

Thevachandran Shenthan, PhD, PE, GE

Associate



Education

- Ph.D., Geotechnical Engineering, State University of New York at Buffalo, 2006
- M.S., Geotechnical Engineering, State University of New York at Buffalo, 2001
- B.Sc. (Hons.), Civil Engineering, University of Peradeniya, Sri Lanka, 1998

Registration and Certification

- Professional Civil Engineer, California, 2006, #69547
- Geotechnical Engineer, California, 2010, #2883
- GSI Certified CCL and Geosynthetics CQA Inspector
- 40-Hour OSHA Trained, 29 CFR 1910.120(e)(2)/8 CCR 5192

Experience

15 years

With AES

9 years

Dr. Shenthan has 15 years experience in advanced geotechnical engineering applied to design and CQA services for landfill, transportation, and water resources projects. He has performed slope stability analyses and seismic deformation analyses, seepage analyses and hydraulic evaluation of landfills for design of alternate LCRS, unsaturated modeling for design of alternative covers, and settlement analyses of landfill projects. He has advanced knowledge in developing test programs and interpretation of test results of soil-geosynthetic interface tests and application of test results in static and dynamic analyses of refuse slopes.

Dr. Shenthan leads the Research and Development (R&D) initiatives for AES for advanced geotechnical applications and numerical modeling. He also brings specialized expertise in design and CQA of geosynthetics for composite liners and has provided CQA services for over 20 million sq. ft. of geosynthetics for composite liner construction for various Landfills. He has performed numerical modeling for unsaturated flow for Calabasas sideslope cover and Mesquite Regional Landfill (MRL) monocovert characterizations. Dr. Shenthan has also performed geotechnical analyses of bridge foundation for 33 interchanges for State Route 22 in Orange County using both shallow and deep (pile) foundations. He has assisted in preparation of geotechnical investigation and as-built reports for a number of projects including MRL final cover evaluation, MRL Cell 1 composite liner, Calabasas sideslope final cover evaluation, FRB East Flank Landslide Remediation, FRB Phases VIIA and VIIB composite liner as-builts, Lamb Canyon Landfill composite liner design, and slope stability and alternative LCRS design evaluations for Lamb Canyon and San Timoteo Sanitary Landfills. He also has prepared Non-Water Release Corrective Action Plans (NWRCAP) for eight landfills in San Bernardino County.

His relevant experience includes:

- **NWRCAPs for Various Landfills, San Bernardino County, California**
Geotechnical Engineer responsible for preparation of Non-Water Release Corrective Action Plans for eight landfills including Baker, Morongo Valley, Milliken, Newberry Springs, Yermo, Apple Valley, Lucerne Valley, and Phelan sanitary landfills, under various on-call task orders.
- **Calabasas Landfill, Los Angeles County, California**
Geotechnical Design Engineer for the evaluation of the existing sideslope cover and demonstrating that the cover meets the requirements for an alternative evapotranspirative final cover. Coordinated lab program and performed unsaturated flow modeling using UNSAT-H.
- **Westlake Farms Composting Facility, Kings County, California**
As Geotechnical Design Engineer, performed soil characterization, interpretation of strength parameters, shallow foundations and pile foundation design, ground modification design, liquefaction analysis, static and seismic settlement analyses

Thevachandran Shenthan, PhD, PE, GE (cont.)

Associate

for Phase 1 construction of the new Composting Facility located in Westlake Farms, Kings County, California involving 52 acres of improvement. Additionally, interpreted data from Falling Weight Deflectometer (FWD) tests and performed pavement design for the 39-acre composting pad and access roads using AASHTO's new Mechanistic-Empirical Pavement Design Guide (MEPDG) and KENLAYER program.

- **San Timoteo Landfill, San Bernardino County, California**

Geotechnical Design Engineer – Slope Stability for the Unit 2, Phase 3 Expansion project. Performed slope stability and seismic deformation analyses of subgrade and refuse fill slopes; performed seismic hazard analysis; provided remediation options; and, assisted in report preparation.

CQA Engineer during CM/CQA services for Unit 2, Phase 3 Expansion. Assisted in compiling and validating field and laboratory test data and in preparing the as-built report.

CQA Monitor during CM/CQA services for Unit 2, Phase 3 Expansion involving 6,000 cu. yds. of clay liner, 400,000 cu. yds. of engineered fill and over 1.5 million sq. ft. of geosynthetics installation including HDPE geomembrane.

- **Lamb Canyon Landfill, Riverside County, California**

Geotechnical Design Engineer – Slope Stability for proposed Phase 2, Stage 3 Expansion project. Performed stability and seismic deformation analyses of refuse fill slopes and alternative LCRS design; and, assisted in report preparation.

CQA Engineer during Phase 2, Stage 3 Expansion. Assisted in compiling and validating field and laboratory test data and in preparing the as-built report.

CQA Monitor for the 26-acre Phase 2, Stage 3 Expansion including testing for earthworks and geosynthetics. Performed QA/QC services for approximately 25,000 cu. yds. of clay liner, 400,000 cu. yds. of engineered fill and 5.4 million sq. ft. of geosynthetics including HDPE geomembrane, GCL and geotextile.

- **Frank R. Bowerman Landfill, Orange County, California**

Geotechnical Design Engineer – Slope Stability for the North-End Landslide Complex Backcut Excavation and East-Flank Excavation projects. Performed slope stability analyses for the interim and final subgrade cut slopes, buttress design and for mechanical stabilization options; performed seismic hazard analysis; Interpreted filed monitoring data from more than 25 inclinometers and a number of vibrating wire piezometers.

CQA Engineer during Phase VIIA, VIIB, and VIIC Expansion projects. Assisted in compiling and validating field and laboratory test data and in preparing the as-built reports.

CQA Monitor for 22-acre Phase VIIA Expansion involving 2.8 million square feet of geosynthetics, and 60,000 cu. yds. of clay liner and Phase VIIB composite liner involving 27 acres of landfill expansion, including 50,000 cu. yds. of clay liner and 3.9 million sq. ft. of geosynthetics.

- **Puente Hills Landfill, Los Angeles County, California**

CQA Engineer for Phase 6 Composite Liner construction responsible for data management for earthworks and geosynthetics. Also performed liquefaction analysis for the improvement and enlargement of Detention Basin D.

Thevachandran Shenthnan, PhD, PE, GE (cont.)

Associate

CQA Monitor for Phase 6 Composite Liner construction involving 5 million sq. ft. of geosynthetics and 560,000 cu. yds. of earthwork.

- **Mesquite Regional Landfill, Imperial County, California**

Geotechnical Design Engineer for the Final Cover Evaluation project. Performed slope stability analyses and seismicity evaluation; generated site specific SWCC curves and derived site specific empirical correlations for various hydraulic parameters; performed soil erosion estimates due to rain and wind; assisted in LCRS design; helped preparing the TDR.

Also performed engineering analyses for the field and laboratory test results during investigations to evaluate crushed aggregate products derived from onsite alluvial sources and evaluated quality and volume of in situ and stockpiled basalt for railroad ballast.

CQA Engineer during Cell 1 Composite Liner project responsible for laboratory testing, and data compilation and validation; provided yield estimates for foundation layer soil and LCRS gravel during processing of onsite materials; helped preparing the as-built report.

CQA Monitor during Cell 1 Composite Liner project involving 2 million sq. ft. of geosynthetics and about 200,000 cu. yds. of earthwork.

- **Lenwood-Hinkley Sanitary Landfill, San Bernardino County, California**

CQA Engineer for the CM/CQA Services for the final closure construction project involving final cover construction on 50 acres of landfill footprint. The project featured screening of stockpiled final cover materials, final cover demonstration fill, excavation of final cover from onsite borrow areas, construction of drainage structures, installation of six perimeter LFG probes and ten LFG vents, and erosion control measures. Tasks included laboratory data compilation and interpretation, material resources suitability evaluation, and preparation of as-built CQA report.

- **Apple Valley Sanitary Landfill, San Bernardino County, California**

CQA Engineer for CQA Services for 40-acre landfill closure involving 25,000 cu. yds. of alternative cover material. Tasks included laboratory data compilation and interpretation, material resources suitability evaluation, and preparation of as-built CQA report.

- **Colton Landfill, San Bernardino County, California**

Geotechnical Design Engineer – Seismic Evaluation for Phase 2 Final Closure project. Performed earthquake hazard analyses, and helped preparing closure and post-closure plans for Phase 2 closure.

- **OII Landfill, Los Angeles County, California**

Geotechnical Design Engineer – Slope Stability and Refuse Settlement for the 30-acre North Parcel and 145-acre South Parcel of the OII Landfill. Performed slope stability analyses for the final refuse fill slopes, long-term refuse settlement estimates, design of alternative cover and foundation design of proposed commercial development for the North Parcel; performed long-term settlement evaluations for the South Parcel using 2-D finite element program SIGMA/W and models based on gas generation patterns and observed short-term settlements. Analyses also involved determination of integrity of geogrid reinforced steepened slopes under long-term settlements, and estimation of frequency and repair quantity of access roads and final cover.

- **State Route 22 Widening, Orange County, California**

Geotechnical Reviewer for the SR-22 Widening project involving bridge foundations for 33 interchanges and several miles of

Thevachandran Shenthnan, PhD, PE, GE (cont.)

Associate

retaining walls. Tasks included review of technical reports and independent verification of deep foundation design calculations for widening of existing bridges and construction of new bridges, pile drivability evaluations, liquefaction analyses, retaining wall design calculations, settlement estimates, and slope stability evaluations.

- **Aquarium of Pacific, Long Beach, Los Angeles County, California**

Geotechnical Engineer on Record for the Animal Care Center and Associated Tanks Expansion project involving geotechnical evaluation and foundation design and CQA services during construction.

Geotechnical Design Engineer for the Watershed Exhibit Expansion project involving investigation and design of foundations for the proposed Watershed Exhibit Expansion, and preparation of the technical report.

Both the above expansions met United States Green Building Council (USGBC)'s LEED Platinum Standards.

- **Sierra Suites, The Pike at Rainbow Harbor, Long Beach, Los Angeles County, California**

Geotechnical investigation and design of deep foundations for the proposed 7-story hotel, and preparation of the technical report.

- **Laugh Factory, The Pike at Rainbow Harbor, Long Beach, Los Angeles County, California**

Geotechnical investigation and design of screw piles, and preparation of the technical report.

CQA Monitor for installation of 146 screw piles, and subgrade preparation. Prepared the as-built report.

- **Newport Boulevard Sidewalk Gap Closure, Orange County, California**

Geotechnical investigation and design of deep foundations for the proposed soldier pile wall.

- **East Garden Grove-Wintersburg Channel Improvements, Huntington Beach, Orange County, California**

Geotechnical review and feasibility evaluation for the proposed channel levee improvement alternatives such as soil-cement embankment, sheetpiling, reinforced concrete box (RCB) structures and MSE walls involving liquefaction, seepage, slope stability, and seismic deformation analyses. Prepared the technical report.

- **O'Neill Regional Park Sewer Conversion**

Geotechnical investigation and slope stability analysis for proposed lift station.

- **Cowan Heights Landslide Investigation, Orange County, California**

Geotechnical investigation, slope stability analyses, mitigation of landslide involving design of buttress and caissons. Helped preparing the technical report.

- **Long Beach Water Department, California**

Preparation of Standard Plans and Specifications for trenching and backfill, and testing protocols.

- **Inland-Empire Regional Composting Facility, Rancho Cucamonga, California**

CQA Engineer for the biofilter media replacement project at the nation's largest indoor biosolids composting facility. Developed modified CQA testing program for the project and prepared the as-built report.

Thevachandran Shenthnan, PhD, PE, GE (cont.)

Associate

Publications

- Somasundaram, S., Shenthnan, T., Khilnani, K., and Irvine, J., 2013, "Characterization and Settlement Modeling of Deep Inert Debris Fills", Proceedings, 18th International Conference on Soil Mechanics and Geotechnical Engineering, Paris, France, September 2013.
- Somasundaram, S., Shenthnan, T., Stark, T.D., and Wright, T.D., 2012, "Shear Strength Characterization and Back Analysis for a Landslide Complex", Proceedings, GeoCongress 2012: State of the Art and Practice in Geotechnical Engineering, Oakland, California, March 2012.
- Somasundaram, S., Shenthnan, T., Benson, C., and Nannapaneni, S., 2010, "Unsaturated Hydraulic Characteristics of Soil with Significant Oversize Particles", Proceedings, 5th International Conference on Unsaturated Soils, Barcelona, Spain, September 2010.
- Thevanayagam, S., Shenthnan, T. (2010) "Cyclic Pore Pressure Generation, Dissipation and Densification in Granular Mixes," T.G. Sitharam (Ed.), International Journal of Geotechnical Earthquake Engineering, 1(1): 42-61 pp.
- Shenthnan, T., Thevanayagam, S., and Martin, G.R. (2006) "Numerical simulation of soil densification using vibro-stone columns", Eds. D. J. DeGroot et al., Geotechnical Engineering in the Information Age, ASCE., ISBN 0-7844-0803-3.
- Shenthnan, T. (2006) "Soil densification using vibro-stone columns supplemented with wick drains," Research Paper Received Honorable Mentioning, Student Research Accomplishments 2005-2006, MCEER, Buffalo, NY.
- Shenthnan, T., Thevanayagam, S., and Martin, G.R. (2006) "Numerical simulation of densification using vibro-stone columns," Proc., Geo Congress 2006, Geo-Institute, Atlanta, GA: Feb.26-Mar.1, 2006.
- Shenthnan, T., Thevanayagam, S., and Martin, G.R. (2006) "Soil densification using vibro-stone columns supplemented with wick drains," Proc., EERI's 8th U.S. National Conference on Earthquake Engineering (8NCEE), San Francisco, CA: Apr.18-22, 2006.
- Thevanayagam, S., Martin, G.R., Nashed, R., Shenthnan, T., Kanagalingam, T., and Ecemis, N. (2006) "Liquefaction Remediation in Silty Soils Using Dynamic Compaction and Stone Columns," MCEER Technical Report, Publication # MCEER-06-0009, State University of New York at Buffalo, NY, August 28, 2006.
- Nashed, R., Thevanayagam, S., Shenthnan, T., and Martin, G.R. (2006) "A design procedure for liquefaction mitigation in silty soils using dynamic compaction," Proc., 8NCEE, San Francisco, California: Apr. 18-22, 2006.
- Shenthnan, T. (2005) "Liquefaction mitigation in silty soils using stone columns supplemented with wick drains," PhD Dissertation, University at Buffalo, NY, 342p.
- Thevanayagam, S., Nashed, R., Shenthnan, T., and Martin, G.R. (2005) "Liquefaction mitigation in silty soils using dynamic compaction and wick drains," Proc., US-Japan Workshop on 'New Applications & Challenging Soils for Ground Improvement Technologies,' Kyoto, Japan: September 8-10, 2005.
- Thevanayagam, S., Nashed, R., Shenthnan, T., and Martin, G.R. (2005) "Liquefaction and remediation of silty soils,"

Thevachandran Shenthnan, PhD, PE, GE (cont.)

Associate

Proc., Caltrans Research Workshop, CA: Fall, 2005.

- Shenthnan, T., Nashed, R., Thevanayagam, S., and Martin, G.R. (2004) "Liquefaction mitigation in silty soils using stone columns and dynamic compaction," J. Earthq. Eng. & Eng. Vibration. 3 (1), Inst. of Eng. Mech., China.
- Shenthnan, T., Nashed, R., Thevanayagam, S., and Martin, G.R. (2004) "Liquefaction mitigation in silty soils using composite stone columns and dynamic compaction," Research Progress and Accomplishments 2003-2004, MCEER, Buffalo, NY: <http://mceer.buffalo.edu/publications/resaccom/04-SP01/contents.asp>
- Shenthnan, T., Thevanayagam, S., and Martin, G.R. (2004) "Densification of saturated silty soils using composite stone columns for liquefaction mitigation," Proc., 13th World Conference on Earthquake Engineering, Vancouver, BC, Canada: Aug. 1-6, 2004.
- Nashed, R., Thevanayagam, S., Martin, G.R., and Shenthnan, T. (2004) "Liquefaction mitigation in silty soils using dynamic compaction and wick drains," Proc., 13th World Conference on Earthquake Engineering, Vancouver, BC, Canada: Aug. 1-6, 2004.
- Thevanayagam, S., Kanagalingam, T., and Shenthnan, T. (2003) "Intergrain friction, Contact density, and cyclic resistance of sands," Proc., 2003 Pacific Conf. on Earthq. Eng., Univ. of Canterbury, Christchurch, New Zealand: Paper# 115.
- Shenthnan, T., Thevanayagam, S., and Martin, G.R. (2003) "Analysis of densification during composite stone column installation in silty soils," Proc., 12th Panamerican Conference on Soil Mechanics and Geotechnical Engineering, 39th U.S. Rock Mechanics Symposium, MIT, Cambridge, MA: June 22-26, 2003.
- Thevanayagam, S., Kanagalingam, T., and Shenthnan, T. (2003) "Intergrain friction, Contact density, and cyclic resistance of silty sands," Proc., 12th Panamerican Conference on Soil Mechanics and Geotechnical Engineering, 39th U.S. Rock Mechanics Symposium, MIT, Cambridge, MA: June 22-26, 2003.
- Thevanayagam, S., Shenthnan, T., and Kanagalingam, T. (2003) "Role of intergranular contacts on mechanisms causing liquefaction and slope failures in silty sands," Final Report, USGS Award # 01HQGR0032 & 99HQGR0021.
- Thevanayagam, S., Shenthnan, T., Mohan, S. and Liang, J. (2002) "Undrained fragility of sands, silty sands and silt" ASCE, J. Geotech. & Geoenviron. Eng. 128 (10): 849-859.
- Shenthnan, T., and Thevanayagam, S. (2002) "Liquefaction mitigation techniques for silty soils," Proc., 18th US-Japan Bridge Eng. Workshop, St. Louis, Missouri.
- Shenthnan, T., Jia, W., and Thevanayagam, S. (2002) "Recent advances in liquefaction mitigation in sands and silty soils," Proc., KEERC-MCEER joint seminar on Retrofit Strategies for Critical Facilities, Buffalo, NY.
- Thevanayagam, S., Kanagalingam, T., and Shenthnan, T. (2002) "Contact density – confining stress – energy to liquefaction," Proc. 15th ASCE Eng. Mech Conf. Columbia Univ., Paper 428.
- Shenthnan, T. (2001) "Factors affecting liquefaction mitigation in silty soils using stone columns", MS Thesis, University at Buffalo, NY, 220p.

Thevachandran Shenthana, PhD, PE, GE (cont.)

Associate

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- Thevanayagam, S., Liang, J., and Shenthana, T. (2000) “A contact index for liquefaction potential analysis of silty/gravelly soils,” In Tassoulas (ed.). EM2000, Proc. 14th ASCE EMD Spec. Conf. Austin, Texas.
- Shenthana, T., Kuruparan, P., Fernando, V., and Seneviratne, H.N. (1998) “Behavior of Laterally loaded piles in sand,” Proc., 54th Annual session, Sri Lankan Assoc. for the Advancement of Science, University of Sri Jeyawardenapura, Sri Lanka. Paper# C-37.