Message from the Chair

Greetings! We enjoyed seeing many of you at the Forum’s Annual Meeting in New Orleans, LA. Division 10’s activities at the Annual Meeting included a co-hosted crayfish boil with YLD and Divisions 2, 4, 6, and 7; and the Midnight Breakfast which has held at the Tequila House with Division 9. Thank you to everyone who participated in these events. I would like to congratulate Esther Mignanelli, a Diversity Fellow and the newest member of Division 10’s Steering Committee! I would also like to thank Asha Echeverria, Kirk Retz and Erin Fallon for their hard work on this, and every recent edition of 2 x 4 x 10.

Division 10 is committed to providing education, resources, and a forum to discuss legal issues which arise on transportation and energy projects nation-wide. We will continue to provide a forum to discuss environmental legislation which affects the construction industry, but we will focus on how environmental legislation and programs impact transportation and energy projects.

In the Summer Edition, we focus on advances in technology in electricity storage and boring methods, water issues, involving underground infrastructure, the Clean Water Act, and marine insurance, and who to call when you have water issues, a hydrologist. If you are looking to get involved with Division 10’s publication efforts, contact Asha Echeverria, Division 10’s Publication Chair, at aeecheverria@bernsteinshur.com.
Energy Storage: Recent Developments and Potential for the Future?

By: Elliotte Quinn, Esq.

The paradigm is shifting in energy production. Production and consumption of electricity have always been instantaneous. The electrons powering our light bulbs are produced at nearly the same time as their consumption. As a result, the demand for electricity must be consistently monitored, and the generators producing electricity must be constantly adjusted to meet demand. Developments in energy storage are rapidly changing that paradigm.

In just the first few months of 2018:

• The Federal Energy Regulatory Commission (“FERC”) issued Order No. 841 requiring regional transmission organizations and independent system operators to create tariff rules allowing full participation by storage resources in capacity, energy, and ancillary service markets;

• California issued the first rules permitting storage resources to “stack” revenue by providing multiple services;

• Maryland became the first state to offer a tax credit to residential and commercial properties for installing storage;

• New York’s Governor called for its public utilities commission to set a storage goal of 1,500 MW by 2030 and combined that with $200 million in funding for storage projects; and

• Grid-tied residential storage outpaced installations in storage’s more traditional residential use of off-grid storage.

Storage’s Potential

Energy storage has applications at both the grid level and behind-the-meter. At the grid level, storage has the potential to reduce the inefficiencies caused by the constant balancing of load and generation. For example, because utilities must have sufficient generation to meet the constantly and instantly changing load, utilities must keep extra generation running to meet the potential future increased load even though those generators’ output is not being used at that moment, i.e., spinning reserves. Energy storage could be utilized to meet instantaneous changes in demand, reducing the need for spinning reserves and the losses associated with running generators whose output is not necessary at the moment.

The demand for electricity changes throughout the day with the peak typically occurring during the afternoon and early evening and the lowest demand occurring at night. Wind typically blows strongest at night which means wind turbines produce significant electricity when there is less demand on the grid. Solar produces the most electricity during the afternoon, but the generation then can be so great that it exceeds demand. Electricity prices in some states fluctuate based on the time of use or other demand pricing mechanisms that cause property owners with solar generation to produce the most during the part of the day when it provides the least advantage in relation to demand pricing. Storage resources could allow both the grid and property owners to store excess solar and wind generation until it is needed or to engage in arbitrage by using or selling the energy when it is more valuable.

For renewable independent producers and developers, as well as for vertically integrated utilities, the two main hindrances to additional renewable generation have been price and the intermittent nature of the output. Prices steadily decreased over recent years. However, because the sun does not always shine and the wind does not always blow, solar and wind generation are still considered intermittent resources that cannot be dispatched to produce on demand like fossil fuel, nuclear, or hydroelectric generation. Combining a storage resource with solar or wind generation can convert the solar or wind resource from intermittent to dispatchable.

Finally, for businesses particularly concerned about power outages or seeking to rely more on on-site renewable generation for environmental or other reasons, storage resources offer potential solutions.

Storage’s Growth

Energy storage has existed for decades, primarily in the form of pumped hydro, but it has not been
widely available. Pumped hydro remains the largest source of energy storage, but further development has been hampered by location and cost constraints. The vast majority of growth in energy storage has come in the form of lithium-ion batteries which made up 97% of the storage capacity deployed in 2016.

The combination of developments in lithium-ion batteries, FERC policy, the growth of intermittent renewables, and the search for cost-effective solutions to transmission constraints are the main drivers of the growth in storage. Lithium-ion batteries are basically the same technology that allowed cell phones to shrink from the giant handsets of the 1990s to the slim pocket computers we carry today. The changes in FERC policy have included orders that opened the market to permit non-generators to provide ancillary services (e.g., reactive power, voltage control, frequency, imbalance, and reserves), allowed storage to more easily interconnect to the grid, and included storage within the options transmission providers must consider when planning transmission systems. As explained previously, solar and wind generation are generally considered intermittent, and storage offers a potential solution to make them dispatchable. Making renewable generation dispatchable both makes them more valuable to the grid and allows renewable project owners to earn more revenue. Finally, shifting generation and loads create congestion on transmission systems, and utilities seeking a solution may find storage to be more cost-effective than alternatives such as constructing new lines.

Storage likely will see continuing growth for many reasons. Technologies continue to improve, costs continue to decrease, and policymakers continue to implement favorable policies. Also, the increasing number of renewable installations and reliance on those resources due to climate change concerns and other reasons, will further storage growth to address dispatchability. Transmission constraints will necessitate transmission system improvements that storage may be able to fulfill. Finally, the growth in electric vehicles will further battery technology development, may provide a source of distributed storage, and may provide a source of reduced cost batteries in the form of electric vehicle batteries that exceeded their useful life for vehicles.

Storage Resources

There are a number of characteristics to consider in designing a storage project depending on the function the storage is intended to serve:

• Capacity: How many watts does the resource need to deliver?
• Duration: How long does the resource need to discharge that capacity?
• Response: How quickly does the resource need to begin discharging?
• Frequency: How often does the resource need to switch from charging to discharging?
• Efficiency: What percentage of the energy used to charge the resource is discharged?

Depending on the needs in relation to those characteristics, several different storage technologies are available for a project:

• Batteries: In a battery, electrical energy is converted into chemical energy for storage. The two types of batteries currently installed as storage resources are solid-state and flow batteries. The lithium-ion batteries that make up the majority of new storage installations are solid-state batteries. Flow batteries use tanks of liquid electrolyte solutions to store energy. Lithium-ion batteries historically have been cheaper and have outpaced flow batteries for that reason. However, lithium-ion batteries generally have been limited to providing energy only up to 4 MWh (megawatt hours). For applications requiring a longer duration, flow batteries can be more cost effective. Additionally, if flow battery technology developments can lower costs, flow batteries have other potential advantages over lithium-ion batteries in terms of lifespan, discharge frequency, and safety.
• Flywheels: In a flywheel, electrical energy is converted into kinetic energy in a rotating device. Flywheels have the ability to provide a large output (capacity) with a fast response time, but generally can only provide the output for a short duration. As a result, flywheels have generally been used for ancillary services like frequency response and not for capacity.
• Other technologies: There are other storage technologies available such as pumped hydro, compressed air, and thermal storage, but their use either has not yet taken off or slowed due to cost, location, and technology issues.
Financing Storage Projects

For in-front-of-the-meter installations (i.e., on the grid, on the utility’s side of the meter), non-utility owned storage, projects can be financed using the traditional pay-for-output model or a tolling agreement. First, a storage resource could be constructed where the resource provides or purchases the electricity needed to charge the resource and then sells its capacity and services into the market. Second, a resource could enter into a tolling agreement with a utility whereby the utility provides the electricity to charge, the utility charges and discharges the resource as needed, and the utility pays for the service.

For grid installations, there are ongoing developments in how to produce financeable projects. As established through FERC’s Order No. 841, other FERC orders, and California’s revenue stacking rules, storage resources will be able to produce revenue from multiple revenue streams, but the dependability and permanency of those streams and how they will be combined is still being worked out. Additionally, because the battery technology and its use for grid scale storage are relatively new, some uncertainty may remain in the market regarding its lifespan, any decline in output over the lifespan, and any increase in operating and maintenance costs compared to projects like wind and solar.

For behind-the-meter installations, financeable projects are most likely where the customer pays an electricity demand charge. In that situation, the customer could install storage, charge during off-peak hours, and discharge when demand charges increase during peak hours. Developers can agree to split demand charge savings with customers and thereby create a revenue stream to finance projects. Another option is to lease a storage system to a customer with the lease payments creating the revenue stream for financing.

Storage Project Risks

Largely due to the fact that the technology and law for storage projects are still developing, constructing storage projects involves a unique risk calculus:

• Technology Risk: Battery products are a developing technology that does not yet have widespread, long-term installations. EPC agreements for storage projects can address this risk through long-term performance guarantees. A new solution is the development of insurance coverage for battery performance. Additionally, the industry is developing the Modular Energy Storage Architecture which is intended to be an open set of specifications and standards furthering predictability, safety, and quality.

• Operating and Maintenance Risk: More complex compared to wind or solar installations due to storage having more functions and variables, the costs for a storage system can be higher and less certain.

• Safety Risk: Exploding cell phone lithium-ion batteries received substantial news coverage following incidents on airplanes in the past few years, and similar concerns exist for storage lithium-ion batteries. The main safety concerns for lithium-ion batteries are thermal runaway where a battery fire feeds itself and explodes, releases of dangerous gases during a battery fire, and battery fires that appear to be extinguished but reignite days or weeks later. Several different groups, like Underwriters Laboratories (“UL”) and National Fire Protection Association, are working to develop safety standards. Reducing safety risks requires attention to design, testing, and commissioning, all issues addressed in EPC agreements.

Developments in energy storage hold incredible promise for revolutionizing the energy grid, the use of renewable generation, distributed generation, and property owners’ control over their energy supply. As with any technological development, there are certain risks and challenges to overcome, but parties installing energy storage resources can minimize these issues through careful contracting and attention to developments in the field.

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Anyone who has opened a newspaper or turned on a television recently has likely seen a feature detailing the precarious state of America’s aged, and rapidly deteriorating, infrastructure. These troubling infrastructure conditions are not exclusive to any one location within the United States, but are instead commonplace throughout the country.

America’s infrastructure woes were highlighted in 60 Minutes’ November 2014 piece, aptly titled, “Falling Apart: America’s Neglected Infrastructure,” during which correspondent Steve Kroft interviewed then-Secretary of Transportation Ray LaHood. When asked to identify one place in the country that epitomized this problem, LaHood ominously responded that “You could go to any major city in America and see roads, bridges, and infrastructure that need to be fixed today. They need to be fixed today.”

Focusing on bridges for a moment, many states, after identifying a need to quickly and efficiently repair and maintain these important (and visible) pieces of infrastructure, have decided to enact legislation authorizing public-private partnerships (“P3s”). As the Commonwealth Court of Pennsylvania recently noted, “[t]ypically, in a P3 contract, . . . the private sector partner finance[s] the upfront capital costs and then recover[s] its investment over the term of the P3 agreement.” There is no “standard” public-private partnership arrangement, as the facts, issues, and circumstances of each potential project differ; this allows for much greater flexibility, and, in turn, much greater innovation. As the Design-Build Institute of America has noted:

“the definition of a P3 varies and can encompass a broad range of approaches that involve a contractual relationship between the public owner and one or more private sector entities. . . . Generally speaking, a P3 is a project delivery model that involves an agreement between a public owner and a private sector partner for the design, construction, financing, and often long-term operations and maintenance of one of more infrastructure assets by the private sector partner over a specified term. Under the P3 delivery model, the public owner transfers to the private sector partner risks that are typically retained by the public owner under a traditional delivery model such as design-bid-build.”

According to the Associated Builders and Contractors, 37 states, along with Puerto Rico, have enacted some form of P3 legislation with regard to horizontal construction/transportation. Take, for example, Pennsylvania. The Pennsylvania General Assembly passed the Public-Private Transportation Partnerships Act (“Pa. Act”) in 2012. Like most other P3s, the Pa. Act is a significant departure from the “usual” procurement process (e.g., sealed bids) and delivery systems (e.g., design-build, design-build, etc.) required for typical public construction projects. The Pa. Act instead allows the Pennsylvania Department of Transportation (“PennDOT”) and other state transportation agencies and authorities to transfer the responsibility for the engineering, construction, operation, and maintenance of new or existing “transportation facilities” to a private-sector entity for a defined time. The Pa. Act was adopted to promote innovative and efficient construction, rehabilitation, and maintenance of such transportation facilities (particularly Pennsylvania’s many structurally-deficient bridges) by tapping into the private sector’s ingenuity and economies of scale.

To date, the most significant project implemented under the Pa. Act has been the Rapid Bridge Replacement Project (“RBRP”) that PennDOT awarded to the consortium of Plenary Walsh Keystone Partners (“Plenary Walsh”) in October 2014. The RBRP is one of the largest (not to mention most ambitious) P3 projects in the country. Under the RBRP, Plenary Walsh is required to finance, design, construct, and maintain 558 structurally-deficient bridges located throughout the Commonwealth for a 28-year term. In exchange, Plenary Walsh will receive about $900 Million, before any contract adjustments.

While at first blush this might seem to be an expensive price tag, when the numbers are broken down, they reveal a significant savings to PennDOT (and thus the Commonwealth’s taxpayers). The RBRP kicked off in the summer 2015 and is
expected to wrap up some time this year; under ordinary delivery systems, these bridges would have likely taken upwards of 10 years to replace. Other states have had similar successes in implementing innovative P3 infrastructure projects.

Based on these successes, construction industry leaders, financiers, and, most importantly, lawmakers should now turn their attention to a less visible type of infrastructure: underground infrastructure. Regardless of whether policymakers and their constituents can observe the decrepit nature of their communities’ underground infrastructure, they need only look to places like Flint, Michigan to see that turning a blind eye is not a solution.

According to the U.S. Conference of Mayors, maintaining, operating, replacing, and upgrading the nation’s water infrastructure could cost between $2.8 trillion to $4.8 trillion through 2028. At the same time, however, according to the Congressional Budget Office, capital spending on new construction and major rehabilitation projects for water utilities is falling at an alarming pace.

Perhaps not so surprisingly, the American Society for Civil Engineers gave the country’s water infrastructure an abysmal “D” grade in its 2017 Infrastructure Report Card. In a similar vein, the Rand Corporation recently noted that, while certain aspects of infrastructure were improving, “problems [regarding water infrastructure] persist that defy easy solutions . . . and [that] many of the state funds for drinking water and wastewater plants have not been operating on a sustainable basis for some time now, and communities with declining tax bases struggle to maintain their . . . water systems and repay their debts to bond holders.”

By way of example, local officials in Flint, Michigan decided to switch water providers to cut costs, which required the city to temporarily use water from the Flint River. City officials, however, did not immediately treat the new water, and instead took a wait-and-see approach that only exacerbated corrosion of the city’s old water pipes that were still in place notwithstanding the fact that they were made, in part, from lead. Eventually, this corrosion caused the lead from the pipes to leach into the drinking supply causing a public health emergency and putting countless people in harm’s way. The cost to remedy the situation in Flint will cost millions, if not billions, of dollars. That pales in comparison, however, to the physical and mental harm that has been inflicted upon the people of Flint. Several public officials have been criminally charged in connection with Flint’s water crisis.

Perhaps in consideration of the situation in Flint and the presence of lead in waterlines in the City of Pittsburgh, in November 2017, Pennsylvania’s Auditor General, Eugene DePasquale, issued a scathing 55-page report (“Report”) that outlined the deficiencies plaguing the Pittsburgh, Pennsylvania Water & Sewer Authority (“PWSA”). Ominously, DePasquale expressly noted “that PWSA’s aging and deteriorating infrastructure issues and financial and operational long-term viability issues result from years of mismanagement and conflicted leadership causing a crisis in the authority’s governance.”

The Report offered numerous alarming details, including: (i) the PWSA system, which includes, approximately 1,200 miles of pipes, is in “deplorable” condition; (ii) PWSA’s average annual capital improvement investment is $31.4 million; and (iii) that PSWA’s average annual capital improvement investment should be $200 million.

Because of the breadth of issues tormenting the PWSA, and surely many other municipalities and water authorities, one potential mechanism to achieve infrastructure-related goals could be through the use of P3s. Although Pennsylvania, like many states, has only enacted a P3 statute accommodating horizontal construction/transportation projects, there may be creative ways around such limitations. For instance, the Pa. Act applies to “transportation facilities,” which is broadly defined as “[a] proposed or existing road, bridge, tunnel, overlap, ferry, busway, guideway, public transportation facility, vehicle parking facility, port facility, multimodal transportation facility, airport, station, hub, terminal or similar facility used or to be used for the transportation of persons, animals or goods… The term includes any improvements or substantial enhancements or modifications to an existing transportation facility.”

Based on the emphasized text above, the Pa. Act appears to be broad enough to include underground infrastructure within “transportation facilities.” Creative lawyers, financiers, and contractors in other states could make similar arguments under their own P3 acts. Therefore, states, municipalities, and water authorities could at least discuss considering the addition of P3s to their respective arsenals in an effort to properly, and efficiently, remedy the “deplorable” underground infrastructure plaguing our country. If this discussion does not yield use of the current P3 statutory structures, it should then prompt a legislative dialogue in order to expand the
application of P3s to underground infrastructure projects.

Texas and a handful of other states already explicitly permit such underground infrastructure P3 projects. In fact, the San Antonio Water System recently took advantage of this legislation to enter into the $3.4 billion Vista Ridge Water Supply P3 Project, which has received critical acclaim, and numerous “best project” awards.

As P3s gain greater notoriety, they will become increasingly more common. This is particularly true in light of President Trump’s recent pronouncement that P3s can, and should, play a large role in his administration’s $1.3 trillion infrastructure plan.

Ultimately, we must acknowledge the critical issues plaguing our country’s underground infrastructure before it is too late. With that in mind, these issues can no longer be tucked into a not seen and, therefore, not to be bothered with category. In order to provide safe, clean drinking water, and reliable wastewater disposal systems, states, municipalities, and water authorities throughout the country should seriously consider utilizing P3s to replace these ticking time bombs before this issue becomes one of further crisis in America.

* A version of this article previously appeared in the January/February 2018 issue of Breaking Ground (Tall Timber Group).

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### DIVISION 10 CONFERENCE CALL

**Time:** 10 am PDT/1 pm EST

**Wednesday, September 5th**

**Call in:** 866-646-6488

**Passcode:** 660 581 7144

### UPCOMING FORUM EVENTS

#### 2018 Fall Meeting

**October 3-5, 2018**

**Montreal, Canada**

#### 2019 Mid-Winter Meeting

**January 31- February 1, 2019**

**Los Angeles, CA**

#### 2019 Annual Meeting

**April 24-27, 2019**

**Hollywood, Florida**
The Future Is Now: Elon Musk’s Plans for Mass Transit

By: Mark J. Kalar, Esq.

In 2015, my social feed was filled with posts from fellow Gen-Xers bemoaning the lack of floating skateboards and self-lacing shoes—predicted in 1989 in Back to the Future Part II. There are numerous examples of how spectacularly 80s science fiction’s vision of the future overshot the technological mark (e.g. Blade Runner, 2001, Terminator, etc.). It seems safe to assume that at least one child of the 80s sees this not as a humorous nostalgia point, but as a gap to be bridged.

That person is Elon Musk, best known as the CEO and cofounder of Tesla. But, he has become nearly as well known for his myriad other endeavors: private space transportation, artificial intelligence, solar energy, implantable brain–computer interfaces, and colonizing Mars. The recurring theme in these projects is the use of technology to “influence the future of humanity.”

Musk’s love of science fiction may help explain why Musk is so willing to take on projects that seem, on their face, to be impractical if not impossible. For example, boring tunnels under existing metropolitan areas to allow for high-speed underground public transportation systems in which passengers are transported on autonomous electric skates traveling at 125-150 miles per hour. When flying cars are the science fiction alternative, tunnels and trains propelled using magnetic levitation (i.e. maglev) become less obviously outlandish.

Musk’s The Boring Company, tasked with solving “the problem of soul-destroying traffic,” invites us to engage in a thought experiment. What if public transportation was approached, not as a reaction to or updating of current systems, but as a from-scratch, engineering-the-future-today problem? What if we ignored jurisdictional regulatory squabbles and past infrastructure investments and focused, single-mindedly, on figuring out how to move lots of people as efficiently as possible? What is the right solution to transit, today, in 2018?

Mass transit has, throughout American history, been intrinsically linked to local and national trends culturally and technologically. Steam powered ferries allowed early-19th century commuters to live in suburban (at the time) Brooklyn and work in Manhattan. Not long after, New York and other east coast cities were boasting omnibus service—horse drawn carriages—for those well-heeled citizens who could afford the 12¢ fare.

As the 19th century ended, transit was moving from horses back to steam. Recognizing that steam-powered transport could move at a significantly faster pace than horse drawn transport, Chicago and New York built elevated railways. When electricity became a reliable source of power in the 1890s, cities started moving underground, which didn’t overshadow the streets. The cost to build underground systems in Boston and New York led to state involvement in managing public transportation systems.

Electric streetcars emerged at roughly the same time and spread across the country. Requiring less infrastructure investment than subways or elevated trains, streetcars became the transit system of choice as America grew in the early 20th century, until the widespread adoption of the automobile led to the decline and abandonment of streetcar systems in favor of buses. Although commuter rail is still widely used, at least in major urban centers like the Eastern Seaboard, Chicago, San Francisco, and LA, it is almost entirely publicly subsidized.

As government’s financial stake has grown in public transit systems, so has public regulation. In addition to myriad overarching federal regulations such as those propagated by the Federal Transit Administration, under the aegis of the US Department of Transportation, transit systems must also comply with the regulations of each state’s individual department of transportation, along with any local requirements.

Musk’s plans are audacious because his proposal, on an abstract level, uses 21st century technology, but hearken back to a 19th century strategy: physically separate mass transit from slower moving auto traffic. Musk’s plan, conceived while stuck in LA traffic, is to dig tunnels under America’s biggest urban centers. Through these tunnels, maglev skates will carry commuters, in their own cars or in small
cabins, close to their final destination at up to 150 mph. For long distance commuting, similar sleds and cabins can travel through depressurized tubes to reach speeds up to 600 mph.

The technology of these systems is, from a theoretical engineering perspective, relatively simple. Magnetic levitation reduces friction with the rails and allows a skate or cabin to travel at high speed with relatively low energy costs (the “loop”). Reduce air friction too, in a depressurized tube, and you can go even faster (the “hyperloop”). Because the skates are autonomous, they can move at these speeds relying on technology and a network of discrete tunnels to avoid collisions.

Returning to our thought experiment, the loop and hyperloop make perfect, logical sense in the abstract. They are ultra-efficient, and not surprisingly coming from Tesla’s CEO, are strictly electric. According to The Boring Company, this makes the systems practically zero-emission. The systems are also discrete and physically removed from the personal automobile transportation network, so speed and safety concerns related to high- and low-speed traffic intermingling are reduced.

But, and it’s a big “but,” there’s still the small matter of boring tunnels under America’s densest and most expensive real estate. Musk claims the reason it hasn’t been done before is the cost of tunneling: “as much as $1 billion per mile. In order to make a tunnel network feasible, tunneling costs must be reduced by a factor of more than 10.” Which is why The Boring Company is a boring company, and not a transit company.

At TED2017, Musk outlined an engineering strategy to make tunneling more efficient. First, the single-vehicle skates can be accommodated in tunnels half the size of typical subway tunnels, which cuts the boring time by 75%. Second, reinforcing the freshly dug tunnels is integrated into the tunneling process itself, saving the time necessary to stop digging and reinforce at regular intervals. Finally, Musk is confident The Boring Company can “jack up the power” of current machines. It is perhaps the vagueness of this last point that has led the strategy to be met with considerable skepticism. What remains to be seen, though, is whether Musk can surmount less abstract obstacles in reimagining modern transit.

One of the most frequently compared endeavors is the “Big Dig” in Boston. The Big Dig rerouted I-93 through the heart of Boston from an overhead highway structure to an underground tunnel system, including several interchanges. At an estimated total cost of $24.3 billion, it also cost more than sending the entire population of Flint, Michigan to the most expensive four-year college in the country. The Big Dig encountered resistance from federal and state environmental agencies, local colleges, railroads, and safety advocates. If a project in a single city ended up being built at a cost 190% over budget and years overdue, what chance do multijurisdictional projects under private property have?

Mr. Musk has shown considerable confidence in the transit projects he’s identified so far: connecting LAX to Culver City and O’Hare airport to downtown Chicago, and from downtown DC to downtown Baltimore. Cities have shown, at best, cautious optimism about the potential. In Culver City, at a city council meeting, The Boring Company’s COO, Jehn Balajadia, made a pitch that was big on energy and ideas but short on details. Unanswered questions from the public included how committed The Boring Company, as a private, for-profit enterprise, would be to equity—a signal that transit is firmly entrenched in the public as a wholly public institution—and whether the technology was adequately developed.

Aside from these eminently practical concerns, Musk has also done much self-inflicted harm. He claimed to have “verbal government approval” to build the Eastern Seaboard hyperloop. Of course, there’s really no such thing as verbal government approval, let alone for a project crossing multiple states and local jurisdictions. The Chicago project has been similarly subject to differing opinions as to its regulatory position and the level of support from the city.

Musk also made waves by expressing his own dislike for public transit. After starting with a fairly rational complaint that transit doesn’t go where or when you want it to, he went on to complain that any “one of [your fellow passengers] might be a serial killer.” The intense backlash included its own Twitter hashtag (#GreatThingsThatHappenedOnTransit) that included pictures of cute kids and stories of commuters meeting future spouses on the train.

While Musk is doing himself no favors by such off-the-cuff remarks that alienate potential partners, The Boring Company itself is trying to stay above the fray. Its spokesperson noted “Musk was criticizing today’s public transportation systems, not the idea of mass transit itself.” And, while there is no shortage
of heartwarming stories around transit experiences, there is a broader question, an engineering question, as to whether such experiences need to be considered as part of the design problem at hand.

Transit advocates are suspicious, tunneling specialist are suspicious—it’s safe to say that Musk has his work cut out for him in terms of winning over the establishment. But, consistent with our current cultural obsession with disruption, it’s also safe to say Musk will continue to find plenty of supporters who will back his vision. And, it may be that actual implementation is not Musk’s goal—some of his other projects, such as the Tesla Solar Roof, have been introduced with great fanfare but orders have not been filled. At the time of this writing, Tesla’s stock performance is suggesting the market doesn’t share this ambivalence to results.

Regardless of whether or not The Boring Company actually succeeds in connecting urban areas via high-speed maglev skates, Elon Musk has already succeeded in challenging some fundamental ideas about what transit should look like and how it should operate—an industry that has been largely reactive for the past century. Our culture has changed considerably over that time, and it follows that our mass transit system should change accordingly to match.

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Five Reasons You Need a Hydrogeologist on Your Construction Defect Case

By: Dr. David S. Lipson

Water can be a causative or contributing factor in many construction defect cases, particularly in areas where shrinking or swelling soils damage building foundations. Some types of soil contain clay minerals such as bentonite that expand when they become wetted, and this clay-swelling mechanism can cause differential movement of foundation elements and subsequent property damages. Other types of soil containing the mineral gypsum can contract or collapse when they become wetted, again potentially causing differential foundation movements and property damages. Soils that are prone to shrinking or swelling occur naturally in the Earth’s crust and their existence in the US has been mapped by government agencies. The structural, mechanical, and chemical properties of shrinking and swelling soils have been known about and investigated by scientists and engineers for over 100 years. These concepts are taught in many science and engineering departments, and most technical information regarding this issue is readily available on the internet. Moreover, engineers have been utilizing standard methods and best practices to identify and ameliorate the influence of shrinking or swelling soils in their designs for decades.

Yet foundation and building damages continue to occur at new and even older developments due to a variety of foreseeable and unforeseen factors, like climate change. Earth’s climate has become more volatile and subject to more extreme weather events over the past several decades, which manifests as larger storms, greater floods, more extensive forest fires and soil erosion, longer-lasting droughts, and changes in rainfall and snowfall patterns. The definition of the 100-year storm is changing. All of these changes in weather patterns change the ways in which water interacts with structures.

When property damages occur, and disputes arise over causation and allocation of liability where water is a causative or contributing factor, hydrogeologists are uniquely qualified to address such questions as: Where did the water come from? Did the water
Hydrogeology is a multi-disciplinary science and engineering field that combines geologic and hydrologic principles. Hydrogeology focuses on the flow of water and other fluids through earth materials, and involves special scientific concepts, testing procedures, and mathematical formulas that are specific to the field. Hydrogeologic principles are involved in almost all subsurface engineering endeavors such as the design of foundations, housing developments, water supply systems, dewatering programs, resource extraction activities, and tunnels.

Here are five reasons you might need to get a hydrogeologist involved in your construction defect case:

1. Water Table. You need a hydrogeologist if your construction defect case involves or may involve the water table. Many construction defect issues arise in areas with a shallow water table, with groundwater within five to fifteen feet of the surface. Issues may arise in areas where the water table rises and falls due to seasonal climate patterns and irrigation schedules, in areas with fine-grained soils, or in areas where the water table is rising. Another often-overlooked groundwater feature that may contribute to foundation damages is a “perched” water table, which is a zone of groundwater saturation above the regional water table that may not be readily detectable during standard geotechnical site investigations. The water table cannot be readily seen, but when its position changes it can come in contact with foundation elements and cause damages. Hydrogeologists have specialized training and skills to determine the potential role of the water table in construction defect cases.

2. Surface Water Infiltration. You need a hydrogeologist if your construction defect case involves or may involve water infiltrating into the ground from a surface water source and coming into contact with structures, causing damage. Examples include seepage of water into the ground from streams, lakes, wetlands, ditches, reservoirs, and other surface water features, or even lawn watering or other irrigation practices. Water infiltrating into the ground cannot readily be seen, but it can seep into the backfill zone, come in contact with foundation elements, and cause damages. Hydrogeologists are uniquely qualified to investigate and determine the potential role of surface water infiltration in construction defect cases.

3. Shrinking or Swelling Soils. You need a hydrogeologist if your construction defect case involves the presence of shrinking or swelling soils, especially if the source of water that entered the backfill zone is unknown and comprised of multiple water sources. The flow of water in shrinking or swelling soils is complex and governed by such factors as mineralogy, grain size distribution, soil structure, and the chemistry of the water, and requires specialized training to characterize, sort out causative factors, and help allocate liability. Hydrogeologists have specialized training and skills needed to understand the flow of water in shrinking or swelling soils.

4. Water Quality Considerations. Water quality is concerned with dissolved substances and overall water chemistry and is an important consideration in the design and construction of subsurface structures from a materials-compatibility perspective. Different types of water can react differently with different construction materials, and not all water types are compatible with all types of construction materials. For example, adverse chemical reactions can occur between water and certain kinds of concrete if the water is corrosive, basic, or contains reactive chemicals such as sulfates, and can manifest as efflorescence in foundation cracks and degradation of concrete. Acidic water can corrode metal foundation components and weaken structures. Moreover, water quality can change over time if new or multiple water sources are present. Many hydrogeologists are trained in aqueous chemistry and geochemistry, and have specialized skills needed to understand water quality, changes in water quality, and chemical compatibility questions.

5. Moisture Intrusion Issues. You need a hydrogeologist if your construction defect case involves or may involve moisture intrusion into basements, sumps, and crawlspaces and is a causative or contributing factor. Moisture intrusion can cause sump pumps to run continuously, efflorescence in foundation cracks, spalling and other degradation of concrete structures, and water damages to floors and finished surfaces. Moreover, the presence of mold in buildings is directly related to the presence of moisture, because mold colonies require a continuous source of moisture for growth and maintenance. In other words, the presence of
a mold problem can be an indicator of a moisture intrusion problem. Fix the moisture intrusion problem, and the mold issue can be resolved. When the root cause of moisture intrusion is in question, hydrogeologists have a unique combination of skills necessary to sort out causation from correlation.

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By: Esther Soria Mignanelli, Esq.

Two federal circuit courts have recently held that companies and municipalities can be sued under the Clean Water Act (“CWA” or the “Act”) for contaminating “Waters of the United States” (or “jurisdictional waters”) if the pollutants at issue can be traced through groundwater of the same hydrologic system to the original point source of the spill or release. These cases have broad implications for many industries, including oil and gas development and construction.

In Hawai’i Wildlife Fund v. County of Maui, the Ninth Circuit became the first federal appellate court to squarely find that a discharge into groundwater without a NPDES permit violates the Act if those pollutants reach jurisdictional waters. Specifically, the court ruled that Maui County violated the Act by discharging sanitary wastewater collected at a treatment facility into four permitted underground injection wells without obtaining a NPDES permit. Although the wells did not lead directly to jurisdictional waters, a portion of the treated wastewater eventually entered the Pacific Ocean through the ocean floor. Before the Maui decision, the EPA and the United States Army Corps of Engineers “ha[d] never interpreted the ‘waters of the United States’ to include groundwater.” Thus, federal district courts have long reached inconsistent decisions on whether materials discharged into groundwater that later reach jurisdictional waters required a NPDES permit. In Maui, the court held the discharge at issue was the “functional equivalent” of a discharge into surface water because the path from the point source to the surface water was “fairly traceable.”

This marked the first federal appellate court to recognize the so-called groundwater “conduit theory” of liability under the CWA; a theory environmental advocacy groups often rely upon in CWA citizen suits. This trend continued in April 2018 when the Fourth Circuit ruled in Upstate Forever v. Kinder Morgan Energy Partners that as long as a citizen-suit plaintiff alleges a direct “hydrological connection” between groundwater and navigable waters, it can state a claim under the CWA for a discharge of a pollutant that passes through groundwater. In the Kinder Morgan case, two environmental organizations filed a lawsuit alleging CWA violations stemming from a leak in a pipeline that occurred in 2014. According to the complaint, petroleum products leaked from the pipeline, then seeped into groundwater, and then later traveled into two nearby creeks and two adjacent wetlands. Although the pipeline, as the point source, was fixed within a few days of discovery, the plaintiffs alleged that a plume of contaminants continued to migrate from groundwater to surface water several years after the leak was fixed.

The district court in Kinder Morgan first concluded the “CWA does not apply to claims involving discharge of pollution to groundwater that is hydrologically connected to surface waters” and dismissed the suit. But the Fourth Circuit flatly
disagreed.

Before addressing the “conduit theory” head on, the Fourth Circuit first had to determine whether the plaintiffs’ complaint alleged an “ongoing violation” of the CWA, because the CWA’s citizen suit provision does not authorize a suit based upon past violations. The court held the CWA did not require a continued release from the pipeline in order for the violation to be “ongoing.” Rather, the constituents from the previously-released gasoline that continued to flow to jurisdictional waters from the groundwater, coupled with the alleged migration of those constituents from groundwater to surface water, was sufficient to allege an “ongoing violation” and for the plaintiffs to clear this jurisdictional bar. As for the plaintiffs’ “conduit theory,” the majority held that pollutants originating from a point source that migrate through groundwater with a “direct hydrologic connection” to the surface water are regulated by the CWA. The court recognized that its “direct hydrologic connection” test was not functionally different from the Ninth Circuit’s “fairly traceable” test.

The Maui and Kinder Morgan decisions have the potential to significantly expand the scope of the CWA to cover a wide range of unintentional or accidental discharges or run-off events that reach surface waters through complex underground waterways. Since it is impossible for owners, contractors, or other operators of a large construction or energy infrastructure site to obtain a discharge permit to cover such accidental releases, such as a leak from a pipeline, this continued expansion of the scope of liability under the CWA could have far-reaching impacts. For example, if this trend continues, coverage under general liability insurance policies might become more difficult to assess, especially in cases where a CWA violation is indirect and the length of any ongoing liability depends upon the geology of the specific site. In addition, the allowance of CWA citizen suits to continue after the source of a discharge has been stopped will increase exposure for companies that have taken remedial actions to correct a leak or to address residual groundwater contamination. This might also cause a remediator to pause before disclosing assessments of ongoing remediation projects to government agencies or other third parties in light of a perceived risk that such documentation might constitute evidence in support of a future citizen-suit alleging ongoing contamination through migration of constituents through complex waterways.

Since the Fourth and Ninth Circuits are the first to adopt the groundwater “conduit theory,” and certain other circuits have previously outright rejected it, we can likely expect more litigation over the legitimacy of this theory to unfold in the coming months and years.

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Dead Men May Tell No Tales, But Lost Shipments Will Haunt You

By: Wendy Estela Scaringe

One of the greatest risks on a construction project is schedule delay, which can be caused by damage, loss, or late delivery of critical “project cargo,” such as a turbine for a power plant project. Damage, loss or delay of project cargo can result in costs many times the replacement value of the cargo, due to damages associated with delays, liquidated damages, and business interruption. Parties with an interest in the timely completion of the project must ensure that critical project cargo and risks related to potential delays are adequately managed. This article will familiarize practitioners with common transport issues, the intersection of marine cargo insurance and construction project delays, common transport issues, and risk reduction through insurance and best practices.

International shipping transports 90% of the world’s goods. In the past decade, large shipping losses have declined by 50%, in large part due to safety enhancements made by ship owners. In 2016, 85 ships were lost, down 15% from 101 from the previous year. During the same period, incident and casualty losses also decreased by 4%. While losses in the ocean cargo transit industry have been decreasing, new risks have emerged alongside old stalwarts:

• Market changes due to the consolidation of major carriers and bankruptcies
• Theft, fraud and corruption
• Piracy
• Natural catastrophes, including adverse weather
• Human error
• Machinery breakdown
• Cargo exposure due to vibration, moisture, crushing, dropping, infestation, or temperature extremes
• Warranty surveyors that are not present or that are ineffective
• Lack of marine expertise during an operation
• Climate change
• Cyber attacks
• Increasing size of ships and mega ships

To manage ocean-related risk, parties with an insurable interest may purchase ocean cargo insurance as well as delay in start-up insurance (DSU). Most ocean cargo insurance policies protect both project cargo and freight for a specific voyage and term at an agreed value. Typically, ocean cargo insurance policies are written on an “all risks” as opposed to a “named perils” basis, providing more comprehensive coverage and shifting the risk of proving a coverage exclusion to the carrier. Marine cargo policies generally do not provide coverage for resulting construction project schedule delay unless the policy is specifically endorsed with DSU coverage.

Usually acquired by the project owner, DSU coverage is generally written as part of the builder’s all risk (“BAR”) policy or an ocean cargo policy, and requires a physical loss which causes the delay. This policy can also be referred to as an Advanced Loss of Profit, Anticipated Profits, Delayed Earnings, Delayed Profits, Delayed Completion Insurance, or Delayed Opening policy. This coverage insures against risks associated with the late completion of a project, including income loss, additional expenses, interest charges and advertising expenses.

General Contractor/Owner/Assured. The General Contractor or the Project Owner of a major construction project typically purchases equipment from the original equipment manufacturer (OEM). It is common that the risk of project cargo loss contractually remains with the OEM supplier until reaching its contractual destination. Even though the OEM supplier may have the risk of loss contractually, the General Contractor and the Project Owner have an interest in the equipment arriving at the construction site on time and undamaged, so these parties will closely monitor the progress of the shipment in conjunction with the supplier, using a marine surveyor to monitor critical risks during transit.

Wendy Estela Scaringe

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Owner/Assured. Depending on contractual structure of the construction project, the Owner most likely will purchase DSU coverage as part of a BAR policy or a marine cargo policy. The DSU coverage is intended to insure against project delays resulting from physical loss or damage to either the facility under a BAR policy, or to the equipment in transit under a marine cargo policy.

Marine Warranty Surveyor. The marine warranty surveyor is a third-party contracted by the Assured and approved by the Insurer, to monitor the movement of cargo while in transit, to support the marine survey warranty typically found in project cargo and DSU policies and to minimize losses based on a list of critical items. The marine warranty surveyor will:

• Review the critical items schedule and advise the Insurer if any of the information is insufficient
• Review the information to determine suitability of lifts, stowage and securing of the critical items
• Visually inspect the conveyance to determine it meets applicable standards
• Send reports to the Assured, Insurer and Broker within a proscribed period from shipping/loading/discharge, which includes the marine warranty surveyor’s opinion of whether the goods have been appropriately secured for the voyage.

Freight Forwarder. A freight forwarder provides expertise and services to a shipper on all aspects of transportation. A freight forwarder is not a carrier and does not take legal possession of goods. A shipper is not required to utilize the services of a freight forwarder. Freight forwarders usually have logistical know-how, economies of scale and shipping discounts, experience with import and export rules and the ability to coordinate shipments, especially if there are different modes of transportation.

Practice Points & Best Practices – Marine Cargo/DSU Coverage

One of the more significant commercial risks parties grapple with in construction contracts is late delivery of components and overall late completion of the projects. When project Owners and General Contractors enter into contracts for major projects, loss of cargo on the open seas may appear to be one of the more attenuated risks. However, loss or damage to OEM equipment in transit at sea can impact project completion and subject the OEM Supplier and General Contractor to significant liquidated damages under the project contracts.

DSU policy language does not typically address the intersection of liquidated damages and the collection of DSU insurance proceeds, nor does a typical construction contract. Sophisticated parties should address these issues early in the contract negotiation and insurance placement process to clarify expectations. The Assured should communicate openly with its broker and share the contract structure. If a project completion delay is caused by an event that also allows for recovery through a DSU claim, the Owner should not have the ability to collect substantial liquidated damages from the General Contractor as well as DSU insurance proceeds, resulting in a windfall. The parties should negotiate the construction contracts to address the issue, and the Owner, as Assured, should carefully negotiate and review the DSU policy to confirm that the DSU insurer does not obtain an offset or credit to account for the liquidated damages collected by the Project Owner. Ideally, DSU proceeds should be paid regardless of whether the Owner has a right to collect liquidated damages, in part because collection of liquidated damages is often disputed resulting in the Project Owner receiving less than originally bargained for and incurring attorneys’ fees to get there.

Conclusion

Risk managers for owners, OEM suppliers and general contractors in the construction industry should become familiar with the liability structure of marine cargo insurance and how it could impact their construction projects. Risks encountered at sea, including sinking vessels, piracy and damage from exotic storms may be perceived as attenuated, but statistics show that they are real and have an impact on construction projects due to damaged or lost equipment or delayed shipments. While the rules of marine cargo and transit may seem esoteric, insurance brokers and underwriters can assist with setting expectations and explaining what coverage is appropriate. Risk managers must understand their supply contract terms and conditions and should be active participants in the placement of insurance coverage and monitoring of cargo transport.

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