Results from Element Matching

Project name: Bod nidarosdomen

Construction site located at: 63.4269, 10.3969

Summary of results

Total score	Substitutions	Savings
459.32 kg CO2 equivalents	81.58%	78.27%

The 'Maximum Bipartite Matching Plural' algorithm yields the best results, substituting 31/38 demand elements (81.58%). Using 'GWP' as the optimization metric, a total score of 459.32 kg CO2 equivalents is achieved. For comparison, a score of 2114.16 kg CO2 equivalents would have been obtained by employing exclusively new materials. This results in a total saving of 78.27%. Note that transportation is not accounted for. Open the CSV file with the file path './Results/substitutions.csv' to examine the substitutions.

Constants used in calculations

Constant	Value	Unit
Density timber	491.0	kg/m^3
Density steel	7850	kg/m^3
GWP new timber	28.9	kg C02 equivalents
GWP reused timber	2.25	kg C02 equivalents
GWP new steel	800.0	kg C02 equivalents
GWP reused steel	4.0	kg C02 equivalents

Information about datasets

Elements	Filename	Number of elements
Reused	SUPPLY_DATAFRAME_SVERRE.xlsx	109
Demand	DEMAND_DATAFRAME_SVERRE.xlsx	38

Performance of algorithms

Name	Score	Substitutions	Time
Maximum Bipartite Matching Plural	459.32	81.58%	0.028
Greedy Algorithm	459.32	81.58%	0.032
MILP	459.32	81.58%	0.592

The design tool is runned with 3 algorithms, namely: Maximum Bipartite Matching Plural, Greedy Algorithm, and MILP. The Maximum Bipartite Matching Plural yields the lowest score, as shown in the table. The substitutions by this algorithm are completed in 0.028 seconds.