August 2010

PF 225 Phase II

Summary Report

Fence Segments O1, O2, O3

Rio Grande Floodplain Analysis

Starr County and Hidalgo County, TX

Contract No. W9126G-07-D-0009

Prepared for

Department of the Army
Engineering & Construction Support Office
United States Army Corps of Engineers
Fort Worth, TX

Prepared by:

Michael Baker Jr., Inc.
Phoenix, Arizona

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DEPARTMENT OF THE ARMY
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August 2010

PROJECT NO. 112319

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Baker

1.0 INTRODUCTION AND PURPOSE

This summary report has been prepared for the United States Army Corps of Engineers' project PF-225 Phase II and specifically addresses fence segments RGV-RGC-1 (Segment O-1), RGV-RGC-2 (Segment O-2), and RGV-MCS-1 (Segment O-3). These segments are located along the International Boundary between the State of Texas and the Republic of Mexico. The Rio Grande forms the International Boundary at these locations.

The purpose of this summary report is to demonstrate that the proposed fence segments satisfy treaty requirements for the Mexico side of the floodplain and that the influence of the proposed fence alignments is minimal on the existing floodplain for the US side of the border while generally conforming to treaty requirements. This report summarize the research, design analysis, and floodplain mapping completed for the O-1, O-2, and O-3 fence segments by Michael Baker Jr., Inc. (Baker). A statement of conclusions based on the Baker efforts is also provided. This paper is based on the following documents:

a) PF 225 Fence Segments O1-O2-O3, Recommendations for Hydraulic Modeling of Impacts From A proposed Bollard Fence Within The Rio Grande Floodplain Using HEC-RAS, May 2008, by Michael Baker Jr., Inc. (Reference 1)
b) PF 225 Phase II Final Drainage Report, Fence Segments O1, O2, O3, Rio Grande Floodplain Analysis, December 2009, by Michael Baker Jr., Inc. (Reference 2)
c) Project Memorandum for PF 225 Phase II Fence Segments O-1, O-2 and O-3 Rio Grande Floodplain, January 15, 2010, by Michael Baker Jr., Inc. (Reference 3)

The specific location for each fence segment is as follows. Fence segment O-1 is located (b) (7)(E) [redacted]. Fence segment O-2 is located approximately (b) (7)(E) [redacted]. Fence segments O-1 and O-2 are (b) (7)(E) [redacted]. Fence segment O-3 is located approximately (b) (7)(E) [redacted]

The Tactical Infrastructure (TI) to be constructed includes pedestrian fence which, due to its configuration, would influence the flow of the Rio Grande as the fence will be located within the existing floodplain. The height of the proposed fence will be approximately (b) (7) [redacted]

2.0 BACKGROUND INFORMATION

No hydrologic analysis was performed as part of the Baker report. The Rio Grande design discharge of 240,000 cfs was used in the study as directed by the United States International Boundary and Water Commission (USIBWC) and was adopted for the hydraulic analysis of the fence locations. This discharge value is based on the flooding event produced by Hurricane Beulah in 1967.

Following is a summary of the analyses and submittals produced for the O-1, O-2, O-3 project.

1) March 28, 2008: the first report for O-1, O-2, O-3 was submitted for review. In this report, the fence was modeled as follows:

(b) (5), (b) (4)

2) May 6, 2008: A white paper was prepared by (b) (6), a Baker Employee, discussing various modeling approaches for the fence and concluded (b) (5), (b) (4).

3) May 9, 2008: USIBWC sent Baker a new existing condition model for use in modeling the fences. (b) (5), (b) (4).

4) May 30, 2008: FM&E investigated whether a (b) (5), (b) (4) would be a viable alternative. The (b) (5), (b) (4)

5) May 27, 2009: The following was decided:
   a) (b) (5), (b) (4)

6) August 6, 2009: A meeting was held with CBP, FME, and USIBWC to discuss the results of new analyses that were (b) (4), (b) (5).

7) December 2009: A (b) (4), (b) (5).

8) January 2010: Meeting held with CBP, FME, USACE, and Baker to discuss the status of (b) (5), (b) (4) [redacted]

9) January 15, 2010: A white paper was prepared by Baker addressing (b) (4), (b) (5) [redacted]

3.0 HYDRAULIC ANALYSIS AND FENCE ALIGNMENT

An existing conditions hydraulic model was prepared by the USIBWC prior to the PF 225 Phase II project. The (b) (4) [redacted] model for the lower reach of the Rio Grande was developed by the USIBWC and provided to Baker. Baker used the USIBWC model (b) (4) [redacted]

Various trial alignments of the O-1, O-2 and O-3 fence segments were analyzed with (b) (4) [redacted] to determine the hydraulic impacts and floodplain extents. Baker presented the results to the United States Customs and Border Patrol (USCBP) and USIBWC on August 6, 2009 at a meeting in Edinburg, Texas. This was followed by another meeting with USIBWC on September 2, 2009 at El Paso, Texas to discuss modeling assumptions and results.

A follow-up meeting was held on September 15, 2009 in Edinburg, Texas where the USCBP presented (b) (4), (b) (5) [redacted]

The goal of the design was to keep changes to water surface elevations, velocities, and deflections to a minimum between the existing and proposed conditions. (b) (4), (b) (5) [redacted]

The proposed conditions (b) (4) [redacted] for each of the three segments was created by starting with the (b) (4), (b) (5) [redacted]

(b) (4), (b) (5) . When comparing the water surface elevations on either side of the fence, it was determined that (b) (4), (b) (5)

3.1 Fence Segment O-1

The preferred fence alignment extends along (b) (5) Total length of the (b) (4), (b) (5) miles and includes (b) (4), (b) (5) from the (b) (4), (b) (5) . The actual fence length is approximately (b) miles. A downstream boundary water surface elevation condition of (b) (4), (b) (5)

See Appendix A for exhibits discussed below. Each exhibit provides an aerial image of the Rio Grande, the cross section location, the existing and proposed floodplain limits, the proposed fence location, and a summary table comparing the pre- vs. post- hydraulic analysis.

(b) (4), (b) (5)

3.2 Fence Segment O-2

The preferred fence alignment extends along (b) (5) Total length of the detailed (b) (4), (b) (5) miles. Additional cross-sections (b) (4), (b) (5) The actual fence length is approximately (b) miles.

Several alternatives using different opening sizes within the fence were studied. The optimal results were obtained using (b) (4), (b) (5), (b) (7) which provided an appropriate balance between the magnitude of hydraulic impacts and security concerns related to the fence opening.

See Appendix B for exhibits discussed below. Each exhibit provides an aerial image of the Rio Grande, the cross section location, the existing and proposed floodplain limits, the proposed fence location, and a summary table comparing the pre- vs. post- hydraulic analysis.

(b) (4), (b) (5)

3.3 Fence Segment O-3

The proposed fence alignment for Segment O-3 was place (b) (4), (b) (5)

The total length of the (b) (4), (b) (5) miles and includes additional cross-sections (b) (4), (b) (5)

.

The hydraulic impacts of the various fence openings were (b) (4), (b) (5)

See Appendix C for exhibits discussed below. Each exhibit provides an aerial image of the Rio Grande, the cross section location, the existing and proposed floodplain limits, the proposed fence location, and a summary table comparing the pre- vs. post- hydraulic analysis.

(b) (4), (b) (5)

(b) (4), (b) (5) [redacted]

4.0 CONCLUSIONS

Based on the detailed hydraulic analysis of the three proposed fence Segments O-1, O-2 and O-3 along the Rio Grande, the hydraulic impacts resulting in terms of changes in water surface elevations, deflections, and flow velocities were quantified. It was determined that (b) (4), (b) (5) [redacted] for a particular proposed fence segment can be (b) (4), (b) (5) [redacted].

(b) (4), (b) (5) [redacted] The photograph below shows the proposed fence type to be used in the O-1, O-2, and O-3 segments.

(b) (4), (b) (5) [redacted]

In summary, hydraulic modeling indicated that the proposed fence alignments for Segments O-1, O-2 and O-3 will result in (b) (4), (b) (5) [redacted]

APPENDIX A

O1 EXHIBITS

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

Variable	(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)
Water Surface Elevation (feet)	
Deflection	
Overbank Velocity (fps) on US Side	
Floodplain Width (feet)	
Remarks: Design Flow = (b) (4), Source: USIBWC	

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

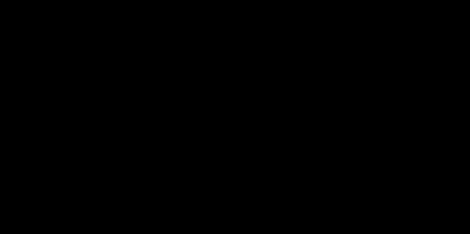
(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

V:\PROJECTS\DHS\112319_PF225 Phase 2\Drainage Reports and dwg\PF225 Phase 2 & COE drainage reports\O-1, O-2, O-3 floodplain analysis\IBWC Lidar Data\Report\July 2010\O1 Baker_IBWC Fence Alignments RS 3578.mxd

Date: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (5), (b) (4), (b) (7)(E), (b) (7)(F)



(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

Variable
Water Surface Elevation (feet)
Deflection
Overbank Velocity (fps) on US Side
Floodplain Width (feet)
Remarks: Design Flow = 2(b) (4), [redacted]s, Source: USIBWC

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

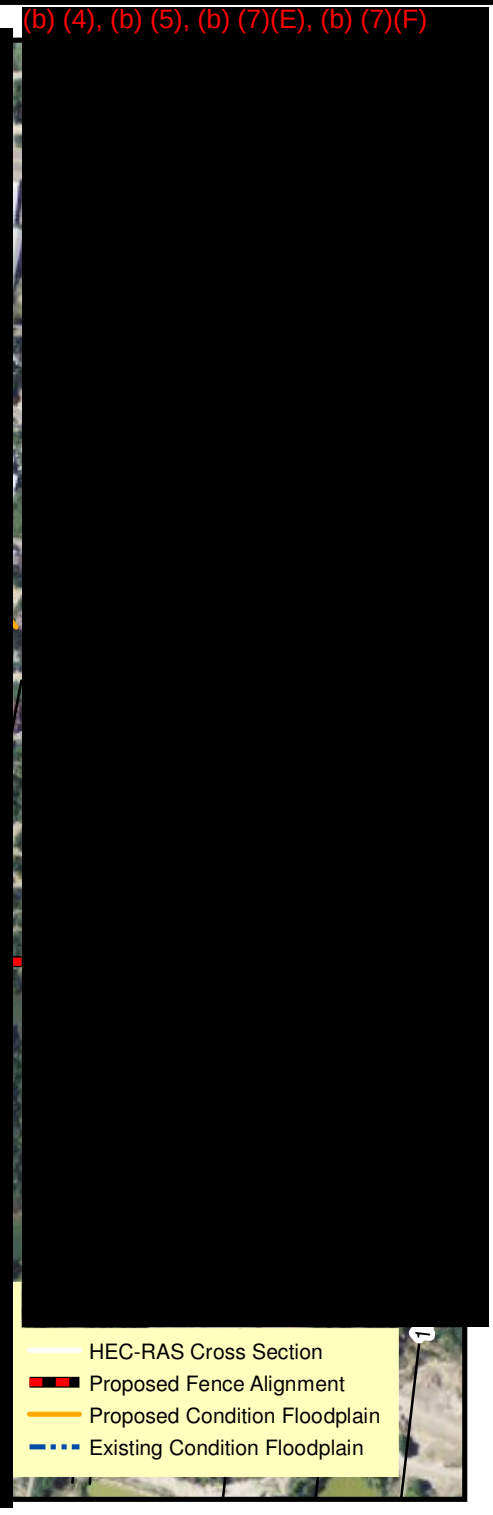
1 inch = 200 ft

V:\PROJECTS\DHS\112319_PF225 Phase 2\Drainage Reports and dwg\PF225 Phase 2 & COE drainage reports\O-1, O-2, O-3 floodplain analysis\IBWC Lidar Data\Report\July 2010\O1 Baker_IBWC Fence Alignments RS 3890.mxd

Date: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)



Variable	(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)
Water Surface Elevation (feet)	
Deflection	
Overbank Velocity (fps) on US Side	
Floodplain Width (feet)	
Remarks: Design Flow = 240,000 cfs, Source: USIBWC	Conclusion:

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

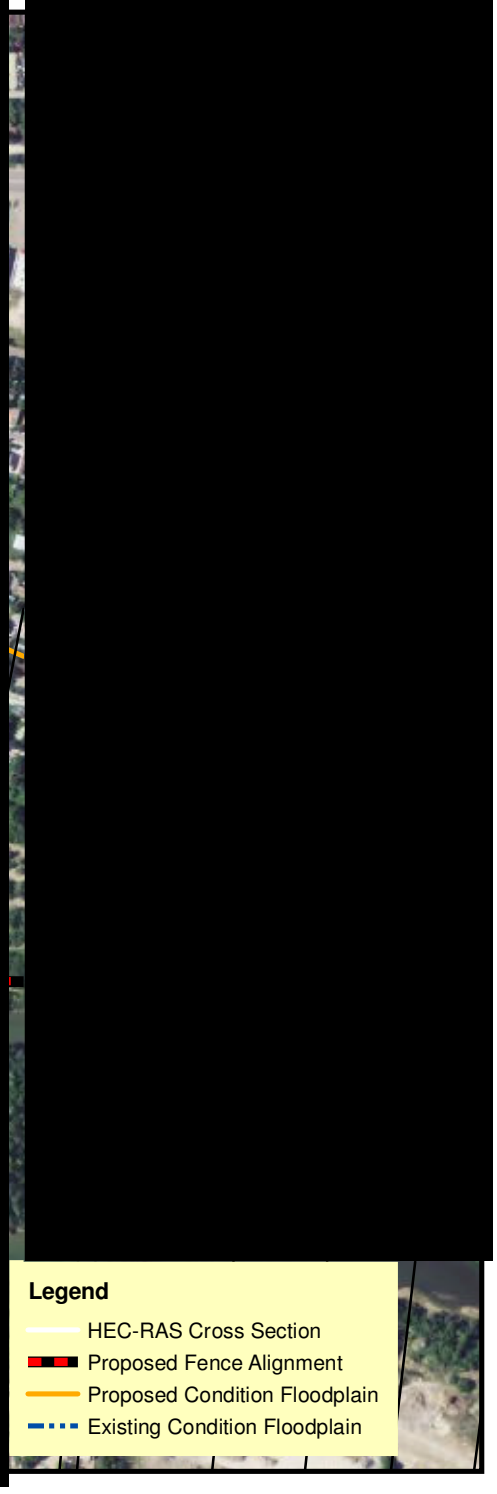
1 inch = 200 ft

V:\PROJECTS\DHS\112319_PF225 Phase 2\Drainage Reports and dwg\PF225 Phase 2 & COE drainage reports\O-1, O-2, O-3 floodplain analysis\IBWC Lidar Data\Report\July 2010\O1 Baker_IBWC Fence Alignments RS 4468.mxd

Date: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)



Variable
Water Surface Elevation (feet)
Deflection
Overbank Velocity (fps) on US Side
Floodplain Width (feet)
Remarks: Design Flow = (b) (4), (b) Source: USIBWC

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

Conclusion:

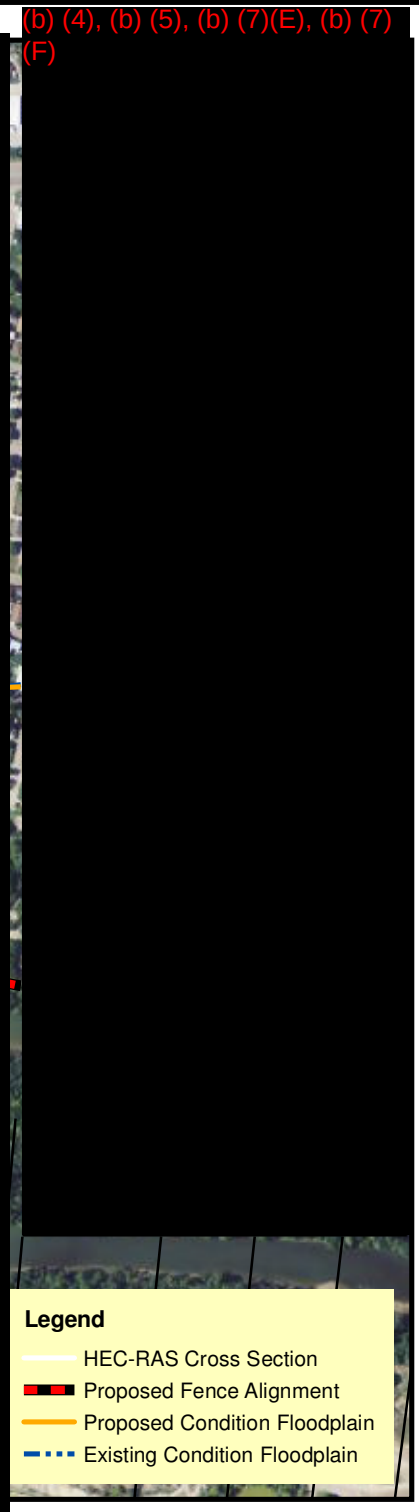
(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

1 inch = 200 ft

V:\PROJECTS\DHS\112319_PF225 Phase 2\Drainage Reports and dwg\PF225 Phase 2 & COE drainage reports\O-1, O-2, O-3 floodplain analysis\IBWC Lidar Data\Report\July 2010\O1 Baker_IBWC Fence Alignments RS 4729.mxd

Date: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)



(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

Variable
Water Surface Elevation (feet)
Deflection
Overbank Velocity (fps) on US Side
Floodplain Width (feet)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

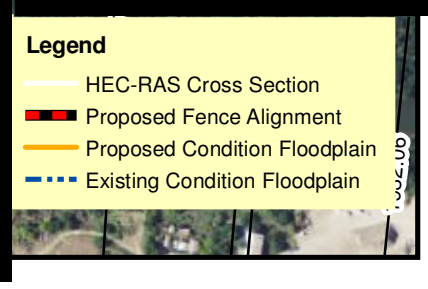
1 inch = 200 ft

V:\PROJECTS\DHS\112319_PF225 Phase 2\Drainage Reports and dwg\PF225 Phase 2 & COE drainage reports\O-1, O-2, O-3 floodplain analysis\IBWC Lidar Data\Report\July 2010\O1 Baker_IBWC Fence Alignments RS 5022.mxd

Date: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)



Variable
Water Surface Elevation (feet)
Deflection
Overbank Velocity (fps) on US Side

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

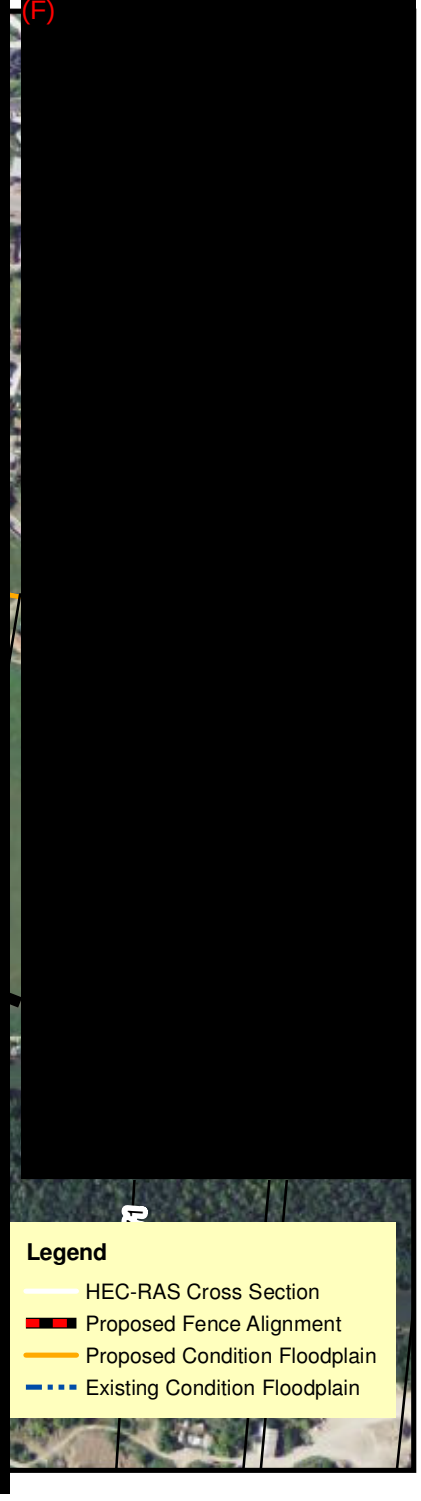
1 inch = 200 ft

V:\PROJECTS\DHS\112319_PF225 Phase 2\Drainage Reports and dwg\PF225 Phase 2 & COE drainage reports\O-1, O-2, O-3 floodplain analysis\IBWC Lidar Data\Report\July 2010\O1 Baker_IBWC Fence Alignments RS 5315.mxd

Date: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)



Variable
Water Surface Elevation (feet)
Deflection
Overbank Velocity (fps) on US Side
Floodplain Width (feet)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

1 inch = 200 ft

V:\PROJECTS\DHS\112319_PF225 Phase 2\Drainage Reports and dwg\PF225 Phase 2 & COE drainage reports\O-1, O-2, O-3 floodplain analysis\IBWC Lidar Data\Report\July 2010\O1 Baker_IBWC Fence Alignments RS 5595.mxd

Date: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

Variable
Water Surface Elevation (feet)
Deflection
Overbank Velocity (fps) on US Side

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

1 inch = 200 ft

Date: August 2010

V:\PROJECTS\DHS\112319_PF225 Phase 2\Drainage Reports and dwg\PF225 Phase 2 & COE drainage reports\O-1, O-2, O-3 floodplain analysis\IBWC Lidar Data\Report\July 2010\O1 Baker_IBWC Fence Alignments RS 5889.mxd

Baker

APPENDIX B

O2 EXHIBITS

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

Variable
Water Surface Elevation (feet)
Deflection
Overbank Velocity (fps) on US Side
Floodplain Width (feet)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

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2 Baker_IBWC Fence Alignments RS 3742.mxd

Date: August 2010

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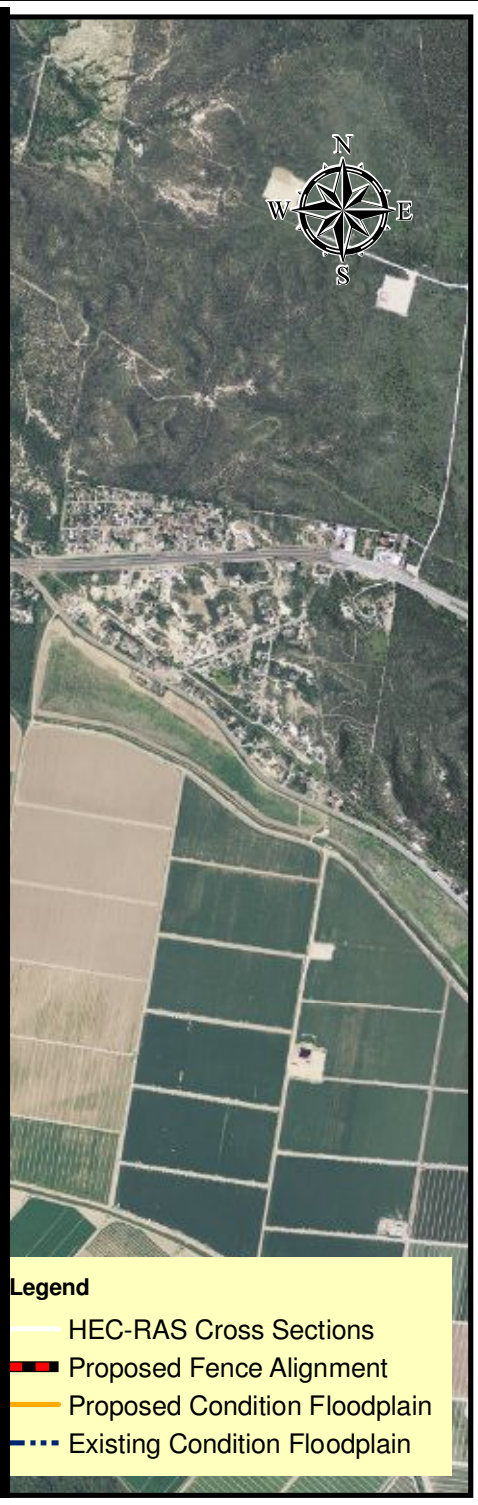

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

Variable
Water Surface Elevation (feet)
Deflection
Overbank Velocity (fps) on US Side

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

1 inch = 400 ft

V:\PROJECTS\DHS\112319_PF225 Phase 2\Drainage Reports and dwg\PF225 Phase 2 & COE drainage reports\O-1, O-2, O-3 floodplain analysis\IBWC Lidar Data\Report\July 2010\O2 Baker_IBWC Fence Alignments RS 4434.mxd

Date: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

Variable	Design Flow with (b) (5), (b) (7)(E),			Impact	
	EXIS COND	PROP COND			
		MX	US	MX	US
Water Surface Elevation (feet)	(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)				
Deflection					
Overbank Velocity (fps) on US Side					

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

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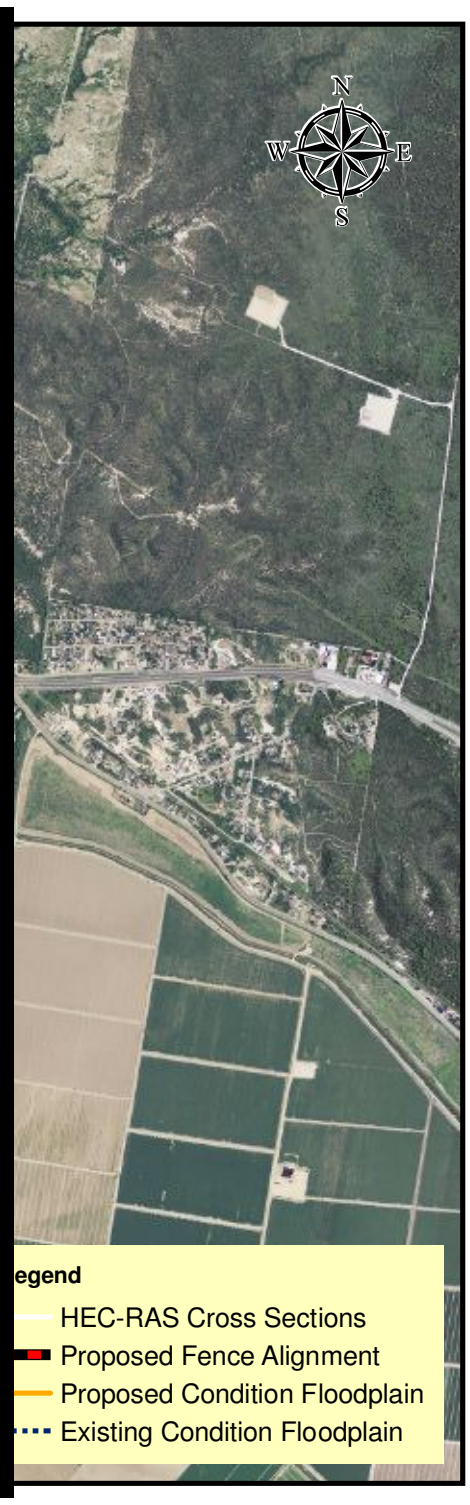
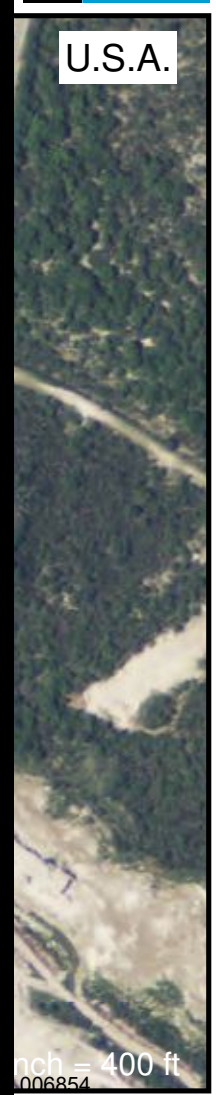
Date: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)



Variable	Design Flow with (b) (7)(F), (b) (7)		Impact
	EXIS COND	PROP COND	
	(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)		
Water Surface Elevation (feet)			
Deflection			
Overbank Velocity (fps) on US Side			
Floodplain Width (feet)			

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)



nch = 400 ft

006854

te: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

Variable	Design Flow with (b) (4), (b) (5), (b) [redacted]		Impact
	EXIS COND	PROP COND	
	(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)		
Water Surface Elevation (feet)			
Deflection			
Overbank Velocity (fps) on US Side			

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

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August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

Variable	Design Flow with (b) (4), (b) (5), (b) [redacted]		Impact
	EXIS COND	PROP COND	
Water Surface Elevation (feet)			
Deflection			
Overbank Velocity (fps) on US Side			
Floodplain Width (feet)			

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

1 inch = 400 ft

BP 006856

Date: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

[redacted]

Variable	Design Flow with (b) (7)(F), (b) (7)(E), [redacted]		Impact
	EXIS COND	PROP COND	
	(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)		
Water Surface Elevation (feet)			
Deflection			
Overbank Velocity (fps) on US Side			

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

[redacted]

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inch = 400 ft

006857

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ate: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

Variable	Design Flow with (b) (4), (b) (5), (b) [redacted]		Impact	
	EXIS COND	PROP COND		
Water Surface Elevation (feet)				
Deflection				
Overbank Velocity (fps) on US Side				
Floodplain Width (feet)				

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

ugust 2010

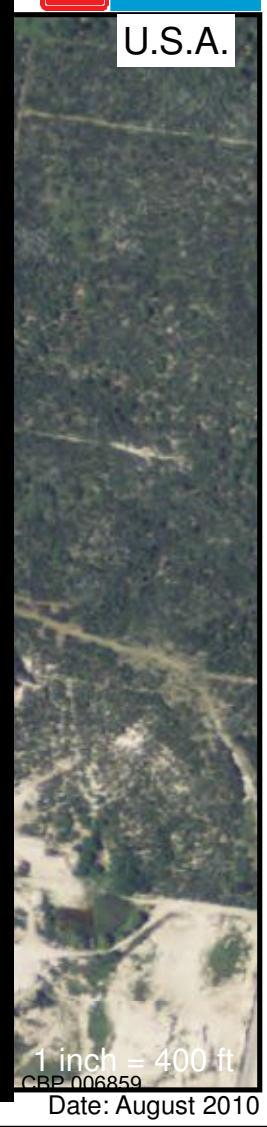
(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

Baker

U.S.A.



1 inch = 400 ft

CBP 006859

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Date: August 2010

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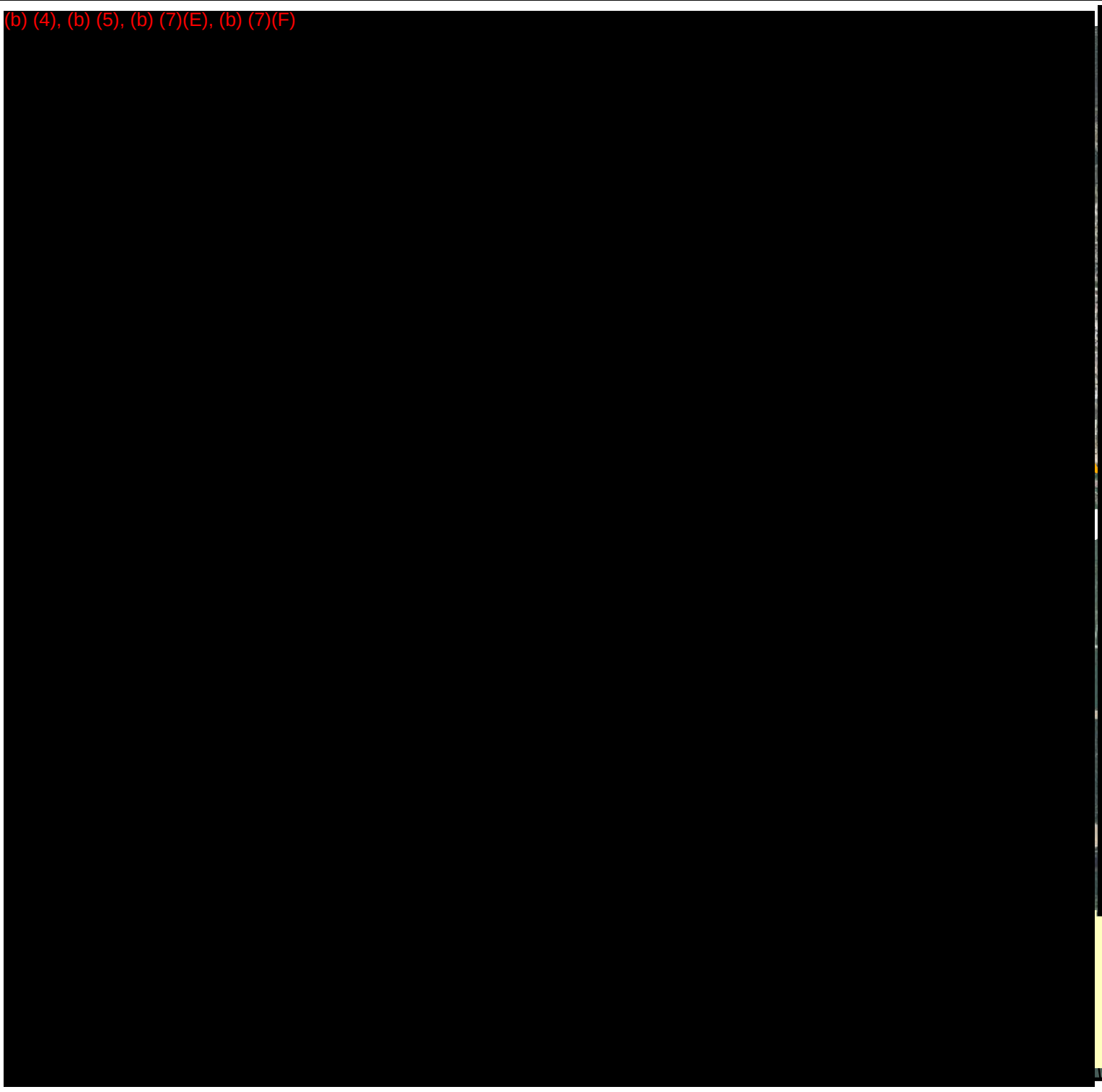
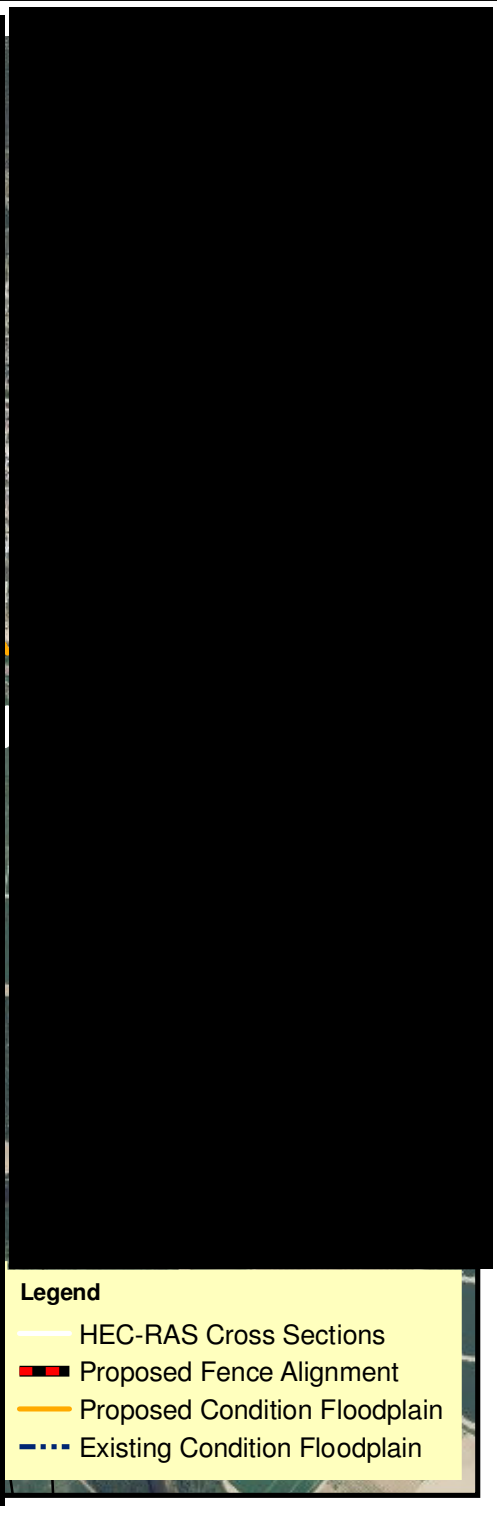




Variable
Water Surface Elevation (feet)
Deflection
Overbank Velocity (fps) on US Side

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

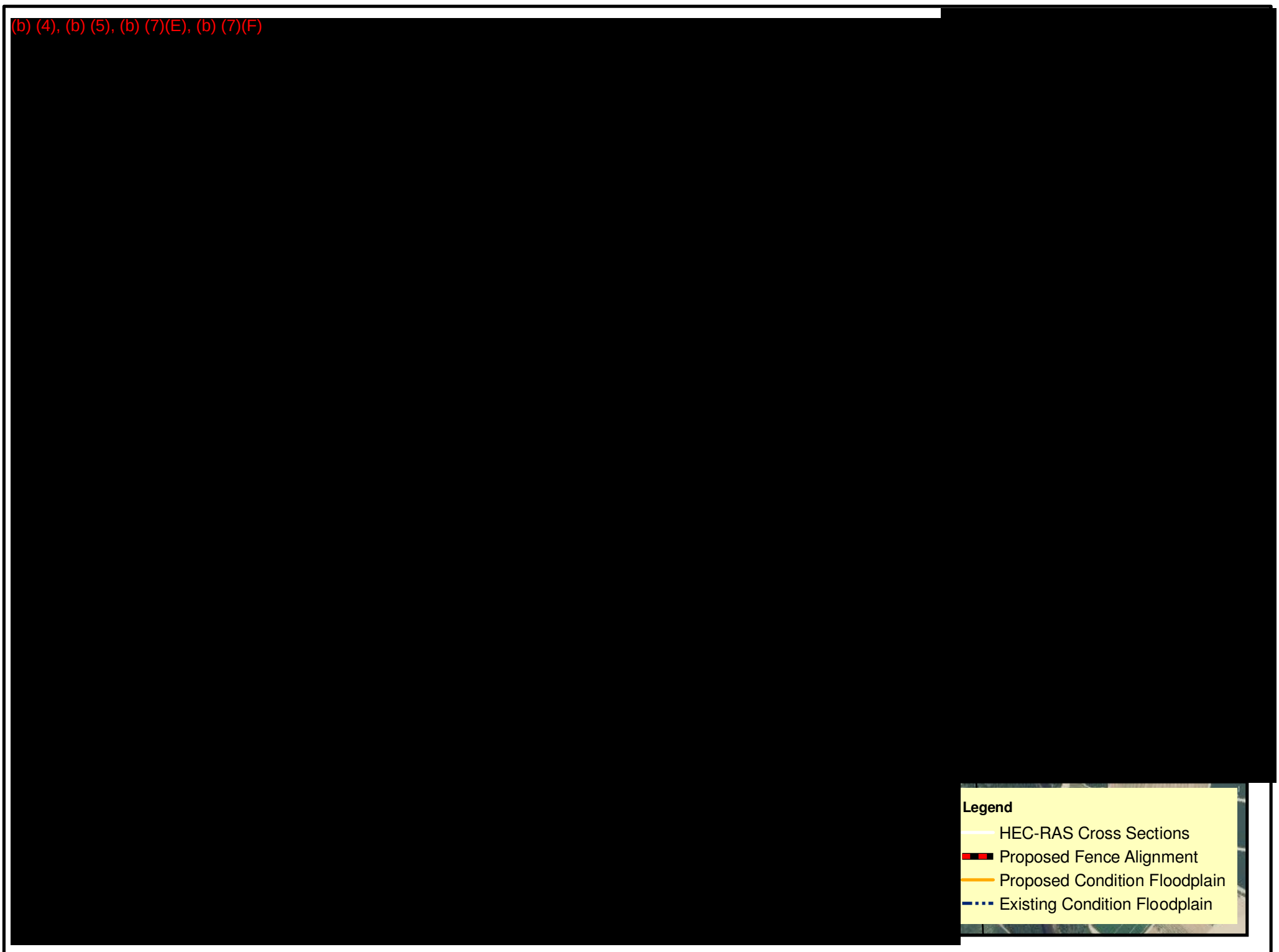
(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

1 inch = 400 ft

Date: August 2010

V:\PROJECTS\DHS\112319_PF225 Phase 2\Drainage Reports and dwg\PF225 Phase 2 & COE drainage reports\O-1, O-2, O-3 floodplain analysis\IBWC Lidar Data\Report\July 2010\O2 Baker_IBWC Fence Alignments RS 10298.mxd

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)



(b) (7)(F), (b) (7)(E), (b) (4), (b) (5)

Variable	
Water Surface Elevation (feet)	
Deflection	
Overbank Velocity (fps) on US Side	

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

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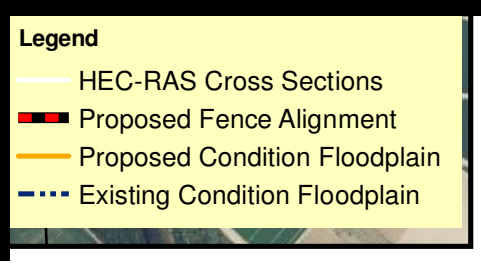
Date: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

[redacted]



(b) (7)(E), (b) (7)(F), (b) (4), (b) (5)

Variable
Water Surface Elevation (feet)
Deflection
Overbank Velocity (fps) on US Side

(b) (7)(F), (b) (7)(E), (b) (5), (b) (4)

[redacted]

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Date: August 2010

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

(b) (7)(E), (b) (7)(F), (b) (4), (b) (5)

Variable
Water Surface Elevation (feet)
Deflection
Overbank Velocity (fps) on US Side

(b) (4), (b) (5), (b) (7)(E), (b) (7)(F)

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Date: August 2010