



INNOVATIVE EDUCATIONAL INTEGRATION OF URBAN
PLANNING BASED ON BIM-GIS TECHNOLOGIES AND
FOCUSED ON CIRCULAR ECONOMY CHALLENGES

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TASK 01/A3. COLLABORATIVE GUIDE FOR LYFE CYCLE ASSESSMENT OF URBAN CONSTRUCTION MATERIALS

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ROMANIA
GREEN
BUILDING
COUNCIL



Centro Tecnológico
del mármol, piedra y materiales



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1. INTRODUCTION

A Collaborative Guide of LCA has been produced and integrated in the Online Educational Collaborative Platform (OECF), where all associated partner has contributed for updating it. It is an online and consultancy document related to LCA (life Cycle Assessment) of urban construction materials for stakeholders.

2. OBJECTIVE OF THE TASK 01/A3

This guide focuses on the Life Cycle Assessment (LCA) of urban construction materials, as well as the main environmental indicator that are part of urban developments from an educational point of view.

The main objective of this guide is to train and raise awareness on the Carbon footprint, Water footprint and Embodied energy of construction materials taking into account the process of circular economy for the development of urban planning and rehabilitation.

During the execution of the UrbanBIM project this training material guide was calculated, compiled and updated, which will also be used for future project tasks, such as “O4 Developing of Educational software of UrbanBIM learning application” for the plug-in database.

This list is based on the BCCA (Andalusian Construction Cost Base)¹, where the Arditec Group from University of Seville, has used to introduce and calculate the LCA data for this project.

3. LCA OF URBAN CONSTRUCTION MATERIALS

BCCA code	Measurement unit	English description	Carbon footprint	Water footprint	Embodied energy	€ per unit of reference
			(t CO ₂ eq/u. ref.)	(m ³ /u. ref.)	MJ/u. ref.	EUR/u. ref.
03ACC00811	kg	B500S corrugated steel bars	0,0016	0,0295	25,5133	1,4865
03ERM00011	m ²	Wooden Formwork for Foundation	-0,0115	5,5177	166,0656	9,7562
03ERT00011	m ²	Metallic fromwork for foundation	-0,0067	4,6274	183,1642	26,3146
03EWW00025	m ²	Steel grating tramex	0,0464	1,3208	737,0959	49,7715
03HAL00715	m ³	Concrete HA-25/P/20/Ila in foundation	0,2927	4,3723	1.606,8430	74,6952
03HAL00765	m ³	Concrete HA-25/B/20/Ila in slabs	0,2961	4,4173	1.631,6552	77,7389

¹ Base de Costes de la Construcción de Andalucía (BCCA) 19 julio 2017. Banco de precios. <https://www.juntadeandalucia.es/organismos/fomentoinfraestructurasyordenaciondelterritorio/areas/vivienda-rehabilitacion/planes-instrumentos/paginas/bcca-sept-2017.html>

03HAM00750	m3	Concrete HA-25/B/20/IIa in walls	0,2959	4,4155	1.627,7516	73,2979
03HMM00012	m3	Blinding concrete HM-20/P/40/I	0,2417	3,6014	1.333,5929	70,5525
03HMM00035	u	Concrete HM-20/P/20/II 80X80X120 cm for traffic light foundation	0,2020	2,7037	1.384,7903	87,2491
10ACN00111	m2	Grey granite polished 2 cm	0,0507	29,7471	911,9594	121,7285
10ACN00112	m2	Black granite polished 2 cm	0,0507	29,7471	911,9594	218,9985
10ACW00112	u	Black granite polished piece 60 x40 cm max.	0,0507	29,7471	911,9594	218,9985
10SES00150	m2	Surface water proofing treatment	0,0034	0,0754	300,0313	12,7265
15ACV91110	m	Vitrified clay pipe 600 mm	0,2467	4,3879	4.570,6059	155,3073
15ADD00100	u	Concrete drainage manhole 1,00X1,00 m y Depth >2,50m	1,8324	199,7122	25.972,2554	2.265,7550
15ADD00110	u	Storm overflow manhole 1,00X1,00 m y Depth >2,00m	2,6703	176,6585	38.734,0325	1.759,5652
15ADW00110	u	Filling and depuration compact system for street fountain	0,3412	8,0906	6.272,3457	5.279,1290
15APP00145	u	Prefabricated circular manhole DIAM. 1,20 m PROF. > 2,50 m	1,9271	17,3828	12.583,3690	931,9425
15ASW00100	u	Polyethylene manhole step	0,0067	0,1877	208,2381	19,1612
15ASW00170	u	Manhole cover DIÁM. 400	0,0972	0,9414	981,5303	84,8700
15CPP00100	m	Road mark 10 cm wide	0,0004	0,0098	10,1069	0,7417
15CRR10102	u	Vertical traffic sign	0,310	6,141	4513,018	114,121
15CSCE02270	m	Copper circuit 1X16 mm2 HO7-K(AS)	0,0003	0,0115	5,5001	16,8675
15CSE03160	m	2 PVC pipes Diam. 110 mm for traffic light network	0,0247	2,4260	315,2360	25,4380
15CSR00100	u	Highway manhole 60x60 cm	0,1978	2,3500	2.300,8631	157,0386
15CSW00120	u	Earthing rods in traffic light	0,0091	0,3647	163,1049	61,2840
15CSW02010	m	Connection cabinet - traffic light regulator	0,0263	0,9162	569,3242	115,0233
15EPP00105	u	Galvanized steel streetlight 6m LEDS light	3,425	70,992	56601,628	1023,065
15MAA90010	m3	Excavation in urbanized area	0,0070	0,0070	0,0000	4,0818
15MCC00101	m3	Superficial compaction with mechanical means	0,0005	0,0680	1,8305	2,0812

15MGD00140	m	PVC drainage pipe diam. 200 mm	0,0443	6,4776	1.145,4691	12,7885
15MGG00170	m2	Geotextile sheet 125-160 gr/m2	0,0003	0,0107	9,0425	2,0975
15MGG00410	m2	Polyethylene geomembrane on sub-base foundation	0,0005	0,0208	17,7232	0,9889
15MGG00810	m2	HD polyethylene geomembrane 1,5 mm	0,0043	0,1798	152,8626	4,3595
15MMG00110	m3	Artificial graded aggregate	0,0249	2,4833	328,2569	11,6616
15MMG00250	m3	Trench-fill with drainig material. Mechanical means	0,0230	2,3695	292,5257	12,2253
15MMG00350	m3	Trench-fill with filter material. Mechanical means	0,0194	2,3695	155,1211	11,8453
15MMG90210	m3	Trench-fill with granular material. Manual means	0,0241	2,5613	330,3925	16,6110
15MMS00180	m3	Rampart with selected soil. Mechanical means	0,0212	0,4119	49,8371	4,8043
15mmw90152	m3	Trench-fill with sand. Mechanical means	0,0155	0,2735	87,0649	14,2274
15MMW90160	m3	Manhole-fill with sand. Mechanical means	0,0165	0,3869	90,1158	15,5817
15MPP90115	m3	Manual excavation in urbanized area >2,50 m	-0,0606	30,1147	906,4350	32,8254
15MPP90125	m3	Mechanical excavation in urbanized area >2,50 m	-0,0125	6,6261	199,4263	6,6461
15MTW00005	m3	Internal transport of material from excavation. Manual means	0,0000	0,0000	0,0000	5,8590
15MTW00010	m3	Internal transport of material from excavation. Mechanical means	0,0004	0,0004	0,0000	0,1671
15mww00210	m2	Trench and manhole shoring	0,0026	0,0106	5,0115	3,8278
15MZZ90110	m3	Manual trench excavation in urbanized area < 2,50 m	-0,0235	12,0475	385,0283	14,1825
15MZZ90120	m3	Mechanical trench excavation in urbanized area < 2,50 m	-0,0056	3,0119	100,5563	3,0078
15mzz90125	m3	Mechanical trench excavation in urbanized area > 2,50 m	-0,0079	4,2167	126,9062	4,2004
15PBB01010	m	Prefabricated curb of photocatalytic concrete (R5) DE 30/40X70 cm	0,2035	3,1393	1.437,9389	60,0267

15PCC00110	m3	Asphalt concrete AC 32 BASE B 50/70 G	0,2329	9,0222	3.917,0049	128,5547
15PCC00120	m3	Asphalt concrete AC 22 BIN B 50/70 S	0,1432	6,7000	2.200,1962	62,8326
15PPP01110	m2	Smooth concrete block pavement 40X20X6 cm, photocatalytic	0,0342	0,5648	256,7800	15,6883
15PPP01120	m2	Interlocking concrete block pavement 30X20X10 cm, photocatalytic	0,0632	0,9888	469,7827	46,9841
15PPP01250	m2	Pavement in children's play area of artificial grass and shock absorbent base	0,0218	1,5075	370,0613	37,4295
15PSS00150	m2	Concrete slab HM-20 DE 15 cm	0,0361	0,5385	197,8622	10,3709
15RCW00120	u	Displacement of 6m height traffic light	0,5984	1,9326	806,9856	563,9850
15RCW00500	u	Tranfer of connection closet	0,2057	4,3462	3.512,2159	205,7358
15RCW00600	u	Electronic regulator transfer	0,0021	0,0071	4,2432	367,6457
15SCE01020	m	Polyethylene pipe PE100 Diam.40 mm PN-10	0,0030	0,0467	53,1720	7,4434
15SVE01020	u	Manual ball valve Diam.40 mm PN-10	0,0084	0,1302	141,6108	117,1300
15UPA0005	u	White concrete bench	2,052	28,071	13531,694	940,840
15UPA0010	u	Bench with METALLIC SUPPORT and nordic pine seat	-0,041	0,227	655,704	256,290
15UPB00100	u	Children`s rocker	0,396	7,351	4847,629	1005,295
15UPF00010	u	Stainless steel drinking water fountain	0,0456	0,9572	1.235,7452	856,1450
15UPW00120	m	Compact recirculation system for fountain	0,2185	4,9834	3.918,4161	1.094,6300
15URC00050	u	Underground container 4000 l.	5,0822	104,7827	83.561,4712	3.923,2700
15URP00010	u	Metallic public bin	0,271	4,348	1979,086	457,779