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Trans Baltic

TRANSVER GmbH
Maximilianstr. 45
80538 München

Telefon
+49 89 211878 - 0

Fax
+49 89 211878 – 29

E-Mail
office@transver.de

Internet
www.transver.de

Geschäftsführer
Dr.-Ing.
Klaus Bogenberger

Wissenschaftliche Berater
Univ.-Prof. Dr.-Ing.
Fritz Busch
Univ.-Prof. Dr.-Ing.
Bernhard Friedrich
Univ.-Prof. Dr./UCB
Hartmut Keller

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HRB 137126

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Anreise
U4, U5 (Lehel)
Tram 17, 19
(Maxmonument)

Analysis of the operational requirements for a Pre-Gate-Parking area (PGP) for terminating traffic to the Port of Hamburg

Summary

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Summary
On behalf of the Hamburg Port Authority

TRANSVER GmbH
Hannover/Munich
Lützerodestraße 10
30161 Hannover

Dr.-Ing. Stephan Hoffmann
Dipl.-Ing. Alexander Dinkel

Institute of Shipping Economics and Logistics (ISL)
Universitätsallee 11-13
28359 Bremen

Dr. Holger Kramer
Prof. Dr. Holger Schütt
Michael Tasto
Sönke Maatsch
Dipl.-Ing. Matthias Dreyer
Dipl.-Ing. Manfred Kiss
Zübeyde Gül

Summary

Superior objective of the survey was to analyze the operational requirements for a Pre-Gate-Parking area (PGP) for terminating traffic to the Port of Hamburg. The focus of the PGP concept, due to the high grade of containerization, is put on container transports. Non-container transports, however, could generally be carried out also.

Following an analysis of approaches to improve the efficiency in container terminals of other ports, as well as an extensive status analysis of existing traffic technology components in the Port of Hamburg the basis for the PGP concept was established. It also included a detailed analysis of the existing process flow of heavy truck handling at the container terminals in the Port of Hamburg.

In order to meet the needs of all process participants when developing and operating a PGP- concept, and, furthermore, reach a high degree of acceptance, all needs were considered right from the beginning. The concept was developed in close cooperation with the Hamburg Port Authority (HPA).

Essentially the PGP concept is based on classic traffic management strategies providing additional parking areas for heavy trucks. As they are needed before entering the gates and due to their spatial location before the gates, they are termed as Pre-Gate-Parking areas (PGP).

In the course of the survey three different operating strategies or scenarios regarding the use of PGP were taken into account and compared with one another. They are:

- optional use of PGP,
- recommended use of PGP in case of temporary traffic overload (in the case of disturbances or capacity overload of the road network),
- obligatory use of PGP as regular service in the Port of Hamburg.

Subsequent to the development of the PGP concept the survey included to analyze the requirements for the location of Pre-Gate-Parking areas. Here the following questions needed to be clarified:

- How does container traffic heading for Hamburg distribute to the various travel directions or motorways respectively?
- For which travel direction to the Port of Hamburg, taking into account all existing and planned parking areas for heavy trucks (truck stops with and without a service area), a high benefit with regard to parking place deficits can be reached by providing Pre-Gate- Parking?
- What kind or type of areas and how much space does Pre-Gate-Parking require?
- Where additional areas in the Hamburg surroundings could be used for Pre-Gate-Parking taking into account the already existing amount of parking areas for heavy trucks?
- Which financial expenses are likely to be made?
- How could an operating concept for Pre-Gate Parking areas be drawn up?

When needs and quantitative analyses were carried out, first of all the most probable route to the Port of Hamburg was calculated for every traffic administration district in Germany as well as relevant European countries. In a second step splits between the various possible routes were estimated for individual larger areas as well as traffic administration districts in the Hamburg surroundings. The hence assessed distribution of the areas on the main transport axes in the Hamburg area has been combined with data from the container traffic model Nordrangehäfen in a further step to be

able to estimate the overall transport volume for these axes. Thus peaks in container traffic in distances of over 300 km from the Port of Hamburg (import and export) could be assessed for the following steps of inquiry. The hence calculated traffic volumes served as a basis to be able to estimate the traffic loads anticipated on a Pre-Gate-Parking area.

For the motorway A7 South of Hamburg (direction North) a number of 80 to 100 parking areas needed was roughly estimated. For a need of 100 parking places a need of land of 15,000 $m^2$was assessed (oriented on how trucks stops normally are designed). This equals approx. 150 m^2space per heavy truck parking place.

As space required for building a service area roughly 4,500 m^2were calculated for the size of the service facilities. Included in this figure again are all zones, which enable the truck driver to reach the service station to tank up as well as the restaurants or, if needed, to visit the garage. Space additionally needed to connect to the railway system; inland waterway transportation or other alternative means of transport have not been considered in the calculations. They would have to be added to the above indicated space. Areas for special functions (e.g. secure parking) have not been taken into account.

To be able to choose an adequate site for Pre-Gate Parking the various existing parking possibilities on and near motorways within a radius of approx. 50 km around Hamburg have been compiled and subsequently been evaluated roughly regarding a possible use as a Pre-Gate-Parking area. Included are motorway service areas with and without catering services as well as existing truck stops in the proximity of motorways.

When performing the location analysis, now, as an example, it was analyzed for motorway A7, South of Hamburg, direction North, whether there is land available, at all to build a PGP at chosen existing locations or at new locations which have still to be developed.

This analysis carried out by evaluating aerial views, along the A7, South of Hamburg, has shown that at quite a many interchanges there is basically room for building a truck stop or Pre-Gate-Parking area. Areas which are too close to the port are rather unsuitable, as, here, in the case of disturbances; a guiding of traffic flows via alternative routes would no more be possible. Hence an important function of the PGP system would no longer be given.

At selected interchanges a sufficient number of possible locations in the proximity of the interchanges as well as near to the railway system (transition to alternative means of transport) have been evaluated. To determine the location finally, a detailed evaluation of environmental impacts has be carried out additionally.

In the chapter “location concept”, based on the results of the preceding evaluation steps, the implementation at a fictive location has been elaborated in text and graphics. The implementation, apart from the organizational, functional and technical aspects, also takes into account the basic conditions and process flows regarding the handling of the heavy trucks at the container terminals in the Hamburg port. Here suggestions for road signage required in the area ahead of the Pre-Gate Parking were made and designed (see figure 1).

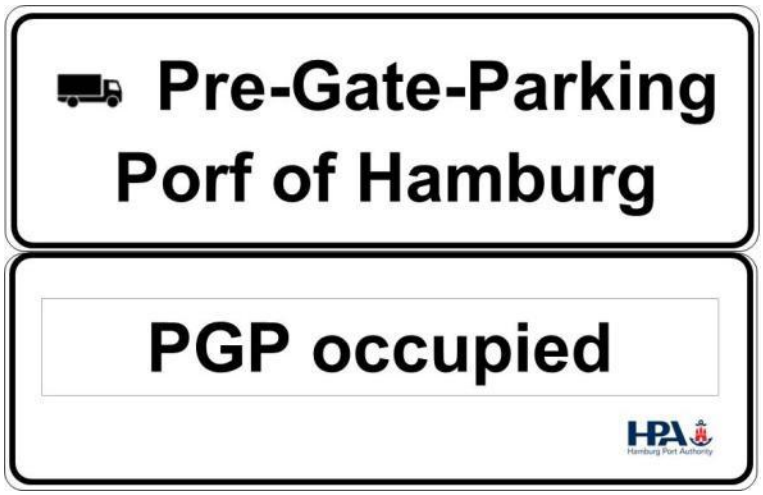

Figure 1: Suggestion for road signage required in the area ahead of the Pre-Gate Parking

Furthermore, the location concept includes detailed proposals concerning the operation and organization of heavy truck departure in the case of disturbances (departure procedure, change of appointments) and the infrastructure needed to manage this (self-service terminals, information desks in case of disturbance).

In conclusion, the cost arising for the individual components and furnishings of a Pre-Gate- Parking area were assessed in detail. Additionally, notes regarding the estimation of benefit were made (benefit components). An explicit assessment and evaluation of benefit as well as the calculation of a final cost-benefit ratio could not been carried out in this analysis, as the data required can only be assessed after a final localization of the site and further complex analyses.

Outlook

The results obtained in this analysis show that the introduction of a PGP system for terminating traffic to the Port of Hamburg is basically possible and an integration into existing process flows generally accomplishable. Due to the fact that only few functions can be shifted to a Pre-Gate-Parking facility, incentives have to be found which advantages, if possible, all participants in the PGP system.

For the time being the introduction of a PGP system can only be implemented if the system is used parallel to the present process procedures, which, after the introduction of the PGP, will remain unchanged in the form of an optional use. Heavy truck drivers and forwarding agencies that do not participate in the PGP procedure are not to face any efforts or disadvantages. Nevertheless, it would be preferable if as many heavy truck drivers and forwarding agencies as possible used the PGP system. This is why the heavy truck drivers and forwarding agencies participating are not to be confronted with e.g. more time and effort or expenditures. The PGP users have in fact to be offered an additional value as incentive for a voluntary use of the PGP features.

This additional value can only be obtained by a linking of features on the Pre-Gate-Parking area in connection with a preferred handling at the terminal (Fast Lane). For the use of the PGP system an advance reservation as well as the granting of a time slot in connection with the advance reservation is imperative. The important advantage of PGP participation for the heavy truck driver is guaranteed handling or even an adjustment of appointments to their personal time schedule by measures of the Truck Appointment. For the terminal operators a more consistent and predictable capacity utilization of the gates as well as prior checking and providing of data could be reached.

Especially important will the Pre-Gate-Parking area be in the case of disturbances in the road network leading to the port or in the zones around the terminals. A consequence of such disturbances is that appointments cannot be kept and the continuing traffic flow to the Port of Hamburg creates a temporary and spatial expansion in the case of disturbance. In order to avoid these higher expenditures of time the PGP system could take corrective action and in these situations advantage the users over the non-users. Technical and conceptual requirements are the reliable and area-wide detection of disturbances in the motorway network as well as the road network of Port of Hamburg. Besides, acute disturbances should be signaled by the gate. In the case of disturbance the drivers will be recommended the use of PGP by means of variable message signs alongside their route. If the driver ignores the recommendation, they will have to face longer waiting times at the gate when missed their appointment.

Having arrived in the Pre-Gate Parking area, the user will obtain further information on location, kind and scope of the disturbance. Furthermore, after the disturbance has terminated, or there is no more traffic jam a dosed control of the flow to the road network leading to the port as well as to the various terminals in the Port of Hamburg will be secured.

For introducing the PGP system to the Port of Hamburg, no fees will have to be paid for the time being. Later, however, there should be regulations that the actual users of the system (heavy truck drivers, forwarding agencies) meet their part in refunding the PGP infrastructure. This could be achieved directly by raising parking fees (parking place guaranteed) or indirectly by paying parts of other fees. Terminal operators should also participate in refunding the PGP system.

A monetary valuation of the benefit of the PGP system, could not been carried out in detail. It can be assumed, however, that most of the above mentioned positive impacts will realize after a PGP system has been implemented taking into account the defined basic conditions.