Part II of
Reviewing VDOT’s Sept. 2008
Traffic Control Plan for Evacuation:
“Hurricane Lane Reversal Plan”

Presented to HRTO
June 15, 2010
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Background

• 1995 to 2008
  – VDOT has continually improved its evacuation traffic control plan, from first plan (1995) to latest (2008).

• March 2010
  – At its March meeting, TTAC asked for HRTO to review the VDOT evacuation plan.

• April 2010
  – At its April meeting, HRTO reviewed presentations by VDOT and TPO staffs
April 2010 HRTO Meeting

• From TPO staff presentation:
  – Problem:
    • Long clearance time for Hampton Roads (36 hours)
  – Recommendations:
    1. Route 58/460 reversal
    2. Leave MMBBT open

• HRTO members responded:
  – Approved first recommendation—Route 58/460 reversal
  – Tabled second recommendation—leaving MMBBT open—until June meeting, requesting members to submit concerns and staff to identify additional resources needed (e.g. for US 17)
Aid Requested by York Co for US 17 (and other routes, as noted) in June 14, 2010 letter to Mr. Colestock, VDEM Director of Operations

• **Related to VDOT traffic control plan:**
  1. Resources for traffic control “to facilitate movement” and “in the event that traffic signals become inoperable”
  2. Resources for traffic control “to assist in routing evacuees to refuges of last resort”
  3. Resources for removal of disabled vehicles and relocation of their occupants on US 17 and other primary roadways (Routes 105, 134, 143, 171, 199, 238 and US 60)

• **Related to other portions of Va. Emergency Op’s Plan (COVEOP):**
  4. Resources for security at refuges of last resort along US 17 and other primary roadways
  5. Resources for relocation of occupants from refuges of last resort to other shelters
  6. Integrated and interoperable communications plan
  7. Supplies for human sustainment at refuges of last resort
  8. Minimal generator power for refuges of last resort
Aid Request #1 and Current VDOT Traffic Control Plan

source: VDOT *Hurricane Lane Reversal Plan*, Sept. ’08

1. **Resources for Traffic Control “to facilitate movement” and “in the event that traffic signals become inoperable”**

   - “...VDOT will modify traffic signal timings of their own signals.” (p. 34)
   - Note: No mention is made of inoperable signals.

   - Recommendation #1: Revise VDOT Plan to identify agency responsible for manning inoperable signals. (p. 34)
Aid Request #2 and Current VDOT Traffic Control Plan

source: VDOT *Hurricane Lane Reversal Plan*, Sept. ’08

2. **Resources for Traffic Control “to assist in routing evacuees to refuges of last resort”**

   – Note: No mention is made of routing evacuees to refuges of last resort.

   – Recommendation #2: Revise VDOT Plan to identify agency responsible for routing evacuees to refuges of last resort.
Aid Request #3 and Current VDOT Traffic Control Plan

source: VDOT Hurricane Lane Reversal Plan, Sept. ’08

3. Resources for Removal of Disabled Vehicles and Relocation of their Occupants

– “The Hampton Roads District [VDOT] and VSP Division 5 will...patrol the critical roadway sections and will observe and report vehicle speeds...as well as incident...locations.” (p. 32)

– “These agencies [local government] shall...assign law enforcement personnel to all links along...primary evacuation routes. This will provide immediate response to incidents.” (p. 32)

– Note: Responsibility for removal of vehicles and relocation of occupants on primaries is currently not identified.

– Recommendation #3: Revise VDOT Plan to identify agency responsible for removal of disabled vehicles and relocation of their occupants on primaries. (p. 32)
Current VDOT Traffic Control Plan

source: VDOT Hurricane Lane Reversal Plan, Sept. ’08

• **Additional Issue**
  – “Law enforcement presence will be required to facilitate the merge of this traffic [Route 134 merging onto US 17 North].” (p.35)
  
  – Note: Responsibility (state vs. local) is currently not identified.
  
  – Recommendation #4: Revise VDOT Plan to identify agency responsible “to facilitate the merge of this traffic.” (p. 35)
Current VDOT Traffic Control Plan

source: VDOT Hurricane Lane Reversal Plan, Sept. ’08

• Additional Issue
  – “These agencies [local government] shall...assign law enforcement personnel to all links along interstate and primary evacuation routes. This will provide immediate response to incidents.” (p. 32)
  – Yet, according to another section of VDOT plan, the state is responsible for interstate incidents:
    • “...to help immediately clear any disabled vehicles that may block the roadway or shoulder, VDOT and VSP personnel will be assigned to sections of the interstate system designated as evacuation routes.” (pp. 34-35)

  – Recommendation #5: Revise VDOT Plan to remove “interstate” from local law enforcement responsibility (p. 32)
Recommendations-
Responsibilities in VDOT Plan

1. Request VDOT to revise its Plan in order to identify agency responsible for manning inoperable signals. (p. 34)
2. Request VDOT to revise its Plan in order to identify agency responsible for routing evacuees to refuges of last resort.
3. Request VDOT to revise its Plan in order to identify agency responsible for removal of disabled vehicles and relocation of their occupants on primaries. (p. 32)
4. Request VDOT to revise its Plan in order to identify agency responsible “to facilitate the merge” for US 17 @ Route 134 ramp (pg. 35).
5. Request VDOT to revise its Plan to in order to remove interstates from local law enforcement responsibility (pg. 32).
The Existing *Clearance Time* Situation
The population of the Southside evacuating localities is almost **3 times greater** than the population of the Peninsula evacuating localities.
A greater *portion* of the Southside population lives in low-lying areas, as compared to the Peninsula.

Therefore, the **vast majority** of evacuating vehicles come from the Southside.
VDOT’s Hurricane Lane Reversal Plan

• The VDOT Plan aids all evacuees by reversing I-64, placing Southside I-64 traffic on the contraflow lanes at 4th View St. in Norfolk and reserving the regular WB I-64 lanes primarily for Peninsula traffic.

• But the Plan closes the MMMBT northbound, reducing the capacity available to the vast majority of evacuees.
VDOT cited evacuation as a “deficiency” in the *Purpose & Need Statement* of the HR Crossing Study, yet VDOT plans to close half of the crossing capacity which currently exists.

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<th>TRANSPORTATION ISSUE OR MODE</th>
<th>TRENDS</th>
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| Bicycle and Pedestrian Facilities | • There are approximately 160 kilometers (105 miles) of bikeways in the study area.  
• Bicycle facilities are mainly used for recreational travel in the study area. | • There are no bicycle or pedestrian linkages between the Southside and Peninsula.  
• Neither bikeways nor pedestrian facilities provide any regular relief from congestion. |
| Intermodal Transfer Points | • There are 58 transfer points in the study area. | • Of the 58 transfer points, 25 are park and ride lots and 30 are park and ride lots.  
• There are only 12 other transfer points. |
| Alternatives to Single Occupancy Vehicle (SOV) Facilities | • 76% of the commuters in Hampton Roads use SOV facilities.  
• 19% carpool.  
• 2% use public transit.  
• There are 17 kilometers (17 miles) of High Occupancy Vehicle (HOV) lanes on the Southside.  
• Alternatives to SOV facilities are currently under study in Hampton Roads. | • There are no HOV facilities on the Peninsula.  
• Other than the HOV facilities on the Southside, there are currently no substantial alternatives to SOVs in the region. |
| Environmental Factors | • The area is currently classified as a marginal non-attainment area for ozone.  
• Non-point sources, such as highways, are contributors to water pollution primarily through water runoff containing petroleum product residues. | • In order to meet the requirements of the Clean Air Act, the region must implement transportation solutions that help to reduce Vehicle Miles Traveled and emissions.  
• The Hampton Roads area must develop transportation alternatives that minimize the impact to water quality, particularly in the Chesapeake Bay. |
| Emergency Services | • Within the last century, there have been three severe hurricanes.  
• An average of two hurricanes a year come close enough to affect Virginia. | • There is a need to efficiently evacuate the “at risk” population in the event of an emergency. |
Impact of Evacuation Traffic Control

• The Corps of Engineers’ *Virginia Hurricane Evacuation Study* (VHES), 2008, estimates clearance times for the VDOT Plan using an Abbreviated Transportation Model (ATM) spreadsheet.

• In order to calculate times for each side of I-64, and to test candidate changes to the VDOT plan, TPO staff developed an ATM Mirror spreadsheet.

  – For the same inputs and assumptions, the ATM and ATM Mirror give *exactly* the same results.
Clearance Times, Base Scenario- Cat. 3, Hi Tourist Occupancy, Heavy Background Traffic (ATM Mirror)

Note: Whereas the ATM assumed that HRBT lanes have capacity equal to 1,800 vphpl, based on the actual capacity measured at the tunnel, TPO staff assumed that these lanes have capacity equal to 1,600 vphpl.

Note: Whereas the ATM assumed that the I-64 West gateway’s lanes (contraflow and regular) have capacity equal to 1,400 vphpl, based on the capacity of stop and go situations (i.e. signalized intersections), TPO staff assumed that these lanes have capacity equal to 1,800 vphpl. (Base saturation flow rate at signalized intersections is 1900 pcphpl, HCM 2000, pg. 16-10.)
The clearance time for the Southside is much longer than that of the Peninsula, and the 36 hour overall clearance time for Hampton Roads is problematic because the storm track error is 100nm at 36 hrs.
Would Virginia decision-makers call for an evacuation of Hampton Roads at 36 hours under this scenario?

Tracking Error at T-minus-36 hours is 115 mi (100 nm).
Alternatives for Improving Clearance Time

• 1. Reversing US 58/460
• 2. Leaving the MMMBT Open
1. Reversing US 58/460

- In order to lower the high clearance time for US 58/460 (36 hours for Cat. 3), VDOT is studying the reversal of this highway.
- At its April meeting, HRTO endorsed reversing US 58/460.
- According to the ATM Mirror spreadsheet, reversing US 58/460 would lower the clearance time for Southside residents by 13 hours, from 36 hours without reversal to 23 hours with reversal.
Clearance Times, Reversing US58/460- Cat. 3, Hi Tourist Occ., Heavy Background Traffic (ATM Mirror)
Reversing US58/460 would bring the overall clearance time down to a **less problematic 23 hours** at which time the storm track error is 65nm.
1. Reversing US 58/460 - Funding

- The reversal of US 58/460 is estimated to cost $7m.
- The CTB has allocated only $600k dollars to this project over the next 6 years in its draft FY11-16 SYIP (to be approved by CTB on June 16).
- The TPO has $5.5m in RSTP reserve, but it was set aside for project cost overruns and for possible reductions in future year allocations thru FY15.
- VDOT just released an additional $3.5m in RSTP.
- **Recommendation**: Use $3.5m in RSTP to fund half the cost of reversal, and request other half of cost from CTB.
2. Leaving the MMMBT Open

- Particularly until the construction enabling US58/460 reversal has been built, another method of lowering the 36 hour clearance time is desirable.

- TPO staff tested the impact of leaving the MMMBT open using the ATM Mirror spreadsheet.
  - Usage of the MMMBT would lower the usage of Suffolk Bypass and thereby lower its clearance time by 7 hours.
Clearance Times with MMMBT Open- Cat. 3, Hi Tourist Occupancy, Heavy Background Traffic (ATM Mirror)

Opening the MMMBT increases the Peninsula clearance time by 7 hours and reduces the Southside clearance time by 7 hours.
Opening the MMMBT increases the Peninsula clearance time by 7 hours and reduces the Southside clearance time by 7 hours...
...thereby reducing the overall time necessary to evacuate Hampton Roads by seven (7) hours.
Reason Given for Closing the MMMBT

• “The MMMBT is not used for evacuating traffic under the current plan because of concerns that congestion would result at the merge point of I-664 and I-64 on the peninsula.” (1)

• Given that this merge point now has 6 outbound lanes to handle 5 inbound lanes (2 ramp lanes from NB I-664 and 3 thru lanes from WB I-64), it appears that congestion will not occur at this merge point.

Leaving the MMMBT Open

• As in many places during evacuation, there may be congestion south of the beginning of the two (2) WB ramp lanes from I-664 NB, assuming that more than two-thirds of the volume in the three (3) NB I-664 lanes will desire to go west.
Leaving the MMMBT Open

• To reduce the regional clearance time by 7 hours, revise the VDOT plan in order to leave the MMMBT open during evacuation
  – This revision can be achieved immediately (i.e. for the current hurricane season because no construction is required) and at no cost.
  – Once the construction enabling the reversal of US58/460 has been completed, the idea of closing the MMMBT should be re-evaluated.
Summary of Recommendations - Responsibilities in VDOT Plan

1. Request VDOT to revise its Plan in order to identify agency responsible for manning inoperable signals. (p. 34)
2. Request VDOT to revise its Plan in order to identify agency responsible for routing evacuees to refuges of last resort.
3. Request VDOT to revise its Plan in order to identify agency responsible for removal of disabled vehicles and relocation of their occupants on primaries. (p. 32)
4. Request VDOT to revise its Plan in order to identify agency responsible “to facilitate the merge” for US 17 @ Route 134 ramp (pg. 35).
5. Request VDOT to revise its Plan to in order to remove interstates from local law enforcement responsibility (pg. 32).
Summary of Recommendations- Additional Capacity

1. In order to construct the improvements necessary to reduce clearance time by 13 hours via the reversal of US 58/460, that the TTAC/HRTPO:
   a. allocate the just-released $3.5m in RSTP to the reversal (thereby funding half of its cost), and
   b. request funding in the next SYIP (e.g. FY12-17) from the CTB for the other half of the cost, and

2. In order to immediately reduce the time necessary to evacuate Hampton Roads by 7 hours, that the TTAC/HRTPO:
   request VDOT to immediately revise its hurricane plan to leave MMMBT open during an evacuation.