RISK MANAGEMENT OF ILLEGAL LEVEL CROSSINGS ON EGYPTIAN NATIONAL RAILWAYS NETWORK

By

Ahmed Said Abdelazim Mohamed

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
CIVIL ENGINEERING - PUBLIC WORKS

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

Risk Management of Illegal Level Crossings on Egyptian National Railways Network

Key Words:
Illegal Level Crossings; Risk Management Plan; Accidents; Trespassing; Risk Index.

Summary:

Illegal level crossings are risky locations on the railway network, where they are used by pedestrians and/or vehicles to randomly cross the railway tracks. In this thesis, a risk management plan was developed to minimize the level of risk through four stages: hazard identification, risk analysis, risk evaluation, and risk control. Hazard identification and risk analysis were used to develop accidents and their consequences prediction sub-models, for the preparation of risk evaluation. Finally, the risk was controlled by engineering measures, legislative enforcement, and public education.

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Dedication

I would like to dedicate my thesis to my family who gave me love, patience, and moral support during my studies. Also, I dedicate my thesis to my father and I ask God Almighty to forgive him and inhabited in the highest paradise.

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Nomenclature

A_{10}	The total number of Accidents during the period of ten years.
AADT	Average Annual Daily Traffic volume.
C_W	Weighted Conflict factor.
DHV	Design Hourly Volume.
E	The Existence of a route from the illegal level crossing to nearest legal level crossing.
ECURR	The Egyptian Code for Urban and Rural Roads.
ENR	Egyptian National Railways.
F_{A10}	The total number of Fatalities which are resulted from the accidents during the period of ten years.
GIS	Geographic Information System.
GPS	Global Positioning System.
ILX	Illegal Level crossing.
ILXP	Illegal Level crossing for Pedestrians.
ILXV	Illegal Level crossing for Vehicles.
L	Track crossing angle.
LLX	Legal Level crossing.
LLXP	Legal Level crossing for Pedestrians.
LLXV	Legal Level crossing for Vehicles.
LX	Level crossing.
MSE	Mean Squared Error.
N	The Number of railway tracks.
P	The number of Pedestrians/day.
PCU	Passenger Car Unit.
R	Road surface type.
RI_P	Risk Index of the Illegal Level crossings for Pedestrians.
RI_V	Risk Index of the Illegal Level crossings for Vehicles.
RMP	Risk Management Plan.
RSCCE	Research and Studies Center of Civil Engineering.
S	The maximum Speed of passing trains.
SA	Surrounding Area.
SD	Sight Distance.
T	The number of passing Trains/day.
V	The number of passing Vehicles/day.
W	The Width of the roadway.