HARDWARE SPECIFICATION WRITING

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Let's talk about specification writing.

Where do you begin? How do you proceed? What is the difference between a specification and a schedule?

These are all questions, that might be asked by the apprentice who is studying to become a consultant. Consultant is the key word with regard to specification writing. As hardware specification writers, we are consultants to the architect.

Remember that the final specification is the responsibility of the architect. You are acting as a consultant and advisor to the architect. Therefore, the specification must be written in a manner satisfactory to the architect.

The overall operation of the building, and this includes the security of the building, is the responsibility of the architect and therefore all decisions ultimately must be his; not just design decisions but the quality decisions and operational decisions.

Let's start from the time the architect secures your services to write the hardware specification. This should occur before the final working drawings are complete. In fact, this is best started in the planning stage of the building. This way you can act as an advisor with regard to swing of doors, location and label requirements of doors and operation of doors, all of which are so closely tied into the hardware specification.

You must know the building — that is, the layout of the building, including the thinking of the architect regarding the operation of the building. You also must know the architect's desires with regard to the specification format. Most firms use the CSI (Construction Specifications Institute) three-part section format. This is the format used in this Tech Talk. Most architects welcome a hardware consultant's assistance in the early stages so that when the details are complete there is standard hardware available to fit the item detailed. By working with the architect as the working drawings are detailed, you can indicate where standard hardware types ran be used, and advise where hardware will have to be customized because of a particular detail. Now is the time to put the hardware specification in final form. Undoubtedly the architect still has not finished his door schedule. This is one of the last items he completed when doing his working drawings. The major portion of the specification can be completed, however, as long as you have a general idea of the type of doors and frames. You can settle with the architect on finishes, designs and most general pieces of hardware. Remember, a specification is not a detailed hardware schedule. Many consultants have caused architects no end of problems because they had written a detailed hardware schedule as a specification and afterwards the architect made changes. When the job finally came out for bids the hardware specification and the door schedule did not agree.

A specification should be written in such a manner so that the architect can make late changes without requiring a complete rewriting of the hardware specification. Most important is that the detail information of the specification be complete. Brevity is important. However, clarity *is* of even greater importance. Be specific in all portions of the new specification.

The best way to organize the specification is to use the CSI format which groups the information into three parts. The first part is the GENERAL part, which covers those general areas of concern which relate to the hardware and which define the general administrative and technical requirements specific to the hardware section.

The second part is the PRODUCTS part of the document. In this part you should describe fully all items of hardware to be used on a job, whether by manufacturer's number or description of items as in a performance type specification. The use of ANSI (American National Standards Institute)/BHMA (Builders Hardware Manufacturers Association) numbers is one method of writing a completely open type specification. On some jobs where government funds are involved it may be required to be written with ANSI/BHMA numbers. If you are using manufacturers' numbers and "Acceptable Substitutions" are allowed, then so indicate in this part. Most manufacturers offer several grades of hardware. Be sure to clarify the grade or quality with regard to acceptable substitutions.

The third part is the EXECUTION part. In this part, you describe in detail how the items listed in Part Two are to be installed. This part also should give hardware locations for installation purposes. This can be done by referencing the appropriate DHI publication on hardware locations or by giving specific directions for each product.

In this part you also make up the groupings of hardware items which will apply to specific doors according to how the specific door is to operate. These groupings are referred to as hardware sets and are numbered sequentially. The HW sets must be completed for all doors before the previous three parts can be completed. These set numbers can be referenced to the doors in one of several ways. If the architect has provided a hardware column in his door schedule then the set numbers can be entered directly into the schedule. Some architects prefer to enter the hardware set number directly on the drawings right of the door opening. Other architects prefer to

have you list the door number right in the hardware specification. In other words, under each hardware set is the list of doors which are to use that particular set.

This, then, is the broad scope of the preparation of the hardware specification. Next we will examine the *specifics* of each part of the specification

PART 1 — GENERAL

This part is intended to include general requirements related to this Section that would not be described in detail in *DIVISION I - General Requirements.* Each item should be carefully coordinated with the applicable sections of DIVISION 1 to eliminate repetitious or conflicting requirements. The **PART 1** requirements expand or supplement, but do not repeat information in *DIVISION 1* of the project specification.

The first article is titled SUMMARY. The first paragraph is *Section Includes.* In this part a general description of the items to be covered in the Hardware Specification can be listed. Include such items as cabinet hardware, plastic or identifying signs, thresholds, etc. There are many items which can and should be included under the Hardware Specification. It is not essential that all items specified be listed here. This is a representative listing of the products specified which permits the reader to assess the section quickly.

The next paragraph is titled *Related Sections.* A listing of related items specified in other sections should be listed here, along with the section number in which they appear. It is important to cover as many items as possible, to be sure they are listed somewhere in the contract specifications.

If an *Allowance* is being used for all or part of. the Finish Hardware then that paragraph is inserted here. On some projects the Architect may want to provide a specific amount of money for the purchase of a special piece of hardware to be selected at a later date. List the item or items and description only. Do not include a cash amount here. No matter whether the allowance is for all of the hardware or for only one or two items, the actual cash amount is listed in the *DIVISION 1* section. Ensure that statements used complement the "Allowances" Section in DIVISION 1.

REFERENCES is the next article. For government jobs and some other public work, ANSI/BHMA numbers, which are the performance standards developed by the BHMA, may be required to be used and the standards should be listed here. Local building codes, the *Fire Doors and Windows* standard (NFPA-80) and the *Life Safety Code* (NFPA-101) which are to be used should also be listed. Also list applicable DHI technical publications.

The next article to be used is **SUBMITTALS**. The requirements for the preparation and submission of the *Hardware Schedule* should be listed first. For example, when a vertical type schedule is used, then a door index should be put in the front, showing the page and heading number under which each door is listed. You should note also the quantity of schedules required for each submission. This can vary from project to project. An excellent reference here is the DHI pamphlet *Sequence and Format for the Hardware Schedule.*

A complete set of *catalog cuts* or *product data sheets* should be required with the schedule submission. It is not necessary to require as many copies of catalog cuts as schedules Usually three copies of catalog cuts would be the maximum required.

In the next paragraph the requirements for submission of *Samples* should be covered Some architects require samples in all cases, some only require samples of items to be substituted Government jobs have specific requirements regarding samples.

The requirement for submission of *Templates* or template information should be the next paragraph under this article, with particular attention given to the fact many jobs now are using pre-machined wood doors This means that template information must be submitted not only to the hollow metal manufacturer, but also the millwork supplier who is doing the preparation of the doors.

A *Keying Schedule* is just as important as the hardware schedule and should be required in the same quantities as the schedule. A good practice is to require the keying information as outlined in the DHI document *Keying Systems and Nomenclature.*

Wiring Diagrams may be required if you have specified an electro-mechanical system or other products which require electrical wiring for operation.

Operation and Maintenance Data is needed by the owner for the proper maintenance of the building. A manual covering all the products furnished under this section, with operation and maintenance information, should be furnished to the owner.

Caution: The subjects of submittals, samples and substitutions is covered in *DIVISION 1.* Be sure that nothing written in Part 1 is in conflict with the corresponding *DIVISION 1* sections.

QUALITY ASSURANCE is next. This article should include statements which provide the criteria, regulatory requirements, limitations and standards to establish a minimum level of quality against which persons, manufacturers and products can be evaluated for compliance with the requirements of the project specification.

The first paragraph is *Substitutions.* The subject of product

"equals" is most important and should not be overlooked. Careful attention to this subject in this paragraph or in **Part 2** can save many problems after the contract is awarded. There are several methods of handling this subject. First, determine the owner's and/or architect's desires with regard to substitute products. In many instances a proprietary specification for some or all items can be in the best interest of the owner; for example, to match existing products for maintenance or for aesthetic reasons.

One method used by many architects today is the prior approval clause. Bidders who wish to bid a substitute product are required to submit a request, together with product information, a specific number of days before the job without undue pressure. A decision then can be given and all bidders notified, in an addendum, that a particular product will be approved as an acceptable substitution.

Where substitute products are acceptable some architects prefer to name several products considered as acceptable substitutes for each product specified. If the architect wishes to name specific products as acceptable substitutes using the manufacturer and product number, this should be done in **PART 2 - PRODUCTS.**

When the specification is written using ANSI/BHMA product numbers, the Substitutions paragraph may not be required. However, many times manufacturers' product numbers are needed even in a specification using ANSI/BHMA numbers.

The main point to remember is that it is far better to provide for the substitutions in advance than to be faced with the possibility of having to accept an inferior product after the contracts have been awarded.

In addition to substitutions the subject of *Supplier Qualification* should be covered. If you have electro-mechanical or electronic type devices specified, the firm supplying these devices should have experience with these products as well as qualified individuals on staff knowledgeable with their operation, installation and service. A statement requiring a specific amount of experience can be used. (See Supplement) In many instances individuals can be judged qualified because they have passed tests conducted by an independent organization such as the Door and Hardware Institute. Most architects today require that the hardware supplier have in their employ a qualified Architectural Hardware Consultant or a person with equivalent qualifications, to properly handle the project. This statement should be placed in this paragraph.

Next, the requirement for the **DELIVERY, STORAGE AND HANDLING** is listed. It is good practice to list the marking and packaging requirements under this paragraph. AH items of hardware being delivered to a job must be marked to correspond with the Hardware Schedule. Although the manufacturer's number on the box may tell the consultant all he or she needs to know, this does not necessarily give the installer on the job the information required. The hardware delivered to the job must be indexed so that anyone who is not a hardware consultant can identify the proper hardware for a given door with a minimum of effort. Proper storage is also covered here. Improper storage can cause severe damage to many mechanical and electro-mechanical devices.

The next article is **WARRANTY.** It is important to review the warranty policy of each manufacturer mentioned in the specification. If the manufacturer warrants his product from time of sale, this could present a problem because the owner of the project may not take possession for many months after the product is sold and installed. Ensure that warranties complement the "Warranties and Bonds" Section in DIVISION 1.

MAINTENANCE is the next article and this should be divided into two sections.

The first is *Maintenance Service.* Some electric and/or electro-mechanical items may require a maintenance contract with the owner, for a specified period after the project is completed. This requirement should be specified here.

Next is *Extra Materials.* The larger the job the greater the need for this paragraph. Specify that extra stock be furnished direct to the owner for maintenance purposes. Also list a requirement for extra screws to be furnished to the installer. All extra screws and any special installation tools and instructions should be turned over to the owner. The specification, as mentioned previously, should be complete, clear and concise. Too many words and too much repetition only create confusion in the mind of the person trying to bid on the specification. The use of a guide specification by the specification writer does not indicate a lack of knowledge. It shows a high degree of efficiency.

Most consultants find it best to have a guide type layout with which to work. By including in this guide all items which should be covered, you then can review these items with the architect to be sure nothing has been missed. This guide specification reduces the chances of error by omission. One caution — and this pertains to all sections of the hardware specification, not just the General section — be careful not to get overloaded with superfluous language or information. (See "Supplement" for sample guidelines.)

PART 2 — PRODUCTS

The first article in this part is **MANUFACTURERS.** A complete list of manufacturers' names (and addresses if they are not a nationally known manufacturer) whose product numbers have been used in the specification should be given here. If you are

going to specify acceptable substitutions for each of the products you list under the products part of the specification then those manufacturers also should be listed. Do not list just the manufacturer's name as being acceptable. Most manufacturers have several different grades of products. It is important to list the exact product which is acceptable as a substitute. This can best be done by listing acceptable substitutions in each product paragraph.

The next article is **MATERIALS.** The first paragraph should list the types of Screws and *Fasteners* to be used, such as sheet metal or machine screws, spanner-head screws, thrubolts and grommets, or sex bolts.

The next series of paragraphs gives a *description of each of the various items of hardware,* either by catalog number from a particular manufacturer or by an ANSI/BHMA number for government projects. This also can be done by description, as in specialty pieces designed by the architect or required to fit a special architectural detail. Each product should be set up as a new paragraph. If you are listing additional acceptable substitutions for each product type you can make them part of the product paragraph.

The number of items to be covered is up to the individual. If the particular item is used in only one hardware set, it may not be desirable to list it in a separate paragraph under this Section. However, where the item is repeated in a number of different hardware sets, by giving a complete description in the materials section it need only be referred to "As specified" in each hardware set without repeating the description.

Proper description of the hardware in this section can prevent misunderstandings later regarding specified items and acceptable substitutions. The architect and owner generally are not well acquainted with hardware and a well defined list of hardware can make it much easier for them to pass judgment at a later date on what is and is not considered an acceptable substitute to that which is specified.

The importance of complete information cannot be overemphasized! An inadequate description or insufficient information may cause confusion in the minds of the bidders, with the net result being a poorly done job. It also may cause claims of shortages on one hand — and requests for "extras" on the other.

Lock trim is always a most critical item and should be given special care. Describe your knob and rose or escutcheon completely. A cast or heavy forged knob design can be furnished with a wrought rose at a considerable price difference from a design with a cast or forged rose. Many designs are available in either cast or heavy forged, or wrought metal. On certain jobs, several different designs and/or finishes may be used. An example of this would be the use of lever handles in an oil rubbed bronze finish, in public areas — knob trim in the same finish in other areas — and a stainless knob trim in designated service areas.

The door stops probably are the most abused portion of the average specification. It is sometimes nearly impossible to determine whether a wall stop or floor stop will be required. A clause calling for wall stops can be used, with floor stops allowed under certain conditions. Since there is no great monetary difference, this should not have any effect on the bidding of the job.

The difference, however, is in the use of overhead stops or holders. A clear indication should be given on where the overhead type stops or holders are to be furnished.

There are more and more variations of door closers available, each type having its advantages and disadvantages. Review areas of performance, appearance and cost with the architect so that he can make his selection to the best advantage of the owner.

HARDWARE FINISH is the next article. Be careful to check the job for special finish requirements in areas such as paneled executive areas, board rooms, lobby areas. Also, watch for special finishes on Duranodic. Kalcor etc. aluminum doors and other special types of doors. One item often overlooked in this paragraph is the need to indicate the base metal to be used. Many items of hardware are available in different base metals, which can have a considerable effect on the quality. The use of ANSI/BHMA finish numbers is highly recommended.

The next article under PART 2 should list the **KEYING REQUIREMENTS** for the project. The consultant should make a thorough investigation into this subject. If the structure is an addition to an existing building or complex of buildings, there well may be an existing master or grand master key which the owners desire to operate the new locks. In addition, the successful bidder should be required to act as coordinator between the owner and/or the architect to establish the keying requirements.

The last article under **PART 2** is **KEY CONTROL**. Give a complete description of the type of key control system to be established or already established in an existing facility. Coordination with the owner is essential in this matter.

See "Supplement" for a list of the most frequently used hardware items, with a brief comment on some of the things of which you should be aware when specifying these items.

As mentioned previously, the architect usually is working on the door details right up to the time the job is to go out for bids. The selection of the types, designs and finishes of the hardware can and should be accomplished in advance. By

developing the Materials article of the specification first, much time can be saved as the plans are being completed. You also will find that by working in advance to develop this materials section, you will be more aware of any possible hardware problems as the door and frame details are developed.

Do not be afraid to advise the architect of possible problems he may encounter with the hardware. What advantages are there with a mullion instead of a vertical rod device, an overlapping astragal and a coordinator? Why can't you put exit devices on double acting doors? If you are going to use a 1-1/2" return on the metal frame and a 2-1/2 knob projection with a 1" wall stop projection, you obviously cannot get the door to open to a full 90 degrees.

The list is endless, but a good consultant will be aware of these problems and point them out to the architect. Do not be afraid to try new methods. However, at the same time, do not overlook the reasons why things have been done a certain way in the past.

A good consultant will keep abreast of new developments, spend time on research, study existing installations and conditions. Then, see what improvements can be made. The architect always is looking for better and more efficient methods.

PART 3 — EXECUTION

The first article is **EXAMINATION.** The contractor should examine all job conditions which effect or are affected by the installation of the finish hardware.

The next article is **INSTALLATION.** This article is every bit as important as the other sections even though it is omitted in many instances. Special instructions for the mounting locations of the various hardware items should be given; for example, push plate and pull or lockset knob heights.

Without specific instructions, these items usually are located at the discretion of the installer. If he is of average height you may be lucky. However, if he is unusually tall or short you may have a problem. Of even greater importance is the coordination between the frame and door manufacturers. If all mounting heights are given in the specification, this will reduce the coordinating problems, and the chance for error.

Just as hardware types are selected depending on the type of building, so the mounting heights should be listed according to the type of building as well as the type of hardware. Lever handles sometimes are easier to use when set higher than the standard knobset. It depends entirely on the desired function of the door and whether the architect may desire and design a special effect on certain doors. Unless consideration is given to the location of the hardware, the effect can be lost.

Mounting instructions for door closers should be given with regard to parallel arm, top jamb, or comer bracket mounting. Door stop installation should be mentioned. A wall stop generally is intended to be set for the knob or strike. What is to prevent the installer from setting it elsewhere, such as at the door closer location? If the closer has a cover, this could cause a problem.

The next article is **FIELD QUALITY CONTROL.** There should be a requirement to do a final inspection to determine that the doors and frames were properly prepared to receive the hardware and that the proper hardware was used on each opening. It is possible for the installer to have installed the steel hinges in the swimming pool area and the brass hinges in the library. After all, they look exactly alike.

ADJUSTING and **CLEANING** are the next articles to be addressed. The installer should be required to make a final adjustment of items of hardware, adjust door closer settings, tighten lock sets, etc. He also should repair or replace any defective or damaged items.

The next article is **PROTECTION.** Indicate here the requirement to provide proper protection for the products and finishes until such time as the owner accepts the project.

The final article of Part 3 is the listing of the **HARDWARE SCHEDULE.** By listing a number of sets for the different functions of doors, you then can apply them to a door or a group of doors.

Example:

HW1	Exterior Entrance
HW2	Stair Exit
HW3	Interior w/lock and door closer
HW4	Interior w/latch and door closer
HW5	Interior w/lock
HW6	Interior w/latch
HW7	Interior w/push-pull and door closer
HW8	Interior w/push-pull, door closer and deadlock

Special doors will require special hardware sets. If the previous portions of the specification are complete, you will require a minimum number of sets. If the quantity and size requirements are spelled out in the products part, then the same hardware set can be used on different sizes of doors. If the template requirements and screw attachments are covered, then the same hardware set can be used on wood or metal doors, with wood or metal frames.

SUMMARY

The Contractor is responsible for the total project and usually

has the authority to divide the work among subcontractors or establish the extent of work performed by any one trade. References to a particular subcontractor or trade conflicts with the contractor's authority, which usually is established by contract language. The specification should be written as if the work will be done by one person. Avoid the use of such terms as "The General Contractor." "This Subcontractor," "The Hardware Supplier" and similar designations.

The more information you put in the **MATERIALS** portion, the fewer number of hardware sets you will require.

1. Divide your specification into three parts:

   GENERAL
   PRODUCTS
   EXECUTION

2. Be sure to complete all parts.

3. Start working with the architect as early as possible in the working drawing stage.

4. Develop the hardware specification as he develops his details.
5. As a consultant, you should advise the architect regarding any differences in product quality, design and price. Then have him make the final decision.

6. The specification must reflect the architect's desires.

7. Be brief, but clear — leave nothing to doubt.

SUPPLEMENT TO HARDWARE SPECIFICATION WRITING

Following is a suggested outline for the HARDWARE SPECIFICATION. *Note: The numbering sequence used in this supplement conforms to the Construction Specifications Institute Section Format and is used in the majority of architects' offices. Always verify with the architect what numbering system to use.*

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

List those items to be covered in the Hardware Section. Example:

1. Furnish, deliver and install all finish hardware necessary for all doors, also hardware as specified herein and as enumerated in "Set Numbers" and as indicated and required by actual conditions at the building. The hardware shall include the furnishing of all necessary screws, special screws, bolts, special bolts, expansion shields and all other devices necessary for the proper application of the hardware.

B. Related Sections

List those items covered in other sections

1. Metal Doors and Frames Section_____
2. Wood Doors Section_____
3. Roll-Up Doors Section_____
4. Aluminum Entrances Section_____
5. Toilet Room Accessories Section_____
6. Toilet Partition Hardware Section_____
7. Metal Casework Hardware Section_____

C. Allowances

Here you can provide (or the purchase of special items of hardware by the Owner or Architect. Example:

1. Contractor shall allow the sum of money indicated under the Allowances Section of DIVISION 1. This allowance is for the purchase of special trim for Doors 101 and 102, to be selected by the Architect at a later date.

2. The stipulated sum does not include the Contractor's profit or installation costs. Should the cost of this hardware be more than the allowance sum, the owner will pay to the contractor such difference, but should the cost be less than the allowance sum, the Contractor will credit the owner with the difference.

1.02 REFERENCES

List documents which should be used in estimating, detailing and installing the items specified. Documents should be listed by name and date such as NFPA101 Life Safety Code dated ____ or ANSI/BHMA Standard A156.1 Butts and Hinges dated ____; DHI publication "Hardware for Labeled Fire Doors" dated ____.

1.03 SUBMITTALS

A. General Requirements

Make all submittals in accordance with SECTION 01300.

B. Schedules

List the requirements for submission of detailed schedules (see DHI document "Sequence and Format for the Hardware Schedule"); also list the quantity of approved schedules which will be required for distribution.

C. Product Data

Product data sheets or catalog cuts always should be required with schedule submission. Indicate the number of copies to be submitted, unless this already is covered in DIVISION 1.

D. Samples

List the requirement for submission of samples as required by the architect.

E. Templates

List the requirement for furnishing approved schedules and template information to those manufacturers who must prepare products for the installation of hardware.

F. Keying Schedule

Require keying schedules the same as hardware schedules. Reference the DHI manual "Keying Systems and Nomenclature."

G. Wiring Diagrams

If you have specified any electrical devices be sure to indicate the type of wiring diagrams and other electrical information which is to be submitted.

H. Operations and Maintenance Data

At the completion of the job furnish to the owner two copies of an Owners Operation and Maintenance Manual. The manual shall consist of a hard cover three ring binder with the project name in front. Include in the manual the following:

Maintenance instructions for each item of hardware.
Catalog pages for each product.
Name, address and phone number of the local representative of each manufacturer.
Parts list for each product.
Copy of the final hardware schedule.
Copy of the final keying schedule.

Note: Be careful not to list something that is not available such as maintenance instructions, if the manufacturer does not publish any for a particular product.

1.04 QUALITY ASSURANCE

List criteria for evaluating:

A. Substitutions

What items will be' considered acceptable substitutions?: Are some items to be proprietary?

Will substitutions be reviewed in advance? Example:

Standards: Manufacturers and model numbers listed are to establish a standard of quality. Similar items by approved manufacturers that are equal in design, function and quality will be accepted upon prior approval of the Architect, and provided required data and physical samples are submitted in accordance with Section 016000.

B. Supplier Qualifications

What amount of experience is required? What types of personnel are required?

Example:

Qualifications: Hardware supplier must be engaged regularly in contracting work and be staffed to expedite work. The firm shall have been furnishing hardware on similar projects in the vicinity for not less than two years. The supplier must have in his employ a certified Architectural Hardware Consultant or a person with equivalent qualifications to inspect periodically and direct detailing, setting, applying and adjusting of hardware.

1.05 DELIVERY, STORAGE AND HANDLING

A. Marking and Packaging

Hardware should be required to be delivered to the

job site in the manufacturers' original packages, marked to correspond with the approved hardware schedule.

B. Delivery

Some items of hardware may have to be delivered to fabricators for factory installation.

C. Storage

Be sure to indicate the need for proper storage methods to protect the material and finishes.

1.06 WARRANTY

Include here statements describing warranties which are in excess of one year warranty covered by contract conditions.

Example:

A. Furnish a five year factory warranty on all door closers against defects in material and workmanship from the date of occupancy of the project.

Caution: Verify that the manufacturer of any product you specify has a warranty policy consistent with what you require in this paragraph. Check to be sure there is no conflict with the "Warranties and Bonds" section in DIVISION 1.

1.07 MAINTENANCE

A. Maintenance Service

If a maintenance contract is required for any products being specified, that requirement should be covered in this paragraph.

B. Extra Materials

A requirement for extra items of hardware for maintenance purposes should be listed here; also, a requirement for extra screws of all sizes and types used on the hardware.

Example:

1. Additional Hardware

Furnish five percent extra of each item of hardware furnished on the contract but not less than one of each item. This extra hardware is to be delivered directly to the owner for maintenance purposes.

2. Extra Screws

Furnish three dozen extra screws and other fasteners of each type, size and finish used with the hardware items furnished. These screws are to be delivered to the installer for use during installation. All extra screws and fasteners and all special installation tools furnished with the hardware shall be turned over to the owner at the completion of the job.

Following is a suggested outline for **PART 2** *of the Hardware Specification. No doubt there are many other items which could be covered. Each consultant must develop his or her own list to suit the architect's needs and specific job requirements.*

PART 2. PRODUCTS

2.01 MANUFACTURERS

Include a complete list of the manufacturers whose numbers appear in the specification. This list also should include manufacturers' addresses.

2.02 MATERIALS

A. Screws and Fasteners

List any special requirements for special screws such as spanner head screws, Phillips head or other special type screws.

B. Hinges

A well written paragraph here can save innumerable variations of hardware sets. Describe the type of hinges desired, then list the sizes and quantities required (or the various sizes of doors.

Example:

1. Where hinges are specified, unless otherwise noted they shall be of the types and sizes as follows: (Numbers are taken from AHSI/BHMA Standard A156.1)

a. Exterior Doors:
1-3/4" thk-Up to 3'0" wide, A2112. 4-1/2". NRP
1-3/4' thk-Over 3'0" wide, A2111, 5', NRP
All doors over 1-3/4' thk, A2111. 5', NRP

b. Interior Doors
1-3/4: thk-Up to 3'-0" wide. A8112, 4-1/2"
1-3/4' thk-Over 3'0" wide, A8111, 5'
All doors over 1-3/4' thk. A8111, 5"

c. The width of hinges shall be sufficient to dear all trim Furnish one pair of hinges for all doors up to 5"0" high. Furnish one additional hinge for every additional 2-1/2 feet or fraction thereof.

C. Pivots

Many consultants prefer to use pivots on exterior doors. Watch head conditions which will not allow for the installation of a top pivot Some details will require a special 1-1/2" offset Pivots often are used on extra heavy doors such as lead lined doors.

D. Floor Closers

An excellent alternate to hinges and surface closers. Available offset or center hung. Attention must be paid to thickness of floor and location of conduit and reinforcing rods in floor. Floor closers often are used for extra heavy doors, such as lead lined. Intermediate pivots must be specified separately. Head conditions may require the use of a side jamb pivot in place of the standard top pivot.

E. Rush Bolts

Be careful to specify longer rods for the top flush bolt on extra high doors. Automatic flush bolts are gaining in popularity and should be considered on many openings, not just on labeled situations. However, be certain that the type specified, for both hollow metal and wood doors, meets the laboratory listing and the U.S. and/or code requirements for the particular opening, if a labeled door condition exists. The use of dust proof strikes always should be considered.

Watch also for conflict with automatic door bottoms.

F. Coordinators

Coordinators must be used on certain pairs of fire doors and should be used on pairs of doors with overlapping astragals. If a stop mounted coordinator is specified, be sure to specify the need for special mounting brackets if parallel arm door closers are used and special strike preparations for vertical rod exit devices.

G. Locks

Mortise? Bored? Pre-assembled, etc.? Does the owner have any specific requirements? Describe the series or type of locks to be used. The specific function can be listed in each hardware set. Watch for conditions requiring special narrow backset locks, soundproof door locks, air seal door locks, special latchbolt throw requirements for labeled doors., etc.

H. Lock Trim

Once the architect has selected the design, be sure to review with him what alternates he will accept. In trim designs, equals sometimes are difficult, if not impossible. You now are dealing in aesthetic values, to which there may be no equals.

I. Exit Devices

Here again, as in locks, a particular series can be specified while the exact function can be listed in the hardware set Remember to give consideration to the trim design and to coordinate it with lock trim and/or door pull design. Most jobs have enough variation in doors, both interior and exterior, and conditions, to require two or more series of exit devices.

J. Door Closers

Some of the more common problems are: clearance behind doors when opened against a wall at 90 degrees; the need to use parallel arm closers; templating and installation conflicts between closers and overhead holders. At times, a top jamb mounted closer is the answer to a particular condition and this, in fact, may be the deciding factor in the selection of the design of closer to be used. The purpose of a door closer is not just to dose a door. More important is the use of a door closer to control a door.

Specify closers with the proper features such as back check in order to provide the owner with the most efficient and maintenance free hardware possible. If you specify a universal size type closer, insert a requirement for adjusting of closer force and the mounting requirements (regular arm, parallel arm, top jamb) to suit each door.

K. Push Plates

Coordinate with pulls and kick plates. Be sure to indicate base material. Finish should be covered in

the paragraph on "Finishes." Wide plates may be preferred from a utility standpoint. However, this often is restricted by the width of the door stile.

L. Door Pulls

Where possible, use a pull on a plate to protect the finish of the door. When this is done, the same notes as on push plates pertain.

M. Protective Plates

Indicate exactly what doors are to receive plates and the type required. To indicate that doors with closers are to have kick plates is not sufficient Labeled doors from closets might have closers, but would not necessarily require kick plates.

Certain doors in Hospitals, Warehouses and utility areas of buildings may require armor plates. Clearly define these situations. Remember for fire doors NFPA 80 restricts protective plates to 16" high unless otherwise tested Particularly in hospitals, mop plates are used on doors even when armor plates or kick plates are not required. Make sure these, too, are spelled out clearly in this section Edge guards would also come under this heading Always list the gauge or thickness of metal desired Also state exactly what width of plate is required on single and pairs of doors, on push side and pull side.

Watch for doors with louvers which may conflict with armor plates or kick plates

N. Door Stops and Holders

Check wall conditions before specifying stops. Wall stops on a steel stud wall can make the wall act like a drum. Wall stops on drywall without a proper ground in the wall will be pushed through the drywall with the first sharp blow. Also watch for undercut doors when specifying floor stops. Such doors are quite common in today's projects, to provide for air circulation or carpeting. Check for conflict between overhead stops and holders and door closers. When using overhead stops and holders, always specify the maximum degree of opening obtainable.

O. Thresholds and Weatherstripping

Sill conditions can vary at each opening. Do not overlook Weatherstripping. Some Architects list Weatherstripping in a separate section.

P. Silencers

Specify where required, generally on all frames except where gasketed doors occur.

Q. Smoke Detectors and Magnetic Holders

A big item in today's commercial buildings. Check local code requirements for any possible restrictions. These may be specified as an integral part of the door closer.

CAUTION. When specifying these products or any electrical devices, always coordinate with Division 16 and electrical drawings.

R. Signage

Used in most buildings for public use, I.E. Hospitals, Schools, Office Buildings, etc.

2.03 FINISHES

List the base metal as well as the finishes of all items to be furnished under this section. Do not forget miscellaneous items such as key cabinets, etc. The use of ANSI/BHMA finish numbers can be extremely helpful here.

2.04 KEYING

The consultant should make a careful check with the architect and/or owner, in case there are special key requirements. Such requirements should be so noted in the specification.

2.05 KEY CONTROL

A. Key Cabinet

Should be sufficient for all keys in the installation plus expansion. Do not forget lockers, cabinet work, equipment and other items having keys.

Following is a suggested outline for PART 3 of the Hardware Specification. Review all items specified in the products section to determine if special mounting locations or other information should be listed in this part.

PART 3. EXECUTION

3.01 EXAMINATION

Specify the requirement for the contractor to examine the appropriate items in the project for suitability to receive finish hardware.

Example:

A. Examine doors, frame and related items for conditions that would prevent the proper application of finish hardware. Do not proceed until defects are corrected.

3.02 INSTALLATION

Review with the architect the mounting locations of the various items of hardware. On most jobs, the DHI publications on mounting locations can be referenced. Care should be taken to review all items for special conditions.

3.03 FIELD QUALITY CONTROL

List the requirement to examine the work after the completion of the installation.

Example:

A. After installation has been completed, provide the services of a qualified hardware consultant to check the project to determine the proper application of hardware according to the approved hardware schedule and keying schedule. Also, check the operation and adjustment of all hardware items.

3.04 ADJUSTING AND CLEANING

Require hardware to have a final adjusting and cleaning at the completion of the project.

Example:

At final completion, hardware shall be left clean and free from disfigurement. Make a final adjustment to all door closers and other items of hardware. Where hardware is found defective, repair or replace or otherwise correct as directed.

3.05 PROTECTION

Provide for the proper protection of all items of hardware until the owner accepts the project as complete.

3.06 HARDWARE SCHEDULE

Example:

A. Provide hardware as specified in the previous articles in sets according to the following schedule:

HW1	
Hinges	As Specified
Exit Devices	Type 1 Function 02
Closer	As Specified
Kick Plate	As Specified
Wall Stop	As Specified
Threshold	As Specified