

0050104 CONTROL OF THE WORK – SHOP DRAWINGS  
COMMENTS FROM INDUSTRY REVIEW

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Keith Waugh  
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Comments: (Internal Review)

Major discussion needed at Structures Meeting. I'm sure there is need for improvement, but the fallout from this one as written will create much more pain and cost than they can imagine. Anyone reviewing the information will feel the need to question everything and approve nothing until it is written the way that they want it, which means covering them from any possible liability. In other words, belt and suspenders, or remember the old cartoon of the "Cowboy after OSHA"?

Response: This issue was discussed during the FDOT/FTBA meeting on Feb 1, 2008. The proposed specification sections have been modified to reflect the meeting outcome.

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Ghulam Mujtaba, P.E., C.P.M.  
State Prestressed Concrete Engineer  
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Comments (Internal Review):

The following are my review comments:

- 1- It may be beneficial to require PCI and AISC Erector Certification for contractors who perform the erection of prestressed concrete and steel members, respectively.
- 2- Subarticle 5-1.4.1(c): The last part of the temporary work includes, cofferdams, and special erection equipment. These items do not belong to the definition of the temporary work. I recommend changing the last part to read: ".....temporary earthworks, and construction of sheeting and cofferdams, and placement or movement of the erection equipment.
- 3- Subarticle 5-1.4.1(k): Change Bracing to Brace to read: Brace is any

temporary structural member or multiple members used to support beams, girders, piles and other permanent structures during the construction activities.

4- Subarticle 5-1.4.5.6: Change the title to "Construction Affecting Public Safety". Change the text of the fifth line to read: ".....wind or incidental construction loads, including the weights of forms and other temporary loads, especially....."

5- Subarticle 5-1.4.5.7 third line: Change " ....are not allowed over the active traffic:" to "....are not allowed on the bridge over the roadway while traffic is moving:".

6- Subarticle 5-1.5.4, third paragraph: Change the first sentence to read: "After erection of the elements, but prior to opening of the roadway, beneath the bridge, to the traffic or public, ensure that the Specialty Engineer....." ...

7-- Subarticle 5-1.5.4, last sentence (editorial comment): A period is missing at the end.

Please advise if there are any questions

- Response:**
- 1- The Department had discussed this issue earlier and decided to hold on to this requirement until further discussions and clarifications with the AISC and construction industry.
  - 2- The existing language is clear and has not created any confusion so far hence there is no need to change.
  - 3- The definition been modified to reflect the review comments.
  - 4- No need to change the title. The title matches the content in the section. If we change the title, the section content will have to be revised accordingly.
  - 5- The sentence has been modified to reflect all other review comments.
  - 6- The sentence has been modified to reflect all other review comments.
  - 7- Has been corrected.

Thanks for your comments.

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John Previte  
D1 Specifications Engineer  
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(813) 519-2676

**Comments:**

Definitions could be improved by not changing format three times. At first, the word to be defined is followed by a colon. Next, at (f), word to be defined is followed by "includes". My main objection is format of (i), (j), and (k). For example, scaffolding, shoring and bracing are systems. Do we want to define the item or the system? I suggest, Scaffold: An elevated work platform..., Shore: A component of falsework..., Brace: A temporary member...

**Response:** The bracing has been defined to comply with the existing format. The specification

defines scaffolding, shoring and bracing as a system. Thanks for your comment.

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Bill Sears  
[william.sears@dot.state.fl.us](mailto:william.sears@dot.state.fl.us)  
954-934-1115

Comments:

Spec. Section 5-1.4.5.6 - Recommend changing from "submit calculations" (which would need to be checked/approved by EOR) to "submit certification of design meeting AASHTO, Construction Handbook & Contract Documents"(which can be accepted w/o checking/approval).  
5-1.4.5.7 - Recommend changing from "Submit, for the Engineer's review" (which would need to be checked/approved by EOR) to "Submit a signed and sealed Erection Plan" (which can be accepted without checking/approval).  
5-1.4.5.7 - Recommend adding to the second sentence of the paragraph "without written approval of the Engineer" since there are times when we do place the concrete deck over active traffic if a false bottom is placed below the deck forms.

Response: (1) Agree and has been modified accordingly. (2) Agree and has been modified accordingly. (3) These requirements have been removed from the proposed section and included in the Design Standard Index 600 for consistency with other traffic control requirements. In general, these requirements will be applicable to typical construction projects. If the Contractor wants to use false bottom and meet the safety requirements to the satisfaction of the Engineer, then the Department can approve his request on a case by case basis.  
Thanks for your comments.

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Tom Bowles  
Russell Engineering, Inc.  
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(954) 321-9336

Comments:

While the intent of the proposed change is noble, the path to improvement is fatally flawed. The Department seeks to ensure Public Safety by putting the Functional Control of the erection activities in the hands of Engineers who likely have no hands on experience whatsoever. It is unlikely that such an individual, so charged, would be capable of generating a workable Erection Plan. With respect due, I would not allow any Specialty Engineer on site during an operation as critical as Beam Erection. Rather than seeking to defer liability to a third party, the Department should recognize these instances Affecting Public Safety during the plan preparation phase and design temporary intermediate and end bracing requirements as part of the Contract Documents. This safeguards the Low Bid Process by leveling the playing field. The proposed, after the fact approach will at best unnecessarily run up the cost to the Public and at worst create a dangerous false sense of security.

In general, the Department has in recent years become far too enamored with this

“Specialty Engineer” method of *passing the buck*.

Response: The EOR is responsible for providing a workable erection scheme that addresses all major phases of erection to satisfy his design assumptions. The plans will show temporary support locations assumed in design and comply with the proposed MOT plans. He will also be responsible for evaluating overall superstructure stability during construction using wind loads and temporary construction loads included in AASHTO Guide Design Specification for Bridge Temporary Works and the AASHTO Construction Handbook for Bridge Temporary Works. The EOR will not be responsible for detailing the plans for the work that falls under the Contractor’s means and methods. The Contractor/Specialty Engineer will be responsible for designing the temporary supports and evaluating the stability of individual components during erection and to develop an erection scheme including bracing that meets the Contractor’s means and methods. Please make a note that once the plans are detailed to require certain construction method or requirements, it will take away contractor’s freedom to perform the work that suits his work schedule, knowledge and equipment he has.

Thanks for your comment

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Tony Garcia, P. E.  
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(850)531-0002

Comments:

Duane: Please find attached my comments regarding the Control of Work-Shop Drawings item. Hopefully you can open the two comments I have made. But just in case, here they are:

1. 5-1.4.5.6 Beam and Girder...; 3<sup>rd</sup> sentence that starts “Adequately brace...and support conditions during all stages of erection (***from placing the first beam or girder to the last***) and deck construction. My concern is that the first beam or girder is usually the crucial one and should be stressed. The contractor should not place just one beam or girder and then leave for the day without making sure that it is braced properly.
2. 5-1.5.4 Erection, last paragraph: Is it the FDOT’s intent that the Specialty Engineer be the one that performs daily inspections of the erected structural members until completion of the deck concrete placement and prepares a report? As a Specialty Engineer, I am very interested in this requirement but can see problems with a structure that is not next door to our office. The cost of travel, room and board, for short work time could be prohibitive and dictate which SE would be hired by the contractor. On a very long viaduct running along an existing highway (such as is being proposed for I-595 or was done for the Tampa Hillsborough project), this cost could be high and extend for a long time. Could the contractor’s engineer carry out the inspection and prepare the report? One argument would be that the engineer would be called upon to make judgment calls when he/she saw something critical that would require the SE’s attention. But this could happen with any element of work.

Response: 1- This issue has been addressed in Section 5-1.5.4. For construction affecting public safety, the specification requires inspection of the erected member(s) prior to allowing traffic underneath the erected member(s). The beams shall be erected and secured as per the approved erection plan. The traffic underneath the erected member(s) will not be allowed until the members are inspected.

2- No, it was not our intent to require specialty engineer to perform daily inspections of the erected members. To clarify this further, the language in the proposed specification has been revised accordingly. It will be contractor's responsibility to certify to the engineer and to perform daily inspections of the erected members. It will be up to the contractors who actually perform these tasks. Please make a note that any deviations from the approved erection plan will require specialty engineer's approval.

Thanks for your comments

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Jason P. Spilak  
PS&E Manager, District 7  
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Comments:

It would be nice to include a sub-section referencing utilities here. Something to the effect, shop drawing shall be submitted for utilities as necessary.

Response: In general, the Department requires shop drawings for items of work not fully details in the plans that require additional drawings and clarification prior to constructing the item. This issue is out side of my expertise and scope of the proposed changes. Please coordinate your comment with the State Utility Office for further discussion and implementation.

Thanks for the comment

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Keith Waugh  
[kwaugh@lewarecc.com](mailto:kwaugh@lewarecc.com)  
352-787-1616, FAX: 352-787-3161

Comments:

All temporary bracing should be included in the contract plans, designed by the Engineer-of-Record. They have all the design data to analyze the structure. This analysis should be a normal part of their design effort. I believe that the engineering expense to the Department would be negligible as there would be no post-design review of a Contractor submitted shop drawing and

no inclusion of shop drawing/design costs in each bid. The construction cost would be the same regardless of who designs or installs the bracing. By requiring that the EOR provide the design, the Department will be able to review and comment on the design without affecting contract time and will also have input regarding cost. If the Contractor submits the design, the EOR will be hesitant to approve another Engineer's system. Ultimately the submittal and resubmittal process will be counterproductive to the Department's goal of expedited construction.

As recently evidenced, we will not be able to use a generically designed bracing system on multiple jobs. We will be required to resubmit the plan with new project references on each sheet. We will pay \$10,000 - \$15,000 per job, a cost put into each bid, and wait for a 45 day turnaround on each job.

Signed and sealed erection plans will drive up the cost of the projects significantly, without increased benefit. Again, the cost of the plan and a Specialty Engineer's site visits, meeting attendance, and the like will add considerable costs. Again, without benefit.

The daily inspection and documentation within 24 hour requirement is unnecessary. We erect beams over another road, immediately brace them, pour the diaphragms within a week, and provide written inspections of the beams every 24 hours for the next 4 weeks..... again, unnecessary.

Response: Your concerns were discussed during the FDOT/FTBA meeting on Feb 1, 2008. The proposed specification sections have been modified to reflect some of your concerns. For simple span concrete girder bridges, the State Design Office is currently working with the FTBA (as agreed in the meeting) to develop with few typical common bracing details that the contractors may use without the shop drawing submittals and approval process. These developed details will eventually become part of the Design Standard drawings. For continuous steel and box girder bridges, the plans will show permanent (for steel plate girders) or temporary (for box girders) cross bracing details as necessary to meet the overall stability of the girder system as assumed in the design.

The EOR will not be responsible for detailing the plans for the work that falls under the Contractor's means and methods. The Contractor/Specialty Engineer will be responsible for designing the temporary supports and evaluating the stability of individual components during erection and to develop an erection scheme including bracing that meets the Contractor's means and methods.

The daily inspection of the erected members will only be required for construction work that affects public safety. We feel that daily inspections are very critical for the public safety. Once the members are installed as per the approved erection plan, the daily inspections will assure the department that nothing has been changed since the members were erected. The daily inspection should not take considerable amount of time unless there are changes in the system. The daily inspection requirement is one of the critical requirement/recommendation by the NTSB after the investigation of the failure of plate girder bridge over traffic in Colorado.

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Michael C. Bone, P.E.  
954-922-6917

Comments:

My comments relative to 0050104 Control of the Work - Shop Drawings are as follows:

Under Definitions Item "k", I suggest saying "between beams, girders, columns, piles, etc." Not essential, but columns are probably the most often braced element of falsework.

Under 5-1.4.5.7, items not allowed over active traffic, consider changing (a) to "Beam, girder and segment placement or post-tensioning." Keyways and areas of the joint face are susceptible to cracking or spauling when the PT load is applied. One could argue that grouting of ducts should be added. I understand they had some splatter on windshields on the Palm Beach Airport Interchange. Talk to some "segmental" folks before deciding.

Under 5-1.5.4, Erection, last paragraph, say "The Contractor will perform daily inspections....." I assume this is the intent. It was not clear upon reading if the Specialty Engineer is to do it.

Please feel free to call if you wish to discuss.

Response: 1- Has been modified accordingly.  
2- Since the chances of keyway failure and grout splatter are very rare and will require complete closure of all lanes during this operation, no changes are needed.  
3- The Specialty Engineer will not be required to conduct daily inspections. This has been clarified in the revised section.

Thanks for your comments.

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Regards,

Michael C. Bone, P.E.  
(954) 922-6917

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**From:** Boyd, Charles [mailto:Charles.Boyd@dot.state.fl.us]  
**Sent:** Tue 10/30/2007 10:40 AM  
**To:** Michael Bone  
**Cc:** Powell, Jr., Rudy; Robertson, Robert  
**Subject:** FW: Beam/Girder Stability

Michael,

Robert asked me to respond to your questions on beam and girder stability.

You are correct about SDG 6.8 not requiring an erection scheme to be shown in the plans for erecting one piece girders. SDG 6.8 requires the EOR to develop an erection scheme and to perform an overall stability evaluation of the superstructure that is consistent with the erection scheme for only the superstructure types listed, i.e. those types that require temporary supports, falsework or a specific construction scheme that is consistent with design assumptions. The EOR is not required to develop an erection scheme for common simple span concrete girders as they can typically be fabricated and erected without temporary supports, falsework, or otherwise any undue difficulty or distress.

To clarify the requirements of FDOT Construction Specification Section 5-1.4.5.6, we will move the first sentence that reads "For construction affecting public safety, submit calculations for stability for all beams and girders." to the end of the paragraph. The stability of all beams and girders during construction is solely the Contractor's responsibility as stated in this section, but for construction affecting public safety we want the erection plan to be submitted and reviewed.

The SDG and FDOT Construction Specification requirements are consistent with the LRFD Bridge Design Specifications Section 5.14.1.2.1 which states: "The preservice conditions of prestressed girders for shipping and erection shall be the responsibility of the contractor." The commentary for this section goes on to state: "*AASHTO LRFD Bridge Construction Specifications* places the responsibility on the Contractor to provide adequate devices and methods for the safe storage, handling, erection, and temporary bracing of precast members". Simple span one piece prestressed beams that are designed and constructed as is and has been typically done meet the requirements of the second paragraph of LRFD Section 2.5.3.

Hope this explanation helps clarify the FDOT requirements for beam and girder bracing. If you have any further questions or comments please contact us.

Regards,

Charles E. Boyd, P.E.  
Assistant State Structures Design Engineer  
Florida Department of Transportation  
Structures Design Office  
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(850) 414-4275  
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**From:** Robertson, Robert  
**Sent:** Tuesday, October 23, 2007 1:25 PM  
**To:** Boyd, Charles  
**Subject:** FW: Beam/Girder Stability

Please respond and tie the issue of contractor responsibility into the answer.

Robert V. Robertson, Jr., P.E.  
State Structures Design Engineer  
605 Suwannee St., MS 33  
Tallahassee, Fl. 32399-0450  
(850) 414-4267

**From:** Michael Bone [mailto:mbone@ceconstruct.com]  
**Sent:** Friday, October 19, 2007 11:00 AM  
**To:** Robertson, Robert  
**Subject:** Beam/Girder Stability

Robert,

Had a chance to digest SDG 6.8 (07/07) while reviewing the proposed shop drawing spec. The way I read it, one piece concrete girders are excluded from the requirement that the designer evaluate stability, wind or rollover, during construction. Is this the intent? My concern is that, if the span does not affect public safety it will not be reviewed under proposed 5-1.4.5.6 and, hence, may not be checked at all. A contractor could argue that, "stability during critical stages of construction" is the designer's responsibility under AASHTO LRFD 2.5.3, Constructability.

Michael C. Bone, P.E.  
954-922-6917

**Response: This issue has been addressed in the attached e-mail by Charles Boyd. Also, the specification has been modified to reflect the first comment above.**

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Christopher Wood  
904-380-5673

**Comments:**

The proposed modification is sorely needed and very timely (since the US 301 Overpass (Fin No 423028-1-52-01) is slated for construction in 2008/2009). I have been somewhat concerned as to how we would handle this issue. Hopefully this change can be incorporated into our contract. Great job.

**Response: No response needed. Thanks for the comment.**

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Eric R. Jagers  
Project Administrator  
Leesburg Operations

Phone: 352-326-7715  
Cell: 352-267-9587  
Fax: 352-315-3161

Comments:

\* It may be necessary to clarify or list any situations in which erection operations will be effecting public safety. This seems clear but there will be instances where this may be questioned (driving under, walking under or boating under). Will the same apply to bridges over railroad tracks. The question is to what extent will the operations be effecting public safety?

Response: Construction affecting public safety has been clearly defined in Section 5-1.4 (d). No further clarification is needed.

Thanks for the comment

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Jose S. Rodriguez  
Tel:813-281-8221  
FAX:813-288-9072  
[jsrodriguez@pbsj.com](mailto:jsrodriguez@pbsj.com)

Comments:

- 1) 5-1.4.5.4: It appears "formwork" should be added to the list of items requiring shop drawings and calculations (when formwork is Construction Affecting Public Safety).
- 2) 5-1.4.5.6: In the first sentence, Construction Affecting Public Safety should be capitalized.
- 3) 5-1.4.5.7: The list of activities not allowed over traffic appears to be out of place here, since some of the activities are not related to girder erection.

- Response:
- 1- The Section 5-1.4.5.5 requires shop drawings submittals for formwork and scaffolding when the work affects public safety.
  - 2- Has been modified accordingly.
  - 3- This requirement has been moved from the specification to the Design Standards.

Thanks for your review comments

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Scott Arnold  
Email:[scott.arnold@dot.state.fl.us](mailto:scott.arnold@dot.state.fl.us)  
Tel:813-975-6136  
FAX:813-975-6150

Comments:

- 1. Rewrite Section 5-1.4.1(k) as, "Bracing is a temporary component which consists of members placed between beams, girders, piles, etc. to provide stability.

2. Section 5-1.4.5.7(c), consider changing from "Concrete deck placement" to "Concrete placement", so other structures such as straddle piers would be covered.
3. Rewrite Section 5-1.4.5.7(d) as, "Railing construction located at edge of deck."

**Response:** 1- Has been modified to comply with other review comments as well.  
2- Agree, will be changed accordingly.  
3- Agree, has been changed accordingly. Please make a note that the construction activity restrictions have been moved from the Specification to the Design Standards.

Thanks for your review comments

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Mayur Patel  
[mayur.patel@dot.state.fl.us](mailto:mayur.patel@dot.state.fl.us)  
UserTel: 352 955 6626, UserFAX: 352 955 6640

**Comments:**

The following are the comments from State Materials Office, submitted by Ghulam Mujtaba and Rod Powers.

- 1.I recommend the modification of the definition for the erection of the beams and other bridge structures as follows: Brace is any temporary structural member used to provide lateral support to beams, girders, piles and other permanent structures during the construction activities.
- 2.It may be beneficial to require PCI and AISC Erector Certification for contractors who perform the erection of prestressed concrete and steel members, respectively.
- 3.Subarticle 5-1.4.1(c): The last part of the temporary work includes, cofferdams, and special erection equipment. These items do not belong to the definition of the temporary work. I recommend changing the last part to read: ".....temporary earthworks, and construction of sheeting and cofferdams, and placement or movement of the erection equipment.
- 4.Subarticle 5-1.4.1(k): Change Bracing to Brace to read: Brace is any temporary structural member or multiple members used to support beams, girders, piles and other permanent structures during the construction activities.
- 5.Subarticle 5-1.4.5.6: Change the title to "Construction Affecting Public Safety". Change the text of the fifth line to read: ".....wind or incidental construction loads, including the weights of forms and other temporary loads, especially....."
- 6.Subarticle 5-1.4.5.7 third line: Change " ....are not allowed over the active traffic:" to "....are not allowed on the bridge over the roadway while traffic is moving:".

7.Subarticle 5-1.5.4, third paragraph: Change the first sentence to read: "After erection of the elements, but prior to opening of the roadway, beneath the bridge, to the traffic or public, ensure that the Specialty Engineer.....".

8 Subarticle 5-1.5.4, last sentence (editorial comment): A period is missing at the end.

**Response:** 1- The definition has been modified in agreement with other review comments as well.

2- Please see the response under Ghulam Mujtaba.

3- Please see the response under Ghulam Mujtaba.

4- Please see the response under Ghulam Mujtaba.

5- Please see the response under Ghulam Mujtaba.

6- Please see the response under Ghulam Mujtaba.

7- Please see the response under Ghulam Mujtaba.

8- Please see the response under Ghulam Mujtaba.

Thanks for the comments

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Fred R. Ochoa, PE  
District Structures Design Engineer, D4  
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John Danielsen  
District 4 Structures and Facilities Engineer  
(954) 777-4644

Comments:

**From:** fred.ochoa@dot.state.fl.us [mailto:fred.ochoa@dot.state.fl.us]

**Sent:** Friday, November 02, 2007 1:26 PM

**To:** Brautigam, Duane; Pavlov, Andre

**Subject:** Fw: Industry Review - 0050104 Control of the Work - Shop Drawings

Duane and Andre,

I don't have any objections to the specification change. John Danielsen, is concerned about a conflict with the SDG. Has this been resolved?

----- Forwarded by Fred Ochoa/D4/FDOT on 11/02/2007 01:24 PM -----

**John Danielsen/D4/FDOT**

To Fred Ochoa/D4/FDOT@FDOT

cc

10/17/2007 12:11 PM

Subject Fw: Industry Review - 0050104 Control of the  
Work - Shop Drawings

Look at this link - I'm not sure you have been told. Up for review is shop drawings section and has to do with added stuff about beam erection and stability. I worked on this last year - it looks

like they took the stuff we used on the SR 60 project. You need to make sure that the SDG removed the part where the EOR is responsible for this, since it would create a conflict.

**Response: The SDG has been modified accordingly. There is no conflict between the proposed change and SDG language.**

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Chris Papastratis  
District 4 Construction Office  
(954) 777-4193 / SC 436-4193  
(954) 448-1043 Cell

**Comments:**

5-1.5.4 (new subarticle) : third paragraph- Not sure if constructed is applicable... I would eliminate and constructed after erected. The Specialty Engineer is only responsible for the erection plan.

Last paragraph: the way it reads, it is the contractor's responsibility to inspect daily, not the Specialty Engineer, correct?

By mistake, I did not sent this review out on time. The review comments were due on 11/12/07.

**Response: 1- Agree, has been modified accordingly.  
2- The Specialty Engineer will not be required to perform daily inspections. This issue has been clarified in the revised paragraph.**

**Thanks for your comments**

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