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CONCEPT DEVELOPMENT REPORT

LOCAL CONCEPT DEVELOPMENT STUDY COOPER STREET (CR 706) BRIDGE OVER ALMONESSON CREEK / AT ALMONESSON LAKE (BRIDGE 3-K-3)

Township of Deptford,
Gloucester County, New Jersey

PREPARED FOR:

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I. INTRODUCTION

A. Foreword

This report documents the Local Concept Development Phase for the evaluation of existing conditions and necessary improvements at the Cooper Street (County Route 706) Bridge 0803-K03 (aka Bridge 3-K-3) and the Almonesson Lake Dam in the Township of Deptford, Gloucester County, New Jersey.

The site is located in a suburban area. Figure 1 is an aerial image of the specific County Route 706 (CR 706) bridge, dam, and project study area.

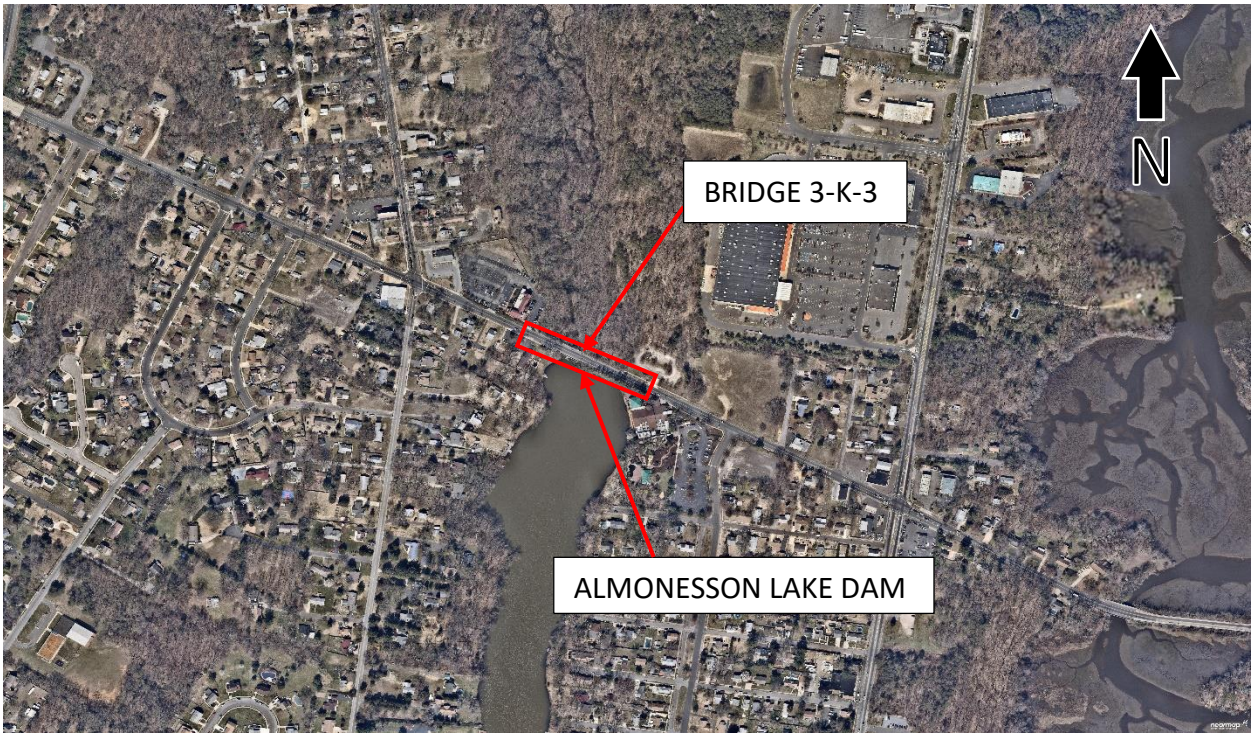

Figure 1 – Aerial image of project study area in Deptford Township, New Jersey.

The overall purpose of this project is to evaluate and address the structural, hydrologic, hydraulic and roadway deficiencies of the crossing, and determine future actions to provide a safe and more efficient crossing.

In accordance with the latest Bridge Re-evaluation Report and Structure Inventory and Appraisal (SI&A) Sheet, the existing bridge is in overall fair condition due to the condition of the arch culvert and is functionally obsolete due to substandard bridge roadway width. Gloucester County has expressed the desire to address the functional obsolescence of Bridge 3-K-3 and comply with the current New Jersey Department of Environmental Protection (NJDEP) dam safety standards utilizing Federal funding. In 2018, the Delaware Valley Regional Planning Commission (DVRPC)

contracted with French & Parrello Associates (FPA) through an equitable selection process using federal guidelines to complete the Local Concept Development Phase.

This project is being advanced under the DVRPC's Local Capital Project Delivery (LCPD) Program. This program is consistent with the Project Delivery Process implemented in 2011 by the New Jersey Department of Transportation (NJDOT) in cooperation with federal agencies. This process is used to evaluate, plan, design, and construct transportation improvements projects. Gloucester County, as the sponsor of the project, will use the LCPD process to obtain approval and access to Federal funding as the project advances to design and construction.

B. Original and Successor Projects

The existing reinforced concrete arch, reinforced concrete drop box spillway, and earth embankment dam were constructed in 1926 to replace a previous bridge/dam which failed earlier in the spring of 1926. The bridge structure consists of a pile supported single span reinforced concrete arch culvert. The bridge carries two 11-foot-wide lanes of traffic over the dam spillway.

Evidence of prior repairs have been observed and noted since the original construction in 1926, most notably the steel tie rod anchors at the downstream wingwalls which are not shown on the original plans. It is suspected that these tie rods were installed to arrest movement and rotation of the downstream wing walls as a result of flood damage in 1940.

C. Data Reviewed

During the data collection phase of this project, specific sources of information were gathered and reviewed to obtain information regarding the existing conditions within the study area. The information was examined to determine if and where project areas are in non-conformance with current design standards and forms the basis for development of the bridge improvement alternatives. The referenced documents include the following:

- Bridge Re-evaluation Survey Reports, Structure No. 0803-K03, CR 706 (Cooper Street) over Almonesson Creek at Almonesson Lake, Deptford Township, Gloucester County; 20th Cycle, April 27, 2016, prepared by Johnson, Mirmiran & Thomspon (JMT); 21st Cycle, April 11, 2018 prepared by JMT **(Appendix B)**

- Underwater Bridge Evaluation Survey Report, Structure No. 0803-K03, CR 706 (Cooper Street) over Almonesson Creek at Almonesson Lake, Deptford Township, Gloucester County; March 29, 2019, prepared by Churchill Consulting Engineers **(Appendix C)**

- Phase 1 Inspection Report National Dam Safety Program, Almonesson Lake Dam NJ 00401; February 1979, prepared by the Department of the Army **(Appendix D)**

- Dam Safety Inspection Report, Almonesson Lake Dam, Almonesson, Deptford Township, Gloucester County, New Jersey; October 31, 2001, prepared by Schoor DePalma Inc.

- Original Construction Plans, Gloucester County NJ Concrete Bridge and Spillway No. 3-K-3 over Almonesson Branch at Almonesson; 1926 **(Appendix E)**

- Detail of Reinforcing, Bridge & Spillway 3-K-3; May 5, 1926, prepared by Kalman Steel Co. Inc. **(Appendix E)**

- Tax Maps **(Appendix F)**

- Crash Data – Accident reports within the study area for a 5 years period between 2013 and 2018 (most recent 5 years) **(Appendix K)**

- Traffic Count Data **(Appendix H)**

D. Design Standards

The following design standards were used to develop the project alternatives:

American Association of State Highway Transportation Officials (AASHTO)

- A Policy on Geometric Design of Highways and Streets (GDHS), 7th Edition, 2018
- LRFD Bridge Design Specifications, 8th Edition, September 2017

Federal Highway Administration (FHWA)

- Manual for Uniform Traffic Control Devices (MUTCD)
- Hydraulic Design of Energy Dissipators for Culverts and Channels, HEC-14, July 2006
- Bridge Scour and Stream Instability Countermeasures, HEC-23, September 2009

Gloucester County

- Gloucester County Specification Manual, Design Standards for Highway and Related Land Improvements in Gloucester County (GC-DSM), rev. December 2006

New Jersey Department of Environmental Protection (NJDEP)

- NJDEP Dam Safety Standards (NJAC 7:20)

New Jersey Department of Transportation (NJDOT) Design Manuals

- NJDOT Roadway Design Manual (RDM), 2015
- NJDOT Bridges and Structures Manual (BDSM), 6th Edition, 2016
- Complete Streets Design Guide (CSDG), 2017

Transportation Research Board (TRB)

- Highway Capacity Manual, 6th Edition, 2016

E. Characteristics of the Roadways and Surrounding Area

County Route 706

County Route 706, Cooper Street, is an Urban Minor Arterial running east and west from Good Intent Road (CR 534) through the Township of Deptford. CR 706 ends at the Deptford municipal boundary and the Gloucester County boundary at the Camden County line. The existing bridge (MP 1.12) over Almonesson Creek / at Almonesson Lake consists of a 30-foot roadway width with a double yellow center line. The bridge also carries a 4-foot-wide sidewalk on the south side of the west approach. The existing bridge railing is substandard and there is no existing guide rail.

The two-directional Average Daily Traffic (ADT) on CR 706 is 11,000 vehicles per day (2019). The posted speed limit is 45 mph from Good Intent Road (MP 0.00) to Orchard Court (MP 0.71). At Orchard Court the speed limit is reduced from 45 mph to 35 mph and is maintained at 35 mph for the remaining length of CR 706.

Almonesson Creek / Almonesson Lake

Almonesson Creek flows south to north in an area east of Almonesson Road and west of Hurffville Road. The Almonesson Lake is the Township of Deptford's largest lake. The lake is a man-made waterbody impounded by the Almonesson Lake dam. Public access to the lake is from Good Intent Road.

The township owned Almonesson Creek Park is a passive recreation park that parallels Almonesson Creek and consists of wooded walking trails and a gazebo. The development of Almonesson Creek Park was funded by Green Acres and considered to be Green Acres encumbered.

Lane Use

The surrounding area of Deptford Township has been developed with residential and commercial uses. Within the project limits, the southeast area is developed with a commercial catering facility known as Auletto Catering. To the northeast is Almonesson Creek Park and Almonesson Park. The northwest area is developed with a commercial facility known as Filomena Lakeview Restaurant and Bar. The southwest area is developed with a commercial child day care facility and single-family homes.

F. Concept Development Scope Statement

The scope of this Study is to complete the Cooper Street Bridge 3-K-3 Concept Development (CD) project phase in accordance with the DVRPC Local Concept Development Delivery Process and in accordance with FPA's proposal dated May 10, 2018. Activities included conducting data

collection, hydrologic and hydraulic (H&H) analysis, performing an alternatives analysis, selecting the Preliminary Preferred Alternative, and preparing this Concept Development Report.

G. CD Public Involvement Action Plan

There was no formal Concept Development Public Involvement Action Plan utilized for this project. However, the County of Gloucester initiated telephone, e-mail, or face-to-face meetings with:

- Township of Deptford Mayor and Township officials
- Filomena's Café
- Auletto Caterers
- Christian Playcare Center

The purpose of this contact was to inform local officials and local business owners that Gloucester County was in the process of conducting a Concept Development study of the area to investigate and offer briefings individually or in a mutually agreeable location for a combined briefing.

Public Information Center (PIC)

A Public Information Center was held on February 19, 2020. The purpose of the meeting was to introduce the Cooper Street project, explain the Local Concept Development Process, explain the Alternatives Analysis conducted for the project, and obtain comments and/or concurrence for the selected PPA from the community stakeholders. Invitees were the general public, property owners adjacent to Almonesson Lake, property and business owners within a 250-foot radius of the proposed improvements, County and Local officials, and the NJDOT Local Aid.

Results of the Public Involvement and the Public Information Center are documented in section V.A.

II. PURPOSE AND NEED

The purpose of the Cooper Street (CR 706) Bridge 3-K-3 and Almonesson Lake Dam project is to improve safety and geometric concerns within the limits of the dam. Three particular Project Needs have been identified:

1. Correct the functional obsolescence and geometric deficiencies of the structure
2. Address the significant repairs that are necessary for the dam to conform with the Dam Safety Standards
3. Improve corridor infrastructure condition and reliability

The following sections summarize the project needs.

A. Bridge Needs

Based on the Bridge Re-Evaluation Survey Report - 21st Cycle (dated April 11, 2018), the bridge is functionally obsolete due to the substandard deck geometry resulting in an SI&A item 68 appraisal rating of 3. Due to a low sufficiency rating of 65.7, it may not be feasible to widen the structure without replacement. The overall condition of the structure is Fair (rated 5) due to the condition of the arch culvert superstructure. However, according to a 2002 dam inspection report, two sets of transverse tie rods were installed during repairs conducted in 1940, as a result of flood damage, to address settlement and movement of the downstream headwalls. These tie rods do not appear on original construction plan and were first noted during a 1979 dam inspection report. A comparison of the existing wingwall location from the 1926 original construction plan to current survey data reveals that the downstream wingwalls may have moved more than 1.5 feet.

B. Scour Needs

The Cycle No. 21 Bridge Re-evaluation Survey Report has identified Bridge 3-K-3 as not scour critical. The existing pile supported foundations are typically considered to inherently mitigate concerns of scour. The channel/channel protection condition rating is Fair (5) due to heavy erosion. There is a drop of approximately 4 feet from the downstream invert to the stream bed which is contributing to slope instability and downstream erosion. Steel sheeting has been driven at roughly 45-degree angles from the bridge fascia and riprap stone and concrete debris has been loosely placed in the downstream channel as erosion countermeasures.

C. Dam & Spillway Needs

A Phase I Inspection Report, prepared by the Department of the Army, dated 1979, classified the dam as a Class III, Low Hazard Dam with an inadequate spillway. Based on the Regular Dam Inspection, conducted October 4, 2001, and a subsequent follow-up dated October 3, 2002, the dam was in satisfactory condition, although the existing drop inlet box spillway was also found to be inadequate resulting in overtopping of the dam.

The NJDEP subsequently upgraded the hazard classification to Class II, Significant Hazard due to the existence of the County Route 706 traversing the crest of the dam and found the dam does not conform to current dam safety regulations. As a result, the New Jersey Department of Environmental Protection – Bureau of Dam Safety and Flood Control (NJDEP-BDSFC) concluded significant repairs are necessary for the dam in order to conform with the Dam Safety Standards.

The NJ Dam Safety Standards require Significant Hazard Dams to pass the 50% of the Probable Maximum Precipitation (PMP) and a High Hazard Dam to pass the full PMP. The existing dam passes 30% of the PMP event but overtops during all larger events. Similarly, the existing bridge waterway opening only passes a 30% PMP event.

The Phase I Inspection Report, the Regular Dam Inspection, and subsequent follow-up recommended:

- Tree removal on earthen dam structure
- Structural repairs to the dam
- Reconstruction of the downstream walls
- Miscellaneous concrete repairs of the spillway and culvert
- Scour protection measures
- Addition of concrete curbing to prevent erosion from surface runoff.

A 2019 inspection of the spillway, performed by Churchill Engineers in support of this project, identified significant deterioration of the concrete spillway roof slab with exposed and broken reinforcement steel bars and heavy scaling and spalls within the concrete spillway side walls and large spall along the northeast side wall. A dam inspection was performed by FPA in support of this project and determined the existing condition of the dam to be poor and remedial action is needed. Similar to the Phase I Inspection, FPA concluded that tree and brush growth should be removed and restore areas of erosion.

D. Roadway Needs

The SI&A information contained in the Cycle No. 21 Bridge Re-evaluation Survey Report rated the approach roadway in good condition with minor defects, such as cracking of approach roadway, small spalls in approach roadway, and minor settlements (less than 1”). The roadway condition is Good (rated 6) with no significant defects.

Geometric deficiencies that were observed are as follows:

- Travel Lane Cross Slope: The existing cross slopes typically range from 3.5 to 7.0 percent and cross slope change of over 8 percent, exceeding the maximum cross slope of 2.5 percent and the maximum cross slope change of 5 percent, respectively
- Shoulder Width: The existing shoulder widths vary with a typical width of approximately 4 feet, which is narrower than the minimum 8-foot shoulder width.

- Bridge Width: The existing bridge roadway width, curb-to-curb, is 30.0 feet wide, which according to the NJDOT SI&A guide has an appraisal rating of 3 based upon an ADT of over 5000 vehicles per day.
    - NJDOT Structural Evaluation and Bridge Management defines functionally obsolete as a bridge having an appraisal rating of less than or equal to 3. The minimum acceptable bridge width for an ADT of over 5000 vpd is 32 feet.
- Beam Guide Rail and End Treatments: Bridge parapets located within the clear zone lack transition guide rail and appropriately rated crash tested end terminals
- Roadway Drainage: Does not comply with current storm water regulations and requirements.
- Pedestrian Compatibility: The existing sidewalk are typically less than 4-feet wide and are substandard. Sidewalk is not continuous through the project limits. Crosswalk intersections are not ADA compliant.

E. Goals and Objectives

The project goals and objectives were developed from input received from the County and based upon the project's purpose and need described above. These goals and objectives will be further developed and refined with input from local officials, business owners, residents and other stakeholders as the project advances through the Capital Delivery Process. While the project may not be able to satisfy all goals and objectives listed herein, the Preferred Alternative seeks to address as many as possible. The project's goals and objectives are as follows:

- Upgrade bridge, dam, spillway and approach roadway conditions to meet current design and safety standards
- Reduce the frequency of major bridge, dam and spillway maintenance activities
- Provide ADA- compliant pedestrian facilities and crossing, as well as increase connectivity within the community
- Provide bicycle compatibility and connectivity within the community
- Avoid or minimize social, economic and environmental impacts
- Correct the controlling substandard design elements
- Utilize accelerated bridge construction (ABC) techniques to minimize the disruption and delay to the public during construction

III. EXISTING INVENTORY AND CONDITION

A. Existing Bridge Inventory and Condition

Within the project limits is Gloucester County Bridge 3-K-3 (structure no. 0803K03), a single span reinforced concrete arch bridge with concrete wingwalls and parapets supported on a timber pile foundation, built in 1926. The structure carries Cooper Street (CR 706) over Almonesson Creek / at Almonesson Lake. The 21st cycle Bridge Re-Evaluation Survey Report from April 2018 indicates the bridge has a sufficiency rating of 65.7 and an overall structural condition of fair due to the condition of the arch culvert. The bridge has a functionally obsolete appraisal rating due to the inadequate bridge deck width.

A field inventory and visual inspection of the general conditions of Bridge 3-K-3 was performed by FPA on March 29, 2019. Based on this inspection, it was confirmed that Bridge 3-K-3 is in overall fair condition and generally consistent with the conditions noted in the 21st cycle report.

B. Scour

The Cycle No. 21 Bridge Re-evaluation Survey Report identifies Bridge 3-K-3 as NOT scour critical based on data provided by NJDOT dated August 2007. The existing pile supported foundations are typically considered to inherently mitigate concerns of scour. Likely due to a drop of several feet at the downstream culvert invert, stream bed scour has occurred at the downstream channel and embankments. Scour countermeasures consisting of random riprap and debris has been placed in the downstream channel. The original construction plans show an 8-foot long by 24-foot-wide timber “flow door” constructed of 2”x8” tongue and groove timber boards at the downstream culvert invert which is suspected to have been constructed to address the scour hazard.

C. Maintenance Issues

No maintenance records were provided to FPA for review during this LCD study.

D. Existing Roadway Inventory and Condition

CR 706 within the project limits is a two-lane urban minor arterial and is under the jurisdiction of Gloucester County. Design elements are inherently based on traffic volumes and design speed. The posted speed limit along CR 706 within the study limits is 35 MPH. Therefore, in accordance with Table 2-1 of the NJDOT Roadway Design Manual (NJDOT-RDM), the design speed along CR 706 is 40 MPH.

1. Passing & Stopping Sight Distance

According to Table 4-1 of the NJDOT-RDM, the minimum stopping sight distance for design speeds of 40 MPH is 305 feet. Based on a review of the existing topographic conditions and field

observations, the horizontal stopping sight distances along CR 706 within the project limits meet or exceed the applicable standards.

2. Horizontal Alignment

The horizontal alignment data for CR 706 within the project limits is based on the Existing Topographic Conditions survey performed by Remington & Vernick Engineers (RVE) and completed on January 25, 2019, review of original construction plans, field observations, and aerial imagery. The existing horizontal alignment within the project limits consists of tangent sections of roadway with a single angle point at Station 9+98.44.

3. Vertical Alignment

The vertical alignment data for CR 706 within the project limits is based on the Existing Topographic Conditions survey performed by RVE and completed on January 25, 2019. The existing vertical alignment is summarized in the following table:

Table 1 - Vertical Alignment Data

PVI Station	Curve Type	As-Built g1	As-Built g2	As-Built A	As-Built K	As-Built Length	Min. Length[1]
10+30.10	Sag	-1.83	+1.90	+3.73	127.43	476’	245’

[1]Based on actual stopping sight distance defined as the distance between the vehicle and the point where a 1-degree angle upward of the headlight beam intersects with the roadway.

The existing vertical curve identified in Table 1 meets or exceeds the criteria identified in Section 4.4.5 of the NJDOT-RDM.

4. Major Roadway Cross Section Elements

a. Cross Slope: CR 706 consists of a crowned roadway with pavement cross slopes ranging from 3.5 to 7.0 in each travel lane. Cross slopes in the shoulders are generally consistent with the cross slopes in the travel lanes. The existing cross slopes exceed the maximum cross slopes of 2.5 percent and cross slope change of 5 percent according to Section 4.2.2 of AASHTO-GDHS.

***b. Lane Widths*:** The lane widths along CR 706 within the project limits are generally eleven (11) feet wide in each direction. This meets the minimum desirable lane width of eleven feet according to Section 5.3 of the NJDOT-RDM.

c. Shoulder Widths: The shoulder widths along CR 706 within the project limits range from three (3) to four (4) feet wide in each direction. Section 5.4.2 of the NJDOT-RDM states that the minimum shoulder width should be eight (8) feet and the desirable shoulder width is twelve (12) feet.

d. ***Roadside or Border Widths:*** The existing border width along CR 706 is generally ten (10) feet. The minimum and desirable border widths for a land service highway according to Section 5.5.2 of the NJDOT-RDM are ten (1) feet and fifteen (15) feet, respectively.

e. ***Superelevation:*** No sections of superelevated roadway exist along CR 706 within the project limits.

5. Clear Zone

The clear zone is defined as the area starting at the edge of the traveled way that is available for safe use by errant vehicles. The width of the clear zone varies with speed, traffic volume, roadside slope, and horizontal roadway alignment. The range of the existing clear zone for CR 706 was estimated using Figure 8-A of the NJDOT-RDM. The existing slopes within the project limits consist of fill slopes of varying grades. Based on a design speed of 40 mph and an ADT over 6,000 vehicles, the range of the existing clear zone for CR 706 within the study limits is 16 – 18 feet. Currently, utility poles, trees, signs, critical slopes, unprotected bridge parapets, and bodies of water exist within the clear zone.

6. Guide Rail

No guiderail exists along CR 706 within the project limits. It is recommended to perform a guide rail warrant analysis during Preliminary Engineering.

7. Hydraulic/Drainage

CR 706 consists of a crowned roadway throughout the project limits. Curb and inlets exist along the mainline roadway and at center span of Bridge 3-K-3. The existing storm sewer system within the project limits is comprised of six (6) type B inlets surrounding Bridge 3-K-3. Based on visual inspections and past bridge re-evaluation reports, the existing inlets were identified as substandard and susceptible to blockage caused by debris. Based on visual inspections, the curbs throughout the project limits are inconsistent in height and exhibit signs of settlement and deflection. Curb is not present at the Northeast corner of Bridge 3-K-3.

A drainage report evaluating the existing storm sewer system was prepared by FPA and concluded that based upon FPA's review of the surrounding topography, drainage areas, and existing conditions, the existing system does not meet current NJOT gutter spread requirements. Additional information can be found in **Appendix N**.

8. Lighting

Based on field observations, utility pole mounted luminaries exist at the Southeast corner of Bridge 3-K-3 and near Auletto Caterers' front entrance. An analysis of the existing illumination was not performed as a part of this study. It is recommended to perform a highway lighting warrant analysis during Preliminary Engineering.

9. Signing

While a full sign inventory was not conducted as a part of this study, the existing regulatory and warning signs appear to be in conformance with the MUTCD. A sign inventory should be conducted during Preliminary Engineering. The inventory should evaluate all signs relative to their conformance with the MUTCD and NJDOT details. The condition, location, message, and retroreflectivity of each sign should be evaluated and documented along with digital images taken which clearly indicate the signs.

No large type GA or overhead sign structures are located within the project limits.

10. Access

The GC-DSM provides design guidance for driveways which provide access to properties adjacent to a County road.

A full access conformance study of the existing driveways was not evaluated during this phase. A cursory access review for each of the concepts was performed to identify any potential access impacts and non-conformance with the GC-DSM. The results are shown in Table 2 below.

Table 2 - Existing Driveway Non-Conformance

Address	Block	Lot	Violation
1737 Cooper Street	246	4	• Inadequate Driveway width • Right Turn Radius • Minimum Spacing – Between Driveways
1738 Cooper Street	238	3	• Right Turn Radius • Minimum Spacing – Between Driveways
Almonesson Creek Park	238	1	• Right Turn Radius

Further evaluation of the existing non-conforming driveways within the project limits should be conducted during Preliminary Engineering in accordance with the GC-DSM and NJDOT Access Design Guidelines.

11. Utilities

FPA prepared and distributed utility coordination letters during the local concept development study which requested verification of existing and/or proposed facilities within the project limits, as well as the name, address, and telephone number of the appropriate contact, to those utilities that have facilities within the project limits. The following utilities have facilities within the project limits:

- Electric – Public Service Electric and Gas (PSEG)

- Gas – South Jersey Industries (SJI)
- Telephone – Verizon
- Cable – Comcast
- Water/Sewer – Deptford Township Municipal Utilities Authority (DTMUA)
- Fiber Optic Cable – N/A

12. Pedestrian/Bicycle Compatibility

Sidewalk is present along the South side of CR 706 from the intersection at Almonesson Road (CR621) to the Eastern end of the Bridge 3-K-3 parapet. Sidewalk is also present along the North side of CR 706 where the Almonesson Creek Park parking area fronts CR 706. The sidewalk widths are typically less than 4-feet wide and do not provide additional space for passing. The NJDOT Complete Streets Design Guide states ADA standards specify a minimum 5-foot clear path width or, if a pedestrian zone is 4 feet wide, additional space should be provided to allow passing at intervals no greater than 200 feet.

Bicycle traffic is not accommodated on either side of CR 706 within the project limits. Based on the current Bicycle design guidelines for a 35 MPH minor arterial, a 5-foot bike lane is recommended.

13. ITS

No Intelligent Transportation Systems (ITS) were identified within the project limits. The nearest NJDOT ITS facilities exist on State Route 42 and State Route 55.

14. Landscape

The existing landscaping within the project limits is mainly grass along the curbline and sidewalk buffer area.

E. Existing Dam and Spillway Inventory and Condition

The Almonesson Lake Dam is an earth embankment dam with a timber sheeting cutoff wall, concrete spillway, and culvert structure (Bridge 3-K-3) constructed in 1926. CR 706 traverses the crest of the dam. Chain link fence is located along the entire length of the dam, both upstream and downstream sides.

The upstream slope of the dam is estimated to be 1.5H:1V and covered with heavy brush and tree growth. The upstream slope was not accessible for thorough inspection. The tree and brush growth do not allow for establishment of suitable ground cover.

The downstream slope of the dam is also estimated to be 1.5H:1V and covered with heavy brush and tree growth. At various locations, erosion and evidence of prior repairs were observed at areas where road drainage has exceeded to the storm drain capacity and stormwater has flowed over the low point and down the face of the dam. One particularly poor area is located directly

behind the eastern end of the downstream wingwall where attempts to repair these areas have been made with riprap, asphalt, and broken asphalt. The following unusual conditions were noted:

- A sanitary sewer manhole in the slope on the east side of the bridge structure
- Roadway drainage discharges through corrugate metal pipes on the slope or toe on both the eastern and western sides of the bridge, with significant erosion at the discharge end of the pipe on the westerly side

The primary spillway is a 3-sided concrete drop inlet box with culvert outlet. The weir length is approximately 43 feet. On the south side of the spillway exists two sections of timber sluice boards that are each 4-feet wide and regulate the lake level from El. +24 to El. +16. The east and west sides are without any timber sluice boards and have a crest elevation at El. +24. The concrete is in poor condition with some areas of spalling. Deteriorated areas of previous repair were noted. Leakage from a spalled area at the junction of the culvert and drop inlet box was observed, as well as leakage noted at the joint between the drop inlet box and culvert headwall on the westerly side, near the base of the spillway rust colored seepage (iron bacteria).

The following unusual conditions were noted:

- The concrete service slab above the drop inlet box was severely deteriorated
- Roadway drainage blocking approximately 2 feet of spillway weir length

The existing condition of the dam is concluded to be in poor condition with remedial action being necessary. Recommended repairs are provided in **Appendix D**.

F. Existing Utilities

According to information shown on the 2019 Existing Topographic Conditions survey prepared by RVE, site inspections, and utility letters were prepared and sent to nine (9) utilities within the project area, the following utilities confirmed the presence of facilities within the project limits:

Table 3 – Utility owners and facilities within the project study area

Utility	Owner	Contact	Phone Number	Facilities
Electric	PSE&G	Mr. Armando Rosario	(856) 778-6814	Utility poles, overhead primary (13KV) and secondary electrical lines
Telephone	Verizon	Mr. Thomas Reber	(856) 306-8606	Overhead (2 aerial copper, 1 aerial fiber) and underground telephone conduits and manholes
Cable	Comcast	Mr. Chris Moldanado	(856) 982-0945	Overhead cable lines
Gas	South Jersey Gas Company	Mr. Jonathon Oliva	(609) 591-9000 x4487	Underground gas valves and mains
Water	Deptford Township MUA	Mr. Mike Cusick	(856) 415-1111 x223	Underground water mains (asbestos concrete pipe (ACP), various sizes), hydrants, and valves
Sewer	Deptford Township MUA	Mr. Mike Cusick	(856) 415-1111 x223	Underground sewer mains (ACP, various sizes) and manholes

A detailed investigation of utilities within the project limits has not been performed and should be conducted during Preliminary Engineering.

G. Summary of Existing Deficiencies

Information gathered from available records, plans, and reports, combined with data observed during field visits, were used to identify areas that were noted to be deficient according to current design criteria. Section II summarized the Project's Purpose and Need as well as the goals and objectives based on these deficiencies.

H. List of Substandard Design Elements

The following Controlling Substandard Design Elements (CSDE) were identified within the project limits using as-built information, reports, and mapping and are summarized below:

- ***Travel Lane Cross Slope:*** The existing cross slopes typically range from 3.5 to 7.0 percent and cross slope change of over 8 percent, exceeding the maximum cross slope of 2.5 percent and the maximum cross slope change of 5 percent, respectively, according to Section 4.2.2 of the AASHTO-GDHS.

- ***Shoulder Width:*** The existing shoulder widths vary with a typical width of approximately 4 feet, which is narrower than the minimum 8-foot shoulder width. Section 5.4.2 of the NJDOT-RDM states that the minimum shoulder width should be eight feet and the desirable shoulder width is twelve feet.
- ***Bridge Width:*** The NJDOT Structural Evaluation and Bridge Management memorandum dated May 15, 2018 defines functionally obsolete as:
    - A bridge having an appraisal rating of less than or equal to 3 for structural inventory and appraisal (SI&A) Item no. 68 Deck Geometry, Item no. 69 Underclearances, or Item no. 72 approach roadway alignment, or
    - A bridge having an appraisal rating equal to or greater than 3 for SI&A Item no. 67 structural evaluation or Item no. 71 waterway adequacy.

The appraisal rating for the deck geometry is rated by comparison of ADT and Bridge Roadway Width, curb-to-curb, using Table 2A of the NJDOT Recording and Coding Guide for SI&A. Based on the existing bridge roadway width, curb-to-curb, of 30.0', and an ADT over 5,000, the existing bridge is rated as 3. The existing bridge does not meet the standard minimum of 4 as described by the NJDOT memorandum.

I. As-Built Plans, Right of Way Maps, and Jurisdiction Map

As-built plans that were obtained and reviewed for this project are listed below and included in **Appendix E.** The Tax maps are included in **Appendix F.** Copies of right of way maps and jurisdictional limit maps and agreements were not available for review.

- Gloucester County: Concrete Bridge and Spillway No. 3-K-3 over Almonesson Branch at Almonesson, 1 sheet (Year: 1926)
- Gloucester County: Road Across Almonesson Lake Almonesson, 1 sheet (Year: 1926)
- Kaufman Steel Co. Inc.: Detail of Reinforcing, 1 sheet (Year: 1926)

IV. TRAFFIC AND CRASH SUMMARY

A. Traffic Operations

In order to assess the operational characteristics of Cooper Street (CR 706) within the study area, Average Daily Traffic (ADT) and Level of Service (LOS) analyses were performed. Automated Traffic Recorder (ATR) data of the westbound and eastbound travel lanes were collected by TechniQuest in support of this project. The CR 706 Westbound ADT recorded was 5641, and the Eastbound ADT was 5387. The LOS analysis was conducted utilizing the Highway Capacity Manual 6th Edition (2016). The resulting westbound LOS is "D" and the resulting eastbound LOS is "E". See the *Traffic Conditions Report*, including Crash Analysis, attached in **Appendix G**.

The proposed typical section on CR 706 is assumed to include two 12-foot-wide lanes and increase the shoulder width from 3-4 feet to 5-foot shoulders. New concrete curb will be installed with a three-foot buffer and a five-foot concrete sidewalk on both the eastbound and westbound sides, as shown in Figure 2. The bridge roadway width will be increased from a substandard width of 30 feet to a compliant width of 34 feet.

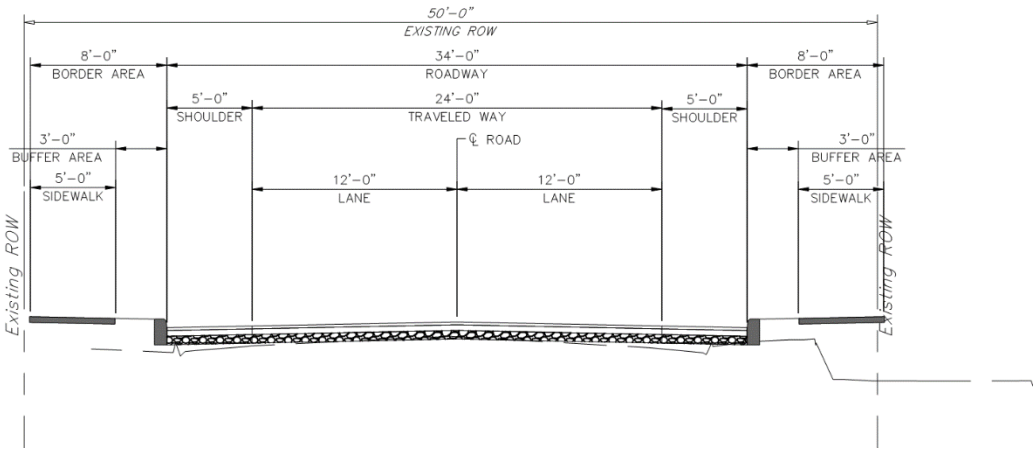

Figure 2 – CR 706 Proposed Typical Section

A future level of service analysis was performed utilizing the Highway Capacity Manual 6th Edition (2016) and the resulting eastbound and westbound level of service is "E". We anticipate that the improved pedestrian conditions, such as provisions to continue the sidewalk along the north and south sides of CR 706, will increase pedestrian traffic. Better accommodation of bicycle travel is also assumed under the proposed conditions. See the *Traffic Conditions Report*, including Crash Analysis, attached in **Appendix G** for more information.

B. Traffic Data

Existing traffic conditions and volumes were obtained through a traffic count program for this LCD study. In addition to undertaking traffic counts for CR 706, existing traffic volumes were observed for the roadways included in the proposed detour routes – Deptford Center Road,

Clements Bridge Road, and Hurffville Road. Additionally, the 2017 traffic volumes available from the NJDOT were obtained for CR 621, CR 534, and NJ 41.

Traffic counts were conducted between April 30, 2019, and May 7, 2019. ATRs were installed on Cooper Street at Bridge 3-K-3, Deptford Center Road (between Almonesson Road and Hurffville Road), Clements Bridge Road (between Almonesson Road and State Route 42), and Hurffville Road (between Clements Bridge Road and Hurffville Road), to collect two-way traffic volume data. Weekday and Weekend AADT for CR 706 and detour routes are provided in Table 4. See traffic count data provided in **Appendix H** for additional information.

Table 4 – Weekday and Weekend Road AADT (both directions)

Route	Weekday (M-F)	Saturday	Sunday
CR 706	11,697	10,839	7,739
Deptford Center Rd	19,269	17,132	12,912
CR 533	25,841	27,211	20,353
SR 41	27,845	25,540	19,783
CR 621[a]	8,188	---	---
CR 534[b]	7,465	---	---

a. 48-hour volume count for CR 621 for 6/26/17 to 6/29/17 at site 110822; Source: NJDOT
b. 48-hour volume count for CR 534 from 02/2/17 through 2/24/17 a side 7-4-462; Source: NJDOT

C. Traffic Volume Forecasts

Traffic volume forecasts were developed based on US Census data and a review of various Deptford Township, Gloucester County, and DVRPC documents. The following sources were included in the information review:

- US Census "QuickFacts" Data for Gloucester County and Deptford Township
- New Jersey State Data Center (NJSDC) Population Forecast Charts
- 2011 DVRPC Gloucester County Transportation Need Study
- 2015 DVRPC Gloucester County Community Vision
- 2017 Deptford Township Adopted Master Plan

A summary of the estimated population growth according to the data collected from the above sources can be found in Table 5 below.

Table 5 – Population growth data sources

Demographic Information Source	Deptford Township Annual Growth	Gloucester County Annual Growth
US Census Data, 2010-2018	N/A	0.14%
NJSDC Population Forecasts, 2010-2034	N/A	0.32%
2011 DVRPC Gloucester County Transportation Need Study, 2005-2035	0.63%	1.16%
2015 DVRPC Gloucester County Community Vision, 2010-2040	N/A	1.25%
2017 Deptford Township Adopted Master Plan, 2010-2040	0.60%	1.02%

A 0.81% annual growth rate was assumed and applied to the existing Peak Hour Traffic Volumes of Cooper Street (CR 706), Deptford Center Road, Clements Bridge Road (CR 544), and Hurffville Road (SR 41) to determine the Future Year 2049 Peak Hour volumes. Deptford Township and Gloucester County officials did not indicate any new planned developments in or near the project study area that could potentially affect future traffic volumes. Therefore, no local growth factor was applied to the Future Traffic Volume projections. For additional details, see the Traffic Conditions Report provided in **Appendix G.**

D. Crash Data Analysis and Crash Diagram

Crash reports were obtained from the Deptford Township Police Department (DTPD) for accidents which occurred along CR 706 between CR 621 and Route 41. The reports include crash types and mile post locations for the years 2014 through 2018 (five most recent available years). The segment crash rate within the project limits is 1.91 crashes per million vehicle miles (MVM), below the state average of 2.89 crashes per MVM. However, increasing the limits of the crash analysis to include all crash reports provided by DTPD, the crash rate increases to 7.08 crashes per MVM. See the *Traffic Conditions Report*, including Crash Analysis, attached in **Appendix G**. The crash diagrams are provided in **Appendix K.**

V. SOCIAL, ECONOMIC, AND ENVIRONMENTAL SCREENING

Subsections B through Q below are based mainly on the Environmental Screening that was prepared on April 16, 2019 for the Cooper Street (CR 706) Bridge over Almonesson Creek / at Almonesson Lake LCD study and supplemented with information regarding the Preliminary Preferred Alternative (PPA). A copy of the screening is included in **Appendix L**.

A. Community Outreach

The Gloucester County Office of the County Engineer initiated telephone contact with officials from the Township of Deptford including the Deptford Township Mayor. The Mayor's office was provided periodic project updates from the County throughout the duration of the project.

On September 25, 2019, the DVRPC, Gloucester County, Deptford Township Mayor, and FPA staff participated in a status meeting at the Gloucester County Engineering Office. The purpose of the meeting was to share information about the project, key issues, present the preliminary preferred alternative to the Township, and solicit feedback from the Township officials. The County Engineer and Assistant County Engineer along with FPA staff presented an overview of the existing conditions in the project areas as well as concepts and alternatives studied during the Concept Development phase.

A Public Information Center (PIC) was held at Auletto Caterers on February 19, 2020. The purpose of the meeting was to introduce the Cooper Street project, explain the Local Concept Development Process, explain the Alternatives Analysis conducted for the project, and obtain comments and/or concurrence for the selected PPA from the community stakeholders. Invitees were the general public, property owners adjacent to Almonesson Lake, property and business owners within a 250-foot radius of the proposed improvements, County and Local officials, and the NJDOT Local Aid. Advertisements were published in the South Jersey Times during the weeks leading up to the PIC. The meeting was an informal open house format with support staff available to answer questions. Project information was presented on display boards throughout the meeting area.

Minutes and attendees of these meetings are provided in **Appendix R** of this report.

Preliminary Engineering Public Involvement

The Public Involvement Action Plan for this project will be initiated at the outset of the PE phase and is anticipated to include the following efforts:

- Initiate follow-ups contact with Deptford Township offering to hold Officials Briefings
- Conduct a follow-up meeting with local officials and provide them with color renderings simulating what the PPA will look like after construction
- Advertise and conduct a Public Information Center during the PE phase. Officials from Deptford Township, Gloucester County, and NJDOT Local Aid will be invited

B. Noise and Air Quality

The environmental screening investigation identified the presence of sensitive receptors to changes in air and noise quality within the study area. These receptors include the Christian Playcare Center in the southwest quadrant of the project area, the Almonesson United Methodist Church at the intersection of Cooper Street and Almonesson Road, and several single-family homes in the project area. As project design progresses, a detailed, quantified analysis of sensitive receptors and potential project impacts to such receptors may be necessary.

C. Socioeconomics

A large portion of the study area is made up of Almonesson Lake and Almonesson Creek Park, a public park with both active and passive recreation activity areas maintained by Deptford Township. The remainder of the study area is developed with residential and commercial uses. The project area has a low-income population of 25%, which is equivalent to the state average but lower than the EPA Region average (30%). As project alternatives are developed, socioeconomic impacts to the residential and commercial uses in the area should be further evaluated by including residents and business owners in the public outreach process.

The areas immediately adjacent to Cooper Street Bridge where construction will take place are not residential and, therefore, it does not appear that the project will have a disproportionate impact on minority or low-income populations. Based on this information it is unlikely that proposed alternatives will not result in environmental justice concerns in this project area.

D. Cultural Resources

The New Jersey Historic Preservation Office (NJHPO) reviews projects for their effects on archaeological and historic architectural resources when federal funding, licensing, or permitting is involved under Section 106 of the National Historic Preservation Act. The NJHPO also reviews projects requiring Freshwater Wetlands, Waterfront Development, Upland Development, Coastal Area Facility Review Act, and Highlands Preservation Area Approval permits issued by the State of New Jersey Department of Environmental Protection's Division of Land Use Regulation.

Hunter Research was requested to prepare a Cultural Resources Screening Report and Intensive-Level Architectural Survey forms. Upon completions of these tasks, Hunter Research determined that the preliminary Area of Potential Effects contains potentially eligible archaeological and architectural resources that may present project constraints.

- **Architecture:** The intensive-level architectural survey identified on potentially eligible resource that will be directly impacted by the proposed project. It is the professional opinion of Hunter Research that the Cooper Street Bridge and Dam, constructed by Gloucester County in 1926, is potentially eligible for the New Jersey and National Registers of Historic Places.

- **Archaeology.** A Phase I archaeological survey may be required, particularly if ground-disturbing activities take place immediately downstream of the bridge and dam, and in the northwestern quadrant, the side of a former mill, and in the northeaster quadrant, the side of an amusement park.

The Cultural Resources Screening Report and Intensive-Level Architectural Survey are provided in **Appendix M** of this report.

E. Section 4(f) Properties

A search of the publicly available Geographic Information Systems data and the NJDEP Green Acres Program Recreational Open Space Inventory (ROSI) was conducted. The ROSI lists one parcel within the project area that could be affected by the project. This parcel is known as Almonesson Creek Park (AKA Woodbrook Park) and is known as Block 238, Lot 1 in Deptford Township, Gloucester County. The Park is listed on the Gloucester County Tax records as being owned by Deptford Township and is located north of Cooper Street. The portion of the park within the proposed project area is mostly forested wetlands and forested upland. There is also a gravel parking lot and hiking trails in the park which are location in the southeast quadrant of the study area.

As the project design develops any encroachments into these publicly owned parcels will need to be evaluated further. Coordination with the Green Acres Program is recommended to ensure that a Section 4(f) Evaluation is not needed and that the NJDEP Green Acres diversion process will not need to be completed.

F. Highlands/Pinelands

This project is not within the New Jersey Highlands Region or the Pinelands Management Areas.

G. Wetlands

According to the SSURGO Soil Mapping for Gloucester County, hydric soils are present along Almonesson Creek on the northern side of Bridge 3-K-3. This include Fluvaquents loam soils (FmhAt) that are frequently flooded. The remaining areas surrounding the project area are mapped as Freehold-Urban Complex (FrrB and FrrC). These soils are not listed as hydric soils.

The environmental screening report confirmed freshwater wetlands and State open waters regulated under the NJ Freshwater Wetlands Protection Act Rules are present on both the northern and southern side of Bridge 3-K-3 within the study area.

H. Reforestation

Because the project sponsors, Gloucester County and the Delaware Valley Regional Planning Commission, are not New Jersey State Agencies, the project will not be subject to the No Net Loss Reforestation Act standards.

I. Floodplain

Federal Emergency Management Agency mapping shows that the study area is within the 100 year plain. However, the reconstruction of a dam and any regulated activity performed in association with the removal of a dam as defined by the NJDEP Dam Safety Standards (N.J.A.C. 7:20) is not subject to NJDEP Flood Hazard Control Act rules provided the dam is in compliance with all applicable requirements of the Dam Safety Standards.

J. Sole Source Aquifer

The project area is located within the Coastal Plain SSA as mapped by New Jersey Geological Survey (digital Sole Source Aquifer Coverage, 1998). However, the project does not propose to discharge any pollutants into the aquifer as part of the bridge and dam reconstruction project; therefore, no impacts to any underlying aquifer are anticipated.

K. Threatened/Endangered Species

The New Jersey Natural Heritage Program for the Office of Natural Lands Management (NHP) database indicates that the project area may be a foraging habitat for the state endangered Bald Eagles (*Haliaeetus leucocephalis*).

The NHP also classifies the Great Blue Heron (*Andrea Herodias*) as a species of "Special Concern" in the study area. However, there are no current regulatory implications associated with the presence of a NJ species of "Special Concern" onsite.

NHP records indicate that there are no documented occurrences of rare plant species or rare ecological communities within the study area.

According to the U.S. Fish and Wildlife Service (USFWS), the project area may contain suitable habitat for the federally threatened Northern long-eared bat (*Myotis septentrionalis*) and flowering plant swamp pink (*Helonias bullata*). A habitat assessment for these federally listed species may be required by the USFWS. Once the project impacts are known, coordination with the USFWS is recommended to determine if any surveys are required.

L. Category 1 Waters

The water classification of Almonesson Creek is freshwater, non-trout waters, Category 2, according to the NJDEP Surface Water Quality Standards. It is anticipated that the riparian zone associated with Almonesson Creek within the study area will be 50 feet. There are no C-1 waterways identified within the project limits.

M. Vernal Pools

No potential or known vernal pool habitats were identified within the project limits.

N. Stormwater

All proposed work will occur within the limits of the existing dam, therefore, the lead agency on the project is anticipated to be the NJDEP Division of Dam Safety. Additionally, the total area of disturbance within freshwater wetlands or transition areas associated with the project is anticipated to be no more than 1 acre and only a GP-18 permit would be required; all wetlands disturbances will be accounted for under a GP-18 permit. As this project is anticipated to be considered a dam rehabilitation project, the project is anticipated to be exempt from compliance with the NJDEP Stormwater Management regulations. A drainage report has been prepared in support of this project and is provided in **Appendix N**.

O. Hazardous Waste

No sites within the study corridor were identified in the databases searched relating to the presence of hazardous wastes, site contamination, or previous site remediation activity. Based on documentary research and site reconnaissance, no sites of questionable integrity and no areas of concern were identified. A hazardous waste screening study has been prepared in support of this project and is provided in **Appendix O.**

P. Anticipated Environmental Permits or Approvals

The following permits and authorizations may be required prior to implementation of the proposed activities including, but not limited to:

Table 6 – Anticipated Environmental Permits or Approvals

Agency	Approval	Statutory Authority
Gloucester County Soil Conservation District	Soil Erosion & Sediment Control Plan Certification	NJ Soil Erosion & Sediment Control Act of 1975
NJ State Historic Preservation Office	Determination of No Adverse Effect or Memorandum of Agreement	Section 106 of the National Historic Preservation Act of 1966
NJDEP	Freshwater Wetlands General Permit (FWGP) 10A for Very Minor Road Crossings and FWGP 18 for Dam Repair	New Jersey Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A)
NJDEP	Dam Safety Permit	Dam Safety Rules (N.J.A.C. 7:20)
NJDEP	Stormwater Management Plan Approval	Stormwater Management Rules (N.J.A.C. 7:8)
NJDEP	Green Acres Diversions/State House Commission	Green Acres Program Rules (N.J.A.C. 7:36)
FHWA	Categorical Exclusion	Section 102 of the National Environmental Policy Act

Q. Environmental Summary with Probable NEPA Document Required

All conceptual project alternatives (except for the "no build" alternative) will result in disturbances to natural and cultural resources within the project area. The variations between the impacts are discussing in the following section (VI. Evaluation of Conceptual Alternatives).

Actions which meet the definition contained in 40 CFR 1508.4 and do not involved significant environmental impacts are reviewed as Categorical Exclusions (CEs) under the National Environmental Policy Act (NEPA). The proposed project will likely require State and Federal permits to authorize disturbances to natural resources; however, the Environmental Screening did not identify any "fatal flaws" that would prohibit the advancement of this project. Therefore, the likely NEPA document required for this project will be a CE requiring the submittal of supporting documentation.

VI. EVALUATION OF CONCEPTUAL ALTERNATIVES

A. Bridge Rehabilitation versus Bridge Replacement

Minor and major bridge rehabilitation was considered during the alternatives analysis. However, the minor rehabilitation alternative was eliminated because it did not meet the Project Purpose and Need. Further discussion regarding bridge rehabilitation alternatives is included in Section VI.C below.

B. Temporary Bridge Location and Widening Constraints

The construction of a temporary vehicular bridge to be used during a major rehabilitation or replacement on the same alignment was evaluated during the Alternatives Analysis. The construction of a temporary bridge was dismissed as a viable solution due to the additional excessive construction costs, construction duration, and environmental impacts.

C. Conceptual Alternatives

The following alternatives were evaluated for addressing the Project Purpose and Need; as well as meeting the Project Goals and Objectives.

No Build

This alternative assumes that no improvements would be made to upgrade the structure and the existing infrastructure would remain the same as it is today. The following restrictions are related to the No Build Alternative:

- Would not eliminate the existing 30-foot substandard bridge roadway width
- Would not improve the hydraulic performance of the dam and spillway
- Would not improve the existing limited facilities on the bridge for pedestrians and bicyclists
- Would not provide the 75-year design life of the Build alternatives. Additional investments would be required to continue use of the bridge and dam beyond the 20-year period

Dam Safety standards require that the spillway of a dam convey the design storm, while maintaining a minimum one foot of freeboard to the crest of the dam. Under the existing conditions, the design storm overtops the dam. Therefore, the existing spillway and dam do not conform to the NJDEP Dam Safety standards. Additionally, the failure to perform the required maintenance to comply with the NJDEP Dam Safety standards may result in a violation of the Safe Dam Act and subsequent orders to fix or decommission the dam, temporary order to drain, or other penalties. Therefore, for these reasons the No Build alternative was eliminated from further consideration.

Rehabilitation

Alternative 1 – Major Rehabilitation with Widening at North Fascia

Alternative 1 includes the rehabilitation of the existing bridge and widening the structure to the north. The widened section would consist of a precast arch extension, new precast spandrel and wing walls, and new pile supported foundation. Two (2) eleven-foot lanes would be provided to match existing, and the shoulders would be widened to five feet along a similar alignment as the existing bridge. The existing southerly border area would be maintained; the northerly border area would consist of a 5-foot sidewalk and 3-foot buffer.

The upstream embankment would consist of 2H to 1V slopes with riprap stone slope protection placed at the waterline. The downstream culvert invert would be maintained approximately 4 feet above the existing grade. A scour hole and/or stilling basin will be constructed downstream to provide energy dissipation.

Upon review of the 20th and 21st Cycle Bridge Re-Evaluation Survey Reports, the existing bridge is in fair condition due to the condition of the arch culvert and Functionally Obsolete due to the substandard bridge roadway width. The downstream wingwalls exhibit movement and rotation (as evidenced by the transverse tie rods installed post-construction and field observations) indicating substructure and slope stability issues.

The overall condition of the dam is in poor condition and remedial action is necessary to conform with dam safety regulations. The maintenance activities listed above for the No Build alterative will be required for the Major Rehabilitation alternative as well. The existing bridge and spillway do not have the capacity to convey the design discharge (50% PMP) required by the Dam Safety Standards. Any rehabilitation would require overtopping protection to safely pass the 50% PMP storm event.

The existing bridge and spillway are founded on a deep foundation of timber piles. Information regarding the diameter, length, strength, and the condition of the timber piles is not available from as-built plans and Bridge Re-evaluation Survey Reports. The unknown information and condition of the timber piles makes retrofitting the foundations subject to additional risks. Given these risks related to reusing the existing deep foundations, it was concluded that the bridge foundations should be replaced in their entirety.

This alternative was dismissed as the estimated total costs are similar to those for other alternatives which include full replacement. This alternative was also dismissed due to the additional right of way impacts to the Green Acre encumbered property associated with the scour hole and overtopping protection. This alternative was also dismissed due to the extent of the rehabilitation needed, hydraulic deficiencies, the unknown condition 0of the existing timber piles and substructure deficiencies.

Alternative 1A – Minor Rehabilitation with Downstream Overtopping Protection

Alternative 1A includes the minor rehabilitation of the existing bridge and spillway in conformance with the Secretary of the Interior's Standards to preserve the structural integrity and extend the useful life. Therefore, the removal of historic materials should be minimized and constructed to the same dimensions that previously existed. The color of surficial concrete to be placed should be coordinated with NJHPO and match the color of the adjacent intact concrete. The existing bridge and roadway section would be maintained to match existing, and the bridge and dam would continue to operate as it does today.

The following rehabilitation activities under Minor Rehabilitation would be necessary to keep the bridge and dam operational and in as good a condition as possible for the next 20 years:

- Repair concrete spalls, cracks, and other concrete deterioration within the arch culvert and drop box spillway
- Repair the leaking joints at the interface of the culvert and drop box spillway
- Remove tree and brush growth from the upstream and downstream faces. A suitable grass cover should be established and maintained on the slopes. Riprap protection should be provided at the water level on the upstream slope
- Repair all areas of erosion on the downstream face to establish a uniform slope to the face of the dam
- Remove the service slab atop the drop box spillway and replace with a catwalk in a manner so as not to impede flow through the spillway
- Extend the storm drain discharge pipe at the westerly downstream face of the dam and backfill and stabilize the eroded areas. The discharge point of the extended pipe should be protected with adequate conduit outlet protection

The upstream embankment would consist of 2H to 1V slopes with riprap stone slope protection placed at the waterline. The downstream culvert invert would be maintained approximately 4 feet above the existing grade. A scour hole and/or stilling basin will be constructed downstream to provide energy dissipation.

Dam Safety standards require that the spillway of a dam convey the design discharge, while maintaining a minimum one foot of freeboard to the crest of the dam or overtopping protection be provided. The existing bridge and spillway do not have the capacity to convey the design discharge (50% PMP) required by the Dam Safety Standards. Overtopping protection is, therefore, required to safely pass the 50% PMP storm event.

The following restrictions are related to Minor Rehabilitation Alternative 1A:

- Would not eliminate the existing 30-foot substandard bridge roadway width

- Would not improve the existing limited facilities on the bridge for pedestrians and bicyclists
- Would not provide the 75-year design life of the Build alternatives. Additional investments would be required to continue use of the bridge and dam beyond the 20-year period

For these reasons, the Minor Rehabilitation alternative does not meet the project's Purpose and Need and was eliminated from further consideration.

Bridge & Spillway Replacement Alternative Concepts

For the development of all conceptual bridge replacement alternatives, the following information was used:

- A tangent alignment for the new bridge is preferred to avoid introducing any unnecessary horizontal curves to CR 706. The horizontal alignment will be similar for all alternatives.
- The vertical profile will be raised by approximately 1 foot at the new bridge to create low points on the east and west approaches to the new bridge. The vertical profile will be similar for all alternatives.
- Based on the H&H analysis performed in support of this project, the minimum bridge waterway opening area to safely pass the spillway design storm (SDS) without overtopping protection is 200 square feet (see section VI.E below for additional H&H requirements). FPA anticipates a proprietary pre-cast arch culvert or pre-cast three-sided frame for this project and will be similar for all bridge structure alternatives. Therefore, the cost of the bridge structure will not impact the selection of the most economically feasible alternative.
- Eliminating the drop at the downstream culvert invert will not require a downstream energy dissipating structure and will be similar for all alternatives; transition riprap will therefore be adequate
- Engineering judgement and assumptions were made based on the region's geology and past projects completed by FPA in the surrounding area, and therefore, FPA anticipates a pile foundation will be needed for this project. Final substructure design and foundation layout will be performed in the later phases of this project. As a result, the cost of the substructure will not significantly vary between alternatives. Therefore, the cost of the substructure will not impact the selection of the most economically feasible alternative.
- The proposed bridge will be designed in accordance with the NJDOT Design Manual for Bridges & Structures.

For the development of all conceptual spillway replacement alternatives, the following information was used:

- The Almonesson Lake Dam is a Class II Significant Hazard Dam. Therefore, the SDS is one-half the probable maximum precipitation (PMP).

- Dam Safety Standards require the spillway to pass the design storm with a minimum of one foot of freeboard to the crest of the dam
- Overtopping protection (downstream steel sheet pile cutoff wall) will be required if the hydraulic performance of the bridge and/or spillway is inadequate to safely pass the SDS
- The proposed spillway will be designed to withstand all load conditions created by various water elevations, in accordance with NJDEP Dam Safety Standards

Alternative 2 – 32 ft. Roadway with Drop Inlet Box Spillway and Overtopping Protection

Alternative 2 includes widening and full substructure and superstructure replacement of Bridge 3-K-3 and spillway along a similar alignment as the existing bridge. The existing arch culvert would be replaced with a 24-foot pre-cast culvert. The proposed structure width is 50.75 feet, which includes the following: 4-bar steel bridge rail 1'-7" wide in both directions, 5-foot sidewalks along both sides of the bridge, two 11-foot lanes, and 5-foot shoulders. The bridge crossing would shift westward to eliminate conflict with the existing bridge and pile foundations.

This alternative would also include a new 45-foot drop box spillway to match the hydraulic performance of the existing spillway. Two valves are proposed, one at the base of the structure to drain the impoundment per the NJ Dam Standards and one just below the spillway for maintenance drawdown. The two valves would allow for partial and complete lowering of the lake.

The proposed 45-foot spillway is insufficient to pass the 50% PMP event, therefore, overtopping protection would be required. The proposed overtopping protection would consist of a steel sheet pile cutoff wall downstream. An upstream steel sheet pile wall is also proposed to help reduce environmental impacts, as well as provide recreational access to the lake. The downstream culvert invert will be lowered to meet the existing grade to allow tailwater into the culvert, which would provide energy dissipation during storm events. Transition riprap would be provided downstream.

This alternative was dismissed due to the inadequate spillway, and therefore, the higher cost to construct overtopping protection to safely pass the SDS. This alternative was also dismissed due to the additional right of way impacts to the Green Acre encumbered property associated with the overtopping protection. This alternative was also dismissed due to the narrower roadway section (32-foot verses 34 foot desired by the County).

Alternative 3 – 32 ft. Roadway with Drop Inlet Box Spillway

Alternative 3 includes widening and full substructure and superstructure replacement of Bridge 3-K-3 and spillway along a similar alignment as the existing bridge. The existing arch culvert would be replaced with a 24-foot pre-cast culvert sufficient to convey the spillway discharge. The proposed structure width is 50.33 feet, which includes the following: 1'-2" concrete parapet, 5-foot sidewalks along both sides of the bridge, two 11-

foot lanes, and 5-foot shoulders. The bridge crossing would shift westward to eliminate conflict with the existing bridge and pile foundations.

This alternative would enlarge the spillway with a new 65-foot drop box spillway. This proposed spillway passes the 50% PMP storm event, and therefore, overtopping protection will not be required. Two valves are proposed, one at the base of the structure to drain the impoundment per the NJ Dam Standards and one just below the spillway for maintenance drawdown. The two valves will allow for partial and complete lowering of the lake.

The upstream embankment would consist of 2H to 1V slopes with riprap stone slope protection placed at the waterline. The downstream culvert invert will be lowered to meet the existing grade to allow the tailwater in the culvert which will provide energy dissipation during storm events. Transition riprap will be provided downstream.

This alternative was dismissed due to the narrower roadway section (32-foot verses 34-foot desired by the County).

Alternative 4 – 32 ft. Roadway with Semi-circular Ogee Spillway

Alternative 4 is similar to Alternative 3 with the primary difference being the spillway geometry. This alternative would enlarge the spillway with a new 76-foot semi-circular ogee spillway. This proposed spillway passes the 50% PMP storm event, and therefore, overtopping protection will not be required. Two valves are proposed, one at the base of the structure to drain the impoundment per the NJ Dam Standards and one just below the spillway for maintenance drawdown. The two valves will allow for partial and complete lowering of the lake.

The upstream embankment would consist of 2H to 1V slopes with riprap stone slope protection placed at the waterline. The downstream culvert invert will be lowered to meet the existing grade to allow the tailwater in the culvert, which will provide energy dissipation during storm events. Transition riprap will be provided downstream.

This alternative was dismissed due to the higher cost of constructing the ogee spillway verses a drop box inlet spillway. This alternative was also dismissed due to the narrower roadway section (32-foot verses 34-foot desired by the County).

Alternative 5 – 32 ft. Roadway with Drop Box Inlet Spillway and Upstream Steel Sheet Pile Wall

Alternative 5 is similar to Alternative 3 with the primary difference being the addition of an upstream steel sheet pile wall. An upstream steel sheet pile wall is proposed to help reduce environmental impacts, to replace the existing destroyed concrete quay wall, and to provide recreational access to the lake.

This alternative was dismissed due to the narrower roadway section (32-foot verses 34-foot desired by the County).

Alternative 6 – 34 ft. Roadway with Drop Box Inlet Spillway with Upstream and Downstream Steel Sheet Pile Walls

Alternative 6 includes widening and full substructure and superstructure replacement of Bridge 3-K-3 and spillway along a similar alignment as the existing bridge. The existing arch culvert would be replaced with a 24-foot pre-cast culvert sufficient to convey the spillway discharge. The proposed structure width is 52.33 feet, which includes the following: 1'-2" concrete parapet, 5-foot sidewalks along both sides of the bridge, two 12-foot lanes, and 5-foot shoulders. The bridge crossing would shift westward to eliminate conflict with the existing bridge and pile foundations.

This alternative would enlarge the spillway with a new 65-foot drop box spillway. This proposed spillway passes the 50% PMP storm event, and therefore, overtopping protection will not be required. Two valves are proposed, one at the base of the structure to drain the impoundment per the NJ Dam Standards and one just below the spillway for maintenance drawdown. The two valves will allow for partial and complete lowering of the lake.

An upstream steel sheet pile wall is proposed to help reduce environmental impacts, to replace the existing destroyed concrete quay wall, and to provide recreational access to the lake. The downstream culvert invert will be lowered to meet the existing grade to allow the tailwater in the culvert, which will provide energy dissipation during storm events. A downstream steel sheet pile wall is proposed to provide overtopping protection for the full PMP storm event, beyond what is required by the current NJ Dam Standards.

This alternative was dismissed due to the increased costs to construct the downstream steel sheet pile wall. This alternative was also dismissed due to excessive impacts to utilities located downstream which, would be impacted by the proposed sheet pile wall.

Alternative 6A – 34 ft. Roadway with Drop Box Inlet Spillway, Upstream Steel Sheet Pile Wall, and Downstream Articulated Concrete Block

Alternative 6A is similar to Alternative 6 with the primary difference consisting of an articulated concrete block (ACB) system proposed on the downstream embankment to provide overtopping protection to safely pass the full PMP storm event.

This alternative was dismissed due to the increased costs to construct the downstream ACB system. This alternative was also dismissed due to excessive impacts to utilities located downstream, which would be impacted by the proposed sheet pile wall.

Alternative 6B – 34 ft. Roadway with Drop Box Inlet Spillway and Upstream Steel Sheet Pile Wall

Alternative 6B is similar to Alternative 6 with the primary difference consisting of no overtopping protection. The overtopping protection proposed by Alternative 6 and 6A

has been eliminated from Alternative 6B. Alternative 6B has been selected as the Preliminary Preferred Alternative.

D. Traffic Analysis

This project is limited to the immediate area of Bridge 3-K-3 and the Almonesson Lake Dam. The proposed improvements will generally match the existing roadway geometry of the CR 706 corridor, which includes two 11-foot lanes and varying width shoulders. Therefore, improved performance and increased capacity will not be realized by this project. Increasing the LOS to an acceptable level would require multiple lanes in each direction. Widening of this short stretch of roadway would not be sensible.

E. Hydrology & Hydraulics Analysis

Subsection E is based mainly on the Hydrologic & Hydraulic Analysis report that was prepared for the Cooper Street (CR 706) Bridge over Almonesson Creek / at Almonesson Lake LCD study and supplemented with information regarding the PPA. A copy of this report is included in **Appendix P**. At the time of this report, the H&H Report has been submitted to the NJDEP Bureau of Dam Safety for approval.

The design storm for a Class II Significant Hazard dam is generally one-half PMP. The State of New Jersey Dam Safety Regulations allow a reduction in the SDF for dams, if it can be shown through incremental analysis that the damage incurred downstream of a structure is not increased for a particular flood event by a breach of the dam. However, two residential homes at the westerly end of Little Drive and located downstream of the Almonesson Lake Dam experience flooding during the breach event of approximately three feet. As such, no reduction of the SDF is recommended.

F. Right of Way Impacts and Review

The preliminary evaluation of right-of-way impacts was prepared utilizing available plans and the existing conditions plan prepared by Remington & Vernick Engineers (RVE) in support of this project. Potential ROW impacts each of the concepts are summarized below. No ROW costs are assumed for the Green Acres impacts. It is anticipated that the Green Acres impacts will be compensated by providing enhancements to existing facilities and/or additional land within the Township of Deptford or Gloucester County to be encumbered by the Green Acres program.

Alternative 1 – Major Rehabilitation with Widening at North Fascia

- Block 238, Lot 1 – Due to realignment of CR 706 and access impacts, guide rail and guide rail tangent end terminal, aerial utilities, downstream cutoff wall, scour hole
- Block 238, Lot 3 – Due to realignment of CR 706 and access impacts, guide rail and guide rail anchorage, aerial utilities, downstream cutoff wall
- Block 245, Lot 2 – Due to guiderail, riprap stone slope protection, and spillway
- Block 245, Lot 1 – Due to guide rail and guide rail end anchorage

- Block 246, Lot 4 – Due to realignment of CR 706 and access impacts, and guide rail controlled release terminal

Total number of permanent easements = 5
Total number of temporary construction easements = 5
Total permanent Green Acres impacts = 0.18 Acres

Alternative 1A – Minor Rehabilitation

- Block 238, Lot 1 – Due to Downstream overtopping protection and scour hole
- Block 238, Lot 3 – Due downstream overtopping protection
- Block 245, Lot 2 – Due to riprap stone slope protection, and spillway

Total number of permanent easements = 3
Total number of temporary construction easements = 5
Total permanent Green Acres impacts = 0.12 Acres

Alternative 2 – 32 ft. Roadway with Drop Inlet Box Spillway and Overtopping Protection

- Block 238, Lot 1 – Due to realignment of CR 706 and access impacts, guide rail and guide rail tangent end terminal, aerial utilities, downstream cutoff wall
- Block 238, Lot 3 – Due to realignment of CR 706 and access impacts, guide rail and guide rail anchorage, aerial utilities, downstream cutoff wall
- Block 245, Lot 2 – Due to guiderail, upstream sheet pile wall, riprap stone slope protection, and spillway
- Block 245, Lot 1 – Due to guide rail and guide rail end anchorage
- Block 246, Lot 4 – Due to realignment of CR 706 and access impacts, and guide rail controlled release terminal

Total number of permanent easements = 5
Total number of temporary construction easements = 5
Total permanent Green Acres impacts = 0.12 Acres

No ROW costs are assumed for the Green Acres impacts. At this time, it is anticipated that the Green Acres impacts will be compensated by providing enhancements to existing facilities.

Alternative 3 – 32 ft. Roadway with Drop Inlet Box Spillway

- Block 238, Lot 1 – Due to realignment of CR 706 and access impacts, embankment slope, guide rail and guide rail tangent end terminal, aerial utilities
- Block 238, Lot 3 – Due to realignment of CR 706 and access impacts, guide rail and guide rail anchorage, and aerial utilities

- Block 245, Lot 2 – Due to guiderail, embankment slope, riprap stone slope protection, and spillway
- Block 245, Lot 1 – Due to guide rail and guide rail end anchorage
- Block 246, Lot 4 – Due to realignment of CR 706 and access impacts, and guide rail controlled release terminal

Total number of permanent easements = 5
Total number of temporary construction easements = 5
Total permanent Green Acres impacts = 0.22 Acres

No ROW costs are assumed for the Green Acres impacts. At this time, it is anticipated that the Green Acres impacts will be compensated by providing enhancements to existing facilities.

Alternative 4 – 32 ft. Roadway with Semi-circular Ogee Spillway

- Block 238, Lot 1 – Due to realignment of CR 706 and access impacts, embankment slope, guide rail and guide rail tangent end terminal, aerial utilities
- Block 238, Lot 3 – Due to realignment of CR 706 and access impacts, guide rail and guide rail anchorage, and aerial utilities
- Block 245, Lot 2 – Due to guiderail, embankment slope, riprap stone slope protection, and spillway
- Block 245, Lot 1 – Due to guide rail and guide rail end anchorage
- Block 246, Lot 4 – Due to realignment of CR 706 and access impacts, and guide rail controlled release terminal

Total number of permanent easements = 5
Total number of temporary construction easements = 5
Total permanent Green Acres impacts = 0.22 Acres

No ROW costs are assumed for the Green Acres impacts. At this time, it is anticipated that the Green Acres impacts will be compensated by providing enhancements to existing facilities.

Alternative 5 – 32 ft. Roadway with Drop Box Inlet Spillway and Upstream Steel Sheet Pile Wall

- Block 238, Lot 1 – Due to realignment of CR 706 and access impacts, embankment slope, guide rail and guide rail tangent end terminal, aerial utilities
- Block 238, Lot 3 – Due to realignment of CR 706 and access impacts, guide rail and guide rail anchorage, and aerial utilities
- Block 245, Lot 2 – Due to guiderail, upstream sheet pile wall, riprap stone slope protection, and spillway
- Block 245, Lot 1 – Due to guide rail and guide rail end anchorage

- Block 246, Lot 4 – Due to realignment of CR 706 and access impacts, and guide rail controlled release terminal

Total number of permanent easements = 5
Total number of temporary construction easements = 5
Total permanent Green Acres impacts = 0.22 Acres

No ROW costs are assumed for the Green Acres impacts. At this time, it is anticipated that the Green Acres impacts will be compensated by providing enhancements to existing facilities.

Alternative 6 – 34 ft. Roadway with Drop Box Inlet Spillway with Upstream and Downstream Steel Sheet Pile Walls

- Block 238, Lot 1 – Due to realignment of CR 706 and access impacts, guide rail and guide rail tangent end terminal, aerial utilities, downstream cutoff wall
- Block 238, Lot 3 – Due to realignment of CR 706 and access impacts, guide rail and guide rail anchorage, aerial utilities, downstream cutoff wall
- Block 245, Lot 2 – Due to guiderail, upstream sheet pile wall, riprap stone slope protection, and spillway
- Block 245, Lot 1 – Due to guide rail and guide rail end anchorage
- Block 246, Lot 4 – Due to realignment of CR 706 and access impacts, and guide rail controlled release terminal

Total number of permanent easements = 5
Total number of temporary construction easements = 5
Total permanent Green Acres impacts = 0.12 Acres

Alternative 6A – 34 ft. Roadway with Drop Box Inlet Spillway, Upstream Steel Sheet Pile Wall, and Downstream Articulated Concrete Block

- Block 238, Lot 1 – Due to realignment of CR 706 and access impacts, guide rail and guide rail tangent end terminal, aerial utilities, downstream ACB system
- Block 238, Lot 3 – Due to realignment of CR 706 and access impacts, guide rail and guide rail anchorage, aerial utilities, downstream cutoff wall
- Block 245, Lot 2 – Due to guiderail, upstream sheet pile wall, riprap stone slope protection, and spillway
- Block 245, Lot 1 – Due to guide rail and guide rail end anchorage
- Block 246, Lot 4 – Due to realignment of CR 706 and access impacts, and guide rail controlled release terminal

Total number of permanent easements = 5
Total number of temporary construction easements = 5
Total permanent Green Acres impacts = 0.12 Acres

Alternative 6B – 34 ft. Roadway with Drop Box Inlet Spillway and Upstream Steel Sheet Pile Wall

- Block 238, Lot 1 – Due to realignment of CR 706 and access impacts, embankment slope, guide rail and guide rail tangent end terminal, aerial utilities
- Block 238, Lot 3 – Due to realignment of CR 706 and access impacts, guide rail and guide rail anchorage, and aerial utilities
- Block 245, Lot 2 – Due to guiderail, embankment slope, riprap stone slope protection, and spillway
- Block 245, Lot 1 – Due to guide rail and guide rail end anchorage
- Block 246, Lot 4 – Due to realignment of CR 706 and access impacts, and guide rail controlled release terminal

Total number of permanent easements = 5
Total number of temporary construction easements = 5
Total permanent Green Acres impacts = 0.22 Acres

No ROW costs are assumed for the Green Acres impacts. At this time, it is anticipated that the Green Acres impacts will be compensated by providing enhancements to existing facilities.

G. Utility Impacts

Electric – PSE&G

Two existing utility poles and energized overhead wires are in conflict with the proposed bridge and dam construction for all build alternatives, except for the major rehabilitation alternative. Additionally, in no case shall utility poles, at new or upgraded guide rail installations, remain in front of the guide rail.

Telephone – Verizon

The utility poles located on the downstream side of the embankment are in conflict with the proposed bridge and dam construction for all build alternatives. Additionally, in no case shall utility poles, at new or upgraded guide rail installations, remain in front of the guide rail. Underground conduit will also require relocation. Correspondence with Verizon has indicated the underground conduit is believed to be unoccupied.

Cable – Comcast

Comcast facilities are installed on Verizon's utility poles and will, therefore, be impacted due to relocation of Verizon's downstream utility poles.

Gas – South Jersey Gas Company

The existing gas main will require relocation as it is in conflict with the proposed bridge and dam construction for all build alternatives, except for the major rehabilitation alternative. Correspondence with South Jersey Gas Company (SJGC) has indicated SJGC would like to replace their existing infrastructure prior to this project beginning construction.

Water – Deptford Township Municipal Utility Authority (DTMUA)

The existing water mains within the project limits are constructed of asbestos concrete pipe (ACP), which are vulnerable to damage caused by construction vibrations. The existing water mains are in conflict with all build alternatives, except for the major rehabilitation alternative.

The DTMUA has requested insertion valves be installed on either side of the bridge and replace the ACP with ductile iron pipe. All build alternatives are suspected to impact the integrity of the ACP water mains.

Sewer – DTMUA

The DTMUA has indicated the existing sewer mains within the project limits are also constructed of ACP, and therefore, all build alternatives are suspected to impact the integrity of the ACP water mains.

Additionally, the sewer mains on both sides of the bridge conflict with the proposed overtopping protection for alternative 1 and alternative 2.

H. ITS Facilities

A search of the NJDOT Intelligent Transportation Systems (ITS) inventory, as well as field investigations did not identify any existing ITS facilities within the LCD study area. No proposed ITS facilities are anticipated for this project.

I. Complete Streets Policy

The proposed project has facilities for pedestrians and bicycles on CR 706. Five-foot wide sidewalks and five-foot wide bicycle compatible shoulders will be provided on each side of the proposed new bridge supporting the NJDOT's Complete Street Policy. Due to significant right of way and environmental impacts, no physically separated bicycle facility will be provided on CR 706.

J. Access Impacts and Review

A full access conformance study of the existing driveways was not evaluated during this phase. A cursory access review for each of the driveways within the project limits was performed to identify any potential impacts. See section III.D.10 and Table 2 for potential access impacts and non-conformance with the GC-DSM.

K. Constructability and Staging Plans and Detour Plan

For all concepts, construction activities for the project will be performed in stages. It is proposed to construct the project in two stages so that existing utilities can be adequately accommodated. Utility accommodations will be similar for all alternatives. All aerial utility poles in conflict with the temporary or proposed conditions must be relocated prior to construction. Refer to section VI.G for utility impacts. The conceptual sequence of construction for all build alternatives is provided on the sheet entitled "Utility Accommodation Plan Proposed Conditions" provided in **Appendix Q**.

The preferred detour route utilizes Clements Bridge Road (CR 544). This detour will maintain traffic on County and State roads throughout the detour route and possess the highest capacity to accommodate the additional vehicles. See the *Traffic Conditions Report* provided in **Appendix G** for additional information regarding detour routes. The proposed detour route will be similar for all alternatives.

Prior to the start of any construction activities, it is recommended that local businesses, residents, and motorists be informed that construction will be taking place starting on a certain date and that a detour will be in effect. Access to businesses within the work zone shall be maintained throughout the project.

L. Controlling Substandard Design Elements and Reasonable Assurance

The preliminary Preferred Alternative (PPA) will require a Design Exception from the standards set forth in the NJDOT-RDM for shoulder width, which are Controlling Substandard Design Elements.

M. Construction Cost Estimate

Preliminary construction cost estimates for each of the conceptual alternatives, including bridge and roadway construction, lump sum items, contingencies, and construction engineering are summarized in the table below. Detailed cost estimates for all alternatives are include in **Appendix V**.

Table 7 – Preliminary Construction Cost Estimates for Build Alternatives

Alternative	Construction	Total Cost[1]
No. 1	$5.8M	$7.5M
No. 1A	$2.5M	$4.6M
No. 2	$6.8M	$8.7M
No. 3	$5.8M	$7.1M
No. 4	$6.9M	$8.4M
No. 5	$6.2M	$7.6M
No. 6	$6.9M	$8.8M
No. 6A	$7.0M	$8.9M
No. 6B	$6.3M	$7.6M

1. Total Cost includes construction engineer, utility relocation, contingencies, and ROW costs

N. Value Engineering Study and Report

A value engineering study was not completed for this project.

O. Life Cycle Cost Analysis

A life cycle cost analysis was not completed for this project.

P. Alternatives Matrix

The Alternative Comparison matrix for the alternatives discussed in section VI.C is included in **Appendix X**.

Q. Risk Analysis Summary

There is no major risk identified for the project. The Risk Summary Matrix is provided in **Appendix Y**.

R. Discussions with Subject Matter Experts

TBD

S. Preliminary Preferred Alternative (PPA)

The Preliminary Preferred Alternative (PPA) is a combination of multiple replacement alternatives developed to address the unique requirements of Bridge 3-K-3 and Almonesson Lake Dam.

Alternative 6B – 34 ft. Roadway with. Drop Box Inlet Spillway and Upstream Steel Sheet Pile Wall was selected as the PPA since this alternative offers the best competitive cost and meets the project goals and objectives.

The PPA will meet the criteria established in the Project Purpose and Need Statement in the following manner:

- The new bridge, dam, spillway and approach roadway conditions will be designed meet current design and safety standards; controlling substandard design elements will be corrected
- The new structure will be designed to require only minimal maintenance throughout their design life
- ADA-compliant pedestrian facilities, as well as an increased connectivity within the community, will be provided by the construction of sidewalk on both sides of CR 706 and across Bridge 3-K-3
- The proposed 5-foot shoulders will provide bicycle compatibility and connectivity within the community
- Environmental and right-of-way impacts will be minimized with the use of an upstream steel sheet pile wall and lowering the downstream invert elevation

- A pre-cast arch will utilize accelerated bridge construction techniques to minimize the disruption and delay to the public during construction

SHPO Mitigation

We anticipate that SHPO will require mitigation to offset the potential adverse effect caused by the Project. The level of mitigation will be negotiated during the Section 106 Consultation.

T. Preliminary Engineering Scope Statement

The completed Preliminary Engineering Scope Statement is provided in **Appendix BB**.

VII. CONCEPT DEVELOPMENT RECOMMENDATION

A. Federal Highway Administration (FHWA) Approval of Report

TBD

B. Capital Program Screening Committee (CPSC) Recommendation

TBD

C. Capital Program Committee (CPC) Approval

TBD

VIII. APPENDIX

Appendix A. Problem Statement

Appendix B. Bridge Re-evaluation Survey Reports

Appendix C. Underwater Bridge Evaluation Report

Appendix D. Dam Inspection Reports

Appendix E. Original Construction Plans

Appendix F. Tax Maps, Subdivision Maps and Deeds

Appendix G. Traffic Conditions Report

Appendix H. Traffic Counts

Appendix I. Existing Topographic Conditions

Appendix J. Straight Line Diagrams

Appendix K. Accident Reports & Crash Diagrams

Appendix L. Environmental Screening Report & Constraint Map

Appendix M. Cultural Resources Screening Report & Intensive-Level Architectural Survey

Appendix N. Drainage Report

Appendix O. Hazardous Waste Screening Study

Appendix P. Hydrologic & Hydraulic Analysis Report

Appendix Q. Conceptual Plans

Appendix R. Community Outreach Documentation

Appendix S. Design Communications Report (DCR)

Appendix T. Letter of Support

Appendix U. NJDOT Communications

Appendix V. NJDEP Communications

Appendix W. Cost Estimates

Appendix X. Alternatives Matrix

Appendix Y. Risk Register

Appendix Z. Complete Streets Checklist

Appendix AA. Preliminary Engineering Public Involvement Action Plan

Appendix BB. Preliminary Engineering Scope Statement