

FINAL REPORT

CHAPTER 3. GATEWAY INTERSECTIONS

CITY OF
MADISON, WI

SOUTH CAPITOL TRANSIT ORIENTED DEVELOPMENT (TOD) DISTRICT PLANNING STUDY

August 2014

Prepared for:

CITY OF MADISON, WI

Prepared by:



SOUTH CAPITOL TRANSIT ORIENTED DEVELOPMENT (TOD) DISTRICT PLANNING STUDY

Background

The 2012 Downtown Plan identifies a need to improve pedestrian and bicycle connections between Madison's Downtown Core and the Lake Monona waterfront. Today, pedestrians and bicyclists can access the lake from Downtown via the bike elevator at Monona Terrace or via at-grade crossings in two intersection areas referred to as Gateway intersections. Gateway Intersections West of Monona Terrace include North Shore Drive and John Nolen Drive, as well as Broom Street and John Nolen Drive. The Gateway Intersection east of Monona Terrace includes Wilson Street/Williamson Street and John Nolen Drive/Blair Street.

The West Gateway and East Gateway intersections serve as critical access points between Downtown and Lake Monona. As shown in Figure 1, existing configurations are complex and crowded by motor vehicle traffic along John Nolen Boulevard and bicycles and pedestrians interacting along the Capital City Trail. Better and safer connections across John Nolen Drive between the Lake Monona waterfront to the Downtown are necessary.

The South Capitol TOD District Planning Study looked at a number of alternatives to improve the safety and aesthetics of the gateway intersections for pedestrians and bicyclists, while continuing to facilitate traffic movement. Through a public process that engaged members of the South Capitol District Planning Committee, City Staff, and members of the general public, intersection improvements were proposed and evaluated.



Figure 1. Intersection at North Shore Drive and John Nolen Drive Looking East



Figure 2. Intersection of North Shore Drive and John Nolen Drive Looking South

This chapter includes an overview of the following:

- West Gateway Issues
- West Gateway Design Concepts
- West Gateway Recommendations
- East Gateway Issues
- East Gateway Design Concepts
- East Gateway Recommendations

Transportation

Based on a detailed traffic analysis, by 2035, the intersections along John Nolen Drive are projected to have the poorest level of service (LOS) and the highest delay in the study area. A number of alternatives were considered to mitigate the increased delay in 2035 due to traffic growth, and a select few were modeled and simulated. A series of recommendations for both North Shore Drive and Broom Street were developed, ranging from geometric improvements, including adding a third westbound through lane at North Shore, to phasing modifications and pedestrian crossing improvements. A sensitivity analysis also was performed for the John Nolen Drive/Blair Street/Wilson Street intersection, demonstrating that re-striping and phase modifications could improve future year conditions, and conversion to a T-intersection could reduce delay even more.

SOUTH CAPITOL TRANSIT ORIENTED DEVELOPMENT (TOD) DISTRICT PLANNING STUDY

West Gateway Issues

The West Gateway intersections are located along John Nolen Drive at North Shore Drive and at Broom Street to the west of Monona Terrace. For bicyclists and pedestrians approaching Downtown Madison on the Capital City Trail from the west, the first at-grade crossing of John Nolen Drive is at North Shore Drive, followed shortly by a crossing that provides more direct access into Downtown at Broom Street. Both intersections experience high levels of motor vehicle traffic and lack wayfinding signage for bicyclists and pedestrians.

North Shore Drive and John Nolen Drive

At this crossing, limited storage for waiting bicyclists and pedestrians causes spillback into the path. This results in bicycle and pedestrian conflicts on the path. The existing crossing is a two-stage crossing with one small island on the northwest side of John Nolen Drive. This configuration results in pedestrian, bicycle and motor vehicle conflicts as the island is often overcrowded.

Broom Street and John Nolen Drive

At Broom Street and John Nolen Drive, the existing crossing is a three-stage crossing with two small islands. A small landing area to the south of John Nolen Drive causes bicycle and pedestrian spillback onto the Capital City Trail. This, along with limited storage on islands, creates conflicts between pedestrians and bicyclists as well as motor vehicles. The multiple-stage crossing also results in long crossing times for pedestrians and bicyclists.



Figure 3. Broom Street and John Nolen Drive Intersection Looking North from Capital City Trail

West Gateway Design Concepts

The consultant team held an internal design charrette to work through issues at the West Gateway and to develop early concepts. The early concepts included grade separations and at-grade concepts. The early concepts were developed further and discussed with the Project Management Team and Planning Committee. Included in these concepts was a proposed underpass by citizen member Ron Shutvet. The consultant team evaluated the John Nolen underpass and the Planning Committee ultimately decided that challenges associated with elevation and Lake Monona prohibited concept feasibility at this time, and a West Gateway underpass was not advanced. A decision was made in November 2013 to advance the most promising concept.

The initial West Gateway design concept was presented in November 2013 after taking into consideration public feedback at the June 2013 Public Meeting and the September 2013



Figure 4. Broom Street and John Nolen Drive Looking North from Law Park

Issues at the West Gateways

The West Gateway intersections feature the following existing issues.

- Pedestrian/bicycle safety
- Pedestrian/bicycle conflicts
- Pedestrian/bicycle/motor vehicle conflicts
- Lack of wayfinding
- Traffic congestion

SOUTH CAPITOL TRANSIT ORIENTED DEVELOPMENT (TOD) DISTRICT PLANNING STUDY

Public Process

West Gateway

Members of the public provided input on pedestrian and bicycle movement and safety, vehicle movement, and design elements and amenities for the West Gateway. Pedestrian and bicycle movement and safety were most often expressed as top priorities, specifically bicyclist and pedestrian crossing abilities at the North Shore Drive/John Nolen Drive intersection and at the Broom Street/John Nolen Drive intersection. Members of the public addressed pedestrian and bicyclist safety and indicated the stretch of Broom Street from John Nolen Drive to Doty Street is dangerous for bicyclists. A significant number of individuals supported developing a northbound bike lane on Broom Street, but also requested that the issue of bicyclists on sidewalks also be addressed. Design concepts proposed by the public included developing an underpass for pedestrians and cyclists under John Nolen Drive as well as extending the sidewalk that discontinues at John Nolen Drive off Broom Street to North Shore Drive. Members of the public addressed issues associated with vehicle movement. On several occasions, the public asked to improve wayfinding at the Wilson Street/Broom Street intersection and to improve traffic control at the North Shore Drive/John Nolen Drive intersection. Additionally, members asked to improve Broom Street accessibility off of John Nolen Drive and to eliminate the channelized right off North Shore Drive onto John Nolen Drive.

Workshop. The consultant team ultimately proposed a concept that included adding fill to Lake Monona and extending lakeshore to accommodate improved bicycle/pedestrian storage and separated paths. The concept included super crossings which provide dedicated space for pedestrians and each direction of bicycle traffic, a cycle track on Broom Street, and shortening the southbound left turn lane on Broom Street. The concept would require adding 20-25 feet of lake fill, but would provide the opportunity for separate bike and pedestrian paths and eliminate the blocking of the Capital City Trail by pedestrians and bicycles waiting to cross John Nolen Drive. Upon presentation of the design concept, the Planning Committee reiterated its disapproval of adding lake fill.

In December 2013, the consultant team proposed a revised concept that maintains the existing lakeshore. In this concept, Broom Street is narrowed to improve bicyclist and pedestrian accommodations. The configuration allows for bicyclists and pedestrians to cross the entire width of John Nolen Drive in one movement. This safety improvement comes with a tradeoff for motorized vehicles. The Broom Street southbound left-turn lane could potentially cause spillback during peak hours, causing congestion for the southbound right turn onto John Nolen Drive. The Planning Committee approved the concept.

West Gateway Recommendations

The West Gateway design concepts shown in Figure 5 and Figure 6 are recommended by the Consultant Team to advance for further study and implementation. These design concepts provide the following improvements.

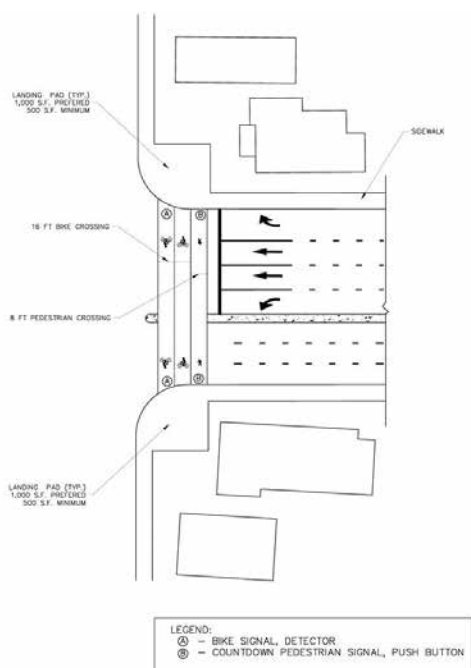
- Pedestrian/bicycle super crossings with dedicated directional bicycle lanes and shared pedestrian lane across John Nolen Drive at North Shore Drive and at Broom Street
- Expanded pedestrian/bicycle queuing areas on both sides of John Nolen Drive
- Cycle track connection to Wilson Street from John Nolen Drive on east side of Broom Street
- Bicycle lane on the east side of Broom Street from Wilson Street to Doty Street
- Signage between Wilson Street and John Nolen Drive to direct bicyclists to travel on the east side of Broom Street

It is further recommended by the Consultant Team that additional signage be installed at the West Gateway intersections to improve wayfinding and etiquette. Signage that directs bicyclists, pedestrians, and motor vehicles on designated areas for each

SOUTH CAPITOL TRANSIT ORIENTED DEVELOPMENT (TOD) DISTRICT PLANNING STUDY

What is a Super Crossing?

A super crossing provides designated space for bicycles in both directions and for pedestrians. Signals are provided for both bicycles and pedestrians, and a preferred 1,000-square-foot landing pad is provided on both sides of the crossing to allow sufficient space for queuing.



mode within the intersections would help create an environment in which users feel empowered to navigate the intersection safely themselves and help others do the same.

These Consultant Team recommendations have been made after careful consideration of stakeholder feedback, as well as weighing the tradeoffs of the proposed design concepts. These tradeoffs include:

- Shortening the Broom Street left-turn lane and narrowing other lanes
- Queuing issues associated with left turns from Broom Street onto John Nolen Drive

- Potential expensive relocation of utilities at North Shore Drive and John Nolen Drive
- Reducing the turn radius for northbound Broom Street onto Wilson Street
- Reduced capacity for southbound right turns from North Shore Drive to John Nolen Drive

Despite these tradeoffs, the Consultant Team recommends the proposed design concepts as the best solutions to advance for the West Gateway intersections.

Public Priorities

At the June 2013 Public Meeting, participants were asked to list issues and opportunities for the West Gateway intersections. Priority issues are shown below along with the percentage of survey participants who ranked the issues as “important” or “very important.”

North Shore Drive/John Nolen Drive

- Safety: 93%
- Bike movement: 87%
- Pedestrian movement: 85%
- Vehicle movement: 61%
- Aesthetics: 44%

Broom Street/John Nolen Drive

- Safety: 86%
- Pedestrian movement: 83%
- Bike movement: 76%
- Vehicle movement: 61%
- Aesthetics: 44%

These priorities were used to establish design concepts for the West Gateway intersections.

SOUTH CAPITOL TRANSIT ORIENTED DEVELOPMENT (TOD) DISTRICT PLANNING STUDY



Figure 5. North Shore Drive and John Nolen Drive Intersection and Broom Street and John Nolen Drive Intersection Looking North from Lake Monona



Figure 6. Broom Street and John Nolen Drive Intersection Looking North from Lake Monona

SOUTH CAPITOL TRANSIT ORIENTED DEVELOPMENT (TOD) DISTRICT PLANNING STUDY

East Gateway Issues

The East Gateway intersection is a multi-legged intersection that acts as the convergence point for four roadways — John Nolen Drive, Wilson Street, Blair Street, and Williamson Street. The intersection is complicated by the railroad that runs through the intersection, the driveways that are within the functional area of the intersection, and the Capital City Trail that crosses the east side of the intersection. The East Gateway experiences high levels of motor vehicle, bicycle, and pedestrian traffic and lacks wayfinding signage for bicyclists and pedestrians.

Conflict points between the railroad, bicyclists, pedestrians, and motorized vehicles — traveling through the intersection and into driveways — create a variety of issues at the East Gateway intersection. Design concepts aim to address these issues by improving the following:

- **Railroad crossing geometry:** The existing approach for bicyclists and pedestrians crossing the railroad is diagonal to the tracks. The safest approach is perpendicular to the railroad
- **Machinery Row access:** The driveways located within the functional area of the intersection are access points to an area called Machinery Row. Addressing access to Machinery Row in a way that increases safety by removing driveways from the

functional area of the intersection would benefit the operation of the intersection

- **Wilson Street function:** Wilson Street lacks parking, open space, and adequate bicycle and pedestrian connections at the East Gateway
- **Signal phasing:** The complex intersection requires signal phasing that results in delay for all modes and directions of travel. Simplified phasing would reduce lost time to signal phase changes and allow more time for all modes to pass through the intersection
- **Channelized right:** The geometry of the existing channelized right turn is not desired by the neighborhood or the bicycle and pedestrian community but it does carry a high volume of traffic
- **Pedestrian and bicycle crossing:** Safety improvements could be made to existing crossings for bicyclists and pedestrians

Issues at the East Gateway

The East Gateway intersection features the following existing issues:

- Pedestrian/bicycle safety
- Pedestrian/bicycle conflicts
- Pedestrian/bicycle/motor vehicle conflicts
- Lack of wayfinding
- Traffic congestion
- Access to Machinery Row
- Neighborhood traffic concerns



Figure 7. East Gateway View Looking North from Machinery Row

SOUTH CAPITOL TRANSIT ORIENTED DEVELOPMENT (TOD) DISTRICT PLANNING STUDY

Public Process

East Gateway

With regard to East Gateway design and amenities, the majority of the public expressed preference for maintaining the existing shoreline and to simplify and beautify the Wilson Street/Broom Street intersection. Members of the public generally supported the proposed super crossing concepts, but requested adequate space for bicyclists and pedestrians at the landings. Members of the public weighed in on pedestrian and bicycle movement and safety, vehicle movement, and design elements and amenities. Pedestrian and bicycle movement and safety were most often expressed as top priorities. Frequent recommendations included changes to pedestrian and bicycle light timing and expanding the pedestrian island to accommodate large groups. Additionally, members of the public asked that the South Capitol District Planning Committee and consultant team consider issues associated with the existing access to Machinery Row with regard to visibility and pedestrian and bicycle safety. Several individuals requested additional greenspace and asked to maintain the existing number of parking spaces. On several occasions, individuals asked to simplify the intersection, to reduce the number of decision points, and to ensure turning movements are safe. Many individuals and groups, including residents of the adjacent neighborhoods, advocated for eliminating the channelized right turn onto Williamson Street and asked to reroute cars coming off of John Nolen Drive to East Washington Avenue. If the channelized right were to remain, several individuals suggested timing the light at the channelized right to be red when the light onto Blair Street is red. In October 2013, the South Capitol Planning Committee approved further development of the East Gateway concept that included a new intersection at Hancock Street and John Nolen Drive and a Wilson Street cul-de-sac. Members of the public asked that the committee and consultant team consider residents of the 100 South block of Hancock Street, pedestrian safety at the Hancock Street/John Nolen Drive intersection, potential loss of parking, and to maintain space for the boat launch. Members of the public expressed concern with regard to negotiating with the Railroad for the new Hancock Street intersection and questioned whether the slope of Hancock Street would be hazardous during winter months. With regard to the proposed Wilson Street cul-de-sac, members of the public asked to ensure there would be proper pedestrian and bike crossings/routes across Blair Street onto Wilson Street and suggested moving the bicycle path slightly north on Blair Street. A significant number of individuals questioned how the cul-de-sac could impact Wilson Street businesses and its potential to create new traffic congestion and wayfinding issues.



Figure 8. Williamson Street Looking East from John Nolen Drive with Machinery Row on the Right

SOUTH CAPITOL TRANSIT ORIENTED DEVELOPMENT (TOD) DISTRICT PLANNING STUDY

Public Involvement

At the June 2013 Public Meeting, participants were asked to list issues and opportunities for the East Gateway intersection. Issues that rose to the top are shown below along with the percentage of survey participants who ranked the issues as “important” or “very important.”

- Safety: 92%
- Pedestrian movement: 92%
- Bike movement: 89%
- Vehicle movement: 72%
- Aesthetics: 52%

These priorities were used to establish design concepts for the East Gateway intersections.

the Planning Committee, as well as public comments from the June Public Meeting. Four initial concepts were proposed to the Planning Committee and the public at the September Workshop.

John Nolen Tunnel

- **Pros:** The tunnel concept separates through movements and reduces conflicts
- **Cons:** The tunnel concept creates long ramps into and out of the tunnel which requires streets and pedestrian crossings to be closed resulting in a loss of urban fabric and connectivity. The tunnel would eliminate a westbound right, eastbound left, and southbound right and left. The cost of the tunnel concept is high at \$30 million. Relocated access for utility building would require relocation of the community garden

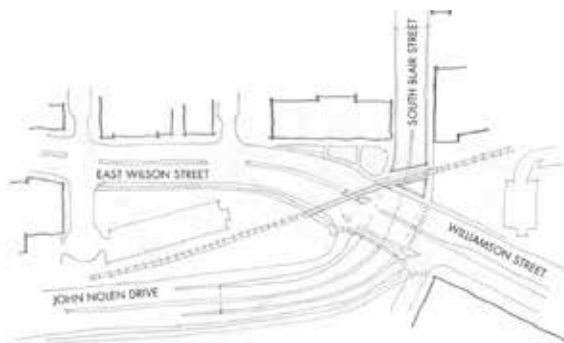


Figure 9. John Nolen Tunnel

East Gateway Design Concepts

Due to the complexity of issues at the East Gateway, the consultant team proposed a series of design concepts for the intersection. Concepts were developed at an internal design charrette that took into consideration feedback from City Staff and



Figure 10. Existing Conditions at the East Gateway

SOUTH CAPITOL TRANSIT ORIENTED DEVELOPMENT (TOD) DISTRICT PLANNING STUDY

Roundabout

- **Pros:** The roundabout concept improves access to Machinery Row and provides an opportunity for a visual element
- **Cons:** The roundabout concept has a bigger footprint, and it creates an acute angle crossing with the railroad, for which rail traffic would disrupt the circulatory flow of the roundabout. Roundabouts also have a perception of difficult for pedestrians to negotiate. Relocated access for utility building would require relocation of the community garden



Figure 10. Roundabout

Elevated Hovenring

- **Pros:** The Hovenring concept would elevate pedestrian and bicycle crossings and serve as a dramatic piece of public art. It is very efficient for pedestrians and bicyclists in that all conflicts with vehicles are eliminated
- **Cons:** After further analysis of the Hovenring and production of concept visualizations, the concept was deemed too massive for the context at the East Gateway Intersection. Roadway and railroad clearance regulations along with the required structural depth would result in a structure almost 30 feet above grade.



Figure 11. Elevated Hovenring

Relocated access for utility building would require relocation of the community garden



Figure 12. Elevated Hovenring Visualization

Hancock Intersection

- **Pros:** The Hancock concept provides more efficient signal operations, reduced conflicts, improved access to Machinery Row, streetscaped termination, improved bicycle and pedestrian facilities, and improved water access. It also creates additional green space north and south of railroad (near Blair) with a potential relocated garden
- **Cons:** The concept creates an additional rail crossing. The grade of Hancock Street between John Nolen Drive and East Wilson Street may cause problems for vehicles starting and stopping especially during inclement weather. The grade of Hancock Street approaching the railroad crossing may raise safety concerns with the rail crossing, especially during inclement weather. The railroad crossing requires the approval of the Office of the Commissioner of Railroads, and the City may not obtain that approval. Relocated access for utility building would require relocation of the community garden



Figure 13. Hancock Intersection

SOUTH CAPITOL TRANSIT ORIENTED DEVELOPMENT (TOD) DISTRICT PLANNING STUDY

The Hancock Intersection Concept

The Hancock concept creates a new at-grade intersection at John Nolen Drive and Hancock Street and eliminates the Wilson Street connection to John Nolen Drive, Blair Street, or Williamson Street. The concept is estimated to cost \$1.5 million and will require no property acquisitions. At the September Public Workshop, the public showed support for the Hancock intersection, identifying other alternatives as too costly or less effective, and in October 2013, the Planning Committee approved the further development of the Hancock Intersection concept. The Planning Committee requested concepts that do not require adding fill to the lake.

Four alternatives of the Hancock intersection that maintained the existing lakeshore were developed.

Alternative 1

- **Pros:** Alternative 1 cleans up Machinery Row entrance, simplifies the intersection and improves level of service (LOS), and creates a “calmed” Wilson frontage with room for parking enhancements
- **Cons:** Alternative 1 requires relocation of a Lake Monona boat ramp and eliminates a parking lot north of John Nolen Drive
- **Railroad modifications:** This alternative eliminates the Wilson crossing and relocates it to the new Hancock crossing

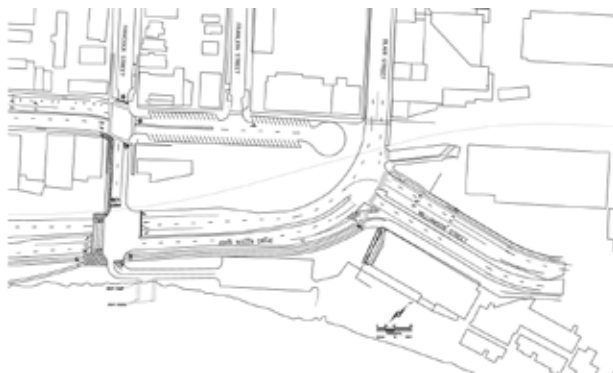


Figure 14. Hancock Intersection Alternative 1

Alternative 2

- **Pros:** Alternative 2 simplifies the intersection to improve LOS and creates a “calmed” Wilson frontage with room for parking enhancements
- **Cons:** Like Alternative 1, Alternative 2 requires relocation of the Lake Monona boat ramp and eliminates a parking lot north of John Nolen Drive. It further maintains the existing, tricky Machinery Row access

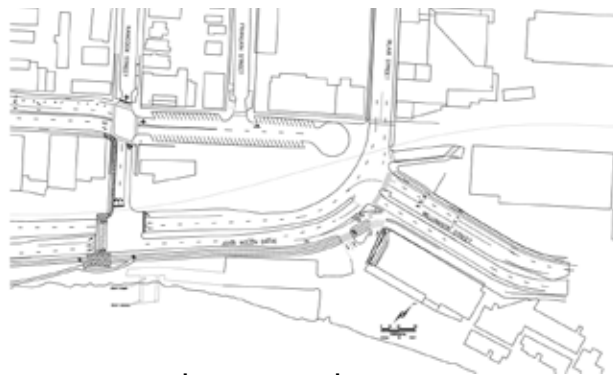


Figure 15. Hancock Intersection Alternative 2

Alternative 3

- **Pros:** Alternative 3 simplifies the intersection to improve LOS and maintains westbound through movements
- **Cons:** Maintains left-turn conflict from John Nolen Drive to westbound Wilson. The alternative maintains existing, tricky Machinery Row access
- **Railroad modifications:** This alternative maintains the Wilson crossing and requires an additional crossing at Hancock Street



Figure 16. Hancock Intersection Alternative 3

SOUTH CAPITOL TRANSIT ORIENTED DEVELOPMENT (TOD) DISTRICT PLANNING STUDY

Alternative 4

- **Pros:** Alternative 4 simplifies the intersection to improve LOS
- **Cons:** Alternative 4 removes the channelized right turn from John Nolen Drive to Williamson, eliminating the two-stage pedestrian crossing but also reducing the efficiency of accommodations for high right-turn volumes. The alternative maintains a left-turn conflict from John Nolen Drive to Westbound Wilson. It further maintains the existing, tricky Machinery Row access
- **Railroad modifications:** This alternative maintains the Wilson crossing and requires an additional crossing at Hancock Street



Figure 17. Hancock Intersection Alternative 4

It was ultimately decided to advance Hancock Alternative 1 as the best option to address issues at the East Gateway intersection. Issues are addressed by this concept as follows.

- **Railroad Crossings:** Eliminating Wilson Street connection improves geometry so vehicles and bicycles crossing tracks will be generally perpendicular
- **Machinery Row Access:** Relocation of driveways improves access to more directions and improve safety by being outside functional area of intersection
- **Wilson Street Function:** The Wilson Street streetscaped termination calms street traffic, provides parking, provides more open space, and allows for improved bicycle and pedestrian connections
- **Signal Phasing:** Eliminating the Wilson Street connection simplifies intersection operations and reduces lost time to signal phase changes, resulting in reduced delay for all modes
- **Channelized Right:** The elimination of the Wilson Street connection allows an expanded channelizing island that provides more space for pedestrian and bicycle queuing
- **Pedestrian/Bike Crossing:** Eliminating Wilson Street motor vehicle connection allows for improved pedestrian rail crossings, improves safety, and creates the potential for bicycle and pedestrian crossing enhancements

Recommendations – East Gateway

The East Gateway design concept shown in Figure 18 is recommended by the Consultant Team to advance for further study and implementation. The concept incorporates design elements that will require multi-jurisdictional agency permits and railroad coordination. Design recommendations, in some cases, can be implemented independently as intermediate improvements. The design concept provides the following improvements:

- Includes new Hancock Street/John Nolen Drive intersection
- Provides pedestrian/bicycle super crossing with two-way bicycle lanes and shared pedestrian lane across John Nolen Drive
- Provides pedestrian/bicycle landing pads on both sides of John Nolen Drive
- Relocates access to Machinery Row across from Hancock Street
- Creates Wilson Street streetscaped termination with parallel street parking in addition to parking for loading/unloading in front of Wilson Street businesses
- Maintains channelized right turn onto Williamson Street off of John Nolen Drive, expands the adjacent pedestrian island, and provides a raised crosswalk between Machinery Row and the pedestrian island

SOUTH CAPITOL TRANSIT ORIENTED DEVELOPMENT (TOD) DISTRICT PLANNING STUDY

It is further recommended by the Consultant Team that additional signage be installed at the East Gateway intersection to improve wayfinding and etiquette. Signage that directs bicyclists, pedestrians, and motor vehicles on designated areas for each mode within the intersections would help create an environment in which users feel empowered to navigate the intersection safely themselves and help others do the same.

These Consultant Team recommendations have been made after careful consideration of stakeholder feedback, as well as weighing the tradeoffs of the proposed design concepts. These tradeoffs include the following:

- Termination of Wilson Street disrupts current traffic patterns including transit routes which would need to reroute through new Hancock intersection. It also has the potential to create traffic diversions through area neighborhoods
- New Hancock intersection will require a steep grade between

Wilson Street and John Nolen Drive, but it would meet current engineering standards

- New Hancock grade crossing will require railroad coordination and permitting
- Bus movements re-routed through intersection at Hancock
- Requires boat launch relocation

Despite these tradeoffs, the Consultant Team recommends the proposed design concept as the best solutions to advance for the East Gateway intersection.

Implementation

Implementation of these Gateway Concepts will require detailed design that may necessitate the modification or exclusion of some components. The design and construction also will require railroad coordination and obtaining the necessary permits from relevant agencies.



Figure 18. East Gateway Design Concept (Note: This concept incorporates design elements that will require agency permits and railroad coordination)