American Bar Association

Forum on the Construction Industry

AACE Recommended Practice
for
Forensic Schedule Analysis

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Contents

I. WHAT IS THE RECOMMENDED PRACTICE FOR FORENSIC SCHEDULE ANALYSIS?

The Recommended Practice for Forensic Schedule Analysis (RP/FSA) is a technical document published by the Association for the Advancement of Cost Engineering, International (AACE).[1] Forensic schedule analysis refers to the study and investigation of events using Critical Path Method (CPM) or other recognized scheduling methods in connection with the resolution of delay claims and potential use in legal proceedings. It is the study of how actual events on a project occurred in relation to a planned schedule for the purpose of understanding the significance of deviations from the schedule.

AACE is an independent industry organization and is a leading professional society for cost estimators, cost engineers, schedulers, project managers, and project control specialists in the United States. It has been in existence since 1956 and has members in 78 countries. It is considered to be the largest organization serving the entire spectrum of cost management professionals. It is the only technical organization of its kind in North America with an active committee (the Claims & Dispute Resolution [CDR] Committee) devoted entirely to construction claims disputes and resolution.

In 2003, the CDR Committee launched the Recommended Practice/FSA project. The purpose of the project was to: "provide a unifying, standard reference for the forensic application of CPM scheduling . . . in order to alleviate, if not eliminate, the confusion among practitioners regarding terminology, definitions and techniques of forensic scheduling." The stated desired result was to "decrease the number of unnecessary disagreements concerning

technical implementation and allow the practitioners to concentrate their skills on resolving disputes over substantive issues."

The approach was also stated in the RP/FSA:

> . . . Recommended Practice/FSA will define, describe and explain the usage of various forensic scheduling techniques in current use. It is not the intent of the Recommended Practice to exclude or to endorse any technique over others. However, it will offer caveats for usage and offer examples of best current practices and implementation for each technique. The focus of the document will be on the technical aspects of forensic scheduling as opposed to the legal aspects. However, relevant legal principles will be discussed to the extent that they would affect the choice of techniques and their relative advantages and disadvantages.

During the four years of development by the Task Force, drafts of the Recommended Practice were distributed to many industry practitioners. Further, comments were received by over one hundred peer professionals (many of whom are not members of AACE), resulting in several revised drafts that included major structural and technical changes to the document.

II. CONTROVERSIAL ISSUES SURROUNDING THE AACE PUBLICATION

1. The Controversy

There has been significant controversy in the scheduling industry regarding the applicability and relevance of the Recommended Practice. At industry conferences and bar association events, scheduling experts have commented for or against the RP/FSA.

2. Response to Criticisms

This paper is written as a point–counterpoint discussion of nine specific criticisms of the Recommended Practice. For each specific criticism, a proponent viewpoint is presented followed by an opposing viewpoint. Mr. Kenji Hoshino is the author of the proponent viewpoint and Mr. Michael D'Onofrio is the author of the opposing viewpoint.

III. POINT–COUNTERPOINT

1. The Label, "Recommended Practice"

a. Proponent Viewpoint - Hoshino

Several individuals have expressed concerns that the Recommended Practice is not in fact a "Recommended Practice." The concern is that the Recommended Practice is rather a catalogue of how to perform various schedule delay methods, and does not "recommend" a practice. Mr. Irvine E. Richter[2] stated:

> In the engineering and construction community the term Recommended Practice denotes procedures or processes that are established by authority, custom, or general consent as a model from which a deviation could be the basis for allegations of failure to comply with the standard of care for that industry. The Recommended Practice does not rise to this level . . . .[3]

Contrary to Mr. Richter's assertions, the Recommended Practice does reflect the consensus of most schedule delay professionals as to the "best" way to perform that particular analysis. A careful review of the published literature on various methodologies[4] shows that the nine identified methodologies in the Recommended Practice reflect the consensus of how each should be performed. While the titles of various methodologies still seem to divide the industry, the underlying procedures and approach remain consistent.

Other aspects of the criticism of use of the term "Recommended Practice" stem from the perception that there should be a single recommended practice. Again, the published literature reflects that there are many methodologies that are used in litigation and many that are accepted by various courts.[5] The Recommended Practice is a catalogue of recommended practices for each methodology rather than a single, one-size-fits all approach. The AACE feels strongly that there is no one "best methodology." The methodology best suited for a particular application is

determined by a variety of factors that are discussed in Section 5 of the Recommended Practice and discussed further below.

It should be noted that one of the few institutional attempts to consolidate and describe schedule delay methodologies, "The Society of Construction Law Delay and Disruption Protocol"[6] published by the United Kingdom Society of Construction Law in 2002 was also criticized[7] for a wide variety of reasons including its "best technique" for retrospectively identifying extensions of time.[8]

Finally, the AACE works within an institutional framework reflective of their technical objectives. Within that context, the current President of the AACE has stated:

> AACE has three major types of publications; the TCM [Total Cost Management] Framework, Recommended Practices, and Professional Practice Guides. After a review of the suitability of these publication types, we have reconfirmed that the most applicable type [of publication for the Forensic Scheduling] document remains our "Recommended Practice" series.[9]

b. <u>Opposing Viewpoint – D'Onofrio</u>

The root of the controversy regarding this Recommended Practice is the label of "Recommended Practice." Simply put, the label "Recommended Practice" is misleading. No practices are recommended. Rather, the document is a catalogue of how to perform various schedule methodologies.

The Recommended Practice should not be considered a proven industry practice or a unifying standard for establishing reliable, accurate methods for performing forensic schedule analysis. Proponents of the Recommended Practice assert that the RP/FSA reflects the consensus of "most" industry professionals as to the "best" way <u>to perform a particular analysis or method</u>. However, the focus of the criticism is not primarily over how each method should be performed, even though there is some concern with this issue as well. The primary

criticism is: The RP/FSA missed an opportunity by proposing to develop a proven industry practice on how to perform various schedule delay methods without taking a position on whether any specific method is acceptable as a reliable, accurate method for performing forensic schedule analysis.

The Recommended Practice does not determine whether a specific forensic schedule analysis method is reliable, comprehensive and accurate in accordance with a good or proven industry practice.[10] The Method Implementation Section of the Recommended Practice states that the intent is to describe each forensic schedule analysis method and to provide guidance in implementing. The user is further warned that the focus of the Recommended Practice is on procedure as opposed to substance: "The user is reminded that the focus of this RP is on procedure as opposed to substance. Adopting a method and using the recommended procedures do not, on their own, assure soundness of substantive content."[11] (emphasis added).

Further, the Scope and Focus section of the RP/FSA explicitly states, "It is not the intent of the RP to exclude or to endorse any method over others." By not excluding or endorsing any method, the Recommended Practice leaves to the industry the question of whether any specific method is acceptable for forensic schedule analysis, or even worse, gives credence to unreliable methods by including a "how to perform" the method in the RP/FSA.

Proponents suggest that the criticism of the Recommended Practice stems from the perception that there should be a single recommended method, and further, that AACE feels strongly that there is no one "best methodology." However, the criticisms of the Recommended Practice do not argue for a single "one-size-fits-all" approach. A number of methodologies have been accepted by various courts in specific instances. The key question is which of the various methodologies provide reliable, accurate results. The Recommended Practice's position of not

excluding or endorsing any method and its decision to focus its recommendations on how to perform each method does not answer this key question.

The label Recommended Practice for Forensic Schedule Analysis is misleading. The Scope and Focus section of the Recommended Practice states:

> This Recommended Practice (RP) covers the technical aspects of forensic schedule analysis methods. It identifies, defines and describes the usage of forensic schedule analysis methods in current use. It is not the intent of the RP to exclude or to endorse any method over others. However, it offers caveats for usage and cites the best current practices and implementation for each.[12] (emphasis added).

Identifying, defining and describing the usage of forensic schedule analysis methods is a challenging and noteworthy industry goal. However, this does not rise to the level of a proven industry practice that establishes reliable and acceptable methods for forensic schedule analysis. The Recommended Practice should have been more accurately labeled: "*The Usage of Forensic Schedule Analysis Methods*" or "*How to Perform Forensic Schedule Analysis Methods.*" This discrepancy is the root of the controversy with the Recommended Practice.

The Introduction of the Recommended Practice states: "Implementation of this Recommended Practice should result in minimizing disagreements over technical implementation of accepted techniques and allow the providers and consumers of these services to concentrate on resolving disputes based upon substantive, factual and legal issues."[13] (emphasis added).

The Recommended Practice does not determine whether a technique is reliable or acceptable. With the stated intent of the Recommended Practice not to exclude any method, it is difficult to imagine a scenario where the current Recommended Practice will allow users to minimize disagreements over methodology and concentrate on resolving disputes based on substantive issues.

2. The Recommended Practice Does Not Contain Legal Cites

a. Proponent Viewpoint - Hoshino

AACE is a technical organization and the Recommended Practice is intended as a technical reference to assist in the preparation of schedule delay analysis. It was never conceived as a legal reference. Further, there are other groups, for example, the ABA Forum on the Construction Industry, who are better able to provide the legal considerations and legal citations when the need arises. Finally, AACE serves a large international membership located in 78 countries around the globe, whose delay analyses are prepared for use in a wide variety of forums including civil law countries, not just U.S. courts and boards. For this reason the AACE concluded that the addition of local, U.S. legal citations in this Recommended Practice is not appropriate.

Certainly for users in the U.S., American legal cites would be a useful enhancement to the Recommended Practice. However, the lack of the feature does not invalidate the usefulness of the document as a technical reference. In recognition of the usefulness, the AACE has extended the following invitation to all experts:

> . . . to assist in developing and maintaining such a jurisdiction-specific, annotated version of 29R-03 that provides legal guidance (initially U.S. based and subsequent versions based on case laws from other nations) concerning the use of the various methods and ranking of same within the context of national case law. [14]

This offer remains open with no volunteers to date.

Finally, there are several excellent publications available that do describe and chronicle the legal decisions applicable to schedule delay. While these publications do not specifically address the methodologies as named in the Recommended Practice, they clearly provide guidance for the practitioner.[15]

b. Opposing Viewpoint – D'Onofrio

The RP/FSA does not address the importance of legal precedence and its implications on the underlying theories and proofs required for forensic delay analysis. This is a major issue because forensic schedule analysis is primarily a tool used in resolving legal disputes. As a result, technical aspects of delay analysis are intertwined with legal precedence on delay issues. In sum, forensic schedule analysis cannot be viewed in a vacuum without regard for legal issues. It is important to consider legal precedence and its implications.

Further, how the legal profession perceives the Recommended Practice is important. The Recommended Practice purports to address the importance of legal principles as set forth in its Scope and Focus section, but fails to do so:

> The focus of the document is on the technical aspects of forensic scheduling as opposed to the legal aspects. This RP is not intended to be a primary resource for legal theories governing claims related to scheduling, delays and disruption. However, relevant legal principles are discussed to the extent that they would affect the choice of techniques and their relative advantages and disadvantages.[16] (emphasis added).

The Recommended Practice does not address the law regarding delay analysis or legal precedence to the extent it has an impact on the acceptance, reliability, or accuracy of a method. By focusing the Recommended Practice on how each methodology should be performed and not on the reliability and accuracy of specific methods, the Recommended Practice has largely avoided dealing with relevant legal principles. In a letter to AACE, Mr. Thomas J. Driscoll,[17] a recognized industry leader, noted that the importance of legal precedence can be demonstrated by reference to the Impacted As-Planned methodology (Method 3.6 in the Recommended Practice) and cited five cases indicating its unacceptability.[18] The Impacted As-Planned methodology is discussed in detail in Section 6 of this paper.

The technical reliability and acceptability of delay analysis methods should be questioned on issues raised by the courts, even if U.S. court decisions aren't binding worldwide. Proponents of the Recommended Practice note that AACE serves a large international membership located in 78 countries which involve more than U.S. courts and boards so American legal precedent would not be appropriate. However, triers of fact in the courts are constantly trying to derive the best practices among competing methodologies and determine a better way to assess what happened on a project. If a method, such as Impacted As-Planned, has been rejected numerous times by the U.S. courts and boards, the reason must be that there are significant problems with the methodology. Maybe it's just a flawed methodology. These problems need to be considered in establishing a worldwide proven industry practice.

A Recommended Practice should be reliable and accurate regardless of the forum for resolution. The RP/FSA discusses legal implications as one of the eleven factors to consider in choosing a delay analysis methodology. Factor 9, Forum for Resolution and Audience, addresses delay analyses that might appear before federal courts and boards, stating the following:

> ". . . If there is good reason to believe that all issues are likely to be settled at the bargaining table, or in mediation, then the range of options for forensic scheduling methods is wide open as the audience is only the people on the other side. Almost any option which appears persuasive is legitimately open for consideration. On the other hand, if legal counsel believes that the issue will end up in a federal court or a federal board of contract appeals, then the range of options available is considerably narrowed because the Boards of Contract Appeals have, for nearly two decades, insisted that delay issues presented to them must rest on CPM scheduling. Therefore, any forensic schedule analysis method that does not appear to be a CPM-based analysis is unlikely to prevail. Further, if the claim is likely to end up before a board of contract appeals, the forensic schedule analyst must recognize that the audience is the trier of fact, likely to be fairly sophisticated in dealing with schedule delay issues, and likely also to be an experienced user of schedules for delay analysis purposes. Therefore, the forensic schedule analyst should recommend a more thorough method.[19] (emphasis added).

The notion that for mediation, "almost any option which appears persuasive is legitimately open for consideration" seems to ignore any sense of accuracy, reliability or accountability, especially when the Recommended Practice does not intend to exclude any methods. The Recommended Practice further notes that if the issue is to end up in federal court or boards then the analyst should use a CPM-based analysis and a "more thorough" method. There is no indication which methods in the Recommended Practice are both CPM-based and more thorough; however, the identification of these methods would be a start to evaluating the reliability and acceptability of methods in accordance with "proven industry practice." The RP/FSA has not taken this step, instead choosing to provide guidance on "how to perform" each method.

3. The Recommended Practice Adopts a New Taxonomy and Nomenclature

a. **Proponent Viewpoint - Hoshino**

The Recommended Practice adopts a new set of names for the various methodologies in an effort to standardize industry terms. Several individuals have criticized this effort as summarized in Mr. Thomas Driscoll's keynote address to the PMI College of Scheduling in May 2009:

> The names of all eight[20] methodologies included in the taxonomy are foreign to the construction industry and legal profession and inconsistent with years of case law. Why create new names when you propose to avoid confusion, and when the objective as an expert is to keep it simple, and be convincing and persuasive? The methodologies recognized as plan + impacts, total time analysis, as-plan versus as-built, as-plan versus as-built versus as-adjusted, collapsed as-built, and windows analysis are all recognized and cited in case law whether acceptable or not and for specific reasons. Obviously, there are variations to these.

The reason for adopting the new taxonomy and nomenclature are stated in the Recommended Practice as follows:

> The industry knows the forensic schedule analysis methods by various common names. Current usage of these names throughout the industry is loose and undisciplined. It is not the intent of this document to enforce more disciplined use of the common names. Instead, the Recommended Practice correlates the common names with a taxonomic classification. This taxonomy allows for the freedom of regional, cultural, and temporal differences in the use of common names for these methods. . .
>
> By using taxonomic classifications, it is hoped that the discussion of the various forensic analysis methods will become more specific and objective. Thus, the Recommended Practice will not provide a uniform definition for the common names of the various methods, but it will instead describe in detail the taxonomic classification in which they belong. [21]

This is especially true for a technical document intended for use in multiple jurisdictions using different systems, practices, and language. So Mr. Driscoll, as one of the practitioners in one of many jurisdictions, is free to use the terms that he has used in his decades-long practice. But the communication of his methods to someone in China, for example, would be greatly facilitated by the use of the new taxonomy and nomenclature.

The names for the various methodologies—or "Method Implementation Protocols" (MIP)—have been one of the biggest obstacles to both courts and experts discussing how the delay analysis was performed. For example, AACE method "Observational / Dynamic / Contemporaneous As-Is (MIP 3.3)" is also known as: windows analysis, impacted update analysis, time impact analysis (TIA), time impact evaluation (TIE), fragnet insertion, and fragnet analysis. Several other different procedures are also called "Windows." Further, the industry is plagued by the continual invention of "new methodologies" by experts each attempting to develop market differentiation.[22]

b. <u>Opposing Viewpoint – D'Onofrio</u>

The Recommended Practice developed a new nomenclature and taxonomy for delay analysis methodologies in an effort to standardize industry terms. A chart of the PR/FSA

nomenclature and a diagram of the RP/FSA taxonomy with overlays of common industry terms are attached as Appendices A and B respectively. Admittedly, some of the common names for delay analysis methods have been used loosely throughout the industry. However, the new taxonomy and nomenclature does raise two concerns.

First, the new taxonomy and nomenclature is complex. One of the challenges in the industry is the need to simply explain methodologies and techniques to triers of fact and others in the legal profession and construction industry. The new taxonomy is not easy to comprehend. As noted, the Recommended Practice correlates the common names for the various methods similar to the biosciences' use of the Latin taxonomic terms to correlate diverse names of plants and animals. The result is a somewhat complex taxonomy that is difficult to explain simply. The nomenclature needs to be understood by more than forensic schedule analysts. The legal profession, in particular, needs to understand and correlate it with the existing case law.

Second, the taxonomic classification system has created a rigid hierarchy which seems to narrowly classify each method. In practice, the implementation of the methods may be confined by the five-level hierarchy. Traditionally, the implementation of a methodology was guided by professional judgment and, if necessary, modified based on the situation and information available. An example of the rigid hierarchy regarding modifications of contemporaneous schedule updates is detailed in the example in Section 8 of this paper. AACE Method 3.3 (Retrospective / Observational / Dynamic / *Contemporaneous As-Is* / Fixed Periods) relies on the project schedule updates without modification (completely untouched) to quantify loss or gain of time. That is designated by the third level of the hierarchy—*Contemporaneous As-Is*. Traditionally, if the forensic analyst determines that the contemporaneous schedule update needed a minor correction, because a necessary activity or logic restraint was inadvertently

dropped, the analyst would make the correction and note the reason for the change. In accordance with the Recommended Practice, this minor correction would change the classification of the method to "modified" for the fourth level of the hierarchy, thereby changing the analysis to Method 3.5 (Retrospective / Observational / Dynamic / *Modified or Recreated* / Fixed Periods). However, Method 3.5 is a methodology where contemporaneous schedules are "modified or completely recreated," whereas the intent of the analyst was to rely on the contemporaneous schedule updates. Even the Recommended Practice notes that Method 3.5 is a "fundamentally different category" than Method 3.3. In this case, it appears that the rigidity of the taxonomy would place two similar methodologies in different classifications.

4. The Recommended Practice Does Not Rank Methods in Order of Preference

a. <u>Proponent Viewpoint - Hoshino</u>

There is no one-method-fits-all solution. Similarly there is no one hierarchical ranking that would apply to all situations. In lieu of attempting to complete the near-impossible task of anticipating all possible uses and creating multiple ranking lists for those uses, the Recommended Practice contains, in Section 5, a discussion of factors to consider in selecting the best method. In addition each method discussed contains as a final section entitled "Factors to Consider" that can assist the practitioner in identifying the most appropriate method for analysis under the specific circumstances of the case.

Section 5 of the Recommended Practice describes in detail some of the issues to be taken into consideration when selecting a schedule delay methodology. Because of the variety of different fact situations, legal circumstances, availability of data, and different forums for resolution of the delay, AACE feels there is no way to rank the various methodologies without

knowing the specifics of each possible situation. For this reason AACE has not ranked the methodologies or provided a preferred methodology that would be best in all circumstances.

b. Opposing Viewpoint – D'Onofrio

The criticism of the Recommended Practice is a more complex issue than a one-method-fits-all delay analysis methodology. In the recent *Construction Lawyer* article, the authors of "A Critical Review" addressed the global concern of order of preference in the Recommended Practice: "It does not rank the methods of analysis discussed therein in terms of degree of accuracy, reliability, and soundness. Thus, it leaves the erroneous impression that all methods of analysis are of equal quality and merit."[23]

The Recommended Practice leaves the erroneous impression that all methods of analysis are of equal quality and merit by not ranking methods. This erroneous impression is compounded by the Recommended Practice's stated intent not to exclude any method. As a result, methods known in the industry to be unreliable have been identified, defined and described in the Recommended Practice.

Proponents of the Recommended Practice state that due to the variety of different fact situations, legal circumstances, availability of data, and different forums for resolution of the delay, there is no way to rank the various methodologies. Further, it is pointed out that Section 5 of the Recommended Practice describes in detail some of the issues to be taken into consideration when choosing a schedule delay methodology. The eleven factors discussed in Section 5, Choosing a Method, are as follows:

Factor 1: Contractual Requirements
Factor 2: Purpose of Analysis
Factor 3: Source Data Availability and Reliability
Factor 4: Size of the Dispute
Factor 5: Complexity of the Dispute

Factor 6: Budget for Forensic Schedule Analysis
Factor 7: Time Allowed for Forensic Schedule Analysis
Factor 8: Expertise of the Forensic Schedule Analyst and Resources Available
Factor 9: Forum for Resolution and Audience
Factor 10: Legal or Procedural Requirements
Factor 11: Past History/Methods and What Method the Other Side is Using

The factors identified in the Recommended Practice to choose a method may have a practical effect on the forensic schedule analyst's selection of a delay analysis methodology; however, not all of these factors form the basis for determining a recommended or proven industry practice. Methodologies should be ranked or grouped on the basis of thoroughness, reliability and accuracy. Determining an order of preference for delay analysis methods should not involve all of the above eleven factors. Factors 6, 7 and 8, the budget, time and expertise of the forensic schedule analyst, have no bearing on determining a proven industry practice. In addition, Factor 11, past history or method used by opposition on a particular project, has no bearing on determining a proven industry practice. Factors 4 and 5, size and complexity of dispute, have some influence on the methodology; however, a recommended practice could be geared toward a more complex dispute recognizing that exceptions would apply for smaller, less complex disputes. Similarly, Factor 3, source data availability, may be determined for a typical construction project when establishing a recommended practice. The type and quality of available data will have an impact on the methodology that can be used to perform an analysis. For example, most projects today have a baseline CPM schedule, monthly schedule updates, and records for as-built data. This was not true 30 years ago. The recommended practice should account for the fundamental data on construction projects, recognizing that there may be exceptions if the data is not available.

Factors 1, 2, 9 and 10 will have the most influence on developing recommended or proven industry practice for delay analysis methods. These factors involve the contractual requirements, purpose of analysis, forum for resolution and legal or procedural requirements. In addition, the various methods should be evaluated in terms of degree of accuracy, reliability and soundness.

The AACE Recommended Practice involving construction claims for recovery of lost labor productivity ranks methods in order of preference. AACE Recommended Practice, 25R-03, Estimating Lost Labor Productivity in Construction Claims, includes the following regarding order of preference of methods:

> **Rank Order the Methodologies:** That is, based on reliability, professional acceptance, case law and construction claims literature, rank the identified methodologies from most to least reliable with respect to documenting estimating damages in claim situations. While it may not be possible to state with certainty which methods are absolutely most or least reliable, it can be stated that under certain sets of circumstances some methods are generally considered more reliable than others. (**CAUTION**: This Recommended Practice was prepared on the basis of the author's understanding of Canadian and U.S. case law. It is recommended that anyone preparing a lost productivity claim seek appropriate legal advice on the methodology to be used. This is especially true if the claim is being pursued under national law other than Canada or the United States.)[24]

The Recommended Practice for Estimating Lost Productivity gives a high order of precedence to project specific studies, such as measured mile or earned value analysis. The total cost method, one of the least preferred methods, is ranked at the low end of the order of precedence.

Comparisons between the thoroughness of delay analysis methods and methods for recovery of lost labor productivity have been made in the past. In the *Morganti National* decision, the court referred to the contractor's As-Planned v. As-Built delay analysis methodology (RP/FSA Method 3.1 and 3.2) as a "total time" analysis and compared it to the

unsatisfactory total cost method—a method ranked at the bottom of AACE's Recommended Practice for Estimating Lost Labor Productivity:

> Although [Expert] purported to compare [Contractor's] as-built performance against [Contractor's] as-planned Schedule A and WC01 schedule, his analysis is in essence a "total time" approach, which is of virtually no value. It is well settled that the "total time" theory of proving delay is insufficient to meet the contractor's burden to prove that government-caused delay actually delayed the overall completion of the project. The "total time" approach to proving delay is as unsatisfactory as the "total cost" method of proving damages, because it assumes that the government is responsible for all of the delay.[25] (emphasis added).

The weaknesses and disadvantages noted within the RP/FSA for specific methodologies begin to establish an order of preference for delay analysis methods. For example, the RP/FSA identifies the following weaknesses and disadvantages for the As-Planned v. As-Built methods (Method 3.1 and 3.2) discussed in the decision above:

- Not suitable for projects with long durations.
- Not applicable to projects built in a manner significantly different than planned.
- Not suitable for complicated projects with multiple planned critical paths.
- Less accurate as the analysis advances through the project.

Clearly this method is not suitable for large complex projects. Not surprisingly, the court compared this method to the unsatisfactory total cost method of proving damages.

The Impacted As-Planned (Method 3.6 and 3.7), a methodology frequently criticized and rejected by the courts and boards, lists the following weaknesses and disadvantages:

- Because it does not rely on an as-built schedule it is perceived as an analysis based on a purely hypothetical model.
- Cannot account for concurrent delays.

The Collapsed As-Built (Method 3.8) lists the following weaknesses and disadvantages:

- Perceived to be purely an after-the-fact reconstruction of events that does not refer to schedule updates used during project.
- Does not necessarily reflect changes in the prospective critical path indicated in contemporaneous schedule updates.

While not explicitly stated in the Recommended Practice, the above methods are most likely not the more thorough CPM based-methods that the Recommended Practice states should be considered for cases that will end up before federal courts or boards.

A variety of the delay analysis methods in the Recommended Practice rely on different fundamental source data and reach different conclusions in apportionment of delay. Different schedule delay analysis methodologies treat basic delay concepts differently and produce different results regarding entitlement for delay.[26] In fact, the RP/FSA in Section 4, Analysis Evaluation, confirms this, stating: "Be advised that differences in analysis methods combined with differences in concurrency and float theories may result in conflicting ultimate conclusions." If the delay analysis methods provide different results, then the industry needs guidance on preferred methods.

The delay analysis methods in the Recommended Practice rely on different source data. Table 6 in the RP/FSA, Source Data Validation Needed for Various Methods, identifies three fundamental sources of data—baseline schedule, schedule updates and as-built record—documents prevalent on most projects today. This table also identifies which source data is needed to implement each of the nine delay analysis methods as shown below:

Source Schedules or Data	METHOD								
	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
Baseline Schedule	Need	Need				Need	Need		
Schedule Updates			Need	Need			Need		Need
As-Built Record	Need	Need			Need			Need	Need

Of particular note is the fact that for each of the nine Recommended Practice methods above, not one method needs all three fundamental sources of data. This might be because Table 6 is documenting the minimum data *needed* to perform each method. The Recommended Practice contains both "Recommended Implementation Protocols" as well as "Enhanced Implementation Protocols" for the various methods. A modified version of Table 6 follows showing additional source data that the delay analyst would most likely *use* in the analysis if the data was available for either the Recommended Implementation Protocols or the Enhanced Implementation Protocols. In the table to follow, the additional source data for the Recommended Implementation Protocols is identified as "RP Use" while additional source data for the Enhanced Implementation Protocols is identified as "EP Use." In addition, the common names for each delay analysis method are shown for reference.

Source Schedules or Data	METHOD								
	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
Baseline Schedule	Need	Need	RP Use	RP Use	RP Use	Need	Need	EP Use	EP Use
Schedule Updates			Need	Need	RP Use		Need		Need
As-Built Record	Need	Need	RP Use	RP Use	Need	EP Use	EP Use	Need	Need
	As-Planned v. As-Built (Total Time)		Contemporaneous Period (Windows Analysis)		Modified Update Analysis	Impacted As-Planned	Prospective TIA	Collapsed As-Built	

As shown in the above table, for Recommended Implementation Protocols only three of the nine methods utilize all three fundamental sources of data. This is troubling considering that the majority of construction projects today have baseline schedules, schedule updates and as-built records. Even under the Enhanced Implementation Protocols only two additional methods

utilize all three fundamental sources of data—a total of five out of nine in all. Are these five methods the more thorough CPM based-methods that the Recommended Practice states should be considered for cases that will end up before federal courts or boards? If the baseline schedule, schedule updates and as-built record are available as source data, should all three be considered in the delay analysis? As stated previously, some of these fundamental documents were not prevalent 30 years ago. If most projects utilize these fundamental documents today, are the methods in the Recommended Practice which do not consider these documents outdated?

The courts and boards have indicated that these documents need to be considered. The Corps of Engineers Board of Contract Appeals addressed the need to consider contemporaneous CPM schedule updates in *J.A. Jones Construction Co.*: "The more a contractor departs in litigation from its contemporaneously-prepared schedules, the greater the need to explain and justify the reasons and assumptions underlying such departures to the Board."[27]

The Veterans Affairs' Board of Contract Appeals further discussed CPM schedule updates in *Jimenez, Inc.*:

> However, the parties are generally held to the CPMs they created and relied upon during the performance of the work, in the absence of compelling reasons to the contrary. As we stated in *P.J. Dick Incorporated*, "we will let the parties 'live or die' by analysis of the CPM to determine the number of days of additional contract performance time." [28]

In addition, the as-built record is also instrumental in any delay analysis as noted by the Department of Transportation Board of Contract Appeals in *J.R. Roberts Corp.*:

> Although the CPM analysis is a well respected tool and may be useful to a trier of facts for ascertaining the impact and interrelationship of Government-caused delays on project scheduling . . . its usefulness as a barometer for measuring time extensions and delay damages is necessarily circumscribed by the extent to which it is employed in an accurate and consistent manner to comport with the events actually occurring on the job. Indeed, . . . this is the single most important factor in determining the acceptability of a contractor's delay analysis.

> . . . we find that appellant's delay analysis is unpersuasive. It did not reflect actual job performance. [29]

The key question is: Should use of the three sources of fundamental data—baseline schedule, schedule updates and as-built record—be considered in a recommended or proven industry practice for forensic analysis methods? The answer is yes.

5. The Recommended Practice Recognizes (Only) Nine Different Methods

a. **Proponent Viewpoint - Hoshino**

Related to the above criticism, some individuals have asserted that a specific methodology has not been included or specifically named and therefore the Recommended Practice is incomplete. As explained above, the taxonomy classified the existing CPM-based delay analysis methods into generic grouping separated by fundamental technical differences outlined in the Recommended Practice. It is the fundamental nature of these technical differences that explains what some believe is a small number (nine in total) of basic methods. In addition there are many more specific variations and implementations of these basic methods, many of which are described within the Recommended Practice in the "Enhanced Protocols" section for each of the nine methods. In that sense, it is more instructive to view the nine methods as prototype-methods.

It was never the intent of the Recommended Practice to collect and describe the infinite number of variations and implementations. Such a task would be impossible and of very limited use, which would explain why there are no other documents that accomplished this task. The AACE is open to proposals to add (or even delete) basic methods. In fact, the 2007 version of the Recommended Practice contained only eight methods. The ninth one was added in Revision 1 issued in June 2009. In recognition of the practitioners who want their particular

variation recognized in the industry, AACE is launching a formal peer review program for forensic schedule analysis method implementations.[30]

b. Opposing Viewpoint – D'Onofrio

The nine methods currently described in the Recommended Practice can be seen in the diagram in Appendix B. The number of methods in and of itself is not a concern because the number may be increased or decreased. The larger concern is what it means for a method to be "recognized in the industry" as noted above. With a stated intent of not excluding methods and a focus on procedure as opposed to substance, there is no standard for thoroughness, reliability and acceptability of the method used to perform the analysis, and reach findings and conclusions. The recognition may be misleading.

6. The Recommended Practice Appears to Endorse the Impacted As-Planned Method

a. Proponent Viewpoint - Hoshino

One of the flash points for much of the criticism is the inclusion of Methods 3.6 (Modeled / Additive / Single Simulation) and 3.7, (Modeled / Additive / Multiple Base), both commonly known as the Impacted As-Planned method (IAP). The authors of this article agree that the IAP is a discredited method *for recovery in connection with compensable delay claims*.[31] Accordingly, the Recommended Practice clearly cautions the user against the use of IAP for the purpose of analyzing a compensable delay claim.

We disagree with the critics of the Recommended Practice when they assert that the judicial determination of unfitness of the IAP extends to other forensic uses of the method, such as for non-compensable time extensions, quantifying acceleration and out-of-sequence work, 'state-of-mind' evidence, and quantifying the impact of delay events that occurred between

notice-to-proceed and the release of the first official CPM update. We do not believe the case law supports the critics' position on this point.[32]

The critics further ignore the fact that there are some simple enhancements or modifications that can be made to IAP that would rectify some of its known failings. Such enhancements, which are included in the Recommended Practice as part of the methodology, include targeting the IAP to as-built dates, parallel analysis inserting contractor caused delays, and others.[33]

The critics also ignore the fact that the IAP is among the most frequently used methods in the construction industry, based on industry studies[34] and ample anecdotal evidence. Further, courts in the U.K. accept this method in litigation. As such, the IAP has a place on the Recommended Practice so long as it is accompanied by appropriate caveats.

b. <u>Opposing Viewpoint – D'Onofrio</u>

Proponents of the Recommended Practice admit that the Impacted As-Planned method is a "discredited method for recovery in connection with compensable delay claims." However, that admission does not go far enough as the Impacted As-Planned method is unacceptable in other situations as well.

The Impacted As-Planned method is neither a good industry practice nor a proven industry practice; it should not be part of a Recommended Practice for Forensic Schedule Analysis. The inclusion of an Impacted As-Planned methodology in the RP/FSA has generated more criticism than any other method. Recent decisions of U.S. courts and boards have consistently held that the Impacted As-Planned method will not be accepted.[35] The fatal flaw of the Impacted As-Planned methodology is that it ignores what actually happened on the project. The courts and boards have uniformly held that an analysis of delays must be based on and

consider the actual performance by all parties on the project.[36] The Impacted As-Planned does not represent the actual condition of the project at any point in time.

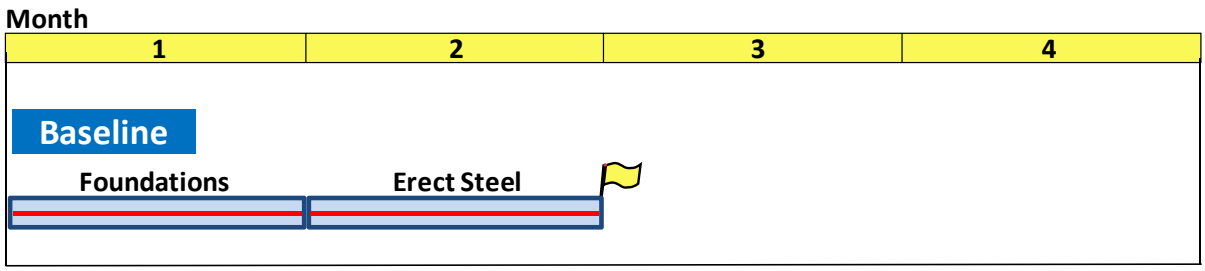
The same flaws that discredit the Impacted As-Planned for establishing compensable delay apply to use of the Impacted As-Planned for acceleration claims. In order to prove acceleration, you need to prove that you were delayed. In order to prove delay, you need to consider what actually happened on the project. In *Robust Construction LLC,* the Armed Services Board of Contract Appeals confirmed that the Impacted As-Planned method was inadequate to evaluate delays on the contractor's constructive acceleration claim.

> Appellant submitted frag-nets to the COE. . . without updating to reflect activities that were or became critical before the impacting events. . . . Furthermore, appellant's frag-net analyses did not all reflect the actual start and finish dates of the impacting and impacted activities. Hence those analyses are not sufficiently credible to show the duration of delays.[37]

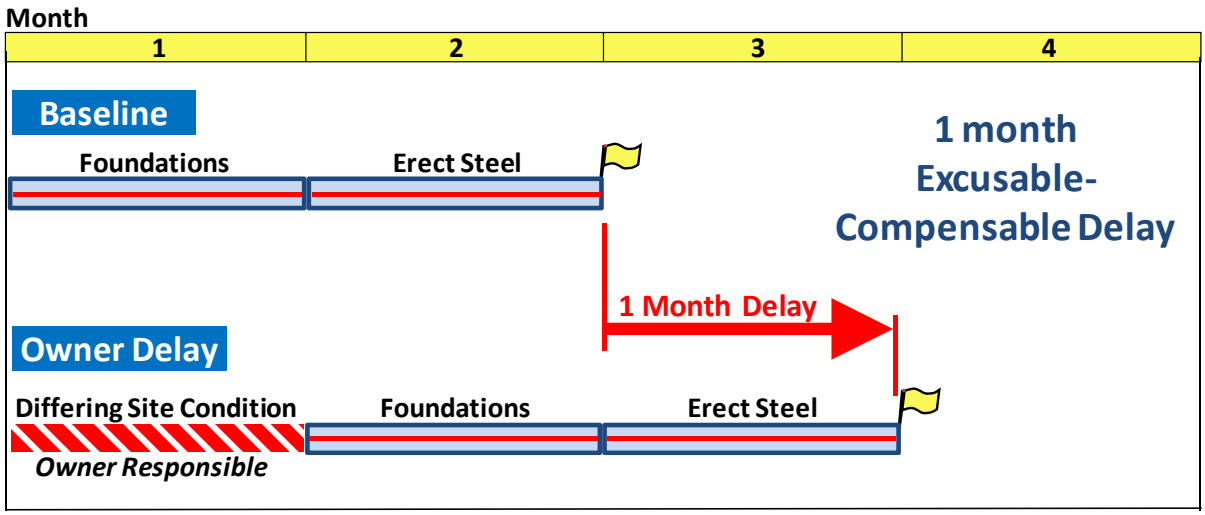
The procedure in the Recommended Practice for analyzing for "approximate concurrency" using an Impacted As-Planned Method is flawed. The procedure for determining concurrency in Method 3.6 (and similarly in Method 3.7) states it is possible to analyze for approximate concurrency by comparing two additive-modeled schedules as follows:

a. Create one additive model by inserting all owner-caused impact events into the baseline.
b. Create another additive model by inserting all contractor-caused and *force majeure*-caused impact events into the baseline.
c. Compare the two resulting schedules. To the extent that the net delay-effect beyond the baseline completion date overlaps there is concurrency.

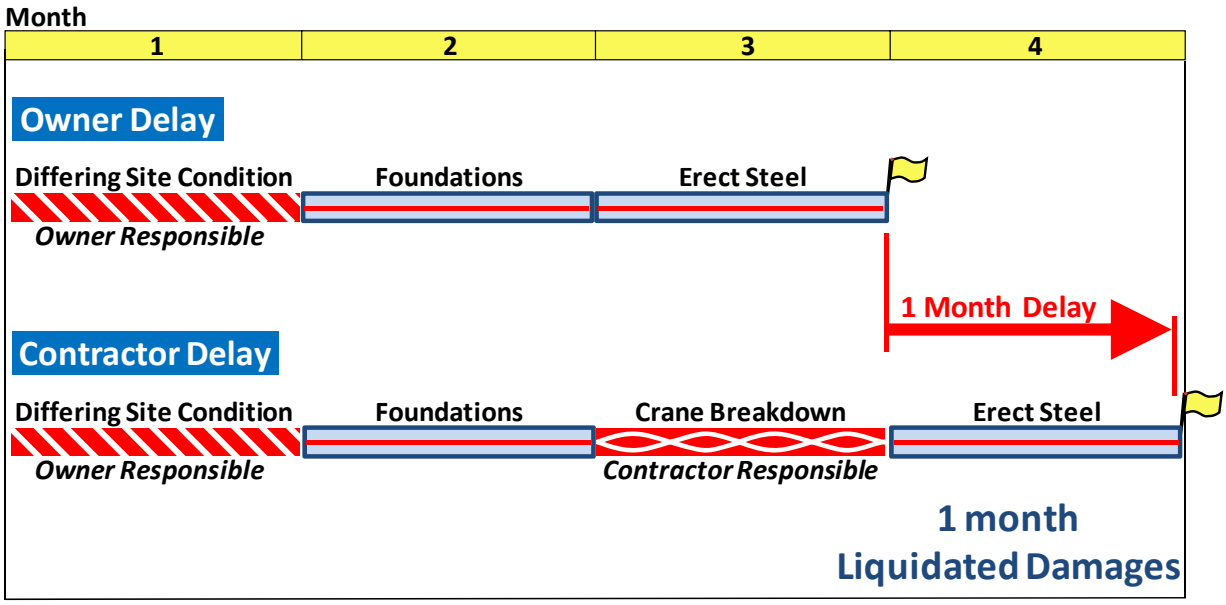
This analysis is entirely theoretical and a mathematical exercise that is inaccurate and grossly misleading.[38] A simple example can demonstrate this. Shown below is an as-planned schedule consisting of two consecutive activities—Foundations and Erect Steel. Each activity is one month in duration and on the critical path of this simple network.



Assume the initial delay is a differing site condition—an owner-responsible delay of one month. This differing site condition delay prevents the foundation work from starting, thus impacting the critical path of our two-activity network. As shown in the figure to follow, the net impact is a one-month excusable-compensable delay.

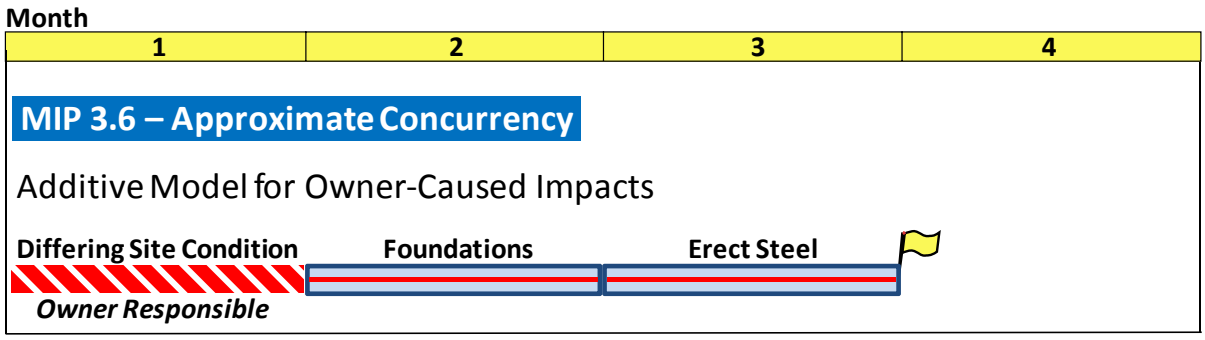


The contractor is now scheduled to start steel erection in Month 3. However, the crane needed to erect the structural steel breaks down—a contractor-responsible delay of one month on the critical path. As shown below, the crane delay results in a one-month non-excusable delay. The contractor is now liable for one month of liquidated damages.

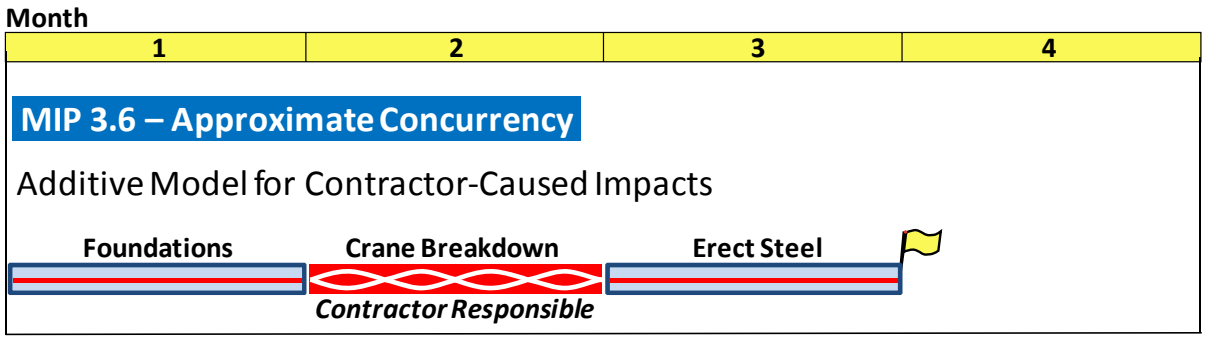


The project was completed in Month 4, in accordance with the schedule in the lower half of the graphic above. As a result the contractor is entitled to one month of extended overhead (excusable-compensable delay) and is liable for one month of liquidated damages (non-excusable delay). As shown above, the two delays on the critical path are clearly not concurrent.

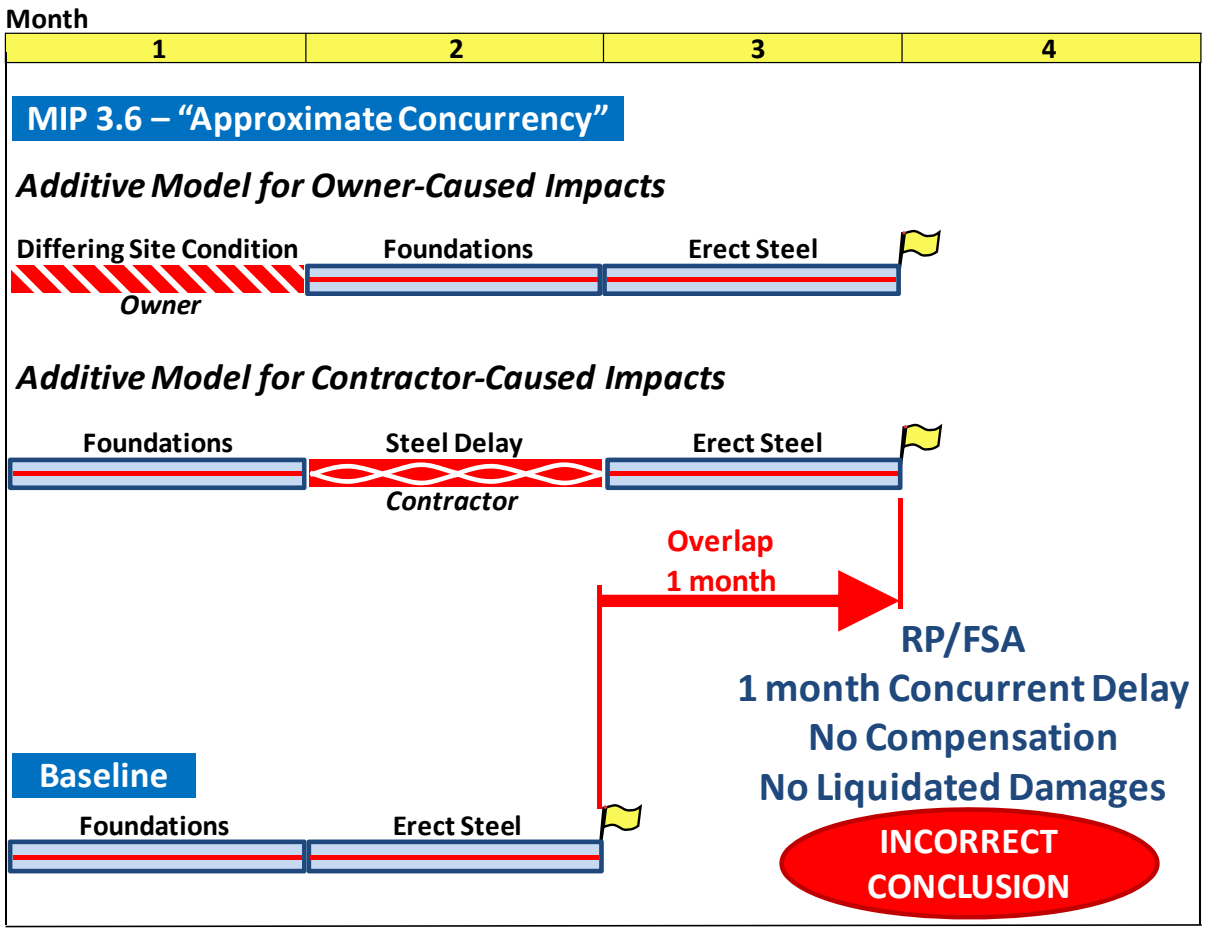
The application of the Recommended Practice procedure for determining approximate concurrency outlined Method 3.6 to the above example is as follows. First, create one additive model by inserting all owner-caused impact events into the baseline schedule.



Next, in accordance with the RP/FSA, create another additive model by inserting all contractor-caused and *force majeure*-caused impact events into the baseline schedule.



Each of these additive models extends the completion by one month to Month 3. The Recommended Practice procedure to find approximate concurrency is to compare the two resulting additive models to the baseline schedule. To the extent that the two additive models above extend beyond the baseline completion date and both overlap, the RP/FSA alleges that there is concurrency. In our example, each additive model extends beyond the baseline one month (to Month 3) and overlaps by one month. Therefore the RP/FSA would erroneously conclude that there is one month of concurrency as shown below.



This Recommended Practice procedure is grossly inaccurate and any instance of this method resulting in true concurrent delay is coincidental. The additive models above do not represent what happened on the project.

Frequency of use of a methodology is not a criterion for establishing a recommended or proven industry practice. The study "*An Investigation into the Use of Construction Delay and Disruption Analysis Methodologies*" has been cited in Endnote 34 as evidence to support the statement that the Impacted As-Planned is "among the most frequently used methods in the construction industry, based on industry studies and ample anecdotal evidence." This study, authored by Nuhu Braimah as a doctoral thesis at the University of

Wolverhampton, was conducted solely within the UK concerning delay and disruption analysis techniques employed to resolve claims.[39] The study is based on analysis of survey responses from 63 contractors and 67 consultants (the majority of whom were quantity surveyor or claims consulting firms) within the UK alone. It did not propose to analyze the practices of the worldwide construction industry or even the U.S. construction industry.

In contrast to several citations taken from the Braimah study that proponents allege lend credibility to the inclusion of the Impacted As-Planned method in the Recommended Practice, the Summary of Findings, Conclusions and Recommendations of the study state:

- DD [delay and disruption] analysis methodologies that are reported in literature to have major weaknesses were found to be the most well-known and widely used methodologies by respondents.
- Contractors and consultants often resort to DD analysis methodologies that are incapable of producing results of high accuracy or reasonable precision / certainty and this has been a major source of disputes on DD claims.

The study found that poor project records and schedules and the high cost to perform certain delay analysis methods were found overall to be the most likely reasons that more simplistic analysis methods are often employed, particularly by contractors. Similarly, the Braimah study also found that despite much criticism by courts and industry experts, the Global Method and Modified Global Methods for calculating damages (equivalent to Total Cost and Modified Total Cost) were the methods *most* often implemented by both contractors and consultants responding to the survey. Despite the frequency of use, AACE's Recommended Practice for Estimating Lost Labor Productivity has identified the Cost Basis methods (Total Cost and Modified Total Cost) as the *least* favorable approach to quantifying lost productivity. Frequency of use was not necessarily a factor in determining order of preference for the Recommended Practice for Lost Labor Productivity

7. The Recommended Practice Appears to Endorse the Collapsed As-Built Method

a. Proponent Viewpoint - Hoshino

As with the Impacted As-Planned method, the Collapsed As-Built (CAB) method has legitimate and accepted uses and applications. No one can deny that there is limited acceptance of the method by U.S. courts.[40] There are circumstances where the use of CAB is not only proper, but necessary, for example, where no contemporaneous schedules exist.
As such, the CAB also has its rightful place on the Recommended Practice as long as it is accompanied by appropriate caveats.

b. Opposing Viewpoint – D'Onofrio

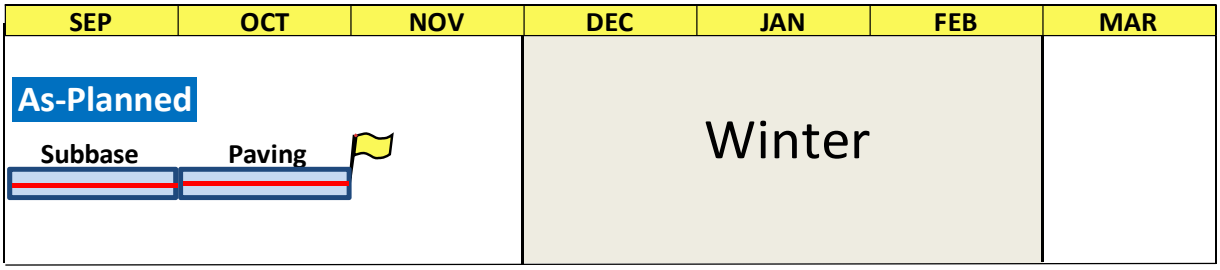
The Collapsed As-Built method is an as-built analysis that ignores the timing and relationship of delays. Although the Collapsed As-Built analysis has been occasionally accepted by the courts and boards, its weaknesses are well known: (1) the after-the-fact approach fails to address the need to issue time extensions on a real-time basis; (2) the analysis is not forward-looking, chronological and cumulative; (3) in order to collapse the schedule, the analyst is forced to insert after-the-fact logic ties; (4) the adjustments are subject to disputes; (5) the approach ignores float created by excusable delay recognized on a cumulative basis; and (6) removal of one party's delays can lead to an improper conclusion.[41] The Collapsed As-Built Schedule does not represent the actual condition of the project at any time. As noted in an industry text, "the only way to determine the accuracy of a collapsed as-built analysis is to perform the more accurate contemporaneous, update impact technique." [42]

The Recommended Practice recognizes some of these criticisms in its weaknesses of Method 3.8, specifically that the Collapsed As-Built is "perceived to be purely an after-the-fact reconstruction of events that does not refer to schedule updates used during the project" and

"does not necessarily reflect the changes in the prospective critical path indicated in contemporaneous schedule updates."

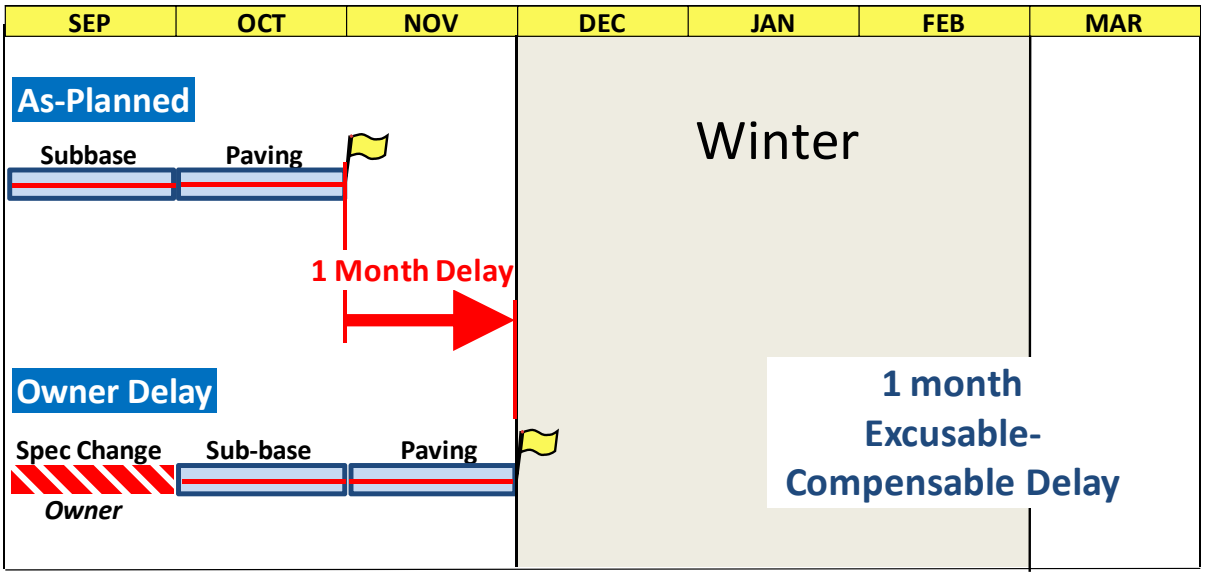
Proponents of the Recommended Practice argue that the Collapsed As-Built method is necessary when no contemporaneous schedule updates exist. However, many times a Collapsed As-Built is used when a baseline schedule and contemporaneous schedule updates do exist. Does it make sense to use this method when a baseline schedule and contemporaneous schedule updates do exist?

The procedure in the Recommended Practice for determining "Excusable and Compensable Delay" using a Collapsed As-Built Method is flawed. The procedure for determining excusable and compensable delay in Method 3.8 (and similarly in Method 3.9) states that the total excusable and compensable delay is "the difference between the as-built completion date and the collapsed as-built completion date resulting from the extraction of all owner-caused delays." This analysis is another mathematical exercise that is inaccurate. A simple example can demonstrate this. Shown below is an as-planned schedule consisting of two consecutive activities—Subbase and Paving.

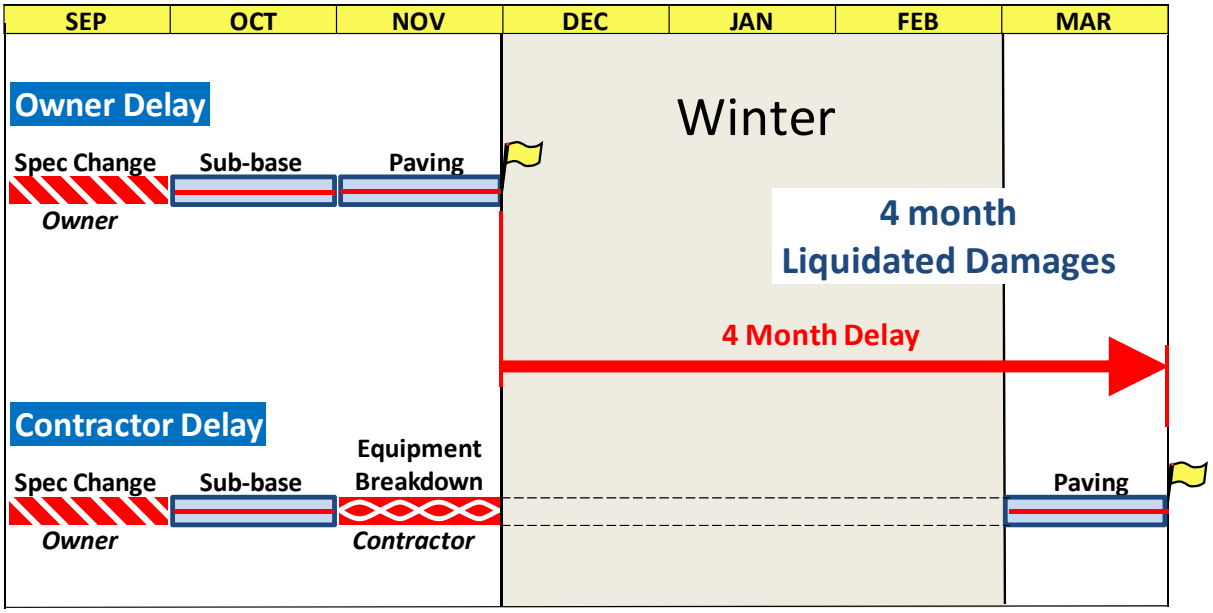


Each activity is one month in duration and on the critical path of this network. In addition, the paving activity is on a winter calendar and cannot be performed in December, January or February.

Assume the initial delay is a specification change for the subbase—an owner-responsible delay of one month. This change in material prevents the subbase work from starting, thus impacting the critical path of our two-activity network. As shown below, the net impact is a one-month excusable-compensable delay.

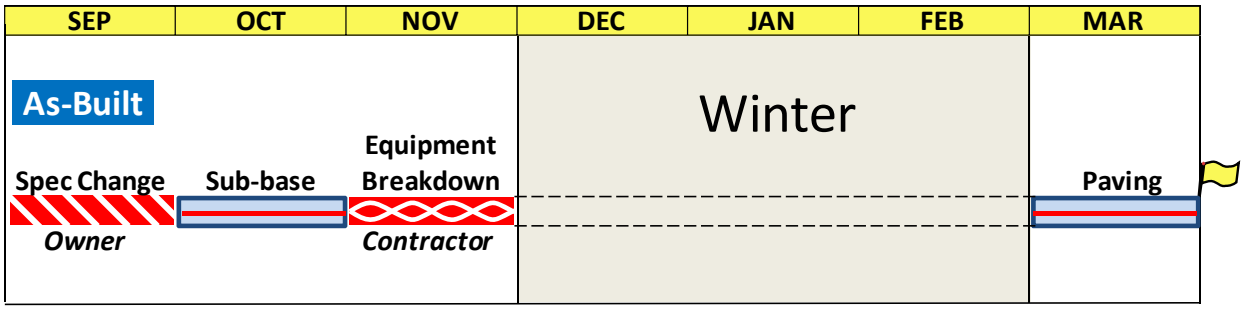


The contractor is now scheduled to start paving in November. However, upon arriving on site, the paving equipment breaks down and is unable to be replaced for one month resulting in a contractor-caused delay. However, due to the winter weather restrictions on paving, the paving cannot be performed until March. As shown in the following graphic, the net impact of the equipment breakdown delay is a four-month non-excusable delay. The contractor is now liable for four months of liquidated damages.



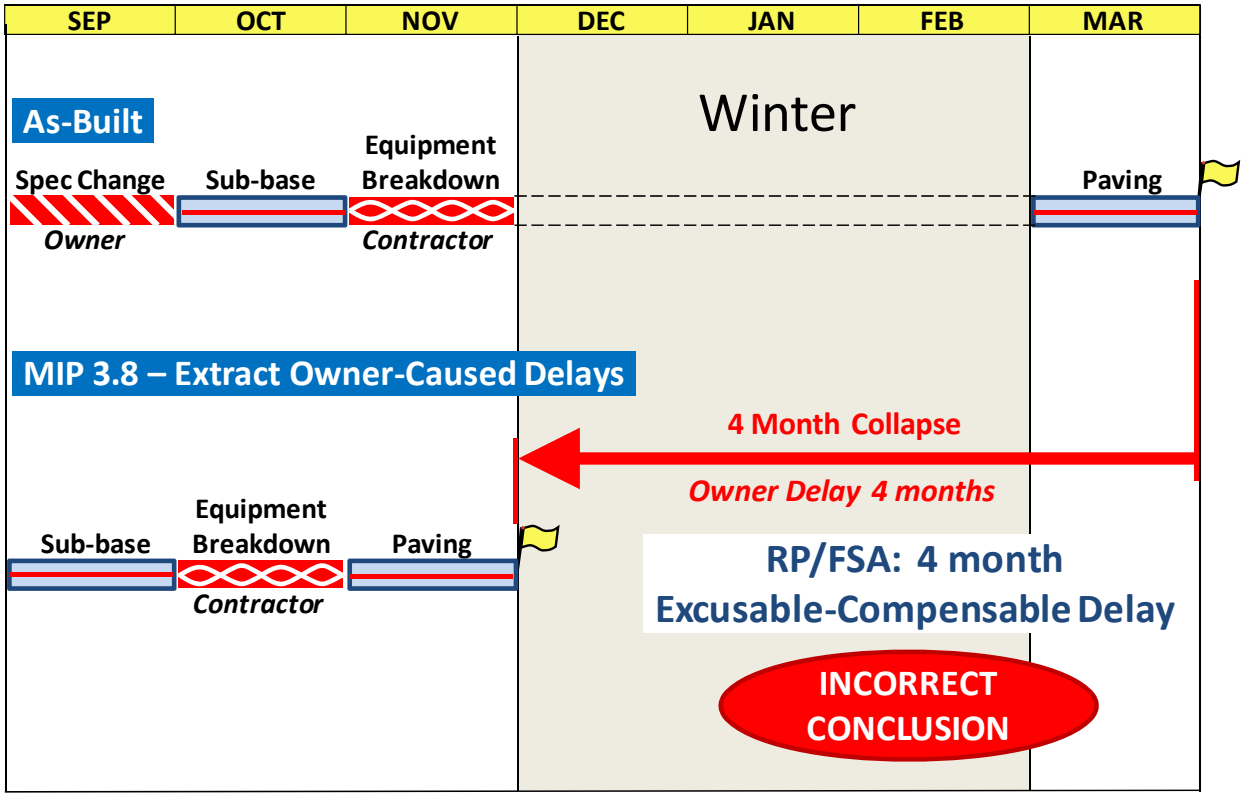
As a result, the contractor is entitled to one month of extended overhead (excusable-compensable delay) and is liable for four months of liquidated damages (non-excusable delay). The project was actually completed in March.

The application of the Recommended Practice procedure for determining excusable-compensable delay outlined in Method 3.8 to the above example is as follows. The as-built completion date is March as shown on the as-built schedule below.



Extract all owner-caused delays from the as-built schedule. In our example, the only owner-caused delay is the specification change (a one-month excusable-compensable delay). As

shown below, extraction of the one-month specification change delay collapses the schedule four months as a result of the winter calendar. Therefore, the RP/FSA would erroneously conclude that there are four months of excusable-compensable delay.



This methodology is a mathematical exercise using an as-built analysis that ignores the timing and relationship of delays. The subtractive model above does not represent what happened on the project.

8. The Recommended Practice Appears to Endorse the Modifications of Contemporaneous Updates

a. <u>Proponent Viewpoint - Hoshino</u>

Among those who favor analytical methods based on contemporaneous CPM updates, there is a debate whether it is appropriate to make modifications to those updates for purposes of

forensic analysis. The debate is far from settled and there is no apparent majority view. The argument is not technical; rather, it goes to evidentiary issues of whether a schedule can be characterized as a contemporaneous project document, having gone through modification. That being the case, both sides of the debate were represented in the Recommended Practice as MIP 3.3 for the unmodified and MIP 3.5 for the modified.

b. Opposing Viewpoint – D'Onofrio

RP/FSA Method 3.3 (Observational / Dynamic / Contemporaneous As-Is / Fixed Periods) is a retrospective technique that uses the contemporaneous schedule updates to quantify delay (Method 3.4 is similar). As noted in the Recommended Practice, the method relies on the validity of the contemporaneous schedule updates. Further, the RP/FSA states that the "As-Is" label for Method 3.3 designates that the schedule updates are evaluated "*completely untouched*" or as is. The criticism raised is that the Recommended Practice, despite indicating reliance on the validity of the contemporaneous schedule updates, fails to address situations where the validity of the schedule updates are in question because of errors, inaccuracy, contract compliance issues, improper revisions in logic or durations in order to maintain the end date, etc.

The Recommended Practice fails to address a procedure in Methods 3.3 and 3.4 for making any corrections or modifications to the contemporaneous schedule updates—no matter how minor. As proponents stated above, Method 3.5 (Observational / Dynamic / Modified or Recreated / Fixed Periods) is classified as "*Modified*" in lieu of "*As-Is*" and allows for modifications to the contemporaneous schedule updates. However, in the Recommended Practice, Method 3.5 uses "contemporaneous schedule updates that were extensively modified or completely recreated" and "is usually implemented when contemporaneous updates are not available or never existed." Further, the RP/FSA recognizes that this is a fundamentally different

category than Method 3.3 or 3.4. Method 3.5 may be appropriate when moderate to extensive modifications of the contemporaneous schedule updates are required. Otherwise, the use of contemporaneous schedule updates, even with noted minor modifications to correct errors or omissions, should be consistent within Methods 3.3 or 3.4.

9. The Recommended Practice Differentiates the Validation of Baseline for Project Control from Validation for Forensic Use

a. Proponent Viewpoint - Hoshino

In a recent presentation before the ABA,[43] Judah Lifschitz stated that it would be incorrect to distinguish the validation of the baseline schedule for use in project controls from validation for forensic analysis purposes. Mr. Lifschitz' assessment ignores that in project controls, validation is performed by the project scheduler or the project controls supervisor with the main focus on generating a reasonable and cost-effective schedule for work that has not yet occurred. In contrast, forensic validation is performed after the fact, more often than not, by a forensic consultant, whose focus in baseline validation are checking for base contract compliance, identifying gross logical errors and verifying the technical soundness of the schedule model for usability. The forensic consultant's view on how the project could have been performed differently or more efficiently is not desired nor considered relevant, unless the evaluation is being performed specifically for that purpose. In project controls, those considerations are paramount to generating a reasonable and cost-effective schedule.

Therefore, the statement in Section 2.2 of the Recommended Practice, as shown below, is valid.

> Note that validation for forensic purposes may be fundamentally different from validation for purposes of project controls. What may be adequate for project controls may not be adequate for forensic scheduling, and vice versa. Thus, the initial focus here is in assuring the functional utility of the baseline data as

> opposed to assuring the reasonableness of the information that is represented by the data or optimization of the schedule logic. So, for example, the validation of activity durations against quantity estimates is probably not something that would be performed as part of this protocol. The test is that, if it is possible to build the project in the manner indicated in the schedule and still be in compliance with the contract, then do not make any subjective changes to improve it or make it more reasonable.
>
> The obvious exception to the above would be where the explicit purpose of the investigation is to evaluate the reasonableness of the baseline schedule for planning, scheduling and project controls purposes. For those guidelines please refer to other Recommended Practices published by AACE.[44]

b. <u>Opposing Viewpoint – D'Onofrio</u>

The validation of the baseline schedule for forensic purposes is fundamentally similar to the validation for use in project controls; however, the implementation is different. The validation of the baseline schedule is to verify that the schedule is a reasonable plan to perform the work within the allotted time period. There is more leeway in suggesting and/or implementing subjective changes to a baseline schedule for project control purposes early in the project. Implementation for forensic analysis purposes should involve corrections of a baseline schedule for situations such as, (1) the contractor's baseline schedule did not comply with contract requirements; (2) the schedule contains fundamental logic errors; or (3) activity durations are not in accordance with contract requirements.

The issue of more concern in the Recommended Practice is the contention that making alterations to a contractor's baseline schedule for purposes of performing a *modeled* analysis is appropriate, but not appropriate when performing an *observational type* analysis, in which one should merely "note the baseline schedule's compliance, or noncompliance." [45] Case law, and good practice, provides that the schedule used as the basis for the schedule analysis model be a reasonable baseline. Similar to Section 8 of this paper, this issue involves the degree of

modification, i.e. whether *any* modification to the baseline schedule, no matter how minor, should change the classification from observational to modified. Minor corrections to the baseline should not change the method to a fundamentally different classification.

IV. AFTERMATH OF AACE "RECOMMENDED PRACTICE" PUBLICATION

1. The Weaponization of the Recommended Practice

When the document was being drafted, the authors were keenly aware of the potential 'weaponization' of the Recommended Practice in depositions and cross-examinations. After all, many, if not most of the authors are experienced expert witnesses who are well aware that any writing that they author can be used in an attempt to undermine the credibility of their testimony by a competent attorney who is, after all, doing the job assigned by the client to the best of his or her ability.

Thus 'weaponization' of any document is inevitable. To address the potential, the Recommended Practice currently contains a number of caveats including:

> The Recommended Practice/FSA is not intended to establish a standard of practice. Therefore, a departure from the recommended protocols should not be automatically treated as an error or a deficiency as long as such departure is based on a conscious and sound application of schedule analysis principles. As with any other advisory document, the recommended practice should be used in conjunction with professional judgment based on adequate working experience and knowledge of the subject matter. It is not intended to be a prescriptive document that can be applied without exception. The recommended protocols are intended to aid the practitioner in creating a competent work product and in some cases may require additional or fewer steps.
>
> The Recommended Practice/FSA should be read in its entirety and fully understood before applying or using the information for any purpose. The Recommended Practice is licensed free of charge to the reader on the condition that the reader refrain from intentional forensic use of the Recommended Practice in a manner in which it is not intended to be used or quoting any of the contents in an out-of-context manner.[46]

Detailed CPM schedule delay analysis is a relatively new undertaking for the construction industry. During the past several decades, new methodologies have emerged and

will likely continue to develop. AACE believes that the 2007 and 2009 Recommended Practices are the next step in the maturation of CPM schedule delay analysis and the development of objective standards. As such, it has identified in a non-project specific manner, methodologies developed over the past decades. AACE acknowledges that revisions to the Recommended Practice will be required and provided for this in the very structure of the Recommended Practice.

AACE is planning for further revisions and has started development of that next revision through the identification of certain changes which it hopes to issue in Summer of 2010.

V. CLOSING

1. Proponent Viewpoint – Hoshino

A proper framing of the 'controversy' is in order. Having witnessed first-hand both the enthusiasm and the resistance from the full spectrum of industry professionals, I can say that the controversy is <u>not</u> among construction lawyers but rather their professional interest in monitoring the controversy among a few forensic scheduling experts. I think the construction lawyers are neutral, preferring to straddle the fence. I also think that most of the forensic scheduling experts are similarly situated on the fence.

The controversy arose from the fact that the document sought to facilitate the bridging of a divide that separates two groups of professionals with distinctly different modes of thinking. On one side of the divide are the forensic scheduling analysts and experts with their engineering backgrounds and a technical predilection to view a problem as something that can be resolved with a wrong-or-right, black-or-white answer. On the other side of the divide are the lawyers who often deal with solutions to problems that demand distinguishing shades of gray, and require a discerning eye. Technical disputes, including construction delay and disruption claims call for

the reconciling of these approaches to problem resolution. The Recommended Practice was written to ease that reconciliation.

Fully aware of the different approaches to problem resolution, AACE, after much debate and consideration, decided to focus on creating a detailed document that would illuminate the technical issues rather than try to fully integrate the two approaches. The Recommended Practice avoids de-stabilizing the playing field, of forensic use of CPM by concentrating on the elemental building blocks of schedule analysis. It discusses in detail, the technical basics such as source data validation, critical path and concurrency. It classifies the current array of forensic CPM analysis methods into nine prototypical groupings (called Method Implementation Protocols, or MIPs), but stays away from discussions of customized specific applications of these methods. Instead of upsetting, skewing or de-stabilizing the current playing field the Recommended Practice illuminates all the lines and corners so that referee calls are more reliable, more transparent and less controversial. By providing illumination, the distinctions between the shades of gray are made more discernible. To those experts who prefer that the world be a binary one consisting of black and white, this is seen as adding to the confusion, because they seek definitive guidance on 'how to be right.' To those lawyers who deal in shades of gray this illumination enhances their acuity and promotes predictability in applying the facts and expert testimony to the current body of law regardless of changes and vagaries in the judicial seasons.

I believe that the Recommended Practice has gained significant traction as a relevant source of technical information. The current controversy is a healthy symptom of that relevance. One thing is for certain, the Recommended Practice is here to stay. The genie cannot be returned to the bottle. The side-show controversy among the forensic scheduling experts notwithstanding,

the Recommended Practice is a useful document that brings the practice of forensic schedule analysis out of the dark.

2. Opposing Viewpoint – D'Onofrio

The 2009 revision of the Recommended Practice added language to soften its potential use as a weapon. The Recommended Practice now states that it is not intended to establish a standard of practice and is not a prescriptive document that can be applied without exception. Further, it states the reader should refrain from intentional forensic use of the Recommended Practice in a manner in which it is not intended to be used. What does that mean? The caveats do not go far enough and actually confuse the reader as to the actual purpose of the document.

I think most forensic schedule analysts recognize that there will never be a step-by-step procedure or cookie-cutter approach to analyzing delay. The Veterans Affairs' Board of Contract Appeals in *P.J. Dick Inc.* referred to the application of scheduling techniques to determine delay as "more the 'art' of computerized, critical path method scheduling than an objective computer-driven exercise." There will always be gray areas in a forensic schedule analysis, hence the need for expert analysis and judgment. AACE has undertaken a challenging and noteworthy industry goal in attempting to develop a recommended practice for forensic schedule analysis. However, the controversy regarding the Recommended Practice among industry experts is real and the problems with the Recommended Practice are real.

There are fundamental concerns which fuel the controversy. First, the name of the Recommended Practice, "Forensic Schedule Analysis," leaves one to believe that it establishes good industry practices for performing reliable and sound forensic schedule analysis. Instead, the scope and focus of the current Recommended Practice falls short of this, specifically by identifying, defining, and describing the usage of forensic analysis methods without establishing

which methods are good industry practices. Second, the Recommended Practice leaves the erroneous impression that all methods of analysis are of equal quality and merit. Third, the Recommended Practice does not address legal issues regarding delay analysis to the extent they impact the reliability, thoroughness or accuracy of a method. Fourth, certain technical methods and procedures found in the Recommended Practice are unreliable or flawed. By their inclusion, these subpar methods and procedures have tainted the credibility of the entire Recommended Practice.

I propose that certain modifications will help to ease the controversy. First, if the focus is to identify, define, and describe the usage of forensic analysis methods, then the name of the Recommended Practice should be changed to reflect that focus. Second, the Recommended Practice should provide an order of preference or grouped hierarchy to reflect reliability and accuracy of the methods. Third, the Recommended Practice should consider questions regarding reliability and validity of specific methods raised by the triers of fact in the courts. Fourth, flawed or unreliable procedures should be removed from the Recommended Practice.

The Recommended Practice is still a "work in progress." The proposed modifications would assist in diffusing some of the widespread criticism in the industry and make the document more effective in establishing good industry practices.

[1] http://www.aacei.org/technical/rps/29R-03.pdf.

[2] Mr. Richter is Chairman and CEO of Hill International, Inc.

[3] Letter from Irvin E. Richter to AACE, March 6, 2009 (on file with the authors).

[4] The list of articles on how to perform specific methodologies is almost endless. The following are articles that provide a compendium of methodologies. S. Mohan and K. Al-Gahtani, *Current Delay Analysis Techniques and Improvements*, Cost Engineering, (September 2006); J. Wickwire, T. Driscoll, S. Hurlbut and S. Hillman, CONSTRUCTION SCHEDULING: PREPARATION, LIABILITY AND CLAIMS at § 9.06 (2d ed. Aspen, 2003) ("A Report Card on Choices for CPM Proof of Delay Claims"); Z. Zafar, "Construction Project Delay Analysis", Cost Engineering, Vol. 38/No.3 (March 1996); S. Alkass, M. Mazerolle & F. Harris, 14(5) *Construction Delay Analysis Techniques*, CONSTRUCTION MANAGEMENT ECONOMICS 375-394. (1966); D. Arditi & T. Pattanakitcharnroon, 24(2) *Selecting a Delay Analysis Method in Resolving Construction Claims* INTERNATIONAL JOURNAL OF PROJECT MANAGEMENT 145-155 (2006); G. Stumpf, *Schedule Delay Analysis*, COST ENGINEERING 32-43 (2000); J.Tieder, *Methods of Delay Analysis and How They Are Viewed by the United States Legal System*, Society of Construction Law International Conference, London, 6/7-Oct-2008; Jennifer W. Fletcher & Laura J. Stipanowich, *Successful Forensic Schedule Analysis*, 1 J. AMER. COLL. CONSTR. LAWYERS 203 (Winter 2007).

[5] See for example PHILIP L. BRUNER & PATRICK O'CONNOR, JR., BRUNER AND O'CONNOR ON CONSTRUCTION LAW §§ 15:120-15:136 (West Rev. ed. 2009) or JON M. WICKWIRE, THOMAS J. DRISCOLL, STEPHEN B. HURLBUT & SCOTT B. HILLMAN, CONSTRUCTION SCHEDULING: PREPARATION, LIABILITY & CLAIMS §§ 9.01-10.07 (2d ed. Aspen 2003).

[6] SOCIETY OF CONSTRUCTION LAW, DELAY AND DISRUPTION PROTOCOL (2002) available at http://eotprotocol.com/ [hereinafter Cited as "SOCL, *Delay and Disruption Protocol*"].

[7] The SOCL data base shows approximately 75 "negative" comments. Source: Mr. Anthony Caletka, co-author of the SOCL Protocol.

[8] SOCL, *Delay and Disruption Protocol*, *supra* note 24, at 47. That "Best Technique" is a variation of a time impact analysis. (AACE – Modeled / Additive / Multiple Base (MIP 3.7)).

[9] Letter from Mark Grotefend to Evans Barba, September 9, 2009 (on file with the authors).

[10] The AACE Recommended Practice Development Guidelines (http://www.aacei.org/technical/rp.shtml - RPDevGuidelines.doc, Rev.2009-01-17) note that a Recommended Practice is intended to provide guidelines that most practitioners would consider

to be good practices that can be relied on and that they would recommend be considered for use where applicable.

[11] RP29-03 (2009) Section 3, Page 31.

[12] RP29-03 (2009) Section 1.3, Page 9.

[13] RP29-03 (2009) Section 1.1, Page 8.

[14] Letter from Mark Grotefend to Evans Barba, September 9, 2009 (on file with the authors).

[15] An incomplete list would include: J. WICKWIRE, T. DRISCOLL, S. HURLBUT AND S. HILLMAN, CONSTRUCTION SCHEDULING: PREPARATION, LIABILITY AND CLAIMS, § 9.06 (2d ed. Aspen 2003) ("A Report Card on Choices for CPM Proof of Delay Claims"); B. BRAMBLE AND M. CALLAHAN, CONSTRUCTION DELAY CLAIMS §§ 11.07-11.08 (3d ed. Aspen 2000); K.PICKAVANCE, DELAY AND DISRUPTION IN CONSTRUCTION CONTRACTS §§ 14.01-15.09 (2d ed. London 2002).

[16] RP29-03 (2009) Section 1.3, Page 9.

[17] Mr. Driscoll is Co-author of CONSTRUCTION SCHEDULING: PREPARATION, LIABILITY AND CLAIMS (3d ed. Aspen, 2010) and currently Senior Vice President of Hill International, Inc. Mr. Driscoll has over 45 years of program, project, construction management and claims experience and has appeared before Federal and State Courts, several Boards of Contract Appeals and Arbitration Panels as an expert witness in construction claims, scheduling and delay analysis.

[18] Letter from Thomas J. Driscoll, Senior Vice President, URS Corp. to AACE International (June 20, 2009).

[19] RP29-03 (2009) Section 5.9, Page 113.

[20] Mr. Driscoll is referring to the 2007 version of the Recommended Practice. The 2009 version contains nine methodologies, or "MIPs."

[21] RP29-03 (2009) Section 1.4, Page 10.

[22] The most recent article identified by the authors is the "Isolated Collapsed But For Delay Analysis" a type of collapsed as-built analysis similar to AACE's "Modeled / Subtractive / Multiple Base (MIP 3.9)." *See* J.B. Yang and P.C. Yin, "Isolated Collapsed But For Delay Analysis" Journal of Construction Engineering and Management – ASCE, Vol. 135, Issue 7, p. 560 (July 2009), available at http://www.pubs.asce.org. The authors note that this type of methodology, the Collapsed As-Built, while often criticized as unacceptable, is widely used and recognized both here in the U.S. and abroad.

[23] A Critical Review, *supra* note 2, at 19.

[24] AACE RP 25-03, Estimating Lost Labor Productivity in Construction Claims, (Rev. April 2004) Section B, Page 3.

[25] *Morganti Nat'l, Inc. v. United States*, 49 Fed. Cl. 110, 140 (2001).

[26] W. Stephen Dale, Esq. and Robert M. D'Onofrio, P.E., *Reconciling Concurrency in Schedule Delay and Constructive Acceleration*, 39 Public Contract Law Journal 161-229 (2010); Abdulaziz A. Bubshait and Michael Cunningham, *Comparison of Delay Analysis Methodologies*, Journal of Construction Engineering and Management – ASCE, p 315, July/August 1998.

[27] *J.A. Jones Construction Co*., ENGBCA No. 6252, 97-1 BCA ¶ 28,918 (1997).

[28] *Jimenez, Inc*., VABCA Nos. 6351, et al., 02-2 BCA ¶ 32,019 (2002).

[29] *J.R. Roberts Corp*., DOTBCA No. 2499, 98-1 BCA ¶ 29,680 (1998).

[30] The "Registered Method" procedure is currently under development by the AACE.

[31] *See Titan Pacific Constr. Corp. v. United States*, 17 Cl. Ct. 630, 637-38 (1989), *aff'd*, 899 F.2d 1227 (Fed. Cir. 1990).

[32] The reliance on case law can be overdone. For instance, critics of the Recommended Practice cannot reconcile the U.S. courts' favorable treatment of the fragnetted time impact analysis (Recommended Practice, MIP 3.7) even though that method is a technical sibling of the Impacted as-Planned that shares many of its defects. *See* Titan Pacific, 17 Cl. Ct. at 637-38; Gulf Contracting, Inc. v. United States, 23 Cl. Ct. 525, 527 (1991), *aff'd*, 972 F.2d 1353 (Fed. Cir. 1992).

[33] See K. Pickavance, *The Proof of Excusable Delay in Building Contracts Without "As-Built" Records*, CONSTR. L.J., Vol. 13, pp. 243-252.

[34] "An Investigation into the Use of Construction Delay and Disruption Analysis Methodologies": N. Braimah, Doctorial Thesis, University of Wolverhampton (UK) August 2008. The author of this study found that: 1) "The As-Planned vs. As-Built methodology was ranked by contractors as the most effective in ensuring success of claims followed by the Impacted As-Planned technique."; 2) "As-planned vs. As-built was ranked first by contractors and overall although it ranked was third by consultants; 3) "Collapsed as-built was rather the most widely used techniques of the consulting firms."; 4) The most widely used methodology, on the whole, was the As-Planned vs. As-Built followed by the Impacted As-planned, despite their reported numerous weaknesses; 5) The Time Impact Analysis and Window Analysis

methodologies, highly acclaimed in the literature as the most rigorous, are not widely used – although consulting firms tend to use them to a higher extent than contractors. *Id*. at 140, 240 & 241.

[35] A Critical Review, *supra* note 2, at 16; Jon M. Wickwire and Stuart Ockman, *Use of Critical Path Method on Contract Claims—2000*, 19 CONSTRUCTION LAWYER 14 (No. 4, October 1999).

[36] J. Wickwire, T. Driscoll, S. Hurlbut and M. Goff, CONSTRUCTION SCHEDULING: PREPARATION, LIABILITY AND CLAIMS at § 9.06 (3d ed. Aspen, 2010).

[37] *Robust Construction, LLC*, ASBCA No. 54056, 05-2 BCA(CCH) ¶33,019 (2005).

[38] Letter from Thomas J. Driscoll, Senior Vice President, URS Corp. to AACE International (June 20, 2009).

[39] "An Investigation into the Use of Construction Delay and Disruption Analysis Methodologies": N. Braimah, Doctorial Thesis, University of Wolverhampton (UK) August 2008.

[40] *See Youngdale & Sons Constr. Co., Inc. v. United States*, 27 Fed. Cl. 516, 551-54 (1993).

[41] J. Wickwire, T. Driscoll, S. Hurlbut and M. Goff, CONSTRUCTION SCHEDULING: PREPARATION, LIABILITY AND CLAIMS at § 9.06 (3d ed. Aspen, 2010).

[42] B. Bramble and M. Callahan, CONSTRUCTION DELAY CLAIMS § 11.07 (3d ed. Aspen 2000).

[43] ABA Forum on the Construction Industry, Mid Winter Meeting – January 28, 2010, Plenary Session 1 by Judah Lifschitz, James Nagle and Hon. Steven Reed.

[44] RP29-03 (2009) Section 2.1, Pages 17-18.

[45] A Critical Review, *supra* note 2, at 20.

[46] RP29-03 (2009) Section 1.1, Page 8.

Appendix A: Nomenclature

Taxonomy																
	1	RETROSPECTIVE														
	2	OBSERVATIONAL								MODELED						
	3	Static Logic			Dynamic Logic					Additive				Subtractive			
	4	3.1 Gross	3.2 Periodic		Contemporaneous Updates (3.3 As-Is or 3.4 Split)		3.5 Modified / Reconstructed Updates			3.6 Single Base[2]		3.7 Multi Base[1]		3.8 Single Simulation		3.9 Multi Simulation[1]	
	5		Fixed Periods	Variable Windows	All Periods	Grouped Periods	Fixed Periods	Variable Windows		Global Insertion	Stepped Insertion	Fixed Periods	Variable Windows or Grouped	Global Extraction	Stepped Extraction	Fixed Periods	Stepped Extraction
Common Names		As-Planned vs As-Built	Window Analysis		Contemporaneous Period Analysis, Time Impact Analysis, Window	Contemporaneous Period Analysis, Time Impact Analysis, Window Analysis	Contemporaneous Period Analysis, Time Impact Analysis	Window Analysis, Time Impact Analysis		Impacted As Planned, What-If	Time Impact Analysis, Impacted As-Planned	Time Impact Analysis	Window Analysis, Impacted As-Planned	Collapsed As-Built	Time Impact Analysis, Collapsed As-Built	Time Impact Analysis, Collapsed As-Built	Time Impact Analysis, Window Analysis, Collapsed As-Built
		As-Planned v. As-Built (Total Time)			Contemporaneous Period (Windows Analysis)		Modified Update Analysis			Impacted As-Planned		Prospective TIA		Collapsed As-Built			

Appendix B: Taxonomy