



Montgomery County Department of Transportation

MD 355 / Rockville Pike Crossing Project

November 23, 2010

Purpose of the Project

The purpose of the project is to:

- Enhance / improve access to mass transit facilities
- Improve the mobility and safety of pedestrians and bicyclists crossing MD 355 / Rockville Pike and improve traffic operations at the intersection of South Wood Road / South Drive / MD 355



Project Goals and Objectives

Primary Goals:

- Improve pedestrian mobility between NNMC, NIH, and Medical Center Metrorail Station facilities through improved crossing of MD 355
- Improve pedestrian safety within the project area by minimizing conflicts with vehicular traffic
- Improve traffic operations to and from NNMC and NIH / Medical Center Metrorail Station at the MD 355 / South Wood Road / South Drive intersection



Project Goals and Objectives

Secondary Goals:

- Promote alternative modes of transportation such as rail, bus, car / vanpool, pedestrian, and bicycle commuting
- Improve efficiency with which emergency and transit vehicles move between the NIH and NNMC campuses



Alternatives Retained for Detailed Study

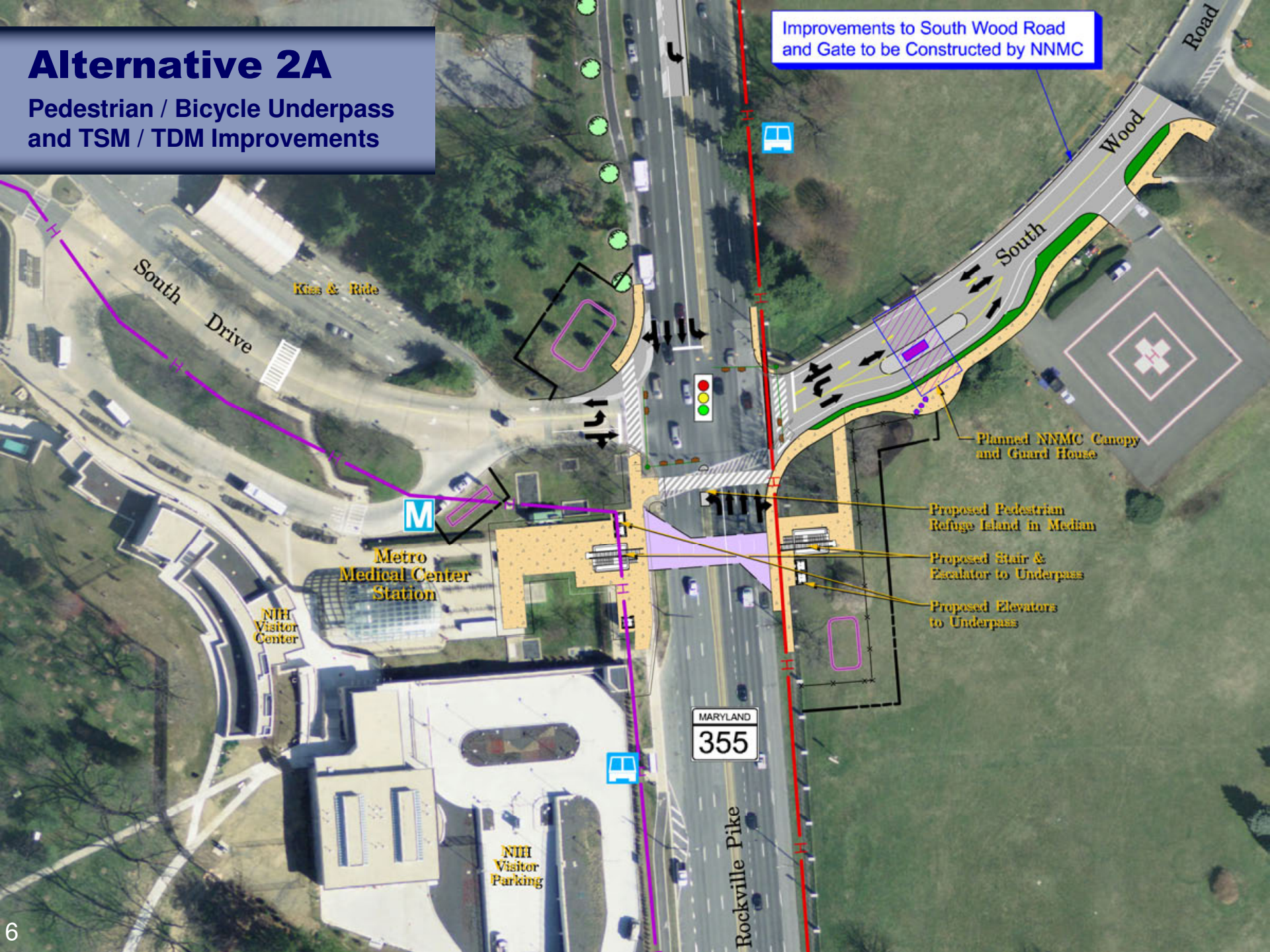
- Alternative 1 – No-Build
- Alternative 2A – Pedestrian / Bicycle Underpass with At-Grade TSM Improvements
- Alternative 2B – Pedestrian / Bicycle Underpass and Deep Elevators with At-Grade TSM Improvements
- Alternative 3 – Grade Separation of MD 355 Under South Wood Road / South Drive



Alternative 2A

Pedestrian / Bicycle Underpass
and TSM / TDM Improvements

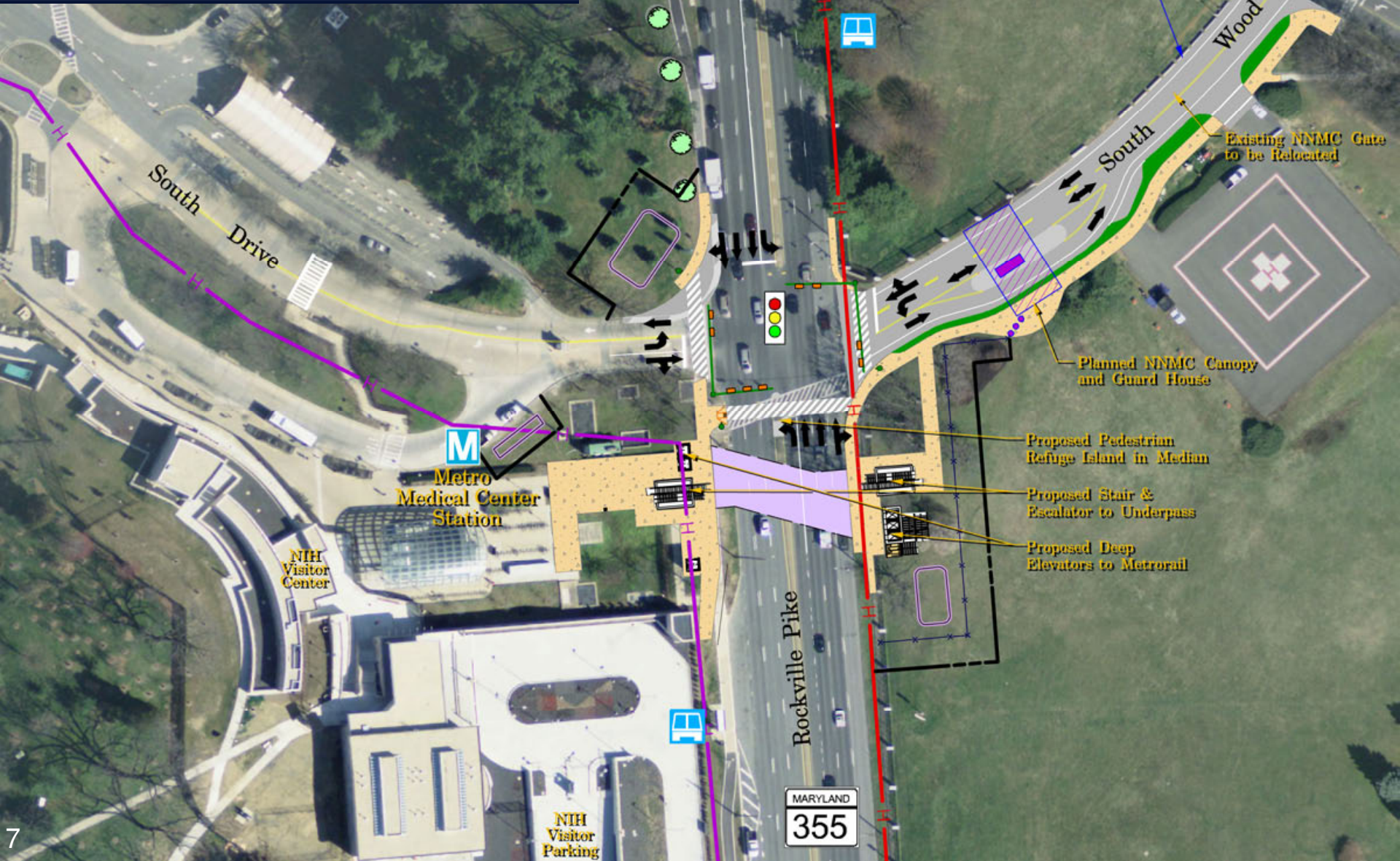
Improvements to South Wood Road
and Gate to be Constructed by NNMC



Alternative 2B

Pedestrian / Bicycle Underpass, Deep Elevators and TSM / TDM Improvements

Improvements to South Wood Road and Gate to be Constructed by NNMC



Existing NNMC Gate to be Relocated

Planned NNMC Canopy and Guard House

Proposed Pedestrian Refuge Island in Median

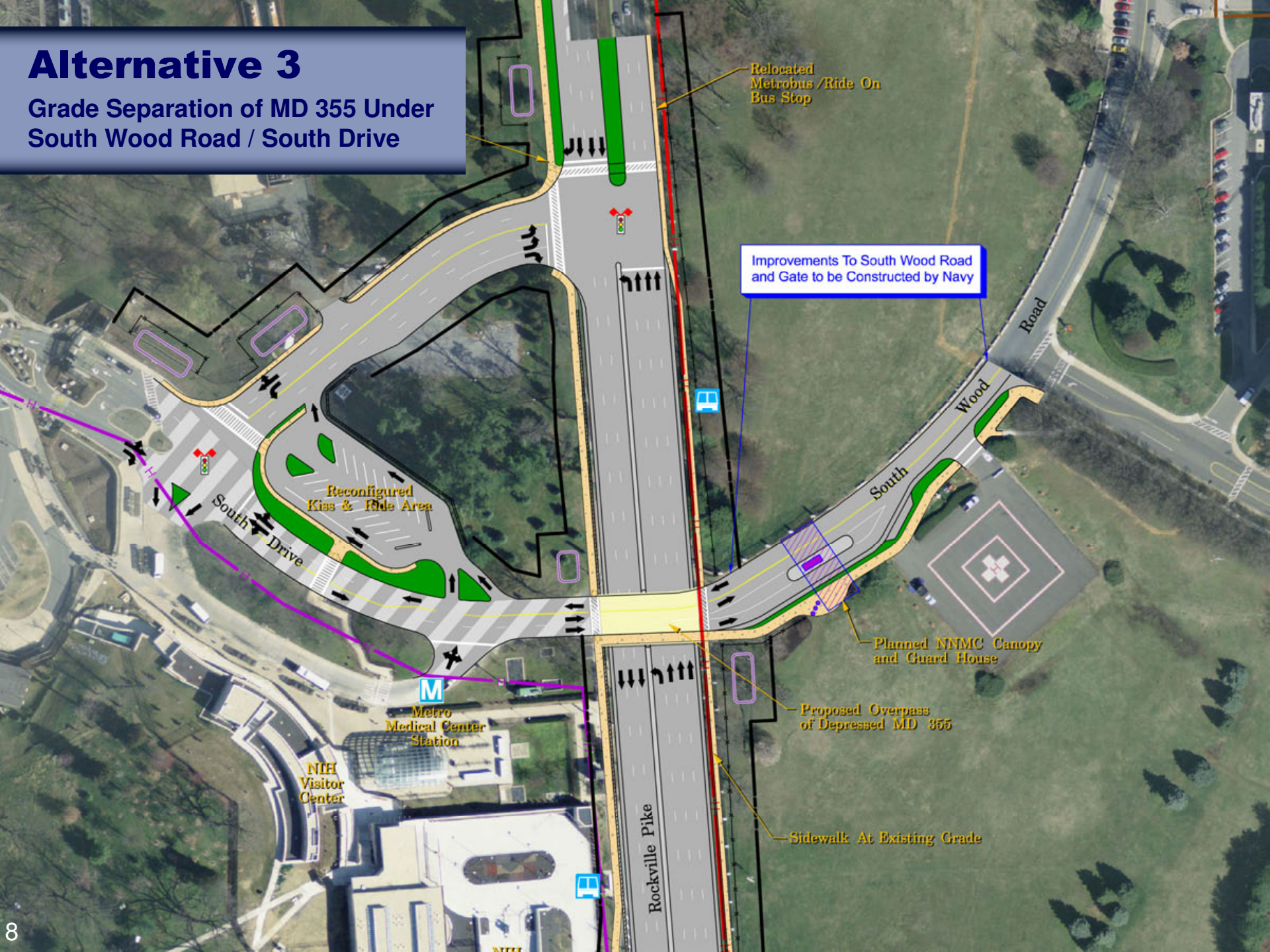
Proposed Stair & Escalator to Underpass

Proposed Deep Elevators to Metrorail

Rockville Pike
MARYLAND
355

Alternative 3

Grade Separation of MD 355 Under South Wood Road / South Drive



Relocated Metrobus/Ride On Bus Stop

Improvements To South Wood Road and Gate to be Constructed by Navy

Reconfigured Kiss & Ride Area

Planned NIMC Canopy and Guard House

Proposed Overpass of Depressed MD 355

Sidewalk At Existing Grade

Metro Medical Center Station

NIH Visitor Center

Rockville Pike

South Wood Road

South Drive

Alternatives Comparison

Evaluation Criteria	No-Build	Alternative 2A	Alternative 2B	Alternative 3
Primary Goals				
Pedestrian / Bicyclist Efficiency: The average pedestrian travel time would be reduced.				
Pedestrian / Bicyclist Safety: Pedestrian/bicyclist and vehicle conflicts would be reduced.				
Traffic Operations: Vehicular delay at the MD 355/South Drive/South Wood Road intersection would be reduced.				
Traffic Operations: Delay would be reduced in the MD 355 corridor from Jones Bridge Road to Cedar Lane.				
Bus Operations: Travel times would decrease for buses.				
Emergency Vehicle Operations: Travel times would decrease for emergency vehicles.				
Impacts and Costs				
Adjacent Projects: Reconstruction of nearby projects would not be required.				
NNMC Gate: NNMC gate processing delays would be accommodated.				
Construction Impacts: Construction would be accommodated with minimal impacts.				
Natural Environment: Impacts to the natural environment would be minimized.				
Cultural Resources: Impacts to cultural resources would be minimized.				
Cost: Estimated total cost				
Secondary Goals				
Alternative modes of travel would be more attractive to travelers.				
Emergency vehicle and bus travel between NIH and NNMC would be more efficient.				

Legend				
● Poor	◐ Fair	○ Good	● Very Good	● Excellent

Primary Goals



MD 355 / Rockville Pike Crossing Project

Efficiency of Pedestrian and Bicycle Movements



MD 355 / Rockville Pike Crossing Project

Efficiency of Pedestrian and Bicycle Movements Summary

Alternative 2A

- Decreases travel time for underpass users (68% of 7,530 total users) by 34 seconds
- Total travel time saved = 48.4 hours per day compared to the No-Build (11% improvement)
- Improves access to/from mass transit facility

Alternative 2B

- Improves travel time for underpass and deep elevator users
- Decreases travel time for Metrorail users (78% of 7,530) by over 2 minutes (139 seconds)
- Total travel time saved = 237.4 hours per day compared to the No-Build (52% improvement)
- Provides the shortest average travel time (deep elevator route)
- Improves access to/from mass transit facility

Alternative 3

- Decreases travel time for overpass (all) users (100% of 7,530) by 68 seconds
- Total travel time saved = 142.2 hours per day compared to the No-Build (31% improvement)
- Improves access to/from mass transit facility
- Improves travel time for non-Metro pedestrians crossing MD 355



Efficiency of Pedestrian and Bicycle Movements

- Travel times were calculated based on time spent walking, waiting at a traffic signal, or riding an escalator / elevator
- Field investigations established the existing pedestrian travel times
- Estimates for crosswalk versus underpass usage are based on pedestrian count data collected at the White Flint Metrorail Station
- Estimates for deep elevators versus crosswalk or underpass usage are based on the number of pedestrians destined for NNMC that will be expected to arrive via Metrorail

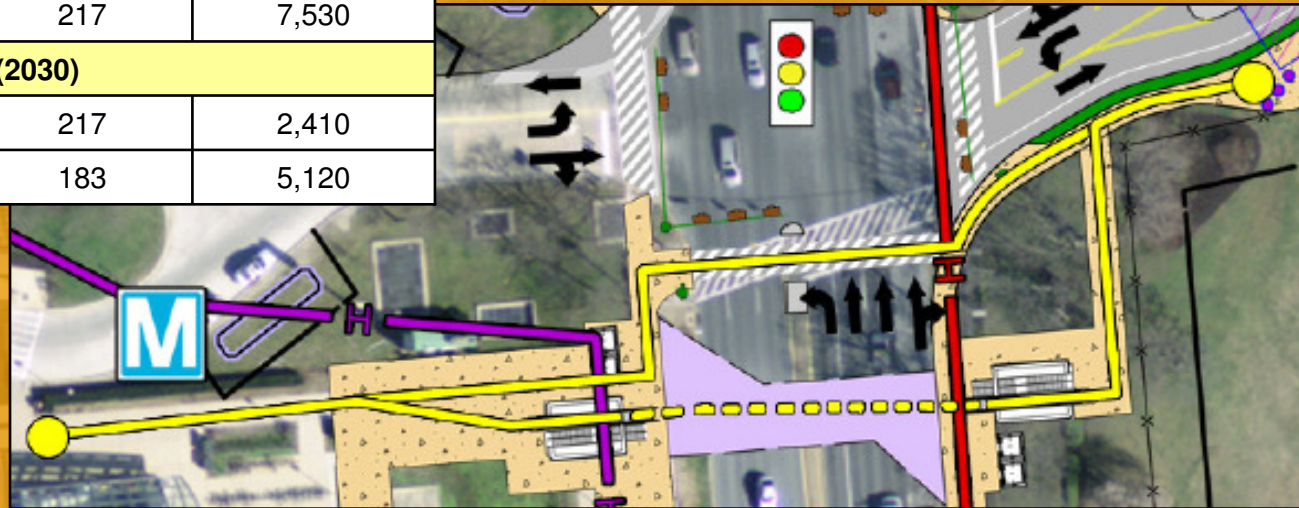


Efficiency of Pedestrian and Bicycle Movements – Results

Alternative 2A

Projected Pedestrian Volumes

Path of Choice	Total Distance Traveled (feet)	Average Travel Time (sec / person)	Number of Pedestrians / Bicyclists Per Day
2030 No Build			
Crosswalk Route	495	217	7,530
Alternative 2A (2030)			
Crosswalk Route	495	217	2,410
Underpass Route	430	183	5,120



Efficiency of Pedestrian and Bicycle Movements – Results

Alternative 2B

Projected Pedestrian Volumes

Path of Choice	Total Distance Traveled (feet)	Average Travel Time (sec / person)	Number of Pedestrians / Bicyclists Per Day
2030 No Build			
Crosswalk Route	495	217	7,530
Alternative 2B (2030)			
Crosswalk Route	495	217	530
Underpass Route	430	183	1,127
Deep Elevator Route	230	78	5,873

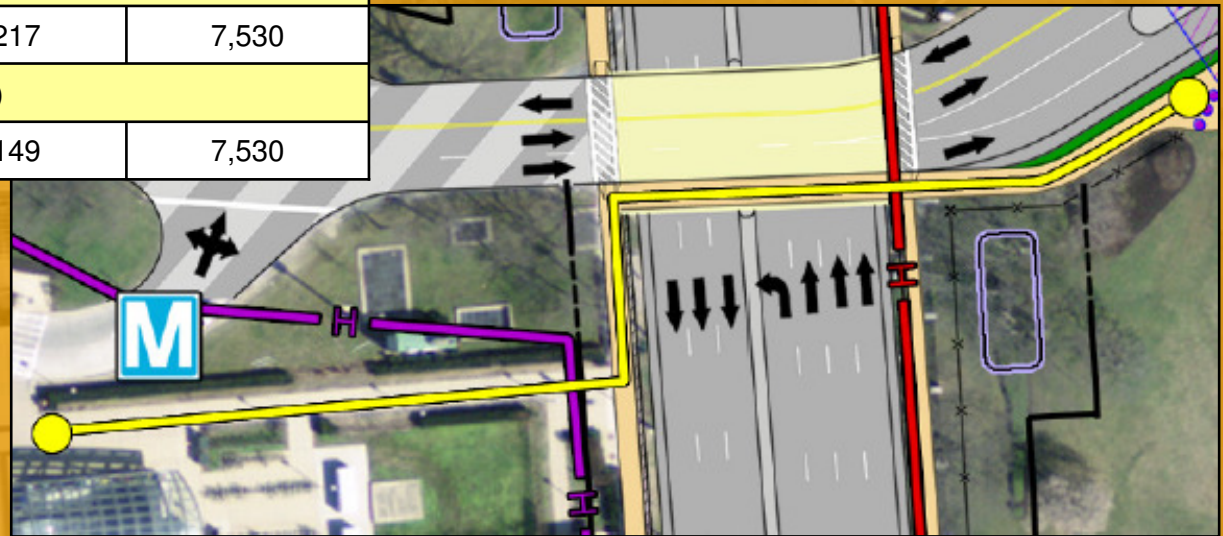


Efficiency of Pedestrian and Bicycle Movements – Results

Alternative 3

Projected Pedestrian Volumes

Path of Choice	Total Distance Traveled (feet)	Average Travel Time (sec / person)	Number of Pedestrians / Bicyclists Per Day
2030 No Build			
Crosswalk Route	495	217	7,530
Alternative 3 (2030)			
Overpass Route	520	149	7,530



Pedestrian / Bicyclist Safety



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Pedestrian / Bicyclist Safety Summary

Alternatives 2A and 2B

- Decreases pedestrian crossing volumes for those using at-grade crosswalk
- Provides opportunity for 100% avoidance of pedestrian/vehicular conflicts
- Reduces number of conflicts between pedestrians and vehicles at the intersection
- Maintains some conflicts with vehicles and wait times for remaining at-grade crossing users (could be safer if at-grade crossing was eliminated)
- Increases safety for underpass and deep elevator users
- Includes additional safety measures such as lighting, video surveillance, and emergency call boxes in the underpass

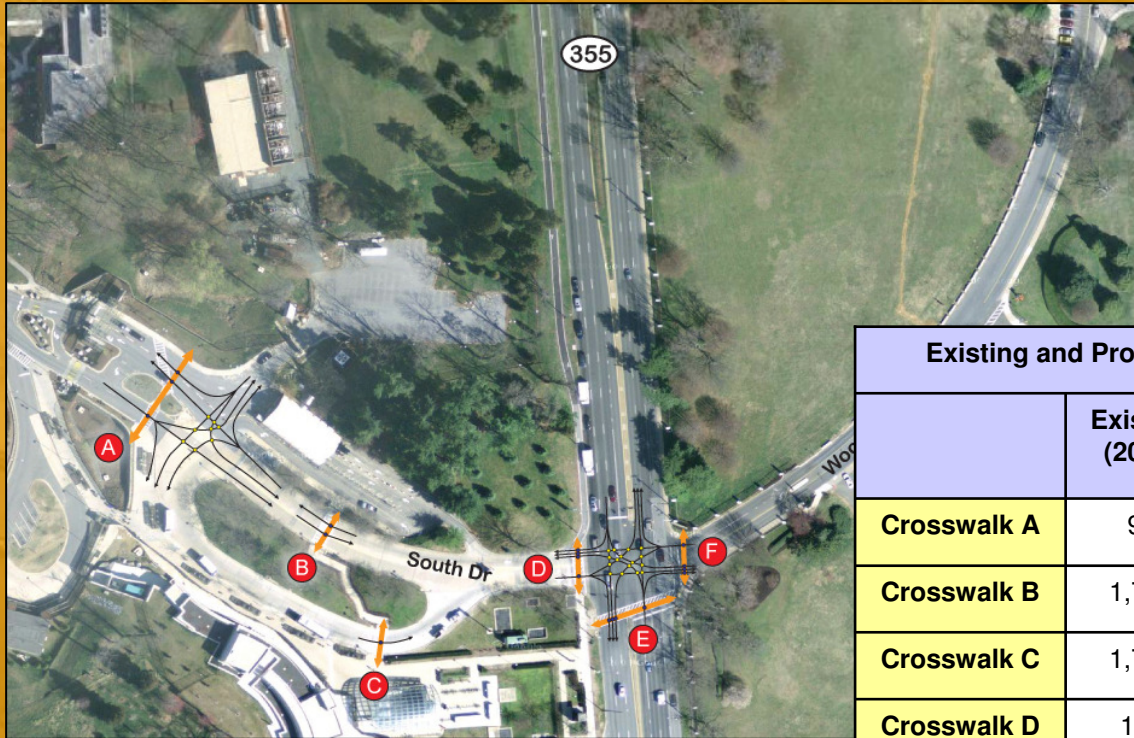
Alternative 3

- Provides opportunity for 100% avoidance of pedestrian/vehicular conflicts
- Completely eliminates conflict points for pedestrians crossing MD 355 at South Wood Road / South Drive
- Creates new crosswalks at each end of the proposed jug handle
- Increases safety for pedestrians crossing South Wood Road / South Drive over MD 355



Pedestrian / Bicyclist Safety - Results

Alternatives 2A and 2B

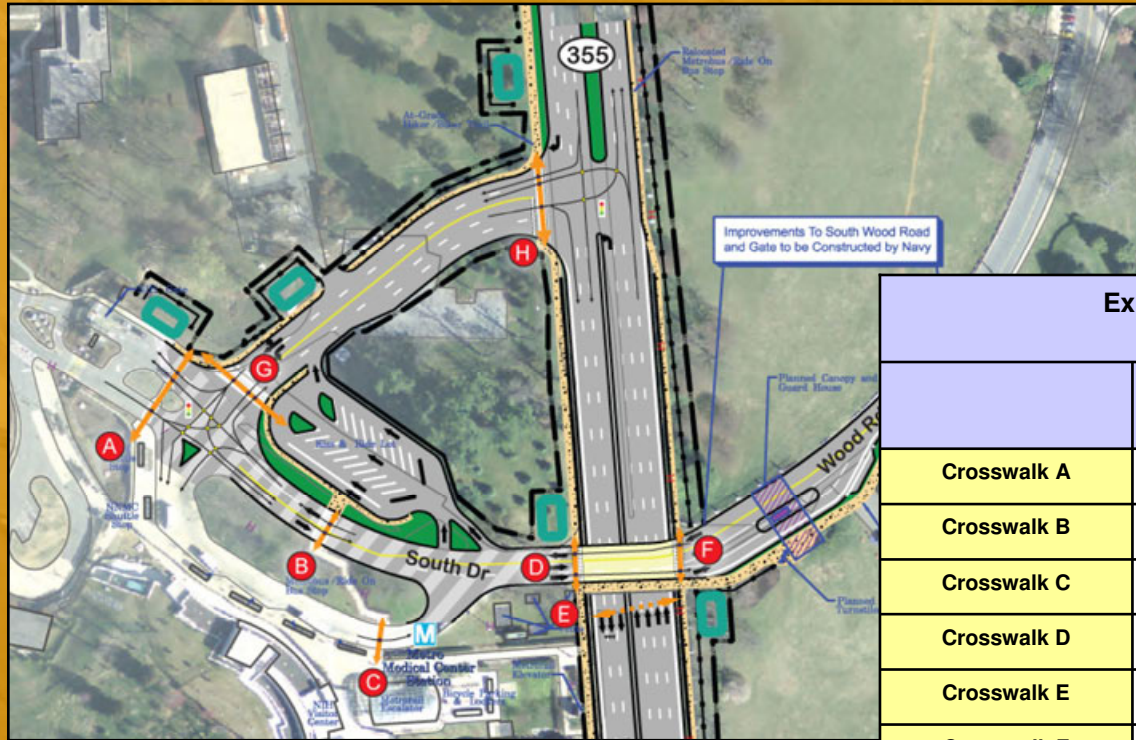


Existing and Proposed Pedestrian Volumes (Daily Peak Period Total)				
	Existing (2010)	No Build (2030)	Alternative 2A (2030)	Alternative 2B (2030)
Crosswalk A	90	125	125	125
Crosswalk B	1,730	2,395	2,395	2,395
Crosswalk C	1,730	2,395	2,395	2,395
Crosswalk D	160	220	220	220
Crosswalk E	2,440	7,530	2,410	530
Crosswalk F	460	640	640	640



Pedestrian / Bicyclist Safety - Results

Alternative 3



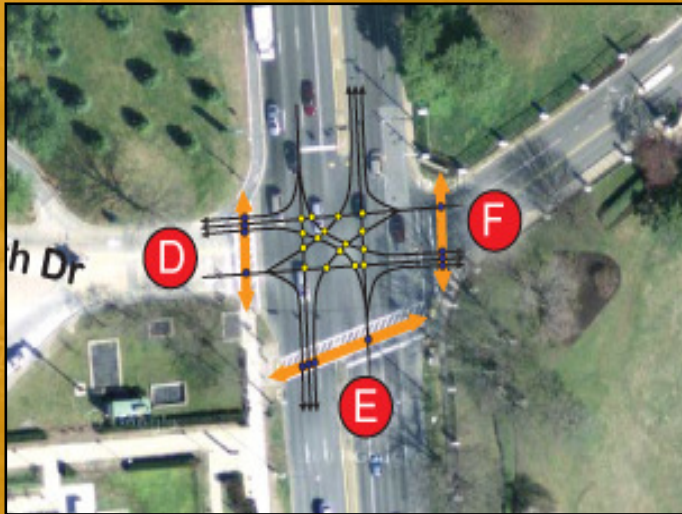
Existing and Proposed Pedestrian Volumes
(Daily Peak Period Total)

	Existing (2010)	No Build (2030)	Alternative 3 (2030)
Crosswalk A	90	125	125
Crosswalk B	1,730	2,395	2,395
Crosswalk C	1,730	2,395	2,395
Crosswalk D	160	220	220
Crosswalk E	2,440	7,530	0
Crosswalk F	460	640	640
Crosswalk G	0	0	125
Crosswalk H	0	0	220

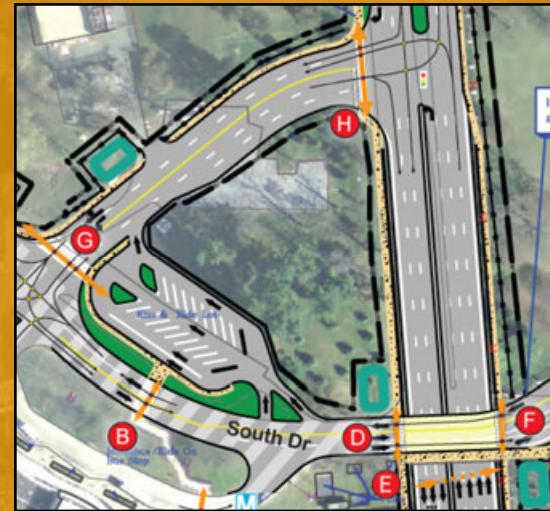


Pedestrian / Bicyclist Safety - Results

Alternatives 2A and 2B



Alternative 3



Existing and Proposed Pedestrian Volumes (Daily Peak Period Total)					
	Existing (2010)	No Build (2030)	Alternative 2A (2030)	Alternative 2B (2030)	Alternative 3 (2030)
Crosswalk E	2,440	7,530	2,410	530	0



Traffic Operations



MD 355 / Rockville Pike Crossing Project

Traffic Operations Summary

Alternatives 2A & 2B

- Minor capacity enhancements provide a slight improvement over No-Build delay conditions
- Reducing the number of pedestrians crossing MD 355 at-grade would reduce intersection delay during the AM peak
- At-grade pedestrian crossings would prevent the optimal signal timing enhancements needed to improve overall LOS
- Overall peak hour network delays will be slightly higher than the No-Build condition



Traffic Operations Summary

Alternative 3

- LOS and delay for both AM and PM peak periods will improve compared to 2030 No-Build and Alternatives 2A and 2B
- Improving South Wood Road / South Drive traffic operations may impact the network and nearby cross streets.
- Congestion and associated operational issues would be “redistributed,” providing relief for some movements, but potentially worsening others.
- Overall peak hour network delays are projected to increase approximately 10 percent due to the redistribution of traffic patterns.



Traffic Operations

- Inventoried 2010 conditions (existing travel times, queues, and volumes) and forecasted data for the 2030 conditions for this study
- Developed Synchro and SimTraffic simulation models to determine the level of service (LOS) and network delay
- Analyzed operational trends of average travel time and delay experienced by the overall network, the intersection, and individual intersection approaches



Traffic Operations – Intersection Delay – Results

Synchro Analysis - LOS and Delay at MD 355 / South Wood Road / South Drive

- Intersection data was isolated, without influence of queues or delays from other intersections
- Delay is the average amount of time during a trip in which the vehicle is not moving (i.e. waiting at a signal or in a queue)

Condition	AM Peak Hour		PM Peak Hour		
	LOS	Delay	LOS	Delay	
Existing Conditions (Existing Signal Location)	C	31 s/veh	F	122 s/veh	
2030 No-Build* (Existing Signal Location)	D	37 s/veh	F	137 s/veh	
Alternatives 2A and 2B – Existing Signal Location					
Alts. 2A & 2B – with Pedestrian Underpass / Elevators	D	36 s/veh	F	137 s/veh	
Alternative 3 – Relocated and New Signal Locations					
Alt. 3 – Grade Separated Improvements	On MD 355 (relocated signal)	C	20 s/veh	C	25 s/veh
	On South Drive (new signal)	B	16 s/veh	B	17 s/veh

*Analysis assumes NNMC Gate reconfiguration project complete

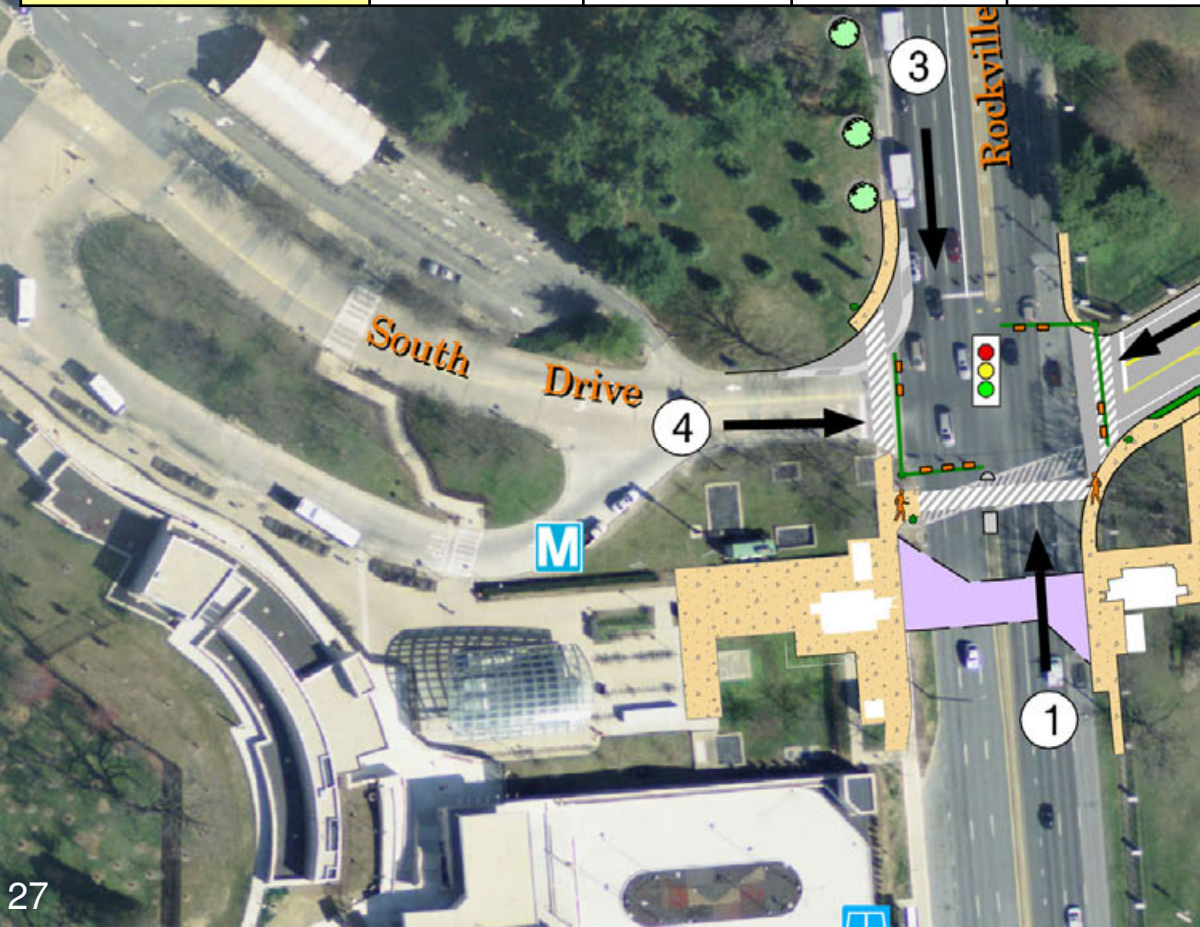


Alternative 2A & 2B Intersection Approach Delay
(SimTraffic Analysis)

Alternative 2A & 2B

2030 Traffic Operations Analysis

Approach	No Build Delay (s/veh)		Build Delay (s/veh)	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
① MD 355 NB	25	97	24	105
② S. Wood Road WB	67	> 360	78	> 360
③ MD 355 SB	21	64	19	71
④ South Drive EB	105	> 360	220	> 360



- Changes at one intersection affect the overall network; therefore small changes in the distribution of traffic has a big effect on delays experienced by individual vehicles
- Delay represents trends in the network, not actual conditions
- Delay > 360 represent vehicles waiting more than 2 cycle lengths

Alternative 3

2030 Traffic Operations Analysis



- Changes at one intersection affect the overall network, therefore small changes in the distribution of traffic has a big effect on delays experienced by individual vehicles
- Delay represents trends in the network, not actual conditions
- Delay > 360 represent vehicles waiting more than 2 cycle lengths

Alternative 3 Intersection Approach Delay (SimTraffic Analysis)				
Approach	No Build Delay (s/veh)		Build Delay (s/veh)	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
① MD 355 NB	-	-	189	231
② MD 355 SB	-	-	20	40
③ Jug Handle EB	-	-	51	> 360
④ Jug Handle WB	-	-	5	8
⑤ South Drive WB	-	-	7	> 360
⑥ South Drive EB	-	-	29	> 360
⑦ MD 355 NB	25	96	-	-
⑧ S. Wood Road WB	67	> 360	-	-
⑨ MD 355 SB	20	64	-	-
⑩ South Drive EB	104	> 360	-	-

Traffic Operations – Network Delay – Results

SimTraffic Analysis – Network Delay for Jones Bridge Road to Cedar Lane

- Data shows continued network delays for the corridor (MD 355 from south of Jones Bridge Road to north of Cedar Lane), including the cross street approaches
- Alternative 3 network delay is higher due to:
 - 1) Shorter queuing areas between the relocated signal on MD 355 and Wilson Drive
 - 2) Proposed signal on South Drive

Percent Increase in Peak Hour Network Delay		
Condition	AM Peak Hour	PM Peak Hour
2030 No-Build Conditions*	N / A	N / A
Alternatives 2A and 2B		
Alternatives 2A & 2B – with Pedestrian Underpass / Elevators	2%	1%
Alternative 3		
Alternative 3 – Grade Separated Improvements	11%	10%

* Analysis assumes NNMC Gate reconfiguration project complete.



Compatibility with Bus Operations



MD 355 / Rockville Pike Crossing Project

Compatibility with Bus Operations Summary

Alternative 2A / 2B

- Shuttle routes remain the same as the No-Build condition
- Trips from the north experience slightly higher travel times compared to No-Build
- Trips from the south experience slightly lower travel times compared to No-Build
- East/west trips experience slightly lower travel times compared to No-Build except for the PM period

Alternative 3

- Routes to and from Medical Center Metro Station are different from No-Build
- Reduction in travel time for buses is due to the removal of pedestrian and bicycle movements
- Trips from the north experience shorter travel time compared to No-Build
- Trips from the south experience longer travel time compared to No-Build
- East/west trips experience significant decreases in travel times compared to No-Build except for PM congestion from the east



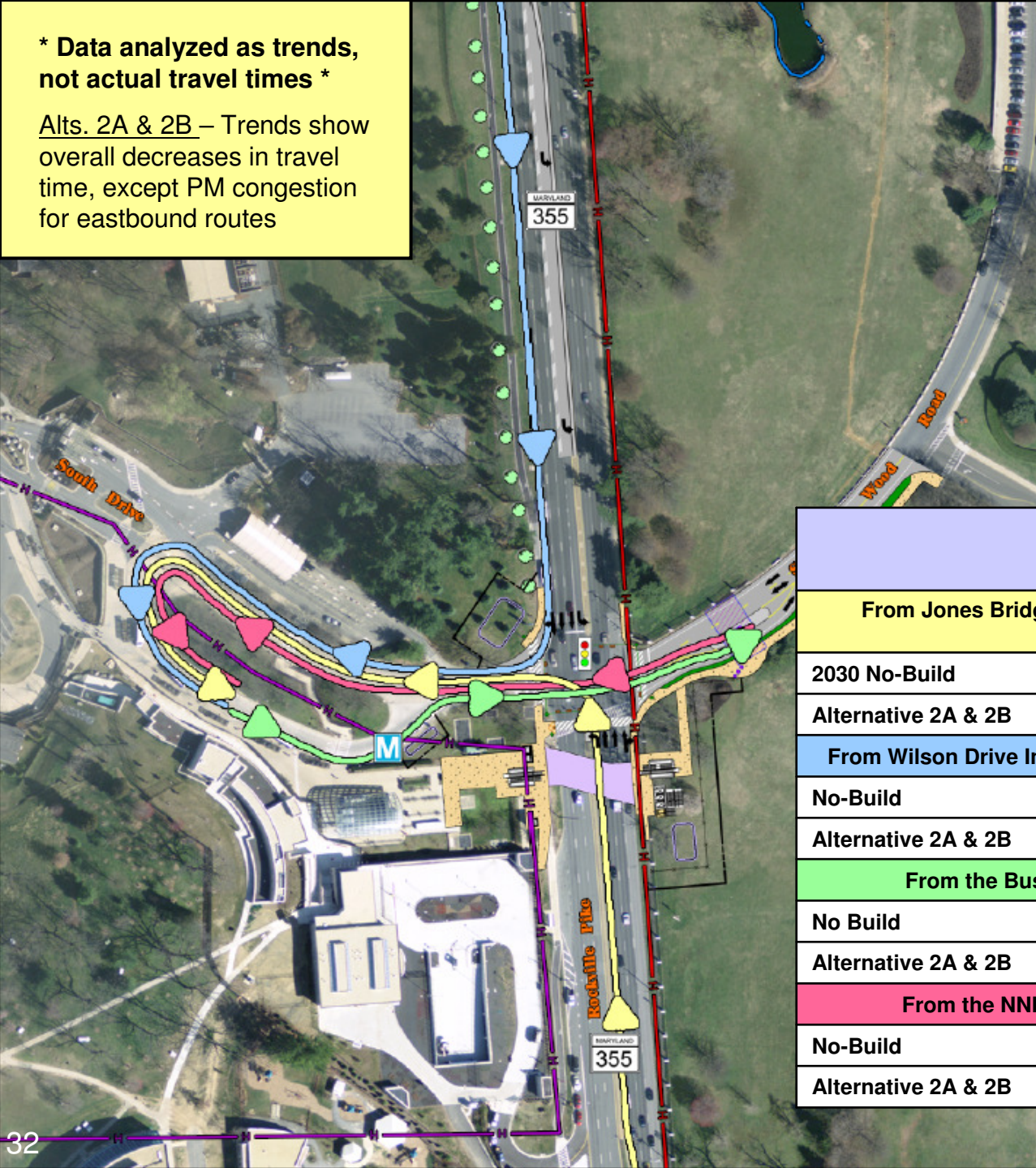


*** Data analyzed as trends, not actual travel times ***

Alts. 2A & 2B – Trends show overall decreases in travel time, except PM congestion for eastbound routes

Compatibility with Bus Operations

Alternative 2A / 2B



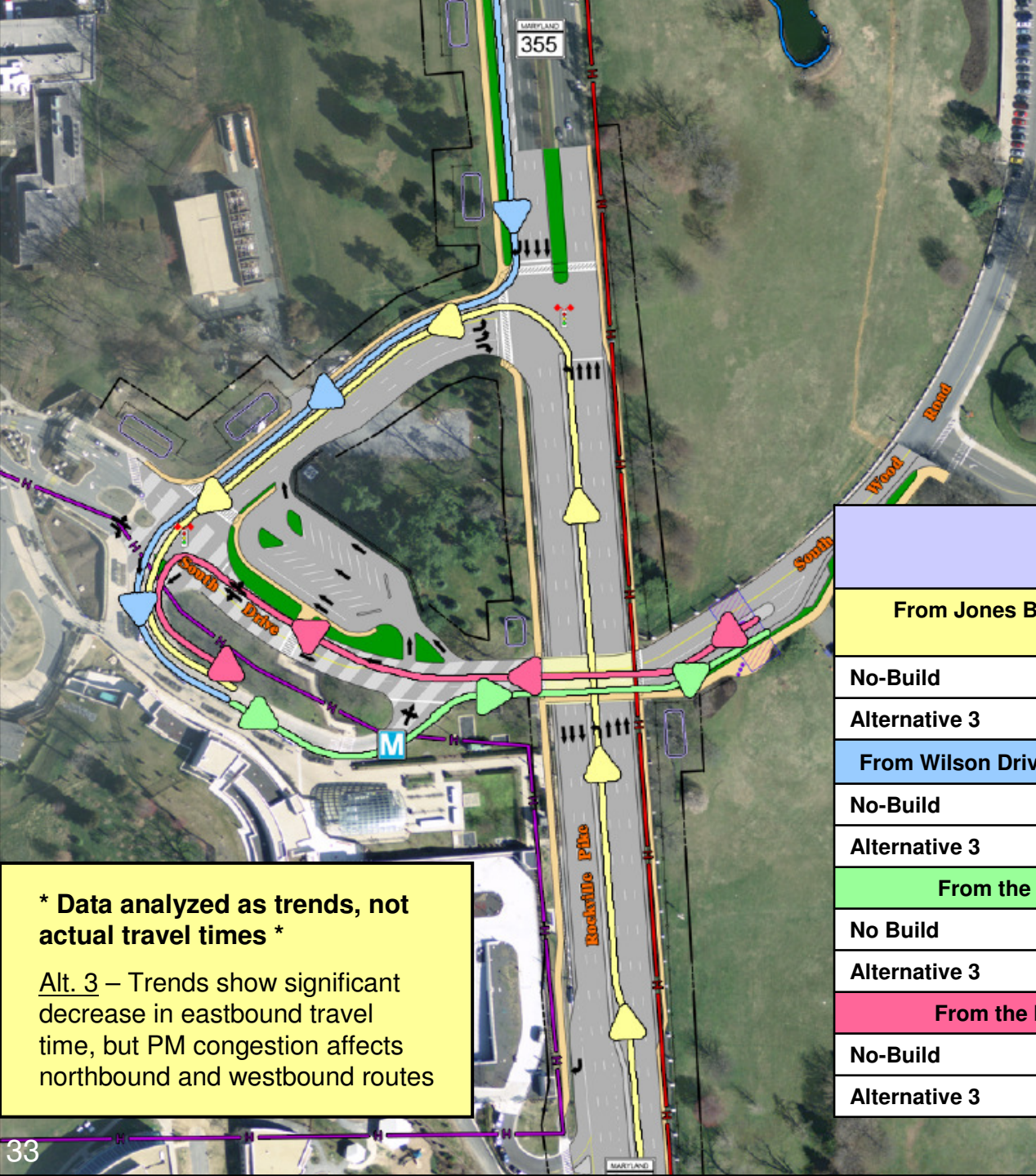
	Average Travel Time (s)	
	AM Peak Hour	PM Peak Hour
From Jones Bridge Road Intersection to the Metro Station – Northbound		
2030 No-Build	97	94
Alternative 2A & 2B	83	93
From Wilson Drive Intersection to the Metro Station – Southbound		
No-Build	57	56
Alternative 2A & 2B	60	65
From the Bus Loop to the NNMC Gate – Eastbound		
No Build	133	> 300
Alternative 2A & 2B	99	> 300
From the NNMC Gate to the Bus Loop – Westbound		
No-Build	87	> 300
Alternative 2A & 2B	69	> 300

* Travel times above 300 seconds represent extreme congestion



Compatibility with Bus Operations

Alternative 3



	Average Travel Time (s)	
	AM Peak Hour	PM Peak Hour
From Jones Bridge Road Intersection to the Metro Station – Northbound		
No-Build	97	94
Alternative 3	82	136
From Wilson Drive Intersection to the Metro Station – Southbound		
No-Build	57	56
Alternative 3	51	49
From the Bus Loop to the NNMC Gate – Eastbound		
No Build	133	> 300
Alternative 3	26	25
From the NNMC Gate to the Bus Loop – Westbound		
No-Build	87	> 300
Alternative 3	55	> 300

*** Data analyzed as trends, not actual travel times ***

Alt. 3 – Trends show significant decrease in eastbound travel time, but PM congestion affects northbound and westbound routes

* Travel times above 300 seconds represent extreme congestion

Emergency Vehicle Operations



MD 355 / Rockville Pike Crossing Project

Emergency Vehicle Operations Summary

Alternatives 2A and 2B

- Routes and travel times same as No-Build

Alternative 3

- Decreases travel time from the north
- Increases travel time from the south



Emergency Vehicle Operations

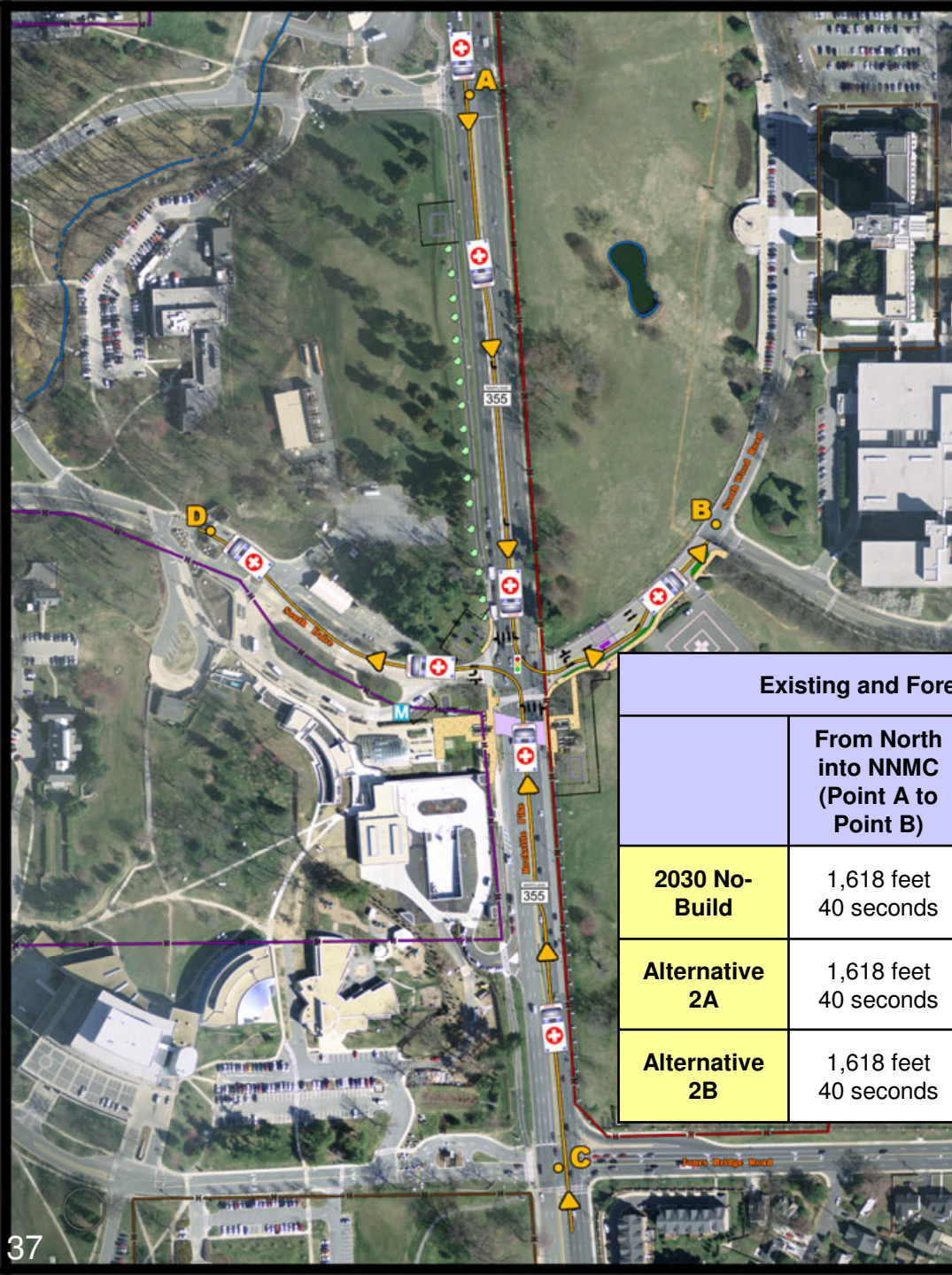
- **Emergency vehicle route operations analyzed from north and south of the intersection and between NNMC and NIH**
 - Point A: MD 355 / Wilson Drive intersection
 - Point B: South Wood Road / South Palmer Road intersection (NNMC)
 - Point C: MD 355 / Jones Bridge Road intersection
 - Point D: NIH Gate on South Drive
- **Change in distance and travel time for each route was analyzed**
 - Traffic signal preemption assumed
- **Assumed Alternatives 2A and 2B would provide the same route for emergency vehicles as the No-Build condition**
- **Assessed the ability to provide direct connection between NIH and NNMC**





Emergency Vehicle Operations - Results

Alternative 2A / 2B



Existing and Forecasted Emergency Vehicle Distance and Travel Time

	From North into NMMC (Point A to Point B)	From North into NIH (Point A to Point D)	From South into NMMC (Point C to Point B)	From South into NIH (Point C to Point D)	From NMMC to NIH (Point B to Point D)
2030 No-Build	1,618 feet 40 seconds	1,728 feet 42 seconds	1,385 feet 34 seconds	1,614 feet 39 seconds	1,130 feet 28 seconds
Alternative 2A	1,618 feet 40 seconds	1,728 feet 42 seconds	1,385 feet 34 seconds	1,614 feet 39 seconds	1,130 feet 28 seconds
Alternative 2B	1,618 feet 40 seconds	1,728 feet 42 seconds	1,385 feet 34 seconds	1,614 feet 39 seconds	1,130 feet 28 seconds



Emergency Vehicle Operations - Results

Alternative 3



Existing and Forecasted Emergency Vehicle Distance and Travel Time

	From North into NNMC (Point A to Point B)	From North into NIH (Point A to Point D)	From South into NNMC (Point C to Point B)	From South into NIH (Point C to Point D)	From NNMC to NIH (Point B to Point D)
2030 No-Build	1,618 feet 40 seconds	1,728 feet 42 seconds	1,385 feet 34 seconds	1,614 feet 39 seconds	1,130 feet 28 seconds
Alternative 3	2,194 feet 48 seconds	1,273 feet 30 seconds	2,910 feet 67 seconds	2,011 feet 50 seconds	1,130 feet 23 seconds

Impacts and Costs



MD 355 / Rockville Pike Crossing Project

Compatibility with Adjacent Projects



MD 355 / Rockville Pike Crossing Project

Compatibility with Adjacent Projects Summary

Coordination with the following project teams will need to continue for the duration of the project:

State Highway Administration Intersection Improvement Projects:

- MD 355 (Rockville Pike) and Cedar Lane
 - **All build alternatives are compatible with the proposed improvements at the intersection**
- MD 355 (Rockville Pike) and Jones Bridge Road
 - **Alternative 2A/2B: Requires minor limited disruptions associated with MOT and temporary reconstruction of the MD 355 median**
 - **Alternative 3: Requires a temporary reconstruction of the channelized right-turn lane proposed by SHA**

Montgomery County Facilities Study:

- Pedestrian / Bicycle and Transit Stop Enhancements
 - **All build alternatives require temporary relocation and reconstruction of pedestrian facilities along the east side of MD 355**



Compatibility with NNMC Proposed Gate Operations



MD 355 / Rockville Pike Crossing Project

Compatibility with NNMC Gate Operations Summary

- Storage provided under existing conditions is insufficient to meet demand
- Storage provided for processing with Alternatives 2A and 2B is insufficient
- Storage provided for processing with Alternative 3 is sufficient
- Alternatives 2A and 2B operate the same as the No-Build when the MD 355/South Wood Road/South Drive intersection is considered in isolation
- Alternative 3 performs better than the No-Build when the new intersections (MD 355/Jug handle and South Drive/Jug handle) are analyzed in isolation
- The network delay is increased with all alternatives compared to No-Build



Compatibility with NNMC Gate Operations – Results

Required Storage Analysis

- Current Gate Location (Existing)
 - Guard house is approximately 285 feet from the MD 355/South Wood Road intersection
 - Single lane approach to guard house in AM and PM peak period
 - Observed traffic queues from the gate to the MD 355/South Wood Road intersection
 - Observed southbound MD 355 left turning vehicles sometimes queuing into the southbound MD 355 through lanes during the AM peak period
- Proposed Gate Location (2030 No-Build)
 - Guard house will be approximately 125 feet from the MD 355/South Wood Road intersection
 - Two lanes approaching guard house in AM peak period only
 - Available queue storage would decrease below the already insufficient approach to the gate
 - Creating two service lanes approaching NNMC gate may present operational issues between southbound left turning and northbound right turning vehicles

Scenario	Gate Location	# of Lanes	Storage Provided (Feet per Lane)	Calculated Storage Required (Feet per Lane)		% of Required Storage Provided	
				All Traffic Using NNMC Gate	SB Lefts Using NNMC Gate	All Traffic Using NNMC Gate	SB Lefts Using NNMC Gate
2010	Existing	1	285	884	639	32	45
	Relocated	2	125	486	351	26	36
2030 No-Build	Relocated	2	125	510	371	25	34



Compatibility with NNMC Gate Operations – Results

Required Storage Analysis

- Proposed Gate Location (Alternatives 2A and 2B)
 - Guard house will be approximately 125 feet from the MD 355/South Wood Road intersection
 - Two lanes approaching guard house in AM peak period only
 - Available queue storage would decrease below the already insufficient approach to the gate
 - Creating two service lanes approaching NNMC gate may present operational issues between southbound left turning and northbound right turning vehicles
- Proposed Gate Location (Alternative 3)
 - Guard house will be approximately 675 feet from the proposed South Drive intersection with the jughandle
 - Two lanes approaching guard house in both AM and PM peak periods
 - Available queue storage approaching the gate would increase
 - Creating two dedicated service lanes approaching NNMC gate does not present additional operational issues

Scenario	Gate Location	# of Lanes	Storage Provided (Feet per Lane)	Calculated Storage Required (Feet per Lane)		% of Required Storage Provided	
				All Traffic Using NNMC Gate	SB Lefts Using NNMC Gate	All Traffic Using NNMC Gate	SB Lefts Using NNMC Gate
2030 No-Build	Relocated	2	125	510	371	25	34
2030 Alts. 2A/2B	Relocated	2	125	510	371	25	34
2030 Alt. 3	Relocated	2	450 *	510	N/A	110	N/A

* After 450 feet with two lanes, one lane is provided for an additional 225 feet



Construction Impacts



MD 355 / Rockville Pike Crossing Project

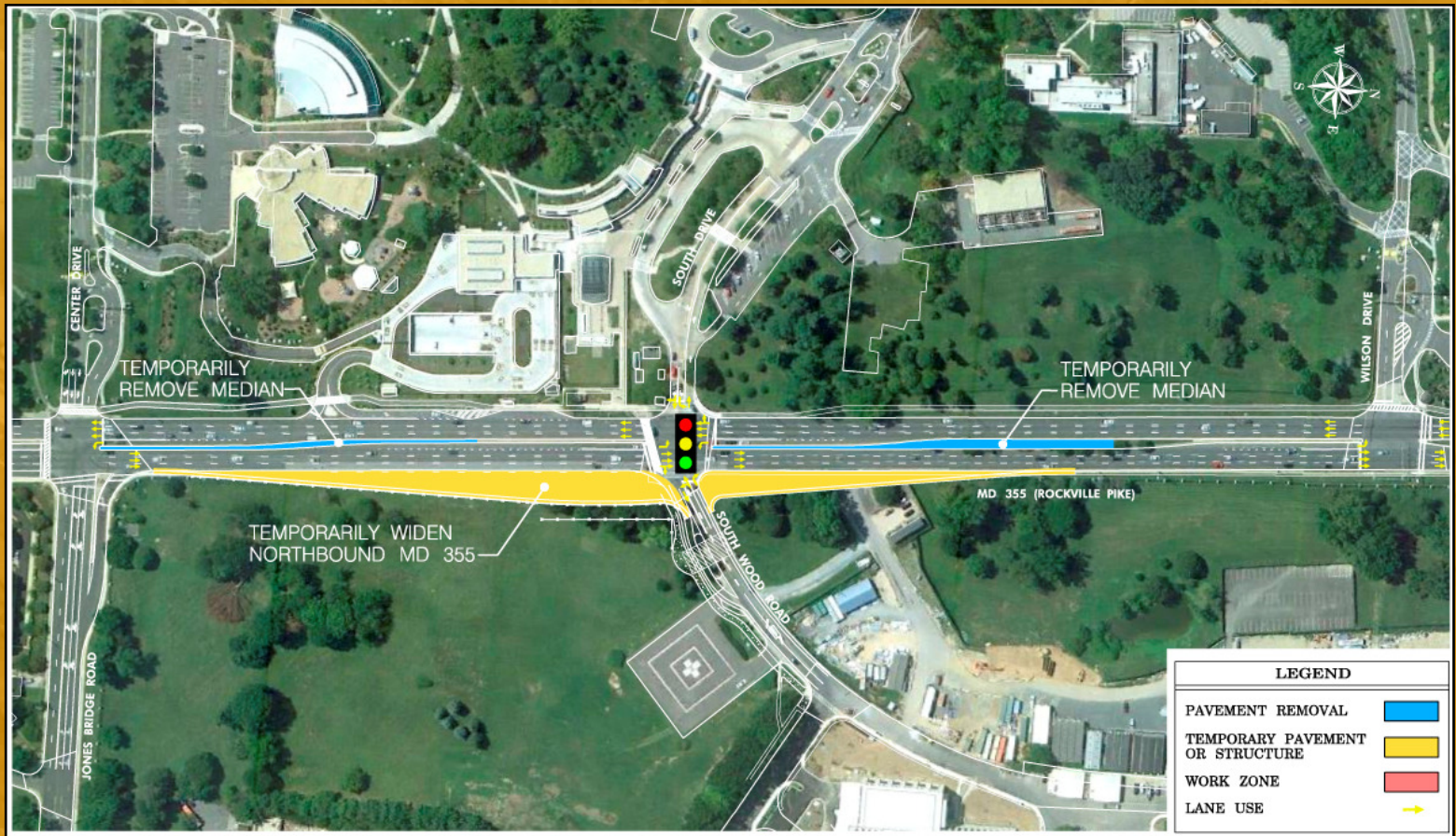
Construction Impacts Summary

Alternatives 2A, 2B, and 3

- All existing travel lanes will be maintained during weekday peak hours on MD 355 (some lane closures during off-peak hours would be necessary)
- Compliance with design requirements (including ADA) will be maintained throughout construction
- Efforts will be made to relocate existing bus stops disturbed during construction
- No gate closures are proposed at any time during any construction phase
- Alternatives 2A and 2B require a smaller construction footprint than Alternative 3
- Alternative 3 will require a temporary bridge to be constructed
- MOT costs range from:
 - \$1-2M (Alternative 2A)
 - \$2-3M (Alternative 2B)
 - \$6-7M (Alternative 3)

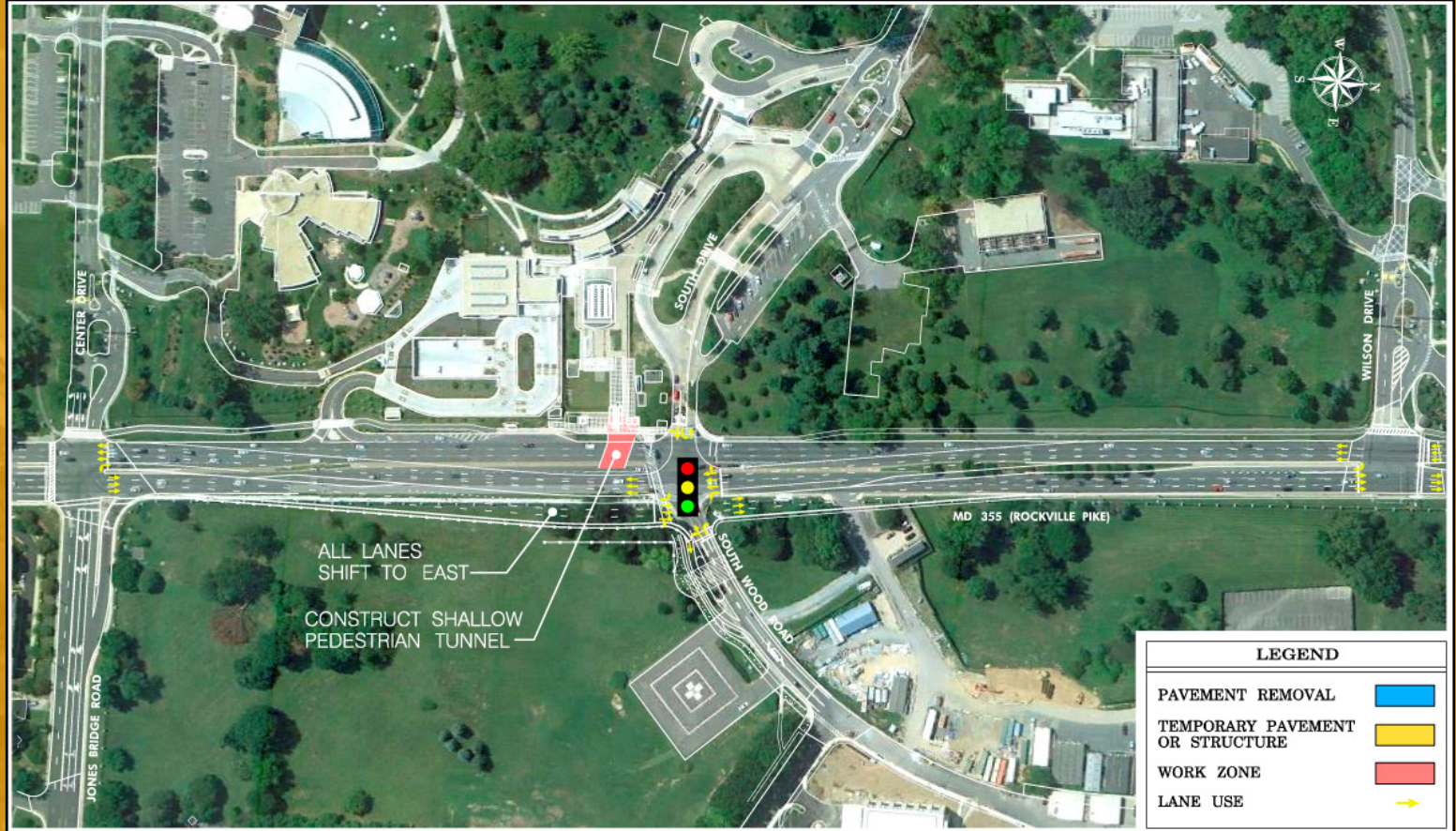


Alternatives 2A & 2B MOT - Phase I

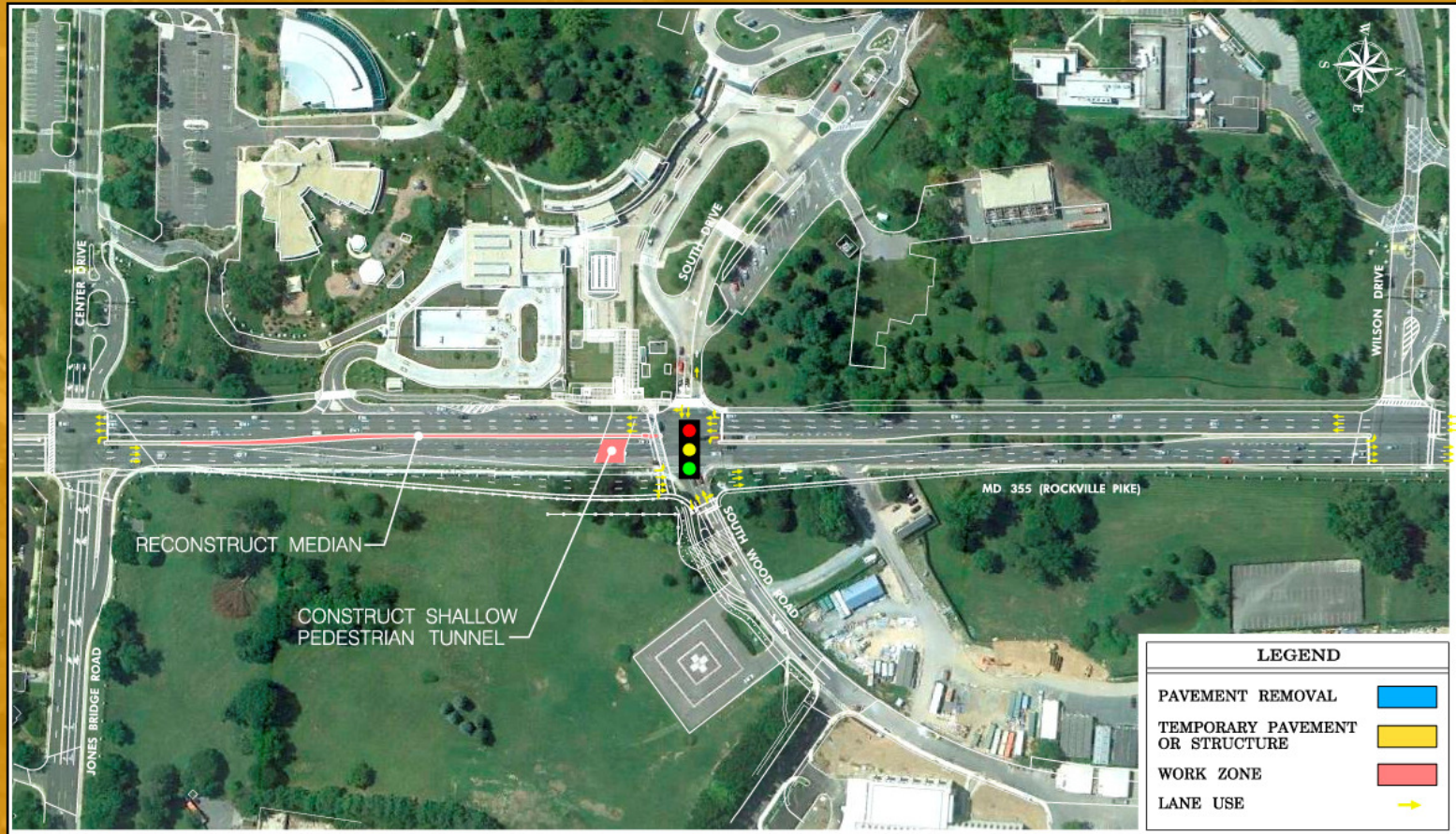


MD 355 / Rockville Pike Crossing Project

Alternatives 2A & 2B MOT - Phase II



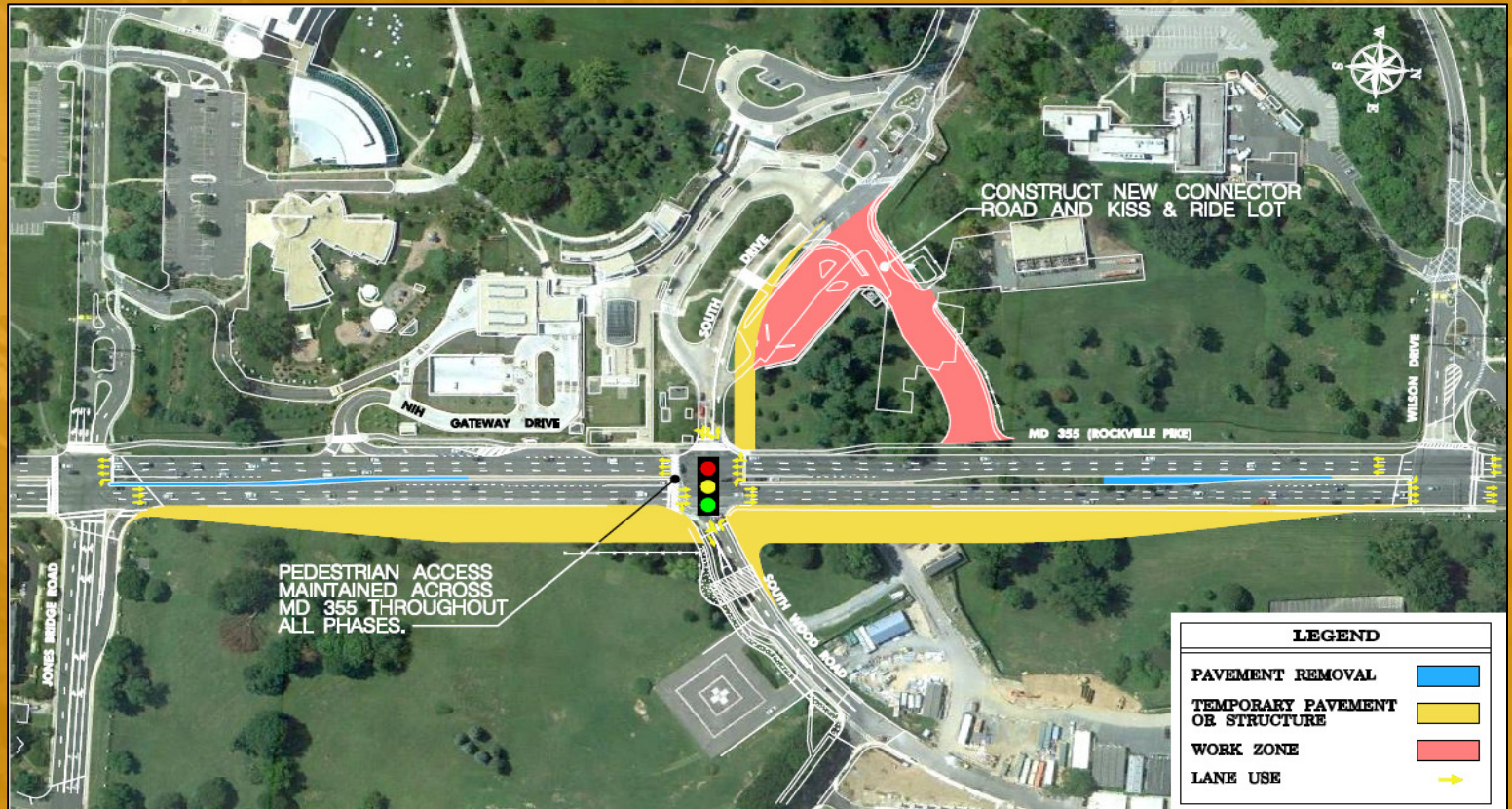
Alternatives 2A & 2B MOT – Phase III



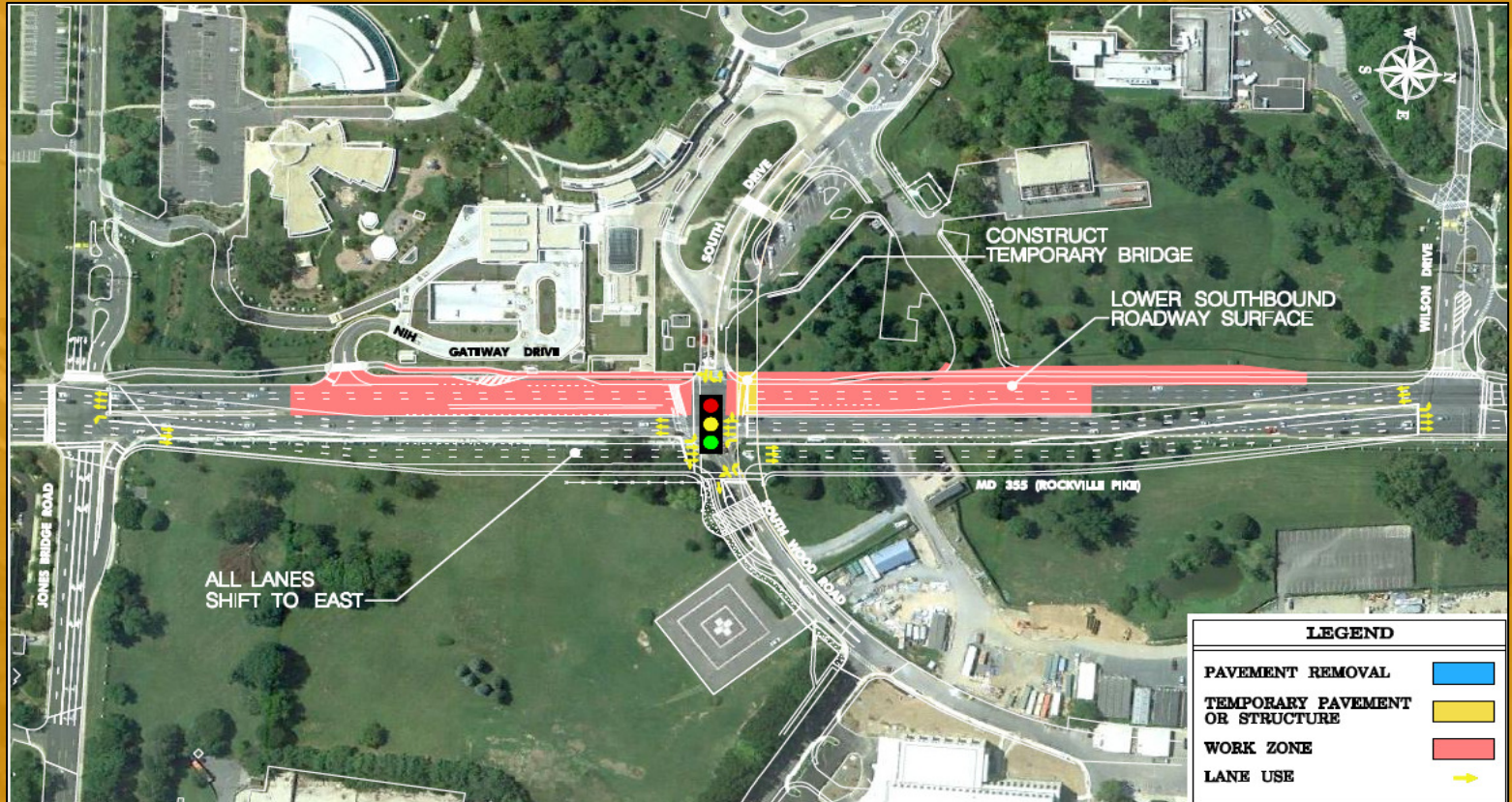
Alternatives 2A & 2B MOT – Phase IV



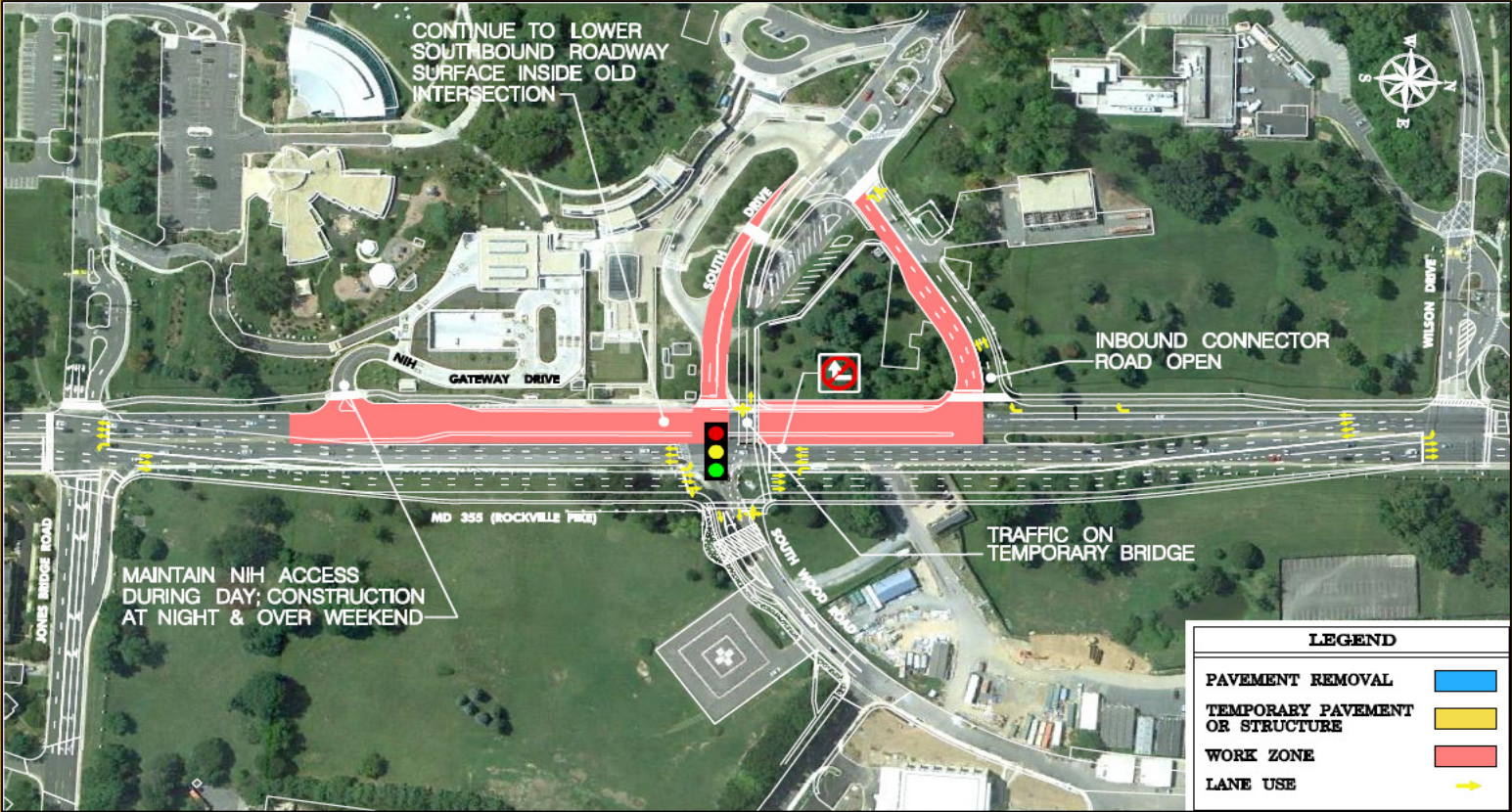
Alternative 3 MOT - Phase I



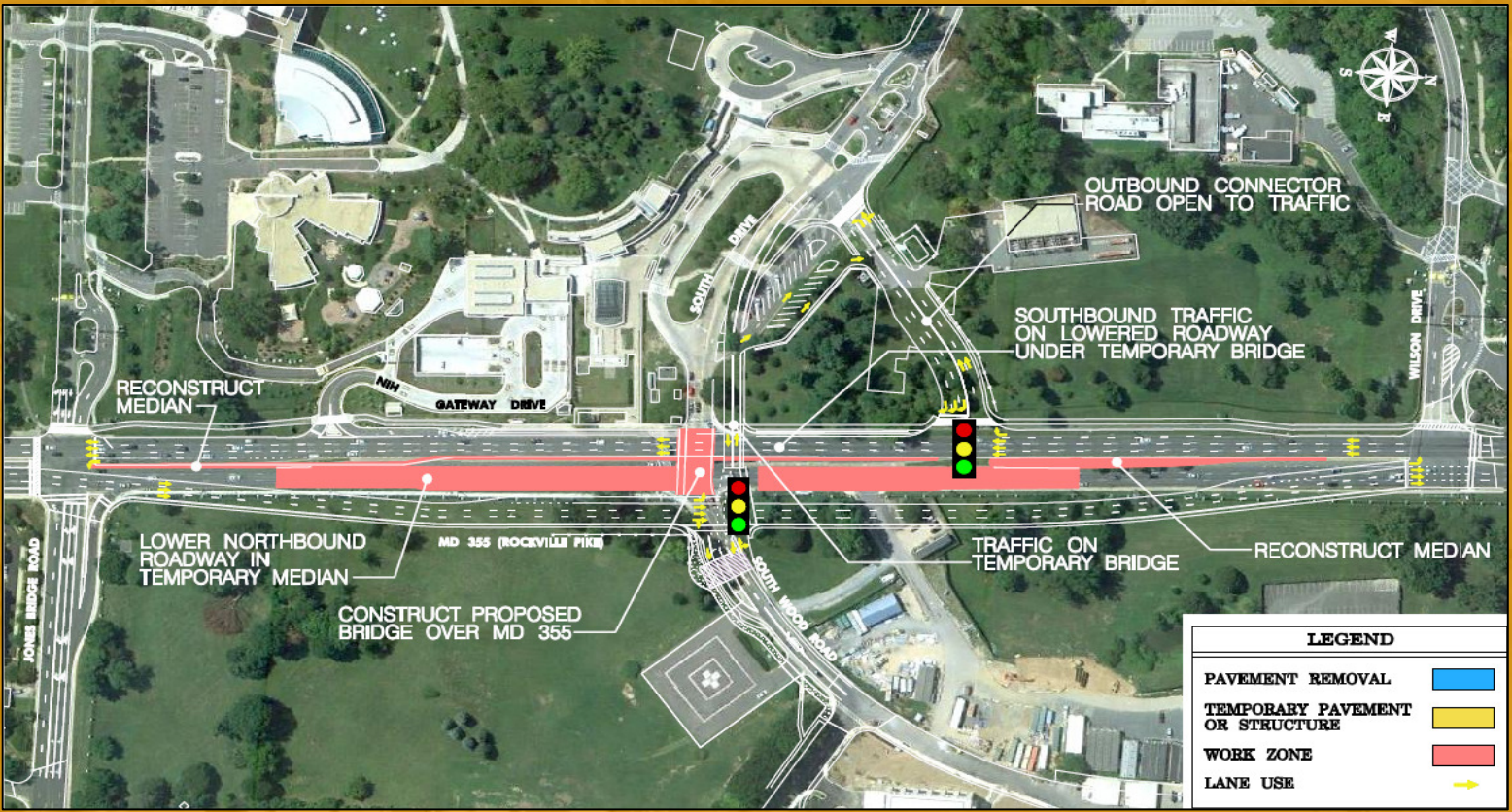
Alternative 3 MOT - Phase II



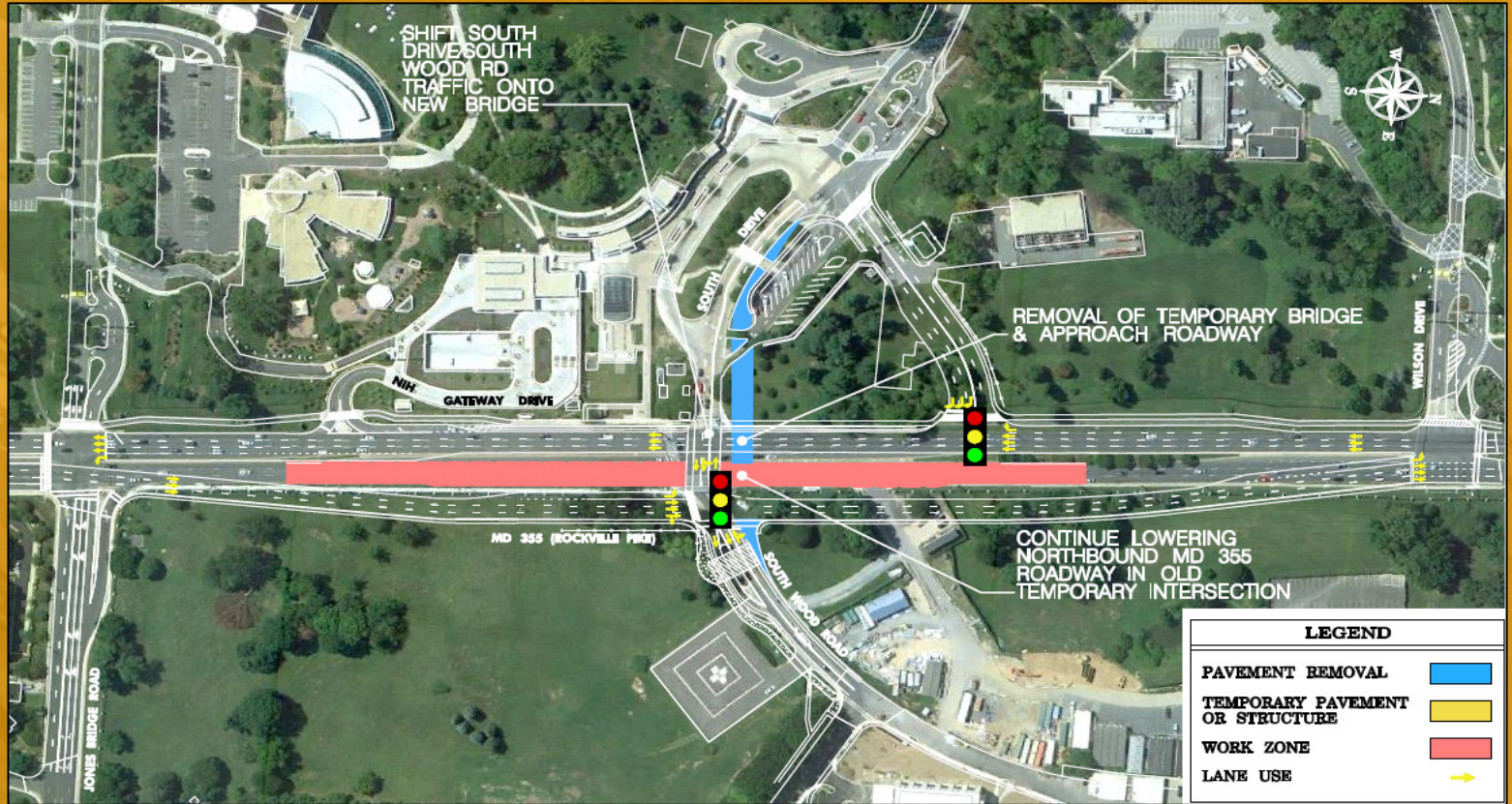
Alternative 3 MOT - Phase III



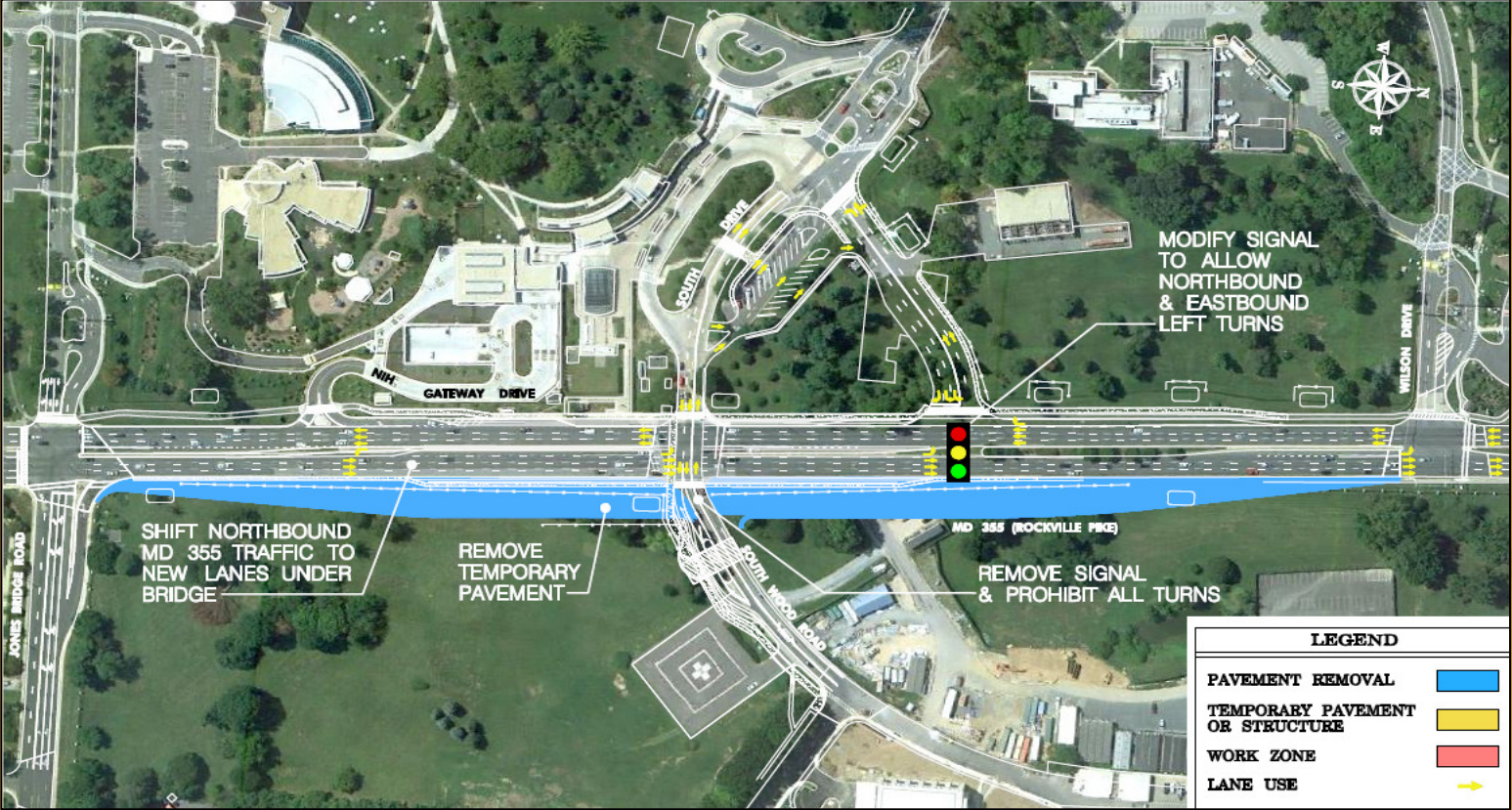
Alternative 3 MOT – Phase IV



Alternative 3 MOT – Phase V



Alternative 3 MOT - Phase VI



Environmental Impacts



MD 355 / Rockville Pike Crossing Project

Environmental Impacts Summary

- Natural environment
 - No impacts to wetlands, streams, floodplains, or parks
 - All alternatives cause impacts to trees
- Cultural resources
 - Alternatives 2A and 2B have 0.8 acres of historic property impacts (likely No Adverse Effect)
 - Alternative 3 has 1.3 acres of historic property impacts (could result in an Adverse Effect)



Environmental Impacts – Results

Natural Environment

- Investigated the impacts for each alternative as it relates to the following natural resources located in the study area:

Natural Environmental Impacts			
Feature	Alternative 2A	Alternative 2B	Alternative 3
Wetlands (acres)	0	0	0
Streams (LF)	0	0	0
Floodplains (acres)	0	0	0
Parks (acres)	0	0	0
Trees with Diameter Breast Height (DBH) 24” and Larger*	17	17	27

* Forest Conservation Act (FCA) and Roadside Tree Permit authorization required



Environmental Impacts – Results

Cultural Resources

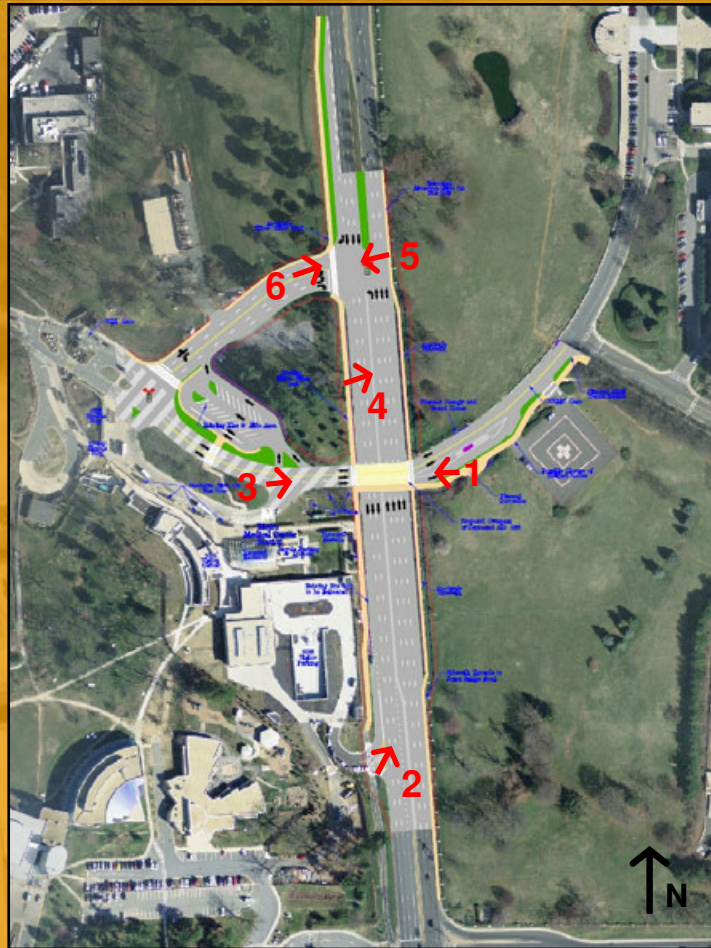
- Section 106 consultation initiated and preliminary feedback obtained from MHT

Historic Property Impacts (acres)			
Feature	Alternative 2A	Alternative 2B	Alternative 3
Bethesda Naval Hospital Tower (BNHT)	0	0	0
NNMC Fence and Landscape (Contributing Elements to BNHT)	0.5	0.5	1.2
Peter Estate (Stone House and Caretaker's Cottage)	0	0	0
East Lawn between Stone House and MD 355 (Contributing Element to Peter Estate)	0.3	0.3	0.1



Environmental Impacts – Results

Photographic Simulations for Alternative 3



MD 355 / Rockville Pike Crossing Project

Environmental Impacts – Results

Photographic Simulations for Alternative 3



View 1: South Wood Road, Looking West towards NIH and MD 355



View 1: Proposed Bridge over MD 355, Looking West towards NIH



Environmental Impacts – Results

Photographic Simulations for Alternative 3



View 2: Looking NE from NIH Parking Entrance to Bethesda Naval Medical Center Tower



View 2: Proposed Lowered Road with Bridge to Left, Looking NE



Environmental Impacts – Results

Photographic Simulations for Alternative 3



View 3: South Drive and MD 355, Looking West



View 3: Proposed Bridge over MD 355,
Looking West



Environmental Impacts – Results

Photographic Simulations for Alternative 3



View 4: Looking NE from MD 355 to Bethesda Naval Medical Center Tower



View 4: Proposed Lowered Road from Side of MD 355, Looking NE



Environmental Impacts – Results

Photographic Simulations for Alternative 3



View 5: Looking SW to Location of Proposed Jug Handle from MD 355



View 5: Proposed Intersection of Jug Handle and MD 355, Looking SW



Environmental Impacts – Results

Photographic Simulations for Alternative 3



View 6: Looking NE from Location of Proposed Jug Handle to MD 355



View 6: Proposed Intersection of Jug Handle and MD 355, Looking NE



Cost Estimates



MD 355 / Rockville Pike Crossing Project

ROW Impacts and Cost Estimates – Results

- No impacts to residential or commercial properties anticipated
- No displacement or relocation of residential or commercial properties anticipated
- Right-of-way pricing data provided by SHA's Office of Real Estate for similar projects within the study area which impacted NNMC and NIH property
- Costs included for property acquisition, damages, and contingencies to cover unforeseen future costs
- Total cost reflects the final design, roadway construction, right-of-way, maintenance of traffic, and utility relocation costs estimated for the alternatives
- Pedestrian underpass and elevator construction costs based on July 2009 WMATA Medical Center Metrorail Station Access Improvement Study

Feature	Alternative 2A	Alternative 2B	Alternative 3	
Right-of-Way Impacts				
NIH Right-of-Way (acres)	0.60	0.60	3.14	
NNMC Right-of-Way (acres)	0.52	0.53	1.23	
Total Right-of-Way (acres)	1.12	1.13	4.37	
Cost *				
Design Cost (millions)	\$4 – 6	\$8 – 10	\$8 – 10	
Right-of-Way Cost (millions)	NIH	\$1 – 4	\$1 – 4	\$10 – 20
	NNMC	\$1 – 4	\$1 – 4	\$3 – 7
	Total	\$4 – 8	\$4 – 8	\$15 – 25
Construction Cost (millions)	\$16 - 20	\$38 – 42	\$36 - 40	
Total Cost (millions) **	\$25 - 31	\$48 - 58	\$58 - 70	

* Cost estimates based on 2010 dollars

** Estimates do not include annual maintenance and operations costs



Secondary Goals



MD 355 / Rockville Pike Crossing Project

Accommodating Alternative Modes of Transportation



MD 355 / Rockville Pike Crossing Project

Accommodating Alternative Modes of Transportation Summary

Alternative 2A

- Decreases travel time for Metrorail users, pedestrians, and bicyclists crossing MD 355
- Improves access to/from mass transit facility
- Reducing the number of pedestrians crossing MD 355 at-grade would reduce intersection delay during the AM peak

Alternative 2B

- Significantly decreases travel time for Metrorail users crossing MD 355
- Decreases travel time for pedestrians and bicyclists
- Improves access to/from mass transit facility
- Reducing the number of pedestrians crossing MD 355 at-grade would reduce intersection delay during the AM peak

Alternative 3

- Decreases travel time for Metrorail users, pedestrians, and bicyclists crossing MD 355
- Improves access to/from mass transit facility
- Completely eliminating conflicts between pedestrians and vehicles would reduce intersection delay



Connectivity Between NNMC and NIH



MD 355 / Rockville Pike Crossing Project

Connectivity Summary

Alternatives 2A and 2B

- Proposed improvements are similar to the No-Build condition

Alternative 3

- Proposed improvement creates a direct connection between NIH and NNMC



Connectivity - Results

Emergency Vehicles

Alternative 2A / 2B



Alternative 3



Emergency Vehicle Distance and Travel Time

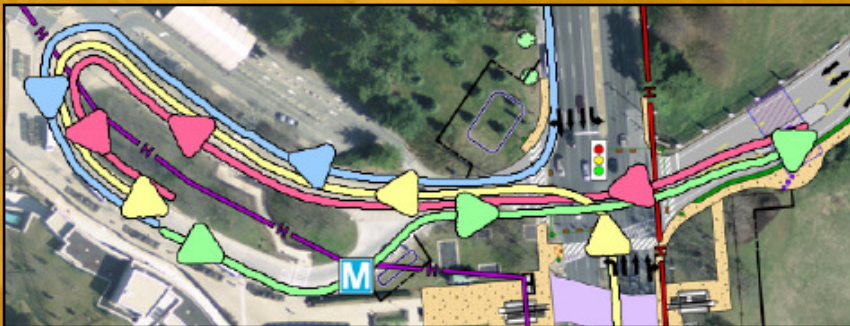
	No-Build	Alternative 2A	Alternative 2B	Alternative 3
From NNMC to NIH (Point D to Point B)	1,130 feet 28 seconds	1,130 feet 28 seconds	1,130 feet 28 seconds	1,130 feet 23 seconds



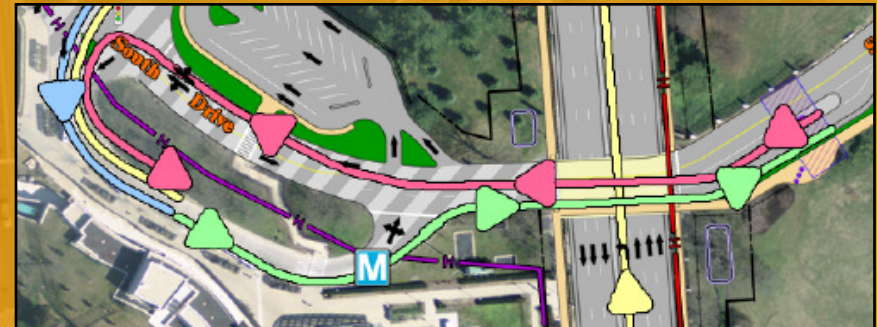
Connectivity - Results

Transit Vehicles

Alternative 2A / 2B



Alternative 3



Transit Vehicle Travel Time

	No-Build		Alternative 2A		Alternative 2B		Alternative 3	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
From the Bus Loop to the NNMC Gate (Eastbound)	133 s	> 300 s	99 s	> 300 s	99 s	> 300 s	26 s	25 s
From the NNMC Gate to the Bus Loop (Westbound)	87 s	> 300 s	69 s	> 300 s	69 s	> 300 s	55 s	> 300 s



Summary



MD 355 / Rockville Pike Crossing Project

Alternatives Comparison

Evaluation Criteria	No-Build	Alternative 2A	Alternative 2B	Alternative 3
Primary Goals				
Pedestrian / Bicyclist Efficiency: The average pedestrian travel time would be reduced.	●	○	●	●
Pedestrian / Bicyclist Safety: Pedestrian/bicyclist and vehicle conflicts would be reduced.	●	○	○	●
Traffic Operations: Vehicular delay at the MD 355/South Drive/South Wood Road intersection would be reduced.	●	●	●	○
Traffic Operations: Network delay would be reduced in the MD 355 corridor from Jones Bridge Road to Cedar Lane.	●	●	●	●
Bus Operations: Travel times would decrease for buses.	●	●	●	○
Emergency Vehicle Operations: Travel times would decrease for emergency vehicles.	●	●	●	●
Impacts and Costs				
Adjacent Projects: Reconstruction of nearby projects would not be required.	●	●	●	○
NNMC Gate: NNMC gate processing delays would be accommodated.	●	●	●	●
Construction Impacts: Construction would be accommodated with minimal impacts.	●	●	●	●
Natural Environment: Impacts to the natural environment would be minimized.	●	●	●	○
Cultural Resources: Impacts to cultural resources would be minimized.	●	●	●	●
Cost: Estimated total cost	\$0	\$25M-\$31M	\$48M-\$58M	\$58M-\$70M
Secondary Goals				
Alternative modes of travel would be more attractive to travelers.	●	○	●	●
Emergency vehicle and bus travel between NIH and NNMC would be more efficient.	●	●	●	○

Legend				
●	●	○	●	●
Poor	Fair	Good	Very Good	Excellent