

La Crosse Cruise Ship Landing & Courtesy Dock

Schematic Design



LA CROSSE
WISCONSIN

SMITHGROUP JJR

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Project Overview

La Crosse Cruise Ship Landing & Courtesy Dock

Viking Cruises was founded in 1997 with the purchase of four ships in Russia. In 2000, the company began to provide river cruising experience in key European cities and also expanded into the American market. Viking provides destination-focused itineraries designed for experienced travelers who have an interest in geography, culture and history. Each journey includes daily shore excursions and programs to immerse in the destination culture. Typical river cruises in Europe, Russia, Egypt, China and Southeast Asia range from 8 to 23 days. The North American demand for river cruising has grown annually and Viking has plans to begin operating river cruises on the Mississippi and has expressed strong interest in making La Crosse one of the destinations on its cruise itinerary. Guests on a Mississippi River cruise will be able to see America from the eyes of the river, while experiencing the local amenities as they stop at small towns and other destinations. La Crosse is an ideal location for a Viking Cruise dock.

SmithGroupJJR was hired by the City of La Crosse to develop a schematic design alternative that would provide for the development of a permanent docking facility to accommodate the Viking River Cruise ships. In addition, the City desires to have courtesy dockage for transient, recreational boaters. The intent of the courtesy dock is to have it located within walking distance to the downtown restaurants, shops and other amenities. The ultimate scope of work includes concept development, preliminary design, permitting, funding assistance and final design. This report will help define the concept so that those future scope items can be better defined.

Site Analysis

Water-Based Analysis

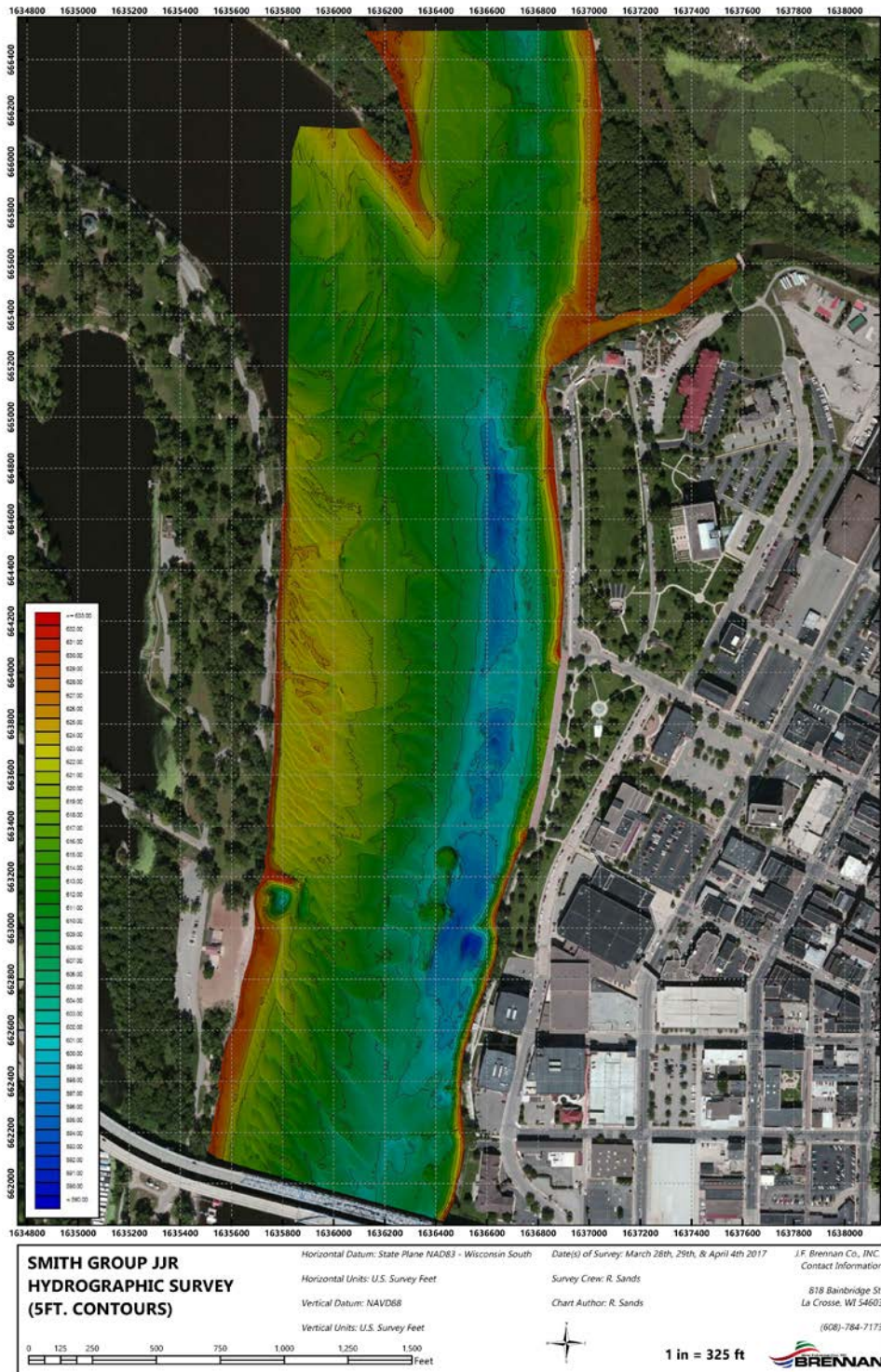


FIGURE 1 BATHYMETRIC SURVEY FROM J.F. BRENNAN CO., INC.

HYDRAULIC MODELING

In order to understand how intense and in what direction the local currents move in this reach of the Mississippi River, SmithGroupJJR performed hydraulic modeling of the river flow patterns. This analysis helps determine acceptable mooring locations for both the Viking ships and recreational boaters.

BATHYMETRIC SURVEY

J.F. Brennan Co., Inc., under contract with SmithGroupJJR, performed a bathymetric survey of the Mississippi River as shown below in Figure 1. The limits of the study were generally defined as the full width of the river commencing at the confluence of the Mississippi, Black and La Crosse rivers to the north, and the STH 16 bridge to the south. Brennan utilized RTK GPS corrections for precise positioning and a multi-beam echo-sounder for depth measurement. Many data points are obtained from the multi-beam echo-sounder that allow for a very detailed river bottom surface model to be created. The work was overseen by a certified hydrographic surveyor as recognized by the American Congress on Surveying and Mapping and The Hydrographic Society of America.

The depths along the study area vary from less than 1-foot along the western shoreline to approximately 33-feet in the center of the main channel.

MODEL SETUP

The MIKE 21 software program was utilized to conduct hydrodynamic simulations of the study area. MIKE 21 is a coastal modeling tool that allows a variety of physical, chemical or biological processes to be simulated.

The bathymetric data was converted to a 3D mesh as shown in Figure 2. Coarser elements, with side lengths ranging from 15.0 to 20.0 meters in length, were generally used throughout the domain. Finer elements, with side lengths of approximately 8.0 meters in length, were used at the confluence of the Mississippi, Black and La Crosse rivers to better capture the flow patterns in that area. A total of 7,246 elements were modeled in the study area.

In addition, flow rates and river stages were obtained from NOAA and USGS gauge data. Representative flow rates are shown in Table 1.

Two types of boundary conditions were used: 1) Constant flow rates, and 2) Constant water elevation. Constant flow rates, as provided in Table 1, were imposed at the Mississippi River upstream,

Black River and La Crosse. At these boundaries, flow is allowed to enter or leave the calculation. The lateral boundaries of the east and west banks may expand or contract, but no flow exchange is allowed to occur along these limits. Constant water elevation (the same level as zero contour level) was imposed at Mississippi River downstream.

The simulation starts with zero water elevations (i.e. same level as zero contour level) and zero velocity throughout the elements. This will generate transient effect, i.e. transition from the initial condition to the steady state solution.

A representative Manning's coefficient was determined based on a flow sensitivity analysis with respect to variations of Manning coefficients. It was found that a Manning's n value of 0.064 provided stable flow.

Constant Coriolis force was used in the simulation, which is automatically computed in MIKE21 for a given latitude (in this case = 43.81°).

Computational time step was 30 seconds. The simulation was run for 500 time steps, so simulation length was 15,000 seconds.

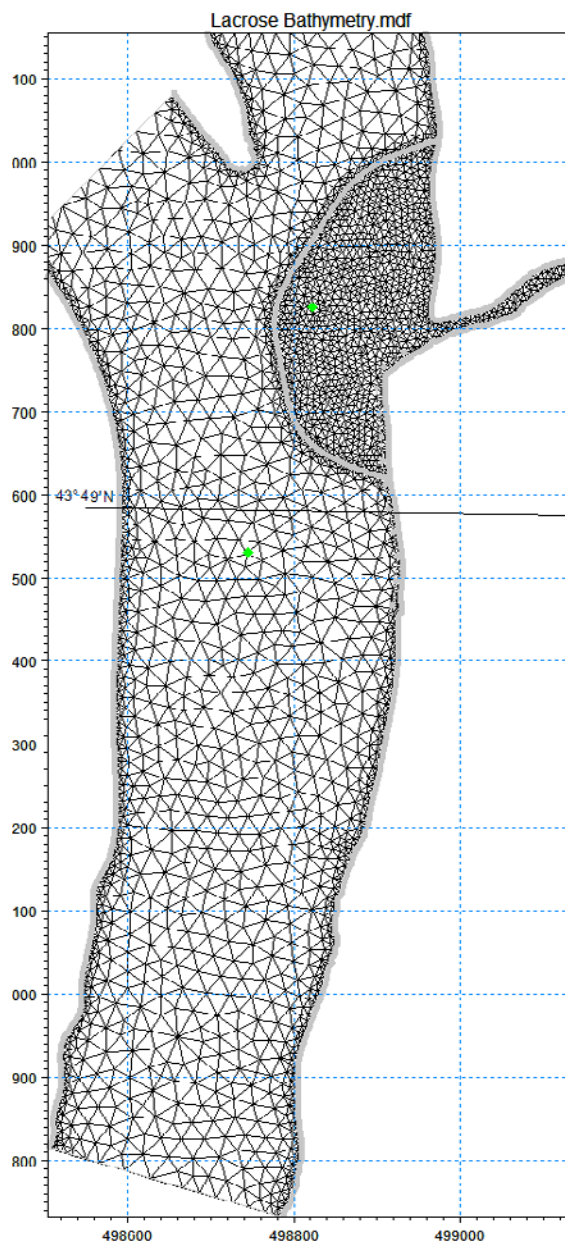


FIGURE 2 3D MESH INVERTED FROM BATHYMETRIC DATA

River	⁽¹⁾ Normal Flow Rates [m ³ /s]	100yr-Flood Conditions [m ³ /s]
Mississippi Upstream (MU)	1,642	6,938
Black River (BR)	125.0 ⁽²⁾	1,076
La Crosse River (LC)	17.0	114
Mississippi Downstream (MD)	1,708	8,045

TABLE 1 FLOW RATES IN THE RIVER IN THE STUDY AREA

Note:

- (1) There is no station directly upstream of Black River. As such corresponding value is inferred from the other flow rates: QBR = QMD – QMU – QLC.
- (2) There is an existing dam upstream of Black River, as such the discharge could at times be zero for Black River at normal operating condition.

MODEL RESULTS

A snapshot of flow pattern in the river field during normal flow conditions determined for the entire study area is shown in Figure 3. This snapshot is taken at the end of the simulation time ($t = 15,000s$) where flow equilibrium has occurred. The plot shows that the main flow (moving faster) occurs in eastern side of the river.

The complex flow field in the area of the La Crosse and Black River confluence with the Mississippi is shown in Figure 4. Figure 4 identifies study points A – E largely along the eastern bank of the Mississippi and in the La Crosse River mouth where potential Viking or courtesy dock improvements may be constructed. Velocities at these locations are given in Table 2. The daily velocities range from $0.57m/s$ ($1.11knot$) at the south end of the Riverside Park bulkhead, diminishing to $0.28m/s$ ($0.54knot$) at the La Crosse River mouth.

At low flows, a reverse current gyre formation develops in zone D due to the relatively high current speed (compared to Black River) from the La Crosse River which on exiting from its mouth the flow spreads towards the north and other directions. On the south side of the La Crosse, at its mouth, sedimentation occurs as velocities are just below the threshold for sediment movement.

The same analysis was performed for the 100-yr flood condition. Figure 5 shows the flow field in the study domain. The flow fields at the various locations near the confluence of Mississippi, La Crosse, and Black River as shown Figures 4 and 5 are presented in Tables 2 and 3.

MODELING CONCLUSIONS AND RECOMMENDATIONS

The analysis shows that the flow in this area ranges from 0.04 to 2 knots under normal conditions, and up to 5 knots in an extreme flood. For berthing, velocities of 2 knots for head berthing and 0.75 knots for beam berthing are recommended as acceptable limits for cruise vessels. For small recreational craft, current speeds of half those values are used as acceptable values. Therefore, the areas along Riverside Park appear suitable for a cruise ship dock but not for the courtesy dock intended to accommodate recreational craft. Areas toward the north end of the Riverside Park (near the mouth of the La Crosse River) appear more suitable for a potential courtesy dock. Due to the limited flow velocities at the La Crosse River, higher amounts of sedimentation may occur and would necessitate routine maintenance dredging for optimal water depths, unless sediment diverters were installed to direct sedimentation away from the proposed courtesy dock.

During the 100-yr flood event, most of the study zone is unsuitable for cruise dockage or courtesy dockage due to high current speeds. Additional analysis and design in the Design Development phase should consider how best to accommodate courtesy dockage during flood events. Proposed plans for the Viking dockage infrastructure or courtesy dockage infrastructure should be able to be removed during flood events. If not, a considerable investment will need to be made to protect the proposed infrastructure from high current speeds, floating debris, ice impacts and scour impacts.

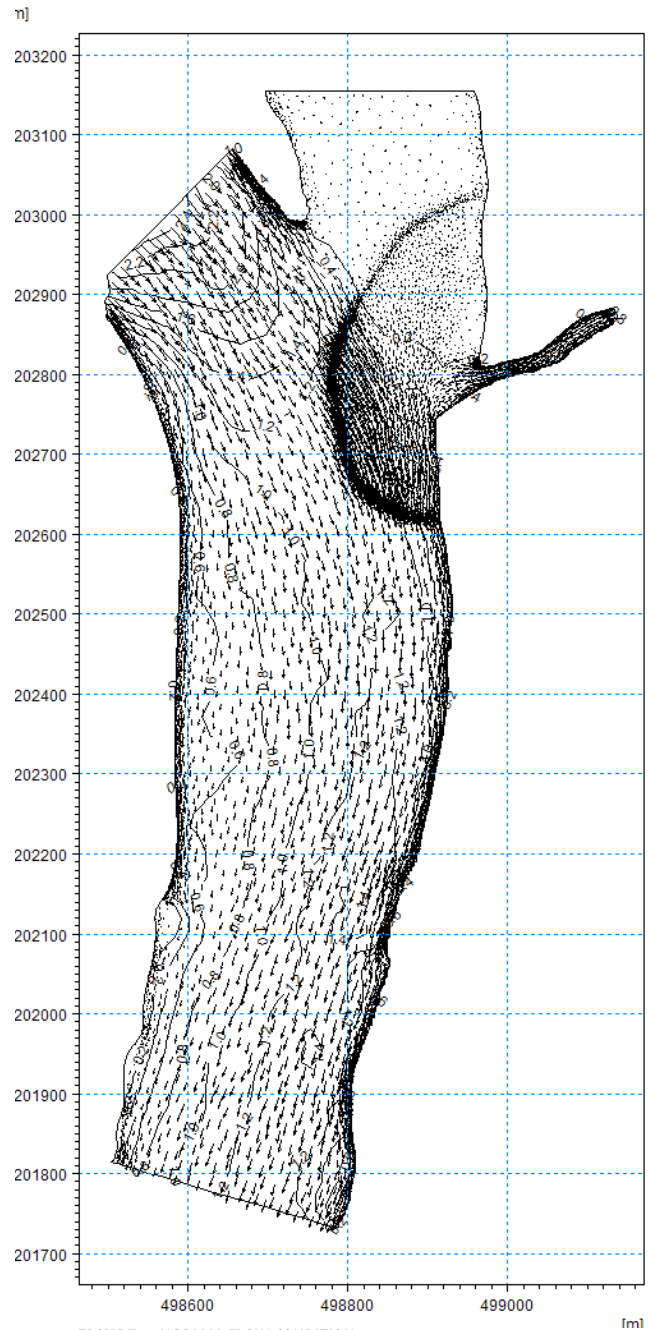


FIGURE 3. NORMAL FLOW CONDITION

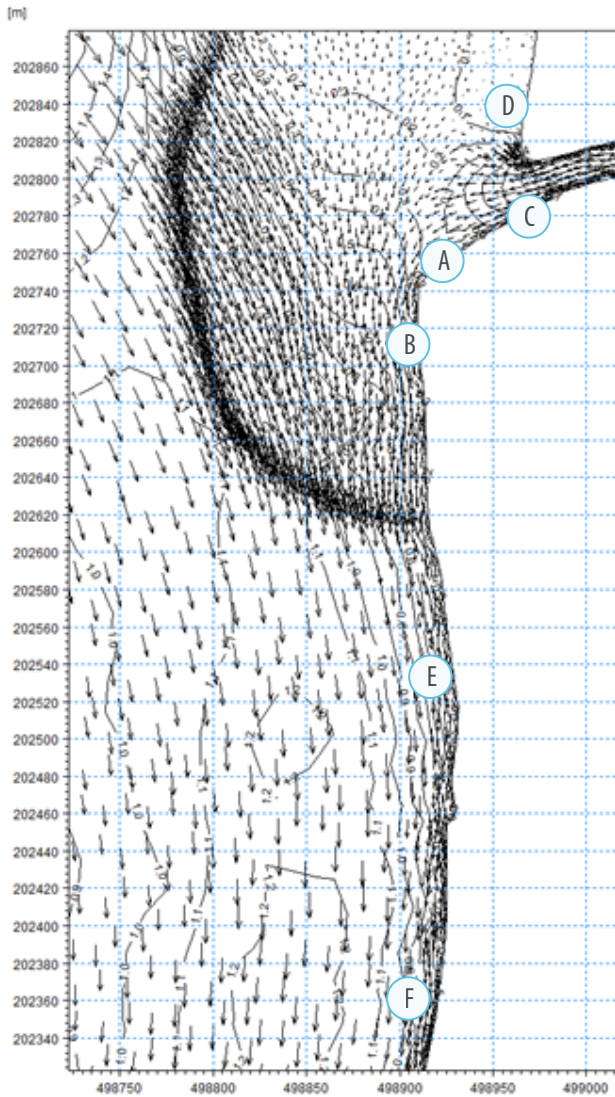


FIGURE 4.

Zones	Current Speed, knot
A	0.54
B	1.11
C	1.32
D	0.04
E	1.34
F	1.98

TABLE 2 CURRENT SPEED AT SELECTED LOCATIONS UNDER NORMAL FLOW CONDITIONS

Summary:

- Zone A - Okay for cruise ship and transient berthing but area subject to heavy sedimentation during flooding events of the La Crosse River.
- Zone B - Okay for general berthing but dangerous due to thrust and wake from upbound barges.
- Zone C - Area okay for transient docks but subject to strong flood flows and heavy sedimentation requiring heavy maintenance.
- Zone D - Good location for transient berthing.
- Zone E - Suitable for cruise boat berthing.
- Zone F - Suitable for side tie berthing of high powered cruise boats only.

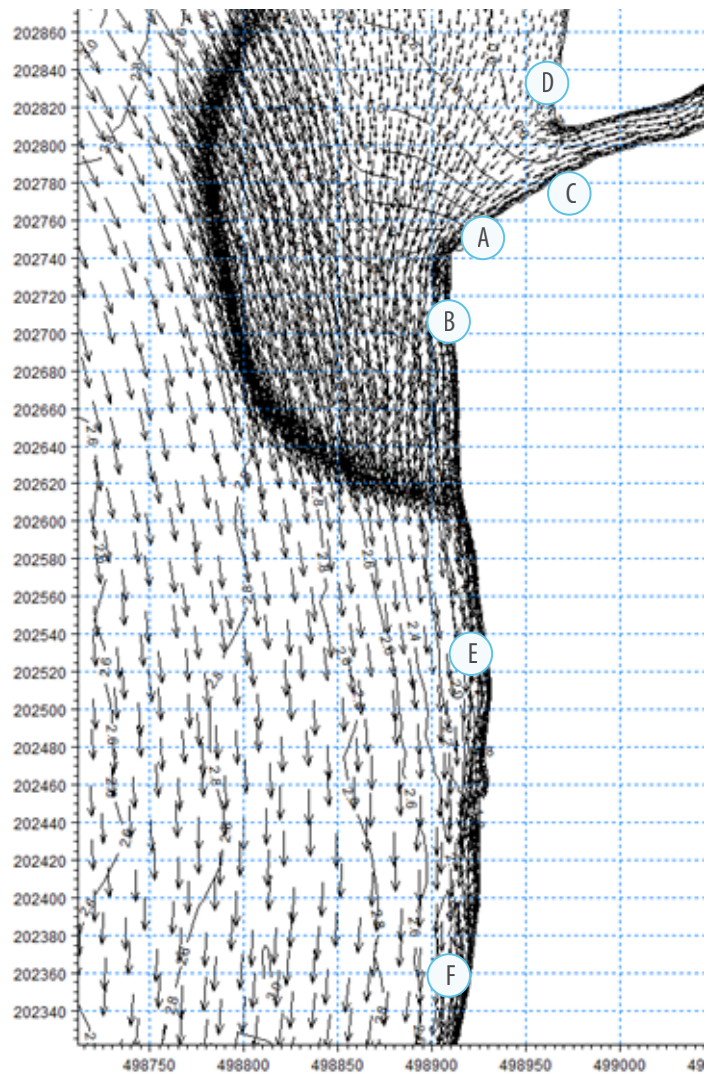


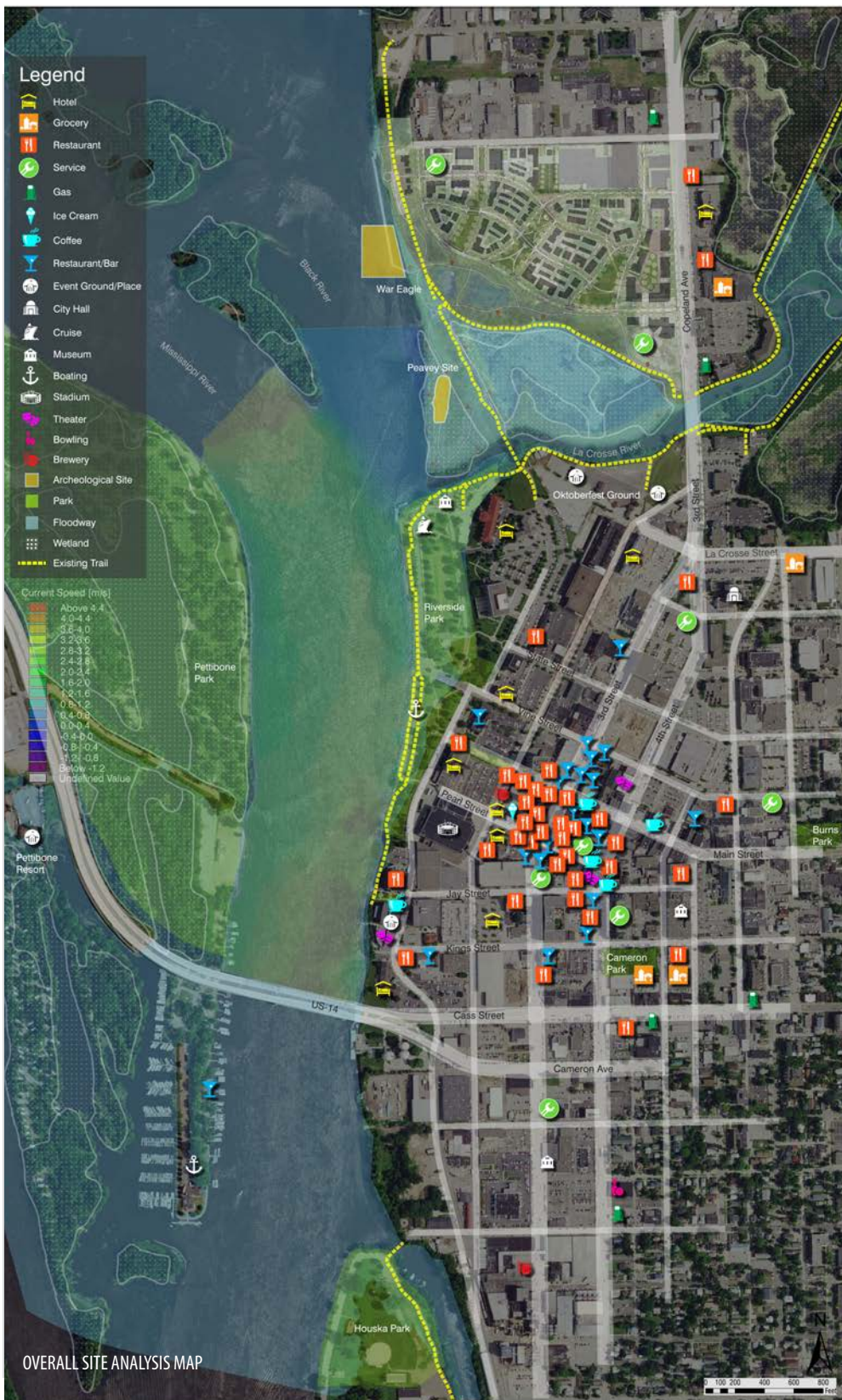
FIGURE 5

Zones	Current Speed, knot
A	2.51
B	4.14
C	1.59
D	0.97
E	4.32
F	4.96

TABLE 3 CURRENT SPEED AT SELECTED LOCATIONS UNDER 100-YEAR FLOW CONDITIONS

SITE ANALYSIS

Landside Analysis



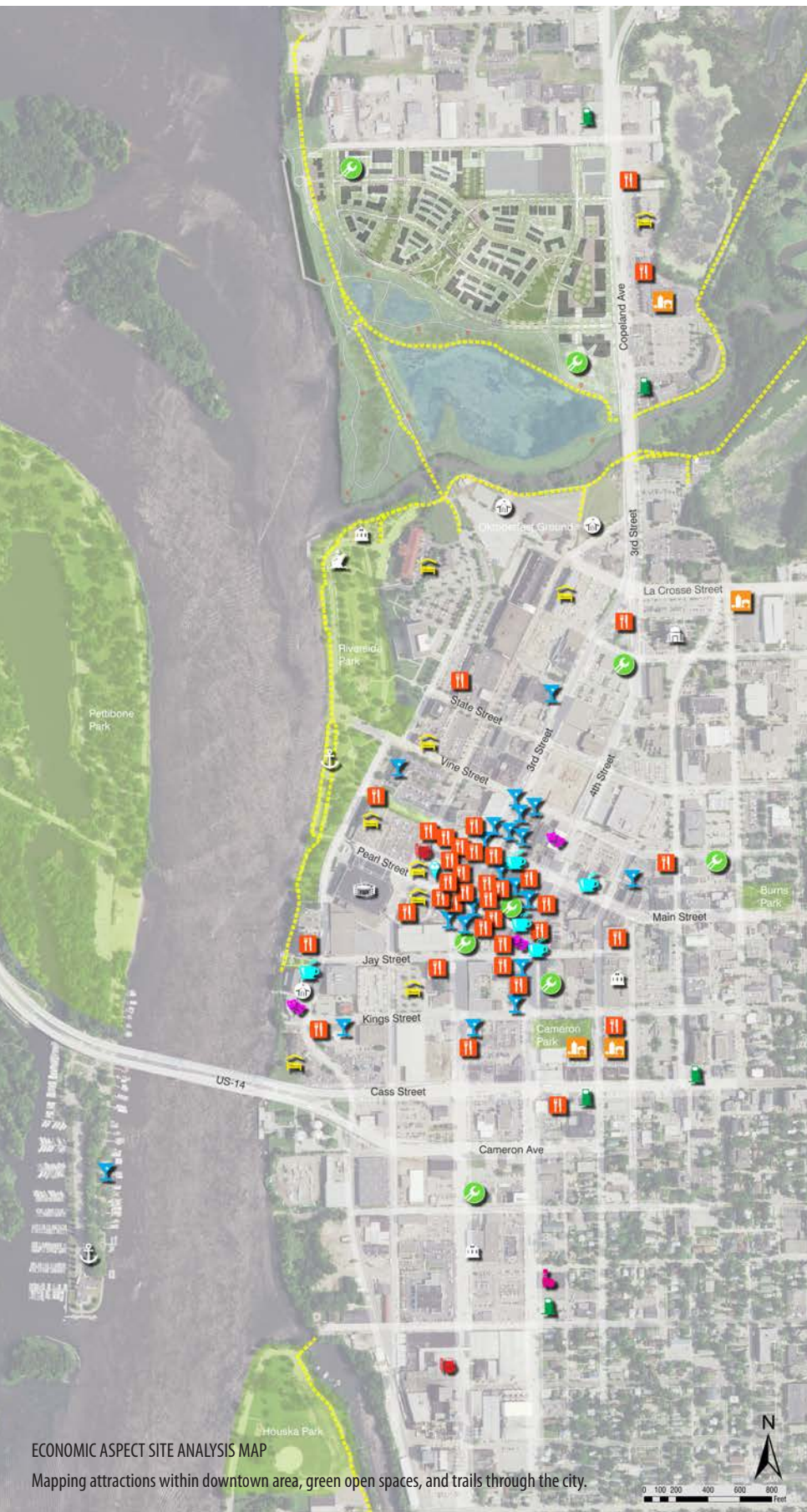
The City of La Crosse sits alongside the Mississippi River with a strong sense of health, well-being, quality of life and education. From the 2002 CONFLUENCE plan to the CITY VISION 2020 report, there are various development plans proposed, from its northern limits to the south of the US-14 bridge over the Mississippi River. These development plans addressed concerns of community engagement, ecological and cultural resources preservation, infrastructure improvement, economic growth, and the concerns of residents' physical/mental health.

The river has long been an asset for industry and transportation, but has evolved into something much more diverse and valuable to La Crosse. With growing river cruise tourism it also creates a unique niche for La Crosse as one of the busiest waterfronts along Mississippi River. La Crosse's riverfront landing, connected waterfront green spaces and commercial opportunities gives the city an advantage over other riverfront communities. These assets, coupled the improvements envisioned in this study to serve additional river cruise lines such as Viking and the addition of downtown transient dockage, have the potential to elevate downtown La Crosse to another level of vibrancy.

ECONOMIC ASPECT

ATTRACTIONS

The downtown La Crosse riverfront offers an attractive mix of amenities for visiting water craft. Numerous restaurants, cafes, bars, and other destinations are clustered in downtown



ECONOMIC ASPECT SITE ANALYSIS MAP

Mapping attractions within downtown area, green open spaces, and trails through the city.

La Crosse between Main Street and Jay Street. Retail and art spaces support a range of music, arts and other cultural activities serving residents and visitors. In addition, a number of new hotels and mixed use developments have recently been implemented or are underway in this area.

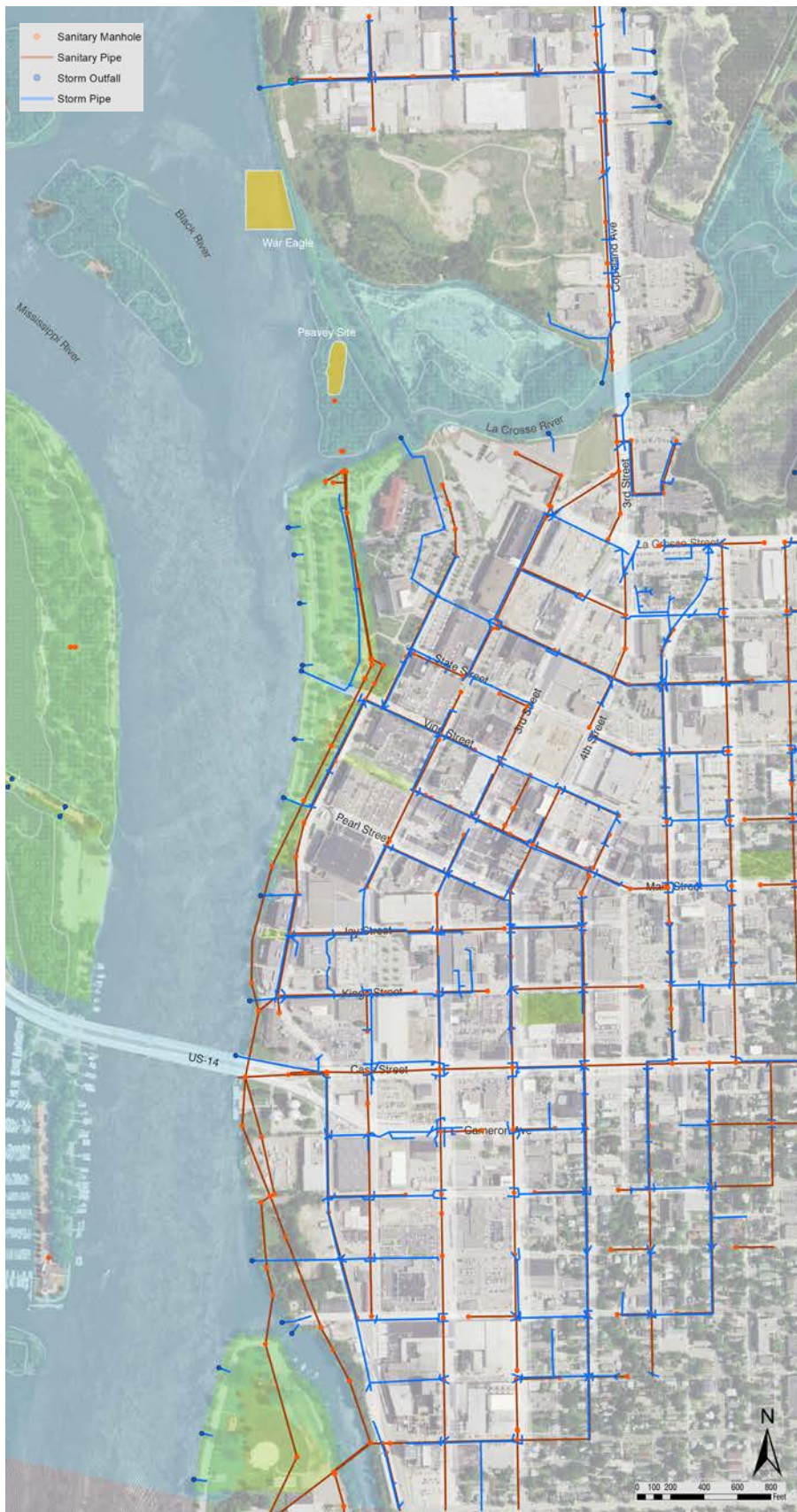
Popular events such as Oktoberfest and Riverfest highlight the City during specific times of the year, generating additional tourism and pedestrian activity in the downtown. Currently, local river cruise vendors occupy the northern tip of Riverside Park while the more fortified landing further south between Vine and Pearl Streets provides docking space for larger, more regional visiting vessels. Both locations are attractive due to their proximity to downtown offerings with the potential of locally-operated restaurant vessels being added in the near future.

Riverside Park is a popular community green space that provides passive recreation space, waterfront trails, river overlooks, public art and flexible lawn space for year round community activities. La Crosse Center and several art performance centers are located at the south end of Riverside Park, south of Pearl Street towards the US-14 bridge. La Crosse Center is currently studying potential expansion plans that may include improved connections to surrounding streets and the riverfront*. This portion of Riverside Park is not of the same visual quality or programmatic value of the rest of the park and could be enhanced with additional amenities and programming to better activate the park throughout the year. Enhancements to the existing landing, as well as the aforementioned La Crosse Center plans, could be leveraged to achieve this. A network of wetland areas and sensitive ecological habitats exist within the La Crosse River corridor just north of downtown, providing an attraction for wildlife enthusiasts, trail users and visiting ecotourists.

DEVELOPMENT PLAN

The City Vision 2020 Master Plan includes a wide range of building renovations and new construction to enhance the City's long term vitality in light of smart growth principles. Reconnecting city life to the waterfront is one of the plan's biggest goals and an important criteria as implementation occurs. The plan

*Proposed La Crosse Center images and designs in this report were provided by Gensler, the architecture firm working on the La Crosse Center proposed expansion.



ENVIRONMENTAL ASPECT ANALYSIS MAP
 Mapping storm and sanitary pipe systems and archeological sites.

seeks to leverage the river for visual, physical, and psychological connection to water and nature for both visitors and residents and highlights the value of ecological and cultural resources.

Recent activity within the study area illustrates the City's commitment to these goals. On the north side of the La Crosse River, the Riverside North development proposes a sustainable, mixed-use waterfront neighborhood on former industrial properties. In the downtown area, active investment plans and redevelopment of the historic business district are emerging. Simultaneously, the City of La Crosse is implementing a bike/walking network within the city and an enhanced public transportation system to facilitate better connectivity of infrastructures and more sustainability in economic, environmental, and social perspectives.

ENVIRONMENTAL ASPECT

UTILITY

The study area contains a number of large scale utilities, including citywide power, sanitary and stormwater corridors that parallel the river through Riverside Park. A large sanitary manhole and several stormwater outfalls are located within Riverside Park and will require further investigation as designs advance. Information was provided by the City of La Crosse.

WETLANDS

The river itself is a tremendous ecological resource with significance on a local, regional, national and international scale. Wetlands at the confluence of the La Crosse, Black and Mississippi Rivers, as well as islands within the rivers, provide both ecological and hydrological benefits in the form of wildlife habitat and regional flood and surface water management. These wetlands are sustained by both surface and groundwater and are frequently inundated by extreme precipitation events. Previous research identified the confluence as habitat for a range of threatened and endangered species, including Bell's Vireo, Henslow's Sparrows, and Bald Eagle. These findings represent significant challenges to



ARCHITECTURAL ELEMENTS IN LA CROSSE DOWNTOWN



ARCHITECTURAL ELEMENTS AND STREETSCAPES IN LA CROSSE DOWNTOWN



BRIDGE FEATURE FOR A RIVERSIDE CITY

development and heavy construction and must be considered carefully during any future plans.

ENDANGERED RESOURCES REVIEW

An Endangered Resources (ER) Review was conducted by the WDNR Bureau of Natural Heritage Conservation dated February 26, 2018. The review identified endangered and threatened species that may be in the project study area and provided follow-up actions. Five species of mussels were identified under the "actions that need to be taken to comply with state and/or federal endangered species laws." Actions required will be to implement erosion control and turbidity barriers during construction and to have a mussel survey conducted by a qualified surveyor prior to any in water work. Any rare mussels discovered must be moved to suitable habitat outside of the project area. Another mussel species is recommended to have the same actions but is not required. Lastly, 18 species were identified as possibly being in proximity to the project area but no actions are required or recommended to mitigate potential impacts because suitable habitat is not present at the project site and no impacts are anticipated.

CULTURAL ASPECT

ARCHEOLOGY SITES

La Crosse was a waterfront commerce hub in the late 1800s with significant pieces of this cultural fabric remaining in the form of maritime industry facilities, railroad infrastructure, and other transportation structures from this era. There are two significant historic sites along the riverbank, the War Eagle and the Peavey site.

The War Eagle was a riverboat that served as a transportation vessel during the Civil War. Afterwards, it remained in service for commercial use and was destroyed

by an accidental fire in 1870, along with other related facilities including dock, warehouses, depot, and grain elevators. This area is now a state registered historic site and cataloged burial site and incorporated into plans for Riverside North. The Peavey Site is the second archeological area, containing stone flakes, a peavey/lumber pike, and other buried artifacts.

HISTORIC APPEARANCE

La Crosse is a riverside city with historically strong commerce activities and remaining architectural elements reflected in building facades and streetscapes. The La Crosse Commercial Historic District contains approximately five blocks of commercial Italianate, Romanesque Revival and Queen Anne architecture from the 19th century. It also includes Chicago Commercial, Art Deco, and some Art Modern buildings from the early twentieth century which creates a unique mixture of architectural styles within the downtown. Though some of the structures no longer remain, the City is proposing a future development plan to preserve as much of this rich historic legacy as possible. New developments might also bring back the elements in a creative and innovative way through thoughtful design.

From a site perspective, Riverside Park reflects the great heritage of La Crosse's riverfront landscape as envisioned by famed landscape architect John Nolen. It provides a reception place for daily cruise visitors, special events and a range of other passive recreational opportunities. In a more contemporary light, the bridge across the Mississippi River to the south of downtown La Crosse is a unique visual amenity and landmark that contributes to the riverfront viewshed. Shipping vessels, gangway platforms, port facilities and landings, riprap revetments, and other maritime features contribute to La Crosse's appearance from the past to present.

Program Validation

Viking Requirements & Accommodations



Passenger Capacity	408
Crew Capacity	173
Mooring Needs	Bow & Stern lines; Starboard preferred, could do portside as well.
Preferred Loading Location	Midship, Deck 1 or Deck 2
Food & Goods Loading Location	Stern, Deck 2
Gangways on Ship	~20 foot in length
Utility Connections Needed	Water – yes Power – not currently, but may want for others or for future considerations
Design Draft	~9 feet + 3 feet of clearance = 12 feet total

TABLE 4. KEY VESSELS PARAMETERS

SmithGroupJJR had a discussion with David Simmons, a consultant hired by Viking to help manage the Mississippi River program, and Steve Fryers, Vikings head of ship design and construction. The purpose of the meeting was to understand some of the technical requirements of the proposed Viking vessel and the landside destination goals Viking has for the City of La Crosse.

The proposed vessel Viking is looking to construct for Mississippi River cruises is a double-bottomed ship that is approximately 450-feet long, 105-feet in breadth, and 6 decks in height. The vessel has a design draft of 8.5 feet and should be able to turn within its own length in a 3 to 4-knot current. Other key vessel parameters are listed in Table 4.

Viking will ask the City for exclusive dock rights, which means when they schedule stops in La Crosse, they want to use the dock. They currently anticipate one call per week for each vessel and anticipate 2 vessels (2 calls total per week, but not at the same time). The season would generally run from July through mid-to-end of October. One of Viking's themes are they "take people to the center of everything" so being in close walking distance to downtown La Crosse is

critical. A typical call to La Crosse would have the boat arrive between 7:00am and 8:00am. Passengers would disembark the vessel and go either on an excursion or be able to walk around downtown on their own. Viking will coordinate buses to take passengers on the excursions. On these days, the crew will help the customers, get the cabins ready, but will also have the opportunity to leave the boat and explore the City. The vessel will leave sometime in the evening depending on the direction (upstream or downstream) the cruise is headed. Passengers are not permitted to disembark and stay for longer periods of time.

The following page displays the current and potential vessel sizes for the site. In addition, the docking schedules for 2016 and 2017 have been included for reference, as more vessels and higher frequency of landings are anticipated in the future.

SmithGroupJJR also had a discussion with the J.F. Brennan company to better understand river pilot maneuvering of barges through this stretch of the Mississippi River. The biggest takeaway from the conversation

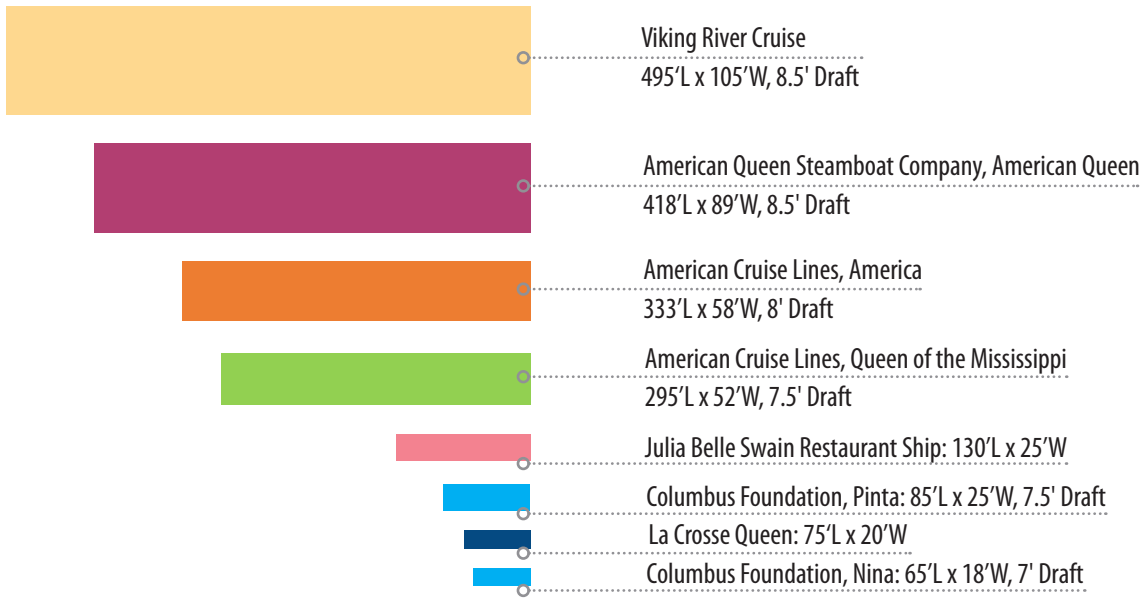
that would potentially impact our project is related to northbound barge traffic. Barges typically swing over toward the project site to make the turn to the northwest near the confluence of the rivers. This is independent of the no wake zone and could cause additional wake for improvements implemented along the east side of the river. Barge traffic, during peak times, uses this stretch of the river multiple times per day.



PROGRAM VALIDATION

Program Vessels and Schedule

SmithGroupJJR had a discussion with Jay Odegaard, Superintendent of Recreation & Park Facilities about the current use of the landing. Currently, there is no programmed schedule for existing ships to use the landing. Use fluctuates with water depths and flow rates of the river. When it's busy, there could be three to four stops per week but there are a lot of weeks with no stops. The addition of Viking would not likely be an issue and scheduling around their exclusive use of the landing facilities would need to be coordinated. Jay's biggest concern would be accommodating water or trash pickup from a cruise vessel. Current facilities within Riverside Park would not accommodate these services well and improvements should be considered in the design.



YEAR 2016	Sun	Mon	Tue	Wed	Thu	Fri	Sat
July Week 4					Green		
July Week 5		Green	Blue	Blue	Blue	Blue	Blue
August Week 1	Blue	Blue		Pink	Green		
August Week 2		Green					Pink
August Week 3				Pink			
August Week 4				Orange			
August Week 5		Orange					
September Week 1					Orange		
September Week 2		Orange					
September Week 3							Pink
September Week 4				Pink	Green		
October Week 1		Green					Pink
October Week 2				Pink	Green		
October Week 3		Green					
October Week 4							

YEAR 2017	Sun	Mon	Tue	Wed	Thu	Fri	Sat
July Week 4							
July Week 5							Pink
August Week 1					Green	Pink	
August Week 2		Green				Pink	
August Week 3		Green		Pink			
August Week 4				Orange			
August Week 5		Orange			Green		Pink
September Week 1		Green			Orange		
September Week 2		Orange					
September Week 3							
September Week 4							
October Week 1					Green		
October Week 2	Orange				Orange	Green	
October Week 3		Green					
October Week 4	Orange				Orange		

ALTERNATIVES CONSIDERED

Program Workshop



Following the wave model analysis, five sites were selected as potential sites for courtesy docks and larger vessel facilities. After meeting with the City and incorporating landside data such as development plans and utilities, three new options were generated.

SITE 1

Site 1 uses existing riverboat landing infrastructure in Riverside Park, near downtown commercial attractions that are desirable to visiting cruise ships, including Viking Cruises. The proposed La Crosse Center renovations adjacent to this site would improve connections to downtown commercial attractions through an enhanced Pearl Street link and portal, further enhancing the attractiveness of this site. Highlights of Site 1 include a consolidated and improved landing facility for multiple large visiting vessels, a strong visual connection from the riverfront through green space into downtown, and creation of a reception landscape and streetscape. Economically, this will be the lowest construction cost option among these three alternatives.

Conversely, the river currents at Site 1 pose challenges for recreational boats trying to maneuver to the proposed courtesy dock. In addition, dockage configurations to accommodate the anticipated larger Viking vessels may interfere with barge maneuvering and the designated navigation channel.

SITE 2

Site 2 is an extension of the Riverside Park landing, providing additional cruise ship dockage to the south. Site 2 provides an improved connection between the north and south riverfront with an extended promenade continuing south to the US 14 bridge. When coupled with proposed La Crosse Center expansion plans and proposed restaurant boat, there is potential to activate this underutilized landscape into a new focal point with a strong visual and physical link to downtown businesses.

From the wave modeling results, Site 2 has similar navigation channel setbacks as Site 1 but has less severe river currents, making it more favorable for cruise ship and recreational docking. To address navigation channel constraints, the team explored

options that excavated a new basin in roughly the location of the existing restaurant parking lot to create more usable water and a stronger water connection to Front Street. The new basin would accommodate transient slips as well as the proposed restaurant boat, creating more linear footage of developable waterfront and potential private investment. Proposed street level La Crosse Center facilities could be leveraged for ticketing and other support uses.

Both the land excavation, and the need to relocate major underground utilities made this option the most costly and ultimately made the excavated basin impractical at this

location. However, the extended landing and promenade were viewed positively and deemed valid for further study.

SITE 3

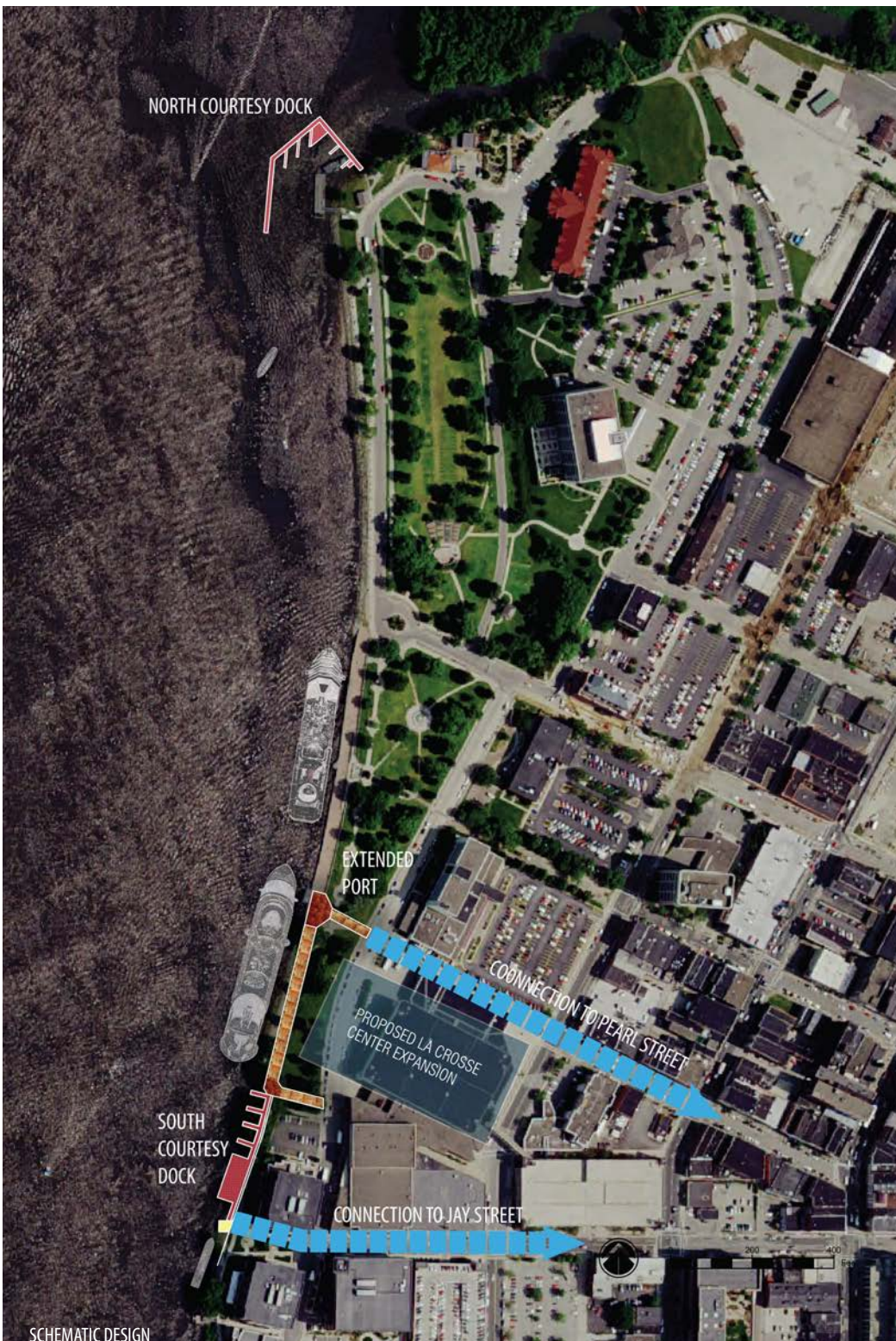
Site 3 is an outside-the-box option that reflects the City's long term plans for new neighborhood development south of the US 14 bridge as an extension of downtown. Site 3 currently contains multiple industrial uses and would require significant land assemblage and upgraded transportation infrastructure, but does have existing docking facilities and river conditions that could be leveraged for cruise ship and transient facilities in the future. Site 3 is also a brownfield site with associated environmental and regulatory challenges that would delay its availability for near term public use. While Site 3 was not determined

to be the best short term option, it does represent an excellent longer term option when the river cruise market supports additional docking facilities and the local development market supports the kind of high quality waterfront neighborhood development that would leverage these tourist-oriented maritime facilities. The City is encouraged to consider cruise ship docking facilities in future neighborhood and sub-area planning for this area.



SCHEMATIC PLAN

Process and Results



DESIGN RESULTS

After an internal charrette and work session with the City team, Site 2 was selected as the preferred location without the excavated basin proposed in the original concept. In addition, direction was given to relocate the existing local cruise activities to the expanded landing south of Pearl Street and convert the northern facility into transient/courtesy dockage for recreational boating.

PROGRAM

Based on conversations with the City team, the following priorities were established for the Schematic Design program:

- 1. Cruise Ship Landing**-develop facilities and associated infrastructure to meet future demand for more active river-related tourism on the Mississippi River, using more and larger vessels.
- 2. Courtesy Dock**-accommodate more recreation vessels and create safe and sustainable transient facilities for Mississippi River travelers.
- 3. Connectivity to downtown area**-Leverage existing Riverside Park connectivity to the Mississippi River and enhance connections between the downtown and water visually, physically, and programmatically.
- 4. Riverside Park**-preserve existing green space for passive use and events along the river and enhance where possible.
- 5. Leverage existing infrastructure**-utilize existing utilities and infrastructure wherever possible and minimize disturbance where new development occurs.

MARINA FACILITIES DESIGN

EXTENDED LANDING

Based on review of the above alternatives with the City team, extending the existing landing was considered the best fit for both land use and economic concerns. The existing utilities will not be disturbed and existing tie-offs maintain their function.

IMPROVED CONNECTIVITY

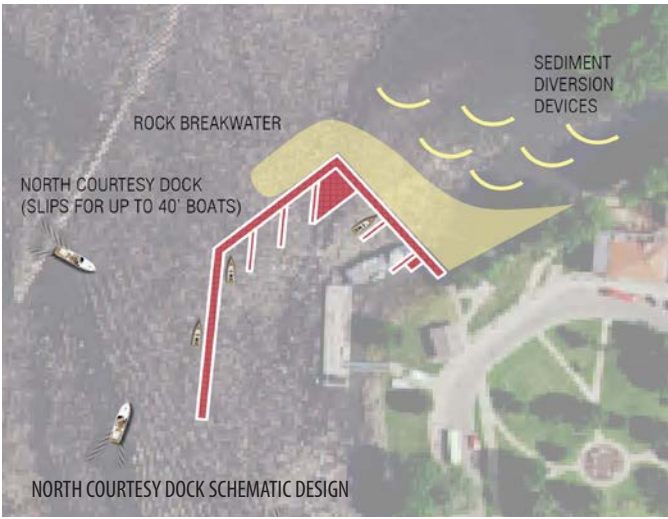
Extension of the Riverside Park promenade, and improvement of the pedestrian connectivity through Pearl Street, brings the City and water closer together and reinforces downtown La Crosse as a unique waterfront destination. The existing parking north of the current restaurant will continue to serve restaurant and general public use, but also provide service vehicle access to visiting cruise ships.

GREEN SPACE

The expansion plan for La Crosse Center proposes enclosed, year-round program space that spans Front Street, providing direct access from Riverside Park. This relationship between the road, park, cruise ships and building structures creates a unique urban design opportunity to activate this currently underutilized section of the riverfront. Further coordination between this project and the La Crosse Center will be needed as designs advance.



COURTESY DOCK DESIGN



SOUTH DOCK

Courtesy docks for short term tie-ups to dine or shop are nestled behind the projection of the main dock wall to help protect them from strong current action, debris and ice impact. A new landing for the La Crosse Queen is adjacent to the courtesy docks which can use the extended platform for ticketing and loading. The restaurant boat can also tie up at this semi-protected location.

NORTH DOCK

According to preliminary discussions with the City, the courtesy dock on the north end of Riverside Park will connect with an existing pier and walkway, extend the dock, and accommodate more recreational boaters wishing to visit La Crosse attractions. The schematic design currently proposes 40 foot slips at this

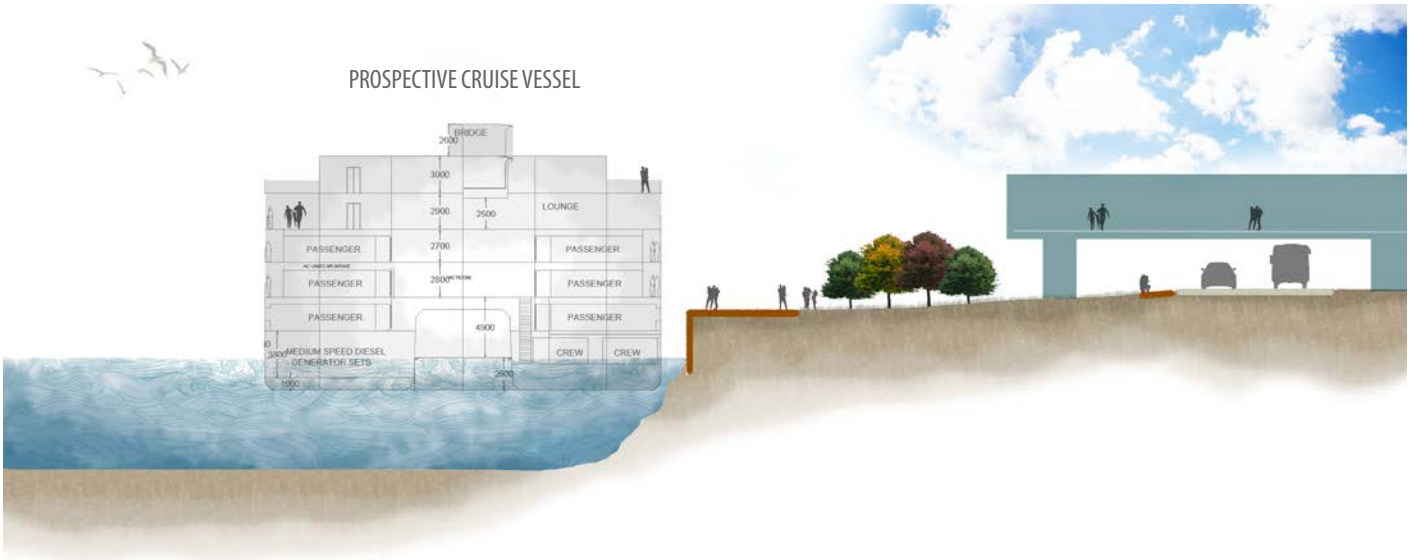
northern facility. The alignment of the slips are in an orientation of the general river flow direction. This eases maneuvering of small crafts into the berths and lowers mooring loads. There are a few concerns for implementing docks at this location.

First, the area is subject to heavy sediment loads. During flood events sediment discharges into the La Crosse River and ultimately ends up at this location. To keep sediment accumulation from forming under the courtesy docks, submerged sediment diversion structures, often called lowa Vanes, can be installed to help move the sediment around and away from the berths.

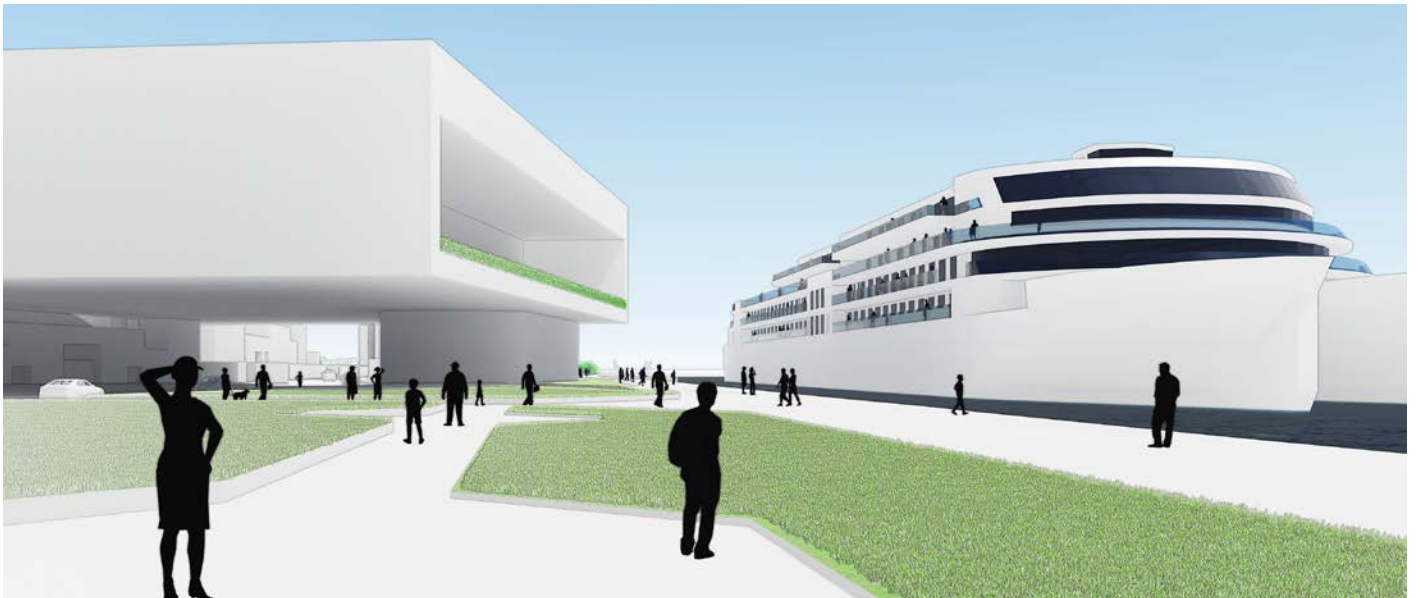
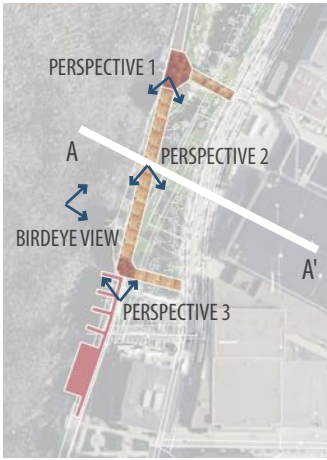
On the west flank, installation of a robust floating wave attenuator would help protect moored yachts from debris and tug/barge wake.

Schematic Plan

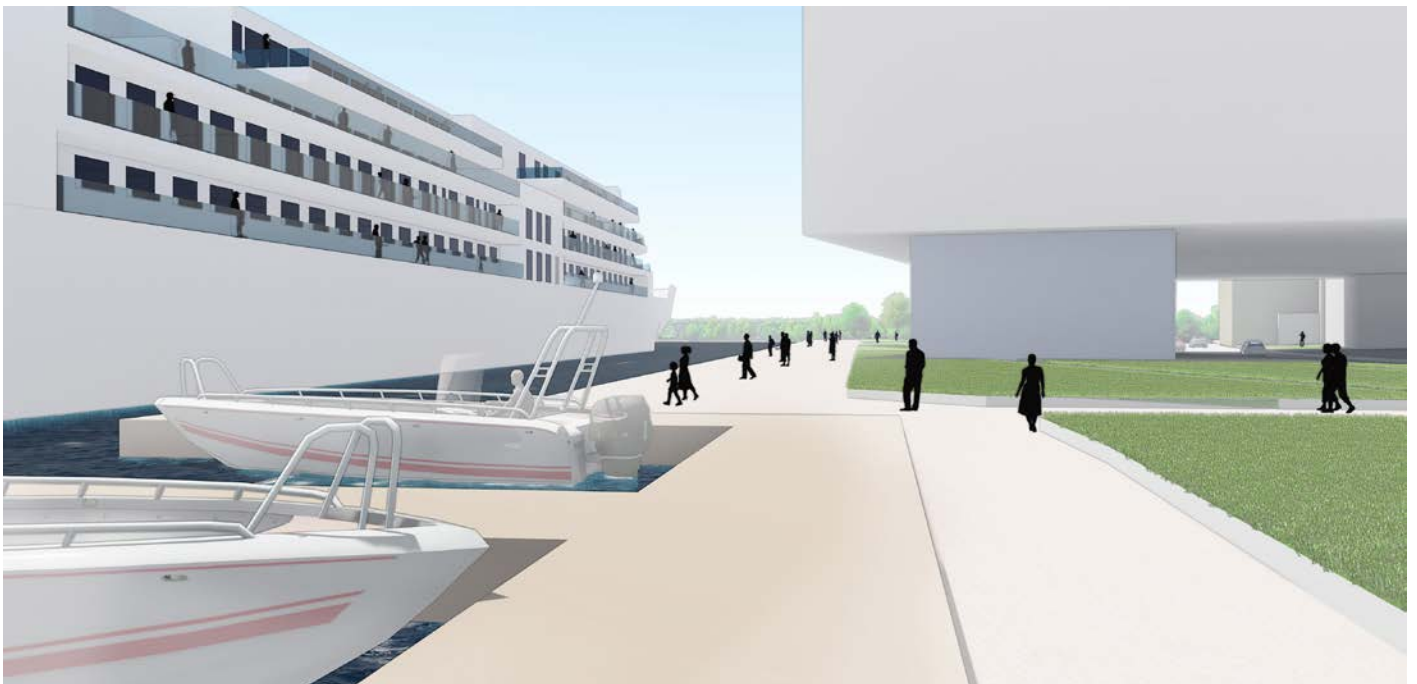
Section and Model



SECTION A-A'



PERSPECTIVE 1: Riverside Park looking south toward the extended landing and proposed La Crosse Center expansion.



PERSPECTIVE 2: View looking north of proposed south courtesy docks, extended landing and proposed La Crosse Center expansion.

Recommendations

The Schematic Design included an extended landing to accommodate a Viking vessel in addition to the other cruise/steamboat vessels that currently use the port. The Schematic Design also provided options for courtesy docks that would allow for short-term tie-ups for visitors to get to the center of downtown from the water. This Schematic Design meets the priorities and goals identified for the project, provided schematic level concepts based on the core team input and began the discussion with the regulatory agencies to have preliminary discussions of permitting feasibility or challenges. Additional investigations, analysis and design is required in the Design Development phase to further verify the project details and to work with the regulatory agencies and stakeholders to ensure all parties have buy-in and gain confidence in the project. Next steps to continue investigation of this project are described.

Extended Landing

During the finalization of the report, the team was notified that Viking is no longer pursuing a Mississippi River Cruise program. Although much of this report was initiated to understand how best to accommodate, there still may be benefits to extending the port landing to the south. If other cruise vessels, steamboats increase their activity along the river and the frequency of stops to La Crosse, this extended landing would be a way to facilitate multiple vessels at the port. It could also provide additional space to program river events or Riverside Park events. Extending the seawall south and the site design adjacent to it could be a benefit to more than just mooring vessels. It could provide needed festival or hardscape park space that would increase the use of this park along the river.

Courtesy Dock

An additional stop for river travelers to get downtown has the potential to be a great amenity for La Crosse. At a schematic level they appear feasible, but further investigations are necessary to ensure the long-term success of courtesy docks is viable from both a safety and financial point of view.

Considering past experiences with docks in this area, we strongly recommend the next step be to further model the river and anticipated conditions. This modeling would include additional numerical modeling and possibly even a physical model that would evaluate river currents and test whether Iowa Vanes or other sediment diversion structures would be feasible at the proposed North Courtesy Dock. Material

grab samples should be sampled from the river bottom to determine grain size properties and help inform and design sediment diversion structures. This modeling could also evaluate the river currents at the proposed South Courtesy Dock to help determine whether the currents are manageable for recreational watercraft. Deployment of an ADCP wave and current sensor to collect current velocity and direction data through the water column should be used to help calibrate the model of flow behavior at these proposed locations. A hydrologic and hydraulic (“H&H”) study would also provide the due diligence that increased erosion wouldn’t be experienced with the implementation of the sediment diversion structures or rock breakwater at the North Breakwater.

Permitting

SmithGroupJJR had a discussions with both USACE and WDNR regulatory staff to discuss the project and understand what regulatory concerns they would have with the project. The USACE indicated that extending the seawall may be a viable option. The USACE did not have any concerns with an extension of the seawall. The USACE also did not have immediate objections to the proposed north courtesy dock, rock breakwater structure or sediment diversion structures. The sediment diversion structures would need to be reviewed to ensure they wouldn’t be an underwater hazard to boating, but would be something that could be permitted. Future steps with USACE would include internal review with channels and harbor group to make sure there were no navigational concerns with the proposed plans and with their

dredging staff to make sure the project wouldn’t impede current routine dredging operations that take place in the area. The site would also need to be reviewed to evaluate potential mussel bed impacts. A Letter of Permission would be issued by the USACE project, which is typically a four to six-month review process.

WDNR staff stated they would require the next steps to determine whether an extension of the seawall is necessary for the desired use of the site. Seawalls tend to hinder fish habitat so WDNR’s first preference would be to maintain the current natural/revetment shoreline condition if this condition can meet the desired use of the shoreline edge and site. A pile-supported boardwalk option could be explored that may be more favorable than a sheet pile edge condition. If a seawall were pursued, an Individual Permit application would be required. WDNR staff had more hesitation with the implementation of the north courtesy dock. With their local experience of this area, they raised concerns over the feasibility of the project with respect to the heavy amounts of sediment and debris that come from La Crosse River. This is consistent with our discussions with City staff on a dock at this location that maintenance in this area would be a major consideration for implementation of infrastructure. Implementation of this dock would require further design, modeling and discussions with City, WDNR and stakeholders before WDNR could commit to being in favor of the project. WDNR permits required would include an individual permit for piers, a miscellaneous structure permit for the sediment diversion structures and a miscellaneous structures permit for the rock breakwater.

Opinion of Probable Construction Cost

The opinion of probable construction costs is shown in the table below.

	Item	Quantity	Unit	Unit Cost	Item Total
General					
1.	Mobilization/Demobilization	1	LS	\$150,000.00	\$150,000
2.	Erosion Control	1	LS	\$10,000.00	\$10,000
3.	Erosion Control (turbidity barrier)	1	LS	\$20,000.00	\$20,000
4.	Site Demolition	1	LS	\$25,000.00	\$25,000
Subtotal					\$205,000
Seawall & Site Improvements					
5.	Sheet Pile Seawall	525	LF	\$2,000.00	\$1,050,000
6.	Sheet Pile Seawall Curb	525	LF	\$50.00	\$26,250
7.	Scour Protection	1,300	TON	\$90.00	\$117,000
8.	20-Ton Bollards / Pile Foundations	4	EA	\$7,500.00	\$30,000
9.	Site Retaining Wall	525	LF	\$225.00	\$118,125
10.	Railing	525	LF	\$175.00	\$91,875
11.	Brick Pavers	22,500	SF	\$25.00	\$562,500
12.	Concrete Pavement, Heavy Duty	1,000	SF	\$12.00	\$12,000
13.	Curb and Gutter	300	LF	\$20.00	\$6,000
14.	Dense Graded Base	900	TON	\$30.00	\$27,000
15.	Stairway Access	3	EA	\$15,000.00	\$45,000
16.	Water Service Allowance	1	LS	\$50,000.00	\$50,000
17.	Power Allowance	1	LS	\$50,000.00	\$50,000
18.	Lighting Allowance	1	LS	\$75,000.00	\$75,000
19.	Site Amenities Allowance	1	LS	\$50,000.00	\$50,000
20.	Topsoil	46,000	SF	\$4.00	\$184,000
21.	Lawn Seed	46,000	SF	\$0.75	\$34,500
22.	Planting Allowance	1	LS	\$50,000.00	\$50,000
23.	South Courtesy Dock	9,120	SF	\$60.00	\$547,200
Subtotal					\$3,126,450
Courtesy Dock Improvements					
24.	North Courtesy Dock	7,250	SF	\$60.00	\$435,000
25.	Rock Breakwater	6,500	TON	\$90.00	\$585,000
26.	Site Improvements	1	LS	\$100,000.00	\$100,000
27.	Sediment Diversion Structures	1	LS	\$100,000.00	\$100,000
Subtotal					\$1,220,000
Subtotal					\$4,551,450
Contingency (20%)					\$910,290
Design Fees (SGJJR)					\$400,000
Total Project Cost					\$5,861,740

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