Public Information Meeting
Monday, February 5, 2018
Tonight’s Presentation

- Study Overview
- Project Goals
- Process & Schedule
- Work Completed to Date
- Previous Input
- Guiding Principles
- Design Opportunities
- Next Steps
Study Overview

• **Purpose**: Identify improvements to the Vietnam Veterans Memorial Bridge and Hanover Street corridor to address accessibility, connectivity, and safety for multiple modes:
  - Bicycle
  - Pedestrian
  - Transit
  - Automobiles
  - Freight

• **Funding**: USDOT $1.1 MM TIGER Grant and a $700,000 match from Baltimore City

• **Study Limits**: Wells Street to Reedbird Avenue (a distance of 1.4 miles)
At the end of this process, the team will produce a PLAN to upgrade and enhance the Hanover Street corridor and Vietnam Veterans Memorial bridge by:

- Providing the surrounding communities with safe and reliable access to key quality of life resources
- Maintaining a critical link between existing and planned bicycle and pedestrian trails
- Improving access for local and regional motorists and freight to and from the Port of Baltimore
- Promoting better connectivity between local bus and light rail services
## Process & Schedule

<table>
<thead>
<tr>
<th>Summer 2016</th>
<th>Winter 2017</th>
<th>Winter 2018</th>
<th>Spring 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assess Existing Conditions &amp; Collect Data</strong></td>
<td><strong>Conduct Economic Market Analysis</strong></td>
<td><strong>Study Existing Transportation Network</strong></td>
<td><strong>Identify Design Opportunities and Constraints</strong></td>
</tr>
<tr>
<td>- Review area master plans</td>
<td>- Assess current economic climate</td>
<td>- Identify potential barriers to multi-modalism</td>
<td>- Identify growth opportunities</td>
</tr>
<tr>
<td>- Collect regional and community demographic data</td>
<td>- Identify future potential development opportunities and challenges</td>
<td>- Review existing pedestrian and bicycle facilities</td>
<td>- Identify design opportunities and constraints</td>
</tr>
<tr>
<td>- Assess existing and proposed land uses</td>
<td>- Review current traffic data</td>
<td>- Identify transit facilities and assess operations</td>
<td>- Compare concepts to study area needs</td>
</tr>
<tr>
<td>- Review bridge inspection reports</td>
<td>- Conduct safety assessment</td>
<td>- Conduct constructability challenges</td>
<td>- Evaluate constructability challenges</td>
</tr>
</tbody>
</table>

### Solicit Public and Agency Feedback

- Develop corridor plan
- Create guiding principles
- Outline recommendations in Project Plan
- Determine costs
- Identify key factors needed to advance project
Work Completed to Date

• Conducted Public Outreach
  ▪ Interagency Advisory Group (IAG)
  ▪ Community Advisory Panel (CAP)
  ▪ Public Meetings – September 2016, January 2017, and May 2017
• Collected Existing Conditions Data
  ▪ Review of available data and previous plans, studies, and inspection reports
  ▪ Field visits to verify existing conditions
• Conducted Economic Market Analysis
  ▪ Review of previous economic and master plans
  ▪ Analysis of demographic, economic, and real estate data
  ▪ Stakeholder interviews
  ▪ Documentation of economic strengths and weaknesses
• Analyzed Existing Transportation Network
  ▪ Investigation of existing demand
  ▪ Review of safety and capacity of existing facilities
• Identified Design Opportunities and Constraints
  ▪ Preliminary bridge options and cost estimates
  ▪ Future (2040) traffic analysis
• Developing Corridor Plan and Guiding Principles
  ▪ Urban design concepts
  ▪ Guiding principles
• What we heard:
  
  - Additional space needed for pedestrians and bicycles to increase comfort and enhance recreation
  - Add barrier separation between pedestrians / bicycles and vehicles for safety
  - Add barrier separation between opposing vehicle travel directions for safety
  - Overall support for removing center reversible lane due to safety concerns
  - Stronger support for pedestrian / bicycle accommodations rather than a dedicated transit lane
Guiding Principles
Guiding Principles

The Guiding Principles for the Hanover Street Corridor Study will:

• Inform the selection of corridor options

• Serve to guide the design-related elements along the Hanover Street corridor

• Establish a framework and serve as a guide for the City of Baltimore to take a proactive approach for future phases of design and construction
Guiding Principles

• Historic and cultural context of the Vietnam Veterans Memorial Bridge
  ▪ Aesthetics
  ▪ Architectural importance
  ▪ Cultural and natural resource preservation
  ▪ Bringing back the original purpose of the bridge – connectivity for all travelers; since rehabilitation in 1970, the purpose of the bridge has been almost exclusively to move vehicles

• Community Revitalization
  ▪ Gateway to current and future development
  ▪ Economic and social growth

• Safety
  ▪ Increased space in the corridor for pedestrians and bicycles
  ▪ Using design opportunities to calm traffic (reduce speeds) improves safety for pedestrians and bicyclists
Guiding Principles

• Connectivity
  ▪ Improved and enhanced multimodal connectivity between pedestrians, bicyclists, transit riders, motor vehicles, and freight operators
  ▪ Remove barriers that block desired movements and gaps that separate people from their desired destinations
  ▪ Make connections within and between neighborhoods, as well as between local and regional origins and destinations (residential, retail, employment, and recreation)

• Accessibility
  ▪ Provide the surrounding communities with safe and reliable access to key quality of life resources (retail, employment, and recreation)
Preliminary Bridge Options
Short-Term Maintenance Option

Option 1 / 2: Full Deck Replacement (Roadway Only)

- Replacement of “Top Slab” of Deck above Precast Planks
  - Does not include movable span steel grid deck replacement
  - Does not include sidewalk replacement
- Methodology
  - Used existing plan sets to derive quantities
  - Cost estimate based upon primary work items
- Cost Estimate
  - Used recent construction costs for similar work
  - Identified contingencies and project soft costs
  - Total cost (2018 $): $8.0 million to $10.0 million
Option 3: Four-Lane Section

- Replacement of Bridge Deck – Full Depth including Precast Planks
  - Includes replacement of movable span steel grid deck
  - Includes bicycle and pedestrian paths, replacing outside barriers, installing new barriers between vehicular traffic and pedestrians and bicyclists, and installing new lighting

- Methodology
  - Used existing plan sets to derive quantities
  - Cost estimate based upon primary work items

- Cost Estimate
  - Used recent construction costs for similar work
  - Identified contingencies and project soft costs
  - Total cost (2018 $): $30.0 million (no rehabilitation of the moveable span)
  - Total cost (2018 $): $50.0 million (fix the moveable span in the closed position)
  - Total cost (2018 $): $70.0 million (full rehabilitation of the moveable span)
Option 4: Separate Pedestrian / Bicycle Bridge and General Rehabilitation of the Existing Bridge to Accommodate Six Travel Lanes

- Requires United States Coast Guard Approval to Fix Movable Span of Existing Bridge
- Replacement of Bridge Deck – Full Depth including Precast Planks
  - Includes structural modifications to fix existing movable span
  - Includes concrete filled steel grating of existing movable span
  - Includes six travel lanes, replacing outside barriers, installing new barriers between opposing vehicular traffic, and installing new lighting
- Construction of New Parallel Pedestrian / Bicycle Bridge
  - Connecting Middle Branch Park to West Covington Park, west of the existing bridge
  - Assumes a fixed channel span
  - Serves bicyclists and pedestrians only
Preliminary Bridge Options

Option 4: Separate Pedestrian / Bicycle Bridge and General Rehabilitation of the Existing Bridge to Accommodate Six Travel Lanes

- Methodology
  - Used existing site information to derive bridge length
  - Cost estimate based upon industry recognized “square foot” costs for similar work

- Cost Estimate
  - Identified contingencies and project soft costs
  - Pedestrian / bicycle bridge cost (2018 $): $20.0 million
  - Existing bridge rehabilitation cost (2018 $): $50.0 million
  - Total cost (2018 $): $70.0 million
Option 5: New Six-Lane Bridge and Demolition of Existing Bridge

- Construction of a New “Signature Crossing”
  - Assumes a movable channel span
  - Includes demolition of the existing bridge
- Methodology
  - Used existing site information to derive bridge length
  - Cost estimate based upon industry recognized “square foot” costs for similar work
  - Used relatively high unit costs for “signature” portion of bridge
- Cost Estimate
  - Used standard contingencies
  - Identified project soft costs
  - **New bridge cost (2018 $):** $230.0 million
  - **Demolition of existing bridge cost (2018 $):** $15.0 million
  - **Total cost (2018 $):** $245.0 million
Option 6: New Four-Lane Bridge and Demolition of Existing Bridge

- **Construction of a New “Signature Crossing”**
  - Assumes a movable channel span
  - Includes demolition of the existing bridge
- **Methodology**
  - Used existing site information to derive bridge length
  - Cost estimate based upon industry recognized “square foot” costs for similar work
  - Used relatively high unit costs for “signature” portion of bridge
- **Cost Estimate**
  - Used standard contingencies
  - Identified project soft costs
  - **New bridge cost (2018 $): $180.0 million**
  - **Demolition of existing bridge cost (2018 $): $15.0 million**
  - **Total cost (2018 $): $195.0 million**
## Preliminary Bridge Options Summary

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Rehabilitation or Replacement</th>
<th>Total Cost (2018 $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 / 2</td>
<td>Full Deck Replacement (Roadway Only)</td>
<td>Short-Term Maintenance</td>
<td>$8.0 M to $10.0 M</td>
</tr>
<tr>
<td>3</td>
<td>Four-Lane Section with 8 to 10 Foot Barrier Separated Pedestrian / Bicycle Paths</td>
<td>Rehabilitation</td>
<td>$30.0 M to $70.0 M</td>
</tr>
<tr>
<td>4</td>
<td>Separate Pedestrian / Bicycle Bridge and General Rehabilitation of the Existing Bridge to Accommodate Six Travel Lanes with No Pedestrian or Bicycle Accommodations</td>
<td>Rehabilitation</td>
<td>$70.0 M</td>
</tr>
<tr>
<td>5</td>
<td>New Six-Lane Bridge with 12 Foot Barrier Separated Pedestrian / Bicycle Paths and Demolition of Existing Bridge</td>
<td>Replacement</td>
<td>$245.0 M</td>
</tr>
<tr>
<td>6</td>
<td>New Four-Lane Bridge with 12 Foot Barrier Separated Pedestrian / Bicycle Paths and Demolition of Existing Bridge</td>
<td>Replacement</td>
<td>$195.0 M</td>
</tr>
</tbody>
</table>
Urban Design Concepts
Potee Street looking north

- Enhanced pedestrian space – bus shelter and bench
- Dedicated bicycle facility
Hanover Street looking north

- Dedicated bicycle facility
- Enhanced landscaping
Peninsula below northern bridge arcade

• Enhanced public recreation space (previously unused)
• Public art displays
Arcade peninsula

- Enhanced public recreation space (previously unused)
- Pedestrian lighting
- Pedestrian stairway connection to/from bridge
Arcade peninsula sculptural stairway to / from bridge
Space below southern bridge vault

- Enhanced public recreation space
- Pedestrian lighting for enhanced safety
- Cleared vegetation to enhance safety
Space under southern end of bridge
View from bridge (looking northwest)

- Barrier between pedestrians and vehicular traffic for enhanced safety
- Pedestrian lighting
- Pedestrian stairway connection to/from bridge

Bike path through Port Covington currently under construction
Hanover Street at Cromwell Street (looking south)

- Enhanced pedestrian crosswalks
- Removed channelized right-turn movements to improve pedestrian safety
Potee Street at Waterview Avenue (looking southeast)

- Enhanced pedestrian crosswalks
Separate pedestrian and bicycle bridge with reconfigured existing bridge
Traffic Analysis
Types of Analysis

Vehicles
• Intersection Level
  ▪ Intersection Performance Measures
    ▪ Level of Service (LOS)
    ▪ Volume-to-Capacity (V/C) Ratio
    ▪ Vehicle Delay

• Network Level
  ▪ Micro-Simulation (SimTraffic)
  ▪ Network Performance Measures
    ▪ Travel Time
    ▪ Queue Lengths
    ▪ Travel Speeds

Other Modes
• Bicycle Level of Comfort
# Intersection LOS Delay Ranges

<table>
<thead>
<tr>
<th>Level of service</th>
<th>Control Delay range (sec/veh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>≤10</td>
</tr>
<tr>
<td>B</td>
<td>&gt;10 and ≤20</td>
</tr>
<tr>
<td>C</td>
<td>&gt;20 and ≤35</td>
</tr>
<tr>
<td>D</td>
<td>&gt;35 and ≤55</td>
</tr>
<tr>
<td>E</td>
<td>&gt;55 and ≤80</td>
</tr>
<tr>
<td>F</td>
<td>&gt;80</td>
</tr>
</tbody>
</table>
Bicycle Level of Comfort

Inputs to Analysis

• # of through lanes
• Divided/Undivided Roadway
• Average Daily Traffic
• Heavy Vehicle Percentage
• Posted Speed Limit
• Width of Outside Lane (and shoulder)
• Pavement Condition

Output

• Level of service (A through F) based on score
Recap of Existing Conditions

• All intersections within the project study area limits operate with a LOS D or better during the AM and PM peak hours.
<table>
<thead>
<tr>
<th>Segment</th>
<th>AM – Northbound</th>
<th>AM – Southbound</th>
<th>PM – Northbound</th>
<th>PM – Southbound</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Average Corridor Travel Times</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Northern Segment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wells Street to Cromwell Street (0.4 miles)</td>
<td>1.3 minutes (2 minutes) [9 minutes]</td>
<td>1.5 minutes (2 minutes) [9 minutes]</td>
<td>1.4 minutes (2 minutes) [9 minutes]</td>
<td>1.3 minutes (2 minutes) [9 minutes]</td>
</tr>
<tr>
<td><strong>Southern Segment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cromwell Street to Reedbird Avenue (0.9 miles)</td>
<td>1.8 minutes (5 minutes) [19 minutes]</td>
<td>2.0 minutes (5 minutes) [19 minutes]</td>
<td>2.3 minutes (5 minutes) [19 minutes]</td>
<td>2.0 minutes (5 minutes) [19 minutes]</td>
</tr>
<tr>
<td><strong>Entire Corridor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1.3 miles)</td>
<td>3.1 minutes (7 minutes) [28 minutes]</td>
<td>3.5 minutes (7 minutes) [28 minutes]</td>
<td>3.7 minutes (7 minutes) [28 minutes]</td>
<td>3.3 minutes (7 minutes) [28 minutes]</td>
</tr>
</tbody>
</table>
2040 No-Build Assumptions

• Volumes and lane configurations represent the No-Build analysis for I-95 Access Improvements Study
  ▪ Includes new Port Covington intersections along Hanover Street (i.e. Magenta Street, Blue Street, Red Street)
  ▪ Does not include any assumed I-95 access improvements
Recap of No-Build Conditions

- 3 intersections operate with LOS F during the AM peak hour
  - Hanover Street at Wells Street
  - Hanover Street at McComas Street
  - Hanover Street at Blue Street
- 5 intersections operate with LOS E or LOS F during the PM peak hour
  - Hanover Street at Wells Street
  - Hanover Street at McComas Street
  - Hanover Street at Blue Street
  - Hanover Street at Red Street
  - Hanover Street at Cromwell Street
2040 Roadway Build Assumptions

- Volumes and lane configurations include improvements currently expected as part of the I-95 Access Improvements Study
  - I-95 NB to Hanover Street SB off-ramp relocated
  - Turn restrictions implemented along Hanover Street at three intersections
  - Side street left-turn lanes as shown
### 2040 Roadway Build Intersection Results

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Existing Conditions</th>
<th>Future Year Conditions (2040 No-Build)</th>
<th>Future Year Conditions (2040 Build)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>AM</td>
</tr>
<tr>
<td>Hanover St &amp; Wells St</td>
<td>30.7</td>
<td>31.0</td>
<td>C</td>
</tr>
<tr>
<td>Hanover St &amp; McComas St</td>
<td>13.6</td>
<td>17.7</td>
<td>B</td>
</tr>
<tr>
<td>Hanover St &amp; Magenta St</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hanover St &amp; Blue St</td>
<td>264.8</td>
<td>180.0</td>
<td>F</td>
</tr>
<tr>
<td>Hanover St &amp; Red St</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hanover St &amp; Cromwell St</td>
<td>18.8</td>
<td>37.7</td>
<td>B</td>
</tr>
<tr>
<td>Potee St and Waterview Ave</td>
<td>21.4</td>
<td>7.5</td>
<td>C</td>
</tr>
<tr>
<td>Hanover St &amp; Waterview Ave</td>
<td>5.1</td>
<td>8.6</td>
<td>A</td>
</tr>
<tr>
<td>Potte St &amp; Cherry Hill Rd</td>
<td>16.1</td>
<td>9.9</td>
<td>B</td>
</tr>
<tr>
<td>Hanover St &amp; Cherry Hill Rd</td>
<td>5.5</td>
<td>10.5</td>
<td>A</td>
</tr>
<tr>
<td>Potee St and Reedbird Ave</td>
<td>8.6</td>
<td>8.4</td>
<td>A</td>
</tr>
<tr>
<td>Hanover St &amp; Reedbird Ave</td>
<td>4.0</td>
<td>5.7</td>
<td>A</td>
</tr>
</tbody>
</table>

### Findings
- 1 intersection operates with LOS E during the AM peak hour (Hanover Street at Wells Street)
- 2 intersections operate with LOS E or LOS F during the PM peak hour (Hanover Street at Wells Street & Hanover Street at McComas Street)

### Improvements
- Intersection results improve in 2040 Build compared to 2040 No-Build because of roadway improvements (e.g. I-95 NB ramp to Hanover Street realignment, side street left-turn lanes), turn restrictions, and signal timing improvements north of the bridge
2040 Roadway Build Intersection Results
Travel lane scenarios examined (with x/x lanes in each direction):

- **2/2/1 reversible lane**
  - Existing bridge width and operations
- **2/2 lanes**
  - Existing bridge width
  - 1 lane reconfigured for pedestrians and bikes
- **3/2 lanes**
  - Existing bridge width
  - Permanent imbalance with 3 lanes in one direction and 2 in the other direction
  - No reversible lane
- **3/3 lanes**
  - New bridge
## Bicycle Level of Comfort On Bridge

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Level of Comfort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing (shared travel lane)</td>
<td>F</td>
</tr>
<tr>
<td>2040 No Build (shared travel lane)</td>
<td>F</td>
</tr>
<tr>
<td>2040 Build – Options 1 and 2 (shared travel lane)</td>
<td>E</td>
</tr>
<tr>
<td>2040 Build – Option 3, 3A, and 3B (barrier separated ped/bike paths)</td>
<td>A</td>
</tr>
<tr>
<td>2040 Build – Option 4 (separate ped/bike bridge)</td>
<td>A</td>
</tr>
<tr>
<td>2040 Build – Option 5 (new bridge with barrier separated ped/bike paths)</td>
<td>A</td>
</tr>
</tbody>
</table>
2040 Build Results – Queues

• AM
  ▪ Northbound queue from Cromwell Street would extend 560’ beyond Cherry Hill Road with existing bridge configuration (i.e. Reversible)

• PM
  ▪ Northbound queue from Cromwell Street would extend 840’ beyond Reedbird Avenue with existing bridge configuration (i.e. Reversible)
  ▪ Northbound queue at Cromwell Street reduced by approximately 1,000 feet for bridge configurations with 3rd northbound lane

• Conclusion
  ▪ The bridge cross section will not have a significant impact on corridor travel time or queueing
2040 Build Results – Travel Times

Travel Times Between Wells Street and Reedbird Avenue

- Minutes

- AM NB
- AM SB
- PM NB
- PM SB

- Reversible (Existing)
- Reversible (No Build)
- Reversible
- Imbalance (NB)
- Imbalance (SB)
- 4 lane
- 6 lane
- Pedestrian
- Bicycle
Next Steps

• Project Documents
  ▪ Draft Project Report
    ▪ Outline corridor recommendations
    ▪ Additional cost information
    ▪ Identify key factors needed to advance project
  ▪ Final Project Report

• Continue robust public outreach program
  ▪ Spring and Summer 2018 Public Meetings
Questions?