

*Docket Item #11*


**City of Alexandria, Virginia**

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**MEMORANDUM**

**DATE:** AUGUST 25, 2011

**TO:** JOHN KOMOROSKE, CHAIRMAN AND MEMBERS OF THE PLANNING COMMISSION; AND  
KEVIN POSEY, CHAIRMAN AND MEMBERS OF THE TRANSPORTATION COMMISSION

**FROM:** RICHARD BAIER, P.E., LEED AP., DIRECTOR, T&ES 

**SUBJECT:** PUBLIC HEARING AND CONSIDERATION OF THE FIRST STAGE OF IMPLEMENTATION FOR THE HIGH CAPACITY TRANSIT CORRIDOR C (VAN DORN/BEAUREGUARD)

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**ISSUE:** Consideration of the High Capacity Transit Corridor C (Van Dorn / Beauregard) and the High Capacity Transit Corridor Work Group (CWG) recommendation for the corridor (Attachment A).

**RECOMMENDATION:** Staff recommends the following:

1. That the Planning Commission and Transportation Commission receive a staff update on the CWG recommendation for Transitway Corridor C (Van Dorn/Beauregard);
2. That the Planning Commission and Transportation Commission receive public comments, and provide input to the City Manager and City Council in consideration of the CWG recommendation that Alternative D be selected for Corridor C (Van Dorn / Beauregard).

**DISCUSSION:** The City's 2008 Transportation Master Plan, and the City Council's 2010 Strategic Plan identify high capacity transitways within the City as high priority projects. The Transportation Master Plan identifies a network of High Capacity Transitways in three of Alexandria's most important travel corridors. These transitways will allow frequent and reliable transit service to existing and future development areas and to local and regional transit hubs. These transitways (which represent the corridors served and not necessarily the actual transitway alignment) are shown in Attachment B and include:

- Corridor A: Route 1 / Washington Street
- Corridor B: Duke Street / Eisenhower Avenue
- Corridor C: Van Dorn / Beauregard

The transitways are part of a larger regional system of high capacity transit between major

activity centers, transit facilities, high density mixed use areas and employment centers. All three of the transitways being planned for in Alexandria provide connectivity to major activity areas within Alexandria, and connectivity to regional destinations such as the Pentagon, Shirlington, and Fairfax County.

The City is currently analyzing the feasibility and implementation of the three transitways as part of the Transitway Corridor Feasibility Study. The first phase of the analysis has focused on Corridor C, due to the completion and opening of the BRAC-133 facility, and the related Beauregard Corridor land use planning effort that is currently underway. The transit options and recommendations for Corridor C have provided the basis for the land use discussions as part of the Beauregard Corridor Small Area Plan. The Transitway Corridor Feasibility Study (Study) is anticipated to be complete by early 2012. Due to the size and complexity of the planning effort, there is much coordination required for this project. City staff is coordinating with Arlington and Fairfax Counties. It is critical that these efforts stay on schedule to ensure optimal coordination between planning efforts and to ensure that adequate transportation infrastructure is in place to support all phases of development.

The Study includes the following:

- Development of concepts to provide enhanced transit services
- Evaluation of different transit mode technologies (bus, enhanced bus, bus rapid transit, and streetcar)
- Evaluation of alternatives for transit operations considering median and side running configurations
- Evaluation of the trade-offs between mixed traffic and dedicated lane facilities
- Identification of overall corridor implementation action plans to inform and guide future study and engineering efforts for each corridor
- Coordination with environmental permitting agencies to discuss the likely scope of future environmental documentation to be required based on the type of funding to be sought
- Coordination with adjacent localities and regional agencies
- Review of financial feasibility of alternatives

Analysis for Corridor C has included a review of existing conditions, an assessment of corridor needs, development of alternatives and screening criteria, and analysis of the alternatives using screening criteria. A significant amount of coordination has occurred with the Beauregard Corridor planning process, including ensuring that the corridor can accommodate the various transitway options.

Seven initial alternatives were developed and reviewed with the CWG. The initial screening analysis resulted in four remaining alternatives for more detailed screening. These four alternatives are described in Attachment C (Draft Selection of Preferred Alternative for Transitway Corridor C, dated May 12, 2011). The four alternatives included:

- **Alternative B:** Rapid Bus in mixed flow connecting to the Pentagon and Shirlington (Baseline Alternative)
- **Alternative D:** Bus Rapid Transit connecting to the Pentagon and Shirlington
- **Alternative E:** Bus Rapid Transit connecting to the Pentagon and Streetcar in mixed traffic connecting to Beauregard Town Center

- **Alternative G: Streetcar in Dedicated Lanes connecting to Columbia Pike**

Screening criteria included four broad categories including 1) effectiveness; 2) impacts; 3) cost effectiveness; and 4) financial feasibility. The screening criteria are further described in Attachment C. After the completion of the detailed screening, staff worked with the consultant to develop a recommendation for Corridor C, based on the screening evaluation, and input from the CWG, staff and the public. A summary of public comments is included in Attachment D.

The technical memorandum, dated May 12, 2011 was prepared by the consultant and recommended a preliminary preferred alternative and phasing strategy for CWG consideration. The CWG recommendation was that Alternative D (Bus Rapid Transit connecting to the Pentagon / Pentagon City and Shirlington) be the preferred alternative for implementation of transit in dedicated lanes in Corridor C. The CWG also recommended that Alternative D should be constructed in a manner that does not preclude future implementation of streetcar in the corridor.

### **High Capacity Transit Corridor Work Group**

Given the City-wide importance of implementing the Transportation Master Plan and to ensure an open and transparent process, a citizen group was created to provide input to such issues as route alignments, cross-sections, methods of operation, type of vehicles, land use considerations, ridership, and financial implications. The group, known as the High Capacity Transit Corridor Work Group (CWG) includes: two members of City Council, one representative from the Planning Commission, one representative of the Transportation Commission, one representative of the Budget and Fiscal Affairs Advisory Commission, one representative of the Chamber of Commerce, two residents appointed by the Federation of Civic Associations, and one resident with transit planning expertise.

The CWG held a total of six public meetings related to Corridor C since the project began in the summer of 2010. An opportunity for public comment was provided at all meetings, and staff has received public comments through other efforts as well, including via the project webpage, e-mails and letters. All public comments related to Corridor C provided to date have been forwarded to the CWG and a summary of the public comments are attached as part of this memorandum (Attachment D).

Based on the analysis described above, at their May 19, 2011 meeting, the CWG recommended that the City move forward with Alternative D in dedicated lanes and that the transit way be designed in a manner not to preclude future conversion to streetcar. It should be noted that dedicated lanes means implementing dedicated lanes where and when feasible. The following motion was made and approved by the CWG:

*"Alternative D is the preferred alternative for phased implementation of transit in dedicated lanes in Corridor C until such time as Alternative G becomes feasible and can be implemented. This course of action is consistent with the Council's recent decision to provide dedicated lane transit along the segment of Corridor A that is north of Braddock Road. Evaluation and analysis will continue of Alternative D in preparation for future implementation of Alternative G. Construction of transit in Corridor C shall be the first priority of Alexandria's transportation projects. Each subsequent corridor shall be evaluated separately*

*regarding the need to acquire additional right-of-way for dedicated lanes as discussed in the Transportation Master Plan."*

### **Land Use Planning**

Beauregard Corridor: Transportation is one of the primary issues being discussed as part of the ongoing community planning process in the Beauregard Corridor. Thus far, there have been a series of City-sponsored community meetings, eight Beauregard Community Stakeholder Group (BCSG) meetings and eight meetings held by the developers in the corridor. Several of these meetings have included presentations and discussions related to transportation and transit within the corridor.

As part of the process regarding potential land use and/or zoning changes, the transitway has been discussed, including the possible dedication of right-of-way by developers. The developers discussing potential redevelopment have property frontage for a significant portion of the proposed transit corridor. Therefore, a recommendation of future Master Plans would be the dedication of right-of-way to accommodate the transitway. This approach is similar to the approach the City took in the recently approved plans for Potomac Yard, North Potomac Yard, and Landmark/Van Dorn.

Accommodating transit and land use planning is consistent with the City's Strategic Plan Goal #3 of providing "a multimodal transportation network that supports sustainable land use and provides internal mobility and regional connectivity for Alexandrians."

Beauregard Street is currently designed as a suburban arterial roadway which lacks adequate accommodation for multiple modes of transportation. Full implementation of the City's Complete Streets policy would require the widening of streets like Beauregard in order to adequately accommodate transit, pedestrians and bicyclists. The proposed transitway itself results in the widening of Beauregard and the loss of existing trees within the median and along one or both sides of the street. Regardless of whether the street is widened to accommodate transit within existing lanes or new dedicated lanes, the existing median and roadway character will be altered as the existing median and side trees will be lost to accommodate the Complete Streets goals. Both T&ES and P&Z staff believe that although there are some downsides, the widening of Beauregard Street is an opportunity, as a significant amount of new landscaping, street trees, bicycle facilities, along with wider sidewalks, transit stations and accompanying street furniture will create an attractive new multi-modal boulevard. This boulevard will accommodate all users, use green technology and complement the character of the neighborhood. Some of these enhanced improvements are desired to be included as potential development contributions in conjunction with the Beauregard Corridor Plan.

A challenge with providing dedicated transit lanes is that they require additional width to the street, unless existing travel lanes are removed to accommodate the transitway. The removal of an existing travel lane was analyzed and discussed as part of the feasibility analysis. However, a majority of the CWG and many community members felt that adding new dedicated lanes would be necessary in the Beauregard-Van Dorn corridor, due to the significant congestion that would result in the taking away of existing travel lanes.

Landmark / Van Dorn Plan: The Landmark / Van Dorn Plan includes a number of transit recommendations and depends on the provision of high-capacity transit service to support the

full build-out of the proposed development. The plan was intended to be consistent with and support implementation of the transitway corridors approved in the City's Transportation Master Plan.

The Landmark/Van Dorn Plan accommodates dedicated transit lanes in Corridor C along Van Dorn Street from Landmark Mall to the Van Dorn Metro Station, and provides for dedicated lanes in the Duke Street Corridor (Corridor B) within the planning area.

### **Process**

Generally, significant planned capital road and transit improvements within the City are included in a Master Plan when approved by the Planning Commission and City Council. Examples include the Route 1 Bridge and the potential new Potomac Yard Metrorail station.

In this case, the general alignment of the Corridor C transitway was approved as part of the 2008 adopted Transportation Master Plan and is a Citywide transportation facility with Citywide transportation and land use implications. Given the importance of these transit facilities and their broad citywide benefit, staff is recommending a phased implementation strategy for each of the three transitway corridors already approved in the Transportation Master Plan, which would consist of the following:

1. CWG review and recommendation to City Council on route alignments, cross-sections, methods of operation, type of vehicles, land use considerations, ridership, and financial implications.
2. Review and input by the Planning Commission, Transportation Commission and approval by the City Council regarding the refined alignment and feasibility for each route.
3. After the specific alignments are approved by City Council, transitway elements including landscaping, streetscape and shelters will also require subsequent briefing to, and input from, the Planning Commission and Transportation Commission and then consideration and approval by City Council.

This three-step approach allows the Planning Commission, Transportation Commission and City Council the opportunity to review each alignment separately from its review of the detailed elements of the transitway. The approach also provides the community and stakeholders the opportunity to review and comment on the proposed transitway during each step of the process given the important Citywide nature of these projects.

### **Conclusion**

The proposed transitway along Corridor C will be one of the largest (approximately 24,000 linear feet or 4.5 miles one direction within the City limit) transit improvements within the City. The transitway was discussed extensively as part of the 2008 Transportation Master Plan. The Council's Strategic Plan includes an objective to increase transit options for locally oriented trips emphasizing inter-jurisdictional coordination, and specifically an initiative to begin formal planning and engineering for Corridor C. The recommendation by the CWG is a necessary implementation component of the Master Plan. The recommendation would provide a dedicated transitway for high capacity transit along a corridor that has high employment and residential

densities, and major redevelopment, especially in the Beauregard and Landmark/Van Dorn areas.

Staff supports the proposed Corridor C transitway because it balances many of the goals of the City and the existing and planned development for this portion of the City. As with all implementation measures, the City often must balance competing objectives, including transit, cost and neighborhood context.

### **Next Steps**

Staff is presenting the preliminary preferred recommendations for Corridor C to the Council at its September 13, 2011 regular session, and a public hearing is scheduled for September 17, 2011 where staff will ask Council to adopt the CWG recommendations and authorize staff to proceed to the next stages of implementation. Once a final Council decision is made, the Corridor C implementation plan will be finalized, and the project can proceed to the next phase which will include an Alternatives Analysis / Environmental Assessment. Following the Alternatives Analysis / Environmental Assessment, if finances are in place, the project will move into design, right-of-way acquisition and construction.

### **FISCAL IMPACT:**

Refined estimates for the transitway construction and operations will be developed during the subsequent phases of design for the transitway. It is anticipated that the Alternatives Analysis required for Corridor C would require \$1 million in funding. Either federal grant funds or City CIP funds will pay for the Alternatives Analysis. The FY 2012-2021 approved City CIP currently includes \$19.5 million in City funds for the construction of Corridor C. The City anticipates that the current redevelopment effort in the Beauregard Corridor will result in dedicated right of way, and significant developer contributions toward a large portion of the capital costs of the project.

The planning level cost estimates range from \$48 million if the alternative selected is Bus Rapid Transit to \$185 million if the alternative selected is streetcar in dedicated lanes. These estimates do not include right of way costs, maintenance facility, rolling stock or ongoing operating costs. At the lower end of the cost estimates the funding sources would likely primarily be City CIP and developer monies. The high end cost estimates would require substantial federal assistance in addition to City and developer monies. Given the state of federal transportation funding and the fact that the federal funds for this purpose are competitively awarded, there is a high degree of uncertainty regarding substantial future federal transportation funding.

**Attachment A** – CWG Corridor C Recommendation

**Attachment B** – City Transitway Initiatives

**Attachment C** - Draft Selection of Preferred Alternative for Transitway Corridor C (Technical Memorandum dated May 12, 2011)

**Attachment D** - Summary of Public Comments

### **STAFF:**

Bruce Johnson, Acting City Manager

Mark Jinks, Deputy City Manager

Richard Baier, P.E., LEED AP., Director, T&ES

Faroll Hamer, Director, P&Z

Abi Lerner, P.E., Deputy Director, T&ES

Jeff Farner, Deputy Director, P&Z  
Jim Maslanka, Division Chief, T&ES  
Steve Sindiong, Principal Transportation Planner, T&ES

# Transitway Corridor Feasibility Study Corridor C Transitway – Recommended Operation

## Alternative D Bus Rapid Transit in Dedicated Lanes from Van Dorn Metro to Pentagon

### Planning-Level Cost Estimate

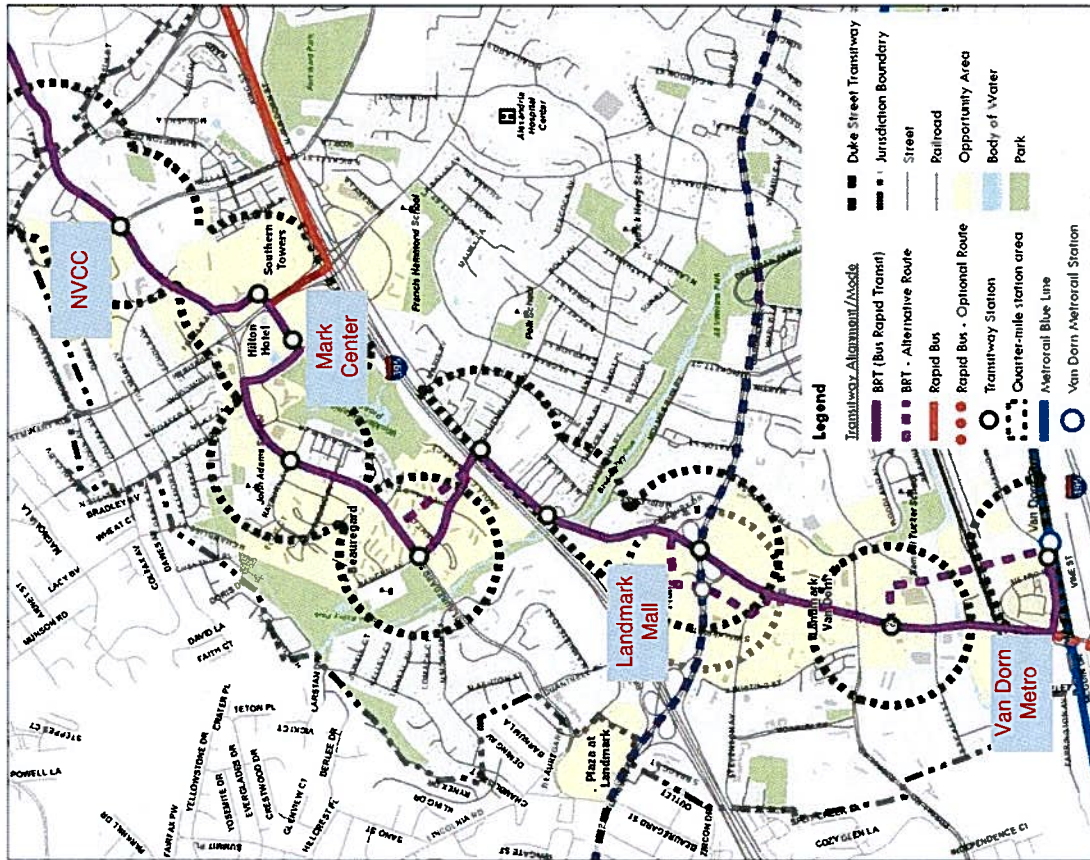
- Capital: \$48 million
- Fleet (25-year): \$20 million
- ROW: \$33 million
- Operating (25-year): \$60 million

### Physical Characteristics

- Low-floor BRT vehicles
- Dedicated lanes (~80% to 90% of corridor)
- Off-board fare collection
- Service specific branding and identity
- Substantial transit stations

### Operational Characteristics

- Transit signal priority at intersections
- Real-time service information
- 7.5-minute peak period headways
- 15-minute off-peak headways
- 18 hours of service (Monday through Saturday)
- 12 hours of service on Sunday
- 2035 Weekday Ridership estimate of 12,500 to 17,500 riders per day





# Transitway Corridor Feasibility Study

## Corridor C Transitway – Recommended Operation

### Alternative G (Long Term) Streetcar in Dedicated Lanes from Van Dorn Metro to Pentagon via Columbia Pike

#### Planning-Level Cost Estimate

- Capital: \$185 million
- Fleet (25-year): \$29 million
- ROW: \$50 million
- Operating (25-year): \$59 million

#### Physical Characteristics

- Streetcar vehicles
- Dedicated lanes (~80% to 90% of corridor)
- Off-board fare collection
- Service specific branding and identity
- Substantial transit stations
- Connection to Columbia Pike Streetcar

#### Operational Characteristics

- Similar to Alternative D
- 2035 Weekday Ridership estimate of 15,000 to 20,000 riders per day

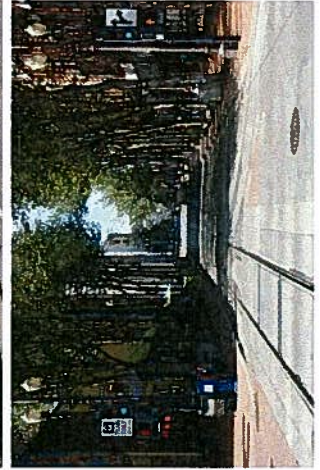


# Beauregard Corridor Small Area Plan Corridor C Transitway – Recommended Operation

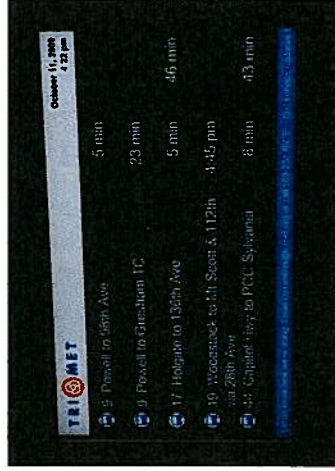
**BRT Characteristics**



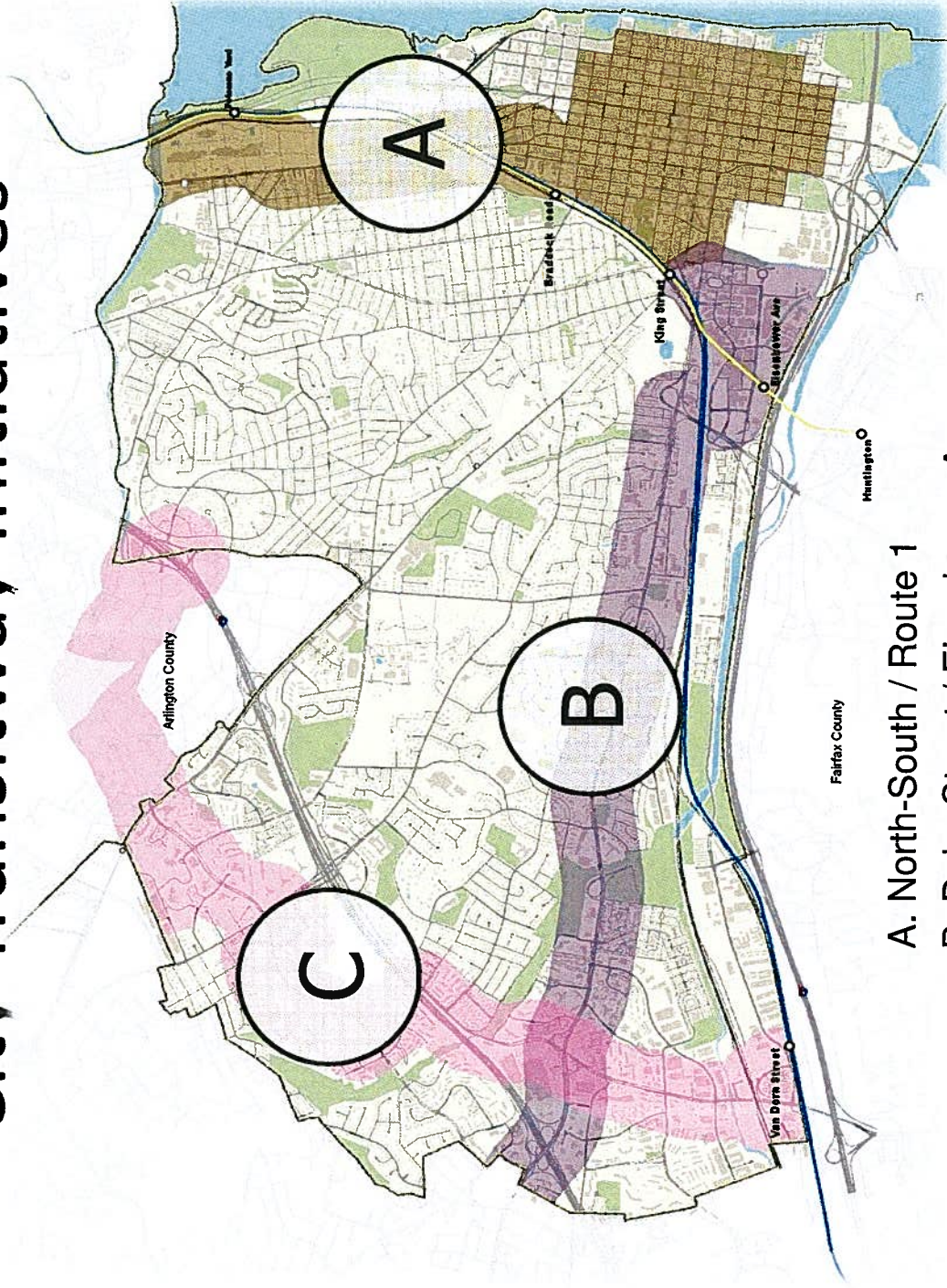
**Streetcar Characteristics**



**Station Characteristics**



# City Transitway Initiatives



- A. North-South / Route 1
- B. Duke Street / Eisenhower Ave
- C. Beauregard/Van Dorn



**MEMORANDUM**

**TO:** Jim Maslanka  
Steve Sindiong  
City of Alexandria

**FROM:** David Whyte  
Paul Elman  
Erin Murphy  
Kimley-Horn and Associates, Inc.

**DATE:** April 11, 2011  
Updated May 12, 2011

**SUBJECT:** Draft Selection of Preferred Alternative for Transitway Corridor C  
(Beauregard/Van Dorn Corridor)

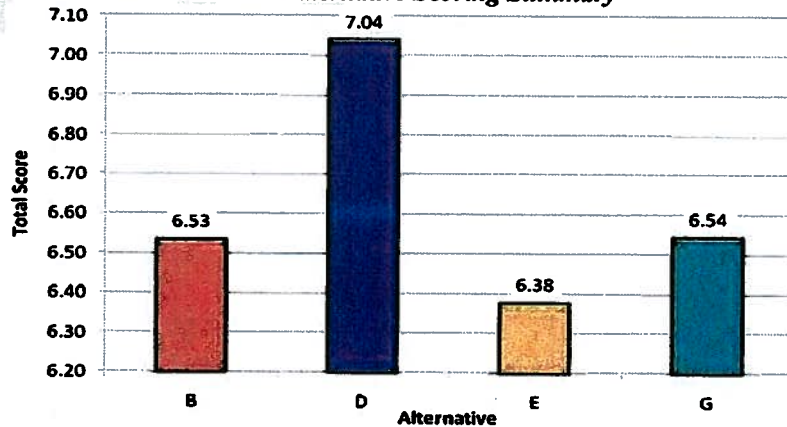
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Suite 400  
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20171

***Executive Summary***

This technical memorandum is part of the City of Alexandria High Capacity Transitway Corridor Feasibility Study. The memorandum describes the process that led to the identification of a preliminary preferred alternative for Transitway Corridor C (the Beauregard/Van Dorn corridor) based on an alternatives screening process.

A baseline alternative (B) and three build alternatives (D, E, and G) were screened using a set of detailed evaluation criteria. The application of the screening criteria to each of the build alternatives resulted in Alternative D being ranked the highest, as shown in **Chart 1**. Based on the evaluation using the screening criteria and comments received from the project's Corridor Working Group (CWG) and the public, a preliminary preferred alternative and phasing strategy was identified. Alternative D (Bus Rapid Transit connecting to the Pentagon/Pentagon City and Shirlington) is recommended as the preferred alternative for implementation of transit in dedicated lanes in Corridor C. Alternative D should be constructed in a manner that does not preclude future implementation of streetcar in the corridor. The results of the Corridor C alternative scoring will be presented at the May 19, 2011 CWG meeting.

**Chart 1: Alternative Scoring Summary**



## INTRODUCTION

As part of the City of Alexandria High Capacity Transitway Corridor Feasibility Study, transitway alternatives were developed for Corridor C (the Beauregard/Van Dorn corridor). Alternatives included the consideration of a specific alignment, set of regional connections, and transit mode technologies. A preliminary screening was undertaken to begin the evaluation process and resulted in the identification of a baseline and three distinct build alternatives for further study. The process by which the baseline and three build alternatives were developed is documented in a study memorandum dated February 28, 2011<sup>1</sup>.

The baseline and three build alternatives were screened with a set of detailed evaluation criteria. These alternatives and the secondary screening were presented to the High Capacity Transit Corridor Work Group (CWG) at the CWG meeting held on March 17, 2011. The CWG and the public were given an opportunity to provide comments within a specified review period.

Following the comment period and CWG meeting, City of Alexandria staff and Kimley-Horn met to discuss feedback received as well as the results of the secondary screening. Using information collected during the CWG meeting, from public comments, and from the meeting with the City, a preliminary preferred alternative and phasing strategy was identified. This memorandum briefly summarizes the process and the results of the secondary screening that lead to the selection of a preliminary preferred alternative.

### *Alternatives*

The baseline alternative for the secondary screening is Alternative B, which is shown in Figure 1. Alternative B consists of a rapid bus operating in mixed-flow traffic. It assumes connections to Shirlington and Pentagon/Pentagon City. The City of Alexandria will implement some elements of Alternative B through the TIGER grant-funded Van Dorn/Beauregard Transit Improvements Project. The improvements to be implemented with the TIGER grant-funded project include transit signal priority, queue jump lanes, and enhanced bus stops at selected locations along Van Dorn Street and Beauregard Street. Locations for the aforementioned elements within the Van Dorn/Beauregard Transit Improvements Project are shown in Figure 2. The three build alternatives selected for secondary screening are shown in Figures 3, 4, and 5, and described briefly below:

Alternative D: Bus Rapid Transit (dedicated lanes) connecting to Pentagon/Pentagon City and Shirlington

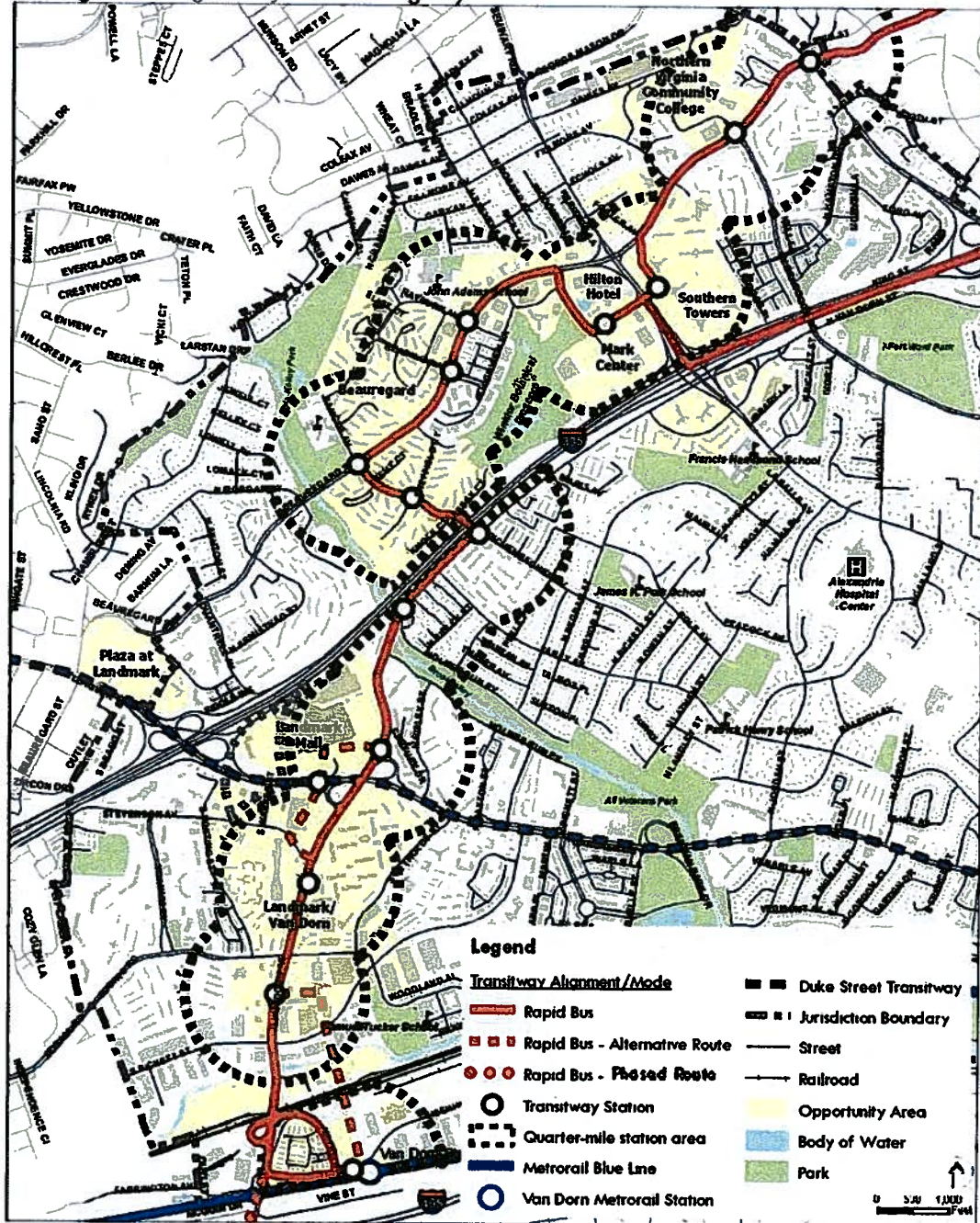
Alternative E: Bus Rapid Transit (dedicated lanes) connecting to Pentagon/Pentagon City and Streetcar (dedicated lanes) connecting to Mark Center and the Rayburn Avenue area along Beauregard Street

Alternative G: Streetcar (dedicated lanes) connecting to Columbia Pike

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<sup>1</sup> Memorandum is available on the City of Alexandria's project website, [www.alexandriava.gov/highcapacitytransit](http://www.alexandriava.gov/highcapacitytransit)

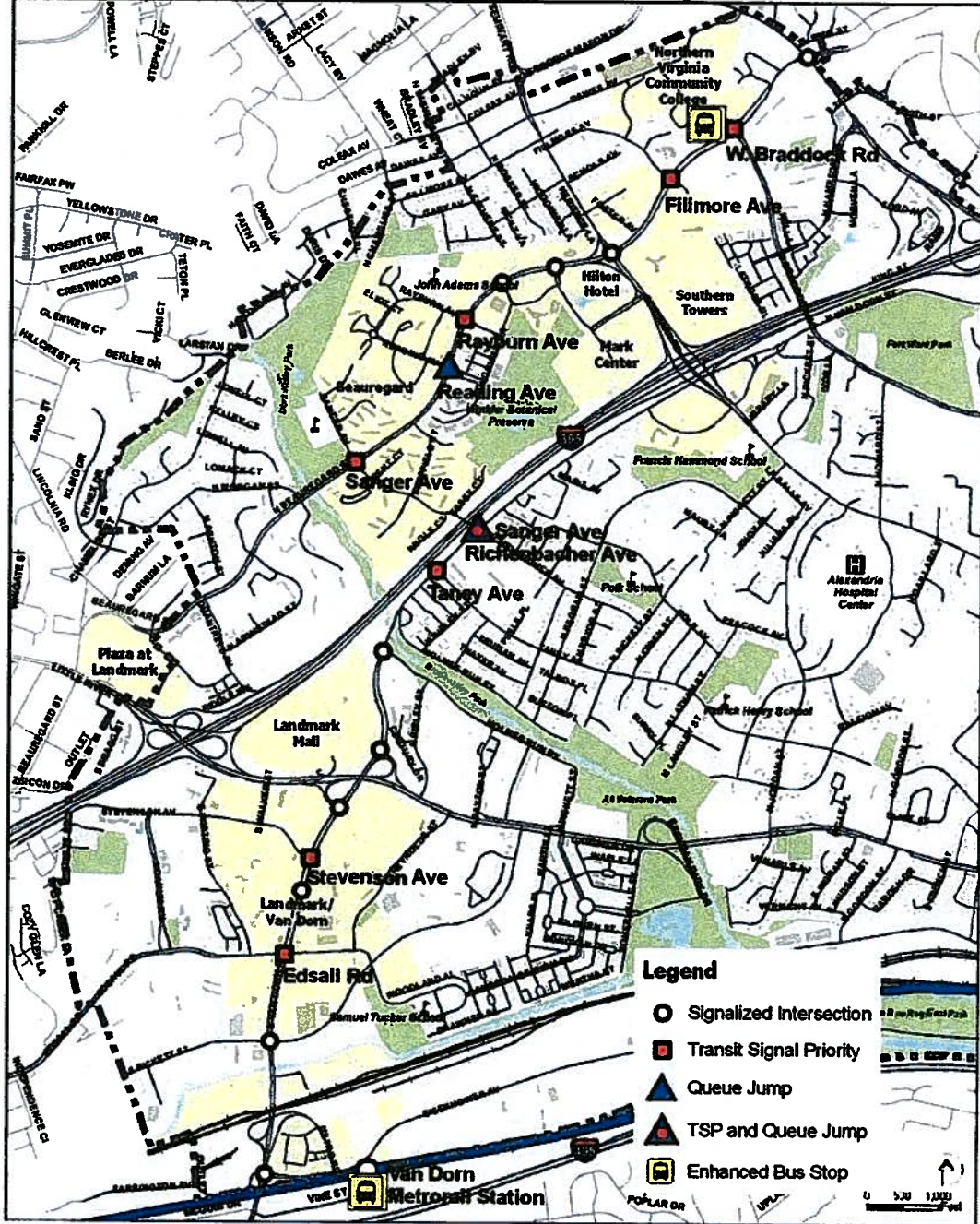
**Figure 1: Alternative B - Baseline (Rapid Bus in Mixed-Flow connecting to Pentagon/Pentagon City and Shirlington)**



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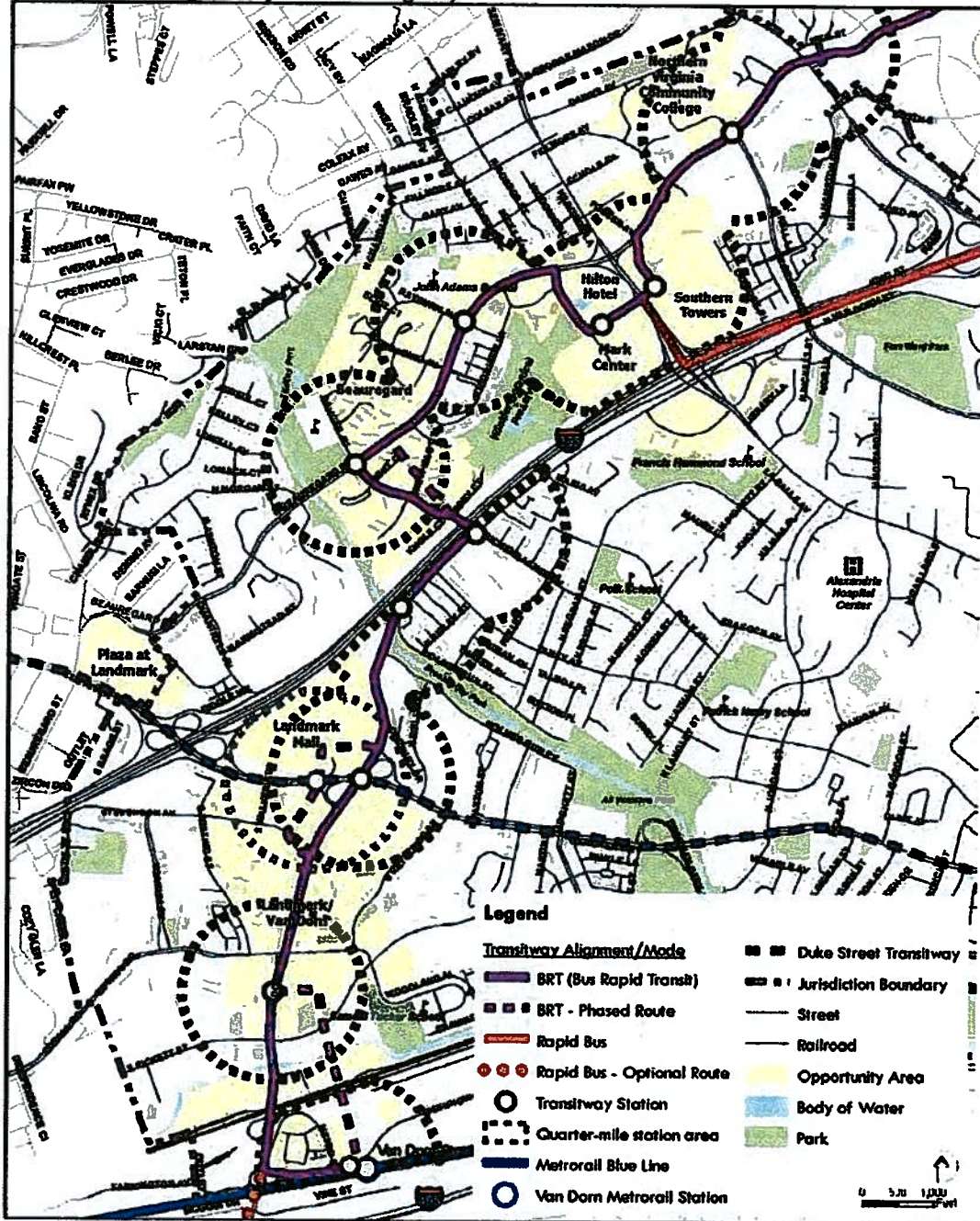
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**Figure 2: Van Dorn/Beauregard Transit Improvements Project**





**Figure 3: Alternative D (Bus Rapid Transit (dedicated lanes) connecting to Pentagon/Pentagon City and Shirlington)**

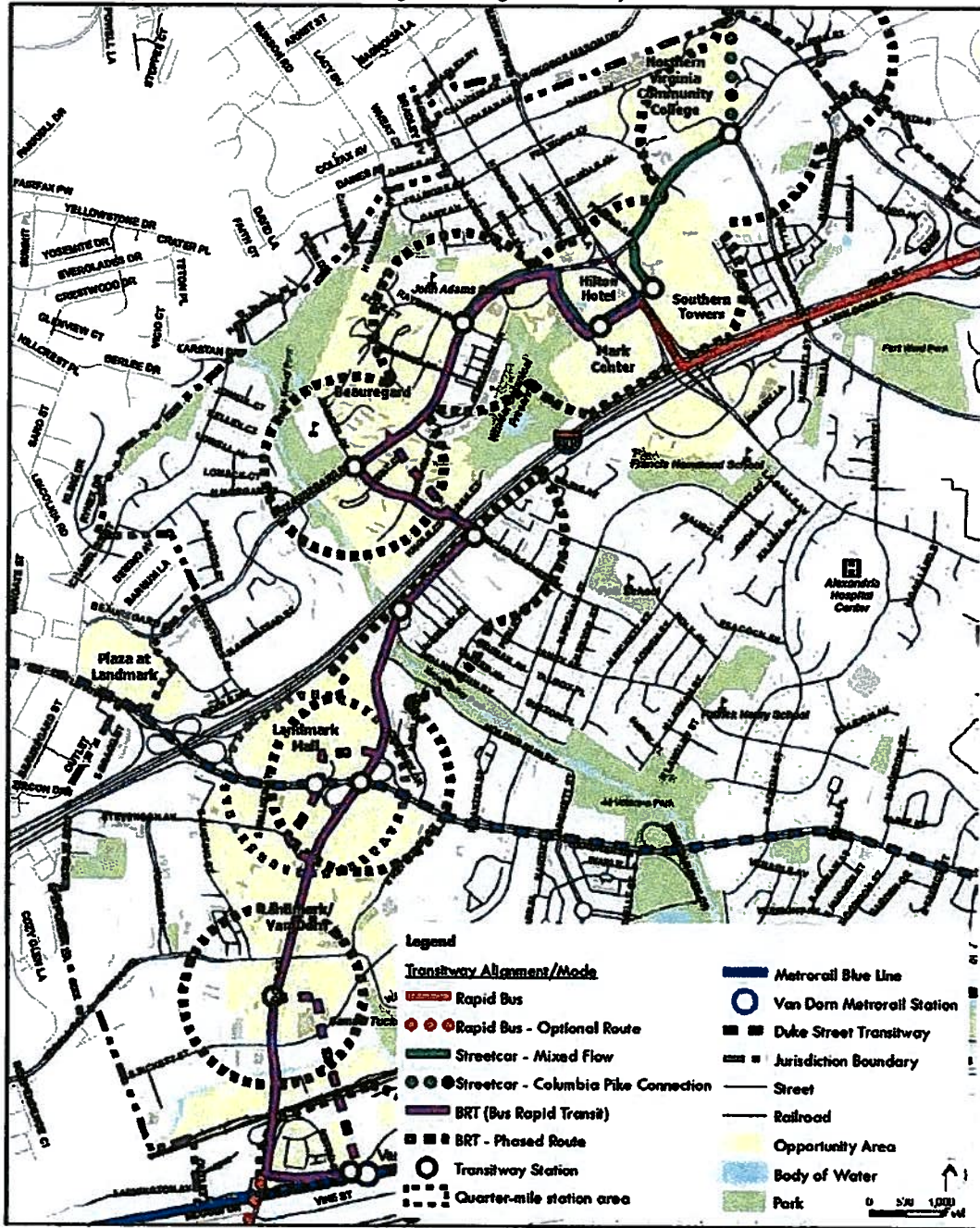


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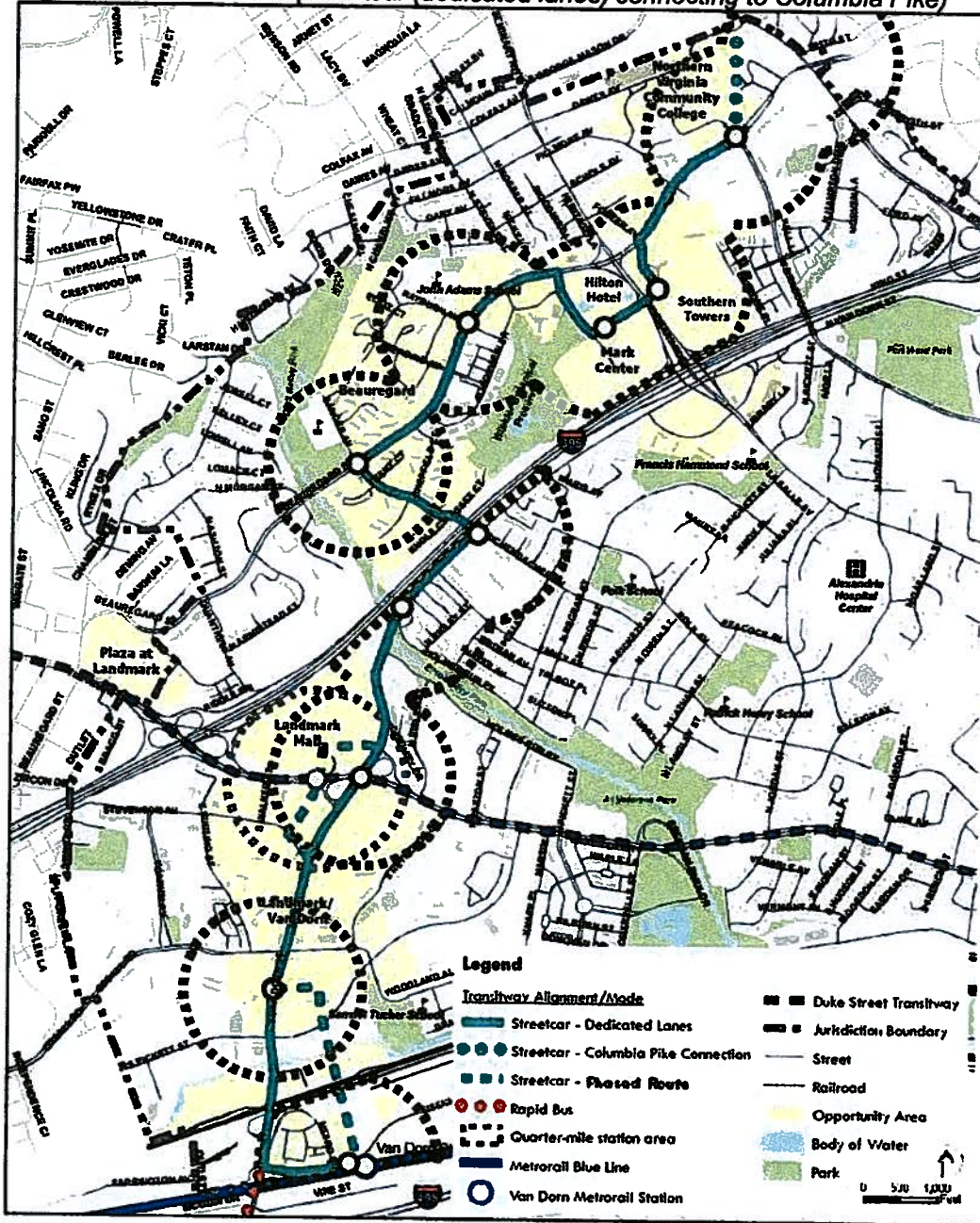
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**Figure 4: Alternative E (Bus Rapid Transit (dedicated lanes) connecting to Pentagon/Pentagon City and Streetcar (dedicated lanes) connecting to Mark Center and the Rayburn Avenue area along Beauregard Street)**



**Figure 5: Alternative G (Streetcar (dedicated lanes) connecting to Columbia Pike)**



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**Evaluation Criteria**

The evaluation criteria to be used in the study were presented to the CWG at the November 18, 2010 meeting<sup>2</sup>. The evaluation criteria developed for this study are modeled after those used in a standard Federal Transit Administration (FTA) Alternatives Analyses and are divided into four major groups: effectiveness, impacts, cost effectiveness, and financial feasibility. Table 1 shows the detailed evaluation and screening criteria by group along with the measurement method for evaluation. Screening criteria were selected for the preliminary review of alternatives. All criteria with the exception of those in the financial feasibility group were used in the secondary comparative evaluation of the alternatives.

**Table 1: Evaluation Criteria**

| General Evaluation Criteria Grouping  | Criteria Sub-Group    | Evaluation Criteria                                       | For Use in Preliminary Screening of Concepts | For Use in Secondary Screening of Concepts | Measurement Method   |
|---|-----------------------|---|--|--|--|
| Effectiveness<br>Addresses stated transportation issues in the corridor                       | Coverage              | Service to Population, Employment, and Other Destinations | ✓  | ✓  | Tabulate population, employment, key destinations, and similar served by alternative   |
|   |                       | Transit Connectivity                                      | ✓  | ✓  | Access to other transit services (existing and planned)  |
|   | Operations            | Running-way Configuration(s)                              | •  | ✓  | Quantify amount of running-way that is dedicated and amount that is mixed-flow   |
|   |                       | Corridor Length   | •  | ✓  | Measured length of the corridor (mi or feet)   |
|   |                       | Capacity  | •  | ✓  | Potential corridor capacity (hourly) based on mode technology, headways, and other conditions  |
|   |                       | Interoperability  | •  | ✓  | Identification of whether the chosen running-way configuration and transit mode technology are compatible with regionally planned systems                      |
|   |                       | Avoidance of Congestion                                   | •  | ✓  | Number and locations of level of service E/F intersections avoided   |
|   |                       | Transit Travel Time                                       | ✓  | ✓  | Transit travel time  |
|   |                       | Intersection Priority                                     | •  | ✓  | Percent of intersections where transit signal priority is needed and can be implemented successfully - notation of where it cannot be implemented successfully |
|   | Ridership             | •   | ✓  | Forecast number of riders (estimated)      |  |
|   | Alignment             | Geometrics  | ✓  | ✓  | Geometric quality of alignment   |
|   |                       | Runningway Status   | •  | ✓  | Percent of corridor to be located on new or realigned roadway  |
|   | Phasing               | Phasing   | •  | ✓  | Identification of ability to phase operations and implementation   |
| Impacts<br>Extent to which economics, environment, community, and transportation are affected | Economic              | Development Incentive                                     | •  | ✓  | Perceived ability to encourage economic development  |
|   | Natural Environmental | Natural Environment                                       | •  | ✓  | Summary of key environmental conditions affected (wetlands, floodplains, T&E, streams, and similar)  |
|   |                       | Parks and Open Space                                      | •  | ✓  | Summary of parks and/or open spaces affected   |

<sup>2</sup> Meeting minutes are available on the City of Alexandria's project website, [www.alexandriava.gov/highcapacitytransit](http://www.alexandriava.gov/highcapacitytransit)



**Table 1: Evaluation Criteria (continued)**

| General Evaluation Criteria Grouping   | Criteria Sub-Group         | Evaluation Criteria                         | For Use in Preliminary Screening of Concepts | For Use in Secondary Screening of Concepts | Measurement Method  |
|--|----------------------------|---|--|--|---|
| <b>Impacts (continued)</b><br>Extent to which economics, environment, community, and transportation are affected | Neighborhood and Community | Property                                    | ✓  | ✓  | Number, use type, and quantity of properties impacted with anticipated level of impact (right-of-way only, partial, or total take)  |
|  |                            | Streetscapes                                | •  | ✓  | Impact to existing streetscapes   |
|  |                            | Community Resources                         | •  | ✓  | Number and location of historical, cultural, community, archaeological resources affected   |
|  |                            | Demographics                                | •  | ✓  | Identification of impacts to special populations  |
|  |                            | Noise and Vibration                         | •  | ✓  | Summarize relative noise and vibration impacts of different mode types and corridor configurations  |
|  | Transportation             | Traffic Flow Impact                         | ✓  | ✓  | Effect of transit implementation on vehicular capacity of corridor  |
|  |                            | Traffic Signals                             | •  | ✓  | Number of existing signalized intersections affected by transit, identification of need for new signal phases, and number/location of new traffic signals needed to accommodate transit |
|  |                            | Multimodal Accommodation                    | •  | ✓  | Impacts to, and ability to accommodate bicycles and pedestrians   |
|  |                            | Parking                                     | •  | ✓  | Impacts to parking  |
| <b>Cost Effectiveness</b><br>Extent to which the costs are commensurate with their benefits                      | Cost                       | Capital cost                                | ✓  | ✓  | Order of magnitude capital cost for corridor (stations, running-way, etc.)  |
|  |                            | Right-of-Way Cost                           |  |  | Order of magnitude for right-of-way acquisition   |
|  |                            | Operating cost                              | •  | ✓  | Order of magnitude operating cost   |
|  |                            | Order of Magnitude Operating Cost Per Rider | •  | ✓  | Order of magnitude cost per rider   |
| <b>Financial Feasibility</b><br>Cost of system/concept is in alignment with available funding                    | Funding                    | Funding                                     | •  | •  | Availability of specific funding sources  |
|  |                            | Private Capital Incentive                   | •  | •  | Ability to attract private capital investment and innovative procurement  |

**Secondary Screening**

The baseline alternative and three selected alternatives were evaluated based on the secondary screening criteria shown in Table 2<sup>3</sup>. Comparative ratings of best, fair, and poor were applied to each alternative. A summary of the ratings for each alternative is shown in Table 2.

<sup>3</sup> Opinions of probable cost for each alternative were based on year 2010 dollars and do not include additional contingency or escalation to a future year mid-point of construction. Cost assumptions do not include costs for major utility relocations/new service or roadway/streetscape improvements that may be implemented concurrently, but are not required for the transit project. Alignments designated as "optional" are not included in the cost assumptions. Costs assume that Arlington County extends Columbia Pike to Northern Virginia Community College.



**Table 2: Secondary Screening Summary**

| Screening Criteria |                     |   | Alternative            |                         |   |                       |
|--------------------|---------------------|---|------------------------|-------------------------|---|-----------------------|
|                    |                     |   | B (baseline)           | D                       | E   | G                     |
| Group              | Sub-Group           | Transit Mode:   | Rapid Bus (mixed)      | BRT (mixed & dedicated) | Streetcar (mixed) & BRT (mixed & dedicated) | Streetcar (dedicated) |
|                    |                     | Northern Connection:  | Shirlington & Pentagon | Shirlington & Pentagon  | Columbia Pike & Pentagon                    | Columbia Pike         |
| Effectiveness      | Coverage            | Service to Regional Destinations                            | ●                      | ●                       | ●   | ●                     |
|                    |                     | Service to Population, Employment, & Retail in the Corridor | ●                      | ●                       | ●   | ●                     |
|                    |                     | Transit Connectivity  | ●                      | ●                       | ●   | ●                     |
|                    | Operations          | Running-way Configuration(s)                                | ○                      | ●                       | ●   | ●                     |
|                    |                     | Corridor Length   | ●                      | ●                       | ●   | ●                     |
|                    |                     | Capacity  | ●                      | ●                       | ●   | ●                     |
|                    |                     | Interoperability  | ●                      | ●                       | ●   | ●                     |
|                    |                     | Avoidance of Congestion                                     | ●                      | ●                       | ●   | ●                     |
|                    |                     | Transit Travel Times in Corridor                            | ●                      | ●                       | ●   | ●                     |
|                    |                     | Transit Travel Times between Termini                        | ●                      | ●                       | ●   | ○                     |
|                    |                     | Ridership   | ○                      | ●                       | ●   | ●                     |
|                    | Alignment           | Alignment Quality   | ●                      | ●                       | ●   | ●                     |
|                    |                     | Runningway Status   | ●                      | ●                       | ●   | ●                     |
| Phasing            | Phasing             | ●   | ●                      | ●                       | ○   |                       |
| Impacts            | Economic            | Development Incentive                                       | ○                      | ●                       | ●   | ●                     |
|                    | Natural Environment | Natural Environment   | ●                      | ●                       | ●   | ●                     |
|                    |                     | Parks and Open Space  | ●                      | ●                       | ●   | ●                     |

**Key to Ratings**

Best ●

Fair ●

Poor ○



**Table 2: Secondary Screening Summary (continued)**

| Screening Criteria                          |                    |                          | Alternative            |                         |   |                       |
|---|--------------------|--------------------------|------------------------|-------------------------|---|-----------------------|
|   |                    |                          | B (baseline)           | D                       | E   | G                     |
| Group                                       | Sub-Group          | Transit Mode:            | Rapid Bus (mixed)      | BRT (mixed & dedicated) | Streetcar (mixed) & BRT (mixed & dedicated) | Streetcar (dedicated) |
|   |                    | Northern Connection:     | Shirlington & Pentagon | Shirlington & Pentagon  | Columbia Pike & Pentagon                    | Columbia Pike         |
| Impacts                                     | Neighborhood       | Property                 | ●                      | ◐                       | ◐   | ◐                     |
|   |                    | Streetscape              | ●                      | ◐                       | ◐   | ◐                     |
|   | and Community      | Community Resources      | ●                      | ●                       | ●   | ●                     |
|   |                    | Demographics             | ●                      | ◐                       | ◐   | ◐                     |
|   |                    | Noise and Vibration      | ○                      | ◐                       | ◐   | ●                     |
|   | Transportation     | Traffic Flow Impact      | ○                      | ●                       | ●   | ●                     |
|   |                    | Traffic Signals          | ◐                      | ○                       | ○   | ○                     |
|   |                    | Multimodal Accommodation | ○                      | ◐                       | ◐   | ●                     |
|   |                    | Parking                  | ●                      | ◐                       | ◐   | ◐                     |
|   | Cost Effectiveness | Cost Effectiveness       | Capital Cost           | ●                       | ◐   | ◐                     |
| Right-of-Way Cost                           |                    |                          | ●                      | ◐                       | ○   | ○                     |
| Operating Cost                              |                    |                          | ◐                      | ●                       | ◐   | ●                     |
| Order of Magnitude Operating Cost per Rider |                    |                          | ○                      | ◐                       | ○   | ●                     |
| <b>Key to Ratings</b>                       |                    |                          |                        |                         |   |                       |
| Best ● Fair ◐ Poor ○                        |                    |                          |                        |                         |   |                       |

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### Scoring

A numeric score was applied to the ratings. Best scored a three, fair scored a two, and poor scored a one. The scores were used to numerically compare the alternatives by criteria group (effectiveness, impacts, cost effectiveness) and overall (combined criteria groups). Based on feedback from the City, CWG, public, and from experience on similar projects, several evaluation criteria were identified as being of greater importance within each criteria group. These evaluation criteria were doubly weighted as compared to the other evaluation criteria:

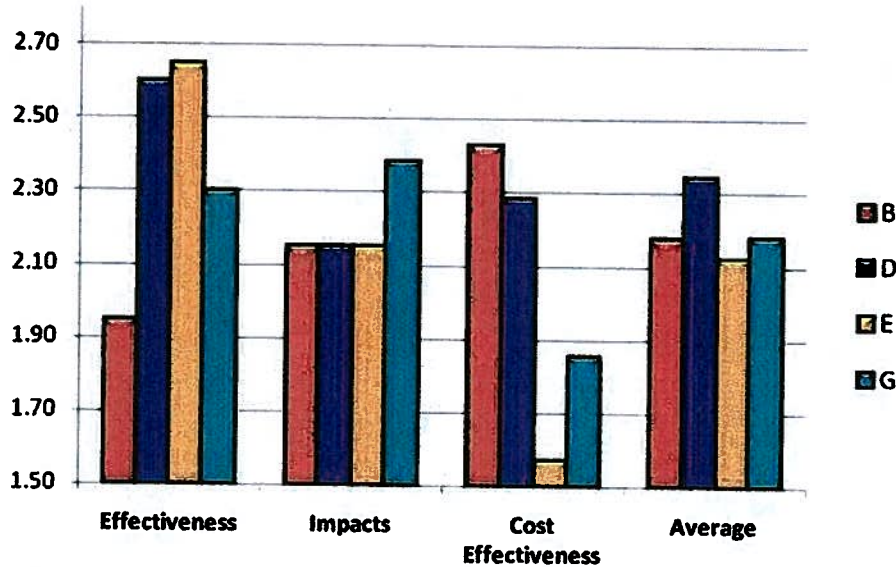
- Transit travel times in corridor
- Transit travel times between termini
- Ridership
- Phasing
- Traffic flow impact
- Capital cost
- Right-of-way cost
- Operating cost

The total scores for each criteria group were averaged (total of individual scores divided by the number of criteria multiplied by the weights) so that each of the three criteria groups would be weighted equally when compared to one another. The average scores from the three criteria groups were added to create a total score for each alternative. The resulting scores (and ranks, based on score) are shown in Table 3 and Chart 2.

**Table 3: Scoring Summary**

|                                 | Alternative            |                         |   |                       |
|---------------------------------|------------------------|-------------------------|---|-----------------------|
|                                 | B (baseline)           | D                       | E   | G                     |
| Transit Mode:                   | Rapid Bus (mixed)      | BRT (mixed & dedicated) | Streetcar (mixed) & BRT (mixed & dedicated) | Streetcar (dedicated) |
| Northern Connection:            | Shirlington & Pentagon | Shirlington & Pentagon  | Columbia Pike & Pentagon                    | Columbia Pike         |
| <b>Screening Criteria Group</b> | <b>Average Score</b>   |                         |   |                       |
| Effectiveness                   | 1.95                   | 2.60                    | 2.65  | 2.30                  |
| Impacts                         | 2.15                   | 2.15                    | 2.15  | 2.38                  |
| Cost Effectiveness              | 2.43                   | 2.29                    | 1.57  | 1.86                  |
| <b>Average Score</b>            | <b>2.18</b>            | <b>2.35</b>             | <b>2.13</b>                                 | <b>2.18</b>           |
| <b>Total Score</b>              | <b>6.53</b>            | <b>7.04</b>             | <b>6.38</b>                                 | <b>6.54</b>           |
| <b>Rank</b>                     | <b>3</b>               | <b>1</b>                | <b>4</b>                                    | <b>2</b>              |

*Chart 2: Scoring Summary by Group*



***Results and Recommendation***

The following summarizes a discussion among City of Alexandria staff and Kimley-Horn regarding the secondary screening and selection of a preferred alternative.

**Alternative D: Bus Rapid Transit connecting to Pentagon/Pentagon City and Shirlington**

- Pros
  - Highest total score of all alternatives studied (including baseline)
  - Second-highest or better score for each screening criteria group
  - Short travel time in corridor and between termini
  - Lowest capital cost of the three build alternatives
- Cons
  - Lowest level of development incentive
  - Lowest ridership projection
  - Does not provide regional streetcar connectivity
- **Recommendation: Alternative D is the preferred alternative for implementation of transit in dedicated lanes in Corridor C. Alternative D should be constructed in a manner that does not preclude future implementation of streetcar in the corridor.**

**Alternative E: Bus Rapid Transit connecting to Pentagon/Pentagon City and Streetcar connecting the Mark Center/the Rayburn Avenue area of Beaugard Street and Columbia Pike**

- Pros
  - Highest score in the effectiveness group
  - Serves local and regional destinations well and has short travel times in corridor and on Bus Rapid Transit to Pentagon/Pentagon City
  - Lower capital cost than Alternative G
  - Attractive to development in the Beaugard corridor
  - Regional streetcar connectivity



- Cons
  - Lowest total score of three build alternatives
  - Lowest score in the cost effectiveness group
  - Highest operations cost of three alternatives
  - Long travel times between termini on streetcar
  - Duplicative service in Beaugard corridor between Mark Center and Rayburn Avenue
- **Recommendation: Columbia Pike streetcar extension to Mark Center and the Rayburn Avenue area of Beaugard Street could be implemented as a second phase of transit in Corridor C, should future conditions support additional transit service implementation.**

Alternative G: Streetcar connecting to Columbia Pike

- Pros
  - Highest score in the impact group
  - Lowest operational cost
  - Short travel times in corridor
  - Highest level of development incentive
  - Highest ridership projections
  - Interface with regional streetcar network
- Cons
  - Lowest score in the effectiveness group
  - Longest travel times between termini
  - Highest capital cost and largest maintenance facility needed
- **Recommendation: If future conditions support additional transit service in Corridor C, implement the streetcar extension element of Alternative E prior to full corridor streetcar implementation. If Alternative G is implemented fully, Bus Rapid Transit service is likely to be discontinued between Mark Center and the Van Dorn Metrorail station.**

***Conclusions and Next Steps***

The results of the secondary screening evaluation and scoring show that Alternative D, Bus Rapid Transit service connecting to Columbia Pike and Pentagon/Pentagon City, scores the highest of the three build alternatives in the cost effectiveness group and in total score. Based on the results of the secondary screening and scoring, CWG and public comments, and discussions between City of Alexandria staff and Kimley-Horn, it is recommended that Alternative D (Bus Rapid Transit connecting to Pentagon/Pentagon City and Shirlington) be selected as the preferred alternative for implementation of transit in dedicated lanes in Corridor C. Alternative D is an effective high-quality and high-capacity transit service and would operate in dedicated lanes. It would have a significantly lower construction cost than rail alternatives that were studied.

Based on an understanding of transit projects recently awarded funds by the Federal Transit Administration (FTA), lower cost projects with high levels of effectiveness are more attractive than higher cost projects with similar levels of effectiveness. Additionally, recent FTA awards have indicated that lower cost projects have had higher levels of federal funding participation (as a percentage of overall cost) than more capital-intensive (expensive) projects.

The pursuit of Alternative D would not preclude an extension of the Columbia Pike streetcar to

the Mark Center/Rayburn Avenue area (streetcar element of Alternative E) or later extension of streetcar service to the Van Dorn Metrorail station. These streetcar projects could be pursued when conditions warrant their consideration. Future conditions that have the potential to affect the decision to pursue rail transit in Corridor C include:

- Columbia Pike streetcar completion to Northern Virginia Community College
- Ridership in-excess of what can be served practically (based on vehicle capacities and maintainable headways) with buses in Corridor C
- Demand for additional transit services in, and connecting to Corridor C
- Rising operating costs due to inefficient rubber tire operations

The results of the Corridor C alternative scoring will be presented at the May 19, 2011 CWG meeting.

## **Transitway Corridor Feasibility Study**

### **Summary of Public Comments (Prior to 08/18/2011)**

#### **Phasing**

- Need for a multi-phased approach to implementing the transitway
- Start out with something smaller, not high capacity transit
- Look at phasing the system, starting with express bus or Bus Rapid Transit, then building a streetcar as ridership increases
- Need to understand where people are and where they want to go

#### **Connectivity**

- Provide connectivity to local activity centers in Alexandria, Arlington, and Fairfax
- Need to serve local residents first, then regional
- Question as to the value of serving the Pentagon
- The high capacity transit system needs to be designed to serve both local residents (to get to area activity centers) as well as regional trips
- Important to consider pedestrian and bicycle connectivity to the system

#### **Mode and Operation**

- Need something that is permanent, like streetcars, that will attract visitors and development
- Need to know ridership before dismissing streetcars
- Make sure that there is a seamless connection between the three corridors and modes
- The system needs to be of high quality to attract choice riders
- Need dedicated lanes for system effectiveness
- Use existing travel lanes to accommodate dedicated lanes rather than widening the road
- Transit needs to operate at high frequencies throughout the day, and not just during peak periods

## **Impacts**

- Do not reduce or impact current local transit services after high capacity transit is implemented
- Need to understand the impacts of the BRAC facility, especially to the roadway system. Don't worsen the traffic impacts, especially after BRAC opens.
- Sanger Avenue cannot handle a transitway – it's already constrained and there are potential environmental impacts to Holmes Run
- Concern regarding intersection of Sanger and Van Dorn which is already congested, and its ability to accommodate high capacity transit
- Concern about impacts to trees along Beauregard Street
- Need to minimize the negative impacts to the west end – it's already being affected by BRAC
- A streetcar system is too expensive
- Concern about the high cost of implementing a streetcar system in dedicated lanes