



Cairo University

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

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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.

Acknowledgments

First of all, I would like to thank God for his endless blessing which gave me the assistance for finishing this thesis.

I give special thanks to my main supervisor Prof. Laila S. Radwan for her supervision, guidance, support, and advice. I am heartily grateful to my supervisors Dr. Ahmed M. M. Farag and Dr. Abdel Meguid M. Refaat for giving me the opportunity to work on my master thesis in their research team. I want to thank all supervisors for their patient guide, from which I have learned the fundamental knowledge of how to research.

I would like to thank Prof. Hassan A. H. Mahdy, Prof. Ahmed Elbadaway T. Abdelmegeed, and Prof. Laila S. Radwan, who agreed to participate in the examining committee.

I express Special thanks to; Dr. Ayman Ibrahim for his support, Eng. Ibrahim El Desouki Ahmed for his help in data collection part, Eng. Ahmed Nazeeh El Kholly for his support in statistical analysis part, and Eng. Mohammed Hamid Nafie for his help in GIS part.

I would like to thank the Egyptian Ministry of Transport that funded this project. Special thanks also to all team staff of the Research and Studies Center of Civil Engineering (RSCEE), Faculty of Engineering, Cairo University for their help in data collection.

I would also like to thank my family and all of my friends, without them I would not be able to finish the master thesis.

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.