

FIELD GUIDE

The Division 8 Estimator's Guide

Doors, Frames, and Hardware: Reading the Documents, Building the Takeoff, Protecting the Margin

FRESCO FIELD DESK

Thirteen chapters. Built from three published Section 087100 specifications, the SDI and HMMA standards, and public interviews and forum discussions with working Division 8 estimators, detailers, and hardware consultants. Everything quoted here is public and sourced.

Start Here

Who prices Division 8 doors, frames, and hardware

Anyone who prices doors, frames, and hardware for a living, and anyone who has to check the number afterward.

Division 8 is a small trade with an outsized ability to hold up a building. People in this trade put the ratio the same way every time: doors run somewhere near one percent of construction cost and a wildly disproportionate share of the problems, because they arrive last and everything else has to be finished before anyone finds out what's wrong with them.

This book is about the part of that problem that happens before anything gets installed. It's about the documents.

Three kinds of Division 8 estimator: solo, distributor, and GC self-perform

"The typical Division 8 estimator" doesn't exist. There are at least three distinct jobs, and a book written for one of them reads wrong to the other two. Most of what follows applies to all three, but where the pain concentrates differs, and it's worth knowing which seat you're reading from.

	Solo or small-shop estimator	Distributor with a rep team	GC self-perform precon
Volume	A handful of bids at a time	High, and steady. Many packages moving at once	Fewer bids, larger and longer
Biggest constraint	Time. Bids get declined because there aren't hours to price them	Consistency. Takeoffs run through people who aren't estimators	Verification. Somebody else did the work and you sign it
Where margin is lost	Bidding the wrong jobs, or no-bidding winnable ones	One wrong assumption replicated across a hundred takeoffs	Scope landing between divisions and nobody carrying it
Chapters that matter most	9 , 10 , 11	5 , 6 , 12	7 , 12 , 13

How to use this book

Part I covers the documents you're handed: what a door schedule carries, what an 087100 spec actually says, and how hardware sets are published across three real owners. Part II is the takeoff itself, from counting openings to getting hardware into a system to pricing what you counted. Part III is where bids go wrong. Part IV is the part worth reading twice, because it's about how estimators who do this well turn document problems into margin rather than absorbing them.

Every chapter ends with a section called What to do on your next bid. If you read nothing else, read those.

How sources are named and attributed in this guide

Everything quoted here is public. The named practitioners spoke or wrote under their own names, in podcasts, published comment threads, and trade discussions, and they're named. Estimators who posted under handles in public forums are described by role instead, because printing a username in a document like this serves nobody.

Where a source works for a manufacturer or a software company, that affiliation is stated every time they're quoted. Read those passages knowing the commercial interest is there. Manufacturer employees are named. Software vendors and the operators narrating their training videos are identified by what they sell rather than by product name, because naming the platform would read as an endorsement this book isn't making.

Three published Section 087100 specifications are examined in detail throughout: the City of Santa Fe's Fire Station No. 2, Cornell University's Design and Construction Standards, and Michigan State University's Construction Standards. All three are public documents. Nothing in this book is a hypothetical.

Chapter 1. What a Door Schedule Actually Is, and What It Leaves Out

A door schedule is a table of openings, one row per door, and the steel industry's own recommended version carries twenty-three columns. Filled in correctly it still won't price the job, because most of what moves a Division 8 number sits in another document or in none of them. The takeoff is a reconciliation before it's a count.

FIGURE 1
Anatomy of a door schedule row
What the row tells you, and what it makes you go find somewhere else.

DOOR NO.	SIZE	TYPE	MATL	FRAME	RATING	HDW SET	REMARKS
109-1	3' -0" x 7' -0"	F	HM	HM	90 MIN	1.0	-

The only pointer to the actual hardware
One number stands in for every component on the opening. Figure 3 is what it expands into.

What the row does not carry
Each of these changes the price, and none of them is on the line you just read.

Handing
Which way it swings. Most hardware does not fit if you guess wrong.

Single or pair
A mouse click on the plan turns one into two. The schedule may not follow.

Finish
Satin stainless and bright brass are different money on the same item.

Lock function
Storeroom, office, classroom. One change can move a device four figures.

Electrification
Power supply, request to exit, door position switch. Often nobody's scope.

Whether it is real
The plan and the schedule disagree more often than either admits.

SDI 111D-24 lists twenty-three door schedule columns, several of them cross-references

SDI 111D-24, "Recommended Door, Frame and Hardware Schedule for Standard Steel Doors & Frames," lays out what a complete one carries:

Item No.	Arch. No.	From	To	Qty	Hand	Label	Frame Gauge	Elev.	Depth	Anchor/Wall Type	Head	Jamb	Sill	Door Gauge	Type	Width	Height	Hdwe. Group No.	Hinges	Lock	Closer	Remarks
----------	-----------	------	----	-----	------	-------	-------------	-------	-------	------------------	------	------	------	------------	------	-------	--------	-----------------	--------	------	--------	---------

Few of those columns contain an answer. "Hdwe. Group No." points at Section 087100, the subject of Chapters 2 and 3, "Anchor/Wall Type" at the wall type legend, "Label" at the life safety plan. They tell you which document to read next.

The schedule also carries defaults that never appear as entries. An SDI 111D-24 general note reads: "Doors provided with 3/4" undercut unless otherwise specified." You receive that number by silence, and its datum belongs to somebody else. HMMA 841-13: "The Architect must define the distance from the top of the floor/finished floor to top of floor covering so appropriate undercuts can be provided." That's frequently missing, so three quarters of an inch stands until an undimensioned floor finish changes it, and on a rated opening a wrong undercut is an NFPA 80 failure, not a trim item.

Section summary. The schedule's most expensive columns are cross-references, not data: hardware group number to the 087100 spec, wall type to the legend, label to the life safety plan. Reading a schedule means reading four documents.

Frame, leaf, and hardware price as one rated assembly

Lori Greene, Manager of Codes and Resources at the hardware manufacturer Allegion, described a rated opening on a fire door inspection podcast, and it holds beyond fire doors:

"it's not only just the door, it's really the whole assembly. You have all the components, the door frame, the hardware, lock, panic, fire exit hardware... door closer, anything that's going on to that door is a component."

The assembly is the unit. ANSI/SDI A250.8-2017 says a component substituted below the assembly's intended rating produces "a corresponding decrease in rating or the loss of the rating in its entirety."

The real information sits on the label below the top hinge: "the rating of the door, whether it's 20 minute, 45, et cetera, the manufacturer, other information, like what kind of hardware it's supposed to have." Greene has found labeled fire doors where none was required, including a fire station bathroom with push-pull hardware, explained as "that's what was in stock at the distributor." Her conclusion:

"it's important to have the floor plans and to understand where the partitions are that need those opening protectives."

Section summary. A door is an assembly of frame, leaf, and hardware, rated no higher than its weakest component. The requirement originates in the partition, so the life safety plan governs the Label column.

Doors are one percent of construction cost and most of the field trouble

Mia Merrel and Benji Bolick, both of the manufacturer ASSA ABLOY, spent an hour on the Construction Brothers podcast on that asymmetry. Doors "are like 1% of the construction costs, but they're like 90% of the construction headaches when you're installing or when you're trying to finish the job because they come in the last." One of the two widened the cost figure to "one to two, maybe three" percent once hardware and access control are counted.

Asked why architects struggle with the scope, one of the two, again from a manufacturer's seat: "They aren't huge fans of doors because there's so many different compliances and rules and codes that go into doors that I mean, no one person could handle all that." You bid from a document written by somebody carrying more code than one person can hold, on a permit deadline.

Handing, duty level, core, and louver free area are left open

Four variables the schedule leaves open, each of which changes the number.

Handing. Both trade glossaries define it in full: "A term used to designate the direction of door swing." The operative chart in SDI 111D-24 carries one note: "KS indicates keyed side of lockset." Hand comes off the keyed side, so on an interior opening with no outside it isn't settled until the hardware schedule assigns the key side, which makes any schedule handed before the hardware schedule provisional.

Duty level. SDI runs four levels, HMMA six, the gauges line up level for level and the names don't. "Heavy duty" is an 18 gauge door under SDI-108 and a 16 gauge door under HMMA 805, so heavy duty with no level number or decimal thickness is ambiguous by a full gauge step across every opening.

Core. A250.8-2017: "The core design shall be at the discretion of the manufacturer." Honeycomb, polystyrene, polyurethane, mineral board and steel stiffeners all satisfy the same level, so a Level 3 exterior door with a honeycomb core complies with the standard and fails the energy spec. Polyurethane and temperature rise cores have to be named.

Louvers. The Type column uses SDI letter symbols: L louvered, V vision light, G half glass, E4 four panel embossed face. None carries performance. A pierced louver delivers about 20 percent free area and an inverted "V" inserted louver 50 to 60 percent, so guessing undersizes the opening by a factor of two and a half.

Section summary. Handing is provisional until the key side is assigned, duty level names mean different gauges under the two competing standards, core is the manufacturer's choice unless named, and a louver letter carries no free area. Four price variables, all left open.

Four ways the door schedule disagrees with the bid set drawings

Chapter 4 settles the count disagreements. Chapter 11 covers what a set conflict is worth if you find it early enough.

Section summary. Door schedules disagree with the bid set four repeating ways: drawn but not scheduled, scheduled but not drawn, counts that differ from the plans, and set assignments that conflict with the 087100 spec. How long a takeoff runs is decided by those disagreements, not by the number of openings.

What to do on your next bid

Before you count anything, put the four documents that define an opening in front of you: the door schedule, the floor plans, Section 087100, and the elevations. Read the general notes first, where the defaults you're inheriting are written. Undercut is the one that bites.

Then confirm every pointer column resolves: hardware group number in the spec, wall type in the legend, label on a rated partition. If one doesn't, you haven't found a takeoff question. You've found an RFI, and Chapter 11 is what that's worth while there's still time to send it.

Chapter 2. Reading the 087100 Spec

The hardware schedule inside an 087100 spec isn't a table. It's text formatted to look like one, which is why every tool you point at it comes back broken. The quieter half: a vague line extracts perfectly and fails on site.

The 087100 hardware schedule is text, not a table, after PDF conversion

A Division 8 supplier asked a public estimators forum for "a (near) fool proof method of extracting door hardware schedules from 087100 specs as tables into Excel." The thread drew 59 comments and no method that held. He'd diagnosed why:

"The lack of visible lines at cell edges/columns & rows really hurts every software solution's ability to properly figure out the table layout."

Hardware consultants author schedules in a word processor; the PDF conversion throws away the cell boundaries, leaving text that only looks tabular. Same estimator: "The GC often doesn't have a non-PDF version anyways... Gotta work with what I got, ya know?"

The output fails three ways on nearly every schedule: **merged columns**, quantity collapsed into description; **broken door number lists** scattered across cells; and **wrapped-text rows**, a wrapped description read as a new row.

Section summary. A hardware schedule in an 087100 spec is text formatted to look like a table, because the cell structure died in the Word-to-PDF conversion before software opened it. Extraction fails those same three ways every time.

Choose a hardware schedule extractor by how predictably it fails

The state of the options, from practicing estimators rather than vendors. ABBYY FineReader is the least-worst pick: predictable, trainable, still merging columns on borderless tables. Excel's Get Data path is free and workable on short schedules, one workbook per page, no consolidation. Bluebeam is unreliable here. Tabula is abandoned.

The general-purpose language models are the trap, and most estimators try them first:

"It kept returning headers only, I'd explain that was wrong, it would tell me it understood the problem and its cause and fix it, then it would do the exact same thing, or close to it with a different problem."

A second estimator hit the same wall independently, never getting past about the first thirteen rows, and paid Gemini came closest in one comparison and still dropped columns. The sharpest line wasn't about tools:

"AI makes me nervous that they're going to mutate or fill in some data point and I'm not going to catch it."

The error that costs money survives a visual scan and lands in a quote: "No company takes ownership of that kind of error except the idiot (me) who put a price out based off bad data... checking it is basically inevitable by default."

Section summary. No generic tool removes the verification step; the good ones shrink the cleanup. Pick the extractor whose failures are predictable, and treat a model's output as unverified until read line by line.

An underspecified 087100 line gets bid to the cheapest compliant product

Marc Ameryckx and Dikesh Pattni, both of the manufacturer ASSA ABLOY, host a podcast on door specification. Pattni's example is one every estimator has seen:

"...as a contractor, you're looking at that specification and thinking, okay, well, they've just looked at a steel door. Shall I just then go out and get the cheapest steel door or do I need to have a certain performance on that steel door?"

Ameryckx answered from the other side, describing your competition as much as you: "During the bidding process, the contractor is going to try to give you the cheapest solution that just fits or barely fits into those bad specs." He described a job where the owner expected a multi-point motorized lock:

"in the specs, it was just mentioned, I want an electric device in my front door to lock the door... But the contractor, he just put an electric strike of 50 euros. That was it. He respected the specs, but at the end the owner wasn't happy at all."

Both men sell specification services for a hardware manufacturer, and the story still describes a compliant bid. Nobody broke a rule. The winning number read an incomplete sentence correctly.

He also named the failure behind those sentences, which is that the spec came from the last project: "There is a big risk if you just copy it from another hospital that you are going to be in trouble at the end." Chapter 11 covers what the correction is worth.

Section summary. An underspecified line extracts cleanly and gets bid to the cheapest product satisfying the words, compliant and frequently not intended. "Electric device" and "steel door" are complete sentences and incomplete scopes.

Check whether Part 2 and Part 3 exist before pricing line items

Read the document's shape before its line items. Whether Part 2 and Part 3 exist at all, whether a clause like Cornell University's finish-designation article points at content the spec contains, and whether electrified sets say how the opening operates all change what you're pricing. Chapter 3 works those through on three published specs. Michigan State University's has no sets to find.

Structure predicts stability too. One estimator explained why hardware sections get reissued wholesale at Addendum 1:

"This occurs most often from a copy paste specification utilized to expedite permitting. If a consultant is involved, they overload the hardware sets in order to sell the most product, and manipulate the specifications themselves so substitutions can't be made... once the hardware conglomerate gets in the building it's hard to introduce a competitor."

Section summary. Check whether Part 2 and Part 3 exist, whether a finish-designation clause points at content the spec contains, and whether electrified sets say how the opening operates. Specs written fast for permitting get replaced at Addendum 1.

Verify row counts, door totals, electrified lines, and spec-versus-schedule conflicts

Row counts per set. Every set's line item count in your spreadsheet matches the spec. A dropped row is invisible once the table looks clean.

Door totals both directions. Total the doors assigned across the sets, reconcile against the drawing schedule's count, then reverse it.

Electrified hardware line by line. There's a "huge price swing between a Grade 1 cylindrical lock and a Exit Device with electric latch retraction," and the electrified item drags power transfers, raceways, and power supplies with it. Chapter 7 covers who carries them.

Spec-versus-schedule conflicts. A set referenced in one document and missing from the other is a document error, not an extraction error. It belongs in an RFI, and Chapter 12 folds it into the QC pass.

What to do on your next bid

Extract with whatever fails predictably, then verify those four items before any of it reaches your estimating system, which is Chapter 5's territory. A better tool doesn't shorten that, because the error that hurts you changed a value quietly.

Then read it again for a different question. Mark every line naming a material or a function with no performance: a steel door with no level, an electric device with no function, a hinge line with no weight. Those price to the cheapest compliant product, and the distance to what the owner pictured is somebody's exposure.

Chapter 3. Hardware Sets: How Three Real Owners Publish Them, and Why It Changes Your Takeoff

A hardware set is a bundle: every component on one opening, in quantities, with catalog numbers and finishes, under the number the door schedule points to.

The execution isn't standardized. This chapter compares three published Section 087100 specs: the City of Santa Fe's Fire Station No. 2, Cornell University's Design and Construction Standards, and Michigan State University's Construction Standards.

A hardware set line carries quantity, catalog number, finish, and manufacturer code

FIGURE 3
Reading a hardware set

Set 1.0 from the City of Santa Fe Fire Station No. 2, Section 087100. Reproduced as printed.

QTY	COMPONENT	CATALOG STRING	FINISH	MFR	labels added; the spec has none
Set: 1.0					
Doors: 109-1					
6	Hinge (heavy weight)	T4A3786 (size/NRP as required)	US26D	MK	
1	Removable Mullion	L980A	US28	SA	
1	Exit Device (storeroom)	10 16 21 43 AD8504 862	US32D	SA	
1	Exit Device (exit only)	10 16 21 43 AD8510 862	US32D	SA	
1	Mullion Cylinder	10 21 980C1	US26D	SA	
2	Surface Closer/Stop/Hold	351 CPSH	EN	SA	1
2	Drop Plate	351D as required	EN	SA	
1	Threshold	270A	(none)	PE	3
1	Gasketing	By Aluminum Frame Mfg.	(none)	OT	2
1	Mullion Gasketing	5110BL	(none)	PE	
2	Sweep	315CN	(none)	PE	

Three things in this set that cost money

- 1 An undecoded finish code

EN appears on 19 lines in this section. Article 3.8.C decodes manufacturers, not finishes.
- 2 A line that is not your scope

OT means somebody else buys it. Ten of the 34 live sets hand a line off. Exclude them in writing.
- 3 Blank finishes

Four lines here carry none. Section-wide it is 83 of 233, each one a price you will invent.

Set 1.0 from Santa Fe, its most complex exterior opening:

Set: 1.0

Doors: 109-1

6 Hinge (heavy weight)	T4A3786 (size/NRP as required)	US26D	MK
1 Removable Mullion	L980A	US28	SA
1 Exit Device (storeroom)	10 16 21 43 AD8504 862	US32D	SA
1 Exit Device (exit only)	10 16 21 43 AD8510 862	US32D	SA
1 Mullion Cylinder	10 21 980C1	US26D	SA
2 Surface Closer/Stop/Hold	351 CPSH	EN	SA
2 Drop Plate	351D as required	EN	SA
1 Threshold	270A		PE
1 Gasketing	By Aluminum Frame Mfg.		OT
1 Mullion Gasketing	5110BL		PE
2 Sweep	315CN		PE

Five columns, no headers: quantity, component, catalog string, finish, manufacturer code.
MK is McKinney, SA Sargent, PE Pemko, OT somebody else's scope.

Section summary. A hardware set bundles every component for one opening under a number the door schedule references. The columns are frequently unlabeled, so reading one depends on knowing the convention.

Santa Fe publishes 40 hardware sets and marks six not in use

The spec carries 40 set headers, 1.0 through 36.0 plus decimal sets 22.1, 26.1, 26.2 and 27.1 absent from the whole-number sequence, and 233 line items across all 40. Six headers are captioned "(NOT IN USE)," so 34 sets are live, carrying 196 of those items: 5.8 per set on average, 2 on a roof hatch, 14 on card-access exterior doors.

Doors are assigned explicitly, a **Doors:** line on 35 of the 40 headers, 76 unique numbers. That's the document's most useful feature, and where its worst problems live: four doors go to two sets at once, nine to a set marked not in use. The five headers with no door line, 6.0, 7.0, 11.0, 19.0 and 22.0, are all dead, which is what makes Set 8.0 read wrong. Chapter 11 covers that.

It states its quantity basis:

"The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door."

Quantities are per opening, so a set applied to a pair doesn't double, and "2 Sweep" on a single door means two sweeps on it.

Santa Fe voids scope inside its own sets. Ten of the 34 live, 29 percent, hand a line to another trade: "By Gate Mfg.," "By Sliding Door Mfg.," "By Speciality Door Mfg.," "By Roof Hatch Mfg.," "By Security Integrator," and the "By Aluminum Frame Mfg." gasketing line in Set 1.0 above. Set 33.0 entire:

Set: 33.0			
Doors: 103J-2, Q-1, R-1, S-1			
1 Padlock	10 21 758 as required	SA	
1 Balance of Hardware	By Roof Hatch Mfg.	OT	

You're supplying a padlock on four openings.

Cornell publishes 23 hardware sets with no finish designations at all

Cornell's standard runs 30 pages: 23 set headers, 1.0 through 22.0 plus an 18.0A on page 28, 186 line items.

Article 2.19.A says: "Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products." There are none: zero US codes, zero BHMA numerics.

Every hinge line in all 23 sets shares the model column:

3	Hinge	As Required	MK
---	-------	-------------	----

The quantity moves and the product never does. Eighteen sets call three, the two pair sets call six, and three call two plus a separate electrified hinge line that does carry a model number. No set names a size, a weight, a bearing type, a removable-pin option, or an A156.1 grade.

Add six proximity reader lines whose entire description reads "Multi-class get model number for each opening from Cornell Police Access Control Program (607-255-4393)," and eight power supply lines specifying neither amperage nor voltage nor board count, and 43 of the 186 line items carry nothing priceable. Twenty-three percent.

Cornell does one thing better. Article 3.08.B requires that "every hardware set that has electronic hardware shall be provided with a 'Theory of Operation'." Set 15.0:

"Outside door closed & locked at all times. Presenting valid credential outside shunts door position switches, activated electric latch retraction in exit device & allows for authorized entrance. Inside free at all time for immediate egress. Operating inside trim activates request to exit switch in exit device shunting door position switch and allowing authorized egress. With loss of power or activation of building fire system door remains locked."

Five sets carry that block, 15.0 through 18.0 plus 18.0A, and Set 14.0 carries a shorter note of its own. It's the only prose inside any hardware set in any of the three documents.

Section summary. Cornell keeps door-level bundling and strips out the product detail: no finishes, hinges "As Required," a quarter of the line items unpriceable. Its Theory of Operation requirement is the best practice of the three.

Michigan State publishes component tables by usage instead of hardware sets

The MSU standard has no Part 2 and no Part 3. The 13-page section is Part 1 General, hardware in Article 1.8, Scheduled Door Hardware, organized A through M by component type across nine tables. Nothing is bundled, numbered, or assigned to a door.

The tables are organized by usage; the hinge schedule's first row:

Classrooms, offices, toilet rooms and storerooms of average size | 1 1/2 pair | Full mortise 4 1/2" X 4 1/2" ball bearing, standard weight, butt hinges with non-rising removable pins | McKinney, Hager BB1279, or approved equal

A menu entry. You match usage to a row, pull the product, and repeat that nine times per opening, once for each subsection with a table, across 61 usage-to-product rows. The other

four subsections, dead bolts, kick plates, removable mullions and secret latches, are narrative you price off prose.

Article 1.3.A.2 then requires your submitted schedule to "Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening," in the same order as the schedule "at the end of Part 3." There is no Part 3. Article 1.10 is the last article.

The assembly is yours. Two bidders reading MSU produce different set counts, contents, and scope boundaries, because the section never defines the bundle.

MSU also declines to select a finish series. Article 1.9.A says hardware "shall have Dull Bronze or Dull Chromium finish," gives both columns for all nine item types, and never says which governs.

Set-based specs and component-menu specs need different pricing postures

	Santa Fe	Cornell	Michigan State
Sets published	40 headers, 34 live	23	none
Line items	233 across 40 headers, 196 live	186	61 usage rows
Doors assigned to sets	yes, 76 doors	no	no
Finishes stated	64% of lines	none	series never selected
Hinges specified	series and weight class	"As Required"	by usage table
Who assembles the set	owner	owner	you

On a set-based spec your exposure is in the errors, which is the Chapter 11 audit; on a component-menu spec it's in the assembly you build.

Hardware set submittals disagree on quantity per opening versus set total

When a hardware set is submitted, should each line show the quantity for one opening or the total across every opening in it? Emilio Bendeveer, a working detailer, raised it publicly in 2025, describing his own software:

"Comsense refuses to change their submittal format (they believe it should be the total quantity of each hardware items for all openings in the hardware set) and they keep referencing that their format matches what DHI recommends, but I find that hard to believe since every other program I've ever used shows the quantities per door. It's very difficult for our customers and architects to review, when they have to do some math to determine if we have the correct quantity of per door."

Lori Greene, Manager of Codes and Resources at the hardware manufacturer Allegion, replied: "Unless something has changed, the hardware set should show the quantity per opening."

Bendever came back with DHI's published language, which appeared to support the total-quantity reading: "Most of my projects are well over \$1 million in doors and hardware and you have to have a calculator in order to determine if the correct quantities of hardware are provided for each item."

Greene's reply: "Interesting...I don't remember ever doing it that way but maybe I did that for my AHC exam in 1994. As a specwriter I listed in the hardware set the quantity for one opening and did the calculations later."

The convention is unsettled between the trade's certifying body, its most-cited code authority, and its most-used software. Get it backwards on a 40-set project and every downstream number is wrong by a multiple.

What to do on your next bid

Answer three questions before counting anything. Does the spec publish assembled sets or a component menu? If sets, are doors assigned? What quantity basis does it state?

Those answers decide whether your next four hours go into auditing someone else's bundles or building your own, and everything downstream inherits the error if you get them wrong.

Chapter 4. Counting the Openings: Match Lines, Duplicate Tags, and Drift

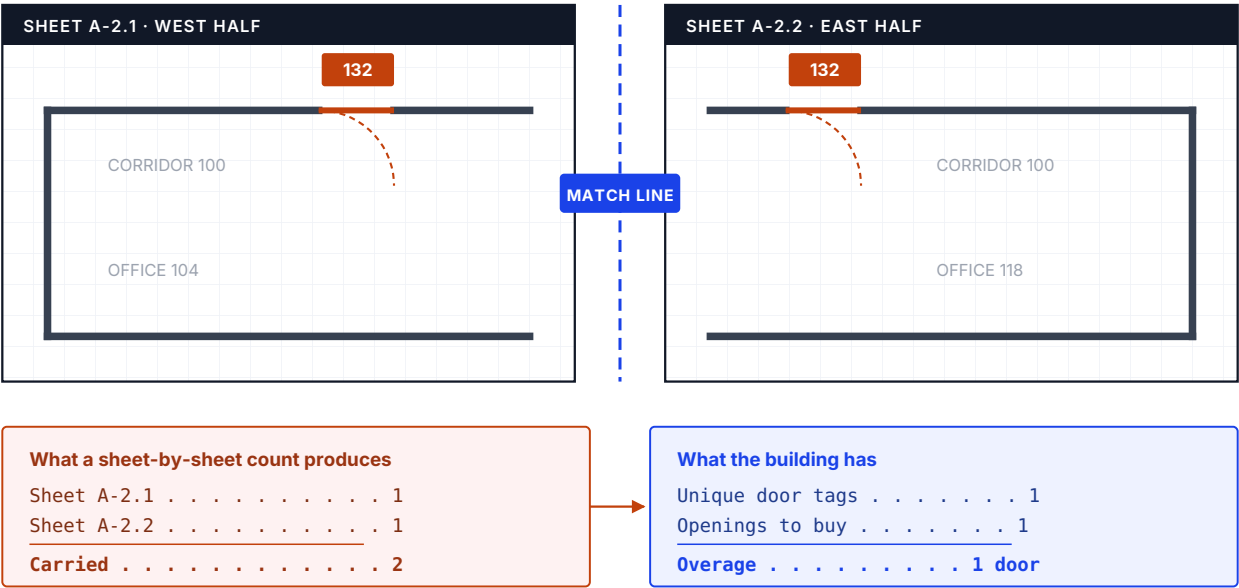
A door takeoff goes wrong less from miscounting than from the same opening being drawn on two sheets, tagged twice in one schedule, or listed on a page copied across three buildings, none of which a sheet-by-sheet count can see. Ninety-nine percent accuracy on a 2,000 door project is still twenty wrong doors, and a Division 8 material quote has nowhere to absorb them.

Every trap here sits between documents. Door 132 is on the schedule and nowhere on the plans; door 400G is on the plans and not in the schedule. Your total can match the schedule and be wrong by both.

FIGURE 2

How one door becomes two

Door 132 sits on the match line. It is drawn on both sheets because it belongs to both.



The tag is the unit, not the drawing. Deduplicate on tag before anything downstream touches the count.

Match lines put the same opening on two sheets by design

On a large footprint the architect cuts the plan into sections joined by match lines, so openings near a seam appear on both sheets. That's the convention working correctly. It becomes a count error because counting proceeds sheet by sheet.

A double counted door inflates your material number and you lose the job to the bidder who counted it once. A door that fell between two sections never gets priced, and you find that one after award, out of your own margin. It happens most on the sets you have least time on: education and healthcare projects with sectional sheets and late addenda.

Section summary. Sectional plans show doors at match lines on more than one sheet by design, so a sheet-by-sheet count doubles them unless someone deduplicates across the seams. Double counted openings cost you the award; lost ones cost you margin after you win.

Duplicate door tags and reused type codes break a tag-based door takeoff

Chapter 1 covers what a door schedule leaves out. For counting, a tag doesn't reliably stand for one opening, and treating it as one turns a document error into a count error.

On one 752 door commercial schedule, the tag S60004A appeared three times. Architects also recycle type codes across schedules, so a code means one product in one place and something else forty sheets later. One estimator, on a recent Division 8 set: "I saw a Div 08 one recently where there were 3 different clear openings for one door on the same page."

Read the schedule as an index into the plans and a duplicate tag is an item to resolve. Read it as the count and it's a number you defend on bid day without knowing.

Repeated multifamily schedule pages multiply one wrong door across every unit

Unit types repeat across floors, floors across buildings, and schedule pages are reissued per building, so counting each repeated page as its own openings gives you every building twice. It fails the other direction too: two pages that look identical can differ by one unit type substitution, and treating the second as a copy loses that silently.

Then the unit math amplifies it. One patio door on the schedule that isn't on the unit plan is a one door discrepancy until you multiply it by forty units across three buildings. Verify repeated pages are identical before counting them as copies.

Reconcile the door schedule against the plans in both directions

Doors appear in the schedule and nowhere on a plan. Doors appear on plans and never make the schedule. A type shows three times in the schedule and eight on the drawings. Each is a count to settle and an RFI you can send.

Reconciliation means running it both directions and resolving or documenting every mismatch before anything gets priced. That record is what lets you defend the count instead of re-arguing it with the GC from memory, and Chapter 13 covers what the audit trail needs when the takeoff came out of software.

Section summary. Reconcile counts both directions area by area, resolve or document every schedule-to-plan mismatch, and keep the record. A mismatch you absorbed silently is indistinguishable, three months later, from a mistake you made.

Doors assigned to two hardware sets in the 087100 specification

In Santa Fe's published Fire Station No. 2 spec, four doors are assigned to two hardware sets at once: 116-1, 146-1, 107-1 and 131-1. Nine more go to Set 8.0, captioned "(NOT IN USE)." Only the specification is public for that project, so nothing here is a claim about its drawings.

The two failure modes behave differently regardless. A match line duplicate inflates your opening count, and the total shows it. A dual set assignment on an opening that's drawn and tagged once leaves the count right and the hardware wrong, which is harder to catch because the number you'd check still reconciles. Chapter 11 covers both and how to get paid for finding them.

General-purpose takeoff software has no memory of match lines or tags

General purpose takeoff software counts what's drawn on the sheet in front of it. Estimators using those tools on Division 8 work report the expected artifacts: double-lined doorways counted once per line, measurements captured behind cabinets, unit-by-unit tagging still done by hand on the repetitive sets automation was supposed to help with.

A counting engine has no concept of a match line, no memory of a tag from another sheet, and no way to know page 14 of the schedule is a reissue of page 11. The counting layer was never the hard part of a Division 8 takeoff. The cross-document layer is, which is why review time belongs on flagged exceptions: three or four flagged problems on that 752 door schedule is a different afternoon than 752 doors, and the only check a solo estimator runs twice.

When a small tenant improvement needs no cross-sheet reconciliation

A thirty opening tenant improvement on one plan sheet has no match lines, no repeated schedules, no unit math. Count it, reconcile it once, and price it. And when you never receive plans, qualify the quote as priced to the schedule as issued rather than imply a reconciliation you had no documents to perform. Chapter 10 covers the language.

What to do on your next bid

Run six checks on the door takeoff before the number leaves your desk. Reconcile schedule counts against plan counts both directions, area by area. Scan for duplicate tags inside each schedule and reused type codes across schedules. On a sectional set, walk the match lines and look at every opening near a seam. On multifamily, confirm repeated pages are identical before treating buildings as copies. Count leaves separately from doors. Then document every resolution and turn what's left into an RFI the day the invitation arrives.

On a Denver project, roughly two hundred doors sat in a schedule buried in the set and the bid went out short by all two hundred. The count wasn't careless. Nobody knew there was a second document.

Chapter 5. Getting Hardware Into the System

Two decisions determine whether a hardware import is right, and both get made in the first ten minutes: which quantity basis the source document is using, and how its sets map onto openings. The rest is typing, and typing errors announce themselves. These two don't. They produce a schedule that imports cleanly, totals cleanly, and is wrong by a multiple.

The five-step hardware entry workflow, from PDF extraction to price books

The workflow hasn't changed much in a decade. You pull hardware set information out of a specification, usually a PDF, with OCR or a PDF-to-Excel converter or your own two hands. You reformat it into the columns your estimating platform expects, cross-reference the sets against the door schedule, enter the line items with hinge quantity, closer size, kick plate width, finish and function, and price against manufacturer books.

Your platform decides those columns. Among Division 8 estimators naming tools in public, Comsense is the clear majority and eMullion a distant second.

On a 300 opening commercial project the cycle eats a day. On a thousand opening hospital or casino it runs several. One misconfiguration in step four takes the whole hardware bill of materials with it.

Hardware entry time goes into cross-referencing, not keystrokes

Several hours of that happen before you open the platform, and they go to interpretation. Specifications arrive with quantities missing. Door schedules reference sets that don't exist. Hinge counts go unstated because the architect assumes the estimator will derive them from door height, closer sizes from width and fire rating. A door gets assigned to set 107.3 on the schedule and 107.4 in the specification, and somebody has to decide which governs.

That layer is where Division 8 expertise sits. One estimator with more than a decade in the trade built an Excel workflow with sorting and filtering macros: fast, and locked to him.

Section summary. The hours in hardware entry go to interpreting incomplete documents, not to keystrokes: unstated hinge counts and closer sizes, sets the schedule references that don't exist, and assignments that conflict between the schedule and the spec. That's expert work, and the workarounds estimators build for it don't transfer.

Confirm quantity per set versus total item quantity before importing

A Division 8 estimating software vendor publishes its own training screencasts, an operator narrating a live import into his company's platform. The commercial interest is on the surface. He stops on this first:

"they do use two different quantity, there's a quantity per set and a total item quantity. Make sure you do quantity per set."

Quantity per set is the count of each item for one opening carrying that set. Total item quantity is that number multiplied across every opening the set is assigned to. Chapter 3 lays out the live disagreement between a working detailer, a widely cited code authority, and the published standard they were both citing.

Choose wrong and every quantity downstream is off by the number of doors in the set, and nothing looks broken, because the numbers are internally consistent.

Import door tags and set numbers first, then read the orphan warnings

From the same software vendor's screencast: "before you import hardware, you do need to at least import the door tag numbers and the hardware set numbers." Until those are loaded the system has nothing to validate against, and once they are, it starts finding things:

"...popped up a message that hardware set 1.1 is missing from the door schedule. So, apparently there's a hardware set 1.1 that's being used but it's not on the door schedule."

That's an orphan: a set is in use and the door schedule never references it. A document error, not an import error, and it surfaced only because the tags were loaded first.

The vendor's operator found the cause upstream in the extracted file:

"they have a column called number of doors. You see some of them are set to zero... I went through the spreadsheet, I created another copy of it and sorted it by this number of doors column and deleted all the zeros."

Sets with zero doors attached are retired sets along for the ride, or assignments that went missing between the specification and the export. Chapter 12 compresses these into a checklist.

Section summary. Load door tags and hardware set numbers before the hardware itself, then read the import warnings instead of clearing them. An orphan warning means a set is in use that the door schedule never assigned, and sets showing zero attached doors are worth sorting into one place.

One heading per opening configuration, and split singles from pairs

A second Division 8 software vendor's product video states the convention, its commercial interest as plain as the first one's: dissimilar openings go on separate headings, so a schedule with 40 sets carries 40 configurations. Pair hardware is counted in separate columns for the active leaf, the inactive leaf and off-door mounting, with pair-only items like flush bolts on the inactive leaf, so a single and a pair don't share a heading. Architects combine them anyway. From a second screencast by the first software vendor, the condition and the fix:

"sometimes an architect will use the same hardware set for a single and a pair of doors. I don't see that too often but I have seen it in the past... you could go to door number two and instead of hardware set one, maybe make the hardware set for door two 1A."

Splitting it into a 1A costs a minute and makes the quantity basis unambiguous for both openings.

New items in your price database have no purchase history behind them

The manufacturer list has to reconcile against your own first, and that mapping isn't clerical. The supply vendor you match a manufacturer to sets the discount, and one manufacturer can carry different price books by division.

Back in the software vendor's import screencast, what the schedule holds that you've never bought:

"There's close to 300 items in this spreadsheet. 43 of them were new items added to the database."

New items have no purchase history behind them, which makes them the most likely to carry a stale price. A schedule where a seventh of the items are new isn't one you've effectively priced before.

Entering a hinge in that second screencast, the software vendor's operator notes the system is "checking the most recent price book to make sure the list price is current." Whether a cleanly imported price is this quarter's price is a separate question, and Chapter 6 covers what happens when it isn't.

What to do on your next bid

Before you import anything, answer one question in writing: is this file quantity per opening, or quantity totaled across the set? Write it at the top of the sheet, because you won't be able to tell from the output.

Then import door tags and set numbers first, hardware second, and treat every warning as a finding. Sort by attached door count and look at the zeros. Count what's new to your database, and split any set an architect applied to both a single and a pair.

Chapter 6. Pricing What You Counted

A per-opening number means nothing until somebody says what hardware it buys. The public exchanges between estimators land in the same place: the round number is well below what the opening costs, and the person carrying it doesn't know which components he's short.

A GC-side estimator carrying \$400 an opening got corrected by a Division 8 distributor estimator, who itemized what that reaches in current pricing:

"At \$400/opening in today's market, you're barely getting a Gr. 2 lock, set of standard BB hinges, and a wall or floor stop."

Three items. No closer, no exit device, no gasketing, no threshold, nothing electrified, nothing on a pair. Another estimator, on why per-opening pricing breaks down:

"A different function on a panic device can make it cost \$1000+ extra."

The unit isn't the opening. It's the function. Chapter 10 covers what to write down when you're forced to price this way anyway.

At the other end, one estimator in the same discussion put "\$2,000 a hollow metal egress opening supply only" on the record. That's his own stated figure rather than a benchmark, and it sits five times above the number that started the argument.

Section summary. Published per-opening figures from Division 8 estimators run from roughly \$400, which one distributor estimator described as barely covering a Grade 2 lock, hinges and a stop, up to a stated \$2,000 for a hollow metal egress opening supply only. Hardware cost tracks function, and function is invisible in an opening count.

Section 232 tariffs hit frames, hardware, and locksets at different rates

Section 232 reaches a single Division 8 opening at three separate points, at two different rates, and misses one common component entirely. A blended per-opening allowance can't absorb that.

Section 232 status as of August 5, 2026, HTS Revision 15. Verify at hts.usitc.gov before relying on these figures.

Hollow metal doors and frames (HTS 7308.30) and aluminum doors, frames and thresholds (HTS 7610.10): **50 percent**. Builders' hardware under HTS 8302, including hinges, closers, pulls, kick plates and escutcheons: **25 percent**, caught as derivative steel and aluminum articles. Locks and locksets under HTS 8301: **on no Section 232 list**.

Since April 6, 2026, all of these apply to the full customs value of the article rather than to its metal content.

On one opening you can carry a frame at 50 percent, a closer at 25, and a lockset at zero. Exit devices sit on the boundary: covered at 25 percent if your supplier classifies them under 8302.41.60, uncovered under 8301.40.60. That's a classification question rather than a rule. Ask your supplier instead of assuming.

Two things cut exposure. Hardware outside the metal chapters is only reached when the covered metal is at least 15 percent of the article's weight, and steel with at least 85 percent U.S. melt-and-pour content drops to 10 percent, a threshold lowered from 95 percent in June 2026. The product exclusion process is not a route: it was terminated in March 2025.

Aluminum mill shapes rose 30.5 percent and steel mill products 17 percent over calendar 2025, both the steepest climbs since 2022, while the broader nonresidential input index rose 3.3 percent. Bid the frames in March, take the award in June, and that spread happened to your number while you waited.

Bid low against an old book and you win the job, then watch the margin go when the invoices arrive. Bid high to hedge and you don't win.

Manufacturer price books load into estimating systems weeks or months late

Comsense and eMullion both price hardware against manufacturer price books, and those books arrive as catalogs that people digitize, validate and load every time a manufacturer issues an update. Reviewing thousand-page catalogs across dozens of manufacturers on a quarterly release schedule takes time. Nobody publishes how long, and the trade's own published accounts put a system price somewhere between a month and a quarter behind the manufacturer's book.

For most projects nobody notices. On a long bid-to-award window in a volatile metals market it's exposure you can't see, because the estimate looks correct.

Section summary. Estimating platforms price against manufacturer books that have to be digitized, validated and loaded by hand, so a system price is only as current as the last load, and how far behind that sits is not something any platform states. The lag is invisible in the output and compounds with every week between your bid and your award.

Specifications leave finishes blank and mix US, BHMA, and proprietary codes

In the City of Santa Fe's published Fire Station No. 2 specification, 83 of 233 line items carry no finish at all. Every gasketing line, every threshold, every sweep and every silencer is blank, and those are the items an estimator prices from habit rather than from the page.

The lines that do carry a finish mix three notations in one column. US32D is a traditional U.S. finish designation, 630 is the BHMA numeric for the same family, and EN is a manufacturer-proprietary code the document never decodes. Pricing that column means translating between two published systems and guessing at a third.

Cornell University's standard, covered in Chapter 3, is the extreme version: 23 hardware sets, 186 line items, not one finish designation, under an article that states the sets indicate finishes complying with ANSI/BHMA A156.18.

Two bidders each apply their own house default, the defaults won't match, and nothing in the document reconciles them.

A current price book cannot fix a wrong opening count

Everything above assumes the count is right. On one Denver project, a schedule buried in the set went uncounted, roughly two hundred openings never made the number, and the job went with it. Chapter 4 is about preventing that.

The markup is thin enough that neither error has anywhere to go. Competitive Division 8 hardware markup runs near 20 percent among the estimators who discuss it publicly. Chapter 11 works out where the money on this trade comes from.

Metal price volatility on long bid-to-award windows and hollow metal packages

Volatility bites hardest on metal-heavy packages with long bid-to-award windows: a hospital or a mid-rise with a few hundred hollow metal frames and a storefront package, bid in spring and awarded in summer. Bid and buy in the same week off domestic stock with pricing locked and both the volatility and the currency of your book matter less. When you do have to raise a number, raise it with the scope attached. A GC challenges a big number far less when the openings, sets and quantities are on the page in front of him.

What to do on your next bid

Put a date on the price book you bid from, in writing, in the proposal. Not the bid date. The price book date. It's the difference between repricing a stale number and arguing about one.

Then decide in advance what triggers a reprice: an award window past sixty days, a metals move you can read in the trade press, or an addendum that changes the hardware. Any of them beats finding out at buyout. And count the finish column, because every line with no finish stated is a price you're about to invent. On a 233 line schedule, that was 83 of them.

Chapter 7. The Division 8 / Division 28 Seam

An electrified opening is priced in one section, powered in a second, connected in a third, and the documents rarely say who owns each step. Every bidder's reading is internally consistent, so nobody notices until procurement.

The device belongs to Division 8, line voltage and rough-in to Division 26, the head end and credentials to Division 28. Everything on the boundary between them is assigned by inference.

Duplicate purchases on electrified openings cost more than omissions

A component nobody carried gets caught: it shows up as a hole in the buyout and somebody eats it. A component two contractors both carried doesn't, because both packages look complete.

Restocking recovers little. On a project carrying thirty to fifty electrified openings, a duplicated boundary component puts five figures on the table, and a power transfer device is four figures before labor. Those are estimators' own projects, so read them as scale.

A hardware set under Section 087100 calls an electrified panic device. The electrical drawings reference electrified hardware by Division 8 without naming a component. The security section names readers and panels and says nothing about the strike. Read them together and there's a component with two owners and a component with none.

Section summary. Electrified scope failures take the form of duplicate purchases more often than omissions: a missing item surfaces as a hole, a doubled item as two complete packages. The conflict shows up only when the hardware schedule, the electrical drawings and the security section are read together.

Furnish, install, connect, and maintain land by assumption on electrified openings

On an ASSA ABLOY podcast episode about secure spaces, Derek Ommert, who works for ASSA ABLOY and holds CPP and PSP certifications from ASIS International, named the industry's own goal:

"That word coordination that Robert used has been the tried and true test of the construction division since I've been in the industry and really what Robert myself and our industry as a whole is trying to do is minimize. Or remove the gaps and overlaps that happen in the construction division eight and division 28."

Note the second noun. Overlaps: a manufacturer describing duplicate scope as a recurring condition of the trade.

Four responsibilities land somewhere on every electrified opening: furnishing, installing, connecting and maintaining. The specification usually assigns none, so they land by assumption. Chapter 10 covers naming them in a qualification.

Both speakers sell integrated electrified openings for a living, so their interest runs toward integration looking simpler. The problem they describe is independently visible in published specifications, three of them below.

Traditional and integrated electrified openings carry different component counts

Robert Tellez, also of ASSA ABLOY, on general contractors:

"especially at the general contractor level, a lot of times they don't understand that savings, all the components that go into a traditional opening versus an intelligent opening."

Ommert had just laid out what a traditional electrified opening consists of:

"that involves wall-mounted readers, disparate devices like your request to exit and door position switches being placed around the door. Maybe there's transfer hinges and electrified locks. There was a lot of trades that had to be involved from electrical with the coordination layout and the design and then the low voltage wiring."

An integrated opening collapses the reader, the switches, the transfer hinge and the wiring into fewer devices, which changes who has anything left to carry.

On a healthcare project built around integrated products, Tellez watched one area revert to traditional access control:

"I was shocked when the security consultant said, oh, this is a bummer because these openings are gonna cost several hundred dollars more now."

The consultant was making Tellez's argument for him. Tellez tells it to make his employer's case, and the size of the number survives the interest: one component on the Division 8 / Division 28 boundary moves a per-opening price by hundreds of dollars.

Section summary. A traditional electrified opening scatters the reader, the request-to-exit device, the door position switch, the transfer hinge and the wiring across several trades; an integrated opening consolidates them. Because the counts differ, the people writing the specification and the people bidding it are often not describing the same opening.

Michigan State bans electric strikes, Cornell restricts them, Santa Fe names one

The electric strike appears in all three published specifications.

The City of Santa Fe's Fire Station No. 2 specification calls an HES electric strike in two hardware sets, and Part 2 contains no electric strike article at all: voltage, fail-safe versus fail-secure, monitoring and UL listing all unstated, no in-line power controller or surge suppressor required. Chapter 11 treats that as an audit finding; as scope it's worse, because fail-safe and fail-secure aren't a price difference but a life safety behavior the document never names.

Cornell University's standard specifies the part in full and then restricts it. Article 2.08 requires A156.31 Grade 1 compliance, a UL listing, cycle counts and voltage, plus an in-line power controller and a surge suppressor from the same manufacturer as the strike under a combined five year warranty. That's a scope instruction as much as a product one: the controller is yours, and it has to be that brand. The article's own heading then adds the condition:

"2.08 ELECTRIC STRIKES (THE USE OF ELECTRIC STRIKES ARE NOT ALLOWED UNLESS APPROVAL IS GRANTED BY THE UNIVERSITY LOCKSMITH (607-255-4753) and CUPD Access Control Program (607-255-4393))"

No Cornell hardware set uses one.

Michigan State University's standard refuses the component outright: where card access is provided, electric strikes are banned, and an electrified lockset or panic bar with a request-to-exit switch is required instead.

House-standard assumptions don't survive any of the three.

Section summary. Three published specifications take three incompatible positions on one component: Michigan State prohibits electric strikes where card access exists, Cornell allows them only with the university locksmith's approval and then specifies a matched power controller and surge suppressor under a five year warranty, and Santa Fe names a model number with no article in Part 2. Read electrified scope fresh on every job.

Electrified hardware content is rising, and the published percentages are first-party

One of the two ASSA ABLOY presenters gave three numbers in a single answer: ten years back, "15% of the product purchased and shipped included access control components," then in 2025, "nearly 40% of our specs included electronic components and over 50% of that hardware purchased had some sort of electronic aspect."

Three different denominators, all first-party and unpublished, so they don't make a curve. They support a direction: electrified content on more openings, further into the building, on door types that used to be mechanical. Enough to triage on, not to price on.

What to do on your next bid

Before you price an electrified opening, write its components one per line with a division and a contractor next to each: lock, strike, power supply, power transfer, request-to-exit, door position switch, reader, wiring, panel. The ones you can't assign are the ones to raise.

Then run it the other way: take every electrified component named in the hardware sets and look for its article in Part 2. Where there isn't one, you have a model number with no performance requirements, and fail-safe versus fail-secure alone is worth an RFI on any egress opening. Whatever's unresolved on bid day becomes a named exclusion; Chapter 10 has the wording.

Chapter 8. Incomplete Drawings and the Bid Spread

A wide Division 8 bid spread is usually not a story about the bidders. It's arithmetic the documents make unavoidable, and on a real published specification you can point at the exact lines that produce it. A GC reads a wide spread as somebody being sharp or somebody missing scope, and levels the bids against each other. If it came out of the document, leveling can't resolve it, because every bidder is reporting the same uncertainty at a different price.

Doors assigned to two hardware sets produce a countable bid spread

In the City of Santa Fe's Fire Station No. 2 specification, four doors are assigned to two hardware sets at the same time. Door 116-1 appears under Set 26.0 and again under Set 26.1, and nothing in the document says which governs.

The two sets aren't near-duplicates. Set 26.0 carries three silencers; Set 26.1 carries gasketing and a brush sweep and no threshold at all. Two estimators, one reading 26.0 as governing and one reading 26.1, price different hardware on the same four openings, and they'll differ on which openings they count, because a door listed twice can be carried once or twice.

Door 146-1 is the same conflict with a heavier package on the other side of it. It sits under Set 26.0 and again under Set 26.2, and 26.2 replaces the silencers with a threshold, gasketing and a sweep.

That's a four-opening difference plus seal packages against silencers. Neither estimator misread anything, and neither can be corrected by leveling. Chapter 11 covers what to do with a finding like that.

Section summary. Four doors in a real published hardware specification are assigned to two hardware sets at once, and the sets differ by an exterior seal package against three silencers. Two estimators reading it reasonably carry different opening counts and different hardware on the same openings, a spread the document produced.

The omitted-items clause sends every bidder a different scope instruction

Two of the three specifications examined in Chapter 3 carry the same disclaimer paragraph, word for word. The sentence that does the damage:

"Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality."

Chapter 10 treats that sentence as the reason to write a qualification, and Chapter 11 works through what it obligates you to furnish. Here it's a spread generator: the same instruction to every bidder with no definition attached.

One bidder reads a set with a closer and no kick plate as a deliberate design decision and carries nothing. Another reads it as an omission he's required to schedule and adds the kick plate. Both comply with the same sentence. Across dozens of sets, the difference isn't in either bid. It's in the paragraph.

Architects issue door schedules on permit deadlines, not on reconciliation

Architects aren't hiding this. Two said so publicly in the same door schedule discussion.

William Gentile, an architect, wrote that he has "repeatedly wrestled with issuing a schedule with adequate time for the consultant to review and question any inconsistencies." The schedule ships because the permit set has a date on it, not because the inconsistencies got resolved.

Robbie McCabe, in the same discussion, described what happens when the design team does more of the work itself: "Designers, it is NOT helpful to predetermine the HW Sets for the specifier... Far more time is spent ensuring if the sets are correct than us creating from scratch."

The sets go out before anyone has reconciled them, and the attempt to get ahead of that produces sets that cost more to verify than to build. Bidders aren't pricing different judgments about a finished document; each is finishing it privately, and the price is where those decisions become visible.

Section summary. Door schedules are issued on permit deadlines rather than on completion, and architects say so under their own names in public. When a set ships unreconciled, every bidder completes it independently, so the spread reads out how differently several estimators finished the same unfinished document.

Supplier, subcontractor, and GC each hedge the same unknown separately

Each layer prices it again. The supplier hedges an unspecified function, the Division 8 subcontractor adds his own hedge for the install condition the drawings don't show, and the GC carries an allowance on top. Three cushions on one unknown, and the owner pays for all three or somebody eats one at buyout.

Chapter 6 covers what a per-opening placeholder buys. The placeholder is a hedge too, and the wider the spread, the more of the total is cushion rather than scope.

Comparing exclusion lists separates a scope difference from a sharp number

If the low bidder excluded scope the others carried, that's a scope difference wearing a price, found by comparing exclusion lists rather than totals. Chapter 12 covers keeping a history of what each supplier normally excludes.

If everyone priced the same scope and the numbers still spread, look at the document conditions in this chapter: dual-assigned doors, sets voided into other trades, missing finishes, hardware called in the sets with no article in Part 2. None of those are the bidders' doing.

And sometimes a bidder is genuinely sharp or genuinely wrong. That's the case everyone assumes first and the least common of the three.

When a wide bid spread is not a document problem

On a clean, complete set with assigned sets, stated finishes and a Part 2 that covers what the schedule calls, the spread tightens by itself, because there's less left to guess at. Hard bid work flips the posture: estimators stop carrying uncertainty and start excluding it, so the risk moves into the exclusion lists.

What to do on your next bid

Reconcile three counts before your number leaves the desk: the opening count on the drawing schedule, the sum of doors assigned across all the hardware sets, and your own takeoff. When they disagree, that difference is the part of your bid that will spread, and you want its size before the GC does.

Then send the number with the count attached: openings carried, sets carried, and every place you resolved a document conflict one way rather than the other. A GC comparing four bids can't tell a sharp number from a short one without a basis.

Chapter 9. The No-Bid Decision

Solo Division 8 estimators turn away work they would have won. The deciding variable usually isn't the size or the difficulty of the job. It's whether the hours are predictable, because a one-person shop is scheduling the rest of the week against that estimate.

Two plan sets arrive Thursday afternoon, both due Monday, and only one gets opened. That call gets made on instinct in ninety seconds, and it's right about some jobs and expensively wrong about others.

Small dense jobs cost more estimating hours per door leaf

A solo estimator working the Southwest described his own filter directly:

"Usually the jobs we turn away are the smaller ones. Smaller ones have more work per door leaf basically."

A thirty-opening job isn't a shrunk-down version of a three-hundred-opening job. On the large one the fixed work spreads: you read the specification once, learn the architect's conventions once, and apply the sets across dozens of doors. On the small one you do that reading for thirty leaves.

The hours per leaf climb as the job gets smaller and the fee doesn't, so small work gets skipped for reasons unrelated to whether it's profitable once won.

Poorly drawn bid sets get declined for unforecastable takeoff hours

The same estimator named the other category:

"Some of the ones we turn away would be high-dollar ones that are just difficult or they're poorly drawn or whatever else."

He's declining revenue on jobs he's qualified to price, because a messy set might take four hours or fourteen and he can't tell which from the invitation. A solo shop can price a hard job; it can't price a job whose hours it can't forecast, because the forecast is what the rest of the week is built on.

Section summary. Solo Division 8 estimators walk away from two kinds of work: small dense jobs, where the fixed reading and set-building spreads across too few leaves, and poorly drawn jobs of any size, where the takeoff might run four hours or fourteen. The second refusal is about unpredictable hours rather than hard hours, and it catches winnable jobs.

Division 8 estimating hours scale with hardware set count, not contract value

Estimators say it themselves. One, in an estimators forum: "I think door hardware may be the worst estimating job out there." Another, describing his current project: "Currently working on one with 256 hardware sets."

Each set is a line-item list to read, verify, price and reconcile against a door schedule (Chapters 3 and 11 cover what's inside them). Estimating hours here scale with document complexity, not contract value.

The opportunity cost of a bad set isn't the loss on that job. It's the bids that didn't go out while you worked it.

A spec with no hardware sets makes you author the sets

Michigan State University's published standard, covered in Chapter 3, contains no hardware sets at all: hardware appears as component tables by usage, and assembling opening-level sets is the bidder's work. Two bidders will produce different set counts, and neither will have misread anything.

You aren't taking off a schedule, you're authoring one, and then you're held to the one you authored. On a residence hall with hundreds of openings, that's unpaid design work in front of the price.

It's a fair reason to decline and a bad reason to decline reflexively: one estimator working the GC side prices more projects without a hardware specification than with one, so a blanket rule would remove most of the available work. The question is whether you can price the assembly effort as a known quantity.

Small dense jobs and familiar architects are worth bidding

Small dense jobs frequently carry the best margin per dollar, partly because fewer bidders bother with them. A thirty-opening job that three suppliers declined is the least contested work in the market.

Familiarity beats cleanliness. A messy set from an architect whose conventions you know is more predictable than a clean set from a firm you've never bid, and predictability is what you're buying.

A difficult document is only a reason to walk if you're pricing it as-is. Bid it as a correction job instead, which Chapter 11 lays out: the same errors that make a set expensive to take off make it a set with less competition. That inverts the calculation on exactly the jobs the instinct rejects.

Declined invitations never appear in your win rate, and GCs stop calling

A declined invitation is invisible in your win rate. A shop that declines forty percent of what comes in can post a strong hit rate and still be shrinking, because the pipeline is trimmed at the front where nothing measures it. It also costs position: estimators who don't respond come off the GC's list.

What to do on your next bid

Triage before you commit. Open the specification and answer a short set of checkable questions: assembled sets or a component menu, doors assigned or not, does Part 2 cover what the sets call, are there electrified openings, has an addendum reissued the hardware section. Twenty minutes, and a gut call becomes an hours estimate.

Then decide against your week rather than the job: whether this job's hours are worth more than the next invitation that arrives while you're working it. Whichever way it goes, answer the same day. The bid you decline in writing costs you a project. The one you leave unanswered costs you an architect.

Chapter 10. Qualify Your Scope in Writing

The cheapest risk transfer available to a Division 8 estimator costs one paragraph and four minutes. Most estimators write some version of it, and most versions are too vague to do anything. One described his in a public forum, and it's specific enough to work:

"I add a qualification to my bid that D/F/H is priced based on the schedule ONLY. Sorry but I am not going to chase around and play where's waldo to make sure the architect did his job..."

Another put the same practice more plainly: "If there is a hardware schedule, that's what we quote."

That's why the qualification matters. You're pricing a document you already know is unreliable, and the qualification names which version of it you priced.

The omitted-items clause runs unopposed without a written qualification

Chapter 8 quotes the disclaimer paragraph that appears word for word in two of the three published specifications examined here. Its final sentence obligates you to furnish whatever the schedule left out, at your price, with no definition of what counts as left out. Cornell has four sets with closers and no kick plates, four with kick plates and no closers, and two with no wall stop and no silencer, and nothing on the page says whether those are deliberate or "omitted items" you now owe. Without a qualification naming the schedule you priced, that clause runs unopposed.

Section summary. Published door hardware specifications routinely disclaim their own schedules and shift responsibility for anything missing onto the supplier. A written qualification is the only thing standing between that clause and your margin.

A Division 8 qualification names the revision, the count, other-trade lines, and assumptions

One: the document and its revision. Name the specification section, the drawing sheet, and the addendum number you priced. Hardware sections get deleted and reissued wholesale at

Addendum 1, and "per the hardware schedule" without a revision date isn't defensible three months later.

Two: the count you carried. If your takeoff found 76 doors assigned across the sets and the drawing schedule shows 84, say which number you used. A count is checkable and a description isn't.

Three: every line you read as another trade's scope. This is where the money leaks. The Santa Fe fire station spec voids scope inside 29 percent of its live hardware sets, ten of the thirty-four: "Balance of Hardware / By Gate Mfg.," "Hardware / By Sliding Door Mfg.," "Gasketing / By Aluminum Frame Mfg.," "Card Reader / By Security Integrator." Four sets are two lines long, one of which is a handoff. Naming those lines in writing converts a silent exclusion into a documented one. It runs backward too: that card reader line sits directly above a power supply and battery backup that are not handed off, so you carry power for a reader you aren't carrying.

Four: what you assumed where the document didn't say. Cornell's 23 hardware sets contain no finishes at all, and every hinge line in them names the product as "As Required" and nothing more. You have to pick something, so state what you picked. An estimator who assumed satin stainless and one who assumed bright brass aren't bidding the same job, and neither is wrong until somebody writes it down.

Qualify electrified openings by furnish, install, connect, and maintain

Electrified openings deserve their own line. Robert Tellez of ASSA ABLOY:

"the coordination side of things during construction. This is by far the biggest challenge for the Division 8, Division 28 contractors, along with the general contractor, is getting this right..."

His colleague Derek Ommert broke down what has to be settled, and it works as a checklist:

"You get things such as power supplies, request to exit, door positions, which is even... an end of line resistor... those things need to be coordinated as far as who's furnishing and installing, who's connecting to or tying in, then who's taking the support and the maintenance of it."

Four verbs, and they don't travel together. A line reading "electrified hardware furnished only, wiring and connection by others" does more work than three paragraphs of general language.

Both speakers work for a manufacturer with a direct commercial interest in integrated openings, though the problem is independently visible in the documents: Santa Fe calls an HES electric strike in two sets and never writes an electric strike article (Chapter 7).

Section summary. Electrified openings need furnish, install, connect, and maintain named separately, because those four responsibilities routinely land with different parties and the specification often assigns none of them.

A scope qualification cannot fix a wrong count or survive leveling

It can't recover a bad count: double-count doors across a match line and you've qualified a wrong number. It can't survive a GC who strips qualifications during leveling, which argues for putting the important exclusions in the proposal body rather than a block at the bottom. And it can't make you money. It protects what you priced; the margin work is in Chapter 11. Name the four items and stop, because a qualification page longer than the price reads as difficult.

Bids with no hardware specification need an assumed function and grade

Some bids arrive with no hardware specification at all. One estimator working the GC side reports pricing more projects without a hardware specification than with one.

That's a different qualification: opening count, assumed grade and function of the primary hardware, finish, and a line saying anything above that assumption is an add. Name the assumed function specifically. Chapter 6 shows what a GC's \$400-an-opening allowance actually buys, and why a single change of function on one device can move a line by four figures.

What to do on your next bid

Write four lines before the price: the document and revision, the opening count you carried, every line you're reading as another trade's work quoted from the spec, and every assumption you made where the spec was silent, especially finish and hinge weight.

Then check whether any would embarrass you if the architect read it. If one would, that's an RFI you still have time to send.

Chapter 11. Audit the Architect's Documents, and Get Paid for It

Division 8 hardware markup in competitive commercial work runs near 20 percent, at least among the estimators who discuss it publicly. One estimator said so in a public estimators forum, then said what he changed:

"Been bidding at 35% and have not been winning, around 20% is what seems to be the other companies markup. Been winning work where I help them fix bad schedules the architect made, that's where I've been finding less competition and so I can mark it up more."

The margin isn't in the count. It's in the correction.

Copied specs, permit deadlines, and consultant product interest produce bad schedules

Marc Ameryckx, who worked as a door specifier before joining ASSA ABLOY's specification team, on the architects who turned his help down:

"...I don't need your help because I took the specs you already delivered the last time for a similar building. But that's not a good idea because every building is different."

His colleague Dikesh Pattni made it concrete: hinge counts get copied onto the next project, where "you may not need as many hinges or you might need more..." Chapter 8 quotes two architects saying so under their own names.

A harder version circulates among estimators. One of them, in a public forum, on why hardware sections get reissued wholesale at Addendum 1:

"This occurs most often from a copy paste specification utilized to expedite permitting. If a consultant is involved, they overload the hardware sets in order to sell the most product, and manipulate the specifications themselves so substitutions can't be made. It's a political game."

Section summary. Door hardware documents arrive incomplete for structural reasons: specs copied from prior projects, schedules shipped on permit deadlines, and set writers who sometimes have a product interest in them. That's the operating condition.

The seven document errors an 087100 audit looks for

Not a posture, a checklist. Every item below comes from a published Section 087100 spec, and every one changes a price.

Doors assigned to two sets at once. In the City of Santa Fe's Fire Station No. 2 spec, four doors appear in two hardware sets. Door 116-1 sits under Set 26.0 and again under Set 26.1: 26.0 carries three silencers, 26.1 gasketing and a brush sweep. Nothing says which governs, so two estimators carry a four-opening spread, both defensible.

Doors assigned to a set that was killed. The same spec's Set 8.0, captioned "(NOT IN USE)," still carries a door list of nine numbers that appear nowhere else in the section, while five other retired sets carry no door list at all. Read the caption literally and you carry nothing for nine openings; read the list as authoritative and you carry 63 line items across nine doors.

Hinges specified as nothing at all. Cornell University's published Design and Construction Standard contains 23 hardware sets, and every hinge line in them shares the model column:

3 Hinge As Required MK

Eighteen sets call three, the two pair sets call six, and three call two alongside an electrified hinge line that does carry a model number. Standard-weight plain-bearing and heavy-weight ball-bearing with non-removable pins are different unit costs. Add the proximity reader lines whose product description is a phone number and the power supply lines naming no amperage or voltage, and 43 of the document's 186 line items carry no priceable designation, 23 percent of the schedule.

Finishes the spec says are there and aren't. Cornell's Article 2.19.A states that designations in the hardware sets indicate finishes complying with ANSI/BHMA A156.18. There are none: not one US code, not one BHMA numeric across 30 pages, including 17 kick plate lines, 11 mechanical lock lines, 8 exit device lines and 17 closer lines. Two estimators apply their own house defaults with nothing to reconcile them.

Component labels that fight their own catalog numbers. Cornell's Set 12.0, titled "Office Non-rated," calls for a "Storeroom Lock" with catalog number 8205 LNL. Its fire-rated twin, Set 13.0, calls the identical 8205 LNL an "Office Lock," and every other storeroom lock in the document is an 8204. Pricing by label and by catalog number reach different numbers.

Sets that are the same set twice. Cornell Sets 5.0 and 6.0 are identical item for item: same twelve lines, same quantities, same catalog strings, same manufacturers. The only difference is the description, "(EXISTING FRAME CONSTRUCTION)" versus "(EXISTING FRAME)." If those conditions differ, it never reached the schedule.

Hardware in the sets that Part 2 never covers. Santa Fe's Sets 3.0 and 4.0 both call an HES 9600-LBSM electric strike, and the spec has no electric strike article: no voltage, no fail-safe or fail-secure statement, no monitoring option, no UL listing, no in-line power controller, no surge suppressor. You buy the strike to the model number and nothing else. On a fire station with card access, a wrongly configured fail-safe opening is rework, possibly an inspection item.

Section summary. An audit is a specific pass: doors in two sets, doors in dead sets, unpriceable line items, finish clauses pointing at absent information, labels that disagree with catalog numbers, duplicate sets, and hardware called in the schedule but never specified in Part 2. Every one exists in specs published by a city fire department and an Ivy League university.

The omitted-items clause makes you furnish whatever the schedule left out

Both documents carry the same paragraph word for word, and its last sentence is the largest single exposure in either:

"Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality."

Read that as a supplier: it obligates you to add whatever is missing, at your price, with no definition of "missing." Cornell has four sets with closers and no kick plates, four with kick plates and no closers, and two with no wall stop or silencer, and never says whether those are deliberate or "omitted items" you now add for free.

The same paragraph says discrepancies "should be brought to the attention of the architect with corrections made prior to the bidding process." That's the mechanism, and it has a clock on it: find the problem the night before bid day and it's too late to use.

The audit is the only window in which a document problem is worth money instead of costing money.

Turning a document error into margin: RFI, qualification, or value engineering

Before bid, as an RFI. The cheapest version. You ask, and the answer becomes part of the bid documents for everyone. No price advantage, but the item leaves your risk column.

At bid, as a written qualification. One estimator's standing practice, quoted in full in Chapter 10: "I add a qualification to my bid that D/F/H is priced based on the schedule ONLY..." That's the floor. It protects you. It doesn't pay you.

After award, as value engineering. This is where the margin is. The estimator at the top of this chapter, the one who stopped losing at 35 percent, was describing exactly that. The forum estimator said the same from the other direction: "once you learn how to use the spec to your advantage it becomes a great tool to transition into value engineering and boost margin." He was describing projects with 100 headings.

Bob Curtin, of TCI, put the distributor's version on the record:

"These issues inevitably trickle down to the distribution level and we end up fixing them. Only we don't get the consulting fees!"

When a small fit-out does not justify a document audit

The audit pays when the errors are numerous, you have time before bid, and the relationship can absorb an RFI without reading as difficulty. On a seven-opening fit-out, price the schedule and move on. It also assumes a document that exists: Michigan State University's published standard contains no hardware sets at all, which Chapter 9 treats as its own case and Chapter 3 answers. An audit you don't put in writing is free QC for the design team.

What to do on your next bid

Pull the door schedule and the hardware sets side by side before you price anything. Run the door numbers for duplicates and for assignment to any set marked not in use. Flag every line with no model number, no finish, or a manufacturer code the document's abbreviation list doesn't decode, and count them.

More than three and you're not looking at a document to price. You're looking at a document to correct, and the correction is the part with margin in it.

Chapter 12. The QC Pass You Run Every Time

A Division 8 estimator runs several bids against the same week, each on a document that breaks in its own way. At working pace, checking either happens as a fixed sequence or it doesn't.

Document checks: doors in two sets, dead sets, unpriceable lines

From Chapters 3 and 11, in running order.

Cross-reference every door number against every set. Two conditions: a door in more than one set, and a door in a set marked not in use. Both appear in the Santa Fe fire station specification: four doors with dual assignments, nine under Set 8.0, captioned "(NOT IN USE)."

Compare the drawing schedule's opening count to the sum of the sets. A disagreement means doors nobody assigned or doors assigned twice.

Flag every line with no priceable designation. No model number, no finish, no manufacturer, or a manufacturer code the document's abbreviation list doesn't decode. In Cornell's published standard that's 43 of 186 line items, including every hinge line in all 23 sets, which name the product as "As Required" and nothing more.

Check singles against pairs. Invisible and expensive. Lori Greene, Manager of Codes and Resources at the hardware manufacturer Allegion, writing on iDigHardware:

"I can't count how many times I've reviewed a submittal and found that a single door had been changed to a pair or vice versa. It may only take a quick mouse-click and a few key-strokes to change it on the plan, but it changes the hardware completely!"

Section summary. The document-side pass is four checks: door numbers cross-referenced against the sets for both duplicates and dead sets, the drawing count against the sum of the sets, line items with nothing you can price, and singles against pairs. Run them before entry, since everything downstream inherits what you miss.

Entry checks for quantity basis, import order, and orphan warnings

From the Chapter 5 source: a Division 8 estimating software vendor's training screencast, its operator narrating a live import into his company's platform, commercial interest on the surface.

Confirm which quantity basis you imported.

"they do use two different quantity, there's a quantity per set and a total item quantity. Make sure you do quantity per set."

Get it backward and every number downstream is off by a multiple, with nothing looking wrong. Chapter 3 has the convention.

Import the door tags and set numbers before the hardware. The validation needs the framework first: "before you import hardware, you do need to at least import the door tag numbers and the hardware set numbers."

Read the orphan warnings instead of dismissing them. The import throws: "...popped up a message that hardware set 1.1 is missing from the door schedule..." A document error surfacing at entry, caught because the tags went in first.

Sort by opening count and look at the zeros. "they have a column called number of doors. You see some of them are set to zero... I created another copy of it and sorted it by this number of doors column and deleted all the zeros." A set with no doors is a retired set or an assignment that went missing.

Count how many items are new to your database. "There's close to 300 items in this spreadsheet. 43 of them were new items added to the database." Items you've never priced are the likeliest to be wrong or stale.

Separate singles from pairs sharing one set number. "sometimes an architect will use the same hardware set for a single and a pair of doors... you could go to door number two and instead of hardware set one, maybe make the hardware set for door two 1A."

Verify prices are current, not just present. A price that imported cleanly two months ago may no longer be right.

Level supplier proposals against each subcontractor's normal exclusion list

Zackery Batt, Senior Estimator at Wharton Smith, who also works part-time with a preconstruction software company productizing the workflow he built, developed his own method for leveling subcontractor proposals.

"every one of my subcontractors that submits a proposal to me, we take off all their exclusions, all their assumptions, and we save them to that subcontractor. So they exclude the same 10 things every time, and they exclude the 11th thing, the 11th time, like I'll know about it. I'll know that that exclusion was job specific because it's out of the normal boilerplate stuff."

The comparison itself isn't the work: "it's child's play to take two proposals and put them side by side in the spreadsheet and go, all right, well this guy's number's lower. Yeah, but that's not what leveling really is." His actual question: "who actually misses stuff after the bid, right?"

He writes his trade knowledge into reference files:

"all the knowledge that I have about carpentry or flooring or millwork that I've acquired over the years and things that are missed and things that are on drawings that aren't technically there... Like if there's millwork, there has to be blocking but sometimes it doesn't call out for blocking."

The Division 8 version writes itself. An electrified opening means a power supply whether or not the set lists one. A fire-rated pair means coordinators or a removable mullion. A card reader means a request-to-exit device and a door position switch. Batt estimates general trades, not Division 8; the method transfers, not the content.

Section summary. Level bids against a stored history of each supplier's normal exclusions so the unusual one stands out, and keep a written list of what an opening type implies whether the schedule says so or not. Both replace memory with something checkable.

Running the same QC checks on a software-generated takeoff

The same list applies when the takeoff came out of software, with one difference: the errors look more finished. Batt: "I know exactly where to look in a spec book to find what I need to

find..." When the host puts that down to experience, he agrees: "That's because I've done it a thousand times." His warning is about the estimators behind him:

"But you look at some of these younger estimators where we're going to come up in this AI generation, it's like they're going to be 100% dependent on AI being right. They won't even know how to check it."

None of these checks require knowing how the tool works.

From his own test of a general-purpose model on plans: "it would hallucinate. It would start inventing things, things that weren't there... sometimes it'd be dead on and sometimes it would be completely off. And an estimate and you can't really afford to have that." Inconsistent accuracy is harder to manage than consistent inaccuracy, because it trains you to stop checking.

When a seven-opening fit-out does not need the full pass

On a seven-opening fit-out the full pass costs more than the exposure: run the door-count reconciliation and the quantity-basis check, skip the rest. It earns its time around thirty openings, on any project with electrified hardware, or on any spec where the first document check found more than three problems.

What to do on your next bid

Write the list down once, or use the one at the back of this guide: six document checks, seven entry checks, two leveling checks. Put it where you'll see it and run it in order.

The estimator who catches a double-assigned door on Tuesday and a wrong quantity basis on Thursday isn't more careful than his competition. He has a list, and the list does the remembering.

Chapter 13. Reviewing an AI Takeoff Without Giving Up the Sign-Off

The estimator who signs the bid owns the number, and nothing about how the takeoff was produced changes that.

The skepticism you hear about automated takeoff gets called resistance to change. It's a reading of the documents: a tool that reads documents inherits their disagreements.

Distrust of automated Division 8 takeoff comes from the documents

Division 8 is a harder reading problem than the trades it gets compared to, because the paperwork is unreliable in ways that don't announce themselves. Chapter 1's four ways a schedule disagrees with the drawings are decisions the document doesn't answer, not extraction problems.

Chapter 3 should end the argument about general-purpose tools: three owners, three incompatible structures, one publishing 40 sets with six dead and one publishing none. Which of two conflicting set assignments governs isn't a perception problem.

The worst version isn't an error at all. As Chapter 2 put it, an underspecified line extracts perfectly, prices cleanly, and fails on site. Nothing flags "steel door" with no level, because nothing is wrong with it.

Section summary. Distrust of automated takeoff on Division 8 is a rational response to the documents, not a temperament. The schedule contradicts the drawings four ways, owners publish sets in incompatible formats, and many line items are unpriceable as written.

One estimator's 95 percent runs on reference files he built himself

Zackery Batt, Senior Estimator at Wharton Smith, is blunt in both directions. He also works part-time with a preconstruction software company building a commercial platform out of the workflow he developed, which is worth holding while reading him. His skepticism runs against that interest.

Chapter 12 quotes what a general-purpose model did with plans; what came next took longer than vendors allow for:

"it was, you know, repetitive for six months building something. It didn't work. Try it again, try it again, try it again until eventually I got something that worked. And then I found a better way to do it and then a better way to do it."

Six months of failure, self-taught, on top of a full workload. His verdict: "I thought my life would get simpler with AI. It's gotten more complicated, to be honest."

He did get it working: on scope generation he puts his workflow at "like 95% accurate," with the residual stated honestly: "...Occasionally it will miss something, but so do I."

Two things about that 95 percent matter more than the number. It isn't a Division 8 figure: Batt estimates general trades. And it belongs to the system he built, the Chapter 12 reference files carrying his own trade knowledge, not the model underneath. Strip those out and you have the model that invented content on plans.

Section summary. The one documented case of automated scope output an estimator would defend took six months of failed attempts and runs on reference files of his own trade knowledge. His 95 percent is a general-trades scope figure, not a Division 8 quantity figure, describing a system he assembled rather than bought.

Check conflicted openings, then high-cost hardware, then the quantity basis

The practical error is treating the review as a verdict on the software. It's the reconciliation you'd run on a takeoff a junior did by hand, and Chapter 12's checks hold unchanged. Three deserve extra weight when the output came out of software.

Start with the openings the documents disagree about. Any tool processing Santa Fe's spec had to do something with the four doors in two sets at once and the nine in a set captioned "(NOT IN USE)." It picked with no answer to pick from, and it's your judgment now.

Then the high-dollar openings, by cost rather than sequence. Exit devices, electrified hardware, fire-rated pairs. Chapter 2 records the swing between a Grade 1 cylindrical lock and an exit device with electric latch retraction, and a wrong function code on a panic device is four figures on one line.

Check the basis before the totals. A reasonable-looking total is the least informative thing on the page. Per opening or per set, and whether a set applied to a pair doubled, produce a plausible wrong number.

Section summary. Reviewing generated output is the same reconciliation as any takeoff, in order: openings where the documents conflict, then high-cost hardware, then the quantity basis. Every check operates on the output rather than the tool, so it works with no view of how it was made.

Professional responsibility for the takeoff does not transfer to the software

Chapter 2's accountability line holds: the party that owns a bad number is the one who put the price out. The Chapter 11 estimator who stopped losing at 35 percent did it by fixing bad schedules, and Chapter 10's qualification is the same work. A tool doesn't decide what count you carried when the sets said 76 and the schedule said 84. Those are positions, and you take them.

Batt calls it reallocation, not substitution: "it's not so much about having AI estimate for me. It's freeing up my time so I can go back to... being an estimator, not running around chasing paper." His leveling question separates the work from the arithmetic: "how do you level a proposal without all that industry knowledge and all that company specific knowledge?"

Section summary. Professional responsibility doesn't transfer to a tool, and neither does the judgment that makes a Division 8 estimator worth hiring: reading what a document fails to say, deciding what to qualify, knowing which errors pay to correct early.

Fewer estimators managing more tools, and the spec-reading skill underneath

His forecast is specific: "I think that in the near future, maybe the next couple of years, it's gonna be, whether it would be five or six estimators, it's gonna be one estimator, managing multiple AI tools or workflows."

He is much less optimistic about the industry's timeline. On people at his own conference predicting a takeover within a year: "It's like, no way. Not even close. Five years." His reason isn't technical. It's the estimator he worked with who ran Excel with a calculator beside the keyboard: "Onboarding and like adoption is gonna hold AI back in construction for years."

Chapter 12 records his harshest warning. This one is about what erodes:

"AI is almost gonna cripple people. It's making everything so easy that you don't have to go look for information. You don't even know where to look at some point."

He can gut check output because he already knows where to look in a spec book. There's no shortcut into that, which is the case for reading the first twelve chapters as the skill and this one as a chapter about a tool.

What to do on your next bid

Take a job you've already priced and run Chapter 12's checks against the takeoff, whatever produced it. Time it. That's your review cost, and you need it before evaluating any claim about time saved.

On the next takeoff out of software, work the openings where the documents contradict each other first, and write down every correction and why. That record is your evidence the review happened and the start of your own reference file.

Common Questions About Division 8 Takeoff

What is a Division 8 takeoff?

It's the count and pricing of every door opening on a project, along with the frames and hardware that go with them. The estimator counts openings rather than doors, since a pair is one opening with two leaves, matches each opening to a hardware set, and prices every component in that set. Chapter 3 covers hardware sets and Chapter 4 covers the count. The work that takes the time isn't the counting. It's reconciling a door schedule, a set of plans, and an 087100 specification that don't agree with each other.

How is a door takeoff different from a takeoff in any other trade?

Two ways. Doors run near one percent of construction cost and a wildly disproportionate share of the field trouble, because they arrive last and everything else has to be finished before anyone finds out what's wrong with them. And the source documents are less standardized than most trades assume. Chapter 3 examines three published Section 087100 specifications from three owners: one publishes 40 hardware sets, one publishes 23 with no finish designations anywhere, and one publishes no hardware sets at all and requires the bidder to build them. Same division, same section number, three different asks.

What makes a door takeoff go wrong?

Almost always something between documents rather than a miscount. An opening near a match line is drawn on two sheets by design and gets counted twice. A door tag repeats inside one schedule, as S60004A did three times on one 752 door commercial schedule. A multifamily schedule page gets reissued per building and every unit gets counted again. A door appears on the plans and never in the schedule, or the reverse. And in the specification itself, a door can be assigned to two hardware sets at once, which leaves the count correct and the hardware wrong. Chapter 4 covers all of them and Chapter 12 turns them into a checklist.

How long does a Division 8 takeoff take?

On a 300 opening commercial project the full cycle of extracting the hardware sets, reformatting them, cross-referencing against the door schedule, entering line items and pricing runs about a day. On a thousand opening hospital or casino it runs several. Several of those hours happen before the estimating platform is even open, and they go to interpretation: unstated hinge counts, missing closer sizes, sets the schedule references that don't exist.

How accurate does a Division 8 takeoff need to be?

More accurate than the round numbers suggest. Ninety-nine percent accuracy on a 2,000 door project is still twenty wrong doors, and competitive hardware markup runs near 20 percent among estimators who discuss it publicly, so a material quote has nowhere to absorb them. The errors that matter are specific and checkable rather than statistical, which is why Chapter 12 is a fixed sequence of checks instead of a target percentage.

Can AI do a Division 8 takeoff?

Parts of it. Extraction and cross-referencing are rote work a machine can do faster than a person, and reading four documents against each other is exactly the kind of task software should carry. What no tool decides is which document governs when they disagree, and Division 8 documents disagree constantly. When a schedule says one thing and a plan says another, someone has to choose, and that someone is an estimator whose name goes on the bid. Chapter 13 covers what a competent review of an automated takeoff actually consists of, and why professional responsibility for the number doesn't transfer to the software that produced it.

The Pre-Submit Checklist

One page. Run it in order. Chapter 12 explains the document, entry and bid checks and when to skip them, Chapter 11 the Part 2 check, and Chapter 10 the qualification lines.

The document

- [] Every door number cross-referenced against every set. Flag any door in more than one set.
- [] Any door assigned to a set marked NOT IN USE.
- [] Drawing schedule opening count reconciled against the sum of the sets. Difference explained.
- [] Every line item with no model number, no finish, no manufacturer, or a manufacturer code the document's own abbreviation list doesn't decode. Count them.
- [] Every single-versus-pair call verified against the plan, not the schedule.
- [] Every hardware item called in a set but never specified in Part 2.

The entry

- [] Quantity basis confirmed: quantity per set, not total item quantity.

- [] Door tags and set numbers imported before hardware.
- [] Orphan warnings read, not dismissed.
- [] Sets with zero doors attached, reviewed as a group.
- [] Count of items new to your database. High count means high price risk.
- [] Singles and pairs sharing one set number, split.
- [] Prices verified current, not merely present.

The bids you received

- [] Each supplier's exclusions compared against their own history. Flag anything outside their boilerplate.
- [] Opening-type implications checked against your own reference list: electrified means a power supply, a fire-rated pair means coordinators or a mullion, a card reader means a request-to-exit device and a door position switch.

The qualification

- [] Specification section, drawing sheet, and addendum number named.
- [] Opening count you carried, stated.
- [] Every another-trade line, quoted from the spec.
- [] Every assumption made where the document was silent, especially finish and hinge weight.

Glossary

Addendum. A revision issued to bid documents before bid day. Division 8 hardware sections get deleted and reissued wholesale at Addendum 1 more often than most trades.

AHC, DHC, DHT. Certifications issued by the Door and Hardware Institute. Architectural Hardware Consultant, Door and Hardware Consultant, Door and Hardware Technician.

Astragal. A molding or strip covering the joint where the two leaves of a pair meet.

BHMA / ANSI A156. The standards series governing hardware performance and finishes. A156.1 is hinges, A156.13 is mortise locks, A156.18 is finishes, A156.31 is electric strikes.

Closer. The device that returns a door to closed. Surface closers mount on the door or frame; concealed closers sit inside one or the other.

Coordinator. A device on a pair that forces the inactive leaf to close before the active one, so the astragal doesn't foul.

Dustproof strike. A floor-set receiver for the bottom flush bolt on a pair. Set into finished floor, which makes it a floor-prep item as well as a hardware item.

Exit device. Also called a panic device or crash bar. The horizontal bar that releases a latch under pressure from the egress side.

Flush bolt. A bolt recessed into the edge of the inactive leaf of a pair, securing it top and bottom.

Gasketing. Perimeter sealing at the frame, for smoke, sound, light, or weather.

Handing. Which side a door is hinged on and which way it swings. Determines whether most hardware fits at all.

Hardware set. A numbered bundle listing every component for one opening, in quantities, and usually with catalog numbers and finishes. The door schedule points at it by number. Published sets routinely leave one or both out, which Chapter 3 works through on three real owners.

Hollow metal. Steel doors and frames, the dominant Division 8 substrate in commercial work.

Kick plate. A protective plate on the push side at floor level. Armor plates and mop plates are variants at different heights.

Label. The tag identifying a fire-rated assembly and its rating, attached at the factory by weld, rivet, drive screw, or tamper-proof adhesive. Once material is in the field, nobody, including the manufacturer, may attach a label without inspection by the listing agency. A missing label is a replacement, not a paperwork fix.

Leaf. One door panel. A pair has an active leaf and an inactive leaf.

Leveling. Comparing subcontractor or supplier proposals to a common scope before choosing one. Distinct from comparing prices.

Match line. The line where a plan sheet is cut and continued on another sheet. Doors near it get counted twice or not at all.

Mullion. The vertical member between two door leaves in a single opening. Removable mullions come out to allow wide loads through.

NFPA 80. The standard for fire doors and other opening protectives. Its 2007 edition introduced annual fire door inspection requirements; 2013 added inspection at installation and after maintenance.

NRP. Non-removable pin. A hinge feature preventing the pin from being driven out from the secure side.

Opening. One doorway, whether it holds a single door or a pair. Quantities in a hardware set are typically per opening, not per leaf.

Opening protective. Any assembly closing a hole in a rated partition. Doors, frames, and hardware together, not any one of them alone.

Request to exit, or RX. A switch signaling that egress hardware was operated, so the access control system doesn't read an authorized exit as a forced door.

Section 087100. The CSI MasterFormat section covering door hardware. Where hardware sets live, when they exist.

Silencer. A rubber bumper set into the frame stop.

Storeroom function. A lock function where the outside lever is always locked and the key retracts the latch. Distinct from office function, where the outside lever can be left unlocked.

Submittal. The schedule and product data a supplier sends for approval after award, before ordering.

Sweep. A seal at the bottom edge of a door.

Theory of Operation. A written description of how an electrified opening behaves in every state, including loss of power. Cornell requires one on every set containing electronic hardware, and it's the best practice found in any of the three specifications examined here.

Threshold. The saddle at the floor line of an opening.

Value engineering. Substituting to reduce cost after award. Chapter 11 covers why the estimator who understands the specification is the one who captures the margin in it.

About This Guide

Fresco built this guide.

We make AI takeoff software for Division 8, and only for Division 8. Doors, frames, and hardware, on jobs running from a thirty-door tenant improvement to a four-thousand-door hospital. Arvind Veluvali and Akhil Gupta founded the company in San Francisco in 2024. More than seventy door and hardware distributors, specialty subcontractors, and manufacturers across the United States and Canada run their takeoffs on it.

We wrote a book about documents instead of a book about software because the documents are the job. Fresco reads schedules, plans, specs, and elevations together and shows the estimator where the package disagrees with itself. Every chapter here is a version of that disagreement. A door assigned to two hardware sets at once. A hinge line that says "As Required" and nothing else. A set captioned NOT IN USE with nine doors still listed under it. We did not invent those examples. They came out of specifications anyone can download, and they are named in this book by owner, set number, and door number.

What the software does not do is make the call. When the schedule and the plan disagree, someone has to decide which one governs, and that someone is an estimator whose name goes on the bid. The rote extraction and the cross-referencing are ours. The sign-off stays yours, which is the argument of Chapter 13 and the reason the last chapter is about the sign-off rather than the software.

If you want to see what it finds on your own set, send us one. We will run it and show you the result, including the parts you would rather we had not found.

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The Division 8 Estimator's Guide. Section 232 figures current as of August 5, 2026, HTS Revision 15. Tariff conditions change; verify at hts.usitc.gov before relying on them.