CHAPTER 2: ALTERNATIVES

NEPA requires that federal agencies explore a range of reasonable alternatives. The alternatives under consideration must include the "no action" alternative as prescribed by 40 CFR 1502.14. Project alternatives may originate from the proponent agency, local government officials, or members of the public at public meetings or during the early stages of project development. Alternatives may also be developed in response to comments from coordinating or cooperating agencies. The alternatives analyzed in this document, in accordance with NEPA, are the result of internal scoping, consultation with FHWA, and a value analysis workshop conducted on March 30, 2012.

Alternatives selected for analysis in this EA address the purpose of and need for action. The NPS explored and objectively evaluated a range of alternatives. Four alternatives were carried forward for further analysis:

- Alternative 1: No Action
- Alternative 2: Restore to Original Conditions
- Alternative 3: Add Merge Lane by Widening the Road toward the Creek
- Alternative 4: Add Merge Lane by Widening the Road toward the Median (Preferred Alternative)

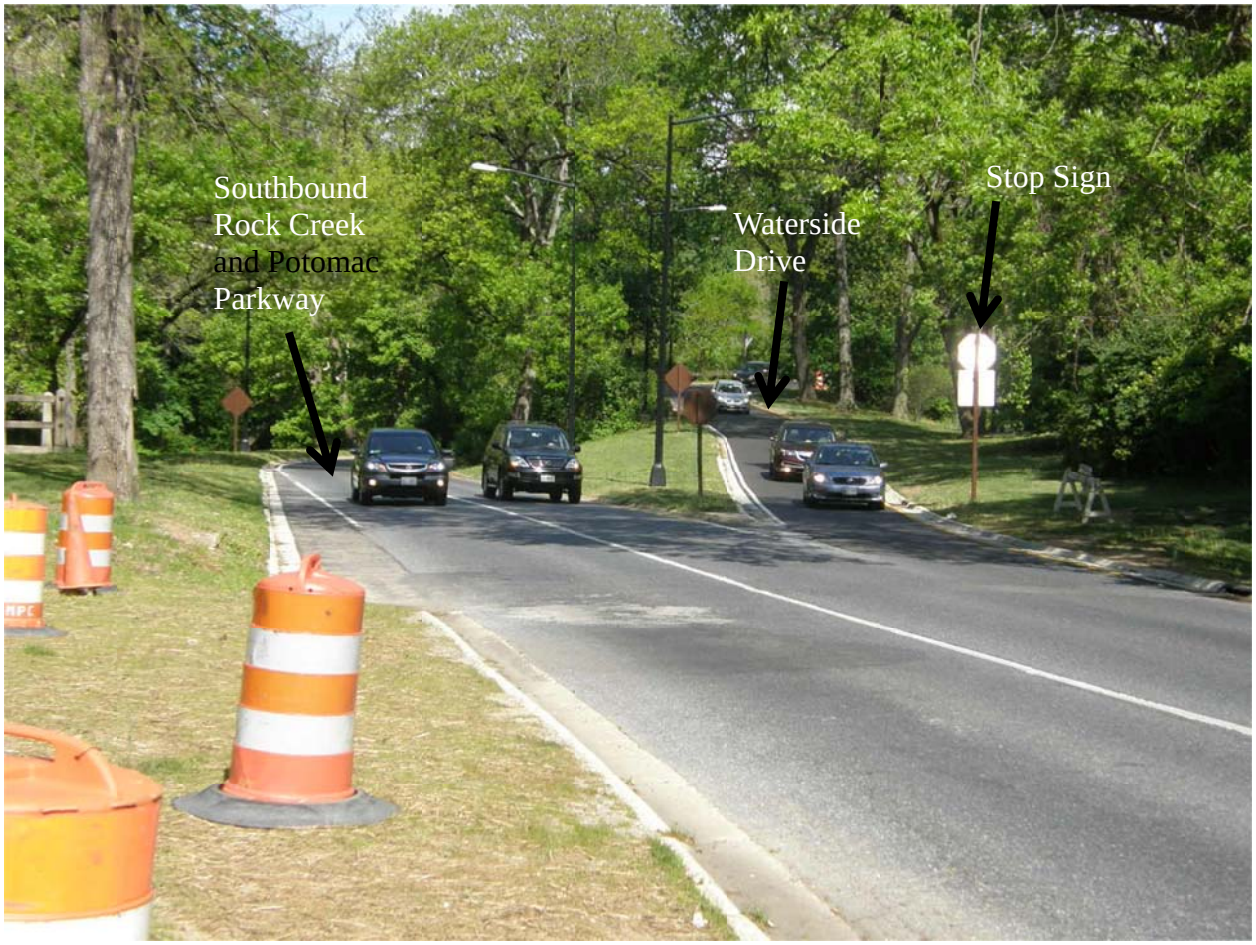
ALTERNATIVE 1: NO ACTION

The no action alternative provides a basis for comparison with the action alternatives and the respective environmental consequences. Should the no action alternative be selected, the NPS would respond to future needs and conditions without major actions or changes in the present course of management.

Under the no action alternative, there would be no road improvements (including road realignment) on Rock Creek and Potomac Parkway southbound at Waterside Drive, NW. The current condition at the intersection of the southbound parkway and Waterside Drive, NW would remain, with vehicles merging onto the parkway from Waterside Drive, NW coming to a full stop at a stop sign before merging from the left. A limited sight distance of 180 feet for merging vehicles would continue to contribute to safety concerns. No trees would be removed under the no action alternative.

Figures 2-1, 2-2, and 2-3 depict the current conditions at Waterside Drive, NW. A schematic of the no action alternative is shown in figure 2-4.

FIGURE 2-3: CURRENT CONDITION OF MERGE AREA OF ROCK CREEK AND POTOMAC PARKWAY AND WATERSIDE DRIVE, NW



In addition to retaining the road configuration, under the no action alternative, the condition of Rock Creek would remain as it is currently. Temporary remedial work was conducted as a result of two storm events in the August and September of 2011 that created erosion damage in and around the surrounding area (see figures 2-2 and 2-3). The temporary remedial work at the site consisted of installation of temporary gabion baskets. The gabion baskets are wire-enclosed baskets filled with riprap intended to provide slope stabilization. Under the no action alternative, erosion would continue to be addressed with the current gabion baskets. No trees would be removed and the impacts to the creek banks would not be addressed. Jersey barriers that were erected along the shoulder of the creek side southbound lane in late 2011 would remain.

FIGURE 2-2: CONDITION OF ROCK CREEK (WEST BANK)

FIGURE 2-3: 2011 CONDITION OF ROCK CREEK (EAST BANK)

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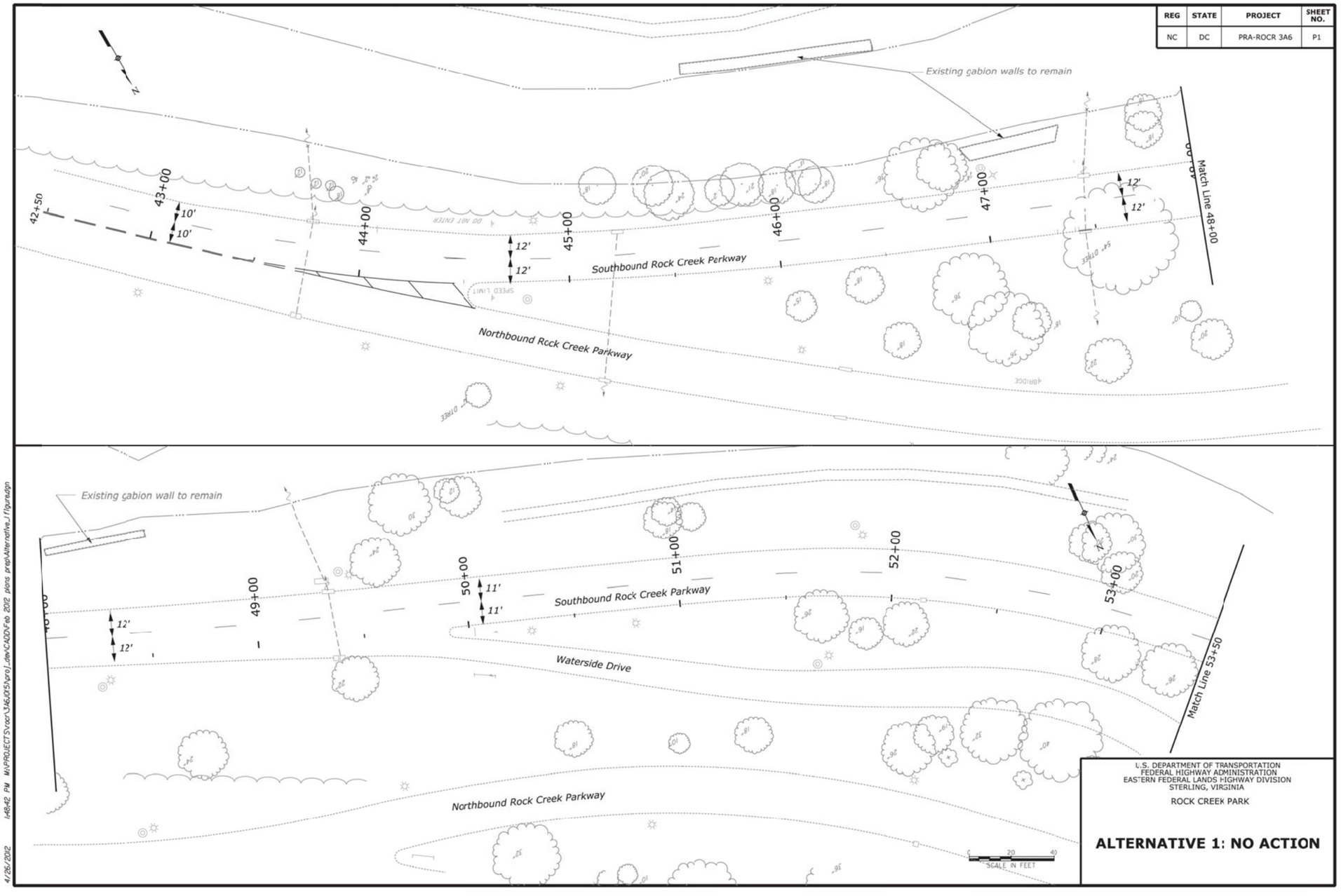
FIGURE 2-4: NO ACTION



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ELEMENTS COMMON TO ALL ACTION ALTERNATIVES

RIPARIAN AREA REVEGETATION

During the course of road construction in 2011 (as part of the 2006 EA that looked at safety improvements for the parkway, including proposed safety improvements at Waterside Drive, NW) the construction of a retaining wall to support an additional lane caused impacts to the riparian areas along the stream bank of Rock Creek near Waterside Drive, NW by 1) removal of 14 trees that provided ecological functions to Rock Creek; 2) removal of soil and vegetation along the roadside bank; and 3) exacerbating trailside bank erosion by the placement of a coffer dam within Rock Creek.

As a response to these riparian zone impacts, the NPS conducted an assessment to determine appropriate compensation for the unavoidable wetland impacts as required by the USACE for Section 404 permits and by the NPS for compliance with Director's Order 77-1: *Wetland Protection*. The findings of the impact assessment concluded that approximately 0.3 acre of riparian area was impacted by the construction.

To mitigate the 0.3 acre of disturbed riparian area, it is required that no less than 0.6 acre of riparian area be planted within the boundary of Rock Creek Park (see SOF for wetlands, appendix C). The increased acreage for mitigating the disturbance is based on a 2:1 ratio intended to offset the temporal loss of mature riparian vegetation. To ensure that the mitigation requirements are met the NPS has prepared a *Revegetation Plan for the Rock Creek Park Riparian Area* (NPS 2012a), which currently entails the revegetation of 0.69 acre of riparian areas; however, the acreage could increase. Below is a summary of the elements of the revegetation plan; refer to the plan for complete details

> The revegetation area is composed of six riparian sites (A-F) along the banks of Rock Creek, east of Beach Drive, NW between Bingham Drive, NW and Sherrill Drive, NW (see figure 1-3 in chapter 1). Vegetative plantings would include species that would be selected and planted based on elevation and/or landscape position in relationship to the stream and stream bank. Proposed species would be representative of species assemblages historically common to surrounding riparian and palustrine habitats and are consistent with native vegetative species found near the project sites. Species to be planted would include red maple (*Acer rubrum*), river birch (*Betula nigra*), and sycamore (*Platanus occidentalis*) in the upland areas and boxelder (*Acer negundo*) and black willow (*Salix nigra*) along the stream bank. Seedlings would be planted for an initial density of 100 trees per acre. Native shrubs, vines, perennials, ferns, and grasses would also be planted. Site preparation would include minor grading to prepare the area for planting, which would be done by hand.

STAGING AREA AND CONSTRUCTION ACCESS

Construction staging for all elements of each alternative (road rehabilitation, stream bank restoration, and riparian area revegetation) would be located at Cathedral Avenue, NW in a previously disturbed and paved area. This staging area is one of three staging areas currently being used for the projects under the *Reconstruction and Rehabilitation of Beach Drive and Rock Creek and Potomac Parkway from P Street to Calvert Street Environmental Assessment / Assessment of Effect* (NPS 2006b). Additional land at Cathedral Avenue, NW would be allowed to support additional construction equipment and materials, if needed.

ALTERNATIVE 2: RESTORE TO ORIGINAL CONDITIONS

ROAD REALIGNMENT

Under alternative 2, Rock Creek and Potomac Parkway southbound at Waterside Drive, NW would be restored to its pre–July 2011 alignment, resulting in the reduction of the current road width. The road width of the southbound lanes would be restored to its original 11-foot lanes plus two 1-foot gutters, for a total road width of 24 feet. Restoration of the road alignment would involve altering approximately 350 linear feet of road, including the removal of the widened areas and reinstallation of curbs and inlets. No additional pavement or impervious surfaces would be added; instead, impervious surface would decrease and return to the original, pre–July 2011 conditions. The total amount of area disturbed as part of the removal of the widened areas and reinstallation of curbs and inlets would be approximately 7,400 square feet (0.17 acre). No trees would be removed under alternative 2; however, trees that were removed during construction activities in 2011 would be replaced with the largest trees possible for the current site.

Sight lines would remain at approximately 180 feet for vehicles merging from Waterside Drive, NW. However, proposed traffic calming measures could slightly improve road safety conditions.

A schematic showing the locations where the road is to be restored to its original conditions, the proposed location of stream bank restoration (discussed below), and traffic calming measures under alternative 2 is shown on figure 2-5.

STREAM BANK RESTORATION

Under alternative 2, the gabion baskets that are currently stabilizing sections of Rock Creek would be replaced with a permanently bioengineered slope. Stream bank soil bioengineering is a broad category of treatments that is often used to include any stabilization technique that includes some plant material. The treatments that fall under this broad definition generally include the use of living, riparian plants as part of the design (Fripp, Hoag, and Moody 2008). Soil bioengineering components would be used to recreate the natural stream bank conditions in the impacted bank areas. Several bioengineering alternatives were considered, but during the value analysis it was determined that vegetated reinforced soil slope (VRSS) would be the most effective and therefore the most appropriate bioengineering approach (CDM Smith 2012).

A VRSS is a soil bioengineering technique that combines the use of woody, living vegetation purposefully embedded into a slope to help stabilize the soil, prevent erosion, and bind together the installed reinforcements. Heavy geotextile material would be used as the primary reinforcement to stabilize the slope. A shorter secondary reinforcement wrap, with a special mixture of soil and organic materials that help to promote the establishment of vegetation and growth, would be used on the face of the overall system. Approximately 250 feet of the east bank and 100 feet of the west bank would receive this treatment. The width of the VRSS on both banks would be approximately 25 feet each, for a total of 6,250 square feet disturbed on the east bank and 2,500 square feet disturbed on the west bank. Photographs showing a VRSS system used in a similar application at a different site are also shown in figures 2-6 and 2-7.

FIGURE 2-5: RESTORE TO ORIGINAL CONDITIONS

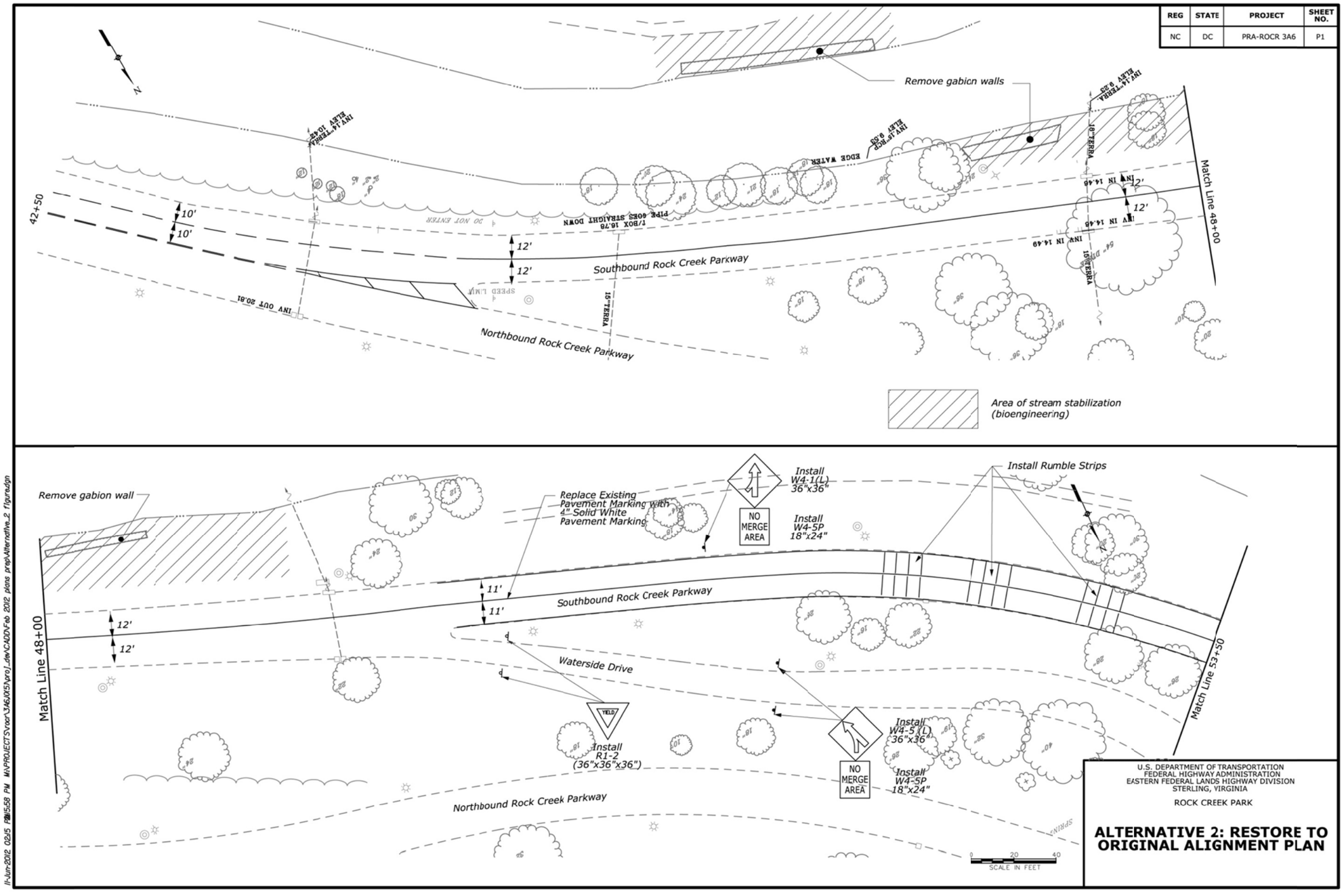

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FIGURE 2-6: EXAMPLE OF VRSS AFTER CONSTRUCTION

Source: Robin B. Sotir & Associates 2012.

FIGURE 2-7: EXAMPLE OF VRSS AFTER VEGETATION ESTABLISHMENT

Source: Robin B. Sotir & Associates 2012.

TRAFFIC CALMING

The following traffic calming measures would be implemented under alternative 2:

- Installation of two signs to read "No Merge" along Waterside Drive, NW near the merge with the southbound parkway.
- Installation of two signs to read "Stay in Lane" along the southbound parkway approaching the merge with Waterside Drive, NW.
- Solid striping and rumble strips along the southbound parkway approaching the merge with Waterside Drive, NW.

CONSTRUCTION COST AND SCHEDULE

The implementation of alternative 2 would cost approximately $750,000 in Federal Lands Highway Program Funds, to include planning, design, and construction. If approved, construction would occur in late fiscal year 2012 and early 2013. Road construction and stream restoration would occur almost concurrently and would be expected to last approximately three months in total. During road construction and stream bank restoration work, the lane of the southbound parkway closest to the creek would be closed. Additionally, the pedestrian traffic on the multi-use trail adjacent to the west bank of the creek would be detoured during stream bank restoration on the west bank. The detoured trail would be placed on previously disturbed soil (possibly using the closed creek side southbound lane of the parkway).

ALTERNATIVE 3: ADD MERGE LANE BY WIDENING THE ROAD TOWARD THE CREEK

ROAD REALIGNMENT

Under alternative 3, approximately 350 linear feet of Rock Creek and Potomac Parkway southbound at Waterside Drive, NW would be realigned approximately five feet toward Rock Creek and a merge lane of approximately 150 linear feet (150 feet with 270 feet of taper) would be added.

The road realignment toward Rock Creek would necessitate the construction of an approximately 350-foot retaining wall between the road and the creek. The retaining wall would be required to support the newly widened pavement and embankment that would be created as a result of the new acceleration lane. The widened pavement would result in steepened bank slopes toward the creek that would become unstable unless a retaining wall is constructed. Construction of the retaining wall would entail installing drilled shafts into the roadside soil in order to support the new structure. The retaining wall would be constructed of natural stone veneer with a concrete, steel reinforced core. In addition to stabilizing the road, the wall would serve as a roadside barrier between the creek and vehicles on the parkway (the ends of the retaining wall would also have steel-backed timber guardrails attached to them to ensure the motorist safety).

Road widening (from the original, pre–July 2011 conditions) toward the creek and construction of a retaining wall would disturb approximately 16,800 square feet (0.39 acre), 9,600 square feet (0.22 acre) of which would be in previously undisturbed areas. Approximately 5,500 square feet (0.12 acre) of new impervious surface would be added by the footprint of the retaining wall and the asphalt added for road realignment and merge lane. No trees would be removed under alternative 3.

Under alternative 3, safety would be improved by the addition of an acceleration lane and taper for merging traffic from Waterside Drive, NW. Merging vehicles would have a dedicated merge lane where they would be able to accelerate to minimize accidents with through traffic and on Waterside Drive, NW. As a result of the new acceleration lane and road realignment, the sight distance for merging traffic from Waterside Drive, NW would be increased from 180 feet to 420 feet, a 240-foot increase. Through traffic

on the southbound parkway would be able to see the merging traffic from farther away and would potentially have enough time to switch lanes or stop to avoid merging vehicles. The merging motorists would be better able to see the through traffic from farther away and would have enough time to find a sufficient gap to safely merge.

A schematic showing the locations where the road is to be restored to its original conditions, the proposed location of stream bank restoration (discussed below), and traffic calming measures under alternative 3 is shown on figure 2-8.

STREAM BANK RESTORATION

Under alternative 3, the eroded sections of the stream bank would be permanently stabilized. The VRSS approach described in alternative 2 would be used to recreate the natural stream bank conditions in the previously impacted bank areas. Approximately 540 linear feet of the east bank and 100 linear feet of the west bank would receive this treatment. The VRSS on the east bank would be placed at the toe of the proposed retaining wall. The width of the VRSS on both banks would be approximately 25 feet each, for a total of 13,500 square feet disturbed on the east bank and 2,500 square feet disturbed on the west bank.

TRAFFIC CALMING

The following traffic calming measures would be implemented under alternative 3:

- Installation of two warning signs showing merging traffic along the southbound parkway approaching the merge with Waterside Drive, NW.
- Installation of two "Yield" signs along Waterside Drive, NW ramp approaching the merge onto the southbound parkway.

  Solid striping and rumble strips along the southbound parkway approaching the merge with Waterside Drive, NW.

CONSTRUCTION COST AND SCHEDULE

The implementation of alternative 3 would cost approximately $3.13 million in Federal Lands Highway Program Funds, to include planning, design, and construction. If approved, construction would occur in late fiscal year 2012 and early 2013. The construction of the road restoration and stream restoration would occur almost concurrently and would be expected to last approximately three months in total. During the road restoration and stream bank restoration work, the southbound lane of the parkway closest to the creek would be closed. Additionally, the pedestrian traffic on the multi-use trail adjacent to the west bank of the creek would be detoured during stream bank restoration. The detoured trail would be placed on previously disturbed soil (possibly using the closed creek side southbound lane of the parkway).

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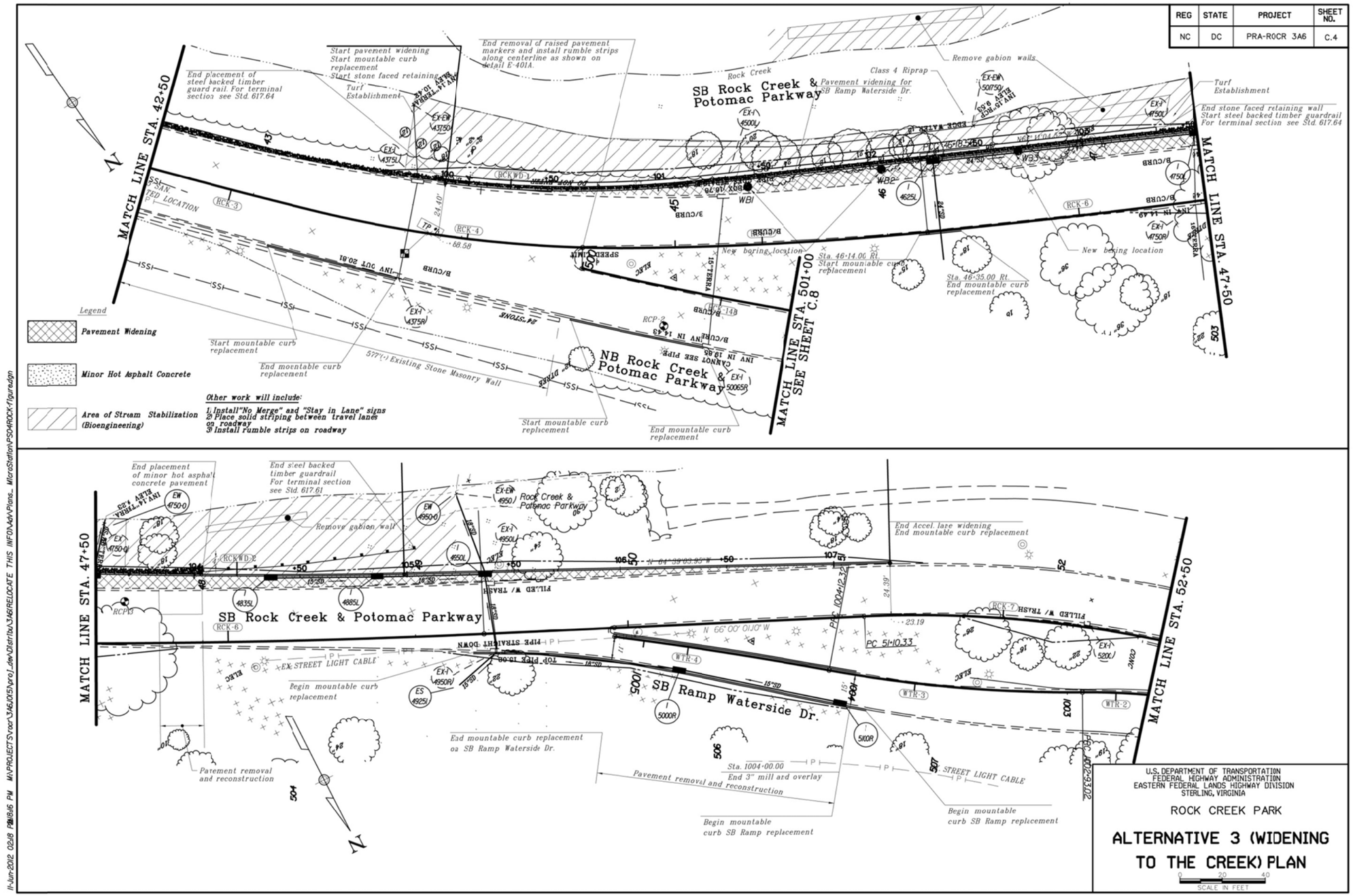
FIGURE 2-8: ADD MERGE LANE BY WIDENING THE ROAD TOWARD THE CREEK



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ALTERNATIVE 4: ADD MERGE LANE BY WIDENING THE ROAD TOWARD THE MEDIAN (NPS PREFERRED ALTERNATIVE)

ROAD REALIGNMENT

Under alternative 4, approximately 350 feet of Rock Creek and Potomac Parkway southbound at Waterside Drive, NW would be realigned approximately 12 feet (from the original, pre–2011 alignment) toward the median between northbound and southbound parkway and a merge lane of approximately 150 feet (150 feet plus 270 feet of taper) would be added (figure 2-9). As a result of the road realignment, up to seven trees, five with diameter at breast height (dbh) between 33.5 and 59.8 inches, would be removed or impacted by construction. The largest caliper trees for the site would be replanted. A steel-backed timber guardrail, similar to others found along the parkway, would be constructed along the length of the newly realigned road between the road and the creek to serve as a roadside barrier for vehicles.

Road widening (from pre–July 2011 conditions) toward the median side would result in the disturbance of approximately 17,500 square feet (0.40 acre), of which approximately 10,100 square feet (0.23 acre) are previously undisturbed areas. Approximately 4,600 square feet (0.11 acre) of new impervious surface would be added by the footprint of the asphalt concrete added for road realignment and merge lane.

Two light poles in the median would be relocated and would require trenching of an area approximately 2.5 feet long (30 inches) by 2.5 feet wide and no more than seven feet deep. In addition, new inlets and a pipe for drainage would be installed, requiring the disturbance of an area approximately six feet long by 3.5 feet wide by four feet deep for the inlets, and approximately 90 feet long by three feet wide and three feet deep for the pipe.

Under alternative 4, safety would be improved by the addition of an acceleration lane and taper for merging traffic from Waterside Drive, NW. The merging vehicles would have a dedicated merging lane and would be able to sufficiently accelerate and potentially avoid traffic accidents with through traffic. As a result of the new acceleration lane and road realignment, the sight distance for merging traffic from Waterside Drive, NW would be increased from 180 feet to 410 feet, a 230-foot increase. Through traffic on the southbound parkway would be able to see the merging traffic from farther away and would potentially have enough time to switch lanes or stop to avoid merging vehicles. The merging traffic would see through traffic from farther away better and would have enough time to find a sufficient gap to safely merge.

STREAM BANK RESTORATION

Stream banks on both sides of Rock Creek would be fully restored using bioengineering, specifically VRSS, with the same linear and square footage as described under alternative 2. Approximately 250 feet of the east bank and 100 feet of the west bank would receive this treatment. The width of the VRSS on both banks would be approximately 25 feet each, for a total of 6,250 square feet disturbed on the east bank and 2,500 square feet disturbed on the west bank.

TRAFFIC CALMING

The following traffic calming measures would also be implemented under alternative 4:

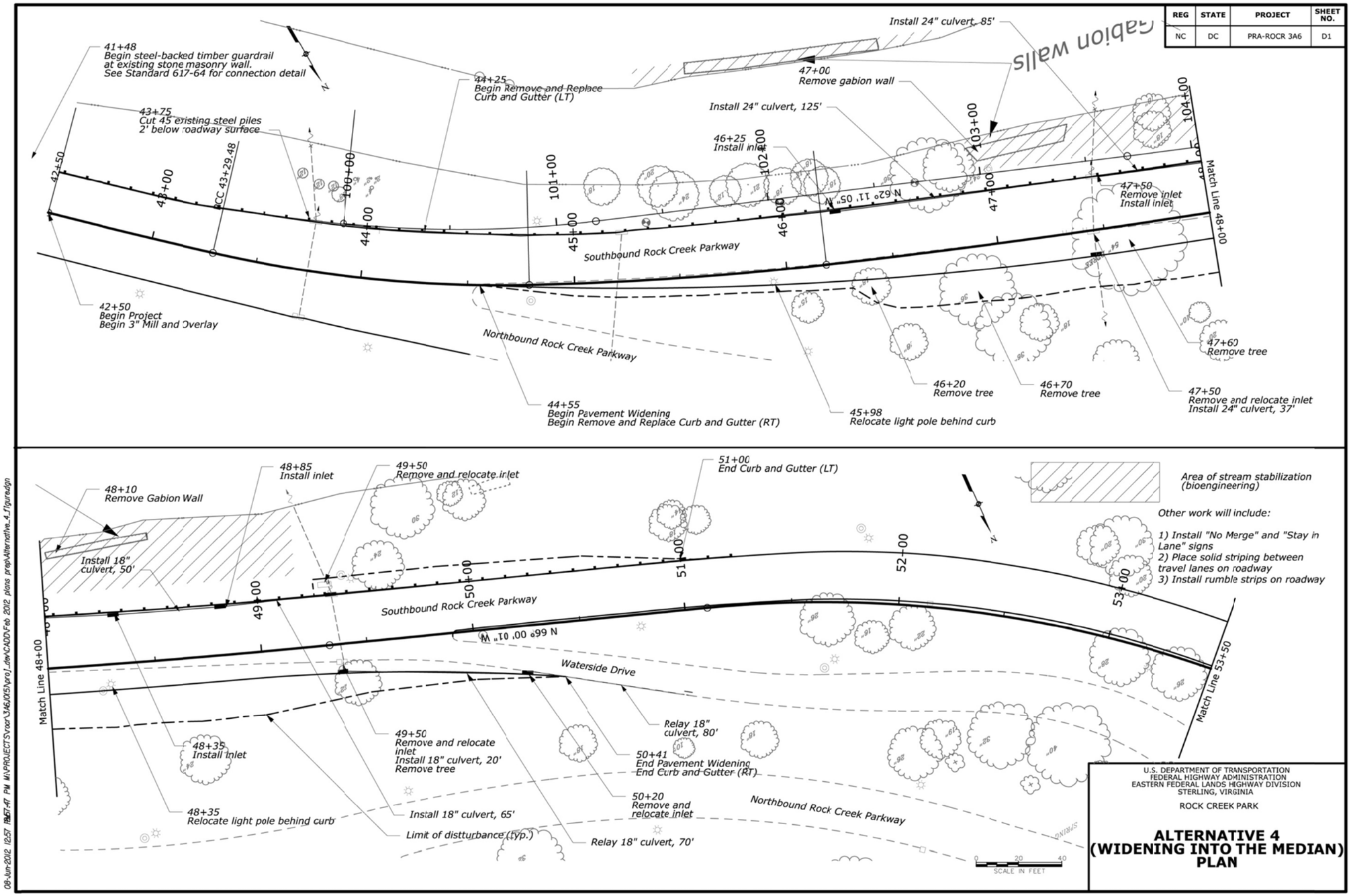
- Installation of two warning signs showing merging traffic along the southbound parkway approaching the merge with Waterside Drive, NW.
- Installation of two “Yield” signs along Waterside Drive, NW ramp approaching the merge onto the southbound parkway.

  Solid striping and rumble strips along the southbound parkway approaching the merge with Waterside Drive, NW.

CONSTRUCTION COST AND SCHEDULE

The implementation of alternative 4 would cost approximately $975,000 in Federal Lands Highway Program Funds, to include planning, design, and construction. If approved, construction would occur in late fiscal year 2012 and early 2013. The construction of the road restoration and stream restoration would occur almost concurrently and would be expected to last approximately three months in total. During the road restoration and stream bank restoration work, the southbound lane closest to the creek would be closed. During construction to realign the road to the median, the median-side lane of the southbound parkway would be closed. Additionally, the pedestrian traffic on the multi-use trail adjacent to the west bank of the creek could be detoured during stream bank restoration. The detoured trail would be placed on previously disturbed soil (possibly utilizing the closed creek side southbound lane of the parkway). Also, the southbound ramp from Waterside Drive, NW will be temporarily closed during nights/weekends in order to make necessary improvements to the ramp.

FIGURE 2-9: ADD MERGE LANE BY WIDENING THE ROAD TOWARD THE MEDIAN



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MITIGATION MEASURES FOR ALL ACTION ALTERNATIVES

The NPS places strong emphasis on avoiding, minimizing, and mitigating potentially adverse environmental impacts. To help ensure the protection of natural and cultural resources and the quality of the visitor experience, the following protective measures would be implemented as part of the selected action alternative. The NPS would implement an appropriate level of monitoring throughout the construction process to help ensure that protective measures are being properly implemented and are achieving their intended results.

GENERAL CONSIDERATIONS

- Construction fencing would be installed to clearly delineate the project disturbance limits prior to commencement of work by the contractor.
- All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone, as defined by the road or construction zone fencing.
- All removed asphalt and other material would be hauled from the site immediately.
- New concrete and asphalt would be produced outside Rock Creek Park. No overnight storage of these materials would be permitted within park boundaries.
- All equipment on the project would be maintained in a clean and well-functioning state to avoid or minimize contamination from automotive fluids, and to ensure that noise controls are properly functioning. All equipment would be checked daily.
- Prior to construction, a hazardous spill plan would be submitted, stating what actions would be taken in case of a spill to minimize any adverse impacts. This plan would also incorporate preventive measures to be implemented, such as the placement of construction staging areas and refueling facilities, storage and handling of hazardous materials, and notification procedures for a spill. A spill kit would be available and workers trained to use it would be available to clean up spills.

WATER RESOURCES

- Rock Creek would be protected from further degradation through the implementation of the BMPs described under the mitigation measures for “Soil Erosion and Sediment Control.”
- Stormwater flow would be diverted as necessary to minimize the potential for the introduction of chemicals or sediments into the stream.
- Adverse effects of fuel spills would be minimized through the following:
    - Construction staging areas would be located at Cathedral Avenue, NW in a previously disturbed and paved area away from surface water features.
    - Activities such as refueling would be located well away from surface water features.
- Areas where refueling or construction vehicle and equipment maintenance are to be conducted would be designated and equipped with containment devices such as temporary earth berms.
- Additional mitigation measures that are protective of water resources are included under General Considerations.

SOIL EROSION AND SEDIMENT CONTROL

- An erosion and sediment control plan would be prepared and implemented, consistent with the D.C. Soil Erosion and Sediment Control Program. An approved D.C. soil erosion and sediment control permit would be obtained.
- The amount of disturbed earth area and soil exposure to rainfall would be minimized.
- Any soil excavated during construction would be stockpiled and reused as fill if needed.
- Erosion containment controls such as silt fencing and sediment traps (for example, check dams and weed-free straw bales) would be used to contain sediment on site.
- Disturbed soil or soil stockpiles would be covered with plastic sheeting, jute matting, erosion netting, straw, or other suitable cover material.
- Erosion and sediment control best management practices (BMPs) would be inspected on a regular basis and after each measurable rainfall to ensure that they are functioning properly and to maintain BMPs (repair and clean) as necessary to ensure that they continue to function properly.
- Temporary BMPs would be used to minimize erosion and sedimentation from ground-disturbing activities that expose bare soil. The BMPs may include the use of silt fence, sediment logs, erosion matting, or check dams. These BMPs would be used only during construction and would be removed once the disturbed area has been permanently stabilized.
- BMPs would be installed and removed in coordination with earth-disturbing activities.
- Prior to clearing and grading, the area to be cleared would be clearly marked to minimize the amount of cleared area.
- Only those areas necessary for construction would be cleared and grubbed.
- Exposed soils would be stabilized and replanted with vegetation identified by the park as appropriate for the vegetation zone where construction is occurring, immediately following completion of construction activities or during temporary cessation of the earth-disturbing activities.

VEGETATION

- Only those areas necessary for construction would be cleared and grubbed.
- Trees that have already been removed during construction before July 2011 would be replaced by dbh (e.g., if a 10-inch dbh tree was removed, NPS would plant 10" dbh worth or five - 2" caliper trees).
- The critical root zone of all trees that are not proposed to be removed would be protected, with a minimum requirement of one foot of protection for each inch of dbh.
- Any trees selected for protection by park staff near construction areas would be marked by silt fence or orange construction fence that would stay in place during the entire construction process. A park arborist would be consulted before the protected zone is to be encroached upon.
- FHWA Eastern Federal Lands Highway Division would ensure seeding with an NPS-approved seed mix to begin establishing ground cover. Once the project is complete, the area would be revegetated pursuant to a planting or landscaping plan. The vegetation planted would be appropriate for the vegetation zone where construction is occurring.

- All fill and aggregate material would be treated or certified free of all nonnative plants before entering the park.
- Vegetation would be maintained and monitored by contractors obtained by the NPS in areas replanted following road rehabilitation to ensure the successful establishment of native species and to ensure that any nonnative invasive species that appear in the replanted areas are removed. Maintenance would be expected for two years and monitoring for three years.
- Any planting plan must be approved by Rock Creek Park Natural Resources staff.

WILDLIFE

- Erosion and sediment controls and stormwater BMPs as discussed above under "Soil Erosion and Sediment" and "Water Resources" would be implemented to minimize potential impacts to aquatic species and their habitats both in and downstream of the project area.
- Wildlife species observed in the construction areas would be provided the opportunity to move out of harm's way.
- Cofferdams would not be in use during fish spawning season (late winter through early summer [February through July]).

CULTURAL RESOURCES

- Impacts to the cultural landscape would be minimized by ensuring that the rehabilitation and reconstruction of Rock Creek and Potomac Parkway is conducted in a manner consistent with *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (Birnbaum 1996).
- Impacts to historic structures would be minimized by ensuring that all proposed road rehabilitation and reconstruction activities are conducted in a manner consistent with *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Restoring, and Reconstructing Historic Structures* (Weeks 1995).
- If archeological resources are discovered during construction, all work in the immediate vicinity of the discovery would be halted until the resources can be identified and documented and an appropriate mitigation strategy can be developed. Consultation with the D.C. historic preservation officer (DCHPO), the NPS, and/or the NPS regional archeologist will be coordinated to ensure that the protection of resources is addressed. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed.
- Historic American Landscapes Survey (HALS) documentation would be completed for historic trees impacted during construction, should alternative 4 be selected. (The other action alternatives would not impact trees in the parkway median.)

TRANSPORTATION MANAGEMENT

- Local agencies would be coordinated with to manage the traffic impacts along arterials.
- Advisory messages would be posted to warn drivers of expected delays and advise them of viable alternatives, including greater usage of mass transit.
- Lane closure would be posted on the park website two weeks prior to each closure and during the closure.

- During the duration of this project, the FHWA would provide and maintain proper signs, barricades, and/or other means of warning the general public of dangers inherent in the project.
- The nearby bicycle/pedestrian trail would remain open at all times.

ALTERNATIVES CONSIDERED BUT DISMISSED

CEQ regulations for implementing NEPA require federal agencies to explore and objectively evaluate all reasonable alternatives, and to briefly discuss the rationale for eliminating any alternatives that were not considered in detail. A number of design and construction options were identified during scoping and reviews of preliminary design plans to improve the section where Waterside Drive, NW merges onto Rock Creek and Potomac Parkway. During internal project development, these options were deemed not feasible or had several disadvantages and were not carried forward for analysis in this EA. Justification for eliminating these options from further analysis was based on factors outlined in Director's Order 12:

- technical or economic infeasibility
- inability to meet the project objectives or resolve the project purpose and need
- duplication with other less environmentally damaging or less expensive alternatives
- conflict with an up-to-date and valid park plan, statement of purpose and significance, or other policy
- too great an impact to the environment

ADD MERGE LANE BY WIDENING THE ROAD TOWARD THE MEDIAN AND THE CREEK

Under this alternative, a 150-linear-foot merge lane would be added along a portion of Rock Creek and Potomac Parkway southbound at Waterside Drive, NW, and the road would be realigned six feet toward the median and six feet toward Rock Creek between northbound and southbound Rock Creek and Potomac Parkway. This alternative was dismissed because the construction of a retaining wall, although smaller in scale than that proposed in alternative 3, would still be required. This alternative would cost approximately $2.5 million (only slightly less than alternative 3) and would not provide additional benefits compared to alternative 3. Impacts to cultural resources in the median would still occur. Benefits to sight lines and safety at the merge would not be any greater than under alternatives 3 and 4. Because this alternative would provide duplication with other alternatives, it was considered but dismissed from further analysis.

TRAFFIC CALMING ALTERNATIVE

Rock Creek and Potomac Parkway southbound at Waterside Drive, NW would be restored to its pre–July 2011 alignment. The road width of the southbound lanes would be restored to 11-foot lanes plus two 1-foot gutters, for a total of 24 feet, in the same manner as under alternative 2.

In addition, the employment of the following traffic calming options was considered to improve traffic flow and to minimize the number of vehicle collisions along the parkway at the merge with Waterside Drive, NW:

- Two warning signs would be installed (one on each side of the southbound lanes of the parkway because it is a two-lane, one-way road) with LED or incandescent bulb flashers with text on the signs reading "Traffic Entering from Left When Flashing." In conjunction, on the southbound parkway Waterside Drive, NW onramp, a presence loop would be installed in advance of the theoretical gore area (the triangular piece of land located where roads merge or split). Once a vehicle passes this presence loop, the flashers on the parkway would flash a warning signal. At all other times, the flashers on these signs would remain unlit.

- On the southbound parkway Waterside Drive, NW onramp, a ramp-metering operation would be installed. Two Red/Yellow/Green (12-inch lens) LED traffic lights would be mounted on poles, one on each side of the ramp road, to be FHWA Manual on Uniform Traffic Control Devices (MUTCD) compliant (duplication of signal indications). These ramp signals can operate at any time, but would probably be in operation only in peak/rush hours. If only operated during rush/peak hours, the ramp signals could operate in yellow flash mode during nonpeak hours to emphasize a "Yield" condition. A stop bar would be needed on the ramp for these signals, with a supplemental sign reading "Stop Here on Red" with an arrow pointing to stop bar. Ramp meter signal operation can either be pre-timed or activated through the use of a presence loop located in advance of the onramp gore areas in only the leftmost travel lane on the southbound parkway, i.e., the lane closest to the onramp.
- The Waterside Drive, NW onramp would be closed during peak hours, or other hours, as necessary, so that traffic would be minimized on the southbound parkway. This option would include the placement of traffic barricades at the following locations: (1) on southbound Waterside Drive, NW at Massachusetts Avenue, NW; (2) on southbound parkway Waterside Drive, NW onramp at the junction of the northbound Waterside Drive, NW with the off-ramp from the northbound parkway; and (3) on the southbound Waterside Drive, NW onramp in the area of theoretical gore at the southbound parkway. A possible motorist travel pattern to access the southbound parkway appears to be the following: (1) use Massachusetts Avenue, NW to progress through Sheridan Circle, (2) use 23rd Street, NW or 22nd Street, NW to P Street, NW, (3) use eastbound P Street. NW to cross over Rock Creek and the parkway, and (4) use access roads for the parkway, from P Street, NW that are west of the river.
- On the parkway's southbound lanes, variable speed limit signs would be installed; this approach is also known as speed harmonization. This operation would allow speeds to be adjusted for peak times versus off-peak times.
- On the parkway's southbound lanes, a speed feedback sign would be installed that flashes the speed of approaching vehicles. This feedback sign is typically installed directly below a posted speed limit sign.
- On the parkway's southbound lanes, a speed-activated warning sign would be installed that flashes the speed of vehicles that exceed the posted speed limit.

On the parkway's southbound lanes, automated speed enforcement cameras would be installed

- The standard-spaced white skip line would be replaced with a solid white line and "Stay in Lane" signs would be installed preceding the blind curve on the parkway's southbound lanes, preferably on both sides of the road.

Because these traffic calming measures would not meet the purpose and need, would potentially have adverse impacts to the historic character of the road, would result in operational difficulties, would impact traffic on adjacent roads, and would provide duplication with other alternatives, they were considered but dismissed from further analysis.

STREAM BANK RESTORATION / BIOENGINEERING OPTIONS

Several bioengineering options were considered during alternatives development and evaluated based on the following factors:

- stability (susceptibility to erosion)
- geometry (minimizes encroachments into stream land)
- visual aesthetics

- system life
- low level of long-term maintenance

As a result, VRSS was determined to best meet these factors over these other options considered. The following options were not considered either because they did not provide the same level of benefit as VRSS or accomplished a similar goal but had a greater environmental impact.

Live Crib Wall — A live crib wall is a combination of a conventional crib wall retaining system with living plant materials placed in the open areas of the cribs. The crib wall is constructed with interlocking wood or concrete members and backfilled with a combination of rock and soil. Living plants or cuttings are placed in the open areas of the cribs, and over time develop a root mass that in combination with the crib elements help armor the stream bank and protect it from erosion. The crib wall also acts as a gravity wall retaining the soil behind the wall. Live crib wall modules used in these applications are typically about four to five feet wide and deep and three to four feet high. These modules can be stacked on fairly steep slopes in a flat, stepped, or staggered face (although stepping or staggering is more beneficial to good plant establishment).

Hedge Layer with Riprap Rock — A hedge layer is a combination of a rock/soil mixture and living plants in the form of live branch cutting and/or rooted container stock. These are typically installed at 2(H):1(V) slope faces with the rock/soil depth being established by the requirement for stabilization. The rock/soil depth for greatest success is typically 1.5 to two feet deep. The vegetation and rock/soil mixture is typically installed in angled parallel layers across the bank. The soil in the rock matrix assists in establishing plant growth. The plant materials are intended to root into the soil/rock mixture, to bind the soil and rock together and farther into the natural subgrade material beneath the rock/soil mixture, and to connect the upper rock zone with the bank beneath. The top growth is intended to create roughness and slow near-bank stream velocities.

Brush Mattress — A brush mattress system is a shallowly installed layer of vegetation. Although rooted plants may be used, typically this system is constructed from live cut branches. The existing stream bank is sloped back to a 2(H):1(V) or flatter slope face. The live cut branches are installed on the bank at right angles to the creek. They are installed close together to form a mattress-like cover over the bank face. The branches are secured (tied down) so as to have close contact with the bank soil. Brush mattress is intended to form a complete surface cover to control erosion. The erosion controlling capabilities become stronger with age as the live cut branches establish via rooting into the face and produce top growth that assists in slowing near-bank velocities.

THE ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The NPS is required to identify the environmentally preferable alternative in its NEPA documents for public review and comment. The NPS, in accordance with the Department of the Interior NEPA Regulations (43 CFR Part 46) and CEQ's Forty Questions, defines the environmentally preferable alternative (or alternatives) as the alternative that best promotes the national environmental policy expressed in NEPA (section 101(b)) (516 DM 4.10). The CEQ's Forty Questions (42 CFR 46.30) (Q6a) further clarifies the identification of the environmentally preferable alternative as, "the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources."

After completing the environmental analysis, the NPS identified alternative 2, Restore to Original Conditions, as the environmentally preferable alternative. The restoration of the road to its original conditions would have the least impacts to biological, cultural, and physical resources within the park. The alternative would require the least amount of construction work, would not increase impervious surfaces in the floodplain, and have the least adverse impacts to vegetation and wildlife. It would not require tree removal or in-stream construction activities. Replacement of the existing gabion basket walls

with VRSS would result in long-term, beneficial impacts to hydrology by reducing stream velocities and the associated risk of local and downstream erosion. Additionally, alternative 2 would result in long-term, beneficial impacts to riparian areas along Rock Creek as a result of revegetation of no less than 0.6 acre to compensate for the 0.3 acre of riparian area that was disturbed during previous roadway construction in 2011, Restoring the road to its original conditions would not result in adverse impacts to historic structures, cultural landscapes, and archeological resources.

The no action alternative, does not meet the criteria for the environmentally preferable alternative as fully as alternative 2. The no action alternative would fail to provide safe traffic conditions along the southbound parkway in the vicinity of Waterside Drive, NW. In addition, under the no action, the eroded creek banks would continue to be stabilized with gabion baskets, a temporary solution. This alternative would not preserve the historic resources of Rock Creek Park. Erosion of Rock Creek and the trail network, and the related degradation of the bucolic setting - all of which are important elements of the Rock Creek and Potomac Parkway Historic District – would continue. The no action alternative would also fail to a culturally pleasing surroundings to current visitors, including pedestrians and motorists, and future generations.

NATIONAL PARK SERVICE PREFERRED ALTERNATIVE

To identify the preferred alternative for the EA, each alternative was evaluated based on ability to meet the purpose and need (table 2-1) and their potential impacts to the environment (see chapter 4 of this document). The project team screened the alternatives using the CBA process during a MVA held March 30, 2012. The objectives of the MVA were to develop the "Preferred" alternative discuss options to address Bioengineering and discuss options to address traffic calming.

The MVA team reviewed the five original alternatives developed by the NPS. One additional alternative was either developed for consideration or reviewed from previous evaluations during the creativity phase of the MVA workshop. The Project Team then reviewed the merits of all the alternatives to determine which were most viable. Ultimately, three action alternatives were chosen to be evaluated in the CBA completed during the MVA workshop (Kirk Value Planners 2012).

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SUMMARY OF ENVIRONMENTAL IMPACTS

The following table provides a summary of environmental consequences for each resource area analyzed in "Chapter 4: Environmental Consequences." Alternatives are determined to have beneficial or adverse impacts for each area of analysis, and adverse impacts are rated as negligible, minor, moderate, or major. Impacts are also assessed as to whether they are short-term (duration of construction) or long-term (greater than the duration of construction). Threshold definitions for each topic are listed in chapter 4.

TABLE 2-1: SUMMARY OF IMPACTS (ENVIRONMENTAL CONSEQUENCES)

Resource Area	Alternative 1: No Action	Action Alternatives		
		Alternative 2: Restore to Original Conditions	Alternative 3: Add Merge Lane and Shift Road toward the Creek	Alternative 4: Add Merge Lane and Shift Road toward the Median
Water Resources	Alternative 1 would result in short-term, benefits to water quality by stabilizing the eroded banks and stopping the downstream flow of associated sediments from the gabion baskets, as well as long-term, negligible to minor, adverse impacts to stream channel configuration by encouraging increased downstream flow and flow velocities during storm events. Cumulative impacts would be long-term and beneficial, with the no action alternative contributing minimal adverse impacts.	Alternative 2 would result in long-term, beneficial impacts to water resources from implementation of VRSS and revegetation of riparian areas along Rock Creek by helping to stabilize the stream banks and providing additional vegetated buffers for Rock Creek. Short-term, negligible to minor, adverse impacts would be associated with construction activities. Cumulative impacts would be long-term and beneficial with alternative 2 contributing slightly to beneficial impacts.	Alternative 3 would result in long-term, minor, adverse impacts from the addition of 5,500 square feet of new impervious surface and from increased downstream velocities and increase sediment loads in Rock Creek, as well as long-term, beneficial impacts from the replacement of the gabion baskets with VRSS and revegetation of riparian areas. Short-term, negligible to minor, adverse impacts would result from construction activity. Cumulative impacts would be long-term and beneficial with alternative 3 having a noticeable adverse contribution to overall long-term, beneficial impacts.	Alternative 4 would result in long-term, negligible to minor ,adverse impacts from the addition of 4,600 square feet of new impervious surfaces and increased runoff, as well as long-term, beneficial impacts from the replacement of the gabion baskets with VRSS and revegetation of riparian areas. Short-term, negligible to minor, adverse impacts would result from construction activity. Cumulative impacts would be long-term and beneficial with alternative 4 having a slight contribution to overall long-term, beneficial impacts.
Floodplain	Alternative 1 would result in long-term, negligible to minor adverse impacts to floodplain functions and values from the presence of the gabion basket walls. Cumulative actions would be long-term and beneficial, with the no action having a negligible contribution to overall long-term, beneficial impacts	Alternative 2 would result in long-term, beneficial impacts from the replacement of the gabion baskets with the VRSS and riparian revegetation along Rock Creek. Short-term, negligible to minor, adverse impacts would occur during construction. Cumulative impacts would be long-term and beneficial, with alternative 2 having a minor contribution to an overall long-term, beneficial impact to floodplain functions and values.	Alternative 3 would result in long-term, minor, adverse impacts to Rock Creek floodplain values and functions from encroachment into the stream channel and the use of a retaining wall, as well as long-term, benefits from the VRSS and riparian revegetation. Short-term, negligible to minor, adverse impacts would result from constriction of the stream channel by the cofferdams during construction. Cumulative impacts would be mostly local, long-term, and beneficial, with alternative 3 contributing minimally to long-term, beneficial cumulative impacts to floodplain functions and values.	Alternative 4 would result in long-term, negligible to minor, adverse impacts to Rock Creek floodplain values and function from increases in impervious surfaces in the floodplain and long-term, benefits from VRSS and riparian revegetation. Cumulative impacts would be mostly local, long-term, and beneficial, with alternative 4 contributing minimally to long-term, beneficial impacts to floodplain functions and values.
Wetlands	Alternative 1 would result in short-term, benefits for waters of the United States from the placement of gabion baskets as well as long-term, negligible to minor, adverse impacts as a result of increasing stream bank erosion and sediment deposition downstream. Cumulative impacts would be overall long-term and beneficial with the no action having a negligible adverse contribution to these impacts.	Alternative 2 would result in long-term, benefits for waters of the United States from stabilization of the stream banks with VRSS by decreasing erosion potential and limiting the amount of sediment entering waters of the United States and revegetation of riparian areas along Rock to mitigate for the impacts to approximately 0.3 acre of riparian area from previous construction activities. Short-term, negligible to minor, adverse impacts would result from construction activities. Cumulative impacts would be long-term and beneficial with alternative 2 having a minimal contribution to these impacts.	Alternative 3 would result in long-term, minor, adverse from road construction; however, there would be long term, beneficial impacts from the stabilization of the stream banks with VRSS by decreasing erosion potential and limiting the amount of sediment entering waters of the United States and revegetation of riparian areas along Rock to mitigate for the impacts to approximately 0.3 acre of riparian area from previous construction activities. Short-term, negligible to minor adverse impacts would be associated with construction activities. Cumulative impacts would be long-term and beneficial but local, with alternative 3 having a minimal contribution to these impacts.	Alternative 4 would result in long-term, beneficial impacts from the stabilization of the stream with VRSS by decreasing erosion potential and limiting the amount of sediment entering waters of the United States and revegetation of riparian areas along Rock to mitigate for the impacts to approximately 0.3 acre of riparian area from previous construction activities. Short-term, negligible to minor adverse impacts would be associated with construction activities. Cumulative impacts would be long-term and beneficial with alternative 4 having a minimal contribution to these impacts.

Resource Area	Alternative 1: No Action	Action Alternatives		
		Alternative 2: Restore to Original Conditions	Alternative 3: Add Merge Lane and Shift Road toward the Creek	Alternative 4: Add Merge Lane and Shift Road toward the Median
Soils	Alternative 1 would result in long-term, minor, adverse impacts to soils due to continued erosion and bank/slope sloughing along Rock Creek near Waterside Drive, NW. Cumulative impacts would be long-term and beneficial with the no action having a minimal contribution to these impacts.	Alternative 2 would result in long-term, beneficial impacts to soils as a result of bank stabilization from VRSS measures and the revegetation of riparian areas. Short-term, minor, adverse impact to soils would be expected during construction as well as short-term, negligible, adverse impacts to soils during revegetation activities. Cumulative impacts would be long-term and beneficial with alternative 3 having a slight contribution to these impacts.	Alternative 3 would result in short-term, moderate, adverse impacts to soil resources as a result of construction activities, which would be mitigated by using construction BMPs. Long-term, moderate, adverse impacts to soil resources would result from the additional compaction of 5,500 square feet of soil and the installation of shafts into the soil to support the retaining wall. Long-term, beneficial impacts would result from the stabilization of currently eroding soils along the creek bank and riparian revegetation along Rock Creek. Cumulative impacts would be long-term and beneficial with alternative 3 having a slight contribution to these impacts.	Alternative 4 would result in short-term, moderate, adverse impacts to soil resources as a result of construction activities, which would be mitigated by using construction BMPs. Long-term, minor to moderate, adverse impacts to soil resources would result from the compaction of 4,600 square feet of soil. Long-term, beneficial impacts would result from the stabilization of presently eroding soils along the creek bank and riparian revegetation along Rock Creek. Cumulative impacts would be long-term and beneficial, with alternative 4 having a slight contribution to these impacts.
Vegetation	Alternative 1 would result in no impacts to vegetation. Lack of mitigation for trees removed during 2011 construction would result in long-term, moderate, adverse impacts to vegetation. Cumulative impacts would be long-term and beneficial with the no action having a slight adverse contribution to these impacts.	Alternative 2 would result in short-term, negligible, adverse impacts to vegetation during construction. Long-term, beneficial impacts would result from the VRSS to replace the current gabion baskets for erosion control and from riparian revegetation. Cumulative impacts would be long-term and beneficial with alternative 2 having a slight contribution to these impacts.	Alternative 3 would result in long-term, negligible to minor, adverse impacts to vegetation. The area is already disturbed and contains primarily maintained and mowed habitat. Implementation of VRSS and revegetation of riparian areas would result in long-term, beneficial impacts to vegetation by allowing vegetation to reestablish along the stream bank. Cumulative impacts would be long-term and beneficial with alternative 3 having a minimal contribution to these impacts.	Alternative 4 would result in long-term, minor, adverse impacts to vegetation as a result of the removal or impact of up to seven trees in the median. VRSS and revegetation of riparian areas would result in long-term, beneficial impacts to vegetation by allowing vegetation to reestablish along the stream bank. Cumulative impacts would be long-term and beneficial with alternative 4 having a slight contribution to these impacts.
Wildlife	Alternative 1 would result in no impacts to wildlife and wildlife habitat. Lack of mitigation for trees removed during 2011 construction would result in long-term, minor to moderate, adverse impacts to wildlife. Cumulative impacts would be long-term and beneficial with the no action having a noticeable adverse contribution to these impacts.	Alternative 2 would result in short-term, negligible to minor, adverse impacts to wildlife from noise from construction activities and construction of the VRSS. Long-term, beneficial impacts would result for aquatic wildlife from implementation of the VRSS and revegetation of riparian areas. Cumulative impacts would be long-term and beneficial with alternative 2 having a slight contribution to these impacts.	Alternative 3 would result in short-term, minor, adverse impacts to wildlife from noise from road construction activities and aquatic wildlife from the construction of VRSS. Long-term, beneficial impacts would result for aquatic wildlife from the VRSS and revegetation of riparian areas. Cumulative impacts would be long-term and beneficial with alternative 3 having a minimal contribution to these impacts.	Alternative 4 would result in short-term, minor, adverse impacts to wildlife from noise from road construction activities and aquatic wildlife from the construction of VRSS. Long-term, minor, adverse impacts would result from the removal or impact of up to seven trees (including five with large diameter) in the median. Long-term, beneficial impacts would result for aquatic wildlife from the VRSS and revegetation of riparian areas. Cumulative impacts would be long-term and beneficial with alternative 4 having a slight contribution to these impacts.
Cultural Resources Historic Structures	Alternative 1 would result in long-term, moderate, adverse impacts to historic structures due to the threat of continued erosion of Rock Creek and the trail network and the related degradation of the bucolic setting, all important elements of the RCPP Historic District. It would have no impacts to all other historic structures within the two APEs. Cumulative impacts would long-term and beneficial with the no action alternative having a noticeable adverse contribution to these impacts. The no action alternative does not constitute an "undertaking" under Section 106 of the National Historic Preservation Act. Therefore, there is no Section 106 equivalent for an evaluation of effects under NEPA.	Alternative 2 would result in long-term, beneficial effects on historic structures in the RCPP Historic District due to the avoidance of the threat of continued erosion of Rock Creek and the trail network and the related degradation of the bucolic setting. It would have no impacts to all other historic structures within the two APEs. Cumulative impacts would be overall long-term and beneficial with alternative 2 having a slight contribution to these impacts. **Assessment of Effect for Section 106**: *no adverse effect.*	Alternative 3 would result in long-term, beneficial impacts on historic structures to the RCPP Historic District due to the avoidance of the threat of continued erosion of Rock Creek and the trail network and the related degradation of the bucolic setting. It would have no impacts to all other historic structures within the two APEs. Cumulative impacts would be overall long-term and beneficial with alternative 3 having a slight contribution to these impacts. **Assessment of Effect for Section 106:** *no adverse effect.*	Alternative 4 would result in negligible, adverse, impacts to the RCPP Historic District due to its impacts to the median and roadway. However, it would have long-term, beneficial impacts to the RCPP Historic District due to the avoidance of the threat of continued erosion of Rock Creek and the trail network and the related degradation of the bucolic setting. It would have no impacts to all other historic structures within the two APEs. Cumulative impacts would be overall long-term and beneficial with alternative 4 having a minimal contribution to these impacts. **Assessment of Effect for Section 106***: no adverse effect.*

Resource Area	Alternative 1: No Action	Action Alternatives		
		Alternative 2: Restore to Original Conditions	**Alternative 3: Add Merge Lane and Shift Road toward the Creek**	**Alternative 4: Add Merge Lane and Shift Road toward the Median**
Cultural Landscape	Alternative 1 would result in long-term, moderate, adverse impacts to cultural landscapes due to the threat of continued erosion of Rock Creek and the negative visual impact to the bucolic setting of the parkway's cultural landscape. Cumulative impacts would be long-term and beneficial with the no action having a noticeable adverse contribution to these impacts The no action alternative does not constitute an "undertaking" under Section 106 of the NHPA. Therefore, there is no Section 106 equivalent for an evaluation of effects under NEPA.	Alternative 2 would result in long-term, beneficial impacts to cultural landscapes from the restoration of Rock Creek and Potomac Parkway to its original alignment, in conjunction with the stabilization of the Rock Creek stream banks and the trail and the revegetation of riparian areas. Implementation of re-landscaping. HALS documentation of significant trees that would be removed or impacted by construction, and further cultural landscape investigations would avoid any adverse effects under Section 106. Cumulative impacts would be long-term and beneficial with alternative 2 having a slight contribution to these impacts. **Assessment of Effect for Section 106**: *no adverse effect.*	*A*lternative 3 would result in long-term, beneficial impacts to cultural landscapes from the stabilization of the Rock Creek stream banks and the trail and the revegetation of riparian areas. Implementation of re-landscaping. HALS documentation of significant trees that would be removed or impacted by construction, and further cultural landscape investigations would avoid any adverse effects under Section 106. Cumulative impacts would be long-term and, beneficial with alternative 3 having a slight contribution to these impacts. **Assessment of Effect for Section 106**: *no adverse effect.*	Alternative 4 would result in long-term, minor, adverse impacts to cultural landscapes from the realignment of the road toward the median, as well as long-term, beneficial impacts from the stabilization of the Rock Creek stream banks and trail and the revegetation of riparian areas. Implementation of re-landscaping. HALS documentation of significant trees that would be removed or impacted by construction, and further cultural landscape investigations would avoid any adverse effects under Section 106. Cumulative impacts would be long-term and beneficial with alternative 4 having a slight contribution to these impacts. **Assessment of Effect for Section 106**: *no adverse effect.*
Archeological Resources	Alternative 1 would not have any impact to archeological resources. There would be no cumulative impacts. The no action alternative does not constitute an "undertaking" under Section 106 of the NHPA. Therefore, there is no Section 106 equivalent for an evaluation of effects under NEPA.	Alternative 2 would not have any impact to archeological resources. There would be no cumulative impacts. **Assessment of Effect for Section 106**: *no adverse effect.*	Alternative 3 would not have any impact to archeological resources. There would be no cumulative impacts. **Assessment of Effect for Section 106**: *no adverse effect.*	Alternative 4 would result in long-term, negligible to minor, adverse impacts as the NPS has the flexibility to revise design prior to construction, if necessary. There are no adverse or beneficial cumulative impacts associated with this alternative. **Assessment of Effect for Section 106**: *no adverse effect.*
Visitor Use and Experience	Alternative 1 would result in long-term, minor, adverse impacts from the continued delays for motorist while attempting to enter the parkway from Waterside Drive, NW, continued visitor access to trails in the area in its current condition, and the continued degraded and unstable stream bank. Cumulative impacts to visitor use and experience would be long-term and beneficial with the no action having a minor, adverse contribution to these impacts.	Alternative 2 would result in long-term, negligible, adverse impacts from the continued delays for motorists attempting to enter the parkway from Waterside Drive, NW. Short-term, minor, adverse impacts would result from the one-lane closure and trail detour during VRSS construction. Long-term, beneficial impacts would occur as a result of stream bank stabilization. Cumulative impacts to visitor use and experience would be long-term and beneficial with alternative 2 having a minor contribution to these impacts.	Alternative 3 would result in long-term, beneficial impacts from the improved merge area between Waterside Drive, NW and the parkway. Short-term, minor, adverse impacts would result from the one-lane closure and trail detour during construction. Long-term, beneficial impacts would occur as a result of stream bank stabilization. Cumulative impacts to visitor use and experience would be long-term and beneficial with alternative 3 having a minor contribution to these impacts.	Alternative 4 would result in long-term, beneficial impacts to visitor use and experience from the improved merge area between Waterside Drive, NW and the parkway. Short-term, minor, adverse impacts would result from the one-lane closure and trail detour during construction. Long-term, beneficial impacts would occur as a result of stream bank stabilization. Cumulative impacts to visitor use and experience would be long-term and beneficial with alternative 4 having a minor contribution to these impacts.
Transportation and Safety	Alternative 1 would have no impacts to traffic volumes on the parkway. Impacts to emergency services, including U.S. Park Police, police, emergency medical services, and fire services would be long-term, negligible, and adverse. The lack of an acceleration lane and a limited sight distance for merging vehicles would result in long-term, minor, adverse impacts to motorists and their safety. Cumulative impacts would be long-term and beneficial with the no action having a noticeable adverse contribution to these impacts.	Alternative 2 would have no impacts to traffic volumes on the parkway. Impacts to emergency services, including U.S. Park Police, police, emergency medical services, and fire services would be long-term, negligible, and adverse. The unsafe conditions at the merge of Waterside Drive, NW onto the parkway southbound would continue under this alternative. Sight distance would remain at approximately 180 feet for vehicles merging from Waterside Drive, NW and proposed traffic calming measures could slightly minimize the unsafe conditions resulting in long-term, minor adverse impacts to motorists. Cumulative impacts would be long-term and beneficial with alternative 2 having a slight adverse contribution to these impacts.	Alternative 3 would have no impacts to traffic volumes on the parkway. Long-term, beneficial, impacts to motorists would result from an additional acceleration lane and traffic calming measures that would improve safety at this segment of the parkway. Cumulative impacts would be long-term and beneficial with alternative 3 having a noticeable contribution to these impacts.	Alternative 4 would have no impacts to traffic volumes on the parkway. Long-term, beneficial, impacts to motorists would result from an additional acceleration lane and traffic calming measures that would improve safety at this segment of the parkway. Cumulative impacts would be long-term and beneficial with alternative 4 having a noticeable contribution to these impacts.

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