From Pen to Pixel

Data-Driven Design

The metaverse, autonomous vehicles, and artificial intelligence are just a few of the many innovations transforming how we see and navigate the world. Whether purchased for entertainment, convenience, or social engagement, our investment in the latest technology has led to an increase in data consumption and information accessibility that continues to grow exponentially in terms of volume and variety.

Big data has become one of society's most powerful tools. How, when, and where it is utilized not only informs decision making but the way people operate on both a personal and professional level. Leveraging this phenomenon, EDSA continues to develop, explore, and incorporate technology and research in ways that are evolving their design process to better inform project opportunities, broaden understanding, and improve efficiencies.

THE BOCA RATON - BOCA RATON, FLORIDA

> Our in-house software programmers + skilled designers are stretching software capabilities for more efficient + effective outputs.
>
> ERIC PROPES

Rapid Experimentation

EDSA Chief Operating Officer Eric Propes suggests the team's enhanced design process is crucial for the firm's growth and future of the landscape architecture profession. "Technology and analytics can be a daunting, but we have adopted an approach that maintains the artistry of design, coupling it with intelligent digital platforms for a refined balance between data influences and designer intuition."

Resulting in a Pen-to-Pixel model-based workflow, the refreshed approach streamlines the team's design and delivery process while informing the development of creative outcomes. "Traditional modeling software such as Autodesk Civil 3D and Revit were initially created with engineers and architects in mind, but we've altered system performance to cater to our specific needs," says Propes. "By pairing our in-house software programmers with our design teams, we've bridged the gap among standard processes and stretched software capabilities for more efficient and effective outputs."

And, while Building Information Modeling (BIM) software has been at the forefront of design and construction for decades, neither Revit or Civil 3D are built for the undulating topography, dynamic hardscape spaces, or the twists and turns of the landscape environments. Serving as 'the glue' between disciplines, EDSA utilizes an additional set of 3D tools such as Autodesk Infraworks, Grasshopper, and Rhinoceros 3D (Rhino) to assimilate digital builds of the architect and engineer, leading to a single, tangible model backed by data that allows for collaboration among all team members. Propes shares, "Making enhanced, faster decisions with the right information, our customization has allowed for flexibility and software integration that showcases transitions between streetscapes, buildings, and outdoor areas – along with every obstacle and amenity in-between."

RAMHAN ISLAND - ABU DHABI, UNITED ARAB EMIRATES

This approach has resonated for projects in the Middle East, where the planning of giga-developments are at an all-time high. "These large-scale, all-hands-on-deck assignments are ideal for our innovative techniques," shares EDSA Vice President Devon King. "While time schedules are limited, there are few creative restrictions – incentivizing our team to push the boundaries of their imagination for highly-feasible, technically-powered solutions." In example, custom scripting helped configure and calculate the population of 50,000+ trees along a winding corridor and evaluate them in terms of water demand, carbon sequestration, shade cover, and visual impact. "Not only did this save us time, but it allowed for cross-pollination between disciplines to ensure logical, sound, and aesthetically-pleasing design alternatives."

That said, EDSA continues to approach each new project with research, creative brainstorming, and typically a site visit. "We still need to immerse ourselves in a place and understand the dynamics and data around it," explains King. What are the environmental, cultural, or social aspects? Are there visible physical constraints? What sounds can be heard in the distance? What obstructions are there to elevation change? "There must be a blend between what the data tells us and the site itself in crafting design alternatives with meaning and purpose."

By taking into account the many different analytic streams of information with an artistic overlay, designers see the relationships between statistical evidence and gain a deeper understanding to derive correlations. This undertaking informs decisions based on verifiable datasets which are no longer case study examples but inclusive of an entire layer, population, scenario, or narrative of a particular site or macro-climate.

BIM MODEL

3D RENDERING

ALINA RESIDENCES - BOCA RATON, FLORIDA

Future *Shaping*

Though it's no secret that good data builds the foundation of great design, confirming references and examining existing conditions are just the start of EDSA's approach to Evidence-Based Design (EBD), where the development of an environment is rooted in scientific research and relevant experiences. Basing decisions on benchmarked projects of similar climate, scope, and scale helps inform the team as to why certain designs will or will not function. "History is a remarkable teacher and has laid the foundation for many current concerns in dealing with nature and the built environment," says Propes. "By doing our research and assimilating proven realizations, our margin of error decreases immensely."

Extended beyond EBD are Research-Informed Design (RID) and Performance-Based Design (PBD), which pair credible research with site analysis to achieve environmentally driven design outcomes. "Right now, we're able to track sunlight, watersheds, hydrology, and elevation," says Jack Garcia, EDSA's Director of Virtual Design and Construction. "We continue to expand our proficiencies which include more logic-based investigations with tools that allow us to report on the conditions we are looking for, or trying to avoid."

And, while designers continue to expand datasets with opportunities to meld data, digitalization, and design, EDSA has broadened their in-house skillset through the addition of a Virtual Design and Construction (VDC) team. Assisting with BIM, immersive visualization, technical quality review, software programming, and application efficiency, VDC provides an enhanced design deliverable rooted in a research-based, virtual 3D realm. "Our goal is to heighten the team's design of immersive environments," shares Garcia. "Consisting of architects, engineers, modelers, and software experts, we help improve the firm's overall automation, legibility, and efficiency for easier execution and assurance that designs function as intended."

Skills of the VDC team were tapped into during the initial development of the Alina Residences in downtown Boca Raton. The team was tasked with providing conceptual design through construction observation services for two of the site's three residential towers. With the client looking to achieve a wellness-driven, indoor/outdoor design vernacular, it was essential that all materials, layouts, and aesthetics put into play by the architect and interior designer – fluidly progress into alfresco spaces for a meaningful design narrative.

Enhancing open areas with green walls, rooftop pools, meditation gardens, and water features, EDSA's initial hand sketches were quickly refined and embedded into BIM and Revit models, allowing the multi-disciplinary team to collaborate on everything from exterior/interior transitions to site furnishings. "We were able to put all of our design ideas into an integrated system that encompassed all information," continued Garcia. "This included everything a client would need – from a 2D CAD model to a full, 3D view of the project backed by site specifications data and individual furnishing measurements."

> "There must be a blend between what the data tells us + the site itself in crafting design alternatives with meaning + purpose."
>
> DEVON KING

THE EDSA DESIGN APPROACH

Begin with the end in mind

1

Opportunity Assessment + Strategy

- Explore goals, assess feasibility + collaborate with other disciplines to define a vision.
- Determine predictable performance criteria + sustainable outcomes.
- Pinpoint what a project needs - socially, financially, ecologically + culturally.
- Become fully acquainted with the site - its physical, social + regional connections.

2

Visioning + Ideation

- Let go of judgment + allow limitless ideas to flow. Explore all that is possible.
- Rapid fire investigation, evaluation + testing of creative alternatives.
- Forge development strategies that possess an intuitive sense for what belongs.

3

Crafting + Refining

- Use the 'big idea' as a standard of measure while addressing how it should be executed.
- Ask, 'why would someone come here' + allow that context to influence the design.
- Synthesize concepts + form associations between elements, ideas, people + places.

4

Production + Implementation

- Illuminate the user experience + verify probability of design outcomes.
- Design with constructibility in mind. Great design is always artful, functional + implementable.
- Serve as Design Guardians of the original vision + project intent.
- Solutions should meet international standards + exceed design practice expectations.

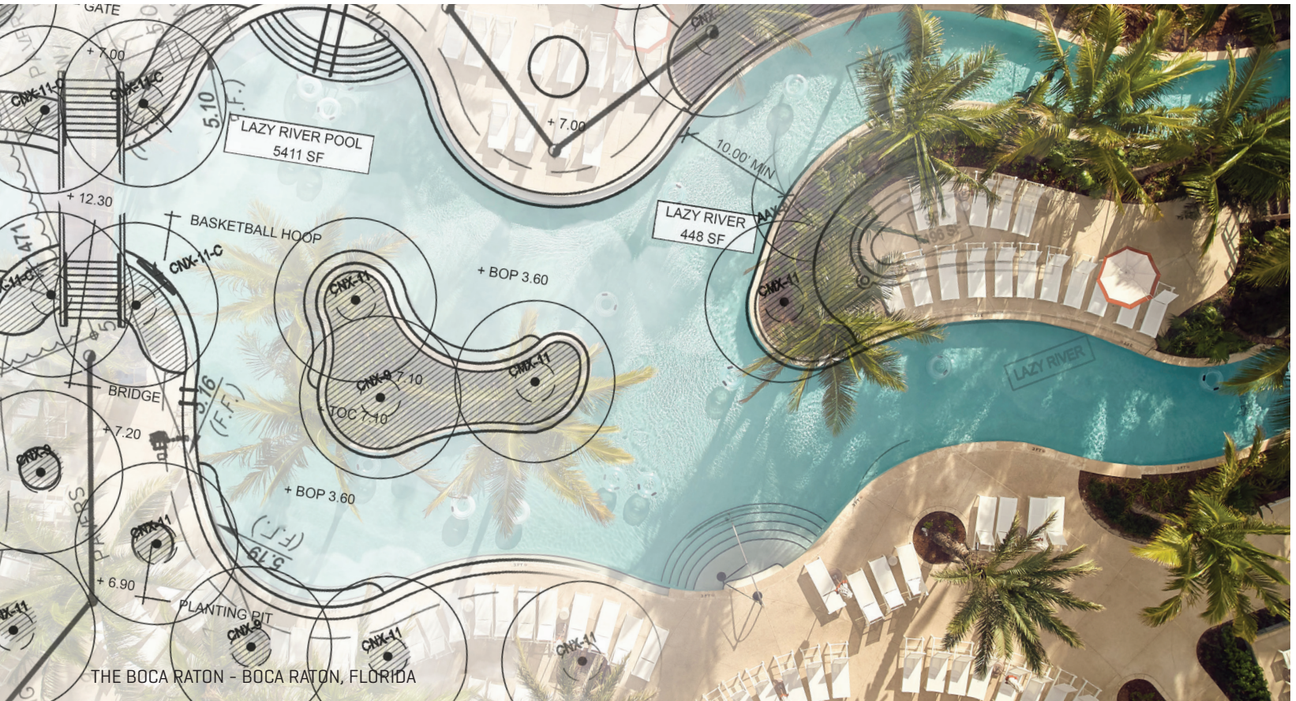
Creative *Expression*

EDSA regularly uses research, data, and automated solutions to digitally depict a client's vision. That said, there is still a strong need for designers to remain in the driver's seat of the creative process. "Technology and data can inform us early on if something is not be feasible – visually, logistically, or financially," shares King. "But there is a need to balance efficiencies with aesthetics. The software can't feel the nuances of a space or anticipate the user's emotional response. That's why a designer's lens is crucial – we decipher the data for the best possible outcome."

Highlighting this process is EDSA's recent retrofit of the Pool Club at The Boca Raton in Florida, where the expansion set the tone for renovations of the originally built 1920's resort. Following initial conceptual sketches, the design team quickly moved into modeling software. During this stage, preliminary concepts were brought to life by utilizing 3D rendering tools such as Lumion and Enscape to establish overall aesthetics. Once the entire team was on the same page for design, layouts, and materials, EDSA was able to host the client in a Virtual Reality (VR) environment.

Used effectively, specifically during design development, VR depicts exactly what the project will look like and how it will be experienced. In the case of the Pool Club, the client was able to walk thought the site, express concerns, and make informed decisions on things like the width of walking paths and height of landscape materials – while viewing simulations of morning and evening sun studies and alternate material selections. The team was then able to address comments in real-time and get buy-in from the client and design team, all in one meeting. This process allowed for a majority of decisions to occur at the early stages – saving time and money for all parties involved.

Progressing into detailed design, EDSA continued to collaborate through their model-based workflow with the project team to troubleshoot clash detections and outstanding issues before producing a final, high level of development (LOD) 3D model to guide contractors during construction. And, while projects can run into issues related to cost overruns, supply chain shortages, infrastructure delays, or unforeseen limitations, EDSA is able to troubleshoot problems immediately, with the design team and the contractor, providing efficient solutions before an element is built. This collaboration helps the team reach their ultimate goal of delivering the same immersive result as the client originally experienced in the VR world.



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PARAMETRIC BRIDGE - MIDDLE EAST

> "Consisting of architects, engineers, modelers, + software experts, the VDC Team improves automation, legibility + efficiency for easier execution + assurance that designs function as intended.

What's Next?

EDSA continues to explore their model-based approach by incorporating new creative tools and processes. In fact, the team recently began incorporating elements of Parametric-Design (PD), where a design is initially shaped according to algorithmic processes instead of being conceptualized from scratch. In example, EDSA developed a customized polymetric vehicular bridge, transforming the structure's traditional look and aesthetic into a futuristic design element. More than just a challenging visual study, the project was also on a tight schedule for execution and implementation.

To meet expedited deadlines, the firm coordinated with the structural engineer to create design modules in Revit, integrating the parametric model to be quickly manufactured off-site and applied to the physical bridge structure. "We have seen the applications of how data, construction, and art can come together," shares Garcia. "This type of application has encouraged us to improve the entire life cycle of design, exploring different ways to merge data that can be monitored and carried into the construction and maintenance of our built projects."

"It's inspiring to think about," shares an enthusiastic King. It's not just designers becoming smarter but the places and infrastructures in and of themselves. It won't be long before an every day public park and its amenities are able to record and store useful metrics such as rainfall, solar gain, circulation patterns, usability, and then physically transform and adapt to these metrics in real time. "This is all valuable information that we can utilize towards the design of healthier, more sustainable, and equitable places. We're going to be able to create a better user experience and a better world – which is what being a planner and landscape architect is all about."