A Sociotechnical Analysis of the Barriers to Green Infrastructure Design in Companies

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Green Infrastructure Implementation in Companies

Why is green infrastructure not the default design technology for civil engineering design companies? Green Infrastructure technology represents a sustainable and regenerative way to move the civil engineering design field forward and manage globaly shifting stormwater volumes. As total atmospheric water is modeled to increase at a rate of 7% per kelvin and precipitation has been found to increase at a similar rate (Wentz et al, 2007), the burden on existing stormwater management (SWM) infrastructure will increase. The current standard practices of utilizing networks of pipes, gutters, and tunnels will require larger and larger element sizes without a shift in design thinking. Larger elements mean greater costs for the additional materials and greater embodied carbon emissions due to the production and transportation of each part of the system. The reinforcing feedback loop created by global climate change and larger SWM system elements necessitates a better solution which comes in the form of green infrastructure; the Water Infrastructure Improvement Act defines green infrastructure as "the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater and reduce flows to sewer systems or to surface waters." (H.R.7279 - 115th Congress, 2017-2018, p. 5). While "Green infrastructure increases exposure to the natural environment, reduces exposure to harmful substances and conditions, provides opportunity for recreation and physical activity, improves safety, promotes community identity and a sense of well-being, and provides economic benefits at both the community and household level." (EPA, 2017, p. 1), it is often not the first solution explored in civil engineering projects within design firms. This status quo is damaging, and a deeper integration of green infrastructure technologies is needed within private design firms. In this research paper, the sociotechnical analysis of green infrastructure implementation in companies is conducted through the application of the theory of technological momentum to contextualize and understand the possibilities for change and adoption of green infrastructure technologies. This analysis will serve to answer the question: what barriers exist in the implementation of green infrastructure design within engineering design companies?

Methods to Identify Barriers

To collect the necessary data to answer the research question and facilitate the discussion, this paper utilizes several methods. Literaty research of new financial strategies which include the economic benefits and hinderences of adopting green infrastructure practices and their associated costs was conducted to closely inspect the adoption of green design practices in design firms.. Keywords for this search include the following: green infrastructure, blue green infrastructure, sustainability, stormwater, sociotechnical, economic, benefits, companies, urban, climate, technological momentum, change, and design. An interview with a practicing engineer aids in providing context for the motivations of implementing green design. This interview comes in the form of a discussion of the ethical implementations of designing with Alex Torres, a civil engineering consultant at Kimley-Horn of DC who specializes in green infrastructure design. This interview sets the foundation for an ethical analysis of if gray infrastructure design should be used at all and the questions are included in **Appendix A**. A brief autoethnographic note speaks to environmental ethical education in civil engineering curriculums. Finally, an analysis of barriers to client investment in green infrastructure provides context towards market factors and interconnects with policy. Together these methods aid in synthesizing the connections between technological momentum, companies, and the implementation of green infrastructure technologies within them.

The History of Stormwater Management and the Need for Green Infrastructure

Scholars identify the first adoptions of storm drainage systems before the year 3000 BC saying,

> Although there is evidence of surface-based storm drainage systems in early Babylonian and Mesopotamian Empires in Iraq (ca. 4000-2500 BC), it is not until after ca. 3000 BC that we find evidence of the well organized and operated sewer and drainage systems of the Minoans and Harappans in Crete and the Indus valley, respectively. The Minoans and Indus valley civilizations originally, and the Hellenes and Romans thereafter, are considered pioneers in developing basic sewerage and drainage technologies, with emphasis on sanitation in the urban environment. (de Feo et al, 2014).

As the wisdom of city design developed, the idea of taking wastes and moving them away from their source became the default way to reduce disease and flooding. The benefits of reduced disease and flooding led to the mainstream adoption of pipe networks as the standard design practice for water and waste management. With the increased size and density of cities today that means miles of sprawling stormwater pipe networks. This model necessitates the constant expansion of those networks and, in cases like the combined sanitary and storm sewers of New York City and Boston, can easily become overwhelmed by storms resulting in "direct discharge of untreated human, commercial, and industrial water into surface waters" (EPA, 2013). As well as being damaging to city ecosystems and posing risks of cholera and other diseases to people, the release of human waste into waterways and streets will only become more prevalent. According to co-director of the Center for Climate Sciences at NASA's Jet Propulsion Laboratory, Joao Teixeira, "Within the scientific community it's a relatively well-accepted fact that as global temperatures increase, extreme precipitation will very likely increase as well. Beyond that, we're still learning" (Buis, 2020). With climate change increasing levels of precipitation and severity of storms across the globe, pipe systems which are already nearing capacity will only suffer further failures and challenges. A better solution is needed for our SWM infrastructure

The traditional style of stormwater management (SWM) is also referred to as gray infrastructure, which the EPA defines as “systems of gutters, pipes, and tunnels—to move stormwater away from where we live to treatment plants or straight to local water bodies.” (EPA, 2021, p. 1). A more sustainable SWM solution comes in the form of green infrastructure. Over the life of a project, green infrastructure technologies can reduce building heating costs and provide benefits that can outweigh higher upfront costs as seen in a 2008 study of green roofs in Portland. The study concluded that private properties receive a $404,000 benefit over the already longer than average forty-year lifespan of the roof and public buildings saw a five-year benefit of $101,660 and a forty-year benefit of $191,421 (Adams, 2008).

Other scholars also propose a “multifunctional infrastructural approach to surface water management” they call Blue/Green Infrastructure or BGI, which adds a focus on amenity and biodiversity to the measures of quantity and quality that are traditional performance metrics for green infrastructure (Bacchin et al, 2016). The addition of blue in BGI serves to highlight the relationship between natural hardscapes, water detention, and water filtration that make the technologies so powerful. Scholars say properly implemented BGI systems are able to maximize benefits through their considerations of greater system factors (Bacchin et al, 2016).

To understand the barriers to change within civil engineering firms, a look into the history of change in the industry is needed. Graduate civil engineering student Omar Maali offers solutions for change management in companies and begins by writing,

> The architecture, engineering, and construction (AEC) industry has often been accused of being slow to adopt change. Yet the breadth of available technology solutions in the

> modern AEC industry continues to grow. Companies therefore must be adept at organizational change management; otherwise, the full benefits of technology solutions may never be realized when a company fails to achieve successful change adoption (Maali et al, 2020).

In the past, the industry had time to slowly modify codes and adopt new technologies, but with current climate concerns, that window does not exist. With President Biden's infrastructure bill calling for a large amount of new construction that will last for decades, the adaptation needs to happen now in order to make a difference. On the topic of traditional views of stormwater management, Stuart Echols and Eliza Pennypacker say,

> Although rainwater has been considered a resource in agricultural contexts for millennia, in urban contexts it has historically been considered a waste product. With some exceptions in historical management strategies, urban rainwater was treated as a problem to be mitigated, a waste product to be eliminated or controlled (Echols et al, 2015).

As traditional design choices and implementations are questioned, the same conclusion is often reached. Civil engineering design needs to change to a more sustainable, regenerative, and green model of infrastructure design and it needs to happen now. This will not come without growing pains or barriers for the designers of today and these factors are explored in the analysis of green infrastructure implementation in companies.

Technological Momentum in Civil Engineering

In order to contextualize the research presented in this paper, American historian, Thomas P. Hughes' theory of technological momentum will be utilized to analyze the questions this paper tackles. In his most influential paper on the topic, Hughes concludes,

> A technological system can be both a cause and an effect; it can shape or be shaped by society. As they grow larger and more complex, systems tend to be more shaping of society and less shaped by it. Therefore, the momentum of technological systems is a concept that

> can be located somewhere between the poles of technical determinism and social constructivism. (Hughes, 1994, p. 112).

Technological momentum allows technologies to be explored from the point of view of how society shapes, molds, and chooses to implement a technology but also how technologies can influence the ways in which society operates. Critics may point to the lack of a rigid theory of strictly social construction or technological determinism, but that is what makes technological momentum so valuable.

Another definition of technological momentum comes from scholar, Dean Dyer who says, "… technological momentum can be defined as the increase in the rate of: 1. the evolution of technology, 2. its infusion into societal tasks and recreations, 3. society's dependence on technology, and 4. the impact of technology on society." (Dyer, 1995). In his paper, Dyer points out the concerns that technological momentum can bring about too much technology and new technology too fast, asserting that "Technology is a means to the end of progress." (Dyer, 1995). He asserts that technologies create a need for new technologies which can be dangerous in situations like nuclear proliferation. Technological momentum can generate a cyclical pattern of new technology genetation followed by that technology influencing society and then a need for more new technology in response. Vicious cycles can come from technological momentum but do not have to exist as the only option of the framework's application. Dyer makes a point to conclude that technological advancement should be checked by experts and public opinion which misses the portion of the framework of technological momentum which allows society to influence technology even after it has gained momentum. To lessen the influence of society on a technology as it grows larger and more complex is not the same as to remove the influence of society completely. What it seems Dyer is arguing against is a push to allow soft technological determinism to dominate the way technologies are created.

Dyer, however, is not the only scholar focused on tecnological momentum. Georgia Tech assistant professor of philosophy, Robert Kirkman describes technological momentum as a means of intertwining the technical and social domains which have traditionally been viewed as completely separate (Kirkman, 2004). Kirkman utilizes technological momentum to describe the suburbanization of metropolitan areas as a sociotechnical system "…through which the functions traditionally associated with cities (e.g. housing, employment, and commerce) are dispersed across whole regions." (Kirkman, 2004). He draws connections between the technical hardware of construction equipment and the social elements of local review authorities, legal entities, and financial institutions. Pointing to the socially constructed roadway system of arterials and cul-de-sacs that has gained momentum, it becomes clear throughout Kirkman's writing how the road network, which acts as the outlines for development, influences the ways in which construction is carried out and areas are suburbanized. The layout of suburbinization, in turn, affects the way businesses are laid out and lowers the efficacy of transit systems while reinforcing the need for a passenger car in a technologically deterministic fashion which fits neatly into the model of technological momentum. Kirkman's use of the technological momentum framework sets the stage for the analysis conducted in this paper to connect the technical and social elements of green infrastructure implementation.

Sociotechnical Analysis of Green Infrastructure Barriers

Implementing green infrastructure technologies within companies requires a multifactor effort to overcome barriers within current civil engineering design systems. A project must have an engineer who makes a conscious effort to implement BGI or the company the engineer works for must have initiatives to further the same end. The reviewers of projects lacking green infrastructure must be challenging those design choices as well as approving innovative green infrastructure efforts in projects which include them. In all cases, the client must be satisfied with the end product including BGI which could come from the client's personal sustainability goals or from the engineer talking a client through the benefits of BGI. The arguments that can be made to a client must help in dissuading them from traditional stormwater infrastructures through sustainability benefits, a smaller need to offset stormwater related credits, lower lifetime costs, and future proofing of their project. The work to advocate for BGI must also overcome the economic arguments of a higher up-front cost in some cases as well as larger maintenance efforts required to keep BGI systems, relying on vegetation, operational. Governmental bodies must push for regulations to require more sustainable practices to meet their own goals of bettering the planet by forcing companies to implement green infrastructure in all their projects. Finally, a shift in the public consciousness towards being aware of the process of stormwater management as well as the benefits of switching to greener practices can serve to put pressures on regulators who do not currently require or recommend sustainable design practices. Overcoming governmental and social hurdles can additionally aid in shifting historically slowly adapting civil engineering design codes and practices.

A considerable impetus for green infrastructure implementation comes from local regulatory bodies and local design requirements. In an interview with Alex Torres of design firm Kimley-Horn of DC, it is apparent that the most straightforward reason to implement green infrastructure technologies is simply that the local jurisdiction requires them (Torres, 2021). One way green design is required is through third-party rating and certification groups like Leadership in Energy and Environmental Design (LEED) and Living Building Challenge (LBC), which score projects based on sustainability goals achieved through design, construction, and operation in the case of LEED certification (U.S. Green Building Council, 2021) and through “petals” of place, water, energy, health and happiness, materials, equity, and beauty in the Living Building Challenge (Living Building Challenge, 2022). Many of the projects Torres works on are based in Washington D.C. where,

> The Green Building Act of 2006 (GBA) requires that all non-residential District public buildings meet the U.S. Green Building Council's LEED certification standards for environmental performance at the “Silver” level or higher. District owned or financed residential projects 10,000 square feet or larger must meet or exceed the Green Communities certification standard. Since January 2012, all new private development projects 50,000 square feet or larger are now required to meet LEED certification at the “Certified” level or higher (DOEE, 2021).

Additionally, DC has stringent stormwater regulations, which call for sustainable stormwater infrastructure solutions, and Green Area Ratio (GAR) requirements that score the ratio of green area to impervious area in projects to “reduce stormwater runoff, improve air quality, and keep the city cooler” (DOEE, 2021). Torres also spoke about a project he worked on in the city of Alexandria, VA where the design of a project would be interfering with a local stream. After bringing the project to reviewers, the city pushed back on the design requiring a set of stream restoration measures that would be necessary to complete for the project to move forward. Rather than being upset at the additional work required, Torres was excited to see the sustainable restoration measures and green infrastructure, he also felt was necessary, be required (Torres, 2021). The excitement for the positive requirements comes from the personal ethics Torres carries into his work and his views on designing in ways that are environmentally sustainable. When asked if current regulations and requirements are enough to push things towards sustainability he responded,

> I think that the agencies and the requirements especially that I have seen here in like DC, Maryland, Virginia area are fantastic. They're really really strict and likely so and I think that the current regulations are in a great great point. They update them regularly and also just like the discussions that I've had with different jurisdictions and agencies and stuff, they, all the reviewers, they all also have this ethical mindset as well of trying to leave the world better than the way they found it. So they push back on design in certain aspects to save a lot of the existing trees a lot of the existing green infrastructure that is already there so yeah they do whatever they can which I've seen consistently throughout jurisdictions here (Torres, 2021).

His statement is a testament to the progress seen in the urban environment of the region where D.C., Maryland, and Virginia meet, commonly referred to as the DMV. He continues saying that he does not ever feel the need to propose something greater than the requirements call for and praises how the current standards require all sites to be left better than they were found. Regulations, like those found in the DMV, show that sustainable design can be and is being socially constructed by local governments. Regulatory bodies and the population of the DMV are conscious of the impact new design and construction have on the environment and have made conscious decisions to accept and advocate for better design practices. The barrier to overcome then becomes how to achieve the same sentiments in places without sustainabile measures in place and to increase the momentum of green design in all localities.

Unlike the jurisdictions in which designers like Alex Torres operate in, most local jurisdictions and review boards do not have stringent requirements or programs on the level of the D.C. GAR requirements. For less progressive jurisdictions, the onus to design for the planet falls on the client, project economics, project schedule, the public perception of BGI, and the personal ethics of the design engineer. In the civil consultancy industry, the relationships between the client, reviewers, and the engineer are paramount. In his experience working on projects in Puerto Rico, Torres notes that he has to push back on what reviews expect to see slightly. He is often told that the SWM technologies he implements in his designs are not necessary and a simpler solution would be good enough or asked why his designs are the way they are to which he replies that that's the way that they need to be (Torres, 2021). When speaking with Torres about annoyances with offsetting onsite water quality issues by purchasing nutrient credits from an external bank that improves water quality elsewhere in the watershed he added,

> …to that point about the nutrient credits, I deal with that on consistent basis where clients are really just trying to take the easy way out and you know because buying nutrient credits is quick, easy, and just something they just have to write a check for, they can you know just brush it off. But you know me as the civil engineer kind of pushing back on that and be like, no, rather than doing that we can just like install something on your site and then you know one you're reducing runoff on your site, which initially that's what the reviewers want and what the jurisdiction wants, and two you don't have to just like write this massive check. (Torres, 2021).

The practice of clients seeking the simplest, code compliant solution is common but requires the judgement and ethics of the engineer to push back against. As more engineers push back on the default design practices, clients and reviewers will come to expect green infrastructure as the new default making the socially constructed implementation gain momentum and allow green infrastructure implementation to influence all other pieces of the equation as it becomes deterministic.

Clients and reviewers like the Virginia Department of Transportation, which acts as both, are extremely rigid in their expectations of presentation and design elements meaning that deviations from standard practices are immediately questioned. Allowing green infrastructure the opportunity to gain momentum in the sphere of client and reviewer expectations can overcome barriers the same way that current expectations were socially constructed practices that gained momentum until they were so commonplace that clients and reviewers came to expect them. A client who goes through projects in jurisdictions with similar regulations or many projects in a single jurisdiction will expect to see things in the ways those reviewers want to see them. This can shift the client's preferred design style to that of the reviewers which may introduce that style to other jurisdictions when the client looks to branch out into new areas. The proliferation of clients and reviewers used to seeing the same types of green projects further pushes the momentum of BGI into being a default. As Torres brought a green SWM design to Puerto Rico, he began the work of getting sustainable design in front of reviewers there and set his client's expectation of work in Purto Rico to include better SWM practices than are required, setting the example for projects to come. The next project to propose BGI will have less explanation to do and will have a greater likelihood of client and reviewer acceptance.

To even reach the point of presenting a design to reviewers, the step of speaking with the client must come first. Developing an understanding with the client that, while the minimum standards of a jurisdiction could more easily be met, amore worthwhile approach would be to go above and beyond is vital. The decision to design greener is rooted in engineering ethics and in a relationship of trust between the client and engineer. With expertise and experience comes the ability to push back and attach personal ethics to project deliverables but does not work with every client. Torres describes the private development industry as very fast paced and offer up a barrier saying, "I think it's something that is unfortunate with private development where it's like they value time over money really you know because for them time is money." (Torres, 2021). With most projects, the returns on client investments do not begin until the space created by the project can be occupied and generate money which creates a barrier to more time-consuming green infrastructure design. To overcome the extra design time, Torres describes how he reasoned with clients to develop a concept in a few hours and build trust that sustainability will not cost the project unnecessary time. With his work in Puerto Rico, he even approaches the conversation from the angle that green infrastructure is the right thing to implement because of the stormwater quantity and quality concerns of a site rather than referencing design requirements. He said he has not yet experienced a client wanting to cut those corners but says that he is unfortunately like to meet such a client at some point in his career (Torres, 2021). The way barriers of client unfamiliarity with BGI and client sensitivity to adding time to projects may be overcome follows the model Torres has demonstrated through his work. The role of the engineer as a consultant as well as a designer is an important distinction that brings with it the need to guide a client through a project ethically.

The barrier which exists within engineers themselves comes from education. In order for an engineer to want to implement green infrastructure on every project, they must have the requisite environmental ethics cemented in their processes. Every engineer has a duty to uphold the engineering code of ethics which contains phrases like, “Engineers, in the fulfillment of their professional duties, shall: hold paramount the safety, health, and welfare of the public…” (NSPE, 2019). The commitment to the safety, health, and welfare of the public must be extended from not only the public of today but also that of future generations. With the scientific evidence existing to support the damaging effects climate change will have on the planet, the collective engineering ethic must make paramount the practice of designing sustainably for the climate. Overcoming a lack of environmental ethic in the engineering profession is a difficult task which may only be achievable through generational reinforcement of ethical principles and the retirement of a workforce that can be profit driven to the point of missing the global picture. Speaking from personal experience at the University of Virginia, environmental ethics are subtly woven throughout a small number of required courses but a truer understanding of environmental ethics must be sought out by students through cross disciplinary courses.

Adapting curriculums and company trainings to consider the future impacts of civil engineering design projects and the role of the engineers as the ethical guides of the projects is an approach that could break through the systemic barrier of value engineering minded designers in a similar fashion to diversity and inclusion initiatives within companies. Environmental sensitivity training may become a mainstay in company toolkits to shape better employees and engineers but requires ethical engineers with proper education to implement. The ethics of engineers is socially constructed through education and only an education system designed to produce ethical engineers will be able to produce enough future engineering professors to continue that education. Much like the expectations for green design in clients, enough engineers must be taught ethics to generate the momentum to make the process of producing ethical enginners in the collegiate education system deterministic.

Many clients desire simply the cheapest possible project and would like the engineer to do no more than the bare minimum. The profits of clients are generally generated by their building or space being occupied rather than the existance of the space itself meaning that they often value simplicity and a short timeline for design and construction. In cases like these, an economic argument is a more viable option to overcome client barriers to green infrastructure. Economic barriers to BGI implementation are split into the categories of capital expenditure, split incentives, lack of incentives, new technology, and changing government policies (Finnegan, 2017). Because of the larger body of knowledge in the area of green buildings, they will serve as the example of green infrastructure as cost factors are discussed. Capital expenditure is a major concern in the costs of green buildings. The network of European cities focused on sustainable construction and innovation through procurement, known as the SCI-Network identify reasons for higher initial investment costs for green buildings due to more expensive design work, higher material costs, third-party certification costs, environmental impact reductions during construction, and contractual provisions which may pass costs onto contractors (SCI-Network, 2011). Higher upfront costs do not, however, tell the entire story of project cost. The World Green Building Council (WGBC) describes the value added by making a building green as higher asset value, due to increased marketability, tenant attraction rates, and rent prices; lower operating costs, due to lower water and energy consumption based on the technologies implemented; workplace productivity and health, due to cleaner air and access to green space; and risk mitigation, due to buildings being overdesigned for current regulations and positioned well for changes in regulations (WGBC, 2022). The idea of being prepared for regulation changes by initially designing for sustainability can counteract some of the uncertainties with changing regulations and criteria that may make sustainability unattractive to a client that is constantly seeing requirement changes in their projects. As with other measures, the more case studies that regulatory bodies have the ability to analyze in their assessments of what should be put into design codes, the more regulations will mold themselves to the best practices established in projects following the technological momentum of the green design technologies. New technologies can even become standard implementations given the time to educate enough designers on how to implement new BGI so that more reviewers and regulators can lay eyes on innovative solutions and push forward new accepted practices. The volatility of the regulations, incentives, and economics can be stabilized by a greater volume of projects that take sustainability seriously and demonstrate what can and should be done in the design world spurred on by success stories created by designers who are already adopting and applying green design practices. Technological momentum ensures that BGI technologies that become more widely adopted will continue growth and affect future BGI innovation and the adoption of BGI as a standard practice if the projects continue to show that green design can be more profitable or economically feasible.

As the scope of the research and analysis has been reached through this project, several limitations of the work became obvious. While ties are made between barriers and larger solutions to overcoming barriers, a deeper understanding of the systemic factors at play in the modifications to design codes and regulations could unearth new knowledge to craft more wholistic solutions. As much of this analysis was done using sources referring to design and construction of urban spaces, additional research into rural BGI implementation challenges and considerations could greatly add to the conversation of tackling new builds in rural or developing areas. This research also focuses on the barriers to green infrastructure implementation in companies and leaves out factors such as barriers to policy, barriers to design standard changes, and limitations of green infrastructure technology itself. Continued research into other factors affecting green infrastructure under a framework like Actor Network Theory would further explore the breadth of the issue and allow for deeper analysis into specific challenges with BGI implementation. Ultimately, the generation of a toolkit for the ethical and climate conscious engineering company is what can and should come from further research building from this work. With all the barriers that will be placed in the way of implementing green infrastructure technologies, company employees ultimately have the greatest power to drive technological momentum through their design choices guided by their personal ethics and they are the ones who need to fully understand the systems in which their designs are generated and live.

The Future of BGI and Sustainable Design Research

To implement green infrastructure design in companies, social, regulatory, ethical, economic, and educational barriers must be overcome through making sustainable practices the new default in enough companies that the technological momentum of those practices creates change in industry. As discussed in this project, there are many different barriers to green infrastructure implementation in companies standing in the way of progress, however, the identification of those barriers allows each to be addressed and overcome. The point of this research is not to make BGI implementation seem impossible, rather it sets a foundation for further discussions of how green infrastructure can be leveraged wherever feasible to create solutions that are socially, economically, and environmentally sustainable.

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Appendix A: Interview Questions

Q: First off could you discuss your role at Kimley-Horn and the kinds of duties and responsibilities that you hold?

Q: Could you maybe expand a little bit more on how your career kind of led you to the position you're in and maybe specifically working on some of that green infrastructure?

Q: Could you like describe some of those decisions and judgments that you face and to what degree you like bring your own ethics or the ethics of being an engineer into it?

Q: So, are there certain like values or ethics that they guide you in your work or what are some of those like motivations for pushing the sustainability aspect?

Q: Do you ever run into situations where you might propose like a building be constructed in a different area or like moving things around in order to like reduce your impact or remove less trees or anything like that?

Q: Do you feel like the like current regulations and kind of like requirements and all of those permanent processes are enough to push things in the right direction or do you think a lot of your own ethical and like sustainability minded design, has to come in to get designs to go out the way that they should?

Q: What differences do you see in the work in Puerto Rico is it a lot of different sort of you need to push back a lot more because those regulations are in place or is there also some sense of like wanting to do good there it's just not structured quite the same?