Site Review Order Requirements

KI Movable Wall

October 2014

Furnishing Knowledge®

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REVIEW DELIVERY REQUIREMENTS

Loading Dock/Street Offload/Parking Lot Offload

Determine if there are any delivery requirements or special delivery methods to be included in project cost and can be executable.

- Can a 53' truck access the planned offload area?
- Does your city allow 53' trucks to deliver to site?
- Do we deliver to site or warehouse?

Freight Elevator/Crane Requirement/Stair Carry

During a site visit, determine the most appropriate delivery path from offload location to product staging area. Make sure the paths are sized adequately to accommodate the component or skid size; whatever the planned method. We'd all hate to experience the fate of delivering product to the 8th floor by stair because the elevator was too small or shut-down for service. On that note: check for any elevator booking requirements or restricted hours of delivery.

Staging Install – Product Placement

Review the floor-plate in the area of install, and/or talk to building officials, to determine the best staging areas and delivery routes for easy install. If security is an issue, the contracted installation company is responsible for providing a secure environment to house the KI Movable Wall product upon delivery until the project is complete; losses due to theft will be the responsibility of the contracted installation company.

OVERALL SITE REVIEW – "COLD SHELL" OR "WARM SHELL" STATUS

What is a Cold Shell?

A Cold Shell is defined as "An unfinished floor area: e.g. raw concrete, no ceiling grid." The following is a detailed list of items that will help you determine a Cold Shell site:

- Exterior cladding is either incomplete or not yet weatherproof. Glazing may or may not be installed.
- Floor surface is unfinished, such as raw concrete. It might need to be 'floated' to help get it level and smooth.
- Structural columns are unfinished and/or not furred out.
- Plumbing and other pipes are not furred out.
- The building's core walls have not been finished.
- Ceiling grid has not been installed.
- HVAC, sprinklers, lighting systems have not been completed.

In this condition we may build our product to 'Hold To' dimensions. The two most important conditions would be furring out and ceiling height.

What is a Warm Shell?

A Warm Shell is defined as "A floor space with finished exterior walls, all furring-out, flooring, and ceiling grid/tiles." The following will help you determine a Warm Shell site:

- Exterior cladding is complete and weatherproof. All glazing has been installed.
- All convector heating cabinets have been installed.
- All flooring has been installed.
- There may be more than one type of flooring .
- Is there raised flooring? If so, which type is it?
- The building's core walls have been finished
- Structural columns are finished and furred out.
- Ceiling grid has been installed.
- Ceiling tiles installed is an ideal condition; however, a site survey can still be carried out if they have not been. In this case, take note of the location and height of the HVAC diffusers and sprinkler heads.
- There may be more than one ceiling type and height. You will need to consider this when you survey the site.
- HVAC, sprinklers, lighting systems have been completed.

REVIEW INTERCONNECTING SITE CONDITIONS

Review Obstructions In Area Of Product Install

- Lights, HVAC vents, sprinkler heads/lines, wall power/data outlets, light switches, fire strobes/alarms, fire alarm pull stations, fire hose cabinets, etc.
- If available, always take a floor-plan of the layout design to confirm area of proposed install.
- Determine if any obstructions exist and where key intersections of KI Movable Wall product occurs with the base building (wall, ceiling, floor). Note the type of obstruction on the plan and elevation of the design drawing or sketch and locate by dimension; also take a photograph of the entire elevation noting the obstructions.
- Coordinate the relocation of the obstructions with the local design team and/or General Contractor or relocate KI Movable Wall products. Provide photos of such conditions.

Perimeter Building Section

While on-site, make a detailed sketch of the perimeter sections. It helps identify items like convectors, window sills, drapery fillers, and exterior bulkheads. This enables us to design the appropriate solution where KI Movable Walls meet the building perimeter.

Note: To promote reusability, support economies of scale, and reduce lead-time, have the General Contractor build-out or fill-in any non-flush conditions at the perimeter of the building.

Note: KI Movable Walls will not terminate directly into glass. If this request is made, please redirect the request to the General Contractor; have them provide a false mullion or build-out. Mounting anything to the face of glass changes the physical properties of glass and creates a potential cracking point as the temperature of the inside and outside of the glass will differ from the standard condition.

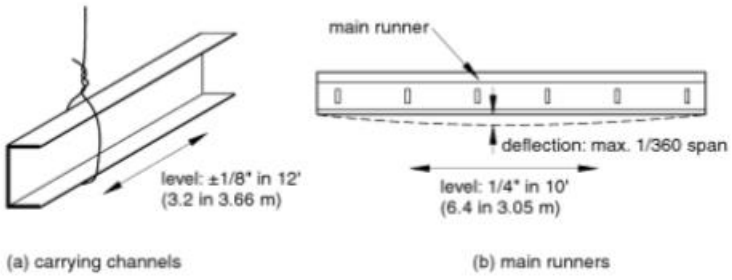
Please document any different termination details and submit with the Verified Field Dimensions (VFD).

Reminder: Regarding Services (Electrical, Plumbing or Data)
Depending on the KI Movable Wall selected Lightline (No) and Genius (Yes) may or may not be able to support routing of services such as electrical, plumbing or data. However, in either case it is still important to know the locations in order to ensure the services are coordinated properly with the KI Movable Wall product (floor, ceiling or wall fed locations). Define KI's role and responsibility with the GC to ensure all project requirements are covered. Know what KI Movable Wall product we will be providing, what the installation technicians' responsibilities are and what the responsibilities "by others" are. Do not make assumptions; if you must, assume they don't have a clue what you are bringing to the table and explain everything.

CONSTRUCTION TOLERANCE STANDARDS

A construction tolerance is the allowable deviation from a given dimension, location, line, grade, or other value given in the contract documents. Tolerances are necessary in construction because no manufacturing, fabrication, or construction process is perfect. There are only degrees of accuracy. Many building product manufacturers and trades have established tolerances that are published and generally accepted in the construction industry. These are based on past experience, professional judgment, and realistic expectations of the materials and construction processes involved.

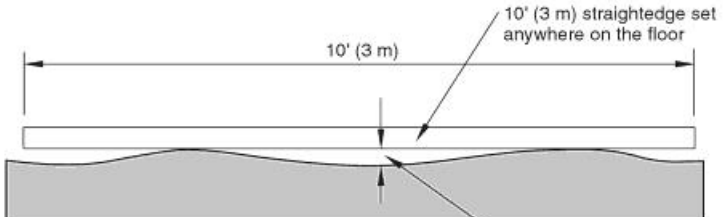
Acceptable Suspended Ceiling Variation: $+^{1}/_{8}$" to $-\ ^{1}/_{4}$" every 10'



(image from the Handbook of Construction Tolerance, 2nd Edition, David Kent Ballast)

Figure 1

Acceptable "Flat" Concrete Floor Variation Using Straightedge Method: $+^{1}/_{4}$" every 10'

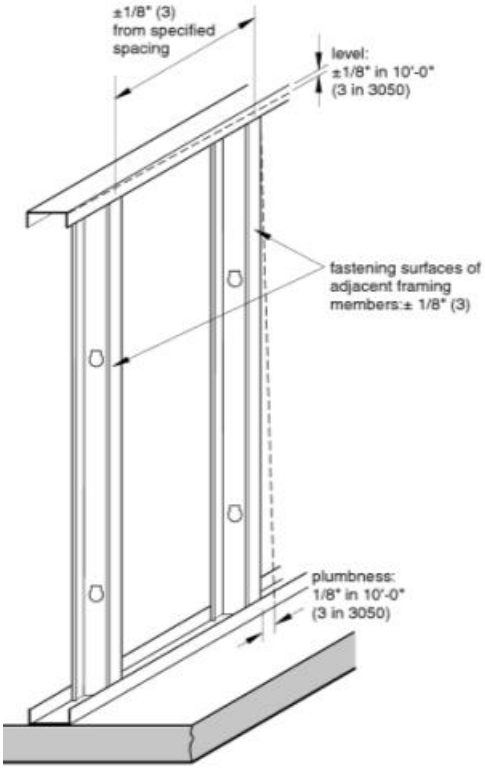


floor surface classification	90% compliance	100% compliance
conventional:	1/2" (13)	3/4" (19)
moderately flat:	3/8" (10)	5/8" (16)
flat:	1/4" (6)	3/8" (10)

(image from Architects Handbook of Construction Detailing, David Kent Ballast)

Figure 2
Acceptable Framing for Gypsum Wallboard Level: $\pm^{1}/_{8}$" to $-\ ^{1}/_{4}$" every 10'
Plumbness: $^{1}/_{8}$" in 10'

Metal Lath/Steel Framing Association (FM/SFA) also recommended the same tolerances.



(image from the Handbook of Construction Tolerance, 2nd Edition, David Kent Ballast)

Figure 3

SITE MEASUREMENTS

Important Overall Notes

- Take long dimensions first – using a 100' tape measure.
- Take measurements to the floor and ceiling in key locations where doors, glazed panels and curved panels are planned. Do this at structural columns and mid span of beams. Be sure to account for thickness of carpet and possible finished ceiling discrepancies based on tile type (e.g.: Tegular tile).
- Measure major elements first (column to column & mullion to mullion).
- Use progressive dimensions wherever possible .
- After the overall dimensions are taken, take dimensions of smaller details in between structural elements.
- Check the sum of the smaller dimensions to ensure they add up to the overall. If they don't re-measure.
- Do not take a series of short dimensions and add them together. This often leads to errors.
- If necessary (and it usually is) measure twice to be absolutely sure!
- Either use metric or imperial dimensions, but don't use both in the same survey
- Use different colored pens for the dimensions lines, arrows and numbers for easier understanding, rather than a single color for all information.
- Take photos. Once you leave the site they can help you remember certain details of the site conditions.

When taking dimensions measure from the face of mullions and finished walls avoid measuring from:

- Face of base trim. Do note the type and thickness of base building trim. It may affect our interaction with perimeter walls.
- Face of unfinished drywall stud. However, there may be occasions where we need to measure from raw studs. Note the thickness of drywall used and account for how it will affect your dimensioning.
- Face of glass.

Dimension Standards

- Measure from face of finished wall to face of finished wall.
- Measure from center of mullion to center of mullion.
- Take one long, then several small dimensions to confirm the long dimensions (check the math on-site before you leave).

Show Your Dimensions

- Over 24" as feet and inches – 2' 6"
- Under 24" as inches only – 24"
- Exception is the ceiling height which should always be in inches only – 108"

Draw a Cross Section

- Bulkhead details.
- Window details.
- A rough sketch that states "EQUAL" on the room sizes does not mean "equal centerlines" when building between drywall. "Equal" means room size; finish-to-finish.

Ceiling Heights

Ceiling Height is by far the most important measurement of all. If the ceiling height is incorrect the product won't fit. A grid of ceiling heights should be taken every 4' and at all base building intersections as well as KI Movable Wall intersections and at doorways. Even though we have vertical adjustment in the base of the glass panels, we have very little in our door units.

Ceiling heights should be taken from finished floor (carpet) to underside of finished ceiling grid. Any site measurement should be identified FROM where and TO where the dimensions were taken. If not; to a finished surface the finish and finish thickness is required to calculate the finished dimension. Example: If the ceiling grid is in, but not the ceiling tile (or finished ceiling), and the site measurement is taken from the concrete slab to the underside of the grid, we cannot use this figure as a finished ceiling height as the tile (if tegular) will decrease the ceiling height by the dimension of the tile groove. The floor finish decreases the ceiling height by the thickness of the carpet.

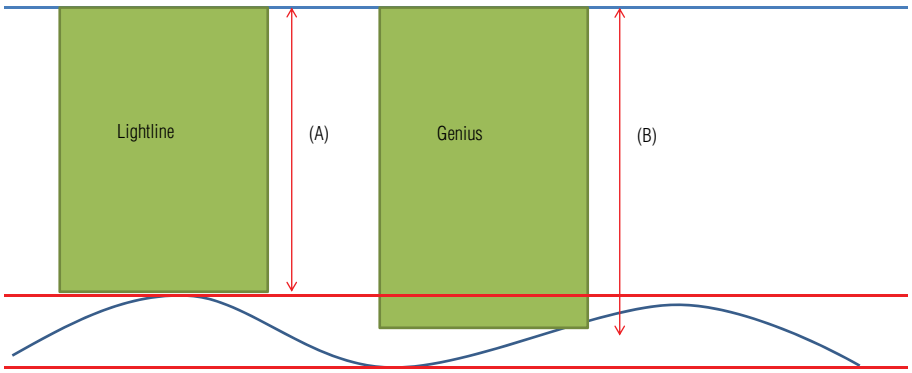
Legend Of Dimensional Terms

F.O. = Face Of
CL = Centerline
U/S = Underside
A.F.F. = Above Finished Floor

Usually ceilings are more level than the slab or floor as they are installed with a laser; however, both conditions may vary and must be understood. KI Movable Wall always tries to provide a single ceiling height solution for its panels and door units it provides the client with the most flexible product for future reconfigurations.

KI Movable Wall Ceiling Heights

KI Lightline and Genius Wall ceiling heights are determined differently (see graphic below) and the tolerance levels/ceiling height guarantee dimension requirements are unique to each product.



(A) Shortest, minimum or smallest ceiling height = Manufactured Ceiling Height
(B) Typically the difference between the maximum and minimum ceiling height = Manufactured Ceiling Height

Figure 4

KI Lightline has a ceiling height adjustability of:

Base Cover Height	Glass Panels Allowable Variation	Cutable Wood slider Cutable Wood Pivot Allowable Variation	Adjustable Glass Slider Adjustable Glass Pivot Allowable Variation	Frameless Glass Slider Frameless Glass Pivot Allowable Variation
2.5" (Note 1)	$+\frac{1}{4}$"	$+1\frac{3}{4}$"	$+1\frac{3}{4}$"	See Note 2
3.25"	+1"	$+1\frac{3}{4}$"	$+1\frac{3}{4}$"	See Note 2
4"	$+1\frac{3}{4}$"	$+1\frac{3}{4}$"	$+1\frac{3}{4}$"	See Note 2
Note 1: 2.5" Base Option-KI will not offer solution unless client is using the product on a level raised floor or the client is willing to float the floor to + ¼" tolerance or +/- 1/8" tolerance for frameless glass pivots.				
Note 2: Door leaves are special and are measured after door frames and glass panels are installed. Assumption ceiling heights are level or +1/8" to – ¼" every 10' per Construction Tolerance Standards. Extra lead-time and delivery/freight/installation costs are required.				

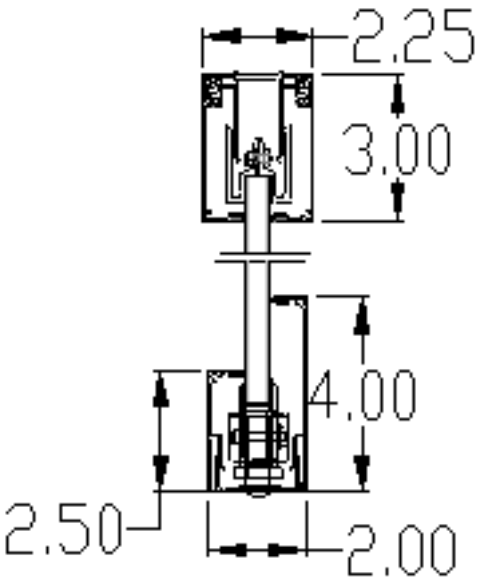


Figure 5

Lightline Standard Ceiling Height Determination Example

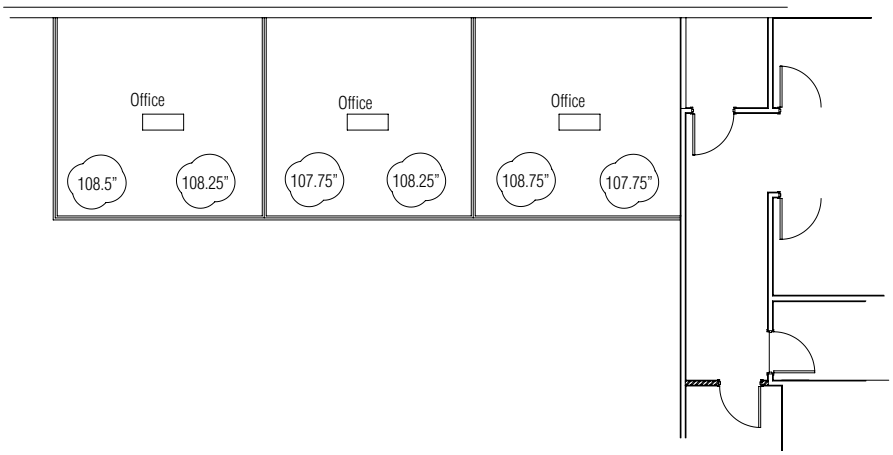
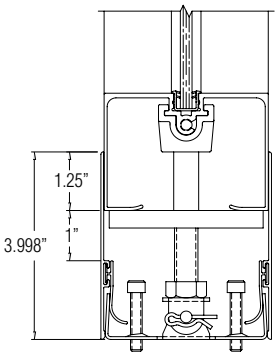


Figure 6

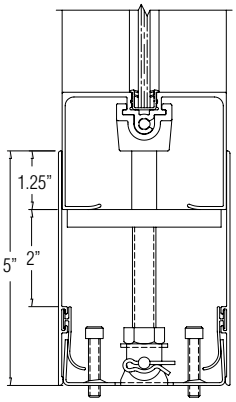
Shortest or Smallest ceiling height:	107.75"
Recommended panel manufacturing ceiling height:	107.75"
Recommended base heights:	Range: 108.75" - 107.75" = 1", 3.25" or 4"
Recommended door type (1 door leaf manf. height):	Cutable Wood Door or Adjustable Glass Door
# of Frameless pivot heights:	Special. Measure in field after panels/frames installed. Include extra lead-time and delivery/freight/install costs to the project price.

KI Genius has a ceiling height adjustability of:

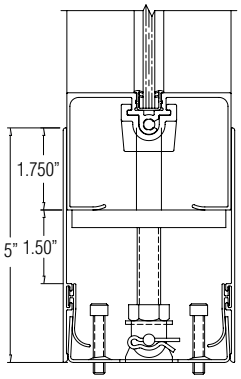
Base Cover Height	Panel Allowable Variation	Door Unit Allowable Variation
4" (Note 1)	± 1"	± 1/2"
5" (Note 2)	± 1 1/2"	± 1/2"
Recessed Base (Note 1)	± 1/2"	± 1/2"
Note 1: Do not specify electrical/data boxes in the base area with these base configurations. Note 2: Adjustment is less when you have electrical in the base cavity.		



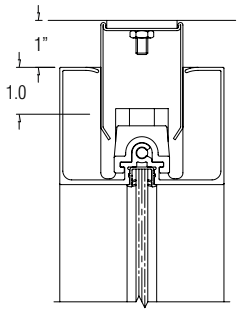
4" BASE
Standard base used when electrical is not in base ± 1"



5" BASE
Standard base used with electrical in the base ± 1" leaving room for electrical box/harness



5" BASE HYBRID
With no electrical in the base the 5" base cover can be used to increase the adjustment in both directions ± 1.50"



CEILING CHANNEL
The recessed ceiling channel allows for ± 1.00" of adjustment at ceiling

Figure 7
Genius Standard Ceiling Height Determination Example

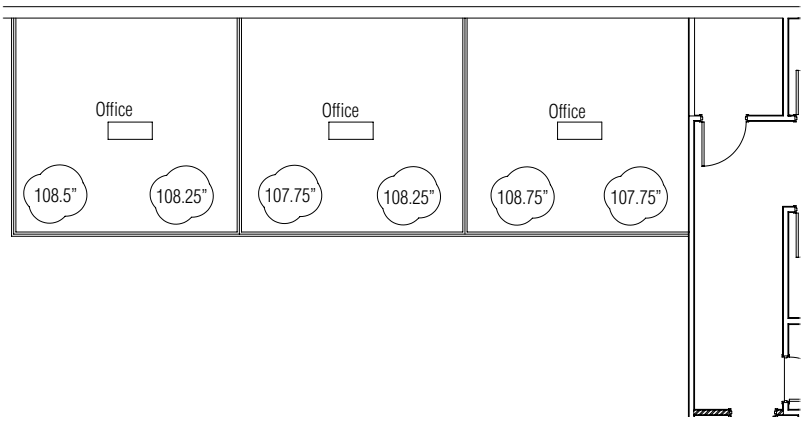


Figure 8

Shortest or Smallest ceiling height:	107.75"
Tallest or Largest ceiling height:	108.75"
Recommended panel manufacturing ceiling height:	(107.75" + 108.75") / 2 = 108.25"
Recommended base heights: (provided no electrical/data in base)	Range: 108.75" - 107.75" = 1", 4" or 5" recessed
Doors in the +/- $^{1}/_{2}$" range:	Yes

Precise Ceiling Height Determination Example

In order to specify KI Movable Wall options such as the Lightline 2.5" base and/or a frameless glass pivot door unit on a non-level raised floor, it is necessary we check the levelness of the floor and the ceiling prior to ordering. In order to determine levelness of the floor and ceiling, you must use a laser level in conjunction with spot measurements.

"Floor"

Is it flat and is it level?

To determine this, establish a 'level plane' by using a rotating laser beam device, (rent one for the survey or hire/schedule a KI technician to bring in survey equipment) and take vertical measurements from it to the floor in as many places as possible (minimum every 3'0"). If a laser is not available a level plane can be established by using a line of string stretched tight between two structural elements.

"Ceiling"

Is it flat and is it level?

It is essential that the vertical measurements from the 'level plane' be taken at the same places where you measured to the floor. This will help accurately establish any variations in the floor-to-ceiling dimension.

It is also important to locate and note the reflected ceiling plan:

- Changes in ceiling levels
- Ceiling grid and tile types
- Changes in ceiling grid and tile types
- Bulkheads
- Drywall and custom drywall ceiling areas
- Coffered ceiling areas
- Lighting units, especially ambient lighting units
- Radiant panels
- Plenum heights for suggested seismic details

If there is no ceiling grid installed you will need firm 'Hold-To' dimensions that we can manufacture from.

“Selection and Use of a Laser”

Selecting a Laser:
- Self-Leveling
- Includes a Tripod
- Rotates 360°
- Cost is between $150 and $400 USD

Set up and Use

Go to the outside wall, preferably at the outside corner. (Outside corners are generally the highpoints.) At this point, set the laser on the tripod. Turn it on and let it adjust itself. With a tape measure select an easy number to work with, say 40”. With the tape measure in front of the laser, crank the tripod up or down until the laser reads 40”, this is your benchmark. Walk away from the laser with the tape measure and spot-check the floor over the entire area where KI MOVABLE WALL is to be installed. As you walk away from the laser using a reader card or the red glasses that come with the laser - take notes as to where the floor changes.

- Use an imaginary grid on the floor to keep your bearings, approximately. 4' squares.
- As you spot-check the tape reading will change. For instance if you checked the tape 4' away from the laser and the tape now reads 40 3/4"” the floor is dropping away.
- At the 40 ¾” reading you now know that the floor dropped 3/4" in that distance. Keep checking the floor in a grid like pattern and keep noting the numbers.
- Numbers going up mean that the floor is dropping.
- Numbers going down mean that the floor is coming back up. In the example you see a few different numbers on the grid fluctuating up or down from 40.

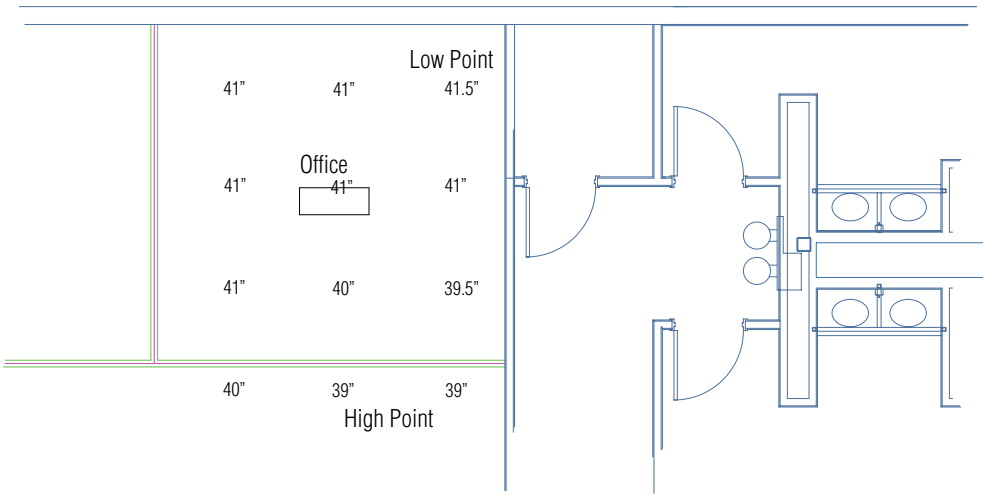


Figure 9

Take note of the highest number on the grid and the lowest number on the grid. In this example the highest number is 41 1/2" and the lowest number is 39”. Remember that the low number is the high point. With these two numbers you establish that the floor has a total drop in some places of 2 1/2". They also give you the median number to create the best module size for the walls.

In this example, the floor is very uneven and beyond even the 4" base of Genius Wall and Lightline. In these cases where it dips much lower you have to inform the client and General Contractor and have a floor floated to meet the requirements for the walls. If it humps up dramatically, the General Contractor will have to grind it down.

Key Horizontal Dimensions Guidelines

Whether it's window mullions, columns or openings in drywall; you need to take dimensions confirming exact locations where our product is meant to connect, align or fit between. It is also a good idea to include and locate building elements near the intended area of installation and verify all surfaces are plumb and square. This helps if future changes to the scope increase/decrease office sizes or front runs. Example: A simple office width change results in connecting to the next window mullion; OR the office is made wider and requires a termination into a column; if not located dimensionally during the site visit unnecessary costs could be incurred.

KI Lightline Walls have horizontal adjustability of: ± $^{3}/_{8}$"
KI Genius Walls have horizontal adjustability of: Varies by Connection Type

Note: The inside clear dimension shall be no more than ± $^{3}/_{8}$" where KI Lightline walls are located. This deviation must be met along all vertical planes of the hard walls, i.e., hard walls should be as plumb and true as possible to maintain the maximum deviation of ± $^{3}/_{8}$" overall.

To ensure surfaces are plumb and square, when measuring between permanent finished drywall partitions, KI requires 3 dimensions for each opening (see Figure 10 below showing locations of measurements).

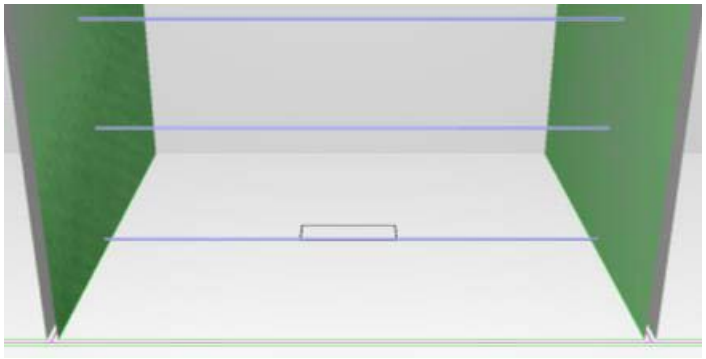


Figure 10

HOLD-TO DIMENSIONS

Hold-to dimensions are required when the base building is not completely ready for physical site measurements but product must be entered into production to meet deadlines. The dimensions must be agreed upon by the design Architect and the General Contractor. If the ceiling height is a Hold To dimension we must discuss the exact location where the ceiling height will be established and run a laser level referencing in that position to determine the floor levelness.

When possible, always deal with centerline dimensions; clear inside dimensions are generally easy to calculate as our walls are 2.25" thick (Lightline finished dimension) or 3.5" (Genius finished dimension). The GC/Architect signs-off on the KI Movable Wall approval shop drawings. It must be made clear that any additional product, due to the base building not being built to the agreed Hold To dimensions, will be considered a Change Order.

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