

Committee on Energy and Commerce  
U.S. House of Representatives  
Witness Disclosure Requirement - "Truth in Testimony"  
Required by House Rule XI, Clause 2(g)(5)

1. Your Name: <i>HOTA V. Gangarao</i>		
2. Your Title: <i>Director, Constructed Facilities Center, Statler College of ENA, WVU</i>		
3. The Entity(ies) You are Representing: <i>West Virginia University</i>		
4. Are you testifying on behalf of the Federal, or a State or local government entity?	Yes	No <input checked="" type="checkbox"/>
5. Please list any Federal grants or contracts, or contracts or payments originating with a foreign government, that you or the entity(ies) you represent have received on or after January 1, 2015. Only grants, contracts, or payments related to the subject matter of the hearing must be listed.  <i>- None -</i> <i>HVR</i>		
6. Please attach your curriculum vitae to your completed disclosure form.		

Signature: \_\_\_\_\_



Date: *March 13, 2017*



**Prof. Hota V. S. GangaRao, Ph.D., P.E., F.ASCE, F.SEI**  
Maurice A. & JoAnn Wadsworth Distinguished Professor of CEE  
Director, National Science Foundation's Center for Integration of Composites into Infrastructure  
Director, Constructed Facilities Center  
PO Box 6103, 549 Engineering Sciences Building, Morgantown, West Virginia 26505-6103

## Education

Ph. D. Civil Engineering, N.C.S.U., Raleigh, N.C., completed in June 1969, awarded in January 1970  
M.S. Civil Engineering, N.C.S.U., Raleigh, N.C., completed in August 1967, awarded in January 1968  
B. Tech. with distinction, Civil Engineering, Indian Institute of Technology, Madras, India, March 1965

## Employment History

Maurice A. & JoAnn Wadsworth Distinguished Professor of Civil Engineering, WVU (2011 - Present)  
Director, National Science Foundation Center for Integration of Composites into Infrastructure (2008 - Present)  
Director, Constructed Facilities Center at WVU: Sponsored by NSF, USDOT-FHWA, WVDOH (1988 - Present)  
Professor of Civil and Environmental Engineering, WVU (1979 - Present)  
Assistant and Associate Professor of Civil and Environmental Engineering, WVU (1969 - 1979)

## Professional Licensure

Registered Professional Engineer (Structural Engineering) #6069, WV, 1973

## Most Outstanding Professional Achievement

Development, Design and Field Implementation of Fiber Reinforced Polymer Composites for Infrastructure Systems including Wicket Gates at the Peoria Lock & Dam on the Illinois River (Won the 2016 Celebration of Engineering and Technology Innovation Award and 2016 USACE Innovation of the Year Award) and East Fork Bridge Rehab (Won the 2015 USACE National Innovation of the Year Award)

## Continuing Professional and Technical Development

### *Major projects coordinated through CFC*

1. USDOT-PHMSA-GFRP Composite High Pressure Pipes and Joints - Design, Manufacture and Implementation, (Sept 2016 - 2018).
2. USACE, NSF and USDoD - Durability of Thermoplastic and Thermoset Composites for Lock Gates and Spec. Development, (Sept 2016 - 2019)
3. NSF - Innovation Managing Director and base budget for CICI, (Aug 2016 - Sept 2019)
4. USDOT-PHMSA - Advancement in the Area of Intrinsically Locatable Plastic Materials, (Sept 2015 - 2017)
5. LTRC - Wrapping of Wood Piles with Composites, (March 2015 - 2017)
6. Rehabilitation of Elkins-Beverly RR Bridges-WVDOT-SRA-RP292 - with others (July 2013 - Dec 2016)
7. Nanjing Univ of Technology - NSF of China - FRP Composites for Infrastructure with Dr. Liang (Jan 2013 - Dec 2019)
8. Dynamic Characterization of US Army Bridges - SBIR - Phase I & II with others - completed (June 2013)
9. US Army Corps of Engineers/NSF - Use of FRP Composites for Waterways - with others (Aug 2012 - Sept 2019)
10. USDOT-FHWA/NSF - International Workshop on Aging of Composites with Dr. Liang (Dec 2012 - Nov 2019)
11. WVDOH Str. where FRP Wraps Would be Beneficial - RP 270 & 299 - WVDOH with 5 others (August 2011 - 2018)
12. Development of Low Cost Pultruded Composites for ships - NGSS with Dr. Liang (July 2008 - 2012)
13. Center for the Integration of Composites into Infrastructure - NSF/Industry & WVU with 5 others (July 2008 - 2019)
14. Thermoplastic Ties Evaluation - DOT-FRA with others (Sept 1996 - 2012)

**Received ~\$1.5 million per year in external funding for the last 20 years, which does not include expenditures for field implementation.**

### *Patents*

1. "Durable, Fire Resistant, Energy Absorbing and Cost-Effective Strengthening Systems for Structural Joints and

- Members”, with Majjigapu P.K.R., U.S. Patent Publication No. 20160326758 (Approved from USPTO with a recommendation for an additional patent as “Divisional Patent”)
2. “Durable, Fire Resistant, Energy Absorbing and Cost-Effective Strengthening **Filler Modules** for Structural Joints and Members”, with Majjigapu P.K.R., U.S. Patent (**Divisional Patent to be submitted immediately**)
  3. “Fiber-Reinforced Polymer Shell Systems and Methods for Encapsulating Piles with Concrete Columns Extending below the Earth’s Surface”, with K. Karri and J. Nestor, U.S. Patent Publication No. 20160348830 (Pending from USPTO)
  4. “Prestressing of Structural Wood Elements Reinforced with External Composite Wraps”, - Pending Application
  5. “3-D Stitched Fabrics,” with Thippeswamy and Shekar, Canadian Patent, Patent Number: 2421735; issued in 2005
  6. “Light Weight FRP Composite Modular Panel,” with Siva Hota, US Patent No.: 6,591,156 B2; issued in 2003
  7. “Modular FRP Deck System,” with Lopez\_Anido, R.A., and Ever Barbero, US Patent No.: 6,544,624; issued in 2003
  8. “Modular FRP Composite Deck Systems”, with Lopez-Anido and E. Barbero, US Patent No.: 6,455,131; issued in 2002
  9. “Modular FRP Composite Panel System”, with R. Lopez-Anido; US Patent #6,309,732; issued in 2001
  10. “New Joints in Precast Panel Industry”, U.S. Patent No. 4676035; issued in 1987
  11. “Building Systems for Modular Construction”, U.S. Patent No. 4320606; issued in 1983

### ***Books, Proceedings and Manuals***

1. “Determination of Bending Modulus using Closed Section FRP Members,” ASTM (D20 Sub-committee Chair), 2017.
2. “Research and Application of Composite Materials in Infrastructure,” Proceedings of the Workshop on Global Innovations in Infrastructure with Advanced Composites, China Architecture and Building Press, ISBN 978-7-112-17363-1, Editors: **Hota** and Liu, 2016.
3. “Chapter 16 Fiber-reinforced polymer (FRP) composites in environmental engineering app.,” Liang and **Hota**, Woodhead Publishing Ltd: Developments in FRP composites for civil engineering, Editor: N. Uddin, 2013.
4. “Applications of Fiber Reinforced Polymer Composites,” Textbook chapter (Encyc. of Polymer science) by **Hota**, 2011
5. “Pre-Standard for LRFD of Pultruded FRP Structures”, Design Manual, ASCE, Coauthored with 5 others, Dec. 2010
6. “FRP Reinforcements for Concrete” Textbook with Vijay and Taly –published in 2007.
7. “Integral Abutment and Jointless Bridges”, Conf. Proc., Co-Chair & Co-Editor (with Mistry & Aluri), March 2005
8. “Polymer Composites III Conf.”, Proc., Co-Chair edited with Creese, published by DESTech Publishing, Co, 2004
9. “FRP Bridge Decks”, AASHTO Guide Specs, June 05 AASHTO and FHWA document
10. “FRP Composite Bridges in WV,” CFC-2001 & 2016, USDOT-FHWA
11. “Polymer Composites II –2001”, Proc., co-edited with Creese, CRC Press, ISBN: 0-8493-1341-4
12. “Infrastructural Renewal and Economic Development” - A Conf. on Polymer Composites,” (Proceedings, co-edited with Creese, Technomic Publishing, Co., Inc., 1999 ISBN No. 1-56676-802-0)
13. “Design of FRP Reinforced Concrete Members,” Course Manual, Michigan State University, March 1997
14. “Survey and Design of Integral Abutment Bridges,” Manual Published by U.S. Department of Transportation-Federal Highway Administration, Feb. 1997. (Co-authored with Thippeswamy and Dickson)
15. “Introduction of Advanced Fiber Reinforced Plastic Composites for Civil Engineering Infrastructure,” manual for WVDOH, Charleston, WV, April, 1996, pp. 1-161 (Co-authored with Mark Wilson)
16. “Nondestructive Evaluation Methods for Highway Bridge Superstructures,” Co-authored with Halabe and Petro, manual submitted to West Virginia Division of Highways (WVDOH, Charleston, WV, July, 1995, pp. 1-177
17. “Introduction to Transportation Systems Rehabilitation and Maintenance,” (Co-authored with Anne Wilkison and R. Nivargikar 619 pages), Submitted to WVDOH, 1995
18. “Nondestructive Testing and Evaluation of Bridges,” Symposium (proceedings) sponsored by ASCE STRUCTURAL CONGRESS '93 (1991-93), 1995, Editor: Hota
19. “Glass Rods in Concrete,” Chapter 14, of a textbook entitled Fiber Reinforced Plastic for Concrete Structures: Properties and Application, by Elsevier Science Publishers, 1993. (Co-authored with Faza)
20. “Construction, Structural Applications,” Chapter in Vol. 6, Int. Encyclopedia of Composites, Editor S. M. Lee, VEH, NY, pp. 173-187, 1992. (Co-authored with Barbero)
21. “Use of Composites in Construction,” Proceedings, co-edited with Dr. R. Nivargikar, Sponsored by the National Science Foundation, May, 1992
22. “Stress-Laminated Timber Bridge Decks,” CFC booklet submitted to USDOT, FHWA, October 1991, 79 pages

**Note: Many other proceedings and manuals co-authored by Hota are not listed above.**

### ***Journal Publications***

1. Muhammad Asif Mahmood Qureshi, **Hota V.S. GangaRao**, Nasir Hayat, Praveen Majjigapu, “Response of Closed GFRP Composite Sections Under Combined Bending and Torsion,” J. of Comp. Matrls, Vol 51, Issue 2, 2017.

2. Dai, F., Yoon, Y., and **GangaRao, H.V.S.**, "State-of-Practice of Construction Site Safety in USA", *Frontiers of Engineering Management Journal*, 2016.
3. Jun Wang, **Hota GangaRao**, Ray Liang, and Weiqing liu, "Experimental and Analytical Responses of Hollow and Concrete Filled GFRP Tube Columns under Impact," *Journal of Comp. in Construction*, ASCE, 2016.
4. P. Vijay, P. Soti, **Hota GangaRao**, Rich Lampo, and John Clarkson, "Repair and Strengthening of Submerged Steel Piles Using GFRP Composites," Vol. 21, Issue 7, *Bridge Eng Journal*, ASCE, July 2016.
5. Daniel D. Estep, **Hota GangaRao**, David Dittenber, M. A. Qureshi, "Responses of Pultruded Glass Composite Box Beams Under Bending and Shear," *Journal of Composites, Composites Part B*, 88, 2016, P 150-161.
6. Vijay, P.V., Soti, P.R., **GangaRao, H.V.S.**, Lampo, R.G. & Clarkson, J.D., "Design and Evaluation of an Integrated FRP Composite Wicket Gate," *J. Composite Structures*, 145:149-161, 2016.
7. Vijay, P.V., **GangaRao, H.V.S.**, Soti, P.R., Liang, R., Skidmore, M., Lampo, R.G., Trovillion, J.C., Ryan, J.P., & Clarkson, J.D., "Evaluation and implementation of FRP shapes for lock and dam structures," *Journal of Advanced Materials*, Volume 2:221-230, 2016 (as per CAMX).
8. Estep D. D., **GangaRao H.V.S.**, and Skidmore, M., "Lateral-Torsional Buckling Load Prediction of Glass Fiber Reinforced Polymer (GFRP) Open Sections," *J. of Composite Materials*, 2016 (submitted).
9. Jun Wang, **Hota GangaRao**, Ruifeng Liang, Weiqing Liu, Ding Zhou, Y Fang, "Durability of Glass Fiber-reinforced Polymer Composites under the Combined Effects of Moisture and Sustained Loads," *Journal of Reinforced Plastics and Composites*, 34(21):1739-54, 2015.
10. Jun Wang, **Hota GangaRao**, Ruifeng Liang & Weiqing Liu, "Durability and Prediction Models of FRP Composites under Various Environmental Conditions: A Critical Review," *J. of Reinforced Plastics and Composites*, 2015; DOI: 10.1177/0731684415610920;1-33.
11. Jun Wang, Weiqing Liu, **Hota GangaRao**, Ruifeng Liang, and Li Wan, "Analytical and Experimental Study on Flexural Behavior of Pultruded FRP Sheet Piles," *Journal of Composite Materials*, Dec 2015.
12. W. Prachasaree, Sangkaew, and **Hota GangaRao**, "Parametric Study on Dynamic Response of FRP Composite Bridges," *International Journal of Poly Sci.* Oct, 2015.
13. Qureshi and **Hota GangaRao**, "Torsional Response of Closed FRP Composite Sections," *Composites, Part B, Engineering*, Vol. 61, p254-266, May 2014.
14. **Hota GangaRao** and Blandford, "Critical Buckling Strength Prediction of Pultruded GFRP Composite Columns," *Journal of Composite Materials*, Vol 48 (29), pp3685-3702, Nov 2014.
15. Liang and **GangaRao**, "FRP Composites in Environmental Applications," Book-Chapter, 16, Woodhead Publication Limited, Number 45, 2013, PP 410 to 468.
16. Liang, **GangaRao**, Ying Lei, Yanhao Li, Daniel Stanislawski and Yongqiang Jiang, "Nondestructive Evaluation of Historic Hakka Rammed Earth Structures," *Sustainability Journal*. 2013, 5, 298-315, ISSN 2071-1050.
17. David B. Dittenber and **GangaRao V.S. Hota**, "Critical review of recent publications on use of natural composites in infrastructure," *Composites Part A: Applied Science and Manufacturing*, 43 (8), August 2012, pages 1419-1429.
18. David B. Dittenber and **GangaRao V.S. Hota**, "Fatigue equation considerations for the American Society of Civil Engineers pre-standard for load and resistance factor design of pultruded fiber-reinforced polymer structures," *Journal of Composite Materials*, first published on July 10, 2012, as Doi:10.1177/0021998312452895.
19. Ruifeng Liang, Daniel Stanislawski and **GangaRao Hota**, "Material Characterization and Structural Response under Earthquake Load of Hakka Rammed Earth Building," *Sustainability Journal*, 2012, vol. 4.
20. Vijay P.V., **GangaRao H.V.S.**, Hui Li, "Field Construction and Performance Evaluation of Jointed Concrete Pavement with FRP Dowels," *International Journal of Pavement Engineering (SI Version)*, Nov. 2012 (submitted).
21. S. Sahirmaw, R. Creese & **Hota GangaRao**, "Life Cycle Cost Estimator as a Decision Tool for FRP Bridge Deck Selection", Accepted for Publication, *Journal of Management & Engineering Integration (JMEI)*, Spring 2011.
22. D. Dittenber & **Hota GangaRao**, "Evaluation of a Life Prediction Model and Environmental Effects of Fatigue for GFRP Materials", *Structural Engineering Inst Journal (IABSE)*, 2010 (4) pp 374-384.
23. **Hota GangaRao**, P. Vijay & R.S. Abhari, "GFRP Strengthening and Evaluation of Railroad Bridge Members", *Str. Eng. Inst. Journal (IABSE)*, 2010 (4) pp 423-427.
24. Udaya Halabe, S.S. Dutta, **Hota GangaRao**, "Infrared Thermographic and Radar Testing of Polymer-Wrapped Composites", *Materials Evaluation Journal*, April 2010, P447- 452.
25. **Hota GangaRao**, PV Vijay, Reza Abhari "Rehab of Railroad Bridge Members with FRP," 2010 Joint Rail Conference Proceedings, JRC 2010-36053, ASME, April 2010.
26. PV Vijay, **Hota GangaRao**, Aneesh Bethi, Venugopal Chada, Qureshi MAM, "Development and Implementation of Recycled Thermoplastic RR Ties," 2010 Joint Rail Conference Proceedings, JRC 2010-36121, ASME April 2010.
27. B. Mutnuri, et al, **Hota GangaRao**, "Natural Fiber Reinforced Pultruded Composites", *ACMA- Comp.* 2010, Feb 2010

28. D.B. Dittenber and **Hota GangaRao**, "Evaluation of Fatigue Life Prediction Model for GFRP Composites Materials", ANTEC 2010.

**Note: Several technical papers are under peer review in quality journals.**

### ***Refereed Proceedings***

1. Dai, F., Yoon, Y., and **GangaRao, H.**, "State-of-Practice of Construction Site Safety in USA", Proceedings Retrospect and Prospects of the Engineering Management in China, Aug 2016, P 13-21.
2. Soti, P. R., Vijay, P.V., **GangaRao H.V.S.**, Lam po, J., & Trovillion, "Design, manufacturing, analysis and implementation of thick solid FRP composite miter blocks," J., CAMX, Anaheim, CA, 2016.
3. Ruifeng, R. Liang., Mark, Skidmore., Vijay, P. V., and **GangaRao, Hota.**, Rehabilitation of East Lynn Lake Bridge with fiber Reinforced Polymer Composites, The 4<sup>th</sup> Biennial TRB-CMTS Conference: From Sail to Satellite: Delivering Solutions for Tomorrow's Marine Transportation Systems Conference, June 21-23, 2016, Washington, DC.
4. Ruifeng, R. Liang., and **GangaRao, Hota.**, Advanced Fiber Reinforced Polymer Composites for Corrosion Mitigation in Water Infrastructure, The 4<sup>th</sup> Biennial TRB-CMTS Conference: From Sail to Satellite: Delivering Solutions for Tomorrow's Marine Transportation Systems Conference, June 21-23, 2016, Washington, DC.
5. Vijay, P. V., Li, H., & **GangaRao H.V.S.**, Field Construction and Long-Term Evaluation of jointed Plain Concrete Pavement with FRP Dowels, TRB 94<sup>th</sup> Annual Meeting Compendium of Papers, 2015.
6. Vijay P.V., **Hota VS GangaRao**, John D. Clarkson, & Richard G. Lampo, Composites for Rehabilitation of Hydraulic Structures, TRB Innovative Technologies for a Resilient Marine Transportation System 3rd Biennial Research and Development Conference Proceedings, June 24-26, 2014, Washington, DC.
7. Vijay, P.V., **GangaRao H.V.S.**, Soti, P.R., Liang, R., Skidmore, M., Lam po, R.G., Trovillion, J.C., Ryan, J.P., & Clarkson, J.D., "Evaluation and implementation of FRP shapes for lock and dam structures," CAMX, Dallas, TX, 2015.
8. Vijay, P.V., Soti, P.R., **GangaRao H.V.S.**, & Lampo, R.G., "Abrasion and corrosion resistant ceramic and vinyl coatings for hydraulic infrastructure," CORCON Conference, Chennai, India, 2015.
9. Vijay, P.V., Soti, P.R., **GangaRao H.V.S.**, & Lampo, R.G., Ryan, J.P., & Clarkson, J.D., "Abrasive behavior of corrosion resistant coatings for hydraulic steel structures," Corrosion Conference, NACE, Dallas, TX, 2015.
10. Vijay P.V., Soti, P. R., **GangaRao H.V.S.**, Lampo R., Ryan J., Clarkson J.D., "Composite Coatings for Tainter Gates," DOD Corrosion Conference, October, Argentina, 2015.
11. Vijay, P.V., Soti, P.R., **GangaRao H.V.S.**, Clarkson, J.D., & Lampo, R.G., "Innovations in Applications of Advanced Composites for Navigational Infrastructure," Proceedings of the Workshop on Global Innovations in Infrastructure with Advanced Composites, China Architecture and Building Press, 164-171, 2015.
12. Vijay, P.V., Clarkson, J.D., **GangaRao H.V.S.**, Soti, P.R., & Lampo, R.G., "FRP Composites for Rehabilitation of Hydraulic Structures," Proceedings of the Workshop on Global Innovations in Infrastructure with Advanced Composites, China Architecture and Building Press, ISBN 978-7-112-17363-1, 172-179, 2015.
13. **Hota GangaRao**, Ray Liang, Mark Skidmore, P Vijay, Richard Lam po, Jeffrey P Ryan, John D. Clarkson, "Transforming Corroded Steel Piles with Advanced Fiber Reinforced Polymer Composites: Rehabilitation of East Lynn Lake Bridge," US DOD Allied Nations Technical Corrosion Conference, Nov. 2015, Pittsburgh, PA.
14. Ray Liang and **Hota GangaRao**, "Advanced Fiber Reinforced Polymer Composites for Corrosion Mitigation in Infrastructure," US DOD Allied Nations Technical Corrosion Conference, Nov. 15-19, 2015, Pittsburgh, PA.
15. Ruifeng Liang, **Hota GangaRao** and Dustin Troutman, "Introduction of Center for Integration of Composites into Infrastructure," A National Science Foundation Industry/University Cooperative Research Center Program CAMX 2015, Dallas Convention Center, October 26-29, 2015, Dallas, Texas.
16. Jun Wang, **Hota GangaRao**, Ruifeng Liang, Weiqing Liu, and Yang Li, "Combined Effects of Load and Wet-dry Cycles on Durability of Glass Fiber Reinforced Polymer Composites," The Twenty-third Annual International Conference on Composites/Nano Engineering (ICCE-23), July 12-18, 2015, Chengdu, China.
17. **Hota GangaRao** "Lateral Torsional Buckling Response of FRP Composite Sections," ICERP 2015, Jan 29 - 31, 2015, Hitex Exhibition Center, Hyderabad, India.
18. Vijay, P.V., Soti, P.R., **GangaRao H.V.S.**, Beaty, T., & Lampo, R.G., "FRP Strengthening of Submerged Concrete and Steel Structures," Proceedings of International Workshop on Advances in Fiber Reinforced Polymers and Composites, (IWAFRPC-2014), 13th & 14th March, 1-13, 2014.
19. Majjigapu, P.K.R., Liang, R., and **GangaRao, H.V.S.**, "Flexural Evaluation of Aged Kenaf Fiber Composites," Research and Application of Composite Materials in Infrastructure - Proceedings of the Workshop on Global Innovations in Infrastructure with Advanced Composites, Nanjing Tech University, China, 2014.
20. Vijay, P.V., Soti, P.R., **GangaRao H.V.S.**, Beaty, T., & Lampo, R.G., "Underwater Wrapping of Concrete Structural Members," ASCE Texas Conference, TX, 2013.

21. Agarwal, S, Gupta, R. K., and **GangaRao, H.V.S.**, "Numerical Modeling of Fire Resistance of FRP Composite Fire Wall Panel," ANTEC 2013, Polymers in Building Construction, May 2013, Boston, MA.
22. Halabe, Dutta and **GangaRao**, "Strength and Ductility Behavior of FRP Composites Wrapped Low-Strength Concrete Cylinders with Embedded Debonds," Proceedings, TX Section-ASCE, Sept, 2013, Dallas, TX.
23. Halabe, U. B., Nandam, K., Majiga, S., Perisetty, N., and **GangaRao, H. V. S.**, "Condition Assessment of GFRP Composite Wrapped Timber Railroad Ties and Timber Bridge Piles Using Infrared Thermography," Proceedings of ASNT Fall 2012 Conference, Orlando, FL, October 29 – November 1, 2012, pp. 156-163.
24. Halabe, U. B., **GangaRao, H. V. S.**, and Perisetty, N., "Infrared Thermography and GPR Techniques for Condition Assessment of RC Bridges," Proceedings of NDE/NDT for Highways and Bridges: Structural Materials Technology (SMT), New York, NY, August 21-24, 2012, pp. 120-127.
25. Ruifeng Liang and **GangaRao Hota**, Engineering Values of Historic Hakka Rammed Earth Buildings, 2012 Toronto Hakka Conference, York University, Keele Campus, Canada, June 29 – July 1, 2012.
26. R. Liang, **H GangaRao**, D. Stanislawski and Y Lei, "Thermal and Mechanical Responses of Hakka Toulou Rammed Earth Structures: Lessons to be Learned for a Sustainable Future," Proceedings of 2011 NSF Engineering Research and Innovation Conference, January 4-7, 2011, Atlanta GA.
27. P Vijay, **H. GangaRao**, R. Liang and M Skidmore, "Rapid Restoration of Rail Road Timber Bridges Using Polymer Composites," ANTEC 2011, May 2011, Boston MA.
28. R. Liang, **H GangaRao**, D. Stanislawski, Y. Lei, Y LI and Y. Jiang, "Material and Structural Response of Historic Hakka Rammed Earth Structures," Proceedings of the 85th Annual Meeting of the West Virginia Academy of Science, April 2010, Morgantown, WV.
29. R. Liang and **H. GangaRao**, "Fiber Reinforced Polymer (FRP) Composites for Infrastructure Applications," NSRP Product Design and Material Technologies Panel Meeting, June 15-16, 2010, Pittsburgh, PA.

**Note: Several others that are not listed here.**

#### ***Short Courses and Seminars***

1. **Hota GangaRao**, (2017). "FRP Wrap Applications for Concrete Structural Systems", ICERP, Jan. 2017, Mumbai, India.
2. **Hota GangaRao**, (2016). "Novel Applications of Polymer Composites for Navigational Structures" Key note address, Plastics in Buildings and Construction Division, Society of Plastics Engineers, Indianapolis, IN.
3. **Hota GangaRao**, (February 2016). "Design of Waterway Structures - PIANC" Workshop, Brussels, Belgium.
4. **Hota GangaRao (Co-authored)**, (2016). "Rehabilitation of East Lynn Lake Bridge with Fiber Reinforced Polymer Composites" The 4<sup>th</sup> Biennial TRB-CMTS Conference: From Sail to Satellite: Delivering Solutions for Tomorrow's Marine Transportation Systems Conference, June 21-23, 2016, Washington, DC.
5. **Hota GangaRao**, (November 2016). "FRP Composite Pipelines" Poster Presentation, USDOT-PHMSA, Cleveland, Ohio.
6. **GangaRao, H.V.S.**, and Majjigapu, P.K.R. (2015). "FRP Rebar and Wraps for Concrete Structures - Case Studies." Short Course Presented to Structural Engineering Association of Pennsylvania, Harrisburg, Pennsylvania, USA.
7. **GangaRao, H.V.S.**, and Majjigapu, P.K.R. (2015). "Fiber Reinforced Plastic Research - Specifications and Details" Short Course Presented to West Virginia Department of Transportation - Division of Highways, Weston, West Virginia, USA.
8. **GangaRao, H.V.S.**, and Majjigapu, P.K.R. (2015). "Case Studies, Design and Construction - FRP Rebar and Wraps for Concrete" Short Course Presented to ASCE Pittsburgh Chapter and Structural Engineering Association of Pennsylvania, Pittsburgh, Pennsylvania, USA.
9. **GangaRao, H.V.S.**, and Majjigapu P.K.R. (2015). "Application of FRP Wraps to Concrete Structures." Workshop Presented at International Conference and Exhibition on Reinforced Plastics (ICERP), Hyderabad, India.
10. **GangaRao, H.V.S.**, (2014). "Design, Construction and Case Studies – FRP Rebar in Concrete as Reinforcement" Presented to USDOT-FHWA/Vermont Agency of Transportation.
11. **Hota GangaRao**, (2014). "FRP Applications for Infrastructure," SAMPE, Beijing, Nanjing, China
12. **Hota GangaRao**, David B. Dittenber, and Praveen Majjigapu (2013). "FRP Composite Manufacturing & Applications to Infrastructure" Workshop Presented at ICEMT, India.
13. Majjigapu, P.K.R., **GangaRao, H.V.S.**, and Vijay, P.V. (2013). "Determine Structures where FRP Wraps would be Beneficial." Short Course Presented to West Virginia Department of Transportation, Morgantown, West Virginia, USA.
14. Review of FRP Structural Systems for Highway Applications - ASCE WV Section (2013).

**Note: Delivered several short courses, key note presentations for ACMA, USACE, SPE, WVDOH & FHWA since 1970's.**

### ***Professional initiatives***

Published over 350 technical papers; Co-Authored two text books; Authored 5 book chapters; Produced 11 US Patents (9 approved + 2 pending approval); Graduated over 300+ students since 1969; Collaborated with several university and industry professionals across the globe for advancing the state-of-the-art of composites and infrastructure systems; Developed over 100 educational programs as key note lectures, session moderator, and chairmanship; Provided technical guidance and presentations for ASCE and SEI Student Chapters of WVU; Chair or co-Chair - Steering Committee - several international and national Conferences on FRP Composites including those at WVU; Chair, ASCE - Structural Composites and Plastics Sub-Committee; CERF-ASCE, Member; Chair, ASCE Sponsored Research on FRP Connections; Worked with several State Highway Agencies to design and help build eight FRP Bridges; Organized several Sessions for ASCE and SAMPE; Proposal and/or Review (Panel) Member for NSF; Review papers for ASCE, ACI and other professional organizations; Organized and Conducted FIVE workshops across WV on FRP Bridges; Invited speaker in US, China, and India for professional meetings; Developing Joint Tech Program with Nanjing Univ. of Technology, China; Working with various WVDOH Districts and WV - State Rail Authority to rehab several Bridges, 1999, 2000, 2014; Responsible to get "National Research Center of Excellence" Designation for WVU's Constructed Facilities Center through US Congress (2000 -2007); Chairman and Editor, Nondestructive Testing and Evaluation of Bridges," Symposium (proceedings) sponsored by ASCE STRUCTURAL CONGRESS '93 (1991-93), 1995; Chairman, First Bridge Maintenance and Rehab Conference for ASCE, TRB, IABSE, WVDOH (1980).

### **Awards & Honors**

1. "2016 Celebration of Engineering and Technology Innovation Award" to be awarded in April 2017
2. "2016 Outstanding Civil Engineer of the Year Award" from ASCE-WV Section
3. "2016 USACE Innovation of the Year Award" for Composite Wicket Gates Design and Field Implementation
4. "2016 Excellence in Teamwork" by National Association of Community Development Extension Professionals
5. "2016 Rising From the Ashes" by National Association of Community Development Extension Professionals
6. "2016-17 WVU Outstanding Merit Fellowship" for Praveen Majjigapu (Advisee & Doctoral Student)
7. "2016 Kenneth D. Gray Leadership Award" for Praveen Majjigapu (Advisee & Doctoral Student)
8. "2016 Eye Foundation of America Outstanding Leader Award" for Praveen Majjigapu (Advisee & Doctoral Student)
9. "2016 SEI Grad Student Chapter of The Year Award" for Praveen Majjigapu (Advisee & Doctoral Student)
10. "2015-16 Maurice & JoAnn Wadsworth Fellowship" for Praveen Majjigapu (Advisee & Doctoral Student)
11. "2015 USACE National Innovation of the Year Award" for East Lynn-East Fork Bridge Piling Rehab
12. "2015 Engineering Excellence Team of the Year" for East Lynn Bridge Piling Rehab, Ohio River Division
13. "2015 CAMX Outstanding Paper Award" The Composites and Advanced Materials Expo (Dallas, TX)
14. Monongalia County Elementary School Building LEED-GOLD certification by US Green Building Council for FRP Modular Panel Construction and Novel Features, Ted Shriver, Architect and Hota GangaRao & PV Vijay, WVU, 2015
15. Fellow, Structural Engineering Institute - 2014
16. NSF Graduate Fellowship for David Dittenber (Advisee & Doctoral Student), 2011-2014
17. "Distinguished Alumnus Award", April 2011, IIT-Madras, India
18. NSF Graduate Fellowship Award to David Dittenber for Industry Internship – Summer 2011
19. "American Composites Manufacturers Association Award" for "Natural Fiber Reinforced Pultruded Composites", along with BRP Inc. and 3 others, Feb 2010
20. SPE and Perkin Elma Scholarship Award for grad student, David Dittenber, 2009-2010 for Fatigue Testing and Evaluation of FRP Composites (2 years in a row)
21. NSF I/UCRC Center for the Integration of Composites into Infrastructure, July 2009
22. Three graduate students received 1st & 3rd place awards in 2 student paper categories, SAMPE, June 2007
23. "Safe Heaven Rescue Chamber," 1st place for Most Creative Application with Dr. Zondlo, GrafTech and FiberTech, ACMA, Oct 2007
24. FRP Bridges in WV, WV-PBS, April 02, 2006
25. Sigma Xi Student Award for the best paper (Mutnuri), Yr 2005
26. Cited as the CEMR Researcher of the Year for the year 1993-1994, 1992-1993 and 1990-1991
27. Cited as one of the Top Five Outstanding Researchers of CEMR since 1981 up to 2006 except during years of ineligibility (Did not apply after 2006)
28. SPE and Perkin Elma Scholarship Award for Best Paper – Brian King – May 2001
29. Special Citation from CERF - ASCE, on "Modular FRP Deck System – Super Deck," 1998
30. Best Paper award for construction of FRP Bridges with Lopez-Anido, Composites Institute – SPI, 1997
31. Best Paper Awards Graduate students (Vedam and BoyaJian) SAMPE, 1996-97
32. Best Paper, Infrastructure, the Composites Institutes 51st Annual Conference and EXPO 96, 1996, Cincinnati, OH:

- “Construction of a Multi-Cellular Fiber Reinforced Plastic Building,” along with 3 others
33. Featured on ABC Evening News as an expert on Timber Bridges (1996)
  34. Featured on CNN Headline News as an expert on FRP Composites (1992)
  35. 1990 Engineered Timber Bridge, National Award of Merit, Barlow Drive Bridge, by AITC, NFPA, 1991
  36. Benedum Distinguished Scholar Award for 1990-91, WVU.
  37. Cited as one of the top FIVE outstanding leaders for the year 1988-89 in the College of Engineering.
  38. Cited for the Best Design of Stressed Timber T-Beam Bridge at the Timber Bridge Conference, WV, 1988.
  39. J.C. Burchinal Award for Best Teacher in Civil Engineering Dept., 1985-86.
  40. “Udani’s Best Concrete Engineer Prize” for year 1983 on Innovative Design and Construction of Precast Concrete Panels with Passive Solar Devices, Institute of Engineers, 1985.
  41. “Prestressed Concrete Members under Combined Bending and Torsion,” Nominated by ASCE for T.Y. Lin Award, 1974.

### **Professional/Technical Society Membership/Involvement**

Fellow: ASCE; Member since 1968 (Student, Associate, Full, and Fellow)

Fellow: Structural Engineering Institute of American Society of Civil Engineers

Technical Advisory Member: AASHTO T6 Committee, member - steering committee on LRFD, specs.

Member: ICERP, International Technical Division (1996 - 2016)

Member: Editorial Board of Constructed Facilities Journal, ASCE

Member: ACMA, ASTM, SAMPE, SPE, ACI (former)

Chair: PIANC, Global Org, Composites Division for Hydraulic Structures (2015 - Present)

Chair: ICERP, International Technical Division (2016 - Present)

Chair: ASCE Composites Committee (2000-2008)

Chair, ASCE Structural Composites and Plastics Sub-Committee

Chair: ASTM-D20.1800 for Full Section Moduli determination for composites and member of three other subcommittees including bearing strength determination and FRP durability

Member: ASCE-Bridge Committee

Steering Committee Member: ACMA - ASCE LRFD developing code for Pultruded Structural Shapes

Chair, Member & Reviewer: SAMPE, ASCE, ACI, Composites Journal

Reviewer: Technical Proposals and Papers for several agencies and journals including National Science Foundation, ASCE Structural, ASCE Mechanics, ASCE Bridge and ASCE Constructed Facilities, ACMA, SAMPE, ACI, J. Composites, Polymer Composites Journal.

### ***WVU, Statler College, and CEE Department Committees***

Chair & Member - Selection of Endowed Chairs, Statler College

Chair & Member - Faculty Promotion and Tenure Committees

Chair - College of Engineering Faculty Council (College Senate)

Task Force - CEMR-P&T Guidelines 2014 - 2015

CEMR Distinguished Prof Search (Energy Professor) 2012 - 2015

Undergrad Curriculum Committee (CEE) 2015

Faculty Mentor (CEE) for one CEE faculty member 2015

Between 1970 - Present, chaired/served on several P&T committees, Faculty committees, Associate Provost for Research search committee, CEMR Dean’s search and other search committees.

### **Civic and Humanitarian Activities**

1. Helped achieve LEED-GOLD certification for Monongalia County Elementary School Buildings (2015)
2. Helped evaluate fire damage of Historic District at Harpers Ferry (2015)
3. Helped rehabilitate four school buildings in three different counties of West Virginia
4. Helped renovate of HRCC greater Morgantown community structure
5. Mentored several students and faculty
6. Working with several State Highway Agencies; building FRP Bridges: Since 1996
7. Organizing workshops on FRP Bridges, USA, China & India (2012-2016)
8. Sahasra Deepika Foundation, Charleston, WV 1996-2006 - Orphanage support group
9. Presentations on Infrastructure updates to Metropolitan Planning Organization, Morgantown, WV



## Research and Creative Scholarly Activity (2006 - Present)

### Research Completed or in Progress

Name	Sponsor	Date	Award (in thousands)
Inspection Walkway System Development with FRPs	WVDOH	2006	\$12
Fire Testing and Evaluation of Composite Panels	Lockheed Martin	2006	\$39
MARCEE Project - Commercialization and Workforce Development	USDOE-NETL	2007-2009	\$75
Blast Resistant Composite Barriers	USDOT-FHWA	2006-2007	\$144
Railroad Ties Using Recycled Polymers	WVDOT-DOH	2006-2008	\$117
Evaluation of Composite Materials for Railroad Infrastructure Safety Enhancements	FRA-USDOT 2005-2008		\$247
Fabrication and Mechanical Characterization of Composite Sandwich Structure	ONR	2007	\$50
Exchange of R&D Experiences on FRP Composites	NSF	2007-2008	\$30
LRFD of Pultruded Structures	ASCE-ACMA	2007-2011	\$212
Field Monitoring of Railroad Wood Bridges Using FRP	USDOT-FRA	2007-2008	\$40
Field Installation and Monitoring of FRP Panels for Pavement Rehab	WVDOH	2007-2009	\$174
Monitoring Bridges with Parallam Bridge Decks	WVDOH	2007-2010	\$224
Aging Evaluations of FRP Composites	Kazak and ICERL	2007-2009	\$80
Fatigue Characterization of Composites for CWP	Lockheed Martin	2008-2009	\$50
CICI Planning Grant	NSF	2007-2008	\$10
Thermoplastic RR Tie Development	FRA-USDOT	2008-2010	\$192
Response of Rammed Earth Structures	NSF	2008-2010	\$88
Evaluation of School Buildings in WV	WVDOE	2009	\$116
Workshop - Strengthening and Rehabilitation of Highway Structures with FRP Composites in WV	WVDOH	2009	\$5
Aging Evaluation of FRP Structures	AEP	2009-2010	\$20
Collaborative Research thru NSF IUCRC- Ctr Integration of Composites into Infrastr (CICI)	Foster Supply	2009-2010	\$15
Safehaven Analysis	Trinity Resources	2009-2011	\$40
Railroad Ties with Recycled Polymers	FRA	2009-2011	\$242
Collaborative Research thru NSF IUCRC- Ctr Integration of Composites into Infrastr (CICI)	Fiber-Tech Industries	2009-2011	\$30
Fabrication and Evaluation of CWP-O TEC	Lockheed Martin	2009-2012	\$196
Development of Manufacturing and Assembly of Pultruded Composites	USDOD-Huntington Ingalls	2009 - 2012	\$523
Collaborative Research thru NSF IUCRC-Ctr Integration of Composites into Infrastr (CICI)	Bedford Reinforced Plastics Inc	2009-2012	\$55
The Center for the Integration of Composites into	NSF	2009 -2014	\$575

Infrastructure (CICI) – NSF-IUCRC - Phase I			
Feasibility of FRP Str. Application to Lock gates	USACE	2010	\$30
Strengthening of RR bridge Piles	SBVR-WVDOH	2010 - 2011	\$56
Green School Wall Panel	Mon County Schools	2010-2011	\$40
Railroad Ties with Recycled Polymers	FRA	2010-2012	\$242
Collaborative Research thru NSF IUCRC- Ctr Integration of Composites into Infrastr (CICI)	Creative Pultrusions	2010 –2013	\$41
Natural Fiber Composites	NSF - Fellowship	2010-2013	\$122
Dynamic Characterization of Army Bridges, Phase 1 and 2	US Army and Erallo	2010-2013	\$344
Madison Avenue Bridge Rehab with FRP	WVDOH	2010-2014	\$131
Collaborative Research thru NSF IUCRC- Ctr Integration of Composites into Infrastr (CICI)	Beijing Huade Creation Env Protec Equip Co	2011-2012	\$154
Cardinal Unit 3 Cooling Tower –Cracked FRP Column Investigation	AEP	2011-2012	\$56
FRP Wrap Applications for WVDOH Bridges –Phase 1: RP 270	WVDOH	2011-2013	\$220
IUCRC Collaborative Research: Durability and Life Cycle Performance of Pultruded and Infused FRPs for Infrastructure (jointly with NCSU)	NSF 2012	–2014	\$200
Collaborative Research thru NSF IUCRC-Ctr Integration of Composites into Infrastr (CICI)	NSF/US Army Corps of Engineers	2012 –2013	\$374
Collaborative Research thru NSF IUCRC- Ctr Integration of Composites into Infrac(CICI)	Erallo Technologies Inc	2012 –2013	\$36
Collaborative Research thru NSF IUCRC- Ctr Integration of Composites into Infrastr (CICI)	Shanghai Bohong	2012-2013	\$15
International Workshop on Aging of Composites	FHWA	2013-2014	\$68
Load Testing and Recommended Repairs for Dailey Branch Bridges	WVDOH-SRA	2013-2014	\$120
Advancement of Intrinsically Locatable Plastic Materials	USDOT-PHMSA	2015-2017	\$299
CICI - NSF - IUCRC - Phase II + REV & RET	NSF	2014-2019	\$528
Innovation Managing Director for CICI	NSF	2015 - 2018	\$600
Rammed Earth – Alaskan Housing Authority & HUD		2015-2017	\$94
CICI - Shanghai - Bohong	Bohong	2014-2016	\$15
CICI - Shanghai - Genius	Genius	2015-2016	\$15
Composite Wraps for WV Bridges	WVDOH	2013-2018	\$328
LTRC - Timber Bridges	LTRC	2015-2017	\$150
Durability USACE - NSF	NSF	2016-2018	\$115
Thermoplastic Bridge Response USDOD-NSF	NSF	2016-2018	\$46.7
Army Guidance USDOD-NSF	NSF	2015-2017	\$46.7