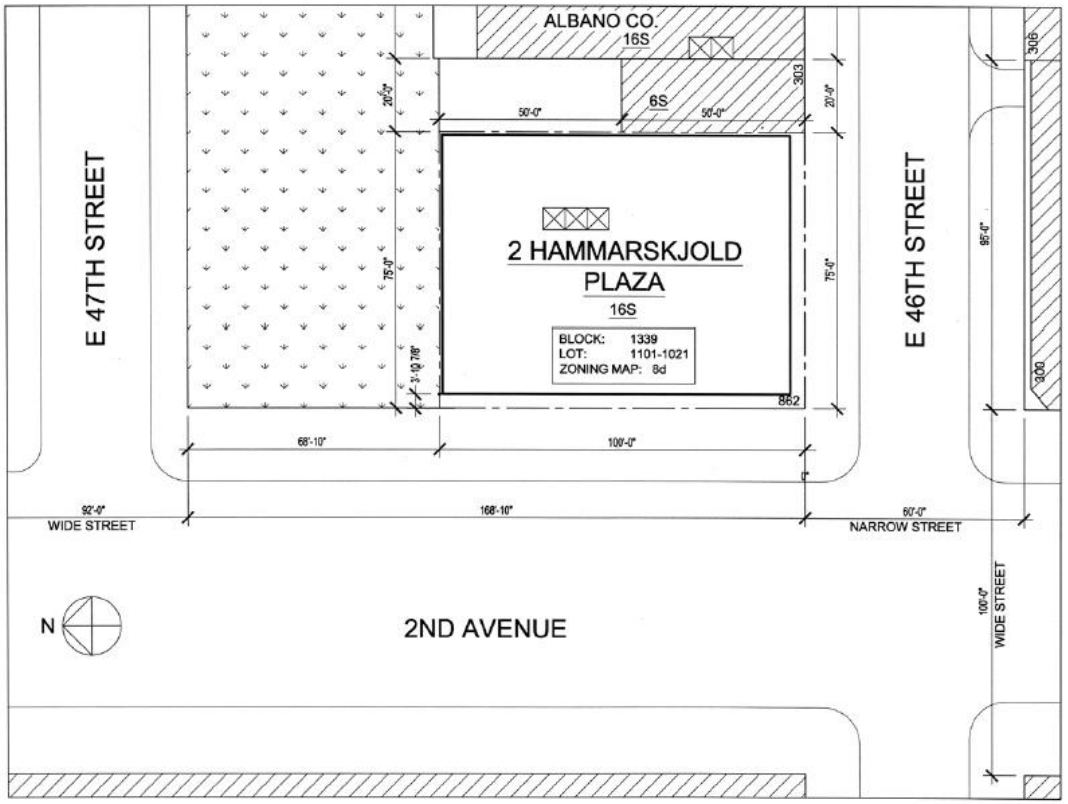


Building technology exhibition 2010; MIT Media Lab, architect Fumihiko Maki

building documentation

2 HAMMARSKJOLD PLAZA

866 SECOND AVENUE, NEW YORK, NY 10017



1 PLOT PLAN
SCALE: 1/16" = 1'-0"

DRAWING LIST

A-0	TITLE SHEET
A-1	NOTES & ABBREVIATIONS
A-2	FIRST FLOOR PLAN
A-3	TYPICAL FLOOR PLAN FLOORS 2-15
A-4	STAIR PLANS, SECTIONS & DETAILS
A-5	BUILDING ELEVATIONS
A-6	BUILDING SECTIONS
A-7	CURTAIN WALL DETAILS
A-8	CURTAIN WALL DETAILS
S-1	TYPICAL STRUCTURAL FLOORS 2-15

ZONING CALCULATIONS

MAP: 8d
BLOCK: 1339
LOT: 1101-1021
ZONING DISTRICT: C1-9TA

LOT AREA = 75'-0" x 100'-0"
= 7500 SQ. FT.

OF FLOORS: 15

TOTAL TYPICAL FLOORS AREA =
(15-1) X (102,993- $\frac{13}{16}$")=
1,441,902'- 5 $\frac{3}{16}$" SQ. FT.

TOTAL 1ST FLOOR AREA=
95'-3 $\frac{3}{16}$" X 71-1 $\frac{3}{4}$" = 81,322'- $\frac{3}{4}$" SQ.FT.

TOTAL FLOOR AREA=1,441,902'- 5 $\frac{3}{16}$"+
81,322'- $\frac{3}{4}$"=1,523,224'-6 $\frac{15}{16}$"

FAR: TOTAL FLOOR AREA / TOTAL LOT AREA

FAR: $\frac{(1,523,224'-6\frac{15}{16}")}{7500}$ = 203.1

0 8' 16' 32'
SCALE: 1/16" = 1'-0"

2 Hammarskjold Plaza
East 46th Street + Second Avenue
New York, New York

Owner:
2 Hammarskjold Plaza

Architects:

Structural Engineer:

Mechanical & Electrical Engineer:

Life Safety & Code Consultant:

Lighting Consultant:

Acoustical Consultant:

Vertical Transportation Consultant:

No.	Date:	Revision:

KEY PLAN

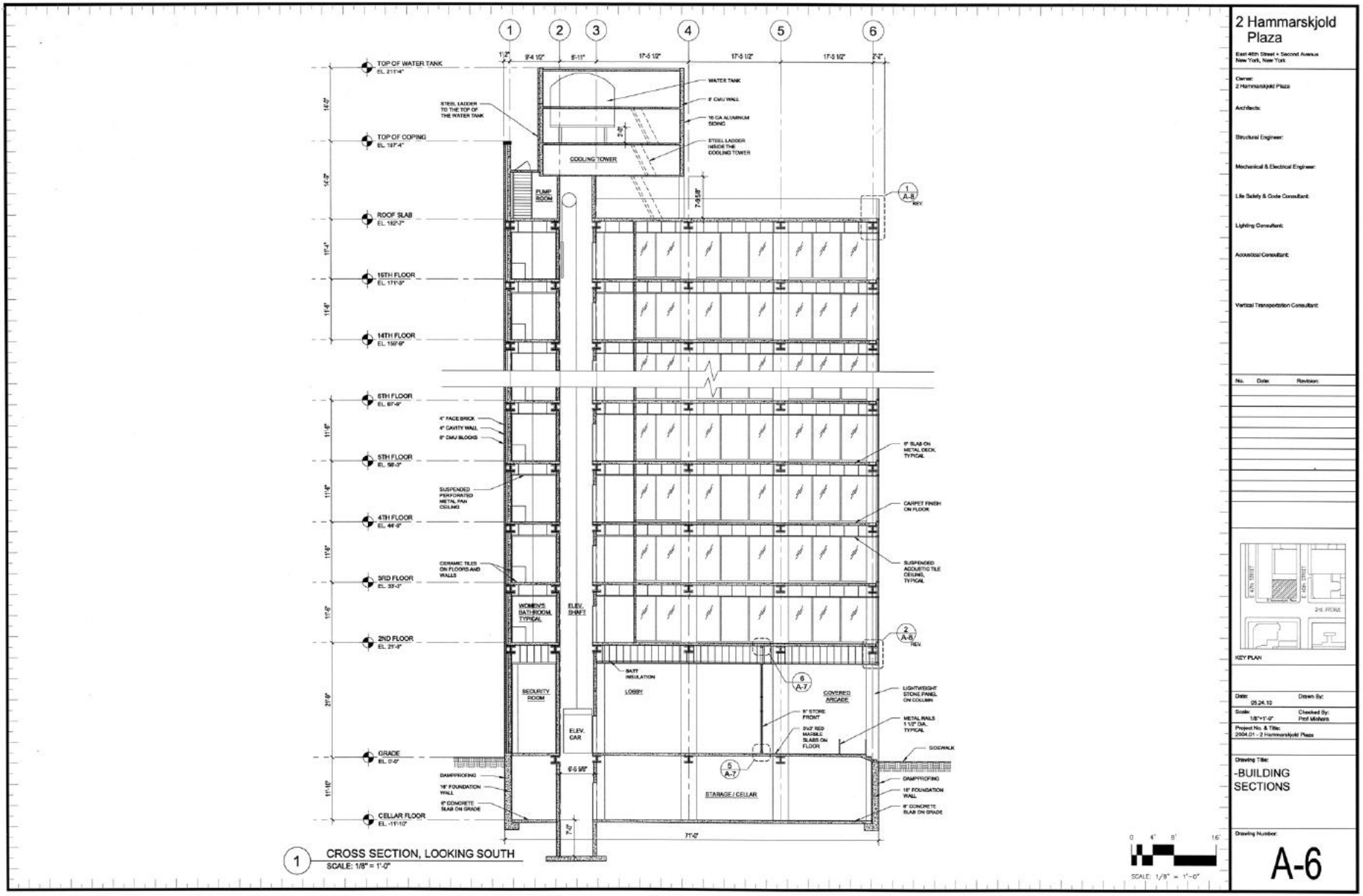
Date: 05.24.10
Drawn By:
Scale: 1/16"=1'-0"
Checked By: Prof Mishara
Project No. & Title: 2004.01 - 2 Hammarskjold Plaza

Drawing Title:
-PLOT PLAN
-DRAWING LIST
-ZONING CALCULATIONS

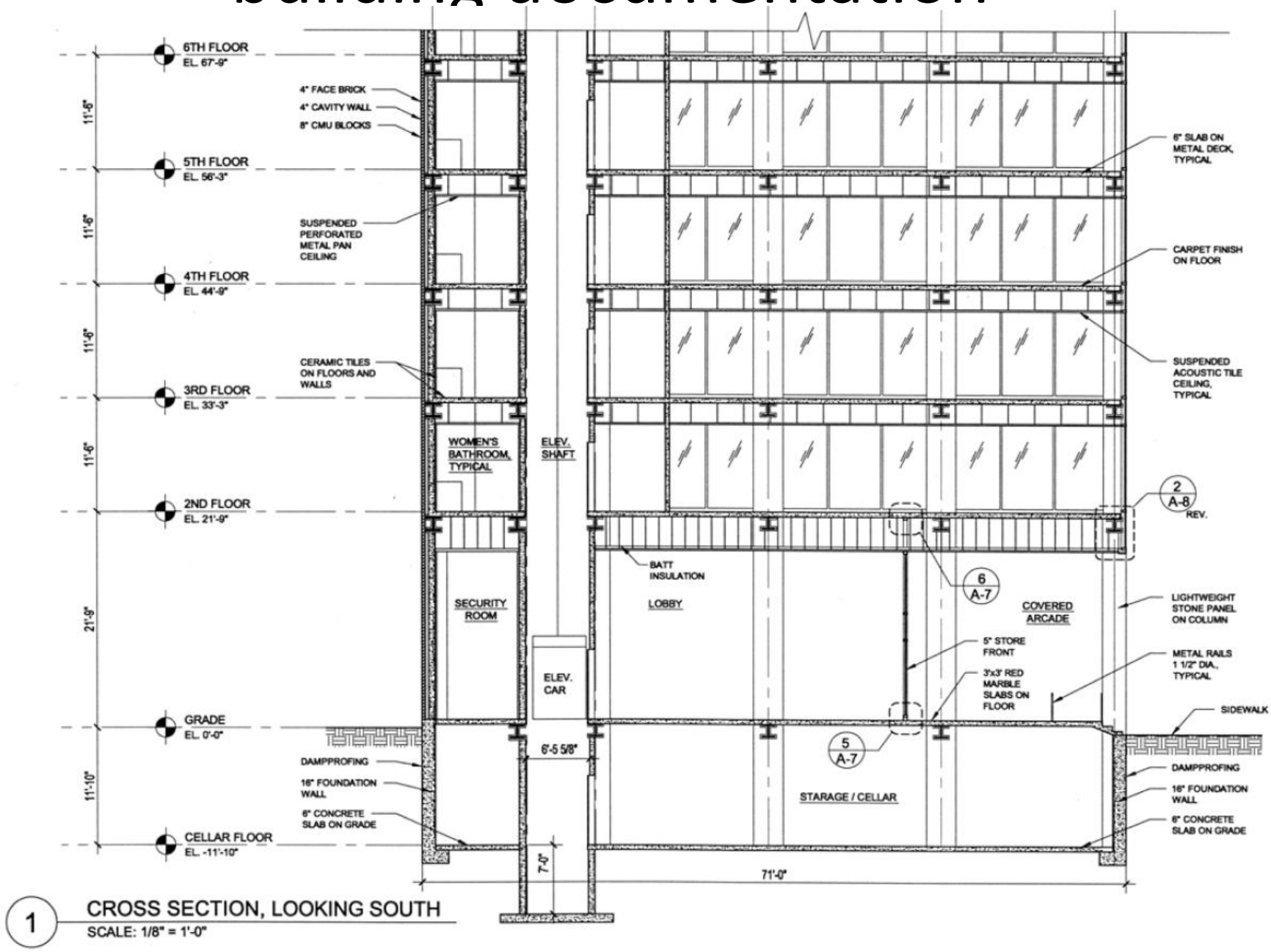
Drawing Number:
A-0

building documentation

building documentation



building documentation



1 CROSS SECTION, LOOKING SOUTH

SCALE: 1/8" = 1'-0"

ARTstor Collection; Pei Cobb Freed & Partners (1966-1989), Title National Gallery of Art, East Building

ARTstor Collection; Pei Cobb Freed & Partners (1966-1989), Title National Gallery of Art, East Building

http://www.worldbuildingsdirectory.com/projects.php?id=37