

## ***Federico (“Fred”) Aguayo, Ph.D.***

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**Assistant Professor**, University of Washington – Department of Construction Management  
**Adjunct Assistant Professor**, University of Washington – Department of Civil and Environmental Engineering  
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### **Profile**

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Assistant Professor with a strong research background in characterizing chemical deterioration processes in concrete and developing performance methods and sustainable solutions for enhancing concrete performance. Involved in numerous projects focusing on durability-related issues in cement-based materials such as corrosion, carbonation, sulfate attack, alkali aggregate reactivity, and early-volume change. Experience in performing multi-scale testing including laboratory and field evaluations, as well as field instrumentation and monitoring of pavement and bridge structures. Primary research efforts have been in designing and developing experimental tools related to durability, hydration and microstructural development, and early-age volume change of cementitious systems for characterizing and predicting concrete performance.

### **Education**

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**Ph.D., Civil Engineering;** (Infrastructure Materials Engineering Specialization); University of Texas at Austin, May 2016, Dissertation: Sulfate Attack of Concrete: An Accelerated Test Method, Mechanisms, and Mitigation Techniques, *Supervisor: Kevin J. Folliard*

**M.S., Civil Engineering;** (Structural and Infrastructure Materials Engineering Specialization); University of Texas at Austin, December 2012, Report: Development of a Scientific Network towards a Unified Performance Approach Specification for Concrete Durability, *Supervisor: Kevin J. Folliard*

**B.S., Civil Engineering;** The University of Texas at Austin, May 2011

### **Professional Experience**

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University of Washington	Adjunct Assistant Professor (CEE)	Jan 2022 – Present
University of Washington	Assistant Professor (CM)	Sept 2021 – Present
Sellen Construction	Project Engineer – Intern	June 2022 – Sept 2022
Texas State University	Assistant Professor	Sept 2016 – Aug 2021
University of Texas at Austin	Post-Doctoral Fellow	May 2016 – Aug 2016
University of Texas at Austin	Graduate Research Assistant (Ph.D.)	Dec 2012 – May 2016
University of Texas at Austin	Graduate Teaching Assistant	Jan 2012 – May 2015
University of Texas at Austin	Graduate Research Assistant (M.S.)	May 2011 – Dec 2012
University of Texas at Austin	Undergraduate Research Assistant	Aug 2010 – May 2011
Georgia Institute of Technology	Undergraduate Research Assistant	May 2010 – Aug 2010
University of Texas at Austin	Undergraduate Research Assistant	Aug 2009 – May 2010
Texas Commission on Environmental Quality (TCEQ)	Engineering Intern	June 2009 – Dec 2009

## Research Interest

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- ❖ Durability of sustainable and alternative cement-based materials (ACMs)
- ❖ Alternative supplementary cementing materials (SCMs) and more effective utilization of locally available materials in concrete
- ❖ Application of rapid setting and novelty cements for accelerated infrastructure construction
- ❖ Developing and improving durability performance methods and specification for cement and concrete
- ❖ Implementation of emerging technologies and advanced sensing systems in construction for multi-scale characterization and modeling of infrastructure materials
- ❖ Long-term performance and structural health monitoring of infrastructure systems

## Honors and Awards

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- ❖ Texas State University Favorite Professor Award, Alpha Chi National College Honor Society, 2020
- ❖ Society of Hispanic Professional Engineers, Faculty Development Institute (FDI) Participant, SHPE National Convention, Phoenix, October 2019
- ❖ NSF Leverage Summer Institute (FDI) travel award, Dallas, July 2018
- ❖ Society of Hispanic Professional Engineers, Faculty Development Institute (FDI) Participant, SHPE National Convention, Kansas City, November 2017
- ❖ Program for Excellence in Teaching and Learning, Texas State University, 2017
- ❖ PCA Professor's Workshop Stipend Award, Interlocking Concrete Pavement Institute (ICPI) 2016
- ❖ Society of Hispanic Professional Engineers (SHPE) Dissertation Scholarship, 2015 (\$5,000)
- ❖ Ph.D. Kolodzey Grant for travel to American Concrete Institute Convention to present "Natural Carbonation of Concrete Mixtures using Supplementary Cementitious Materials in Austin, TX", Kansas City, MO, 2015 (\$1,000)
- ❖ Portland Cement Association Education Foundation Research Fellowship, "An accelerated test method to determine the resistance of concrete to external sulfate attack", 2013 (\$20,000)
- ❖ American Concrete Institute Central Texas Chapter Scholarship, 2012 (\$2,000)
- ❖ Precast/Prestressed Concrete Institute (PCI) Engineering Design Competition - Big Beam Contest National Champions, 2012 (\$1,500)
- ❖ American Concrete Institute Foundation Fellowship Program – Finalist, 2012
- ❖ Equal Engineering Opportunity (EOE) Academic Leader Hall of Fame, 2011 (\$500)
- ❖ National Science Foundation (NSF) Louis Stokes Alliances for Minority Participation Program (LSAMP) Travel Grant, Science in Society International Conference, Madrid, Spain, 2011
- ❖ Hispanic Engineer National Achievement Awards Corporation (HENAAC) Great Minds in STEMS Scholarship, 2010 (\$1,500)
- ❖ Featured in Hispanic Engineer National Achievement Awards Corporation (HENAAC) Great Mind in STEMS issue of Hispanic Scholars, 2010
- ❖ Faulkner Brothers Endowed Scholarship, 2010
- ❖ University of Texas, Student Engineering Council Poster Competition – Honorable Mention, 2010
- ❖ Department of Civil Engineering, Architectural and Environmental Engineering Scholarship, 2009
- ❖ Raul Field-Escandon Civil Engineering Scholarship, 2009
- ❖ Bechtel Corporation Diversity Scholarship, 2009
- ❖ President's Achievement Scholarship, 2007

## Students Advised

### Ph.D Supervisor – Current

<i>Name</i>	<i>University</i>	<i>Department</i>	<i>Thesis/Report Title</i>	<i>Date</i>
Daniel Akerele	University of Washington	Construction Management	TBD	09/2022 – Present
Okechi Ikechuku Kingley	Texas State University	Material Science, Engineering and Commercialization	Durability and Mechanical Performance of Rapid Setting Hydraulic Cements (RSHC)	09/2019 – Present

### M.S. Supervisor

<i>Name</i>	<i>University</i>	<i>Department</i>	<i>Thesis/Report Title</i>	<i>Date</i>
Deep Kotadiya	Texas State University	Engineering Technology	Mechanical Properties and Early-age Volume Change of Rapid Setting Hydraulic Cements (RSHC)	01/2020 – Dec 2021
Laura Velandia	Texas State University	Engineering Technology	ASR and DEF Assessment of Rapid Setting Hydraulic Cements (RSHC)	01/2020 – August 2021
Sushitha Mercy Joseph Prabhakar	Texas State University	Engineering Technology	An accelerated method for sulfate attack of concrete	09/2018 – 08/2020
Okechi Ikechuku Kingley	Texas State University	Engineering Technology	Alkali silica reactivity of blended fly ash systems	08/2017 – 08/2019
Omkar Thombare	Texas State University	Engineering Technology	The role of relative humidity and CO <sub>2</sub> concentration of high volume fly ash concrete mixes	09/2018 – 08/2019
Krushika Lokhande	Texas State University	Engineering Technology	Accelerated carbonation of concrete	01/2018 – 05/2019
Anup Sarnot/M.S.T	Texas State University	Engineering Technology	Natural Carbonation of Concrete	01/2017 – 12/2017

### Committees Served

<i>Name</i>	<i>University</i>	<i>Department</i>	<i>Dissertation</i>	<i>Date</i>
Mohammed Tijani (Ph.D.)	Texas State University	Material Science, Engineering and Commercialization	Improving the sustainability of alternative cementing binders through the addition of supplementary cementing materials (SCMs)	09/2021 – Present
Debo Argha (M.S.)	Texas State University	Engineering Technology	Characterizing the influence set-control admixtures in Rapid Setting Hydraulic Cements (RSHC)	09/2021 – Dec 2022
Mehrab Nodehi (M.S.)	Texas State University	Civil Engineering	Mechanical properties and cracking potential of alkali-	09/2020 – Spring

			activated materials containing waste glass powder	2022
Mohammed Tijani (M.S.)	Texas State University	Civil Engineering	Development of Sustainable Lightweight Concrete with High-Volume Fly Ash	08/2019 – 08/2021
Mithill Mazumder (Ph.D.)	Texas State University	Material Science, Engineering and Commercialization	Characterization of crack sealant materials and implementation techniques	01/2017 – 05/2019
Ahmed Wajahat Ali (M.S.)	Texas State University	Engineering Technology	Multiple stress creep recovery (MSCR) characterization of polymer modified asphalt binder containing wax additives	01/2017 – May 2018
Ben Lugo (M.S.)	Texas State University	Engineering Technology	Effect of communication channels on contractor collaboration	05/2017 – 12/2017
Chizitelu Modebelu (M.S.)	Texas State University	Engineering Technology	Ultra-high strength concrete with waste foundry sand	01/2017 – May 2017
Sarah McMaster (M.S.)	Texas State University	Engineering Technology	Developing a predictive model for the void content of pervious concrete	01/2017 – May 2017

### **Undergraduate Research Student Supervision**

<i>Name</i>	<i>Research Project Title</i>	<i>Date</i>
Paola Huynh	Development of Sustainable Rapid Setting Hydraulic Cements (RSHC)	12/2020 – Present
Damini Gopal	Development of Sustainable Rapid Setting Hydraulic Cements (RSHC)	03/2020 - Present
Brandon Holt Chenault	Developing Maturity Models for Rapid Setting Hydraulic Cements (RSHC)	08/2020 – 05/2021
Teague Hartigan	Carbonation-induced corrosion of high-volume SCM concrete	04/2019 – 04/2021
John Paul San Miguel	Evaluating the coefficient of thermal expansion (CoTE) of Texas coarse aggregates	09/2018 – 05/2019
Maria Valdez	ASR Durability of blended fly ash concrete systems	05/2018 – 05/2019
Dezmond Davis	Effect of accelerated carbonation on high volume fly ash concrete mixes	05/2018 – 12/2018
Olvin Funez	Developing an accelerated performance test for sulfate resistance of cement-based systems	05/2017 – 12/2018
Brent Vant Land	Durability performance of high strength and ultra high strength concrete	05/2017 – 09/2018
Charles Sorg	Evaluating the coefficient of thermal expansion(CoTE) of Texas coarse aggregates	05/2017 – August

		2017
Kady Williams	Evaluating the coefficient of thermal expansion(CoTE) of Texas coarse aggregates	01/2017 – May 2017
Thomas Bailey	Durability performance of high strength concrete with waste foundry sand	09/2016 – May 2017
Hunter Robb	Durability performance of high strength concrete with waste foundry sand	09/2016 – May 2017
Raul Olvera	Evaluation of the effect of gypsum addition on the sulfate resistance of high-calcium fly ash mortars	08/2015 – 05/2016
Jessica Milligan	Evaluation of the effect of gypsum addition on the sulfate resistance of high-calcium fly ash mortars	08/2015 – 05/2016
Sofia Alarcon	Performance of mortar bars under sulfate attack using accelerated method	01/2015 – 05/2015
Victoria Ibarra	Durability of Calcium Aluminate Cements	08/2014 – 12/2014
Adrian Terrazas*	Accelerated test method for evaluating sulfate attack	05/2014 – 08/2014
John Van Hoosier	Accelerated test method for evaluating sulfate attack	01/2012 – 08/2012
Drew Johnson	Natural Carbonation of Concrete	08/2011 – 12/2011

(\* Louis Stokes Alliance for Minority Participation (LSAMP) Summer Research Academy Participant)

### **Personal Research Project Leaderships**

<i>Name</i>	<i>University</i>	<i>Thesis/Report Title</i>	<i>Date</i>
Aguayo, F.M.	University of Texas at Austin	External Sulfate Attack of Concrete: An accelerated test method, mechanisms, and mitigation techniques (PCA)	01/2013 – 05/2016
Aguayo, F.M./ M.S.	University of Texas at Austin	Development of a Scientific Network Towards a Performance Approach Specification (LafargeHolcim)	08/2011 – 12/2012
Aguayo, F.M.*	University of Texas at Austin	TxDOT 0-6813, Evaluation of ASTM C494 for precast concrete, Raissa P. Ferron (PI)	08/2013 – 12/2014
Aguayo, F.M.*	University of Texas at Austin	TxDOT 0-6723, Development of rapid, cement-based repair materials for transportation structures, Kevin J. Folliard (PI)	08/2011 – 05/2013
Aguayo, F.M.*	University of Texas at Austin	Portland Cement Association, An Accelerated test method to determine the resistance of concrete to external sulfate attack, Kevin J. Folliard (Co-PI)	08/2013 – 05/2016
Aguayo, F.M.*	University of Texas at Austin	Lafarge Inc., Durability specifications for concrete, Kevin J. Folliard (Co-PI)	08/2011 – 05/2013
Aguayo, F.M.*	University of	Kerneos Aluminate Technologies, Multi-Scale	08/2009 –

	Texas at Austin	characterization, implementation, and monitoring of calcium aluminate cement based-systems, Kevin J. Folliard (PI)	08/2011
Aguayo, F.M.*	Georgia Institute of Technology	GDOT, A forensic investigation on chemical, physical, and biological degradation mechanisms in coastal concrete piles, Kimberly E. Kurtis (PI), Brett Holland (PhD Mentor)	05/2010 – 08/2010

(\* denotes other research project involvement/leadership)

## Publications

### Peer-Reviewed Journal Articles

1. Aguayo, F., Okechi, I.K., Torres, A., Nodehi, M., “Influence of relative humidity and CO<sub>2</sub> concentration on the carbonation of alternative cementitious binders,” *Under Review*
2. Aguayo, F., Okechi, I.K., Torres, A., Nodehi, M., “Compressive strength and alkali silica reactivity of blended class C and class F fly ashes,” *Under Review*
3. Villarreal, R., Torres, A., **Aguayo, F.**, Moro, C., “An alternative test method for determining hardened air void parameters for concrete pavement,” *Journal of Civil Engineering and Construction*, 2023, 12(1), 19-39. <https://doi.org/10.32732/jcec.2023.12.1.19>
4. **Aguayo, F.**, M. Nodehi, “Deterioration of mortar bars using binary and ternary mixtures immersed in sodium sulfate solutions,” *Ceramics*, vol. 5, 2022, 991-1008. <https://doi.org/10.3390/ceramics5040071>
5. Villarreal, R., Torres, A., **Aguayo, F.**, Moro, C., “Assessing the degree of polish and hardened concrete air void parameters,” *Journal of Civil Engineering and Construction*, 2022, 11(4), 177-188. <https://doi.org/10.32732/jcec.2023.11.4.177>
6. Nodehi, M., **Aguayo, F.**, Nodehi, S.E., Gholampour, A., Ozbakkaloglu, T., Gencel, O., “Durability properties of 3D printed concrete (3DPC),” *Automation in Construction*, vol. 142, 2022. <https://doi.org/10.1016/j.autcon.2022.104479>
7. Mohammed, T., **Aguayo, F.**, Nodehi, M., Ozbakkaloglu, T., “Engineering properties of structural lightweight concrete containing expanded shale and clay with high volume class F fly ash,” *Structural Concrete*, 2022. <https://doi.org/10.1002/suco.202200562>
8. Anahita, E., Hos Narayan, S., **Aguayo, F.**, Seyedmeysam, K., “Experimental investigations and empirical modeling of rubber wear on concrete pavement,” *Journal of Engineering Tribology*, vol. 237, 2022, <https://doi.org/10.1177/13506501221104290>
9. Okechi, I.K., **Aguayo, F.**, Torres, A., “Coefficient of thermal expansion of concrete produced with recycled concrete aggregates,” *Journal of Civil Engineering and Construction*, 2022, 11(2), 65-74. <https://doi.org/10.32732/jcec.2022.11.2.65>
10. Nodehi, M., **Aguayo, F.**, “Ultra high performance and high strength geopolymer concrete,” *Journal Building Pathology and Rehabilitation*, 2021, 6(1), 1-29. <https://doi.org/10.1007/s41024-021-00130-5>
11. Torres, A., **Aguayo, F.**, Allena, S., Ellis, M., “The effects of various polynaphthalene sulfonate based superplasticizers on the workability of reactive powder concrete,” *Journal of Building Material Science*, 2021, 2(1), 24-29. <https://doi.org/10.30564/jbms.v2i1.2731>

12. **Aguayo, F.**, Torres, A, Kim, Y.J., Thomabare, O, “Accelerated carbonation assessment of high-volume fly ash concrete,” *Journal of Material Sciences and Chemical Engineering*, Vol. 8 No.3 (2020): DOI:10.4236/msce.2020.83002
13. Torres, A., **Aguayo, F.**, Gaedicke, C., Nerby, P., Cavazos, M., Nerby, C., (2020) “Developing High Strength Pervious Concrete Mixtures with Local Materials,” *Journal of Materials Science and Chemical Engineering*, 8, 20-34. DOI: 10.4236/msce.2020.81003.
14. Torres, A., **Aguayo, F.**, Allena, S., Ellis, M. “Investigating the rheological properties of ultra high strength concrete made with various superplasticizers,” *Advances in Sciences and Engineering*, Vol. 11 No. 2 (2019): DOI:10.32732/ase.2019.11.2.95.
15. Torres, A., **Aguayo, F.**, Allena, S., Modubelu, C., “Mechanical Properties of Ultra High Performance Fiber Reinforced Concrete with Foundry Sand” *Journal of Civil Engineering and Construction*, Vol. 8 No. 4 (2019): DOI:10.32732/jceec.2019.8.4.157
16. Huy Vu H., Pham G., Chonier, A., Brouard E., Rahnarajan S., Pillai, R., Gettu R., Santhanam M., **Aguayo F.**, Folliard K.J., Thomas M.D., Moffat T., Shi, C., Sarnot A., “Impact of different climates on the resistance of concrete to natural carbonation,” *Construction and Building Materials*, Vol. 216 No. 20 (2019): 450-467 DOI:10.1016/j.conbuildmat.2019.04.263
17. **Aguayo, F.**, Drimalas, T., and Folliard, K.J., “An Accelerated Test Method to Evaluate Cementitious Mixtures Subjected to Chemical Sulfate Attack,” *Advances in Civil Engineering Materials*, no. 1 (2019): 190–206, <https://doi.org/10.1520/ACEM20180099>
18. Torres, A., **Aguayo, F.**, Allena, S., “Developing sustainable ultra high strength concrete mixtures using spent foundry sand,” *Journal of Civil Engineering and Architecture*, Vol. 13 (2019): 343-352 DOI:10.17265/1934-7359/2019.06.001
19. **Aguayo, F.**, Torres, A., Talamini, T., and Whaley, K., “Investigation into the heat of hydration and alkali silica reactivity of sustainable ultra-high strength concrete with foundry sand,” *Advances in Materials Science and Engineering*, Vol. 2017, Article ID 2096808 (2017). <https://doi.org/10.1155/2017/2096808>
20. **Aguayo, F.**, Drimalas, T., Folliard, K.J., “Sulfate resistance of mortar Bars in calcium, magnesium, and sodium sulfate using a vacuum impregnation technique,” *ACI Special Publications (SP 317-10)*, 10.1-10.2, 2017
21. **Aguayo, F.**, Drimalas, T., Folliard, K.J., “Natural carbonation of concrete,” *ACI Special Publications (SP-305-2)*, 2.1-2.12, 2015

### **Refereed Conference Proceedings**

1. **Aguayo, F.**, Torres, A., Thomabare, O., Drimalas, T. “Evaluating carbonation-induced corrosion in high-volume SCM mixtures through the square root model,” *Proceeding of the International Conference on Sustainable Production and Use of Cement and Concrete*, RILEM Bookseries, Vol. 22 Villa Clara, Cuba, June 23-30, 2019
2. Torres, A., **Aguayo, F.**, Srinivas, A., Modebelu, C., “Mechanical Properties of Ultra High Strength Concrete with Foundry Sand,” *Proceeding of the International Conference on Sustainable Production and Use of Cement and Concrete*, RILEM Bookseries, Vol. 22 Villa Clara, Cuba, June 23-30, 2019

3. **Aguayo, F.**, Funez, O.J., Drimalas, T., Folliard, K.J., Lute, R.D., “An alternative method to evaluate the sulfate resistance of cementitious binders,” External Sulfate Attack – Field Aspects and Lab Test. RILEM Bookseries, Vol. 21, Madrid, Spain, May 23-25, 2018
4. **Aguayo F.**, Drimalas, T., Folliard, K.J., “Performance of various mixtures in calcium, magnesium, and sodium sulfate using a vacuum impregnation technique,” ACI Committee 201 Special Publications: Sulfate Attack on Concrete: A Holistic Perspective, American Concrete Institute National Convention, October 23-27, 2016, Philadelphia, PA
5. **Aguayo, F.**, Drimalas, T., Folliard, K.J., “Natural Carbonation of Concrete,” 1<sup>st</sup> ACI Special Publications SP-305–2 International Workshop on Durability and Sustainability of Concrete Structures, October 1-3, 2015, Bologna Italy

### **Non-Refereed Conference Proceedings**

1. **Aguayo, F.**, Huang, Y., Michael, D.A.T., Drimalas, T., Folliard, K.J., “Effect of Environmental Conditions on the Propagation of Natural Carbonation,” The Corvallis Workshops: Service Life Predictions, Corvallis, OR, July 16-19, 2017
2. **Aguayo, F.**, Bentivegna, A.F., Folliard, K., “Characterization of Early-age Behavior of Calcium Aluminate Cement-based Systems with Limestone Filler Using Isothermal Calorimetry and Mechanical Strength Development,” Society of Hispanic Professional Engineer (SHPE) National Conference, October 27, 2011, Anaheim, CA

### **Other Publications/Articles**

1. Holland, B.R., Kurtis, K.E., Moser, R.D., Kahn, L.F., **Aguayo, F.**, Singh, P.M. “Multiple Deterioration Mechanisms in Coastal Concrete Piles: A forensic case study” Concrete International (CI) Magazine

### **Technical Report**

1. Holland, B.R., Kurtis, K.E., Moser, R.D., Kahn, L.F., **Aguayo, F.**, Singh, P.M. “Multiple Deterioration Mechanisms in Coastal Concrete Piles: A forensic case study” Concrete International (CI) Magazine

### **Papers in Preparation (In order of most progress)**

1. **Aguayo, F.**, Torres, A., Kingley, O.I., Nodehi, M.Valdez, M., “Alkali silica reactivity of fly ash produced from blended coal sources,” Planned submission to Construction and Building Materials Journal
2. **Aguayo, F.**, Torres, A., Kingley, O.I., Davis, D. Valdez, M., “Investigation on the early hydration of blended fly ash systems,” Planned submission to Construction and Building Materials Journal
3. **Aguayo, F.**, Torres, A. Thomabare, O., Davis, D. Valdez, M., “The role of relative humidity on accelerated carbonation of novel alternative cementitious materials (ACMs),” Planned submission to Advances in Civil Engineering Materials Journal

### **Professional Presentations**

1. **Aguayo, F.**, “Alternative Cements (And Other Powders),” Sellen Construction, September 2022
2. **Aguayo, F.**, Torres, A., Okechi, I.K., Nodehi, M., “Carbonation and Chloride Induced Corrosion in Novel rapid Hardening Cements,” International Materials Research Congress, August 2022



3. **Aguayo, F.**, Okechi, I.K., Torres, A. “Influence of Relative Humidity and CO<sub>2</sub> Concentration on the Carbonation of Alternative Cementitious Binders,” The Corvallis Workshops, June 2022
4. **Aguayo, F.**, Okechi, I.K., “Evaluation of Carbonation in Concrete Produced using Rapid Hardening Binders,” American Concrete Institute (ACI) Research in Progress, October 2021
5. **Aguayo, F.** Torres, A., Prabhakar, M., Drimalas, T., “An Accelerated Method for Determining Sulfate Resistance of Cement-Based Systems,” Tran-SET Conference, Virtual Conference, September 2020
6. **Aguayo, F.**, Kinglsey O.I., Torres, A. “Hydration Reactivity and Kinetics of Blended Fly Ash Systems”, Calmetrix Austin Applications Conference, Austin, Texas, May 2020
7. Torres, A., **Aguayo, F.** “Investigating the Impact of Foundry Waste on the Mechanical Performance of Self Consolidating Concrete,” American Concrete Institute Fall National Convention, Session: Concrete with Recycled Materials, Cincinnati, OH, October 23<sup>rd</sup>, 2019
8. **Aguayo, F.** Torres, A., Prabhakar, M., Drimalas, T., “An Alternative Approach to Evaluating Sulfate Resistance of Cement-Based Systems,” ACI Houston Chapter – Concrete Symposium, Houston, Texas, July 17th, 2019
9. **Aguayo, F.**, “Using Isothermal Calorimetry to Evaluate Early-Age Reactivity of Calcium Aluminate Cements (CACs)”, Calmetrix Austin Applications Conference, Austin, Texas, May 16-17, 2018
10. **Aguayo, F.**, Funez, O.J., Drimalas, T., Folliard, K.J., Lute, R.D., “An alternative method to evaluate the sulfate resistance of cementitious binders,” RILEM TC-251 External Sulfate Attack – Field Aspects and Lab Test, Madrid, Spain, May 23-25, 2018
11. **Aguayo, F.**, Torres, A., “Hydration and Alkali Silica Reaction Performance of Ultra High Strength Concrete with Foundry Sand” Agriculture, Civil, Environmental & Biological Engineering Session- Keynote Speaker, Society of Hispanic Professional Engineers (SHPE) National Conference, Kansas City, November 2017
12. **Aguayo F.**, Huang, Y., Michael, D.A.T., Drimalas, T., Folliard, K.J., “Effect of Environmental Conditions on the Propagation of Natural Carbonation,” The Corvallis Workshops – Service Life Prediction of Concrete, Corvallis, OR, July 16, 2017
13. **Aguayo F.**, Drimalas, T., Folliard, K.J., “Performance of various mixtures in calcium, magnesium, and sodium sulfate using a vacuum impregnation technique,” Fall American Concrete Institute National Convention, Session: Sulfate Attack on Concrete: A Holistic Perspective, Philadelphia, PA, October 23-27, 2016
14. Drimalas, T., Lowe, T.E., **Aguayo, F.**, Folliard, K.J., “Laboratory and Field Evaluations on Physical Salt Attack,” Fall American Concrete Institute National Convention, Session: Sulfate Attack on Concrete: A Holistic Perspective, Philadelphia, PA, October 23-27, 2016
15. **Aguayo, F.**, Drimalas, T., Folliard, K.J., “Natural Carbonation of Concrete Mixtures using Supplementary Cementitious Materials in Austin, TX,” Spring ACI Convention, Session: Research in Progress, April 13, 2015, Kansas City, MO
16. **Aguayo, F.**, Drimalas, T., Folliard, K.J., “An Accelerated Test Method for Evaluating the Performance of Various Mixtures Susceptible to Chemical Sulfate Attack,” Fall ACI Convention, Session: Open Paper, October 28, 2014, Washington, D.C.

17. **Aguayo, F.**, Drimalas, T., Folliard, K.J., “An Accelerated Test Method for Evaluating the Sulfate Resistance of Concrete,” The Corvallis Workshops, 2<sup>nd</sup> – Characterization Tools to Assess Performance of Cement-Based Materials, July 16, 2014 Corvallis, OR
18. **Aguayo, F.**, Bentivegna, A.F., Folliard, K.J., “Characterization and Development of a Paste and Mortar Isothermal Calorimeter for Calcium Aluminate Cement,” 5<sup>th</sup> Advances in Cement-Based Materials, July 8, 2014 Cookeville, TN
19. **Aguayo, F.**, Drimalas, T., Folliard, K., “Characterizing the Disconnect Between Laboratory and Field Performance of External Sulfate Attack What does ASTM C1012 tell us?,” American Concrete Institute Convention, October 17, 2011 Anaheim, CA
20. Bentivegna, A.F., **Aguayo, F.**, Zuniga, J. R., “Effect of Limestone Filler on Calcium Aluminate Cement Hydration and Early-Age Volume Change.” The American Ceramic Society - 2nd Advances in Cement-Based Materials, Nashville, Tennessee. July, 2011
21. Bentivegna, A.F., **Aguayo, F.**, “Using Isothermal Calorimetry to Evaluate Hydration of Calcium Aluminate Cement Based Systems.” The American Ceramic Society - Advances in Cement-Based Materials, West Lafayette, Indiana. July 15, 2010

### **Poster Presentations**

1. Valdez, Maria, **Aguayo, F.**, Ikechukwu, O. “Alkali Silica Reactivity of Blended Class C and Class F Fly Ash System,” Women in Science and Engineering (WiSE) Expo, March 8, 2019, San Marcos, TX
2. **Aguayo, F.**, Drimalas, T., Folliard, K.J., “Natural Carbonation of Concrete Mixtures using Supplementary Cementitious Materials in Austin, TX,” Spring ACI Convention, Session: Research in Progress, April 13, 2015, Kansas City, MO
3. **Aguayo, F.**, Drimalas, T., Folliard, K.J., “An Accelerated Test Method for Evaluating the Performance of Various Mixtures Susceptible to Chemical Sulfate Attack,” Fall ACI Convention, Session: Open Paper, October 28, 2014, Washington, D.C.
4. **Aguayo, F.**, Drimalas, T., Folliard, K.J., “An Accelerated Test Method for Evaluating the Sulfate Resistance of Concrete,” The Corvallis Workshops, 2<sup>nd</sup> – Characterization Tools to Assess Performance of Cement-Based Materials, July 16, 2014 Corvallis, OR
5. **Aguayo, F.**, Bentivegna, A.F., Folliard, K.J., “Characterization and Development of a Paste and Mortar Isothermal Calorimeter for Calcium Aluminate Cement,” 5<sup>th</sup> Advances in Cement-Based Materials, July 8, 2014 Cookeville, TN
6. **Aguayo, F.**, Drimalas, T., Folliard, K., “Characterizing the Disconnect Between Laboratory and Field Performance of External Sulfate Attack What does ASTM C1012 tell us?,” American Concrete Institute Convention, October 17, 2011 Anaheim, CA
7. Bentivegna, A.F., **Aguayo, F.**, Zuniga, J. R., “Effect of Limestone Filler on Calcium Aluminate Cement Hydration and Early-Age Volume Change.” The American Ceramic Society - 2nd Advances in Cement-Based Materials, Nashville, Tennessee. July, 2011
8. Bentivegna, A.F., **Aguayo, F.**, “Using Isothermal Calorimetry to Evaluate Hydration of Calcium Aluminate Cement Based Systems.” The American Ceramic Society - Advances in Cement-Based Materials, West Lafayette, Indiana. July 15, 2010

**Invited Presentations**

1. **Aguayo, F.**, “Sulfate Attack on Concrete,” The Corvallis Workshops, June 2022
2. **Aguayo, F.**, “Five Things You Can Do to Enhance Your Concrete Durability,” National Precast Concrete Association, Precast Show, March, 2020 Ft. Worth, Texas, February 2020, Austin, Texas
3. **Aguayo, F.**, “Rapid Setting cements for Structural Applications,” ACI Central Texas Professional Chapter Monthly Meeting, February 2020, Austin, Texas
4. **Aguayo, F.**, “Fundamentals of Concrete Durability,” Concurso Nacional De Diseno De Mezclas De Concreto, May 2018, Toluca, Mexico (Presentation done in Spanish)
5. **Aguayo, F.**, “Sustainability of Concrete for Infrastructure,” ASCE Continuing Education Conference: Designing a Resilient Central Texas, April 2018, Austin, TX
6. **Aguayo, F.**, Drimalas, T., Folliard, K., “Sulfate Resistance of Concrete: Development of a New Test Method,” ACI Central Texas Chapter Meeting, March 13, 2014 Austin, TX
7. **Aguayo, F.**, “Fundamentals of Research,” Texas Research Experience Roundtable Discussions, October 16, 2013, University of Texas at Austin, Austin, TX
8. **Aguayo, F.**, “What to Include in your Lab Notebook?,” Texas Research Experience Roundtable Discussions, October 12, 2011, University of Texas at Austin, Austin, TX

**Grants and Contracts (External Total \$1.51M, Internal Total \$18K)**

<i>Principal Investigator</i>	<i>Other Investigators</i>	<i>Project Title</i>	<i>Funding Agency</i>	<i>Grant Total</i>	<i>Grant Period</i>
F. Aguayo		TxDOT Inter-Agency Contract (IAC), Evaluating the Coefficient of Thermal Expansion (CTE) of Texas Coarse Aggregates	Texas Department of Transportation (TxDOT)	\$200,000	Dec 2016 – Dec 2018
F. Aguayo*		Durability Testing of Sustainable High Strength Concrete	Texas State Research Enhancement Program	\$16,000	Jan 2017 – May 2018
F. Aguayo		Evaluating Limestone Cements Containing Greater than 15% Limestone - ASTM C666 Standard Test Method for Resistance of	External Service Contract – UT-Austin and Texas State	\$2,165	Oct 2017 – Aug 2018

		Concrete to Rapid Freezing and Thawing			
F. Aguayo*		Accelerated Sulfate Testing of Concrete	Undergraduate Research Fellowship – Texas State University	\$1,000	Jan 2018 – May 2018
A. Torres	F. Aguayo, Y.J. Kim, J. Wilde	Developing Sustainable High Strength Concrete Mixtures	Concrete Industry Management (CIM) Patrons Board	\$50,000	May 2019 – Aug 2019
F. Aguayo		TxDOT Inter-Agency Contract (IAC), Evaluating the Coefficient of Thermal Expansion (CTE) and Alkali Silica Reactivity of Texas Coarse Aggregates	Texas Department of Transportation (TxDOT)	\$200,000	Jan 2019 – Jan 2021
F. Aguayo		Coefficient of Thermal Expansion (CTE)	External Service Contract – Private Industry	\$19,188	March 2019 – Aug 2019
F. Aguayo	J. Schemmel E. Humphries	Use of Rapid Setting Hydraulic Cements (RSHC) for Structural Applications	Texas Department of Transportation (TxDOT)	\$465,000	June 2019 – May 2022
F. Aguayo		Evaluation of Stabilization of Gypsiferous Soils for Concrete Pavements	Cement Council of Texas	\$10,000	Jan 2020 – Dec 2020
F. Aguayo*		Sustainability and Rapid Setting Cements	Undergraduate Research Fellowship – Texas State University	\$970	March 2020 – Dec 2020
F. Aguayo		Bill Spitzer and Associates Inc Testing Program	External Service Contract –	\$10,040	Oct 2020 – Feb 2021

			Private Industry		
A. Torres	F. Aguayo	Enhanced Entrained Air Void System Characterization for Durable Highway Concrete	National Road Research Alliance (NRRRA)	\$120,000	Jan 2021 – Aug 2022
F. Aguayo	A. Torres K.J. Folliard	Chloride and Carbonation Induced Corrosion of Low Carbon Cements	Holcim Innovation Center	\$22,000	March 2022 – Dec 2024
A. Torres	F. Aguayo	Use of Rapid Setting Hydraulic Cements (RSHC) for Structural Applications	Texas Department of Transportation (TxDOT)	\$107,509/\$43,411(UW-share)	June 2022 – Aug 2023
C. Newtonson	F. Aguayo	Accelerated Sulfate Attack Testing for Concrete	NMDOT	\$53,000/\$5,000 (UW-share)	June 2022 – Dec 2023
F. Aguayo	T. Thonstad	Development of Rapid, Cement-Based Repair Materials for Washington Concrete Pavement Panels	Washington Department of Transportation (WSDOT)	\$200,000	Aug 2023 – July 2025
F. Aguayo	T. Thonstad	Developing a Sustainable and High-Early Strength Concrete (HESC) for Rapid Bridge Deck Overlay Preservation	Washington Department of Transportation (WSDOT)	\$100,000	Aug 2023 – July 2025

\* Denotes Internal Grant

### Grants and Contracts Under Review (External Total \$1.53M)

<i>Principal Investigator</i>	<i>Other Investigators</i>	<i>Project Title</i>	<i>Funding Agency</i>	<i>Grant Total</i>	<i>Grant Period</i>
F. Aguayo	J. Ideker	Alkali-Silica	Idaho	\$150,000	July 2023

	(Oregon State Univ)	Reaction (ASR) Mitigation Strategies with Specific Admixtures	Transportation Department (ITD)		– June 2026
K.J. Folliard (UT-Austin)	T. Drimalas (UT-Austin) F. Aguayo	Developing a Performance-Based Concrete Overlay Mix Design for Improved Resistance to Early-Age Cracking and Increased Durability	Texas Department of Transportation (TxDOT)	\$450,000	Sept 2023 – Aug 2025
D. E. Lehman	T. Thonstad F. Aguayo F. Catherine (Univ. of Minnesota)	Structural Tests of Slab-Column and Slab-Beam-Column Connections for the Champlain Towers South (NIST-RFQ-22-7301949)	The National Institute of Standards and Technology (NIST)	\$1,185,670/\$623,799 (UW-Share)	Sept 2023 – Aug 2024
C. Newton (New Mexico State Univ.)	F. Aguayo J. Stanton D. E. Lehman M. Eberhard P. M. Calvi T. Thonstad	Ultra-Durable High Performance Concrete Transportation Infrastructure (ULTRAns)	Tier 1 University Transportation Center (UTC)	\$2,000,000/\$630,000 (UW-Share)	Nov 2023 – Oct 2024
H. Wen (Washington State Univ.)	F. Aguayo	Infrastructure Northwest UniveRsity TrAnSportation CEnTer (Infra-SET)	Region 10 University Transportation Center (UTC)	\$3,000,000/\$126,406 (UW-Share)	Nov 2023 – Oct 2024

## **Teaching Experience**

### **University of Washington**

2023 – Present      CM 313, Methods and Materials I  
2022 – Present      CM 420, Temporary Structures  
2022 – Present      CM 580, Temporary Structures (Graduate)  
2022 – Present      CM 323, Methods and Materials II

### **Texas State University**

2020 – 2021      CIM 3340, Concrete Construction Systems  
2019 – 2021      CIM 4340, Concrete Problems: Diagnosis, Prevention and Dispute Resolution  
2018 – 2021      CSM 1260, Introduction to the Construction and Concrete Industry  
Summer 2017      TECH 5360, Construction Company Financial Control  
2017 – 2021      CIM 3420, Fundamentals of Concrete: Properties and Testing

2016 – 2021            TECH 5315, Engineering Economic Analysis

**University of Texas at Austin**

2016            CE 324, Properties of Civil Engineering Materials, Teaching Assistant  
2015            CE 351, Concrete Materials, Teaching Assistant  
2014            CE 393, Advance Concrete Materials, Teaching Assistant  
2014            CE 393C, Experimental Methods in Cement Chemistry, Teaching Assistant  
2013            CE 324, Properties of Civil Engineering Materials, Teaching Assistant  
2012            CE 324, Properties of Civil Engineering Materials, Teaching Assistant

**Undergraduate Student Research Mentorship**

2020            Faculty Mentor, Undergraduate Research Fellowship (URF), Damini Gopal, TxState University  
2018            Faculty Mentor, Undergraduate Research Fellowship (URF), Olvin Funez, TxState University  
2014 – 2015    Graduate Mentor, Women in Engineering (WEP) Research Experience, University of Texas at Austin  
2014            Graduate Mentor, NSF Louis Stokes Alliance for Minority Participation, University of Texas at Austin  
2013 - 2016    Graduate Mentor, Texas Research Experience (TRES), University of Texas at Austin

**Training Course Presentations**

“Fundamentals of Concrete (VIR CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Virtual Training Course, April 5, 2022.

“Concrete Durability and Troubleshooting (VIR CON 120),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Virtual Training Course, February 15, 2022.

“Fundamentals of Concrete (VIR CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Virtual Training Course, February 1, 2022.

“Fundamentals of Concrete (VIR CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Virtual Training Course, November 30, 2021.

“Concrete Durability and Troubleshooting (VIR CON 120),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Virtual Training Course, July 20, 2021.

“Fundamentals of Concrete (VIR CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Virtual Training Course, June 15, 2021.

“Fundamentals of Concrete (CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Dallas, TX, March 10, 2020.

“Concrete Durability and Troubleshooting (CON 120),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, San Antonio, TX, February 20, 2020.

“Fundamentals of Concrete (CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, San Antonio, TX, February 19, 2020

“Fundamentals of Concrete (CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Amarillo, TX, February 6, 2020.

“Fundamentals of Concrete (CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Lubbock, TX, December 16, 2019.

“Concrete Durability and Troubleshooting (CON 120),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Austin, TX, December 6, 2019.

“Fundamentals of Concrete (CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Austin, TX, December 5, 2019.

“Fundamentals of Concrete (CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Laredo, TX, March 18, 2019.

“Concrete Durability and Troubleshooting (CON 120),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Dallas, TX, March 7, 2019.

“Fundamentals of Concrete (CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Dallas, TX, March 6, 2019.

“Concrete Durability and Troubleshooting (CON 120),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Laredo, TX, February 14, 2019.

“Fundamentals of Concrete (CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, El Paso, TX, January 29, 2019.

“Fundamentals of Concrete (CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Austin, TX, January 15, 2019.

“Fundamentals of Concrete (CON 205),” Office of Distance and Extended Learning course presented to Texas Department of Transportation, Beaumont, TX, December 13, 2018.

## **Professional Service**

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### **Professional Organizations**

Member, American Concrete Institute Committee 201 – Durability of Concrete, 2009 – Present

Member, American Concrete Institute Committee 236 – Material Science of Concrete, 2009 – Present

Member, American Concrete Institute Committee 364 – Rehabilitation of Concrete Structures, 2012– Present

Chair, American Society for Testing and Materials International Mather Scholarship Committee, 2022 – Present

Member, American Society for Testing and Materials International Committee C01 on Cement, 2016 – Present

    Subcommittee, C01.26 – Heat of Hydration, 2016 – Present

    Subcommittee, C01.29 – Sulfate Resistance, 2016 – Present

Member, American Society for Testing and Materials International Committee C09, Concrete and Concrete Aggregates, 2016 – Present

    Subcommittee, C09.24 – Supplementary Cementitious Materials, 2016 – Present

    Subcommittee, C09.50 – Aggregate Reactions in Concrete, 2016 – Present

Member, Society of Professional Hispanic Engineers (SHPE), 2007 – Present

Member, American Society of Civil Engineers (ASCE), 2008 – 2012

Member, American Concrete Institute Central Texas Chapter, 2008 – Present

Member, American Concrete Institute San Antonio Chapter, 2016 – Present

### **Journal Reviewer**

ACI Materials Journal, 2019 – Present

Construction and Building Materials, 2019 – Present

ASTM Advances in Civil Engineering Materials Journal, 2018 – Present

International Journal of Concrete Structures and Materials, 2018 – Present

Cement and Concrete Composites, 2014 – Present



### **Proposal Reviewer**

Transportation Consortium of South-Central States (Tran-SET), Project Review Committee, Fall 2019  
NSF SBIR/STTR Proposal Panel Reviewer, Infrastructure Materials, 2016 – Present

### **Conference Scientific Panels**

Member, Scientific Committee, Transportation Consortium of South-Central States (Tran-SET) Conference, San Antonio, TX, April 2019

### **Research Project Review Committee**

Project Reviewer for the Transportation Consortium of South-Central States (Tran-SET), Research Project: *Evaluation of Alternative Sources of Supplementary Cementitious Materials (SCMs) for Concrete Materials in Transportation Infrastructure*, Fall 2020

Project Reviewer for the Transportation Consortium of South-Central States (Tran-SET), Research Project: *Engineered Geopolymer Composites (EGC) for Sustainable Transportation Infrastructure*, Fall 2019

## **University Service and Assignments**

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### **University**

University Graduate Faculty, Fall 2016 – 2021

Texas State Bobcat Day, Spring 2017 – 2021

### **College**

Materials Science, Engineering and Commercialization (MSEC), Admissions Committee Member, 2019 – 2021  
Cockrell School of Engineering Standing Committee, Equal Opportunity of Engineering Graduate Student Representative, 2012-2014

Minority Introduction to Engineering (MITE) program, Volunteer and Presenter, Preparing for a STEM Degree, Summer 2012

College of Science and Engineering Commencement, Fall 2016 – 2021

Texas State Bobcat Day, Spring 2017 – 2021

Graduate Research Conference – Panel Session Chair, Fall 2017

### **Departmental**

Serving as the Primary Investigator for the Texas State University-Infrastructure Materials Laboratory, Fall 2016 – 2021

Society of Mexican American Engineers and Scientists Faculty Advisor, Fall 2018 – 2021

ACI Student Chapter Faculty Advisor, Fall 2016 – Present

CIM Program Director Search Committee – Member, Fall 2019

Senior Lab Service Technician Search Committee – Member, 2017

Prepared and presented program update for the CIM NSC meeting at New Jersey Institute of Technology (NJIT)

Assessment of the Tecnológico de Monterrey (Monterrey Institute of Technology) for possible collaboration with the Department of Engineering Technology

CIM Program Director Search Committee – Member, Fall 2016

### **Community**

Breakthrough Austin, Volunteer and Presenter, The Wonderful World of Concrete, Summer 2015

J.J. Pickle Elementary (AISD), Summer Science Camp, The Wonderful World of Concrete, Summer 2015

Dawson Elementary (ASID), Science Showcase, The Wonderful World of Concrete, Summer 2015

Explore UT, Volunteer, 2011 – Present

Habitat for Humanity, Volunteer, 2011& 2014  
Thinkery, Volunteer, Summer 2013

### **Professional Licenses**

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- ❖ Engineer-In-Training (EIT), # 57497, certified in the Texas Board of Professional Engineers, 2011

### **Project Publicity/Recognition**

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- ❖ Texas State University Faculty Research Spotlight entitled Reducing the Carbon Footprint in Concrete Construction <https://www.txstate.edu/research/resources/research-newsletter/newsletter-archives/research-newsletter-summer-2019/faculty-research-spotlight/faculty-research-spotlight-aguayo.html>
- ❖ KXAN Local News entitled Texas State professor searching for concrete solution to construction pollution <https://www.kxan.com/news/local/hays/texas-state-professor-searching-for-concrete-solution-to-construction-pollution/>
- ❖ The University of Texas at Austin, Civil, Architectural, and Environmental Engineering Student Spotlights entitled *Advancing Construction Materials Technology* <http://www.cae.utexas.edu/news/spotlights/107-aguayo>, 2012
- ❖ The University of Texas at Austin, Civil, Architectural, and Environmental Engineering News and Features titled *Fred Aguayo – JP Gleason Fellowship* <http://www.cae.utexas.edu/news/366-portland>, 2012

### **Other Qualifications**

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- ❖ Bilingual - Fluent in Spanish