How to Read Blueprints

From the beginning…

Before explaining how to read blueprints, it may be valuable to understand what blueprints are. It is quite difficult to build a structure to scale when the scale you are working with is very small. To make things a bit easier to read, architects and designers complete their drawings on large scale vellum sheets of various sizes. Probably the most common size for commercial work is 36” x 48”.

Twenty years ago we didn’t have the technology that we do today where most plans are drawn on computers by CAD systems. CAD is short for computer aided design. Plans were drawn by hand on semi-transparent film called vellum. Blueprints are then made by overlaying the vellum drawings on top of blueprint paper which is ran through the blueprint machine, which exposes the paper to intensified light and ammonia. This exposure to ammonia and light causes the blueprint paper to develop and the drawings are transposed in a dark blue color.

The vellum drawings were very valuable since it represented hours and hours of work that the architect put in to creating the drawing. But today the popular method for creating plans is by CAD. Once drawings are completed in the computer, they are plotted (printed) on a large-scale printer called a plotter. If the vellums are accidentally destroyed the architect has the plans on file to re-plot. Copies can now be made from these vellums by either a blueprint machine or a large scale printer for crisp “black and white” copies.

Typical blueprints will consist of the following pages, depending on the structure being built.

- Site Plan, also called the plot plan
- Elevations. Pictures of front, rear, left & right sides of building.
- Foundation plan. Shows footings, steel placement, etc.
- Floor plan. If there’s more than one floor level, you will have multiple floor plans. Such as 2nd Floor, 3rd Floor, etc.
- Roof plan. This will show roof framing.
- Electrical plan. Placement of electrical service, switches, etc.
- HVAC & Plumbing plans.

Components of a blueprint, or plan.

The Scale

Since plans cannot be the same size as the actual building, they have to be drawn small enough to fit on paper. The most common scale is ¼”. This means that every ¼” equals 1 foot. A 1” line would equal 4 feet in our drawing. Larger buildings may be drawn in a smaller scale to get the building on the page. Each page of the plan will have the scale noted. **SCALE: ¼” = 1’** Now, that’s not so bad.
Dimension Lines

Measurements from one point to another are called dimension lines. These will be drawn as a solid line with a mark at either end. Different designers use different marks. This one uses arrows.

Callouts (Call outs)

You will probably notice a number of circles, triangles, or hexagons with numbers inside of them. Placed next to windows and doors, and sometimes next to other elements such as lighting or plumbing fixtures, these notations correspond to those on the window, door, plumbing and electrical schedules found elsewhere on the blueprint. These schedules indicate the size and types of the windows and doors to be used. Sometimes even the manufacturer and model numbers are on these schedules. They are a type of marker for us.

Examples of call outs

![Examples of call outs](image)

Schedules

In the previous section we mentioned the callouts would refer to the corresponding schedules; window, door, etc. To determine what window goes in the location shown here, we would check the callout and refer to the WINDOW SCHEDULE.
Looking at our WINDOW SCHEDULE, we can determine this window is an Anderson / C125. Our window salesperson will also note there are 3 of these windows in the building when doing his estimate for us.

### WINDOW SCHEDULE

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>QTY</th>
<th>DESCRIPTION</th>
<th>EXT. TRIM</th>
<th>GLAZING</th>
</tr>
</thead>
<tbody>
<tr>
<td>W01</td>
<td>3</td>
<td>ANDERSON / C125</td>
<td>VINYL</td>
<td>DOUBLE</td>
</tr>
<tr>
<td>W02</td>
<td>2</td>
<td>ANDERSON / C15</td>
<td>VINYL</td>
<td>DOUBLE</td>
</tr>
<tr>
<td>W03</td>
<td>3</td>
<td>ANDERSON / C155</td>
<td>VINYL</td>
<td>DOUBLE</td>
</tr>
<tr>
<td>W04</td>
<td>4</td>
<td>ANDERSON / C155</td>
<td>VINYL</td>
<td>DOUBLE</td>
</tr>
<tr>
<td>W05</td>
<td>1</td>
<td>ANDERSON / C155</td>
<td>VINYL</td>
<td>DOUBLE</td>
</tr>
<tr>
<td>W06</td>
<td>1</td>
<td>ANDERSON / C155</td>
<td>VINYL</td>
<td>DOUBLE</td>
</tr>
<tr>
<td>W07</td>
<td>2</td>
<td>ANDERSON / C255</td>
<td>VINYL</td>
<td>DOUBLE</td>
</tr>
</tbody>
</table>

There can be other schedules on a blueprint to make referencing information easier and more compact. These help to organize and “neaten up” the blueprint. This is an example of a ROOM FINISH SCHEDULE.

### ROOM FINISH SCHEDULE

<table>
<thead>
<tr>
<th>ROOM</th>
<th>FLOORING</th>
<th>BASEBOARD</th>
<th>WALLS</th>
<th>CEILING</th>
<th>HARDWARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOBBY</td>
<td>PARQUET</td>
<td>STAIN</td>
<td>PAINT</td>
<td>PAINT</td>
<td>ANT. BRASS</td>
</tr>
<tr>
<td>HALLWAY</td>
<td>PARQUET</td>
<td>STAIN</td>
<td>PAINT</td>
<td>PAINT</td>
<td>ANT. BRASS</td>
</tr>
<tr>
<td>MAIN OFFICE</td>
<td>PARQUET</td>
<td>PAINT</td>
<td>PAINT</td>
<td>PAINT</td>
<td>ANT. BRASS</td>
</tr>
<tr>
<td>REST ROOMS</td>
<td>TILE</td>
<td>PAINT</td>
<td>PAINT</td>
<td>PAINT</td>
<td>CHROME</td>
</tr>
<tr>
<td>RECEPTION</td>
<td>PARQUET</td>
<td>VINYL</td>
<td>PANELING</td>
<td>PAINT</td>
<td>ANT. BRASS</td>
</tr>
<tr>
<td>ELEVATOR</td>
<td>PARQUET</td>
<td>VINYL</td>
<td>PANELING</td>
<td>PANELING</td>
<td>ANT. BRASS</td>
</tr>
</tbody>
</table>
A cross section is a “cut-away view” or “side view” of a particular portion of the building, showing us internal components of the building that are not visible or easy to draw on the plan from a “top view”, such as a Floor Plan. Depending on the complexity of the building, there can be several of these on the blueprint. It will be important to the designer of the plan to express to the contractor every detail of the building. Many of these details are found within the wall section. Notice the larger scale for the wall section.

Details

Areas of the building that the designer wants you to have a better understanding of are usually arranged on the Detail Page of the blueprints. If the building doesn’t have enough details to warrant devoting an entire page to this endeavor, they will simply be put off to the side on the page where they are most relevant. The designer will mark the area of concern with a callout indicating which detail to refer to. This is a popular way for structural engineers to indicate details such as the type and size of straps, hangers and nailing patterns. As an example, look for Detail A1 on this diagram, then refer to the Detail A1 on the next page. The designer wants you to see how this wall is constructed.

DETAIL A1
As you can see, this detail tells the contractor exactly how this portion of the building is to be constructed. Many of your tradesmen will need to refer to this same detail. In this case, the Mason, Framer, Siding Contractor, Roofer, Drywall Contractor and Insulation Contractor will all refer to this detail to define their work.
Windows and Doors

Openings in a building are placed and sized for many different reasons. The three main reasons would be for:

- Function
- Appearance
- Building Codes

A designer has to take all three into consideration when assembling the plan. The owner may want a door in a certain location, but this may interfere with the NC Accessibility Code or a Fire Code. Windows also have to meet certain egress codes (allowing for escape from fire) if they are in certain rooms and must be of a certain size and height from the floor. The following diagram shows a double hung window and a sliding window as they would appear on an exterior wall on the Floor Plan.

![Diagram of a double hung window and a sliding window.]

This diagram shows a regular swing door and a sliding glass door in the same exterior wall on the Floor Plan.
An interior bifold door would look like this.

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**Stairways**

Here is a diagram of a stairway with a landing in the middle. You will notice the “up arrow” indicating this stairway is going to the next level above this one and not downward to a lower level. Also, there is a Detail S1. The designer wants you to how this stairway is to be built.
And this is an example of the way the designer would show his stair detail.

**Blueprint Pages**

The following pages are the ones that are most typical in today’s industry. Obviously, a blueprint for a multi-level industrial complex are going to be much more involved than those for a simple, single level retail store. But, we are working with the basics today.

**Title Page**

In general, this page contains the name and location of the project, the name of the architect and engineer and usually has an index to the drawings.

**Site Plan**

This plan is drawn to a different scale from the rest of the pages. As the site can be huge, a more common scale would be 1” = 20’. This would make it much easier to show the entire piece of property including property lines, just like a survey. The outline of the building will be placed on the plan with all the setback dimensions. Also, drives, walkways and parking lots will be on this page. Additional information that can be found on this page would be; elevations, benchmark, easements, and utility services such as water, electric, etc...
Foundation Plan

This is the page your mason will refer to the most. Some prints will call this a Basement Plan. Here you will find the dimensions of the building, the type of footers to support the building and the steel used for reinforcement. Your plumber and electrician will also use this page for locating plumbing waste lines and underground electrical. If there is a downdraft range and it is a floor is a slab on grade, your HVAC contractor will need to review this page and get his exhaust ductwork in place prior to pouring the floor slab.

Elevations

The elevation page will show the front, rear, left and right side of the building. Many of the details about the exterior materials and finish of the building will be on this page as well. Vertical dimensions will also be shown on this page.

Floor Plan

If you are building a one story building, then you will just have one of these. If your building has more than one story, there will be an additional page for the 2nd Floor. If there are more floors and they are identical, a page may read 2nd – 5th Floor. The Floor Plan is the most referred to page in the blueprint because it has the most information. Depending on the complexity of the interior, Floor Plans can be more diversified by separating the information onto two similar pages known as a Dimensional Floor Plan and an Architectural Floor Plan. The Dimensional Floor Plan will focus only on dimensions and there will be minimal or no text. The Architectural Floor Plan will have no dimensions, but many notes as to the names and descriptions of items that the designer feels are of importance.

The Floor Plan is where you will find the location of windows and doors, elevator shafts, Mechanical Rooms, stairways, plumbing fixtures, cabinetry, shelving, appliances and more.

Roof Plan

A complete drawing of how the roof is to be constructed will be found on this page. Framing members, steel decking notes, dimensions and specifications are all found here. If roof trusses are involved, a truss layout page will accompany this page for placement and bracing of the roof trusses.
Mechanicals

Your plan will also have additional pages for the trades. There will be an Electrical Page showing all the placement of lighting, switches, receptacles, electrical service and anything else needed to power the building. Another page is the HVAC Layout. This will show duct placement and sizes, air handler and condenser specifications and locations. The last would be a Plumbing Plan. This page will show supply lines, waste lines and their appropriate drops and angles and the size of pipe to use.

Detail Page

If a plan has many details, a separate page will be dedicated to this. This way, all of the details are gathered for ease of use.

In conclusion, I do hope this manual was helpful to those needing a starting point. Learning to read blueprints is not something that happens overnight, but with exposure it is easy to catch on. The true task is finding information you are looking for where it should be on the plan. Don’t be too surprised when you find conflicting information. This happens when owners make changes to plans in the beginning and the designer failed to correct all the pages affected. When the plans are not clear, consult with the designer for clarification. This is much less expensive than the alternative.

Additional Reading

Two of your reference books have outstanding information that will take you to the next level as they are more involved than this manual. Look to these books for more information.

**Modern Masonry** by Clois E. Kicklighter

Chapter 3

**Carpentry and Building Construction** by Fierer & Fierer

Chapter 3