Reconstruction of Old Lake Wilson Road (CR 545) Widening Project Development and Environment (PD&E) Study from County Road 532 to South of Sinclair Road

Osceola County

FINAL CONCEPTUAL BRIDGE HYDRAULICS ASSESSMENT

Prepared For:
Osceola County
Board of County Commissioners
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Kissimmee, Florida 34741

Prepared By:
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March 2022

Professional Engineer Certificate

I hereby certify that I am a registered professional engineer in the State of Florida practicing with Patel, Greene, and Associates, LLC, and that I have prepared or supervised the preparation and approve the findings, opinions, conclusions, and technical advice hereby reported for:

PROJECT: **Reconstruction of Old Lake Wilson Road (CR 545) Widening Project Development and Environment (PD&E) Study from County Road 532 to South of Sinclair Road**

Osceola County

REPORT: **FINAL CONCEPTUAL BRIDGE HYDRAULICS ASSESSMENT**

DATE: **March 2022**

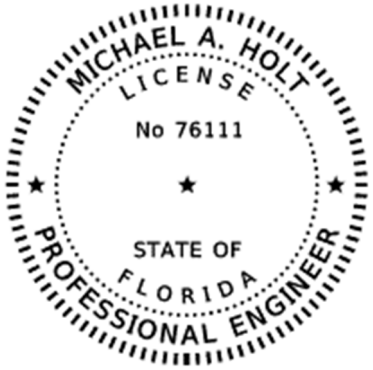
CLIENT: **Osceola County**

I acknowledge that the procedures and references used to develop the results contained in this report are standards to the professional practice of transportation engineering and planning as applied through professional judgment and experience.

NAME: Michael A. Holt

FL PE No.: 76111

SIGNATURE:



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This item has been digitally signed and sealed by:

Michael A Holt
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on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Executive Summary

Osceola County is conducting a Project Development and Environment (PD&E) study to evaluate the widening of Old Lake Wilson Road/County Road 545 (CR 545) from two to four lanes. The purpose of this PD&E study is to evaluate engineering and environmental data and document information that will aid the County in determining the location, type, and preliminary design of the proposed improvements. The total project length is approximately 2.5 miles. The study includes capacity improvements along the roadway and at intersections, a new bridge over Interstate 4 (I-4), the addition of a median, and bicycle and pedestrian features. The proposed project also includes widening of culverts and bridges along the corridor, including the existing quadruple 11' x 7.5' arch pipe bridge culvert (Bridge #924147) over Davenport Creek.

The project is located within the jurisdiction of the South Florida Water Management District (SFWMD) and the Florida Department of Environmental Protection (FDEP). The project is divided into 8 sub-basins based on the existing roadway profile, roadside ditch profiles, culvert and cross drain locations.

The vertical datum used for this study is the North American Vertical Datum of 1988 (NAVD 88). To convert from NAVD 88 to National Geodetic Vertical Datum of 1929 (NGVD 29), add 0.883 feet.

Federal Emergency Management Agency (FEMA) floodplains are located at two riverine crossings located along the project corridor. The subject of this report is the crossing of Davenport Creek, which is a regulatory floodway within the study limits. Please refer to the Location Hydraulics Report (submitted under a separate cover) for discussion of the anticipated floodplain impacts. This report is limited to a discussion of the conceptual assessment of the hydraulic considerations associated with the widening and/or replacement of this crossing, as well as the current condition and expected future design service life of the crossing.

The intent of this conceptual bridge hydraulics assessment is to document regulatory requirements associated with the widening and/or replacement of Bridge #924147 over Davenport Creek, and provide a preliminary hydraulic assessment of the existing crossing and proposed alternatives.

The original bridge culvert was constructed in 1954 and it is approximately 42 ft wide with four 11' x 7.5' arch pipes for a total bridge length of 57.4 ft. The headwalls are sand-cement rip-rap exhibiting deterioration including settlement, open joints with vegetative growth, cracks, and missing sand-cement bags. The July 2020 bridge inspection report (see **Appendix C**) notes the following issues:

- Area of undermining @ pipe 3 (see **Appendix C** for a plan view of pipe designations)
- Multiple sand-cement bags missing over the east end of pipe 1
- Sand-cement bags missing @ western waterline (approx. 4' x 3') between pipes 3 & 4
- Sand-cement bags generally brittle with some open joints and vegetative growth (both walls)
- Settlement over the east end of pipe 1 with cracking up to ¼"
- Delaminative corrosion and corrosion holes in pipes 3 & 4
- Previously applied bituminous coating is failing, resulting in corrosion (all pipes)
- Miscellaneous asphalt "mowing strips" behind guardrail cracked and broken apart
- Depression in headwall over pipe 4 (2' dia x 1 ½' deep)

- 75% occlusion of pipe 1 and 50% occlusion of pipe 2
- “Up to 2 ft” of sand accumulation in pipes 3 & 4

It should be noted that many of these deficiencies were also observed during a December 2021 site visit. Site photographs taken during the field reviews and a field review memo are provided in **Appendix D**.

Due to the age and existing conditions of the bridge culvert, it is unlikely that simply widening to accommodate the proposed improvements will meet expectations as to future Design Service Life.

Hydraulic analysis of the existing crossing shows overtopping of the road in the existing condition. If the existing bridge culvert is widened to accommodate the proposed roadway improvements, the hydraulic analysis shows an increase in the upstream stages at the crossing. Since this crossing is a regulatory crossing and requires a No-Rise certification, widening the existing crossing is not a suitable alternative.

For these reasons, Bridge #924147 is recommended to be replaced to accommodate the proposed improvements.

The current effective Flood Insurance Study (FIS) for Osceola County is 12097CV000A, dated June 18, 2013. This study incorporates historical data from various studies performed by the U.S. Army Corps of Engineers (USACE), Jacksonville District, as well as a November 1996 study prepared by Post, Buckley, Schuh & Jernigan covering unincorporated areas of Osceola County.

The scope of this report is to discuss regulatory guidance and best management practices for the future design and analysis of various alternatives to widen and/or replace Bridge #924147. Based on the factors discussed in the following sections, the recommendation is to consider replacement of the crossing in order to extend the service life of the deteriorating culvert(s) and address some of the existing deficiencies that cannot readily be addressed through normal maintenance/rehabilitation practices such as deformation/distortion of the individual barrels.

The final analysis performed during design will need to consider the following:

- Condition of the existing crossing and anticipated remaining service life
- Desired Level of Service (LOS) for the crossing
- Hydrology of the contributing basin and characteristics of the upstream/downstream reaches
- No-rise certification requirements of the regulatory floodway
- Existing vs. proposed profile grade of the roadway
- Hydraulic performance associated with analyzed alternatives
- Anticipated scour conditions
- Environmental effects associated with direct, indirect, and shading impacts
- Constructability and phasing/maintenance of traffic
- Cost of various alternatives

The proposed multi-modal roadway consists of a four-lane divided roadway with 11-foot lanes, a raised median, and bicycle/pedestrian features.

The crossing will require a no-rise certification through Osceola County Floodplain Management. Please see **Table ES-1** for the Flood Data for the existing bridge culvert as obtained from the current effective Osceola County FIS dated June 2013.

Table ES-1. Flood Data for Existing Quadruple 11' x 7.5' Arch Pipe Culvert

Flood Data	Design Flood 50-year	Base Flood 100-year	Greatest Flood 500-year[1]
Stage EL NAVD 88 (ft)[2]	91.3	92.0	92.7
Discharge (cfs)[3]	2524	2986	4066
Exceedance Probability (%)	2	1	0.2

1. Overtopping occurs near the 50-year frequency (approx. elev. 90.3') in existing conditions.
2. Stage EL in NAVD 88 estimated from the Davenport Creek Flood Profiles in the current effective FIS.
3. Total discharge obtained from Table 5 (Summary of Discharges) in the current effective FIS.

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1.0 GENERAL INFORMATION

1.1 INTRODUCTION

The purpose of this Conceptual Bridge Hydraulics Assessment is to document regulatory requirements and design considerations associated with the widening and/or replacement of Bridge #924147 over Davenport Creek. The existing bridge culvert crossing is located immediately north of the Reunion Boulevard overpass. See the Project Location Map and Bridge Location Map in **Appendix A**.

The original bridge culvert was constructed in 1954 and it is approximately 42 ft wide with four 11' x 7.5' arch pipes for a total bridge culvert length of 57.4 ft. The headwalls are sand-cement rip-rap exhibiting deterioration including settlement, open joints with vegetative growth, cracks, and missing sand-cement bags. The channel meanders, but the crossing is approximately perpendicular to the roadway alignment.

The currently effective Flood Insurance Study (FIS) for Osceola County is 12097CV000A, dated June 18, 2013. This study incorporates historical data from various studies performed by the U.S. Army Corps of Engineers (USACE), Jacksonville District, as well as a November 1996 study prepared by Post, Buckley, Schuh & Jernigan covering unincorporated areas of Osceola County. See relevant excerpts from the current effective FIS in **Appendix B**.

The scope of this report is to discuss regulatory guidance and best management practices for the future design and analysis of various alternatives to widen and/or replace Bridge #924147. Based on the factors discussed in the following sections, the recommendation is to consider replacement of the crossing in order to extend the service life of the deteriorating culvert(s) and provide a more hydraulically efficient section.

A number of options are available for this crossing, and final design will evaluate the selected options according to the ultimate selected typical. Options could include:

1. Replacement with a bridge structure (single or multi-span)
2. Replacement with a multi-cell concrete box culvert (CBC)
3. In-kind replacement with a quadruple arch pipe
4. Widening of the existing quadruple arch pipe

This conceptual bridge hydraulics assessment report presents an evaluation of the feasibility of these alternatives and recommends the replacement of the bridge culvert crossing, with the precise nature of the proposed improvements to be determined during the final design process. The final design will balance factors such the desired LOS, constraints of the proposed roadway PGL, environmental impacts associated with each alternative, and cost in selection of the alternatives to be evaluated. It should be noted that option 4 is shown for reference only, and is not recommended due to the age and condition of the existing infrastructure.

Elevations within this report are North American Vertical Datum (NAVD) of 1988 unless otherwise stated. The NAVD datum is 0.883 feet less than the NGVD datum at this location. See the VERGE report in **Appendix A**.

1.2 PROJECT LOCATION

The site is located at approximate Longitude 081° 35' 26" W and Latitude 28° 16' 16" N, within Section 35, Township 25 South, and Range 27 East in Osceola County, Florida. Please to **Exhibit A-1** in **Appendix A** for the project location map, **Exhibit A-2** for the bridge location map, and **Exhibit A-3** for the USGS quadrangle map.

1.3 DESIGN PARAMETERS

This crossing will adhere to the regulations/requirements of Osceola County, and will require demonstration of a no-rise design due to the regulatory floodway designation of this section of Davenport Creek. Preliminary hydraulic analysis was performed, however final analysis will be required to provide assurance that no adverse impacts to the floodway will occur due to the proposed improvements. Detailed guidance is provided in the FDOT Drainage Design Guide (Chapter 5: Bridge Hydraulics).

1.4 PERMITTING REGULATIONS

This project lies within the jurisdiction of the South Florida Water Management District (SFWMD) and the Florida Department of Environmental Protection (FDEP). A modification of existing environmental resource permits (ERPs) will be required under Statewide ERP rule 62-330.443. In accordance with generally accepted design, avoidance and minimization of environmental impacts will be discussed, in addition to the required hydraulic and hydrologic analyses.

1.5 EXISTING CONDITIONS

The existing CR 545 from CR 532 to South of Sinclair Road has two 12-foot travel lanes and 4-foot unpaved outside shoulders on both sides. **Figure 1-1** shows the Existing Typical Section.

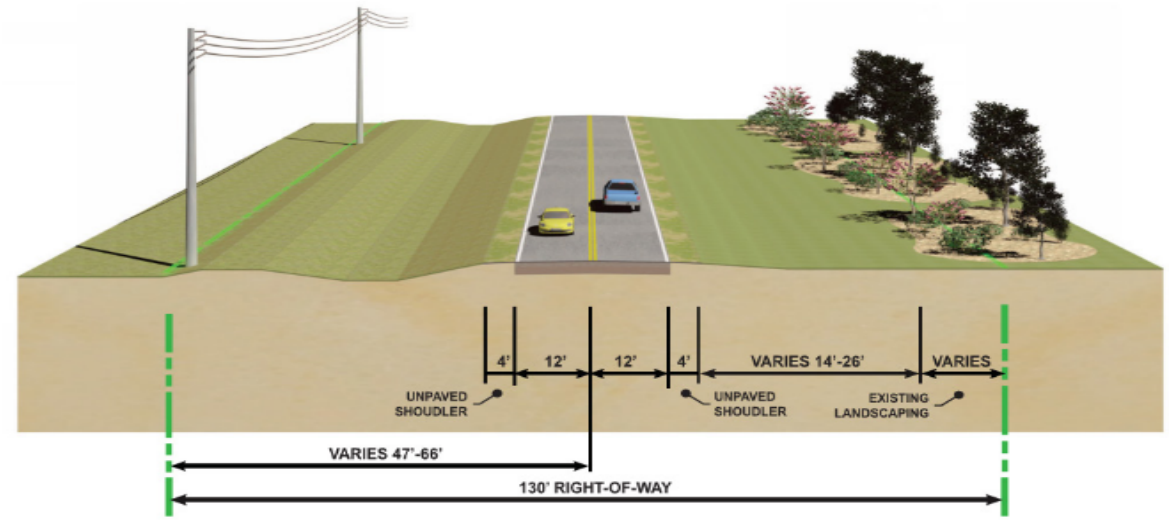

Figure 1-1. Existing Typical Section of Old Lake Wilson Road

The roadway crosses the creek in a roughly perpendicular alignment, with guardrail on both sides of the roadway. The original bridge culvert was constructed in 1954 and it is approximately 42 ft wide with four 11' x 7.5' arch pipes for a total bridge culvert length of 57.4 ft. The headwalls are sand-cement rip-rap exhibiting deterioration including settlement, open joints with vegetative growth, cracks, and missing sand-cement bags. The channel meanders, but the crossing is approximately perpendicular to the roadway alignment. The existing deck drains directly to the creek between the guardrail posts. While the bridge has a current sufficiency rating of 85.3 with condition noted as "fair", the July 2018 NBID report summary (see **Appendix C**) describes this bridge culvert as having "major deterioration or disintegration, extensive cracking and leaching or spalls on the walls and slabs" in addition to stating that the channel protection at this location is being eroded. The July 2020 bridge inspection report (see **Appendix C**) notes the following issues:

- Area of undermining @ pipe 3 (see **Appendix C** for a plan view of pipe designations)
- Multiple sand-cement bags missing over the east end of pipe 1
- Sand-cement bags missing @ western waterline (approx. 4' x 3') between pipes 3 & 4
- Sand-cement bags generally brittle with some open joints and vegetative growth (both walls)
- Settlement over the east end of pipe 1 with cracking up to ¼"
- Delaminative corrosion and corrosion holes in pipes 3 & 4
- Previously applied bituminous coating is failing, resulting in corrosion (all pipes)
- Miscellaneous asphalt "mowing strips" behind guardrail cracked and broken apart
- Depression in headwall over pipe 4 (2' dia x 1 ½' deep)
- 75% occlusion of pipe 1 and 50% occlusion of pipe 2
- "Up to 2 ft" of sand accumulation in pipes 3 & 4

It should be noted that many of these deficiencies were also observed during a December 2021 site visit. Site photographs taken during the field reviews and a field review memo are provided in **Appendix D**.

1.6 EXISTING FLOODING CONDITIONS

The Osceola County Road and Bridge Department were contacted regarding flooding history within the roadway corridor associated with the Old Lake Wilson PD&E. The Road and Bridge Department stated that there was no history of flooding within the project limits (inclusive of the bridge culvert location). However, hydraulic modeling for the existing crossing shows overtopping of the roadway for the 50-year storm event. Refer to **Appendix E** for the input and results of the HY-8 hydraulic analysis.

1.7 FLOOD STUDIES/DATA

The current effective Flood Insurance Study (FIS) for Osceola County is 12097CV000A, dated June 18, 2013. This study incorporates historical data from various studies performed by the U.S. Army Corps of Engineers (USACE), Jacksonville District, as well as a November 1996 study prepared by Post, Buckley, Schuh & Jernigan covering unincorporated areas of Osceola County.

Excerpts from the FIS which are relevant to the crossing of Bridge #924147 are provided in **Appendix B** of this report. The water surface elevations and cross section locations are shown in the Flood Insurance Rate Map (FIRM) panel 12097C0040G. See **Exhibit A-4** and **Exhibit A-5** in **Appendix A**. It is recommended that the FIS model data be requested to research the effective conveyance assumed for the floodplain modeling, and determine if the existing conditions are accurately represented.

1.8 PROPOSED CONDITIONS

The proposed future improvements include widening CR 545 from two 12-foot lanes to four 11-foot lanes, the addition of a median, and accommodations for bicycles and pedestrians. All typical section alternatives maintain the existing landscape on the east side of CR 545. There are two currently approved proposed typical section alternatives under consideration.

Proposed Typical Section 1 includes four 11-foot travel lanes, a 37.5-foot median, 5-foot bike lanes, curb and gutter, a 10-foot sidewalk along the left (LT) side of the alignment, and a 5-foot sidewalk along the right (RT) side of the alignment. **Figure 1-2** shows Proposed Typical Section 1.

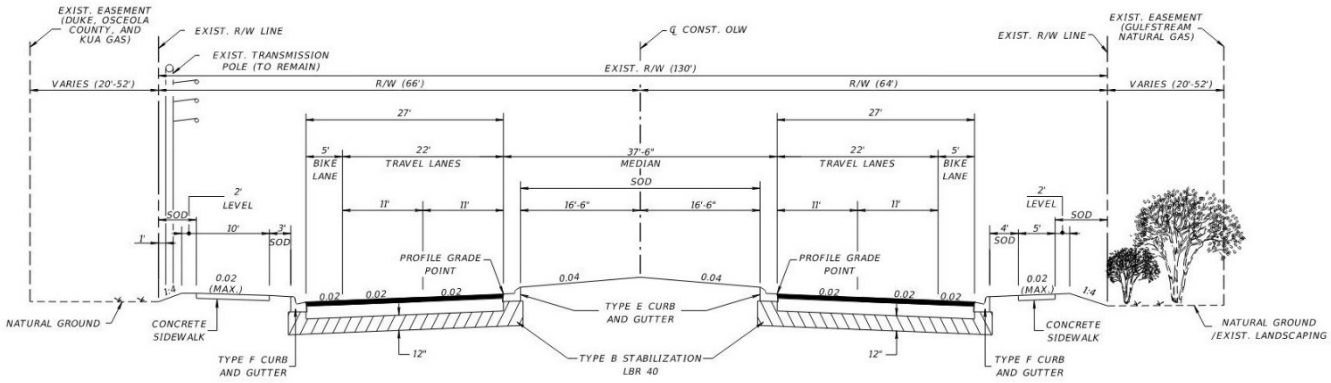

Figure 1-2. Proposed Typical Section 1

Proposed Typical Section 2 includes four 11-foot travel lanes, a 37.5-foot median, 7-foot buffered bike lanes, curb and gutter, an 8-foot sidewalk along the left (LT) side of the alignment, and a 5-foot sidewalk along the right (RT) side of the alignment. **Figure 1-3** shows Proposed Typical Section 2.

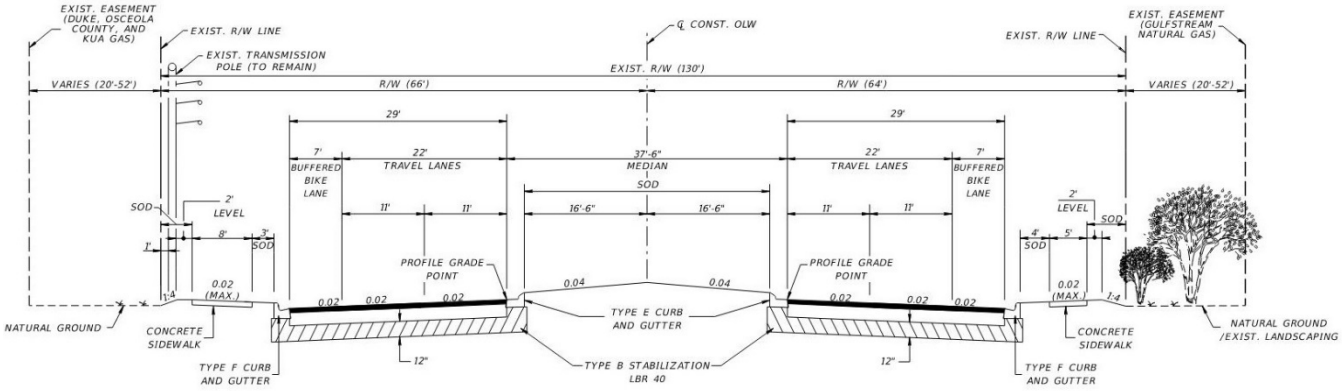

Figure 1-3. Proposed Typical Section 2

1.9 PROPOSED CONDITIONS ALTERNATIVES

A number of options are available for this crossing, and final design will evaluate the selected options according to the ultimate selected typical. Final options to be considered will be developed during the design phase.

Depending on the anticipated timeframe of the roadway widening, consideration should be given to performing some of the deferred maintenance required in order to preserve the integrity of the crossing, and provide the full conveyance capacity for the crossing by cleaning out the accumulated sediment in the southern barrels.

For purpose of discussion, options noted in this report include:

1. Replacement with a bridge structure (single or multi-span)
2. Replacement with a multi-cell concrete box culvert (CBC)
3. In-kind replacement with a quadruple arch pipe
4. Widening of the existing quadruple arch pipe

A single span bridge structure alternative could be constructed given the short span required. However, a bridge span would require a low member elevation of approximately 93.3' for a two-foot drift clearance for the 50-year frequency (see **Table 1**). This is above the existing roadway profile elevation of approximately 90.5 per the latest available LiDAR (see **Exhibit A-6** in **Appendix A**). This would require a significant increase in grade, thus a substantial increase in fill for the abutment with a resulting increase in the transverse floodplain impacts and environmental impacts associated with this crossing. While this can be mitigated through design, the two most likely methods would be lengthening the bridge (perhaps requiring multiple spans) to tie back down near the existing profile, or using MSE wall to mitigate the fill requirements. Both

of these would significantly increase the cost of this alternative type, rendering this alternative less likely to be the most cost-effective viable alternative. However, because the roadway could very likely require a significant change in grade, this may be the more likely alternative.

The CBC alternative does not require drift clearances, therefore the CBC impact to the roadway profile grade and environmental impacts are less than the bridge structure alternatives. The existing cross-sectional area by design is approximately 259.2 ft^2 for a quadruple 11' x 7.5' arch pipe crossing. This would represent a triple 10' x 8' CBC as an approximate mathematically equivalent area. However, the preliminary hydraulic analysis showed a rise in the upstream stage for the 100-year storm event. Several other cross drain configurations were analyzed including a quadrulple 10' x 8' CBC, quadruple 11' x 8 CBC, and a quadruple 12' x 8' CBC. The alternative that met the no-rise criteria was the quadruple 12' x 8' CBC. In the proposed condition, the cross drain length is significantly longer which increases the friction losses and the road will be raised a few feet, therefore, a larger cross sectional area is needed to offset these factors and maintain upstream stages.

An extension of the existing culvert pipes would be the least expensive option. However, preliminary analysis shows that this option does not meet the no-rise criteria. In addition, as noted in Section 1.5 of this report, there are areas of substantive deterioration in this crossing, there is a significant likelihood that the existing pipe culverts will not provide the desired design service life associated with the newly constructed improvements. For these reasons, it is recommended that replacement be considered at this location.

1.10 CONSTRUCTION AND MAINTENANCE OF TRAFFIC

Due to the nature of the corridor and the prevalence of gated communities in the area, there is not a "convenient" detour route available for a full road closure. Detour routes, as well as various alternatives such as phased construction should be vetted during the design process. It should be noted that although phased construction may be feasible to eliminate detours, if this is selected as the most viable option, it will result in an increase in cost and construction time for the project. During the design phase, all relevant factors should be considered in selecting means and methods and construction phasing schema.

2.0 HYDROLOGY

The hydrology for this site should be derived during the design phase from the best available data, sources of which may include the currently effective FIS report and/or model, available USGS data such as quadrangles, current LiDAR data, recent ERP data for the area, etc. There is also a USGS hydrologic monitoring station (02266480) on the east side of the crossing which will provide data which may be useful for calibration of model results. This station is part of the USGS National Water Dashboard, providing "real-time" data as shown in the screenshot in **Figure 2-1** below. Best practices for development of the site hydrology include the use of gage data, and/or use of the USGS regression equations. In general, other methodologies should be justified if used, and comparison of results with traditional methodologies provided for reference.

For the preliminary analysis of the crossing, flow information from the current effective FIS at the Bridge #924147 were used.

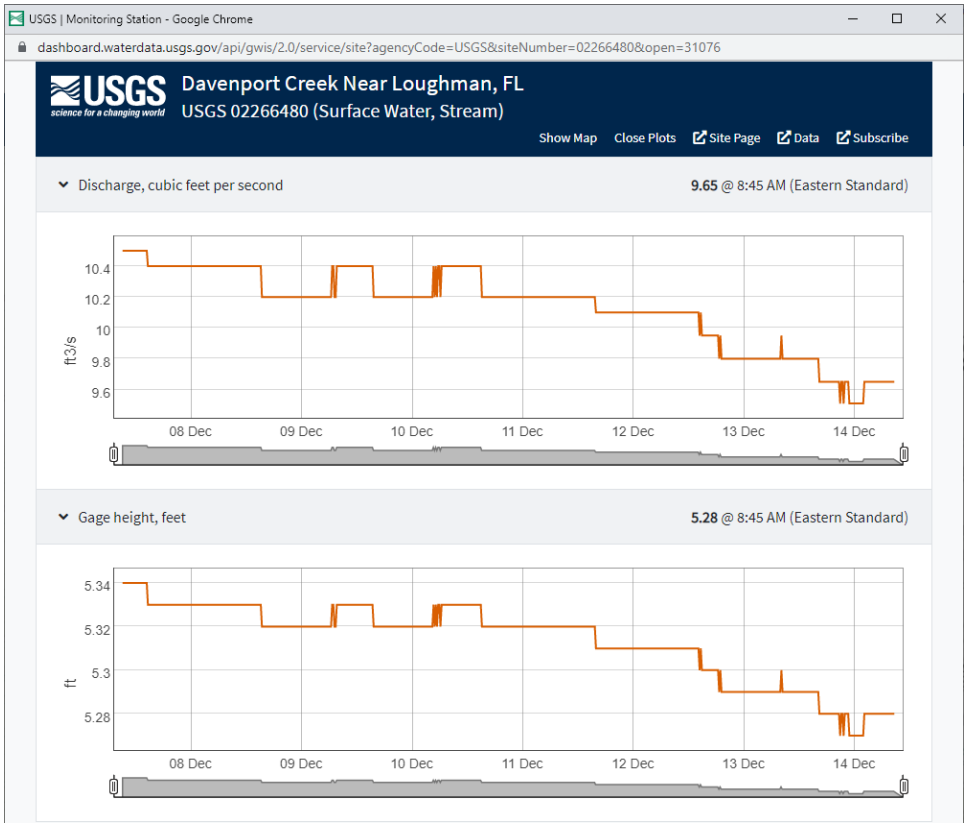

Figure 2-1. Real-time snapshot (Station 02266480)

3.0 HYDRAULIC ANALYSIS

The preliminary hydraulic analysis for this crossing was performed using HY-8 (version 7.50). The 50-year, 100-year, and 500-year storm events were analyzed. Existing flow information for each storm event was obtained from the current effective FEMA FIS Study for Davenport Creek at Bridge #924147. The original HEC-2 model from FEMA was obtained to verify and input the existing inlet and outlet elevations as well as the existing bridge culvert length. Four (4) crossing conditions were analyzed: existing condition (quadruple 11' x 7' arch , proposed condition with quadruple 10' x 8' CBC, proposed condition with quadruple 11' x 8' CBC, and proposed condition with quadruple 12' x 8' CBC. The proposed condition took into account the approximately 3-foot raised profile of the roadway.

Existing flood stages according to the current effective FIS are listed in **Table 1** for reference.

Table 1. Flood Data for Existing Quadruple 11' x 7.5' Arch Pipe Culvert

Flood Data	Design Flood 50-year	Base Flood 100-year	Greatest Flood 500-year[1]
Stage EL NAVD 88 (ft)[2]	91.3	92.0	92.7
Discharge (cfs)[3]	2524	2986	4066
Exceedance Probability (%)	2	1	0.2

1. Overtopping occurs near the 50-year frequency (approx. elev. 90.3') in existing conditions.
2. Stage EL in NAVD 88 estimated from the Davenport Creek Flood Profiles in the current effective FIS.
3. Total discharge obtained from Table 5 (Summary of Discharges) in the current effective FIS.

Existing and proposed upstream stages from the HY-8 preliminary hydraulic analysis are listed in **Table 2**. Refer to **Appendix E** for the HY-8 input and results.

Table 2. HY-8 Preliminary Hydraulic Analysis Upstream Stage Results

	Upstream Stage (ft)			
Discharge (cfs)	Existing: Quadruple 11'x7' CMP	Proposed: Quadruple 10' x 8' CBC	Proposed: Quadruple 11' x 8' CBC	Proposed: Quadruple 12' x 8' CBC
50-Year Q = 2524	91.41	91.62	91.33	91.12
100-Year Q = 2986	91.67	92.27	91.87	91.56
500-Year Q = 4066	92.22	94.21	93.46	92.89

During the design phase, the hydraulic analysis of the hydrologic results is typically performed using programs appropriate to the crossing. This system is a riverine crossing (i.e. not tidally influenced or tidally dominated), and the floodway is moderately wide with no anticipation of a secondary flow through adjacent crossdrains even in extreme events. As such, one-dimensional modeling of steady-state flow conditions is expected to be appropriate for the analysis. HEC-RAS are the most commonly used programs for this type of analysis. It should be noted that the design engineer is responsible for determining the most appropriate methodology for analysis

based on an understanding of the hydrology of the basin and the characteristics of the crossing, the channel, and the contributing area(s). Some of the design parameters which will need to be established include:

- Proposed profile grade at the crossing.
  - Current low point is at/near the crossing, requiring close coordination with roadway designer.
- Desired LOS for the crossing
- Appropriateness of steady-state vs. unsteady-state analysis
- Appropriateness of one-dimensional vs. two-dimensional modeling
- Contributing basin size and characteristics
- Tailwater boundary conditions
- Manning's N-values
- Contraction/Expansion coefficients
- Geotechnical soils data
- Geometry of the proposed crossing

Once the model has been completed, calibration of the model can be performed using available gage data, anecdotal local knowledge of frequency/duration of overtopping, or an established condition from a historical storm event. Given the presence of a monitoring station at this crossing, gage data is likely the most appropriate source of calibration data.

This crossing is located in a regulatory floodway, and as such will require a no-rise analysis.

4.0 SCOUR ANALYSIS

A scour analysis will be performed during the design phase and alternative selection phase to determine scour potential and how this affects bridge foundation alternatives. Scour components would be anticipated to include aggradation/degration scour, contraction scour, and local scour, which will be summed in order to obtain the anticipated total scour depth. This information, in conjunction with calculated velocities, will be used to determine the required protection/armoring methodologies necessary to prevent undermining of foundations, abutments, etc. associated with the proposed alternative. Although aggradation/degradation is minimal for much of the channel (per July 2020 bridge inspection report), there were a couple of areas with significant aggradation for the previous 2 year period. It is recommended that this be reviewed during the design phase, to determine if the channel has stabilized, and identify any corrective action needed to ensure continued effectiveness of the crossing.

5.0 DECK DRAINAGE

The existing deck drains directly to the creek between the guardrails. Consideration should be given to collection of runoff by shoulder gutter in front of the guardrail and draining to the ends of the bridge, to collect in inlets located adjacent to the crossing. The existing low point of the roadway is at/near the crossing, and spread should be carefully evaluated based on the final profile grade design to ensure there are no hazardous conditions due to ponding at the proposed sag location.

6.0 RESOURCES FOR ANALYSIS

The following resources were referenced in the discussion of required analyses for the selection of an alternative for the widening/replacement of this crossing.

- FDOT Drainage Manual, 2022
- FDOT Drainage Design Guide, 2022
- Osceola County Land Development Code
- Osceola County FIS 12097CV000A, effective 6/18/2013

Other resources which may be relevant to the final design/selection of crossing alternatives include:

- USGS Water Supply Paper 2339, Guide for Selecting Manning's Roughness Coefficients for
  Natural Channels and Flood Plains
- HEC-23 Bridge Scour and Stream Instability Countermeasures, 3rd Edition, 9/2009
- HEC-18 Evaluating Scour at Bridges, 5th Edition, 4/2012
- Magnitude and Frequency of Floods for Rural Streams in Florida, 2006, SIR 2011-5034.
- HEC-RAS Applications Guide, Version 5.0, February 2016.
- HEC-RAS User's Manual, Version 6.0, May 2021.

7.0 CONCLUSIONS & RECOMMENDATIONS

As noted in Section 1.5 of this report, there are areas of substantive deterioration in this crossing and it is anticipated that an extension of the existing quadruple arch pipe will not provide the design service life desired for the newly constructed roadway improvements. Additionally, preliminary hydraulic analysis of the the existing crossing shows overtopping of the road in the existing condition. If the existing bridge culvert is widened to accommodate the proposed roadway improvements, the hydraulic analysis shows an increase in the upstream stages at the crossing. Since this crossing is a regulatory crossing and requires a No-Rise certification, widening the existing crossing is not a suitable alternative. For these reasons, it is recommended that the crossing be replaced.

As noted in Section 1.9, the preliminary recommendation is a quadruple 12' x 8' CBC. This is based on:

- Less impact to the profile than a bridge option.
- Adequate hydraulic efficiency (i.e. less friction loss).
- Inadequacy of the existing quadruple arch pipe with respect to hydraulic efficiency and design service life.

Preliminary HY-8 calculations for this option have been included in the appendices. Note that the recommendation is based on a conceptual assessment of the crossing, and the final size/type of crossing at this location will be refined during the design phase of this project, based on the final chosen alignment, profile, and design level survey and geotechnical exploration.

Appendix A

Exhibits

Exhibit A-1	Project Location Map
Exhibit A-2	Bridge Location Map
Exhibit A-3	USGS Quadrangle Map
Exhibit A-4	Flood Zone Map
Exhibit A-5	FEMA Firmette
Exhibit A-6	LiDAR Contours
Exhibit A-7	VERGE report

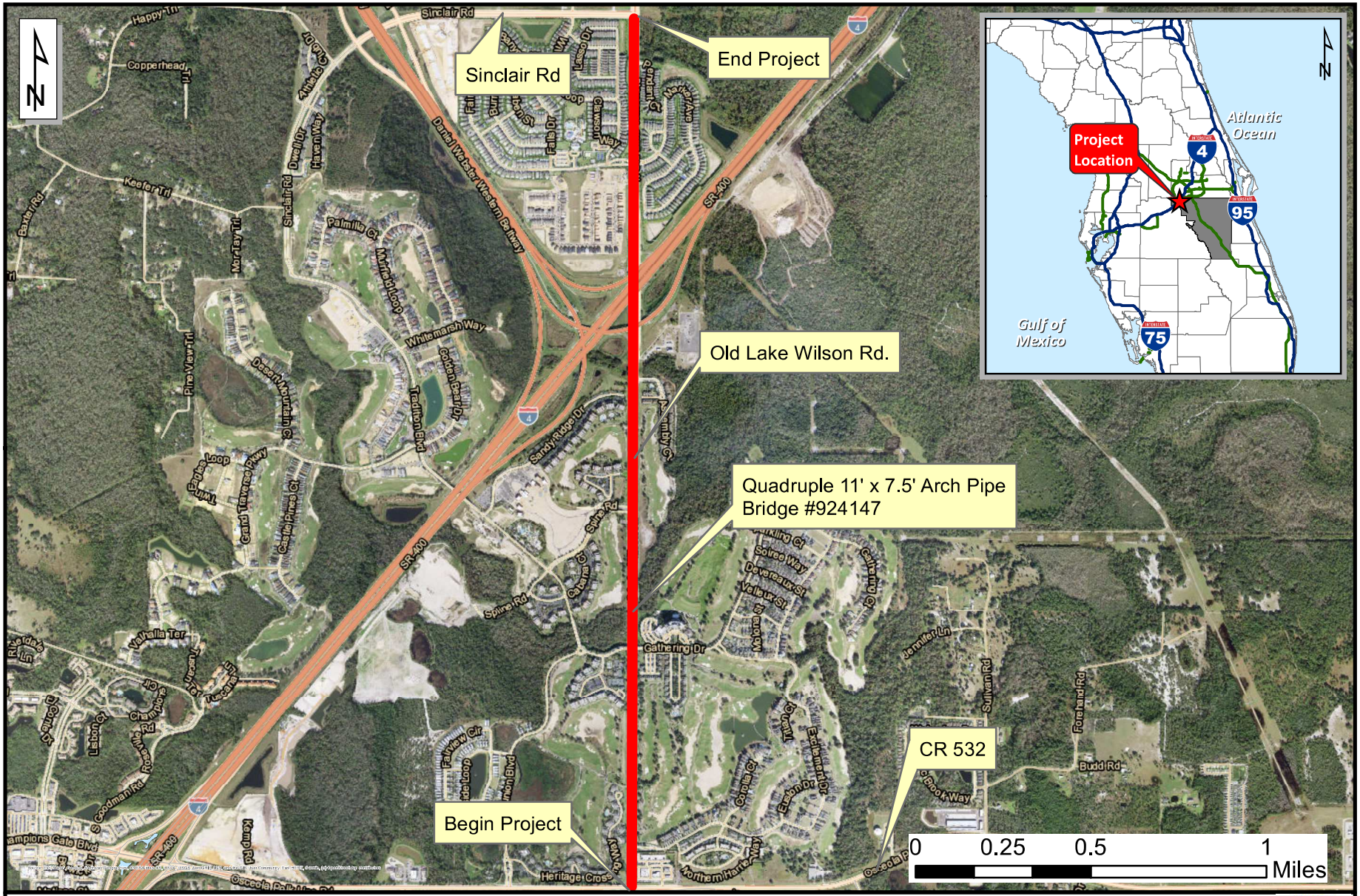

Exhibit A-1

Project Location Map

Old Lake Wilson Rd. From CR 532 (Oscola Polk Line Rd.) to South of Sinclair Rd.

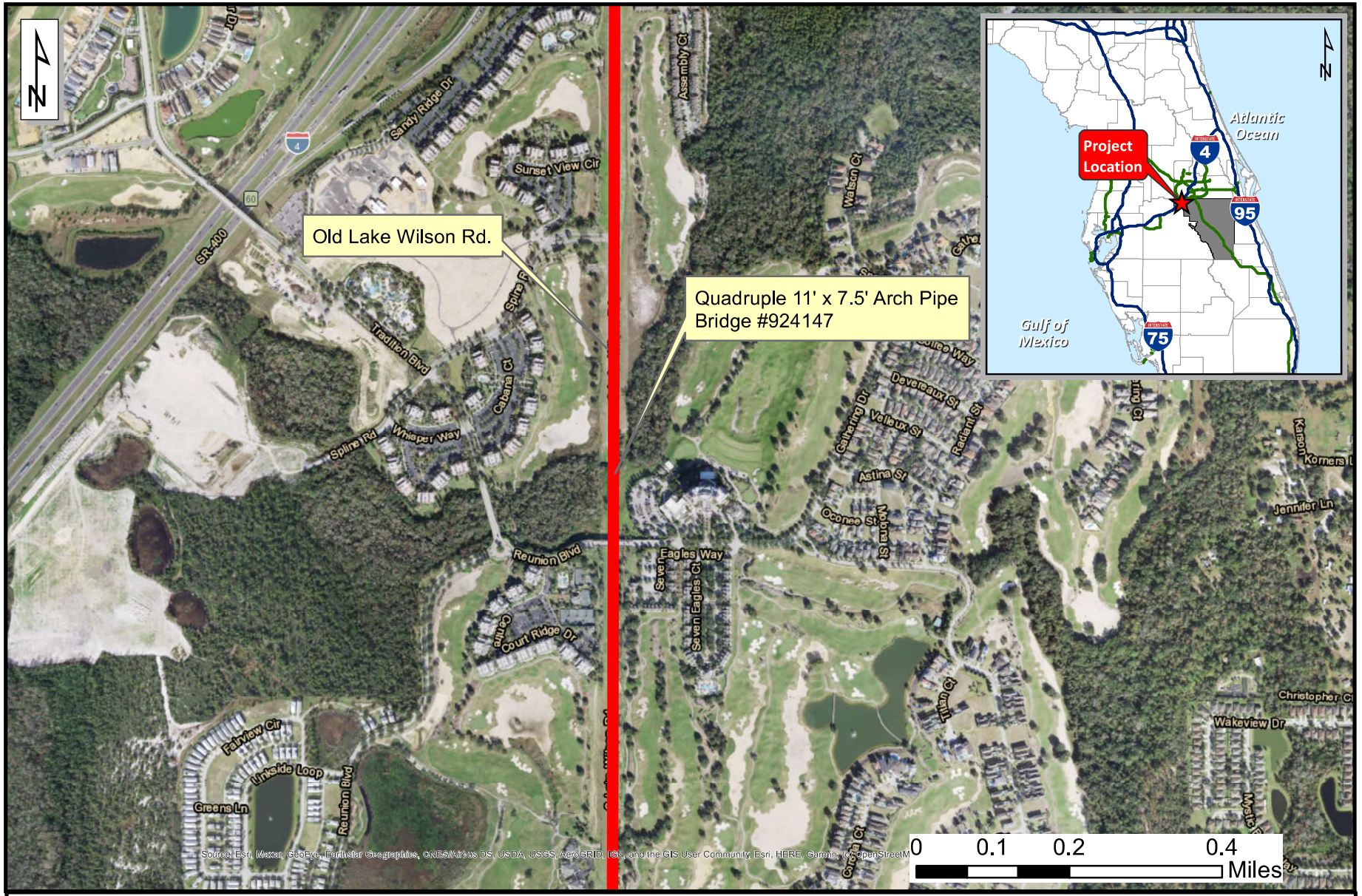

Exhibit A-2

Bridge Location Map

Old Lake Wilson Rd. From CR 532 (Oscola Polk Line Rd.) to South of Sinclair Rd.

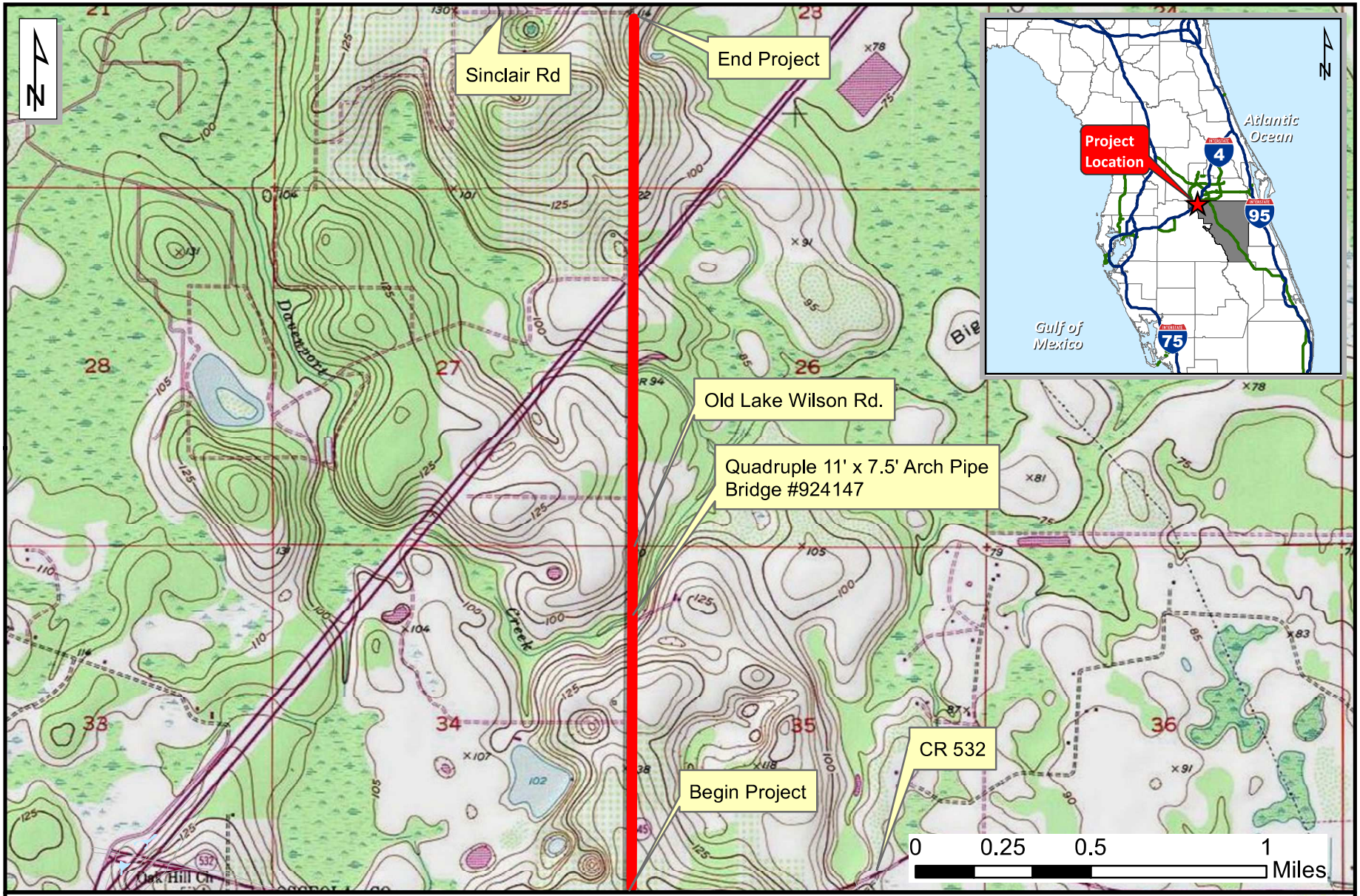

Exhibit A-3

USGS Quadrangle Map

Old Lake Wilson Rd. From CR 532 (Oscola Polk Line Rd.) to South of Sinclair Rd.

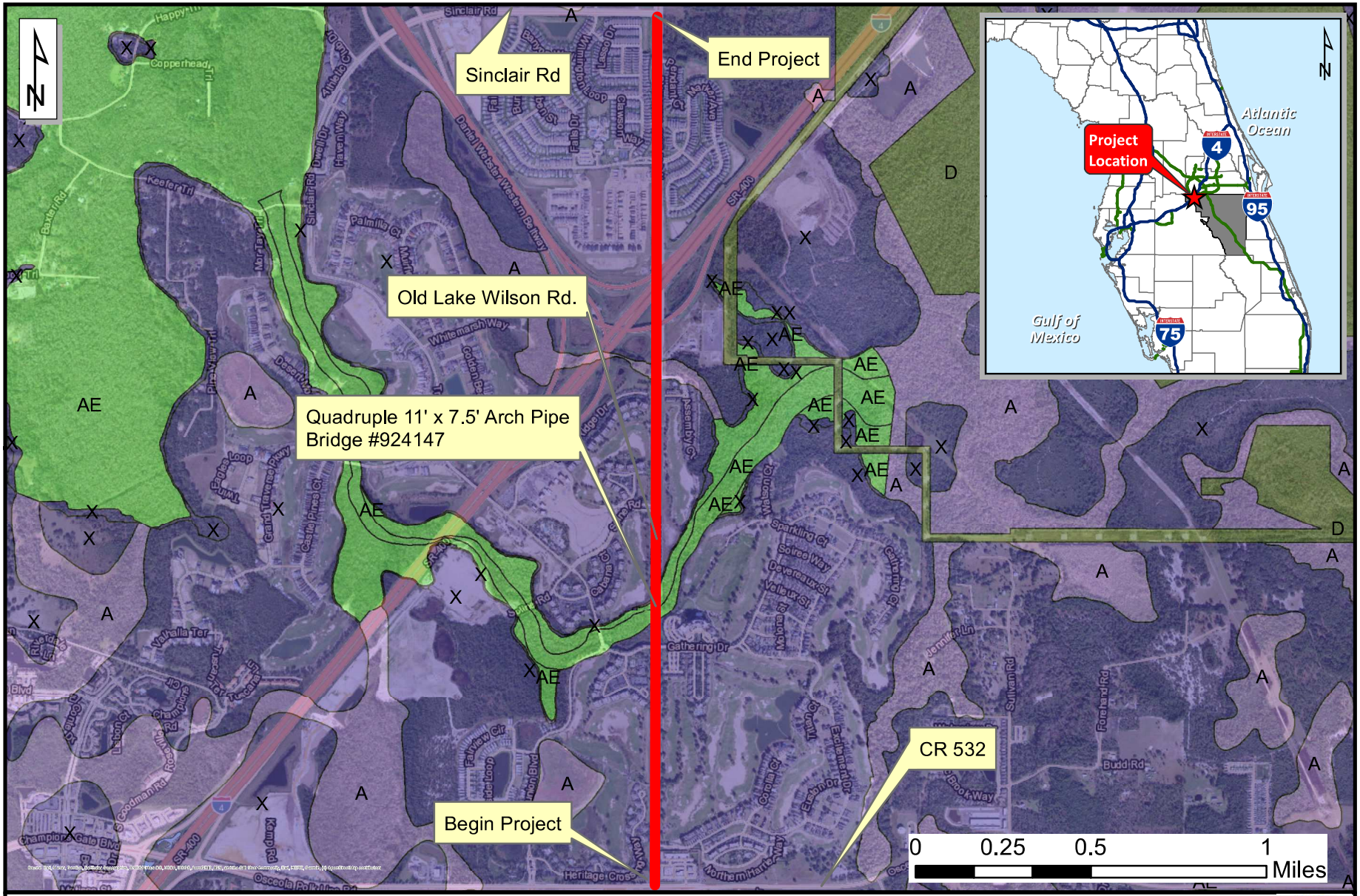

Exhibit A-4

Flood Zone Map

Old Lake Wilson Rd. From CR 532 (Oscola Polk Line Rd.) to South of Sinclair Rd.

Quadruple 11' x 7.5' Arch Pipe Bridge #924147

ZONE AE
ZONE A
ZONE D
LIMIT OF STUDY
DESERT MOUNTAIN CT
LOXAHATCHEE CT
Culvert
Dirt Road
WHITEMARSH WAY
TRADITION BLVD
GOLDEN BEAR DR
ASSEMBLY LN
ASSEMBLY CT
SANDY RIDGE DR
S OLD LAKE WILSON RD
COYOTE CREEK WAY
TWIN EAGLES LP
CASTLE PINES CT
GRAND TRAVERSE PKWY
Bridge
SUNSET VIEW CIR
WATSON CT
GATHERING LP
Davenport Creek
SPARKLING CT
SOIREE WAY
DEVEREAUX ST
VELLEUX ST
RADIANT ST
GATHERING DR
GATHERING CT
GREAT WATERS WAY
WYNSTONE
PROFILE BASE LINE
WHISPER WAY
CABANA CT
OCONEE ST
ASTINA ST
MOLONA ST
JENNIFER LN
SULLIVAN RD
VALHALLA TER
TUSCAN TER
TUSCANA LN
TUSCANY WAY
SEVEN EAGLES WAY
Davenport Creek Tributary No. 4
SEVEN EAGLES CT
CENTRE COURT LN
CENTRE COURT RIDGE DR
TITHAN CT
EXCITEMENT DR
FAIRVIEW CIR
GREENS LN
LINKSIDE LP
REUNION BLVD
WAKEVIEW DR
MYSTIC BROOK WAY
MARSH MEADOW LN
BRIDGEVIEW DR
CAROLINA WREN DR
MOURNING DOVE CIR
CORDELIA CT
HOUSTON DR
HERITAGE CROSSING WAY
HERITAGE CROSSING CT
NORTHERN HARRIER WAY
OSCEOLA POLK LINE RD
KEMP RD
PURPLE MARTIN LN
MINI MOUNTAIN RD
POLK CONNECTION RD
FLOODING
AK1498
AK1497
AK1495
AK1496
AK1491
AK1492
AK1487
AK1489
AK1488
AK1483
AK1486
AK1481
429
545
4
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27
34
35
82
83
84
85
86
87
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89
90
92
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94
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96
98
99
101
102
103

MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET

MET 00 0 300 600

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0040G

FIRM

FLOOD INSURANCE RATE MAP

OSCEOLA COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 40 OF 900

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
OSCEOLA COUNTY	120189	0040	G
REEDY CREEK IMPROVEMENT DISTRICT	120577	0040	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
12097C0040G

MAP REVISED
JUNE 18, 2013

Federal Emergency Management Agency

Exhibit A-5

This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at https://msc.fema.gov.

Exhibit A-6

LiDAR Contours

Old Lake Wilson Rd. From CR 532 (Oscola Polk Line Rd.) to South of Sinclair Rd.

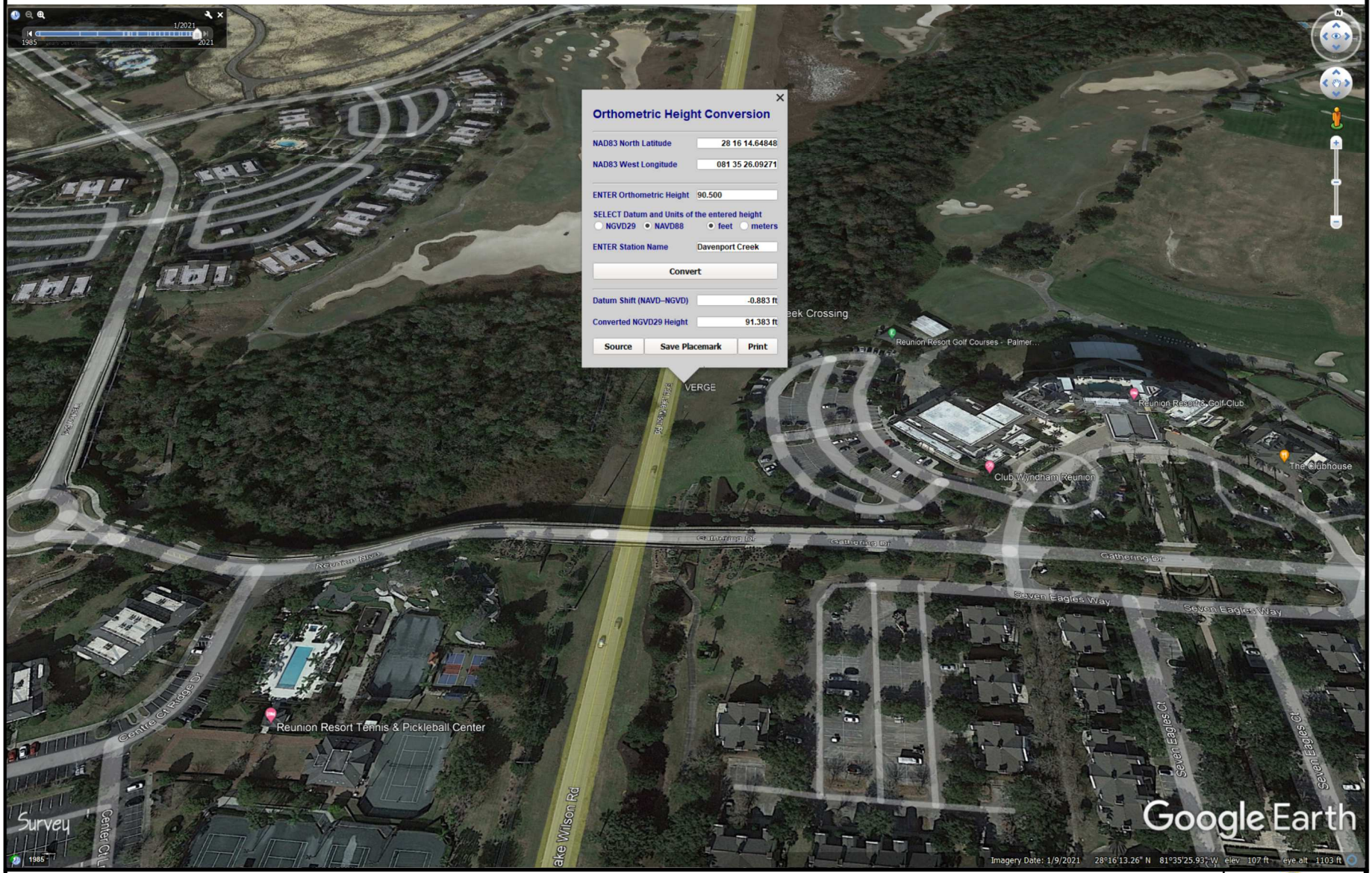

Exhibit A-7

VERGE Report

Old Lake Wilson Rd. From CR 532 (Oscola Polk Line Rd.) to South of Sinclair Rd.

Appendix B

Excerpts from Osceola County FIS 12097CV000A

FLOOD INSURANCE STUDY

OSCEOLA COUNTY, FLORIDA
AND INCORPORATED AREAS

Community Name	Community Number
KISSIMMEE, CITY OF	120190
OSCEOLA COUNTY (UNINCORPORATED AREAS)	120189
REEDY CREEK IMPROVEMENT DISTRICT	120577
ST. CLOUD, CITY OF	120191

REVISED
June 18, 2013

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
12097CV000A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this Flood Insurance Study may be revised and republished at any time. In addition, part of this Flood Insurance Study may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the Flood Insurance Study. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current Flood Insurance Study components.

Initial Countywide FIS Effective Date: May 7, 2001

First Revised Countywide FIS Date: June 18, 2013

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FIGURES

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EXHIBITS

Exhibit 1 – Flood Profiles

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FLOOD INSURANCE STUDY

OSCEOLA COUNTY, FLORIDA, AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Osceola County, including the Cities of Kissimmee and St. Cloud; Reedy Creek Improvement District; and the unincorporated areas of Osceola County (referred to collectively herein as Osceola County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

The Reedy Creek Improvement District is located in more than one county; the flood hazard information for the portion of this community located in Orange County is included in the FIS report for Orange County, Florida, and Incorporated Areas (Reference 1).

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence, and the State (or other jurisdictional agency) will be able to explain them.

The Flood Insurance Rate Map (FIRM) and FIS report for this countywide study have been produced in digital format. Flood hazard information was converted to meet the Federal Emergency Management Agency (FEMA) FIRM database specifications and geographic information standards and is provided in a digital format so that it can be incorporated into a local Geographic Information System and be accessed more easily by the community.

1.2 Authority and Acknowledgments

The sources of authority for this FIS report are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

For this revision of the countywide FIS, new hydrologic and hydraulic analyses were prepared by BakerAECOM, LLC, for FEMA, under Contract No. HSFEHQ-09-D-0368, Task R4-TO66. This revised study was completed in March 2011.

For the initial countywide FIS, the hydrologic and hydraulic analyses were prepared by Engineering Methods & Applications, Inc., for FEMA, under Inter-Agency Agreement No. EMW-95-C-4705. That work was completed in July 1996.

The initial countywide FIS was prepared to include all jurisdictions within Osceola County in a countywide FIS. Information on the authority and acknowledgements for each jurisdiction with a previously printed FIS report included in the countywide FIS is shown below:

Kissimmee, City of:	The hydrologic and hydraulic analyses for the FIS report dated January 2, 1981, were prepared by the U.S. Army Corps of Engineers (USACE), Jacksonville District, for the Federal Insurance Administration (FIA), under Inter-Agency Agreement No. IAA-H-1878, Project Order No. 10. That work was completed in June 1979.
Osceola County (Unincorporated areas):	The hydraulic analyses for the FIS report dated August 3, 1981, were prepared by the USACE, Jacksonville District, for FEMA, under Inter-Agency Agreement No. IAA-H-1878, Project Order No. 10, Amendment No. 1. That work was completed in January 1980. The hydrologic and hydraulic analyses for the FIS report dated March 16, 1989, were prepared by the USACE, Jacksonville District for FEMA, under Inter-Agency Agreement No. IAA-H-1878, Project Order No. 10, Amendment No. 1. That work was completed in January 1980. The hydrologic and hydraulic analyses for the FIS report dated November 20, 1996, were prepared by Post, Buckley, Schuh & Jernigan, Inc.
St. Cloud, City of:	The hydrologic and hydraulic analyses for the FIS report dated March 1980 were prepared by the USACE, Jacksonville District, for the FIA, under Inter-Agency Agreement No. IAA-H-1878, Project Order No. 10. That work was completed in February 1979. For the FIS report dated April 3, 1996, flooding information was taken from the FIS for the unincorporated areas of Osceola County because of corporate limits changes and flooding mismatches between the City of St. Cloud and the unincorporated areas of Osceola County (Reference 2).

The authority and acknowledgments for Reedy Creek Improvement District are not included because there was no previously printed FIS report for this community.

Base map information shown on the FIRM was provided in digital format by Osceola County Planning Office.

The coordinate system used for producing the FIRM is the Florida State Plane FIPS 0901. Corner coordinates shown on the FIRMs are in latitude and longitude referenced to the UTM projection, North American Datum (NAD 83) HARN and the GRS80. Distance units were measured in feet.

1.3 Coordination

An initial Consultation Coordination Officer (CCO) meeting (also occasionally referred to as the Scoping meeting) is held with representatives of the communities, FEMA, and the study contractors to explain the nature and purpose of the FIS and to identify the streams to be studied by detailed methods. A final CCO (often referred to as the Preliminary DFIRM Community Coordination, or PDCC, meeting) is held with representatives of the communities, FEMA, and the study contractors to review the results of the study.

For this revision of the countywide FIS, the initial CCO meeting was held on November 3, 2009, and attended by community officials, representatives of the St. Johns River and South Florida Water Management Districts, the State of Florida, FEMA Region IV, and the study contractor, Baker AECOM, LLC.

The final CCO meeting was held on August 16, 2011 to review and accept the results of this FIS. Those who attended this meeting included representatives of St. Cloud, Kissimmee, Osceola County, AECOM, and FEMA. All problems raised at that meeting have been addressed in this study.

The dates of the historical initial and final CCO meetings held for the communities within the boundaries of Osceola County are shown in Table 1, "Historical CCO Meeting Dates."

Table 1: Historical CCO Meeting Dates

Community Name	Initial CCO Date	Final CCO Date
Kissimmee, City of	December 13, 1977	March 13, 1980
Osceola County and Incorporated Areas (countywide)	September 22, 1994	September 29, 1998
Osceola County (Unincorporated Areas)	February 23, 1978	March 2, 1981
St. Cloud, City of	December 13, 1977	July 10, 1979

Table 2: Flooding Sources Studied by Detailed Methods (continued)

Flooding Source	Reach Length (miles) or Area (square miles)	Limits of Study
Coon Lake	1.8	For its entire shoreline within Osceola County
Cox Creek	1.7	[2]
Cypress Lake	0.01 sq. mi.	[2]
Davenport Creek	7.5	From its confluence with Reedy Creek to Oak Island Drive
Davenport Creek Tributary No. 1	1.0	From its confluence with Davenport Creek to Oak Island Drive
Davenport Creek Tributary No. 2	1.6	From its confluence with Davenport Creek to a point approximately 0.86 mile upstream of confluence
Dead River	0.5	[2]
East City Canal	3.2	From its confluence with Lake Tohopekaliga to just downstream of Oak Street
East City Canal Tributary 1[1]	0.4	From the confluence with East City Canal to a point approximately 2,370 feet upstream
East Lake Tohopekaliga	20.1	[2]
Gator Bay Branch	1.1	[2]
Heart Lake	0.01 sq. mi.	[2]
Jackson Canal	1.7	[2]
Jim Branch	0.6	[2]
Kissimmee River	3.0	[2]
Lake Bullock	1.4	
Lake Cecil	1.6	[2]
Lake Center	3.3	For its entire shoreline within Osceola County
Lake Davenport	1.0	For its entire shoreline within Osceola County
Lake Gentry	0.7	For its entire shoreline within Osceola County

Table 3: Flooding Sources Studied by Approximate Methods (continued)

Flooding Source	Reach Length (miles) or Area (square miles)
Crabgrass Creek	10.7
Cypress Lake	0.1 sq. mi.
Davenport Creek	0.9
Dead River	3.6
Elbow Branch	3.1
Fish Lake	0.4 sq. mi.
Gap Creek	2.9
Garrett Branch	3.5
Gator Branch	6.6
Hammock Branch	1.9
Hatchineha Canal	2.4
Hog Pen Slough	0.3 sq. mi.
Indian Branch	2.7
Jackson Canal	4.5
Jane Green Creek	3.6
Jim Branch	0.8
Kissimmee River	12.9
Lake Jackson	3.2
Lake Marian	8.0
Little Creek	3.2
Little North Prong	1.9
Major Sloush	0.2 sq. mi.
Mill Slough	0.9
North Branch Crabgrass Creek	2.2
North Fork Taylor Creek	5.2
NP (unnamed streams)	916.0
NP - Priority 1- Poinciana	0.6
NP - Priority 4 – Kennansville	14.7
Orchid Creek	7.5
Padgett Branch	0.8

Table 5: Summary of Discharges (continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharge (Cubic Feet per Second)			
		10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance
DAVENPORT CREEK					
At mouth	27.13	2,126	3,396	3,991	5,320
Approximately 0.6 mile downstream of State Route 545	26.73	1,932	3,099	3,648	4,866
At State Route 545	25.56	1,516	2,524	2,986	4,066
Approximately 0.4 mile upstream of State Route 545	25.28	1,496	2,511	2,970	4,042
Approximately 0.3 mile downstream of Interstate Route 4	24.94	1,487	2,491	2,944	4,066
Approximately 0.6 mile downstream of Keefer Trail	22.49	1,417	2,368	2,798	3,813
At Keefer Trail	22.20	1,416	2,358	2,785	3,791
Approximately 0.6 mile upstream of Keefer Trail	14.88	363	628	820	1,346
At confluence of Davenport Creek Tributary No. 2	8.53	898	1,466	1,718	2,341
Approximately 1,000 feet downstream of confluence of Davenport Creek Tributary No. 1	5.54	389	578	663	871
At Oak Island Road	0.40	9	18	21	178
DAVENPORT CREEK TRIBUTARY NO. 1					
Approximately 100 feet downstream of North Goodman Road	3.96	95	224	348	693

Table 5: Summary of Discharges (continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharge (Cubic Feet per Second) 10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance
DAVENPORT CREEK TRIBUTARY NO. 2					
Approximately 0.9 mile upstream of mouth	1.56	679	1,066	1,239	1,626
EAST CITY CANAL[1]					
At mouth	6.37	1,128	1,531	1,661	2,018
EAST CITY CANAL TRIBUTARY 1					
At confluence with East City Canal	0.9	375	575	687	932
MILL SLOUGH					
At U.S. Route 441	11.6	710	1,040	1,360	2,050
At Mill Slough Road	10.7	660	970	1,300	1,900
PEG HORN SLOUGH					
At mouth	2.28	714	1,003	1,090	1,258
At Neptune Road	2.01	612	840	896	1,008
At Old Landfill entrance road	1.19	351	416	420	427
At Canoe Creek Road	0.46	209	398	465	508
REEDY CREEK					
At Cypress Lake	282.0	3,300	5,000	5,700	6,350
At Lake Russell	264.0	2,700	4,000	4,500	5,100
At U.S. Route 92 bridge	209.0	800	1,100	1,100	1,100

[1]Peak discharges computed with UNET (Reference 25)

Table 6: Summary of Stillwater Elevations (continued)

Flooding Source and Location	Elevation (feet NAVD88) 10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance
SARDINE LAKE	64.4	65.2	65.6	66.1
TROUT LAKE	64.5	65.3	65.6	66.2

*Data not available

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

Except where noted, cross sections were obtained from field surveys. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry. Cross sections were located at close intervals upstream and downstream of bridge and culverts to compute the significant backwater effects of these structures.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the FIRM (Exhibit 2).

Table 7, “Manning’s ‘n’ Values,” contains the channel and overbank "n" values for the streams studied by detailed methods.

Table 7: Manning’s “n” Values

Flooding Source	Channel “n”	Overbank “n”
Bass Slough	0.025	0.025-0.10
Bass Slough Tributary	0.025	0.035-0.075
Big Wateree Creek Tributary 4	*	*
Boggy Creek	0.030	0.020
C-33 Canal	0.025-0.17	0.03-0.18
Canoe Creek (C-34 Canal)	0.025-0.17	0.03-0.18
Davenport Creek	0.025-0.17	0.03-0.18
Davenport Creek Tributary No. 1	0.025-0.17	0.03-0.18

Table 7: Manning's "n" Values (continued)

Flooding Source	Channel "n"	Overbank "n"
Davenport Creek Tributary No. 2	0.025-0.17	0.03-0.18
East City Canal	0.025-0.17	0.03-0.18
East City Canal Tributary 1	0.025-0.11	0.035-0.11
Mill Slough in City of Kissimmee	0.04	0.50
Mill Slough in Osceola County (Unincorporated Areas)	0.030	0.020
Peg Horn Slough	0.025-0.17	0.03-0.18
Reedy Creek	0.030	0.020
Reedy Creek Tributary No. 1	0.025-0.17	0.03-0.18
Reedy Creek Tributary No. 2	0.025-0.17	0.03-0.18
Reedy Creek Tributary No. 3	0.025-0.17	0.03-0.18
Shingle Creek	0.025-0.17	0.03-0.18
St. Johns River	0.025-0.17	0.03-0.18
West Branch Shingle Creek*	0.025-0.17	0.03-0.18
West City Canal	0.025-0.17	0.03-0.18
WPA Canal	0.025-0.17	0.03-0.18
WPA Canal Tributary 1	0.025-0.095	0.025-0.095
WPA Canal Tributary 1-1	0.025	0.045-0.095

*Includes West Branch Shingle Creek Tributary listed separately in previous FIS reports

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

3.2.1 Methods for Flooding Sources with New or Revised Analyses in Current Study

Water-surface profiles for the 10-, 2-, 1- and 0.2-percent-annual-chance recurrence intervals were computed for detailed analyses, and the water-surface profile for the 1-percent-annual-chance recurrence interval was computed for approximate analyses. The USACE HEC-RAS step-backwater computer program version 4.0 was utilized for hydraulic analyses of Bass Slough (Lower Reach), Bass Slough (Upper Reach), Bass Slough Tributary, WPA Canal Tributary 1,

Revised Analyses for Countywide FIS

Cross sections were obtained from a variety of sources. The primary source was new field surveys. Other cross sections were obtained from the South Florida Water Management District and from the previous FISs.

Water-surface elevations of floods of the selected recurrence intervals were computed using the USACE UNET one-dimensional, unsteady flow and HEC-2 water-surface profile computer programs; UNET was used for C-33 Canal, Canoe Creek (C-34 Canal), East City Canal, West City Canal, and Lakes Center, Gentry, Joel, Lizzie, Myrtle, and Preston and Alligator, Brick, Coon, and Trout Lakes; HEC-2 was used for Davenport Creek, Davenport Creek Tributary No. 1, Davenport Creek Tributary No. 2, Peg Horn Slough, Reedy Creek Tributary No. 1, Reedy Creek Tributary No. 2, and Reedy Creek Tributary No. 3, Shingle Creek, West Branch Shingle Creek, West Branch Shingle Creek Tributary, and WPA Canal (References 25 and 28). For the St. Johns River, the hydraulic analyses were taken from *The Mean Annual, 10-Year, 25-Year, and 100-Year Flood Profiles for the Upper St. Johns River Under Existing Conditions* (Reference 19). Starting water-surface elevations for streams were taken to be normal depth; for lakes, the highest operating elevations specified by the South Florida Water Management District were used (Reference 19).

Gage data for historical storm events was used for calibration and verification of the UNET and HEC-2 models. Gage data were obtained from the South Florida Water Management District and the USGS (References 29 and 30). USGS gages were used for the Alligator Chain of Lakes at the S-60 spillway on the C-33 Canal (ID 02260800); at the S-57 culvert on the C-30 Canal (ID 02261500); on the east shore of Cypress Lake near the mouth of Canoe Creek (ID 02266600); on Shingle Creek at the Kissimmee Airport (ID 02263800); on Shingle Creek at Campbell (ID 02264495); and on Davenport Creek near Loughman (ID 02266480). South Florida Water Management District gages were used on the Kissimmee East-West Canal (ID KISSD-H and KISSD-E).

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD). With the completion of the North American Vertical Datum of 1988 (NAVD), many FIS reports and FIRMs are now prepared using NAVD as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to the NAVD. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. It is important to note that adjacent counties may be referenced to NGVD, which may result in differences in base flood elevations across county lines.

No floodway was computed Davenport Creek Tributary 1, Davenport Creek Tributary 2, St. Johns River, and Tributary No. 1.

Near the confluence of streams studied in detail, floodway computations were made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 8, "Floodway Data," for certain downstream cross sections of Bass Slough Tributary, East City Canal Tributary 1, Reedy Creek Tributary No. 1, Reedy Creek Tributary No. 2, Shingle Creek, West City Canal, WPA Canal Tributary 1, and WPA Canal Tributary 1-1 are lower than the regulatory flood elevations in that area, which must take into account the 1-percent-annual-chance flooding due to backwater from other sources.

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross sections is provided in Table 8. To reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation (WSEL) of the base flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
DAVENPORT CREEK								
A	4,500	734	3,963	1.0	80.2	80.2	81.2	1.0
B	5,330	440[2]	2,627	1.5	81.8	81.8	82.4	0.6
C	6,730	359	2,112	1.7	84.4	84.4	84.8	0.4
D	8,130	292	1,723	2.1	86.0	86.0	86.8	0.8
E	9,230	112	794	4.6	88.9	88.9	89.5	0.6
F	10,520	223	2,087	1.4	92.9	92.9	93.6	0.7
G	11,820	231	1,596	1.9	93.5	93.5	94.2	0.7
H	13,385	136	819	3.6	95.1	95.1	95.5	0.4
I	14,045	42	453	6.5	96.2	96.2	96.7	0.5
J	15,745	191	1,782	1.7	98.8	98.8	99.6	0.8
K	16,872	384	3,259	0.9	102.6	102.6	103.2	0.6
L	18,342	228	1,923	1.5	103.2	103.2	103.8	0.6
M	20,392	286	1,627	1.7	104.9	104.9	105.6	0.7
N-R*								

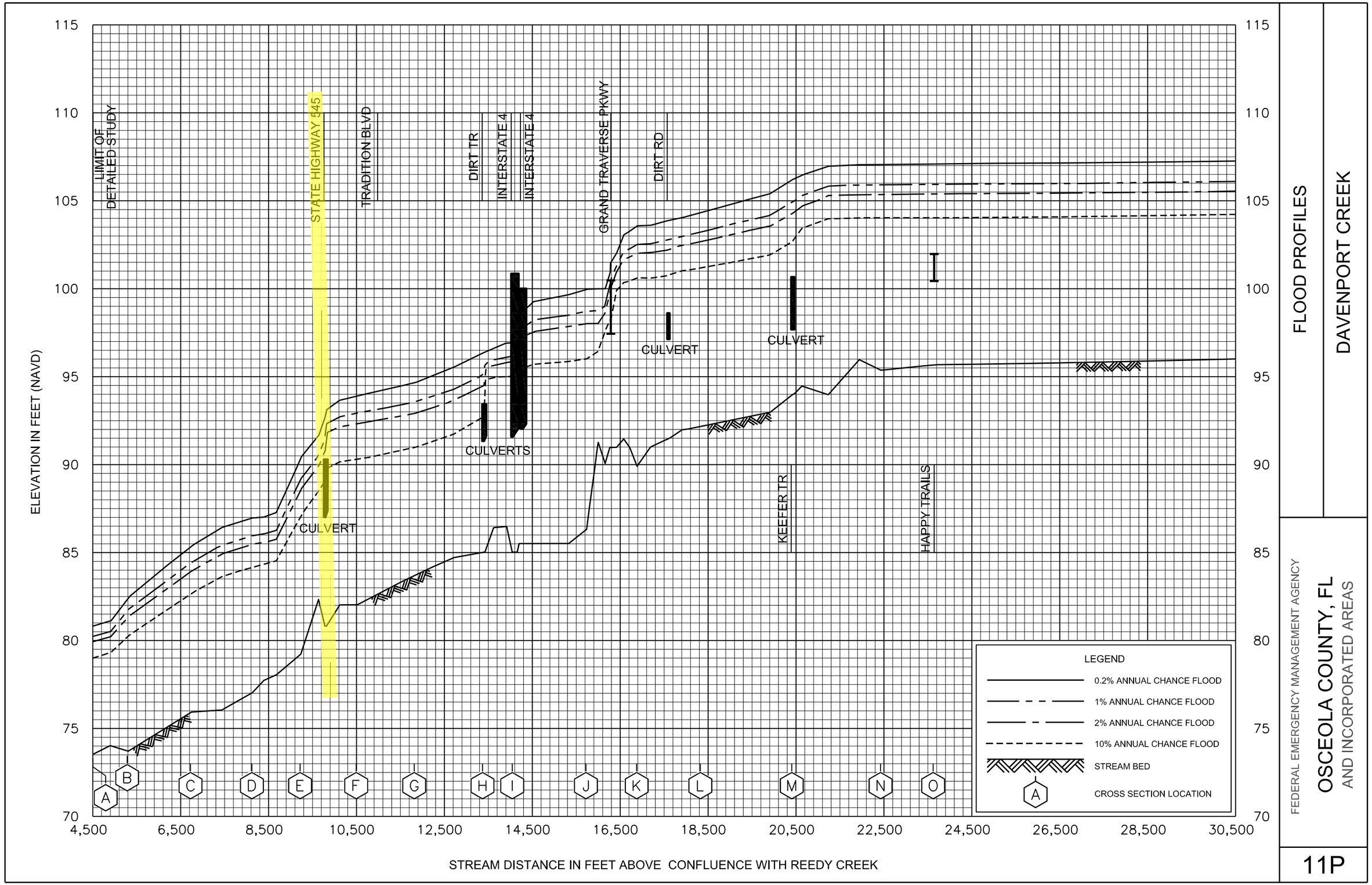
[1] Stream distance in feet above confluence with Reedy Creek
[2] Value represents total width; however, floodway is not shown inside Reedy Creek Improvement District
* Floodway data not available

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
OSCEOLA COUNTY, FL
AND INCORPORATED AREAS

FLOODWAY DATA

DAVENPORT CREEK



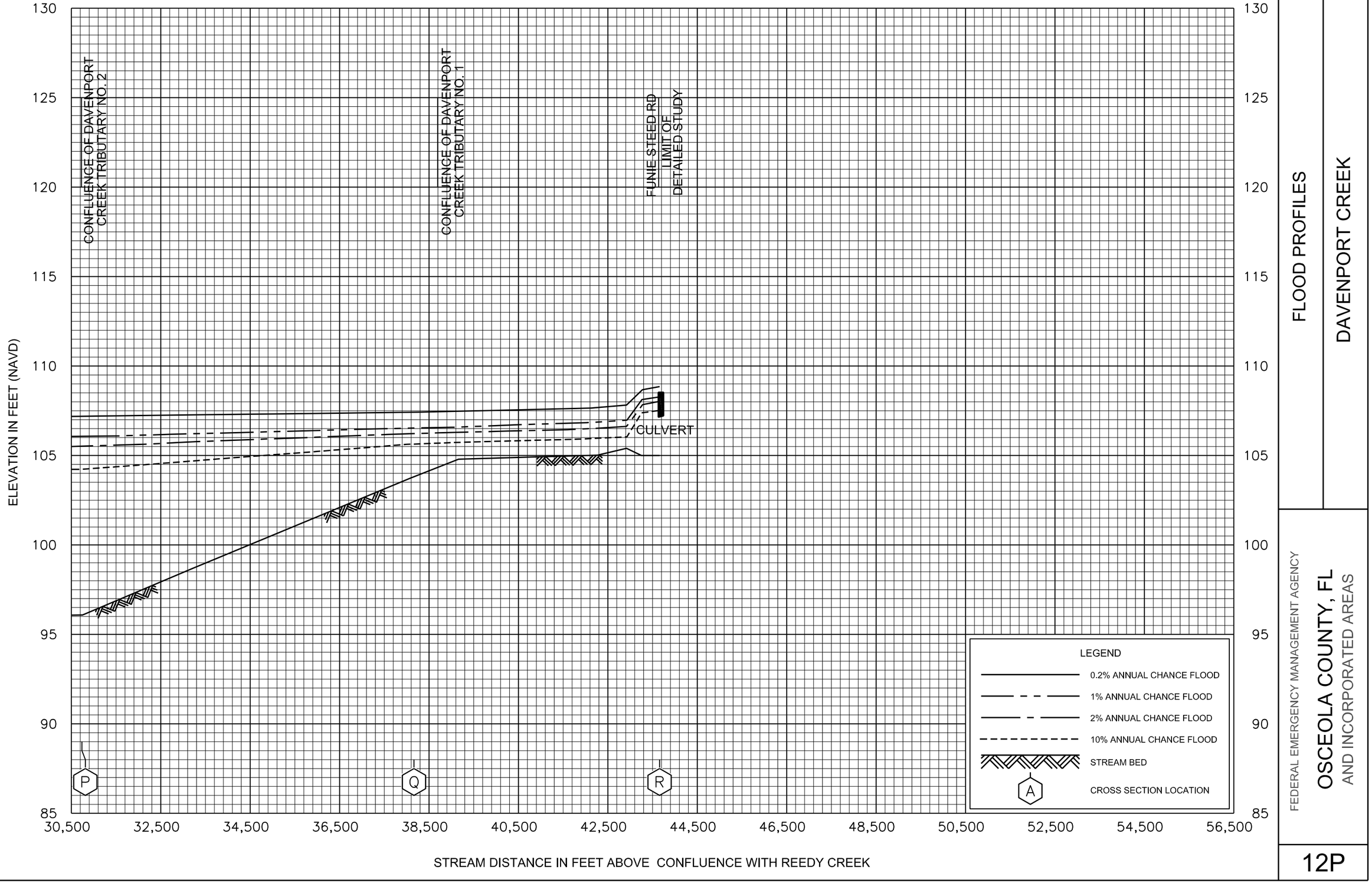
FLOOD PROFILES

DAVENPORT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

OSCEOLA COUNTY, FL
AND INCORPORATED AREAS

11P



FLOOD PROFILES

DAVENPORT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

OSCEOLA COUNTY, FL
AND INCORPORATED AREAS

12P

Appendix C

Bridge 924147 - Inspection Data

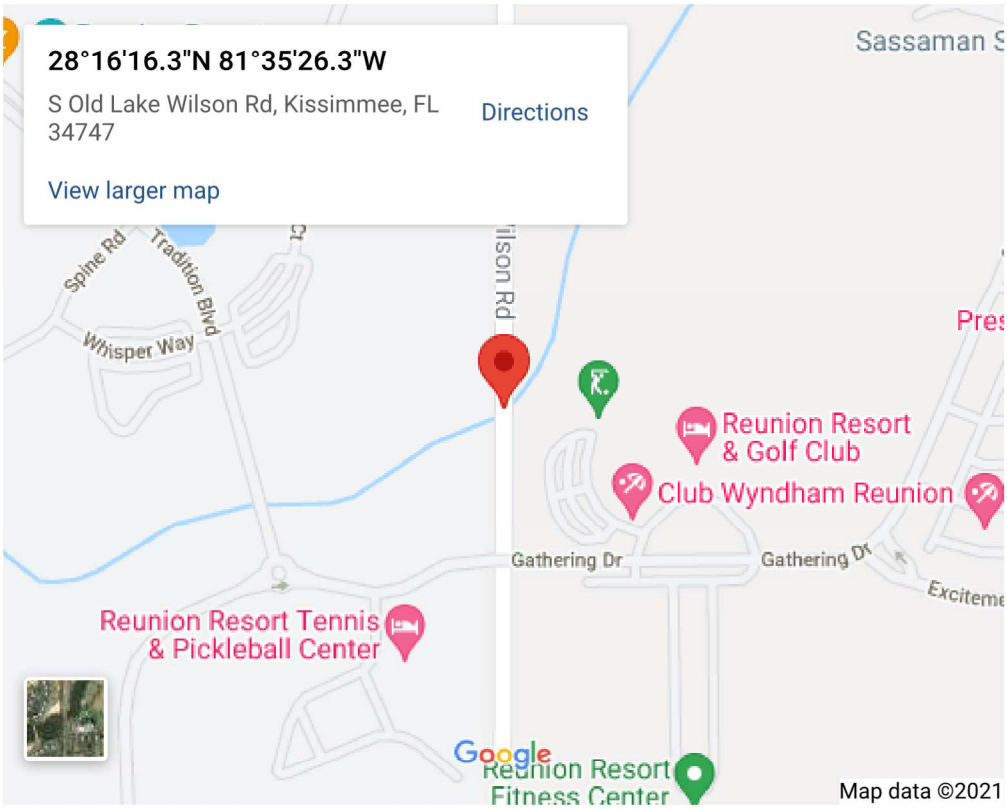
NBID data – July 2018

Excerpts from latest Bridge Inspection Report – July 2020

NBID data – July 2018

Old Lake Wilson Rd over Davenport Creek

Coordinates:
+28.27120, -81.59064
28°16'16" N, 81°35'26" W



Facts

Source: National Bridge Inventory. Information not verified; use at your own risk.

Name:	Old Lake Wilson Rd over Davenport Creek
Structure number:	924147
Location:	0.8 Mile North of CR-532
Purpose:	Carries highway over waterway
Route classification:	Minor Arterial (Urban) *[16]*
Length of largest span:	11.5 ft. *[3.5 m]*
Total length:	57.4 ft. *[17.5 m]*
Owner:	County Highway Agency *[02]*
Year built:	1954
Historic significance:	Bridge is not eligible for the National Register of Historic Places *[5]*
Design load:	MS 18 / HS 20 *[5]*
Number of main spans:	4
Main spans material:	Steel *[3]*
Main spans design:	Culvert *[19]*
Deck type:	Not applicable *[N]*

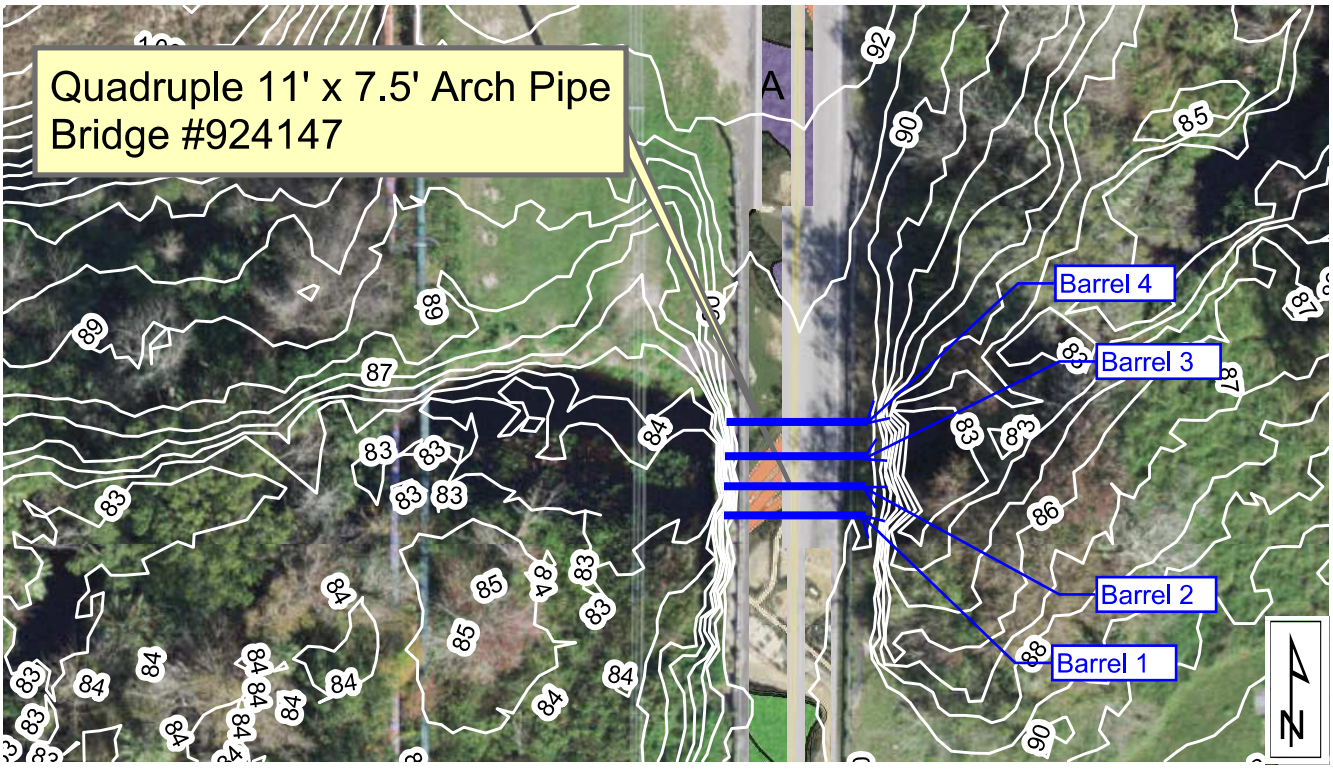
Latest Available Inspection: July 2018

Good/Fair/Poor Condition:	Fair
Status:	Open, no restriction *[A]*
Average daily traffic:	8,419 *[as of 2014]*
Truck traffic:	5% of total traffic
Structural appraisal:	Somewhat better than minimum adequacy to tolerate being left in place as is *[5]*
Water adequacy appraisal:	Equal to present minimum criteria *[6]*
Roadway alignment appraisal:	Better than present minimum criteria *[7]*
Channel protection:	Bank protection is being eroded. River control devices and/or embankment have major damage. Trees and rush restrict the channel. *[5]*
Culvert condition:	Moderate to major deterioration or disintegration, extensive cracking and leaching or spalls on concrete or masonry walls and slabs. Minor settlement or misalignment. Noticeable scouring or erosion at curtain walls, wingwalls or pipes. Metal culverts have significant distortion and deflection in one section, significant corrosion or deep pitting. *[5]*
Scour condition:	Bridge foundations determined to be stable for assessed or calculated scour condition. *[5]*
Sufficiency rating:	85.4

Previous Inspections

Date	Condition	Culvert Condition	ADT	Suff. Rating
July 2018	Fair	5 out of 10	8419	85.4
July 2016	Fair	5 out of 10	8419	85.4
July 2014	Fair	5 out of 10	8419	85.4
July 2012	Fair	6 out of 10	8419	96.8
July 2010	Fair	6 out of 10	8419	96.8
July 2008	Fair	6 out of 10	8419	76.1
July 2006	Fair	6 out of 10	8419	85.2
July 2004	Fair	6 out of 10	8419	85.2
July 2002	Fair	6 out of 10	8419	85.2
July 2000	Fair	6 out of 10	8364	85.2
July 1998	Fair	6 out of 10	8309	83.2
July 1996	Fair	6 out of 10	9165	83.3
July 1994	Fair	6 out of 10	4000	85.2
July 1992	Fair	6 out of 10	4000	86.5
October 1991	Good	7 out of 10	3600	86.7

Excerpts from latest Bridge Inspection Report – July 2020



FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
Inspection/CIDR Report with PDF attachment(s)
Inspection

Structure ID: 924147

DISTRICT: D5 - Deland **INSPECTION DATE: 7/20/2020 LKSP**

BY:	Ayres Associates	STRUCTURE NAME:	4-11x7.5x42 CMPC
OWNER:	2 County Hwy Agency	YEAR BUILT:	1954
MAINTAINED BY:	2 County Hwy Agency	SECTION NO.:	92 570 000
STRUCTURE TYPE:	3 Steel - 19 Culvert	MP:	0.806
LOCATION:	0.8 Mile North of CR-532	ROUTE:	00545
SERV. TYPE ON:	1 Highway	FACILITY CARRIED:	Old Lake Wilson Rd
SERV. TYPE UNDER:	5 Waterway	FEATURE INTERSECTED:	Davenport Creek

☐ FUNCTIONALLY OBSOLETE ☐ STRUCTURALLY DEFICIENT

TYPE OF INSPECTION: Regular NBI

DATE FIELD INSPECTION WAS PERFORMED: ABOVE WATER: 7/20/2020 UNDERWATER: 7/20/2020

SUFFICIENCY RATING: 85.3
HEALTH INDEX: 31.82

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
BRIDGE INSPECTION REPORT
ADDENDUM

CONTENTS OF ADDENDUM

* This section is not included in this report.

PREPARED FOR: FDOT
BRIDGE OWNER: OSCEOLA COUNTY
PREPARED BY: AYRES ASSOCIATES

REPORT IDENTIFICATION

Bridge Number: 924147 – Regular NBI	Inspection Date: 07/20/2020

Bridge Name: Old Lake Wilson Rd over Davenport Creek (4-11x7.5x42 CMPC)

Facility Carried: Old Lake Wilson Rd.

Featured Intersected: Davenport Creek

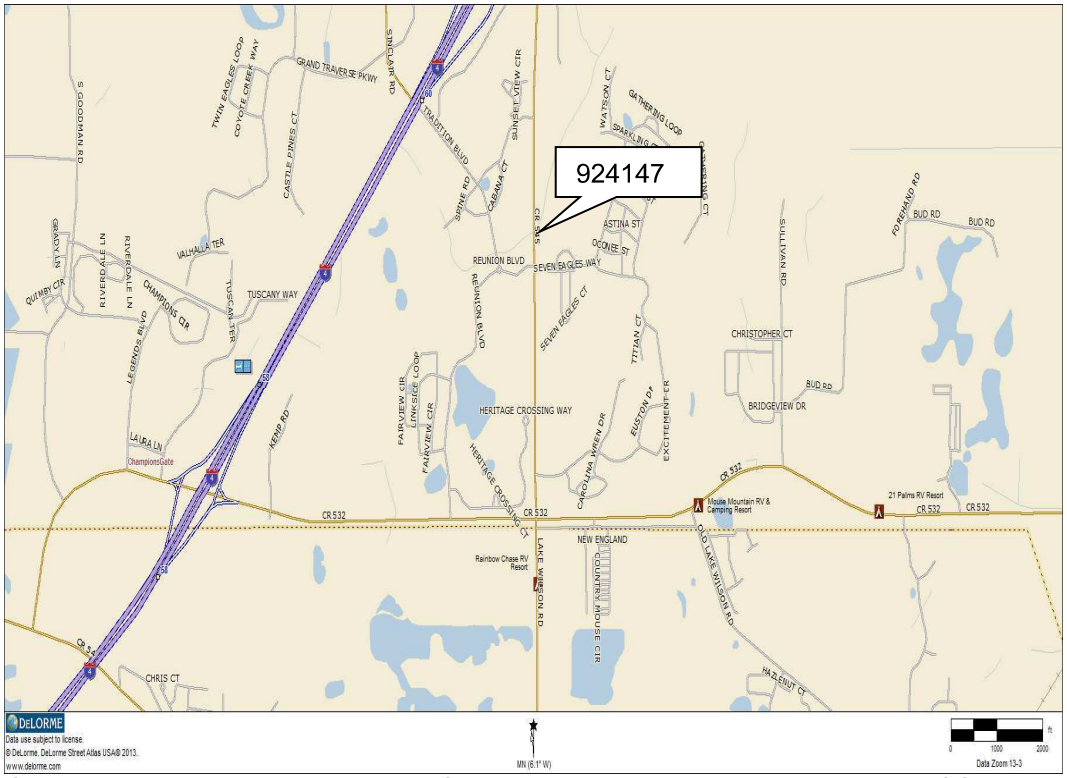
North Approach

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
BRIDGE INSPECTION REPORT

Bridge No: 924147 Inspection Date: 07/20/2020

BRIDGE LOCATION MAP

West Elevation



Old Lake Wilson Rd over Davenport Creek 0.8 Mile North of CR-532
(4-11x7.5x42 CMPC)

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
BRIDGE INSPECTION REPORT

Bridge No: 924147 Inspection Date: 07/20/2020

SKETCHES AND PHOTOS

Photo 1: Element 8290: Build up in Pipe 1

Photo 2: Element 8477: Sand cement rip rap bags missing from the east headwall at Pipe 1

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
BRIDGE INSPECTION REPORT

Bridge No: 924147 Inspection Date: 07/20/2020

SKETCHES AND PHOTOS

Photo 3: Element 8477: Missing bags from the west headwall between Pipes 3 and 4

Photo 4: Element 8477: Settled sand cement rip rap bags in the east headwall over Pipe 1

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
BRIDGE INSPECTION REPORT

Bridge No: 924147 Inspection Date: 07/20/2020

SKETCHES AND PHOTOS

Photo 5: Element 8477: Vegetation growing through the joints of the west headwall

Photo 6: Element 240: Delaminative corrosion on pipes sidewalls and connecting hardware and failed bituminous/galvanized coatings of pipes

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
BRIDGE INSPECTION REPORT

Bridge No: 924147 Inspection Date: 07/20/2020

SKETCHES AND PHOTOS

Photo 7: Element 240: Corrosion hole at the east end of Pipe 3

Photo 8: Inspection Notes: Crack in the asphalt surfacing over and approaching the structure

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
BRIDGE INSPECTION REPORT

Bridge No: 924147 Inspection Date: 07/20/2020

SKETCHES AND PHOTOS

Photo 9: Inspection Notes: Washout in the west asphalt mowing strip

Photo 10: Inspection Notes: Depression over Wall 4 in the asphalt mowing strip

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
BRIDGE INSPECTION REPORT

Bridge No: 924147 Inspection Date: 07/20/2020

SCOUR EVALUATION

LEFT SIDE

		ORIGINAL	PREVIOUS	CURRENT	CHANGE
		12/18/90	07/30/18	07/20/20	
Wall 1			3.6	3.8	-0.2
C/L of Pipe 1		4.5	4.6	3.9	0.7
Wall 2			5.9	4.9	1.0
C/L of Pipe 2		5.8	6.2	5.6	0.6
Wall 3			5.5	5.8	-0.3
C/L of Pipe 3		7.4	7.1	7.0	0.1
Wall 4			8.0	7.2	0.8
C/L of Pipe 4		7.5	8.0	8.0	0.0
Wall 5			7.9	7.5	0.4

Waterline at C/L of Pipe 3	7.0	5.1	6.0

RIGHT SIDE

		ORIGINAL	PREVIOUS	CURRENT	CHANGE
		12/18/90	07/30/18	07/20/20	
Wall 1			3.8	3.6	0.2
C/L of Pipe 1		3.5	3.8	3.6	0.2
Wall 2			4.0	2.1	1.9
C/L of Pipe 2		4.5	6.5	3.4	3.1
Wall 3			6.7	6.2	0.5
C/L of Pipe 3		6.8	6.5	6.5	0.0
Wall 4			7.4	6.3	1.1
C/L of Pipe 4		5.8	7.4	7.6	-0.2
Wall 5			7.0	7.5	-0.5

Waterline at C/L of Pipe 3	6.4	4.5	5.0

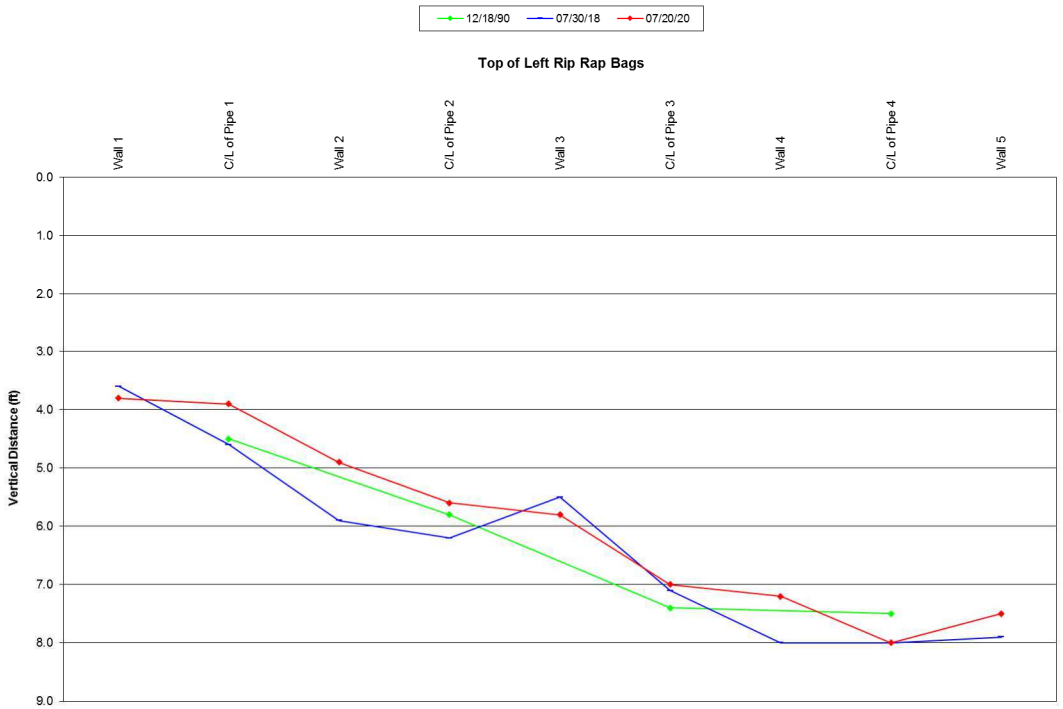
Negative Change = Degradation; Positive Change = Aggradation
The Degradation/Aggradation measurements for this bridge do not indicate significant difference from the last inspection
All measurements are in feet.
Measurement Reference : Top of Sand-Cement Rip Rap Bags

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
BRIDGE INSPECTION REPORT

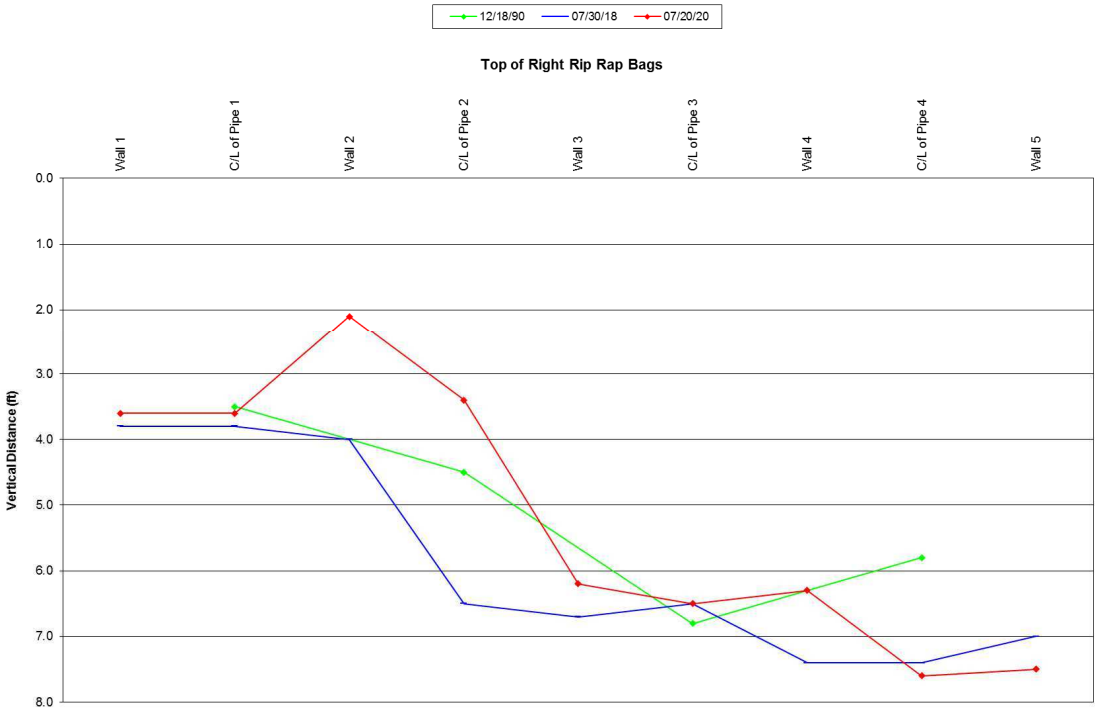
Bridge No: 924147 Inspection Date: 07/20/2020

SCOUR EVALUATION

LEFT SIDE SOUNDINGS



RIGHT SIDE SOUNDINGS

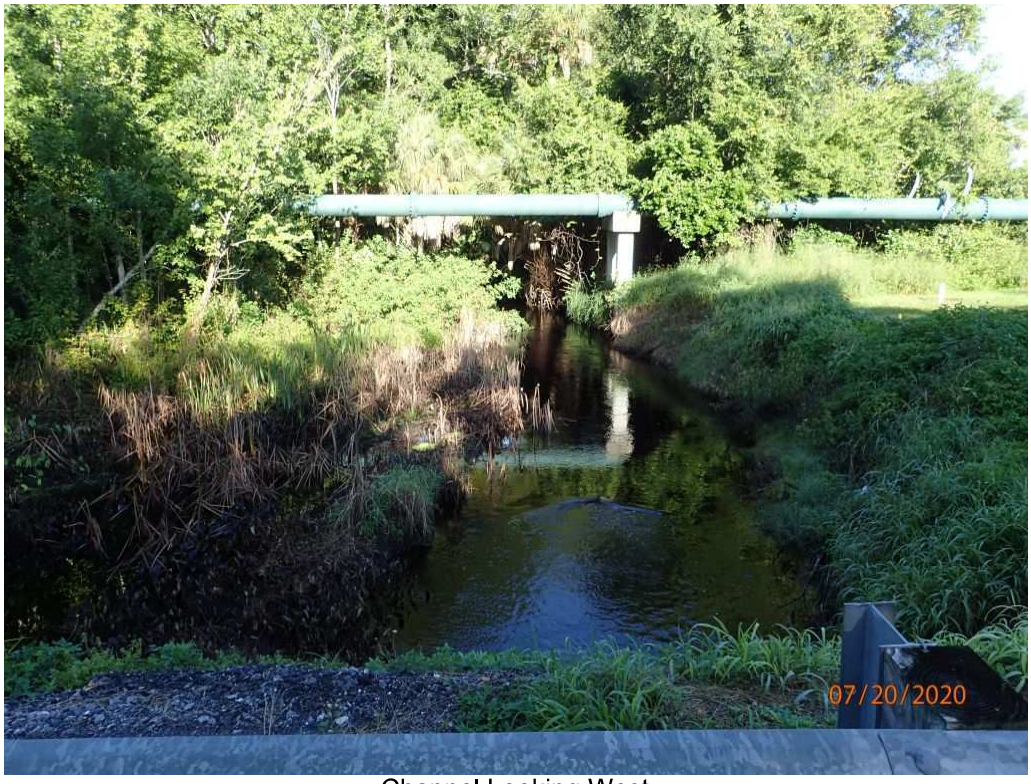


Relative Channel Plots Are Not To Scale.
Any Vertical Curvature Of Datum Point Is Not Reflective In Plot.

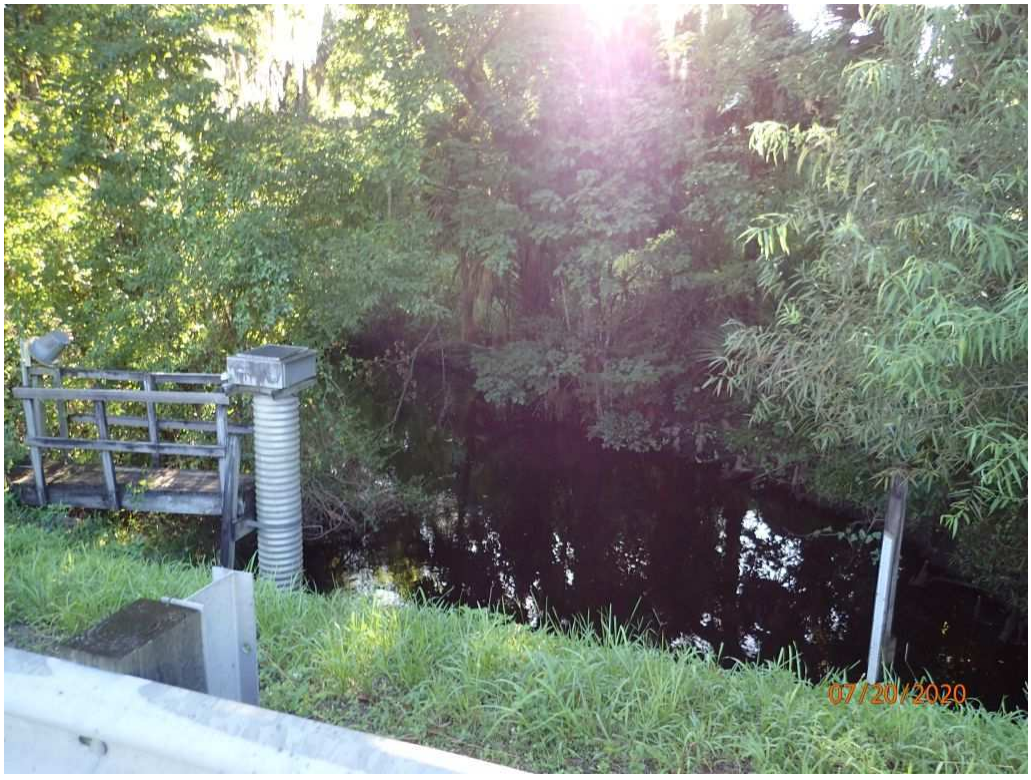
FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
BRIDGE INSPECTION REPORT

Bridge No: 924147 Inspection Date: 07/20/2020

SCOUR EVALUATION



Channel Looking West



Channel Looking East

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
BRIDGE INSPECTION REPORT

Bridge No: 924147 Inspection Date: 07/20/2020

FIELD PREPARATION

A. Tools and Equipment

Full Size Cargo Van:	Yes:	__	No:	X	Pick-up Truck:	Yes:	X	No: __
Automobile:	Yes:	__	No:	X				
Camera:	Yes:	X	No:	__	Video:	Yes:	__	No: X
NDT Equipment:	Yes:	__	No:	X				
NDT Type: N/A								
Binoculars:	Yes:	__	No:	X				
Diving Performed:	Yes:	X	No:	_	Max Depth: 2.6ft.		Current: < 1 fps	

Dive Mode: N/A

Hand Tools: (i.e. Chipping Hammer, 6' Ruler, etc.)

1. Standard Inspection Tools
2. Chipping Hammers
3. Flashlights
4. Carpenter Ruler
5. Inspection Hand Tools

Other:__

B. Services

Flag Crew: N/A
Electrician: N/A
Snooper: N/A
Other: N/A

C. Scheduling (Brief Explanation)

Topside with Underwater:
Topside Hours: 2 hrs. Underwater Hours: 0 hrs. Travel Time: 2 hrs.

D. Site Conditions

Boat Needed: NO Type of Boat: N/A

Location of Boat Ramp: N/A

Lengthy Travel Required: NO

Difficult Access: NO

Water Obviously Polluted: NO

Water quality is fair (partially meets use): YES

Strong Water Current: NO

Other: NONE

E. UNDERWATER ELEMENTS INSPECTED:
N/A

Appendix D

Field Review Photographs

Patel, Greene & Associates, LLC
12570 Telecom Drive, Temple Terrace, FL 33637
813.978.3100 | patelgreene.com

FIELD REVIEW MEMORANDUM

Project Name/Number: Old Lake Wilson PD&E
Owner: Osceola County
Date: December 10, 2021
Location: Old Lake Wilson Road from CR 532 to South of Sinclair Road

Observations:

Due to the location of the existing ponds, visual inspection was performed from the roadway unless otherwise noted below.

- Pond 370 – appeared well maintained.
- Pond 491 – appeared well maintained.
- Pond 9 – appeared well maintained.
- Pond 8 – accessible, pond is well maintained.
- Pond 6 – inaccessible (behind fencing and residential structures), unable to visually inspect.
- Pond 374 – accessible, not maintained. Overgrown with vegetation, unable to visually see whether the original contours were still intact (i.e., viability/existence of permitted stage storage unclear). Sufficient area within this quadrant to restore the pond, and if currently unused, may have "excess" volume available based on the original analysis.
- Ponds 105A, 105B, and 108A are in the I-4 L/A R/W and appeared properly maintained based on visual inspection from the roadway.

Field review of the crossing at Bridge Culvert #924147 was performed as well.

- A USGS hydrologic monitoring station is located at this crossing.
- Present Water – approximately 5.3' deep
- Poorly maintained, with multiple locations exhibiting raveling of the miscellaneous asphalt behind the guardrail.
- Channel outside of the "baseflow" is overgrown and heavily vegetated.
- Only the northern 2 barrels (designated barrels 3 & 4 in July 2020 inspection report) are utilized during baseflow conditions.
    - Barrel 2 is approximately 30% to 50% occluded, giving an effective flowline 2 ½' to 3 ¾' above the channel bottom.
    - Barrel 1 is approximately 50% to 75% occluded, giving an effective flowline of 3 ¾' to 5 ½' above the channel bottom.
- Vegetation downstream of Barrel 1 is well-established, indicating that flow through this barrel is likely infrequent and does not achieve significant velocities.

Photo 1: West side – Facing North

Photo 2: South side of the channel totally overgrown

Photo 3: South side of the channel totally overgrown

Photo 4: Barrel 1 – View looking down from top - Totally overgrown, mostly occluded

Photo 5: East side – Facing North

Photo 6: USGS Hydrologic Monitoring Station 02266480

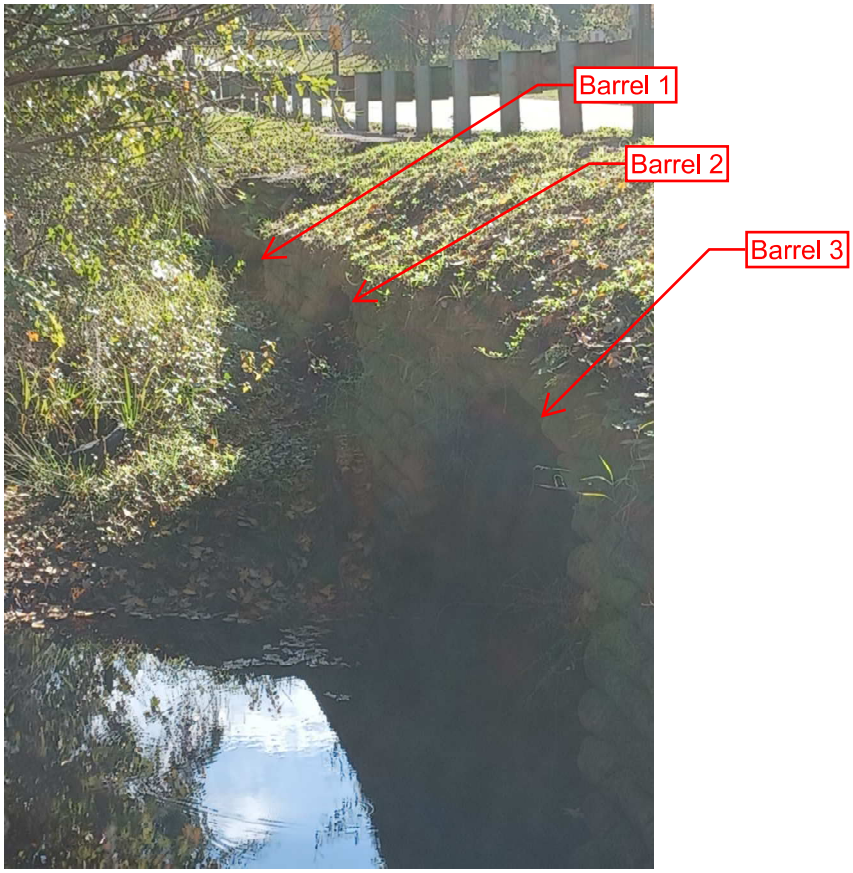


Photo 7: Occluded Barrels

Photo 8: Vegetative overgrowth in front of Barrels 1 & 2

Appendix E

Preliminary HY-8 Hydraulic Analysis

Table 1 - Comparison of Existing and Proposed WSE

Discharge	Water Surface Elevation NAVD (ft)			
	Existing 4 - 11'x7' CMP	Proposed 4 - 10'x8' CBC	Proposed 4 - 11'x8' CBC	Proposed 4 - 12'x8' CBC
50-Year El = 2524	91.41	91.62	91.33	91.12
100-Year El = 2986	91.67	92.27	91.87	91.56
500-Year El = 4066	92.22	94.21	93.46	92.89

Existing 4 - 11'x7' CMP

Figure E-1: Original HEC-2 model data screenshot

```
                                     X     X  XXXXXXX   XXXXX              XXXXX
                                     X     X  X        X     X           X     X
                                     X     X  X        X                       X
                                     XXXXXXX  XXXX     X          XXXXX    XXXXX
                                     X     X  X        X                  X
                                     X     X  X        X     X            X
                                     X     X  XXXXXXX  XXXXX              XXXXXXX
1
   25JUL96      14:42:17                                                                    PAGE    1



                                                                    THIS RUN EXECUTED 25JUL96    14:42:17
************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
************************************


T1      Engineering Methods and Applications
T1      Flood Insurance Study
T2      Osceola County
T3      Davenport Creek
T4      100-year flood

   elevations based on the 1988 datum
   all cross sections proceed from left to right looking upstream



  structure 118
  GAGE POINT
X3       10                                                          89.98      90.53
GR      100        690      97.43      798.5      93.38      898.5      86.11      989.5      85.7      989.5
GR     84.6      998.5      83.87       1000       83.9     1004.2       83.8     1008.3      83.4     1013.7
GR     83.2       1019       83.3     1024.4       82.7     1029.6       80.8       1035      80.8       1041
GR     81.9     1044.4       82.5       1050       82.5     1055.8       82.4       1058      82.9       1065
1
   25JUL96      14:42:17                                                                    PAGE    4


GR    92.68       1158      96.28       1258      99.94       1358     102.71       1458     104.7       1558


SC    4.013       0.50        3.0                  8.79                  40.3        1.1      80.1       79.8
  NOTE:  culverts assumed to be partially closed with fill
         check velocity through culvert
```

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

50-yr Minimum Flow: 2524 cfs

100-yr Design Flow: 2986 cfs

500-yr Maximum Flow: 4066 cfs

Flows from FEMA FIS Study

Table 1 - Summary of Culvert Flows at Crossing: EX-DC HW

Headwater Elevatio	Total Discharge (c	Culvert 1 Discharg (cfs)	Roadway Discharg (cfs)	Iterations
91.41	2524.00	1635.16	888.74	5
91.50	2678.20	1684.04	993.26	3
91.58	2832.40	1731.03	1100.45	3
91.67	2986.00	1775.93	1209.19	3
91.75	3140.80	1819.17	1320.76	3
91.83	3295.00	1860.96	1433.23	3
91.91	3449.20	1901.27	1547.16	3
91.99	3603.40	1940.22	1662.44	3
92.07	3757.60	1977.91	1778.97	3
92.14	3911.80	2014.44	1896.66	3
92.22	4066.00	2049.90	2015.43	3
90.30	752.91	752.91	0.00	Overtopping

Rating Curve Plot for Crossing: EX-DC HW

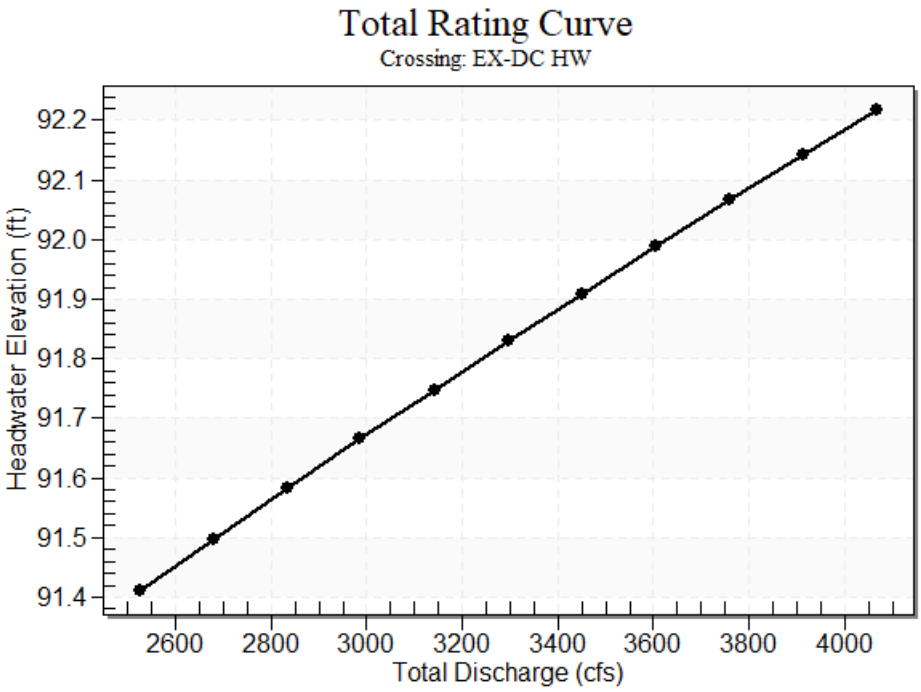


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2524.00	1635.16	91.41	6.258	11.312	4-FF	7.092	3.849	7.092	10.200	6.734	0.000
2678.20	1684.04	91.50	6.387	11.397	4-FF	7.092	3.916	7.092	10.200	6.936	0.000
2832.40	1731.03	91.58	6.512	11.482	4-FF	7.092	3.979	7.092	10.200	7.129	0.000
2986.00	1775.93	91.67	6.631	11.565	4-FF	7.092	4.038	7.092	10.200	7.314	0.000
3140.80	1819.17	91.75	6.747	11.647	4-FF	7.092	4.095	7.092	10.200	7.492	0.000
3295.00	1860.96	91.83	6.860	11.728	4-FF	7.092	4.149	7.092	10.200	7.664	0.000
3449.20	1901.27	91.91	6.970	11.808	4-FF	7.092	4.201	7.092	10.200	7.830	0.000
3603.40	1940.22	91.99	7.077	11.887	4-FF	7.092	4.251	7.092	10.200	7.991	0.000
3757.60	1977.91	92.07	7.181	11.965	4-FF	7.092	4.298	7.092	10.200	8.146	0.000
3911.80	2014.44	92.14	7.283	12.042	4-FF	7.092	4.344	7.092	10.200	8.296	0.000
4066.00	2049.90	92.22	7.383	12.118	4-FF	7.092	4.388	7.092	10.200	8.443	0.000

****

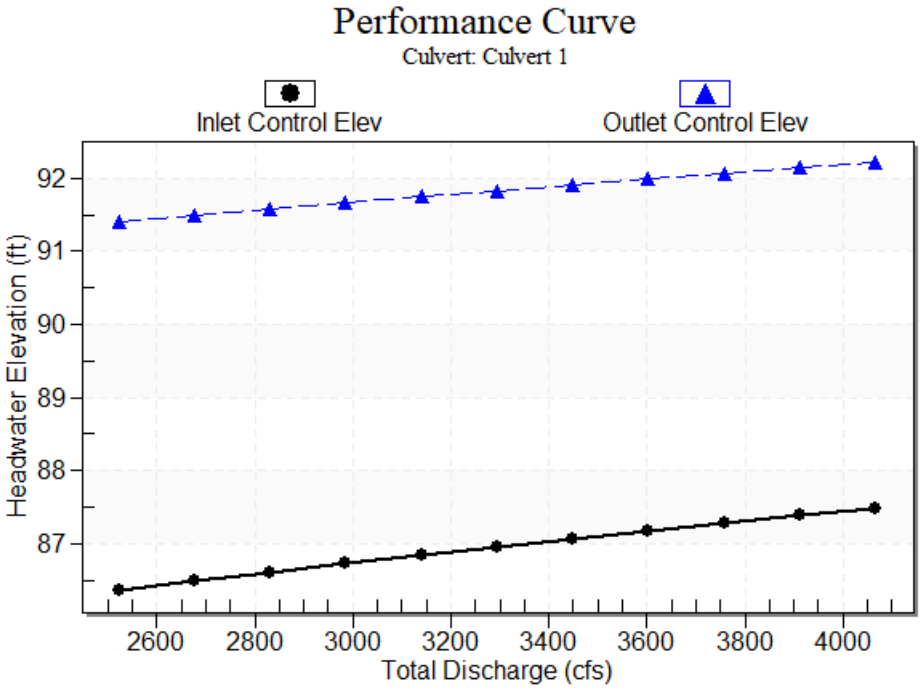
Straight Culvert

Inlet Elevation (invert): 80.10 ft, Outlet Elevation (invert): 79.80 ft

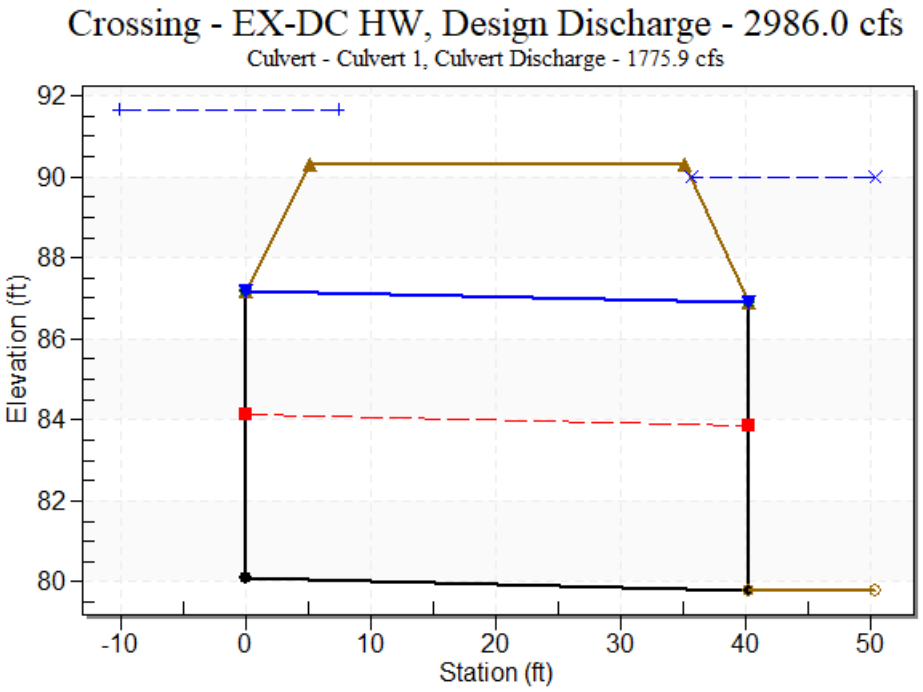
Culvert Length: 40.30 ft, Culvert Slope: 0.0074

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 80.10 ft
Outlet Station: 40.30 ft
Outlet Elevation: 79.80 ft
Number of Barrels: 4

Information from original HEC-2 Model

Culvert Data Summary - Culvert 1

Barrel Shape: Pipe Arch
Barrel Span: 131.00 in
Barrel Rise: 85.10 in
Barrel Material: Steel Structural Plate
Embedment: 0.00 in
Barrel Manning's n: 0.0340
Culvert Type: Straight
Inlet Configuration: Headwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: EX-DC HW)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
2524.00	90.00	10.20
2678.20	90.00	10.20
2832.40	90.00	10.20
2986.00	90.00	10.20
3140.80	90.00	10.20
3295.00	90.00	10.20
3449.20	90.00	10.20
3603.40	90.00	10.20
3757.60	90.00	10.20
3911.80	90.00	10.20
4066.00	90.00	10.20

Tailwater Channel Data - EX-DC HW

Tailwater Channel Option: Enter Constant Tailwater Elevation
Constant Tailwater Elevation: 90.00 ft

Roadway Data for Crossing: EX-DC HW

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 250.00 ft
Crest Elevation: 90.30 ft
Roadway Surface: Paved
Roadway Top Width: 30.00 ft

Proposed 4 - 10'x8' CBC

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

50-yr Minimum Flow: 2524 cfs

100-yr Design Flow: 2986 cfs

500-yr Maximum Flow: 4066 cfs

Table 1 - Summary of Culvert Flows at Crossing: PR-DC 10x8

Headwater Elevatio	Total Discharge (c	Culvert 1 Dischar (cfs)	Roadway Dischar (cfs)	Iterations
91.62	2524.00	2524.00	0.00	1
91.83	2678.20	2678.20	0.00	1
92.04	2832.40	2832.40	0.00	1
92.27	2986.00	2986.00	0.00	1
92.51	3140.80	3140.80	0.00	1
92.77	3295.00	3295.00	0.00	1
93.03	3449.20	3449.20	0.00	1
93.31	3603.40	3603.40	0.00	1
93.60	3757.60	3757.60	0.00	1
93.90	3911.80	3911.80	0.00	1
94.21	4066.00	4066.00	0.00	1
94.30	4108.38	4108.38	0.00	Overtopping

Rating Curve Plot for Crossing: PR-DC 10x8

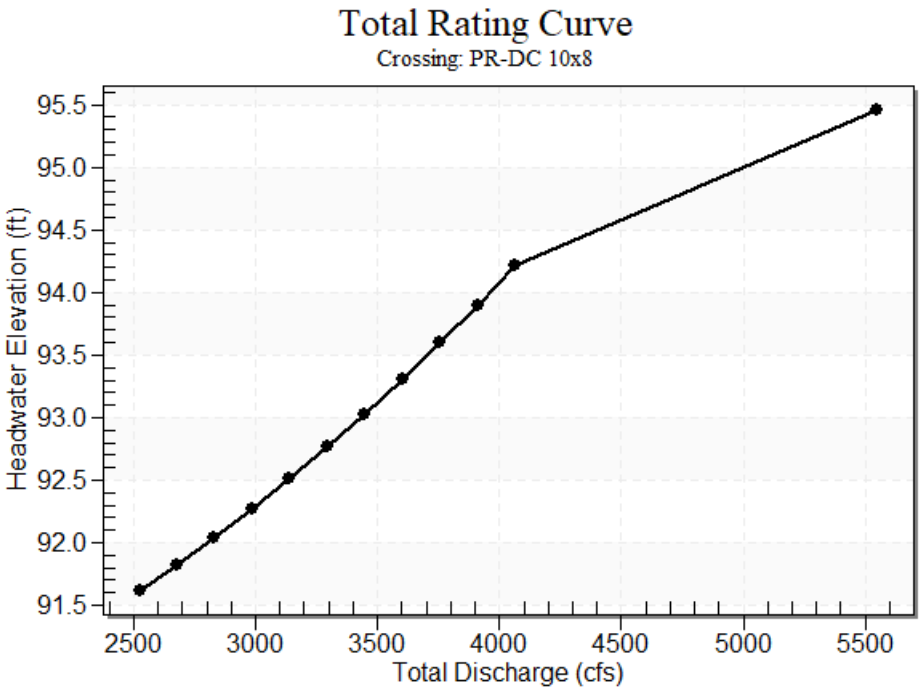


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2524.00	2524.00	91.62	8.459	11.523	4-FF	3.602	4.982	8.000	10.830	7.888	0.000
2678.20	2678.20	91.83	8.839	11.727	4-FF	3.760	5.183	8.000	10.830	8.369	0.000
2832.40	2832.40	92.04	9.224	11.944	4-FF	3.916	5.380	8.000	10.830	8.851	0.000
2986.00	2986.00	92.27	9.616	12.171	4-FF	4.070	5.573	8.000	10.830	9.331	0.000
3140.80	3140.80	92.51	10.020	12.413	4-FF	4.223	5.764	8.000	10.830	9.815	0.000
3295.00	3295.00	92.77	10.434	12.666	4-FF	4.375	5.951	8.000	10.830	10.297	0.000
3449.20	3449.20	93.03	10.859	12.931	4-FF	4.525	6.135	8.000	10.830	10.779	0.000
3603.40	3603.40	93.31	11.298	13.208	4-FF	4.675	6.317	8.000	10.830	11.261	0.000
3757.60	3757.60	93.60	11.752	13.497	4-FF	4.823	6.496	8.000	10.830	11.743	0.000
3911.80	3911.80	93.90	12.221	13.798	4-FF	4.970	6.672	8.000	10.830	12.224	0.000
4066.00	4066.00	94.21	12.707	14.112	4-FF	5.117	6.846	8.000	10.830	12.706	0.000

****

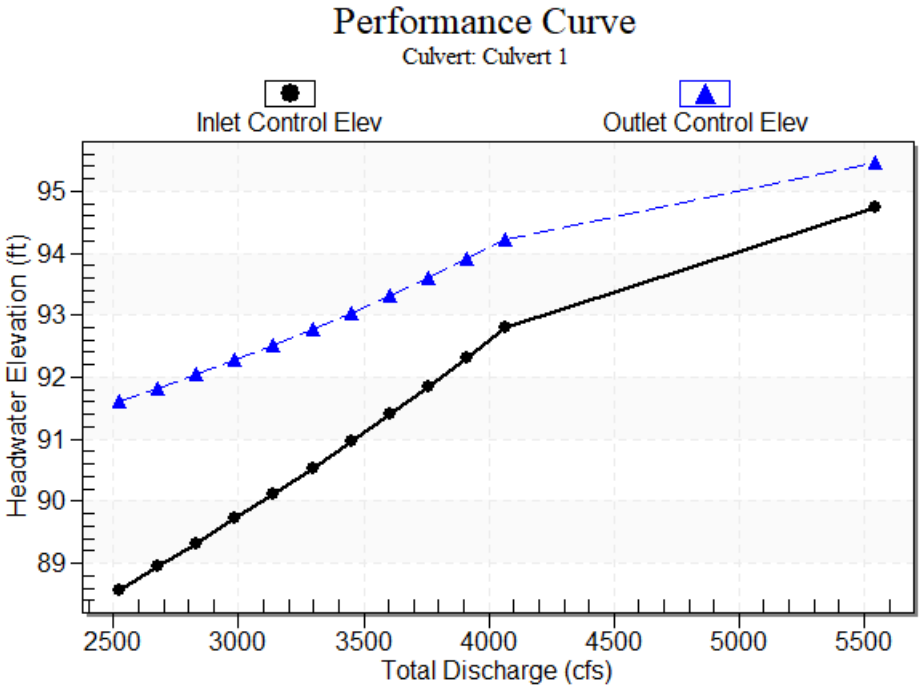
Straight Culvert

Inlet Elevation (invert): 80.10 ft, Outlet Elevation (invert): 79.17 ft

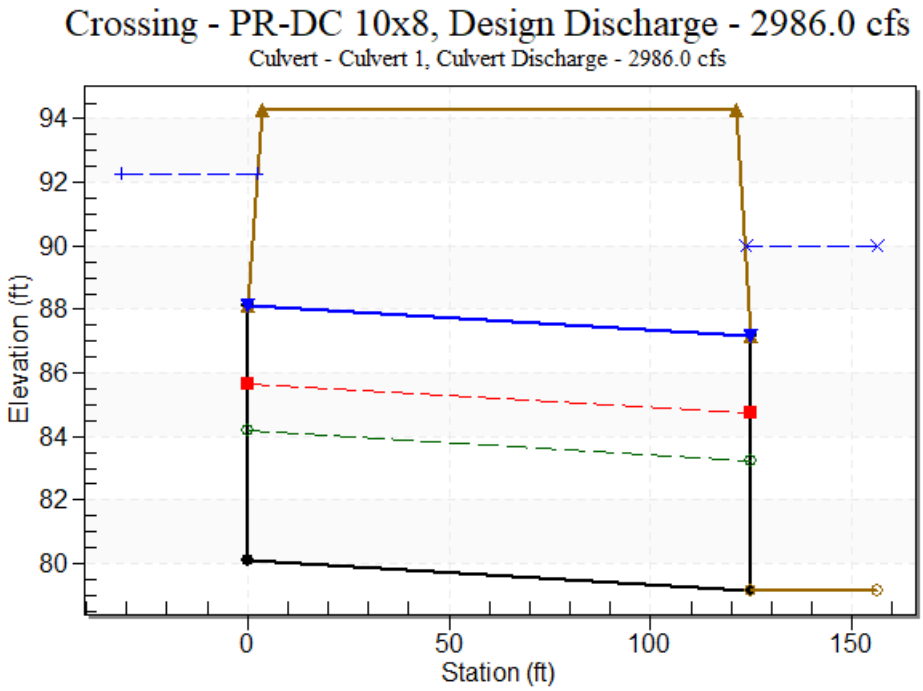
Culvert Length: 125.00 ft, Culvert Slope: 0.0074

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 80.10 ft
Outlet Station: 125.00 ft
Outlet Elevation: 79.17 ft
Number of Barrels: 4

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box
Barrel Span: 10.00 ft
Barrel Rise: 8.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: PR-DC 10x8)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
2524.00	90.00	10.83
2678.20	90.00	10.83
2832.40	90.00	10.83
2986.00	90.00	10.83
3140.80	90.00	10.83
3295.00	90.00	10.83
3449.20	90.00	10.83
3603.40	90.00	10.83
3757.60	90.00	10.83
3911.80	90.00	10.83
4066.00	90.00	10.83

Tailwater Channel Data - PR-DC 10x8

Tailwater Channel Option: Enter Constant Tailwater Elevation
Constant Tailwater Elevation: 90.00 ft

Roadway Data for Crossing: PR-DC 10x8

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 240.00 ft
Crest Elevation: 94.30 ft
Roadway Surface: Paved
Roadway Top Width: 118.00 ft

Proposed 4 - 11'x8' CBC

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

50-yr Minimum Flow: 2524 cfs

100-yr Design Flow: 2986 cfs

500-yr Maximum Flow: 4066 cfs

Table 1 - Summary of Culvert Flows at Crossing: PR-DC 11x8

Headwater Elevatio	Total Discharge (c	Culvert 1 Dischar (cfs)	Roadway Dischar (cfs)	Iterations
91.33	2524.00	2524.00	0.00	1
91.50	2678.20	2678.20	0.00	1
91.68	2832.40	2832.40	0.00	1
91.87	2986.00	2986.00	0.00	1
92.06	3140.80	3140.80	0.00	1
92.27	3295.00	3295.00	0.00	1
92.49	3449.20	3449.20	0.00	1
92.72	3603.40	3603.40	0.00	1
92.96	3757.60	3757.60	0.00	1
93.20	3911.80	3911.80	0.00	1
93.46	4066.00	4066.00	0.00	1
94.30	4532.21	4532.21	0.00	Overtopping

Rating Curve Plot for Crossing: PR-DC 11x8

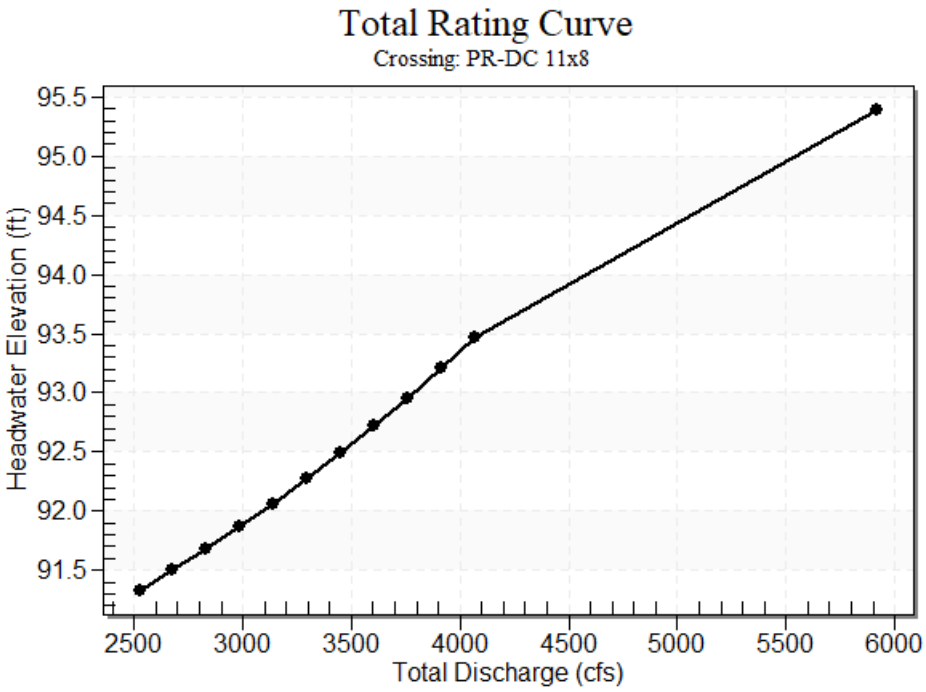


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2524.00	2524.00	91.33	7.902	11.234	4-FF	3.305	4.675	8.000	10.830	7.170	0.000
2678.20	2678.20	91.50	8.242	11.401	4-FF	3.447	4.864	8.000	10.830	7.609	0.000
2832.40	2832.40	91.68	8.584	11.579	4-FF	3.587	5.049	8.000	10.830	8.047	0.000
2986.00	2986.00	91.87	8.929	11.766	4-FF	3.725	5.230	8.000	10.830	8.483	0.000
3140.80	3140.80	92.06	9.282	11.965	4-FF	3.862	5.409	8.000	10.830	8.923	0.000
3295.00	3295.00	92.27	9.640	12.173	4-FF	3.998	5.584	8.000	10.830	9.361	0.000
3449.20	3449.20	92.49	10.006	12.390	4-FF	4.132	5.757	8.000	10.830	9.799	0.000
3603.40	3603.40	92.72	10.381	12.618	4-FF	4.266	5.928	8.000	10.830	10.237	0.000
3757.60	3757.60	92.96	10.766	12.856	4-FF	4.398	6.096	8.000	10.830	10.675	0.000
3911.80	3911.80	93.20	11.162	13.103	4-FF	4.529	6.261	8.000	10.830	11.113	0.000
4066.00	4066.00	93.46	11.570	13.361	4-FF	4.659	6.425	8.000	10.830	11.551	0.000

****

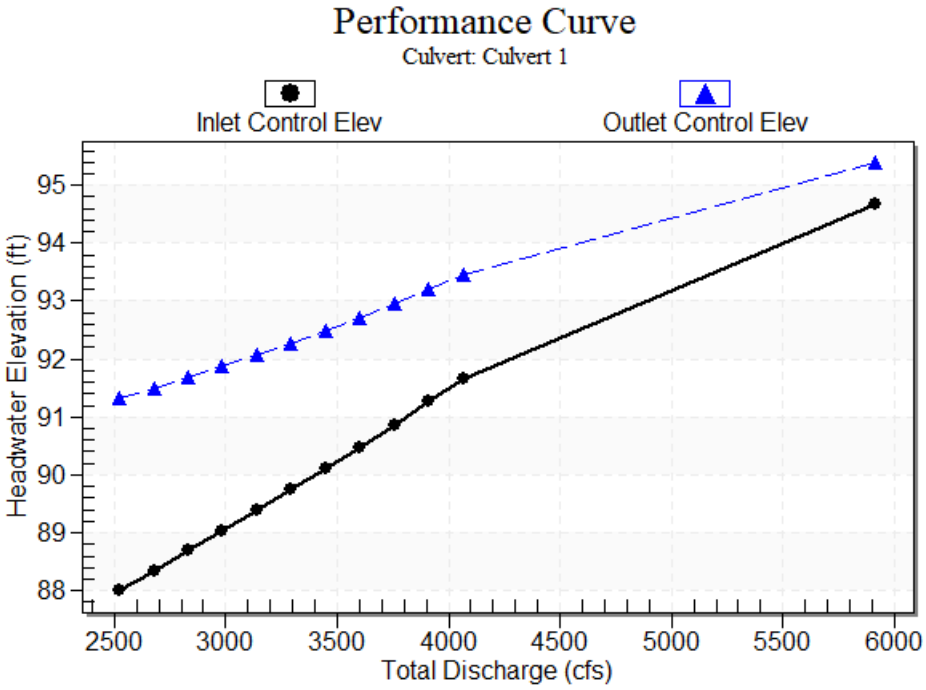
Straight Culvert

Inlet Elevation (invert): 80.10 ft, Outlet Elevation (invert): 79.17 ft

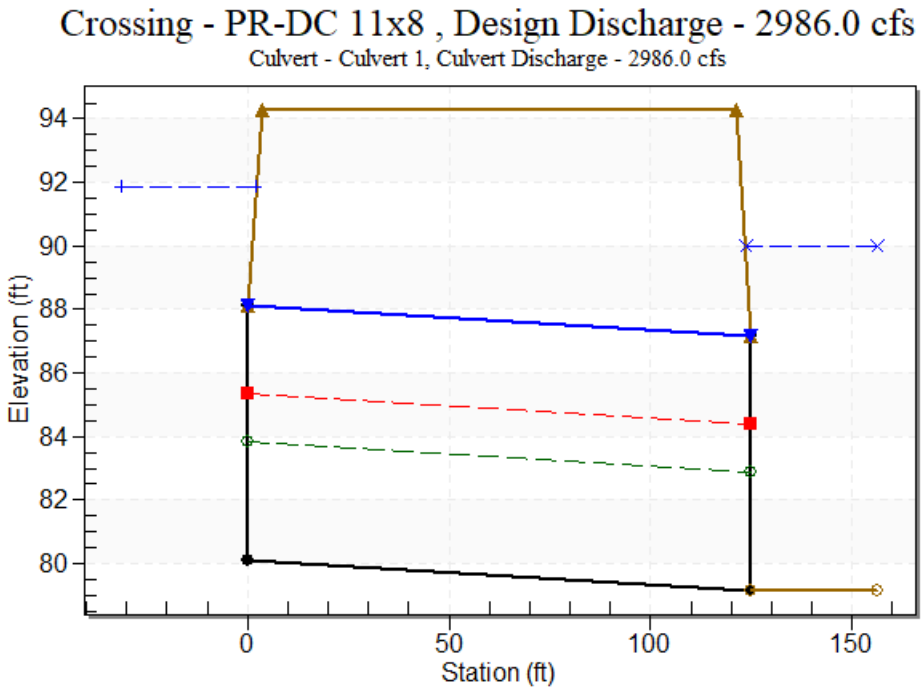
Culvert Length: 125.00 ft, Culvert Slope: 0.0074

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 80.10 ft
Outlet Station: 125.00 ft
Outlet Elevation: 79.17 ft
Number of Barrels: 4

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box
Barrel Span: 11.00 ft
Barrel Rise: 8.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: PR-DC 11x8)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
2524.00	90.00	10.83
2678.20	90.00	10.83
2832.40	90.00	10.83
2986.00	90.00	10.83
3140.80	90.00	10.83
3295.00	90.00	10.83
3449.20	90.00	10.83
3603.40	90.00	10.83
3757.60	90.00	10.83
3911.80	90.00	10.83
4066.00	90.00	10.83

Tailwater Channel Data - PR-DC 11x8

Tailwater Channel Option: Enter Constant Tailwater Elevation
Constant Tailwater Elevation: 90.00 ft

Roadway Data for Crossing: PR-DC 11x8

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 240.00 ft
Crest Elevation: 94.30 ft
Roadway Surface: Paved
Roadway Top Width: 118.00 ft

Proposed 4 - 12'x8' CBC

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

50-yr Minimum Flow: 2524 cfs

100-yr Design Flow: 2986 cfs

500-yr Maximum Flow: 4066 cfs

Table 1 - Summary of Culvert Flows at Crossing: PR-DC 12x8

Headwater Elevatio	Total Discharge (c	Culvert 1 Dischar (cfs)	Roadway Dischar (cfs)	Iterations
91.12	2524.00	2524.00	0.00	1
91.26	2678.20	2678.20	0.00	1
91.40	2832.40	2832.40	0.00	1
91.56	2986.00	2986.00	0.00	1
91.73	3140.80	3140.80	0.00	1
91.90	3295.00	3295.00	0.00	1
92.08	3449.20	3449.20	0.00	1
92.27	3603.40	3603.40	0.00	1
92.47	3757.60	3757.60	0.00	1
92.68	3911.80	3911.80	0.00	1
92.89	4066.00	4066.00	0.00	1
94.30	4956.02	4956.02	0.00	Overtopping

Rating Curve Plot for Crossing: PR-DC 12x8

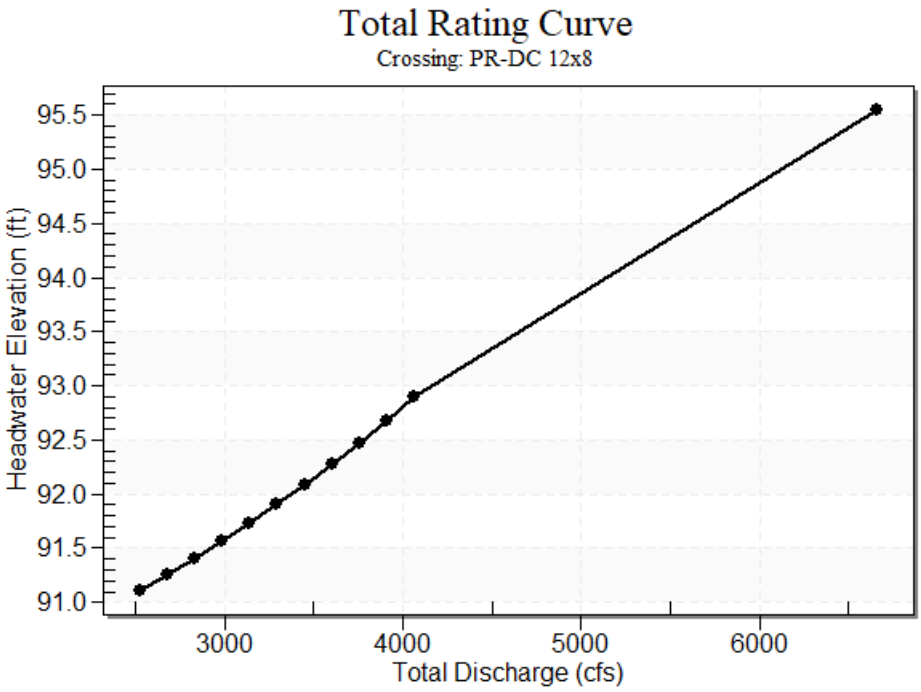


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2524.00	2524.00	91.12	7.440	11.015	4-FF	3.065	4.412	8.000	10.830	6.573	0.000
2678.20	2678.20	91.26	7.750	11.156	4-FF	3.194	4.590	8.000	10.830	6.974	0.000
2832.40	2832.40	91.40	8.061	11.304	4-FF	3.322	4.764	8.000	10.830	7.376	0.000
2986.00	2986.00	91.56	8.372	11.461	4-FF	3.447	4.935	8.000	10.830	7.776	0.000
3140.80	3140.80	91.73	8.689	11.627	4-FF	3.572	5.104	8.000	10.830	8.179	0.000
3295.00	3295.00	91.90	9.007	11.801	4-FF	3.695	5.270	8.000	10.830	8.581	0.000
3449.20	3449.20	92.08	9.330	11.983	4-FF	3.817	5.433	8.000	10.830	8.982	0.000
3603.40	3603.40	92.27	9.659	12.173	4-FF	3.937	5.594	8.000	10.830	9.384	0.000
3757.60	3757.60	92.47	9.995	12.372	4-FF	4.057	5.752	8.000	10.830	9.785	0.000
3911.80	3911.80	92.68	10.338	12.579	4-FF	4.176	5.908	8.000	10.830	10.187	0.000
4066.00	4066.00	92.89	10.690	12.794	4-FF	4.294	6.063	8.000	10.830	10.589	0.000

****

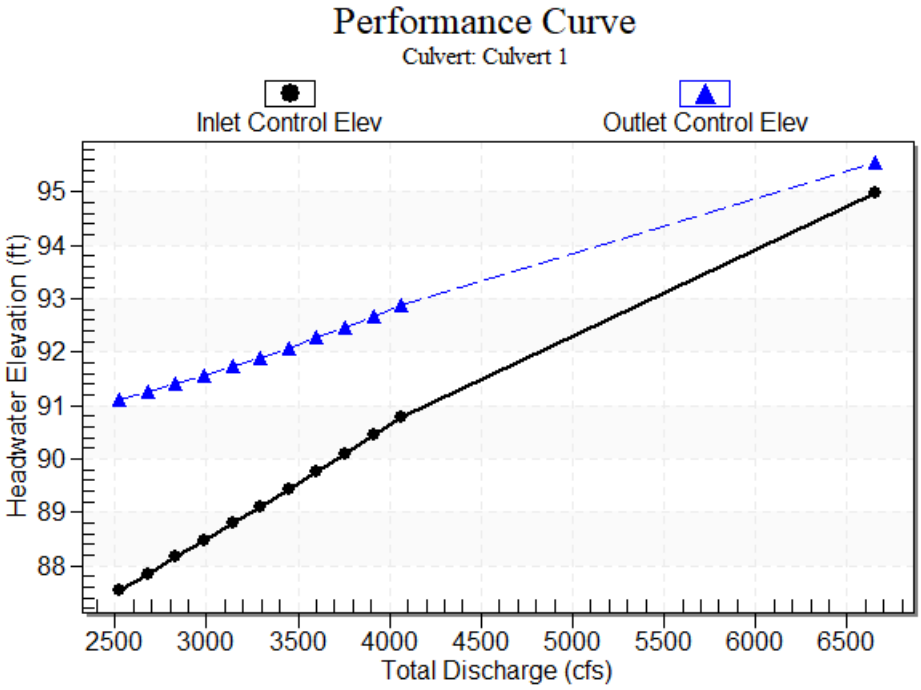
Straight Culvert

Inlet Elevation (invert): 80.10 ft, Outlet Elevation (invert): 79.17 ft

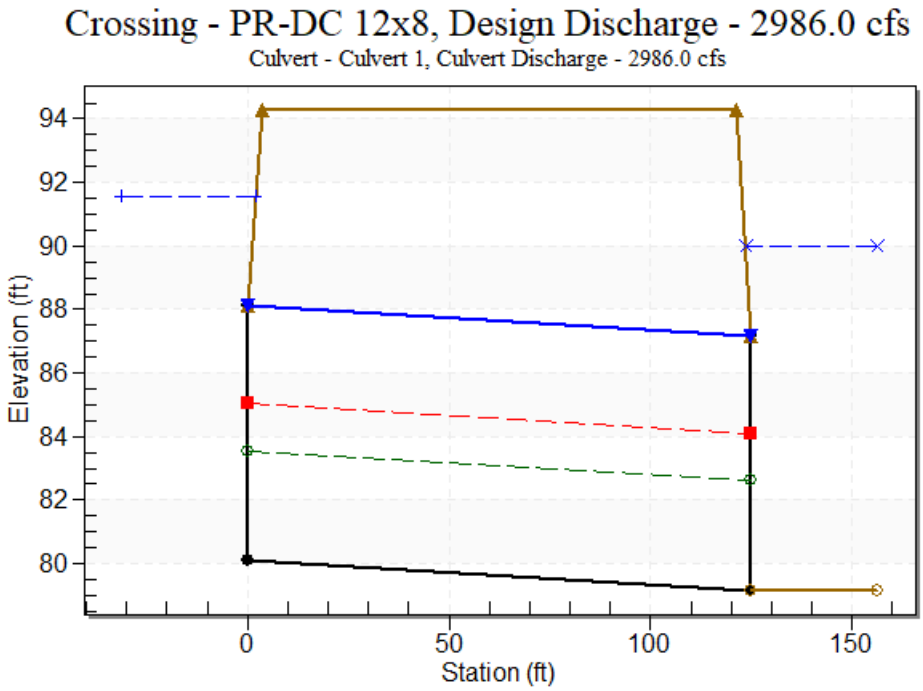
Culvert Length: 125.00 ft, Culvert Slope: 0.0074

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 80.10 ft
Outlet Station: 125.00 ft
Outlet Elevation: 79.17 ft
Number of Barrels: 4

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box
Barrel Span: 12.00 ft
Barrel Rise: 8.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: PR-DC 12x8)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
2524.00	90.00	10.83
2678.20	90.00	10.83
2832.40	90.00	10.83
2986.00	90.00	10.83
3140.80	90.00	10.83
3295.00	90.00	10.83
3449.20	90.00	10.83
3603.40	90.00	10.83
3757.60	90.00	10.83
3911.80	90.00	10.83
4066.00	90.00	10.83

Tailwater Channel Data - PR-DC 12x8

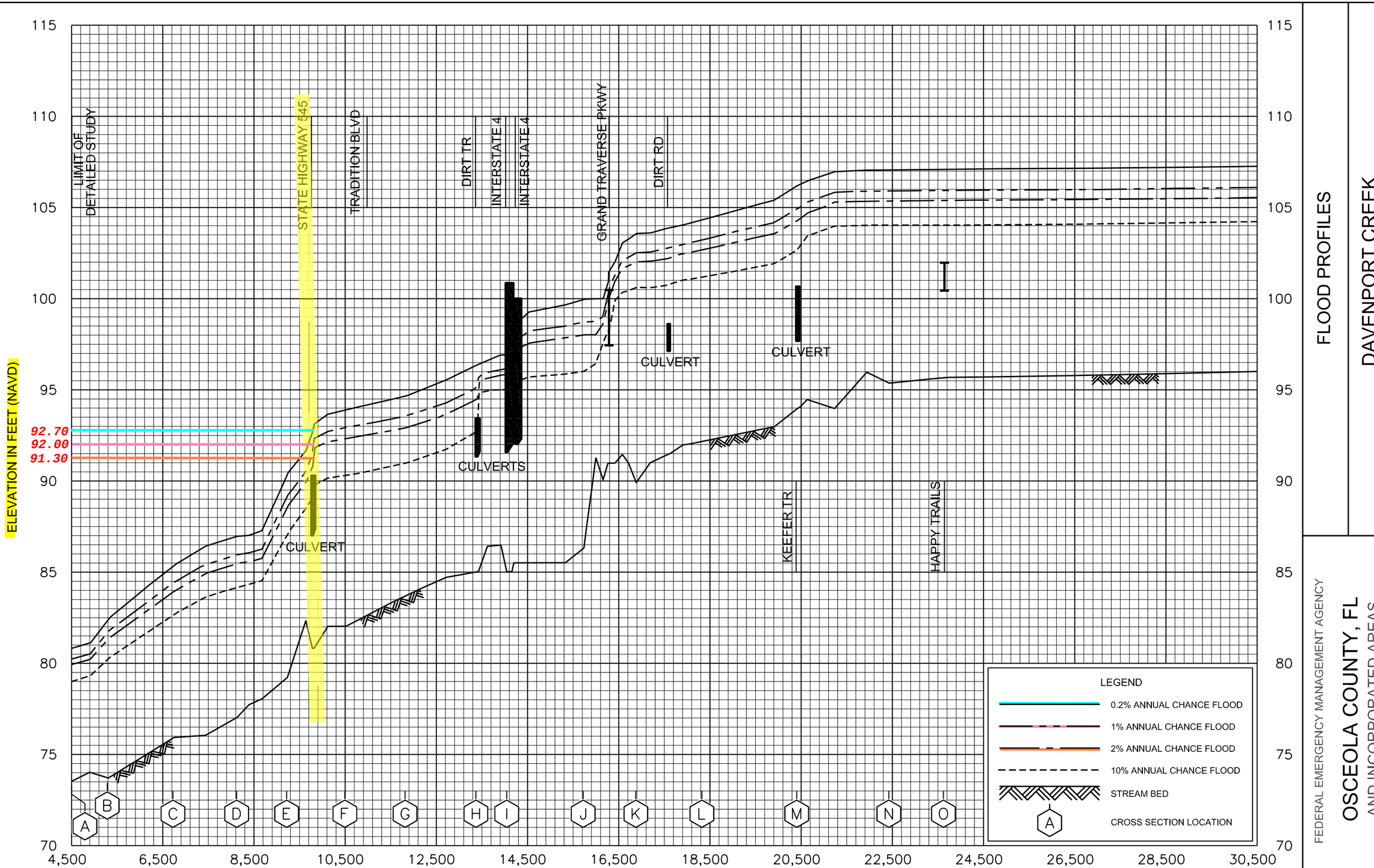
Tailwater Channel Option: Enter Constant Tailwater Elevation
Constant Tailwater Elevation: 90.00 ft

Roadway Data for Crossing: PR-DC 12x8

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 240.00 ft
Crest Elevation: 94.30 ft
Roadway Surface: Paved
Roadway Top Width: 118.00 ft

FLOOD PROFILES

DAVENPORT CREEK



FEDERAL EMERGENCY MANAGEMENT AGENCY

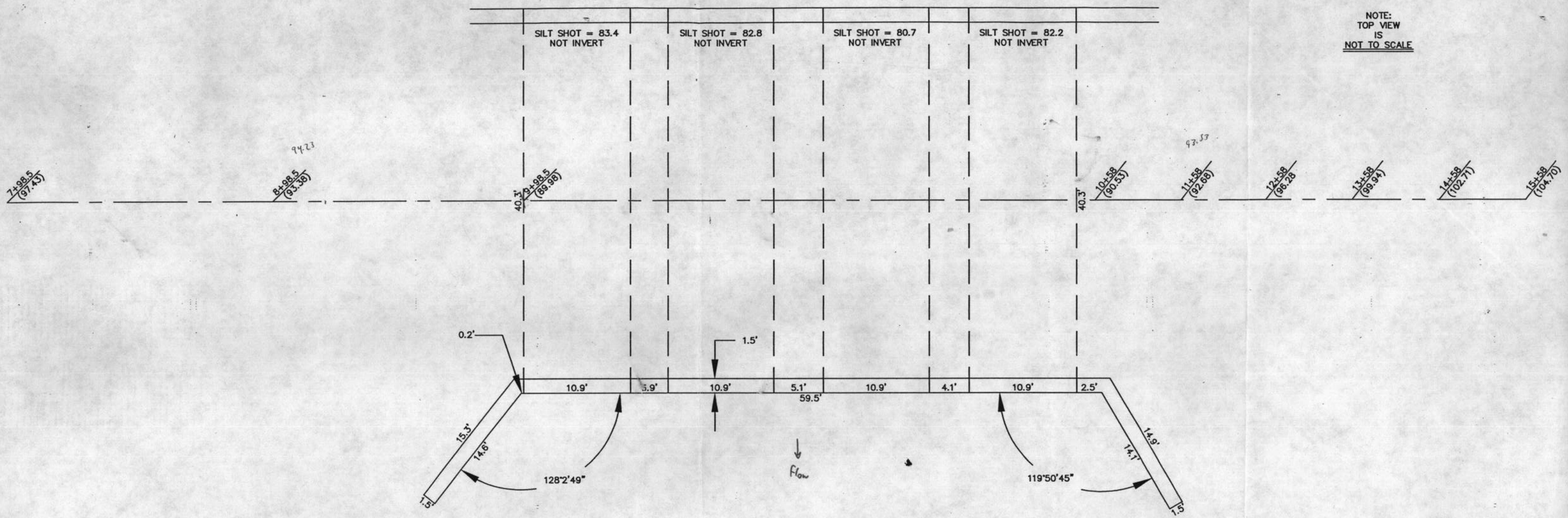
OSCEOLA COUNTY, FL

AND INCORPORATED AREAS

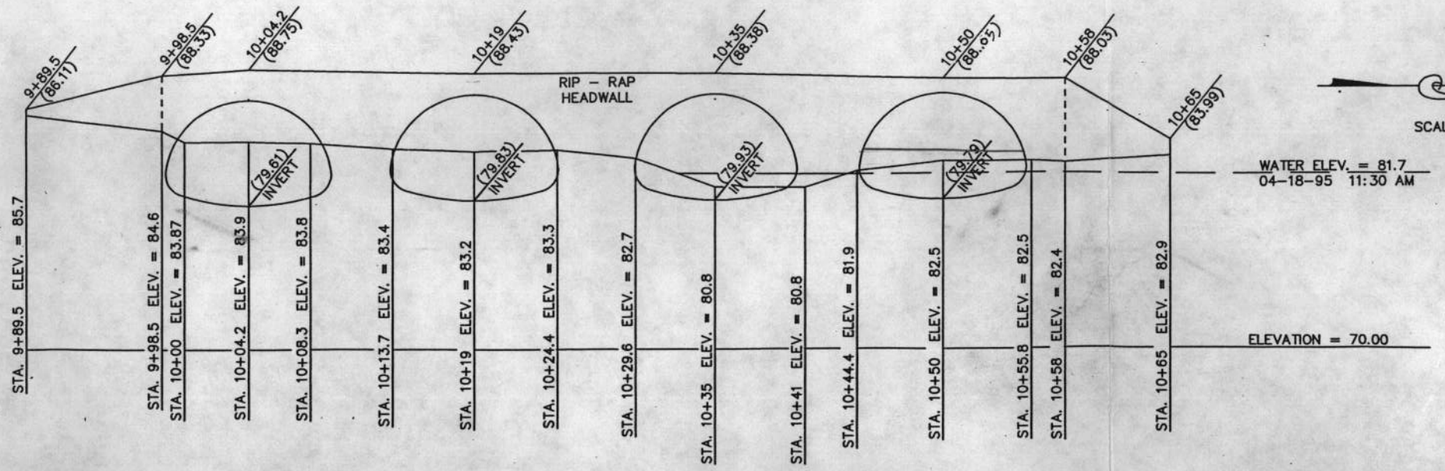
118

SECTION 34, TOWNSHIP 25 SOUTH, RANGE 27 EAST
1200±' SOUTH OF THE NORTH LINE OF SECTION 34,
AND ON THE LINE OF SECTION 34, EAST OVER DAVENPORT CREEK BASIN

NOTE:
TOP VIEW
IS
NOT TO SCALE



ALL STRUCTURES ARE
7.1'X 10.92' ARCH PIPES



SCALE: 1" = 10'

(15.00) DENOTES ELEVATIONS BASED ON N.A.V.D. 1988

FIELD BOOK OSCEOLA "F" PAGES 2–5

QUAD: INTERCESSION CITY FLA.

DEGROVE SURVEYORS, INC.
2155 ART MUSEUM DRIVE
JACKSONVILLE, FLORIDA, 32207
(904) 396–8606

T. 25 S.

Oak Island

BR 106

92

96

100

101

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103

104

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122

123

BM 118

BM 113

Buck Lake

Lake Wilson

Creek

Water Tank

Fishers Island

Bunker Hill

Reedy Lake

DAVENPORT

ORE K SWAMP

Dave Port Creek

Creek

Big Island

Trailer Park

Ch

14 72 A51 RM1
14 72 A51 RM2
14 72 A50 RM1
14 72 A50 RM2
14 F4 (14 G4
14 72 A49 RM2
14 72 A49
14 D4
14 E4
14 72 A48
14 72 A48 RM2
14 C4
14 72 A47
14 72 A47 RM1
14 72 A47 RM2
14 72 A46 RM1
14 72 A46 RM2
14 B4
14 72 A46
14 A4
14 72 A45 RM1
14 72 A45 RM2
14 Y3 142 23
14 Z3 142 SD

OSCEOLA CO
POLK CO

T. 25 S.
T. 26 S.

4640 I SW
(LAKE LOUISA S.W.)

2 MI. TO U.S. 27

LOUGHMAN 3 MI.
LOUGHMAN 1.9 MI.

(DAVENPORT)
4640 II NE

430 000 FEET
(EAST)

300 000 FEET (EAST)

28°15'
81°37'30"

17'30"

20'

35'

Mapped, edited, and published by the Geological Survey

SCALE 1:24

Attachment A - Summary of Discharges

Stream	Location	Drainage Area (mi^2)	Peak Discharges (cfs)			
			10-year	50-year	100-year	500-year
Davenport Creek	at mouth (cross section 123)	27.13	2126	3396	3991	5320
	at cross section 121	26.73	1932	3099	3648	4866
	at gage (State Road 545)	25.56	1516	2524	2986	4066
	at cross section 116	25.28	1496	2511	2970	4042
	at cross section 115	24.94	1487	2491	2944	4006
	at cross section 109	22.49	1417	2368	2798	3813
	at cross section 107	22.20	1416	2358	2785	3791
	at cross section 103+104	14.88	363	628	820	1346
	at cross section 101	8.53	898	1466	1718	2341
	at A-19 C subasin outfall	6.37	441	689	801	1078
	at cross section 99	5.54	389	578	663	871
	at Oak Island Rd (cross section 94)	0.40	9	18	21	178
Davenport Tributary 1	at cross section 95	3.96	95	224	348	693
Davenport Tributary 2	at cross section 100	1.56	679	1066	1239	1626

RIVERINE HYDRAULIC ANALYSIS FORM

Attachment B: Culvert Information

Community Name: Osceola County

Flooding Source: Davenport Creek

Roadway/Railroad Name: State Road 545

Hydraulic Model Used: HEC-2 Special Culvert Routine

Location (in terms of stream distance or cross-section identifier): cross section 6.0 (gage point)

Culvert Sheet 1 **of** 7

Shape	Material	Number of Barrels	Span Ft	Rise Ft	Space Between Barrels Ft	Length of Barrel Ft	Upstream Invert Elevation Ft	Downstream Invert Elevation Ft
arch pipes	Concrete	4	10.92	7.1	5	40.3	80.1	79.8

Inlet Geometry			Manning's "n" Coefficients			Velocity Distribution Coefficient	Entrance Loss Coefficient	Friction Loss Coefficient	Pier Loss Coefficient
Wingwall Angle	Headwall (width)	Other	Downstream	Through Culvert	Upstream				
128°	59.5 ft	—	0.035	0.013	0.035	—	0.50	—	—

Weir Coefficient	Orifice Coefficient	Total Loss Coefficient	Contraction Loss Coefficient	Expansion Loss Coefficient	Road Elevation at Stream Centerline Ft	Minimum Road Elevation Ft
3.0	—	—	0.6	0.8	90.3	89.98

100-year Flood Discharge			100-year Flood Elevations (Ft)					
Total Discharge cfs	Discharge Due to Low or Pressure Flow	Discharge Due to Weir Flow	Elevation of Upstream Energy Gradient	Elevation of Downstream Energy Gradient	Upstream Water-Surface Elevation	Downstream Water-Surface Elevation	Upstream Floodway Water-Surface Elevation	Downstream Floodway Water-Surface Elevation
2986	1758	1229	92.54	91.62	92.27	91.26	92.83	91.60

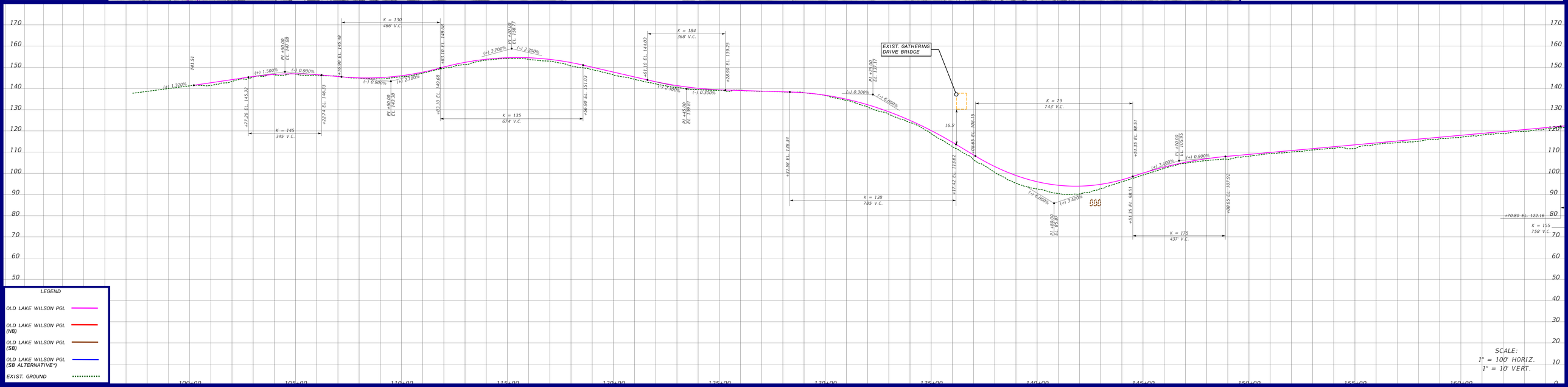
100-year Flood Widths (Ft)					
Topwidth Upstream Floodplain	Weir Length	Topwidth Downstream Floodplain	Topwidth Upstream Floodway	Floodway Weir Length	Topwidth Downstream Floodway
241.75	229	219.62	70.74	71	70.74

OLD LAKE WILSON ROAD FROM CR 532 TO SINCLAIR ROAD TYPICAL 2

LEGEND

- EXISTING R/W LINE
- PROPOSED R/W LINE
- PROPOERTY LINE
- TO BE CONSTRUCTED BY OTHERS

DESIGN SPEED = 45 MPH



LEGEND

- OLD LAKE WILSON PGL
- OLD LAKE WILSON PGL (NB)
- OLD LAKE WILSON PGL (SB)
- OLD LAKE WILSON PGL (SB ALTERNATIVE*)
- EXIST. GROUND

SCALE:
1" = 100' HORIZ.
1" = 10' VERT.

Appendix F

Correspondence

From: Rick Cole <Rick.Cole@osceola.org>
Sent: Tuesday, September 14, 2021 2:01 PM
To: Joshua DeVries <Joshua.Devries@OSCEOLA.ORG>
Cc: Susan E Gosselin <susan.gosselin@OSCEOLA.ORG>; David Dangel <ddangel@inwoodinc.com>
Subject: RE: Old Lake Wilson Road History of Flooding

Josh,

Road & Bridge has no history of flooding within the project limits shown on the map. Thank you

Rick Cole
Road & Bridge Assistant Director
Osceola County Florida
O: (407) 742-7500
F: (407) 891-1795
rick.cole@osceola.org
www.osceola.org

From: Joshua DeVries <Joshua.Devries@OSCEOLA.ORG>
Sent: Tuesday, September 14, 2021 1:44 PM
To: Rick Cole <Rick.Cole@osceola.org>
Cc: Susan E Gosselin <susan.gosselin@OSCEOLA.ORG>; David Dangel <ddangel@inwoodinc.com>
Subject: FW: Old Lake Wilson Road History of Flooding

Rick,

Susan mentioned that you might be able to assist with the below highlighted question asking us to verify that there is no history of flooding within the project limits. I have attached a map showing the project limits in blue. Any assistance is greatly appreciated.

Thank You,

Joshua DeVries, AICP
Director of Planning / Sr. Planner
Department of Transportation and Transit
Osceola County Government
1 Courthouse Square, Suite 3100
Kissimmee, FL 34741
Phone: 407.742.7813
Fax: 407.742.0204
Joshua.DeVries@Osceola.org

From: David Dangel <ddangel@inwoodinc.com>
Sent: Tuesday, September 14, 2021 9:55 AM
To: Joshua DeVries <Joshua.Devries@OSCEOLA.ORG>
Subject: FW: Old Lake Wilson Road History of Flooding

Josh,

Please see the question below from PGA. Is there someone at the County that would be good for them to contact about any kind of flooding history on Old Lake Wilson Road?

David

From: Jen Rehrl <Jen.Rehrl@patelgreene.com>
Sent: Tuesday, September 14, 2021 9:39 AM
To: David Dangel <ddangel@inwoodinc.com>
Cc: Michael Holt <Michael.Holt@patelgreene.com>
Subject: Old Lake Wilson Road History of Flooding

Good morning, David,

I am working on the Old Lake Wilson Road LHR and PSR. We received a comment during our QC that we need to contact Osceola County to verify that there is no history of flooding within the project limits. Do you have a contact at the County that could help answer this question (we will copy you on our email to the County to keep you in the loop)? If you would prefer to email the County directly, that would work too.

Thanks for your help.

Jennifer Rehrl
Engineer Intern II

Patel, Greene & Associates, LLC (PGA)
280 W. Canton Avenue, Suite 400, Winter Park, FL 32789
Office: (407) 720-7420, Ext. 408 | Cell: (863) 242-6029 | Email: Jen.Rehrl@patelgreene.com

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