Hercbase Presentation Reference Sheet & Appendices

Dust
Appendix A

- Manitoba Infrastructure Materials Engineering branch, 2018 assessment: 'The (Hercbase) product produces much less dust than the conventional cement stabilization methods we have used in the past"

Frost Boil Repairs (vs. conventional)
Appendix B

- Steve Blayney and Associates, assessment: "Hercbase would be approximately 75% of the cost, and would be completed in about 40% of the time... (and) the carbon footprint would be less than half."

Soil Stabilization Comparison (high-traffic yard)
Appendix C

- SSU Engineering Inc, report:
    - Hercbase = $6.40 / square foot, shortest project timeline
    - Geogrid textile = $8.08 / square foot, 57% longer project timeline
    - Geotextile = $9.87 / square foot, 114% longer project timeline
    - No geotextile = $10.20 / square foot, 128% longer project timeline

Appendix A

Manitoba Infrastructure

Materials Engineering Branch

Date: August 16, 2018

Subject: HERCBASE Road Cement Stabilization Open House

Report Prepared By: Pavement Section, Materials Engineering Branch

BACKGROUND

MI received an invitation to witness a granular layer (base/subgrade) stabilization project, using a slurried cementitious material called HERCBASE. The Pavement Section attended the open house which was a project located in the Village of Schazenfeld, 10 km south of Winkler MB. Several road sections have been stabilized or being stabilized under the same project (contract).

PROJECT OVERVIEW

The overview includes the following:

1) Product Information
2) Project Construction Method
3) Photographs of Project Sites

Product Information

HERCBASE is an additive system designed to suspend cementitious materials and delay the hydration allowing for easier transportation, placement and compaction. The system allows for dust free placement of cement, lime, fly ash, slag etc. with a liquid tanker and attached nozzles/injectors.

- Application rate 2%-12% (3%-8% is common) by dry weight.
- Effective in granular material (low dose) and clay soils (high dose).
- Produces workable foundation for both rigid and flexible pavements.
- Increases compressive strengths of soil and granular base materials.
- Increases pavement support (optimizes the performance of upper layer) and can reduce the layer thickness, depending on the dose and strength
- Decreases plasticity index to meet job specifications.
- Can be used to stabilize new (imported) granular materials to reduce pavement base layer thickness.

Appendix A

Project Construction Method

- Process in-situ materials using a tractor-mounted pulveriser (Photo 1).
- Inject HERCBASE into the pulverised material with a slurry injector (Photo 2).
- Mix HERCBASE and the in-situ material together using a pulveriser (Photo 1).
- Level pulverised material with disc harrow (Photo 3).
- Compact cemented soil/base with sheepsfoot roller (Photo 4)
- Reshape compacted surface with a motor grader to ensure adequate cross slope.
- Finish the surface using a pneumatic tire roller (Photo 5).
- Place bituminous surfacing following standard practice.

Project Photos

Photo 1 - Tractor Mounted Pulveriser

Photo 2- Slurry Injector

Photo 3 - Disc Harrow

Photo 4 - Sheepsfoot roller

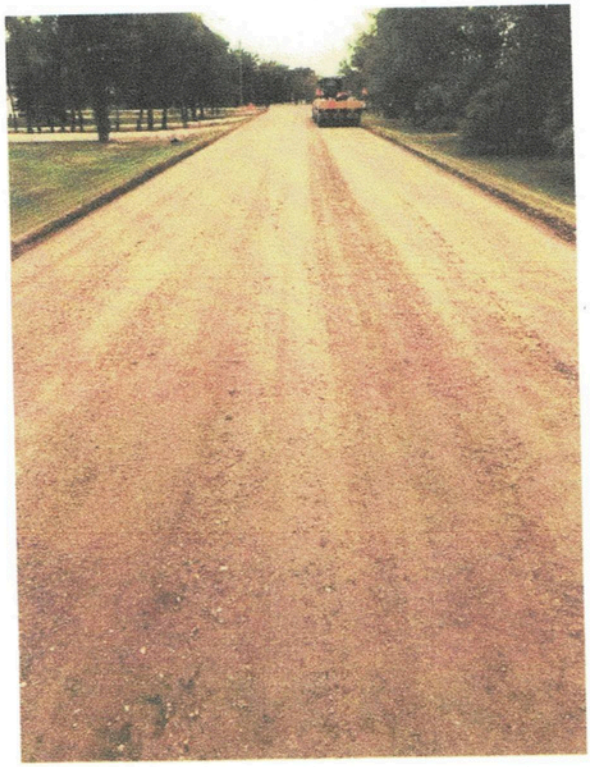

Photo 5 - Finished surface before paving

SUMMARY

HERCBASE is a slurry mixture of cementitious material designed for easier transportation and placement. The product produces much less dust than the conventional cement stabilization methods we have used in the past.

Recommendation

1. HERCBASE to submit "New Product Submission Form" for additional information
2. Consider HERCBASE for a cement stabilization project, especially for thin pavements.

Appendix B

Hercbase vs Conventional

Frost Boil Repairs

For the comparison we are using a typical RM road of 28' wide x 1 mile length.

Conventional

Using an average depth of 3' for excavating and replacing the unsuitable materials whether they are silt, top soil or any other unstable material, placing a geotextile, placing 2 ½' of a pit run gravel topped off with .5' of A Base gravel.

			Days
Excavation	16,500 cy @ $17.00 =	$ 280,500.00	16
Geotextile	16,500 sy @ $ 5.00 =	$ 82,500.00	
Pit Run	22,000 t @ $27.00 =	$ 594,000.00	22
A Base	4,200 t @ $35.00 =	$ 147,000.00	4
	Total =	$1,104,000.00	42

Hercbase

Excavation could be reduced to 12" and incorporate 8" of Hercbase and top off with 12" of A Base gravel

			Days
Excavation	5,500 cy @ $17.00 =	$ 93,500.00	5
Hercbase	13,750 sm @ $32.00 =	$ 440,000.00	4
A Base	8,400 t @ $35.00 =	$ 294,000.00	8
	Total =	$ 827,500.00	18

The Hercbase would be approximately 75% of the cost and would be completed in about 40% of the time needed to do the work in the conventional method. The carbon footprint with the Hercbase method would be less than half of the conventional construction.

Soil samples would need to be taken to arrive at a design for the strength of the Hercbase required. Factors such as types of vehicles, loads, speed and when the roads are used (Spring thaw for seeding) all have to be accounted for to arrive at a proper design. The above example is for a typical unstable road and conditions, cost of gravel and mobilization will vary in different municipalities. These costs are based on the Morden-Winkler area. The working days are based on a medium sized crew performing the work.

Appendix B

STEVEN BLAYNEY BIO

MAPLE LEAF CONSTRUCTION LTD. (1978 – 2012)

Started with surveying and progressed to estimating, project management and managing the Country Division of Maple Leaf Construction Ltd. Dealt with Federal, First Nations, Provincial and Municipal Governments along with private developers and business owners. Worked on various heavy construction projects throughout Manitoba, Saskatchewan and Ontario both as a general contractor and sub-contractor.

On the company's safety committee from it's inception and an active member looking after the country crews. Always kept up to date with the regulations in every jurisdiction we worked in and ensured our crews and subcontractors complied.

One of the first Gold Seal Certified (GSC) Project Managers in the company. A member of the Manitoba Heavy Construction Association and took dozens of safety and educational courses offered.

Some of those include:

Emergency Preparedness and Response, Excavating and Trenching, Communicating Effectively, Office and Field Best Practices, Building a Harassment Free and Respectful Workplace, Supervisors and Safe Work, Effective Workplace Committee Meetings, Safety and Employment Law, Working in Other Jurisdictions, Investigating Workplace Incidents, Fatigue Awareness, Effective Safety Talks, Construction Industry Standards, Construction Industry Standards, Prime Contractor, Complying with Legislation, Completing Hazard Assessments, St. John's First Aid and CPR along with other courses suitable to provide a safe workplace and environment for the people I worked with.

Canadian Public Works Association (CPWA)

American Public Works Association (APWA)

On the Board of Directors with the Manitoba Chapter of the APWA for the past 19 years. Manitoba Chapter President three times. The Manitoba Director on the APWA Council of Chapters from. Past President of the CPWA where I travelled across Canada meeting with our Chapters discussing various infrastructure projects and advocated with the different political parties in Ottawa on infrastructure in.

Started a consulting company after retiring and have worked on a variety of infrastructure projects including an airport, sub-divisions, roadworks, cement stabilization projects, LDS and sewer and water projects, business parks and highway projects.

Appendix C

PAVEMENT REPORT

DATE: January 27, 2025

FILE: 25 009

TO: **STEVE BLAYNEY & ASSOCIATES**
Sblayney95@gmail.com
Attention: **STEVE BLAYNEY**

PHONE: 204 509 7385

FROM: **SILVESTRE URBANO, P.ENG.**
Sr. Geotechnical Engineer
SSU Engineering Inc.
846 Oakenwald Avenue
Winnipeg, Manitoba R3T 1N1
Tel: (431) 373-8767

FAX:

RE: **PAVEMENT ASSESSMENT COMPARISONS ON SOFT SILT DESIGNATED AS HEAVY-DUTY TRAFFIC USING UNREINFORCED, GEOTEXTILE, GEOGRID AND HERCBASE SLURRY COMPENSATION**

As requested, a pavement assessment comparison was conducted on a soft silt subgrade. The assessment is based on heavy duty traffic using unreinforced (plain granular fill), geotextile (non-woven or woven geotextile), geogrid and hercbase slurry (soil-cement). *Note that the subgrade is a damp soft silt where seepage is not present.*

PAVEMENT ASSESSMENT (HIGH TRAFFIC LOADING)

The pavement recommendation for heavy duty traffic on soft and damp silt is calculated and written in the Tables below. Based on the AASHTO and Equivalent Single Axle Load (ESAL) of about 261,705 for heavy duty and approximate CBR of >1 (0.3 to 0.4), the recommended pavement structure at this site should be as follows:

Granular Thicknesses on Unreinforced

	Heavy Duty	% Compaction
Base Course	600mm (24 inch)	98% Std Proctor
Subbase (Class"C")	700mm (28 inch)	97% Std Proctor
n/a	n/a	n/a
Required Structural Number, 7.9	Calculated, 8.0	n/a

Granular Thicknesses with Geotextile

	Heavy Duty	% Compaction
Base Course	550mm (22 inch)	98% Std Proctor
Subbase (Class"C")	700mm (26 inch)	97% Std Proctor
Woven or non-woven geotextile	1 layer	6 or 8 oz thickness
Required Structural Number, 7.3	Calculated, 7.4	n/a

Granular Thicknesses with Geogrid

	Heavy Duty	% Compaction
Base Course	350mm (14 inch)	98% Std Proctor
Subbase (Class"C")	650mm (26 inch)	97% Std Proctor
Geogrid	0.76mm	4.1 kN/m or 6.6 kN/m
Required Structural Number, 5.9	Calculated, 6.1	n/a

Granular Thicknesses with Hercbase

	Heavy Duty	% Compaction
Base Course	200mm (8 inch)	98% Std Proctor
Subbase(Class"C")	300mm (12 inch)	97% Std Proctor
Hercbase	200mm	2.0 MPa (Min.Strength)
Required Structural Number, 3.0	Calculated, 3.1	n/a

Note that for stability and long-termed performance, a drain tile place below the bottom of any ditch is suggested for positive drain.

The approximate site stripping depends entirely on the design grade. The prepared subgrade should be proof rolled with a non-*vibratory sheepsfoot roller* (min. 20 passes) which translates to at least 95% Std Proctor and inspected by qualified geotechnical engineer prior to the placement of the overlying granular fill.

ADDITIONAL RECOMMENDATIONS

The granular base course and subbase materials should include organic-free, non-frozen, aggregate conforming to the Manitoba Infrastructure gradation limits.

Any saturated subgrade conditions should be dried off quickly by excavation of sump pit or

installation of permanent subdrains (600mm below the subgrade level) connected to positive outlet (catch basin) prior to placing the granular fill structure with reinforcing material (geotextile, geogrid or hercbase). At these locations, the placing of granular fill should follow the reinforcing specifications for soft grounds.

Hercbase Slurry should have a minimum compressive strength of 2.0 MPa. Any concrete subject to cycles of freezing and thawing should be air entrained in accordance with the latest edition of CSA A23.1, Concrete Materials and Methods of Concrete Construction.

Exterior, grade supported concrete slabs will be subjected to some seasonal vertical movements related to frost. Exterior concrete slabs should not be tied into rigid structures such as grade beams, pile caps or interior slabs. In addition, localized subsurface drainage should be provided around the structure.

CLOSURE

The findings and recommendations provided in this report were prepared by Silvestre Urbano of SSU Engineering Inc. (the Consultant) in accordance with generally accepted professional engineering principles and practices. The recommendations are based on the results of field and laboratory investigations and are reflective only of the actual testhole(s) and/or excavation(s) examined. If conditions encountered during construction appear to be different than those shown by the testhole(s) and/or excavation(s) at this site, the Consultant should be notified immediately in order that the recommendations can be reviewed and modified as necessary to address actual site conditions.

This report is limited in scope to only those items that are specifically referenced in this report. There may be existing conditions that were not recorded in this report. Such conditions were not apparent to the Consultant due to the limitations imposed by the scope of work. The Consultant, therefore, accepts no liability for any costs incurred by the Client for subsequent discovery, manifestation or rectification of such conditions.

This report is intended solely for the Client named as a general indication of the visible or reported physical condition of the items addressed in the report at the time of the geotechnical investigation. The material in this report reflects the Consultant's best judgment in light of the information available to it at the time of preparation.

This report and the information and data contained herein are to be treated as confidential and may be used only by the Client and its officers and employees in relation to the specific project that it was prepared for. Any use a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. The Consultant accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The report has been written to be read in its entirety, do not use any part of this report as a separate entity.

All files, notes, source data, test results and master files are retained by the Consultant and remain the property of the Consultant.

Appendix C

Hercbase vs Other Designs for stabilizing yards

As per the report prepared by SSU Engineering Inc. I have the following price comparisons for the various structural designs for the heavy duty traffic on areas with poor subgrade materials. I have used tendered prices from 2024 projects in the Morden – Winkler area.

I have used an area of 1 acre which I have broken down to a square foot price.

1 acre = 43,562 square feet

#1 (no geotextile)

Excavation 52" – C Base 28" – A Base 24"

$444,190.00 or $10.20 / square foot

For 1 acre it would take 16 days to complete

#2 (Geotextile)

Excavation 48" – Geotextile – C Base 26" – A Base 22"

$430,062.00 or $9.87 / square foot

For 1 acre it would take 15 days to complete

#3 (Geogrid textile)

Excavation 30" – Geogrid textile – C Base 26" – A Base 14"

$352,131.00 or $8.08 / square foot

For 1 acre it would take 11 days to complete

#4 Hercbase

Excavation 20" – Hercbase – C Base 12" – A Base 8"

$278,795.00 or $6.40 / square foot

For 1 acre it would take 7 days to complete