City Council Work Session | Bridge Street District Public Improvements

AGENDA | Monday, April 21, 2014

6:30 p.m. **Introduction & Overview**

Mayor Michael Keenan
Marsha Grigsby, City Manager

6:35 p.m. **Bridge Street District Transportation Planning Study**

Paul A. Hammersmith, PE, Director of Engineering/City Engineer
Jean-Ellen M. Willis, PE, Engineering Manager - Transportation

6:55 p.m. **Roundabout Simulation Video**

Jean-Ellen M. Willis, PE, Engineering Manager - Transportation

7:00 p.m. **Bridge Street District Streetscape Studies**

Terry Foegler, Director of Strategic Initiatives/Special Projects
Megan O'Callaghan, Director of Public Service
Darren Meyer, MKSK

Outcomes/Next Steps

City of Dublin
Office of the City Manager
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Memo

To: Members of Dublin City Council

From: Marsha I. Grigsby, City Manager

Date: April 21, 2014

Initiated By: Terry D. Foegler, Director of Strategic Initiatives/Special Projects
Megan D. O'Callaghan, Public Service Director

Re: City Council Work Session – Bridge Street District Public Improvements Update

Background

A series of City Council work sessions are planned through the spring of 2014 to update Council on the various Bridge Street District planning efforts and decisions related to public improvements in the Bridge Street District. The purpose of this work session is to update Council members on the transportation network planning for the Bridge Street District, present a video of the future roundabout at Riverside Drive/State Route 161 depicting future traffic conditions, and provide initial recommendations for the design of the Bridge Street District public realm.

BSD Transportation Planning Study (20 minutes)

While the Bridge Street District Vision Plan established the concept of the grid street network as a key organizing and transportation element of the BSD that would provide multiple routes for vehicles, bikes, pedestrians and transit, a significant amount of additional planning and analysis of the transportation network has taken place since the Vision was adopted in 2010. The Bridge Street District (BSD) Transportation Planning Study followed the completion of the Nelson\Nygaard Transportation Study, the adopted Bridge Street District zoning regulations and the Dublin Community Plan updated in July 2013.

Since the grid was essentially established though the earlier BSD planning efforts, the traditional method of requiring developers to perform individual traffic impact studies for each proposed development was determined to be less appropriate for assessing impacts. In order to identify those key needed roadway improvements throughout the Bridge Street District (especially where the Bridge Street District grid and the City's established thoroughfares meet), the BSD Transportation Planning Study was commissioned to comprehensively identify necessary roadway improvements throughout the Bridge Street District. This study focuses on the more significant intersections and roadways that are impacted by the regional network, in addition to future projections for the Bridge Street District.

It is Staff's intent to provide an overview of the study results and key recommendations at the City Council Work Session. Should Council desire additional detail on any specific element of the study, Staff is prepared to present more in-depth information at future work sessions of Council. Please refer to the attached memo regarding the **Bridge Street District Transportation Planning Study** and the **Bridge Street District Executive Summary** for additional detail, study purpose and outcomes.

State Route 161/Riverside Drive Roundabout (5 minutes)

The implementation of turning restrictions and split phase traffic signal operations has retained reasonable levels of efficiency at this intersection, and has provided the City additional time to

provide a long term solution. However, it has long been understood that a long-term solution is needed at this intersection, and as Council is aware, studies have been performed since 2005 to identify the preferred improvement. On March 12, 2014, Council affirmed the preferred planned improvement for this key intersection as a multi-lane roundabout with an eastbound right turn lane which will remove all existing turning restrictions. A preliminary design for the roundabout intersection has been completed, funding has been programmed in 2014 for final design and construction is expected for the 2015-2020 planning window.

As part of the Bridge Street District communications efforts, a video simulation has been prepared and will be publicly shared for the first time with City Council at the April 21 work session. The purpose of the video is to demonstrate how the roundabout will operate and allow for more efficient traffic flow at peak traffic conditions at Bridge Street District build-out conditions. The video is intended to explain the roundabout conditions and how it will function, but remains at a high level to ensure that it will be accessible to and easily understood by the public. This video will be posted to the City's website and advertised through the City's usual media channels. Further, as development plans for the abutting properties move forward, we have the flexibility to add these designs to the animation.

Streetscape (one hour, 30 minutes)

As Council is aware, one of the core principles of the Bridge Street District is to create an engaging, walkable environment. The grid mentioned previously, lined with well-designed private development projects, plays a critical role in achieving this principle. At the April 7, 2014 City Council Work Session, Darren Meyer with MKSK Studios presented an introduction to the streetscape study that has been initiated to examine the design of the Bridge Street District public realm. He also provided the initial framework and some of the guiding principles for the design of the truly public portion of this realm – the public rights-of-way and the adjacent public green spaces. Staff noted that additional information would be brought forward as decisions for public improvements need to be made.

The April 21st work session will focus on more specific recommendations for key transportation elements within the BSD such as curb, walkways, bicycle infrastructure, lighting, signs, and other public realm details. The recommended enhancements have both initial and long-term cost implications, as well as serving as key elements in defining the walkable character of this District. The objective of this session is to obtain a general endorsement by Council regarding the nature, character and types of materials and facilities being proposed within and along our Bridge Street District roadways.

Attachments include:

1. Bridge Street District overview map showing the proposed street network and streets that have been highlighted as signature streets. Signature streets are those that have been recommended to receive investment in high quality materials to help define the character of the public realm.
2. Raw bid data of granite and concrete curb installed in Central Ohio in the past 6 years.
3. Life cycle cost analysis of granite curb compared to concrete curb

Cost analysis of granite and concrete curb applied to the overall linear feet of streets in the BSD, signature streets in the BSD, and historic core streets.

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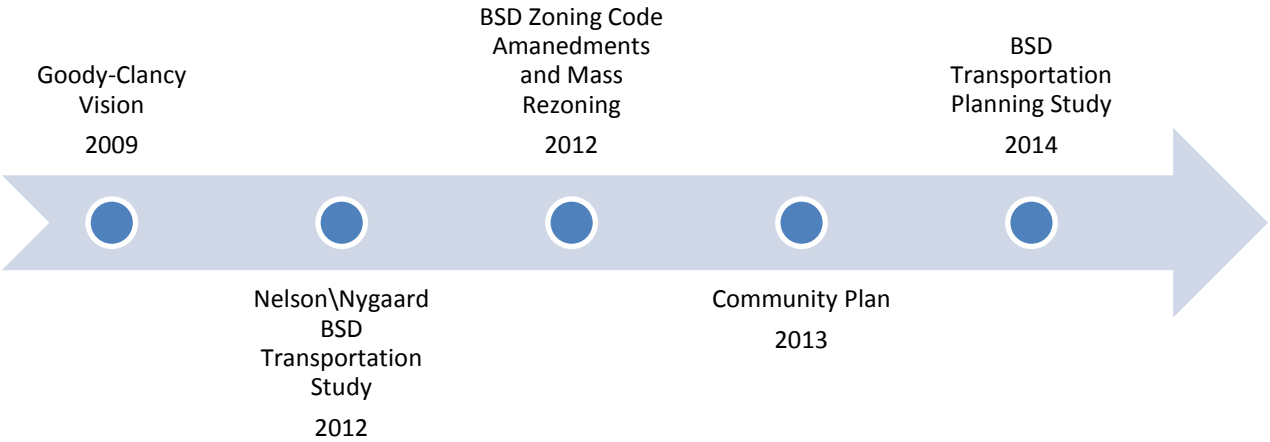
Paul A. Hammersmith, PE, Director of Engineering/City Engineer
Jean-Ellen M. Willis, PE, Engineering Manager - Transportation

Re: Bridge Street District Transportation Planning Study

Background

The Bridge Street District (BSD) Transportation Planning Study was a direct outgrowth of the Goody-Clancy Vision, Nelson\Nygaard Transportation Study, the Zoning Code amendments, and the Community Plan. Below is a brief timeline of these BSD transportation network milestones.



The Goody-Clancy Vision established the concept of the grid network as a core organizing and transportation framework for the more urban development pattern proposed for the BSD. It proposed to provide multiple routes for vehicles, bikes, pedestrians and transit, and generally improve mobility and walkability options within the BSD.

The Nelson\Nygaard Transportation Study proved the overall operation and layout of the proposed roadway network presented in the Goody-Clancy Vision, and verified it would serve the transportation needs of the district. These were the key conclusions of the Nelson\Nygaard report:

1. A dense, grid-style street pattern was verified to operate well in the urban core context of the BSD,
2. Multiple grid connections help alleviate congestion so turn lanes are not required except at key locations,

3. A dense, mixed-use development environment (as envisioned for the BSD), supported by a multi-modal transportation system likely results in about a 40 per cent internal capture of vehicle trips in the District,
4. New river bridges improve overall neighborhood connectivity but do not relieve current or projected congestion for the Bridge Street/High Street intersection,
5. "Street Family" classifications are used to better convey the character of the area's streets and the BSD as an urban core, rather than traditional suburban roadway functional classes which convey street hierarchy.

The Zoning Code amendments adopted by Dublin City Council on March 26, 2012 incorporated the dense, grid-style street pattern of development for the BSD. The BSD mass rezoning occurred on May 9, 2012. By eliminating the need for individual sites to be rezoned, this also relieved the development requirement of performing site specific traffic impact studies

The Community Plan adopted on July 1, 2013 prescribed the right-of-way widths and street hierarchy of the BSD within the Thoroughfare Plan. The area plan for the Bridge Street District was also updated in the Community Plan.

BSD Transportation Planning Study

With the above tools in place, staff began to take a closer look at the intersection operations at key locations within the district and wanted to understand when major improvements needed to occur. These improvements focused heavily on locations where proposed BSD grid roadways meet the existing Dublin thoroughfares. Without the need for traditional method of individual traffic impact studies, the Bridge Street District Transportation Planning Study was commissioned to investigate these needs in more comprehensive manner. The purpose of the study was to:

1. Evaluate traffic operations at key intersections,
2. Identify needed improvements on key street links and at key intersections,
3. Identify land uses and development densities that will trigger needed infrastructure improvements,
4. Determine a plan and/or process for phasing the needed infrastructure improvements through year 2035 based on the BSD's proposed development patterns/types, needed capacity, and a likely development timing scenario,
5. Refine typical section elements for future street links, and
6. Develop conceptual plans to graphically illustrate the recommended improvements.

With these tasks in hand, LJB Inc. embarked on the study in November 2012. The Executive Summary of the recently completed Transportation Planning Study is attached for reference. These are the major conclusions of this study:

1. Confirms the needed number of travel lanes previously assumed on existing and future street links and identifies locations where additional right-of-way may be needed to accommodate multiple modes of travel.
2. Identifies the location and type of intersection improvements that are needed to balance vehicular operating conditions with accommodations for other travel modes. Vehicular

levels of service projected in this study will ultimately improve as mode splits and transit share increase over time.

3. Confirms that turn lanes are needed at key intersections along Bridge Street, Riverside Drive and Dublin Road to maintain acceptable vehicular levels of service.

4. Specific projects are needed independently of any impacts from the BSD development projects, namely at the SR 161/Riverside Drive, SR 161/Bridge Street/Frantz Road/Post Road, and Riverside Drive/Tuller Road intersections.

5. Proposes possible planning windows for each of these improvements to help the City with budgeting, based upon an informed district-wide development phasing scenario.

Next Steps

Dovetailing the BSD planning efforts and the Transportation Planning Study, preliminary and detailed engineering are underway on multiple transportation projects in the BSD. Detailed engineering is currently underway for the following projects:

1. SR 161/Riverside Drive roundabout

2. Riverside Drive relocation

3. Tuller Ridge Drive-Dale Drive connector

4. John Shields Parkway – Phase 1 (Tuller Ridge to Mooney Street/Vrable skilled nursing)

Based on recent feedback from City Council, staff is beginning an alignment study for key BSD roadways on the west side of the Scioto River. These include the Dublin Road/Shawan Falls Drive Connector, the realigned Post Road/Rock Cress roadway, and the John Shields Parkway bridge crossing. The next steps for this connector are to develop the scope of services for this alignment study, and then solicit qualifications from potential consultants. The selected consultant is expected to be under contract in the next few months.

Since staff is only planning to provide an initial, higher level summary review of this study at your April 21 work session, we encourage Council to determine what level of additional future review and discussion it may wish to hold in future Council meetings or work sessions.

The outcomes of this study will also provide the key information for our next phase of BSD community outreach and educational efforts, and will likely also include a video summary presentation of the study's key findings and recommendation.

Recommendation

Information only.

EXECUTIVE SUMMARY

INTRODUCTION

The Bridge Street District (BSD) is an area of Dublin, Ohio that encompasses approximately 1,100 acres and includes the city's Historic District. Planning efforts for the BSD began in 2009 with a vision to create a "vibrant and walkable environment with a dynamic mix of land uses and housing types." Embodied the objectives for the District are the elements of a **diverse, active and connected transportation network** that are pivotal to supporting the overarching vision for the District. One critical part of creating a well-connected transportation network within a more urban context is by developing a grid street system that offers the following benefits:

- Accommodates most proposed development formats.
- Necessitates fewer travel lanes while providing the same overall capacity of a more suburban street network.
- Provides multiple and redundant connections within the system which exponentially increases the number of travel routes to improve traffic dispersion.
- Creates small block sizes that reduce concentrations of vehicle traffic at key locations, thereby eliminating the need for turn lanes at internal intersections.
- Allows for narrower street widths to allocate more space for pedestrians and bicyclists and reduces street crossing widths.

An important element of the BSD planning process included the 2012 Transportation Plan, by Nelson/Nygaard, that verified the street grid will operate well as the future transportation network within the District. The plan bids farewell to a more typical suburban transportation system, synonymous with an automobile-centric environment and welcomes a new era where available transportation choices will better meet the needs of people – people getting from place to place on foot, on bicycle, on bus, and in their personal vehicles. This will increasingly result in a series of trade-offs as a more balanced transportation system among all user types is developed. As a result of the 2012 Transportation Plan, Dublin staff realized the need to conduct additional studies to determine more specific impacts at key locations where the urban framework of the BSD meets the existing suburban infrastructure.

Study Purpose

Significant efforts have been invested by the City of Dublin and its stakeholders to create a solid foundation for the planning, visioning, and transportation network of the BSD. The Bridge Street Planning Study serves as a continuation of those efforts and is intended to help better define the nature of the roadway impacts and needed improvements that will be triggered by the phased development for the full build out of the BSD. These findings will help the City plan and program the timing of these improvements as development throughout the BSD occurs over time. The report also includes an assessment, at five-year intervals, depicting which events would likely trigger specific needed roadway improvements.

It is important to note the development assumptions contained in this study represent one BSD development scenario based on the best information available at the start of the project in November, 2012. The actual timing to build the recommended improvements will be evaluated and adjusted as necessary through the City's five-year Capital Improvement Program process based on the actual timing and location of private development projects that move forward.

The detailed planning of the District's street gird combined with the analysis included in this phasing study replaces the traditional approach of requiring individual site-specific traffic impact studies. In effect, by planning the larger transportation network with respect to overall development demands within the District, the transportation impacts have been determined in this study.

The following objectives were identified to achieve the complex and unique goals of this study:

- Evaluate traffic operations at key intersections.
- Identify needed improvements on key street links and at key intersections.
- Identify land uses and development densities that will trigger needed infrastructure improvements.
- Determine a plan for phasing the needed infrastructure improvements through year 2035 based on the BSD's proposed development patterns/types, needed capacity, and a likely development timing scenario.
- Refine typical section elements for future street links.
- Develop conceptual plans to graphically illustrate the recommended improvements.

STUDY METHODOLOGY

The existing street infrastructure in the BSD is largely characteristic of a typical suburban street network where many of the roadways serve both regional and local travel demands. The urban street grid concept planned for the BSD creates new street links designed primarily to serve local travel needs and provide multiple, redundant connection points. These new street links will form new intersections with the existing infrastructure. These intersections where the suburban roadway network meets the urban grid network have been identified as key locations for this study. A primary objective of this study is to identify the infrastructure needs at existing and future intersections where the suburban and urban environments meet. Identification of the future infrastructure needs was accomplished using the following approach:

- Forecast future development patterns/types for the BSD in likely five-year development windows.
- Update the travel demand model to refine the TAZ structure and reflect assumed parking locations.
- Generate future traffic volumes in five year increments.
- Conduct technical analyses including traffic signal warrants, intersection and street link capacity analysis, and turn lane length analysis.
- Identify improvements to the existing street network and at key intersections.
- Develop a transportation improvement phasing plan, based on projected traffic volumes and anticipated development.
- Refine street typical sections based on the continuing evolution of the District.

A key element in the methodology of this study is the concept of modal priority which is about deciding which travel modes get priority on which streets. These decisions are critical to ensuring that no single mode is excessively sacrificed at the expense of another so that the goal to balance

the system is achieved. Dublin has always placed importance on pedestrian and bicycle travel which is evident in the existing infrastructure that features sidewalks, shared use paths, shared travel lanes and pedestrian tunnels throughout the community. As with most transportation systems, there remains a need to prioritize some streets for motor vehicle travel. However, well-planned communities like Dublin with diverse land uses and street variety have the foundation to prioritize streets for other modes, such as walking, bicycling and transit use. This will be the case for many of the existing and future streets within the BSD, where enhancing walkability is a major goal of the BSD vision.

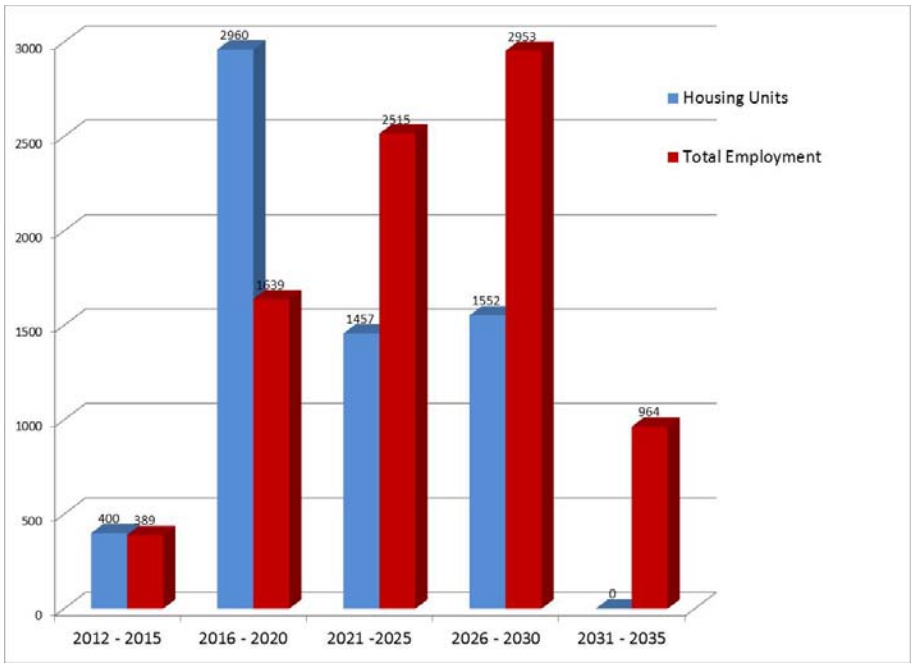
A primary goal of this study is to identify improvements needed to provide reasonable levels of service at key intersections and street links where the urban and suburban systems converge. Several of these improvements are necessary independent of the BSD, but rather are due to anticipated growth in regional vehicular traffic. Results and recommendations presented in this study acknowledge that the highest levels of vehicular service (i.e. LOS C/D or better) cannot be provided at all locations while maintaining the desired modal balance. To that end, lower levels of service for vehicular traffic (i.e. LOS E/F) may still exist at some locations even with implementation of the recommended improvements.

DEVELOPMENT FORECASTS

As early development proposals began to emerge at the outset of this study in November 2012, the anticipated timing of development over the next 20 years could not be known with certainty. Since the type of development was defined in the zoning regulations applicable to the BSD, the next step to address possible phasing needs was to predict when and where that development would occur. Dublin staff and the project consultant team assigned type, quantity and timing of development in the BSD using the concept of “planning windows”. Four planning windows of five-year durations were defined so that potential development could be assigned to specific time frames beginning in 2015. An initial planning window of three years was included to capture construction projects expected to be completed between the start of this phasing study through 2015.

This effort resulted in the phased build out planning scenario on which our analysis is based. Even though the actual phasing of private development will likely be different than this scenario, the framework of these recommendations provides the flexibility to adjust the timing of implementing various roadway improvements, based on the actual location of BSD development activities. Specific timing decisions, shaped by current development and traffic data, will be made as part of the City’s annual update to its Five-Year Capital Improvement Program.

Forecasts for housing and employment quantities for each planning window are shown in the graph on the next page**.** The number of new housing units, in this planning scenario, is expected to peak during the 2016-2020 planning window with new employment generators peaking during the 2026 – 2030 planning window.



Future traffic volumes for the BSD study area were generated for each of the five planning windows based on development allocation assumptions generated by the study team. The Dublin travel demand model (TDM) was used to generate future traffic volumes. The TDM process included the following components:

- The 2035 base model included traffic analysis zone (TAZ) splits for the Bridge Street area. Several TAZs were split in the TDM road network model and land use database so that development areas and roadway links could be better aligned.
- The 2004 base model was updated to reflect year 2012 conditions, including changes to the street network since 2004, revised speed assumptions, and new zone connectors for the revised TAZ system. Additional socioeconomic inputs were modified and traffic counts updated. The result was a validated 2012 sub-area model for the BSD.
- A parking allocation model was developed and applied to each planning window to assign trips to the TAZ of parking locations rather than the TAZ of the final destination.
- Beginning with the 2012 validated model, the land use database was incrementally updated to reflect development and street network changes attributed to each planning window. This provided traffic volume projections in the form of average daily traffic volumes (ADT) on existing and future street links and AM/PM peak hour turning movement volumes at the study intersections.

A key element of the TDM iterations by planning window was the introduction of the John Shields Parkway bridge crossing. Key output from the TDM related to traffic distribution with the John Shields Parkway bridge crossing are summarized below:

- A 10-percent reduction in traffic on Bridge Street is expected between N. High Street and Riverside Drive. Although volumes are reduced, there is still a high level of congestion projected for Bridge Street between High Street and Riverside Drive.

- A 17-percent reduction in traffic is expected on N. High Street/Dublin Road south of John Shields Parkway. This finding suggests that traffic is diverting from N. High Street/Dublin Road to John Shields Parkway to Riverside Drive which has more capacity than Dublin Road. Although volumes are reduced on Dublin Road, the demand still exceeds the capacity of a 2-lane roadway.
- A 6-percent increase in traffic on Dublin Road between Emerald Parkway and John Shields Parkway, suggesting traffic diversion from Emerald Parkway.
- A 16-percent increase in traffic is expected on southbound Riverside Drive between John Shields Parkway and Bridge Street, suggesting traffic diversion from N. High Street/Dublin Road.
- A 54-percent increase in traffic on John Shields Parkway east of Riverside Drive, suggesting that complete east/west connectivity between Shawan Falls Drive and Dublin Center Drive has a direct effect on use of John Shields Parkway.
- The Bridge Street link between High Street and Riverside Drive is expected to experience a high level of congestion. Since John Shields Parkway will provide an alternative to crossing the Scioto River on Bridge Street, the John Shields Bridge crossing, when introduced in the TDM, changes traffic patterns at the Bridge Street/High Street intersection, notably the EB left turn movement and the SB right turn movement. With the new bridge crossing in place, traffic redirects to/from Bridge Street to the north on High Street to avoid the congested link of Bridge Street. When Rock Cress Parkway and the Franklin Street extension come online, the demand for turning movements at the Bridge Street/High Street intersection are reduced.

FUTURE STREET NETWORK

The network-level changes shown in **Exhibit B**, on page 8 of the report, represent the essential streets of the BSD street grid pattern and form the "bones" of the network. This street pattern was conceived in the Vision Plan, evaluated and refined as part of the Nelson/Nygaard Transportation Study, and formally made public policy by its incorporation in, and the adoption of, the BSD zoning code, and the 2012 Transportation Plan amendment to the Community Plan.

RECOMMENDED IMPROVEMENTS

Street link recommendations

A key result of this study is verification of the needed number of travel lanes on existing and future streets and comparison with travel lane assumptions of the City's Thoroughfare Plan. Refinement of the typical street sections identified locations where planned right of way widths may be insufficient to accommodate the desired street elements. Key locations listed below and shown graphically in **Exhibit I**, on page 71 of the report, will require additional rights-of-way at intersections in order to maintain on-street parking, bicycle lanes and vehicle turn lanes. This information will assist in determining the needed rights-of-way as part of the development review process or by other means.

- **Post Road extended between Future Street C and Shawan Falls Drive**: A 4/5 lane section is recommended on Post Road between Future Street C and Shawan Falls Drive. The conceptual layout is shown in **Figure 13,** on page 40 of the report. This street link was originally envisioned as a two-lane section with an 80 foot right of way.
- **John Shields Parkway – East of Riverside Drive:** Two westbound through lanes and one eastbound through lane are recommended on John Shields Parkway between Riverside Drive and the first intersection to the east. This recommendation will affect the

availability of on-street parking on the north side of John Shields Parkway, but will provide additional through capacity needed at the Riverside Drive intersection. A conceptual layout is shown in **Figure 14,** on page 41 of the report**.**

> **John Shields Parkway – Dublin Road to Riverside Drive**: The recommended typical section across the John Shields Parkway bridge features a four-lane, undivided section (two eastbound lanes and two westbound lanes). This section is recommended so that turn lanes can be provided at the adjacent intersections without varying the width of the bridge. The conceptual layout is shown in **Figure 15,** on page 41 of the report**.**

Intersection Recommendations

Intersection level improvements are recommended at key existing and future study intersections. These recommendations include signal phasing changes, turn lane length changes, additional turn lanes, additional through lane capacity, and lane configuration and lane sizing needs at future intersections.

The following intersections and their recommended improvements are needed independently of any effects from the BSD development projects:

> **State Route 161/Bridge Street/Frantz Road/Post Road intersection upgrade**: This is the highest capacity-restricted intersection in the study area, currently operating at LOS F during both the AM and PM peak periods. The most significant challenge at the Post Road-Frantz Road intersection is managing the two high volume movements that compete for the same allocation of green-time split – the northbound left turn from Frantz Road and southbound right turn from Post Road. While a cursory review of strategies to redistribute traffic at the Post Road/Frantz Road intersection was performed as part of this study, additional study is needed to determine how best to handle the high turning volumes while balancing needs of other modes of travel.

> **State Route 161/Riverside Drive intersection upgrade**: While turning restrictions and split phase operation have retained reasonable efficiency, a long term solution is needed at this intersection. The planned improvement is a multi-lane roundabout with an eastbound right turn lane which will remove all existing turning restrictions. A preliminary design for the roundabout intersection has been completed and construction is expected for the 2016-2020 planning window. Since this location has been independently studied, detailed capacity analyses of the roundabout intersection was not included as part of this study.

> **Riverside Drive/Tuller Road intersection access modification**: Modification of this intersection is needed to restrict movements to right-in/right-out only. This will include removal of the existing traffic signal and installation of a median. With the intersection access converted to right-in/right-out only, poor levels of service are expected for the westbound right turn movement from Tuller Road to Riverside Drive. Even with full east/west connectivity provided by John Shields Parkway, traffic demand on Tuller Road for northern destinations is expected to remain high.

The following intersections have improvements recommended as a result of this study. Additional details and conceptual layouts of the recommended intersection improvements can be found in the **Recommended Improvements** section of the report.

- **Bridge Street at Shawan Falls Drive/Corbins Mill Drive:** Additional right-of-way will be needed on Shawan Falls Drive to accommodate the desired section for turn lanes at the Bridge Street intersection, bicycle facilities and parking.
- **Bridge Street at Franklin Street:** Traffic signal control is expected to be warranted at this intersection by 2035. The current pavement markings can be modified for an eastbound left turn lane on Bridge Street within the existing pavement.
- **Riverside Drive at Dale Drive (Future Street A):** Future Street A will replace the east/west section of Dale Drive and form a new intersection with Riverside Drive. A Signal upgrade is expected at the Riverside Drive/Future Street A intersection with the following recommended lane configuration.
  - **Northbound Riverside Drive**: Two through lanes with a shared right turn lane
  - **Southbound Riverside Drive**: Two through lanes with an exclusive left turn lane. The planned 450-foot turn lane can be extended if needed by removing a portion of the median.
  - **Westbound Future Street A**: One left turn lane and one right turn lane are recommended for the WB approach on Future Street A. The WB left turn lane should extend the length of Future Street A from Riverside Drive to the first intersection east of Riverside Drive to maximize access to the turn lane.

  An exclusive pedestrian phase was modeled at the Riverside Drive/Future Street A intersection to determine the effects on vehicular levels of service. Assuming 25 seconds of pedestrian clearance time for the exclusive phase, vehicular levels of service are maintained.
- **Riverside Drive at Emerald Parkway:** Emerald Parkway, Phase 8 will form the east leg at the Riverside Drive intersection with Emerald Parkway. This intersection was modeled assuming the following lane configurations, which represents the maximum number of lanes, but requires modification of the existing bridge that spans the Scioto River. Even with this lane configuration, the intersection is expected to perform very poorly for many of the major movements.
  - **Northbound Riverside Drive**: two through lanes, two exclusive left turn lanes and one exclusive right turn lane
  - **Southbound Riverside Drive**: two through lanes, an exclusive left turn lane and an exclusive right turn lane
  - **Eastbound Emerald Parkway**: two through lanes, one exclusive left turn lane, one exclusive right turn lane
  - **Westbound Emerald Parkway**: two through lanes (shared right turn), one left turn lane
- **High Street at Rock Cress Parkway:** Rock Cress Parkway will form a new intersection on N. High Street. Traffic signal control is expected at this intersection. The following lane configuration is recommended to provide intersection level of service (LOS) B. Additional right of way will be needed on Rock Cress Parkway to accommodate the desired section that provides turn lanes at the High Street intersection, along with bicycle facilities and parking.
  - **Northbound High Street**: One through lane (with shared right turn movement) and an exclusive left turn lane

- **Southbound High Street**: One through lane (with shared right turn movement) and an exclusive right turn lane
- **Eastbound Rock Cress Parkway**: One through/right turn lane and one exclusive left turn lane

> **Dublin Road at John Shields Parkway**: John Shields Parkway will form a new intersection on Dublin Road. It is expected that this intersection will operate under traffic signal control. The recommended footprint for this future intersection has been limited to a single through lane in each direction on both Dublin Road and John Shields Parkway. This recommendation is influenced by the City's desire to retain the rural character of Dublin Road while providing modal priority to pedestrians and bicycles on John Shields Parkway.

- **Northbound Dublin Road**: one through lane (with shared right turn movement), one exclusive left turn lane
- **Southbound Dublin Road**: one through lane, one exclusive left turn lane, one exclusive right turn lane. Presently two southbound through lanes on Dublin Road merge to a single lane approximately 600-feet south of Emerald Parkway. Continuation of the two southbound approach lanes is recommended with the outside lane terminating as a drop right turn lane at John Shields Parkway. This is recommended to minimize lane transitions over short distances and to provide additional capacity on Dublin Road which has been identified as a capacity deficient link.
- **Eastbound John Shields Parkway**: one through lane (with shared right turn movement), one exclusive left turn lane
- **Westbound John Shields Parkway**: one through lane, one exclusive right turn lane, one exclusive left turn lane

With the above lane configuration, poor vehicular levels of service are expected for several movements. Improved vehicular levels of service could be attained with the following changes to the intersection footprint:

- Additional through lane capacity (2 NB and 2 SB through lanes) on Dublin Road would provide LOS D with all movements at LOS E or better
- Additional through lane capacity (2 EB and 2 WB through lanes) on John Shields Parkway and dual southbound left turn lanes on Dublin Road would provide LOS D. However, LOS F is still expected for the NB through and SB left turn movements.

> **Riverside Drive at John Shields Parkway:** The intersection of Riverside Drive and John Shields Parkway is expected to operate under traffic signal control. The following conditions are recommended for the final build out of Riverside Drive/John Shields Parkway intersection. This lane configuration will provide an overall intersection LOS E in the 2035 PM peak hour, with LOS F for several individual movements.

- **Southbound Riverside Drive**: Two southbound through lanes (with a shared right turn movement) and an exclusive left turn lane. The southbound left turn lane is planned at 600-feet. This length exceeds the 95th percentile queue length of 280 feet projected for this movement based on 2035 volumes. Queues in the

SB through lanes are projected at over 900-feet which will create blocking conditions for the left turn lane during peak periods.

- **Northbound Riverside Drive**: Two northbound through lanes (with a shared right turn movement) and an exclusive left turn lane. The northbound left turn lane is recommended at 800-feet to minimize blockage of the left turn lane by through lane queues. The calculated queue length in the NB left turn lane is 275 feet; however NB through lane queues of 765 feet is expected.
- **Westbound John Shields Parkway**: Two westbound through lanes (with a shared right turn movement) with an exclusive left turn lane are recommended. The second WB through lane will be formed approximately 300-feet in advance of the Riverside Drive intersection, immediately past the first intersection east of Riverside Drive. On-street parking is not recommended on the north side of John Shields Parkway within this block so that two westbound through lanes can be provided at the Riverside Drive intersection. The length of the westbound left turn lane is recommended at approximately 300-feet. Queue lengths of 560 feet are expected in the two WB through lanes which will create blocking conditions for the left turn lane during peak periods.
- **Eastbound John Shields Parkway**: One eastbound through lanes with an exclusive left turn lane and an exclusive right turn lane are recommended. The length of the right turn lane extends across the bridge.

> **Post Road at Future Street C**: A roundabout is anticipated for this intersection. Two entry lanes on each approach with two circulating lanes are expected. The critical movement is the NB left turn movement.

> **Post Road (extended) at Shawan Falls Drive (extended)**: A new intersection will be formed by the extension of Post Road, the extension of Shawan Falls Drive and the new link of Rock Cress Parkway. Shawan Falls Drive forms the north and south legs, Post Road forms the west leg, and Rock Cress Parkway forms the east leg at this intersection.

With traffic signal control (which is expected to be warranted by 2035), the following lane configurations are recommended to provide an intersection LOS C.

- **Northbound Shawan Falls Drive**: One through lane (with a shared right turn movement) and an exclusive left turn lane
- **Southbound Shawan Falls Drive**: One through lane (with a shared right turn movement) and an exclusive left turn lane
- **Eastbound Post Road**: One through lane, an exclusive left turn lane and an exclusive right turn lane
- **Westbound Rock Cress Parkway**: One through lane (with a shared right turn movement) and an exclusive left turn lane

Capacity at this intersection was alternatively evaluated assuming a modern roundabout design. Two entry lanes on each approach with two circulating lanes are needed to achieve levels of service E or better for all movements. Demand for the SB right turn movement during the AM peak hour could warrant a SB right turn bypass lane.

Recommendations for additional study

- Additional study is needed to determine how best to handle very high turning movement volumes at the Bridge Street intersection with Post Road/Frantz Road while balancing needs of other travel modes. Additional study should include the Post Road/Future Street C intersection. Intersection treatments and aesthetics should also be explored to ensure compatibility with the BSD standards, development patterns, and adjacent streetscapes.
- Additional study will be needed to further explore the increased importance of transit service in the expanding urban environment of the District. Topics for further understanding include: ridership demand and composition, appropriate routes and locations for future service, vehicle types and capacities, possibilities for operating entity, and timeframes for implementing transit in the context of development trends.

PHASING PLAN

A detailed plan for phasing all future infrastructure improvements was developed as part of this study, as detailed below in **Table ES1**. The phasing plan includes budgetary cost estimates, evaluation criterion, and development densities triggering the respective improvements. While the phasing plan allocates infrastructure improvements to specific timeframes (2012 through 2035), actual implementation of these improvements will likely occur at different times, based on the actual pattern, location, and phasing of development. These findings set a framework for what improvements will be needed once actual development patterns begin to unfold.

Key elements of the phasing plan include:

- Improvements to Riverside Drive, including future intersections, are phased for completion between 2012 and 2020, including the realignment of Riverside Drive, Bridge Street/SR 161 intersection upgrade, and new intersection with Future Street A (replacing Dale Drive).
- The majority of John Shields Parkway east of Riverside Drive is recommended to be complete by year 2020, with the exception of the link through the Thomas Parcel, although private development activity may leverage the completion of the Thomas segment as well. The final link of John Shields Parkway through the Thomas parcel is critical to maximizing the needed east/west connectivity provided by a complete street connection between Riverside Drive and Village Parkway.
- The sections of John Shields Parkway west of Riverside Drive are phased between 2021 and 2030, including the new bridge crossing of the Scioto River.
- The extension of Post Road east of Shawan Falls Drive (Rock Cress Parkway) is phased by the design year 2035 as a result of the potential redevelopment of the school property.

CONCLUSIONS

As the BSD continues to evolve and the actual timing of development projects becomes clearer, this study will serve as a guiding document that equips the City of Dublin with the information needed to make the best decisions for the future infrastructure of the District. The framework of this study is not a static prescription that dictates precise timeframes or project phasing, but rather it serves as a road map for better understanding the overarching needs of the District: Key findings of the study include:

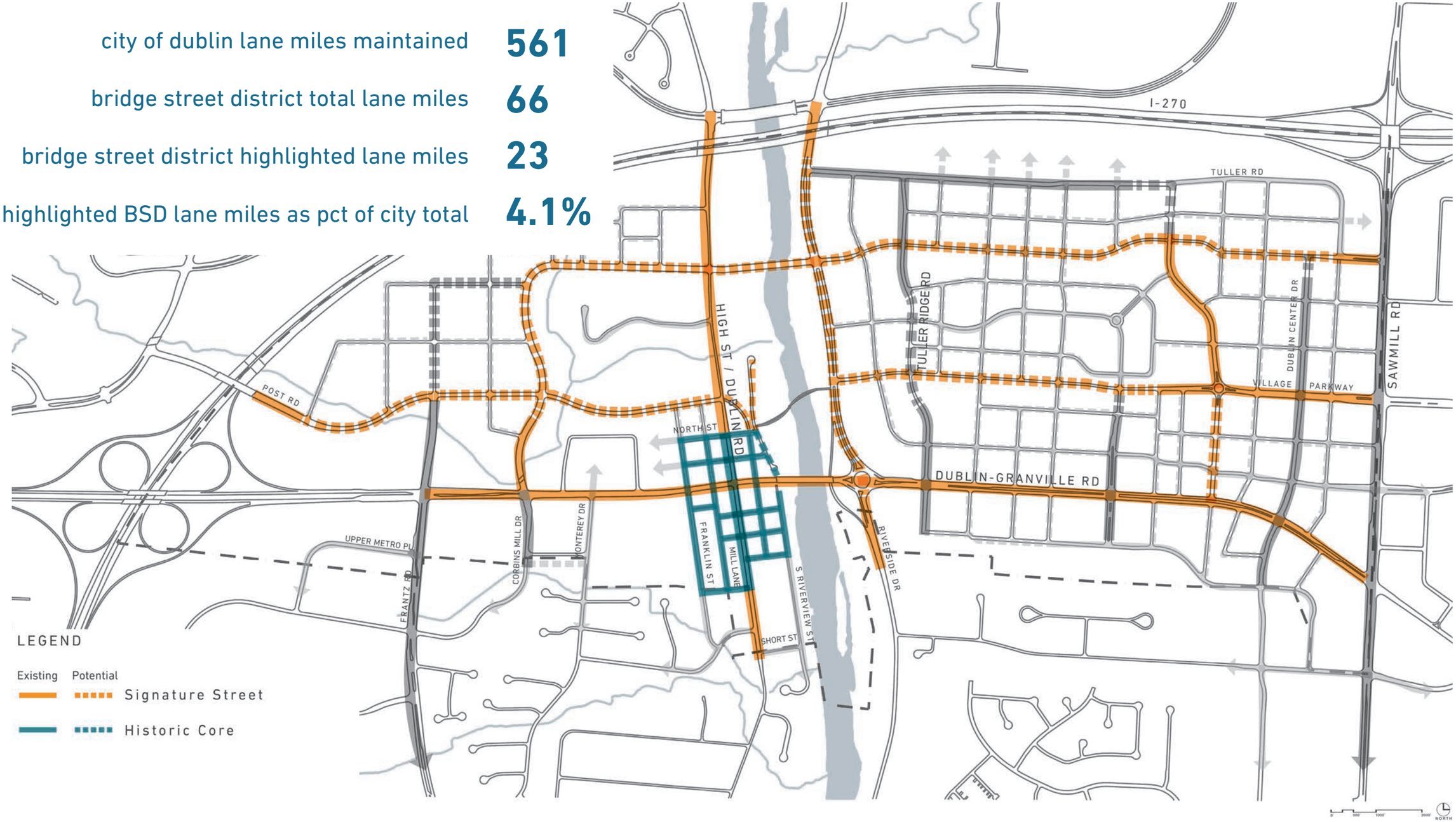
- Confirms the needed number of travel lanes previously assumed on existing and future street links and identifies locations where additional right of way may be needed to accommodate multiple modes of travel.

- Identifies the location and type of intersection improvements that are needed to balance vehicular operating conditions with accommodations for other travel modes. Vehicular levels of service projected in this study will ultimately improve as mode splits and transit shared increase over time.
- Confirms that turn lanes are needed at key intersections along Bridge Street, Riverside Drive and Dublin Road to maintain acceptable vehicular levels of service.
- Specific projects are needed independently of any impacts from the BSD development projects, namely at the SR 161/Riverside Drive, SR 161/Bridge Street/Frantz Road/Post Road, and Riverside Drive/Tuller Road intersections.
- Proposes possible planning windows for each of these improvements to help the City with budgeting.

TABLE ES1: RECOMMENDED PHASING PLAN

Network ID	Intersection or street link	Improvement	Improvement Description	Budgetary Cost Estimate	Planned Capital improvement project	Development Infrastructure	Network Connectivity	Roadway capacity	Intersection capacity	Development triggering improvement (See Influence Area Graphics, Appendix E)
PLANNING WINDOW 1: 2012 - 2015										
1	Intersection	Bridge Street/Shawan Falls signal phasing upgrade	Add protective/permissive left turn phasing on Shawan Falls and Corbins Mill	$200,000					●	-
2	Link	Emerald Parkway, Phase 8	Link extension east of Riverside including upgrades to Riverside/Emerald intersection	$7,744,000	●		●			-
3	Link	Riverside Drive Realignment - Dale Drive to Tuller Road	Realignment and reconstruction of Riverside Drive to a 4-lane divided section	$9,500,000	●	●				-
PLANNING WINDOW 2: 2016 - 2020										
4	Link	Post Road - Realignment to Future Street C	Includes new roundabout at Post Road/Future Street C intersection	$4,400,000			●	●	●	300 DU, 61 KSF
5	Link	John Shields Parkway - Riverside through the Thomas parcel	Includes new intersection at Riverside Drive	$5,600,000		●				1925 DU, 124 KSF Comm, 242 KSF Office
6	Link	John Shields Parkway - Village Pkwy to Dublin Center Dr		$4,100,000		●				425 DU
7	Link	Dale Drive - Extension north to Tuller Ridge	Includes new intersection at Future Street A	$4,400,000		●				1925 DU, 124 KSF Comm, 242 KSF Office
8	Intersection	Bridge Street / Riverside Drive - intersection upgrade	Upgrade intersection to modern roundabout	$3,500,000	●		●		●	-
9	Intersection	Riverside Drive/Future Street A - intersection upgrade	Add SB left turn lane on Riverside, construct east leg as Future Street A	$2,600,000		●				1925 DU, 124 KSF Comm, 242 KSF Office
10	Intersection	Riverside Drive / Tuller Road	Signal removal and conversion to right-in/right-out only access	$300,000	●					-
PLANNING WINDOW 3: 2021 - 2025										
11	Link	Post Road Extension - Future Street C to Shawan Falls	Includes new intersection at Post Road extended and Shawan Falls extended	$3,900,000		●	●			548 DU, 316 KSF
12	Link	Shawan Falls Drive - Extension north of Post Road John Shields Parkway - Shawan Fall extension to Dublin Road		$9,500,000		●	●	●		548 DU, 316 KSF
13	Link	Shawan Falls Drive - Extension to Post Road	Includes intersection upgrades at Bridge Street	$2,400,000					●	548 DU, 316 KSF
PLANNING WINDOW 4: 2026 - 2030										
14	Link	John Shields Parkway - east Thomas Parcel to Village Pkwy	Includes new intersection on Village Parkway	$3,800,000		●	●			787 DU, 1106 KSF
15	Link	John Shields Parkway - Dublin Road to Riverside Drive	Includes new bridge crossing and intersection modifications at Dublin and Riverside	$26,200,000			●	●	●	1287 DU, 1424 KSF
16	Link	Future Street A - new link from Dale Drive to Village Parkway	Includes new intersections with Dale Drive extension and with Future Street D	$8,800,000		●				787 DU, 1106 KSF
17	Link	Future Street C - Extension north of Post Road to John Shields	Includes intersection modifications at Post and new intersection on John Shields	$5,800,000		●				500 DU, 282 KSF
PLANNING WINDOW 5: 2031 - 2035										
18	Link	Rock Cress Parkway - Shawan Falls to N. High	Includes new intersection on N. High Street	$8,100,000			●			413 KSF
19	Link	Franklin Street Extension - Bridge Street to Rock Cress Parkway	Includes intersection modifications on Bridge Street and new intersection on Rock Cres	$3,600,000					●	413 KSF
20	Link	Future Street B - new link from Village Parkway to Dublin Granville	Includes intersection modifications at Dublin Granville and at Village Parkway	$4,800,000		●				57 KSF

city of dublin lane miles maintained	**561**
bridge street district total lane miles	**66**
bridge street district highlighted lane miles	**23**
highlighted BSD lane miles as pct of city total	**4.1%**



MKSK

DUBLIN BSD STREETSCAPE CHARACTER

CITY OF DUBLIN

Date April 21, 2014

			Straight 18" Curb		Curb Removed	
Project & Contractor	**Location**	**Date of Bid**	**Granite**	**Concrete**	**Granite**	**Concrete**
70/71 Phase 2C Mound Street	**Columbus**	**2013**				
Complete General			$48.00	$22.00		$3.00
Ruhlin			$47.00	$32.00		$1.75
Kokosing			$52.00	$25.00		$1.00
Third Avenue	**Grandview**	**2012**				
Kenmore				$18.00		$2.00
Savko				$9.10		$5.70
Trucco				$32.00		$2.47
Igel				$28.00		$3.50
Complete General				$30.00		$5.00
Main Street	**New Albany**	**2012**				
Columbus Asphalt				$16.00		$9.00
Complete General				$20.00		$3.50
Trucco				$23.00		$3.50
Nationwide, Front, High Street	**Columbus**	**2012**				
Complete General				$32.00		$5.50
Asplundh				$29.20		$3.80
Igel				$34.00		$5.00
Danbert				$35.27		$3.72
RiverSouth Front Street Ph2	**Columbus**	**2010**				
Shelly and Sands			$65.00	$18.00		$0.50
Igel			$68.00	$27.50		$1.20
Complete General			$70.00	$30.00		$6.00
Trucco			$65.00	$40.00		$2.00
RiverSouth Rich Street	**Columbus**	**2010**				
Shelly and Sands			$65.00	$28.00	$10.00	$0.50
Igel			$65.00	$29.00	$12.00	$1.25
Complete General			$70.00	$30.00	$15.00	$6.00
Trucco			$62.00	$40.00	$17.00	$4.00
RiverSouth Main Street	**Columbus**	**2010**				
Shelly and Sands			$65.00	$22.00	$12.00	$0.50
Igel			$66.00	$27.00	$12.00	$1.25
Complete General			$70.00	$20.00	$15.00	$6.00
Trucco			$63.00	$32.00	$17.00	$4.00
Rich Street Bridge	**Columbus**	**2010**				
Kokosing			$63.13	$36.00		$2.20
Complete General			$78.50	$44.00		$4.00
Great Lakes			$220.00	$40.00		$2.00
CJ Mahan			$125.00	$29.00		$2.00
Parsons/Livingston Avenue	**Columbus**	**2010**				
Savko			$53.40	$12.70	$9.10	$2.70
Complete General			$70.11	$12.00	$11.00	$2.00
Kokosing			$50.51	$9.00	$4.00	$2.00

			Straight 18" Curb		Curb Removed	
Project & Contractor	**Location**	**Date of Bid**	**Granite**	**Concrete**	**Granite**	**Concrete**
Mound St/High St - FCC	**Columbus**	**2009**				
Igel			$56.00	$20.00		
Thompson Concrete			$125.00	$30.00		
RiverSouth Front Street Ph1	**Columbus**	**2008**				
Igel			$57.00	$22.00		$2.75
Complete General			$60.00	$39.00		$4.00
RiverSouth Ludlow Street Ph1	**Columbus**	**2008**				
Igel			$62.00			$2.75
Complete General			$55.00			$4.00
RiverSouth Wall Street Ph1	**Columbus**	**2008**				
Igel			$63.00	$20.50		$2.75
Complete General			$55.00	$39.00		$4.00
Town Street	**Columbus**	**2008**				
Trucco			$130.00	$30.00		$2.50
Complete General			$140.00	$32.00		$6.00
Civic Center Drive	**Columbus**	**2008**				
Complete General			$45.00	$25.00		$4.00
Igel			$80.00	$16.00		$7.00
Gay Street	**Columbus**	**2007**				
Complete General				$18.00		$3.00
Igel				$26.00		$20.00
High/Main Street	**New Albany**	**2007**				
Columbus Asphalt				$24.00		$10.00
Complete General				$19.00		$5.00
Igel						$4.00

	Straight 18" Curb		Curb Removed	
Summary	**Granite**	**Concrete**	**Granite**	**Concrete**
Min	$45.00	$9.00	$4.00	$0.50
Max	$220.00	$44.00	$17.00	$20.00
Median	**$65.00**	**$27.75**	**$12.00**	**$3.50**
Mean	$74.40	$26.51	$12.19	$3.88
Total Bids	34	48	11	49

Input

Granite Initial Cost	$65.00	per linear foot
Granite Removal & Reset Cost	$0.00	per linear foot
Granite Replacement Rate	Assume 50 Years*	
Concrete Initial Cost	$27.75	per linear foot
Concrete Removal & Disposal Cost	$3.50	per linear foot
Concrete Replacement Rate	Assume 25 Years	

Discount Rates	25 Year PV	50 Year PV	75 Year PV
2.00%	0.6095	0.3715	0.2265
3.00%	0.4776	0.2281	0.1089
4.00%	0.3751	0.1407	0.0528
5.00%	0.2953	0.0872	0.0258

Real Treasury Interest Rate on a 30-year Treasury

		Year	Ending Rate
3.70%	**3/13/14 Spot Rate**	2009	4.63%
		2010	4.34%
3.75%	**5 yr average**	2011	2.89%
		2012	2.95%
		2013	3.96%

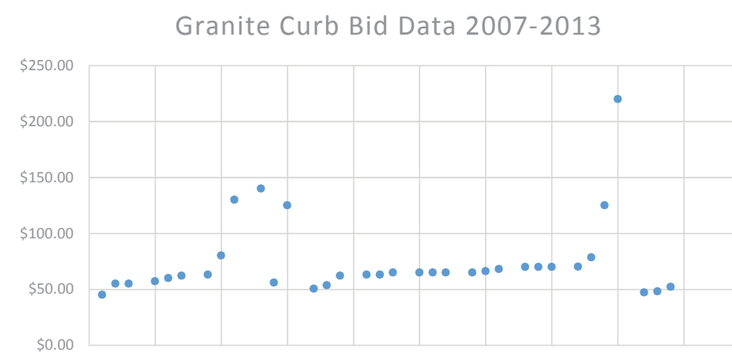
Net Present Value Analysis

2% Discount Rate	**Cost At Installation**	**NPV 25 Years**	**NPV 50 Years**
Granite	$65.00	$65.00	$65.00
Concrete	$27.75	$46.80	$58.41

3% Discount Rate	**Cost At Installation**	**NPV 25 Years**	**NPV 50 Years**
Granite	$65.00	$65.00	$65.00
Concrete	$27.75	$42.68	$49.80

4% Discount Rate	**Cost At Installation**	**NPV 25 Years**	**NPV 50 Years**
Granite	$65.00	$65.00	$65.00
Concrete	$27.75	$39.47	$43.87

5% Discount Rate	**Cost At Installation**	**NPV 25 Years**	**NPV 50 Years**
Granite	$65.00	$65.00	$65.00
Concrete	$27.75	$36.98	$39.70



Bid Data Summary	Granite	Concrete
Min	$45.00	$9.00
Max	$220.00	$44.00
Median	**$65.00**	**$27.75**
Mean	$74.40	$26.51
Total Bids	34	48

Granite Curb - Cost Analysis

Streets	Lin. Ft.	Cost/LF	Total Cost
Total BSD Streets	133,796	$ 1,800.00	$ 240,832,800.00
Total BSD Signature Streets	38,510	$ 2,400.00	$ 92,424,000.00
Total Historic Core Streets	10,578	$ 2,400.00	$ 25,387,200.00

Project	Cost/lf		Granite Curb Cost/Street LF	
Riverside Drive	$ 2,217	est	$ 130.00	**6%**
161/Riverside Roundabout	$ 4,482	est	$ 130.00	**3%**
Parsons-Livingston	$ 3,400		$ 130.00	**4%**
Civic Center Drive	$ 2,900		$ 130.00	**4%**
Front Street	$ 2,900		$ 130.00	**4%**
Rich Street	$ 2,700		$ 130.00	**5%**
Main Street	$ 2,000		$ 130.00	**7%**
Average	**$ 2,943**		**$ 130.00**	**4%**

Curb Installation Cost - Granite Curb Premium = 3.8% of Initial Project Cost

Concrete Curb	Lin. Ft.	Install Cost/LF	Total Cost	Pct Street Cost	
Total BSD Street Curb	290,286	$ 27.75	$ 8,055,436.50	3.3%	
Total BSD Signature Street Curb	97,512	$ 27.75	$ 2,705,958.00	2.9%	
Total Historic Core Street Curb	21,157	$ 27.75	$ 587,106.75	2.3%	
				2.9%	**Average**

Granite Curb	Lin. Ft.	Install Cost/LF	Total Cost	Pct Street Cost	
Total BSD Street Curb	290,286	$ 65.00	$ 18,868,590.00	7.8%	
Total BSD Signature Street Curb	97,512	$ 65.00	$ 6,338,280.00	6.9%	
Total Historic Core Street Curb	21,157	$ 65.00	$ 1,375,205.00	5.4%	
				6.7%	**Average**

Curb Life Cycle Cost - 4% Discount Rate - Granite Curb Premium = 2.2% of Initial Project Cost

Concrete Curb	Lin. Ft.	L50 Cost/LF	Total Cost	Pct Street Cost	
Total BSD Street Curb	290,286	$ 43.87	$ 12,734,846.82	5.3%	
Total BSD Signature Street Curb	97,512	$ 43.87	$ 4,277,851.44	4.6%	
Total Historic Core Street Curb	21,157	$ 43.87	$ 928,157.59	3.7%	
				4.5%	**Average**

Granite Curb	Lin. Ft.	L50 Cost/LF	Total Cost	Pct Street Cost	
Total BSD Street Curb	290,286	$ 65.00	$ 18,868,590.00	7.8%	
Total BSD Signature Street Curb	97,512	$ 65.00	$ 6,338,280.00	6.9%	
Total Historic Core Street Curb	21,157	$ 65.00	$ 1,375,205.00	5.4%	
				6.7%	**Average**

Curb Life Cycle Cost - 2% Discount Rate - Granite Curb Premium = 0.7% of Initial Project Cost

Concrete Curb	Lin. Ft.	L50 Cost/LF	Total Cost	Pct Street Cost	
Total BSD Street Curb	290,286	$ 58.41	$ 16,955,605.26	7.0%	
Total BSD Signature Street Curb	97,512	$ 58.41	$ 5,695,675.92	6.2%	
Total Historic Core Street Curb	21,157	$ 58.41	$ 1,235,780.37	4.9%	
				6.0%	**Average**

Granite Curb	Lin. Ft.	L50 Cost/LF	Total Cost	Pct Street Cost	
Total BSD Street Curb	290,286	$ 65.00	$ 18,868,590.00	7.8%	
Total BSD Signature Street Curb	97,512	$ 65.00	$ 6,338,280.00	6.9%	
Total Historic Core Street Curb	21,157	$ 65.00	$ 1,375,205.00	5.4%	
				6.7%	**Average**