

Engineering Brief # 41

October 19, 1989

Subject: INFORMATION: Engineering Brief No. 41,
Salviacim Paving Process

FROM: Manager, Engineering and Specifications Division, AAS-200
TO: All Regions

Attn: Manager, Airports Division

Engineering Brief No. 41 furnishes information on a new paving process known as Salviacim.

The information contained in this brief is not to be construed as general approval by the Office of Airport Standards. Use of this product will be on a case-by-case basis and will require prior approval by this office.

Any comments you care to offer will be appreciated.

ORIGINAL SIGNED BY
ROBERT BATES
Robert Bates

Attachment

ENGINEERING BRIEF NO. 41

Salviacim Paving Process

GENERAL

Salviacim is a semi-rigid surfacing process consisting of an open-graded asphalt concrete filled with a special resin-modified cement grout. The jointless wearing surface is approximately 1 1/2 inches thick and may be applied to an existing asphalt or concrete pavement. We envision the primary use of Salviacim will be on asphaltic concrete surfaces to provide protection against fuel spillage and resistance to abrasion and rutting.

Salviacim has been applied to various types of pavements in France and England over the past 15 years. These include a parking lot for heavy trucks, an apron at a commercial airport, and maintenance and staging areas for tanks. Based on information to date, Salviacim pavement can withstand abrasive action from tracked vehicles, heavy point loads, and pavement deterioration from fuel spills.

MATERIALS AND CONSTRUCTION

The open-graded asphalt concrete mixture is similar to a porous friction course and is placed using standard paving techniques. There is no mix design procedure used to determine the optimum asphalt content. The aggregate gradation band used is based on

field experience and combined with an asphalt content of about 4 percent will produce a mixture with 20-25 percent voids. The air voids content is critical since the grout cannot penetrate the mix if sufficient voids are not present.

When the in-place mix has cooled down a grout is introduced into the voids. The grout is composed of cement, sand, mineral filler, water, and Prosalvia L7 (a proprietary material), which is poured onto the open-graded mixture, squeegeed over the surface, and vibrated into the voids with a small vibratory roller. Excess grout is then removed to achieve a slight exposure of the surface aggregates.

CONCLUSIONS

however several

Salviacim appears to be a viable paving process, however several areas require additional investigation prior to its acceptance as a Standard paving technique. These include:

Performance under various climatic conditions i.e.,
freeze-thaw cycles

Material specifications

Mix design for grout

Standardization of laboratory tests for mix design and
acceptance testing

Construction procedures

Use of proprietary material

Based on field performance in Europe during the past 10-15 years we believe that the Salviacim process has some application for airport pavements. For example, apron areas that have been damaged due to fuel spillage can be milled and replaced with Salviacim, inch-for-inch, thereby maintaining grade and pavement strength.

Salviacim may be specified for use on apron pavements on a case by case basis. When this process is specified in a project, the engineer must furnish evidence to show that equal or better performance can be achieved than with conventional methods, commensurate with any increase in costs. Approval for each project will be required by the Office of Airport Standards so that we will be aware of the locations where Salviacim has been used and can monitor and evaluate its performance.

Attached, for your information, is a specification for Salviacim Wearing Course provided to this office by the supplier.

ORIGINAL SIGNED BY
RICHARD J. WORCH

Richard J. Worch
Civil Engineer

SPECIFICATIONS

SALVIACIM WEARING COURSE

SCOPE:

This work will consist of the construction of one course of hot-mixed, hot-laid bituminous open grade mixture compacted and then percolated with a special hydraulic grout, on a bituminous base course on all the zones of heavy duty asphalt and test areas as shown on the drawings.

I. DESCRIPTION OF THE PROCESS

The SALVIACIM is a semi-rigid surfacing process consisting of a hot mixed, hot laid open graded asphalt support coat filled with a special resin-modified cement grout.

II. ASPHALTIC OPEN-GRADE CONCRETE

This work will consist of aggregate and bituminous material mixed in a central plant and compacted on a bituminous base course.

II. MATERIALS

Aggregates

a) Coarse Aggregates.

The coarse aggregates will be clean, hard, durable, sound and free from organic matter, it will meet the following requirements:

- The percentage of crushed particles (one fractured face) will be 90% minimum.
- The percentage of flat and elongated pieces will be less than 10%.
- When coated with asphalt, will pass a stripping test in accordance with AASHO T 182.

b) Fine Aggregates.

The fine aggregates will comply with the following:

- The ratio of crushed sand over total fine aggregates will be bigger than 75%.

c) The combined mineral aggregates will meet the following quantity requirements:

- Loss by Abrasion Test - Los Angeles (AASHO T 96)
= 35 max.

- Sand equivalent (AASHO T 176) determined after all processing except for addition of Asphalt binder = 45 min.

- Plasticity index = 3 max.

II.A-2 BITUMEN

The asphalt cement will be of grade 60-70 conforming to the requirements of the Ministry of Communications section 4.04 paragraph B-2.

II.BJOB MIX

The job mix formula will combine the mineral aggregates and the asphalt in such proportions as to produce a mixture having a grading falling within the following limits which will ensure to the mixture a percentage of void between 15 and 23% :

AASHO Sieve Size	% by weight passing sieve
3/4"	100
1/2"	70 - 95
3/8"	55 - 80
#4	13 - 30
#10	5 - 18
#50	3 - 10
#200	2 - 5

When compared to the job-mix formula, the produced final mix will have the following tolerances:

AASHO # 50 and larger + 5%
200 + 1.5%
Asphalt content + 0.3%

The bitumen content of the job mix will be determined according to the french method: "module de richesse" as follows:

% of bitumen = $\alpha \times K \times \sqrt[5]{\epsilon}$
where:

$\alpha = 2.65/\gamma_{sub G}$
 $\gamma_{sub G}$ = apparent gravity of the combined aggregates

K = "module de richesse" having a value of 3 to 3.5
 ϵ = conventional specific surface
= $0.25G + 2.3S + 12s + 135f$

G = percentage of retained on sieve 1/4"

S = percentage of material passing on 1/4" and retained on sieve # 50

s = percentage of material passing on sieve # 50 and retained on sieve # 200

f = percentage of passing on sieve # 200.

II. C TESTING OF THE DAILY PRODUCTION

In order to maintain the production conforming to the job mix formula, the following daily testing will be performed:

1. Quantitative extraction of bitumen from bituminous paving mixture AASHTO T 164.

2. Sieve analysis of the dry mixture (without bitumen) AASHTO T 27.

III. HYDRAULIC CEMENT GROUT

III.A MATERIALS

III.A-1 Water

The water to be used will be clean and will meet the same requirements as for water for concrete:

- Sulphate (SO₄) content
(ASTM D516) = 3000 ppm maximum

- Chloride - Cl content
(ASTM D512 = 1000 ppm maximum

- PH Value
(ASTM D1293) = 4 minimum

III.A-2 Cement

Cement will be sulphate resisting (Type V) cement meeting the requirements of ASTM C150 specifications.

III.A-3 Mineral Filler

The mineral filler to be used will have a plasticity index less than 3.

III.A-4 Fine Sand

The fine sand will have a sand equivalent of 50% minimum and a plasticity index of less than 3.

III.A-5 Synthetic Resin

Special resin: Prosalvia PL7 from Jean Lefebvre will be used. see technical data attached.

III.B JOB-MIX OF THE GROUT

The various components will be mixed in such proportions as

to produce a mixture having suitable percolation quality.

This percolation quality is determined by the Marsh Cone Method.

The maximum viscosity recommended by the Salviacin processholder for good percolation is 12 seconds

The water cement ratio of the mixture will be between 0.60 and 0.85.

When combined, the fine sand and the mineral filler will meet the requirements of the following grading limits:

AASHO Sieve Opening	% of passing by weight
No. 8	100
No. 30	88 - 100
No. 50	70 - 100
No. 100	55 - 90
No. 200	40 - 80

III.C QUALITY CONTROL OF THE GROUT MIXTURE

- 1.The grading of the combined fine sand plus filler will be checked periodically using the sieve analysis method AASHO T 27.
2. The viscosity of the grout will be checked daily using the Marsh Cone Method.
- 3.The quantity of the grout used per square meter will be checked daily. The rate of application of the grout should be 16 to 20 kg per square meter. It will be determined by simple measurement of the quantity of grout (Kg) Poured on the determined are (square meter).
4. The coring of the cured final product will allow to check the depth of the grout percolation. The minimum depth recommended by the Salviacin process holder is 2/3 of the total thickness of the wearing course.