HOW TO READ ARCHITECTURAL DRAWINGS

FOR ATTORNEYS INVOLVED IN CONSTRUCTION DEFECT LITIGATION

With JOEL M. KARR,
Registered Architect, NCARB
Owner, FOLIO 42 INC.

Expert Witness Advise & Consult

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Construction Expert Witnesses and Litigation Support

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- Litigation Support
- Insurance Claims & Appraisals
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- Estimates & Cost Analysis
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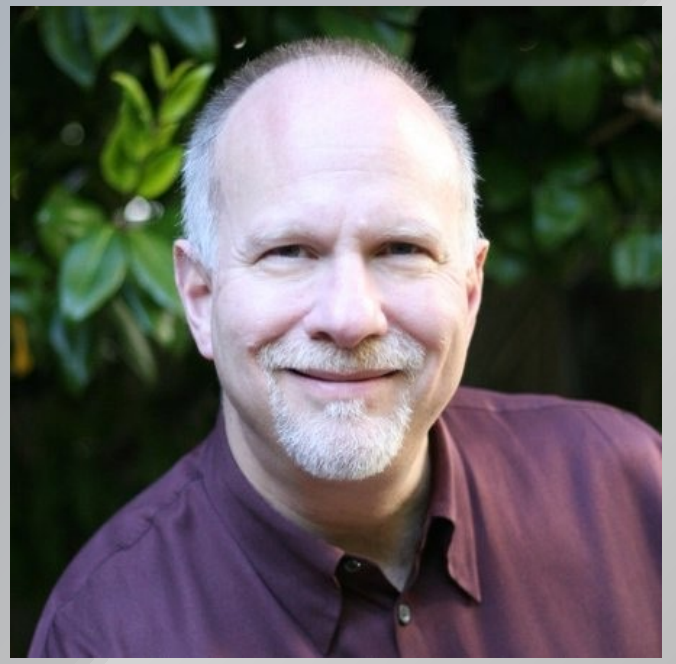
FOLIO 42 INC. – ARCHITECTS & CONSULTANTS

Joel is an ***award winning, California licensed architect*** with certification from the National Council of Architectural Registration Boards (NCARB) for practice in all 50 US States and Canada, with over 35 years of experience.

- ***Noteworthy projects*** with some of the worlds' most renowned firms, including Kohn Pedersen Fox Architects of New York, and CF Murphy/Helmut Jahn of Chicago, and firms overseas.
- ***Large scale corporate and commercial projects*** as well as smaller residential designs
- Teaching positions at ***UC Berkeley*** and with California College of the Arts.

- His experience in ***construction defects/claims cases*** includes forensic analysis on projects large and small, reports and analysis.



JOEL M. KARR, Registered Architect, NCARB
Owner, FOLIO 42 INC.
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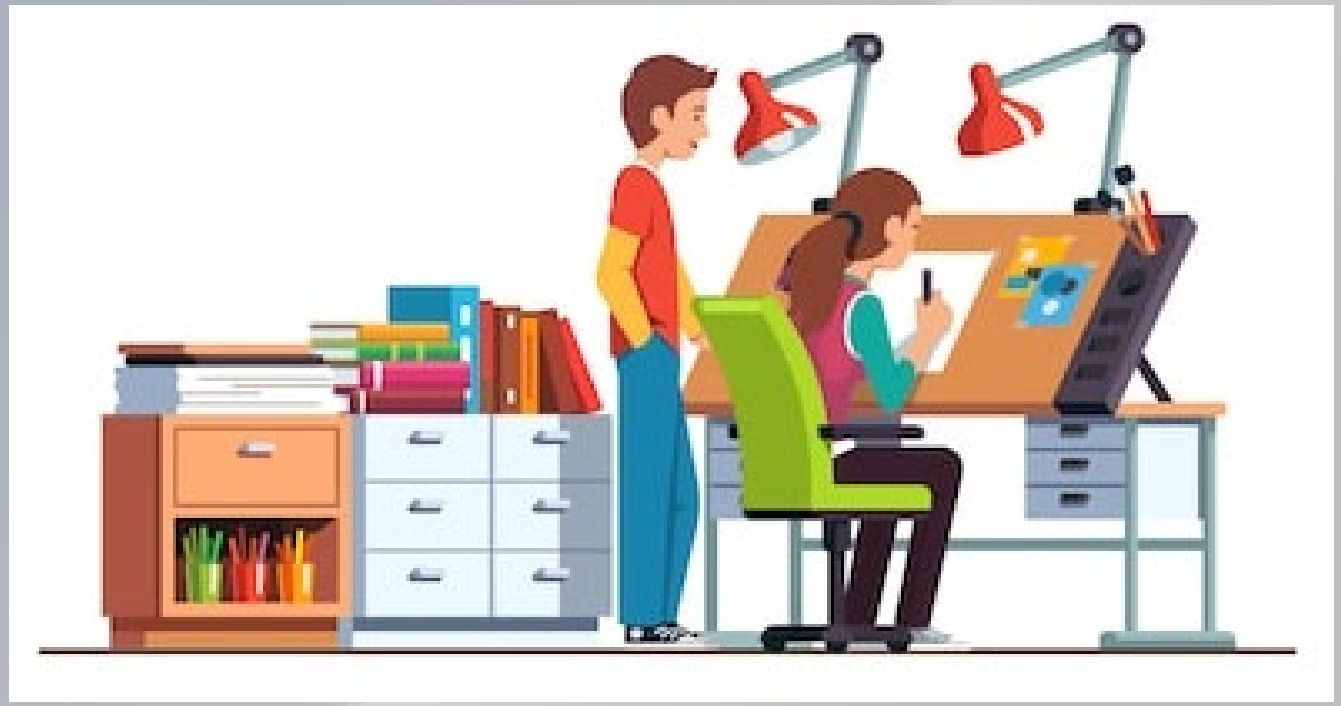
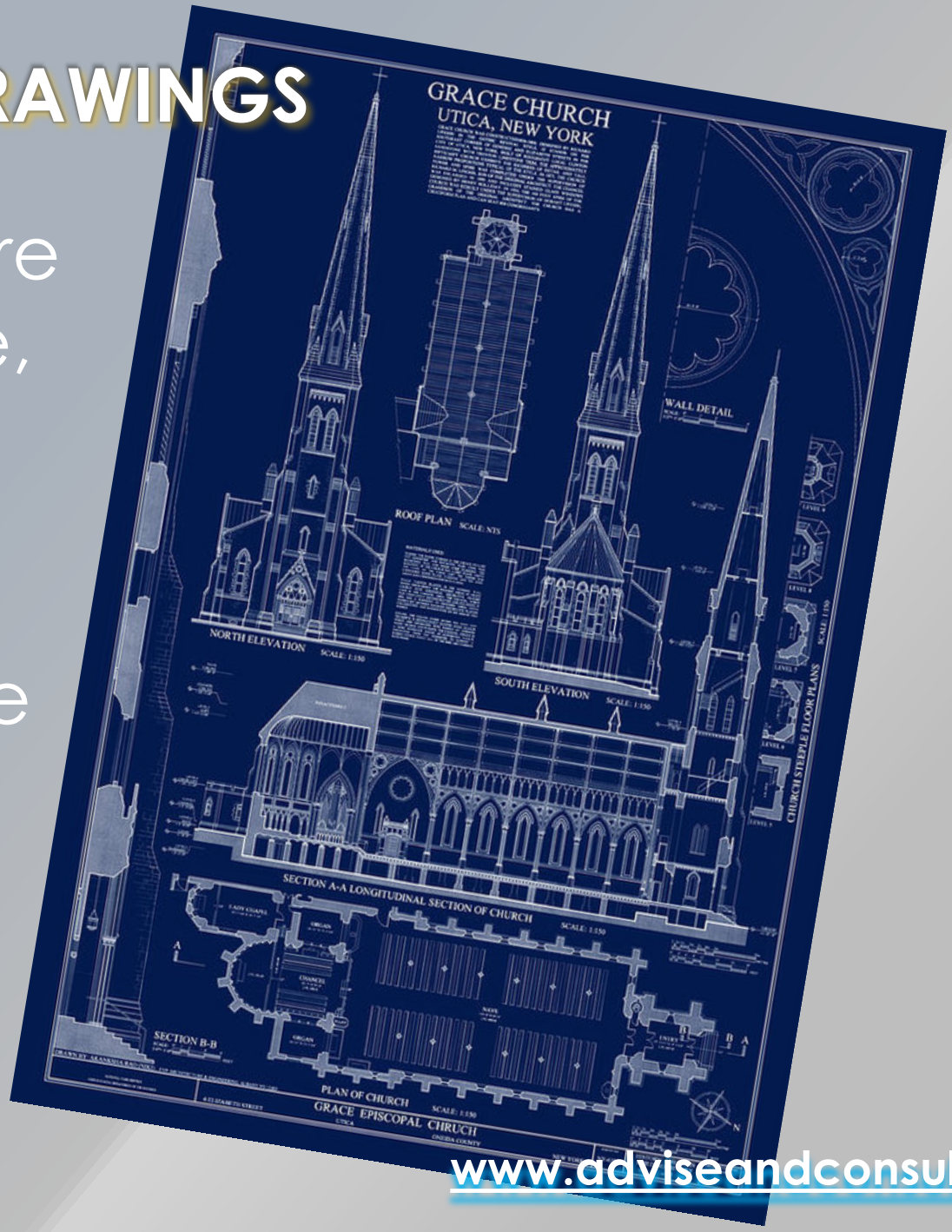
Reading architects' drawings is a skill that most architects spend years in school to learn.

You will not be an expert after today's seminar, but you will be able to navigate through a set of drawings and have a solid, if basic, understanding. Subsequent seminars will deal with reading design details which is where a lot of legal issues are exposed.



READING ARCHITECTURAL DRAWINGS

Historically, our drawings were called “blueprints”, because, in fact, they were BLUE. The printing process used an ammonia solution that developed the image on the paper in blue.



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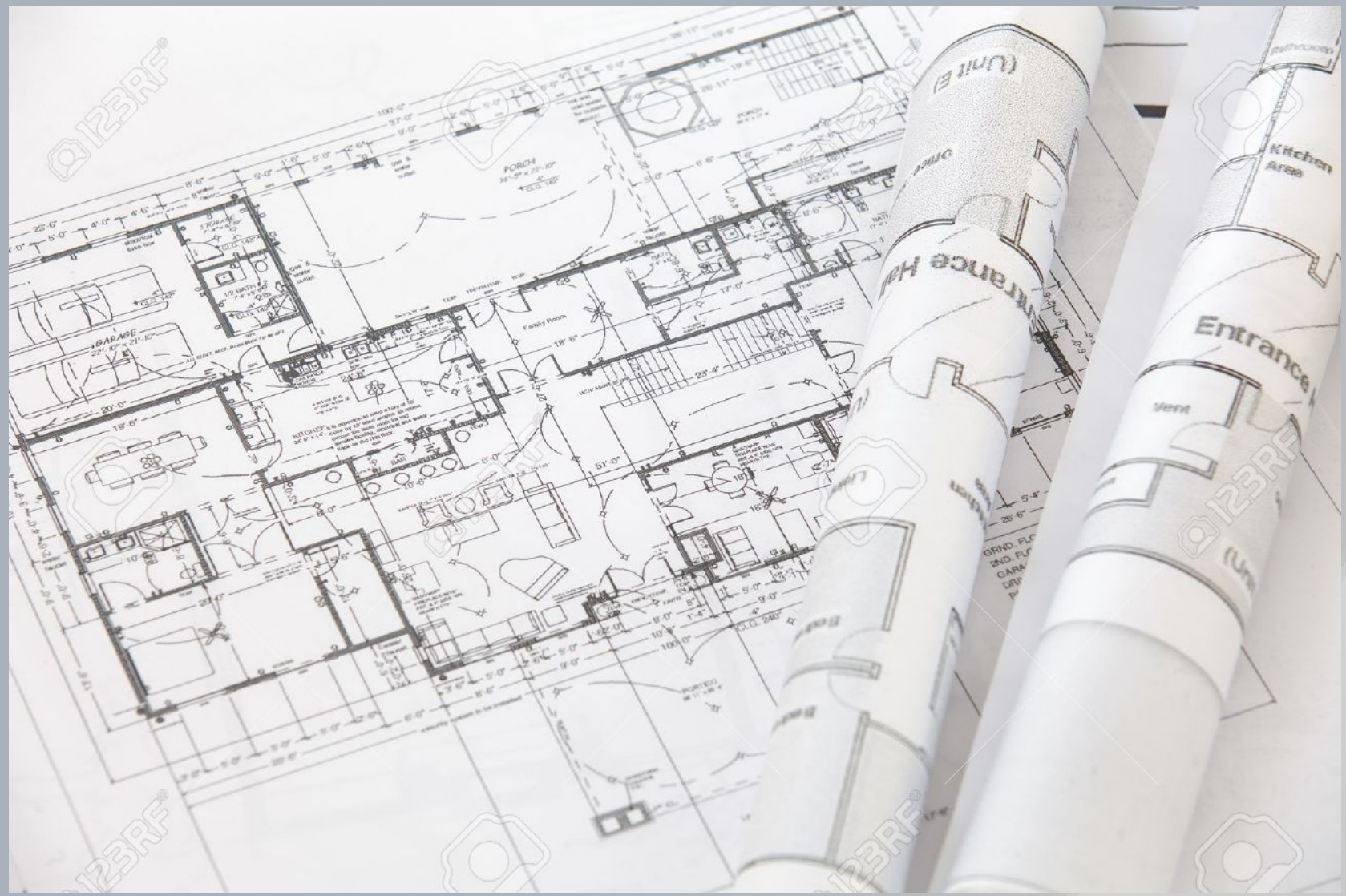
READING ARCHITECTURAL DRAWINGS



Today's drawings are copied using a typical "Xerox" process, so not actually "blueprints"

READING ARCHITECTURAL DRAWINGS

The Basics:

There are three (arguably four) critical and universal drawing types:

- Plans
- Sections
- Elevations

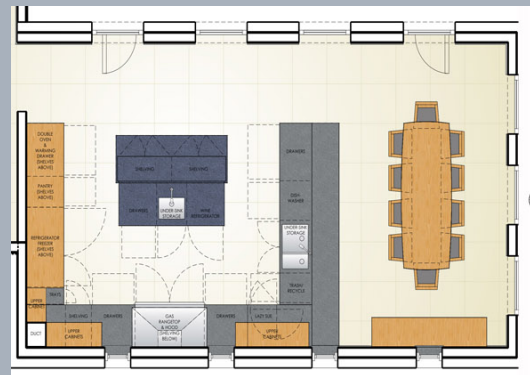
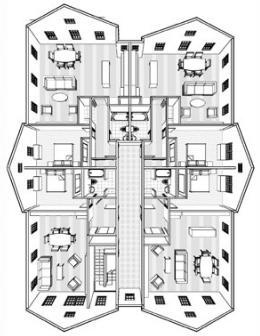
The fourth is axonometric/perspective

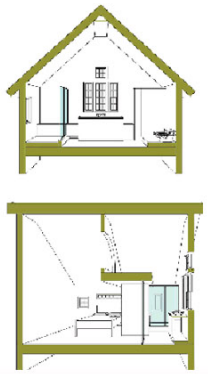
These can all be used in both presentation (design) drawings as well as "Construction Drawings"

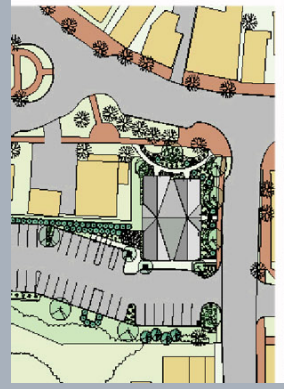
THEY ARE ALL HIGHLY ABSTRACTED WAYS TO SEE A PHYSICAL OBJECT

READING ARCHITECTURAL DRAWINGS

"Preliminary", "Design", "Presentation" or other terms refer to drawings used for early design phases, prior to developing construction drawings. These usually don't include any technical information like dimension strings, notes, keys and the like.





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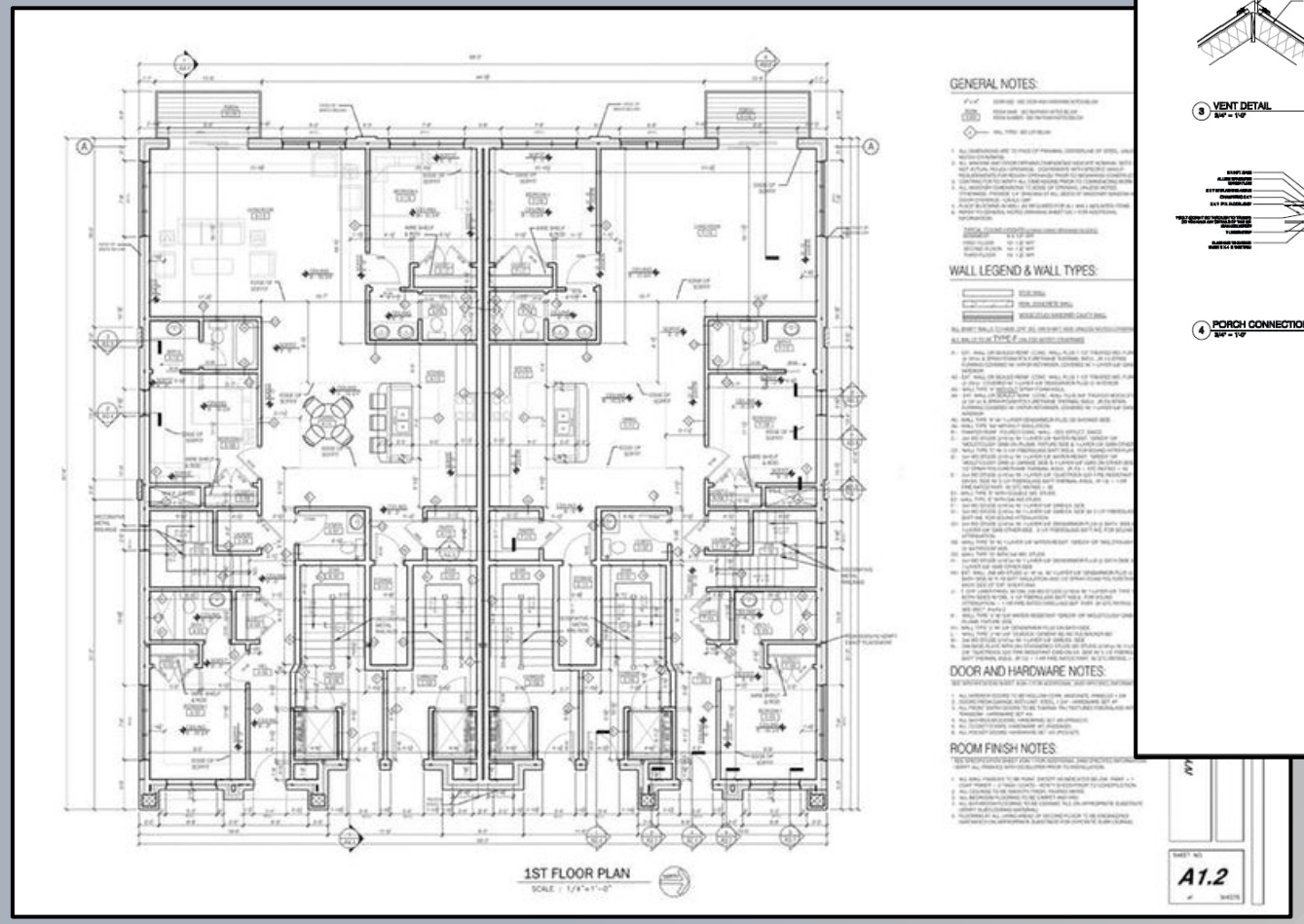
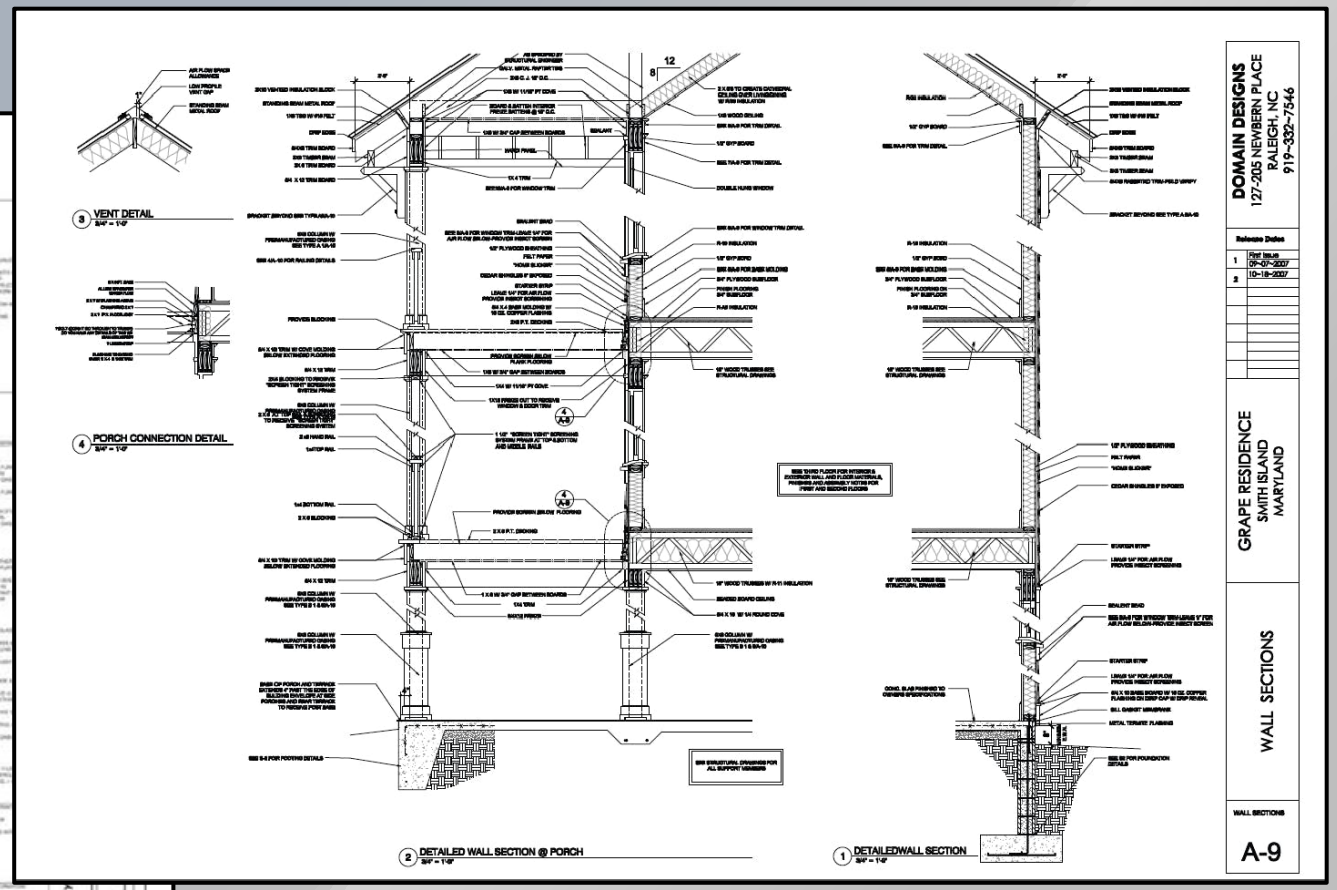
"Construction", or "Contract" or "Detailed" drawings are fully developed versions of the design drawings, after the client approves the design.





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READING ARCHITECTURAL DRAWINGS

Typical process between architect and owner is:

1. First meeting/introduction
2. Preliminary Design sketches
3. Schematic Design
4. Design Development
5. Construction Documents
6. Value Engineering
7. Bidding/Negotiation/Permitting
8. Construction
    1. Preconstruction
    2. Construction phase
    3. Punch lists
9. Project closeout

Another session will explore the complexities and legal issues in each of these phases

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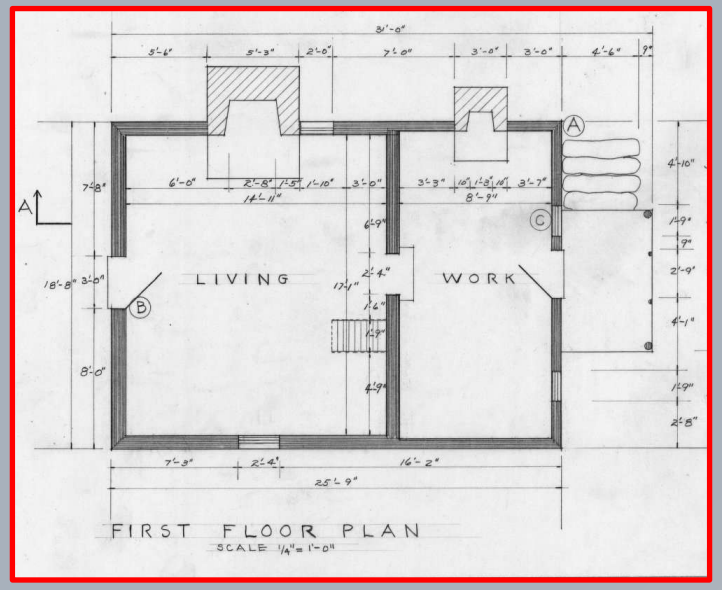
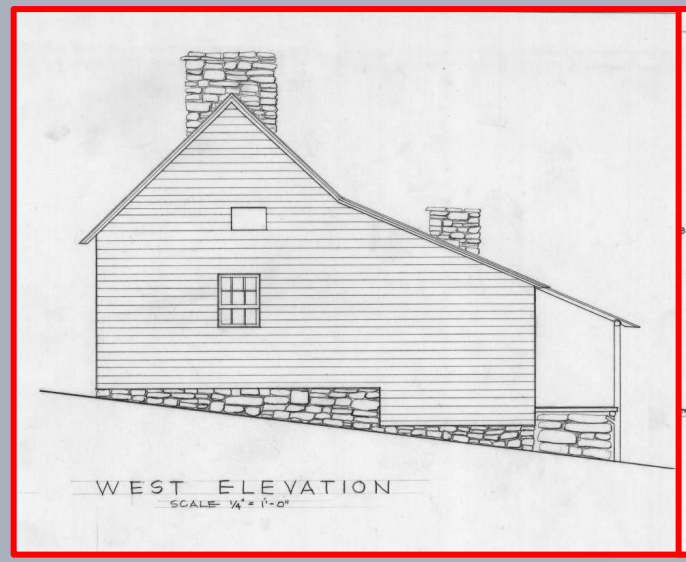
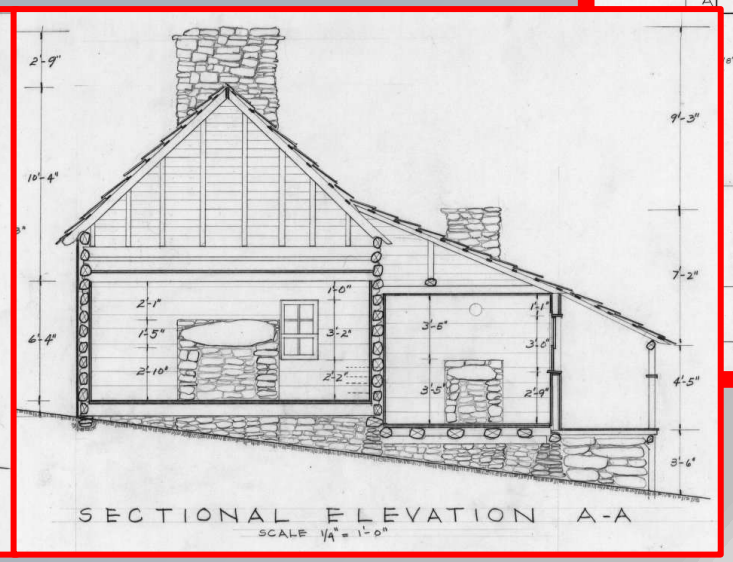
READING ARCHITECTURAL DRAWINGS

Drawing types

- Plans
- Sections
- Elevations



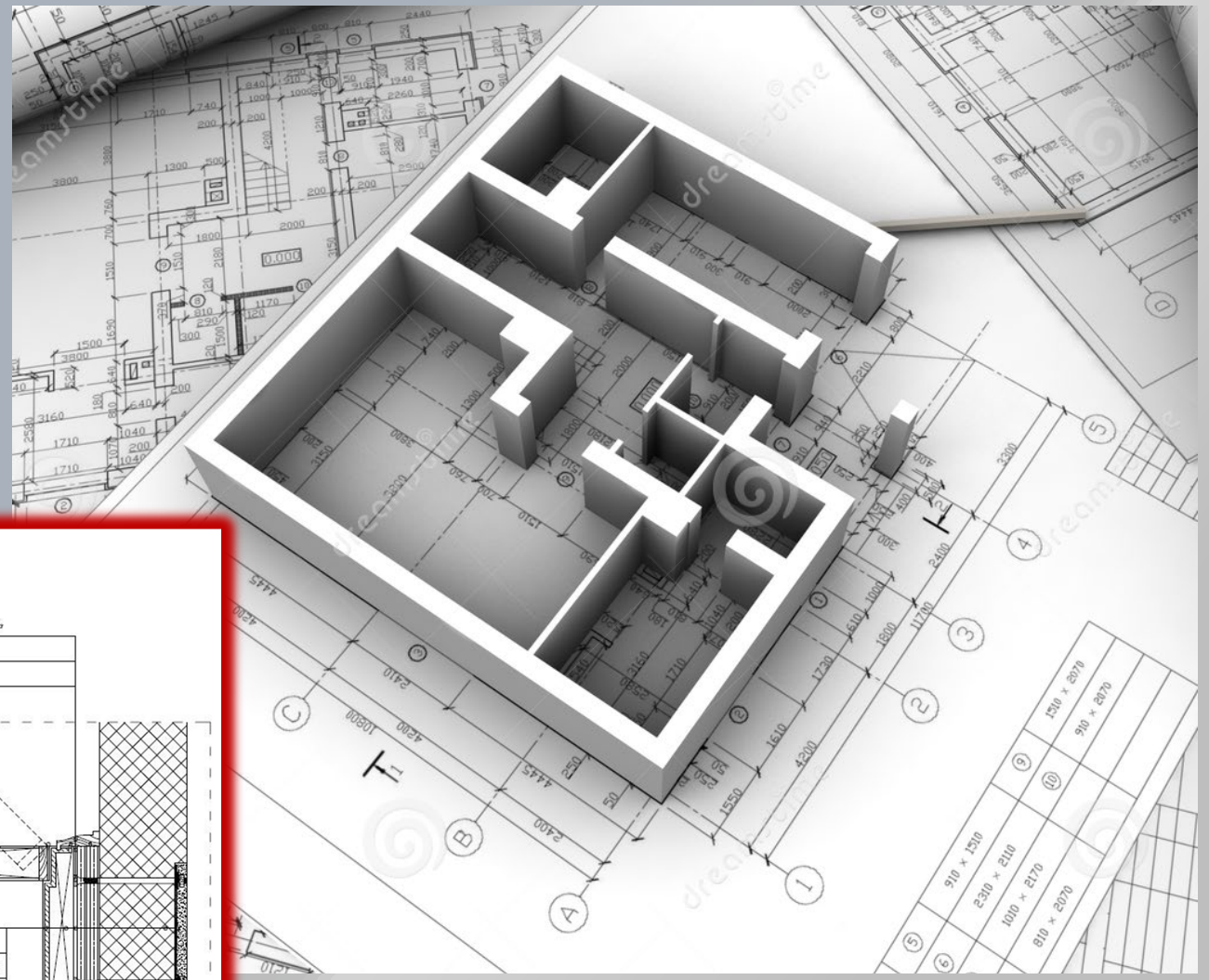


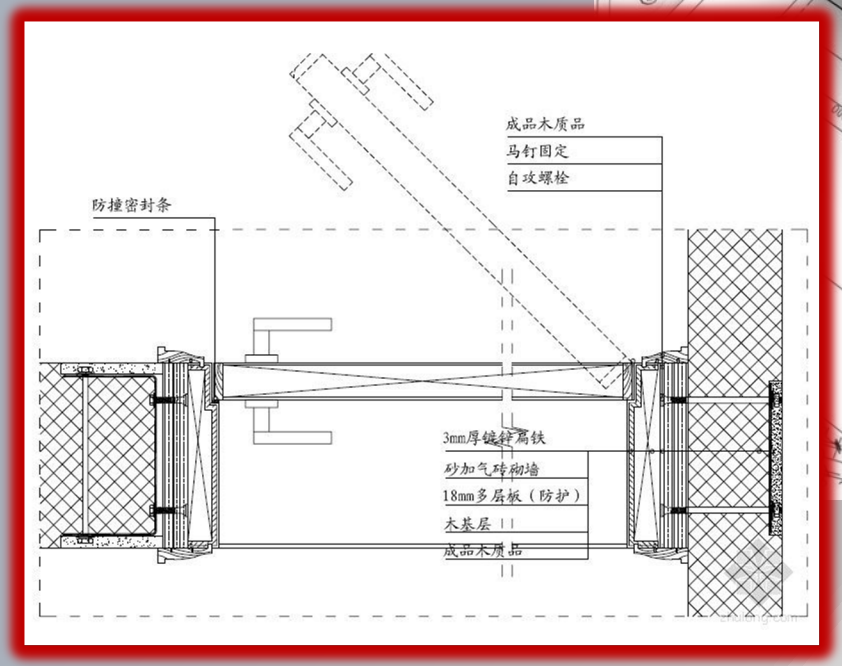


READING ARCHITECTURAL DRAWINGS

Drawing types

PLANS are abstracted planar "cuts" horizontally through a building or detailed element of a structure

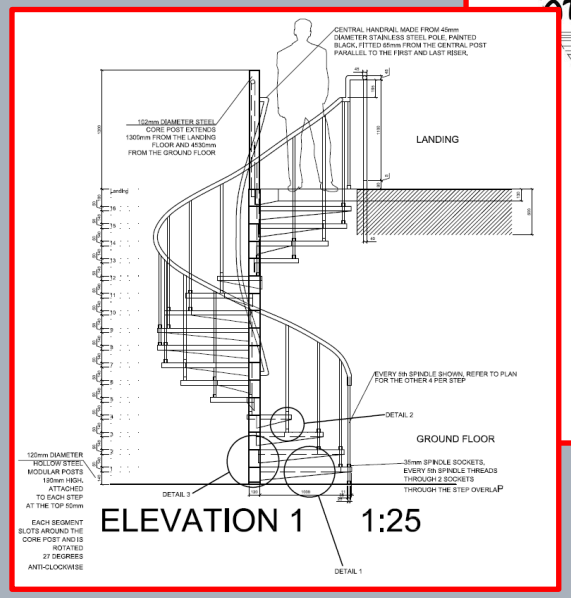


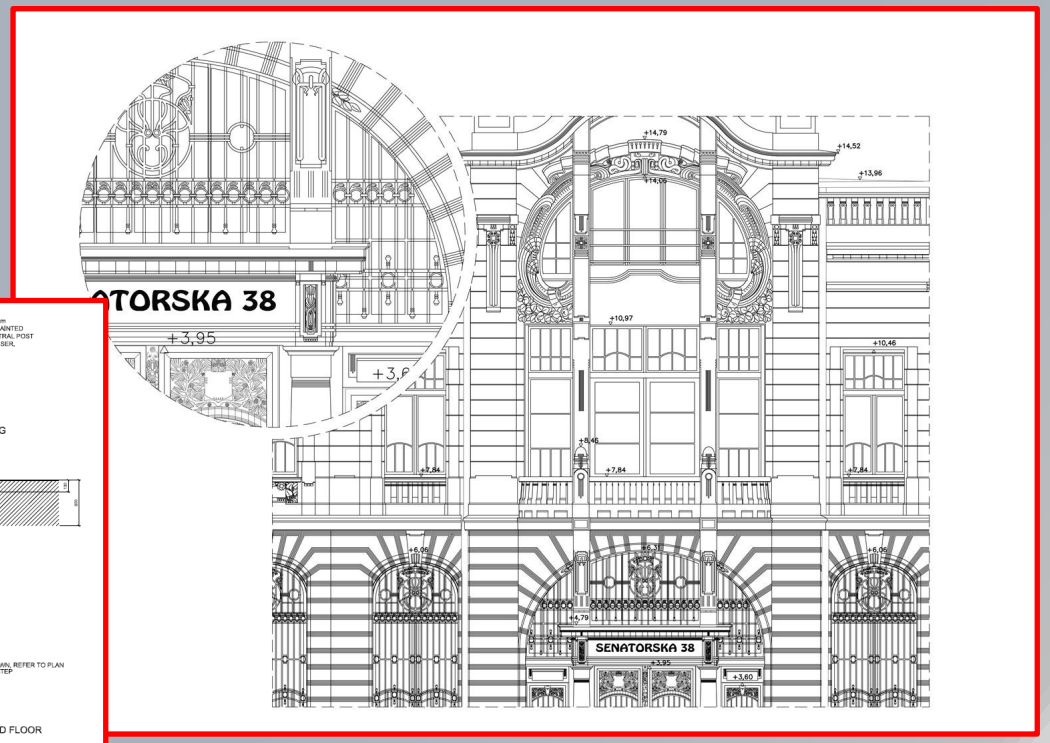


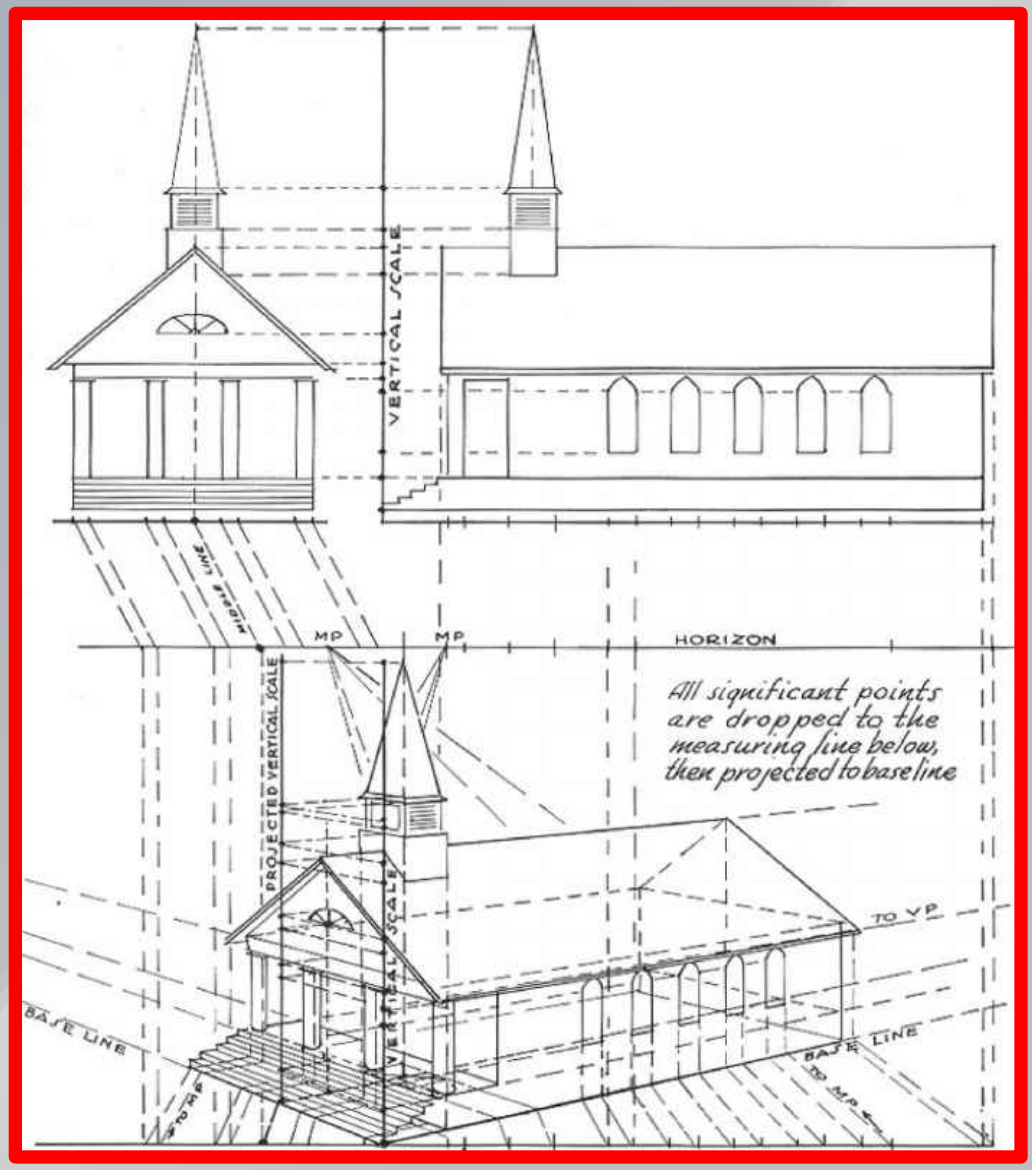
READING ARCHITECTURAL DRAWINGS

Drawing types

ELEVATIONS are abstracted flattened views of the side or front FACE of a building or object



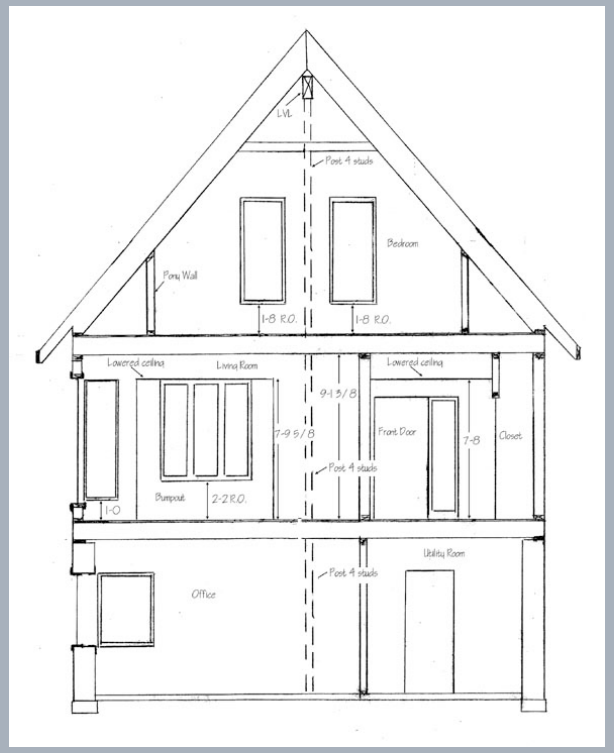


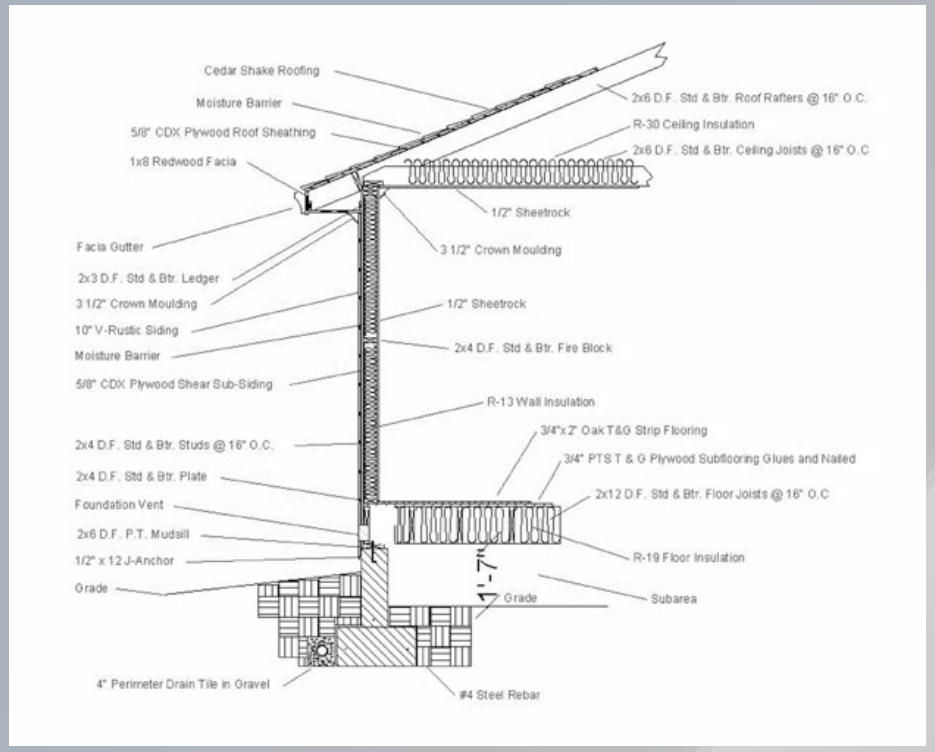


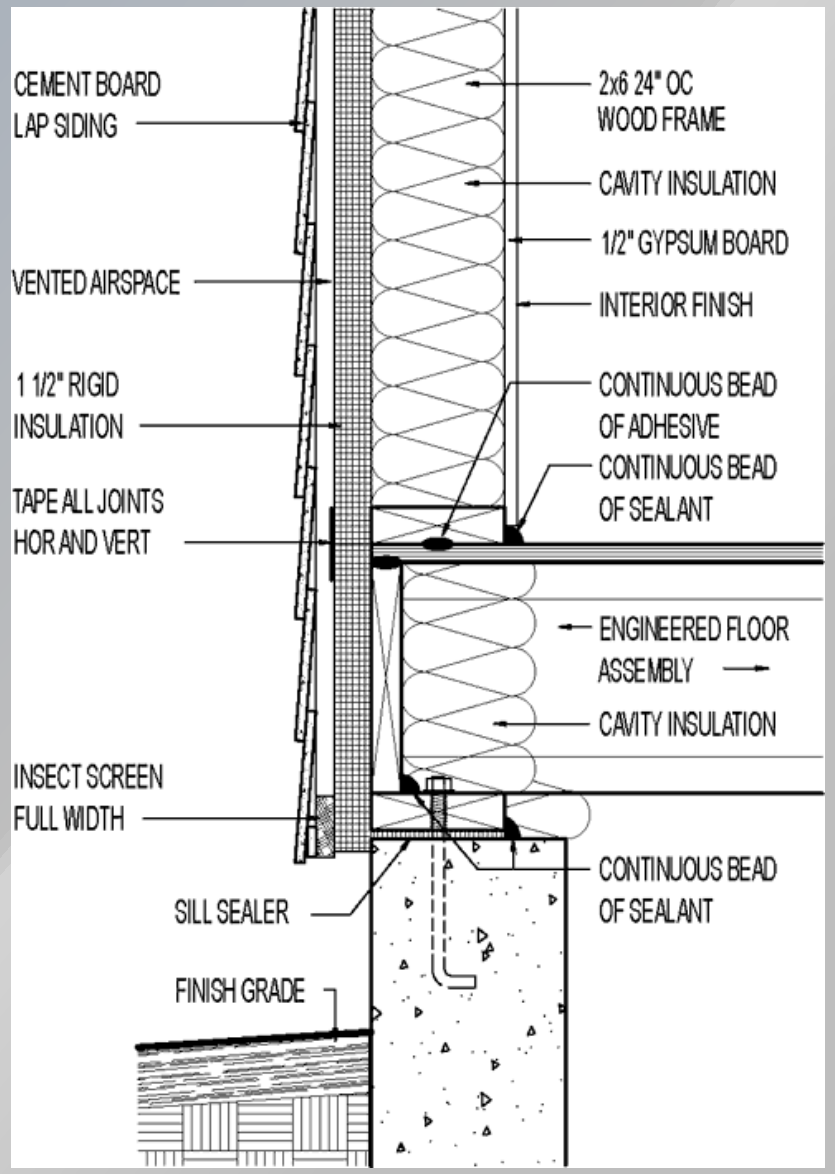
READING ARCHITECTURAL DRAWINGS

Drawing types

SECTIONS are abstracted flattened views of a vertical planar "cut" through a building or object, and the most heavily used in construction drawings



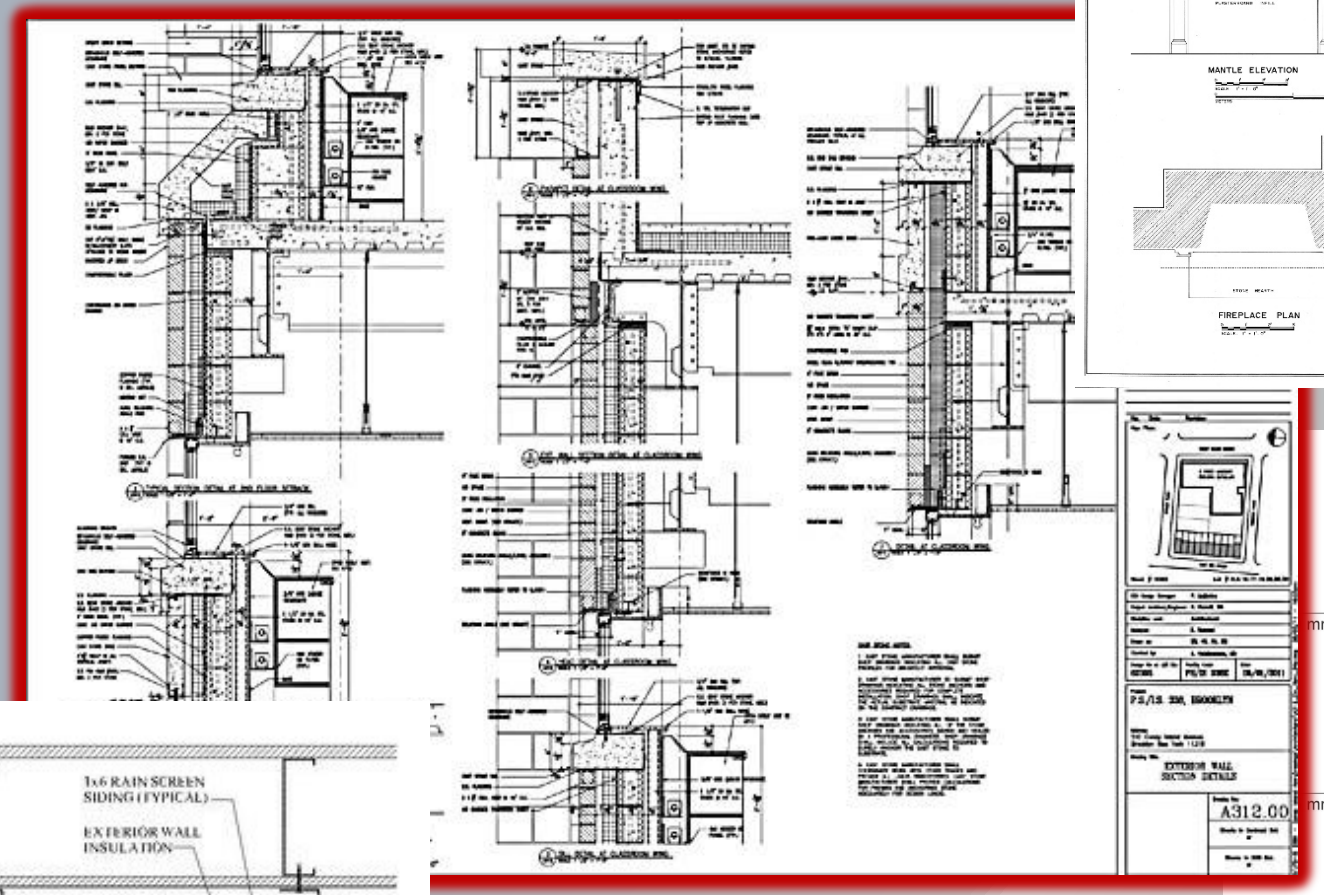


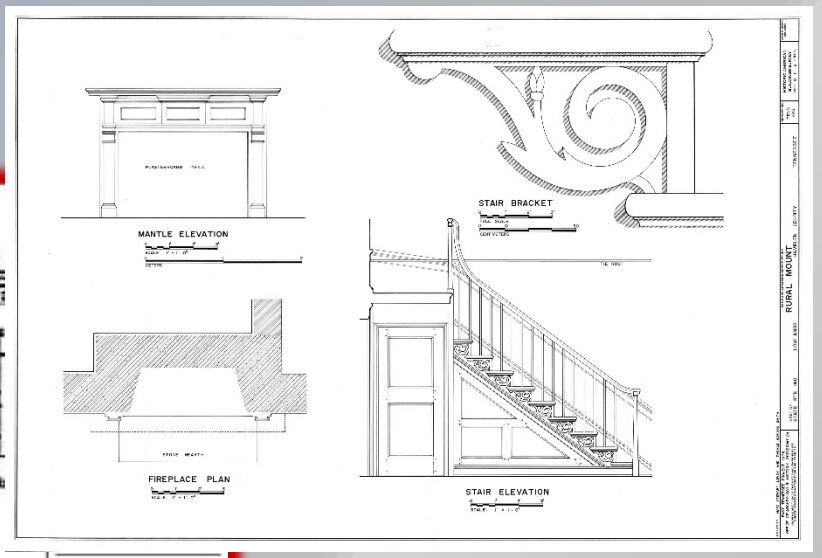


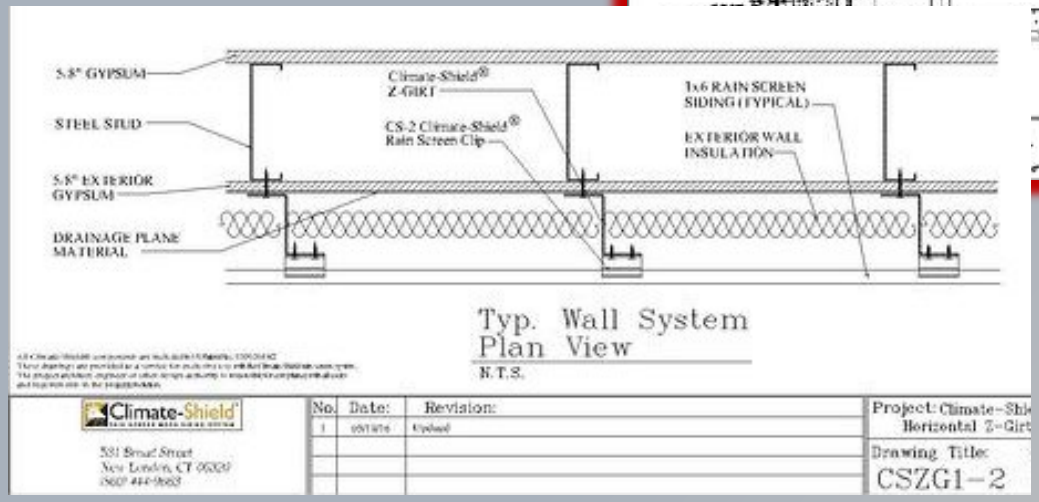
READING ARCHITECTURAL DRAWINGS

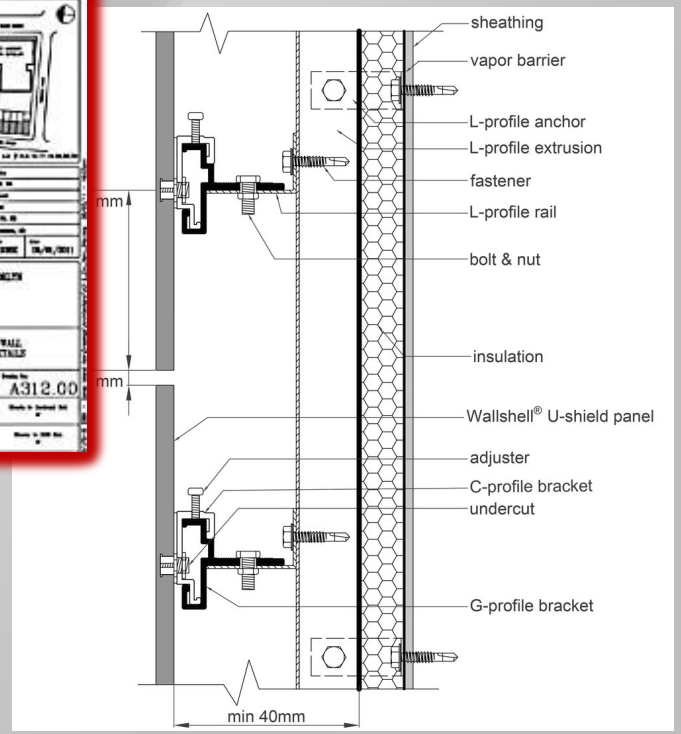
DETAILS

Can be any of the types of drawings: plan/elevation/ section.









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READING ARCHITECTURAL DRAWINGS

TYPICAL DRAWING SETS

AIA Standard format for drawing sequence

- N – Information
- C – Civil Engineering
- A – Architectural
- I – Interior Design
- S – Structural
- M – Mechanical
- E – Electrical
- P – Plumbing
- L -- Landscape

DRAWING INDEX

Sheet Number	Sheet Title	Drawing Revision Number	Issue Date
GENERAL			
AN0	Cover Sheet and Drawing Index		
AN1	Abbreviations, General Notes, and General Symbols		
AN2	Life Safety Plans		
AN3	Accessibility Details		
AN4	Los Angeles Green Building Code Mandatory Measures		
AN5.1	General Conditions		
AN5.2	General Conditions		
ARCHITECTURAL			
A0.1	Project Site Plan		
A0.5	Accessible Site and Parking Details		
A1.0	Construction Plans		
A2.0	Roof Plan		
A3.0	Exterior Elevations		
A4.0	Building Sections		
A4.1	Wall Sections		
A4.2	Wall Sections		
A5.0	Enlarged Unit "A" Plan and Reflected Ceiling Plan		
A5.1	Enlarged Unit "B" and Community Room Plan and Reflected Ceiling Plan		
A5.2	Enlarged Unit "C" Plan and Reflected Ceiling Plan		
A6.0	Elevator Plan and Details		
A7.0	Enlarged Stair Plans and Details		
A7.1	Enlarged Stair Plans and Details		
A8.1	Interior Elevations		
A8.2	Interior Elevations		
A9.0	Architectural Details		
A10.0	Project Schedules and Typical Details		
TYPE A	Type A Container Elevations		
TYPE B	Type B Container Elevations		
TYPE C	Type C Container Elevations		
TYPE D	Type D Container Elevations		
TYPE E	Type E Container Elevations		
TYPE F	Type F Container Elevations		
TYPE G	Type G Container Elevations		
STRUCTURAL			
S0.1	General Notes		
S1.0	Foundation Plan		
S1.1	Ground Floor Framing Plan		
S2.0	Second Floor Framing Plan		
S2.1	Third Floor Framing Plan		
S3.0	Roof Framing Plan		
S4.0	Wall Elevations and Details		
S4.1	Braced Frame Elevations and Details		
S5.0	Foundation Details		
S6.0	Floor Details		
S6.1	Floor Details		
S6.2	Floor Details		
S7.0	Roof Framing Details		
S7.1	Roof Framing Details		
MECHANICAL			
MP0.1	Mechanical & Plumbing - Notes, Symbols and Calculations		
MP0.2	Mechanical & Plumbing - Schedules		
MP1.1	Mechanical - 1st and 2nd Floor Plan		
MP1.2	Mechanical - 3rd Floor and Roof Plan		
MP1.3	Mechanical - Enlarged Typical Details		
MP2.0	Plumbing - CW/HW/Gas Site Plan		
MP2.1	Plumbing - CW/HW/Gas 1st and 2nd Floor Plan		
MP2.2	Plumbing - CW/HW/Gas 3rd Floor and Roof Plan		
MP2.3	Plumbing - CW/HW/Gas Enlarged Typical Details		
MP3.0	Plumbing - Sewer/Vent Site Plan		
MP3.1	Plumbing - Sewer/Vent 1st and 2nd Floor Plan		
MP3.2	Plumbing - Sewer/Vent 3rd Floor and Roof Plan		
MP3.3	Plumbing - Sewer/Vent Enlarged Typical Details		
MP4.1	Mechanical and Plumbing - Details		
MP4.2	Mechanical and Plumbing - Details		
MP4.3	Mechanical and Plumbing - Details		
MP5.1	Mechanical and Plumbing - Title 24 Documentation		
MP5.2	Mechanical and Plumbing - Title 24 Documentation		
ELECTRICAL			
E0.01	Electrical Cover Sheet		
E1.01	Electrical Plans - Overall		
E4.01	Electrical - Enlarged Plans		
E5.01	Electrical - Single Line Diagram		
E5.02	Electrical - Panel Schedules		

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READING ARCHITECTURAL DRAWINGS

CONTRACTUAL RESPONSIBILITY FOR CONSULTANTS

WHO PAYS EACH CONSULTANT?

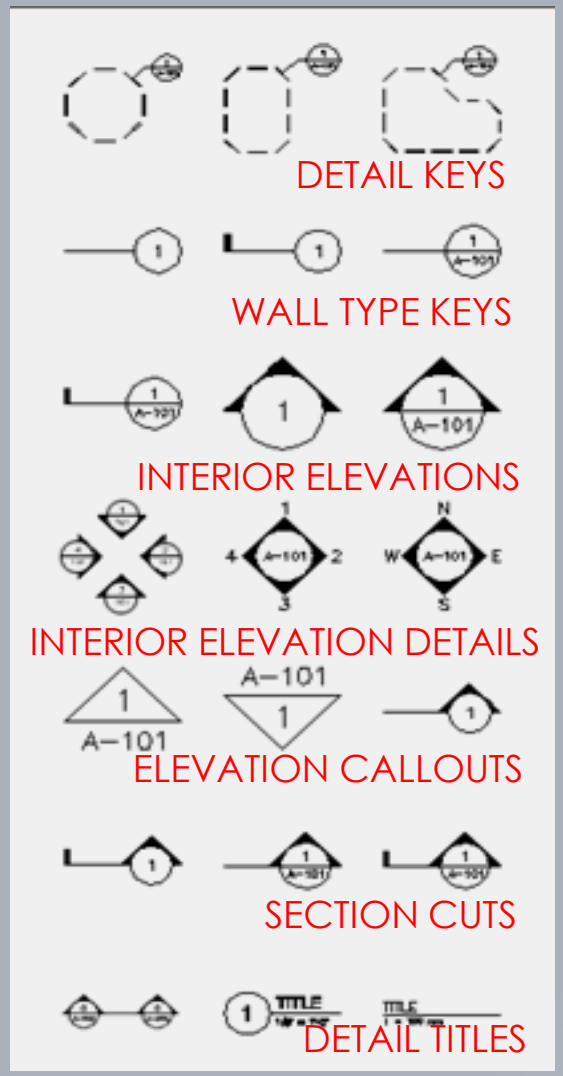
- C – Civil Engineering --- OWNER
- A – Architectural --- OWNER
- I – Interior Design --- OWNER OR ARCHITECT
- S – Structural --- ARCHITECT
- M – Mechanical --- ARCHITECT
- E – Electrical ---ARCHITECT
- P – Plumbing --- ARCHITECT
- L – Landscape --- OWNER

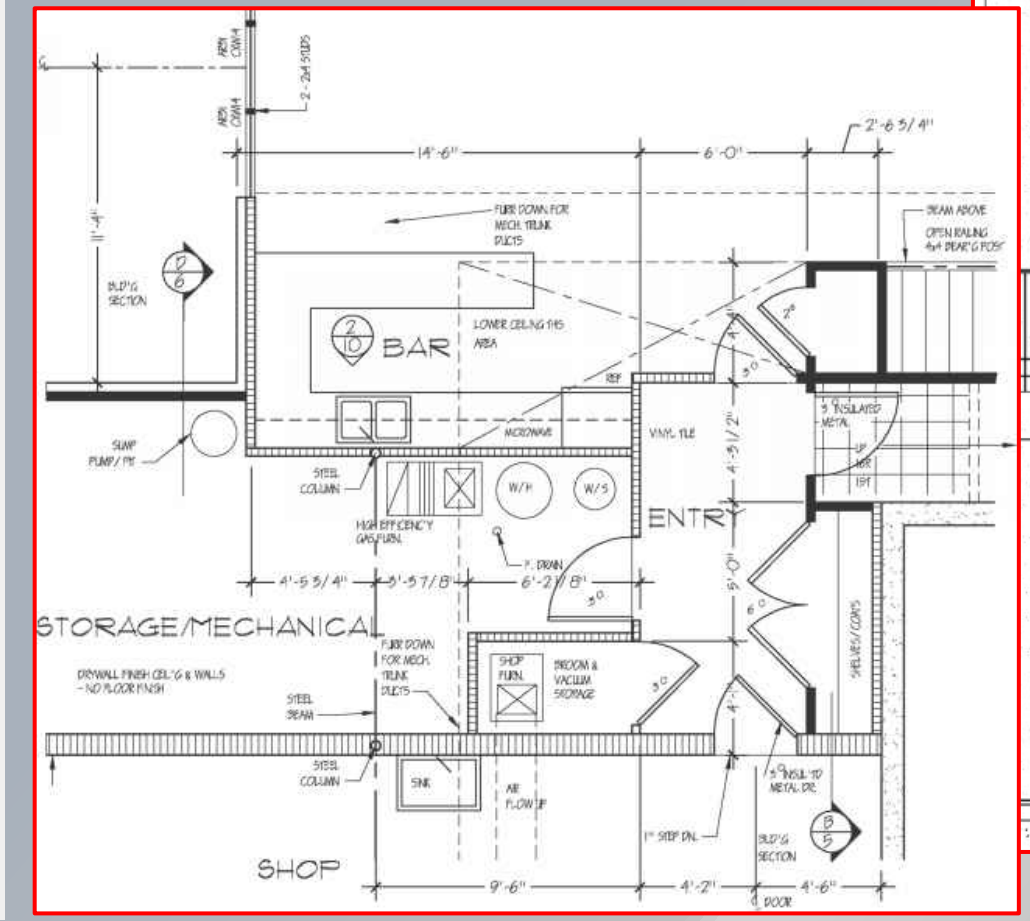
WHO COORDINATES EACH CONSULTANT?

- C – Civil Engineering --- ARCHITECT
- A – Architectural --- ARCHITECT
- I – Interior Design ---ARCHITECT
- S – Structural --- ARCHITECT
- M – Mechanical --- ARCHITECT
- E – Electrical ---ARCHITECT
- P – Plumbing --- ARCHITECT
- L – Landscape --- ARCHITECT

READING ARCHITECTURAL DRAWINGS

KEYS AND SYMBOLS





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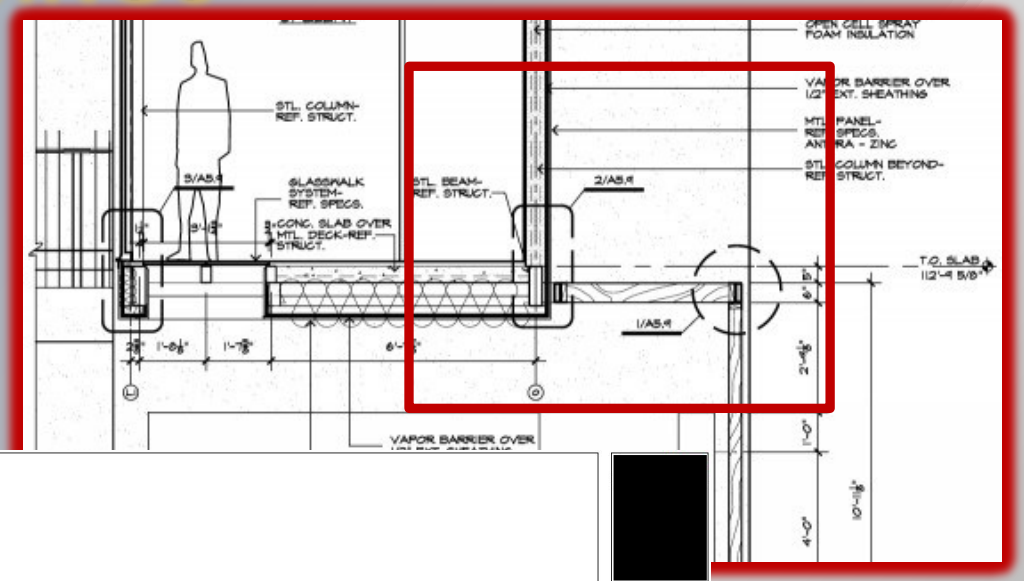
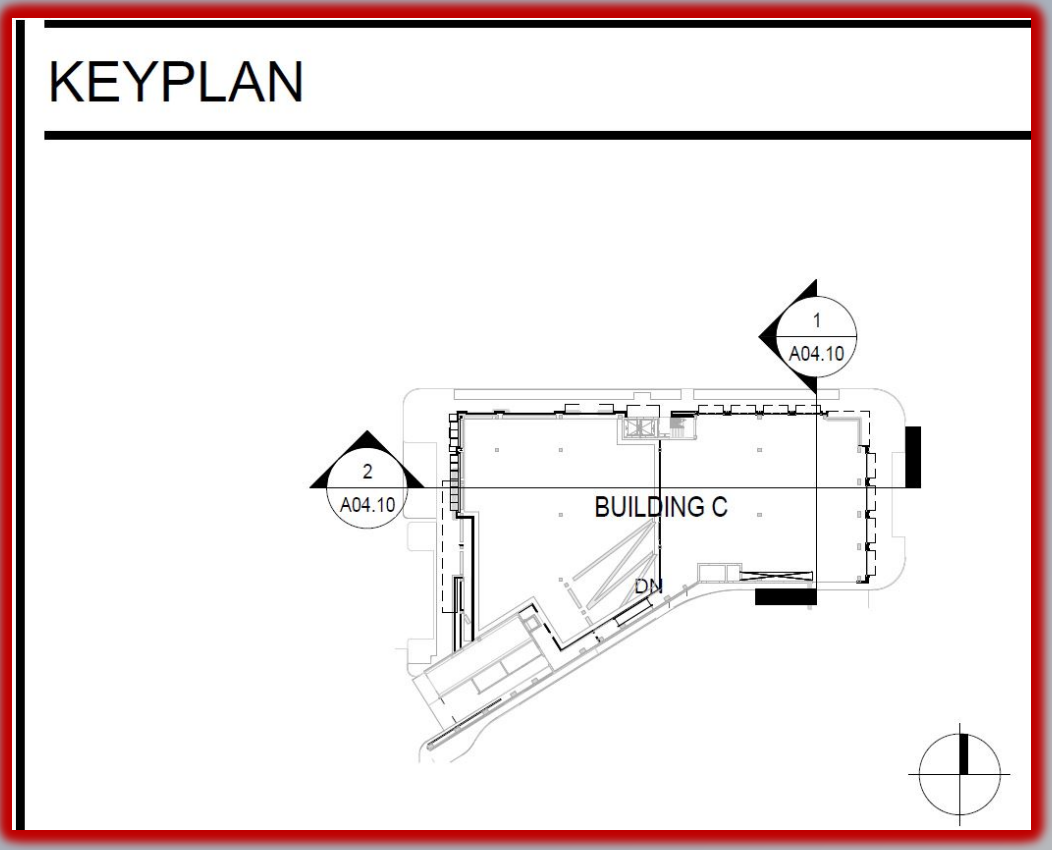
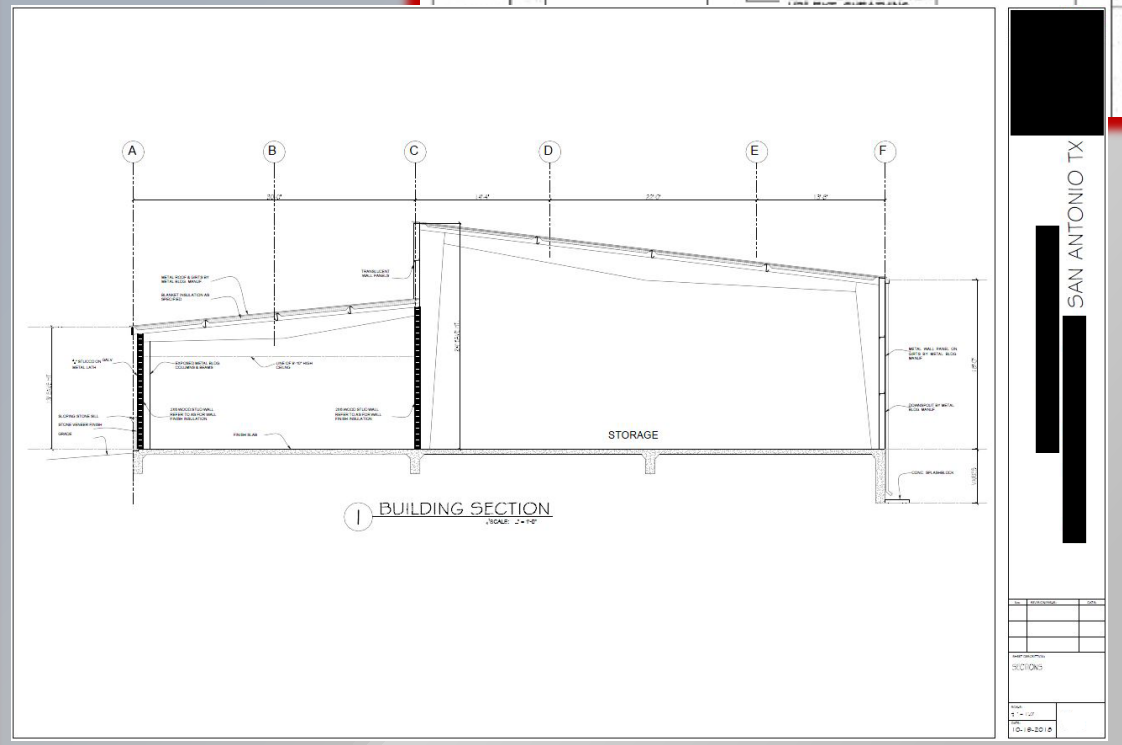
READING ARCHITECTURAL DRAWINGS

KEYS AND SYMBOLS are

(among other reasons) used to direct the viewer "forward" to a subsequent sheet, and a more enlarged drawing of some specific part of the building.







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READING ARCHITECTURAL DRAWINGS

NAVIGATING THROUGH A SET OF DRAWINGS

For a new building. This is a multi-family housing project currently under construction. It presents many technical challenges for both architect and builder, in that it's a building made from shipping containers, in a modular manufacturing facility.

READING ARCHITECTURAL DRAWINGS

COVER SHEET

- SHEET INDEX (Table of Contents)
- PROJECT LOCATION MAP
- GENERAL NOTES
- PROJECT CONTACTS
- ETC

- EVERY SET OF DRAWINGS INCLUDES DIFFERENT THINGS HERE, BUT IT'S GENERALLY THE HIGHEST LEVEL INFORMATION THAT MAY BE REQUIRED

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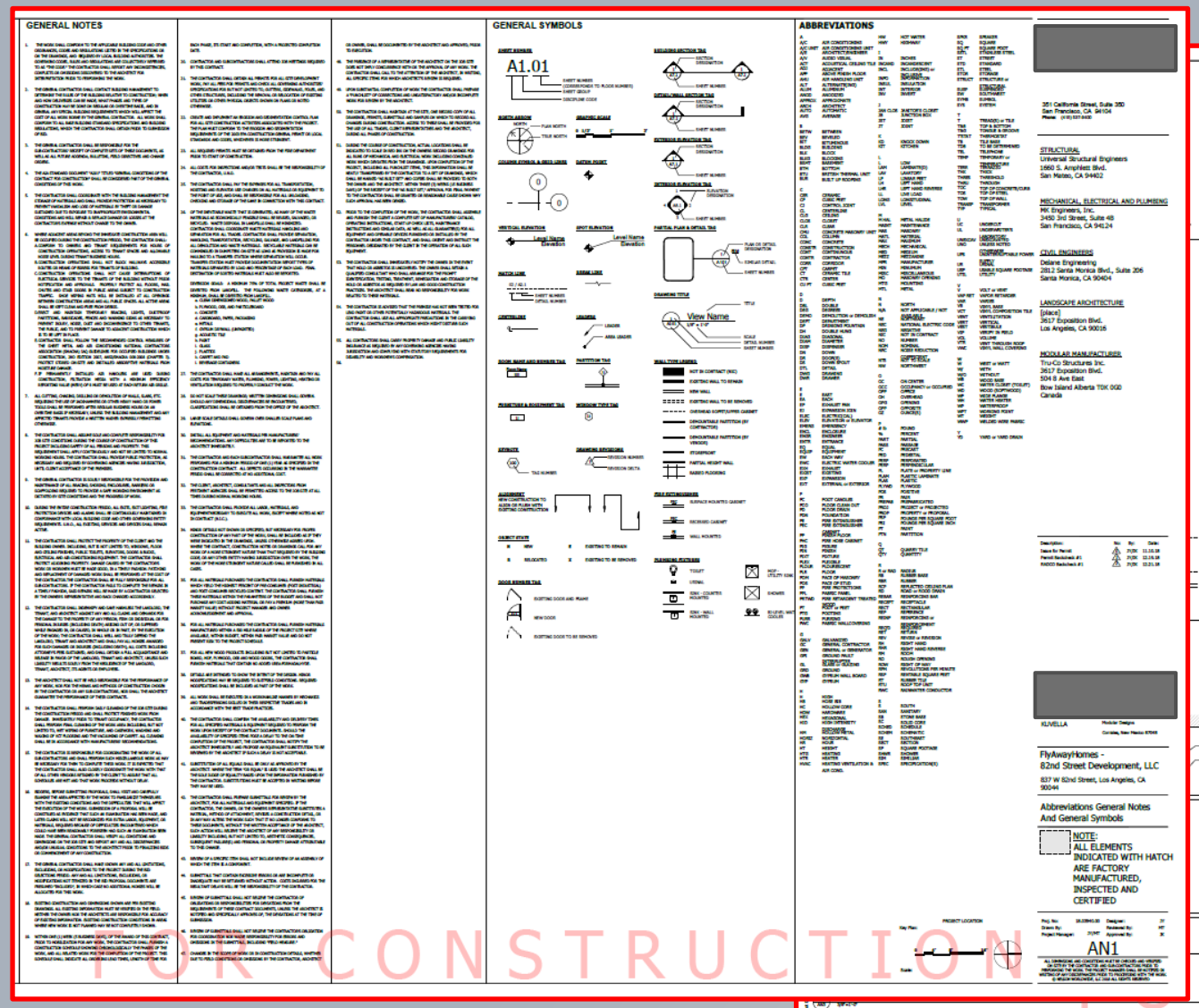
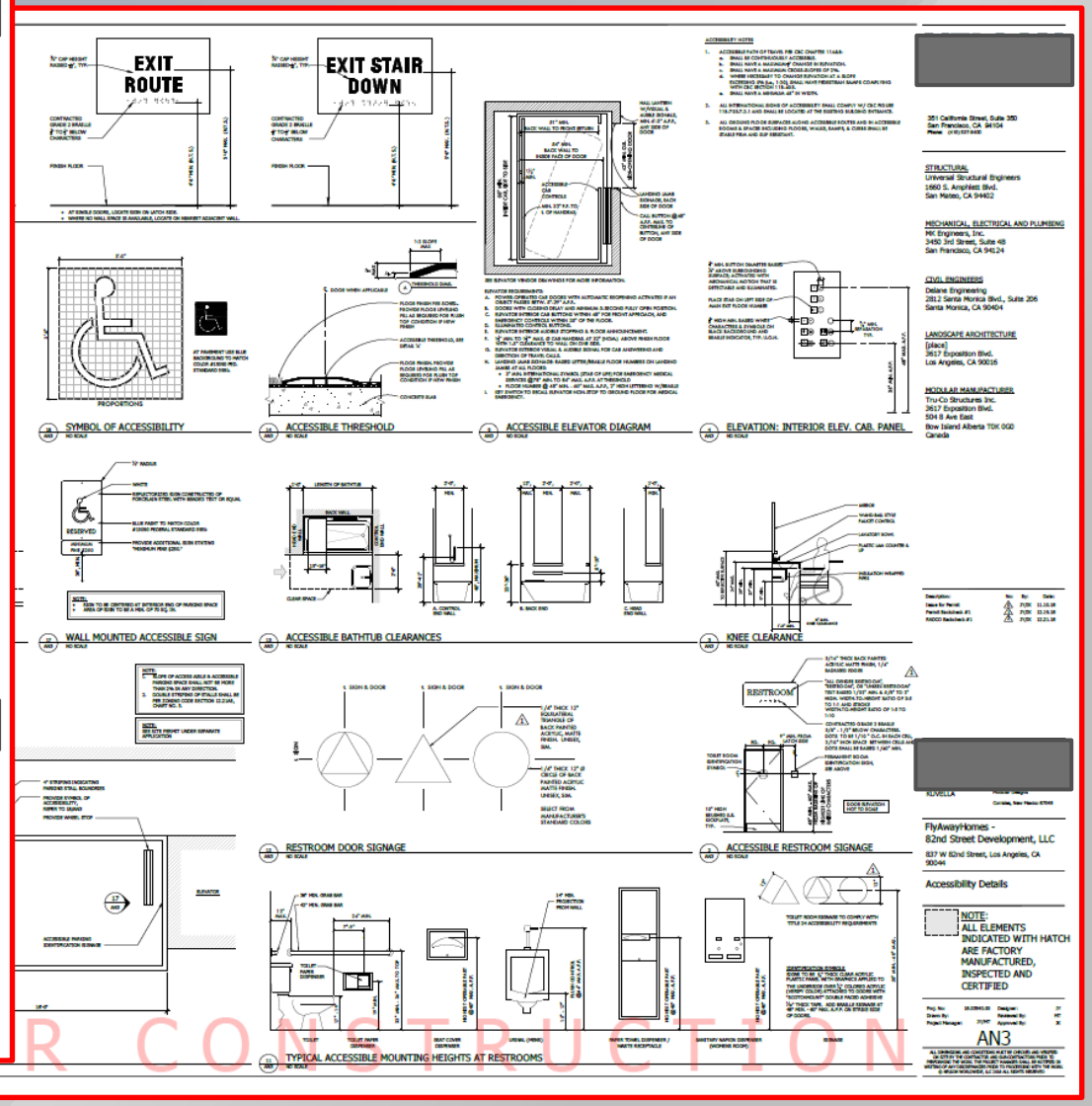
READING ARCHITECTURAL DRAWINGS



GENERAL NOTES

GENERAL SYMBOLS

ABBREVIATIONS



EXIT ROUTE

EXIT STAIR DOWN

SYMBOL OF ACCESSIBILITY

ACCESSIBLE THRESHOLD

ACCESSIBLE ELEVATOR DIAGRAM

ELEVATION: INTERIOR ELEV. CAB. PANEL

WALL MOUNTED ACCESSIBLE SIGN

ACCESSIBLE BATHTUB CLEARANCES

KNEE CLEARANCE

RESTROOM DOOR SIGNAGE

ACCESSIBLE RESTROOM SIGNAGE

TYPICAL ACCESSIBLE MOUNTING HEIGHTS AT RESTROOMS

351 California Street, Suite 350
San Francisco, CA 94104
Phone: (415) 837-8400

STRUCTURAL
Universal Structural Engineers
1660 S. Amphlett Blvd.
San Mateo, CA 94402

MECHANICAL, ELECTRICAL AND PLUMBING
MK Engineers, Inc.
3450 3rd Street, Suite 4B
San Francisco, CA 94124

CIVIL ENGINEERS
Delane Engineering
2812 Santa Monica Blvd., Suite 206
Santa Monica, CA 90404

LANDSCAPE ARCHITECTURE
[place]
3617 Exposition Blvd.
504 B Ave East
Bow Island Alberta T0K 0G0
Canada

MODULAR MANUFACTURER
Tru-Co Structures Inc.
3617 Exposition Blvd.
504 B Ave East
Bow Island Alberta T0K 0G0
Canada

FlyAwayHomes -
82nd Street Development, LLC
837 W 82nd Street, Los Angeles, CA 90044

Abbreviations General Notes And General Symbols

Accessibility Details

NOTE:
ALL ELEMENTS INDICATED WITH HATCH ARE FACTORY MANUFACTURED, INSPECTED AND CERTIFIED

AN1

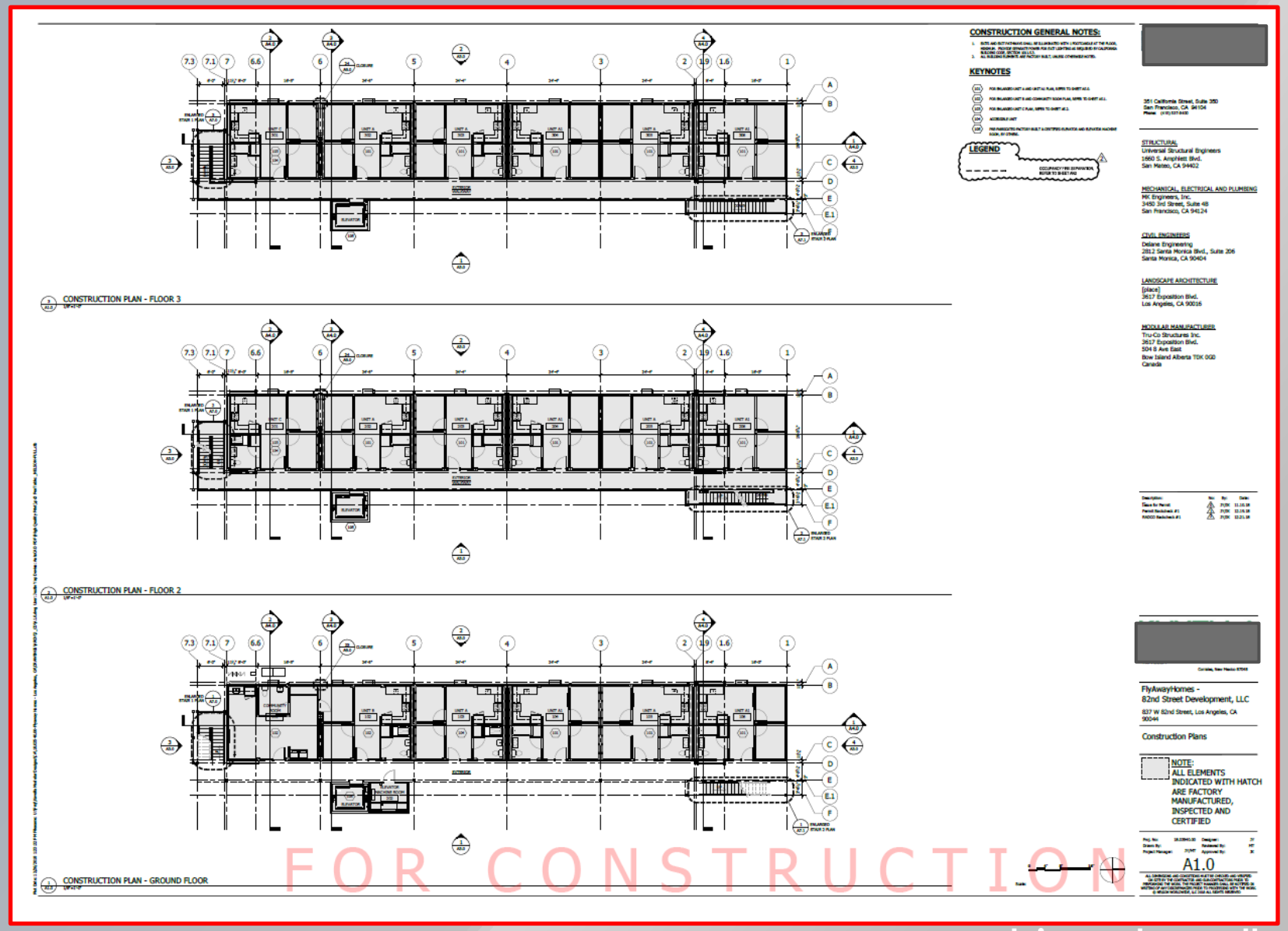
AN3

FOR CONSTRUCTION FOR CONSTRUCTION

READING ARCHITECTURAL DRAWINGS

A 1.0

- NEARLY ALWAYS THE SHEET NUMBER USED FOR THE MAIN, OVERALL PLAN VIEWS OF THE PROJECT
- THE ORIGIN OF ***ALL KEYS IN THE ENTIRE SET*** IS SOMEWHERE IN THIS DRAWING.



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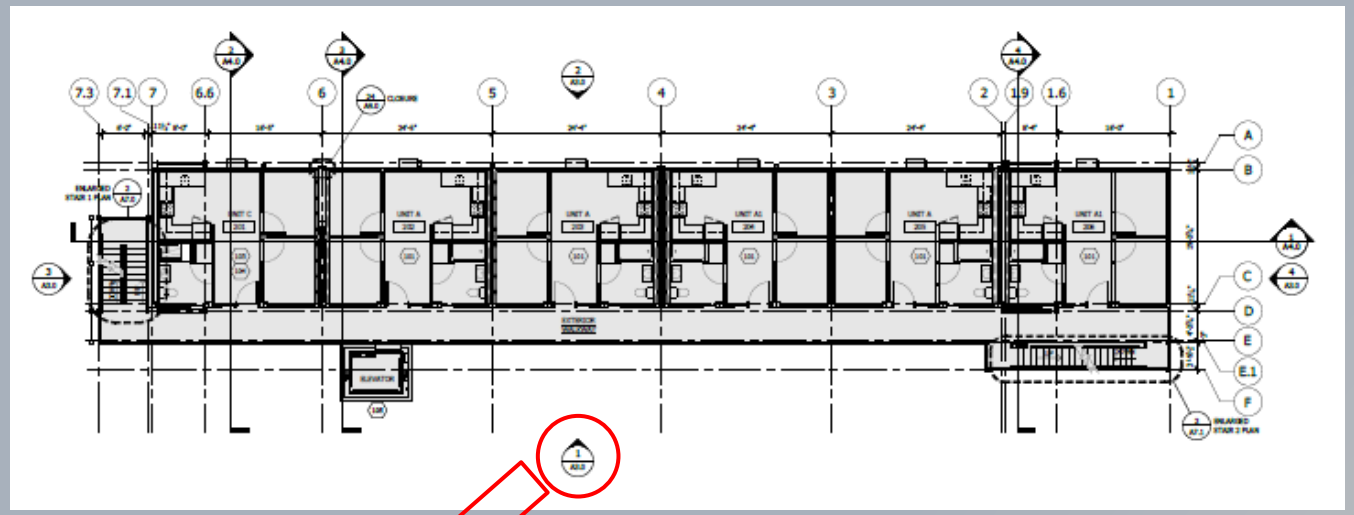
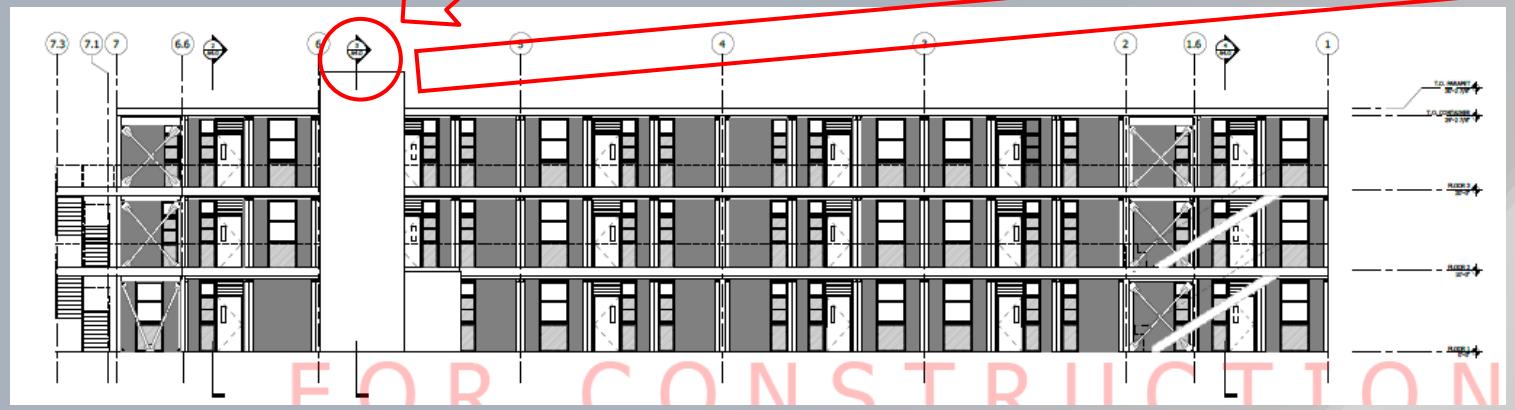
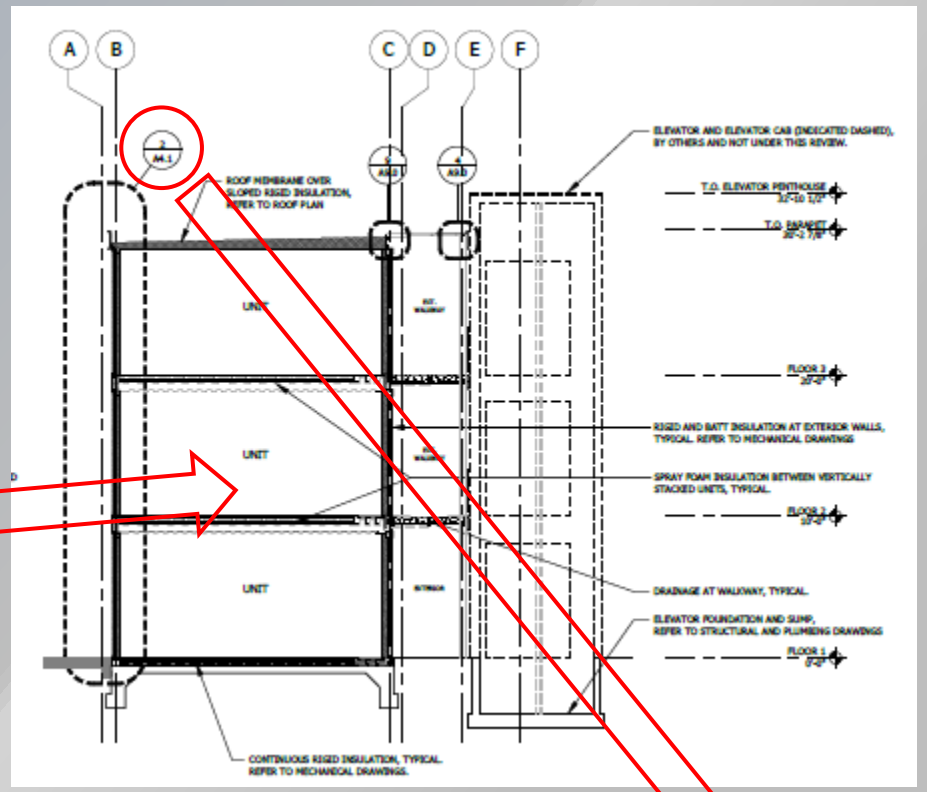
READING ARCHITECTURAL DRAWINGS

NAVIGATING THROUGH A SET OF DRAWINGS

Think of it as going from LARGE to SMALL. Starting with the entire building, "drilling down" to parts of the building (elevations, sections, wall sections, etc) and further, deeper, into the detail level.







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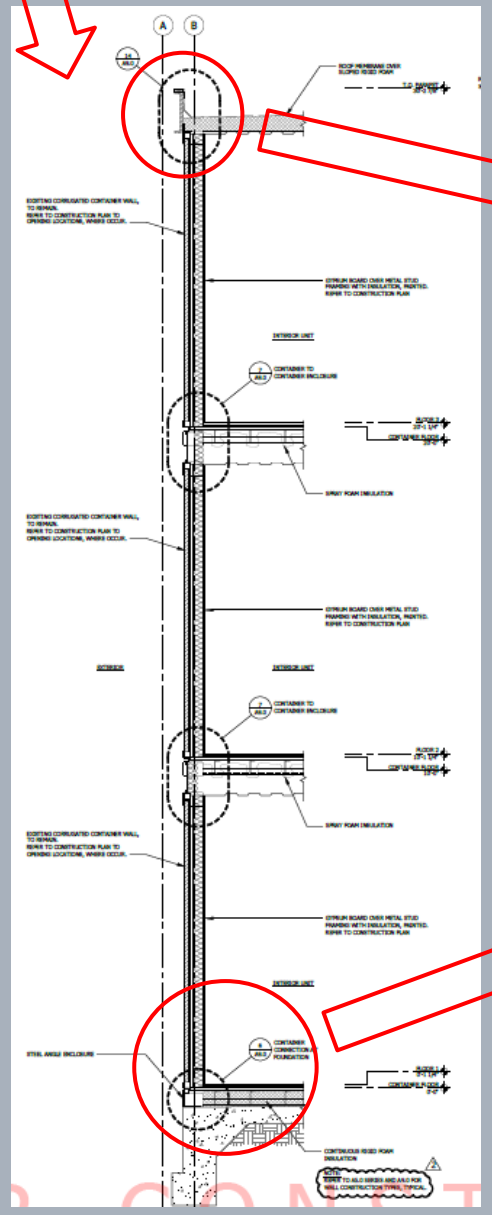
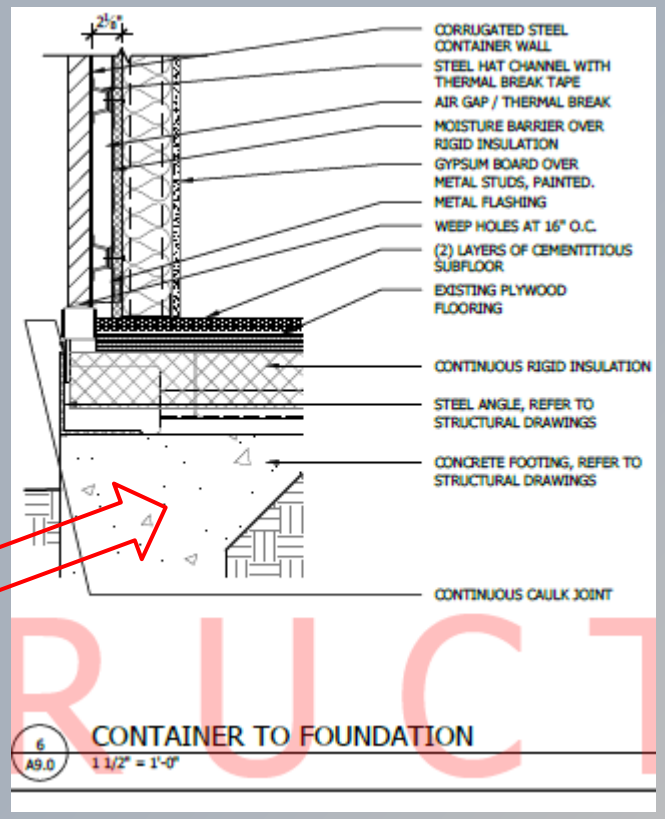
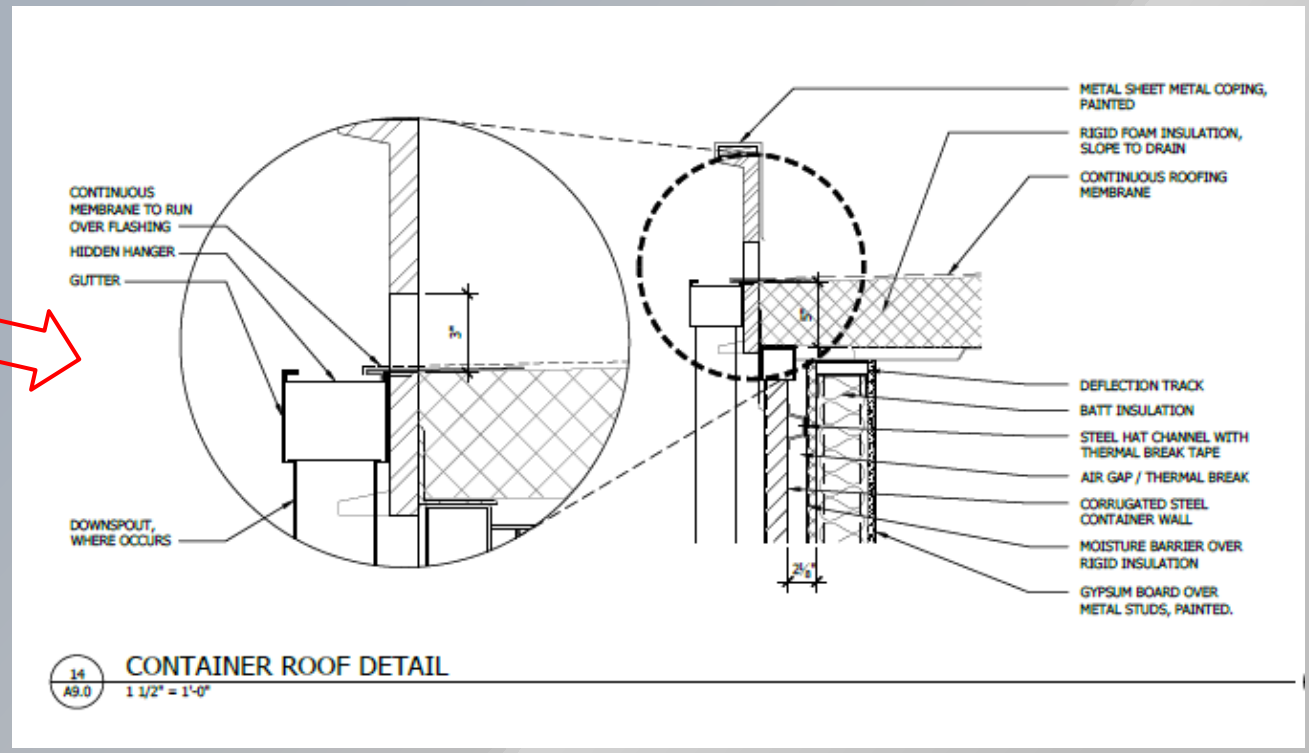
READING ARCHITECTURAL DRAWINGS







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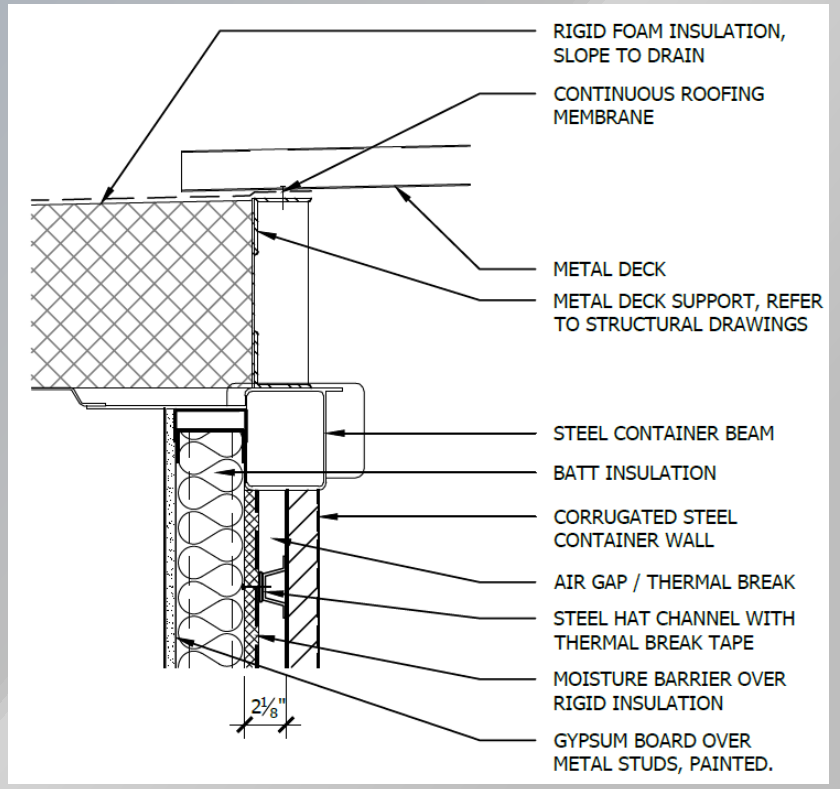
READING ARCHITECTURAL DRAWINGS

A NOTE ON NOTES

Written notes in drawings are a sticky subject legally. They **might** protect the architect and/or the contractor from liability, but there are several caveats.

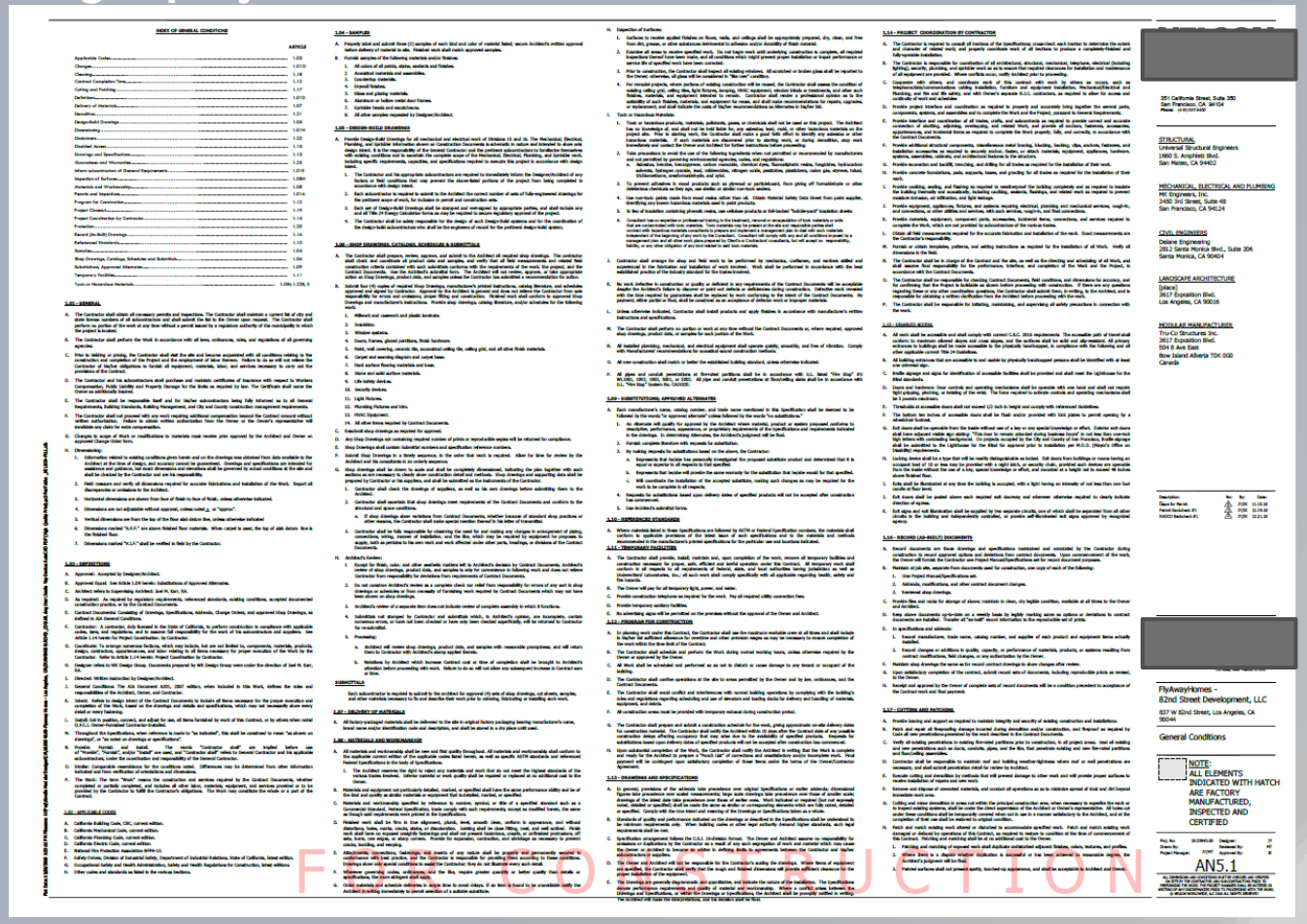
- The presence or absence of any given note is ***VERY frequently the basis of a dispute.***
- Although a note may not be present in the drawings, it might be covered in the specification book. (More on that later)
- A note that includes actual product spec is usually frowned upon, since there have to be some kind of written specs, which usually will cite actual names of products/manufacturers/quality level, etc.

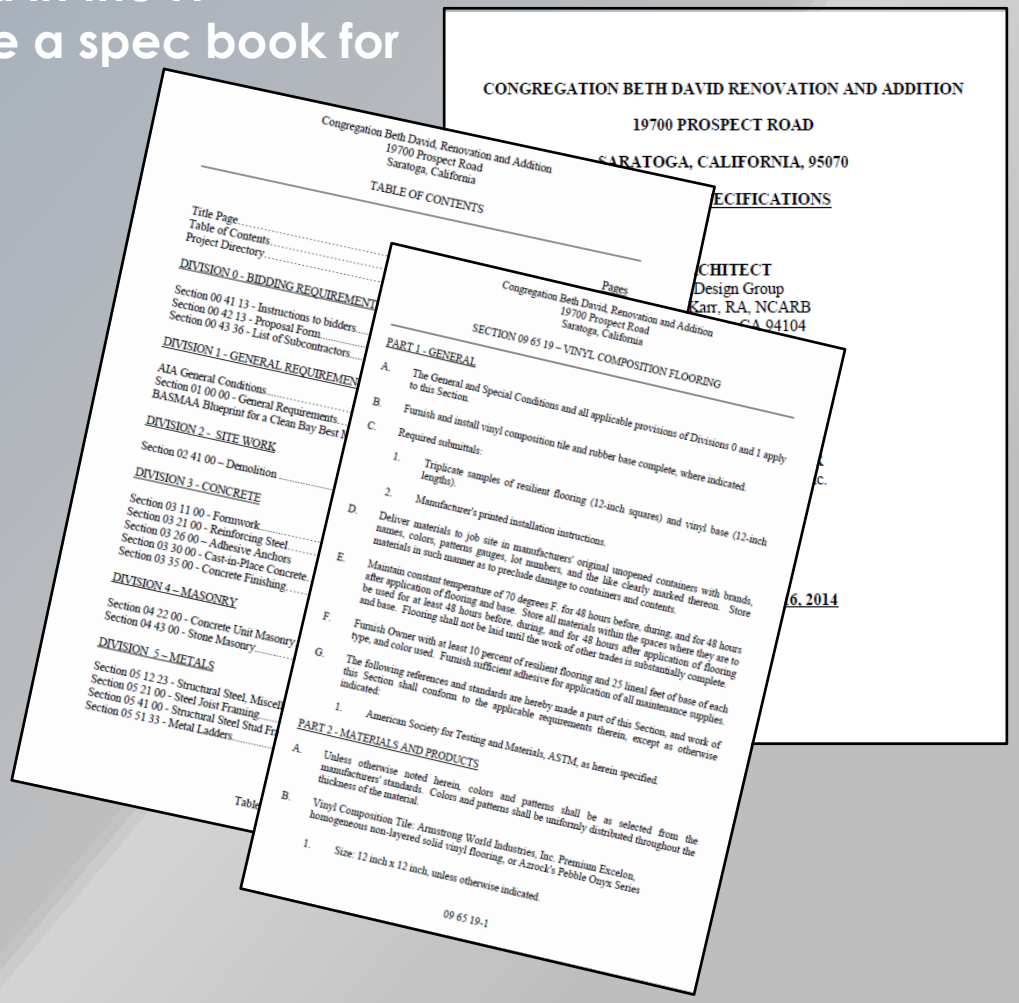


READING ARCHITECTURAL DRAWINGS

WRITTEN SPECIFICATIONS

Depending on the scale of the project, they may be found in the N "Information" sheets at the front of the set, or there may be a spec book for larger projects.





FOR CONSTRUCTION

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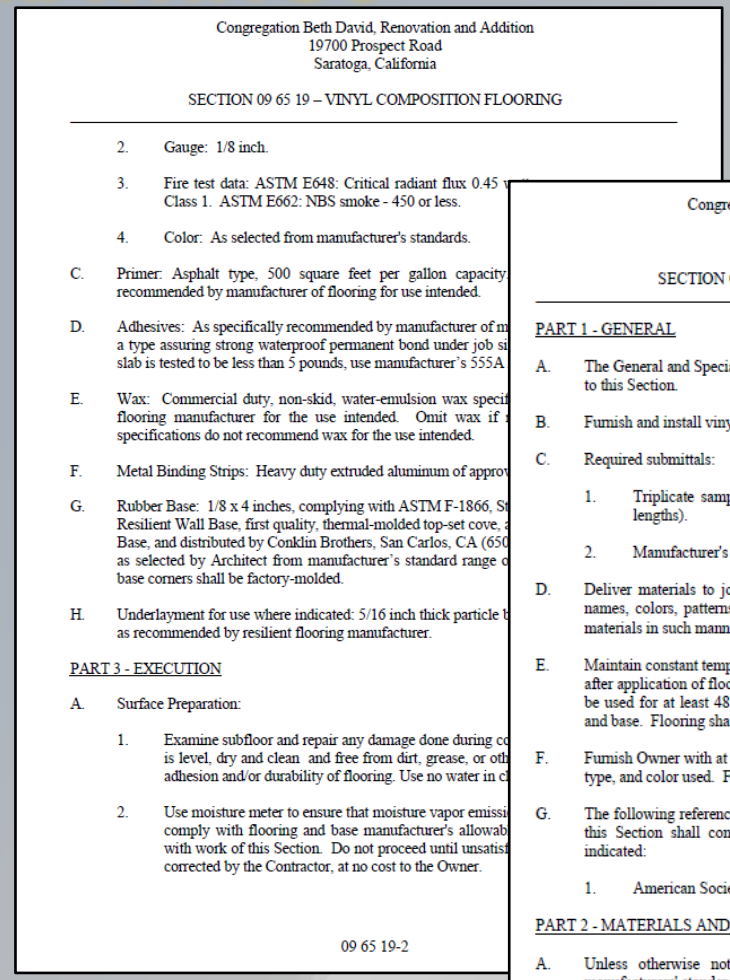
READING ARCHITECTURAL DRAWINGS

Master Format Book form

CSI Index

- Division 00 - Procurement and Contracting Requirements
- Division 01 - General Requirements
- Division 02 - Existing Conditions
- Division 03 - Concrete
- Division 04 - Masonry
- Division 05 - Metals
- Division 06 - Wood, Plastics, Composites
- Division 07 - Thermal and Moisture Protection
- Division 08 - Openings
- Division 09 - Finishes
- Division 10 - Specialties
- Division 11 - Equipment
- Division 12 - Furnishings
- Division 13 - Special Construction
- Division 14 - Conveying Equipment
- Division 21 - Fire Suppression
- Division 22 - Plumbing
- Division 23 - Heat, Ventil, Air Con (HVAC)
- Division 25 - Integrated Automation
- Division 26 - Electrical
- Division 27 - Communications
- Division 28 - Electronic Safety
- Division 31 - Earthwork
- Division 32 - Exterior Improvements
- Division 33 - Utilities
- Division 34 - Transportation
- Division 35 - Marine Construction
- Division 40 - Process Integration
- Division 41 - Material Process and Handling Equipment
- Division 42 - Process Heat, Cool, and Dry Equipment
- Division 43 - Process Gas and Liquid Handling Equipment
- Division 44 - Pollution and Waste Control Equipment
- Division 45 - Industry-Specific Manufacture Equipment
- Division 46 - Water and Wastewater Equipment
- Division 48 - Electrical Power Generation



Congregation Beth David, Renovation and Addition
19700 Prospect Road
Saratoga, California

SECTION 09 65 19 – VINYL COMPOSITION FLOORING

2. Gauge: 1/8 inch.

3. Fire test data: ASTM E648: Critical radiant flux 0.45 w
Class 1. ASTM E662: NBS smoke - 450 or less.

4. Color: As selected from manufacturer's standards.

C. Primer: Asphalt type, 500 square feet per gallon capacity
recommended by manufacturer of flooring for use intended.

D. Adhesives: As specifically recommended by manufacturer of m
a type assuring strong waterproof permanent bond under job si
slab is tested to be less than 5 pounds, use manufacturer's 555A

E. Wax: Commercial duty, non-skid, water-emulsion wax specif
flooring manufacturer for the use intended. Omit wax if
specifications do not recommend wax for the use intended.

F. Metal Binding Strips: Heavy duty extruded aluminum of approv

G. Rubber Base: 1/8 x 4 inches, complying with ASTM F-1866, St
Resilient Wall Base, first quality, thermal-molded top-set cove,
Base, and distributed by Conklin Brothers, San Carlos, CA (650
as selected by Architect from manufacturer's standard range o
base corners shall be factory-molded.

H. Underlayment for use where indicated: 5/16 inch thick particle b
as recommended by resilient flooring manufacturer.

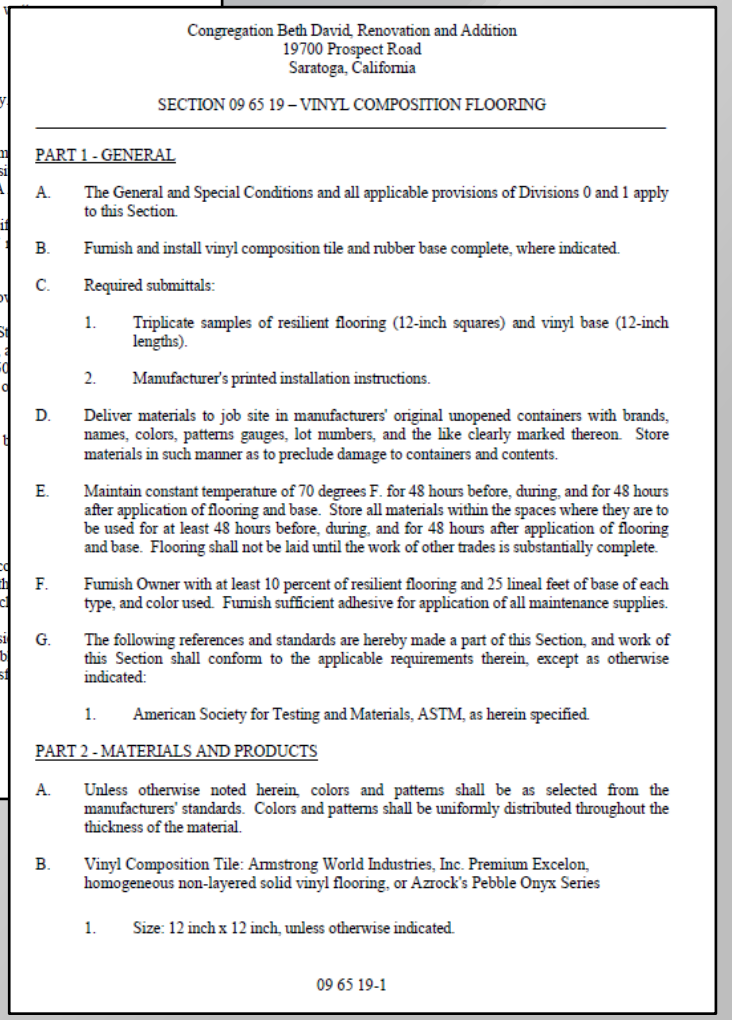
PART 3 - EXECUTION

A. Surface Preparation:

1. Examine subfloor and repair any damage done during co
is level, dry and clean and free from dirt, grease, or oth
adhesion and/or durability of flooring. Use no water in c

2. Use moisture meter to ensure that moisture vapor emissi
comply with flooring and base manufacturer's allowab
with work of this Section. Do not proceed until unsatisf
corrected by the Contractor, at no cost to the Owner.

09 65 19-2



Congregation Beth David, Renovation and Addition
19700 Prospect Road
Saratoga, California

SECTION 09 65 19 – VINYL COMPOSITION FLOORING

PART 1 - GENERAL

A. The General and Special Conditions and all applicable provisions of Divisions 0 and 1 apply to this Section.

B. Furnish and install vinyl composition tile and rubber base complete, where indicated.

C. Required submittals:

1. Triplicate samples of resilient flooring (12-inch squares) and vinyl base (12-inch lengths).

2. Manufacturer's printed installation instructions.

D. Deliver materials to job site in manufacturers' original unopened containers with brands, names, colors, patterns gauges, lot numbers, and the like clearly marked thereon. Store materials in such manner as to preclude damage to containers and contents.

E. Maintain constant temperature of 70 degrees F. for 48 hours before, during, and for 48 hours after application of flooring and base. Store all materials within the spaces where they are to be used for at least 48 hours before, during, and for 48 hours after application of flooring and base. Flooring shall not be laid until the work of other trades is substantially complete.

F. Furnish Owner with at least 10 percent of resilient flooring and 25 lineal feet of base of each type, and color used. Furnish sufficient adhesive for application of all maintenance supplies.

G. The following references and standards are hereby made a part of this Section, and work of this Section shall conform to the applicable requirements therein, except as otherwise indicated:

1. American Society for Testing and Materials, ASTM, as herein specified.

PART 2 - MATERIALS AND PRODUCTS

A. Unless otherwise noted herein, colors and patterns shall be as selected from the manufacturers' standards. Colors and patterns shall be uniformly distributed throughout the thickness of the material.

B. Vinyl Composition Tile: Armstrong World Industries, Inc. Premium Excelon, homogeneous non-layered solid vinyl flooring, or Azrock's Pebble Onyx Series

1. Size: 12 inch x 12 inch, unless otherwise indicated.

09 65 19-1

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READING ARCHITECTURAL DRAWINGS

RFI/RFC/SK/FIELD INSTRUCTION

These are some of the critical items in construction disputes and ***a LEGAL case cannot be made*** without studying them.

012B

RFI #012 Bio-Swale

[redacted] Date: 03/13/2015

To:			
Joseph Larrea WK Design Group, LLC 351 California Street, Suite 350 San Francisco, CA 4104	Attention:	Joseph Larrea
	Project:	Congregation Beth David
	Job Number:	BBC# 13-48

We are sending you

Attached	Under Separate Cover via:		
☐ Proposal	☐ Prints	☐ Plans	☐ Oth
☐ Contract	☐ Change Order	☐ Samples	
☐ Submittals	☐ Shop Drawings	☐ Specification	

Quantity	Date	Description
	3/13/2015	Please provide more detail of the Bio-Swale on Sheet 3 & 4 of the Civil Drawings.
		Please respond by Tuesday, March 17th 2015

These are transmitted as checked below

☐ For Approval	☐ Approved as Submitted	☐ Resubmit copies for approval
☐ For Your Use	☐ Approved as Noted	☐ Submit ( ) copies for distribution
☐ As Requested	☐ Returned for Corrections	☐ Return ( ) approved sample
x For Review and Comment	☐ Revise and Resubmit/Work May Not Proceed	
☐ FOR BIDS DUE:		☐ PRINTS RETURNED AFTER LOAN

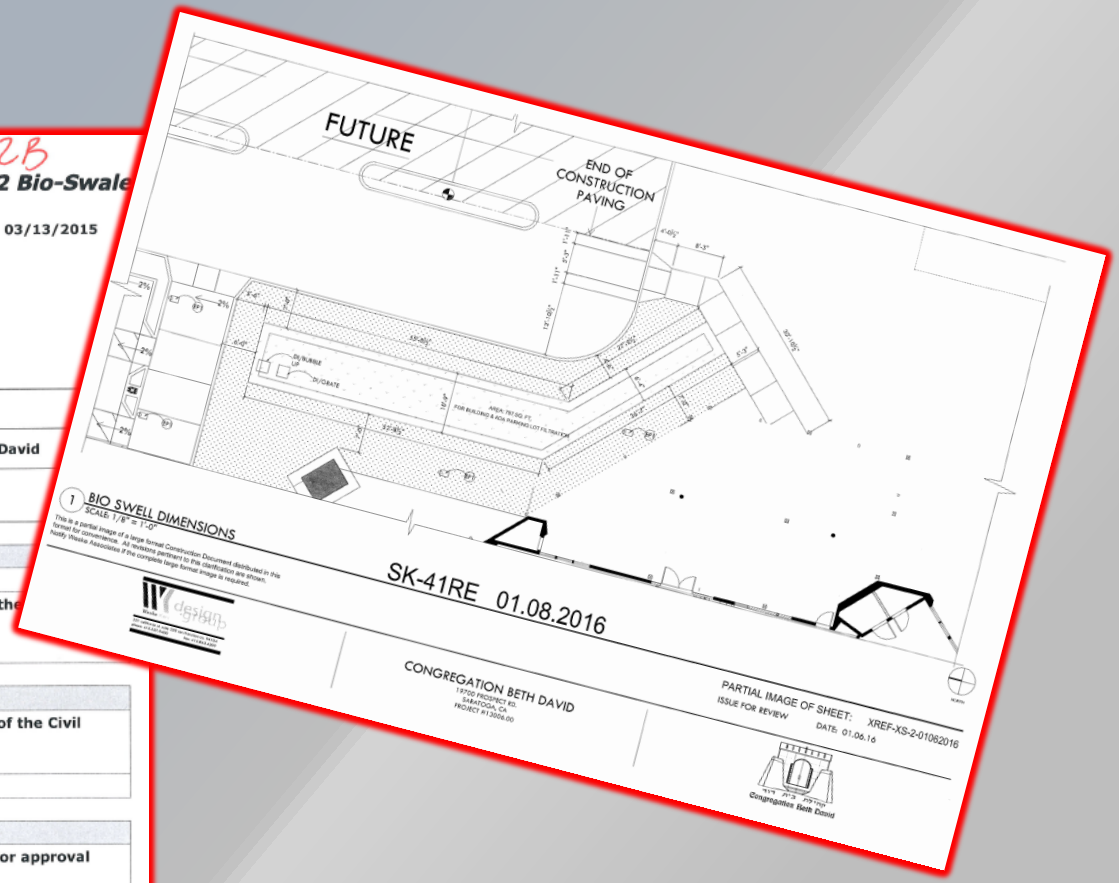
Response:

Please see SK-41RE 01-08-2016

Copy to:

Joel Karr-WK Design Group
Suzanne Mainguy– Bryson Burns Construction
Frank Dickinson – Bryson Burns Construction

Signature



READING ARCHITECTURAL DRAWINGS

WHAT WE LEARNED TODAY

- Phases of design and construction
- Basic understanding of plan/elevation/section/detail
- How to understand what they are and how to read them.
- What are details, and their importance
- How to navigate through a set of architectural drawings
- Drawing index and how to understand difference in each section
- How to navigate through a set of drawings to find the detailed drawing you need
- Reading architectural specifications
- CSI Format and how to read a CSI specification

SUBSEQUENT SESSIONS WILL INCLUDE:

- ARCHITECTS' STANDARD OF CARE AND ITS MEANING IN CONSTRUCTION LITIGATION
- EXPLANATION OF EACH DRAWING TYPE IN DETAIL
- DEEPER UNDERSTANDING OF THE ISSUES RAISED IN CLOSE DETAIL DRAWINGS

HOW TO READ ARCHITECTURAL DRAWINGS

THANK YOU !!

EUGENE PETERSON
eugene@adviseandconsult.net

JOEL M. KARR
joel@adviseandconsult.net
415-572-5033

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Folio42