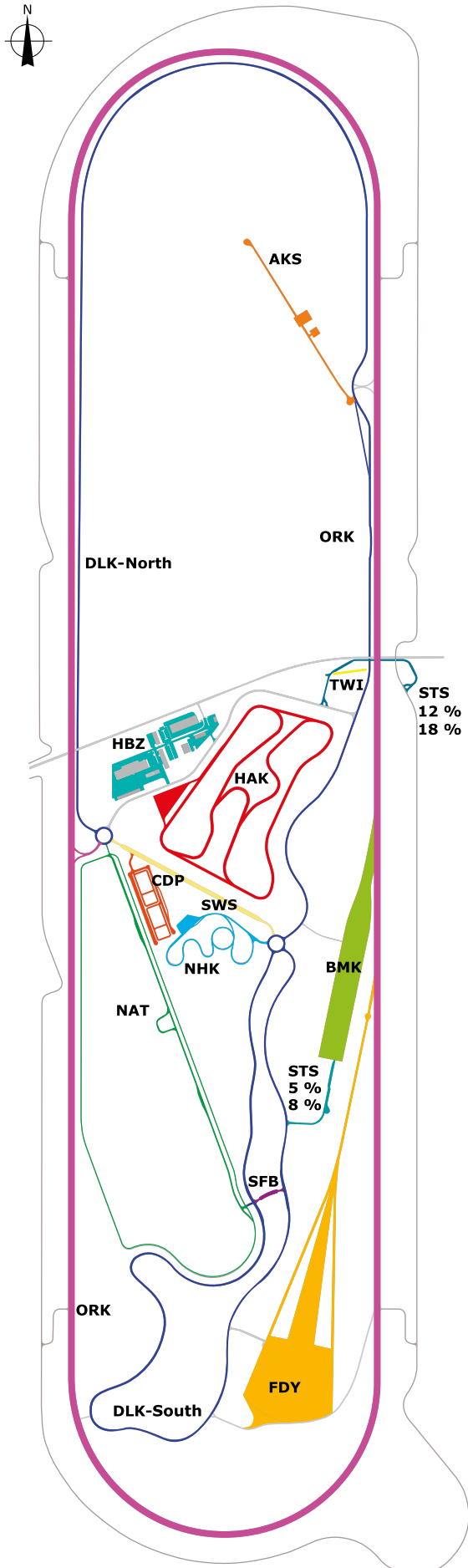




Test Tracks

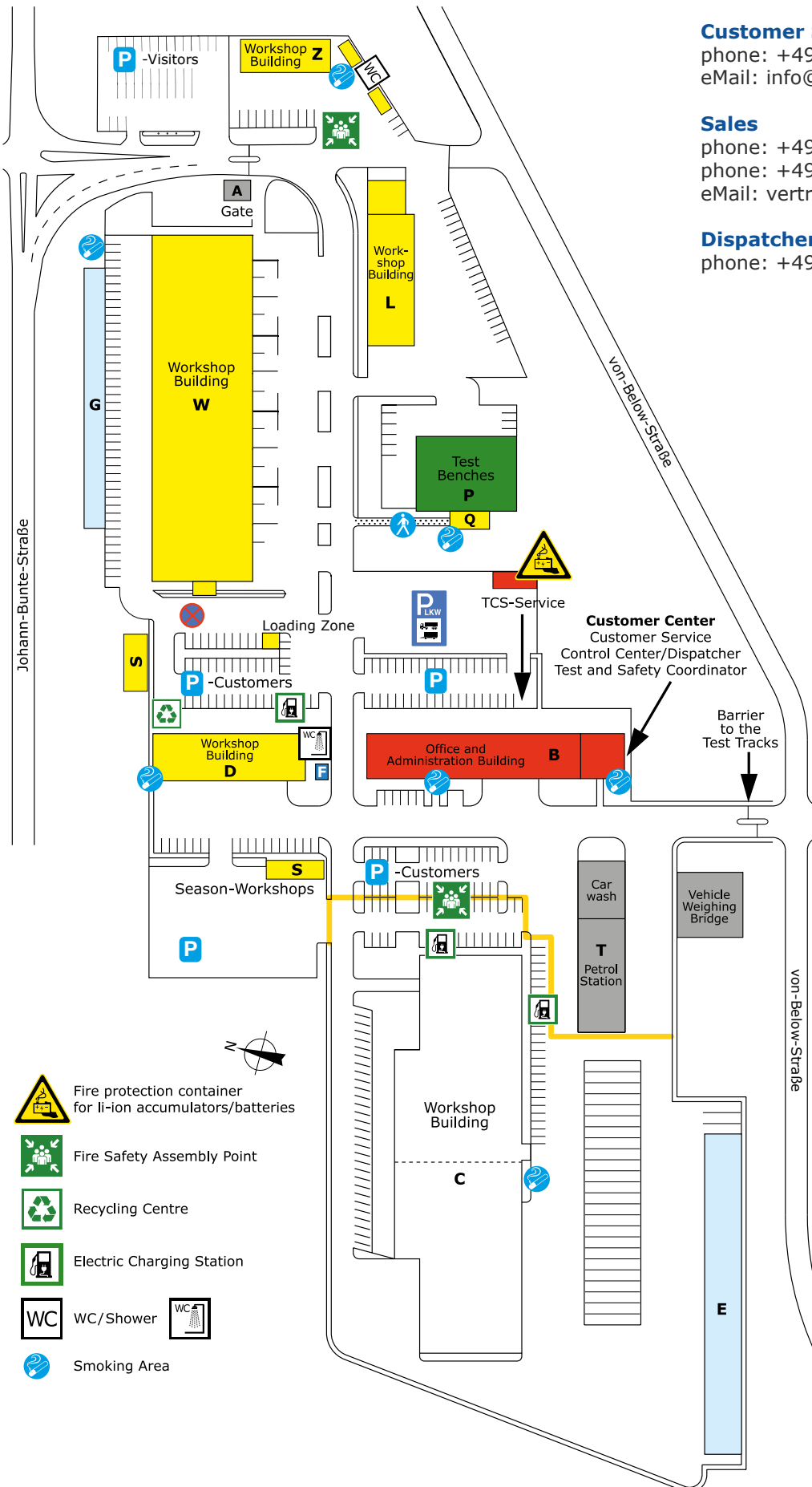


Facility Overview



- S. 4 Administration Area (HBZ)**
Workshops, Test Benches, Administration, Dispatcher, Filling Station, Car Wash, Vehicle Weighing Bridge
- S. 5 High Speed Oval (ORK)**
12.3 km, 4/5 lanes (plus safety lane); Vehicle speeds up to 250 km/h with zero side force; special surface include concrete freeway sections (e.g. FW 710 L.A.), long-wave two way and equal-sided excitation
- S. 6 Vehicle Dynamics Area (FDY)**
300 m diameter circular area with 1.2 km tangential and radial accesses
- S. 7 Braking Tracks (BMK)**
300 m, multi-lane wet surfaces (130 m thereof longitudinal aquaplaning surface) with a 280 m straight access from the high speed oval (Friction Level from 0.13 to 0.90)
- Misuse Test Area**
Exchangeable track modules
- S. 8 Durability Road North (DLK-North)**
Approx. 12.4 km (incl. Durability Road South) with multiple modules
- S. 9 Durability Road South (DLK-South)**
Approx. 12.4 km (incl. Durability Road North) with multiple modules
- S. 10 Handling Track (HAK)**
2.6 km, reproduction of small Hockenheimring
- S. 11 Wet Handling Track (NHK)**
1.1 km with integrated skid-pad (40 m radius)
- S. 12 Acoustic Track (AKS)**
Over 300 m long with measurement areas for cars and trucks (built in accordance with DIN ISO 10844:2014)
- S. 13 Gravel Track (NAT)**
Loose mineral mixture
- S. 14 Hill Sections (STS)**
Gradients of 5 %, 8 %, 12 % and 18 %
- S. 15 Rough Road (SWS)**
Concrete plate jolts up- and downwards, large stones set in concrete, various pavements
- S. 16 Twist Road (TWI)**
Mutually offset, sinusoidal road corrugations
- Banked Road (SFB)**
2 tracks with a length of 75 m each and approx. 4 m wide, angle of inclination transverse to the driving direction 15° and 20°
- S. 17 City Durability Road (CDP)**
Total track length of 443 m, slalom track approx. 250 m, salt water trough with adjustable water level

Administration Area (HBZ)



Customer Service







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Sales

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 phone: +49 4961 975-330
 eMail: vertrieb@atp-papenburg.de

Dispatcher

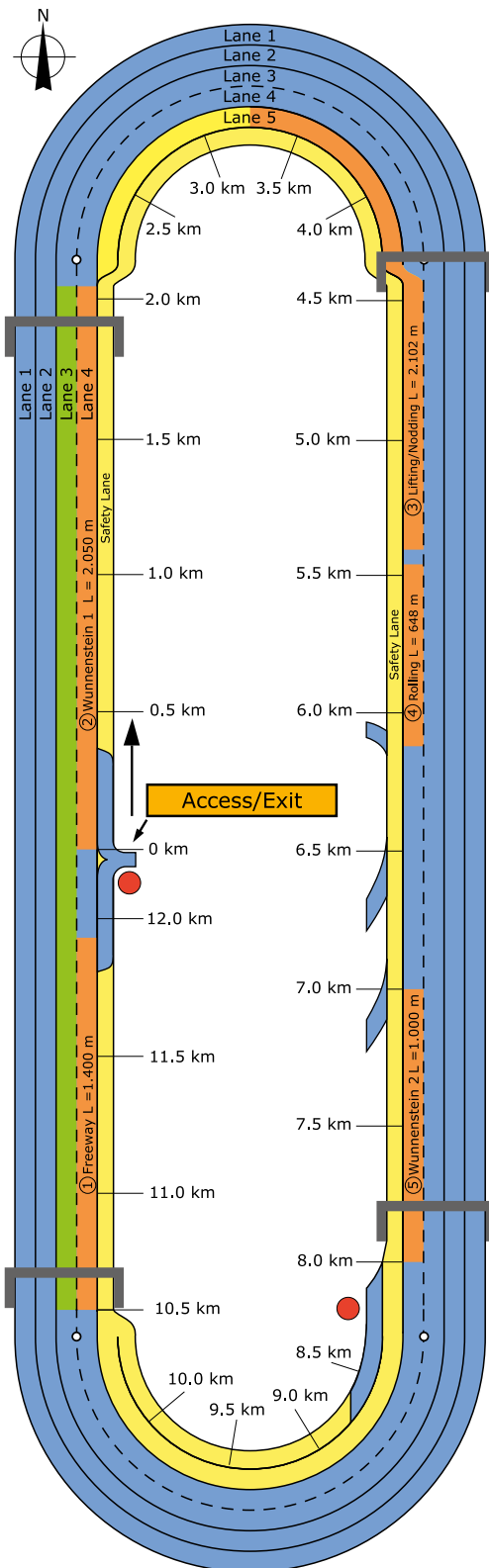
phone: +49 4961 975-317

-  Fire protection container for li-ion accumulators/batteries
-  Fire Safety Assembly Point
-  Recycling Centre
-  Electric Charging Station
-  WC/Shower
-  Smoking Area

High Speed Oval (ORK)

- High Speed Oval with banked curves up to 49.7°
- Zero side force up to 250 km/h
- Speed sensor in lane 1 and 2

Complete dimensions	Length: 12.3 km
Straight Lanes West/East	Length: each 4.0 km (5 lanes)
Curves North/South	Length: each 2.15 km (6 lanes)



- Asphalt**
- Special Section**
- Concrete**
- Safety Lane**
- Variable Light Displays**
- Roofed Parking Site**

Special elements of the High Speed Oval

The following modules are integrated:

1. Freeway Design: Concrete	Reproduction of an American highway (FW 710 L.A.) Concrete plates with scouring, concrete plate jolts downwards Straight (one lane) Length: 1.400 m Width: 4 m
2. Wunnenstein 1 Design: Concrete	Reproduction of the state motorway section (A 81 before the Wunnenstein service area as of 1990). Concrete plates with scouring, concrete plate jolts Straight (one lane) Length: 2.050 m Width: 4 m
3. Lifting/Nodding Design: Asphalt	Long-wave equal-sided excitation Curve (one lane) Length: 1.100 m Width: 4 m Straight (one lane) Length: 1.000 m Width: 4 m
4. Rolling Design: Asphalt	Long-wave two way excitation Straight (one lane) Length: 648 m Width: 4 m
5. Wunnenstein 2 Design: Asphalt	Reproduction of the state motorway section (A 81 behind Wunnenstein service area as of 1990). Short-wave periodic rolling condition Straight (one lane) Length: 1.000 m Width: 4 m

Vehicle Dynamics Area (FDY)

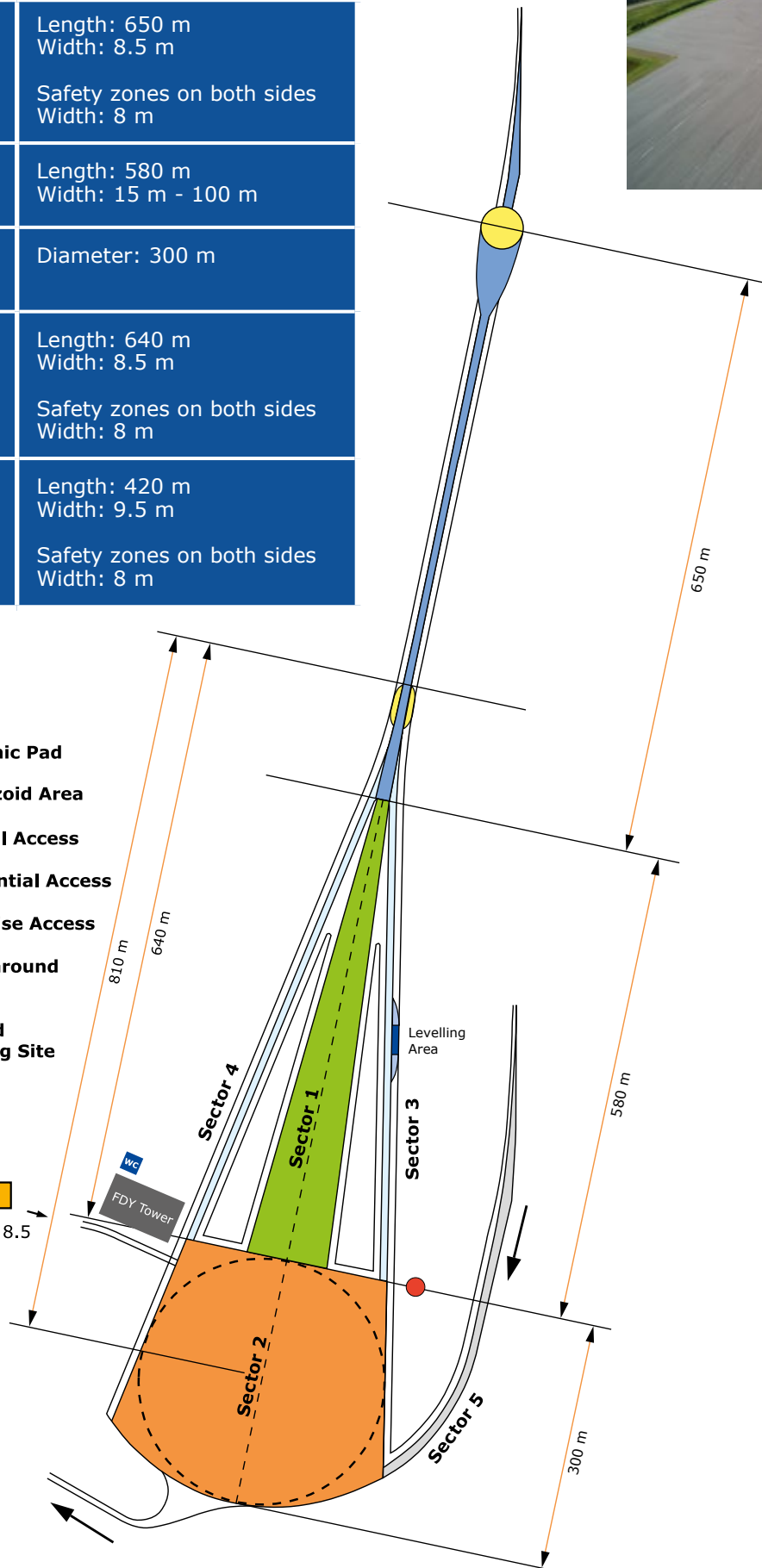
- Circular plate with primary trapezoid area

Central access	Length: 650 m Width: 8.5 m Safety zones on both sides Width: 8 m
Trapezoid Area Sector 1	Length: 580 m Width: 15 m - 100 m
Circular Area Sector 2	Diameter: 300 m
two tangential accesses Sector 3 and 4	Length: 640 m Width: 8.5 m Safety zones on both sides Width: 8 m
Accesses on partial arc (BAB exit) Sector 5	Length: 420 m Width: 9.5 m Safety zones on both sides Width: 8 m



- Dynamic Pad**
- Trapezoid Area**
- Central Access**
- Tangential Access**
- Sidewise Access**
- Turn-around Area**
- Roofed Parking Site**

Access/Exit
via DLK-South, km 8.5



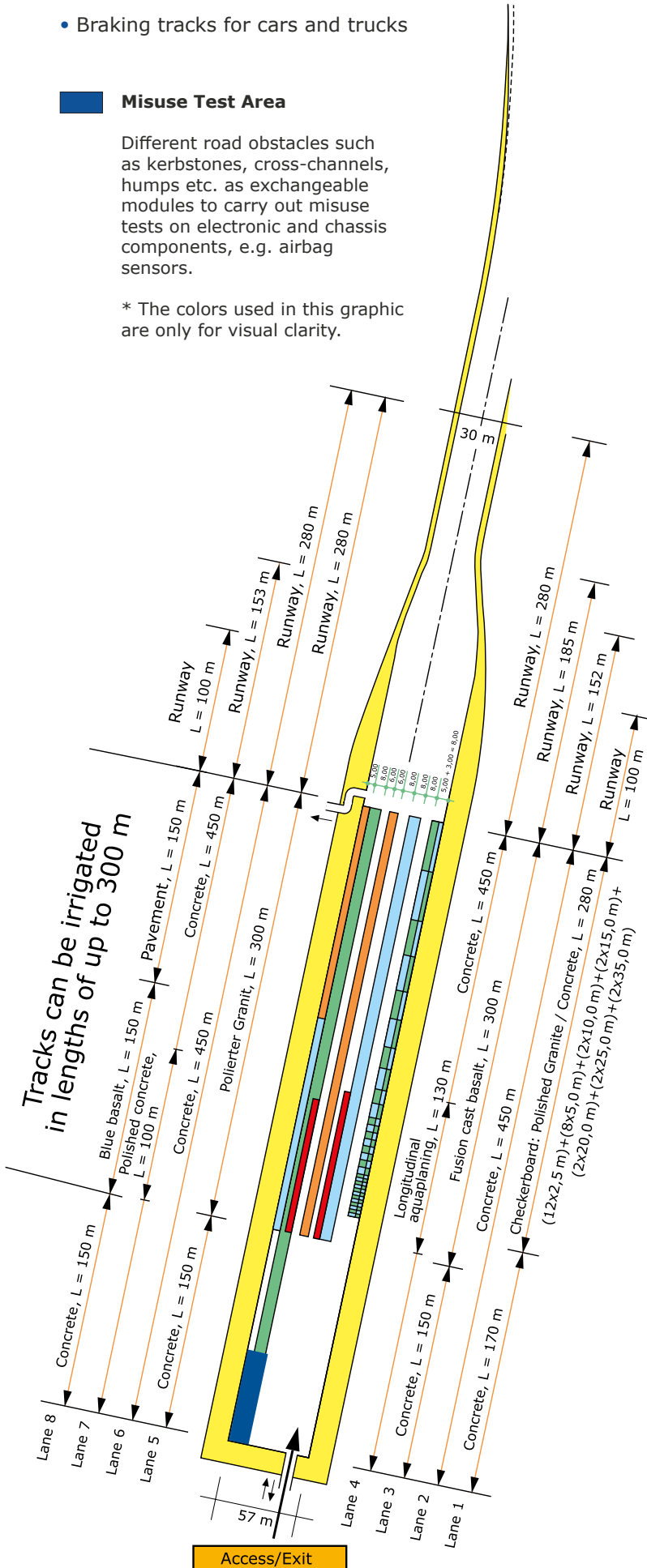
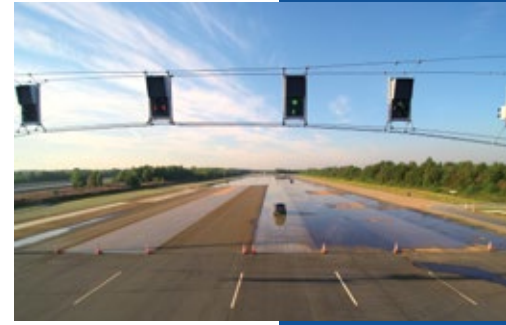
Braking Tracks (BMK)

- Braking tracks for cars and trucks

Misuse Test Area

Different road obstacles such as kerbstones, cross-channels, humps etc. as exchangeable modules to carry out misuse tests on electronic and chassis components, e.g. airbag sensors.

* The colors used in this graphic are only for visual clarity.

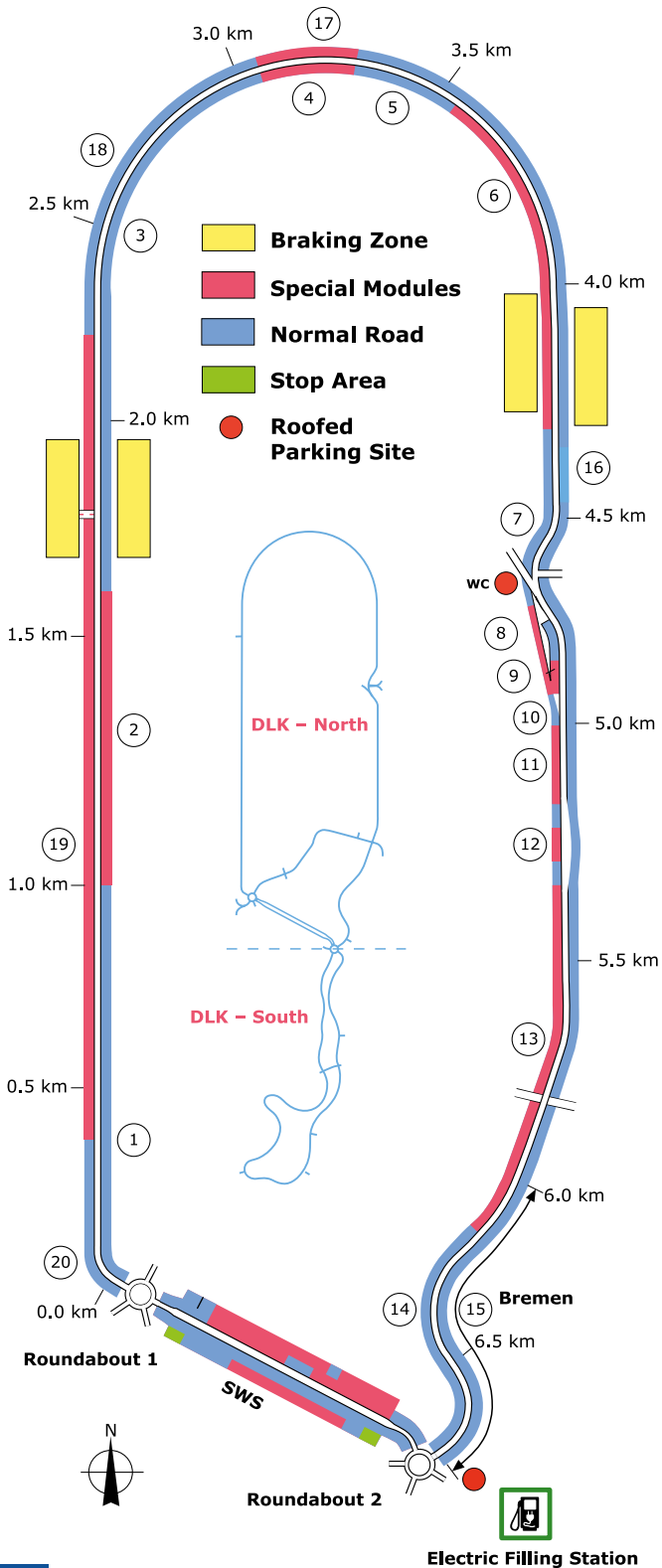


Lane	Surface	Length	Width
1	Checkerboard Polished granite/concrete	280 m	8 m
	Concrete	150 m	57 m
2	Concrete	300 m	8 m
	Concrete	150 m	57 m
3	Fusion cast basalt Temporarily construction testing with different surfaces	300 m	8 m
	Concrete	150 m	57 m
	Runway, L = 280 m	Runway, L = 185 m	Runway, L = 152 m
4	Concrete	300 m	8 m
	incl. longitudinal aquaplaning surface	130 m	
	Concrete	150 m	57 m
5	Polished granite	300 m	6 m
	Concrete	150 m	57 m
6	Concrete	300 m	6 m
	Concrete	150 m	57 m
7	Concrete	450 m	8 m
	Polished concrete	100 m	8 m
8	Pavement	150 m	5 m
	Blue basalt	150 m	5 m
	Concrete	150 m	5 m

Information on norm requirements, friction coefficients, etc. upon request

Durability Road North (DLK-North)

- Track with a total length of 12.4 km
- Division in DLK-North (6.9 km), DLK-South (4.8 km) and SWS (0.7 km)
- Various special modules



Inner lane: Sequence in clockwise driving direction from roundabout 1

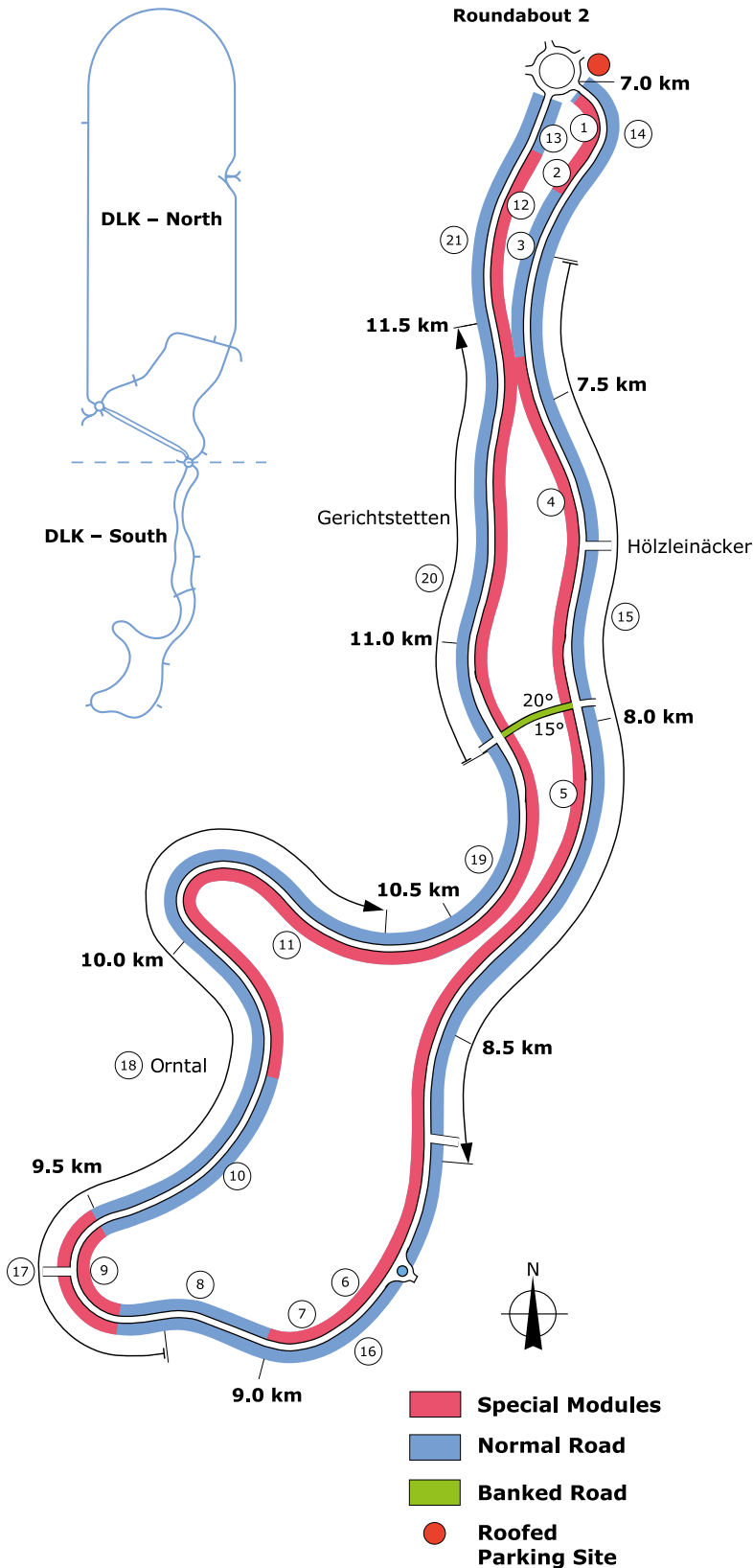
Module	Specification	Length
1	Normal road	975 m
2	Cross fall change	663 m
3	Normal road	1.397 m
4	Steering shock	188 m
5	Normal road	273 m
6	Long-wave single modules	750 m
7	Normal road	660 m
8	Bypass' free wheeling	179 m
9	Moch hollow	34 m
10	Normal road	56 m
11	Short amplitude, alternating long-wave excitation	239 m
12	Hilltop	85 m
13	Short amplitude, alternating long-wave excitation	935 m
14	Normal road	614 m

Outer lane: Sequence in counter clockwise driving direction from roundabout 2

Module	Specification	Length
15	Bremen	774 m
16	Normal road	2.828 m
17	Steering shock	188 m
18	Normal road	795 m
19	Grooves	1.869 m
20	Normal road	372 m

Durability Road South (DLK-South)

- Track with a total length of 12.4 km
- Division in DLK-North (6.9 km), DLK-South (4.8 km) and SWS (0.7 km)
- Various special modules
- One-way street (clockwise)



Inner lane: Sequence in clockwise driving direction from roundabout 2

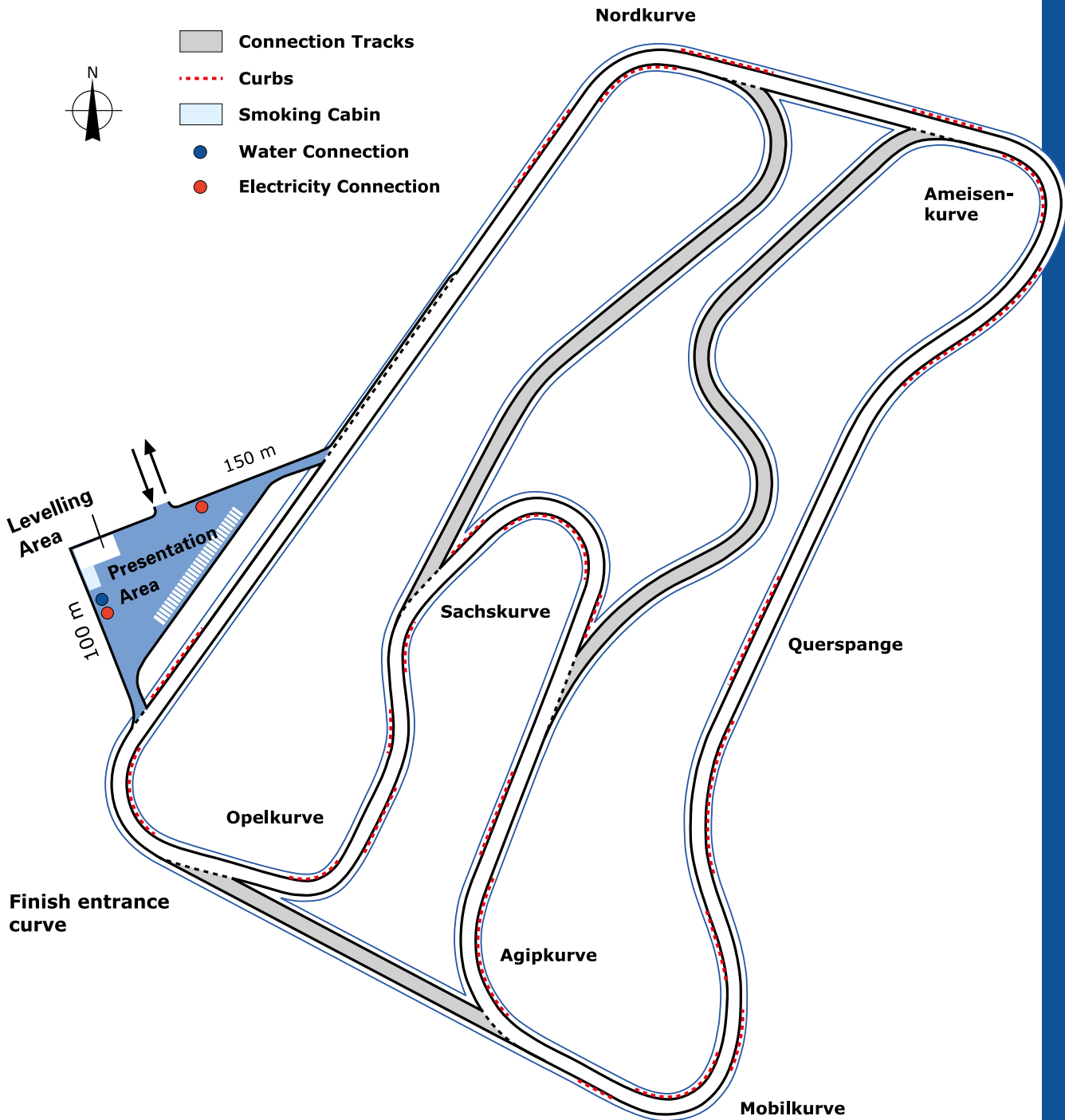
Module	Specification	Length
1	Manhole covers and cross joints	107 m
2	Single obstacles	50 m
3	Normal road	253 m
4	Aichtal, alternately	200 m
5	Aichtal	1.173 m
6	Eislingen	200 m
7	Manhole covers and cross joints	93 m
8	Normal road	216 m
9	Steering shock	185 m
10	Normal road	394 m
11	Aichtal	1.871 m
12	Brake-Hop	36 m
13	Normal road	74 m

Outer lane: Sequence in counter clockwise driving direction from roundabout 2

Module	Specification	Length
14	Normal road	186 m
15	Hölzeinäcker	1.429 m
16	Normal road	629 m
17	Steering shock	185 m
18	Orntal	1.084 m
19	Normal road	564 m
20	Gerichtstetten	599 m
21	Normal road	361 m

Handling Track (HAK)

- Reproduction of the small Hockenheimring
- Length 2.6 km and width 10 m
- Dividable in two separate tracks
- Driving direction clockwise



Wet Handling Track (NHK)

- Length 1.1 km
- Integrated skid-pad (40 m radius)
- Short-time workshop with storage facility
- Programm-controlled irrigation (with various switch settings)



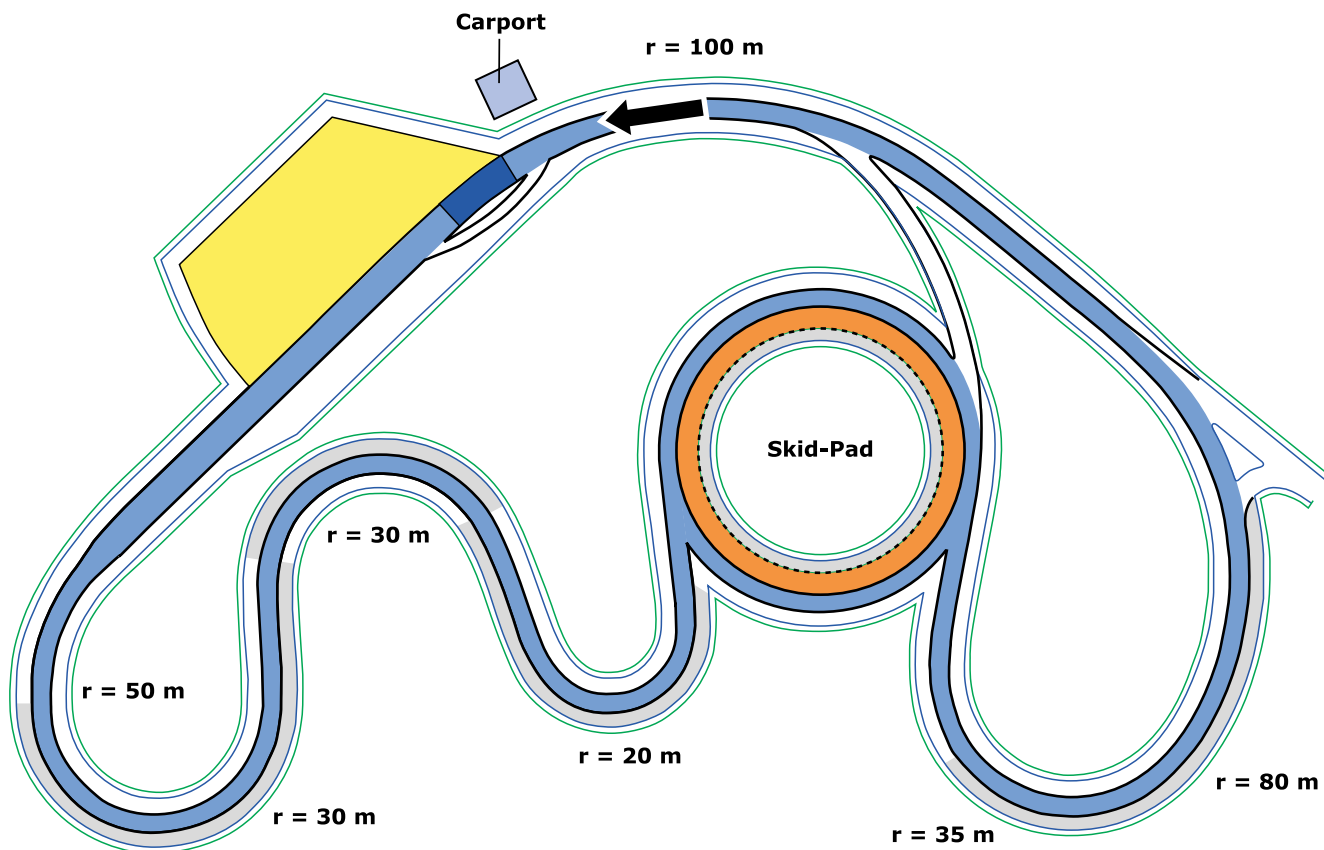
- Blue Basalt**
- Transverse Aquaplaning**
- Interception Area**
- Sequences can be watered**
- Asphalted Run-out Area**

Wet handling/Transverse aquaplaning with integrated skid-pad

Total length	1.1 km
Lane width	5.0 m

Dimensions of skid-pad

Asphalt	r = 40 m
Blue basalt	r = 35 m
Lane width	each 5 m



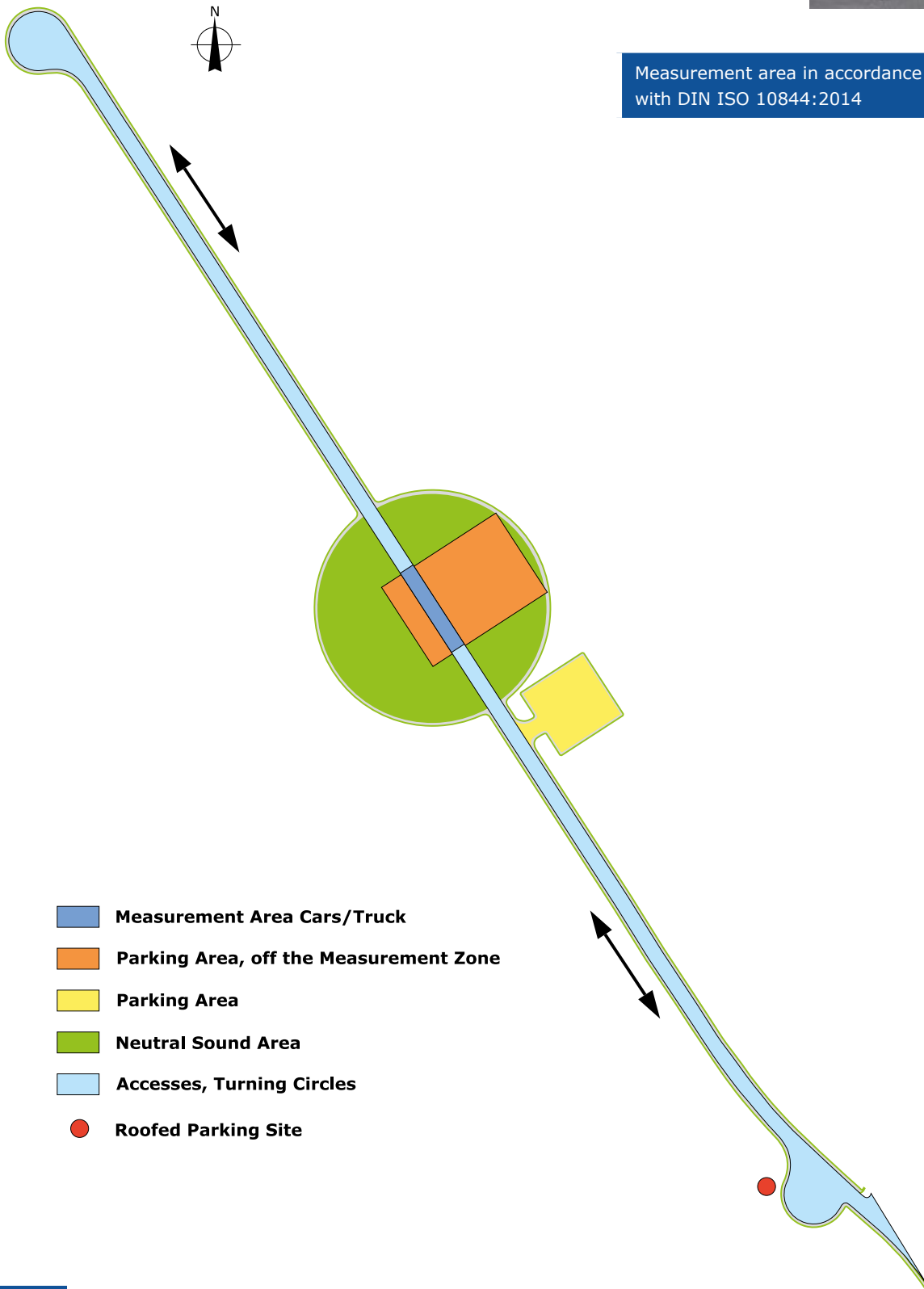
Acoustic Track (AKS)

- Separate lanes for cars and trucks
- Length 300 m (round trip)
- External noise measurements for accelerated passing in accordance with DIN ISO 362, ECE R51 and tire rolling noise measurement acc. to ECE R117

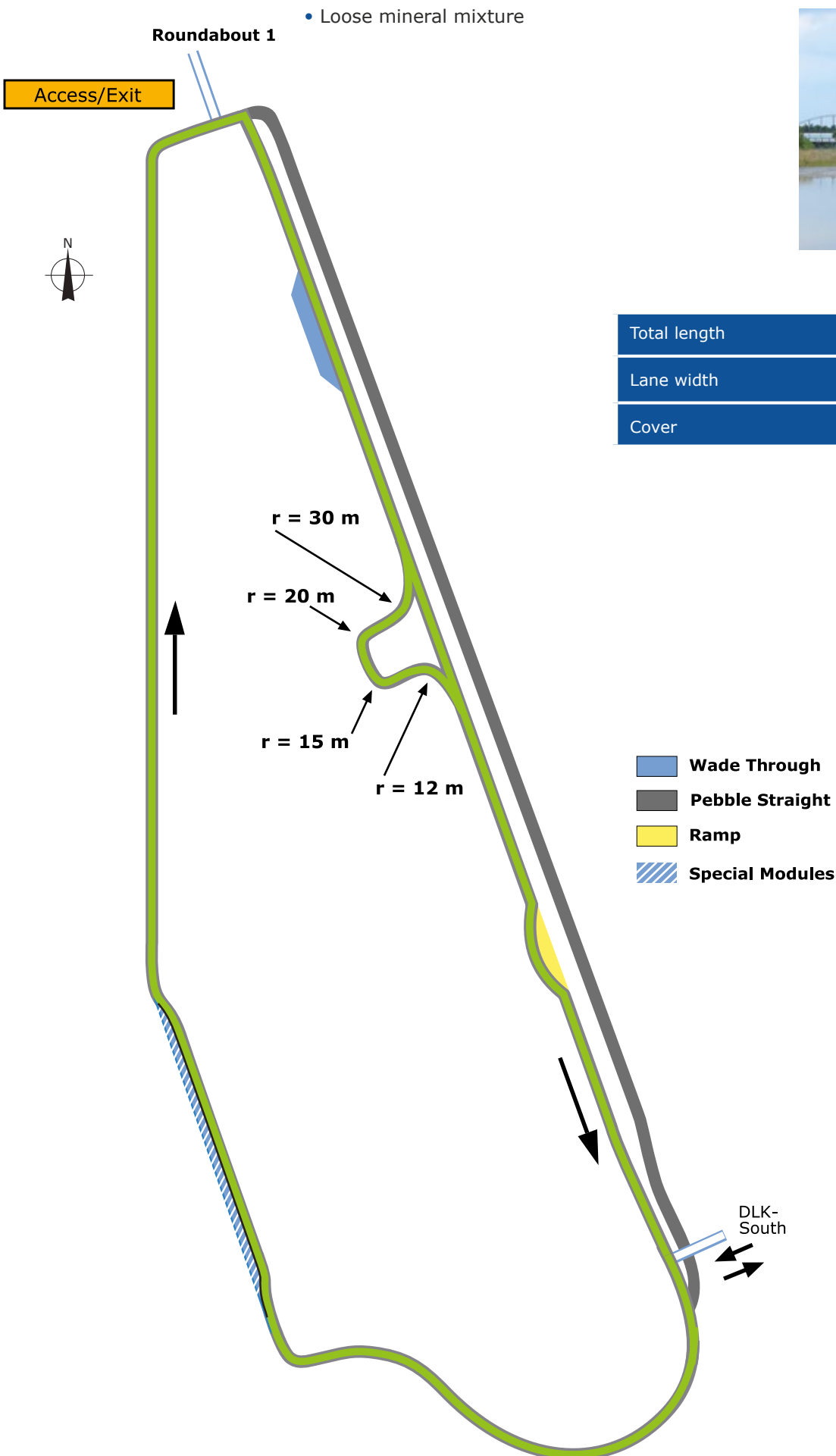


Measurement area in accordance with DIN ISO 10844:2014

Length: 40 m
Width: 3.5 m



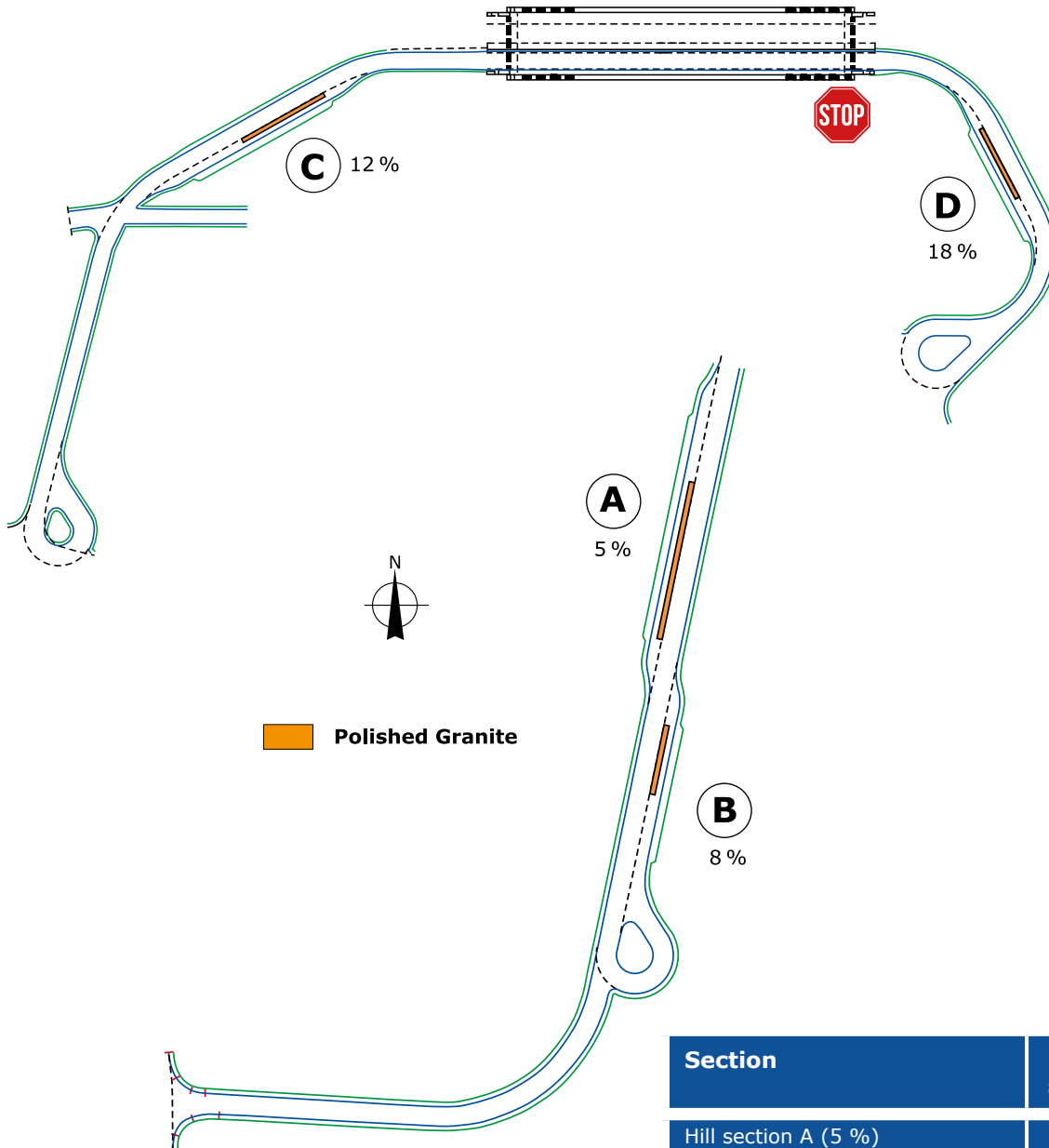
Gravel Track (NAT)



Total length	4 m
Lane width	Approx. 3.7 km
Cover	mineral mixture

Hill Sections (STS)

- 4 Sections with 5 % (A), 8 % (B), 12 % (C) and 18 % (D)
- Special surface: Polished Granite - can be irrigated



Section	Length special surface
Hill section A (5 %)	50 m
Hill section B (8 %)	22 m
Lane width for both sections	6 m

Section	Length special surface
Hill section C (12 %)	32 m
Hill section D (18 %)	27 m
Lane width for both sections	5.5 m

Rough Road (SWS)

- Various surface modules

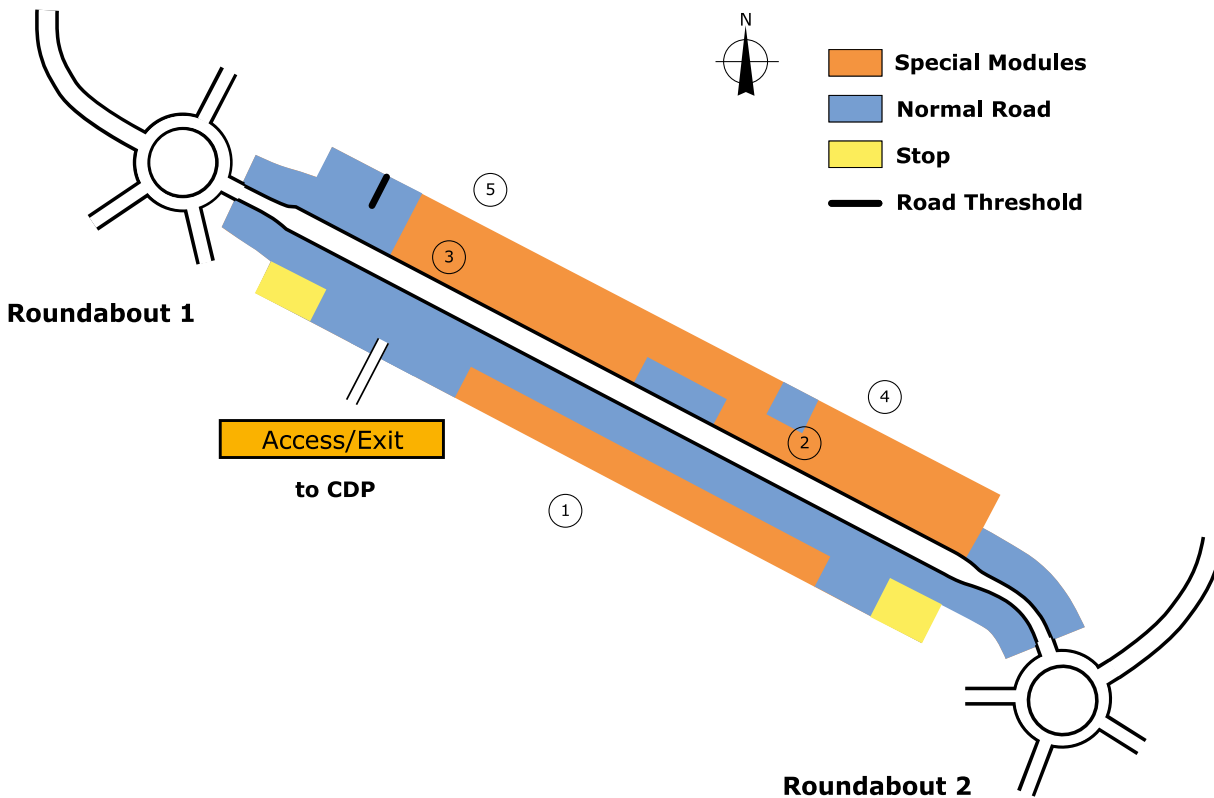


Left lane: direction from roundabout 2 to roundabout 1

Module	Specification	Length
	Inside: Normal road	703 m
1	Outside: Normal road Large stones set in concrete Normal road	75 m 300 m 175 m

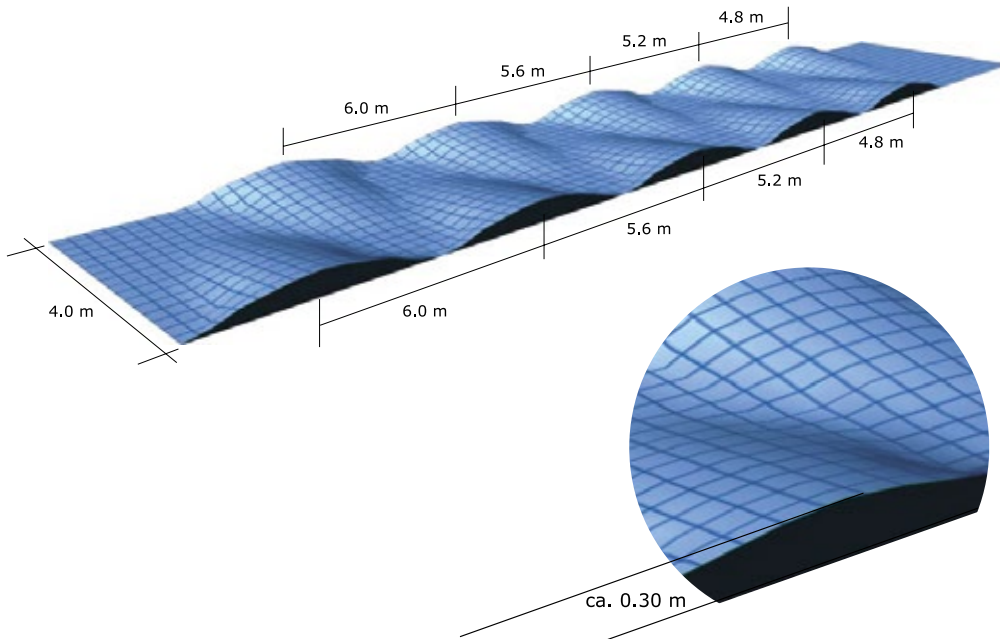
Right lane: direction from roundabout 2 to roundabout 1

Module	Specification	Length
	Normal road	97 m
2	Inside: Concrete plate jolts downwards Normal road	195 m 85 m
3	Concrete plate jolts upwards Normal road	195 m 131 m
4	Outside: Small set pavement Normal road	150 m 25 m
5	Pavement Normal road	300 m 75 m



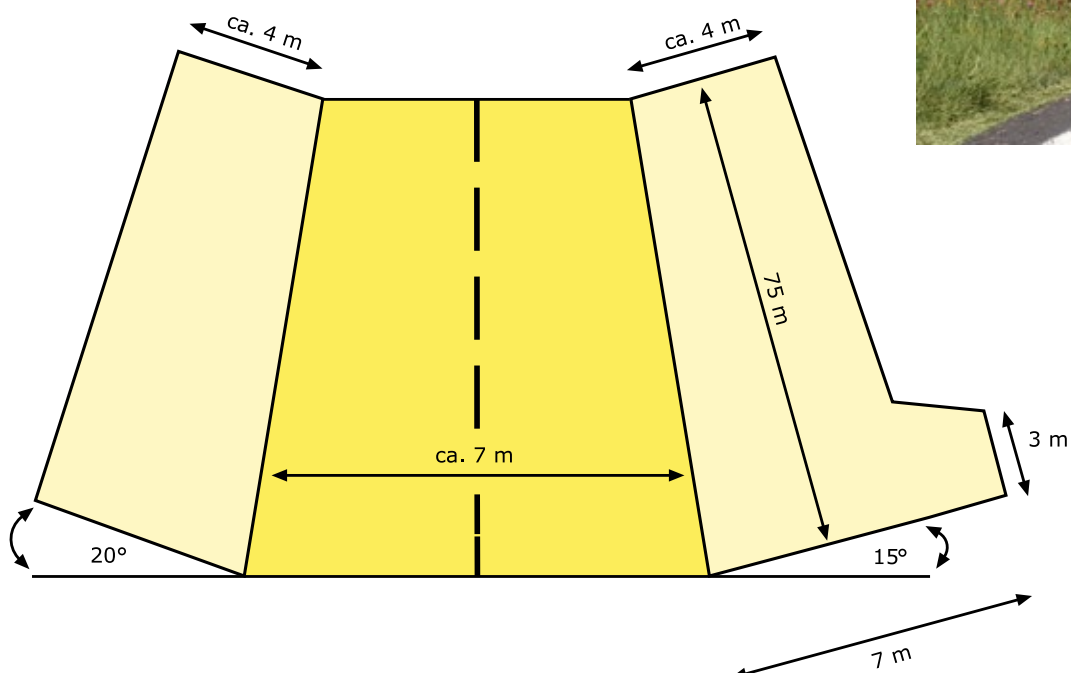
Twist Road (TWI)

- Mutually offset, sinusoidal road corrugations for body, chassis and overall vehicle testing



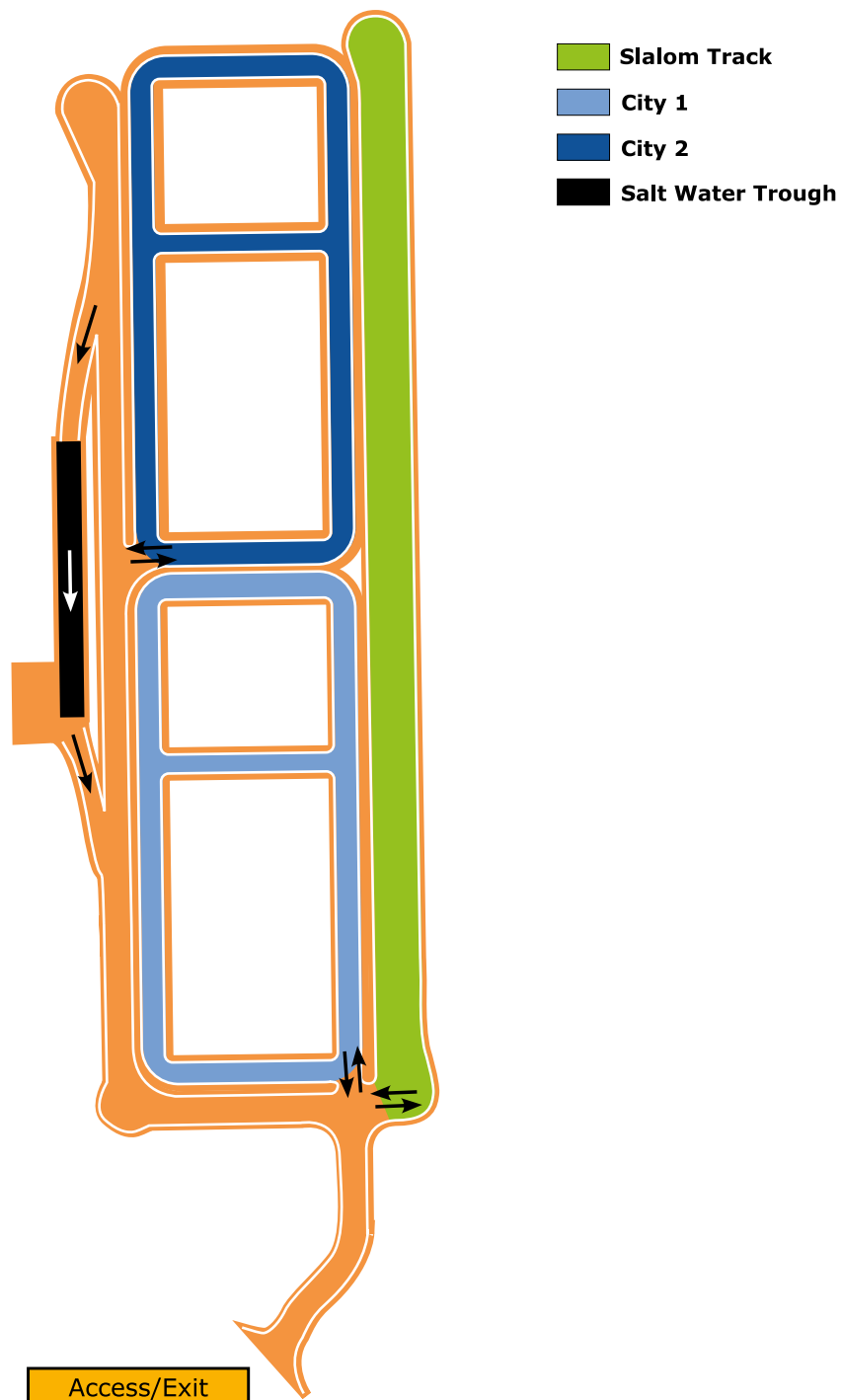
Banked Road (SFB)

- Two roadways with a length of 75 m each and width of approx. 4 m with an angle of inclination diagonal to the driving direction of $15^\circ = 26,8\%$ and $20^\circ = 36,4\%$ for body, chassis and overall vehicle testing.

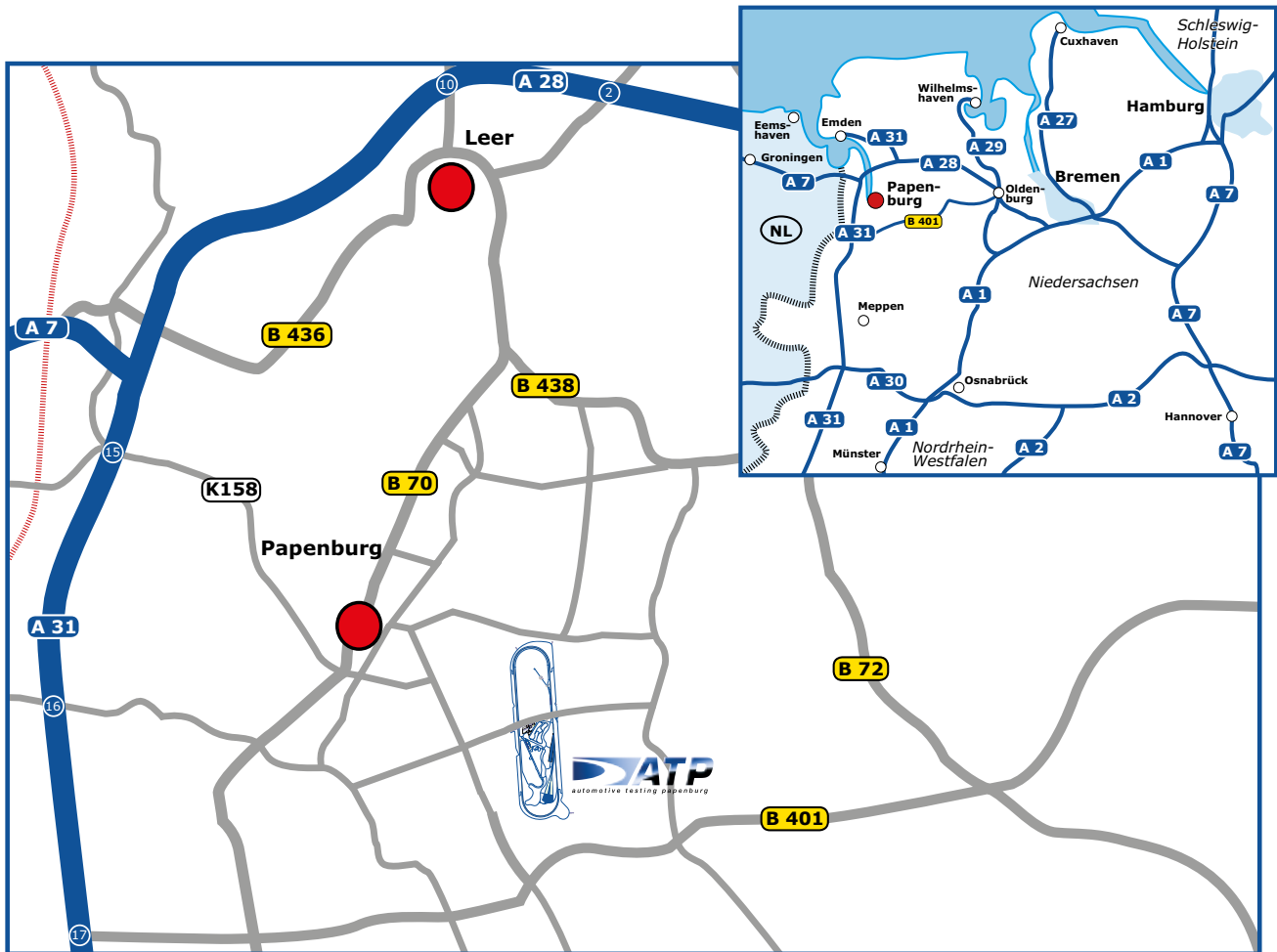


City Durability Road (CDP)

- City 1 and City 2 have a total track length of 443 m
- Slalom Track with a functional length of about 250 m
- Salt water trough with individually adjustable water level



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