

AACE
INTERNATIONAL
RECOMMENDED
PRACTICE

29R-03

FORENSIC SCHEDULE ANALYSIS

SAMPLE

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FORENSIC SCHEDULE ANALYSIS

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Disclaimer: The opinions expressed by the authors and contributors to this recommended practice are their own and do not necessarily reflect those of their employers, unless otherwise stated.

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CONTENTS

1. ORGANIZATION AND SCOPE	9
1.1 Introduction	9
1.2. Basic Premise and Assumptions	10
1.3. Scope and Focus	10
1.4. Taxonomy and Nomenclature	11
A. Layer 1: Timing	13
1. Prospective	13
2. Retrospective	13
B. Layer 2: Basic Methods	13
1. Observational	13
2. Modeled	14
C. Layer 3: Specific Methods	14
1. Observational Methods	14
a. Static Logic Observation	14
b. Dynamic Logic Observation	14
2. Modeled Methods	14
a. Additive Modeling	14
b. Subtractive Modeling	15
D. Layer 4: Basic Implementation	15
1. Gross Mode or Periodic Mode	15
2. Contemporaneous / Asynchronous / Contemporaneous / Split	15
3. Modified or Reversed	15
4. Single Base, Simulation or Multi-Base, Simulation	16
E. Layer 5: Specific Implementation	16
1. Fixed Periods vs. Variable Periods / Grouped Periods	16
2. Global (Insertion or Extraction) vs. Stepped (Insertion or Extraction)	16
1.5. Underlying Fundamentals and General Principles	17
A. Underlying Fundamentals	17
B. General Principles	17
1. Use CPM Calculations	17
2. Concept of Data Date Must be Used	17
3. Shared Ownership of Network Float	17
4. Update Float Preferred Over Baseline Float	18
5. Sub-Network Float Values	18
6. Delay Must Affect the Critical Path	18
7. All Available Schedules Must Be Considered	18
2. SOURCE VALIDATION	18

April 25, 2011

<u>2.1. Baseline Schedule Selection, Validation, and Rectification (SVP 2.1)</u>	19
A. General Considerations.....	19
B. Recommended Protocol	19
C. Recommended Enhanced Protocol	20
D. Special Procedures	21
1. Summarization of Schedule Activities	21
2. Reconstruction of a Computerized CPM Model from a Hardcopy.....	21
3. De-Statusing a Progressed Schedule to Create a Baseline	22
4. Software Format Conversions	22
<u>2.2. As-Built Schedule Sources, Reconstruction, and Validation (SVP 2.2)</u>	23
A. General Considerations	23
B. Recommended Protocol	24
C. Recommended Enhanced Protocol	25
D. Special Procedures	25
1. Creating an Independent As-Built from Scratch “Daily Specific As-Built” (DSAB)	25
2. Creating a Fully Progressed Baseline.....	27
3. Determination of ‘Significant’ Activities for Inclusion in an As-Built.....	27
4. Collapsible As-Built CPM Schedule	28
5. Summarization of Schedule Activities	28
<u>2.3. Schedule Updates: Validation, Rectification, and Reconstruction (SVP 2.3)</u>	28
A. General Considerations	28
B. Recommended Protocol.....	29
C. Recommended Enhanced Protocol	29
D. Special Procedures	29
1. Reconstructed Updates	29
a. “Hindsight” Method	30
b. “Blindsight” Method	30
2. Bifurcation: Creating a Progress-Fully Half-Step Update.....	30
3. Correcting the Contemporaneous Project Schedule for the Analysis	30
<u>2.4. Identification and Quantification of Discrete Delay Events and Issues (SVP 2.4)</u>	32
A. General Considerations	32
1. ‘Delay’ Defined	33
a. Activity-Level Variance (ALV).....	33
b. Distinguishing ALV from Project-Level Variance (PLV)	34
c. Distinguishing Delay-Cause from Delay-Effect	34
d. Delay Characterization is Independent of Responsibility.....	34
2. Identifying and Collecting Delays	34
a. Two Main Approaches to Identification and Collection	34
b. Criticality of the Delay	35
3. Quantification of Delay Durations and Activity Level Variances	35
a. Variance Method	35
b. Independent Method	35
4. Cause of Variance	36
5. Assigning or Assuming Variance Responsibility.....	36
a. Contractor Delay	36
b. Owner Delay.....	37
c. Force Majeure Delay.....	37

April 25, 2011

B. Recommended Protocol	37
C. Recommended Enhanced Protocol	38
D. Special Procedures	38
1. Duration and Lag Variance Analysis	38
3. METHOD IMPLEMENTATION	38
3.1. Observational / Static / Gross (MIP 3.1)	39
A. Description	39
B. Common Names	39
C. Recommended Source Validation Protocols	40
D. Enhanced Source Validation Protocols	40
E. Minimum Recommended Implementation Protocols	40
F. Enhanced Implementation Protocols	41
1. Daily Delay Measure	41
G. Identification of Critical and Near-Critical Paths	42
H. Identification and Quantification of Concurrent Delays and Pacing	43
I. Determination and Quantification of Excusable and Compensable Delay	43
1. Excusable and Compensable Delay (ECD)	43
2. Excusable and Non-Compensable Delay (END)	43
J. Identification and Quantification of Mitigation / Constructive Acceleration	44
K. Specific Implementation Procedures and Enhancements	44
L. Summary of Considerations in Using the Minimum Protocol	44
M. Caveats in Using the Minimum Protocol / Conditions Requiring Enhanced Protocols	44
3.2. Observational / Static / Periodic (MIP 3.2)	45
A. Description	45
B. Common Names	46
C. Recommended Source Validation Protocols	46
D. Enhanced Source Validation Protocols	46
E. Minimum Recommended Implementation Protocols	46
F. Enhanced Implementation Protocols	48
1. Daily Delay Measure	48
G. Identification of Critical and Near-Critical Paths	49
H. Identification and Quantification of Concurrent Delays and Pacing	49
I. Determination and Quantification of Excusable and Compensable Delay	50
1. Excusable and Compensable Delay (ECD)	50
2. Excusable and Non-Compensable Delay (END)	50
J. Identification and Quantification of Mitigation / Constructive Acceleration	50
K. Specific Implementation Procedures and Enhancements	50
1. Fixed Period	50
2. Variable Periods	51
L. Summary of Considerations in Using the Minimum Protocol	51
M. Caveats in Using the Minimum Protocol / Conditions Requiring Enhanced Protocols	51
3.3. Observational / Dynamic / Contemporaneous As-Is (MIP 3.3)	52
A. Description	52
B. Common Names	52
C. Recommended Source Validation Protocols	53
D. Enhanced Source Validation Protocols	53
E. Minimum Recommended Implementation Protocols	53

April 25, 2011

F. Enhanced Implementation Protocols	54
G. Identification of Critical and Near-Critical Paths.....	55
H. Identification and Quantification of Concurrent Delays and Pacing.....	55
I. Determination and Quantification of Excusable and Compensable Delay.....	55
1. Non-Excusable and Non-Compensable Delay (NND)	56
2. Excusable and Compensable Delay (ECD)	56
3. Excusable and Non-Compensable Delay (END)	56
J. Identification and Quantification of Mitigation / Constructive Acceleration.....	56
K. Specific Implementation Procedures and Enhancements.....	57
1. All Periods	57
2. Grouped Periods.....	57
3. Blocked Periods	57
4. Changing the Contemporaneous Project Schedule During the Analysis.....	57
L. Summary of Considerations in Using the Minimum Protocol.....	58
M. Caveats in Using the Minimum Protocol / Conditions Requiring Enhanced Protocols	58
3.4. Observational / Dynamic / Contemporaneous Split (MIP 3.4)	59
A. Description	59
B. Common Names	59
C. Recommended Source Validation Protocols	60
D. Enhanced Source Validation Protocols	60
E. Minimum Recommended Implementation Protocols	60
F. Enhanced Implementation Protocols	61
G. Identification of Critical and Near-Critical Paths.....	61
H. Identification and Quantification of Concurrent Delays and Pacing.....	62
I. Determination and Quantification of Excusable and Compensable Delay.....	62
J. Identification and Quantification of Mitigation / Constructive Acceleration.....	62
K. Specific Implementation Procedures and Enhancements.....	62
1. All Periods.....	63
2. Grouped Periods.....	63
3. Blocked Periods	63
4. Bifurcation: Creation of Progress-Only Half-Step Update	63
5. Changing the Contemporaneous Project Schedule During the Analysis.....	65
L. Summary of Considerations in Using the Minimum Protocol.....	65
M. Caveats in Using the Minimum Protocol / Conditions Requiring Enhanced Protocols	66
3.5. Observational / Dynamic / Modified or Recreated (MIP 3.5)	66
A. Description	66
B. Common Names	67
C. Recommended Source Validation Protocols	67
D. Enhanced Source Validation Protocols	67
E. Minimum Recommended Implementation Protocols.....	68
F. Enhanced Implementation Protocols	68
1. Daily Progress Method	68
G. Identification of Critical and Near-Critical Paths	68
H. Identification and Quantification of Concurrent Delays and Pacing.....	69
I. Determination and Quantification of Excusable and Compensable Delay.....	69
J. Identification and Quantification of Mitigation / Constructive Acceleration.....	69
K. Specific Implementation Procedures and Enhancements.....	69
1. Fixed Periods	69
2. Variable Periods	70

April 25, 2011

3. Fixed Periods vs. Variable Periods	70
L. Summary of Considerations in Using the Minimum Protocol.....	70
M. Caveats in Using the Minimum Protocol / Conditions Requiring Enhanced Protocols	70
3.6. Modeled / Additive / Single Base (MIP 3.6)	71
A. Description	71
B. Common Names	72
C. Recommended Source Validation Protocols	72
D. Enhanced Source Validation Protocols	72
E. Minimum Recommended Implementation Protocols	72
F. Enhanced Implementation Protocols	73
G. Identification of Critical and Near-Critical Paths.....	73
H. Identification and Quantification of Concurrent Delays and Pacing.....	74
I. Determination and Quantification of Excusable and Compensable Delay.....	74
1. Excusable and Compensable Delay (ECD)	74
2. Non-Excusable and Non-Compensable Delay (NND)	75
3. Excusable and Non-Compensable Delay (END)	75
J. Identification and Quantification of Mitigation / Constructive Acceleration	75
K. Specific Implementation Procedures and Enhancements.....	75
1. Global Insertion	75
2. Stepped Insertion	76
L. Summary of Considerations in Using the Minimum Protocol.....	76
M. Caveats in Using the Minimum Protocol / Conditions Requiring Enhanced Protocols	76
3.7. Modeled / Additive / Multiple Base (MIP 3.7)	77
A. Description	77
B. Common Names	77
C. Recommended Source Validation Protocols	77
D. Enhanced Source Validation Protocols	77
E. Minimum Recommended Implementation Protocols	77
F. Enhanced Implementation Protocols	78
G. Identification of Critical and Near-Critical Paths.....	79
H. Identification and Quantification of Concurrent Delays and Pacing.....	79
I. Determination and Quantification of Excusable and Compensable Delay.....	80
1. Excusable and Compensable Delay (ECD)	80
2. Non-Excusable and Non-Compensable Delay (NND)	81
3. Excusable and Non-Compensable Delay (END)	81
J. Identification and Quantification of Mitigation / Constructive Acceleration.....	82
K. Specific Implementation Procedures and Enhancements.....	82
1. Fixed Periods	82
2. Variable Periods	82
3. Global Insertion	82
4. Stepped Insertion	82
L. Summary of Considerations in Using the Minimum Protocol.....	82
M. Caveats in Using the Minimum Protocol / Conditions Requiring Enhanced Protocols	83
3.8. Modeled / Subtractive / Single Simulation (MIP 3.8)	83
A. Description	83
B. Common Names	84
C. Recommended Source Validation Protocols	84
D. Enhanced Source Validation Protocols	84

April 25, 2011

E. Minimum Recommended Implementation Protocols	84
F. Enhanced Implementation Protocols	85
G. Identification of Critical and Near-Critical Paths.....	85
H. Identification and Quantification of Concurrent Delays and Pacing.....	85
I. Determination and Quantification of Excusable and Compensable Delay.....	86
1. Excusable and Compensable Delay (ECD)	86
2. Non-Excusable and Non-Compensable Delay (NND)	86
3. Excusable and Non-Compensable Delay (END)	86
J. Identification and Quantification of Mitigation / Constructive Acceleration.....	86
K. Specific Implementation Procedures and Enhancements.....	87
1. Choice of Extraction Models.....	87
a. Global Extraction	87
b. Stepped Extraction	87
2. Creating a Collapsible As-Built CPM Schedule.....	87
3. Identification of the Analogous Critical Path (ACP)	90
L. Summary of Considerations in Using the Minimum Protocol.....	90
M. Caveats in Using the Minimum Protocol / Conditions Requiring Enhanced Protocols	91
3.9. Modeled / Subtractive / Multiple Base (MIP 3.9)	91
A. Description	91
B. Common Names.....	92
C. Recommended Source Validation Protocols	92
D. Enhanced Source Validation Protocols	92
E. Minimum Recommended Implementation Protocols	92
F. Enhanced Implementation Protocols	93
G. Identification of Critical and Near-Critical Paths for each Periodic Update.....	93
H. Identification and Quantification of Concurrent Delays and Pacing.....	94
I. Determination and Quantification of Excusable and Compensable Delay.....	94
1. Excusable and Compensable Delay (ECD)	95
2. Non-Excusable and Non-Compensable Delay (NND)	95
3. Excusable and Non-Compensable Delay (END)	95
J. Identification and Quantification of Mitigation / Constructive Acceleration.....	95
K. Specific Implementation Procedures and Enhancements.....	95
1. Choice of Analysis Periods.....	95
a. Fixed Periods	95
b. Variable Periods	95
c. Fixed Periods vs. Variable Periods	96
2. Order of Analysis Periods	96
3. Choice of Modeling Increments	96
a. Periodic Modeling	96
b. Cumulative Modeling	97
4. Choice of Extraction Modes	98
a. Global Extraction	98
b. Stepped Extraction	98
5. Creating a Collapsible As-Built CPM Schedule.....	99
6. Identification of the Analogous Critical Path (ACP)	99
L. Summary of Considerations in Using the Minimum Protocol.....	99
M. Caveats in Using the Minimum Protocol / Conditions Requiring Enhanced Protocols	99
4. ANALYSIS EVALUATION	99

April 25, 2011

4.1. Excusability and Compensability of Delay	100
A. General Rules	100
B. Accounting for Concurrent Delay	100
C. Equitable Symmetry of the Concept	102
4.2. Identification and Quantification of Concurrent Delay	103
A. Relevance and Application	103
B. Various Definitions of Concurrency	103
C. Pre-Requisite Findings Concerning the Delays Being Evaluated for Concurrency	104
1. Two or More Delays that are Unrelated and Independent	104
2. Two or More Delays that are the Contractual Responsibility of Different Parties	105
3. The Delay Must be Involuntary	105
4. The Delay Must be Substantial and Not Easily Curable	105
D. Functional Requirements Establishing Concurrency and the Factors that Influence Findings	105
1. Literal Concurrency vs. Functional Concurrency	106
2. Least Float vs. Negative Float	108
3. Cause of Delay vs. Effect of Delay	108
4. Frequency, Duration, and Placement of Analysis Intervals	109
a. Frequency and Duration	109
b. Chronological Placement	110
5. Order of Insertion or Extraction in Stepped Implementation	110
6. Hindsight vs. Blindsight	110
E. Defining the Net Effect of Concurrent Combinations of Delays	112
F. Pacing	113
G. Demonstrating Pacing	114
1. Existence of the Parent Delay	115
2. Showing of Contemporaneous Activity to Resume Normal Pace	115
3. Evidence of Contemporaneous Interference	115
4.3. Critical Path and Float	115
A. Identifying the Critical Path	115
1. Critical Path: Long Path School vs. Total Float Value School	115
2. Negative Float / Zero Float School vs. Lowest Float Value School	116
B. Quantifying 'Near-Critical'	116
1. Duration of Discrete Delay Events	117
2. Duration of Each Analysis Interval	117
3. Historical Rate of Float Consumption	118
4. Amount of Time or Work Remaining on the Project	118
C. Identifying the As-Built Critical Path	118
D. Common Critical Path Alteration Techniques	120
1. Resource Leveling and Smoothing	120
2. Multiple Calendars	120
3. Precedence Logic / Lead and Lag	121
4. Start and Finish Constraints	121
5. Various Calculation Modes	121
a. Schedule Calculation	121
b. Duration Calculation	122
6. Use of Data Date	122
7. Judgment Calls During the Forensic Process	122
E. Ownership of Float	122

April 25, 2011

4.4. Delay Mitigation and Constructive Acceleration	123
A. Definitions	123
B. General Considerations	124
1. Differences between Directed Acceleration, Constructive Acceleration, and Delay Mitigation	124
2. Acceleration and Compensability	125
3. Delay Mitigation and Compensability	125
C. Elements of Constructive Acceleration	125
1. Contractor Entitlement to an Excusable Delay	125
2. Contractor Requests and Establishes Entitlement to a Time Extension	126
3. Owner Failure to Grant a Timely Time Extension	126
4. Implied Order by the Owner to Complete More Quickly	126
5. Contractor Notice of Acceleration	126
6. Proof of Damages	127
5. CHOOSING A METHOD	127
5.1 Factor 1: Contractual Requirements	128
5.2 Factor 2: Purpose of Analysis	128
5.3 Factor 3: Source Data Availability and Reliability	129
5.4 Factor 4: Size of the Dispute	130
5.5 Factor 5: Complexity of the Dispute	130
5.6 Factor 6: Budget for Forensic Schedule Analysis	130
5.7 Factor 7: Time Allowed for Forensic Schedule Analysis	131
5.8 Factor 8: Expertise of the Forensic Schedule Analyst and Resources Available	131
5.9 Factor 9: Forum for Resolution and Audience	132
5.10 Factor 10: Legal or Procedural Requirements	132
5.11 Factor 11: Custom and Usage of Methods on the Project or the Case	132
REFERENCES	132
CONTRIBUTORS	133
APPENDIX A: FIGURE 1 – NOMENCLATURE CORRESPONDENCE FIGURE	135
APPENDIX B: FIGURE 2 – TAXONOMY OF FORENSIC SCHEDULE ANALYSIS	136

April 25, 2011

1. ORGANIZATION AND SCOPE

1.1. Introduction

The purpose of the AACE[®] International Recommended Practice 29R-03 *Forensic Schedule Analysis* is to provide a unifying reference of basic technical principles and guidelines for the application of critical path method (CPM) scheduling in forensic schedule analysis. In providing this reference, the RP will foster competent schedule analysis and furnish the industry as whole with the necessary technical information to categorize and evaluate the varying forensic schedule analysis methods. The RP discusses certain methods of schedule delay analysis, irrespective of whether these methods have been deemed acceptable or unacceptable by courts or government boards in various countries around the globe.

This RP is not intended to establish a standard of practice, nor is it intended to be a prescriptive document applied without exception. 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 recommended practice, the RP should be used in conjunction with professional judgment and knowledge of the subject matter. While the recommended protocols contained herein are intended to aid the practitioner in creating a competent work product it may, in some cases, require additional or fewer steps.

AACE recognizes that the method(s) of analysis to be utilized in a given situation, and the manner in which a particular methodology might be implemented, are dependent upon the contract, the facts, applicable law, availability and quality of contemporaneous project documentation, and other circumstances particular to a given situation. Therefore, the RP should be read in its entirety and fully understood before applying or using the information for any purpose. The reader should refrain from using the RP in a manner which is not consistent with its intended use, and not quote any of the contents in an out-of-context manner. As with any other recommended practice published by AACE, this RP is subject to future revisions as new methodologies are identified; new forensic scheduling software is developed; etc.

Forensic¹ scheduling analysis refers to the study and investigation of events using CPM or other recognized schedule calculation methods. It is recognized that such analyses may potentially be used in a legal proceeding. It is the study of how actual events interact in the context of a complex model for the purpose of understanding the significance of a specific deviation or series of deviations from some baseline model and their role in determining the sequence of events within the complex network.

Forensic schedule analysis, like many other technical fields, is both a science and an art. As such, it relies upon professional judgment and expert opinion and usually requires many subjective decisions. One of the most important of these decisions is what technical approach should be used to measure or quantify delay and identify the effected activities in order to focus on causation. Equally important is how the analyst should apply the chosen method. The desired objective of this RP is to reduce the degree of subjectivity involved in the current state of the art. This is with the full awareness that there are certain types of subjectivity that cannot be minimized, let alone eliminated. Professional judgment and expert opinion ultimately rest on subjectivity, but that subjectivity must be based on diligent factual research and analyses whose procedures can be objectified.

For these reasons, the RP focuses on minimizing procedural subjectivity. It does this by defining terminology, identifying methodologies currently used by forensic scheduling analysts, classifying them, and setting forth recommended procedural protocols for the use of these techniques. By describing uniform procedures that

¹ The word 'forensic' is defined as: 1. Relating to, used in, or appropriate for courts of law or for public discussion or argumentation. 2. Of, relating to, or used in debate or argument; rhetorical. 3. Relating to the use of science or technology in the investigation and establishment of facts or evidence in a court of law: *a forensic laboratory*. [9] relating to, or used in debate or argument; rhetorical. 3. Relating to the use of science or technology in the investigation and establishment of facts or evidence in a court of law: *a forensic laboratory*. [9]

April 25, 2011

increase the transparency of the analytical method and the analyst's thought process, the guidelines set forth herein will increase both the accountability and the testability of an opinion and minimize the need to contend with "black-box" or "voodoo" analyses.

Implementation of this RP 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.

1.2. Basic Premise and Assumptions

- a. Forensic scheduling is a technical field that is associated with, but distinct from, project planning and scheduling. It is not just a subset of planning and scheduling.
- b. Procedures that may be sufficient for the purpose of project planning, scheduling, and controls may not necessarily be adequate for forensic schedule analysis.
- c. It is assumed that this document will be used by practitioners to foster consistency in practice and be used in the spirit of intellectual honesty.
- d. All methods are subject to manipulation as they all involve judgment calls by the analyst whether in preparation or in interpretation.
- e. No forensic schedule analysis method is exact. The level of accuracy of the answers produced by each method is a function of the quality of the data used to obtain the answer, the accuracy of the assumptions, and the subjective judgments made by the forensic schedule analyst.
- f. Schedules are a project management tool that, by and of themselves, do not demonstrate root causation or responsibility for delays. Legal entitlement to delay damages should be distinct and apart from the forensic schedule analysis methodologies outlined in this RP.

1.3. Scope and Focus

The scope and focus of this RP are:

- a. This RP covers the technical aspects of forensic schedule analysis methods. It identifies, defines, and describes the usage of various 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 and considerations for usage and cites the best current practices and implementation for each method.
- b. The focus of this 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 factors 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.
- c. Accordingly, the RP primarily focuses on the use of forensic scheduling techniques and methods for factual analysis and quantification as opposed to assignment of delay responsibility. This, however, does not preclude the practitioner from performing the analysis based on certain assumptions regarding liability.
- d. This RP is not intended to be a primer on forensic schedule analysis. The reader is assumed to have advanced,

April 25, 2011

hands-on knowledge of all components of CPM analysis and a working experience in a contract claims environment involving delay issues.

- e. This RP not intended to be an exhaustive treatment of CPM scheduling techniques. While the RP explains how schedules generated by the planning and scheduling process become the source data for forensic schedule analysis, it is not intended to be a manual for basic scheduling.
- f. This RP is not intended to override contract provisions regarding schedule analysis methods or other mutual agreement by the parties to a contract regarding the same. However, this is not an automatic, blanket endorsement of all methods of delay analysis by the mere virtue of their specification in a contract document. It is noted that contractually specified methods often are appropriate for use during the project in a prospective mode but may be inappropriate for retrospective use².
- g. It is not the intent of this RP to intentionally contradict or compete with other similar protocols³. All efforts should be made by the user to resolve and reconcile apparent contradictions. AACE requests and encourages all users to notify AACE and bring errors, contradictions, and conflict to its attention.
- h. This RP deals with CPM-based schedule analysis methods. It is not the intent of the RP to exclude analyses of simple cases where explicit CPM modeling may not be necessary, and mental calculation is adequate for analysis and presentation. The delineation between simple and complex is admittedly blurry and subjective. For this purpose, a 'simple case' is defined as any CPM network model that can be subjected to mental calculation whose reliability cannot be reasonably questioned and allows for effective presentation to lay persons using simple reasoning and intuitive common sense.
- i. Finally, the RP is an advisory document to be used in conjunction with professional judgment based on working experience and knowledge of the subject matter. It is not intended to be a prescriptive document that can be applied without exception. While used as intended, this RP will aid the practitioner in creating a competent work product, but some cases require additional steps and some require less. Thus, 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 confident and sound application of schedule analysis principles.

1.4. Taxonomy and Nomenclature

The industry knows the forensic schedule analysis methods and approaches described herein 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 RP will correlate the common names with a taxonomic classification. This taxonomy will allow for the freedom of regional, cultural, and temporal differences in the use of common names for these methods.

The RP correlates the common names for the various methods to taxonomic names much like the biosciences use Latin taxonomic terms to correlate regionally diverse common names of plants and animals. This allows the common variations in terminology to coexist with a more objective and uniform language of technical classification. For example, the implementation of method implementation protocol (MIP) 3.7 (aka "TIA") has a bewildering array of regional variations. Not only that, the method undergoes periodic evolutionary changes while maintaining the same name.

² For example, the prospective mode of "Time Impact Analysis" method that inserts estimated delay fragments into the current schedule update for the purpose of contemporaneously demonstrating entitlement to time extensions.

³ The only other similar protocol known at this time is the "Delay & Disruption Protocol" issued in October 2002 by the Society of Construction Law of the United Kingdom [1]. The DDP has a wider scope than this RP.

April 25, 2011

By using taxonomic classifications, the RP allows the discussion of the various forensic analysis methods to become more specific and objective. Thus, the RP 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. Figure 1 – *Nomenclature Correspondence* shows the commonly associated names for each of the taxonomic classifications.

The RP’s taxonomy is a hierarchical classification system of known methods of schedule impact analysis techniques and methods used to analyze how delays and disruptions affect entire CPM networks. For example, methods like the window analysis and collapsed as-built are included in the taxonomy, while procedures such as fragnet modeling, bar charting, and linear graphing are not included. Procedures are tools, not methods, and therefore are not classified under this taxonomy.

The taxonomy is comprised of five layers: timing, basic and specific methods, and the basic and specific implementation of each method. Please refer to Figure 2 – *Taxonomy of Forensic Schedule Analysis* for a graphic representation of the taxonomy. The elements of the diagrams are explained below.

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	Contemporaneous Period Analysis, Time Impact Analysis, Window Analysis	Global Insertion, Stepped Insertion, 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			

Footnotes

1. Contemporaneous or Modified / Reconstructed Updates
2. The single base can be the original baseline or an update

Figure 1 – Nomenclature Correspondence (see enlarged size figure in Appendix A)

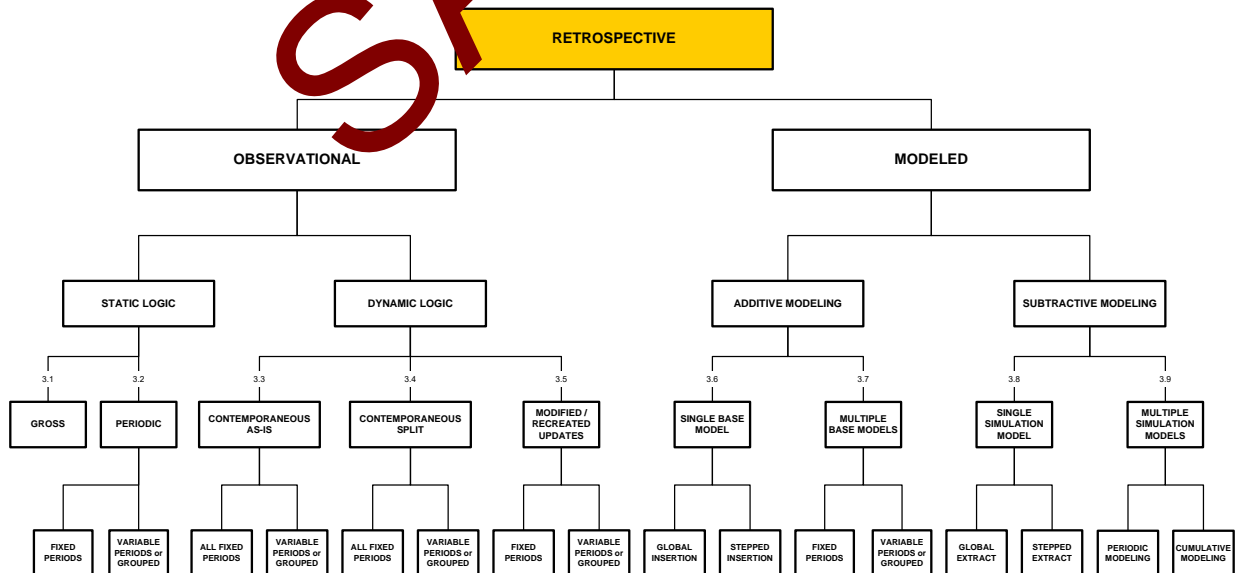


Figure 2 – Taxonomy of Forensic Schedule Analysis (see enlarged size figure in Appendix B)