

Construction documents vary greatly in format and quality. Some firms supply specifications and drawings that rival the project manual for Noah's ark, while others just throw together paper and drawings that try to simulate a construction project.

In order to bid successfully on a project, it is essential to understand and coordinate the written documents and drawings. If features are missed or misunderstood, your bid will be too high or too low.

Fortunately, there is a logical and structured system to classify and describe each aspect of the work that is required for a building project. When it is used, each element of a project manual will interrelate with its co-part in the bidding process.

The system was initially introduced by Construction Specifications Institute (CSI) in 1963. CSI updated it and issued it under the name "Masterformat" in 1978. Further updates have occurred in 1983 and 1988.

In 1986, McGraw Hill Information Systems adopted the system for organization of "Sweets Catalog Files." In 1987, the R.S. Means Co. adopted Masterformat as the coding system for its construction cost data publications and database.

As a result, Masterformat has become an industry standard. By using the system when you prepare your bid, you will have ready access to the data available from Means and other sources.

Construction Documents

The construction documents include all the written and graphic materials received from the architect or engineer to convey the design and legal requirements of a job. Once we win a bid and sign a contract, we are bound to the owner to perform the tasks as stipulated.

The documents that must be closely coordinated with each other prior to a bid are the drawings and the specifications. The drawings show us how things are arranged and connected. A specification is the written description explaining how one item relates to another in terms of quality, content, and workmanship.

The key to coordinating drawings and specifications accurately and efficiently is to be systematic. The "Masterformat Manual of Practice" provides a procedure to view the construction process step-by-step, similar to the way a job progresses.



READING PRINTS AND SPECS

*The Masterformat system can
help you do efficient takeoffs
and accurate bids*

by Charles Hults

CASE STUDY: Reading A Rehab

The drawings and scope of work excerpted on this page were developed by the Pratt Architectural Collaborative for the New York City Department of Housing Preparation and Development (HPD). They describe a relatively small residential project: remodeling of a three-unit building for the HPD Homestead Project.

The first page of the drawings, A-1, is typical of a small project like this, including an index of each page and the legend of symbols as shown.

Excerpts from the scope of work shown above are marked up with CSI section numbers, the page numbers of the drawings, and miscellaneous notes. The notes include items that are unclear and must be checked with the architect (or, in this case, the city department) in charge of the project.

A project of this size (approximately \$120,000 in 1986) is worth the expense of an architect and specifications writer. However, for this city-sponsored project, the job of monitoring and supervising the work was left in the hands of the responsible city agency. In a situation like that, it is especially important to closely coordinate the specifications with the drawings, and seek clarifications before bidding. The consultations should include conferences that are attended by the homeowner.

For example, this scope of work does not include any product information for substantial items such as cabinets, appliances, plumbing fixtures, and bathroom tile. These items are noted generically on the drawings, as they should be. Since in this case the specifications say nothing about quality, it is important to clarify the expectations before bidding.

You may also have to reclassify items according to your own scheme. For example, in this scope of work, the kitchen cabinets are listed under "equipment." In preparing your bid, it would be better to re-classify them as section 06400 laminated face cabinets, or 12300 manufactured casework.

The work on this project spans several categories, beginning with demolition. In the Masterformat system, sitework is division 2, and demolition is section 02050. Notations on the drawings should be made in the order the work will be done, starting from the outside, then the basement, working upward in the building. Demolition in this project included excavation of the front porch area, digging up the basement for the columns and piers, and breaking up the basement slab to aid in trenching for a new foundation and front wall. The basement plan (Figure A) shows notes and drawing references used to prepare this bid.

The detail of the stoop (Figure B) includes generic descriptions of products that can be translated into Masterformat codes. For example, we can specify the stoop under 03200 concrete reinforcement. The 1/2-inch rebar can be included as mediumscope section 03210 for reinforced steel. If can be narrowed further to detailed sections such as 03212 for No. 4 reinforcing steel rod. One advantage of the CSI Masterformat system is its flexibility: You can assign codes in as much detail as will be useful in preparing your estimate.

Scope of Work

Description of Premises: 2-story 3-family house with cellar.

GENERAL 00100

- The owner's architect will file all required plans and applications with the Department of Building.
- The owner shall pay the initial filing fee.
- The contractor shall do all the work shown on the contract drawings, specifications and scope of work, shall give all notices and shall pay all further fees to obtain required permits and sign-offs.
- Work shall comply with all laws, ordinances, rules and regulations of all agencies having jurisdiction.

DEMOLITION AND SITEWORK DIVISION 2 - SITEWORK

- Excavate for new footings and foundation walls as shown on the drawings. 02220
- Backfill and tamp as required. 17 CID

CONCRETE

- Break up cellar slab as required to pour new 2'0"x2'0"x1'0" deep reinforced concrete footings for new brick piers as indicated on drawings; patch slab as required after pouring footings (5 footings).
- Break up cellar slab as required to rebuild front foundation wall and footing as shown on drawings; pour new portion of cellar slab over gravel base as required after foundation work complete, thickness to match existing (60 SF).
- New poured-in-place 2'4"x8" deep reinforced concrete footings and 12" to 8" foundation walls for front wall and stoop as shown on the drawings (20 LF).
- New 8" front areaway slab on gravel base (60 SF).

DEMO
CELLAR
SLAB -
0275
GRAVEL
BASE -
02220
REINFORCED
STEEL - 03210
W/WT - 03220

MASONRY

- New 1'0"x1'0" brick piers in cellar as shown on the drawings (5). BRICK PIERS - 04210
- Remove existing front wall including stone walls and lintels, retaining upper portion of wall and cornice; brace and shore building as indicated on the drawings. Rebuild front wall up to cornice with 8" concrete block as shown on drawings (480 SF).
- New welded wire mesh reinforced 3-coat stucco finish for external face of new front wall, colored and scored to imitate brownstone (480 SF).
- New precast concrete sills for new front wall colored to match stucco (5).
- New 8" concrete block side walls for stoop, per drawings (60 SF).
- New precast concrete steps and landing for new stoop (4 steps and landing).
- Repair party walls in cellar in areas shown on drawings.

Rough Carpentry

- New girder (3) 3 x 10's, through-bolted 2' o.c. in cellar (48 LF).
- New framing for new partitions, per drawings (148 LF).
- New wood base on new partitions throughout.
- New blocking for firestopping between apartments and public hall, see firestopping detail (56 LF).
- New wood floor joists to replace damaged joists, as noted on drawings. New joists shall be equivalent in size, strength and spacing to existing.
- New handrail for cellar stairs.
- New 3/4" plywood subfloor and roof sheathing as required (approx. 1400 SF).

Ceramic Tile and Bathroom Accessories 09300

- New ceramic tile floor, base, and 6-ft. tub wainscot (3 baths).
- Standard bath accessories including chrome shower rods and marble saddles (3 baths).
- New ceramic tile in first floor entry vestibule (19 SF).

CHECK
ARCHITECT
FOR
QUALITY

Equipment

- New kitchen cabinets and plastic laminate over plywood or composition board countertops (11.5 LF of base cabinets; 11.5 LF of counter; 26.5 LF of wall cabinets).
- New medicine cabinets with mirrored doors (3).
- New gas ranges, 30", with electric pilots (3).
- New refrigerators (3).

DRAWING INDEX

A-1 GENERAL NOTES, DRAWING INDEX, LEGEND, PLUMBING RISER DIAGRAMS, PLOT PLAN.

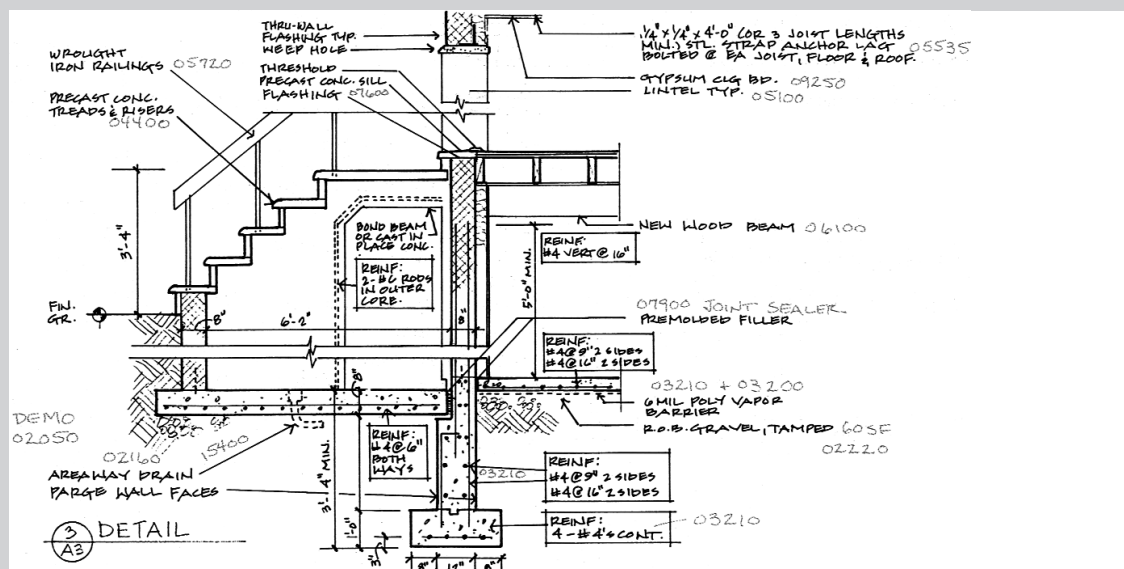
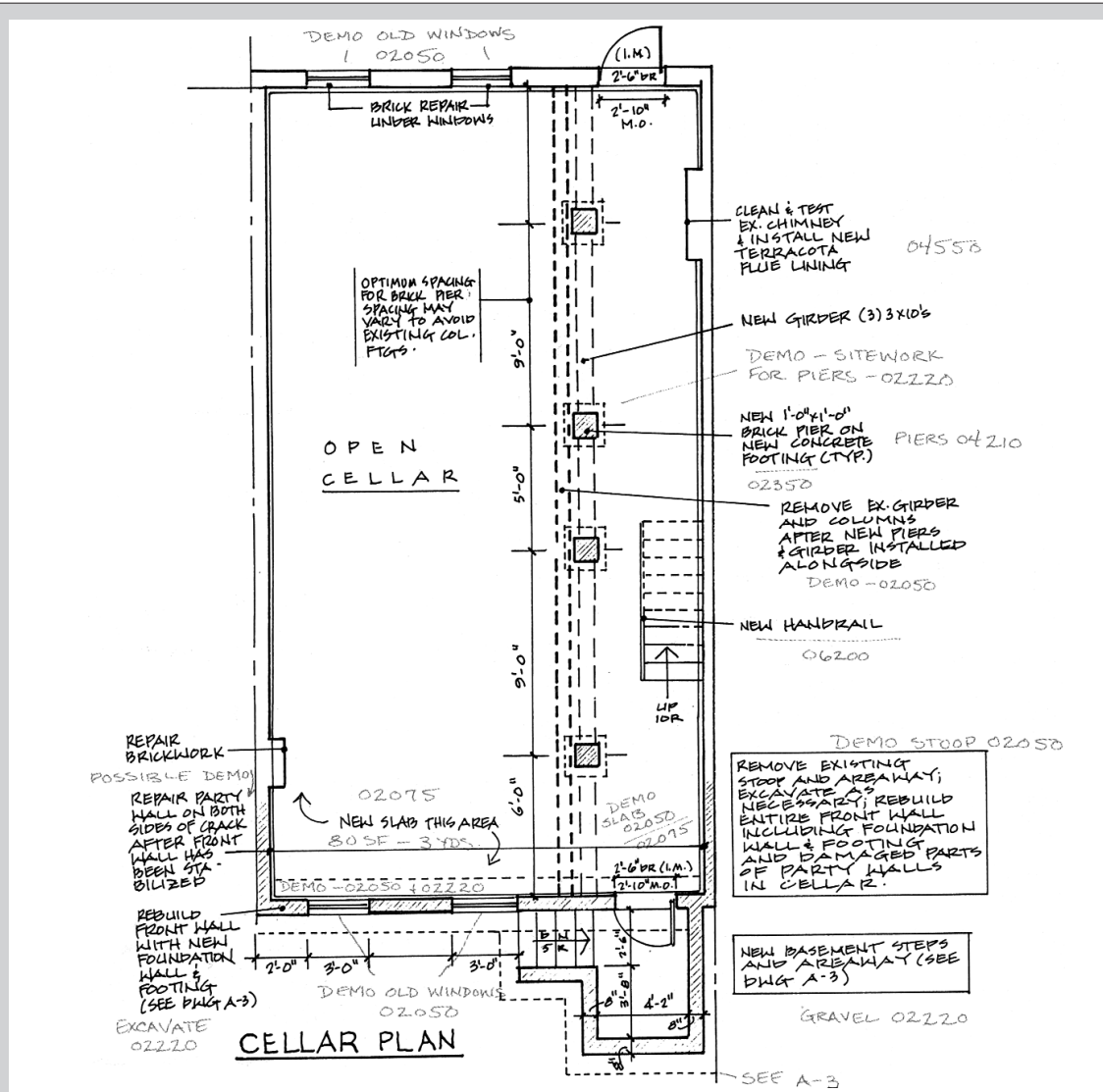
A-2 FLOOR PLANS, INTERIOR ELEVATIONS, DETAILS

A-3 DETAILS OF FRONT HALL & STOOP

M-1 PLUMBING, HEATING, & ELECTRICAL SYSTEM

LEGEND

- EXISTING CONSTRUCTION TO RECEIVE NEW LAYER OF GYP. BD.
- EXISTING CONSTRUCTION TO REMAIN
- EXISTING CONSTRUCTION TO BE REMOVED
- NEW INTERIOR PARTITION OR FURRING
- FIRE-RETARDED PARTITION
- NEW CONCRETE BLOCK
- NEW FACE BRICK
- NEW POURED-IN-PLACE CONCRETE
- PARTITION DETAIL REFERENCE
- DETAIL NO.
- ELEVATION REFERENCE
- SECTION REFERENCE



The manual places this information into 16 separate categories called divisions. The divisions are the major titles for the work that is to be done. They are:

1. General
2. Sitework
3. Concrete
4. Masonry
5. Metals
6. Wood and Plastics
7. Thermal and Moisture Protection
8. Doors and Windows
9. Finishes
10. Specialties
11. Equipment
12. Furnishings
13. Special Construction
14. Conveying Systems
15. Mechanical
16. Electrical

Divisions are broken down into *Broadscope*, *Mediumscope*, and *Narrowscope* sections to define a project more specifically. Each part of the project is given a five-digit code that describes the work in as broad or nar-

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row terms as you want.

The first two digits define the division number. For example, any project involving sitework begins with 02. A demolition project, described in a broad sense, would be given the code 02050. You can be slightly more specific with the code 02060 for building demolition. You can narrow it down further with the codes 02070 for selective demolition, or 02071 for minor demolition for remodeling.

This numerical system allows us to

code specifications and drawings to track products, costs, and materials necessary for developing an estimate.

Each division, section, and subsection is detailed in the "Masterformat Manual." An alphabetical "key work" index codes products and materials to their respective divisions in the specifications process.

The code numbers will not appear on the drawings or specifications supplied by the architect. You will have to write them in yourself. For a small project, it may not be worth your time to code every aspect of the job in the narrowest possible terms. However, using at least the broad category codes will help you to coordinate drawings and specifications with the data and reference materials you use for bidding (see "Reading a Rehab," previous page).

Responsibility To Correct Errors

Contractors shoulder a large measure of responsibility to review and verify the accuracy of contract documents, descriptions of field conditions, and drawings. The latest edition of the American Institute of Architects' Conditions of Contract says that any errors or discrepancies found are to be conveyed to the architect/engineer in charge of the project. It also states that shop drawings must be verified and returned to the architect by the contractor to acknowledge their accuracy.

The Standard General Conditions of Contract, issued by the Engineers' Joint Document Contract Committee (EJCDC) states that a contractor is not to rely on the drawings for determination of the actual physical conditions at the job site. The contractor is instructed to rely on the supplemental conditions of the contract to determine the accuracy of the technical data contained in the drawings. Thus it is wise to visit the site and verify all building dimensions for scale and installation of products and materials.

Drawings do more than simply provide a pictorial description of the written documents. They sometimes

contain notes, dimensions, and general instructions that do not appear in the specifications. Names of materials on the drawings should be in generic, rather than proprietary terms. For example, insulation should be described as 3-1/2-inch R-11 fiberglass batt insulation, rather than using a trade name. In theory, specifications should provide detailed descriptions of all materials, but if crucial information is missing, check the drawings.

Looking At The Whole Job

Whether you are a contractor for carpentry, electrical, plumbing, roofing, or specialty work, you should look at the whole job in relation to your portion of the project. If you don't know what's going on around you and how it interrelates to your work, snags can occur.

On larger jobs, each individual page of drawings typically relates to a single field. On small jobs, however, you have to view all the drawings, as information relating to your field may be spread over different pages. The drawing index on page one should tell you the placement of specific items.

On large projects you may be given only the portions of the drawings that relate to your specialty. In this case, I would go to the architect/engineer's office and view the complete set of drawings. If awarded the bid, I would request a complete set of drawings for my work area.

For example, if it is a high-rise building and your work is confined to one floor, it is important to seek any information impacting on that floor. Many of the tasks—for example, ceiling work, drywall, ironwork, and woodwork—interrelate with each other in placement of materials. The contractor for any of those jobs should also make note of any plumbing, hvac, sprinkler, or electrical work on that floor.

Also, new asbestos laws apply to renovation projects. If the electrician is boring core holes through existing vinyl-asbestos tile to reach the story where you are working, you may encounter incidental exposure to materials that contain friable asbestos. You should receive feedback on these possibilities from the job safety coordinator, and include any resulting expenses in your bid. For example, you may have to use personnel who are trained in "restrictive asbestos techniques" and provide protective equipment.

Clarifications

Sometimes the construction documents provide insufficient clues as to the desired quality of workmanship and materials. If, for example, there are generic descriptions of kitchen cabinets on the drawings and scope of work, you may have to check with the architect/engineer to determine the quality and price range that are desired.

Make sure you have conferences that are attended by the building owner. Have documentation signed by the owner stipulating the type of products to be used.

Studying The Documents

The first step in preparing an estimate is to read the specifications and drawings at least three times. The first reading should provide an overview to place you in your segment of the job. Second, familiarize yourself with the impact of other trades on your work. The third reading is to check if you missed anything in the first two readings.

Drawings are numbered on the lower

right corner of each page. If it is a small project, the first page should list general notes, a drawing index, legends or symbols, the plumbing riser diagram, and plot plans. In a larger project, each of these features may have a page of its own.

The specifications should note the applicable laws, standards, and references for the contractor to view in order to meet specific requirements. These include such items as frost lines, depth of footings, firestops in wall-and-ceiling systems, and thicknesses of fire-retarding elements of flooring and structural members.

Be sure that you understand all aspects of the documents. In particular, take the time to become familiar with all the symbols shown in the drawing index.

Inspecting The Job

Then inspecting a job and preparing your estimate, start from the outside. If there is no outside work, proceed to the portion of the site where your work will begin. Go from the bottom of the building up. If there is a basement, that is the bottom.

Have at your disposal colored markers and highlighters so you can color-coordinate the drawings when you take off your specialty. Have your estimate forms at hand. Quantity take-off sheets can be used to list the components of each operation, or a consolidated estimate form can be used to list the major tasks with sub-work detailed at the bottom of the page. You can find good forms for this use in a loose-leaf book, *Means Forms for Building Professionals* (R.S. Means Company, Inc., 100 Construction Plaza, Kingston, MA 02364). As an alternative, you can use ruled pads to develop your own headings and subgroups.

As you move through the building, use a highlighter to mark on the drawings each item for which you will be responsible.

Then write in the CSI section number next to the item. You may also want to enter numbers for other parts of the project, and note who is responsible for them. If the work is yours, draw a red circle around the CSI number, isolating it as yours to bid.

Make sure items noted on the drawings are accurately described in the scope of work. List the page number of the drawing next to each of the items in the scope of work so that you can coordinate them. After you have prepared your documentation and notes, walk through the building again to compare items with what you found in your original inspection. If there are discrepancies, clear them up with the architect/engineer or the agency/owner involved.

As you become experienced with Masterformat, you'll learn how to best adapt it to the projects you bid on. In small residential or commercial projects it is usually most efficient to consolidate several sections into broad categories. In large projects, you'll want more detailed coding with sharper distinctions among the sections.

Either way, the Masterformat method will provide an excellent tool to coordinate the specifications with the drawings, in preparation for your estimate and bid. ■

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Using CSI Masterformat With A Computer

The CSI Masterformat system has been adopted by some estimating software to organize cost information. The R.S. Means estimating program is one example. Even if you do not use this type of database, you can still enter the CSI information yourself with most estimating software.

You can adapt the CSI system to estimate costs of virtually any job you might encounter. Since Masterformat is set up in five digits, you can develop and additional numerical code extension to classify products by type. Most programs use three-digit extensions.

As an example, the narrow-scope code for plastic laminates is 06241. You may wish to use extensions for various brand names:

06241.000 Plastic laminate
06241.100 Formica plastic laminates

06241.200 Nevamar plastic laminates

06241.300 Pionite plastic laminates

In turn, each of the extensions can be broken down further to indicate patterns:

06241.101 Formica plastic laminates, solid colors

06241.102 Formica plastic laminates, patterns

06241.103 Formica plastic laminates, wood grained

Other digits may be used to indicate sizing. With three digits available for each extension, you can get as detailed as you want.

These types of cost codes and product information can be taken from your existing cost data files from previous jobs, or newly developed if you are just starting out. The extensions are not part of the standard code number, so you can set them up in any manner that suits your needs.