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Geotechnical Publications





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GEOTECHNICAL

FOUNDATIONS

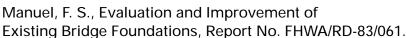
Bridge Foundations

Elias, V., Strategies for Managing Unknown Bridge Foundations, Report No. FHWA-RD-92-030.

Lam, I. P. and Martin, G. R., Seismic Design of Highway Bridge Foundations, Volume I: Executive Summary; Volume II: Design Procedures and Guidelines; Volume III: Example Problems and Sensitivity Studies, Report Nos. FHWA-RD-86-101, 102, and 103.

Moulton, L. K., Tolerable Movement Criteria for Highway Bridges, Report No. FHWA-TS-85-228.

Moulton, L. K., Ganga Rao, H. V. S., and Halvorsen, G. T., Tolerable Movement Criteria for Highway Bridges, Final Report, Report No. FHWA/ RD-85/107.



Nataraja, Mysore S., Bridge Foundation Needs, Report No. FHWA-RD-82-050.

Moulton, L. K., Ganga Rao, H. V. S., and Halvorsen, G. T., Tolerable Movement Criteria for Highway Bridges, Interim Report, Report No. FHWA/RD-81/162.

Ferrito, J. M., and Forrest, J. B., Determination of Seismically Induced Soil Liquefaction Potential at Proposed Bridge Sites, Volume 1, Report No. FHWA-RD-77-127.

Ferrito, J. M., and Forrest, J. B., Determination of Seismically Induced Soil Liquefaction Potential at Proposed Bridge Sites, Volume 2, Report No. FHWA-RD-77-128.





Drilled Shafts

O'Neill, Michael W., and Reese, Lyman C., Drilled Shafts: Construction Procedures and Design Methods, Vol. I: Chapters 1-8 and Vol. II: Chapters 9-Appendices, ADSC-TL-4, FHWA-IF-99-025.

O'Neill, M. W., Townsend, F. C., Hassan, K. M., Buller, A., and Chan, P. S., Load Transfer for Drilled Shafts in Intermediate Geomaterials, Report No. FHWA-RD-95-172.

Osterberg, J. O., The Osterberg Cell for Load Testing Drilled Shafts and Driven Piles, Report No. FHWA-SA-94-035.

Baker, C. N., Parikh, G., Briaud, J. L., Drumright, E. E. and Mensah, F., Drilled Shafts for Bridge Foundations, Report No. FHWA-RD-92-004.

O'Neill, M. W., Drilled Shafts: Construction Procedures and Design Methods, Report No. FHWA-HI-88-042.

Reese, L. C., Handbook on Design of Piles and Drilled Shafts Under Lateral Loads, Report No. FHWA-IP-84-11.

Pile Foundations

Armour, T. and Groneck, P., et al., Micropile Design and Construction Guidelines and Implementation Manual, Report No. FHWA-SA-97-070.

Hannigan, P. J., Goble, G. G., Thendean, G., Likins, G. E., and Raushe, F., Design and Construction of Driven Pile Foundations, two volumes, Report Nos. FHWA-HI-97-013 and 014.

Laefer, Debra, Micropiles and Related Techniques: State of Technology, Report No. FHWA-RD-96-204.

Bruce, D. A. and Juran, I., Drilled and Grouted Micropiles: State of the Practice Review, Volume I: Background, Classifications, Cost; Volume II: Design; Volume III: Construction, QA/QC, and Testing; Volume IV: Case Histories; Report Nos. FHWA-RD-96-016, 017, 018. and 019.

Raushe, F., Thendean, G., Abou-Matar, H., Likens, G. E., and Goble, G. G., Determination of Pile Driveability and Capacity From Penetration Tests, Volume I: Volume II: Appendices, Volume III: Literature Review, Report Nos. FHWA-RD-96-179,180, and181.

Paikowsky, S. G., Regan, J. E., and McDonnell, J. J., A Simplified Field Method for Capacity Evaluation of Driven Piles, Report No. FHWA-RD-94-042.

Ng, E. S., Tsang, S. K. and Auld, B. C., Pile Foundations: The Behavior of Piles in Cohesionless Soils, Volume I: Research Report, and Volume II: Appendices, Report Nos. FHWA-RD-88-081, and 082.

DiMillio A. F., Ng, E. S., Briaud, J. L. and O'Neill, M. W., Pile Group Prediction Symposium: Summary, Volume I: Sandy Soil, Report No. FHWA-TS-87-221.

DiMillio, A. F., O'Neill, M. W., Hawkins, R. A., Vgaz, O. G., and Vesic, A. S., Pile Group Prediction Symposium: Summary, Volume II: Clay Soil, Report No. FHWA-TS-87-222.

Raushe, F., Likens, G. E., Goble, G. G., and Hussein, M, The Performance of Pile Driving Systems: Inspection Manual, Report No. FHWA/RD-86/160.

Reese, L. C., Behavior of Piles and Pile Groups Under Lateral Loads, Report No. FHWA/RD-85/106.

Ko, H-Y., Atkinson, R. H., and Goble, G. G., Centrifuge Testing of Model Piles and Pile Groups, Volume 1: Executive Summary, Volume 2: Centrifuge Tests in Sand, Volume 3: Centrifuge Tests in Clay, Report Nos. FHWA/RD-84-002. 003, and 004.

DiMillio, Albert F., Pile Group Load Tests in Clay: Introduction and Background, *Proceedings of the Pile Group Prediction Symposium*, Report No. FHWA/TS-84-203.

Briaud, J. L., Tucker, L., Lytton, R. L., and Coyle, H. M., Behavior of Piles and Pile Groups in Cohesionless Soils, Final Report, Report No. FHWA/RD-83/038.

Davisson, M. T., Manuel, F. S., and Armstrong, R. M., Allowable Stresses in Piles, Report No. FHWA/RD-83/059.

O'Neill, M. W., Field Study of Pile Group Action, Interim Report, Mathematical Models and Design of Load Test, Report No. FHWA/RD-

81/001.

O'Neill, M. W., Hawkins, R. A., and Mahar, L. J., Field Study of Pile Group Action, Final Report, Report No. FHWA/RD-81/002. Note: Appendices A-F are reported in separate volumes as follows:

Ha, H. B. and O'Neill, M. W., Appendix A: User's Guide for Program PILGP1, Report No. FHWA/RD-81/003.

Ha, H. B. and O'Neill, M. W., Appendix B: Documentation for Program PILGP1, Report No. FHWA/RD-81/004.

Mahar, L. J. and O'Neill, M. W., Appendix C: Geotechnical Investigation, Report No. FHWA/RD-81/ 005.



Muster, G. L. and O'Neill, M. W., Appendix D: Detailed Graphical Presentation of Reduced Data, Report No. FHWA/RD-81/006.

White, A. H., Peterson, N. C., Skytta, J. R., and O'Neill, M. W., Appendix E: Evaluation of Instrumentation, Report No. FHWA/RD-81/007.

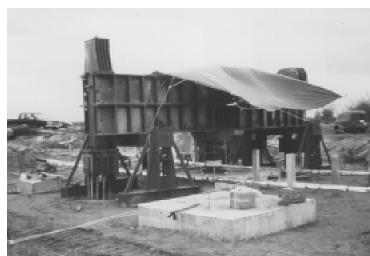
O'Neill, M. W., Hawkins, R. A., and Mahar, L. J., Appendix F: Supplementary Information, Report No. FHWA/RD-81/008.

Spread Footings

Briaud, J. L. and Gibbens, R., Large-Scale Load Tests and Data Base of Spread Footings on Sand, Report No. FHWA-RD-97-068.

Gifford, D. G., Wheeler, J. R., Kraemer, S. R., and McKown, A. F., Spread Footings for Highway Bridges, Report No. FHWA/RD-86/185.

DiMillio, A. F., Performance of Highway
Bridge Abutments Supported by Spread
Footings on Compacted Fill, Report No. FHWA/RD-81/184.



GROUND IMPROVEMENT

Bruce, D. A., and Bruce, M. E., An Introduction to the Deep Mixing Methods as Used in Geotechnical Applications, Report No. FHWA-RD-99-138.

Bruce, D. A., and Bruce, M. E., An Introduction to the Deep Mixing Methods as Used in Geotechnical Applications – Appendices, Report No. FHWA-RD-99-144.

Lukas, R. G., Geotechnical Engineering Circular No. 1, Dynamic Compaction, Report No. FHWA-SA-95-037.

Lukas, R. G., Dynamic Compaction for Highway Construction: Volume 1: Design and Construction Guidelines, Report No. FHWA/RD-86/133.

Chemical Grouting

Waller, Muriel J., and Huck, Peter J., Design and Control of Chemical Grouting, Volume 1, Report No. FHWA-RD-82-036.

Krizek, Raymond J., and Baker, Wallace Hayward, Design and Control of Chemical Grouting, Volume 2, Report No. FHWA-RD-82-037.

Baker, Wallace Hayward, Design and Control of Chemical Grouting, Volume 3, Report No. FHWA-RD-82-038.

Baker, Wallace Hayward, Design and Control of Chemical Grouting, Volume 4, Report No. FHWA-RD-82-039.

Tallard, G. R., and Caron, C., Chemical Grouts for Soils, Volume 1: Avaliable Materials, Report No. FHWA-RD-77-50.

Herndon, Joe, and Lenahan, Tom, Grouting in Soils, Volume 1, Report No. FHWA-RD-76-26.

Herndon, Joe, and Lenahan, Tom, Grouting in Soils, Volume 2, Report No. FHWA-RD-76-27.

Slope Stability

Abramson, Lee, Boyce, Glenn, et al., Advanced Course on Slope Stability, Volume 1, Report No. FHWA-SA-94-005.

Abramson, Lee, Boyce, Glenn, et al., Advanced Course on Slope Stability, Volume 2, Report No. FHWA-SA-94-006.

Johnson, Robert B., Factors That Influence the Stability of Slopes—A Literature Review, Report No. FHWA-RD-79-54.

Earth Retaining Systems

Sabitini, P. J., Elias, V., et al., Geotechnical Engineering Circular No. 2 – Earth Retaining Systems, Report No. FHWA-SA-96-038.

Lateral Support Systems

Sabitini, P.J., Pass, D.G., and Bachus, R.C., Geotechnical Engineering Circular No. 4, Ground Anchors and Anchor Systems, Report No. FHWA -SA-99-015.

Goldberg, D. T., Jawarski, W. E., et al., Concepts for Improved Lateral Support Systems, Report No. FHWA-RD-75-131.

Goldberg, D. T., Jawarski, W. E., et al., Lateral Support Systems and Underpinning, Volume 1, Report No. FHWA-RD-75-128.

Goldberg, D. T., Jawarski, W. E., et al., Lateral Support Systems and Underpinning, Volume 2, Report No. FHWA-RD-75-129.

Goldberg, D. T., Jawarski, W. E., et al., Lateral Support Systems and Underpinning, Volume 3, FHWA-RD-75-130.

Permanent Ground Anchors

Weatherby, P. E., Permanent Ground Anchor Walls, Volume 1: Current Practice and Limiting Equilibrium Analysis; Volume 2: Full-Scale Wall Tests and Soil Structure Interaction Model; Volume 3: Model-Scale Wall Tests and Ground Anchor Tests; Volume 4: Conclusions and Recommendations, Report Nos. FHWA-RD-98-065, 066, 067, and 068.

Weatherby, D. E., Design Manual for Permanent Ground Anchor Walls, Report No. FHWA-RD-97-130.

Weatherby, D. E., Tiebacks, Report No. FHWA-RD-82-047.



Weatherby, D. E., Tiebacks, Executive Summary, Report No. FHWA-RD-82-048.

Nicholson, P. J., Permanent Ground Anchors-Nicholson Design Criteria, Report No. FHWA-RD-81-151.

Pfister, P., Evers, G., et al., Permanent Ground Anchors-Soletanche Design Criteria, Report No. FHWA-RD-81-150.

Otta, L., and Pantucek, et al., Permanent Ground Anchors-Stump Design Criteria, Report No. FHWA-RD-81-152.

Reinforced Soil Structures

Elias, V., Corrosion/Degradation of Soil Reinforcement for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, Report No. FHWA/SA-96/072.

Elias, V., Durability/Corrosion of Reinforced Soil Structures, Report No. FHWA/RD-89/186.

Christopher, B. R., Gill, S. A., Juran, I., and Mitchell, J. K., Reinforced Soil Structures, Volume 1: Design and Construction Guidelines, Volume 2: Summary of Research Systems Information, Report Nos. FHWA/RD-89/043 and 044.

Frondistou-Yannas, S., Corrosion Susceptibility of Internally Reinforced Soil Retaining Structures, Report No. FHWA/RD-83/105.



Chi, M., Dennis, B., et al., Slurry Walls as an Integral Part of Underground Transportation Structures, Report No. FHWA-RD-80-047.

Clough, G. W., Analysis and Design Problems in Modeling Slurry Wall Construction, Report No. FHWA-RD-73-93.

Soil Nailing

Byrne, R. J. Cotton, D., Porterfield, J., Wolschleg, C., and Ueblecker, G., Manual for Design and Construction of Soil Nail Walls, Report No. FHWA-SA-96/069.

Porterfield, James A., Cotton, David M., et al., Soil Nailing Field Inspectors Manual-Soil Nail Walls, Report No. FHWA-SA-93-068.

Elias, V., and Juran, I., Soil Nailing for Stabilization of Highway Slopes and Excavations, Report No. FHWA/RD-89/198.



Stone Columns

Barksdale, R. D. and Bachus, R. C., Design and Construction of Stone Columns, Report No. FHWA/RD-83/026. Volume 2: Appendixes, Report No. FHWA/RD-83/027.

Geosynthetics

Elias, V., Long-term Durability of Geosynthetics Based on Exhumed Samples from Construction Projects., Report No. FHWA-RD-00-157.

Elias, V., Salman, A., Juran, I., Pearce, E., and Lu, S., Testing Protocols for Oxidation and Hydrolysis of Geosynthetics, Report No. FHWA-RD-97-144.

Elias, V., Carlson, D., Bachus, R. C. and Giroud, J. P., Stress Cracking Potential of High-Density Polyethlene Geogrids, Report No. FHWA-RD-97-142.

Elias, V., Yuan, Z., Swan, R. H. and Bachus, R. C., Development of Protocols for Confined Extension/Creep Testing of Geosynthetics for Highway Applications, Report No. FHWA-RD-97-143.

Allen, T. M. and Elias, V., Durability of Geosynthetics for Highway Applications, Interim Report, Report No. FHWA-RD-95/016.



Kraemer, S. R., and Smith, A. D., Geocomposite Drains: Volume 1: Engineering Assessment and Preliminary Guidelines, Report No. FHWA/RD-86/171.

Vertical (Wick) Drains

Rixner, J. J., Kraemer, S. R., and Smith, A. D., Prefabricated Vertical Drains: Volume 1: Engineering Guidelines, Report No. FHWA/RD-86/168.

Rixner, J. J., and Kraemer, S. R., Prefabricated Vertical Drains, Volume 2: Summary of Research Effort, Report No. FHWA-RD-86-169.

Rixner, J. J., and Kraemer, S. R., Prefabricated Vertical Drains, Volume 3, Report No. FHWA-RD-86-170.

Soil and Rock Behavior

Expansive Soils

Snethen, D. R., Expansive Soil in Highway Subgrades: Summary, Report No. FHWA-TS-80-236.

Snethen, D. R., An Evaluation of Methodology for Prediction and Minimization of Detrimental Volume Change of Expansive Soils in Highway Subgrades, 2 Volumes, Report Nos. FHWA-RD-79-49 and –50.

Snethen, D. R., Technical Guidelines for Expansive Soils in Highway Subgrades, Report No. FHWA-RD-79-51.

Snethen, D. R., and Johnson, Lawrence, D., An Evaluation of Expedient Methodology for Identification of Potentially Expansive Soils, Report No. FHWA-RD-77-94.

Snethen, D. R., and Johnson, L.D., An Investigation of the Natural Microscale Mechanisms That Cause Volume Change in Expansive Clays, Report No. FHWA-RD-77-75.

Patrick, D. M., and Snethen, D. R., An Occurrence and Distribution Survey of Expansive Materials in the United States by Physiographic Areas, Report No. FHWA-RD-76-82.

Snethen, D. R., and Townsend, Frank C., et al., A Review of Engineering Experiences with Expansive Soils in Highway Subgrades, Report No. FHWA-RD-75-48.

Lamb, Donald R., and Hanna, Steven J., Proceedings of Workshop on Expansive Clays and Shales in Highway Design and Construction, Report No. FHWA-RD-73-72.

Frost Action

Johnson, T. C., Berg, R. L., Chamberlain, E. J., and Cole, D. M., Frost Action Predictive Techniques for Roads and Airfields: Volume 1: A Comprehensive Survey of Research Findings, Report No. FHWA/RD-87/057.

Chamberlain, E. J., Frost Susceptibility of Soil, Review of Index Tests, Report No. FHWA/RD-82/081.

Berg, R. L., Guymon, G. L., and Johnson, T. C., Mathematical Model to Correlate Frost Heave of Pavements With Laboratory Predictions, Report No. FHWA-RD-79-71.



Shale

Strohm, W. E., Design and Construction of Shale Embankments: Summary, Report No. FHWA-TS-80-219.

Shamburger, J.H., Patrick D.M., and Lutten, R.J., Design and Construction of Compacted Shale Embankments - Volume 1: Survey of Problem areas and Current Practices, Report No. FHWA-RD-75-61.

Bragg, G.H. and Ziegler, T.W., Design and Construction of Compacted Shale Embankments - Volume 2: Evaluation and Remedial Treatment of Shale Embankments, Report No. FHWA-RD-75-62.

Lutton, R.J., Design and Construction of Compacted Shale Embankments - Volume 3: Slaking Indexes for Design, Report No. FHWA-RD-77-1.

Strohm, W.E., Design and Constuction of Compacted Shale Embankments -Volume 4: Field Evaluation and Laboratory Investigations, Report No. FHWA-RD-78-140.

Strohm, W. E., Bragg, G. H., and Ziegler, T. W., Design and Construction of Compacted Shale Embankments - Volume 5: Technical Guidelines, Report No. FHWA-RD-78-141.

Soil Compaction and Stabilization

Terrel, R. L., Epps, J. A., Barenberg, E. J., Mitchell, J. K., and Thompson, M. R., Soil Stabilization in Pavement Structures: A User's Manual, Report No. FHWA-IP-80-2.

Hoover, J. M. and Handy, R. L., Chemical Compaction Aids for Fine-Grained Soils, 2 Volumes, Report Nos. FHWA-RD-79-63 and 64, Iowa State University.

Nussbaum, P. J., Kantro, D. L., and Helmuth, R. A, The Role of Magnesium Oxide in Lime Stabilization, 3 Volumes, Report Nos. FHWA-RD-75-98, 99, and 100, Portland Cement Association.

Fohs, Donald G., A Laboratory Evaluation of Two Proprietary Materials as Compaction Aids and Soil Stabilizers, Report No. FHWA-RD-75-32.

Kinter, Earl B., Development and Evaluation of Chemical soil Stabilizers, Final Report, Report No. FHWA-RD-75-17.

Ormsby, W.C., and Kinter, E.B., Strength Development and Reaction Products in Lime-Montmorillonite-Water Systems, Report No. FHWA-RD-72-31.

Rock Slopes

Brawner, C. O., Rockfall Hazard Mitigation Methods - Participant's Manual, Report No. FHWA-SA-93-085.

Pierson, L. A. and Van Vickle, R., Rockfall Hazard Rating System - Participants Manual, Report No. FHWA-SA-93-057.

Pierson, L. A. and Van Vickle, R., The Rockfall Hazard Rating System, Report No. FHWA-OR-EG-90-01

TUNNELING

Egilsrud, Philip E., Prevention and Control of Highway Tunnel Fires, Report No. FHWA-RD-83-32.

Cording, E. J., Evaluation of Second Eisenhower Tunnel Instrumentation Results, Report No. FHWA-RD-81-10.

Wickham, G. E., and Tiedemann, Cut-and-Cover Tunneling, Vol. 1: Construction Methods, Design, and Activity; Vol. 2: Cost Analysis and Systems Evaluation, Report Nos. FHWA-RD-76-28 and 29.

Harding, J. C., Rubin, L. A., et al., Drilling and Preparation of Reusable Long Range, Horizontal Bore Holes in Rock and in Gouge, Volume 1, Report No. FHWA-RD-75-95.

Mock, W. M., Jr., Tracy, N. K., et al., Drilling and Preparation of Reusable, Long Range, Horizontal Bore Holes in Rock and in Gouge, Volume 2, Report No. FHWA-RD-75-96.

Goldberg, Donald T., Jaworski, Walter E., and Gordon, M. Daniel, Lateral Support Systems and Underpinning, Vol. I: Design and Construction; Vol. 2: Design Fundamentals; Vol. 3: Construction Methods; Vol. 4: Concepts for Improved Lateral Support Systems, Report Nos. FHWA-RD-75-128, 129, 130, and 131.

Ash, J. L., Russell, B. F., et al., Improved Subsurface Investigation for Highway Tunnel Design and Construction, Volume 1, Report No. FHWA-RD-74-29.

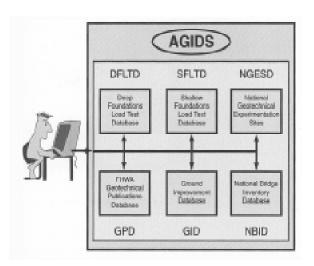
Regan, T. J., Jr., Cut-and-Cover Tunneling Techniques, Vol. 1: A Study of the State of the Art, Vol.2: Appendix, Report Nos. FHWA-RD-73-40 and 41.

GENERAL

Computer Programs

Urzua, Alfredo, User's Manual for Computer Program CBEAR: Bearing Capacity Analysis of Shallow Foundations, Report No. FHWA-SA-94-034.

Urzua, Alfredo, User's Manual for Computer Program SPILE: Ultimate Static Capacity for Driven Piles, Report No. FHWA-SA-92-044.



Urzua, Alfredo, EMBANK-One Dimensional Compression Due to Embankment Loads User's Manual, Report No. FHWA-SA-92-045.

Lytle, R. J., Laine, E. F., et al., Data Processing Applied to Site Characterization, Report No. FHWA-RD-82-049.

Remote Sensing

Fox, Nathaniel S., Sensing Systems for Measuring Mechanical Properties in Ground Masses, Volume 1, Report No. FHWA-RD-81-109.

Kastman, K., Lukas, R., et al., Sensing Systems for Measuring Mechanical Properties in Ground Masses, Volume 2, Report No. FHWA-RD-81-110.

Lacasse, Suzanne K., et al., Sensing Systems for Measuring Mechanical Properties in Ground Masses, Volume 3, Report No. FHWA-RD-81-111.

Gamage, John, Williams, Stuart S., Jr., Sensing Systems for Measuring Mechanical Properties in Ground Masses, Volume 4, Report No. FHWA-RD-81-112.

Russell, L. S., Everett, J. R., et al., Development of Airborne Electromagnetic Survey Instrumentation and Application to the Search for Buried Sand and Gravel, Summary Report, Report No. FHWA-RD-77-35.

Russell, O., Stanczuk, D., et al., Aerial Remote Sensing Techniques for Defining Critical Geologic Features Pertinent to Tunnel Location & Design, Report No. FHWA-RD-76-72.

Fountain, L. S., Herzig, R. X., et al., Detection of Subsurface Cavities by Surface Remote Sensing Techniques, Report No. FHWA-RD-75-80.

Reviews, Workshops, Risk Analysis, Seismic, Earthquakes, etc.

DiMillio, Albert F., A Quarter Century of Geotechnical Research, Report No. FHWA-RD-98-139.

Kavazanjian, E., Matasovic, T., Hamou, T. H., and Sabatini, P.J., Geotechnical Engineering Circular No. 3, Design Guidance: Geotechnical Earthquake Engineering for Highways, Volume I: Design Principal; Volume II: Design Examples; Report Nos. FHWA-SA-97-076 and 077.

Walkinshaw, John, and Dumas, Christopher, FHWA Metrication Guidelines, Report No. FHWA-SA-95-035.

Benoit, J., Sawyer, S. M., Adams, M. T., and De Alba, P. A, National Geotechnical Experimental Sites: Central Data Repository User Manual, Report No. FHWA-RD-94-071.

DiMillio, A. F. and Prince, G., National Geotechnical Experimentation Sites, *Public Roads*, Vol. 57, No. 2., 1993

Cheney, R. S. and Chassie, R. G., Soils and Foundations Workshop Manual, Report No. FHWA-HI-88-009.

Consla, J. and Baecher, G.B., Geotechnical Risk and Reliability: The State of the Art, Report No. FHWA/RD-87/110.

Baecher, G.B., Geotechnical Risk Analysis: A Users Guide, Report No. FHWA/RD-87/111.

Moulton, Lyle K., Highway Subdrainage Design, Report No. FHWA-TS-80-224.

Owen, G. Norman and Schall, Roger E., Earthquake Engineering of Large Underground Structures, Report No. FHWA-RD-80-195.

Ladd, Charles C., and Foott, Roger, Foundation Design of Embankments on Varved Clays, Report No. TS-77-214.

Testing

Kyfor, Zenon G., Schnere, Austars R., et al., Static Testing of Deep Foundations, Report No. FHWA-SA-91-042.

Briaud, J. L. and Miran, J., The Cone Penetrometer Test, Report No. FHWA-SA-91-043.

Briaud, J. L., The Pressuremeter Test for Highway Applications, Report No. FHWA-IP-89-008.

Fox, N. S., Handy, R. L., Trott, G. D., Remmes, B. and Moldt, S., Determination of Horizontal Stress in Soils, Report No. FHWA/RD-81/118.

Ladd, C. C., Germaine, J. T., et al., Evaluation of Self-boring Pressuremeter Tests in Boston Blue Clay, Report No. FHWA-RD-80-052.

Moulton, L. K., and Seals, Roger K., Determination of the In Situ Permeability of Base and Subbase Courses, Report No. FHWA-RD-79-88.

Bush, A. J., III and Sullivan, R. T., Dynamic Testing of Slotted Underdrain Pipe, Report No. FHWA-79-501.

Schmertmann, J. H., Guidelines for Cone Penetration Test, Report No. FHWA-TS-78-209.

Butler, H. D., and Roy, Horace E., Texas Quick Load Method for Foundation Load Testing, Report No. FHWA-IP-77-8.

Ferrito, J. M., Forrest, J. B., Compilation and Analysis of Cyclic Triaxial Test Data, Final Report, Report No. FHWA-RD-77-129.

Huck, P. J., Pincus, H. J., et al., Determination of the In Situ State of Stress of Soil Masses, Report No. FHWA-RD-74-68.

Waste Utilization

Chesner, W. H., Collins, R.J., and MacKay, M.H., User Guidelines for Waste and By-Product Materials in Pavement Construction, Report No. FHWA-RD-97-148.

Bloomquist, D., Diamond, G., Oden, M., Ruth, B., and Tia, M., Engineering and Environmental Aspects of Recycled Materials for Highway Construction, Report No. FHWA-RD-93-088.

Anon., A Study of the Use of Recycled Paving Materials, Report No. FHWA-RD-93-148/ EPA/600/R-93/095.

Erdeley, J., and Ledbetter, W. B., Field Performance of Littercrete (Incinerator Residue) in a Bituminous Base, Report No. FHWA/RD-88/022.

Snyder, Richard R., Evaluation of Fused Incinerator Residue as a Paving Material, Report No. FHWA-TS-80-229.

Majidzadeh, K., Executive Summary - Power Plant Bottom Ash in Black Base -and Bituminous Surfacing, Report No. FHWA-RD-79-72.

Patankar, Uday, et al., Evaluation of the Economic and Environmental Feasibility of Using Fused and Unfused Incinerator Residue in Highway Construction, Report No. FHWA-RD-79-83.

Pachowski, J., The Application of Brown Coal Fly Ash to Road Base Courses, Report No. FHWA-RD-79-101.

Gnaedinger, J. P., and Zimmerman, R. E., Lime Treatment of Incinerator Residue for Base Course Construction, Report No. FHWA-RD-78-91.

Pavlovich, Raymond J., Lentz, Howard J., and Ormsby, W. C., Installation of Incinerator Residue as Base-Course Paving Material in Washington, DC, Report No. FHWA/RD-78/114.

Teague, D. J., and Ledbetter, W. B Three Year Results in the Performance of Incinerator Residue in a Bituminous Base, Report No. FHWA/RD-78/144.

McQuade, P., Investigation of the Use of Coal Refuse - Fly Ash Compositions as Highway Base Course Material: State-of-the-Art and Optimum Use Area Determination, Report No. FHWA-RD-78-208.

Majidzadeh, Kamran, Power Plant Bottom Ash in Black Base and Bituminous Surfacing: State-of-the-Art Report, Report No. FHWA-RD-77-71.

Collins, R. J., et al., Guidelines for the Use of Incinerator Residue in Highway Construction, Report No. FHWA-RD-77-72.

Nebgen, J. W., et al., Evaluation of Sulfate-Bearing Waste Material From Fluidized Bed Combustion of Coals for Soil Stabilization, Report No. FHWA-RD-77-136.

Majidzadeh, K., Users Manual - Power Plant Bottom Ash in Black Base and Bituminous Surfacing: State-of-the-Art Report, Report No. FHWA-RD-77-148.

Collins, R. J., Miller, R. H., and Ciesielski, S. K., Guidelines for Use of Incinerator Residue as Highway Construction Material, Report No.FHWA/RD-77/150.

Collins, Robert J., et al., Technology for use of Incinerator Residue on Highway Construction Material, Report No.FHWA/RD-77/151.

Meyers, James F., Pichumani, Raman, and Kapples, Bernadette S., Fly Ash as a Construction Material for Highways, Report No. FHWA-RD-76-10.

Smith, Lloyd M. and Larew, H. Gordon, User's Manual for Sulfate Waste in Road Construction, Report No. FHWA-RD-76-11.

Haynes, J. and Ledbetter, W. B., Incinerator Residue in Bituminous Base Construction, Report No. FHWA/RD-76/12.

Smith, L. M., Kawam, A., et al., Technology for Using Sulfate Waste in Highway Construction, Report No. FHWA-RD-76-31.

Smith, L. M. and Kawam, A., The Effect of Gypsum on Lime-Fly Ash Compositions: Literature Review and Annotated Bibliography, Report No. FHWA-RD-76-84.

Collins, R. J. and Miller, R. H., Availability of Mining Wastes and Their Potential for Use as Highway Material Vol. 1. Classification and Technical and Environmental Analysis, Report No. FHWA-RD-76-106.

Collins, R. J. and Miller, R. H., Availability of Mining Wastes and Their Potential for Use as Highway Material Vol. II. Location of Mining and Metallurgical Wastes and Mining Industry Trends, Report No. FHWA-RD-76-107.

Collins, R. J. and Miller, R. H., Availability of Mining Wastes and Their Potential for Use as Highway Material Vol. III. Annotated Bibliography, Report No. FHWA-RD-76-108.

Pindzola, D., Large Scale Continuous Production of Fused Aggregates from Incinerator Residue, Report No. FHWA/RD-76/115.

Nebgen, J. W., et al., Use of Waste Sulfate for Remedial Treatment of Soils, Report No. FHWA-RD-76-143.

Nebgen, J. W., et al., Use of Waste Sulfate for Remedial Treatment of Soils Volume II: Appendixes, Report No. FHWA-RD-76-144.

Kawam, A., Smith, L. M., Ross, J., Larew, H. G., and Rude, L., Feasibility of Using Sewage Sludge in Highway Embankment Construction, Report No. FHWA-PD-75-38.

Pindzola, D. and Collins, R. J., Technology for the Use of Incinerator Residue as Highway Material-Identification of Incinerator Practices and Residue Sources, Report No. FHWA/RD-75/81.

Pindzola, D., and Chou, R. C., Synthetic Aggregate from Incinerator Residue by a Continuous Fusion Process, Report No. FHWA/RD-74/23.

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