VIRGINIA DEPARTMENT OF TRANSPORTATION

I-85 / I-95 INTERCHANGE FEASIBILITY STUDY

REFINED CONCEPT 1 | PROJECT A

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

REFINED CONCEPT 1 | PROJECT A

COST: $3.3M

Eliminate the loop ramp to I-95 southbound from S. Crater Road, realign Graham Road and the I-95 on-ramp to intersect, and create separate north- and southbound left-turn lanes on S. Crater Road.

GENERAL ELEMENTS

Close the existing on-ramp to I-95 Southbound/Route 460 Bus. from S. Crater Road

INTERSECTION-SPECIFIC ELEMENTS

Intersection #1 (Graham Road/S. Crater Road/I-95 Southbound On-Ramp)

- Realign Graham Road and on-ramp to intersect
- Shift southbound lanes on S. Crater Road through intersection to develop a separate southbound left-turn lane to the I-95 Southbound on-ramp
- Develop a separate northbound left-turn lane on S. Crater Road to Graham Road
- Proposed traffic signal operation :

  - 85 second cycle

  - Protected/permissive NB/SB left turns

FUTURE PARK AND RIDE LOT

VDOT identified the area within the vacated loop ramp as a potential future location for a park and ride lot. Assuming Graham Road is realigned, there would be enough area to construct 150-250 parking spaces. The estimated cost to design and construct a park and ride lot (150-250 spaces) would range from approximately $750,000 to $1.25M.

Implementing this concept would eliminate the approximately 250-foot weaving section between the I-85 northbound off-ramp merge with the I-95 southbound collector-distributor road and the Graham Road off-ramp. It would shift traffic demand from the existing Graham Road off-ramp to a new off-ramp that would ultimately connect to S. Crater Road approximately one-half mile south of the current Graham Road/S. Crater Road intersection.

- Eliminating the weaving section and developing an additional lane on C-D road in advance of the three-way split would include overhead lane signs to direct travelers to the desired lane.
- The potential risk of wrong-way movements at an isolated on-way off-ramp that violates driver expectancy remains, but risks can be mitigated by providing signage in accordance with 2009 Manual on Uniform Traffic Control Devices (MUTCD) and VDOT Supplement.
- New off-ramp avoids Poor Creek pumping station and sanitary force mains.

VIRGINIA DEPARTMENT OF TRANSPORTATION

I-85 / I-95 INTERCHANGE FEASIBILITY STUDY

REFINED CONCEPT 1 | PROJECT B

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

REFINED CONCEPT 1 | PROJECT B

COST: $8.1M

Eliminate the I-95 southbound C-D road off-ramp to Graham Road and construct a new off-ramp to S. Crater Road from the Route 460 Bus./I-95 southbound split.

Key consideration: The new off-ramp alignment is designed to avoid the Poor Creek pump station and sanitary force mains.

GENERAL ELEMENTS

Close the existing I-95 Southbound C-D road off-ramp to Graham Road

Construct a new off-ramp to S. Crater Road

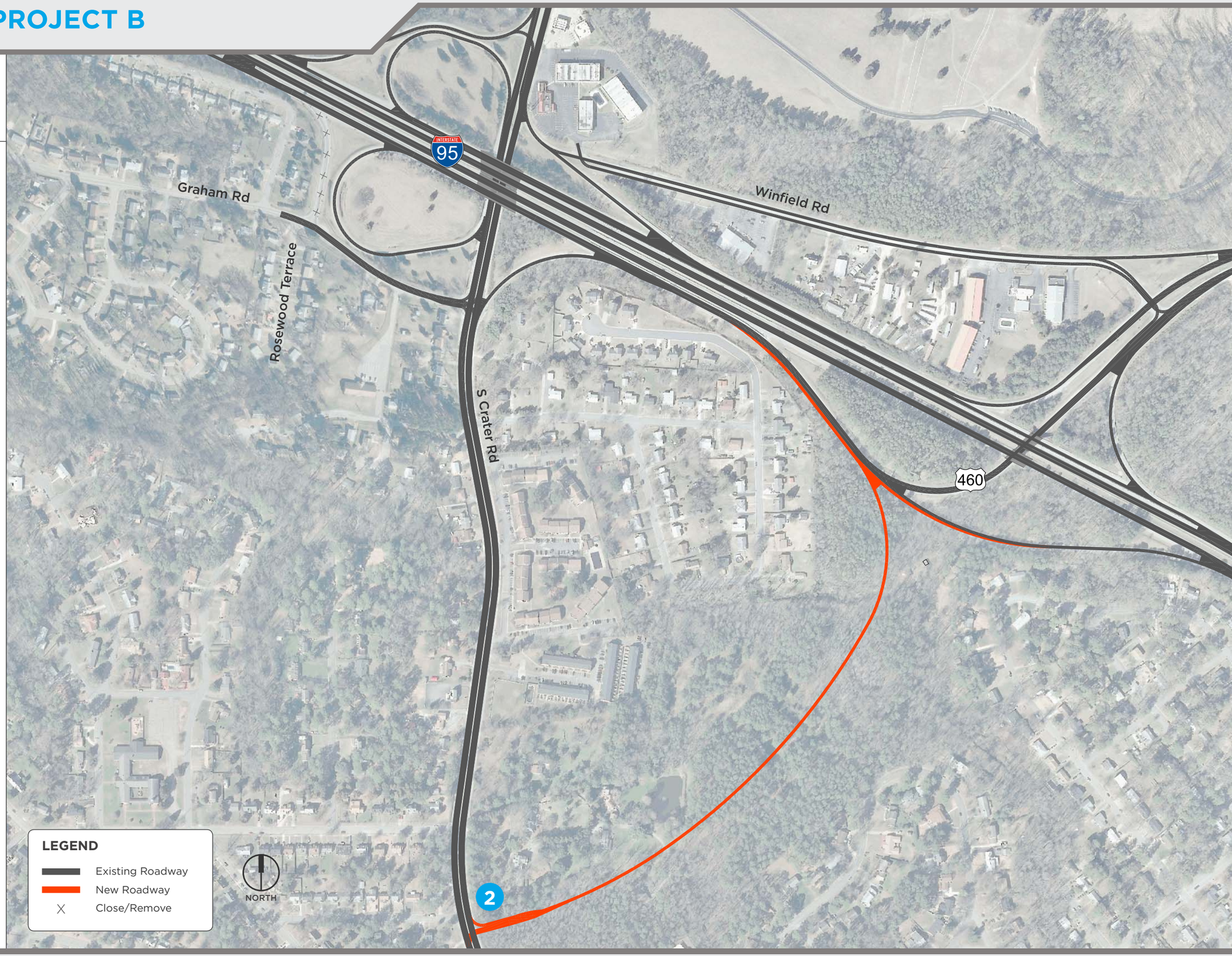
- Widen I-95 Southbound C-D Road to accommodate new exit
- Re-design placement/design of overhead guide signs to account for a third option at the downstream I-95 Southbound/ Route 460 Bus./S. Crater Road off-ramp at diverge point
- Remove the yield condition on I-85 northbound to I-95 southbound C-D Road. A two-lane C-D road can accept single-lane ramps from I-95 southbound and I-85 northbound in a free-flow condition.

INTERSECTION-SPECIFIC ELEMENTS

Intersection #2 (New I-95 Southbound Off-Ramp/S. Crater Road)

- Install new traffic signal at S. Crater Road and new off-ramp
- Develop dual westbound left-turn lanes and a single right-turn lane on off-ramp
- Proposed traffic signal operation
  - 100 second cycle
  - Two-phase signal operation

Continued on Reverse Side



Intersection #2 (Winfield Road/S. Crater Road)

- Remove the Off-Ramp from I-95 Northbound to S. Crater Road
- Realign Winfield Road to S. Crater Road to provide full movements
  - Construct a separate southbound left-turn lane on S. Crater Road
  - Construct a separate northbound right-turn lane on S. Crater Road (beyond the I-95 bridge structure)

Intersection #6 (Winfield Road/Route 460 Bus.)

- Construct channelized right-turn lane from eastbound Winfield Road to the I-95 Northbound on-ramp

Implementing this concept would eliminate the approximately 360 foot weaving section between the S. Crater Road on-ramp to I-95 northbound movement and the off-ramp to the E. Wythe Street/E. Washington Street couplet in downtown Petersburg.

Introduces approximately one total mile of out-of-direction travel for drivers traveling from S. Crater Road to I-95 northbound/I-85 southbound/E. Wythe Street.

Elimination of the I-95 northbound off-ramp to S. Crater Road northbound increases the overall weaving distance between on- and off-ramps on C-D road.

Potential environmental, right-of-way, and utility impacts of improvements:

- Winfield Road should not be widened to the north to avoid impacting existing cultural resources.
- Increased traffic volumes on Winfield Road require further investigation of access management policies and should include outreach to affected business and property owners along this corridor.
- Realigning the Graham Road off ramp with Rosewood Terrace (the existing offset subdivision road across from the Graham Road off ramp) or vice versa will require some right of way.
- Widening along Graham Road is assumed to be towards the Limited Access Right of Way in lieu of towards the outside to reduce right of way impacts. Impacts to properties along S. Crater Road south of Graham Road are anticipated.

VIRGINIA DEPARTMENT OF TRANSPORTATION

I-85 / I-95 INTERCHANGE FEASIBILITY STUDY

REFINED CONCEPT 2 | PROJECT A

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

REFINED CONCEPT 2 | PROJECT A

COST: $11.6M

Intersection improvements on S. Crater Road north of I-95, Winfield Road corridor improvements, and modifications to the Winfield Road/Route 460 Bus. intersection as well as the I-95 northbound on-ramp and C-D road.

Key considerations of this Concept include the following:

- Winfield Road should not be widened to the north to avoid impacting existing cultural resources.
- Increased traffic volumes on Winfield Road require further investigation of access management policies and should include outreach to affected business and property owners along this corridor.

GENERAL ELEMENTS

Reconstruct the I-95 Northbound on-ramp merge from Winfield Road/Route 460 Bus. to provide adequate merge and decision distance requirements

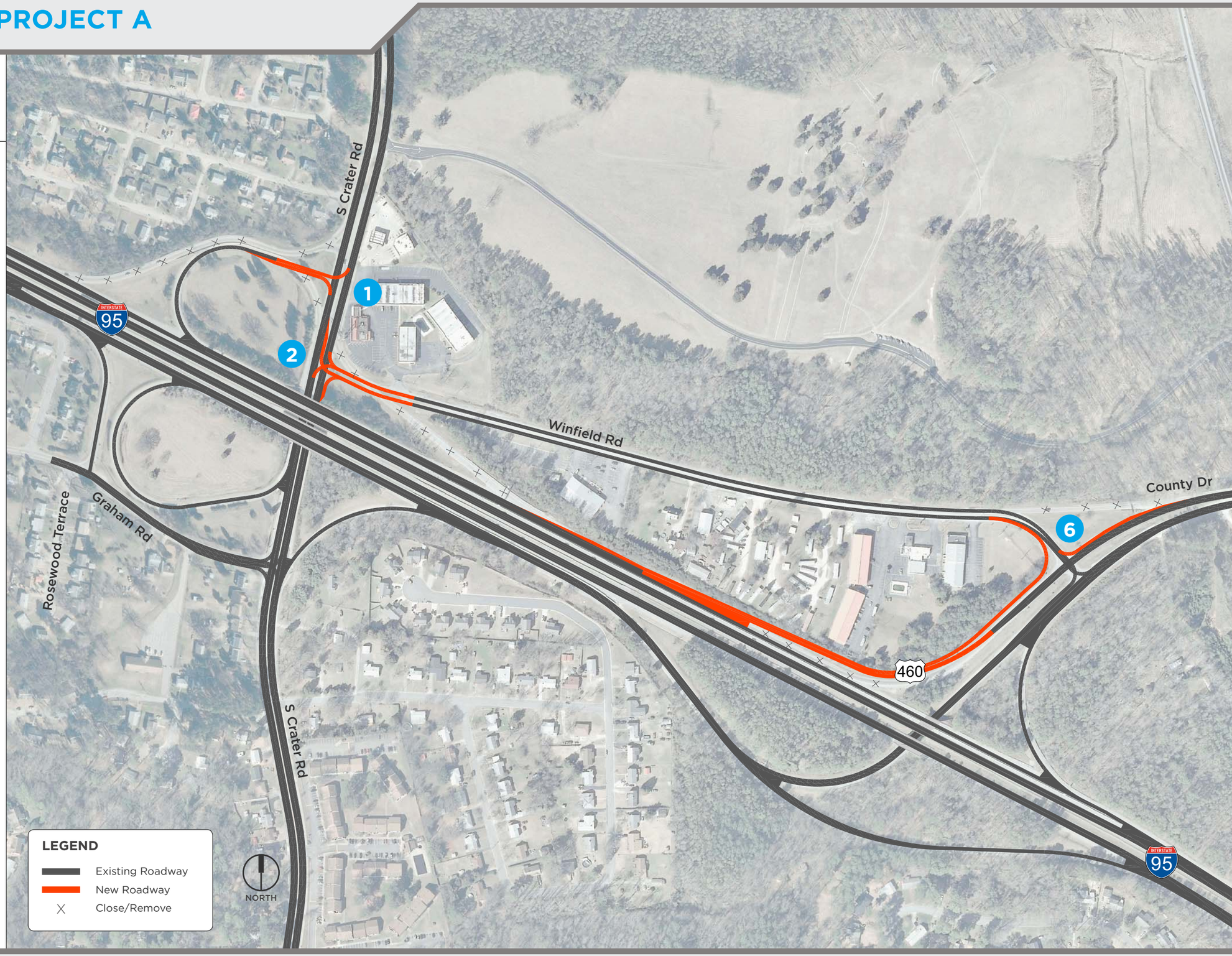
INTERSECTION-SPECIFIC ELEMENTS

Intersection #1 (I-95 NB On-Ramp/S. Crater Road)

- Remove the existing on-ramp to I-95 Northbound from S. Crater Road
- Eliminate the free-flow I-95 NB off-ramp movement to southbound S. Crater Road and reconstruct the approach to intersect S. Crater Road at a controlled intersection

  - Develop separate left- and right-turn lanes on the off-ramp

Continued on Reverse Side



VIRGINIA DEPARTMENT OF TRANSPORTATION

I-85 / I-95 INTERCHANGE FEASIBILITY STUDY

REFINED CONCEPT 2 | PROJECT B

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

REFINED CONCEPT 2 | PROJECT B

COST: $3.8M

Improvements to the I-95 southbound off-ramp to Graham Road, Graham Road widening, and modifications to the Graham Road/S. Crater Road intersection.

Key considerations of this Concept include the following:

- Realigning the Graham Road off ramp with Rosewood Terrace (the existing offset subdivision road across from the Graham Road off ramp) or vice versa will require some right of way.
- Widening along Graham Road is assumed to be towards the Limited Access Right of Way in lieu of towards the outside to reduce right of way impacts. Impacts to properties along S. Crater Road south of Graham Road are anticipated.

GENERAL ELEMENTS

Develop a second eastbound lane on Graham Road between the Off-Ramp and S. Crater Road.

INTERSECTION-SPECIFIC ELEMENTS

Intersection #3 (Graham Road/S. Crater Road)

- Construct a second eastbound right-turn lane from Graham Road to S. Crater Road

Intersection #4 (I-95 Southbound Off-Ramp/ Graham Road)

- Develop dual southbound left-turn lanes on the I-95 Southbound off-ramp and a separate shared through-right lane
- Realign off-ramp and Rosewood Terrace to intersect one another

VIRGINIA DEPARTMENT OF TRANSPORTATION

I-85 / I-95 INTERCHANGE FEASIBILITY STUDY

REFINED CONCEPT 1 + 2 | PROJECT A

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

REFINED CONCEPT 1 + 2 COMBINED | PROJECT A

COST: $3.3M

Eliminate the loop ramp to I-95 southbound from S. Crater Road, realign Graham Road and the I-95 on-ramp to intersect, and create separate north- and southbound left-turn lanes on S. Crater Road.

GENERAL ELEMENTS

Close the existing on-ramp to I-95 Southbound/Route 460 Bus. from S. Crater Road

INTERSECTION-SPECIFIC ELEMENTS

Intersection #1 (Graham Road/S. Crater Road/I-95 Southbound On-Ramp)

- Realign Graham Road and on-ramp to intersect
- Shift southbound lanes on S. Crater Road through intersection to develop a separate southbound left-turn lane to the I-95 Southbound on-ramp
- Develop a separate northbound left-turn lane on S. Crater Road to Graham Road
- Proposed traffic signal operation :

  - 85 second cycle

  - Protected/permissive NB/SB left turns

FUTURE PARK AND RIDE LOT

VDOT identified the area within the vacated loop ramp as a potential future location for a park and ride lot. Assuming Graham Road is realigned, there would be enough area to construct 150-250 parking spaces. The estimated cost to design and construct a park and ride lot (150-250 spaces) would range from approximately $750,000 to $1.25M.

Intersection #7 (Winfield Road/Route 460 Bus.)

- Construct channelized right-turn lane from eastbound Winfield Road to the I-95 Northbound on-ramp
- Construct a new traffic signal
    - Proposed traffic signal operation
        - 85 second cycle
        - Protected/permissive NB left turn

VIRGINIA DEPARTMENT OF TRANSPORTATION

I-85 / I-95 INTERCHANGE FEASIBILITY STUDY

REFINED CONCEPT 1 + 2 | PROJECT B

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

REFINED CONCEPT 1 + 2 COMBINED | PROJECT B

COST: $11.6M

Intersection improvements on S. Crater Road north of I-95. Winfield Road corridor improvements, and modifications to the Winfield Road/Route 460 Bus. intersection as well as the I-95 northbound on-ramp and C-D road.

GENERAL ELEMENTS

Reconstruct the I-95 Northbound on-ramp merge from Winfield Road/Route 460 Bus. to provide adequate merge and decision distance requirements.

INTERSECTION-SPECIFIC ELEMENTS

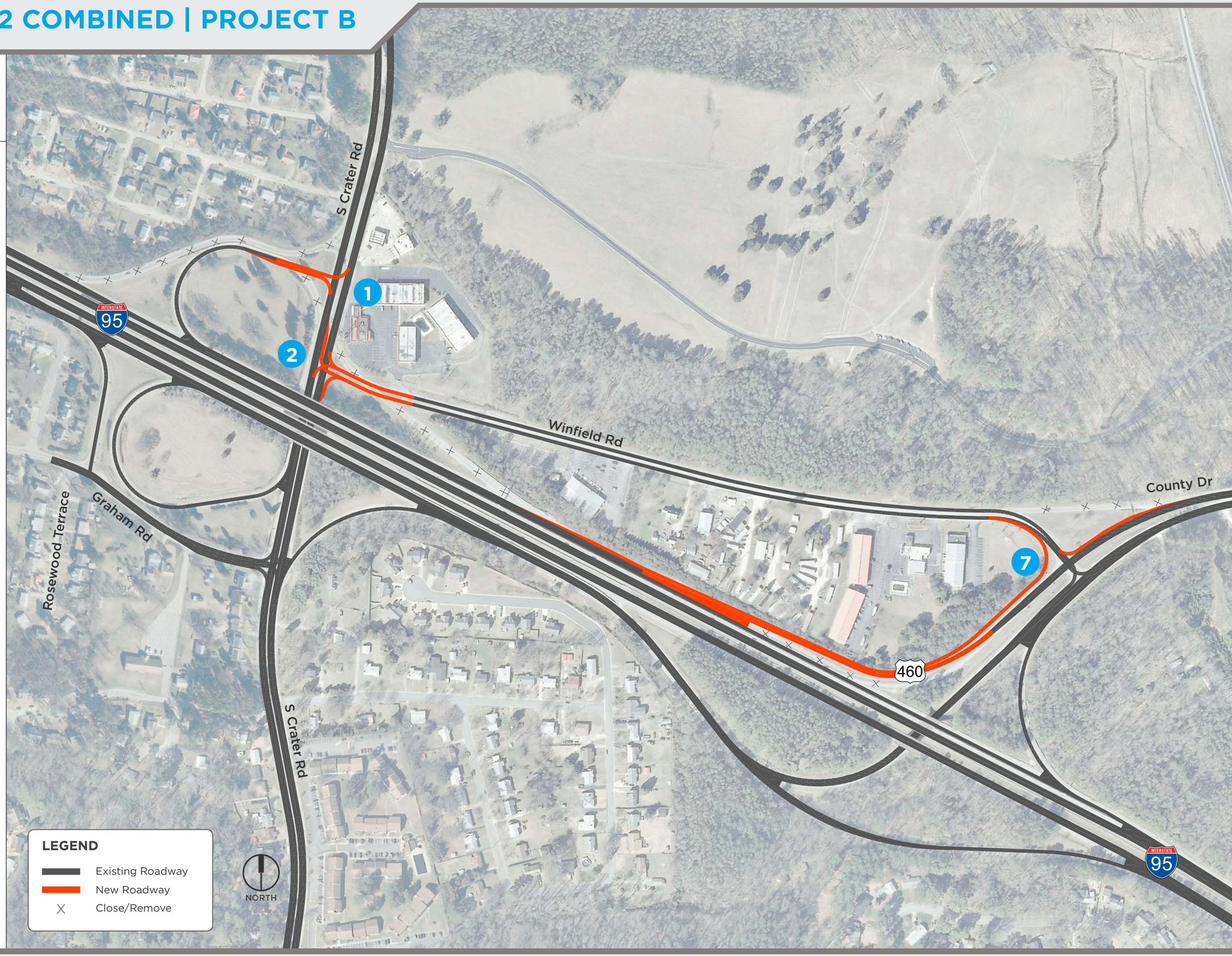
Intersection #1 (I-95 NB On-Ramp/S. Crater Road)

- Close the existing on-ramp to I-95 Northbound from S. Crater Road

Intersection #2 (Winfield Road/S. Crater Road)

- Remove the Off-Ramp from I-95 Northbound to S. Crater Road northbound
- Realign Winfield Road to S. Crater Road to provide full movements
  - Construct a separate southbound left-turn lane on S. Crater Road
  - Construct a separate northbound right-turn lane on S. Crater Road (beyond the I-95 bridge structure)

Continued on Reverse Side



- Construct dual westbound left-turns and a separate right-turn lane on Route 460 Bus. Extension
- Construct a new traffic signal
    - Proposed traffic signal operation
        - 100 second cycle
        - Protected/permissive SB left turn

Intersection #5 (I-95 Southbound C-D Road/Route 460 Bus. Extension)

- Construct a separate left-turn, two through, and separate right-turn lane on the I-95 Southbound C-D Road approach
- Construct a new traffic signal
    - Proposed traffic signal operation
        - 85 second cycle
        - Permissive SB left turn and NB right turn

Intersection #6 (I-95 Northbound Off-Ramp/Route 460 Bus.)

- Reconstruct off-ramp to intersect Route 460 Bus. at a controlled intersection
- Construct a new traffic signal
    - Proposed traffic signal operation
        - 85 second cycle
        - Permissive WB right turn

VIRGINIA DEPARTMENT OF TRANSPORTATION

I-85 / I-95 INTERCHANGE FEASIBILITY STUDY

REFINED CONCEPT 1 + 2 | PROJECT C

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

REFINED CONCEPT 1 + 2 COMBINED | PROJECT C

COST: $18.5M

Includes the elimination of the I-95 southbound off-ramp to Graham Road (similar to Concept #1 Project A), but creates a new intersection with a two-way extension of Route 460 Bus. as opposed to a one-way free-flow off-ramp connection to S. Crater Road.

Key considerations of this Concept include the following:

The alignment of the two-way extension of Route 460 Bus. to S. Crater Road is designed to avoid the Poor Creek Sanitary Pump Station and sanitary force mains.

The design assumes that the existing Route 460 Bus. underpass of I-95 is not modified or widened to accommodate Route 460 Bus. two-way travel (two travel lanes total, one in each direction) underneath the bridge.

GENERAL ELEMENTS

Close the existing I-95 Southbound C-D road off-ramp to Graham Road.

Construct two-way extension of Route 460 Bus. west to S. Crater Road.

Re-construct I-95 Southbound C-D road extension to intersection with new Route 460 Bus. extension.

Yield condition on I-85 northbound ramp to I-95 southbound C-D road can be removed. Two-lane C-D road can accept both single-lane ramps from I-95 southbound and I-85 northbound in a free-flow condition.

INTERSECTION-SPECIFIC ELEMENTS

Intersection #4 (Route 460 Bus. Extension/S. Crater Road)

- Construct a separate southbound left turn lane on S. Crater Road
- Construct a separate northbound right-turn lane on S. Crater Road

Continued on Reverse Side