# FORT WASHINGTON OFFICE CENTER TRANSPORTATION IMPROVEMENTS

By

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Transportation access to Fort Washington Office Center is negatively affected by two main factors:

- Periodic flooding disrupts or cuts off access, and forces emergency evacuations. Flooding also causes deterioration of road pavement. The roads are unpleasant to drive on and give a very negative impression of the Office Center. Proper maintenance is costly under these conditions.
- 2) The road network is confusing with poor connections to some portions of the park. The zig-zag turns of Virginia Drive are uncomfortable to drive when vehicles are travelling side by side, particularly when travelling next to a truck.

Roadway improvements recommended by the Strategic Master Planning Report on the Fort Washington Business Campus (Wulff Architects, 2005) generally consist of raising Virginia Drive above the floodplain and removing one of its jogs, renaming some roads, creating a zipramp from just after the turnpike toll onto Commerce Drive at the Best Western Hotel, and improving the Camp Hill Road, Virginia Drive and Highland Avenue relationships and intersections, and finally addressing the need to eventually tie Maryland Drive back to Commerce Drive to remove too many dead-ends.

# **Existing Traffic and Travel Patterns**

With today's uses, the Office Center generates about 5,000 inbound trips in the morning peak hour and 5,000 outbound trips in the evening peak hour. The percentage of traffic using a particular approach roadway depends on the destination within the office park, since people use different external routes to minimize their travel time. For the offices east of Camp Hill Road, a higher percentage enters from the direction of Susquehanna Road; for destinations in the western end of the Office Center a higher percentage enters from the direction of Avenue.

Redevelopment scenarios examined as part of the Fort Washington Area Flooding and Transportation Improvement Study would add a net of about 1.2 million square feet of development. This would generate approximately 1,000 additional vehicle trips in the peak hours.

The travel patterns of employees were analyzed using information on municipality of residence supplied by Upper Dublin Township. Residence locations within a 50 mile radius (which includes 94% of all employment) were divided into zones for purposes of estimating routes of approach.

The estimated usage of the Pennsylvania Turnpike for travel to the Office Center is 15% to and from the west and 10% to and from the east. Travelers approaching from the east (NE Philadelphia, Lower Bucks County) can use either the westbound slip ramp to Virginia Drive or the Fort Washington interchange.

In the morning peak hour, about two-thirds of motorists that exit to Pennsylvania Avenue from the Fort Washington interchange (Turnpike and Route 309) make the right turn to enter the Office Center. About 40% of these motorists are coming from the Turnpike.

Roadway improvements that have been studied include the following:

- 1. Slip Ramp From Existing Turnpike Exit
- 2. New EZ Pass ramps to/ from eastbound PA Turnpike at Camp Hill Road
- 3. Virginia Drive Improvements
- 4. Improved Connections to Central Portion of Office Center
- 5. Improved Circulation to New York and Maryland Avenues

Figure 1 of the exhibits at the end of this report illustrates the improvements that are recommended as a result of this study.

# 1. Slip Ramp from the Existing Turnpike Exit

A new exit from the PA Turnpike leading directly into Fort Washington Office Center rather than existing routing via Pennsylvania Avenue to Commerce Drive is perceived as being much more convenient, because the Office Center is visible from the interchange. The actual decrease in travel distance is about 0.8 miles.

A slip ramp from the Fort Washington interchange directly to Commerce Drive is attractive in concept because it

- Provides more convenient access to the area of the Office Center that is best suited for increased development. The flooding analysis has shown that all areas of the Office Center are vulnerable except the highest elevation area west of Pinetown Road.
- Serves both directions of travel on the Turnpike
- Uses an existing bridge over the Turnpike

The expected volume that would be diverted to this ramp from the current Pennsylvania Avenue to Commerce Drive route is about 400 vehicles in the morning peak hour and about 2,900 daily. This is current traffic without increases from added development.

Several alternative locations were examined.

• EZ Pass only slip ramp exit in advance of toll plaza, intersecting Commerce Drive at the curve

A slip ramp in advance of the toll plaza does not have sufficient distance for traffic from the westbound off ramp to merge over to the right and does not offer enough advance perception of the fact that the ramp is for EZ Pass only. This route also crosses through an area subject to severe flooding.

• Ramp through township-owned right of way south of Best Western Hotel intersecting Commerce Drive at the curve

This location does not require a new tolling facility and is usable by both EZ Pass and cash tolls. However the ramp to Route 309 north is only 600 feet past the toll plaza, so that a ramp to Commerce Drive would need to first follow the Route 309 ramp alignment and then diverge to exit. The physical constraints of the 309 ramp and the 335 Commerce Drive and Best Western properties result in a new ramp to Commerce Drive at this location having too sharp a curve, causing a safety concern.

• Ramp to Commerce Drive between Route 309 and the curve

This ramp would also take off from the Route 309 north ramp alignment but would have a more gradual curve and would meet Commerce Drive opposite an eventual new access to the area served by Maryland and New York Avenues. That portion of the park is suited to denser development since it is safe from flooding. A new off ramp would truly provide a direct access to this area. However this alignment would pass through one or more properties and the impact to those properties would need to be considered in locating the intersection with Commerce Drive. Figure 3 of the exhibits at the end of this report shows a concept plan of this ramp.

A high volume already uses the on ramp from the Turnpike to Route 309 north. Adding a zip ramp to Commerce Drive is likely to result in some congestion during the AM peak hour due to the number of additional vehicles trying to get over to the right to make the first exit after the toll.

# 2. New EZ Pass ramps to/ from eastbound PA Turnpike at Camp Hill Road

The existing Turnpike EZ Pass interchange for westbound on-off traffic to Virginia Drive (Exit 340) has shown a steady increase in use since its opening in 2000. It currently serves about 800 vehicles exiting the westbound off-ramp in the morning peak and 1,000 vehicles entering the westbound on-ramp in the afternoon peak. Not all of this traffic is from the Fort Washington Office Center – traffic from outside the Office Center comprises at least half of the demand.

The potential for an eastbound on-off ramp counterpart was studied by the Turnpike in the late 1990's and the location determined to be feasible was Camp Hill Road. This location has the only existing bridge over the Turnpike within the Office Center. The eastbound on-off ramps

were not pursued at that time by the Township, due to the concern for the residential character of Camp Hill Road.

Eastbound EZ Pass slip ramps to Camp Hill Road would improve the access to the central and eastern portion of Fort Washington Office Center. Existing Turnpike users travelling eastbound destined to these areas would be diverted from the Fort Washington interchange to the Camp Hill Road ramp. These drivers would then not have to negotiate the winding road through the office center. For the exit from the Office Center to the eastbound Turnpike, drivers today have a choice between backtracking to Fort Washington interchange or travelling 4.5 miles on local roads to get to Willow Grove interchange; neither is convenient. A slip ramp to enter eastbound will generate new Turnpike users because of the reduced travel time. This will reduce PM traffic travelling out from the Office Center north on Dreshertown Road and east on Susquehanna Road. The peak directional ramp traffic is expected to be in the range of 600 – 900 vehicles.

The most feasible design for eastbound exit from and entry to the Turnpike would be a two-way ramp from Camp Hill Road extending east to meet the Turnpike. The two-way ramp is preferred to a half-diamond interchange because of the proximity to the Fort Washington interchange. It allows adequate spacing between the eastbound on ramp from the Fort Washington interchange and the off ramp to Camp Hill Road, so that weaving traffic is not a concern on the Turnpike main line. The ramp intersection with Camp Hill Road would be designed to allow entry from and exit to the north only (direction of Fort Washington Office Center).

The Turnpike deceleration lane for the eastbound off ramp would begin east of the Camp Hill Road underpass, and the off ramp would loop back west and rise to meet Camp Hill Road. The on ramp would intersect Camp Hill Road at the same location. Southbound traffic on Camp Hill Road would turn left into the on-ramp.

Another advantage of this layout is that it minimizes conflicting traffic movements at the Camp Hill Road intersection. The off ramp traffic enters Camp Hill Road toward the Office Center via a right turn and can operate as a yield movement; also, the off ramp traffic does not cross paths with traffic turning into the on ramp.

The ramp would require acquisition of right of way. Design of the ramp would also need to account for wetlands and storm water mitigations proposed by the flooding study. Length of the exit ramp is 1,175 feet and the length of the on ramp is 1,700 feet. Figure 2 of the exhibits at the end of this report shows a concept plan of the ramps.

# Camp Hill Road Circulation Modification

The purpose of EZ Pass slip ramps is to improve access to the Office Center. Slip ramps to Camp Hill Road are of no benefit without a connection between Camp Hill Road and the Office Center. The Turnpike is not proposing to construct any more slip ramps, and will not consider adding ramps that do not have the support of the municipality.

The following modifications to Camp Hill Road circulation are proposed in order to confine Turnpike traffic to the Office Center. The proposed modifications also recognize the presence of a one-lane underpass on Camp Hill Road under the Norfolk Southern Railroad tracks just to the south of the Turnpike, which cannot handle heavy two-way traffic volume.

- 1. Design the off ramp to direct all exiting Turnpike traffic north toward the Office Center.
- 2. Design the on ramp to allow entry only from the direction of the Office Center.
- 3. Turns to and from the Turnpike from Camp Hill Road south would not be permitted and the physical design would prohibit these turns.
- 4. Convert Camp Hill Road to one way northbound from Heller Way (just south of the one lane underpass) to the Turnpike slip ramp intersection.
- 5. Provide signs at Virginia Drive and Camp Hill Road for "Turnpike Only" similar to the signs at the existing slip ramp interchange opposite Office Center Drive.

At the one-lane railroad underpass, the current two-way volume on Camp Hill Road at times causes some queuing due to the need to yield in alternate directions. One way travel would flow through the underpass without conflict. One way northbound travel in the segment between Heller Way and the slip ramps prevents intrusion of Turnpike ramp traffic to the south, and also eliminates need to widen Camp Hill Road Bridge over the Turnpike for a turn lane to the on ramp. Local traffic northbound would be unaffected. Local traffic southbound (approximately 300 vehicles in the peak hour) would have to turn at or before Virginia Drive, since south of Virginia Drive would provide access to the eastbound PA Turnpike only. Southbound traffic would divert among several routes depending on the destination (e.g. Pinetown to Commerce, Susquehanna to Limekiln). Emergency vehicles would still be able to travel south on Camp Hill Road with an emergency signal operation at the railroad underpass.

It is recognized that making a connection between Camp Hill Road and the Office Center will draw some local traffic to utilize that roadway to access the Office Center. For Camp Hill Road north of Highland Avenue, not much effect is anticipated since Pinetown Road, the Susquehanna Road entry driveway and Virginia Drive already provide access from the north (as well as Camp Hill Road itself via Highland Avenue). However for Camp Hill Road south of Virginia Drive there is latent demand, since the alternate route of Limekiln Pike to Susquehanna Road to Virginia Drive is very congested in the morning. Northbound Camp Hill Road traffic north of Pennsylvania Avenue would increase during the morning commuter hours; however this would be offset by a decrease in the southbound traffic. Some AM commuter volume would be relieved on northbound Limekiln Pike south of Susquehanna Road.

# **3.** Virginia Drive Improvements

Several alternatives were considered with the objective of improving access and reducing the impact of flooding.

# Potential Improvements to Virginia Drive Alignment in West End

In order to mitigate the zig zag effect on Virginia Drive, options would be to relocate the roadway to cut off the jogged alignment or to soften the existing curves.

Relocation alignment starting at 335 Commerce Drive, running behind the existing buildings and connecting to Virginia Drive west of Rapp Run would cut off four jogs. Alternatively, a relocation starting at the intersection of Virginia Drive and Delaware Drive and running behind two buildings to return to Virginia Drive west of Rapp Run would eliminate two jogs. However, either of these new alignments places Virginia Drive deeper into the floodplain. It appears that flood mitigation measures will not be sufficient to keep these areas dry. Therefore the expense of constructing new roadway on these alignments is not justified.

Feasible improvements to the existing curves consist of increasing the radii and widening the lanes through the curves.

# Raising the Virginia Drive Roadway

In order to mitigate the effect of flooding on Virginia Drive, the concept of raising the entire roadway was suggested in previous studies. The flooding studies reveal that, even with upstream watershed improvements, much of Virginia Drive will still be subject to flooding and in places the water would be five to ten feet deep in the 10 year flood.

In order for raising the roadway to be effective, it should be raised sufficiently to be drivable in a 10-year flood. That means the depth of water on the roadway should be no more than six inches in a 10-year flood.

A key consideration is the extent of future flooding at the intersection of Susquehanna Road and Virginia Drive with storm water management. It is assumed that intersection would not be raised. Ideally Virginia Drive inside the Office Center would be improved to be passable when the Susquehanna Road intersection is passable.

Raising the Virginia Drive Roadway on embankment would create a dike effect on Pine Run that would compound the severity of flooding in other areas. To avoid this dike effect, Virginia Drive would need to be raised on pilings to allow the floodwater to flow underneath. At a cost of about \$10,000 per linear foot, it is not feasible to raise Virginia Drive out of the floodplain.

# Examination of Relocated Roadway in East End

In general, Virginia Drive west of Camp Hill Road is out of the floodway (although it is within the 100-year floodplain up to Pinetown Road). However, Virginia Drive from the intersection with Camp Hill Road to the east is in the floodway itself. Since raising Virginia Drive is not a viable option, an alternative concept was explored of relocating the major circulation to a higher elevation. The concept involves a new alignment starting at the curve at 500 Virginia Drive, creating an elevated section on pilings to cross the Rapp Run floodplain, and curving to meet Camp Hill Road. Highland Avenue would be realigned to meet relocated Virginia Drive at a 'T' intersection.

At Camp Hill Road, two alternatives were considered.

The first alternative was to cross Camp Hill Road at a four way intersection and extend relocated Virginia Drive east through the office center properties to meet West Office Center Drive, and extend West Office Center Drive east to meet Susquehanna Road at a new traffic signal. This concept poses significant challenges with right of way and configuration of property access and parking.

The second alternative was to use existing Camp Hill Road as the alignment to Susquehanna Road, with widening and driveway access to the office center. This option would be less costly since it requires less right of way and would be on the perimeter of office center properties rather than bisecting properties. It is recognized that the western side of Camp Hill Road is residential. From a traffic perspective, other recommended improvements have already created a connection between Camp Hill Road and the office center. The design of Camp Hill Road would need to mitigate visual impacts as much as possible. This is the alternative that is shown in the Fort Washington Office Park Development Plan (Figure 13). Camp Hill Road from the south would meet the new alignment at a signalized 'T' intersection.

In either alternative, from Susquehanna Road the existing Virginia Drive would be retained as the major access to the Turnpike slip ramps, Office Center Drive, and the first access to 1100 Virginia Drive (GMAC). This section might be renamed Dreshertown Road to provide continuity and avoid confusion with the western portion of Virginia Drive. The road could continue west as a driveway serving destinations as far west as DeVry University.

This concept would reduce existing volumes on Virginia Drive at Office Center Drive and the Turnpike slip ramps, improving the level of service at that intersection.

At the intersection of Virginia Drive and Susquehanna Road, the traffic volume would not be reduced but vehicles to and from the western part of the office center would take a different path through the intersection. It is noted that there are existing severe congestion problems at the intersection of Virginia Drive and Susquehanna Road, particularly in the morning peak hour. With or without a relocation of Virginia Drive, Level of Service 'F' conditions will remain without a widening of Susquehanna Road.

# Recommendation for Virginia Drive

Relocation of Virginia Drive is the long term sustainable solution. The construction cost is substantial and right of way is required. The other option is leaving Virginia Drive in its present location, and reconstructing the road to upgrade the inadequate paving which is only about five inches depth. This will require planning for increased maintenance costs on a

continuing basis, since periodic flooding will deteriorate the pavement. A comparison of cost is provided in Table 2 of the exhibits at the end of this report.

# 4. Improved Connections to Central Portion of Office Center

A connection between Highland Avenue and Virginia Drive is proposed that would improve access to the central portion of the Office Center. If Virginia Drive is relocated to a higher elevation as proposed to avoid flooding, the Highland Avenue connection would be located such that it did not cross the floodplain of Rapp Run. This would serve to maintain circulation and access during lesser flood events that cut off access today.

Another improved connection is the proposed EZ Pass slip ramps and connection of Camp Hill Road to Virginia Drive described earlier. The proposed road configuration and circulation are intended to minimize traffic impact on the residential portions of Camp Hill Road while providing a very significant improvement in access to the central and eastern portions of the Office Center.

Camp Hill Road presently rises over the Turnpike, descends to intersect Virginia Drive, and rises again to Highland Avenue. The intersection of Virginia Drive and Camp Hill Road is in the floodway, and when it is flooded the traffic circulation on both roads is cut off. Camp Hill Road could remain elevated on a new bridge over Virginia Drive. This would improve the vertical alignment and maintain an open roadway in flood conditions. A bridge is costly, and the utility depends in part on what other access improvements are constructed (e.g., slip ramps).

# 5. Improved Circulation to New York and Maryland Avenues

The destinations within the Office Center located on Maryland, New York, and New Jersey Drives are isolated and remote because they are served only by dead-end roads. As part of redevelopment, Maryland Drive could be extended as a loop connecting with New York Drive. In order to improve the access and visibility of this area, New York/Maryland Drive should be extended south to intersect Commerce Drive east of the Route 309 overpass. The extension is physically feasible and is conceived as a four lane roadway at its intersection with Commerce Drive, in order to serve parking facilities for high density development. The intersection of Commerce Drive and Maryland Drive extension would be signalized.

# **Other Improvements**

# **Public Transportation**

SEPTA's Route 201 bus provides weekday service from the R-5 train station to Fort Washington Office Center. The bus runs Monday through Friday, generally once every half-hour each direction. Service from the station starts at 6:00 am and the last return trip to the station starts at

7:50 pm. The route runs along Pennsylvania Avenue to Commerce Drive, along Virginia Drive to Office Center Drive, along Office Center Drive to Camp Hill Road where it exits to Susquehanna Road and loops back into the Office Park to Office Center Drive. There are bus shelters at the train station, on eastbound Commerce Drive at the corner with Delaware Drive, westbound at 420 Delaware Drive, and westbound at 500 Virginia Drive. Two shelters will be placed at 1100 Virginia Drive (at DeVry and GMAC) by the developer.

Ridership on the Route 201 is about 275 riders per day. Ridership is much higher from the train station to the park than the return trip; many riders get a ride home with a co-worker. Financially the revenue is 41% of cost, exceeding SEPTA's minimum percent of operating costs to justify the route. However, no expansion in service would be considered without a dedicated funding source to subsidize the additional operating cost.

The creation of a connected loop roadway through the New York/ Maryland Drive area with access at both Commerce Drive and New Jersey Drive will allow SEPTA to serve the primary redevelopment area much more efficiently.

# Pedestrians

Few pedestrians are seen walking within the FWOC, but pedestrians are present. They walk to transit stops, to the few restaurants, and also just to get outside and walk during the day.

There are sidewalks along both sides of some Office Center roadways including New Jersey, New York, Maryland, and Office Center Drive. The main spine of Commerce/Virginia Drive however has long sections with sidewalk on one side only. Pedestrians must walk across the street in order to use sidewalk. If taking the bus, this means people must walk/ wait on grassed area, which is sometimes wet and muddy. All bus stops should have paved waiting areas, and sidewalk connections to bus stops should be completed.

The Cross County Trail is proposed to be constructed through the Office Center. The Cross County Trail will connect the Schuylkill River Trail to Willow Grove in Upper Moreland Township. The preliminary trail route is from the SEPTA train station along Pennsylvania Avenue (either along the street or along the railroad) to Commerce Drive, and then through the Office Center generally on a route following Commerce and Virginia Drives to Susquehanna Road. The Trail cross section is preferably 12 feet paved with 2-foot shoulders. The minimum paved width is 10 feet. The exact route of the Trail within the Office Center is subject to revision during design. Upper Dublin Township has planned for additional trails along the northern edge of the Office Park. All properties in the Office Center should have sidewalk access to trail connections.

The alternative of relocating Virginia Drive traffic circulation to a higher elevation offers the opportunity to use the existing Virginia Drive alignment as a trail.

# Wayfinding

Finding a particular business location or destination in the Fort Washington Office Park can be a challenge for visitors and delivery vehicle drivers who are not familiar with the FWOC. Locating Virginia Drive is a problem for motorists who enter at Pennsylvania Avenue and Commerce Drive. Motorists get lost trying to find New Jersey, New York or Maryland Drive.

Vehicular directional signs should be placed at decision points along the roadways, typically in advance of intersections. As an example, a sign should be placed for northbound motorists on Commerce Drive in advance of the intersection with Delaware Drive to indicate that New Jersey, New York and Maryland Drive are straight ahead and Virginia Drive is reached by turning right. Street name signs should have minimum six inch high letters and should be placed in visible locations.

Simple highway-type signs would suffice. However, signs could also be used as one element to enhance the image of the Office Center, by creating a distinctive and attractive sign program. Such a sign program would require services of a graphic design firm experienced in campus signing projects.

All properties should have signs which clearly indicate the address number. At some locations, neither the business name nor a street address number is visible to the motorist on the street. A clear address number not only helps visitors, but it helps emergency service providers quickly find the location of a call.

A comprehensive sign program should include major gateway signs at Pennsylvania Avenue and Commerce Drive and at Susquehanna Road and Virginia Drive, and secondary gateway signs at Pinetown Road and Highland Avenue and at the Susquehanna Road access to Office Center Drive.

Exhibits illustrating proposed improvements follow on the succeeding pages. A cost estimate for the potential roadway improvements is provided.

# Exhibits

Figure 1	Potential Roadway Improvements
Figure 2	Camp Hill Road EZ Pass Slip Ramp Concept Plan
Figure 3	Commerce Drive Slip Ramp/ Maryland Drive Connection Concept Plan
Figure 4	Existing Roadways with Completion of Route 309 Project
Figure 5	Existing Lane Configurations and Traffic Controls
Figure 6	2006 Morning Peak Hour Traffic Volumes
Figure 7	2006 Evening Peak Hour Traffic Volumes
Figure 8	2010 Projected Morning Peak Hour Volumes
Figure 9	2010 Projected Evening Peak Hour Volumes
Figure 10	2010 Morning Peak Hour Volumes with Relocation of Virginia Drive
Figure 11	2010 Evening Peak Hour Volumes with Relocation of Virginia Drive
Table 1	Trip Generation of Fort Washington Office Center

Table 2Order of Magnitude Cost Estimates



### <u>LEGEND</u>

- EXISTING ROAD
- NEW ROAD
- WIDENED ROAD
- REMOVED AS A THROUGH ROAD (PORTIONS MAY CONVERT TO DRIVEWAY)
- EXISTING TRAFFIC SIGNAL
- NEW TRAFFIC SIGNAL

Potential Roadway Improvements Flooding and Transportation Study FORT WASHINGTON OFFICE CENTER August 8, 2008









# <u>LEGEND</u>

ROADWAYTOLL ROADTRAFFIC SIGNAL

# Existing Roadways in Vicinity of Fort Washington Office Center

FIGURE 4

rt Washington Office Center Flooding and Transportation Study FORT WASHINGTON OFFICE CENTER August 8, 2008



# <u>LEGEND</u>

ROADWAYTOLL ROADTRAFFIC SIGNAL

# Existing Roadways in Vicinity of Fort Washington Office Center

FIGURE 4

rt Washington Office Center Flooding and Transportation Study FORT WASHINGTON OFFICE CENTER August 8, 2008



# **Existing Lane Configurations and Traffic Control** Fort Washington Office Center UPPER DUBLIN TOWNSHIP, PENNSYLVANIA



















Orth - Rodgers Associates, Inc. TRANSPORTATION ENGINEERS and PLANNERS



Orth - Rodgers Associates, Inc. TRANSPORTATION ENGINEERS and PLANNERS



# Table 1Trip Generation of Fort Washington Office CenterWith Redevelopment - TDR Phase 1

Land Lico		Kcf	AM Trips			PM Trips		
	Land Ose	1/21	Total	In	Out	Total	In	Out
Zone 1	Office	170	287	253	34	269	46	223
	Manufacturing	145	91	70	21	103	37	66
	Warehouse	112	90	74	16	71	18	53
	Total	427	468	397	71	443	101	342
2one 2	Office	3180	2986	2628	358	3640	619	3021
	Manufacturing	1135	913	703	210	924	333	591
	Total	4315	3899	3331	568	4564	952	3612
Zone 3	Office	944	1130	994	136	1136	193	943
	Total	944	1130	994	136	1136	193	943
Zone 4	Office	1100	1277	1124	153	1311	223	1088
	Manufacturing	24	18	14	4	18	6	12
	Total	1124	1295	1138	157	1329	229	1100
Zone 1		427	468	397	71	443	101	342
	Zone 2/3	5259	5029	4325	704	5700	1145	4555
Zone 4		1124	1295	1138	157	1329	229	1100
All Zones		6810	6792	5860	932	7472	1475	5997

Traffic Analysis Zones

Zone 1 - Area between Pennsylvania Avene and Route 309 overpass

Zone 2 - Area between Route 309 overpass and Camp Hill Road

Zone 3 - Area between Camp Hill Road and eastern property line of 1100 Virginia Drive (GMAC)

Zone 4 - Area beween eastern property line of 1100 Virginia Drive and Susquehanna Road

TDR Zones illustrated in Figure 13 of Fort Washington Area Flooding and Transportation Study report

### Table 2

### FORT WASHINGTON OFFICE CENTER

### MONTGOMERY COUNTY, PENNSYLVANIA

### ORDER OF MAGNITUDE COST ESTIMATE TRANSPORTATION IMPROVEMENTS

IMPROVEMENT	DESCRIPTION	COST	LENGTH (ft)	R/W required?		
Virginia Drive Relocation (with section of elevated road)	Pinetown to Susquehanna	14,861,610	9,135	yes		
Removal of Existing Virginia Drive	GMAC to Camp Hill Road	550,140	)			
Highland Ave Relocation	to intersect relocated VaDr	447,543	500	yes		
Traffic Signals	at Highland and reloc VA at Camp Hill and Reloc VA	125,000 125,000	)			
Camp Hill Rd Bridge over VA Dr.	either VA Dr. alternative	9,908,840	)			
Maryland Dr connection to Commerce Dr	4-lane to NJ Drive (Fig. 3)	1,234,530	1,200	yes		
Maryland Dr connectivity loop	2-lane loop (Fig. 3)	2,308,300	2,700	yes		
Ramp from Fort Washington interchange to Commerce Dr	Fig. 3	4,895,335	5	yes		
EZ Pass slip ramp EB off-on to Camp Hill Rd	Fig. 2	6,083,280	)	yes		
<b>TOTAL</b> Cost of Right of Way not included		\$40,539,578	3			
RECONSTRUCT VIRGINIA DRIVE IN PLACE   Limits of Work – beginning at Pinetown Road and ending at Susquehanna Road (Total Roadway Length = 9,188 feet)   assumes traffic signal at Virginia Drive and and Camp Hill Road; no right of way required   Virginia Drive Reconstruction   Traffic Signal   9,464,140   200,000   \$9,664,140						

#### Table 2a

### FORT WASHINGTON OFFICE CENTER

#### MONTGOMERY COUNTY, PENNSYLVANIA

# ORDER OF MAGNITUDE COST ESTIMATE

### VIRGINIA AVENUE

### ROADWAY RELOCATION

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
CLEARING AND GRUBBING	LS	1	\$100,000.00	\$100,000.00
ROADWAY EXCAVATION	CY	24,350	\$30.00	\$730,500.00
SAWCUTTING	LF	18,400	\$3.50	\$64,400.00
FULL DEPTH PAVEMENT *	SY	48,720	\$60.00	\$2,923,200.00
CEMENT CONCRETE CURB	LF	18,270	\$27.00	\$493,290.00
DRAINAGE	LF-WIDEN	18,300	\$100.00	\$1,830,000.00
	CONSTRU	CTION COST	SUBTOTAL 1	\$6,141,390.00
			†	
UTILITIES	3°	% OF SUBTO	TAL 1	\$184,240.00
	4 <sup>c</sup>	% OF SUBTO	TAL 1	\$245,660.00
PAVEMENT MARKING AND SIGNING	30	% OF SUBTO	TAL 1	\$184,240.00
EROSION AND SEDIMENT CONTROL	2°	% OF SUBTO	TAL 1	\$122,830.00
LANDSCAPING/SEEDING	29	% OF SUBTO	TAL 1	\$122,830.00
	CONSTRU		SUBTOTAL 2	\$7.001.190.00
		<u>eneee</u>		······
MAINTENANCE AND PROTECTION OF TRAFFIC	55	% OF SUBTO	TAL 2	\$350,060.00
MOBILIZATION AND INSURANCE	39	% OF SUBTO	TAL 2	\$210,040.00
	CONSTRU		SUBTOTAL 3	\$7,561,290.00
ELEVATED ROADWAY	SF	21,600	\$225.00	\$4,860,000.00
DESIGN				\$550,000.00
CONTINGENCIES	25% OF SUBTOTAL 3			\$1,890,320.00
	\$14,861,610			

NOTES:

1 - THIS ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT-OF-WAY ACQUISITION.

\* - 1 1/2" WEARING COURSE

3" BINDER COURSE

5" BITUMINOUS CONCRETE BINDER COURSE

6" SUBBASE

Limits of Work - beginning at Pinetown Road and ending at Susquehanna Road (Total Roadway Length = 9,135 feet)

Assume Total Elevated Roadway Length = 450 feet

#### ESTIMATED MAINTENANCE COST OF RELOCATED ROADWAY

Assuming Roadway Resurfacing will take place **once in 20 years** with 1 ½" Milling (\$3 per SY) and 1 ½" Overlay (\$7 per SY) at an assumed annual inflation rate of 4%, the Equivalent Total Cost to resurface the roadway alone would be approximately **\$1,067,000** 

	lable 2b					
FORT WASHINGTON OFFICE CENTER						
MONTGOMERY COUNTY, PENNSYLVANIA						
ROADWAY	RECONST	RUCTION				
DESCRIPTION	UNIT	QUANTITY	UNIT	TOTAL		
			COST	COST		
	LS	1	\$100,000.00	\$100,000.00		
	CY	24,500	\$30.00	\$735,000.00		
SAWCUTTING	LF	18,500	\$3.50	\$64,750.00		
FULL DEPTH PAVEMENT *	SY	49,000	\$60.00	\$2,940,000.00		
	LF	18,200	\$27.00	\$491,400.00		
DRAINAGE	LF-WIDEN	18,400	\$100.00	\$1,840,000.00		
	CONCTRU			<u> </u>		
	CONSTRU		SUBIUIALI	\$6,171,150.00		
UTILITIES	ITILITIES 3% OF SUBTOTAL 1			\$185,130.00		
PAVEMENT MARKING AND SIGNING	/EMENT MARKING AND SIGNING 3% OF SUBTOTAL 1			\$185.130.00		
EROSION AND SEDIMENT CONTROL	2% OF SUBTOTAL 1			\$123,420.00		
LANDSCAPING/SEEDING	29	6 OF SUBTO	TAL 1	\$123,420.00		
				. ,		
	\$6,788,250.00					
	1					
MAINTENANCE AND PROTECTION OF TRAFFIC	5% OF SUBTOTAL 2			\$339,410.00		
MOBILIZATION AND INSURANCE	3% OF SUBTOTAL 2			\$203,650.00		
CONSTRUCTION COST SUBTOTAL 3			\$7,331,310.00			
DESIGN				\$300,000.00		
CONTINGENCIES	25% OF SUBTOTAL 3			\$1,832,830.00		
	\$9,464,140					

NOTES:

1 - THIS ESTIMATE DOES NOT INCLUDE COSTS FOR RIGHT-OF-WAY ACQUISITION.

\* - 1 1/2" WEARING COURSE

3" BINDER COURSE

5" BITUMINOUS CONCRETE BINDER COURSE

6" SUBBASE

Limits of Work – beginning at Pinetown Road and ending at Susquehanna Road (Total Roadway Length = 9,188 feet)

### ESTIMATED MAINTENANCE COST OF RECONSTRUCTED ROADWAY

Assuming Roadway Resurfacing will take place **once every 10 years** with 1 ½" Milling (\$3 per SY) and 1 ½" Overlay (\$7 per SY) at an assumed annual inflation rate of 4%, the Equivalent Total Cost to resurface the roadway alone would be approximately **\$1,798,000** in 20 years