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STUDY OF RECOMPOSITION OF ASPHALT PAVING FOR SANITATION WORKS

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BACKGROUND

- INFRASTRUCTURE LINKED TO ECONOMY;

The paving constitutes the major part of the cost of transport infrastructure of an urban network, representing an asset whose management, maintenance and proper conservation are fundamental for minimizing the expenses involved in transportation.

- CONSERVATION OF THE PAVEMENT;

  The quality control during the process of reconstitution of the pavement is extremely important, as it garantees its characteristics and longer lifetime, thus avoiding rework.

BACKGROUND

- PURPOSE OF THE PAVEMENT;

  Paving a vehicle circulation road is a construction work that tries to, first of all, improves the traffic, in that it is made more regular surface (guaranteeing better comfort when driving the vehicle), a more adherent surface (guaranteeing greater safety in wet track conditions), a less noisy surface due to the dynamic action of the tires (guaranteeing better environmental comfort in urban and rural roads), whatever the physical improvement offered (BALBO, 2007).

- DEFECTS DUE TO INADEQUATE EXECUTION;
- Sinking
- Corrugation
- Exudation

BACKGROUND

PROCESS OF PROPER REPAIR.

a) Repair execution time should be as fast as possible, as any interruption brings risks to users;

b) The area repaired should be as small as possible, avoiding causing inconvenience to those that travel on the road;

c) Color changes on the pavement should be avoided, as well as the use of different materials from the rest of the coating (visual comfort);

d) The remaining surface of the ground must be leveled to avoid an uneven surfaces (comfort hearing).

OBJECTIVES

- To study the paving recomposition in the closure of trenches of sanitation services;
- To analyze the impact on the soil during the opening of the trench;
- To evaluate the recomposition method of the base and sub-base that form the pavement infrastructure.

OBJECTIVES

- To evaluate and compare the allowable tension for the original and to be reconstituted sub-bases
- To analyse the process of asphalt mass production
- To study preparation alternatives for the pavement recomposition, in order to restore it with the same or better quality when compared to the original pavement

METHODS

- Weekly average of open trenches:

Trenches for the services	Number of trenches created per week	Trenches' Depth
Water and sewage network extension	15	Trenches for water network extension: between 0.8 and 0.9 cm; Trenches for sewage network extension: ~1.5 m
Water connection	14	Shallow trenches, between 0.8 and 0.9 cm
Sewage connection	6	Deep trenches, ~1.5 m (varying according to the lot capacity)

Source: Extensão de Rede Águas Guariroba, 2016.

METHODS

Analysis of the impact on the soil during the trench opening:

The “hand test” was utilized for this step

METHODS

Evaluation of the base and sub-base recomposition method:

Supervision of the team.

Evaluation and comparison of the compaction degree of the original pavement and reconstituted trench sub-bases

For this procedure we utilized the penetrometer, an equipment that provides soil penetration resistance values.

METHODS

- Dynamic penetration: insertion of the equipment in the soil by applying body weight to penetrate:

METHODS

STUDYING ALTERNATIVES FOR PAVEMENT RECOMPOSITION

In addition to observation analyzes made during the field work, the proposals for a good recomposition resulted from the analyses of the results regarding the impact on the soil:

1) During the opening of the trench;

2) Evaluating the methods of the base and sub-base recompositions;

3) Evaluating and comparing the compacting degree of the original pavement and reconstituted trench sub-bases;

4) Analyzing the process of asphalt mass production.

RESULTS AND DISCUSSION

- Impact on the soil

Color of the soil when trench was opened

Color of the soil after being exposed for procedures

RESULTS AND DISCUSSION

- Reconstitution of the layers:
  - Sub-base:

  - Base:

RESULTS AND DISCUSSION

- Coating

Primer application

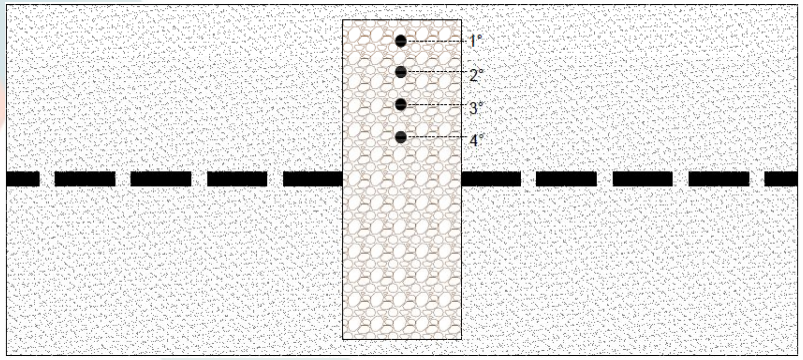
Capping

RESULTS AND DISCUSSION

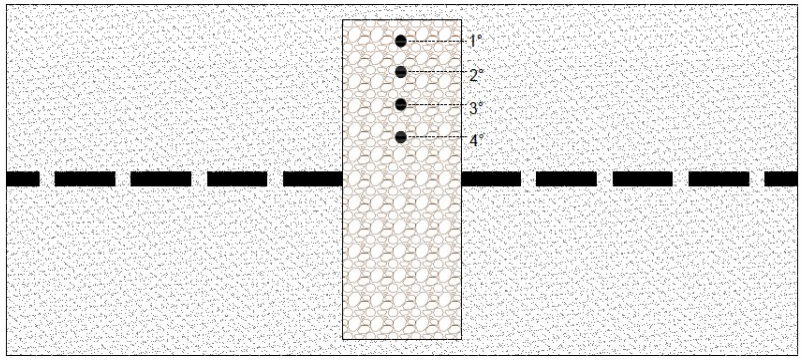
One month after the procedures we observed a flaw: the asphalt mass was 5 mm taller than the original pavement

RESULTS AND DISCUSSION

The essay was performed in the same trench after reoving the pavement layers and the base as well after the compaction of the new sub-base.



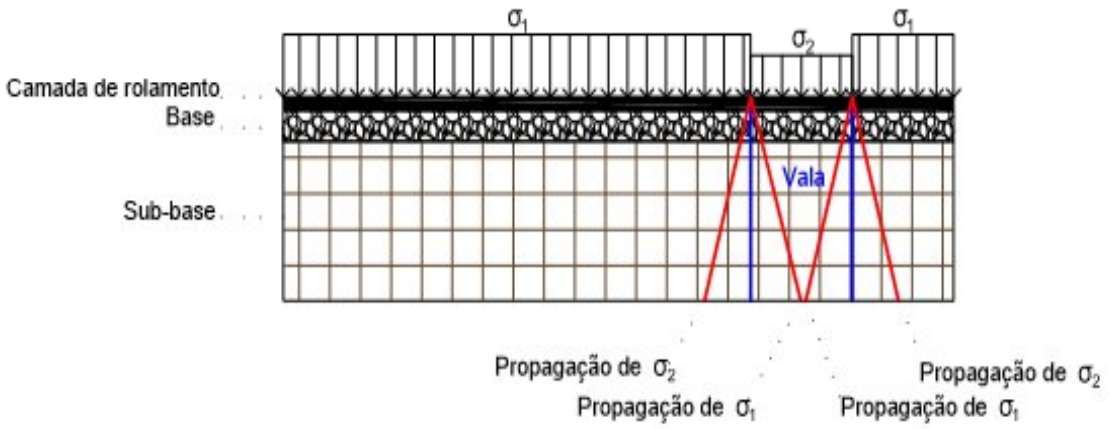
Trench recently opened for performing the essay procedure.



Essay after trench compaction.

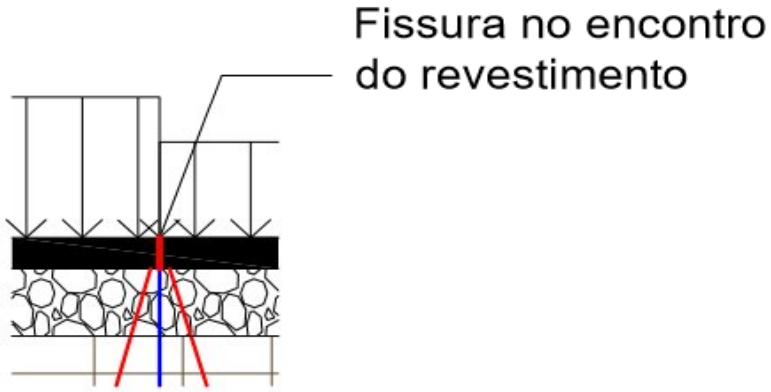
RESULTS AND DISCUSSION

Propagation of tensions generated from the two sub-bases' differences



RESULTS AND DISCUSSION

- Cracking generated by the shear stress



RESULTS AND DISCUSSION

Proposed method for a good pavement recomposition on trenches for sanitation works:

- The trench should be put in place out of the vehicle’s trails, and limited by two guide lines
- The distance between the guide lines should be the width of the trench plus 15 cm on each of the trench’s sides
- The pavement should be cut with clipper saw and excavated with a coffin-shaped backhoe (vertical slope)
- The material found in the trenches should be analyzed
- If the soil meets the requirements, if can be reutilized respecting the storage beside the trench, covered by tarpaulin.

RESULTS AND DISCUSSION

- To start the trench closure, its bottom should be regularized, leveled and compressed.
- In order to avoid shifting of the pipe, coating should be made on both sides simultaneously, and the soild utilized in the coating should be free of rocks.
- The backfill of the trench should be made in 20 cm layers, and compressed with manual tools or tools that allow for a good result.
- A layer of 20 cm of compacted and leveled crusher run should be put in the base. The layer should be 4 to 5 cm below the original coating in order to allow the recomposition of the new coating.
- After compaction, the base’s layer should be homogeneously primed.

RESULTS AND DISCUSSION

- The coating replacement should ideally be done on the same day of the opening of the trench.
- The asphalt mass should be spread with the help of a rake, filling all the spaces.
- The compression should be made with a small propeller roller.
- After the compression procedure is done, the level of the new mass should be the same of the original pavement.
- This verification should be done with the help of a wooden ruler.

CONCLUSION

The process of reconstitution of the sewage connection trench done at the Sandoval Ribeiro Soares street demonstrated flaws on the pavement cutting, on the storage of the soil beside the trench, on the trench’s bottom compression and asphalt mass compression.

Economic aspects and quality standards should be identified beforehand, in addition to appropriate team training and supervision, to avoid flaws and work repetition expenses.

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Thank You!