

TRANSCRIPT

EPISODE 9

How to Save Every Commercial Project Both Time and Money!

September 10th, 2019

My top 10 RFIs that mitigate
changes and accelerate the
schedule!

**3PHASE
RADIO**

With Jeffrey Mort



<p>0:00 <i>Jeff Mort</i></p>	<p>Today's audio master class: how to save every commercial project both time and money--my top 10 RFIs that mitigate changes and accelerate the schedule today on 3-Phase Radio.</p>
<p>0:29 <i>Music</i></p>	<p><i>[Bluesy rock by CryBaby Creek].</i></p>
<p>0:29 <i>Jeff Mort</i></p>	<p>Welcome my friends to episode number nine of 3-Phase Radio, your "Transformation Station"-- an educational program created to transform the electrical industry. I'm your host, Jeffrey Mort. Thank you for joining us today in the 3-Phase Radio community. Thanks to my friends and family of CryBaby Creek for the intro music they made just for you. You can enjoy more of their talent wherever music is found.</p>
<p>0:57 <i>Jeff Mort</i></p>	<p>Today's 3-Phase Radio audio masterclass: how to save every project both time and money--my top 10 Requests for Information that mitigate changes and accelerate the schedule. Just a quick reminder to please, as always, share, subscribe, and review to help this valuable program grow. But before we get started, today's program is brought to you by our very own Resource Center created for your convenience. There you'll find awesome tools, reliable gear and apparel, personal and professional development resources. It's not easy to find products and services you can trust. At the JeffreyMort.com Resource Center each item is tested and approved by me so you don't have to worry. I recommend only products and services and companies that I believe in. Full disclosure, as an affiliate for some of the products</p>

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<p>2:09 <i>Jeff Mort</i></p>	<p>So today's program is directed towards architects, engineers, project owners, owners, project managers, construction managers, and general contractors. And this group, we'll call it Group A, will benefit most from this episode; but Group B, electrical contractors, estimators, project managers, forepersons, electricians, and even apprentices can gain valuable knowledge today, too.</p>
<p>2:39 <i>Jeff Mort</i></p>	<p>So the problem we're looking at today, project document errors and omissions can cost a project precious time and money. Just the terms "errors" and "omissions" is somewhat taboo in the design world. But today we are going outside of that comfort zone and making some magic happen.</p>
<p>2:59 <i>Jeff Mort</i></p>	<p>So what exactly are project documents for those of you in Group B that may or may not know? I'm talking about plans and specs. I'm talking about contract drawings, blueprints, and specifications. And now the definition of errors would be misinformation. This would be conduit runs that were mis-sized or wire sizes that could have been mis-sized.</p>
<p>3:24 <i>Jeff Mort</i></p>	<p>And what are we talking about for omissions? We're talking about</p>

	<p>missing but required information. Something that was forgotten to be put on the drawings. So errors is misinformation, and omissions are missing information, but information that is certainly required for the execution of the project. For those that may not be familiar, I'll explain how this happens and how it can impact the project.</p>
<p>3:49 <i>Jeff Mort</i></p>	<p>Now everyone makes mistakes. I'm guilty of making mistakes. I don't like to think of it as "guilty," because I learned from my mistakes. So I take every loss and I turned it into a lesson. I don't believe in losses. And I certainly don't believe in punishment for mistakes. I believe every mistake brings us further in life.</p>
<p>4:06 <i>Jeff Mort</i></p>	<p>So that being said, some of those mistakes are miscalculations in engineering. Missed details, possibly inexperience, perhaps not being current with electrical codes, possibly inadequate field surveys. Could have been a missed meeting. Somebody couldn't make it to a meeting and there was something important said at that meeting that needed to make it into the drawings, and it didn't make it there. There is a classic example of an omission. Employee turnover: one engineer started the project, he left his company, another engineer picked it up and there was a disconnect in communication there.</p>
<p>4:45 <i>Jeff Mort</i></p>	<p>A lot of times errors and omissions are due to software glitches in the software that produces these digital drawings. And the old "copy and paste" of the wrong information. So taking some information from one project, copying it and pasting it into the</p>

	<p>new project. Sometimes that can be dangerous and very costly. But, it's not always the engineer's fault, either. Many times it's from scope changes without notice to the engineer. That happens quite a bit.</p>
<p>5:14 <i>Jeff Mort</i></p>	<p>Added equipment after the engineering has already been done and made it to the CAD files, and changed equipment after the design. This happens so often--that equipment gets changed and nobody told the engineer. So the drawings still have the old information or some information so that these drawings could be bid on and the equipment changed. And now the information that's on the drawings is no longer accurate.</p>
<p>5:40 <i>Jeff Mort</i></p>	<p>Project document errors and omissions can in some cases cost a project millions of dollars above contract and may extend the project schedule well beyond the substantial completion date. Enter the RFI. As many of us know, this stands for Request for Information. No one really likes them. Group A, they find them professionally embarrassing sometimes, not all the time, but sometimes they can be professionally embarrassing. And Group B, well, they find them aggravating, it takes time to put this information on a piece of paper and submit that.</p>
<p>6:14 <i>Jeff Mort</i></p>	<p>And then it's the waiting game. Waiting for an answer. And sometimes the answer you get doesn't make sense. Maybe because the information presented in that RFI, maybe that didn't make sense either. So there's a lot of give and take here. So despite generating money, contract changes are disruptive to</p>

	<p>productivity and workflow and typically costs the subcontractor more time than material unit pricing can capture.</p>
<p>6:38 <i>Jeff Mort</i></p>	<p>To make matters worse, when the proposal is rejected for disputes, the revise and resubmit process further delays the scheduled work and eats away at the overhead and profit allowance. Three revisions later, due to a dispute over, say, the quantity of some three-quarter inch EMT, the electrical contractor just lost the 15% markup allowance to office overhead. It's the same story, just a different job.</p>
<p>7:05 <i>Jeff Mort</i></p>	<p>So I've personally drafted thousands of RFIs that ultimately generated millions of change order dollars. The one surprising fact that I've found over the years is that most are preventable, or at least the patterns are somewhat predictable. Today, I'll guide you through my process to bring the most common errors and omissions for commercial electrical plans and specifications to the surface to help Group A, the design team, mitigate change orders before the bid, reduce embarrassing exposure, and stay under budget and ahead of schedule.</p>
<p>7:40 <i>Jeff Mort</i></p>	<p>I'll also help Group B, the build team, install once per an accurate design, minimize paperwork, reduce stress, and increase your personal time away from work. That all sounds pretty good, right? So here's my top 10 RFIs for commercial work with three examples each. So you're getting 30 valuable tips in just one episode.</p>
<p>8:04 <i>Jeff Mort</i></p>	<p>So number one: room number changes. Now it doesn't sound like</p>

	<p>a big deal to change room numbers and this room number change is sometimes owner-generated, and it's sometimes generated by the architect. What you want to do is you want to confirm that they will not be changing, that those room numbers on those construction documents will not be changing. And when they do change, I'll tell you what it affects, it affects a fire alarm programming. It also affects lighting control programming.</p>
<p>8:32 <i>Jeff Mort</i></p>	<p>And I'll give you an extra one here. It also affects panel directories. So if you have your points list for your fire alarm already listed out with room numbers for where that device lives, or if you have lighting control devices already programmed with room numbers for where that device lives, and if you have all your panel directories already made out, printed, and installed in your panel and somebody sweeps the building with an entire room number change.</p>
<p>8:55 <i>Jeff Mort</i></p>	<p>And let me give you an example. I've seen this happen before a closet was added and they didn't want to make it, let's say the room next to it was 201 and they didn't want to make it 201B. They made it 202 and changed every room number after that in the entire building. And fire alarm programming, lighting control programming, and panel directories all needed to change and they would not budge on that. So that was a huge change order that generated. So room number changes is my number one RFI. Send out an RFI confirming that the room numbers that are on the drawings are staying the same.</p>

<p>9:27 <i>Jeff Mort</i></p>	<p>Number two: distribution. And this is usually engineering mistakes. Sometimes inaccurate information or copy and paste. I see a lot of mistakes copy and pasting for distribution. And I'll give you an example from specification. Copper versus aluminum. Sometimes the previous job that they copied and pasted called for aluminum feeders and that's the way the job was bid, but they really wanted copper feeders and it's usually an upcharge to go from aluminum to copper, and a very pricey one at that. And to go from copper to aluminum, sometimes if the conduit sizes, you know, as we all know, aluminum doesn't carry as much amperage as copper and bigger wire means bigger pipe.</p>
<p>10:13 <i>Jeff Mort</i></p>	<p>So a lot of times, if the conduits were already running slab and somebody wants to do a little VE, a little value engineering, or a mistake was made and they really want that aluminum wire, sometimes those conduits will not accommodate the aluminum wire. So keep that in mind folks.</p>
<p>10:27 <i>Jeff Mort</i></p>	<p>So B under number two distribution is feeder sizes and this is usually a copy/paste issue. And this is a schedule, right? A feeder schedule versus breaker size. And, that's something that is easy to look at. If you just take the time to go through your distribution drawings, look at your feeder sizes, look at your feeder schedule, and look at the breaker sizes and make sure that everything is sized accordingly. That is one of the key things I look for when going through a set of documents and drafting RFIs for questions and potential problems that we can get rid of with paper instead of with parts and labor.</p>

<p>11:02 <i>Jeff Mort</i></p>	<p>And then C for number two distribution is MLO versus MCB. And this is usually a copy/paste issue in the distribution documents. And for those of you that don't know, MLO for panel boards stands for main lug only versus MCB, which stands for main circuit breaker. So if you have panel schedules calling for an MLO and really need an MCB, that can be a costly change back to the design team to implement main circuit breakers in your panel boards instead of main lugs. Because, you know, some of those circuit breakers could be upwards of, you know, 1200, 2000 amps in a particular panel. Sometimes even just a 400 amp conversion from main lug to main breaker could be a costly issue and a costly mistake. Especially if the mistake doesn't get caught in the pre-approval stages for the switch gear.</p>
<p>11:56 <i>Jeff Mort</i></p>	<p>And as you know, switch gear is usually one of the first systems that is ordered. So once that is in place and those things are built and especially when they're onsite and already installed, and then you realize there's an issue, it's super costly to convert things from main lug to main circuit breaker. It's a lot easier to do it on paper when the mistake is picked up. So that's why this makes my top 10 RFI list.</p>
<p>12:18 <i>Jeff Mort</i></p>	<p>Moving on to number three is mechanical. And this is usually an engineer-to-engineer communication breakdown. And I hate to say it, but between electrical and mechanical, there are so many RFIs that are typically written on a project. So I'll give you three of the main issues that you look for between electrical and mechanical drawings for equipment. And that is A: voltage.</p>

<p>12:44 <i>Jeff Mort</i></p>	<p>So voltage variation. So if you're coming out of one 2108 panel to a piece of equipment because that's what your electrical mechanical schedule called for--let's say an air handle unit. And, the mechanical drawings actually call for 480 volts. So now you're re-configuring your conduit to a different source. And sometimes if it needs, let's say it's the reverse of that, let's say the equipment requires 120/208, however, it's a 480 volt circuit on the electrical drawings, right? So if this thing needs 120/208, chances are the amperage is higher and the conduit is not going to be the right size.</p>
<p>13:21 <i>Jeff Mort</i></p>	<p>So that's usually a problem, which brings us to our next issue that I look for in mechanical is amperage discrepancies between the electrical drawings and the mechanical drawings. So we want to make sure that the amperage called out in the circuit on the electrical matches the equipment schedule on the mechanical drawings. So it's a pretty easy comparison right there.</p>
<p>13:39 <i>Jeff Mort</i></p>	<p>Next is C under mechanical, so we went A, B--A is voltage, B is amperage, and C is the source and that's emergency versus normal. A lot of times, you might find that a piece of equipment is called the come from a normal source on electrical drawings. However, when you look at the mechanical schedule, there might be a check box checked there to say that that needs to be on emergency power for some ventilation, whereas it might cause a life safety issue if this piece of equipment does not run during a power outage on the generator. So mechanical engineering-to-engineering issues that I look for are voltage,</p>

	<p>amperage, and emergency versus normal. So that is source.</p>
<p>14:21 <i>Jeff Mort</i></p>	<p>Moving along to number four in my top 10 RFIs for commercial electrical projects is fire alarm. And again, this is a lot of times an engineering issue or an engineer-to-engineer issue. And A is the first thing I look for is duct smokes. This is a huge coordination problem where the mechanical drawings may not call for duct smokes, where the electrical drawings do, or even worse, the electrical drawings do not call for them when the mechanical drawings need them. And there is a whole criteria for what size units require duct smokes and where those duct smokes should and will be placed for proper fire detection.</p>
<p>15:02 <i>Jeff Mort</i></p>	<p>So duct smokes locations are one of the biggest things. That's quantity and location. So you need to know the rules around duct smokes, you need to know how many CFMs before it needs one, and how many CFMs before it needs one in a supply, and one in the return. And you also need to know if the return splits, whether or not you need multiple in the returns and where those locations are. So duct smokes are a huge one.</p>
<p>15:27 <i>Jeff Mort</i></p>	<p>Next one. It's really simple: pull stations for fire alarm at the exits within five feet of the exit. So a lot of times you can just scan through the drawings and look at the egress paths and make sure that there's a pull station highlighted for your fire alarm system at those exits. So that's a very common mistake that sometimes gets just overlooked.</p>

<p>15:46 <i>Jeff Mort</i></p>	<p>C under fire alarm RFIs is system integration. Whoa--now the fire alarm system integrates with almost every other system in the building. It integrates with a lot of electrical systems such as generator, lighting control, security, access control, things of that nature. It also integrates with fire protection, audio/visual, theatrical lighting, door magnets, door hardware. Oh my goodness, the list goes on and on and on and on and on. So systems integration, that's usually a big one. And there is a huge margin for error for errors and omissions in system integration for fire alarm. And that's just scratching the surface. Sometimes on a larger project I've written as many as 100 RFIs simply on fire alarm. That is crazy.</p>
<p>16:35 <i>Jeff Mort</i></p>	<p>So moving along to number five in my top 10 RFIs is electrified door hardware. Oh my goodness. This is another one that I could just go deep in and do a whole episode on. And this is a lot of times an engineer-to-engineer issue or an architect-to-engineer issue. So I'll break this down for electrified door hardware. RFIs, you want to look at electrical drawings versus security drawings and also access control, right? So you want to compare what does the electrical call for a particular door location, and what does the security and access control call for for that same door.</p>
<p>17:10 <i>Jeff Mort</i></p>	<p>You want to make sure that you're installing per what is needed and in that the drawings that you purchased at bid time that you bid on or that are going out to the contractor for Group A. And you want to make sure that these things are in alignment so that when these drawings go to bid that someone's bidding on</p>

	<p>accurate information and it's gonna mitigate a change order. Just check on these things.</p>
<p>17:32 <i>Jeff Mort</i></p>	<p>So number five, electrified door hardware. B would be electrical versus door schedule. And this is a simple comparison, but when you have a building with, you know, three to 500 doors in it, you need to compare all those and make sure that the electrical is calling for electrical service everywhere that the door hardware calls for electrical service.</p>
<p>17:53 <i>Jeff Mort</i></p>	<p>And C is electrical details if you're lucky enough to have them. Now, I usually love it when there's details, because the more information the better, and the more accurate the installation is. However, there's more margin for error in those details. So the devil is in the details. Electrical details versus door hardware specifications. So you can go to the door hardware specification and you can look at all the different door hardware packages in there, usually like 11.4 or 11.5. There'll be a whole breakdown of all the equipment and manufacturers that comes with that, and you want to look for anything that says "electrified" or "powered", or has a voltage rating next to it. And you want to make sure that those are captured in the electrical details for that particular door. Very, very important. And it could be a very time consuming comparison, but it is well worth saving the money because door hardware can get super crazy when it comes to electrical installations.</p>
<p>18:51 <i>Jeff Mort</i></p>	<p>And it's not uncommon for a 200,000 square foot, say, school</p>

	<p>building to have \$95,000 change order for mistakes. Someone's getting a talking to, and that's a true story. And then especially important for door hardware comparisons is for doors that fall in a CMU, which is a masonry application, a cement masonry unit, a concrete masonry unit. So a block wall, if you've got a door going in a block wall and you didn't rough for it because the electrical drawings did not call for any electrified door hardware in there? However, when the package shows up, the spec needed that door hardware to have--let's say mag locks or access control or whatever it needed--and you didn't rough for it. Now, somebody's taking out some blocks so you can get some wires in there. It's pretty hard to over work some masonry, especially when it's grout-filled.</p>
<p>19:44 <i>Jeff Mort</i></p>	<p>So we're just getting warmed up here. We'll get right back to the program in just a minute. If you like what you're hearing each and every week, as always, please review, share, and subscribe. And I am proud to announce that now you can support 3-Phase Radio on Patreon. I produce and offer this podcast for free to help my fellow electricians and design team friends out. If you like what you've heard and you like to help make more episodes possible, please support me on Patreon. Supporters will get bonus content including extra episodes, and I saved some of the good ones for the inner circle. You'll also get worksheets, how-to guides, and direct access to me via a monthly group coaching call. I'd also love to use Patreon as a platform to offer even more coaching, education, and mentorship opportunities. Once I hit my first milestone of \$100 per month in support, I will be able to add</p>

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<p>21:07 <i>Jeff Mort</i></p>	<p>So now let's get back to it. Number six in my top 10 RFIs for commercial electrical work to mitigate changes and save your project both time and money. Number six is in the FS drawings. The food service drawings and food service can--oh my goodness--be a nightmare sometimes. And a lot of times these mistakes fall between the electrical engineer and the consultant, the food service consultant. I'll give you an example. I've had food service projects that had over 400 line items for pieces of equipment that needed electrical connections and that as a huge opportunity to mitigate some change orders in there and defending the electrical engineers here.</p>
<p>21:56 <i>Jeff Mort</i></p>	<p>A lot of times when you have that many food service items, the equipment just changes so drastically from pieces of equipment. The owners changed their minds. So you got owner-generated changes and a lot of times electrical contractors will get upset with the electrical engineer thinking they didn't know what they were doing and that wasn't the case. They did the best they could with the information they had at the time that they needed to produce those 90 or 100% contract drawings. So a lot of times it's owner-generated changes or late submittals or a food service</p>

	<p>consultant or designer didn't have the right information or gave the wrong information. So, electricians, that's not always the electrical engineer's fault. Electrical engineers I'm behind you guys, 100%, I think you do a bang up job and you do the best you can with the information that you have. So thank you very much.</p>
<p>22:42 <i>Jeff Mort</i></p>	<p>So food service issues: "A" would be voltage discrepancies, amperage discrepancies, and source discrepancies. So very similar to mechanical. You want to compare what the electrical drawings say to what the food service schedule says. "B" is how the power gets there. And that would be whether they're looking for a stub up or a device or a disconnect, a hardwired connection with a disconnect. And a lot of times it might call for a disconnect and the equipment show up with a cord and plug or vice versa. So those can be late game change orders where you're scrambling to hook up this equipment so that they can open and start making some money. And then "C" in food service nightmare is NEMA configurations: three-wire versus four-wire or the right receptacle outlet. A lot of times the food service schedule will call out exactly what device the equipment is looking for, which is fantastic.</p>
<p>23:35 <i>Jeff Mort</i></p>	<p>However, if it says it needs an L14-30R and that's what you order and install and the thing shows up and it needs a different NEMA configuration, now you're scrambling around to get the right device. Or you find out that the unit needs a neutral and you didn't pull one and you ran it in MC cable and not a conduit. So it's not as simple as pulling. A lot of times in food service, the engineers are smart and they'll call everything has a neutral, and</p>

	<p>that's good. I'd rather have it and not need it than need it and not have it. And if it was in the documents, then it was been on to have a neutral. So if it was shown in there you best pull one, otherwise, when you say that you don't have a neutral there, you'll be owning/pulling the neutral if the drawings called for it. They are group B.</p>
<p>24:19 <i>Jeff Mort</i></p>	<p>So moving on, number seven on my top 10 RFIs to mitigate change orders is exterior device elevations. And this is a big one. A lot of buildings nowadays have exteriors that are block or brick or architectural panels and there are a lot of devices that go on the outside of a building. So this is usually a common miscommunication between the electrical engineer and the architect or vice versa from the architect to the electrical engineer. So what kind of devices am I talking about on the exterior? I'm talking about lighting fixtures. Where are those things going? Over the doors, on the side of the doors, or how high up? You want to make sure you know where these are going.</p>
<p>25:00 <i>Jeff Mort</i></p>	<p>Also receptacle outlets. Those are usually by the door, but maybe they need to be by some equipment. And they might be shown on the floor plan for the electrical drawing. But when you look at the elevation that the masons are blocking up the brick or putting on the brick or the curtain wall or the architectural panels, you want to know where exactly in that panel or that brick line that these receptacle outlets and light fixtures are going.</p>
<p>25:23 <i>Jeff Mort</i></p>	<p>Another big one are card readers and cameras and fire alarm</p>

	<p>devices. So, you know, a typical--let's use the school for an example. I love schools as an example because they have a lot of everything in them. You'll have all those on the exterior of a building. You have light fixtures, you have receptacles, card readers, cameras, fire alarm devices, bells, beacons. The list goes on. Knox Boxes for the key for the fire department to get in.</p>
<p>25:46 <i>Jeff Mort</i></p>	<p>So you have all those devices and it's really helpful. Architects, Group A--it's really helpful to us as the installers to know exactly what your intent was for where these devices are going. So exterior device elevations, it's one of my favorite RFIs. And the best thing you can do, Group B, is if your RFI in these things offers suggestions, take a picture or you can do this on a digital markup with a Bluebeam. I love Bluebeam. You could do it with a digital markup on the drawing and you can draw in the devices and you can do the work for the architect and engineer make their job easier. That's all they have to do is say, "Yes, yes, I like everywhere that you place those devices on the drawing, approved, please install accordingly."</p>
<p>26:27 <i>Jeff Mort</i></p>	<p>That is the best thing. And it makes a great relationship between Group B and Group A. Those guys love it and it makes for a great partnership going forward. And they love to work with you later on down the road. Last thing you want to do is, you know, Group B, last thing you want to do is bash Group A and then you work with these guys again and it just makes for a sour relationship.</p>
<p>26:47 <i>Jeff Mort</i></p>	<p>So moving on. Number eight is interior device elevations. And this</p>

	<p>is again electrical engineer to architect miscommunication, and architects are very particular about where they want devices. So my take on it as a Group B installer sometimes is if you're particular about these devices, then please show them on your interior elevations. And I'm talking about things like classrooms and specialized rooms especially that have millwork and casework in them. Talking about teacher stations and interactive whiteboards in laboratory stations.</p>
<p>27:21 <i>Jeff Mort</i></p>	<p>It's for good reason that these devices need to be shown on these interior device elevations. And I understand that there's a lot of pressure on Group A to get these drawings out to bid by the owner, get these things out to bid so we can get this project moving. So a lot of these fine details usually fall by the wayside, but it is super important and a lot of times it'll cost time. Like in this situation. You own these devices but you just don't know where to put them. So you're really not going to generate a change order here, but it's going to cost time to document where you want these devices and slows down the process of the project. And I've had some projects where they do show some devices, but not all of them. And a lot of situations seem like they were copied and pasted, which just creates confusion.</p>
<p>28:06 <i>Jeff Mort</i></p>	<p>So interior device elevations, Group A, it's awesome when you guys put these things exactly where you want them, when you are afforded the time to pay attention to the detail in these drawings. Makes Group B's jobs so much easier. And also, interior elevations are super important in specialty rooms like auditoriums and</p>

	<p>media centers. We have lots of audio visual devices and theatrical lighting components and controllers and architectural panels and especially architectural lighting. And also vestibules with glass and curtain walls. A lot of times they'll show so many devices in these vestibules, and it's a curtain wall with an inch and a half mullion. And there's just no way that you can get all the devices in that mullion where they want them. And, you know, that goes for getting your door openers in there as well. Power for your door openers.</p>
<p>28:56 <i>Jeff Mort</i></p>	<p>So moving on, number nine in RFIs, this is one that's way down the road in a project and it's often overlooked, but it's super important to get these things out of the way at the front end. And that's FF&E components. And what does FF&E stand for, Group B? It is finish furniture and equipment. So this is a lot of stuff that the project doesn't own, but the owner owns having a contractor come in after substantial completion to start installing equipment such as a powered furniture locations. So you might have cubicles or custom furniture that requires power and the drawings from the electrical engineer or they might not have had that information. So by the time these jobs get to bid, you might be able to obtain that information or just before bid time engineers, you guys might be able to sweep through these drawings and prevent some change orders later on.</p>
<p>29:48 <i>Jeff Mort</i></p>	<p>So maybe the owner changed some equipment. You might want to double check before these drawings go out the door to bid at bid time and just make sure that, you know, what are the final</p>

	<p>FF&E components? And I'm talking about powered furniture. I'm talking about specialized equipment furnished by others and delivered at the end. And then another one that kind of falls under this category is floor box locations. So the electrical engineer knows that they need floor boxes somewhere in this area, but they usually aren't left with the responsibility of providing the exact location. So this is a huge front end RFI that sometimes surfaces some missing information or missing material. But, at least it locates the floor boxes for the electrical contractor because one of the first things in a brand new building are the slabs getting poured, right?</p>
<p>30:39 <i>Jeff Mort</i></p>	<p>First you do foundations and then you do steel and then you start pouring slabs. And before that happens, you need to lay a lot of underground conduit for branch and communications and theatrical lighting and things of that nature for floor box locations. So RFling every single floor box in your entire building. I'm talking slab on grade, slab on deck, the whole package. You want all of those out there. And sometimes, the architects have enough time to put those dimensions on the slab edge drawings if you're lucky enough to have slab edge drawings in your project. So that's what you want to look at. Group B, if you're going to RFI floor box locations, you want to check your architectural or structural slab edge drawings to make sure that the floor box locations are there and you have every X Y axis for these off of column lines. So FF&E components, powered furniture, floor box locations, specialized equipment.</p>

<p>31:28 <i>Jeff Mort</i></p>	<p>Moving on to number 10. Last but not least, we're talking about motorized equipment. And that populates a lot of RFIs and sometimes a lot of change orders. So Group A, you guys, if you can get this stuff nailed down prior to the drawings going out to bid, you might be able to save the project quite a bit of time and money schedule-wise and cost-wise and change orders and RFIs. We're talking about sports equipment. So again, using the school as an example, you may have a lot of motorized sports equipment such as basketball hoops, batting cages, and you know, some other components that are motorized, usually up at the ceiling. And if the equipment is not matching the electrical requirements...I mean, the last thing I want to do is pull the 208 volt circuit to something that's 30 feet in the air in a gymnasium ceiling when you have a parquet wood floor that you just can't drive a lift on later to convert that thing over to a 40 volt receptacle outlet or a circuit. So sports equipment is a big one. Motorized equipment bleachers fall into that. Motor shades, another nightmare. Sometimes on projects and sometimes it's the voltage or the location for the motor shades, and whether it's a single shade or blackout shade, you know, both of those. So motor shades can certainly get really convoluted. That's something that you want to match the specification requirements for motor shades to the electrical requirements for the motor shades and make sure that they're in alignment.</p>
<p>32:52 <i>Jeff Mort</i></p>	<p>That's as simple as that. It's comparing the two systems. It's comparing the two documents, right? You want to go in the spec, you want to look at motor shades, what do those guys own? What</p>

	<p>are they going to be providing? Because the equipment shows up per the specification. And if that equipment is a mismatch with the electrical drawings, you can tell that on the front end as soon as you have those plans and specs in front of you.</p>
<p>33:10 <i>Jeff Mort</i></p>	<p>Another one is projector screens. A lot of times they might call for a projector screen in a certain room and the electrical drawings have nothing. I've run into that so many times. Overhead door controls, and I'm not just talking about garage doors, I'm talking about corridor doors sometimes that those door controls are required. And the electrical drawings, they don't show those. So Group A, you can CYA and just say "EC owns all the controls for each door," and then there it is. And that could save a change order in the end where the EC gets handed this pile of sensors and buzzers and bells and limit switches from the door control guy.</p>
<p>33:45 <i>Jeff Mort</i></p>	<p>And he says, "I don't do electrical work. I don't own that electrical work." And the EC's saying, "I don't own it, either." The owner's looking for these doors to operate so that the building inspector can give a Certificate of Occupancy. The fire department is looking for these things to operate so they can do a 100% test. And everybody's looking at each other saying "we don't own in it." And then somebody is working overtime on a T&M slip to get these things done and nobody's happy. So a lot of these things can be mitigated on the front end. And I'll give you a bonus one here. I'll give you some bonus. We ran through one through 10. I'll get to the bonus in a minute, but we'll go through one through 10 real</p>

	quick here.
34:23 <i>Jeff Mort</i>	Number one was room number changes.
34:25 <i>Jeff Mort</i>	Number two was distribution.
34:28 <i>Jeff Mort</i>	Number three was mechanical.
34:29 <i>Jeff Mort</i>	Number four was fire alarm.
34:31 <i>Jeff Mort</i>	Number five was electrified door hardware.
34:35 <i>Jeff Mort</i>	Number six was food service systems, and not every building has food service in it. And sometimes if they do, it's very minor. And then sometimes, like I said, I've seen 400 line items in a food service drawing before.
34:47 <i>Jeff Mort</i>	Number seven, exterior device elevations.
34:50 <i>Jeff Mort</i>	Number eight, interior device elevations.
34:52 <i>Jeff Mort</i>	Number nine, FF&E components.
34:55 <i>Jeff Mort</i>	Number 10, motorized equipment.

<p>34:56 <i>Jeff Mort</i></p>	<p>And the bonus: be thorough on site circuits. Things like generator, things like lighting, outbuildings, signs, irrigation pumps, lift stations. Why do I name all these things? Slabs and foundations. That's why. At the end of the day when somebody has a lift station outside and you didn't know about it, it's hard to get through that foundation and through that slab to get your power source back out there.</p>
<p>35:20 <i>Jeff Mort</i></p>	<p>So a lot of those things are worth a second look. Sometimes the site drawings are the first to get generated and those go out the door. And then the electrical drawings, they don't cover all the things that are going in that site. You know, irrigation drawings. Sometimes those are late down the road. And, the electrical engineer, again, didn't have the information for the irrigation pump. So something that can get double checked on the way out the door, Group A, before bid time and save yourself a major change order and some mild embarrassment, because an irrigation pump was omitted on the drawings.</p>
<p>35:53 <i>Jeff Mort</i></p>	<p>So notice I didn't cover it lighting and lighting control RFIs. I could do an entire podcast series just on lighting and lighting control RFIs, but we'll get to that in a future episode.</p>
<p>36:06 <i>Jeff Mort</i></p>	<p>So there it is. Over 30 items that consistently generate costly change orders that disrupt workflow and cost the project both time and money. So the call to action: design professionals, owners, project managers, and estimators--you can use this information to double check the design before bid time. Then</p>

	listen again and triple check it.
<p>36:28 <i>Jeff Mort</i></p>	<p>Construction managers, general contractors, and electrical contractors: use this episode as a guide to look for errors and omissions early on so you're not removing work, protecting finishes, cutting and patching, and working nights, weekends, and vacations to execute last-minute changes. Be home with your family instead. Go to the lake, go to the beach, or your kid's game for the love of Pete.</p>
<p>36:51 <i>Jeff Mort</i></p>	<p>For your convenience, you can easily download and print the transcript for this episode and all the episodes at 3PhaseRadio.com. Or even better, support the program, become a member, and get the coolest worksheets in the biz. Whether you're on the design side or the build side, whether you're in Group A or Group B, just imagine not having this checklist of valuable information. Or listen again, get the worksheet, apply the steps, and be the hero that saves every project lots of time and lots of money.</p>
<p>37:27 <i>Jeff Mort</i></p>	<p>If you're interested in learning more about the document review process to mitigate costly project change orders, you can get on the list for our free video course simply by going to 3PhaseRadio.com and entering your name and email.</p>
<p>37:43 <i>Jeff Mort</i></p>	<p>Now I have a question for you. Remember when you were a kid and you had that magic eight ball that you could ask anything, shake it and get an answer? Imagine if instead of getting one of</p>

	<p>the same 20 predictable answers every time you asked it a question, that instead you got an informative, purposeful answer backed by decades of experience and knowledge and a call to action to send you in the right direction? Well, now you have that very power at your fingertips. Just go to 3PhaseRadio.com and click on the "Ask Jeff" button at the top of the page. Submit your question, and not only will you receive a valuable response, but selected questions and answers will be read at the end of each 3-Phase Radio podcast.</p>
<p>38:27 <i>Jeff Mort</i></p>	<p>Consider this a complimentary and valuable resource and an opportunity to plug in to over 30 years of experience brought to you by 3-Phase Radio and Jeffrey Mort Industries. I want to thank everybody for listening. I sincerely appreciate you guys listening to every episode that I put out there for you. I'm doing this all for you guys, so please be sure to get on the website and support us through Patreon. Take advantage of all the awesome resources we have. Check out our Resource Center. Use the "Ask Jeff" button. Get on our email list and don't miss a beat. Thank you so much for listening and please remember: the best investment you can make is in yourself. Cheers.</p>
<p>39:45 <i>Music</i></p>	<p><i>[Bluesy rock by CryBaby Creek].</i></p>