

MD 355 - North
Corridor Advisory Committee
Meeting #3

Montgomery County
RAPID TRANSIT

BRT CORRIDOR STUDIES

Sidney Kramer Upcounty Regional Services Center
Germantown, Maryland
June 3, 2015



Welcome

Topics to be discussed:

- Project Update – 10 min
- Transit Ridership – 35 min
- Traffic Operations – 35 min
- Draft Project Purpose and Need Language – 10 min
- BRT Running Way Options – 35 min
- Future Meetings & Questions – 10 min

Project Update – Corridor Planning Study

- Conducting a preliminary assessment of a range of conceptual improvements
- Developing recommendations to be used in subsequent phases (i.e., NEPA or MEPA)
- Utilizing the Planning and Environment Linkages (PEL) approach
 - Consider environmental, community, and economic goals early in the transportation planning process
 - Use products developed during PEL to guide the subsequent environmental review process (i.e., NEPA or MEPA)
 - For more on PEL, go to:
<http://environment.fhwa.dot.gov/integ/index.asp>

Project Update – Informational Open House Meetings

The Informational Open House meetings postponed, to:

- Allow for greater coordination and input from the CAC Members
- Evaluate and/or incorporate preliminary findings of the City of Rockville and City of Gaithersburg BRT Studies
- Develop preliminary service planning information
- Once new dates are identified, the public will be informed through a series of outreach efforts: “Save The Date” postcard, informational brochure, newspaper ads, project website, and coordination with local civic organizations

CAC Meeting No. 3 Agenda

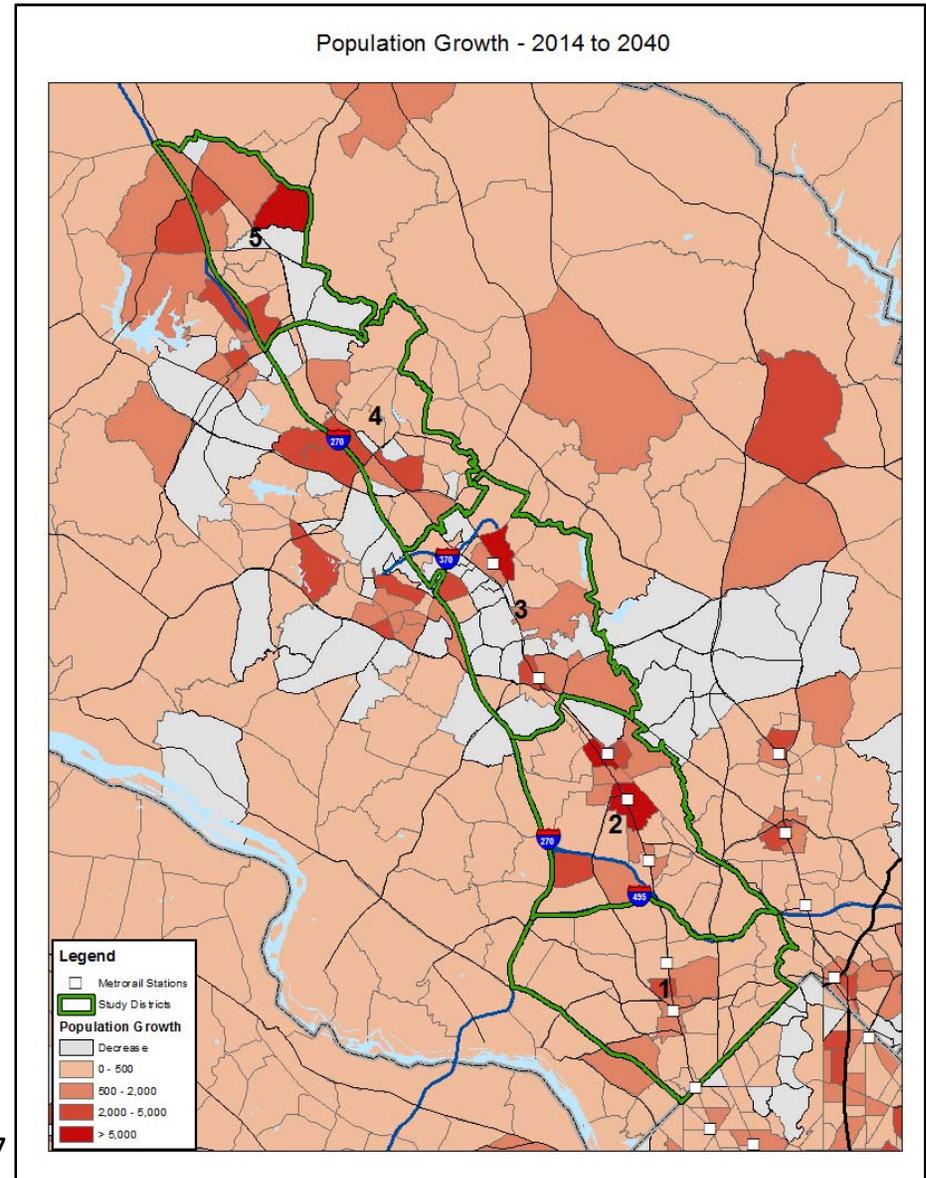
Topics to be discussed:

- Project Update
- **Transit Ridership**
- Traffic Operations
- Draft Project Purpose and Need Language
- BRT Running Way Options
- Future Meetings & Questions

Population Growth

Dist	2014	2040	Growth	Percent Growth
1	87,900	101,800	13,900	15.9%
2	80,200	122,700	42,500	53.0%
3	48,000	68,000	20,000	41.5%
4	66,000	76,200	10,200	15.5%
5	26,000	40,600	14,600	56.2%
Total	308,100	409,300	101,200	32.9%

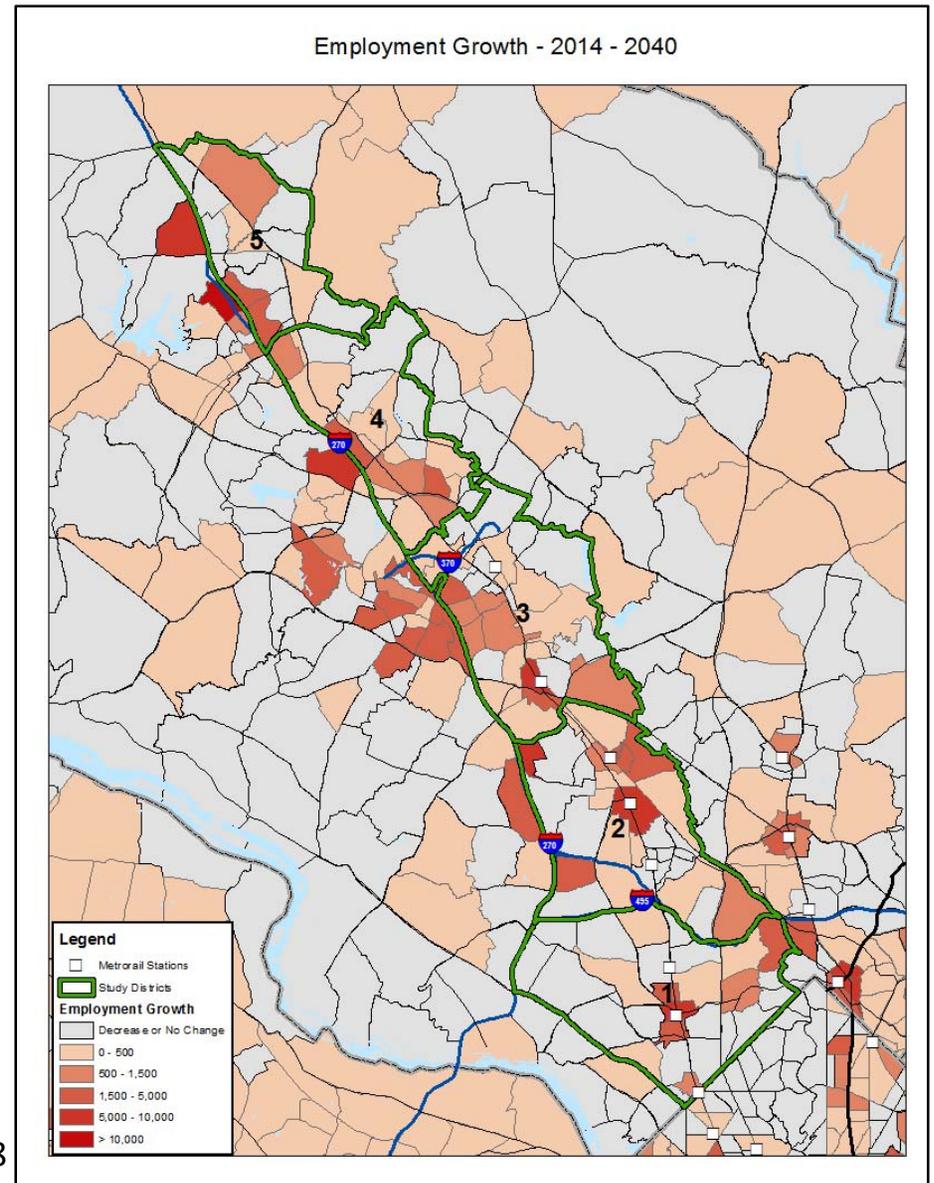
Source: MWCOG Round 8.3 Cooperative
 Land Use Forecasts



Employment Growth

Dist	2014	2040	Growth	Percent Growth
1	94,500	114,100	17,600	20.1%
2	84,600	122,100	37,500	46.7%
3	61,300	78,700	17,400	36.3%
4	30,600	39,500	8,900	13.4%
5	9,800	14,800	5,000	19.4%
Total	282,800	369,200	86,300	28.0%

Source: MWCOG Round 8.3 Cooperative Land Use Forecasts



Existing Travel Patterns

All Daily Trips, All Trip Purposes

From/To	1	2	3	4	5	Corridor Total
1	92,841	25,450	5,706	2,191	424	126,613
2	27,474	92,503	18,356	4,729	885	143,946
3	6,651	20,358	51,687	11,156	1,486	91,338
4	4,621	8,542	17,448	61,691	7,382	99,685
5	1,389	2,172	3,008	9,378	26,181	42,128
Corridor Total	132,976	149,025	96,205	89,146	36,358	503,709

Source: MWCOG Forecasting Model

Existing Travel Patterns

Daily Commute Trips

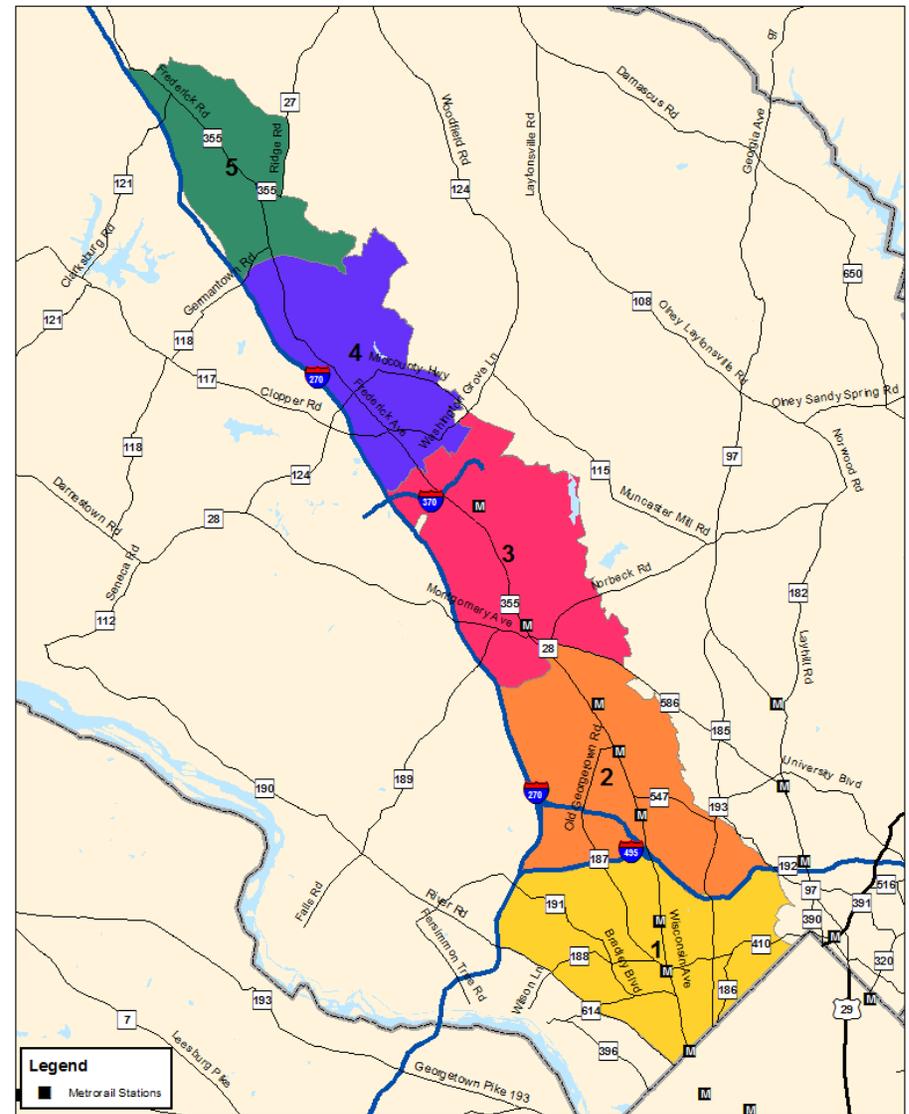
From/To	1	2	3	4	5	Corridor Total
1	9,467	3,438	1,143	358	61	14,466
2	5,048	8,389	2,863	685	118	17,102
3	1,752	3,024	4,718	1,146	168	10,808
4	1,771	2,289	3,466	4,558	841	12,925
5	599	641	751	870	1,220	4,081
Corridor Total	18,638	17,780	12,940	7,617	2,407	59,382

Commuter Trips account for only a small portion of trips within the Study Corridor (12%)

Source: MFCOG Forecasting Model

Existing Travel Patterns

- Daily Trips within the Study Corridor:
 - 504,000 in 2014
- Many daily short trips:
 - 325,000 trips within the same district
 - 125,000 trips within the same Transportation Analysis Zone (TAZ)
 - 140,000 non-motorized trips
- Non-commute trips are large majority of percentage of total trips within the study corridor (88% of total)



2040 Travel Patterns

All Daily Trips, All Trip Purposes

From/To	1	2	3	4	5	Corridor Total
1	101,942	29,794	6,134	2,086	471	140,426
2	33,964	143,191	25,101	5,405	1,112	208,773
3	7,852	28,843	68,343	13,512	1,863	120,412
4	5,002	10,635	20,008	66,741	7,901	110,287
5	2,081	3,642	4,662	13,000	35,890	59,275
Corridor Total	150,840	216,105	124,248	100,743	47,236	639,173

Source: MWCOG Forecasting Model

2040 Travel Patterns

Daily Commute Trips

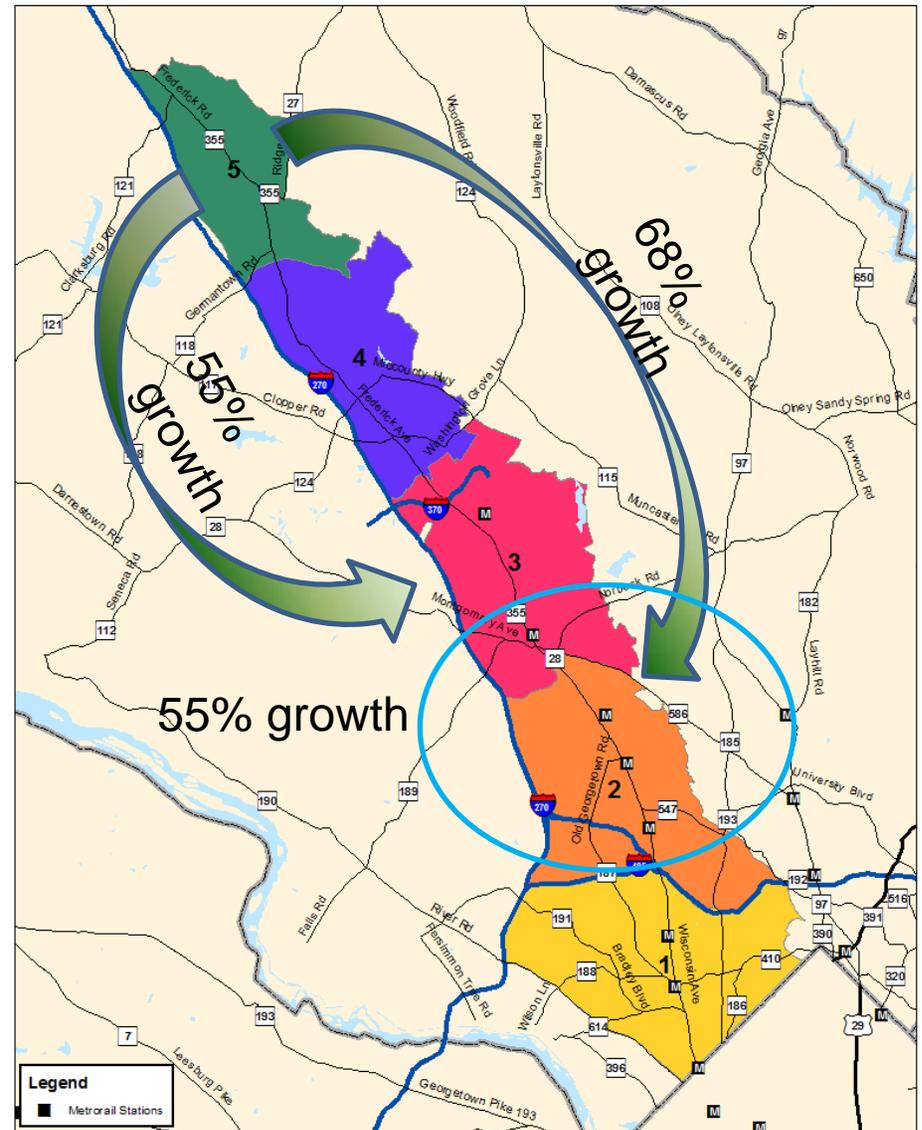
From/To	1	2	3	4	5	Corridor Total
1	10,922	4,357	1,276	326	74	16,955
2	6,737	16,563	4,704	858	186	29,049
3	2,148	4,660	7,157	1,520	273	15,757
4	1,757	2,676	3,587	5,460	1,108	14,589
5	892	1,133	1,250	1,546	2,064	6,886
Corridor Total	22,456	29,390	17,974	9,711	3,705	83,236

Commuter Trips account for only a small portion of trips within the Study Corridor (13%)

Source: MFCOG Forecasting Model

2040 Travel Patterns

- Daily Trips within the Study Corridor:
 - 639,000 in 2040
 - 27% increase over 2014
- Many daily short trips:
 - 28% increase in trips within the same district
 - 27% increase in trips within the same TAZ
 - 62% increase in non-motorized trips
- Non-commute trips remain large majority of future trips (87%)
- The most growth in travel is associated with district 2



Transit Service (No-Build)

- Three backbone Ride On services on MD 355
 - Ride On 75: Montgomery County Correctional Facility to Germantown TC
 - Ride On 55: Germantown TC to Rockville Metro
 - Ride On 46: Shady Grove Metro to Medical Center Metro
- Future 2040 Transit Network includes:
 - Purple Line – Bethesda to New Carrollton
 - Corridor Cities Transitway (CCT) – Shady Grove to Comsat

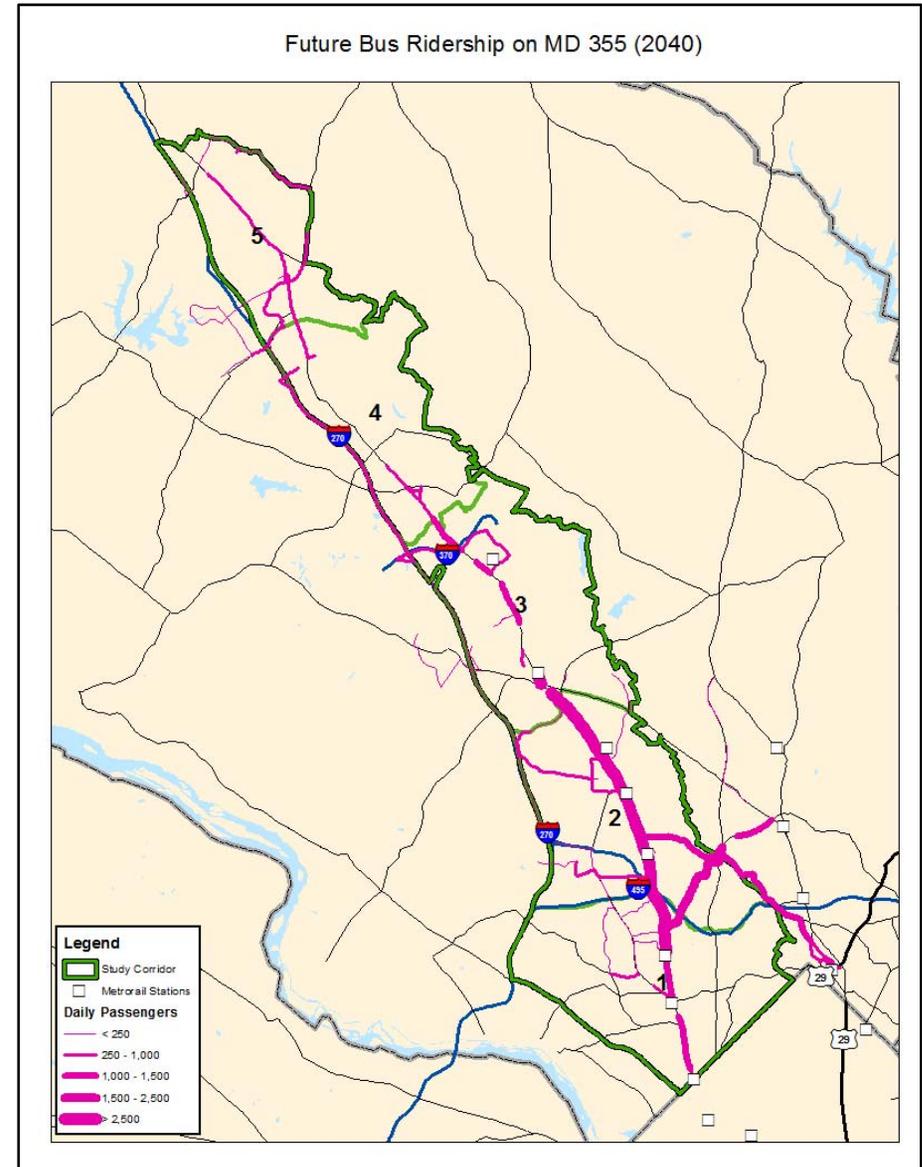


Transit Ridership

Route	Existing Daily Ridership (Weekday)
46	3,683
55	7,920
75	479

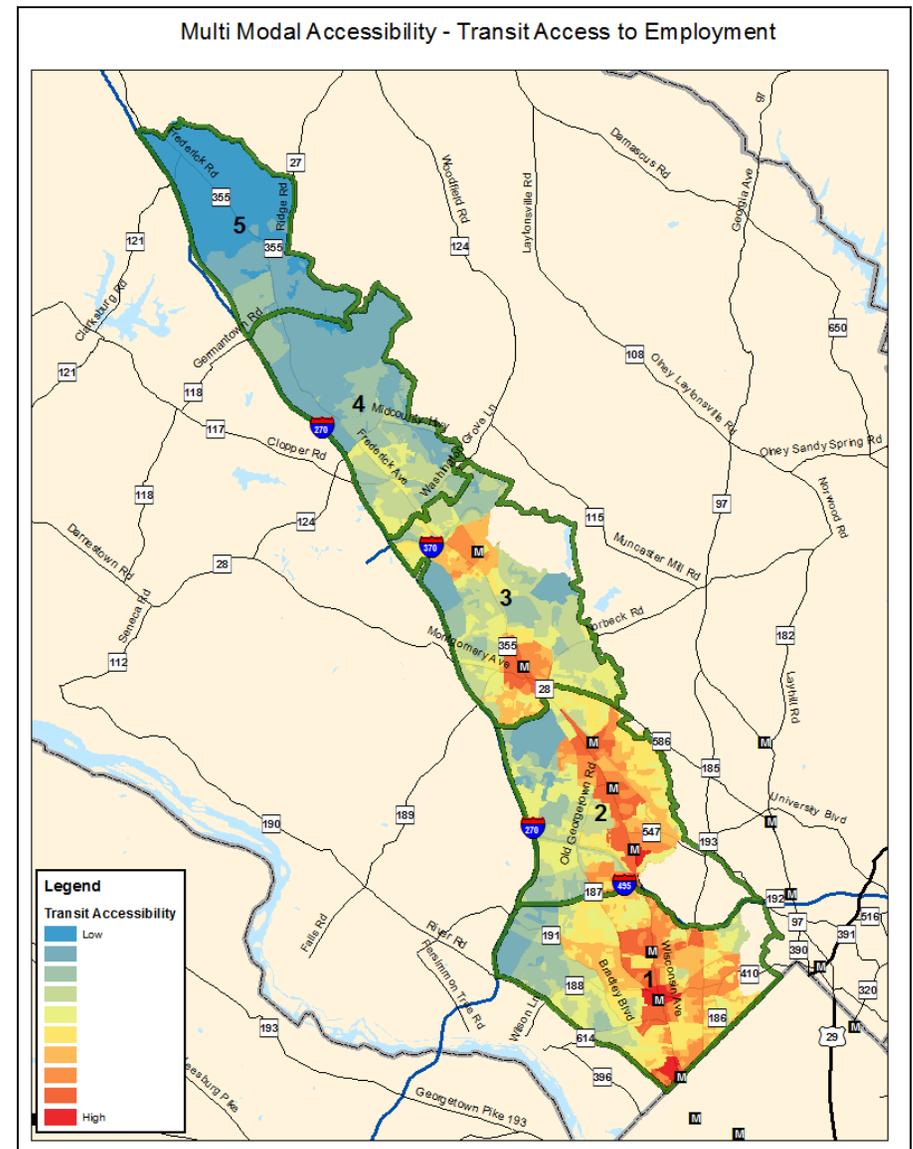
- Bus Ridership Forecast to Increase by 40% by 2040
- Significant increases in Metrorail boardings
 - 58% increase for northern Red Line stations (White Flint north)
 - 27% increase for southern Red Line stations (Grosvenor south)

Source: RideON, RideChecks and MWCOG Forecasting Model



Transit Accessibility

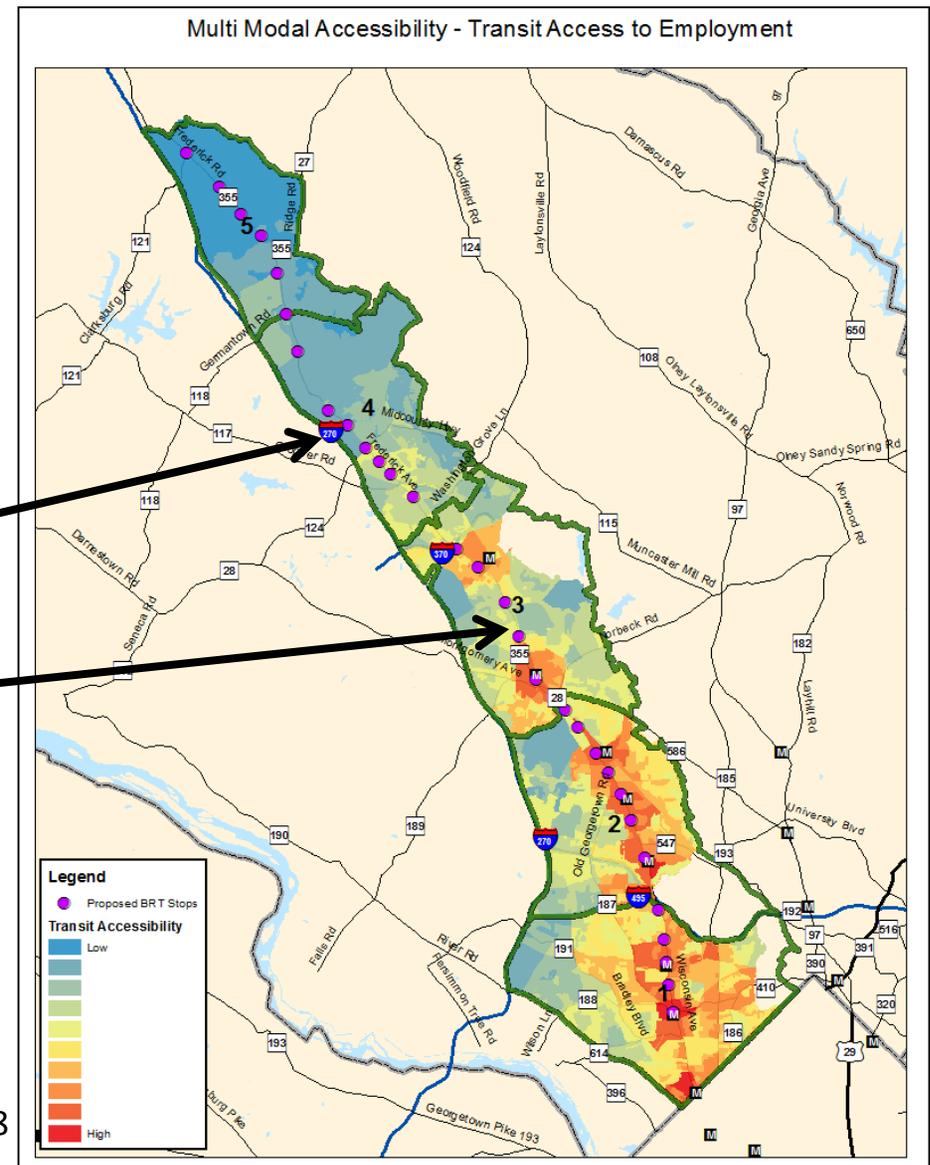
- Measure of number of jobs accessible by transit within a given time
- Transit accessibility to jobs:
 - Higher in Southern portion of Corridor
 - Highest accessibility clustered near Metrorail stations



Transit Accessibility

- Proposed BRT:
 - 31 stations
 - 21 miles

- Potential to improve transit accessibility:
 - Districts 4 and 5 north of Metrorail
 - Between existing Metrorail stations



Regional Demand Summary

- Significant growth in population and employment in the corridor
- Strong existing and future transit ridership in the corridor (bus, Metrorail, CCT)
- Potential travel markets for BRT:
 - Local trips within the corridor
 - Potential Metrorail feeder service from northern districts
- BRT to provide improved transit options and accessibility for County residents

Questions



CAC Meeting No. 3 Agenda

Topics to be discussed:

- Project Update
- Transit Ridership
- **Traffic Operations**
- Draft Project Purpose and Need Language
- BRT Running Way Options
- Future Meetings & Questions

Existing and Future No-Build Traffic Volumes

Roadway Sections (North to South)	2015 Average Daily Volumes (counted)	2040 Average Daily Volumes (projected)	Total Average Traffic Growth 2015 to 2040
MD 121 to MD 27	7,700 – 22,200	8,600 – 25,300	13%
MD 27 to MD 124	21,200 – 39,800	23,500 - 45,900	13%
MD 124 to I-370	26,500 - 43,900	33,000 - 53,700	23%
I-370 to MD 28	41,400 - 50,600	50,100 - 61,000	21%
MD 28 to I-495	40,800 – 60,800	51,200 – 73,325	23%
I-495 to MD 410	28,800 – 67,800	33,800 – 80,200	18%



What is Level of Service (LOS)?

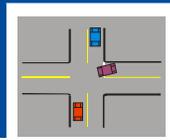


Level of Service is a quantitative measure of traffic operational conditions. Ranges of operation are defined for each type of roadway section (signalized intersections, freeways, ramp junctions and weaving sections) and are related to the amount of traffic demand at a given time as compared to the capacity of that type of roadway section.

Six levels of service are defined for each type of roadway section and are given letter designations from A to F, with A representing good operating conditions and F representing unsatisfactory operating conditions.

Intersection

- Highly stable, free-flow condition with little or no congestion
- Delay: <10 seconds/vehicle



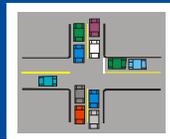
- Stable, free-flow condition with little congestion
- Delay: 10 to 20 seconds/vehicle



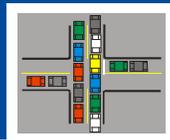
- Free-flow condition with moderate congestion
- Delay: 20 to 35 seconds/vehicle



- Approaching unstable condition with increasing congestion
- Delay: 35 to 55 seconds/vehicle



- Unstable, congested condition
- Delay: 55 to 80 seconds/vehicle



- Stop and go
- Delay: >80 seconds/vehicle



Roadway

LOS A



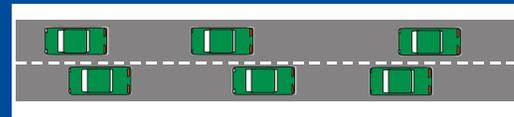
- Free flowing
- Uninterrupted vehicle

LOS B



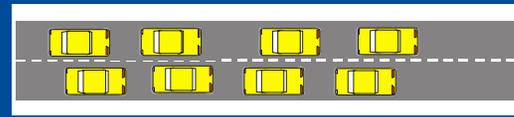
- Stable flow
- Other vehicles are more noticeable

LOS C



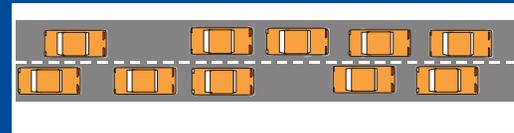
- Stable flow
- Vehicle operations affected by other vehicles

LOS D



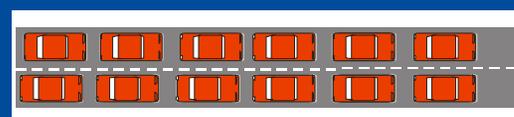
- High density free flow
- Operation of vehicle is affected by other vehicles

LOS E



- High density traffic flow, nearing capacity
- Operating conditions are extremely poor

LOS F



- Forced or breakdown flow
- Amount of traffic exceeds capacity

Existing and Forecast No-Build Level of Service

MD 355 Intersections	2015 AM LOS (Delay in seconds)	2015 PM LOS (Delay in seconds)	2040 AM LOS (Delay in seconds)	2040 PM LOS (Delay in seconds)
MD 121 (Clarksburg Rd)	D (53)	E (57)	E (66)	E (76)
MD 27 (Ridge Rd)	D (47)	E (70)	D (47)	F (81)
MD 118/Germantown Rd	D (47)	E (61)	E (65)	E (78)
Middlebrook Rd	D (45)	E (76)	E (57)	F (107)
MD 124 (Mont. Vil. Ave)	E (58)	F (97)	E (65)	F (107)
Shady Grove Road	F (96)	E (77)	F (120)	F (87)
Gude Drive	F (81)	D (54)	F (105)	E (76)
MD 28 (Veirs Mill Rd)	C (34)	D (39)	D (38)	D (40)
Twinbrook Parkway / Rollins Ave	C (21)	C (34)	C (25)	D (36)
MD 187/Old Georgetown Rd	D (45)	D (47)	E (69)	E (79)
MD 547 (Strathmore Ave)	C (34)	D (50)	D (45)	E (69)
Cedar Lane	E (62)	F (105)	D (36)	E (71)
Jones Bridge Rd / Center Drive	D (49)	D (55)	E (70)	E (59)
MD 410 WB / MD 187 WB	D (54)	E (56)	E (72)	F (88)

Speeds and Travel Time (Southbound)

Roadway Sections (North to South)	2015 Average Speed (mph) SB (AM/PM)	2040 Average Speed (mph) SB (AM/PM)	2015 Average Travel Time (min) SB (AM/PM)	2040 Average Travel Time (min) SB (AM/PM)
MD 121 to MD 27	16 / 34	14 / 30	12.2 / 5.7	14.1 / 6.3
MD 27 to Professional Dr	27 / 28	24 / 27	7.1 / 6.8	8.0 / 7.0
Professional Dr to I-370	19 / 21	14 / 18	11.7 / 10.9	15.7 / 12.0
I-370 to Edmonston Dr	17 / 19	13 / 15	15.6 / 13.8	20.5 / 17.0
Edmonston Dr to Twinbook Pkwy	26 / 21	26 / 14	3.0 / 3.9	3.1 / 5.8
Twinbrook Parkway to MD 547	22 / 15	20 / 9	5.1 / 7.2	5.5 / 12.9
MD 547 to Pooks Hill Rd	21 / 22	12 / 18	4.2 / 3.9	7.5 / 4.7
Pooks Hill Rd to MD 410	14 / 11	9 / 6	9.4 / 11.6	15.0 / 20.6
Total Corridor	19 / 20	14 / 15	68.3 / 63.8	89.4 / 86.3

Speeds and Travel Time (Northbound)

Roadway Sections (North to South)	2015 Average Speed (mph) NB (AM/PM)	2040 Average Speed (mph) NB (AM/PM)	2015 Average Travel Time (min) NB (AM/PM)	2040 Average Travel Time (min) NB (AM/PM)
MD 121 to MD 27	32 / 30	31 / 28	5.9 / 6.3	6.1 / 6.7
MD 27 to Professional Dr	27 / 23	27 / 15	7.0 / 8.4	7.1 / 12.5
Professional Dr to I-370	27 / 22	16 / 15	8.4 / 10.2	14.3 / 15.1
I-370 to Edmonston Dr	23 / 18	18 / 13	11.4 / 14.4	14.3 / 20.0
Edmonston Dr to Twinbook Pkwy	27 / 16	26 / 9	3.0 / 4.9	3.1 / 9.2
Twinbrook Parkway to MD 547	20 / 20	18 / 20	5.6 / 5.6	6.2 / 5.5
MD 547 to Pooks Hill Rd	18 / 16	16 / 5	4.6 / 5.0	5.2 / 16.8
Pooks Hill Rd to MD 410	24 / 6	23 / 6	5.4 / 20.5	5.7 / 23.3
Total Corridor	25 / 17	20 / 11	51.3 / 75.3	62.0 / 109.1

MD 355 Crash History

Roadway Sections (North to South)	Total Crashes (2011 to 2013)	Crashes Per Mile	High Crash Types
MD 121 to MD 27	109	33	Opposite Direction, Rear End, Left Turn
MD 27 to Great Seneca Creek	193	66	Left Turn, Angle
Great Seneca Creek to I-370	382	94	Opposite Direction, Left Turn, Pedestrian
I-370 to MD 28	339	97	Left Turn, Pedestrian
MD 28 to MD 547	444	114	Left Turn, Angle
MD 547 to I-495	132	101	Opposite Direction
I-495 to Cedar Lane	94	127	Sideswipe
Cedar Lane to Woodmont Ave	112	144	Rear End, Left Turn, Pedestrian
Woodmont Ave to MD 410	112	122	Rear End, Sideswipe, Left Turn, Angle, Pedestrian

Questions



CAC Meeting No. 3 Agenda

Topics to be discussed:

- Project Update
- Transit Ridership
- Traffic Operations
- **Draft Project Purpose and Need Language**
- BRT Running Way Options
- Future Meetings & Questions

Draft Project Purpose Language

The purpose of this project is to provide a new higher speed, high frequency, all day transit service along the MD 355 corridor between the Bethesda Metrorail Station and Redgrave Place in Clarksburg that will:

- Enhance transit connectivity and multi-modal integration along the corridor as part of a coordinated regional transit system;
- Improve the ability for buses to move along the corridor (bus mobility) with improved operational efficiency, on-time performance/reliability, and travel times;
- Address current and future bus ridership demands;
- Attract new riders and provide improved service options for existing riders as an alternative to congested automobile travel through the corridor;
- Build upon previous Montgomery County Bus Rapid Transit studies;
- Support approved Master Planned residential and commercial growth along the corridor;
- Improve transit access to major employment and activity centers;
- Achieve Master Planned non-auto driver modal share; and
- Provide safe multi-modal access to transit

Draft Project Need Language

- Four specific needs for the project have been identified by the study team:
 - **System connectivity** – A high-quality, continuous transit connection is needed from Bethesda to Clarksburg that can support the surrounding mixed used development along the corridor.
 - **Mobility** – Traffic congestion currently impedes bus and rider mobility and results in unpredictable bus service, longer travel times, and delayed schedules. A more reliable, shorter travel time, and on time performance transit service is needed.
 - **Transit demand/attractiveness** – Transit demand and ridership in the MD 355 corridor continues to grow. A high-quality transit service is needed to maintain current transit riders and attract new riders.
 - **Livability** – Transit improvements are needed throughout the MD 355 corridor to create a transportation network that enhances choices for transportation users and promotes positive effects on the surrounding communities and residents' quality of life.

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BRT Features

Running Way	Service Plan	Stations	Vehicles	Technology
Select one or more from each column				
Mixed traffic	Circulator	Branded stop	Standard	Vehicle guidance
Separate roadway	Limited stops	Branded shelter	Standard with brand	Traffic signal priority
Dedicated lanes: New lanes or repurposing existing lanes	Express	Shared with Local bus	Stylized	Bridgeplates
Median or curb lanes	Combination of route types	Rail-like station	30, 40 and 60 lengths	Real-time Passenger info
Queue jumps/ bypasses	Reconfigured network	Multimodal terminal	Guided/ unguided	Active electronic suspension
Tunnel segments	Minimal brand		CNG	Wi-fi
Shared or semi-exclusive lanes	Family of brands		Hybrid-electric	Vehicle location
Shared HOV or bus-only highway lanes	Complete brand marketing campaign		Advanced propulsion	Pre-payment fare collection

BRT Running Way Options

- Six BRT Running Way options have been identified for consideration
- The proposed six options can be mixed and matched along different segments of the corridor to best fit within the surrounding area
- Location and dimensions of proposed roadway elements will vary throughout the corridor
- The following typical sections represent six options, illustrating the interaction between vehicles and the BRT, as they could generally be applied throughout the corridor
- **NOT EVERY OPTION IS APPROPRIATE FOR EVERY SEGMENT OF THE MD 355 CORRIDOR**

BRT Running Way Options

Summary of Options

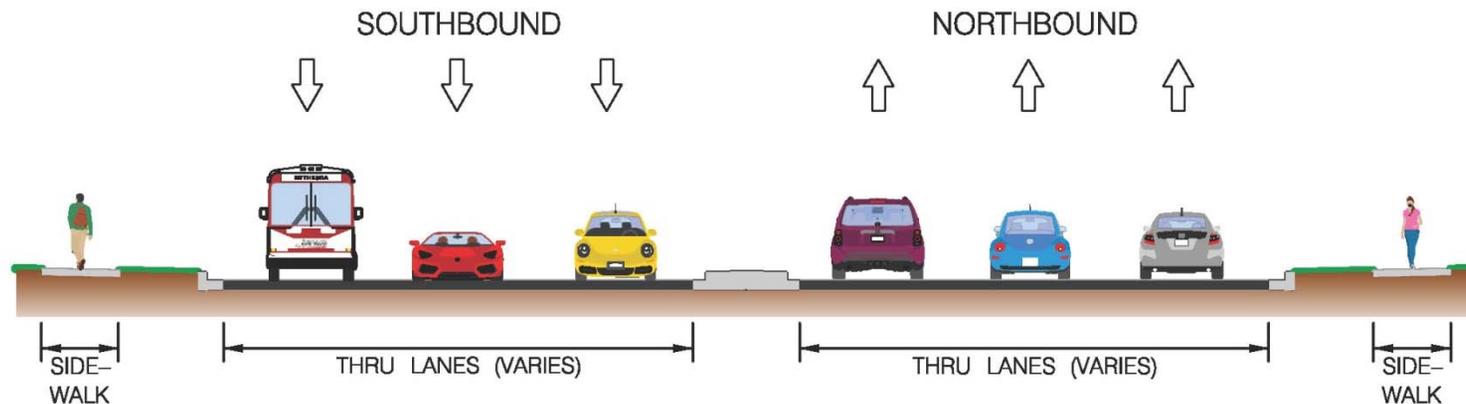
- Option 1 – BRT in Mixed Traffic
- Option 2 – BRT Queue Jump Lanes
- Option 3* – One-Way, Reversible, Dedicated BRT Lane
- Option 4* – Bi-directional, Dedicated BRT Lane
- Option 5* – Dedicated BRT Median Lanes
- Option 6* – Dedicated BRT Curb Lanes

* Types Vary – Could be achieved through additional lane(s) or lane repurposing

BRT Running Way Options

Option 1 – BRT in Mixed Traffic

- Could include enhancements to existing WMATA and Ride-On bus services via system operational improvements, and minor facility improvements such as transit signal priority
- Could include considerations for enhanced transit service with limited stops



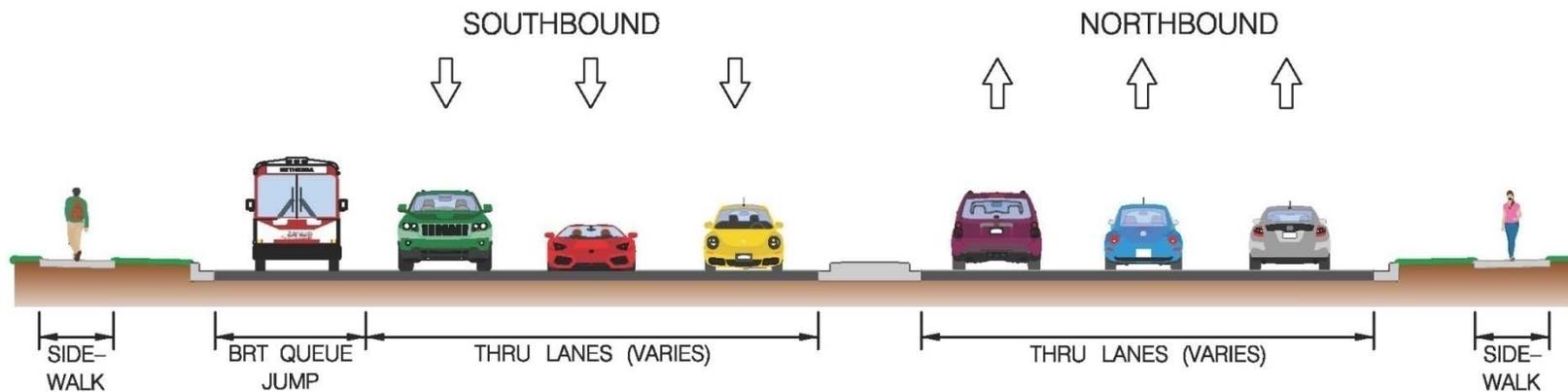
BRT in Mixed Traffic - City of Brampton, Canada



BRT Running Way Options

Option 2 – BRT Queue Jump Lanes

- Could include upgrades to existing WMATA and Ride On bus service via system operational improvements, and minor facility improvements such as transit signal priority and BRT queue jump lanes
- Could include considerations for enhanced transit service with limited stops



BRT Running Way Options

Option 2 – BRT Queue Jump Lanes

Transit signal priority

Approaching BRT vehicle may get a green light if it is behind schedule.

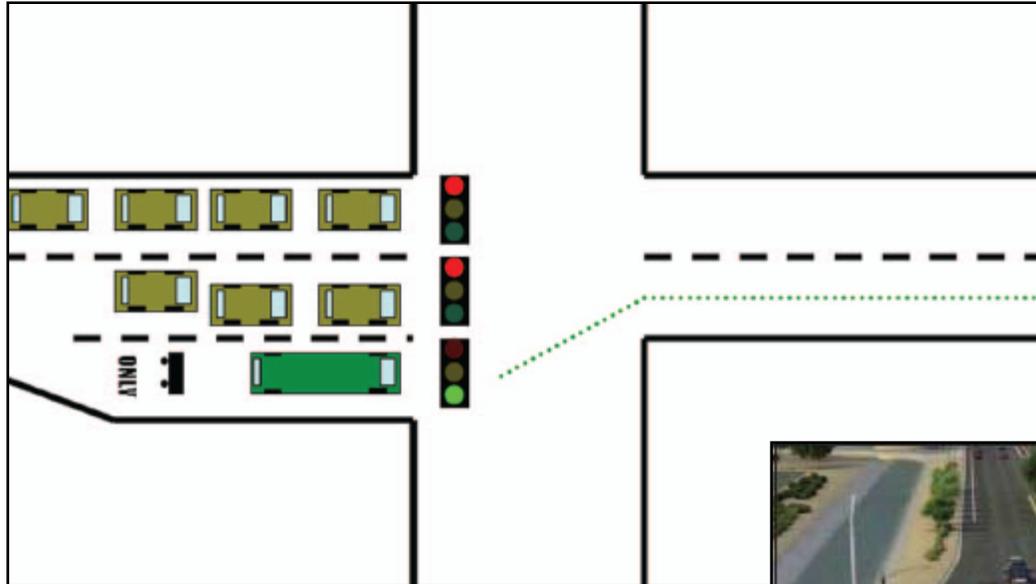
BRT uses special lane to bypass stopped cars.

Queue jump

Curb extension

Widened sidewalk at BRT station means bus does not have to wait to merge back into travel lane to leave station.

BRT Queue Jump

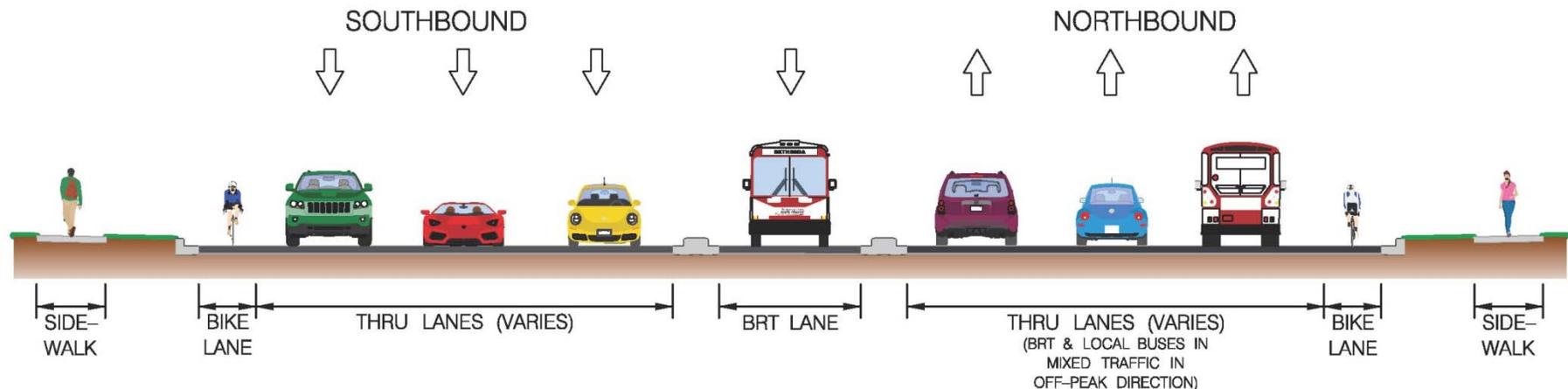


BRT Running Way Options

Option 3 – One Way, Reversible, Dedicated BRT Lane

- Would provide new BRT service in addition to the existing local bus service.
- Peak direction BRT buses in the one-way reversible lane would stop at new BRT stations, while off-peak direction BRT buses will operate in mixed traffic and could use existing bus stops retrofitted for BRT.
- Directionality of the dedicated BRT lane would be determined by peak-hour demand.
- Reversible lane could be implemented in the median or curb lane via an additional lane or repurposing of an existing travel lane

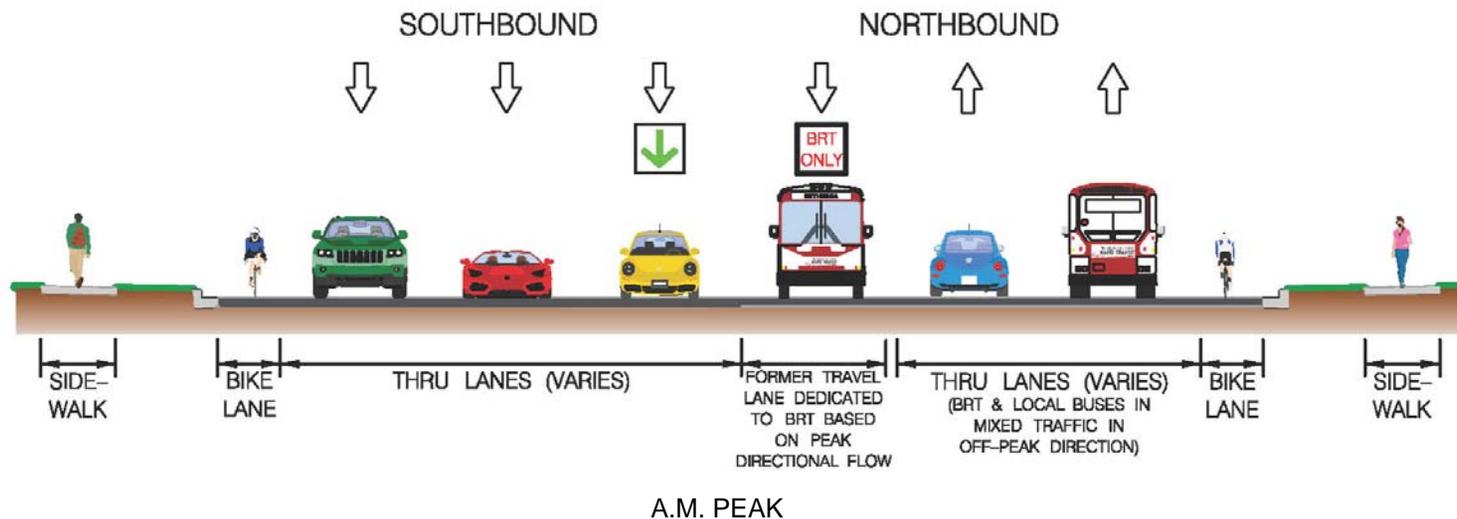
Type A: Additional lane is included to accommodate the dedicated BRT lane



BRT Running Way Options

Option 3 – One Way, Reversible, Dedicated BRT Lane

Type B: Existing travel lane is repurposed* to accommodate the dedicated BRT lane



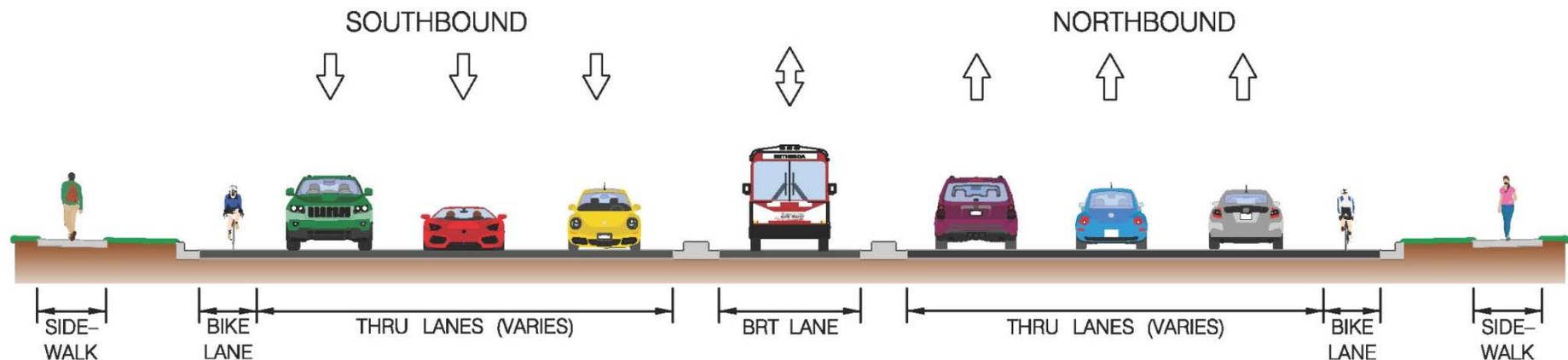
* A lane that is converted from an existing use to use by buses or other transit vehicles. Existing uses can include: travel lanes, parking, shoulder, etc.

BRT Running Way Options

Option 4 – Bi-directional, Dedicated BRT Lane

- Would provide new BRT service in addition to the existing local bus service
- Buses in bi-directional lanes would stop at new BRT stations
- In a bi-directional system BRT buses share a single lane that will have passing zones to maintain operation
- Bi-directional lanes could be implemented in the median or curb lane via an additional lane or repurposing of an existing travel lane

Type A: Additional lane is included to accommodate the dedicated BRT lane



Bi-Directional Lane – Eugene, Oregon



Bi-Directional Lane – Eugene, Oregon

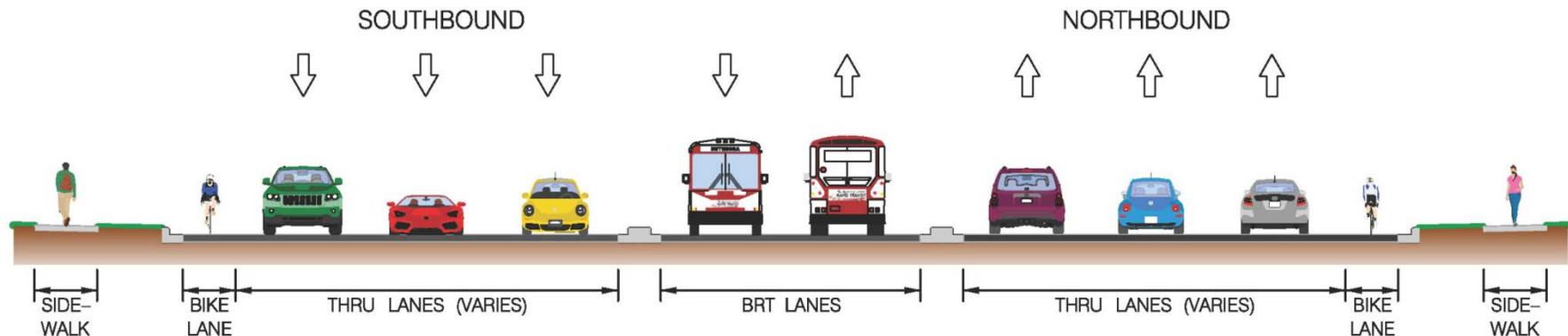


BRT Running Way Options

Option 5 – Dedicated Median BRT Lanes

- Would provide new BRT service in addition to the existing bus service
- BRT would operate in dedicated lanes located in the median with new stations and implemented via additional lanes or repurposing of existing travel lane(s)

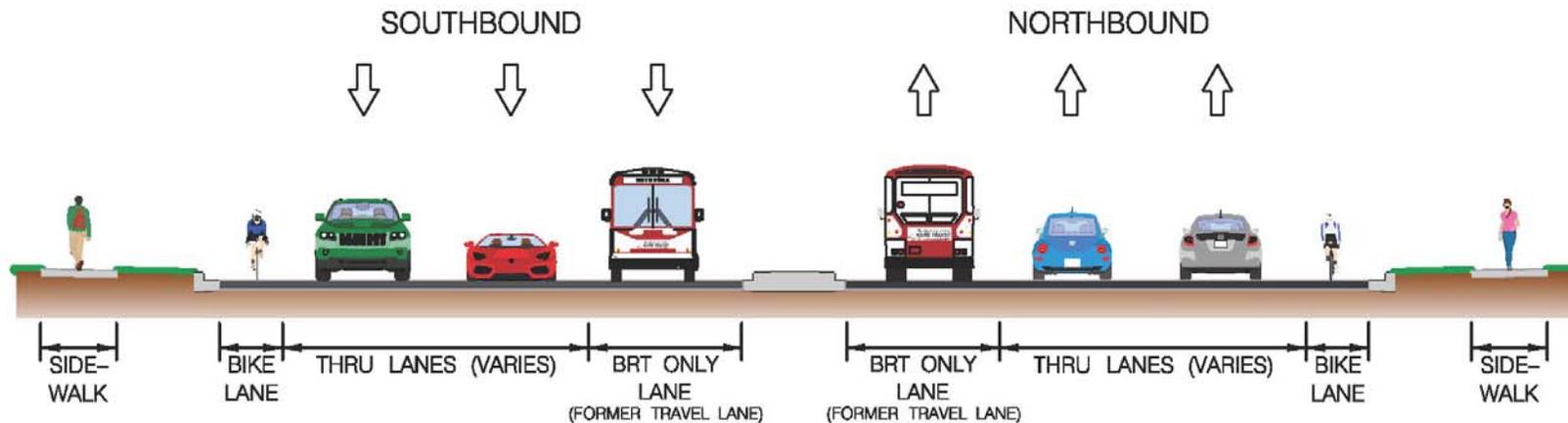
Type A: Additional lanes are included to accommodate the dedicated BRT lanes



BRT Running Way Options

Option 5 – Dedicated Median BRT Lanes

Type B: Existing travel lanes are repurposed* to accommodate the dedicated BRT lanes



* A lane that is converted from an existing use to use by buses or other transit vehicles. Existing uses can include: travel lanes, parking, shoulder, etc.

Dedicated Median BRT Lanes

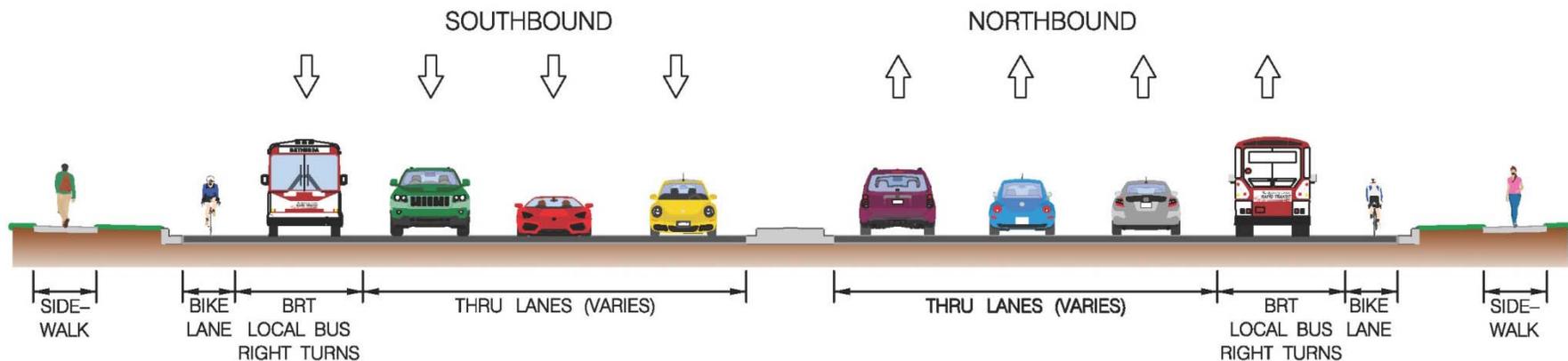


BRT Running Way Options

Option 6 – Dedicated Curb BRT Lanes

- Would provide new BRT service in addition to the existing local bus services
- BRT would operate in dedicated lanes located curbside with new stations and implemented via additional lanes or repurposing of existing travel lane(s)
- The curbside lane could be shared with existing bus services, vehicles making right turns, and those merging to and from MD 355

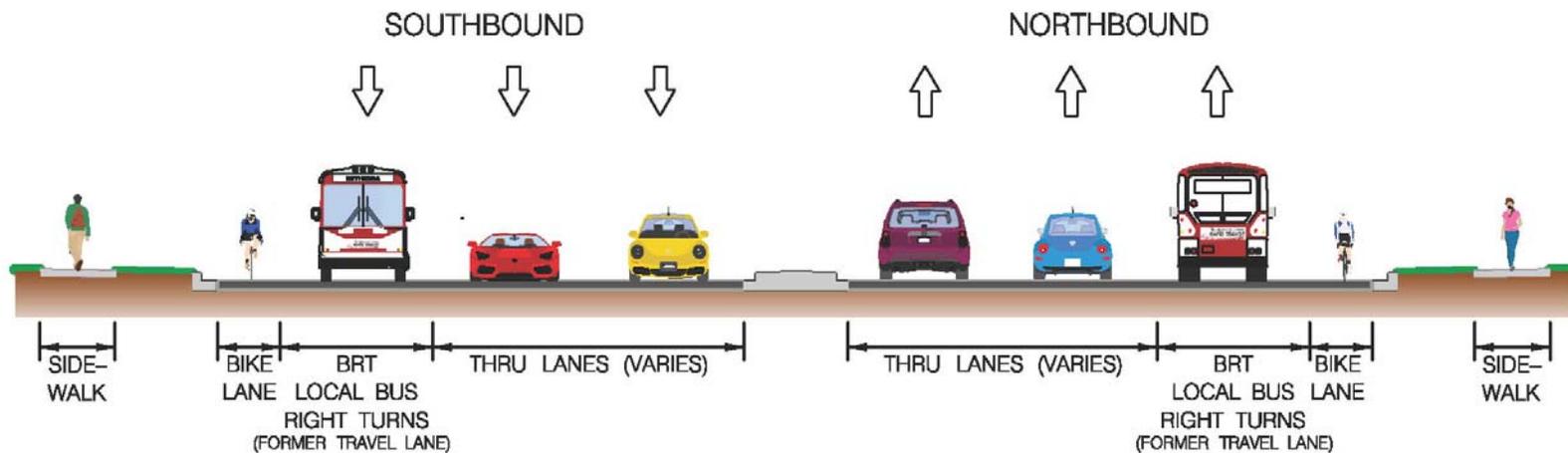
Type A: Additional lanes are included to accommodate the dedicated BRT lanes



BRT Running Way Options

Option 6 – Dedicated Curb BRT Lanes

Type B: Existing travel lanes are repurposed* to accommodate the dedicated BRT lanes



* A lane that is converted from an existing use to use by buses or other transit vehicles. Existing uses can include: travel lanes, parking, shoulder, etc.

Dedicated Curb BRT Lanes



BRT Running Way Options

Summary of Options

- Option 1 – BRT in Mixed Traffic
- Option 2 – BRT Queue Jump Lanes
- Option 3* – One-Way, Reversible, Dedicated BRT Lane
- Option 4* – Bi-directional, Dedicated BRT Lane
- Option 5* – Dedicated BRT Median Lanes
- Option 6* – Dedicated BRT Curb Lanes

* Types Vary – Could be achieved through additional lane(s) or lane repurposing

Questions



CAC Meeting No. 3 Agenda

Topics to be discussed:

- Project Update
- Transit Ridership
- Traffic Operations
- Draft Project Purpose and Need Language
- BRT Running Way Options
- Future Meetings & Questions

Future Meeting Schedule

- Next CAC Meeting: To Be Determined
- Informational Open House Meetings: Fall 2015

Questions

