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WILSON DAM BRIDGE DECK REFURBISHMENT
DRAFT ENVIRONMENTAL ASSESSMENT
Lauderdale and Colbert Counties, Alabama

Prepared by:
TENNESSEE VALLEY AUTHORITY
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Acronyms and Abbreviations

ADEM	Alabama Department of Environmental Management
AL	Alabama
ALDOT	Alabama Department of Transportation
APE	Area of Potential Effect
BMP	Best Management Practices
CAA	Clean Air Act
CBMPP	Construction Best Management Practices Plan
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO_2	Carbon Dioxide
CWA	Clean Water Act
dB	Decibel
dBA	A-Weighted Decibel
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
ESA	Endangered Species Act of 1973
FHWA	Federal Highway Administration
GHG	Greenhouse Gas
HUD	U.S. Department of Housing and Urban Development
LBP	Lead-Based Paint
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NOx	Nitrous Oxide
NPDES	National Pollutant Discharge Elimination System
NPS	U.S. National Park Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
pcf	Per Cubic Foot
RCRA	Resource Conservation and Recovery Act
SHPO	State Historic Preservation Officer
SO_2	Sulfur Dioxide
TVA	Tennessee Valley Authority
USACE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

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CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

The Tennessee Valley Authority (TVA) proposes to refurbish and repair the Wilson Dam Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, and repaint the fly-over handrails (see Figure 1-1). The repairs would be limited to the concrete arches on the dam above the spring line, bridge deck, fly-over, curbs, parapets, and sidewalks between the control building and the north end of the fly-over. The dam below the spring line, the equipment operating deck on the upstream side of the bridge, and the lock are outside the project scope.

Construction of Wilson Dam began in 1918, and it was dedicated in 1926. At the time that the dam was dedicated, a primary roadway crossing the Tennessee River over the top of the dam, as well as the original lock, was opened between Muscle Shoals and Florence, Alabama. In May 1933, TVA acquired the dam from the U.S. Army Corps of Engineers (USACE). TVA owns the Wilson Dam while the USACE Nashville District operates the Wilson Dam locks for TVA. Both the dam and bridge are listed in the National Register of Historic Places (NRHP) as a National Historic Landmark (NHL).

The original wearing surface of the bridge deck was brick pavers, which were removed in the late 1950s, and replaced with the current concrete deck and the steel superstructure fly-over was constructed over the lock. The arches appear to be constructed of mass unreinforced concrete. The bridge deck also appears to be unreinforced concrete.

Over the years, the downstream face where the concrete arches interface with the parapet have developed widespread spalls (areas where chips, splinters or fragments are broken off) with efflorescence (whitish powdery substance due to migration of mineral rich water through the porous concrete where it evaporates) and visible water movement. In addition, the sidewalk, curb, and deck have developed widespread cracking.

The bridge fly-over that crosses over the locks adjacent to the dam consists of 30 steel spans. The epoxy overlay with a flint aggregate wearing surface on the fly-over was installed in the 1980s but is showing signs of wear and tear with areas where the epoxy overlay has been worn down or completely disappeared. In addition, expansion joints on the fly-over installed in the 1950s are deteriorating and the handrails need repainting.

Deterioration of Parapet and Curb

Bridge Deck Cracks

Bridge Deck Cracks

Concrete Arch Showing Spalling and Efflorescence

Failing Epoxy Overlay and Deteriorating Bridge Joint on Fly-over

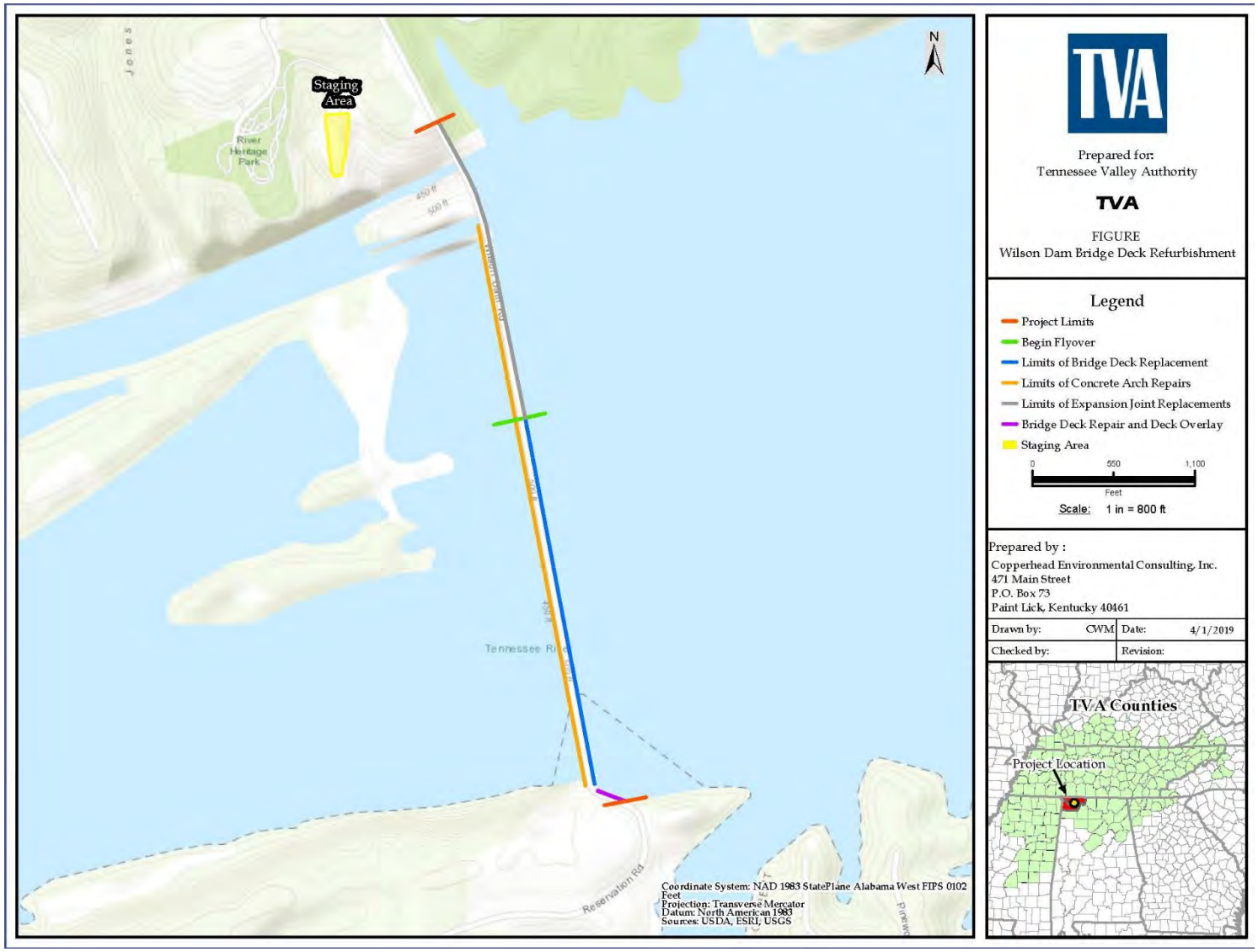

Figure 1-1. Project Location

1.2 Purpose and Need

The purpose of the proposed action is to refurbish and repair the Wilson Dam Bridge deck and other concrete surfaces, such as the arch faces, and to stop the flow of water through the deck and parapets. The bridge deck and sidewalk are cracking due to water entering the space (void layer) between the original arch concrete and the newer concrete deck. The concrete arches exhibit a large amount of concrete spall near the top surface due to water passing through the existing deck and deteriorating the arch face. Due to age and wear and tear, the epoxy overlay, expansion joints, and handrails on the fly-over section of the bridge are deteriorating.

If the bridge is left unrepaired, deterioration of keyways, arches, fly-over overlay, and expansion joints may worsen over time, which would increase the potential for public safety risks including falling debris.

1.3 Decision to Be Made

TVA must decide whether to refurbish the Wilson Dam Bridge deck, fly-over, and other surfaces. TVA's decision would consider factors such as potential environmental impacts, economics, availability of resources, and TVA's long-term goals. This Environmental Assessment (EA) has been prepared to support the decision-making process and determine whether an Environmental Impact Statement (EIS) should be prepared.

1.4 Related Environmental Reviews

The following environmental reviews have been prepared for actions near the project location:

- *Muscle Shoals Power Service Shop Warehouse EA (TVA 2019a).* The EA evaluated the proposed construction of a new warehouse to support the relocation of spare turbine rotors and other generating components to a central location.
- *Muscle Shoals Outdoor Education and Recreation Area Improvements EA (TVA 2015).* The EA addressed proposed improvements to the trail/recreation system located north of Reservation Road on the Muscle Shoals Reservation, including three trailheads and the Reservation Road Trail.
- *Muscle Shoals Reservation Redevelopment Final EIS (TVA 2011).* The EIS documented the potential environmental effects of the proposed sale of 1,400 acres of land on the Reservation in Colbert County, Alabama. After the final EIS was published, TVA worked with the local community to develop a comprehensive master plan to guide development of the land. During this process, TVA identified 400 acres of land that should be retained by TVA due to ongoing TVA business needs and limited development opportunities due to prior industrial operations. The TVA Board of Directors subsequently approved the disposal of approximately 1,000 of the 1,400 acres analyzed in the final EIS.
- *Wilson Dam Bascule Bridge Replacement EA (USACE 2008).* The EA addressed a proposed construction of a fixed bridge over the lower end of the auxiliary lock at Wilson Dam to provide safe, reliable access to the main lock.
- *River Heritage Hotel EA (TVA 2002).* The EA addressed a 12-acre permanent easement for the proposed construction of a 150 to 200-room hotel adjacent to

the Wilson Dam. The TVA Board of Directors approved the easement and the hotel was constructed in 2005.

- *Muscle Shoals/Wilson Dam Reservation Land Use Plan EA (TVA 1996).* TVA prepared this EA to evaluate land on the Reservation needed for TVA program uses and to identify areas that would be made available for external uses.
- *Patton Island Bridge and Approaches Crossing the Tennessee River and Connecting the Cities of Florence and Muscle Shoals EIS* (FHWA 1991). The Federal Highway Administration prepared this EIS to consider the proposed construction of a multi-lane highway bridge over the Tennessee River downstream of the Wilson Dam. The Patton Island Bridge was opened in 2002 and was renamed the Singing River Bridge in 2010.

The description of the affected environment and the assessment of impacts contained in the documents listed above were used in support of the analyses of environmental resources in Chapter 3.

1.5 Scope of the Environmental Assessment and Summary of the Proposed Action

TVA prepared this EA to comply with the National Environmental Policy Act (NEPA), associated regulations promulgated by the Council on Environmental Quality (CEQ; 40 CFR Parts 15000-1508), and TVA's procedures for implementing NEPA. TVA considered the possible environmental effects of the proposed action and determined that the resources listed below are potentially impacted by the alternatives considered.

- Air Quality
- Climate
- Surface Water
- Wildlife
- Threatened and Endangered Species
- Solid and Hazardous Waste
- Visual Resources
- Cultural and Historic Resources
- Recreation
- Transportation
- Noise
- Socioeconomics and Environmental Justice

Given the nature of the project, the following resources are not found in the study area or would not be impacted by any of the project alternatives. These include:

- *Aquatic Resources* – The TVA Natural Heritage Database indicated that there are federally listed aquatic animals and several state-listed mussels within 10-miles of Wilson Dam. In addition, the tailwater below Wilson Dam has been designated nonessential experimental population status by the U.S. Fish and Wildlife Service (USFWS) for 13 federally listed mussels and one federally listed snail. However, no work would be performed in the river. Completion of the repairs on the arch faces would require a work platform of some type to be placed along the bridge by the Contractor. The Contractor would be required to install appropriate netting to prevent debris from falling into the water. The Contractor would also be required to install measures to prevent waste materials such as concrete from washing into storm drains. Containment measures would be required during replacement fly-over expansion joint activities and preparation of the fly-over handrails for repainting.

- *Dam Safety* – The bridge refurbishment activities would not have an impact on the water barrier structures or operation of the dam.

- *Navigation* – The bridge refurbishment activities would not have an impact on the lock or commercial navigation.

- *Additional Resource Areas* - Potential effects related to land use, vegetation, floodplains, managed areas, prime farmland, aquatic species, and wetlands were considered. However, due to the nature of the action and project footprint, potential effects were found to be absent, and these resources have not been brought forward for further evaluation.

TVA's action would satisfy the requirements of Executive Order (EO) 11988 (Floodplains Management), EO 11990 (Protection of Wetlands), EO 12898 (Environmental Justice), EO 13751 (Invasive Species); and applicable laws including the National Historic Preservation Act (NHPA), Endangered Species Act (ESA), Clean Water Act (CWA), Clean Air Act, and Resource Conservation and Recovery Act (RCRA).

1.6 Public and Agency Involvement

TVA is issuing this draft EA for public review and comment. Its availability was announced in a TVA news release and in an advertisement in the *Florence Times Daily* newspaper. The draft EA was also posted on TVA's website. Notifications of its availability were sent by mail or email to local, state, and federal agencies and to individuals and organizations that had previously expressed an interest in the Wilson Dam or the Muscle Shoals Reservation. TVA has consulted with the Alabama State Historic Preservation Office (SHPO), and federally recognized tribes under Section 106 of the NHPA.

1.7 Necessary Permits or Licenses

The proposed action would be subject to the Alabama Department of Environmental Management (ADEM) General National Pollutant Discharge Elimination System (NPDES) Permit for stormwater discharge associated with construction activity. This permit requires that a Construction Best Management Practices Plan (CBMPP) be implemented. Stormwater discharges would need to comply with ADEM NPDES permit (ALG 36-0012) for the Wilson Dam.

CHAPTER 2 – ALTERNATIVES

2.1 Alternatives Development Process

A total of six alternatives were identified during initial project scoping (see Appendix C) including:

- *Alternative A – No Action*. Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck or other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails.

- *Alternative B – Repair Scheme A*. This alternative would include the following: stabilize and repair the bridge deck by pressure injecting urethane polymer or an equivalent product into the space or void between the arch concrete and the existing concrete overlay. It would repair existing deck cracks by epoxy injection. This alternative also includes performing spot grinding of the deck to improve rideability and patch deteriorated concrete arch faces. Alternative B is the least-cost alternative to meet the minimum needs of the proposed bridge refurbishment.

- *Alternative C – Repair Scheme B*. This alternative would perform the same repairs as Alternative B but would also include the patching of deteriorated concrete surfaces on the rails and sidewalks.

- *Alternative D – Repair Scheme C*. This alternative would include the following: stabilize and repair the bridge deck and construct a new latex modified concrete overlay; and patch deteriorated surfaces of arch face, rails, and sidewalks.

- *Alternative E – Repair Scheme D*. This alternative would include the following: remove and replace existing bridge deck; patch deteriorated surfaces of arches, rails, and sidewalks; reseal the fly-over epoxy overlay; remove and replace the fly-over expansion joints; and recoat/repaint the fly-over handrails. Alternative E is the highest cost alternative.

- *Alternative F – Hybrid Repair Scheme*. This alternative would combine Repair Schemes A through D on a span-by-span basis. This alternative may provide cost saving opportunities; however, it could result in a longer schedule for completion of the bridge refurbishment as additional assessment of each bridge span would be needed to assign a repair scheme to each span.

TVA has determined that from the standpoint of NEPA, there are two alternatives that would be carried forward in the EA: Alternative A – No Action Alternative; and Alternative E – Repair Scheme D. The environmental impacts of Alternative A and Alternative E are analyzed in detail in this EA and are summarized in Table 2-1. These summaries are derived from the information and analyses provided in the Affected Environment and Environmental Consequences sections of each resource in Chapter 3.

Table 2-1. Summary and Comparison of Alternatives by Resource Area

Issue Area	Alternative A – No Action	Alternative E – Repair Scheme D
Air Quality	No impact.	Temporary, minor increase in local air emissions due to construction activities.
Climate	No impact.	No impact.
Surface Water	Minor impact.	Temporary, minor adverse impacts during removal of bridge deck, deteriorated concrete from arch faces, fly-over expansion joints, and preparation of fly-over handrails.
Wildlife	No impact.	No impact.
Threatened and Endangered Species	No impact.	No impact.
Solid and Hazardous Waste	No impact.	Minor impact due to construction.
Visual	Minor impact.	Temporary, minor adverse impact but long-term visual benefit.
Cultural and Historic Resources	Minor impact.	No adverse effect.
Recreation	No impact.	Minor, short-term impacts on recreation due to temporary construction detour. No long-term impacts.
Transportation	Minor impact.	Temporary, short-term impacts to vehicle and pedestrian traffic due to bridge closure during construction. Long-term beneficial impacts as bridge and fly-over can accommodate current and forecasted traffic.
Noise	No impact.	Temporary, minor impact due to construction noise. No long-term impact.
Socioeconomic and Environmental Justice	No impact.	Short-term, minor, beneficial increases in employment, payroll, and tax payments during construction. Beneficial impacts would extend to environmental justice if workers are hired from minority or low-income populations.

2.2 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish or repair the Wilson Dam Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or recoat/repaint the fly-over handrails. The spalling, efflorescence, and cracking would not be addressed, and the deterioration of keyways and arches may worsen over time, which would increase the potential for public safety risks associated with falling debris. The epoxy overlay, expansion joints, and handrails would not be resealed, replaced, or repainted which could lead to worsening public safety conditions on the fly-over. Additionally, deterioration of the bridge could lead to additional water infiltration affecting the integrity of the bridge and dam below.

2.3 Alternative E – Repair Scheme D

As described above, this alternative would include the following: remove and replace existing bridge deck; and patch deteriorated surfaces of arches, rails, and sidewalks (see Appendix A). The repairs would be limited to the concrete arches on the dam above the spring line, bridge deck, fly-over, curbs, parapets, and sidewalks between the control building and the north end of the fly-over (see Figure 1). The dam below the spring line, the equipment operating deck on the upstream side of the bridge, and the lock are outside the project scope. The project area includes an approximately 1.6-acre staging area located within the lock operations area. The proposed staging area is an existing gravel and fenced staging area used as part of the Wilson Dam Bascule Bridge Replacement project.

The existing concrete bridge deck and deteriorated material between the arch faces and existing concrete bridge deck would be removed. The method to remove concrete would be hydrodemolition which utilizes high-pressure water to remove the concrete. A skid steer loader would be used to put concrete debris in a dump truck. A new reinforced concrete bridge deck would be constructed, and joints would be sealed. Deteriorated concrete arch faces, bridge rails, and sidewalks would be patched. Construction traffic would include private vehicles for 35 workers along with large delivery or construction trucks including dump trucks and concrete mixer trucks. Project construction would occur over an estimated 8-month period.

During refurbishment activities, existing curbs, deck drain plates, and light fixtures set into the guard rails of the bridge would be removed, retained, and reinstalled as a part of the project. Repair of any damaged lights is not a part of this project, however, the damaged lights or those that are missing globes would be reinstalled for potential future repair or restoration. In places where curbs are missing, in-kind replacements would be installed. Additionally, any concrete or paint applied textural finishes would be matched to Wilson Dam's current appearance.

In addition, the epoxy overlay with a flint aggregate wearing surface on the fly-over would be replaced. As part of the process, a small, surface preparation milling machine would scarify the surface, the surface would be pressure washed, and then the epoxy would be applied using a trailer mounted mixer/applicator. This epoxy resurfacing would take approximately two weeks with the most time involving surface preparation activities. To replace the six expansion joints, a cut would be made in the concrete a few inches behind the joint and then the joint would be chipped out with small pneumatic hammers. A replacement joint would be set from the bottom and concrete would be poured around the new joint (see Appendix B). Each expansion joint would take approximately a week to replace. To remove the paint/coating on the handrails, an abrasive pressure wash would be used. Operations to remove the expansion joints and prepare the handrails would be fully contained to avoid or minimize releases of materials.

Wilson Dam Bridge Fly-over

2.4 Alternatives Eliminated From Further Discussion

TVA carefully considered a range of rehabilitation options for repairing the Wilson Dam Bridge, fly-over, and arches. The alternatives identified above were evaluated based on a set of criteria including: longevity of the repair, efficiency, safety, design, impacts to the public, and environmental impacts (see Appendix D). Apart from the No Action Alternative, all the alternatives partially meet the project purpose and need. TVA determined, however, that the urethane polymer injection proposed under Alternatives B, C, and D may not entirely stabilize the deck of the bridge. Urethane stabilization is also a newer technology, and the longevity of the repair is uncertain. Alternatives D and E scored equally as the highest for safety concerns, and all action alternatives scored equally for environmental concerns. Based on the presumed duration of road closure, Alternative E scored best for limiting inconvenience to the public and extending estimated service life for the bridge. Therefore, Alternatives B, C, D, and F have been eliminated from further consideration.

2.5 TVA's Preferred Alternative

Alternative E is the alternative that has the best potential to fully meet TVA's asset management and structural preservation goals. Alternative E scored highest for achieving the purpose and need of the project and the longevity of the repair.

2.6 Summary of Mitigation Measures

Mitigation measures identified in Chapter 3 to avoid, minimize, or reduce adverse impacts to the environment are summarized below. TVA's analysis of Alternative E includes mitigation, as required, to reduce or avoid, minimize, or reduce adverse effects. Project-specific best management practices (BMPs) are also identified.

- *Cultural Resources*. As specified in the 100% Wilson Dam Bridge Deck Refurbishment Design (see Appendix A), TVA and the contractor would ensure that the character-defining features of the bridge would be retained in accordance with *Secretary of the Interior's Standards for Rehabilitation*.

- *Surface Water*. TVA would implement BMPs and control measures in a CBMPP to prevent the discharge or loss of potential pollutants into the Wilson or Pickwick Reservoirs and to contain and properly dispose of all wastes, accidental spills, surface runoff, or other potential contaminants. TVA would comply with applicable environmental laws and regulations, including ADEM NPDES permit (ALG 36-0012) for Wilson Dam and ADEM's General Permit for Construction Activities.

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CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Air Quality

3.1.1 Affected Environment

The Clean Air Act regulates the emission of air pollutants and, through its implementing regulations, establishes National Ambient Air Quality Standards (NAAQS) for several "criteria" pollutants that are designed to protect the public health and welfare with an ample margin of safety. The criteria pollutants are ozone, particulate matter, carbon monoxide (CO), nitrous oxides (NO_x), sulfur dioxide (SO_2), and lead.

Specified geographic areas are designated as attainment, nonattainment or unclassifiable for specific NAAQS. Areas with ambient concentrations of criteria pollutants exceeding the NAAQS are designated as nonattainment areas and new emissions sources in or near these areas are subject to more stringent air permitting requirements.

Colbert and Lauderdale counties are in attainment with applicable NAAQS (USEPA 2016) and ambient air quality standards referenced in the ADEM Administrative Code, Title 335-3 (ADEM Administrative Code 2016).

The proposed project would be subject to both federal and state regulations that impose permitting requirements and specific standards for expected air emissions. These include ADEM Administrative Code, 335-3-4-.02 Fugitive Dust and Fugitive Emissions.

3.1.2 Environmental Consequences

3.1.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. There would be no changes to the existing air quality conditions and no new impacts on air quality.

3.1.2.2 Alternative E – Repair Scheme D

Transient air pollutant emissions would occur during the 8-month construction phase. Construction-related air quality impacts would primarily result from the staging of construction vehicles, equipment, and supplies and the operation of construction vehicles and equipment and worker personnel vehicles. The daily workforce during construction is expected to be 35 workers. During construction, approximately 3,500 vehicles per day would detour from crossing the Wilson Dam Bridge to the Singing River Bridge, located 1.1 miles downstream. At the same time, worker personnel vehicles (approximately 35) would drive to the project site and park at the staging area.

Combustion of gasoline and diesel fuels by internal combustion engines (e.g., vehicles, generators, construction equipment, etc.) would generate local emissions of particulate matter, NO_x, CO, volatile organic compounds, and SO_2.

Equipment expected to be used include 1-2 truck-mounted cranes, 2 skid steer loaders, 1 forklift, 2-4 dump trucks, concrete trucks and pump trucks during deck pours, hand tools (small pneumatic hammer), generators, air compressors, vacuum cleaners, airless spray equipment, abrasive pressure washer, and other miscellaneous equipment. Emissions

associated with these vehicles and equipment are expected to result in negligible impacts to air quality because there would be relatively few emissions sources (e.g., trucks, private vehicles) used during construction and use would be temporary.

Removal of the bridge deck, milling the fly-over surface, cutting/chipping out the expansion joints, preparing the surface of the fly-over handrails, and vehicular traffic over paved roads at the site also would result in the emission of fugitive dust during active construction periods. Based on analyses conducted at other construction sites, it is expected that the largest fraction (greater than 95 percent by weight) of fugitive dust emissions would be deposited within the construction site boundaries. To minimize air impacts TVA requires all contractors to keep construction equipment properly maintained and to use BMPs (such as covered loads and wet suppression) to minimize fugitive dust.

Air quality impacts from construction activities would be temporary (approximately 8 months) and would depend on both human factors (e.g., intensity of activity, control measures) and natural factors such as wind speed and direction. However, even under unusually adverse conditions, these emissions from construction activities would have, at most, a minor transient impact on air quality and would be well below the applicable ambient air quality standards.

There would be indirect effects caused by the approximately 3,500 vehicles per day using the Wilson Dam Bridge that would shift to crossing the Singing River Bridge nearby. Air emissions generated from these vehicles would continue unchanged but are expected to temporarily shift to the nearby bridge. The slight increase in distance traveled due to the temporary detour may cause a small increase in air emissions.

Overall, the potential impacts to air quality from construction-related activities on local and regional air quality would be temporary and minimal.

3.2 Climate

3.2.1 Affected Environment

Data trends indicate increasing temperatures, decreasing precipitation, declining cloud cover, and increasing solar radiation in the TVA power service area. TVA has taken an active role in preparing for the potential impacts of Climate Change, by developing and maintaining its Climate Change Adaptation Plan (TVA 2016). Also, since 2011, TVA, in coordination with other federal agencies as well as state and local partners, has initiated a Climate Change Sentinel Monitoring program with 18 stations in the TVA power service area designed to assess potential biological, ecological, and hydrological responses of aquatic ecosystems related to climate change. TVA is also monitoring effects of climate change on agriculture, forest resources, and recreation. TVA also participates in the Department of Energy’s Partnership for Energy Sector Climate Resilience, the aim of which is to improve the resilience of energy infrastructure to extreme weather and climate change impacts.

Gases that trap heat in the atmosphere are called greenhouse gases. Gases that contribute to the greenhouse effect include: water vabor, carbon dioxide, methane, and nitrous oxides. Global atmospheric concentrations of carbon dioxide, methane, nitrous oxide, and certain manufactured greenhouse gases have all risen significantly over the last few hundred years. Too much of these greenhouse gases can cause Earth's atmosphere to trap more and more heat and affect climate change. TVA power plant carbon dioxide emissions have

dropped by approximately 31 percent between 2011 and 2017 due to a multitude of emission reduction projects instituted by TVA in this period.

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. Implementing the No Action Alternative would not result in any new emissions of greenhouse gases and therefore, this alternative would not impact climate change.

3.2.2.2 Alternative E – Repair Scheme D

Carbon dioxide emissions would occur during the construction phase. Construction-related carbon dioxide emissions would be primarily related to the combustion of gasoline and diesel fuels by internal combustion engines (vehicles, generators, construction equipment, etc.). The total amount of these greenhouse gas emissions (GHG) would be small and would last for a short time (8 months). These emissions would not adversely affect regional GHG levels with no discernable link or effect to changes in global climate. Therefore, this alternative would not result in noticeable impacts on climate change.

The GHG emissions associated with operation of the bridge would be similar to current conditions and would not create a new impact on climate change.

TVA would continue to monitor climatic effects as they occur and continue to update its plans and policies as evidence of changing climate conditions continues to be gathered and as the forecasting capabilities continue to evolve.

3.3 Surface Water

3.3.1 Affected Environment

The project area drains to the Tennessee River both upstream and downstream of Wilson Dam. Upstream, Wilson Reservoir has been designated by the Alabama Department of Environmental Management for uses including public water supply, fish and wildlife, swimming and other whole-body water-contact recreation. Downstream, Pickwick Reservoir has been designated for uses including public water supply and fish and wildlife.

Water quality monitoring of the main stem reservoirs of the Tennessee River system is conducted by TVA through its Reservoir Ecological Health Monitoring Program. Objectives of the program are to provide basic information on the “health” or integrity of the aquatic ecosystem in each TVA reservoir and to provide screening level information for describing how well each reservoir meets the "fishable" and "swimmable" goals of the Clean Water Act. Sampling activities involve examination of appropriate physical, chemical, and biological indicators in the forebay, midregion, and headwater areas of each reservoir. In the most recent monitoring results, from 2016, Wilson Reservoir received an ecological health rating of “poor” with concerns related to dissolved oxygen, chlorophyll, and bottom life. Pickwick Reservoir’s ecological health rating is “fair” with concerns related to chlorophyll (TVA 2019b). The Tennessee River (Wilson Reservoir) is listed by the State of Alabama under Section 303(d) of the Clean Water Act as an impaired waterbody because of excessive nutrients from agriculture (ADEM 2018).

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. There would be no change in operation of the bridge but minor impacts to water quality would occur due to continuing deterioration of keyways, expansion joints, and arches and the increased potential for falling debris from the structure. Continued aging and degradation of the structure could pose water quality issues over the long term should the existing drainage structure become compromised.

3.3.2.2 Alternative E – Repair Scheme D

Infrastructure disturbances associated with construction and demolition activities could potentially result in water quality impacts. Erosion and sedimentation could increase turbidity (water cloudiness) and threaten aquatic life. Construction activities with the potential to affect surface water include those that generate dust, debris, and stormwater runoff. Specific activities that could affect surface water include using high-pressure water (i.e., hydrodemolition) to remove deteriorated and sound concrete, cutting and chipping out the expansion joints, and using aggregate under high pressure to remove coating/paint on the fly-over handrails. Where possible, preparation activities would be contained (e.g., cutting/chipping out of expansion joints or removing coating/paint from handrails) to avoid/minimize potential impacts to water quality. Water used during cutting operations would be collected using shop vacuums. Even with the use of full containment, the possibility exists of minimal amounts of concrete dust/chipping debris, saw wash water, paint dust from the use of abrasive media on the handrails, and the abrasive media entering the surface water.

Water used during refurbishment preparation activities would help to suppress dust and would drain toward storm drains. TVA would comply with the NPDES permit, including Part 1.A, and would utilize best management and maintenance practices to minimize potential impacts and to prevent the discharge or loss of potential pollutants to the reservoir and to contain and properly dispose of all wastes, accidental spills, surface runoff, or other potential contaminants. TVA would also comply with applicable local, state and federal laws and regulations. The use of the existing graveled area for staging equipment, materials, and vehicles would help minimize potential for erosion and sedimentation. Workers will use portable toilets (porta potties/porta johns) and a crew wash station that will be cleaned on a regular basis and removed after construction is completed.

With implementation of these minimization and control measures, there would be temporary, minor impacts on water quality because these measures would help to prevent and minimize the amount of contaminants entering stormwater drains on the bridge. The potential for impacts would be greatest during removal of the deck, an action that is anticipated to take several months. No long-term water quality impacts are anticipated and the proposed action would not affect the long-term water quality or ecological health of Wilson or Pickwick Reservoirs.

3.4 Wildlife

3.4.1 Affected Environment

The Tennessee River provides diverse habitat features and supports a wide range of wildlife. Habitat along the shoreline near Wilson Dam consists of deciduous-dominated woodlands, fields, maintained parks and open areas, and floodplain areas. These draw a

variety of birds including waterfowl and shorebirds; Alabama Birding Trail Sites 6 and 7 are immediately adjacent to the dam. Based on current eBird records, Lauderdale and Colbert counties are the 3rd and 4th most bird species-rich counties in the state, respectively (eBird 2012).

Bald eagles and golden eagles are both federally protected under the Bald and Golden Eagle Protection Act. Bald eagles utilize the Tennessee River corridor to nest and forage year-round. Golden eagles forage along the Tennessee River throughout the winter. Bald eagles are routinely observed from the dam and in the surrounding area (eBird 2012). Golden eagles are infrequent to the area and have not been documented within 10 miles of the project area in the past decade. A great blue heron (*Ardea herodias*) rookery is present on Jackson Island, just downstream of Wilson Dam. Although bats and birds are known to roost in bridges, buildings, and dams, TVA biologists completed a survey of Wilson Dam in 2018 and found no indications of roost use. Five caves have been documented within three miles of the project area.

Wilson Dam connects the communities of Florence and Muscle Shoals and the predominant land-cover within 10 miles of Wilson Dam is urban development (NLCD 2011). Portions of the natural environment that remain have been impacted by anthropogenic sprawl and are often maintained for recreation, designated natural areas, or other environmental amenities.

3.4.2 Environmental Consequences

3.4.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. As a result, this alternative would not adversely impact wildlife or their habitats.

3.4.2.2 Alternative E – Repair Scheme D

Activities proposed under Alternative E would occur on the bridge deck, fly-over, and arches and would require use of an existing temporary equipment and supply staging area.

Despite the prevalence of birds around Wilson Dam, Alternative E would not directly impact wildlife because work would be confined to the dam bridge, fly-over, arches, and existing gravel-lined staging area. Bridge construction has been shown to have limited influences on bird species groups found on the Tennessee River (Bonnington and Smith 2018) when no activities would be conducted in aquatic or terrestrial wildlife habitat. Construction is not expected to impact species using nearby caves or forested areas, such as Jackson Island (0.15 miles) or the nearest cave (1.1 miles). These habitats are sufficient distance from the Wilson Dam Bridge that construction noise at the habitat areas would be under 60 A weighted decibels (dBA) (a typical conversation occurs at 60 dBA and is not loud enough to cause hearing damage) (see Section 3.11 for information on noise levels associated with typical construction equipment). Implementation of BMPs would minimize indirect impacts from sediment mobilization and introduction of contact water into Wilson Reservoir and the Tennessee River. No indirect impacts are expected to wildlife species or habitat surrounding the project action area because the proposed action is too far removed in distance to affect these species or their habitat.

3.5 Threatened and Endangered Species

3.5.1 Affected Environment

In the United States, species may be federally listed as threatened or endangered under the ESA, which affords broad protections to the listed species. A species' status is critically reviewed prior to listing and, once listed, federal agencies are required to follow structured procedures to conserve endangered and threatened species when taking a federal action that may jeopardize these species. The State of Alabama also requires separate protections for species considered endangered or of special concern within the state. The state species listing is updated by the Alabama Department of Conservation and Natural Resources and these species are identified in the State Wildlife Action Plan.

A review of the USFWS Information for Planning and Consultation (IPaC) tool indicated that 3 mammals, 3 fishes, 10 mussels, and 1 snail could potentially be within 10 miles of the project area (Table 3-1). The wood stork (*Mycteria americana*) us federally listed as threatened and has been observed within 10 miles of Wilson Dam each of the past three years by multiple observers and corroborated with photo evidence (eBird 2012). Impacts to this species are also evaluated. Wood storks are a rookery nesting species with overlapping nesting requirements to great blue heron. Despite this, no wood stork observations near Wilson Dam have occurred during nesting season, nor has any nesting activity near this dam been reported.

Table 3-1. Federally Listed Species

Common Name	Scientific Name	Federal Status	Species Group
Gray Bat	*Myotis grisescens*	Endangered	Mammal
Indiana Bat	*Myotis sodalis*	Endangered	Mammal
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened	Mammal
Wood Stork	*Mycteria americana*	Threatened	Bird
Alabama Cavefish	*Speoplatyrhinus poulsoni*	Endangered	Fish
Slackwater Darter	*Etheostoma boschungi*	Threatened	Fish
Spotfin Chub	*Erimonax monachus*	Threatened	Fish
Dromehary Pearlymussel	*Dromus dromas*	Endangered	Mussel
Fanshell	*Cyprogenia stegaria*	Endangered	Mussel
Orangefoot Pimpleback	*Plethobasus cooperianus*	Endangered	Mussel
Pink Mucket	*Lampsilis abrupta*	Endangered	Mussel
Ring Pink	*Obovaria retusa*	Endangered	Mussel
Rough Pigtoe	*Pleurobema plenum*	Endangered	Mussel
Sheepnose Mussel	*Plethobasus cyphyus*	Endangered	Mussel
Snuffbox Mussel	*Epioblasma triquetra*	Endangered	Mussel
Spectaclecase	*Cumberlandia monodonta*	Endangered	Mussel
White Wartyback	*Plethobasus cicatricosus*	Endangered	Mussel
Slender Campeloma	*Compeloma decampi*	Endangered	Snail

Federally endangered gray bats (*Myotis grisescens*) and Indiana bats (*Myotis sodalis*) have been recorded in Lauderdale County and gray bats have also been documented in Colbert County. Gray bats reside primarily in caves and Indiana bats hibernate in caves and roost

in trees throughout the summer. There is designated critical habitat for the Indiana bat within 10 miles of Wilson Dam. TVA biologists completed a survey of Wilson Dam in 2018 and found no indications of bat use or potential roosting sites on the deck of the dam, arches, or fly-over. Five caves have been documented within three miles of the dam, the closest of which is approximately 1.1 miles from the dam.

3.5.2 Environmental Consequences

3.5.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. As a result, this alternative would not impact threatened or endangered animals.

3.5.2.2 Alternative E – Repair Scheme D

Federally listed mammals would not be directly impacted by Alternative E because work would be confined to the dam bridge, fly-over, and arches and existing fenced gravel-lined staging area. These areas have no bat use as confirmed by TVA biologists. No activities would be conducted in species habitat and, due to sufficient distance of the proposed actions from known caves, construction is not expected to impact listed bat species using nearby caves or forested areas. There would be no impact on the wood stork because this species has not been observed using the project area during nesting season or for nesting activity. Wood stork occurrence in the project area appears to be limited to migration and the scale and location of the proposed action is not expected to affect migration.

Federally listed fish and mollusks would not be directly impacted by Alternative E because work would be confined to the dam bridge, fly-over, and arches and gravel-lined staging area. No impacts to the watercourse are anticipated and implementation of BMPs would minimize indirect impacts from sediment mobilization and introduction of contact water into Wilson Reservoir and the Tennessee River.

Activities proposed under Alternative E would require use of an existing temporary equipment and supply staging area. No threatened and endangered species habitat occurs in the staging area. Therefore, Alternative E is not anticipated to have an impact on threatened and endangered species.

3.6 Solid and Hazardous Waste

3.6.1 Affected Environment

Solid waste consists of a broad range of materials that include refuse, sanitary wastes, contaminated material, scrap metals, nonhazardous wastewater treatment plant sludge, nonhazardous air pollution control wastes, various nonhazardous industrial waste, and other materials (solid, liquid, or contained gaseous substances). Solid wastes are generally managed through recycling and local landfills.

Hazardous wastes consist of materials that may be harmful to human health or the environment due to their toxicity, reactivity, ignitability, or corrosivity. Hazardous materials and management of these materials are regulated under a variety of federal laws including the Occupational Safety and Health Administration standards; Emergency Planning and Community Right to Know Act; RCRA; the Comprehensive Environmental Response, Compensation, and Liability Act; and the Toxic Substances Control Act. The federal laws regulating hazardous wastes are under RCRA and its implementing regulations codified in

Title 40 CFR Parts 260-280. The regulations define what constitutes a hazardous waste and establishes a “cradle to grave” system for management and disposal of hazardous wastes.

3.6.2 Environmental Consequences

3.6.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. Therefore, no hazardous or solid substances would be generated from construction or operation activities.

3.6.2.2 Alternative E – Repair Scheme D

Under Alternative E, demolition debris, such as concrete, would be generated during bridge deck and expansion joint removal. The concrete deck to be removed is approximately 3,600 tons (3,200’ x 20’ x 0.75’ x 150 per cubic foot (pcf)/2,000 tons/lb.) and the concrete debris generated during expansion joint removal would add several hundred more pounds. The refurbishment action includes a 10% increase in debris due to removal of materials from arches, sidewalks, and guardrail faces for an approximate total of 4,000 tons.

The six steel expansion joints weigh approximately 2,800 pounds in total and are expected to be recycled.

Various hazardous wastes, such as fuels, solvents, paints, adhesives, lead-based paint (LBP) and compressed gases could also be produced during construction. Oily wastes generated during servicing of heavy equipment would be managed by TVA approved off-site vendors who service on-site equipment using appropriate self-contained used oil reservoirs. Appropriate spill prevention, containment and disposal requirements for hazardous wastes would be implemented to protect construction and plant workers, the public, and the environment. A small amount of LBP debris may be generated during the preparation of the fly-over handrails. LBP would be captured as part of the closed abrasive pressure wash system. The amounts of LBP generated are anticipated to be small as most LBP on the handrails would have been removed during previous repainting efforts (repainting efforts have occurred post-1977 when the LBP ban went into effect).

TVA would manage all solid wastes generated from construction activities in accordance with established procedures. Solid wastes would be managed as required by applicable state regulations in conformity with TVA’s environmental procedures and BMPs. General municipal solid waste and scrap metal could be incorporated into TVA’s existing recycling program. Solid waste construction impacts are expected to be minor.

Nonhazardous waste generated from deck and expansion joint removal as well as preparing areas of sidewalk, guardrails, fly-over, and parts of arches would include concrete and a limited amount of other construction wastes, such as metal, paper, wood, plastic, and other debris. Appropriate disposal of non-recyclable materials generated by this action would be disposed at the Republic Services’ Morris Farm Sanitary Landfill located approximately 32 miles to the east in Hillsboro; the Shoals Solid Waste Authority Landfill located less than 10 miles to the south in Tuscumbia; or the Florence Municipal Solid Waste Landfill, a permitted construction and demolition debris management facility located approximately 10 miles northwest in Florence. Overall, sufficient landfill capacity is available to accommodate the additional solid waste generated as a result of the proposed construction activities. Generation of construction wastes would be short-term and

temporary; therefore, with implementation of standard TVA procedures including recycling, direct or indirect effects associated with construction wastes would be minimal.

Hazardous materials used during refurbishment may include limited quantities of fuels, solvents, paints, and other hazardous materials. The deck, fly-over, expansion joint, and arch refurbishment would not require any solvents. Repaired handrails located along the bridge may be repainted to match existing handrails. The fly-over deck would be coated with two layers of epoxy. Appropriate spill prevention, containment, and disposal requirements for hazardous materials would be implemented to protect construction and plant workers, the public, and the environment. All wastes would be characterized for appropriate disposal and a TVA approved permitted third-party waste disposal facility would be used for ultimate disposal of the wastes. Therefore, no significant impacts associated with the use of fuels, oil, lubricants, and the limited quantities of other hazardous materials generated during construction would be expected.

Operation of the refurbished bridge deck and fly-over would be the same as described under Alternative A and no direct or indirect effects related to solid or hazardous wastes are anticipated from use of the refurbished bridge deck and fly-over.

3.7 Visual Resources

3.7.1 Affected Environment

This assessment provides a review of the visual attributes of existing scenery, along with the anticipated impacts resulting from the proposed action. The classification criteria used in this analysis are adapted from a scenic management system developed by the U.S. Forest Service and integrated with planning methods used by TVA. The classification process is also based on the methodology and descriptions adapted from Landscape Aesthetics, A Handbook for Scenery Management, Agriculture Handbook Number 701 (U.S. Forest Service 1995).

Scenic resources within a landscape are evaluated based on several factors that include scenic attractiveness, integrity and visibility. Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures and visual composition of each landscape. Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. The varied combinations of natural features and human alterations both shape landscape character and help define their scenic importance. The subjective perceptions of a landscape's aesthetic quality and sense of place are dependent on where and how it is viewed. For this analysis, the affected environment is the dam, as well as the physical and natural features of the landscape around it.

The Wilson Dam is an National Historic Landmark (NHL) and is listed in the National Register of Historic Places (NRHP). It has been a visual presence in the area since the 1920s. No other historic resources are within direct line of sight to the Wilson Dam. The nearest identified historic resource, the circa 1870 Norfolk Southern Railroad Bridge, is located approximately 2.69 miles west-southwest of the Wilson Dam. No NRHP-eligible resource associated with the TVA Muscle Shoals Reservation is within direct line of sight.

The downstream face of the Wilson Dam, where the concrete arches interface with the parapet have developed widespread spalls with efflorescence and visible water movement.

In addition, the sidewalk, curb, parapet, and deck have developed widespread cracking. Sections of the bridge parapet show previous repairs that do not match the original bridge.

On the north shore of the dam is the Marriott Shoals Hotel and Spa constructed in 2005 and the 26-story Renaissance Tower built in 1991. On the south shore of the dam is the control building, a scenic overlook, and residential development. Upstream of the dam is Wilson Reservoir and downstream is the Tennessee River/ Pickwick Reservoir and the forested Jackson Island. Wilson Reservoir is visually dynamic depending on the time of year (e.g., lower pool levels may result in exposure of reservoir banks, bottoms, and flats). The combination of development and land use patterns along its shore contributes to the overall visual character of the area.

The potential impacts to the visual environment from a given action are assessed by evaluating the potential for changes in the scenic value class ratings based upon landscape scenic attractiveness, integrity, and visibility. Sensitivity of viewing points available to the public, their viewing distances and visibility of the proposed action are also considered during the analysis. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. The extent and magnitude of visual changes that could result from the proposed facility were evaluated based on the process and criteria outlined in the U.S. Forest Service scenic management system.

3.7.2 Environmental Consequences

3.7.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. If the bridge is left unrepaired, deterioration of the deck, fly-over, expansion joints, keyways, and arches may progress over time, increasing the visible spalls and cracks and further degrading the scenic attractiveness of the dam, bridge, and fly-over. A minor visual impact would occur due to continued deterioration of the dam, bridge, an fly-over.

3.7.2.2 Alternative E – Repair Scheme D

Construction activities would temporarily affect the visual environment due to refurbishment activities. Hydrodemolition activities to remove the bridge deck concrete and the deteriorating concrete on the faces of the arches would be visible to visitors and residents viewing the Wilson Dam from the nearby shores. Cutting and chipping expansion joints as well as preparing the fly-over surface would also be visible. In addition, dump trucks removing debris or concrete mixer trucks would be visible entering and leaving the project area. Therefore, temporary, minor impacts to the visual environment are anticipated.

TVA intends to rehabilitate the bridge such that deteriorated features would be repaired to match the original features in design, color, texture, and other visual qualities. The textural finishes of any concrete or paint applied would be matched to the Wilson Dam's current appearance. Existing curbs, deck drain plates, and light fixtures set into the guard rails of the bridge would be removed, retained, and reinstalled as a part of the project. Overall, the project would provide long-term visual benefits as it restores the scenic attractiveness of the dam, bridge, and fly-over by removing spall and the cracks in the roadway, sidewalks, and parapets.

3.8 Cultural and Historic Resources

3.8.1 Affected Environment

Cultural resources include prehistoric and historic archaeological sites, districts, buildings, structures, and objects, as well as locations of important historic events that lack material evidence of those events. Cultural resources that are listed, or considered eligible for listing, in the NRHP are called historic properties. To be considered a historic property, a cultural resource must possess both integrity and significance. A historic property's integrity is based on its location, design, setting, materials, workmanship, feeling, and association. The significance is established when historic properties meet at least one of the following criteria: (a) are associated with important historical events or are associated with the lives of significant historic persons; (b) embody distinctive characteristics of a type, period, or method of construction; (c) represent the work of a master, or have high artistic value; or (d) have yielded or may yield information important in history or prehistory (36 CFR Part 60.4).

Section 106 of the NHPA requires federal agencies to consider the effects of their proposed undertakings on historic properties and provide the Advisory Council on Historic Preservation an opportunity to comment on those effects. TVA determined that the Proposed Action (Alternative E) is an "undertaking" as defined by the regulations under NHPA. Once an action is determined to be an undertaking, the regulations require agencies to consider whether the proposed activity has the potential to impact historic properties. If the undertaking is such an activity, then the agency must follow the following steps: (1) involve the appropriate consulting parties; (2) define the area of potential effects (APE); (3) identify historic properties in the APE; (4) evaluate possible effects of the undertaking on historic properties in the APE; and (5) resolve adverse effects (36 CFR § 800.4 through 800.13.). An APE is defined as the "geographic area or areas within which the undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR § 800.16.).

TVA defined the APE to be the following: the boundary of the Wilson Dam NHL (which includes the foundation lines of Wilson Dam, including the power house and the old and new locks); the planned staging area within the lock operation area on the north shore of the Tennessee River; and any historic properties within 0.5 miles and direct line of sight of Wilson Dam. Given the scale and scope of the project and limited view beyond the bridge itself, the APE accounts for both direct and indirect/visual effects.

The direct APE is limited to the concrete arches on the dam above the spring line, bridge deck, curbs, parapets, fly-over, and sidewalks between the control building at the south end and the fly-over's north end, as well as the existing 1.6-acre staging area located within the lock operations area. The surface of the staging area is covered in gravel and it is enclosed by a chain link fence.

Pietak (2002) investigated the APE as part of Tract I in a cultural resources survey of the Muscle Shoals Reservation. No archaeological sites were discovered and no additional work was recommended. None of the identified resources in the Alabama Register of Landmarks and Heritage web map have direct line of sight to Wilson Dam. The nearest identified resource, the c. 1870 Norfolk-Southern Railroad Bridge, is located approximately 2.69 miles west-southwest of Wilson Dam and does not have a direct line of sight. NRHP data available through the National Park Service (NPS) indicates the only historic property within 1.25 miles of Wilson Dam is the Florence Wagon Works Site, listed in the NRHP by TVA in 1996. The site is not within direct line of sight. TVA records indicate additional

NRHP-eligible resources associated with TVA's Muscle Shoals Reservation (including, but not limited to the Power Service Building and CCC Pavilion) are also not located within direct line of sight.

TVA considers effects to historic properties pursuant to Section 106 of the NHPA. The only historic property within the APE is the Wilson Dam NHL. In 1966, Wilson Dam was designated an NHL by the U. S. Department of the Interior and listed in the NRHP. The NHL was certified in 1977 (Rettig and Sheely 1976).

Section 106 of the NHPA requires federal agencies to consult with the respective State Historic Preservation Officer (SHPO) and Indian tribes when proposed federal actions could affect historic and cultural resources, including archaeological resources, which are also protected under the Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act, in addition to the NHPA. Additionally, federal agencies must consult with the Secretary of the Interior for projects affecting NHLs.

3.8.2 Environmental Consequences

3.8.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or coat/paint the fly-over handrails. As a result, the dam,bridge, and flyover would continue to deteriorate. This alternative would have the potential to diminish the integrity of the NHL Wilson Dam and Bridge and could adversely affect this historic resource.

3.8.2.2 Alternative E – Repair Scheme D

Under Alternative E, there would be a direct and visual effect on the Wilson Bridge NHL from removing and replacing the existing bridge deck; patching deteriorated surfaces of arch face, rails, and sidewalks; resealing the fly-over epoxy overlay; replacing the fly-over expansion joints; and painting the fly-over handrails.

Specifically, existing curbs, deck drain plates, and light fixtures set into the guard rails of the bridge would be removed, retained, and reinstalled as a part of the project. The repair of any damaged lights is not a part of this project, however, the damaged lights or those that are missing globes would be reinstalled for potential future repair or restoration. In places where curbs are missing, in-kind replacements would be installed.

On the fly-over, the steel handrails would be prepared using an abrasive pressure wash to remove the existing coating/paint. This process has been used previously to remove paint on the handrails and has not caused harm to the handrails.

Any concrete or paint applied textural finishes would be matched to Wilson Dam's current appearance. Furthermore, as the plans specify, the contractor would take special care to protect any parts of the structure that are not to be removed specifically and the contractor is not allowed to use a hydraulic ram on a backhoe, mini excavator, or other equipment for concrete removal on portions of the structure to remain in service.

Given that the design of the bridge refurbishment is in keeping with the *Secretary of the Interior's Standards for Rehabilitation,* it is unlikely that the rehabilitation of the bridge, arches, and fly-over at the Wilson Dam would diminish the integrity of the NHL. Therefore, Alternative E would have no adverse effect to historic properties.

TVA completed consultation on a portion of the project excluding work on handrails and the flyover with the Alabama Historical Commission/SHPO, who provided concurrence on TVA's finding of no adverse effect to historic properties. TVA is currently in consultation on the paint removal and repainting of the handrails and flyover portionof the project.TVA is currently in consultation with the following federally-recognized tribes: Absentee Shawnee Tribe of Oklahoma, Alabama-Coushatta Tribe of Texas, Alabama-Quassarte Tribal Town, Cherokee Nation, The Chickasaw Nation, Coushatta Tribe of Louisiana, Eastern Band of Cherokee Indians, Eastern Shawnee Tribe of Oklahoma, Jena Band of Choctaw Indians, Kialegee Tribal Town, The Muscogee (Creek) Nation, Poarch Band of Creek Indians, The Seminole Nation of Oklahoma, Shawnee Tribe, Thlopthlocco Tribal Town of Oklahoma, and the United Keetoowah Band of Cherokee Indians in Oklahoma.

TVA also notified the Secretary of the Interior, via the Southeast Regional Office of the NPS, regarding the SHPO's concurrence on the finding of no adverse effects, as required for projects affecting NHLs (see Appendix F). TVA will send additional consultation once the SHPO concurrence on the remainder of the project is received.

3.9 Recreation

3.9.1 Affected Environment

Nearby recreation opportunities include boating and fishing on Wilson Reservoir. Common fish species include catfish, smallmouth bass, and largemouth bass. Fishing is also popular on the tail waters below the dam, both from the bank or by boat.

The closest boat access facilities are the TVA-owned public boat ramp and associated parking lot at the south end of the dam and the privately-operated Steenson Hollow Marina approximately 0.5 miles east of the dam.

The Wilson Dam Visitors Center is located on Reservation Road at the south end of the dam and includes display panels and interpretive materials. A visitor overlook and ADA-accessible fishing pier are located across the road to the east, while the 1-mile Energy Trail runs along the bluffs above the Tennessee River to the west.

The Muscle Shoals Waterfall Walk, 0.18 miles in length, is located along the southern shore below the dam. This paved trail provides views of Wilson Dam, limestone bluffs, and a waterfall. The trail is popular for bird watching, as many bird species congregate along the tail waters and at Jackson Island.

View of Muscle Shoals Waterfall Walk from Wilson Dam Bridge

The City of Florence operates two city parks on the north shore of the river and reservoir. Veteran's Memorial Park, located northeast of the dam, provides a variety of recreation amenities including baseball fields, tennis courts, a disc golf course, picnic areas, and a playground. River Heritage Park, northwest of the dam, features picnic shelters, a playground, and an interactive water fountain that is open seasonally. The park also has several river overlooks and is the starting point for the future River Walk Heritage Trail, a planned 2-mile walking path along the Tennessee River. Figure 3-1 provides an overview of local recreation areas and facilities.

Bird Watching from Muscle Shoals Waterfall Walk

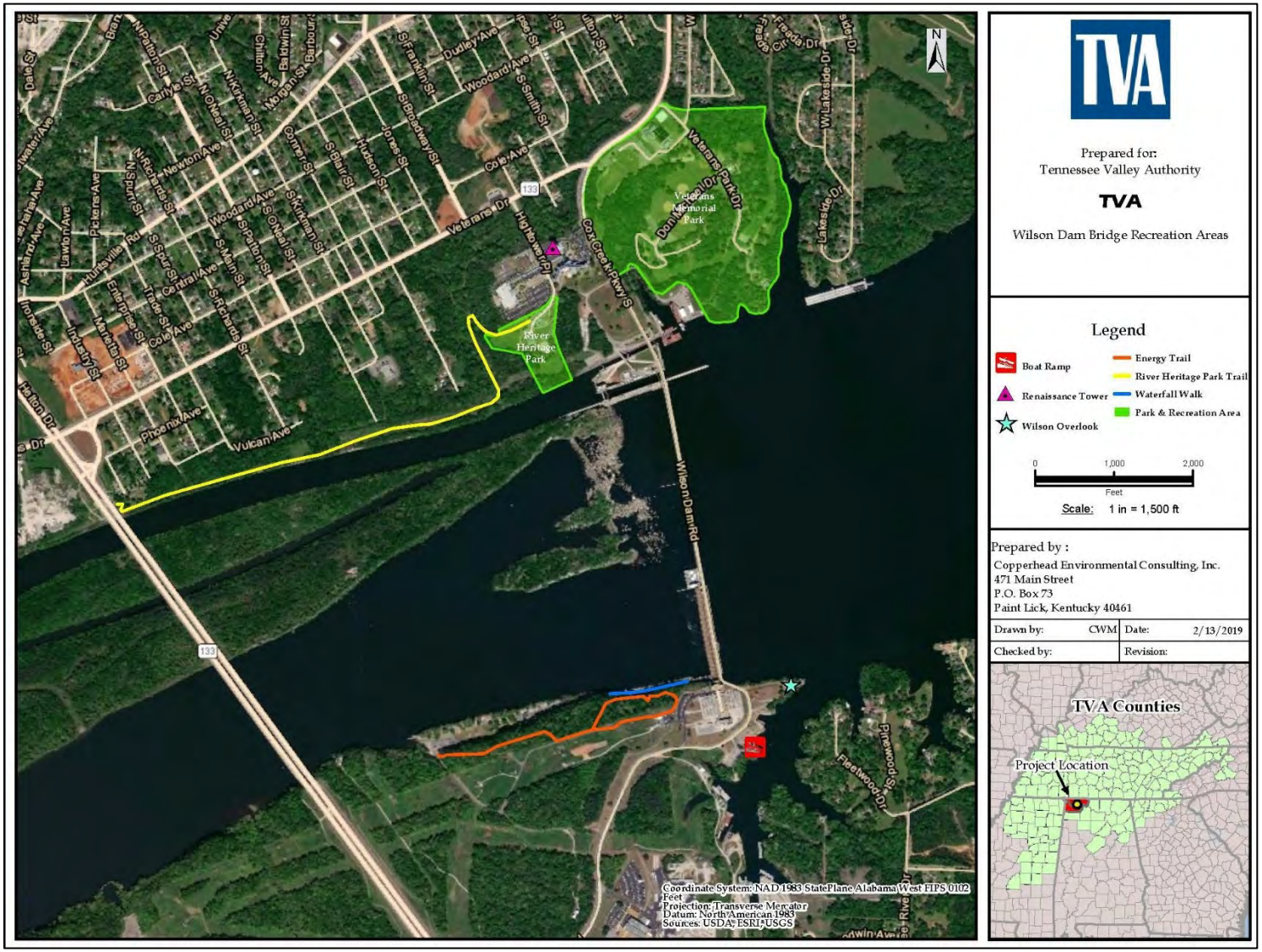

Figure 3-1. Recreation Areas

3.9.2 Environmental Consequences

3.9.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. There would be no temporary closures or other adverse impacts on recreation over the short- or long-term.

3.9.2.2 Alternative E – Repair Scheme D

Implementation of the proposed action would result in minor, short-term, indirect impacts on recreation similar to those described for transportation below. There would be no direct impacts because all recreation facilities would remain open during refurbishment and no recreation activities would be unavailable.

The closure of Reservation Road would require users to use Singing River Bridge on State Highway 133/157 as an alternate route when accessing recreation facilities and activities on the opposite side of the dam. For example, access to the visitors' center from the north end of the dam would require a 5-minute detour on the Singing River Bridge. These impacts would only occur while Reservation Road is closed.

Activities such as fishing, boating, hiking, and bird watching would be unaffected.

3.10 Transportation

3.10.1 Affected Environment

The Muscle Shoals Reservation is served by highway and railway modes of transportation. The transportation network surrounding the Reservation contains roads, bridges, rail lines, and navigable waterways. Reservation Road crosses the Wilson Dam. Based on a 2017 traffic study, approximately 3,500 vehicles per day travel across the Wilson Dam (Volkert 2017). Wilson Dam Traffic Data is provided in Appendix E.

To the west of the dam is Alabama State Highway 133 (AL 133) or Wilson Dam Road, a multi-lane divided highway, which runs north-south between Muscle Shoals and Florence and carries traffic over the Tennessee River (see Figure 3-2). AL 133 crosses the Tennessee River via the Singing River Bridge (formerly known as the Patton Island Bridge) and carries over 34,710 vehicles per day (ALDOT 2017). On the south side of the Wilson Dam, Reservation Road, a minor arterial, continues until it intersects with AL 133/Wilson Dam Road. On the north side of the Wilson Dam, Reservation Road becomes South Cox Creek Parkway and intersects with Veterans Drive, which are both principal arterials.

The Alabama Department of Transportation (ALDOT) is finishing up work on a section of AL 133 south of the Singing River Bridge in 2019. Additional roadway projects are planned in Florence over the next few years.

A pedestrian sidewalk is on the west side of the bridge crossing the dam. No dedicated bicycle facilities are in the project area. Trail systems are near the project area on both sides of the dam/ bridge but are not within the project area.

There is an extensive intermodal system in the Muscle Shoals area. Included in this system are two railways, Norfolk-Southern Railroad and the Tennessee Southern Rail Company. Norfolk-Southern serves Colbert County with connections to markets to the east, west and south of the Shoals Area. The Tennessee Southern Rail Company is a short line railroad

that serves Lauderdale County with connections into middle Tennessee. The rail service in the Muscle Shoals area is freight based with no passenger rail service.

AL 133 and Singing River Bridge

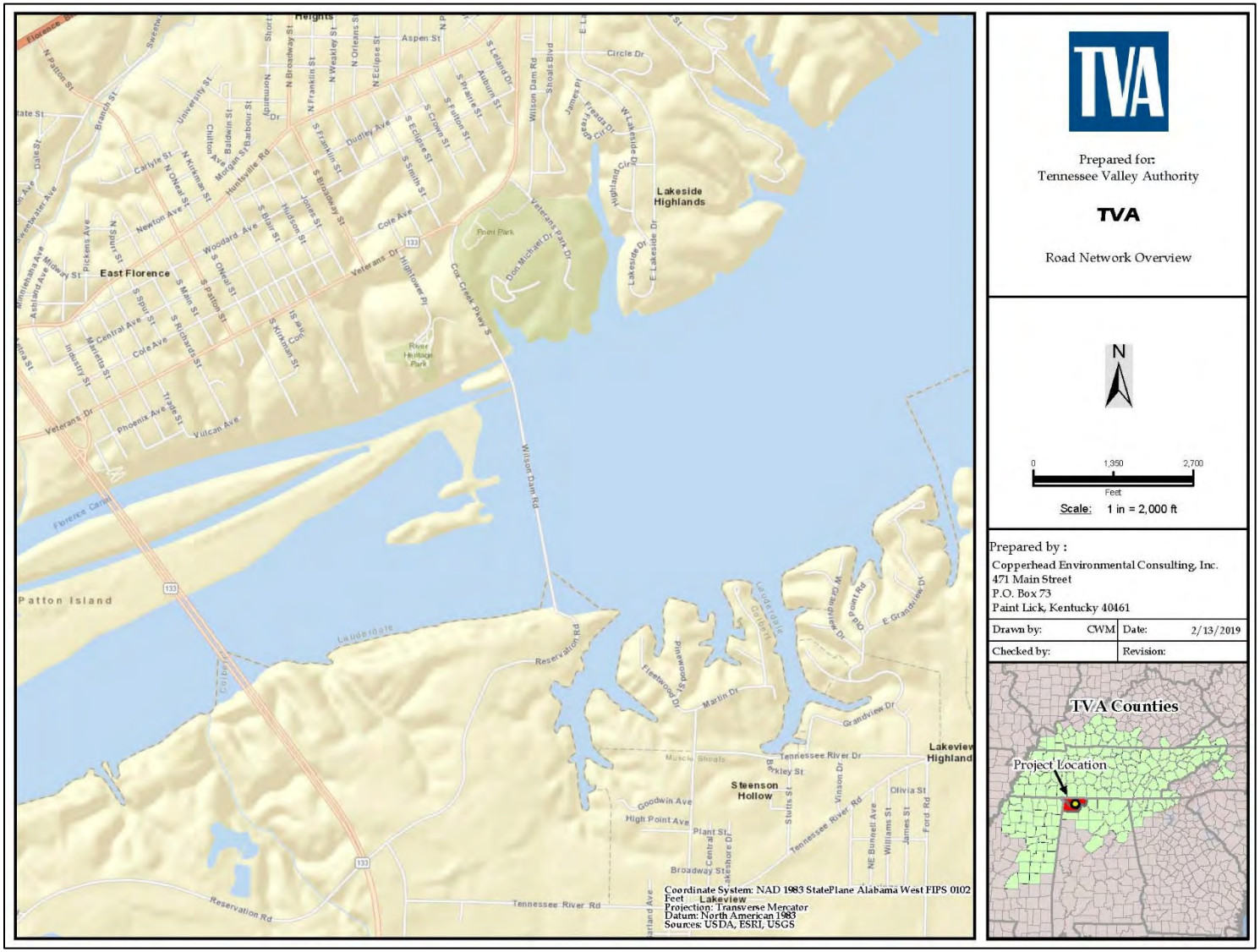

Figure 3-2. Road Network Overview

The Tennessee River provides opportunities for commercial and industrial transportation in the Muscle Shoals Area. The navigable waterway has created the opportunity for thousands of industrial and service jobs at businesses and industries that utilize the river for transportation. The Wilson Dam has a navigation lock, which is operated by the USACE. Port facilities are available on both sides of the waterway for use by commercial and industrial interests. Public and private docks are located along the Tennessee River providing an intermodal transportation connection. The Florence – Lauderdale County Port Authority is a public, not-for-profit organization chartered by the Lauderdale County Commission and the City of Florence. The Authority owns the Port of Florence. The Port Authority leases land and equipment to private operators and manages the public dock.

The Port of Florence is a multi-modal port located at mile 256 on the Tennessee River. Tennessee Southern Railroad provides rail access to the port and operator services at the public dock. The railway connects to CSX north of Columbia, Tennessee. The Tennessee Southern Railroad also operates the Port Authority's 40-ton overhead bridge crane. Fleeting is provided by Muscle Shoals Marine Service.

The Northwest Alabama Regional Airport is located north of U.S. Highway 72 Alternate approximately 3 miles south of the Wilson Dam. The airport has 14 "T" hangers, 12 aerial ports and tie-downs for over 75 general aviation aircraft. The airport hosts approximately three passenger flights per day and 15 freight/mail flights per day (Northwest Alabama Regional Airport 2019). Commercial passenger air service is provided by Mesaba Airlines operating as a Delta Connection with daily connections to Atlanta, Georgia.

3.10.2 Environmental Consequences

3.10.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. Reservation Road would remain open and traffic would continue to use Wilson Dam Bridge. A potential minor impact to transportation would occur if deterioration of the bridge and fly-over continues to the point where it can no longer accommodate current or forecasted traffic volumes.

3.10.2.2 Alternative E – Repair Scheme D

As discussed in the Purpose and Need section, the concrete bridge deck and sidewalks have deficiencies in the form of cracks and evidence of previous repairs. The overlay and expansion joints on the fly-over are showing signs of wear and tear. To repair the bridge deck, fly-over, and sidewalks, Reservation Road over the Wilson Dam Bridge would be closed for approximately 8 months. Detoured traffic would use existing arterial roads and cross the Tennessee River using the nearby Singing River Bridge on AL 133. The detour would add approximately 5 minutes to an average crossing. The small volume of traffic, approximately 3,500 vehicles per day, is not anticipated to negatively affect existing traffic on nearby roads or the Singing River Bridge, where traffic volumes would temporarily increase by approximately 10 percent during repairs. Currently, during bad weather, such as when water freezes on the dam, the bridge is closed and traffic is detoured. Similarly, during dam safety maintenance or inspections, the bridge is closed. Bridge closures occur on a semi-regular basis and travelers using the Wilson Dam Bridge have become accustomed to these closures.

The daily workforce during construction/renovation is expected to be approximately 35 workers. Construction traffic is expected to predominantly consist of a mix of passenger

cars and pickup trucks, along with less frequent large delivery or construction trucks including dump trucks and concrete mixer trucks. For this analysis, the bounding value of the construction workforce (35 workers) is used to assess potential effects on traffic operations. Traffic is assumed to be distributed during a peak morning period (to the site) and during a peak evening period (away from the site). Therefore, a daily traffic volume of 35 vehicles per day (worker vehicles, material delivery trucks, and construction trucks (dump and cement) is assumed to be generated by Alternative E. It is assumed that construction-related traffic would utilize interstate highways or major arterial roadways as much as possible and therefore would only generate a minor increase in traffic on local roads.

Pedestrians using the bridge and fly-over, primarily guests of the Muscle Shoals Hotel and Spa or visitors, would not be able to cross the bridge during repairs but other pedestrian facilities (trails) located on both sides of the Tennessee River near the Wilson Dam would continue to provide for pedestrian access.

Temporary bridge closure would have no impact on boat or barge traffic as the Wilson Dam locks would not be affected by the bridge closure. Passenger and freight air and freight travel would not be affected by the temporary bridge closure.

The temporary bridge closure is not expected to affect local emergency, fire, and law enforcement agencies and would not jeopardize their capacity to respond to other emergencies. These services occur on both sides of the Tennessee River and in case of a large emergency, access would continue through use of the Singing River Bridge.

After repair work is completed, no change in vehicle traffic volume is anticipated and traffic patterns should return to current levels. Therefore, the Project is expected to have a temporary, minor adverse impact on transportation during repairs and have a long-term transportation benefit as the bridge and fly-over would be able to continue to accommodate current or forecasted traffic volumes.

3.11 Noise

3.11.1 Affected Environment

Noise is defined as unwanted or unwelcome sound usually caused by human activity and added to the natural acoustic setting of a locale. It is further defined as sound that disrupts normal activities or diminishes the quality of the environment. Community response to noise is dependent on the intensity of the sound source, its duration, the proximity of noise-sensitive land uses and the time of day the noise occurs (i.e., higher sensitivities would be expected during the quieter overnight periods).

Sound is measured in units of decibels (dB) on a logarithmic scale. Therefore, increasing the noise level by 5 dB results in a noise level perceived by the human ear to be twice as loud as the original source. Given that the human ear cannot perceive all pitches or frequencies in the sound range, sound level measurements are typically weighted to correspond to the limits of human hearing, as measured in dBA. A noise change of 3 dBA or less are not normally detectable by the average human ear. An increase of 5 dBA is generally not readily noticeable and a 10-dBA increase is usually felt to be "twice as loud" as before.

The Noise Control Act of 1972, along with its subsequent amendments (Quiet Communities Act of 1978, USC 42 4901-4918), delegates authority to the states to regulate environmental noise and directs government agencies to comply with local community noise statutes and regulations. Although there are no federal, state, or local regulations for community noise in Colbert or Lauderdale counties, USEPA guidelines (1974) recommend that Ldn (day-night average sound level) not exceed 55 dBA for outdoor residential areas. The USEPA noise guideline recommends an Ldn of 55 dBA, which is sufficient to protect the public from the effect of broadband environmental noise in typical outdoor and residential areas. These levels are not regulatory goals but are “intentionally conservative to protect the most sensitive portion of the American population” with “an additional margin of safety” (USEPA 1974). The U.S. Department of Housing and Urban Development (HUD) considers an Ldn of 65 dBA or less to be compatible with residential areas (HUD 1985).

Sound from a source spreads out as it travels from the source and the sound pressure level diminishes with distance. In addition to distance attenuation, the air absorbs sound energy. Atmospheric effects (wind, temperature, precipitation) and terrain/vegetation effects also influence sound propagation and attenuation over distance from the source. An individual’s sound exposure is determined by measurement of the noise that the individual experiences over a specified time interval.

Community noise refers to outdoor noise near a community. A continuous source of noise is rare for long periods and is typically not a characteristic of community noise. Typical background day/night noise levels for rural areas range between 35 and 50 dB whereas higher-density residential and urban areas background noise levels range from 43 dB to 72 dB (USEPA 1974). Background noise levels greater than 65 dBA can interfere with normal conversation, watching television, using a telephone, listening to the radio and sleeping.

At the Wilson Dam, ambient noise sources include regular operations at the dam (water releases from the reservoir), lock (opening and closing lock), barges, and daily vehicle traffic crossing the bridge. Noise levels increase when cranes and machinery are used during lock outages. Birds also frequent the areas below the dam and generate noise from their calls and activity and have a roost on Jackson Island.

The Northwest Alabama Regional Airport at Muscle Shoals is 3 miles south of the Wilson Dam. The airport can accommodate small to medium size airplanes. The airport hosts approximately three passenger flights per day and 15 freight/mail flights per day (Northwest Alabama Regional Airport 2019). Approaching and departing planes regularly pass over the nearby Muscles Shoals Reservation and are an external source of noise.

Sensitive noise receptors (residences, hotels, parks, etc.) are located near the proposed project. On the north side, the Muscle Shoals Hotel and Spa is 0.36 miles; and Veterans Park is 0.2 mi away from the project area. The nearest residence is located approximately 0.36 miles to the southeast of the dam. A parking lot and overlook of the dam is approximately 0.1 miles from the dam.

Construction noise associated with the proposed action would include the use of vehicles such as dump trucks, delivery trucks, concrete mixers, pavers, pickup trucks, and skid steer loaders, and generators and hand-held pneumatic tools. These types of equipment emit 55 to 85 dBA at a distance of 50 feet (FHWA 2017).

3.11.2 Environmental Consequences

3.11.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. Therefore, there would be no changes to the existing noise environment and no new impacts on sensitive receptors.

3.11.2.2 Alternative E – Repair Scheme D

Repairs at the Wilson Dam are anticipated to take up to 8 months. During this time, vehicle traffic would detour to the Singing River Bridge and traffic noise would decrease. At the same time, worker personnel vehicles (approximately 35) would park at the staging area. Equipment expected to be used to rehabilitate the dam and bridge include 1-2 truck-mounted cranes, 2 skid steer loaders, 2-4 dump trucks, concrete trucks and pump trucks during deck pours, hand tools, generators, compressors and other miscellaneous equipment. Construction activities would primarily occur during the day on weekdays; however, construction activities could occur at night or on weekends, if necessary. Typical noise levels from construction equipment are expected to be 85 dBA or less at 50 feet.

Based on a simplified analysis of straight-line noise attenuation from the project boundary, it is estimated that construction phase noise levels would attenuate to below the USEPA guidelines. For example, the sound level of construction tools and equipment emitting 55 to 85 dBA at 50 feet would be approximately 28.5 to 58.5 dBA at Veteran's Park (0.2 miles away) and approximately 27.3 to 57.3 dBA at the Muscle Shoals Hotel and Spa and at the nearest residence (approximately 0.23 miles away). These construction noise impacts would be partially offset by the absence of noise from the 3,500 vehicles which normally travel over the bridge.

Given the temporary and intermittent nature of construction noise, the impact of noise generated from construction activities is expected to be minor. There may be minor indirect noise impacts from the detour of traffic (approximately 3,500 vehicles per day) onto the nearby Singing River Bridge. This would temporarily increase the vehicle noise on the detour routes used. The detour traffic noise would only occur during the 8-month construction period.

3.12 Socioeconomics and Environmental Justice

3.12.1 Affected Environment

The northern shore of Wilson Reservoir is the boundary between Lauderdale County (to the north) and Colbert County (to the south). The largest population center near the project is the City of Florence, which is in Lauderdale County directly north of the dam. The City of Muscle Shoals, in Colbert County, is approximately two miles southwest of the dam.

Population and income estimates were derived from the most recent US Census data and are provided in Table 3-2 below. This includes information on low-income and minority populations. EO 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) mandates federal agencies to consider potentially disproportionate health or environmental impacts that their activities may have on minority or low-income populations. Although TVA is not subject to this EO, it routinely evaluates the impacts of its actions on low-income and minority populations.

Table 3-2. Population and Income

Metric	State of Alabama	Colbert County	Lauderdale County	City of Florence	City of Muscle Shoals
Population	4,874,747	54,500	92,538	39,852	14,022
Per Capita Income	$25,746	$23,675	$25,803	$23,311	$26,227
Median Household Income	$46,472	$45,477	$44,888	$37,843	$52,201
Persons in Poverty (Percent)	16.9	15.4	13.7	22.2	10.2
Minority Population (Percent)	34.4	21.5	15.4	24.7	17.3

Source: US Census 2019

During refurbishment, a temporary workforce of approximately 35 workers would utilize services and likely commute from their homes in Colbert and Lauderdale counties.

3.12.2 Environmental Consequences

3.12.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not refurbish the Wilson Bridge deck and other concrete surfaces, reseal the fly-over epoxy overlay, remove and replace the fly-over expansion joints, or repaint the fly-over handrails. There would be no temporary workforce needed to conduct refurbishment and therefore no impacts on socioeconomics or environmental justice.

3.12.2.2 Alternative E – Repair Scheme D

Implementation of the proposed action would result in minor, short-term beneficial impacts on socioeconomics, primarily through the temporary use of 35 workers to conduct refurbishment activities. Because workers would likely be local to Colbert and Lauderdale counties, there would be no anticipated increase in sales or lodging taxes. However, the proposed action would provide employment for these workers for the duration of refurbishment activities. Beneficial impacts would extend to environmental justice if workers are hired from minority or low-income populations. Indirect effects would be minor and include spending by workers in the local economy.

3.13 Unavoidable Adverse Impacts

Unavoidable adverse impacts are the effects of the proposed action on natural and human resources that would remain after mitigation measures or BMPs have been applied. Mitigation measures and BMPs are typically implemented to reduce a potential impact to a level that would be below the threshold of significance as defined by the CEQ and the courts. Impacts associated with refurbishment and repair of the Wilson Dam Bridge deck, fly-over, and other concrete surfaces have the potential to cause unavoidable adverse effects to several environmental resources.

Impacts associated with construction have the potential to cause unavoidable adverse effects to existing open water habitats. Use of high-pressure water and aggregate to remove deteriorated and sound concrete and old paint could cause temporary impacts to water quality in receiving water bodies from runoff/drainage. BMPs to filter and minimize runoff would be implemented, and water released by construction activities would meet established ADEM permit limits.

Other impacts associated with Alternative E would primarily be related to activities associated with the use of construction equipment. Equipment use may result in varying amounts of air emissions, noise and vibration that may potentially impact onsite workers. Potential noise impacts also include traffic noise associated with the construction workforce traveling to and from the site. Emissions from construction activities and equipment are minimized through implementation of BMPs, including proper maintenance of construction equipment and vehicles.

3.14 Relationship of Short-Term Uses to Long-Term Productivity

NEPA requires a discussion of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. This EA focuses on the analyses of environmental impacts associated with the refurbishment or repair of the Wilson Dam Bridge deck, fly-over, and concrete surfaces. These refurbishment activities are considered short-term uses of the environment as they would occur during the 8 months of construction and the long-term use is considered to be initiated upon the completion of the refurbishment and reopening of the bridge to traffic. This section includes an evaluation of the extent that the short-term uses preclude any options for future long-term use of either the bridge or dam.

Construction activities would have a negative effect on a limited amount of short-term uses of the environment such as air, noise and transportation resources as described above. Most environmental impacts during construction activities would be relatively short term and would be addressed by BMPs and mitigation measures. Construction activities would have a limited, yet favorable short-term impact to the local economy through the creation of construction and support jobs and revenue.

Use of an existing solid waste landfill would have a minor impact on capacity and, therefore, have an impact on the users of the landfill. This project is not anticipated to have any significant impact on solid waste management capacities due to the small volume of waste to be managed.

In the long-term, refurbishing or repair of the bridge deck, fly-over, and other concrete surfaces is not expected to alter long-term uses of the bridge or dam.

3.15 Irreversible and Irretrievable Commitments of Resources

This section describes the expected irreversible and irretrievable environmental resource commitments used in the refurbishment of the Wilson Dam bridge deck, fly-over epoxy overlay, expansion joints, and handrails. The term irreversible commitments of resources describe environmental resources that are potentially changed by construction or operation and that could not be restored at some later time to the resource’s state prior to construction or operation. For example, the construction of a road through a forest would be an irretrievable commitment of the productivity of timber within the road right of way if the road remains. Irretrievable commitments of resources are generally materials that are used for the refurbished bridge in such a way that they could not, by practical means, be recycled or restored for other uses. For example, mining of ore is an irreversible commitment of a resource; once the ore is removed and used, it cannot be restored. Under Alternative A, no irreversible or irretrievable commitments would occur as the existing bridge would remain unchanged. Under Alternative E, the bridge refurbishment would involve irreversible commitment of fuel, energy, and concrete, overlay, and painting material resources.

3.16 Cumulative Effects

CEQ regulations for implementing the procedural provisions of the NEPA of 1969, as amended (42 USC § 321 et seq.) define cumulative impact as: "…the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR § 1508.7).

The proposed action identified under Alternative E would occur on land that was previously disturbed and is used for transportation, water storage, and energy generating purposes. Consequently, the potential for direct and indirect effects from project activities is generally low. For resources where no direct or indirect effects were identified, there would be no cumulative effects.

Unless otherwise stated, the geographic scope of analysis is assumed to include a 5-mile radius around the Wilson Dam. This is the area in which indirect and cumulative effects are expected to occur. This area is largely defined by urban and suburban land use, water features including Wilson Reservoir, and agricultural and forested lands in unincorporated areas.

Past, present and reasonably foreseeable future actions were identified within the 5-mile radius and include the following:

- Commercial, and industrial development in Florence (e.g., Underwood Baptist Church student building, Florence; University of North Alabama renovations to historic Strickland Building).
- American Paper & Twine started construction in 2019 of a 30,000 square foot facility in Shoals Research Airpark in Muscle Shoals.
- The Alabama Department of Transportation (ALDOT) is finishing up work on a section of AL 133 south of the Singing River Bridge in 2019.
- In 2019, ALDOT will widen a section of U.S. 43 to four lanes and add a turning lane. The work is from AL 64 north to the Tennessee state line (Lauderdale County).
- In 2019, ALDOT will replace two bridges at the Ash Boulevard overpass on Hatch Boulevard in Sheffield.
- In 2020, ALDOT will replace the overpass on Mitchell Boulevard at Coffee Road in Florence.

As shown in Table 3-3, the cumulative impacts associated with the proposed action in combination with the above identified actions would be insignificant.

Table 3-3. Cumulative Impacts

Resource Area	Alternative E – Repair Scheme D
Air Quality	Minor, short-term cumulative impacts. The temporary construction-related air emissions are not expected to result in any changes to NAAQS attainment.
Climate	Minor, short-term cumulative impacts.
Surface Water	Minor, short-term cumulative impacts due to the confined scale of the construction activities and the BMP minimization measures that would be implemented to minimize impacts to water quality. No long-term water quality or ecological health impacts are anticipated.
Wildlife	No cumulative impacts.
Threatened and Endangered Species	No cumulative impacts.
Solid and Hazardous Waste	Minor short- and long-term cumulative impacts due to the small waste volumes generated and the regional solid waste management capacity. The capability of regional waste management facilities to continue accepting waste would not be compromised.
Visual	Short- and long-term beneficial cumulative impacts on the visual landscape as it restores the visual qualities of the current Wilson Dam and bridge. This would result in long-term cumulative effects if other nearby restoration or preservation actions are undertaken.
Cultural and Historic Resources	No cumulative impacts.
Recreation	Minor, short-term cumulative impacts on recreation due to temporary construction detour. No long-term cumulative impacts to nearby recreation facilities are anticipated.
Transportation	Minor, short-term cumulative impacts to vehicle traffic due to temporary construction detour that would occur simultaneously with other transportation improvement and development projects and their traffic impacts. No cumulative impacts anticipated on air, railroad, or barge transportation.
Noise	Minor, short-term cumulative noise impacts.
Socioeconomic and Environmental Justice	Minor, short-term, beneficial cumulative impacts from the temporary employment of a construction workforce. The proposed action is not expected to contribute to cumulative impacts on environmental justice.

CHAPTER 4 – LIST OF PREPARERS

4.1 NEPA Project Management

Name:	**Ashley Pilakowski**
Education:	B.S., Environmental Management
Project Role:	NEPA compliance, document preparation and project management
Experience:	8 years in environmental planning and policy and NEPA compliance.

Name:	**Lori Whitehorse**
Education:	B.S., Plant and Soil Science
Project Role:	TVA Environmental Program Manager
Experience:	15 years of environmental regulatory compliance

Name:	**Marty Marchaterre (Copperhead)**
Education:	J.D., Law; B.A., History and Political Science
Project Role:	Project Manager, NEPA Coordinator
Experience:	28 years of experience in NEPA document preparation.

4.2 Other Contributors

Name:	**Michael Bradley**
Education:	M.S., Communications
Project Role:	Strategic Communications Partner
Experience:	20 years involved in engineering, science, environmental, and energy communications

Name:	**Ben Byard**
Education:	B.S., M.S, and PhD. Civil Engineering
Project Role:	FAM Bridge Program Manager
Experience:	12 years of structural engineering experience

Name:	**John Day**
Education:	B.A., Business
Project Role:	Facilities Program Manager
Experience:	20 years of project management experience

Name:	**Elizabeth B. Hamrick**
Education:	M.S., Wildlife and B.S. Biology
Project Role:	Terrestrial Ecology (Animals), Terrestrial Threatened and Endangered Species
Experience:	17 years conducting field biology, 12 years technical writing, 8 years compliance with NEPA and ESA.

Name:	**Hailie A. Hearnes**
Education:	M.A., Public History (Historic Preservation) and B.S., Historic Preservation
Project Role:	Architectural Historian, Cultural Compliance
Experience:	11 years performing historic architectural surveys, NRHP assessments, condition assessments, and documentation for NHPA compliance

Name:	**Venita Perkins**
Education:	B.S., Chemical Engineering
Project Role:	Environmental Scientist
Experience:	17 years of environmental work

Name:	**A. Chevales Williams**
Education:	B.S., Environmental Engineering
Project Role:	Surface Water
Experience:	13 years of experience in water quality monitoring and compliance; 10 years of NEPA planning and environmental services

Name:	**Richard Borthwick (Copperhead)**
Education:	PhD, Biology (Candidate); M.S., Biology and Ecology; B.S., Natural Resource and Environmental Management and Wildlife and Fisheries
Project Role:	Wildlife, Threatened and Endangered Species
Experience:	10 years of experience performing environmental assessments and field surveys.

Name:	**Kelsie Eshler (Copperhead)**
Education:	B.A., Environmental Earth Science
Project Role:	Solid and Hazardous Waste; Transportation
Experience:	3 years of experience performing environmental assessments and field surveys.

Name:	**Chris McNees (Copperhead)**
Education:	B.S., Environmental Studies
Project Role:	Geographic Information Systems
Experience:	15 years of experience in restoration, remediation, spatial analysis, sample collection, lab analysis, and habitat assessments.

Name:	**Drew Vankat (Copperhead)**
Education:	M.S., Environmental Policy and Planning and B.Phil., Urban and Environmental Planning
Project Role:	Socioeconomics and Environmental Justice, Recreation, Surface Water, QA/QC
Experience:	12 years of experience with environmental policy including NEPA document preparation.

CHAPTER 5 – ENVIRONMENTAL ASSESSMENT RECIPIENTS

5.1 Federal Agencies

National Park Service, Secretary of the Interior

5.2 Federally Recognized Tribes

Absentee Shawnee Tribe of Oklahoma

Alabama-Coushatta Tribe of Texas

Alabama-Quassarte Tribal Town

Cherokee Nation

The Chickasaw Nation

Coushatta Tribe of Louisiana

Eastern Band of Cherokee Indians

Eastern Shawnee Tribe of Oklahoma

Jena Band of Choctaw Indians

Kialegee Tribal Town

The Muscogee (Creek) Nation

Poarch Band of Creek Indians

The Seminole Nation of Oklahoma

Shawnee Tribe

Thlopthlocco Tribal Town of Oklahoma

United Keetoowah Band of Cherokee Indians in Oklahoma

5.3 State Agencies

Alabama Historical Commission, State Historic Preservation Officer

Alabama Department of Environmental Management

Alabama Department of Transportation

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CHAPTER 6 – LITERATURE CITED

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Appendix A – Wilson Dam Bridge Deck Refurbishment Design

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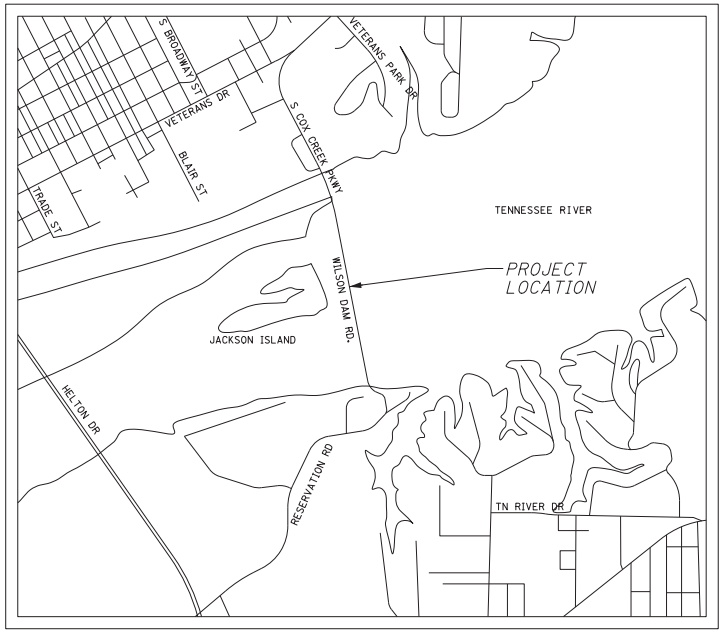
TENNESSEE VALLEY AUTHORITY

WILSON DAM BRIDGE DECK REPLACEMENT

INDEX OF SHEETS



LOCATION MAP

NTS

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE TITLE SHEET
SHEET NO. 1

31-JAN-2019 03:33
Projects\1012500 - TVA_WilsonDamPhase2\DGN\01_TITLE

GENERAL NOTES

DESCRIPTION OF THE WORK:

THE SCOPE OF WORK SHALL INCLUDE THE FOLLOWING:

1. INSTALL BRIDGE CLOSURE SIGNS AS SHOWN ON SHEET NO. 4A.
2. REMOVE THE EXISTING CONCRETE BRIDGE DECK WITHIN THE LIMITS SHOWN IN THE PLANS.
3. CONSTRUCT NEW REINFORCED CONCRETE BRIDGE DECK.
4. REPLACE OR RESEAL BRIDGE DECK JOINTS AT LOCATIONS NOTED.
5. SEAL LONGITUDINAL CONSTRUCTION JOINT BETWEEN EXISTING CONCRETE CURBS AND NEW CONCRETE BRIDGE DECK.
6. PATCH DETERIORATED ARCH FACES.
7. REMOVE AND REPLACE DEFECTIVE AREAS OF EXISTING BRIDGE RAILS AND SIDEWALKS.
8. REPAIR DETACHED DRAIN PIPE AT ONE LOCATION.
9. REMOVE TOP 1.5" OF DECK CONCRETE AND PERFORM FULL DEPTH DECK REPAIRS AT LOCATIONS NOTED IN THE PLANS OR AS DIRECTED BY THE ENGINEER.
10. CONSTRUCT A POLYMER MODIFIED CONCRETE OVERLAY AT LOCATIONS NOTED IN THE PLANS.
11. REPLACE MISSING OR DAMAGED CURB IRONS AS DIRECTED BY THE ENGINEER.

DEFINITIONS:

WHENEVER THE FOLLOWING TERMS ARE USED IN THE PLANS, IT IS UNDERSTOOD THAT THEY REPRESENT THE FOLLOWING:

A. CONTRACTOR: ENTITY RESPONSIBLE FOR CONSTRUCTION

B. ENGINEER/ENGINEER OF RECORD: DESIGN ENGINEER, TVA BRIDGE MANAGER, OR THEIR DESIGNATED REPRESENTATIVE

C. OWNER: TENNESSEE VALLEY AUTHORITY (TVA)

D. TVA CONSTRUCTION MANAGER: REFERS TO AN INDIVIDUAL EMPLOYED BY TVA FOR COORDINATION OF CONSTRUCTION ACTIVITIES

E. CONSTRUCTION QUALITY ASSURANCE (CQA) MANAGER: THE CQA MANAGER IS A QUALIFIED PROFESSIONAL ENGINEER RESPONSIBLE FOR EXECUTION OF THE CQA AND RELATED DOCUMENTATION AS OUTLINED IN THE CMP.

SPECIFICATIONS:

1. ALL WORK ON THIS PROJECT SHALL BE DONE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND THE 2018 EDITION OF THE ALABAMA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, APPLICABLE SPECIAL PROVISIONS, AND TECHNICAL SPECIFICATIONS.
2. ADDITIONAL NOTES MAY BE FOUND ON THE SUBSEQUENT SHEETS OF THE CONTRACT PLANS, AND SUCH NOTES SUPPLEMENT THE GENERAL NOTES GIVEN ON THIS SHEET.

CONTRACTOR ACTIVITIES:

1. THE CONTRACTOR SHALL ADHERE TO THESE PLANS FOR CONSTRUCTION, ALONG WITH THE QMP, CQC PLAN, AND OTHER REFERENCED SPECIFICATIONS, STANDARDS, AND APPLICABLE ENVIRONMENTAL AND SAFETY REGULATIONS DURING THE PROJECT ENTIRETY.
2. ACCESS TO THE SITE, STORAGE, AND STAGING AREAS, SHALL BE DETERMINED BY TVA. CONTRACTOR SHALL COORDINATE CONSTRUCTION ACCESS AND STAGING AREAS PRIOR TO THE START OF WORK.
3. THE CONTRACTOR'S MOBILIZATION SHALL INCLUDE, BUT IS NOT LIMITED TO, THE PURCHASE OF INSURANCE; PREPARATION OF REQUIRED SUBMITTALS FOR APPROVAL; TRANSPORTATION OF PERSONNEL, EQUIPMENT, AND SUPPLIES TO THE SITE; AND PROCURING BADGES, BACKGROUND CHECKS, AND ORIENTATION TRAINING FOR WORKERS AS REQUIRED BY TVA.
4. THE CONTRACTOR SHALL BID WITH THE UNDERSTANDING THAT CONSTRUCTION ACTIVITIES MAY BE HALTED IF DEEMED NECESSARY TO ENSURE PLANT OPERATIONS, REPAIR PLANT EQUIPMENT, ETC.
5. THE CONTRACTOR SHALL COORDINATE WORK ACTIVITIES AS NEEDED WITH THE SPILLWAY OPERATIONS. THE CONTRACTOR IS ALERTED TO THE POSSIBILITY THAT SPILLWAY OPERATIONS MAY CAUSE ADDITIONAL MOISTURE ON THE CONCRETE SURFACES THAT MAY AFFECT CONCRETE POURS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ENSURING THAT ALL MATERIALS ARE PLACED IN A MANNER WHICH CONFORMS WITH THE MATERIAL MANUFACTURER'S RECOMMENDATIONS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF ALL ACCESS ROADS, STAGING AREAS, AND STORAGE AREAS USED DURING CONSTRUCTION AND SHALL RESTORE SAID AREAS TO THEIR ORIGINAL CONDITION OR BETTER ONCE CONSTRUCTION IS COMPLETE UNLESS THE TVA CONSTRUCTION MANAGER PROVIDES WRITTEN PERMISSION TO THE CONTRACTOR TO LEAVE THE AREA "AS-IS". UPON COMPLETION OF THE PROJECT, THE CONTRACTOR SHALL REMOVE ALL PERSONNEL AND EQUIPMENT FROM THE SITE, INCLUDING ANY TEMPORARY ITEMS INSTALLED BY THE CONTRACTOR DURING THE COURSE OF THEIR WORK. THE SITE SHALL BE LEFT IN A CONDITION ACCEPTABLE TO THE OWNER WITH ALL TRASH AND DEBRIS REMOVED.
7. THE WORK LIMITS ARE SHOWN ON THE CONSTRUCTION PLANS. THE CONTRACTOR SHALL NOT WORK OR USE AREAS OUTSIDE THE WORK LIMITS. AREAS WITHIN THE WORK LIMITS SHALL BE MAINTAINED BY THE CONTRACTOR DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SITE SECURITY AND PROTECTION OF THE WORK AREA.
8. SITE WORK SHALL BE ACCOMPLISHED IN A MANNER THAT WILL NOT RESULT IN DAMAGE TO EXISTING STRUCTURES, PAVEMENTS, SURVEY MONUMENTS, INSTRUMENTATION, TREES, OR LANDSCAPING THAT IS NOT DESIGNATED FOR REMOVAL. SITE USAGE, ACCESS IMPROVEMENTS, TEMPORARY DRAINAGE, AND EROSION CONTROL MEASURES SHALL BE SUBMITTED TO THE ENGINEER FOR ACCEPTANCE.
9. MATERIALS DELIVERED FOR INCORPORATION INTO THE WORK SHALL BE TEMPORARILY STORED IN THE STAGING AREA NOTED ON SHEET 4. MATERIALS SHALL BE STORED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
10. BLASTING IS NOT PERMITTED ON THE PROJECT SITE.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE HEALTH AND SAFETY OF ITS PERSONNEL AND SHALL MEET INDUSTRY STANDARD REQUIREMENTS. THE CONTRACTOR SHALL ADHERE TO THE OWNER'S REQUIREMENTS FOR SAFETY DURING CONSTRUCTION, UNLESS SUCH STANDARDS ARE SUPERCEDED BY REGULATORY REQUIREMENTS. ALL OPERATIONS SHALL BE PERFORMED BY THE CONTRACTOR IN STRICT ACCORDANCE WITH TVA SAFETY STANDARDS AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) REQUIREMENTS.
12. THE CONTRACTOR SHALL COMMUNICATE CONSTRUCTABILITY ISSUES OR DISCREPANCIES IN THE CONSTRUCTION DOCUMENTS TO THE CQA MANAGER AND TVA CONSTRUCTION MANAGER IMMEDIATELY UPON BECOMING AWARE. THE CONTRACTOR SHALL USE THE OWNER'S REQUEST FOR INFORMATION (RFI) FORM THAT IS CONTAINED IN THE QMP TO COMMUNICATE AND ESTABLISH WRITTEN DOCUMENTATION OF THE ISSUE AND ITS RESOLUTION.
13. CONSTRUCTION ACTIVITIES SHALL BE OBSERVED BY THE CQA MANAGER OR A DESIGNATED REPRESENTATIVE ON THE CQA TEAM. THE CONTRACTOR SHALL COORDINATE WITH THE CQA REPRESENTATIVE AND INFORM THE REPRESENTATIVE OF THE CONTRACTOR'S SCHEDULED WORK SHIFTS TO ENSURE THAT CQA REPRESENTATION OCCURS AS REQUIRED. THE CQA TEAM WILL OBSERVE CONSTRUCTION ACTIVITIES AS REQUIRED.
14. VERIFY ALL DIMENSIONS AND GEOMETRY OF THE EXISTING STRUCTURE IN THE FIELD AS NECESSARY FOR PROPER FIT OF PROPOSED CONSTRUCTION PRIOR TO THE FABRICATION OF ANY COMPONENT.
15. THE CONTRACTOR SHALL COORDINATE WITH THE TVA CONSTRUCTION MANAGER AND ALABAMA 811 TO LOCATE AND VERIFY ALL UTILITIES PRIOR TO CONSTRUCTION TO ENSURE THERE IS NO CONFLICT WITH THE WORK.
16. ONSITE UTILITIES AND UNDERGROUND FACILITIES, WHETHER SHOWN ON THE PLANS OR NOT, SHALL BE PROTECTED BY THE CONTRACTOR FROM DAMAGE BY THE CONTRACTOR'S OPERATIONS. IF DAMAGE OCCURS, THE CONTRACTOR SHALL COORDINATE REPAIRS WITH THE TVA CONSTRUCTION MANAGER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE ATTRIBUTED TO THE CONTRACTOR'S OPERATIONS.
17. PROPOSED MODIFICATIONS TO DESIGN FEATURES AS SHOWN (OR DESCRIBED) IN THE ISSUED FOR CONSTRUCTION DESIGN DOCUMENTS SHALL BE APPROVED BY THE ENGINEER OF RECORD. TEMPORARY FEATURES IMPLEMENTED TO FACILITATE CONSTRUCTION SHALL BE DESCRIBED IN APPROVED PROJECT DOCUMENTS.
18. VEHICULAR ACCESS TO THE SITE SHALL BE DETERMINED BY TVA. BRIDGE CLOSED SIGNS SHALL BE PLACED AS SHOWN IN THE PLANS. THE BRIDGE WILL BE CLOSED BY TVA UTILIZING EXISTING GATES.
19. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF THE WORKSITE FROM UNAUTHORIZED PERSONNEL AT ALL TIMES DURING CONSTRUCTION.
20. A PERMIT SHALL BE OBTAINED FROM TVA PRIOR TO ANY WORK REQUIRING DRILLING OR CHIPPING INTO CONCRETE MORE THAN 5 INCHES.
21. ADDITIONAL REPAIR WORK MAY BE REQUIRED AS THE CONTRACT PROGRESSES WHICH IS NOT SHOWN ON THESE PLANS. WORK WILL BE AS DIRECTED BY THE ENGINEER. PAYMENT WILL BE MADE AT AN AGREED UPON PRICE.
22. CONCRETE TO BE CLASS "A" IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, EXCEPT BRIDGE DECK CONCRETE SHALL BE IN ACCORDANCE WITH TECHNICAL SPECIFICATION 1.
23. CONCRETE SURFACE FINISH: CLASS 3 FINISH SHALL APPLY TO THIS SITE.
24. ALL CONCRETE IN REPAIR AREAS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
25. BRIDGE DECK SURFACE FINISH SHALL CONFORM TO THE REQUIREMENTS IN THE STANDARD SPECIFICATIONS.
26. THE CONTRACTOR SHALL PROVIDE 100% CONVENTIONAL FALL PROTECTION FOR WORKERS WHERE REQUIRED BY OSHA REQUIREMENTS.
27. HORIZONTALLY DRILLED HOLES SHALL BE DRILLED ½" IN DIAMETER LARGER THAN THE BAR, CLEANED, PACKED WITH NON-SHRINK GROUT, AND THE BAR ROTATED (NOT DRIVEN) TO ITS SEAT. VERTICALLY DRILLED HOLES SHALL BE DRILLED ¼" IN DIAMETER LARGER THAN THE BAR, CLEANED, PACKED WITH EPOXY GROUT, AND THE BAR SHALL BE DRIVEN TO ITS SEAT. ALL GROUTING MATERIAL SHALL BE APPROVED BY THE ENGINEER.
28. CONCRETE FORM WORK, FALSEWORK, AND TEMPORARY SUPPORTS SHALL BE REMOVED FROM THE JOB SITE AFTER WORK IS COMPLETED. COST OF FORMS, FALSEWORK, AND TEMPORARY SUPPORT SHALL BE INCLUDED IN ITEMS BID ON. THIS WORK SHALL BE COMPLETED BEFORE FINAL PAYMENT IS APPROVED.
29. STRUCTURAL STEEL SHALL CONFORM TO AASHTO M270 GRADE 36 (ASTM A709 GRADE 36) UNLESS OTHERWISE NOTED.
30. CARE SHALL BE TAKEN WHILE REMOVING AND REPAIRING BRIDGE COMPONENTS SO AS NOT TO DISTURB OR DAMAGE ANY UTILITIES.
31. CONTRACTOR SHALL TAKE PRECAUTION TO NOT DAMAGE OR BLOCK EXISTING DECK DRAINS. ANY DAMAGE OR BLOCKAGE TO EXISTING DECK DRAINS SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. DURING DECK POURS, DRAINS SHALL BE PROTECTED TO PREVENT WET CONCRETE FROM ENTERING THE DRAIN.
32. THE CONTRACTOR SHALL TAKE SPECIAL CARE TO PROTECT ANY PARTS OF THE STRUCTURE THAT ARE NOT TO BE REMOVED SPECIFICALLY. THE CONTRACTOR IS NOT ALLOWED TO USE A HYDRAULIC RAM MOUNTED ON A BACKHOE (COMMONLY CALLED A HOE RAM), MINI EXCAVATOR, OR OTHER EQUIPMENT FOR CONCRETE REMOVAL ON PORTIONS OF THE STRUCTURE TO REMAIN IN SERVICE. ALL DEVICES PROPOSED FOR CONCRETE DEMOLITION SHALL MEET THE APPROVAL OF THE ENGINEER.
33. THE CONTRACTOR IS RESPONSIBLE FOR AND SHOULD TAKE ALL PRECAUTIONS TO ENSURE THE STABILITY OF THE STRUCTURE DURING THE REPAIRS. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING REPAIR AND CONSTRUCTION.
34. REPAIR QUANTITIES PROVIDED HEREIN BASED ON OBSERVATIONS FROM AUGUST 2018 INSPECTION. CONTRACTOR SHALL VERIFY ALL LOCATIONS TO BE REPAIRED, DIMENSIONS, AND QUANTITIES WITH THE ENGINEER PRIOR TO ORDERING MATERIALS OR BEGINNING THE WORK.
35. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND QUANTITIES BEFORE ORDERING ANY MATERIALS.
36. NOTHING IN THE GENERAL NOTES OR SPECIAL PROVISIONS SHALL RELIEVE THE CONTRACTOR FROM HIS RESPONSIBILITIES TOWARD THE SAFETY AND CONVENIENCE OF THE GENERAL PUBLIC AND TVA STAFF.
37. ALL REPAIR MATERIALS SHALL MATCH THE CURRENT APPEARANCE OF THE STRUCTURE. THE CONTRACTOR SHALL CONSTRUCT 4'x4' MOCK-UPS TO DEMONSTRATE THE APPEARANCE OF THE PROPOSED MATERIALS FOR APPROVAL BY TVA'S FIELD REPRESENTATIVE. ALL WORK SHALL MEET THE FULL APPROVAL OF THE FIELD REPRESENTATIVE. THE COST OF CONSTRUCTING MOCK-UPS AND OBTAINING APPROVALS WILL NOT BE PAID DIRECTLY AND SHOULD BE INCLUDED IN THE COST OF OTHER ITEMS.

31-JAN-2019 03:34
Projects\002500 - TVA_WilsonDamPhase2\DGN\02_GENERAL NOTES

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE GENERAL NOTES (1)
SHEET NO. 2

GENERAL NOTES CONT.

CONFORMITY WITH PLANS AND CONSTRUCTION TOLERANCES

1. ALL WORK PERFORMED AND MATERIALS SUPPLIED SHALL CONFORM TO THE LINES, GRADES, CROSS-SECTIONS, DIMENSIONS, AND MATERIAL REQUIREMENTS, AS SHOWN ON THE PLANS FOR CONSTRUCTION.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION SURVEYING AND FIELD MEASUREMENTS TO VERIFY CONFORMANCE WITH LINES, GRADES, CROSS-SECTIONS, DIMENSIONS, AND TOLERANCES SHOWN ON THESE PLANS FOR CONSTRUCTION. SURVEYING AND FIELD MEASUREMENTS SHALL BE PERFORMED AT APPROPRIATE TIMES THROUGHOUT CONSTRUCTION TO VERIFY PLAN CONFORMANCE AND TO PROVIDE THE NECESSARY DATA FOR PREPARATION OF RECORD DRAWINGS. THE CONTRACTOR SHALL PROVIDE AS-BUILT RECORDS OF THE CONSTRUCTED PROJECT TO THE ENGINEER UPON COMPLETION OF CONSTRUCTION. ITEMS TO BE VERIFIED AND/OR MEASURED BY SURVEYING SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:
   a. ALIGNMENT DIMENSIONS AND ELEVATIONS OF STRUCTURES AT ONE FOOT INTERVALS.
   b. OTHER ITEMS DEEMED NECESSARY BY THE CQA TEAM AND/OR CONTRACTOR TO VERIFY PLAN CONFORMANCE AND CONSTRUCTION TOLERANCES.
3. ACCEPTABLE CONSTRUCTION TOLERANCES FROM PLAN DIMENSIONS, ELEVATIONS, AND GRADES SHALL BE AS FOLLOWS:
   a. HORIZONTAL: +/- 1/8 INCH
   b. VERTICAL: +/- 1/8 INCH

QUALITY CONTROL:

1. QUALITY CONTROL REQUIREMENTS SHALL BE DETAILED IN THE QUALITY MANAGEMENT PLAN (QMP) AND CONSTRUCTION QUALTY MANAGEMENT PLAN (CQMP)
2. CERTIFICATIONS OF MATERIAL QUALITY AND CONFORMANCE TO PROJECT REQUIREMENTS SHALL BE SUBMITTED TO THE ENGINEER.

SPECIAL ENVIRONMENTAL NOTES TO CONTRACTOR:

1. CONTRACTOR SHALL USE EXTREME CARE AND TAKE ANY MEASURE NECESSARY TO ENSURE THAT NO DEBRIS IS DROPPED INTO THE RIVER BELOW. THIS SHALL BE ACCOMPLISHED BY THE USE OF BASKETS, NETTING, WRAPPING, WORK PLATFORMS, OR OTHER SIMILARLY EFFECTIVE MEANS. ANY DEBRIS WHICH IS ALLOWED TO DROP ON THE BANKS BELOW THE BRIDGE SHALL NOT BE ALLOWED TO ENTER THE WATER AND SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR. COST OF REMOVING AND DISPOSING OF DEBRIS SHALL BE INCLUDED IN OTHER ITEMS BID ON.
2. ALL CLEANING MATERIALS, SURFACTANTS, CHEMICALS, AND FINSATE WATER SHALL BE COLLECTED AND PROPERLY DISPOSED AND NOT DISCHARGED TO THE TENNESSEE RIVER. ANY PAINT SCRAPINGS AND/OR OTHER SOLID MATERIAL SHOULD ALSO BE COLLECTED AND PROPERLY DISPOSED.
3. ALL WASH, DEBRIS, AND PAINT WILL HAVE A CONTAINMENT SYSTEM IN PLACE WHILE REPAIRING THE BRIDGE. NO DUST, SPRAY, OR PANT MAY ENTER THE STREAM.
4. CONCRETE AND FUGITIVE CONCRETE DUST SHOULD BE PREVENTED FROM ENTERING THE RECEIVING WATERS BENEATH THE PROJECT AREA.
5. FRESHLY POURED CONCRETE SHALL NOT BE ALLOWED TO COME IN CONTACT WITH THE RIVER WATER.
6. ANY AREA THAT IS DISTURBED OUTSIDE LIMITS OF CONSTRUCTION DURING THE LIFE OF THIS PROJECT SHALL BE REPAIRED BY THE CONTRACTOR AT HIS EXPENSE.

SEDIMENT CONTROL:

1. TEMPORARY EPSC MEASURES MAY BE REMOVED AT THE BEGINNING OF THE WORKDAY BUT MUST BE REINSTALLED AT THE END OF THE WORKDAY OR BEFORE/DURING A PRECIPITATION EVENT.
2. THE CONTRACTOR SHALL ESTABLISH AND MAINTAIN A PROACTIVE METHOD TO PREVENT THE OFFSITE MIGRATION OR DEPOSIT OF SEDIMENT OFF THE PROJECT LIMITS (E.G. R.O.W., EASEMENTS, ETC.), INTO WATERS OF THE STATE/U.S., OR ONTO ROADWAYS USED BY THE GENERAL PUBLIC. IF SEDIMENT ESCAPES THE CONSTRUCTION SITE, OFFSITE ACCUMULATIONS OF SEDIMENT THAT HAVE NOT REACHED A STREAM MUST BE REMOVED AT A FREQUENCY SUFFICIENT TO MINIMIZE OFFSITE IMPACTS (E.G., FUGITIVE SEDIMENT THAT HAS ESCAPED THE CONSTRUCTION SITE AND HAS COLLECTED IN A STREET MUST BE REMOVED SO THAT IT IS NOT SUBSEQUENTLY WASHED INTO STORM SEWERS AND STREAMS BY THE NEXT RAIN AND/OR SO THAT IT DOES NOT POSE A SAFETY HAZARD TO USERS OF PUBLIC STREETS). ARRANGEMENTS CONCERNING REMOVAL OF SEDIMENT ON ADJOINING PROPERTY MUST BE NEGOTIATED WITH THE ADJOINING PROPERTY OWNER BEFORE REMOVAL OF SEDIMENT.
3. OFFSITE VEHICLE TRACKING OF SEDIMENTS AND THE GENERATION OF DUST SHALL BE MINIMIZED. A STABILIZED CONSTRUCTION EXIT (A POINT OF ENTRANCE/EXIT TO THE CONSTRUCTION PROJECT) SHALL BE PROVIDED TO REDUCE THE TRACKING OF MUD AND DIRT ONTO PUBLIC ROADS BY CONSTRUCTION VEHICLES.

GOOD HOUSEKEEPING MEASURES & WASTE DISPOSAL

1. THE CONTRACTOR SHALL ESTABLISH AND MAINTAIN A PROACTIVE METHOD TO PREVENT LITTER AND CONSTRUCTION WATERS FROM ENTERING WATERS OF THE TENNESSEE RIVER. THESE MATERIALS SHALL BE REMOVED FROM STORMWATER EXPOSURE PRIOR TO ANTICIPATED STORM EVENTS OR BEFORE BEING CARRIED OFFSITE BY WIND, OR OTHERWISE PREVENTED FROM BECOMING A POLLUTANT SOURCE FOR STORMWATER DISCHARGES. AFTER USE, MATERIALS USED FOR ESPC SHALL BE REMOVED FROM THE SITE.
2. THE CONTRACTOR SHALL TAKE APPROPRIATE STEPS TO ENSURE THAT PETROLEUM PRODUCTS OR OTHER CHEMICAL POLLUTANTS ARE PREVENTED FROM ENTERING WATERS OF THE STATE/U.S. ALL EQUIPMENT REFUELING, SERVICING, MACHINERY, AND STAGING AREAS SHALL COMPLY WITH ALL LOCAL, STATE, FEDERAL, AND TVA LAWS, RULES, REGULATIONS, AND ORDINANCES, INCLUDING THOSE OF THE NATIONAL FIRE PROTECTION ASSOCIATION. APPROPRIATE CONTAINMENT MEASURES FOR THESE AREAS SHALL BE USED.
3. CONTRACTORS SHALL PROVIDE DESIGNATED TRUCK WASHOUT AREAS ON THE SITE. THESE AREAS MUST BE SELF CONTAINED, NOT CONNECTED TO ANY STORMWATER OUTLET OF THE SITE, AND PROPERLY SIGNED. WASH DOWN OR WASTE DISCHARGE OF CONCRETE TRUCKS SHALL NOT BE PERMITTED ONSITE UNLESS PROPER SETTLEMENT AREAS HAVE BEEN PROVIDED IN ACCORDANCE WITH BOTH LOCAL, STATE, FEDERAL, AND TVA REGULATIONS.
4. WHEEL WASH WATER SHALL BE COLLECTED AND ALLOWED TO SETTLE OUT SUSPENDED SOLIDS PRIOR TO DISCHARGE. WHEEL WASH WATER SHALL NOT BE DISCHARGED DIRECTLY INTO ANY STORMWATER SYSTEM OR STORMWATER TREATMENT SYSTEM.
5. PORTABLE SANITARY FACILITIES SHALL BE PROVIDED ONSITE BY THE CONTRACTOR. SANITARY WASTE SHALL BE COLLECTED FROM THE PORTABLE UNITS IN A TIMELY MANNER BY A LICENSED WASTE MANAGEMENT CONTRACTOR OR AS REQUIRED BY ANY REGULATIONS. THE CONTRACTOR SHALL OBTAIN ANY AND ALL NECESSARY PERMITS TO DISPOSE OF SANITARY WASTE.
6. ONLY CONSTRUCTION PRODUCTS NEEDED SHALL BE STORED ONSITE BY THE CONTRACTOR. THE CONTRACTOR SHALL STORE ALL MATERIALS UNDER COVER AND IN APPROPRIATE CONTAINERS. PRODUCTS MUST BE STORED IN ORIGINAL CONTAINERS AND LABELED. MATERIAL MIXING SHALL BE CONDUCTED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR'S RESPONSIBLE PARTY SHALL INSPECT MATERIAL STORAGE AREAS REGULARLY TO ENSURE PROPER USE AND DISPOSAL.
7. WHEN POSSIBLE, ALL PRODUCTS SHALL BE USED COMPLETELY BEFORE PROPERLY DISPOSING OF THE CONTAINER OFFSITE. THE MANUFACTURER'S DIRECTIONS FOR DISPOSAL OF MATERIALS AND CONTAINERS SHALL BE FOLLOWED.
8. ALL HAZARDOUS WASTE MATERIALS SHALL BE DISPOSED OF IN A MANNER WHICH IS COMPLIANT WITH LOCAL, STATE, FEDERAL, OR TVA REGULATIONS. SITE PERSONNEL SHALL BE INSTRUCTED IN THESE PRACTICES, AND THE INDIVIDUAL DESIGNATED AS THE CONTRACTOR'S RESPONSIBLE PARTY SHALL BE RESPONSIBLE FOR SEEING THAT THESE PRACTICES ARE FOLLOWED. THE CONTRACTOR SHALL OBTAIN ANY AND ALL NECESSARY PERMITS TO DISPOSE OF HAZARDOUS MATERIAL.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE GENERAL NOTES (2)
SHEET NO. 2A

31-JAN-2019 03:34
Projects\002500 - TVA_WilsonDamPhase2\DGN\02A_GENERAL NOTES 2

ESTIMATED QUANTITIES

	ITEM NO.	UNIT	DESCRIPTION	TOTAL
(1)	206C001	SQ YD	REMOVING CONCRETE PAVEMENT	5,950
(2)	206C012	SQ YD	REMOVING BRIDGE DECK (PARTIAL ONLY)	961
(3)	502A001	LB	STEEL REINFORCEMENT (GRADE 60)	74,370
(4)	510B001	CU YD	BRIDGE DECK CONCRETE	1,530
(5)	520A100	CU YD	REPAIRS TO EXISTING BRIDGE (PMC OVERLAY)	40
(6)	520A101	SQ YD	REPAIRS TO EXISTING BRIDGE (FULL DEPTH DECK REPAIR)	120
(7)	520A102	LF	REPAIRS TO EXISTING BRIDGE (BRIDGE JOINT SEALING)	5,020
(8)	520A103	SQ FT	REPAIRS TO EXISTING BRIDGE (UNREINFORCED CONCRETE REPAIR AREAS)	3,900
(9)	520A104	SQ FT	REPAIRS TO EXISTING BRIDGE (REINFORCED CONCRETE REPAIR AREAS)	510
(10)	520A105	LS	REPAIRS TO EXISTING BRIDGE (REMOVE AND RESET SIGN)	1
(11)	520A106	LS	REPAIRS TO EXISTING BRIDGE (DRAIN REPAIRS)	1
(12)	520A107	LS	REPAIRS TO EXISTING BRIDGE (TEMPORARY WORK PLATFORM)	1
(13)	520A108	LF	REPAIRS TO EXISTING BRIDGE (CURB IRON REPAIR)	75
(14)	522A000	LF	BRIDGE JOINT SEAL (TYPE "A")	1,060
(14)	522B000	LF	BRIDGE JOINT SEAL (TYPE "B")	45
(14)	522H000	LF	REPLACEMENT OF EXISTING BRIDGE JOINT SEAL	199
(15)	600A000	LS	MOBILIZATION	1
(16)	603A000	EACH	FURNISHING FIELD OFFICE	1
(17)	701A230	MILE	SOLID YELLOW, CLASS 2, TYPE A TRAFFIC STRIPE (5" WIDE)	2
(18)	740B000	SQ FT	CONSTRUCTION SIGNS	50

FOOTNOTES:

(1) INCLUDES ALL COSTS FOR REMOVAL AND DISPOSAL OF BRIDGE DECK CONCRETE FROM MAIN SPANS AND HYDRODEMOLITION REMOVAL OF DETERIORATED MATERIAL BETWEEN ORIGINAL ARCH CONCRETE AND EXISTING BRIDGE DECK.

(2) INCLUDES ALL COSTS FOR HYDRODEMOLITION OF APPROACH SPANS.

(3) INCLUDES ALL COSTS FOR PLACEMENT OF REINFORCEMENT IN NEW BRIDGE DECK. ALL BARS SHALL BE EPOXY COATED.

(4) INCLUDES ALL COSTS FOR PLACEMENT OF NEW BRIDGE DECK CONCRETE. CONCRETE SHALL MEET THE REQUIREMENTS OF TECHNICAL SPECIFICATION 1.

(5) INCLUDES ALL COSTS FOR PLACEMENT OF NEW POLYMER MODIFIED CONCRETE (PMC) OVERLAY IN APPROACH SPANS.

(6) INCLUDES ALL COSTS FOR REMOVAL AND REPLACEMENT OF BRIDGE DECK CONCRETE IN APPROACH SPANS.

(7) INCLUDES ALL COSTS FOR PLACEMENT OF A HIGH MOLECULAR WEIGHT METHACRYLATE JOINT SEALANT ALONG CONSTRUCTION JOINT BETWEEN NEW BRIDGE DECK OR PMC OVERLAY AND EXISTING CURBS.

(8) INCLUDES COSTS OF REMOVAL AND DISPOSAL OF DETERIORATED CONCRETE, PROVIDING AND INSTALLING CONCRETE ANCHORS, PROVIDING AND INSTALLING WELDED WIRE REINFORCEMENT, AND PLACEMENT OF NEW CONCRETE IN ARCH AND SIDEWALK REPAIR AREAS.

(9) INCLUDES COSTS OF REMOVAL, DISPOSAL, AND REPLACEMENT OF CONCRETE IN REINFORCED CONCRETE REPAIR AREAS. ALSO INCLUDES THE COSTS OF CLEANING EXISTING REINFORCING STEEL.

(10) INCLUDES ALL COSTS FOR TEMPORARY REMOVAL AND REPLACEMENT OF WARNING SIGNS AND LIGHTS IN AREAS IN CONFLICT WITH ARCH REPAIR AREAS AS SHOWN ON SHEET 18.

(11) INCLUDES ALL COSTS FOR THE REATTACHMENT OF DRAIN PIPE AS SHOWN ON SHEET 20.

(12) INCLUDES ALL COSTS FOR DESIGNING, ERECTING, MAINTAINING, AND REMOVAL OF TEMPORARY WORK PLATFORM(S) DEEMED NECESSARY BY THE CONTRACTOR TO COMPLETE THE WORK. SHOP DRAWINGS FOR WORK PLATFORMS SHALL BE PREPARED BY A PROFESSIONAL ENGINEER AND REVIEWED BY THE ENGINEER PRIOR TO INSTALLATION. ALL WORK PLATFORMS SHALL MEET THE FULL SATISFACTION OF THE ENGINEER AND THE TVA CONSTRUCTION MANAGER.

(13) INCLUDES ALL COSTS FOR CONCRETE REMOVAL, STEEL REMOVAL, CONCRETE PLACEMENT, AND NEW CURB IRON PLACEMENT AS SHOWN ON SHEET 15.

(14) INCLUDES ALL COSTS FOR REMOVAL AND REPLACEMENT OF EXISTING JOINTS AS DEPICTED IN THE PLANS.

(15) INCLUDES ALL MOBILIZATION COSTS AS DESCRIBED IN THE GENERAL NOTES.

(16) INCLUDES ALL COSTS FOR PROVIDING, MAINTAINING, AND REMOVING CONTRACTOR'S FIELD OFFICE AT THE SITE. SHALL ALSO INCLUDE ALL COSTS FOR TEMPORARY SANITARY FACILITIES AND HOUSEKEEPING MEASURES AT THE SITE. CONTRACTOR SHALL SUBMIT FIELD OFFICE SPECIFICATIONS TO TVA FOR APPROVAL.

(17) INCLUDES ALL COSTS FOR PLACEMENT OF NEW DOUBLE YELLOW LINE ALONG CENTERLINE OF BRIDGE IN REPAIR AREAS.

(18) INCLUDES ALL COSTS FOR PLACING, MAINTAINING, AND REMOVING TEMPORARY CONSTRUCTION SIGNS.

ESTIMATED ARCH REPAIR QUANTITIES

ARCH NUMBER	TOTAL, SF	ARCH NUMBER	TOTAL, SF
ARCH NO. 0	40	ARCH NO. 40	37
ARCH NO. 1	61	ARCH NO. 41	57
ARCH NO. 2	72	ARCH NO. 42	58
ARCH NO. 3	68	ARCH NO. 43	72
ARCH NO. 4	50	ARCH NO. 44	53
ARCH NO. 5	60	ARCH NO. 45	53
ARCH NO. 6	38	ARCH NO. 46	58
ARCH NO. 7	28	ARCH NO. 47	48
ARCH NO. 8	18	ARCH NO. 48	80
ARCH NO. 9	14	ARCH NO. 49	70
ARCH NO. 10	48	ARCH NO. 50	76
ARCH NO. 11	38	ARCH NO. 51	93
ARCH NO. 12	44	ARCH NO. 52	52
ARCH NO. 13	65	ARCH NO. 53	93
ARCH NO. 14	18	ARCH NO. 54	126
ARCH NO. 15	63	ARCH NO. 55	10
ARCH NO. 16	26	ARCH NO. 56	11
ARCH NO. 17	53	ARCH NO. 57	127
ARCH NO. 18	34	ARCH NO. 58	56
ARCH NO. 19	66	ARCH NO. 59	56
ARCH NO. 20	0	ARCH NO. 60	56
ARCH NO. 21	16	ARCH NO. 61	56
ARCH NO. 22	76	ARCH NO. 62	56
ARCH NO. 23	65	ARCH NO. 63	56
ARCH NO. 24	66	ARCH NO. 64	56
ARCH NO. 25	54	ARCH NO. 65	56
ARCH NO. 26	55	ARCH NO. 66	56
ARCH NO. 27	91	ARCH NO. 67	56
ARCH NO. 28	72	ARCH NO. 68	56
ARCH NO. 29	79	ARCH NO. 69	56
ARCH NO. 30	53	ARCH NO. 70	56
ARCH NO. 31	78	ARCH NO. 71	56
ARCH NO. 32	83	ARCH NO. 72	56
ARCH NO. 33	62	ARCH NO. 73	56
ARCH NO. 34	50	ARCH NO. 74	56
ARCH NO. 35	74	ARCH NO. 75	56
ARCH NO. 36	48	ARCH NO. 76	56
ARCH NO. 37	50	ARCH NO. 77	56
ARCH NO. 38	28	ARCH NO. 78	56
ARCH NO. 39	59		

NOTE: ARCH REPAIR QUANTITIES FOR ARCH NOS. 0-58 ARE BASED ON MEASUREMENTS TAKEN FROM AUGUST 2018 INSPECTION. QUANTITIES FOR ARCH NOS. 59-78 ARE ESTIMATES.

TVA

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DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE ESTIMATED QUANTITIES
SHEET NO. 3

31-JAN-2019 03:33
Projects\012500 - TVA_WilsonDamPhase2\DGN\03_EST QUANTITIES

N

NOTES:

THE CONTRACTOR SHALL DEMONSTRATE PROPER HOUSEKEEPING MEASURES AT ALL TIMES WITHIN THE STAGING AREA.

ANY DAMAGE TO THE AREA AS A RESULT OF THE CONTRACTOR'S ACTIONS SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE.

AT THE CONCLUSION OF CONSTRUCTION, THE AREA SHALL BE RETURNED TO ITS PRECONSTRUCTION CONDITION TO THE SATISFACTION OF THE ENGINEER. IT IS RECOMMENDED THAT A PRECONSTRUCTION SITE INSPECTION BE PERFORMED INCLUDING PHOTO LOGS OF THE AREA. ALL COSTS FOR STAGING AREA RESTORATION TO PRECONSTRUCTION CONDITION WILL BE CONSIDERED INCIDENTAL TO THE WORK AND WILL NOT BE PAID DIRECTLY.

THE CONTRACTOR SHALL, AT ALL TIMES, PROVIDE AND KEEP UPDATED CONTACT INFORMATION FOR THEIR ONSITE REPRESENTATIVE WITH THE ENGINEER, PLANT MANAGER, AND LOCK MASTER.

THE CONTRACTOR SHALL ABIDE BY ALL SECURITY REQUIREMENTS DICTATED BY TVA.

THE CONTRACTOR SHALL COORDINATE GATE ACCESS WITH TVA PLANT MANAGEMENT.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

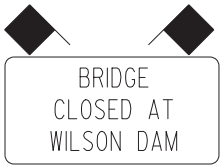
VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE STAGING AREA
SHEET NO. 4

31-JAN-2019 03:33
Projects\1012500 - TVA_WilsonDamPhase2\DGN\04_STAGING AREA

BRIDGE CLOSURE SIGN LOCATIONS - AREA 1

BRIDGE CLOSURE SIGN LOCATIONS - AREA 2



MUTCD NO.: SPEC
60" × 30"
(1)

NOTES:

BRIDGE WILL BE CLOSED DURING CONSTRUCTION. EXISTING GATES WILL BE USED TO CLOSE STRUCTURE TO TRAFFIC.

CLOSURE SIGNS SHALL NOT BE DISPLAYED MORE THAN FORTY-EIGHT (48) HOURS BEFORE PHYSICAL CONSTRUCTION BEGINS. SIGN MAY BE ERECTED UP TO ONE WEEK BEFORE NEEDED, IF THE SIGN FACE IS FULLY COVERED.

ALL SIGNS SHALL BE IN STRICT ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

CLOSURE SIGNS SHALL REMAIN IN PLACE UNTIL THE COMPLETION OF THE PROJECT.

THE LOCATION OF THE CLOSURE SIGNS ARE TO BE APPROVED BY TVA PRIOR TO INSTALLATION.

A TOTAL OF FOUR (4) SIGNS ARE REQUIRED. ADDITIONAL MAY BE REQUESTED BY TVA.

SIGNS INCLUDING ALL SUPPORTS SHALL BE PAID UNDER ITEM NO. 740B000.

CONTRACTOR SHALL COORDINATE AND COMMUNICATE BRIDGE CLOSURE WITH ALDOT, LOCAL GOVERNMENT PERSONNEL, AND LOCAL EMERGENCY MANAGEMENT AS NECESSARY.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

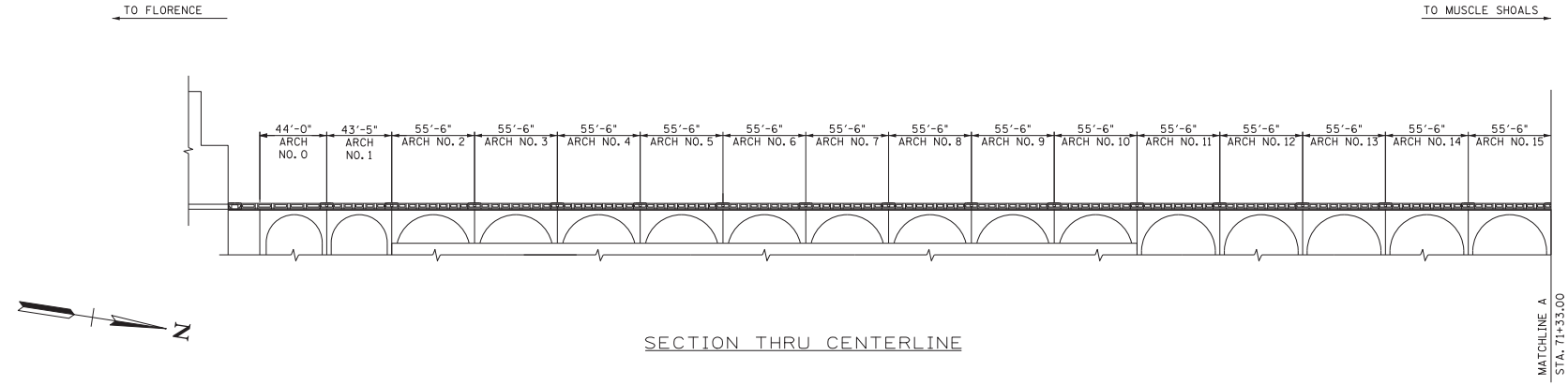
NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

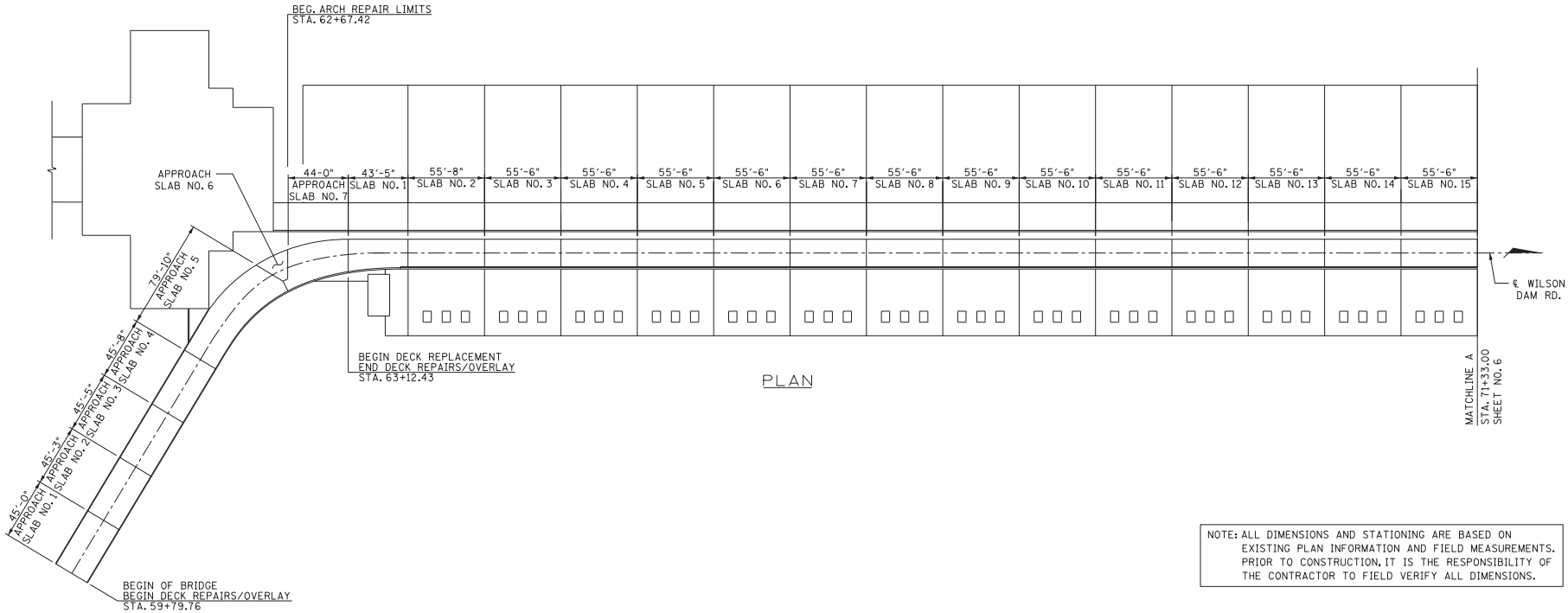
VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE TRAFFIC CONTROL
SHEET NO. 4A

31-JAN-2019 03:33
Projects\012500 - TVA_WilsonDamPhase2\DGN\044_SIGN LOCATIONS



SECTION THRU CENTERLINE



PLAN

NOTE: ALL DIMENSIONS AND STATIONING ARE BASED ON EXISTING PLAN INFORMATION AND FIELD MEASUREMENTS. PRIOR TO CONSTRUCTION, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

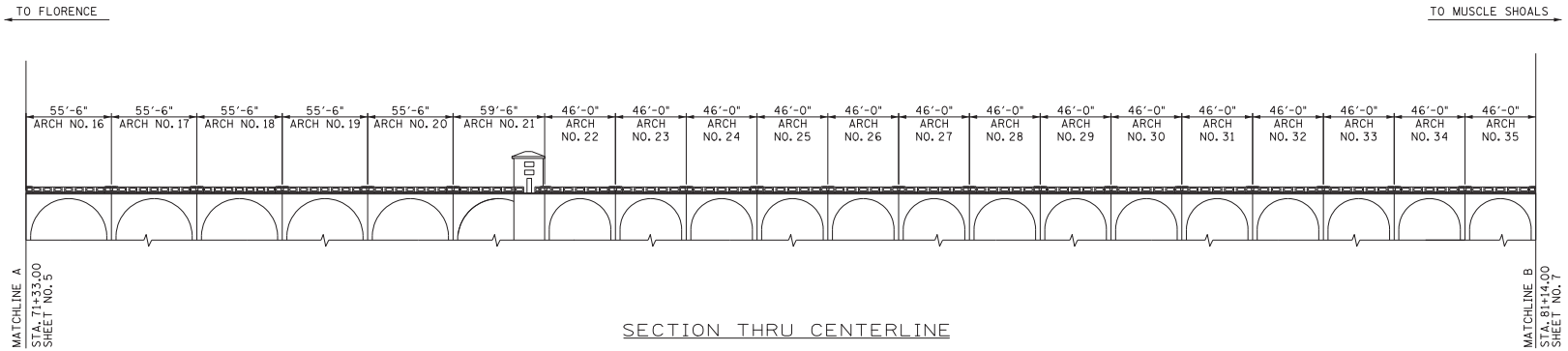
NO.	REVISION	DATE	SIG.

SCALE 1" = 40'
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE LAYOUT (1)
SHEET NO. 5

31-JAN-2019 03:33
Projects\002500 - TVA_WilsonDamPhase2\DGN\05_LAYOUT1



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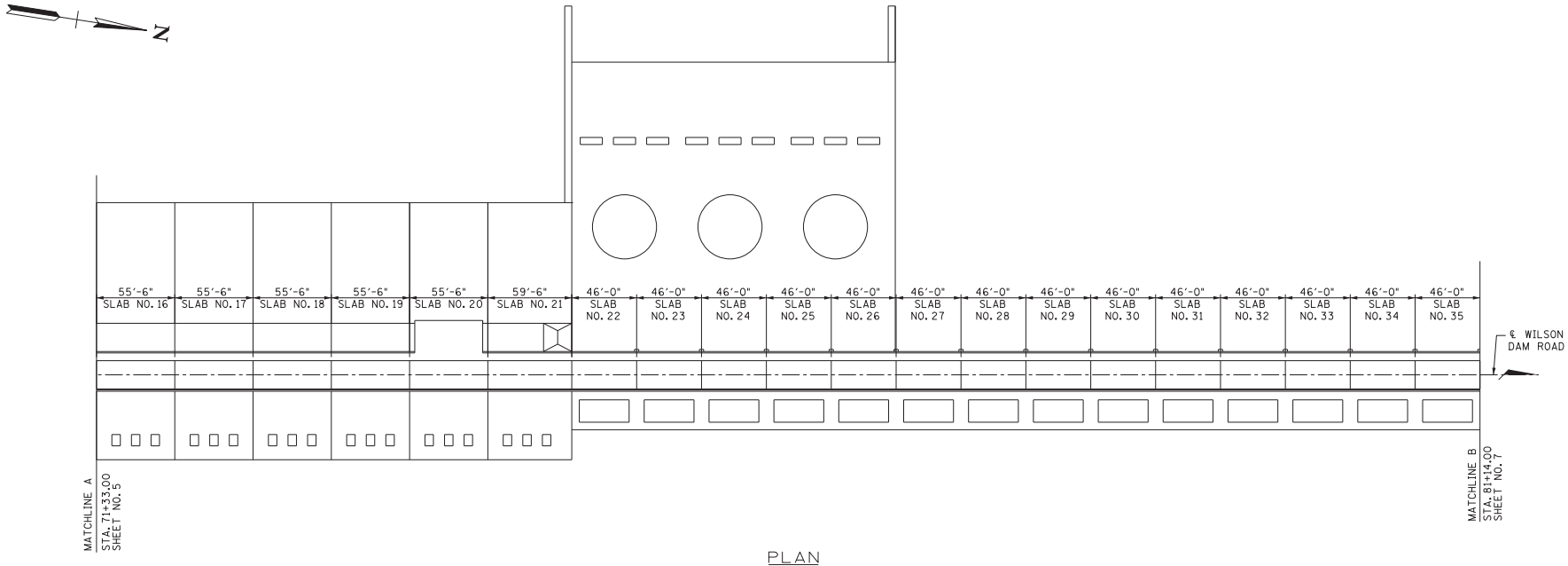


PLAN

NOTE: ALL DIMENSIONS AND STATIONING ARE BASED ON EXISTING PLAN INFORMATION AND FIELD MEASUREMENTS. PRIOR TO CONSTRUCTION, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

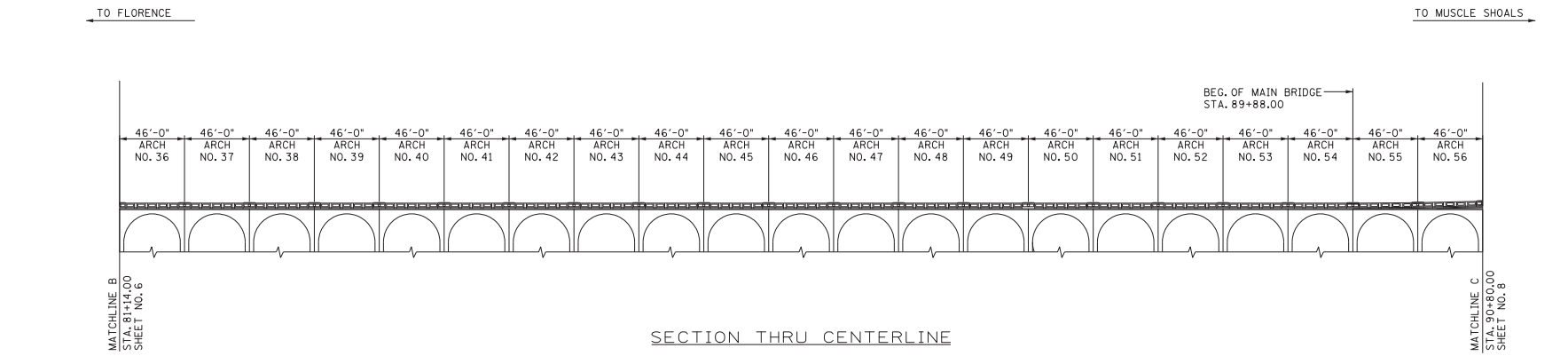
NO.	REVISION	DATE	SIG.

SCALE 1" = 40'
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE LAYOUT (2)
SHEET NO. 6

31-JAN-2019 03:33
Projects\1012500 - TVA_WilsonDamPhase2\DGN\06_LAYOUT2



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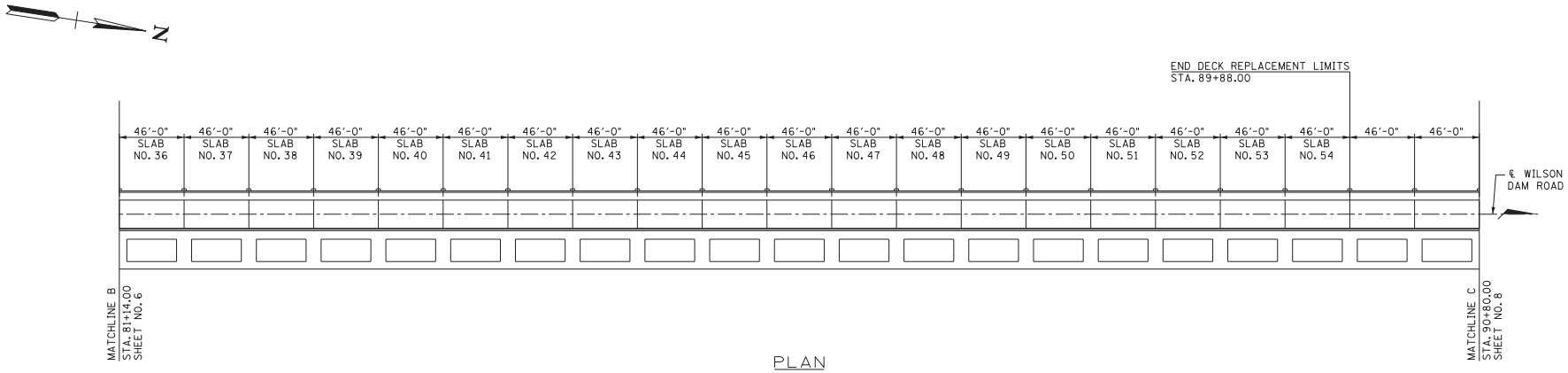


PLAN

NOTE: ALL DIMENSIONS AND STATIONING ARE BASED ON EXISTING PLAN INFORMATION AND FIELD MEASUREMENTS. PRIOR TO CONSTRUCTION, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

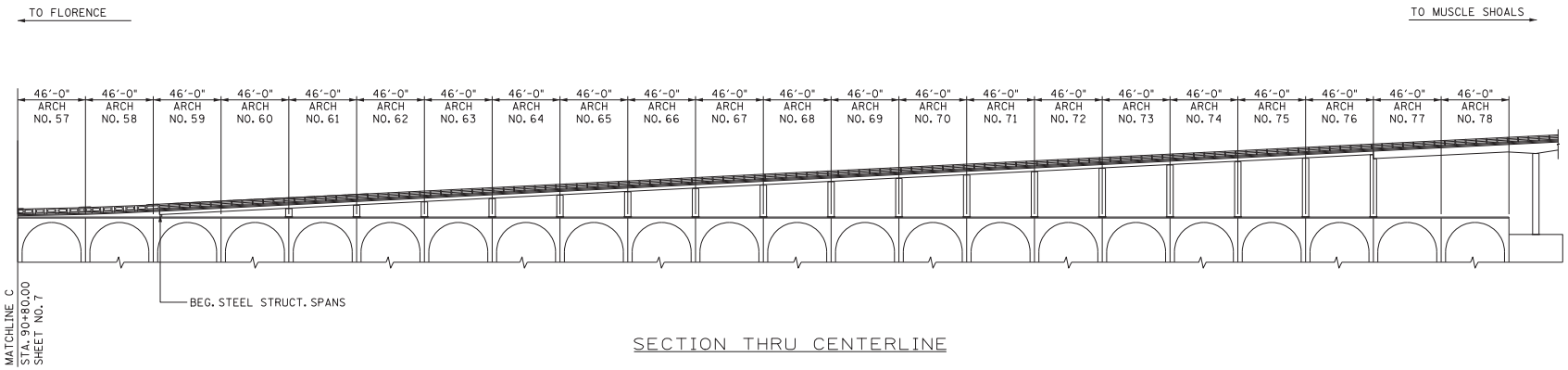
NO.	REVISION	DATE	SIG.

SCALE	1" = 40'
DRAWN	A. ALLSBROOK
DESIGN	A. ALLSBROOK
CHECKED	J. ECKEL

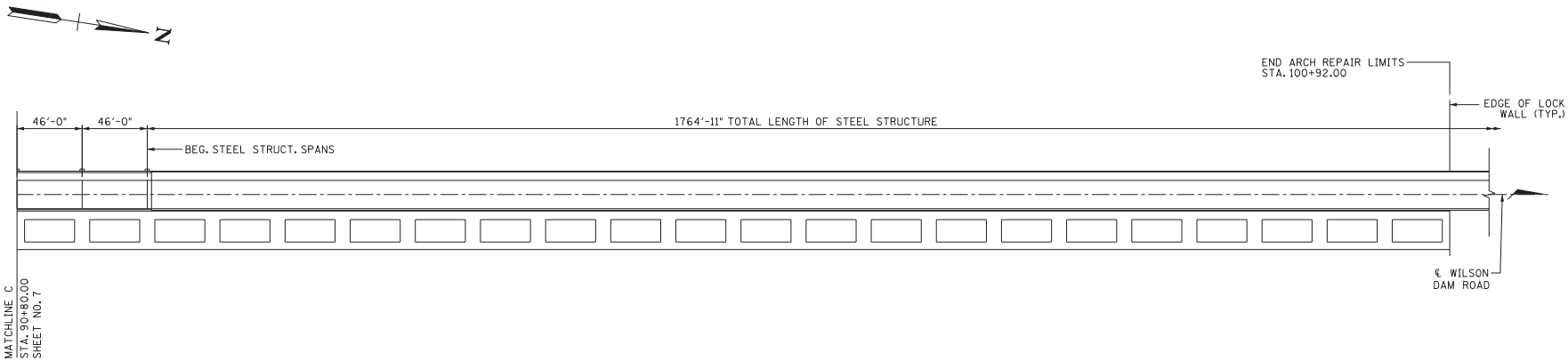
VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE LAYOUT (3)
SHEET NO. 7

31-JAN-2019 03:33
Projects\1012500 - TVA_WilsonDamPhase2\DGN\07_LAYOUT3



SECTION THRU CENTERLINE



PLAN

NOTE: ALL DIMENSIONS AND STATIONING ARE BASED ON EXISTING PLAN INFORMATION AND FIELD MEASUREMENTS. PRIOR TO CONSTRUCTION, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

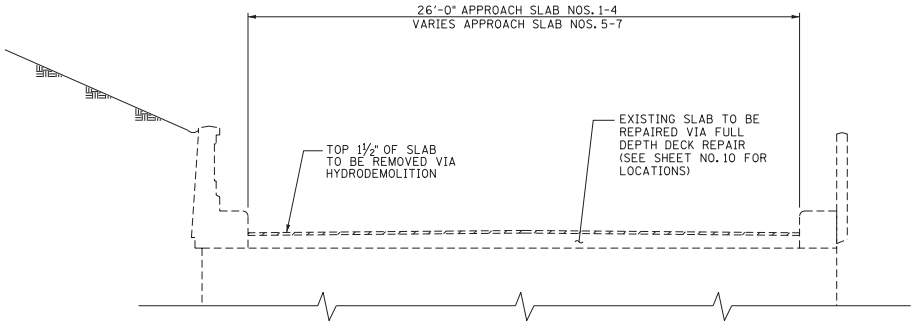
NO.	REVISION	DATE	SIG.

SCALE 1" = 40'
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

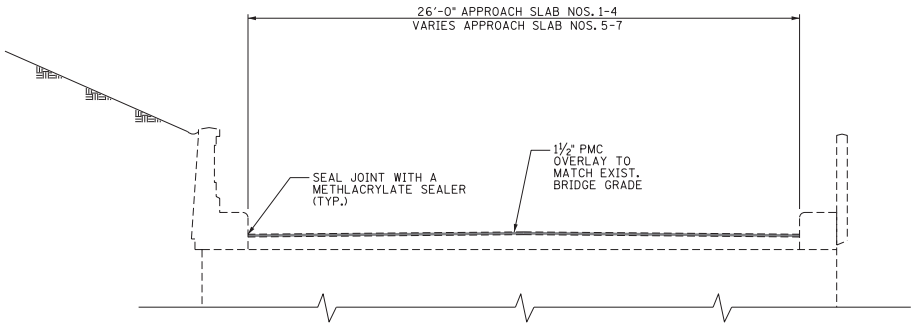
JOB NO. 1012500.17
DATE 11-30-2018
TITLE LAYOUT (4)
SHEET NO. 8

31-JAN-2019 03:33
Projects\012500 - TVA_WilsonDamPhase2\DGN\08_LAYOUT4



TYPCIAL SECTION - HYDRO REMOVAL

(SHOWING APPROACH SLAB NOS. 1-4, APPROACH SLAB NOS. 5-7 SIMILAR)



TYPCIAL SECTION - PMC PLACEMENT

(SHOWING APPROACH SLAB NOS. 1-4, APPROACH SLAB NOS. 5-7 SIMILAR)

SEQUENCE OF CONSTRUCTION NOTES:

APPROACH SLAB NOS. 1 THRU 7 SHALL RECEIVE HYDRODEMOLITION AS DESCRIBED BELOW. THE AREA SHALL BE SCARIFIED 1½" MINIMUM AND HAVE FULL DEPTH DETERIORATED CONCRETE REMOVED USING HYDRODEMOLITION. AFTER HYDRODEMOLITION, THE ENGINEER WILL INSPECT AND MARK ADDITIONAL AREAS TO BE REMOVED.

ALL COSTS ASSOCIATED WITH HYDRODEMOLITION, INCLUDING ALL MATERIAL AND LABOR NECESSARY TO REMOVE AND DISPOSE OF ALL CONCRETE AND OTHER DEBRIS, VACUUMING, SHIELDING, CONTAINMENT, FILTRATION OF WASTEWATER, ADDITIONAL JACKHAMMERING, PROTECTIVE BARRIER, AND ALL OTHER ASPECTS OF WORK NECESSARY TO REMOVE THE TOP 1½" MINIMUM OF THE BRIDGE DECK BY HYDRODEMOLITION SHALL BE INCLUDED UNDER ITEM NO. 206C012.

AFTER HYDRODEMOLITION, PRESSURE WASHING OF 10,000 P.S.I. MIN. AND VACUUMING OF THE HYDRODEMOLISHED SURFACES SHALL BE DONE PRIOR TO PLACEMENT OF THE NEW PMC OVERLAY TO ENSURE A DECK FREE OF ANY LOOSE MATERIAL. THE SURFACES SHALL MEET WITH THE APPROVAL OF THE ENGINEER BEFORE PLACEMENT OF THE PMC IS ALLOWED.

THE NEW 1½" PMC OVERLAY SHALL MATCH THE ORIGINAL BRIDGE DECK ELEVATION, AND SHALL BE PAID FOR UNDER ITEM NO. 520A100.

THE COST OF THE METHACRYLATE SEALANT TO BE PAID UNDER ITEM NO. 520A102.

FOR FULL DEPTH DECK REPAIR AREAS AND REPAIR DETAIL, SEE SHEET NO. 10.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

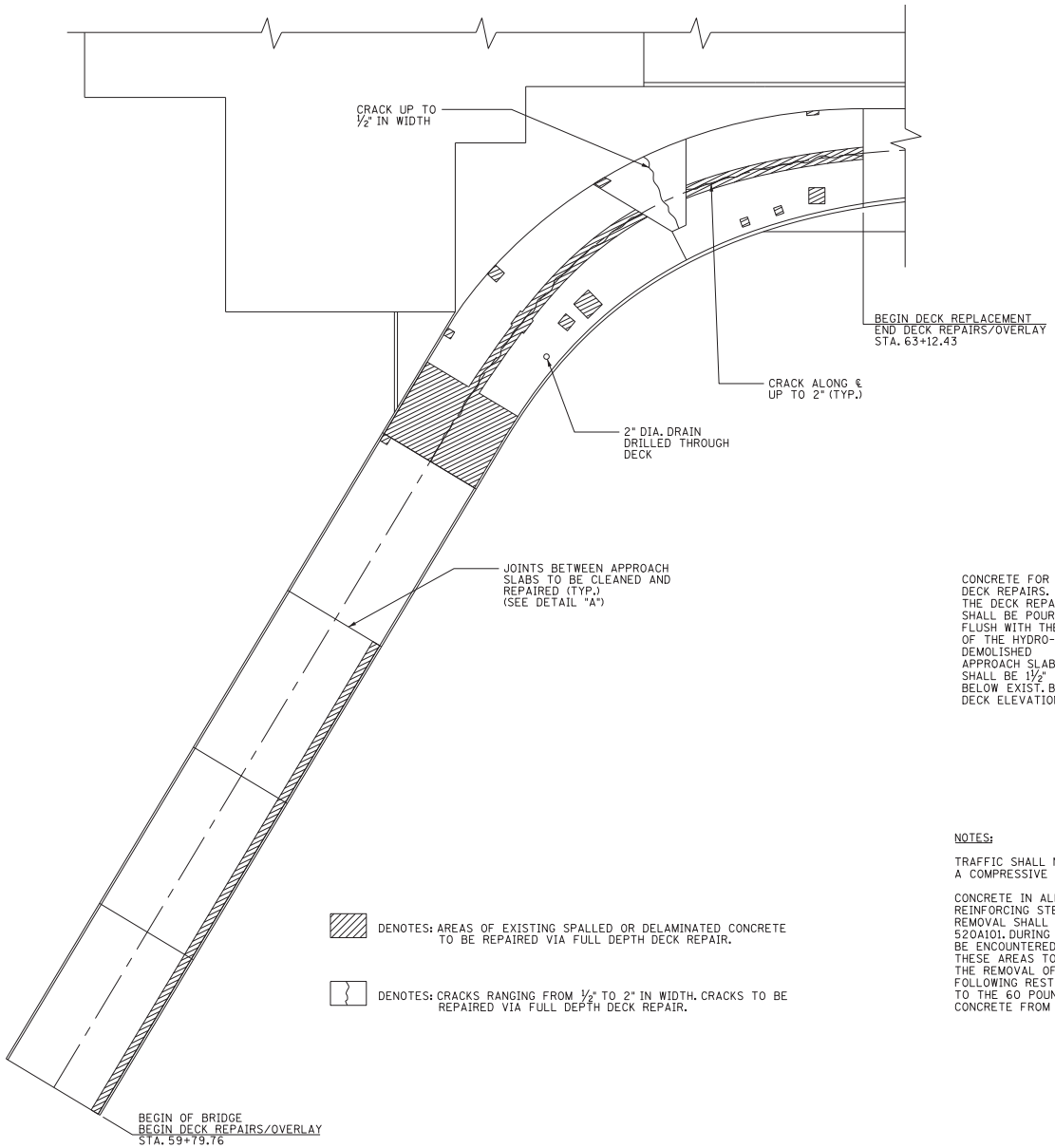
NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

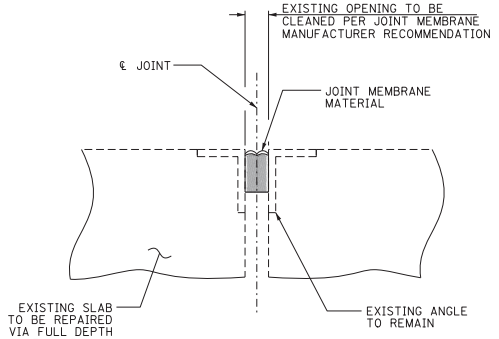
VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE DECK REPAIR TYPICAL SECTION
SHEET NO. 9

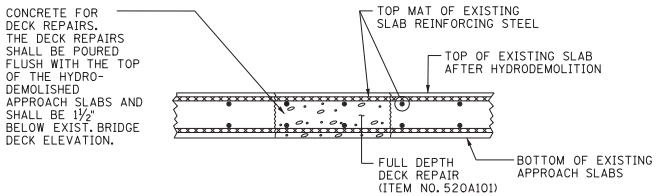
31-JAN-2019 03:34
Projects\102500 - TVA_WilsonDamPhase2\DGN\09_DECK REPAIR



PLAN SHOWING APPROACH SLABS



DETAIL "A"
(ITEM NO. 522H000)



DETAIL SHOWING FULL DEPTH DECK REPAIR

NOTES:

TRAFFIC SHALL NOT BE PERMITTED ON ANY REPAIR AREA UNTIL TEST SPECIMENS ATTAIN A COMPRESSIVE STRENGTH OF 3,000 PSI MINIMUM.

CONCRETE IN ALL DELAMINATED OR MARKED AREAS SHALL BE REMOVED TO COMPLETE SLAB DEPTH. ALL REINFORCING STEEL IN AREAS OF DECK REPAIR SHALL BE COMPLETELY CLEANED. AREAS OF CONCRETE REMOVAL SHALL BE DESIGNATED BY THE ENGINEER. DECK REPAIR WILL BE PAID FOR UNDER ITEM NO. 520A101. DURING TOP 1½" OF SLAB REMOVAL VIA HYDRODEMOLITION, SHOULD DETERIORATED CONCRETE BE ENCOUNTERED WHICH APPEARS TO RUN FULL DEPTH IN THE SLAB, THE ENGINEER MAY DESIGNATE THESE AREAS TO BE REPAIRED VIA FULL DEPTH DECK REPAIR. POWER DRIVEN HAND TOOLS USED FOR THE REMOVAL OF UNSOUND CONCRETE IN MAKING FULL DEPTH REPAIR AREAS ARE SUBJECT TO THE FOLLOWING RESTRICTIONS: 1) PNEUMATIC HAMMERS FOR FULL DEPTH REPAIR AREAS SHALL BE RESTRICTED TO THE 60 POUND CLASS. 2) CHIPPING HAMMERS OF THE 15 POUND CLASS SHALL BE USED TO REMOVE CONCRETE FROM BENEATH ANY REINFORCING STEEL.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

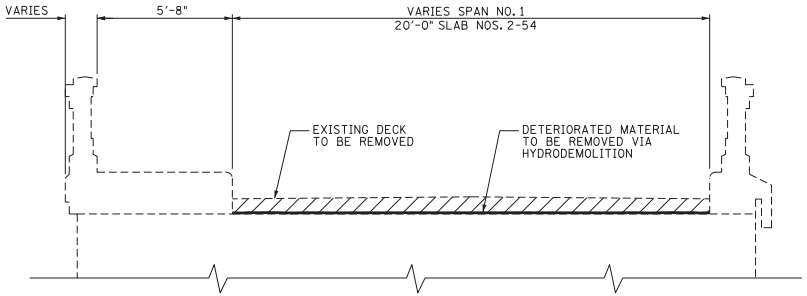
NO.	REVISION	DATE	SIG.

SCALE	N.T.S.
DRAWN	A. ALLSBROOK
DESIGN	A. ALLSBROOK
CHECKED	J. ECKEL

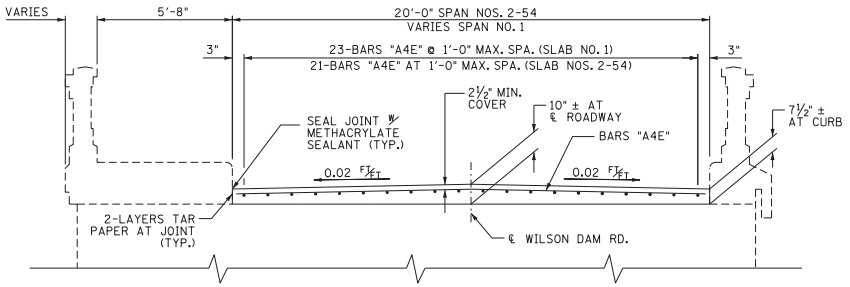
VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE DECK REPAIR DETAILS
SHEET NO. 10

31-JAN-2019 03:34
Projects\102500 - TVA_WilsonDamPhase2\DGN\0_DECK REPAIR



TYPCIAL SECTION - DECK REMOVAL



TYPICAL SECTION - DECK REPLACEMENT

NOTES:

PRIOR TO REMOVAL OF ANY PORTION OF THE CONCRETE DECK, CONTRACTOR SHALL MARK ALL EXISITNG CONDUITS, LIGHT FIXTURES, AND ANY OTHER UTILITES THAT WILL BE ENCOUNTERED DURING DECK REMOVAL AND REPLACEMENT, CURB AND SIDEWALK REPAIR, AND RAIL REPAIR PROCESS. IN ADDITION, CONTRACTOR SHALL COORDINATE WITH TVA TO MOVE CONDUIT OR UTILITIES AS NEEDED TO COMPLETE WORK.

CONTRACTOR SHALL TAKE SPECIAL CARE WHEN REMOVING EXISTING CONCRETE DECK TO PRESERVE EXISTING CONCRETE CURB ON BOTH SIDES OF THE SLAB. THE CONTRACTOR SHALL VERIFY WITH TVA CONDUIT LOCATIONS IN THE AREAS OF CONCRETE CURB REMOVAL AND REPLACEMENT.

AFTER REMOVAL OF THE EXISTING CONCRETE SLAB, THE LAYER OF THE FILL MATERIAL SHALL BE REMOVED VIA HYDRODEMOLTION.

AFTER THE HYDRODEMOLITION OPERATION IS COMPLETED, THE ENGINEER WILL DETERMINE IF THE EXPOSED ARCH CONCRETE AND CONCRETE CURB JOINT IS SUFFICIENTLY CLEANED OR IF ADDITIONAL BLASTING IS REQUIRED. ALL LOOSE MATERIAL SHALL BE REMOVED FROM THE DECK PRIOR TO POURING CONCRETE. AREAS OF THE DECK, NOT ACCESSIBLE OR OTHERWISE ADAPTABLE TO HYDRODEMOLITION, SHALL BE REMOVED BY CONVENTIONAL POWER CHIPPING OR HAND TOOLS. PNEUMATIC HAMMERS HEAVIER THAN THE 30 POUND CLASS SHALL NOT BE USED.

PRIOR TO PLACEMENT OF NEW SLAB, CONTRACTOR SHALL PLACE 2-LAYERS OF TAR PAPER BETWEEN THE CURB AND NEW SLAB CONCRETE. THE LONGITUDINAL JOINT BETWEEN THE DECK AND CURB SHALL BE SEALED WITH A METHACRYLATE SEALANT ALONG THE ENTIRE LENGTH OF THE BRIDGE AFTER THE NEW SLAB CONCRETE HAS BEEN CURED.

THE COST OF THE METHACRYLATE SEALANT TO BE PAID UNDER ITEM NO. 520A102.

THE CONTRACTOR SHALL TAKE PRECAUTIONS (PLUGGING DRAINS, PLUGGING EXISTING JOINTS, ETC.) TO ENSURE HYDRODEMOLITION WASTEWATER DOES NOT ENTER THE TENNESSEE RIVER.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

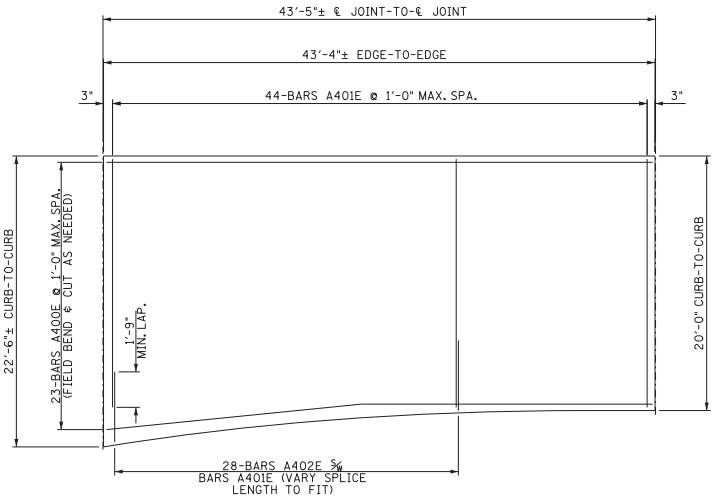
NO.	REVISION	DATE	SIG.

SCALE N.T.S
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

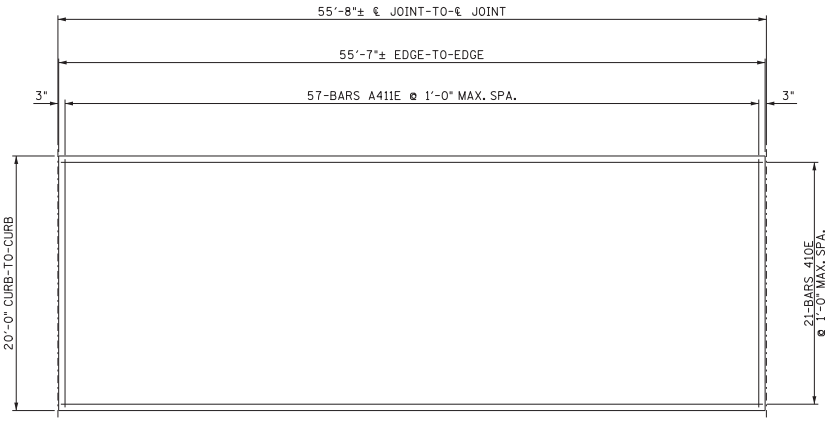
VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE DECK REPLACEMENT TYPICAL SECTION
SHEET NO. 11

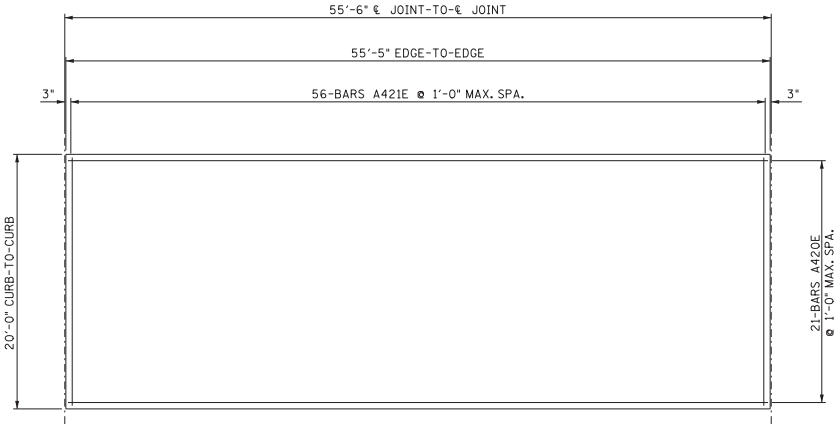
31-JAN-2019 03:33
Projects\012500 - TVA_WilsonDamPhase2\DGN\LDECK REPAIR



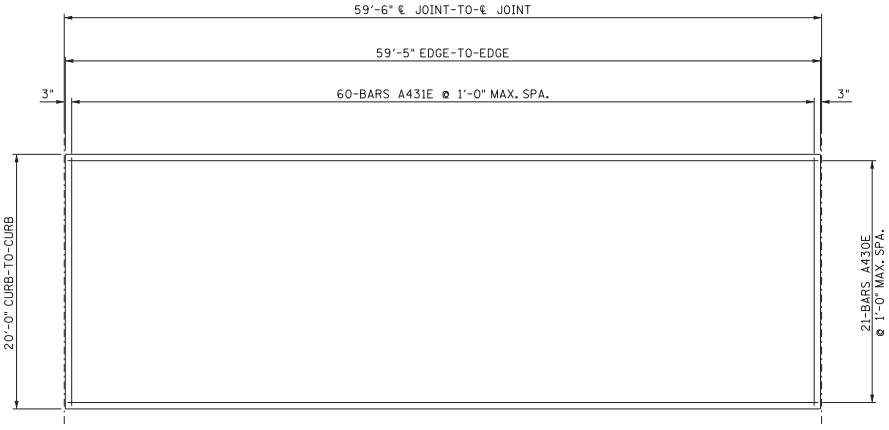
DECK PLAN
(SLAB NO. 1)



DECK PLAN
(SLAB NO. 2)



DECK PLAN
(SLAB NOS. 3-20)



DECK PLAN
(SLAB NO. 21)

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

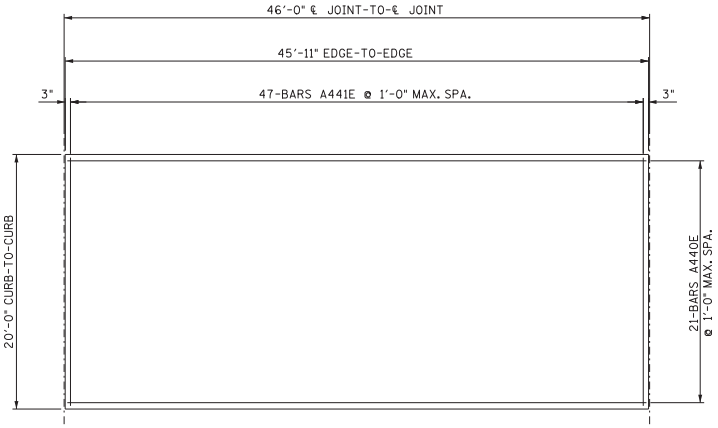
NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE DECK REPLACEMENT DETAILS (1)
SHEET NO. 12

31-JAN-2019 03:33
Projects\1012500 - TVA_WilsonDamPhase2\DGN\12_DECK REPAIR

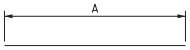


DECK PLAN
(SLAB NOS. 21 THRU 54)

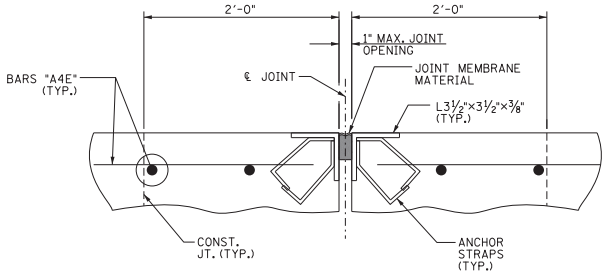
DECK REPLACEMENT BILL OF STEEL

BAR	LOCATION	SIZE	NO REQ'D.	BENDING DIMENSION A	B	C	D	LENGTH
A400E	SLAB NO. 1	4	23	43'-2"				43'-2"
A401E	SLAB NO. 1	4	44	19'-8"				19'-8"
A402E	SLAB NO. 1	4	28	5'-6"				5'-6"
A410E	SLAB NO. 2	4	21	55'-3"				55'-3"
A411E	SLAB NO. 2	4	57	19'-8"				19'-8"
A420E	SLAB NOS. 3-20	4	378	55'-1"				55'-1"
A421E	SLAB NOS. 3-20	4	1008	19'-8"				19'-8"
A430E	SLAB NO. 21	4	21	59'-1"				59'-1"
A431E	SLAB NO. 21	4	60	19'-8"				19'-8"
A440E	SLAB NOS. 21-54	4	714	45'-7"				45'-7"
A441E	SLAB NOS. 21-54	4	1598	19'-8"				19'-8"

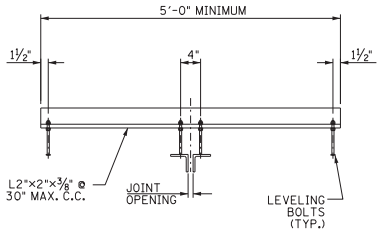
NOTE: BARS DENOTED WITH A SUFFIX "E" TO BE EPOXY COATED.
NOTE: COST OF EPOXY COATING TO BE INCLUDED IN ITEM NO. 502A001.



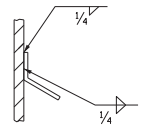
BARS "A"



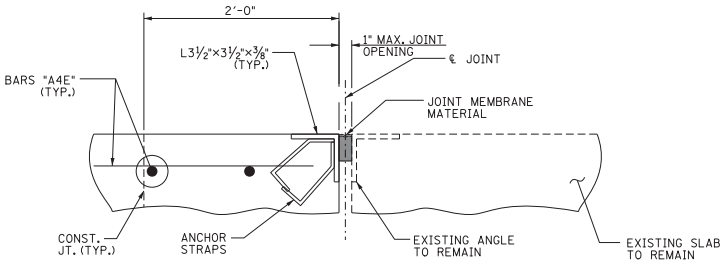
TYPE "A" JOINT DETAIL
(TYPICAL UNLESS OTHERWISE NOTED)
(ITEM NO. 522A000)



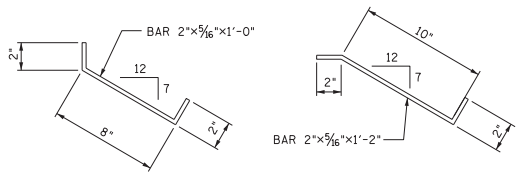
DETAIL SHOWING ALIGNMENT GUIDE ANGLES



TYP. ANCHOR STRAP TO MEMBRANE RETAINER CONNECTION



TYPE "B" JOINT DETAIL
(TYPICAL AT SLAB NO. 1 ℄ SLAB NO. 54)
(ITEM NO. 522B000)



ANCHOR STRAP DETAILS

NOTES:

ROADWAY EXPANSION DEVICES SHALL BE FABRICATED TO MATCH CROSS SLOPE, SKEW, AND GRADE OF EXISTING BRIDGE DECK.

THE ANGLES SHALL BE 50 KSI STEEL. THE REMAINDER OF THE JOINT SHALL BE A36 STEEL.

ALL STEEL THAT IS PART OF THE JOINT ASSEMBLY SHALL BE GALVANIZED WITH ASTM A-123. COST TO BE INCLUDED IN THE UNIT PRICE BID FOR THE EXPANSION JOINT.

THE SHOP DRAWINGS SHALL PROVIDE INFORMATION REGARDING MATERIAL SPECIFICATIONS, GEOMETRY, A TABLE OF VARIABLE TEMPERATURES WITH CORRESPONDING SETTINGS, AND A BILL OF MATERIALS.

WELDING SHALL CONFORM TO AASHTO SPECIFICATIONS FOR BRIDGES, CURRENT EDITION AND PERFORMED BY CERTIFIED WELDERS. FABRICATORS SHALL BE CERTIFIED UNDER THE AISC QUALITY CERTIFICATION CATEGORY I.

JOINTS SHALL BE SHIPPED FROM THE MANUFACTURER WITH ALIGNMENT GUIDE ANGLES SIMILAR TO THOSE SHOWN ON THIS SHEET.

JOINT MEMBRANE MATERIAL SHALL BE AN EMSEAL BEJS SYSTEM OR APPROVED EQUIVALENT.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

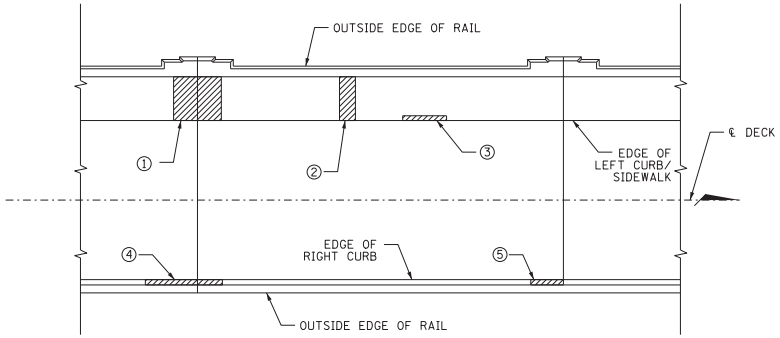
NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE DECK REPLACEMENT DETAILS (1)
SHEET NO. 13

31-JAN-2019 03:33
Projects\102500 - TVA_WilsonDamPhase2\DGN\03_DECK REPAIR

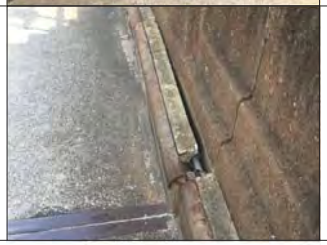


TYPICAL PLAN VIEW

(TYPICAL FOR EACH DECK SECTION)
(SHOWING CURB AND SIDEWALK DEFICIENCIES)

NOTE: DEFICIENCIES SHOWN IN TABLE AND ELEVATION SKETCH MAY OR MAY NOT BE FOUND IN EACH SLAB SECTION, BUT ARE MEANT TO REPRESENT THE TYPICAL LOCATION, DESCRIPTION, AND APPEARANCE OF THE DEFICIENCIES FOUND THROUGHOUT THE ENTIRE STRUCTURE. AREAS TO BE REPAIRED WILL BE DELINEATED BY THE ENGINEER.

DEFICIENCIES

DEF. NO.	LOCATION/COMPONENT	DEF. DESCRIPTION	PHOTO	REPAIR DESCRIPTION
①	ACROSS ENTIRE WIDTH OF SIDEWALK BETWEEN DECK JOINTS (TYP. AT EVERY JOINT)	SIDEWALK SPALL AND DELAMINATION ACROSS ENTIRE WIDTH OF SIDEWALK. SEVERITY OF SPALLS VARY.		SEE REPAIR DETAIL ON SHEET 15.
②	ACROSS WIDTH OF SIDEWALK (WIDTH OF DEFICIENCIES VARY)	SPALLS AND DELAM. ON TOP OF CONCRETE SIDEWALK SURFACE DEPTH AND WIDTH VARIES.		SEE REPAIR DETAIL ON SHEET 15.
③	SIDE OF CURB (SIDEWALK SIDE, LEFT SIDE LOOKING FORWARD)	CURB SPALLED AND/OR PREVIOUS PATCH FAILING AND DAMAGED CURB PLATE.		SEE REPAIR DETAILS ON SHEET 15.
④	SIDE OR TOP OF CURB (RIGHT SIDE LOOKING FORWARD)	SPALL OR DETERIORATING CONCRETE ON SIDE, TOP, OR WRAPPED AROUND CURB.		SEE REPAIR DETAIL ON SHEET 15.
⑤	SIDE OR TOP OF CURB (RIGHT SIDE LOOKING FORWARD)	BROKEN CURB OR DETERIORATED CURB SHOWING EXPOSED CONDUIT.		SEE REPAIR DETAIL ON SHEET 15.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

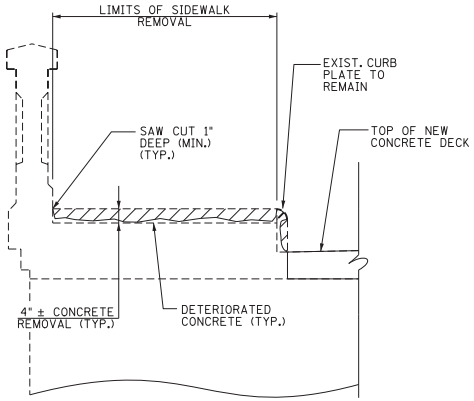
NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

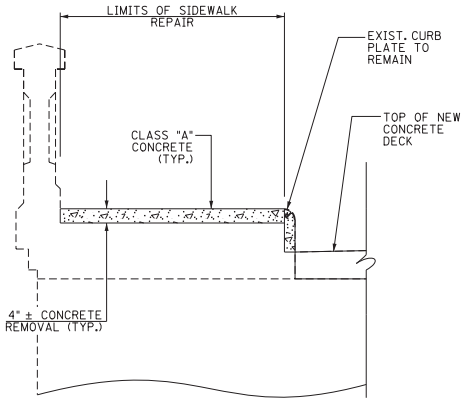
VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE SIDEWALK & CURB REPAIR DETAILS (1)
SHEET NO. 14

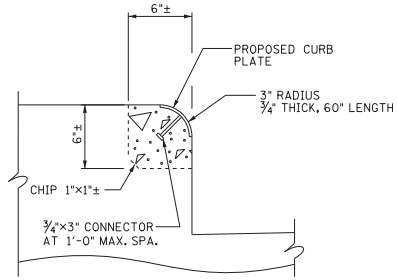
31-JAN-2019 03:35
Projects\1012500 - TVA_WilsonDamPhase2\DGN\14_SIDEWALK CURB REPAIR DETAILS



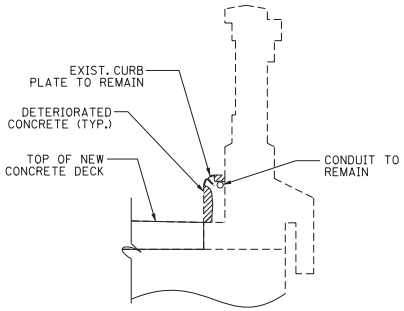
TYPICAL SECTION
(ITEM NO. 520A103)
(SHOWING SIDEWALK ON LEFT SIDE)



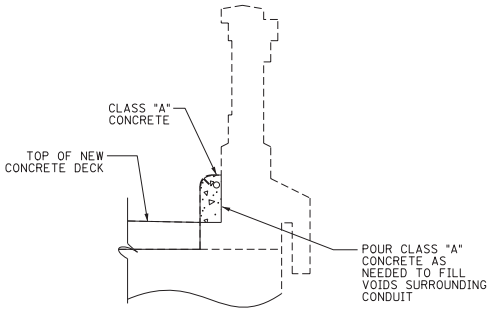
TYPICAL SECTION
(ITEM NO. 520A103)
(SHOWING SIDEWALK ON LEFT SIDE)



CURB PLATE REPLACEMENT DETAIL
(ITEM NO. 520A108)
(CURB PLATE TO BE AASHTO M270 GRADE 50W)



TYPICAL SECTION
(ITEM NO. 520A103)
(SHOWING CURB ON RIGHT SIDE)



TYPICAL SECTION
(ITEM NO. 520A103)
(SHOWING CURB ON RIGHT SIDE)

NOTES:

CAUTION SHALL BE TAKEN TO AVOID DAMAGE TO EXISTING CONDUIT.

WHERE SIDEWALK HEAVES ARE BEING REPAIRED AT EXPANSION JOINT, PLACE A ½" FIBERBOARD BOND BREAKER.

CONCRETE FOR REPAIRS SHALL BE CLASS "A" PER SECTION 501 OF THE STANDARD SPECIFICATIONS.

PRIOR TO PLACING THE NEW CONCRETE AGAINST ANY BROKEN OR SCARIFIED SURFACE, AN APPROVED EPOXY ADHESIVE SHALL BE APPLIED TO THE ROUGHENED CONCRETE.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #

WILSON DAM BRIDGE DECK REFURBISHMENT

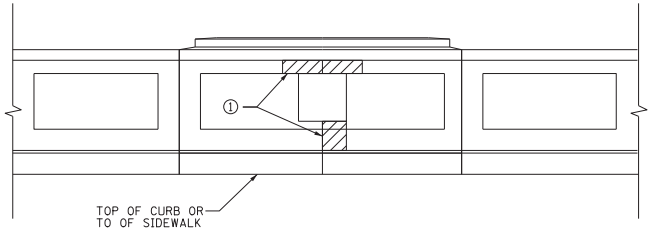
NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

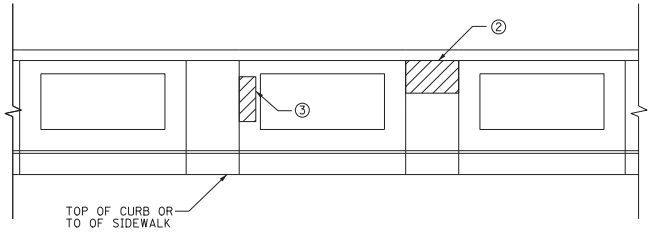
JOB NO. 1012500.17
DATE 11-30-2018
TITLE SIDEWALK & CURB REPAIR DETAILS (2)
SHEET NO. 15

31-JAN-2019 03:33
Projects\002500 - TVA_WilsonDamPhase2\DGN\S_SIDEWALK CURB REPAIR DETAILS (2)



TYPICAL RAIL ELEVATION

(TYPICAL RAIL AT DECK JOINTS)
(SHOWING DEFICIENCIES ON RAIL)



TYPICAL RAIL ELEVATION

(TYPICAL RAIL BETWEEN DECK JOINTS)
(SHOWING DEFICIENCIES ON RAIL)

DEFICIENCIES

DEF. NO.	LOCATION/COMPONENT	DEF. DESCRIPTION	PHOTO	REPAIR DESCRIPTION
①	TYPICAL AT LIGHT/PLATE LOCATIONS ON BOTH SIDES (LEFT AND RIGHT) OF RAIL	VARIOUS SPALLS AROUND LIGHT/PLATE. MOST ARE FAILED AND DETERIORATED EXISTING PATCHES.		LIGHT TO BE REMOVED PRIOR TO CONCRETE REMOVAL AND REPAIR, THEN RESET. SEE DETAIL "B" ON SHEET NO. 19 FOR REPAIR DETAILS.
②	TYPICAL AT RAIL POSTS ON BOTH SIDES (LEFT AND RIGHT) OF RAIL	SPALL OR DELAM. OF CONCRETE RAIL ACROSS CENTER POST. REBAR USUALLY EXPOSED. SIZE VARIES.		CONCRETE REPAIR TO MATCH EXISTING LINES. SEE DETAIL "B" ON SHEET NO. 19 FOR REPAIR DETAILS.
③	LOCATIONS VARY THROUGHOUT RAIL ON BOTH SIDES (LEFT AND RIGHT)	SPALL OR DELAM. CONCRETE ON RAIL. REBAR USUALLY EXPOSED. SIZE VARIES.		CONCRETE REPAIR TO MATCH EXISITNG LINES. SEE DETAIL "B" ON SHEET NO. 19 FOR REPAIR DETAILS.

NOTES: DEFICIENCIES SHOWN IN TABLE AND ELEVATION SKETCH MAY OR MAY NOT BE FOUND IN EACH SLAB SECTION, BUT ARE MEANT TO REPRESENT THE TYPICAL LOCATION, DESCRIPTION, AND APPEARANCE OF THE DEFICIENCIES FOUND THROUGHOUT THE ENTIRE STRUCTURE. AREAS TO BE REPAIRED WILL BE DELINEATED BY THE ENGINEER.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

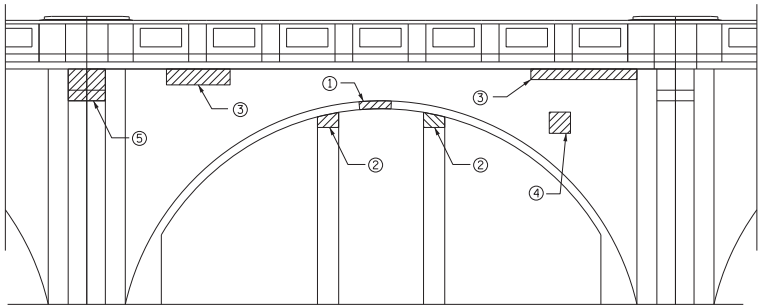
NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE RAIL REPAIR DETAILS
SHEET NO. 16

31-JAN-2019 03:34
Projects\012500 - TVA_WilsonDamPhase2\DGN\16_RAIL REPAIR DETAILS



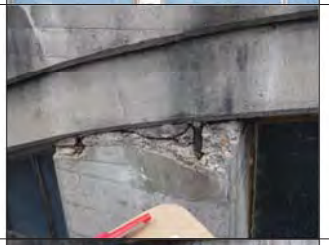
ELEAVTION - TYPICAL ARCH WITH WINDOWS

(SHOWING TYPICAL DEFICIENCIES FOUND IN ARCHES WITH WINDOWS)
(ARCH NOS. 0-2, 6-7, & 16)

NOTES: DEFICIENCIES SHOWN IN TABLE AND ELEVATION SKETCH MAY OR MAY NOT BE FOUND IN ALL ARCHES, BUT ARE MEANT TO REPRESENT THE TYPICAL LOCATION, DESCRIPTION, AND APPEARANCE OF THE DEFICIENCIES FOUND THROUGHOUT THE ENTIRE STRUCTURE. AREAS TO BE REPAIRED WILL BE DELINEATED BY THE ENGINEER.

PRECAUTIONS SHALL BE TAKEN SO AS TO NOT DAMAGE EXISTING WINDOWS. ANY DAMAGED WINDOWS WILL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

DEFICIENCIES

DEF. NO.	LOCATION/COMPONENT	DEF. DESCRIPTION	PHOTO	REPAIR DESCRIPTION
①	WINDOWED ARCH ARCH NOS. 0, 2, 6, 7, & 16	SPALLS & DELAMINATION OF CONCRETE TYPICAL AROUND LIP ALONG WINDOW.		CONCRETE TO MATCH EXISTING LINES. SEE DETAIL "B" ON SHEET NO. 19.
②	WINDOWED ARCH ARCH NOS. 0, 2, 6, 7, & 16	SPALLS AT TOP OF COLUMN MEETING LIP BETWEEN WINDOW SECTION SHOWING REPAIR (TYP.).		CONCRETE TO MATCH EXISTING LINES. SEE DETAIL "B" ON SHEET NO. 19.
③	WINDOWED ARCH ARCH NOS. 0, 2, 6, 7, & 16	SPALLS & DELAMINATION ON ARCH FACE (SHOWING LOCATION ALONG DECK/ARCH JOINT).		CONCRETE TO MATCH EXISTING FACE OF ARCH. SEE DETAIL "A" FOR DETAILS ON SHEET NO. 19.
④	TYPICAL ON ALL ARCHES	SPALL OR DELAM. ON ARCH FACE (SHOWING DELAMINATION ON FACE OF ARCH).		CONCRETE TO MATCH EXISTING FACE OF ARCH. SEE DETAIL "A" FOR DETAILS ON SHEET NO. 19.
⑤	TYPICAL ON ALL ARCHES	SPALL OR DELAMINATION ON CONCRETE AT ARCH JOINTS.		CONCRETE TO MATCH EXISTING CONTOURS AND JOINT LINE. SEE DETAIL "4" FOR DETAILS ON SHEET NO. 19.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

NO.	REVISION	DATE	SIG.

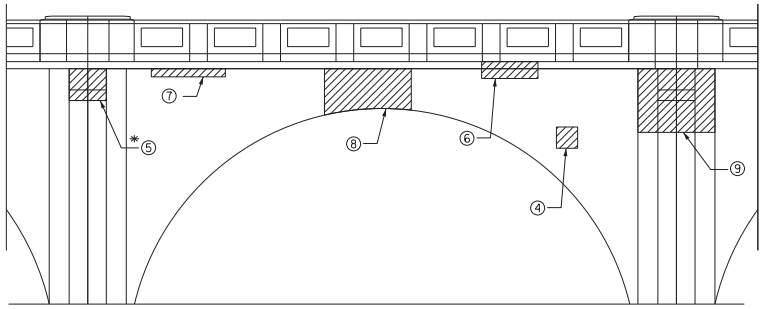
SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE ARCH REPAIR DETAILS (1)
SHEET NO. 17

31-JAN-2019 03:33
Projects\012500 - TVA_WilsonDamPhase2\DGN\17_ARCH DETAILS 1

* FOR DEF. NO. 5, SEE SHEET NO. 17.



ELEAVTION - TYPICAL ARCH WITHOUT WINDOWS

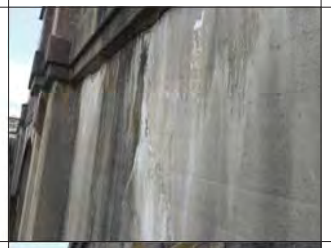
(SHOWING TYPICAL DEFICIENCIES FOUND IN ARCHES WITH NO WINDOWS)
(ARCH NOS. 3-5, 8-15, & 17-78)

NOTES: DEFICIENCIES SHOWN IN TABLE AND ELEVATION SKETCH MAY OR MAY NOT BE FOUND IN ALL 79 ARCHES, BUT ARE MEANT TO REPRESENT THE TYPICAL LOCATION, DESCRIPTION, AND APPEARANCE OF THE DEFICIENCIES FOUND THROUGHOUT THE ENTIRE STRUCTURE. AREAS TO BE REPAIRED WILL BE DELINEATED BY THE ENGINEER.

▲ WARNING SIGNS AND LIGHTS SHALL BE REMOVED AND RESET AT THE CONCLUSION OF CONSTRUCTION. COST TO BE PAID UNDER ITEM NO. 520A105.

▲ TYPICAL SIGN AT ARCH NO. 34 & ARCH NO. 51.

DEFICIENCIES

DEF. NO.	LOCATION/COMPONENT	DEF. DESCRIPTION	PHOTO	DEF. REPAIR
④	TYPICAL ON ALL ARCHES	SPALL OR DELAM. ON ARCH FACE (SHOWING DELAMINATION ON FACE OF ARCH).		CONCRETE TO MATCH EXISTING FACE OF ARCH. SEE DETAIL "A" FOR DETAILS ON SHEET NO. 19.
⑥	WINDOWLESS ARCH ARCH NOS. 3-5, 8-15, & 17-78	SPALL OR DELAM. BETWEEN ARCH & DECK/RAIL AT JOINT.		CONCRETE TO MATCH EXISTING FACE OF ARCH AND DECK. CURRENT JOINT LINE TO BE MAINTAINED. SEE DETAIL "A" FOR DETAILS ON SHEET NO. 19.
⑦	WINDOWLESS ARCH ARCH NOS. 3-5, 8-15, & 17-78	SPALL ON ARCH FACE BELOW DECK/ARCH JOINT.		CONCRETE TO MATCH EXISTING FACE OF ARCH. SEE DETAIL "A" FOR DETAILS ON SHEET NO. 19.
⑧	WINDOWLESS ARCH ARCH NOS. 3-5, 8-15, & 17-78	SPALL ON ARCH FACE EXTENDING FROM DECK/ARCH JOINT TO ARCH OPENING.		CONCRETE TO MATCH EXISTING FACE OF ARCH, AND EXISTING RADIUS OF ARCH. SEE DETAIL "A" FOR DETAILS ON SHEET NO. 19.
⑨	SECTION BETWEEN ARCHES (TYP. BETWEEN EACH ARCH)	SPALL ON TOP SECTION BETWEEN ARCHES.		CONCRETE TO MATCH EXISTING CONTOURS AND JOINT LINE. SEE DETAIL "A" FOR DETAILS ON SHEET NO. 19.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

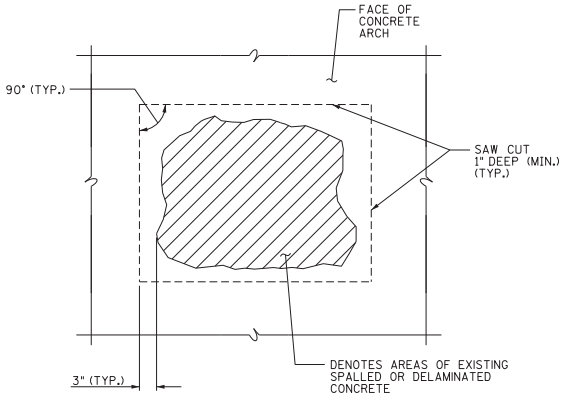
NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

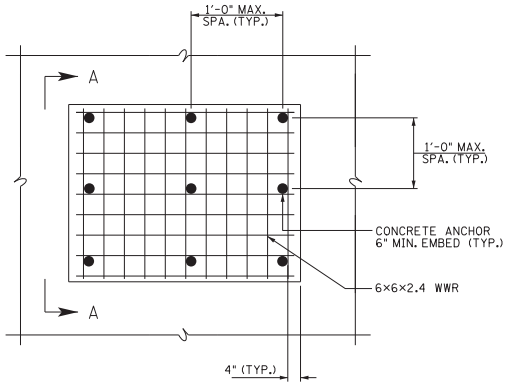
VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE ARCH REPAIR DETAILS (2)
SHEET NO. 18

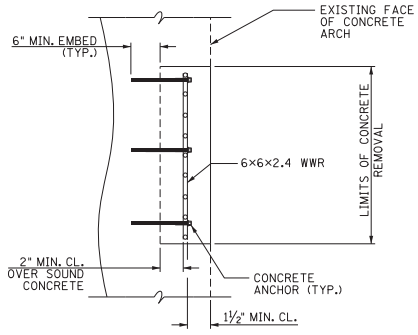
31-JAN-2019 03:33
Projects\012500 - TVA_WilsonDamPhase2\DGN\18_ARCH DETAILS 2



STEP 1

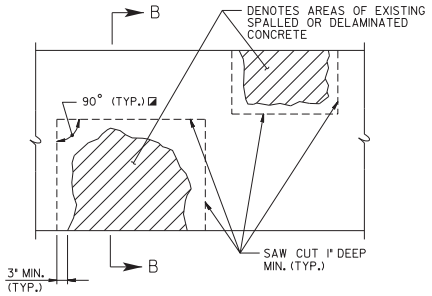


STEP 2

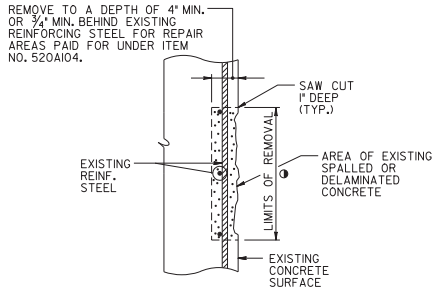


SECTION A-A

DETAIL "A"
(REPAIR OF UNREINFORCED CONCRETE)
(ITEM NO. 520A103)



DETAIL "B"
(CONCRETE REPAIR WITH EXISTING REBAR)
(ITEM NO. 520A104)



SECTION B-B

NOTES;

◒ DENOTES: LIMITS AND LOCATION OF REPAIRS TO BE DESIGNATED BY THE ENGINEER.

◪ DENOTES: SAW CUT EXISTING CONCRETE SURFACES SO AS TO OBTAIN SQUARED CORNERS.

EXTREME CARE SHALL BE TAKEN WHEN REMOVING THE EXISTING SPALLED OR DELAMINATED CONCRETE SO AS NOT TO DAMAGE THE EXISTING REINFORCING STEEL. ALL EXPOSED EXISTING REINFORCING STEEL SHALL RECEIVE A COMPLETE CLEANING TO REMOVE ALL RUST. ALL EXISTING REINFORCEMENT SHALL REMAIN IN PLACE AND INCORPORATED INTO THE NEW CONSTRUCTION. ALL WORK MUST MEET WITH THE FULL APPROVAL OF THE ENGINEER.

PNEUMATICALLY PLACED CONCRETE IS NOT ALLOWED.

COST OF SAW CUTTING, REMOVING SPALLED OR DELAMINATED CONCRETE, CLEANING, PATCHING MATERIAL, LABOR AND ANY MISCELLANEOUS MATERIALS NECESSARY TO COMPLETE THE REPAIRS AS SHOWN TO BE INCLUDED IN ITEM NO. 604-I0.05, CONCRETE, S.F.

POWER HAND DRIVEN TOOLS USED FOR REMOVAL OF UNSOUND CONCRETE ARE SUBJECT TO THE FOLLOWING RESTRICTIONS:

1. PNEUMATIC HAMMERS HEAVIER THAN THE 35 LB. CLASS SHALL NOT BE USED.
2. CHIPPING HAMMERS OF THE I5 LB. CLASS SHALL BE USED TO REMOVE CONCRETE FROM BEHIND REINFORCING STEEL.

WWR SHALL BE FIELD BENT AS REQUIRED TO MATCH ORIGINAL. COST INCLUDED IN ITEM NO. 520A103.

CONTRACTOR SHALL TAKE EXTREME CARE AND TAKE ANY MEASURE NECESSARY TO ENSURE THAT NO DEBRIS IS DROPPED INTO THE TENNESSEE RIVER BELOW. THIS SHALL BE ACCOMPLISHED BY THE USE OF BASKETS, NETTING, WRAPPING, WORK PLATFORMS, OR OTHER SIMILARLY EFFECTIVE MEANS. ANY DEBRIS WHICH IS ALLOWED TO ENTER THE WATER SHALL BE REMOVED AND DISPOSED BY THE CONTRACTOR. COST OF REMOVING AND DISPOSING OF CONCRETE SHALL BE INCLUDED IN ITEM NO. NOS. 520A103 & 520A104.

CONCRETE FOR REPAIRS SHALL BE CLASS "A" PER SECTION 501 OF THE STANDARD SPECIFICATIONS.

PRIOR TO PLACING THE NEW CONCRETE AGAINST ANY BROKEN OR SCARIFIED SURFACE, AN APPROVED EPOXY ADHESIVE SHALL BE APPLIED TO THE ROUGHENED CONCRETE.

TVA

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE GENERAL REPAIR DETAILS
SHEET NO. 19

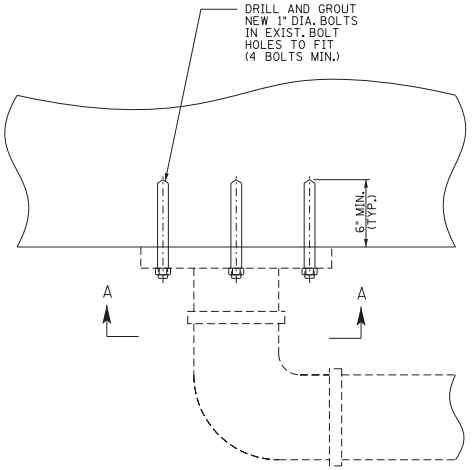
31-JAN-2019 03:33
Projects\1012500 - TVA_WilsonDamPhase2\DGN\9_GENERAL REPAIR DETAILS

EXISTING DRAIN UNDER ARCH
(ARCH NO. 60)

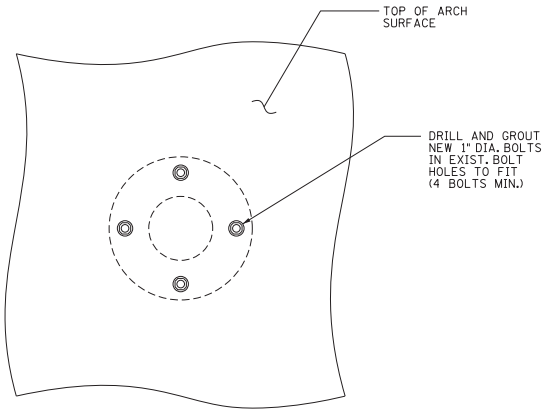
NOTES:

EXISTING DRAIN HOLE, DRAIN PLATE, AND ANY CONCRETE THAT IS IN CONTACT WITH MOUNTED DRAIN PLATE SHALL BE THOROUGHLY CLEANED BEFORE DRAIN IS REATTACHED.

A MINIMUM OF FOUR (4) 1" DIAMETER BOLTS SHALL BE EMBEDDED INTO THE TOP OF THE CONCRETE ARCH USING EXISTING BOLT HOLES. BOLTS SHALL BE EMBEDDED A MINIMUM OF 6" INTO THE ARCH AND GROUTED INTO PLACE.



DRAIN REPAIR DETAIL



SECTION A-A

TENNESSEE VALLEY AUTHORITY
CONTRACT #
WILSON DAM BRIDGE DECK REFURBISHMENT

NO.	REVISION	DATE	SIG.

SCALE N.T.S.
DRAWN A. ALLSBROOK
DESIGN A. ALLSBROOK
CHECKED J. ECKEL

VOLKERT

JOB NO. 1012500.17
DATE 11-30-2018
TITLE DRAINAGE REPAIR DETAILS
SHEET NO. 20

31-JAN-2019 03:35
Projects\1012500 - TVA_WilsonDamPhase2\DGN\20_DRAINAGE MODIFICATIONS

Appendix B – Expansion Joint Installation Details

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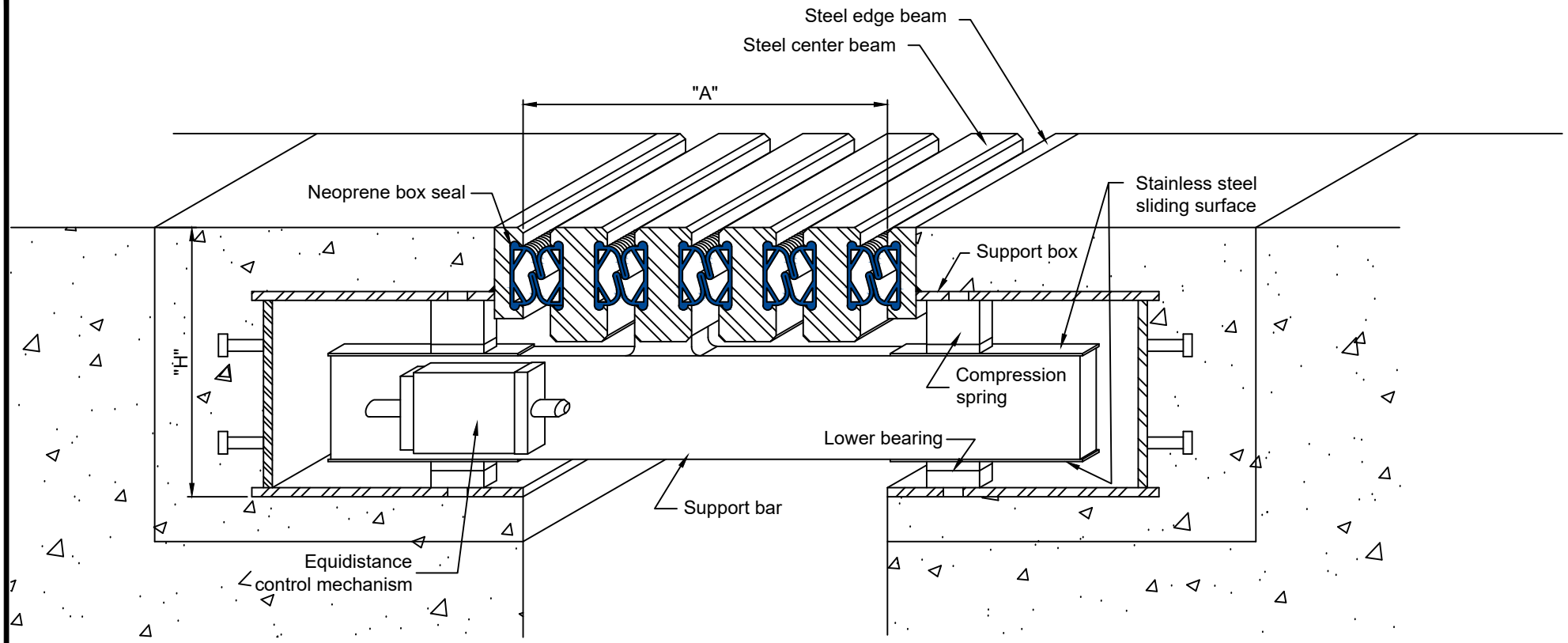

Design Features

- Large movement system for use on heavy traffic conditions
- 30 year history of success
- Rugged design mechanically locks all seal profiles for water tightness
- Recommended for new installations and retrofit projects
- Engineered for durabilitly and versatility
- Neoprene box seal provides double layer protection

Wabo®Modular

D1500

System Dimension Table

Model Number	Total Movement		Dimension "A" Min.		Dimension "A" Max.		Dimension "H"	
	inches	mm	inches	mm	inches	mm	inches	mm
D-1500	15.000	381	10.000	254	25.000	635	10.250	260

Consult your WBA Representative with your special design requirements.

PROJECT NAME: -

PROJECT LOCATION: -

DRAWING DESCRIPTION: Wabo®Modular

DATE: 5/19/10 MODEL: "D" Series

BASF We create chemistry

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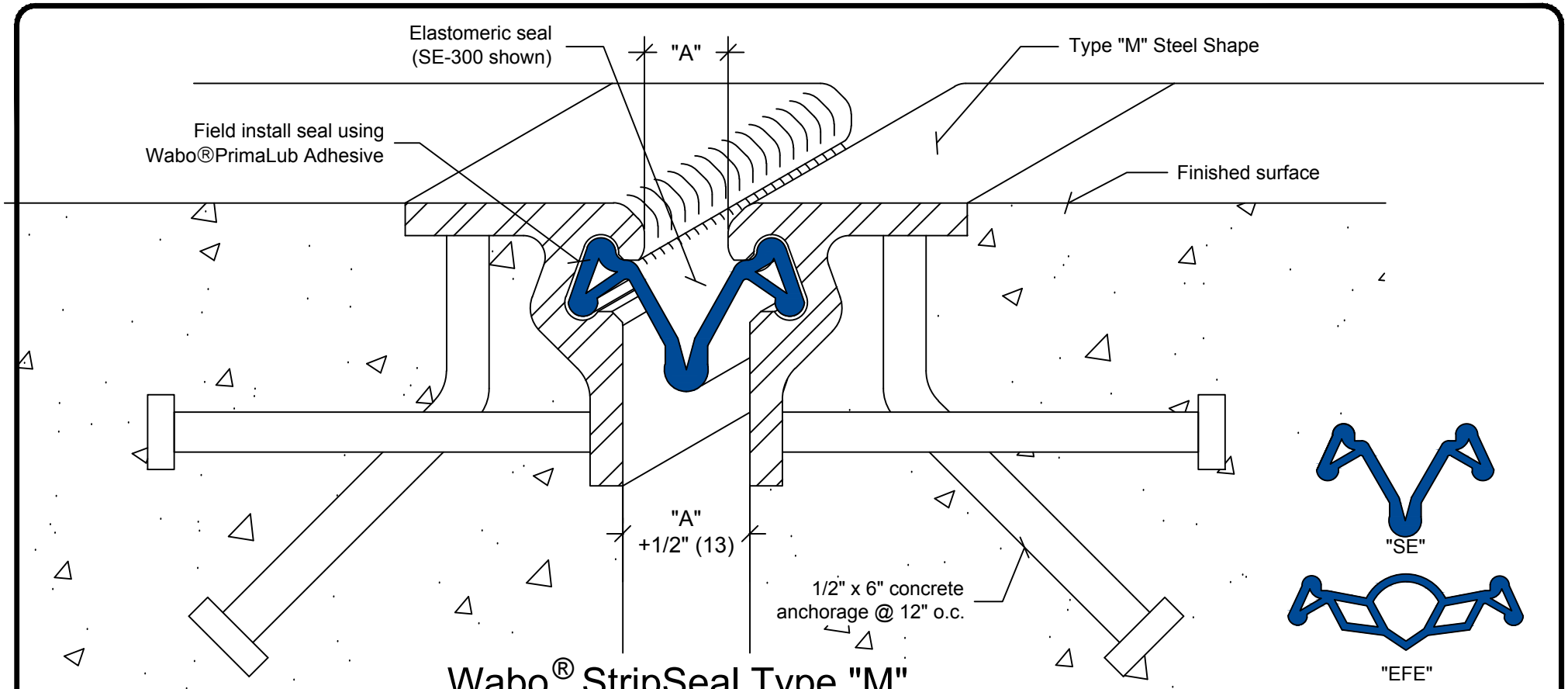
REVISION NO: -

SHEET NO: 5

DRAWING NO: C-20518



Wabo® StripSeal Type "M"

Cast in Place Condition

Design Features

- Rugged design accodating HS-20 loading
- Extrusion cavity mechanically locks all seal profiles for watertight application
- System can be cast into the concrete slab
- Accommodates multi-directional movements
- Custom designs engineered for unique projects

Seal Dimension Table

Model Number	Total Movement		Joint Width "A" Min.		Joint Width "A" Max.		Min. Install Width	
	inches	mm	inches	mm	inches	mm	inches	mm
SE-300	3.000	76	0	0	3.000	76	1.500	38
SE-400	4.000	102	0	0	4.000	102	1.500	38
SE-500	5.000	127	0	0	5.000	127	2.000	51
EFE-400	4.000	102	0.500	13	4.500	114	2.500	64

Consult your WBA Representative for factory molded horizontal changes, severe skews or joint intersections

PROJECT NAME: -

PROJECT LOCATION: -

DRAWING DESCRIPTION: Wabo®StripSeal

DATE: 5/19/10 MODEL: Type "M"

BASF
We create chemistry

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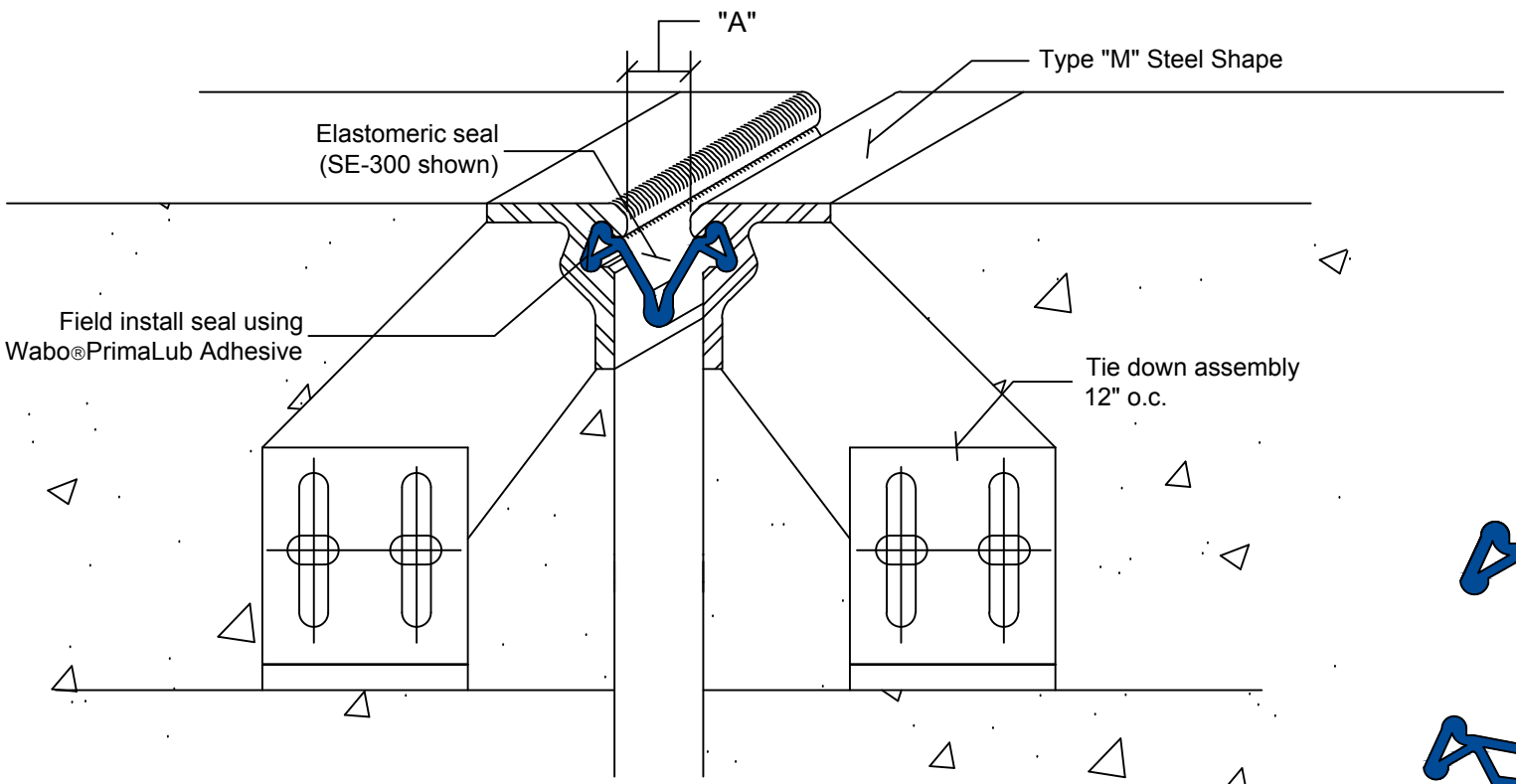
REVISION NO: -

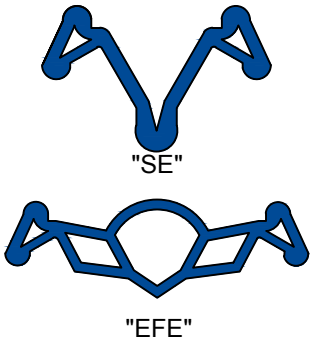
SHEET NO: 1

DRAWING NO: C-20519



Wabo® Stripseal Type "M"

Tie Down Condition



Design Features

- Rugged design accodating HS-20 loading
- Extrusion cavity mechanically locks all seal profiles for watertight application
- Accommodates multi-directional movements

Seal Dimension Table

Model Number	Total Movement		Joint Width "A" Min.		Joint Width "A" Max.		Min. Install Width	
	inches	mm	inches	mm	inches	mm	inches	mm
SE-300	3.000	76	0	0	3.000	76	1.500	38
SE-400	4.000	102	0	0	4.000	102	1.500	38
SE-500	5.000	127	0	0	5.000	127	2.000	51
EFE-400	4.000	102	0.500	13	4.500	114	2.500	64

Consult your WBA Representative for factory molded horizontal changes, severe skews or joint intersections

PROJECT NAME: -

PROJECT LOCATION: -

DRAWING DESCRIPTION: Wabo®StripSeal

DATE: 5/19/10 MODEL: Type "M"

BASF We create chemistry

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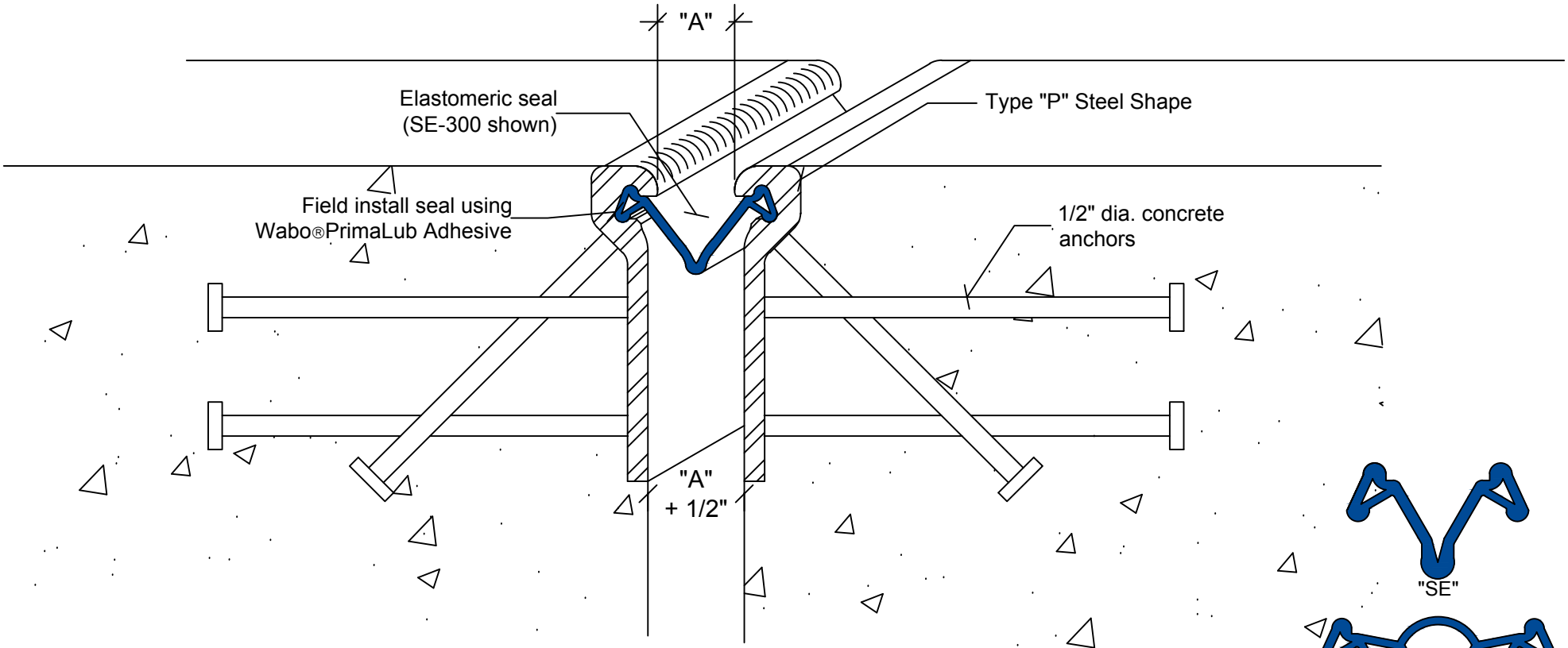
REVISION NO: -

SHEET NO: 2

DRAWING NO: C-20519



Wabo® StripSeal Type "P"

Cast In Place Condition

Design Features

- Rugged design accodating HS-20 loading
- Extrusion cavity mechanically locks all seal profiles for watertight application
- Accommodates multi-directional movements

Seal Dimension Table

Model Number	Total Movement		Joint Width "A" Min.		Joint Width "A" Max.		Min. Install Width	
	inches	mm	inches	mm	inches	mm	inches	mm
SE-300	3.000	76	0	0	3.000	76	1.500	38
SE-400	4.000	102	0	0	4.000	102	1.500	38
SE-500	5.000	127	0	0	5.000	127	2.000	51
EFE-400	4.000	102	0.500	13	4.500	114	2.500	64

Consult your WBA Representative for factory molded horizontal changes, severe skews or joint intersections

PROJECT NAME: -

PROJECT LOCATION: -

DRAWING DESCRIPTION: Wabo®StripSeal

DATE: 5/19/10 MODEL: Type "P"

BASF We create chemistry

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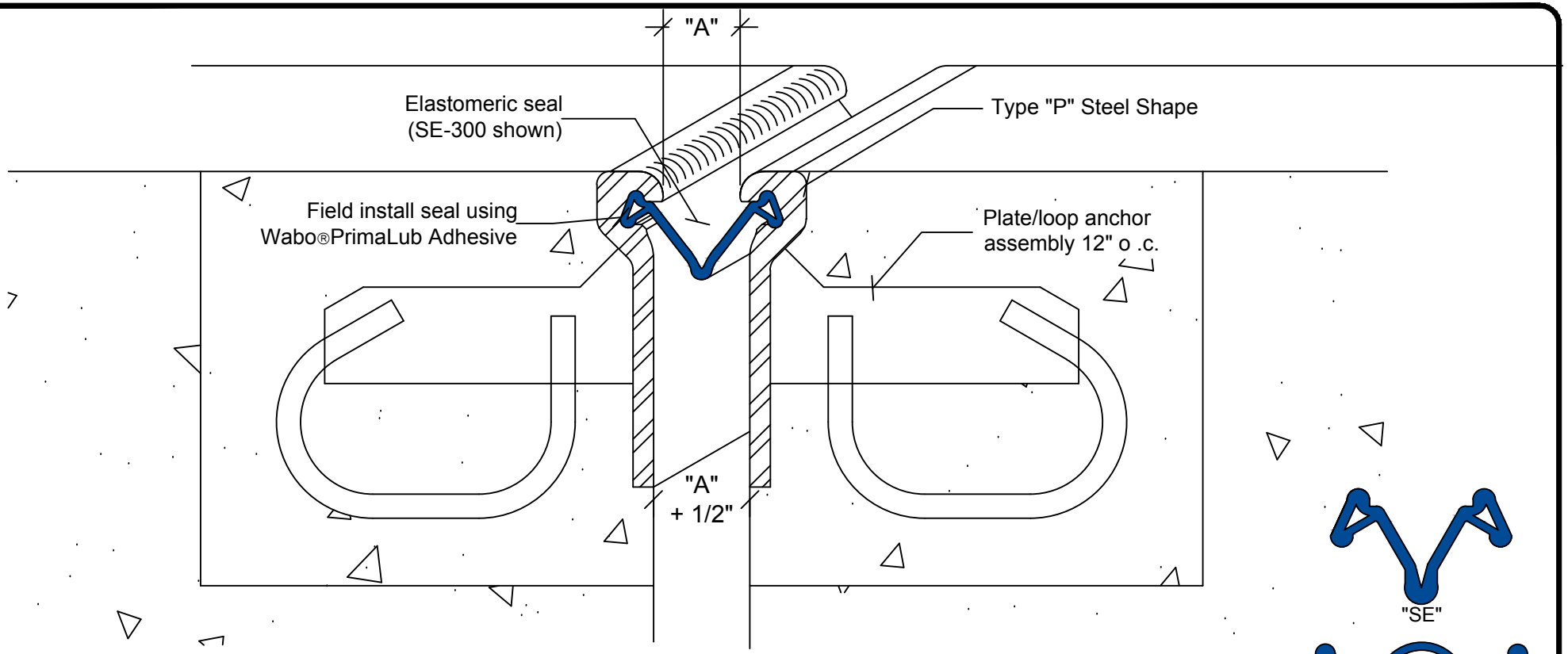
REVISION NO: -

SHEET NO: 3

DRAWING NO: C-20519



Wabo® StripSeal Type "P"

Cast In Place Condition

Design Features

- Rugged design accodating HS-20 loading
- Extrusion cavity mechanically locks all seal profiles for watertight application
- Accommodates multi-directional movements

Seal Dimension Table

Model Number	Total Movement		Joint Width "A" Min.		Joint Width "A" Max.		Min. Install Width	
	inches	mm	inches	mm	inches	mm	inches	mm
SE-300	3.000	76	0	0	3.000	76	1.500	38
SE-400	4.000	102	0	0	4.000	102	1.500	38
SE-500	5.000	127	0	0	5.000	127	2.000	51
EFE-400	4.000	102	0.500	13	4.500	114	2.500	64

Consult your WBA Representative for factory molded horizontal changes, severe skews or joint intersections

PROJECT NAME: -

PROJECT LOCATION: -

DRAWING DESCRIPTION: Wabo®StripSeal

DATE: 5/19/10 MODEL: Type "P"

BASF We create chemistry

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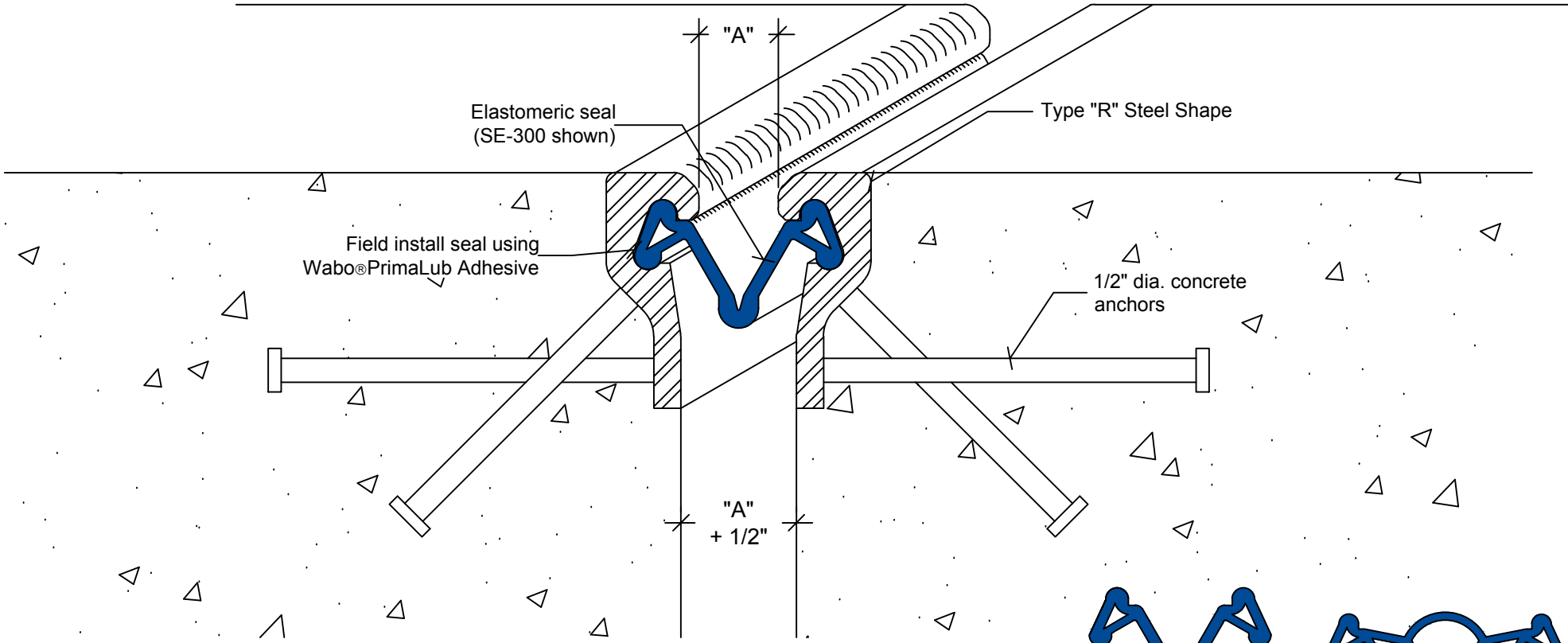
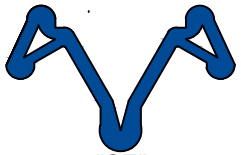
REVISION NO: -

SHEET NO: 4

DRAWING NO: C-20519





"SE"

"EFE"

Wabo® StripSeal Type "R"

Cast In Place Condition

Design Features

- Rugged design accodating HS-20 loading
- Extrusion cavity mechanically locks all seal profiles for watertight application
- Accommodates multi-directional movements

Seal Dimension Table

Model Number	Total Movement		Joint Width "A" Min.		Joint Width "A" Max.		Min. Install Width	
	inches	mm	inches	mm	inches	mm	inches	mm
SE-300	3.000	76	0	0	3.000	76	1.500	38
SE-400	4.000	102	0	0	4.000	102	1.500	38
SE-500	5.000	127	0	0	5.000	127	2.000	51
EFE-400	4.000	102	0.500	13	4.500	114	2.500	64

Consult your WBA Representative for factory molded horizontal changes, severe skews or joint intersections

PROJECT NAME: -

PROJECT LOCATION: -

DRAWING DESCRIPTION: Wabo®StripSeal

DATE: 5/19/10 MODEL: Type "R"

BASF We create chemistry

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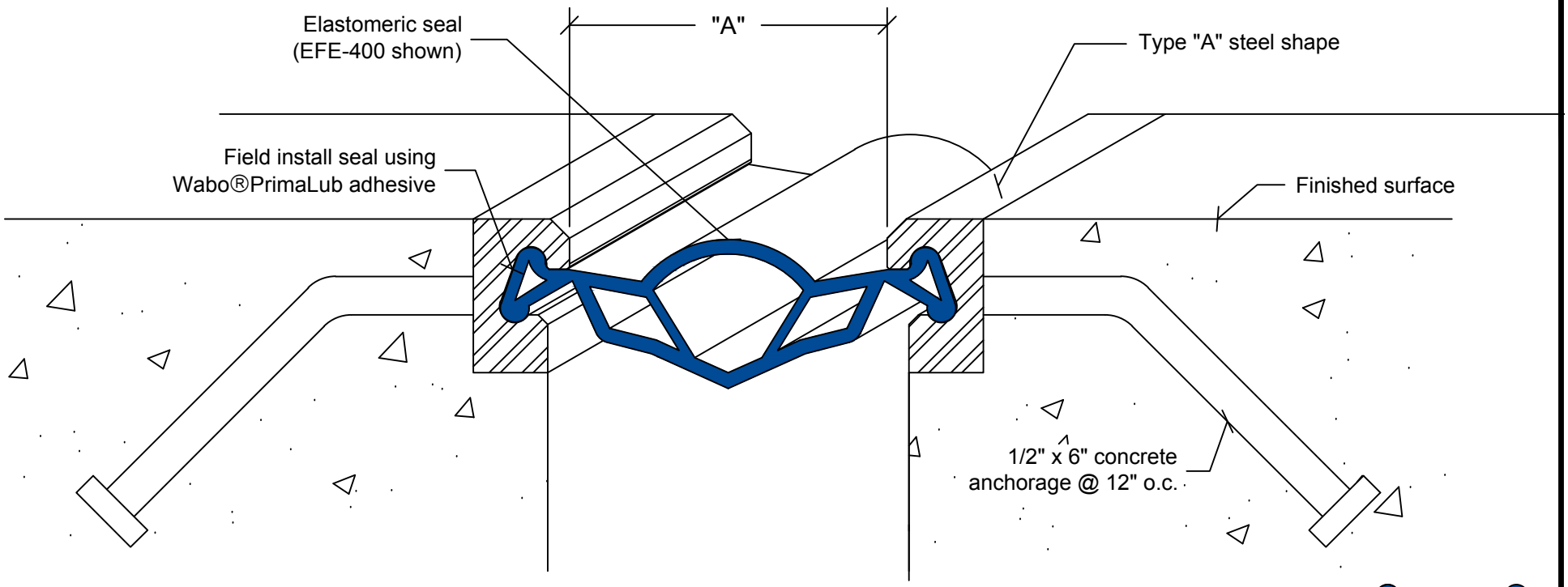
REVISION NO: -

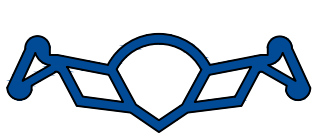
SHEET NO: 5

DRAWING NO: C-20519

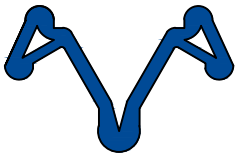


Wabo® StripSeal Type "A"

Cast in Place Condition



"EFE"



"SE"

Design Features

- Rugged design accodating HS-20 loading
- Extrusion cavity mechanically locks all seal profiles for watertight application
- System can be cast into the concrete slab
- Accommodates multi-directional movements
- Custom designs engineered for unique projects

Seal Dimension Table

Model Number	Total Movement		Joint Width "A" Min.		Joint Width "A" Max.		Min. Install Width	
	inches	mm	inches	mm	inches	mm	inches	mm
SE-300	3.000	76	0	0	3.000	76	1.500	38
SE-400	4.000	102	0	0	4.000	102	1.500	38
SE-500	5.000	127	0	0	5.000	127	2.000	51
EFE-400	4.000	102	0.500	13	4.500	114	2.500	64

Consult your WBA Representative for factory molded horizontal changes, severe skews or joint intersections

PROJECT NAME: -

PROJECT LOCATION: -

DRAWING DESCRIPTION: Wabo®StripSeal

DATE: 5/19/10 MODEL: Type "A"

BASF We create chemistry

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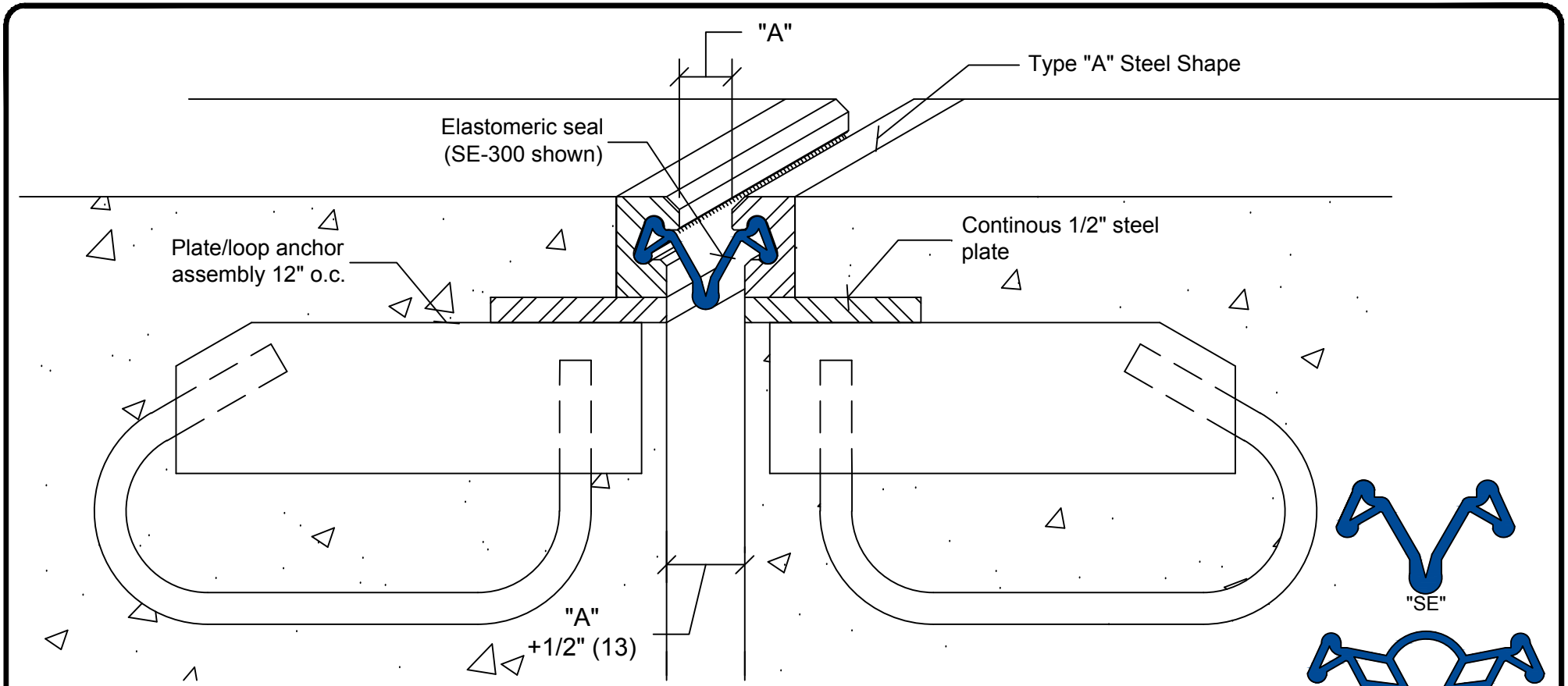
REVISION NO: -

SHEET NO: 6

DRAWING NO: C-20519



Wabo® StripSeal Type "A" Modified

Cast in Place Condition

Design Features

- Rugged design accodating HS-20 loading
- Extrusion cavity mechanically locks all seal profiles for watertight application
- System can be cast into the concrete slab
- Accommodates multi-directional movements
- Custom designs engineered for unique projects

Seal Dimension Table

Model Number	Total Movement		Joint Width "A" Min.		Joint Width "A" Max.		Min. Install Width	
	inches	mm	inches	mm	inches	mm	inches	mm
SE-300	3.000	76	0	0	3.000	76	1.500	38
SE-400	4.000	102	0	0	4.000	102	1.500	38
SE-500	5.000	127	0	0	5.000	127	2.000	51
EFE-400	4.000	102	0.500	13	4.500	114	2.500	64

Consult your WBA Representative for factory molded horizontal changes, severe skews or joint intersections

PROJECT NAME: -

PROJECT LOCATION: -

DRAWING DESCRIPTION: Wabo®StripSeal

DATE: 5/19/10 MODEL: Type "A"

BASF We create chemistry

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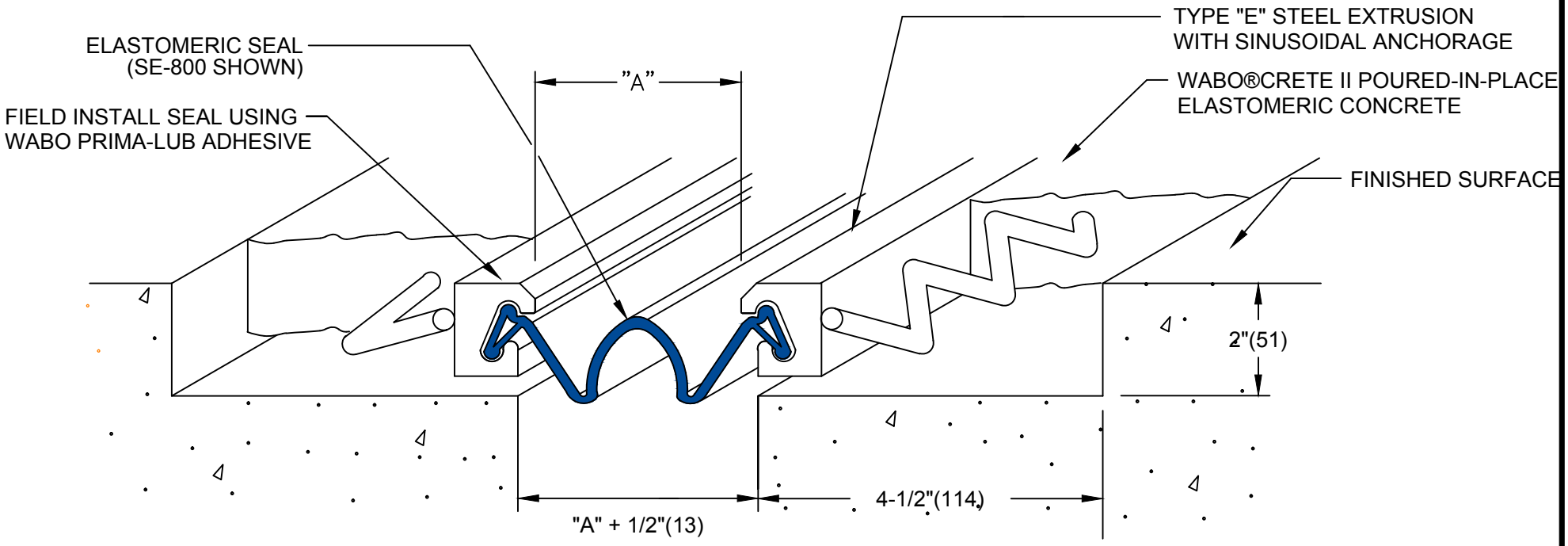
REVISION NO: -

SHEET NO: 7

DRAWING NO: C-20519



Wabo®CreteStripSeal (Model:SSS) DETAIL

SLAB TO SLAB CONDITION
NOT TO SCALE

Design Features

- Rugged design accodating HS-20 loading
- Extrusion cavity mechanically locks all seal profiles for watertight application
- System can be cast into the concrete slab
- Accommodates multi-directional movements
- Custom designs engineered for unique projects

( ) - DENOTES MILLIMETERS

DIMENSION CHART

PROFILE	MODEL	"A" @ MIN	"A" @ MID	"A" @ MAX	Total Movement
	SE-800	1/2"(13)	4-1/2"(114)	8-1/2"(216)	8"(203)

PROJECT NAME: -

PROJECT LOCATION: -

DRAWING DESCRIPTION: Wabo®StripSeal

DATE: 6/27/13 MODEL: Type "E"

BASF
We create chemistry

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REVISION NO: -

SHEET NO: 8

DRAWING NO: C-20519

Appendix C – Wilson Dam Bridge Deck Refurbishment Study

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Wilson Dam Bridge Deck Refurbishment Study

TVA Contract Number
PO3021131

Wilson Dam Bridge over Tennessee River

TVA Wilson Dam and Hydro Plant
Florence, Alabama

Prepared for:
Tennessee Valley Authority

Report Date: October 10, 2017

Preparer: Justin Eckel, PE

Reviewer: Tony Montiel, PE

Volkert, Inc.
302 Innovation Dr., Suite 100
Franklin, Tennessee 37067
Tel: (615) 656-1845
Fax: (615) 656-1870
Volkert.com

WILSON DAM BRIDGE DECK REFURBISHMENT STUDY

Wilson Dam Bridge over Tennessee River
TVA Wilson Dam and Hydro Plant
Florence, Alabama

Section **Page No.**

1.0 Executive Summary

The purpose of this study is to develop repair options and cost estimates for the repair of the bridge deck and other concrete surfaces for the Wilson Dam Bridge over the Tennessee River. The primary goal is to present viable conceptual repair options for stopping the flow of water through the deck and parapets and removing and replacing deteriorated concrete on the arch faces. The project limits for this study include the concrete arches on the dam above the spring line, bridge deck, curbs, parapets, and sidewalks between the control building and the beginning of the main bridge over the lock.

The conceptual repair details and techniques provided served as a basis for the development of four repair schemes and their associated preliminary cost estimates. The objective in the development of the different repair schemes was to identify a range of total project costs and each scheme's relative risk to allow for the Tennessee Valley Authority (TVA) to arrive at their preferred alternate. The schemes identified are denoted as:

- Repair Scheme A – stabilize and repair the bridge deck and perform spot grinding of the deck to improve rideability and patch deteriorated concrete arch faces
- Repair Scheme B – perform the same repairs as Repair Scheme A, but also patch deteriorated concrete surfaces of the rails and sidewalks and retrofit deck drainage
- Repair Scheme C – stabilize and repair the bridge deck and construct a new latex modified concrete overlay; patch deteriorated surfaces of arch face, rails, and sidewalks; and retrofit deck drainage
- Repair Scheme D – remove and replace existing bridge deck; patch deteriorated surfaces of arch face, rails, and sidewalks; and retrofit deck drainage

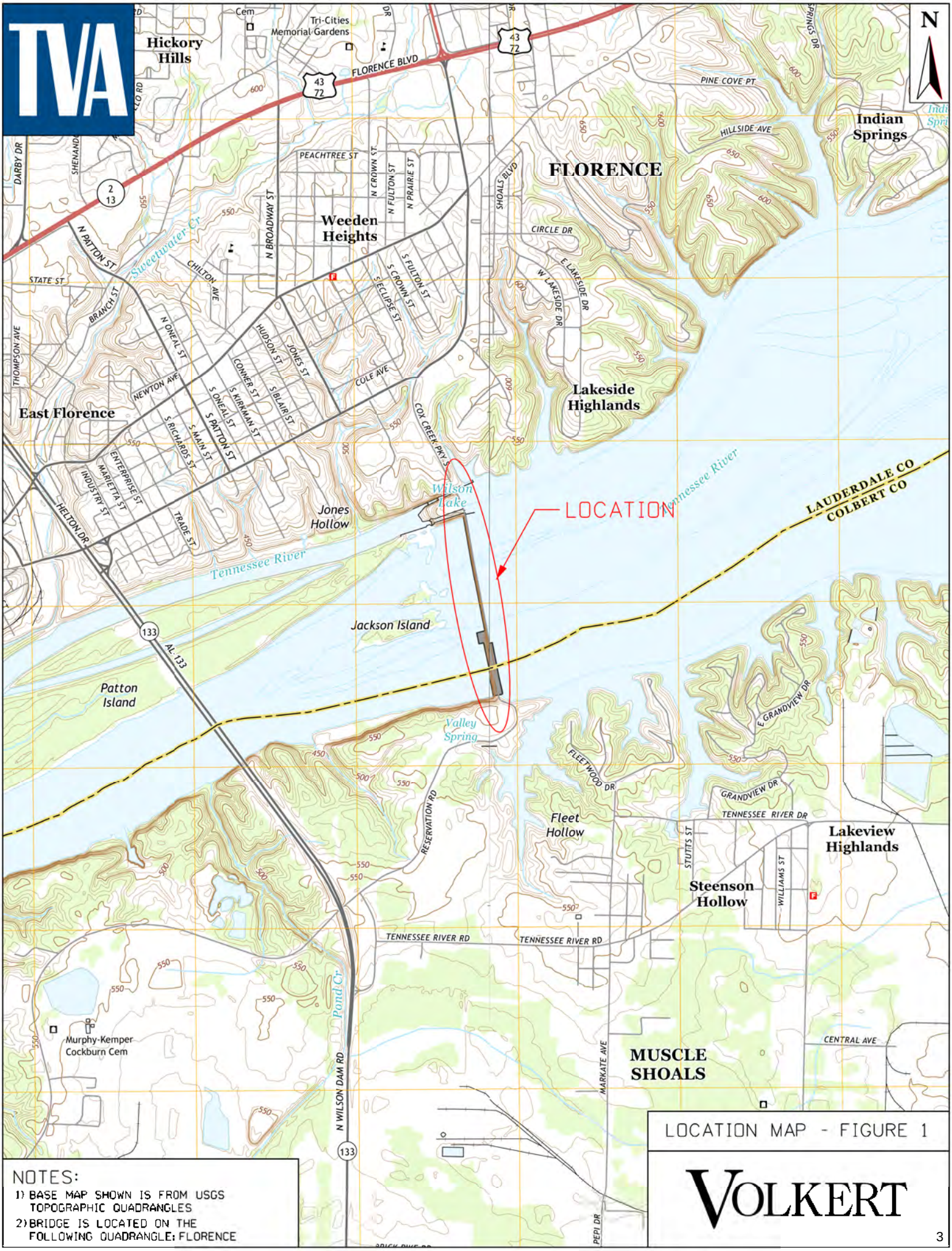
The total preliminary estimated cost for the repair schemes ranged from $1,614,000 for Repair Scheme A to $4,743,000 for Repair Scheme D.

2.0 Project Description

The purpose of this study is to develop repair options and cost estimates for consideration by the Tennessee Valley Authority (TVA) for the bridge over Wilson Dam. The primary goal is to present viable conceptual repair options for stopping the flow of water through the deck and parapets and removing and replacing deteriorated concrete on the arch faces. The project limits for this study include the concrete arches on the dam above the spring line, bridge deck, curbs, parapets, and sidewalks between the control building and the beginning of the main bridge over the lock. Deficiencies and associated repair options have been identified. The repair options provided herein have been developed through review of state DOT bridge repair practice for similar deficiencies and discussions with product suppliers. Repairs have been grouped to provide repair schemes and their associated cost estimates that range from a lower end to a higher end rehabilitation option.

The original construction of Wilson Dam by the Army Corp of Engineers began in 1918 and was completed in 1924. The dam was acquired by TVA in 1933. The original wearing surface was brick pavers which were removed in the late 1950s and replaced with a concrete deck when the additional steel superstructure viaduct was constructed over the lock. The arch appears to be constructed of mass unreinforced concrete. The bridge deck also appears to be unreinforced. Available plans are provided in Appendix A.

The dam and bridge are listed on the National Register of Historic Places and Wilson Dam is listed as a National Historic Landmark. Wilson Dam spans the Tennessee River between Florence and Muscle Shoals, Alabama (see Figure 1). The impoundment of the Tennessee River above Wilson Dam has created Wilson Lake to the east with Pickwick Lake to the west.



NOTES:

1) BASE MAP SHOWN IS FROM USGS TOPOGRAPHIC QUADRANGLES
2) BRIDGE IS LOCATED ON THE FOLLOWING QUADRANGLE: FLORENCE

LOCATION MAP - FIGURE 1

VOLKERT

3.0 Field Investigation

For this Phase 1 study, only a minor amount of field investigation was undertaken. For future phases of the project, more field investigation is recommended to better refine quantities used to develop cost estimates. The field investigation for this study included a combination of traffic counts, ground penetrating radar (GPR), concrete sampling and testing, concrete sounding using hammers, visual observation, and field survey.

3.1 Traffic Analysis

Traffic counts were completed using two cameras attached to a light pole approximately 500' north of the main bridge over the lock along South Cox Creek Parkway. Data was collected on Thursday, July 27, 2017 through Saturday, July 29, 2017. Bi-directional average daily traffic (ADT) in 15-minute increments was collected. Average Daily Traffic and Peak Hour Traffic are shown in Table 1 and Table 2, respectively.

DATE	ADT	NORTHBOUND	SOUTHBOUND
Thursday, July 27, 2017	3,639	1,749	1,890
Friday, July 28, 2017	3,472	1,660	1,812
Saturday, July 29, 2017	3,492	1,626	1,866

Table 1: Average Daily Traffic

TIME	PEAK TOTAL	NORTHBOUND	SOUTHBOUND
Thursday, July 27, 2017			
7:15 – 8:15	240	69	171
11:15 – 12:15	229	124	105
15:30 – 16:30	358	232	126
Friday, July 28, 2017			
6:30 – 7:30	182	44	138
11:00 – 12:00	218	122	96
15:30 – 16:30	326	208	118
Saturday, July 29, 2017			
7:45 – 8:45	138	77	61
11:00 – 12:00	269	142	127
15:15 – 16:15	291	132	159

Table 2: Peak Hour Traffic (By Day)

Additional traffic data including turn movement counts, can be found in Appendix B.

3.2 Concrete Sampling and Testing Results

A total of six locations were identified for deck sampling. At each location, a core sample was taken through the newer concrete deck (deck) and the original arch structure (arch). At each location, ground penetrating radar (GPR) testing was performed prior to concrete coring to determine if any obstructions (conduit, reinforcement, etc.) would interfere with the coring. Sampling locations for which conduit interfered were relocated slightly to avoid the conflict. During GPR testing, it was observed that a thin layer was present approximately eight to ten inches below the surface. It is believed that this is potentially a layer of deteriorated bedding material (void) from the original pavers that was not properly removed before the new deck was cast. A sample GPR image is presented in Figure 2. A schematic of the core locations is shown in Figure 3 with a summary of the sample locations, deck and void thicknesses, and tests to be performed shown in Table 3. For the complete GPR Observation Report, see Appendix C.

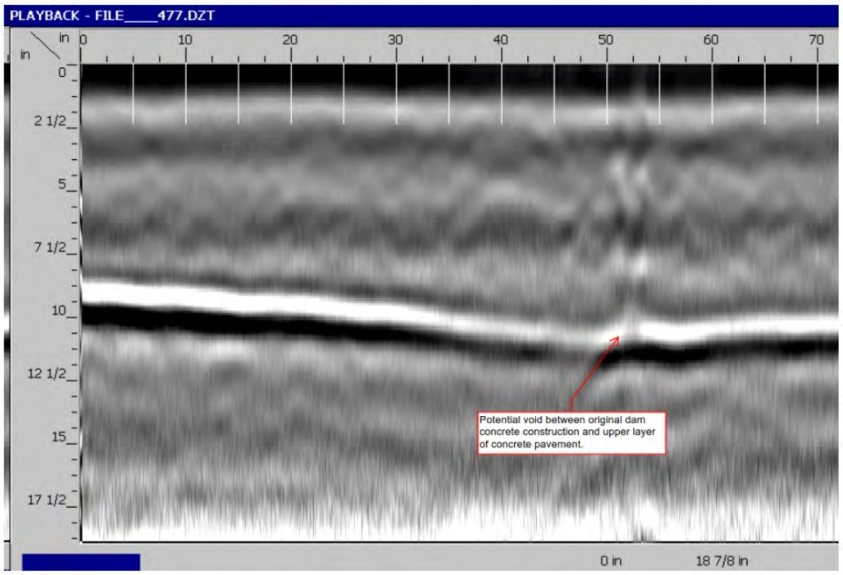
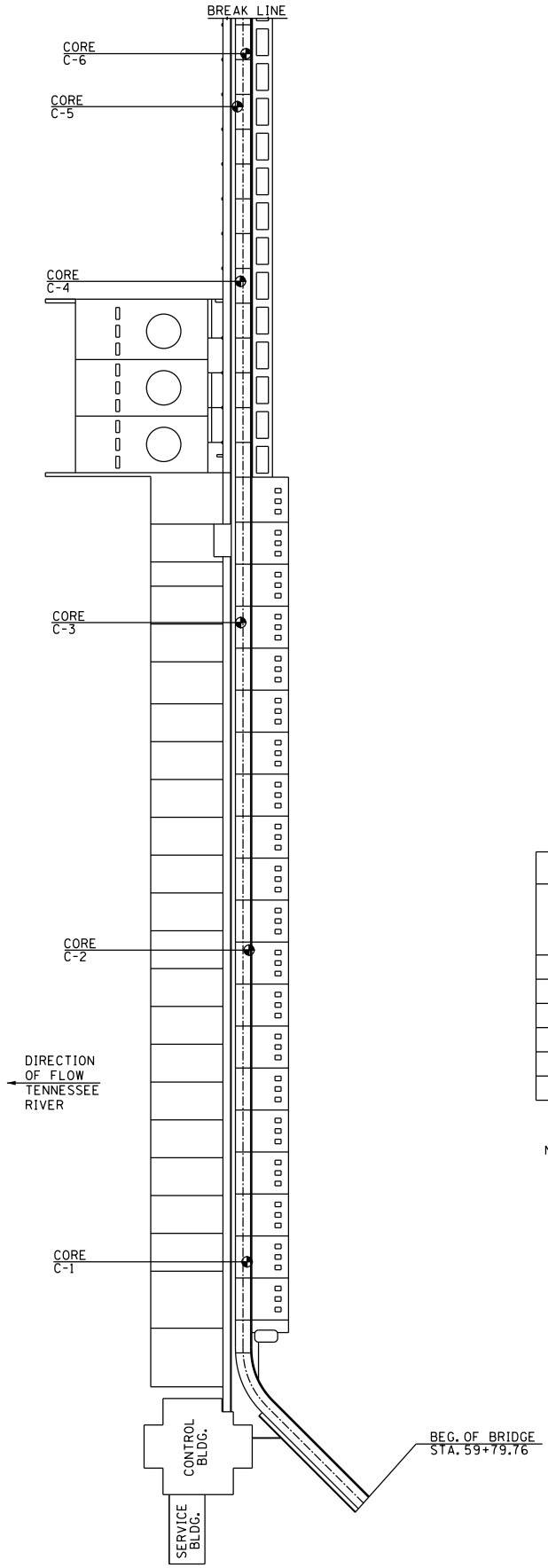


Figure 2: Sample GPR Image

CORE NO.	DECK THICK.	VOID DEPTH	SPECIMENS TO BE TESTED					
			CHLORIDE		PETROGRAPHY		COMPRESSION	
			DECK	ARCH	DECK	ARCH	DECK	ARCH
1	8.250”	0.250”		YES		YES	YES	
2	7.750”	0.250”					YES	
3	9.250”	0.500”	YES	YES	YES	YES		
4	8.750”	0.125”	YES	YES	YES	YES		
5	9.125”	0.250”		YES		YES	YES	
6	9.625”	0.125”					YES	

Table 3: Concrete Deck and Arch Sample Data



CORE LOCATIONS		
DESCRIPTION	STATION	OFFSET FT.
C-1	64+25.76	5.33 RT.
C-2	68+37.76	8.00' RT.
C-3	72+70.76	3.00' LT.
C-4•	77+21.76	3.33' LT.
C-5	79+52.76	7.42' LT.
C-6	80+22.76	4.00' RT.

• CONTROL SAMPLES

NOTE: OFFSET DESIGNATION BASED ON LOOKING FORWARD ON SURVEY.

PLAN VIEW OF CORE SAMPLE LOCATIONS

VOLKERT

TVA

WILSON DAM BRIDGE DECK REFURBISHMENT STUDY

DRAWN BY	A.D.A.	DATE	10-10-2017	FIGURE 3
CHECKED BY	J.T.E.	PROJ.NO.	741400.17	
BACKCHECKED BY	A.A.M.	SCALE	N.T.S.	

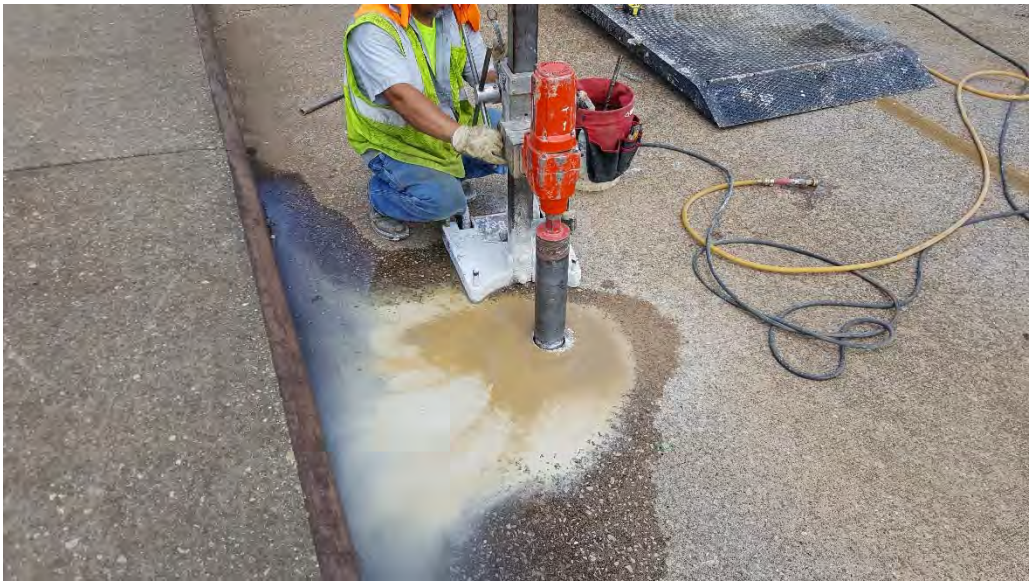


Figure 4: Typical Concrete Coring Setup

Figure 5: Typical Deck and Arch Samples

As can be seen in Table 3, this deteriorated layer (void) varied in depth from 0.125" to 0.500" for the samples collected. It is believed that the differential settlement along the deck slab is the probable cause of the cracking in the deck. This cracking has allowed water to pass through the deck, where it travels along the construction joint between the arch and the deck, eventually daylighting along the arch face. This passage of water is believed to be the cause of the deterioration of the concrete in the face of the arch.

Concrete testing on samples collected included petrographic examination, thin section examination, Los-Alamos stain tests, chloride analysis, and compressive testing. A complete report of the testing results can be found in Appendix D. A summary of the findings include:

- The concrete represented by each of the cores consisted of plain well-hydrated concrete. Coarse aggregates consisted of a combination of crushed limestone and chert, and fine aggregates consisted of natural sand.
- The presence of alkali-silica reactive aggregates was not detected by either Los Alamos staining or visual or microscopic examinations.
- The bridge deck cores were slightly-to-moderately air entrained. The arch cores were not air entrained. No honeycombing was observed in the samples.
- None of the samples contained reinforcing steel or wire mesh.
- Core #3 from the bridge deck was cored over an apparent open fracture, as evidenced by discoloration and the presence of calcium carbonate deposits. Core #3 from the arch exhibited the presence of carbonated fractures normal to the core axis, indicative of likely freeze-thaw distress.
- Microfracturing of the matrices was observed in each of the cores. In half of the cores (Core #3 and Core #4 from the arch and Core #3 from the bridge deck), these fractures appeared to the associated with the presence of expansive ettringite, which was also present in the matrices and air voids of the majority of the cores. This is suggestive of sulfate attack of the concrete.
- Chloride analyses indicated slightly elevated to elevated acid soluble (total) chlorides in half of the samples, but water-soluble chlorides, those typically associated with corrosion of steel reinforcement or concrete scaling, were minimal, with several results just above detection limits.
- Compressive strength tests from the bridge deck samples indicated strengths of 4,830 psi to 5,610 psi.

3.3 Field Observations and Measurements

Concrete faces for the arches adjacent to the turnaround, at approximate station 73+55, were visually observed from the turnaround and their areas of deteriorated concrete estimated. Five arches were estimated in all totaling approximately 10% of the project limits. The deteriorated area of those five arches was assumed to be representative of the entire project when calculating repair quantities. Further hands-on inspection of the arch faces by sounding is recommended in future project phases to better quantify the limits of this deterioration. It is also recommended that concrete cores be taken horizontally along the arch for further evaluation.

Figure 6: Typical Arch Deterioration

Beginning at the turnaround and extending approximately 722’ toward the control building, our staff sounded the concrete surfaces of the bridge rails and sidewalks on both sides of the roadway to estimate the deteriorated concrete areas. The length of visible deck crack in each span as well as any areas of needed full depth deck repair were also estimated. The inspected account for approximately 27% of the structure. The areas of repair observed over these limits was assumed to be representative of the entire project limits when calculating repair quantities for the cost estimates.

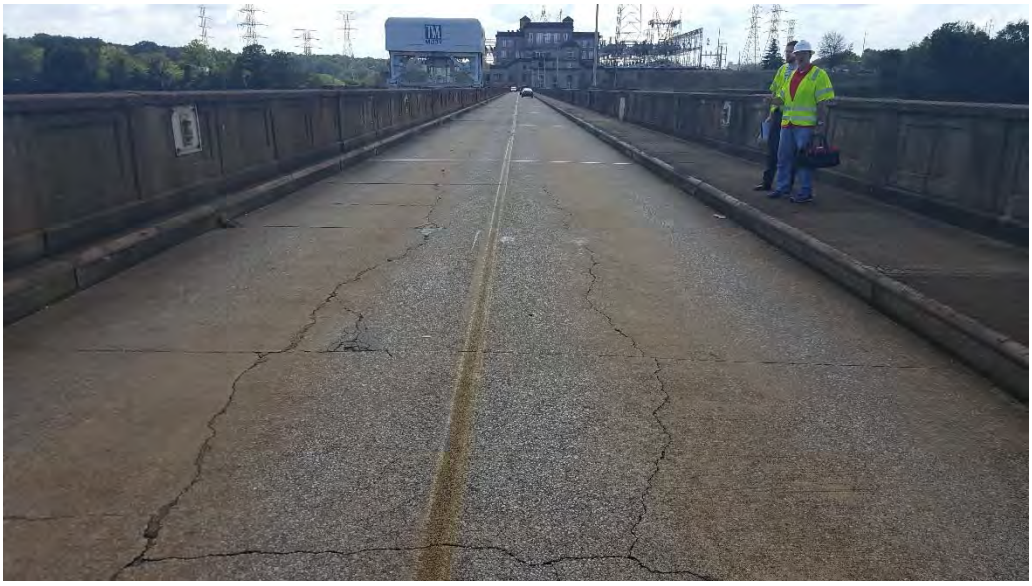


Figure 7: Typical Deck Cracking

Figure 8: Typical Deck Patching

Figure 9: Typical Sidewalk Spall

Figure 10: Typical Rail Spall

3.4 Field Survey and Deck Drainage

Field survey was completed by taking cross-sections at approximately fifty foot intervals along the structure. In addition to these cross-sections, each deck drain was also located and the elevations recorded. The finished grade elevation determined through this survey matched very closely with the elevation shown in the plans of 524.60. The surveyed elevations stayed fairly consistent and ranged from approximately 524.52 to 524.78. The cross-slope of the roadway measured approximately between one and two percent.

A hydraulic analysis was performed to see how the existing deck drains will handle a 10-year storm event. The 10-year design frequency is what is required by ALDOT for bridge deck drainage design. Using the FHWA HEC 21 formula for flat bridges, a required inlet spacing of 90' was derived. The spacing of the existing deck drains varies from approximately 46' to 55', so this criteria appears to be met. Due to the structure not having shoulders, the ALDOT criteria of limiting spread to the shoulders could not be met. Therefore, we assumed a maximum allowable spread of one-half of the travel lane, which is allowed by some agencies on lower speed facilities. The calculations can be found in Appendix E. These calculations do not take into consideration the size and flow capacity of the existing deck drains. The capacity of the existing drains could not be verified due to the unique configuration that is no longer typically used, and no published information could be found to confidently determine the existing grate capacities.

Figure 11: Typical Deck Drain

4.0 Repair Techniques

For each of the deficiencies noted during the field investigation, repair techniques have been identified based on our staff's experience with similar projects, research of multiple state DOT procedures, and discussions with product suppliers. Possible repair techniques are discussed in the following sections.

4.1 Bridge Deck

As discussed previously, it is believed that the presence of the "void" between the original arch concrete and the newer concrete deck is the probable cause of the deck cracking. Repair technique options include:

- Stabilize deck and "level-out" riding surface by spot grinding
- Stabilize deck and construct new latex modified concrete overlay
- Remove and replace existing deck

Preliminary repair details for each of these techniques are shown in Figures 12 through 14. For stabilization of the deck, a product such as Uretek 486 STAR Polymer is recommended. These products can be injected through the deck using ports which will stabilize and stiffen the "void" layer. Product data can be found in Appendix F. Stabilizing the deck will provide a lower cost alternative when compared to a complete removal and replacement of the deck. It does, however, come with the risk of less certainty of whether or not the polymer filled all of the voids. This is discussed further in Section 6.0.

4.2 Concrete Arches

The concrete arch faces exhibit a large amount of concrete spall near the top surface as discussed in Section 3.3. This deterioration is believed to be a result of water passing through the existing deck and working its way across the construction joint between the original arch and new overlay and deteriorating the arch face. Once the deck is repaired and sealed from water infiltration, it is recommended to repair this deteriorated arch concrete. Arch faces should be sounded and deteriorated concrete removed. Since the arch is unreinforced, the patch concrete should be anchored in place through the use of concrete anchors and welded wire reinforcement as shown in Figure 15.

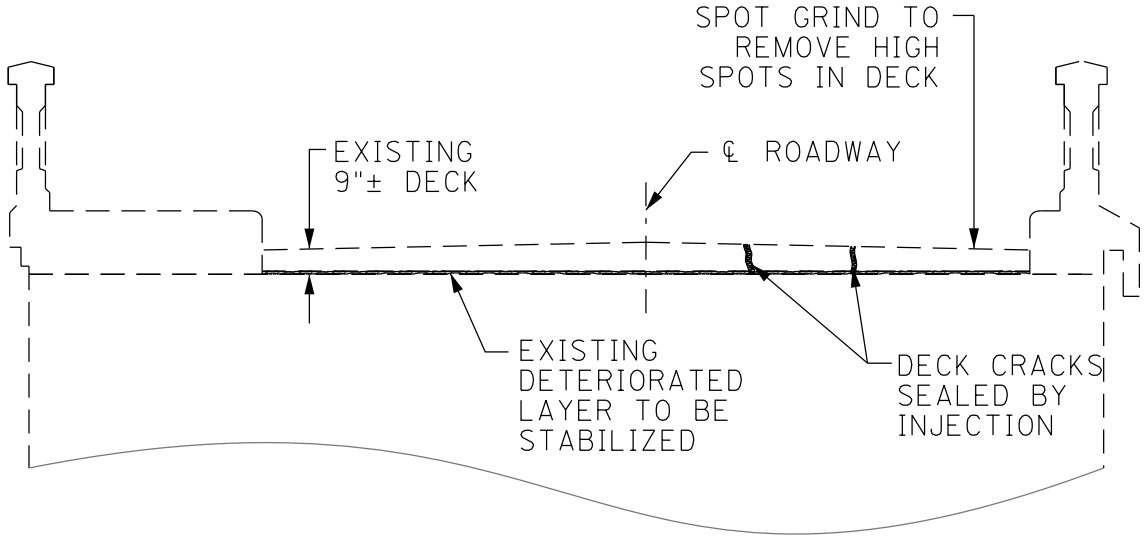
4.3 Miscellaneous Concrete Repairs

Additional concrete repairs were also identified during this preliminary field investigation. They include full depth deck repairs, sidewalk spall repairs, and barrier rail spall repairs. Details for each of these

repairs are presented in Figures 16 through 18. The details provided for full depth deck repair should be used on spot areas should the stabilization option be selected for the global scheme on the deck.

4.4 Deck Drainage

Based on past experience, we do not expect the existing deck drains to be able to adequately drain the deck surface once the deck cracks are sealed. We recommend that additional deck drains be added to the structure. These could be placed near the mid-span of each arch and have a similar shape and size as the existing grate inlets currently installed on the deck near the beginning of the flyover over the lock.



PROPOSED CONSTRUCTION

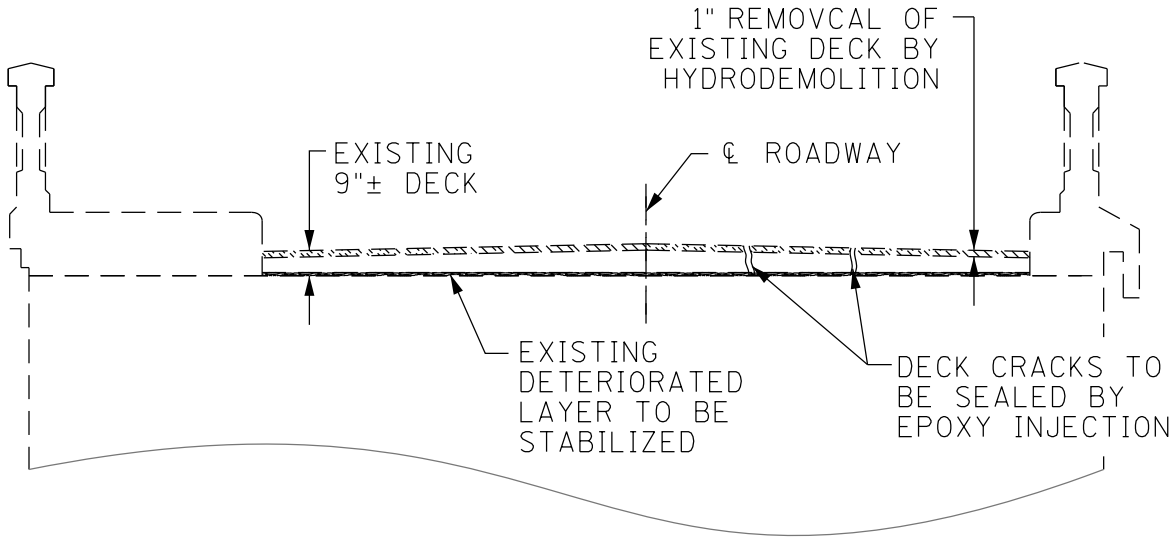
DECK STABILIZATION AND REPAIR

VOLKERT

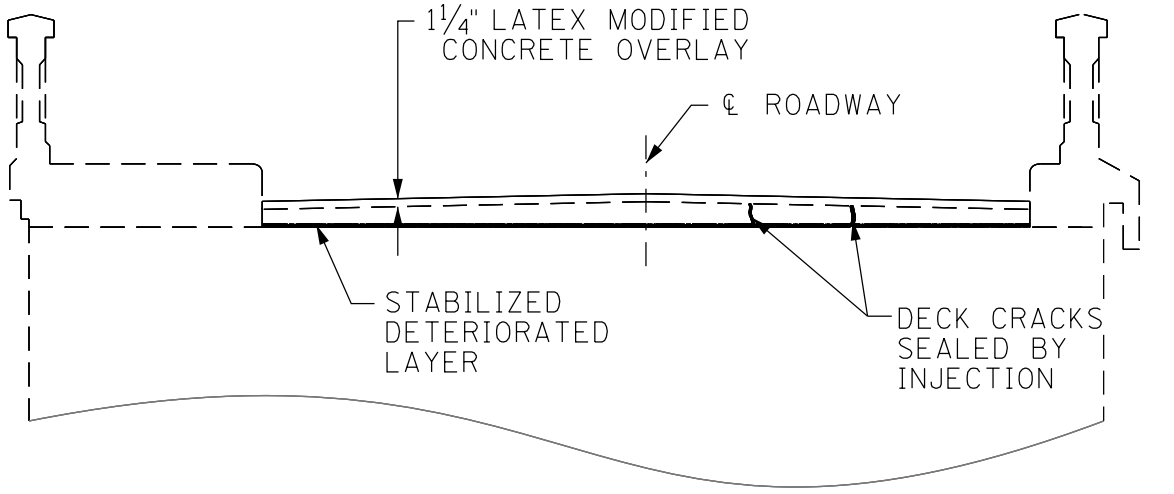
TVA

WILSON DAM BRIDGE
DECK REFURBISHMENT
STUDY

DRAWN BY A.D.A.	DATE 10-10-2017	FIGURE
CHECKED BY J.T.E.	PROJ.NO. 741400.17	12
BACKCHECKED BY A.A.M.	SCALE N.T.S.	



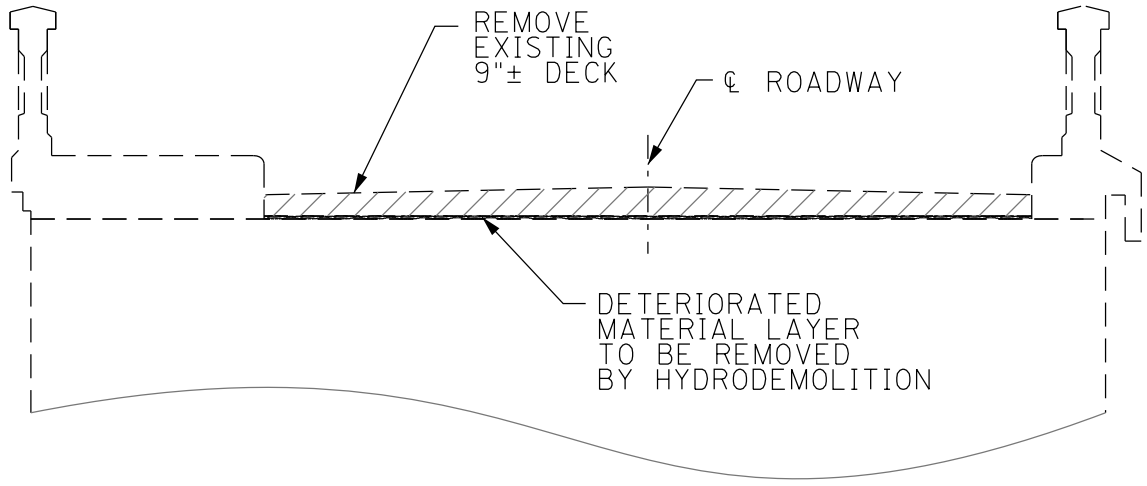
PROPOSED CONSTRUCTION



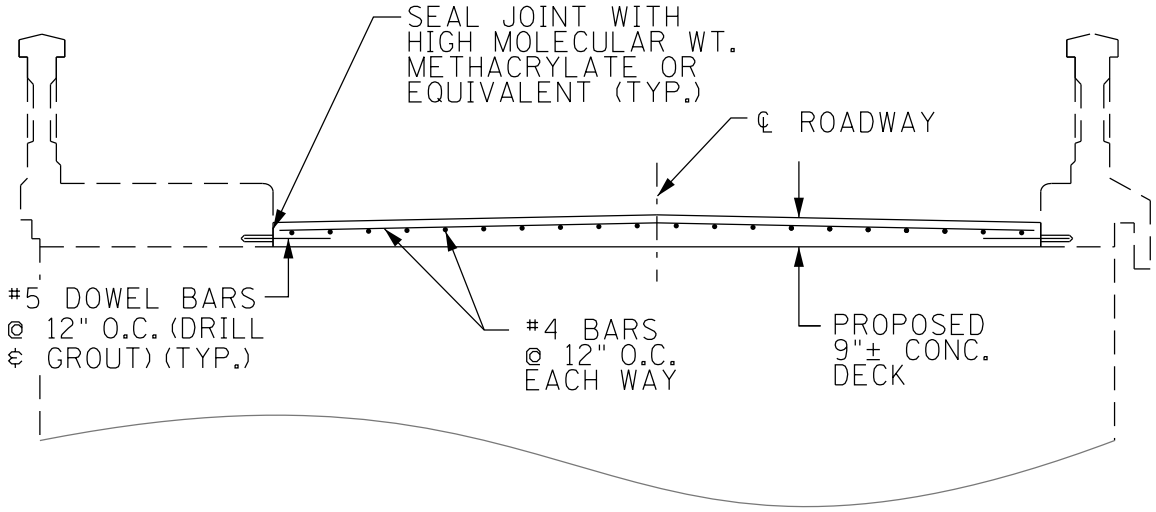
PROPOSED CONSTRUCTION

DECK STABILIZATION AND REPAIR WITH PROPOSED OVERLAY

VOLKERT	TVA WILSON DAM BRIDGE DECK REFURBISHMENT STUDY	DRAWN BY A.D.A.	DATE 10-10-2017	FIGURE 13
		CHECKED BY J.T.E.	PROJ.NO. 741400.17	
		BACKCHECKED BY A.A.M.	SCALE N.T.S.	



PROPOSED REMOVAL



PROPOSED CONSTRUCTION

FULL DECK REPLACEMENT

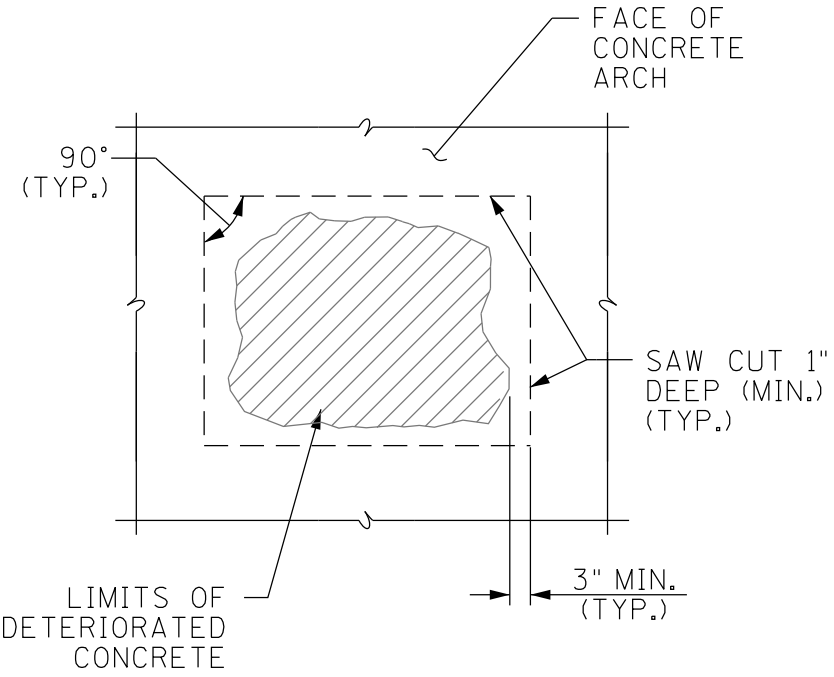
VOLKERT

TVA

WILSON DAM BRIDGE
DECK REFURBISHMENT
STUDY

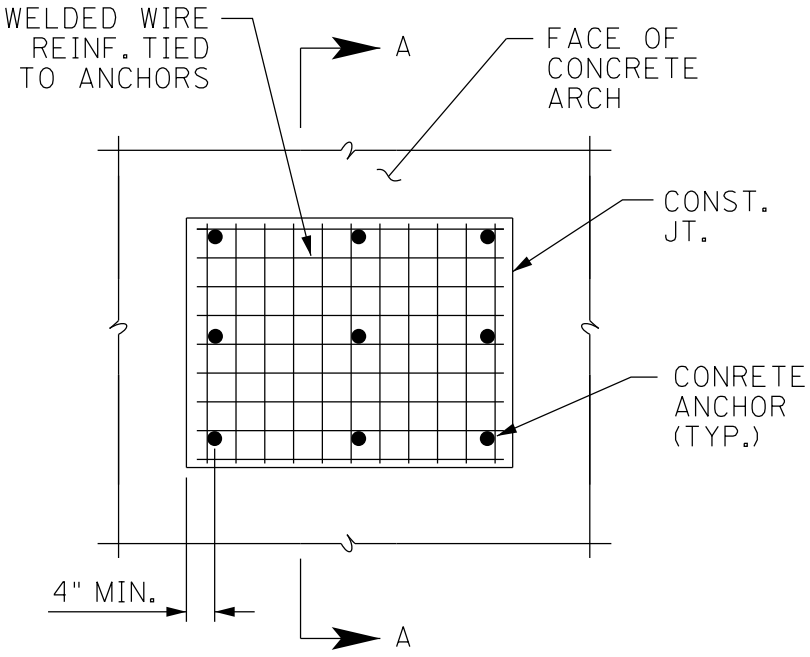
DRAWN BY	A.D.A.	DATE	10-10-2017	FIGURE
CHECKED BY	J.T.E.	PROJ.NO.	741400.17	14
BACKCHECKED BY	A.A.M.	SCALE	N.T.S.	

STEP 1

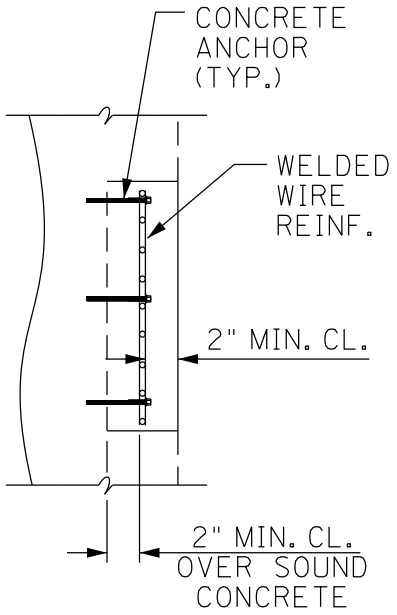


PLAN

STEP 2



PLAN

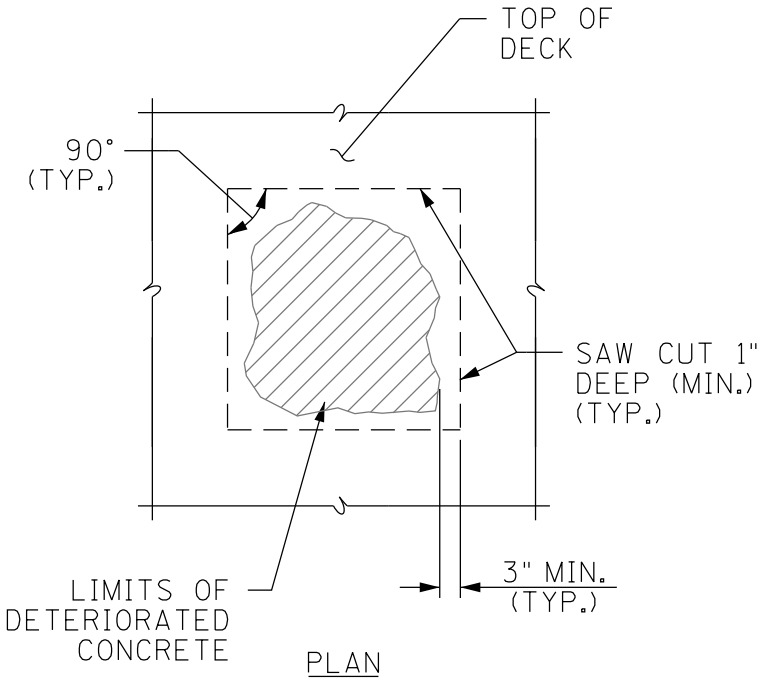


SECTION A-A

UNREINFORCED CONCRETE ARCH REPAIR

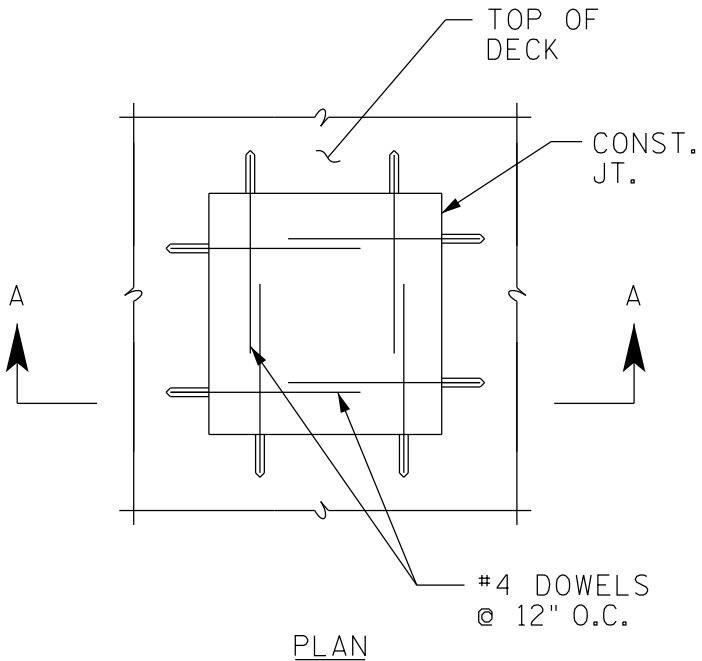
VOLKERT / TVA	WILSON DAM BRIDGE DECK REFURBISHMENT STUDY	DRAWN BY A.D.A.	DATE 10-10-2017	FIGURE 15
		CHECKED BY J.T.E.	PROJ.NO. 741400.17	
		BACKCHECKED BY A.A.M.	SCALE N.T.S.	

STEP 1

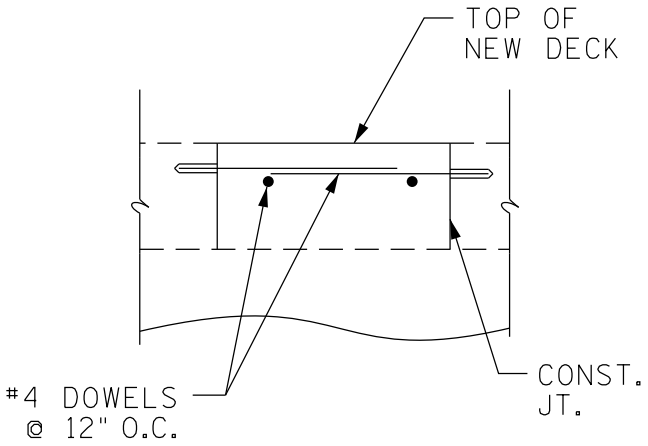


PLAN

STEP 2



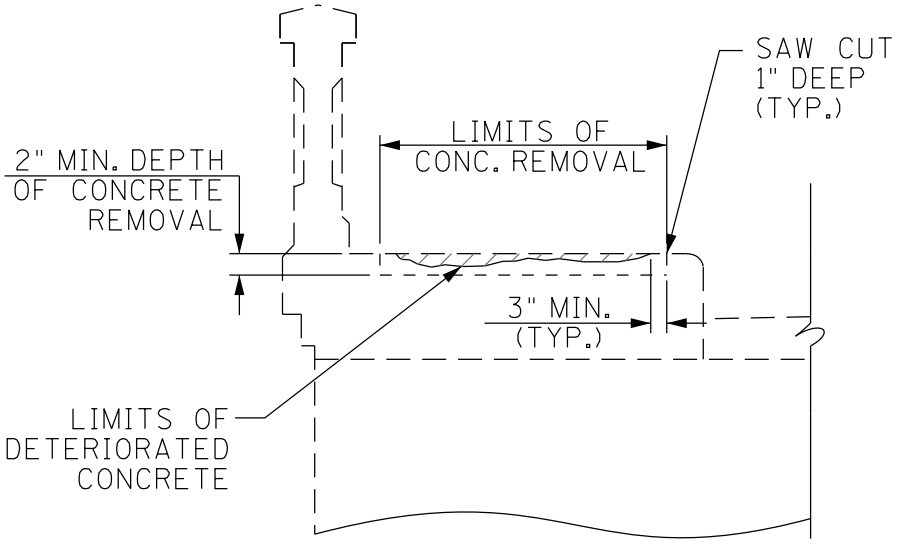
PLAN



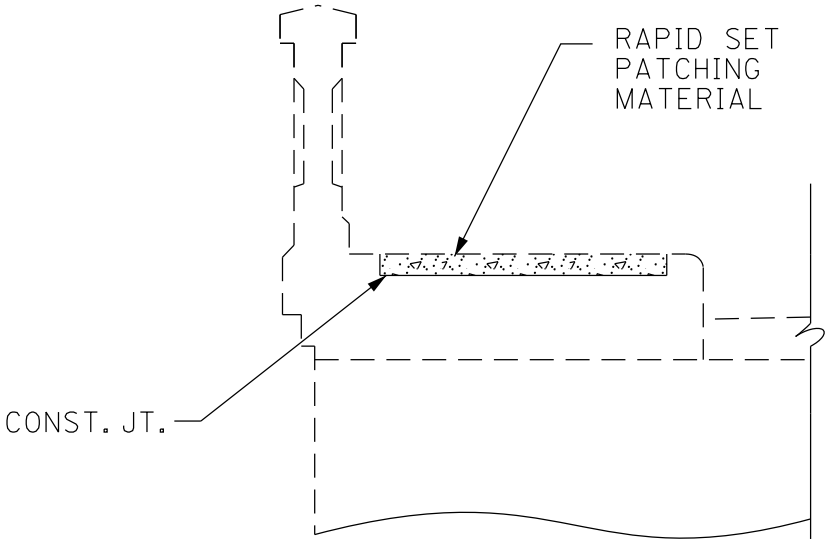
SECTION A-A

CONCRETE DECK REPAIR

VOLKERT / TVA	WILSON DAM BRIDGE DECK REFURBISHMENT STUDY	DRAWN BY A.D.A.	DATE 10-10-2017	FIGURE 16
		CHECKED BY J.T.E.	PROJ.NO. 741400.17	
		BACKCHECKED BY A.A.M.	SCALE N.T.S.	



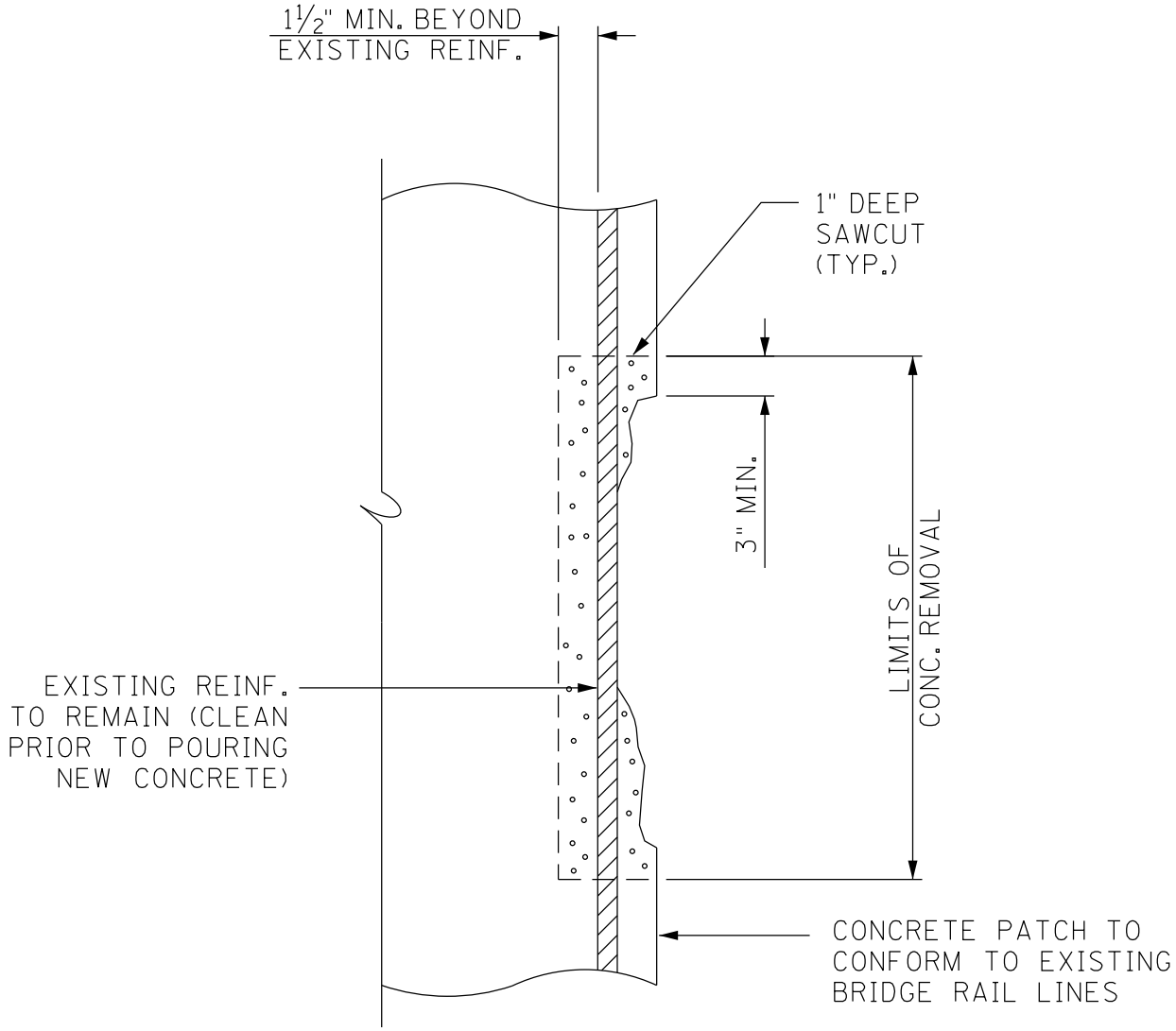
PROPOSED REMOVAL



PROPOSED CONSTRUCTION

SIDEWALK SPALL REPAIR

VOLKERT	TVA WILSON DAM BRIDGE DECK REFURBISHMENT STUDY	DRAWN BY A.D.A.	DATE 10-10-2017	FIGURE 17
		CHECKED BY J.T.E.	PROJ.NO. 741400.17	
		BACKCHECKED BY A.A.M.	SCALE N.T.S.	



PROPOSED REPAIR

BRIDGE RAIL SPALL REPAIR

VOLKERT

TVA

WILSON DAM BRIDGE DECK REFURBISHMENT STUDY

DRAWN BY	A.D.A.	DATE	10-10-2017	FIGURE
CHECKED BY	J.T.E.	PROJ.NO.	741400.17	18
BACKCHECKED BY	A.A.M.	SCALE	N.T.S.	

5.0 Preliminary Cost Estimates

Based on the field investigation undertaken for this phase of the project, preliminary estimated quantities were calculated as shown in Appendix G. Using the repair details provided herein, unit prices were developed by comparing historical pricing data from other projects, discussions with product suppliers, and discussions with contractors. A discussion of each repair scheme and its associated cost estimate are provided in the following sections.

5.1 Repair Scheme A

The first repair scheme considered seeks to provide a least-cost alternative to meet the minimum needs of the project. This scheme will:

- Stabilize the bridge deck by pressure injecting Uretek polymer or an equivalent product into the "void" between the arch concrete and the existing concrete overlay.
- Repair existing deck cracks by epoxy injection.
- Perform spot full depth concrete deck repairs of the existing concrete overlay.
- Perform spot grinding of existing bridge deck to remove high spots for rideability.
- Patch deteriorated concrete arch faces.

TABLE 4: PRELIMINARY ESTIMATED COST - REPAIR SCHEME A					
Repair Item	**Location**	**Unit**	**Quantity**	**Unit Price**	**Total Price**
Deck Stabilization	Bridge Deck	GAL	744	$220.00	$163,680.00
Deck Crack Repair	Bridge Deck	LF	3558	$120.00	$426,960.00
Deck Crack Repair	Bridge Deck	GAL	178	$190.00	$33,820.00
Deck Concrete Repair	Bridge Deck	SY	101	$950.00	$95,950.00
Spot Grinding of Bridge Deck	Bridge Deck	SY	595	$7.00	$4,165.00
Patch Arch Faces	Arches	CF	1186	$375.00	$444,750.00
SUBTOTAL					**$1,169,325.00**
Mobilization			15%	$175,398.75	$175,398.75
Contingency			20%	$268,944.75	$268,944.75
PRELIMINARY ESTIMATED COST:					**$1,614,000.00**

5.2 Repair Scheme B

The second repair scheme provides the same deck repair technique as Repair Scheme A and adds the patching of the sidewalks and rails and retrofits the deck drainage. This scheme will:

- Stabilize the bridge deck by pressure injecting Uretek polymer or an equivalent product into the "void" between the arch concrete and the existing concrete overlay.
- Repair existing deck cracks by epoxy injection.
- Perform spot full depth concrete deck repairs of the existing concrete overlay.
- Perform spot grinding of existing bridge deck to remove high spots for rideability.
- Patch deteriorated concrete arch faces.
- Patch deteriorated concrete surfaces of the rails and sidewalks.
- Provide retrofits to deck drainage.

TABLE 5: PRELIMINARY ESTIMATED COST - REPAIR SCHEME B					
Repair Item	**Location**	**Unit**	**Quantity**	**Unit Price**	**Total Price**
Deck Stabilization	Bridge Deck	GAL	744	$220.00	$163,680.00
Deck Crack Repair	Bridge Deck	LF	3558	$120.00	$426,960.00
Deck Crack Repair	Bridge Deck	GAL	178	$190.00	$33,820.00
Deck Concrete Repair	Bridge Deck	SY	101	$950.00	$95,950.00
Spot Grinding of Bridge Deck	Bridge Deck	SY	595	$7.00	$4,165.00
Patch Arch Faces	Arches	CF	1186	$375.00	$444,750.00
Sidewalk Patching	Sidewalks	SF	1416	$210.00	$297,360.00
Bridge Rail Patching	Bridge Rails	SF	553	$150.00	$82,950.00
Install New Deck Drains	Bridge Deck	EA	106	$2,500.00	$265,000.00
SUBTOTAL					**$1,814,635.00**
Mobilization			15%	$272,195.25	$272,195.25
Contingency			20%	$417,366.05	$417,366.05
PRELIMINARY ESTIMATED COST:					**$2,505,000.00**

5.3 Repair Scheme C

The third repair scheme is similar to Repair Scheme B except that it also provides a new latex modified concrete overlay and the accompanying joint modifications. This scheme will:

- Stabilize the bridge deck by pressure injecting Uretek polymer or an equivalent product into the "void" between the arch concrete and the existing concrete overlay.
- Repair existing deck cracks by epoxy injection.
- Perform spot full depth concrete deck repairs of the existing concrete overlay.
- Patch deteriorated concrete arch faces.
- Patch deteriorated concrete surfaces of the rails and sidewalks.
- Provide retrofits to deck drainage.
- Install a new latex modified concrete overlay.
- Resetting existing expansion joints.

TABLE 6: PRELIMINARY ESTIMATED COST - REPAIR SCHEME C					
Repair Item	**Location**	**Unit**	**Quantity**	**Unit Price**	**Total Price**
Deck Stabilization	Bridge Deck	GAL	744	$220.00	$163,680.00
Deck Crack Repair	Bridge Deck	LF	3558	$120.00	$426,960.00
Deck Crack Repair	Bridge Deck	GAL	178	$190.00	$33,820.00
Deck Concrete Repair	Bridge Deck	SY	101	$950.00	$95,950.00
Patch Arch Faces	Arches	CF	1186	$375.00	$444,750.00
Sidewalk Patching	Sidewalks	SF	1416	$210.00	$297,360.00
Bridge Rail Patching	Bridge Rails	SF	553	$150.00	$82,950.00
Surface Prep by Hydrodemolition	Bridge Deck	SY	5946	$40.00	$237,840.00
Resetting Joints	Bridge Deck	LF	1100	$300.00	$330,000.00
LMC Bridge Deck Overlay	Bridge Deck	CY	248	$850.00	$210,800.00
Repaint Pavement Markings	Bridge Deck	LM	1	$4,000.00	$4,000.00
Install New Deck Drains	Bridge Deck	EA	106	$2,500.00	$265,000.00
SUBTOTAL					**$2,593,110.00**
Mobilization			15%	$388,966.50	$388,966.50
Contingency			20%	$596,415.30	$596,415.30
PRELIMINARY ESTIMATED COST:					**$3,579,000.00**

5.4 Repair Scheme D

The final repair scheme calls for a complete removal and replacement of the existing deck. This scheme would allow for removal of the "void" layer and provide the most certainty in the condition of the underlying arch material. This scheme will:

- Remove existing concrete bridge deck.
- Remove deteriorated material between arch and existing concrete bridge deck by hydrodemolition.
- Construct new reinforced concrete bridge deck.
- Reset existing bridge deck joints.
- Seal longitudinal construction joint between existing concrete curbs and new concrete deck.
- Patch deteriorated concrete arch faces.
- Patch deteriorated concrete surfaces of the rails and sidewalks.
- Provide retrofits to deck drainage.

TABLE 7: PRELIMINARY ESTIMATED COST - REPAIR SCHEME D					
Repair Item	**Location**	**Unit**	**Quantity**	**Unit Price**	**Total Price**
Remove Concrete Bridge Deck	Bridge Deck	SY	5946	$24.00	$142,704.00
Surface Prep by Hydrodemolition	Bridge Deck	SY	5946	$40.00	$237,840.00
Bridge Deck Concrete	Bridge Deck	CY	1487	$950.00	$1,412,650.00
Bridge Deck Reinforcement	Bridge Deck	LB	87236	$2.00	$174,472.00
Sealing Longitudinal Joints	Bridge Deck	LF	5352	$5.00	$26,760.00
Sealing Longitudinal Joints	Bridge Deck	GAL	72	$250.00	$18,000.00
Resetting Joints	Bridge Deck	LF	1100	$300.00	$330,000.00
Patch Arch Faces	Arches	CF	1186	$375.00	$444,750.00
Sidewalk Patching	Sidewalks	SF	1416	$210.00	$297,360.00
Bridge Rail Patching	Bridge Rails	SF	553	$150.00	$82,950.00
Repaint Pavement Markings	Bridge Deck	LM	1	$4,000.00	$4,000.00
Install New Deck Drains	Bridge Deck	EA	106	$2,500.00	$265,000.00
SUBTOTAL					**$3,436,486.00**
Mobilization			15%	$515,472.90	$515,472.90
Contingency			20%	$790,391.78	$790,391.78
PRELIMINARY ESTIMATED COST:					**$4,743,000.00**

5.5 Hybrid Repair Scheme

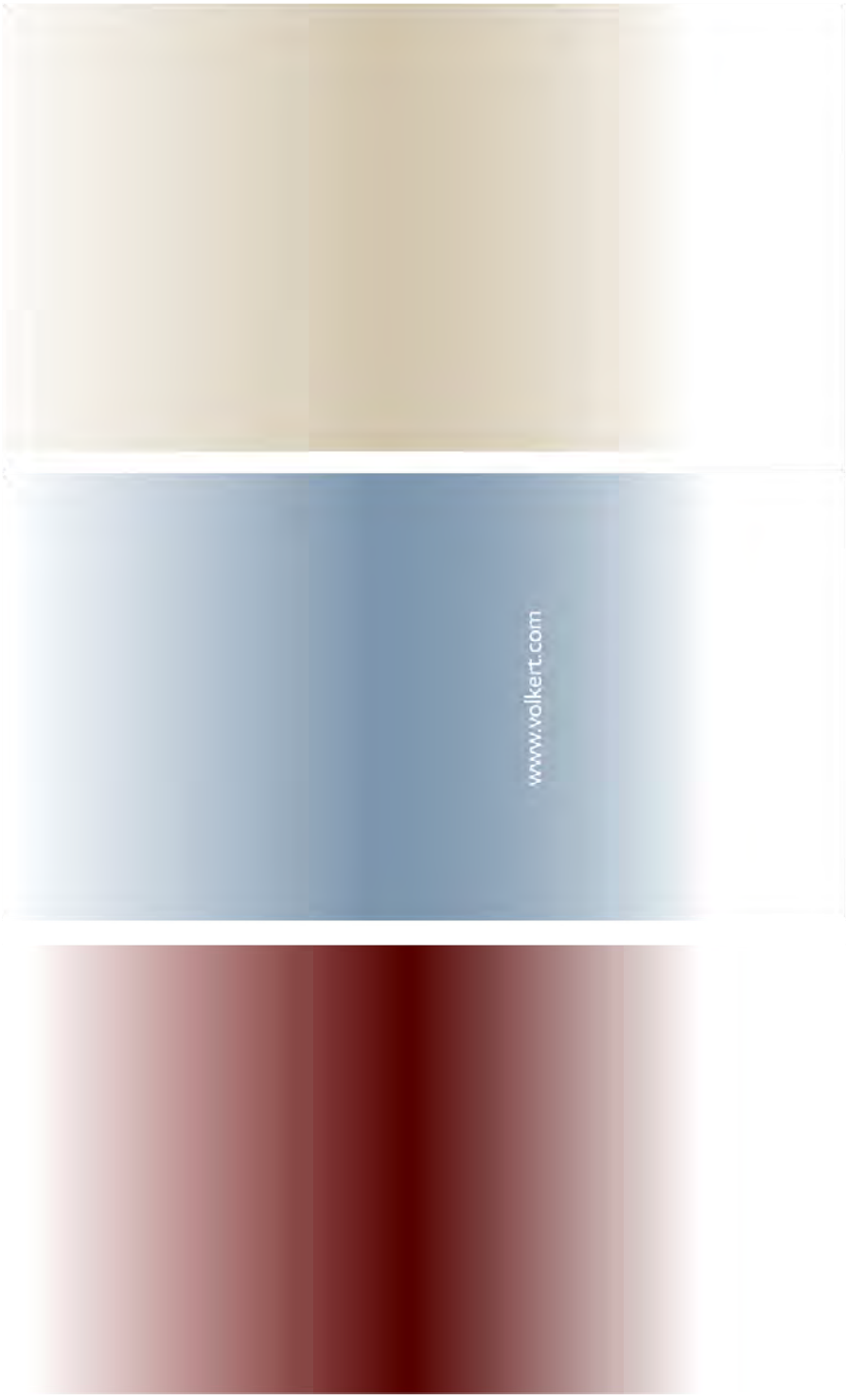
Another possible repair scheme that could also be considered by TVA is a hybrid scheme which combines Schemes A through D on a span-by-span basis. During the next phase of the project, Volkert and TVA staff could evaluate spans and assign a repair scheme to be used on each span. This approach may realize some cost savings, but would also require much more coordination between TVA's field representative, office staff, and the contractor to ensure that the proper repair technique is used on each respective span.

6.0 Assumptions, Risks, and Unknowns

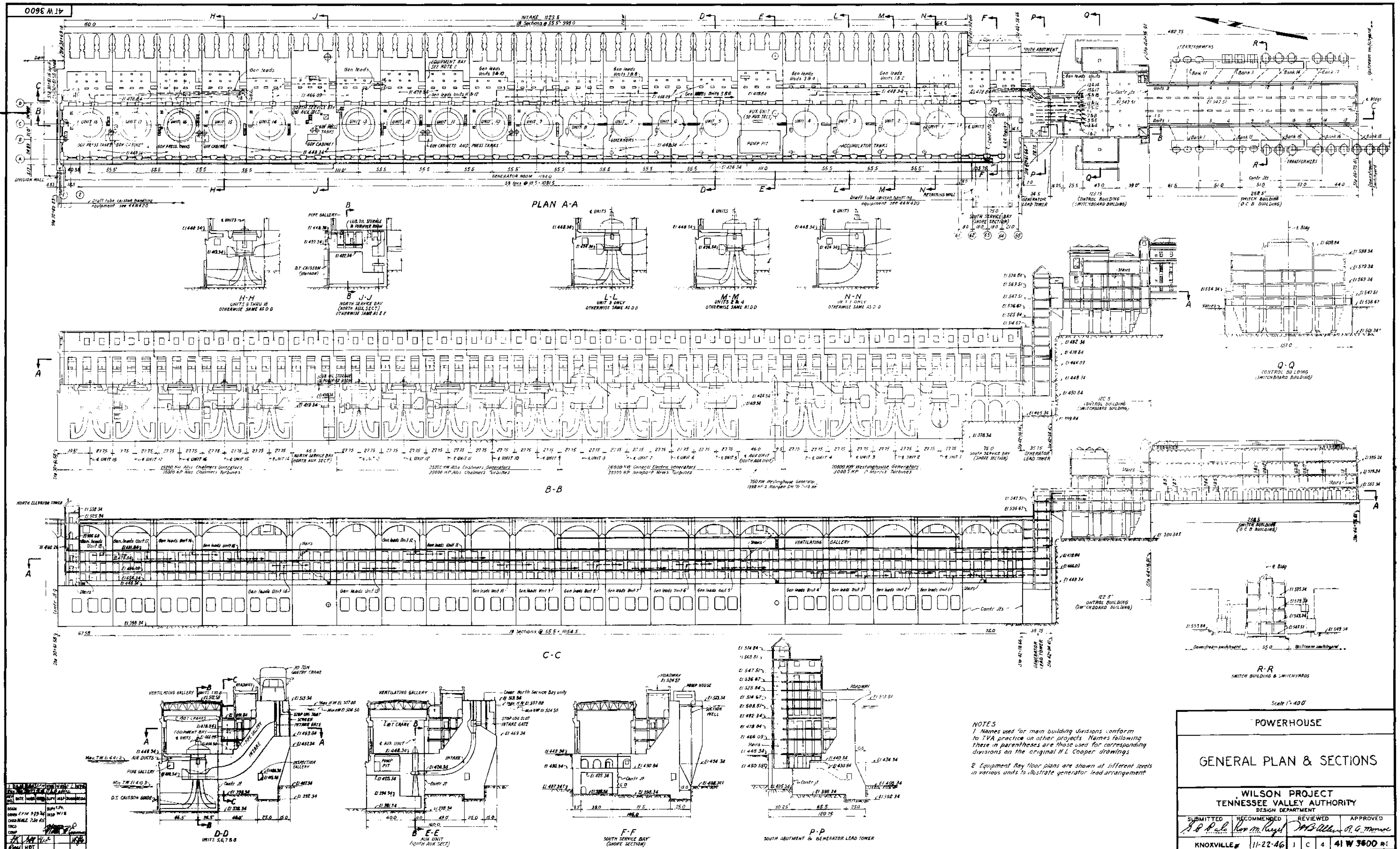
Every project comes with some amount of inherent risk. The best way to mitigate this risk is through the accumulation of a greater amount of information to attempt to reduce the number of unknowns and assumptions. For this Phase 1 study, the following notes are provided for TVA's consideration in their decision making process regarding future phases of this project.

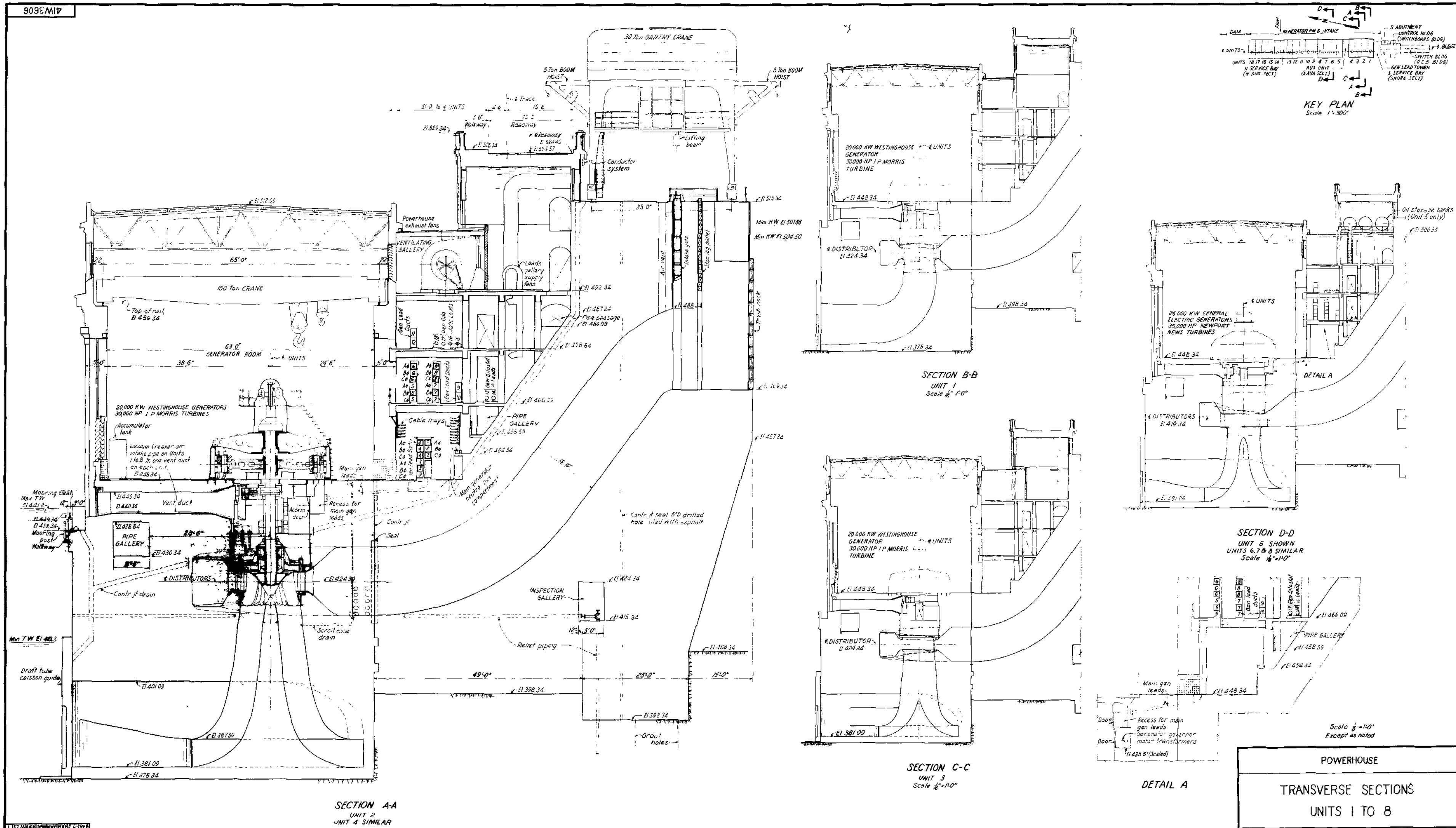
- It is assumed that the six concrete cores and their locations are representative of the entire project area. This is a risk typical with most roadway and bridge projects where a limited number of geotechnical borings are assumed to be representative of the entire project limits. This site has the additional risk with the uncertainty of the condition of the arch concrete below the existing concrete overlay and the extent of the "void" layer between the concrete lifts. While the arch cores that were sampled appear to be in good condition, it is possible that there could be areas of the arch concrete that are in poor condition due to years of water flowing through the deck. If this concrete is in poor condition or contains cracks, it could lead to additional material needing to be pumped in these areas resulting in quantity and price overruns.
- As shown in Section 3.2, the "void" layer appears as a dark band (reflection) when using the GPR testing. A risk of the stabilization schemes is the uncertainty in whether or not the pumped grout is filling all of the voids. It is most likely that a reflection will still be seen in that layer even after injection. It is the opinion of our GPR subconsultant that the reflection after injection would have a lower amplitude reflection than the void would cause. Unfortunately, however, they feel it would be a 50/50 chance whether or not accurate results are obtained. Additionally, they feel the best approach would be to do a pre-injection survey and then a post-injection survey at the same locations and compare the differences. A decision would need to be made as to whether these surveys would be done on the entire structure or whether a representative number of samples would be selected.
- There are potential environmental and safety risks on the project due to chipping of concrete and containment of materials. It will be of utmost importance that the contractor be aware of these risks and that proper means and methods are followed that will protect the environment, workers, and TVA staff and property.

- It is recommended that more hands-on inspection of the arch faces be performed during the next phase of the project to get a better estimate on the extent of the deterioration of the concrete. This may include the performance of horizontal cores in the arch face.
- Due to the historical significance of this structure, the contractor will be required to match the current appearance of the structure. It is recommended that the contractor be required to construct mock-ups using the same materials that will be incorporated in the repairs prior to the work being performed for approval by TVA or their representative.
- It is assumed that the bridge will be closed during the repairs to increase safety to workers and the motoring public and that these costs will not be included in contractor bids.
- Details and repair unit prices provided herein are based on past project experience with multiple DOTs for similar repair technique applications or discussions with product manufacturers. If TVA employs more strict contractual language than contractors typically see, fewer bidders may submit and/or higher unit prices could be seen to account for this perceived risk.
- It is assumed that the 1940s era deck slab and original concrete arch are unreinforced based on the limited plans information available. This is supported by the results of the GPR testing.



Appendix A
Existing Plans


41 W 3600
PLAN A-A
H-H
UNITS 9 THRU 18
OTHERWISE SAME AS D-D
J-J
NORTH SERVICE BAY
(NORTH AUX SECT)
OTHERWISE SAME AS E-E
L-L
UNIT 3 ONLY
OTHERWISE SAME AS D-D
M-M
UNITS 2 & 4
OTHERWISE SAME AS D-D
N-N
UNIT 1 ONLY
OTHERWISE SAME AS D-D
B-B
C-C
Q-Q
CONTROL BUILDING
(SWITCHBOARD BUILDING)
R-R
SWITCH BUILDING & SWITCHYARDS
D-D
UNITS 5,6,7 & 8
E-E
AUX UNIT
(SOUTH AUX SECT)
F-F
SOUTH SERVICE BAY
(SHORE SECTION)
P-P
SOUTH ABUTMENT & GENERATOR LEAD TOWER
Scale 1"=400'
NOTES
1 Names used for main building divisions conform to TVA practice on other projects Names following these in parentheses are those used for corresponding divisions on the original H L Cooper drawings
2 Equipment Bay floor plans are shown at different levels in various units to illustrate generator lead arrangement
POWERHOUSE
GENERAL PLAN & SECTIONS
WILSON PROJECT
TENNESSEE VALLEY AUTHORITY
DESIGN DEPARTMENT
SUBMITTED
RECOMMENDED
REVIEWED
APPROVED
KNOXVILLE
11-22-46
1
C
4
41 W 3600 R1
RECORD DRAWING AS CONSTRUCTED



NOTES
1 Details of Units 1,3,5 8 similar to SECT A A except as shown

POWERHOUSE

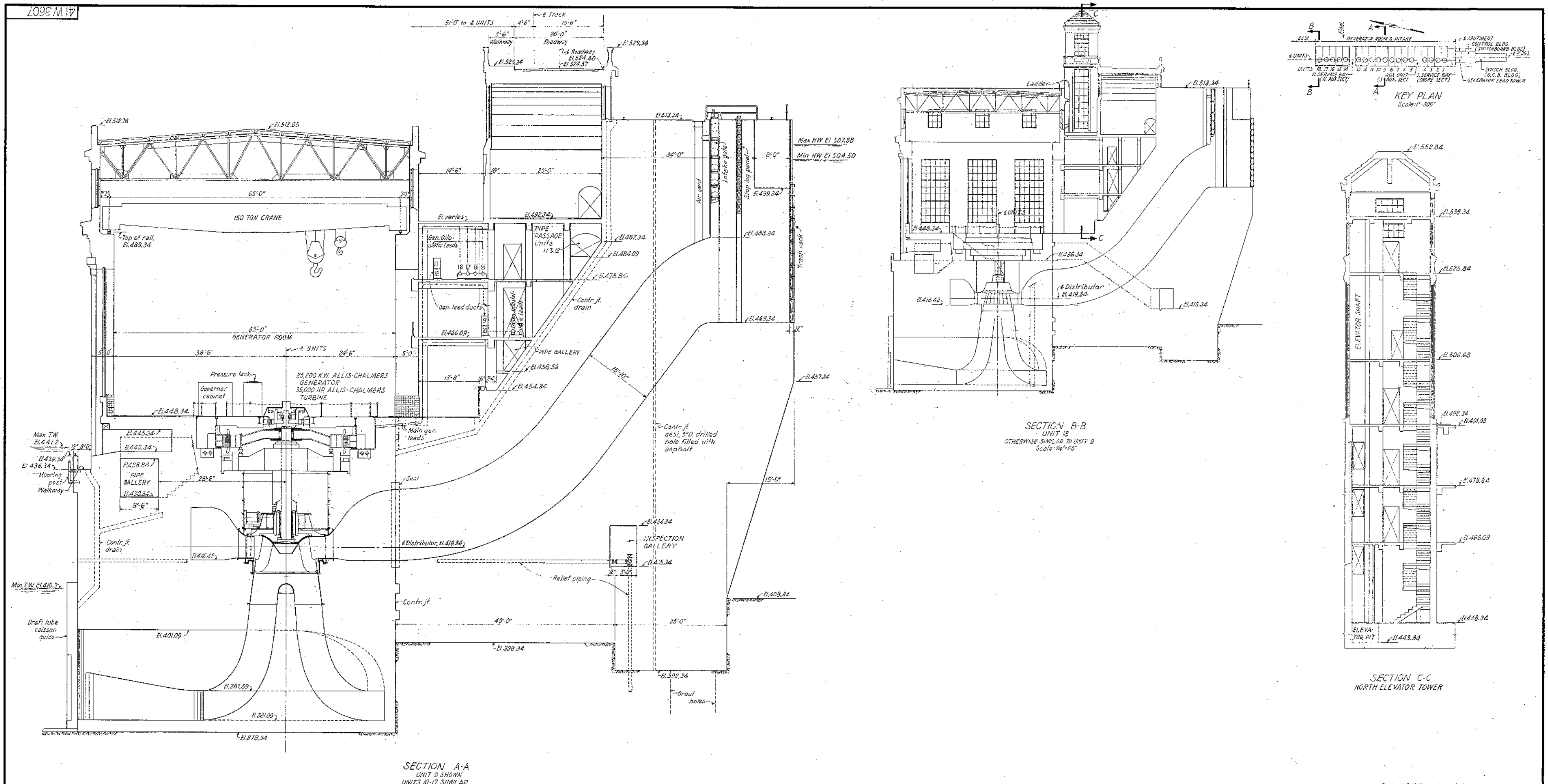
TRANSVERSE SECTIONS
UNITS 1 TO 8

WILSON PROJECT
TENNESSEE VALLEY AUTHORITY
DESIGN DEPARTMENT

SUBMITTED	RECOMMENDED	REVIEWED	APPROVED
B.R. Rule	Roy M. Right	W.B. Allen	R. A. Monroe

KNOXVILLE 11-22-46 1 C 4 41W3606R1

RECORD DRAWING AS CONSTRUCTED



SECTION A-A
UNIT 9 SHOWN
UNITS 10-17 SIMILAR

Scale 1/8"=1'-0" except as noted

POWERHOUSE

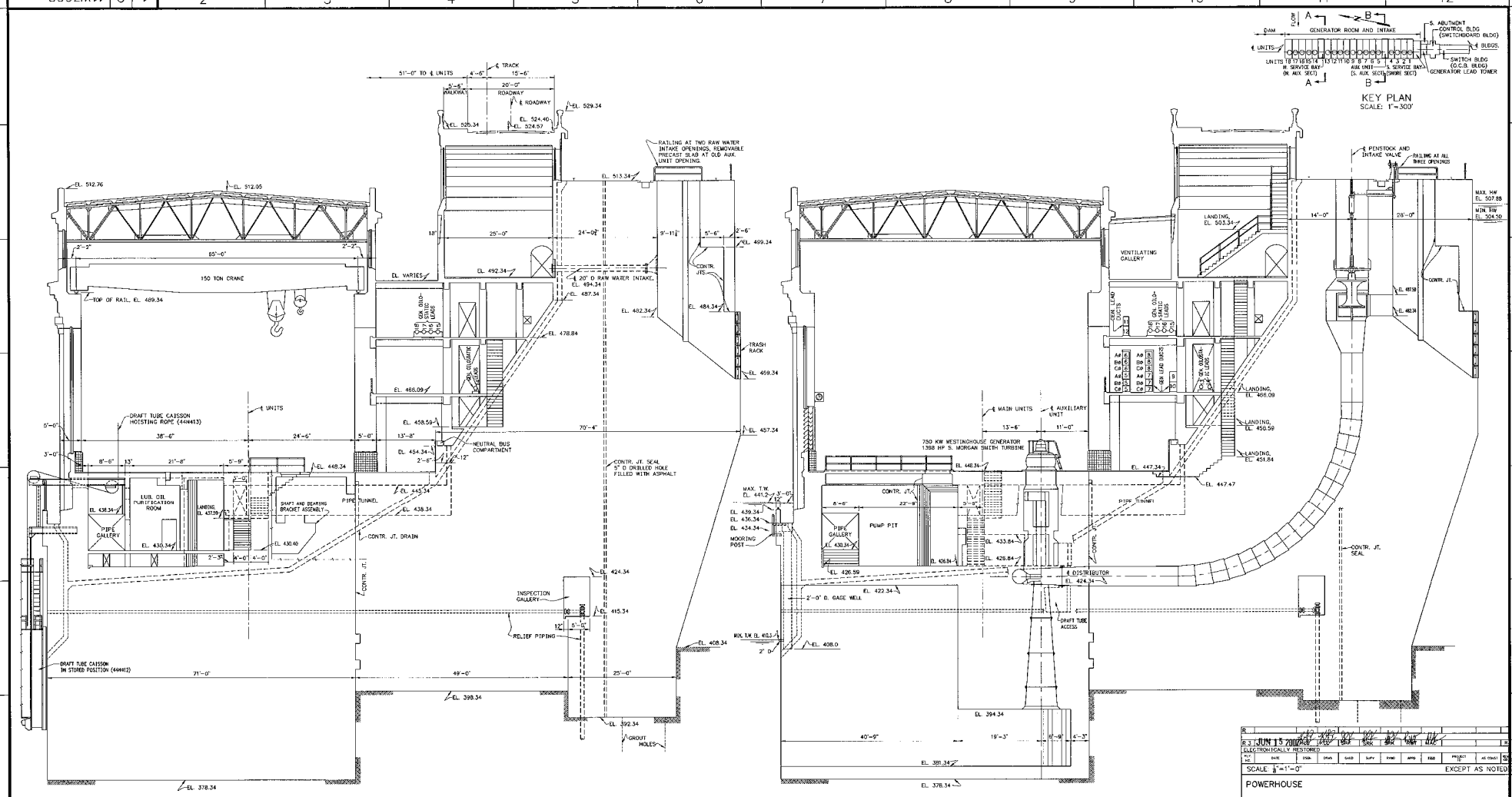
TRANSVERSE SECTIONS
UNITS 9 TO 18

WILSON PROJECT
TENNESSEE VALLEY AUTHORITY
DESIGN DEPARTMENT

SUBMITTED	RECOMMENDED	REVIEWED	APPROVED
G. P. Palo	Roy M. Riegel	W. B. Allen	R. A. Monroe

KNOXVILLE | 11-22-46 | 1 | C | 4 | 41 W 3607 R1

RECORD DRAWING AS CONSTRUCTED



ELECTRONICALLY RESTORED
JUN 15 2000

SCALE 1"=1'-0" EXCEPT AS NOTED

POWERHOUSE

TRANSVERSE SECTIONS NORTH SERVICE BAY AND AUXILIARY UNIT

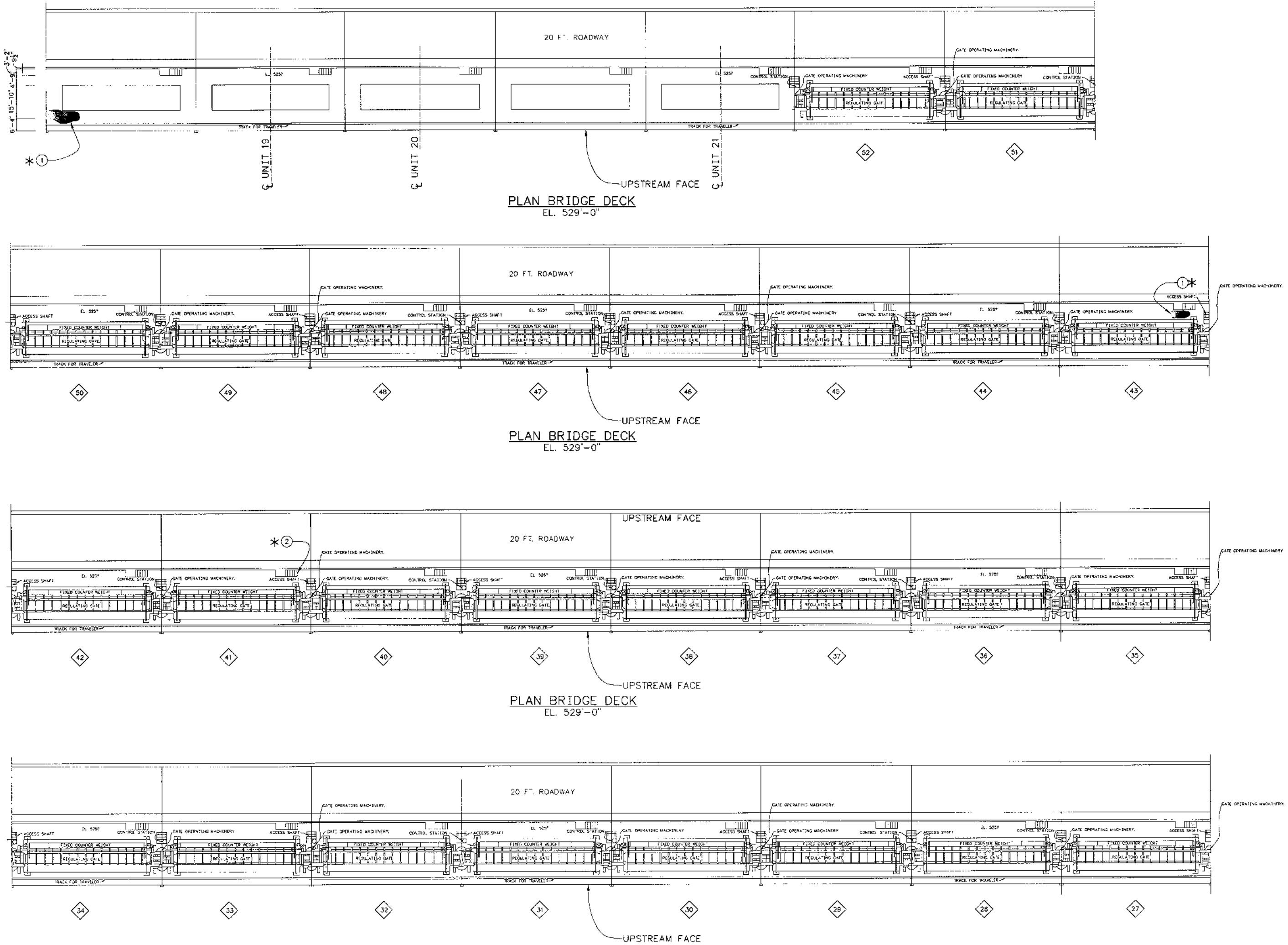
WILSON PROJECT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R2000 | 11-22-48 | 1 | C | 41W3608 | R 3

ELECTRONICALLY RESTORED DRAWING
THIS DRAWING HAS BEEN COMPLETELY REDRAWN AND SUPERSEDES : (41W3608 R2)

PLOT FACTOR:96
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY



PLAN BRIDGE DECK
EL. 529'-0"

PLAN BRIDGE DECK
EL. 529'-0"

PLAN BRIDGE DECK
EL. 529'-0"

PLAN BRIDGE DECK
EL. 529'-0"

OBSERVATIONS:

*① MINOR SPALL ON DECK (NF, 6-18-03)
*② CORRODED HANDRAIL (NF, 6-18-03)

KEY:

- (#) OBSERVATION
- (PM#) PREVENTATIVE MAINTENANCE
- (CM#) CORRECTIVE MAINTENANCE
- ◇# SPILLWAY BAYS

NOTES:
1. DRAWING IS MARKED TO RECORD THE RESULTS OF THE INSPECTIONS DATED ON OR BEFORE JUNE 18, 2003.
2. AN ASTERISK (*) INDICATES NEW OR INCREASED DAMAGE WHEN COMPARED TO PREVIOUS INSPECTIONS.
3. "NSC" INDICATES NO SIGNIFICANT CHANGE FROM PREVIOUS INSPECTIONS.

COMPANION DRAWING:
51W810-2

REV NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APVD	ISSD	PROJECT ID	AS CONST
R0	7-30-4	NF	EJO	SRK	VAN	VAN	RWT	MAC		

INITIAL ISSUE TO INCLUDE RESULTS OF 6-18-03 INSPECTION

SCALE: NONE EXCEPT AS NOTED

SPILLWAY

INSPECTION RECORD SPILLWAY DECK

DESIGNED BY: N FOSTER | DRAWN BY: EJ ODEN | CHECKED BY: SR KRAMER | SUPERVISED BY: VA ANSELL | REVIEWED BY: VA ANSELL | APPROVED BY: RW TOMPKINS | ISSUED BY: MA CONES

WILSON HYDRO PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

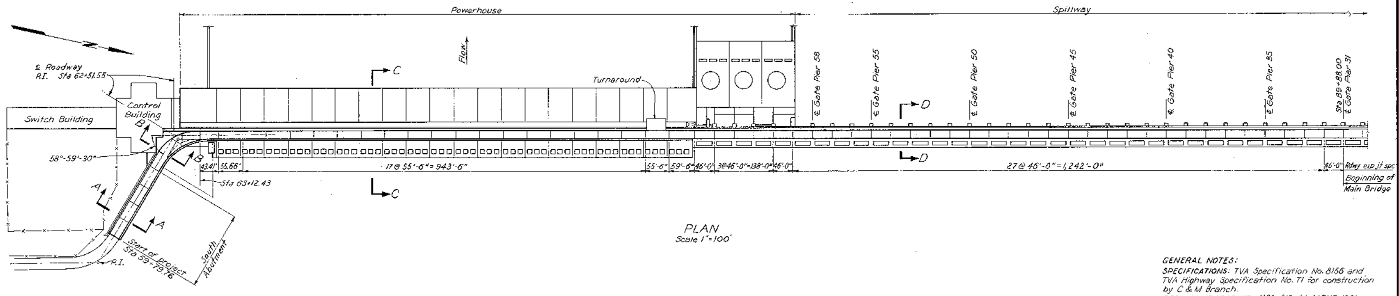
AUTOCAD R02 | DATE | 1 | DS | 51W810-1 | R0

PLOT FACTOR:XX
W_TVA

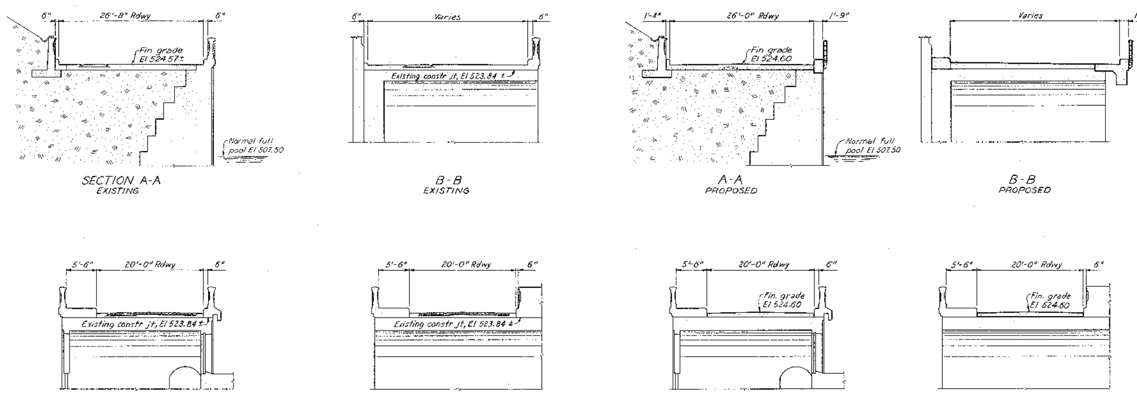
C.A.D. DRAWING
DO NOT ALTER MANUALLY

TASK COMPLETED BY: | REV NO.

1 DS 51W810-1



PLAN
Scale 1" = 100'



SECTION A-A EXISTING — B-B EXISTING — A-A PROPOSED — B-B PROPOSED

C-C EXISTING — D-D EXISTING — C-C PROPOSED — D-D PROPOSED

GENERAL NOTES:

SPECIFICATIONS: TVA Specification No. 8156 and TVA Highway Specification No. T1 for construction by C & M Branch.

DESIGN LIVE LOADING: H20-S16-44, AASHO 1961 on two lanes.

Stationing is backed in from Station 100+00.000 at ℄ Bent 18 of the Main Bridge Across Wilson Dam and is calculated along the tangents to the center lines of roadway and not around the arc of the curve.

CONCRETE: Except as noted, concrete shall be Class A, made with Type II cement having air-entraining agents sufficient to entrain 3 to 6 % of air by volume, and a water reducing, set reducing agent of the lignin-type or hydroxylated carboxylic acid-type used in the optimum amount recommended by the manufacturer. Fly ash shall not be used in any concrete.

Concrete for the post-tensioned bracket shall be Class S and have a strength of at least 5000 psi when cables are tensioned. Max. size coarse aggregate shall be size 4.

Forms for exterior faces of curbs and girders shall be lined with plywood and exposed corners chamfered 3/4", unless noted.

REINFORCING STEEL: For schedule and bending diagrams, see 80H494. All dimensions relative to spacing are to centers of bars.

Threaded Dowels: Deformed bars, new billet-steel, intermediate grade, ASTM A15 and A305. Plate washers, ASTM A7. Steel nuts, ASTM 307, self-locking nuts.

STRUCTURAL STEEL: Except as noted, all material shall be carbon structural steel ASTM A7.

Lead bolt anchors and bolts - Standard commercial quality.

Cast iron pipe - Standard commercial quality.

Wrought Iron Scuppers: See TVA Specification No. 8156.

Premolded Expansion Joint Material: AASHO, Spec. M153, Type II. Poured Joint Filler - T1 Spec. 1150.

WELDING: See TVA Spec. No. 8156.

FIELD PAINT: All exposed metal parts shall be given one coat of red lead iron oxide paint and two coats of aluminum paint. See T-1 Spec.

SPECIAL NOTE: If concrete is poured in hot weather all necessary precautions shall be taken to protect surfaces from cracking.

Scale 1/8" = 1'-0"
Except as noted

PROJECT 1-80

BRIDGE ACROSS WILSON DAM
SOUTH END IMPROVEMENTS

GENERAL DRAWING

WILSON PROJECT
TENNESSEE VALLEY AUTHORITY
DIVISION OF DESIGN

SUBMITTED — RECOMMENDED — APPROVED

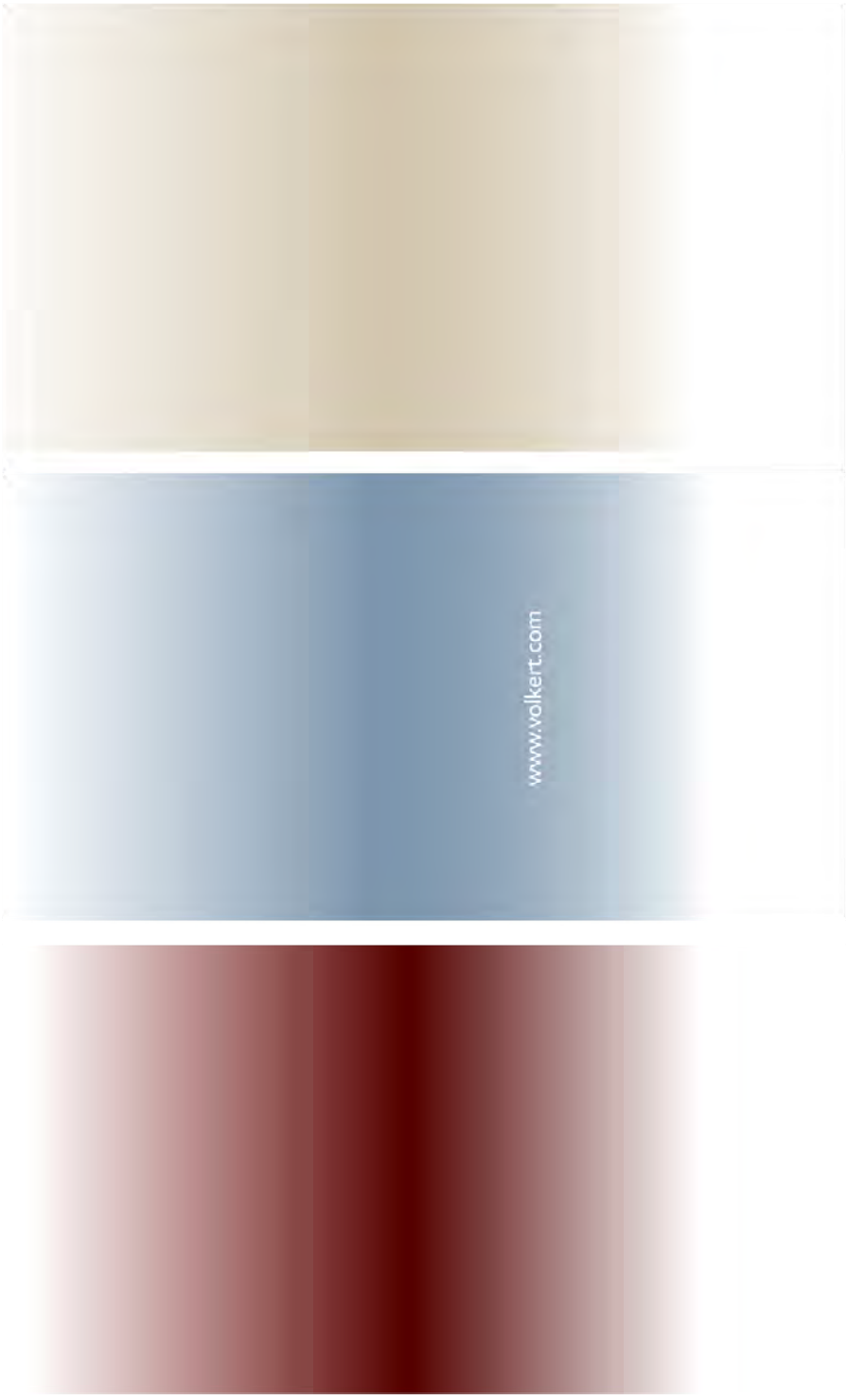
KNOXVILLE	5-23-62	1	HR	5	80H485 R1

RECORD DRAWING AS CONSTRUCTED 7-15-63

REV NO.	DATE	MADE	CHKD	SUPV	INSP	SUBM	RECM
1							

Signed as constructed

DSGN. JHT — DRWN. JHT — CHKD. JGE — TRCD. — COMP. — SUPV. — INSP. — ENGINEER



Appendix B
Traffic Analysis

Volkert, Inc.

302 Innovation Drive
Suite 100
Franklin, TN 37067

Office 615.656.1845
Fax 615.656.1870

www.volkert.com

August 8, 2017

Mr. Jon C. Riley, ASLA, PMP
Tennessee Valley Authority
1010 Reservation Road
Complex D, OSW 112
Muscle Shoals, AL 35662

RE: **Wilson Dam Traffic Volume Data**

Dear Mr. Riley:

This memorandum provides a summary of the traffic volume data collected along South Cox Creek Parkway at Wilson Dam in Florence, Alabama. The parameters for the data collection were as follows:

- Data was collected along South Cox Creek Parkway on the north side of Wilson dam, just south of the first intersection (local access roadway) (see figure below);
- Data was collected on Thursday, July 27th through Saturday, July 29th, 2017;
- Bi-directional average daily traffic (ADT) in 15-minute increments were collected.

Table 1 shows the ADT and **Table 2** shows the peak hour periods for each of the three days of data collection.

TABLE 1
AVERAGE DAILY TRAFFIC

DATE	ADT	NORTHBOUND	SOUTHBOUND
Thursday, July 27th 2017	3,639	1,749	1,890
Friday, July 28th, 2017	3,472	1,660	1,812
Saturday, July 29th, 2017	3,492	1,626	1,866

TABLE 2
PEAK HOUR TRAFFIC (BY DAY)

DATE	PEAK TOTAL	NORTHBOUND	SOUTHBOUND
Thursday, July 27th 2017			
7:15 – 8:15	240	69	171
11:15 – 12:15	229	124	105
15:30 – 16:30	358	232	126
Friday, July 28th, 2017			
6:30 – 7:30	182	44	138
11:00 – 12:00	218	122	96
15:30 – 16:30	326	208	118
Saturday, July 29th, 2017			
7:45 – 8:45	138	77	61
11:00 – 12:00	269	142	127
15:15 – 16:15	291	132	159

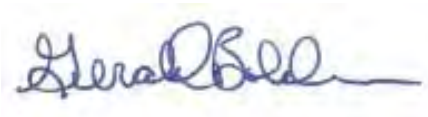
Additional traffic date collected included the vehicle classifications. Based on the various classified vehicles, Table 3 shows the percent breakdown.

TABLE 3
VEHICLE CLASSIFICATIONS (% ADT)

DATE	PASSENGER CARS/MOTORCYCLES	SINGLE UNIT/BUSES
Thursday, July 27th 2017	72.7%	27.3%
Friday, July 28th, 2017	71.4%	28.6%
Saturday, July 29th, 2017	77.9%	22.1%

Should you have any questions or need additional information, please contact me.

Sincerely,



Gerald Bolden, PE, PTOE
Traffic and ITS Manager

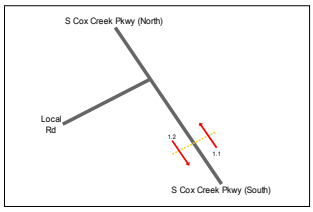
Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

Date
Thursday 27 July 2017

Weather
Sunny Intervals
Temp: 36°C



Marr Traffic
Transportation Data Collection
41 Peabody Street, Nashville, TN 37210
1 (615) 431-6750
1 (800) 615-3765

0000 - 2400 (Weekday 24h Session)

	Northbound S Cox Creek Pkwy (South)				Int
	Thru 1,1	Thru 1,2	Peds 1a	App Total	Int Total
TIME					
0000 - 0015	3	5	0	8	8
0015 - 0030	3	0	0	3	3
0030 - 0045	2	0	0	2	2
0045 - 0100	1	1	0	2	2
Hourly Total	9	6	0	**15**	**15**
0100 - 0115	0	1	0	1	1
0115 - 0130	2	2	0	4	4
0130 - 0145	0	0	0	0	0
0145 - 0200	2	0	0	2	2
Hourly Total	4	3	0	**7**	**7**
0200 - 0215	1	0	0	1	1
0215 - 0230	0	0	0	0	0
0230 - 0245	0	1	0	1	1
0245 - 0300	2	1	0	3	3
Hourly Total	3	2	0	**5**	**5**
0300 - 0315	1	3	0	4	4
0315 - 0330	2	1	0	3	3
0330 - 0345	1	2	0	3	3
0345 - 0400	1	3	0	4	4
Hourly Total	5	9	0	**14**	**14**
0400 - 0415	0	1	0	1	1
0415 - 0430	0	3	0	3	3
0430 - 0445	0	3	0	3	3
0445 - 0500	1	6	0	7	7
Hourly Total	1	13	0	**14**	**14**
0500 - 0515	2	9	0	11	11
0515 - 0530	5	12	0	17	17
0530 - 0545	6	17	0	23	23
0545 - 0600	8	24	0	32	32
Hourly Total	21	62	0	**83**	**83**
0600 - 0615	6	23	0	29	29
0615 - 0630	6	29	0	35	35
0630 - 0645	5	48	0	53	53
0645 - 0700	9	53	0	62	62
Hourly Total	26	153	0	**179**	**179**
0700 - 0715	19	32	0	51	51
0715 - 0730	13	49	0	62	62
0730 - 0745	10	48	0	58	58
0745 - 0800	28	40	0	68	68
Hourly Total	70	169	0	**239**	**239**
0800 - 0815	18	34	0	52	52
0815 - 0830	22	17	0	39	39
0830 - 0845	26	17	0	43	43
0845 - 0900	14	19	0	33	33
Hourly Total	80	87	0	**167**	**167**
0900 - 0915	22	14	0	36	36
0915 - 0930	12	20	0	32	32
0930 - 0945	11	20	0	31	31
0945 - 1000	23	16	0	39	39
Hourly Total	68	70	0	**138**	**138**
1000 - 1015	18	16	0	34	34
1015 - 1030	31	22	0	53	53
1030 - 1045	35	16	0	51	51
1045 - 1100	18	25	0	43	43
Hourly Total	102	79	0	**181**	**181**
1100 - 1115	29	20	0	49	49
1115 - 1130	39	26	0	65	65
1130 - 1145	31	29	0	60	60
1145 - 1200	25	29	0	54	54
Hourly Total	124	104	0	**228**	**228**
1200 - 1215	29	21	0	50	50
1215 - 1230	24	30	0	54	54
1230 - 1245	29	35	0	64	64
1245 - 1300	36	19	0	55	55
Hourly Total	118	105	0	**223**	**223**
1300 - 1315	23	27	0	50	50
1315 - 1330	28	30	0	58	58
1330 - 1345	27	16	0	43	43
1345 - 1400	22	26	0	48	48
Hourly Total	100	99	0	**199**	**199**
1400 - 1415	20	26	0	46	46
1415 - 1430	29	29	0	58	58
1430 - 1445	25	27	0	52	52
1445 - 1500	22	37	0	59	59
Hourly Total	96	119	0	**215**	**215**
1500 - 1515	33	31	0	64	64
1515 - 1530	36	34	0	70	70
1530 - 1545	81	32	0	113	113
1545 - 1600	58	30	0	88	88
Hourly Total	208	127	0	**335**	**335**
1600 - 1615	41	38	0	79	79
1615 - 1630	52	26	0	78	78
1630 - 1645	48	29	0	77	77
1645 - 1700	47	30	0	77	77
Hourly Total	188	123	0	**311**	**311**
1700 - 1715	51	28	0	79	79
1715 - 1730	63	26	0	89	89
1730 - 1745	43	31	0	74	74
1745 - 1800	31	29	0	60	60
Hourly Total	188	114	0	**302**	**302**
1800 - 1815	37	25	0	62	62
1815 - 1830	35	26	0	61	61
1830 - 1845	16	38	0	54	54
1845 - 1900	20	36	0	56	56
Hourly Total	108	125	0	**233**	**233**
1900 - 1915	16	26	0	42	42
1915 - 1930	31	28	0	59	59
1930 - 1945	33	26	0	59	59
1945 - 2000	19	21	0	40	40
Hourly Total	99	101	0	**200**	**200**
2000 - 2015	16	29	0	45	45
2015 - 2030	12	21	0	33	33
2030 - 2045	22	23	0	45	45
2045 - 2100	9	20	0	29	29
Hourly Total	59	93	0	**152**	**152**
2100 - 2115	3	22	0	25	25
2115 - 2130	12	14	0	26	26
2130 - 2145	6	18	0	24	24
2145 - 2200	7	13	0	20	20
Hourly Total	28	67	0	**95**	**95**
2200 - 2215	7	9	0	16	16
2215 - 2230	7	7	0	14	14
2230 - 2245	5	8	0	13	13
2245 - 2300	8	16	0	24	24
Hourly Total	27	40	0	**67**	**67**
2300 - 2315	7	8	0	15	15
2315 - 2330	7	5	0	12	12
2330 - 2345	1	5	0	6	6
2345 - 0000	2	2	0	4	4
Hourly Total	17	20	0	**37**	**37**
Grand Total	1749	1890	0	**3639**	**3639**
App Percentage	48.06	51.94	0.00		
Int Percentage	48.06	51.94	0.00	100.00	
Motorcycles	11	7	-	18	
Passenger cars	1235	1392	-	2627	
4 tire, single unit	482	454	-	936	
Buses	1	2	-	3	
2 axle, 6 tire, single unit	20	35	-	55	
3 axle, single unit	0	0	-	0	
4 or more axle, single unit	0	0	-	0	
4 or less axle, single trailer	0	0	-	0	
5-axle tractor semitrailer	0	0	-	0	
6 or more axle, single trailer	0	0	-	0	
5 or less axle, multi trailer	0	0	-	0	
6 axle, multi-trailer	0	0	-	0	
7 or more axle, multi-trailer	0	0	-	0	
Motorcycles (%)	0.63	0.37	-	0.49	
Passenger cars (%)	70.61	73.65	-	72.19	
4 tire, single unit (%)	27.56	24.02	-	25.72	
Buses (%)	0.06	0.11	-	0.08	
2 axle, 6 tire, single unit (%)	1.14	1.85	-	1.51	
3 axle, single unit (%)	0.00	0.00	-	0.00	
4 or more axle, single unit (%)	0.00	0.00	-	0.00	
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	

Grand Total (All Sessions)

	Northbound			
	S Cox Creek Pkwy (South)			
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total
Grand Total	1749	1890	0	**3639**
App Percentage	48.06	51.94	0.00	
Int Percentage	48.06	51.94	0.00	100.00
Motorcycles	11	7	-	18
Passenger cars	1235	1392	-	2627
4 tire, single unit	482	454	-	936
Buses	1	2	-	3
2 axle, 6 tire, single unit	20	35	-	55
3 axle, single unit	0	0	-	0
4 or more axle, single unit	0	0	-	0
4 or less axle, single trailer	0	0	-	0
5-axle tractor semitrailer	0	0	-	0
6 or more axle, single trailer	0	0	-	0
5 or less axle, multi trailer	0	0	-	0
6 axle, multi-trailer	0	0	-	0
7 or more axle, multi-trailer	0	0	-	0
Motorcycles (%)	0.63	0.37	-	0.49
Passenger cars (%)	70.61	73.65	-	72.19
4 tire, single unit (%)	27.56	24.02	-	25.72
Buses (%)	0.06	0.11	-	0.08
2 axle, 6 tire, single unit (%)	1.14	1.85	-	1.51
3 axle, single unit (%)	0.00	0.00	-	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00

Int Total
3639

Peak Hour Window: 0000 - 2400 (Weekday 24h Session)

1530 - 1630 (Intersection Peak Hour)

	Northbound				
	S Cox Creek Pkwy (South)				
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total	Int Total
1530 - 1545	81	32	0	113	113
1545 - 1600	58	30	0	88	88
1600 - 1615	41	38	0	79	79
1615 - 1630	52	26	0	78	78
Hourly Total	232	126	0	**358**	**358**
Grand Total	232	126	0	**358**	**358**
App Percentage	64.80	35.20	0.00		
Int Percentage	64.80	35.20	0.00	100.00	
Motorcycles	1	0	-	1	1
Passenger cars	149	98	-	247	247
4 tire, single unit	79	25	-	104	104
Buses	0	1	-	1	1
2 axle, 6 tire, single unit	3	2	-	5	5
3 axle, single unit	0	0	-	0	0
4 or more axle, single unit	0	0	-	0	0
4 or less axle, single trailer	0	0	-	0	0
5-axle tractor semitrailer	0	0	-	0	0
6 or more axle, single trailer	0	0	-	0	0
5 or less axle, multi trailer	0	0	-	0	0
6 axle, multi-trailer	0	0	-	0	0
7 or more axle, multi-trailer	0	0	-	0	0
Motorcycles (%)	0.43	0.00	-	0.28	0.28
Passenger cars (%)	64.22	77.78	-	68.99	68.99
4 tire, single unit (%)	34.05	19.84	-	29.05	29.05
Buses (%)	0.00	0.79	-	0.28	0.28
2 axle, 6 tire, single unit (%)	1.29	1.59	-	1.40	1.40
3 axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
PHF	0.716	0.829	-	0.792	0.792

Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

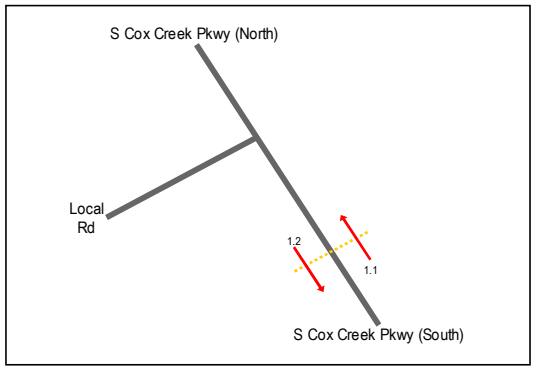
Date
Thursday 27 July 2017

Weather
Sunny Intervals
Temp: 36°C

Peak Hour Data (Interactive Diagram)

Marr Traffic
Transportation Data Collection

41 Peabody Street, Nashville, TN 37210
1 (615) 431-6750
1 (800) 615-3765



A (Northbound) S Cox Creek Pkwy (South)

Thru	Thru	Peds
126	232	0

A (Out)	A (In)	A (Tot)
358	358	716

Time Interval

1530 - 1630 (Intersection Peak Hour)

Parameter

Grand Total

Peak Hour Window: 0600 - 0900 (Weekday AM Peak)

0715 - 0815 (Intersection Peak Hour)

	Northbound				
	S Cox Creek Pkwy (South)				
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total	Int Total
0715 - 0730	13	49	0	62	62
0730 - 0745	10	48	0	58	58
0745 - 0800	28	40	0	68	68
0800 - 0815	18	34	0	52	52
Hourly Total	69	171	0	**240**	**240**
Grand Total	69	171	0	**240**	**240**
App Percentage	28.75	71.25	0.00		
Int Percentage	28.75	71.25	0.00	100.00	
Motorcycles	0	0	-	0	0
Passenger cars	47	111	-	158	158
4 tire, single unit	22	50	-	72	72
Buses	0	0	-	0	0
2 axle, 6 tire, single unit	0	10	-	10	10
3 axle, single unit	0	0	-	0	0
4 or more axle, single unit	0	0	-	0	0
4 or less axle, single trailer	0	0	-	0	0
5-axle tractor semitrailer	0	0	-	0	0
6 or more axle, single trailer	0	0	-	0	0
5 or less axle, multi trailer	0	0	-	0	0
6 axle, multi-trailer	0	0	-	0	0
7 or more axle, multi-trailer	0	0	-	0	0
Motorcycles (%)	0.00	0.00	-	0.00	0.00
Passenger cars (%)	68.12	64.91	-	65.83	65.83
4 tire, single unit (%)	31.88	29.24	-	30.00	30.00
Buses (%)	0.00	0.00	-	0.00	0.00
2 axle, 6 tire, single unit (%)	0.00	5.85	-	4.17	4.17
3 axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
PHF	0.616	0.872	-	0.882	0.882

Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

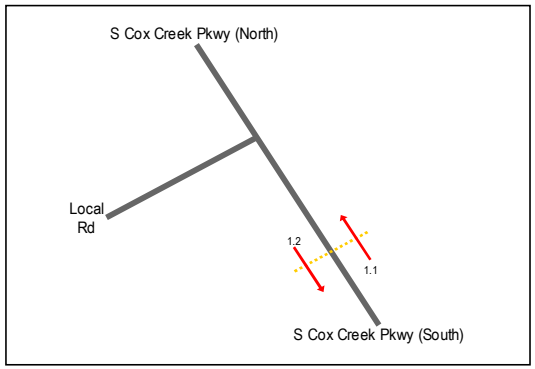
Date
Thursday 27 July 2017

Weather
Sunny Intervals
Temp: 36°C

Peak Hour Data (Interactive Diagram)

Marr Traffic
Transportation Data Collection

41 Peabody Street, Nashville, TN 37210
1 (615) 431-6750
1 (800) 615-3765



A (Northbound) S Cox Creek Pkwy (South)

Thru	Thru	Peds
171	69	0

A (Out)	A (In)	A (Tot)
240	240	480

Time Interval

0715 - 0815 (Intersection Peak Hour)

Parameter

Grand Total

Peak Hour Window: 1100 - 1300 (Weekday Inter Peak)

1115 - 1215 (Intersection Peak Hour)

	Northbound				
	S Cox Creek Pkwy (South)				
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total	Int Total
1115 - 1130	39	26	0	65	65
1130 - 1145	31	29	0	60	60
1145 - 1200	25	29	0	54	54
1200 - 1215	29	21	0	50	50
Hourly Total	124	105	0	**229**	**229**
Grand Total	124	105	0	**229**	**229**
App Percentage	54.15	45.85	0.00		
Int Percentage	54.15	45.85	0.00	100.00	
Motorcycles	0	0	-	0	0
Passenger cars	85	75	-	160	160
4 tire, single unit	37	27	-	64	64
Buses	0	0	-	0	0
2 axle, 6 tire, single unit	2	3	-	5	5
3 axle, single unit	0	0	-	0	0
4 or more axle, single unit	0	0	-	0	0
4 or less axle, single trailer	0	0	-	0	0
5-axle tractor semitrailer	0	0	-	0	0
6 or more axle, single trailer	0	0	-	0	0
5 or less axle, multi trailer	0	0	-	0	0
6 axle, multi-trailer	0	0	-	0	0
7 or more axle, multi-trailer	0	0	-	0	0
Motorcycles (%)	0.00	0.00	-	0.00	0.00
Passenger cars (%)	68.55	71.43	-	69.87	69.87
4 tire, single unit (%)	29.84	25.71	-	27.95	27.95
Buses (%)	0.00	0.00	-	0.00	0.00
2 axle, 6 tire, single unit (%)	1.61	2.86	-	2.18	2.18
3 axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
PHF	0.795	0.905	-	0.881	0.881

Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

Date
Thursday 27 July 2017

Weather
Sunny Intervals
Temp: 36°C

Peak Hour Data (Interactive Diagram)

Marr Traffic
Transportation Data Collection

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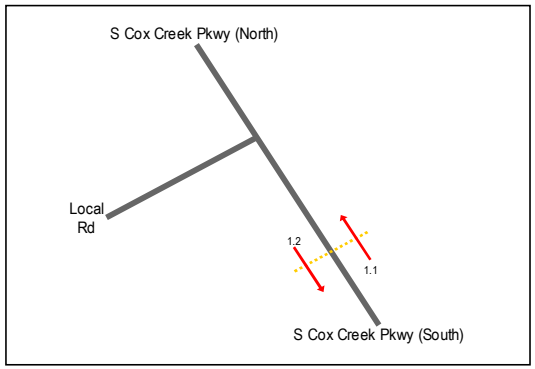

A (Northbound) S Cox Creek Pkwy (South)

Thru	Thru	Peds
105	124	0

A (Out)	A (In)	A (Tot)
229	229	458

Time Interval

1115 - 1215 (Intersection Peak Hour)

Parameter

Grand Total

Peak Hour Window: 1500 - 1800 (Weekday PM Peak)

1530 - 1630 (Intersection Peak Hour)

	Northbound				
	S Cox Creek Pkwy (South)				
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total	Int Total
1530 - 1545	81	32	0	113	113
1545 - 1600	58	30	0	88	88
1600 - 1615	41	38	0	79	79
1615 - 1630	52	26	0	78	78
Hourly Total	232	126	0	**358**	**358**
Grand Total	232	126	0	**358**	**358**
App Percentage	64.80	35.20	0.00		
Int Percentage	64.80	35.20	0.00	100.00	
Motorcycles	1	0	-	1	1
Passenger cars	149	98	-	247	247
4 tire, single unit	79	25	-	104	104
Buses	0	1	-	1	1
2 axle, 6 tire, single unit	3	2	-	5	5
3 axle, single unit	0	0	-	0	0
4 or more axle, single unit	0	0	-	0	0
4 or less axle, single trailer	0	0	-	0	0
5-axle tractor semitrailer	0	0	-	0	0
6 or more axle, single trailer	0	0	-	0	0
5 or less axle, multi trailer	0	0	-	0	0
6 axle, multi-trailer	0	0	-	0	0
7 or more axle, multi-trailer	0	0	-	0	0
Motorcycles (%)	0.43	0.00	-	0.28	0.28
Passenger cars (%)	64.22	77.78	-	68.99	68.99
4 tire, single unit (%)	34.05	19.84	-	29.05	29.05
Buses (%)	0.00	0.79	-	0.28	0.28
2 axle, 6 tire, single unit (%)	1.29	1.59	-	1.40	1.40
3 axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
PHF	0.716	0.829	-	0.792	0.792

Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

Date
Thursday 27 July 2017

Weather
Sunny Intervals
Temp: 36°C

Peak Hour Data (Interactive Diagram)

Marr Traffic
Transportation Data Collection

41 Peabody Street, Nashville, TN 37210
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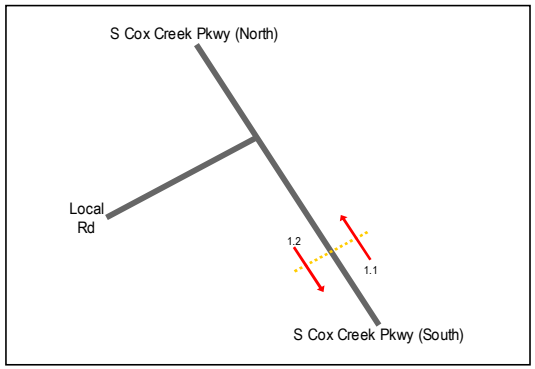


A (Northbound) S Cox Creek Pkwy (South)

Thru	Thru	Peds
126	232	0

A (Out)	A (In)	A (Tot)
358	358	716

Time Interval

1530 - 1630 (Intersection Peak Hour)

Parameter

Grand Total

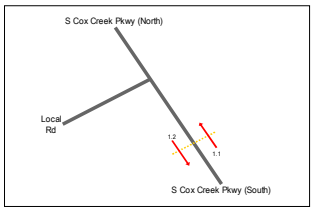
Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

Date
Friday 28 July 2017

Weather
Light Rain
Temp: 31°C



Marr Traffic
Transportation Data Collection

41 Peabody Street, Nashville, TN 37210
1 (615) 431-6750
1 (800) 615-3765

0000 - 2400 (Weekday 24h Session)

	Northbound S Cox Creek Pkwy (South)				
TIME	Thru 1,1	Thru 1,2	Peds 1a	App Total	Int Total
0000 - 0015	1	1	0	2	2
0015 - 0030	2	4	0	6	6
0030 - 0045	3	1	0	4	4
0045 - 0100	0	1	0	1	1
Hourly Total	6	7	0	**13**	**13**
0100 - 0115	0	3	0	3	3
0115 - 0130	1	0	0	1	1
0130 - 0145	0	2	0	2	2
0145 - 0200	0	1	0	1	1
Hourly Total	1	6	0	**7**	**7**
0200 - 0215	1	0	0	1	1
0215 - 0230	2	2	0	4	4
0230 - 0245	0	0	0	0	0
0245 - 0300	1	0	0	1	1
Hourly Total	4	2	0	**6**	**6**
0300 - 0315	1	0	0	1	1
0315 - 0330	0	1	0	1	1
0330 - 0345	1	3	0	4	4
0345 - 0400	0	4	0	4	4
Hourly Total	2	8	0	**10**	**10**
0400 - 0415	2	3	0	5	5
0415 - 0430	1	5	0	6	6
0430 - 0445	0	2	0	2	2
0445 - 0500	0	5	0	5	5
Hourly Total	3	15	0	**18**	**18**
0500 - 0515	1	5	0	6	6
0515 - 0530	1	5	0	6	6
0530 - 0545	1	14	0	15	15
0545 - 0600	4	17	0	21	21
Hourly Total	7	41	0	**48**	**48**
0600 - 0615	2	21	0	23	23
0615 - 0630	9	26	0	35	35
0630 - 0645	5	40	0	45	45
0645 - 0700	19	46	0	65	65
Hourly Total	35	133	0	**168**	**168**
0700 - 0715	10	21	0	31	31
0715 - 0730	10	31	0	41	41
0730 - 0745	11	24	0	35	35
0745 - 0800	21	23	0	44	44
Hourly Total	52	99	0	**151**	**151**
0800 - 0815	12	26	0	38	38
0815 - 0830	24	17	0	41	41
0830 - 0845	20	14	0	34	34
0845 - 0900	15	15	0	30	30
Hourly Total	71	72	0	**143**	**143**
0900 - 0915	15	18	0	33	33
0915 - 0930	16	16	0	32	32
0930 - 0945	23	14	0	37	37
0945 - 1000	17	19	0	36	36
Hourly Total	71	67	0	**138**	**138**
1000 - 1015	14	16	0	30	30
1015 - 1030	18	18	0	36	36
1030 - 1045	23	21	0	44	44
1045 - 1100	25	21	0	46	46
Hourly Total	80	76	0	**156**	**156**
1100 - 1115	43	18	0	61	61
1115 - 1130	25	28	0	53	53
1130 - 1145	27	22	0	49	49
1145 - 1200	27	28	0	55	55
Hourly Total	122	96	0	**218**	**218**
1200 - 1215	23	29	0	52	52
1215 - 1230	33	23	0	56	56
1230 - 1245	28	23	0	51	51
1245 - 1300	35	22	0	57	57
Hourly Total	119	97	0	**216**	**216**
1300 - 1315	31	27	0	58	58
1315 - 1330	24	14	0	38	38
1330 - 1345	26	27	0	53	53
1345 - 1400	17	34	0	51	51
Hourly Total	98	102	0	**200**	**200**
1400 - 1415	29	33	0	62	62
1415 - 1430	30	33	0	63	63
1430 - 1445	32	33	0	65	65
1445 - 1500	23	32	0	55	55
Hourly Total	114	131	0	**245**	**245**
1500 - 1515	42	33	0	75	75
1515 - 1530	35	31	0	66	66
1530 - 1545	78	23	0	101	101
1545 - 1600	45	28	0	73	73
Hourly Total	200	115	0	**315**	**315**
1600 - 1615	37	31	0	68	68
1615 - 1630	48	36	0	84	84
1630 - 1645	32	28	0	60	60
1645 - 1700	35	26	0	61	61
Hourly Total	152	121	0	**273**	**273**
1700 - 1715	56	41	0	97	97
1715 - 1730	44	29	0	73	73
1730 - 1745	34	29	0	63	63
1745 - 1800	40	20	0	60	60
Hourly Total	174	119	0	**293**	**293**
1800 - 1815	34	35	0	69	69
1815 - 1830	26	39	0	65	65
1830 - 1845	39	29	0	68	68
1845 - 1900	20	33	0	53	53
Hourly Total	119	136	0	**255**	**255**
1900 - 1915	24	33	0	57	57
1915 - 1930	39	30	0	69	69
1930 - 1945	21	25	0	46	46
1945 - 2000	14	20	0	34	34
Hourly Total	98	108	0	**206**	**206**
2000 - 2015	21	19	0	40	40
2015 - 2030	14	29	0	43	43
2030 - 2045	9	24	0	33	33
2045 - 2100	8	27	0	35	35
Hourly Total	52	99	0	**151**	**151**
2100 - 2115	14	22	0	36	36
2115 - 2130	17	17	0	34	34
2130 - 2145	1	28	0	29	29
2145 - 2200	5	20	0	25	25
Hourly Total	37	87	0	**124**	**124**
2200 - 2215	6	15	0	21	21
2215 - 2230	7	9	0	16	16
2230 - 2245	2	11	0	13	13
2245 - 2300	5	8	0	13	13
Hourly Total	20	43	0	**63**	**63**
2300 - 2315	9	13	0	22	22
2315 - 2330	5	9	0	14	14
2330 - 2345	4	9	0	13	13
2345 - 0000	5	1	0	6	6
Hourly Total	23	32	0	**55**	**55**
Grand Total	1660	1812	0	**3472**	**3472**
App Percentage	47.81	52.19	0.00		
Int Percentage	47.81	52.19	0.00	100.00	

Motorcycles	1	2	-	3
Passenger cars	1189	1287	-	2476
4 tire, single unit	452	507	-	959
Buses	0	1	-	1
2 axle, 6 tire, single unit	18	15	-	33
3 axle, single unit	0	0	-	0
4 or more axle, single unit	0	0	-	0
4 or less axle, single trailer	0	0	-	0
5-axle tractor semitrailer	0	0	-	0
6 or more axle, single trailer	0	0	-	0
5 or less axle, multi trailer	0	0	-	0
6 axle, multi-trailer	0	0	-	0
7 or more axle, multi-trailer	0	0	-	0
Motorcycles (%)	0.06	0.11	-	0.09
Passenger cars (%)	71.63	71.03	-	71.31
4 tire, single unit (%)	27.23	27.98	-	27.62
Buses (%)	0.00	0.06	-	0.03
2 axle, 6 tire, single unit (%)	1.08	0.83	-	0.95
3 axle, single unit (%)	0.00	0.00	-	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00

Grand Total (All Sessions)

	Northbound			
	S Cox Creek Pkwy (South)			
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total
Grand Total	1660	1812	0	**3472**
App Percentage	47.81	52.19	0.00	
Int Percentage	47.81	52.19	0.00	100.00
Motorcycles	1	2	-	3
Passenger cars	1189	1287	-	2476
4 tire, single unit	452	507	-	959
Buses	0	1	-	1
2 axle, 6 tire, single unit	18	15	-	33
3 axle, single unit	0	0	-	0
4 or more axle, single unit	0	0	-	0
4 or less axle, single trailer	0	0	-	0
5-axle tractor semitrailer	0	0	-	0
6 or more axle, single trailer	0	0	-	0
5 or less axle, multi trailer	0	0	-	0
6 axle, multi-trailer	0	0	-	0
7 or more axle, multi-trailer	0	0	-	0
Motorcycles (%)	0.06	0.11	-	0.09
Passenger cars (%)	71.63	71.03	-	71.31
4 tire, single unit (%)	27.23	27.98	-	27.62
Buses (%)	0.00	0.06	-	0.03
2 axle, 6 tire, single unit (%)	1.08	0.83	-	0.95
3 axle, single unit (%)	0.00	0.00	-	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00

Int Total
3472

Peak Hour Window: 0000 - 2400 (Weekday 24h Session)

1530 - 1630 (Intersection Peak Hour)

	Northbound				
	S Cox Creek Pkwy (South)				
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total	Int Total
1530 - 1545	78	23	0	101	101
1545 - 1600	45	28	0	73	73
1600 - 1615	37	31	0	68	68
1615 - 1630	48	36	0	84	84
Hourly Total	208	118	0	**326**	**326**
Grand Total	208	118	0	**326**	**326**
App Percentage	63.80	36.20	0.00		
Int Percentage	63.80	36.20	0.00	100.00	
Motorcycles	1	1	-	2	2
Passenger cars	128	92	-	220	220
4 tire, single unit	77	23	-	100	100
Buses	0	0	-	0	0
2 axle, 6 tire, single unit	2	2	-	4	4
3 axle, single unit	0	0	-	0	0
4 or more axle, single unit	0	0	-	0	0
4 or less axle, single trailer	0	0	-	0	0
5-axle tractor semitrailer	0	0	-	0	0
6 or more axle, single trailer	0	0	-	0	0
5 or less axle, multi trailer	0	0	-	0	0
6 axle, multi-trailer	0	0	-	0	0
7 or more axle, multi-trailer	0	0	-	0	0
Motorcycles (%)	0.48	0.85	-	0.61	0.61
Passenger cars (%)	61.54	77.97	-	67.48	67.48
4 tire, single unit (%)	37.02	19.49	-	30.67	30.67
Buses (%)	0.00	0.00	-	0.00	0.00
2 axle, 6 tire, single unit (%)	0.96	1.69	-	1.23	1.23
3 axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
PHF	0.667	0.819	-	0.807	0.807

Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

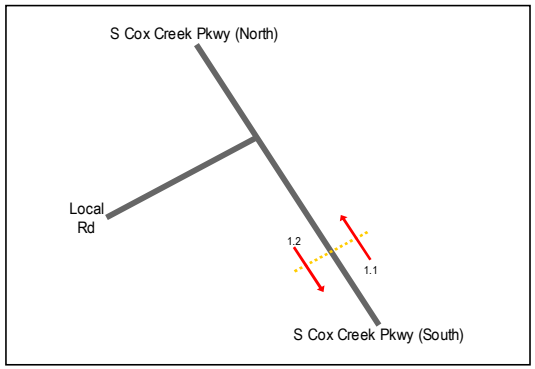
Date
Friday 28 July 2017

Weather
Light Rain
Temp: 31°C

Peak Hour Data (Interactive Diagram)

Marr Traffic
Transportation Data Collection

41 Peabody Street, Nashville, TN 37210
1 (615) 431-6750
1 (800) 615-3765



A (Northbound) S Cox Creek Pkwy (South)

Thru	Thru	Peds
118	208	0

A (Out)	A (In)	A (Tot)
326	326	652

Time Interval

1530 - 1630 (Intersection Peak Hour)

Parameter

Grand Total

Peak Hour Window | 0600 - 0900 (Weekday AM Peak)

0630 - 0730 (Intersection Peak Hour)

	Northbound				
	S Cox Creek Pkwy (South)				
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total	Int Total
0630 - 0645	5	40	0	45	45
0645 - 0700	19	46	0	65	65
0700 - 0715	10	21	0	31	31
0715 - 0730	10	31	0	41	41
Hourly Total	44	138	0	**182**	**182**
Grand Total	44	138	0	**182**	**182**
App Percentage	24.18	75.82	0.00		
Int Percentage	24.18	75.82	0.00	100.00	
Motorcycles	0	0	-	0	0
Passenger cars	20	79	-	99	99
4 tire, single unit	23	58	-	81	81
Buses	0	0	-	0	0
2 axle, 6 tire, single unit	1	1	-	2	2
3 axle, single unit	0	0	-	0	0
4 or more axle, single unit	0	0	-	0	0
4 or less axle, single trailer	0	0	-	0	0
5-axle tractor semitrailer	0	0	-	0	0
6 or more axle, single trailer	0	0	-	0	0
5 or less axle, multi trailer	0	0	-	0	0
6 axle, multi-trailer	0	0	-	0	0
7 or more axle, multi-trailer	0	0	-	0	0
Motorcycles (%)	0.00	0.00	-	0.00	0.00
Passenger cars (%)	45.45	57.25	-	54.40	54.40
4 tire, single unit (%)	52.27	42.03	-	44.51	44.51
Buses (%)	0.00	0.00	-	0.00	0.00
2 axle, 6 tire, single unit (%)	2.27	0.72	-	1.10	1.10
3 axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
PHF	0.579	0.750	-	0.700	0.700

Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

Date
Friday 28 July 2017

Weather
Light Rain
Temp: 31°C

Peak Hour Data (Interactive Diagram)

Marr Traffic
Transportation Data Collection

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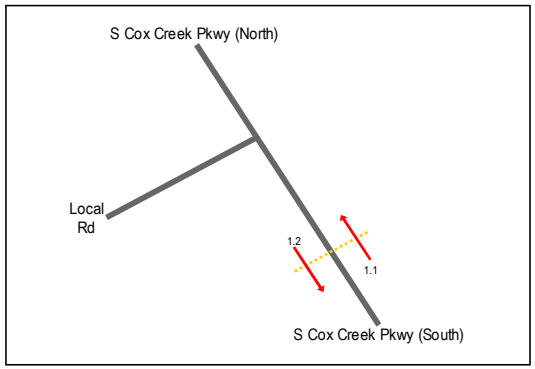

A (Northbound) S Cox Creek Pkwy (South)

Thru	Thru	Peds
138	44	0

A (Out)	A (In)	A (Tot)
182	182	364

Time Interval

0630 - 0730 (Intersection Peak Hour)

Parameter

Grand Total

Peak Hour Window: 1100 - 1300 (Weekday Inter Peak)

1100 - 1200 (Intersection Peak Hour)

	Northbound				
	S Cox Creek Pkwy (South)				
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total	Int Total
1100 - 1115	43	18	0	61	61
1115 - 1130	25	28	0	53	53
1130 - 1145	27	22	0	49	49
1145 - 1200	27	28	0	55	55
Hourly Total	122	96	0	**218**	**218**
Grand Total	122	96	0	**218**	**218**
App Percentage	55.96	44.04	0.00		
Int Percentage	55.96	44.04	0.00	100.00	
Motorcycles	0	0	-	0	0
Passenger cars	77	63	-	140	140
4 tire, single unit	43	33	-	76	76
Buses	0	0	-	0	0
2 axle, 6 tire, single unit	2	0	-	2	2
3 axle, single unit	0	0	-	0	0
4 or more axle, single unit	0	0	-	0	0
4 or less axle, single trailer	0	0	-	0	0
5-axle tractor semitrailer	0	0	-	0	0
6 or more axle, single trailer	0	0	-	0	0
5 or less axle, multi trailer	0	0	-	0	0
6 axle, multi-trailer	0	0	-	0	0
7 or more axle, multi-trailer	0	0	-	0	0
Motorcycles (%)	0.00	0.00	-	0.00	0.00
Passenger cars (%)	63.11	65.63	-	64.22	64.22
4 tire, single unit (%)	35.25	34.38	-	34.86	34.86
Buses (%)	0.00	0.00	-	0.00	0.00
2 axle, 6 tire, single unit (%)	1.64	0.00	-	0.92	0.92
3 axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
PHF	0.709	0.857	-	0.893	0.893

Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

Date
Friday 28 July 2017

Weather
Light Rain
Temp: 31°C

Peak Hour Data (Interactive Diagram)

Marr Traffic
Transportation Data Collection

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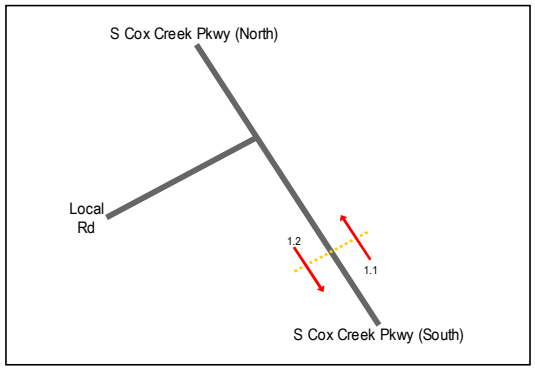

A (Northbound) S Cox Creek Pkwy (South)

Thru	Thru	Peds
96	122	0

A (Out)	A (In)	A (Tot)
218	218	436

Time Interval

1100 - 1200 (Intersection Peak Hour)

Parameter

Grand Total

Peak Hour Window: 1500 - 1800 (Weekday PM Peak)

1530 - 1630 (Intersection Peak Hour)

	Northbound				
	S Cox Creek Pkwy (South)				
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total	Int Total
1530 - 1545	78	23	0	101	101
1545 - 1600	45	28	0	73	73
1600 - 1615	37	31	0	68	68
1615 - 1630	48	36	0	84	84
Hourly Total	208	118	0	**326**	**326**
Grand Total	208	118	0	**326**	**326**
App Percentage	63.80	36.20	0.00		
Int Percentage	63.80	36.20	0.00	100.00	
Motorcycles	1	1	-	2	2
Passenger cars	128	92	-	220	220
4 tire, single unit	77	23	-	100	100
Buses	0	0	-	0	0
2 axle, 6 tire, single unit	2	2	-	4	4
3 axle, single unit	0	0	-	0	0
4 or more axle, single unit	0	0	-	0	0
4 or less axle, single trailer	0	0	-	0	0
5-axle tractor semitrailer	0	0	-	0	0
6 or more axle, single trailer	0	0	-	0	0
5 or less axle, multi trailer	0	0	-	0	0
6 axle, multi-trailer	0	0	-	0	0
7 or more axle, multi-trailer	0	0	-	0	0
Motorcycles (%)	0.48	0.85	-	0.61	0.61
Passenger cars (%)	61.54	77.97	-	67.48	67.48
4 tire, single unit (%)	37.02	19.49	-	30.67	30.67
Buses (%)	0.00	0.00	-	0.00	0.00
2 axle, 6 tire, single unit (%)	0.96	1.69	-	1.23	1.23
3 axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
PHF	0.667	0.819	-	0.807	0.807

Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

Date
Friday 28 July 2017

Weather
Light Rain
Temp: 31°C

Peak Hour Data (Interactive Diagram)

Marr Traffic
Transportation Data Collection

41 Peabody Street, Nashville, TN 37210
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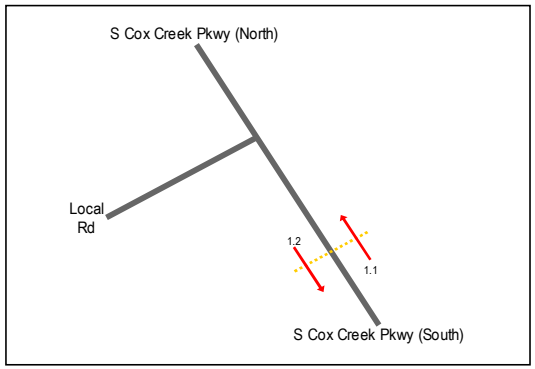


A (Northbound) S Cox Creek Pkwy (South)

Thru	Thru	Peds
118	208	0

A (Out)	A (In)	A (Tot)
326	326	652

Time Interval

1530 - 1630 (Intersection Peak Hour)

Parameter

Grand Total

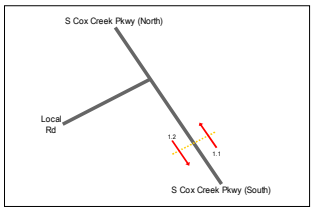
Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

Date
Saturday 29 July 2017

Weather
Cloudy
Temp: 30°C



Marr Traffic
Transportation Data Collection

41 Peabody Street, Nashville, TN 37210
1 (615) 431-6750
1 (800) 615-3765

0000 - 2400 (Saturday 24h Session)

	Northbound S Cox Creek Pkwy (South)				
TIME	Thru 1,1	Thru 1,2	Peds 1a	App Total	Int Total
0000 - 0015	5	9	0	14	14
0015 - 0030	3	1	0	4	4
0030 - 0045	1	0	0	1	1
0045 - 0100	2	2	0	4	4
Hourly Total	11	12	0	**23**	**23**
0100 - 0115	2	2	0	4	4
0115 - 0130	2	1	0	3	3
0130 - 0145	1	4	0	5	5
0145 - 0200	3	5	0	8	8
Hourly Total	8	12	0	**20**	**20**
0200 - 0215	0	2	0	2	2
0215 - 0230	0	1	0	1	1
0230 - 0245	1	2	0	3	3
0245 - 0300	2	1	0	3	3
Hourly Total	3	6	0	**9**	**9**
0300 - 0315	2	3	0	5	5
0315 - 0330	1	3	0	4	4
0330 - 0345	4	0	0	4	4
0345 - 0400	0	7	0	7	7
Hourly Total	7	13	0	**20**	**20**
0400 - 0415	0	4	0	4	4
0415 - 0430	1	3	0	4	4
0430 - 0445	2	1	0	3	3
0445 - 0500	2	4	0	6	6
Hourly Total	5	12	0	**17**	**17**
0500 - 0515	1	4	0	5	5
0515 - 0530	1	3	0	4	4
0530 - 0545	3	5	0	8	8
0545 - 0600	2	4	0	6	6
Hourly Total	7	16	0	**23**	**23**
0600 - 0615	5	3	0	8	8
0615 - 0630	5	9	0	14	14
0630 - 0645	4	12	0	16	16
0645 - 0700	9	10	0	19	19
Hourly Total	23	34	0	**57**	**57**
0700 - 0715	5	6	0	11	11
0715 - 0730	11	8	0	19	19
0730 - 0745	20	8	0	28	28
0745 - 0800	25	13	0	38	38
Hourly Total	61	35	0	**96**	**96**
0800 - 0815	17	17	0	34	34
0815 - 0830	14	11	0	25	25
0830 - 0845	21	20	0	41	41
0845 - 0900	18	10	0	28	28
Hourly Total	70	58	0	**128**	**128**
0900 - 0915	18	15	0	33	33
0915 - 0930	24	16	0	40	40
0930 - 0945	23	23	0	46	46
0945 - 1000	22	19	0	41	41
Hourly Total	87	73	0	**160**	**160**
1000 - 1015	14	25	0	39	39
1015 - 1030	32	22	0	54	54
1030 - 1045	36	23	0	59	59
1045 - 1100	39	22	0	61	61
Hourly Total	121	92	0	**213**	**213**
1100 - 1115	35	38	0	73	73
1115 - 1130	34	24	0	58	58
1130 - 1145	39	31	0	70	70
1145 - 1200	34	34	0	68	68
Hourly Total	142	127	0	**269**	**269**
1200 - 1215	31	18	0	49	49
1215 - 1230	33	31	0	64	64
1230 - 1245	45	38	0	83	83
1245 - 1300	35	22	0	57	57
Hourly Total	144	109	0	**253**	**253**
1300 - 1315	33	34	0	67	67
1315 - 1330	30	29	0	59	59
1330 - 1345	26	43	0	69	69
1345 - 1400	33	36	0	69	69
Hourly Total	122	142	0	**264**	**264**
1400 - 1415	26	31	0	57	57
1415 - 1430	22	36	0	58	58
1430 - 1445	32	42	0	74	74
1445 - 1500	28	50	0	78	78
Hourly Total	108	159	0	**267**	**267**
1500 - 1515	23	32	0	55	55
1515 - 1530	34	39	0	73	73
1530 - 1545	37	39	0	76	76
1545 - 1600	31	39	0	70	70
Hourly Total	125	149	0	**274**	**274**
1600 - 1615	30	42	0	72	72
1615 - 1630	34	35	0	69	69
1630 - 1645	25	29	0	54	54
1645 - 1700	34	33	0	67	67
Hourly Total	123	139	0	**262**	**262**
1700 - 1715	35	37	0	72	72
1715 - 1730	24	31	0	55	55
1730 - 1745	25	36	0	61	61
1745 - 1800	26	36	0	62	62
Hourly Total	110	140	0	**250**	**250**
1800 - 1815	27	41	0	68	68
1815 - 1830	21	31	0	52	52
1830 - 1845	18	31	0	49	49
1845 - 1900	27	29	0	56	56
Hourly Total	93	132	0	**225**	**225**
1900 - 1915	19	39	0	58	58
1915 - 1930	30	29	0	59	59
1930 - 1945	20	27	0	47	47
1945 - 2000	22	25	0	47	47
Hourly Total	91	120	0	**211**	**211**
2000 - 2015	30	33	0	63	63
2015 - 2030	13	33	0	46	46
2030 - 2045	12	28	0	40	40
2045 - 2100	17	36	0	53	53
Hourly Total	72	130	0	**202**	**202**
2100 - 2115	10	21	0	31	31
2115 - 2130	12	24	0	36	36
2130 - 2145	10	11	0	21	21
2145 - 2200	11	12	0	23	23
Hourly Total	43	68	0	**111**	**111**
2200 - 2215	11	23	0	34	34
2215 - 2230	4	19	0	23	23
2230 - 2245	7	12	0	19	19
2245 - 2300	6	6	0	12	12
Hourly Total	28	60	0	**88**	**88**
2300 - 2315	10	13	0	23	23
2315 - 2330	8	7	0	15	15
2330 - 2345	3	4	0	7	7
2345 - 0000	1	4	0	5	5
Hourly Total	22	28	0	**50**	**50**
Grand Total	1626	1866	0	**3492**	**3492**
App Percentage	46.56	53.44	0.00		
Int Percentage	46.56	53.44	0.00	100.00	
Motorcycles	26	23	-	49	
Passenger cars	1234	1437	-	2671	
4 tire, single unit	362	402	-	764	
Buses	0	0	-	0	
2 axle, 6 tire, single unit	4	4	-	8	
3 axle, single unit	0	0	-	0	
4 or more axle, single unit	0	0	-	0	
4 or less axle, single trailer	0	0	-	0	
5-axle tractor semitrailer	0	0	-	0	
6 or more axle, single trailer	0	0	-	0	
5 or less axle, multi trailer	0	0	-	0	
6 axle, multi-trailer	0	0	-	0	
7 or more axle, multi-trailer	0	0	-	0	
Motorcycles (%)	1.60	1.23	-	1.40	
Passenger cars (%)	75.89	77.01	-	76.49	
4 tire, single unit (%)	22.26	21.54	-	21.88	
Buses (%)	0.00	0.00	-	0.00	
2 axle, 6 tire, single unit (%)	0.25	0.21	-	0.23	
3 axle, single unit (%)	0.00	0.00	-	0.00	
4 or more axle, single unit (%)	0.00	0.00	-	0.00	
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	

Grand Total (All Sessions)

	Northbound			
	S Cox Creek Pkwy (South)			
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total
Grand Total	1626	1866	0	**3492**
App Percentage	46.56	53.44	0.00	
Int Percentage	46.56	53.44	0.00	100.00
Motorcycles	26	23	-	49
Passenger cars	1234	1437	-	2671
4 tire, single unit	362	402	-	764
Buses	0	0	-	0
2 axle, 6 tire, single unit	4	4	-	8
3 axle, single unit	0	0	-	0
4 or more axle, single unit	0	0	-	0
4 or less axle, single trailer	0	0	-	0
5-axle tractor semitrailer	0	0	-	0
6 or more axle, single trailer	0	0	-	0
5 or less axle, multi trailer	0	0	-	0
6 axle, multi-trailer	0	0	-	0
7 or more axle, multi-trailer	0	0	-	0
Motorcycles (%)	1.60	1.23	-	1.40
Passenger cars (%)	75.89	77.01	-	76.49
4 tire, single unit (%)	22.26	21.54	-	21.88
Buses (%)	0.00	0.00	-	0.00
2 axle, 6 tire, single unit (%)	0.25	0.21	-	0.23
3 axle, single unit (%)	0.00	0.00	-	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00

Int Total
3492

Peak Hour Window: 0000 - 2400 (Weekday 24h Session)

1515 - 1615 (Intersection Peak Hour)

	Northbound				
	S Cox Creek Pkwy (South)				
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total	Int Total
1515 - 1530	34	39	0	73	73
1530 - 1545	37	39	0	76	76
1545 - 1600	31	39	0	70	70
1600 - 1615	30	42	0	72	72
Hourly Total	132	159	0	**291**	**291**
Grand Total	132	159	0	**291**	**291**
App Percentage	45.36	54.64	0.00		
Int Percentage	45.36	54.64	0.00	100.00	
Motorcycles	7	0	-	7	7
Passenger cars	98	121	-	219	219
4 tire, single unit	26	38	-	64	64
Buses	0	0	-	0	0
2 axle, 6 tire, single unit	1	0	-	1	1
3 axle, single unit	0	0	-	0	0
4 or more axle, single unit	0	0	-	0	0
4 or less axle, single trailer	0	0	-	0	0
5-axle tractor semitrailer	0	0	-	0	0
6 or more axle, single trailer	0	0	-	0	0
5 or less axle, multi trailer	0	0	-	0	0
6 axle, multi-trailer	0	0	-	0	0
7 or more axle, multi-trailer	0	0	-	0	0
Motorcycles (%)	5.30	0.00	-	2.41	2.41
Passenger cars (%)	74.24	76.10	-	75.26	75.26
4 tire, single unit (%)	19.70	23.90	-	21.99	21.99
Buses (%)	0.00	0.00	-	0.00	0.00
2 axle, 6 tire, single unit (%)	0.76	0.00	-	0.34	0.34
3 axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
PHF	0.892	0.946	-	0.957	0.957

Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

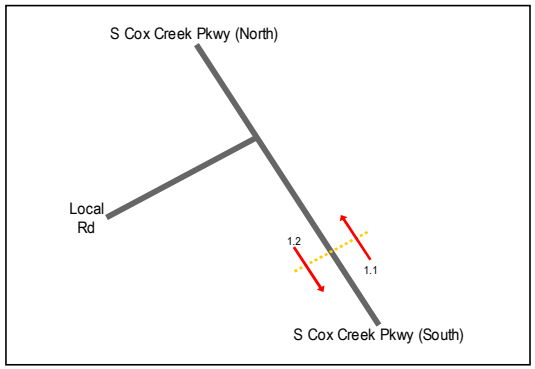
Date
Saturday 29 July 2017

Weather
Cloudy
Temp: 30°C

Peak Hour Data (Interactive Diagram)

Marr Traffic
Transportation Data Collection

41 Peabody Street, Nashville, TN 37210
1 (615) 431-6750
1 (800) 615-3765



A (Northbound) S Cox Creek Pkwy (South)

Thru	Thru	Peds
159	132	0

A (Out)	A (In)	A (Tot)
291	291	582

Time Interval

1515 - 1615 (Intersection Peak Hour)

Parameter

Grand Total

Peak Hour Window: 0600 - 0900 (Weekday AM Peak)

0745 - 0845 (Intersection Peak Hour)

	Northbound				
	S Cox Creek Pkwy (South)				
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total	Int Total
0745 - 0800	25	13	0	38	38
0800 - 0815	17	17	0	34	34
0815 - 0830	14	11	0	25	25
0830 - 0845	21	20	0	41	41
Hourly Total	77	61	0	**138**	**138**
Grand Total	77	61	0	**138**	**138**
App Percentage	55.80	44.20	0.00		
Int Percentage	55.80	44.20	0.00	100.00	
Motorcycles	0	0	-	0	0
Passenger cars	58	39	-	97	97
4 tire, single unit	19	22	-	41	41
Buses	0	0	-	0	0
2 axle, 6 tire, single unit	0	0	-	0	0
3 axle, single unit	0	0	-	0	0
4 or more axle, single unit	0	0	-	0	0
4 or less axle, single trailer	0	0	-	0	0
5-axle tractor semitrailer	0	0	-	0	0
6 or more axle, single trailer	0	0	-	0	0
5 or less axle, multi trailer	0	0	-	0	0
6 axle, multi-trailer	0	0	-	0	0
7 or more axle, multi-trailer	0	0	-	0	0
Motorcycles (%)	0.00	0.00	-	0.00	0.00
Passenger cars (%)	75.32	63.93	-	70.29	70.29
4 tire, single unit (%)	24.68	36.07	-	29.71	29.71
Buses (%)	0.00	0.00	-	0.00	0.00
2 axle, 6 tire, single unit (%)	0.00	0.00	-	0.00	0.00
3 axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
PHF	0.770	0.763	-	0.841	0.841

Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

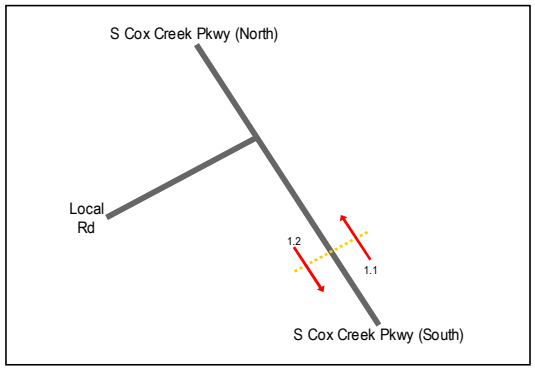
Date
Saturday 29 July 2017

Weather
Cloudy
Temp: 30°C

Peak Hour Data (Interactive Diagram)

Marr Traffic
Transportation Data Collection

41 Peabody Street, Nashville, TN 37210
1 (615) 431-6750
1 (800) 615-3765



A (Northbound) S Cox Creek Pkwy (South)

Thru	Thru	Peds
61	77	0

A (Out)	A (In)	A (Tot)
138	138	276

Time Interval

0745 - 0845 (Intersection Peak Hour)

Parameter

Grand Total

Peak Hour Window: 1100 - 1300 (Weekday Inter Peak)

1100 - 1200 (Intersection Peak Hour)

	Northbound				
	S Cox Creek Pkwy (South)				
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total	Int Total
1100 - 1115	35	38	0	73	73
1115 - 1130	34	24	0	58	58
1130 - 1145	39	31	0	70	70
1145 - 1200	34	34	0	68	68
Hourly Total	142	127	0	**269**	**269**
Grand Total	142	127	0	**269**	**269**
App Percentage	52.79	47.21	0.00		
Int Percentage	52.79	47.21	0.00	100.00	
Motorcycles	2	5	-	7	7
Passenger cars	114	93	-	207	207
4 tire, single unit	24	29	-	53	53
Buses	0	0	-	0	0
2 axle, 6 tire, single unit	2	0	-	2	2
3 axle, single unit	0	0	-	0	0
4 or more axle, single unit	0	0	-	0	0
4 or less axle, single trailer	0	0	-	0	0
5-axle tractor semitrailer	0	0	-	0	0
6 or more axle, single trailer	0	0	-	0	0
5 or less axle, multi trailer	0	0	-	0	0
6 axle, multi-trailer	0	0	-	0	0
7 or more axle, multi-trailer	0	0	-	0	0
Motorcycles (%)	1.41	3.94	-	2.60	2.60
Passenger cars (%)	80.28	73.23	-	76.95	76.95
4 tire, single unit (%)	16.90	22.83	-	19.70	19.70
Buses (%)	0.00	0.00	-	0.00	0.00
2 axle, 6 tire, single unit (%)	1.41	0.00	-	0.74	0.74
3 axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
PHF	0.910	0.836	-	0.921	0.921

Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

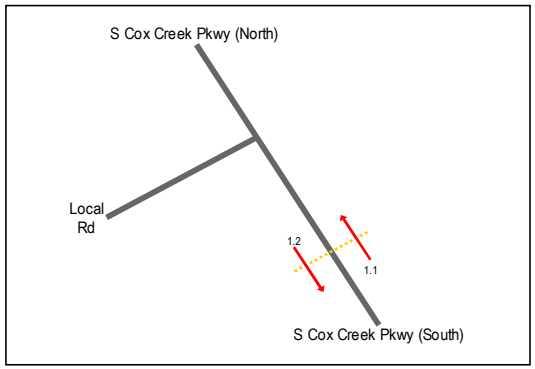
Date
Saturday 29 July 2017

Weather
Cloudy
Temp: 30°C

Peak Hour Data (Interactive Diagram)

Marr Traffic
Transportation Data Collection

41 Peabody Street, Nashville, TN 37210
1 (615) 431-6750
1 (800) 615-3765



A (Northbound) S Cox Creek Pkwy (South)

Thru	Thru	Peds
127	142	0

A (Out)	A (In)	A (Tot)
269	269	538

Time Interval

1100 - 1200 (Intersection Peak Hour)

Parameter

Grand Total

Peak Hour Window: 1500 - 1800 (Weekday PM Peak)

1515 - 1615 (Intersection Peak Hour)

	Northbound				
	S Cox Creek Pkwy (South)				
TIME	Thru 1.1	Thru 1.2	Peds 1a	App Total	Int Total
1515 - 1530	34	39	0	73	73
1530 - 1545	37	39	0	76	76
1545 - 1600	31	39	0	70	70
1600 - 1615	30	42	0	72	72
Hourly Total	132	159	0	**291**	**291**
Grand Total	132	159	0	**291**	**291**
App Percentage	45.36	54.64	0.00		
Int Percentage	45.36	54.64	0.00	100.00	
Motorcycles	7	0	-	7	7
Passenger cars	98	121	-	219	219
4 tire, single unit	26	38	-	64	64
Buses	0	0	-	0	0
2 axle, 6 tire, single unit	1	0	-	1	1
3 axle, single unit	0	0	-	0	0
4 or more axle, single unit	0	0	-	0	0
4 or less axle, single trailer	0	0	-	0	0
5-axle tractor semitrailer	0	0	-	0	0
6 or more axle, single trailer	0	0	-	0	0
5 or less axle, multi trailer	0	0	-	0	0
6 axle, multi-trailer	0	0	-	0	0
7 or more axle, multi-trailer	0	0	-	0	0
Motorcycles (%)	5.30	0.00	-	2.41	2.41
Passenger cars (%)	74.24	76.10	-	75.26	75.26
4 tire, single unit (%)	19.70	23.90	-	21.99	21.99
Buses (%)	0.00	0.00	-	0.00	0.00
2 axle, 6 tire, single unit (%)	0.76	0.00	-	0.34	0.34
3 axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or more axle, single unit (%)	0.00	0.00	-	0.00	0.00
4 or less axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5-axle tractor semitrailer (%)	0.00	0.00	-	0.00	0.00
6 or more axle, single trailer (%)	0.00	0.00	-	0.00	0.00
5 or less axle, multi trailer (%)	0.00	0.00	-	0.00	0.00
6 axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
7 or more axle, multi-trailer (%)	0.00	0.00	-	0.00	0.00
PHF	0.892	0.946	-	0.957	0.957

Florence, AL
Classified Turn Movement Count

Site 1 of 1
S Cox Creek Pkwy (South)

Lat/Long
34.806695°, -87.627815°

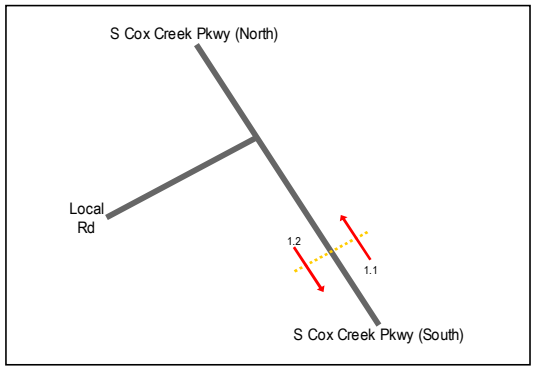
Date
Saturday 29 July 2017

Weather
Cloudy
Temp: 30°C

Peak Hour Data (Interactive Diagram)

Marr Traffic
Transportation Data Collection

41 Peabody Street, Nashville, TN 37210
1 (615) 431-6750
1 (800) 615-3765



A (Northbound) S Cox Creek Pkwy (South)

Thru	Thru	Peds
159	132	0

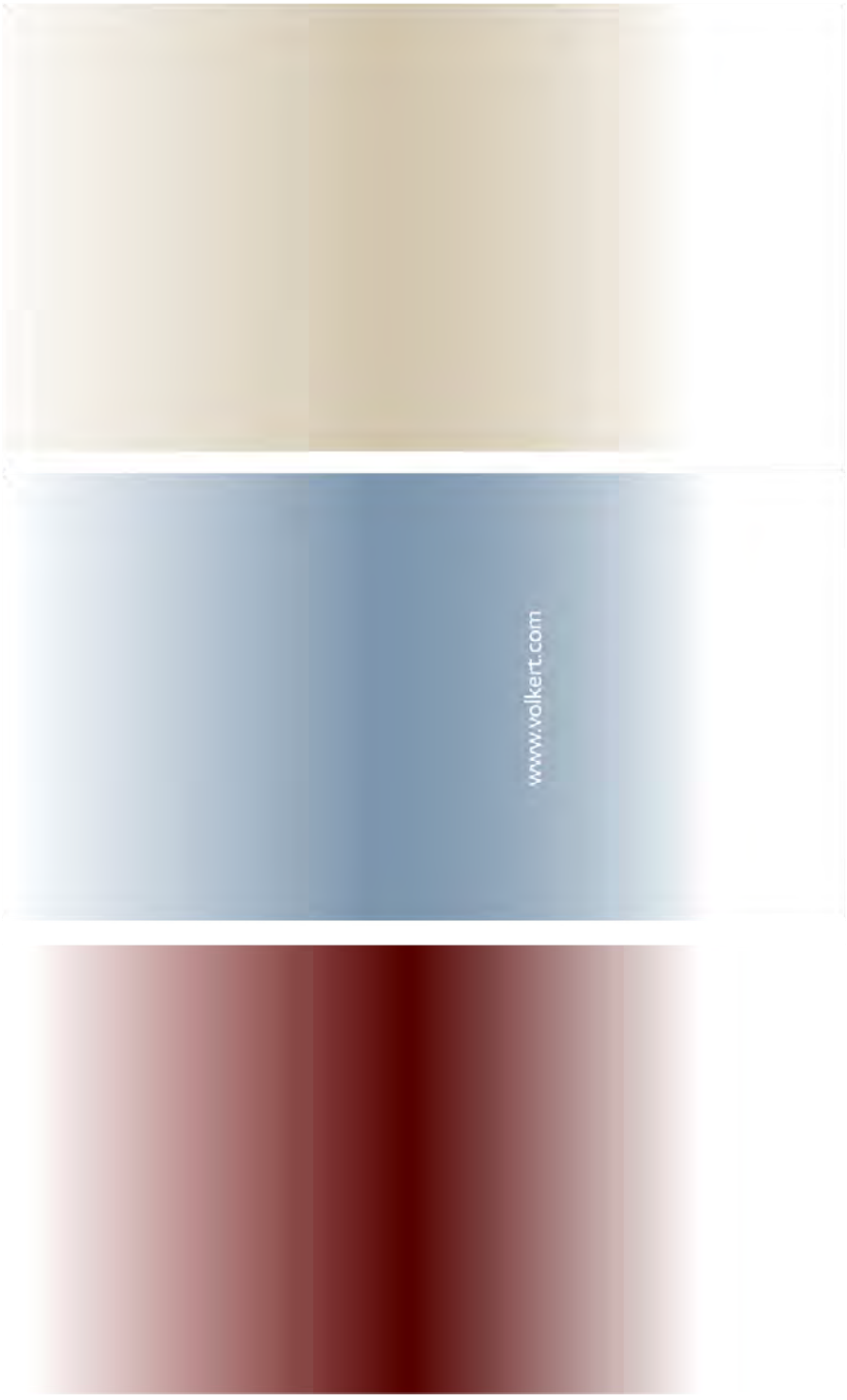
A (Out)	A (In)	A (Tot)
291	291	582

Time Interval

1515 - 1615 (Intersection Peak Hour)

Parameter

Grand Total



Appendix C
GPR Report

GENERAL OBSERVATION REPORT

Report Number: E1171088.0001
Service Date: 08/10/17
Report Date: 08/11/17

Terracon
110 12th St N
Birmingham, AL 35203-1537
205-942-1289

Client

Volkert, Inc.
Attn: Adam Davidson
330 Mallory Station Road
Suite A-1
Franklin, TN 37067

Project

Bridge Over TVA Wilson Dam
Bridge over TVA Wilson Dam
Florence, AL

Project Number: E1171088

Terracon representative Scott Looney visited the project site on 7/31/17 as scheduled by Mr. Justin Eckel with Volkert, Inc. The purpose of the visit was to perform ground-penetrating radar (GPR) evaluations of the concrete pavement.

GSSI SIR-3000 Structure-Scan GPR equipment with a 1.6 GHz antenna for concrete scanning was utilized to perform the evaluations. GPR evaluations were made using 2-D scanning techniques. The GPR scan area surfaces consisted of bare concrete.

Our representative performed GPR evaluations to locate reinforcing steel, utilities, and voids within the upper layer of concrete pavement over the dam at six locations selected by Mr. Eckel with Volkert for scanning and concrete core samples. The GPR scanning was performed on the top side of the pavement within approximately 3'-0" of the proposed location for each concrete core sample.

TVA personnel with similar GPR equipment performed GPR evaluations at the same locations and with the same results. The upper layer of concrete pavement typically appeared to be approximately 8" to 10" in thickness over the original dam concrete construction. At several locations there appeared to be a potential void between the original dam concrete construction and the upper layer of concrete pavement. For the most part, the concrete at the test locations appeared to be free of reinforcing steel or utilities as few targets were detected with the GPR equipment. The location of the few targets detected with GPR in the test areas was marked directly on the face of the concrete with blue wax crayon and/or white spray paint by TVA personnel. The markings represent the approximate longitudinal center line of each component detected. Terracon and the TVA personnel performing GPR evaluations recommended drilling or coring of the concrete be performed a minimum of 2" away from the lines marking the location of the targets detected with GPR.

An image of the GPR data from each location scanned is attached for reference. It must be noted that the depth of the potential voids and targets in the attached images are approximate as ground truth was not utilized in the field to adjust the GPR settings.

The intent of our scope is to determine the location of the steel reinforcement, utilities, and voids in the concrete components. Thereafter, others than Terracon will review our findings to determine necessary repairs and future use of the structure.

Ground Penetrating Radar utilizes electromagnetic waves to detect changes in the subsurface of the area being scanned or evaluated. Changes in the signal generally indicate material property changes such as, but not limited to electromagnetic conductivity and dielectric constant, which in some cases can be qualitatively linked to other material properties such as density, moisture, or material type. While this can be effective in identifying the presence and approximate location of items such as embedded reinforcing steel and post tensioned tendons, utilities and voids in concrete and masonry structures, among other things, it must be understood that, as with any nondestructive evaluation method, these processes rely on instrument signals to indicate physical conditions in the field. Signal information can be affected by on-site conditions beyond the control of the operator such as but not limited to, concrete types, concrete moisture, and/or reinforcing steel or other

Services:

Terracon Rep.: Scott Looney
Reported To:
Contractor:
Report Distribution:
(1) Volkert, Inc., Adam Davidson

Reviewed By: Brandon Smith
rvw1: drs
Project Manager

Terracon
110 12th St N
Birmingham, AL 35203-1537
205-942-1289

Client
Volkert, Inc.
Attn: Adam Davidson
330 Mallory Station Road
Suite A-1
Franklin, TN 37067

Project
Bridge Over TVA Wilson Dam
Bridge over TVA Wilson Dam
Florence, AL

Project Number: E1171088

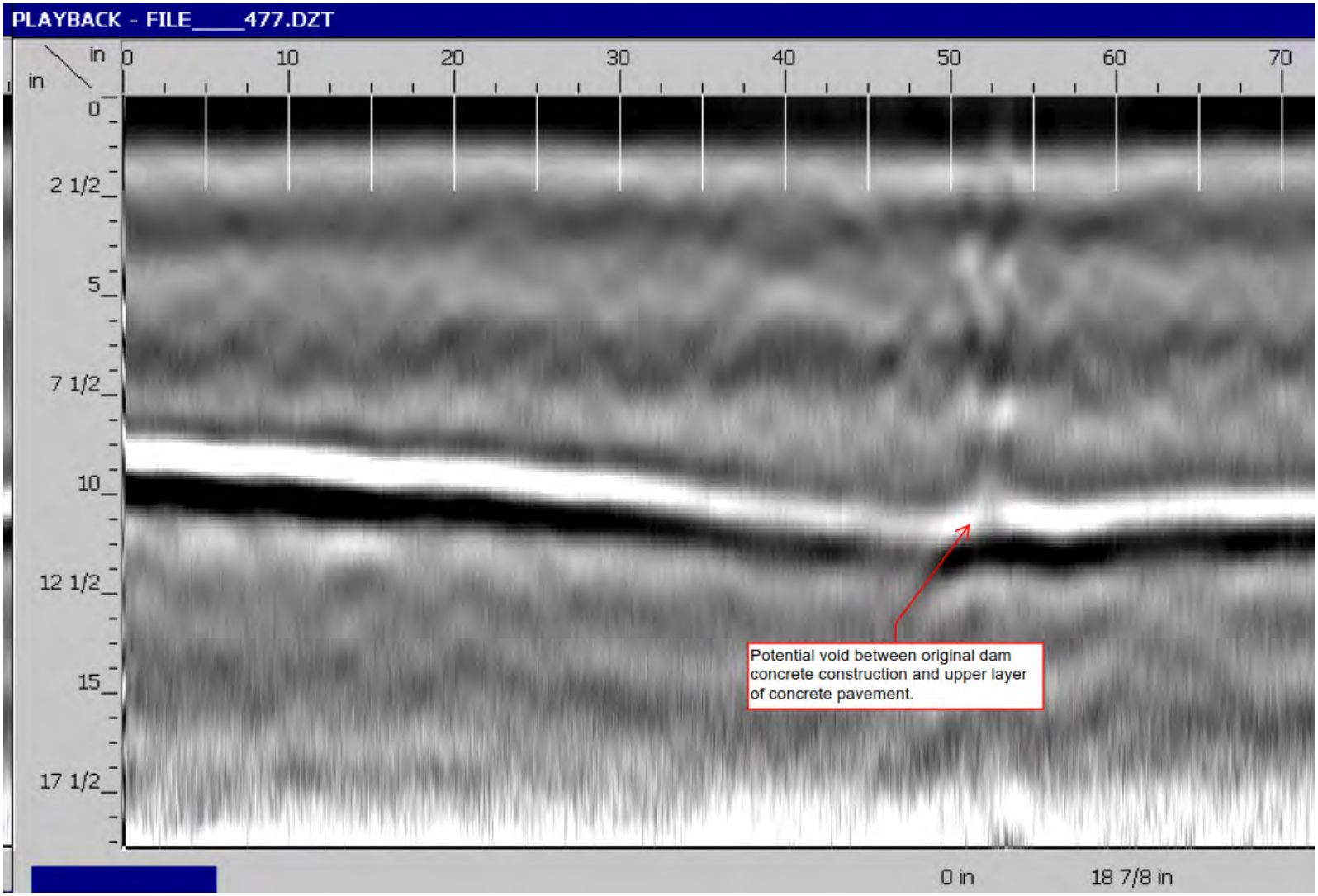
detected component's layout, orientation and spacing, as well as the presence of unknown and unexpected conditions. Utilizing conventional observation, sampling and testing ("truthing") of select areas is highly recommended to confirm the results from the GPR evaluation.

As with other nondestructive evaluation methods, the GPR results may provide a level of confidence but should not be considered precise or absolute. Further, it should be recognized that the results of GPR are one-dimensional and operator's cannot guarantee the accuracy of the information and may not be able to discern or predict with specificity what has given off the signals being recorded. As such, unexpected items and materials may be present and remain undetected. Due to the previously identified limitations of the GPR method, there is an inherent level of risk that must be accepted by the end user of the interpreted data. Thus, Terracon shall not be held responsible for any associated damages, losses or injuries resulting from use of the information provided. Terracon has identified the approximate locations of the detected targets, but Terracon will not be responsible for clearing areas for coring, sawing or other penetrations.

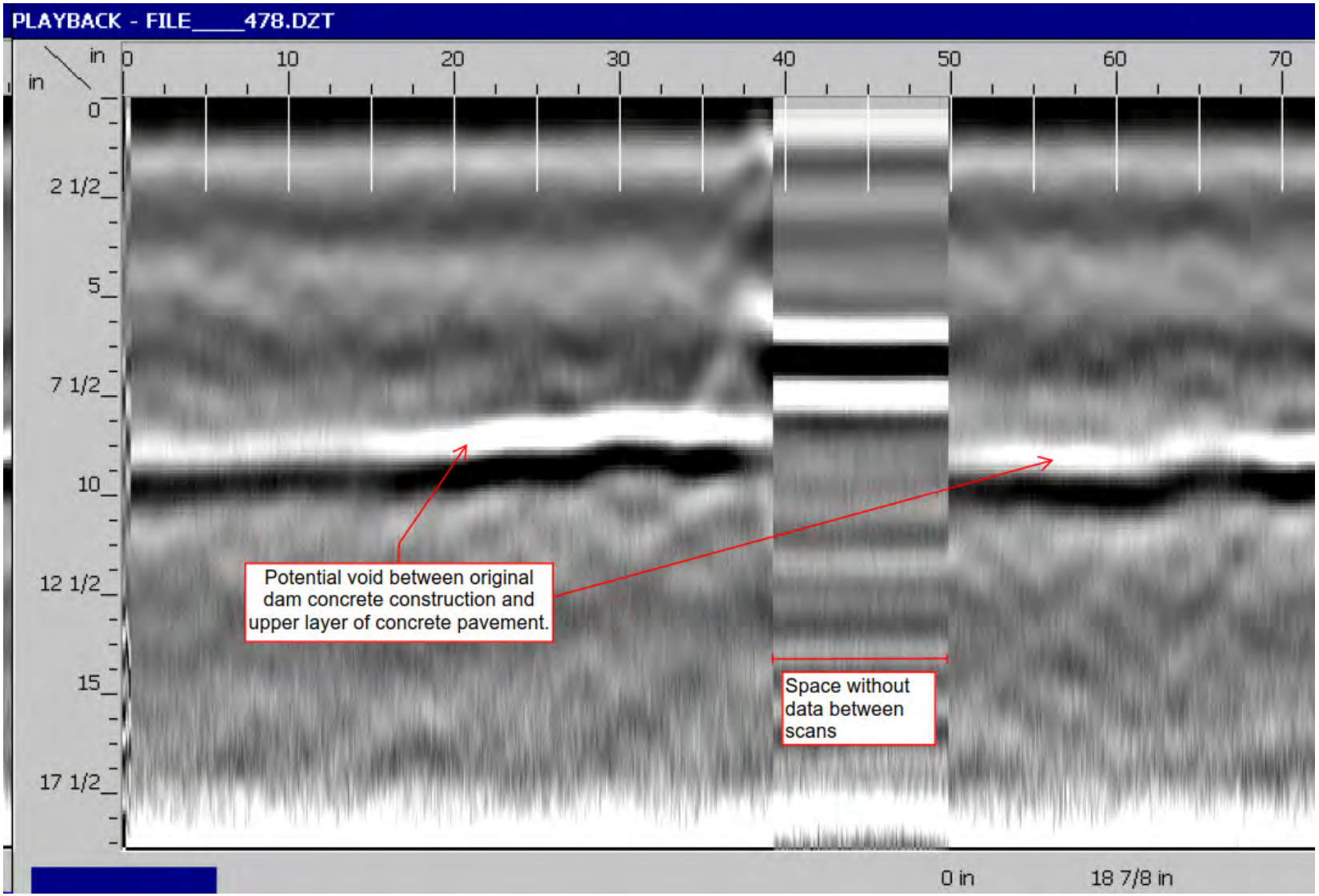
Services:

Terracon Rep.: Scott Looney
Reported To:
Contractor:
Report Distribution:
(1) Volkert, Inc., Adam Davidson

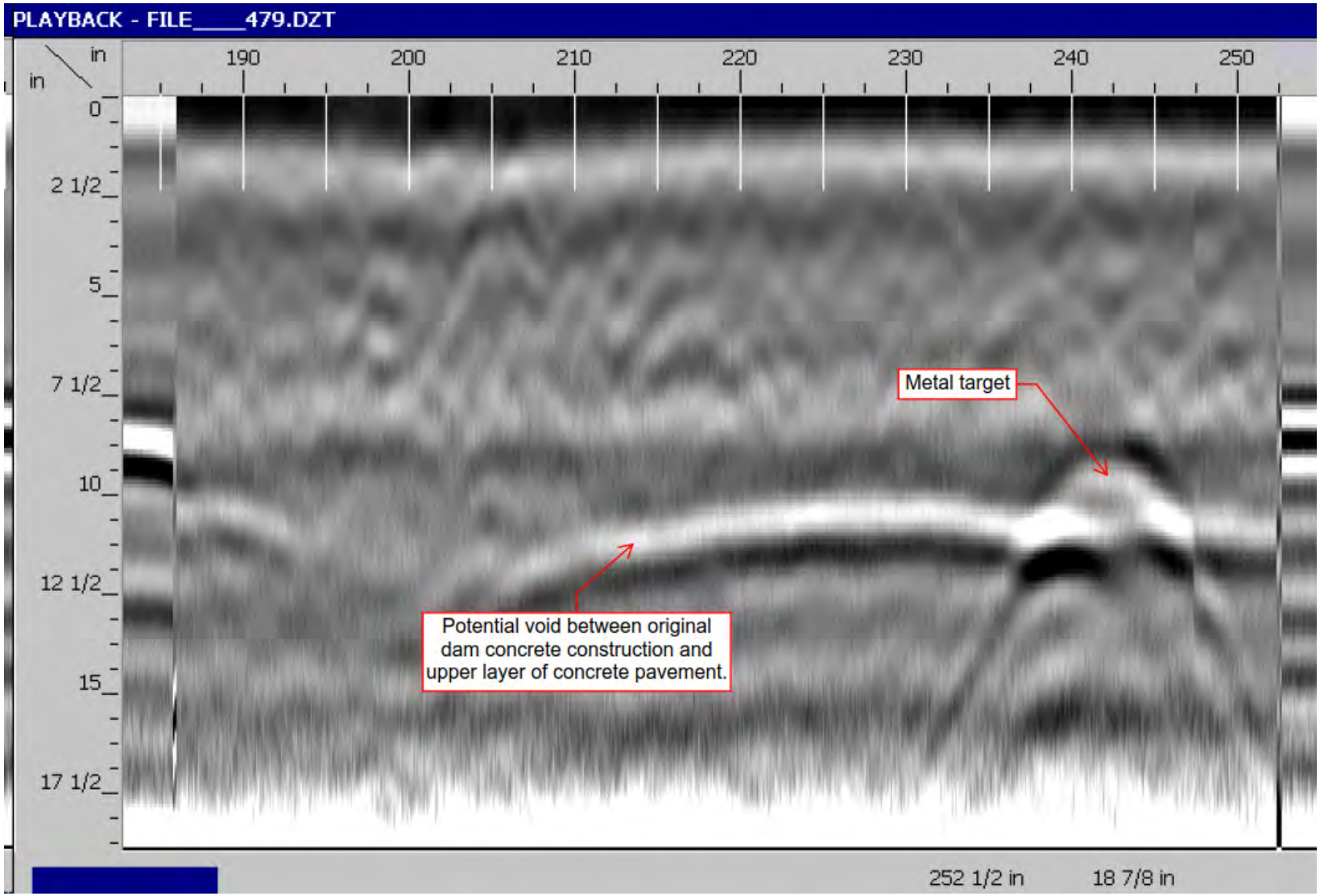
Reviewed By: Brandon Smith
rvw1: drs
Project Manager



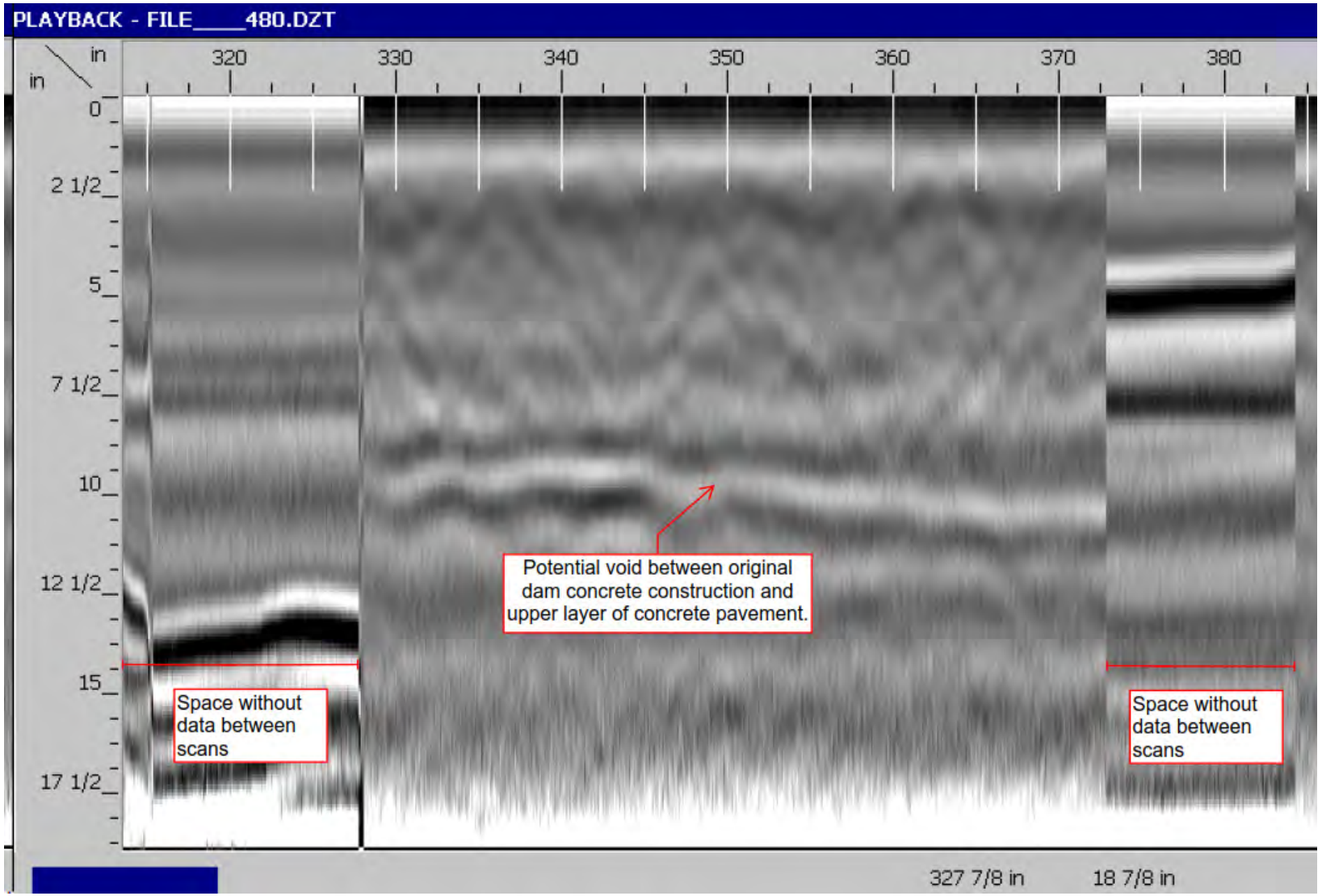
Bridge Over TVA Wilson Dam	Core location: #1	Terracon
	Report Number: E1171088.0001	
Bridge over TVA Wilson Dam	Technician: Scott Looney	110 12th St N
Florence, AL	Date: 08/10/17	Birmingham, AL 35203-1537
	Scale: Not to Scale	**205-942-1289**



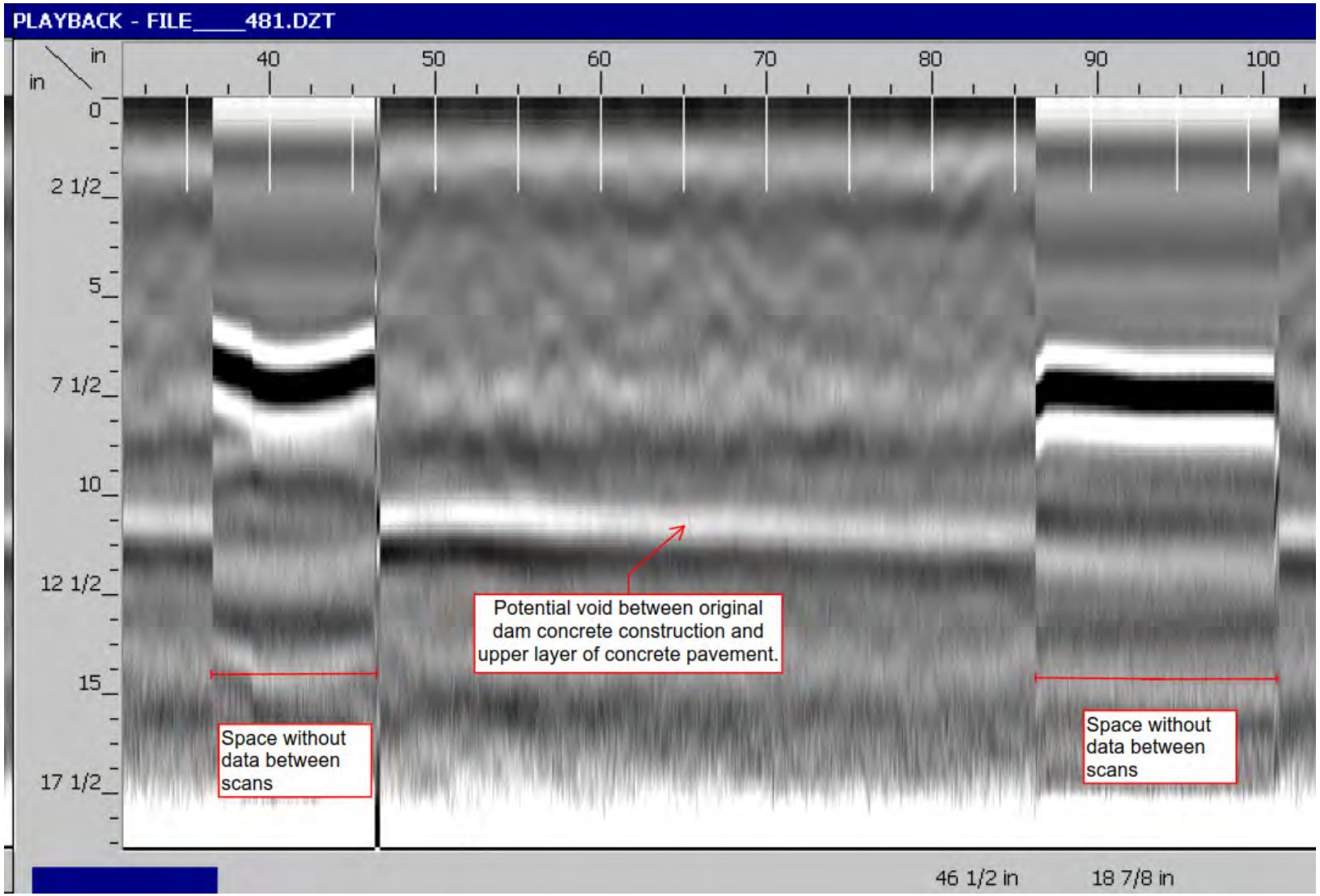
Bridge Over TVA Wilson Dam	Core location: #2	Terracon
	Report Number: E1171088.0001	
Bridge over TVA Wilson Dam	Technician: Scott Looney	110 12th St N
Florence, AL	Date: 08/10/17	Birmingham, AL 35203-1537
	Scale: Not to Scale	**205-942-1289**



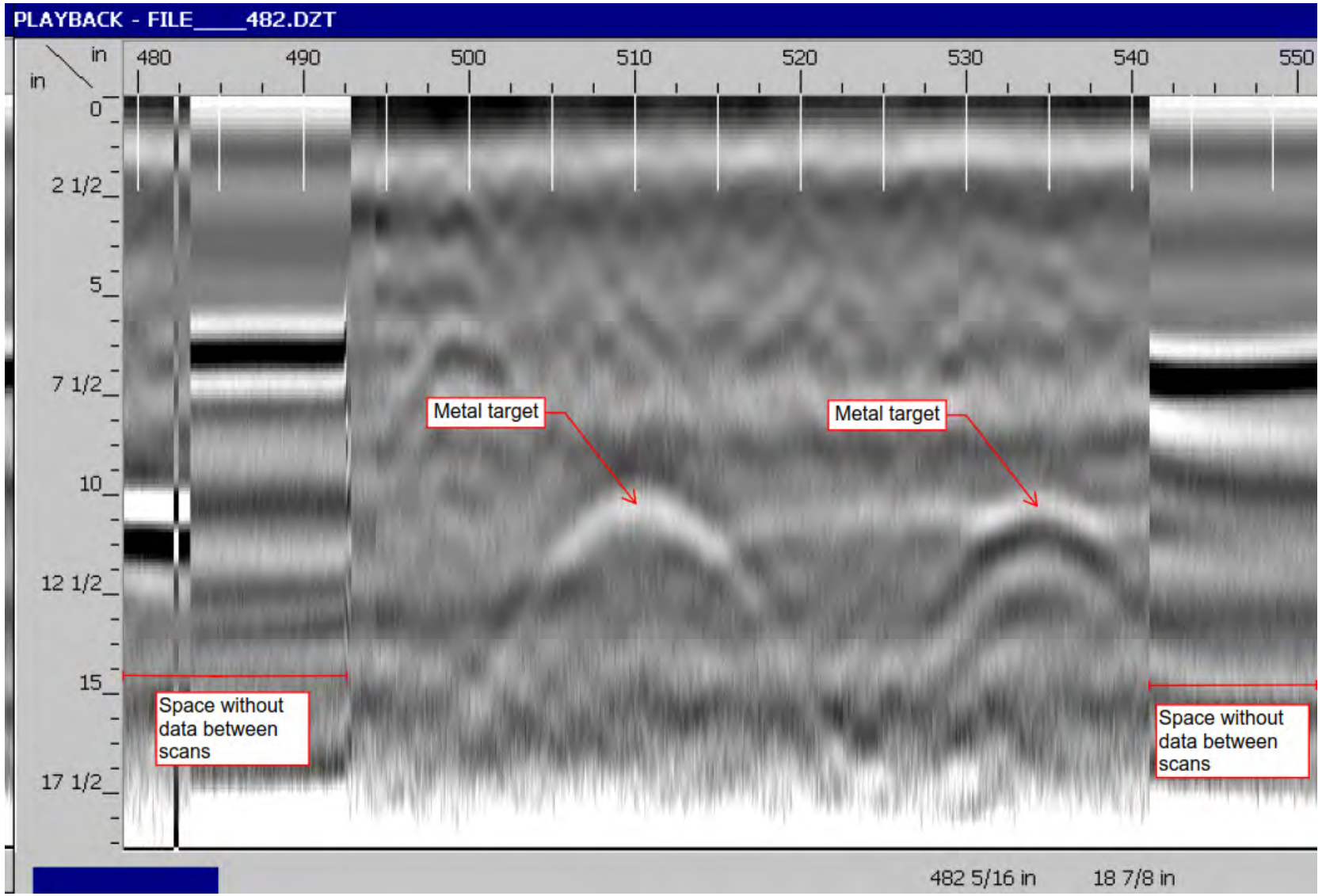
Bridge Over TVA Wilson Dam	Core location: #3	Terracon
	Report Number: E1171088.0001	
Bridge over TVA Wilson Dam	Technician: Scott Looney	110 12th St N
Florence, AL	Date: 08/10/17	Birmingham, AL 35203-1537
	Scale: Not to Scale	**205-942-1289**



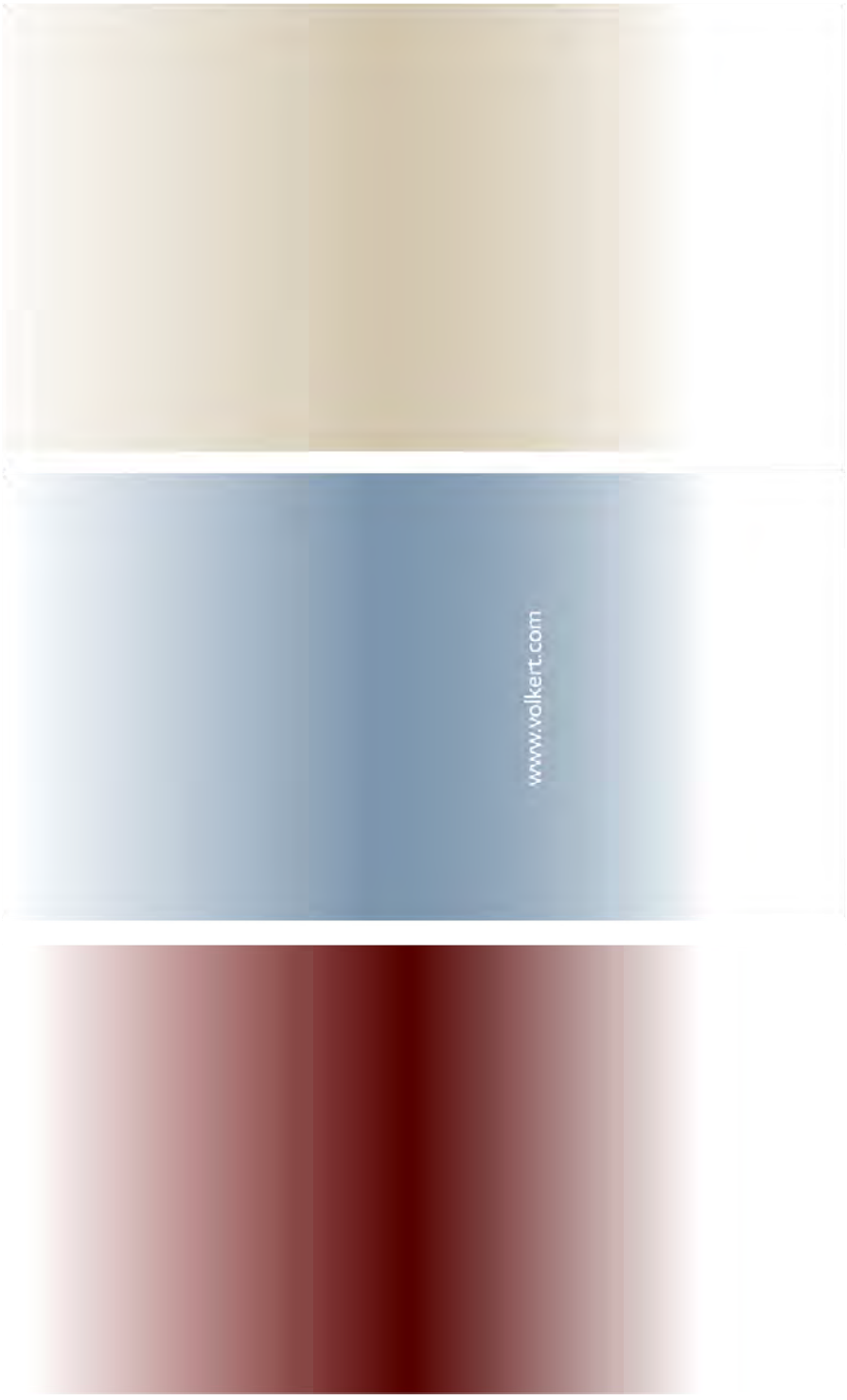
Bridge Over TVA Wilson Dam	Core location: #4	Terracon
	Report Number: E1171088.0001	
Bridge over TVA Wilson Dam	Technician: Scott Looney	110 12th St N
Florence, AL	Date: 08/10/17	Birmingham, AL 35203-1537
	Scale: Not to Scale	**205-942-1289**



Bridge Over TVA Wilson Dam	Core location: #5	Terracon
	Report Number: E1171088.0001	
Bridge over TVA Wilson Dam	Technician: Scott Looney	110 12th St N
Florence, AL	Date: 08/10/17	Birmingham, AL 35203-1537
	Scale: Not to Scale	**205-942-1289**



Bridge Over TVA Wilson Dam	Core location: #6	Terracon
	Report Number: E1171088.0001	
Bridge over TVA Wilson Dam	Technician: Scott Looney	110 12th St N
Florence, AL	Date: 08/10/17	Birmingham, AL 35203-1537
	Scale: Not to Scale	**205-942-1289**



Appendix D
Concrete Testing Report

Results of Petrographic Examinations and Laboratory Testing of Concrete Cores

TVA Wilson Dam
Florence, Alabama

Terracon Project No. E1171088
Lab Nos. 6650-6655
September 15, 2017

Prepared for:
Volkert, Inc.
Franklin, Tennessee

Prepared by:
Terracon Consultants, Inc.
Cincinnati, Ohio

RESULTS OF PETROGRAPHIC EXAMINATIONS AND LABORATORY TESTING OF CONCRETE CORES
TVA Wilson Dam
Florence, Alabama

Terracon Project No. E1171088

September 12, 2017

1.0 INTRODUCTION & BACKGROUND

A total of 10 nominal 4-inch diameter concrete cores were obtained by Terracon, Birmingham, Alabama personnel and were received at the Terracon, Cincinnati, Ohio materials laboratory on August 14, 2017. The cores were provided to perform petrographic examinations and laboratory testing to determine the general condition of the concrete. Core identifications and assigned laboratory numbers are presented in Table I, below.

TABLE I
Core Identification

CORE IDENTIFICATION	STATION NUMBER	CORE LOCATION	LAB NUMBER
#1	64+25.76	BRIDGE DECK	6646
#2	68+37.76	BRIDGE DECK	6647
#5	79+52.76	BRIDGE DECK	6648
#6	80+22.76	BRIDGE DECK	6649
#3	72+70.76	BRIDGE DECK	6650
#4	77+21.76	BRIDGE DECK	6651
#1	64+25.76	ARCH	6652
#3	72+70.76	ARCH	6653
#4	77+21.76	ARCH	6654
#5	79+52.76	ARCH	6655

2.0 PETROGRAPHIC METHODOLOGY

Petrographic examinations were performed on 6 of the cores selected by the client in accordance with ASTM Method C 856 and concrete proportions and hardened air contents were determined in accordance with ASTM Method C 457, Procedure B. The cores were measured, visually examined and photographed as received. Cores were then sawn lengthwise to obtain cross sections of each core for visual and stereomicroscopic examinations. Twenty-five micron thick thin-sections of each core were prepared and examined by polarized light microscopy.

Sawn sections were stained using proprietary Los Alamos stains to further detect the presence of ASR. Phenolphthalein stain was also applied to sawn surfaces of the cores. Phenolphthalein is a pH indicator which turns from colorless to magenta at about a pH of 9-10. When the stain remains colorless after application, the concrete is usually carbonated and maintains a pH below 9.

Photographs of the cores as received, after sawing and after stain application, as well as thin-section photomicrographs, are included in Appendix A. A summary of information obtained for each core is presented in Table II, below.

TABLE II
Concrete Proportions & Hardened Air Content,%
(ASTM C457, Procedure B)

Core ID.	Lab No.	Total Aggregates	Total Cementitious Material	Total Air
#3, Bridge Deck	6650	68.4	28.2	3.4 (1.7)
#4, Bridge Deck	6651	70.5	24.5	5.0 (2.7)
#1, Arch	6652	73.1	25.9	1.0 (1)
#3, Arch	6653	65.3	33.8	0.9 (0.9)
#4, Arch	6654	71.7	22.8	2.5 (2.5)
#5, Arch	6655	71.3	28.4	0.3 (0.3)

Note: Air contents in parentheses represent entrapped size air (>0.04 inches). ASTM C 457 does not distinguish between entrained and entrapped air. The distinction is typically made by the petrographer based on void size, shape and location within the matrix.

TABLE III
Summary of General Physical Characteristics

Core ID.	Lab No.	Coarse Aggregate	Fine Aggregate	Cementitious Materials	Carbonation Depth, Inches, based on Phenolphthalein stain	Los Alamos Staining
#3, Bridge Deck	6650	3/4" Crushed Limestone, Chert	Natural Sand	Portland Cement	Carbonated along fracture and slightly carbonated throughout	No ASR detected
#4, Bridge Deck	6651	1" Crushed Limestone, Chert	Natural Sand	Portland Cement	Carbonated in upper 1/4 inches	No ASR detected
#1, Arch	6652	1 ½" Crushed Limestone, Chert	Natural Sand	Portland Cement	Carbonated less than 1/16 inches	No ASR detected
#3, Arch	6653	½" Crushed Limestone, Chert	Natural Sand	Portland Cement	Carbonated in upper 1/8 inches	No ASR detected
#4, Arch	6654	2" Crushed Limestone, Chert	Natural Sand	Portland Cement	Completely carbonated	No ASR detected
#5, Arch	6655	3/4" Crushed Limestone, Chert	Natural Sand	Portland Cement	Carbonated in upper 3/4 inches	No ASR detected

TABLE IV
Summary of Microscopy Characteristics

Core ID.	Lab No.	Reactive Aggregates	Void fillings	Microfracturing
#3, Bridge Deck	6650	No	Ettringite (V,P), no apparent ASR gels	Throughout sample
#4, Bridge Deck	6651	No	Ettringite (V,F,P), no apparent ASR gels	Throughout sample
#1, Arch	6652	No	No apparent ettringite or ASR gels	Common upper 1"
#3, Arch	6653	No	Ettringite (V,F,P), no apparent ASR gels	Throughout sample
#4, Arch	6654	No	Ettringite (V,F,P), no apparent ASR gels	Throughout sample
#5, Arch	6655	No	Ettringite (V,P), no apparent ASR gels	Common upper 5mm

V=Voids, F=Fractures and P=Paste

3.0 SUMMARY OF GROSS CORE CHARACTERISTICS

The cores were each 3-5/8 inches in diameter, varied in length from 1-1/2 inches to 9-1/4 inches, and were broken off at their interior surfaces. The Core #3 and Core #4 from the bridge deck were moderately air entrained. The cores from the arches are not air entrained. The concrete was well consolidated, with few coalescing voids and no honeycombing. The cores contained no steel or wire mesh. The top surfaces of Core #3 and Core #4 from the bridge deck were sandy. In all arch cores the top surface consisted of bituminous and cementitious material.

The cores were generally intact, with the exception of Core #3 from the bridge deck, which was cored over a full-depth fracture and Core #3 from the arch, which had subparallel fractures associated with freeze-thaw damage. The fracture in Core #3 from the bridge was stained black and also exhibited filmy deposits of white calcium carbonate. The bottom surface of Core #3 and Core #5 from the arch exhibited calcium carbonate deposits around aggregates.

Aggregate materials were hard, dense and rounded to subangular. These materials consisted of ¾-inch to 2-inch maximum size crushed limestone and chert coarse aggregate, and natural sand fine aggregate. Cementitious materials in all samples consisted solely of Portland cement. These materials appeared to be well mixed and evenly distributed, with no aggregate segregation or preferred particle orientation.

The concrete appeared to be undergoing sulfate attack. The presence of ettringite was noted in 5 of the 6 samples (except for Core #1 from the arch) and its presence in both air voids and cement paste was associated with microfracturing. The presence of ASR gels was not identified either by Los Alamos staining or by visual or microscopic examinations.

Carbonation of the matrix was identified by phenolphthalein stain in the exterior 1/16 inches to 3/4 inches of all the cores, except Core #3 from the bridge deck, which was slightly carbonated around the fracture, and Core #4 from the arch, which was completely carbonated.

Although microfracturing was observed to some extent in all cores, the majority of the microfracturing was confined to the exterior 1 to 2 inches of the sample.

7.0 THIN-SECTION EXAMINATION

Thin-sections from each core were examined for the occurrence of alkali-silica reactivity, other chemical reactions, microfracturing, degree of hydration of cementitious materials and the presence of matrix carbonation. Photomicrographs are presented in Appendix A. Based on the examinations, cementitious materials consisted solely of well-hydrated Portland cement. Microfracturing of the matrix was observed in each sample, although minor in amount. Generally, the observed charts consisted of microcrystalline quartz, with no chalcedonic chert, opal or agate.

Core #4 from the bridge deck, contained trace amounts of chalcedonic chert. Microfracturing associated with the chert was generally isolated and trivial in amount. The presence of ettringite was common in air voids and minor amounts occurred in the cement paste, with none observed in Core #1 from the arch. Ettringite was commonly associated with microfracturing in Core #3 and Core #4 from the arch and Core #4 from the bridge deck. Ettringite was rarely associated with microfracturing in the remaining cores. The was no apparent presence of silica gels in any of the samples.

8.0 LOS-ALAMOS STAIN TESTS

"Los Alamos" stains are commercially available, but proprietary, stains that are used to identify areas of occurrence of ASR. The stains consist of "yellow" stain and a "red" stain which is further applied only if the yellow stain indicates the presence of ASR. The yellow stain is first applied, then rinsed off. Areas of ASR are identified by bright yellow staining remaining after the rinsing. The cores submitted exhibited no apparent detection of ASR. This suggests that ASR is not occurring.

9.0 CHLORIDE ANALYSES

Both water-soluble (W/S) (ASTM C1218) and acid-soluble (total) (A/S) (ASTM C1152) chloride analyses were performed by the Terracon, Las Vegas, Nevada laboratory on powdered samples from each core. Results are summarized below in Table V and presented in Appendix B.

TABLE V
Chloride Analyses

CORE IDENTIFICATION	CORE LOCATION	LAB NUMBER	W/S CHLORIDE	A/S CHLORIDE
#3	BRIDGE DECK	6650	0.002	0.008
#4	BRIDGE DECK	6651	0.005	0.072
#1	ARCH	6652	0.002	0.085
#3	ARCH	6653	0.001	0.005
#4	ARCH	6654	0.001	0.005
#5	ARCH	6655	0.004	0.020

Note: All results in % by weight of concrete

Based on these analyses, Core #4 from the bridge deck and Core#1 from the arch exhibit elevated acid-soluble chloride concentrations. Core #5 from the arch exhibited slightly elevated acid-soluble (total) chloride concentrations. Water-soluble chlorides, those typically responsible for chloride attack of reinforcing steel and concrete scaling, appear to be present in only minimal concentrations.

10.0 COMPRESSIVE STRENGTH

Compressive strength tests were performed on the remaining 4 cores not used for petrographic examinations, in accordance with ASTM C 42. Compressive strength results are summarized below in Table VI and presented in Appendix C.

TABLE VI
Compressive Strength
ASTM C42

CORE IDENTIFICATION	CORE LOCATION	LAB NUMBER	COMPRESSIVE STRENGTH, PSI
#1	BRIDGE DECK	6646	5030
#2	BRIDGE DECK	6647	5280
#5	BRIDGE DECK	6648	5610
#6	BRIDGE DECK	6649	4830

11.0 FINDINGS/CONCLUSIONS

- The concrete represented by each of the cores consisted of a plain (Portland cement only) well-hydrated concrete. Coarse aggregates, while highly variable in size, consisted of a combination of crushed limestone and chert, and fine aggregates consisted of natural sand.

- The presence of alkali-silica reactive aggregates was not detected either by Los Alamos staining or visual or microscopic examinations.

- The bridge deck cores were slightly to moderately air entrained. The arch cores were not air entrained. No honeycombing was observed in the samples.

- None of the samples contained reinforcing steel or wire mesh.

- Core #3 from the bridge deck was cored over an apparently open fracture, as evidenced by discoloration and the presence of calcium carbonate deposits. Core #3 form the arch exhibited the presence of carbonated fractures normal to the core axis, indicative of likely freeze-thaw distress.

- Microfracturing of the matrices was observed in each of the cores. In half of the cores (Core #3 and Core #4 from the arch, and Core #3 from the bridge deck), these fractures appeared to be associated with the presence of expansive ettringite, which was also present in the matrices and air voids of the majority of the cores. This is suggestive of sulfate attack of the concrete.

- Chloride analyses indicated slightly elevated to elevated acid-soluble (total) chlorides in half of the samples, but water-soluble chlorides, those typically associated with corrosion of steel reinforcement or concrete scaling, were minimal, with several results just above detection limits.

- Compressive strength tests run on companion cores from the bridge deck indicated strengths of 4,830 psi to 5,610 psi.

Terracon appreciates the opportunity to be of service to you on this project. Please contact the undersigned if you have any questions or need additional information.

Sincerely,
Terracon Consultants, Inc.

Stewart Abrams
Geologist
(513) 612-9169

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Attachments: Photographs & Photomicrographs
Chloride Test Results
Compressive Strength Test Results

APPENDIX A

Photographs & Photomicrographs

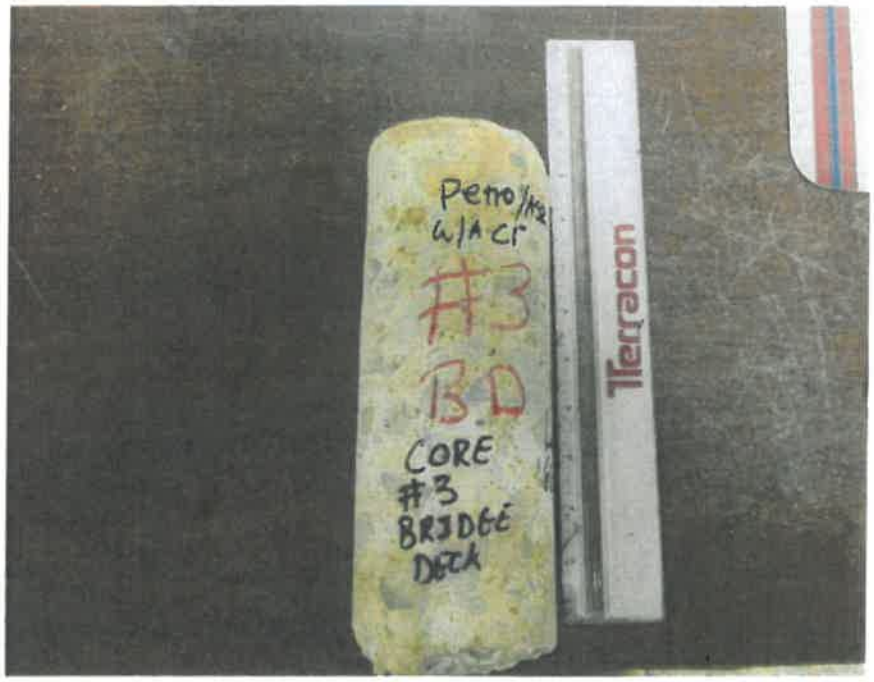


Photo 1: Core #3 from bridge deck (Lab No. 6650), as received.

Photo 2: Top surface of Core #3 from bridge deck.

Photo 3: Fractured side of Core #3 from bridge deck.

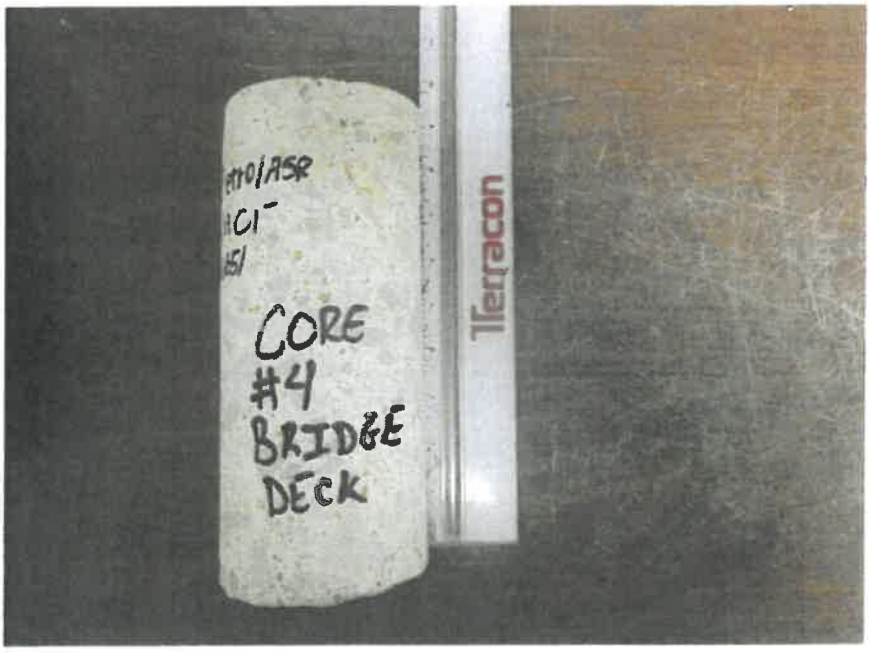


Photo 4: Core #4 from bridge deck (Lab No. 6651), as received.

Photo 5: Top surface of Core #4 from bridge deck.

Photo 6: Core #1 from arch (Lab No. 6652), as received.

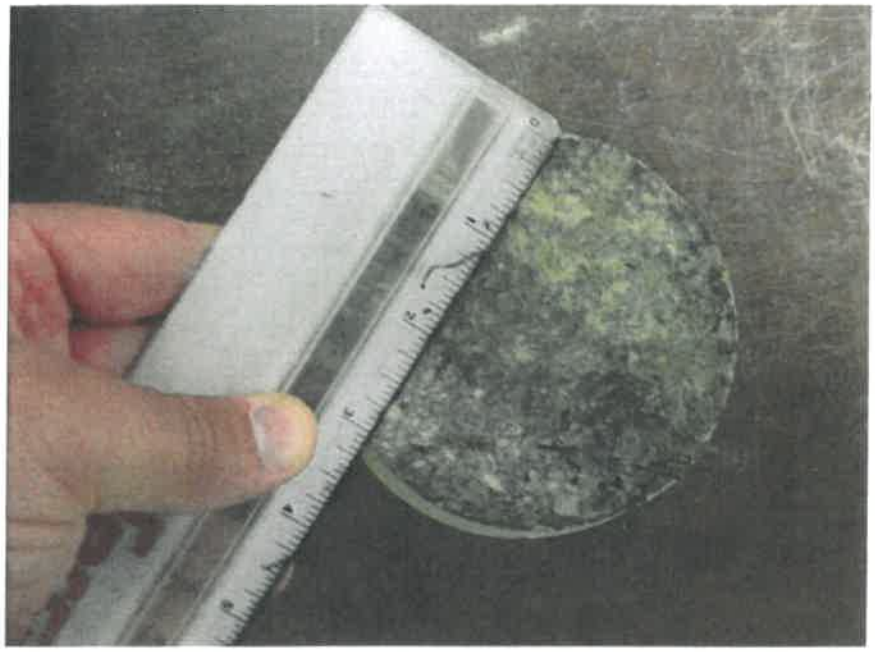


Photo 7: Top surface of Core #1 from arch.

Photo 8: Core #3 from arch (Lab No. 6653), as received.
Note subparallel fracturing likely due to freeze-thaw distress.

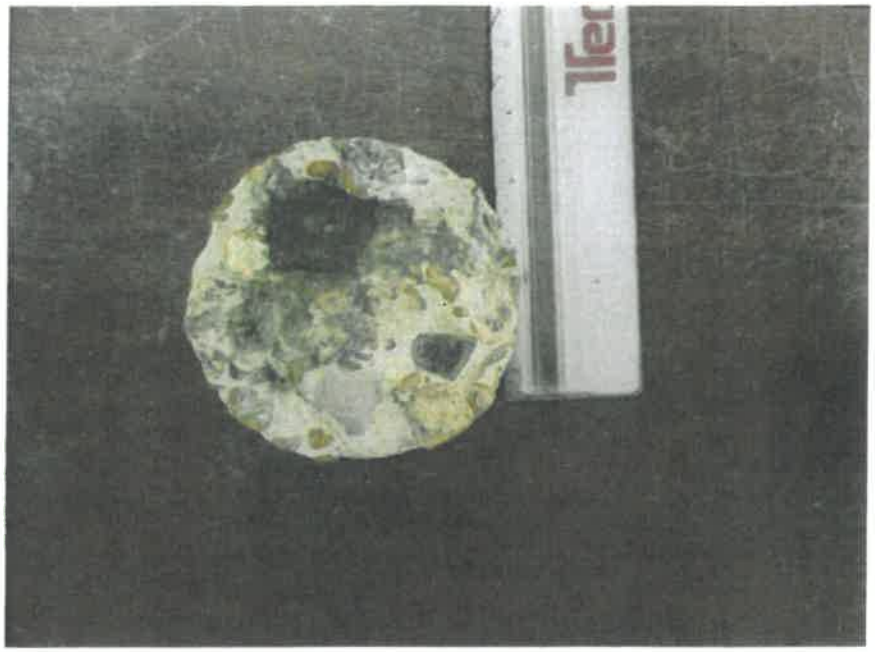


Photo 9: Top surface of Core #3 from arch.

Photo 10: Interior surface of Core 3 from arch; showing possible carbonate deposits (white) around aggregate particles.

Photo 11: Core #4 from arch (Lab No. 6654), as received.

Photo 12: Bottom surface of Core #4 from arch showing large aggregate and shell (white).

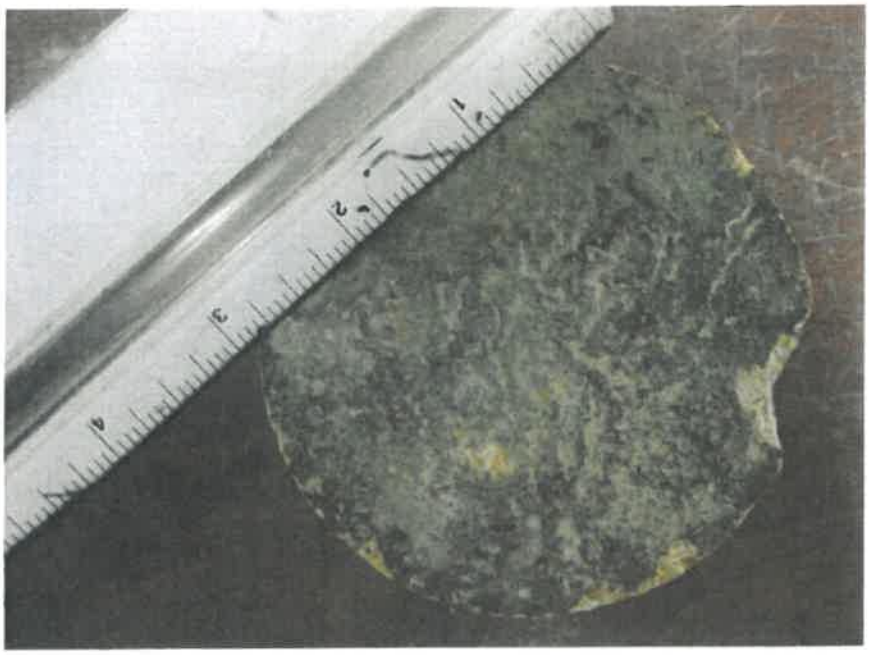


Photo 13: Top surface of Core #4 from arch

Photo 14: Core #5 from arch (Lab No. 6655), as received

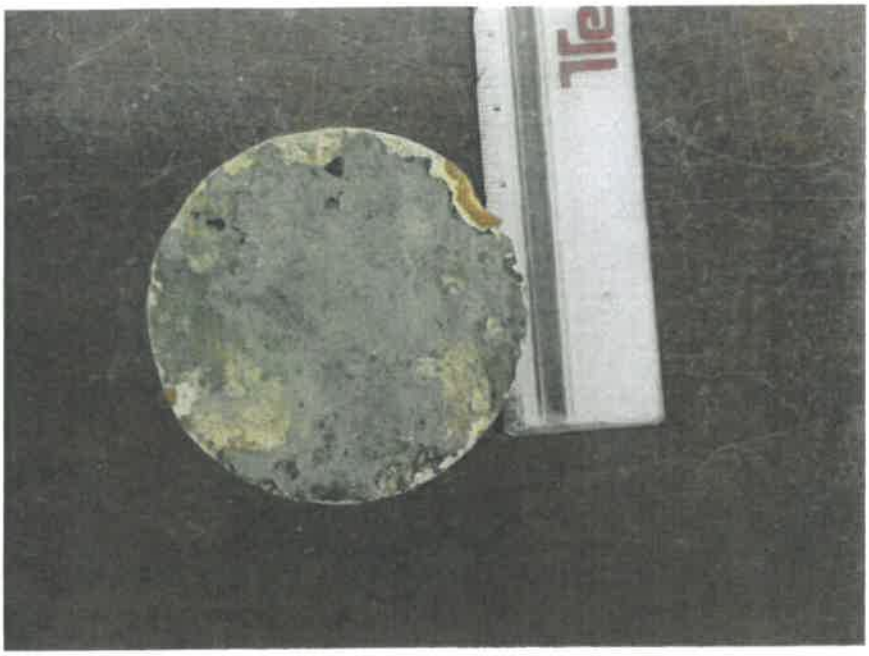


Photo 15: Top surface of Core #5 from arch, as received

Photo 16: Bottom surface of Core #5 arch from arch showing possible calcium deposits (faint white)

Photo 17: Longitudinally sawn sections of Core #3 from bridge deck. No fractures are apparent.

Photo 18: Longitudinally sawn sections of Core #4 from bridge deck. No fractures are apparent.

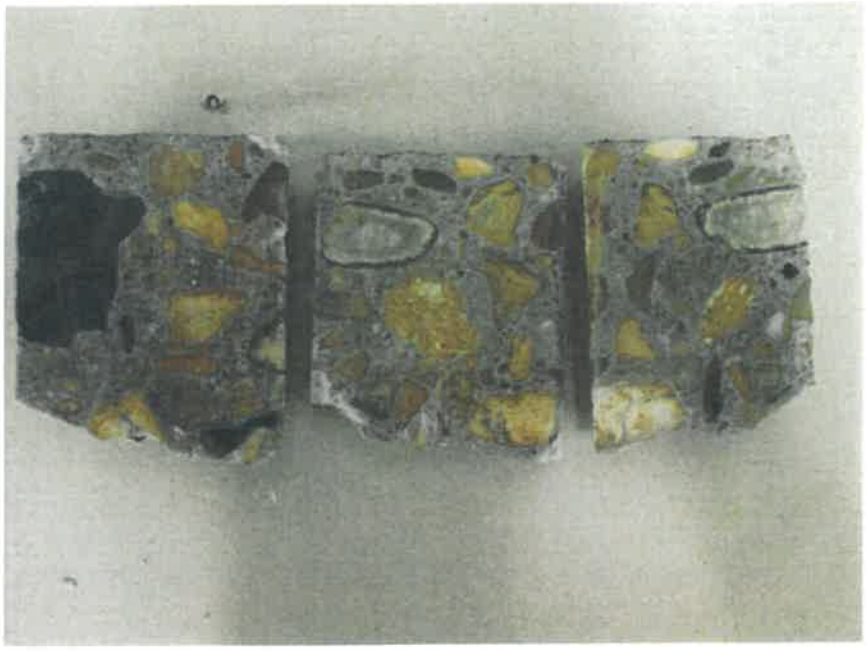


Photo 19: Longitudinally sawn sections of Core #1 from arch. No fractures are apparent, but "rinds" around coarse aggregate particles are evident.

Photo 20: Longitudinally sawn sections of Core #3 from arch showing subparallel fractures normal to the core axis, likely from freeze/thaw distress.

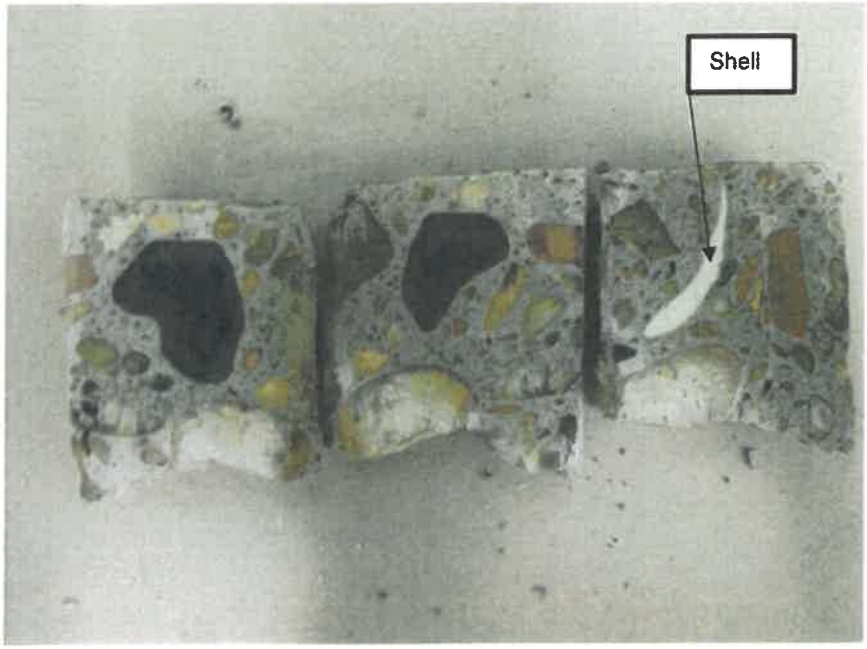


Photo 21: Longitudinally sawn sections of Core #4 from arch. No fractures are apparent. Note white arcuate shell fragment.

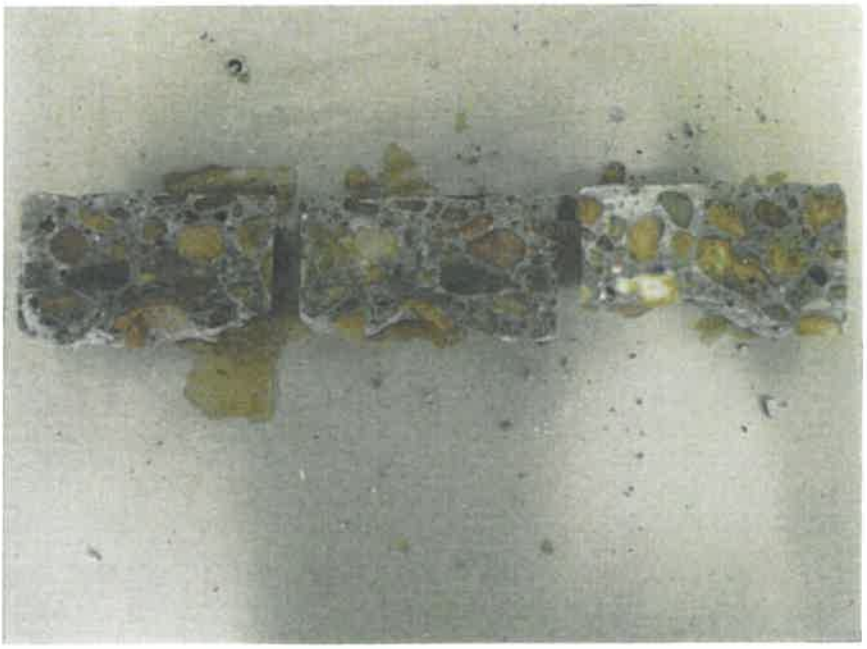


Photo 22: Longitudinally sawn sections of Core #5 from arch. No fractures are apparent.

Photo 23: Los Alamos stains used.

Photo 24: Sawn surfaces of Core #3 from bridge deck (Lab No. 6650) (left) and Core #4 from bridge deck (Lab No. 6651) (right) after application and rinsing of Los Alamos stains. No ASR is apparent.

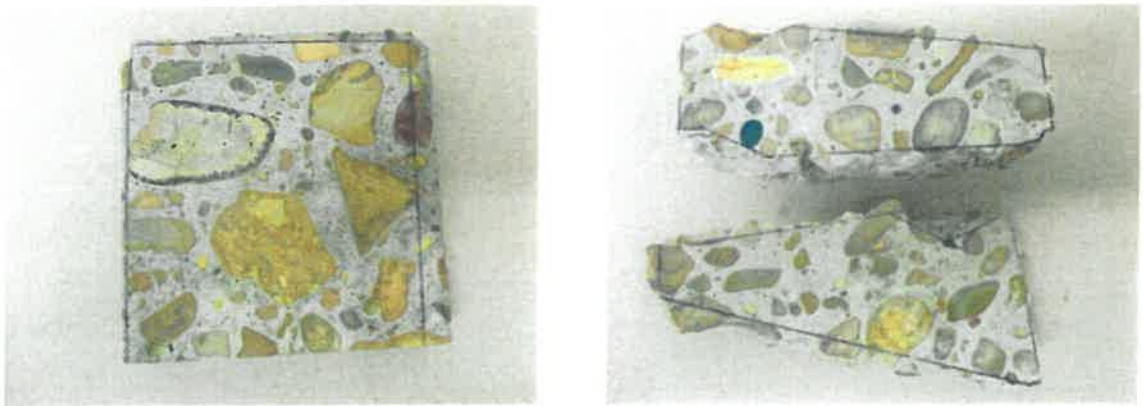


Photo 25: Sawn surfaces of Cores Core #1 from arch (Lab No. 6652) (left) and Core #3 from arch (Lab No. 6653) (right) after application and rinsing of Los Alamos stains. No ASR is apparent.

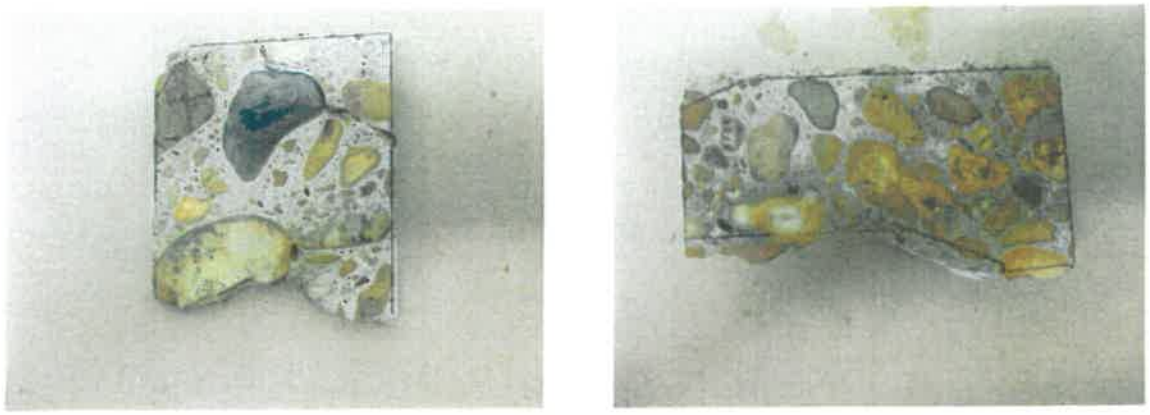


Photo 26: Sawn surfaces of Core #4 from arch (Lab No. 6654) (left) and Core #5 from arch (Lab No. 6655) (right) after application and rinsing of Los Alamos stains. No ASR is apparent.

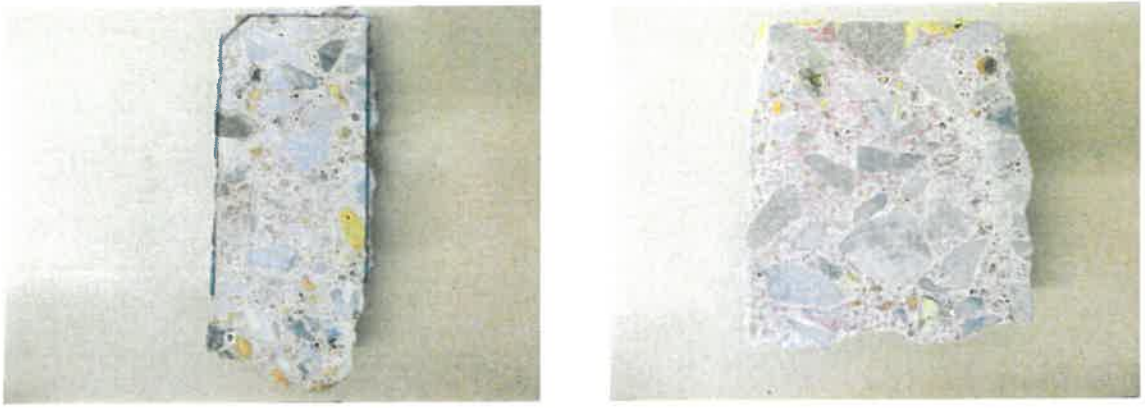


Photo 27: Sawn surfaces of Core #3 from bridge deck (Lab No. 6650) (left) and Core #4 from bridge deck (Lab No. 6651) (right) after application of phenolphthalein stain. Areas not stained magenta are carbonated.

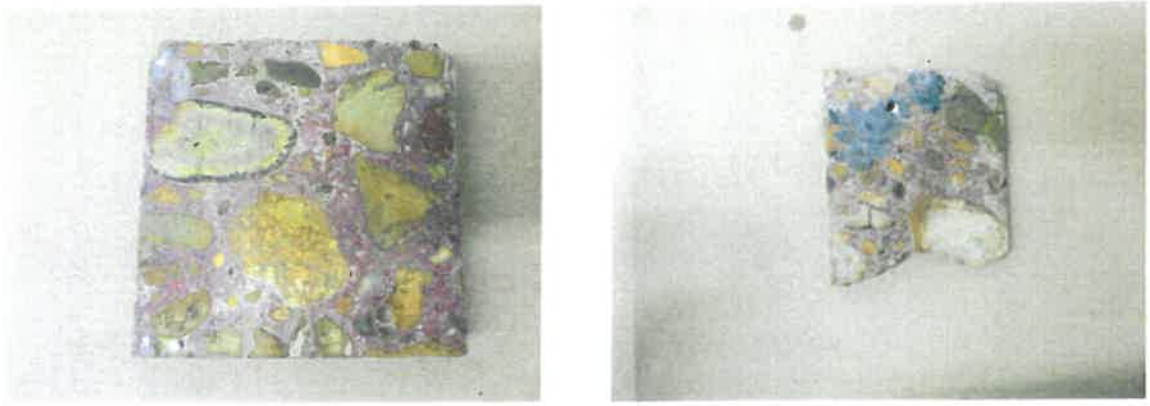


Photo 28: Sawn surfaces of Cores Core #1 from arch (Lab No. 6652) (left) and Core #3 from arch (Lab No. 6653) (right) after application of phenolphthalein stain. Areas not stained magenta are carbonated.

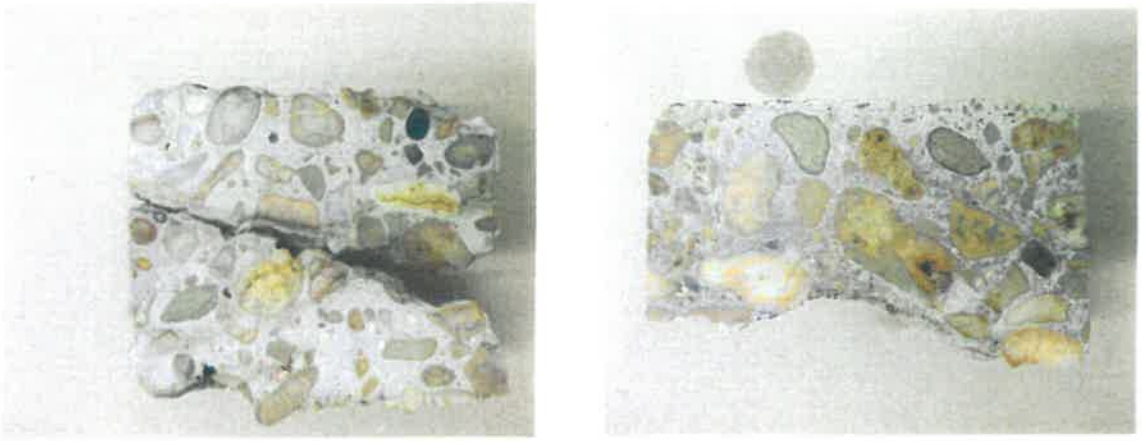


Photo 29: Sawn surfaces of Core #4 from arch (Lab No. 6654) (left) and Core #5 from arch (Lab No. 6655) (right) after application of phenolphthalein stain. Areas not stained magenta are carbonated.

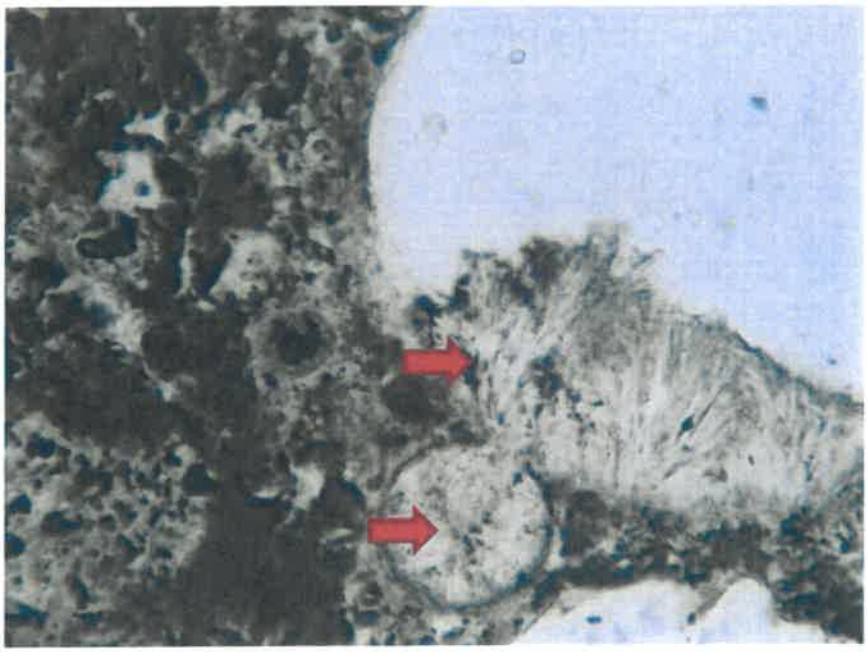


Photo 30: Thin-section photomicrograph of Core #3 from bridge deck (Lab No. 6650) showing ettringite needles in matrix and air voids (red arrows). Plane polarized light, magnification 200X.

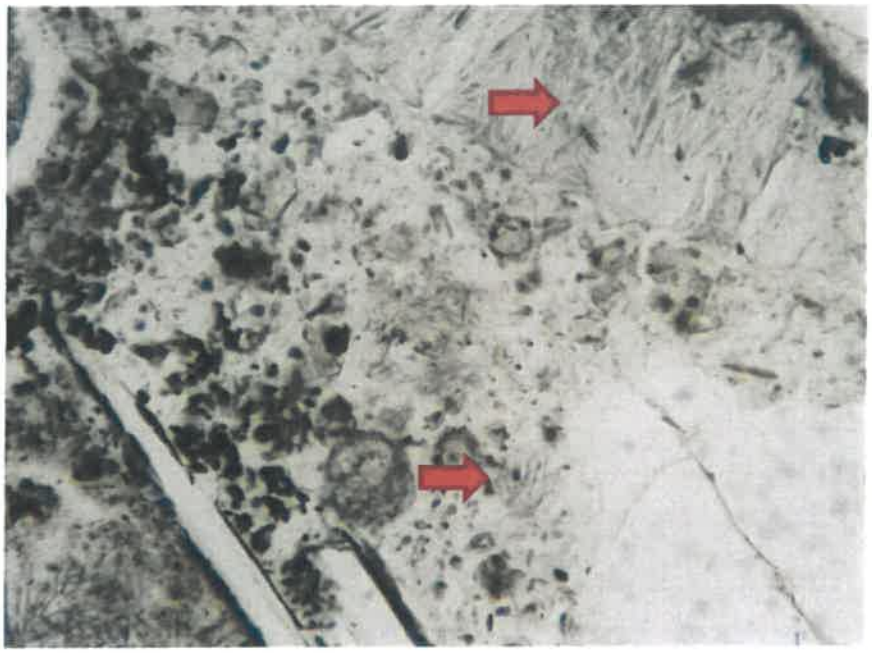


Photo 31: Thin-section photomicrograph of Core #3 from bridge deck (Lab No. 6650) showing ettringite needles in the paste of the concrete. Plane polarized light, magnification 200X.

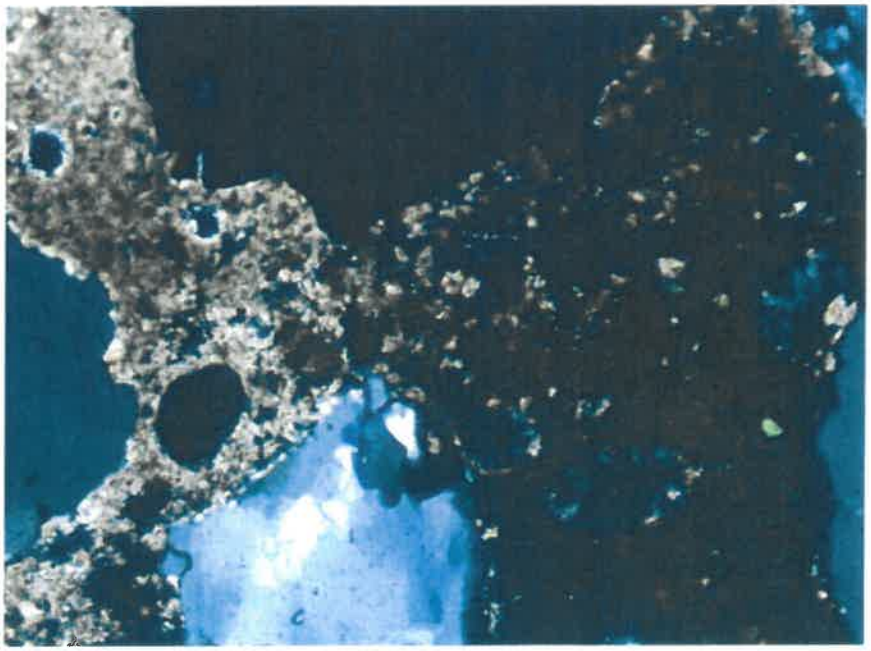


Photo 32: Photomicrograph of Core #3 from bridge deck (Lab No. 6650) showing carbonated (left) and non-carbonated (right) matrix. Crossed polars, magnification 100X.

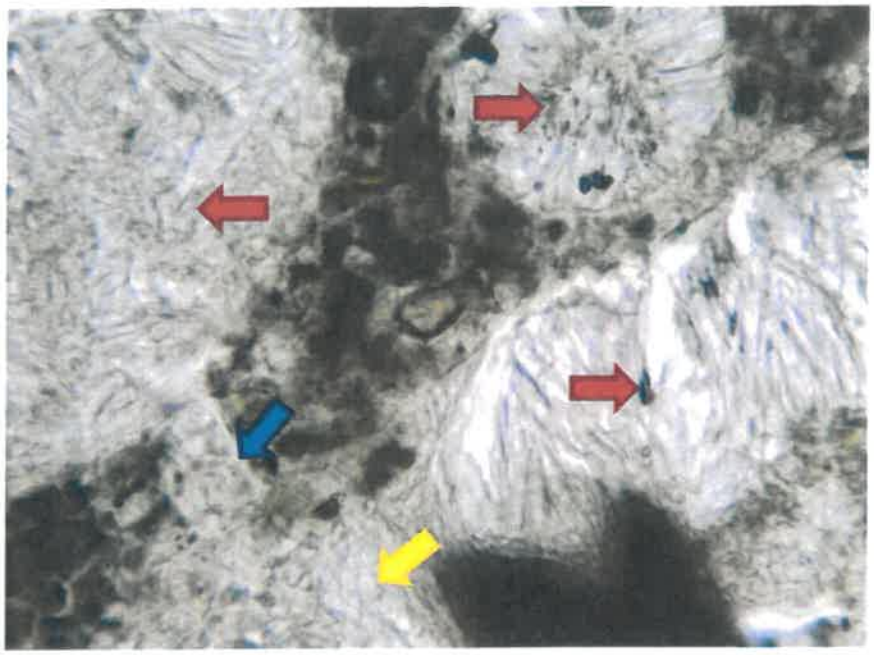


Photo 33: Photomicrograph of Core #4 from bridge deck (Lab No. 6651) showing ettringite needles in paste (yellow arrow), microfracting (blue arrow) and air voids (red arrows). Plane polarized light, magnification 400X.

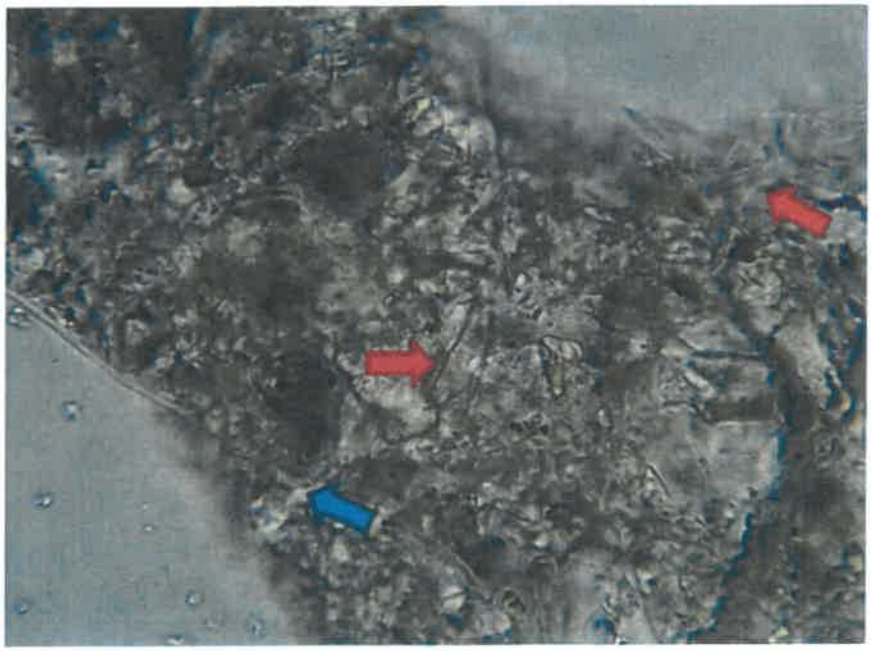


Photo 34: Photomicrograph of Core #4 from bridge deck (Lab No. 6651) showing ettringite needles in paste (red arrows) associated with microfracturing (blue arrow). Plane polarized light, magnification 600X.

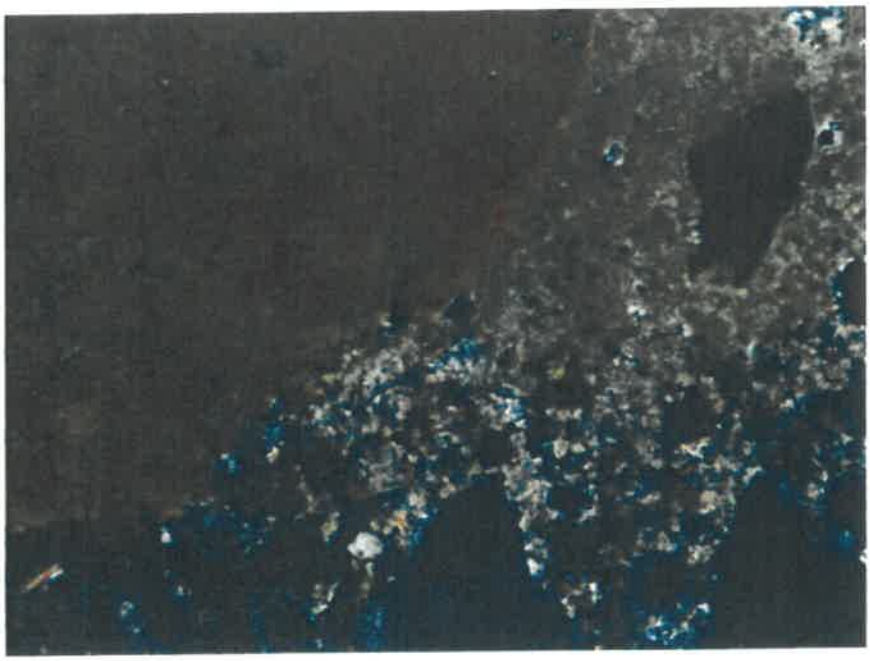


Photo 35: Photomicrograph of Core #4 from bridge deck (Lab No. 6651) showing carbonated (top) and non-carbonated (bottom) matrix. Crossed polars, magnification 100X.

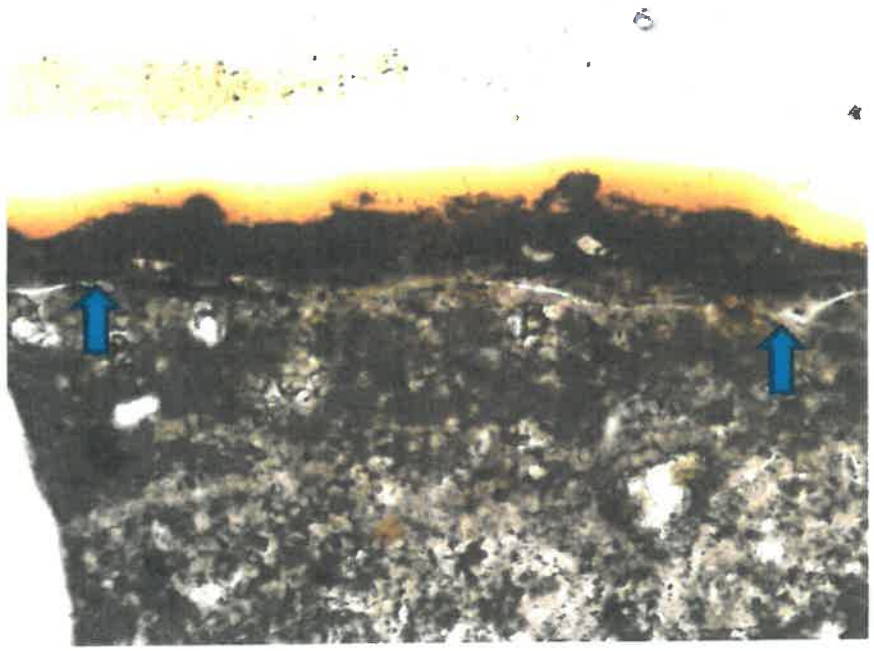


Photo 36: Photomicrograph of Core #1 from arch (Lab No. 6652) showing carbonation of exterior surface and microfracturing parallel to the exterior surface. Plane polarized light, magnification 100X.

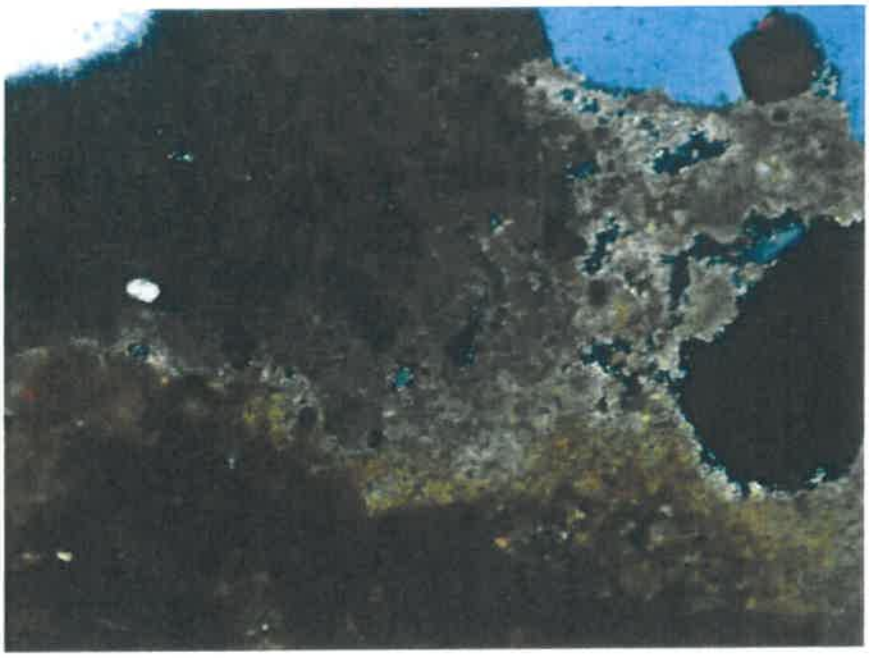


Photo 37: Photomicrograph of Core #1 from arch (Lab No. 6652) showing carbonated (top) and non-carbonated (bottom) matrix. Crossed polars, magnification 100X.

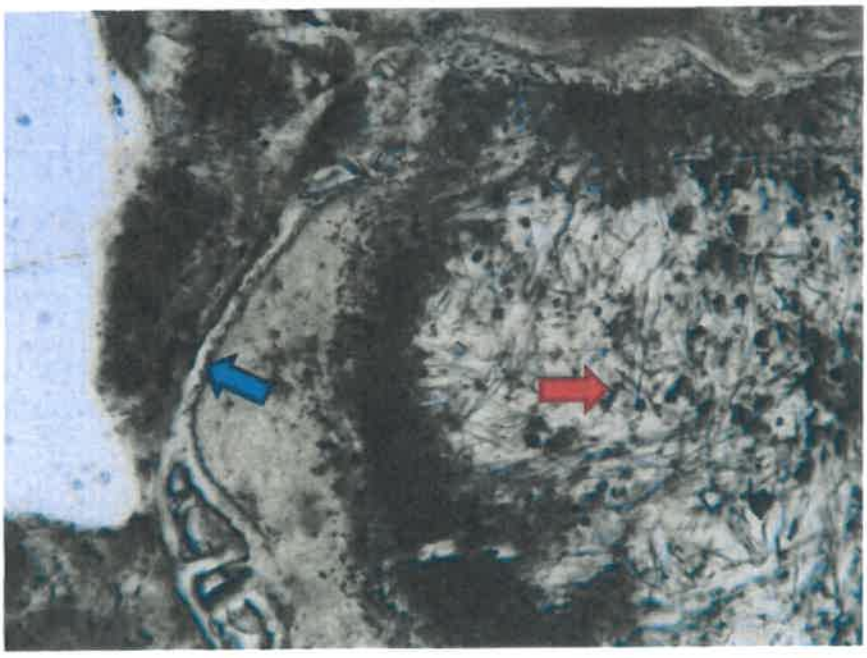


Photo 38: Photomicrograph of Core #3 from arch (Lab No. 6653) showing entrapped air void filled with ettringite (red arrow) and microfractures (blue arrow). Plane polarized light, magnification 200X.

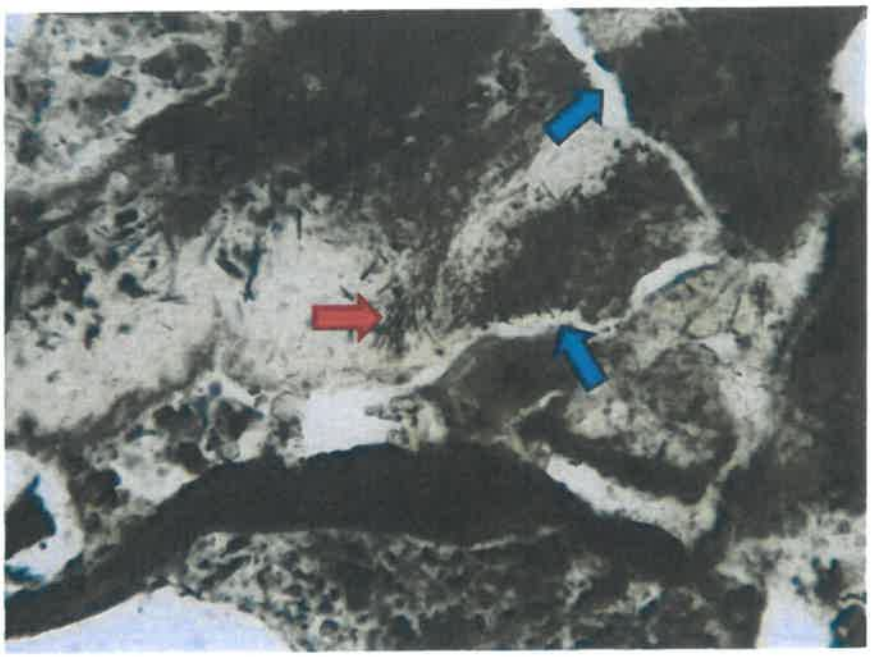


Photo 39: Photomicrograph of Core #3 from arch (Lab No. 6653) showing ettringite present in paste (red arrow) and associated microfracturing (blue arrows). Plane polarized light, magnification 200X.

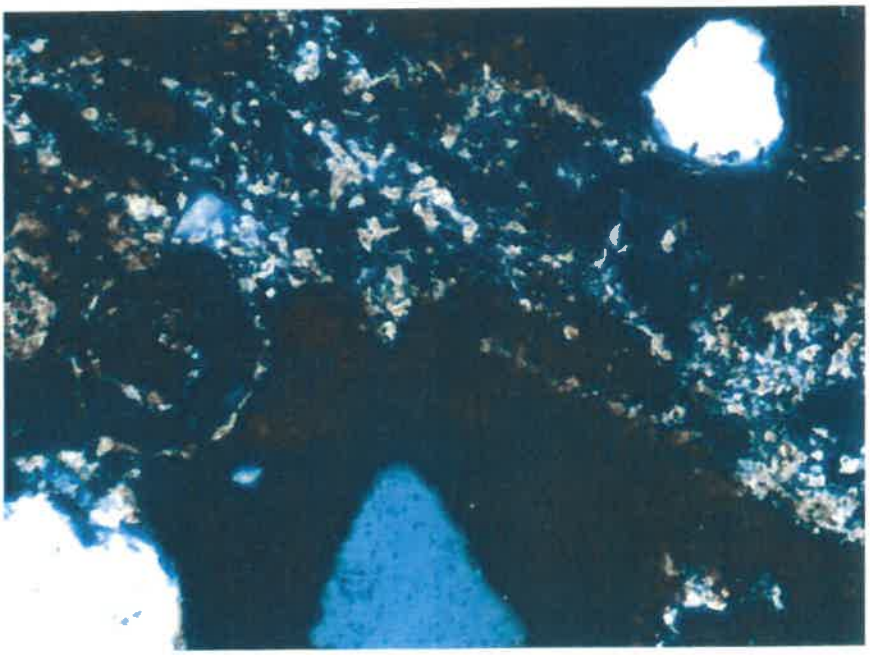


Photo 40: Photomicrograph of Core #3 from arch (Lab No. 6653) showing carbonation isolated to microfractures. Crossed polars, magnification 100X.

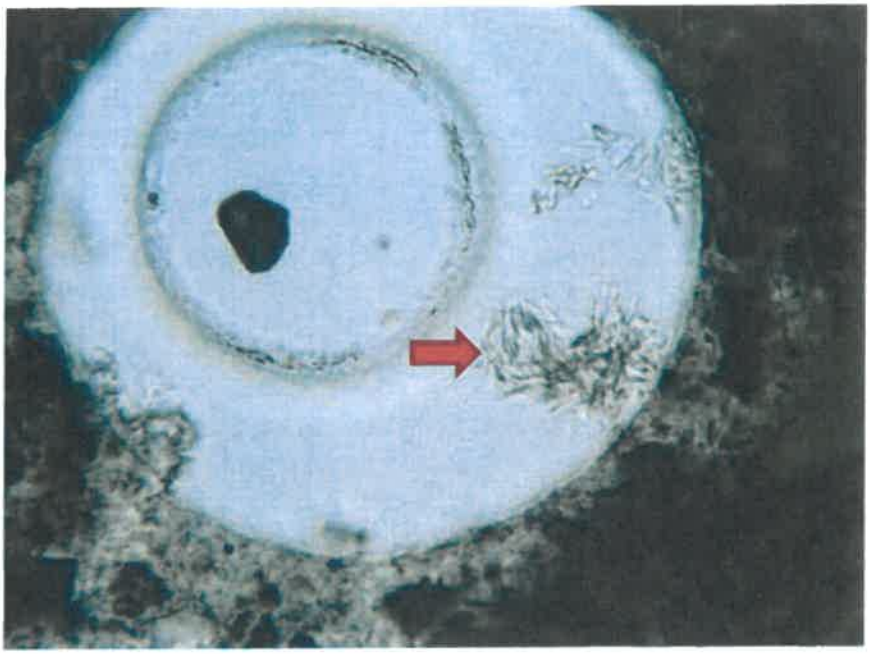


Photo 41: Photomicrograph of Core #4 from arch (Lab No. 6654) showing entrapped air void containing ettringite needles (red arrow). Plane polarized light, magnification 400X.

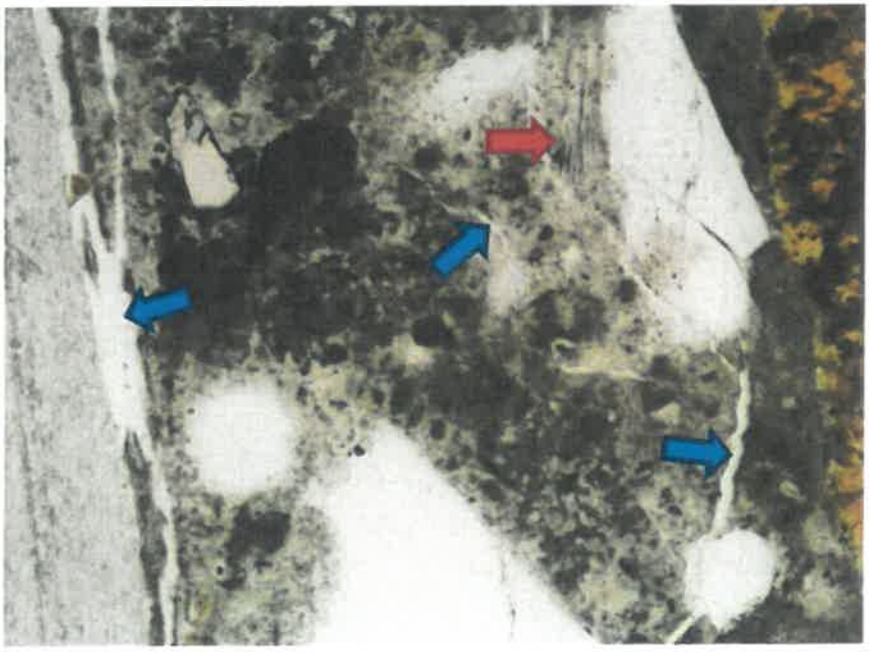


Photo 42: Photomicrograph of Core #4 from arch (Lab No. 6654) showing exterior surface microfractures (blue arrows) and ettringite in paste (red arrow). Plane polarized light, magnification 100X.

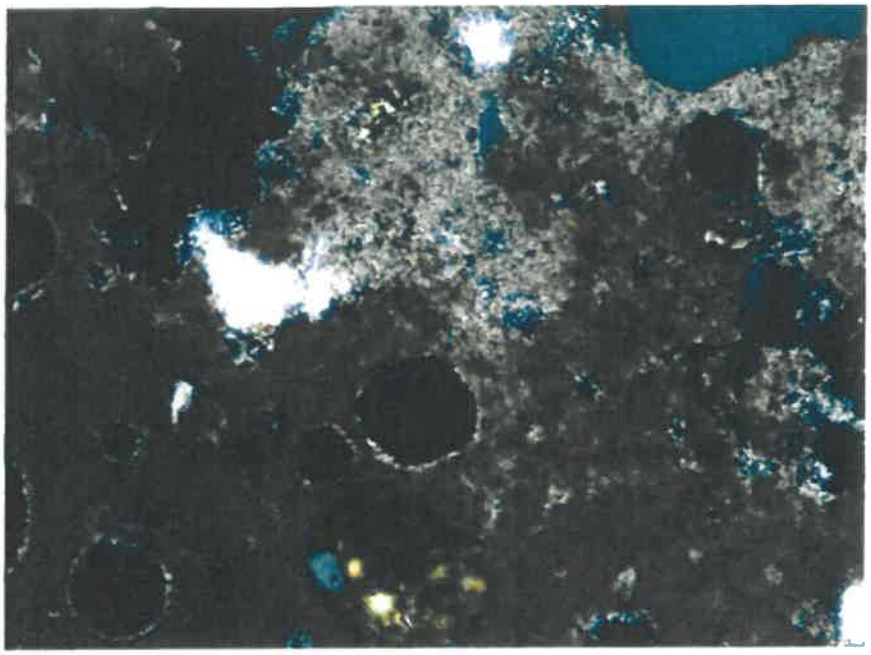


Photo 43: Photomicrograph of Core #4 from arch (Lab No. 6654) showing carbonated (top) and non-carbonated (bottom) matrix. Crossed polars, magnification 100X.

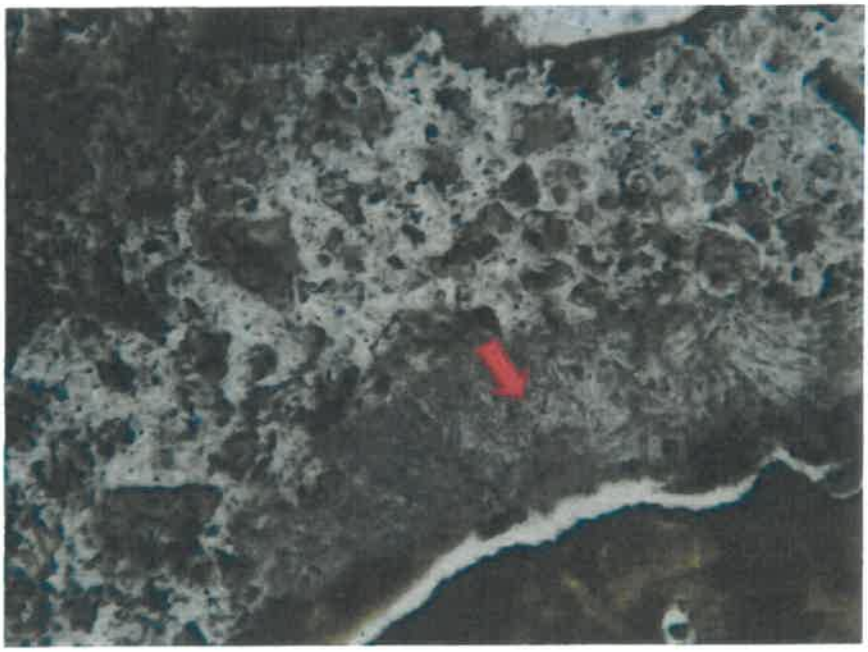


Photo 44: Photomicrograph of Core #5 from arch (Lab No. 6655) showing ettringite present in paste (red arrow), and associated microfracture. Plane polarized light, magnification 200X.

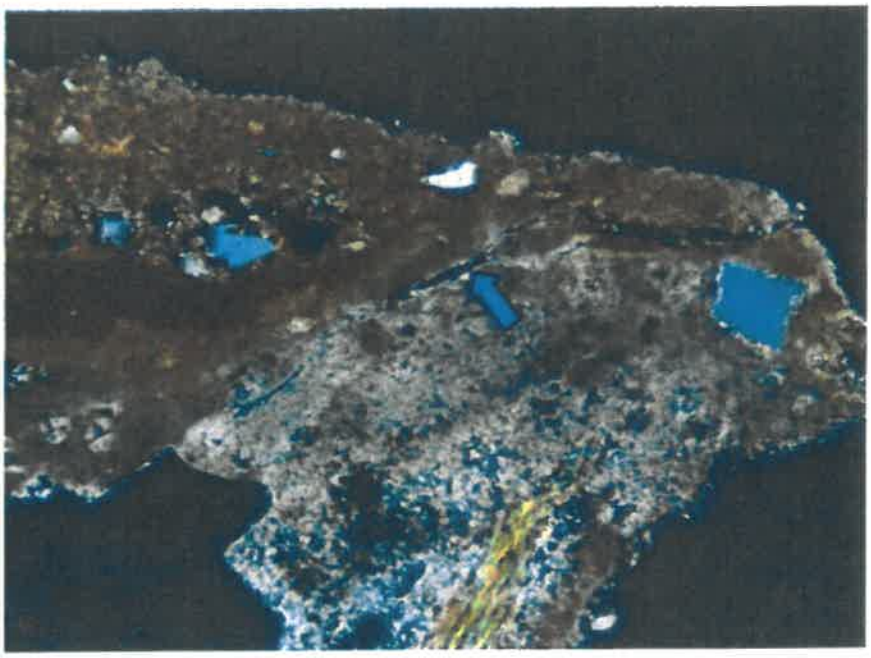


Photo 45: Photomicrograph of Core #5 from arch (Lab No. 6655) showing exterior surface carbonation and microfracture (blue arrow). Crossed Polars, magnification 100X.

APPENDIX B

Chloride Analyses

CHEMICAL LABORATORY TEST REPORT

Project Number: E1171088
Service Date: 09/01/17
Report Date: 09/11/17
Task:

Terracon
750 Pilot Road, Suite F
Las Vegas, Nevada 89119
(702) 597-9393

Client
Volkert, Inc.

Project
Bridge Over TVA Wilson Dam

Sample Submitted By: Terracon (N1) **Date Received:** 9/1/2017 **Lab No: 17-0900**

Results of Chlorides in Concrete

Lab Number	6550	6551	6552	6553
Sample Location	Core 3 Br.	Core 4 Br.	Core 1 Ar.	Core 3 Ar.
Sample Depth (ft.)				
Acid-Soluble Chlorides in Concrete and Mortar, ASTM C 1152 (percent %)	0.008	0.072	0.085	0.005
Water-Soluble Chlorides in Concrete and Mortar, ASTM C 1218 (percent %)	0.002	0.005	0.002	0.001

Analyzed By: Trisha Campo
Trisha Campo
Chemist

CHEMICAL LABORATORY TEST REPORT

Project Number: E1171088
Service Date: 09/01/17
Report Date: 09/11/17
Task:

Terracon
750 Pilot Road, Suite F
Las Vegas, Nevada 89119
(702) 597-9393

Client
Volkert, Inc.

Project
Bridge Over TVA Wilson Dam

Sample Submitted By: Terracon (N1) **Date Received:** 9/1/2017 **Lab No: 17-0900**

Results for Chlorides in Concrete

Lab Number	6554	6555
Sample Location	Core 4 Ar.	Core 5 Ar.
Sample Depth (ft.)		
Acid-Soluble Chlorides in Concrete and Mortar, ASTM C 1152 (percent %)	0.005	0.020
Water-Soluble Chlorides in Concrete and Mortar, ASTM C 1218 (percent %)	0.001	0.004

Analyzed By: Trisha Campo
Chemist

APPENDIX C

Core Report

CORE REPORT - ASTM C-42

Terracon

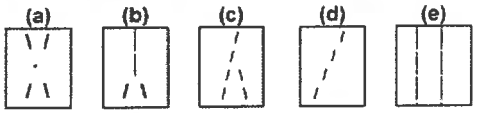
Client: Volkert, Inc.
Project: Bridge Over TVA Wilson Dam
Florence, AL

Order No. E1171088
Date Typed: 8-18-17
Date Drilled:

Description of Pavement or Structure: Bridge Deck

Lab No.	6646	6647	6648	6649
Identification	Core 1	Core 2	Core 5	Core 6
Location of Core	Bridge Deck	Bridge Deck	Bridge Deck	Bridge Deck
Condition of Core				
Length of Core (Approx)	8.431	7.897	9.243	9.648
Thickness Required				
Depth of Reinforcement				
Type of Coarse Agg.	Limestone/Chert	Limestone/Chert	Limestone/Chert	Limestone/Chert
Mixture Used	N/A	N/A	N/A	N/A
Condition of Sub Soil	N/A	N/A	N/A	N/A
Date Concrete Placed	Unknown	Unknown	Unknown	Unknown
COMPRESSION TESTS				
Date Tested	8-17-17	8-17-17	8-17-17	8-17-17
Weight, Lbs.	7.10	6.55	7.70	8.15
Length of Core (in.)	7.152	7.102	7.121	7.525
Diameter of Core (in.)	3.681	3.686	3.700	3.695
Area of Core (sq.in.)	10.64	10.67	10.75	10.72
Capped Length (in.)	7.537	7.409	7.411	7.789
Ratio Length to Dia.	2.05	2.01	2.00	2.11
Correction Factor	None	None	None	None
Total Load, Lbs.	53,514	56,310	54,980	51,830
Uncorrected Strength (psi)	5,030	5,280	5,610	4,830
Corrected Strength (psi)	5,030	5,280	5,110	4,830
Type of Fracture	D	D	D	C

Remarks:



Respectfully submitted
Terracon

Tim Goodall,
Laboratory Manager

Terracon 611 Lunken Park Drive Cincinnati, Ohio 45226
P [513] 321 5816 F [513] 321 0294 www.terracon.com

Appendix E
Deck Drainage Calculations

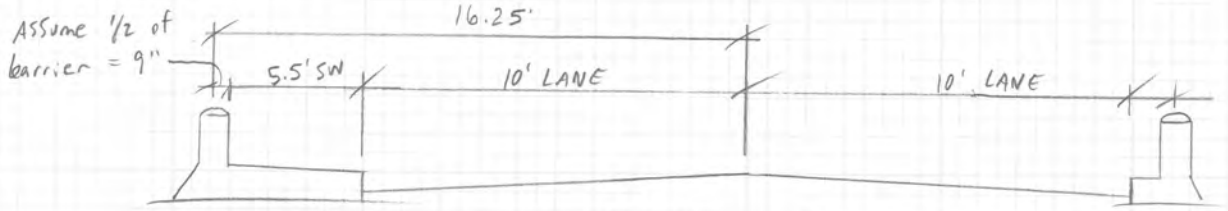
VOLKERT

DESIGN COMPUTATIONS

Designer DAB Date 9/28/2017 Sheet No. 1 of 2

Checker _____ Date _____ Job No. 741400

Description Wilson Dam – Deck Drainage Analysis

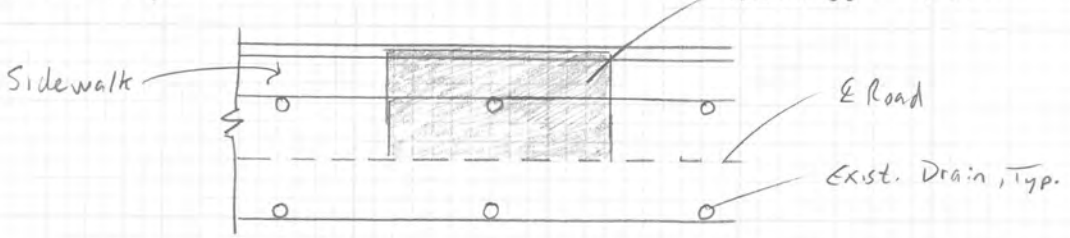


Roadway Section

- Existing inlet spacing varies... use 56' c/c spacing
  → worst case average

So drainage area....

16.25' x 56' = 910 SF



Deck in Plan View

Design Storm... ALDOT Structural Design Manual
- ↳ Specifies 10 year storm as design frequency
- ↳ States that rainfall spread on bridge shall be limited to shoulder area during design storm. Not feasible since this structure has no shoulder. Use 1/2 lane, or 5', for spread.

FHWA 'Design of Bridge Deck Drainage' online document:
- ↳ Section 9.2 → assume t_c = 5 minutes
  - ↳ so i_{10} = 8.21 in/hr per NOAA IDF curves

Manning's n = 0.016
spread T = 5'
pvmt. width W_p = 16.25' (contributing width)
rational runoff coeff. C = 0.9
gutter cross slope S_x = 2%

VOLKERT

DESIGN COMPUTATIONS

Designer DAB Date 9/28/2017 Sheet No. 2 of 2

Checker _____ Date _____ Job No. 741400

Description Wilson Dam - Deck Drainage Analysis

Constant Inlet spacing $L_c = \frac{1312}{(nC_iW_p)^{0.67}} S_x^{1.44} T^{2.11}$

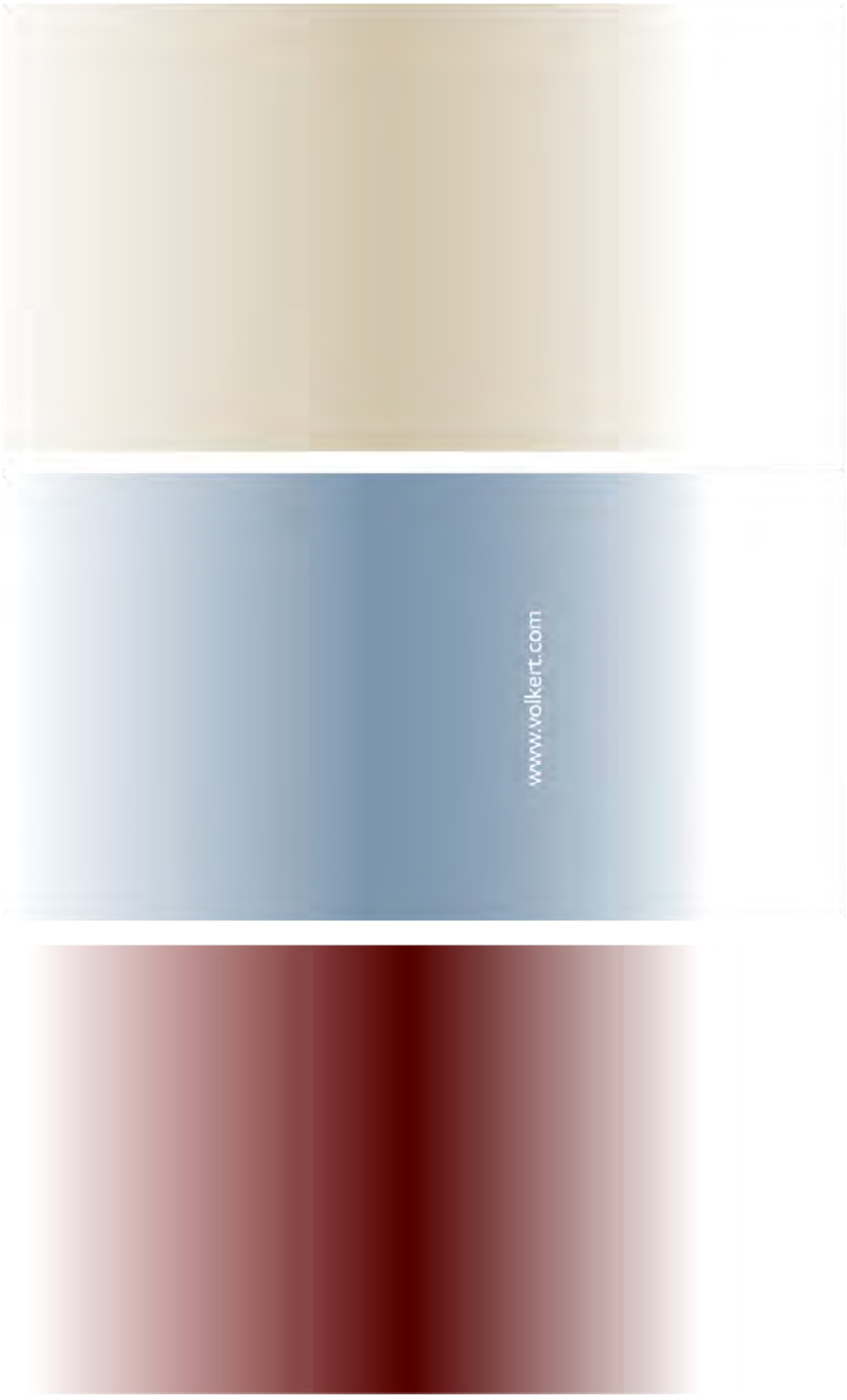
$= \frac{1312}{[(0.016)(0.9)(8.21)(16.25)]^{.67}(.02)^{1.44}(5')^{2.11}}$

$L_c = 90'$

$L_c = 90' >$ existing spacing $\sim 55'$

↳ ∴ Existing spacing meets FHWA criteria for this formula.

* However, this formula does not take into consideration the flow capacity of the existing drainage inlets. Manufacturer's detail drawings and flow data could not be found for existing grates.



Appendix F
Manufacturer Information

URETEK 486 STAR Polymer

Polyurethane Foam Grout | Technical Data Sheet | February 26, 2016

PRODUCT DESCRIPTION

URETEK 486 STAR is a two component high density expanding thermo set polyurethane resin system formulated for the under sealing, void filling & lifting of settled pavement, the stabilizing & stiffening of weak soils, and for the encapsulation & sealing of buried infrastructure. URETEK 486 STAR coupled with minimally invasive injection techniques achieves repairs without the necessity of excavation or demolition.

UNIQUE PROPERTIES

URETEK 486 STAR is capable of expanding 15 to 20 times its original starting volume in unconfined conditions. Fully cured URETEK 486 STAR material is inert and non-toxic. URETEK 486 STAR polymers are formulated in various densities and expansive coefficients for specific project applications. The low viscosity & lubricity of URETEK 486 STAR polymer allows for easy penetration into soils while compacting surrounding soils and displacing water without detrimental dilution or loss of dimensional stability to the resin system.

URETEK 486 STAR has a patented chemical composition that allows for direct application into water or very damp regions while still maintaining good physical properties. The patented chemical nature of URETEK 486 STAR goes beyond available hydrophobic technologies currently available. URETEK 486 STAR will form proper polyurethane linkages even while being injected directly into water. This property makes it ideal for lifting and stabilizing in areas with elevated soil moisture. Because of the monolithic and hydrophobic nature of URETEK 486 STAR the polyurethane grout will resist underground water erosion or weakening.

PROCESSING PARAMETERS

URETEK 486 STAR is a two component system that must be applied with a proportioning unit designed to allow 1 to 1, by volume, metering of materials. The proportioning equipment must be capable of maintaining recommended injection temperatures and pressures.

APPLICATIONS INCLUDE

Slab Jacking; Foundation Repair; Soil Stabilization; Void Filling; Pavement Lifting; Bridge Approach Stabilization and lifting; Pipe and Culvert Repair; Airfield Pavement Stabilization; Increasing the Load Bearing Capacity of Weak Soils

STORAGE AND HANDLING

URETEK 486 STAR components have a shelf life of 1 year when stored at 60 – 80˚F out of direct sunlight and extreme humidity, >80% RH. URETEK 486 STAR “A” component is water sensitive and caution must be taken to ensure “A” component is not exposed to moisture. If the material remains in a receptacle be sure to tightly seal lid to minimize moisture exposure.

The “A” and “B” components should not be stored in temperatures less than 50°F for prolonged periods. Some phase separation in the “B” component may be noticed at these temperatures. If there is phase separation the material must be warmed and thoroughly mixed prior to use. Consult URETEK for proper warming and mixing guidelines. If the “A” component is allowed to crystallize or separate from exposure to cold temperatures, it is not useable and must be replaced.

SAFETY PRECAUTIONS

Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling URETEK 486 STAR components. Before working with these products, you must read and become familiar with the available information on their hazards, proper use, and handling. Information is available in several forms, e.g., material safety data sheets and product labels. Contact URETEK USA, Inc. at 1.888.287.3835.

URETEK 486 STAR Polymer

Polyurethane Foam Grout | Technical Data Sheet | February 26, 2016

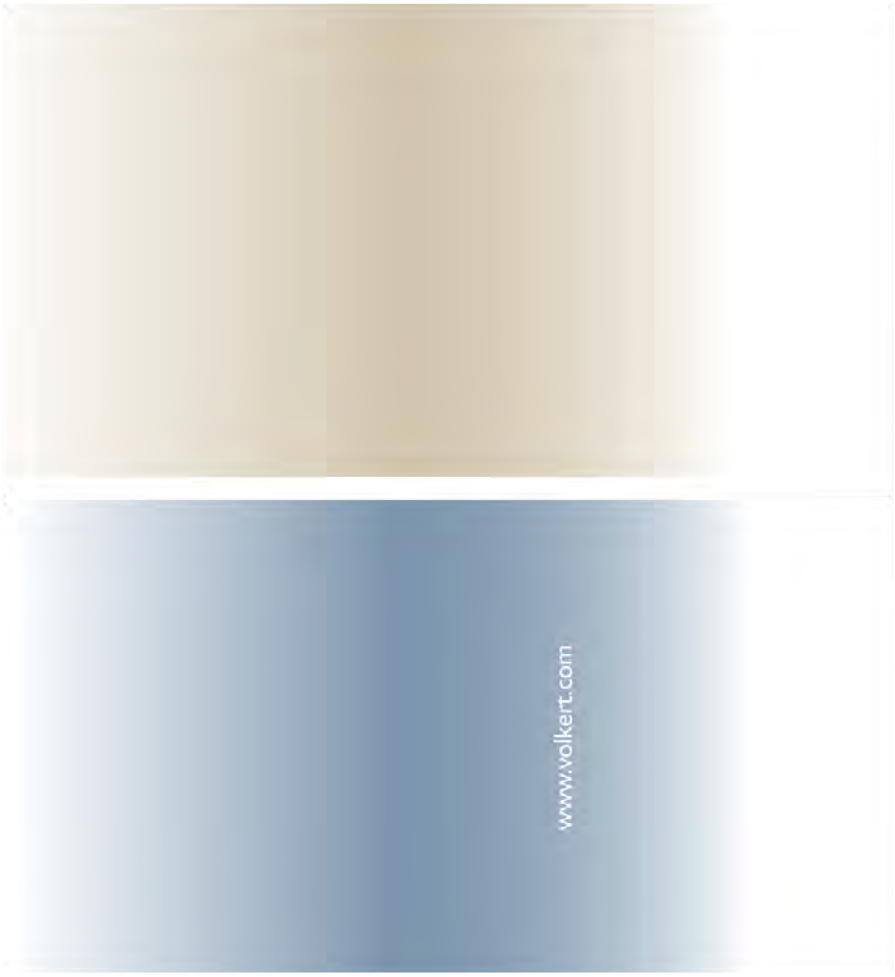
TECHNICAL DATA

Physical Property	Test Method	486 3LB	486 4LB BD	486 4LB	486 4LB GD	486 6LB	486 8LB
Apparent Density. min	ASTM D 1622	3 lbs./cu. ft.	4 lbs./cu. ft.	4 lbs./cu. ft.	4 lbs./cu. ft.	6 lbs./cu. ft.	8 lbs./cu. ft.
Compressive Strength	ASTM D 1621	30 psi	60 psi	60 psi	60 psi	100 psi	175 psi
Compressive Modulus	ASTM D 1621	1700 psi	2000 psi	2000 psi	2000 psi	3000 psi	4000 psi
Dimensional Stability	ASTM D 2126						
-40°F		< 2% change	< 2% change	< 2% change	< 2% change	< 1% change	< 1% change
+200°F		< 2% change	< 2% change	< 2% change	< 2% change	< 1% change	< 1% change
Flexural Strength	ASTM D 790	50 psi	90 psi	90 psi	90 psi	170 psi	280 psi
Flexural Modulus	ASTM D 790	950 psi	2000 psi	2000 psi	2000 psi	4000 psi	7000 psi
Shear Strength	ASTM C 273	35 psi	45 psi	45 psi	45 psi	100 psi	100 psi
Sheer Modulus	ASTM C 273	500 psi	900 psi	900 psi	900 psi	1100 psi	1400 psi
Tensile Strength	ASTM D 1623	60 psi	90 psi	90 psi	90 psi	120 psi	150 psi
Tensile Modulus	ASTM D 1623	1700 psi	2000 psi	2000 psi	2000 psi	3000 psi	4000 psi
Elongation	ASTM D 1623	< 1%	< 1%	< 1%	< 1%	< 1%	< 1%
% Water Absorption	ASTM D 2842	< 2%	< 2%	< 2%	< 2%	< 2%	< 2%
Closed Cell Content	ASTM D 6226	90%	90%	90%	90%	90%	90%

Disclaimer: Physical properties generated under controlled laboratory conditions. Actual properties may vary under real world conditions. No warranty expressed or implied is given as individual results may vary.

CHEMICAL RESISTANCE

Chemical	Resistance	Chemical	Resistance	Chemical	Resistance	Chemical	Resistance
Water	Excellent	Isopropanol	Excellent	Orthodichlorobenzene	Excellent	Ethylene Glycol	Good
Gasoline	Excellent	Benzene	Excellent	Mineral Spirits	Excellent	Butylacetate	Good
Tolulene	Excellent	Benzene Chloride	Excellent	NaO_2 – 25%	Excellent	Anylactetate	Good
Carbon Tetrachloride	Excellent	Kerosene	Excellent	HCL – 25%	Excellent	Varsol	Good
Brine Saturated	Excellent	Linseed Oil	Excellent	Butyrol	Excellent	Ammonium Hydroxide – Conc.	Good
Brine 10%	Excellent	Diesel Oil	Excellent	Xylene	Excellent	Methylene Chloride	Fair
Styrene	Excellent	Diisobutyl ketone	Excellent	Hexane	Excellent	Ethylacetate	Fair
Turpentine	Excellent	Potassium Hydroxide 1%	Excellent	Diisobutylene	Excellent	Acetone	Poor
JP-4 Fuel	Excellent	Ammonium Sulfate 2%	Excellent	Diluted Hydrochloric Acid	Good	Ethyl Alcohol	Poor
JP-5 Fuel	Excellent	Potassium Chloride 5%	Excellent	Formaldehyde	Good	Methyl Alcohol	Poor
Sulfuric Acid 10%	Excellent	Hydrogen Sulfide 100% Wet	Excellent	O. Chlorobenzene	Good	Sulfuric Acid Concentrate	Chemical Attack
Hydrochloric Acid 10%	Excellent	Hydrogen Sulfide 80% Wet	Excellent	Trichloroethylene	Good	Nitric Acid Concentrate	Chemical Attack
Sodium Hydroxide Concentrate	Excellent	Ammonium Hydroxide 10%	Excellent	Acetic Acid 2%	Good		
Sodium Hydroxide 10%	Excellent	Motor Oil	Excellent				



Appendix G
Preliminary Estimated Quantities

TVA Wilson Dam
Phase 1 Study Quantity Calculations

Total Length of Project: 2675.57 FT

Arches

Number of Arches Viewed: 5
Length per Viewed Arch: 55.5 FT
Total Length of Arch Viewed: 277.5 FT
Percent Viewed Arch: 10.37%

Estimated Repair Areas		
Length	Width	Area
6	3	18
40	3	120
6	6	36
6	6	36
12	3	36
	Σ =	246 SF

Ratio for Entire Project: 9.64
Total Repair Area: 2372 SF
Assumed Repair Depth: 0.5 FT
Concrete Volume: 1186 CF

Deck Cracks

Total Length Measured: 722 FT

Estimated Deck Cracks per Span			
90	80	70	80
130	90	60	100
70	60	50	80
		Σ =	960 LF

Percent of Project Measured: 26.98%
Ratio for Entire Project: 3.71
Length of Deck Cracks: 3557.5 LF
Repair Volume: 178 GAL - assumes 20LF per GAL

Stabilize Void Under Deck

see core sample data:

Core #	Void (in.)
1	0.25
2	0.25
3	0.5
4	0.125
5	0.25
6	0.125
	0.25

<=average void depth

Total Length:	2675.57	FT
Width of Slab:	20	FT
Volume of Void:	1115	CF
Conversion 1:	6	LBS/CF
Weight of Void Material:	6688.9	LBS
Conversion 2:	9	LBS/GAL
Void Repair Volume:	743	GAL

Full Depth Deck Repair

Total Length Measured: 726 FT

Est. Deck Repair in Measured Spans			
Length	Width	Area (SF)	Area (SY)
4	4	16	1.78
6	6	36	4.00
18	2	36	4.00
16	2	32	3.56
2	2	4	0.44
2	2	4	0.44
10	4	40	4.44
14	5	70	7.78
4	2	8	0.89
		Σ =	27.33

SY

Percent of Project Measured:	27.13%	
Ratio for Entire Project:	3.69	
Deck Repair Area:	100.7	SY

Sidewalk Patching

Total Length Measured: 726 FT

Estimated Concrete Patching Area in Measured Spans					
Left Side			Right Side		
Length	Width	Area (SF)	Length	Width	Area (SF)
6	2	12	2	1	2
6	2	12	10	1	10
12	2	24	3	1	3
18	2	36	15	1	15
6	2	12	40	0.5	20
6	2	12	20	1	20
6	1	6	6	1	6
24	1	24	25	1	25
18	1	18	25	1	25
48	1	48			126
30	1	30			
12	1	12			
12	1	12			
		258			

Total Meaured Repair Area: 384 SF
Percent of Project Measured: 27.13%
Ratio for Entire Project: 3.69
Repair Areas: 1415.2 SF

Bridge Rail Patching

Total Length Measured: 726 FT

Estimated Bridge Rail Patching Area in Measured Spans					
Right Side			Left Side		
Length	Width	Area (SF)	Length	Width	Area (SF)
6	1	6	3	1	3
9	1	9	2	2.5	5
6	1	6	2	3	6
8	1	8	1	1	1
3	4	12	1	1	1
2	2	4	2	1	2
2	2	4	1	1	1
8	2	16	4	1	4
12	2	24	4	4	16
6	2	12			39
6	1	6			
2	2	4			
		111			

Total Meaured Repair Area: 150 SF
Percent of Project Measured: 27.13%
Ratio for Entire Project: 3.69
Repair Areas: 552.8 SF

Hydrodemolition

Project Length:	2675.57	FT
Roadway Width:	20	FT
Hydrodemolition Area:	5946	SY

Latex Modified Concrete (LMC) Overlay

Project Length:	2675.57	FT
Roadway Width:	20	FT
Overlay Depth:	0.125	FT
Concrete Volume:	248	CY

Deck Replacement

Deck Length:	2675.57	FT
Deck Width:	20	FT
Deck Thickness:	0.75	FT
Deck Concrete:	1486	CY

Deck Removal

Deck Length:	2676	FT
Deck Width:	20	FT
Deck Area:	5946	SY

Resetting Existing Joints

Length of Joint:	20	FT
Number of Joints:	55	
Total Length of Joint:	1100	FT

Sealing Longitudinal Deck Joint

Deck Length:	2675.57	FT
Runs of Sealant:	2	
Total Sealant Length:	5351.14	FT
Conversion:	75	LF/GAL
Total Sealant:	71.3	GAL

Deck Reinforcement

Assume #4 bars at 12" centers each way

Length of Longitudinal Bar:	2675.57	FT
Number of Long. Bars:	20	
Increase for Splices:	5%	
Total Longitudinal Bar Length:	56187	FT
Length of Transverse Bar:	20	FT
Number of Transverse Bars:	2676	
Total Transverse Bar Length:	53520	FT
Total Reinforcement Length:	109707	FT
Bar Unit Weight:	0.668	LB/FT
Total Deck Reinforcement Wt:	73285	LB
Number of Dowels:	5350	*<=assume #5 dowels at 12" centers on each side*
Length of Dowes:	2.5	FT
Total Length of Dowels:	13375	FT
Bar Unit Weight:	1.043	LB/FT
Total Weight of Dowels:	13951	LB
Total Reinforcement Weight:	87236	LB

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VOLKERT

Appendix D – Scoping Study Alternatives Scoring

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Rating Criteria	Options						Notes
	A	B	C	D	E (do nothing)	F (hybrid)	
Does the option fix the problem?	10	10	10	20	0	15	It is unclear if the urethane injection will fully stabilize the deck, there may be areas that the material does not flow to. Complete removal and replacement of the deck is the option with the lowest risk and will fully address the stability of the deck.
What is the expected longevity of the option?	10	10	10	18	0	15	Urethane stabilization is a newer technology, and it longevity is uncertain. A new concrete deck can be expected to last at 50 years.
What are the Environmental impacts?	10	10	10	10	15	10	There are environmental challenges with each repair option, so they were weighted equally. The "do nothing" option E, provides the lowest environmental impact, but would still result in concrete from the underside of the deck falling into the river.
What is the inconvenience to the public?	15	13	12	10	20	13	For this specific project, the options are ranked based on the presumed duration of the road closure. However, it was also discussed that the options with long closures, also have a longer expected service life, and could have a lower impact to the public if the entire service life was considered.
Does this option address the safety concerns of the plant and public?	5	10	15	15	0	15	The safety concerns considered were the falling concrete into the river, the road conditions, and sidewalk and handrail condition.
Totals	**50**	**53**	**57**	**73**	**35**	**68**	

5.1 Repair Scheme A

The first repair scheme considered seeks to provide a least-cost alternative to meet the minimum needs of the project. This scheme will:

- Stabilize the bridge deck by pressure injecting Uretek polymer or an equivalent product into the "void" between the arch concrete and the existing concrete overlay.
- Repair existing deck cracks by epoxy injection.
- Perform spot full depth concrete deck repairs of the existing concrete overlay.
- Perform spot grinding of existing bridge deck to remove high spots for rideability.
- Patch deteriorated concrete arch faces.

5.2 Repair Scheme B

The second repair scheme provides the same deck repair technique as Repair Scheme A and adds the patching of the sidewalks and rails and retrofits the deck drainage. This scheme will:

- Stabilize the bridge deck by pressure injecting Uretek polymer or an equivalent product into the "void" between the arch concrete and the existing concrete overlay.
- Repair existing deck cracks by epoxy injection.
- Perform spot full depth concrete deck repairs of the existing concrete overlay.
- Perform spot grinding of existing bridge deck to remove high spots for rideability.
- Patch deteriorated concrete arch faces.
- Patch deteriorated concrete surfaces of the rails and sidewalks.
- Provide retrofits to deck drainage.

5.3 Repair Scheme C

The third repair scheme is similar to Repair Scheme B except that it also provides a new latex modified concrete overlay and the accompanying joint modifications. This scheme will:

- Stabilize the bridge deck by pressure injecting Uretek polymer or an equivalent product into the "void" between the arch concrete and the existing concrete overlay.
- Repair existing deck cracks by epoxy injection.
- Perform spot full depth concrete deck repairs of the existing concrete overlay.
- Patch deteriorated concrete arch faces.
- Patch deteriorated concrete surfaces of the rails and sidewalks.
- Provide retrofits to deck drainage.
- Install a new latex modified concrete overlay.
- Resetting existing expansion joints.

5.4 Repair Scheme D

The final repair scheme calls for a complete removal and replacement of the existing deck. This scheme would allow for removal of the "void" layer and provide the most certainty in the condition of the underlying arch material. This scheme will:

- Remove existing concrete bridge deck.
- Remove deteriorated material between arch and existing concrete bridge deck by hydrodemolition.
- Construct new reinforced concrete bridge deck.
- Reset existing bridge deck joints.
- Seal longitudinal construction joint between existing concrete curbs and new concrete deck.
- Patch deteriorated concrete arch faces.
- Patch deteriorated concrete surfaces of the rails and sidewalks.
- Provide retrofits to deck drainage.

Appendix E – Wilson Dam Traffic Volume Data

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Volkert, Inc.

302 Innovation Drive
Suite 100
Franklin, TN 37067

Office 615.656.1845
Fax 615.656.1870

www.volkert.com

August 8, 2017

Mr. Jon C. Riley, ASLA, PMP
Tennessee Valley Authority
1010 Reservation Road
Complex D, OSW 112
Muscle Shoals, AL 35662

RE: **Wilson Dam Traffic Volume Data**

Dear Mr. Riley:

This memorandum provides a summary of the traffic volume data collected along South Cox Creek Parkway at Wilson Dam in Florence, Alabama. The parameters for the data collection were as follows:

- Data was collected along South Cox Creek Parkway on the north side of Wilson dam, just south of the first intersection (local access roadway) (see figure below);
- Data was collected on Thursday, July 27th through Saturday, July 29th, 2017;
- Bi-directional average daily traffic (ADT) in 15-minute increments were collected.

Table 1 shows the ADT and **Table 2** shows the peak hour periods for each of the three days of data collection.

TABLE 1
AVERAGE DAILY TRAFFIC

DATE	ADT	NORTHBOUND	SOUTHBOUND
Thursday, July 27th 2017	3,639	1,749	1,890
Friday, July 28th, 2017	3,472	1,660	1,812
Saturday, July 29th, 2017	3,492	1,626	1,866

TABLE 2
PEAK HOUR TRAFFIC (BY DAY)

DATE	PEAK TOTAL	NORTHBOUND	SOUTHBOUND
Thursday, July 27th 2017			
7:15 – 8:15	240	69	171
11:15 – 12:15	229	124	105
15:30 – 16:30	358	232	126
Friday, July 28th, 2017			
6:30 – 7:30	182	44	138
11:00 – 12:00	218	122	96
15:30 – 16:30	326	208	118
Saturday, July 29th, 2017			
7:45 – 8:45	138	77	61
11:00 – 12:00	269	142	127
15:15 – 16:15	291	132	159

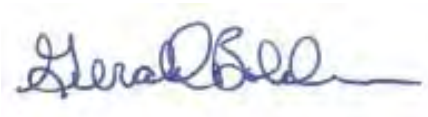
Additional traffic date collected included the vehicle classifications. Based on the various classified vehicles, Table 3 shows the percent breakdown.

TABLE 3
VEHICLE CLASSIFICATIONS (% ADT)

DATE	PASSENGER CARS/MOTORCYCLES	SINGLE UNIT/BUSES
Thursday, July 27th 2017	72.7%	27.3%
Friday, July 28th, 2017	71.4%	28.6%
Saturday, July 29th, 2017	77.9%	22.1%

Should you have any questions or need additional information, please contact me.

Sincerely,



Gerald Bolden, PE, PTOE
Traffic and ITS Manager

Appendix F – Consultation Correspondence

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ALABAMA HISTORICAL COMMISSION

468 South Perry Street
Montgomery, Alabama 36130-0900
334-242-3184 / Fax: 334-240-3477

Lisa D. Jones
Executive Director
State Historic Preservation Officer

February 28, 2019

Edward W. Wells
TVA
400 West Summit Hill Drive
Knoxville, TN 37902

Re: AHC 19-0549
Rehabilitation of Wilson Bridge
Lauderdale and Colbert Counties

Dear Mr. Wells:

Upon review of the above-referenced project forwarded by your office, we have determined that project activities will have no effect on any cultural resources listed on or eligible for the National Register of Historic Places. Therefore, we concur with the proposed project activities.

However, should artifacts or archaeological features be encountered during project activities, work shall cease and our office shall be consulted immediately. Artifacts are objects made, used or modified by humans. They include but are not excluded to arrowheads, broken pieces of pottery or glass, stone implements, metal fasteners or tools, etc. Archaeological features are stains in the soil that indicate disturbance by human activity. Some examples are post holes, building foundations, trash pits and even human burials. **This stipulation shall be placed on the construction plans to insure contractors are aware of it.**

We appreciate your commitment to helping us preserve Alabama's historic archaeological and architectural resources. Should you have any questions, please contact Amanda McBride at 334.230.2692 or Amanda.McBride@ahc.alabama.gov. Have the AHC tracking number referenced above available and include it with any future correspondence.

Sincerely,

Lee Anne Wofford
Deputy State Historic Preservation Officer

LAW/EDS/amh

Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, TN 37902

March 12, 2019

Ms. Cynthia Walton
National Historic Landmarks Program Manager
National Park Service
100 Alabama Street, SW
1924 Building
Atlanta, Georgia 30303

Dear Ms. Walton:

TENNESSEE VALLEY AUTHORITY (TVA), REHABILITATION OF WILSON BRIDGE, LAUDERDALE AND COLBERT COUNTIES, ALABAMA (34.798017, -87.625152)

TVA proposes to repair and refurbish the Wilson Dam Bridge deck and other concrete surfaces. Wilson Dam is TVA's only National Historic Landmark (NHL). For the purpose of this review, the limit of the repairs would include the concrete arches on the dam above the spring line; and bridge deck, curbs, parapets, and sidewalks between the control building and the beginning of the main bridge over the lock (Figure 1). The dam below the spring line, the equipment operating deck on the upstream side of the bridge, and the steel lock viaduct area are outside of the scope of work of this project.

Construction of Wilson Dam began in 1918 and ended in 1926. When the dam was dedicated in 1926, a primary roadway was opened between Muscle Shoals and Florence, Alabama crossing the Tennessee River over the top of the dam and the original lock. In May 1933, TVA acquired the dam from the U.S. Army Corps of Engineers (USACE). TVA owns Wilson Dam and the USACE Nashville District operates the Wilson Dam locks for TVA. In 1966, Wilson Dam was designated a NHL by the U. S. Department of the Interior (DOI), and was listed in the National Register of Historic Places (NRHP). The NHL was certified in 1977 (Rettig and Sheely 1976).

The original wearing surface of the bridge was comprised of brick pavers, which were removed in the late 1950s and replaced with a concrete deck when the additional steel superstructure viaduct was constructed over the lock. The arch appears to be constructed of mass unreinforced concrete. The bridge deck also appears to be unreinforced (Figure 2).

Over the years, the downstream face where the concrete arches interface with the parapet have developed widespread spalls with efflorescence and visible water movement. In addition, the sidewalk, curb, and deck have developed widespread cracking (Figures 3-5). The purpose of the proposed action is to refurbish and repair the Wilson Dam Bridge deck and other concrete surfaces, in order to stop the flow of water through the deck and parapets and to remove and replace deteriorated concrete on the arch faces. If the bridge is left unrepaired, deterioration of keyways and the arch may progress over time, and increase the potential for falling debris.

TVA finds that the proposed improvements constitute an undertaking (as defined at 36 CFR § 800.16(y)) that has the potential to cause effects to historic properties. We are initiating consultation under Section 106 of the National Historic Preservation Act for this undertaking.

TVA defined the area of potential effects (APE) to be the following: the boundary of the Wilson Dam NHL (which includes the foundation lines of Wilson Dam, including the power house and the old and new locks); the planned lay down area within the lock operation area on the north shore of the Tennessee River; and any historic properties within 0.5 mi and direct line of sight of Wilson Dam. Given the scale and scope of the project and limited view beyond the bridge itself, the APE accounts for both direct and indirect/visual effects.

The direct APE is limited to the concrete arches on the dam above the spring line; the bridge deck, curbs, parapets, and sidewalks between the control building and the beginning of the main bridge over the lock; and an approximately 1.6 acre staging area located within the lock operations area (see Figure 1). The surface of the staging area is graveled and fenced in from when used as part of the Wilson Dam Bascule Bridge Replacement project (Figures 6-7). Pietak (2002:2) investigated the APE as part of Tract I in a Cultural Resources survey of the Muscle Shoals Reservation. No archaeological sites were discovered, and no additional work was recommended. Thus, TVA finds that the proposed bridge rehabilitation will have no effect on archaeological resources.

None of the identified resources in the Alabama Register of Landmarks and Heritage web map have direct line of sight to Wilson Dam. The nearest identified resource, the c. 1870 Norfolk-Southern Railroad Bridge, is located approximately 2.69 mi west-southwest of Wilson Dam and does not have a direct line of sight. NRHP data available through the National Park Service (NPS) indicates the only historic property within 1.25 mi of Wilson Dam is Florence Wagon Works Site, listed in the NRHP by TVA in 1996. The site is not within direct line of sight. TVA records indicate additional NRHP-eligible resources associated with TVA's Muscle Shoals Reservation (including, but not limited to the Power Service Building and CCC Pavilion) are also not located within direct line of sight. Thus, TVA finds that the only historic property within the APE is the Wilson Dam NHL.

TVA contracted with Volkert to assess the bridge and then develop a design for the project. The 100% design plans for the bridge rehabilitation are enclosed with this letter. The proposed plan is based on the information provided in the plans as well as a subsequent site visit.

As seen in the plans, TVA intends to rehabilitate the bridge, acknowledging the need to alter or add to a historic resource in order to provide continuing use while retaining the property's historic character. Rehabilitation of the bridge will ensure a vital connection between Florence and Muscle Shoals will remain across the dam, safety will be ensured, and the character-defining features of the bridge will be retained. In keeping with the Secretary of the Interior's Standards for rehabilitation:

a) the bridge will retain its historic purpose;
b) the character-defining features of the bridge will be retained;

c) distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize the bridge will be preserved;
d) deteriorated historic features will be repaired rather than replaced or new features will match the old in design, color, texture, and other visual qualities, and where possible, materials; and
e) alterations will not destroy historic materials that characterize the property and new work will be differentiated from the old with compatible massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.

Specifically, existing curbs, deck drain plates, and light fixtures within the bridge will be removed, retained, and reinstalled as a part of the project (Figures 8-11). Repair of any damaged lights is not a part of this project however, the damaged lights or those that are missing globes will be reinstalled for potential future repair or restoration. In places were curbs are missing, in-kind replacements will be installed. Additionally, any concrete or paint applied textural finishes will be matched to Wilson Dam's current appearance. Furthermore, as the plans specify, the contractor will take special care to protect any parts of the structure that are not to be removed specifically and the contractor is not allowed to use a hydraulic ram on a backhoe, mini excavator, or other equipment for concrete removal on portions of the structure to remain in service.

Given that the design of the rehabilitation of the bridge is keeping with the Secretary of the Interior's Standards for Rehabilitation, it is unlikely that the rehabilitation of the bridge over Wilson Dam will diminish the integrity of the c. 1918 NHL. Thus, TVA finds that the proposed project will have no adverse effect to historic properties.

In the letter dated February 28, 2019 (enclosed), the Alabama State Historic Preservation Office concurred with TVA that the proposed rehabilitation would not have an adverse effect on Wilson Dam and concurred with the project proceeding.

Pursuant to 36 CFR § 800.10(c), TVA is notifying the Secretary of consultation involving the NHL Wilson Dam.

Should you have any questions or comments, please contact Hallie Hearnes in Knoxville by email, hahearnes@tva.gov or by phone, (865) 632-3463.

Sincerely,

Clinton E. Jones
Manager
Cultural Compliance

HAH:ABM
Enclosures

REFERENCES CITED

Pietak, Lynn Marie, Aaron Deter-Wolf, Ruth Nichols, Jim D'Angelo, and Kristin Wilson

2002 *Cultural Resources Survey for the Muscle Shoals Reservation, Lauderdale and Colbert Counties, Alabama*. Submitted to the Tennessee Valley Authority by TRC, Atlanta, Georgia.

Rettig, Polly M. and Horace J. Sheely, Jr.

1976 Wilson Dam, National Register of Historic Places Inventory – Nomination Form, United States Department of the Interior, National Park Service, Washington, D.C.

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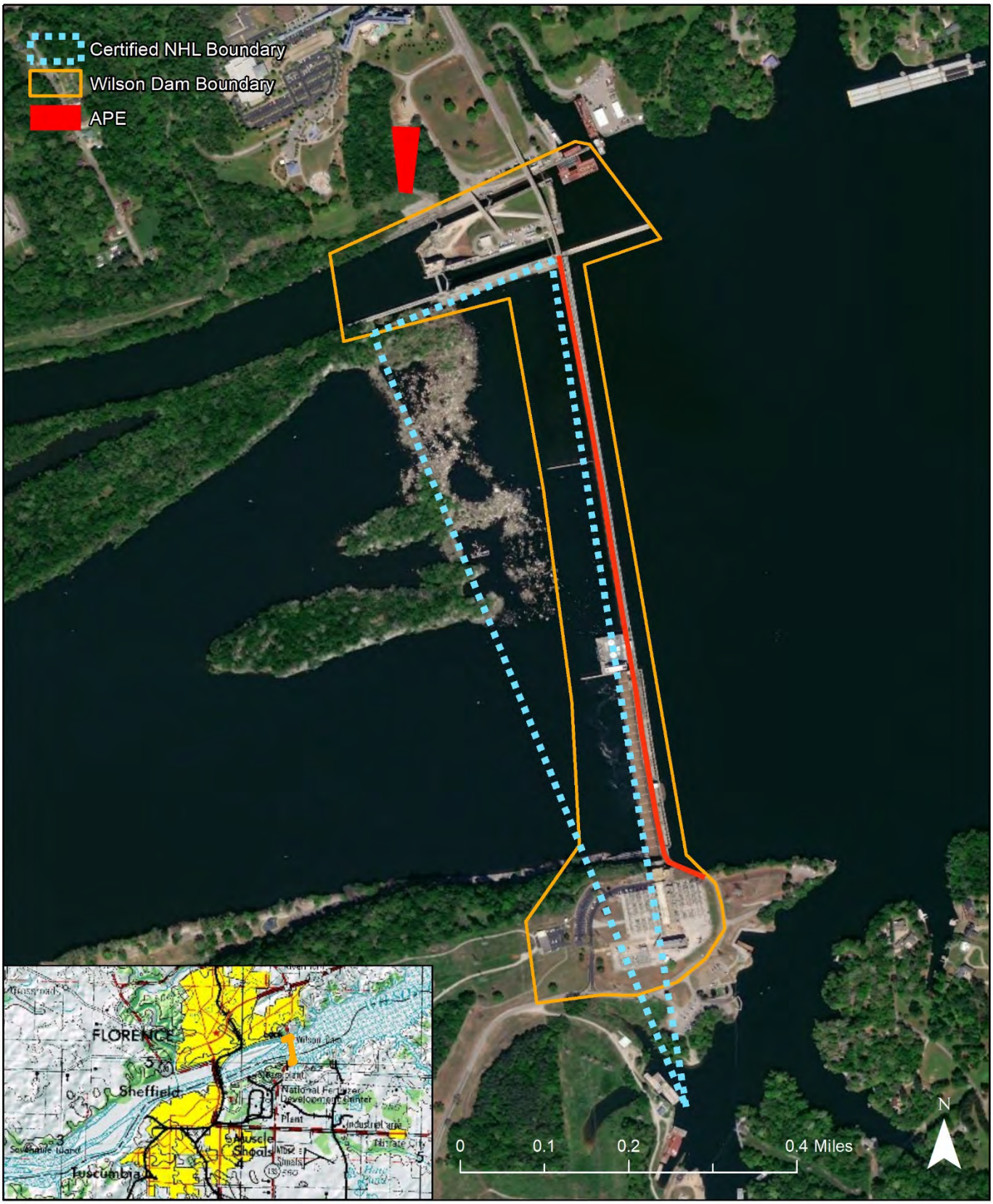
Ashley A. Pilakowski, WT 11-B
M. Susan Smelley, BR 2C-C
Lori A. Whitehorse, WT 11-B
ECM, WT CA-K



Wilson Dam Rehabilitation

Source: TVA, ESRI, NPS, USGS

Author: Jacob Wall, TVA 1/23/2019

Figure 1. Aerial image and topographic quadrangle showing the APE and Wilson Dam NHL.

Figure 2. Overview of the deck of Wilson Bridge, facing north, toward Florence, AL.

Figure 3. Longitudinal deck crack.

Figure 4. Downstream face of the dam and bridge from the lock wall.

Figure 5. Typical spalling at parapet concrete arch interface

Figure 6. Overview of the access gate to the existing staging area.

Figure 7. Overview of the existing stage area, facing south to the Tennessee River/Pickwick Reservoir.

Figure 8. Historic light fixture on the interior of the bridge railing to be removed and reinstalled.


Figure 9. Damaged historic light fixture on the interior of the bridge railing to be removed and reinstalled.

Figure 10. Historic desk drain at the base of the curb at its intersection with the deck.

Figure 11. Previous repair flanked by existing steel at curb; sections like this will be repaired to feature new steel curb that matches the profile of the existing curb.

Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, TN 37902

April 22, 2019

Ms. Lee Anne Wofford
Deputy State Historic Preservation Officer
Alabama Historical Commission
468 South Perry Street
Montgomery, Alabama 36730-0900

Dear Ms. Wofford:

TENNESSEE VALLEY AUTHORITY (TVA), REHABILITATION OF WILSON BRIDGE (AHC 19-0549), LAUDERDALE AND COLBERT COUNTIES, ALABAMA (34.798017, -87.625152)

TVA previously consulted on the rehabilitation of Wilson Bridge (AHC 19-0549). We received concurrence on our finding of no adverse effect to historic properties.

Since the completion of previous consultation, TVA proposes to add additional actions to the project while the bridge is closed for rehabilitation. The bridge fly-over that crosses over the locks, and is adjacent to the dam consists of 30 steel spans (Figures 1 and 2). The epoxy overlay with flint aggregate wearing surface on the fly-over was installed in the 1980s, but is showing signs of wear and tear in areas where the epoxy overlay has been worn down or completely disappeared (Figure 3). In addition, expansion joints on the fly-over installed in the 1950s are deteriorating and the handrails need repainting. To address deterioration, TVA proposes to expand the previous project to include resealing of the fly-over epoxy overlay, removal and replacement of the fly-over expansion joints, and recoating/repainting of the fly-over handrails.

As a part of the process to replace the epoxy overlay with a flint aggregate wearing surface on the fly-over, a small surface preparation milling machine would scarify the surface; the surface would be pressure washed; and then the epoxy would be applied using a trailer mounted mixer/applicator. To replace the six expansion joints, a cut would be made in the concrete a few inches behind the joint and then the joint would be chipped out with small pneumatic hammers. A replacement joint would be set from the bottom, and concrete would be poured around the new joint. To remove the paint/coating on the handrails, an abrasive pressure wash would be used. This process has been used previously to remove paint on the handrails and has not caused harm to the handrails.

TVA finds that the proposed improvements constitute an undertaking (as defined at 36 CFR § 800.16(y)) that has the potential to cause effects to historic properties. We are initiating consultation under Section 106 of the National Historic Preservation Act for this undertaking.

TVA defined the area of potential effects (APE) to be the following: the boundary of the Wilson Dam National Historic Landmark (NHL) - which includes the foundation lines of Wilson Dam, including the power house and the old and new locks; the planned lay down area within the lock operation area on the north shore of the Tennessee River; and any historic properties within 0.5 mi and direct line of sight of Wilson Dam (see Figure 1). The expanded direct APE includes the handrails, expansion joints, and deck of the fly-over portion of the bridge. APE for archaeology has not changed from the original scope, thus this consultation is in regards to historic architectural resources. The undertaking is not the type of activity that would have an effect to archaeological resources.

Construction of Wilson Dam began in 1918 and ended in 1926. When the dam was dedicated in 1926, a primary roadway was opened between Muscle Shoals and Florence, Alabama crossing the Tennessee River over the top of the dam and the original lock. In May 1933, TVA acquired the dam from the U.S. Army Corps of Engineers (USACE). TVA owns Wilson Dam and the USACE Nashville District operates the Wilson Dam locks for TVA. In 1966, Wilson Dam was designated a NHL by the U. S. Department of the Interior (DOI) and listed in the National Register of Historic Places (NRHP) (Rettig and Sheely 1976). The NHL was certified in 1977.

None of the identified resources in the Alabama Register of Landmarks and Heritage web map have direct line of sight to Wilson Dam. The nearest identified resource, the c. 1870 Norfolk-Southern Railroad Bridge, is located approximately 2.69 miles west-southwest of Wilson Dam, and does not have a direct line of sight. NRHP data available through the National Park Service indicates the only historic property within 1.25 miles of Wilson Dam is Florence Wagon Works Site listed in the NRHP by TVA in 1996. The site is not within direct line of sight. TVA records indicate additional NRHP-eligible resources associated with TVA's Muscle Shoals Reservation including, but not limited to the Power Service Building and CCC Pavilion are also not located within direct line of sight. Thus, TVA finds that the only historic property within the APE is the Wilson Dam NHL.

Any concrete or paint applied textural finishes would be matched to Wilson Dam's current appearance. Furthermore as the plans specify, the contractor would take special care to protect any parts of the structure that are not to be removed specifically, and the contractor is not allowed to use a hydraulic ram on a backhoe, mini excavator, or other equipment for concrete removal on portions of the structure to remain in service.

Given that the original project and expanded scope (handrails, epoxy overlay, and expansion joints) is keeping with the *Secretary of the Interior's Standards for Rehabilitation*, it is unlikely that the additional actions related to the rehabilitation of the fly-over portion of the bridge at Wilson Dam will diminish the integrity of the c. 1918-1926 NHL. Thus, TVA finds that the proposed project will have no adverse effect to historic properties.

Pursuant to 36 CFR 800.5(b), we are seeking your concurrence with TVA's finding that there will be no adverse effect to historic properties as a result of the proposed undertaking.

Should you have any questions or comments, please contact Hallie Hearnes in Knoxville by email, hahearnes@tva.gov or by phone, (865) 632-3463.

Sincerely,

Edward W. Wells

Edward W. Wells on Behalf of Clinton E. Jones
Manager
Cultural Compliance

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Enclosures

REFERENCES CITED

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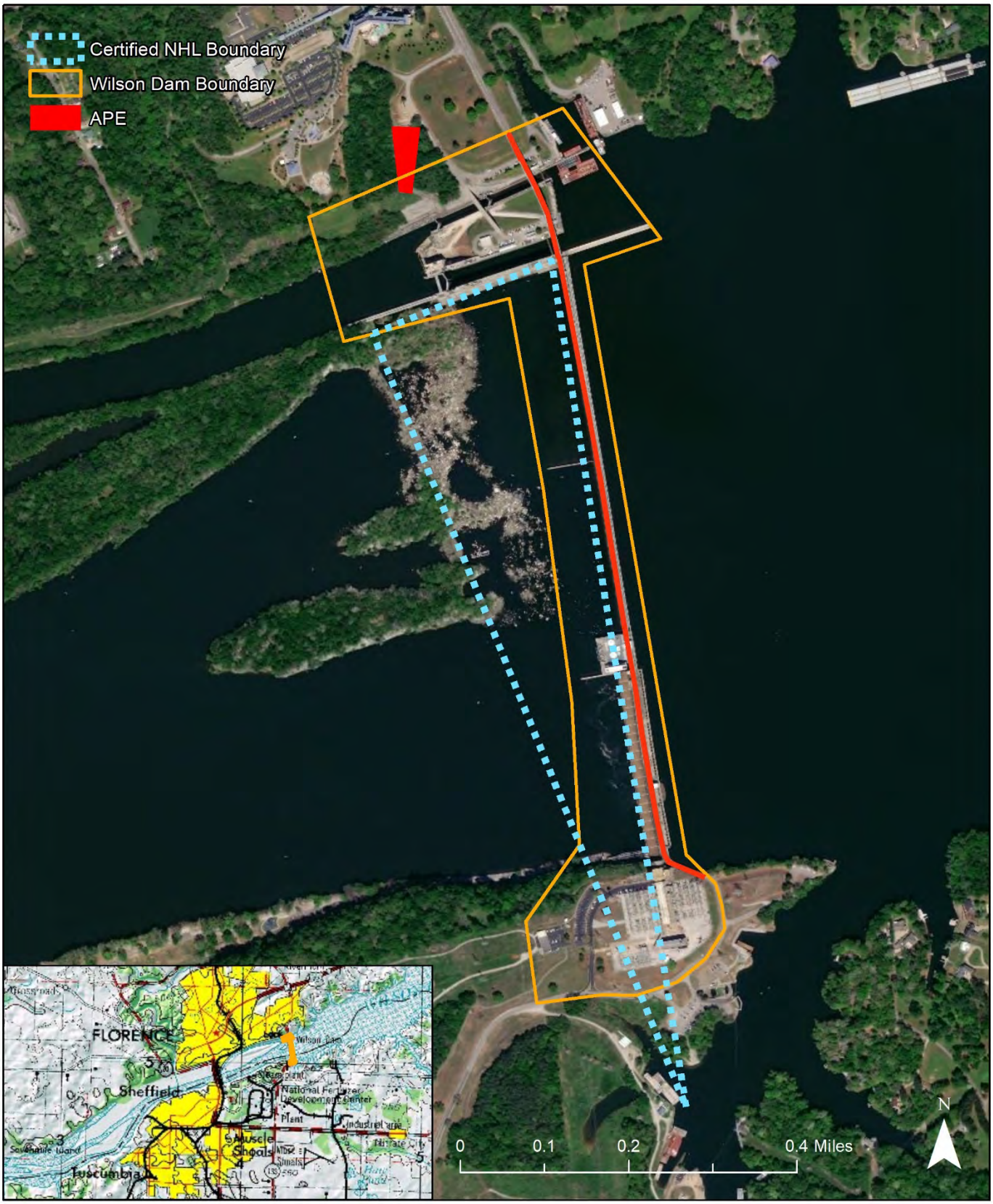

Wilson Dam Rehabilitation

Source: TVA, ESRI, NPS, USGS

Author: Jacob Wall, TVA 4/18/2019

Figure 1. Aerial image and topographic quadrangle showing the APE and Wilson Dam NHL.

Figure 2. Overview of Wilson Dam highlighting for fly-over portion of the bridge (shoalstrac.com).

Figure 3. Overview of deterioration of epoxy overlay and the coatings on the handrails (werunracephotos.com).