



Client: City of Ann Arbor
Project Name: East Stadium Boulevard Bridge Replacement Project
Location: City of Ann Arbor
Project Number: 12940111
Issue Date: July 25, 2007

**PROJECT
MEMORANDUM**

TO: **Mike Nearing, PE
City of Ann Arbor**

FROM: **Matt Klawon, PE
Jonathan Coleman, EI**

SUBJECT: **East Stadium Boulevard Full Closure and Emergency Closure Scenarios – DRAFT**

1.0 INTRODUCTION

This memorandum summarizes the recommended traffic re-allocation for the planned full closure detour and the emergency closure detour, as well as the detour route reduction methodology for the full closure detour. Due to the nature of each detour, the traffic re-allocation percentages will differ. This memorandum also highlights and explains these differences.

2.0 TRAFFIC REALLOCATION

The network is defined as all intersections included in the study area from Packard Street to the north, Industrial Highway to the east, I-94 to the south and Ann Arbor-Saline Road/Main Street to the west. For all detour routes, traffic volumes were redistributed throughout the network based on existing traffic patterns.

2.1 Full Closure Detour

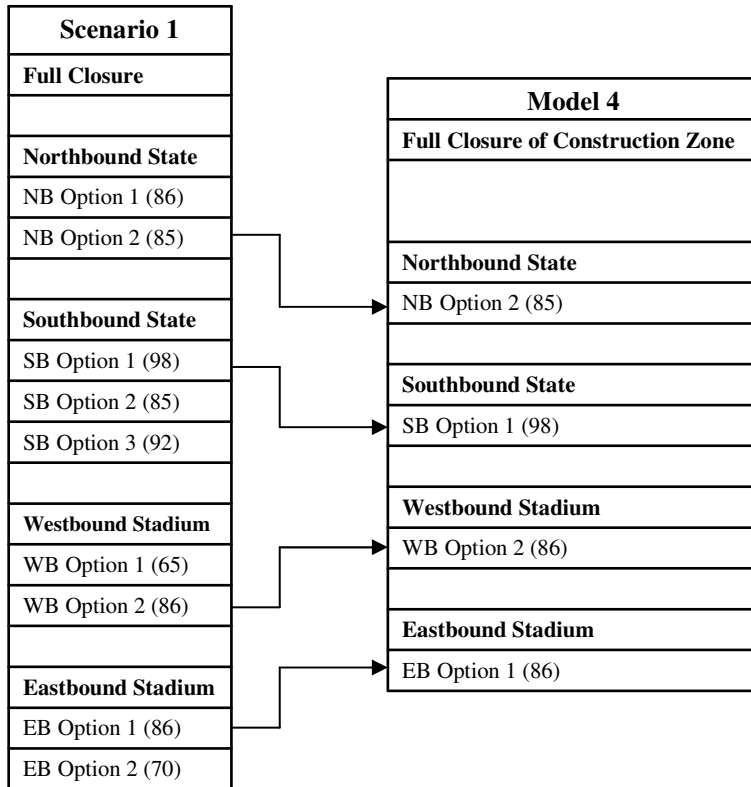
Scenario 1 was determined to be a Full Closure with the following available detour route options: two for Northbound State, three for Southbound State, two for Westbound Stadium, and two for Eastbound Stadium. Each of the route options were further reviewed by applying the weighted ranking, proposed construction staging and pro-active engineering judgment. Based on this review, the highest ranking option was not always deemed to be the most favorable option. Instead, the multiple options were reduced to the most favorable detour route option based on the overall review process. The model that resulted from this detour route deduction methodology is the Full Closure Detour (Model 4). **Figure 1** on the next page shows the detour route reduction methodology from Scenario 1 to Model 4.

Model 4 provides a detour plan to handle construction traffic if a full closure of the construction site is necessary. Model 4 is intended to operate as a planned detour route to be in place for an extended amount of time during construction with specific detour signing in place. Therefore, a percentage of traffic was canceled under this detour model. The methodology used to determine the percentage of canceled traffic and an explanation of the detour ranking was discussed in a previous memo. This memo is included in **Appendix A**.

URS began by canceling a percentage of traffic volumes at intersections closest to the closure points and worked farther away, intersection by intersection, until the percentage of traffic was canceled on the entire network. For detoured traffic volumes, URS used a similar methodology of removing traffic volumes from movements approaching the closure and redistributing the volumes along movements on detour routes. Finally, URS redistributed traffic to logical destination points within the network, and in all scenarios local traffic was maintained past the soft closure up to the hard closure. For example, with an eastbound detour in place, the soft closure would occur at the Stadium Boulevard/Main Street intersection; however, local traffic would still proceed past the soft closure to reach a residence, a golf course parking lot or the stadium parking lot.

Outbound traffic is defined as traffic that would have traveled through the closure if the closure were not in effect. A percentage of the total outbound traffic from the closure for both the AM and PM peak-hour periods has been assigned to each alternate route in the following sections.

**FIGURE 1
DETOUR REDUCTION METHODOLOGY FOR FULL CLOSURE**



2.1.1 Northbound Option 2

If northbound State Street traffic is prohibited under the Stadium Boulevard Bridge, then northbound traffic must use an alternate route or avoid the area altogether:

- 20-25% of all outbound traffic is diverted from northbound State Street to eastbound Stimson Street to northbound Industrial Highway to eastbound Stadium Boulevard to north-westbound Packard Street to northbound State Street
- 20% of all outbound traffic is diverted to Eisenhower Parkway to reach logical destination points
- 20% of all outbound traffic is diverted from northbound State Street to eastbound Stimson Street to northbound Industrial Highway to eastbound Stadium Parkway to north-westbound Packard Street to specific points where traffic is distributed to other routes based on known originating points or logical destination points (For example, trips known to originate from the right turn movement from Dewey Street and Granger Street from northbound State Street will travel on a detour until the traffic reaches Dewey Street or Granger Street, respectively.)
- 35-40% of all outbound traffic is canceled on the network

2.1.2 Southbound Option 1

If southbound State Street traffic is prohibited under the Stadium Boulevard Bridge, then southbound traffic must use an alternate route or avoid the area altogether:

- 30% of all outbound traffic is diverted from southbound State Street to westbound Hill Street to southbound Main Street to eastbound Eisenhower Parkway to southbound State Street
- 10% of all outbound traffic is diverted from southbound State Street to south-eastbound Packard Street to westbound Stadium Boulevard to southbound Industrial Highway to westbound Stimson Street to southbound State Street
- 15-20% of all outbound traffic is diverted from southbound State Street to a specific detour route based on known originating point or logical destination point (For example, trips known to originate from the left turn movement at Dewey Street and Granger Street onto southbound State Street will travel with the residential area to reach Park Street and will follow southbound Industrial Highway to westbound Stimson Street to the assumed destination of southbound State Street.)
- 40-45% of all outbound traffic is canceled on the network

2.1.3 Westbound Option 2

If westbound Stadium Boulevard traffic is prohibited over the Stadium Boulevard Bridge, then westbound traffic must use an alternate route or avoid the area altogether:

- 30% of all outbound traffic is diverted from westbound Stadium Boulevard to southbound Industrial Highway to westbound Eisenhower Parkway to northbound Main Street to westbound Stadium Boulevard
- 10-20% of all outbound traffic is diverted from westbound Stadium Boulevard to north-westbound Packard Street to eastbound Hill Street to southbound Main Street to westbound Stadium Boulevard
- 50-60% of all outbound traffic is canceled on the network

2.1.4 Eastbound Option 1

If eastbound Stadium Boulevard traffic is prohibited over the Stadium Boulevard Bridge, then eastbound traffic must use an alternate route or avoid the area altogether:

- 30% of all outbound traffic is diverted from eastbound Stadium Boulevard to southbound Main Street to eastbound Eisenhower Parkway to northbound Industrial Highway to eastbound Stadium Boulevard
- 10% of all outbound traffic is diverted from eastbound Stadium Boulevard to northbound Main Street to eastbound Hill Street to south-eastbound Packard Street to eastbound Stadium Boulevard
- 60% of all outbound traffic is canceled on the network

2.2 Emergency Closure Detour

In the event that an emergency closure of the Stadium Boulevard Bridge over State Street is required, all State Street and Stadium Boulevard traffic must use an alternate route around the closure to reach its ultimate destination points. To determine these alternate routes, URS used existing traffic volume patterns and utilized sound traffic engineering judgment. Traffic was assumed to *not* follow the shortest path through neighborhood streets near the hard closure as it is anticipated that the city of Ann Arbor would place closure barricades and law enforcement as necessary to prohibit these movements upon notification of the closure. In addition, it is anticipated that the city of Ann Arbor would place road closure signing at key intersections to prohibit vehicles from entering the hard closure. This detour would be short-term in nature, unexpected and detour routes would not be signed. Therefore, no percentage of traffic was canceled under this detour option.

Outbound traffic is defined as traffic that would have traveled through the closure if the closure were not in effect. A percentage of the total outbound traffic from the closure for both the AM and PM peak-hour periods has been assigned to each alternate route below.

2.2.1 Northbound Alternate Routes

If northbound State Street traffic is prohibited under the Stadium Boulevard Bridge, then northbound traffic must use an alternate route:

- 60% of all outbound traffic is diverted from northbound State Street to eastbound Stimson Street to northbound Industrial Highway to eastbound Stadium Boulevard to north-westbound Packard Street to northbound State Street
- 20% of all outbound traffic is diverted from northbound State Street to eastbound Eisenhower Parkway to northbound Industrial Highway to eastbound Stadium Boulevard to north-westbound Packard Street to northbound State Street
- 20% of all outbound traffic is diverted from northbound State Street to westbound Eisenhower Parkway (using the eastbound Eisenhower Parkway turnaround) to northbound Main Street to eastbound Hill Street to northbound State Street

2.2.2 Southbound Alternate Routes

If southbound State Street traffic is prohibited under the Stadium Boulevard Bridge, then southbound traffic must use an alternate route:

- 75% of all outbound traffic is diverted from southbound State Street to westbound Hill Street to southbound Main Street to eastbound Eisenhower Parkway to southbound State Street
- 25% of all outbound traffic is diverted from southbound State Street to south-eastbound Packard Street to westbound Stadium Boulevard to southbound Industrial Highway to westbound Eisenhower Parkway to southbound State Street

2.2.3 Westbound Alternate Routes

If westbound Stadium Boulevard traffic is prohibited over the Stadium Boulevard Bridge, then westbound traffic must use an alternate route:

- 25% of all outbound traffic is diverted from westbound Stadium Boulevard to southbound Industrial Highway to westbound Eisenhower Parkway to northbound Main Street to westbound Stadium Boulevard
- 25% of all outbound traffic is diverted from westbound Stadium Boulevard to north-eastbound Packard Street to westbound Hill Street to southbound Main Street to westbound Stadium Boulevard
- 50% of all outbound traffic is diverted from westbound Stadium Boulevard to southbound Industrial Highway to westbound Stimson Street to southbound State Street to westbound Eisenhower Parkway to northbound Main Street to westbound Stadium Boulevard

2.2.4 Eastbound Alternate Routes

If eastbound Stadium Boulevard traffic is prohibited over the Stadium Boulevard Bridge, then eastbound traffic must use an alternate route:

- 25% of all outbound traffic is diverted from eastbound Stadium Boulevard to southbound Main Street to eastbound Eisenhower Parkway to northbound Industrial Highway to eastbound Stadium Boulevard
- 25% of all outbound traffic is diverted from eastbound Stadium Boulevard to northbound Main Street to eastbound Hill Street to south-eastbound Packard Street to eastbound Stadium Boulevard
- 50% of all outbound traffic is diverted from eastbound Stadium Boulevard to southbound Main Street to eastbound Eisenhower Parkway to northbound State Street to eastbound Stimson Street to northbound Industrial Highway to eastbound Stadium Boulevard

3.0 CONCLUSION

Figure 2 below presents a summary of the differences between the Full Closure Detour and the Emergency Closure Detour.

**FIGURE 2
SUMMARY OF DIFFERENCES**

Type	DETOUR TYPE	
	Full Closure	Emergency Closure
Duration	Long-term	Short-term
Operation	Planned	Unexpected
Detour Signing	Signed	Not signed
Canceled Trips	35% - 60%	0%

**APPENDIX A
DETOUR ROUTE REDUCTION METHODOLOGY MEMO**



Client: City of Ann Arbor
Project Name: East Stadium Boulevard Bridge Replacement Project (Detour Evaluation)
Location: City of Ann Arbor
Project Number: 12940111
Issue Date: January 17, 2007

**PROJECT
MEMORANDUM**

TO: **Mike Nearing, PE
City of Ann Arbor**

FROM: **Matt Klawon, PE**

SUBJECT: **East Stadium Boulevard Detour Route Reduction Methodology – DRAFT**

1.0 INTRODUCTION

This memorandum summarizes the reduction process that was created and implemented in order to evaluate available detour route options and scenarios to establish the top detour route options for further analysis. The reduction methodology is necessary to address the following concerns:

- Number of possible detour route scenarios exceeds the ability to accurately model each scenario.
- Project construction will be in pre-determined stages which eliminates certain detour route scenarios.
- Existing traffic demands can dictate acceptable detour route locations and directions.
- Pro-actively reduce the impact of the proposed detours by avoiding highly residential areas.

The methodology scenario presented in this memorandum is an organized and systematic approach where applying the above concerns will reduce the available detour route scenarios to a manageable number of top detour routes which will be modeled in detail.

2.0 DETERMINATION OF ALL POSSIBLE DETOUR ROUTE SCENARIOS

An analysis was conducted to determine all possible detour route scenarios for this project. For this memorandum a route scenario is defined as which traffic patterns are being maintained through the construction zone. For a construction project that is outside of the roadway one route scenario would be that all directions of traffic are maintained. Conversely, if this same project then required the closure of all traffic through the construction zone, an additional scenario would be where all traffic is being detoured.

Applying this principle to the traffic handling for the East Stadium Bridge project resulted in the potential for 15 detour route scenarios, which are presented in **Appendix A**.

Several detour routes were considered, for each direction of travel through the construction zone. Each route had slightly different characteristics which provided a variety between routes and allowed a systematic ranking criterion to be applied. The routes were ranked by applying a weighted ranking scale, which was developed by the project team and approved by the City in an effort to determine which route had the greatest potential of succeeding. The ranking of each route is indicated by the number in the parenthesis after each option, such as Stadium Boulevard EB Option 1 (86). In this instance, the option has a ranking of 86 out of a possible 100 points. The proposed detour routes and brief descriptions are presented in **Appendix B**.

3.0 DETERMINATION OF DETOUR ROUTE COMBINATIONS

From the previous discussion of possible detour scenarios as mentioned in Section 2.0, each defined scenario has a limited number of detour combinations available based upon the number of routes available for each direction of travel. Expanding on the example discussed in Section 2.0, a detour combination could be described as applying the top detour route options for each direction of travel to be detoured around the fully closed construction zone. Another detour route combination for this fully closed construction zone scenario could be applying the top northbound and southbound routes options, while using the second best route options for westbound and eastbound movements.

An example of a detour combination for Scenario 2 would be to maintain northbound State apply southbound State Detour Option 1, apply westbound Stadium Detour Option 2, and eastbound Stadium Detour Option 1. For Scenario 2 there are a total of 12 possible detour combinations due to the multiple detour route options present.

By applying each available detour route to each of the 15 scenarios leads to a statistical determination of 105 detour combinations possible for this construction project.

4.0 REDUCTION PROCESS

The 105 possible detour combinations were reduced to a list of the top detour combinations for further review by applying the weighted ranking, proposed construction staging and pro-active engineering judgment as follows.

Eastbound Stadium Option 2 and the Westbound Stadium Option 1 detour routes were considered to be unfavorable based upon the following:

- Stadium Boulevard is currently a truck route through the City of Ann Arbor.
- Physical and safety impact of commercial truck traffic being diverted along Hill Street.
- Safety concerns regarding the greater volume of pedestrian and non-motorized traffic observed along these routes, being exposed to commercial and detour traffic.
- Availability of other viable detour routes which have less impact to the university.

Southbound State Option 2 detour route was considered to be unfavorable based upon the following:

- The proximity of Hoover Street to the university
- Safety concerns regarding the greater volume of pedestrian and non-motorized traffic observed along these routes, being exposed to commercial and detour traffic.
- Intersection of Hoover and Main would likely require a temporary traffic signal to facilitate the increased westbound to southbound detoured traffic volumes.

Northbound State Option 1 detour route was considered to be unfavorable based upon the following:

- Early indications of negative public opinion regarding the utilization of Park and Granger streets.
- Potential high impact to quality of life throughout this neighborhood.
- Safety concerns regarding residential non-motorized traffic along these roadways.

Preliminary engineering and design of the construction project have indicated that there are several reasons for maintaining one direction of motorized and non-motorized traffic on Stadium Boulevard through the construction zone. It has been determined that one lane of the westbound Stadium Boulevard traffic flow will be maintained for the following reasons:

- Maintaining westbound traffic will allow for consistent access to Pioneer High School in the morning.
- Provides the necessary facilities for non-motorized access through the construction area.
- No viable alternatives for detouring of non-motorized traffic around construction site.

- Maintains the westbound truck route and the integrity of truck access to State Street (via Stimson).

Northbound State Option 2 detour route and the detouring of any northbound traffic along State Street was considered to be unfavorable for the following:

- Does not support access to the downtown business district.
- Does not assure consistent arrival times for students and commuters traveling to the downtown and University of Michigan campuses.

By maintaining one lane of northbound traffic through the construction zone, non-motorized traffic will also be provided with access through the site.

Southbound State Option 3 detour route was considered to be unfavorable for the following:

- The southbound left turn movement at State and Packard has limited capacity due to the tight spacing of existing traffic signals.
- Limited southbound left turn storage area.
- Due to northbound State Street traffic being maintained traffic signal operations may not be capable of facilitating the southbound left turn traffic at the State Street and Packard intersection.

5.0 CONCLUSION

After the above reductions presented in Section 4.0 were applied, the fifteen initial scenarios and 105 detour combinations become reduced to 3 scenarios/models shown below:

Model 1	Model 2	Model 3
NB/WB Maintained	NB/WB/EB Maintained	NB/SB/WB Maintained
Northbound State NB Maintained	Northbound State NB Maintained	Northbound State NB Maintained
Southbound State SB Option 1 (98)	Southbound State SB Option 1 (98)	Southbound State SB Maintained
Westbound Stadium WB Maintained	Westbound Stadium WB Maintained	Westbound Stadium WB Maintained
Eastbound Stadium EB Option 1 (86)	Eastbound Stadium EB Maintained	Eastbound Stadium EB Option 1 (86)

Due to construction requirements and the preliminary engineering only two of the three scenarios/models shown above may be used during the construction phase of this project those scenarios are Model 1 and Model 2. It is anticipated that the staging of traffic in Model 1 will be implemented during the first stage of construction and the staging of traffic in Model 2 will be used during the second stage of construction should additional pavement width be available to maintain two directions of traffic on Stadium. Model 3 will be provided to represent a stage of construction where State Street would be open to all traffic, while Stadium Boulevard is reduced to maintaining only the westbound direction of traffic. As a contingency, URS proposes that Model 4 with full closure of the construction site be considered to provide a mitigation plan for any substantial problems which may arise during construction.

Therefore, the final models for further evaluation are outlined below.

Model 1	Model 2	Model 3	Model 4
NB/WB Maintained	NB/WB/EB Maintained	NB/SB/WB Maintained	Full Closure of Construction Zone
Northbound State NB Maintained	Northbound State NB Maintained	Northbound State NB Maintained	Northbound State NB Option 2 (85)
Southbound State SB Option 1 (98)	Southbound State SB Option 1 (98)	Southbound State SB Maintained	Southbound State SB Option 1 (98)
Westbound Stadium WB Maintained	Westbound Stadium WB Maintained	Westbound Stadium WB Maintained	Westbound Stadium WB Option 2 (86)
Eastbound Stadium EB Option 1 (86)	Eastbound Stadium EB Maintained	Eastbound Stadium EB Option 1 (86)	Eastbound Stadium EB Option 1 (86)

**APPENDIX A
DETOUR ROUTE SCENARIOS**

The 15 Possible Detour Scenarios

Scenario 1
Full Closure
Northbound State
NB Option 1 (86)
NB Option 2 (85)
Southbound State
SB Option 1 (98)
SB Option 2 (85)
SB Option 3 (92)
Westbound Stadium
WB Option 1 (65)
WB Option 2 (86)
Eastbound Stadium
EB Option 1 (86)
EB Option 2 (70)

Scenario 2
NB Maintained
Northbound State
NB Maintained
Southbound State
SB Option 1 (98)
SB Option 2 (85)
SB Option 3 (92)
Westbound Stadium
WB Option 1 (65)
WB Option 2 (86)
Eastbound Stadium
EB Option 1 (86)
EB Option 2 (70)

Scenario 3
SB Maintained
Northbound State
NB Option 1 (86)
NB Option 2 (85)
Southbound State
SB Maintained
Westbound Stadium
WB Option 1 (65)
WB Option 2 (86)
Eastbound Stadium
EB Option 1 (86)
EB Option 2 (70)

Scenario 4
WB Maintained
Northbound State
NB Option 1 (86)
NB Option 2 (85)
Southbound State
SB Option 1 (98)
SB Option 2 (85)
SB Option 3 (92)
Westbound Stadium
WB Maintained
Eastbound Stadium
EB Option 1 (86)
EB Option 2 (70)

Scenario 5
EB Maintained
Northbound State
NB Option 1 (86)
NB Option 2 (85)
Southbound State
SB Option 1 (98)
SB Option 2 (85)
SB Option 3 (92)
Westbound Stadium
WB Option 1 (65)
WB Option 2 (86)
Eastbound Stadium
EB Maintained

Scenario 6
NB/SB Maintained
Northbound State
NB Maintained
Southbound State
SB Maintained
Westbound Stadium
WB Option 1 (65)
WB Option 2 (86)
Eastbound Stadium
EB Option 1 (86)
EB Option 2 (70)

Scenario 7
NB/WB Maintained
Northbound State
NB Maintained
Southbound State
SB Option 1 (98)
SB Option 2 (85)
SB Option 3 (92)
Westbound Stadium
WB Maintained
Eastbound Stadium
EB Option 1 (86)
EB Option 2 (70)

Scenario 8
NB/EB Maintained
Northbound State
NB Maintained
Southbound State
SB Option 1 (98)
SB Option 2 (85)
SB Option 3 (92)
Westbound Stadium
WB Option 1 (65)
WB Option 2 (86)
Eastbound Stadium
EB Maintained

Scenario 9
WB/EB Maintained
Northbound State
NB Option 1 (86)
NB Option 2 (85)
Southbound State
SB Option 1 (98)
SB Option 2 (85)
SB Option 3 (92)
Westbound Stadium
WB Maintained
Eastbound Stadium
EB Maintained

Scenario 10
SB/WB Maintained
Northbound State
NB Option 1 (86)
NB Option 2 (85)
Southbound State
SB Maintained
Westbound Stadium
WB Maintained
Eastbound Stadium
EB Option 1 (86)
EB Option 2 (70)

Scenario 11
SB/EB Maintained
Northbound State
NB Option 1 (86)
NB Option 2 (85)
Southbound State
SB Maintained
Westbound Stadium
WB Option 1 (65)
WB Option 2 (86)
Eastbound Stadium
EB Maintained

Scenario 12
NB/SB/WB Maintained
Northbound State
NB Maintained
Southbound State
SB Maintained
Westbound Stadium
WB Maintained
Eastbound Stadium
EB Option 1 (86)
EB Option 2 (70)

Scenario 13
NB/SB/EB Maintained
Northbound State
NB Maintained
Southbound State
SB Maintained
Westbound Stadium
WB Option 1 (65)
WB Option 2 (86)
Eastbound Stadium
EB Maintained

Scenario 14
NB/WB/EB Maintained
Northbound State
NB Maintained
Southbound State
SB Option 1 (98)
SB Option 2 (85)
SB Option 3 (92)
Westbound Stadium
WB Maintained
Eastbound Stadium
EB Maintained

Scenario 15
SB/WB/EB Maintained
Northbound State
NB Option 1 (86)
NB Option 2 (85)
Southbound State
SB Maintained
Westbound Stadium
WB Maintained
Eastbound Stadium
EB Maintained

**APPENDIX B
DESCRIPTION OF DETOUR ROUTES**

EAST STADIUM BLVD. BRIDGES REPLACEMENT

Potential Detour Routes
for State Street and Stadium Boulevard

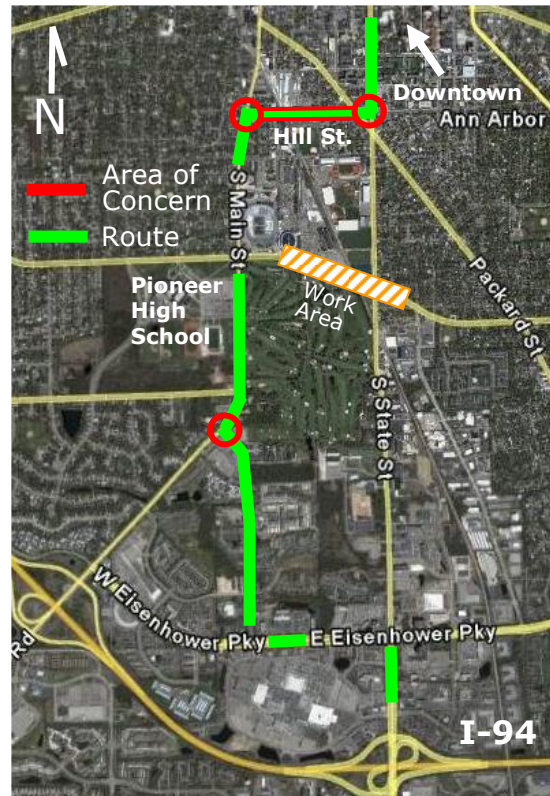
Preliminary & Advisory
URS Corporation
January 17, 2007

Southbound State Street Detour

Route Option #1

Option #1 Route Highlights:

- The first turn of the detour from State Street will be a right turn onto Hill Street which will allow for sufficient capacity.
- The second turn will be a left turn at the traffic signal of South Main Street where Hill Street ends.
- The intersection of South Main Street and Ann Arbor Saline Road has dual southbound left turn lanes to support detour traffic.
- Southbound State Street is not designated as a truck route at the point where this detour begins.
- Concerns regarding truck traffic on Hill Street and Main Street south of Ann Arbor Saline may be omitted, since the beginning of the detour route is not on an established truck route.



The proposed route shown above is South State to Hill Street to South Main Street to East Eisenhower Parkway to South State Street.

Detour Route Ranking Score 98

Recommendation: This route appears to have the necessary facilities to handle the additional traffic volumes from the detour route and will have the least amount of impact to residents/businesses currently along this route. Hill Street is the only roadway in this proposed route that is not usually subjected to higher traffic volumes. Hill Street serves a mixture of residential and University buildings and is not a truck route. Detour traffic along this roadway will be comprised of private passenger vehicles and local delivery commercial traffic.

The traffic signal at the intersection of Hill Street and South Main would be re-timed to provide adequate capacity for the westbound to southbound detour movement. Concerns regarding the potential reductions in capacity that may occur on South Main Street due to the University of Michigan Stadium project will need to be addressed and coordinated with the University's project.

A preliminary review has indicated that this movement can be maintained through the construction zone for the duration of the project. This option should be investigated further and be included in the modeling and research of mitigation measures which would make this detour route successful if selected.

Southbound State Street Detour

Route Option #2

Option #2 Route Highlights:

- The first turn of the detour from State Street will be a right turn onto Hoover Street which will allow for sufficient capacity. This right turn lane has greater storage than the southbound right turn at State and Hill Street.
- The second turn will be a left turn at South Main Street where Hoover Street ends.
- The intersection of South Main Street and Ann Arbor Saline Road has dual southbound left turn lanes to support detour traffic.
- Southbound State Street is not designated as a truck route at the point where this detour begins.
- Concerns regarding truck traffic on Hoover Street and Main Street south of Ann Arbor Saline may be omitted, since the beginning of the detour route is not on an established truck route.



The proposed route shown above is South State to Hoover Street to South Main Street to East Eisenhower Parkway to South State Street.

Detour Route Ranking Score 85

Recommendation: This route appears to have the necessary facilities to handle the additional traffic volumes from the detour route and will have a minimal impact to residents/businesses currently along this route. Hoover Street is the only roadway in this proposed route that is not usually subjected to higher traffic volumes. Hoover Street serves a mixture of residential and University buildings and is not a truck route. Detour traffic along this roadway will be comprised of private passenger vehicles and local delivery commercial traffic, however this roadway is considered to be in the University of Michigan Campus and has higher volumes of pedestrian and bicycle traffic than Hill Street.

A temporary traffic signal may be necessary at the intersection of Hoover Street and South Main. The South Main and Pauline signal may need to be coordinated to facilitate the temporary signal at Hoover Street. Concerns regarding the potential reductions in capacity that may occur on South Main Street due to the University of Michigan Stadium project will need to be addressed and coordinated with the University's project.

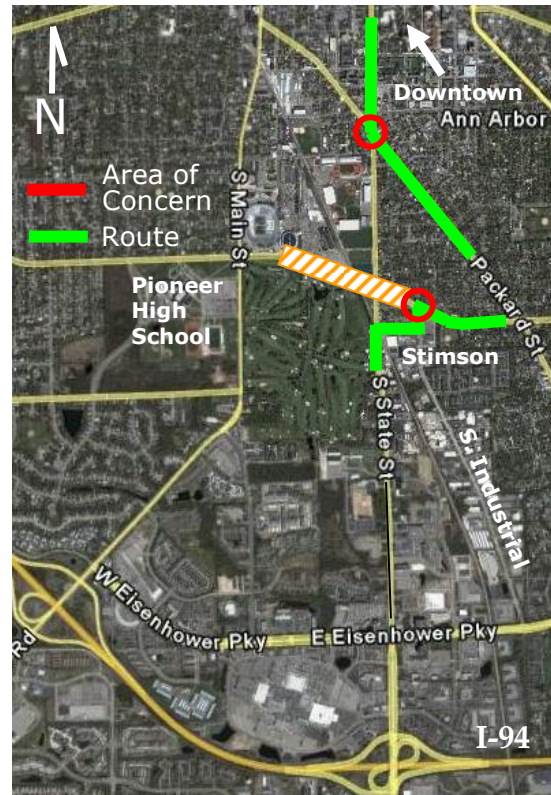
A preliminary review has indicated that this movement can be maintained through the construction zone for the duration of the project. This option should be investigated further and be included in the modeling and research of mitigation measures which would make this detour route successful if selected.

Southbound State Street Detour

Route Option #3

Option #3 Route Highlights:

- The first turn of the detour from State Street will be a left turn onto Packard Street. This left turn movement may not provide enough capacity for the detour movement.
- The second turn will be a right turn from Packard to Stadium. This movement should not hinder the detour traffic.
- The intersection of Stadium at Industrial, Stimson at Industrial and Stimson at State would be retimed to handle the additional detour traffic at these intersections.
- Concerns regarding commercial traffic on this route may be omitted, since State Street is not a truck route. Packard, Stadium, South Industrial, Stimson are designated truck routes.



The proposed route shown above is South State to Packard Street to Stadium to South Industrial to Stimson to South State Street.

Detour Route Ranking Score 92

Recommendation: This route appears to be a candidate for a potential detour route, however there may be capacity limitations for the southbound left turn movement from State to Packard. If further analysis indicates that there would be a reduction in the opposing northbound traffic, this limitation may be overcome. Detour traffic along this roadway will be comprised of private passenger vehicles and local delivery commercial traffic.

It is anticipated that this detour route would overlap with other detour routes for this project, such as the Eastbound Stadium detour route and northbound State Street routes. This overlapping would be significantly affect the operation of the traffic signals of Stadium at South Industrial and Stadium at Packard, due to increased traffic demand.

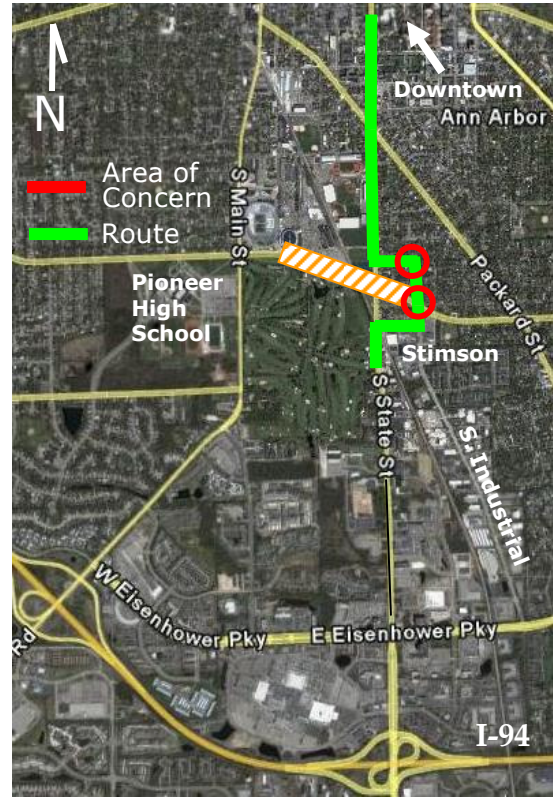
A preliminary review has indicated that this movement can be maintained through the construction zone for the duration of the project. URS is recommending that this option be omitted from further investigation due to the limited capability of the State and Packard intersection operating effectively under the detour conditions and the availability of other exclusive detour route paths for the southbound State Street traffic.

Northbound State Street Detour

Route Option #1

Option #1 Route Highlights:

- This route provides the shortest distance for detouring the northbound traffic around the project.
- It is believed that the timing of the signalized intersections could be modified to handle the detour traffic along this route.
- The area north of Stadium Street, from Park to Granger is a residential area. Significant community agreement would be necessary to allow this detour traffic to travel this route.
- All northbound commercial traffic is currently required to make the right turn off of State onto Stimson. The northbound truck route on State Street ends at Stimson. Therefore detouring the truck traffic is not necessary.



The proposed route shown above is South State to Stimson to South Industrial to Park to Granger to South State Street.

Detour Route Ranking Score 86

Recommendation: This route appears to be a candidate for a potential detour route, however detouring of traffic through the residential area would require significant public approval. Detour traffic along this roadway will be comprised of private passenger vehicles and local delivery commercial traffic, all heavy truck traffic would be required to seek a different route as they are currently doing.

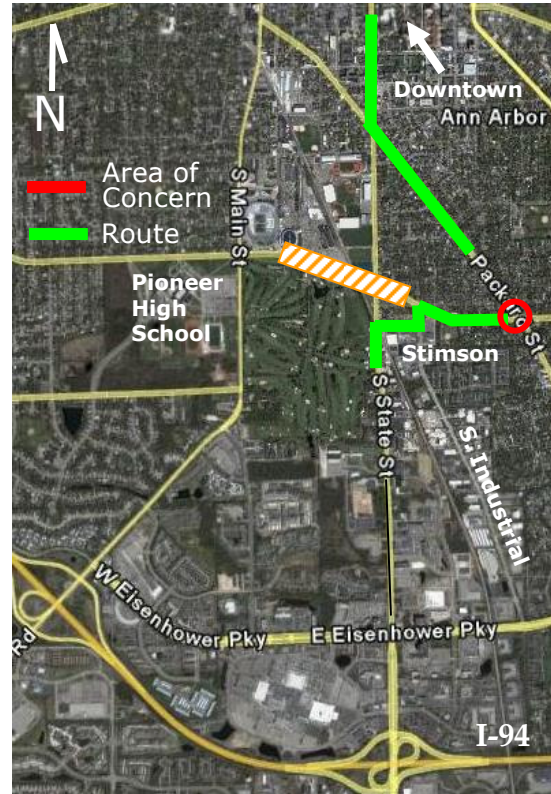
A preliminary review has indicated that this movement can be maintained through the construction zone for the duration of the project. URS is recommending that this option be investigated further. There should be a careful approach to the amount of resources allocated to this investigation until the public opinion is weighed and this detour route is accepted by the residents in this area.

Northbound State Street Detour

Route Option #2

Option #2 Route Highlights:

- This route will detour traffic along main roadways, however the route is longer and will incur more delay overall.
- It is believed that the timings of the signalized intersections could be modified to handle the detour traffic along this route.
- The eastbound Stadium to northbound Packard movement will be of concern specifically regarding the ability of commercial traffic to negotiate the turn safely.
- The intersection of Stadium and Packard will need to be re-timed to handle the increased eastbound left turn traffic.



The proposed route shown above is South State to Stimson to South Industrial to Stadium to Packard to South State Street.

Detour Route Ranking Score 85

Recommendation: This route appears to be the most publicly acceptable detour route. It will require more time than the other option and will also pose specific challenges in the optimization of the traffic signals to facilitate the detour movements through the intersections. Detour traffic along this roadway will be comprised of private passenger vehicles, local delivery commercial traffic, and some heavy truck traffic.

A preliminary review has indicated that this movement can be maintained through the construction zone for the duration of the project. URS is recommending that this option be investigated further and be included in the modeling and research of mitigation measures which would make this detour route successful if selected.

Eastbound Stadium Blvd Detour

Route Option #1

Option #1 Route Highlights:

- This route will detour traffic along main roadways.
- It is anticipated that the timings of the signalized intersections could be modified to handle the detour traffic along this route.
- The intersection of Stadium and South Industrial will need to be re-timed to handle the increased eastbound left turn traffic.
- There may be a concern regarding the capacity of the eastbound left turn movement from Eisenhower to South Industrial.
- Stadium is currently a truck route, while portions of South Main and Eisenhower are not.



The proposed route shown above is Stadium to South Main to Eisenhower to South Industrial to Stadium.

Detour Route Ranking Score 86

Recommendation: This route appears to be a good candidate for a potential detour, however the capacity of the eastbound left turn movement at Eisenhower and South Industrial will require further investigation. Detour traffic along this roadway will be comprised of private passenger vehicles and local delivery commercial traffic. Additional accommodations for the commercial traffic on Stadium will need to be made if the traffic cannot be routed down South Main or Eisenhower.

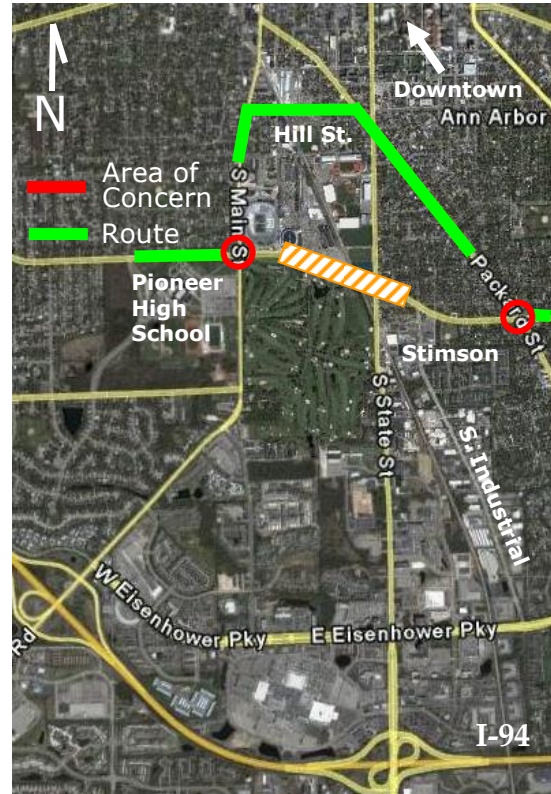
URS is recommending that this option be investigated further and be included in the modeling and research of mitigation measures which would make this detour route successful if selected.

Eastbound Stadium Blvd Detour

Route Option #2

Option #2 Route Highlights:

- The first turn of the detour from Stadium will be a left turn onto South Main which may restrict the capacity of the detour route.
- The use of Hill Street may require significant approval from citizens and public groups due to the additional traffic demand.
- Concerns regarding commercial traffic on Hill Street will need to be addressed, since this traffic type will be need to be a part of the detoured traffic.
- The southbound left turn from Packard onto Stadium may require additional traffic signal retiming.
- The University of Michigan project may have a substantial impact on this route, coordination will be necessary.



The proposed route shown above is Stadium to South Main to Hill to Packard to Stadium.

Detour Route Ranking Score 70

Recommendation: This route appears to have the necessary facilities to handle the additional traffic volumes from the detour route and will have the least amount of impact to residents/businesses currently along this route. Hill Street is the only roadway in this proposed route that is not usually subjected to higher traffic volumes. Hill Street is a mixture of residential and University buildings and is not part of the truck routes in Ann Arbor. Detour traffic along this roadway will be comprised of private passenger vehicles and local delivery commercial traffic. Additional accommodations for the heavy truck traffic on Stadium will need to be made if the traffic cannot be routed down Hill Street.

The traffic signal at the intersection of Stadium and South Main would be re-timed to provide adequate capacity for the eastbound to northbound detour movement. Concerns regarding the potential reductions in capacity that may occur on South Main Street due to the University of Michigan Stadium project will need to be addressed and coordinated with the University's project.

URS is recommending that this option be investigated further and be included in the modeling and research of mitigation measures which would make this detour route successful if selected.

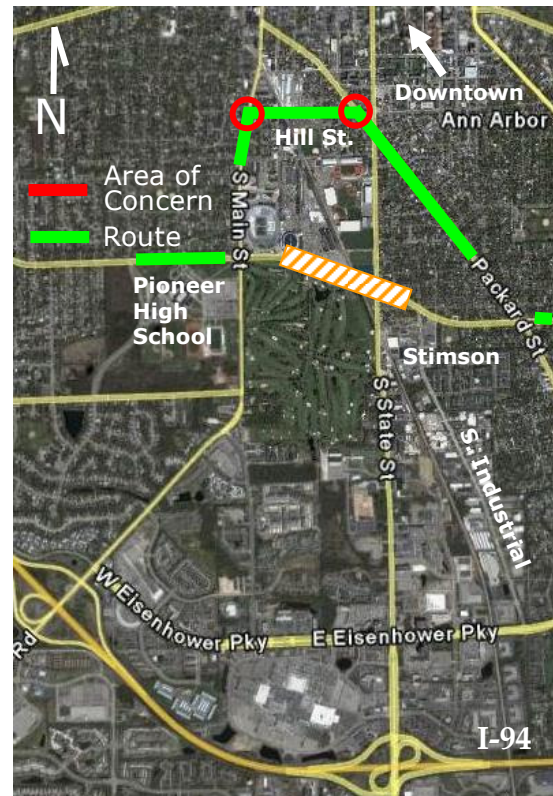
Preliminary & Advisory
URS Corporation
Jan 17, 2007

Westbound Stadium Blvd Detour

Route Option #1

Option #1 Route Highlights:

- The first turn of the detour from Stadium will be a right turn onto South Main which should allow for sufficient capacity.
- The left turn movement from Packard onto Hill may prove to be unable to accommodate the detour movement.
- The use of Hill Street may require significant approval from citizens and public groups due to the additional traffic demand.
- Concerns regarding commercial traffic on Hill Street will need to be addressed, since this traffic type will be a part of the detoured traffic.
- The University of Michigan project may have a substantial impact on this route, coordination will be necessary.



The proposed route shown above is Stadium to Packard to Hill to South Main to Stadium.

Detour Route Ranking Score 65

Recommendation: Areas of concern along this route include the northbound Packard left turn onto Hill Street, due to the limited capacity at this intersection, this movement may prove to be inadequate in handling the detour traffic. Of the roadways in this route, Hill Street is the only roadway that is not usually subjected to higher traffic volumes. Hill Street is a mixture of residential and University buildings and is not part of the truck routes in Ann Arbor. Detour traffic along this roadway will be comprised of private passenger vehicles and local delivery commercial traffic. Additional accommodations for the commercial traffic on Stadium will need to be made if the traffic cannot be routed down Hill Street.

Concerns regarding the potential reductions in capacity that may occur on South Main Street due to the University of Michigan Stadium project will need to be addressed and coordinated with the University's project.

URS is recommending that the westbound Stadium traffic movement be maintained through the construction zone for the duration of the project. This movement is a primary inbound movement for Pioneer High School and preliminary review has indicated that this movement can be maintained during construction. This option should be investigated further and be included in the modeling and research of mitigation measures which would make this detour route successful if selected.

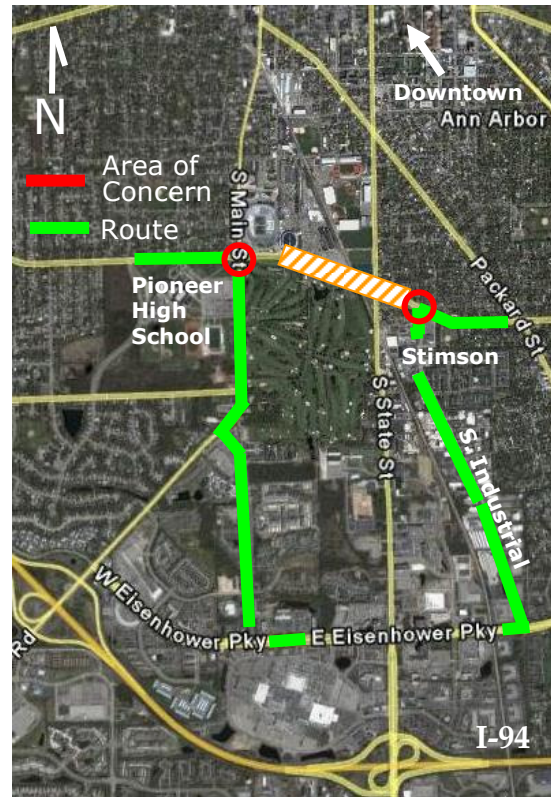
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URS Corporation
Jan 17, 2007

Westbound Stadium Blvd Detour

Route Option #2

Option #2 Route Highlights:

- This route will detour traffic along main roadways.
- It is believed that the timings of the signalized intersections could be modified to handle the detour traffic along this route.
- The intersection of Stadium and South Industrial will need to be re-timed to handle the increased westbound left turn traffic.
- There may be a concern regarding the capacity of the northbound left turn movement from South Main to Stadium.
- Sections of this route are not designated truck routes and this will need to be addressed as truck traffic will be need to be a part of the detour.



The proposed route shown above is Stadium to South Industrial to Eisenhower to South Main to Stadium.

Detour Route Ranking Score 86

Recommendation: Areas of concern along this route include the westbound Stadium left turn onto South Industrial, this movement may prove to be inadequate in handling the detour traffic if the traffic signal timing cannot be modified to accommodate the volumes. Detour traffic along this roadway will be comprised of private passenger vehicles and local delivery commercial traffic. Additional accommodations for the heavy truck traffic on Stadium will need to be made if the traffic cannot be routed along this route.

Concerns regarding the potential reductions in capacity that may occur on South Main Street due to the University of Michigan Stadium project will need to be addressed and coordinated with the University's project.

URS is recommending that the westbound Stadium traffic movement be maintained through the construction zone for the duration of the project. This movement is a primary inbound movement for Pioneer High School and preliminary review has indicated that this movement can be maintained during construction. This option should be investigated further and be included in the modeling and research of mitigation measures which would make this detour route successful if selected.

Preliminary & Advisory
URS Corporation
Jan 17, 2007

Considerations for maintaining northbound State Street during construction.

- Facilitates the morning peak traffic movements into the city.
- Allows for commuters to have consistent arrival times for work and school.
- Supports the downtown business district.
- Provides access through the construction zone for non-motorized traffic.

Considerations for maintaining westbound Stadium Boulevard during construction.

- Maintains the inbound route in the morning commute to Pioneer High School. This aides in assuring that the start times for the school will be maintained by consistent bus arrivals.
- Maintains access by both the westbound and eastbound Stadium Avenue traffic to the University parking facilities located east of the stadium and the golf course to the south.
- Provides the necessary facilities for non-motorized access through the construction area.
- No viable alternatives for detouring of non-motorized traffic around construction site.
- Maintains the westbound truck route and the integrity of truck access to State Street (via Stimson).