



TIRE STEWARDSHIP
Manitoba

TECHNICAL REPORT

TIRE DERIVED AGGREGATE (TDA) FOR MANITOBA MUNICIPAL ROADS

Cost Effective High Performing Environmentally Friendly

*TDA installed at Strollway Street,
Town of Winnipeg Beach*

TIRE DERIVED AGGREGATE (TDA)

A Permanent Solution for
Municipal Road Repair!

BEFORE

Frost Heave Damaged Road



AFTER

Success! Road Repaired Using TDA



TDA IN MANITOBA

TDA (tire derived aggregate) has been successfully used for two decades by Manitoba municipalities as a light-weight fill material to improve the stability of embankments built on weak soils in rural roads.

TYPE OF TDA

TYPE A — maximum size of 3 in. (75 mm).

TYPE B — maximum size of 12 in. (305 mm).

Type B is the most common type used in Manitoba roads.



Installing TDA at Silver Bay Road, RM of Siglunes

WHY USE TDA?

Using TDA in road beds not only reduces the demand for natural aggregate, but also puts Manitoba's recycled tires to good use.

TDA is the best solution for municipal roads.

Cost-Effective: Less expensive than other light-weight fill materials.

High-Performing: Light-weight, free draining characteristics help solve engineering problems.

Follows ASTM D6270-08(2012), Standard Practice for Use of Scrap Tires in Civil Engineering Applications.

Environmentally-Friendly: Reduces need for mined resources such as gravel.

Transporting lighter TDA loads saves fuel.



Installing TDA at Silver Bay Road, RM of Siglunes

MANITOBA'S MUNICIPAL ROAD PROJECTS

Projects completed:

RM of La Broquerie

Colony Access Road

RM of Springfield

Garven Road

RM of Siglunes

Silver Bay Road

Cook Road

RM of Hamiota

Municipal Road 136W (78N – 79N)

Municipal Road 87N (137W – 138W)

Municipal Road 80N (135W – 136W)

Town of Hamiota

4th Street

RM of Grahamdale

Grove Road

Town of Winnipeg Beach

Maple Avenue

Strollway Street

RM of Lac du Bonnet

Red Deer Road

RM of Gimli

Gimli Park Road



Excavation of unstable road bed at Strollway Street, Town of Winnipeg Beach

TDA IN ROADS EXPLAINED

MANITOBA CLIMATE

Our extreme climate, poor drainage and soil type create the perfect conditions for frost heaving to occur in Manitoba's municipal roads.

Frost heaving is due to:

- High ground water level close to the surface.
- Fine soils that "wick" the moisture into the road bed.
- Temperatures cold enough to cause "frost lenses" to form in the road bed.
- When these frost lenses thaw the road breaks down.

TDA TYPE B PROPERTIES

TDA prevents the wicking action that brings moisture into the road bed where it can form a "frost lens."

TDA has 8 times the insulation value of mineral aggregate reducing frost penetration into the road bed and subgrade.

TDA is light-weight and interlocking which helps stabilize soils that have low load-bearing properties.

ENVIRONMENTALLY PROVEN

The geotechnical application of TDA is approved in Manitoba and elsewhere.

TDA is a routinely tested material that meets soil and groundwater environment standards.

According to (Humphrey & Katz, 2002) a field study of water quality effects of TDA placed below the water table was conducted over a four-year period.

The results of the study demonstrated that TDA had an insignificant effect on the concentration of metals with water standards as they did not exceed ambient (naturally occurring) levels.

DURABILITY

TDA is made of vulcanized rubber which is durable and has been proven to remain stable in the toughest environments including heavily used road embankments.

HYDRAULIC CONDUCTIVITY

Studies show that TDA is more conductive than natural aggregate and allows free drainage of rain and snow melt water through road embankments.

ROAD INSTALLATION

No performance issues with the use of TDA have been known to occur if road installation specifications such as proper TDA placement, soil cover and finishing layer are respected.

The following examples illustrate the savings possible if TDA is used in road embankments.

TDA CALCULATOR

(MATERIAL ONLY)



User inputs

Length of the road	200 m		
Width of the road	7.5 m		
Excavating depth	1.20 m		
Density of C base gravel 3" – 4"	1.50 tonne/m ³	12	\$/tonne
Density of A base gravel 3/4"	2.00 tonne/m ³	17	\$/tonne
Geotextile	100 m	1,100	\$/100m
Clay	225 m ³	12	\$/m ³
Total weight of TDA	4.50 tonne	15	\$/tonne
Compressibility of TDA	50 %		

Avg. Cost

Tire Derived Aggregate quantities

Area of base of the road	1,500 m ²
Required final volume of TDA	900 m ³
Required thickness of TDA	0.6 m
Required final volume of C base gravel 3" – 4"	525 m ³
Required final volume of A base gravel 3/4"	150 m ³
Required final volume of clay	225 m ³

Material cost

TDA	68	\$
Transportation*	100	\$/hour
Geotextile**	2,200	\$
Clay	2,700	\$
Gravel 3" – 4"	9,450	\$
Gravel 3/4"	5,100	\$
Total cost for 30 years life span	19,518	\$

*Transportation cost was not added to the total

** For a typical application, if required. Geotextile use determined by water table or soil type

*** Installation cost was assumed to be the same in both cases and was not added to the total cost

**** Gravel, sand and shredded tires, purchased directly by a municipality or local government district for its own use, are exempted from the retail sales tax

Road life span (TDA) = 25-30 years

NATURAL AGGREGATE CALCULATOR

(MATERIAL ONLY)



User inputs

Length of the road	200 m		
Width of the road	7.5 m		
Excavating depth	1.20 m		
Density of C base gravel 3" – 4"	1.50 tonne/m ³	12	\$/tonne
Density of A base gravel 3/4"	2.00 tonne/m ³	17	\$/tonne
Clay	150 m ³	12	\$/m ³

Avg. Cost

Natural Aggregate quantities

Area of base of the road	1,500 m ²
Required final volume of C base gravel 3" – 4"	1,500 m ³
Required thickness of 3" – 4"	1 m
Required final volume of A base gravel 3/4"	150 m ³
Required final volume of clay	150 m ³

Material cost

Transportation*	150	\$/hour
Clay	1,800	\$
Gravel 3" – 4"	27,000	\$
Gravel 3/4"	5,100	\$
Total cost in the first year	33,900	\$

Every 3–4 years, 0.1m of gravel 3/4" is added in order to fix the road. Total maintenance cost during **30 years** is 7.5* \$5,100

Total cost for 30 years life span 72,150 \$

*Transportation cost was not added to the total

*** Installation cost was assumed to be the same in both cases and was not added to the total cost

**** Gravel, sand and shredded tires, purchased directly by a municipality or local government district for its own use, are exempted from the retail sales tax

Road life span (NA) = 3-4 years



TDA installed at Gimli Park Road, RM of Gimli

FOR MORE INFORMATION

on TDA, or to discuss any of the information contained in this report, contact **Tire Stewardship Manitoba**.

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