ACKNOWLEDGEMENTS

The researcher owes a deep sense of gratitude to Dr. Srijit Biswas, FIE, Professor and Head, Deptt. of Civil Engineering, FET, Manav Rachna International University for constant guidance and inspiration, innovative ideas, his relentless support and encouragement. Without his vast wealth of experience, it would have never been possible to complete it.

The researcher is highly indebted to Dr. M.K. Soni, Executive Director and Dean, FET, Manav Rachna International University for his valuable suggestions and inspiration.

The researcher is extremely grateful to Dr. B.S. Gill, Associate Director, FET, Manav Rachna International University for his constant monitoring and encouragement.

The researcher is also thankful to Dr. Sarita Sachdeva, Professor and Head, Department of Biotechnology, Manav Rachna International University for providing all the necessary facilities and cooperation in carrying out his research work.

The researcher is extremely grateful to the National Highways Authority of India, Govt. of India for providing a suitable platform for completion of his research work. The researcher is also thankful to M/S Ashoka Buildcon, Sh. Yogesh Tiwari, ED, Sh. Rahul Korhale who helped to carry out the research work.

The researcher is also thankful to Mrs. Asha Rawat, Personal Secretary for her great help in the typing work, organization of data and completing the thesis work after sparing her valuable time. Without her efforts, it may not have been possible to bring it in the present shape.

Last but not the least, the researcher is highly grateful to his parents whose blessings, love and affection brought this result. This work would never have been completed without the unwavering strength, support and love provided by my wife Mrs. Anshu Singla, son Sahil Singla and daughter Aarushi.

(Bant Singh)