Purdue University Campus Traffic Circulation Plan Synthesis Report – State Street Corridor (FINAL)

Prepared for:

PURDUE UNIVERSITY

PURDUE RESEARCH FOUNDATION

CITY OF WEST LAFAYETTE INDIANA

January 17, 2015

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I certify that this TRAFFIC SYNTHESIS REPORT has been prepared by me or under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering.

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STAKEHOLDERS & ACKNOWLEDGEMENTS

This report development was a collaborative effort between American Structurepoint, Inc. and the stakeholders listed below and their key representatives. American Structurepoint would like to thank each stakeholder for their valuable input on this synthesis report which will help them make a prudent decision on the future transportation improvements and associated funding for implementation through the Purdue University campus in West Lafayette.

- **Purdue University**
  - Michael B. Cline
  - Drew Furry
  - Steven Schultz
  - Robert Olson
  - Adrian Allen
- **City of West Lafayette**
  - David Buck
- **Purdue Research Foundation**
  - Gregory Napier

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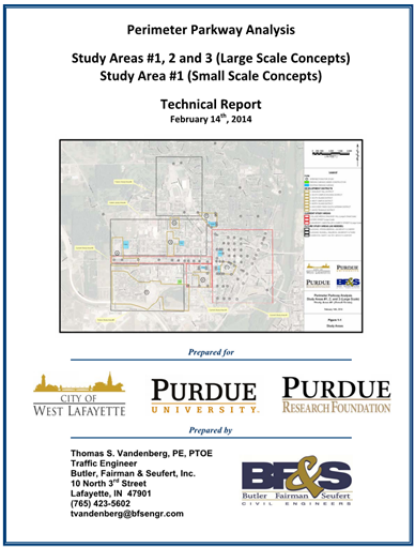
1.0 Executive Summary

1.1 Project Purpose and Need

The purpose of this report is to synthesize the results and recommendations of numerous previous traffic studies that have been done for and around the Purdue University Campus over the past decade. Special emphasis is placed on the two most recent and relevant studies that are currently being used to define future infrastructure implementation and investment:

- *Re-State | A Master Plan for State Street prepared by MKSK (June 2014)* – This report defines a vision and strategy to re-imagine, re-invest and re-make the State Street corridor through Downtown West Lafayette, Purdue University, and a newly opened western gateway through creating a sense of place for all modes of travel.

- *Perimeter Parkway Analysis Technical Report prepared by Butler Fairman & Seufert (February 2014)* – This report forms a synthesis of the previous traffic studies and planning studies performed by PKG, HE-BFS and BFS in conjunction with the Purdue University Campus Master Plan and provides the most updated concept for the Perimeter Parkway corridor.



The need for this study was identified by Purdue University and the City of West Lafayette. The intent of this study was not to "reinvent the wheel" on a decade of efforts that have been put into various previous studies by Purdue University and the City of West Lafayette. Instead, it was to facilitate a general consensus amongst the stakeholders by providing a peer review of the proposed recommendations from the previous studies. Secondly, it was to provide value engineering solutions for various roadway segments and intersections along the core corridors of Perimeter Parkway and State Street, parts of which are under consideration for development in the next five years.

The overarching goal is to provide the University and its Board of Trustees and the City of West Lafayette a comprehensive understanding of the future scope of infrastructure improvements proposed and identified as necessary for the two corridors, with corresponding estimates of the preliminary cost/budget.

1.2 Traffic Analysis General Recommendations | State Street and Perimeter Parkway Corridors

Several past traffic studies referenced in the previous sections of this report evaluated multiple traffic scenarios for numerous intersections and roadway segments comprising the State Street and Perimeter Parkway corridors. American Structurepoint reviewed the capacity analysis files available from these studies and for the most part is in agreement with the analysis results and recommended improvement alternates along the respective corridors.

As discussed during the stakeholder progress meetings, three different sensitivity analyses were considered in developing the traffic diversion scenarios for any shift in traffic from State Street based on constructing the Perimeter Parkway. Upon consensus with the stakeholders 20%, 35% and 50% shift in traffic scenarios were identified for sensitivity analysis. The intent of the sensitivity analysis was to gain confidence in the overall operations with "what if" shifts and corresponding impacts to the reconfiguration recommendations being considered along the State Street and Perimeter Parkway corridors.

Results of the capacity analysis for existing year and the three future year sensitivity scenarios with the new traffic matrix projections based on recommended lane configurations from the previous studies showed similar intersection operations and LOS performance, with the exception of the intersection of Grant Street & State Street. A majority of the intersections will operate at an acceptable LOS (D or better) except for the intersection of Northwestern Avenue & Stadium Avenue and Northwestern Avenue & Grant Street. These intersections had a poor LOS in the previous studies as well. This is primarily attributable to the inability to construct any additional capacity improvements because of the tight right-of-way at these intersections. Exhibit 1 shows a brief summary of recommended improvements identified from previous studies and corresponding changes identified by Structurepoint based on the analysis performed for this study. A significant portion of the Perimeter Parkway corridor would operate at an acceptable level of service with a two-lane configuration and exclusive turn lanes at various intersections. Aside from the aesthetic and consistency standpoint, this could be viewed as a value engineering opportunity. The potential cost savings are discussed in detail in section 5.4 of this report.

Additional analysis was performed at the critical intersection of Grant Street & State Street to identify multiple options for consideration by the stakeholders. For the opening day scenario, keeping the geometry similar to MKSK's proposed geometry will result in LOS E during the PM peak and it also shows congestion/queuing on the WB and NB approaches. Providing a dedicated WB right-turn lane will result in a substantial reduction in congestion/queuing at this intersection and results in approach LOS's of D and E with the overall intersection LOS of D. Providing a WB right-turn lane has some merit since it can help improve the capacity for the WB thru movement that is hindered because of the WB right-turns blocking/slowing that movement in a shared lane situation. However; this comes at additional right-of-way cost which needs to be carefully evaluated by Purdue University as well as City of West Lafayette in making a final decision about acceptable operations at this intersection.

As recommended in the previous studies, it is very critical to provide proper “wayfinding and gateway signs” at the proposed new roundabouts along State Street to promote Tapawingo Drive and River Road as the eastern border of the Perimeter Parkway. Similarly, such signs should also be provided along the northern, southern and western border of the campus at the US 231 and Northwestern Avenue access points that connect to the Perimeter Parkway corridor. Proper and specific “wayfinding and gateway signs” will encourage arriving vehicles along State Street to use the correct segment to turn left or right to access various parking garages through the north or south end of perimeter parkway and it will essentially help reduce the through traffic volumes on internal core roadways, including the State Street segment.

One of the recommendations regarding wayfinding and gateway signs is to direct motorists to specific landmark buildings and parking (surface lots or garages) associated with those buildings. Specific direction should be given for visitors, and employee directions could be given separately via other internal University communication channels. It is also recommended that the University consider reevaluating parking permits for their employees and assign the employees working in certain sections of the campus to park only in the garages or the surface lots that are in the close proximity in order to ensure that the traffic patterns are evenly distributed throughout the campus. The primary purpose of this would be to divert traffic away from the State Street corridor.

Exhibit 1 - Recommended Improvements Comparison between Previous Studies and Current Study

ID	Intersection	ASI Scope	Major/Minor	Existing Control	Future Control	BFS and/or MKSK Studies Recommendations	Current ASI Study Recommendations	Potential Cost Savings (Yes/No)
	State Street Corridor							
1	State Street & US 231	Yes	Major	Signal	Signal	E/W (State Street) = Proposed 4-lane section with turn lanes between Airport Rd & US 231 N/S (US 231) = Existing Configuration	E/W (State Street) = Existing 2-lane section w/turn lanes is sufficient N/S (US 231) = Existing Configuration	
2	State Street & Airport Road	Yes	Major	Signal	Signal or Roundabout	N/S (Airport Road) = Proposed 4-lane Section with turn lanes	N/S (Airport Road) = Existing 2-lane section with turn lanes	Yes
3	State Street & McCutcheon Dr	No	Minor	TWSC	TWSC	E/W (State Street) = Proposed 2-lane section	In agreement w/BFS and MKSK studies	No
4	State Street & McArthur Dr	No	Minor	TWSC	TWSC	E/W (State Street) = Proposed 2-lane section	In agreement w/BFS and MKSK studies	No
5	State Street & Martin Jischke Dr	Yes	Major	Signal	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes N/S (Martin Jischke Dr) = 2-lane section with turn lanes	In agreement w/BFS and MKSK studies	No
6	State Street & Russell Street	No	Major	Signal	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes N/S (Russell Street) = Proposed 2-lane section with turn lanes and 2-way conversion of North Russell Street	In agreement w/BFS and MKSK studies	No
7	State Street & Waldron Street	No	Minor	TWSC	TWSC	E/W (State Street) = Proposed 2-lane section with turn lanes N (Waldron Street) = Proposed 2-lane section and 2-way conversion of North Waldron Street	In agreement w/BFS and MKSK studies	No
8	State Street & University Street	No	Major	Signal	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes N (University Street) = Proposed 2-lane section and 2-way conversion of North University Street	In agreement w/BFS and MKSK studies	No NOTE: Possible re-alignment of University Street for N/S connectivity between north and south sections of Perimeter Parkway (ADDITIONAL COST)
9	State Street & Marstellar Street	No	Major	Signal	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes S (Marstellar Street) = Proposed 2-lane section with turn lane and 2-way conversion of South Marstellar Street	E/W (State Street) = Proposed 2-lane section with turn lanes S (Marstellar Street) = No need for 2-way conversion, keep existing section as is	Yes
10	State Street & Sheetz Street	No	Major	TWSC	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes S (Sheetz Street) = Proposed 2-lane section with turn lane and 2-way conversion of South Sheetz Street	In agreement w/BFS and MKSK studies	No
11a	State Street & Grant Street	Yes	Major	Signal	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes N/S (Grant Street) = Proposed 2-lane section with turn lane and 2-way conversion of North Grant Street	E/W (State Street) = Proposed 2-lane section with turn lanes N/S (Grant Street) = Keep North Grant Street as 1-way NB to avoid significant impact OR Convert North Grant Street into 2-way but close south leg to vehicular traffic (less significant impact)	
11b	State Street & Grant Street - ALT	Yes	Major	Signal	Signal			No
12	State Street & Andrew Street	No	Minor	TWSC	TWSC	E/W (State Street) = Proposed 2-lane section	In agreement w/BFS and MKSK studies	No
13	State Street & Northwestern Street	No	Major	Signal	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes N (Northwestern Ave) = Proposed 2-lane section with turn lane and 2-way conversion of Northwestern Ave	In agreement w/BFS and MKSK studies	No
14	State Street & Chauncey Ave	No	Major	TWSC	TWSC /Mini Roundabout	E/W (State Street) = Proposed 2-lane section with turn lanes N/S (Chauncey Ave) = Proposed 2-lane section with turn lane and 2-way conversion of Chauncey Ave	In agreement w/MKSK study recommendation to keep it as a TWSC intersection instead of a mini roundabout	No
15	State Street & Salisbury Street	No	Minor	TWSC	TWSC	E/W (State Street) = Proposed 2-lane section with turn lanes N/S (Salisbury St) = Proposed 2-lane section with right turn only from Sailsbury street approaches	In agreement w/BFS and MKSK studies	No
16	State Street & River Road	Yes	Major	Signal	Roundabout	Proposed 2-lane roundabout with single exit for WB direction	Proposed 2-lane roundabout with dual exit for WB direction	No - Increase cost
17	State Street & Tapawingo Dr	Yes	Major	Signal	Roundabout	Proposed 2-lane roundabout with right-turn by-pass lane for WB direction	Proposed 2-lane roundabout - No need for right-turn by-pass lane for WB direction	Yes
	River Road Corridor							
18	River Road & Tapawingo Dr / Williams St	Yes	Major	Signal	Roundabout		Proposed 2-lane roundabout with 2-lane entries and 2-lane circulatory NB	Yes
18a	River Road & Tapawingo Dr / Williams St - ALT	Yes	Major	Signal	Signal	Proposed 2-lane roundabout with 3-lane entries and 3-lane circulatory NB	Keep existing signal as is to minimize construction and ROW impacts	Yes
19	River Road & Fowler Avenue Ramp	Yes	Major	Signal	Signal		Keep signalized ramp terminal and add ramp connection to accommodate SB to WB movement at Fowler	Yes
20	River Road & Wiggins St Ramp	Yes	Major	Signal	Signal	Major modifications identified with Roundabout Ramp terminals		Yes
	US 231 Corridor							
21	US 231 & River Road	Yes	Major	Signal	Signal	NA	No changes to the existing configuration	No
22	US 231 & Martin Jischke Dr	Yes	Major	Signal	Signal	NA	No changes to the existing configuration	No
23	US 231 & Airport Road	Yes	Major	Signal	Signal	NA	No changes to the existing configuration	No
	South Perimeter Parkway Corridor (Harrison Street / Williams Street)							
24	Williams Street & Salisbury Street	No	Minor	TWSC	TWSC	E/W (Williams St) = Proposed 4-lane section S (Sailsbury St) = Existing 2-lane section	In agreement w/BFS and MKSK studies	No
25	Williams Street & Chauncey Ave	No	Minor	TWSC	TWSC	E/W (Williams St) = Proposed 4-lane section S (Chauncey Ave) = Existing 2-lane section	In agreement w/BFS and MKSK studies	No
26	Williams Street & Grant Street	No	Minor	TWSC	Signal	E/W (Williams St) = Proposed 4-lane section N/S (Grant St) = Existing 2-lane section	In agreement w/BFS and MKSK studies	No
27	Harrison Street & Grant Street	No	Minor	AWSC	AWSC	E/W (Harrison St) = Proposed 2-lane section N/S (Grant St) = Existing 2-lane section	In agreement w/BFS and MKSK studies	No
28	Harrison Street & Sheetz Street (Williams St Realignment)	No	Minor	TWSC	Roundabout	E/W (Harrison St) = Proposed 4-lane section N/S (Sheets St/Williams St) = Proposed 4-lane section	E/W (Harrison St) = Proposed 2-lane section N/S (Sheets St/Williams St) = Proposed 2-lane section sufficient from capacity and LOS standpoint	Yes
29	Harrison Street & Marstellar Street	Yes	Minor	TWSC	TWSC	E/W (Harrison St) = Proposed 4-lane section N/S (Marsteller Dr) = Proposed 2-lane section	E/W (Harrison St) = Existing 2-lane section would be sufficient from capacity and LOS standpoint N/S (Marsteller Dr) = In agreement with the BF&S recommendations	Yes
30	Harrison Street & University Street	No	Minor	AWSC	TWSC	E/W (Harrison St) = Existing 2-lane section wide enough for future 4-lane N/S (University St) = Existing 2-lane section	In agreement w/BFS and MKSK studies	No
31	Harrison Street & Russell Street	No	Minor	AWSC	TWSC	E/W (Harrison St) = Existing 2-lane section wide enough for future 4-lane N/S (Russell St) = Existing 2-lane section	In agreement w/BFS and MKSK studies	No
32	Harrison Street & Martin Jischke Dr	Yes	Major	Roundabout	Roundabout	Existing - No Change	Existing - No Change	No
	North Perimeter Parkway Corridor (Stadium Avenue/Northwestern Avenue)							
33	McCormick Road & Stadium Avenue	Yes	Minor	TWSC	Signal	Existing condition = 2-lane section on all approaches w/turn-lanes for N/S approaches	Recommend signal installation to make it an attractive route for commuters travelling from west of campus.	No
34	Stadium Ave & University Street	No	Minor	Signal	Signal	S (University St) = Proposed 2-way conversion	In agreement w/BFS and MKSK studies	No
35	Stadium Ave & Northwestern Ave	Yes	Major	Signal	Signal	Existing - No change	Exclusive right turn lane for WB approach would improve LOS but huge ROW impact	No
36	Northwestern Ave & Grant Street	No	Major	Signal	Signal/Roundabout	Existing - No change	Converting into RAB could improve operations significantly but possible ROW impacts	No
37	Northwestern Ave & Fowler St	No	Major	Free flow	Free flow	Existing Condition - No change		
38	Northwestern Ave & Wiggins St	No	Major	Free flow	Free flow			
39	North Street & Northwestern Ave	No	Minor	TWSC	Signal	Proposed 2-lane section along all approaches with recommendation to install traffic signal	In agreement w/BFS and MKSK studies	No
40	North Street & Grant Street	No	Minor	TWSC	AWSC/TWSC	Proposed 2-lane section along all approaches with recommendation to have bus only signal for proposed SB flow on Grant Street south of North Street	Recommend utilizing the 2-way conversion on Grant Street to be open for cars and buses without a dedicated bus only lane and/or bus only signal. Recommend keeping the intersection control as TWSC with North Street stop controlled	Negligible
41	River Road & Fowler Street Ramp	Yes	Major	Signal	Roundabout/Signal	See 19 & 20		
42	River Road & Wiggins Street Ramp	Yes	Major	Signal	Roundabout/Signal			
	Note: See Appendix A & B for Conceptual Geometric Layouts from the Previous Studies							

1.3 Opinion of Probable Project Cost for State Street and Perimeter Parkway Corridors

American Structurepoint provided an opinion of probable construction cost based on the proposed plans and recommendations from the *Perimeter Parkway Analysis* and *State Street Master Plan* studies for the campus area. Since the project area involves multiple roadways and cross sections, and differing roadway characteristics; costs for each segment were generated separately. The separate costs were then grouped together based on State Street and Perimeter Parkway reconstruction costs. An alternate scenario for resurfacing Airport Road, and the McCormick Road and Stadium segments was also presented as a potential for cost savings. An additional scenario was investigated for improving State Street as a standalone project with minimal improvements to the Perimeter Parkway that are critical for State Street project. The breakdown of roadway segments, with their associated costs for all the cost options evaluated is shown in Exhibit 2. Exhibits 3 and 4 show a simplified visual layout of the project area with the overall scope summary for: a) the Full Build Option and b) the State Street Standalone Option with only critical segments of Perimeter Parkway. An overall summary of the construction cost, utilities cost, engineering design, right-of-way acquisition, and the hardscape/architectural costs for the three scope options discussed in this report are as shown below (*Note: All costs are in 2018 Dollars*):

1. State Street and Perimeter Parkway Full Build Cost Summary
   - Total Cost = $79.3M
   - Roadway Construction Cost = $56.2M
   - Hardscape/Architectural Features Cost = $5.6M
   - Utility Adjustment Cost = $3.7M
   - Land Acquisition Cost = $3.5M
   - Engineering Cost = $10.3M
2. State Street and Perimeter Parkway Resurface Alternate Cost Summary
   - Total Cost = $67.5M
   - Roadway Construction Cost = $46.1M
   - Hardscape/Architectural Features Cost = $5.6M
   - Utility Adjustment Cost = $3.7M
   - Land Acquisition Cost = $3.5M
   - Engineering Cost = $8.6M
3. State Street Standalone and Critical Segments of Perimeter Parkway Cost Summary
   - Total Cost = $62.0M
   - Roadway Construction Cost = $42.8M
   - Hardscape/Architectural Features Cost = $5.6M
   - Utility Adjustment Cost = $2.3M
   - Land Acquisition Cost = $3.5M
   - Engineering Cost = $7.8M

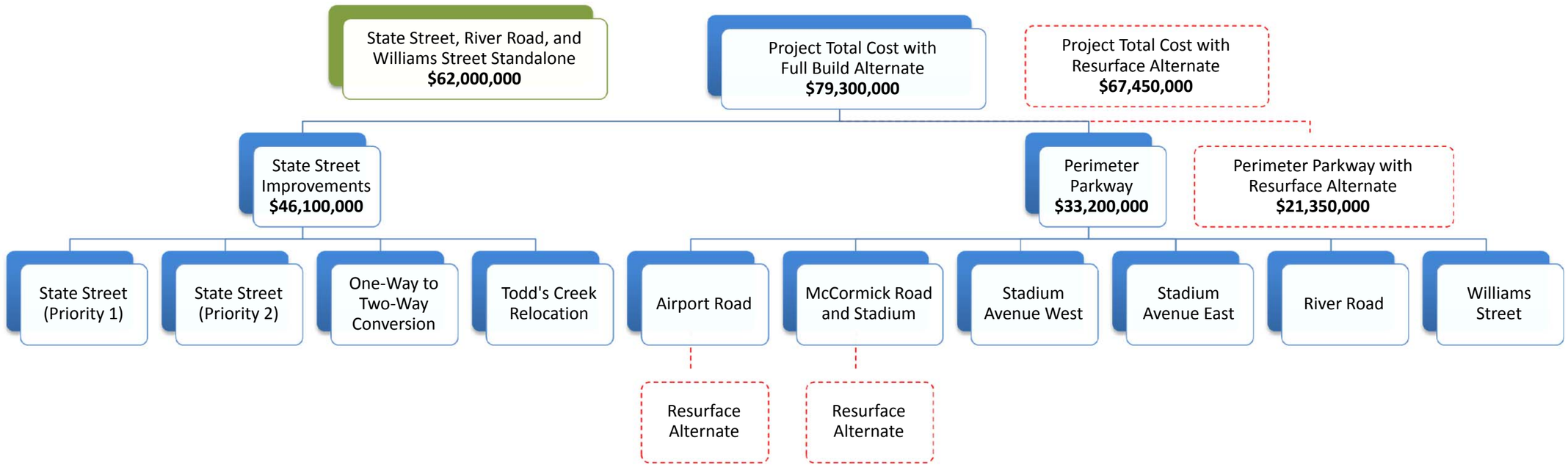


Exhibit 2 – Roadway Segments and Total Costs

Exhibit 3 - Project Cost Overview | State Street and Perimeter Parkway Full Build

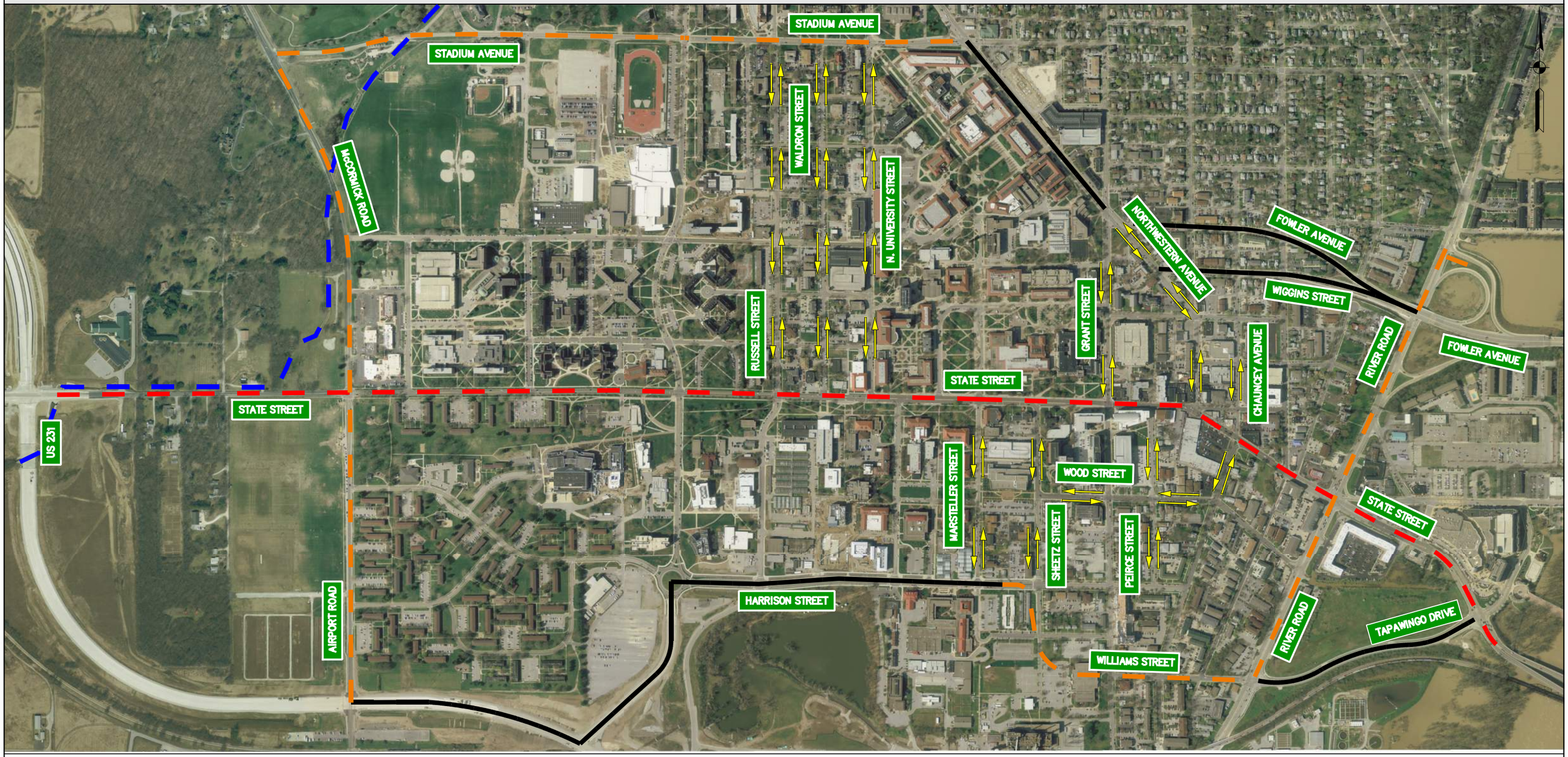
STATE STREET TOTAL COST = $46,100,000
LENGTH = 2.16 MI. (US 231 TO TAPAWINGO)
ONE-WAY TO TWO-WAY CONVERSION ( )
TODD'S CREEK ( )

+

PERIMETER PARKWAY, FULL RECONSTRUCTION, COST = $33,200,000
LENGTH = 3.10 MILES

=

TOTAL COST= $79,300,000



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10/30/2014

DESIGNED: NRM	DRAWN: NRM
CHECKED: MJM	CHECKED: MJM

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STATE STREET & PERIMETER PARKWAY
PROJECT COST OVERVIEW

HORIZONTAL SCALE	BRIDGE FILE
1" = 200'	
VERTICAL SCALE	DESIGNATION NO.
SURVEY BOOK	SHEETS
	1 of 1
LAST UPDATED	PROJECT NO.
10/30/2014	

Exhibit 4 - Project Cost Overview | State Street Standalone with only Critical Segments of Perimeter Parkway

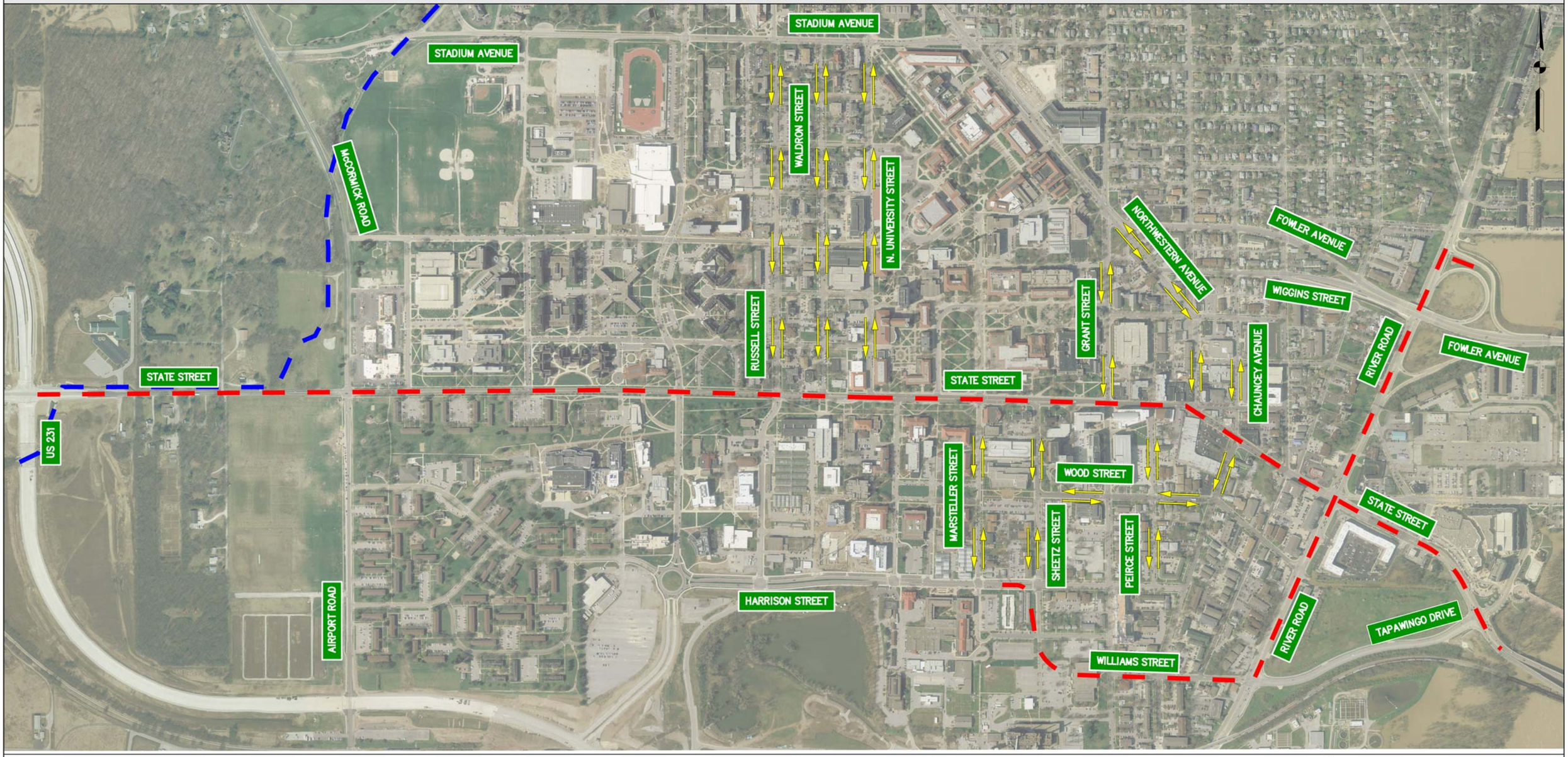
ROADWAY CONSTRUCTION

TODD'S CREEK

ONE-WAY TO TWO-WAY CONVERSION ( )

= $62,000,000

TOTAL COST= $62,000,000
(INCLUDES CONTINGENCY)



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11/26/2014

DESIGNED: NRM	DRAWN: NRM
CHECKED: MJM	CHECKED: MJM

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STATE STREET
PROJECT OVERVIEW

HORIZONTAL SCALE	BRIDGE FILE
1" = 200'	
VERTICAL SCALE	DESIGNATION NO.
SURVEY BOOK	SHEETS
	1 of 1
LAST UPDATED	PROJECT NO.
11/26/2014	

1.4 Value Engineering Ideas

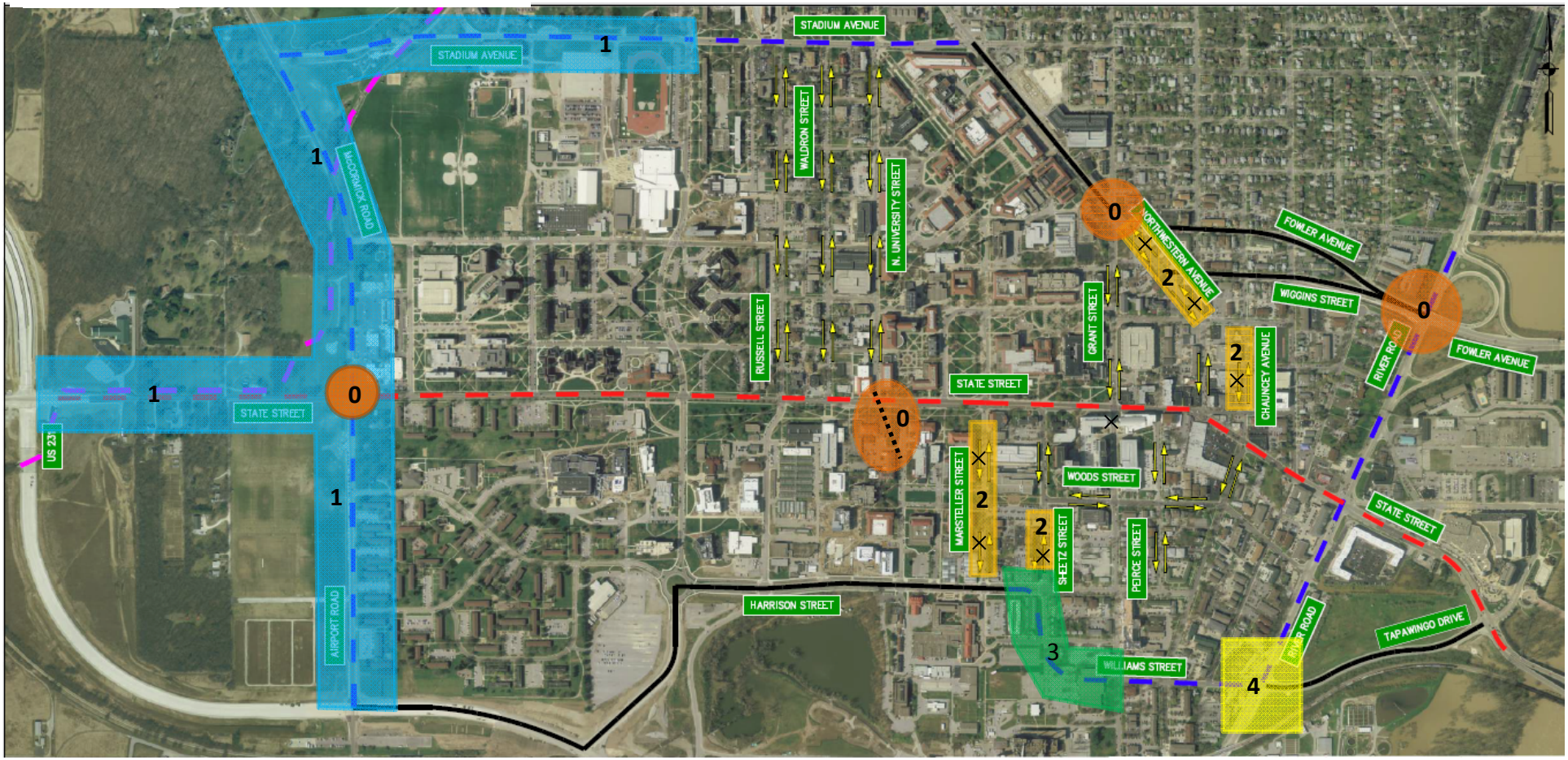
Additional options were investigated in order to reduce costs while still maintaining the functionality of the roadway segments. Exhibit 5 shows the location and additional description of value engineering items. It is anticipated that during the plan development and design phase of this project, additional value engineering options can be evaluated that could result in additional cost savings on the overall project. The following items are listed with their respective cost savings:

VE Idea	Description	Construction Cost Savings
1	Reduce Airport Road, McCormick Road, and Stadium Avenue to 2-lane sections	$2,700,000
2	Reduce number of streets converted from "One Way" to "Two Way" traffic	$500,000
3	Reduce Williams Street to a 2-lane section, and construct a single lane roundabout at Williams/Harrison & Sheetz	$1,400,000
4	Reconstruct a conventional intersection at Williams Street and River Road instead of a roundabout	*Negligible
	Total Potential Savings from Value Engineering for Full Build Option:	**$4,600,000 (~6% of Full-Build Cost)**
	Total Potential Savings from Value Engineering for State Street Standalone Option:	**$1,900,000 (~3% of State Street Standalone Cost)**

Exhibit 5 - Value Engineering Ideas

Purdue Traffic Synthesis – State Street

Cost Saving / VE Ideas



Cost Saving / VE Idea # 1:
- Reduce from 4-lane section to 2-lane section based on capacity analysis

ANTICIPATED SAVINGS = ~$2.7M

Cost Saving / VE Idea # 2:
- 2-way conversion not required based on capacity analysis

ANTICIPATED SAVINGS = ~$500K

Cost Saving / VE Idea # 3:
- Reduce from 4-lane section to 2-lane section
- Single lane roundabout at Williams/Harrisson & Sheetz

ANTICIPATED SAVINGS = ~$1.4M

Cost Saving / VE Idea # 4:
- Keep it as existing signalized intersection instead of roundabout

ANTICIPATED SAVINGS = BREAK-EVEN
QUASI-TANGIBLE BENEFITS = TRAVEL TIME SAVINGS DURING MOT, FASTER CONSTRUCTION

Potential Alternate Ideas – ADDITIONAL COST – "0"
- Single lane roundabout at State Street & Airport Road
- University Street realignment for N/S connectivity
- Dual lane roundabout at Northwestern & Grant Street
- Interchange modification at Fowler / Wiggins

Total Anticipated Cost Savings = ~$4.6M (Approx. 6% of Full Build Cost)

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1.5 Proposed Construction Schedule for Standalone State Street Corridor Project

The schedule presented here is for the Standalone State Street Corridor Project which was defined as the "current scope of the project" by Purdue University and City of West Lafayette and would include all the components along the Perimeter Parkway that have been deemed critical and necessary for the State Street corridor construction. The schedule is based on a typical design/bid/build procurement model and is broken down into segments of independent utility from a construction standpoint. Each segment has the following common assumptions:

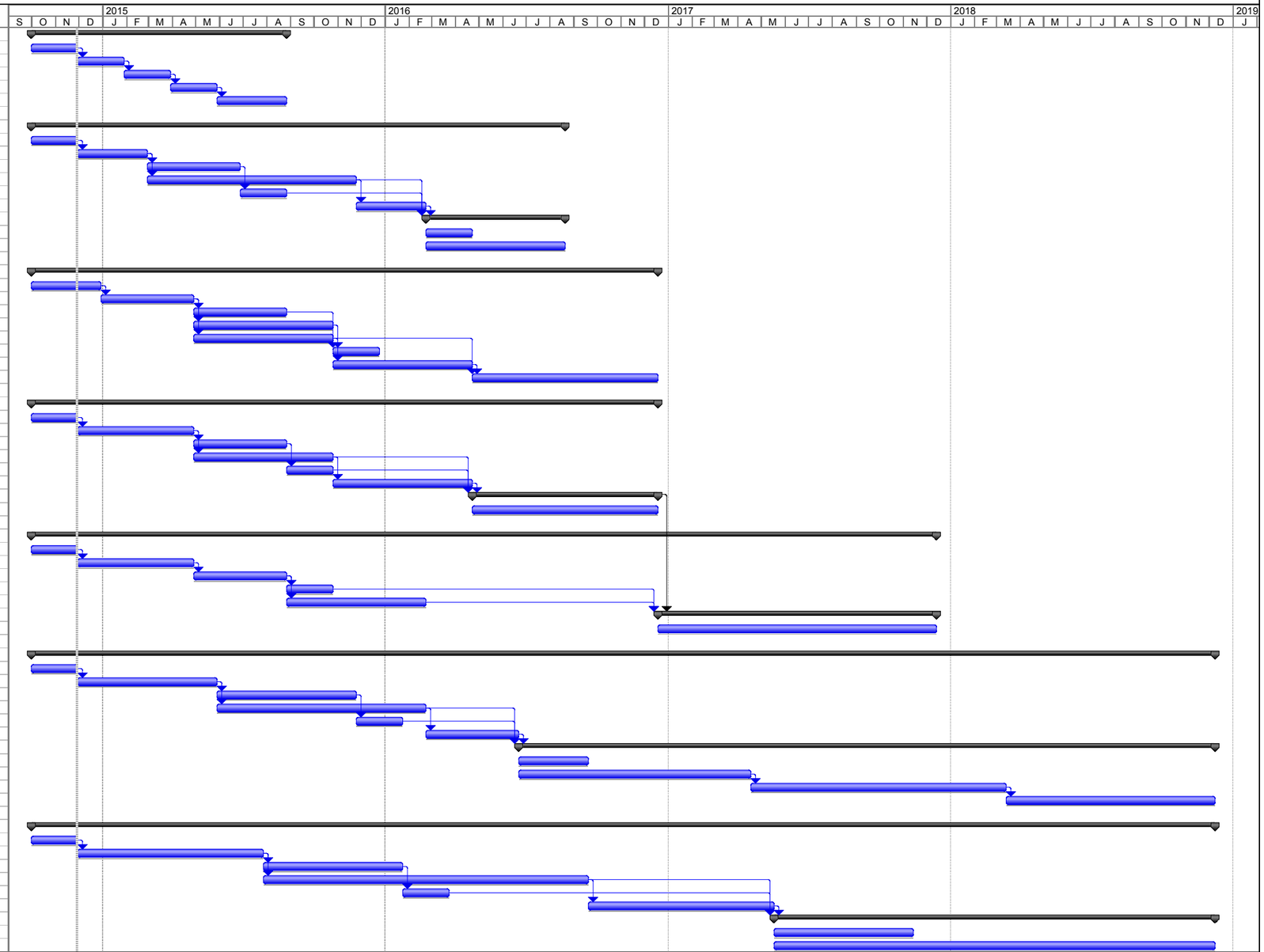
- Goal is for all construction activity to be completed by end of 2018
- All activity durations are listed in elapsed calendar days
- The traffic synthesis study report activity will be substantially completed by the end of November 2014.
- The bidding activity includes the advertisement, bidding, and contract award process taking 60 days.
- Preference to maximize construction activity during Purdue University's summer sessions which are mid-May to mid-August time period, and to avoid traffic and pedestrian disruptions during other time periods as much as possible.
- Assumes an accelerated land acquisition process, when noted, through the use of a right-of-way incentive program similar to one utilized by the Indiana Department of Transportation (INDOT). The incentive program is designed and intended to provide motivation to the property owner to sign and accept an offer to purchase, and all conveyance documents, within 30 calendar days of receiving the offer. This program offers the property owner a 10% incentive payment for acquisition of needed right-of-way in exchange for accepting an offer within 30 days. This program also includes a 10% incentive payment for parcels requiring relocation if the tenant relocates in less than 90 days.
- Assumes no federal funding involved in the project except as noted below for the Williams Street construction from Harrison Street to Grant Street.

It is highly recommended that field survey be performed soon in order to initiate the development of design plans and begin construction in a timely manner to achieve the goal of completion of construction by end of 2018. A detailed CPM schedule and a color coded visual map are shown in Exhibits 6 & 7.

Exhibit 6 - Detailed CPM Schedule for Traditional Design Bid Build Procurement Model

State Street & Perimeter Parkway
Project Schedule Overview

ID	Task Name	Duration	Start	Finish	Predecessors
1	**1. River Road @ Fowler Ave (Interchange Modifications)**	**236 days**	**Wed 10/1/14**	**Thu 8/27/15**	
2	Traffic Study	60 edays	Wed 10/1/14	Sun 11/30/14	
3	Preliminary Design	60 edays	Sun 11/30/14	Thu 1/29/15	2
4	Final Design	60 edays	Thu 1/29/15	Mon 3/30/15	3
5	Bidding	60 edays	Mon 3/30/15	Fri 5/29/15	4
6	Construction	90 edays	Fri 5/29/15	Thu 8/27/15	5
7					
8	**2. Williams Street (Grant St to River Road)**	**493 days**	**Wed 10/1/14**	**Sun 8/21/16**	
9	Traffic Study	60 edays	Wed 10/1/14	Sun 11/30/14	
10	Preliminary Design	90 edays	Sun 11/30/14	Sat 2/28/15	9
11	Final Design	120 edays	Sat 2/28/15	Sun 6/28/15	10
12	Land Acquisition	270 edays	Sat 2/28/15	Wed 11/25/15	10
13	Bidding	60 edays	Sun 6/28/15	Thu 8/27/15	11
14	Utility Relocation	90 edays	Wed 11/25/15	Tue 2/23/16	12
15	**Construction**	**129 days**	**Tue 2/23/16**	**Sun 8/21/16**	**12,14,13**
16	Temp. Signals on Harrison & Grant St	60 edays	Tue 2/23/16	Sat 4/23/16	
17	Williams St & Tapawingo Dr. Closure	180 edays	Tue 2/23/16	Sun 8/21/16	
18					
19	**3. Todd's Creek Relocation**	**578 days**	**Wed 10/1/14**	**Mon 12/19/16**	
20	Drainage Study	90 edays	Wed 10/1/14	Tue 12/30/14	
21	Preliminary Design	120 edays	Tue 12/30/14	Wed 4/29/15	20
22	Final Design	120 edays	Wed 4/29/15	Thu 8/27/15	21
23	Permitting	180 edays	Wed 4/29/15	Mon 10/26/15	21
24	Land Acquisition	180 edays	Wed 4/29/15	Mon 10/26/15	21
25	Bidding	60 edays	Mon 10/26/15	Fri 12/25/15	22,23
26	Utility Relocation	180 edays	Mon 10/26/15	Sat 4/23/16	24
27	Construction	240 edays	Sat 4/23/16	Mon 12/19/16	24,26
28					
29	**4. State St. (US 231 to Airport Rd)**	**578 days**	**Wed 10/1/14**	**Mon 12/19/16**	
30	Traffic Study	60 edays	Wed 10/1/14	Sun 11/30/14	
31	Preliminary Design	150 edays	Sun 11/30/14	Wed 4/29/15	30
32	Final Design	120 edays	Wed 4/29/15	Thu 8/27/15	31
33	Land Acquisition	180 edays	Wed 4/29/15	Mon 10/26/15	31
34	Bidding	60 edays	Thu 8/27/15	Mon 10/26/15	32
35	Utility Relocation	180 edays	Mon 10/26/15	Sat 4/23/16	33
36	**Construction**	**170 days**	**Sat 4/23/16**	**Mon 12/19/16**	**33,34,35**
37	State Street Closure	240 edays	Sat 4/23/16	Mon 12/19/16	
38					
39	**5. State St. (Airport Rd to University St.)**	**836 days**	**Wed 10/1/14**	**Thu 12/14/17**	
40	Traffic Study	60 edays	Wed 10/1/14	Sun 11/30/14	
41	Preliminary Design	150 edays	Sun 11/30/14	Wed 4/29/15	40
42	Final Design	120 edays	Wed 4/29/15	Thu 8/27/15	41
43	Bidding	60 edays	Thu 8/27/15	Mon 10/26/15	42
44	Utility Relocation	180 edays	Thu 8/27/15	Tue 2/23/16	42
45	**Construction**	**258 days**	**Mon 12/19/16**	**Thu 12/14/17**	**43,44,36**
46	State Street Closure	360 edays	Mon 12/19/16	Thu 12/14/17	
47					
48	**6. State St. (University St. to Tapawingo Dr.)**	**1093 days**	**Wed 10/1/14**	**Sun 12/9/18**	
49	Traffic Study	60 edays	Wed 10/1/14	Sun 11/30/14	
50	Preliminary Design	180 edays	Sun 11/30/14	Fri 5/29/15	49
51	Final Design	180 edays	Fri 5/29/15	Wed 11/25/15	50
52	Land Acquisition	270 edays	Fri 5/29/15	Tue 2/23/16	50
53	Bidding	60 edays	Wed 11/25/15	Sun 1/24/16	51
54	Utility Relocation	120 edays	Tue 2/23/16	Wed 6/22/16	52
55	**Construction**	**643 days**	**Wed 6/22/16**	**Sun 12/9/18**	**52,53,54**
56	Tapawingo Dr. South Leg Closure	90 edays	Wed 6/22/16	Tue 9/20/16	
57	Phased River Rd to Tapawingo Dr	300 edays	Wed 6/22/16	Tue 4/18/17	
58	Phased Grant St. to River Rd	330 edays	Tue 4/18/17	Wed 3/14/18	57
59	Phased University St. to Grant St.	270 edays	Wed 3/14/18	Sun 12/9/18	58
60					
61	**7. Williams Street (Harrison St to Grant St)**	**1093 days**	**Wed 10/1/14**	**Sun 12/9/18**	
62	Traffic Study	60 edays	Wed 10/1/14	Sun 11/30/14	
63	Preliminary Design	240 edays	Sun 11/30/14	Tue 7/28/15	62
64	Final Design	180 edays	Tue 7/28/15	Sun 1/24/16	63
65	Land Acquisition	420 edays	Tue 7/28/15	Tue 9/20/16	63
66	Bidding	60 edays	Sun 1/24/16	Thu 3/24/16	64
67	Utility Relocation	240 edays	Tue 9/20/16	Thu 5/18/17	65
68	**Construction**	**407 days**	**Thu 5/18/17**	**Sun 12/9/18**	**65,66,67**
69	Phased Roundabout @ Harrison St & Sheetz St	180 edays	Thu 5/18/17	Tue 11/14/17	
70	New Alignment Williams St. Construction	570 edays	Thu 5/18/17	Sun 12/9/18	



Project: Purdue State Street
Date: Fri 11/28/14

Task — Progress — Summary — External Tasks — Deadline
Split — Milestone — Project Summary — External Milestone

Draft 11-29-14

Exhibit 7 - Visual Map Summarizing Segments/Tasks to match CPM Schedule

1. RIVER ROAD @ FOWLER AVE
(INTERCHANGE MODIFICATIONS)

2. WILLIAMS STREET
(GRANT ST. TO RIVER RD.)

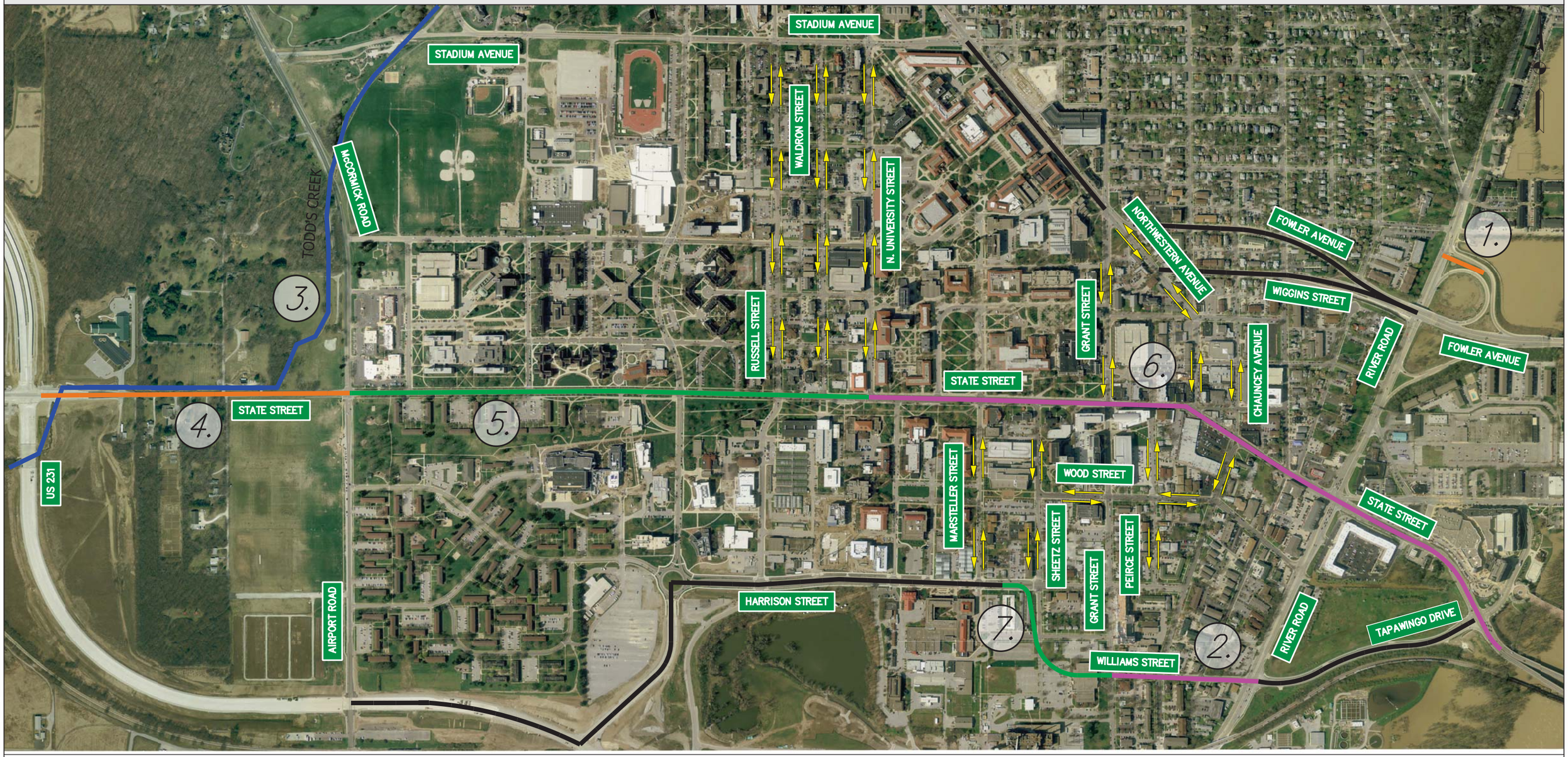
3. TODD'S CREEK

4. STATE STREET
(US 231 TO AIRPORT RD.)

5. STATE STREET
(AIRPORT RD. TO UNIVERSITY ST.)

6. STATE STREET
(UNIVERSITY ST. TO TAPAWINGO DR.)

7. WILLIAMS STREET
(HARRISON ST. TO GRANT ST.)



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12/1/2014

DESIGNED: NRM	DRAWN: NRM
CHECKED: MJM	CHECKED: MJM

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CITY OF WEST LAFAYETTE

STATE STREET & PERIMETER PARKWAY
PROJECT SCHEDULE OVERVIEW

HORIZONTAL SCALE	BRIDGE FILE
1" = 200'	
VERTICAL SCALE	DESIGNATION NO.
SURVEY BOOK	SHEETS
	1 of 1
LAST UPDATED	PROJECT NO.
12/1/2014	

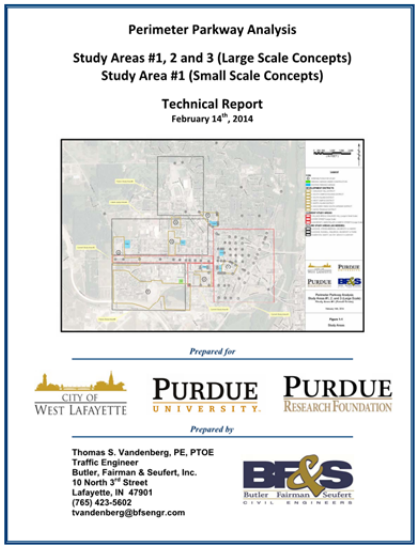
2.0 Project Scope with Purpose and Need

Purdue University selected American Structurepoint, Inc. to develop a synthesis report for campus traffic circulation on the Purdue University campus in West Lafayette, Indiana. The primary objective of this report was to review and evaluate results and recommendations from numerous previous traffic studies that have been done for and around the Purdue University Campus over the past decade. Special emphasis has been placed on the two most recent and relevant studies that are currently being used to define future infrastructure implementation and investment:

- *Re-State | A Master Plan for State Street prepared by MKSK (June 2014)*

This report defines a vision and strategy to re-imagine, re-invest and re-make the State Street corridor through Downtown West Lafayette, Purdue University, and a newly opened western gateway through creating a sense of place for all modes of travel.

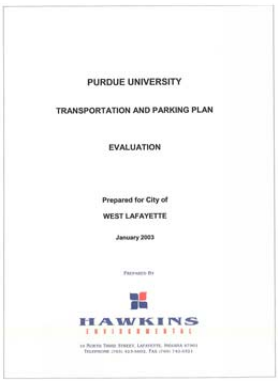
- *Perimeter Parkway Analysis Technical Report prepared by Butler Fairman & Seufert (February 2014)*



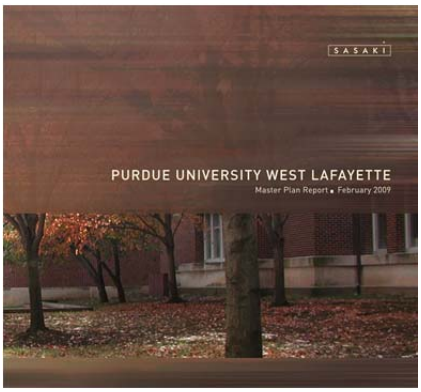
This report forms a synthesis of the previous traffic studies and planning studies performed by PKG, HE-BFS and BFS in conjunction with the Purdue University Campus Master Plan as shown below:

- *Transportation and Parking Master Plan prepared by PKG (2001)*

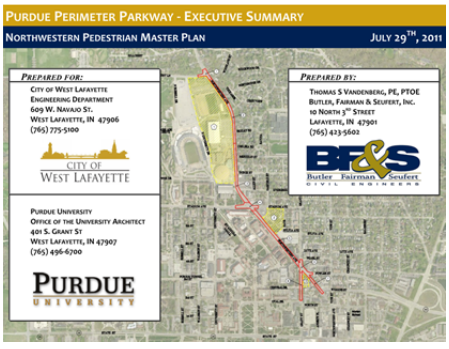
- *PKG Transportation and Parking Master Plan Evaluation prepared by HE-BF&S for City of West Lafayette (2003)*



- *Purdue University West Lafayette Master Plan Report prepared by Sasaki (2009)*



- *Northwestern Pedestrian Master Plan prepared by BF&S (2011)*



The primary objective of this report is to review and evaluate recommendations from these past studies for various roadway segments and intersections, especially major intersections along the State Street and Perimeter Parkway corridors. The intent of this study was not to "reinvent the wheel" on a decade of efforts that have been put into various previous studies by Purdue University and the City of West Lafayette. Instead, it was to facilitate a general consensus amongst the stakeholders by providing a peer review of the proposed recommendations from the previous studies. Secondly, it was to provide value engineering solutions for various roadway segments and intersections along the core corridors of Perimeter Parkway and State Street, parts of which are under consideration for development in the next five years.

The overarching goal is to provide the University and its Board of Trustees and the City of West Lafayette a comprehensive understanding of the future scope of infrastructure improvements proposed and identified as necessary for the two corridors, with corresponding estimates on the preliminary cost/budget.

The rough boundary of the study area evaluated and currently under consideration for future improvements is as described below and shown in Figure 1:

- Stadium Avenue/Northwestern Avenue to the north
- Airport Road/McCormick Road/US 231 to the west
- US 231/Martin Jischke Drive/Harrison Street/Williams Street to the south
- River Road to the east
- State Street corridor between Wabash River and US 231

American Structurepoint, Inc. developed this synthesis report under the guidance and joint efforts of the following stakeholders:

- Purdue University
- City of West Lafayette
- Purdue Research Foundation (PRF)

The scope of this study generally includes:

- Identifying any gaps or any missing information in previous studies that is essential for the overall review of the improvement program and that is necessary to validate that the overall transportation network within the study area (as well as the study intersections) will operate acceptably.
- Perform traffic data collection and traffic capacity analysis with three sensitivity checks for the major intersections within the State Street and Perimeter Parkway corridors to confirm previously recommended lane configurations, traffic control, and operational performance at these major intersections. Figure 2 shows the major study intersections.
- Review and compute the project preliminary construction cost that has previously been estimated for both the Perimeter Parkway and the State Street corridor based on the scope defined under the two core studies. The estimates will also include verification of utility relocation, land acquisition, engineering services, and inflation costs.
- Computations of the preliminary construction cost estimates for any proposed changes recommended under this synthesis report, which may be different from the previous recommendations.
- Provide a general overview for a Transportation Management Plan (TMP), with recommendations for construction phasing/sequencing as well as a project delivery plan. Include recommendations that provide value from a cash flow, procurement, and sequencing of construction standpoint with pros and cons for the conventional design bid build construction contract vs. public private partnership type contract.

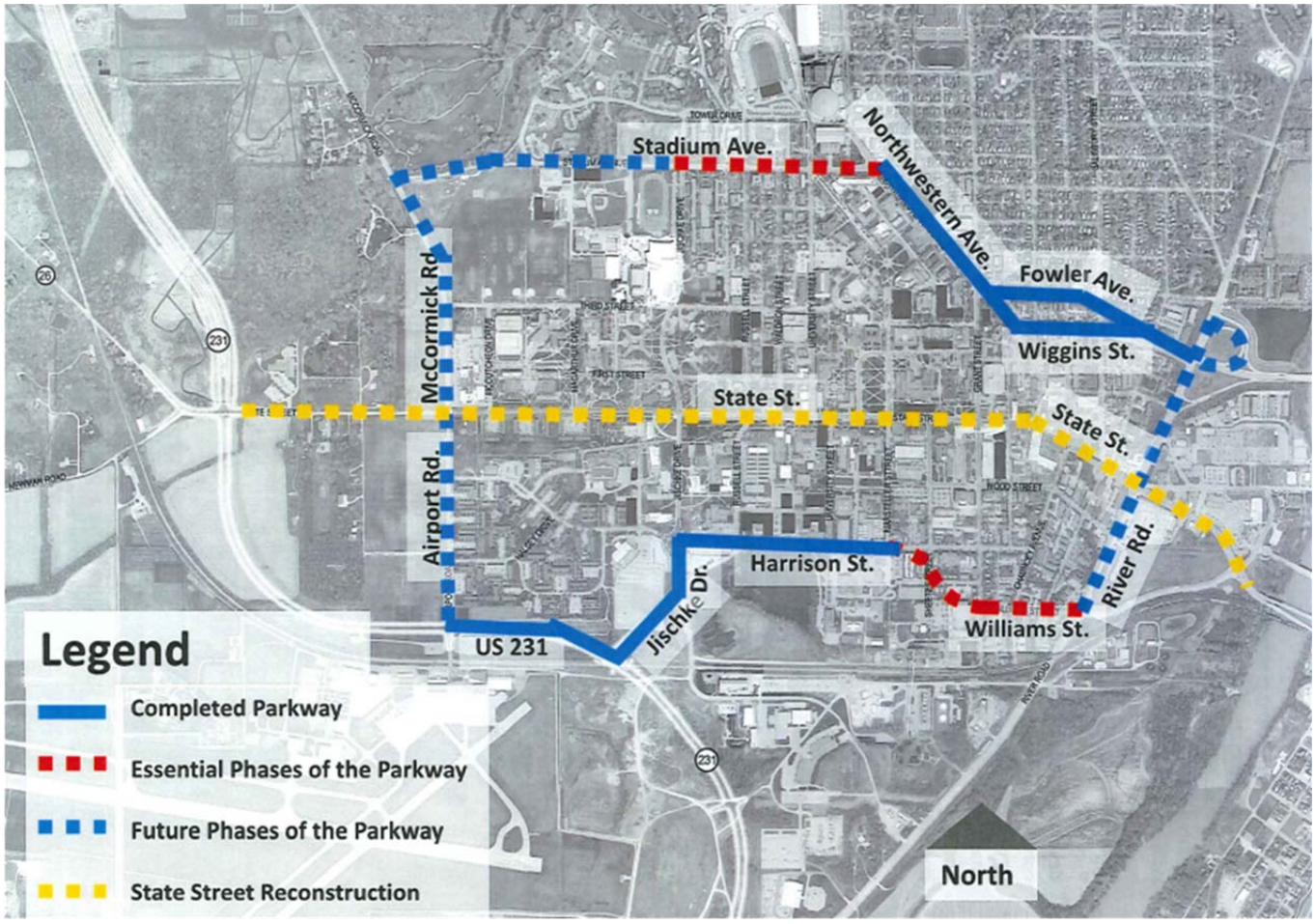


Figure 1 – Project Study Area (Perimeter Parkway and State Street Corridors)

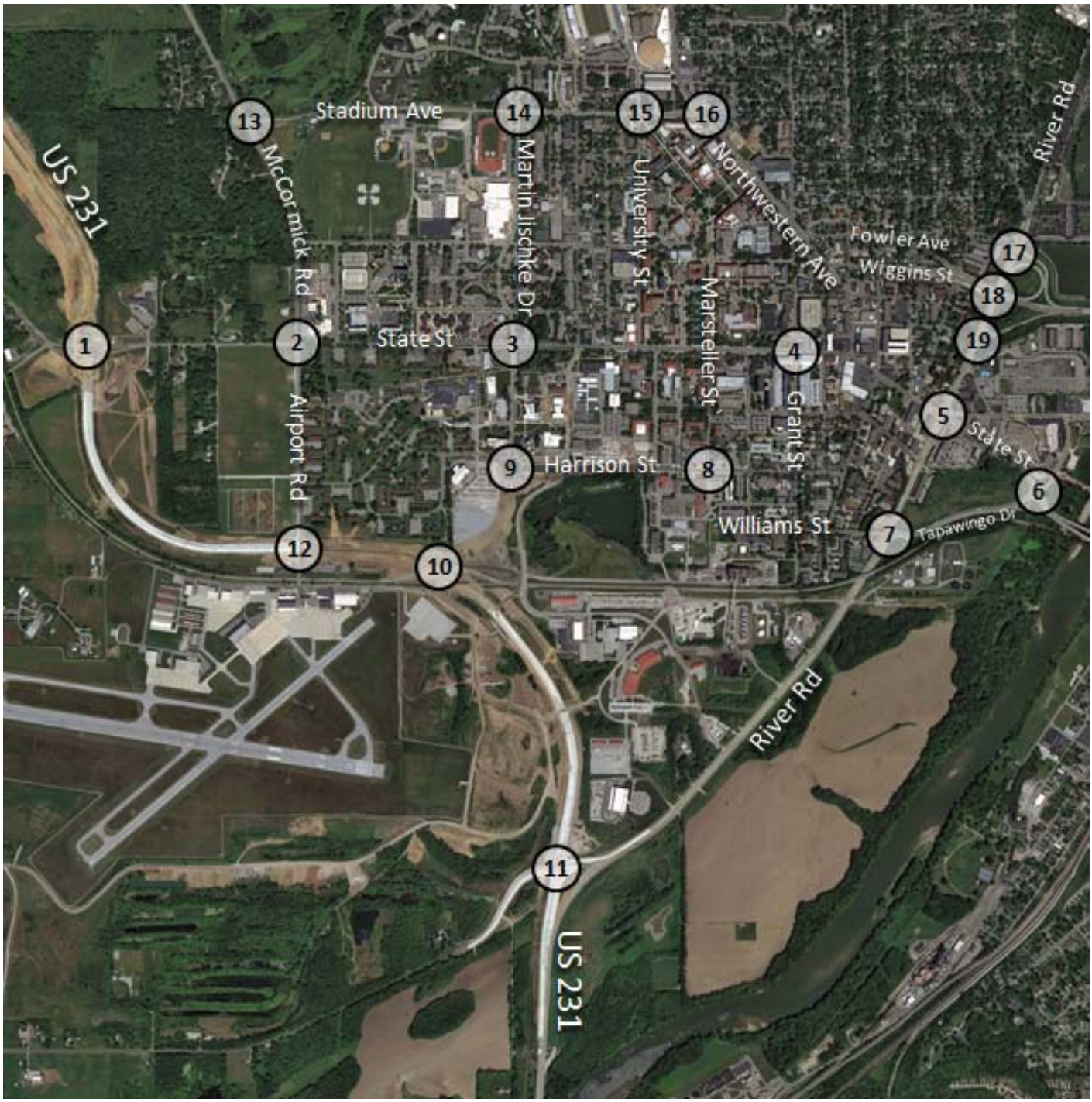


Figure 2 – Major Study Intersections

3.0 Summary of Past Traffic Studies

3.1 Purdue Perimeter Parkway

The Perimeter Parkway concept has been in development for over a decade and following provides a brief summary of key findings from these studies that have been the basis and foundation in development of the parkway concept.

- **Transportation and Parking Master Plan prepared by PKG (2001)** – As very well defined in the most recent BF&S Perimeter Parkway Synthesis report (2014), this PKG study provides the first documentation of the Perimeter Parkway concept and defines the importance and need for relocating thru traffic operations from the internal roadways of Purdue University campus to the outer perimeter roadway.
- **Purdue University West Lafayette Master Plan Report prepared by Sasaki (2009)** – The master plan was last updated in 2009 and it outlined the following five principles to establish a core structure for decision making when planning for the Purdue area:
    - Promote compact growth within the existing campus
    - Establish State Street as a collaborative center
    - Create program synergies through strong mixed-use districts
    - Encourage a simple, integrated transportation system with a Perimeter Parkway
    - Preserve the Western Lands

These principles form the basis of the further evaluation carried out by BF&S and MKSK with their respective studies involving further refinement and development of the Perimeter Parkway and State Street corridors.

- **Purdue Perimeter Parkway Analysis Technical Report prepared by BF&S (2014)** – This report forms a synthesis of the previous traffic studies and planning studies performed by PKG, HE-BFS and BFS in conjunction with the Purdue University Campus Master Plan and provides most updated concept for the Perimeter Parkway corridor as shown in Figure 3. See Appendix A for a copy of this report. This study further refined the Perimeter Parkway concept with the anticipated completion of the new U.S. 231 by-pass (which was the basis of the traffic model under this study with the base traffic data from prior to U.S. 231 by-pass construction) and the impacts it would have on the large scale transportation concepts that were recommended under some of the previous traffic studies. This study also considered the impacts associated with the Purdue Research Foundation's Commercial Development Master Plan from 2010 as well as the Northwestern Pedestrian Master Plan from 2011. Traffic analysis and assessments were performed for vehicles, pedestrians / bicycles and transit operations. Several traffic scenarios were identified under this study with Alternative Network (Scenario 2) from the study report as shown in Figure 3 as the recommended preferred alternate by the stakeholders.

3.2 State Street

- **Re-State | A Master Plan for State Street prepared by MKSK (June 2014)** – The State Street Master Plan (SSMP) study was initiated in October 2013 as a collaborative effort among the City, Purdue University and PRF after the relinquishment of State Street from INDOT to the City following completion of the US 231 highway and the City's annexation of the University campus. MKSK guided the planning effort and the public engagement process. This study primarily grew out of Principle 2 of Purdue's Campus Master Plan "Establish State Street as a Collaborative Center".

The goal of this study was to transform State Street from a state highway that divides the campus and community into an active, vibrant street that helps unify the campus and the community. The report did a great job to develop a vision and strategy to re-imagine, re-invest and re-make State Street corridor through Downtown West Lafayette, Purdue University and a newly opened western gateway by integrating a sense of place for all modes of travel. The plan focused on re-construction of State Street and a general overview of the concept plan as proposed in the study is shown in Figure 4. The study included an underlying assumption that the construction of the Perimeter Parkway would be completed as a four-lane boulevard around Purdue's campus in order to help facilitate the shift in traffic patterns from State Street to the new parkway. See Appendix B for a copy of the SSMP report.

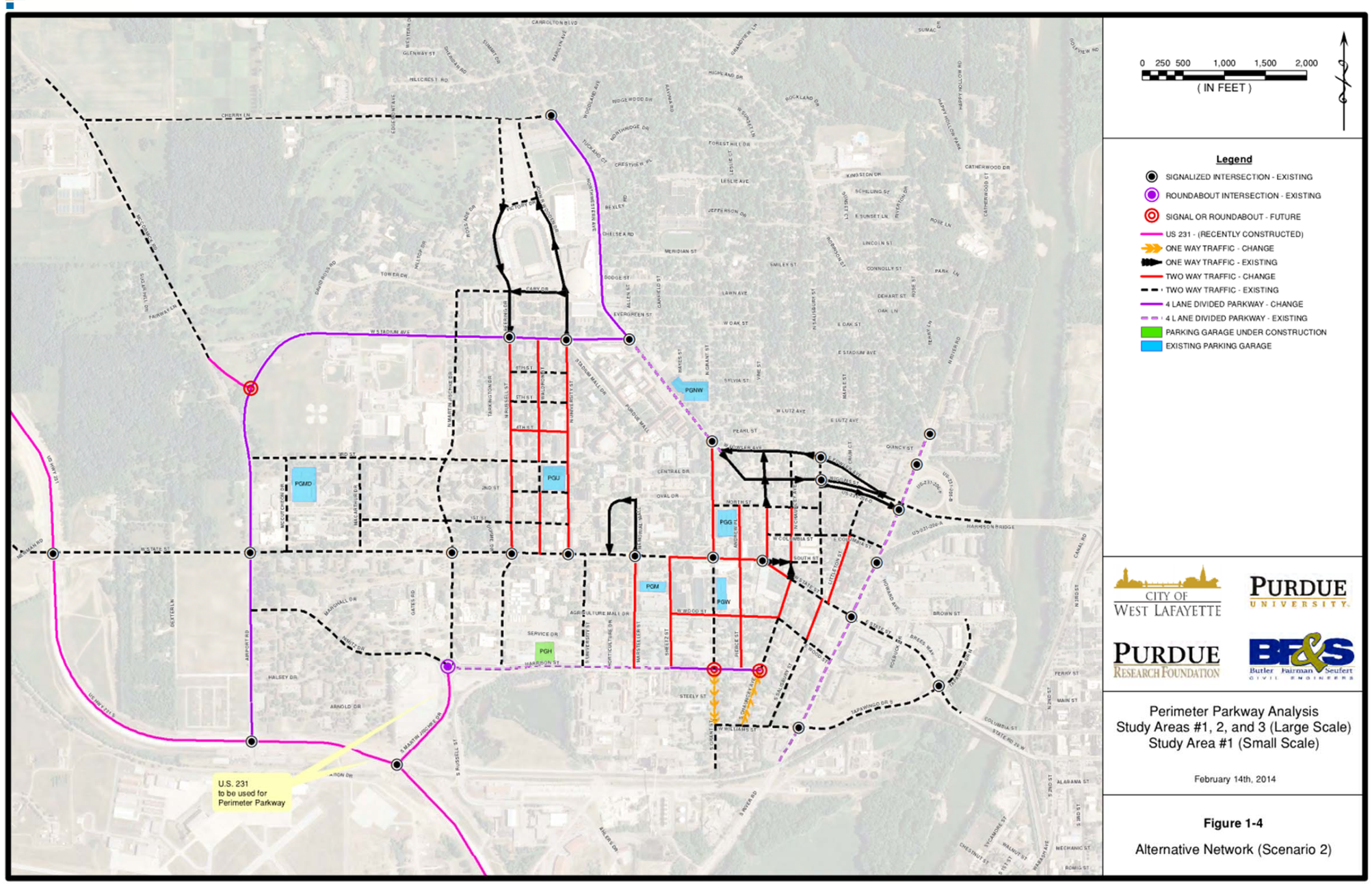


Figure 3 – General overview of the Proposed Concept for Perimeter Parkway (Source: BF&S Study)

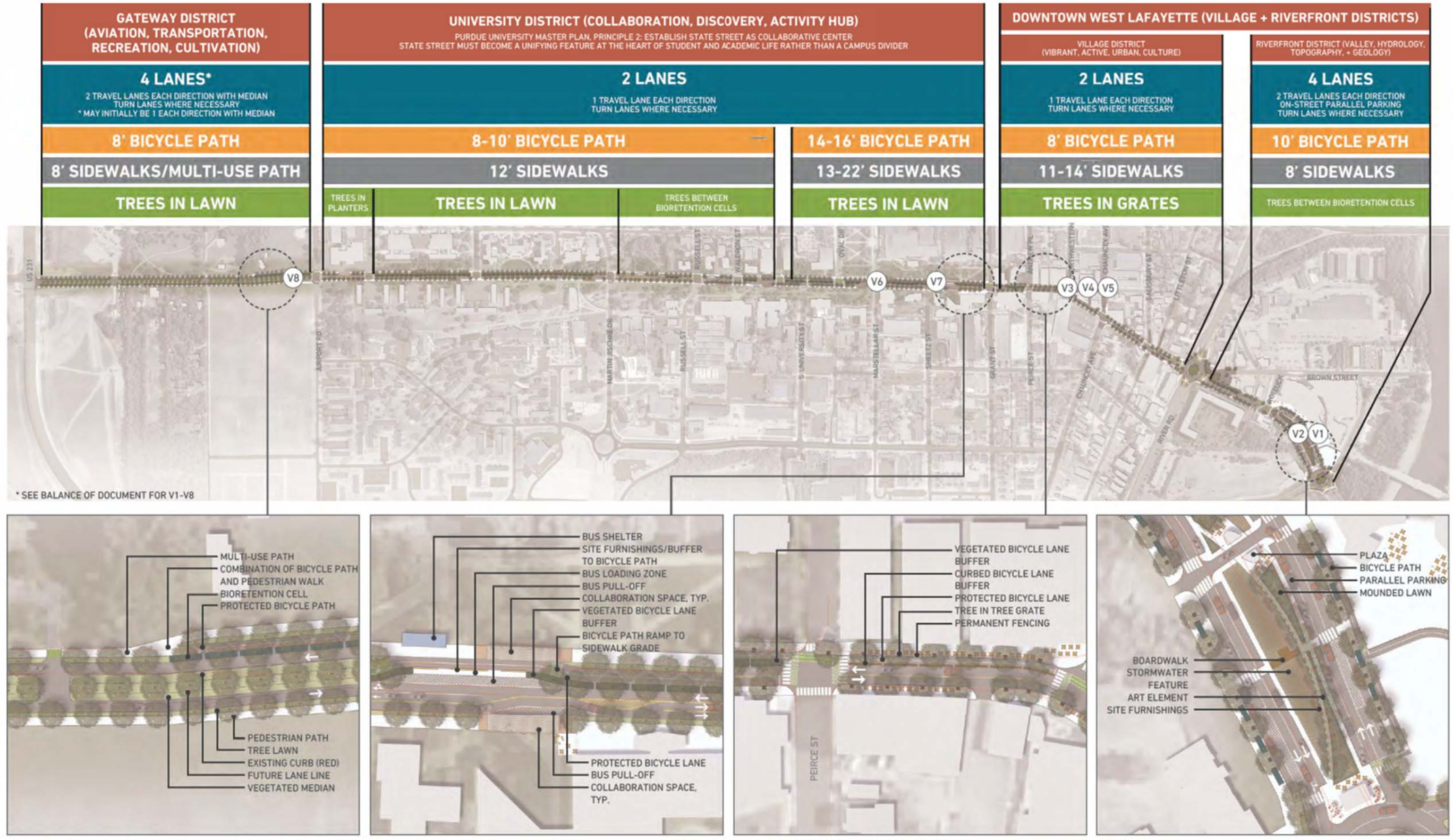


Figure 4 – General overview on the State Street Corridor Scope (Source: MKSK SSMP Study)

4.0 Traffic Analysis Review and Additional Capacity Analysis w/Sensitivity Scenarios

4.1 Traffic Analysis Review

Several past traffic studies had developed multiple traffic model scenarios for numerous intersections and roadway segments comprising the State Street and Perimeter Parkway corridors. American Structurepoint reviewed the capacity analysis files available from these studies and for the most part is in agreement with the analysis results and recommended improvement alternates along the respective corridors. One of the concerns identified in these previous studies was the use of old traffic data (2008 and 2011) prior to opening of the new US 231 highway. It is anticipated that since the construction of US 231, the traffic patterns on the internal and external roadway network through the Purdue University campus and vicinity areas has most likely changed to an extent that it may result in some changes to the proposed improvements and roadway network along these corridors.

During careful evaluation and review of the previous studies and corresponding supporting analysis, it was identified that the traffic projections for the conversion of State Street into a two-way traffic pattern through the existing segment that is currently one-way westbound only showed a negligible westbound through volume at the intersection of State Street & Grant Street. This represented a philosophy that with several one-way to two-way conversions, including the segment of Grant Street between Northwestern Avenue and State Street, the result would be a significant shift in through volumes from State Street to the Perimeter Parkway segment. Considering the placement of existing and proposed parking garages, which are the primary traffic generators along State Street, this philosophy was considered unreasonable.

It was recommended to the stakeholders that new traffic data should be collected at 19 major intersections for capacity evaluation as part of this study. This would also allow for a new traffic model to be developed to account for a more appropriate shift in traffic from State Street to Perimeter Parkway with the two-way conversion. It was also discussed during the stakeholder progress meetings that three different percent shifts in through traffic should be considered in developing the traffic diversion scenarios for any shift in traffic from State Street based on constructing the Perimeter Parkway. Upon consensus with the stakeholders, 20%, 35% and 50% shift in traffic scenarios were identified for sensitivity analysis. The intent of the sensitivity analysis was to gain confidence in the overall operations with “what if” scenarios and corresponding impacts to the reconfiguration recommendations being considered along the State Street and Perimeter Parkway corridors. Conversion of some one-way streets to two-way operation will help reduce the confusion to drivers unfamiliar with the area, and will increase accessibility to destinations within the campus area and convenience for the visitors coming to campus.

4.2 Traffic Forecast Scenarios and Model Development

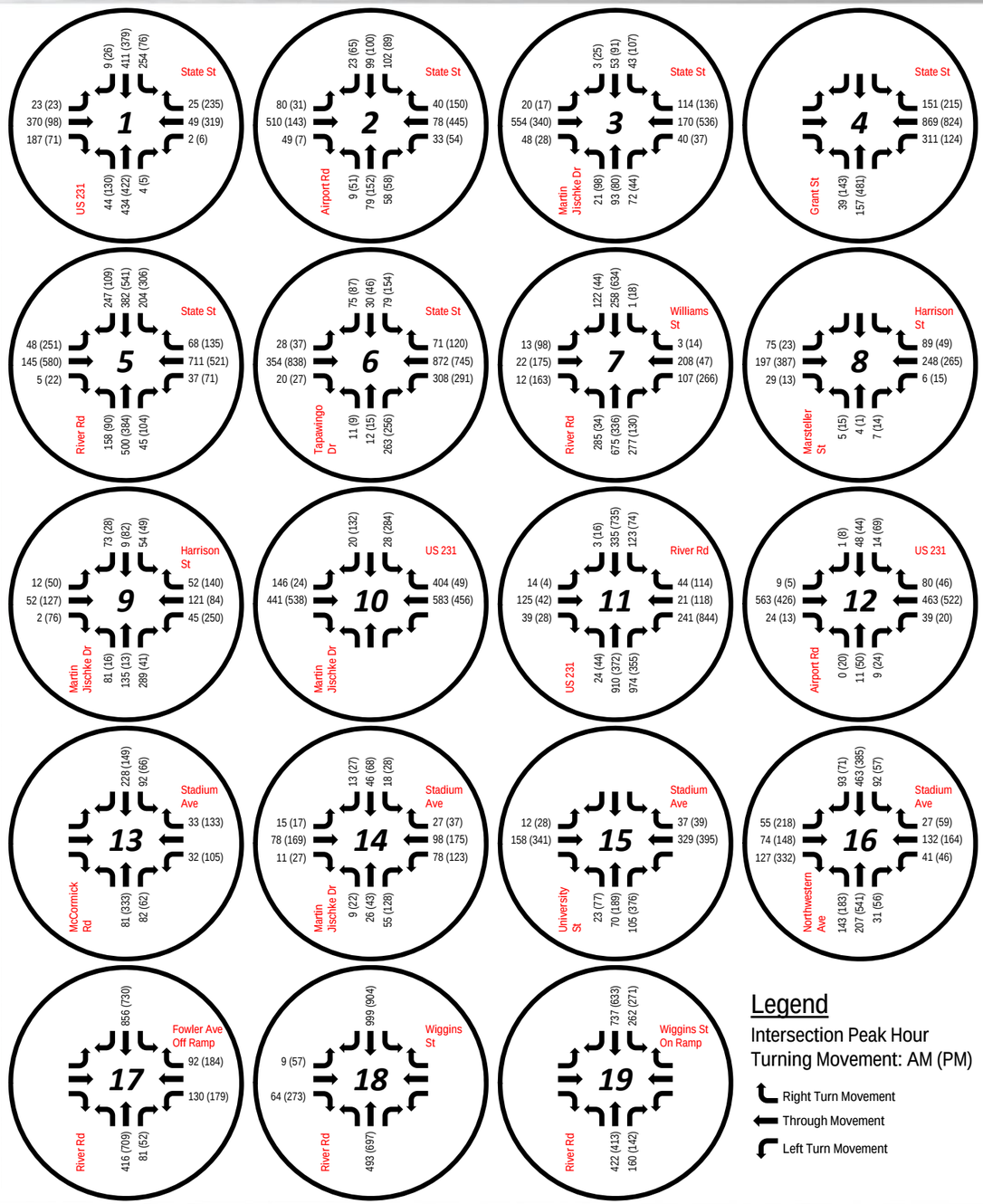
Existing intersection turning movement counts were collected for AM and PM peaks in August 2014 for the major intersections identified in Figure 2 using Miovision video counting technology. Detailed intersection turning movement counts, including a break-down for cars, trucks, pedestrians and bicycles for the study intersections is included in Appendix C of this report. Figure 5 shows the Existing (2014) AM and PM peak hour volumes. Comparing 2014 traffic counts with the old data from previous studies demonstrated a 12 to 25 percent drop in traffic along the State Street corridor, which justified the hypothesis of a significant change in traffic pattern within the campus roadways after new US 231 construction.

There were multiple ways to develop the new traffic volume data set, as shown in the decision matrix developed in Table 1. Option B in the decision matrix was selected for development of traffic model / matrix. For the purpose of this study, traffic has been forecasted using the following steps:

1) Use the newly collected traffic data as base traffic volumes
2) Reassign traffic throughout the network to account for the one-way to two-way conversion and shift in traffic from State Street to Perimeter Parkway segments for the respective sensitivity percentage
3) Apply one percent background growth to the base adjusted volumes to generate design year (2030) traffic volumes
4) Account for additional new trips anticipated with the commercial development Master Plan for the area south of State Street and north of new US 231 highway
5) Add 3 and 4 to generate the total volume matrix for a given sensitivity scenario

Figures 6, 7 and 8 show the Design Year (2030) AM and PM peak hour projected volumes for the 20%, 35% and 50% sensitivity scenarios, respectively.

Figure 5 - Existing (2014) AM and PM Peak Traffic Volumes



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2014 Existing Peak Hour Traffic Volumes

CITY OF WEST LAFAYETTE

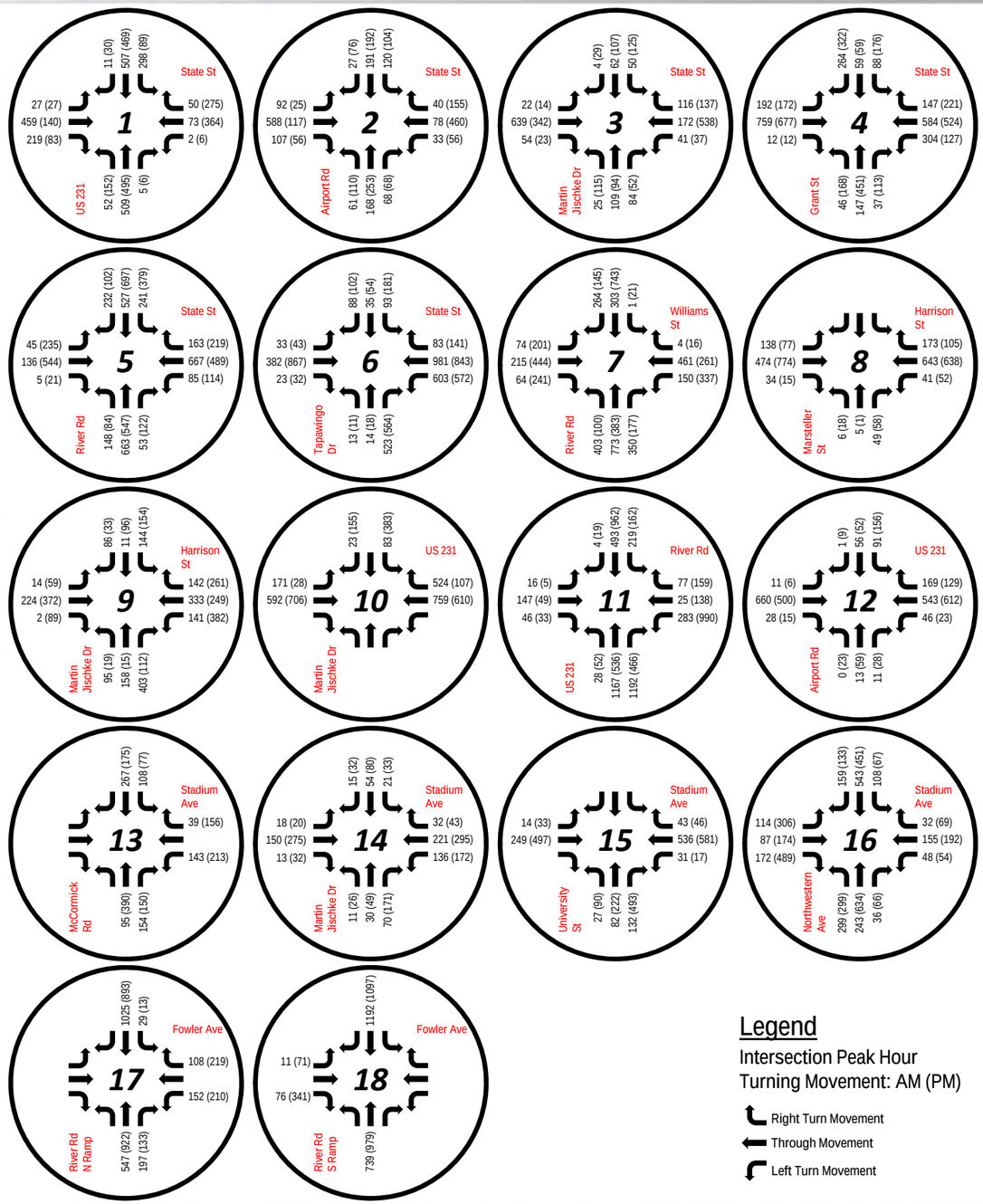
Table 1 – Development of Traffic Volume Data Set – Decision Matrix

Option	Pros	Cons
A	• Using model which was previously approved by stakeholders • Level of complexity: relatively simple	• **Only PM peak data available** • Sensitivity analysis for traffic diversion is difficult/not possible
B	• AM and PM peak data available • Higher level of confidence in key intersection analysis results in AM and PM peak • Sensitivity analysis for traffic diversion is possible • Level of complexity: moderate	• At intersections where new traffic data was not collected, the background traffic counts must be manipulated in order to show the 15-20% diversion to US 231 (only for PM peak hour data) • AM peak analysis is only for key intersections where new traffic data was collected.
C	• Using model which was previously approved by stakeholders • Higher level of confidence in key intersection analysis results • Level of complexity: moderate	• **Only PM peak data available** • Sensitivity analysis for traffic diversion is difficult/not possible

D	• Easily run new scenarios using a travel demand software tool (VISUM)	• **Infeasible** due to the following:
		  • Too time intensive
		  • Too costly

Option	Step	Description
A	1	Utilize traffic data from existing study only
	2	Subtract existing traffic from proposed traffic to determine where traffic was diverted and where new development traffic was assigned
	3	Multiply existing through movements on State Street by 0.80 or 0.85 to adjust for drop in traffic due to US 231
	4	Make adjustments to traffic diversion and new trip assignment as necessary
	5	Add adjusted existing traffic data to adjusted diverted/new trips to determine proposed traffic
B	1	Utilize newly counted traffic data at key intersections as background traffic
	2	Develop new traffic diversion scenarios (use sensitivity analysis - 20%, 35%, 50% diversion from State to Perimeter Parkway)
	3	Assign diverted trips based on parking allocation on campus
	4	AM peak hour analysis is only for the key intersections. For PM peak hour, use previously collected traffic counts at non-key intersections to supplement the new traffic data. Adjust non-key intersections similar to option A1 & A3 above.
C	1	Subtract existing traffic in previous study from proposed traffic in previous study to determine where traffic was diverted and where new development traffic was assigned
	2	Make adjustments to traffic diversion and new trip assignment as necessary
	3	For key intersections, use the newly collected traffic counts as background traffic. For all other intersections, use previously collected traffic counts at non-key intersections to supplement the new traffic data. Adjust non-key intersections similar to option A1 & A3 above.
D	1	Perform an extensive data collection effort to collect all new AM and PM peak hour traffic counts
	2	Collect origin-destination data
	3	Develop a travel demand model
	4	Allow the travel demand model to dynamically assign trips to the proposed roadway configuration

Figure 6 - Design Year (2030) AM and PM Peak Traffic Volumes - 20% Sensitivity Scenario



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2030 Future Peak Hour Traffic Volumes – 20% Shift

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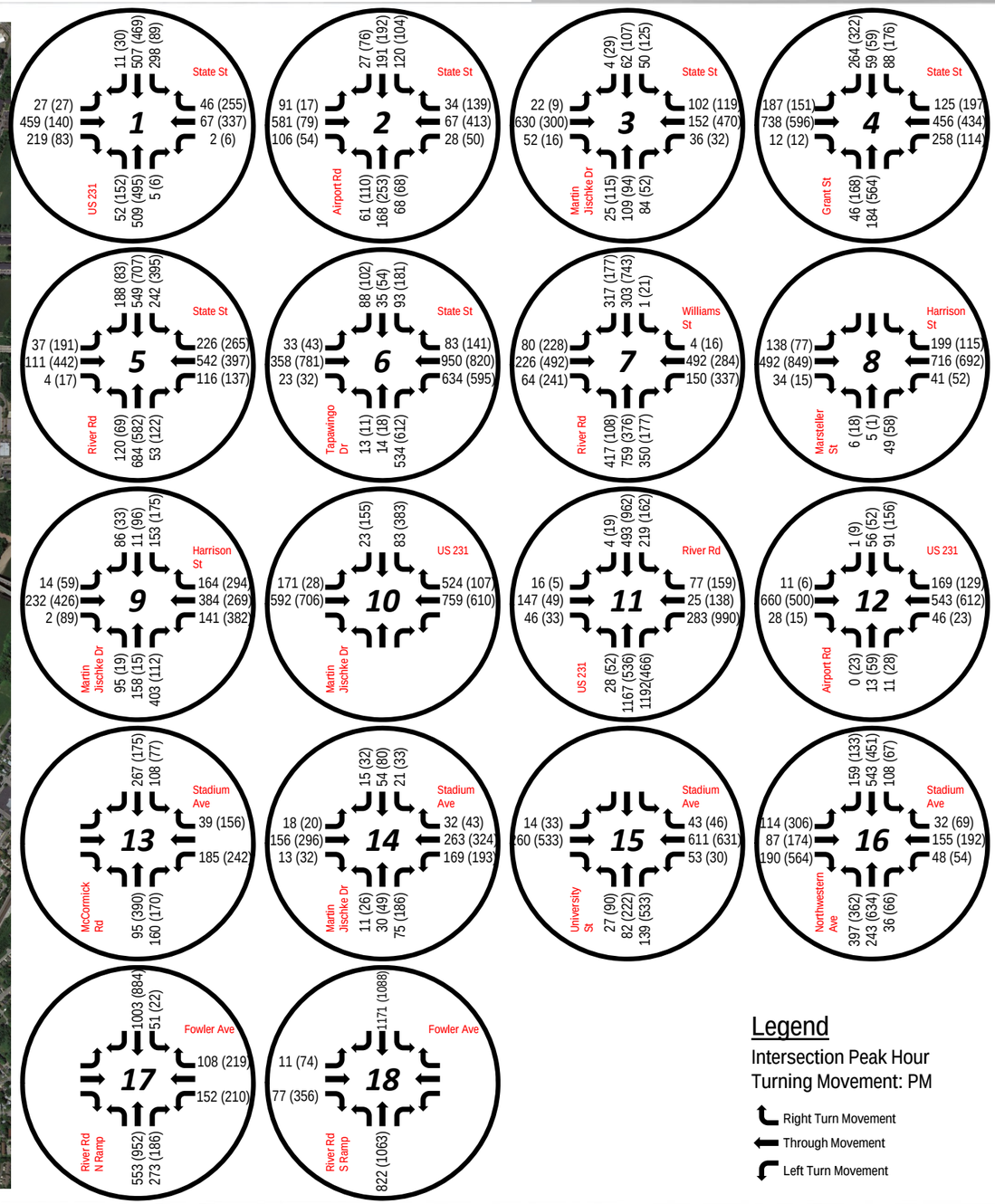
Figure 7 - Design Year (2030) AM and PM Peak Traffic Volumes - 35% Sensitivity Scenario



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2030 Future Peak Hour Traffic Volumes – 35% Shift

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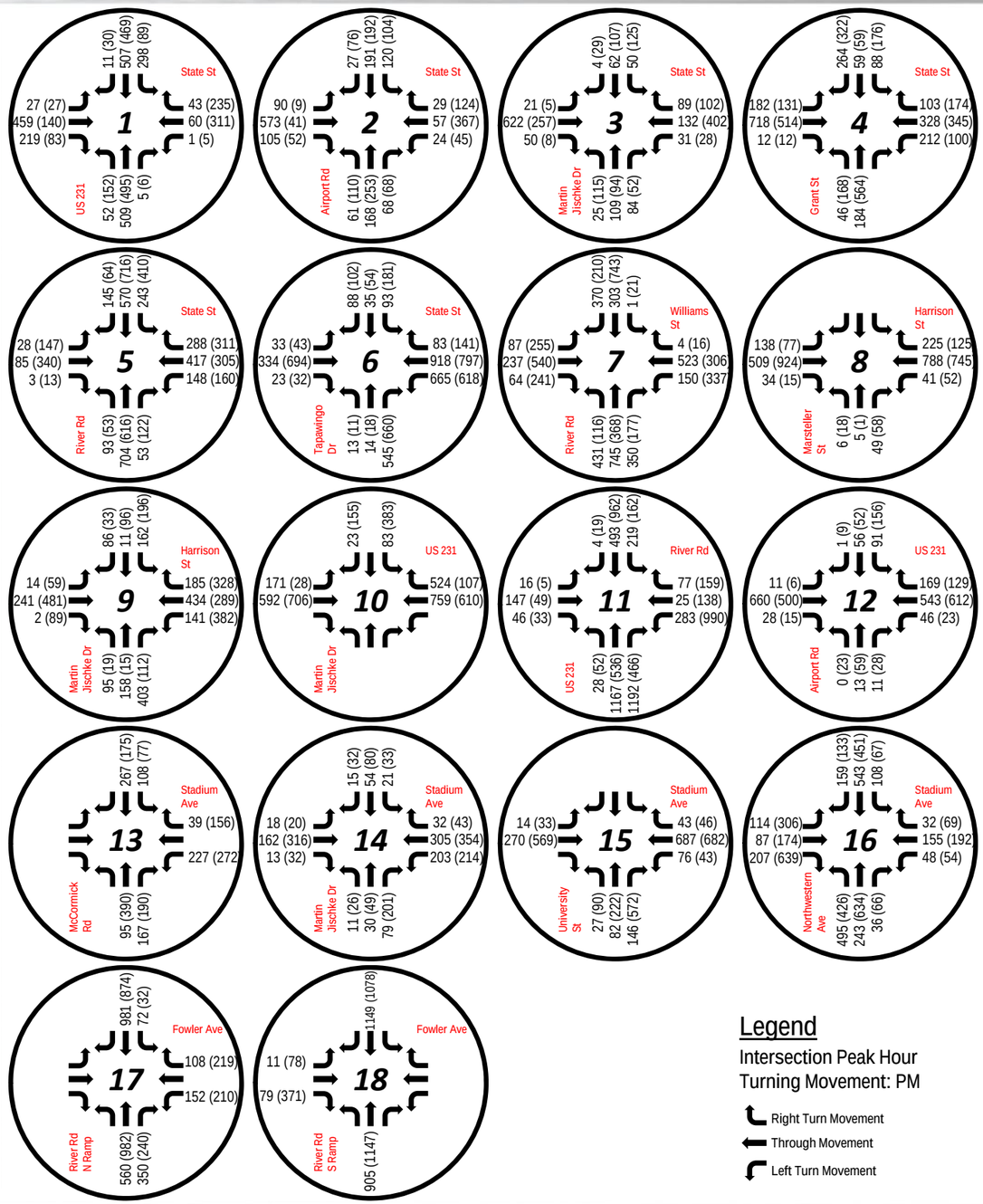
Figure 8 - Design Year (2030) AM and PM Peak Traffic Volumes - 50% Sensitivity Scenario



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2030 Future Peak Hour PM Traffic Volumes – 50% Shift

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4.3 Capacity Analysis

The capacity analysis was performed based on the methodology outlined in the *Highway Capacity Manual* (TRB 2010). The standard parameter used to evaluate traffic operating conditions is referred to as the level-of-service (LOS). There are six LOS (A through F) which relate to driving conditions from best to worst, respectively. LOS for segments and intersections are defined in terms of control delay per vehicle, which is a direct correlation to driver discomfort, frustration, fuel consumption, and lost travel time. The following software tools were used to evaluate intersection capacities and to compute the LOS for the major intersections in the study area:

a) ARCADY 8 - software developed by Transportation Research Laboratory to evaluate roundabout capacities

b) VISSIM 6 - a traffic simulation software tool used to visually show roundabout operations and show how the overall system will operate

c) Synchro & SimTraffic - software for capacity analysis and simulation of signalized and unsignalized intersections using HCM2010 methodology

Results of the capacity analysis for existing year and the three future year sensitivity scenarios with the new traffic projections based on recommended lane configurations from the previous studies showed similar intersection operations and LOS performance with the exception of the intersection of Grant Street & State Street. A majority of the intersections will operate at an acceptable LOS (D or better) except for the intersection of Northwestern Avenue & Stadium Avenue and Northwestern Avenue & Grant Street. These intersections had a poor LOS under the previous studies as well. This is primarily and it was mainly attributable to the inability to construct any additional capacity addition because of the tight right-of-way at these intersections. Appendix C1 shows the Synchro and ARCADY capacity analysis outputs for all the studied scenarios. Table 2 shows a brief summary of recommended improvements identified from previous studies and corresponding changes identified by Structurepoint based on the analysis performed for the current study. Majority of the traffic calming recommendations such as lane reduction, streetscape, pedestrian crossings and roundabouts along the corridor as well as some of the ITS recommendations are still valid from the previous studies. A significant portion of the Perimeter Parkway corridor would operate at an acceptable level of service with a two-lane configuration and exclusive turn lanes at various intersections. Aside from the aesthetic and consistency standpoint, this could be viewed as a value engineering opportunity. The potential cost savings are discussed in detail in section 5.4 of this report.

Additional analysis was performed at the critical intersection of Grant Street & State Street to identify multiple options for consideration by the stakeholders. Table 3 summarizes various scenarios evaluated for this intersection including restriction of certain turning movements. For the opening day scenario, keeping the geometry similar to MKSK's proposed geometry will result in LOS E during the PM peak and it also shows congestion/queuing on the WB and NB approaches. This results in approach LOS's of E and F but the overall intersection is LOS E. Providing a dedicated WB right-turn lane will result in a substantial reduction in congestion/queuing at this intersection and results in approach LOS's of D and E with the overall intersection LOS at D. Providing a WB right-turn lane has some merit since it can help improve the capacity for the WB thru movement that is hindered because of the WB right-turns blocking/slowing that movement in a shared lane situation. However; this comes at additional right-of-way cost which needs to be carefully evaluated by Purdue University as well as the City of West Lafayette in making a final decision about acceptable operations at this intersection.

As recommended in the previous studies, it is very critical to provide proper "wayfinding and gateway signs" at the proposed new roundabouts along State Street to promote Tapawingo Drive and River Road as the eastern border of the Perimeter Parkway. Similarly, such signs should also be provided along the northern, southern and western

border of the campus at the US 231 and Northwestern Avenue access points that connect to the Perimeter Parkway corridor. Recommendations such as “electronic wayfinding” as identified in previous studies are valuable considerations along the gateway(s) to the campus which could also be integrated with the smart parking technology so the travelers are abreast of the parking occupancy which can help manage the traffic flow through the network, especially the Perimeter Parkway corridor. Proper and specific “wayfinding and gateway signs” will encourage arriving vehicles along State Street to use the correct segment to turn left or right to access various parking garages through the north or south end of perimeter parkway and it will essentially help reduce the through traffic volumes on internal core roadways, including the State Street segment.

One of the recommendations regarding wayfinding and gateway signs is to direct motorists to specific landmark buildings and parking (surface lots or garages) associated with those buildings. Specific direction should be given for visitors, and employee directions could be given separately via other internal University communication channels. It is also recommended that the University consider reevaluating parking permits for their employees and assign the employees working in certain sections of the campus to park only in the garages or the surface lots that are in the close proximity in order to ensure that the traffic patterns are evenly distributed throughout the campus. The primary purpose of this would be to divert traffic away from the State Street corridor.

Table 2 - Recommended Improvements Comparison between Previous Studies and Current Study

ID	Intersection	ASI Scope	Major/Minor	Existing Control	Future Control	BFS and/or MKSK Studies Recommendations	Current ASI Study Recommendations	Potential Cost Savings (Yes/No)
	State Street Corridor							
1	State Street & US 231	Yes	Major	Signal	Signal	E/W (State Street) = Proposed 4-lane section with turn lanes between Airport Rd & US 231 N/S (US 231) = Existing Configuration	E/W (State Street) = Existing 2-lane section w/turn lanes is sufficient N/S (US 231) = Existing Configuration	
2	State Street & Airport Road	Yes	Major	Signal	Signal or Roundabout	N/S (Airport Road) = Proposed 4-lane Section with turn lanes	N/S (Airport Road) = Existing 2-lane section with turn lanes	Yes
3	State Street & McCutcheon Dr	No	Minor	TWSC	TWSC	E/W (State Street) = Proposed 2-lane section	In agreement w/BFS and MKSK studies	No
4	State Street & McArthur Dr	No	Minor	TWSC	TWSC	E/W (State Street) = Proposed 2-lane section	In agreement w/BFS and MKSK studies	No
5	State Street & Martin Jischke Dr	Yes	Major	Signal	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes N/S (Martin Jischke Dr) = 2-lane section with turn lanes	In agreement w/BFS and MKSK studies	No
6	State Street & Russell Street	No	Major	Signal	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes N/S (Russell Street) = Proposed 2-lane section with turn lanes and 2-way conversion of North Russell Street	In agreement w/BFS and MKSK studies	No
7	State Street & Waldron Street	No	Minor	TWSC	TWSC	E/W (State Street) = Proposed 2-lane section with turn lanes N (Waldron Street) = Proposed 2-lane section and 2-way conversion of North Waldron Street	In agreement w/BFS and MKSK studies	No
8	State Street & University Street	No	Major	Signal	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes N (University Street) = Proposed 2-lane section and 2-way conversion of North University Street	In agreement w/BFS and MKSK studies	No NOTE: Possible re-alignment of University Street for N/S connectivity between north and south sections of Perimeter Parkway (ADDITIONAL COST)
9	State Street & Marstellar Street	No	Major	Signal	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes S (Marstellar Street) = Proposed 2-lane section with turn lane and 2-way conversion of South Marstellar Street	E/W (State Street) = Proposed 2-lane section with turn lanes S (Marstellar Street) = No need for 2-way conversion, keep existing section as is	Yes
10	State Street & Sheetz Street	No	Major	TWSC	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes S (Sheetz Street) = Proposed 2-lane section with turn lane and 2-way conversion of South Sheetz Street	In agreement w/BFS and MKSK studies	No
11a	State Street & Grant Street	Yes	Major	Signal	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes N/S (Grant Street) = Proposed 2-lane section with turn lane and 2-way conversion of North Grant Street	E/W (State Street) = Proposed 2-lane section with turn lanes N/S (Grant Street) = Keep North Grant Street as 1-way NB to avoid significant impact OR Convert North Grant Street into 2-way but close south leg to vehicular traffic (less significant impact)	
11b	State Street & Grant Street - ALT	Yes	Major	Signal	Signal			No
12	State Street & Andrew Street	No	Minor	TWSC	TWSC	E/W (State Street) = Proposed 2-lane section	In agreement w/BFS and MKSK studies	No
13	State Street & Northwestern Street	No	Major	Signal	Signal	E/W (State Street) = Proposed 2-lane section with turn lanes N (Northwestern Ave) = Proposed 2-lane section with turn lane and 2-way conversion of Northwestern Ave	In agreement w/BFS and MKSK studies	No
14	State Street & Chauncey Ave	No	Major	TWSC	TWSC /Mini Roundabout	E/W (State Street) = Proposed 2-lane section with turn lanes N/S (Chauncey Ave) = Proposed 2-lane section with turn lane and 2-way conversion of Chauncey Ave	In agreement w/MKSK study recommendation to keep it as a TWSC intersection instead of a mini roundabout	No
15	State Street & Salisbury Street	No	Minor	TWSC	TWSC	E/W (State Street) = Proposed 2-lane section with turn lanes N/S (Salisbury St) = Proposed 2-lane section with right turn only from Sailsbury street approaches	In agreement w/BFS and MKSK studies	No
16	State Street & River Road	Yes	Major	Signal	Roundabout	Proposed 2-lane roundabout with single exit for WB direction	Proposed 2-lane roundabout with dual exit for WB direction	No - Increase cost
17	State Street & Tapawingo Dr	Yes	Major	Signal	Roundabout	Proposed 2-lane roundabout with right-turn by-pass lane for WB direction	Proposed 2-lane roundabout - No need for right-turn by-pass lane for WB direction	Yes
	River Road Corridor							
18	River Road & Tapawingo Dr / Williams St	Yes	Major	Signal	Roundabout		Proposed 2-lane roundabout with 2-lane entries and 2-lane circulatory NB	Yes
18a	River Road & Tapawingo Dr / Williams St - ALT	Yes	Major	Signal	Signal	Proposed 2-lane roundabout with 3-lane entries and 3-lane circulatory NB	Keep existing signal as is to minimize construction and ROW impacts	Yes
19	River Road & Fowler Avenue Ramp	Yes	Major	Signal	Signal		Keep signalized ramp terminal and add ramp connection to accommodate SB to WB movement at Fowler	Yes
20	River Road & Wiggins St Ramp	Yes	Major	Signal	Signal	Major modifications identified with Roundabout Ramp terminals		Yes
	US 231 Corridor							
21	US 231 & River Road	Yes	Major	Signal	Signal	NA	No changes to the existing configuration	No
22	US 231 & Martin Jischke Dr	Yes	Major	Signal	Signal	NA	No changes to the existing configuration	No
23	US 231 & Airport Road	Yes	Major	Signal	Signal	NA	No changes to the existing configuration	No
	South Perimeter Parkway Corridor (Harrison Street / Williams Street)							
24	Williams Street & Salisbury Street	No	Minor	TWSC	TWSC	E/W (Williams St) = Proposed 4-lane section S (Sailsbury St) = Existing 2-lane section	In agreement w/BFS and MKSK studies	No
25	Williams Street & Chauncey Ave	No	Minor	TWSC	TWSC	E/W (Williams St) = Proposed 4-lane section S (Chauncey Ave) = Existing 2-lane section	In agreement w/BFS and MKSK studies	No
26	Williams Street & Grant Street	No	Minor	TWSC	Signal	E/W (Williams St) = Proposed 4-lane section N/S (Grant St) = Existing 2-lane section	In agreement w/BFS and MKSK studies	No
27	Harrison Street & Grant Street	No	Minor	AWSC	AWSC	E/W (Harrison St) = Proposed 2-lane section N/S (Grant St) = Existing 2-lane section	In agreement w/BFS and MKSK studies	No
28	Harrison Street & Sheetz Street (Williams St Realignment)	No	Minor	TWSC	Roundabout	E/W (Harrison St) = Proposed 4-lane section N/S (Sheets St/Williams St) = Proposed 4-lane section	E/W (Harrison St) = Proposed 2-lane section N/S (Sheets St/Williams St) = Proposed 2-lane section sufficient from capacity and LOS standpoint	Yes
29	Harrison Street & Marstellar Street	Yes	Minor	TWSC	TWSC	E/W (Harrison St) = Proposed 4-lane section N/S (Marsteller Dr) = Proposed 2-lane section	E/W (Harrison St) = Existing 2-lane section would be sufficient from capacity and LOS standpoint N/S (Marsteller Dr) = In agreement with the BF&S recommendations	Yes
30	Harrison Street & University Street	No	Minor	AWSC	TWSC	E/W (Harrison St) = Existing 2-lane section wide enough for future 4-lane N/S (University St) = Existing 2-lane section	In agreement w/BFS and MKSK studies	No
31	Harrison Street & Russell Street	No	Minor	AWSC	TWSC	E/W (Harrison St) = Existing 2-lane section wide enough for future 4-lane N/S (Russell St) = Existing 2-lane section	In agreement w/BFS and MKSK studies	No
32	Harrison Street & Martin Jischke Dr	Yes	Major	Roundabout	Roundabout	Existing - No Change	Existing - No Change	No
	North Perimeter Parkway Corridor (Stadium Avenue/Northwestern Avenue)							
33	McCormick Road & Stadium Avenue	Yes	Minor	TWSC	Signal	Existing condition = 2-lane section on all approaches w/turn-lanes for N/S approaches	Recommend signal installation to make it an attractive route for commuters travelling from west of campus.	No
34	Stadium Ave & University Street	No	Minor	Signal	Signal	S (University St) = Proposed 2-way conversion	In agreement w/BFS and MKSK studies	No
35	Stadium Ave & Northwestern Ave	Yes	Major	Signal	Signal	Existing - No change	Exclusive right turn lane for WB approach would improve LOS but huge ROW impact	No
36	Northwestern Ave & Grant Street	No	Major	Signal	Signal/Roundabout	Existing - No change	Converting into RAB could improve operations significantly but possible ROW impacts	No
37	Northwestern Ave & Fowler St	No	Major	Free flow	Free flow	Existing Condition - No change		
38	Northwestern Ave & Wiggins St	No	Major	Free flow	Free flow			
39	North Street & Northwestern Ave	No	Minor	TWSC	Signal	Proposed 2-lane section along all approaches with recommendation to install traffic signal	In agreement w/BFS and MKSK studies	No
40	North Street & Grant Street	No	Minor	TWSC	AWSC/TWSC	Proposed 2-lane section along all approaches with recommendation to have bus only signal for proposed SB flow on Grant Street south of North Street	Recommend utilizing the 2-way conversion on Grant Street to be open for cars and buses without a dedicated bus only lane and/or bus only signal. Recommend keeping the intersection control as TWSC with North Street stop controlled	Negligible
41	River Road & Fowler Street Ramp	Yes	Major	Signal	Roundabout/Signal	See 19 & 20		
42	River Road & Wiggins Street Ramp	Yes	Major	Signal	Roundabout/Signal			
	Note: See Appendix A & B for Conceptual Geometric Layouts from the Previous Studies							

Table 3 - Grant Street & State Street - Traffic Analysis Scenarios Summary

Grant Street & State Street - Summary of Various Traffic Analysis Scenarios								
	Design Year Traffic (2030)		Design Year Traffic (2030)			Opening Day Traffic (2018)		
	No Improvements Beyond MKSK Concept or Needing any Additional ROW		With Additional Improvements beyond MKSK Concept					
Scenarios	**AM Peak**	**PM Peak**	**AM Peak**	**PM Peak**	**Recommended Improvements**	**AM Peak**	**PM Peak**	**Recommendation**
Scenario 1	LOS E | Delay = 60.1 Seconds	LOS F | Delay = 119.9 Seconds	LOS D | Delay = 50.3 Seconds	LOS D | Delay = 54.7 Seconds	WB Right-Turn Lane, NB Right-Turn Lane	LOS D | Delay = 41.2 Seconds	LOS E | Delay = 76.3 Seconds	See Note 1
Scenario 2	LOS C | Delay = 30.4 Seconds	LOS C | Delay = 30.4 Seconds	LOS C | Delay = 30.4 Seconds	LOS C | Delay = 30.4 Seconds	No Additional Widening	No need for any additional analysis under these scenarios		
Scenario 3	LOS D | Delay = 45.8 Seconds	LOS E | Delay = 72.2 Seconds	LOS D | Delay = 45.6 Seconds	LOS D | Delay = 53.1 Seconds	Accommodate NB Right-turn Lane within available pavement cross section, E/W left-turns Pm + Pt			
Scenario 4	LOS C | Delay = 28.6 Seconds	LOS D | Delay = 47.9 Seconds	LOS C | Delay = 28.6 Seconds	LOS D | Delay = 47.9 Seconds	No Additional Widening			

Note 1 - If bike separation median proposed under MKSK plan is removed through a small segment of State Street to accommodate exclusive right-turn lane for a direct access to the parking garage alley behind the University Bookstore, there will be a significant reduction in right-turn volume at the State and Grant intersection resulting in improved LOS at this intersection during opening day

Scenario Descriptions

Scenario 1 Full access intersection with all turning movements allowed
Scenario 2 Restrict traffic to/from south leg of Grant Street, all other movements allowed
Scenario 3 Restrict left-turn movements only for N/S approaches, Allow left-turn movements for E/W approaches
Scenario 4 Restrict left-turn movement on all approaches

5.0 Opinion of Probable Overall Project Cost

American Structurepoint provided an opinion of probable construction cost based on the proposed plans and recommendations from the *Perimeter Parkway Analysis* and *State Street Master Plan* studies for the campus area. Since the project area involves multiple roadways, cross sections, and differing roadway characteristics, costs for each segment were generated separately. A general overview of the project scope defined from the previous studies is show in Figures 3 and 4 under Section 3 of this report. The separate costs were then grouped together based on State Street and Perimeter Parkway reconstruction costs. An alternate scenario for resurfacing Airport Road, and the McCormick Road and Stadium segments was also presented as a potential for cost savings. An additional scenario was investigated for improving State Street as a standalone project with minimal improvements to the Perimeter Parkway that are critical for State Street project.

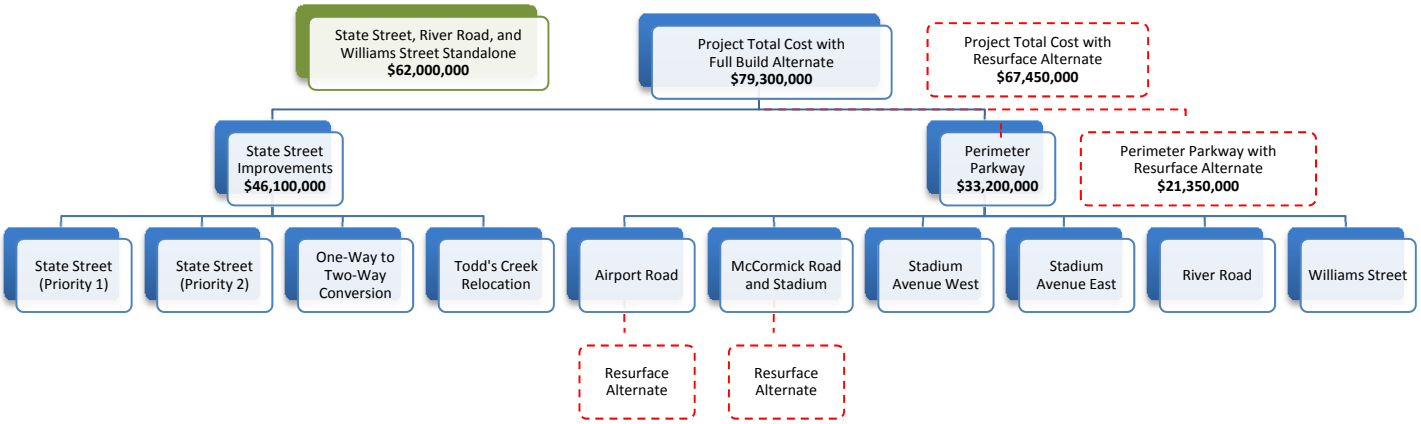


Figure 9 – Roadway Segments and Total Costs

In order to construct State Street, the River Road and Williams Street segments would need to be completed to provide an alternate route for drivers to bypass State Street (see construction phasing section of the report for more details). The breakdown of roadway segments, with their associated costs for all the cost options evaluated is shown in Figure 9. Figures 10, 11 and 12 show a detailed visual layout of the project area with associated breakdown of the project scope summary and corresponding cost for construction, design and right-of-way acquisition for all the cost options evaluated per the scope defined in this section of the report. Figures 13 and 14 show a simplified visual layout of the project area with overall scope summary for the two corridors (State Street and Perimeter Parkway): a) the Full Build Option and b) the State Street, River Road and Williams Street Standalone Option with only critical segments of Perimeter Parkway. Figure 15 shows an exhibit of ROW impacts associated with the proposed improvements along State Street and Perimeter Parkway corridors.

Overall summary on the construction cost, utilities cost, engineering design, right-of-way acquisition, and the hardscape/architectural costs for the three scope options discussed in this report are as shown below (Note: All costs are in 2018 Dollars):

1. State Street and Perimeter Parkway Full Build Cost Summary
   - Total Cost = $79.3M
   - Roadway Construction Cost = $56.2M
   - Hardscape/Architectural Features Cost = $5.6M
   - Utility Adjustment Cost = $3.7M
   - Land Acquisition Cost = $3.5M
   - Engineering Cost = $10.3M
2. State Street and Perimeter Parkway Resurface Alternate Cost Summary
   - Total Cost = $67.5M
   - Roadway Construction Cost = $46.1M
   - Hardscape/Architectural Features Cost = $5.6M
   - Utility Adjustment Cost = $3.7M
   - Land Acquisition Cost = $3.5M
   - Engineering Cost = $8.6M
3. State Street Standalone and Critical Segments of Perimeter Parkway Cost Summary
   - Total Cost = $62.0M
   - Roadway Construction Cost = $42.8M
   - Hardscape/Architectural Features Cost = $5.6M
   - Utility Adjustment Cost = $2.3M
   - Land Acquisition Cost = $3.5M
   - Engineering Cost = $7.8M

Methodology for Cost Computations

Anticipated construction costs for each roadway segment were itemized by pay item; and each pay item was quantified based on the roadway cross section and required upgrades. Itemized pay item costs were based on historical bid prices. Storm sewer costs are included in the roadway construction cost component of the estimates. Because the estimates are preliminary in nature, a 25% contingency was added to the total.

Utility costs were included for upgrades to existing facilities that are expected to be incurred by the project as directed and identified by Purdue Utilities. Relocation costs for private utilities that are not located within easements were not expected to be incurred by the project; therefore are not included in the estimates.

Land acquisition costs were calculated based on preliminary assessments of the areas expected to be impacted by the roadway construction. Cost to purchase right of way as well as land acquisitions services are included in the estimates.

Engineering costs were also included and assumed to be 7% of the total construction cost for roadway engineering, and 20% of the total construction cost for utility relocation engineering. Construction Inspection costs were included and assumed to be 10% of the roadway construction costs.

All project costs were then combined and sub-totaled for the State Street improvements and for the Perimeter Parkway improvements; and a 5% additional contingency was added to the total cost.

Since project construction is anticipated to be completed in 2018, inflation was added to all costs at a rate of 4%.

Detailed cost estimates for each segment are included in Appendix D

5.1 State Street Improvements

5.1.1 State Street Priority 1

The segment limits for Priority 1 include State Street from Marsteller Street to Tapawingo Drive. Costs were generated based on the recommended improvements from the State Street master plan by MKSK per their draft final report included under Appendix B.

- This segment includes new multi-lane roundabouts at the intersection of State and Tapawingo, and at the intersection of State and River.
- The roadway cross section consists of a four lane roadway from Tapawingo to River, and two lane roadway from River to Marstellar. Travel lanes are separated by a raised median or center turn lane. There is sidewalk on the south side of the road and cycle path on the north side.
- The cost estimate assumes that existing asphalt pavement can be resurfaced by milling and replacing with a 4" asphalt overlay with some widening and patching of existing pavement, although roundabout construction will be full depth pavement reconstruction.
- New traffic signals at Roebuck, Chauncey, Northwestern, Grant, and Marstellar are included in the estimate for this segment. New pedestrian signals are also included at Tapawingo, River, Pierce, and Sheetz. Storm sewer costs are included for replacement of the current system.
- New roadway lighting is provided throughout the limits. Architectural components were also included based on the recommendations from the MKSK report.
- Utility relocation upgrade costs for overhead electric, cable, and telephone lines to be replaced with underground facilities are included in the estimate.
- 0.12 Acres of residential right of way and 1.65 acres of commercial right of way are required for construction of this segment.

5.1.2 State Street Priority 2

The segment limits for Priority 2 are from US 231 to Marstellar Street. Costs were generated based on the recommended improvements from the State Street master plan by MKSK.

- The roadway cross section includes two travel lanes, a bicycle path on the north side, and sidewalk on the south side. Travel lanes are separated by a raised median or center turn lane.
- The cost estimate assumes that existing asphalt pavement can be resurfaced by milling and replacing with a 4" asphalt overlay with some widening and patching of existing pavement.
- New traffic signals are included at University, Russel, Jishcke, Airport, and US 231. New pedestrian signals are also included at Oval, University, Waldron, Macarthur, and McCutcheon.
- New roadway lighting is provided throughout the limits. Architectural components were also included based on the recommendations from the MKSK report.
- Utility costs include relocation of overhead electric, cable and telephone lines to underground facilities. Also included is an upgrade to replace an 18" high pressure steam line near Marstellar Street with a new tunnel, a new 18" chilled water line between Russell and Waldron with a new tunnel, and new 10" sanitary sewer from US 231 to Airport Road.
- A culvert conveying Todd's Creek under State Street will need to be widened and is included in the cost of this segment; however a plan to relocate Todd's Creek to the south side of State Street is included in a separate cost within the State Street category.
- 1.59 Acres of residential right of way and 2.17 acres of commercial right of way are required for construction of this segment.

5.1.3 One-Way to Two-Way Conversion

As part of the MKSK report, several roadways along State Street were recommended to be converted from one-way traffic to two-way traffic. Costs were generated for these streets to be milled and resurfaced with a 1.5" asphalt overlay, then new pavement markings and signage was included to convert to two-way traffic. Costs were also included for modification of existing traffic signals to be converted for two way operation. The breakdown below identifies segments that form the basis of the impacts with one-way to two-way conversion and inclusion in corresponding estimates.

Traffic Signal Modifications included in State Street estimates:

- State St & Russell St.
- State St & University St.
- State St & Marsteller St.
- State St & Grant St.
- State St & Northwestern Ave.

Modifications to traffic signals included in "One-way" reconfigurations estimates:

- Russell St. & Stadium
- Russell St. & 3rd St.
- University & Stadium
- University & 3rd St.
- Northwestern & Grant
- Northwestern & North
- Chauncey Ave. & Wood

- Wood & Pierce

Non-Signalized Intersection Improvements included in "One-way" reconfigurations estimates:

- Remove Existing Signs
- New Stop Signs
- New Street Name Signs
- New Lane Control Signs
- New Miscellaneous Signs (No Parking, Speed Limit, Guide, Informational) where needed
- New Intersection Pavement Markings

5.1.4 Todd's Creek Relocation

The cost of relocating Todd's Creek was generated from the Draft Flood Mitigation Study and recommended alternative. The recommended alternative (Alternative No. 2) included creating a new ditch to the south of State Street and other improvements to mitigate flooding in the existing ditch.

5.2 Perimeter Parkway Improvements

5.2.1 Airport Road

Costs were estimated for reconstruction of Airport Road from US 231 to State Street.

- The roadway would be upgraded to a lighted four lane boulevard style roadway, separated by a raised median. The typical section included 12' travel lanes separated by a 12' raised median. Pedestrian improvements included a 10' asphalt path on one side of the road and a 5' sidewalk on the other side.
- It was assumed that the roadway would remain close to the existing grade, so no major earthwork would be required for the improvement.
- A new storm sewer was included in the cost of the roadway construction and all required widening would be to the west of the roadway, towards the intramural fields.
- Since the intramural fields are owned by Purdue University, right of way costs were not generated for the widening of Airport Road.

Resurface Alternate

As a cost savings alternate, Airport Road may be resurfaced instead of fully reconstructed to a boulevard style roadway. Costs for resurfacing Airport Road included milling the existing asphalt pavement and replacing with a 1.5" asphalt overlay; then adding new pavement markings. Resurfacing would require no additional right of way.

5.2.2 McCormick Road and Stadium

Costs were estimated for reconstructing McCormick Road from State Street to Stadium Avenue, and Stadium Avenue from McCormick Road to Jischke Drive.

- The roadway would be upgraded to a lighted four lane boulevard style roadway, separated by a raised median.
- Pedestrian improvements included an asphalt path on one side of the road and a sidewalk on the other side.
- It was assumed that the roadway would remain close to the existing grade, so no major earthwork would be required for the improvement.
- A new storm sewer was included in the cost of the roadway construction as well.
- All widening required for reconstruction would be along Purdue University owned property therefore no right of way costs were included in the estimates.

Resurface Alternate

Similar to Airport Road, a cost savings alternative was developed to resurface McCormick and Stadium instead of fully reconstructing. The cost included milling the existing asphalt pavement and replacing with a 1.5" asphalt overlay; then adding new pavement markings. Resurfacing would require no additional right of way.

5.2.3 Stadium Avenue West

Costs were estimated for reconstructing Stadium Avenue from Jischke Drive to N. University Street.

- The new roadway would be a four lane road with sidewalk on the north side of the roadway.
- Construction of a new storm sewer is included in the cost, as well as utility relocations to upgrade electric, telephone, and cable lines to underground facilities. Costs to replace a 24" chilled water line are also included in the estimate for Stadium Avenue West.
- All widening of the roadway would be done to the north, where right of way was assumed to be donated; therefore no right of way costs are included in this segment.

5.2.4 Stadium Avenue East

Costs for Stadium Avenue from N. University Street to Northwestern Avenue were included for milling and replacing the existing roadway with a 4" asphalt overlay, and widening where necessary to provide a continuous four lane section. Costs also include modification of the existing traffic signal at Northwestern Avenue.

There are no right of way costs associated with this segment.

5.2.5 River Road

Limits for the River Road segment extend from the Fowler Street interchange to Williams Street/Tapawingo Drive.

- River Road would be milled 1" and resurfaced with a 4" asphalt overlay, and full reconstruction of a new roundabout at the intersection of Williams Street/Tapawingo Drive.

- The roundabout would include new lighting, and a 4’ center curb would be constructed along the entire roadway.
- A new southbound to westbound connection would be made at the Fowler interchange, which would include new pavement construction and two new traffic signals to facilitate the new connection.
- New right of way would be required for the roundabout construction at Williams/Tapawingo; and these costs were included in the estimate for the Williams Street segment.

5.2.6 Williams Street

Williams Street would be fully reconstructed as a four lane roadway with raised median from River Road to create a new connection to Harrison Street.

- The alignment for the new connection would go through the Freehafer building; resulting in the demolition of the building.
- Also included in the cost are new sidewalk and asphalt path, roadway lighting, storm sewer system, and the demolition cost for Freehafer.
- The hill at the River Road intersection would be re-graded to provide a more gradual profile transition for vehicles traveling through the new Williams Street. The profile grade change would also require a pedestrian underpass for walkers along River Road to pass underneath Williams; which is also included in the cost.
- Land Acquisition costs for Williams Street include the cost of the land required at the intersection with River Road, as well as the costs for widening the roadway and creating the new alignment.
- There are 0.29 acres of residential right of way and 2.38 acres of commercial right of way required for the Williams Street Segment.

LEGEND

STATE STREET (PRIORITY 1)
LENGTH = 0.85 MI. (MARSTELLER TO TAPAWINGO)
TOTAL COST = $21,477,000
ROADWAY CONSTRUCTION COST = $13,390,000
ARCHITECTUAL COMPONENTS COST = $3,090,000
UTILITY ADJUSTMENT COST = $759,000
LAND ACQUISITION COST = $1,435,000
ENGINEERING COST = $2,803,000

STATE STREET (PRIORITY 2)
LENGTH = 1.31 MI. (US 231 TO MARSTELLER)
TOTAL COST = $19,790,000
ROADWAY CONSTRUCTION COST = $11,390,000
ARCHITECTUAL COMPONENTS COST = $2,190,000
UTILITY ADJUSTMENT COST = $1,499,000
TODD'S CREEK MITIGATION COST = $1,950,000
LAND ACQUISITION COST = $148,000
ENGINEERING COST = $2,613,000

ONE-WAY TO TWO-WAY CONVERSION
LENGTH = 3.30 MI.
TOTAL COST = $2,633,000
ROADWAY CONSTRUCTION COST = $2,250,000
ENGINEERING COST = $383,000

AIRPORT ROAD
LENGTH = 0.42 MI.
TOTAL COST = $3,270,000
ROADWAY CONSTRUCTION COST = $2,794,000
ENGINEERING COST = $476,000

McCORMICK ROAD & STADIUM
LENGTH = 1.07 MI.
TOTAL COST = $8,677,000
ROADWAY CONSTRUCTION COST = $7,415,000
ENGINEERING COST = $1,262,000

STADIUM AVENUE - WEST
LENGTH =0.49 MI.
TOTAL COST = $3,610,000
ROADWAY CONSTRUCTION COST = $1,810,000
UTILITY ADJUSTMENT COST = $1,266,000
LAND ACQUISITION COST = ASSUMED DONATED
ENGINEERING COST = $534,000

STADIUM AVENUE - EAST
LENGTH = 0.13 MI.
TOTAL COST = $398,000
ROADWAY CONSTRUCTION COST = $340,000
ENGINEERING COST = $58,000

RIVER ROAD
LENGTH = 0.57 MI.
TOTAL COST = $5,500,000
ROADWAY CONSTRUCTION COST = $4,700,000
LAND ACQUISITION COST = INCLUDED IN WILLIAMS ST.
ENGINEERING COST = $800,000

WILLIAMS STREET
LENGTH = 0.42 MI.
TOTAL COST = $10,164,000
ROADWAY CONSTRUCTION COST = $5,430,000
FREEHAFER DEMOLITION COST = $2,000,000
LAND ACQUISITION COST = $1,810,000
ENGINEERING COST = $924,000

RECONSTRUCTION COMPLETE

NOTE: SOLID LINE = RECONSTRUCTION
DASHED LINE = MILL AND RESURFACE
ALL COSTS ARE INFLATED TO 2018 (4%)
ENGINEERING COST INCLUDES DESIGN AND CI
UTILITY ADJUSTMENTS SCOPE AS DETERMINED BY PURDUE AND CITY OF WEST LAFAYETTE

PROJECT SCOPE SUMMARY

- NEW MULTI-LANE ROUNDABOUTS AT RIVER RD. & TAPAWINGO DR.
- 1TO 2 TRAVEL LANES EACH DIRECTION PLUS TURN LANES AS NEEDED WITH RAISED MEDIAN
- MILL EXISTING ROAD & WIDEN WHERE NECESSARY
- DEDICATED BICYCLE PATH ON NORTH SIDE OF STATE STREET
- NEW ROADWAY DRAINAGE INLETS AND MANHOLES
- NEW ARCHITECTURAL DESIGN, BUS STOPS, AND OUTDOOR SPACES
- NEW STREET LIGHTING AND NEW SIGNALIZED INTERSECTIONS

- 1TO 2 TRAVEL LANES EACH DIRECTION PLUS TURN LANES AS NEEDED WITH RAISED MEDIAN
- MILL EXISTING ROAD & WIDEN WHERE NECESSARY
- DEDICATED BICYCLE PATH ON NORTH SIDE OF STATE STREET
- NEW ROADWAY DRAINAGE INLETS AND MANHOLES
- NEW ARCHITECTURAL DESIGN, BUS STOPS, AND OUTDOOR SPACES
- NEW STREET LIGHTING AND NEW SIGNALIZED INTERSECTIONS
- NEW PEDESTRIAN CROSSING SIGNALS
- MITIGATE TODD'S DITCH BASED ON MITIGATION STUDY (ALT. NO. 2)

- MILL EXISTING ROAD AND RESURFACE
- NEW ROADWAY SIGNING AND PAVEMENT MARKINGS
- MODIFICATION OF EXISTING TRAFFIC SIGNALS FOR 2-WAY TRAFFIC

- FULL ROADWAY RECONSTRUCTION
- 2 LANES OF TRAFFIC IN EACH DIRECTION
- NEW SIDEWALK AND PATH
- NEW ROADWAY DRAINAGE INLETS AND MANHOLES

- FULL ROADWAY RECONSTRUCTION
- 2 LANES OF TRAFFIC IN EACH DIRECTION
- NEW SIDEWALK AND PATH
- NEW ROADWAY DRAINAGE INLETS AND MANHOLES
- NEW TRAFFIC SIGNAL

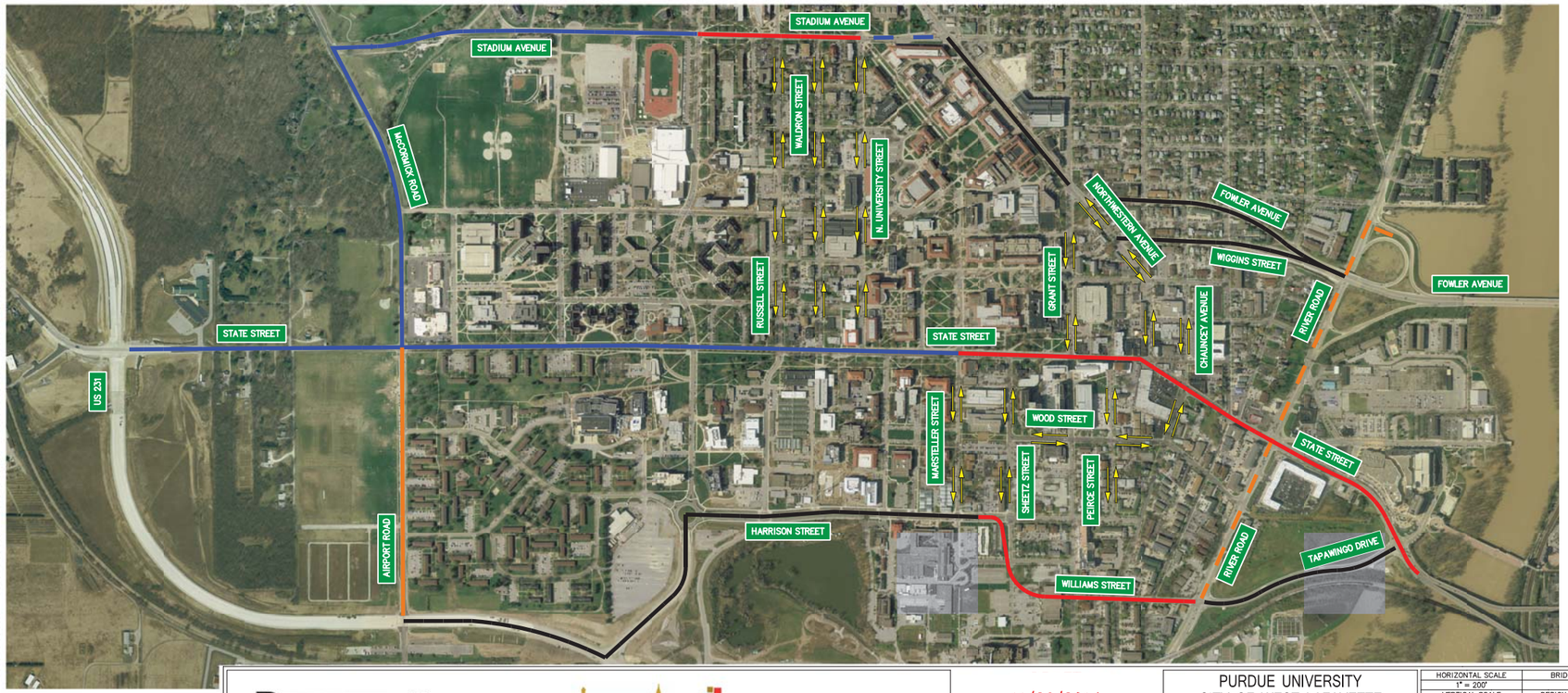
- FULL ROADWAY RECONSTRUCTION
- 2 LANES OF TRAFFIC IN EACH DIRECTION
- NEW SIDEWALK ON NORTH SIDE
- NEW ROADWAY DRAINAGE INLETS AND MANHOLES
- NEW TRAFFIC SIGNAL AT MARTIN JISCHKE DRIVE

- MILL EXISTING ROAD & WIDEN WHERE NECESSARY
- NEW ROADWAY PAVEMENT MARKINGS
- MODIFICATION OF EXISTING TRAFFIC SIGNAL

- NEW ROUNDABOUT AT WILLIAMS STREET
- NEW ROADWAY LIGHTING AT ROUNDABOUT
- MILL EXISTING ROAD AND RESURFACE WITH HMA
- NEW 4' CONCRETE CENTER CURB
- TWO NEW TRAFFIC SIGNALS AT RAMPS TO FOWLER AVENUE
- NEW SOUTHBOUND TO WESTBOUND CONNECTION TO LOOP RAMP

- NEW ROADWAY ALIGNMENT
- 2 LANES OF TRAFFIC IN EACH DIRECTION WITH RAISED MEDIAN
- NEW SIDEWALK AND MULTI-USE PATH
- NEW ROADWAY LIGHTING
- NEW ROADWAY DRAINAGE INLETS AND MANHOLES
- REMOVAL OF EXISTING BUILDINGS AND OBSRUCTIONS

TOTAL IMPROVEMENTS COST = $79,300,000 (2018 DOLLARS, INCLUDES 5% CONTINGENCY)



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11/26/2014

DESIGNED: NRM | DRAWN: NRM
CHECKED: MJM | CHECKED: MJM

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CITY OF WEST LAFAYETTE

STATE STREET & PERIMETER PARKWAY
PROJECT COST OVERVIEW
FULL-BUILD IMPROVEMENTS

HORIZONTAL SCALE	BRIDGE FILE
1" = 200'	
VERTICAL SCALE	DESIGNATION NO.
SURVEY BOOK	SHEETS
	1 of 1
LAST UPDATED	PROJECT NO.
11/26/2014	

Figure 10 - Detailed Project Cost Overview and Scope Summary | State Street and Perimeter Parkway Full Build

LEGEND

STATE STREET (PRIORITY 1)
LENGTH = 0.85 MI. (MARSTELLER TO TAPAWINGO)
TOTAL COST = $21,477,000
ROADWAY CONSTRUCTION COST = $13,390,000
ARCHITECTUAL COMPONENTS COST = $3,090,000
UTILITY ADJUSTMENT COST = $759,000
LAND ACQUISITION COST = $1,435,000
ENGINEERING COST = $2,803,000

STATE STREET (PRIORITY 2)
LENGTH = 1.31 MI. (US 231 TO MARSTELLER)
TOTAL COST = $19,790,000
ROADWAY CONSTRUCTION COST = $11,390,000
ARCHITECTUAL COMPONENTS COST = $2,190,000
UTILITY ADJUSTMENT COST = $1,499,000
TODD'S CREEK MITIGATION COST = $1,950,000
LAND ACQUISITION COST = $148,000
ENGINEERING COST = $2,613,000

ONE-WAY TO TWO-WAY CONVERSION
LENGTH = 3.30 MI.
TOTAL COST = $2,633,000
ROADWAY CONSTRUCTION COST = $2,250,000
ENGINEERING COST = $383,000

AIRPORT ROAD
LENGTH = 0.42 MI.
TOTAL COST = $153,000
ROADWAY CONSTRUCTION COST = $130,000
ENGINEERING COST = $23,000

McCORMICK ROAD & STADIUM
LENGTH = 1.07 MI.
TOTAL COST = $508,000
ROADWAY CONSTRUCTION COST = $433,000
ENGINEERING COST = $75,000

STADIUM AVENUE - WEST
LENGTH =0.49 MI.
TOTAL COST = $3,610,000
ROADWAY CONSTRUCTION COST = $1,810,000
UTILITY ADJUSTMENT COST = $1,266,000
LAND ACQUISITION COST = ASSUMED DONATED
ENGINEERING COST = $534,000

STADIUM AVENUE - EAST
LENGTH = 0.13 MI.
TOTAL COST = $398,000
ROADWAY CONSTRUCTION COST = $340,000
ENGINEERING COST = $58,000

RIVER ROAD
LENGTH = 0.57 MI.
TOTAL COST = $5,500,000
ROADWAY CONSTRUCTION COST = $4,700,000
LAND ACQUISITION COST = INCLUDED IN WILLIAMS ST.
ENGINEERING COST = $800,000

WILLIAMS STREET
LENGTH = 0.42 MI.
TOTAL COST = $10,164,000
ROADWAY CONSTRUCTION COST = $5,430,000
FREEHAFER DEMOLITION COST = $2,000,000
LAND ACQUISITION COST = $1,810,000
ENGINEERING COST = $924,000

RECONSTRUCTION COMPLETE

NOTE: SOLID LINE = RECONSTRUCTION
DASHED LINE = MILL AND RESURFACE
ALL COSTS ARE INFLATED TO 2018 (4%)
ENGINEERING COST INCLUDES DESIGN AND CI
UTILITY ADJUSTMENTS SCOPE AS DETERMINED BY PURDUE AND CITY OF WEST LAFAYETTE

PROJECT SCOPE SUMMARY

- NEW MULTI-LANE ROUNDABOUTS AT RIVER RD. & TAPAWINGO DR.
- 1TO 2 TRAVEL LANES EACH DIRECTION PLUS TURN LANES AS NEEDED WITH RAISED MEDIAN
- MILL EXISTING ROAD & WIDEN WHERE NECESSARY
- DEDICATED BICYCLE PATH ON NORTH SIDE OF STATE STREET
- NEW ROADWAY DRAINAGE INLETS AND MANHOLES
- NEW ARCHITECTURAL DESIGN, BUS STOPS, AND OUTDOOR SPACES
- NEW STREET LIGHTING AND NEW SIGNALIZED INTERSECTIONS

- 1TO 2 TRAVEL LANES EACH DIRECTION PLUS TURN LANES AS NEEDED WITH RAISED MEDIAN
- MILL EXISTING ROAD & WIDEN WHERE NECESSARY
- DEDICATED BICYCLE PATH ON NORTH SIDE OF STATE STREET
- NEW ROADWAY DRAINAGE INLETS AND MANHOLES
- NEW ARCHITECTURAL DESIGN, BUS STOPS, AND OUTDOOR SPACES
- NEW STREET LIGHTING AND NEW SIGNALIZED INTERSECTIONS
- NEW PEDESTRIAN CROSSING SIGNALS
- MITIGATE TODD'S DITCH BASED ON MITIGATION STUDY (ALT. NO. 2)

- MILL EXISTING ROAD AND RESURFACE
- NEW ROADWAY SIGNING AND PAVEMENT MARKINGS
- MODIFICATION OF EXISTING TRAFFIC SIGNALS FOR 2-WAY TRAFFIC

- MILL EXISTING ROAD AND RESURFACE
- NEW ROADWAY PAVEMENT MARKINGS

- MILL EXISTING ROAD AND RESURFACE
- NEW ROADWAY PAVEMENT MARKINGS

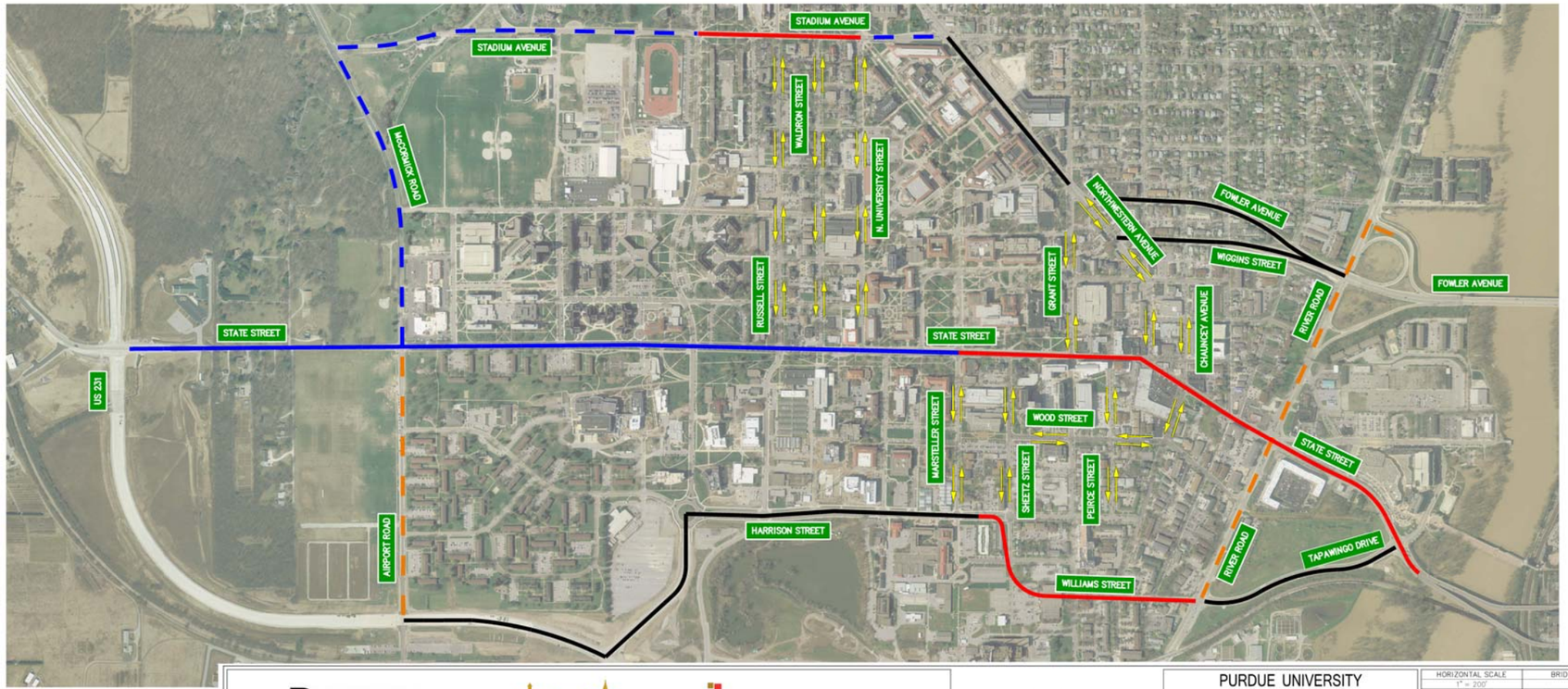
- FULL ROADWAY RECONSTRUCTION
- 2 LANES OF TRAFFIC IN EACH DIRECTION
- NEW SIDEWALK ON NORTH SIDE
- NEW ROADWAY DRAINAGE INLETS AND MANHOLES
- NEW TRAFFIC SIGNAL AT MARTIN JISCHKE DRIVE

- MILL EXISTING ROAD & WIDEN WHERE NECESSARY
- NEW ROADWAY PAVEMENT MARKINGS
- MODIFICATION OF EXISTING TRAFFIC SIGNAL

- NEW ROUNDABOUT AT WILLIAMS STREET
- NEW ROADWAY LIGHTING AT ROUNDABOUT
- MILL EXISTING ROAD AND RESURFACE WITH HMA
- NEW 4' CONCRETE CENTER CURB
- TWO NEW TRAFFIC SIGNALS AT RAMPS TO FOWLER AVENUE
- NEW SOUTHBOUND TO WESTBOUND CONNECTION TO LOOP RAMP

- NEW ROADWAY ALIGNMENT
- 2 LANES OF TRAFFIC IN EACH DIRECTION WITH RAISED MEDIAN
- NEW SIDEWALK AND MULTI-USE PATH
- NEW ROADWAY LIGHTING
- NEW ROADWAY DRAINAGE INLETS AND MANHOLES
- REMOVAL OF EXISTING BUILDINGS AND OBSRUCTIONS

TOTAL INTERIM IMPROVEMENTS COST = $67,450,000 (2018 DOLLARS, INCLUDES 5% CONTINGENCY)



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11/26/2014

DESIGNED: NRM	DRAWN: NRM
CHECKED: MJM	CHECKED: MJM

PURDUE UNIVERSITY
CITY OF WEST LAFAYETTE

STATE STREET & PERIMETER PARKWAY
PROJECT COST OVERVIEW
INTERIM IMPROVEMENTS

HORIZONTAL SCALE	BRIDGE FILE
1" = 200'	
VERTICAL SCALE	DESIGNATION NO.
SURVEY BOOK	SHEETS
	1 of 1
LAST UPDATED	PROJECT NO.
11/26/2014	

Figure 11 - Detailed Project Cost Overview and Scope Summary | State Street and Perimeter Parkway Resurface Alternate

LEGEND

STATE STREET (PRIORITY 1)
LENGTH = 0.85 MI. (MARSTELLER TO TAPAWINGO)
TOTAL COST = $21,477,000
- ROADWAY CONSTRUCTION COST = $13,390,000
- ARCHITECTUAL COMPONENTS COST = $3,090,000
- UTILITY ADJUSTMENT COST = $759,000
- LAND ACQUISITION COST = $1,435,000
- ENGINEERING COST = $2,803,000

STATE STREET (PRIORITY 2)
LENGTH = 1.31 MI. (US 231 TO MARSTELLER)
TOTAL COST = $20,226,000
- ROADWAY CONSTRUCTION COST = $11,390,000
- ARCHITECTUAL COMPONENTS COST = $2,190,000
- UTILITY ADJUSTMENT COST = $1,499,000
- TODD'S CREEK MITIGATION COST = $2,386,000
- LAND ACQUISITION COST = $148,000
- ENGINEERING COST = $2,613,000

ONE-WAY TO TWO-WAY CONVERSION
LENGTH = 3.30 MI.
TOTAL COST = $2,633,000
- ROADWAY CONSTRUCTION COST = $2,250,000
- ENGINEERING COST = $383,000

RIVER ROAD
LENGTH = 0.57 MI.
TOTAL COST = $5,500,000
- ROADWAY CONSTRUCTION COST = $4,700,000
- LAND ACQUISITION COST = INCLUDED IN WILLIAMS ST.
- ENGINEERING COST = $800,000

WILLIAMS STREET
LENGTH = 0.42 MI.
TOTAL COST = $10,164,000
- ROADWAY CONSTRUCTION COST = $5,430,000
- FREEHAFER DEMOLITION COST = $2,000,000
- LAND ACQUISITION COST = $1,810,000
- ENGINEERING COST = $924,000

RECONSTRUCTION COMPLETE
NOTE: SOLID LINE = RECONSTRUCTION
DASHED LINE = MILL AND RESURFACE
ALL COSTS ARE INFLATED TO 2018 (4%)
ENGINEERING COST INCLUDES DESIGN AND CI
UTILITY ADJUSTMENTS SCOPE AS DETERMINED BY PURDUE AND CITY OF WEST LAFAYETTE

TOTAL IMPROVEMENTS COST = $62,000,000 (2018 DOLLARS)

PROJECT SCOPE SUMMARY

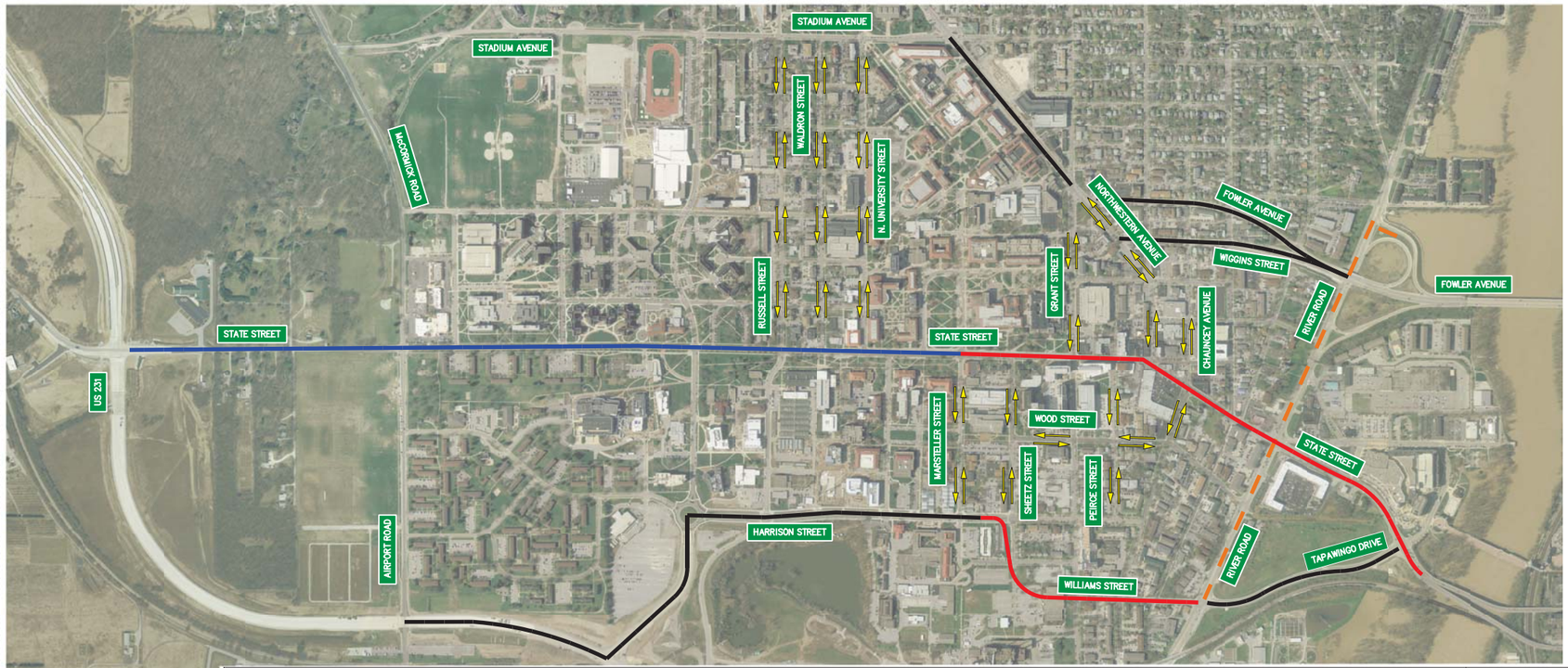
- NEW MULTI-LANE ROUNDABOUTS AT RIVER RD. & TAPAWINGO DR.
- 1TO 2 TRAVEL LANES EACH DIRECTION PLUS TURN LANES AS NEEDED WITH RAISED MEDIAN
- MILL EXISTING ROAD & WIDEN WHERE NECESSARY
- DEDICATED BICYCLE PATH ON NORTH SIDE OF STATE STREET
- NEW ROADWAY DRAINAGE INLETS AND MANHOLES
- NEW ARCHITECTURAL DESIGN, BUS STOPS, AND OUTDOOR SPACES
- NEW STREET LIGHTING AND NEW SIGNALIZED INTERSECTIONS

- 1TO 2 TRAVEL LANES EACH DIRECTION PLUS TURN LANES AS NEEDED WITH RAISED MEDIAN
- MILL EXISTING ROAD & WIDEN WHERE NECESSARY
- DEDICATED BICYCLE PATH ON NORTH SIDE OF STATE STREET
- NEW ROADWAY DRAINAGE INLETS AND MANHOLES
- NEW ARCHITECTURAL DESIGN, BUS STOPS, AND OUTDOOR SPACES
- NEW STREET LIGHTING AND NEW SIGNALIZED INTERSECTIONS
- NEW PEDESTRIAN CROSSING SIGNALS
- MITIGATE TODD'S DITCH BASED ON MITIGATION STUDY (ALT. NO. 2)

- MILL EXISTING ROAD AND RESURFACE
- NEW ROADWAY SIGNING AND PAVEMENT MARKINGS
- MODIFICATION OF EXISTING TRAFFIC SIGNALS FOR 2-WAY TRAFFIC

- NEW ROUNDABOUT AT WILLIAMS STREET
- NEW ROADWAY LIGHTING AT ROUNDABOUT
- MILL EXISTING ROAD AND RESURFACE WITH HMA
- NEW 4' CONCRETE CENTER CURB
- TWO NEW TRAFFIC SIGNALS AT RAMPS TO FOWLER AVENUE
- NEW SOUTHBOUND TO WESTBOUND CONNECTION TO LOOP RAMP

- NEW ROADWAY ALIGNMENT
- 2 LANES OF TRAFFIC IN EACH DIRECTION WITH RAISED MEDIAN
- NEW SIDEWALK AND MULTI-USE PATH
- NEW ROADWAY LIGHTING
- NEW ROADWAY DRAINAGE INLETS AND MANHOLES
- REMOVAL OF EXISTING BUILDINGS AND OBSRUCTIONS



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CITY OF WEST LAFAYETTE

STATE STREET
PROJECT COST OVERVIEW

HORIZONTAL SCALE	BRIDGE FILE
1" = 200'	
VERTICAL SCALE	DESIGNATION NO.
SURVEY BOOK	SHEETS
	1 of 1
LAST UPDATED	PROJECT NO.
11/26/2014	

Figure 12 - Detailed Project Cost Overview and Scope Summary | State Street Standalone and Critical Segments of Perimeter Parkway

Figure 13 - Project Cost Overview | State Street and Perimeter Parkway Full Build

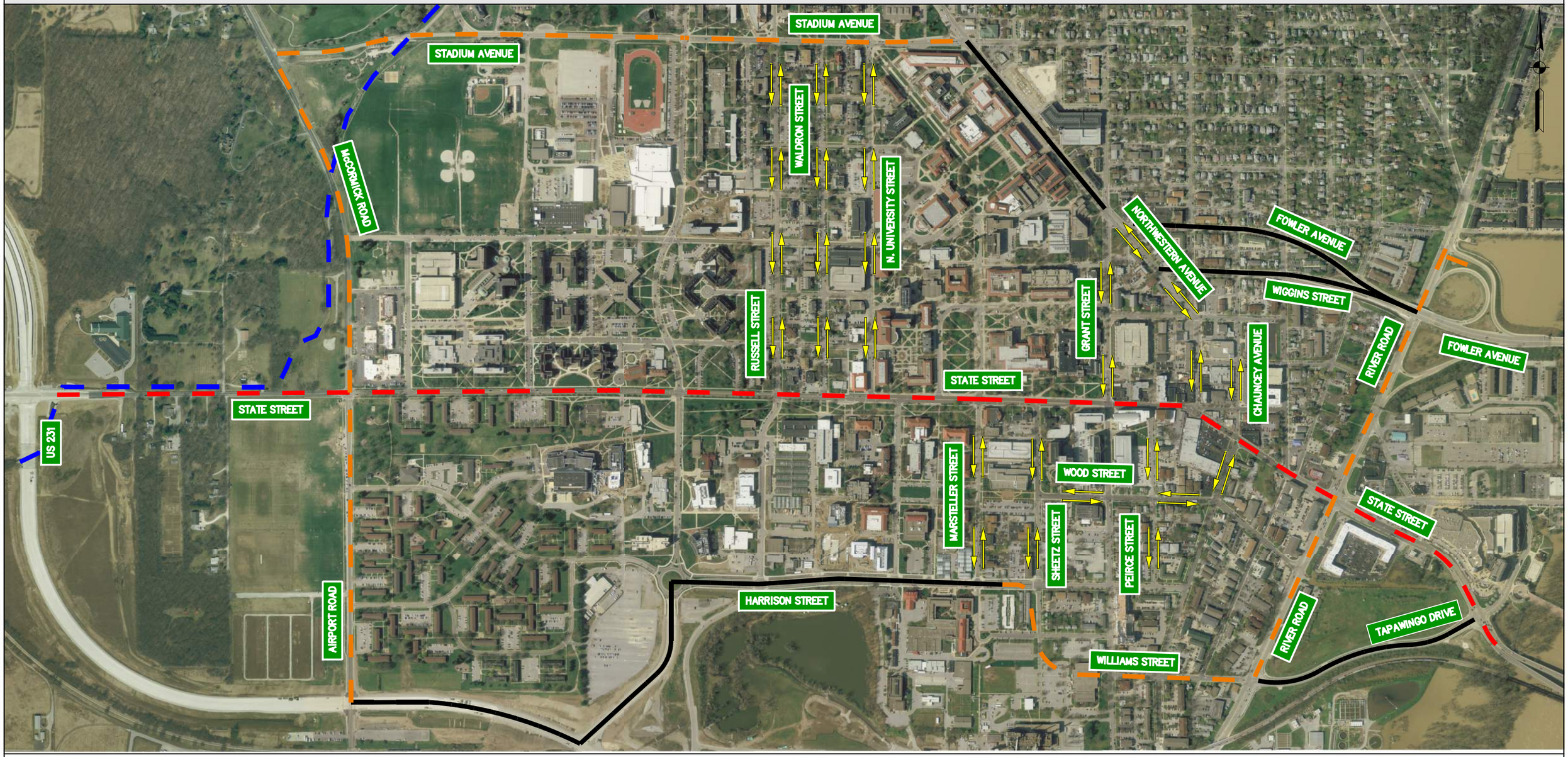
STATE STREET TOTAL COST = $46,100,000
LENGTH = 2.16 MI. (US 231 TO TAPAWINGO)
ONE-WAY TO TWO-WAY CONVERSION ( )
TODD'S CREEK ( )

+

PERIMETER PARKWAY, FULL RECONSTRUCTION, COST = $33,200,000
LENGTH = 3.10 MILES

=

TOTAL COST= $79,300,000



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CITY OF WEST LAFAYETTE

STATE STREET & PERIMETER PARKWAY
PROJECT COST OVERVIEW

HORIZONTAL SCALE	BRIDGE FILE
1" = 200'	
VERTICAL SCALE	DESIGNATION NO.
SURVEY BOOK	SHEETS
	1 of 1
LAST UPDATED	PROJECT NO.
10/30/2014	

Figure 14 - Project Cost Overview | State Street Standalone and Critical Segments of Perimeter Parkway

ROADWAY CONSTRUCTION

TODD'S CREEK

ONE-WAY TO TWO-WAY CONVERSION ( )

= $62,000,000

TOTAL COST= $62,000,000
(INCLUDES CONTINGENCY)

STADIUM AVENUE
STADIUM AVENUE
McCORMICK ROAD
WALDRON STREET
N. UNIVERSITY STREET
RUSSELL STREET
NORTHWESTERN AVENUE
FOWLER AVENUE
WIGGINS STREET
GRANT STREET
CHAUNCEY AVENUE
RIVER ROAD
FOWLER AVENUE
STATE STREET
STATE STREET
US 231
MARSTELLER STREET
WOOD STREET
SHEETZ STREET
PEIRCE STREET
STATE STREET
AIRPORT ROAD
HARRISON STREET
RIVER ROAD
TAPAWINGO DRIVE
WILLIAMS STREET

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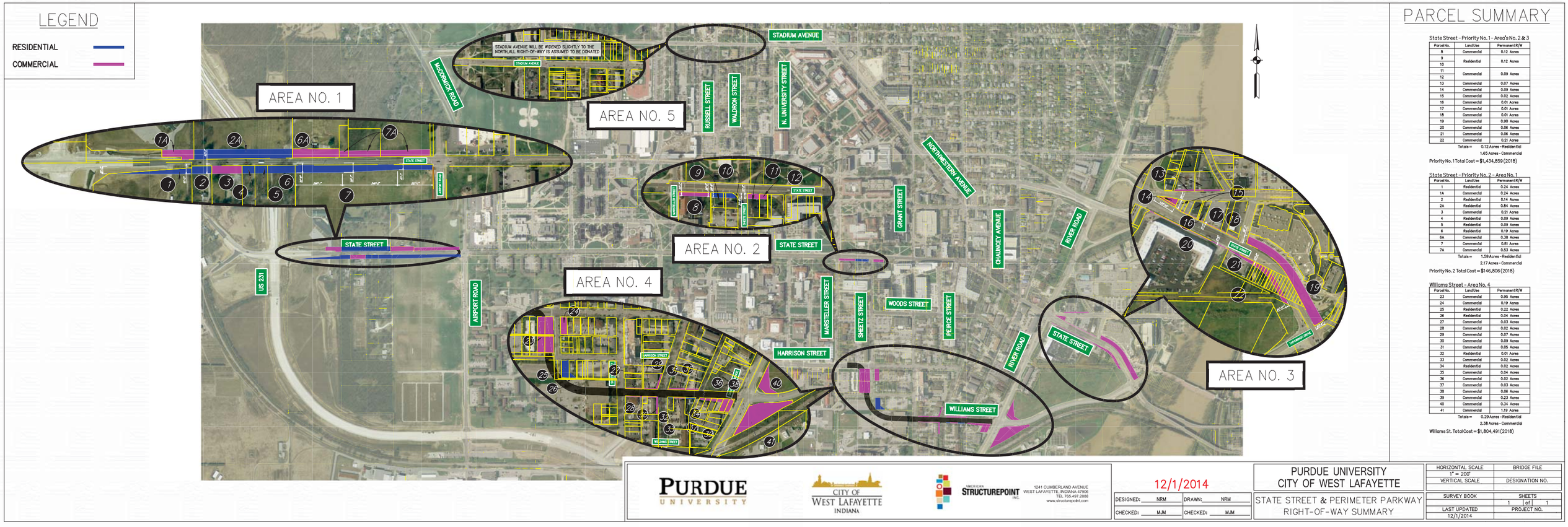
CITY OF WEST LAFAYETTE

STATE STREET
PROJECT OVERVIEW

HORIZONTAL SCALE	BRIDGE FILE
1" = 200'	
VERTICAL SCALE	DESIGNATION NO.
SURVEY BOOK	SHEETS
	1 of 1
LAST UPDATED	PROJECT NO.
11/26/2014	



PARCEL SUMMARY

State Street - Priority No. 1 - Area's No. 2 & 3

Parcel No.	Land Use	Permanent R/W
8	Commercial	0.12 Acres
9	Residential	0.12 Acres
10		
11	Commercial	0.09 Acres
12		
13	Commercial	0.07 Acres
14	Commercial	0.09 Acres
15	Commercial	0.02 Acres
16	Commercial	0.01 Acres
17	Commercial	0.01 Acres
18	Commercial	0.01 Acres
19	Commercial	0.90 Acres
20	Commercial	0.06 Acres
21	Commercial	0.06 Acres
22	Commercial	0.21 Acres

Totals = 0.12 Acres - Residential
1.65 Acres - Commercial

Priority No. 1 Total Cost = $1,434,859 (2018)

State Street - Priority No. 2 - Area No. 1

Parcel No.	Land Use	Permanent R/W
1	Residential	0.24 Acres
1A	Commercial	0.24 Acres
2	Residential	0.14 Acres
2A	Residential	0.84 Acres
3	Commercial	0.21 Acres
4	Residential	0.09 Acres
5	Residential	0.09 Acres
6	Residential	0.19 Acres
6A	Commercial	0.38 Acres
7	Commercial	0.81 Acres
7A	Commercial	0.53 Acres

Totals = 1.59 Acres - Residential
2.17 Acres - Commercial

Priority No. 2 Total Cost = $146,806 (2018)

Williams Street - Area No. 4

Parcel No.	Land Use	Permanent R/W
23	Commercial	0.95 Acres
24	Commercial	0.19 Acres
25	Residential	0.22 Acres
26	Residential	0.04 Acres
27	Commercial	0.03 Acres
28	Commercial	0.02 Acres
29	Commercial	0.07 Acres
30	Commercial	0.09 Acres
31	Commercial	0.05 Acres
32	Residential	0.01 Acres
33	Commercial	0.02 Acres
34	Residential	0.02 Acres
35	Commercial	0.04 Acres
36	Commercial	0.02 Acres
37	Commercial	0.03 Acres
38	Commercial	0.06 Acres
39	Commercial	0.23 Acres
40	Commercial	0.24 Acres
41	Commercial	1.19 Acres

Totals = 0.29 Acres - Residential
2.38 Acres - Commercial

Williams St. Total Cost = $1,804,491 (2018)

Figure 15 - Right-of-Way Impacts Summary | State Street and Perimeter Parkway

5.3 Roadway Segments Not Included

Construction of the following roadway segments is not included in the cost estimates:

- Harrison Street from Airport Road to Williams Street
- Tapawingo Drive from River Road to State Street
- Northwestern Avenue from Stadium Avenue to Fowler Avenue
- Fowler Avenue
- Wiggins Street

5.4 Value Engineering Ideas

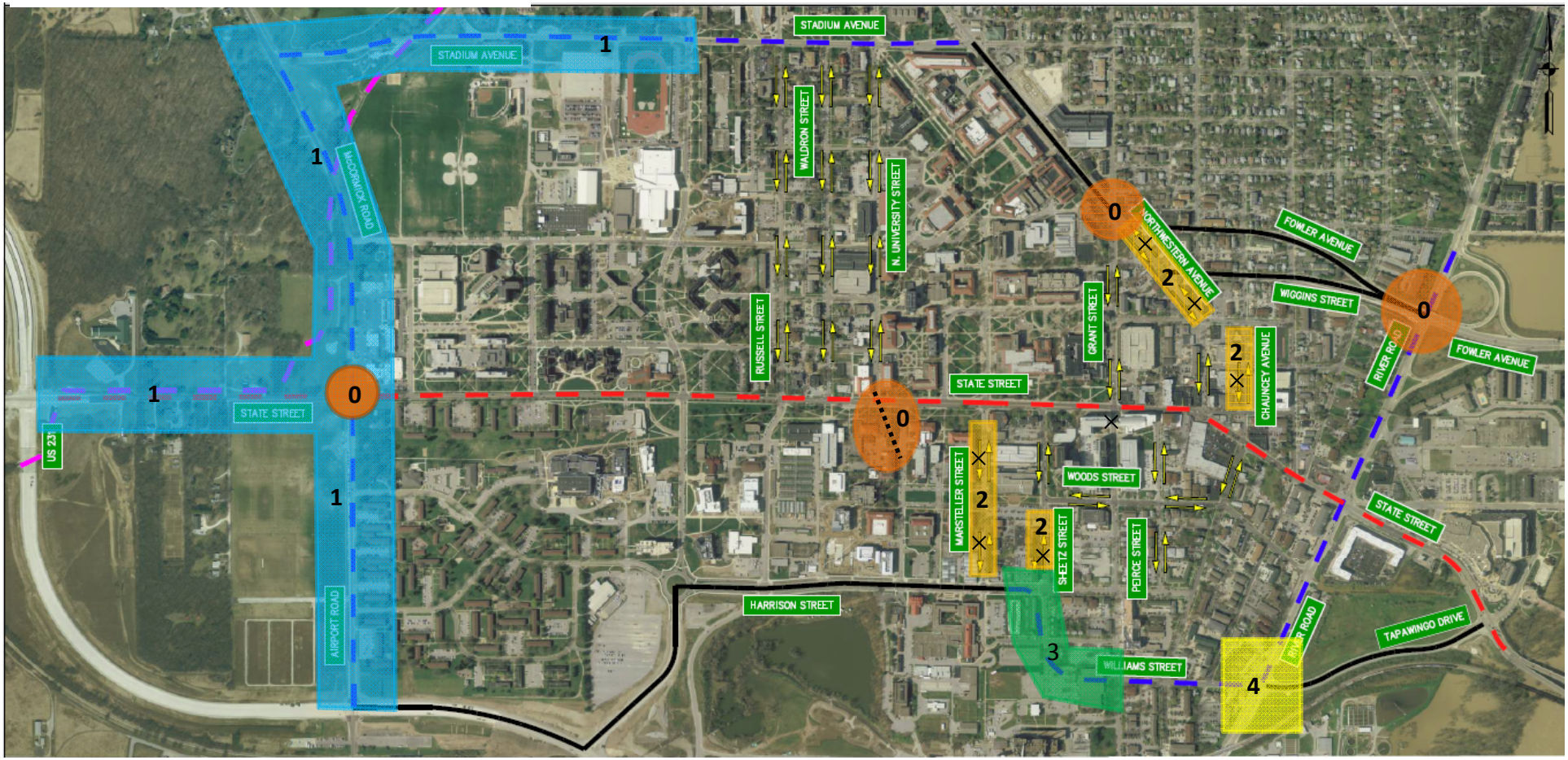
Additional options were investigated in order to reduce cost while still maintaining the functionality of the roadway segments. Figure 16 shows the location and additional description of value engineering items. It is anticipated that during the plan development and design phase of this project, additional value engineering options can be evaluated that could result in additional cost savings on the overall project. The following items are listed with their respective cost savings:

VE Idea	Description	Construction Cost Savings
1	Reduce Airport Road, McCormick Road, and Stadium Avenue to 2-lane sections	$2,700,000
2	Reduce number of streets converted from "One Way" to "Two Way" traffic	$500,000
3	Reduce Williams Street to a 2-lane section, and construct a single lane roundabout at Williams/Harrison & Sheetz	$1,400,000
4	Reconstruct a conventional intersection at Williams Street and River Road instead of a roundabout	*Negligible
	Total Potential Savings from Value Engineering for Full Build Option:	**$4,600,000 (~6% of Full-Build Cost)**
	Total Potential Savings from Value Engineering for State Street Standalone Option:	**$1,900,000 (~3% of State Street Standalone Cost)**

Figure 16 - Value Engineering Ideas

Purdue Traffic Synthesis – State Street

Cost Saving / VE Ideas



Cost Saving / VE Idea # 1:
- Reduce from 4-lane section to 2-lane section based on capacity analysis

ANTICIPATED SAVINGS = ~$2.7M

Cost Saving / VE Idea # 2:
- 2-way conversion not required based on capacity analysis

ANTICIPATED SAVINGS = ~$500K

Cost Saving / VE Idea # 3:
- Reduce from 4-lane section to 2-lane section
- Single lane roundabout at Williams/Harrisson & Sheetz

ANTICIPATED SAVINGS = ~$1.4M

Cost Saving / VE Idea # 4:
- Keep it as existing signalized intersection instead of roundabout

ANTICIPATED SAVINGS = BREAK-EVEN
QUASI-TANGIBLE BENEFITS = TRAVEL TIME SAVINGS DURING MOT, FASTER CONSTRUCTION

Potential Alternate Ideas – ADDITIONAL COST – "0"
- Single lane roundabout at State Street & Airport Road
- University Street realignment for N/S connectivity
- Dual lane roundabout at Northwestern & Grant Street
- Interchange modification at Fowler / Wiggins

Total Anticipated Cost Savings = ~$4.6M (Approx. 6% of Full Build Cost)

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Ideas identified as "0" in Figure 16 and briefly discussed below will result in additional cost but are identified as potential alternate solutions at certain intersections/segments along the studied corridors of Perimeter Parkway and State Street for future consideration by the stakeholders:

1. Single lane roundabout instead of traffic signal at the intersection of State Street & McCormick Road/Airport Road. This could also serve as a gateway entrance to the University campus from the west.
2. Dual lane roundabout at the intersection of Northwestern Avenue & Grant Street would function at an acceptable level of service but may require additional right-of-way.
3. Additional modifications at River Road & Fowler Avenue/Wiggins Street interchange including roundabout controlled ramps as discussed in the previous study performed by BFS would result in additional improvements to the traffic flow along the River Road corridor and could help make Perimeter Parkway more appealing.
4. Realigning University Street through State Street could result in better north/south connectivity between the campus but this may need further evaluation on impacts to the existing University buildings in the vicinity of State Street and existing utilities in the area.

Additional costs associated with the above ideas are not evaluated in this report.

VE Ideas # 1 & 3, as shown in Figure 16, were identified based on the results of traffic capacity analysis. It was found that a two lane section with exclusive turn lanes at various intersections would be sufficient from a capacity standpoint along portions of the Perimeter Parkway corridor. Hence, reducing to a two lane section results in $2.7M of cost savings under the full build option *(Note: If resurface alternate is considered by the stakeholders, a two lane section would result in $9.1M of cost savings)*. This VE option should be given consideration from both the cost-savings standpoint and the standpoint of consistency on the overall parkway. It may not be worth saving this amount when compared with the total project cost (from a magnitude stand point) for the full build option. A more than adequate capacity addition (i.e. a four lane section on the entire Perimeter Parkway corridor) will maintain consistency with some of the existing sections of the corridor and maintain the original intent of the four lane Perimeter Parkway concept. Additionally, it could also make Perimeter Parkway an obvious attractive route (beltway) around the university campus for its employees with faster travel time to their respective offices and correspondingly an assurance for the stakeholders in getting a significant amount of traffic diverted from State Street to the parkway corridor.

In order to determine the costs for Item # 4, as shown in Figure 16, a preliminary layout for the intersection was developed. This was necessary to determine quantities as well as verify whether the conventional intersection would work with the existing terrain. The intersection layout is shown in Figure 17. Since the existing Williams Street profile ties in to River Road with a very steep grade, vehicles currently traveling through the intersection from Tapawingo Drive experience a sudden grade break. This causes drivers to slow down and affects the capacity of the intersection. When the Perimeter Parkway is constructed, this will become a more heavily utilized segment and a more continuous through movement is necessary to accommodate traffic.

Preliminary profiles and cross sections were developed for the layout and are included in Appendix E. By raising the intersection approximately five feet and transitioning River Road to a reverse crown section, a

profile grade was developed that could meet standard roadway criteria to maintain traffic through the intersection. The grade on Williams Street would be adjusted to 7% and tie in to the top of the existing hill. The 7% grade would flatten the existing grade, requiring about 4 feet of earth fill to be placed on the hill. In order to minimize adverse effects to adjacent properties and buildings, earth retaining walls would be used along the outside limits of the adjacent sidewalk. From a construction cost standpoint, the roundabout and conventional intersection are comparable; however, the conventional intersection would provide anticipated savings in travel time during construction and would be able to be built faster.

Figure 17 – Williams Street Conventional Intersection (VE Alternate for Cost Savings)

6.0 Construction Phasing, Project Schedule and Delivery Alternates

6.1 Construction Phasing and Sequencing

Based on several brainstorming meetings with the stakeholders, a preliminary idea was conceptualized as shown in Figure 18 for the construction phasing and sequencing of improvements that are identified as part of the current scope of the State Street corridor only. River Road at the Fowler Avenue Interchange and the Williams Street Realignment segments shown in green are critical segments for State Street construction and need to be implemented first. The State Street segment between US 231 and Grant Street as shown in cyan/blue could be closed for construction with the minor side streets open to traffic. The State Street segment between Grant Street and Tapawingo Drive must remain open to traffic at all times during construction; however, the roundabout at State and Tapawingo could be constructed in phasing as shown in Figure 19.

There are two alternates proposed for the River Road and Williams Street/Tapawingo Drive intersection, one with a roundabout and one with a conventional signalized intersection. Proposed construction sequencing for a roundabout at this location is shown in Figure 20, as this is the preferred alternative of the stakeholders and it would be the more challenging alternate from a construction standpoint.

Figure 18 - Concept for Construction Phasing and Sequencing

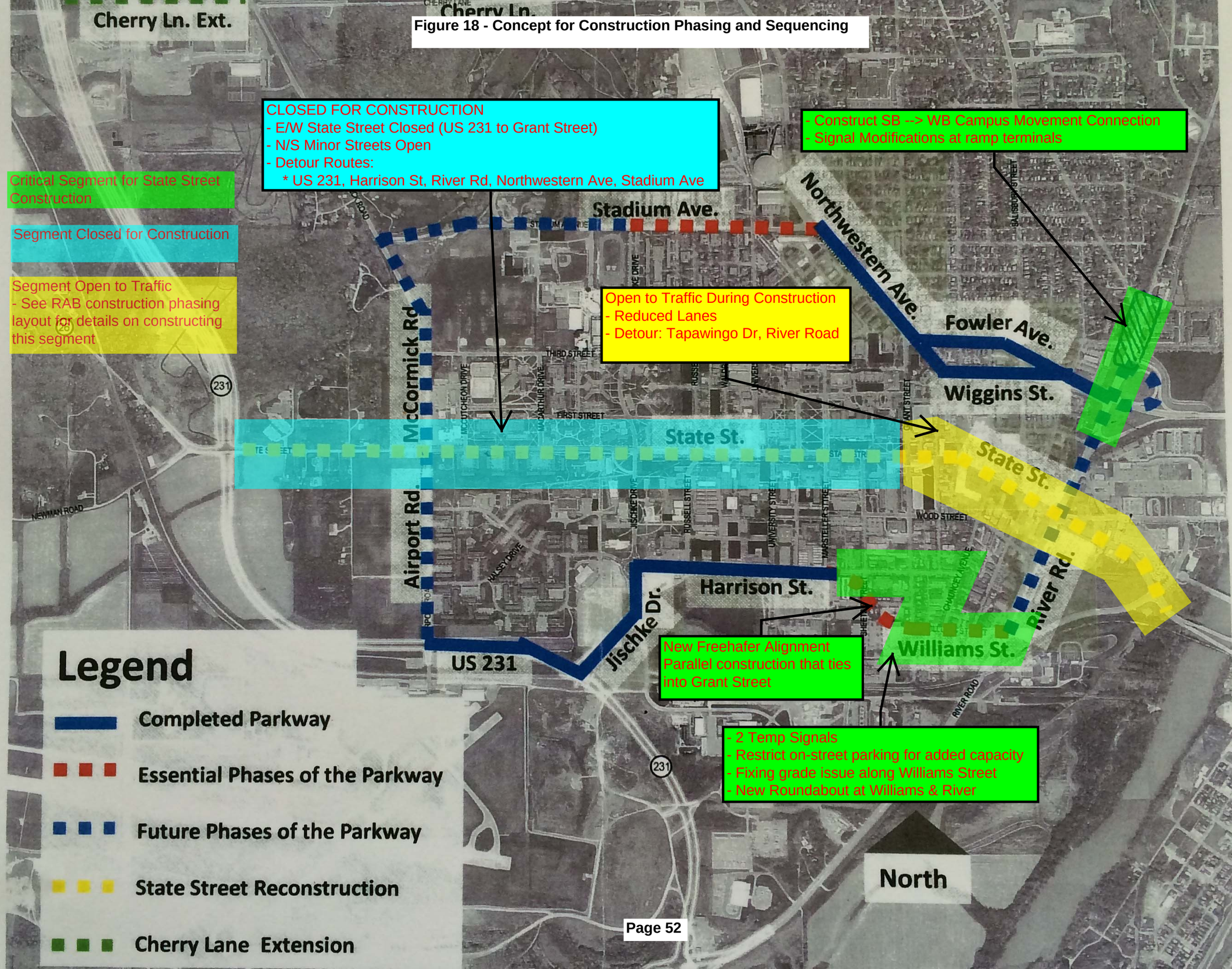


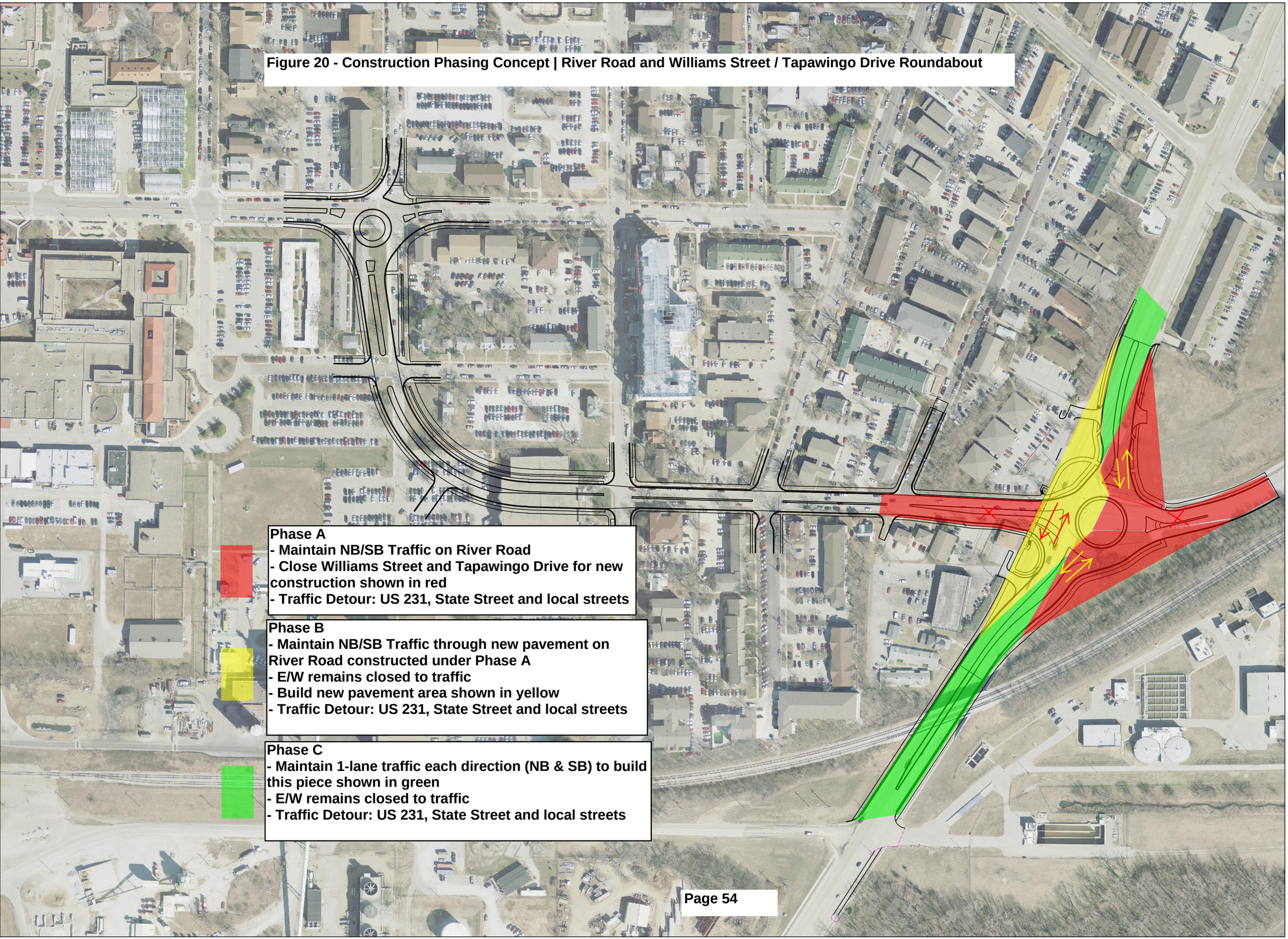
Figure 19 - Construction Phasing Concept | State Street and Tapawingo Drive Roundabout

Phase A
- Maintain EB/WB traffic on State Street and SB left and right turning traffic on Tapawingo Drive
- Construct new pavement shown in red
- Close south leg of Tapawingo Drive parallel to the closer for Williams Street RAB construction
- Traffic Detour: State Street

Phase B
- Maintain EB/WB traffic on State Street and SB left and right turning traffic on Tapawingo Drive through new pavement constructed under Phase A
- Build the segment shown in yellow
- Keep south leg of Tapawingo Drive closed until Williams Street RAB construction is completed
- Traffic Detour: State Street

Possible Cost Saving Ideas that can also accelerate construction timing for this segment of the roadway (only if it is viewed as a viable option by the City, Purdue and PRF):
1. Salvage existing pavement along Tapawingo Drive instead of full depth reconstruction
2. Salvage existing pavement along East leg of State Street instead of full depth reconstruction

Figure 20 - Construction Phasing Concept | River Road and Williams Street / Tapawingo Drive Roundabout



6.2 Project Schedule and Delivery Alternates

Project Schedule Overview

The schedule presented in this section is for the Standalone State Street Corridor Project estimated at $62 million as summarized in Section 5 of this report. The Standalone State Street Corridor Project was defined as the basis of the schedule by Purdue University and City of West Lafayette. They also specified that it should include all the components of Perimeter Parkway that are critical and necessary for State Street corridor construction. The schedule is based on a typical design/bid/build procurement model and is broken into segments of independent utility from a construction standpoint. Each segment has the following common assumptions:

- Goal is for all construction activity to be completed by end of 2018
- All activity durations are listed in elapsed calendar days
- The traffic synthesis study report activity will be substantially completed by the end of November 2014.
- The bidding activity includes the advertisement, bidding, and contract award process taking 60 days.
- Preference to maximize construction activity during Purdue University's summer sessions, which are mid-May to mid-August, and to avoid traffic and pedestrian disruptions during other time periods as much as possible.
- Assumes an accelerated land acquisition process, when noted, through the use of a right-of-way incentive program similar to one utilized by the Indiana Department of Transportation (INDOT). See Appendix F. The incentive program is designed and intended to provide motivation to the property owner to sign and accept an offer to purchase, and all conveyance documents, within 30 calendar days of receiving the offer. This program offers the property owner a 10% incentive payment for acquisition of needed right-of-way in exchange for accepting an offer within 30 days. This program also includes a 10% incentive payment for parcels requiring relocation if the tenant relocates in less than 90 days.
- Assumes no federal funding involved in the project except as noted below for the Williams Street construction from Harrison Street to Grant Street.

A detailed CPM schedule and a color coded visual map are shown in Figures 21 & 22. Specifics regarding the segments include:

1. River Road at Fowler Avenue Interchange Modifications
    a. Targeted a construction window of Purdue's Summer Break 2015
    b. Need field survey work to begin design immediately
    c. Assumes no land acquisition or utility relocations required
    d. Assumes no roadway closures are required

2. Williams Street from Grant Street to River Road
    a. Targeted a 2016 construction season
    b. Includes profile grade and intersection improvement of Grant Street at Williams Street.
    c. Includes installation of temporary traffic signals at Harrison Street and Grant Street, and Grant Street and Williams Street.
    d. Need field survey work to begin design immediately
    e. Assumes an accelerated land acquisition process with incentives
    f. An aggressive and proactive utility coordination process is required
    g. Assumes Williams Street and Tapawingo Drive are closed to through traffic

h. Assumes River Road is phased maintenance of traffic and open to through traffic at all times during construction

3. Todd's Creek Relocation
    a. Targeted a 2016 construction season
    b. An aggressive and extensive waterway permitting process with IDNR, IDEM and USACOE is required

4. State Street from US 231 to Airport Road
    a. Targeted a 2016 construction season simultaneously with Todd's Creek Relocation construction
    b. Assumes all right-of-way will be quickly transferred from Purdue to the City of West Lafayette during an aggressive land acquisition process, and that the Church will be a cooperative seller
    c. Assumes State Street will be closed to through traffic. Access to all property owners and businesses will be provided by the contractor through temporary means.

5. State Street from Airport Road to University Street
    a. Targeted a 2017 construction season immediately following State Street from US 231 to Airport Road.
    b. Assumes Williams Street improvements from Grant Street to River Road are completed for use of the Perimeter Parkway as a detour route

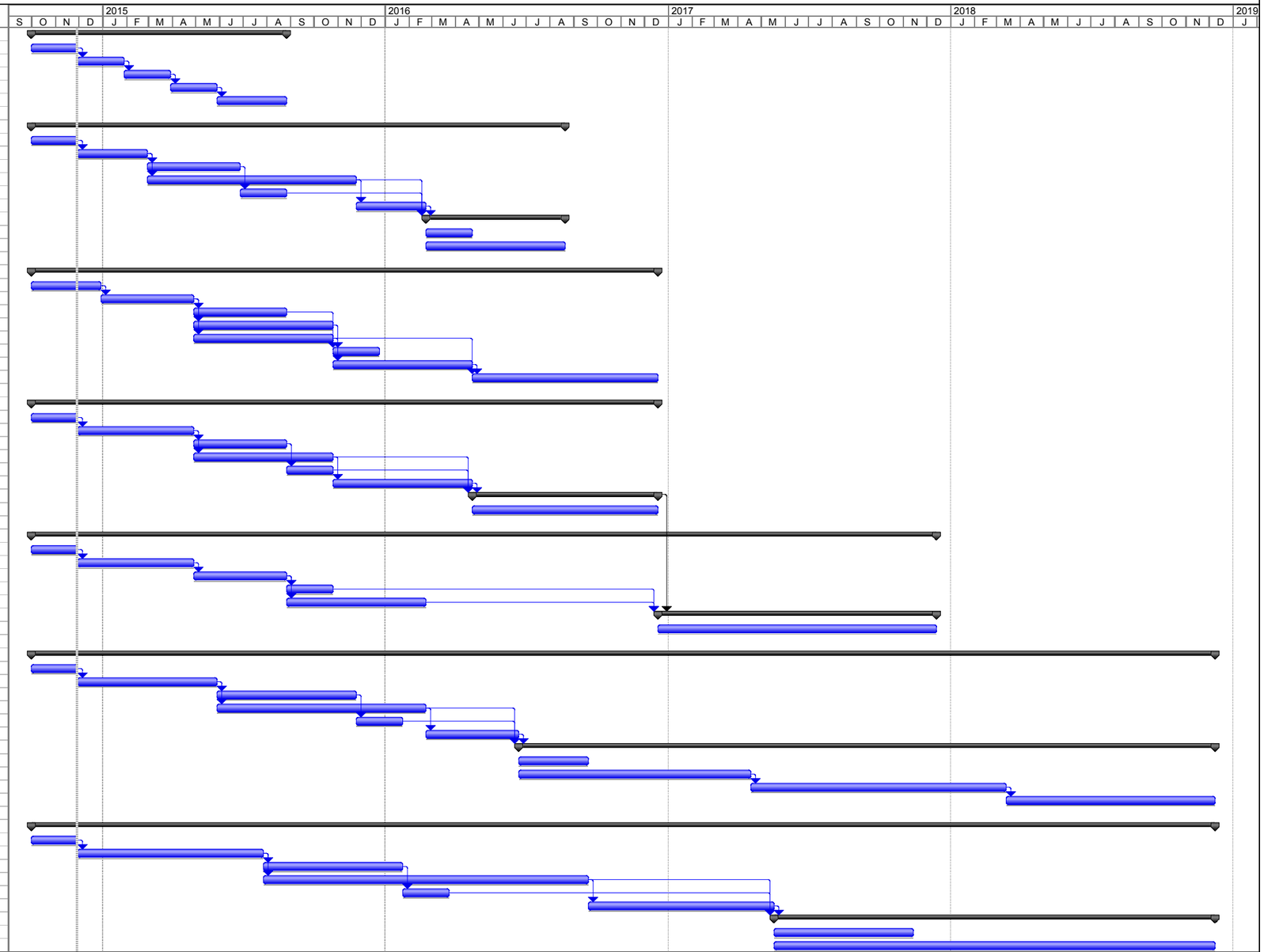
6. State Street from University Street to Tapawingo Drive
    a. Assumes construction will be split into 3 sub-segments to minimize impacts to adjacent property and business owners along State Street
        i. River Road to Tapawingo Drive: Targeted 2016 construction season
        ii. Grant Street to River Road: Targeted 2017 construction season
        iii. University Street to Grant Street: Targeted 2018 construction season
    b. Assumes full closure of the south leg of the intersection of Tapawingo Drive with State Street to occur simultaneously with the closure of Williams Street from Grant Street to River Road.
    c. Assumes phased maintenance of traffic of all sub-segments of State Street with all traffic movements being open and provided for during construction.
    d. Assumes an accelerated land acquisition process with incentives
    e. An aggressive and proactive utility coordination process is required

7. Williams Street from Harrison Street to Grant Street
    a. Targeted a 2017 and 2018 construction season
    b. Assumes Freehafer Hall is vacated by May 2017
    c. Assumes phased maintenance of traffic for the roundabout construction at Harrison Street and Sheetz Street with all traffic movements being open and provided for during construction. Also assumes that this intersection be constructed and completed early while the new alignment construction occurs simultaneously.
    d. Assumes a project development process and timeline in accordance with the INDOT requirements for use of federal funds.

Figure 21 - Detailed CPM Schedule for Traditional Design Bid Build Procurement Model for State Street Standalone Option

State Street & Perimeter Parkway
Project Schedule Overview

ID	Task Name	Duration	Start	Finish	Predecessors
1	**1. River Road @ Fowler Ave (Interchange Modifications)**	**236 days**	**Wed 10/1/14**	**Thu 8/27/15**	
2	Traffic Study	60 edays	Wed 10/1/14	Sun 11/30/14	
3	Preliminary Design	60 edays	Sun 11/30/14	Thu 1/29/15	2
4	Final Design	60 edays	Thu 1/29/15	Mon 3/30/15	3
5	Bidding	60 edays	Mon 3/30/15	Fri 5/29/15	4
6	Construction	90 edays	Fri 5/29/15	Thu 8/27/15	5
7					
8	**2. Williams Street (Grant St to River Road)**	**493 days**	**Wed 10/1/14**	**Sun 8/21/16**	
9	Traffic Study	60 edays	Wed 10/1/14	Sun 11/30/14	
10	Preliminary Design	90 edays	Sun 11/30/14	Sat 2/28/15	9
11	Final Design	120 edays	Sat 2/28/15	Sun 6/28/15	10
12	Land Acquisition	270 edays	Sat 2/28/15	Wed 11/25/15	10
13	Bidding	60 edays	Sun 6/28/15	Thu 8/27/15	11
14	Utility Relocation	90 edays	Wed 11/25/15	Tue 2/23/16	12
15	**Construction**	**129 days**	**Tue 2/23/16**	**Sun 8/21/16**	**12,14,13**
16	Temp. Signals on Harrison & Grant St	60 edays	Tue 2/23/16	Sat 4/23/16	
17	Williams St & Tapawingo Dr. Closure	180 edays	Tue 2/23/16	Sun 8/21/16	
18					
19	**3. Todd's Creek Relocation**	**578 days**	**Wed 10/1/14**	**Mon 12/19/16**	
20	Drainage Study	90 edays	Wed 10/1/14	Tue 12/30/14	
21	Preliminary Design	120 edays	Tue 12/30/14	Wed 4/29/15	20
22	Final Design	120 edays	Wed 4/29/15	Thu 8/27/15	21
23	Permitting	180 edays	Wed 4/29/15	Mon 10/26/15	21
24	Land Acquisition	180 edays	Wed 4/29/15	Mon 10/26/15	21
25	Bidding	60 edays	Mon 10/26/15	Fri 12/25/15	22,23
26	Utility Relocation	180 edays	Mon 10/26/15	Sat 4/23/16	24
27	Construction	240 edays	Sat 4/23/16	Mon 12/19/16	24,26
28					
29	**4. State St. (US 231 to Airport Rd)**	**578 days**	**Wed 10/1/14**	**Mon 12/19/16**	
30	Traffic Study	60 edays	Wed 10/1/14	Sun 11/30/14	
31	Preliminary Design	150 edays	Sun 11/30/14	Wed 4/29/15	30
32	Final Design	120 edays	Wed 4/29/15	Thu 8/27/15	31
33	Land Acquisition	180 edays	Wed 4/29/15	Mon 10/26/15	31
34	Bidding	60 edays	Thu 8/27/15	Mon 10/26/15	32
35	Utility Relocation	180 edays	Mon 10/26/15	Sat 4/23/16	33
36	**Construction**	**170 days**	**Sat 4/23/16**	**Mon 12/19/16**	**33,34,35**
37	State Street Closure	240 edays	Sat 4/23/16	Mon 12/19/16	
38					
39	**5. State St. (Airport Rd to University St.)**	**836 days**	**Wed 10/1/14**	**Thu 12/14/17**	
40	Traffic Study	60 edays	Wed 10/1/14	Sun 11/30/14	
41	Preliminary Design	150 edays	Sun 11/30/14	Wed 4/29/15	40
42	Final Design	120 edays	Wed 4/29/15	Thu 8/27/15	41
43	Bidding	60 edays	Thu 8/27/15	Mon 10/26/15	42
44	Utility Relocation	180 edays	Thu 8/27/15	Tue 2/23/16	42
45	**Construction**	**258 days**	**Mon 12/19/16**	**Thu 12/14/17**	**43,44,36**
46	State Street Closure	360 edays	Mon 12/19/16	Thu 12/14/17	
47					
48	**6. State St. (University St. to Tapawingo Dr.)**	**1093 days**	**Wed 10/1/14**	**Sun 12/9/18**	
49	Traffic Study	60 edays	Wed 10/1/14	Sun 11/30/14	
50	Preliminary Design	180 edays	Sun 11/30/14	Fri 5/29/15	49
51	Final Design	180 edays	Fri 5/29/15	Wed 11/25/15	50
52	Land Acquisition	270 edays	Fri 5/29/15	Tue 2/23/16	50
53	Bidding	60 edays	Wed 11/25/15	Sun 1/24/16	51
54	Utility Relocation	120 edays	Tue 2/23/16	Wed 6/22/16	52
55	**Construction**	**643 days**	**Wed 6/22/16**	**Sun 12/9/18**	**52,53,54**
56	Tapawingo Dr. South Leg Closure	90 edays	Wed 6/22/16	Tue 9/20/16	
57	Phased River Rd to Tapawingo Dr	300 edays	Wed 6/22/16	Tue 4/18/17	
58	Phased Grant St. to River Rd	330 edays	Tue 4/18/17	Wed 3/14/18	57
59	Phased University St. to Grant St.	270 edays	Wed 3/14/18	Sun 12/9/18	58
60					
61	**7. Williams Street (Harrison St to Grant St)**	**1093 days**	**Wed 10/1/14**	**Sun 12/9/18**	
62	Traffic Study	60 edays	Wed 10/1/14	Sun 11/30/14	
63	Preliminary Design	240 edays	Sun 11/30/14	Tue 7/28/15	62
64	Final Design	180 edays	Tue 7/28/15	Sun 1/24/16	63
65	Land Acquisition	420 edays	Tue 7/28/15	Tue 9/20/16	63
66	Bidding	60 edays	Sun 1/24/16	Thu 3/24/16	64
67	Utility Relocation	240 edays	Tue 9/20/16	Thu 5/18/17	65
68	**Construction**	**407 days**	**Thu 5/18/17**	**Sun 12/9/18**	**65,66,67**
69	Phased Roundabout @ Harrison St & Sheetz St	180 edays	Thu 5/18/17	Tue 11/14/17	
70	New Alignment Williams St. Construction	570 edays	Thu 5/18/17	Sun 12/9/18	



Project: Purdue State Street
Date: Fri 11/28/14

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

Draft 11-29-14

Figure 22 - Visual Map Summarizing Segments/Tasks to match CPM Schedule

1. RIVER ROAD @ FOWLER AVE
(INTERCHANGE MODIFICATIONS)

2. WILLIAMS STREET
(GRANT ST. TO RIVER RD.)

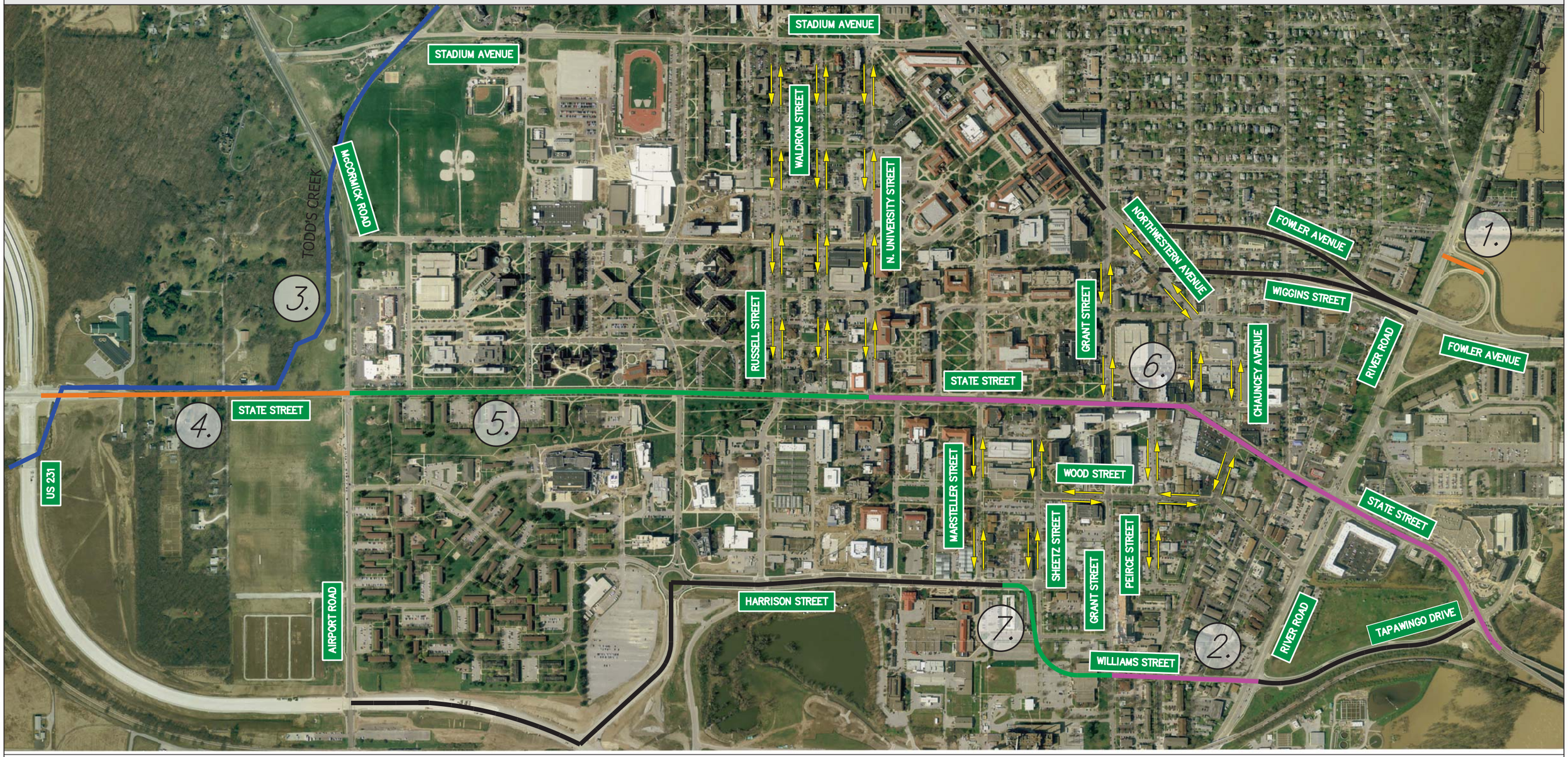
3. TODD'S CREEK

4. STATE STREET
(US 231 TO AIRPORT RD.)

5. STATE STREET
(AIRPORT RD. TO UNIVERSITY ST.)

6. STATE STREET
(UNIVERSITY ST. TO TAPAWINGO DR.)

7. WILLIAMS STREET
(HARRISON ST. TO GRANT ST.)



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12/1/2014

DESIGNED: NRM	DRAWN: NRM
CHECKED: MJM	CHECKED: MJM

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STATE STREET & PERIMETER PARKWAY
PROJECT SCHEDULE OVERVIEW

HORIZONTAL SCALE	BRIDGE FILE
1" = 200'	
VERTICAL SCALE	DESIGNATION NO.
SURVEY BOOK	SHEETS
	1 of 1
LAST UPDATED	PROJECT NO.
12/1/2014	

Project Delivery Alternates

A carefully chosen project delivery method can help overcome/prevent many project challenges. Project delivery is simply the contractual structure for how the final project is designed and constructed/delivered to the owner. There are several types of project delivery alternates, but the two common types that apply to this project the most are design-bid-build and design-build (with or without financing option). The appropriateness of any given project delivery alternate varies depending on the goals of the project, time constraints, cost constraints, party at risk and existing constraints at the site.

The proposed recommendation for the project schedule in this study focuses on the traditional design-bid-build delivery method. Since Purdue University and the City of West Lafayette are considering other project delivery and procurement alternates (i.e. Public Private Partnership), it is highly recommended that they properly investigate such project delivery alternates, along with their potential for success or failure when compared to the traditional approach. This section of the report provides some advantages and disadvantages that should be considered before making a decision on which method to choose for a given project. Some of the guidelines and information is available through USDOT and FHWA which are defined as policy guidelines for some major capital transportation projects.

Design-Bid-Build (DBB)

Advantages

- Owner has full control of the design and construction of the project
- Design is complete prior to construction award and any changes are easily accommodated prior to start of construction
- FHWA research has shown that percent cost change during construction for DBB was lower than for the DB type contract on projects valued between $20-50M
- Construction cost is fixed at contract award
- Low bid cost structure can provide maximum competition
- Owner controls the quality of design and construction

Disadvantages

- Requires significant owner expertise and resources
- Owner at risk to contractor for design errors
- FHWA research has shown that cost change during construction was significantly higher for DBB compared to DB Finance on projects greater than $100M, indicating that cost containment for large-scale infrastructure projects (>$100M) is more difficult in the DBB project delivery approach.
- Sequential design and construction typically results in a longer schedule and could be a problem on a project with a tight time constraint.
- No contractor input in design, planning or value engineering, especially on the means and methods of construction technology. This primarily applies to projects with special construction items such as tunneling.
- Actual construction cost unknown until contract awarded

For the current scope and anticipated cost of the State Street project ($62 million) and based on the time constraint identified by Purdue University to work toward a project schedule to deliver a completed corridor by end of 2018, we believe there is enough time to deliver the project successfully using a conventional DBB approach provided funding is also secured by all the stakeholders involved.

Design-Build with Finance Option - aka Public Private Partnership (P3)

Advantages

- Could provide greater infrastructure solutions
- Faster project completion and return on investment could be greater if an appropriate financing approach is selected
- FHWA research has shown that cost change during construction was significantly lower for DB Finance (P3) type contract compared to DBB on projects greater than $100M, indicating that cost containment for large-scale infrastructure projects (>$100M) is more likely using the P3 project delivery approach.
- Risks are weighed from initial conceptual stages and operational and project execution risk is transferred to the private sector
- Reduces government/public entity's budget and budget deficits

Disadvantages

- FHWA research has shown that percent cost change during construction for DB type contract was higher than for DBB on projects valued between $20-50M, indicating that DB (with or without financing type) is not necessarily the best solution for use on projects under $100M in construction cost.
- Public agency/entity will pay a premium to transfer the risks to the private sector – included in the bid by private sector
- On specialized/smaller projects (typically less than $100M), this option reduces the number of contractors willing to put a consortium together for the requested project since the administrative time and effort involved in a relatively small P3 project is no different than competing for a large P3 project
- Owner's representatives must be highly specialized personnel and contracting experts.

It is recommended that Purdue University, the City of West Lafayette and their legal teams perform a "Value for Money (VfM)" analysis to compare the P3 delivery method with the DBB delivery method to identify possible "value savings" that can be achieved on this project by choosing one delivery method over another. Relevant references from FHWA's office of Innovative Program Delivery have been added to Appendix G of this report. The conventional "Design-Build (without financing)" delivery approach was not separately evaluated in this report mainly because of the fact that the Design-Build Statute in the Indiana Code (IC 5-30-1-12) does not apply to a public works project involving the design, construction, alteration or repair of a "public highway" (which would cover the State Street and Perimeter Parkway roadway corridors being discussed).

6.3 Transportation Management Plan

According to INDOT policy, every project that will have significant impact on the traveling public, area businesses, and/or residents during construction must go through a process to develop a Transportation Management Plan (TMP). The purpose of the TMP is to engage stakeholders and community leaders to discuss the project impacts, receive input to design of MOT plans, adjust the MOT plans where necessary, and document the entire process from conception to implementation.

The State Street project scope as currently defined by Purdue University and the City of West Lafayette and evaluated in this study will introduce significant changes to the existing roadway network that feeds traffic in and out of the University campus. This will require extensive planning efforts for construction to proceed with the least amount of impact to users of the roadways and existing businesses in the vicinity of the project limits. As the project undergoes design development, it is highly recommended to start working towards a well-defined TMP.

A TMP has multiple objectives, and these are listed here:

- Minimize lane closures and detours through the construction zones
- Provide as safe of environment as possible for both the traveling public and the construction workers
- Minimize disruption for local businesses
- Provide tools to help keep the public informed of detours
- Involve local engineering, street, and emergency services personnel in maintenance of traffic discussions
- Minimize delays due to detours
- Minimize impact of detours on local roads
- Incorporate experience from previous projects
- Maintain access to the local road system where reasonable
- Maximize efficiency and cost effectiveness of construction

Development of the preferred plan includes balancing the sometimes competing objectives listed above to develop a cost effective, safe plan that allows for efficient construction of the project contracts. Because of the significant size of this project for a major university campus and the economic impact that construction may have on the traveling public and businesses in the area, a TMP stakeholder group is the first thing that needs to be established to address MOT issues and provide an opportunity for stakeholders to provide input regarding local impacts. A detailed plan involving detour routes during construction, special provisions to address the switch in MOT phases for several phases of construction through multiple segments along the corridor, identifyin a list of various stakeholders, coordinating with emergency responders, transit operators (CityBus), business owners, utility owners etc. will have to be put into place prior to construction.

Appendices

Appendix A – Perimeter Parkway Analysis Study Report prepared by BF&S

Appendix B – Re-State | A Master Plan for State Street prepared by MKSK

Appendix C – Intersection Turning Movement Counts for AM and PM peaks for major study intersections

Appendix C1 – Synchro and ARCADY Capacity Analysis Software Outputs for all scenarios

Appendix D – Detailed Cost Estimates Computations

Appendix E – Profile and Cross Sections for the Williams Street & River Road Conventional Intersection Alternate

Appendix F – INDOT Right of Way Incentive Program

Appendix G – FHWA Office of Innovative Program Delivery References

Note: All the appendices files are compiled and organized with Appendix # in a CD/DVD attached with this report

Appendix A – Perimeter Parkway Analysis Study Report prepared by BF&S

Appendix B – Re-State | A Master Plan for State Street prepared by MKSK

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