

Designer Embodied Carbon (EC) Calculation - Civil & Electrical	
Build Table Most Contributing Materials 1%>. Embodied Carbon A1-5	
Project Name:	Chester Road
Project Scope:	T11 Replacement - In Situ

Project Embodied Carbon Breakdown and Totals t(CO2e):			Calculation Date:	01/10/2025
Total A1-5w	137.9689468		Project Code:	50016361
A5a	4.61		Project Completed in Financial Year:	2025
Total A1-5 t(CO2e)	142.58	Note: Total A1-5t(CO2e): Total A1-5w + A5a = Ans	Estimated Cost of Civil Build(£): (To Estimate A5a)	£658,754.00
			Structural timber: in Tonnes, (To Calculate Sequestration Value)	0.075
			Sequestration Value t(CO2e):	-0.123

Design Values															Notes/ Comments
Embodied Carbon t(CO2e)					ECF kg(CO2e/kg)			Embodied Carbon t(CO2e)				Total EC t(CO2e)			
Stage of works	Material	Units values to input in conversion to tonnes cell	Conversion to Tonnes	Quantity(t)	A1-3	A4	A5w	A1-3	A4	A5w	A1-5w	A1-5w			
Foundation Excavation & Backfill	Soil assumed 5% cement content. 1m3 = 1.9 tonnes of clay soil. Ref:	input value in m3 (in 'conversion to tonnes' cell)	21.375	49.63275	0.061	0.005	0.004452	3.0276	0.2482	0.221	3.496726503	Foundation Excavation & Backfill	3.496726503		
Foundation	Asphalt, 8% (Bitumen) binder content (by mass) weight @ 2322kg / m3	input value in m3 (in 'conversion to tonnes' cell)	0	0	0.086	0.005	0.005777	0	0	0	0	Foundation	0		
	PVC Pipes (Waste water) weight @ 0.72kg / m	input value in meters (in 'conversion to tonnes' cell)	0	0	3.23	0.005	0.172409	0	0	0	0	Foundation	0		
	Concrete Kerb 26.74 linear meters per m3	input value in m3 (in 'conversion to tonnes' cell)	0	0	0.188	0.005	0.00211	0	0	0	0	Foundation	0		
	Limestone Aggregate, 2650kg/m3	input value in m3 (in 'conversion to tonnes' cell)	16.2	42.93	0.005	0.005	0.001484	0.2147	0.2147	0.0637	0.49300812	Foundation	0.49300812		
Reinforced Concrete	Ready mix concrete 32/40. 2350kg / m3	input value in m3 (in 'conversion to tonnes' cell)	0.865	2.03275	0.132	0.005	0.008215	0.2683	0.0102	0.0167	0.295185791	Reinforced Concrete	0.295185791		
	Rebar (New) weight @ H10 = 0.62kg / m	input value in kg (in 'conversion to tonnes' cell)	2.976	0.002976	2.77	0.032	0.14946	0.0082	1E-04	0.0004	0.008783545	Reinforced Concrete	0.008783545		
	Rebar (New) weight @ H12 = 0.89kg / m	input value in kg (in 'conversion to tonnes' cell)	1.513	0.001513	2.77	0.032	0.14946	0.0042	5E-05	0.0002	0.004465559	Reinforced Concrete	0.004465559		
	Rebar (New) weight @ H20 = 2.47kg / m	input value in kg (in 'conversion to tonnes' cell)	243.05	0.24305	2.77	0.032	0.14946	0.6732	0.0078	0.0363	0.717352353	Reinforced Concrete	0.717352353		
Reinforced Concrete	Rebar mesh A252 (New) weight = 2.4kg / m2	input value in kg (in 'conversion to tonnes' cell)	6	0.006	2.77	0.032	0.14946	0.0166	0.0002	0.0009	0.01770876	Reinforced Concrete	0.01770876		
	Stainless Steel Windposts Grade 304 weight @ 37.5kg / m	input value in meters (in 'conversion to tonnes' cell)	0	0	6.15	0.032	0.062	0	0	0	0	Steel works	0		
	Steel General (New) weight @ 7900kg / m3 (contractor weights for materials on steel is a must)	input value in kg (in 'conversion to tonnes' cell)	0	0	2.89	0.032	0.0294	0	0	0	0	Steel works	0		
	Mild Steel Fencing weight @ 25kg per linear meter	input value in meters (in 'conversion to tonnes' cell)	75	1.875	1.53	0.005	0.01553	2.8688	0.0094	0.0291	2.90724375	Steel works	2.90724375		
Superstructure	Clay Brick (2000kg / m3)	input value in kg (in 'conversion to tonnes' cell)	0	0	0.24	0.005	0.06575	0	0	0	0	Superstructure	0		
	Louvres RSH5700 edition / weight @ 25kg/m2 (Assumed aluminium frame)	input value in kg (in 'conversion to tonnes' cell)	0	0	12.79	0.032	0.1284	0	0	0	0	Superstructure	0		
	Mineral wool insulation, Rockwool RW3, weight at 60kg/m3	input value in kg (in 'conversion to tonnes' cell)	0	0	1.28	0.005	0.069059	0	0	0	0	Superstructure	0		
	Autoclaved Aerated Concrete Block 600kg / m3	input value in kg (in 'conversion to tonnes' cell)	0	0	0.375	0.005	0.0995	0	0	0	0	Superstructure	0		
Roof	Timber truss weight @ 3kg / m	input value in kg (in 'conversion to tonnes' cell)	0	0	0.42	0.005	0.12847	0	0	0	0	Roof	0		
	Concrete roof tiles weight @ 3kg / m2	input value in kg (in 'conversion to tonnes' cell)	0	0	0.1	0.005	0.00123	0	0	0	0	Roof	0		
	Concrete Roof Columns weight @ 355kg / m	input value in meters (in 'conversion to tonnes' cell)	0	0	0.188	0.005	0.00211	0	0	0	0	Roof	0		
	PVC Pipes (weight @ 0.72kg / m)	input value in meters (in 'conversion to tonnes' cell)	0	0	3.23	0.005	0.172409	0	0	0	0	Roof	0		
Cable Excavation & Backfill	Soil assumed 5% cement content. 1m3 = 1.9 tonnes of clay soil. Ref: (https://coolconversion.com/volume-mass-construction/~1-cubic-meter-of-clay-soil-to-tonne)	input value in m3 (in 'conversion to tonnes' cell)	141.4	268.66	0.061	0.005	0.004452	16.388	1.3433	1.1961	18.92763432	Cable Excavation & Backfill	18.92763432		
	Cable Ducts PVC-3 Phases -ave weight 3.3kg / m	input value in meters (in 'conversion to tonnes' cell)	216	0.7128	3.23	0.005	0.172409	2.3023	0.0036	0.1229	2.428801135	Cable Excavation & Backfill	2.428801135		
	Single Core Cable 33kV - 3 Phases : ave weight @ 15.6kg/m	input value in meters (in 'conversion to tonnes' cell)	11	0.04026	3.81	0.032	0.0386	0.1534	0.0013	0.0016	0.156232956	Cable Excavation & Backfill	0.156232956		
	Single Core Cable 6.6 / 11kV - 3 Phases : av weight @ 13.6kg/m	input value in meters (in 'conversion to tonnes' cell)	44	0.0748	3.81	0.032	0.0386	0.285	0.0024	0.0029	0.29026888	Cable Excavation & Backfill	0.29026888		
	Multicore Cable : av weight @ 1.5kg/m	input value in meters (in 'conversion to tonnes' cell)	150	0.225	3.7	0.032	0.0375	0.8325	0.0072	0.0084	0.8481375	Cable Excavation & Backfill	0.8481375		
Transformers	Transformer 33kV	input value in Tonnes (in 'conversion to tonnes' cell)	38.73	38.73	2.67	0.032	0.0272	103.41	1.2394	1.0535	105.701916	Transformers	105.701916		
	Transformer 132kV	input value in Tonnes (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0	Transformers	0		
	Transformer EAT	input value in Tonnes (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0	Transformers	0		
Switchgear	Protection Panels: ave weight 260kg	input quantity (in 'conversion to tonnes' cell)	2	0.52	3.03	0.16	0.03208	1.5756	0.0832	0.0167	1.6754816	Switchgear	1.6754816		
	Switch Gear 2	input value in Tonnes (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0	Switchgear	0		
	Switch Gear 3	input value in Tonnes (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0	Switchgear	0		
	Switch Gear 4	input value in Tonnes (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0	Switchgear	0		
	Switch Gear 5	input value in Tonnes (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0	Switchgear	0		
	Switch Gear 6	input value in Tonnes (in 'conversion to tonnes' cell)	0	0		0.16	0.00178	0	0	0	0	Switchgear	0		

Calculation Notes:	
Weight of structural Timber (Excluding temp works):	tonnes
Weight of Temporary Timber (formworks, Assumed reuse):	0.075 tonnes
Foundation -Trench Excavations	At Length[] m x Width[] m x Depth[] m = [] m3
Cables - Trench Excavtions	At Length[0] m x Width[0] m x Depth[0] m = [] m3
Power Cable circuit lengths	[] meter lengths

Important note: All materials calculated in above sheet, includes only imported materials

Key:	A1-3	Calculation are based on Embodied Carbon Factors (ECF) to Extract & Manufacture the material Calculated as: Tonnes x ECF kg(CO2e/kg) = Embodied Carbon t(CO2e). Sourced IstructE
	A4	Calculation based on kg of CO2e produced by Distance travelled in km, ECF based on: Tonnes x ECF kg(CO2e/kg) = Embodied Carbon t(CO2e). Distances referenced from IstructE: Locally sourced within 50km = 0.005kg(CO2e) / Nationally Sourced within 320km = 0.32kg(COe) / European sourced within 1500km = 0.16kg(CO2e): Sourced IstructE
	A5w	Calculation based on the Waste Factor (WF) of Materials. So brick has a waste factor of 20%, Steel 1% etc.... Material WFx(Material ECF x Distance Travelled x Distance travelled forwaste material taken to landfill (C2) x CO2 used for processing disposal (C3-4) = A5w / Example, assumed waste of concrete is : 0.053 x (A1-3 x x A4 x C2 x C3-4) = A5w : Sourced IstructE
	5a	Typical assumed costat stage A1-5 of build is 50% so: 700kg(CO2e) per £100,000 so: 0.7 x (cost of build + 100,000)= Ans t(CO2e): Sourced IstructE

Key:	Designer to fill in all cells highlighted in light grey					Reference note:	Calculations & Embodied Carbon factors for materials used in the table are sourced from the BSRIA (ICE) & IstructE
	The 'Embodied Carbon t(CO2e)' cells are using a traffic light system to indicate, low- high contributing materials. Below this cell in an example of how the colour format works and what they indicate.						
	Low		Medium		High	Ref for material Embodied Carbon Factors:	BSRIA guide: Hammond.G et al., 'Embodied Carbon', The Inventory of Carbon and Energy, (ICE).
	0	12.5	25	37.5	50		Embodied Carbon - The Inventory of Carbon and Energy (ICE) (greenbuildingencyclopedia.uk)
	The notes table to the left can be used to help breakdown and review calculations. The structural timber values in tonnes can be used to calculate the sequestration value, this is used to calculate the amount of carbon storage throughout the builds life cycle Example: 28 tonnes of structural timer x -1.64 kg(CO2e) = -32.8t(CO2e). For more information see notes calculation A1-5 on the tab below.					Ref for calculating Embodied Carbon A1-5s Cell colour formatting:	The Institution of Structural Engineers 'How to calculate embodied carbon'.
							A brief guide to calculating embodied carbon. (istructe.org)

