

# Time Impact Analysis – Impacted Timelines

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Some general rules/guidelines that should always be followed:

1. You become your company's voice (communicator) on any document that passes through the hypothetical walls of your company. You do not know who beyond your company walls will read and need to fully understand your communication. Many of the things I say in my daily reports class apply to any documentation. If at all possible do not cause others to question what you have written or require further information/clarity. This is a built-in administrative delay!
2. Never make the reader interpret acronyms/abbreviations. There first use in a document must provide the meaning plus the acronym, and then you can use the acronym/abbreviation in the document.
3. If you use standard industry estimating factors, explain and justify their use. <sup>1</sup>See below:

The intent of this publication is to provide a tool by which the construction industry—owners, architects, engineers and contractors—can arrive at a fair determination of costs that may be incurred when a project is impacted by various factors ranging from weather, stacking of trades, fluctuations in the size of work crews, delays, to factors that diminish productivity. The material contained in this manual is intended to assist you in planning and is not meant to provide absolute costs nor percentages which would be incurred. Each project, locale, situation is unique and variances will occur even within the same jurisdiction. Each organization utilizing this manual should determine how the material contained within these pages will apply to its specific circumstances, and must make individual decisions on contract terms. It is unlawful for contractors to agree to use any particular cost or percentage figure in contract provisions which can have an effect on the ultimate price.

The MCAA factors have proven to be a reliable means of estimating the loss of labor productivity on construction projects for over 30 years. The specific values shown in the factor tables must be applied with careful consideration and a review of the facts surrounding the events, which lead to the loss of productivity. The applications of the various MCAA factor percentages will vary as project conditions dictate. This manual will provide specific guidelines and examples of several methods of application for the proper use of the MCAA factors in calculating the loss of labor productivity on construction projects.

These factors listed are intended to serve as a reference only. Individual cases could prove to be too high or too low. The factors should be tested by your own experience and modified accordingly in your own use of them, since percentages of increased costs due to the factors listed may vary from contractor to contractor, crew to crew and job to job.

4. Always review for just plain good English.

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<sup>1</sup> Change Orders, Overtime, Productivity, MCAA, Publication M3

## OVERVIEW

<sup>2</sup>Unplanned delays on a construction project are often regrettable but unavoidable. If the party responsible for executing the contract (Contractor) has been delayed by the effects of a change in the work or an event that was beyond his or her ability to reasonably foresee and plan for in the bidding process, then the entity responsible for overseeing the contract (Owner/CM/GC) may be obligated to adjust the contract, depending upon the terms of the contract.

TIA is a simplified analytical procedure typically specified on construction projects to facilitate the award of excusable days to project completion, due to delays that were not the responsibility of the Contractor. The TIA process may also be used by the Contractor as an internal method to evaluate alternatives to regain or improve project completion for delays caused by the Contractor. Construction law in most localities require the injured party (in this case the Contractor) to petition for a contract time extension, if they have been delayed by the actions or inactions of parties not under their control. To this goal, many contracts specify that a TIA be prepared and submitted to objectively substantiate the Contractor's request for a time extension. Once the duration of time has been agreed upon then the added time-related costs of such a delay can be determined in terms of the contract.

The TIA procedure should be reduced to the most basic level possible and still reflect a reasonable assessment of the result of a delay. It is recommended that the time adjustment to the contract be calculated quickly, using an agreed upon standard method, with the results appropriate to the actual delay to a reasonable degree of certainty. The Owner should approve or reject this TIA strictly in accordance with contract terms and the same standard as was used by the Contractor. Time Impact Analysis is not an attempt to simulate reality, only to approximate it. It is a recognized analytical technique intended to facilitate a reasonable estimation of the time impact to the project caused by a single delay event or series of events.

**Here is where we must vary from a standard TIA. TIA are usually forecasts or estimates as they are done in contract to elicit quick COs. Once the impact has been felt, the workaround accomplished and money spent, the history side of the impact must be real data, no longer a future estimate. DO NOT ESTIMATE REAL/KNOWN DATA.**

<sup>1</sup>The TIA procedure is performed while a project is on-going, and thus has a 'forward-looking' or a "prospective analysis" perspective in near-real time. *Retrospective (hindsight) forensic research and analysis is not desired or required as a TIA is a forecast designed to facilitate a timely contract adjustment prior to the actual work being completely preformed.*

The longer the period between the delay and the approval of the TIA, the less useful and valid the TIA becomes. Because 'time' is the issue being negotiated, the value obtained from a timely resolution of this contractual adjustment is greatly diminished by delay in preparation and/or approval of the TIA. Delay in

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<sup>2</sup> AACE International Recommended Practice No. 52R-06, TIME IMPACT ANALYSIS – AS APPLIED IN CONSTRUCTION  
TCM Framework: 6.4 – Forensic Performance Assessment, 7.2 – Schedule Planning and Development, 10.2 – Forecasting, 10.3 – Change Management

*approval of a TIA may result in a supplemental claim by the Contractor of constructive acceleration. At some point, delay in preparation and/or approval of a TIA so diminishes the value of the analysis that the inherent inaccuracies of a TIA invalidates the use of this simple procedure and calls for a more thorough retrospective, forensic analysis.*

**Next, we are forced to vary our methodology since we do not have live Primavera Schedule files containing full workflow logic. All we have are calculated dates. We do not even know with certainty if the stated dates are (forward pass) early dates or (backward pass) late dates. We must make the assumption that the dates presented to us are all early dates (be ready to start on dates).**

*<sup>1</sup>The TIA is typically associated with the modeling of the effects of a single change or delay event. It requires a Critical Path Method (CPM) schedule that is able to show the pure CPM calculation differences between a schedule that does not include a delay and one that does include an activity modeling the delay event. The difference for project completion, between the non-impacted schedule and that of the schedule with the impact, is considered to be the impact of the delay for time duration considerations. TIA assumes that the most recently accepted schedule update, just prior to the actual delay, correctly displays the project status and logical sequence of work involved on the project at the time of the delay. It also assumes that the Contractor's and Owner's responses to that delay are independent of the rest of the project and that the actual delay will not result in a change in the project work plan. In effect, a TIA assumes that the CPM schedule, in-effect at the time of the delay, is 'frozen' and will not change (other than the change brought about by the delay.) The above assumptions provide a means of quickly analyzing the impact of the delay, but they can also introduce subtle (and sometimes not so subtle) inaccuracies under certain conditions.*

**The following checklist was provided by Chris Carson as a typical example of what his company uses to assure a properly done and complete TIA is presented. Use this for your edification not as a template. It is far too extensive for what you are currently doing. However, it will be a mind jogger.**

### <sup>3</sup>Checklist for Time Impact Analysis Preparation and Review

**Contemporaneous Prospective TIA** (prepared during the project, before the impact event time)

- 1. Verify specification requirements for use of TIA**
  - a. If none, follow industry practice for TIA
  - b. If stated, follow spec requirement
- 2. Is there a narrative submitted with the TIA**
  - a. If yes, start review
  - b. If no, request narrative
    - i. Narrative explains reason for TIA
    - ii. Narrative explains assumptions
      1. Scope of work
      2. Use of resources
      3. Are assumptions consistent with previous schedule?
    - iii. Narrative explains logic
      1. Fragnet duration calculations
        - a. Are duration calculations consistent with previous schedule?
          - i. If not, is the rationale explained and reasonable?
      2. Fragnet sequencing rationale
      3. Choice of predecessors/successors (what existing activities are affected by fragnet insertion?)
      4. Identify any work stoppage due to impact event
  - c. Note any questionable assumptions
- 3. Identify schedule used for pre-impact comparison**
  - a. How close is the Data Date (DD) to the actual beginning of the event?
    - i. Immediately prior to event (best).
    - ii. Is the un-progressed Baseline Schedule the chosen schedule?
      1. Does the impact event happen immediately upon NTP?
        - a. If yes, Baseline is appropriate
        - b. If no, is there any progress prior to the impact event?
          - i. If no, Baseline is appropriate.
          - ii. If yes, need to update schedule to immediately prior to impact event.
    - iii. Are there any schedule updates between the chosen schedule and the event?
      1. If no, proceed.
      2. If yes, wrong schedule was chosen, need to use the appropriate schedule.

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- iv. If the DD is not immediately prior to event, does the CP change between DD & event?
  - 1. If no, schedule is acceptable to use.
    - a. Must document that the CP does not change
  - 2. If yes, need to update to event date

#### **4. Verify schedule for reasonableness**

- a. Does the schedule appropriately represent conditions at the beginning of the impact event (is the schedule an accurate model of the project)?
  - i. If yes, use schedule as is
  - ii. If no, determine changes needed for schedule to model the project
    - 1. Make changes
    - 2. Document changes
- b. Is the schedule update information accurate?
  - i. Check Progress
    - 1. If yes, use schedule as is
    - 2. If no
      - a. Need to correct actual progress dates and activities
      - b. Document carefully any changes
  - ii. Check logic
    - 1. If yes, use schedule as is
    - 2. If no
      - a. Need to correct actual progress dates and activities
      - b. Document carefully any changes
- c. Are there Constraints in the chosen schedule?
  - i. If none, use schedule as is
  - ii. If date constraints, check to see if they will inaccurately skew results
    - 1. If no, use schedule as is
    - 2. If yes
      - a. Make changes so Constraint use is appropriate
      - b. Document carefully any changes
- d. Check Calendars
  - i. Are there non-work Calendars active in the schedule?
    - 1. If no, use schedule as is
    - 2. If yes, investigate Calendar usage
      - a. Verify that they are accurate non-work times
      - b. Verify that they are appropriately applied to schedules
      - c. Verify that holidays and non-work weather planning doesn't end with current schedule dates.
  - ii. Are there shift or overtime Calendars active in the schedule?
    - 1. If no, use schedule as is
    - 2. If yes, investigate Calendar usage
      - a. Verify that they are accurate shifts and work periods
      - b. Verify that they are appropriately applied to schedules

#### **5. Check for concurrent delays not modeled in analysis**

- a. Are there any other delays in the project?
  - i. If no, proceed.

- ii. If yes, are they identified?
  - 1. Are they modeled in the update? Verify accuracy
  - 2. Are they modeled in the fragnet insertion? Verify accuracy
  - 3. Are they concurrent? Verify accuracy
  - 4. Are they pacing delays? Verify accuracy
    - a. Has the contractor taken advantage of delay to re-sequence other work?
    - b. Is the unaffected work proceeding as planned?

## **6. Verify fragnet insertion in schedule**

- a. Does the insertion match the narrative?
  - i. If yes, proceed.
  - ii. If no, reject.
- b. Are there any changes in the schedule other than the insertion?
  - i. Run a Digger report and check for additional changes
    - 1. If yes, reject.
    - 2. If no, proceed.
  - ii. Check for missed changes:
    - 1. Added constraints
    - 2. Changes in relationship types
    - 3. Changes in calendars
    - 4. Check software settings, especially Progress Override vs. Retained Logic
      - a. If original schedule used PO setting, reconsider reasonableness, see item above.
        - i. Use of PO in original schedule means the schedule did not model the project, poor choice.
        - ii. Retained Logic keeps original planned logic
        - iii. If the project has out-of-sequence work, it may no longer model the actual progress of the project and could require schedule revisions to make the schedule reasonable
  - iii. Remove the fragnet and recalculate
    - 1. If calculation yields identical completion date with un-impacted schedule, proceed.
    - 2. If the completion date changes, reject.
- c. Review the first and last activities of the fragnet
  - i. Is the first activity tied appropriately to predecessors?
  - ii. Is the last activity tied appropriately to successors?
  - iii. Are there any interim activities that have relationships to existing schedule activities?
    - 1. If yes, are they tied appropriately?
  - iv. Are there lags added to relationships between fragnet and schedule?
    - 1. Are they identified and explained in narrative?
    - 2. Are they reasonable?

## **7. Review Critical Path (CP) changes**

- a. Identify CP in pre-impact schedule.

- b. Identify CP in after-impact schedule.
  - c. Is the CP the same?
    - i. If yes, impact event directly affected Critical Path.
    - ii. If no, impact event caused a shift in Critical Path.
      - 1. Follow the activities on the CP, and identify how the CP shifted.
      - 2. Document shifts in CP.
- 8. Compare completion dates**
- a. Choose appropriate activity to compare completion date.
  - b. Verify completion date of pre-impact schedule.
  - c. Compare completion date of after-impact schedule.
  - d. Identify difference in completion dates.
- 9. Document and write report**
- a. Verify that conclusions match facts.
    - i. Summarize results
      - 1. Specification requirement or industry standard
      - 2. Address narrative
      - 3. Identify and verify choice of schedule for use in analysis
      - 4. Reasonableness of schedule
      - 5. Concurrent delays
      - 6. Fragnet insertion in schedule
      - 7. Critical Path changes and shifts
      - 8. Compare completion dates
      - 9. Documentation
  - b. Include supporting documents.

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## TIME-IMPACT ANALYSIS

### The Way It Was Meant To Be Performed

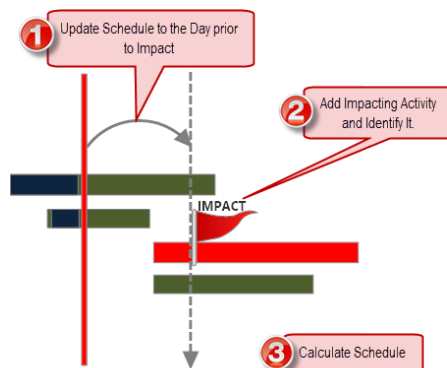
#### A TUTOR

Long ago and not so far away, the USACE got fed up und of the job claims and lawsuits at a job's conclusion. They felt, and rightly so, that the cost of rightly suffered impacts to a contractor's work should be decided during contract execution. The result would be an early settlement that was reasonable and allowed the project to continue on with the air cleared. In order for this to happen in a reasonable and rightly manner, a new analysis process dubbed Time-Impact Analysis (TIA) Method was spawned.

TIA was meant to be a contemporaneous method that would allow someone to apply a combination of known and evaluated facts about the impact and combine these facts with our best and reasonable forward estimates of how the impact would ripple forward through affected schedule logic. The goal herein was to settle on a time extension contemporaneously and finalize the impact caused delays at the time and agree to move forward.

Even if project actual progress varied from the TIA, the parties accepted these facts and no additional delays were considered.

The first steps are to prepare the project schedule for the insertion of the impact activity.

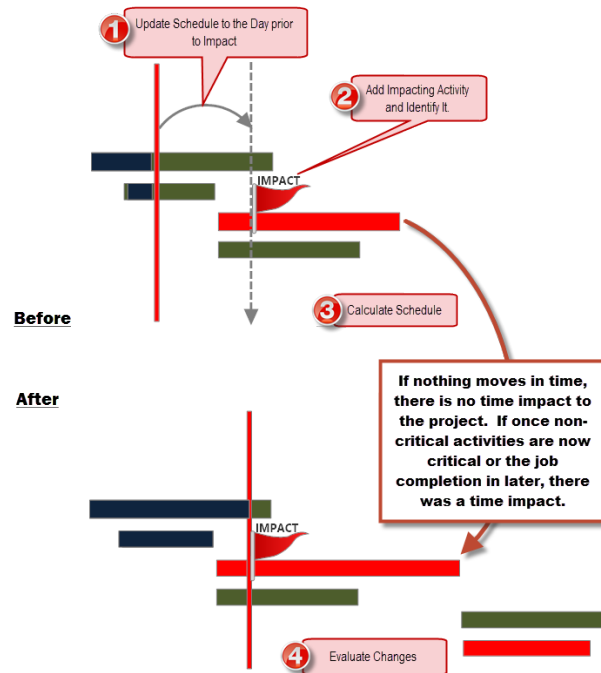


Next, make a copy of the schedule. This will become your analysis copy. Now is when, your best estimates are made and you have considered your attempts to mitigate the delay on your impact. Any attempts to mitigate need only be reasonable, not extreme and costly.

Now we insert the impact activity that represents to impact itself. Next we identify any hard (physical) relationships starting from the impact activity and add them to our CPM network. Next we look at our soft or preferential logic for items like crew relocation or equipment relocation or rental return. These are often mitigation attempts to minimize the impact ripple on the other project work. At this point we



are creating a quasi cause-and-effect diagram. As we do all of this manipulation, we keep careful notes to help us prepare the narrative on this impact. We then recalculate the schedule.



TIA in its early days was not meant to segregated blame, it was only meant to indicate if some impacting event that will be the subject of a change order contained the element of either excusable or compensable time extension to the contract specified completion.

Today, this remains the best method to accompany a change order request wherein a time extension is requested. Keep it simplistic, to the point, as realistic as an estimate can be.

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