CONTENTS		
CHAPTER- 1: INTRODUCTION Pond Ash Properties of Pond Ash Polypropylene Fibers	1 2 3	
CHAPTER- 2: PRODUCTION AND CONSUMPTION OF POND ASH IN INDIA		
Sources Estimation of Quantity of Production in India Utilization of Fly Ash Economy in Use of Fly Ash	6 6 7 11	
CHAPTER- 3: PAPER REVIEW		
1. 2003, F. Puertas, T. Amat, A. Ferna´ndez-Jime´nez, T. Va´zquez : Mechanical and durable behaviour of alkaline cement mortars reinforced with polypropylene fibers	12	
2. 2005, P.S. Songa, S. Hwangb, B.C. Sheub: Strength properties of nylon- and polypropylene-fiber-reinforced concretes	13	
3. 2006, Matthias Zeiml , David Leithner, Roman Lackner, Herbert A. Mang : How do polypropylene fibers improve the spalling behavior of in-situ concrete?	13	
4. 2006, Nemkumar Banthia , Rishi Gupta : Influence of polypropylene fiber geometry on plastic shrinkage cracking in concrete	14	
5. 1995, M.L. Allan and L.E. Kukacka: Strength and durability of polypropylene fiber reinforced grouts	15	
6. 1998, N. Segre, E. Tonella, and I. Joekes: Evaluation of the stability of polypropylene fibers in environments aggressive to cement based materials	15	
7. 1995, Ann Lamontagne and Michel Pigeon: The influence of polypropylene fibers and aggregate grading on the properties of dry-mix shotcrete	16	
8. 1990, Abdul-Hamid J. Al-Tayyib and Mesfer M. Al-Zahrani : Corrosion of Steel Reinforcement in Polypropylene Fiber Reinforced Concrete Structures	16	
9. 2010, Maria Carolina Rodezno and Kamil Elias Kaloush: Effect of Different Dosages of Polypropylene Fibers in Thin Whitetopping Concrete Pavements	17	

10. 2010, Bo Wu, Eddie Siu-Shu Lam, Qun Liu, Wilson Yuk- ming Chung and Ivy Fung-yuen Ho: Creep Behavior of High-Strength Concrete with Polypropylene Fibers at Elevated Temperatures	17
11. Mousa F. Attom, Adil K. Al-Tamimi : Effects of Polypropylene Fibers on the Shear Strength of Sandy Soil	18
12. Peng Zhang, Qingfu Li, and Hua Wei: Investigation of Flexural Properties of Cement-Stabilized Macadam Reinforced with Polypropylene Fiber	18
13. Li Guo-zhong and Zhao Shuai : Proportioning Design and Mechanical Properties Research of Polypropylene Fiber and Polymer Emulsion Reinforced	19
14. C. X. Qian and P. Stroeven: Development of hybrid polypropylene-steel fiber-reinforced concrete	19
15. Sidney Mindess and Gary Vondran : Properties of Concrete Reinforced with Polypropylene Fibers Under Impact Loading	20
CHAPTER- 4: EXPERIMENTAL WORK	
Material Description Polypropylene Fibers Physical and Chemical Properties Pond Ash Grain Size Analysis Results of Grain Size Analysis Specific Gravity Test Result of Specific Gravity Test Standard Proctor Test	23 23 23 23 25 28 29 31 31
Standard Proctor Test Results Standard Proctor Test Results for Pond Ash + 0%	33
Polypropylene Fibers Standard Proctor Test Results for Pond Ash + 0.5% Polypropylene Fibers	34
Standard Proctor Test Results for Pond Ash + 1.0% Polypropylene Fibers	35
Standard Proctor Test Results for Pond Ash + 1.5% Polypropylene Fibers	36
Standard Proctor Test Results for Pond Ash + 2.0% Polypropylene Fibers	37
Standard Proctor Test Results for Pond Ash + 2.5% Polypropylene Fiber	38

Modified Proctor Test	39
Modified Proctor Test Results	
Modified Proctor Test Results for Pond Ash + 0%	41
Polypropylene Fibers	
Modified Proctor Test Results for Pond Ash + 0.5%	42
Polypropylene Fibers	
Modified Proctor Test Results for Pond Ash + 1.0%	43
Polypropylene Fibers	
Modified Proctor Test Results for Pond Ash + 1.5%	44
Polypropylene Fibers	
Modified Proctor Test Results for Pond Ash + 2.0%	45
Polypropylene Fibers	
Modified Proctor Test Results for Pond Ash + 2.5%	46
Polypropylene Fibers	
California Bearing Ratio Test	47
California Bearing Ratio (unsoaked) Test Results	
CBR Test Results for Pond Ash + 0%	51
Polypropylene Fibers	
CBR Test Results for Pond Ash + 0.5%	52
Polypropylene Fibers	
CBR Test Results for Pond Ash + 1.0%	53
Polypropylene Fibers	
CBR Test Results for Pond Ash + 1.5%	54
Polypropylene Fibers	
CBR Test Results for Pond Ash + 2.0%	55
Polypropylene Fibers	
CBR Test Results for Pond Ash + 2.5%	56
Polypropylene Fibers	
California Bearing Ratio (soaked) Test Results	
CBR Test Results for Pond Ash + 0%	57
Polypropylene Fibers	
CBR Test Results for Pond Ash + 0.5%	58
Polypropylene Fibers	
CBR Test Results for Pond Ash + 1.0%	59
Polypropylene Fibers	
CBR Test Results for Pond Ash + 1.5%	60
Polypropylene Fibers	
CBR Test Results for Pond Ash + 2.0%	61
Polypropylene Fibers	
CBR Test Results for Pond Ash + 2.5%	62
Polypropylene Fibers	

CHAPTER-5: COMPARISON AND ANALYSIS OF RESULTS	
CHAPTER-6: COST ANALYSIS OF REINFORCED POND ASH USED ROAD CONSTRUCTION	
General	68
Calculation of Pavement Thickness	68
Cost Analysis	74
CONCLUSION	76
FUTURESCOPE	78
REFERENCE	79

LIST OF TABLES	PAGE
Table- 1: Physical Properties of Pond Ash	2
Table- 2: Chemical Composition of Pond Ash	2
Table- 3: Grain Size Analysis of Pond Ash	28
Table- 4: Pond Ash with 0% Polypropylene Fibers (Std. Proc. Test)	33
Table- 5: Pond Ash with 0.5% Polypropylene Fibers (Std. Proc. Test)	34
Table- 6: Pond Ash with 1.0% Polypropylene Fibers (Std. Proc. Test)	35
Table- 7: Pond Ash with 1.5% Polypropylene Fibers (Std. Proc. Test)	36
Table- 8: Pond Ash with 2.0% Polypropylene Fibers (Std. Proc. Test)	37
Table- 9: Pond Ash with 2.5% Polypropylene Fibers (Std. Proc. Test)	38
Table- 10: Pond Ash with 0% Polypropylene Fibers (Mod. Proc. Test)	41
Table- 11: Pond Ash with 0.5% Polypropylene Fibers (Mod. Proc. Test)	42
Table- 12: Pond Ash with 1.0% Polypropylene Fibers (Mod. Proc. Test)	43
Table- 13: Pond Ash with 1.5% Polypropylene Fibers (Mod. Proc. Test)	44
Table- 14: Pond Ash with 2.0% Polypropylene Fibers (Mod. Proc. Test)	45
Table- 15: Pond Ash with 2.5% Polypropylene Fibers (Mod. Proc. Test)	46
Table- 16: Standard Load Values for CBR Test	47
Table- 17: Pond Ash with 0% Polypropylene Fibers (unsoaked CBR Test)	51
Table- 18: Pond Ash with 0.5% Polypropylene Fibers (unsoakedCBR Test)	52
Table- 19: Pond Ash with 1.0% Polypropylene Fibers (unsoaked CBR Test)	53
Table- 20: Pond Ash with 1.5% Polypropylene Fibers (unsoaked CBR Test)	54

Table- 21: Pond Ash with 2.0% Polypropylene Fibers (unsoaked CBR Test)	55
Table- 22: Pond Ash with 2.5% Polypropylene Fibers (unsoaked CBR Test)	56
Table- 23: Pond Ash with 0% Polypropylene Fibers (soaked CBR Test)	57
Table- 24: Pond Ash with 0.5% Polypropylene Fibers (soakedCBR Test)	58
Table- 25: Pond Ash with 1.0% Polypropylene Fibers (soaked CBR Test)	59
Table- 26: Pond Ash with 1.5% Polypropylene Fibers (soaked CBR Test)	60
Table- 27: Pond Ash with 2.0% Polypropylene Fibers (soaked CBR Test)	61
Table- 28: Pond Ash with 2.5% Polypropylene Fibers (soaked CBR Test)	62
Table- 29:Various Parameters of Delhi Silt	68
Table- 30: Recommended Design for Traffic Range 10 – 150 msa (CBR 5%)	70
Table- 31: Recommended Design for Traffic Range 10 - 150 msa (CBR 7%)	71
Table- 32: Recommended Design for Traffic Range 10 – 150 msa (CBR 9%)	73
Table- 33: Cost Comparison between Delhi Silt and Pond Ash when Used as Sub-grade Material	74
Table- 33: Cost Comparison between Delhi Silt and Pond Ash when Used as Sub-grade Material	<i>7</i> 5

LIST OF FIGURES	PAGE
Fig. 1 – Plot between Particle size and percent finer	28
Fig. 2 – Plot between Moisture Content and Dry Density for Pond Ash + 0% Polypropylene Fibers (Std. Proc. Test)	33
Fig. 3 – Plot between Moisture Content and Dry Density for Pond Ash + 0.5% Polypropylene Fibers (Std. Proc. Test)	34
Fig. 4 – Plot between Moisture Content and Dry Density for Pond Ash + 1.0% Polypropylene Fibers (Std. Proc. Test)	35
Fig. 5 – Plot between Moisture Content and Dry Density for Pond Ash + 1.5% Polypropylene Fibers (Std. Proc. Test)	36
Fig. 6 – Plot between Moisture Content and Dry Density for Pond Ash + 2.0% Polypropylene Fibers (Std. Proc. Test)	37
Fig. 7 – Plot between Moisture Content and Dry Density for Pond Ash + 2.5% Polypropylene Fibers (Std. Proc. Test)	38
Fig. 8 – Plot between Moisture Content and Dry Density for Pond Ash + 0% Polypropylene Fibers (Mod. Proc. Test)	41
Fig. 9 – Plot between Moisture Content and Dry Density for Pond Ash + 0.5% Polypropylene Fibers (Mod. Proc. Test)	42
Fig. 10 – Plot between Moisture Content and Dry Density for Pond Ash + 1.0% Polypropylene Fibers (Mod. Proc. Test)	43
Fig.11 – Plot between Moisture Content and Dry Density for Pond Ash + 1.5% Polypropylene Fibers (Mod. Proc. Test)	44
Fig. 12 – Plot between Moisture Content and Dry Density for Pond Ash + 2.0% Polypropylene Fibers (Mod. Proc. Test)	45
Fig. 13 – Plot between Moisture Content and Dry Density for Pond Ash + 2.5% Polypropylene Fibers (Mod. Proc. Test)	46
Fig. 14 – Plot between Penetration and Load for Pond Ash + 0 % Polypropylene Fibers	51

Fig. 15 -	- Plot between Penetration and Load for Pond Ash + 0.5% Polypropylene Fibers	52
Fig. 16 -	- Plot between Penetration and Load for Pond Ash + 1.0% Polypropylene Fibers	53
Fig.17 -	Plot between Penetration and Load for Pond Ash + 1.5% Polypropylene Fibers	54
Fig. 18 -	- Plot between Penetration and Load for Pond Ash + 2.0% Polypropylene Fibers	55
Fig. 19 -	- Plot between Penetration and Load for Pond Ash + 2.5% Polypropylene Fibers	56
Fig. 20 -	- Plot between Penetration and Load for Pond Ash + 0 % Polypropylene Fibers	57
Fig. 21 -	- Plot between Penetration and Load for Pond Ash + 0.5% Polypropylene Fibers	58
Fig. 22 -	- Plot between Penetration and Load for Pond Ash + 1.0% Polypropylene Fibers	59
Fig. 23 -	- Plot between Penetration and Load for Pond Ash + 1.5% Polypropylene Fibers	60
Fig. 24 -	- Plot between Penetration and Load for Pond Ash + 2.0% Polypropylene Fibers	61
Fig. 25 -	- Plot between Penetration and Load for Pond Ash + 2.5% Polypropylene Fibers	62
Fig. 26 -	- Comparative Plot of Standard Proctor Test Results	63
Fig. 27 -	- Variation of MDD with Fiber Content	64
Fig. 28 -	- Variation of Percentage Change in MDD with Fiber Content	64
Fig. 29 -	- Comparative Plot of Modified Proctor Test Results	65
Fig. 30 -	- Variation of OMC with Fiber Content	66

Fig. 31 - Variation of Soaked CBR with Fiber Content	66
Fig. 32 - Variation of Soaked CBR with Fiber Content	67
Fig. 33 - Cross-section of a Pavement	69
Fig. 34 - Pavement Thickness According to IRC Specifications	70
Fig. 35 – Cross-section of a Pavement	71
Fig. 36 - Pavement Thickness According to IRC Specifications	72
Fig. 37 – Cross-section of a Pavement	72
Fig. 38 - Pavement Thickness According to IRC Specifications	73

LIST OF PICTURES	PAGE
Pic. 1 – Polypropylene Fibers	4
Pic. 2 – Construction of Embankment with Fly Ash at Second Nizamuddin Bypass	10
Pic. 3 – Construction of Embankment with Fly Ash at Kalindi Bypass	10
Pic. 4 – Wet Disposal of Pond Ash from Rajghat Power Station	24
Pic. 5 – Ash Pond at Rajghat	24
Pic. 6 - Indian Standard Code Specifications for grain Size Analysis	25
Pic. 7 – Sieve Arrangement for Grain Size Analysis	26
Pic. 8 – Pycnometer with Water and Sample	30
Pic. 9 – Pycnometer with Water	30
Pic .10 - Standard Proctor Test Apparatus	32
Pic. 11 - Weighing of sample to find moisture content	32
Pic. 12 - Modified Proctor Test Apparatus	40
Pic. 13 - Weight Measurement of MPT Samples	40
Pic. 14 – California Bearing Ratio Test Machine	49
Pic. 15 – CBR Test Setup	50
Pic. 16 - Imprint of Plunger on the Sample after the Test	50