

# A Comprehensive Approach to Cycle Time Components

BC Forest Safety Council

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BC **Forest Safety** Council

*Unsafe is Unacceptable*

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## **INTRODUCTION**

Practically, cycle time can be described as the total time necessary to complete a log hauling cycle – the time it takes for an empty logging truck to travel from the log delivery site to the loading location, receive the load of logs, travel from the loading site to the log delivery location, have the load removed, and be prepared for the next load.

Although the concept is broadly understood across industry, there are very few concise definitions and descriptions of cycle time. The 2012 Cycle Time Review Project identified wide variability and operational inconsistencies across BC industry with respect to exactly what a cycle time includes, and what it does not include. This document provides a practical approach to discretely identifying the activities or elements that are typically involved in hauling logs. Once it is determined which of these elements will be included in cycle time determinations, users can methodically determine or establish the amount of time that element deserves.

## **THE TRADITIONAL APPROACH**

One source that has been in use for some 25 years (with variations) can be found in the Ministry of Forests, Lands and Natural Resource Operations Appraisal Manuals. The Coast Appraisal Manual (CAM) does not define cycle time and cycle time has no similar role in determining log transportation allowances for coastal stumpage determination purposes. Section 3.5.1.1 of the current Interior Appraisal Manual (IAM) provides a description of “Primary Cycle Time”.

*“The cycle consists of loading, hauling, weighing, unloading, return time, and unavoidable delays.”*

IAM further describes the considerations and criteria used to determine cycle times.

*“The cycle time will normally be determined by taking into consideration all the factors that may affect it: distance, expected rate of speed, necessary delays, expected standard of roads and their maintenance, traffic density, and seasonal weather conditions.*

*Unavoidable delays are periods when the truck is on the job but not operating due to unpredictable delays such as; tightening binder chains, minor repairs made by driver, checking and adjusting brakes, minor delays prior to loading and unloading, refuelling, etc.*

*Unavoidable delay time does not include any breakdown which requires shop repair, the services of a skilled mechanic, or a spilled load of logs. The time for load, unload and unavoidable delay is set at 75 minutes for cable yarding systems and 60 minutes for all other systems.”*

This definition - initially intended as the methodology for determining cycle times for appraisal purposes, but now having the purpose of providing a consistent methodology for licensees to submit information required by government - falls short of providing the full log hauling picture. It does not identify or describe all of the activities or actions that must be completed as a matter of practical necessity, or as required by various regulatory legislations, company or owner procedures, and industry best practices.

## **A NEW APPROACH**

Operational variations exist, but most log hauling in BC takes place according to largely standardized processes, allowing the identification of the components of log hauling to be fairly straight-forward. How much time, on average, it takes to travel from Point A to Point B (often broken down into a series of several sector times) and back again, and completing all associated activities (wrapping up, unloading, etc.) can be estimated, calculated and/or measured directly. Adding up the time allocated to each sector and activity should yield a reliable cycle time.

Establishing a cycle time has two primary parts – deciding which elements are to be included in the calculations, and applying an accepted methodology to determine the time allocated to each element. While several of the parameters described in IAM – distance, road construction and maintenance standards, traffic density and seasonal weather conditions – continue to be valid and justifiable considerations, some of the parameters included or excluded in the Appraisal Manual and in typical cycle time calculations seem inconsistent with operational reality.

For example, IAM indicates tightening load binders is an unavoidable, or unpredictable, delay. Yet Regulations prescribe a minimum frequency with which binders must be checked. Depending on the “haul” (timber type, configuration, duration, etc.), the number of wrapper checks that is practically necessary may be greater than the minimum required by regulation. But when considered across the industry, that number is not highly variable – it’s usually two or three wrapper checks.

Similarly, most log haulers interviewed in the Cycle Time Review surveys indicated that their cycle times do not include the time required for minor repairs made by drivers, checking and adjusting brakes, or refuelling. Yet, the IAM definition indicates each is a cycle time component.

Some survey respondents said that the rate of speed used to determine the cycle time is greater than what is advisable in a given road section or road class, especially when expected road maintenance standards are not upheld. Drivers commented that the *expected* rate of speed is, on average and certainly during adverse weather and road conditions, much greater than the *safe* speed. Several drivers and truck owners said that the cycle and sector times are reasonable and achievable on a consistent basis; it’s the avoidable delays that ruin their day.

Hauling logs includes numerous legal requirements. It seems reasonable that government policies (such as appraisal methodologies) and industry procedures (such as cycle time calculations) should recognize existing statutes and regulations, particularly those related to safety performance. Pre-trip inspections are required by at least two pieces of legislation and are a standard industry expectation. But it is not apparent that the IAM description includes time for pre-trip inspections, and survey respondents said their cycle times don’t include time for pre-trip inspections.

These discrepancies may point to a system disconnect. It appears that some of the elements that IAM indicates could or should be considered in determining cycle times are not being included in calculations. Some log hauling activities that Licensees typically include in cycle time calculations are not identified in the IAM definition. And it appears that some of the things a log hauler must do as a matter of law are not recognized in the appraisal methodology, and not in cycle time calculations.

MFLNRO staff explained that IAM cycle time calculations are not intended for direct application to hauling contracts (although some survey respondents indicated that they do use that methodology). Certainly every Licensee as a prudent business enterprise is free to seek negotiated contract prices that minimize delivered log costs. However, if the methodology used to determine the value of timber the Crown sells to Licensees (i.e. stumpage) applies outdated, incorrect or incomplete parameters, it cannot arrive at estimates that reflect today’s realities. If those methods do not fully recognize the time necessary to safely complete a hauling cycle,

there is risk that such shortcomings tend to under-estimate log hauling costs, and that those costs are passed on to log haulers by an inadequate cycle time.

Recognizing there are differences between the standard practices of today and the methodologies and terminologies described in the IAM process, the Cycle Time survey process sought to obtain current and relevant information from Licensees, contractors, drivers and others. Such information can then be used to develop an updated list of what activities are being, or legitimately *ought* to be, included in a cycle time. Based on survey responses and a little re-thinking of appraisal methodologies in the current regulatory context, the goal of this document is to offer an updated and inclusive description of the elements and variables that should be considered in determining cycle times.

## **CYCLE TIME COMPONENTS**

### **A. Empty travel time**

Empty travel time includes the time it takes for an empty log truck to travel from the off-loading or log delivery location to loading site on the harvest block (i.e. “under the loader”, but the trailer, if there is one, is still on the truck).

Empty travel time should be measured in real time or calculated using travel speeds an average efficient operator would apply for each specific road section / road class on the haul route.

Commonly, the total empty haul route is divided into sectors identified by road section or road class (e.g. highway, secondary highway, main haul road, bush road) and starting and ending at practical, identifiable locations (e.g. road junction). The distance of each sector is accurately measured and recorded (often to the nearest 0.1 km)

Determining the speed for each sector should consider legal speed limits. Recognizing that daily road and traffic conditions preclude an empty logging truck consistently maintaining the posted speed limit, some calculate empty sector time using a percentage of the posted speed limit (e.g. 90% to 95%).

For sectors in which no posted speed limit applies, the sector time can be determined by measuring and recording actual travel times. Typically, this should be done by timing multiple trucks during *average* conditions - the road is being maintained in a condition the same as what will be experienced over the duration of the haul, and during representative traffic volume / frequency, etc.

Empty travel time should recognize known and reasonably foreseen road hazards, and seasonal conditions that will influence travel speed, including clearing loaded traffic consistent with road use protocols.

### **B. Loading time**

The loading phase begins when the empty log truck is under the loader ready for the trailer to be removed and ends when the secured and marked load is ready for transport. To determine a fair average loading time, real time measurements should be conducted during a representative range of conditions (e.g. weather, timber type, loader operator, time of day, configuration) and should include the following activities.

1. Off-loading the trailer and preparing the rigging: hooking up hitch(es), connecting air lines and electrical and scale cords, calibrating scales, setting up stakes, conducting a tug test, double checking gear, etc. and ensuring the unit is ready to accept the load.
2. The loader placing and arranging logs in the bunks.
3. Positioning and re-positioning the truck to facilitate loading (e.g. move ahead to next log deck).
4. The loader adjusting the load to ensure proper crown, correct axle weights, length / height dimensions.
5. Completing or receiving the load slip (paper or electronic entry device).
6. Securing the load: the loader restraining the bundle(s) to permit driver to inspect the load, apply and secure all wrappers and complete necessary checks to ensure the truck and load are ready for transport.

### **C. Loaded travel time**

Loaded travel time includes the time necessary for the loaded log truck to travel from the loading site on the cut block to the log off-loading site.

As with empty travel times above, loaded travel times should be delineated by sectors (i.e. when loaded route is same as empty route, use the same sectors) and measured or calculated using representative and realistic values. Loaded travel times for all sectors will apply a slower travel speed than used for empty travel. In some cases (e.g. paved “flat” highway, where road grades do not exceed 5%), it will be suitable to apply a percentage of the posted speed limit (e.g. 80% or 90%). But because loaded log trucks take more time to slow down before and accelerate away from intersections, are impacted to a greater degree by adverse and steep favorable grades and must slow down for potholes, off-camber corners and frost heaves, the vertical and horizontal road alignment plus other conditions impact loaded travel times to a greater degree than they do empty travel times. Usually, applying a generic percentage will not accurately reflect the time necessary to transport a load of logs over that sector; actual observation and recording of representative times will provide a more reliable result.

Time required to complete wrapper checks, load marking, brake checks and other activities is discussed below under **Unavoidable Delay Times**

Where weigh scales are used at the delivery location, loaded travel time includes the time up to when the driver proceeds onto the weigh scales. Where weigh scales are not used, loaded travel time ends when the loaded truck pulls into the off-loading site but the driver has not yet initiated preparations for off-loading.

### **D. Unloading time**

The unloading phase begins once the loaded truck pulls onto the weigh scales, or into the off-loading site, and ends once the empty truck has been prepared for return travel to the loading site, and has been “weighed out” or is leaving the off-loading site. To determine an average unloading time, conduct real time measurements during representative conditions (e.g. unloading location, banding or not banding, loader type, truck configuration, etc.) and include activities listed below. Alternatively,

several survey respondents indicated they determine unloading time by calculating the period between the recorded “weigh in” time and the recorded “weigh out” time, averaging a number of such recordings over a period.

1. Weighing in (if a weigh scale site is used at the off-loading site).
2. Affixing bands or cables around the load (if applied).
3. Travelling in and about the off-loading area (e.g. as directed to a specific off-loading site).
4. Waiting time once in the owner’s site.
5. Removing, recoiling and storing wrappers (as per regulation and site owner direction). Depending on the method used, this includes time at the wrapper removal station or having the load secured by the off-loading machine, and then removing and storing the wrappers.
6. Preparing the unit for return travel to the loading site, including but not limited to lowering stakes, checking all rigging for structural integrity, sweeping rocks or woody debris from the rigging, checking tires, disconnecting and re-loading the trailer, and travel to the weigh scale.
7. Weighing out (if a weigh scale site is used at the off-loading site).

#### **E. Unavoidable Delay Time**

##### **I) Actions Necessary to Satisfy Legal Requirements**

Statutes and regulations (e.g. Motor Vehicle Act and related Regulations, WorkSafeBC Regulations, Timber Marking and Transportation Regulation, etc.) require that log truck drivers perform several important steps to confirm their truck and load are prepared for transportation. What drivers must actually do, and how long it takes to complete those steps varies by application (e.g. off-highway versus on-highway). Brake checks take longer for 8-axle configurations than 5-axes. Some loads settle more than others, and require more frequent wrapper checks. Seasonal or weather-related factors attract additional time and effort to complete necessary activities. Rather than *unavoidable delays*, these are legal requirements deemed integral to successful log hauling operations.

Survey responses suggest contractors and drivers are unclear if, or to what extent, their cycle times include these activities. If they are, elements will often be lumped into a “Delay Time” and no discrete allotted time is identified. However, because they are legal or otherwise necessary steps, cycle time calculations should recognize and evaluate the following.

1. Load marking - painting and/or hammer marking and any additional marking requirements specified by the log purchaser.
2. Wrapper check stops – WorkSafeBC Regulations require that load binders “must be checked and kept tight during transportation”. The frequency and duration of stops to confirm load securement varies according to several factors (e.g. how tightly the load was loaded, timber type, axle configuration, number of bundles, weather, etc.).

Load securement regulations (National Safety Code) specify that a driver will inspect the vehicle’s cargo and cargo securement system every 3 hours or 240 kilometres AND the driver of a vehicle transporting logs will inspect the vehicle, the logs and securing devices, and make necessary adjustments before the vehicle enters a highway.

3. Installing and checking a flag or log light; may not be necessary for all loads/configurations.
4. Brake checks – Regulators, owners and drivers agree well-adjusted brakes are essential. Some haul routes include mandatory brake check points. But for all routes, the appropriate practical frequency with which drivers need to check brakes is influenced by terrain (steep road systems deserve more brake attention than flat lands) and driving habits. How long it takes, on average, to complete a brake check depends on the number of axles, the type of braking components used, operator proficiency and conditions (checks take longer when the rig is caked in mud, snow or ice).
5. Applying, checking and removing winter chains as necessary to ensure adequate stopping traction at all times.
6. En-route delays associated with road closure / alternate route designation, temporary stoppages and/or reductions in travel speed due to highway or resource road construction and maintenance works.
7. Pre-trip inspections and log book completion (typically several brief entries during the day). These have not been traditionally included in cycle time calculations. However, they are legal requirements that some say are generally not well met by log haulers. Perhaps part of the issue is that operators paid on a percentage of truck gross do not see those elements as productive log hauling time, and therefore not really part of their pay cheque. Overtly recognizing time to complete these actions may help ensure drivers consistently do them, and provide owners with assurances equipment is up to the demands of hauling logs every day.
8. Weighing at government scales – Because some haul routes do not pass government scales, while others pass multiple scales, and because empty log trucks are sometimes exempted, this would be a variable or haul-specific requirement.

## **II) Actions Necessary to Satisfy Practical Requirements**

While not legally mandated, log truck drivers must complete several tasks and actions in order for log hauling to occur. Most are standard operating procedures that forest industry employers and owners expect, and items that other industries recognize. While this report does not recommend these elements necessarily be included in cycle time determinations, it is appropriate that parties identify and discuss these steps.

1. Re-fuelling – In many construction projects, the owner recognizes re-fuelling time (or pays another contractor to re-fuel contract machines, after hours). When loggers calculate their bids, they include the time necessary to re-fuel each of their machines. If re-fuelling is part of IAM timber valuation calculations, it may be appropriate to recognize this as part of daily log hauling operations.
2. Scheduled maintenance and servicing – typically considered a “pre-condition” of contractual engagement.
3. Minor repairs – fixing an airline, tightening a backing plate, having a tire repaired / replaced, replacing lights, etc.
4. Assistance on steep grades – winching or otherwise pulling the empty truck up to the loading location and/or providing braking assistance (e.g. “snubbing”). This may be calculated as an element of empty or loaded travel time, or as a separate action.



5. Adding water for water-cooled brake systems (typically only for off-highway applications).
6. Coffee and meal breaks – Employment Standards Regulation Section 37.2 exempts employers from recognizing meal breaks (as well as several other practical allowances enjoyed by most other workers) for a person employed as a logging truck driver who is paid on a compensation system other than an hourly rate and who is working in the Interior area as defined in section 1(1) of BC Reg. 22/96, and Timber Harvesting Contract and Subcontract Regulations.

It seems curious that Employment Standards acknowledge that other truck drivers, including Coastal log truck drivers paid on an hourly basis, and indeed almost all other employees deserve paid meal breaks, yet the typical Interior log hauler does not. From one perspective, the rationale for this exemption is understandable – the driver is paid a percentage of truck gross revenue, and coffee time is unproductive in that it does not move the truck or load any closer to the delivery site. Some suggest that log haulers can pour their coffee when they are stopped to check their wrappers, and enjoy it with their sandwich once they resume driving. Some log haulers say they are quite adept at pouring coffee while driving. However, from a safety perspective, a Regulation and/or payment mechanism that encourages drivers to incorporate distractions into their driving seems at odds with the safety interests of the driver and the motoring public. Several valid studies confirm that regular breaks to snack and hydrate help drivers manage fatigue, and provide opportunities for a stretch and a walk that contribute to general health and wellness.

A forest industry looking to attract, retain and sustain log truck drivers might consider investing in mechanisms that encourage healthy work habits, in spite of out-dated statutes.

#### **F. Avoidable Delays**

Avoidable delays are precisely that – time incurred for delays caused by avoidable events or circumstances; ones that are somewhat predictable and therefore manageable. Most cycle time determinations do not recognize avoidable delays. But, to varying degrees, they are part of a log hauler’s day. Drivers are bound by hours of service rules, but because hauling contracts do not recognize avoidable delays, and because drivers not paid on an hourly basis receive no compensation for this extra time, there is significant incentive for log haulers to “make up” this time in order to have enough hours to make their last trip.

For log haulers, “making up” time usually means speeding, skipping a brake or wrapper check, driving aggressively, not putting on the second set of chains when they should be, etc. “Making up” time increases risks for the driver and others. Often, the log hauler “gets away” with such shortcuts, but sometimes the outcomes are catastrophic.

Given the hours of service limitations, unproductive delay time reduces available productive time, and reduces overall utilization of limited log hauling resources. But because avoidable delays are manageable, they offer the greatest opportunity to increase operational efficiencies for licensees, contractors and log truck drivers while reducing incentives to undertake risky behaviours.

The following are examples of avoidable delays.

1. Time spent waiting to load.
2. Time spent waiting to weigh in, or weigh out.

3. Time spent waiting to unload.
4. Time spent at government scales and roadside inspections.

Strategies to manage and reduce avoidable delays will be addressed in a subsequent document, but a brief overview of a few practical methods is provided below.

**I.) Minimizing wait time at the loader**

- Assign each truck a loading time, with each time spaced out according to a realistic loading time. Instruct loader operator not to commence loading until that time. Monitor for compliance.
- Assign each truck a time to “leave town”, each spaced out according to a realistic loading time and considering the established empty travel time. Monitor for compliance.

**II.) Minimizing time spent waiting to weigh in / weigh out**

- Assign each contractor a series of scheduled weigh-in times based both on realistic loading times and time studies of unloading operations. There is no sense weighing-in 20 trucks in an hour if the unloading capacity tops out at 15 trucks per hour. A congested mill yard can contribute to hurrying, frustration, distraction and loss of productivity. In jurisdictions where wait time is part of the total cycle calculation, owners have very efficient unloading arrangements that help them realize other cost savings.
- If the mill yard is waiting for trucks to unload, rather than alternating 1 empty / 1 loaded, weigh in 2 or 3 trucks, and then weigh out 2 or 3 trucks
- Use average tare weights and enable unloaded trucks to sometimes bypass the weigh scales.
- Extend scale hours.

**III.) Minimizing time spent at government scales and roadside inspections**

- Although this will remain a legal requirement, there are at least a couple of ways to manage / reduce the frequency with which truckers have to stop at government scales. The Weigh To Go program can provide transponders that effectively “wave through” compliant truckers. Truckers that run quality equipment and are known to be working hard to haul within prescribed limits (often working with an effective Licensee-administered overload policy) are less frequently the target of CVSE, C&E and WSBC enforcement activities.