

# Litteratursökning

## Sökord

SVE: Skumbitumen, Skummat bitumen, Skumasfalt

ENG: Foamed Asphalt, Foamed Bitumen, Asphalt Foam, Foam Asphalt

Totalt: 84 Träffar, År 2013 till 1964

US: 47, SE: 11, NO: 11, FI: 3, KA: 2, FR: 2, UK: 2, NZ: 2, IS: 1, TY: 1, PO: 1, LI: 1

Ref.: 1

Rutting potential of warm mix asphalt and possible misleading results due to reheating

Wang, Hao; Al-Qadi, Imad L; Baek, Jongeun; Leng, Zhen

The main objective of this study is to evaluate the rutting potential of warm mixes produced with various warm mix additives (Evotherm, Sasobit, and foamed asphalt). To achieve this objective, an experimental matrix was developed to determine the mechanical properties of warm mixes and the control mix. Laboratory performance testing includes evaluation of modulus, strength, and rutting potential using dynamic modulus test, indirect tensile (IDT) strength test, flow number (FN) test, and loaded wheel track (LWT) test. The test results show that the warm mix could have slightly greater or less rutting potential than the control mix depending on the type of warm mix additive and the recycled material used in the mix. In the laboratory tests, plant-produced mixes were compacted in the laboratory without and with reheating. It was found that the reheating process could significantly stiffen the mixture and the stiffening ratios varied from 1.2 to 2.0 depending on the performance characteristics and the type of mixture. In addition, the rutting test results show different levels of correlation with the dynamic modulus and the tensile strength, depending on the stress state in the performance test. This suggests that attention should be paid to the measured characteristics of each performance test based on the loading conditions.

Akademika Publishing

Utgivningsort: Trondheim

Upplaga: sidor: s 627-636

År: 2013

ISBN: 978-82-321-0286-0

Index terms: Deformation, Strain, Tension, Stiffness, Properties, Stone mastic asphalt, Laboratory (not an organization), Test

Ämnesord: Deformation, Töjning, Dragning, Styvhet, Egenskaper, Skelettasfalt, Laboratorium, Test

Acc nr.: VTI 2013.0053:2 Id: 164758

Ref.: 2

## Quality assessment of Norwegian field trials with Warm Mix Asphalt

Jørgensen, T; Telle, R; Bragstad, R

Eleven test sections with Warm Mix Asphalt (WMA) were constructed in four Norwegian regions in 2011. WMA is produced and laid at lower temperature than traditional asphalt concrete due to a modified mix technique or use of a temperature reducing additive. The aim of the project was to document that WMA's are of same level of quality as ordinary hot mix asphalt. The test roads sections were 1020 m in average. The trial WMA and the corresponding reference asphalt were laid in parallel lanes. Average daily traffic (ADT) of the test sections were 650 to 9000. Six WMA techniques were applied and surveyed: - WAM-foam - LMK-foam - Green asphalt (foaming and adding recycled asphalt) - Rediset WMX (chemical additive) - Cecabase RT (chemical additive) - Sasobit (organic additive). Same aggregates and gradation was used in the WMA and in the reference asphalt. The WMA-trial mixes were documented by binder testing, Marshall density, adhesion and wheel-track rutting. In the field trials, temperature reductions of 20 to 39 °C were achieved with the WMA techniques. The WMA quality was assessed by measuring void content and wheel-tracking rutting on drilled cores from the newly laid pavement. The initial rutting and IRI-evenness of the test sections were measured with a mobile laser pavement profile scanner. The development of rutting and IRI-evenness will be measured annually. Due to differences between asphalt mixes, traffic volumes and local climates, emphasis was laid on the relative performance of the WMA and reference on each test section. There were no significant difference in quality between the new-laid WMA's and the reference asphalts. The long term performance of the test sections will be followed up.

Akademika Publishing

Utgivningsort: Trondheim

Upplaga: sidor: s 745-754

År: 2013

ISBN: 978-82-321-0286-0

Index terms: Foamed bitumen, Temperature, Bituminous mixture, Performance, Rut, Evenness, Field (test), Experimental road

Ämnesord: Skumbitumen, Temperatur, Asfaltmassa, Prestanda, Hjulspår, Jämnhet, Fältförsök, Provvägar

Acc nr.: VTI 2013.0053:2 Id: 164787

Ref.: 3

Time-dependent stiffness increase of foamed asphalt stabilized base material

Khosravifar, S; Schwartz, CW; Goulias, DG

Foamed asphalt stabilized base (FASB) is a cold-recycling process that combines reclaimed asphalt pavement and/or recycled concrete with a small amount of foamed asphalt binder. The combination of water and binder causes a gain in stiffness after placement due to drying effects and the irreversible bonds formed between the binder and aggregate during curing. To investigate this process, a series of experiments was conducted on a 20 cm thick FASB base layer for a lane addition project in Maryland. In-place overall stiffness of the section was measured over seven consecutive days using a Zorn lightweight deflectometer (LWD) and a Humboldt GeoGauge. The stiffness increase with time was compared to that for a conventional 20 cm thick granular aggregate base (GAB) on top of the same subgrade. The stiffness values measured by each of these in-situ devices were different because of differences in applied stress states and zones of influence and the influence of subgrade stiffness on the overall response. The stiffness increases for both the FASB and GAB layers were corrected based on elastic 2-layer assumptions which revealed that the equivalent stiffness of FASB layer increases by a modulus ratio (FU) of 8.2 while this factor is about 3.9 for the GAB layer. FU was predicted using partially saturated soil mechanics, which affirmed that the stiffness gain in FASB layer is significantly higher than can be explained by mere drying of granular materials. This higher rate of stiffening in FASB layer reveals the effects of curing and the development of adhesive bonds between the binder and coated aggregates. The long-term post-construction stiffness was also measured using a Dynatest falling weight deflectometer (FWD) on the final pavement structure 4 months after construction. Backcalculated layer moduli showed that the final stiffness of the field-cured FASB was about 2524 MPa, 15 times higher than that for the GAB material.

Akademika Publishing

Utgivningsort: Trondheim

Upplaga: sidor: s 939-948

År: 2013

ISBN: 978-82-321-0286-0

Index terms: Foamed bitumen, Recycling (mater), Bituminous mixture, Stiffness, Deflection, Roadbase, Field (test), Unsaturated soil, Performance

Ämnesord: Skumbitumen, Återvinning, Asfaltmassa, Styvhet, Deflektion, Bärlager, Fältförsök, Prestanda

Acc nr.: VTI 2013.0053:2 Id: 164910

Ref.: 4

Cold in-place recycling of marginal materials in Malaysia: how does it fare?

Mohd Hizam, Harun; Nafisah Abdul, Aziz; Mat Zin, Hussain; Yazip Matori, Mohd; Najib, Abdullah Mohd

In the early 1980s, a major part of the road networks linking dwellers in oil palm plantation consisted of laterite and crushed aggregate materials. These roads initially carried low traffic volume with less than 1,000 vehicles per day which includes heavy vehicles carrying palm fruits and timber logs. With the increase in infrastructure development, these roads underwent upgrading as well. It is a common practice in Malaysia to upgrade this type of road by introducing granular base course and asphaltic concrete overlay. However, recently the use of in-situ recycling technique has been introduced to upgrade the existing marginal materials to an acceptable quality as part of a comprehensive study on full depth Cold in-Place Recycling (CIPR). Various stabilizing agents such as foamed bitumen, emulsion, ordinary Portland cement and hydrated lime were used in the CIPR technique. This paper describes pavement evaluation and structural design processes, mix design and construction methods, and presents the performance test results for two project sites, namely Felda Pekoti Timur and Felda Krau, in Pahang, Malaysia.

VTI

Utgivningsort: Linköping

Upplaga: sidor: 13 s, 965,74 kB

År: 2012

Övrig info: Ingår i: EPAM 2012: Malmö, Sweden, 5–7 September: 4th

European pavement and asset management conference

Index terms: Cold in situ recycling, Bituminous mixture, Foamed bitumen, Cement, Lime, Emulsion, Additive, Experimental road, Performance, Surfacing

Ämnesord: Kall återvinning, Asfaltmassa, Skumbitumen, Cement, Kalk, Emulsion, Tillsatser, Provvägar, Prestanda, Beläggningar

Acc nr.: VTI 2012.0115 Id: 160789

Ref.: 5

Återvinning av asfaltgranulat vid motorvägsbygget på E4, Markaryd: uppföljningar åren 2005-2010

Jacobson, Torbjörn; Waldemarson, Andreas

<http://www.vti.se/sv/publikationer/pdf/atervinning-av-asfaltgranulat-vid-motorvagsbygget-pa-e4-markaryd--uppfoljningar-aren-20052010.pdf>

In connection with the construction of the highway on E4 between Strömsnäsbruk and the county border to Skåne in 2004-2006, about 100 000 tonnes of asphalt were recycled by new technologies according to Swedish standards. These asphalt materials came mainly from those parts of the old E4 with adjoining sections of road that were dug out in connection with the construction of the new road. In the northern part of the object, stage 1, the Swedish Road Administration (SRA) had a permission from the environmental authority to recover about 30 000 tonnes of tar contaminated asphalt by cold recycling with foamed bitumen (asphalt foam). In the southern part of the object, stage 2, about 70 000 tonnes of crushed asphalt pavement (asphalt granulate) were recycled without the addition of new binders. In both cases, the reclaimed asphalt was used as base course under the regular asphalt pavement. It replaced the conventional base course of crushed rock with the same thickness, 80 mm or 150 mm. This report describes tests with recycling of crushed asphalt pavement (asphalt granules) as base course in stage 2. The road has been followed up during 2006-2010. During the construction phase compaction test was performed and the asphalt material was characterized by laboratory tests. The highway was opened to traffic in June 2006. Wearing course was laid in the summer of 2007.

VTI. VTI notat 25-2010

Utgivningsort: Linköping

Upplaga: sidor: 28 s + bil. (16 s), 577 kB

År: 2011

Index terms: Bituminous mixture, Roadbase, Construction material, Compaction, Properties, Experimental road, Rut, Evenness, Recycling (mater)

Ämnesord: Asfaltmassa, Bärlager, Byggnadsmaterial, Packning, Egenskaper, Provvägar, Hjulspår, Jämnhet, Återvinning

Acc nr.: VTI P5000:2010-25 Id: 157169

Ref.: 6

Some aspects of foamed bitumen technology

Namutebi, May

<http://kth.diva-portal.org/smash/record.jsf?searchId=1&pid=diva2:413017>

Although foamed bitumen has been widely applied in pavement construction some of its aspects are still not yet understood. In this study, some of these aspects including: effects of the foaming process on binder chemistry, characterization of foamed bitumen and development of a rational method to optimize foam characteristics, evaluation of aggregate particle coating within foamed bitumen treated materials, and development of a gyratory compaction procedure for laterite gravels treated with foamed bitumen were addressed. The effects of the foaming process on bitumen chemistry were investigated using Fourier transform infrared spectroscopy techniques. Also, foam characteristics of three binders were established and a rational method to optimize foam characteristics proposed. Aggregate particle coating with foamed bitumen was studied using the concepts of surface energy and Rice density. In addition a gyratory laboratory compaction procedure for laterite gravels treated with foamed bitumen was established using the modified locking concept. Infrared techniques have shown that foaming does not cause any changes in the binder chemistry, suggesting that foaming may be a physical process. Further, foam characteristics are greatly influenced by binder viscosity. Also, the equiviscous temperature seems to produce foam with optimum foam characteristics. Rice density results showed that aggregate size fraction, binder expansion ratio and viscosity influenced aggregate particle coating. Surface energy results revealed that foamed bitumen exhibited better coating attributes than neat bitumen. A new compaction procedure for laterite gravels treated with foamed bitumen based on the modified locking point was developed.

Kungliga tekniska högskolan, KTH. Skolan för arkitektur och samhällsbyggnad (ABE),  
Transportvetenskap, Väg- och banteknik TRITA-VBT 11:05 1650-867X

Utgivningsort: Stockholm

Upplaga: sidor: 63 s, 875,46 kB

År: 2011

ISBN: 978-91-7415-910-3

Index terms: Foamed bitumen, Properties, Bituminous mixture, Compaction, Gyratory compactor

Ämnesord: Skumbitumen, Egenskaper, Asfaltmassa, Packning, Gyrator

Acc nr.: Id: 160051

Ref.: 7

Återvinning av krossad asfaltbeläggning vid motorvägsbygget på E4, via Markaryd: uppföljningar åren 2005-2010

Jacobson, Torbjörn; Viman, Leif

[http://fudinfo.trafikverket.se/fudinfoexternwebb/Publikationer/Publikationer\\_001101\\_001200/Publikation\\_001191/VTI%20Utl%c3%a5tande%20768%20E4%20Markaryd%202010-12-14.pdf](http://fudinfo.trafikverket.se/fudinfoexternwebb/Publikationer/Publikationer_001101_001200/Publikation_001191/VTI%20Utl%c3%a5tande%20768%20E4%20Markaryd%202010-12-14.pdf)

I samband med byggande av motorvägen på E4 mellan Strömsnäsbruk och länsgränsen mot Skåne har under åren 2004-2006 ca 100 000 ton returafalt återvunnits med för svenska förhållanden ny teknik. Asfaltmaterialen kom huvudsakligen från de delar av gamla E4:an med anslutande vägvägsnitt som grävdes bort i samband med byggandet av den nya vägen. På norra delen av objektet, etapp 1, fick dåvarande Vägverket av miljömyndigheten tillstånd att återvinna ca 30 000 ton tjärafalt genom kall återvinning med skummat bitumen (skumasfalt). På södra delen av objektet, etapp 2, återvanns ca 70 000 ton krossad asfaltbeläggning (asfaltgranulat) utan tillsättning av nytt bindemedel. I båda fallen lades återvinningsmassorna som bärlager under ordinarie asfaltbeläggning. De ersatte konventionellt bärlager av krossat bergmaterial och lades med samma tjocklek, 80 mm eller 150 mm.; I rapporten redovisas försöken med återvinning av krossad asfaltbeläggning (asfaltgranulat) i bärlager på etapp 2. Vägen har följts upp under perioden 2006-2010. Under byggnadsskedet utfördes packningsförsök och beläggningmaterialen karakteriserades genom laboratorieprovningar. Motorvägen öppnades för trafik i juni 2006. Slitlagerbeläggningen lades på sommaren 2007.

VTI.

VTI utlåtande 768

Utgivningsort: Linköping

Upplaga: sidor: 1,10 MB, 37 s

År: 2010

Index terms: Recycling (mater), Bituminous mixture, Crushing, Roadbase, Construction material, Experimental road, Core (boring), Properties, Laboratory (not an organization), Test, Rate of compaction

Ämnesord: Återvinning, Asfaltmassa, Krossning, Bärlager, Byggnadsmaterial, Provvägar, Borrkärnor, Egenskaper, Laboratorium, Test, Packningsgrad

Acc nr.: Id: 156825

Ref.: 8

Measuring Effects of Warm-Mix Additives: Use of Newly Developed Asphalt Binder Lubricity Test for the Dynamic Shear Rheometer

Hanz, Andrew J; Faheem, Ahmed; Mahmoud, Enad; Bahia, Hussain U

<http://dx.doi.org/10.3141/2180-10>

An emphasis on environmental stewardship has prompted the use of warm-mix technologies aimed at allowing for production of conventional asphalt mixtures at reduced temperatures. Successful use of warm-mix asphalt (WMA) in field demonstrations has created a need for development of mix design procedures. A major impediment in development of these procedures is the evaluation of the effect of WMA technologies on asphalt binder and mixture workability. The objective of this study was to introduce a new test methodology for estimating asphalt binder workability by measuring the lubricity effects of a surfactant-based additive as well as binder **foaming processes** through novel use of the dynamic shear rheometer with a new testing fixture. The new test allows measuring the coefficient of friction of binders at various temperatures, loading rates, and normal force. Asphalt binder lubricity measurements were correlated to mixture workability tests defined by the compactive effort required to densify a mixture to 8% air voids. Mixture testing was conducted at temperatures ranging from 90°C to 135°C. Results of asphalt binder workability testing demonstrated a significant reduction in coefficient of friction due to the use of a surfactant-based WMA additive and identified a need for revised procedures for evaluation of foamed asphalts. Both warm-mix processes demonstrated enhanced mixture workability relative to the hot-mix asphalt; however, significant differences were not realized until compaction temperatures were below those normally used in production.

Transportation Research Board Transportation Research Record: Journal of the Transportation Research Board 0361-1981

Utgivningsort: Washington DC

Upplaga: nr: nr 2180 sidor: s 85-92

År: 2010

ISBN: 9780309160506

Acc nr.: VTI P8167:2180 Id: 159023



Ref.: 9

Road pavement material characterization and rehabilitation: selected papers from the 2009 GeoHunan international conference, August 3-6, 2009, Changsha, Hunan, China

Steyn, Wynand JvdM (ed); Jenkins, Kim (ed); Solaimanian, Mansour (ed)

This Geotechnical Special Publication contains 26 papers that were presented at the GeoHunan International Conference, Challenges and Recent Advances in Pavement Technologies and Transportation Geotechnics, held in Changsha, Hunan, China, from August 3 to 6, 2009. The material in these peer-reviewed papers is gracefully balanced between theoretical analyses and practical applications. These papers cover advances in roadway and pavement maintenance and management.; The five major topics analyzed in this volume include: Advances in Laboratory Characterization of Pavement Materials; Forensic Studies; Rehabilitation Strategy Selection and Preventative Maintenance Treatments; Roadway Widening; and Stabilization, Recycling, Foamed Bitumen and Emulsion, Granular Materials.; This publication will be valuable to pavement engineers, researchers, and practitioners in providing improved road pavement infrastructure. Geotechnical professors and students, design engineers, contractors, and others involved in geotechnical engineering will also benefit.

American Society of Civil Engineers, ASCE.

Geotechnical special publication 191

Utgivningsort: Reston, VA

Upplaga: sidor: 203 s

År: 2009

ISBN: 9780784410431

Index terms: Pavement design, Flexible pavement, Rigid pavement, Conference

Acc nr.: VTI 2010.0040 Id: 152670

Ref.: 10

Degree of Influence of Active Fillers on Properties of Recycled Mixes with Foamed Asphalt

Halles, Felipe A; Thenoux, Guillermo Z

<http://trrjournalonline.trb.org/loi/trr>

Active fillers in foamed asphalt mixes are added to modify the fine fraction of aggregate gradation or to reduce the moisture sensitivity of the mix. Some countries use cement as an active filler, and other countries use lime or fly ash, among other ingredients. However, limited information is available concerning the influence of different types of active fillers on the mechanical properties of foamed asphalt mixes. This paper presents the results of a project carried out to study the relative influence of active fillers on the mechanical properties of recycled mixes with foamed asphalt. Four active fillers were studied: portland cement, cement kiln dust, hydrated lime, and fly ash Class C. Indirect tensile strength, triaxial resilient modulus, and triaxial permanent deformation tests were carried out to quantify the influence of these active fillers on the properties of one particular full-depth reclamation material. Different curing methods and moisture conditioning were used to evaluate the role of active fillers after the mix production process. As a result of this study, it was concluded that, for the full-depth reclamation material tested, whereas some active fillers have an important influence on the mechanical properties and long-term performance of foamed asphalt mixes, others act only as mineral fillers of the aggregate gradation. Also, because foamed asphalt takes a long time to cure, some active fillers play an important role in contributing to the early strength of foam recycled mixes.

Transportation Research Record: Journal of the Transportation Research Board

Utgivningsort: Washington DC

Upplaga: nr: nr 2095 sidor: s 127-135

År: 2009

ISBN: 9780309126328

Acc nr.: VTI P8167:2095 Id: 153771

Ref.: 11

Full-Scale Experiment on **Foam Bitumen Pavements** in an Accelerated Testing Facility

Gonzalez, Alvaro; Cubrinovski, Misko; Pidwerbesky, Bryan Dale; Alabaster, David

<http://trrjournalonline.trb.org/loi/trr>

**Foam bitumen** stabilization is a viable alternative for reducing aggregate consumption in New Zealand. An accelerated full-scale experiment on foam bitumen pavements was conducted in the Canterbury Accelerated Pavement Testing Indoor Facility as part of a Transit New Zealand research project to study the effects of foam bitumen on unbound granular materials. Six pavement sections were tested. Three were constructed with foam bitumen contents of 1.2%, 1.4%, and 2.8% and with a common active filler content of 1.0% cement. Two more pavements were constructed with adding cement only (1.0%) and **foam bitumen** only (2.2%). In addition, one control section with the untreated unbound material was tested. Strains were collected with a three-dimension Emu soil strain system installed in each pavement section. Results showed that surface deflections decreased at sections with higher bitumen contents. After the application of 5,710,000 equivalent standard axles, the control section and all sections that had been stabilized with cement only and bitumen only showed large amounts of rutting. Conversely, little rutting was observed in the three sections stabilized with 1.2%, 1.4%, and 2.8% **foam bitumen** and 1.0% cement. Water was introduced into these three pavements with additional accelerated loading; this caused the section with the lowest **foam bitumen** content to fail. These results showed that **foam bitumen** and cement had a significant effect on improving the performance of the materials studied. Material samples taken for indirect tensile strength (ITS) and repeat load triaxial (RLT) for laboratory tests showed that the ITS test was a good predictor of the pavement performance and produced a clear trend, although RLT results were not conclusive.

Transportation Research Record: Journal of the Transportation Research Board

Utgivningsort: Washington DC

Upplaga: nr: nr 2094 sidor: s 21-29

År: 2009

ISBN: 9780309126113

Acc nr.: VTI P8167:2094 Id: 153897

Ref.: 12

Bituminous paving mixtures 2008

<http://trrjournalonline.trb.org/loi/trr>

This record includes 19 papers that explore selecting appropriate asphalt concrete mixes, premature surface cracking in full-depth asphalt pavements, fracture face image analyses of foamed asphalt mixes, fracture in asphalt mixtures caused by moisture damage, asphalt binder film thickness, and interface bonding of hot-mix asphalt and concrete surfaces, fracture-based friction model for pavement interface characterization. This issue of the TRR also examines viscoelastic behavior of hydrated lime-modified asphalt matrix and hot-mix asphalt under moisture damage conditions, superpave number of design gyrations compaction levels, anisotropic behavior of hot-mix asphalt at low temperatures, hot-mix asphalt lab compactability, and quality management of hot-mix asphalt with seismic methods. In addition, this TRR highlights an artificial neural network for backcalculation of dynamic modulus from resilient modulus of asphalt concrete, asphalt material characterization in support of the Mechanistic-Empirical Pavement Design Guide (MEPDG) implementation, permanent deformation characterization of asphalt mixtures, asphalt mixture creep compliance at low temperatures, performance characteristics of plant-produced asphalt mixtures, fatigue analysis of asphalt mixtures, and verification of rutting predictions from the MEPDG.

Transportation research record 2057

Utgivningsort: Washington DC

Upplaga: sidor: 167 s

År: 2008

ISBN: 978-0-309-11326-7

Index terms: Bituminous mixture, Bituminous materials, Mix design, Aggregate, Binder, Performance, Test, Test method

Acc nr.: VTI P8167:2057 Id: 149572

Ref.: 13

Understanding Internal Structure Characteristics of Foamed Asphalt Mixes with Fracture Face Image Analyses

Fu, Pengcheng; Harvey, John T; Jones, David; Chao, You-Chen

<http://trrjournalonline.trb.org/loi/trr>

The rate of use of full-depth reclamation with foamed asphalt to rehabilitate cracked pavements is increasing worldwide. However, the state-of-the-art understanding of foamed asphalt mixes and the state-of-the-practice engineering application are largely empirical because of the lack of in-depth knowledge of this material's internal structure characteristics. A fracture face image analysis framework for quantification of the asphalt mastic phase distribution in foamed asphalt mixes, which is a key microscopic structure characteristic, is described. Fracture face asphalt coverage is a quantitative indicator of asphalt spot distribution on fractured faces and is primarily a function of the asphalt dispersion in the mix, the relative strengths of the asphalt mastic and mineral filler phases, and the boundary conditions of specimen compaction and testing. Fracture face image analyses combined with laboratory testing results are presented. It was found that (a) the strength of the asphalt mastic phase is much less susceptible to moisture conditioning than the strength of the mineral filler phase, (b) filler contents that are too low or too high both negatively influence the effectiveness of asphalt stabilization, and (c) the image analyses show that the impact of asphalt grade on the asphalt distribution in the mix dominates the effectiveness of asphalt stabilization but not the strength of the asphalt cement itself. Additionally, engineers can perform a qualitative fracture face asphalt distribution check at the project level of mix design to diagnose mix problems, for which an interim guideline is proposed.

Transportation Research Record: Journal of the Transportation Research Board

Upplaga: nr: nr 2057 sidor: s 20-27

År: 2008

ISBN: 9780309113267

Index terms: Foamed bitumen, Mastic asphalt, Bituminous mixture, Recycling, Digital image processing, Image analysis, Test, Laboratory, Micro, Structure, Strength, Particle size distribution

Acc nr.: VTI P8167:2057 Id: 151494

Ref.: 14

Sustainable Pavements: Environmental, Economic, and Social Benefits of In Situ Pavement Recycling

Alkins, Andrew; Lane, Becca; Kazmierowski, Thomas J

<http://trrjournalonline.trb.org/loi/trr>

The Ministry of Transportation Ontario, Canada, is committed to using technologies to help build a more sustainable transportation system that supports today's needs while protecting the environment for future generations. Cold in-place recycling (CIR) is an established pavement rehabilitation technology that processes an existing asphalt pavement, sizes it, mixes in additional asphalt cement, and lays it back down without off-site hauling and processing. The added asphalt cement is typically emulsified asphalt. A recent development in CIR technology is the use of expanded (foamed) asphalt, rather than emulsified asphalt, to bind the mix. This combination of CIR and expanded asphalt technologies is termed cold in-place recycled expanded asphalt mix (CIREAM). Both CIR and CIREAM technologies support the philosophy of a sustainable transportation system. More specifically, CIR and CIREAM meet the criteria for a sustainable pavement: safe, efficient, economic, environmentally friendly pavement that meets the needs of present-day users without compromising those of future generations.

Transportation Research Record: Journal of the Transportation Research Board

Upplaga: nr: nr 2084 sidor: s 100-103

År: 2008

ISBN: 9780309125970

Index terms: Cold in situ recycling, Admixture, Bituminous materials, Emulsion, Expanded material, Foamed bitumen, Environment protection, Greenhouse gas, Emission, Economic efficiency

Acc nr.: VTI P8167:2084 Id: 151614

Ref.: 15

Återvinning av tjärasfalt och krossad asfaltbeläggning vid motorvägsbygget på E4 vid Markaryd

Jacobson, Torbjörn

<http://www.vti.se/sv/publikationer/pdf/atervinning-av-tjarasfalt-och-krossad-asfaltbelaggning-vid-motorvagsbygget-pa-e4-vid-markaryd.pdf>

I samband med byggande av E4:an mellan Strömsnäsbruk och länsgränsen mot Skåne har under åren 2004–2006 ca 100 000 ton returafalt återvunnits med för svenska förhållanden ny teknik. Asfaltmaterialen kom huvudsakligen från de delar av gamla E4 med anslutande vägvägsnitt som grävdes bort i samband med byggandet av den nya vägen. På norra delen av objektet, etapp 1, fick Vägverket av miljömyndigheten tillstånd att återvinna ca 30 000 ton tjärasfalt genom kall återvinning med **skummat bitumen (skumasfalt)**. På södra delen av objektet, etapp 2, återvanns ca 70 000 ton krossad asfaltbeläggning (asfaltgranulat) utan tillsättning av nytt bindemedel. I båda fallen lades återvinningsmassorna som bärlager under ordinarie asfaltbeläggning. De ersatte konventionellt bärlager av krossat bergmaterial och lades med samma tjocklek, 8 cm eller 15 cm.; I rapporten ges en beskrivning av planering, riktlinjer för återvinning av tjärhaltiga material och krossad asfalt, förprovning, provpackning i fält, kontrollsträckor, kvalitetskontroll, miljöuppföljningar och slutligen uppföljningar av färdig väg. Motorvägen öppnades i sin helhet för trafik i juni 2006. Uppföljningarna av vägen planeras pågå även under 2007.; Alternativ URL:

[http://fudinfo.trafikverket.se/fudinfoexternwebb/Publikationer/Publikationer\\_001401\\_001500/Publikation\\_001477/N9-2007Sve.pdf](http://fudinfo.trafikverket.se/fudinfoexternwebb/Publikationer/Publikationer_001401_001500/Publikation_001477/N9-2007Sve.pdf)

VTI.

VTI notat 9-2007

VTI notat

Utgivningsort: Linköping

Upplaga: sidor: 84 s

År: 2007

Index terms: Bitumen tar mixture, Cold in situ recycling, **Foamed bitumen**, Recycling, Bituminous mixture, Roadbase, Compaction, Test, In situ, Laboratory, Rutting, Evenness, Pollution, Aromatic compounds, Follow up study, Evaluation

Acc nr.: VTI P5000:2007-09 Id: 143923

Ref.: 16

Bituminous and nonbituminous materials of bituminous paving mixtures 2007

<http://trrjournalonline.trb.org/loi/trr>

This record includes 17 papers that explore the dynamic modulus of asphalt mixtures, rheology of asphalt films, asphalt binder moisture sensitivity, the bond energy of asphalt binders, oxidative aging of polymer-modified binders, and polyphosphoric acid-modified asphalt binders. This issue of the TRR also examines the role of viscosity in dynamic creep tests, lime and liquid antistrip agents effects on hot-mix asphalt, Superpave fine aggregate angularity, Sasobit and Aspha-Min additives in warm-mix asphalt, foamed bitumen mixes, warm-mix asphalt field performance, plant-produced reclaimed asphalt pavement mixtures, wax-modified asphalt, volumetric properties of hot-mix asphalt, crumb rubber asphalt mixes, and calcareous fillers' effect on bituminous mix aging.

Transportation research record 1998

Utgivningsort: Washington DC

Upplaga: sidor: 148 s

År: 2007

ISBN: 978-0-309-10424-1

Index terms: Bitumen, Bituminous materials, Aggregate, Bituminous mixture

Acc nr.: VTI P8167:1998 Id: 146741



Ref.: 17

Kerrosstabilointien kehitysprojekti INFRA-STABIL: projektin yhteenveto (Base course stabilization development project INFRA\_STABIL: summary report)

Laukkanen, Kyösti; Laaksonen, Rainer

[http://alk.tiehallinto.fi/julkaisut/pdf2/3201073-vkerrostab\\_kehitysprojekti.pdf](http://alk.tiehallinto.fi/julkaisut/pdf2/3201073-vkerrostab_kehitysprojekti.pdf)

Tiehallinto. Tiehallinnon selvityksiä 47/2007

Utgivningsort: Helsingfors

Upplaga: sidor: 23 s

År: 2007

ISBN: 978-951-803-966-5

Index terms: Roadbase stabilization, Flexible pavement, Mix design, Material, Composite, Blast furnace slag, Cement, Foamed bitumen

Acc nr.: VTI P3021:2007-47 Id: 147674

Ref.: 18

Alternative strategies for rehabilitation of low-volume roads in Nevada

Maurer, Gayle; Bemanian, Sohila; Polish, Patty

<http://trrjournalonline.trb.org/loi/trr>

An overview of the attempt by the Nevada Department of Transportation (NDOT) to find alternative rehabilitation strategies to rehabilitate its low-volume road network effectively is provided. Because of Nevada's continuing growth, NDOT is faced with the challenge of how to balance its available funding between pavement preservation and capacity improvement projects. NDOT is responsible for 13,000 lane miles of roadway, of which 3,385 lane miles (26%) qualify as low-volume roads. The low-volume roads have a two-directional average daily traffic of 400 or less. Five roadway projects with a combined total of 111 centerline miles were rehabilitated with 29 combinations of structural and surface strategies. The rehabilitation strategies investigated included full-depth reclamation with lime, cement, asphalts, and foamed asphalt. Various cold-mix, cold-in-place recycling with millings and different rejuvenating agents, and surface treatment test sections were constructed. The constructability issues that were reported during construction are discussed. In addition, pavement condition is examined and laboratory testing is reviewed. Results suggest that NDOT can use alternative rehabilitation strategies in place of its conventional method of 2-in. plant-mix bituminous surface overlay and chip seal to rejuvenate its low-volume roadway network. A cost saving of approximately \$100,000 per centerline mile is anticipated.

Transportation research record

Upplaga: volym: 2 nr: nr 1989 sidor: s 309-20

År: 2007

Index terms: Low traffic road, Road network, Maintenance, Recycling, Cold in situ recycling, Remixing, Lime, Cement, Bitumen, Foamed bitumen, Construction method, Alternative, Strengthening, Deflectograph, Evaluation, Rutting, Modulus of elasticity, Strength

Acc nr.: VTI P8167:1989:2 Id: 147948

Ref.: 19

Laboratory investigations of mechanical performance of foamed bitumen mixes that use half-warm aggregates

Gaudefroy, Vincent et al

<http://trrjournalonline.trb.org/loi/trr>

For several years, as environmental criteria have become stricter and stricter, new moderated-temperature mixing technologies-warm or even half-warm (less than 100°C)-have appeared. This study, realized in Laboratoire Central des Ponts et Chaussées (LCPC) in Nantes, France, within the framework of the partnership between Eiffage Travaux Publics and LCPC, aimed at determining the influence of mixing parameters (such as temperature and initial water content of the mix aggregates) on the quality of mixing and the mechanical properties of the half-warm foamed bitumen mixes compared with the traditional cold-foamed bitumen mix and hot-mix asphalt, both of which acted as reference materials. It was also a way to understand better the role of water and its influence on asphalt quality. This study highlights the influence of the increase in the aggregate temperature to elaborate mix treated with foam bitumen. This coating process allows many benefits: an increase in coating quality, compactibility, and water resistance. As a consequence, mechanical performances are improved.

Transportation research record

Upplaga: nr: nr 1998 sidor: s 89-95

År: 2007

Index terms: Bituminous mixture, Heat, Reduction, Aggregate, Temperature, Foamed bitumen, Coating, Compaction, Properties, Moisture, Stripping, Workability

Acc nr.: VTI P8167:1998 Id: 148146

Ref.: 20

Early-life performance of cold-in-place pavement recycling with foamed asphalt technique

<http://trrjournalonline.trb.org/loi/trr>

The cold-in-place recycling technique with foamed asphalt stabilization was used to rehabilitate a severely damaged, heavily trafficked highway, part of the Trans European Network. Lack of experience, at least as far as the performance of the aforementioned technique for heavy-duty pavements was concerned, was the main reason for the Greek Ministry of Public Works to undertake a field experiment incorporating semirigid and flexible pavements. To achieve this goal, a comprehensive monitoring and data analysis research study was performed; it concentrated on the falling weight deflectometer as a major tool for the in situ evaluation of early-life performance of the recycled pavement. In addition, as-built roughness and ground-penetrating radar measurements, accomplished with in situ material coring and related laboratory tests, were performed. The roughness data analysis raised several issues concerning the construction of the recycled layer. According to the deflection analysis, an improvement in the recycled pavement structural condition was observed during the early life. The foamed asphalt material of the semirigid pavement proved to be stiffer than that of the flexible pavement. Furthermore, significant differences between pavement design parameters and related in situ characteristics were obtained through the strain response analysis.

Transportation research record

Upplaga: nr: nr 2005 sidor: s 36-43

År: 2007

Index terms: Cold in situ recycling, Foamed bitumen, Roadbase stabilization, Deflectograph, Evenness, Semi rigid pavement, Strain, Tension

Acc nr.: VTI P8167:2005 Id: 148263

Ref.: 21

Mechanistic comparison of cement- and bituminous-stabilized granular base systems

Berthelot, Curtis et al

<http://trrjournalonline.trb.org/loi/trr>

The Saskatchewan, Canada, Department of Highways and Transportation is investigating alternative recycling and strengthening systems for inservice thin granular pavements. This research is being performed to improve the granular pavement structural integrity and to reduce the dependence on new source aggregates. A pilot project investigated the mechanistic-climatic laboratory characterization of materials used to construct test sections on Control Section Highway 15-11 (C.S. 15-11). This research demonstrated the use of ground-penetrating radar and falling weight deflection measurements to select uniform field test section locations. In situ recycled granular base was sampled and found to be a typical thin granular pavement requiring strengthening because it is relatively high in fine sand fraction and has a high portion of intermediate plastic clay fines. These two properties are known to cause marginal performance of granular bases in the field. This research showed that cement and bituminous stabilization significantly improved the mechanistic primary response and climatic durability properties of marginal granular base materials. However, it was found that the asphalt emulsion with cement stabilization showed the highest performance improvement. It also was found that the addition of cement to emulsified and **foamed asphalt** stabilization systems significantly improved the mechanistic-climatic durability of the marginal granular base aggregate. This study demonstrated the rapid triaxial tester to be a pragmatic and cost-efficient methodology to characterize the mechanistic constitutive relations of granular base materials for performing mechanistic road structural modeling.

Transportation research record

Upplaga: nr: nr 2026 sidor: s 70-80

År: 2007

Index terms: Roadbase, Granular, Roadbase stabilization, Strengthening, Recycling, In situ, Cement, Bitumen, Emulsion, **Foamed bitumen**, Test, Laboratory, Triaxial, Poisson's ratio, Dynamics, Modulus

Acc nr.: VTI P8167:2026 Id: 148634

Ref.: 22

Mechanical characterisation of cold-recycled mixtures

Pasetto, Marco; Baldo, Nicola; Bortolini, Gianpaolo

TRA-Transport Research Arena Europe 2006: Göteborg, Sweden, June 12th-15th 2006: greener, safer and smarter road transport for Europe, Paper

Upplaga: nr: Session 6.07.3 sidor: 5 s

År: 2006

Index terms: Cold in situ recycling, Foamed bitumen, Bituminous mixture, Recycling, Material, Flexible pavement

Acc nr.: VTI 2006.0332 Id: 142083

Ref.: 23

In-place determination of stiffness of subsurface reclaimed layers in thin surface hot-mix asphalt pavements: fast nondestructive test and analysis method

Mallick, Rajib B; Bradley, Julie E; Nazarian, Soheil

<http://trrjournalonline.trb.org/loi/trr>

Seismic testing and analysis using a nondestructive method was developed to determine the moduli of reclaimed layers in thin surface hot-mix asphalt pavements. This method is particularly useful when accurate backcalculation of moduli is difficult because of the existence of unknown layers and when the extraction of intact cores for laboratory testing is impossible. Sixteen Maine Department of Transportation projects with foamed asphalt and plant-mixed recycled asphalt pavement reclaimed layers were tested according to this method using a portable seismic property analyzer. Layer thickness uniformity was checked with a ground-penetrating radar, and falling weight deflectometer was used at multiple load levels to acquire deflection data. Seismic test data were analyzed to estimate layer moduli. The collected data were found to have very low variability. The deflections calculated with the predicted moduli and actual deflections were found to compare well, and the use of predicted moduli as seed moduli resulted in backcalculations with relatively low root-mean-square errors. The moduli were corrected for temperature, and design moduli were recommended. This newly developed method can be used effectively to determine the moduli of subsurface layers, and its use is important for collecting a large amount of data, specifically because of the highly variable nature of the reclaimed layers. A logical next step will be to develop artificial neural networks to automate the process of data reduction from seismic testing. This would allow departments of transportation and industry to fully use the benefits of this fast, nondestructive testing method.

Transportation research record

Upplaga: nr: nr 1949 sidor: s 11-19

År: 2006

Index terms: Non destructive, Seismic, Modulus of elasticity, Recycling, Flexible pavement, Test method, Evaluation, Deflection, Linear, Elasticity

Acc nr.: VTI P8167:1949 Id: 145724

Ref.: 24

Effect of aggregate gradation, mineral fillers, bitumen grade, and source on mechanical properties of foamed bitumen-stabilized mixes

Saleh, Mofreh Fawzy

<http://trrjournalonline.trb.org/loi/trr>

With the rapid growth of traffic volumes and axle loads, the use of efficient and cost-effective stabilization methods is imperative. The use of foam bitumen stabilization is rapidly growing because of its environmentally friendly benefits and its high field performance properties. In this study, a detailed investigation of the mechanical properties of foam-stabilized mixes was carried out. The experimental work presented compares the mechanical properties of foam-stabilized mixes created with two different gradations and eight bitumen types from six different sources. Different types of mineral fillers, including hydrated lime, fly ash type C, portland cement, and pond ash, were used in the mix design. The volumetric properties, resilient moduli, indirect tensile strengths, fracture energies, and California bearing ratio (CBR) values were investigated. Temperature and moisture susceptibilities were studied and compared for different types and grades of bitumen. Foam-stabilized mixes provided lower temperature susceptibility than did hot-mix asphalt. The effect of bitumen source and grade on moisture susceptibility was inspected. The foam-stabilized mixes provided reasonable moisture resistance as the index of retained strength exceeded 80% to 90% after 5 days of soaking. The effect of aggregate gradation and mineral fillers on the indirect tensile strength and the fracture energy was evident. Hot-mix asphalts provided higher tensile strength and fracture energy than did foam-stabilized mixes. Foamed bitumen stabilization significantly enhanced the CBR values as the soaked CBR of foam-treated specimens provided higher CBR values than the conventional untreated aggregates.

Transportation research record

Upplaga: nr: nr 1952 sidor: s 90-100

År: 2006

Index terms: Foamed bitumen, Roadbase stabilization, Volumetric analysis, Modulus of elasticity, Tensile, Strength, CBR, Temperature, Moisture, Sensitivity, Impact study, Particle size distribution, Mineral, Filler, Bitumen, Origin, Hydrated lime, Cement

Acc nr.: VTI P8167:1952 Id: 145779



Ref.: 25

Merkblatt für Kaltrecycling in situ im Strassenoberbau M KRC

Forschungsgesellschaft für Strassen- und Verkehrswesen.

FGSV 636

Utgivningsort: Köln

Upplaga: sidor: 37 s

År: 2005

ISBN: 3-937356-59-2

Index terms: In situ, Recycling, Cold coated material, Bituminous mixture, Test method, Specifications, **Foamed bitumen**

Acc nr.: VTI P4258:636 Ref Id: 140999

Ref.: 26

Implementation of cold in-place recycling with expanded asphalt technology in Canada

Lane, Becca; Kazmierowski, Tom

<http://trrjournalonline.trb.org/loi/trr>

Cold in-place recycling (CIR) is a pavement rehabilitation method that processes an existing hot-mix pavement, sizes it, mixes in additional asphalt cement, and lays it back down without off-site hauling and processing. The added asphalt cement is typically emulsified asphalt. A recent development in CIR technology is the use of expanded (foamed) asphalt rather than emulsified asphalt to bind the mix. This combination of CIR and expanded asphalt technologies is termed cold in-place recycled expanded asphalt mix (CIREAM). The Ministry of Transportation Ontario (MTO) constructed a CIREAM trial section on Highway 7 in July 2003. The 5-km CIREAM trial section was constructed adjacent to an 8-km section on which conventional CIR was performed. CIREAM placement resulted in a smooth, hard, uniform surface that provided an excellent platform for paving operations. The CIREAM placement progressed in a continuous and efficient manner, with 5 km placed over a 3-day period. Indirect tensile strength testing was carried out on both materials during construction. Falling weight deflectometer (FWD) testing and evaluation of pavement roughness and rutting by the use of MTO's automatic road analyzer (ARAN) were carried out. Resilient modulus testing of core samples of the CIR material and CIREAM was also carried out. The results of the FWD, ARAN, and resilient modulus tests indicated that the CIR and CIREAM pavements were performing similarly. A field review 1 year after construction showed no discernible distortion, rutting, or cracking. On the basis of short-term results, CIREAM appears to be an acceptable in-place recycling and rehabilitation strategy that provides an economical alternative to conventional CIR, reduces curing time, and extends the construction season.

Transportation Research Record

Upplaga: nr: 1905 sidor: s 17-24

År: 2005

Index terms: Cold in situ recycling, Admixture, **Foamed bitumen**, Experimental road, Tension, Strength, Deflectograph, Evenness, Rutting, Modulus of elasticity, Cracking, Follow up study

Acc nr.: VTI P8167:1905 Id: 144434

Ref.: 27

Fast nondestructive field test method to determine stiffness of subsurface layer in thin surface hot-mix asphalt pavement

Mallick, Rajib B; Das, Animesh; Nazarian, S

<http://trrjournalonline.trb.org/loi/trr>

The determination of the moduli of subsurface stabilized layers in pavements with unknown and variable layers and thin asphalt layers is a challenging problem. Reliable estimation of moduli cannot be obtained from backcalculation of falling weight deflectometer data. In addition, for many stabilized layers, full-depth intact cores cannot be obtained from the field, and hence, laboratory determination of the moduli is not possible. Analysis of the seismic property of a pavement is a well-known method for estimation of the surface modulus of the pavement. This paper proposes a simple methodology on how seismic data acquired on the pavement surface can be effectively used to estimate the modulus of the surface layer as well as those of the subsequent subsurface layers of a flexible pavement. A research study was conducted on three hot-mix asphalt pavements with a foamed asphalt (FA) stabilized base in Maine. These three pavements were tested with both portable seismic and falling weight deflectometer equipment. Cores were taken from the same locations and tested in the laboratory for their resilient moduli. The modulus values obtained from different tests were compared, the effect of temperature on the modulus of the FA was evaluated, and the deflections computed from layered elastic analysis by use of the predicted modulus of the FA layer were compared with the observed deflections. It is concluded that the portable seismic equipment can be used to determine accurate moduli of subsurface stabilized layers. The practical advantages of using such equipment warrant further study for refinement of the method.

Transportation Research Record

Upplaga: nr: 1905 sidor: s 82-9

År: 2005

Index terms: Flexible pavement, Layer, Roadbase stabilization, Foamed bitumen, Modulus of elasticity, Non destructive, Method, Calculation, Seismic, Apparatus, Evaluation, Bitumen, Temperature, Deflection

Acc nr.: VTI P8167:1905 Id: 144441

Ref.: 28

Nordisk asfaltforskning åren 2001-2003: sammanställning av de FoU-projekt som presenterats vid förbundsutskottsmötena i Tromsö 2001, Nådendal 2002 och Reykjavik 2003

Torfason, Halldor (red)

[http://ptl.fi/NVFnorden/imageblob/33\\_5\\_2004.zip](http://ptl.fi/NVFnorden/imageblob/33_5_2004.zip)

Nordiska vägtekniska förbundet. NVF rapport 5:2004.

Utskott 33: Asfaltbeläggningar

Utgivningsort: Reykjavik

Upplaga:

År: 2004

Index terms: Swedish, English, Norwegian, Iceland, Bituminous mixture, Flexible pavement, Durability, Recycling, Fly ash, Repaving, Human tolerance, Aggregate, Properties, Foamed bitumen, Hot coated material, Diffusion, Binder, Methylene blue test, Temperature, Drinasphalt, Frost resistance, Wear, Deformation, Cracking, Experimental road, Laboratory, Test

Acc nr.: VTI P0592:2004-05 Id: 137172

Ref.: 29

New Zealand experience with foam bitumen stabilization

Saleh, Mofreh F

<http://trrjournalonline.trb.org/loi/trr>

**Foamed bitumen** stabilization is burgeoning steadfastly and internationally. Although it involves higher initial material costs than cement or lime stabilization, it offers the advantages of being free from transverse shrinkage cracking and of being a fast technique that minimizes traffic delays. This work forms part of a larger project aimed at investigating the feasibility and potential applications of the **foamed bitumen** stabilization technique to speed its adoption in New Zealand. In this research, the **foaming** characteristics of two sources each of two grades of bitumen currently in use in New Zealand are presented. The effect of bitumen source and grade and the type of fines were studied. Fly ash Type C was used to modify the aggregate gradation to adjust the percentage of the fine fraction (passing the 75-micron sieve). Portland cement was used at 2% by the dry weight of aggregates as a partial replacement for the fly ash. The **foamability** results for each source were quite different. For each source, the softer grade provided better quality foam than the harder grade. Two groups of mixes were prepared. The two groups were identical except that the first group contained 2% portland cement as a partial replacement of the fly ash. Optimum **foam** and water contents were determined for the two groups. The effect of curing time on the resilient modulus of foam-stabilized mixes was investigated. Both groups showed high resilient modulus values and rapid rates of increase of the moduli with curing time.

Transportation Research Record

Upplaga:

År: 2004

Index terms: English, USA, Soil stabilization, **Foamed bitumen**, Bitumen, Variability, Fine, Fly ash, Cement, Water content, Curing, Time, Modulus of elasticity

Acc nr.: VTI P8167:1868; VTI P8169:2004 Id: 137982

Ref.: 30

Accelerated pavement testing evaluation of the structural contribution of full-depth reclamation material stabilized with foamed asphalt

Romanoschi, Stefan A et al

<http://trrjournalonline.trb.org/loi/trr>

Research was conducted to determine the effectiveness of the use of foamed asphalt-stabilized reclaimed asphalt pavement from full-depth reclamation (FAS-FDR) as base material for flexible pavements. The experiment, conducted at the Civil Engineering Infrastructure Systems Laboratory of Kansas State University, consisted of constructing four pavements—one with a 9-in. conventional Kansas AB-3 granular base and one each with 6, 9, and 12 in. of FAS-FDR—and subjecting them to a full-scale accelerated pavement test. All four pavement sections were loaded with 500,000 axle load repetitions, at room temperature and under moderate moisture levels in the subgrade soil. The measured stresses and strains as well as the permanent deformation (rutting) observed on the pavement sections indicated that FAS-FDR can be used successfully as a base material. The measured rut depths and compressive vertical stresses at the top of the subgrade suggest that a 1-in. FAS-FDR base shows performance equivalent to that of a 1-in. conventional Kansas AB-3 granular base. The effective structural number computed from the falling weight deflectometer tests on the as-constructed pavements showed that average structural layer coefficient for the FAS-FDR base material was 0.18.

Transportation research record

Upplaga: nr: nr 1896 sidor: s 199-207

År: 2004

Index terms: Recycling, Bituminous mixture, Flexible pavement, Use, Roadbase stabilization, Foamed bitumen, Full scale, Load, Repetitive loading, Acceleration, Test, Rutting, Stress, Strain

Acc nr.: VTI P8167:1896; VTI P8169:2004 Id: 144164

Ref.: 31

Dypstabilisering med fres: feltforsøk i Budalen

Hoff, Inge

[http://www.sintef.no/upload/A04337\\_%20Feltforsøk%20Budalen.pdf](http://www.sintef.no/upload/A04337_%20Feltforsøk%20Budalen.pdf)

SINTEF Bygg og miljø. Veg og samferdsel. STF22 A04337

Utgivningsort: Trondheim

Upplaga: sidor: 44 s

År: 2004

ISBN: 82-14-03589-9

Index terms: Roadbase stabilization, Foamed bitumen, Lignosulphonate, Test, In situ, Rutting, Evenness, Bearing capacity, Visual inspection, Laboratory, Test method, CBR, Triaxial, Modulus of elasticity

Acc nr.: Id: 151226

Ref.: 32

Full-depth in-place recycling and road strengthening systems for low-volume roads: Highway No 19 case study

Berthelot, Curtis; Gerbrandt, Ron

<http://trrjournalonline.trb.org/loi/trr>

The province of Saskatchewan has the highest number of public roads per capita in Canada, totaling approximately 198,700 km. The Saskatchewan Department of Highways and Transportation manages approximately 26,100 km of these public roads. As with most public road agencies, the department has limited resources for managing this relatively large network of low-volume roads and therefore continually strives to research and implement more cost-effective and technically feasible solutions. Of particular concern are approximately 7,500 km of thin membrane surface (TMS) roads that are undergoing accelerated damage as truck traffic and loading increase. Although conventional TMS upgrading strategies are normally effective, there are potentially significant benefits to be gained with implementation of more cost-effective methods of road strengthening. Systems include granular soil strengthening and applications of different cement products, lime, various grades of fly ash, geotextiles, geogrids, natural and manufactured fibers, emulsified bitumen, tall oil, lignin, foamed bitumen, and synthetic ionic and cationic chemicals. Since 1999, in conjunction with Pavement Scientific International and in cooperation with the University of Saskatchewan and product suppliers, the department has constructed pilot projects on Highway No. 19 to identify, develop, and implement more cost-effective strengthening systems. The primary research objective is to investigate alternative road construction systems that will improve the load-carrying capacity and environmental durability of Saskatchewan TMS roads. Improved mechanistic engineering methods played a part in this initiative, and pilot project performance was monitored.

Transportation Research Record

Upplaga:

År: 2003

Index terms: English, USA, Conference, Low traffic road, Recycling, Sealing coat, Strengthening, Economic efficiency, In situ, Experimental road, Inspection, Benkelman beam, Deflectograph, Roadbase stabilization, Variability, Method

Acc nr.: VTI P8169:2003 Ref; VTI P8167 Id: 131759



Ref.: 33

Foamed bitumen stabilisation for New Zealand roads

Saleh, M; Herrington, P

Transfund New Zealand.

Research report 250

Utgivningsort: Wellington

Upplaga:

År: 2003

ISBN: 0-478-25360-5

Index terms: New Zealand, English, Foamed bitumen, Strengthening, Flexible pavement, Mix design, Properties, Cost, Laboratory, Test, Resilience

Acc nr.: VTI P8760:250 Id: 132392

Ref.: 34

Pavement recycling: Guidelines for in place recycling with cement, in place recycling with emulsion or foamed bitumen / Recyclage des chaussées: Guides pour le retraitement en place au moyen de ciment, retraitement en place à froid à l'émulsion ou à la mousse de bitume, recyclage à chaud en centrale des enrobés bitumineux

World Road Association, PIARC.

PIARC Committee C7/8 - "Road Pavements"

Utgivningsort: La Defense

Upplaga:

År: 2003

ISBN: 2-84060-153-2, 2-84060-154-0

Index terms: English, French, France, Pavement, Recycling, Cement, Foamed bitumen, Hot coated material, Cold in situ recycling, Method, Material, Equipment, Cost

Acc nr.: VTI 2004.0059 Id: 132454

Ref.: 35

Louisiana experience with foamed recycled asphalt pavement base materials

Mohammad, Louay N et al

<http://trrjournalonline.trb.org/loi/trr>

Utilization of existing recyclable materials has always been key to more efficient and economical highway construction. Use of the foamed-asphalt (FA) technique to stabilize recycled asphalt pavement (RAP) is one strategy for an efficient use of salvaged construction materials. The main objective of this study is to investigate the potential use of FA-treated RAP as a base course material in lieu of a crushed-limestone base beneath a concrete pavement layer. Test sections were constructed at US-190 near Baton Rouge, Louisiana, and used for field evaluation of the FA RAP base. The laboratory mixture design of the FA RAP, the construction of the experimental base section, and the field evaluation of the stiffness of the FA RAP base layers using different in situ testing devices are presented. Preliminary results of both laboratory and field tests showed that the FA-treated RAP mixtures are very promising and can be used as an alternative to the traditional limestone base beneath a concrete pavement layer.

Transportation Research Record

Upplaga:

År: 2003

Index terms: English, USA, Bituminous mixture, Recycling, Method, Expanded material, Stability, Roadbase stabilization, Experimental road, Mix design, Laboratory, Road construction, Binder content, Moisture content, Deflectograph, Cone penetrometer

Acc nr.: VTI P8169:2003 Ref; VTI P8167 Id: 135357

Ref.: 36

Förbättring av vägar genom stabilisering med bitumenemulsion, skummat bitumen och tillsats av cement: uppföljning av två objekt i D- och U-län

Jacobson, Torbjörn

<http://www.vti.se/sv/publikationer/pdf/forbattrning-av-vagar-genom-stabilisering-med-bitumenemulsion-skummat-bitumen-och-tillsats-av-cement.pdf>

Kalla markinblandningsmetoder har en stark miljö- och återvinningsprofil.; Materialet behöver inte värmas, befintliga material tas till vara och slipper; mellanlagras, transportbehovet av nya vägmateriäl är litet och tekniken; passar bra; för objekt långt från asfaltverk. En förutsättning för ett bra resultat är; att befintligt; stenmaterial har en någorlunda lämplig och homogen sammansättning.; I samband med förbättring och förstärkning av två vägar inom Region; Mälardalen utfördes provvägsförsök med inblandning av skummat bitumen i det; ena fallet och kombinationen av emulsion och cement eller enbart emulsion i; det; andra fallet. Vid åtgärderna användes moderna djupfräsar (två olika) med bra; styrutrustning för bindemedelsspridning och nivåjustering. Basbitumenet; utgjordes; av kvalitet 330/430 enligt specifikationerna i ATB VÄG. I viss utsträckning; inblandades också makadam.; Följande provvägar ingår i undersökningen.; Skumstabilisering på väg D677, Bie-Flodafors, Södermanland (4 sträckor); Emulsion + cement på väg U256, Norberg-Sala, Västmanland (5 sträckor); Variabler är undergrundsförhållanden, makadaminblandning, lagertjocklekar; samt; mängden inblandad cement. Vid D677 var det stabiliserade materialet sandigt; och; relativt finmaterialrikt med låg andel av asfaltinslag. Vid U256 var andelen; asfaltmaterial högre (ca 50 %) samtidigt som det obundna materialet var; finkornigt; med relativt hög finmaterialhalt. Provvägarna har följts upp under några år; med avseende på utveckling av spår, jämnhet, bärighet, skador på vägen samt; egenskaper hos stabiliserat lager.

Statens väg- och transportforskningsinstitut.

VTI notat 26-2002

VTI notat

Utgivningsort: Linköping, Linköping

Upplaga:

År: 2002

Index terms: Swedish, Sweden, Roadbase stabilization, Modified bitumen, Emulsion, Foamed bitumen, Cement, Experimental road, Rutting, Evenness, Deflection, Voids ratio, Stiffness, Tension, Stripping

Acc nr.: VTI P5000:2002-26 Id: 125755

Ref.: 37

**Foamix**: Pilot scale trials and design considerations

Nunn, M; Thom, N

TRL Limited.

Viridis. Viridis report VR1

Utgivningsort: Crowthorne

Upplaga:

År: 2002

Index terms: English, United Kingdom, **Foamed bitumen**, Experimental road, Production, Method, Variability, Thickness, Reduction, Surfacing, Pavement design, Recommendations, Load, Transfer, Bearing capacity, Cracking, Plate bearing test, Deflectograph, Recycling, Bituminous mixture

Acc nr.: VTI 2002.0705 Id: 126344

Ref.: 38

Förbättring av vägar genom stabilisering med bitumenemulsion, skummat bitumen och cement: uppföljning av två objekt i D- och U-län

Jacobson, Torbjörn; Hornwall, Fredrik

<http://www.vti.se/sv/publikationer/pdf/forbattrring-av-vagar-genom-stabilisering-med-bitumenemulsion-skummat-bitumen-och-cement--uppfoljning-av-tva-objekt-i-d--och-u-lan.pdf>

Kalla markinblandningsmetoder har en stark miljö- och återvinningsprofil. Materialet behöver inte värmas, befintliga material tas till vara och slipper mellanlagras, transportbehovet av nya vägmateriäl är litet och tekniken passar bra för objekt långt från asfaltverk. En förutsättning för ett bra resultat är att befintligt stenmaterial har en någorlunda lämplig och homogen sammansättning. I samband med förbättring och förstärkning av två vägar inom Region Mälardalen utfördes provvägsförsök med inblandning av skummat bitumen i det ena fallet och kombinationen av emulsion och cement eller enbart emulsion i det andra fallet. Vid åtgärderna användes moderna djupfräsar (två olika) med bra styrutrustning för bindemedelsspridning och nivåjustering. Basbitumenet utgjordes av kvalitet 330/430 enligt specifikationerna i ATB VÄG. I viss utsträckning inblandades också makadam.

Statens väg- och transportforskningsinstitut. VTI notat 29-2001

Utgivningsort: Linköping

Upplaga:

År: 2001

Index terms: Swedish, Sweden, Roadbase stabilization, Stability, Improvement, Surfacing, Bitumen, Emulsion, Cement, Foamed bitumen, Follow up study, Visual inspection, Deflectograph, Transverse profile, Boring

Acc nr.: VTI P5000:2001-29 Id: 120730

Ref.: 39

Some characteristics of foamed bitumen mixes

Nataatmadja, Andreas

<http://trrjournalonline.trb.org/loi/trr>

A study was conducted at the School of Engineering of Griffith University on characterization of a range of foamed bitumen stabilized mixes in the laboratory. Marshall and servo-controlled gyratory compactors were used in specimen preparation. A closed-loop, servo-controlled dynamic loading system was utilized to determine the resilient modulus. It was found that the Marshall compaction method produced higher resilient modulus values compared with the gyratory compaction method. Moreover, Marshall compaction showed an optimum bitumen content associated with the maximum density. The gyratory compactor produced specimens that were less dependent on bitumen content but had higher density values. The temperature used to cure the specimens was also examined. An accelerated curing temperature of 60 deg C was found to be too high, resulting in an overestimation of the resilient modulus compared with specimens cured at an ambient temperature. Furthermore, the resilience test results also showed that the resilient modulus was significantly affected by the applied strain; with higher strain, a lower modulus resulted. Because of its relatively low bitumen content and use of lime additive, the resilient modulus of foamed bitumen mixes is affected by temperature variation less than that of typical hot-mix asphalt concrete mixes.

Transportation Research Record

Upplaga:

År: 2001

Index terms: English, USA, Bituminous mixture, Foamed bitumen, Compaction, Method, Laboratory, Marshall, Gyratory compactor, Modulus of elasticity, Density, Bitumen content, Temperature, Variability

Acc nr.: VTI P8167:1767 Id: 132133

Ref.: 40

Förbättring av vägar genom stabilisering/remixing: D677, Bie-Flodafors (skummat bitumen), U256, Norberg-Sala (bitumenemulsion + cement). Lägesrapport 1999/2000

Jacobson, Torbjörn; Hornwall, Fredrik

Statens väg- och transportforskningsinstitut. VTI notat

VTI notat 47-2000

Utgivningsort: Linköping

Upplaga:

År: 2000

Index terms: Swedish, Sweden, Remixing, Foamed bitumen, Bitumen, Emulsion, Cement, Roadbase stabilization, Recycling, Cold in situ recycling, Construction method, Test, Laboratory, Measurement, Evenness, Rutting, Bearing capacity

Acc nr.: VTI P5000:2000-47 Ref Id: 117403



Ref.: 41

Design guide and specification for structural maintenance of highway pavements by cold in-situ recycling

Milton, LJ; Earland, MG

Transport Research Laboratory. TRL report 386

Utgivningsort: Crowthorne

Upplaga:

År: 1999

Index terms: English, Cold in situ recycling, Aggregate, Specification, Pavement design, Surveillance, Durability, Binder, Bituminous materials, Cement, Surfacing, Repair, Highway, Mehtod, In situ, Foamed bitumen, Recycling, United Kingdom

Acc nr.: VTI P4040:386 Id: 111364

Ref.: 42

Full-depth reclamation process

Kearney, Edward J; Huffman, John E

<http://trrjournalonline.trb.org/loi/trr>

Many roads and streets fail structurally after having performed well for several years. The standby treatment of a hot-mix overlay does not address the real problem with most of these roads— inadequate roadbase strength. Public agencies throughout the United States are making full-depth reclamation (FDR) one of the most popular pavement rehabilitation methods. The FDR process allows complete reconstruction using 100% of the existing pavement materials, while correcting grade, cross slope, and underlying pavement problems. In FDR, a new base is produced by pulverizing the existing asphalt pavement and mixing it with some of the underlying granular materials. Additional structural strength can be achieved by incorporating new crushed aggregates, asphalt emulsion, foamed asphalt, and chemical stabilizers. Laboratory testing of the reclaimed asphalt pavement (RAP), the subgrade soils, and a mixture of the two will determine whether an additive is needed. The RAP testing should include an extraction for asphalt content and an aggregate sieve analysis. For soils, the minimum testing would include a sieve analysis, sand equivalent, liquid limit, plastic limit, and plasticity index. Guidelines for selecting stabilizers on the basis of these test results are included. Additional strength tests on the stabilized materials can be used in structural design of the pavement. A thorough project evaluation is essential to ensure success. This includes a pavement condition survey, a traffic study, and structural design, in addition to the testing. Proper construction procedures and quality control plus an experienced contractor are necessary.

Transportation Research Record

Upplaga:

År: 1999

Index terms: English, USA

Acc nr.: VTI P8167:1684 Id: 123497

Ref.: 43

Durable and safe road pavements. IV international conference. Kielce, 5-6 May 1998. Proceedings to the sessions I and II: Materials for road pavement construction. Proceedings for the sessions III and IV: Pavement construction, rehabilitation and maintenance techniques

Road and Bridge Research Institute

Utgivningsort: Warszawa

Upplaga:

År: 1998

ISBN: 83-907304-5-6

Index terms: English, Polish, Bituminous mixture, Pavement design, Conference, Material, Permeability, Durability, Fatigue, Deformation, Cracking, Modified bitumen, Foamed bitumen, Recycling, Tyre, Poland

Acc nr.: VTI 98.0689:1 Id: 103816

Ref.: 44

Bitumistabiloidun massan ominaisuudet ja testausmenetelmät (Characteristics and testing methods of bitumen stabilised paving mixtures)

Peltonen, Petri; Laaksonen, Rainer

Tielaitos. Tielaitoksen selvityksiä 12/1998.

(Vägverket. Vägverkets utredningar)

Utgivningsort: Helsingfors

Upplaga:

År: 1998

Index terms: Finnish, Finland, Mix design, Bituminous mixture, Filler bitumen mixture, Curing, Particle size distribution, Gravel, Aggregate, **Foamed bitumen**, Emulsion, Test method, Modulus of elasticity, Deformation, Fatigue, Stress, Compaction, Stiffness, Measurement

Acc nr.: VTI P3021:98-12 Id: 103976

Ref.: 45

Stabilisering med skummad bitumen väg D677, Bie - Flodafors, Södermanland

Jacobson, Torbjörn; Hornwall, Fredrik

Statens väg- och transportforskningsinstitut. VTI notat

VTI notat 85-1998

Utgivningsort: Linköping

Upplaga:

År: 1998

Index terms: Swedish, Foamed bitumen, Bituminous mixture, Roadbase stabilization, Stability, In situ, Strengthening, Construction method, Evenness, Deflection, Particle size distribution, Binder content, Sweden

Acc nr.: VTI P5000:98-85 Ref Id: 108584

Ref.: 46

Feltforsök skumgrus som slitelag, rv 358 Gautefall august 1997

Jørgensen, Torbjörn

Statens vegvesen. Veglaboratoriet.

Intern rapport 2011

Utgivningsort: Oslo

Upplaga:

År: 1998

Index terms: Norwegian, Norway, Foamed bitumen, Cold coated material, Construction, Laying, Water content, Binder, Penetration, Viscosity, Particle size distribution, Density, Mix design

Acc nr.: VTI P0384:2011 Id: 125552

Ref.: 47

Rehabilitation of roads and motorways. Papers of the XXIII international road conference, Pärnu, Estonia 25-27 August, 1997.

The Baltic Road Council.

International Road Federation, IRF

Estonian Road Administration.

Latvian Road Administration.

Lithuanian Road Administration

Utgivningsort: uo

Upplaga:

År: 1997

Index terms: English, Highway, Repair, Conference, Bituminous mixture, Binder, Foamed bitumen, Recycling, Remixing, Repaving, Deterioration, Freight transport, Policy, Road network, PMS, Data bank, Technology, Maintenance, Paint, Estonia, Latvia, Lithuania

Acc nr.: VTI 97.1595 Id: 101225

Ref.: 48

Baerelag av skum- og emulsjonsgrus

Myre, Jostein

Statens Vegvesen. Veglaboratoriet.

Intern rapport 1673

Utgivningsort: Oslo

Upplaga:

År: 1994

Index terms: Norwegian, Norway, Bituminous mixture, Roadbase, Gravel, Foamed bitumen, Emulsion, Mix design, Modulus of elasticity, Deflectograph, Rutting, Roadbase stabilization

Acc nr.: VTI P0384:1673 Id: 88642



Ref.: 49

Bitumistabilointi (Bitumen stabilization)

Kuskelin, Arto et al

Tielaitos.

Tielaitoksen selvityksiä 25/1994.

(Vägverket. Vägverkets utredningar)

Utgivningsort: Helsingfors

Upplaga:

År: 1994

Index terms: Finnish, Bitumen, Method, Emulsion, Foamed bitumen, Mix design, Structure, Roadbase stabilization, Recycling, Finland

Acc nr.: VTI P3021:94-25 Id: 92407

Ref.: 50

Förstärkning av lågtrafikerade vägar genom inblandning av bituminösa bindemedel: Provvägar och laboratorieprovning. Huvudrapport

Jacobson, Torbjörn

Statens Väg- och Trafikinstitut. VTI meddelande

VTI meddelande 666

Utgivningsort: Linköping

Upplaga:

År: 1991

Index terms: Swedish, Strengthening, Roadbase stabilization, Low traffic road, Emulsion, Foam, Bitumen, Binder content, Mix design, Cement, Coarse aggregate, Crushed aggregate, Sweden, Mixing, Method, Bearing capacity, Rutting, Follow up study, In situ, Moisture content, Frost, Sensitivity, Modulus of elasticity, Tension, Strength, Laboratory, Construction method

Acc nr.: VTI P1690:666

VV P1690:666

; Ref Id: 71811

Ref.: 51

Oppsummering av erfaringer med bruk av kald bitumenstabilisering (bitumenemulsjon, skumbitumen) i baerelag

Asfaltindustriens Laboratorium.

AIL.

Intern rapport 4:1989

Utgivningsort: Hövik

Upplaga:

År: 1989

Index terms: Norwegian, Norway, Cold coated material, Binder, Emulsion, Expanded material, Mixer, In situ, Method, State of the art report

Acc nr.: VTI P0379:89-04 Id: 62201

Ref.: 52

Bituminous binders - Nordic overview

Ruud, Olav E

Statens Väg- och Trafikinstitut. VTI rapport

VTI rapport

Upplaga:

År: 1988

Index terms: English, Sweden, Bituminous materials, Conference, Binder, Cut back bitumen, Oil, Emulsion, Gravel, **Foam**

Acc nr.: VTI P0654:329A

SVT P0654:329A Id: 59846

Ref.: 53

Structural response of foamed-asphalt-sand mixtures in hot environments

Bissada, Amir F

Transportation Research Record

Upplaga:

År: 1987

Index terms: English, Foam, Bituminous mixture, Sand, Aggregate, Mix design, High, Temperature, Laboratory, Test, USA

Acc nr.: VTI P8167:1115 Id: 61173

Ref.: 54

Bitumenstabilisering av grusbaerelag

Dörum, S; Wold, R

Statens Vegvesen. Veglaboratoriet.

Intern rapport 1271

Utgivningsort: Oslo

Upplaga:

År: 1986

Index terms: Norwegian, Gravel, Roadbase, Frost, Sensitivity, Soil stabilization, Bitumen, Emulsion, Expanded material, Norway

Acc nr.: VTI P0384:1271 Id: 56674

Ref.: 55

Use of foamed asphalt in cold, recycled mixtures

Tahmoressi, Maghsoud; Engelbrecht, Johann C; Kennedy, Thomas W

US Department of Transportation.

Texas of Austin University.

Center for Transportation Research

Utgivningsort: Washington DC

Upplaga:

År: 1986

Index terms: English, Recycling, Emulsion, Cut back bitumen, Tension, Strength, Hveem, Stability, Modulus of elasticity, Expanded material, Bitumen, USA, Salvage

Acc nr.: VTI 88.0850 Id: 57490

Ref.: 56

Chemcrete-modifisert asfalt: Supplement til intern rapport nr 1105

Wold, R

Statens Vegvesen. Veglaboratoriet. Intern rapport 1217

Utgivningsort: Oslo

Upplaga:

År: 1985

Index terms: Norwegian, Norway, Bituminous materials, Binder, Stability, Additive, In situ, Laboratory, Voids, Foam asphalt, Modification

Acc nr.: VTI P0384:1217 Id: 43290



Ref.: 57

Asfaltkonferanse, Asker 6.-7. november 1984

Statens Vegvesen. Veglaboratoriet. Intern rapport 1207

Utgivningsort: Oslo

Upplaga:

År: 1985

Index terms: Norwegian, Recycling, Foam asphalt, Axle load, Cost, Development, Roadbase, Reinforcement, Tyre, Pressure, Norway, Conference, Stability, Bituminous materials

Acc nr.: VTI P0384:1207 Id: 43353

Ref.: 58

Field evaluation of foamed asphalt binder in an aggregate bituminous base course

Knight, Norman

Pennsylvania Department of Transportation. -

Bureau of Bridge & Roadway Technology. RP 81-14

Utgivningsort: Harrisburg, PA

Upplaga:

År: 1985

Index terms: English, Roadbase, Emulsion, Bituminous materials, Binder, Performance, Evaluation, Properties, Core, Aggregate, Pavement design, USA

Acc nr.: VTI 86.0183 Id: 47090

Ref.: 59

Structural comparison of two cold recycled pavement layers

Wijk, AJ van

Transportation Research Record

Upplaga:

År: 1984

Index terms: English, USA, SVT, Recycling, Emulsion, Foam, Bitumen, Cold, Elasticity modulus, Marshall, Hveem, Deflection

Acc nr.: VTI P8167:954; SVT P8167:954 Id: 44483

Ref.: 60

Evaluation of recycled mixtures using foamed asphalt

Roberts, Freddy L; Engelbrecht, Johann C; Kennedy, Thomas W

Transportation Research Record

Upplaga:

År: 1984

Index terms: English, Foam, Bituminous mixture, Recycling, Evaluation, Bitumen, Cut back bitumen, Strength, Hweem, USA, Voids ratio

Acc nr.: VTI P8167:968 Id: 50169

Ref.: 61

The use of foamed asphalt in bituminous stabilization of base and subbase materials and recycled pavement layers (Draft final report)

Wood, LE; Altschaeffl, AG; Cravens Beaudoin, CM; Castedo, LH

Purdue University

Joint Highway Research Project. Report 84-5

Utgivningsort: West Lafayette IN

Upplaga:

År: 1984

Index terms: English, Foam, Bituminous mixture, Mix design, Durability, Water, Sensitivity, Additive, Freezing thawing cycle, Bearing capacity, Roadbase stabilization, USA, Layer, Aggregate, Recycling, Test

Acc nr.: VTI 87.0042 Id: 51304

Ref.: 62

Design and performance study of sand bases treated with foamed asphalt

Acott, SM; Myburgh, PA

Transportation Research Record

Upplaga:

År: 1983

Index terms: English, SVT, Low cost road, Foam, Sand, Bituminous materials, Durability, Roadbase stabilization, Mix design, USA, Conference

Acc nr.: VTI P8167:898; SVT P8167:898 Id: 39366

Ref.: 63

Use of asphalt emulsion and foamed asphalt in cold-recycled asphalt paving mixtures

Mang Tia; Wood, LE

Transportation Research Record

Upplaga:

År: 1983

Index terms: English, SVT, Low cost road, Bituminous materials, Recycling, Emulsion, Cold, Properties, Performance, Evaluation, Test method, USA, Conference, Calculation, Foam

Acc nr.: VTI P8167:898; SVT P8167:898 Id: 39370

Ref.: 64

Laboratory investigation of the use of foamed asphalt for recycled bituminous pavements

Brennen, M; Tia, M; Altschaeffl, A; Wood, LE

Transportation Research Record

Upplaga:

År: 1983

Index terms: English, USA, SVT, Recycling, Flexible pavement, Asphalt, Foam, Laboratory, Properties, Marshall, Test method

Acc nr.: VTI P8167:911; SVT P8167:911 Id: 40865



Ref.: 65

**Foamed-asphalt** paving mixtures: Preparation of design mixes and treatment of test specimens

Ruckel, PJ; Acott, SM; Bowering, RH

Transportation Research Record

Upplaga:

År: 1983

Index terms: English, USA, SVT, **Foam**, Bituminous mixture, Test specimen, Mix design, Aggregate, Evaluation, Laboratory

Acc nr.: VTI P8167:911; SVT P8167:911 Id: 40866

Ref.: 66

Use of foamed asphalt in recycling of an asphalt pavement

Wijk, A van; Wood, LE

Transportation Research Record

Upplaga:

År: 1983

Index terms: English, USA, SVT, Flexible pavement, Recycling, Foam, Asphalt, Construction method, Maintenance, Test road, Cold, Mix design

Acc nr.: VTI P8167:911; SVT P8167:911 Id: 40867

Ref.: 67

Structural properties of laboratory mixtures containing foamed asphalt and marginal aggregates

Little, DN; Button, JW; Epps, JA

Transportation Research Record

Upplaga:

År: 1983

Index terms: English, USA, SVT, Particle size distribution, Asphalt, Foam, Fine, Aggregate, Laboratory, Sand, Silt, Fatigue, Test method, Properties, Thickness, Layer, Quality

Acc nr.: VTI P8167:911; SVT P8167:911 Id: 40868

Ref.: 68

Field evaluation of foamed asphalt binder in aggregate bituminous base course and surface course.  
Construction report

Knight, Norman E; Hoffman, Gary L

Pennsylvania Department of Transportation.

Materials and Testing Division

Utgivningsort: Harrisburg, PA

Upplaga:

År: 1983

Index terms: English, Bituminous mixture, Foamed bitumen, Binder, Aggregate, Basecourse, Performance, In situ, Mix design, Marshall, Moisture content, USA

Acc nr.: VTI 94.0814 Id: 84742

Ref.: 69

Characterization of cold-recycled asphalt mixtures

Mang Tia

Purdue University. Joint highway research project FHWA-IN-JHRP-82-5

Utgivningsort: West Lafayette, IN

Upplaga:

År: 1982

Index terms: English, Recycling, Bituminous mixture, Emulsion, Foam, Bitumen, Additive, Marshall, Hveem, Elasticity modulus, Mix design, USA, Recommendations

Acc nr.: VTI 83.0866 Id: 38058

Ref.: 70

Use of in situ foamed asphalt in Michigan

Mosey, J; Welke, RA

Transportation Research Board, Annual Meeting 1982. Preprint

Upplaga:

År: 1982

Index terms: English, Bituminous mixture, Foam, In situ, Test, Mixing, USA

Acc nr.: VTI 61.849 Id: 38800

Ref.: 71

Stabilization of three typical Indiana aggregates using foamed asphalt

Castedo Franco, LH; Shofstall, RL

Purdue University. Joint highway research project FHWA-IN-JHRP-81-19

Utgivningsort: West Lafayette, IN

Upplaga:

År: 1981

Index terms: English, Foam, Bitumen, Aggregate, Hveem, Marshall, Elasticity modulus, Mix design, USA

Acc nr.: VTI 83.0867 Id: 38057

Ref.: 72

Laboratory investigation on the use of foamed asphalt for recycled bituminous pavements

Brennan, M

Purdue University. Joint highway research project. FHWA-IN-JHRP-81-5

Utgivningsort: West Lafayette, IN

Upplaga:

År: 1981

Index terms: English, Foam, Bitumen, Water, Mixing, Recycling, Bituminous mixture, Marshall, Hveem, USA

Acc nr.: VTI 83.0868 Id: 38136



Ref.: 73

Asphalt pavement construction: New materials and techniques: A symposium, San Diego, Calif., 12 Dec. 1979

ASTM special technical publication 724

Utgivningsort: Philadelphia, PA

Upplaga:

År: 1980

Index terms: English, Bitumen, Rubber, Sealing coat, Surface dressing, Multilayer, Aggregate, Sulphur, By product, **Foam**, United States, Carbon, Mix design, Strengthening, Conference

Acc nr.: VTI P4888:724 Id: 37860

Ref.: 74

Många decibel bilbuller kan sparas genom tilläggsisolering

Motorbranschen

Upplaga:

År: 1979

Index terms: Sound, Prevention, Car, Bitumen, Foam, Plastic material, Swedish

Acc nr.: VTI 61.068 Id: 14390

Ref.: 75

Base stabilization with foamed asphalt

Abel, F; Hines, CR

Colorado Division of Highways. Materials Laboratory

Utgivningsort: Denver, CO

Upplaga:

År: 1979

Index terms: English, Deflection, Foam, Bituminous mixture, Water, Strength (mater), Test method, Aggregate, USA

Acc nr.: VTI 83.0749 Id: 37442

Ref.: 76

Forest Service geotechnical workshop, August 14-17, Ames, Iowa. Proceedings. Vol 1-2

USDA, Forest service

Utgivningsort: Washington DC

Upplaga:

År: 1979

Index terms: English, Soil mechanics, Low traffic road, Gravel road, Dust, Control, Subgrade, Moisture, Density, Foundation, Petrography, Conference, Aggregate, Foamed bitumen, Landslide, Retaining wall, Bituminous mixture, Pavement design, Strengthening, Deterioration, Geotextile, USA

Acc nr.: VTI 98.0594:1-2 Id: 102876

Ref.: 77

**FOAMIX asphalt**: An alternative mixing method

Ruckel, PJ

Kansas asphalt paving conference, 22. Kansas 1978

Upplaga:

År: 1978

Index terms: English, Conference, Bitumen, **Foam**, Water, Mixing, USA

Acc nr.: VTI 61.805 Id: 38091

Ref.: 78

Performance of newly constructed full-depth foamed bitumen/crushed rock pavements

Bowering, RH; Martin, CL

ARRB Proceedings. Vol 8, session 19

Upplaga:

År: 1976

Index terms: Roadbase, Foam, Stress (in material), Deformation, Measurement, Bituminous mixture, Thickness, Crushed stone

Acc nr.: VTI P0528 Id: 5986

Ref.: 79

Soil stabilization by means of foamed asphalt

Engelke, IW

Quinquen Regional Convention 5. Paper

Upplaga:

År: 1976

Index terms: English, Conference, Bituminous materials, Soil stabilization, Foam, Properties, Test method, Mixing, South Africa

Acc nr.: VTI 61.874 Id: 39286

Ref.: 80

Les enduits superficiels: Journees d'information. Lille 19-21 novembre 1974

Ministere de l'Equipement. 0458-5860

Laboratoires des Ponts et Chaussees.

Bulletin de liaison.

Special

Utgivningsort: Paris

Upplaga:

År: 1975

Index terms: French, Surface dressing, Aggregate, Lightweight, Expanded clay, Shale, Expanded material, Binder, Bitumen, Tar mixture, Polymerization, France, Admixture, Artificial, Mix design, Construction machinery, Laying, Properties

Acc nr.: VTI 97.1183 Id: 99452



Ref.: 81

Plant setup for foamed asphalt

Construction Canada

Upplaga:

År: 1964

Index terms: English, Canada, Mixing plant, Foam, Bitumen, Design

Acc nr.: VTI 62.0131 Id: 29311

Ref.: 82

Treating marginal aggregates and soils with foamed asphalt

Lee, DY

Iowa State University

Upplaga:

År: uå, s 211-50

Index terms: English, USA, Laboratory, Stability, In situ, Foam, Recycling, Bitumen, Test method, Local materials, Properties, Soil, Compaction, Aggregate, Marshall, Cold, Bituminous mixture, Water content, Production, Moisture content

Acc nr.: VTI 62.0121 Id: 42642

Ref.: 83

Foamed asphalt in low-cost and energy saving construction

Lee, DY

Iowa State University

Upplaga:

År: uå, s 587-603

Index terms: English, USA, Foam, Bitumen, Properties, Cold, Water content, Moisture content, Aggregate, Soil, Stability, Test method

Acc nr.: VTI 62.0122 Id: 42643

Ref.: 84

Evaluation and prevention of water damage to asphalt pavement materials

American Society for Testing and Materials.

ASTM special technical publication 899

Utgivningsort: Philadelphia, PA

Upplaga:

År: uå, 154 s

Index terms: English, Standard specification, Flexible pavement, Prevention, Damage, Water, Material, Evaluation, Moisture, Stripping, Performance, USA, Bituminous mixture, Freezing thawing cycle, Admixture, Efficiency, Foam, Lime, Strength, Binder, Bitumen

Acc nr.: VTI P4888:899 Id: 52458