

Article

The Effective Use of National Recovery and Resilience Plan Funding: A Methodological Approach for the Optimal Assessment of the Initiative Costs

Francesco Tajani ¹, Felicia Di Liddo ² and Rossana Ranieri ¹

¹ Department of Architecture and Design, Sapienza University of Rome, Italy

² Department of Civil, Environmental, Land, Building Engineering and Chemistry, Polytechnic University of Bari, Italy

* Correspondence: francesco.tajani@uniroma1.it

Santa Maria della Pietà monumental compendium

Pavillion [No.]	GFA [m ²]	Optimal Cost [€]	Official Cost [€]	Δ [%]
5	1,688	2,192,300	2,236,146	2.00
6	1,629	716,760	738,263	3.00
7	1,350	2,704,191	2,744,754	1.50
16	2,140	3,194,841	3,220,400	0.80
18	2,370	3,681,992	3,733,540	1.40
23	1,500	2,305,937	2,398,174	4.00
24	396	804,963	869,360	8.00
25	740	1,534,445	1,649,528	7.50
28	3,790	4,815,681	4,873,469	1.20
31	1,900	2,815,653	2,855,072	1.40
41	750	1,552,106	1,676,274	8.00
TOTAL CONSTRUCTION COSTS [€]		26,318,869	26,994,980	
INDIRECT COSTS (25%) [€]		6,579,717	6,748,745	
TOTAL INITIATIVE COSTS [€]		32,898,586	33,743,725	

Tor Bella Monaca public housing compendium

Intervention	GFA [m ²]	Optimal Cost [€]	Official Cost [€]	Δ [%]
<i>North Building</i>				
BUILDING ENERGY RECOVERY AND UPGRADING				
<i>Floor -1</i>				
Demolition of staircases	57.00	4,959.52	5,133.10	3.5
Redevelopment of existing underground parking	2,403.63	2,169,703.78	2,213,097.86	2

Functional reconversion of parking space into basement	486.54	439,188.93	445,776.76	1.5
Upgrading of staircase	240.00	216,642.71	231,807.70	7
Expansion of parking space	1,726.86	1,558,798.43	1,652,326.34	6
Floor 0				
Demolition of staircases	85.00	7,395.78	7,691.61	4
Demolition of balcony	590.00	51,335.38	53,388.80	4
Residential units redevelopment	1,543.87	1,393,619.20	1,414,523.49	1.5
Services redevelopment	260.10	234,786.53	244,177.99	4
Energy retrofitting	553.06	198,666.42	210,586.41	6
Upgrading of staircase and hallway	306.32	276,504.88	290,330.12	5
Building of new slab	258.60	285,591.17	297,014.82	4
Floor 1				
Energy retrofitting	2,575.01	924,974.68	971,223.41	5
Upgrading of staircase and hallway	482.00	532,308.37	564,246.87	6
Upgrading of staircase	237.87	85,447.38	91,428.70	7
Demolition of loggias facing the street	33.19	2,888.04	3,003.56	4
Loggias realization	96.60	106,682.55	114,150.33	7
Floor 2				
Energy retrofitting	2,821.03	1,013,349.58	1,053,883.56	4
Upgrading of staircase	208.63	74,942.79	80,188.79	7
Floor 3				
Energy retrofitting	2,821.03	1,013,349.58	1,074,150.55	6
Upgrading of staircase	208.63	74,942.79	80,188.79	7
Floor 4				
Energy retrofitting	2,867.78	1,030,142.76	1,071,348.47	4
Upgrading of staircase	208.63	74,942.79	79,963.96	6.7
Floor 5				
Energy retrofitting	2,867.78	1,030,142.76	1,066,197.76	3.5
Upgrading of staircase	208.63	74,942.79	79,814.07	6.5
Floor 6				
Energy retrofitting	2,128.92	764,734.12	790,735.08	3.4
Upgrading of staircase	151.63	54,466.71	57,625.78	5.8
Floor 7				
Energy retrofitting	2,128.92	764,734.12	789,970.35	3.3
Upgrading of staircase	151.63	54,466.71	57,625.78	5.8

South Building

BUILDING ENERGY RECOVERY AND UPGRADING

Floor -1				
Demolition of staircases	66.00	5,742.60	6,035.47	5.1
Redevelopment of existing underground parking	2,288.37	2,065,661.12	2,113,171.33	2.3

Functional reconversion of parking space into basement	197.88	178,621.91	193,268.91	8.2
Functional reconversion of parking space into services	125.46	113,249.97	123,102.72	8.7
Upgrading of staircase	234.19	211,395.35	227,038.61	7.4
Expansion of parking spaces	1,585.08	1,430,816.75	1,489,480.24	4.1
Floor 0				
Demolition of staircases	92.00	8,004.84	8,685.25	8.5
Demolition of balcony	757.00	65,865.90	71,003.44	7.8
Residential units redevelopment	1,757.25	1,586,228.56	1,622,711.82	2.3
Services redevelopment	362.95	327,626.96	348,595.09	6.4
Energy retrofitting	553.06	198,666.42	212,970.40	7.2
Upgrading of staircase and hallway	331.91	299,606.03	317,882.00	6.1
Building of new slab	318.60	351,853.62	374,372.25	6.4
Floor 1				
Energy retrofitting	2,898.53	1,041,189.62	1,083,878.39	4.1
Upgrading of staircase and hallway	96.60	106,682.55	113,510.23	6.4
Upgrading of staircase	282.77	101,574.34	108,075.10	6.4
Demolition of loggias facing the street	44.26	3,850.71	4,085.60	6.1
Loggias realization	123.00	135,838.03	144,531.66	6.4
Floor 2				
Energy retrofitting	3,268.50	1,174,084.78	1,201,088.73	2.3
Upgrading of staircase	242.02	86,936.79	91,631.38	5.4
Floor 3				
Energy retrofitting	3,268.50	1,174,084.78	1,210,481.41	3.1
Upgrading of staircase	242.02	86,936.79	92,413.81	6.3
Floor 4				
Energy retrofitting	3,343.15	1,200,901.96	1,265,750.67	5.4
Upgrading of staircase	242.02	86,936.79	93,370.11	7.4
Floor 5				
Energy retrofitting	3,343.15	1,200,901.96	1,266,951.57	5.5
Upgrading of staircase	242.02	86,936.79	93,196.24	7.2
Floor 6				
Energy retrofitting	2,604.29	935,493.32	957,009.67	2.3
Upgrading of staircase	188.58	67,739.43	72,752.15	7.4
Floor 7				
Energy retrofitting	2,604.29	935,493.32	958,880.65	2.5
Upgrading of staircase	188.58	67,739.43	71,194.14	5.1
Public spaces				
Internal Courtyard Recovery - NORTH				
Public space (courts)	1,150.00	107,832.43	112,684.89	4.5
Park/garden area and sports field	3,800.00	356,315.84	360,591.63	1.2

<i>Internal Courtyard Recovery - SOUTH</i>				
Park area	2,950.00	276,613.61	288,784.61	4.4
Public space	1,251.00	117,302.93	122,464.26	4.4
Road surfaces and parking spaces	1,115.00	67,371.65	70,268.63	4.3
Agricultural Park	5,440.00	236,664.81	250,864.70	6
<i>Avenue Recovery</i>				
Recovery of Avenue	6,400.00	600,110.89	636,117.54	6
Parking spaces	3,612.00	218,247.88	225,231.81	3.2
Streets facilities	8,760.00	438,000.00	455,520.00	4
Tree-lined sidewalk	748.00	54,235.68	55,320.39	2
Tower-side parking spaces with trees	2,711.50	163,836.96	167,113.70	2
Public spaces	561.00	52,603.47	54,918.02	4.4
Archaeological parking spaces and sidewalk	1,100.00	66,465.30	69,788.57	5
<i>Internal Courtyard Parking Recovery</i>				
Private gardens	430.00	40,319.95	42,335.95	5
Public space	1,450.00	135,962.62	142,760.75	5
Tree-lined parking spaces	2,550.00	154,078.65	157,160.22	2
<i>Mineral Court Recovery</i>				
Private gardens	430.00	40,319.95	41,368.27	2.6
Public space/garden	2,083.00	195,317.34	200,395.59	2.6
New tree-lined parking space	2,150.00	129,909.45	134,196.46	3.3
<i>Archaeological Area Recovery</i>				
Crossing paths	1,200.00	69,607.30	73,783.74	6
Green works, irrigation system, lighting	10,000.00	435,045.60	445,051.65	2.3
Tree planting [cadauno]	25.00	12,500.00	12,800.00	2.4
<i>Agro side connections</i>				
Public space	1,326.00	124,335.48	127,195.20	2.3
Road	7,775.00	233,250.00	247,245.00	6
<i>New construction</i>				
<i>Internal Courtyard - NORTH</i>				
Demolition of Pavilion 1	275.00	23,927.51	25,482.80	6.5
Excavation and earthworks for hypogeum spaces	16,400.00	832,387.25	874,006.61	5
Museum (hypogeum)	1,765.00	2,902,913.15	3,048,058.81	5
Retaining structures	1,100.00	370.876,37	389,420.19	5
<i>Internal Courtyard - SOUTH</i>				
Demolition of Pavilions 2 and 3	522.00	45,418.76	48,461.82	6.7
Excavation and earthworks for hypogeal spaces	4,000.00	203,021.28	214,187.45	5.5
Hypogeum collaboratory	510.00	838,802.10	895,001.84	6.7
Playroom reconstruction	510.00	620,012.10	662,792.93	6.9
Retaining structures	200.00	67,432.07	70,803.67	5

TOTAL CONSTRUCTION COSTS [€]	39,711,474.68	41,702,435.73
INDIRECT COSTS (25%) [€]	9,927,868.67	10,425,608.93
TOTAL INITIATIVE COSTS [€]	49,639,343.35	52,128,044.66
TOTAL COSTS OF THE TWO INITIATIVES	82,537,929.6	85,871,769.7

Table S1. Summary of the *Santa Maria della Pietà* monumental compendium and *Tor Bella Monaca* public housing compendium initiatives: identification of the GFA, of the optimal costs and the official costs, and the percentage differential (Δ) between the official costs and the optimal costs for each intervention.