



**2011-IESALC**  
**Wilmington, NC**

Prepared for the Illuminating Engineers Society – Aviation Lighting Committee – Fall Conference 2011 in Wilmington NC  
by Dipl. Ing. Helge Mack, Fraport and Dipl. El. Ing. HTL Alfred Seiterle, AEROPLAN LTD Zurich/Switzerland

# Overview of Frankfurt Rhine/Main



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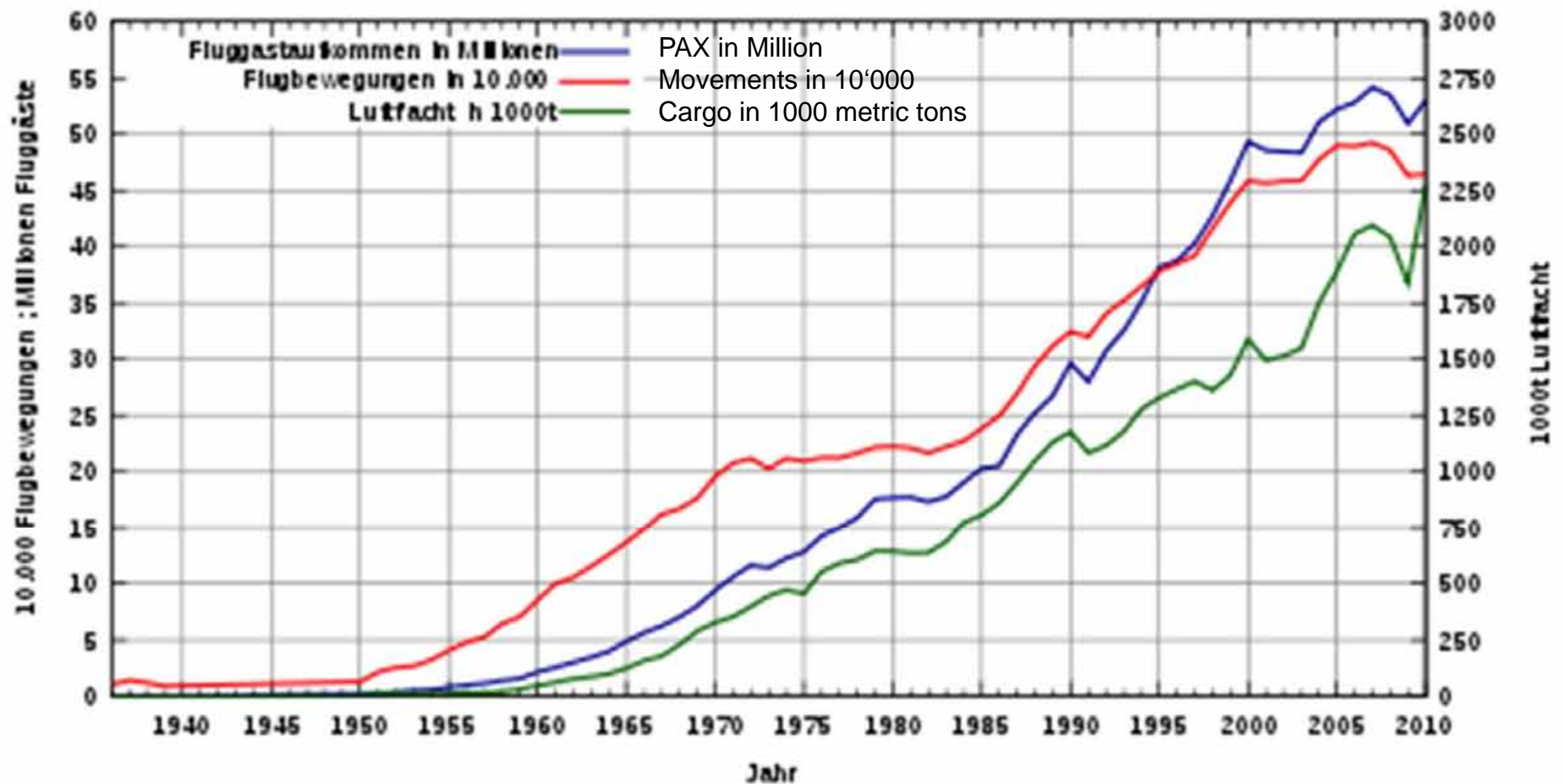
# Overview of Frankfurt Rhine/Main

## Airbridge Memorial

For those 79 killed in action  
During the Berlin Air raid  
(26.June 1948 to 12.May 1949)



# Overview of Frankfurt Rhine/Main



Source: Wikipedia

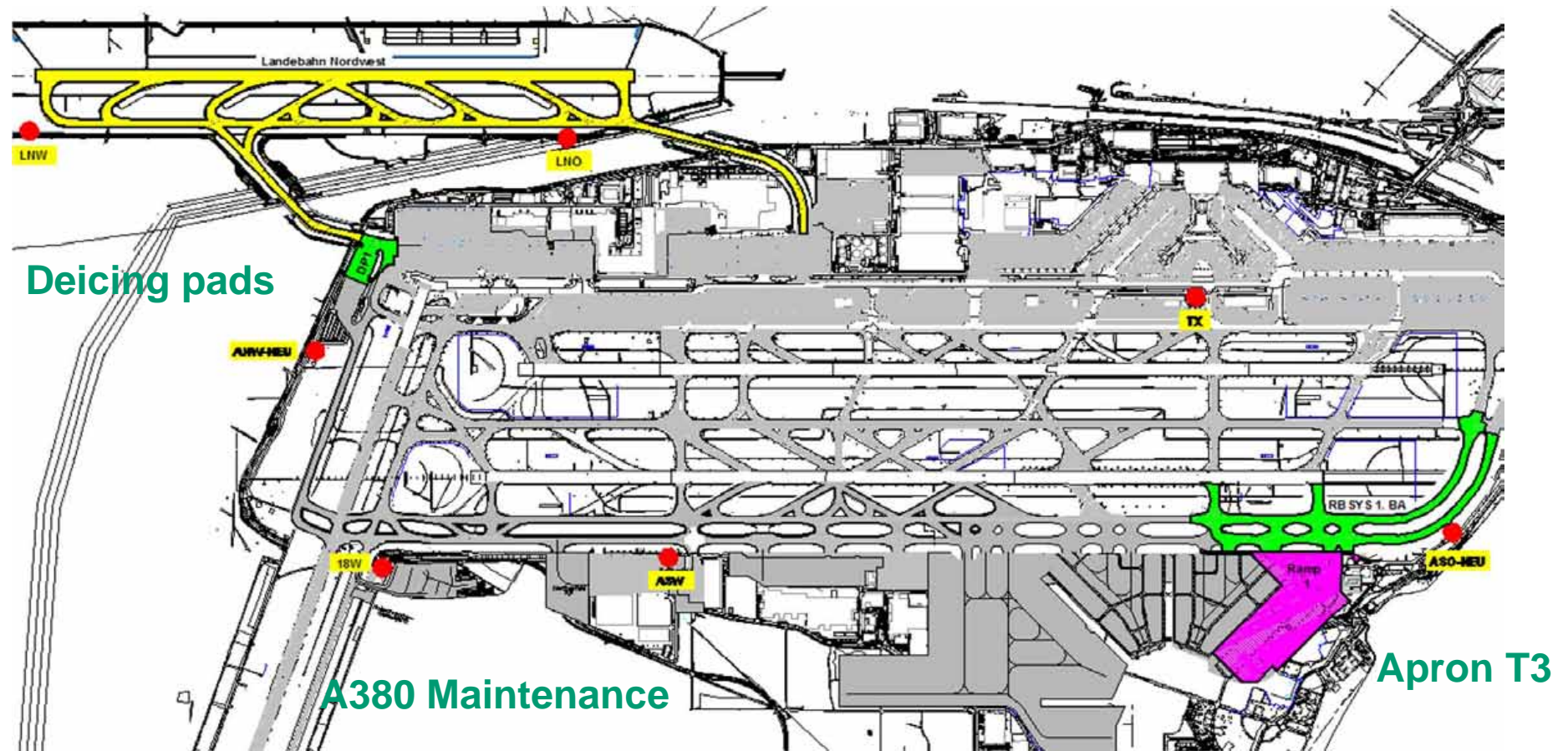
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# Expansion Program

4th Runway

Taxiway System



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# Taxiway System



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# Taxiway and Ramp Lighting

## Quantities LED Luminaries

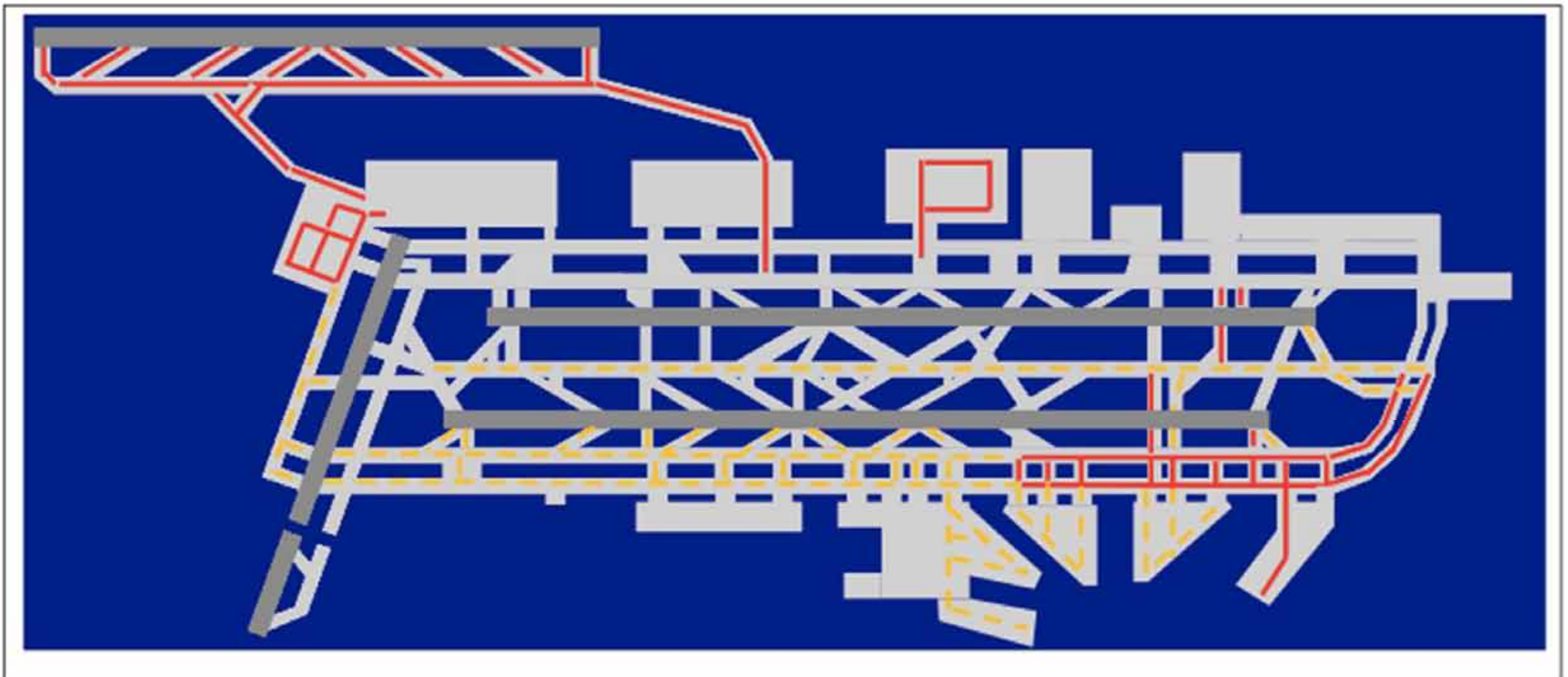
Project Number	Number of loops	Number of „LED's“	Number of Lights	Project partition
B-000655	66	3'820	2'145	TXC LED-Taxiway Centreline Lights
B-000655	18	931	931	STB LED-Stopbar Light, inset and elevated
B-000655	9	584	584	TXE LED-Taxiway Edge Lights inset and elevated
B-000655	6		443	TGS LED-Signs 600x3000mm
B-000830	2	1'200	48	RGL LED Runway Guard Lights Type A
B-000835	2	650	325	T3 – Ramp - TXC
B-000835	2	300	300	T3 – Ramp - STB
TOTAL	105	7'485*	4'286	(*Without signs)

# Taxiway and Ramp Lighting Implementing LED Luminaries

--- planned areas until 2015

installed LED Systems: TXC, TXE, CLB, STB, RGL, Signs

— existing areas



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# Taxiway and Ramp Lighting

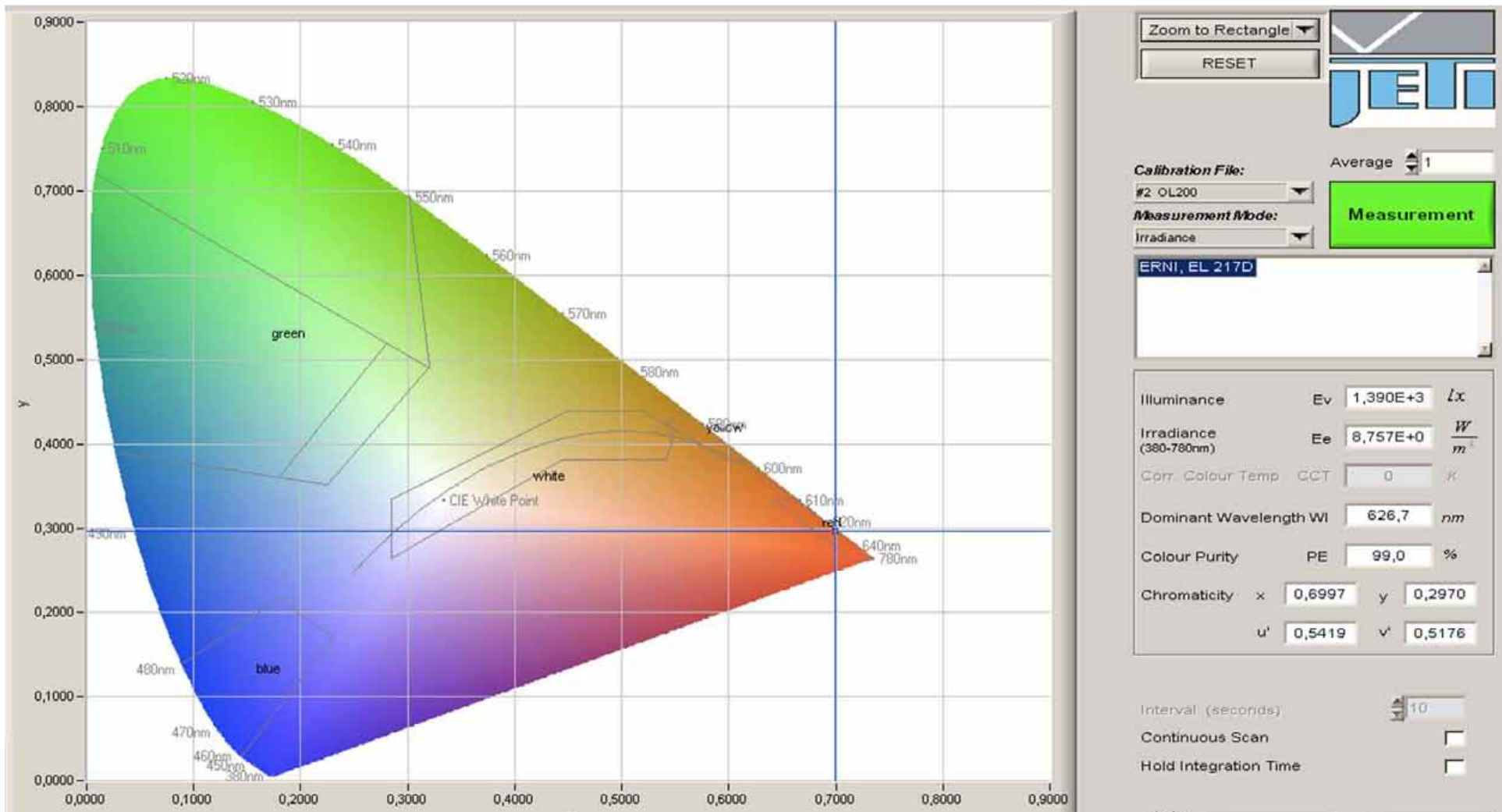
## Implementing LED Luminaires



Mixing LED with Halogen lights  
Has to be considered carefully:

- Compare Brilliancy (Candelas)
- Compare Photometrics (Coverage)
- Compare Colour adoption (Colours)
- Consider Different manufacturers

# Taxiway and Ramp Lighting Implementing LED Luminaires



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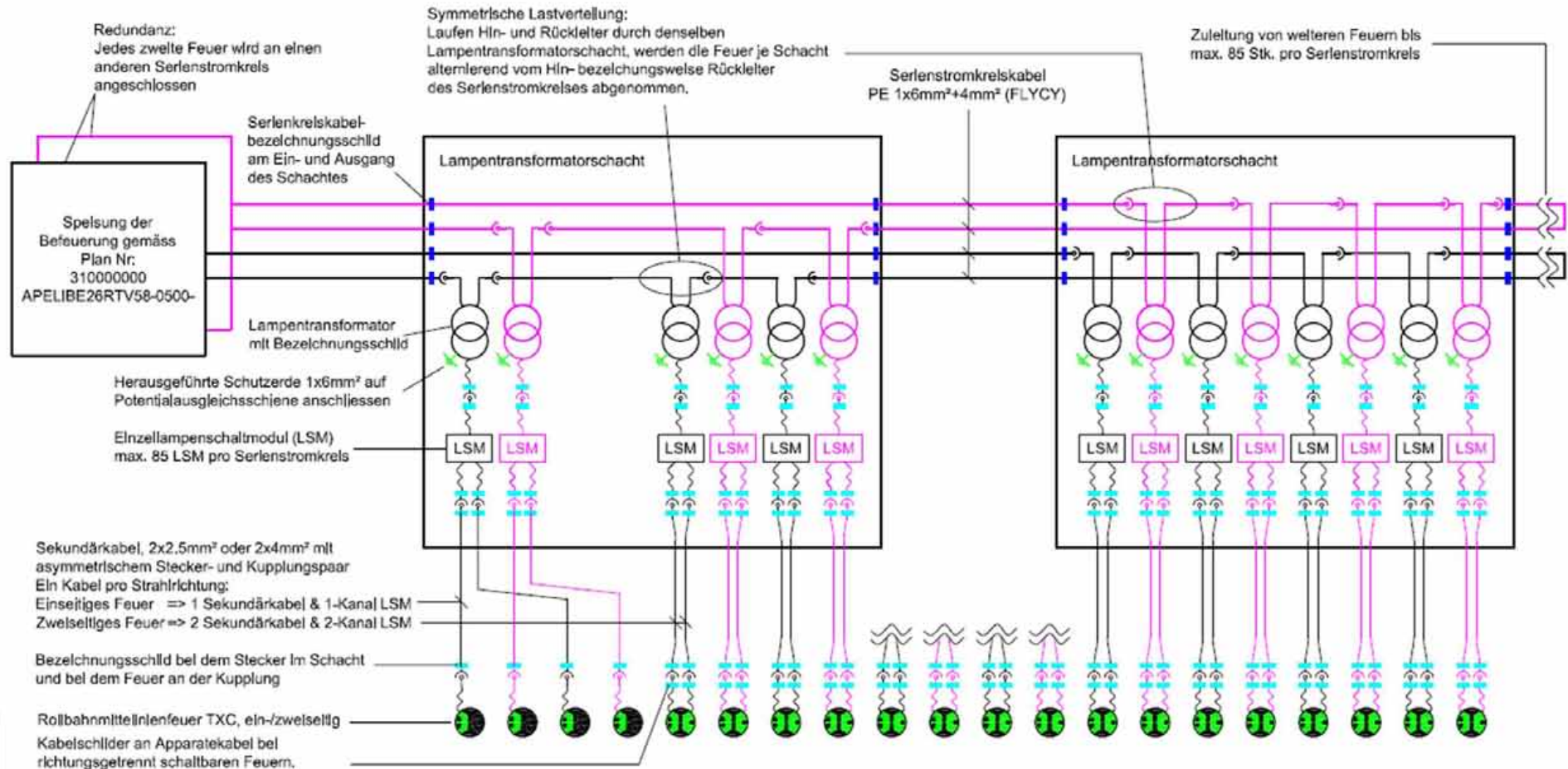


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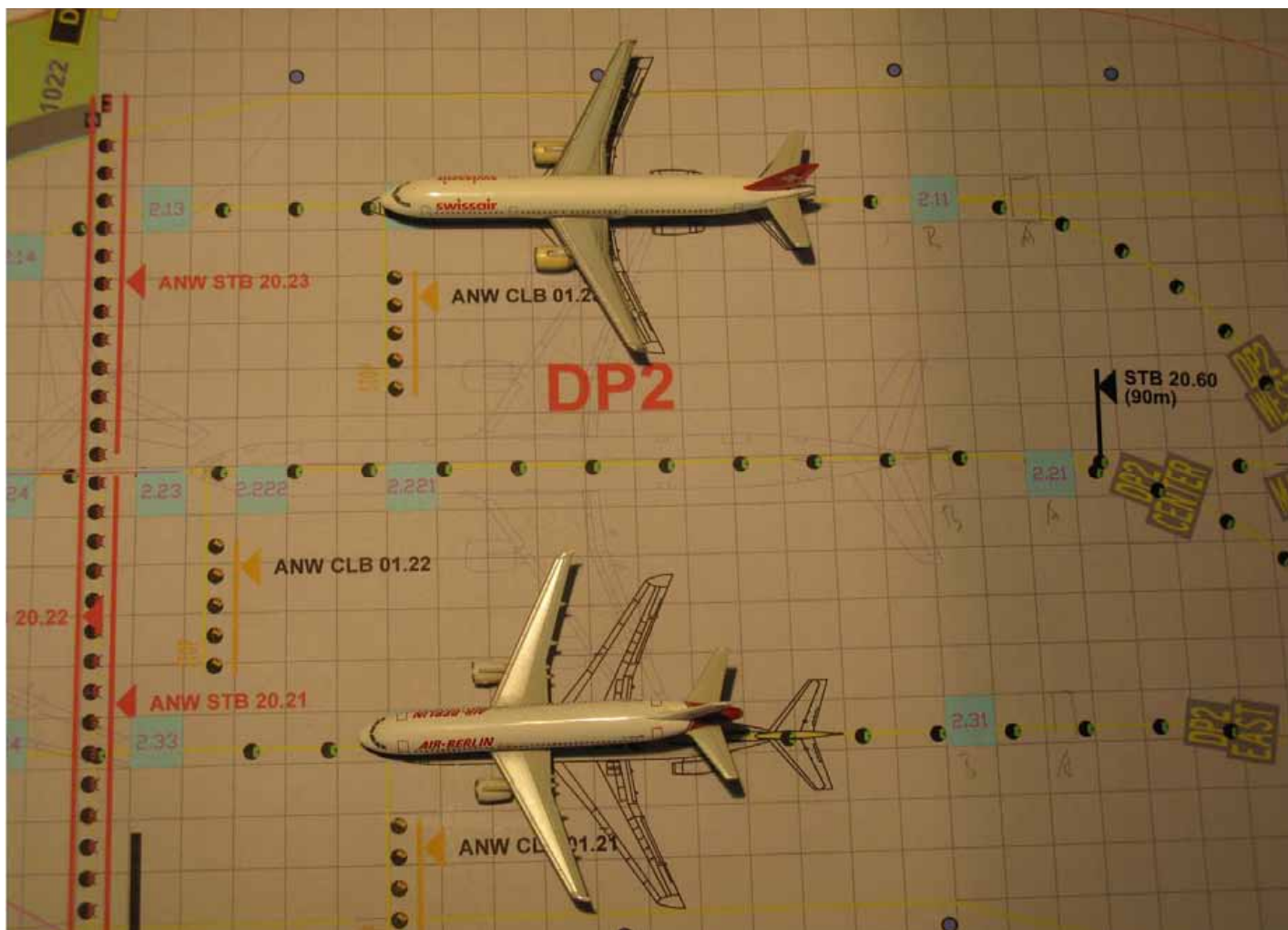
# Segmenting of the taxiway centrelines

## Scheme for adresable lamp switches





# De-icing Pads Configuration



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# De-icing Pads

## De-icing position



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# De-icing Pads Configuration of the Eye Line



Approaching the stop position



At the stop position

# Apron Centrelines Clearance Bar



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# De-icing Pads

## Centreline-, Eyeline-, Stopbar- and Edgelights



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# The 4th Runway

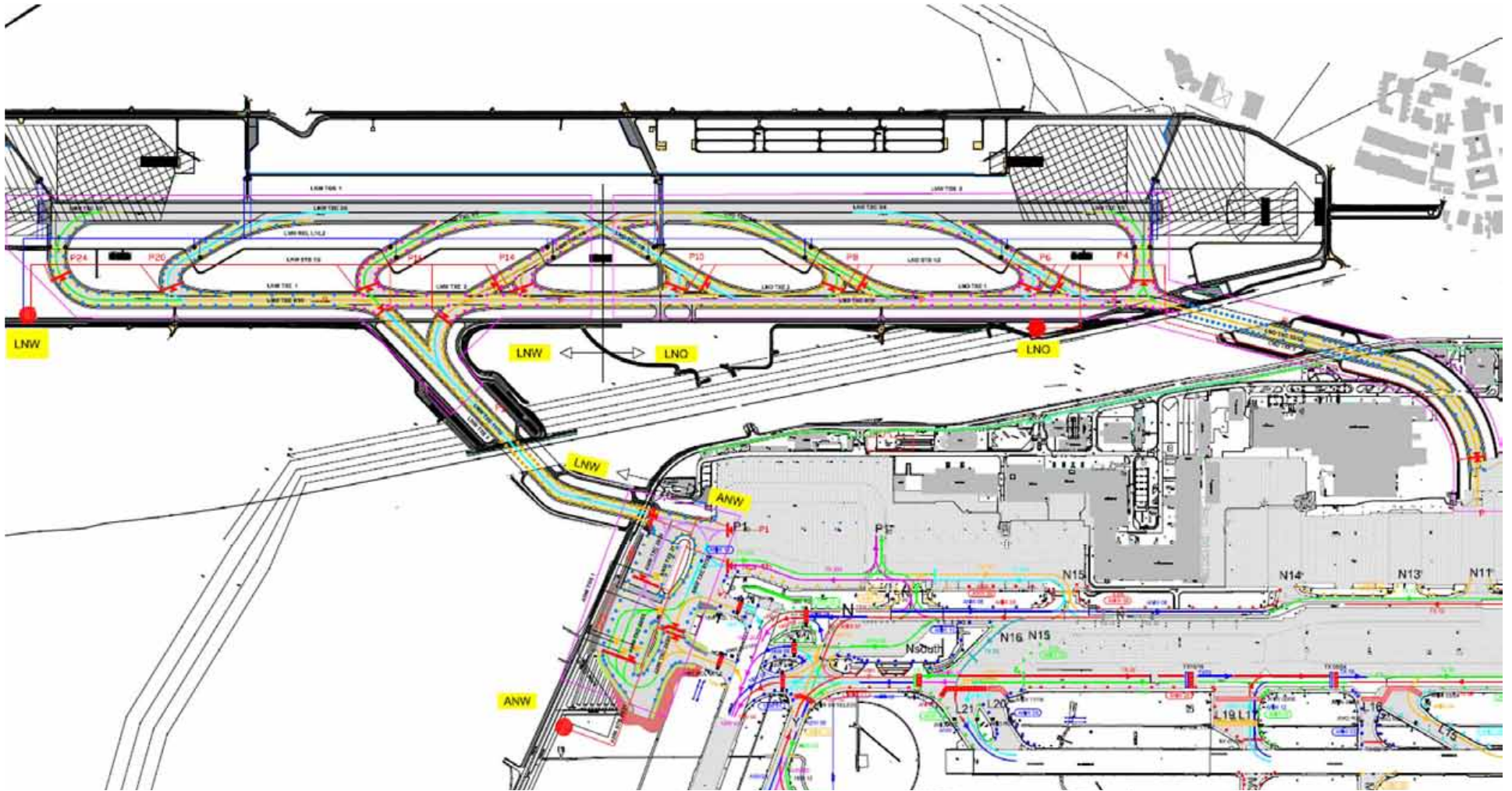
## CAT II/III 07L-25R



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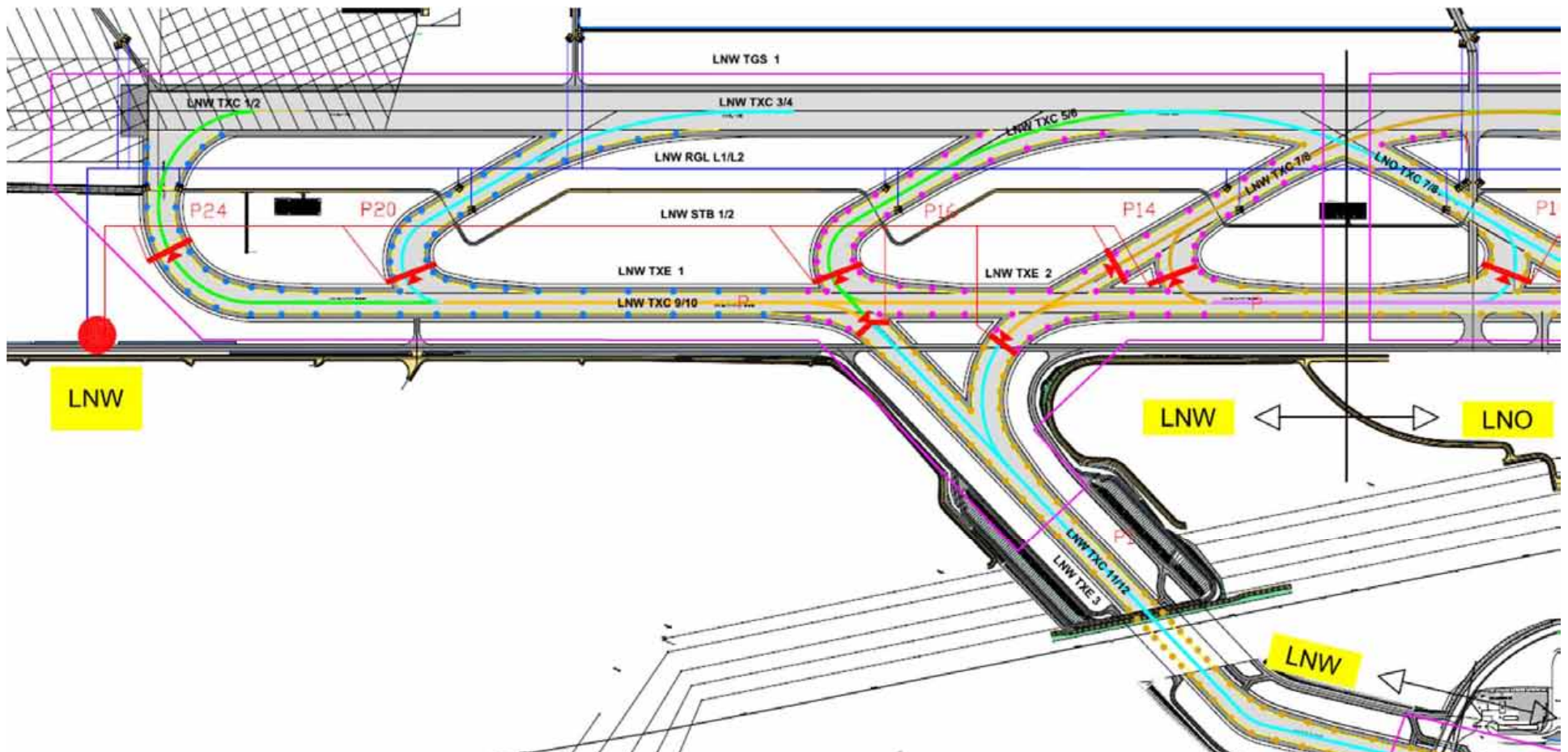
# Series circuits



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# Runway 07L-25R

## Series circuits



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# Runway Lighting

## Quantities Halogen Luminaires

Section	Number of Series Circuits	Number of Lamps	Number of Luminaires	AGL System
B-000830	6	344	344	Approach CAT II/III
B-000830	4	120	120	Approach Low intensity CAT I
B-000830	6	108	108	Approach red side rows CAT II/III
B-000830	2	46	46	Sequence flash light
B-000830	6	372	186	Runway Centreline
B-000830	8	24	8	PAPI 3° and 3,2°
B-000830	6	360	360	Touch down zone
B-000830	4	18	18	Threshold
B-000830	-	40	20	Threshold / Runway End combined
B-000830	4	77	77	Runway Edgelights, elevated HI/LI
B-000830	-	30	15	Runway Edgelights, inset HI
B-000830	-	15	15	Runway Edgelights, inset LI
TOTAL	56	1'554	1'317	

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# Redundant Emergency power supply 650kVA, redundant for RWY 07L-25R



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# Emergency Genset Switchgear



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# Redundant LV Distribution



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## CCR and Step-up Transformer



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## CCR with integrated lamp control master



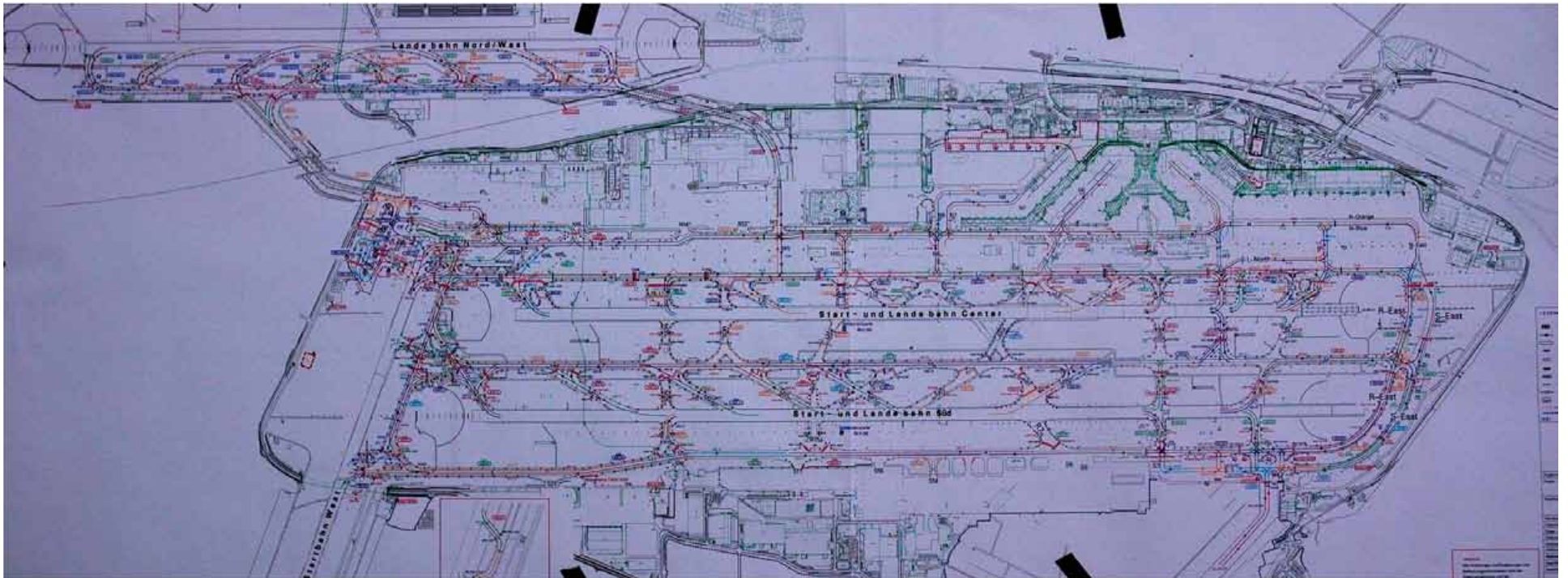
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# Staff Training



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# The Taxiway Circuits



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# Lighting Final Tests



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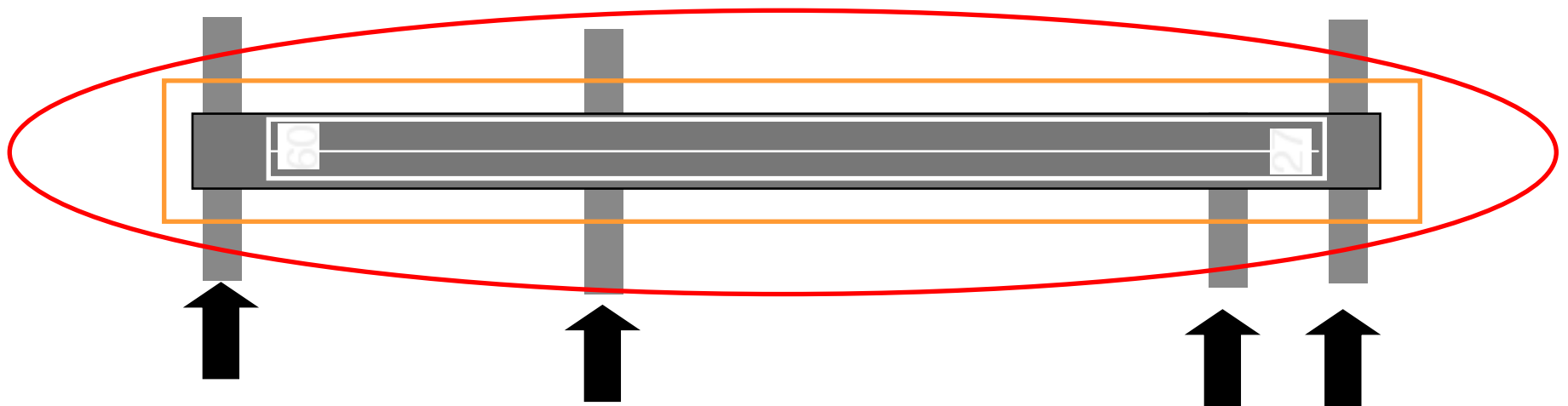


## Preventions against runway incursions

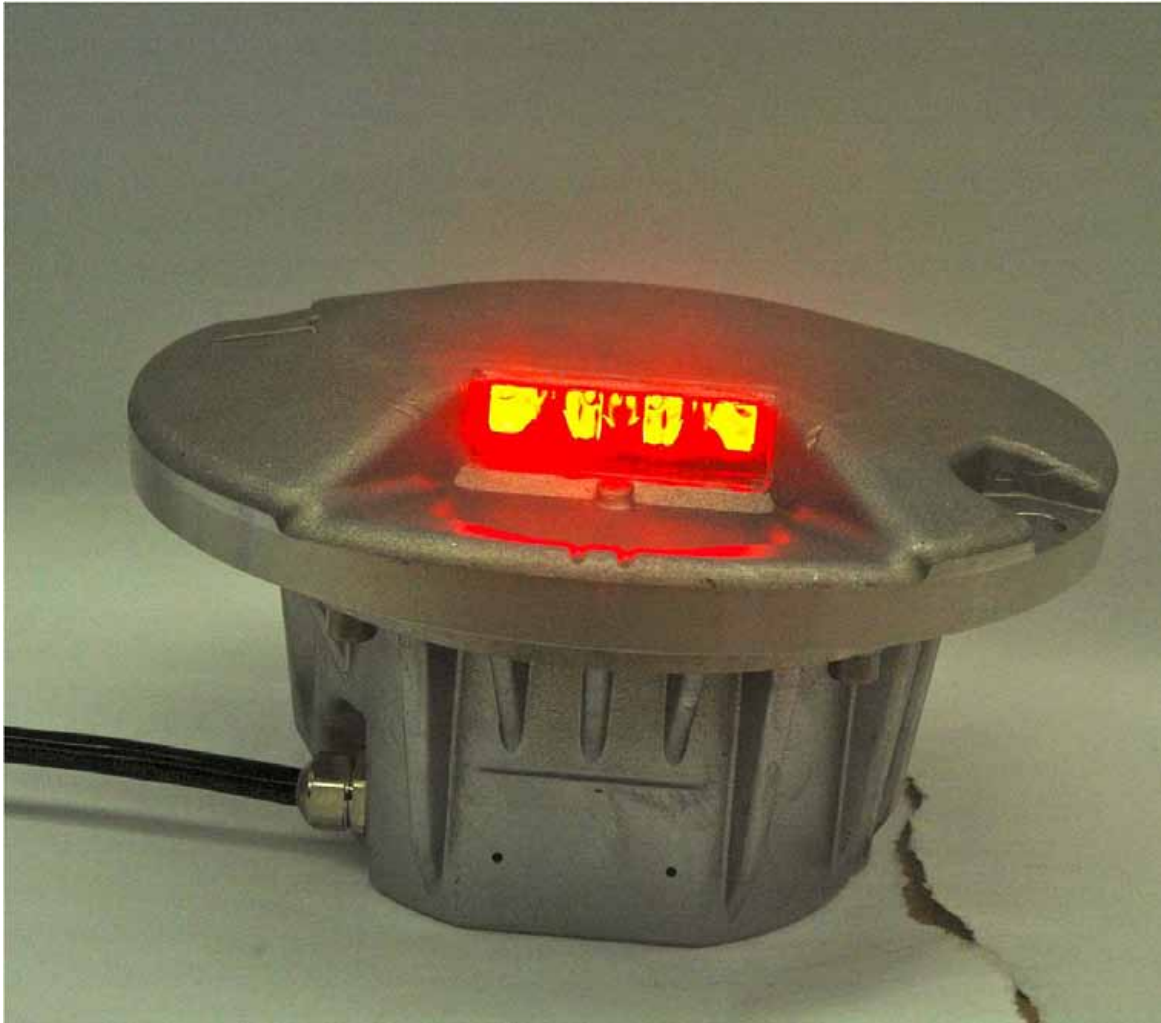
Ring of red under CAT II/III Operations done by stopbars

Ring of yellow done by Runway guard lights

1

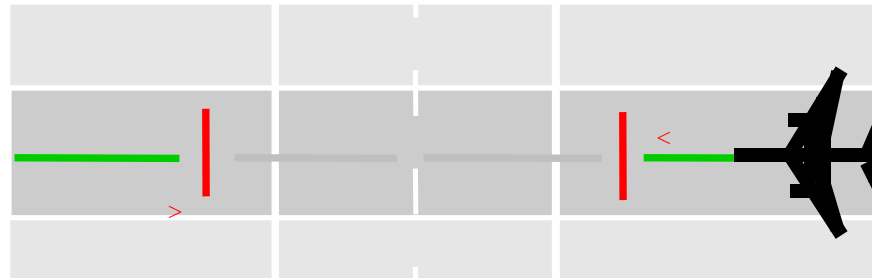


## Preventions against runway incursions LED Inset and elevated Stopbar Lights

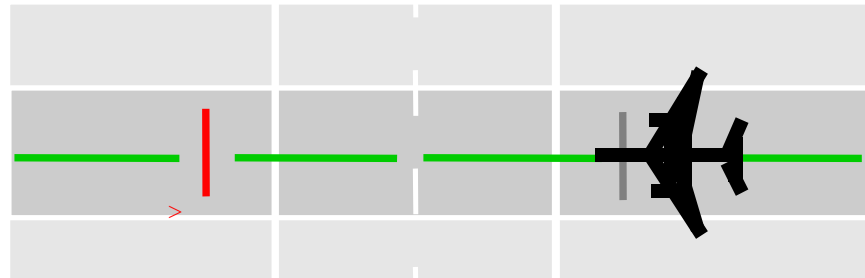


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# Runway Crossing



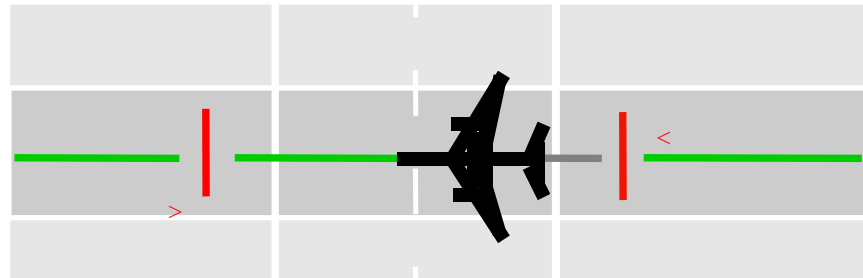
# Runway Crossing



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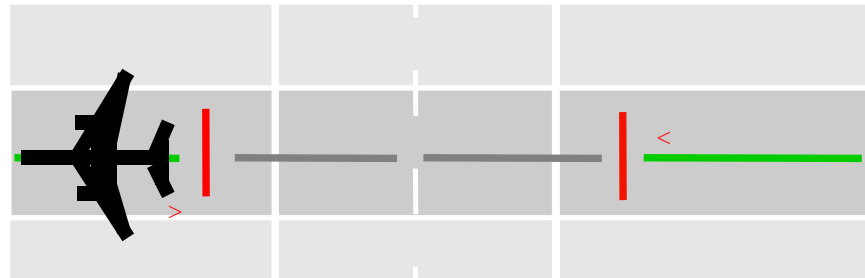


# Runway Crossing



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# Runway Crossing



# Runway Guard Lights

## Synchronized flashing



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## Control and Monitoring



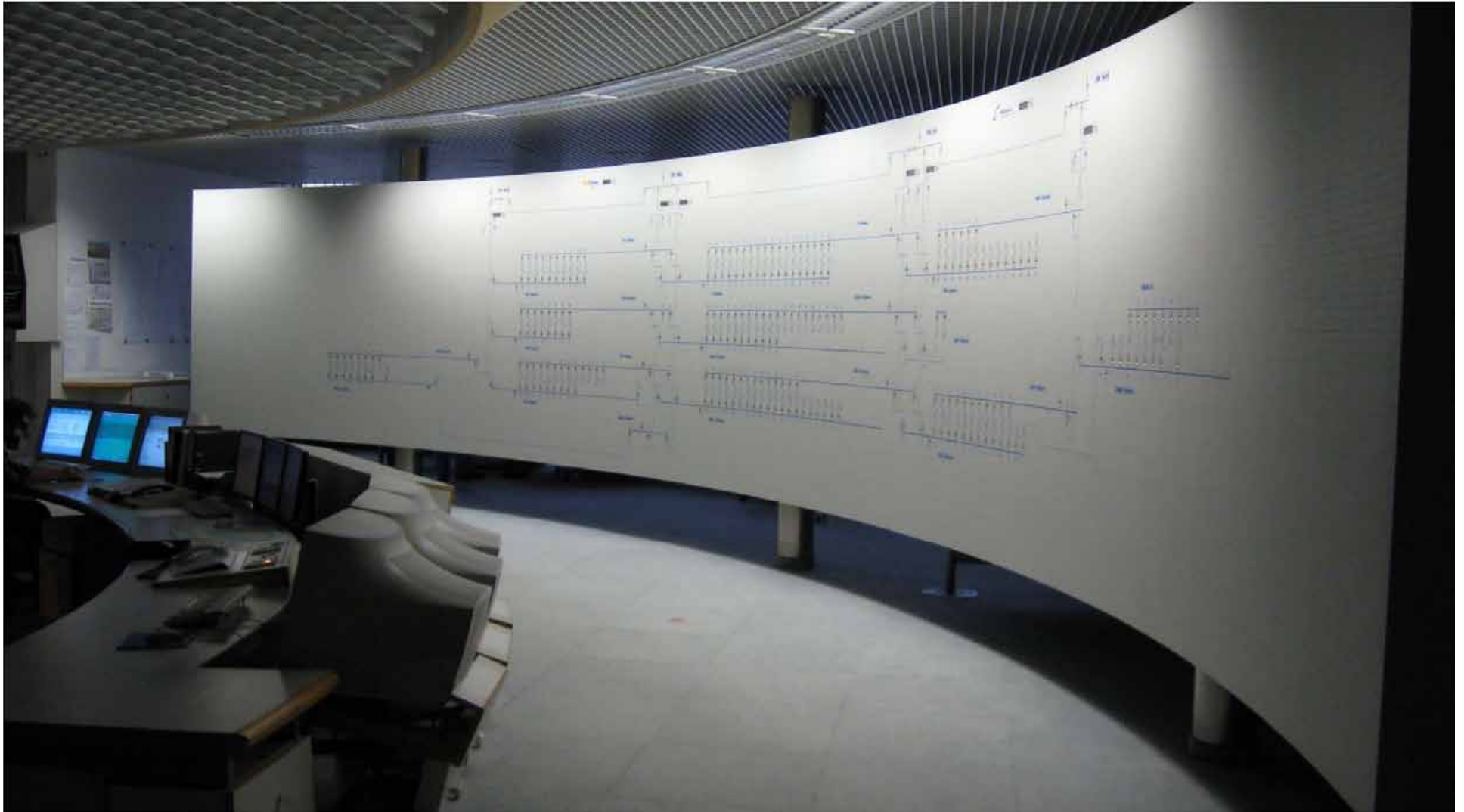
Apron Control



Remote Control unit

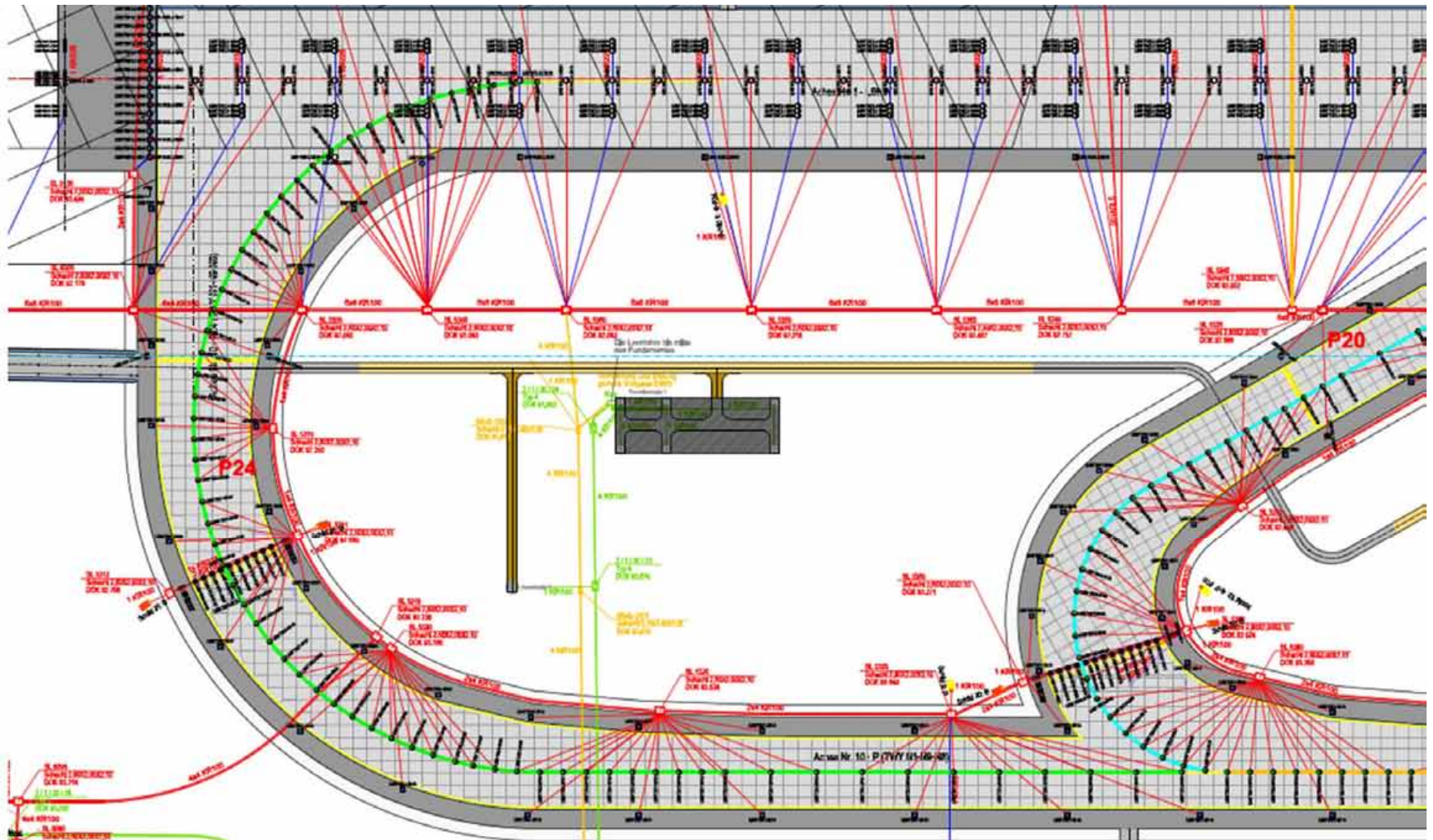
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# Technical Centre



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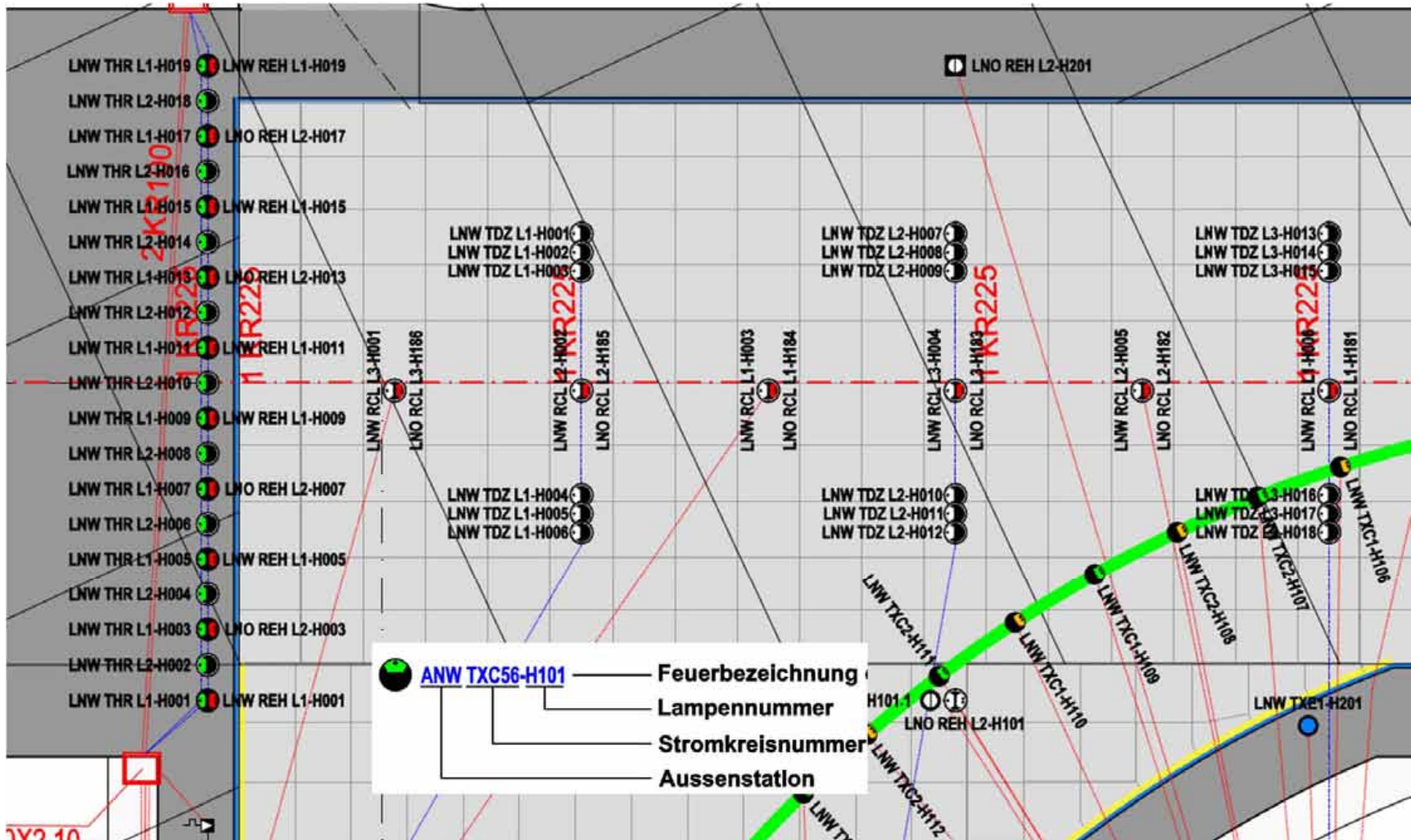
## Ductbanks and cable sleeves



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# Coding the luminaires



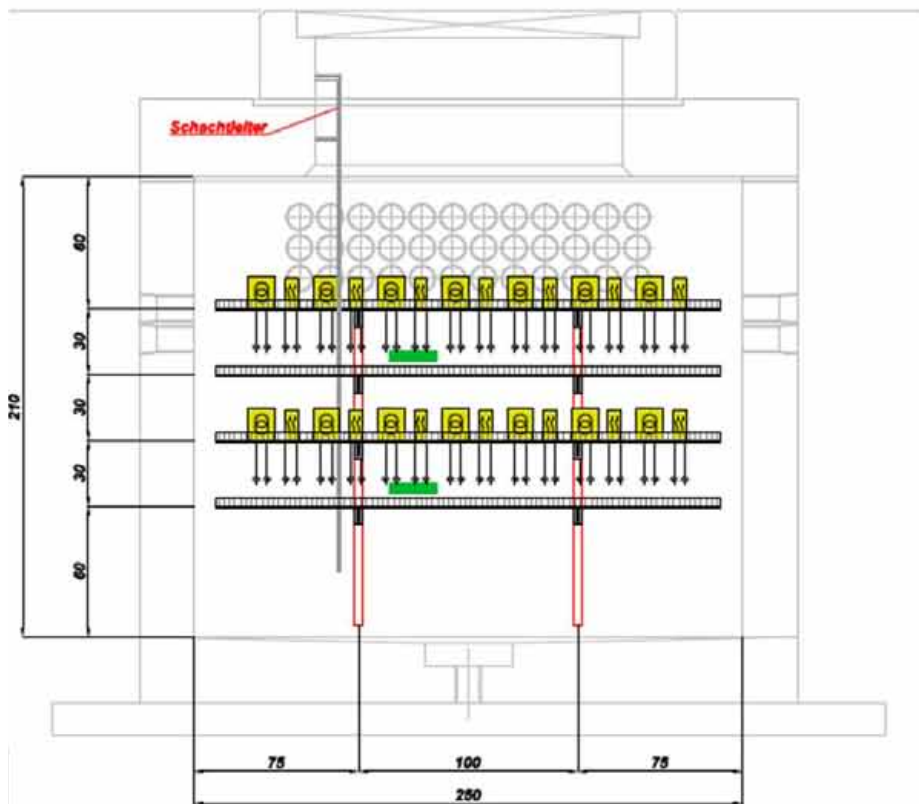
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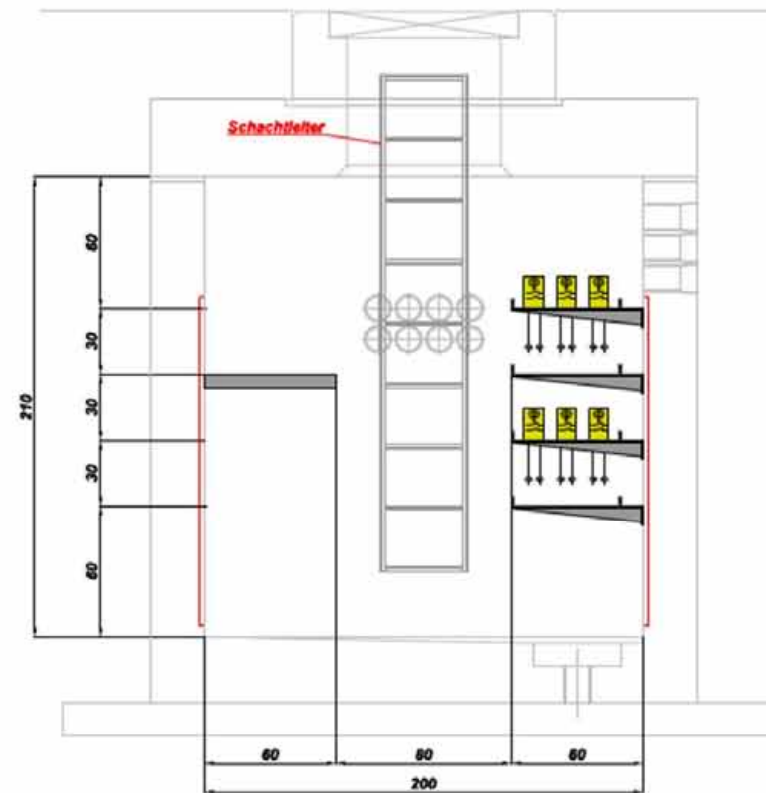
# Manhole

Cable runs and Lamptransformer racks for 36 Transformer and LSM

**SCHNITT A-A**



**SCHNITT B-B**



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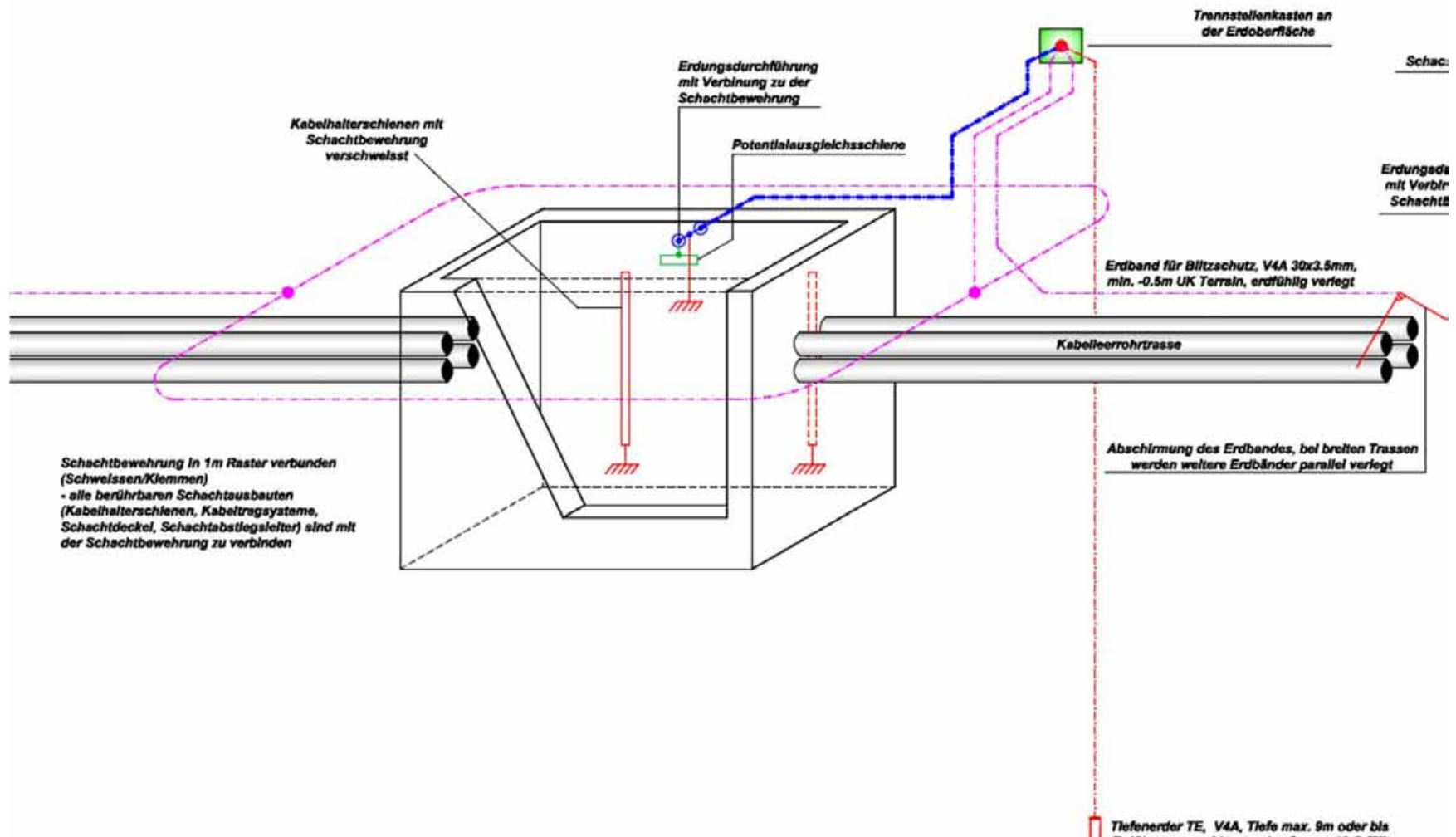
# Manhole

## Cable races and Transformer grids



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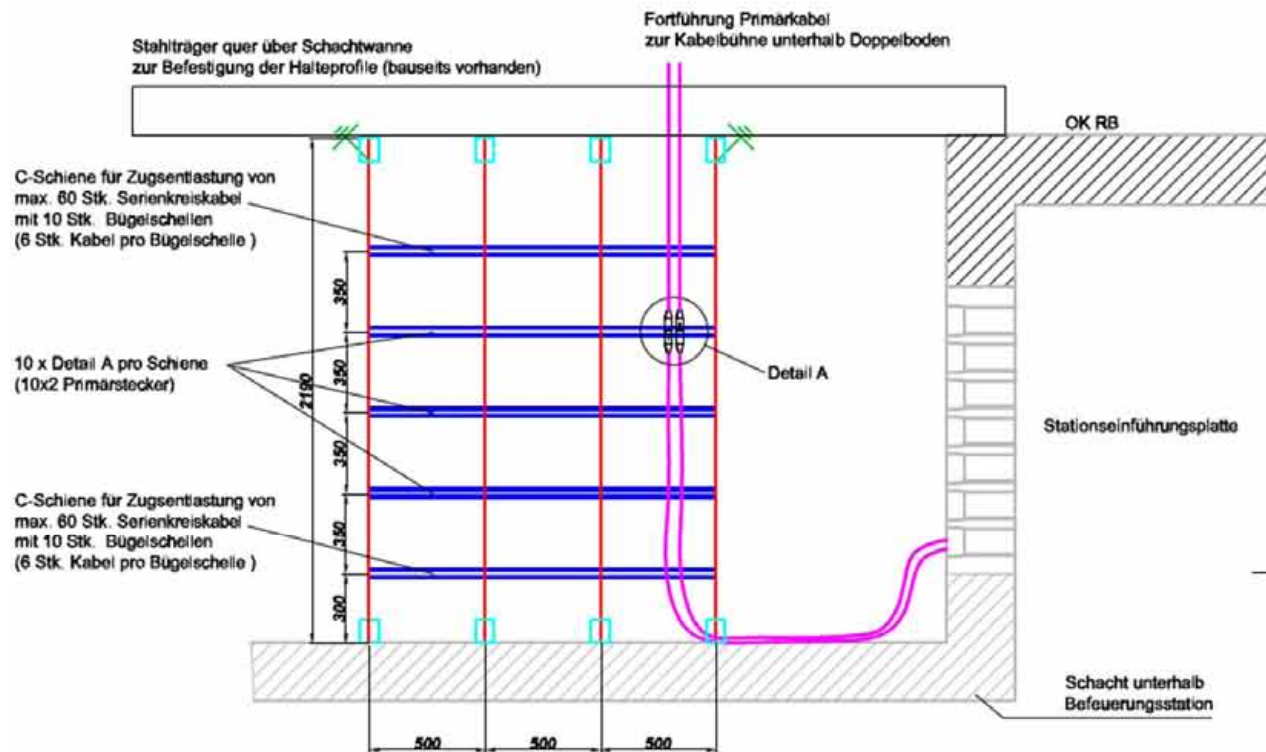
# EMC Measures



# EMC Measures

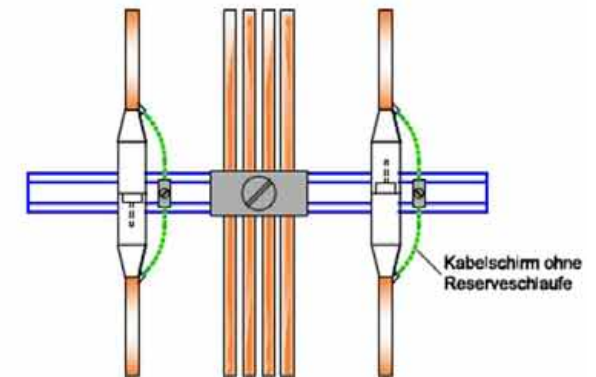
## Grounding of the primary cable screens

### Konstruktion zur Erdung der Serienkreiskabelschirme an der Befeuerungsstationseinführung - doppelseitig belegbar - für 60 Stk. Kabel pro Seite



#### Detail A:

- Ausfädelung von 2 Stk. Stecker
- Befestigung der Erden mit Hammerflussschraube
- Abfang der verbleibenden 4 Stk. Primärleitungen mit Bügelschelle



#### Legende:

- C-Schiene
- I-Proflischiene - Grundgerüst
- Kopfplatte
- Erdschlussstelle

Bemassung in mm  
Die Masse sind ab Bau zu nehmen



# ILS-LLZ



# NAVAIDS

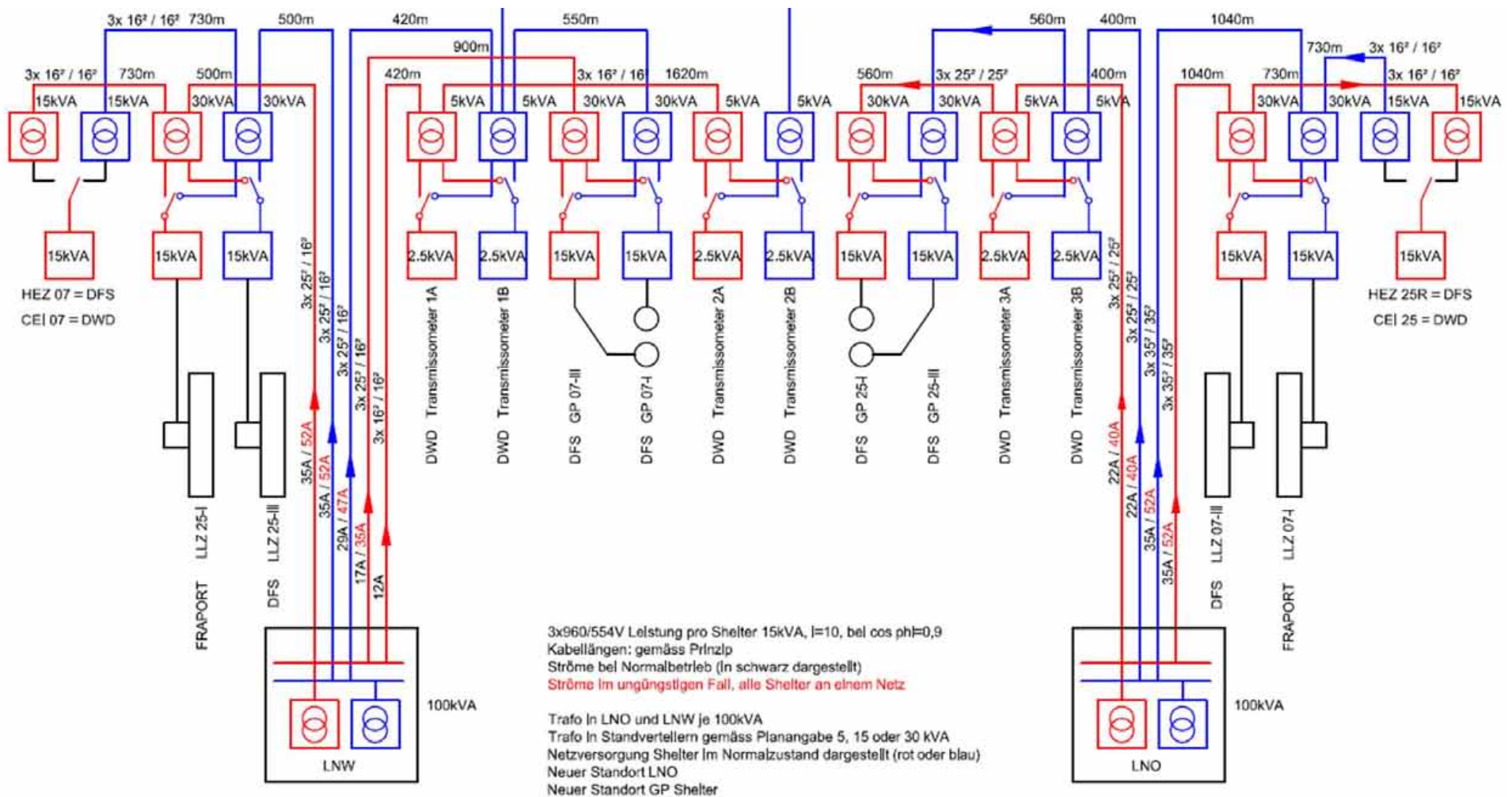
Glidepath for 3° and 3,2°



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# Supply for NAVAIDS and Weather Sensors

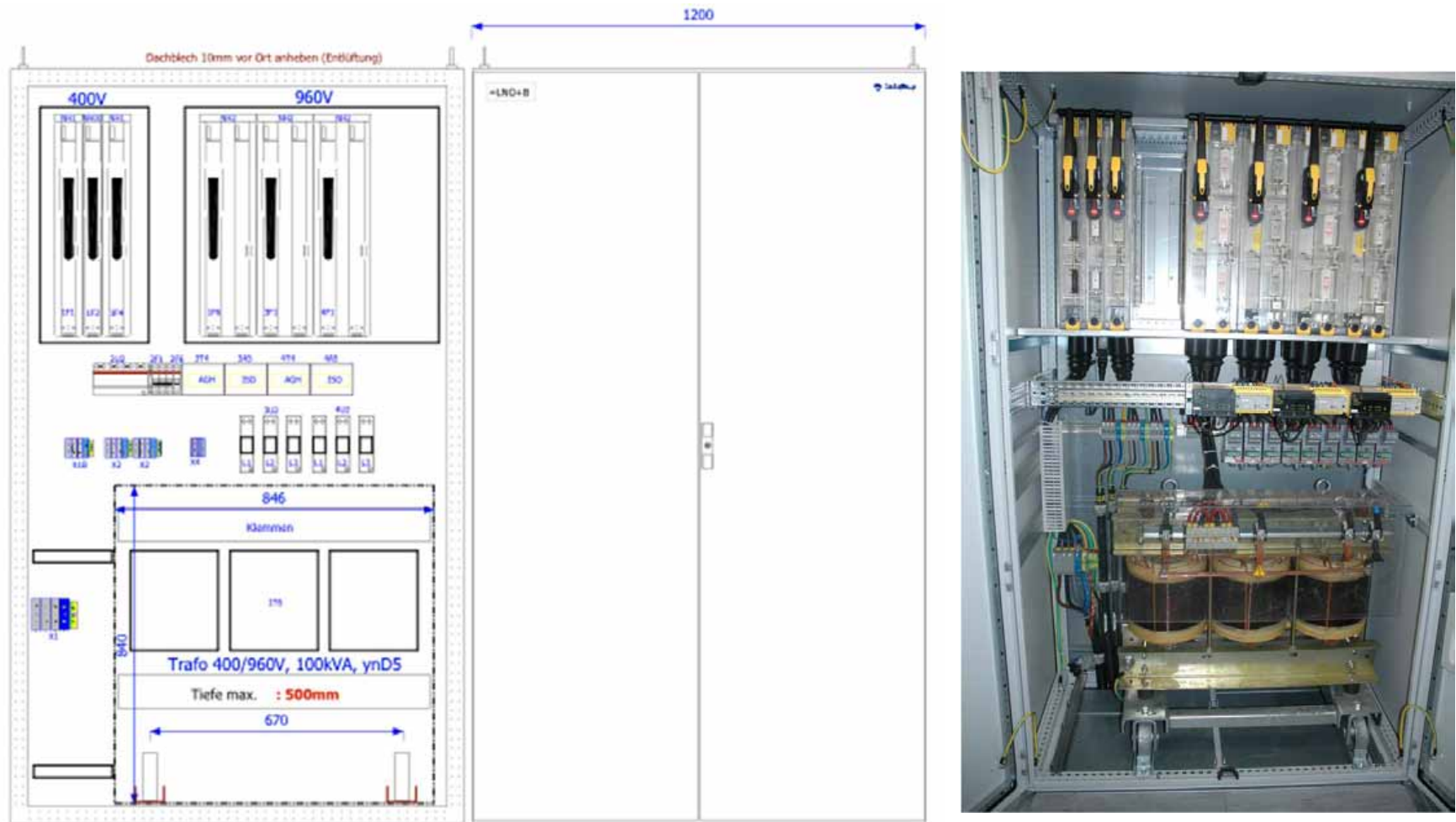
## Overview 3x960V Network





# 3x960V Supply for NAVAIDS and Weather Sensors

## Redundant feeder in Transformer Vault

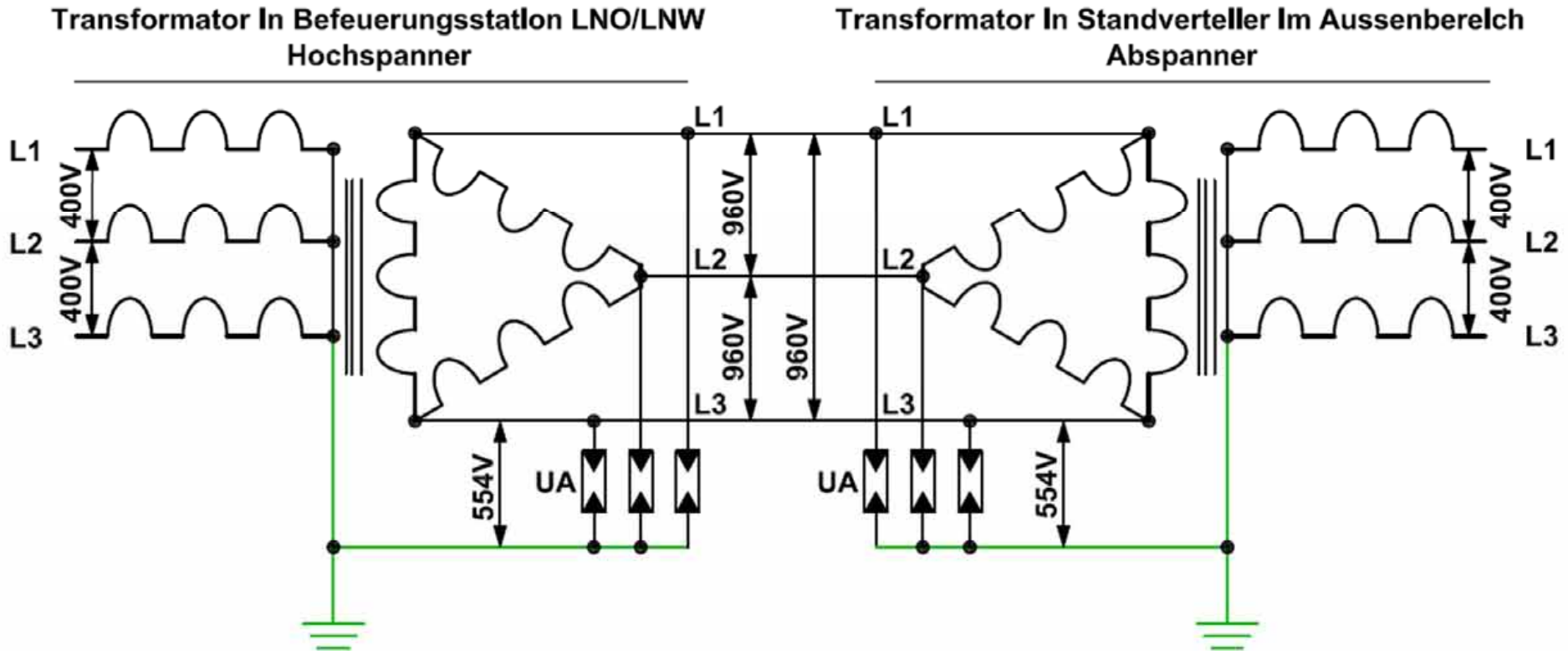


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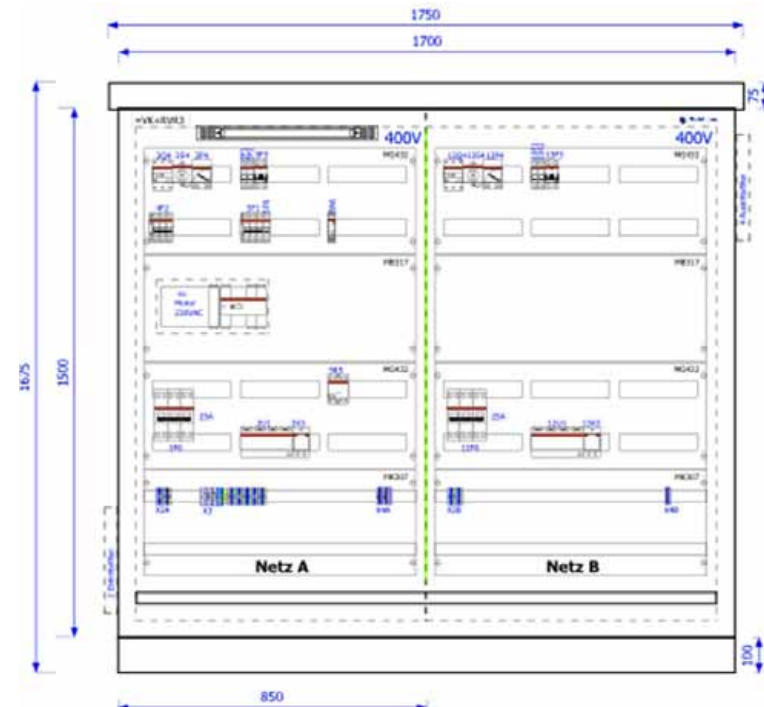
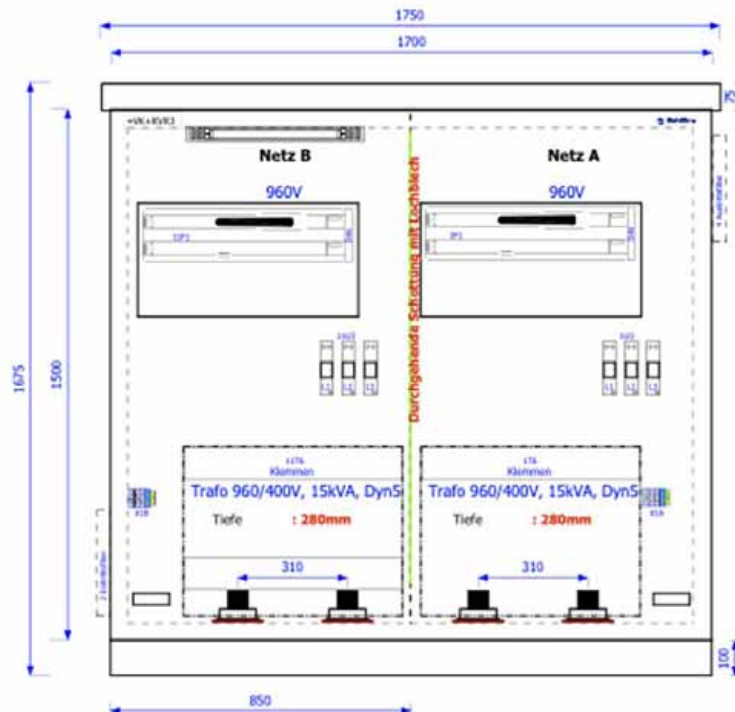
# 3x960V Supply for NAVAIDS and Weather Sensors

## Principle



# 3x960V Supply for NAVAIDS and Weather Sensors

## Step down Transformer Box



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## 3x960V Step down Transformer, primary



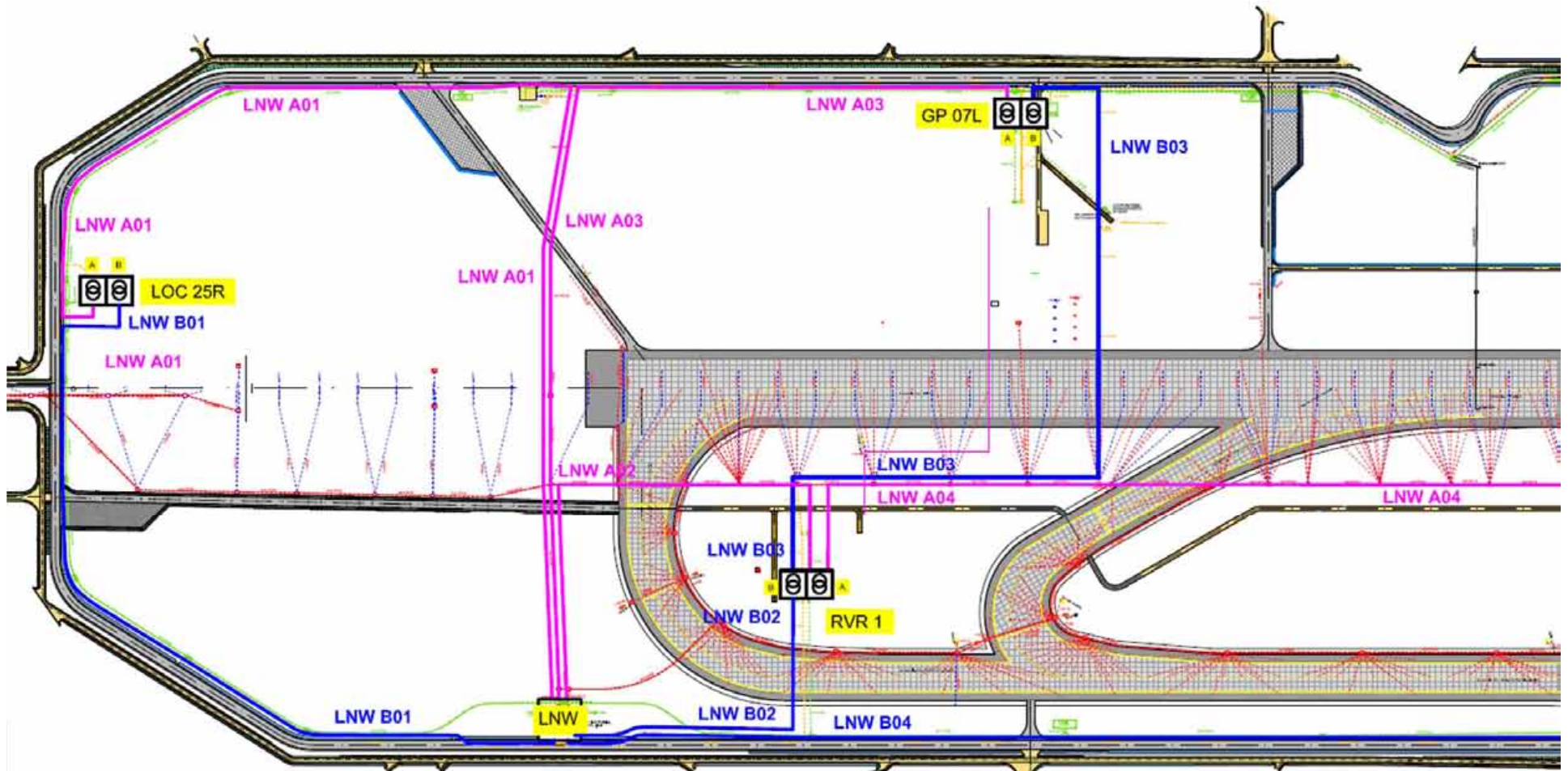
## Step down Transformer, 3x400VAC secondary





# 3x960V Supply for NAVAIDS and Weather Sensors

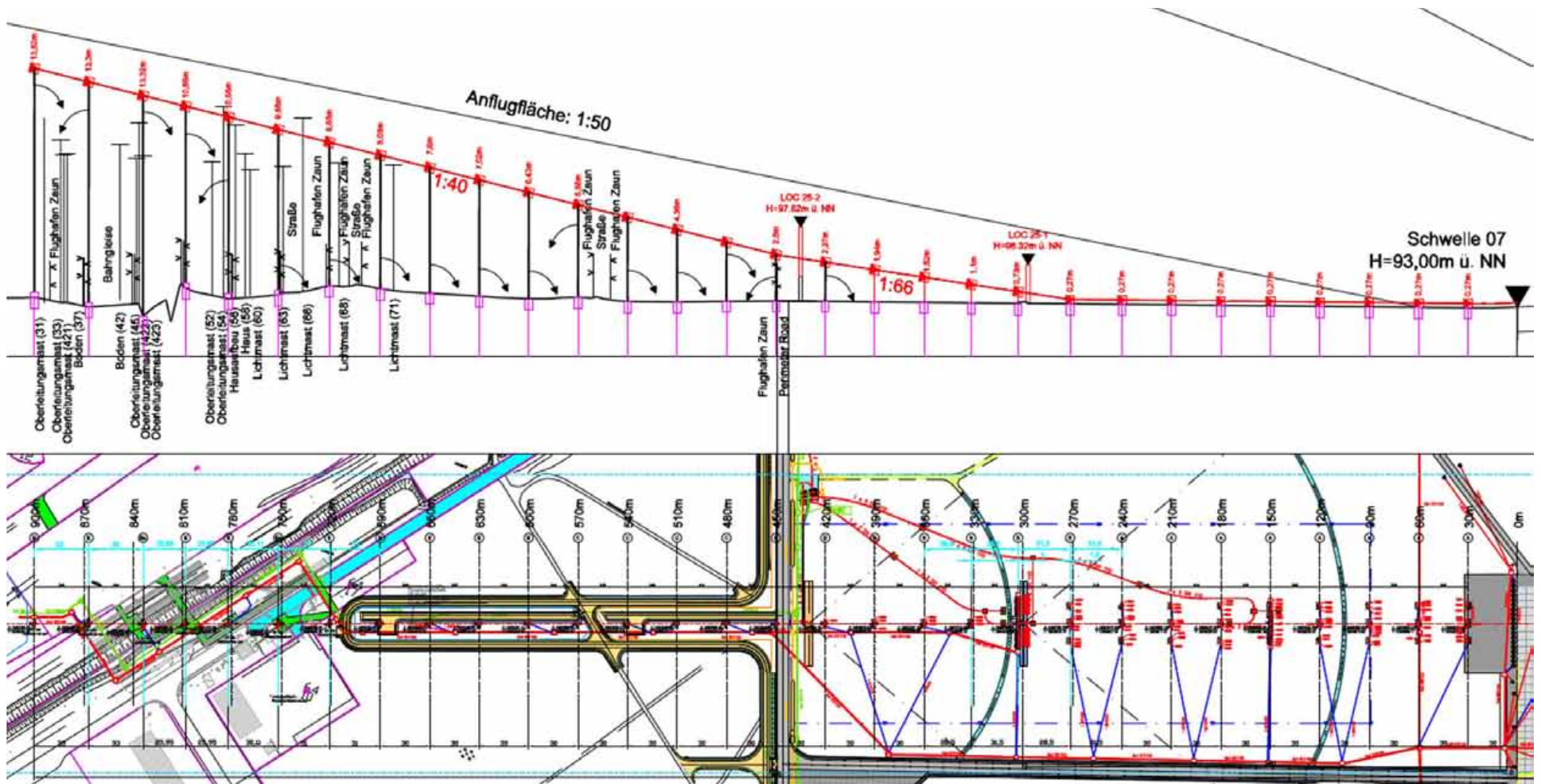
## Redundant cableing



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# Approach Lighting System 07L

## Cross section and lay out



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# Approach Lighting System Fibreglass Mast



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# Approach Lighting System Crossing a railway line



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# Safety mast system

## Certification Tests according USAF



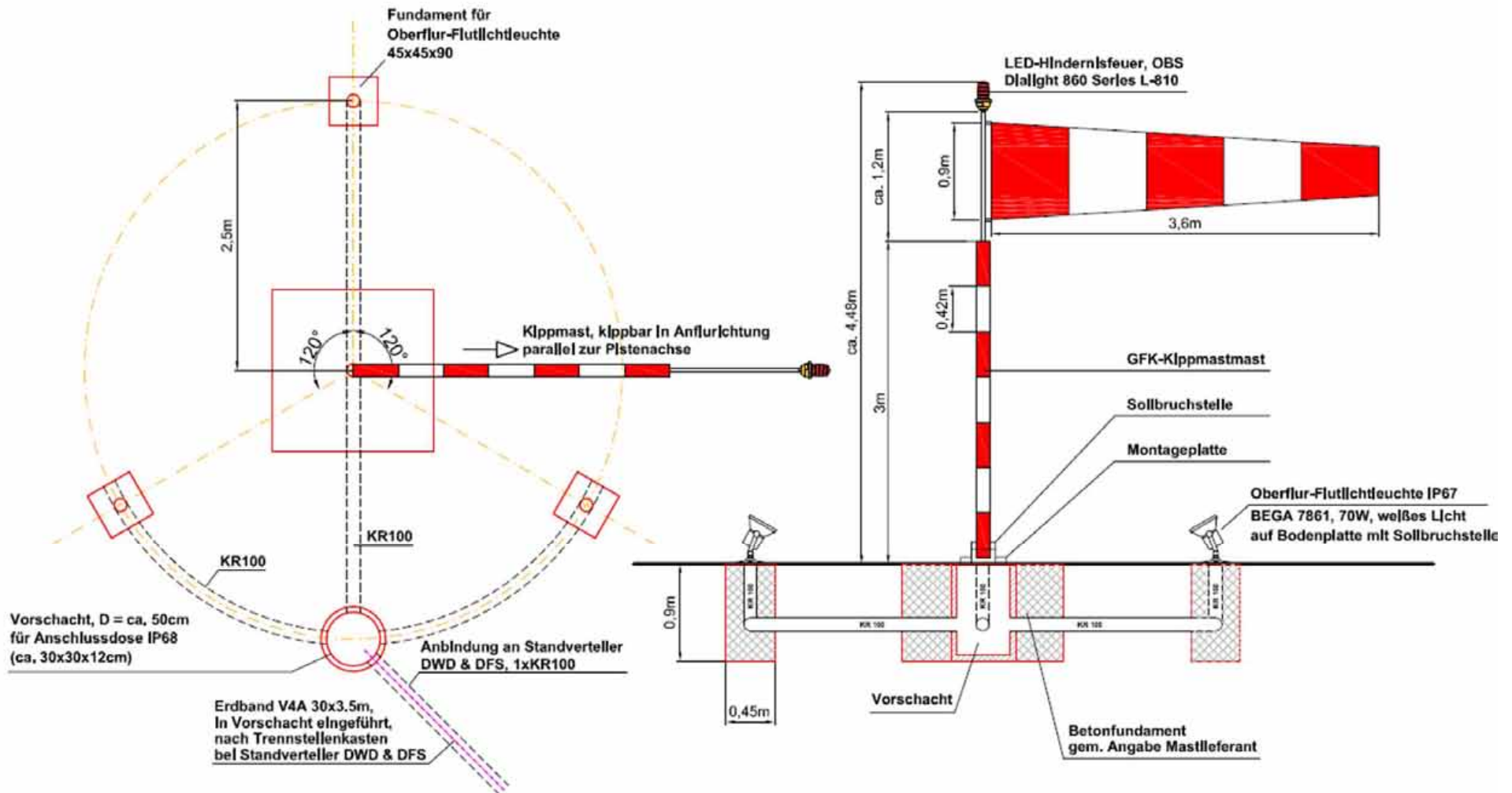
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# Fiberglass Windmast



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# Windcone on fiberglass mast



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# Thank you for your interest



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# Questions?



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