



Enviro Span and Ultra Class Mining Trucks

Ron W. Hammerstedt, B.Sc.F., RPF

Mining companies have requested heavy load information for Enviro-Span for the western states and western Canada. The information below was developed to show that Enviro-Span is suitable for heavy mining equipment. In short, Enviro Span exceeds the requirements to support the heaviest “Ultra Class” mining trucks in the world.

The following is a summary of findings and calculations for the relative loading of ultra-class mining trucks (i.e. 400 ton payload) versus the BC L150 configuration. There is an additional design constraint that actually works in our favour and I have described it below. It amounts to the maximum practical bearing pressures of normal native soils and the fact that mining operations have to work on top of native materials as do all other resource extraction endeavors.

Culvert requirements for cross drainage and small stream crossings on mining haul roads used by ultra-class (up to 400 ton payload) haul trucks do not appear to be different from other types of resource extraction roads. Mining haul roads for these large vehicles can and do utilize standard, galvanized steel, closed bottom culverts buried to manufacturers specifications (refer to the paper “GUIDELINES FOR MINE HAUL ROAD DESIGN” by Tannant and Regensburg, 2001). Since Enviro Span meets or exceeds both the load carrying capacity and burial depth capacity of standard galvanized steel culverts, it follows that it would be suitable for this purpose.

Further to that, from our testing program for Enviro Span, we have established maximum ground pressure figures for use in L150 load configurations (from Gohl and Anderson, 2009) that may be compared to the maximum ground pressures established for the ultra-class haul trucks (from Caterpillar 797F specification sheet and Goodyear Tire personal communication with Rob Propst, 2012). They compare as follows:

A fully loaded dual wheel set on a 5-axle, 18 wheel, 150,000 lb configuration (BC, L150) yields 107 lb/sq.in. of ground pressure at the most heavily loaded axle. A fully loaded wheel on a dual axle, six wheel, 400 ton mining truck yields 80 lb/sq.in. Due to the spacing of the wheels and axles, one module of Enviro Span will accommodate one dual wheel set of a 5-axle truck at one time. This represents a ground pressure of 107 lb/sq.in. applied on the top of the fill above the culvert. Due to the spacing of the wheels, one module of Enviro Span will accommodate only one wheel of an ultra-class mining truck at one time. This represents a ground pressure of 80 lb/sq.in. applied on the top of the fill above the culvert.



The relative ground pressure of a 400 ton mining truck is actually only about 75% that of an L150, 5-axle semi-trailer truck. From Tannant and Regensburg, it is shown that the wider dispensation of the higher total bearing load (by the lower ground pressure) is enough to keep the vertical load on the fill and culvert from increasing significantly. This feature serves to demonstrate that the ultra-class mining trucks have been designed to be utilized on existing mine haul roads that use standard galvanized steel culverts and roadbed preparation. This relates to the fact that normal soil bearing pressures cannot be exceeded by the vehicles or they would simply be inoperable over most types of terrain (soils) other than solid rock. Essentially, the tires must be designed so that their contact pressures do not exceed the bearing capacity of normal, native materials. That is why the truck sizes have been constrained to below 300 tons until recently when tire manufacturers have been able to develop tires that were up to this task. As it happens, all mining (and other resource extraction) roads have to utilize the native materials at hand in the subgrades. This means that the design constraints for mining haul roads are largely the same as for any other. The only difference in the mining roads is that in order to reduce maintenance due to the high cycling of loads, they will sometimes use tightly specified crushed rock to surface the subgrade. This is to reduce surface wear and rutting.

Just as a note, an L150 specification for a 5-axle truck is not a “normal” application. L150 trucks do exceed the bearing capacities of many normal soils. The ground pressures yielded by such configurations actually begin to break down the subgrades of normal haul roads for any sort of resource extraction and they also inflict extreme point loads on bridges and culverts. That is why they are not to be found in normal applications. The ultra-class mining trucks are actually more suitable than L150 to run over haul roads under sustained, high cycle applications and will work very well with Enviro Span.

About the author: Ron W. Hammerstedt, B.Sc.F., RPF. has been a Registered Professional Forester for the past 30 years. His career has been characterized by an unconventional and very successful approach to natural resource stewardship that has led to award winning innovations and operational improvements in large scale forest management systems.

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