

A Letter from the Forum of ASCE NCS Life Members

An Unusual Civil Engineering Project with An Opportunity to Give Back

A while ago I was contacted by the President of Engineers without Borders (EWB) Professional Chapter of DC. As you may know, EWB's work is of a slightly different nature than the Community Engineering Corp ASCE is partnered with. EWB primarily works overseas – and as we are all aware, engineering problems span the globe, not just the District/Maryland/Virginia area.

That is why we are making this call to the NCS Membership. The residents of Sierra Leone are asking for our help in designing a small bridge. We are looking for someone with expertise in small bridge design/construction that is willing to make this a project a reality. We know it is a long way from home, but all help will be virtual, there is no competition with the private sector, and all

active volunteers are covered by EWB's Professional Liability and International Commercial Liability policies regarding errors and omissions, etc. [You can find a brief overview of this [here](#)]. The first step to being an active member is to create a Volunteer Village account [here](#) and fill in as much of the personal profile as possible. From there, volunteers can be added to project rosters and assigned mentor, REIC, or other roles as appropriate. Additional questions can be fielded to the EWB President, Nicole Regobert, at president@ewb-dc.org.

If you think you may be able to help in any capacity, please reach out to: president@ewb-dc.org.

Thank you!

Sincerely,
Phillip Melville, PE, F.ASCE
Life Member Forum Chair
phillipmelville@juno.com



Free STEM Career Exploration Course

RePicture is offering a free STEM Career Exploration Course this summer. The course is for college students interested in science, technology, engineering, or math (STEM), recent STEM graduates, and exceptionally motivated high school students. During this fun and educational course, students will:

- Explore career opportunities while competing for prizes
- Improve the skills most valued by employers
- Grow their network and be part of a growing STEM community

The 6-week course will meet in June and July. Sessions will be live and recorded to fit their schedule. The hours are flexible and students will typically spend 8–15 hours per week in webinars, group activities, and assignments. Students can join one career exploration track for all 6 weeks, or explore different options. Career exploration tracks include:

- Designing our Communities
- Helping People Through Disaster/ Adapting to Climate Change
- Protecting the Health of People and the Planet
- Green Energy

Weekly professional skills development topics will include:

- Personal Branding
- STEM Writing and Presentation Skills
- Professional Networking

To join, students should go to bit.ly/RePictureJoin2021 or for more information visit RePicture.com/Students.

RePicture is also looking for professionals that are willing to volunteer. You can volunteer at bit.ly/RePicture2021.

The Abridged Calumet "K": Episode 7

The fascinating novel *Calumet "K"* by Samuel Merwin and Henry Webster was published in 1901. Its hero? An efficacious engineer.

An 8-episode condensed edition with text by Ranjit Sahai © 2021. All Rights Reserved. [Illustrations by Harry Edwards, from novel.]

Dreaming of a Winter Vacation

On the twenty-second of November Bannon received this telegram: *We send today complete drawings for marine tower which you will build in the middle of spouting house. Harahan Company are building the Leg.*

Bannon read it carefully, folded it, opened it, and read it again, then tossed it on the desk. "We're off now, for sure," he said to Miss Vogel. "I've known that was coming sure as Christmas."

Hilda picked it up. "Is there an answer, Mr. Bannon?" "No, just file it. Do you make it out?" She read it and shook her head. Bannon ignored her cool manner. "It means that we're going to have the time of our lives for the next few weeks. I'm going to carry compressed food in my pockets, and when mealtime comes around, just take a capsule."

"I think I know," she said slowly; "a marine leg is the thing that takes grain up out of ships. And we've been building a spouting house instead to load it into ships. But why do they want the marine leg?" she asked, "any more now than they did at first?"

"They've got to get the wheat down by boat and by rail, that's all. Both sides have got big men fighting. You've seen it in the papers, haven't you?" She nodded.

The next morning's mail brought the drawings and instructions; and with them came a letter from Brown to Bannon. "I suppose there's not much good in telling you to hurry," it ran; "but if there is another minute a day you can crowd in, I guess you know what to do with it. Page told me today that this elevator will make or break them. Mr. MacBride says that you can have all January for a vacation if you get it through. We owe you two weeks off, anyhow, that you didn't take last summer."

Bannon read it to Hilda, saying as he laid it down: "That's something I like." He turned the letter over in his hand. "I might go up on the St. Lawrence," he went on. "That's the only place for spending the winter that ever struck me when I was on a job there. Were you ever there?" he asked. "No, I've never been anywhere but home and here, in Chicago." "Where is your home?" "It was up in Michigan. That's where Max learned the lumber business. But he and I have been here for nearly two years."

"Well," said Bannon, "some folks may think it's cold up there, but there ain't anywhere else to touch it. It's high ground, you know, nothing like this," he swept his arm about to indicate the flats outside, "and the scenery beats anything this side of the Rockies. It ain't that there's mountains there, you

understand, but it's all big and open, and they've got forests there that would make your Michigan pine woods look like weeds on a sandhill. And the river's great. You haven't seen anything really fine till you've seen the rapids in winter. The people there have a good time too. They know how to enjoy life."

She looked up. Her eyes were sparkling as they had sparkled that afternoon on the elevator when she first looked out into the sunset. "Yes," she replied. "I think I know what you mean." Bannon turned half away, as if to go. "You'll have to go down there, that's all," he said abruptly. He looked back at her over his shoulder, and added, "That's all there is about it."

Her eyes were half startled, half mischievous, for his voice had been still less impersonal than before. Then she turned back to her work, her face sober, but an amused twinkle lingering in her eyes. "I should like to go," she said, her pencil poised at the top of a long column. "Max would like it, too."

A Looming Strike

It was the night of the tenth of December. Three of the four stories of the cupola were building, and the upright posts were reaching toward the fourth. It still appeared to be a confused network of timbers, with only the
continued on page 3

Upcoming Events

Until further notice, all in-person ASCE NCS events have been cancelled. Opportunities for virtual events will be announced as they are planned.

Newsletter

Maria Raggousis, Editor

June 2021 Issue Deadline: May 21, 2021

To Submit Articles: newsletter@asce-ncs.org

NCS eNewsletter Archives: go to www.asce-ncs.org and view along the sidebar.

Address Changes: Call 1-800-548-ASCE, e-mail member@asce.org, visit www.asce.org, or write: ASCE – Membership, 1801 Alexander Bell Drive, Reston, VA 20191. Include your membership number.

National Capital Section

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Committee Chairs

Please refer to the [NCS website](http://www.asce-ncs.org) for a current list of NCS committees and chairs.

The Abridged Calumet "K": Episode 7

continued from page 2

beginnings of walls, but as the cupola walls are nothing but a shell of light boards to withstand the wind, the work was further along than might have been supposed.

A little after eight o'clock Max saw Grady looking about the distributing floor and up through the girders overhead, with quick, keen eyes. Max understood what it all meant: Grady had chosen a time when Bannon was least likely to be on the job. It meant mischief – Max could see that; and he felt a boy's nervousness at the prospect of excitement. He stepped farther back into the shadow. Grady was looking about for Peterson; when he saw his burly figure outlined against a light at the farther end of the building, he walked directly toward him, not pausing this time to talk to the laborers or to look at them. Max, moving off a little to one side, followed, and reached Peterson's side just as Grady, his hat pushed back on his head and his feet apart, was beginning to talk.

"I stand here, Mr. Peterson, the man chosen by these slaves of yours, to look after their rights. I do not ask you to treat them with kindness, I do not ask that you treat them as gentlemen. What do I ask? That's the last stick of timber that goes across this floor until you put a runway from the hoist to the end of the building. And every stick that leaves the runway has got to go on a dolly. Mark my words now – I'm talking plain. My men don't lift another pound of timber on this house – everything goes on rollers." He pulled out his watch. "At ten o'clock, if your runway and the dollies ain't working, the men go out." He turned away, waved to the laborers and walked grandly toward the stairway.

Max whistled. "I'd like to know where Charlie is," said Peterson. "He ain't far. I'll find him," and Max hurried away.

Bannon was sitting in the office chair with his feet on the drafting table, figuring on the back of a blotter. He did not look up when the door opened, and Max came to the railing gate. "Grady's been up on the distributing floor," said Max, breathlessly, for he had been running.

"What did he want?"

"He's going to call the men off at ten o'clock if we don't put in a runway and dollies on the distributing floor."

Bannon looked at his watch. "Is that all he wants?" Max, in his excitement, did not catch the sarcasm in the question. "That's all he said, but it's enough. We can't do it."

Bannon closed his watch with a snap. "No," he said, "and we won't throw away any good time trying. You'd better round up the committee that's supposed to run this lodge and send them here. That young Murphy's one of them. Bring Pete back with you, and the new man, James."

Max lingered, with a look of awe and admiration. "Are you going to stand out, Mr. Bannon?" he asked. Bannon dropped his feet to the floor and turned toward the table. "Yes," he said. "We're going to stand out."

Judgement Day

Since Bannon's talk with President Carver a little drama had been going on in the local lodge, a drama that neither Bannon, Max, nor Peterson knew about.

James had been selected by Carver for this work because of proved ability and shrewdness. He had no sooner attached himself to the lodge, and made himself known as an active member, than his personality, without any noticeable effort on his part, began to make itself felt. Up to this time Grady had had full swing, for there had been no one among the laborers with force enough to oppose him.

The first collision took place at an early meeting after Grady's last talk with Bannon. The delegate, in the course of the meeting, bitterly attacked Bannon, accusing him, at the climax of his oration, of an attempt to buy off the honest representative of the working classes for five thousand dollars.

This had a tremendous effect on the excitable minds before him. He finished his speech with an impassioned tirade against the corrupt influences of the money power, and was mopping his flushed face, listening with elation to the hum of anger that resulted, confident that he had made his point, when James arose.

The new man was as familiar with the tone of the meetings of laborers as Grady himself. At the beginning he had no wish further than to get at the truth. Grady had not stated his case well. It had convinced the laborers, but to James it had weak points. He asked Grady a few pointed questions, that, had the delegate felt the truth behind him, should not have been hard to answer. But Grady was still under the spell of his own oratory, and in attempting to get his feet back on the ground, he bungled.

continued on page 4

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The Abridged Calumet "K": Episode 7

continued from page 3

James did not carry the discussion beyond the point where Grady, in the bewilderment of recognizing this new element in the lodge, lost his temper, but when he sat down, the sentiment of the meeting had changed.

Few of those men could have explained their feelings; it was simply that the new man was stronger than they were, perhaps as strong as Grady, and they were influenced accordingly. There was no decision for a strike at that meeting. Grady, cunning at the business, was determined to carry through the strike without the preliminary vote of the men.

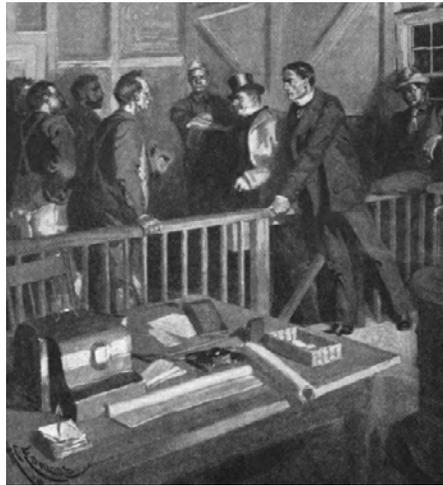
Bannon did not have to wait long. Soon there was a sound of feet outside the door, and after a little hesitation, six laborers entered, five of them awkwardly and timidly, wondering what was to come. Peterson followed, with Max, and closed the door.

The members of the committee stood in a straggling row at the railing, looking at each other and at the floor and ceiling – anywhere but at the boss, who was sitting on the table, sternly taking them in. James stepped to one side. "Is this all the committee?" Bannon presently said. The men hesitated, and Murphy, who was in the center, answered, "Yes, sir." "You are the governing members of your lodge?" There was an air of cool authority about Bannon that disturbed the men. So, they looked at the floor and ceiling again, until Murphy at last answered: "Yes, sir."

Bannon waited again, knowing that every added moment of silence gave him the firmer control. "I have brought

you here to ask you this question: Have you voted to strike?"

The silence was deep. Peterson, leaning against the closed door, held his breath; Max, sitting on the railing with his elbow thrown over the desk, leaned slightly forward. The eyes of the laborers wandered restlessly about the room. They



If you hang on this man after he's been proved a blackmailer, your lodge can be dropped from the Federation.

were disturbed, taken off their guard; they needed Grady. But the thought of Grady was followed by the consciousness of the silent figure of the new man, James, standing behind them. Murphy's first impulse was to lie. Perhaps, if James had not been there, he would have lied. As it was, he glanced up two or three times, and his lips as many times framed themselves about words that did not come. Finally, he said, mumbling the words: "No, we ain't voted for no strike." "There has been no such

decision made by your organization?" "No, I guess not."

Bannon turned to Peterson. "Mr. Peterson, will you please find Mr. Grady and bring him here." Max and Peterson hurried out together. Bannon drew up the chair, and turned his back on the committee, going on with his figuring. Not a word was said; the men hardly moved; and the minutes went slowly by.

Then there was a stir outside, and the sound of low voices. The door flew open, admitting Grady, who stalked to the railing, choking with anger. Max, who immediately followed, was grinning, his eyes resting on a round spot of dust on Grady's shoulder, and on his torn collar and disarranged tie.

Peterson came in last, and carefully closed the door – his eyes were blazing, and one sleeve was rolled up over his bare forearm. Neither of them spoke.

Grady was at a disadvantage, and he knew it. Breathing hard, his face red, his little eyes darting about the room, he took it all in – the members of the committee; the boss, figuring at the table, with an air of exasperating coolness about his lean back; and last of all, James, standing in the shadow. It was the sight of the new man that checked the storm of words that was pressing on Grady's tongue. But he finally gathered himself and stepped forward, pushing aside one of the committee.

Then Bannon turned. He faced about in his chair and began to talk straight at the committee, ignoring the delegate. "This

continued on page 5

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The Abridged Calumet "K": Episode 7

continued from page 4

man Grady threatened a good while ago that I would have a strike on my hands. He finally came to me and offered to protect me if I would pay him five thousand dollars."

"That's a lie!" shouted the delegate.

"He came to me" Bannon had hardly paused. He drew a typewritten copy of Grady's letter from his pocket, and read it aloud, then handed it over to Murphy. "Tonight he's ordered a strike. He calls himself your representative, but he has acted on his own responsibility. Now, I am going to talk plain to you. I came here to build this elevator, and I'm going to do it. I propose to treat you men fair and square. If you think you ain't

treated right, you send an honest man to this office, and I'll talk with him. But I'm through with Grady. If you send him around again, I'll throw him off the job."

"I laid this matter before President Carver," continued Bannon, "I have his word that if you hang on to this man after he's been proved a blackmailer, your lodge can be dropped from the Federation. If you try to strike, you won't hurt anybody but yourselves. That's all. You can go."

"Wait" Grady began, but they filed out without looking at him.

James, as he followed them, nodded, and said, "Good night, Mr. Bannon."

Then for the last time Bannon led Grady away. "Now, Mr. Grady," he said, "this is where our ground stops. The other sides are the road there, and the river, and the last piles of cribbing at the other end. I'm telling you so you will know where you don't belong. Now, get out!"

Novel's condensed text by Ranjit Sahai, ASCE-NCS Past President (2013–14), is a principal with RAM Corp serving State DOTs on projects in traffic engineering design, stormwater facility inspections, and information technology. ■



Dr. Z's Corner

Civil Engineering & Artificial Intelligence (AI) Applications from Netherlands

This special issue of Dr. Z's Corner will be the last before we break for the summer. This month I've decided to surprise our readers and invited two well-known engineers and scholars from Europe. My guest authors, Dr. Eleni Smyrou and Dr. İhsan Engin Bal, work together as a husband and wife team and currently both are faculty at Hanze University of Applied Sciences Groningen, Netherlands. I hope you will enjoy their interesting article.

Introduction

Technology is evolving at an unprecedented speed, by transforming the society, politics, governance, and professions. Civil engineering is no exception.

Computers significantly changed the way structures are engineered. The method of Hardy Cross from the University of Illinois Urbana-Champaign, for example, was revolutionary in the 30s, enabling structural engineers to design and build taller structures until the 60s. Similarly, the elastic design spectrum, proposed by Nathan Newmark who is another professor at Urbana-Champaign,

revolutionized the seismic design of structures starting from the 50s. The implementation of computerized methods in civil engineering, however, was a total game changer. Now 90 years after the first publication of the Cross Method, and more than 60 years after the proposal of the Newmark Spectrum, our structural design problems are more complex than ever.

Although the civil engineering discipline adapted well to the early changes of computerization, the adoption of emerging technologies in the new millennium is slow. The use of brute-force when using computers to analyze and design larger, taller and more complex structures has become the main exploitation area of technology in civil engineering. Furthermore, structures have become much more complex in the last few decades, requiring interface with other disciplines via technologies such as BIM (Building Information Modeling), which is another technological development that found a place in practice. Apart from those, and despite the extensive research, other emerging technologies did not actually revolutionize the

design and construction processes, yet; though this may change in the coming years.

Things are changing recently, although slow and limited. Some new technology applications in civil engineering are evident in the last few years. The momentum in new technologies spreading through our daily routines, and the increasing societal and economic demands, are forcing the civil engineering discipline to adapt.

In this article, we discuss one of the major emerging technologies, "Artificial Intelligence", the magic word of the recent years.

What is AI?

Artificial Intelligence (AI) is a broader term that covers all sorts of applications where the intelligence is developed by a machine. Although the concept dates back to the 40s, everyday applications were only possible when the available computational power was enough to deploy large datasets for training models. This happened in the last several years,

continued on page 6

thanks to the use of GPU (Graphics Processing Unit), which was a major breakthrough for the realization of real-life AI.

The computers consist of CPU (Central Processor Unit) and GPU among other components. The processes are usually done by CPU and thus the computational power of your computer will heavily depend on the power of your CPU. GPU, however, is attached to the graphical unit of the computer and is used only for graphically demanding applications, such as playing videos, rendering 3D models, or playing games. Over the years the GPUs have become stronger and stronger, creating a sort of hidden power inside every computer, but used only for graphical purposes. It was not until a few years ago that it was discovered that the GPUs can be extremely useful for training AI models because they can run multiple training processes in parallel, something which can speed up the AI training significantly.

Today AI is almost everywhere. Entertainment platforms on the internet, for example, provide song, movie or series recommendations based on AI technology. The more time you spend on such platforms, the more data the AI algorithm will collect, get better trained and, in a way, get better acquainted to you. It will eventually provide you better and better recommendations. After a while these platforms become like a good friend who know your taste very well. That is the machine intelligence we are talking about.

Can AI Detect Structural Problems?

The same concept as entertainment platforms applies in almost all fields. In civil engineering for example, AI is already used in several areas. One of the most successful applications is detecting structural problems, anomalies, damage and deterioration based on photographs. Similarly

to the entertainment platforms, the more data which is provided, the more accurate the model and the predictions become. Such AI-powered tools are more suitable for existing structures at the moment, thanks to the abundance of data for training models. Even if not, it is easier to collect data from existing structures rather than the new structures that are not even built yet. That is why many engineering firms are digging out their photographic databases to see if they can throw these photos into a smart AI model and replace the laborious engineering work of damage detection with computer codes.

In recent work¹ with our colleagues from Hanze University of Applied Sciences in Groningen (Netherlands) and University of Leeds (UK), we showed that a simple photograph would be enough to detect a crack on a masonry brick surface. Earlier methods were able to only place the crack in a bounding box, telling us simply "there is a crack somewhere inside this box". Our method detects the cracks pixel-wise, telling us the exact location, length, spread and width of the crack in a photograph. This was not achieved in masonry surfaces before, although AI-based crack detection is more advanced in concrete and asphalt surfaces, which are rather homogenous. Our work brings new opportunities such as regular scanning of historical buildings or old masonry structures based on simple photographs, an opportunity that will significantly reduce costs and time, and allow access to many more structures. What is superior in this method is that, even photographs taken by citizens and non-technical people can be used for extracting engineering information in a fully automatic fashion.

We support the crack detection technology with other emerging technologies, such as 3D scene reconstruction and near-infrared (NIR) crack width estimation, among others. The former is a method that can build a 3D

computer model if enough photos are taken from a real structure, while the latter is a method where we developed invisible markers that reflect light only if special NIR cameras are used. Both of these technologies allow us to train a building responsible person or a citizen for taking suitable photographs for engineering purposes. Photographs can be taken regularly or after an event, such as earthquakes or deep excavations. We are already testing the combination of these technologies in a project funded by the Cultural Heritage Agency of the Netherlands (RCE).

AI is a promising concept and will certainly find further application areas in civil engineering, helping engineers make critical decisions for complex problems.

About the Authors:

Dr. Eleni Smyrou and Dr. Ihsan Engin Bal work at Hanze University of Applied Sciences Groningen, Netherlands, in the Earthquake Resistant Structures research group. They both have degrees in civil engineering, as well as M.Sc. and Ph.D. degrees in earthquake engineering. Their work areas are seismic design, assessment, monitoring and strengthening of structures. Use of new technologies for structural safety has been a major research agenda topic for them for the last couple of years. They are also co-founders of "Senso Engineering – Vibration Solutions" and "Strintel – Structural Intelligence", two startups which are providing services on the use of new technologies for structural safety.



¹ <https://www.sciencedirect.com/science/article/pii/S0926580521000571> (this is an open access article which is freely downloadable)

ASCE Geo-Institute National Capital Chapter 2021 Student Essay Competition Winners

The topic for this year's essay competition was: "What are the positive and negative aspects of geotechnical engineering that shape your desire to pursue a career in the field?"

The ASCE NCS GI members voted for the best essay and the following students have been awarded the 2021 scholarships:

First Place: Yasmine Khiri, Howard University, yasmine.khiri@bison.howard.edu



Yasmine Khiri is a Senior Student pursuing Civil Engineering at Howard University. She is from Marrakesh, Morocco and speaks Arabic, French and English. She was a part of the Howard University Women's tennis team for 3 years.

In her essay, Yasmine stated: *"I wish to work as a Geotechnical Engineer so I can design and build magnificent structures that can be used by many people such as bridges and dams, which change people's lives, bridges which cut down travel times from 4 hours to 45 minutes, bridges in third world countries which make the difference between children going to school and not getting education."*

Second Place: Natalie Gallo, University of the District of Columbia, natalie.gallo@udc.edu



Natalie Gallo is currently a Senior student at the University of the District of Columbia, and she will be graduating in May 2021. She is a proud Latina, and she strives to always break stereotypes in the civil

engineering field. This summer, she will begin her first geotechnical engineering job in Maryland, and she hopes to become a professional engineer in the near future.

In her essay, Natalie highlighted: *"The understanding of the geotechnical field excites me whether I choose to design the next Hoover Dam or test Mars soil samples for future exploration. I have always envisioned my civil engineering career out in the field where no two days are the same and the challenges and difficulties of the geotechnical field are what gravitated me to want to pursue this career. The only negative aspect of the geotechnical engineering field is the lack of Hispanic and female diversity. Naturally, this negative aspect only motivates and encourages me to break through."* ■

Civil Engineering and You

Digital Twins: Their Technical Framework

The fourth in a series of articles on digital twins in civil engineering, written by Ranjit Sahai, PE, F.ASCE.

Before we continue our journey through more Digital Twin scenarios – *Your Future Home* was in the February 2021 issue and *Stormwater Control* network was in the March 2021 issue – in upcoming articles, let's take a step back to explore the concept of the **Common Data Environment** (CDE) referenced in the ISO 19650 standard that governs specifications for building information modeling. A grasp of the concept will help explain how data of different types across disciplines and vendors interacts to enable the digital twin to replicate the physical twin.

Document Environments

To start, let us examine three engineering document management environments engineers use.

FILING CABINETS: From ancient times to the late 1960s, engineers communicated design and specifications on a physical medium called documents. These are typically saved in filing cabinets.

ELECTRONIC FOLDERS: With the emergence of CAD software in the last 1960s, design and specifications could be created on an electronic storage medium. This data could now be saved as files in electronic folders on a computer disk drive.

EDMS: As electronic content proliferated, and more data relevant to communicating design could be collected and saved quickly and easily, electronic document management systems (EDMS) emerged. Autodesk Vault and Bentley ProjectWise are two such systems. Such systems help engineers keep their electronic documents organized, version controlled, and accessible in a multi-user networked computer environment.

How do electronic folders differ from EDMS systems?

The key difference between electronic folders and an EDMS system is the latter's use of an SQL database to

supplement electronic folders in a computer network environment. The database is used to track data about files in electronic folders – data such as file name, description, checkout status, version number, project number, and the like. The database speeds up searches and makes possible the use of powerful search queries.

Because the term Common Data Environment (CDE) refers to the overall structure for storing and accessing data, each of the three environments – filing cabinets, electronic folders, and EDMS can be thought of as different levels of CDEs.

However, it is only the EDMS that would qualify as the "common" data environment for pre-Digital Twin scenarios such as those enabled by BIM software solutions like Autodesk Revit, Bentley OpenRoads Designer, VectorWorks and the like.

continued on page 8

Because BIM software solutions are file-based, EDMS systems can still facilitate shared storage and access to design and construction data.

Digital Twin Hub

Digital Twin scenarios are not document-based. They depend on multi-user, multi-software, and multi-disciplinary connectivity between the physical asset and its digital representation. As the physical asset evolves from design to as-built to operations, so does its digital twin. Digital Twin scenarios are model-based.

An engineer's design is not a set of documents for use by the contractor, but a digital model in which all design disciplines and trade contractors collaborate to evolve the model to be constructible.

In other words, the model can be used by an autonomous earth-grading machine or a rebar laying robot or a HoloLens-wearing carpenter guided by the projected 3D model and not a document – no standard details are used but all elements laid out as they would be constructed. And as construction progresses, the model gets adjusted by imaging devices that monitor the equipment used and quantities placed. Think of the digital twin hub as an information aggregator that serves



Progression of the capabilities of the data storage and access environment: **Filing Cabinet > Electronic Folder > EDMS > Hub.**

as the single source of truth over the asset's lifecycle.

This scenario calls for what can be thought of as a hub of digital models. Digital models are stored in the hub in a common industry schema such as the Industry Foundation Classes ([What is IFC?](#)) so they are software file format and vendor agnostic.

It is the common industry schema that enables information to flow from vendor-specific disciplinary tools to the hub over the lifecycle of the asset. The

hub receives and sends data through connectors that translate data to and from the IFC schema to the proprietary format of design and construction tools. Additionally, all changes to the model are tracked so one can see its evolution over time.

As we explore other Digital Twin scenarios and case studies in upcoming articles, keep the concept of this digital model hub in mind. It will help explain how the digital twin does what it does.

It may interest you to know that Bentley's ProjectWise 365 and iTwin services and Autodesk's Tandem are emerging digital twin platforms from the two dominant CAD vendors for our industry. Trimble's recently launched Quadri is another digital modeling hub that is making its move to the US from its roots in the Norway infrastructure industry.

About the Author

Ranjit, a Past President (2013–14) of ASCE-NCS, is a principal and founder of RAM Corporation, a firm serving State DOTs with a focus on traffic engineering design, stormwater facility inspections, and IT solutions for engineering workflows.



Special June Meeting Announcement

By the ASCE National Capital Section's D.C. Report Card Team

The National Capital Section's D.C. Report Card Team is pleased to announce the impending release of the 2021 Edition of the Report Card for D.C.'s Infrastructure.



Work on updating the 2016 Edition, the inaugural release, began in January 2019 with the goal of releasing the updated Report Card in the first quarter of 2020. However, circumstances beyond our control made it necessary to delay the release. The Committee's hard work is now coming to an end. Final editing and preparations

for its release are in its final stage with the release targeted for June 15, 2021.

The Report Card gives you facts and grades on D.C.'s core infrastructure. The Report

Card shows how it all stacks up – from roads to water to levees. It helps you engage with policy makers to help them with information necessary to take the big steps needed to prioritize infrastructure investments. After all, infrastructure serves as the backbone of our economy and quality of life.

We encourage you to block your calendar for an hour at noon on June 15, 2021 and keep an eye out for the invitation to attend the online release event for the 2021 edition of the D.C. Report Card. Looking forward to your participation.

TEAM MEMBERS: Chair: Ranjit Sahai. Content Authors: Hari Aamidala, Robert Principato, David Townsend, Eric Uhl, Jason Levinn, Brenna Thorpe, Arthur "Scott" Kiefer. Editor: Norine Walker. ■

Four Reasons to Update your Resume Today

By Shana Carroll

When was the last time you updated your resume? If you are like most people, you haven't updated your resume since the last time you were looking for a new job, or the marketing department was updating company resumes for proposal purposes. This may have been a month ago, or two years ago, and chances are, it was difficult for you to capture all of the relevant information on your resume because you simply didn't remember it. If you are the type of person who works on multiple projects per year, do your future-self a favor and keep your resume updated. If you are like me, updating your resume seems like a chore and you are a procrastinator by nature so it doesn't get done until someone else in your company needs it or you are looking for a new project. After all, when you finish the project, shouldn't you be excited to move on to the next one? Of course, you should! However, by updating your resume when you work on the project or upon project completion, you have the best, freshest information and you can celebrate your recent success! So stop procrastinating and update your resume!

Having an updated resume will help you 1) navigate application submissions that

require experience, such as an Engineer In Training; 2) remember the successful projects you worked on when it is time to fill out your annual review forms; 3) win more business for yourself and your company; and 4) be prepared if another business opportunity arises.

Reason 1: *Your project history is readily accessible when you need to fill out applications.*

Many entry-level professionals go on to seek additional certifications and licenses, such as a Professional Engineer licensure. These types of applications require explanation of work experience. These can be completed quickly if you have been keeping track of your work. I recommend adding each project you work on to your resume either as you are working on it, or upon completion. Be sure to include not only information about your role on the project, but also add details such as the type of analysis you performed.

Reason 2: *You need help remembering all the great things you've done.*

How can you remember all of the great work you've completed if you don't take

notes? Keeping track of them as you achieve them will not only reinforce your success as you write it down, but will also allow you to have better recall when sharing your success with others. When keeping notes on your project successes, be sure to include not only project details, but also key internal and external team members you worked with and specific details on your role on the team. When you have an up-to-date record of your work, you can use it as a reference of the amazing work you completed when you are disheartened by an office setback, and you have an automatic list with extensive details of your individual achievements when completing your annual review.

Reason 3: *A resume can win or lose future work for your company.*

Many Americans work in industries such as consulting or construction where the common practice is to present proposals to clients to win future work. The goal of the proposal is to show the client that your firm is experienced and can excel at the given task, while providing value and good customer service. In any proposal, whether written or verbal, the client needs to feel that you and your company are qualified to tackle their specific problem. Often, this request for qualifications comes in the form of a formal proposal where key employee resumes are included.

A client may decide quickly whether or not to award work based on the strength of the resumes provided. Additionally, some clients will even award work

contingent on certain team members being assigned to their project. You will easily stand out by having an updated resume.

Reason 4: *Just like a boy scout, you should always be prepared.*

When opportunity presents itself, you need to be prepared. Alexander Graham Bell said, "Before anything else, preparation is the key to success." While you may love your current job, you should be prepared if an opportunity that is "more right" for you comes along. For example, I was a staff engineer at a consulting firm where my technical skills grew at an accelerated rate, and I loved working with the other team members. However, I was not able to grow my writing, presentation, or client relationship skills as quickly as I wanted. While out on a site one day I got a call from a recruiter who described my dream position and asked if I was interested and had a current resume. Luckily, I had been tracking my project experience in preparation for the Professional Engineer Exam application and could send the same day. After one phone interview and one face-to-face interview I was hired, that was nine years ago. Having an updated resume allowed me to quickly seize a great opportunity for professional growth. Keep your resume up to date, but keep it to yourself until you have both the need to share it and the time to make it special and unique for the company and position you are applying for.

What did you add to your resume today? ■

ASCE-NCS Newsletter Patron

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ASCE-NCS Committee and Branch News and Updates



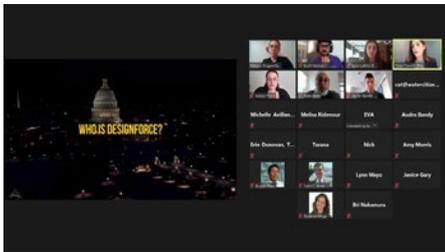
Younger Members Forum

By Kush Vashee, P.E., CAPM, M. ASCE
Monthly Happy Hour. The NCS Younger Members Forum (YMF) holds monthly happy hours, alternating between Arlington, VA and Washington, DC. Happy hours are usually the first Wednesday of each month unless a holiday falls during that week.

On April 7th the NCS YMF held their 4th virtual happy hour of the year on Webex! We hope for a bigger turnout when the group hosts their next virtual happy hour starting at 6PM on May 5th on Webex, look out for some emails soon with registration details. We hope to see you there!



Professional Development: We hosted a Diversity and Inclusion themed webinar learning about D&I within the AEC industry on April 8th and had 25+ participants! Please let us know if you would like more diversity and inclusion themed events.



We have rescheduled the first part of a three-part Career Booster series for May. Part One will be held at 6PM–8PM on May 19th on Webex. Additionally, if you have suggestions for professional development meeting topics or would like to become more involved with the YMF in other areas, please contact the YMF President at ncsymfpresident@gmail.com.

Stay Connected! Check out photos and stay up-to-date with YMF events by visiting the new YMF Facebook page (ASCE National Capital Section Younger Members Forum), following us on Twitter (@ASCE_NCS_YMF), LinkedIn (ASCE National Capital YMF), and Instagram (@asce_ncs_ymf)

Get Involved! Are you interested in getting involved with more Younger Members activities? Do you have ideas for social events or volunteering activities? The NCS Younger Members Group is always looking for new members! Let us know if you are not already on our mailing list! If you would like to become more active with the YMF or would like more information on our events, please email the YMF President.

Reston Branch

By Christopher J. Friend, P.E., Reston Branch Vice President

April Reston Branch Meeting

On April 6th, the Reston Branch hosted Jessica Klinefelter, Vice President in charge of Wallace Montgomery's Environmental Department, for a virtual presentation. Ms. Klinefelter presented on "Having an Environmental Mindset during Planning and Design Processes". In her position at Wallace Montgomery, she provides oversight and leadership in natural resources studies, environmental documentation, delineations, environmental design, permitting and environmental monitoring. She received a Master's in Wildlife Biology and published articles on the federally-threatened bog turtle. From that time, she has continuously provided environmental consulting for public works and transportation clients for 23 years. She is familiar with regulations that protect natural, social, and cultural resources. Jessica has experience in both environmental planning and environmental permitting; responsible for dozens of NEPA documents and environmental permits.



The presentation highlighted the importance of incorporating an environmental mindset at project scoping to help avoid lengthy schedule delays and reduce costs on transportation and public utility projects. With a focus on Natural



Resources, Jessica discussed their approach at Wallace Montgomery to involve environmental staff early in the planning and design process to ensure a smooth project delivery down the road. Typical environmental risks to wetlands and waterways that are encountered on linear projects were discussed, as well as how they can be appropriately mitigated with an environmental mindset. The presentation also covered the Section 404 permitting process and how avoidance and minimization of impacts can reduce mitigation costs and potentially eliminate the need for permits altogether. Real-world project examples were shared where these methods have been used successfully to save time and money in Maryland and Virginia. Overall, the presentation was very informative and well received by our Branch!

May Reston Branch Meeting

On May 11th at Noon, the Reston Branch will host a virtual meeting with Howard University and AlexRenew for their presentation on *Investigating Methods for Quantification of SARS-CoV-2 in Wastewater*. Please be on the lookout for additional meeting information via e-mail and our LinkedIn page.

Worldwide, there is growing interest in using wastewater-based epidemiology to track the COVID-19 pandemic. Recent reports reveal that SARS-CoV-2, the virus that causes COVID-19 infection, viral particles can be measured in wastewater and there are ongoing efforts to correlate these measurements with infection data. This approach is of interest because it can assess temporal and geospatial variabilities that may not be captured due to limited testing capacity. We will present the results of a partnership between Howard University

continued on page 11

and AlexRenew to monitor wastewater for SARS-CoV-2 from May 2020 – December 2020.

About the Presenters

Jeseth Delgado Vela is an Assistant Professor in the Civil and Environmental Engineering Department at Howard University. Her research applies tools in molecular biology to develop sustainable and cost-efficient urban water treatment. She is interested in understanding microbial community interactions to improve the urban water cycle. She received her PhD and master's degree from the University of Michigan. She received her bachelor's degree in Civil Engineering from the University of Texas at Austin in 2012.

Allison Deines is the Director of Strategy and Policy at Alexandria Renew Enterprises (AlexRenew) in Alexandria, Virginia. In this role, she leads AlexRenew's research initiatives, works to educate decision-makers on issues of importance to the water sector and ensures that AlexRenew is well-prepared to respond to changes in local, state, or federal policies. Prior to AlexRenew, Allison spent seven years as the Director of Special Projects at the Water Research Foundation, working with water sector leaders to develop and fund projects to address critical water-sector research needs. She has a Master's in Public Administration and Policy from American University and a Bachelor's of Science in Environmental Science for The George Washington University. In her free time, Allison likes to go on hikes with her husband, Raffaele and two children, Alex and Stella.

The Reston Branch has launched a [group](#) on LinkedIn to provide regular updates for the Branch as well as offer a place for branch members to connect. See the following link for additional information: <https://www.linkedin.com/groups/13759693/>



GEO-
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National Capital Chapter

Geo-Institute

Call for Board Elections and Open Board Positions

According to the Board By Laws and rules, our Chapter will hold elections of board members for the next term. *Term dates are from July 2021 to July 2023.* Elections will take place over the week

of May 15th, 2021 by using an online platform. The ASCE GI NCS are inviting all our members from the DC, VA and MD to participate in the elections of the new board over the week of May 15th 2021.

If you or anyone you know is interested in being part of the ASCE GI NCS Board, there are positions which are open to everyone (i.e., recent graduates, young professionals, senior engineers, principal engineers are all welcome). Please contact Santiago Caballero (santiago.caballero@aecom.com) with a short bio, a few sentences on why you would like to participate in this organization, and which position(s) you are most interested in by Friday, May 7th 2021.

Board Positions Include:

- Chair
- Co-chair
- Treasurer
- Secretary
- Director of Programs
- Director of Student Outreach
- Director at Large
- Director of Younger Member Outreach

ASCE GI NCS May Webinar

Our upcoming webinar on *Laterally Loaded Large Diameter Piles* presented by Professor Jean-Louis Briaud, PhD, PE, DGE, Distinguished Member ASCE, ASCE President will be held on May 26th 2021, 12:00–1:15pm (EST).

The cost is \$10 per person, 1 PDH certificate will be issued to all participants. The webinar is FREE for students, faculty members and government staff. Please contact us at asce.ncs.gec@gmail.com to receive webinar details directly. After you register and pay for the event, you will receive a Link that includes the Zoom details. Please check your Spam folder or send us an email if you do not receive it right after payment is processed.

Click [HERE](#) to register!

Laterally Loaded Large Diameter Piles

The question to be answered is how well are current P-y curves at predicting the behavior of large diameter piles subjected to monotonic lateral loading? Current P-y curves were developed about 60 years ago based on lateral load tests on piles which ranged from 0.3 to 0.6 m in diameter. Today's pile diameters can reach 4 m or more.

This significant difference in scale brings into question the applicability of these early P-y curves to today's large diameter piles. A horizontal load tests database of 46 piles with diameters larger than 1.5 m (up to 3.0 m) and 64 piles with diameters less than 1.5 m both in sand and in clay was assembled. Predictions of load and displacement are carried out using commonly used P-y curves and the software LPILE. These predictions are compared to the measured loads and measured displacements. The ratio of predicted over measured quantities is plotted against pile diameter and trends are noted. Then, modifications to the p-y curves are proposed so that the ratio of predicted over measured displacement remains approximately independent of diameter. Finally, the probability that the predictions will be unsafe is evaluated.

About the Speaker

Professor Jean-Louis Briaud is a Distinguished Professor and Holder of the Spencer J. Buchanan Chair in the Zachry Department of Civil and Environmental Engineering at Texas A&M University, a Distinguished Member of the American Society of Civil Engineers, and a Professional Engineer. He received his bachelor's degree in France in 1972 and his Ph.D. degree from the University of Ottawa in Canada in 1979. He is currently President of the American Society of Civil Engineers. Among other awards, he has received the ASCE Ralph Peck Award from the USA, the CGS Geoffrey Meyerhof Foundation Engineering Award from Canada, the Honorable Aitalyev Medal from Kazakhstan, and is a member of the National Academy of Natural Sciences in Russia. He has supervised 50 PhD students and 90 Master students. He is the author of a book entitled Geotechnical Engineering and one entitled The Pressuremeter; he has published about 300 articles and reports. He enjoys tennis, soccer, and rugby, and plays jazz piano at the amateur level.



Environmental & Water Resources Institute

On May 6th, the EWRI Chesapeake Bay and National Capital Sections held a webinar on John Englander's new book, *Moving to Higher Ground: Rising Sea Level and the Path Forward*.

continued on page 12

John Englander is a renowned oceanographer, multi-book author, speaker, and expert on climate change and sea level rise. His 2012 book, *High Tide on Main Street* explained the science in easy-to-understand terms. Politico listed it as one of the top fifty books to read. Englander's new book, *Moving to Higher Ground: Rising Sea Level and the Path Forward* (The Science Bookshelf) was released April 6, 2021 in hardcover, softcover, e-book and audio book.

His broad marine science background, coupled with explorations in Greenland and Antarctica, allows him to see the big-picture impacts of changing climate and rising sea level on society. Millions of people in the US and around the world have read his books, or heard his

message through blogs and popular talks.

Englander is consistently rated as one of the best speakers on climate change and sea level rise, and works tirelessly to help communities understand why sea level will rise far higher than most can imagine and likely much sooner too.

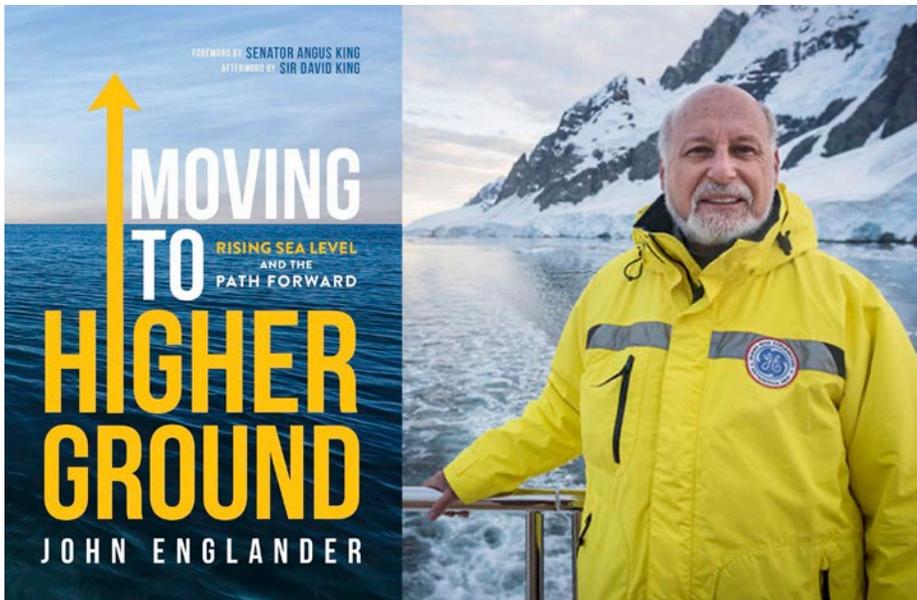
As a leading spokesperson for "intelligent adaptation", John is the foremost advocate that, globally, we must move to higher ground. John's background as a scientist, explorer, entrepreneur, and CEO (International SeaKeepers Society, Cousteau Society) combine to help him analyze not just the scientific impacts of profound SLR, but also the business, economic, and humanitarian impacts.

Architectural Engineering Institute

On May 6th, the AEI DC committee gathered (physically distanced and in accordance with the DC Government and CDC recommendations) to assist in sorting, packing, and distributing dry goods and produce at the Capital Area Food Bank in Northeast DC.



The Capital Area Food Bank is vital to the supply chain for the procurement and distribution of food in the Greater Washington Metropolitan area. We are thankful for the work of this organization and those who are committed to reducing hunger in the community. The Capital Area Food Bank is always looking for volunteers either as grocery delivery drivers, in the distribution center, at community markets, in the garden, or hosting events. [Click here](#) if you would like to volunteer individually or organize a group volunteer effort. ■



Employment Clearinghouse

The NCS provides the Employment Clearinghouse as a free service to its membership. The Clearinghouse allows members to post short notices for available positions or candidates seeking employment. All employers listed herein are equal opportunity employers. If you have questions, are seeking employment or would like to post a position please contact the [newsletter editor](#).