

The cost of a road starts with the ground.

Its true value is measured throughout its working life.

Why build this road? To transport what, how often, for how many years - and with what consequences?

A road is a production asset.

We do not choose machinery on purchase price alone. Why choose a road without considering truck productivity, reliability, maintenance and residual value?

Build

Clearing, excavation, foundations, aggregates, transport and drainage.

Operate

Fuel, haul cycles, truck wear, maintenance and interruptions.

Address the impacts

Hydrology, habitats, permits, restoration and climate risks.

What value do we place on what the construction price does not measure?

The best road may be hybrid.

Stable ground: a traditional road may be optimal. Variable ground: XtremeM modules can target difficult sections. A hybrid configuration therefore combines a conventional road with modules in strategic locations; hydrological management is a complementary area for study.

We do not aim to replace every road. We aim to address the sections where conventional construction becomes costly or damaging.

Compare 15 years of service

Ground conditions change the cost of a road.

Documented projects in northern settings illustrate how ground conditions, remoteness and construction requirements affect costs.

Prohibition Creek · ≈ CAD 3.81 M/km

Government of the N.W.T. · 2022-2024

CAD 25.5 M in funding for the 6.7 km first phase of a two-lane all-season road. Ratio of announced funding, not a final construction cost.

[Official source](#)

Far North gravel roads · ≈ CAD 3 M/km

Northern Policy Institute · 2022

A historical estimate from 2017 cited in the 2022 report for all-season gravel roads in the Far North. This benchmark is not a current market average.

[Read the study](#)

Slave Geological Province · ≈ CAD 2.66 M/km

Proposed corridor · historical estimate

Approximately CAD 1.1 B for a proposed 413 km corridor, giving an indicative ratio. This is a regional infrastructure concept, not a road constructed at that cost.

[Academic analysis](#)

Another benchmark: the Northern Policy Institute reports a 2019 quote of CAD 550,000 to 800,000/km for a timber-mat road in a northern setting. This technology differs from XtremeM; it is not an equivalent-scope technical price comparison.

Traditional-road cost benchmarks

These amounts are not XtremeM prices. They vary with ground conditions, region and scope of work.

Traditional-road type	Indicative order of magnitude CAD/km
Improved forestry road, limited traffic	150,000 to 500,000
Mining road on favourable ground	500,000 to 1.2 M
Permanent industrial mining road	1.2 to 3 M
Peatland, wetland or difficult ground	2 to 5 M
Remote North or permafrost	3 to 8 M and above

Indicative orders of magnitude to confirm: scoping assumptions, not demonstrated averages or statistics drawn from the references above. Replace with project quantities and quotations reflecting loads, width, structures and year.

A kilometre is almost never uniform.

Bearing capacity, water, freeze-thaw cycles and transitions between soils determine the work required and the maintenance risks.

Rock: Good bearing capacity; excavation may be needed	Sand: Often favourable; erosion is possible
Silt: Sensitive to water and frost	Clay: Variable settlement and bearing capacity
Mixed soils: Localized weak points	Peatland: Low bearing capacity, water storage
Swamp: Sensitive flows and habitats	Permafrost: Risk of subsidence on thawing

Load distribution through the assembly is assessed against loads, ground support and traffic cycles.

A road crosses a watershed. Water flows across the landscape.

Embankments can interrupt diffuse flows. Ditches can concentrate water towards a few culverts. Watershed management must consider the cumulative effect of roads, not just each culvert in isolation.

Designing access around water

Traditional road

Embankments, ditches and culverts shape road drainage. Their design must account for natural flows, expected flow rates and downstream effects.

Targeted modular intervention

XtremeM modules can be positioned on sensitive sections to limit earthworks and preserve diffuse flows where site conditions allow. Bearing capacity, crossings and drainage still require project-specific design.

The real issue is not to eliminate all hydraulic management: it is to design access that disrupts watershed functions as little as possible. Watercourse crossings and concentrated flows require specific design.

Depending on ground conditions and loads, a modular configuration may reduce excavation, imported aggregates and longitudinal drainage works. Site preparation and required structures must still be defined for each location; no quantified hydrological benefit or zero-impact outcome is assumed.

Road quality changes the economics of transport.

13% · Fuel

Savings of up to 13% simulated in the independent study by Maier et al. (2025), for a mining-road case in Brazil.

17% · Productivity

A gain of up to 17% simulated per truck in the same study, with cycles up to 15% shorter.

Up to CAD 3.5 B/year · Climate and roads

Potential annual increase in road maintenance and repair costs in Canada by 2050, presented to the Senate in 2023.

Results from specific studies and projections, not measured XtremeM performance. They explain why operations and risks belong in the decision, without being automatically applied to the calculator.

What does the quotation leave out?

A day of access?	What production cost follows an unexpected closure?
One haul cycle?	What are the minutes, fuel and wear avoided worth?
A functioning watershed?	What value do preserved hydrological functions have?
A month gained?	What is the benefit of earlier commissioning?
A smaller footprint?	Which studies and mitigation measures are needed? Faster permitting is not guaranteed.
A second use?	What will recovery and redeployment cost? What value remains in the modules?

A completed road must also support efficient operations.

During the first seasons of use on a forest road, driving conditions can vary considerably with the soil, drainage and rainfall. Mud, rutting and surface deformation may require grading or additional materials while slowing vehicles down. This stabilization period therefore carries a real cost: additional maintenance, slower deliveries and occasional access disruptions. Comparing solutions means considering not only construction, but also road availability and operational efficiency from the moment the road enters service.

FHWA geotechnical guide

What value do we place on natural water retention?

Recharge, wetland protection, reduced sedimentation and resilience to extreme rainfall: these functions extend beyond the construction price.

Compare 15 years of service, not just day one.

An initial economic view of the same access road operated for 15 years, without redeployment, with removal and site restoration in year 15. If the road stays in service, adapt end-of-use costs and terminal values. Amounts are editable: these assumptions are neither quotations nor guaranteed performance.

Calculated quantity : 486 modules · 1 row · Resulting modular width : 4.11 m

Assumption	Selected value
Length	1 km
Required usable width	4.11 m
Price per module	1,995 USD
USD to CAD exchange rate	1.4154 CAD/USD
EUR to CAD exchange rate	1.5908 CAD/EUR
Traditional construction	1,500,000 CAD/km
Initial module transport	40,000 CAD/km/row
Light preparation and installation	30,000 CAD/km/row
Annual traditional maintenance	65,000 CAD/km/year
Annual modular maintenance	2,500 CAD/km/row/year
Losses from traditional-road downtime	0 CAD/year
Losses from modular-road downtime	0 CAD/year
Modular transport savings	0 CAD/year
Traditional site restoration	200,000 CAD
Module lifting and removal	20,000 CAD
Site restoration after removal	20,000 CAD
Traditional-road residual value	0 CAD
Module residual value	10 % purchase
Real discount rate	6 %

End-of-use lump sums cover the whole project. Costs per km/row apply to a 4.11 m row. No reuse is counted.

Indicative price: USD 1,995/module, taken from the launch offer and to be confirmed for the order. Usable dimensions: 4.11 × 2.06 m. Reference exchange rates dated 16 October 2026: USD 1 = CAD 1.4154; EUR 1 = CAD 1.5908. Other amounts are working assumptions, not regional averages.

[Customize this scenario online](#)

Read the result, then customize

ILLUSTRATIVE SCENARIO · 1 KM · 15 YEARS · CAD

Item	Traditional	XtremeM
Initial construction, purchase, transport and installation	1,500,000 CAD	1,442,329 CAD
Maintenance - present value	631,296 CAD	24,281 CAD
Downtime - present value	0 CAD	0 CAD
Transport savings - deduction	0 CAD	0 CAD
Site restoration - present value	83,453 CAD	8,345 CAD
Module removal - present value	0 CAD	8,345 CAD
Residual value - year-15 deduction	0 CAD	-57,263 CAD
Compared economic cost	2,214,749 CAD	1,426,038 CAD

Savings with XtremeM

788,711 CAD

Modular investment breakdown

Module purchase	1,372,329 CAD
Initial module transport	40,000 CAD
Light preparation and installation	30,000 CAD
Nominal residual value at year 15	137,233 CAD

Initial cost + discounted annual maintenance and downtime - discounted transport savings + discounted removal and site restoration - discounted residual value. Annual expenditure at year-end; end of use and residual value at year 15. Constant amounts, excluding taxes and financing costs.

The traditional example at CAD 1.5 M/km and its maintenance at CAD 65,000/km/year come from the supplied scenario. They are not observed costs. Specify comparable width, ground conditions and works before drawing conclusions.

Modular maintenance covers inspection, cleaning and keeping the access road in service. No periodic panel replacement is assumed. Downtime and transport savings start at zero because no operating scenario has been supplied.

An initial view, not the entire life cycle

This calculator does not calculate reuse across successive sites, detours, seasonal closures, flooding, CO2 emissions or the ecological value of the watershed. It does not design bearing capacity. These areas require a project-specific scenario and data; their absence does not mean zero cost.

The PDFs show a fixed scenario and its assumptions. Edit your scenario in the Web version.

Explore the sources

Senate of Canada · testimony of 31 October 2023

Infrastructure adaptation, road maintenance and repairs.

Maier et al. (2025)

Rolling resistance, fuel and productivity: simulation results for a mining case.

Meneses and Sepúlveda (2023)

Simulation of mining-road deterioration.

Mukherjee et al. (2024)

Hydrological risks at culverts and crossings.

Northern Policy Institute (2022)

Innovative solutions for northern roads.

FHWA · geotechnical guide

Moisture, density and behaviour of compacted soils.

Bank of Canada · daily exchange rates

Source of the dated exchange-rate benchmarks used in the scenario.

External studies address their own projects and methods. They are not comparative tests of XtremeM.

Construction sources

Prohibition Creek · Official source

Far North gravel roads · Read the study

Slave Geological Province · Academic analysis

The ground provides the context. Let's build the comparison.

Share the length, width, soil type, traffic and budgets. Compare solutions for the same service delivered.

See XtremeM in action

View the technical data

Explore the launch offer

Explore the watershed study

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Discuss my access road

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