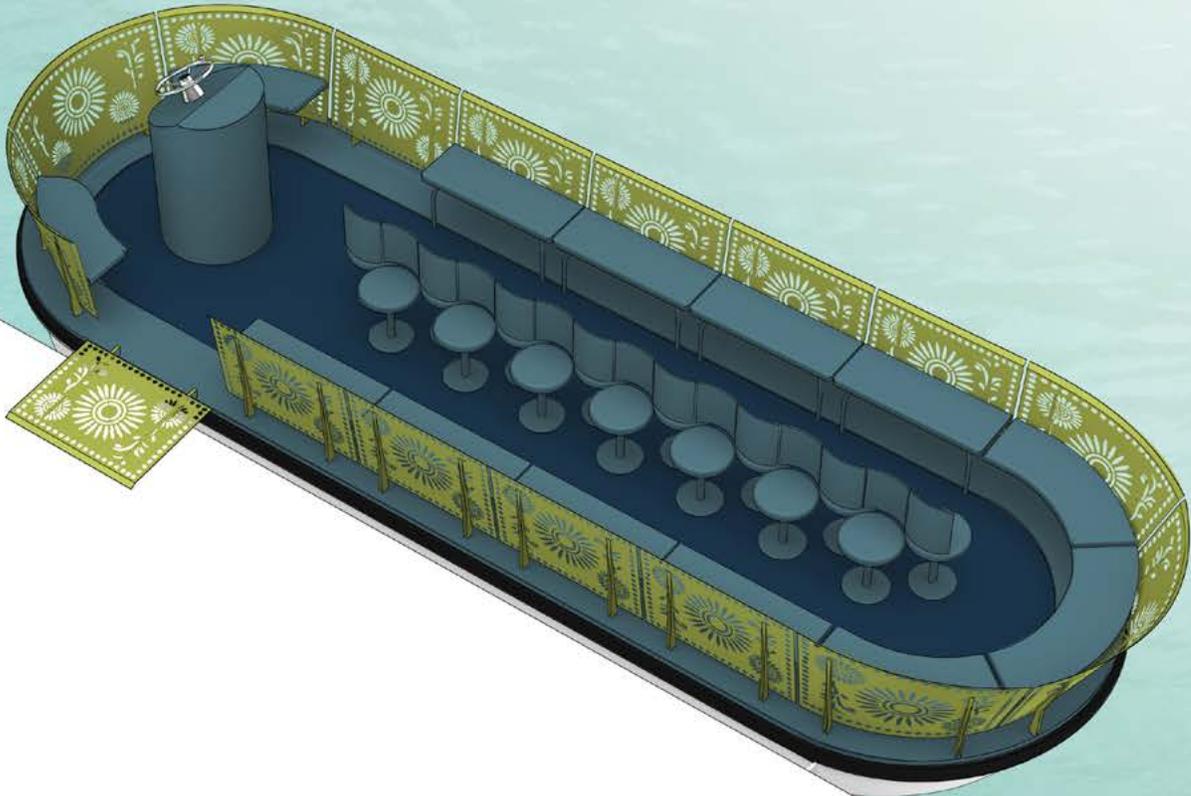


# RIVER BOAT



## Proposal Overview

Good design is good for business. This is because good design is an intricate weaving of aesthetics, function, and the needs of users and service providers. Our firm has a long history of finding innovative new ways to design and produce familiar things, while bringing new life and vitality to them.

We've designed and manufactured innovative digital photo booths that transformed an old idea into a multi-million dollar company. We've created an articulated folding solar array that sits atop a modular transportable building - a product with a similar cost to the River Boats - now patented, trademarked, and deployed at over 30 locations across the country and beyond. We've worked with a fortune 500 company to design and manufacture innovative new LED street lighting by the hundreds. And, we're a licensed architecture practice in Texas. We know what it takes to bring large scale products from concept, through manufacturing and specialty fabrication, to completion.

*Pairing complex fabrication and innovative business practices is in our DNA.*

For the San Antonio River Boats, we propose a mixture of refined familiar elements accompanied by a sophisticated level of modular design that allows for many different uses and configurations. We also propose the optional development of a mobile app for the new fleet to provide end-users with a better, easier experience and allow the City of San Antonio to realize greater revenues.

The current riverboats offer the prospective market two familiar options: crowded, affordable tours and group dining. These options exclude a large portion of the potential available market for these boats. For the individual who doesn't wish to rub elbows with dozens of other tourists or doesn't have a large enough group to justify a group dinner on board, the river boats are less desirable.

*We will change the River Boat experience for the better.*

## Design

Our Approach to the River Boat Design challenge began with a simple gesture, circumscribed within the City of San Antonio's iconic "Deep in the Heart" logo. This simple rounded rectangle, or pill shape, creates an iconic form for the vessels that is hydrodynamic and simple to fabricate.

The form of the boats translates clearly into an iconic logo or symbol of it's own - clearly recognizable on the water, on line, in smart-phone apps, on t-shirts and mugs, or on way finding signage along the river walk and at boarding locations. Perhaps, most importantly, our design looks less like a utilitarian barge and more like an elegant boat.

We firmly believe that the iconic form, brand recognition, and multi-functional modularity of our design will create excitement unlike any since the inception of the riverboat tours in 1968. New functions and uses will translate into new ridership as the new river boat experience aligns with an ongoing rebirth of cool on the riverwalk. The sustainable efficiency of Torqeedo's electric power and propulsion system will create a smooth ride and noise free experience for both boat passengers and river walkers. The form and brand will create a new accessibility for the public, on the river walk and online combining the simplicity of Uber with a new festive and iconic riverboat, creating a fantastic new River Walk experience for everyone...

## Functionality, Durability, and Longevity

Form follows function. We believe this. The simple and elegant form of the River Boat design is rooted in both iconography and the exterior ergonomics of piloting the boats around tight curves in the river, and the interior ergonomics of seating that provides maximum space and comfort. These are the functions that matter: how safely does it function for the pilots and how comfortably does it function for the passengers? We believe our design answers these questions confidently. The sections below describe durability and longevity in great detail.

## Constructability

Our design proposes standard aluminum closed hull construction similar to the current river barges. Geometry is limited to simple curves that can be easily rolled, cut, and fabricated. The stainless steel deck with integral threaded couplings for the modular deck components will be CNC cut for accurate placement and location of the couplings so that modular elements are guaranteed to fit. Our firm has extensive experience in CNC fabrication and can supply authored files for direct CNC cutting and fabrication with a guaranteed fit.

We have coordinated carefully with Torqueedo and specified their battery and propulsion system due to their tested experience on River Walk barges and our research confirming that they are industry leaders in this field. The console design will use a Torqueedo throttle with kill switch, waterproof electric switches for lighting and VHF radio, and a hydraulic action steering wheel.

## Maintenance

The hull of the boat will be fully welded Aluminum which we propose to be left unpainted to reduce maintenance at and below the waterline. The hull will be reinforced with 4" and 6" aluminum channels internally. The rub-rails of the boat are aluminum channel extensions with a 3/8" faceplate and a continuous black neoprene bumper bolted through the faceplate. The face plate will be painted aluminum, along with the top plate below the guard rails. These will require minimal re-painting as these surfaces will be protected by the bumper and will not be walked on.

The deck of the boat features 1/2" internal threaded couplings to mount a variety of modular components including the hinged pilots console, seating, tables, and other future accessories. These couplings and the deck will be 304 stainless steel with a non-slip epoxy paint finish. The deck surface will be 3/16" thick, and will be supported by aluminum cross members as indicated above. The epoxy coating will need to be re-applied periodically due to abrasion wear from foot traffic. Longevity of this coating will depend on the final product specification and the amount of abrasive foot traffic.

Seating will be constructed of powder coated aluminum or steel (depending on weight requirements and strength needed), and will require no paint touchup. Long term scratching or abuse may require re-powder coating of such components after 5-10 years.

Seating Surfaces will be comprised of marine grade plywood atop steel or aluminum plates (re: above), with heavy duty vinyl and foam padded upholstery gathered and stapled to plywood, then captured by the powder coated steel or aluminum plates to prevent fraying or loosening of the vinyl.

Railings will be powder coated 1/8" aluminum plates on tapered columns bolted to the deck. Like the modular seating components described above, the powder coat finish will require no paint touchup, and will last 5-10 years or more before needing to be re-powder coated. Generally, powder coating is considered a maintenance free coating, though some sources recommend a light wax, similar to car wax, bi-annually to improve long term UV resistance and guard against color fading.

The fold-down ramp railings will be made of 1/8" powder coated steel (instead of aluminum) to resist denting from foot traffic. These sections will be reinforced with additional members, and will have a perforated graphic pattern to increase rigidity and minimize the size of holes to prevent high heels or wheels from penetrating. These sections will also be painted with a non-slip epoxy coating on the interior surface. This coating, like the deck surface, will require periodic re-painting due to foot traffic.

## Innovation

**Advanced 3D Modeling:** Our boat will be fabricated using advanced digital fabrication technologies to ensure precision and repeatability. We will create a parametric digital master model of the entire vessel - down to the smallest nuts and bolts - to reveal fabrication conflicts and provide timely delivery and quality assurance. This same model will be used to generate material take offs, and provide cost control for each component of the boats.

**CNC Laser Cutting:** The same CNC technologies will allow us to provide uniquely patterned guardrails that are laser cut and/or punched with accuracy and efficiency. Since cut files are authored by our office, the cost for customization is minimal, and different colors, patterns, names, etc. can be provided.

**CNC Waterjet Cutting:** The modular deck surface will allow for easy reconfiguration of seating, tables, railings, and other future items like sun shading, parade float decorations, floating stage set designs, and other events yet to be imagined! The deck will be CNC water-jet cut in one piece by one of the largest CNC water-jet cutting machines in North America. This will provide a seamless deck with highly accurate locations for the internally threaded couplings. When not used, the couplings will be plugged with a flush fastener.

**Spring-Hinged Access Ramp:** The hinging guard rail ramp sections will allow for easy boarding and de-boarding for all passengers. This railing section will lock upright into place at a slight outward angle to match the rest of the guardrails. With an upward release, it will hinge outward to create a ramp to load passengers. The weight of the ramp section will be offset by a concealed torsion spring below the deck level, at the pivot point. Our firm has successfully designed and engineered hinging and/or articulating components on multiple mass-produced products.

**Programmable LED Lighting:** LED lighting will be used throughout, for their long lifespan and minimal draw on the boats electric power system. Headlights (for navigating darker sections of the River Walk), port and starboard lighting, and an all around light, as required by law for a boat less than 12 meters in length will be provided, along with a lighting glow at the water level that does not present a light source in conflict with the above. The "ground effect" lighting will be water proof (IP-67) rated, and will be fully programmable, with several colors and/or effects controlled by a simple set of pushbuttons on the pilots console.

**Electric Power and Propulsion:** Finally, the Torqueedo electric battery and propulsion system specified below provides a highly efficient, safe, and quite ride experience for both those on the boats and those walking the River Walk.

## Technical Specifications

**Vessel:** The River Boat measures 27'-0" from bow to stern with a 9'-0" beam. The hull is aluminum with aluminum channel reinforcing and a neoprene bumper rail.

The dry weight of the vessel will be approximately 8000 pounds, and it will draft approximately 16", not including a 18-24" mid-mounted aluminum keel.

A full passenger compliment will weigh approximately 6000 pounds, and will draft an additional 6-8" depending upon the hull design and profile below water level.

Due to ADA requirements the hinged guard-rail / ramps may accommodate an 8" range of motion relative to the passenger loading level of 17" above water level. As such the boat will be designed to have a freeboard of 21" when empty and 13" when fully loaded. This will allow for a 1:10 slope for a 36" ramp length plus a 1/2" threshold.

The vessel will seat 43 passengers (including 2 wheelchair positions with comppanion seating on either side) comfortably with 21" of legroom between facing seats, 42" width for 2 person bench seats at the perimeter, and staggered individual seats in the center row. These dimensions represent a marked improvement in personal space for all passengers.

**Battery Power:** We propose providing twelve (12) Torqeedo Power 26-104. These batteries are waterproof, lightweight and will provide power for a full day of touring with the ability to charge quickly in off hours. The specifications include:

- High-performance lithium battery 2,797 Wh
- Rated voltage 25.9 V, charge 108 Ah
- Weight 53.6 lbs (24.3 kg), total battery weight: 643.2 lbs.
- Including battery management system with integrated protection against overcharging, short circuit, deep discharge, polarity reversal, overheating and submersion
- Waterproof to IP67

**Motor Propulsion:** We propose providing one (1) Torqeedo Cruise 4.0 R/T with specifications as follows:

- 8 Horsepower
- 24.6" length shaft
- 4.0kw
- 48v
- High-Pitch Large Diameter Metallic Propeller
- 1.7kw Fast Charger for POWER batteries

## Modular Component Options

Just as this iconic form is transferable and recognizable along the river walk and beyond, the modular nature of the form itself can be transformed to accommodate a broad range of functions. A series of coarse threaded couplings located in the flat deck surface allow for all components of the river boats to be added or removed.

Railings may be changed to fit the seasons, seats may be added / removed / or reconfigured to fit the functions of touring, dining, commuting, and variations that have yet to be offered. Tables, shade sails, parade float decor, thrones for the NBA champions, and things we haven't thought of yet, can all be attached to our multifunctional deck.

## Cost Estimate

Please see the attached Control Estimate and Critical Path Timeline for both cost assurance and a high level path toward completion of the fleet by January 2017 as desired.

## Preliminary Control Estimate

DESCRIPTION	VENDOR	CONTROL ESTIMATE
<b>Custom Built Hull</b> Aluminum	TBD	\$13,750
<b>Motor &amp; Batteries</b> 4kW / 8 hp equivalent, high performance lithium batteries	Torqueedo	\$24,189
<b>Deck Fabrication</b> Stainless Steel w/ threaded attachment couplings	Campo Sheet Metal	\$6,750
<b>Components</b> Varies	Star Precision and others	\$8,250
<b>Assembly</b>	TBD	\$1,000
<b>Shipping/Delivery</b>	TBD	\$500
<b>Custom Lighting</b>	Phillips	\$3,000
<b>TOTAL</b>		<b>\$57,939</b>

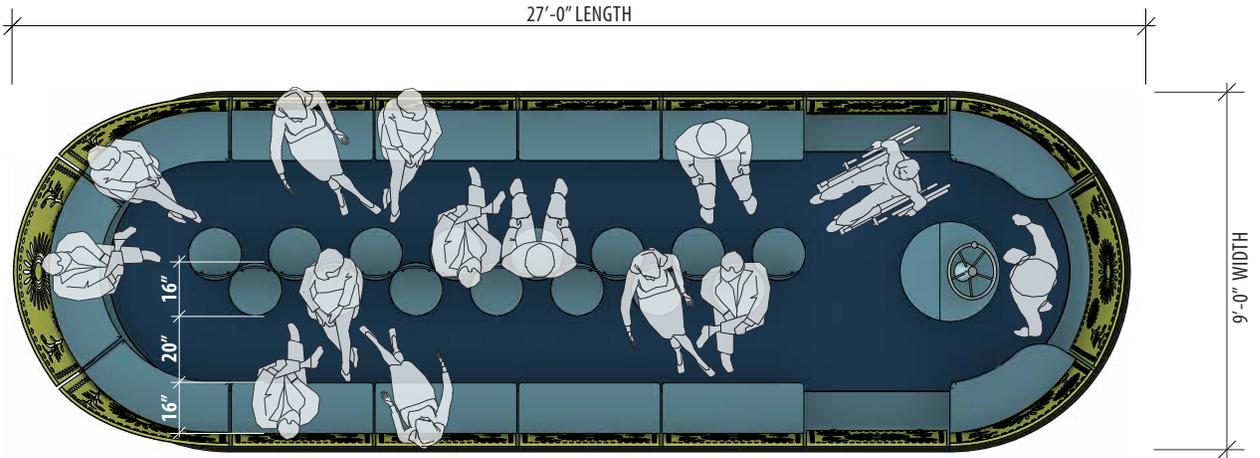
**Mobile Application OPTIONAL**  
**Solar Shade Canopy OPTIONAL**

TBD	\$4,500 x 45
TBD	\$15,000 x 5

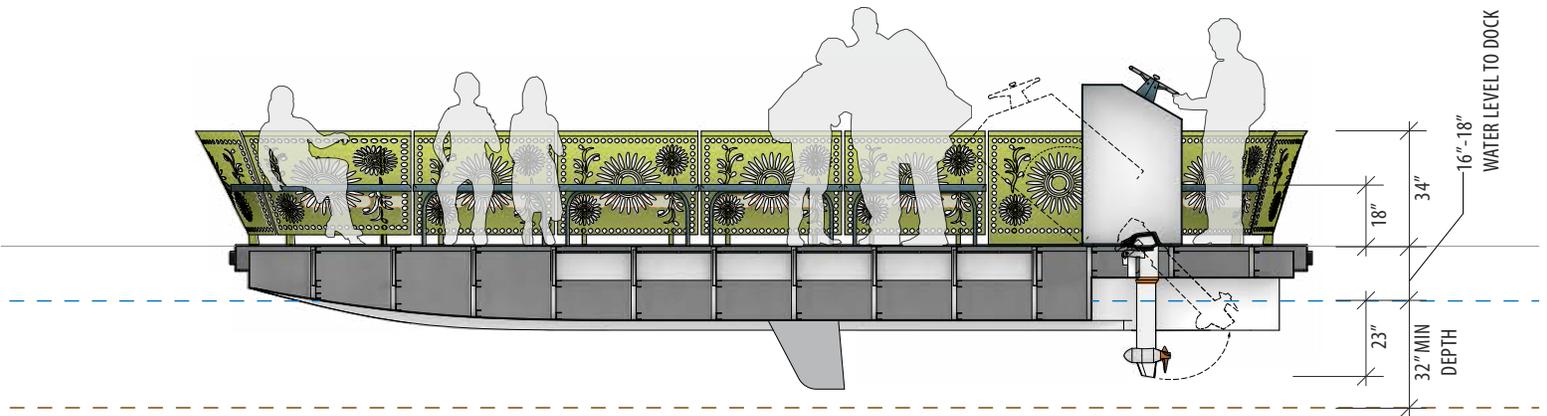
All figures reflect a per boat cost contingent on a volume order based on a projected 45 boat fleet.

## Preliminary Project Schedule

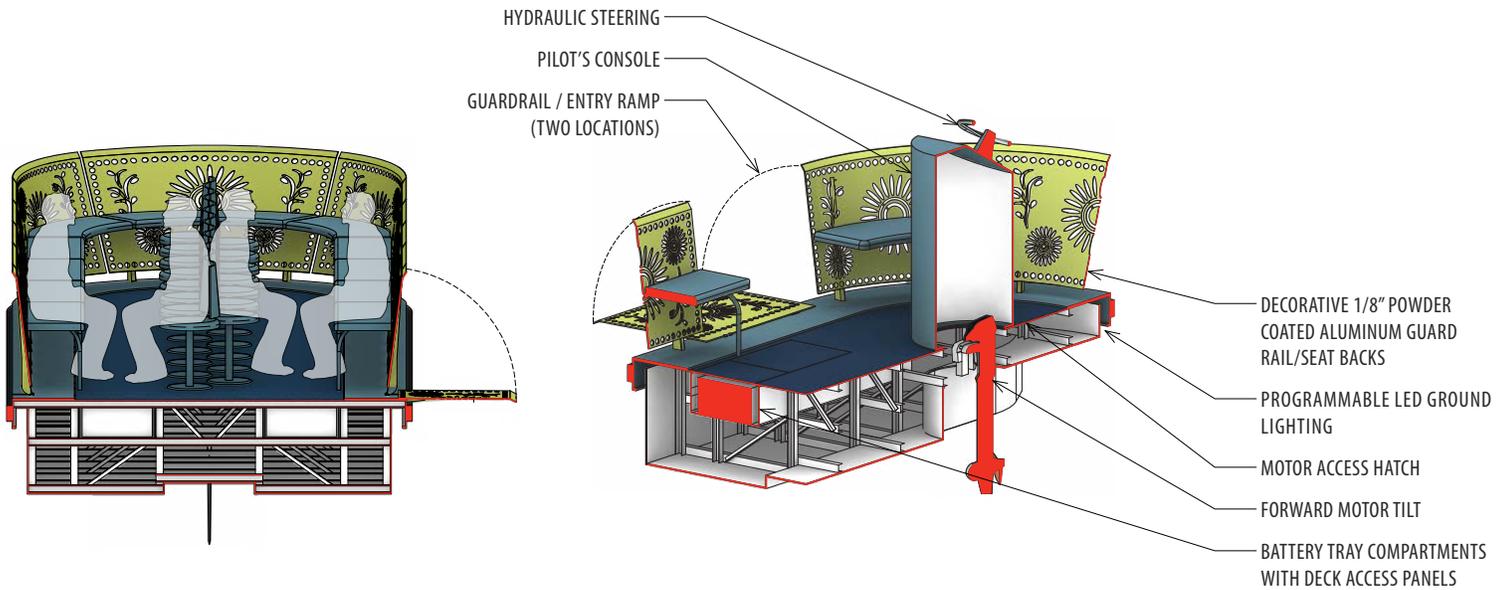
DESCRIPTION	VENDOR	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	
Design/Engineering		█											
Hull Fabrication	TBD					█							
Deck Fabrication	Campo Sheet Metal					█							
Accessory Fabrication	Star Precision and others						█						
Assembly	Campo Sheet Metal								█				
Shipping / Delivery	TBD									█			
Commissioning	S.A. River Authority											█	
Construction Oversight						█							



1:20 PLAN



1:20 SECTION



# ALL ELECTRICAL PROPULSION SYSTEMS ARE NOT CREATED EQUAL.



## Superior Power Train Engineering

- **ISO 9000 development environment**
- **CE Certification** means our products have passed rigorous testing procedures, and are insurable
- Latest **brushless motor design** with state-of-the-art electronic commutation
- Most efficient propellers
- Complete and **total system design**
- All components are **IP67 waterproof**
- High performance and safe lithium battery chemistries

# SYSTEM AS PROPOSED FOR NEW SAN ANTONIO RIVER BARGE



Single Cruise 4kW outboard  
(8hp equivalent)



Remote Throttle showing speed,  
battery %, and range



(2) Chargers 1.7kw each



(12) POWER lithium batteries,  
2.7kwh each

## **Proven power, better runtime, and faster charging**

- Metal prop optional
- Recharge from 240 vac
- Charge time 9-10 hours
- Integrates with standard steering hardware

# SAMPLE WIRING DIAGRAM

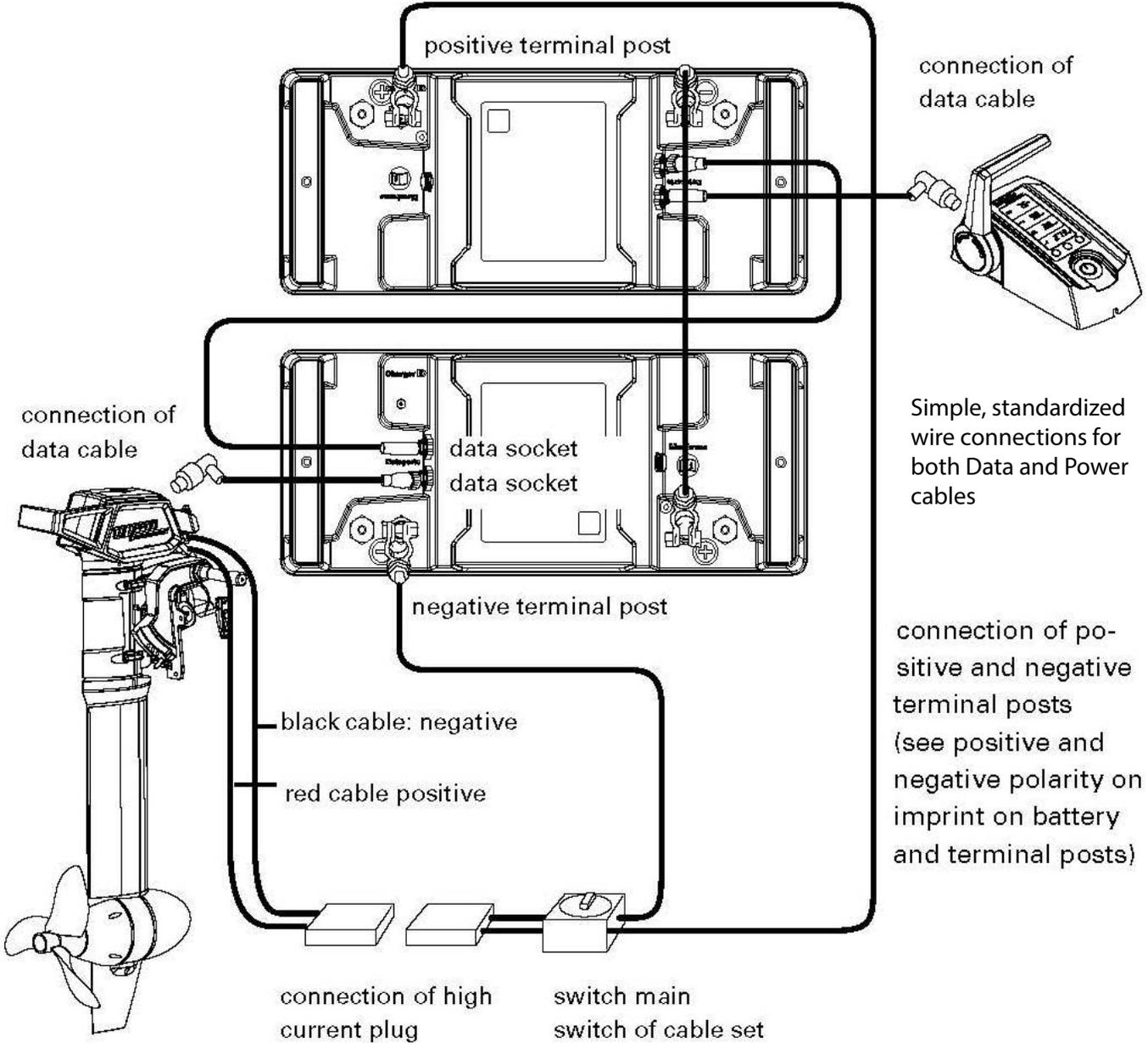


Diagram showing 2 batteries in series, actual installation will have 5 more sets in parallel

# TORQEEDO PROPULSION SYSTEM

## What's included with our system

- Components as purchased (motor, throttle, batteries, chargers)
- DC wiring limited to (chargers - batteries - motor)
- DC fuses and/or circuit breakers related to propulsion system
- Data wiring (motor - batteries - throttle)

## What's not included (boat builders responsibility and cost)

- 240vac 'shorepower' cordset (located at each marina slip)
- On-board 240vac power inlet
- On-board 120/240vac breaker panel\*
- On-board 12vdc breaker panel
- Any non-propulsion electrical systems (lights, PA system, bilge pumps, power inverter, DC/DC converter, etc...)
- NOTE: accessory loads may be connected to the Torqeedo batteries if desired
- Steering system



\*AC breaker panel

# ELECTRIC MOTORS: OUTBOARD DRIVE VS INBOARD

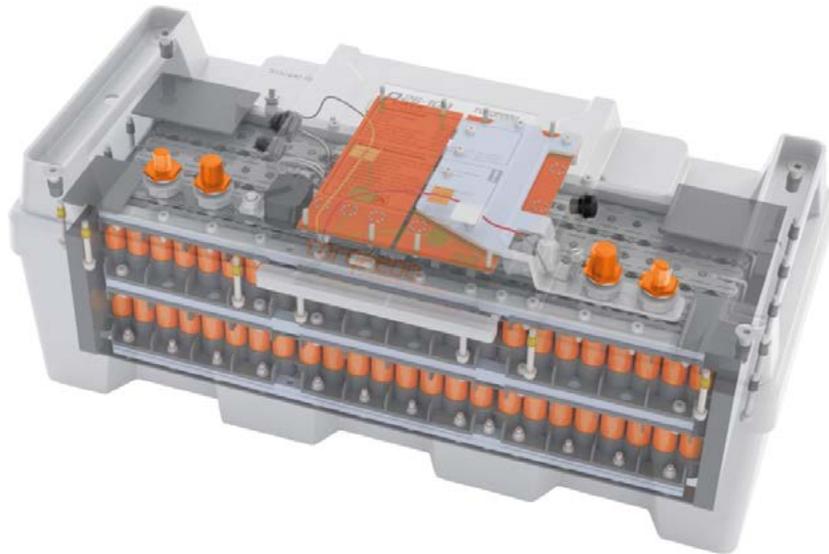
	<b>Torqeedo Outboard</b>	<b>Inboard</b>
<b>Steering/ Maneuverability</b>	Very easy to steer because of <b>'directional thrust'</b> (existing barges are using outboards)	Poor steering response at low speeds, requires rudder. Always steers better in one direction.
<b>Motor Maintenance</b>	Electric Outboard can be <b>swapped out on the river</b> in less than <b>15 minutes</b>	Boat has to be in Marina for service, involved and time consuming
<b>Propeller material</b>	Composite or <b>Metal</b>	Composite or Metal
<b>Propeller maintenance</b>	Simply tilt up motor and <b>change propeller in 10 mins</b> while boat is in the water	Must pull boat out of the water to change propeller
<b>Instrumentation</b>	<b>% battery, speed, consumption,</b> and highly accurate GPS based range calculator in throttle	Limited battery meter
<b>Waterproofing</b>	<b>Yes, fully submersible IP67</b>	Unlikely
<b>Propeller Shaft Seal Maintenance</b>	Pull motor off boat, replace seal, reinstall: <b>Less than 1hr</b>	Boat must be pulled from the water for this involved service

# BATTERIES: WHY LITHIUM AND NOT TRADITIONAL LEAD ACID?

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# BATTERIES: LITHIUM SAFETY

*Torqueedo has shipped more marine-grade lithium batteries than any other manufacturer.*



## **Lithium Batteries are safe and reliable if they are:**

- **Manufactured by a top-tier cell fabrication plant**
  - we only use Panasonic and Sony 'Cylindrical Safety Cells' from Japan
  - and Johnson Controls cells from the US
- **Are properly packaged in a true marine case**
  - IP67 waterproof and structurally robust
- **Have an effective BMS (Battery Management System)**
  - preventing over charging, over discharging, and other electrical conditions
- **Conservatively charged and discharged**
  - less heat generated
- **Proper over-current protection**

# SYSTEM OPERATION



## Easy to use 'Smart Throttle'

Information Display integrated into throttle, showing

- Battery percentage %
- Remaining range in miles
- Current speed in MPH
- Current power usage in watts

# SYSTEM OPERATION



## **Easy to use automatic battery chargers**

- **240volt/30amp single phase service per boat will be required**
  - However, standard chargers will only pull about 15amps at full load
- **Standard recovery times**
  - 5% to 100% will be about 10 hours
  - 20% to 100% will be about 8 hours
- **Optional faster charging is possible at additional cost**
- **'Full cycling' is not required, as there is no 'memory effect'**
- **Charging is an automatic process and only requires the operator to plug the boat in to shorepower**
- **We recommend that the chargers be permanently installed on-board the vessel, and that the cord set remain in the marina**

# SERVICE AND SUPPORT: EXTENDED WARRANTY

*Torqeedo is happy to provide additional warranty protections for our products that are delivered as a complete system*



- **POWER 26-104 Lithium Batteries**
  - Standard 2-year limited warranty
  - **Extended to 4-year** limited warranty for SA River Barges
- **Cruise Series Motors**
  - Standard 6-month limited warranty for commercial use
  - **Extended to 2-year** limited warranty for SA River Barges

# SERVICE AND SUPPORT



## **Training program for Operator (or other designated party) to become a factory-authorized service center**

- Will perform repairs quickly, directly, and locally at the marina
- Locally stock spare parts and replacement units, avoiding shipping cost and delays
- A Torqeedo Cruise motor can be swapped out in about 15 minutes on the water

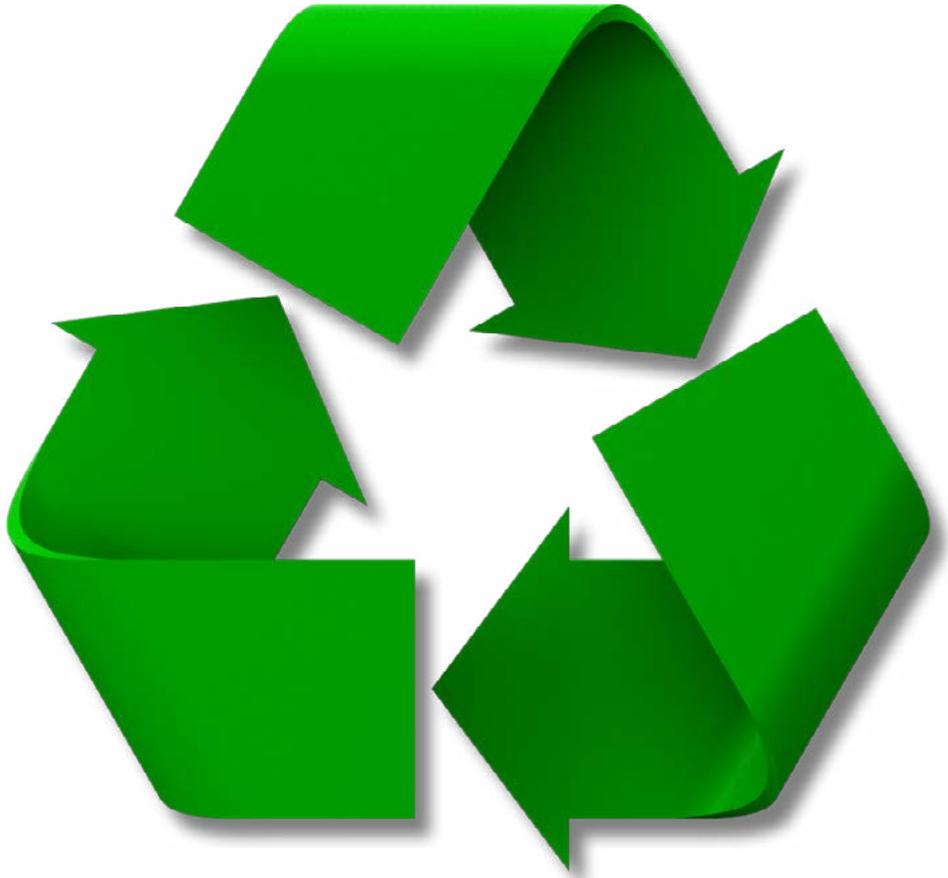
## **Extended hours phone support available as a premium service**

### **Driver coaching for a smooth transition to the electric helm**

- Electric boats drive a little differently than gas powered boats
- The additional torque can be used to maneuver more accurately
- Skippers will know how to properly operate and can get the most benefit out of the system

# SERVICE AND SUPPORT

## *Total Lifecycle Management for Lithium Batteries*



### **Cradle to Grave lithium battery recycling program**

- As SA purchases a new set of batteries from Torqeedo, we will take responsibility for proper recycling of the old batteries
- In some cases, these older lithium batteries can be re-purposed to provide grid energy storage to facilitate the integration of variable renewable resources, such as wind and solar

# SERVICE AND SUPPORT: GLOBAL SERVICE NETWORK



# WHY *TORQEEDO* ELECTRIC PROPULSION?

- **Only system that is 17-months proven** on a San Antonio River Barge
- 3+ years proven on all OKC River Barges
- **Outboards outperform inboards for this application**
  - Much easier to steer, inboard w/rudder can not make the multiple tight turns required in the canal system
  - Easier to maintain, no boat haul-outs required
- **Manufactured in Germany**, CE certified, sales and service office in US, direct executive support
- **Extended warranty** support, battery costs are capped
- Internationally recognized as the market leader in efficiency, unit sales, product choices

# ACCOUNT TEAM FOR CITY OF SAN ANTONIO



**Steve Trkla** – President, Torqeedo Inc.  
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**Todd Sims** - Global Product Manager  
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**Tess Smallridge** - Marketing Manager  
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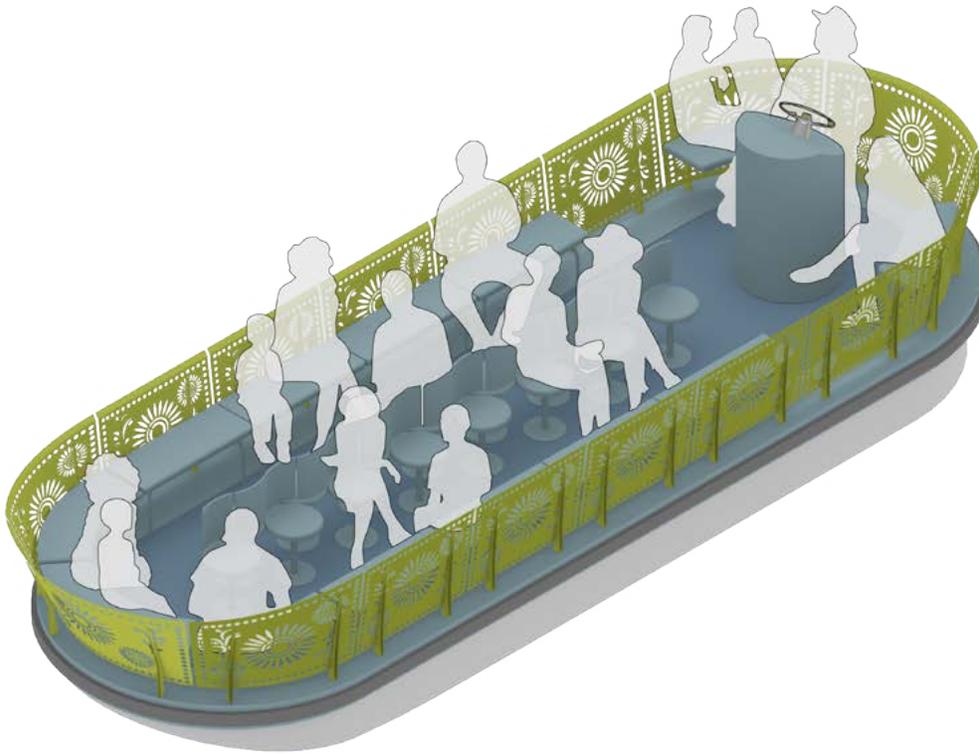
**Sven Kirchhoff** – Service & Quality Manager  
Sven.kirchhoff@torqeedo.com  
815-444-8806

**Torqeedo Inc.**  
171 Erick Street, Crystal Lake IL 60014



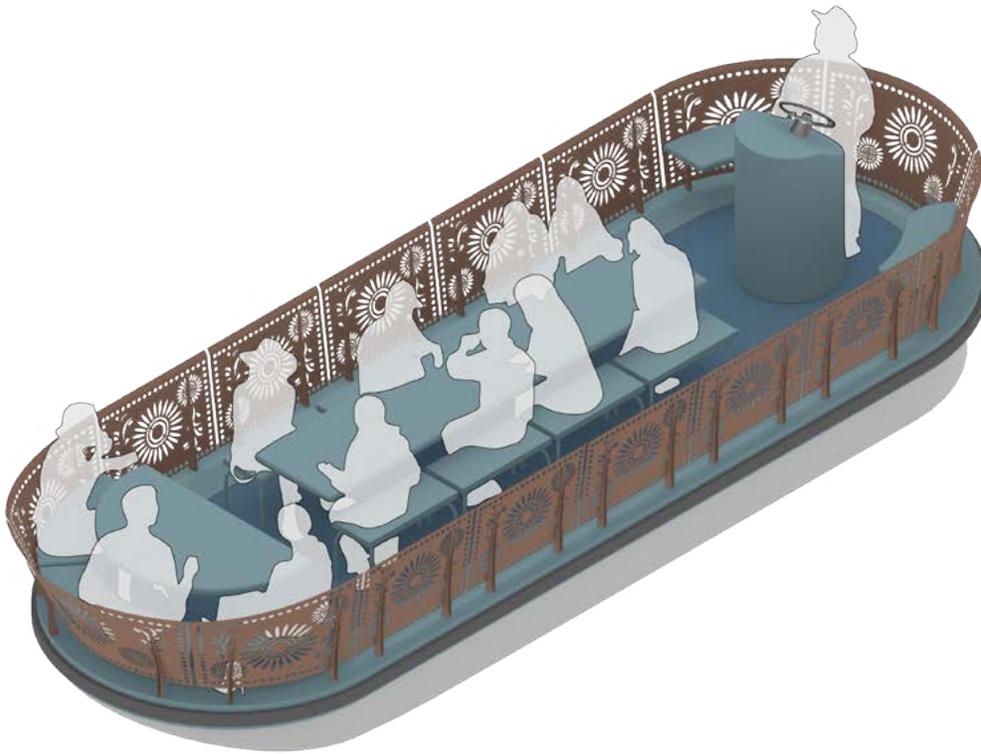
## MODULAR COMPONENTS

Envision new possibilities for the River Boat experience with the easy addition or removal of modular components: touring, dining, commuting, and other variations yet to be offered. Tables, shade sails, parade float decor, and other accessories can be attached to our multi-functional flat deck surface with flush threaded coupling connections.



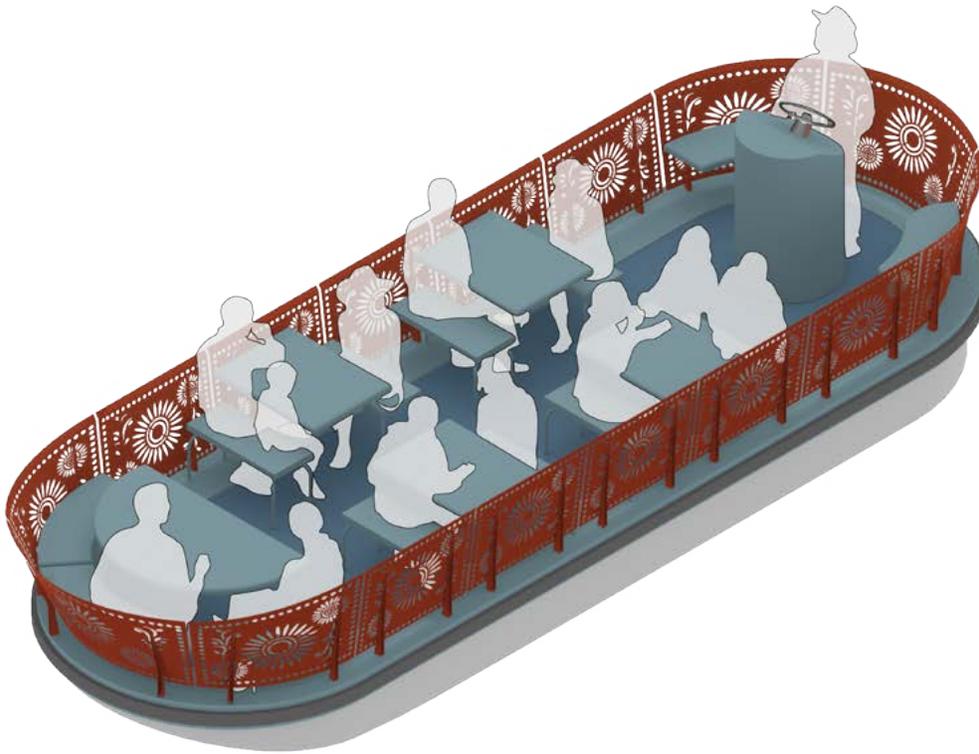
## RIVER TOUR

It's a classic, but we're making it better! Padded bench seating and a staggered wavy back on the center row gives 4" more legroom to every passenger. Curved bench seating at the bow and stern give more options to passengers and companion seating for wheelchairs. And our flat deck and integral fold-down ramps make access to the boats easy for everyone. No steps, no tripping, no problem!



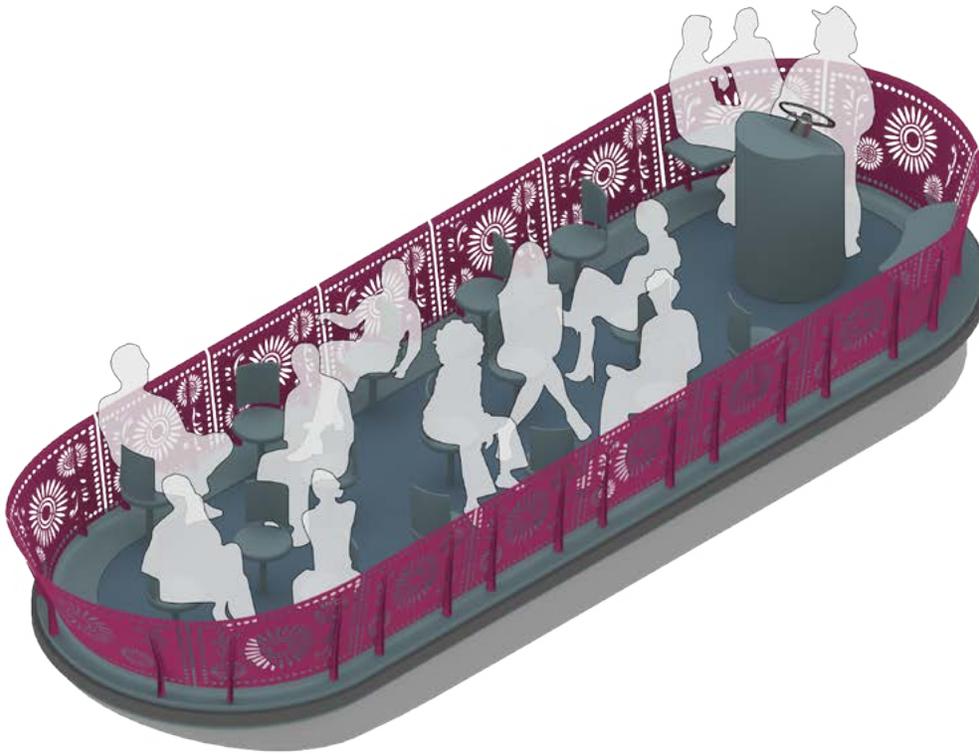
## DINNER CRUISE

For the discerning party of 20, or the farmhouse table crowd ready to sit and dine with their friends and their soon-to-be new friends, the modular deck also accommodates the big long center table. The outward leaning guardrails create an elegant ambiance while providing more room for you (and your waiter!) to get in and out gracefully!



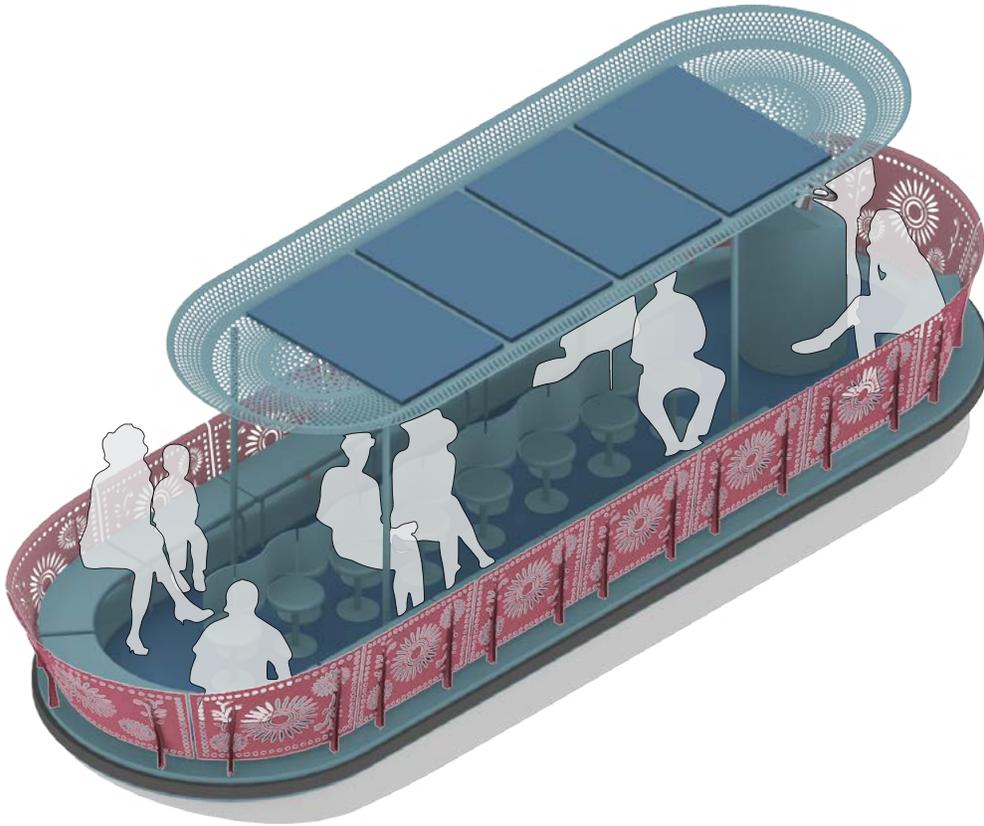
## COCKTAIL CRUISE

Formal dinner too formal? We agree. Sometimes you just want to grab a cocktail and some chips and guac. Our modular deck allows for different configurations of tables and chairs, maybe a few four-tops, and that great corner booth that everyone wants...



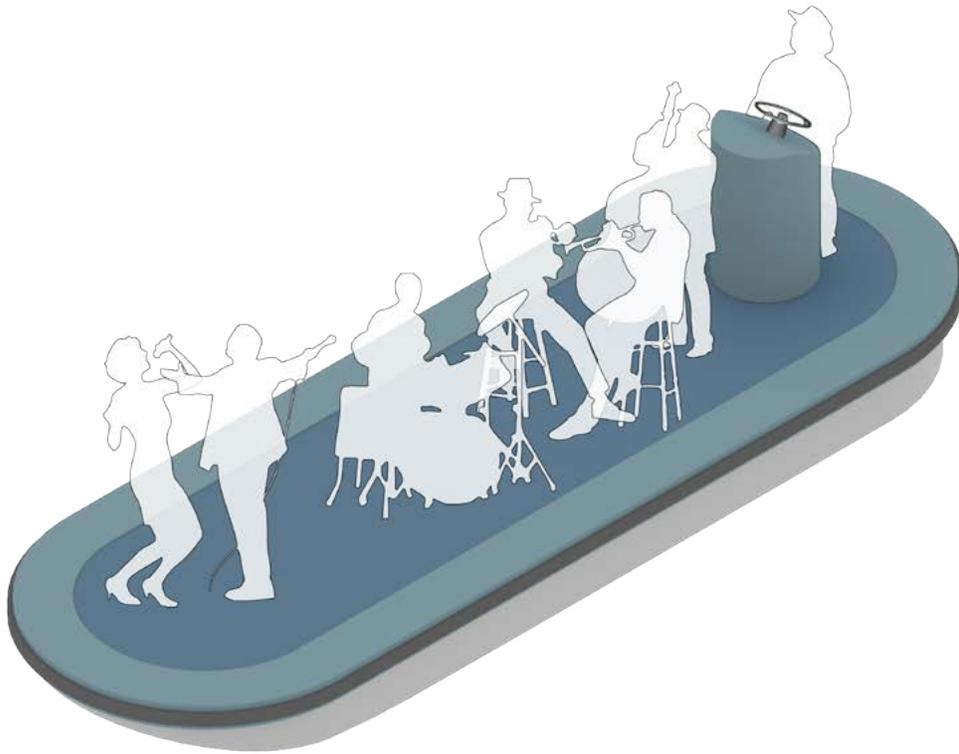
## 360 VIP TOUR

On this tour, everyone is a captain! With benches removed, there is ample room for this 16 person tour to seat everyone in style in rotating captain's chairs. Sure it costs a little more, but when you can free-wheel around to see all the sights, it just might be worth it!



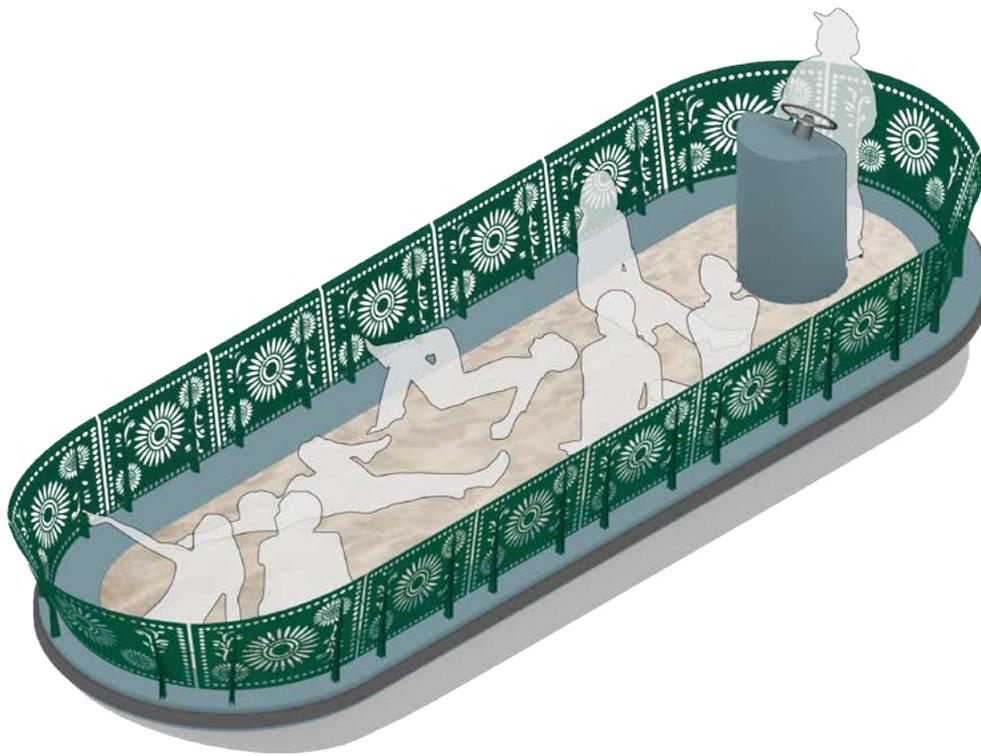
## RIVER TAXI

Is that a tour boat or a taxi? Can't tell? Neither could we. Our integral "ground effect" lighting will be yellow when it's a taxi, red when it's a tour, blue for dinner cruises... You get the picture. Wait. It can't be "ground effect" if its water. So what is it? It's waterproof, programmable LED's, pointing down, as if to whistle and yell TAXI!



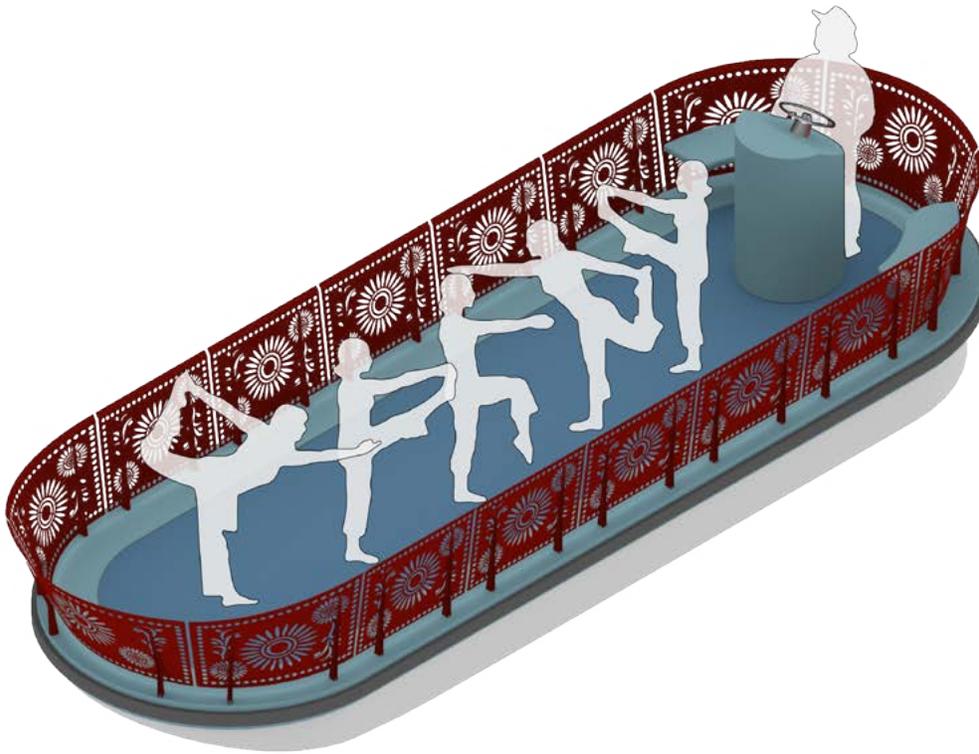
## FLOATING FLOAT

It's party time! The Spurs just won, again! Now this is where the modular deck really helps. The float committee will grouse far less when clearing the deck, and attaching plumes, balloons, and thrones is made easy with our integrated flush stainless steel threaded coupling attachment points. Integrated what!? Never mind. It'll be easy and fun to trick out these boats into floats.



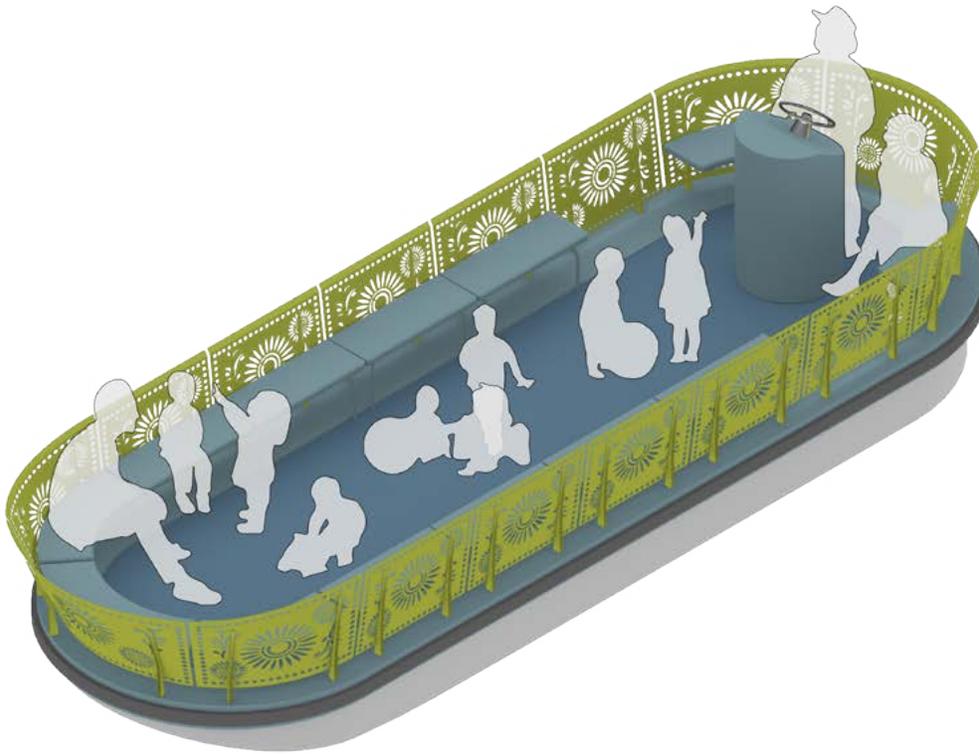
## BEACH CRUISE

Ahh, lounging on a sandy beach. In San Antonio. On the River walk. If I was in college I would do that in a heartbeat! Why not? When you have a modular deck you can do things on boats that nobody has thought of before!



## MORNING YOGA

What? You can do yoga on a boat?! That's what some of us said at first, then we Googled it. Yes you can. In fact, people do yoga on stand up paddle boards. Google it. You're welcome. In fact, the stand up paddle boards look a bit like our iconic pill-shaped River Boat forms. Bringing us full circle. Ommm....



## PLAY PEN

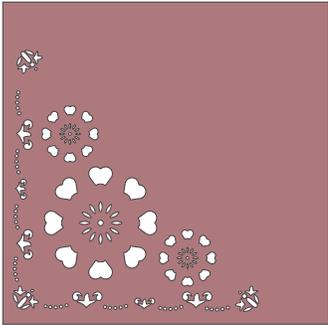
We've got kids. We get it. You're trying to relax and enjoy the River Walk and something keeps nagging you. Or someone. River Boats to the rescue! Ship the little ones off for a 45 minute tour with guessing games and sing alongs that will leave the kids pumped, parents relieved, and passers by saying "aww! So cute!"



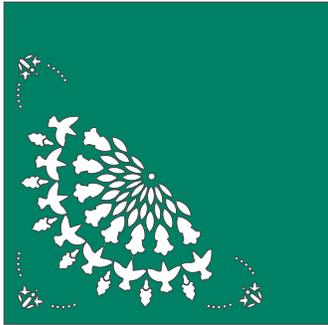




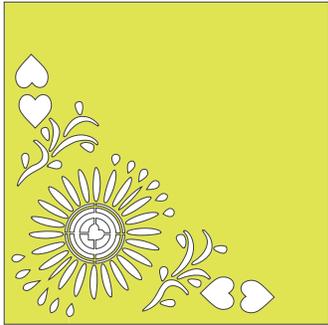
# STEEL RAILINGS, COLORS AND PATTERNS



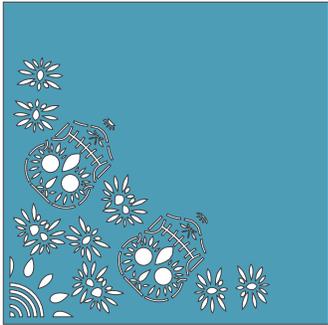
"CINNAMON"  
PANTONE #479C



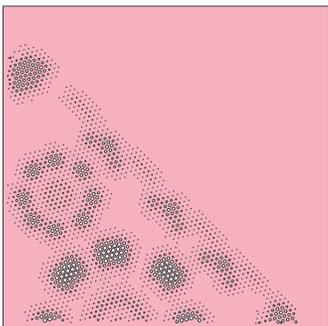
"VERDES"  
PANTONE #341C



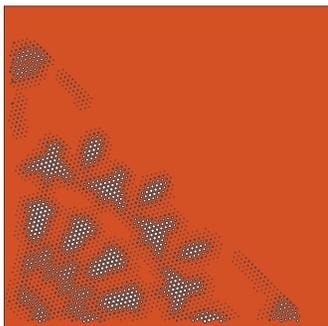
"TOMATILLO"  
PANTONE #341C



"AZURE"  
PANTONE #549C



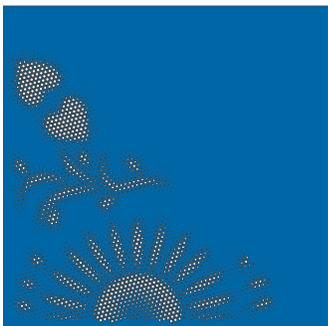
"ROSA"  
PANTONE #189C



"HABANERO"  
PANTONE #173C



"FIESTA"  
PANTONE #212C

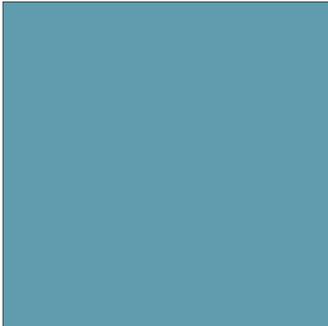


"BLUEBELL"  
PANTONE #647C

## OTHER COMPONENTS



STEEL DECK SURFACE  
(POLYURETHANE NON-SKID  
FINISH)



PAINTED DECK RIM AND  
FURNITURE COMPONENTS

SEE ATTACHED MATERIAL  
SAMPLES FOR VINYL SEAT  
CUCHION FABRIC SELECTIONS

(SELECTIONS FROM SAN ANTONIO GRAPHIC  
STANDARDS COLOR PALLETE)