



Architecture Engineering Pla

January 8, 2004

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Re: Orpheum Theatre Terra Cotta Restoration  
Project Update  
HGA Commission Number 0781-006-25

Dear Tom:

I would like to take this opportunity to give you a project update. I visited the site shortly after our December 1, 2003 introductory meeting and again during the week of December 8, 2003 and December 15, 2003. Pay Application 2, from Macpherson-Towne, has been forwarded; and I will give you some feedback on that as well.

Considerable gains had made since my previous visit in November. Macpherson-Towne has increased the number of people on the crew in order to finish the job as quickly as possible. When I stopped by December 21, 2003, the crew was packing up staging equipment and cleaning up the site.

On one hand, this is good news since it means the building will spend less time exposed to harsh winter conditions. Unfortunately, certain areas that required further investigation of underlying structural steel have been repaired at the surface level without the benefit of a more thorough evaluation of the steel support system. The lack of follow through on investigation requests has been a source of frustration on this project. The following is a general summary of work performed to date. Reference to the Scope of Work described in the Contract Documents for Priority Level "A" items are provided to help qualify my revisions to the investigation component on the second Application for Payment.

With the scaffolding down, I was not able to evaluate the extent or quality of repairs recently made to the balcony from the balcony level. We will have to find some way to review that area. In particular, I would like to see what waterproofing measures were applied to the end piers. A recent conversation with the site supervisor leads me to believe that the metal flashing details provided were not implemented (See 14.2/4-9). I am concerned that reliance on a masonry patch may result in similar failure in the future.

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I would also like to verify the status of RFP-2R dated October 8, 2003. This RFP dealt with waterproofing issues at the balcony. At one point, Wayne Olson had verbally agreed to authorize this work, but I have not seen written confirmation or received a change order from the contractor. To protect the terra cotta at the base of the balustrade, it is important that the metal flashing lining the balcony floor, and returning at the base of the terra cotta toe rail, has been repaired where it had previously pulled away. Installing a drain cover at the south end drain will help prevent drain blockage and the kind of severe freeze/thaw damage that has already occurred at the north end. The staging has been removed, and I was not able to review the work in this area. At this point, I am not sure which waterproofing measures have been taken.

The north end balcony pier is missing one or two capstones. Although not part of the original inventory or shop drawing total, these units may have already been compromised; and, therefore, vulnerable to the deconstruction efforts required at the brick pier. I spoke with Mark Macpherson, and he is aware that replacement pieces need to be ordered. An expected delivery date was not given, however, replacement pieces typically take 90-120 days after approval of shop drawings to arrive on site. We may want to consider covering this area until repairs can be made.

The lintel on Hawthorne is complete and once again spans the opening without supplemental wood bracing. Although structural integrity has been restored to the lintel, the quality of the masonry work on the Hawthorne side may have suffered from a rush at the end to finish the project. One of the new terra cotta units appears to have been installed with a badly damaged corner. This is unacceptable, and the unit should be replaced.

As we have discussed previously, a few areas have been thoroughly investigated and appropriate repairs made to steel and effected masonry. These repairs should perform well for years to come. The remaining areas, those where surface repairs have been made to masonry but underlying structural steel and terra cotta anchorage were not investigated or repaired, remain a concern and should be watched closely for signs of advancing deterioration. We expect that further deterioration will accelerate less aggressively now that water is being kept out of the system. However, as backup and anchorage steel continues to degrade over time, cracks in masonry joints and masonry units will begin to reappear, and the deterioration cycle will continue to worsen.

There were eight primary areas given the Priority Level "A" designation. I will discuss each one in turn and point out the extent of work completed for each area:

- South Tower (2/ A401 & 2/A402): All required work has been completed.

Condition of brick masonry above the terra cotta cornice: Brick masonry on the south elevation of the south tower was bowed outward and loose. Underlying steel structure was investigated in 2002 and found to lack structural integrity. Recommended steel repairs were provided in RFP-1, October 7, 2002. Masonry on remaining sides was completely repointed.

2. Terra cotta corner cornice units: The corner unit presented in detail 28/4-9 demonstrated the most severe outward physical deterioration. It was sacrificed in order to investigate the structural steel support system. Our structural engineer determined that the steel, although corroded, was capable of providing adequate support for the corner unit. It was

recommended that exposed steel surfaces be ground down to solid metal then prepared to receive a high performance coating as per RFP-1.

Since the steel supporting the most damaged unit was determined to be structurally sound, it was reasoned that steel at other corner units would be in as good or better condition. Due to budget constraints, it was decided that investigation of steel at other corner units was not required unless anchorage of a particular unit was found to be unstable. The contractor determined that remaining corner units were stable, and repairs were made in situ. We expect that as long as water is kept out of the system, repairs made to the terra cotta units should extend the life of the assembly for some time to come. However, since underlying steel was not repaired, I would recommend that these units continue to be evaluated for signs of advancing deterioration. Should conditions continue to worsen, replacement is recommended.

The corner units were the largest and most expensive pieces scheduled for replacement. Construction Documents indicated replacement of nine corner units. The revised shop drawings placed an order for one unit. I would expect significant cost savings associated with this change. The difference will be accounted for in a future change order.

- North Tower (2-3/A401): Investigation of steel not completed.

Condition of brick masonry above the terra cotta cornice: Visible cracks were observed in brick masonry and joints on the north elevation of the north tower. Given the discovery that the integrity of structural steel at the south tower was compromised, the contractor was asked to investigate underlying steel at the north tower. Unfortunately, masonry repairs were completed without investigation of steel. Based on similar conditions found at the south tower, we expect steel in this area to be extremely corroded. Although masonry on all sides was completely repointed, deteriorating steel will continue to exert pressure on adjacent masonry. This area should be watched for signs of advancing deterioration. Should cracks begin to reappear, masonry should be removed and steel investigated and repaired.

2. Terra cotta corner cornice units: The corner unit presented in detail 34B & 40.2B/ 4-9 had a significant horizontal crack. The contractor determined that the unit was stable, and subsequent terra cotta surface repairs were made in place. As an added safety factor, we recommended anchoring the bottom section to sound substrate above. Although apparently sound, this unit should be monitored periodically.

Although not part of the current Scope of Work, we talked at our previous meeting about taking advantage of the staging to selectively investigate the steel at the impost blocks along Hawthorne. This is no longer a matter of convenience and will probably have to wait for the next round of restorative work.

- Cornice (2/A401; 30-31.1/4-9): Investigation of steel not completed.

The cornice has been, and still remains, an area of primary concern. There has been extensive water damage to this area over a long period of time and evidence of advanced deterioration is observable both externally and from inside the building. Bid documents request investigation of terra cotta anchorage systems and supporting steel. Due to limited accessibility and assumed fragility of damaged units, we recommend non-destructive testing and investigation of this area from inside the building. Macpherson-Towne was unable to secure a fiber optic scope and other avenues of investigation were not explored. However, we feel that investigation of this area is critical and should be pursued with a consultant or contractor that has access to the appropriate technology and available resources.

Terra cotta surface repairs have been completed.

- Balcony window surrounds (2/A401; 15, 17-18/4-9): Investigation of steel completed.

Terra cotta has been replaced in the first and second bays. The restorative work appears to be very well done. After a brief evaluation of steel at the window headers in bays one and two, it was determined that further investigation was not required at this time. Terra cotta repairs have been completed.

- Balcony (2/A401; 10-24/4-9): Investigation and repair of steel partially completed.

- 1 Terra cotta and masonry at the south end of the balcony (bay one) has been completely rebuilt and repairs to structural steel and masonry anchorage have been made. (See RFP-3, October 8, 2003).

Investigation of structural steel at the north end was, at MCDA's request, not completed. Due to the extent of deteriorated steel encountered at the south end, steel integrity at the north end, which demonstrated similar surface damage, remains a concern. This area should also be monitored for changes in surface appearance. Any signs of advancing deterioration should be addressed in the next restoration phase.

3. The condition of the north end drain has not been fully addressed. The north drain was blocked when work began. When the contractor reopened this drain, water began leaking through soffit joints below. We believe the drain piping is cracked somewhere between the drain and entrance point to the building. Due to budget concerns, the direction from the MCDA was to block the drain rather than undertake extensive repairs in the area. Although blocking off the drain will keep water from entering the soffit, it also allows a substantial amount of water to continue pooling behind the baluster toe rail. This adds additional weight to what we believe is an already compromised structural system. Our recommendation is that water pooling in this area be removed frequently.

Aside from the issues related to waterproofing, balcony repairs appear to be well done from a street level view. As the new terra cotta patinas with age, it will be difficult to differentiate the replacement terra cotta from the original units.

- Dripstone @ Corner of 9<sup>th</sup> and Hawthorne (2-3/A401; 37B, 40B, 40.1/4-9): Investigation of steel not completed.

Due to the integration of masonry, terra cotta and steel systems at the corner, the contractor and architect agreed that a full investigation of backup steel would be difficult to achieve without causing additional damage to adjacent masonry. Given the tight budget, it was thought that the money required to unravel the intricacies of the original construction at this location might be better spent in other areas. The broken unit shown in 40.1B/4-9 was replaced.

Lintel (3/A401; 41- 45/4-9): All required work has been completed.

Terra Cotta Units in this area were severely damaged. The Contract Documents assumed 100% replacement of terra cotta. Some of the upper band dripstone units were salvageable and shop drawings were revised accordingly (three out of ten were scheduled for replacement). There were some units requiring replacement elsewhere in the project that were missed when the shop drawings were first issued. These would more or less offset the number taken out of the lintel and associated cost implications would be minimal.

2. Steel anchorage in this area had failed years ago and the assembly was supported on wood bracing. There was real concern as to the integrity of the underlying primary steel structure as well. Steel investigation performed by our structural engineer found the primary system to be compromised due to the effects of long-term water penetration. Connection capacity at the ends was determined to be adequate but the steel itself required reinforcing. Repair recommendations were issued as RFP-4, November 11, 2003. Repairs have since been made and terra cotta has been reinstalled.
- Stage House Corner (3/A401; 67-68, 68.2B/4-9): Investigation of steel not completed.

- 1 There are a number of severe cracks observed in brick masonry at the northeast corner of the stage house. A large vertical crack on the east face runs through head joints and brick units alike. Terra cotta units have also shifted at this location. The north face again shows significant vertical and diagonal cracks. This pattern is consistent with deterioration of underlying structural steel, in this case a corner column and beam connection are likely candidates.

Construction Documents request that a section of brick at the northeast corner be removed so that a structural engineer can investigate the integrity of structural steel in the area described in detail 67/4-9. Again, masonry repairs were made before structural steel was investigated. Although water no longer has a direct access to the underlying steel, deterioration in this area is believed to be serious and sooner or later we would expect cracks to reappear in these same areas.

2. Brick masonry has been repointed as indicated on the drawings.
3. Terra cotta repairs will be reviewed the week of January 12, 2004.

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In summary, Macpherson-Towne did a great job repairing the 9<sup>th</sup> Street façade. Their brick masonry work is exceptional. Considering the nature of terra cotta construction and the difficulties of extrication and insertion of replacement units, the terra cotta work is, for the most part, acceptable. We were disappointed to see the damage caused to intact dripstone units as one horizontal joint was mechanically ground out and, as stated earlier, the installation of a replacement unit with a damaged corner will not be accepted.

I still have reservations about the investigation work. I do not feel that nearly enough investigation work was accomplished on this job. Steel investigation could have taken place much earlier in the year, and repairs made before terra cotta arrived. I believe that some of the missed opportunities are likely a result of the late startup for work begun in 2003, and the rush at the end to close out the project. Of the eight areas slated for investigation: 44% were fully investigated, 19% were eliminated or held over for future phases, the remaining 37% are outstanding.

We will sign off on Pay Application 2 with revisions to the investigation component. Mark Macpherson and I will try to meet next week on site for a walk through. If you care to join us, let me know your schedule, and we can we try to arrange a time to meet at your convenience. The punchlist will summarize the site evaluation.

This should bring us all up to speed.

Sincerely,

HAMMEL, GREEN AND ABRAHAMSON, INC.



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