



Estimation of Costs
Case 2 Rail Viaduct Alternative I-beam

	text	quantities	unit	unite price lower limit	unite price upper limit	unite price avarage	factor of difficulty *)2	total	chapter sum	further explanations
	01. building Railway Viaduct								2 116 071.88 €	
	land acquisition and reimbursements								7 452.00 €	
	reimbursements for temporary use									
	site areas, excavation pit, construction road	2 160.00	m2	3.00 €	3.90 €	3.45 €	1.00	7 452.00 €		
	excavation pit								288 282.00 €	
	pit excavation abutment	6015	m3	20.00 €	26.00 €	23.00 €	1.00	138 345.00 €		transportation costs for excavation are not included
	pit excavation pier	870	m3	20.00 €	26.00 €	23.00 €	1.00	20 010.00 €		
	backfill (filled in layers around 30cm and compressed)	910	m3	35.00 €	45.50 €	40.25 €	1.00	36 627.50 €		
	soil improvement qualified	615	m3	27.00 €	35.10 €	31.05 €	1.00	19 095.75 €		
	soil improvement with concrete	615	m3	100.00 €	130.00 €	115.00 €	1.00	70 725.00 €		
	compressing subsoil	605	m2	5.00 €	6.50 €	5.75 €	1.00	3 478.75 €		
	dismantling existing structure								0.00 €	
	If there is an existing structure or building which has to be dismantled, the costs have to be taken into account.	0.00	m3	300.00 €	390.00 €	345.00 €	1.00	0.00 €		optional
	new construction of railway viaduct								1 784 400.38 €	
	clear construction field	2 160.00	m2	5.00 €	6.50 €	5.75 €	1.00	12 420.00 €		*)1
	recultivation of construction field	2 160.00	m2	5.00 €	6.50 €	5.75 €	1.00	12 420.00 €		*)1
	topsoil excavation	895	m2	2.50 €	3.25 €	2.88 €	1.00	2 573.13 €		*)1
	application of top soil	895	m2	5.00 €	6.50 €	5.75 €	1.00	5 146.25 €		*)1
	granular subbase in final position	330	m2	25.00 €	32.50 €	28.75 €	1.00	9 487.50 €		
	foundation abutment reinforced concrete	290	m3	250.00 €	325.00 €	287.50 €	1.00	83 375.00 €		
	drilling pile Ø 90 to 120 cm	0	m	450.00 €	585.00 €	517.50 €	1.00	0.00 €		optional
	operation drilling equipment	0	psch*)3	20 000.00 €	26 000.00 €	23 000.00 €	1.00	0.00 €		optional
	side wall reinforced concrete	195	m3	400.00 €	520.00 €	460.00 €	1.00	89 700.00 €		
	wing wall reinforced concrete	190	m3	400.00 €	520.00 €	460.00 €	1.00	87 400.00 €		
	foundation piers reinforced concrete	220	m3	250.00 €	325.00 €	287.50 €	1.00	63 250.00 €		
	piers reinforced concrete	140	m3	400.00 €	520.00 €	460.00 €	1.00	64 400.00 €		
	superstructure prefabricated elements reinforced concrete	495	m3	700.00 €	910.00 €	805.00 €	1.00	398 475.00 €		
	basic transportation costs prefabricated elements	12	St	1 000.00 €	1 300.00 €	1 150.00 €	1.00	13 800.00 €		includes all basics, like a transporter is needed, prefabricated elements have to be uploaded, fixed for transportation and have to be unloaded etc.
	transportation way costs prefabricated elements	100	1/km	10.00 €	13.00 €	11.50 €	1.00	1 150.00 €		quantitie presumed includes costs for driver, fuel, temporary barriers, escort vehicle, temporary dismantle of obstacles etc. adjust with the factor of difficulty depending on difficulty of transportation way situation
	mobile crane operation for assembly	2	day	10 000.00 €	13 000.00 €	11 500.00 €	1.00	23 000.00 €		
	supersturcture cast in-situ deck reinforced concrete	220	m3	700.00 €	910.00 €	805.00 €	1.00	177 100.00 €		
	rebar for reinforced concrete	290	t	1 100.00 €	1 430.00 €	1 265.00 €	1.00	366 850.00 €		150 to 200 kg/m3
	edge beam reinforced concrete	160	m3	790.00 €	1 027.00 €	908.50 €	1.00	145 360.00 €		
	cable duct cover	180	m	25.00 €	32.50 €	28.75 €	1.00	5 175.00 €		
	railing	180	m	240.00 €	312.00 €	276.00 €	1.00	49 680.00 €		
	protective concrete	870	m2	50.00 €	65.00 €	57.50 €	1.00	50 025.00 €		
	bitumen waterproofing superstructure	870	m2	65.00 €	84.50 €	74.75 €	1.00	65 032.50 €		
	bituminous coating for areas which are in contact with soil	105	m2	10.00 €	13.00 €	11.50 €	1.00	1 207.50 €		
	drainage wall (drainage concrete stones)	60	m2	30.00 €	39.00 €	34.50 €	1.00	2 070.00 €		
	construction joints	26	m	15.00 €	19.50 €	17.25 €	1.00	448.50 €		
	drainage system	1	psch	15 000.00 €	19 500.00 €	17 250.00 €	1.00	17 250.00 €		
	grounding	1	psch	2 500.00 €	3 250.00 €	2 875.00 €	1.00	2 875.00 €		
	bridge equipment, dummy joints, logo with year	1	psch	2 500.00 €			1.00	2 875.00 €		dummy joint = a slot cut into a concrete slab to prevent serious fractures
	concrete elastomer joint	180	m	90.00 €	117.00 €	103.50 €	1.00	18 630.00 €		
	track junction profile	26	m	250.00 €	325.00 €	287.50 €	1.00	7 475.00 €		
	internal grounding	1	psch	5 000.00 €	6 500.00 €	5 750.00 €	1.00	5 750.00 €		
	temporary structures and building aids								35 937.50 €	
	waterpumping	1	psch	10 000.00 €			1.00	11 500.00 €		depends on landscape conditions, depending on amount of waterpumping factor of difficulty must be choosen between 0.5 - 5.0
	support structure and protective scaffolding	1	psch	15 000.00 €	13 000.00 €	11 500.00 €	1.00	17 250.00 €		
	working scaffold for edge beams	1	psch	3 500.00 €	19 500.00 €	17 250.00 €	1.00	4 025.00 €		
	construction of site road	55	m3	30.00 €	4 550.00 €	4 025.00 €	1.00	1 897.50 €		assumed value, depends on local conditions
	dismantling of site road	55	m3	20.00 €	39.00 €	34.50 €	1.00	1 265.00 €		assumed value, depends on local conditions
	built sheeting	0	m2	350.00 €	26.00 €	23.00 €	1.00	0.00 €		optional
	use of device for driving work	0	psch	20 000.00 €	455.00 €	402.50 €	1.00	0.00 €		optional
					26 000.00 €	23 000.00 €	1.00			



	02 disposal								0.00 €	
	If there is an existing structure or building which has to be dismantled, the costs for disposal have to be taken into account. excavation	0	t	24.55 €	31.92 € depends on reuse for other bridges, e.g. animal overpass and for other sites; contamination etc.	28.23 €		0.00 €		
	03 Other								359 732.22 €	
	construction site equipment	1	psch	211 607.19 €	211 607.19 €	211 607.19 €	1.00	211 607.19 €		10% of construction costs
	traffic safety	0	psch	5 000.00 €			1.00	0.00 €		optional, depends on traffic crossing in location of bridge
	traffic light control during construction time	0	psch	8 000.00 €	6 500.00 €	5 750.00 €	1.00	0.00 €		optional, depends on traffic crossing in location of bridge
	security requirements	1	psch	42 321.44 €	10 400.00 €	9 200.00 €	1.00	42 321.44 €		2% of total construction costs
	construction planning	1	psch	105 803.59 €	42 321.44 €	42 321.44 €	1.00	105 803.59 €		5% of construction costs

		total	per m2/bridge	
	only construction costs	2 116 071.88 €	2 325.35 €	
	subtotal construction costs	2 475 804.09 €	2 720.66 €	
	planning costs	495 160.82 €		20 - 25% of subtotal construction costs, calculated with 20%
	total costs CAPEX (net)	2 970 964.91 €	3 264.80 €	
	total costs OPEX (net)	31 741.08 €	34.88 €	1.5% of CAPEX

- *}1

Depends on dimensions of railway viaduct. The amount is for the shown case. For other dimensions the amount changes and thus the total price.

bridge area

910 m2
- *}2

factor to describe the level of difficulty, for factors of costs which can differ very much depending on location (e.g. for waterpumping) this faktor can be set to a value higher than 1
- *}3

psch = lump sum

additional infromation

- prices are experience values from previous and current ongoing projects of MKP in Germany. Prices can allways differ depending on country, economic situation etc.
- tracks, ballast, rails etc. are not included in price