

Measurement report

# Tallinna Maraton

21,1 km

Karen Aau  
WA - AIMS B grade measurer  
August 2024

## GENERAL INFORMATION

**Name of measurer:** Karen Aau, B grade measurer

**Address:** Vanakuu 13-13, Tallinn, Estonia

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**E-mail:** aau.karen@gmail.com

**Name of event:** Tallinna Maraton

**Location:** Tallinn, Estonia

**Race date:** 07.09.2024

**Distance:** 21,1 km

**Advertised race distance:** not less than 21097,5 m

**Race contact person:** Mati Lilliallik

**Phone:** +372 521 3331

**E-mail:** jooks@jooks.ee

### Description of the course

**Type of course:** flat, point to point

**Race surface:** asphalt

**Separation:** 0,46%

**Altitude:**

Start – 18,5 m, Finish 23,5 m

Highest point – 27 m, Lowest point – 4 m

Difference in elevation highest > lowest point – 23 m

### Measurement details

**Section of road available:** Mostly entire width of road, except:

P8>P9 - Paldiski road (land-side lane between Tuuleveski St > Mõisa St)

P13>P14 - Rannamäe tee St (cycle path up to the right-hand bend to the bus park)

P14>Finish - Toompuiestee St (Old Town side lane)

**Line to be taken at turns:** shortest possible route

## DETAIL OF THE CALIBRATION COURSE

**Date:** 01.08.2022

**Location of calibration course:** pathway at Kõrgepinge street near Paldiski road

**Measure method:** steel taped

**Number of measurements:** 2

**Markers:** nails

**Start time:** 11:30

**Finish time:** 12:00

**Temperature:** *Start +19°C, Finish +19°C, Average +19°C*

### MEASUREMENTS AND CALCULATIONS:

1 First measurement.

$$\frac{6}{\# \text{ tape lengths}} \times \frac{49,9 \text{ m}}{\text{distance per tape length}} + \frac{0,6 \text{ m}}{\text{partial tape length}} = \frac{300 \text{ m}}{\text{measured distance}}$$

2 Second measurement.

$$\frac{6}{\# \text{ tape lengths}} \times \frac{49,9 \text{ m}}{\text{distance per tape length}} + \frac{0,612 \text{ m}}{\text{partial tape length}} = \frac{300,012 \text{ m}}{\text{measured distance}}$$

3 Average raw (uncorrected) measurement of course 300,006 m

4 Temperature correction.

$$\text{Correction factor} = 1 + (0.0000116 \times [19 - 20]) = 0,9999884$$

5 Multiply the temperature correction factor by the average raw measurement of the course

$$\frac{0,9999884}{\text{correction factor}} \times \frac{300,006 \text{ m}}{\text{avg. raw measurement}} = \frac{300,0025199 \text{ m}}{\text{corrected measurement}}$$

6 Final (adjusted) length of calibration course: **300 m**

$$\underline{300,0025199 \text{ m} - 0,0025199 \text{ m} = 300\text{m}}$$

**Summary:** To get 300 m length calibration course, divorced 2,5 mm with steel tape.

## BICYCLE CALIBRATION DATA SHEET

### PRE-CALIBRATION:

**Day:** 02.08.2022

**Time:** 11.05

**Temperature:** +20°C

Start count	Finish count	Difference
380382	383663	3281
383663	386945	3282
386945	390226	3281
390226	393508	3282

Pre-measurement average count =  $(3281+3282+3281+3282) / 4 = 3281,5$

Counts per km =  $3281,5 \times 1000 / 300 = 10938,3333$

Working Constant =  $10938,3333 \times 1,001 / 1000 = 10,9492716 \text{ c/m}$

### POST-CALIBRATION:

**Day:** 02.08.2022

**Time:** 15.00

**Temperature:** +23°C

Start count	Finish count	Difference
725980	729261	3281
729261	732542	3281
732542	735824	3282
735824	739105	3281

Post-measurement average count =  $(3288+3288+3288+3289) / 4 = 3281,25$

Counts per km =  $3281,25 \times 1000 / 300 = 10937,5$

Working Constant =  $10937,5 \times 1,001 / 1000 = 10,9484375 \text{ c/m}$

**CONSTANT FOR THE DAY =  $(10,9492716+10,9484375) / 2 = 10,9488546 \text{ c/m}$**

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### PRE-CALIBRATION:

**Day:** 02.08.2022

**Time:** 23.10

**Temperature:** +18°C

Start count	Finish count	Difference
740555	743842	3287
743842	747129	3287
747129	750416	3287
750416	753703	3287

Pre-measurement average count =  $(3287+3287+3287+3287) / 4 = 3287$

Counts per km =  $3287 \times 1000 / 300 = 10956,6667$

**Working Constant =  $10956,6667 \times 1,001 / 1000 = 10,9676233 \text{ c/m}$**

**POST-CALIBRATION:**
**Day:** 03.08.2022

**Time:** 2.10

**Temperature:** +15°C

Start count	Finish count	Difference
964070	967358	3288
967358	970646	3288
970646	973934	3288
973934	977223	3289

 Post-measurement average count =  $(3288+3288+3288+3289) / 4 = 3288,25$ 

 Counts per km =  $3288,25 \times 1000 / 300 = 10960,8333$ 

 Working Constant =  $10960,8333 \times 1,001 / 1000 = 10,9717942$  c/m

**CONSTANT FOR THE DAY =  $(10,9676233+10,9717942) / 2 = 10,9697087$  c/m**


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**PRE-CALIBRATION:**
**Day:** 09.08.2022

**Time:** 21.10

**Temperature:** +18°C

Start count	Finish count	Difference
86837	90129	3292
90129	93422	3293
93422	96714	3292
96714	100006	3292

 Pre-measurement average count =  $(3292+3293+3292+3292) / 4 = 3292,25$ 

 Counts per km =  $3292,25 \times 1000 / 300 = 10974,1667$ 

 Working Constant =  $10974,1667 \times 1,001 / 1000 = 10,9851408$  c/m

**POST-CALIBRATION:**
**Day:** 09.08.2022

**Time:** 23.45

**Temperature:** +14°C

Start count	Finish count	Difference
171000	174294	3294
174294	177588	3294
177588	180882	3294
180882	184175	3293

 Post-measurement average count =  $(3294+3294+3294+3293) / 4 = 3293,75$ 

 Counts per km =  $3293,75 \times 1000 / 300 = 10979,1667$ 

 Working Constant =  $10979,1667 \times 1,001 / 1000 = 10,9901458$  c/m

**CONSTANT FOR THE DAY =  $(10,9851408+10,9901458) / 2 = 10,9876433$  c/m**

**PRE-CALIBRATION:**
**Day:** 09.08.2023

**Time:** 12.08

**Temperature:** +19°C

Start count	Finish count	Difference
960270	963552	3282
963552	966835	3283
966835	970118	3283
970118	973401	3283

 Pre-measurement average count =  $(3282+3283+3283+3283) / 4 = 3282,75$ 

 Counts per km =  $3282,75 \times 1000 / 300 = 10942,5$ 

 Working Constant =  $10942,5 \times 1,001 / 1000 = 10,9534425$  c/m

**POST-CALIBRATION:**
**Day:** 09.08.2023

**Time:** 15.55

**Temperature:** +21°C

Start count	Finish count	Difference
269457	272742	3285
272742	276028	3286
276028	279313	3285
279313	282599	3286

 Post-measurement average count =  $(3285+3286+3285+3286) / 4 = 3285,5$ 

 Counts per km =  $3285,5 \times 1000 / 300 = 10951,66666$ 

 Working Constant =  $10951,66666 \times 1,001 / 1000 = 10,96261832$  c/m

**CONSTANT FOR THE DAY =  $(10,9534425+10,96261832) / 2 = 10,95803041$  c/m**


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**PRE-CALIBRATION:**
**Day:** 09.08.2023

**Time:** 22.30

**Temperature:** +15°C

Start count	Finish count	Difference
283790	287079	3289
287079	290368	3289
290368	293658	3290
293658	296948	3290

 Pre-measurement average count =  $(3289+3289+3290+3290) / 4 = 3289,5$ 

 Counts per km =  $3289,5 \times 1000 / 300 = 10965$ 
**Working Constant =  $10965 \times 1,001 / 1000 = 10,975965$  c/m**

**POST-CALIBRATION:**
**Day:** 10.08.2023

**Time:** 02.05

**Temperature:** +13°C

Start count	Finish count	Difference
423438	426728	3290
426728	430019	3291
430019	433310	3291
433310	436600	3290

 Post-measurement average count =  $(3290+3291+3291+3290) / 4 = 3290,5$ 

 Counts per km =  $3290,5 \times 1000 / 300 = 10968,33333$ 
**Working Constant** =  $10968,33333 \times 1,001 / 1000 = 10,97930166$  c/m

**CONSTANT FOR THE DAY** =  $(10,975965+10,97930166) / 2 = 10,97763333$  c/m

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**PRE-CALIBRATION:**
**Day:** 07.08.2024

**Time:** 21.30

**Temperature:** +19°C

Start count	Finish count	Difference
340285	343567	3282
343567	346849	3282
346849	350131	3282
350131	353412	3281

 Pre-measurement average count =  $(3282+3282+3282+3281) / 4 = 3281,75$ 

 Counts per km =  $3281,75 \times 1000 / 300 = 10939,16666$ 
**Working Constant** =  $10939,16666 \times 1,001 / 1000 = 10,95010582$  c/m

**POST-CALIBRATION:**
**Day:** 08.08.2024

**Time:** 00.15

**Temperature:** +16°C

Start count	Finish count	Difference
461230	464514	3284
464514	467798	3284
467798	471082	3284
471082	474366	3284

 Post-measurement average count =  $(3284+3284+3284+3284) / 4 = 3284$ 

 Counts per km =  $3284 \times 1000 / 300 = 10946,66666$ 
**Working Constant** =  $10946,66666 \times 1,001 / 1000 = 10,95761332$  c/m

**CONSTANT FOR THE DAY** =  $(10,95010582+10,95761332) / 2 = 10,95385957$  c/m

## COURSE MEASUREMENT DATA SHEET

reading	counts	distance	adj.dist	location
<i>Measured in reverse of running direction, 03.08.2022, c=10,9697087 c/m</i>				
--- adjustment here removes 1058 counts $c = 10,95385957 c/m = 96,6 m$ ---				
899456	0	0.0m		START - at Falgi tee near pc (detailed sketch attached)
917394	17938	<b>1635,2 m</b>	<b>1538,6 m</b>	P1 – the edge of the manhole cover before the turn to Kolde pst St
<i>Measured in running direction, 03.08.2022, c=10,9697087 c/m</i>				
790581	0	1635,2 m	1538,6 m	P1 - the edge of the manhole cover before the turn to Kolde pst
791085	504	<b>1681,1 m</b>	<b>1584,5 m</b>	P2 - pc post left hand after turning to Kolde pst
791085	0	1681,1 m	1584,5 m	P2 - pc post left hand after turning to Kolde pst
794250	3165	<b>1969,6 m</b>	<b>1873,0 m</b>	P3 - kids on the road sign post left hand
<i>Measured in running direction, 07.08.2024, c = 10,95385957</i>				
--- adjustment here with steel tape adds 5,1 m ---				
457412	0	1969,6 m	1873,0 m	P3 - kids on the road sign post left hand
460651	3239	<b>2265,3 m</b>	<b>2173,8 m</b>	P4 – lp right hand before pc
<i>Measured in reverse of running direction, 07.08.2024, c = 10,95385957</i>				
378353	0	2265,3 m	2173,8 m	P4 - lp right hand before pc
390586	12233	<b>3382,1 m</b>	<b>3290,6 m</b>	P16 - lp left hand after pc
<i>Measured in reverse of running direction, 07.08.2024, c = 10,95385957</i>				
377945	0	3382,1 m	3290,6 m	P16 - lp left hand after pc
378353	408	<b>3419,3 m</b>	<b>3327,8 m</b>	P5 – first lp left hand
<i>Measured in reverse of running direction, 07.08.2024, c = 10,95385957</i>				
356652	0	3419,3 m	3327,8 m	P5 – first lp left hand
373713	17061	<b>4976,8 m</b>	<b>4885,3 m</b>	P6 - tlp before left turn to Paldiski mnt
<i>Measured in reverse of running direction, 03.08.2022, c=10,9697087 c/m</i>				
754680	0	4976,8 m	4885,3 m	P6 - tlp before left turn to Paldiski mnt
758451	3771	<b>5320,6 m</b>	<b>5229,1 m</b>	P7 - tlp after pc on Paldiski mnt before turn to Kõrgepinge St
<i>Measured in running direction, 02.08.2022, c=10,9488546 c/m</i>				
441124	0	5320,6 m	5229,1 m	P7 - tlp after pc on Paldiski mnt before turn to Kõrgepinge St
467266	26142	<b>7708,2 m</b>	<b>7616,7 m</b>	P8 – wooden lp left hand before the trash cans
<i>Measured in reverse of running direction, 09.08.2023, c=10,95803041 c/m</i>				
242839	0	7708,2 m	7616,7 m	P8 – wooden lp left hand before the trash cans
260144	17305	<b>9287,4 m</b>	<b>9195,9 m</b>	P9 - tunnel wall left hand
49379	0	9287,4 m	9195,9 m	P9 - tunnel wall left hand
100887	51508	<b>13997,9 m</b>	<b>13896,4 m</b>	P10 - signpost post right hand before intersection
<i>Measured in running direction, 09.08.2023, c=10,95803041 c/m</i>				
4028	0	13997,9 m	13896,4 m	P10 - signpost post right hand before intersection
11601	7573	<b>14679,0 m</b>	<b>14587,5 m</b>	P11 - lp right hand before junction
<i>Measured in running direction, 07.08.2024, c = 10,95385957</i>				
391735	0	14679,0 m	14587,5 m	P11 - lp right hand before junction
397967	6232	<b>15248,2 m</b>	<b>15156,7 m</b>	P15 - right hand cycle path sign post before car park
<i>Measured in running direction, 07.08.2024, c = 10,95385957</i>				
376066	0	15248,2 m	15156,7 m	P15 - right hand cycle path sign post before car park
377066	1000	<b>15339,5 m</b>	<b>15248,0 m</b>	P16 - lp right hand before pc



*Measured in running direction, 07.08.2024, c = 10,95385957*

378353	0	15339,5 m	15248,0 m	P16 - lp right hand before pc
390586	12233	<b>16365,0 m</b>	<b>16364,8 m</b>	P4 - lp right hand before pc

*Measured in reverse of running direction, 07.08.2024, c = 10,95385957*

--- adjustment here with steel tape adds 5,1 m ---

457412	0	16365,0 m	16364,8 m	P4 – lp right hand before pc
460651	3239	<b>16752,0 m</b>	<b>16665,6 m</b>	P3 - kids on the road sign post left hand

*Measured in reverse of running direction, 03.08.2022, c = 10,96970875 m*

791085	0	16752,0 m	16665,6 m	P3 - kids on the road sign post right hand
794250	3165	<b>17040,5 m</b>	<b>16954,1 m</b>	P2 - pc post right hand before turning to Ristiku St
799026	0	17040,5 m	16954,1 m	P2 - pc post right hand before turning to Ristiku St
805598	6572	<b>17639,6 m</b>	<b>17553,2 m</b>	P12 - pc sign post right hand after Luste St

*Measured in reverse of running direction, 03.08.2022, c=10,9697087 c/m*

931577	0	17639,6 m	17553,2 m	P12 - pc sign post right hand after Luste St
956349	24772	<b>19897,8 m</b>	<b>19811,4 m</b>	P13 – pc sign post right hand before Kopli/Suurtüki St corner

*Measured in reverse of running direction, 09.08.2023, c=10,97763333 m*

346582	0	19897,8 m	19811,4 m	P13 – pc sign post right hand before Kopli/Suurtüki St corner
353671	7089	<b>20543,6 m</b>	<b>20457,2 m</b>	P14 - manhole cover Center left hand near Toompuiestee 37/1

*Measured in reverse of running direction, 09.08.2023, c = 10,97763333 m*

--- adjustment here with steel tape removes 6,3 m ---

319452	0	20543,6 m	20457,2 m	P14 - manhole cover Center left hand near Toompuiestee 37/1
326550	7098	<b>21190,2 m</b>	<b>21097,5 m</b>	FINISH - at Falgi tee near pc (detailed sketch attached)

### **Note any adjustments made to the course after measurement:**

Adjustments made between START – P1 (new startline, removed 96,6 m with bicycle) and P9 – FINIŠ (new finish line, removed 6,3 meters with steel tape)

### **Notes:**

lp= lamp post

pc=pedestrian crossing

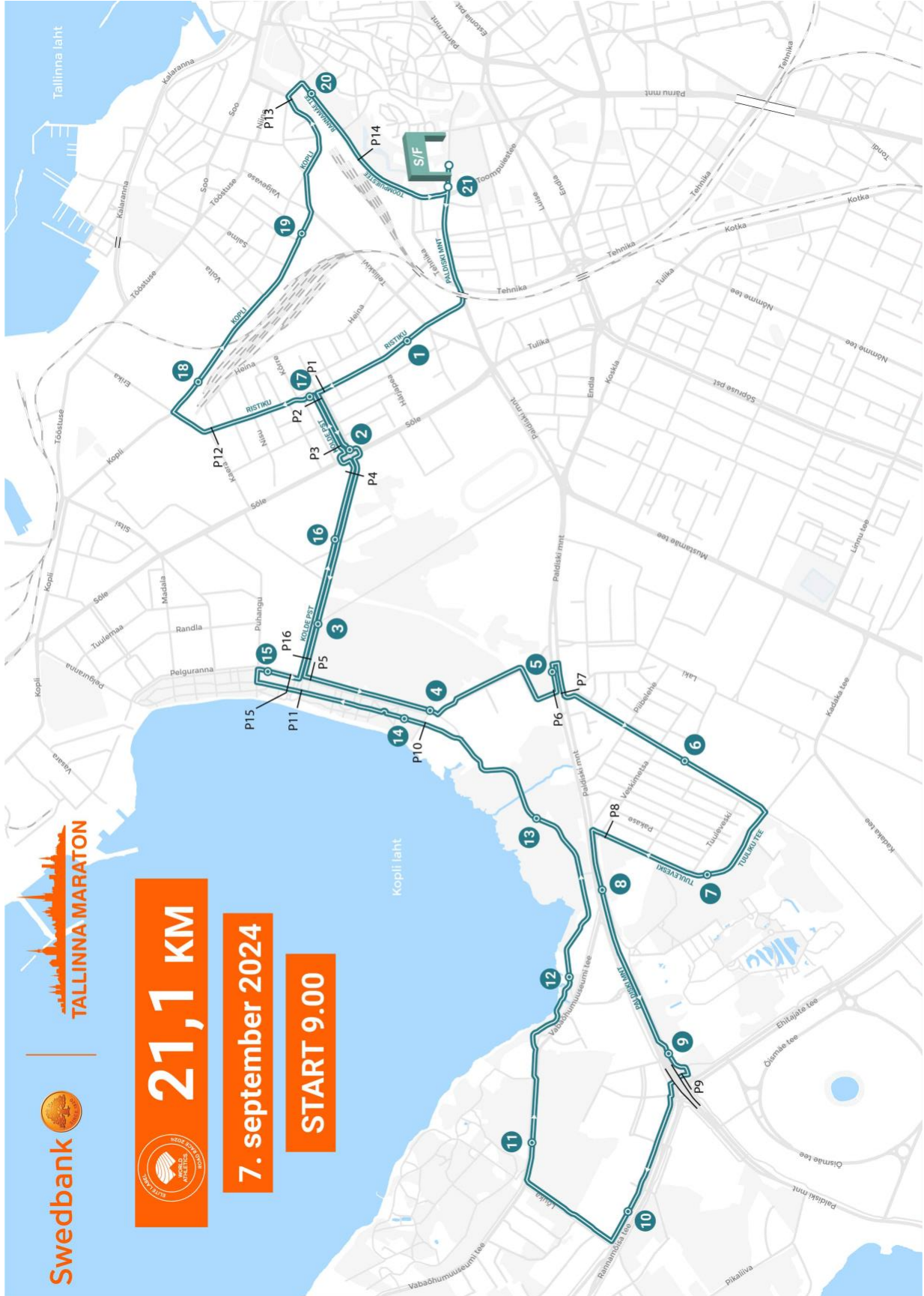
tlp=traffic light post

**CALIBRATION COURSE – 300 m**

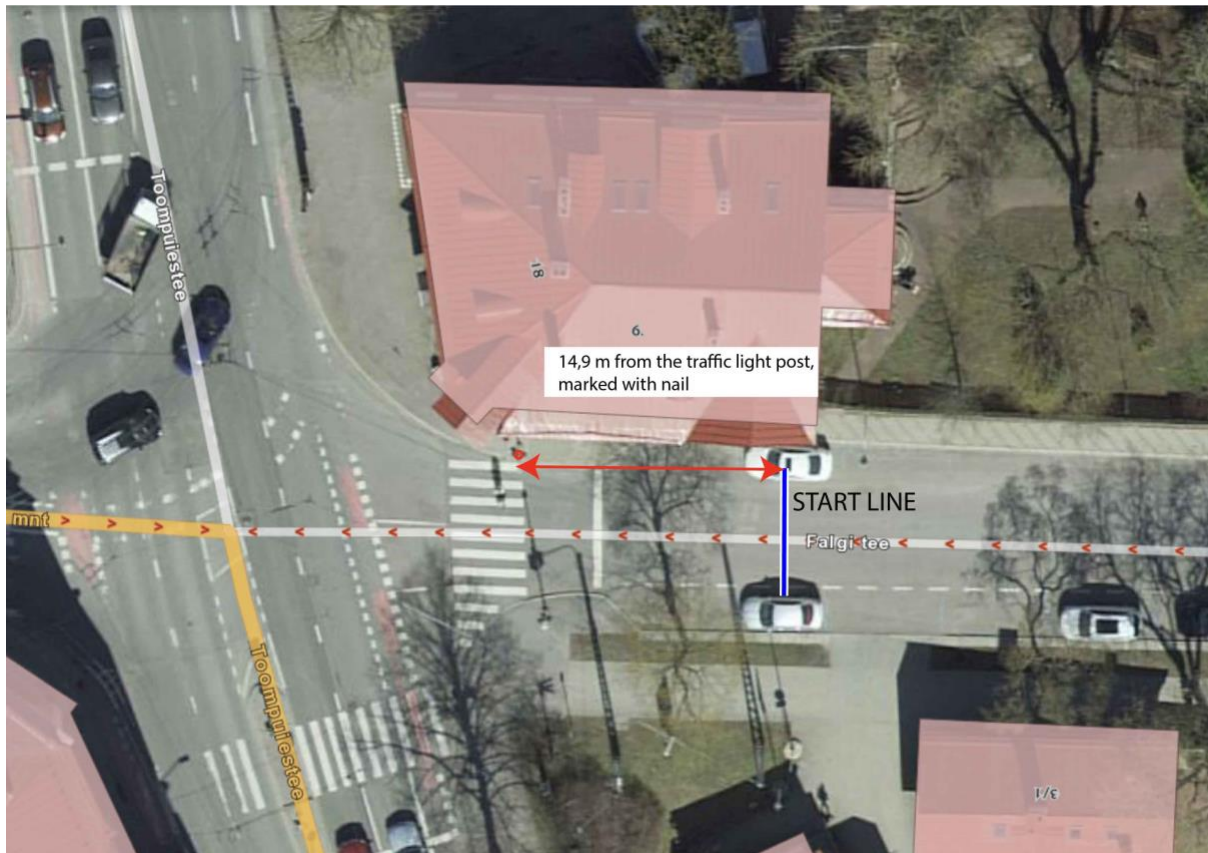




## COURSE



## START LINE

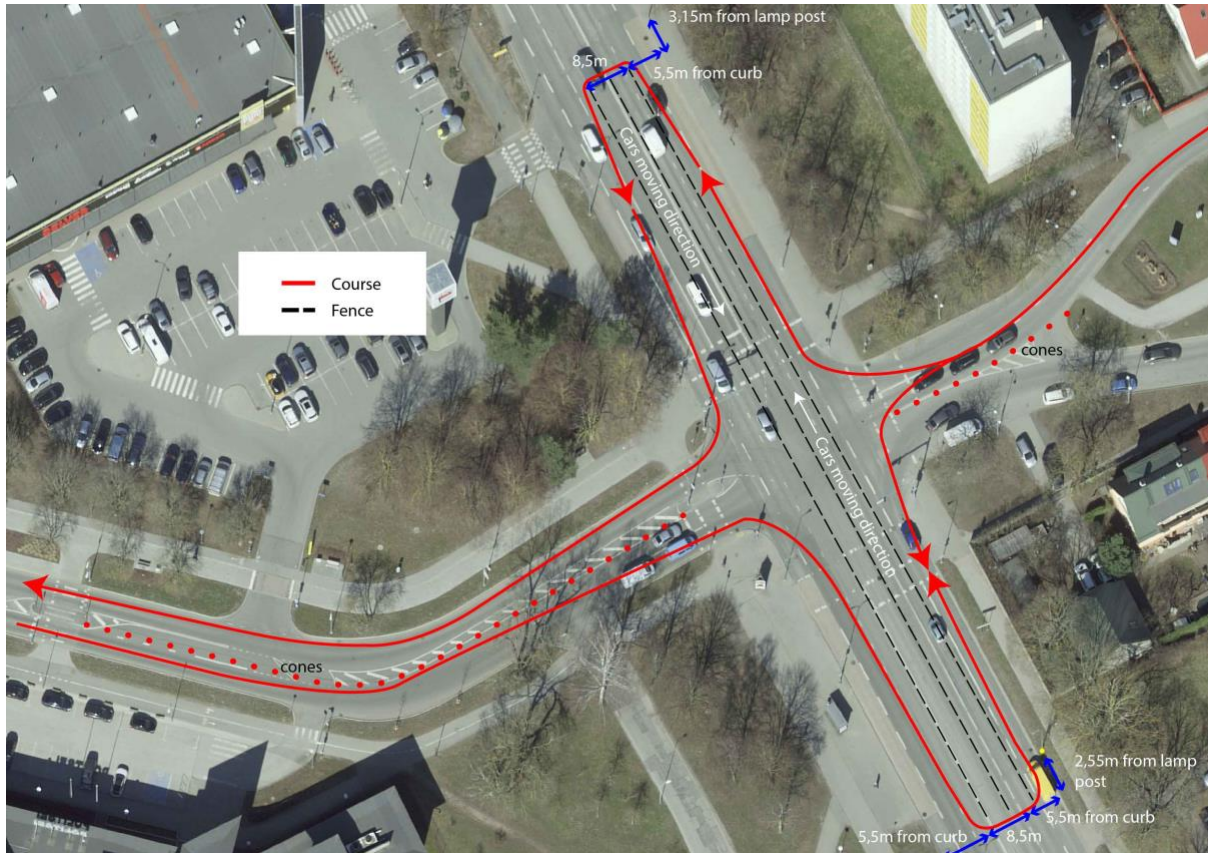


## FINISH LINE





### SÕLE St P3>P4



### PALDISKI ROAD P6>P7





**PALDISKI ROAD P8>P9**



**VABAÕHUMUUSEUMI TEE St P9>P10**





**PELGURANNA St / KOLDE PST St P11>P16**



**RANNAMÄE TEE St P13>P14**

