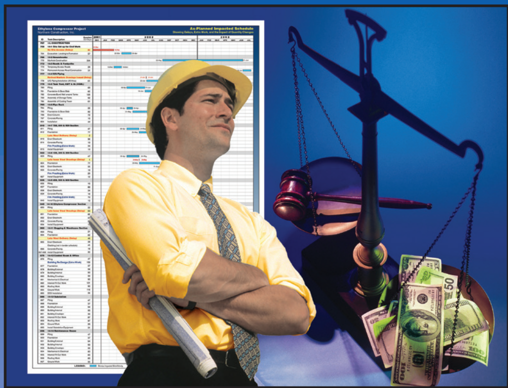

Construction Labor Hour Productivity Claims – Success or Failure?

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LONG INTERNATIONAL

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1. INTRODUCTION

Construction claims related to cost and/or productivity impacts often fail due to a lack of contemporaneous project documentation. Contemporaneous project documents must accompany a claim to substantiate the alleged impacts.

Preparation of a construction claim generally involves three components: (i) proving or demonstrating entitlement, (ii) establishing causation, and (iii) calculating damages. Factors pertaining to demonstrating entitlement and calculating damages are beyond the scope of this article,[1] which focuses on the causation aspect of construction claims related to productivity loss.

Causation is the connection, or cause-effect relationship, between the actions or inactions of the owner (or owner's third party, in which case the owner is contractually responsible) and the damages the contractor is claiming. Productivity (and/or damages) claims often fail because this cause-effect nexus is not established. Contractors often do not provide the supporting data necessary to successfully advance their claim.

For a construction claim, project documentation is the primary source data used to develop the link between the productivity impacts and/or delays and the root causes of those impacts. A project must be set up correctly on the front end and include detailed cost, labor, and schedule planning. Once this setup is complete, these items must be diligently tracked against the plan.

Regarding labor productivity, establishing proper cost codes (or cost accounts) based on the scope of work and the project work breakdown structure is a key first step in tracking labor hours.[2] Labor hour management is often the biggest risk on a construction project and frequently impacts project profitability. Therefore, it is essential to develop detailed, project-specific cost codes and coding structures for recording labor hours. The establishment of cost codes is typically a balance between necessarily managing labor hours and not making the coding so specific that it creates a burden on the field crews who need to track and assign their work hours to these codes. However, the expectations for field crews must be set such that they understand the importance of properly tracking and recording their time to the proper cost codes.

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1 For additional information on this topic, see Long, Richard J., Rod C. Carter, and Harold E. Buddemeyer, *Cumulative Impact and Other Disruption Claims in Construction*, Virtual Bookworm Publishing, https://virtualbookworm.com/collections/all-books/products/cumulative-impact-and-other-disruption-claims-in-construction.

2 The terms "cost codes" and "cost accounts" are used interchangeably and often vary per individual company. For purposes of this article, the term "cost code" is used.

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Several items are listed below that a construction claims expert should consider when preparing a productivity (or damages) claim in addition to what the contract may require.

- The contractor should reserve its rights (if applicable);
- The contractor should adhere to the contract change notice requirements;
- The claim should flow from an entitlement;
- There should be a causal link between the claimed labor hours and labor costs and the entitlement (and this link should be identified);
- The contractor should demonstrate that the claimed productivity loss was not self-inflicted;
- If the contractor was responsible for certain productivity loss, these labor hours and costs should be identified;
- The contractor should make an effort to mitigate impacts;
- The costs should represent actual damages;
- The claimed costs should not be duplicative with other claimed costs;
- The claimed costs should be reasonably incurred; and
- The claimed costs should be properly supported.

This article discusses two actual claim scenarios in which the author provided expert witness support to subcontractors that were advancing claims to the owner through the general contractor. In the first scenario, the subcontractor established project controls that formed the basis for a detailed tracking system for the project. This tracking system included the establishment of project-specific cost codes and a baseline schedule that identified the subcontractor's plan to build the project based on its bid and information received from the general contractor. As project impacts occurred, the subcontractor thoroughly documented the delays and impacts to its work.

In the second scenario, the subcontractor set up generic and high-level cost codes that included a significant number of labor hours in each of the individual codes. The codes were not sufficiently detailed to allow the subcontractor to track its labor and understand its actual labor costs as compared against its budget. As impacts occurred on the project, the subcontractor neither thoroughly documented the impacts to its work nor provided the general contractor with proper notices of the impacts.

These scenarios are examples of what to do and what not to do when managing a project that is experiencing delays and disruption to the work.

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Although this article is not intended to be a description and summary of various methodologies related to productivity analyses, several methodologies are discussed.[3]

2. PRODUCTIVITY CASE STUDIES OF TWO REPRESENTATIVE PROJECTS

The two projects discussed below are actual projects in which the author provided expert witness support during the claims process. The projects are discussed as specifically as possible without divulging confidential information.

2.1 PROJECT NO. 1

The analysis of this project occurred after the project was complete and the subcontractor was anticipating submitting a claim for delay and productivity loss. As a first step in the development of the claim, the author interviewed the project team and had access to the following documents:

- Construction subcontract;
- Subcontractor's estimate;
- Daily reports;
- Direct labor payroll data;
- Electronic and PDF schedules;
- Project correspondence (letters and emails);
- Budgeted labor hour data;
- Change request/change order documentation and associated logs;
- Request for information (RFI) log; and
- Contract drawings.

Review of the above documents indicated that the subcontractor had established sensible cost coding to track its labor hours. The cost codes were set up such that there was not an excessive number of labor hours in any one cost code. The establishment of cost codes is typically a balance between a necessary way to manage labor hours without making the coding too specific such that it creates a burden on the field crews that need to track and assign their labor hours to these codes. For this project, the labor hours were well balanced and set up in a structure based on the scope of work and the project work breakdown structure.

However, labor is often the most challenging aspect of a construction project to track and manage. Labor overruns can mean the difference between a profitable project and one that is not. Although management staff should not burden field crews with an excessive number of cost codes, it is

[3] See AACE® International Recommended Practice 25R-03, "Estimating Lost Labor Productivity in Construction Claims," Rev. April 13, 2004. See also the American Society of Civil Engineers (ASCE) Standard ANSI/ASCE/CI 71–21, "Identifying, Quantifying, and Proving Loss of Productivity," © 2021.

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important to establish a well-developed coding system that allows project management staff to sufficiently track labor overruns and underruns.

Review of the documents indicated that the actual labor hours were approximately double those planned in the subcontractor's bid and that the project was executed much differently than was anticipated in the subcontractor's bid and baseline schedule. Instead of the work flowing in a logical and efficient manner, the subcontractor had to perform much of its work out of sequence and frequently relocate labor resources to areas in which work was available.

As the author interviewed project staff and reviewed documents, it became evident that most of the project was impacted by owner-responsible events that resulted in productivity loss. Because of this, a measured mile analysis to establish productivity loss was not feasible. This methodology requires a performance period during which some part of the contractor's performance was not impacted by owner-responsible delay and disruption events to establish the "measured mile." Depending on the particulars of the project, the measured mile is considered to be one of the best methodologies for calculating productivity loss.

One of the many attributes of a measured mile analysis is that the bid productivity does not need to be verified. Because the measured mile analysis is based on the productivity actually achieved during periods where no impacts occurred compared to the impacted period, the planned productivity does not factor into the analysis.

When the measured mile methodology is not or cannot be used, the analyst should consider the contractor's planned labor budget estimate and establish that the productivity loss was not due to a bid error. For the subject project, the subcontract was competitively bid and the bids were all within a few percent (of total cost) of each other. This proximity of bids is typically indicative of an accurate bid, although the analyst should still review the contract bid as part of the analysis.

In the absence of a measured mile, several other methodologies are available,[4] including the use of factors. Several guidance documents are available for this type of analysis, including guides from the Mechanical Contractors Association of America (MCAA) and Electrical International (The Foundation for Electrical Construction, Inc.).

This methodology involves selection of factors (listed in the published guidance documents) to represent the various impacts that contributed to a contractor's productivity loss. Examples of these factors include, but are not limited to, overtime, stacking of trades, out-of-sequence work,

[4] This article is not intended to discuss the various methodologies for calculating productivity loss. For additional information on these methodologies, see Long, Richard J., Rod C. Carter, and Harold E. Buddemeyer, *Cumulative Impact and Other Disruption Claims in Construction*, Virtual Bookworm Publishing, https://virtualbookworm.com/collections/all-books/products/cumulative-impact-and-other-disruption-claims-in-construction.

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and dilution of supervision. These factors can be applied to the remaining planned labor hours to forecast future productivity loss, or they can be applied to actual labor hours to estimate productivity loss on completed work. Because the subject project was complete, only actual labor hours were used for the productivity loss calculations (although planned labor hours could also be used for a completed project).

The productivity guides referenced above allow the analyst to choose severity of factors affecting productivity, typically based on minor, moderate, or severe impacts. The factors and severity are chosen after a detailed and thorough causation analysis. Importantly, the factors and severity do not have to be assigned uniformly across all work. For example, only certain labor hours may have been affected by out-of-sequence work. The factor should only be applied to the labor hours (and associated cost codes) that were affected by the out-of-sequence work.

Similarly, the severity of the factor does not have to be uniform across time. For the out-of-sequence work example, there may be a time when the work was more impacted than others. In this circumstance, the analyst may choose a minor factor for one duration of the work and a moderate factor for another. The analyst must thoroughly document the selection of the factors and associated severity, including a description of the basis on which these factors were selected.

One of the benefits of detailed cost codes is that they allow a productivity analysis to be more specific and only address the impacts to labor hours associated with a certain scope of work. As an example, if a framing contractor has one cost code for framing work on a ten-story building and only one floor is impacted, it is difficult for the contractor to make the connection between the impact and the additional labor hours in the cost code. In this example, a schedule nexus showing when each floor was framed may be helpful to separate the labor hours. However, if one cost code is established for each floor of the building, then this correlation is much easier as long as contemporaneous product documentation is available to support the claim.

Upon selection of the methodology, the author performed a detailed review of the project record, including analysis of the subcontractor's daily reports. Daily reports can be one of the most helpful support documents to establish causation, as they are prepared contemporaneously by the contractor and should (if properly prepared) include notes related to anything impacting the planned work that occurred on a given day.

As the project documentation was reviewed, it became evident that the subcontractor's daily reports were thorough and included information on the cost codes that had been worked on each day and the specific area of the project in which the work had been performed. The subcontractor had sufficient detail in the cost codes, but the daily reports provided further detail.

Additionally, the daily reports included notes on any current impact on the work and included photographs supporting the data within the report. Samples of the daily report entries are noted below:

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> *Stop work order by [general contractor] in place for rough in work. Need this stop work order lifted.*

Another daily report indicated:

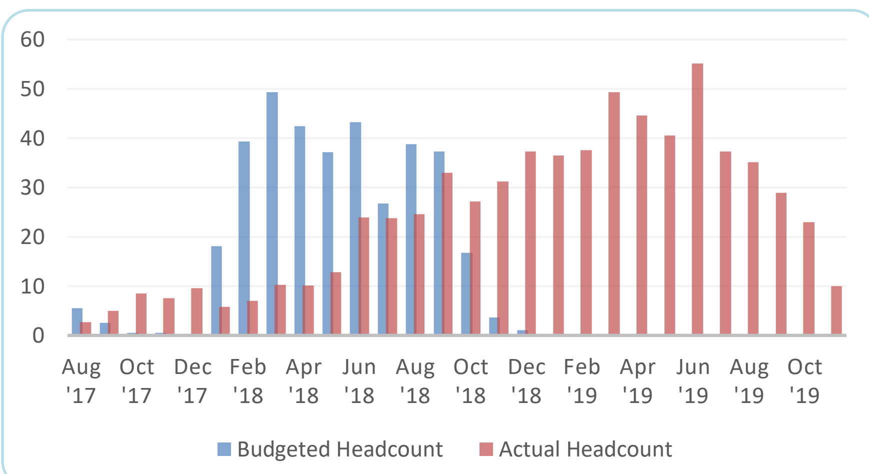
> *Other trades material stored without coordination throughout [area] prevent efficient installation.*

Each of the excerpts above were noted in respect to the area in which the work was to be performed and the type of work that was anticipated in the area.

As the daily reports were reviewed, a table was developed that documented the impacts by scope of work, area, and day. Use of this data and the date of the report facilitated the causation analysis and the selection of the factors affecting productivity (discussed above).

The subcontractor's schedules were resource-loaded, which assisted in the comparison of planned vs. actual labor hours. The planned labor hours were obtained from the resource-loaded schedule and the actual hours were obtained from the subcontractor's payroll software (that had been properly set up utilizing cost codes). A comparison of planned vs. actual labor hours yielded the headcount histogram displayed in Figure 2-1 below:

Figure 2-1: Budgeted vs. Actual Headcount[5]



[5] The data in the headcount histogram is taken directly from the project. However, the dates have been changed for purposes of this article.

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It is evident from the figure above that the work took much longer than planned and the peak headcount was reached much later than planned. Additionally, a larger labor force was required than the subcontractor anticipated.

When presenting a claim, it is the author's experience that graphics such as the histogram above are extremely helpful in furthering a damage and/or productivity analysis. This graphic is a simple representation of the difference between the subcontractor's planned labor and actual labor due to the impacts. One does not need to be a construction or productivity expert to note the huge disparity between the as-planned and as-built conditions.

The subcontractor's schedule was also used to compare its planned durations with the actual durations. Due to the productivity impacts, the activities took two to three times longer to complete than planned, which further supported the analysis. A schedule analysis is typically used to establish causation in a construction delay claim, but the schedule can also be useful in aiding a productivity claim. When submitting a construction claim, there is no such thing as too much support.

As further support for the subcontractor's claims, the subcontractor sent letters to the general contractor that included detail on the delay and disruption occurring on the subcontractor's work. These letters further validated the data in the daily reports. The project manager sent letters noting instances of design changes, out-of-sequence work, delayed predecessor work, late release of drawings, and the frequent changes to the overall schedule. The letters noted that these impacts were resulting in labor inefficiencies.

After reviewing the project record and developing a summary and timing of the issues, factors were selected to model the impacts to the subcontractor's productivity. Factors and severity levels were carefully selected based on the timing of the impacts and the degree of impact the factor had on the work.

In any construction project, no party performs perfectly and contractors advancing productivity claims must acknowledge their own contributions to productivity losses. A claim in which the contractor claims all of its lost labor hours is typically seen as highly suspect. This problem must be kept in mind by the claim analyst, who must strive to develop a reasonable and well-documented basis for the claim.

Because the contractor took the time to set up the project with sensible cost codes and kept detailed and contemporaneous data on the impacts as they occurred, the author was able to perform a detailed and well-supported productivity analysis.

Although outside the scope of this article, it is important to note that expert testimony is an important factor when pursuing a productivity claim. Courts, as well as United States and international arbitrations, look to construction expert analysis as described above when considering a productivity claim and its validity.

2.2 PROJECT NO. 2

For this project, the author was engaged to perform a schedule and productivity analysis for a subcontractor on a project that was not yet complete. The subcontractor intended to pass the claim to the owner as part of the general contractor's claim. The subcontractor complained of delays and significant productivity losses based on its actual labor hours, potential productivity losses on its remaining labor hours, and the possible need to accelerate. The subcontractor produced documents similar (although less detailed) to those provided for Project No. 1 above.

Upon initial review of the project record and interviews with subcontractor personnel, several issues were identified that would be problematic in advancing a claim for productivity loss. The first issue was the nature of the subcontractor's bid. The bid was not competitive, as the subcontractor had teamed with the general contractor to prepare the overall bid package that was submitted to the owner. If the measured mile methodology could not be used (for example, because there was no period of unimpacted work), the subcontractor's bid may need to be verified by a third-party expert. In a claim situation, if a contractor's bid forms any part of the basis of the claim, it is necessary to demonstrate that bid error is not being wrongly claimed as owner-responsible productivity loss.

The second issue pertained to the subcontractor's cost codes. Based on the size and scope of the project, the cost coding established to track labor hours was (in this author's opinion) too high-level and resulted in the individual codes containing an unacceptably high number of labor hours. Although the subcontractor's bid was detailed by different work areas and further broken out by the specific types of work, this detail was not carried into the establishment of the cost codes.

To reiterate, causation is the cause-effect relationship between the actions or inactions of one party and the resulting delays and/or impacts to the other party. For a productivity analysis, detailed labor hour data is needed such that the impacting events can be linked to labor hours to show how the impacts caused an increase in labor hours, forming the basis for the productivity loss. When cost codes are too high-level, this correlation is very difficult to make, unless the impact negatively affected all of the contractor's work in all areas. Again, if a framing contractor has one cost code for framing work on a ten-story building and only one floor is impacted, it may be difficult for the contractor to make the connection between the impact and the additional labor hours in the cost code. However, if one cost code is established for each floor of the building, this correlation is easier (if contemporaneous project documentation is available that supports the claim).

As the review of the project record continued, the labor hours did not appear to be recorded as intended. Further research into the subcontractor's labor reporting indicated that quantities were not being recorded in the field and, therefore, the labor hours were not associated with installed quantities. Quantity tracking was only being performed once per month as part of the pay application cycle. The quantities were billed per cost code, as well as the actual labor hours associated with each cost code.

The available data indicated that a measured mile analysis would be impractical due to the high-level nature of the cost codes. Other productivity loss analyses would also need to be performed at a high level due to the lack of detail in the cost codes.

To piece together the labor data and quantities, this author used the monthly pay applications and performed an earned value analysis using the monthly quantities and labor hours. The earned value analysis yielded sporadic data related to the cost codes. The analysis indicated that some of the cost codes were forecast to have significant overruns, while others were forecast to have significant underruns. Further, the data suggested that, despite the subcontractor's claims of productivity impacts, the subcontractor was forecasting a significant underrun in overall labor hours and a corresponding savings with respect to the labor budget.

Although earned value measurement is typically a valuable tool to understand labor hour forecasts, measuring data only once per month at a high level of the work scope does not provide enough detail to be useful to a project team. The data was also based on the high-level cost codes, which made it even less accurate for gaining an understanding of the labor and material forecasts.

In addition to the concerns regarding the labor reporting, the contemporaneous records kept by the subcontractor lacked detail. The notes in the daily reports were vague and insufficient to support any claims related to productivity.

These vague reports, coupled with the lack of detail found in the high-level cost codes, precluded the identification of where the subcontractor had planned to work and the reasons why the work was impacted. As noted in the discussion of the other project associated with this case study, more detailed cost coding allows more granularity when performing a productivity analysis.

Discussions with the project management team revealed that the culture was "field driven" and that the project management team did not want to create a burden on the field crews by requiring them to utilize a larger set of cost codes and to report installed quantities, which would have allowed the management team to have a more direct insight into the labor budgets and performance. Further, the management staff did not require detailed daily reports, as they wanted the crews putting work in place, not doing paperwork.

The adage of not burdening field crews with paperwork is sometimes found in construction companies. Although field crews are responsible for putting work in place, it is essential that they document their installed quantities and associated labor hours using an appropriate level of detail in the cost codes. A contractor's objective should be to build a good project and be profitable while doing so. Failure to accurately track labor is often the cause of a project being completed over budget.

One positive attribute of the subcontractor's project controls tools was that it created a detailed schedule that was updated monthly. Additionally, the subcontractor received the general contractor's schedule updates. The general contractor made frequent changes to the logic in its schedules based on impacts from the owner, and the subcontractor implemented these changes into its own schedules. However, the subcontractor did not document the reasons for the changes to its schedule. In these situations, it is helpful for contractors to prepare schedule narratives that outline the basis for the changes to the schedules and logic.

A schedule analysis can be used to further support a productivity analysis. Although the subcontractor's other data did not support the productivity impacts, the schedule analysis revealed that the subcontractor's remaining durations for many of its schedule activities were not progressed for months at a time, indicating that the work was started but not able to be completed. This information would have been good support for productivity impact claims if other documentation had also been available. For example, if the schedule activities corresponded to a more detailed cost code, labor hour overruns in the cost code (for a specific time frame) could have been compared to the extended duration of the schedule activity.

Based on the results of the earned value analysis and contemporaneous project information, the author could not justify the subcontractor's position in advancing the claim for productivity loss. The author prepared an internal report and analysis for the subcontractor's management team outlining the preliminary findings and recommendations not to pursue the claim. After discussions with the management team, the subcontractor agreed that it was in its best interests not to advance the claim for productivity loss.

3. CONCLUSIONS AND LESSONS LEARNED

When setting up cost codes and other project controls on a construction project, one should remember to begin with the potential end in mind. Although construction practitioners generally want to avoid disputes, it is always helpful to establish proper project controls in case a claim situation occurs. Further, setting up a project correctly is essential to accurately track and record labor hours and costs and may be helpful for estimating costs on future similar projects.

Because labor is such a volatile risk on a construction project, it is recommended that contractors implement a system to set up and track field labor and installed quantities weekly by cost code. As the project progresses, frequent monitoring should be performed on labor hours, and detailed records and correspondence kept to document any impact and/or changes to the contractor's work.

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Accordingly, proper and timely notices should be sent to the general contractor (in the case of a subcontractor) advising of impacts to the work.

Setting up a project budget and schedule correctly and keeping detailed records can be compared to buying insurance. It is often something that people do not want to deal with or think about (or spend the money on), but they are certainly glad to have it when they need it. The same is true for baseline schedule development, establishment of project-specific cost codes, and the related updating and tracking of actual performance against these baselines.

About the Author

__Scott M. Francis, P.E., PSP,__ is a Vice President of Long International and has over 23 years of experience in various areas of project management, contract disputes and resolution, CPM schedule development and execution, contract administration, design engineering, construction management, and government contracting. Mr. Francis has performed CPM schedule development and updating, project cost control, impact identification and causation analyses, change order pricing and resolution, retrospective schedule delay analyses, time extension and acceleration analyses, concurrent delay assessments, and damages quantification. Mr. Francis' work experience includes petrochemical, oil refinery, nuclear power, commercial, industrial, road/highway, and hospital/medical projects. He holds a B.S. degree in Civil Engineering from Colorado State University and a minor in mathematics. Mr. Francis is based in the Denver, Colorado area and can be contacted at sfrancis@long-intl.com and (303) 827-2489.