

JUNE 2013
LETBANESEKRETARIATET

ALIGNMENT ASSUMPTIONS

REPORT



SYSTRA

COWI

ADDRESS COWI A/S
Visionsvej 53
9000 Aalborg
Denmark

TEL +45 56 40 00 00
FAX +45 56 40 99 99
WWW cowi.com

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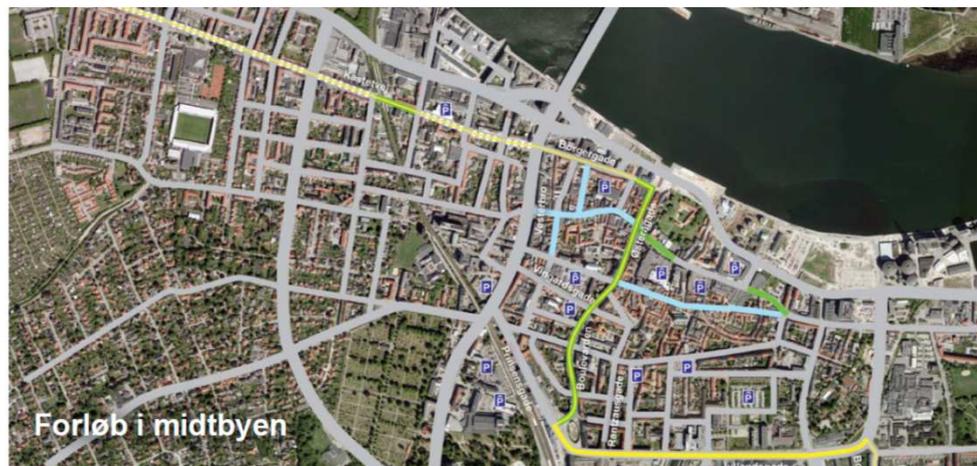
1 Introduction

The current document aims to lay out the assumptions used in the design of the Aalborg Light Rail Transit (LRT) alignment in the context of the Aalborg High-Class Transport Feasibility Study. Furthermore, it presents examples of the format that will be used to provide typical cross-sections and top-view drawings for the above-mentioned study.

2 Design assumptions for the alignment

We assume that, unless otherwise indicated, the LRT right-of-way is to be segregated from car traffic (except at intersections); it is to be placed in the centre of the road; and the OCS (overhead catenary system) masts are to be placed centrally, in between the two tracks.

The drawing below summarizes the other sorts of configurations for the alignment in the West of the city and in the City Centre.



	Indfaldsveje		Bus/cykel gade
	Overordnede fordelingsveje		Gågade
	Sekundære fordelingsveje/boliggader		Eget tracé
	Reduceret biltrafik		Delt tracé

3 Technical assumptions related to the LRT right of way

Technical constraints have been applied to the LRT alignment according to the rules set out in the German Strassenbahn-Bau- und Betriebsordnung (BOStrab) unless otherwise indicated.

3.1 Structure gauge

Rolling stock constructors provide tables indicating appropriate structure gauge for their rolling stock in function of:

- The curve radius of a given section
- The presence (or not) of an obstacle between the two tracks

We have been asked to design infrastructure that would be compatible with the light rail rolling stock that will be deployed in Aarhus. Nonetheless, this rolling stock is unknown at this time.

As such, we determine the structure gauge in the current study based on:

- The assumed width of the light rail rolling stock in Aarhus, according to the tender specifications: 2.65 m
- The “worst-case” (i.e. widest) structure gauges for light rail rolling stock of this width currently on the market.
- A “worst-case” assumption regarding the space needed for the centrally-place overhead contact system (OCS) masts *on a straight alignment*: 50 cm¹

¹ Note that BOStrab recommends that this value be 70 cm. Nonetheless, extensive LRT experience in France has shown that 50 cm in a straight alignment are sufficient *provided*

Given that the current study is in a quite preliminary stage, we find that it is appropriate to be even more conservative in our estimates than the tender specifications in Aarhus. Indeed, it will be much easier to optimise the width of the light rail right-of-way in later stages of the project than it would be to find more space because the alignment designed in the feasibility study did not allow enough margin to account for the actual product choices and technical constraints that will be identified later on.

Our conservative assumptions on structure gauge for the two tracks in a straight alignment are the following:

Structure gauge width without central OCS mast: **6.50 m**

Structure gauge width with central OCS mast: **7 m**

3.2 Station Platform

For the Aarhus LRT, it is assumed that vehicle length shall be between 36m and 44m for a single unit arrangement. For Aalborg the station platform length is 40m for a single unit arrangement with one or two access ramps at 4%.

When possible, stations should be in straight alignment except in special cases.

The height of the platforms in stations will be 300mm.

A distance of 6.2 m between station platforms (on straight alignment without central mast) will be taken into account to allow for maximum accessibility.

that the masts have an I profile. We have taken this assumption because of the extremely constrained width in certain sections of the alignment. Note that, if needed, it would be possible to further compress the LRT right of way by attaching the overhead line to building facades instead of to masts.

4 Assumptions related to road regulations

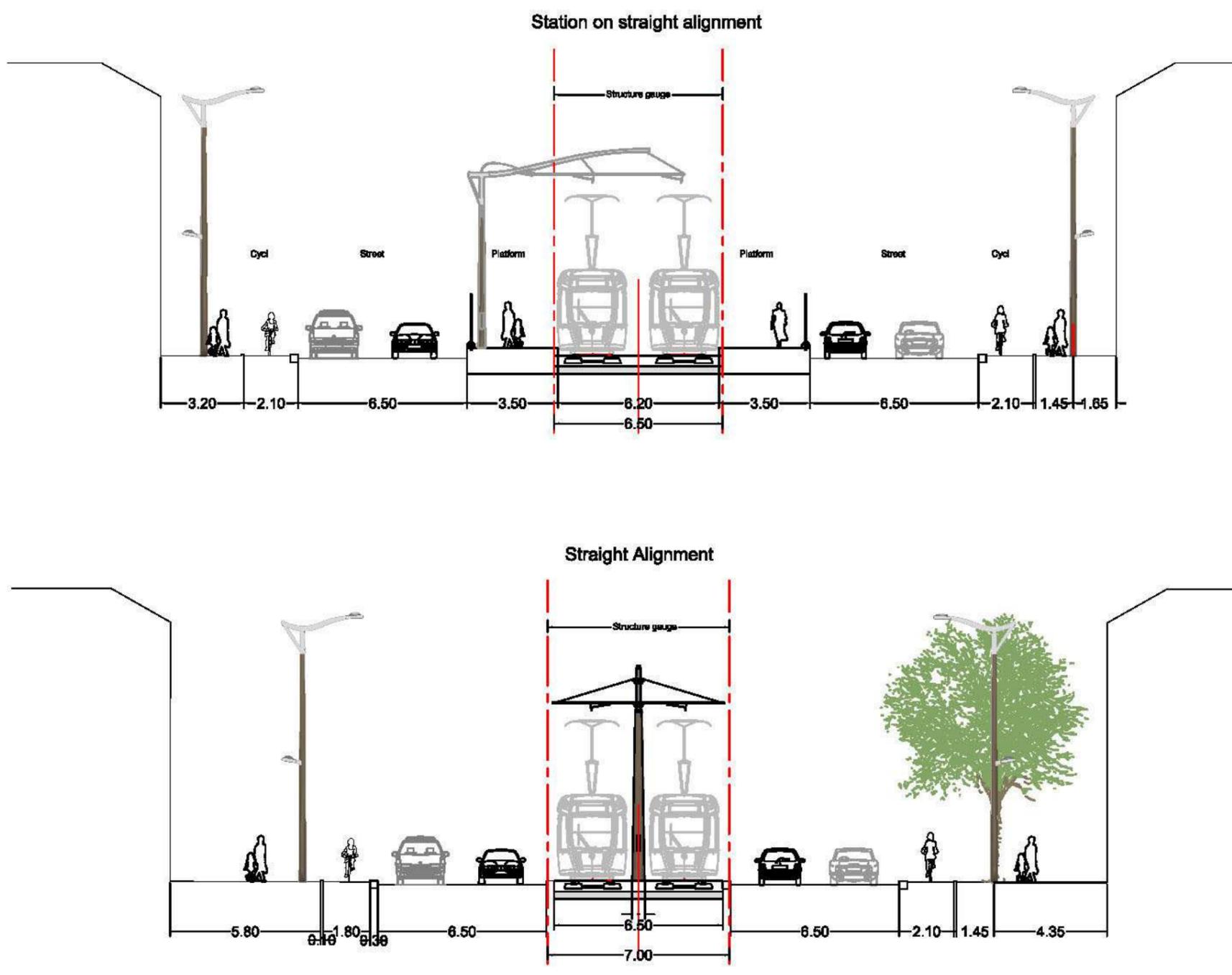
Based on the provided documentation, we make the following assumptions related to rules for the dimensions of roads and bike lanes:

- Width of one-way bike lane: 2.10 m
- Width of two-way bike lane: 3.5m
- Width of single, isolated traffic lane: 3.5m
- Width of single traffic lane when there are 2 or more contiguous lanes: 3.25 m
- at 60-80 km/h:
 - o Continuous object²
 - Indicative : $2.6 \text{ (assumed truck, figure 6.13) } / 2 + 1 \text{ (figure 6.14) } = 2.3\text{m}$
 - Minimum: $2.6 \text{ (assumed truck, figure 6.13) } / 2 + 0.6 \text{ (figure 6.14) } = 1.9\text{m}$
 - o Single object
 - Indicative : $2.6 \text{ (assumed truck, figure 6.13) } / 2 + 1.5 \text{ (figure 6.14) } = 2.8\text{m}$
 - Minimum: $2.6 \text{ (assumed truck, figure 6.13) } / 2 + 1 \text{ (figure 6.14) } = 2.3\text{m}$
- At 30-50 km/h

² The following distances are drawn from figures 6.13 and 6.14 of the document “Gauge and object distance.pdf”, which was provided by COWI.

- Continuous object
 - Indicative : 2.6 (assumed truck, figure 6.13) / $2 + 1$ (figure 6.14) = 2.3m
 - Minimum: 2.6 (assumed truck, figure 6.13) / $2 + 0.5$ (figure 6.14) = 1.8m
- Single object
 - Indicative : 2.6 (assumed truck, figure 6.13) / $2 + 1.5$ (figure 6.14) = 2.8m
 - Minimum: 2.6 (assumed truck, figure 6.13) / $2 + 1$ (figure 6.14) = 2.3m

5 Example cross-sections



6 Example finished top-view drawing

