



# Market approach



# Contents

- history
- types of functional contracts in the Netherlands
  - performance contracts
  - engineering and construct (E&C) contracts
  - design and construct (D&C) contracts
  - design, build, finance and maintain (DBFM) contracts

# History

Starting point:  
RWS Business Plan 2004

- focus on
  - network management
  - end user
  - efficiency (more with less)
- key elements in achieving these goals
  - more professional own organisation
  - much larger role for private sector





# History

Larger role for private sector:

- “Private sector unless” – principle for construction, maintenance and management of infrastructure
- RWS will
  - safeguard the interest of society
  - maintain its operational offensive strength
  - remains accountable and approachable for public and society
- Traffic management, incident and calamity management etc remain primary tasks of RWS



# History

Realisation of the larger role for private sector:

- innovative procurement of infrastructure realisation and maintenance
- RWS will
  - concentrate on the 'what' question of design and realisation of infrastructural work
  - based upon price and quality
- Private sector will have increased freedom to use its knowledge, experience and creativity in the 'how' question of design and realisation of infrastructural works



# Types of functional contracts

From simple to complex

- *Performance contracts* for routine maintenance (grass mowing, cleaning of traffic signs, emptying garbage containers at service areas etc) (no design component)
- *Engineering & Construct contracts* for maintenance of wearing courses of pavements (limited design component)
- *Design & Construct contracts*; contractor has a design responsibility (new design, widening, strengthening); usually with 7 to 10 years of warranty
- *DBFM – contracts*; contractor is not only responsible for the design but also for the maintenance of his work for 20 to 30 years



# Types of functional contracts - performance

*Performance contracts* for routine maintenance

- usually for complete road districts
- simple jobs that do not require design activities
- usually functional requirements ('traffic noise screens must be clean'; 'water must run off freely'; 'grass must not be higher than 0.20 m')
- however these requirements are not always SMART and can lead to discussion
- several requirements have been downgraded to lower level requirements for this reason



# Road districts







## Types of functional contracts – E&C

*Engineering & Construct contracts* for maintenance of wearing courses of pavements (limited design component)

- road owner decides upon basic design, i.e. the type of maintenance treatment (e.g. inlay in right hand lane, wearing course replacement over total width; sealing treatment; porous asphalt overlay, ...)
- contractor does further engineering, like selection of aggregates, binder, filler, mix design, planning and organisation of the work, selection of traffic systems, ...
- usually a 7 or 5 years warranty
- this can conflict with routine maintenance by another contractor



## Types of functional contracts – E&C - continued

In Engineering & Construct contracts, performance is assessed

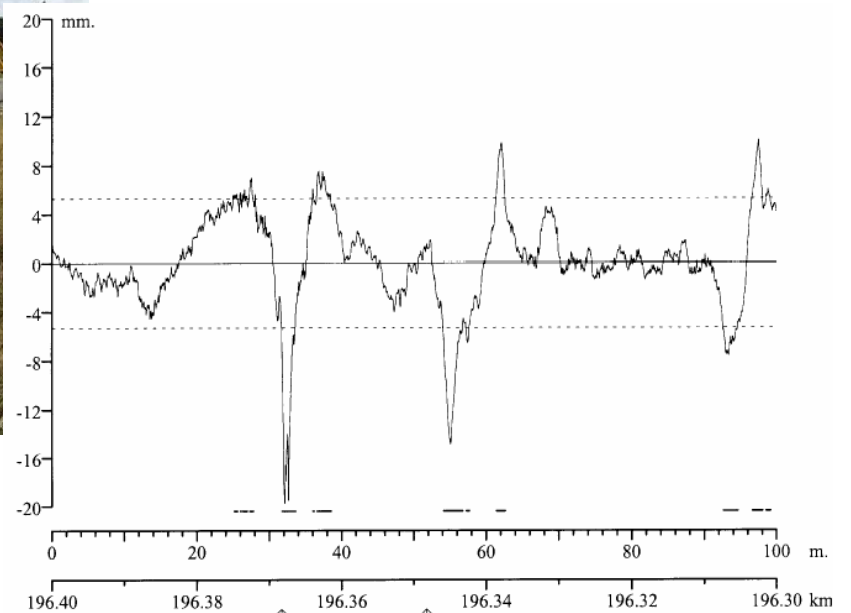
- After construction
  - by contractor
- During guarantee / maintenance period
  - usually as a part of routine PMS monitoring by RWS
- At end of guarantee / maintenance period
  - jointly by contractor and client, usually organised by contractor



## Performance assesment after construction

property	assessment method	criteria
Transversal slope	geodetical survey	according to: <ul style="list-style-type: none"><li>• design (D&amp;C)</li><li>• specifications (E&amp;C)</li></ul>
Longitudinal evenness	Viagraph	C5 - value < 3%
Skid resistance	86% slip trailer	$\geq 0.40$
Brake deceleration	Instrumented test vehicle	$\geq 5.2\text{m/s}^2$
<ul style="list-style-type: none"><li>• <math>\Delta h</math> over seams</li><li>• <math>\Delta h</math> at pavement edges</li></ul>	<ul style="list-style-type: none"><li>• straight edge</li><li>• straight edge</li></ul>	<ul style="list-style-type: none"><li>• <math>\Delta h &lt; 5\text{mm}</math></li><li>• <math>\Delta h &lt; 70\text{mm}</math></li></ul>
layer thicknesses	cores	according to: <ul style="list-style-type: none"><li>• design (D&amp;C)</li><li>• specifications (E&amp;C)</li></ul>
noise <ul style="list-style-type: none"><li>• single layer PA</li><li>• twin layer PA</li><li>• thin wearing courses and thin inlays</li></ul>	<ul style="list-style-type: none"><li>• void content &amp; layer thickness</li><li>• permeability test (Becker aparatus)</li><li>• verification of composition, compaction and layer thickness</li></ul>	<ul style="list-style-type: none"><li>• <math>\geq 20\%</math> &amp; <math>\geq 50\text{mm}</math></li><li>• drainage time <math>\leq 20\text{sec}</math></li><li>• according to product specifications</li></ul>
raveling	visual inspection	no raveling
cracking	visual inspection	no cracking

# Longitudinal evenness





# Skid resistance



Rijkswaterstaat





# Breaking deceleration





## Performance assesment during warranty period

property	assessment method	criteria
Skid resistance	86% slip trailer	$\geq 0.38$
Transversal evenness	ARAN laser rut depth measurement	rut depth $< 18$ mm
Longitudinal evenness	ARAN IRI - measurement (D&C)	IRI - value $\leq 3$ m/km
Transversal slope	Aran slope measurement (D&C)	no uniform criteria
Raveling	visual inspection	<ul style="list-style-type: none"><li>• <math>&lt; 20\%</math> stone loss/m<sup>2</sup></li><li>• <math>&lt; 25</math>m/100m with 11-20% stone loss/m<sup>2</sup></li><li>• no loss of deeper stones</li></ul>
Cracking	visual inspection	<ul style="list-style-type: none"><li>• crack width <math>&lt; 21</math>mm</li><li>• <math>\Delta h</math> over crack <math>&lt; 11</math>mm</li><li>• less than 7 transversal cracks per 100m</li><li>• less than 30m longitudinal cracks per 100m</li><li>• connected cracks may not contain loose elements</li></ul>
Combined damage	visual inpection	moderate raveling + cracking may not have great extent

# Performance assessment during warranty period

## Automatic Road Analyser (ARAN)

- currently measures longitudinal evenness, transversal evenness, transversal slope
- also collects video images of the road and its surroundings
- automatic detection of ravelling is in advanced stage







# Performance assesment during warranty period

(continued)

- skid resistance
- visual inspection (from PMS monitoring)



## Types of functional contracts - E&C - continued

If performance does not meet requirements during guarantee / maintenance period (note: these requirements are RWS intervention criteria!), the contractor

- has to replace the work by new work according to original requirements
- has to pay for extra traffic measures
- has to pay a penalty
- loses any rights concerning bonuses



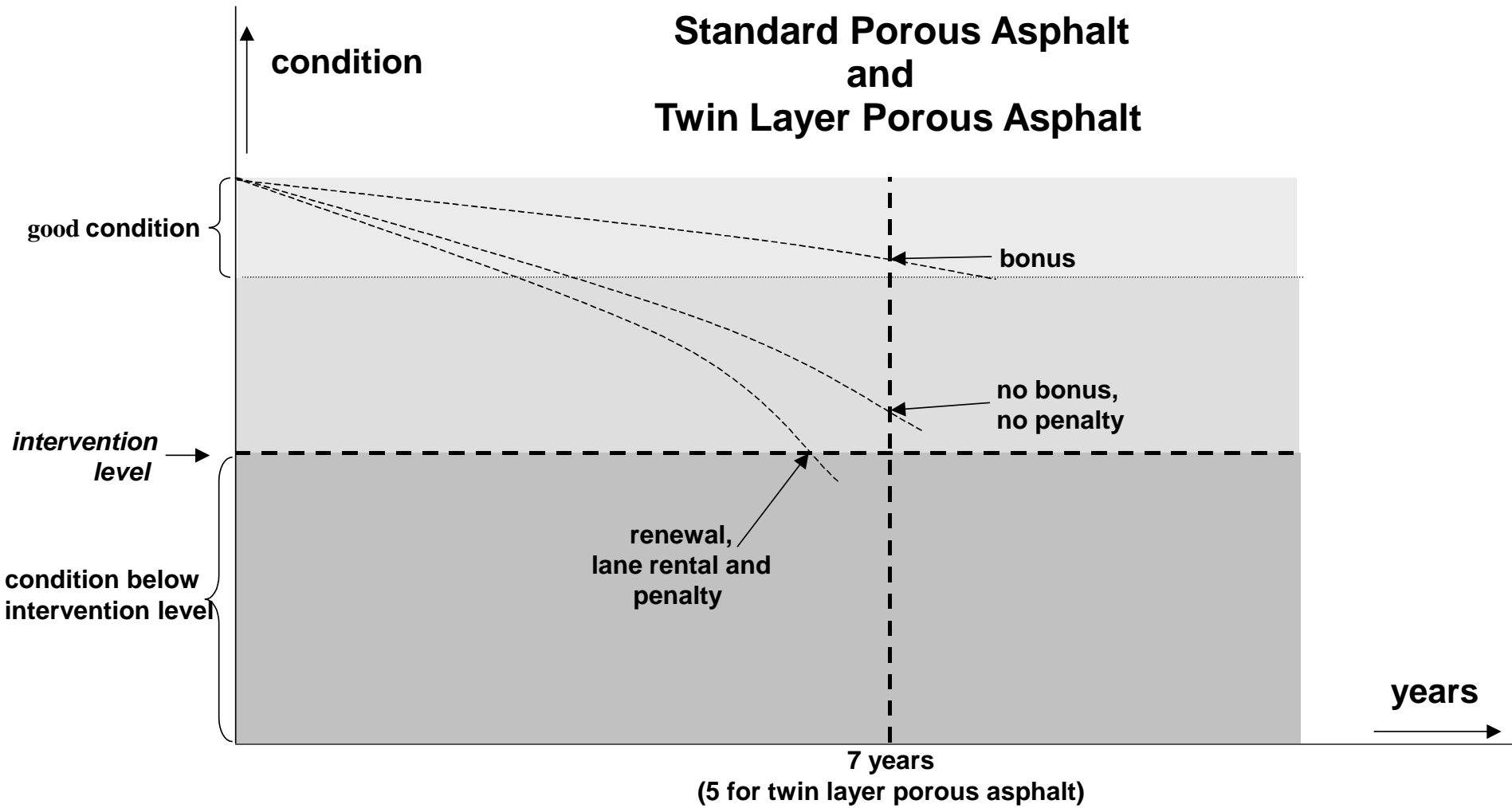
## Types of functional contracts - E&C - continued

At the end of the guarantee / maintenance period

- the performance is assessed to see if the contractor is entitled to a bonus or should pay a penalty
- basically the properties are similar to the properties during the guarantee / maintenance periods, but the criteria are higher

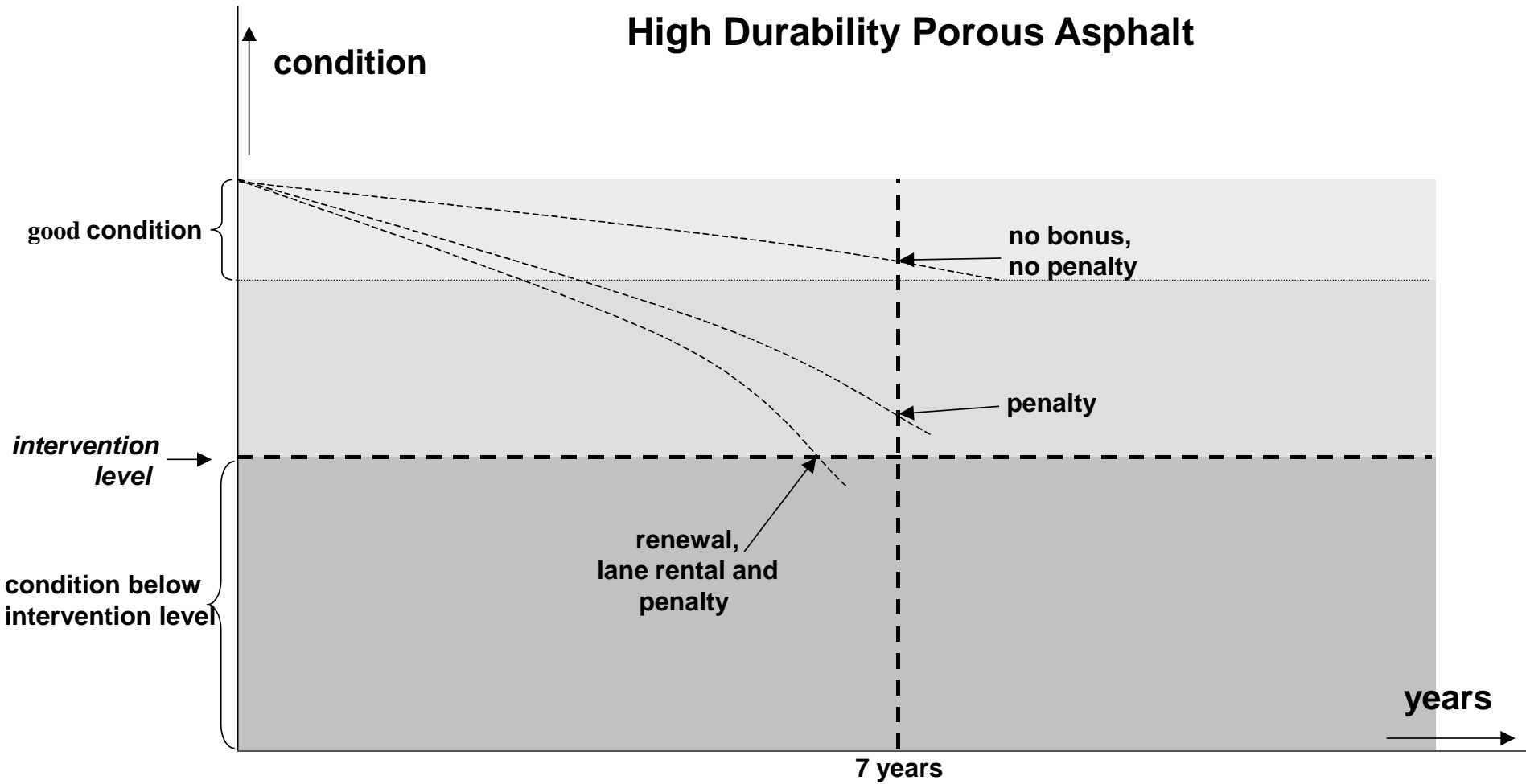


# Standard Porous Asphalt and Twin Layer Porous Asphalt





# High Durability Porous Asphalt





# Types of functional contracts – D&C

## *Design & Construct contracts*

- contractor has a design responsibility
- used for new design, reconstruction, road widening etc...
- usually with 7 to 10 years of warranty;
- wearing course performance is assessed the same way as for E&C - contracts
- for construction performance (bridges, structural pavement layers) the warranty period is insufficient; this is usually covered by a design verification



# Types of functional contracts – DBFM

## *DBFM – contracts*

- contractor has a design responsibility
- contractor is also responsible for the maintenance for 20 to 30 years
- this long M-period transfers a large parts of the risks to the contractor
- contractor is partly paid on the basis of availability (periodic “availability fee”)
- contractor also receives payments for realisation of new, or improvement of existing, infrastructure objects (tunnels, bridges, roads)



# Types of functional contracts – DBFM

## Availability fee

- net availability fee
- = gross availability fee – availability correction – performance penalty
- gross availability is a periodic payment, adapted yearly based on an index figure
- where the contractor still uses existing infrastructure (“Transition Infrastructure”), only a part of the gross availability fee is paid for its maintenance





## Types of functional contracts – DBFM

### Availability fee correction

- availability correction is a correction for each 15 min that a lane is not available because
  - it does not meet the requirements
  - the contractor is working on it (unless this is because of circumstances on which he has no influence, like accidents)
- availability correction is higher in day time than in night time



## Types of functional contracts – DBFM

### Performance penalty

- = gross availability fee \* [penalty points \* 0,1% - bonus(%)]
- penalty points can be scored by a number of shortcomings, like
  - accidents due to (lack of) action by the contractor
  - causing dangerous situations
  - working without correct communication or authorisation
  - exceeding contractual repair timesand are increased when shortcomings occur several times and / or last for a longer time
- bonus is paid if no penalty points are given in two consecutive periods



## Types of functional contracts – DBFM

Payments for realisation of new, or improvement of existing infrastructure objects (tunnels, bridges, roads)

- the contract contains a list of new and existing infrastructure objects
- the contractor receives a payment after realisation of an object
- the object must meet output specifications which are in principle similar to output specifications of D&C – contracts but cover less aspects (only long term risks)



# Types of functional contracts – DBFM

## Tender in preparation

- Via15 (Arnhem-Nijmegen)
- A27 Hooipolder-Lunetten
- N18 Varseveld- Enschede

## In tender stage

- Schiphol - Amsterdam – Almere
- N33 Assen - Zuidbroek

## In realisation stage

- 2<sup>nd</sup> Coen tunnel / Westrandweg
- A12 Utrecht - Veenendaal
- A15 Maasvlakte - Vaanplein

## In exploitation stage

- N31 Waldwei