

II. ALTERNATIVES CONSIDERED

MD 210 MULTI-MODAL STUDY

II. ALTERNATIVES CONSIDERED

A. Background

1. History

MD 210, also known by its original name of Indian Head Highway, connects Washington, D.C. at its northern terminus with the town of Indian Head, in Charles County, approximately 20 miles south of the Prince George's County/Washington, D.C. line. Indian Head Highway was constructed as a two-lane roadway by the Federal Government in 1945 as part of the National Defense Highway System conceived during World War II. MD 210 supplanted Livingston Road and Oxon Hill Road as the primary north-south corridor in Prince George's County. After World War II, the highway provided a direct, partially controlled access connection from the nation's capital to the U.S. Naval Ordinance Station on the Potomac River in Indian Head.

Indian Head Highway continued to grow in importance with the sub urbanization of Washington, D.C., the growth in population in southern Prince George's County, and most recently the growth in Charles County. Various projects to widen MD 210 have been implemented, the most important of which are as follows:

- 1966 - MD 210 was dualized to four-lanes from Fort Washington Road to the north
- 1986 - MD 210 was dualized to four-lanes from MD 373 to Fort Washington Road
- 1992 - MD 210 was widened to six-lanes from Old Fort Road North to the north
- 1996 - MD 210 was widened to six-lanes from Old Fort Road North to MD 228

It is noted that along with the 1996 widening of MD 210, MD 228 was completed, which provided a two-lane east-west connection from the US 301 and MD 5 corridors in the Waldorf area to MD 210.

This project planning study was initiated in 1997 based on the growing frequency and severity of traffic congestion, and associated safety concerns along MD 210 between the Capital Beltway and MD 228, a distance of approximately ten miles. Peak hour delays/congestion have become particularly prevalent at the eleven signalized intersections within the segment of MD 210 for through traffic and traffic accessing or crossing MD 210 from side roads. The eleven intersections south of the beltway in the project area consist of:

- Oxon Hill Road*
- Wilson Bridge Drive
- Kerby Hill/Livingston Road
- Livingston/Palmer Road
- Old Fort Road North
- Fort Washington Road
- Swan Creek/Livingston Road
- Old Fort Road South
- Farmington Road
- MD 373
- MD 228*

*Initial scoping activities revealed that these two intersections were being addressed as part of other design contracts and were therefore not included in the MD 210 Multi-Modal Study.

2. Design Criteria Common to all Alternatives

The proposed typical sections and geometric parameters have been developed in accordance with the design speeds and roadway segment functions, and were obtained from American Association of State Highway and Transportation Officials (AASHTO) Geometric Design of Highways and Streets supplemented by applicable SHA policies and directives.

Gas lines, Verizon transmission lines, Potomac Edison Power Company (PEPCO) high tension wires and Washington Suburban Sanitary Commission (WSSC) underground water lines are located within, or adjacent to, the proposed right-of-way for the Build Alternatives. Utility reconnaissance through SHA District 3 offices has been completed to assess impacts and determine specific engineering constraints.

The design criteria used in developing the improvement alternatives is summarized as follows:

MD 210 Mainline

Design Speed:	60 mph (typical)
Max. Degree of Curvature:	4° 45'
Lane Width:	Generally 12 feet (see typical section on Figure II-1A)
Shoulder Width:	Varies 4 feet to 12 feet (see typical section on Figure II-1A)
Max. Vertical Grade:	Generally 4%

The above parameters are generally controlled by the existing horizontal and vertical conditions. Closed section design (curbing on the median and outside edges of shoulder) has been included throughout to minimize impacts.

MD 210 Cross Roads

Design Speed:	40 mph (typical)
Max. Degree of Curvature:	10° 00'
Lane Width:	Generally 11 feet (see typical section on Figure II-1B)
Shoulder Width:	None
Max. Vertical Grade:	Generally 6%*

*(At some isolated locations grades as high as 8% were required for short distances to meet existing conditions)

The design of all cross roads includes a five-foot wide bike lane outside the travel lanes in each direction within the limit of improvement, as shown on the typical section. No shoulders are proposed on the crossroads. A five-foot wide sidewalk on each side of the crossroad has been assumed for each overpass design.

Any intersections that are proposed to remain at-grade have been evaluated on a case-by-case basis for proper pedestrian and bicycle accommodation (e.g., sidewalk connections, crosswalks, etc.). Coordination between SHA and community residents will be maintained throughout the project planning and design phases to ensure appropriate accommodation of bicyclists and pedestrians with the proposed improvements. A bicycle/pedestrian meeting was held on July 23, 2002, in Fort Washington, MD to discuss the plans and receive input for the interchange and intersection improvements being considered for the MD 210 corridor.

Interchange Ramps (Closed Section)

Geometric Criteria					
Description	Directional & Other 2 Lane Ramps (I-295 HOV Connections)		Single Lane Outer Ramps Diamonds, etc.	Inner Loops	
	Gores	Ramp Proper		Gores	Ramp Proper
Maximum Super elevation	0.08		0.08	0.10	
Design Speed	60	50	50	40	30
Maximum Degree of Curve	5	7.5	7.5	13.5	25
Minimum Radius	1,206	764	764	432	250
Maximum Vertical Grade*	5%		5%	6%	

*Where topographic conditions dictated, grades steeper than desirable were used, in accordance with AASHTO minimum criteria.

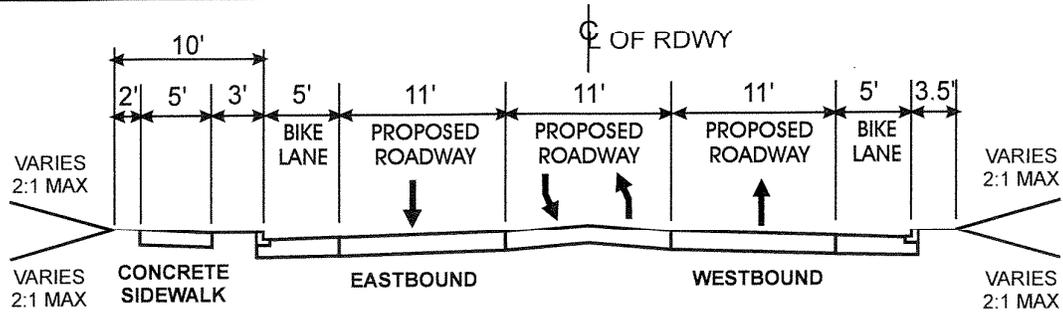
B. Alternatives Presented at the Informational Public Workshop (May 2000)

1. No-Build Alternative (Alternative 1)

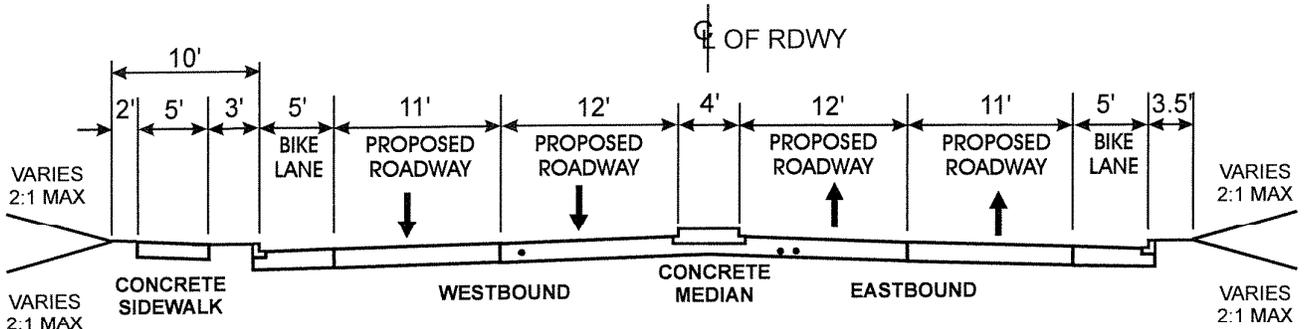
The No-Build Alternative was presented for consideration at each of the intersection locations as well as along mainline MD 210. This alternative included routine maintenance, minor construction projects and developer-based improvements associated with new developments. These minor improvements would not have been expected to measurably affect roadway capacity or safety. The No-Build Alternative served as a baseline for the comparison of all other alternatives.

2. Alternative 5A: No High Occupancy Vehicle (HOV) Lanes

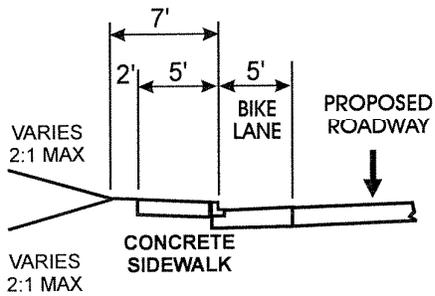
Alternative 5A included no HOV lanes on MD 210 (or side roads) and no widening of MD 210 other than that necessary in the immediate vicinity of an intersection location to support a given intersection improvement option (e.g., acceleration lanes, turn lanes, etc.). There would be no improvement to the MD 210 connection to or from I-295. This alternative is predicted to reduce traffic congestion but not alleviate it altogether. Two sets of intersection capacity improvement options as previously discussed were considered with Alternative 5A:



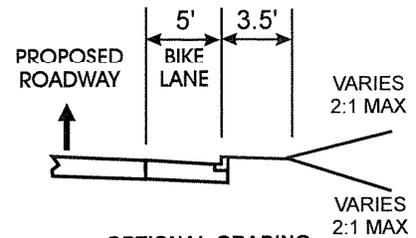
RELOCATED SWAN CREEK ROAD - OPTION C, D



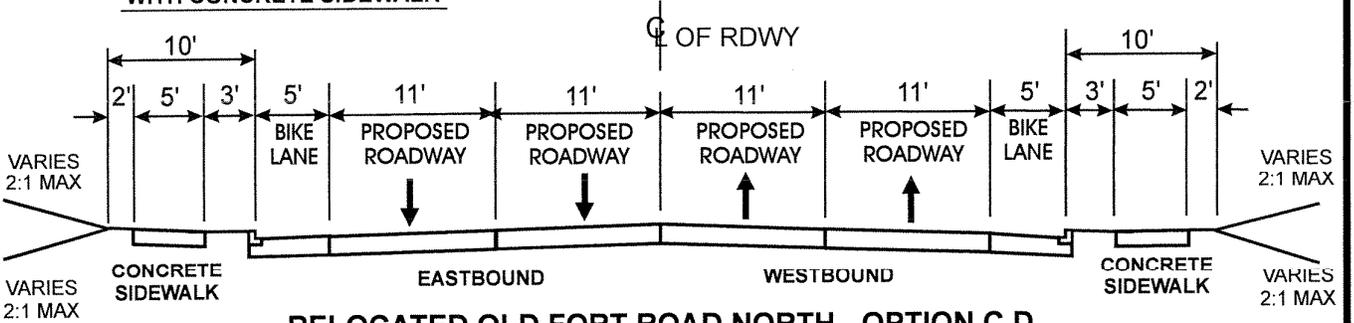
RELOCATED FORT WASHINGTON ROAD - OPTION D



OPTIONAL GRADING WITH CONCRETE SIDEWALK



OPTIONAL GRADING W/O CONCRETE SIDEWALK



**RELOCATED OLD FORT ROAD NORTH - OPTION C, D
RELOCATED OLD FORT ROAD SOUTH - OPTION C
RELOCATED PALMER/LIVINGSTON ROAD - OPTION A-D
RELOCATED KERBY HILL ROAD - OPTION A**



MD 210 MULTI-MODAL STUDY
1-95/1-495 TO MD 210

**TYPICAL SECTIONS
MD 210 MAINLINE**

DATE
MAY, 2004

NOT TO SCALE

FIGURE
II-1B

a. Capacity Option 1

Capacity Option 1 included the least number of interchanges considered potentially reasonable for analysis. Interchanges would only be provided at the Kerby Hill/Livingston Road and Livingston Road/Palmer Road intersections. The remaining intersections were proposed to be expanded with the existing traffic signals to remain. Under this option, a 4th through lane in each direction would be included on MD 210, from Old Fort Road North to Old Fort Road South. With this 4th through lane and additional side road turn lanes these intersections were predicted to operate at 5% to 30% over capacity. The intersections to the north would be a greater percentage over capacity than those to the south. While these intersections were predicted to operate over capacity, the proposed improvements were much less impactful to the socio-economic and natural environment and less costly. The existing MD 210 median openings would be closed at Wilson Bridge Drive and all unsignalized median break locations, leaving each of these locations right-turn in, right-turn out access only.

b. Capacity Option 2

Capacity Option 2 included the greatest number of interchanges considered necessary to achieve LOS D or better during the peak periods. Interchanges were proposed at the Kerby Hill Road/Livingston Road, Livingston Road/Palmer Road, Old Fort Road North, Fort Washington Road, and Swan Creek Road/Livingston Road and Old Fort Road South locations. These interchanges were expected to operate at LOS D or better for the weaves on and off MD 210 as well as the intersections proposed where the ramps tie into the side roads. Most of the ramp tie-in intersection locations would warrant traffic signals and would operate at LOS C or better during the peak period. The remaining intersections, Farmington Road and MD 373, were proposed for expansion, with the existing traffic signals to remain. Again, the existing MD 210 median openings were to be closed at Wilson Bridge Drive and all unsignalized median break locations, leaving each of these locations right-turn in, right-turn out access only.

3. Alternative 5B: Reversible, Barrier-Separated Median HOV Lanes

Alternative 5B consisted of widening MD 210 to provide a two-lane, reversible, barrier-separated HOV facility in the median of MD 210 for the portion of the study area from the Capital Beltway to south of Swan Creek Road. South of Swan Creek Road, the barrier-separated HOV lanes would transition to concurrent flow HOV lanes, which would continue down to MD 373, becoming general use lanes south of MD 373. At the northern extremity of the project, an exclusive HOV connection was proposed between MD 210 and the I-295 ramps. Two options were developed for this connection. One option included an exclusive HOV connection via a fly-over ramp, from the median of MD 210, over the southbound MD 210 roadway using an

alignment splitting the vacant area between the existing "S-curve" ramps. Another option included an exclusive HOV ramp fly-over of the northbound MD 210 general use lanes, whereby the new HOV ramps would have been closely aligned adjacent to the existing northbound I-295 "S-curve" ramp. The reversible section of the HOV lanes would have operated northbound for morning peak traffic conditions and southbound for evening peak conditions.

This type of HOV facility was projected to carry a minimum of 5,970 vehicles a day, including buses, vanpools and carpools of three or more persons. These two lanes were expected to carry an additional 50% or more of the people in the three general use lanes. These lanes were projected to operate at the posted speed limit (or greater), which would have resulted in travel time saving of up to 10 to 15 minutes within the project area, as compared to the No-Build Alternative, depending on the Capacity Option chosen.

Access to and from the HOV lanes would not have been permitted at the intersections due to the driver confusion resulting from two types of turning movements from side roads. Access would have been provided at approximately three locations northbound and southbound between the Capital Beltway and MD 228. The access points consisted of slip ramps allowing general-use traffic to merge into and out of the HOV lanes, at certain locations.

Intersection Capacity Option 1 and Option 2, as described under Alternative 5A above, were both evaluated with this alternative.

The typical section for Alternative 5B is shown on Figure II-1A.

4. Alternative 5C: Concurrent Flow HOV Lanes

Alternative 5C consisted of the widening of MD 210 to provide an additional lane in each direction designated as a concurrent flow HOV lane (i.e., one HOV lane in each direction). Special striping to create an approximate four-foot wide separation between the new HOV lane and the existing three general-use lanes would have been included. The determinations as to whether flexible pylons would be used to separate the HOV and general-use lanes and the extent to which vehicles would have the freedom to move between the HOV and general use lanes as they travel along the corridor were not finalized.

This type of HOV facility was expected to carry a maximum of 4,720 vehicles a day, including buses, vanpools and carpools of three or more persons. The additional lane was expected to carry an additional 50% of the people in the three general use lanes. These lanes are projected to operate at the posted speed limit (or greater). Travel time saving studies were not

modeled for Alternative 5C, but the time saving were anticipated to be slightly less than the travel times for Alternative 5B, depending on the Capacity Option chosen.

Intersection Capacity Option 1 and Option 2, as described under Alternative 5A above, were evaluated with this alternative.

The typical section for Alternative 5C is shown on Figure II-1A.

5. Alternative 5A: Interchange/Intersection Option Locations

a. MD 210 Ramps to and from I-295

Capacity Option 1, 2

No improvement to the MD 210 connection to and from the I-295 "S-Curve" Ramps would have been provided under Alternative 5A Capacity Option 1 or 2. Various improvements to the I-295 S-Curve Ramps and the Oxon Hill Road intersection with MD 210 are proposed under the Woodrow Wilson Bridge project.

b. Location A - Wilson Bridge Drive

Capacity Option 1, 2

Option A - Included an at-grade intersection improvement with right-in/right-out turn movements and no widening of MD 210.

c. Location B - Livingston Road/Kerby Hill Road

Capacity Option 1, 2

Option A - Included a grade-separation with interchange ramps in the northeast and southwest quadrants of Kerby Hill Road. On the west side of MD 210, a MD 210 southbound to Kerby Hill Road ramp ties into a two-way service road which then intersects with Relocated Kerby Hill Road. A ramp to MD 210 southbound from existing Kerby Hill Road uses the existing access road alignment adjacent to the existing service station. East of MD 210, a loop ramp from MD 210 northbound to Relocated Kerby Hill Road and an outer ramp to MD 210 northbound from Relocated Kerby Hill Road are proposed. The proposed Relocated Kerby Hill Road requires two lanes eastbound and westbound and is realigned, west of MD 210, to the north side of the existing roadway, eliminating the skewed intersection. The proposed roadway crosses over the existing concrete stream channel and MD 210 tying in east of MD 210 following closely adjacent to the existing roadway.

Option A-1 - An optional two-lane access road alignment to the Wilson Towers Apartments and Brookside Park Condominiums was also proposed in the northwest quadrant crossing over the existing concrete stream channel and tying into opposite the proposed service road improvements to create a four-way intersection. This optional alignment allowed the two complexes to access MD 210 northbound without entering MD 210 traffic. This connection allowed the existing concrete stream channel culverted rather than bridged.

Option A-2 - Also a two-lane access road, but differing from Option A-1 by creating a four-way intersection east of the existing concrete channel. This alignment required that the proposed Kerby Hill Road structure span over the existing concrete channel, as well as MD 210.

d. Location C - Palmer Road/Livingston Road

Capacity Option 1, 2

Option A - Included a $\frac{3}{4}$ diamond interchange at Palmer/Livingston Road, with diamond ramps in the northeast, northwest and southeast quadrants. Additionally, in the southwest quadrant, MD 210 southbound to Palmer/Livingston Road and Palmer/Livingston Road to MD 210 southbound single lane ramps was proposed. Palmer/Livingston Road would have been realigned to the south of the existing intersection, to accommodate two lanes in each direction and cross over MD 210. A new access road was proposed behind the existing businesses (displacing one business) in the northwest quadrant. The existing trail along Henson Creek would have been reconstructed in the immediate vicinity of MD 210.

Option B - Included a $\frac{1}{2}$ diamond interchange on the east side of MD 210, with ramps in the northeast and southeast quadrants. On the west side of MD 210, in the southwest quadrant, a two-lane ramp from MD 210 southbound to Palmer/Livingston Road and a Palmer/Livingston Road to MD 210 southbound single lane ramp are proposed. Proposed Palmer/Livingston road is the same as Option A but the proposed access road differs by not displacing any businesses. Because there was no proposed ramp in the northwest quadrant, a proposed access road with retaining walls was proposed in front of the existing businesses along Palmer/Livingston Road. As with Option A, the existing trail along Henson Creek would be reconstructed.

Option C - Included a grade-separation with closed section interchange ramps in the southeast and southwest quadrants only. East of MD 210, in the southeast quadrant a Palmer/Livingston Road to MD 210 northbound loop ramp and MD 210 northbound to Palmer/Livingston Road outer ramp was proposed. These ramp alignments allowed the avoidance of impacts to parkland and the minimization of impacts to wetlands in the northeast quadrant. Similar to Option B, a two-lane ramp from MD 210 southbound and a single lane

ramp to MD 210 southbound from Palmer/Livingston Road was proposed. Proposed Palmer/Livingston Road was the same as Option A and B. A proposed access road, similar to Option B, with retaining walls, was included in front of the existing businesses along Livingston Road. The existing trail along Henson Creek was to be reconstructed with the MD 210 improvements under this option.

Option D - Included a grade-separation with closed-section ramps in all quadrants except for the northeast quadrant. East of MD 210 in the southeast quadrant, similar to Option C, a loop ramp and outer ramp connection was proposed. On the west side of MD 210, similar to Option A, single lane ramps in the southwest quadrant as well as a single lane ramp in the northwest quadrant were proposed. Realigned Palmer/Livingston Road was the same as with the previous options. The access road was the same as Option A with the road behind the existing businesses. The trail along Henson Creek was to be reconstructed, immediately west of MD 210.

e. **Location D - Old Fort Road North**

Capacity Option 1

Option A - Included an additional through lane and acceleration/deceleration lanes in each direction on MD 210, with the intersection remaining at-grade. Old Fort Road North would have been widened to accommodate a single left turn, two through lanes and a right turn lane eastbound and westbound. The existing service road in the northeast quadrant would have been closed and traffic diverted east to the Broadview Road intersection with Old Fort Road North.

Capacity Option 2

Option C – Consisted of a diamond interchange at Old Fort Road North, including a realigned Old Fort Road North to the south of the existing intersection, with two lanes in each direction crossing over MD 210. The existing service road in the northeast quadrant would have been closed with traffic being diverted east to the Broadview Road intersection with Old Fort Road North.

Option D – Consisted of a half-diamond interchange west of MD 210, with ramps in the northwest and southwest quadrants. A loop ramp from MD 210 northbound and outer ramp connection to MD 210 northbound were also proposed in the northeast quadrant on the east side of MD 210. Old Fort Road North and the service road were similar to Option C.

f. Location E - Fort Washington Road

Capacity Option 1

Two optional at-grade designs were proposed for Capacity Option 1.

Option A - Included an additional through lane and acceleration/deceleration lanes in each direction on MD 210. Fort Washington Road west of MD 210 would have been widened to accommodate five total lanes at the intersection. The eastbound intersection approach consisted of two left turn lanes, a left/through lane and a right through lane. East of MD 210, the existing access road would have been realigned to allow additional queuing length. At the intersection, the existing church entrance on the east side of MD 210 would have also been realigned. The westbound traffic lanes consisted of a left through lane and a double right turn.

Option B - Included the same improvements as Option A except the realigned access road east of MD 210 would have resulted in the westbound to northbound movement being accommodated by the parallel the service road to northbound MD 210, rather than via the double right turn at the intersection.

Capacity Option 2

Option D - Included a $\frac{3}{4}$ diamond interchange with ramps in the northeast, northwest and southeast quadrants. The design also required a relocated Fort Washington Road fly-over north of the existing Tantallon Shopping Center. The existing access road east of MD 210 was to fly-over MD 210 and tie into existing Fort Washington Road west of MD 210 at the existing Livingston Road intersection. Existing Fort Washington Road would have then become a right in/right out only intersection at MD 210. Relocated Fort Washington Road would have had one lane in each direction with left turn lanes where required.

g. Location F - Livingston Road/Swan Creek Road

Capacity Option 1

Option A - Included an additional through lane and acceleration/deceleration lanes in each direction on MD 210. The enhanced Swan Creek Road approaches to the intersection consisted of two left turn lanes, two through lanes and a right turn lane eastbound, with one left turn lane, two through lanes and one right turn lane westbound.

Capacity Option 2

Option C - Included an interchange with a loop ramp from southbound MD 210 to Relocated Swan Creek Road and an outer ramp from Relocated Swan Creek to southbound MD 210 in the southwest quadrant. On the east side of MD 210, a northbound MD 210 to Relocated Swan Creek Road outer ramp in the southeast quadrant and a relocated Swan Creek to northbound MD 210 outer ramp in the northeast quadrant was proposed. A Relocated Swan Creek Road crossing over MD 210 to the south of the existing intersection was proposed, with one lane in each direction and a center turn lane. The existing access road in the northeast quadrant was to be relocated.

Option E - Included an interchange with a single lane ramp from MD 210 southbound to Livingston Road in the northwest quadrant. Access to Swan Creek Road from MD 210 southbound would have been achieved with an at-grade right-in/right-out configuration. On the east side of MD 210, a MD 210 northbound to Swan Creek Road outer ramp and a loop ramp from Swan Creek Road to MD 210 northbound was proposed in the southeast quadrant. The Livingston Road crossing over MD 210, located to the north of the existing intersection, included one lane eastbound and one lane westbound with a center turn lane. The existing service road in the northeast quadrant would have been relocated east of its current location. A Swan Creek Road to Livingston Road Connector, behind the Old Forte Village Shopping Center, was also proposed. This option avoided the need for any roadway movements in the environmentally sensitive southwest quadrant.

h. Location G - Old Fort Road South

Capacity Option 1

Two options for at-grade intersection improvement were proposed for Capacity Option 1. Option A included acceleration/deceleration lanes on MD 210. The Old Fort Road South approaches to the intersection included two left turn lanes, a through lane and right turn lane eastbound and westbound.

Option B included acceleration/deceleration lanes on MD 210 and indirect left turns to Old Fort Road South from MD 210. The enhanced Old Fort Road South approaches to the MD 210 intersection included two left turn lanes, two through lanes and a right turn lane eastbound and westbound.

Capacity Option 2

Option C - Included a diamond interchange with Old Fort Road South over MD 210. The proposed Old Fort Road South approaches to the MD 210 intersection consisted of two lanes eastbound and westbound.

i. Location H - Farmington Road

Capacity Option 1, 2

Two at-grade design options were considered collectively for Capacity Options 1 and 2. Option A included a single left turn, one through lane and a right turn lane for the eastbound approach and a left turn, through lane and single right turn lane for the westbound MD 210 intersection approach.

Option B included indirect left turns from MD 210 northbound and southbound onto Farmington Road. The enhanced Farmington Road approaches to the MD 210 intersection consisted of a single left turn, a through lane and a through/right turn lane eastbound and a single left turn, through lane and right turn lane westbound.

j. Location I - MD 373

Capacity Option 1, 2

Two at-grade design options were considered collectively for Capacity Options 1 and 2. Option A included improvements to lengthen acceleration/deceleration lanes on MD 210, and the enhanced approaches to the MD 210 intersection consisted of a single left turn and through/right turn lane eastbound and two left turn lanes, a single through and a right turn lane westbound.

Option B included acceleration/deceleration lanes on MD 210 and indirect left turns to MD 373 from MD 210 northbound and southbound. The MD 373 approaches to the MD 210 intersection consisted of a single left turn; one through lane and one through/right turn lane eastbound and two left turn lanes, through lane and a right turn lane westbound.

6. Alternative 5B: Interchange/Intersection Option Locations

Alternative 5B consisted of the widening of MD 210 to provide two reversible, barrier-separated median HOV lanes, as presented at the May, 2000 Workshop. Subsequent to the workshop, however, the southern limit of the proposed reversible HOV section was shifted north to Swan Creek Road, with a transition to concurrent flow HOV south of that point. Alternatives 5B and 5C were then identical south of Swan Creek Road.

a. MD 210 Ramps to and from I-295

Capacity Option 1, 2

Option A – Consisted of an exclusive HOV connection between MD 210 and I-295 via a fly-over ramp from the median of MD 210 over the southbound MD 210 roadway using an alignment splitting the vacant area between the existing "S-curve" ramps.

Option B – Consisted of an exclusive HOV flyover ramp of the northbound MD 210 general use lanes. Once over MD 210 northbound, the HOV ramp formed two barrier-separated lanes. The new HOV ramps would have closely paralleled the existing northbound I-295 "S-curve" ramp then split and connected to the existing northbound and southbound I-295 ramps.

b. Location A - Wilson Bridge Drive

Capacity Option 1, 2

Option A - Consisted of an at-grade intersection improvement with right-in/right-out turn movements.

c. Location B - Livingston Road/Kerby Hill Road

Capacity Option 1, 2

Option A - Included a grade-separation with interchange ramps in the northeast and southwest quadrants of Kerby Hill Road. On the west side of MD 210, a MD 210 southbound to Kerby Hill Road ramp tied into a two-way service road which then intersected with Relocated Kerby Hill Road. A ramp to MD 210 southbound from existing Kerby Hill Road used the existing access road alignment adjacent to the existing service station. East of MD 210, a loop ramp from MD 210 northbound to Relocated Kerby Hill Road and outer ramp to MD 210 northbound from Relocated Kerby Hill Road were proposed. The proposed relocated Kerby Hill Road required two lanes eastbound and westbound and was realigned, west of MD 210, to the north side of the existing roadway, eliminating the skewed intersection. The proposed roadway crossed over the existing concrete stream channel and MD 210 tying in to existing Livingston Road east of MD 210.

Option A-1 - An option consisting of a two-lane access road to the Wilson Towers Apartments and Brookside Park Condominiums in the northwest quadrant, which crossed over the existing concrete stream channel and tied into the existing apartment/condominium access road opposite the proposed service road improvements to create a four-way intersection was

considered. This optional alignment would have allowed the apartment/condo residents to access MD 210 northbound without entering MD 210 traffic. Option A-1 assumed that the existing concrete stream channel would be culverted under Kerby Hill Road.

Option A-2 - Also an optional two-lane access road alignment, which differed from Option A-1 by creating a four-way intersection east of the existing concrete channel. This alignment required the proposed Kerby Hill Road structure over MD 210 to span the existing concrete channel.

d. Location C - Palmer Road/Livingston Road

Capacity Option 1, 2

Option A - Included a $\frac{3}{4}$ diamond interchange at Palmer/Livingston Road, with ramps in the northeast, northwest and southeast quadrants. The southwest quadrant of the interchange included ramps accommodating the MD 210 southbound to Palmer/Livingston Road and Palmer/Livingston Road to MD 210 southbound movements. Palmer/Livingston Road was to be realigned to the south of the existing intersection, to accommodate two lanes in each direction and cross over MD 210. A new access road was proposed behind the existing businesses (displacing one business) in the northwest quadrant. The existing trail along Henson Creek was to be reconstructed in the immediate vicinity of MD 210.

Option B - Included a $\frac{1}{2}$ diamond interchange on the east side of MD 210, with ramps in the northeast and southeast quadrants. In the southwest quadrant, a two-lane ramp from MD 210 southbound to Palmer/Livingston Road and a single lane ramp from Palmer/Livingston Road to southbound MD 210 were proposed. Under this option, the design of Proposed Palmer/Livingston road was identical to that for Option A, but the proposed access road differed by not displacing any businesses. With no proposed ramp in the northwest quadrant, a proposed access road with retaining walls was possible in front of the existing businesses along Palmer/Livingston Road. As with Option A, the existing trail along Henson Creek would have been reconstructed.

Option C - Consisted of a grade-separation with closed section interchange ramps in the southeast and southwest quadrants only. In the southeast interchange quadrant, a loop ramp carrying Palmer Road to MD 210 northbound and an outer ramp carrying northbound MD 210 to Palmer Road outer ramp were proposed. These ramp alignments allowed the avoidance of impacts to the parklands and the minimization of impacts to wetlands in the northeast quadrant. In the southwest quadrant, similar to Option B, a two-lane ramp from MD 210 southbound and a single lane ramp to MD 210 southbound from Palmer/Livingston Road were proposed. The

alignment of the Proposed Palmer/Livingston Road overpass was the same as for Options A and B. Similar to Option B, a proposed access road with retaining walls was possible in front of the existing businesses along Livingston Road. The existing trail along Henson Creek was to be reconstructed under this option.

Option D – Consisted of a grade-separation with closed-section ramps in all quadrants except for the northeast quadrant. Similar to Option C, a loop ramp and outer ramp connection were proposed in the southeast quadrant. Similar to Option A, a single lane ramp in the southwest quadrant as well as a single lane ramp in the northwest quadrant were proposed. The alignment of the Palmer/Livingston Road overpass was proposed in the same location as the previous options. The access road behind the existing businesses was the same as with Option A. The trail along Henson Creek would have been reconstructed immediately west of MD 210.

e. **Location D - Old Fort Road North**

Capacity Option 1

Option B - Included at-grade intersection widening with indirect left turns from MD 210 to Old Fort Road North. On the approaches to MD 210, Old Fort Road North would have been widened to accommodate a single left turn, two through lanes and a right turn lane eastbound and westbound. The two reversible HOV lanes proposed in the median of MD 210 would have been bridged over the intersection at Old Fort Road North. The existing service road north of Old Fort Road would have been closed and traffic diverted east to the Broadview Road intersection with Old Fort Road North.

Capacity Option 2

Option C – Consisted of a diamond interchange at Old Fort Road North. An overpass of MD 210, located to the south of the existing intersection would have consisted of two lanes in each direction. The existing service road in the northeast quadrant was to be closed, with traffic diverted east to the Broadview Road intersection with Old Fort Road North.

Option D – Included diamond interchange ramps in the northwest and southwest quadrants, a loop ramp from northbound MD 210 to westbound Old Fort Road North and an outer ramp connection from westbound Old Fort Road North to northbound MD 210. The designs of Old Fort Road North and the existing service road were similar to those for Option C.

f. Location E - Fort Washington Road

Capacity Option 1

Option C – Consisted of an at-grade intersection widening with an indirect left turn from southbound MD 210 to existing Fort Washington Road. The two reversible HOV lanes proposed in the median of MD 210 would have been bridged over the intersection at Fort Washington Road. East of MD 210, the existing service road was realigned to create additional queuing length for the approach to MD 210. Right turns onto MD 210 northbound were relocated from the existing intersection to the realigned service road ramp, which then merged onto northbound MD 210. The westbound intersection approach consisted of one left lane and one through lane. West of MD 210, Fort Washington Road approach was to be widened to two left turn lanes, a left/through lane and right turn lane.

Capacity Option 2

Option D - Included a $\frac{3}{4}$ diamond interchange with ramps in the northeast, northwest and southeast quadrants. The design also provided a relocated Fort Washington Road fly-over north of the existing Tantallon Shopping Center. The existing access road east of MD 210 crossed over MD 210 to tie into existing Fort Washington Road west of MD 210 at the existing Livingston Road intersection. Existing Fort Washington Road then became a right in/right out only intersection at MD 210. Relocated Fort Washington Road had one lane in each direction with left turn lanes where required.

g. Location F - Livingston Road/Swan Creek Road

Capacity Option 1

Option B – Consisted of an at-grade intersection with indirect left turns from MD 210 to Swan Creek Road on the east side of MD 210, a ramp in the southeast quadrant to connect northbound MD 210 with Livingston Road and a realignment of the existing access road opposite the proposed ramp tie-in in the northeast quadrant. The southwest intersection quadrant included a loop ramp connecting southbound MD 210 to Swan Creek Road as well as an outer ramp providing the return movement to southbound MD 210. The proposed Swan Creek Road approach configuration was two left turn lanes and two through lanes eastbound, and a single left, two through lanes and a right turn lane westbound.

Capacity Option 2

Option C - Included an interchange with a loop ramp in the southwest quadrant, connecting southbound MD 210 to Relocated Swan Creek Road and an outer ramp from Relocated Swan Creek to southbound MD 210. A northbound MD 210 ramp to Relocated Swan Creek Road was proposed in the southeast quadrant and a relocated Swan Creek Road ramp to northbound MD 210 ramp was proposed in the northeast quadrant. The Relocated Swan Creek Road crossing over MD 210 to the south of the existing intersection included one lane in each direction with a center turn lane. The existing access road in the northeast quadrant was to be relocated.

Option D - Included an interchange with a loop ramp from MD 210 southbound to Relocated Swan Creek Road and an outer ramp from Relocated Swan Creek Road to MD 210 southbound in the southwest quadrant. On the east side of MD 210, a MD 210 northbound to Relocated Swan Creek Road outer ramp and a loop ramp from Relocated Swan Creek Road to MD 210 northbound was proposed. A Relocated Swan Creek Road crossing over MD 210 to the south of the existing intersection required one lane eastbound and westbound with a center turn lane. The existing access road in the northeast quadrant was to be relocated. An HOV median structure providing a connection between Relocated Swan Creek Road and MD 210 was proposed requiring MD 210 to be widened to the east. The HOV median structure would have operated northbound for the morning peak traffic period allowing vehicles to access the MD 210 HOV lanes. For evening peak conditions, the HOV median structure would have operated southbound allowing vehicles to exit to Swan Creek Road from the MD 210 HOV lanes.

Option E – Consisted of an interchange with a single lane outer ramp from MD 210 southbound to Livingston Road in the northwest quadrant on the west side of MD 210. Access to Swan Creek Road from MD 210 southbound would have been achieved with an at-grade right-in/right-out intersection improvement. On the east side of MD 210, a MD 210 northbound to Swan Creek Road outer ramp and a loop ramp from Swan Creek Road to MD 210 northbound was proposed in the southeast quadrant. The Livingston Road crossing over MD 210 required one lane eastbound and westbound with a center turn lane. The existing service road in the northeast quadrant was to be relocated east of its current location. A Swan Creek Road to Livingston Road Connector, behind the Old Forte Village Shopping Center, was also proposed. This option avoided the need to accommodate any interchange movements in the environmentally sensitive southwest quadrant.

h. Location G - Old Fort Road South

Capacity Option 1

Option B – Consisted of at-grade improvements, including acceleration/deceleration lanes on MD 210 and indirect left turns to Old Fort Road South from MD 210. The widened Old Fort Road South approaches to the MD 210 intersection included two left turn lanes, two through lanes and right turn lane eastbound and westbound.

Capacity Option 2

Option C - Included a diamond interchange with Old Fort Road South over MD 210. The proposed Old Fort Road South typical section within the interchange area consisted of two lanes eastbound and westbound.

i. Location H - Farmington Road

Capacity Option 1, 2

Option B – Consisted of at-grade improvements, including indirect left turns from MD 210 northbound and southbound to Farmington Road. The widened Farmington Road approaches to the intersection consisted of a single left turn, a through lane and a through/right turn lane eastbound, with a single left turn lane, through lane and right turn lane westbound.

j. Location I - MD 373

Capacity Option 1, 2

Option B - Consisted of at-grade improvements, including acceleration/deceleration lanes on MD 210 and indirect left turns to MD 373 from MD 210 northbound and southbound. Proposed MD 373 approaches to the MD 210 intersection consisted of a single left turn; one through lane and one through/right turn lane eastbound, with two-left turn lanes, one through lane and one right turn lane westbound.

7. Alternative 5C: Interchange/Intersection Option Locations

Alternative 5C consisted of the widening of MD 210 to provide one concurrent flow HOV lane adjacent to the three existing general use lanes in each direction, as shown in Figure II-1C and presented at the May, 2000 Workshop.

a. MD 210 Ramps to and from I-295

Capacity Option 1, 2

Option A - Included an exclusive HOV connection between MD 210 and I-295 via a fly-over ramp, from the median of MD 210, over the southbound MD 210 roadway using an alignment splitting the vacant area between the existing "S-curve" ramps.

Option B - Included an exclusive HOV ramp fly-over of the northbound MD 210 general use lanes. Once over MD 210 northbound, the HOV ramp formed two barrier-separated lanes. The new HOV ramp closely paralleled the existing northbound I-295 "S-curve" ramp then split to connect with the existing northbound and southbound I-295 ramps.

b. Location A - Wilson Bridge Drive

Capacity Option 1, 2

Option A – Consisted of an at-grade intersection improvement with right-in/right-out turn movements.

c. Location B - Livingston Road/Kerby Hill Road

Capacity Option 1, 2

Option A - Included a grade-separation with interchange ramps in the northeast and southwest quadrants of Kerby Hill Road. On the west side of MD 210, a MD 210 southbound to Kerby Hill Road ramp tied into a two-way service road which then intersected with Relocated Kerby Hill Road. A ramp to MD 210 southbound from existing Kerby Hill Road used the existing access road alignment adjacent to the existing service station. East of MD 210, a loop ramp from MD 210 northbound to Relocated Kerby Hill Road and outer ramp to MD 210 northbound from Relocated Kerby Hill Road were proposed. The proposed relocated Kerby Hill Road required two lanes eastbound and westbound and was realigned, west of MD 210, to the north side of the existing roadway, eliminating the skewed intersection. The proposed roadway crossed over the existing concrete stream channel and MD 210 tying in to existing Livingston Road east of MD 210.

Option A-1 - An option consisting of a two-lane access road to the Wilson Towers Apartments and Brookside Park Condominiums in the northwest quadrant, which crossed over the existing concrete stream channel and tied into the existing apartment/condominium access road opposite the proposed service road improvements to create a four-way intersection was

considered. This optional alignment would have allowed the apartment/condo residents to access MD 210 northbound without entering MD 210 traffic. Option A-1 assumed that the existing concrete stream channel would be culverted under Kerby Hill Road.

Option A-2 - Also an optional two-lane access road alignment, which differed from Option A-1 by creating a four-way intersection east of the existing concrete channel. This alignment required the proposed Kerby Hill Road structure over MD 210 to span the existing concrete channel.

d. Location C - Palmer Road/Livingston Road

Capacity Option 1, 2

Option A - Included a $\frac{3}{4}$ diamond interchange at Palmer/Livingston Road, with ramps in the northeast, northwest and southeast quadrants. The southwest quadrant of the interchange included ramps accommodating the MD 210 southbound to Palmer/Livingston Road and Palmer/Livingston Road to MD 210 southbound movements. Palmer/Livingston Road was to be realigned to the south of the existing intersection, to accommodate two lanes in each direction and cross over MD 210. A new access road was proposed behind the existing businesses (displacing one business) in the northwest quadrant. The existing trail along Henson Creek was to be reconstructed in the immediate vicinity of MD 210.

Option B - Included a $\frac{1}{2}$ diamond interchange on the east side of MD 210, with ramps in the northeast and southeast quadrants. In the southwest quadrant, a two-lane ramp from MD 210 southbound to Palmer/Livingston Road and a single lane ramp from Palmer/Livingston Road to southbound MD 210 were proposed. Under this option, the design of Proposed Palmer/Livingston road was identical to that for Option A, but the proposed access road differed by not displacing any businesses. With no proposed ramp in the northwest quadrant, a proposed access road with retaining walls was possible in front of the existing businesses along Palmer/Livingston Road. As with Option A, the existing trail along Henson Creek would have been reconstructed.

Option C - Consisted of a grade-separation with closed section interchange ramps in the southeast and southwest quadrants only. In the southeast interchange quadrant, a loop ramp carrying Palmer Road to MD 210 northbound and an outer ramp carrying northbound MD 210 to Palmer Road outer ramp were proposed. These ramp alignments allowed the avoidance of impacts to the parklands and the minimization of impacts to wetlands in the northeast quadrant. In the southwest quadrant, similar to Option B, a two-lane ramp from MD 210 southbound and a single lane ramp to MD 210 southbound from Palmer/Livingston Road were proposed. The

alignment of the Proposed Palmer/Livingston Road overpass was the same as for Options A and B. Similar to Option B, a proposed access road with retaining walls was possible in front of the existing businesses along Livingston Road. The existing trail along Henson Creek was to be reconstructed under this option.

Option D – Consisted of a grade-separation with closed-section ramps in all quadrants except for the northeast quadrant. Similar to Option C, a loop ramp and outer ramp connection were proposed in the southeast quadrant. Similar to Option A, a single lane ramp in the southwest quadrant as well as a single lane ramp in the northwest quadrant were proposed. The alignment of the Palmer/Livingston Road overpass was proposed in the same location as the previous options. The access road behind the existing businesses was the same as with Option A. The trail along Henson Creek would have been reconstructed immediately west of MD 210.

e. **Location D - Old Fort Road North**

Capacity Option 1

Option B - Included at-grade intersection widening with indirect left turns from MD 210 to Old Fort Road North. On the approaches to MD 210, Old Fort Road North would have been widened to accommodate a single left turn, two through lanes and a right turn lane eastbound and westbound. The existing service road north of Old Fort Road would have been closed and traffic diverted east to the Broadview Road intersection with Old Fort Road North.

Capacity Option 2

Option C – Consisted of a diamond interchange at Old Fort Road North. An overpass of MD 210, located to the south of the existing intersection would have consisted of two lanes in each direction. The existing service road in the northeast quadrant was to be closed, with traffic diverted east to the Broadview Road intersection with Old Fort Road North.

Option D – Included diamond interchange ramps in the northwest and southwest quadrants, a loop ramp from northbound MD 210 to westbound Old Fort Road North and an outer ramp connection from westbound Old Fort Road North to northbound MD 210. The designs of Old Fort Road North and the existing service road were similar to those for Option C.

f. Location E - Fort Washington Road

Capacity Option 1

Option C - Included at-grade intersection widening with an indirect left turn from MD 210 southbound to existing Fort Washington Road in the northwest quadrant of the intersection. East of MD 210, the existing service road was realigned to create additional queuing length for the MD 210 approach. Right turns onto MD 210 northbound would have been relocated from the intersection onto the realigned service road ramp, which would then have merged onto northbound MD 210. The westbound approaches consisted of one left turn and one through lane. West of MD 210, the Fort Washington Road approaches were to be widened to two left turn lanes, a left/through and a right turn lane.

Capacity Option 2

Option D - Included a $\frac{3}{4}$ diamond interchange with ramps in the northeast, northwest and southeast quadrants. The design also provided a relocated Fort Washington Road fly-over north of the existing Tantallon Shopping Center. The existing access road east of MD 210 crossed over MD 210 to tie into existing Fort Washington Road west of MD 210 at the existing Livingston Road intersection. Existing Fort Washington Road then became a right in/right out only intersection at MD 210. Relocated Fort Washington Road had one lane in each direction with left turn lanes where required.

g. Location F - Livingston Road/Swan Creek Road

Capacity Option 1

Option B – Consisted of an at-grade intersection with indirect left turns from MD 210 to Swan Creek Road on the east side of MD 210, a ramp in the southeast quadrant to connect northbound MD 210 with Livingston Road and a realignment of the existing access road opposite the proposed ramp tie-in in the northeast quadrant. The southwest intersection quadrant included a loop ramp connecting southbound MD 210 to Swan Creek Road as well as an outer ramp providing the return movement to southbound MD 210. The proposed Swan Creek Road approach configuration was two left turn lanes and two through lanes eastbound, and a single left, two through lanes and a right turn lane westbound.

Capacity Option 2

Option C - Included an interchange with a loop ramp in the southwest quadrant, connecting southbound MD 210 to Relocated Swan Creek Road and an outer ramp from

Relocated Swan Creek to southbound MD 210. A northbound MD 210 ramp to Relocated Swan Creek Road was proposed in the southeast quadrant and a relocated Swan Creek Road ramp to northbound MD 210 ramp was proposed in the northeast quadrant. The Relocated Swan Creek Road crossing over MD 210 to the south of the existing intersection included one lane in each direction with a center turn lane. The existing access road in the northeast quadrant was to be relocated.

Option D - Included an interchange with a loop ramp from MD 210 southbound to Relocated Swan Creek Road and an outer ramp from Relocated Swan Creek Road to MD 210 southbound in the southwest quadrant. On the east side of MD 210, a MD 210 northbound to Relocated Swan Creek Road outer ramp and a loop ramp from Relocated Swan Creek Road to MD 210 northbound was proposed. A Relocated Swan Creek Road crossing over MD 210 to the south of the existing intersection required one lane eastbound and westbound with a center turn lane. The existing access road in the northeast quadrant was to be relocated. An HOV median structure providing a connection between Relocated Swan Creek Road and MD 210 was proposed requiring MD 210 to be widened to the east. The HOV median structure would have operated northbound for the morning peak traffic period allowing vehicles to access the MD 210 HOV lanes. For evening peak conditions, the HOV median structure would have operated southbound allowing vehicles to exit to Swan Creek Road from the MD 210 HOV lanes.

Option E – Consisted of an interchange with a single lane outer ramp from MD 210 southbound to Livingston Road in the northwest quadrant on the west side of MD 210. Access to Swan Creek Road from MD 210 southbound would have been achieved with an at-grade right-in/right-out intersection improvement. On the east side of MD 210, a MD 210 northbound to Swan Creek Road outer ramp and a loop ramp from Swan Creek Road to MD 210 northbound was proposed in the southeast quadrant. The Livingston Road crossing over MD 210 required one lane eastbound and westbound with a center turn lane. The existing service road in the northeast quadrant was to be relocated east of its current location. A Swan Creek Road to Livingston Road Connector, behind the Old Forte Village Shopping Center, was also proposed. This option avoided the need to accommodate any interchange movements in the environmentally sensitive southwest quadrant.

h. Location G - Old Fort Road South

Capacity Option 1

Option B – Consisted of at-grade improvements, including acceleration/deceleration lanes on MD 210 and indirect left turns to Old Fort Road South from MD 210. The widened Old

Fort Road South approaches to the MD 210 intersection included two left turn lanes, two through lanes and right turn lane eastbound and westbound.

Capacity Option 2

Option C - Included a diamond interchange with Old Fort Road South over MD 210. The proposed Old Fort Road South typical section within the interchange area consisted of two lanes eastbound and westbound.

i. Location H - Farmington Road

Capacity Option 1, 2

Option B – Consisted of at-grade improvements, including indirect left turns from MD 210 northbound and southbound to Farmington Road. The widened Farmington Road approaches to the intersection consisted of a single left turn, a through lane and a through/right turn lane eastbound, with a single left turn lane, through lane and right turn lane westbound.

j. Location I - MD 373

Capacity Option 1, 2

Option B - Consisted of at-grade improvements, including acceleration/deceleration lanes on MD 210 and indirect left turns to MD 373 from MD 210 northbound and southbound. Proposed MD 373 approaches to the MD 210 intersection consisted of a single left turn; one through lane and one through/right turn lane eastbound, with two-left turn lanes, one through lane and one right turn lane westbound.

C. Alternatives Presented in the Draft Environmental Impact Statement and at the Location/Design Public Hearing

All of the Alternatives and Options presented at the Informational Public Workshop were selected for detailed study, included in the DEIS and presented at the Location/Design Public Hearing on June 21, 2001. In consideration of all comments received, SHA developed with capacity Option 2 due to the level of support the interchanges received from the public and the fact that Capacity Option 1 would not provide acceptable levels of service.

D. Alternatives Dropped From Consideration

Subsequent to the June, 2001 Location/Design Public Hearing, the following Alternatives were dropped from consideration:

1. No-Build Alternative (Alternative 1)

Alternative 1 (No Build) was not selected because it does not satisfy the purpose and need. Minor improvements for normal traffic maintenance and safety operations would not improve the degrading roadway capacity.

2. Alternative 5A

Alternative 5A was not selected because it would preclude any future accommodation of transit or other multi-modal options on mainline MD 210.

3. Alternative 5B

Alternative 5B was not selected primarily because strenuous opposition voiced by the public to HOV lanes. In addition, this alternative had higher impacts and approximately 20% higher costs as compared to Alternative 5A Modified (Refer to Section II.E.1. for description) and provided more roadway capacity than would be needed for the design year traffic.

4. Alternative 5C

Alternative 5C was also not selected because of the public opposition to HOV lanes. This alternative also had higher impacts and approximately 15% higher costs as compared to Alternative 5A Modified and provided more roadway capacity than would be needed for the design year traffic.

5. Capacity Option 1

Capacity Option 1, which included improved at-grade intersections at all locations south from Palmer/Livingston Road, was not selected since failing intersection operations would occur in the design year at four locations, and there was general support from the public for access control (i.e., interchanges) at those four locations (Old Fort Road North, Fort Washington Road, and Old Fort Road South).

6. Value Pricing Feasibility Study

The Maryland Department of Transportation included the MD 210 corridor as part of a statewide Value Pricing Feasibility Study, investigating high occupancy toll application in corridors that were considering HOV lanes. With the decision to not include HOV in the SHA-Selected Alternative, HOT lane consideration on MD 210 has been dropped.

E. Preferred Alternative Presented at the Informational Public Workshop (September 2002)

1. Alternative 5A Modified Mainline

Following the combined Location/Design Public Hearing further studies were conducted to refine both the mainline alternatives and intersection improvements options. The considerable public opposition to the widening of MD 210 to provide HOV lanes was balanced against travel demand forecasting data indicating that HOV lanes on MD 210 would be heavily utilized due to the substantial long distance commuter orientation in the corridor, expanding transit service plans (particularly commuter bus) and high vehicle occupancy rates.

Alternative 5A modified would provide six interchanges from Kerby Hill Road to Old Fort Road South, while maintaining the existing three through lanes in each direction (plus auxiliary lanes at the interchanges) with no HOV. However, the median would be widened to provide the Alternative 5C (concurrent HOV) footprint in the vicinity of the interchange so as to not preclude additional improvements in the future. Bridge abutments for the side road overpasses would be set consistent with the Alternative 5C footprint, but the mainline lanes would generally coincide with the existing roadway pavement, as feasible, between the interchanges. Where needed, the right-of-way would be preserved through the development review process for the potential additional lanes or other improvements in each direction throughout.

Designated bike lanes within the roadway, as well as sidewalks behind the curb, are included with all the proposed overpasses with Alternative 5A Modified. Bike travel along MD 210 would be accommodated under the Alternative in the same manner as with current conditions. Bike travel will not be prohibited on the MD 210 shoulders, but through various county projects and public information campaigns, north-south bike travel will be encouraged on parallel county facilities, such as Oxon Hill Road and Livingston Road.

2. Location A – Wilson Bridge Drive Option A

Wilson Bridge Drive Option A consists of an at-grade intersection with no widening of MD 210, but closure of the median opening and removal of the traffic signal, allowing right-in/right-out movements only. Improvements would be made to the internal roadway network for the Brookside Condominiums and Wilson Towers Apartments to provide the full range of access to MD 210 at the Kerby Hill interchange. Please see Figures II-5 and II-6.

3. Location B – Kerby Hill Road Option C

Kerby Hill Road Option C consists of a grade-separation with interchange ramps in the northeast and southeast quadrants of Kerby Hill Road. On the west side of MD 210, the southbound exit ramp from MD 210 ties into Kerby Hill Road opposite a two-way service road that serves the Brookside Park Condominium and Wilson Towers Apartments communities. A ramp to MD 210 southbound from existing Kerby Hill Road uses the existing access road alignment adjacent to the existing service station. East of MD 210, a loop ramp from northbound MD 210 to Relocated Kerby Hill Road and a ramp to MD 210 northbound from Relocated Kerby Hill Road are proposed. The proposed Relocated Kerby Hill Road requires two lanes in each direction through the interchange area, and is realigned to the north side of the existing roadway on the west side of MD 210 for better geometrics and maintenance of traffic. See Figure II-6.

4. Location C – Palmer/Livingston Road Option E

Palmer/Livingston Road Option E consists of a half-diamond interchange on the east side of MD 210, with single-lane ramps each in the northeast and southeast quadrants. In the southwest quadrant, a 2-lane ramp from MD 210 southbound to Palmer/Livingston Road and a Palmer/Livingston Road to MD 210 southbound single lane ramp are proposed. The proposed Palmer/Livingston roadway alignment is skewed rather sharply in relation to MD 210 in order to tie the vertical grade into existing Livingston Road on the west side of MD 210 with as few business displacements as possible. The northwest quadrant contains a proposed access road with retaining walls to allow access to the existing businesses along Palmer/Livingston Road. The existing trail and Henson Creek would be reconstructed as necessary where the MD 210 bridge over the trail and Henson Creek is proposed to be widened, and a new trail connecting the above-described access road to the existing Henson Creek trail would be constructed. See Figure II-7.

5. Location D – Old Fort Road North Option C

Old Fort Road North Option C consists of a diamond intersection at Old Fort Road North. Old Fort Road North would be realigned to the south of the existing intersection and would be comprised of two lanes in each direction while crossing over MD 210. The existing service road in the northeast quadrant would be closed with traffic being diverted east to the Broadview Road intersection. See Figure II-8. Commitments have been made to keep the profile of the northwest quadrant ramp as low as possible to maximize visibility between MD 210 and the Livingston Square Shopping Center.

6. Location E – Fort Washington Road Option D

Fort Washington Road Option D consists of a 3/4-diamond interchange with a relocated Fort Washington Road fly-over north of the existing Tantallon Shopping Center. The existing access road east of MD 210 would fly-over MD 210 and tie into existing Fort Washington Road west of MD 210 at the existing Livingston Road intersection. The existing Fort Washington Road then becomes a right in/right out only intersection at MD 210. Relocated Fort Washington Road would have one lane in each direction with left turn lanes at intersections. See Figure II-9.

7. Location F – Swan Creek Road

a. Option C

Swan Creek Option C consists of an interchange with a loop ramp from MD 210 southbound to Relocated Swan Creek Road and an outer ramp from Relocated Swan Creek to MD 210 southbound in the southwest quadrant. On the east side of MD 210, a MD 210 northbound to Relocated Swan Creek Road outer ramp in the southeast quadrant and a relocated Swan Creek to MD 210 northbound outer ramp in the northeast quadrant is proposed. A Relocated Swan Creek Road crossing over MD 210 to the south of the existing intersection would require one lane in each direction with a center turn lane. The existing access road in the northeast quadrant would be relocated.

b. Option G

Swan Creek Road Option G developed at the request of the U. S. Army Corps of Engineers to minimize the impacts to wetlands in the southwest intersection quadrant. Option G consists of a configuration to restore the continuity of Livingston Road across MD 210 via an overpass. Redundant exit ramps are proposed from northbound MD 210 to Livingston Road to maximize visibility and accessibility to the Old Forte Village Shopping Center and Fort Washington Hospital. Northbound Livingston Road would remain connected to the existing parallel service road in the east side of MD 210. Exits would also be redundant off of southbound MD 210, with a new ramp to intersect Livingston Road in front of the Fort Washington Hospital and the retention of the existing right turn onto Swan Creek Road at the existing intersection location. A new road behind the Old Forte Village Shopping Center would maintain access to Livingston Road, on the west and east sides of MD 210, for Swan Creek Road traffic from the west. See Figure II-10 and II-11.

8. Location G – Old Fort Road South Option C

Old Fort Road South Option C consists of a standard diamond interchange with Old Fort Road South over MD 210. Location G is the southernmost of the grade-separated interchanges proposed with Alternative 5A Modified. Old Fort Road South is proposed to include two lanes in each direction in the interchange area. Since a service road is being eliminated by the ramp onto southbound MD 210, a new access road is proposed to serve residences in the southwest quadrant of the interchange. See Figure II-12.

9. Location H – Farmington Road Option A

Farmington Road Option A includes minor improvements to widen the eastbound and westbound approaches of the at-grade intersection. The westbound approach would be widened by one additional lane width to provide a deceleration lane for the ramp spur connecting to northbound MD 210 and separated through and left turn lanes at the MD 210 intersection. The eastbound approach would be widened by one additional lane width to allow an exclusive right turn lane onto southbound MD 210. See Figure II-15.

10. Location I – MD 373 Option A

MD 373 Option A includes lengthening the accel/decel lanes on the MD 210 approaches to the intersection. The westbound MD 373 approach to MD 210 proposed to be widened by one lane width to provide a double left turn, a single through and a right turn lane. The eastbound approach would remain as is with a single left turn and through right turn lane. MD 210 resurfacing is proposed throughout the intersection area. See Figures II-16 and II-17.

F. SHA- Selected Alternative 5A Modified Subsequent to the September, 2002 Informational Public Workshop

The SHA Administrator chose Alternative 5A Modified as the SHA-Selected Alternative in June 2003.

The description of the selected alternative is the same as what was described previously in the Preferred Alternative at the Informational Public Workshop.

The individual intersection/interchange options comprising the SHA-Selected Alternative are summarized as follows:

Location A – Wilson Bridge Drive Option A

Location B – Kerby Hill Road Option C

Location C – Palmer/Livingston Road Option E

Location D – Old Fort Road North Option C

Location E – Fort Washington Road Option D

Location F – Swan Creek Road Option G

Location G – Old Fort Road South Option C

Location H – Farmington Road Option A

Location I – MD 373 Option A

Preliminary concept plans for the SHA-Selected Alternative indicating potential landscaping measures are shown on Figures IV-19 through IV-26.

Alternative 5A Modified has a total estimated cost of \$228.4 million. A breakdown by segment of Alternative 5A Modified costs is included on Tables S-2 and S-3.

G. Traffic Operations with SHA - Selected Alternative 5A Modified

Peak hour delays/congestion have become particularly prevalent at the eleven signalized intersections within the study segment of MD 210 for through traffic and traffic accessing or crossing MD 210 from side roads. The eleven signalized intersections along MD 210 studies and presented herein consist of:

- Oxon Hill Road
- Wilson Bridge Drive
- Kerby Hill Road/Livingston Road
- Livingston Road/Palmer Road
- Old Fort Road North
- Fort Washington Road
- Swan Creek Road/Livingston Road
- Old Fort Road South

- Farmington Road
- MD 373 (Accokeek Road)
- MD 228

As previously noted, the Oxon Hill Road and MD 228 intersections are being addressed as part of other design contracts and were therefore not included in this study.

3. Traffic Volumes

The existing Average Daily Traffic (ADT) volumes along the study segment of MD 210, as measured in 2000, range from 43,550 vehicles per day (vpd) between the MD 228 and MD 373 intersection to 68,550 vpd between the I-295 Ramps and Kerby Hill Road intersections. These traffic volumes are projected to increase to range from 62,785 vpd between the MD 373 and MD 228 intersections to 93,970 vpd between the Kerby Hill Road/Livingston Road and Palmer Road intersections in the design year 2020. Table II-1 presents the existing (2000) and projected (2020) ADT's along with the projected (2020) ADT's for the proposed Build Alternative.

Alternative 5A Modified includes no HOV lanes on MD 210 and no widening of MD 210 other than that necessary in the immediate vicinity of an intersection location to support a given intersection improvement. Consequently, the ADT's for Alternative 5A are projected to be the same as the No-Build Alternative, as shown in Table II-1.

TABLE II-1**MD 210 BI-DIRECTIONAL AVERAGE DAILY TRAFFIC**

Intersection Along MD 210	(2000) Existing	No-Build 2020	Alt. 5A 2020
Oxon Hill Road	27,650	93,445	93,445
Wilson Bridge Drive	68,550	91,850	91,850
Kerby Hill Road/Livingston Road	68,200	93,970	93,970
Livingston Road/Palmer Road	57,450	84,100	84,100
Old Fort Road North	59,300	83,685	83,685
Fort Washington Road	49,600	74,315	74,315
Swan Creek Road/Livingston Road	46,200	70,280	70,280
Old Fort Road South	45,650	66,595	66,595
Farmington Road	44,200	63,410	63,410
MD 373	43,550	62,785	62,785
MD 228			

*Includes the respective HOV ADT.

2. Level of Service and Operational Characteristics

Level of Service - Signalized Intersections

Level of service (LOS) for signalized intersections is defined in terms of delay. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Qualitatively, level of service criteria are stated as follows:

- LOS A describes operations with very low delay
- LOS B describes operations where delay just starts to be noticeable
- LOS C describes operations with an average amount of perceived delay
- LOS D described operations where delays begin to approach the unacceptable levels and congestion becomes more noticeable
- LOS E described operations considered to be the limit of acceptable delay
- LOS F describes operations, which are considered to be unacceptable to most drivers (generally greater than 1 minute). This condition often occurs with over saturation, i.e., when arrival flow rates exceed the capacity of the intersection.

Level of Service - Ramps and Merge/Diverge Areas

Level of service for ramps and merge/diverge areas is defined in terms of driving turbulence.

- LOS A represents unrestricted operations. Merging and diverging maneuvers are carried out without disruption to through vehicles. There is no noticeable turbulence in the ramp influence area.
- At LOS B, minimal levels of turbulence exist. Merging and diverging maneuvers become noticeable to through drivers, as merging and diverging drivers to smoothly fill available gaps and make lane changes within the ramp influence area must adjust speeds. Speeds of vehicles in the influence area begin to decline slightly.
- At LOS C, the level of merging or diverging turbulence becomes noticeable and the average speed within the ramp influence area begins to decline. Driving conditions are still relatively comfortable at this level.

- At LOS D, virtually all vehicles slow to accommodate merging or diverging maneuvers as turbulence levels become intrusive. Some ramp queues may form, but freeway operation remains stable.
- At LOS E, speeds reduce to 50± miles per hour as the turbulence of merging and diverging maneuvers becomes intrusive to all drivers in the influence area. Both ramp and freeway queues begin forming as flow levels approach capacity limits.
- LOS F represents breakdown, or unstable, operation. Queues have visibly formed on the freeway and on-ramps as approaching demand flows exceed the discharge capacity of the downstream freeway.

Table II-2 presents the predicted AM and PM levels of service for the design year 2020 at each intersection location under Alternative 5A and the No-Build Alternative. If the intersection location for the Build Alternative is proposed to be upgraded to an interchange then the levels of service shown in Table II-2 pertain to merge/diverge areas.

The levels of service for intersections formed by the interchange ramp terminals are presented in Figure II-2 along with the proposed lane configurations. If the intersection location for the Build Alternative is proposed to be upgraded and remain a signalized at-grade intersection then the levels of service pertain to signalized intersections. These are also presented in Figure II-2 along with the proposed lane configurations.

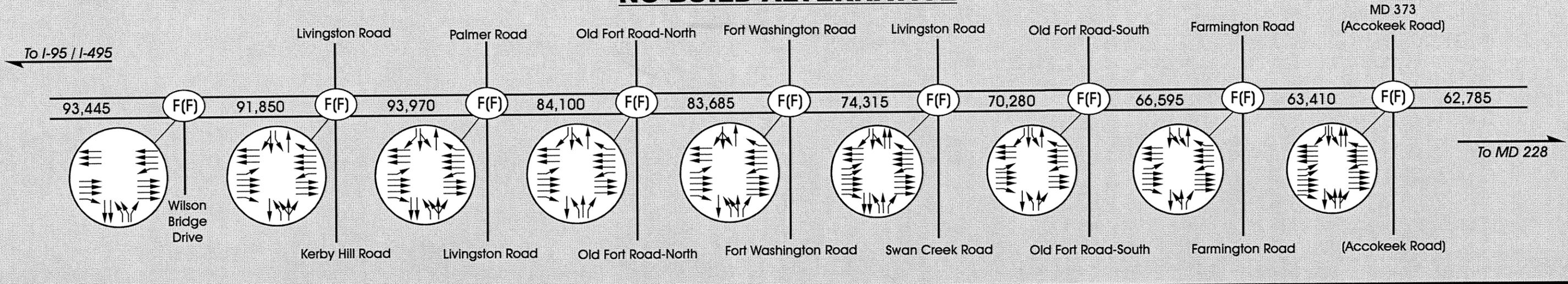
One set of intersection capacity improvement options is currently being considered with Alternative 5A Modified, namely Capacity Option 2. Capacity Option 2 includes the greatest number of interchanges considered necessary to achieve LOS D or better during the peak periods. Interchanges are proposed at the Kerby Hill Road/Livingston Road, Livingston Road/Palmer Road, Old Fort Road North, Fort Washington Road, Swan Creek Road/Livingston Road and Old Fort Road South locations. These interchanges are predicted to operate at LOS D or better for traffic merging and diverging to and from MD 210. The intersections formed by the ramp terminals and the secondary roads would require signalization and are predicted to operate at LOS D or better during the peak periods. The two remaining intersections are proposed to be expanded with the existing traffic signals to remain. The existing MD 210 median openings would be closed at Wilson Bridge Drive and all other unsignalized existing median break locations would be closed, leaving each of these locations right-turn/in right-turn out access only.

TABLE II-2

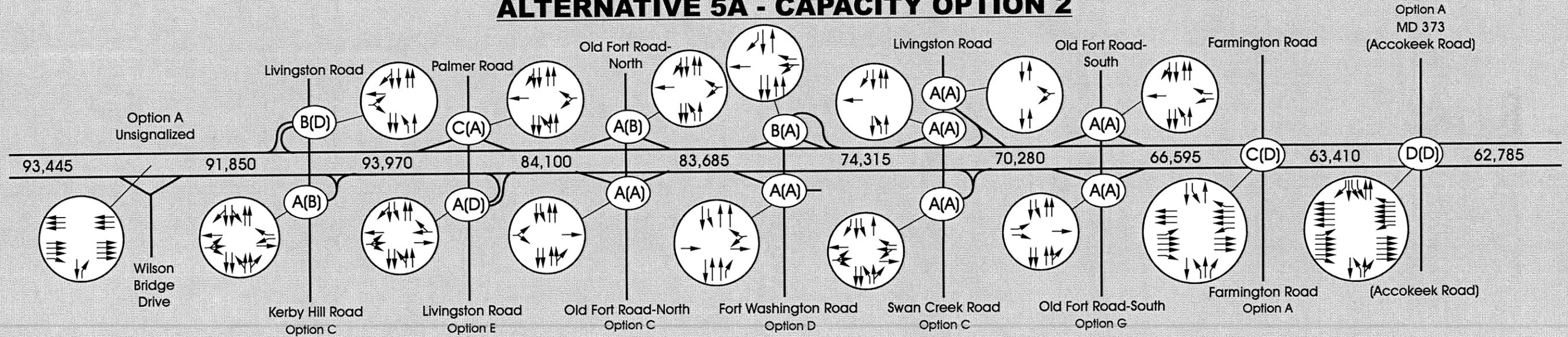
LEVELS OF SERVICE USING 2020 DEMAND TRAFFIC VOLUMES

Intersections	Ramps	No-Build		Alternative 5A	
		AM	PM	Capacity Option 2	
				AM	PM
Wilson Bridge Drive	SB Off	F	<i>F</i>	B	<i>E</i>
	SB On	1.35	1.61	B	<i>E</i>
Kerby Hill/Livingston	NB Off	F	<i>F</i>	D	<i>B</i>
	NB On			D	<i>B</i>
	SB Off			B	<i>E</i>
	SB On			B	<i>D</i>
Palmer/Livingston	NB Off	F	<i>F</i>	D	<i>B</i>
	NB On			D	<i>B</i>
	SB Off			B	<i>E</i>
	SB On			B	<i>D</i>
Old Fort North	NB Off	F	<i>F</i>	D	<i>B</i>
	NB On			D	<i>B</i>
	SB Off			B	<i>D</i>
	SB On			B	<i>D</i>
Fort Washington	NB Off	F	<i>F</i>	C	<i>A</i>
	NB On			D	<i>B</i>
	SB Off			B	<i>D</i>
	SB On			A	<i>C</i>
Swan Creek/Livingston	NB Off	F	<i>F</i>	C	<i>A</i>
	NB On			C	<i>A</i>
	SB Off			A	<i>C</i>
	SB On			B	<i>C</i>
Old Fort South	NB Off	F	<i>F</i>	C	<i>A</i>
	NB On			C	<i>A</i>
	SB Off			B	<i>C</i>
	SB On			A	<i>C</i>
Farmington	At-Grade	F	<i>F</i>	C	<i>D</i>
		1.08	1.11		
MD 373	At-Grade	F	<i>F</i>	D	<i>D</i>
		1.23	1.25		

NO-BUILD ALTERNATIVE



ALTERNATIVE 5A - CAPACITY OPTION 2



LEGEND:

3040	2020 Northbound HOV ADT
98,730	2020 Bi-directional Total ADT
2930	2020 Southbound HOV ADT
(F(F))	2020 AM/PM Levels of Service (Typ.)

	MD 210 MULTI-MODAL STUDY 1-95/1-495 TO MD 210	
	INTERSECTION / RAMP TERMINAL LEVELS OF SERVICE	
DATE MAY, 2004	NOT TO SCALE	FIGURE II-2