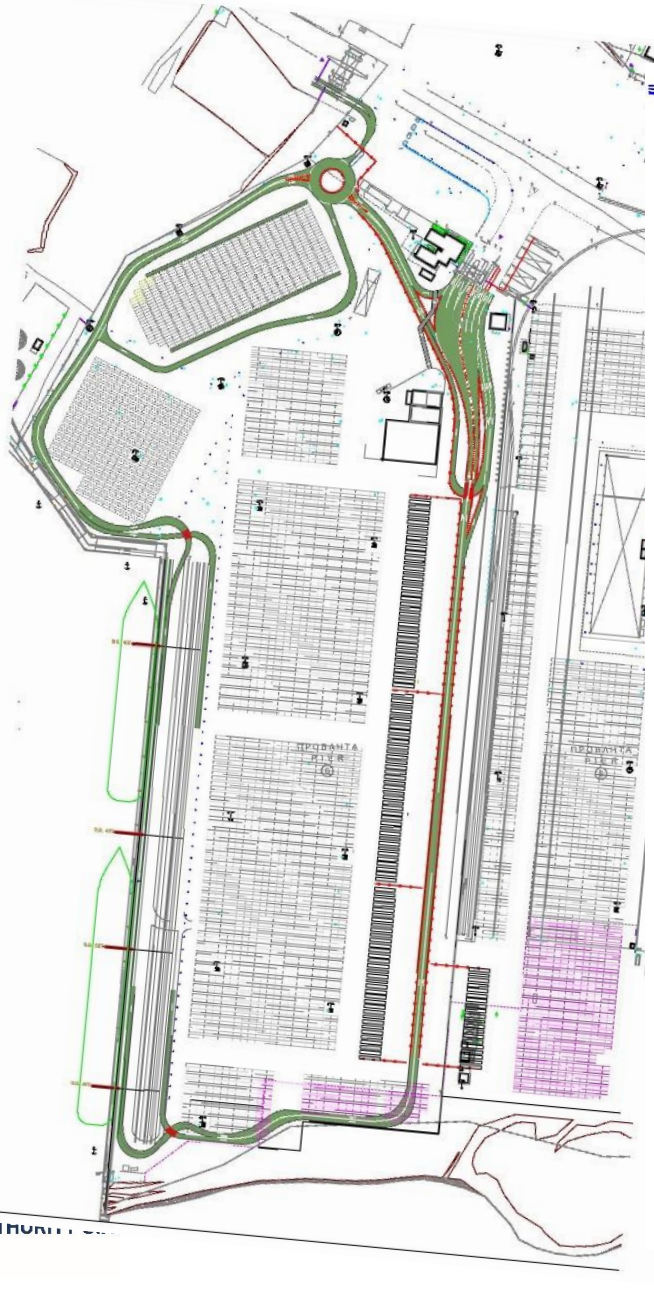
DRACOBIT SYSTEM Coated Areas at the ThPA Container Terminal

November 2022

Thessaloniki Port (ThPA) – Container Terminal

ThPA Container Terminal Layout

Pier 6 - Ground slots design



Pier 6 CT – Ground slots with a google maps background

Typical construction dates of the 6th pier Container Terminal:

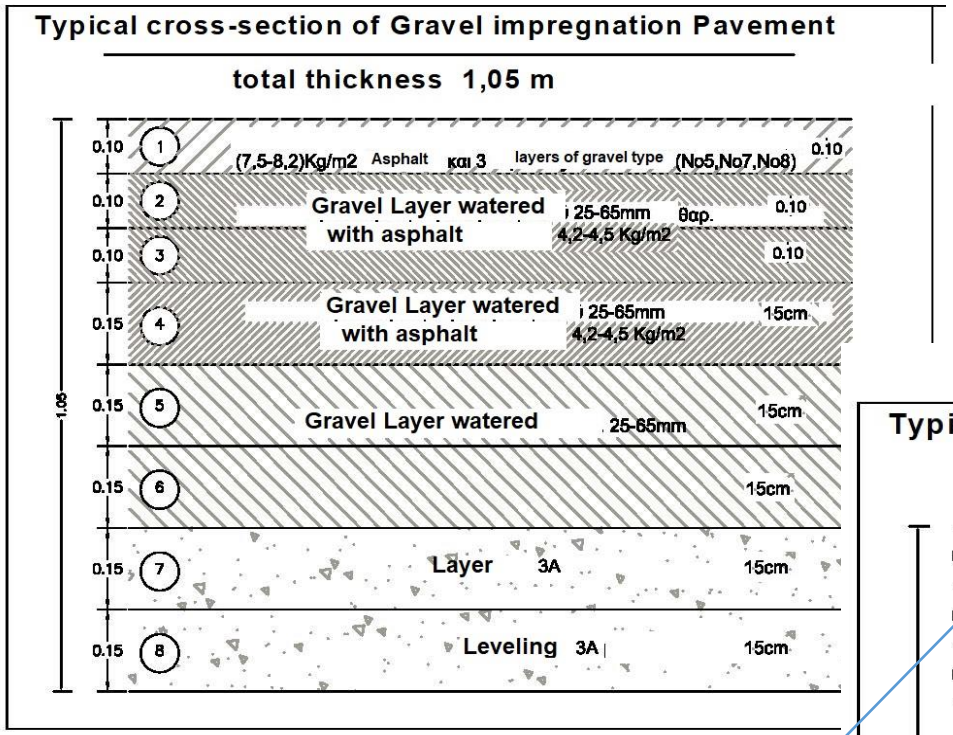
1978 - 1986: The backfilling and embankment of the 6th pier was constructed by gradually advancing from land and embanking to terrain level.

1987 - 1989 : Buildings and service facilities were built for the container terminal.

1987 - 1989 : The pavements of the CT were completed.

1990 + : The Container Terminal at Pier 6 starts operation.

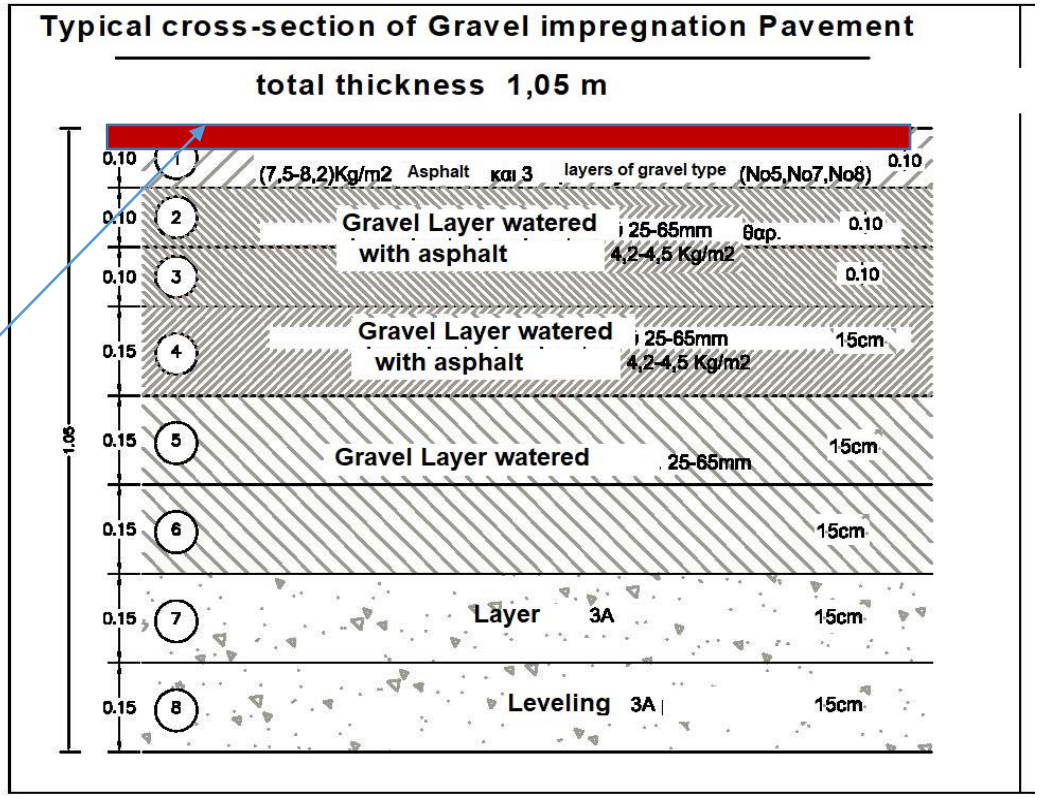
Before DRACOBIT



Pavement section

The pavement has a total thickness of 1.05 m and consists of successive layers of gravel. The 4 top layers have total thickness 0.45 m and were filled with a specific quantity of asphalt (impregnation with asphalt).

After DRACOBIT SYSTEM 5 cm



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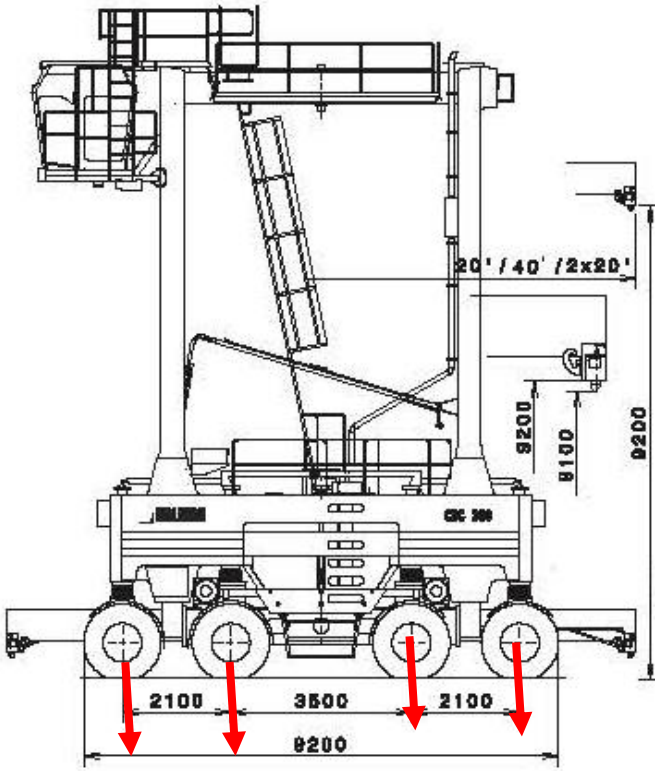
EXISTING ASPHALT SURFACE DECRIPTION

- The existing pavements of the Container terminal were constructed after the consolidation (without preload) of the embankment, before 35 years.
- The type of the pavement is called impregnated gravels.
- It has a total thickness of 1.05 m.
- It consist of successive layers of gravels. There are 4 gravel layers of 15 cm (60 cm) and 4 top layers (45 cm) filled with a specific quantity of asphalt (impregnation with asphalt).
- The estimated lifetime of a pavement, depending on the type is approximately 25-30 years. Already the existing pavement is about 35 years old.

The problems arose because of aging issues and the Straddle Carriers traffic over this period.

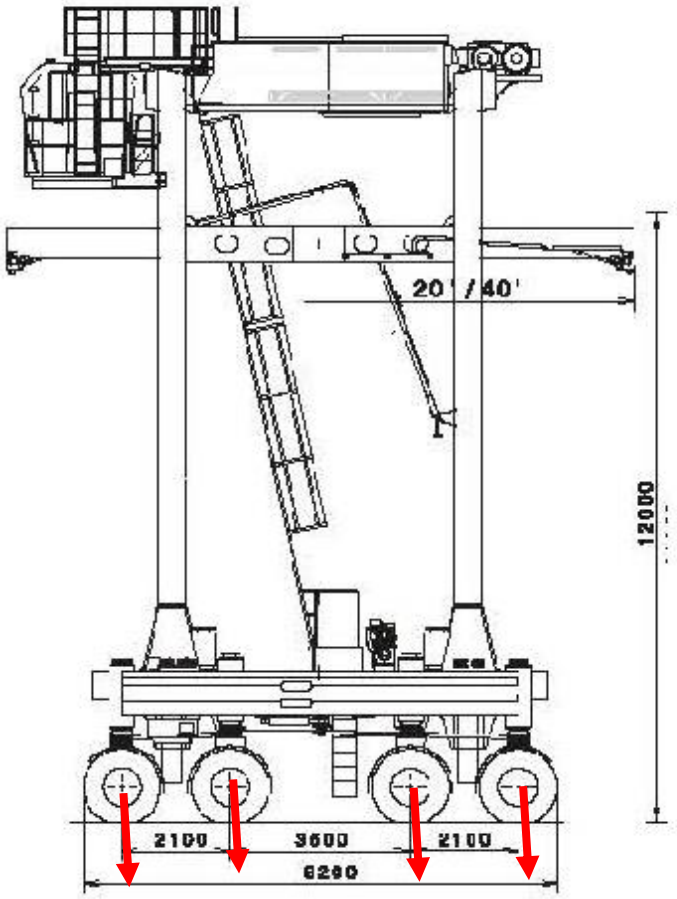
Container Terminal - Straddle Carrier Operated

Straddle Carrier 1 over 2



Max Wheel load
14,6 ton/wheel
Max weight = 116,8 t

Straddle Carrier 1 over 3



Max Wheel load
15 ton/wheel
Max weight = 120 t

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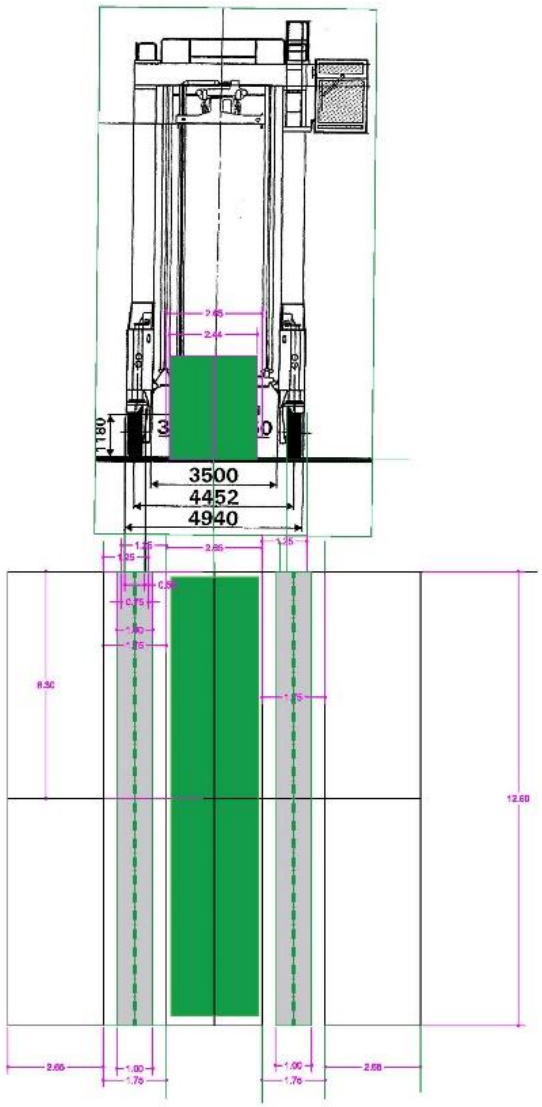
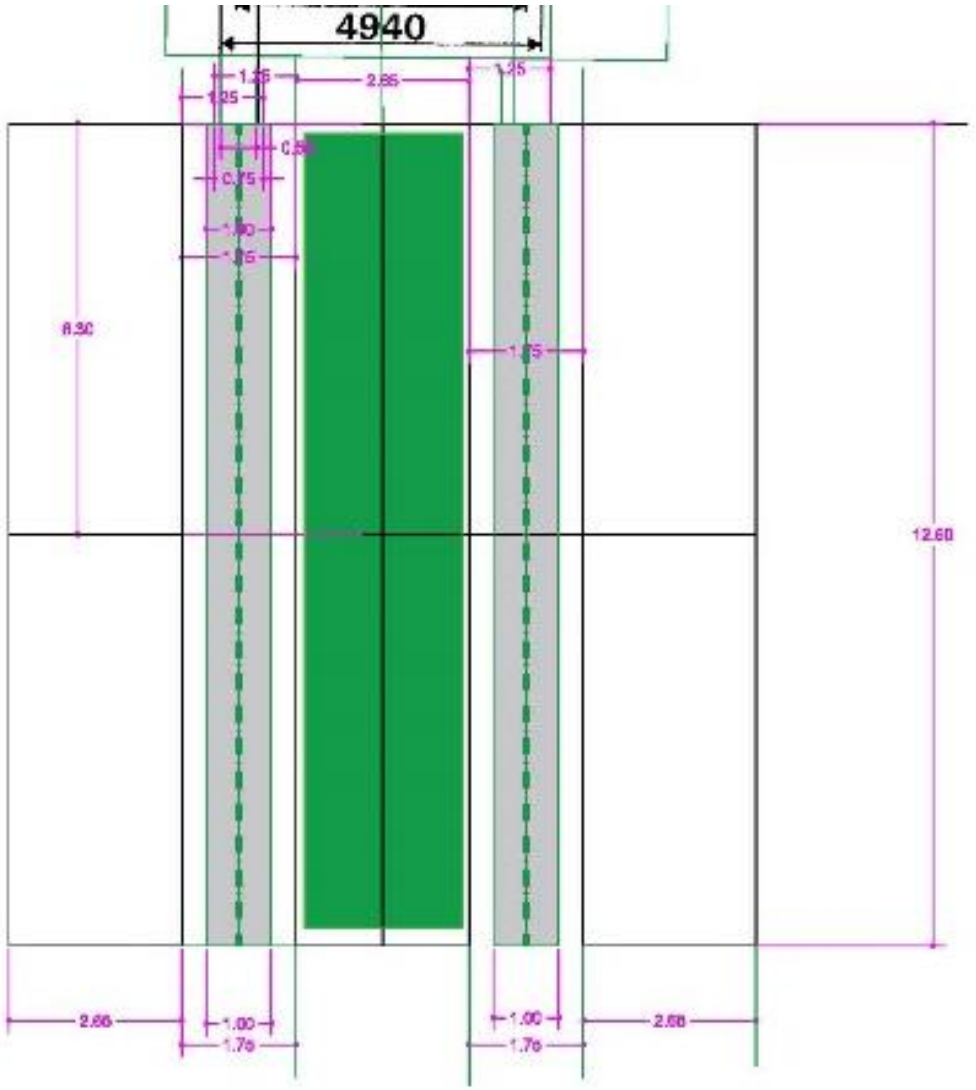
Parking Lanes for trucks and container storage by Straddle Carriers

Parking Lanes



Top View Dimensions



ThPA Container Terminal Pavement

The **aging of the pavement** comes with deterioration problems as the destruction of the asphalt in the surface layer resulting in the disintegration of the surface layer.

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ThPA Container Terminal Pavement

Surface pits were created at the container stacking areas and the machinery circulation is disturbed because of the wheel grooves.

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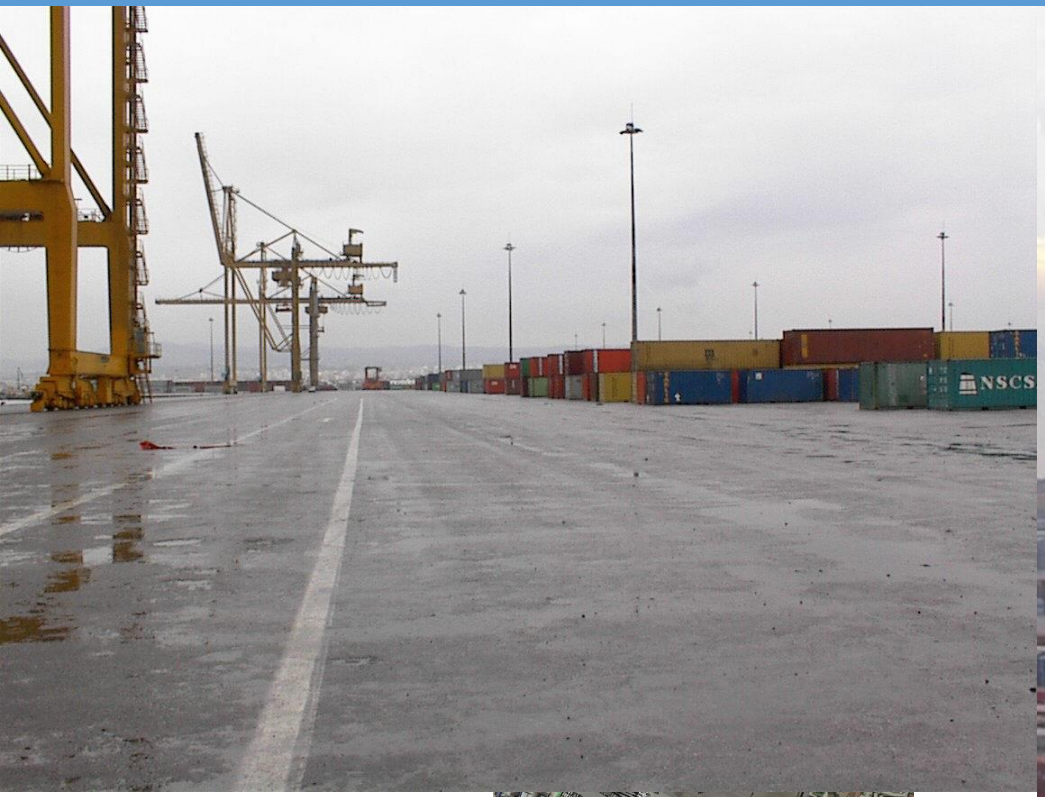
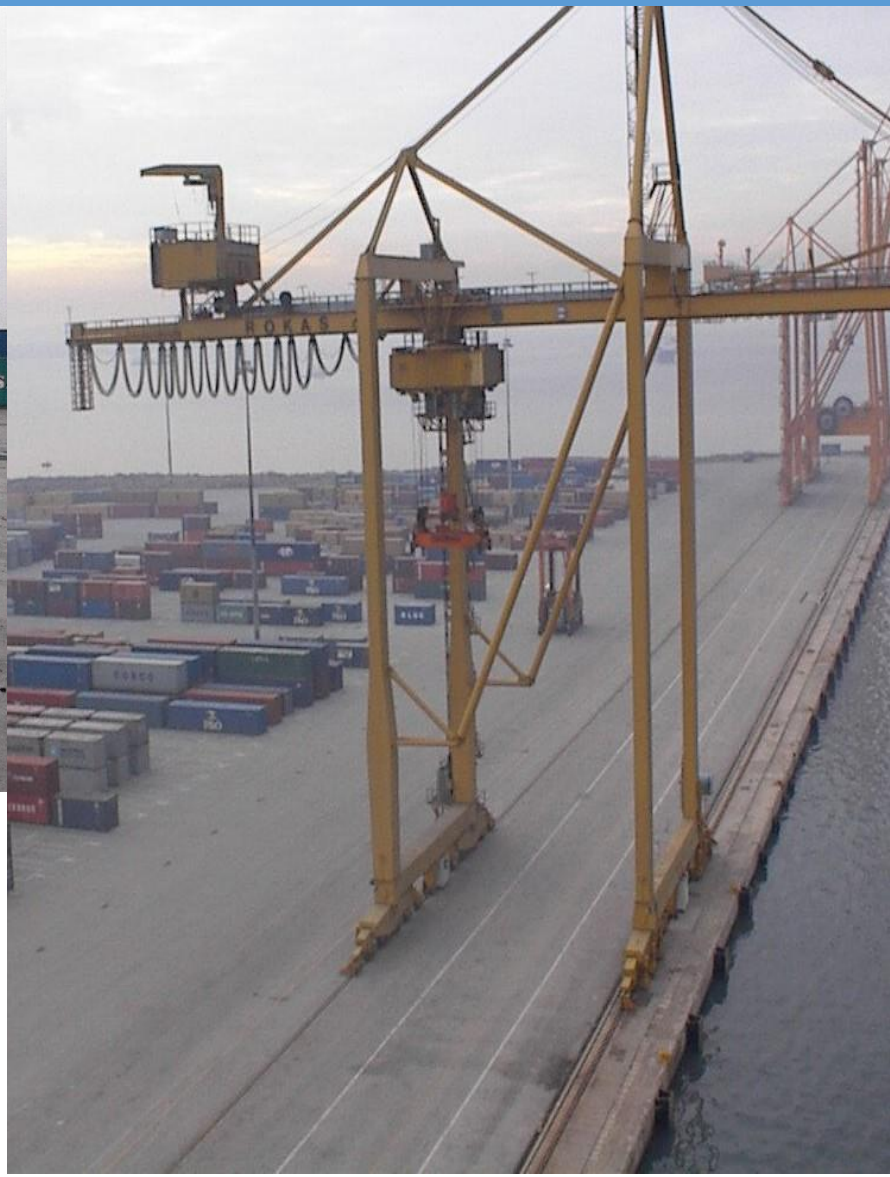
AREA 01 –Along Quay 26 – BEFORE APPLICATION





Area 1

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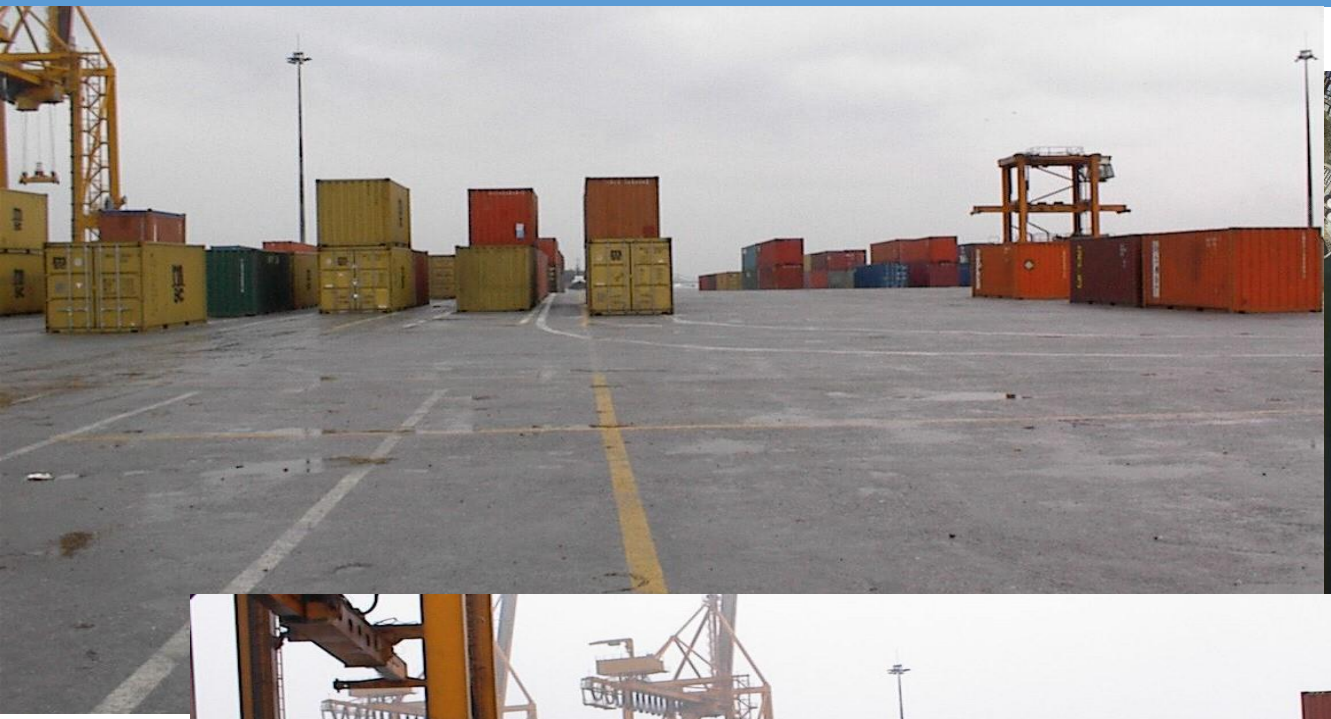
AREA 03 SC road – BEFORE APPLICATION



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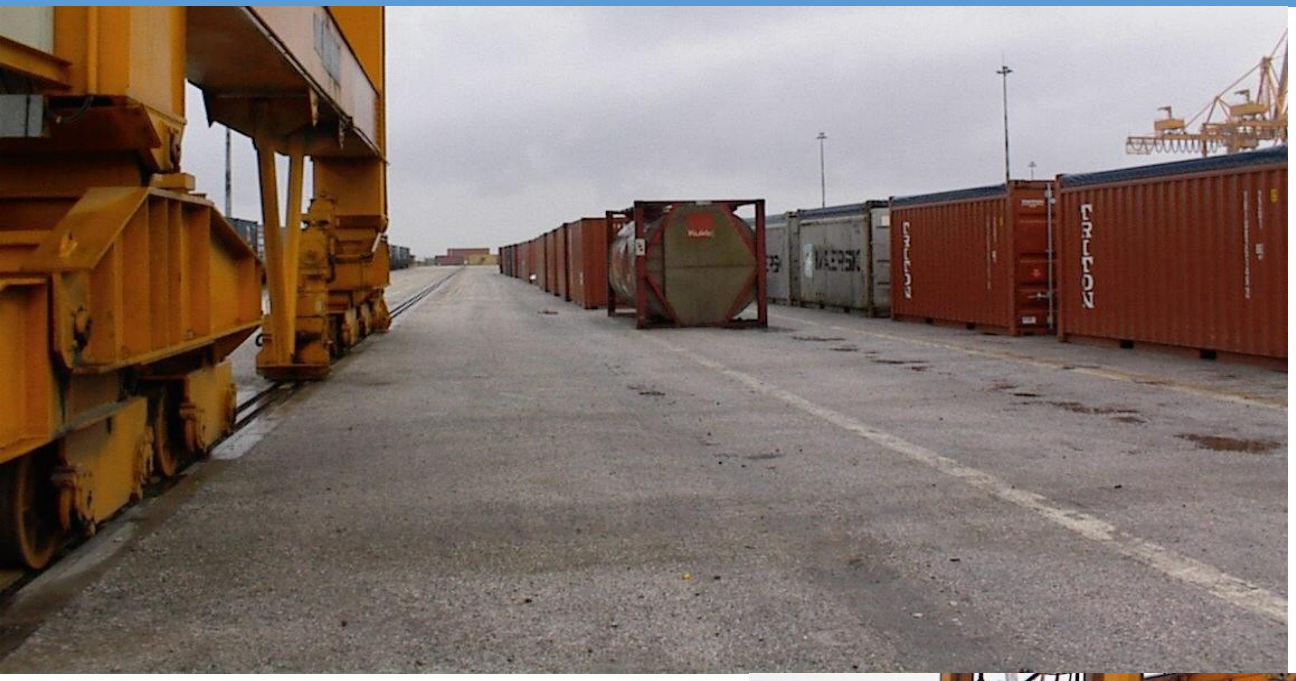
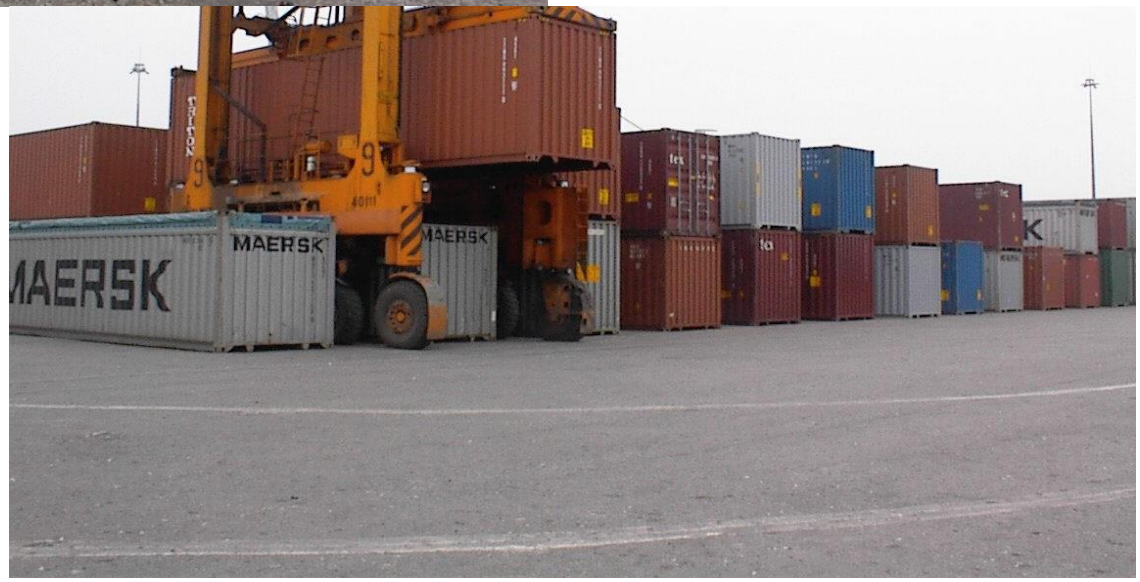
EXISTING PROBLEMS ON SC LANES





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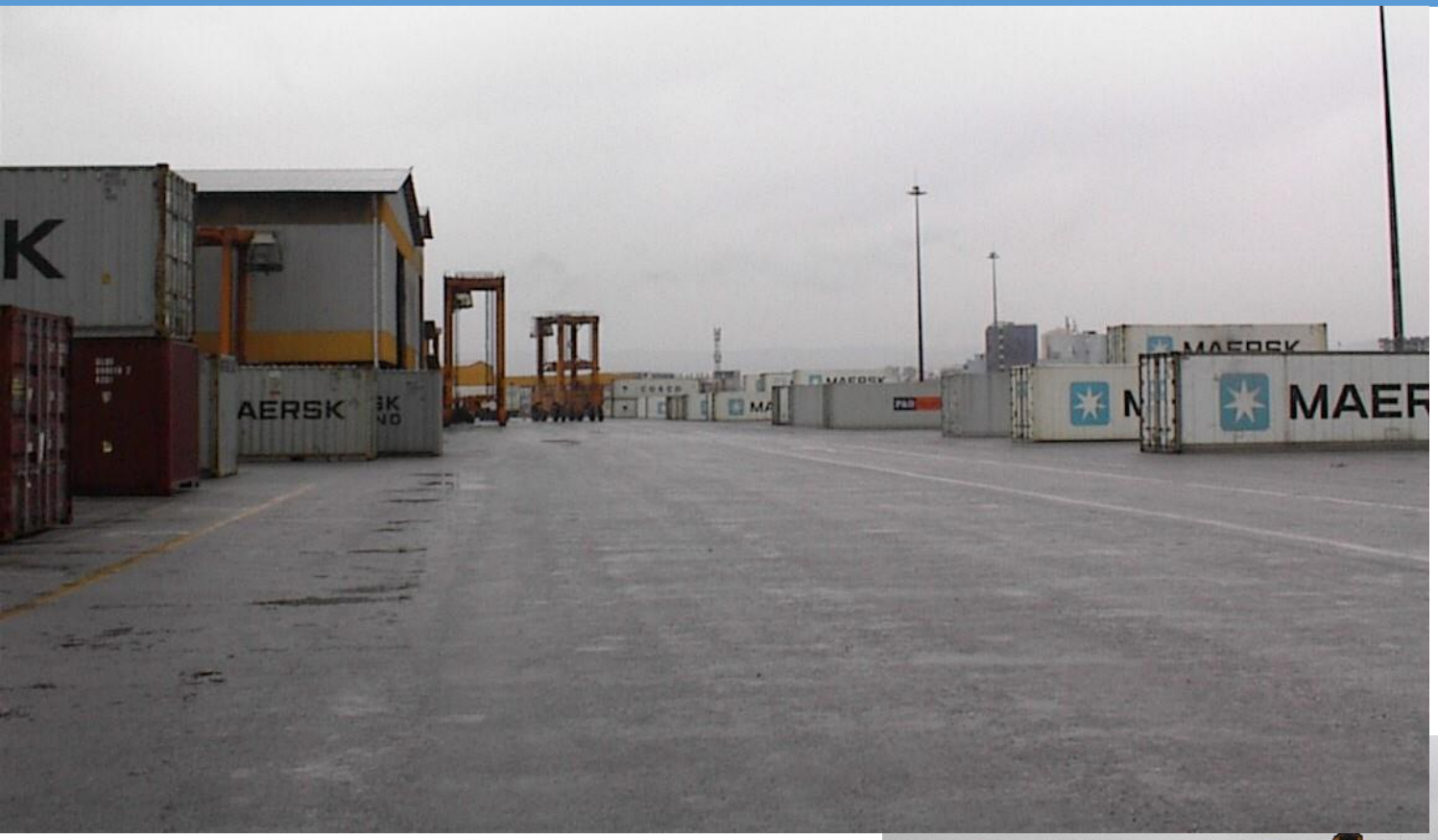
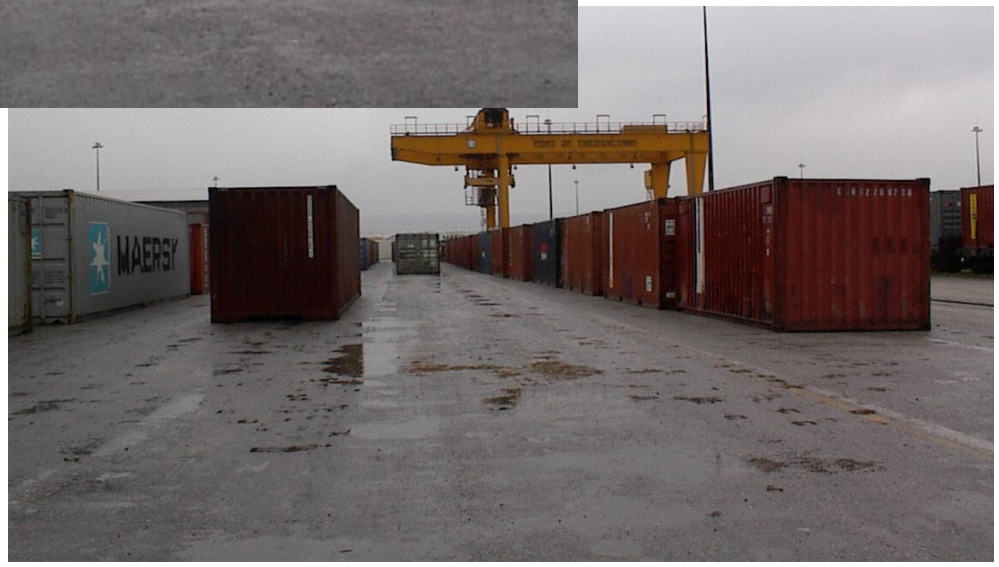
EXISTING PROBLEMS ON TRANSTRAINER AREA





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REHABILITATION CHOICES AVAILABLE

The impregnated concrete is a flexible pavement with the ability to follow the settlements and the surface can be filled to restore levels and slopes.

Due to the form of the sub layer, the surface coating must have elasticity and to fully cooperate with the underlying coating to function together and avoid cracking.

The choices were:

- New Asphalt coating replacing the old one (two layer of 5 cm)
- New structure with Concrete Coating (with 30 cm concrete slabs)
- New course coating using the DRACOBIT SYSTEM (5cm layer)

Why DRACOBIT SYSTEM was Proposed as a Possible Choice?

The DRACOBIT SYSTEM was selected because:

- **The DRACOBIT SYSTEM is simple,** and it can be installed by an asphalt contractor and the application is ONLY the replacement of 5 cm top layer.
- **The PROJECT COMPLITION TIME is fast,** and the project side could be given to ThPA in 72-120 hours after the DRACOBIT application depending on the usage of the area.
- **The DRACOBIT SYSTEM has NO JOINTS** that are necessary on concrete slap surfaces. This minimize future maintenance needs.
- The **DRACOBIT SYSTEM is cheaper** than any concrete block surface with joints and further long lasting than any traditional asphalt layer system.

DRACOBIT TESTING AREA in ThPA

In order to check if the application procedure of the **DRACOBIT SYSTEM** was suitable for ThPA pavement restorations for larger surface coatings a test application was requested on an area **of 400 square meters.**

The test was performed by DRACO through its local representative EM4C and the help of the ThPA Staff. Laboratory tests were performed by NAMA LAB according to the asphalt mix proposed.

The surface was further visually observed with normal traffic for a period of two months and the results were positively evaluated concluding in the selection of the system for the coating of larger areas.

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Timetable of DRACOBIT SYSTEM application periods

num	Date	Location	Area (m2)	Comments
TEST	July 2018	Contribution Area of Quays 26 and 27	**400**	Application and properties tests
1	September 2018	Behind Crane rail along Quay 26	**10,500**	Straddle Carriers traffic area and Container loading /unloading
2	February 2019	Between truck road and Transtainer rail	**10,000**	Straddle Carriers traffic area and Container loading /unloading
3	March 2019	Straddle Carrier Vertical to Quay Main Road	**3,500**	Main road used only by SC connecting Stacking Areas inside the Container Terminal
4	March 2019	Roundabout CT Gate	**4,100**	Truck and Reach Stacker road
5	April 2019	Truck Parking Lanes	**1,500**	Parking Lanes used by Straddle Carriers for Container loading /unloading to trucks
		TOTAL AREA	**30,000**	

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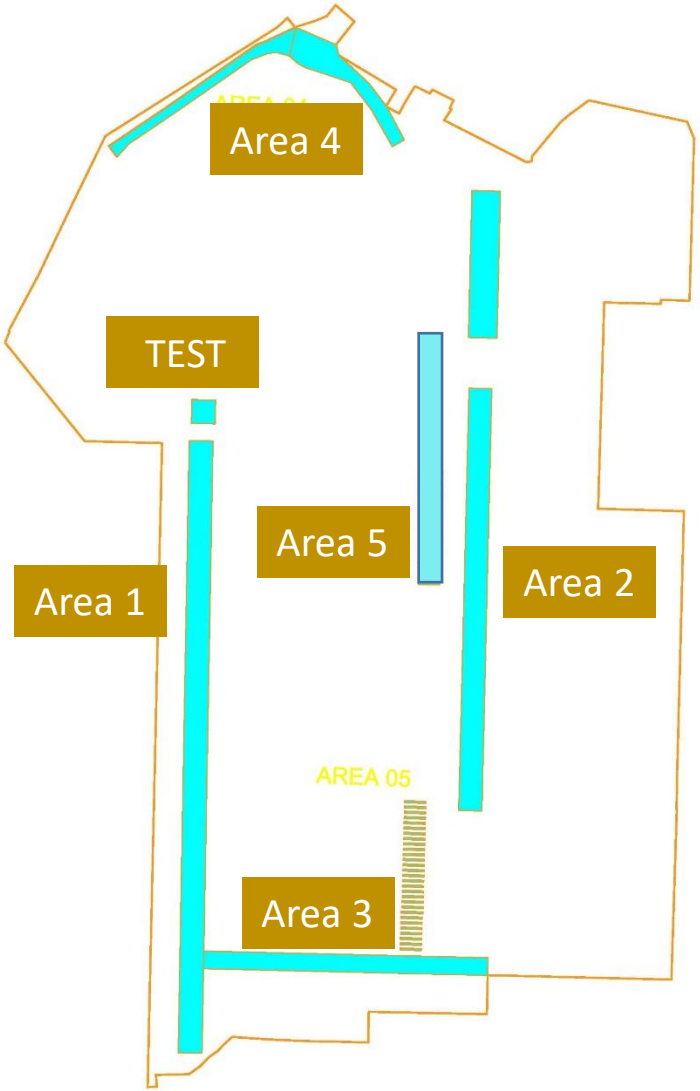
ThPA Container Terminal

Areas with DRACOBIT pavement in the Container Terminal



DRACOBIT APPLICATION CHARACTRISTICS

- For the **DRACOBIT** applications a **5 cm thickness** was used over an existing asphaltic surface. The open asphalt mix was made using an aggregate calcareous mix and asphalt 50/70 with a measured over 22% open spaces.
- The average consumption was 3.7 kg/m^2/cm.

- For the **DRACOBIT HD** applications a **6 cm thickness** was used over an existing asphaltic surface. The open asphalt mix was made using an aggregate mix, based on rust and hart inert, and asphalt 50/70 with a measured over 22% open area.
- The average consumption was 3.8 kg/m^2/cm.

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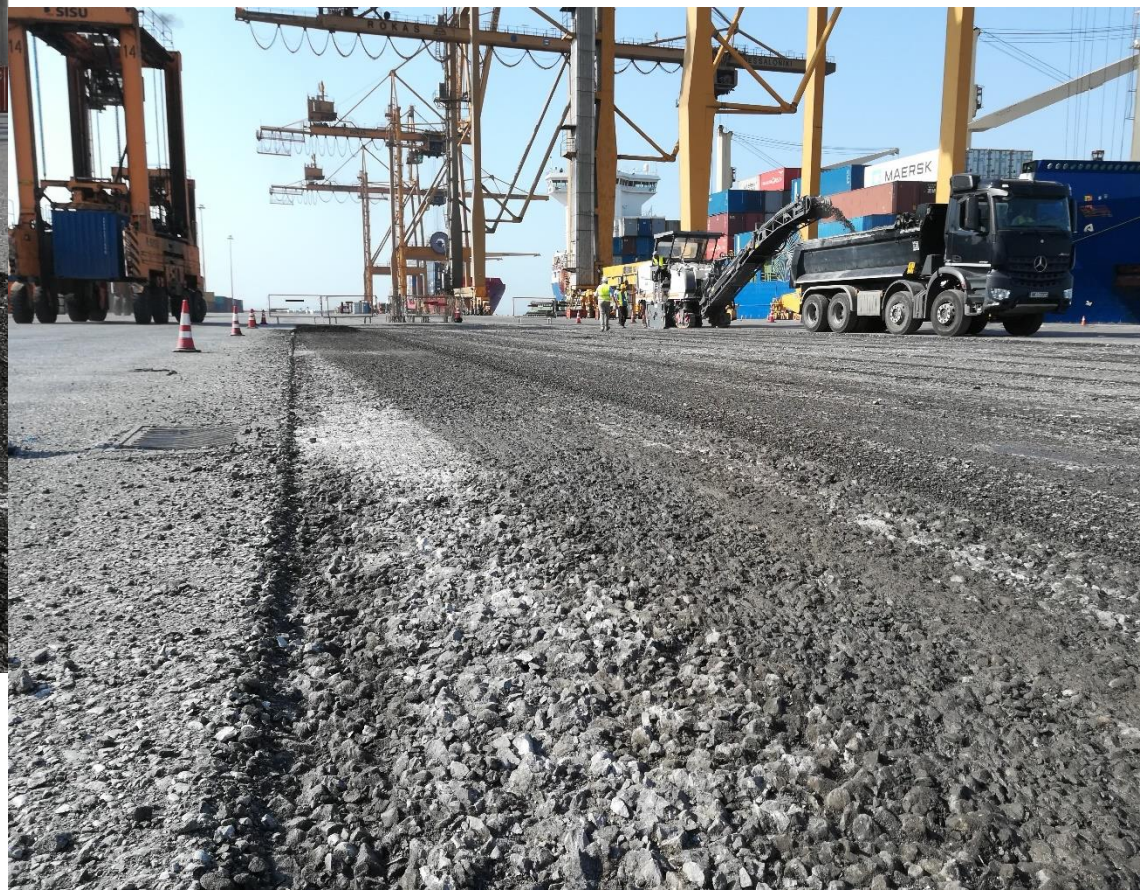
PROBLEMS DURING APPLICATIONS

- During the **SECOND and the THIRD application periods** of the DRACOBIT there where a few problems related to high wind and unexpected rain conditions. If the weather predictions showed either very high winds or rain the operation was stopped. Then it started when it was observed that the pavement was dry enough.

- In case of an unexpected rain the area that the DRACOBIT applied during the last two hours was covered with plastic until the rain was over. Of course, there were some very small areas that DRACOBIT were reapplied.

STEPS OF DRACOBIT APPLICATION 1/4

- Removal of 5cm of the old asphalt pavement



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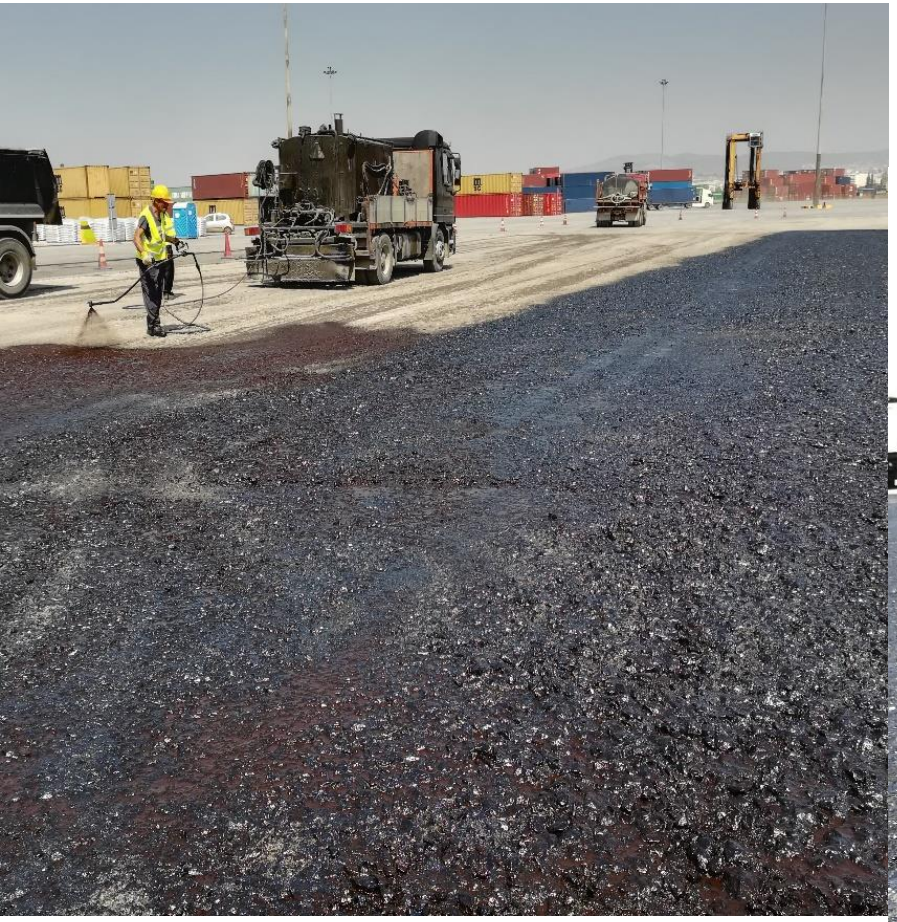
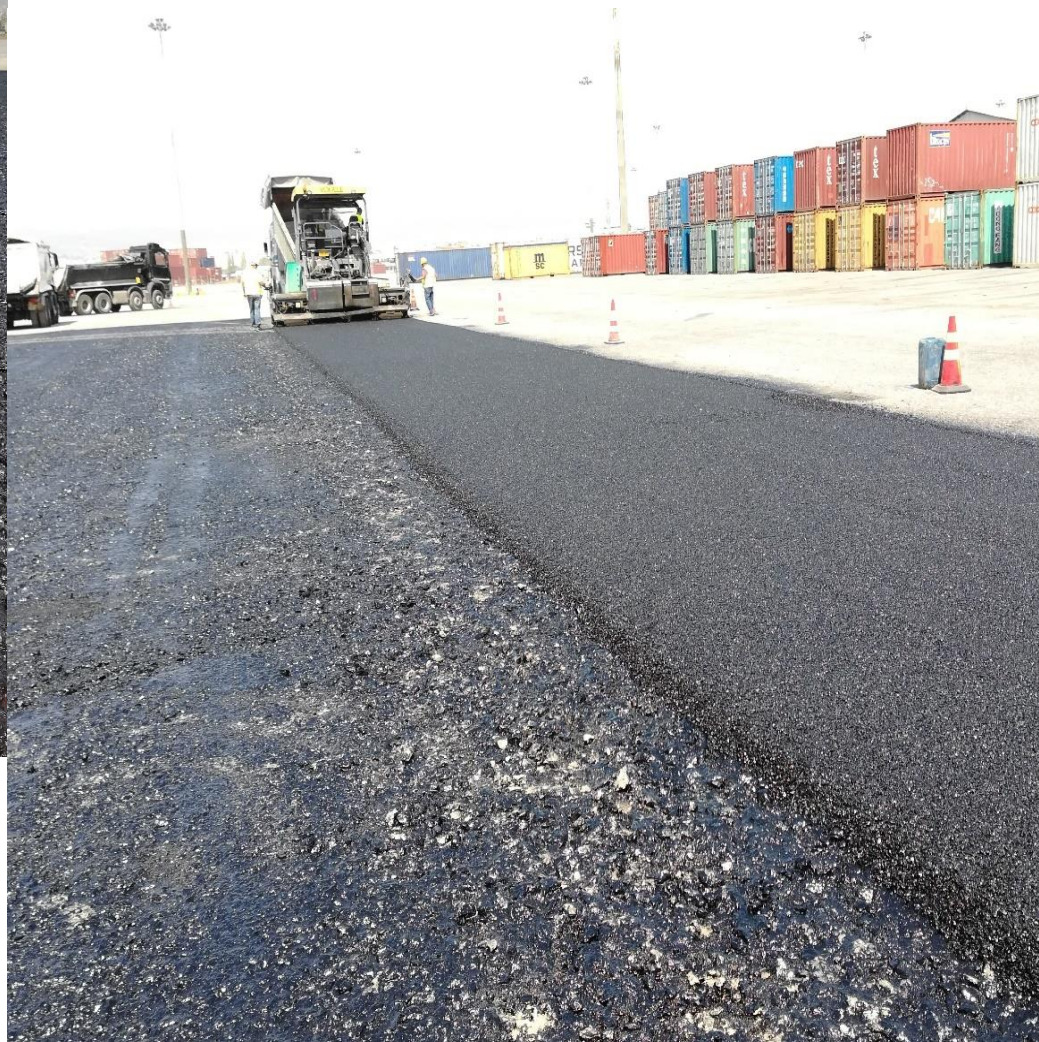
STEPS OF DRACOBIT APPLICATION 2/4

- Application of the open asphalt layer





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STEPS OF DRACOBIT APPLICATION 3/4

Application of DRACOBIT

- First Layer

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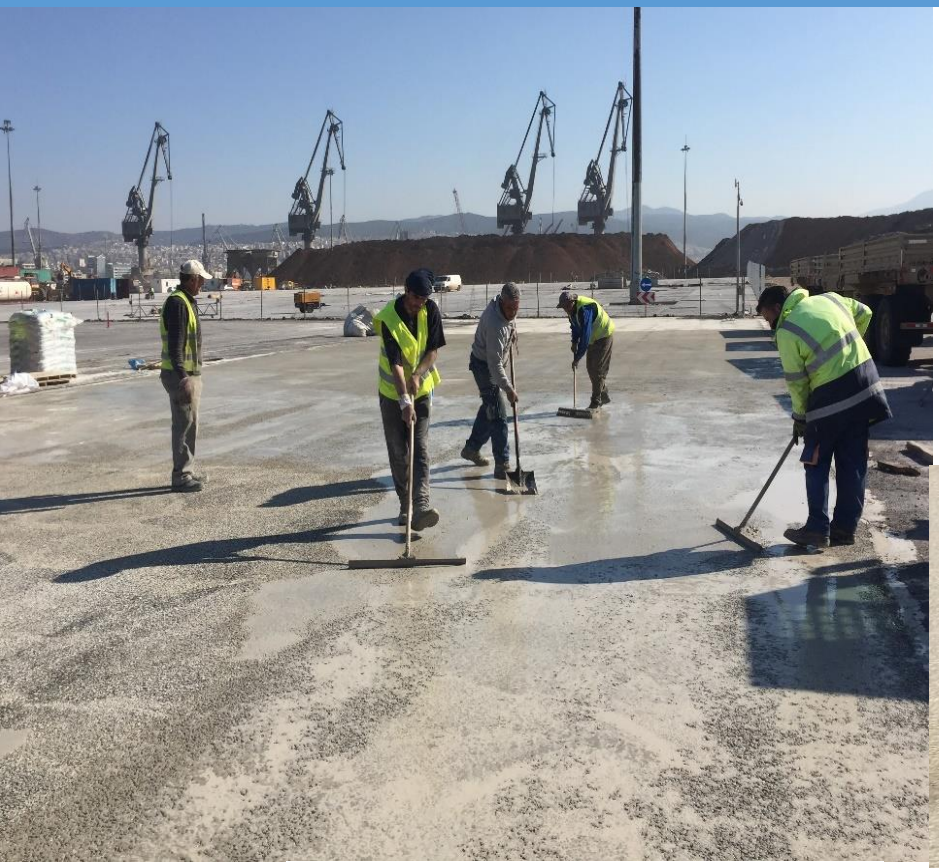
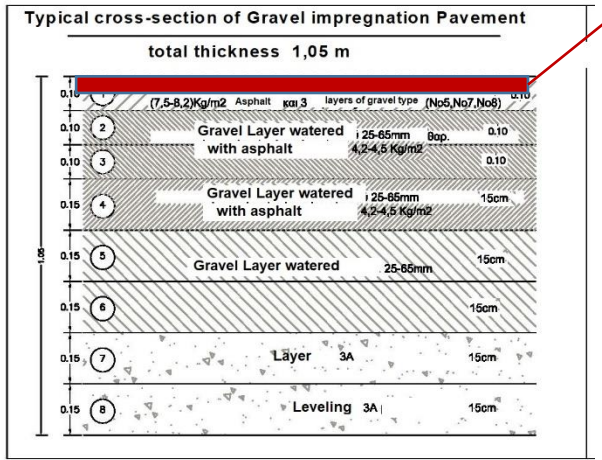
STEPS OF DRACOBIT APPLICATION 4/4



Application of DRACOBIT

- Second Layer



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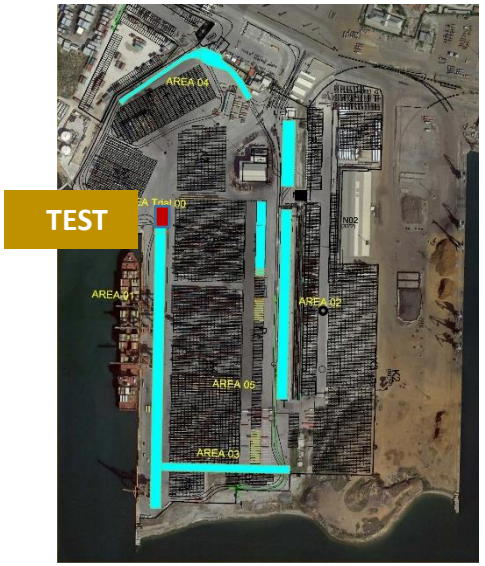
TEST AREA



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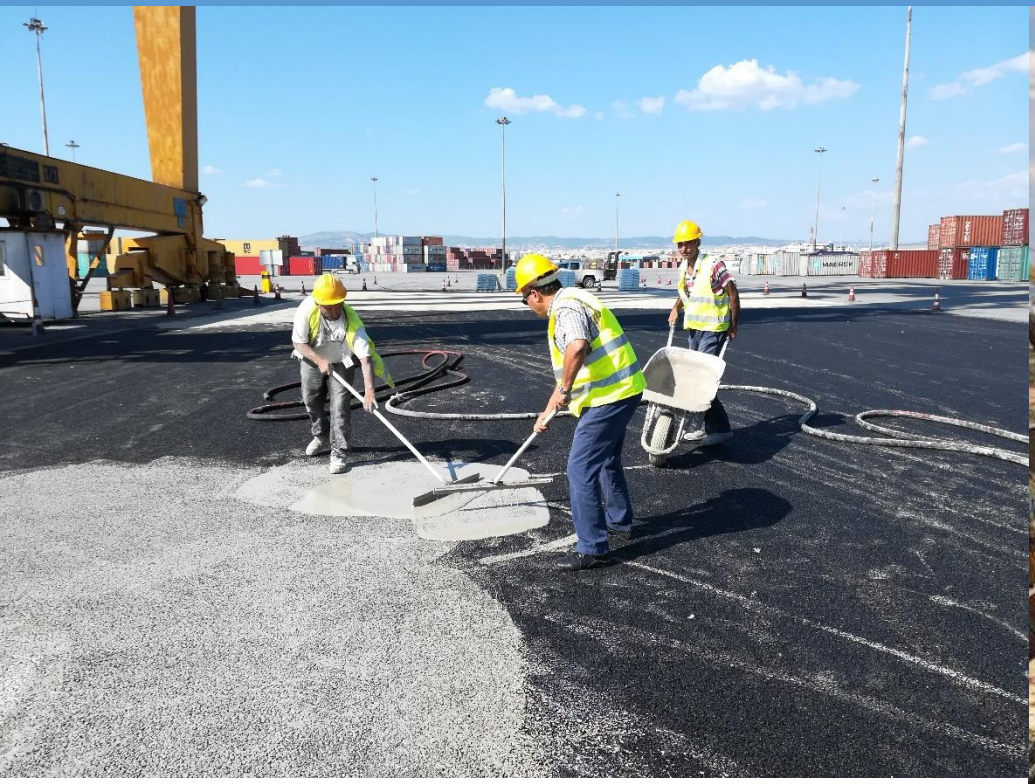
AREA 01 –Along Quay 26



Area 1

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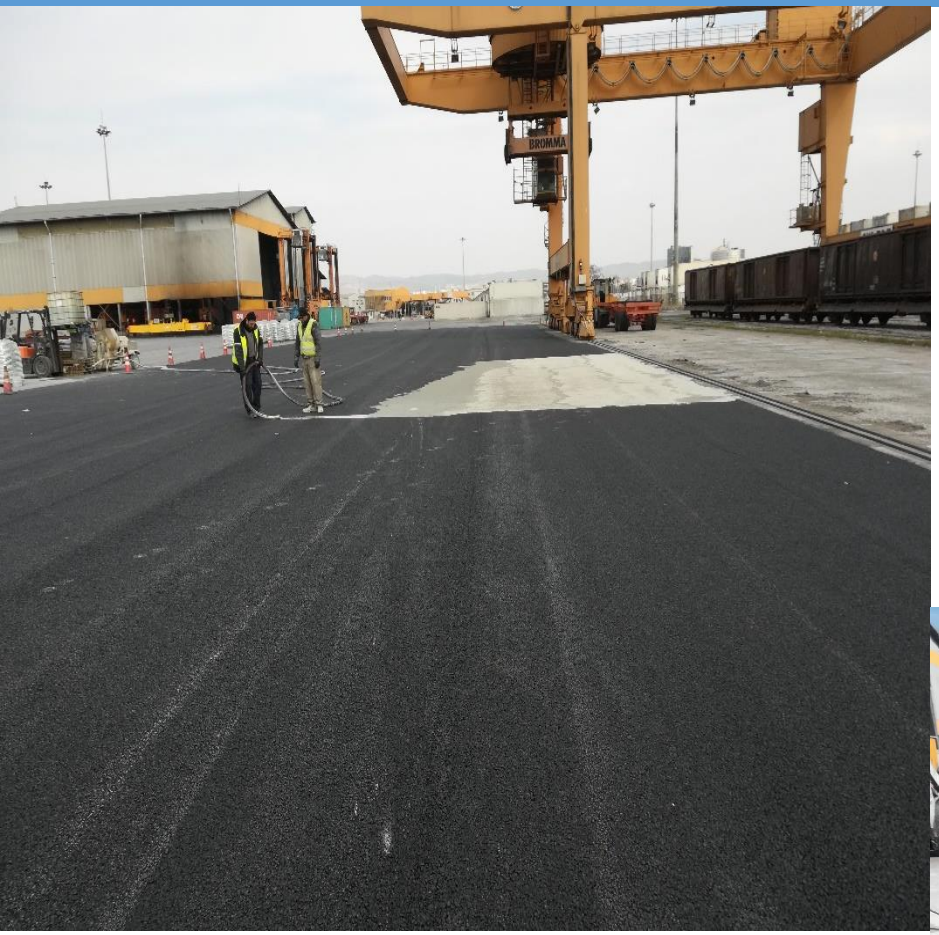
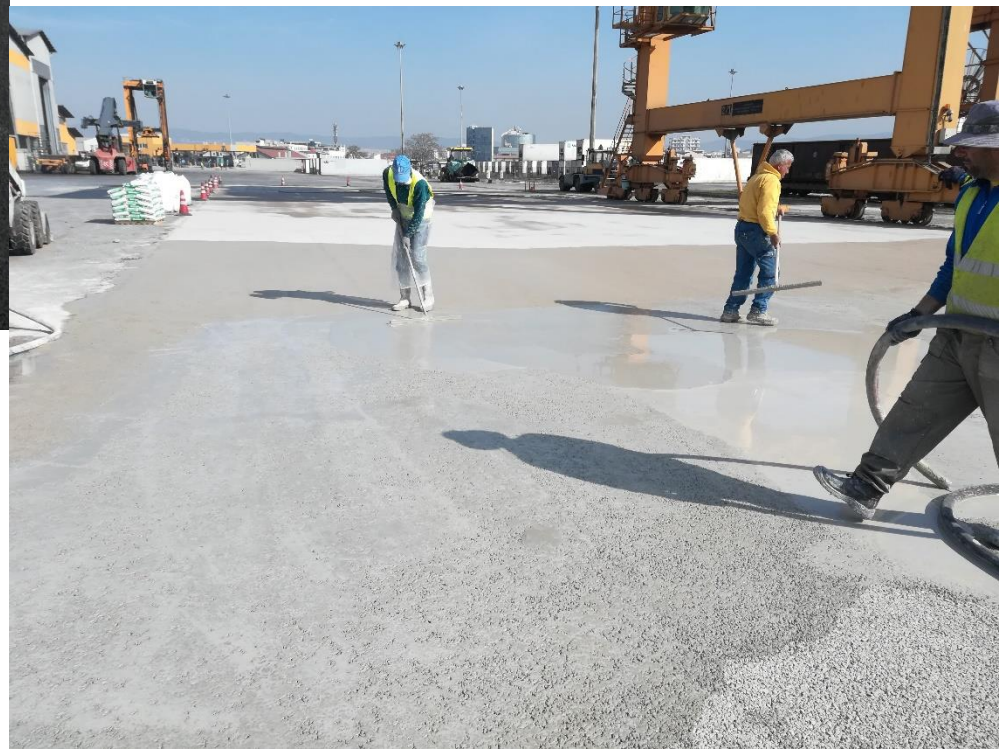
AREA 02 Along Transtainer





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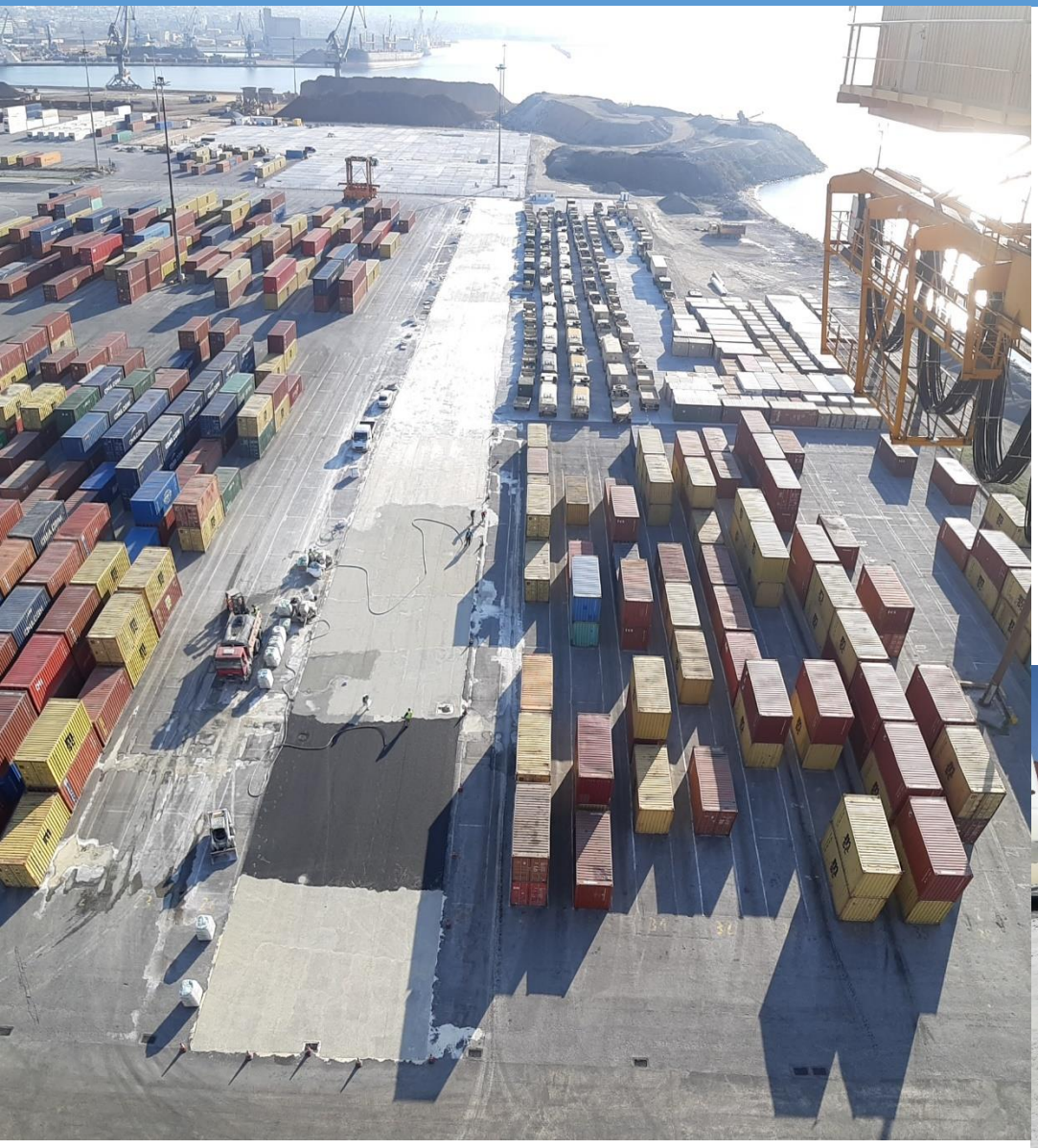
AREA 03 SC road



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AREA 04

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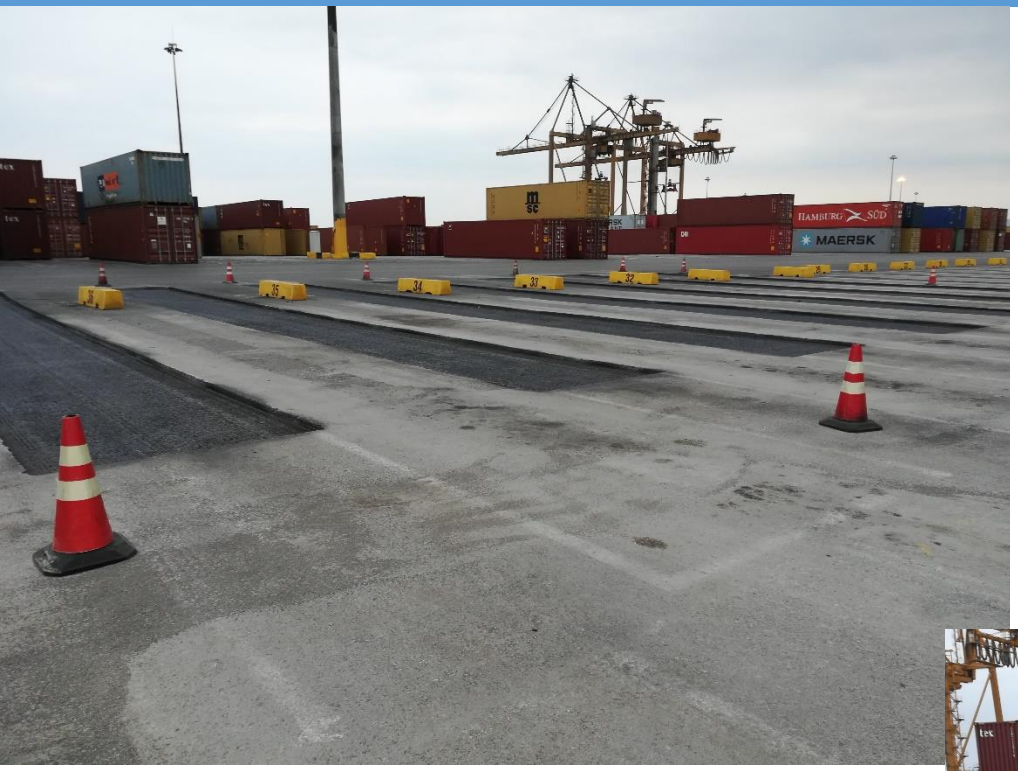
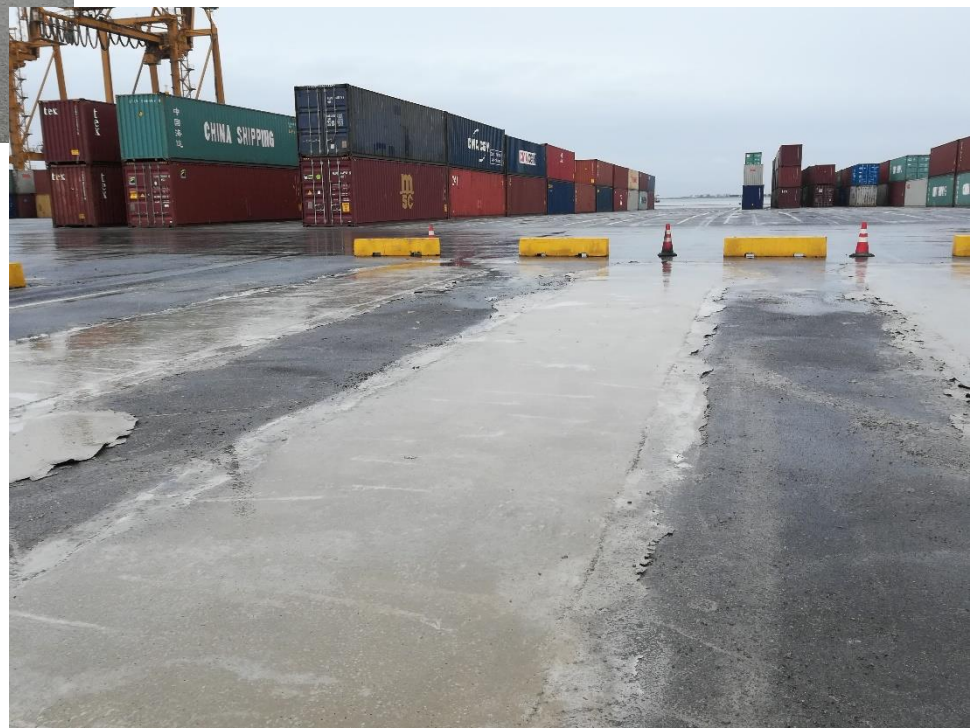
AREA 05 Parking





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CONCLUSION FROM DRACOBIT APPLICATIONS

After four (4) years from the DRACOBIT SYSTEM applications it can be concluded that:

- The DRACOBIT has performed very good and **the feed back from the Container Terminal staff is very positive!**
- The areas do not have any problems and the surface does not have any rutting, aggregate loss, cracks etc.

- The DRACOBIT HD has performed also with very good results without any rutting and without any chipping!

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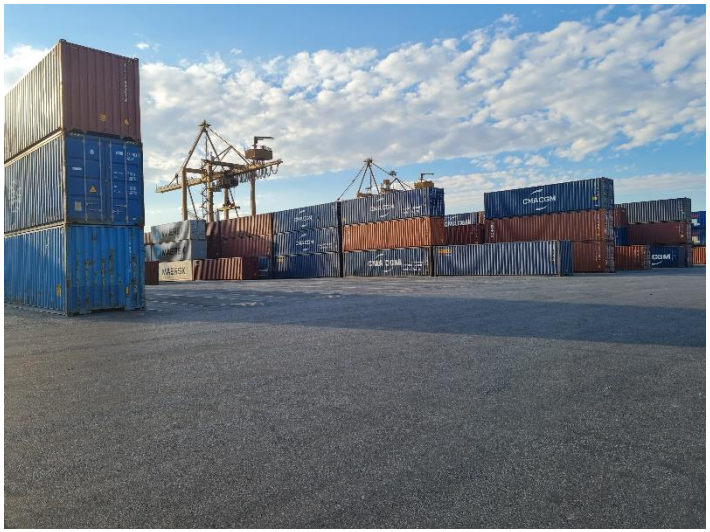
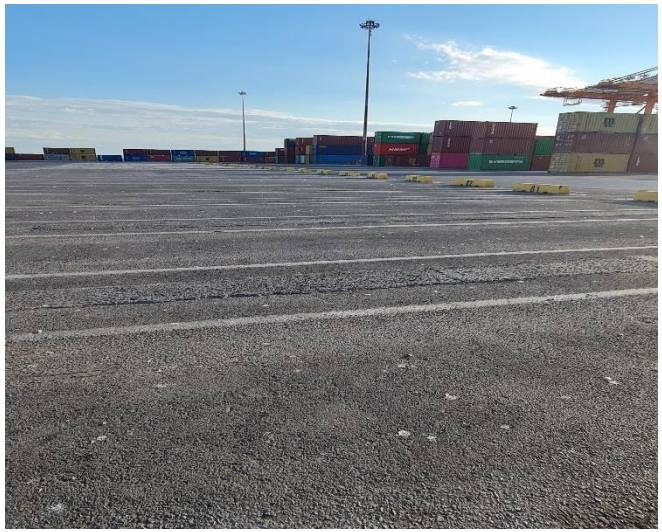
FUTURE AREAS THAT DRACOBIT IS UNDER CONSIDERATION TO BE APPIED BY ThPA

- Straddle Carriers Parking Lanes in Truck Parking Areas
- Container Stacking Areas
- Straddle Carries traffic lanes





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THANK YOU FOR YOUR ATTENTION !

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