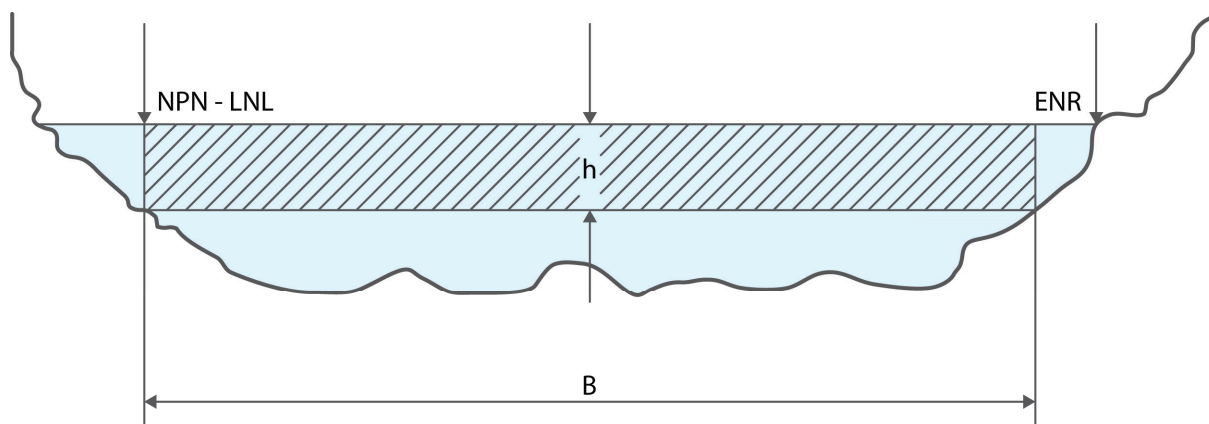


DESIGN CRITERIA FOR FAIRWAY DIMENSIONS

(Recommendations for defining the fairway dimensions, hydrotechnical and other structures on the Danube River, Danube Commission, Budapest, 1988)¹



Fairway - part of the river adapted for the safe navigation, marked with appropriate signaling and marking system.

Main characteristics of the fairway are defined by its minimal dimensions:

- Fairway depth (h)
- Fairway width (B)
- Bend curvature (R)

All these dimensions are being defined using the low navigation and regulation level as the reference (LNL, NPN, ENR - Etiage navigable et de régularisation).

Low Navigation and Regulation Level (LNL, NPN, EN) - water level, defined for all navigable sections of the Danube River, from Kelheim (km 2411,60) to Sulina (km 0,00), defined by the 94% duration of discharges over the 30 year period, on days without ice.

Minimal fairway depth - depth provided in the fairway at LNL, within its minimal width boundary.

Minimal fairway width - width at LNL, corresponding to minimal fairway depth.

Minimal bend curvature - bend curvature along the fairway axis, at LNL.

¹ It is necessary to have in mind that as of January 2012, new *Recommendations on Minimal Requirements in Regard to Defined Fairway Dimensions, Including the Hydrotechnical and other Works on the Danube River* are in place. These Recommendations are to be applied for new projects. Having in mind that realization of the project *Preparation of Documentation for River Training and Dredging Works on Selected Sectors Along the Danube River* started before the adoption of these Recommendations, they were not taken into account for this Project

For the Danube River fairway, following values have been defined in DC Recommendations:

Minimal Depth:

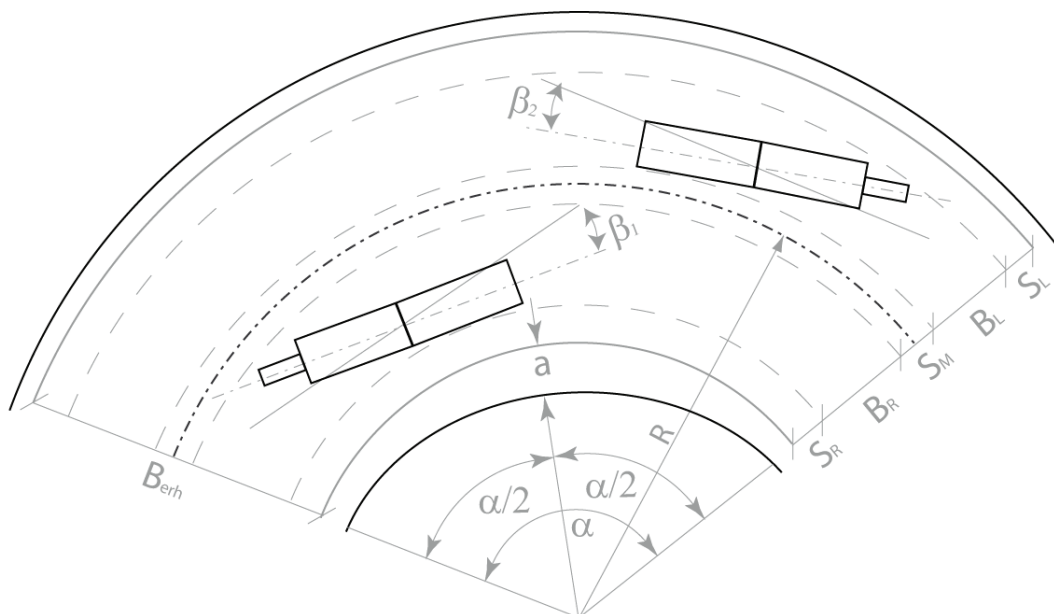
- on free flowing section 25 dm
- in reservoirs 35 dm

Minimal Width:

- on free flowing section
 - o On stretches with erodible bed min 180m
 - o On stretches with rocky bottom and rapids min 100m
 - o On transitional stretches within reverse curves with erodible bed min 150m
- in reservoirs min 180m
 - with extension to 200m in bends

Minimal Bend Curvature:

- min 1000m
- On stretches with unfavorable geomorphological characteristics as an exception it is allowed 750m



Low navigation levels at profiles of main gauging stations on the Danube River:

Gauging Station	Chainage	“0” of gauging station	LNL* (1971-2000)	LNL** (1981-2010)
		(masl)	Relative depth (cm) / absolute level (masl)	
Bezdan	1425+590	80.64	10 / 80.74	-10 / 80.54
Apatin	1401+900	78.84	87 / 79.71	46 / 79.30
Bogojevo	1367+250	77.46	84 / 78.30	11 / 77.57
Bačka Palanka	1298+560	73.97	-	47 / 74.44
Novi Sad	1254+980	71.73	80 / 72.53	57 / 72.30
Slankamen	1216+020	69.68	142 / 71.10	117 / 70.85
Beograd	1173+310	67.87	223 / 70.10	213 / 70.00

* - in DC publication, *Low Navigation and Regulation Level and High Navigation Level on Most Important Gauging Stations on the Danube River, for Period 1971-2000*, published in 2007., only LNL for stations Bezdan and Bogojevo have been updated. For other stations defined values stayed unchanged (and they were defined in mid 80'). It is important to have in mind that, in the past, discharge measurements have been performed only at gauging stations Bezdan and Bogojevo, and only in recent years continuous measurements have been performed at stations Novi Sad and Slankamen.

** - for the purpose of the Project, new calculation of LNL was performed, using the 1D hydraulic model, having in mind DC Recommendations for LNL calculations. Danube Commission is planning preparation of new publication with newly calculated LNL, calculated for period 1981 - 2010. Values obtained using 1D model will be incorporated into this publication.