# Service planning and integration study

## Background and Task Purpose

Coordination of the Ride On, Metrobus and other bus operations within Montgomery County with the RTS system will require a detailed review of those systems and the planned RTS operations. To develop a comprehensive service plan will require characterization of the RTS system, including identification of the operating parameters of the RTS. This will include an assessment of the type of operations to be accommodated in the RTS runningways, whether vehicles will be required to serve center platform stations necessitating left as well as right side doors, whether non RTS vehicles would use the RTS runningways (and, if so, whether they would serve center platform stations), whether local operations would parallel RTS operations, the approximate location of stations and accommodations to facilitate transfers between RTS and non-RTS operations. This analysis will analyze the degree to which RTS service should vary, if at all, for every corridor.

## Inputs and Assumptions

Previous planning for the RTS would be the basis for this task including potential guideway locations and station locations.

### Existing (Completed) Studies

* Countywide Bus Rapid Transit Study (PB) – July 2011
* Montgomery County Transit Task Force Report May 2012
* Councilman Elrich’s plan
* Institute for Transportation and Development Policy (ITDP) – Demand and Service Planning Study
* Veirs Mill and Georgia Avenue BRT New Starts Studies
* Corridor Cities Transitway FEIS
* Purple Line FEIS
* WMATA PCN Network Evaluation Study
* COG Multimodal Hot Spots Study (and data/GIS layers)

### Existing (Ongoing) Studies

* Countywide Transit Corridors Functional Master Plan
* WMATA Metrobus Market Effectiveness Study
* TIGER bus priority implementation (Veirs Mill Road only)

### Focus on Seven Initial Corridors

1. MD355 South/Rockville Pike
2. MD586/Veirs Mill Road
3. Georgia Avenue North (Glenmont to Olney)
4. Randolph Road
5. US 29 Columbia Pike
6. CCT South
7. ICC

## Methodology

### Review Existing Studies and Plans

All previous and pertinent studies and plans related to the planning of RTS in Montgomery County will be reviewed, as well as future population growth forecasts and development around the proposed RTS corridors. This review will provide a baseline understanding of the planning decisions made to date that relate to the RTS, and will inform the analysis and recommendations that will be developed as part of this study. It will also provide a picture of the future growth and development along the proposed RTS corridors.

#### Operating Assumptions

Understanding how the RTS system is envisioned to operate is necessary to determine how the RTS will function within the existing transit and roadway network. Information about plans for routing, termini, service frequency, and service span will be used as input to the development of the detailed operating plan in Task V. Operating assumptions will be reviewed to determine whether they are still valid.

The operating assumptions that have been made for the CCT as well as the Veirs Mill corridors, the two corridors furthest along in the planning process, will be reviewed. The potential implications of current operating assumptioins for other RTS corridors will be evaluated. This will include a description of how design decisions already included in these projects could affect vehicle design, operating requirements, and the characteristics of the RTS fleet. This information will be presented in a tabular format.

#### Exclusive Lane Locations

Existing studies will be reviewed to determine locations where transit-only lanes have been proposed. The key document to review in this context is the Countywide Transit Corridor Functional Master Plan, currently under development by the Montgomery County Planning Department. Maps produced by the Master Plan process will be reviewed as they are available. Information about whether an RTS lane is proposed for a median or a shoulder will be included, as well as how that lane is proposed to be used. The Functional Master Plan provides an input to this service planning study in terms of where exclusive lanes could be available to support RTS services .This information, along with the locations of queue jumps and TSP, will be used when developing the travel times, headways, and other operating characteristics for each RTS corridor.

#### Queue Jump and TSP Locations

A geospatial database will be developed using existing studies and plans of the locations for queue jumps and TSP, similar to the one developed for exclusive lane locations. The database will provide a snapshot of where these treatments are proposed within the seven study corridors.

#### Forecast Growth

Forecasts of population demographics and job growth will be assembled from the regional model MWCOG Cooperative Land Use Forecasts, Round 8.1 and mapped against the seven RTS corridors. This information will be used to evaluate potential demand, to review proposed station locations and to inform operations planning.

#### Planned Development

The Montgomery County Comprehensive Plan, Small Area Plans, and Sector Plans along RTS corridors will be mapped into GIS. This information will be used along with the data on forecast growth to inform and refine route planning as well as stop locations. The location of a major development along the corridor may provide the opportunity to gain right-of-way needed for station areas as well as rapid transit treatments such as exclusive lanes or queue jumps.

*Decision Matrix*

Coordination with the steering committee and other stakeholders through a workshop or series of workshops will be carried out to develop and populate a decision matrix to facilitate the narrowing of potential options that will be addressed in the study. This process is not meant to exclude or rule out any particular approach, feature, or treatment but does serve to focus the study and provide soft boundaries for what will be analyzed. The matrix will have various characteristics, including service planning (e.g. frequency, span, headway, fare collection, exclusivity, local bus access, RTS routes per corridor, station spacing), infrastructure (e.g. platform location, busway ocation, HOV access, intersection treatments), station design and bus interface (e.g. platform level boarding, comfort/amenities). These characteristics will be evaluated at either the system-wide, corridor type, corridor, or segment levels.

### Compile Existing Transit Network

The existing transit network for Montgomery County will be compiled. The geospatial network will be used to determine interactions between existing services and the RTS. Any future transit corridors proposed in studies by WMATA will be mapped. The majority of this information will come from a 2012 study completed for MWCOG but will also include information from the ITDP study as well.

#### GIS Route Layers

As part of a 2012 MWCOG study for *Multimodal Coordination of Bus Priority Hot Spots*, data by roadway segment on bus volumes, speeds, and services across the WMATA Compact Region, including all of Montgomery County was developed. During this study, all Ride On routes were re-drawn to snap them to the NavTeq roadway layer, providing a way to look at effective bus frequency comprising multiple routes, as well as providing a way to incorporate roadway speed data. This dataset will be amended to include any service changes since the study was finalized, and will provide a snapshot of existing bus service along the seven initial RTS implementation corridors.

#### Route Characteristics

The database from the MWCOG Bus Priority Hot Spots will be updated to include changes to route frequencies and other operating characteristics made since the completion of the study.

#### Ridership

Estimates of current transit ridership will be developed for the seven RTS corridors. This will be based on ridership counts for both Ride On and Metrobus. This data will be taken from the most recently available data, preferably farebox data at the trip level and APC data at the stop level. If the data is available at the stop level by trip for each route traveling in one of the seven corridors, this will allow existing ridership figures for each corridor to be developed. These figures can be used to determine how much ridership may switch to an RTS route as well as assist in the development of figures for person throughput associated with each corridor. The figures will be needed to determine the impacts of rapid bus treatments as well as to compare the corridors to each other. Origin-destination data available from recent passenger surveys on Ride On and Metrobus will be reviewed to better understand transit rider travel patterns.

#### Actual travel time

Existing travel time information will be pulled from the AVL system for WMATA and Ride On. Much of this information is already included in the geodatabase developed for the aforementioned *Hot Spots* study. This data will be used to develop a baseline of the travel time for transit along the seven RTS corridors. Travel times for each of the seven RTS services will be estimated based on projected operating conditions. Travel time savings gained from using exclusive lanes, signal priority, or other operational characteristics will be estimated for each corridor later in the study. These new times can then be compared to the existing times to determine cost and benefit.

### *Review of Existing Fleet*

A review of the existing fleet of local buses operating within the study area will be conducted. A table will be produced documenting the types of vehicles being operated, their age, and other characteristics that would impact how they interact with the proposed RTS system. It will be important to determine whether all the vehicles could stop, pick-up and discharge passengers at a higher boarding platform. It will also be necessary to know the vehicle characteristics of the existing fleet, as they may inform decisions on the future RTS fleet. This could impact decisions relating to station and guideway design, if it is determined that local buses should operate within and serve stops along the RTS corridors. A review of fleet management plans will be necessary to determine replacement time frames and costs.

### Develop Criteria for RTS

Montgomery County is proposing to create a new class of bus service with its RTS initiative. To differentiate RTS from other bus services, a clear definition of this service that can be communicated to political leaders and the riding public is needed. This section will set out criteria for RTS services that will define how it operates, where it operates, for which markets it is appropriate, and how the distinction between RTS and other bus service is communicated to the public. This section will also address whether the system will provide the same operating characteristics for each corridor, or the degree to which operations may be varied while still meeting the definition of the RTS service.

#### Service Standards

For RTS to appeal to choice riders it must be seen as different from regular bus service. The RTS will do this by offering premium service in terms of convenience, travel time, and reliability. Riding on an RTS route must be seen as competitive with driving to lure people out of their cars and be considered a “smart” choice for commuting and other travel. Thus, each RTS route must run so frequently that missing a particular bus will not be seen as a major problem. The span of service must be set to cover all of the high-demand periods; but during times of lower demand, the benefits of consistent and easy to understand service must be weighed against the costs of operating more service than demand would traditionally warrant. This task will recommend the minimum level of service that should qualify as constituting RTS service. This will reflect input from the RTS Advisory Committee, recognized BRT standards (e.g., from the Institute for Transportation and Development Policy’s BRT Standards document), criteria being used nationally in other BRT systems, and required minimum standards to maintain eligibility for FTA funding.[[1]](#footnote-1)

#### Ridership Criteria

Prior planning efforts have laid out RTS alignments in the travel corridors of Montgomery County having the highest current transit ridership and overall travel demand. The density of demand is critical in determining an appropriate service level for RTS routes. This analysis will focus on the minimum ridership per unit of service operated to justify the implementation of RTS treatments. A proposed threshold in the Transit Corridors Function Master Plan is 1,600 passengers per hour in the peak direction (pphpd) to justify the construction of a median busway. Other thresholds exist and will be reviewed.

#### Roadway Criteria

A key feature of bus rapid transit systems such as Montgomery County’s proposed RTS is their flexibility when it comes to roadway treatments and operating environments. Nonetheless, for the purpose of distinguishing the RTS from other bus service, desired characteristics of guideway to qualify as part of the RTS will be defined. The proposed RTS network may or may not match the busway network being developed as part of the Transit Corridors Functional Master Plan, but to the extent that the RTS routes can use the proposed busways to improve travel time and reliability, they will do so.

### *Branding Criteria*

The purpose of branding is to communicate a recognizable name and graphical image to the riding public of what is part of the RTS system so potential riders understand the level of service and accommodations they may expect when choosing to use the RTS system. The physical characteristics associated with branding include vehicles, stops, and roadway treatments, each of which is different from regular bus service. Recommendations for branding guidelines will be produced, but will not include any creative branding elements.

### Route Planning – Proposed RTS and Local

All of the proposed RTS corridors are served by existing bus routes operated by Ride On, Metrobus, or both. Some routes serve the entire corridor while others serve only a portion before diverting to other corridors or adjacent neighborhoods. This task will develop detailed service plans for each corridor, including trunk services, feeder routes, limited-stop expresses, local routes and hybrid services.

#### Review proposed RTS

Among the many prior planning studies for busways and rapid bus service in Montgomery County, numerous proposals for BRT-type service have been developed. This task will evaluate the various proposals and recommend optimal service characteristics for the core trunk route(s) in each corridor. Each corridor will be considered individually—in terms of existing travel patterns of transit passengers—and as part of the RTS network and in relation to the Metrorail system. The goal of this task is to design trunk routes that serve the greatest number of passengers in the most convenient way and to maximize the value of capital and operating investments in the corridor.

#### Develop high-level operating plans – several options for each corridor

Ride On and Metrobus operate a mature network of bus routes in the proposed RTS corridors. Implementation of the RTS will necessitate changes in these existing routes. This task will develop several options for route restructuring to accommodate and best take advantage of the new facilities that would be established as the RTS is implemented. For example, current local routes could be converted to feeder routes for the main trunk route, or they could be extended to operate in the RTS corridor to form a “composite” trunk route (where many routes together provide a combined high level of service in the main corridor). The main trunk route, or perhaps a collection of routes, would operate on a limited-stop basis to reduce travel time, but parallel local service would likely be maintained so that current passengers would not have to walk longer distances to bus stops.

Shared use of physical infrastructure will be considered including how local service could potentially utilize new transit runningways and stations. Considerations such as neighborhood coverage, duplication of service, combined/coordinated headways, complementarity of span of service (peak vs. off-peak vs. late night) and others will inform the alternative operating plans. Various types of service plans will be considered including BRT only in exclusive lanes, BRT plus local bus utilizing exclusive lanes with express type service (no stops when on exclusive lane), and both BRT and local buses utilizing exclusive lanes and BRT stations. The operating plans will also consider the potential interaction and overlap with existing Metrorail stations and proposed CCT and Purple Line stations and the implications of shared use and intermodal transfers.

*Sketch-level Ridership Estimates*

Sensitivity tests will be performed to inform the decision as to the amount of mode shift and levels of ridership that may be obtained with various service concepts. This will include the use of sketch level manual adjustments applying information from the industry to estimate levels of change in mode shift or ridership based. Results from prior model runs will be reviewed (i.e. from the PB study) and data from existing models will be used, but additional model runs will not be utilized to produce these high level estimates.

#### Develop Detailed Operating Plans

After review, a preferred operating plan for each corridor will be recommended. This plan will include operating parameters such as travel time between timepoints, headways, cycle time, span of service, coordination with parallel and feeder services, transfer opportunities (timed and incidental), station and stop spacing, and impacts of runningway treatments. The result of this effort will be a package of routes serving each corridor (both RTS and complementary local services) including their key service characteristics. This task will also examine the potential to enhance local bus routes with limited stop service, priority treatments, off-board fare collection, improved stops, and enhanced stations. The implementation timeframe for these operating plans is assumed to be the near-term period (within the next ten years), so that current development patterns and projects in the near-term pipeline would be the basis for ridership generation.

The results of this analysis would be compared to and shared with the concurrent work taking place in the Transit Corridors Functional Master Plan. If a desired RTS corridor is identified that is not part of the current planned network (unlikely), the potential addition of that corridor will be sought. More likely, the service plan for RTS will indicate which of the proposed corridors has the greatest near-term ridership potential and thus should be the focus of capital investment for runningway improvements. This information can help guide the Functional Master Plan in setting priorities.

#### Develop Operating Costs

Using the route packages specified above, vehicle revenue hours and miles of service for all routes in the package as well as vehicle requirements will be calculated. Operating costs will be estimated using a two or three factor model. Costs will be estimated separately for the potential operators of the service, including Ride On, Metrobus, or another entity. Supplemental operating costs for RTS service will be discussed and estimated, as premium services often have additional maintenance costs (e.g., passenger facilities, fare collection equipment, bus servicing), and additional operating costs to guarantee a premium level of service (i.e., additional extraboard to ensure no missed trips and possibly premium pay for operators).

*Develop Phasing Plan*

Develop a possible phasing plan based on the results of the proceeding subtasks. The phasing structure will be defined in coordination with the steering committee and describe the order in which the corridors could be implemented. Considerations will include the timing feasibility of runningway improvements, minimizing disruptions in transit service and general roadway traffic, and maintaining coherence in the overall bus system and the RTS network as it develops over time. More detailed phasing plans for each corridor will be completed in a later stage of implementation planning beyond the scope of this study

### Identify Physical Design

#### Runningway

The purpose of this task is to identify desired runningway treatments in RTS corridors to promote service quality in terms of increased travel speed and reliability. Documents such at *The BRT Standard 1.0* (ITDP, 2012), *Operational Analysis of Bus Lanes on Arterials* (TCRB R-26), and *Bus Rapid Transit: Implementation Guidelines* (TCRB R-90) all provide guidance on potential bus priority treatments. The Countywide Transit Corridors Functional Master Plan is in the process of completing a set of recommendations for busways and exclusive lanes in the county. This study will use the latest versions of the recommendations in the Functional Master Plan to inform the analysis of what exclusive transit facilities could be available to support the operations of the RTS network.

The recommendations that result from this task will inform many of the other design considerations that follow. Decisions associated with fleet characteristics, station access, and station area design will be affected. Additionally, the location and design of the guideway throughout the seven corridors need to be considered from a systemwide view. If four of the corridors have a median-oriented guideway and the remaining three have a curb-oriented guideway, then the fleet would have to be designed to accommodate passenger pick-up and drop-off on both sides of the vehicle. The other alternative would be to have a mixed fleet that can only serve one type of guideway design, but this would result in additional operating considerations. These questions and costs will need to be addressed with the recommendations.

Bus Rapid Transit systems come in multiple shapes and sizes from which Montgomery County may choose the kind of features appropriate to its RTS system. While each corridor has unique conditions, one can make generalizations based on the kind of roadway characteristics existing in each corridor. Following a similar methodology to WMATA’s 2007 Priority Corridor Network Study, each corridor will be broken into general types. For each type, the feasibility of various bus priority improvements will be scored and a final set of potential improvements will be listed that allow the system to meet the minimum service standards outlined in Subtask III. At a minimum, this section will explore bus priority treatments in the following areas:

* Corridor lane configuration (e.g., median-aligned runningway, curb aligned runningway)
* Right-of-way separation treatments (e.g., painted lanes, physical barriers, completely separate runningway)
* Intersection treatments (e.g.., transit signal prioritization, turn restricted busway)
* Passing lanes (e.g., runningway with passing lanes to enable local and express service)

Ridership demand is a key factor in assessing the need for and viability of various physical design elements. , this task will conjoin what physical design elements are feasible in each corridor (from the Functional Master Plan) with what design elements are desirable and justifiable. Differentiating between near-term (within the coming decade) and long-term (out to 2040) demand will also be important.

The final product of this task will be a set of recommended treatments for the seven initial RTS corridors. These runningway treatment options will be significantly narrowed down from the dozens of existing options and allow the County to develop and refine design alternatives for each corridor. The goal is to set the stage for the conceptual design of the runningway in the next phase of the RTS process, once this service planning and integration study is complete.

#### Stations

Station locations proposed in existing studies will be used as a starting point for this plan, and refined station locations will be developed based on route configurations, roadway characteristics, adjacent development, ridership projections and physical constraints. Existing transit ridership, current and future population and employment density, and development plans will all be included in the refinement of station locations on each of the seven corridors. While final decisions about station locations and all work in the physical design of those stations will take place in future phases of the RTS process, it is important for this phase of the study to have a “working plan” for RTS stations in order to flesh out the operating characteristics of RTS and related local routes.

### Capital Needs

The purpose of this task is to identify the general capital needs not already outlined in previous sections, with the goal of providing Montgomery County enough guidance and detail to issue an RFP for design and/or procurement of equipment and to have a complete understanding of the breadth of the cost drivers.

#### Rolling Stock

Based on the work conducted in the previous sections, the number of vehicles required to operate the RTS service, along with the general vehicle specifications (e.g., number of doors, location of doors, vehicle length, floor height, articulation) will be estimated. The desired functional characteristics of the fleet will be described including provisions for bicycles, access for mobility impaired riders, seating capacity and door configurations. The implications of mixing fuel/propulsion systems for the existing maintenance facilities and the current fleed will be assessed. The final product of this section will be a guide for bus specification standards by type of bus operation.

#### Shelter Design and Passenger Amenities

This section will outline design guidelines and minimum specifications for RTS stations. The ultimate product will provide a package of passenger amenities that meet the County’s goals and objectives for the RTS system, and can be utilized for designing the passenger shelters and procuring the necessary passenger amenities at a later stage of the project.

#### Technology Applications

This section will identify what applications should be incorporated into the RTS system to provide passengers real-time transit information, and provide the operator with state of the art performance data, scheduling optimization, and vehicle tracking capabilities. The final product will be a general set of recommended tools, including their feature set and target users.

#### Fare Collection Equipment

This section will outline the fare collection equipment necessary to implement the fare collection concepts described in the operation plans developed in scope item III. Specifications will include type of fare collection technology, estimate of the number and type of Ticket Vending Machines (TVMs) necessary to service the system, and type of fare collection barriers (if any) that would be implemented across the system.

## Deliverables

* Technical memorandum covering Tasks I and II, Review of Existing Studies and Plans, Fleet, and Existing Transit Network
* Technical memorandum documenting the agreed upon minimum RTS criteria
* Service and Operating plan
	+ Maps
	+ Route characteristics
* Technical memorandum outlining the phasing plan
* Technical memorandum outlining the capital elements needed for the service
* Capital and operating cost estimates
1. FTA plans to issue a notice of proposed rulemaking on minimum standards for BRT projects this summer. [↑](#footnote-ref-1)