

The design team developed, evaluated, and screened 21 alternatives. Each alternative was evaluated based on the project evaluation criteria. From the initial 21 alternatives, one alternative was chosen for further analysis. This alternative was expanded into three separate alternatives that were evaluated through a more detailed traffic, structural, functional and contextual analysis and compared to each other and the original Phase 2.

#### **ASSUMPTIONS FOR ALTERNATIVES**

Major assumptions used in the analysis were:

1. This project is driven by contextual design considerations from project partners. Consequently, this report will be a basis for further concept development and refinement of SR 519 Phase 2.
2. Construction of Alternative A and the "A" portion of Alternative A+B will require night time closures of the I-90 off-ramp to 4th Avenue South. These closures can be held to an absolute minimum and still allow construction crews time to safely tie into existing structures and place traffic barriers.
3. Column placement for all Alternatives was adjusted to minimize impact to existing infrastructure. However, the staging area at the existing Metro Ryerson base, the area adjacent to the baseball stadium roof support, and the area east of the existing baseball stadium parking garage will be affected by placement of support columns. Exact positioning of these columns and their attendant effects will be part of further design development.
4. Columns sited adjacent to South Atlantic Street have been placed in-line with the existing column bents supporting South Atlantic Street. The initial assumption is that this 'corridor' will be acceptable to the railroads for column placement.
5. To determine sensitivity of the study area traffic to South Royal Brougham Way traffic, each alternative was modeled with:
  - i. South Royal Brougham Way completely closed to traffic.
  - ii. South Royal Brougham Way open in a reduced capacity to reflect increased train traffic.
6. To determine sensitivity of the study area traffic to South Holgate Street traffic, each alternative was modeled with:
  - i. South Holgate Street completely closed to traffic
  - ii. South Holgate Street open in a reduced capacity to reflect increased train traffic.
7. All alternatives were modeled based on Alaskan Way Viaduct south end concept 10C (See Viaduct Alternatives, Appendix B).
8. Each alternative may be further optimized based on signalization and channelization modifications. These options will be evaluated during the development phase of the project.

## ALTERNATIVE A

Alternative A would route westbound traffic from I-5 and I-90 to both 4th Avenue South and South Atlantic Street, as shown in Figure 4-1.

Alternative A would provide for construction of a two lane elevated ramp from the existing I-90 westbound ramp to South Atlantic Street west of the South Atlantic Street and 4th Avenue South elevated intersection as shown in Figure 4-1.

Traffic from westbound I-90 and southbound I-5 would be able to travel on the existing I-90 loop ramp to 4th Avenue South as well as the new two-lane ramp from the I-90 westbound ramp to South Atlantic Street. Traffic from the northbound I-5 ramp would be restricted to the new ramp only.

Improvements along South Atlantic Street between 1st Avenue South and 4th Avenue South would vary. From 1st Avenue South to the tie in with off-ramp from I-90, revisions consist of two lanes and left turn pocket westbound and two lanes eastbound. From the I-90 off-ramp to 4th Avenue South, South Atlantic Street is revised to consist of one lane westbound and three lanes eastbound.

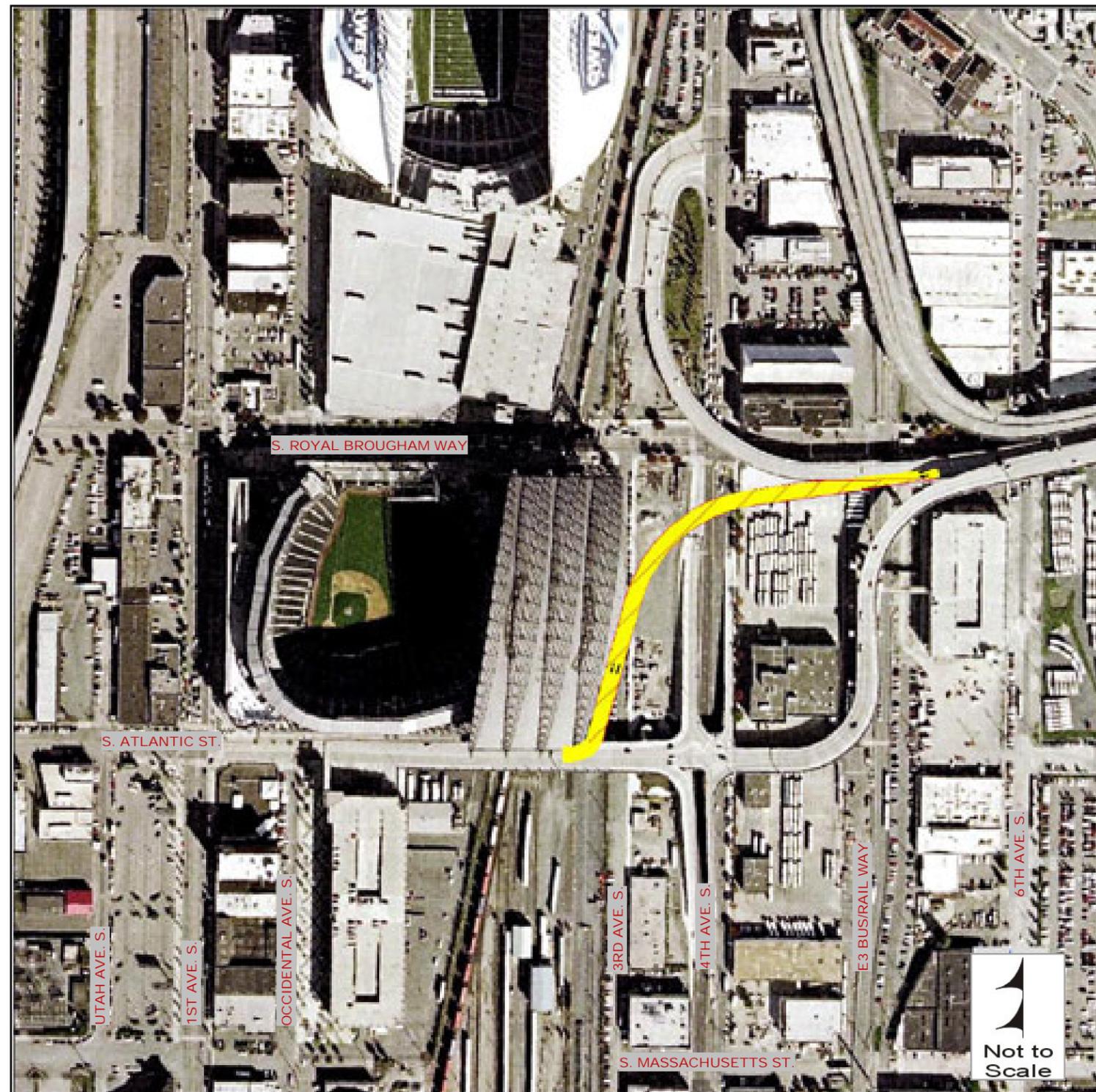


Figure 4-1: Alternative A

## ALTERNATIVE B

Alternative B would create a couplet with South Atlantic Street as the westbound leg and a new South Massachusetts Street ramp as the eastbound leg connecting to South Atlantic Street then to I-90 eastbound as shown in Figure 4-2.

Improvements would be made on Massachusetts Street to provide two lanes of one-way eastbound traffic beginning at 1st Avenue South, traveling east to a northward curve past the existing parking garage. The roadway would approximately follow the edge of the BNSF railway tracks to the north-northeast to a second curve that would bring it into alignment with eastbound South Atlantic Street. A left-turn ramp would be provided for traffic wanting to return to South Atlantic Street westbound.

Improvements to South Atlantic Street would be adapted from the initial improvements noted below. From 1st Avenue South and South Atlantic Street to Occidental Avenue South, South Atlantic Street would be three westbound lanes and a single eastbound lane. From Occidental Avenue South to the 'tie-in' to the South Massachusetts Street extension, South Atlantic Street would be three westbound lanes only. From the 'tie-in' to 4th Avenue South, South Atlantic Street would be revised to one lane westbound and three lanes eastbound.

The new Massachusetts Street roadway would be constructed to allow ingress and egress to Occidental Avenue South for access to and from the baseball stadium parking garage.

Further traffic analysis is required to determine whether revising the existing channelization, signalization, and traffic operations at 4th Avenue South and South Atlantic Street will improve the level of service.

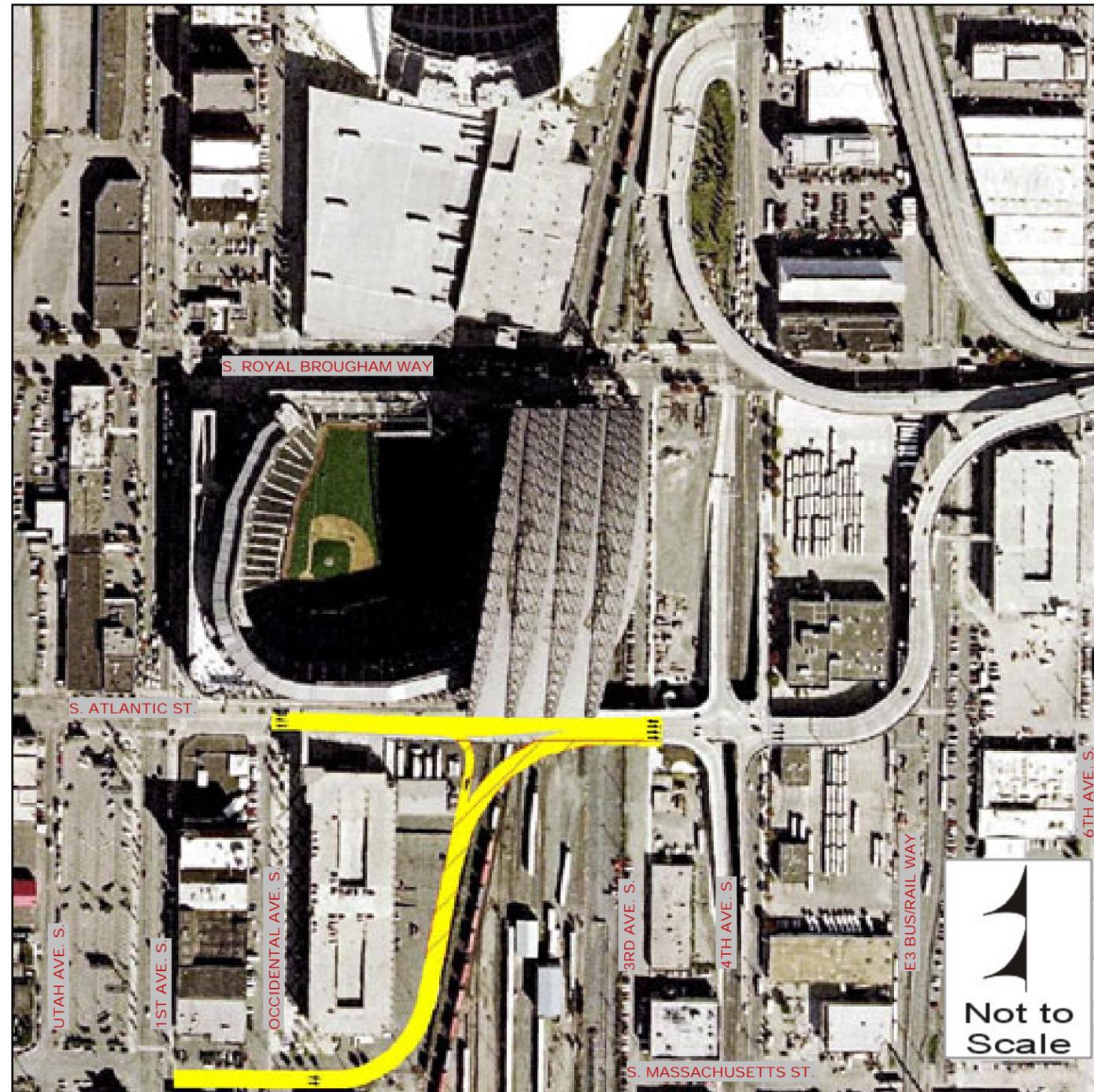


Figure 4-2: Alternative B

## ALTERNATIVE A + B

Alternative A + B combines the westbound I-90 off-ramp configuration (Alternative A) with an Eastbound and Westbound couplet arrangement on South Atlantic Street and Massachusetts Streets between 1st Avenue South and 4th Avenue South (Alternative B), as shown in Figure 4-3.

The westbound I-90 exit to South Atlantic Street is identical to Alternative A and would consist of a signalized right turn only, two-lane exit to westbound South Atlantic Street. West of this intersection, South Atlantic Street would be modified to consist of three westbound only lanes, by separating the eastbound traffic southerly toward Massachusetts as described below. From the 'tie-in' to 4th Avenue South, South Atlantic Street would be revised to consist of one lane westbound and three lanes eastbound.

As with Alternative B, improvements would be made to Massachusetts Street that would provide two lanes of one-way eastbound traffic beginning at 1st Avenue South, traveling east to a northward curve past the existing parking garage. The roadway would approximately follow the edge of the BNSF railway tracks to the north-northeast to a second curve that would bring it into alignment with eastbound South Atlantic Street. A left turn pocket would be provided in the eastbound traffic direction to return to South Atlantic Street westbound.

As with Alternative B, the new Massachusetts Street roadway would be constructed to allow ingress and egress to Occidental Avenue South for access to and from the baseball stadium parking garage.

Further traffic analysis is required to determine whether revising the existing channelization, signalization, and traffic operations at

4th Avenue South and South Atlantic Street will improve the level of service.

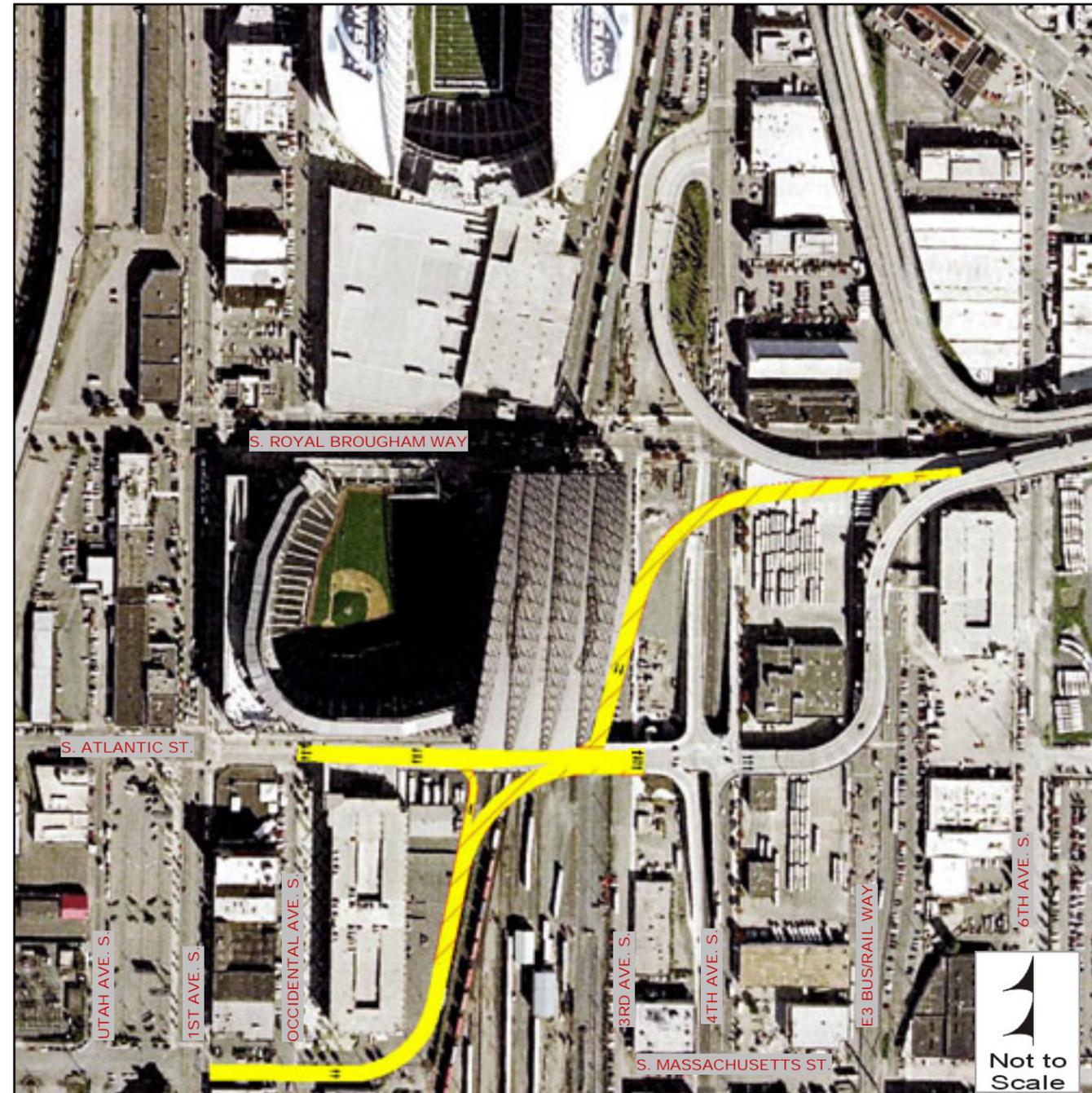


Figure 4-3: Alternative A + B

### 1ST AVENUE SOUTH AND SOUTH ATLANTIC STREET

For this study the 1st Avenue South and South Atlantic Street improvements are a common feature for Alternatives A, B, and A + B. Although this alternative can be considered a 'local access' stand-alone improvement, it constitutes the first phase of any future SR 519 Phase 2 work. Traffic models for each alternative include the 1st Avenue South and South Atlantic Street intersection improvements, with modifications as noted in the alternative descriptions (See Figure 4-4).

Proposed improvements to the 1st Avenue South and South Atlantic Street intersection would expand the intersection to six lanes of travel on the 1st Avenue South legs (northbound and southbound) and five lanes on the South Atlantic Street legs (eastbound and westbound). 1st Avenue South would be revised as follows:

- North of Intersection: Single southbound through/right turn lane, single southbound lane, and dual southbound left turn lanes (southbound to eastbound). Two northbound lanes.
- South of Intersection: Two southbound through lanes, dual left turn lanes (northbound to westbound), single northbound lane, and one northbound through/right turn lane.

South Atlantic Street would be revised as follows:

- West of Intersection: Two lanes westbound. Single left turn lane (eastbound to northbound), single eastbound through lane, and single eastbound through/right turn lane.
- East of Intersection: Dual eastbound lanes (Alternative A), single eastbound lanes (Alternatives B and A +B), single left turn lane (westbound to southbound), single through-lane westbound, and single through/right turn lane (westbound to northbound).

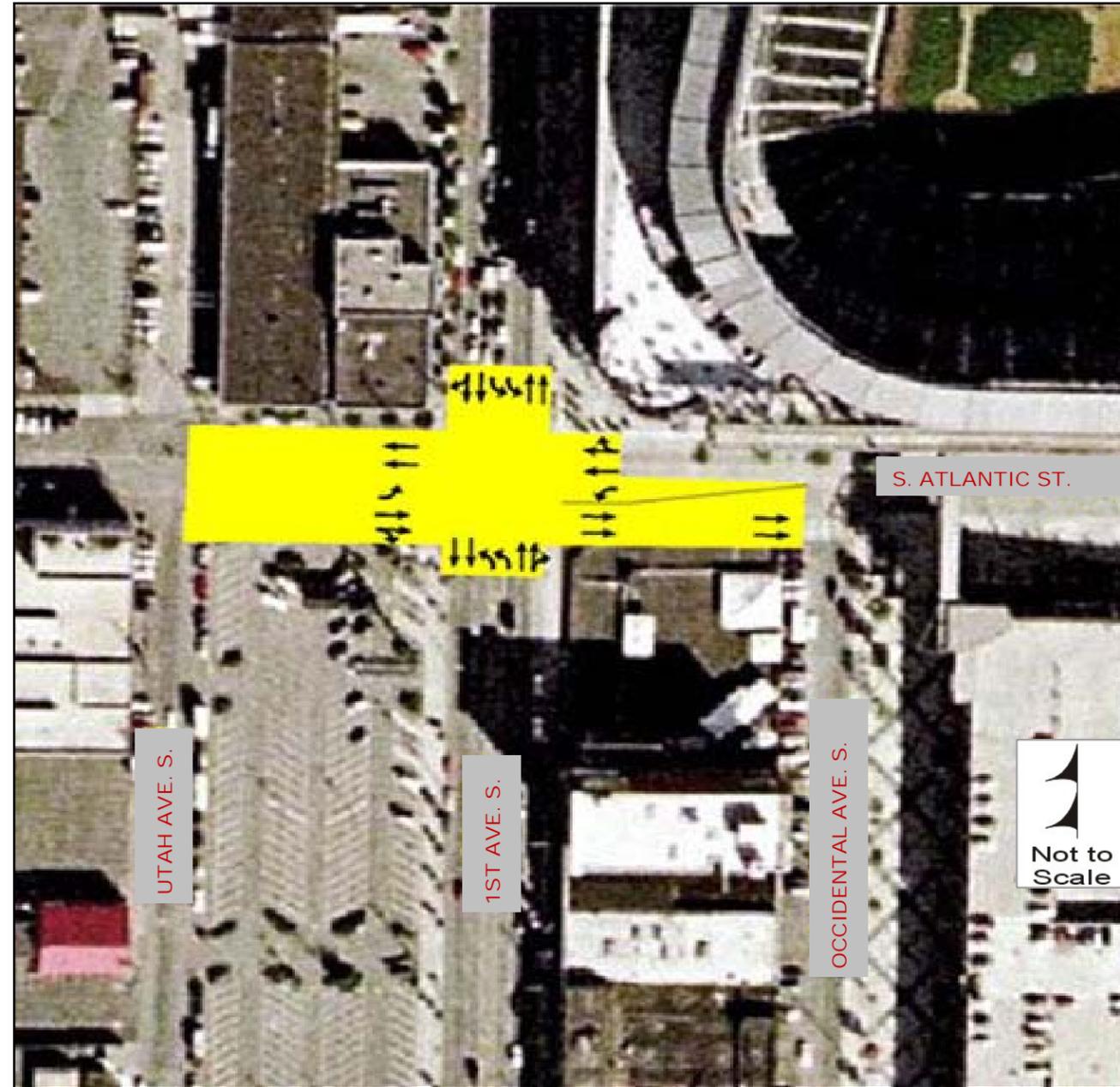


Figure 4-4: Proposed 1st and Atlantic Intersection Improvements

## ORIGINAL PHASE 2

The original SR 519 Phase 2 design included a westbound I-90 exit directly to South Royal Brougham Way. In addition, the project would have connected both northbound and southbound 4th Avenue South to westbound South Royal Brougham Way via a flyover ramp touching down on South Royal Brougham Way adjacent to the I-90 off-ramp. As an added feature, the 4th Avenue South/South Royal Brougham Way connector could have been connected directly to the Stadium Exhibition Center parking structure. A sidewalk attached to this ramp was connected to the original stadium area, elevated pedestrian walkway design. This combined pedestrian corridor would have provided a grade-separated walkway from Safeco Field to Sound Transit's South Royal Brougham Way Station (See Figure 4-5).

This alternative began on I-90 with the on-ramp merges from I-5. Merged I-90 westbound traffic and traffic from I-5 southbound combined into two lanes to a divergence point that provided two lanes to 4th Avenue South and one lane continuing toward South Royal Brougham Way. Northbound I-5 traffic could not exit to 4th Avenue South. This single lane was then added to traffic from northbound I-5 that remained in a separate lane until merging to form two lanes of westbound traffic. These two lanes touched down on South Royal Brougham Way, at or near Occidental Avenue South.

The design also included a connection between 4th Avenue South and South Royal Brougham Way, over the existing rail tracks. This 4th Avenue South connector would have been adjacent to the former eastbound ramp to I-90. The structure was elevated over the rail tracks and joined the proposed Phase 2 I-90 ramp to touch down on South Royal Brougham Way. The geometry of this connection would have allowed direct connection to the Qwest Field parking

structure, although this structure was not part of the original project.

The combined SR 519 Phase 1 and Phase 2 projects would have created a couplet between South Royal Brougham Way and South Atlantic Street. Traffic on South Royal Brougham Way would have been primarily westbound, while traffic on South Atlantic Street would have been primarily eastbound.



Figure 4-5: SR 519 Phase II

## OTHER CONSIDERATIONS

### South Royal Brougham Grade Separation

Because traffic operations benefit from South Royal Brougham Way being kept open even under reduced capacity, short-term improvements to the railroad-grade crossing, such as quad gates or similar features, should be installed to improve near-term at-grade safety.

During the review of the initial draft of this report, some of the project partners requested that a “South Royal Brougham Way Connector,” a grade-separated ramp connecting 4th Avenue South to South Royal Brougham Way, over and west of the railroad tracks, be evaluated as part of this report. The project partners also requested that alternatives for a pedestrian grade-separation crossing over 4th Avenue South and the railroad tracks be studied.

### Traffic Loop Ramp

Several alternatives were developed and studied. A two-lane loop ramp connecting 4th Avenue South to South Royal Brougham Way west of the railroad tracks, and also to the second floor of the Public Stadium Authority (PSA) garage, was developed as shown in Figure 4-6. The ramp starts at the intersection of 3rd Avenue South and South Royal Brougham Way and rises at a slope of approximately 7 percent to clear the railroad vertical clearance envelope. This configuration fits within the available right-of-way of 3rd Avenue South and the WSDOT property between 3rd and 4th Avenues South. It also clears the alignment of the Alternative A ramp discussed previously within this report. It can accommodate two-way, one lane each way traffic or two-lane east or west bound traffic that can be reversed for special events under police

supervision. The proposed grades and curve radius allows a 20-mile per hour design speed according to AASHTO criteria.

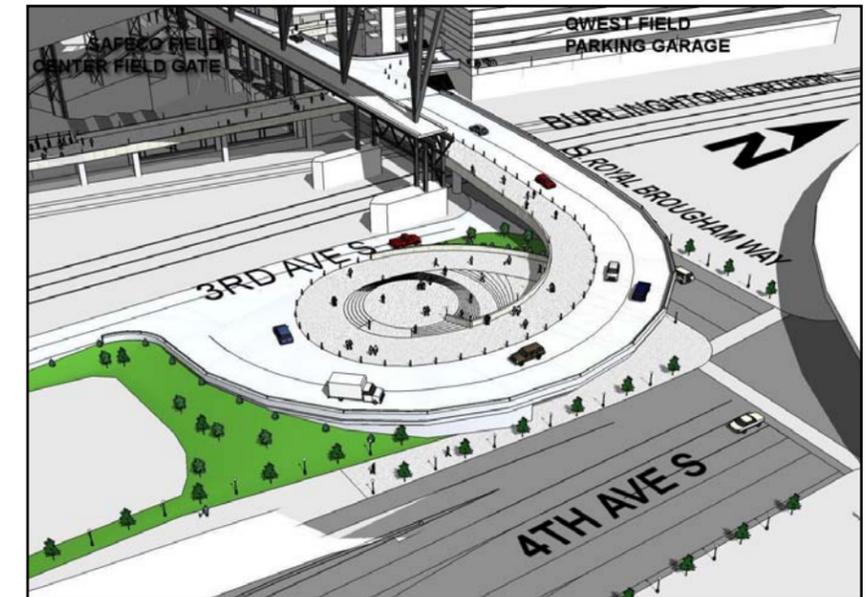
The Loop Ramp is considered a local access, reduced capacity street as compared to the existing South Royal Brougham Way. It does, however, allow limited traffic circulation should either a train block South Royal Brougham Way or if South Royal Brougham Way is closed to traffic permanently within the railroad right-of-way.

### Pedestrian Ramp

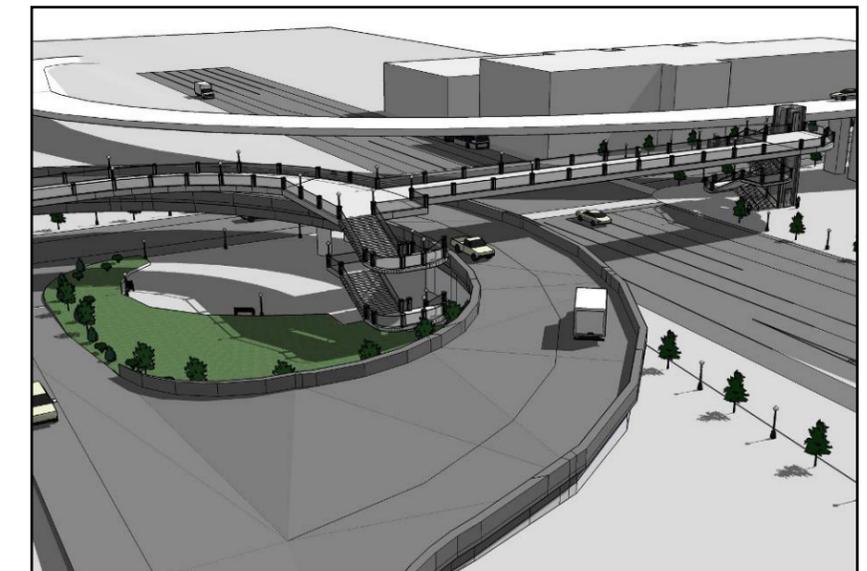
Figure 4-6 shows conceptually a circular ramp nesting within the Traffic Loop Ramp discussed above. This pedestrian ramp allows people to cross the railroad right-of-way above train traffic. It directs pedestrians to the southwest corner of the 4th Avenue South and South Royal Brougham Way intersection, complies with ADA criteria, and accommodates bicycle traffic as well.

The ramp may connect to the mezzanine level of Safeco Field and across the Traffic Loop Ramp to the second floor of the PSA garage where elevators are available to accommodate ADA requirements. Stairs are provided to the south sidewalk west of the railroad right-of-way on South Royal Brougham Way. Stairs also may be incorporated in the center of the circular ramp within the Traffic Loop Ramp.

Alternatives for an elevated pedestrian ramp across 4th Avenue South were developed as shown in Figure 4-7 and represent additional expense above that shown in the estimated cost of the pedestrian ramp shown in Figure 4-6. It was assumed that stairs and either elevators or a series of switchback ramps would direct pedestrians to the south sidewalk of South Royal Brougham Way between 4th and 5th Avenues South.



**Figure 4-6: South Royal Brougham Way Loop and Pedestrian Ramps**



**Figure 4-7: Alternative 2 – Bridge Connecting to East Side of 4th Avenue South with Two Stair-Elevator Towers**

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