



Bridge Management System for UAE: Database Development for Bridge Inventory

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Summary

Two of the authors have contributed to the development of a framework for a bridge management system in the United Arab Emirates. The proposed BMS consists of eight main modules, which include inventory, inspection, condition assessment, deterioration models, repair strategy, maintenance, research and development, and decision-making. Each module has inputs, outputs, and inter-relationship with other modules.

In this paper, inventory and inspection modules of the proposed BMS framework will be discussed. In addition, the Entity-Relationship (E-R) Information modelling technique that is used to create the conceptual information model for the inventory database will be presented and discussed.

Keywords: Facility Management, Information Technology, Inspection and Maintenance.

1. Background

A framework for the BMS in UAE has been developed. The inventory module, which is the main focus of this paper, consists of fixed data, history and update components [1]. This data consists of, but not limited to, information related to location, appraisal items, structure type, construction materials, as built drawings, function, inspection data, maintenance and service performed, loads, and load rating limitations. [2-6]

The serviceability and safety of a bridge is impacted by the inspection process [7]. According to the FHWA guidelines, a periodic inspection has to be carried out, at least once every two years, on bridges within the public roadways [5, 8].

2. Research Objectives

The proposed framework for the BMS was discussed elsewhere [1], however, initial development of the inventory and inspection modules are discussed in this paper. The research team is working closely with the bridge engineers from local governmental agencies to achieve the project goals. A checklist was developed to unify the data collection from all participating agencies.

3. Database Development

In Figure 1, the entities identified in this system are shown in rectangles and the relationships between entities are shown in diamond shapes. The numbers on the line connectors represent the cardinality ratio of the relationships. More specifically, the Bridge entity has four relationships. It has a one to one relationship with the Bridge Deck entity; it also has a one to one relationship with the Beam Collection entity. Likewise the Bridge entity has a one to many relationships with the Pier Line entity and a one to two relationship with the Approach Slabs entity. Moreover, the Bridge Deck entity can have zero or more Expansion Joints. Since a record in the later entity can only be identified through its Bridge Deck, it is referred to as weak entity type. The double rectangle and double diamond shape represent such a weak entity type. The diagram contains another 2 weak entity types namely; the Beam entity which is identified within the Beam Collection and the Pier which is identified through the Pier Line entity.

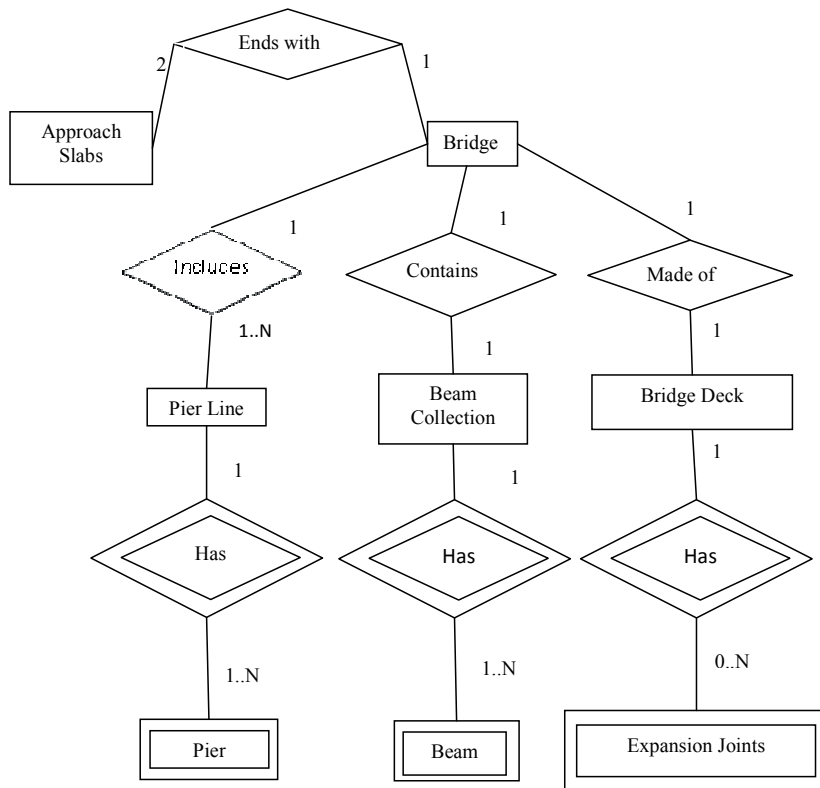


Fig. 1: ER-diagram of the bridge management database system.

4. Conclusions

This paper presents an effort to develop a database for the inventory and inspection modules of a BMS. The conceptual information model for the developed inventory database utilized the conceptual Entity-Relationship (E-R) information modelling technique. The BMS entities, their attributes, and the relationships between these entities were illustrated.

5. References

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