

11 Terminologies for Delay Analysis

by **Ir Liu Yang** Planning Associate Director, AMAE MHKIE MICE CEng DIC MEng JD
yliu@apexplanningtech.com

The importance of planning has gained increasing attention in construction projects. Take NEC contract as an example, it introduces a core clause, Clause 3 on Time, to emphasise the necessity of an accepted and regularly revised programme to enhance effective project management. Therefore, when engaging in discussions regarding planning and delays, it is helpful to familiarise with specific terminologies commonly used in this context. Below are 11 terminologies frequently used in delay analysis.

1 Extension of Time (EoT) Entitlement

In construction projects, several factors can lead to delays, such as adverse weather conditions, design changes, unforeseeable site conditions, or actions by third parties. When these delays occur and affect the project schedule, the affected party may be entitled to an Extension of Time (EoT).

An entitlement to an EoT refers to the right granted to a party in the contract. If the contract does not explicitly state that the completion date is non-extendable, the party should be given a reasonable time extension to complete the work. Granting an EoT involves extending the original completion date to a later date to accommodate the impact caused by the delaying events.

To establish an entitlement to an EoT, the party seeking the extension usually needs to demonstrate that the delay event caused a critical delay to the completion of the project. This typically involves providing a delay analysis and supporting it by corresponding site records, such as progress reports, correspondences and other relevant evidence. It is important to note that each construction contract may have specific provisions and requirements regarding EoT entitlement, and there may be condition precedents that must be followed in order to qualify for the claim. Therefore, a thorough review of the contract terms is necessary to determine the specific procedures and criteria for claiming an EoT.

2 Critical Path

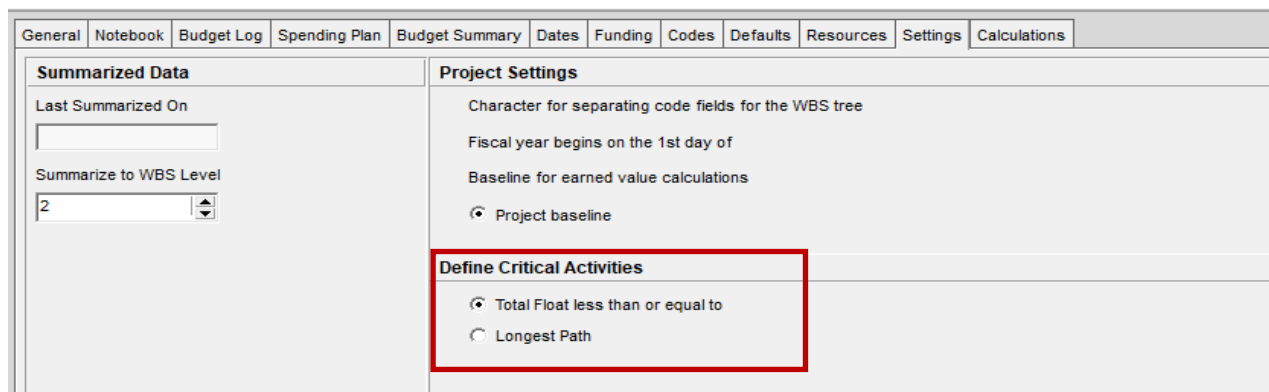
Critical path is defined in Society of Construction Law “Delay and Disruption Protocol 2nd Edition 2017” that:

“The longest sequence of activities through a project network from start to finish, the sum of whose durations determines the overall project duration. There may be more than one critical path depending on workflow logic. A delay to progress of any activity on the critical path will, without acceleration or re-sequencing, cause the overall project duration to be extended, and is therefore referred to as a ‘critical delay’.”

The critical path is the sequence of activities that determines the project's completion date, and any delay in a critical path activity will result in a delay to the overall project. The critical paths can be identified through three types of analysis: prospective, contemporaneous, and retrospective critical path analysis, which utilise different scheduling techniques and programme available for the project. It is important to note that establishing a valid and

reasonable critical path analysis is crucial when claiming delay, as challenges to the assessed critical path can potentially invalidate the entitlement to an EoT.

Further, in construction programme scheduling software like Primavera P6, there are two settings to determine the critical paths. However, it is important to keep in mind that these two methods may indicate different critical paths. It is not advisable to solely rely on computer-generated critical paths as they can be subject to challenges and may not accurately reflect the project's true critical path.



3 Baseline Programme

A baseline programme is a predefined schedule that establishes the planned start and completion dates for each activity at the outset of a project. It encompasses not only the Contractor's planned sequence of works, methodology, and allocation of plant and resources but also serves as a reference point throughout the project for measuring progress and identifying any delays. The baseline programme is typically developed and agreed upon by both the contracting parties to reflect the planned works the Contractor is obligated to carry out within the contract period, excluding the impact of any variations. It is a primary document used to assess the entitlement to an EoT when delays occur.

In particular, in NEC contracts, Clause 31.1 requires the submission of a First Programme to the *Project Manager* within a specified timeframe. This First Programme serves as the initial baseline programme for acceptance.

4 As-built Programme

The as-built programme is prepared as a record programme that reflects the actual sequence and duration of activities as they were completed after the project's completion. Its purpose is to serve as a documentation tool, capturing the project's final schedule and providing a record of the project's progress.

It is to note that the updates made to the as-built programme depend on the planning engineer's understanding and assumptions regarding the works involved in each activity when updating the actual progress. So, it is important for individuals relying on the as-built records to verify the dates by cross-checking with site records or other reliable sources of information. This verification process helps ensure the accuracy and reliability of the as-built programme and provides a solid basis for analysis and reference.

5 Programme Update

Interim updated programmes reflect the actual progress of the works. The programme is updated not only with activity progress, as-built start and finish dates but also with latest sequence of works and construction methodology to compute the remaining works for the project. This helps project decision makers have a clear understanding of the project status with quantified figures. By regularly updating the programme, it informs the project practitioners with insights into areas of delay and helps identify potential future risks of the project.

6 Total Float and Free Float

In planning, two types of floats are commonly discussed: Free Float and Total Float. Total Float refers to the amount of time an activity can be delayed without impacting the project's final completion date. It is important to note that Total Float can have a value of zero or even negative numbers. Total Float services as a useful reference in assessing the criticality of different paths within the programme.

Free Float represents the amount of time an activity can be delayed without affecting the start time of its successor activities.

7 Method of Delay Analysis

Delay analysis is a crucial process in construction projects that involves identifying and assessing delays to determine their impact on the project schedule and completion date. The Society of Construction Law “Delay and Disruption Protocol” provides valuable guidance in this area, presenting six methods of analysis. The table of delay analysis method is extracted as below. The protocol is available at https://www.scl.org.uk/sites/default/files/documents/SCL_Delay_Protocol_2nd_Edition_Final.pdf

Method of Analysis	Analysis Type	Critical Path Determined	Delay Impact Determined	Requires
Impacted As-Planned Analysis	Cause & Effect	Prospectively	Prospectively	<ul style="list-style-type: none"> Logic linked baseline programme. A selection of delay events to be modelled.
Time Impact Analysis	Cause & Effect	Contemporaneously	Prospectively	<ul style="list-style-type: none"> Logic linked baseline programme. Update programmes or progress information with which to update the baseline programme. A selection of delay events to be modelled.
Time Slice Windows Analysis	Effect & Cause	Contemporaneously	Retrospectively	<ul style="list-style-type: none"> Logic linked baseline programme. Update programmes or progress information with which to update the baseline programme.
As-Planned versus As-Built Windows Analysis	Effect & Cause	Contemporaneously	Retrospectively	<ul style="list-style-type: none"> Baseline programme. As-built data.
Retrospective Longest Path Analysis	Effect & Cause	Retrospectively	Retrospectively	<ul style="list-style-type: none"> Baseline Programme. As-built programme.
Collapsed As-Built Analysis	Cause & Effect	Retrospectively	Retrospectively	<ul style="list-style-type: none"> Logic linked as-built programme. A selection of delay events to be modelled.

8 Concurrent Delay

The issue of concurrent delay is a commonly raised question in construction projects. It arises when two or more events occur simultaneously, and each event, if considered individually, would have caused a delay to the project.

There are decisions that have established criteria to assess concurrent delay and discussed entitlements to time and cost in such circumstances. The criteria for assessing concurrent delay is stringent and worth in-depth discussions. The issue of concurrent delay is discussed in a separate paper titled “What Does Concurrent Delay Really Mean?”.

9 Contemporaneous Records

The assessment of delays requires support from site records. An analysis backed by relevant and reliable site records is not only convincing but also difficult to challenge. In establishing a claim, different tiers of site records can be relied upon, and the strength of the claim depends on the relevance and credibility of the evidence presented.

It is important to note that the relevance and primacy of the evidence play a crucial role in the strength of the claim. Site records that directly correlate to the events in question and are considered primary sources of information hold greater weight in supporting the delay findings.

10 Causation

The link between a delay event and its impact on the project schedule is the key in determining whether the event was a significant cause of the overall project delay or merely one of several contributing factors. Establishing clear causation, supported by contemporaneous records, is essential in fully substantiating the impact of a specific delay event.

11 Delay Expert Witness

There are occasions when disputes over EoT entitlement cannot be resolved through amicable negotiations. In such cases, when resolution through dispute resolution mechanisms becomes necessary, engaging an independent expert witness is essential to assess the cause and duration of the project's EoT in mediation, arbitration, or litigation proceedings.

About the Author

Ms Liu is a chartered engineer and with a background in law. She specialises in consulting on construction projects in the area of panning and delay analysis. Her experience covers a wide spectrum of construction project life cycle from tendering, project delivery, and dispute resolution, with a particular focus on Hong Kong and APAC region.



Ir Liu Yang

Planning Associate Director
AMAE MHKIE MICE CEng DIC MEng JD
yliu@apexplanningtech.com



Apex Planning
& Technology Co. Ltd