

3-4-3 Concept for I-64/HRBT *update*

FYI in HRTPO Board agenda
for October 19, 2017 meeting
Robert B. Case, PhD, PTOE, PE

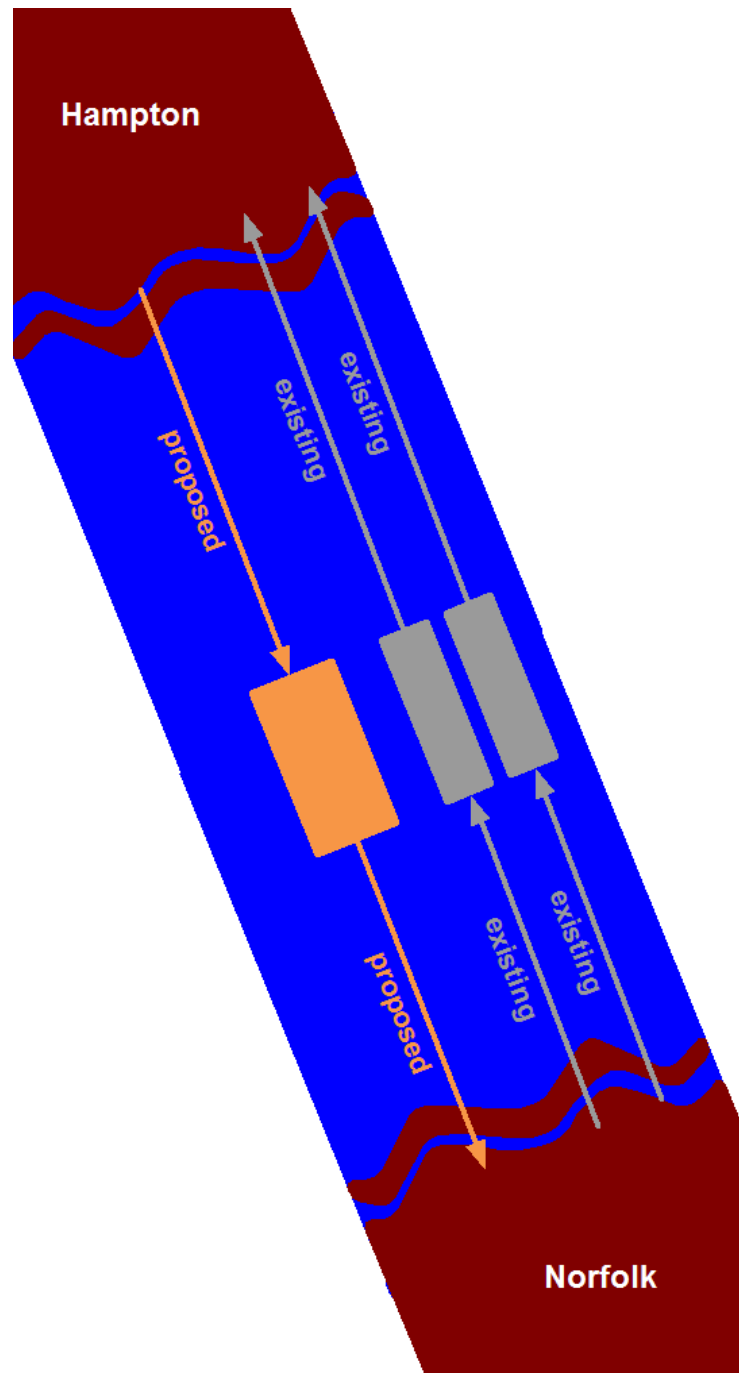
Update

- HRTPO staff presented the 3-4-3 concept to the HRTPO Board at its Nov. 19, 2015 meeting
- This Oct. 19, 2017 update of the 3-4-3 concept:
 - Reflects HRBT concept from HRCS SEIS*:
 - Westbound traffic using existing bridge-tunnels
 - Eastbound traffic using one new bridge-tunnel
 - Reflects HRTPO Board's endorsement of HOT lanes

Three Alternatives

- **3-3-3 with 1 HOT lane at bridge-tunnel**
 - Reflecting 3-lane concept from Hampton Roads Crossing Study, Supplemental Environmental Impact Statement (HRCS SEIS)
- **3-4-3 with 2 HOT lanes at bridge-tunnel**
- **3-4-3 with 1 HOT lane at bridge-tunnel**

The
3-4-3
and
3-3-3
require
same
basic
infra-
structure.



Both can be built largely within existing ROW in Hampton.

Crossing harbor westbound, both use existing bridges and tunnels.

Crossing harbor eastbound, both use new bridge-tunnel.

Both can be built largely within existing ROW in Norfolk.

3-3-3

A journey from Norfolk to Hampton

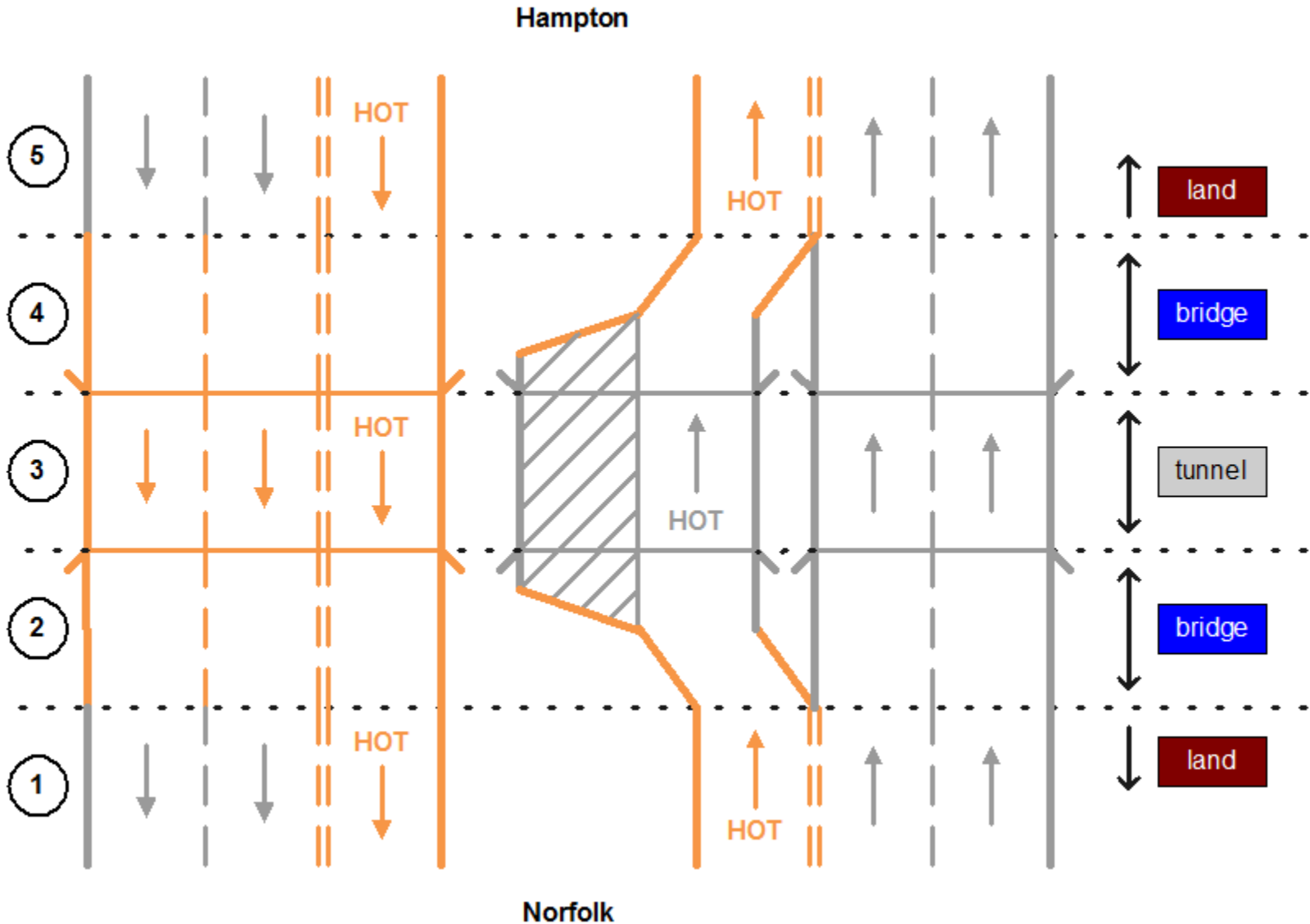
3-3-3 Schematic

Key

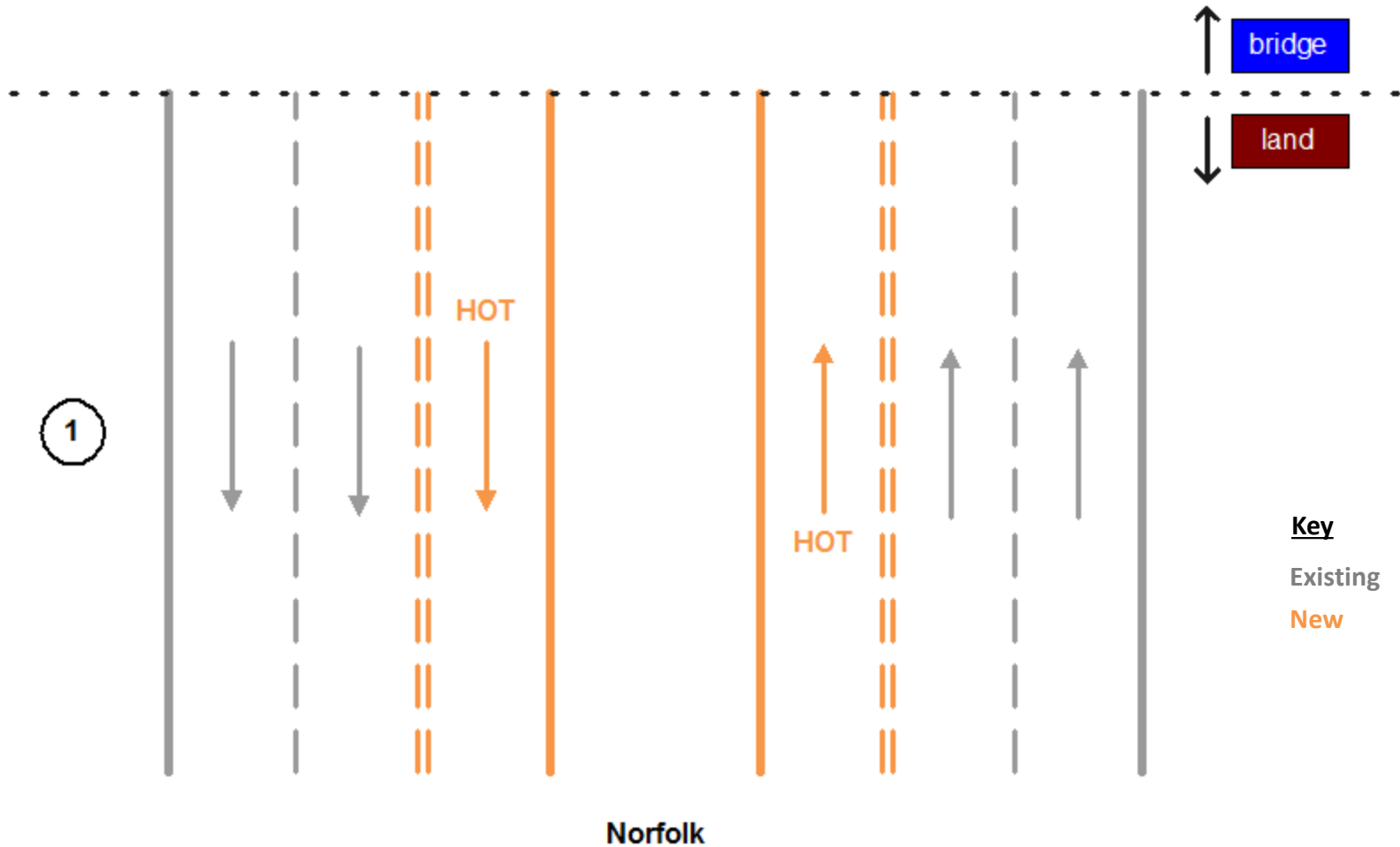
Existing

New

3-3-3 uses only 3 of 4 existing bridge-tunnel lanes

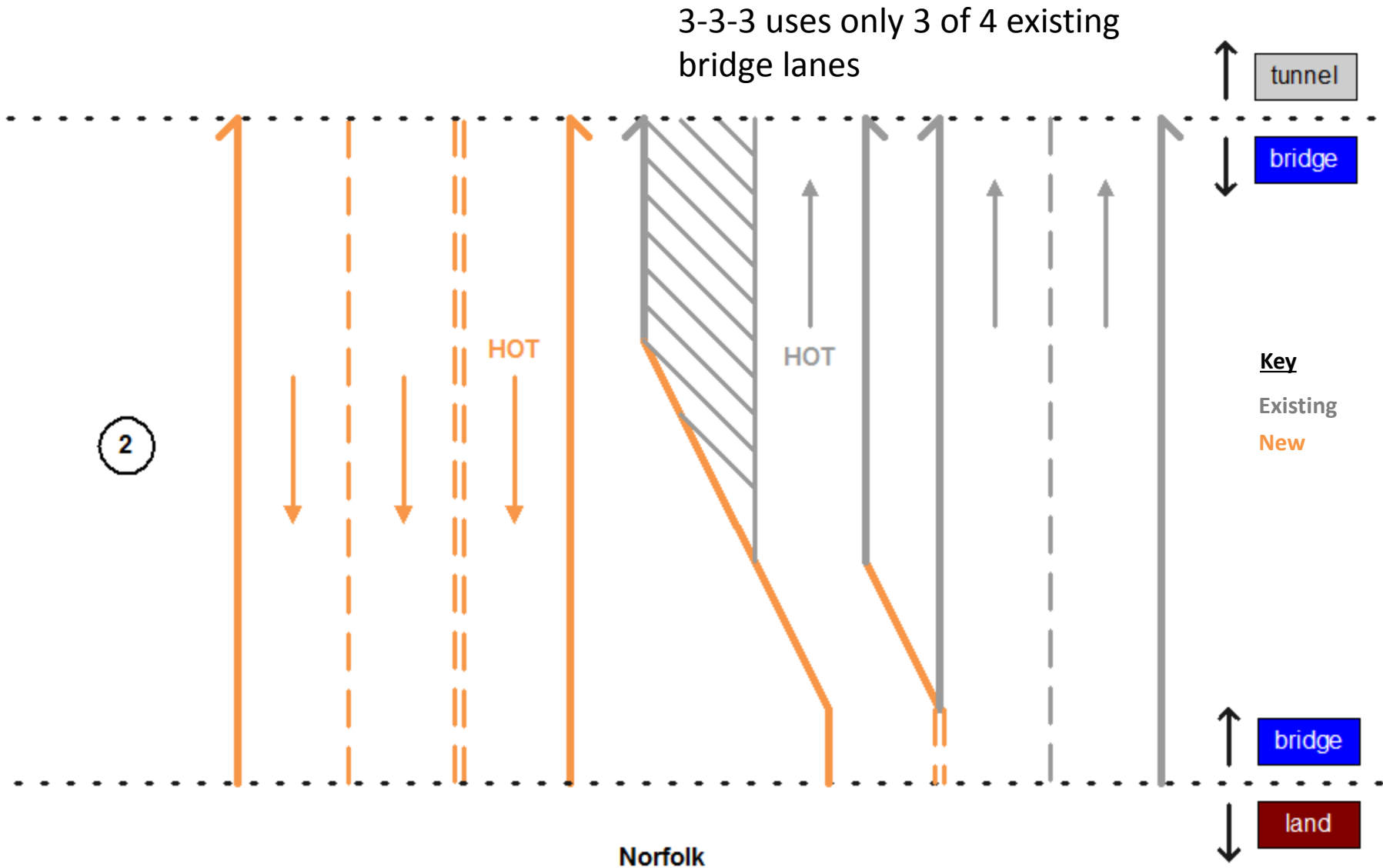


3-3-3, Section 1: *On Land, in Norfolk*



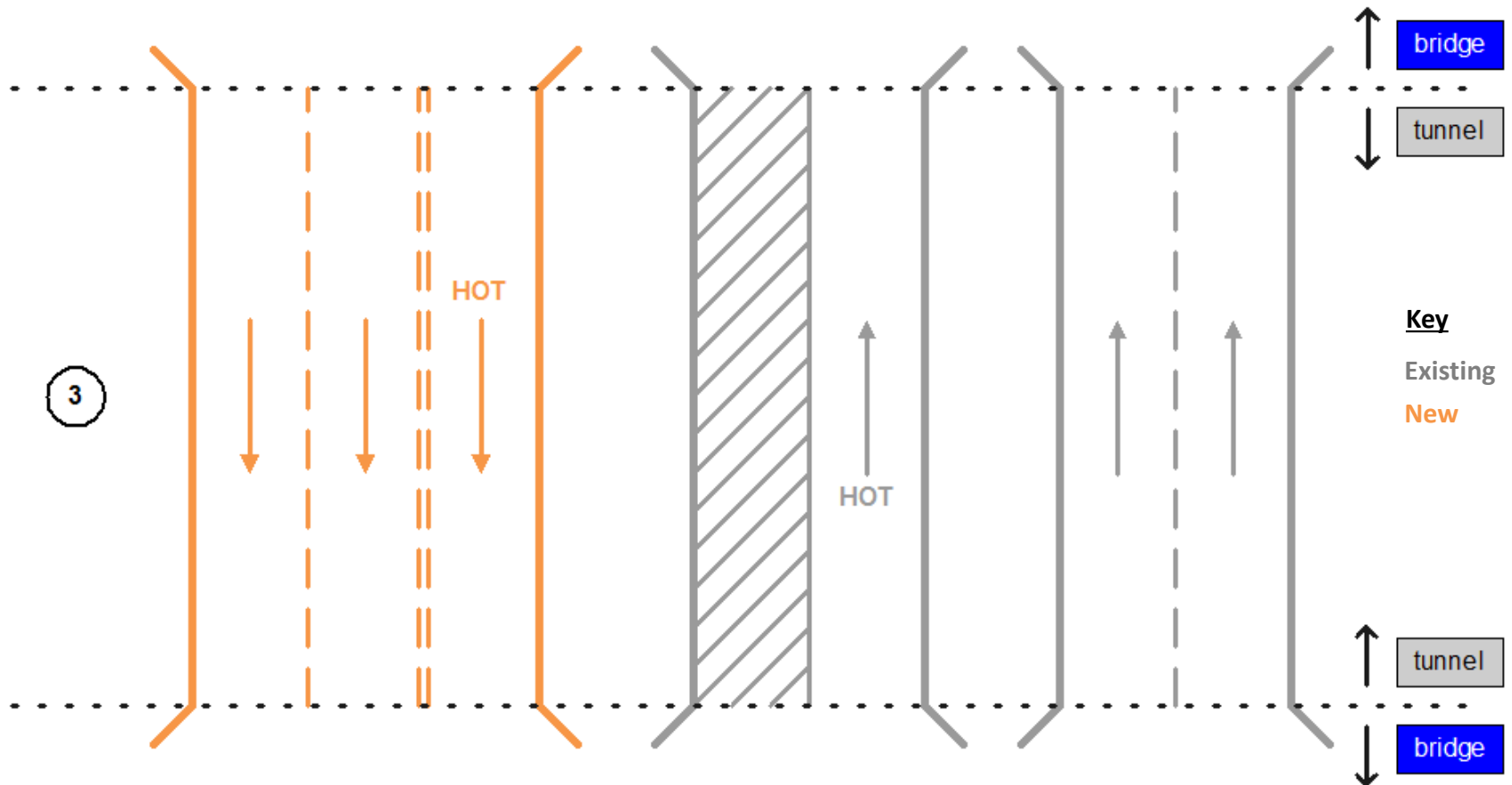
On land, widening accomplished largely within existing ROW.

3-3-3, Section 2: *Bridges, Norfolk Side*

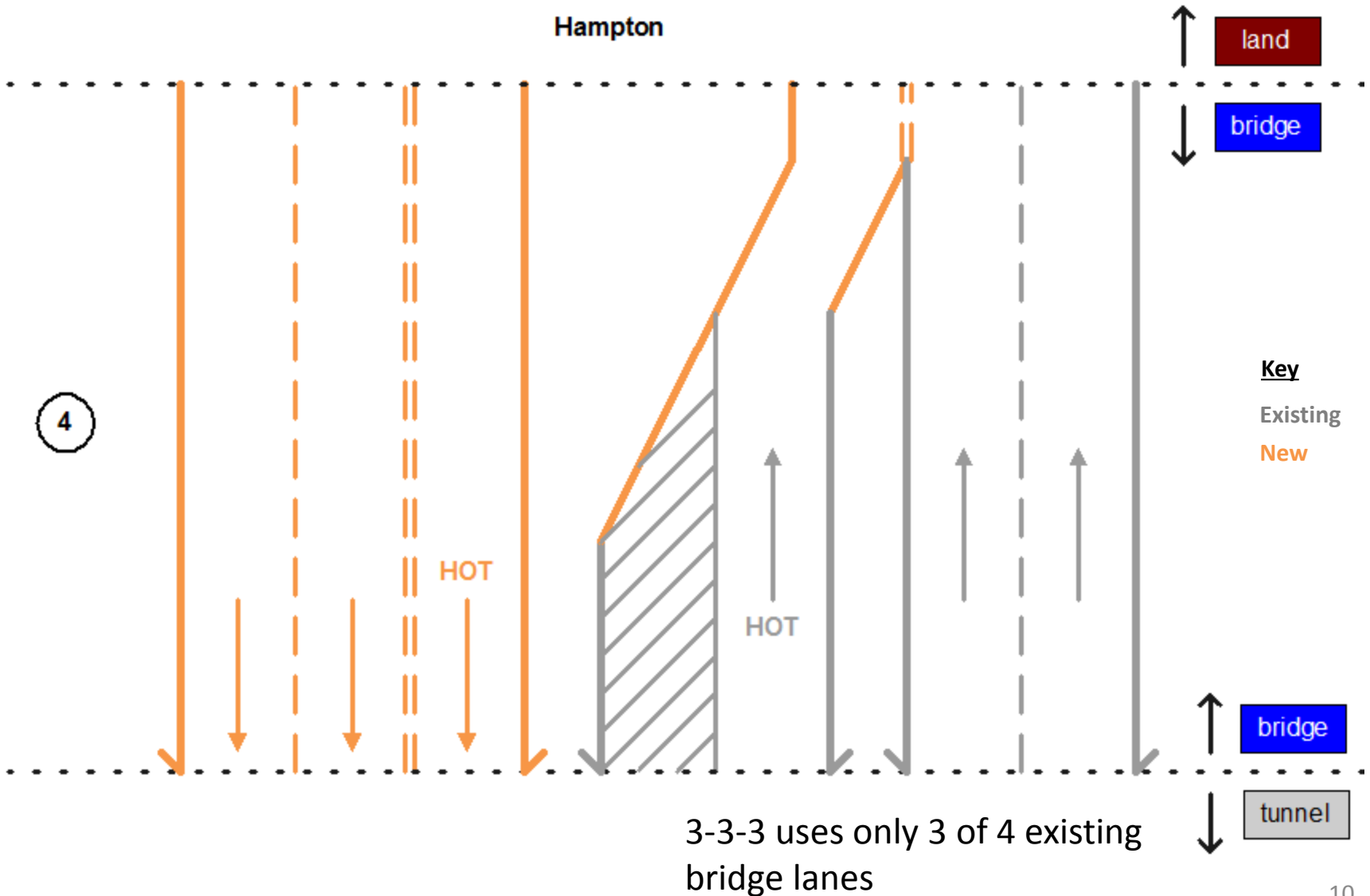


3-3-3, Section 3: *Tunnels*

3-3-3 uses only 3 of 4 existing tunnel lanes

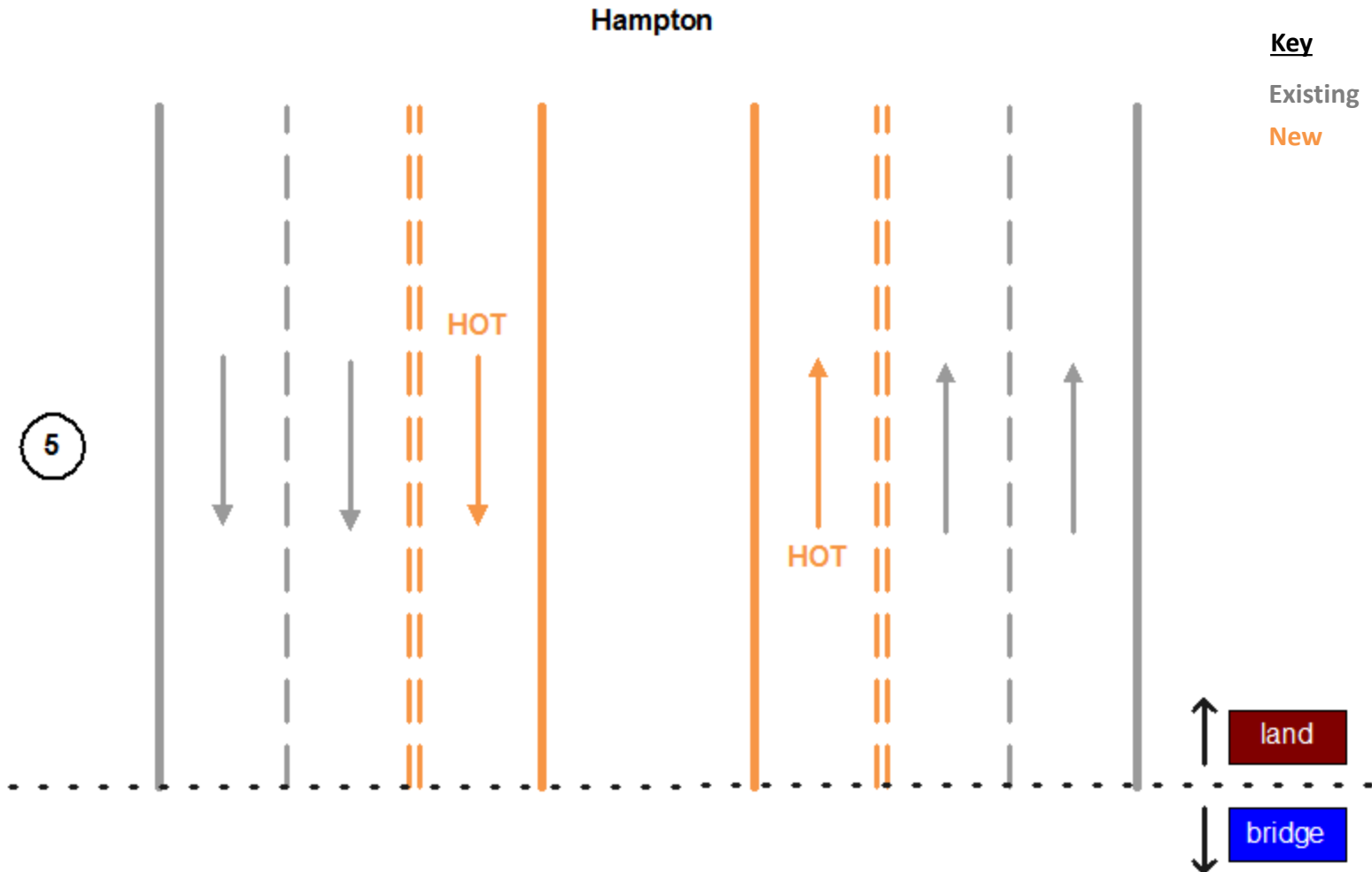


3-3-3, Section 4: *Bridges, Hampton Side*



3-3-3, Section 5: *On Land, in Hampton*

On land, widening accomplished largely within existing ROW.



The 3-3-3 increases capacity by 38%

- The existing system capacity is 3,200 vpd.
- The 3-3-3 system capacity is 4,400 vpd.
- Therefore, the **3-3-3 would increase capacity by 38%.**

Capacities, vph

	General Purpose (GP) lanes							HOT lanes						System			
	on land		at tunnel		controlling			on land		at tunnel		controlling		one direction	other direction		
Existing	2	2,100	4,200	2	1,600	3,200	3,200	0	1,400	0	0	1,200	0	0	3,200	3,200	
3-3-3 with HOT	2	2,100	4,200	2	1,600	3,200	3,200	1	1,400	1,400	1	1,200	1,200	1,200	4,400	4,400	138%
3-4-3 with 2 HOT lanes at tunnel	2	2,100	4,200	2	1,600	3,200	3,200	1	1,400	1,400	2	1,200	2,400	1,400	4,600	4,600	144%
3-4-3 with 1 HOT lane at tunnel	2	2,100	4,200	3	1,600	4,800	4,200	1	1,400	1,400	1	1,200	1,200	1,200	5,400	5,400	169%

3-4-3 with 2 HOT lanes at Bridge-Tunnel

A journey from Norfolk to Hampton

3-4-3 w/ 2HOT Schematic

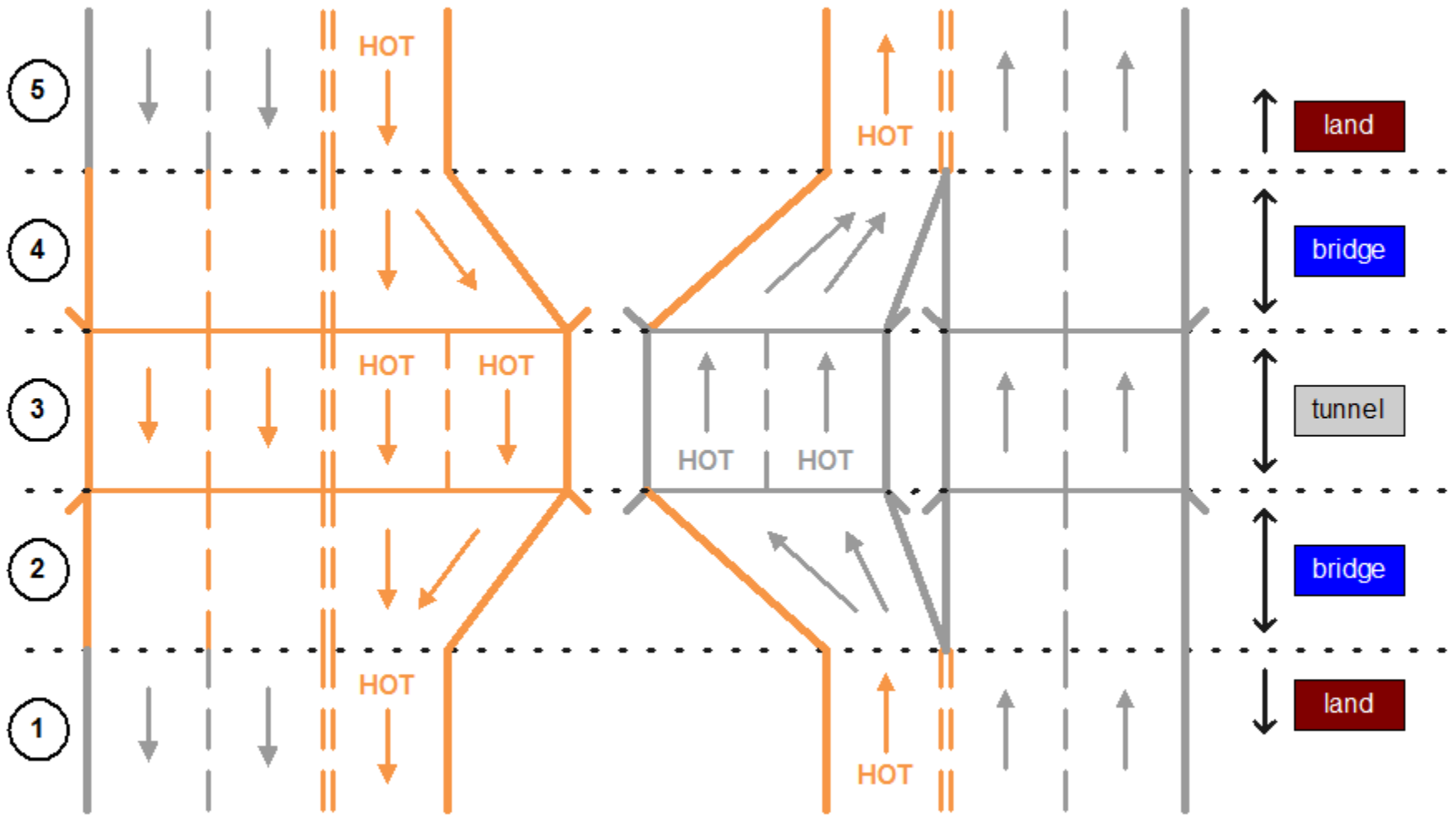
Key

Existing

New

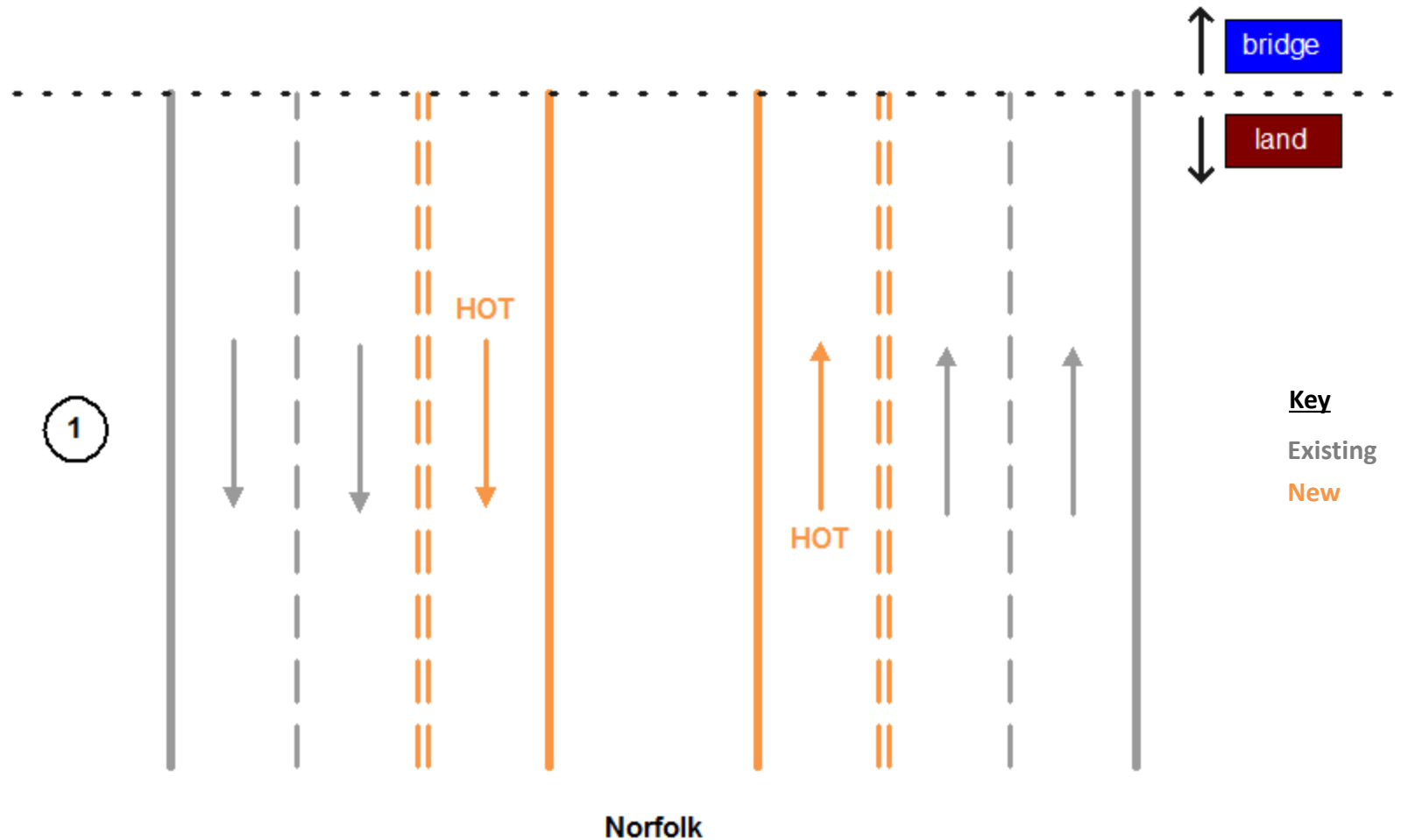
3-4-3 uses all 4 existing bridge-tunnel lanes

Hampton



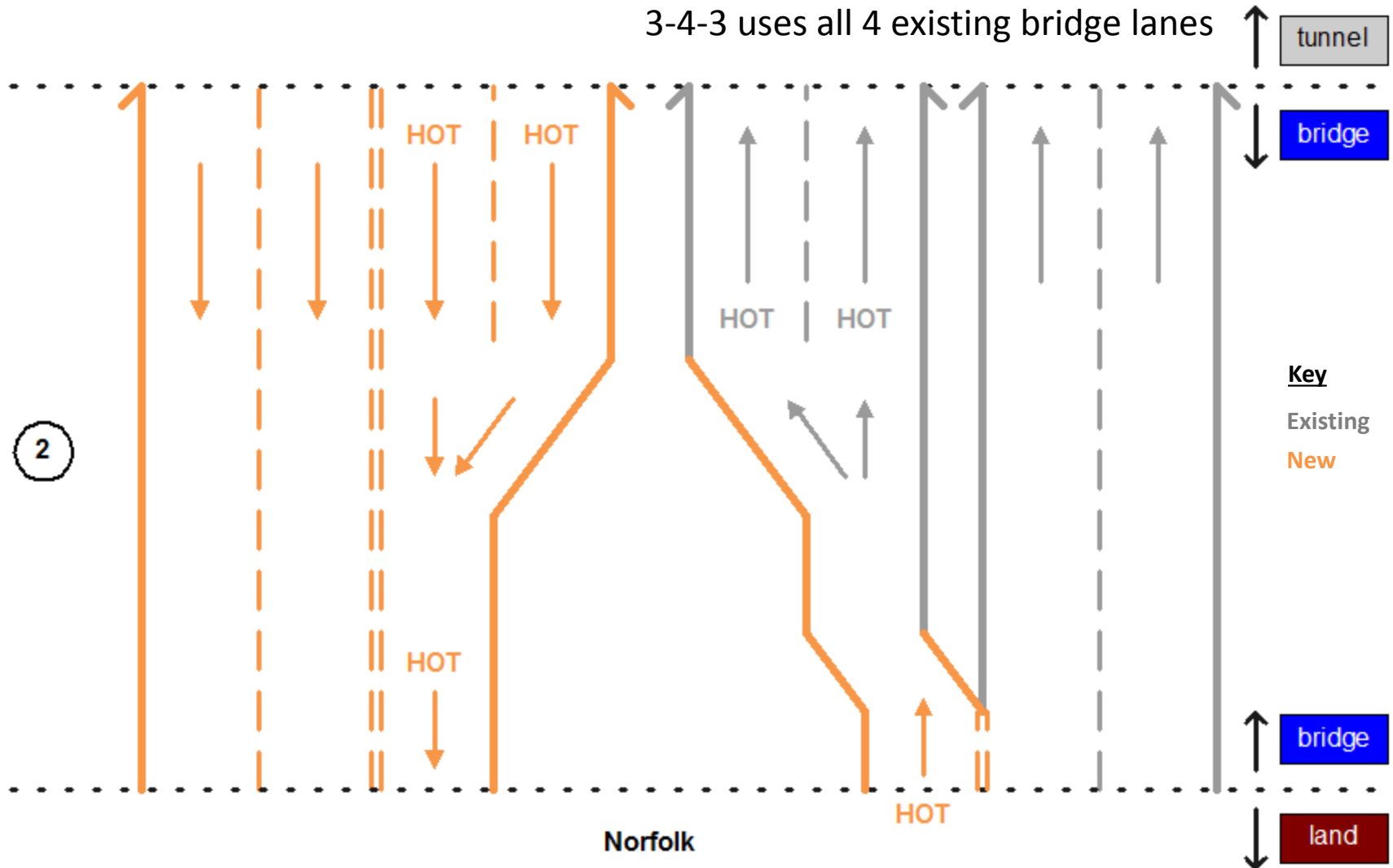
Norfolk

3-4-3: *On Land, in Norfolk*



On land, widening accomplished largely within existing ROW.

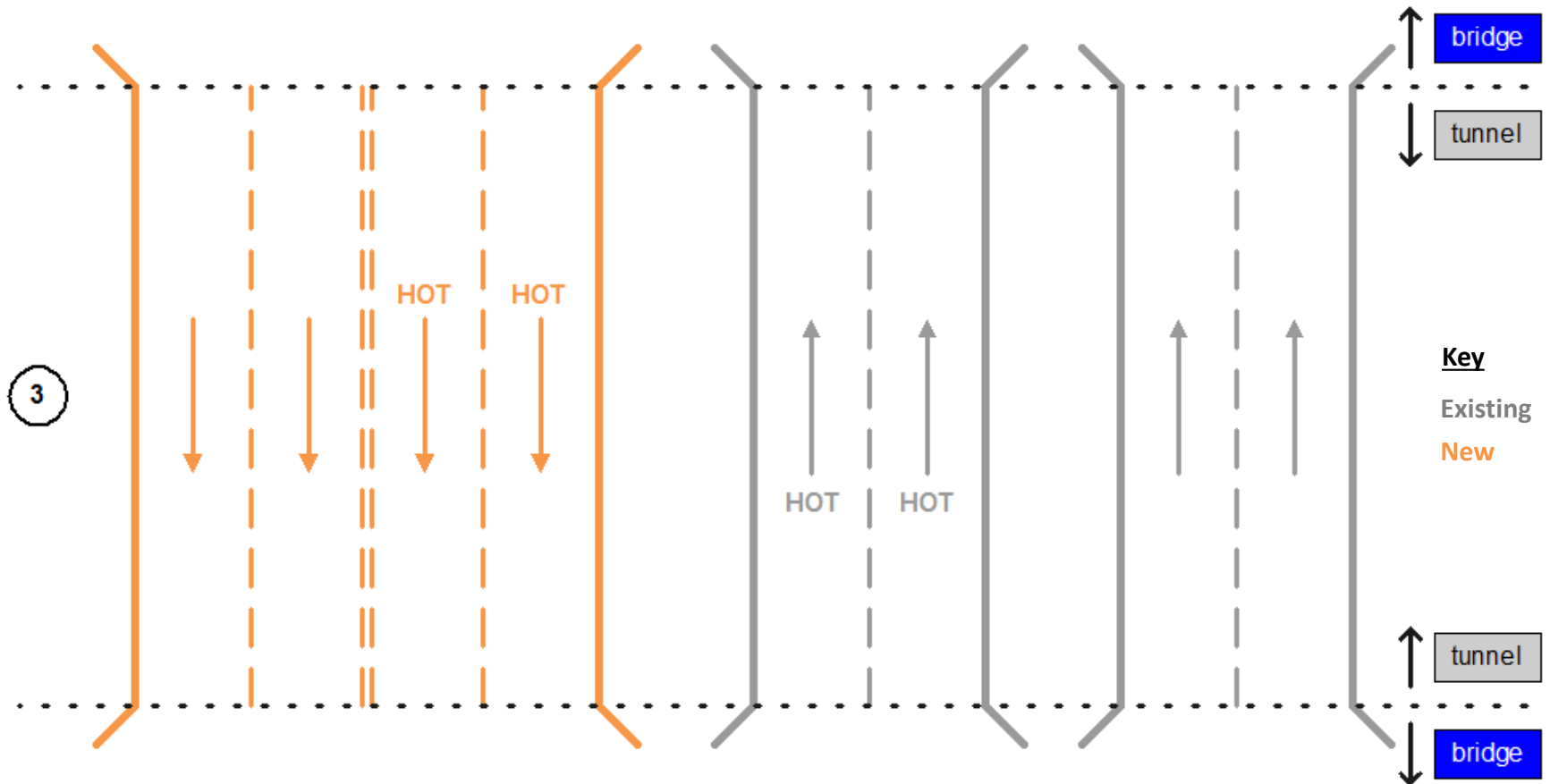
3-4-3 w/ 2 HOT lanes: *Bridges, Norfolk Side*



If the merge of HOT lanes were to become congested, VDOT could increase the HOT toll rate (\$).

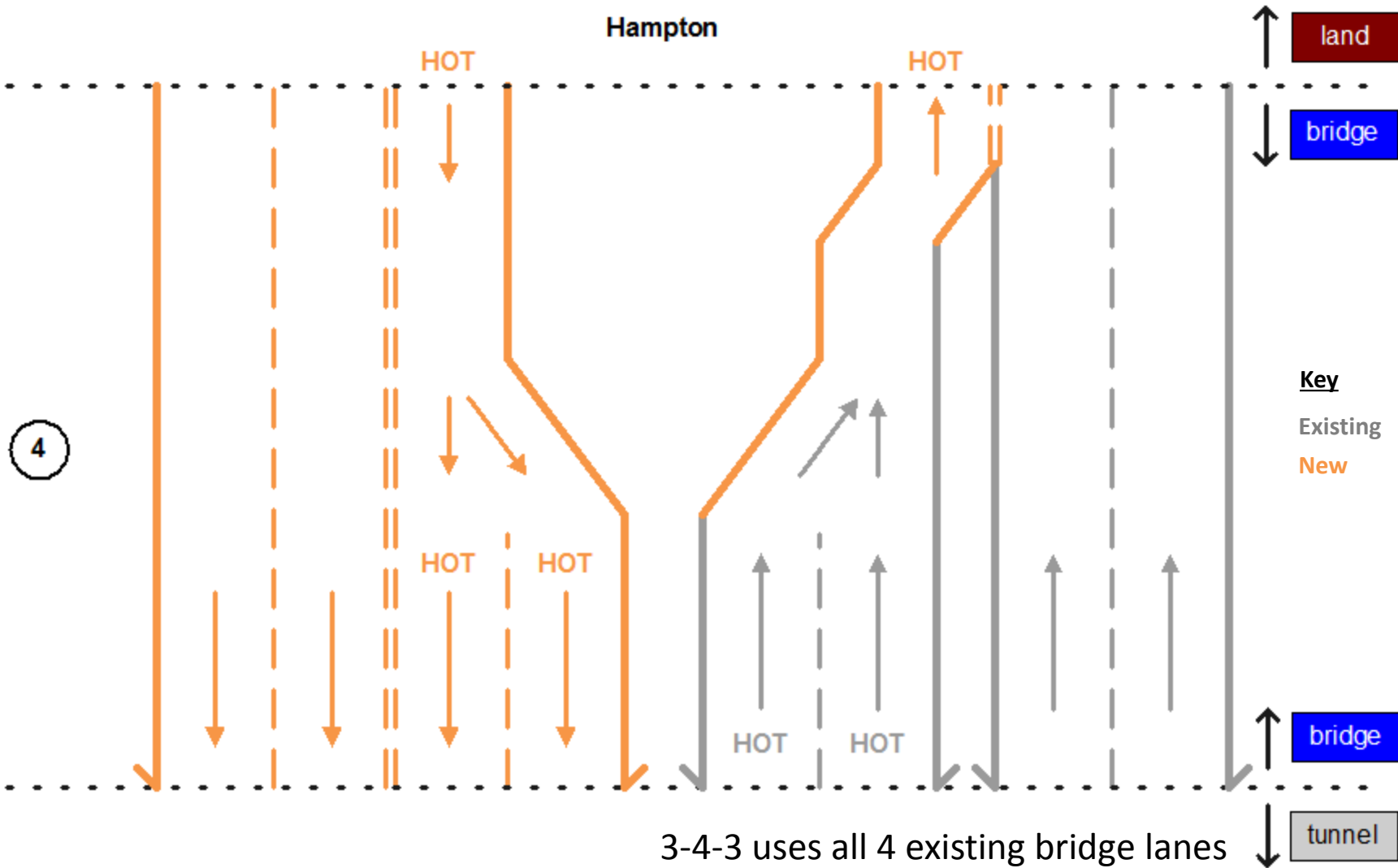
3-4-3 w/ 2 HOT lanes: *Tunnels*

3-4-3 uses all 4 existing tunnel lanes



Since no additional HOT vehicles were added to the system where the HOT lane split into 2 HOT lanes, the single HOT lane down-stream of the tunnel can handle as many vehicles as the single HOT lane upstream of the tunnel can supply.

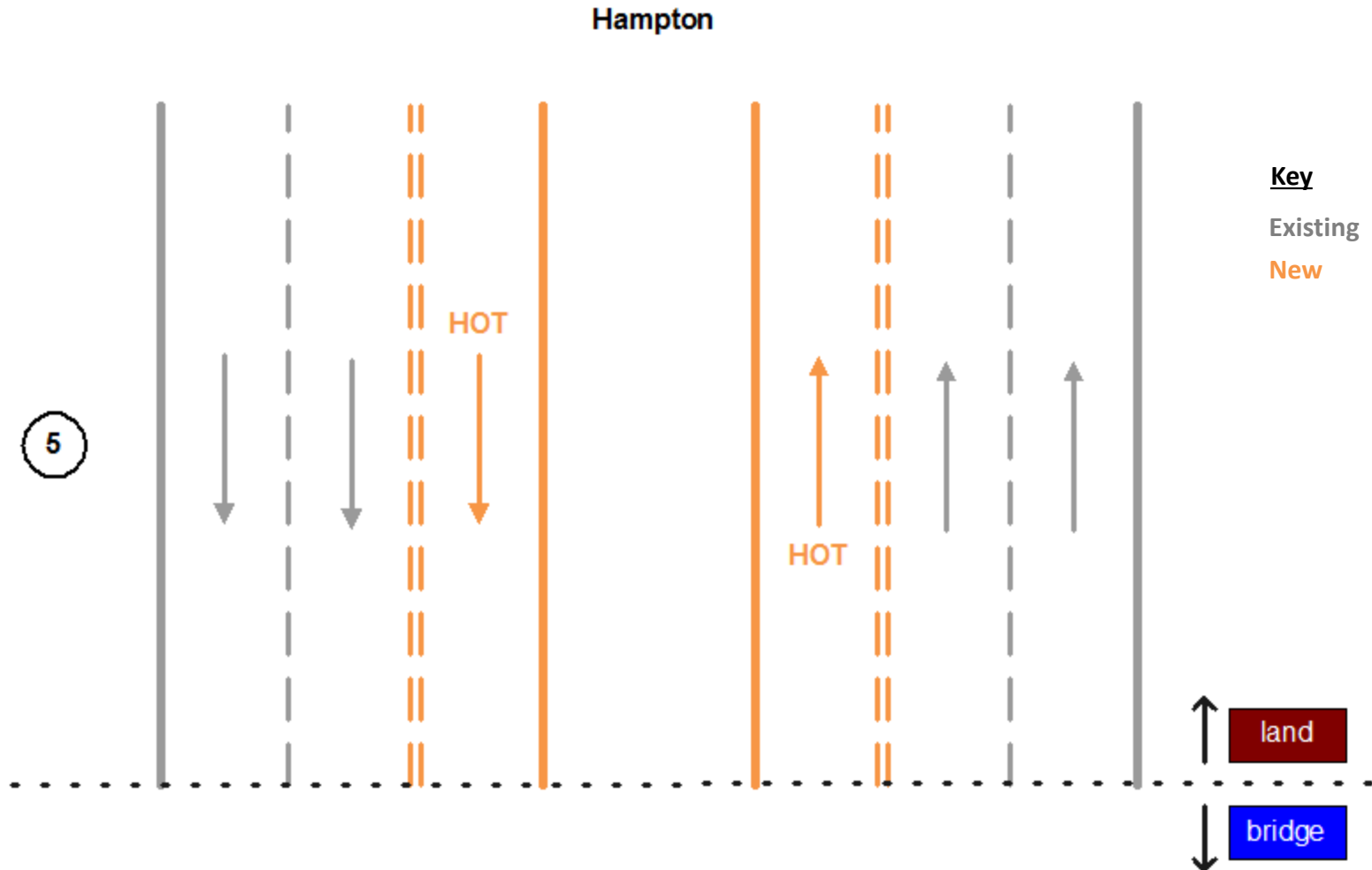
3-4-3 w/ 2 HOT lanes: *Bridges, Hampton Side*



If the merge of HOT lanes were to become congested, VDOT could increase the HOT toll rate (\$).

3-4-3: *On Land, in Hampton*

On land, widening accomplished largely within existing ROW.



3-4-3 w/ 2 HOT lanes increases capacity by 44%

- The existing system capacity is 3,200 vpd.
- This 3-4-3 w/ 2 HOT lanes system capacity is 4,600 vpd.
- Therefore:
 - whereas the 3-3-3 would increase system capacity by 38%
 - 3-4-3 w/ 2 HOT lanes in each direction would increase capacity by **44%**

Capacities, vph

	General Purpose (GP) lanes						HOT lanes						System				
	on land		at tunnel		controlling		on land		at tunnel		controlling		one direction	other direction			
Existing	2	2,100	4,200	2	1,600	3,200	3,200	0	1,400	0	0	1,200	0	0	3,200	3,200	
3-3-3 with HOT	2	2,100	4,200	2	1,600	3,200	3,200	1	1,400	1,400	1	1,200	1,200	1,200	4,400	4,400	138%
3-4-3 with 2 HOT lanes at tunnel	2	2,100	4,200	2	1,600	3,200	3,200	1	1,400	1,400	2	1,200	2,400	1,400	4,600	4,600	144%
3-4-3 with 1 HOT lane at tunnel	2	2,100	4,200	3	1,600	4,800	4,200	1	1,400	1,400	1	1,200	1,200	1,200	5,400	5,400	169%

3-4-3 with 1 HOT Lane at Bridge-Tunnel

A journey from Norfolk to Hampton

3-4-3 w/ 1HOT Schematic

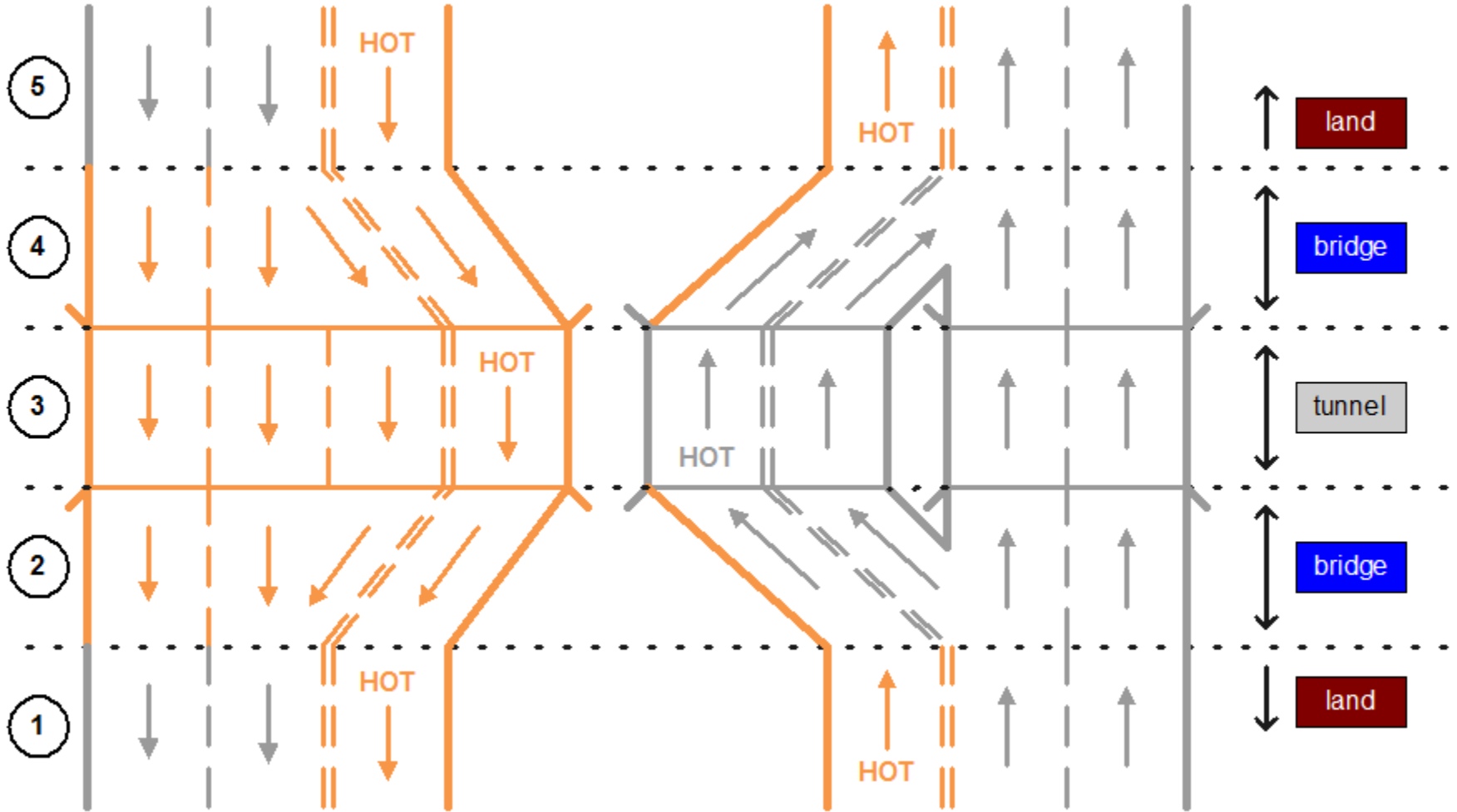
Key

Existing

New

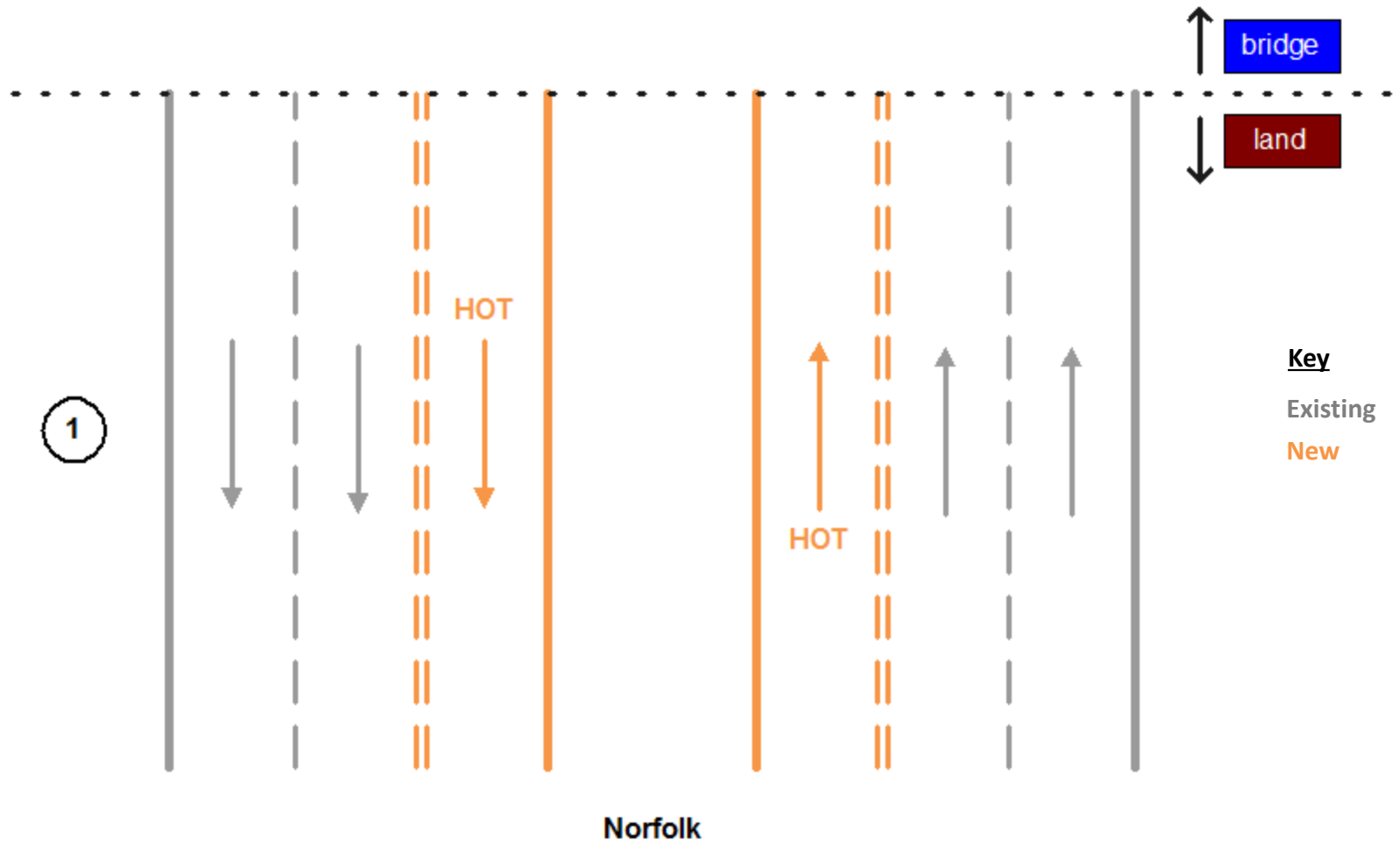
3-4-3 uses all 4 existing bridge-tunnel lanes

Hampton



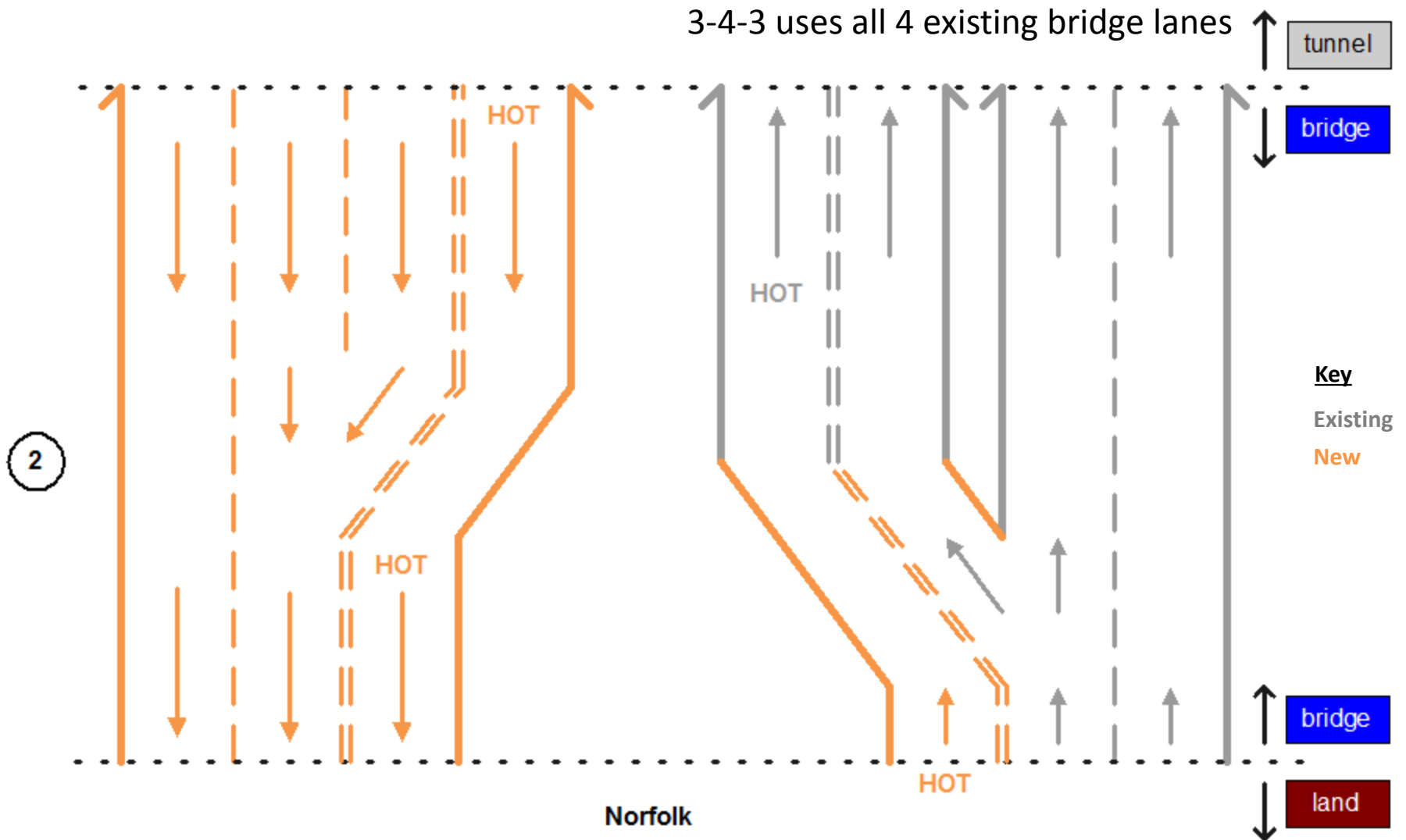
Norfolk

3-4-3: *On Land, in Norfolk*



On land, widening accomplished largely within existing ROW.

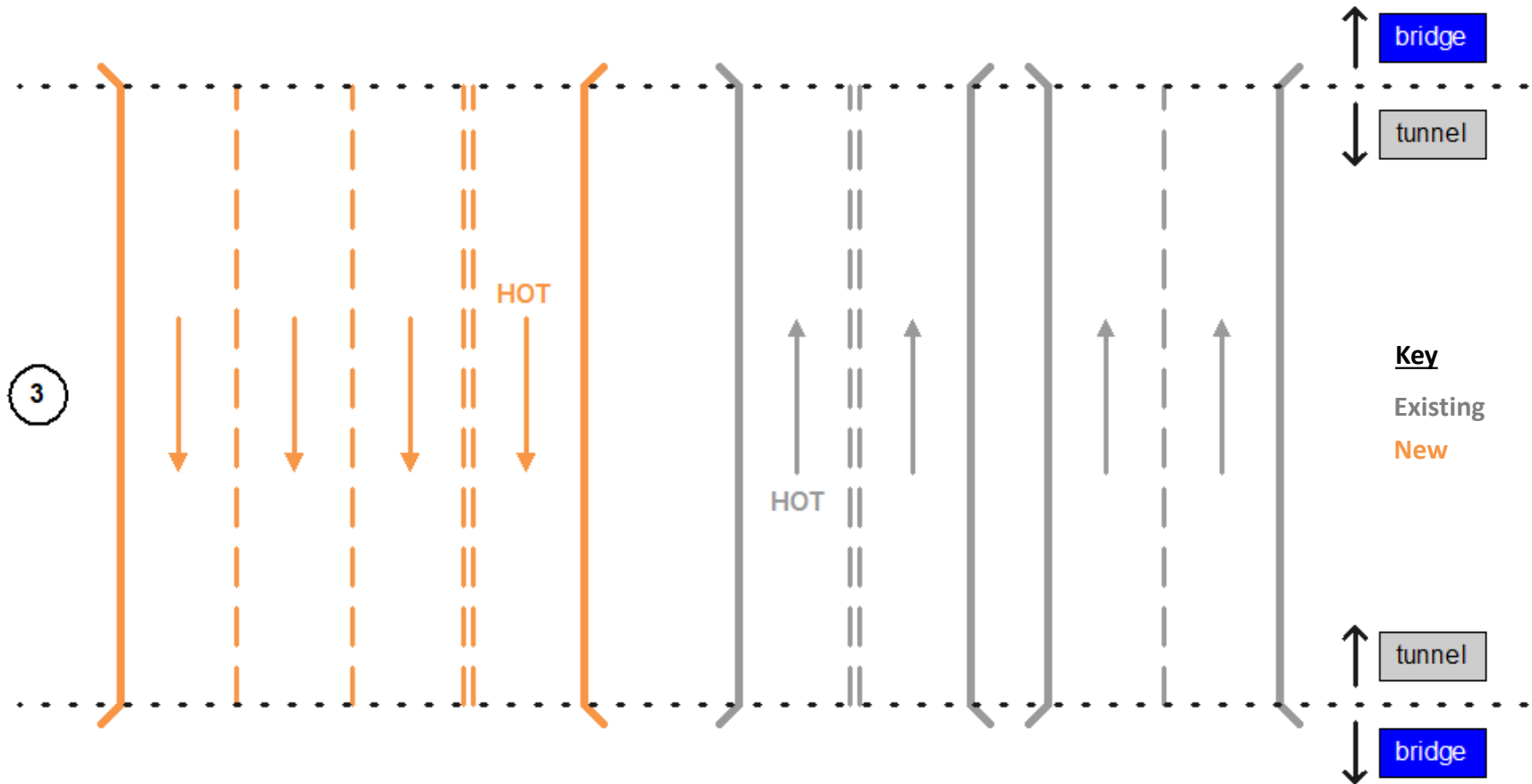
3-4-3 w/ 1 HOT lane: *Bridges, Norfolk Side*



For smooth operation, these actions will occur over longer distances than shown in this not-to-scale schematic. 24

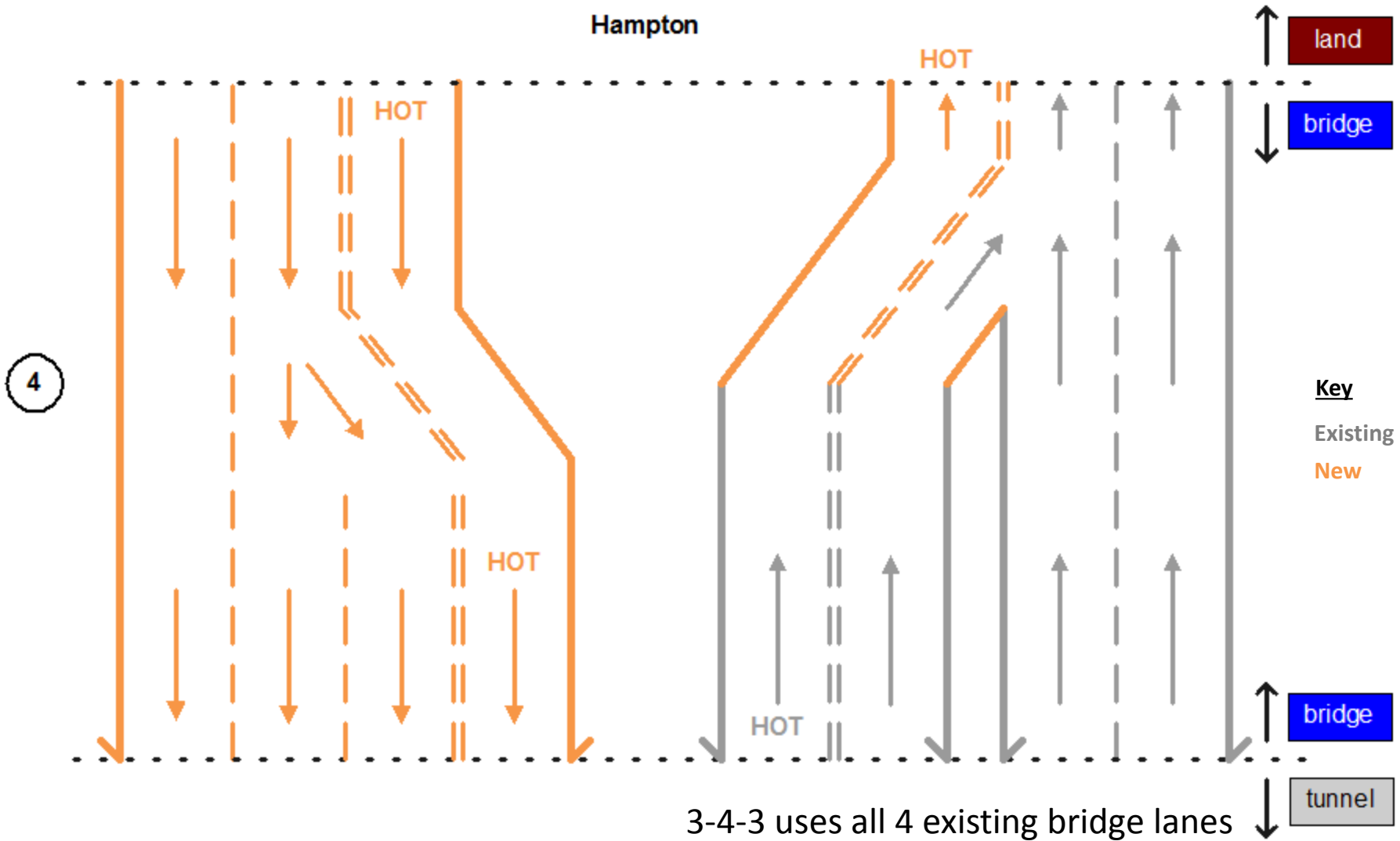
3-4-3 w/ 1 HOT lane: *Tunnels*

3-4-3 uses all 4 existing tunnel lanes



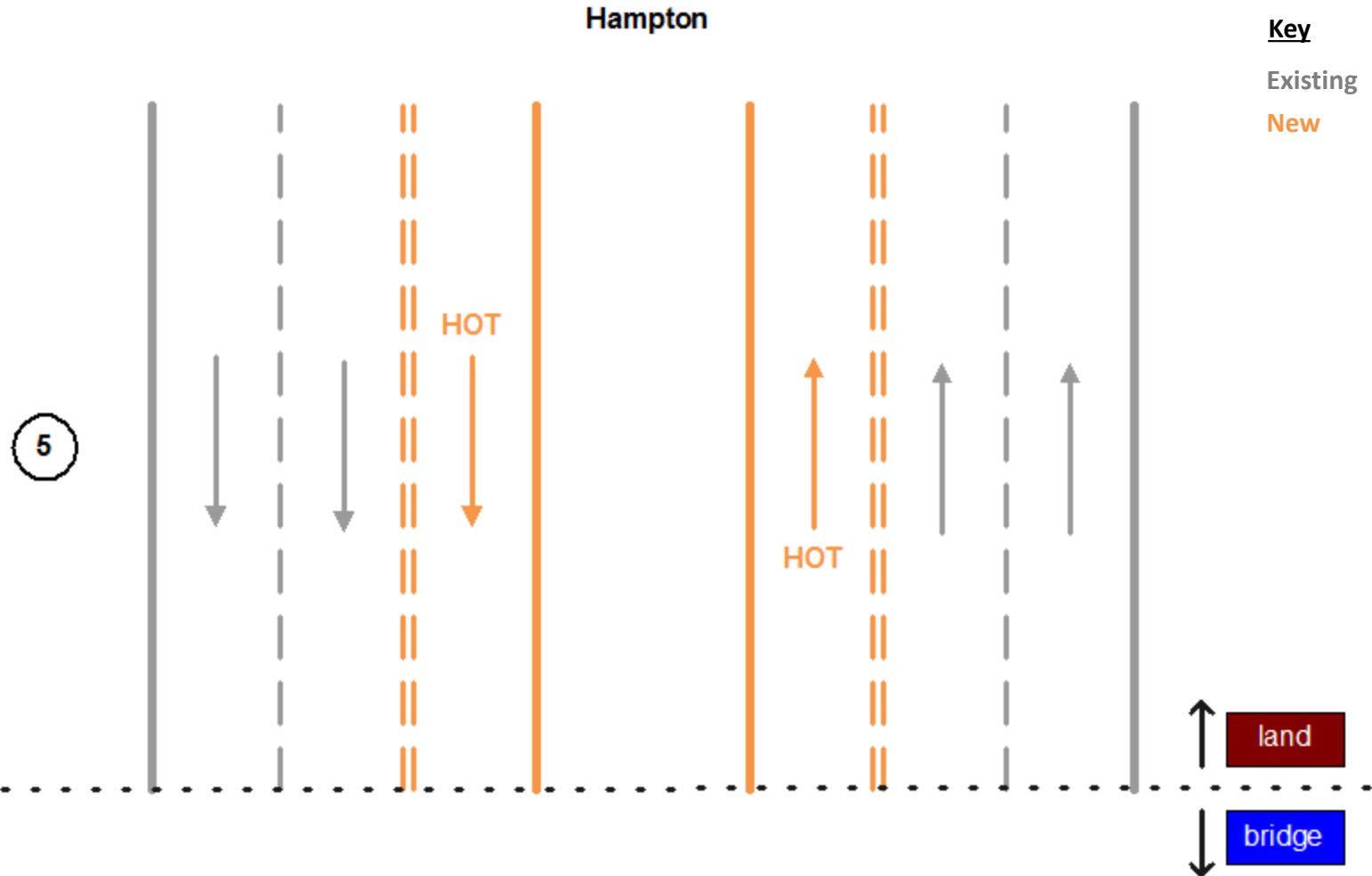
Note that, since no additional GP vehicles are added to the system where the GP lane split, the 2 GP lanes downstream of the tunnels can handle as many GP vehicles as the 2 GP lanes upstream of the tunnels can supply.

3-4-3 w/ 1 HOT lane: *Bridges, Hampton Side*



3-4-3: *On Land, in Hampton*

On land, widening accomplished largely within existing ROW.



3-4-3 w/ 1 HOT lane increases capacity by 69%

- The existing system capacity is 3,200 vpd.
- The 3-4-3 w/ 1 HOT lane system capacity is 5,400 vpd.
- Therefore,
 - whereas the 3-3-3 would increase system capacity by 38%
 - 3-4-3 w/ 1 HOT lane in each direction would increase capacity by **69%**
 - i.e. approximately **twice as much new capacity** as the 3-3-3.

Capacities, vph

	General Purpose (GP) lanes							HOT lanes						System				
	on land			at tunnel				on land			at tunnel			controlling			one	other
	lanes	capacity	total	lanes	capacity	total	controlling	lanes	capacity	total	lanes	capacity	total	controlling	direction		direction	
Existing	2	2,100	4,200	2	1,600	3,200	3,200	0	1,400	0	0	1,200	0	0	3,200	3,200		
3-3-3 with HOT	2	2,100	4,200	2	1,600	3,200	3,200	1	1,400	1,400	1	1,200	1,200	1,200	4,400	4,400	138%	
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3-4-3 with 1 HOT lane at tunnel	2	2,100	4,200	3	1,600	4,800	4,200	1	1,400	1,400	1	1,200	1,200	1,200	5,400	5,400	169%	

System Capacity

