BURGESS & NIPLE
Engineers ■ Architects ■ Planners

SOUTH HIGH STREET CORRIDOR IMPROVEMENTS FEASIBILITY STUDY

FINAL REPORT

Prepared for:
City of Urbana
Clark County-Springfield Transportation Coordinating Committee
February 2019

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Project Description

South High Street is an approximately mile long corridor near the southern limits of Urbana, intersecting Miami Street (U.S. 36) at the northern end and S.R. 55 (Lewis B. Moore Drive) at the southern end of the study limits. The City of Urbana, in cooperation with the Clark County-Springfield Transportation Coordinating Committee (CCSTCC), is exploring opportunities to improve sidewalk connectivity, provide bicycle infrastructure, incorporate on street parking and address drainage issues within the project corridor. The City anticipates using the feasibility study finding to pursue funding alternatives. The project location is illustrated in ***FIGURE 1.***

FIGURE 1

FIGURE 1: PROJECT LOCATION

Using the on-call study contract with CCSTCC, B&N was tasked to provide recommendations for potential improvement within the project corridor to meet the project needs for the City of Urbana. The improvements addressed the project goals which included the following:

- Providing pedestrian and bicycle connectivity for residents and Urbana University Staff and students
- Address any safety concerns at Miami Street / High Street and S.R. 55 / High Street
- Identify other potential corridor improvements such as on-street parking, drainage upgrades, and traffic speeds
- Develop cost estimates for proposed funding applications

The project scope included performing a traffic analysis to determine the capacity of the corridor and identify any capacity related improvements. Additionally, the safety of the corridor was studied to identify any potential crash patterns and determine potential improvements to address safety concerns. Proposed typical sections were provided and a cost estimate prepared to assist with funding applications.

This report describes the corridor characteristics, traffic and safety study findings, public input, and potential improvements for the corridor.

Corridor Characteristics

The corridor being studied is High Street from the intersection of Miami Street to the intersection of S.R. 55. The corridor is illustrated in ***FIGURE 1.***

High Street is a two-lane urban road. The roadway is classified as a *Minor Collector* with a posted speed of 25 mph. From College Street to Miami Street, the roadway typically has a 10' travel lane in each direction, curb, and a sidewalk with a width of 4' to 5' on both sides of the street. A minimal buffer is present adjacent to the walk in some locations. In other locations the walk is adjacent to the roadway. South of College Street, the existing roadway typical section changes to 10.5' to 11' lanes in each direction, no or intermittent curb, and no sidewalks. The City staff has observed pedestrians walking in the roadway in portions of the corridor without sidewalks. There is no designated parking within the project. residents currently pull off along the roadway on gravel, paved, or dirt shoulders. Existing lighting in the corridor is on utility poles owned by Dayton Power & Light / Miami Valley Lighting. The lighting is primarily at intersections and in between blocks. Right-of-way widths vary in the corridor.

TABLE 1 summarizes the widths from the southern project limits to the northern project limits.

FIGURE 2 and ***FIGURE 3*** illustrate the existing typical sections for the corridor.

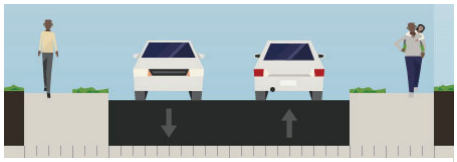

FIGURE 2: TYPICAL SECTION NORTH OF COLLEGE STREET

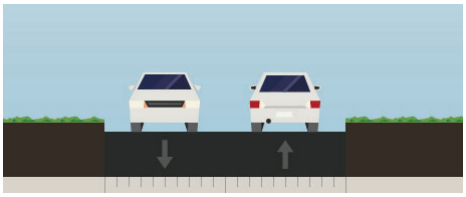

FIGURE 3: TYPICAL SECTION SOUTH OF COLLEGE STREET

TABLE 1: EXISTING RIGHT-OF-WAY

LOCATION	RIGHT-OF-WAY WIDTH
SR 55 to W Broadway Street	50’
W Broadway Street to Powell Avenue	60’
Powell Avenue to Thompson Street	50’
Thompson Street to College Street	45’
College Street to Miami Street	40’

Most of the side streets intersect South High with stop signs. Three four-way stops are present in the corridor at the intersections of Reynolds Street, Thompson Street and W Broadway Street. The intersection of South High Street and Miami is signalized. At the S.R. 55 intersection, South High Street aligns with the drive to the Champaign County Community Center and is stop-controlled. Some storm sewer has been constructed by the City of Urbana, however, in several locations the existing storm is ineffective, and ponding is evident after storm events. Some minor grade revisions were performed by the City to alleviate some of the ponding concerns as a near-term solution, however the area generally still sees ponding issues. The residents along the corridor have indicated that speeding is an issue.

There is currently no direct access to the Simon Kenton Trail from South High Street. The trail can be accessed from College Way or Miami Street west of the South High Street intersection.

Most of the residences in the South High Street corridor are single family homes. Some multi-family complexes are located at the southern end of the project. The corridor has two characteristics. North of College Street the homes are older, historic homes with larger lawns, fences, brick walks, and large trees adjacent to the roadway. Several locations were identified by the City of Urbana as historic in nature and areas to avoid impacts. These included the existing serpentine brick wall at 218 W Market Street (parcel K48-25-00-01-16-002-00), properties on the National Historic Registry at 222 College Street and 335 College Street, and the house on the southeastern corner of S High Street and Water Street at 233 W Water Street (K48-25-00-01-16-079-00). Homes south of College Street are post World War II era houses with smaller lawns and with smaller or no trees adjacent to the roadway.

Urbana University is in the corridor between Powell Avenue and University Drive, with access at Reynolds Street / College Way. South High Street is considered the main gateway to the university campus. Signage for the campus currently exists at the intersection of South High Street and Miami Street, Reynolds Street and U.S. 68, and at S.R. 55 and South High Street.

Deliveries to the University typically access the campus via U.S. 68 to Reynolds Street, crossing South High Street. Buses for collegiate or other sporting events typically access the campus via. S.R. 55 and South High Street to University Drive. The University has about 350 on campus students. Other students are residents from Urbana or commute to the college campus. The University athletic fields that border South High Street between University Drive and Powell Avenue are also used seasonally by community organizations for K-12 club sports.

South High Street serves as a connector to numerous pedestrian, cyclists and motorist destinations for those living or working in the corridor and at the University. At the northern end of the corridor, South High Street provides access to Miami Street, with downtown Urbana and numerous restaurants, businesses and other services several blocks to the east. At the intersection, pedestrians, cyclists and motorists can access the local soup kitchen and the UDF just to the east. To the west on Miami Street is the Depot Coffee House and the Simon Kenton Trail. At the southern end of the corridor, a hotel is proposed in the northeastern quadrant of S.R. 55 and South High Street, with several outparcels that may see future development and create destinations for pedestrian, cyclists or motorists in the South High Street corridor. At the South High Street and S.R. 55 intersection is the drive access to the Champaign County Community Center, including Bureau of Motor Vehicles, Job & Family Services, Board of Elections, County Recorder, County Auditor, County Treasurer, OSU Extension Office, County Health District, Ohio Means Jobs Champaign County, Driver Exam Station, as well as Freedom Grove.

There is on-demand transit service in the corridor that operates from 8 am to 5 pm by appointment.

Design Criteria Referenced in Study

TABLE 2 summarizes the design criteria and reference document was used in the analysis of the corridor footprint assuming a 25-mph design speed for South High Street.

TABLE 2: DESIGN CRITERIA

CRITERIA	DIMENSION	REFERENCE
Design / Posted Speed for South High Street	25 mph	Posted speed limit signs in field
Minimum Thru Lane	10’	ODOT Location & Design Manual (L&D), Volume 1 Section 300, Figure 301-4
Parking Lane Width	7’	ODOT L&D Manual, Volume 1 Section 300, Figure 301-4
Sidewalk Width	5’	ODOT L&D Manual, Volume 1 Section 300, Figure 306-2
Sidewalk Buffer (Tree lawn)	2’ minimum	ODOT L&D Manual, Volume 1 Section 300, Figure 306-2
Bike Lane Width	5’	ODOT L&D Manual, Volume 1 Section 308.5.4
Buffer Between Parking and Bike Lane	2.5’ (total bike lane, buffer, parking width = 14.5’)	NACTO Urban Bikeway Design Guide, Conventional Bike Lanes
Calculation for Horizontal Pavement Tapers	L (length of taper) = (Width * Speed^2) / 60	Section 301.1.4
Speed Hump Design	Length – 14’ Height – 3.5”	Updated Guidelines for the Design and Application of Speed Humps, ITE (2011)

Traffic Analysis

Traffic volumes were collected by CCSTCC using Miovision at the intersections of U.S. 36 & High Street and S.R. 55 & High Street. Counts at the US 36 intersection were collected on September 27, 2018 and the SR 55 intersection was collected on October 10, 2018. The AM peak hour for the intersection of US 36 & High Street was determined to be 7:30am – 8:30am and 3:30pm – 4:30pm for the PM peak hour. At the intersection of SR 55 & High Street, the AM peak hour is 6:00am – 7:00am and the PM peak hour is 2:45pm – 3:45pm. Existing AM and PM peak hour traffic counts for the two study intersections are illustrated in ***FIGURE 4***. Raw traffic counts are summarized in the Appendix.

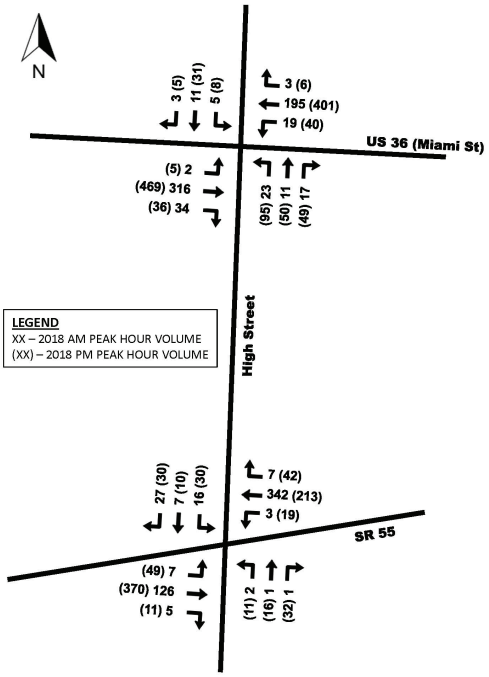

FIGURE 4: 2018 TRAFFIC VOLUMES

Traffic Forecasts

To develop the 2040 traffic forecasts, the ODOT Modeling and Forecasting Unit provided a SHIFT (Simplified Highway Forecasting Tool) analysis for U.S. 36 and S.R. 55. The SHIFT analysis uses historic traffic counts as well as the Statewide travel demand model to estimate the annual growth rate for traffic volumes. For this area, the SHIFT analysis determined that traffic volumes were declining. Per ODOT standard practice, the 2040 volumes from SHIFT were reported to be the same as the 2018, rather than show a decline. For the High Street study, a 1% annual growth rate was assumed to provide a conservative analysis. This equates to a 22% increase in traffic volumes between 2018 and 2040. **FIGURE *5*** shows the 2040 traffic volumes.

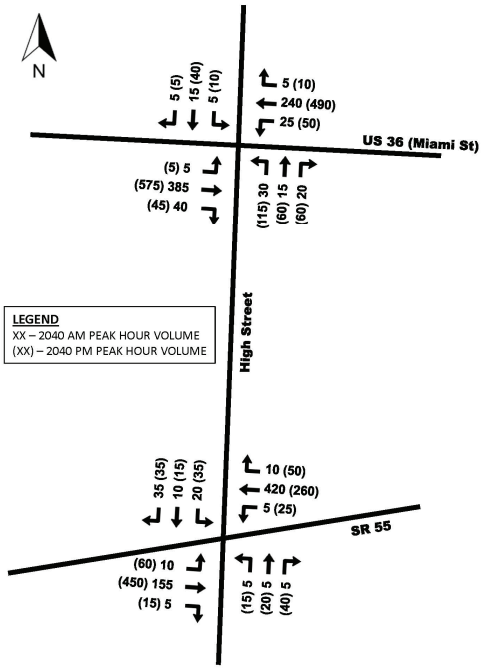

FIGURE 5: 2040 TRAFFIC VOLUMES

Capacity Analysis

Capacity analysis was conducted for the intersections of U.S. 36 & High Street and S.R. 55 & High Street for the 2018 and 2040 conditions. Analysis was conducted with Synchro 10.0 software using the HCM 2010 module. The Level of Service (LOS), delay, volume-to-capacity ratios (v/c), and 95% queue results for both the AM and PM peak hours are illustrated in ***TABLE 3*** for the U.S. 36 & High Street intersection, and **TABLE *4*** for the S.R. 55 & High Street intersection. Output from Synchro is provided in the Appendix.

TABLE 3: HIGH STREET & U.S. 36 CAPACITY RESULTS

High Street & US 36 Existing Condition Intersection Operations												
	Int.	Eastbound US 36			Westbound US 36			Northbound High Street			Southbound High Street	
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour												
LOS	B	B	B		B	B		B			B	
Delay	12.7	11.7	13.5		15.1	11.1		13.4			12.9	
v/c		0.004	0.471		0.050	0.262		0.100			0.033	
95th Queue		3’	151’		15’	84’		29’			16’	
		B – 13.5			B – 11.4			B – 13.4			B – 12.9	
PM Peak Hour												
LOS	B	B	B		B	B		B			B	
Delay	15.4	15.0	16.2		19.4	13.6		16.8			13.9	
v/c		0.013	0.653		0.134	0.521		0.329			0.075	
95th Queue		6’	237’		25’	178’		100’			30’	
		B – 16.2			B – 14.1			B – 16.8			B – 13.9	
High Street & US 36 2040 Condition Intersection Operations												
	Int.	Eastbound US 36			Westbound US 36			Northbound High Street			Southbound High Street	
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour												
LOS	B	B	B		B	B		B			B	
Delay	13.2	11.8	14.1		16.3	11.0		14.3			13.6	
v/c		0.009	0.550		0.071	0.313		0.110			0.040	
95th Queue		6’	186’		17’	101’		36’			19’	
		B – 14.0			B – 11.4			B – 14.3			B – 13.6	
PM Peak Hour												
LOS	B	B	B		C	B		B			B	
Delay	17.7	16.5	19.4		23.9	14.7		19.0			14.8	
v/c		0.014	0.774		0.213	0.619		0.417			0.096	
95th Queue		6’	364’		33’	226’		128’			36’	
		B – 19.4			B – 15.5			B – 19.0			B – 14.8	

TABLE 4: HIGH STREET & S.R. 55 CAPACITY RESULTS

High Street & SR 55 Existing Condition Intersection Operations												
	Int.	Eastbound US 36			Westbound US 36			Northbound High Street			Southbound High Street	
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour												
LOS	A	A			A			B			B	
Delay	1.4	0.4			0.1			12.4			12.3	
v/c		0.01			0.00			0.01			0.10	
95th Queue		1’			0’			1’			8’	
		A – 0.4			A – 0.1			B – 12.4			B – 12.3	
PM Peak Hour												
LOS	A	A			A			C			C	
Delay	3.3	0.9			0.6			15.9			17.8	
v/c		0.04			0.02			0.16			0.22	
95th Queue		3’			2’			14’			20’	
		A – 0.9			A – 0.6			C – 15.9			C – 17.8	
High Street & SR 55 2040 Condition Intersection Operations												
	Int.	Eastbound US 36			Westbound US 36			Northbound High Street			Southbound High Street	
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour												
LOS	A	A			A			B			B	
Delay	1.8	0.5			0.1			13.6			14.2	
v/c		0.01			0.00			0.03			0.15	
95th Queue		1’			0’			3’			14’	
		A – 0.5			A – 0.1			B – 13.6			B –14.2	
PM Peak Hour												
LOS	A	A			A			C			D	
Delay	4.4	0.9			0.6			21.3			26.2	
v/c		0.05			0.03			0.27			0.35	
95th Queue		4’			2’			26’			38’	
		A – 0.9			A – 0.6			C – 21.3			C – 26.2	

Reviewing the results shown in **TABLE *3***, the intersection of U.S. 36 & High Street operates at LOS B during the AM and PM peak hours in both 2018 and 2040. As shown in **TABLE *4***, the intersection of S.R. 55 & High street operates at LOS A during the AM and PM peak hours in both 2018 and 2040. This operation is acceptable, and no capacity improvements are recommended at these intersections.

Safety Analysis

Crash data from the most recent three calendar years (2015 through 2017) was obtained from ODOT’s GIS Crash Analysis Tool (GCAT) through the TIMS portal. The OH-1 report for each documented crash was reviewed to correct information where necessary and to locate the crashes properly within the study area.

In the three-year study period, there were 26 reported crashes with nine (35 percent) resulting in injury. Seven crashes occurred in 2015, 10 crashes occurred in 2016, and nine crashes occurred in 2017. **FIGURE *6*** illustrates the crash frequency by type of crash. A collision diagram that shows crash patterns by illustrating the approximate location of each reported crash at this intersection is provided in FIGURE 6.

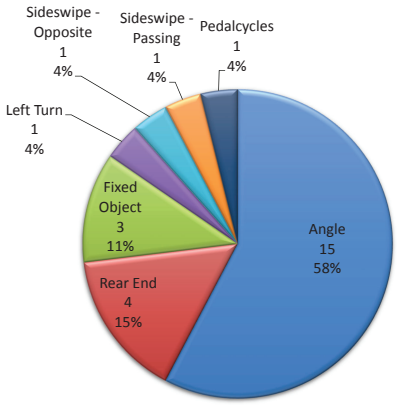

FIGURE 6: FREQUENCY OF CRASHES BY TYPE OF CRASH

The majority of the crashes within the study area were angle crashes. Crashes occurred throughout the day, with the majority of crashes (58 percent) occurring between the hours of 10:00 AM and 5:00 PM. Over 73 percent of the crashes occurred on dry pavement which indicates that adverse weather or pavement conditions were not contributing factors to crashes occurring within the study area.

Of the 15 angle collisions occurring within the study area, three (20 percent) resulted in injury. Seven of the 15 angle crashes occurred at the unsignalized intersection of South High Street with S.R. 55 (Lewis B. Moore Drive). Three of these crashes involved a southbound vehicle and an eastbound vehicle, while two crashes involved a northbound vehicle and westbound vehicle. Two crashes involved southbound left-turning vehicles with each a westbound through vehicle and eastbound through vehicle. There may be several factors contributing to these crashes. The northbound and southbound approaches are stop controlled while the eastbound and westbound approaches of S.R. 55 are uncontrolled. Conversely, several of the other intersections along South High Street are all-way stop-controlled with traffic stopping on all four approaches. Without a W4-4p sign ("Cross Traffic Does Not Stop"), vehicles on South High Street may not realize that traffic on S.R. 55 does not stop. Another contributing factor may be the horizontal curve along S.R. 55 between South High Street and US 68. Vehicles on South High Street and coming out of the Champaign County complex may not have clear lines of sight to vehicles coming from the east on S.R. 55 because of the curve. As a result, drivers may select an inadequate gap. Similarly, vehicles coming from the west on S.R. 55 may be traveling at higher rates of speed which results in fewer, shorter gaps.

The other angle collisions occurred throughout the study area, with no other discernable pattern to the crashes.

There were no other identified crash patterns throughout the study area. 10 crashes occurred at the signalized intersection of South High Street with US 36 (Miami Street); however, there were no discernable patterns to these crash occurrences.

The near-term recommendation at S.R. 55 is to provide the W4-4P sign ("Cross Traffic Does Not Stop") for motorists stopped on South High Street. See ***FIGURE 7*** for a graphic of this sign.

FIGURE 7: SIGN W4-4P

Proposed Corridor Improvements

After meeting with the City of Urbana, Urbana University, and the CCSTCC, the following potential corridor improvements were identified to address the goals and public and City concerns for South High Street.

The traffic analysis confirmed that two lanes would be adequate for the traffic in the project corridor. All existing curb within the project corridor will be replaced with new curb to meet current city standards. In the areas along the corridor where no curb is present, new curb will be placed to facilitate drainage and meet the urban collector design criteria. Continuous sidewalks conforming to a 5' standard width is proposed within the corridor from S.R. 55 to Miami Street, creating pedestrian connectivity to the various services and amenities in the area. On-street bike facilities will be provided throughout the corridor. On street parking will be maintained in a portion of the corridor. The City staff identified the need for traffic calming elements in the corridor to slow traffic and create a corridor that would discourage cut-through traffic.

Initial Proposed Improvements

Based on the collaboration meeting with the City, University and CCSTCC, initial improvements were proposed in preparation of the January 10, 2019, public involvement meeting.

Throughout the entire corridor, new curb and 5' sidewalk was proposed. A tree lawn was proposed where right-of-way could accommodate the tree lawn. Curb ramps were provided at all the side street intersections, at S.R. 55 on the northern leg of the intersection (crossing South High Street), and at Miami Street, meeting the Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way Guidelines (July 2011).

From S.R. 55 to College Street, the wider right-of-way and offset of the houses from the roadway facilitated a wider roadway footprint, providing two 10.5' wide travel lanes, 5' bike lanes and an 8' parking lane with a 3' buffer between the parking lane and the bike lane. A cycle track was discussed with the City. There was concern about driver expectancy and the cycle track since cyclists travel in both directions on a single side of the roadway. Drivers expect bicyclists to be traveling in the same direction as oncoming traffic and may not look in the opposite direction for cyclists in the adjacent curb lane, creating the potential for bicycle / vehicle crashes. There is also a challenge of transitioning the cycle track at S.R. 55 and at College Street and shifting the two-way travel on one side of the roadway to a "Share the Lane" movement. These concerns eliminated the cycle track option. Since parking was only necessary along one side of the roadway to address the corridor needs, parking was proposed along the eastern side of South High Street from just south of W Broadway Street to College Street, matching the limits of the current gravel parking pull offs used by residents in the corridor in existing conditions.

From College Street to Miami Street, the footprint was narrowed to avoid significant right-of-way impacts and adjacent houses. The travel lanes matched the existing conditions and were 10' wide, and the bike lanes transitioned to a "Share the Lane" condition. No parking was proposed in this stretch of the corridor. A minor alignment revision was made to improve sight distance at Water Street and South High Street. The existing house in the southeastern corner of the intersection sits adjacent to the back of sidewalk, creating an obstruction to the intersection sight distance. To mitigate this obstruction, the roadway alignment for South High Street was tapered slightly to the west, eliminating the proposed tree lawn between the sidewalk and the roadway. This taper was shifted back to the original roadway alignment just north of the intersection.

Traffic Calming Elements

While stops signs are sometimes thought of as traffic calming elements, the installation of a stop sign is not intended to slow traffic. Stop signs cannot be placed without warranting conditions based on traffic volumes, sight distance and crash records (per the Manual on Uniform Traffic Control Devices, or MUTCD). Placing stop signs at intersections that do not meet the warrants may be violated, increasing the potential for crashes. Additionally, studies have shown that stop signs are not effective for controlling or reducing midblock speeds and overuse of stop signs could cause drivers to carelessly stop or not stop. One study showed placing stops signs along a street could increase peak speeds as motorists tend to speed up between stop signs to regain perceived lost time at the sign.

The South High Street corridor does have three intersections with longstanding four-way stop control. Speeding was noted as a concern as well as cut through traffic. There are opportunities between the four-way stop controlled intersections to provide additional traffic calming that will slow traffic. With the decrease in speeds and increase in travel time, motorists looking for a quick route around downtown are likely to avoid South High Street with these additional traffic calming elements.

To provide traffic calming elements, traffic circles were proposed at Powell Avenue and College Street, and curb extensions or "bulb-outs" were proposed along the corridor from W Broadway Street to College Street at the parking lane.

Per the NACTO Urban Bikeway Design Guide, traffic circles are one of several recommended treatments to provide traffic management in an urban corridor. Traffic circles can reduce conflicts and maintain slower speeds. Motorists will need to slow before navigating around the circle. To address the potential for buses and delivery trucks in the corridor and reduce maintenance costs with landscaping, the traffic circles were proposed with a 4" rolled curb and concrete center island. The 4" height of the island is tall enough to discourage passenger cars from traversing the center island while still providing full use of the island to larger vehicles. Traffic circles do differ from roundabouts. The entry and exit geometry is not curved like a roundabout with splitter islands while vehicles enter a traffic circle in a straight line. In the South High Street corridor, placing a traffic circle at Powell Avenue provides a break in the straight stretch of roadway between two stop-controlled intersections – W Broadway Street and Thompson Street. Similarly, a traffic circle at College Street provides a traffic calming element between Thompson Street and the four-way stop at Reynolds Street. The traffic circle at College Street also provides an indicator to the motorist of a change in the corridor characteristics to the historic neighborhood in the corridor and a changing in the bicycle facilities from bike lanes to "Share the Lane" markings. The benefits of the traffic calming at College is also realized by the bicyclists as they transition from dedicated bike lanes to a shared lane situation. Pedestrians benefit from slower vehicle speeds due to the reduced severity of crashes between vehicles and pedestrians, if a crash occurs. See ***FIGURE 8*** for examples of traffic circles.

FIGURE 8: EXAMPLES OF TRAFFIC CIRCLES

A second traffic calming element in the S.R. 55 to College Street part of the corridor is curb bulb-outs. Located at the intersections, the bulb out extends the sidewalk into the street, ending the parking lane. The biggest benefits of the bulb out are the increased visibility of pedestrians and the shorter crossing length. Visibility is increased by bringing the pedestrians out beyond the parking lane. The physical and visual narrowing of the roadway also serves as a traffic calming measure by narrowing the roadway corridor at the intersections. These features are recommended by the NACTO Urban Design Guide where on-street parking is provided for these reasons. An example of a curb extension or bulb-out is shown in ***FIGURE 9***.

FIGURE 9: EXAMPLE OF CURB EXTENSION ("BULB-OUT")

Public Involvement

The recommendations described in the previous section were presented at a public meeting held on January 10, 2019. A mailing was sent on December 20, 2018 to approximately 88 property owners that had property abutting South High Street in the corridor limits. Twenty-three attendees (including staff from City of Urbana, CCSTCC, and B&N) were present. A representative from the local media also attended. The meeting was held on the Urbana University campus from 6:00 pm

to 7:30 pm with a short presentation on the study goals and proposed recommendations at 6:30 pm. Prior to and at the end of the presentation, public comments and questions were received. The public meeting flyer, sign in sheet and comment summary can be found in the Appendix.

Below is a summary of the public comments and the response or proposed revisions provided in the proposed improvements following the comments in italics.

- Residents at the College Street / South High Street intersection voiced concerns about the jog in intersection at College Street; parking from College to Hovey is not used frequently and residents indicated it was acceptable to remove the parking to adjust the jog in the intersection.
  - *The layout was adjusted to remove the parking and minimize the jog at College.*
- A resident noted observing cars not stopping at the four-way stop at Thompson Street and suggested a potential traffic circle at this location.
  - *The intersection is currently signed as a four-way stop and will remain with that signage. Other traffic calming elements will be investigated to encourage slower speeds.*
- It was suggested to place a traffic circle at Reynolds Street
  - *The intersection is currently signed as a four-way stop and will remain with that signage. Since this is a delivery route to the University, a traffic circle is not desirable here. Other traffic calming elements will be investigated to encourage slower speeds.*
- Speeding is identified as an issue north of University Drive (also noted near Miami)
  - *Other traffic calming elements will be investigated to encourage slower speeds.*
- It was asked if street lighting be provided with the project.
  - *Street lighting will be investigated at least at the intersections.*
- One resident suggested widening High Street
  - *The R/W constraints do not permit further widening and the intent of the project is to provide traffic calming and pedestrian / bicycle elements.*
- There was concern that the proposed 5' sidewalks are too wide.
  - *Per ODOT and AASHTO standard, a 5' minimum sidewalk will be provided.*
- Fix drainage
  - *Intended as part of the recommendations.*
- Residents living south of Hovey Street stated the City should definitely provide parking.
  - *Intended as part of the recommendations.*
- A resident stated no traffic circle at College Street and S High Street (too much impact to adjacent property), and asked if a stop sign could be placed instead.
  - *Noted. A stop sign must be warranted and cannot be installed for traffic calming purposes. The traffic circle is intended to slow traffic and has a minimal footprint that fits within the intersection.*
- There was a request to eliminate the buffer along bike lane and parking.
  - *Per NACTO, a buffer is recommended to prevent the potential for "dooring" collisions (a cyclists hitting an open vehicle door). The buffer width will be investigated to confirm the width.*
- Keep bike lanes
  - *Intended as part of the recommendations.*
- A comment indicated the curb extensions were okay, but the traffic circles were not desirable.
  - *Noted. Since traffic calming is a corridor goal, traffic circles will be considered as potential calming elements.*
- Like the sidewalks

From the public meeting, the buffer between the bike lane and the parking was investigated. Per the NACTO Urban Bike Design Guide, a minimum of 14.5' is preferred for a bike lane / buffer / parking lane area. This would include a 5' bike lane, a 2.5' buffer, and a 7' parking lane. The overall footprint of this area was narrowed to reduce the 8' parking lane to 7' and the 3' buffer to 2.5', pulling in the overall roadway footprint and addressing concerns about impacts to property frontage along the eastern side of South High Street.

To address the jog at the College Street intersection, the parking was identified as not necessary by the residents and eliminated. This revision provided space within the right-of-way to shift the roadway alignment to the east based on the WS^2 / 60 taper rate and minimize the jog at College Street.

To address other potential traffic calming options, speed humps were investigated. NACTO's Urban Design Guide provided the following recommendation:

"Vertical speed control measures are composed of wide, slight pavement elevations that self-enforce a slower speed for motorists. Note: the type of narrow, abrupt speed bumps used in private driveways or parking lots are not recommended for public streets and are a hazard to bicyclists. Some examples of recommended speed management treatments include the following:

- *Speed humps are 3 to 4 inches high and 12 to 14 feet long, such that speeds are reduced to 15 to 20 mph. They are often referred to as "bumps" on signage and by the general public.*
- *Speed humps should be no more than 500 feet (152 m) apart or between slow points where the desired 85th percentile operating speed is between 25 and 30 mph. Institute of Transportation Engineers. (2011). Updated Guidelines for the Design and Application of Speed Humps and Speed Tables.*

'Improperly designed, speed humps and all speed bumps are dangerous for bicyclists… both 3-inch and 4-inch humps are likely to be safe for bicyclists, although the 4-inch hump should probably be used with caution where bicycle traffic is frequent or rapid. Speed humps should be located far enough from intersections that turning cyclists are no longer leaning when they encounter the hump.' "

Final Proposed Improvements

Based on this information, the distances between Powell Avenue and Thompson Street and Water Street and Miami Street were investigated for locations and applications. There is about 1,200' between Powell Avenue and Thompson Street. Given the above guidance, placing one speed hump between Powell Avenue and Thompson Street would provide about 600' between the intersections and the speed hump. The spacing is over the 500' maximum spacing, but not excessively so and should still prove effective in combination with the other applications in the corridor. Between Water Street and Miami Street, Market Street is the halfway point. The speed hump isn't applicable in the middle of an intersection. A potential alternative could be a speed table at this location, however, per the NACTO and ITE guidelines, speed humps lend themselves to speeds between 25 mph – 35 mph. A speed table application may not provide the same traffic calming results as a speed hump. To avoid the intersection and provide better traffic calming with a speed hump, a location halfway between Market Street and Abbey Lane was proposed. The corridor between Miami Street and Market Street feels narrow with the proximity of the adjacent private fences, serpentine wall, and houses close to the roadway, which lends itself to a natural traffic calming effect. Market Street to Water Street is where the footprint feels like it widens, especially on the east side since the houses are further off the road. A speed hump near Market could help reinforce the slower speeds.

To address the drainage concerns, the plan did not lay out a proposed storm sewer at this level of development. The cost estimate did include costs for upgrades and reuse of the existing storm system as well new storm sewer laterals and trunk line. The main storm sewer for the area drains a portion of the corridor northerly to Water Street, flows to the west to

Walnut Street, and enters the Town Branch. A portion of the Town Branch is contained in a culvert under the residential / commercial areas and city streets before outletting in a channel to Dugan Run. The remaining portion of the project flows to the south towards S.R. 55. The proposed storm sewer improvements will need to assess the amount of flow the that can be directed to the Town Branch system and not exceed the existing system capacity.

After reviewing the existing street lighting in the project corridor and the alternatives for upgrading the street lighting, it was determined that the City will plan on upgrading the street lighting by installing additional light fixtures on wooden poles with overhead service connections from the adjacent Dayton Power & Light facilities.

Using this information and the public feedback, a final recommendation was made and is summarized in the following section. Plan sheets showing the horizontal alignment are provided in the Appendix.

S.R. 55 to W Broadway Street

The proposed roadway footprint from S.R. 55 to W Broadway will include 5' sidewalks, 4' tree lawns, 5' bike lanes, and two 10.5' traffic lanes. Just south of W Broadway, a 7' parking lane and a 2.5' buffer will be provided. The 4' tree lawn was eliminated within the parking limits to avoid excessive right-of-way impacts. See ***FIGURE 10*** and ***FIGURE 11*** for proposed typical sections.

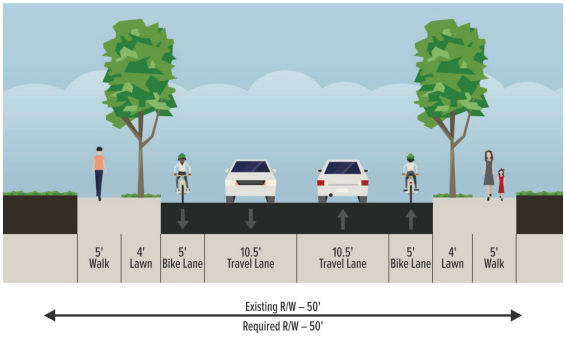

FIGURE 10: S.R. 55 TO W BROADWAY STREET – NO PARKING

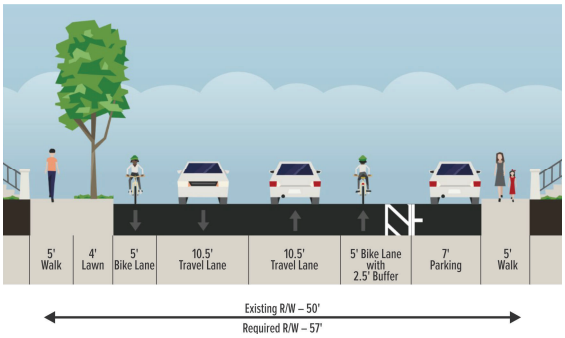

FIGURE 11: S.R. 55 TO W BROADWAY STREET – PARKING

W Broadway Street to Hovey Street

From W Broadway Street to Hovey Street, the roadway typical section includes 5' sidewalks, 5' bike lanes, two 10.5' traffic lanes, a 7' parking lane and a 2.5' buffer. This section of the corridor also included a speed hump between Powell Avenue and Thompson Street. The speed hump is shown on the plan sheets in the Appendix and is marked with chevron striping. See ***FIGURE 12*** for a proposed typical section.

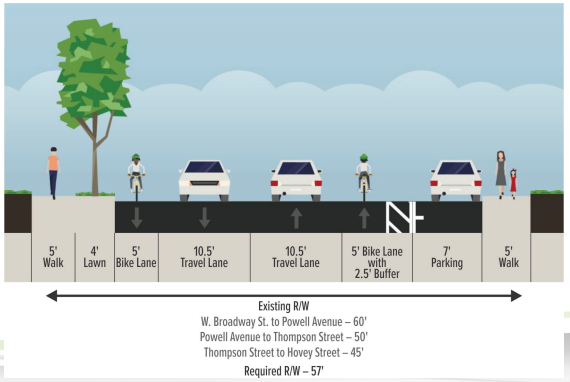

FIGURE 12: W BROADWAY STREET TO HOVEY STREET

Hovey Street to College Street

The Hovey Street to College Street typical section is similar to the W Broadway Street to Hovey Street typical section except that it eliminates the parking lane on the east side of the roadway so the alignment at College Street could be adjusted to minimize the jog in the roadway. See ***FIGURE 13*** for a proposed typical section.

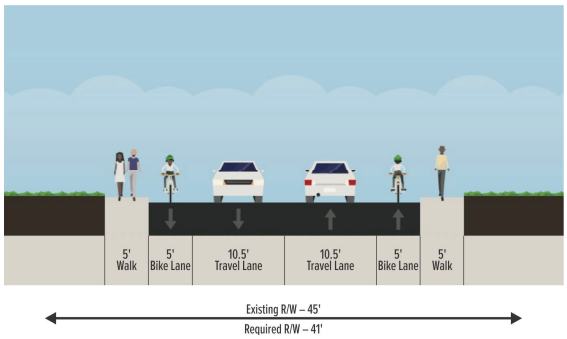

FIGURE 13: HOVEY STREET TO COLLEGE STREET

College Street to Miami Street

From College Street to Miami Street, the roadway typical section includes 5' sidewalks, a 3' minimum tree lawn where right-of-way permitted, two 10' traffic lanes, and "Share the Lane" markings. This section of the corridor also included a speed hump between Water Street and Market Street. The speed hump is shown on the plan sheets in the Appendix and is marked with chevron striping. See ***FIGURE 14*** for a proposed typical section.

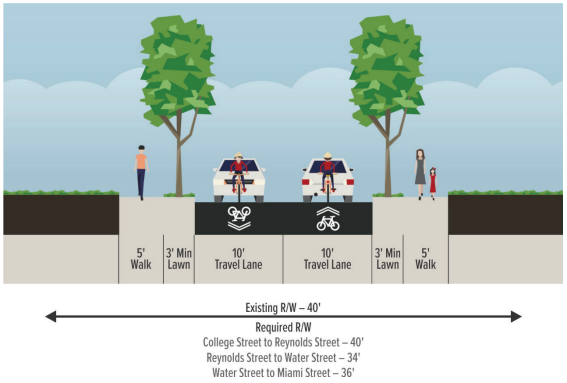

FIGURE 14: COLLEGE STREET TO MIAMI STREET

Preliminary Cost Estimate

A preliminary cost estimate was developed for the proposed final improvements. The following assumptions were made in this estimate:

- In each category, a contingency for miscellaneous items was provided. The intent of this contingency is to capture the costs for items typically identified in detail design. An overall estimate contingency was also applied for the preliminary level estimate.
- The proposed storm sewer cost assumed that a small portion of the existing storm sewer recently installed by the City of Urbana could be maintained. The costs for pipe removal and backfill of any proposed pipe trenching is captured in the contingency percentage for miscellaneous storm items.
- Post Construction Stormwater Best Management Practices – per the ODOT L&D Volume 2, projects with less than 1 acre of new impervious area located within new right-of-way do not require quantity treatment. Based on the right-of-way information provided, the proposed final improvements do require right-of-way acquisition, but the total new impervious area located within this new right-of-way is less than 1 acre. It was assumed that only quality treatment will be required. Two manufactured systems were proposed to provide the quality treatment, assuming one system will be placed at the outfall of each storm sewer trunk line.
- Various water items were included to account for impacts to the fire hydrants, water values, and minor raising or lowering of water services and lowering of water mains.
- The pavement quantities assumed full depth pavement along the widening areas and within 2' of proposed curb replacement. A proposed build of was provided, including 1.5" of asphalt surface course, 7.5" of asphalt concrete base, and 6" of aggregate base. It was assumed that the existing street would be milled 1.5" and resurfaced. A contingency quantity for full depth spot repairs was also provided to address spot locations of base failure within

the resurfacing area. The asphalt quantity for the speed humps assumed a 4" thickness over the width and length of the speed hump.

- Concrete drive quantities were calculated assuming a 6" depth.
- The concrete traffic circle center was assumed to be 8" thick.
- At the South High Street and Miami Street intersection, new pedestrian push buttons and pedestals were proposed at the new ramps in the southern leg of the intersection.

Costs are summarized in ***TABLE 5***.

TABLE 5: ESTIMATED COSTS FOR ALTERNATIVE 1

PROPOSED FINAL IMPROVEMENT COSTS	
ROADWAY	$321,000
DRAINAGE	$1,032,100
WATER	$101,500
PAVEMENT	$1,397,000
EROSION CONTROL	$49,600
TRAFFIC CONTROL	$100,700
TRAFFIC SIGNAL	$4,700
MAINTENANCE OF TRAFFIC	$92,000
MISC. ITEMS	$131,000
20% CONTINGENCY	$646,000
TOTAL	$3,875,600