

Accepted Manuscript

A novel selective disassembly sequence planning method for adaptive reuse of buildings

Benjamin Sanchez, Carl Haas



PII: S0959-6526(18)30523-7

DOI: [10.1016/j.jclepro.2018.02.201](https://doi.org/10.1016/j.jclepro.2018.02.201)

Reference: JCLP 12148

To appear in: *Journal of Cleaner Production*

Received Date: 30 October 2017

Revised Date: 23 January 2018

Accepted Date: 19 February 2018

Please cite this article as: Sanchez B, Haas C, A novel selective disassembly sequence planning method for adaptive reuse of buildings, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.02.201.

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Wordcount: Manuscript & Abstract(8,808) + Figure captions (126) + Text in figures (804) = **9,738 words**

“A novel selective disassembly sequence planning method for adaptive reuse of buildings”

Sanchez, Benjamin^{1,2,4} and Haas, Carl^{1,3}

¹Ralph Haas Civil Infrastructure Sensing Laboratory, Department of Civil and Environmental Engineering, University of Waterloo, On, Canada.

²b2sanche@uwaterloo.ca

³chaas@uwaterloo.ca

⁴corresponding author

Abstract:

Adaptive reuse of buildings can be an attractive alternative to new construction in terms of sustainability and a circular economy. Achieving net benefits with adaptive reuse partly relies on efficiently planning building disassembly. The aim of this paper is to describe a new efficient single-target selective disassembly sequence planning method developed for adaptive reuse of buildings. Finding a global optimum disassembly planning solution for buildings can be time consuming and physically impractical due to the high number of possible solutions. The method developed seeks to minimize environmental impact and removal costs using rule-based recursive analyses for planning recovery of target components from multi-instance building subsystems based upon physical, environmental and economic constraints. Rule-based recursive methods have been demonstrated to be an efficient alternative to find near-optimal disassembly sequences by eliminating uncommon or unrealistic solutions. Validation is achieved through functional demonstration with case studies, where high quality, practical, realistic, and physically feasible solutions for single-target selective disassembly of buildings are found by using the new method. For adaptive reuse of buildings, the new method can be used to reduce the costs of disassembly and demolition and improve the planning process.

Keywords: disassembly planning, adaptive reuse, life cycle assessment, net environmental impacts, green design methods.

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