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# Coordinated Renewal Planning of Civil Infrastructure Systems

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**Abstract :** The challenges facing aging urban infrastructure systems require a more holistic and comprehensive approach to their management. The large number of urban infrastructure renewal activities occurring in cities throughout the world leads to social, economic and environmental impacts on the communities in its vicinity. As such, a coordinated effort is required to streamline these activities. This paper presents a framework to enable temporal (time-based) coordination of water, sewer and road intervention activities. Intervention activities include routine maintenance, renewal, and replacement of physical assets. The coordination framework considers 1) Life-cycle costs, 2) Infrastructure level-of-service, and 3) Risk exposure to system operators. The model enables infrastructure asset managers to trade-off options of delaying versus bringing forward intervention activities of one system in order to be executed in conjunction with another co-located system in the right-of-way. The framework relies on a combination of meta-heuristics and goal-based optimization. In order to demonstrate the applicability of the framework, a case study for a major infrastructure corridor in Cairo, Egypt is taken as an example. Results show that the framework can be scaled-up to include other infrastructure systems located in the right-of-way like electricity, gas and telecom, provided that information can be shared among these entities.

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