Jeanie Bourke - Re: Fire Boat Quarters

From: Jeanie Bourke
To: Stephen Weatherhead
Date: 4/8/2013 9:22 AM
Subject: Re: Fire Boat Quarters

Good Morning Steve,

I'm not sure a Monday morning is the best time to read this challenging email, but I actually do understand the extensive research described in attempts to achieve the required fire separation ratings. It's unfortunate that the UL design doesn't quite meet the specifications, but it appears the proposal in the ASK 3 is a good solution to the 2 hour rating.
As for the existing floor drain in the workshop, if this is not exposed during construction, the cut sheet on Sure Seal is acceptable as an alternative installation in this instance.

I will add this information to the permit documents.

Thanks for your due diligence on this Steve,

Jeanie

>>> Stephen Weatherhead <sweatherhead@wintonscott.com> 4/5/2013 5:19 PM >>>
Hi Jeanie,

Regarding trap primers. We do specify new trap primers for the two new floor drains we are installing- labeled on P1 as FD-1. Detail 3 on P2 shows the primer detail. The plumbing engineer assumed that the existing FD at the workshop could be left as is. However, he has sent me the attached cut sheet for an insert that can be inserted in the drain allowing water to pass through but preventing odors from entering the space. He was not sure if this constituted a "code compliant alternative" - can you advise?

So now regarding fire proofing, in keeping with my track record on other recent projects, this gets complicated!

The drawings submitted for permit do not utilize spray fireproofing. What is called out on the details is spray foam insulation over 5/8" GWB on metal hat channels attached to the underside of the tees. We had initially planned on spray fireproofing but cost and concern about the possibility of the coating delaminating over time due to flexing of the planks and water migration caused us to look at drywall. We had the same concern about the spray foam going directly on the tees and coming loose over time. So we ended up showing framing and drywall attached to the plank creating a dry, stable surface for the spray foam insulation.

We are not able to definitively determine the fire rating characteristics of the existing plank. We have worked with Becker Structural to review original drawings but the info is insufficient to make a complete determination. I have attached ASK 3 as well as a copy of original section details of the plank. In IBC section 721.2.2, a methodology is given for determining the rating of a floor ceiling assembly made of concrete. Table 721.2.3(5) provides info. on the minimum cover of concrete over reinforcing strands in precast concrete beams

required to achieve various rating durations. The determination is based on calculating the area of the "beam" portion of the plank, called the stem as well as a portion of the "flange" or deck portion of the plank which then coincides with a required minimum cover which in our case would be 1 1/2" to achieve a 2 hour rating. We know from the existing drawings that the reinforcing in the flat deck portion of the plank is centered within 4" thickness of concrete so we have 1 1/2" cover there. There are also reinforcing strands that run in the stem and these run at an angle as can be seen in the attached pdf of original details. Where the strand is positioned at its closest point to the bottom surface of the stem that is the point of minimum cover which also needs to be 1 1/2" but the drawings do not call out what the dimension is. It appears by relative scale to be a similar dimension to the cover of rebar in the flat deck portion of the plank but it is not called out so we don't know. In 721.2.3.3.1 "Calculating concrete cover" it indicates that cover is calculated by determining the minimum thickness of concrete between the surface of a single strand and the fire-exposed surface. As we have 1 1/2" cover from top of plank to the rebar located in the deck we can assume we have 2 hour protection for fire coming from the parking garage side. Bur for protection from fire starting on the crew quarters side we don't know the existing cover.

When Becker Structural looked at it they felt that the plank should be good for at least a 1 hour rating and we figured that adding a layer of drywall would get us to an equivalent of 2 hours. However, there are no UL assemblies that reflect exactly what we are trying to do. The closest I could find is Assembly J503 (attached) but in this assembly the drywall is attached to the bottom of the stems and the stem spacing is 4' not 5' so its not exactly the same. I also did some research online and found a research article done on performance based determination of fire ratings for concrete tees which is mostly about running test scenarios and analyzing the results but there was no direct way to apply the data to our specific circumstances. However, it did mention in general that applying insulation to the concrete is helpful because it protects the concrete from heat for a longer period. Apparently, failure of the prestressed concrete tees starts when the concrete gets so hot it starts to form hairline cracks which disturbs the bond with the reinforcing strands. As this process continues the strands eventually lose their bond to the concrete completely and the plank begins to fail.

So as confusing as this all is, I believe we have come up with a reasonable approach to reach equivalency to a 2 hour rating and we have also improved the situation by sprinklering the crew quarters.

A final clarification is that the original drawings, as mentioned above, show the framing and GWB applied first with the spray foam sprayed on after. In the attached ASK we have changed that because we were told by the insulation applicator that we have to have a 15 minute thermal barrier over the foam. There is a paint coating that can be applied but it will cost the project $7,000 so we looked again at flipping the detail where the foam is applied directly to the concrete with the GWB over it. We figured that even if the foam starts to delaminate because of movement or water infiltration, the framing and GWB will hold it all in place anyway. The GWB is specified as moisture and mold resistant so it will hold up if there is ever any water infiltration.

Sorry to be working on such out of the box projects! - have a good weekend and let me know if this all seems ok to you.

Steve