Memorandum

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April 26, 2012

TO: Jim Hahnenberg, U.S. Environmental Protection Agency
Beth Olson, Wisconsin Department of Natural Resources

CC: Jeff Lawson, Lower Fox River Remediation LLC
Sue O'Connell, Lower Fox River Remediation LLC
Bryan Heath, NCR Corporation
George Berken, Boldt Technical Services
Gary Kincaid, Wisconsin Department of Natural Resources
Denis Roznowski, Foth

FR: Troy Gawronski, Foth

RE: Lower Fox River OU3 *COMMP* Hydrographic Survey – Year Zero

Background

The Lower Fox River Remediation LLC (LLC) retained Foth Infrastructure & Environment, LLC (Foth) to document the methodology employed for and the results of the Year Zero hydrographic survey in compliance with requirements of The *Lower Fox River Remedial Design Cap Operations, Maintenance, and Monitoring Plan* (*COMMP*) for the Lower Fox River Operable Units 2-5 (Anchor QEA and Tetra Tech EC, 2009), which was approved by the Agencies/Oversight Team (A/OT) on April 22, 2009. The *COMMP* describes post-placement cap monitoring activities that will be performed to provide a high level of assurance that the engineered caps retain their physical integrity and protectiveness over time. The *COMMP* also outlines contingency response actions that will be implemented if the engineered caps do not meet performance standards.

On June 29, 2011, the LLC met with representatives of the A/OT to discuss the *COMMP* to gain concurrence on the methods to be employed for monitoring of the engineered caps. Discussions during this meeting refined and clarified several items such as monitoring requirements and schedule. Meeting minutes for this meeting were drafted by TtEC and accepted by the A/OT on August 4, 2011 and are included as Attachment 1.

As part of the *COMMP* requirements, routine monitoring of all cap areas by geophysical methods (including sub-bottom profiling and/or hydrographic survey) will be completed. Further, the *COMMP* states the first routine monitoring of completed engineered caps shall be completed 2 years post-construction. This routine monitoring will include the

completion of a hydrographic survey to analyze the top of engineered cap elevations and the change in that surface, if any. In order to evaluate the change in top of cap elevation over time, a baseline or reference point needs to be established. Baseline cap elevations were established by completing a hydrographic survey of each cap in OU3 following completion of construction (Figures 1 and 2). The hydrographic survey documenting the baseline conditions has been termed the "Year Zero" survey.

This memorandum presents the methods utilized and the results of the Year Zero hydrographic survey for OU3.

Methods

In November 2011, J. F. Brennan Company (Brennan) completed hydrographic surveys of approximately 26.8 acres of engineered caps in OU3 in accordance with the *COMMP*. Foth audited Brennan's surveys. Auditing reports for the completion of these surveys are included as Attachment 2.

Because a vast majority of the caps are in areas with water depths of greater than 3 feet, a multi-beam survey system (200 kilohertz [kHZ]) was utilized to ensure the highest degree of accuracy and coverage. As discussed below, only one cap, CA 69, is located in less than 3 feet of water. This cap was surveyed using a 200 kHZ single-beam system which is more accurate for water depths less than 3 feet. (This area was approved as an exceptional area by the A/OT.) Overlap of the multi-beam survey swaths resulted in over 95% coverage of the survey project area, which meets or exceeds project specifications and industry standards.

Results

Upon completion of the hydrographic surveys, the data were processed and top of cap contours were created. For each cap in OU3 (excluding CA 69), Foth produced two figures to show top of cap elevations (Figures 3A and 3B through 14A and 14B). The first figure, in each series of two, shows the post construction top of cap elevation in a two dimensional plan view. This figure also shows the designed cap-placement limits. The second figure in the series shows a three dimensional (3-D) isometric view, which better depicts potential minor surface irregularities as compared to the two dimensional views. The results of these multi-beam surveys will be used as the baseline information for future monitoring events.

As stated previously, CA 69 was not included in the multi-beam survey as water depths were not sufficient to allow for the multi-beam survey system to be utilized; however, a baseline survey was completed using single-beam equipment. Figure 15 shows the results of the CA 69 single-beam survey that will be used as the baseline information for future monitoring events.

The Year Zero survey work was completed to serve as the baseline post-construction survey for engineered caps in OU3. The next post-cap monitoring event will be completed after an event-based trigger (e.g., a 20-year or greater flow event) or in the

next scheduled COMMP year-two post-construction survey in 2014. At that time, another hydrographic survey will be completed over the entire OU3 cap area following the same protocols summarized in the methods section of this memorandum and as described in more detail in the *COMMP*. Results from the next hydrographic survey will be compared to the baseline survey to assess integrity of the caps.

To supplement the survey information provided in this Year Zero *COMMP* reporting memorandum, we have also attached cap thickness verification data prepared by TtEC (Attachment 3). These data indicate that when applying A/OT approved statistical procedures, the minimum cap aggregate thicknesses were achieved in all cases.

The hydrographic survey data collected for the Year Zero cap monitoring indicate that the cap material in place meets the performance standards set forth in the *Lower Fox River Remedial Design 100% Design Report* (Tetra Tech et al., 2009 a and b) and the *COMMP,* and no irregularities were identified. These surveys will serve as the baseline for future surveys to assess long-term cap performance.

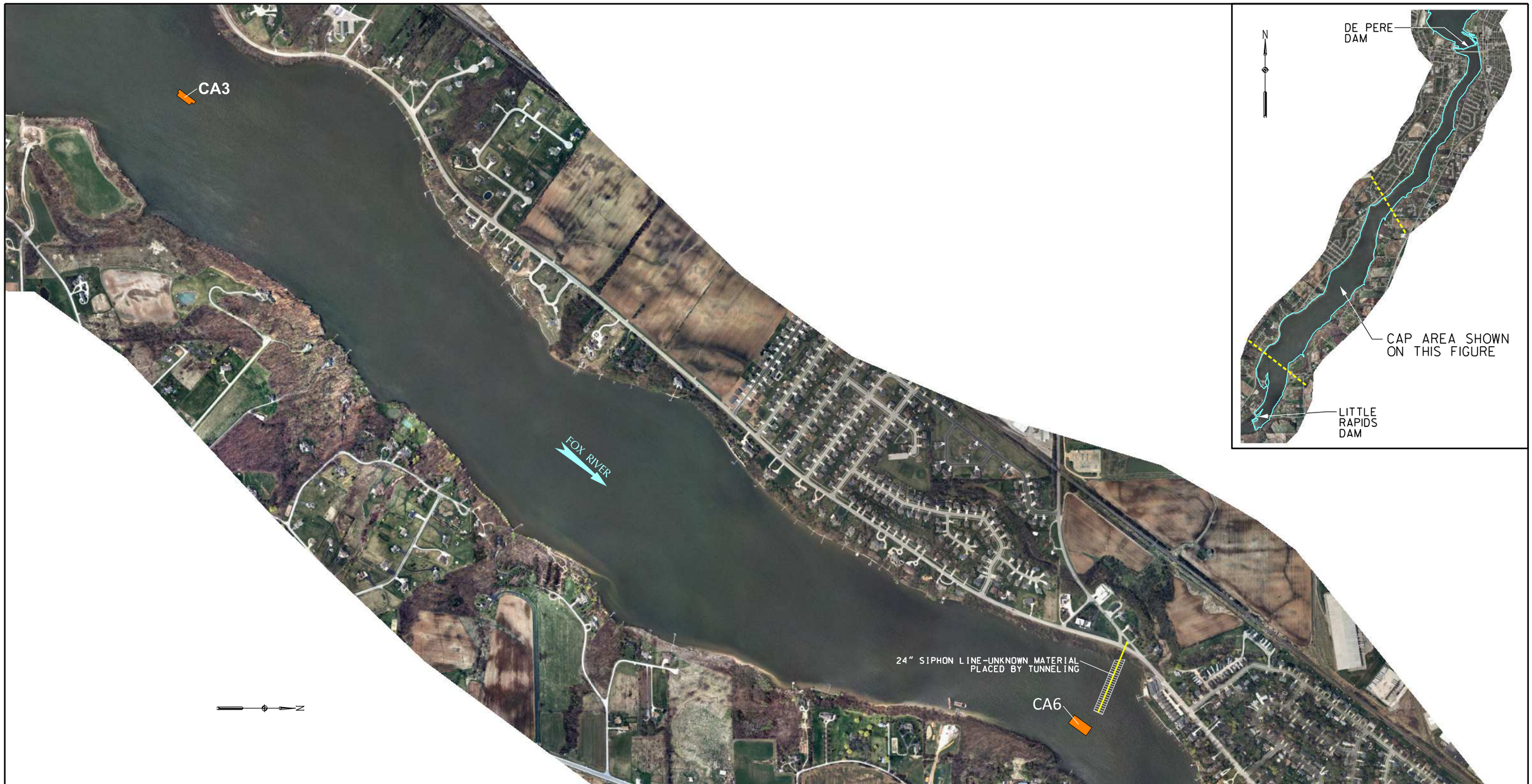
References

Anchor QEA, LLC and Tetra Tech EC, Inc., 2009. *Lower Fox River Remedial Design Cap Operations, Maintenance, and Monitoring Plan*. Prepared for Appleton Papers Inc., Georgia-Pacific Consumer Products LP, and NCR Corporation. April 2009.

Tetra Tech EC, Inc., Anchor Environmental, L.L.C., J. F. Brennan Co, Inc., and Boskalis Dolman (Tetra Tech et al.). 2009a. *Lower Fox River Remedial Design; 100 Percent Design Report Volume 1*. Prepared for Appleton Papers Inc., Georgia-Pacific Consumer Products LP, and NCR Corporation. April 2009.

Tetra Tech EC, Inc., Anchor QEA, L.L.C., J. F. Brennan Co, Inc., and Boskalis Dolman (Tetra Tech et al.). 2009b. *Lower Fox River Remedial Design; 100 Percent Design Report Volume 2*. Prepared for Appleton Papers Inc., Georgia-Pacific Consumer Products LP, and NCR Corporation. November 2009.

Figures



LEGEND

CA6 — DESIGN CAP PLACEMENT LOCATION AND IDENTIFICATION

NOTES:

1. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
2. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
3. DESIGN CAP PLACEMENT LIMITS and UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 500' 1000'
BAR SCALE

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FIGURE 1

LOWER FOX RIVER - OU3
CAP PLACEMENT LOCATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-1 All Caps.dgn
1/23/2012 jrb2

LEGEND

CA15 "A" CAP DESIGN PLACEMENT LOCATION AND IDENTIFICATION

CB31 "B" CAP DESIGN PLACEMENT LOCATION AND IDENTIFICATION

NOTES:

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0 500' 1000'
BAR SCALE

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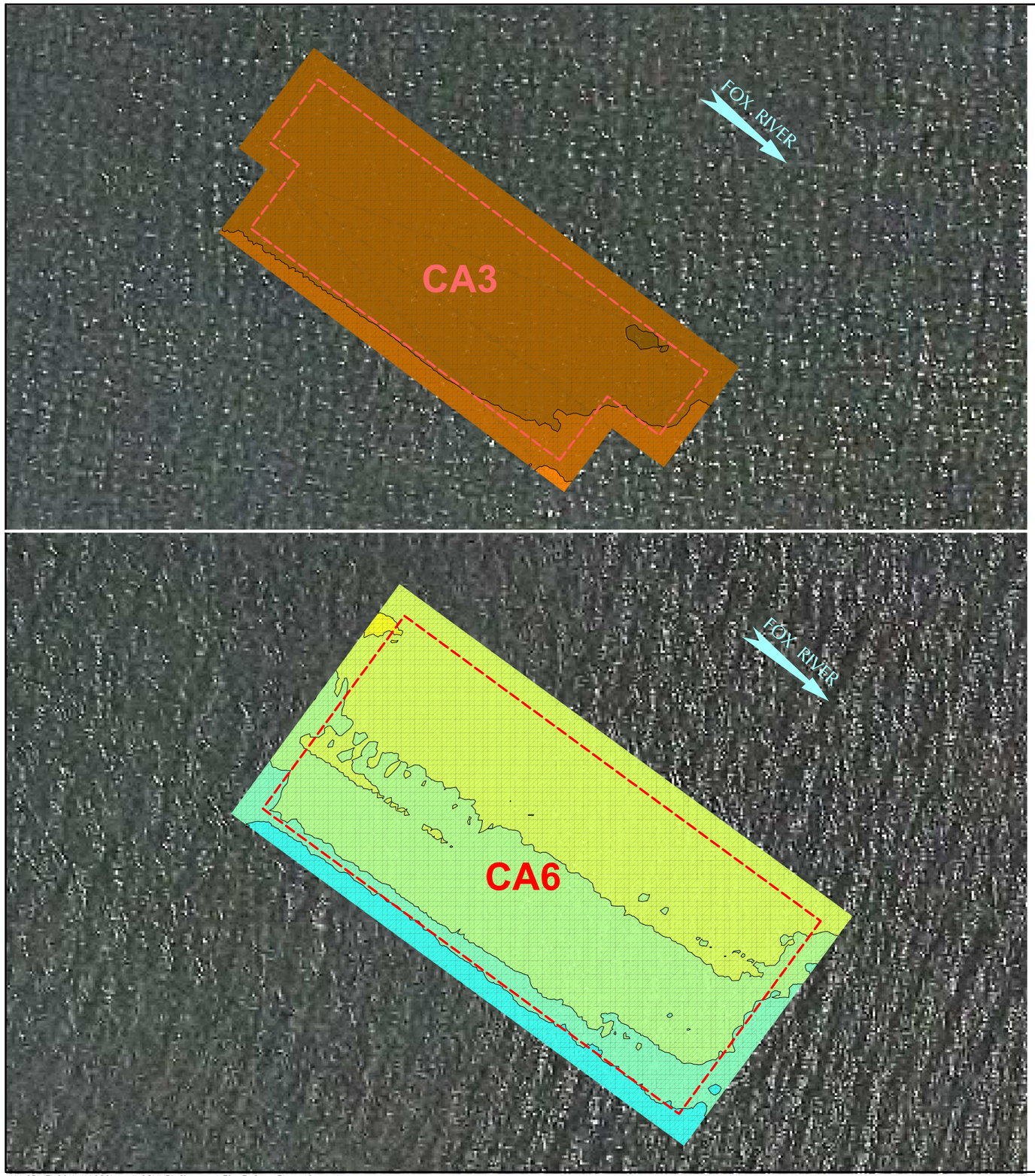
FIGURE 2

LOWER FOX RIVER - OU3
CAP PLACEMENT LOCATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-2 All Caps.dgn
1/23/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
- ELEVATION 575 – 576
- ELEVATION 574 – 575
- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
- ELEVATION 569 – 570
- ELEVATION 568 – 569
- ELEVATION 567 – 568
- ELEVATION 566 – 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
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4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25′ 50′
BAR SCALE

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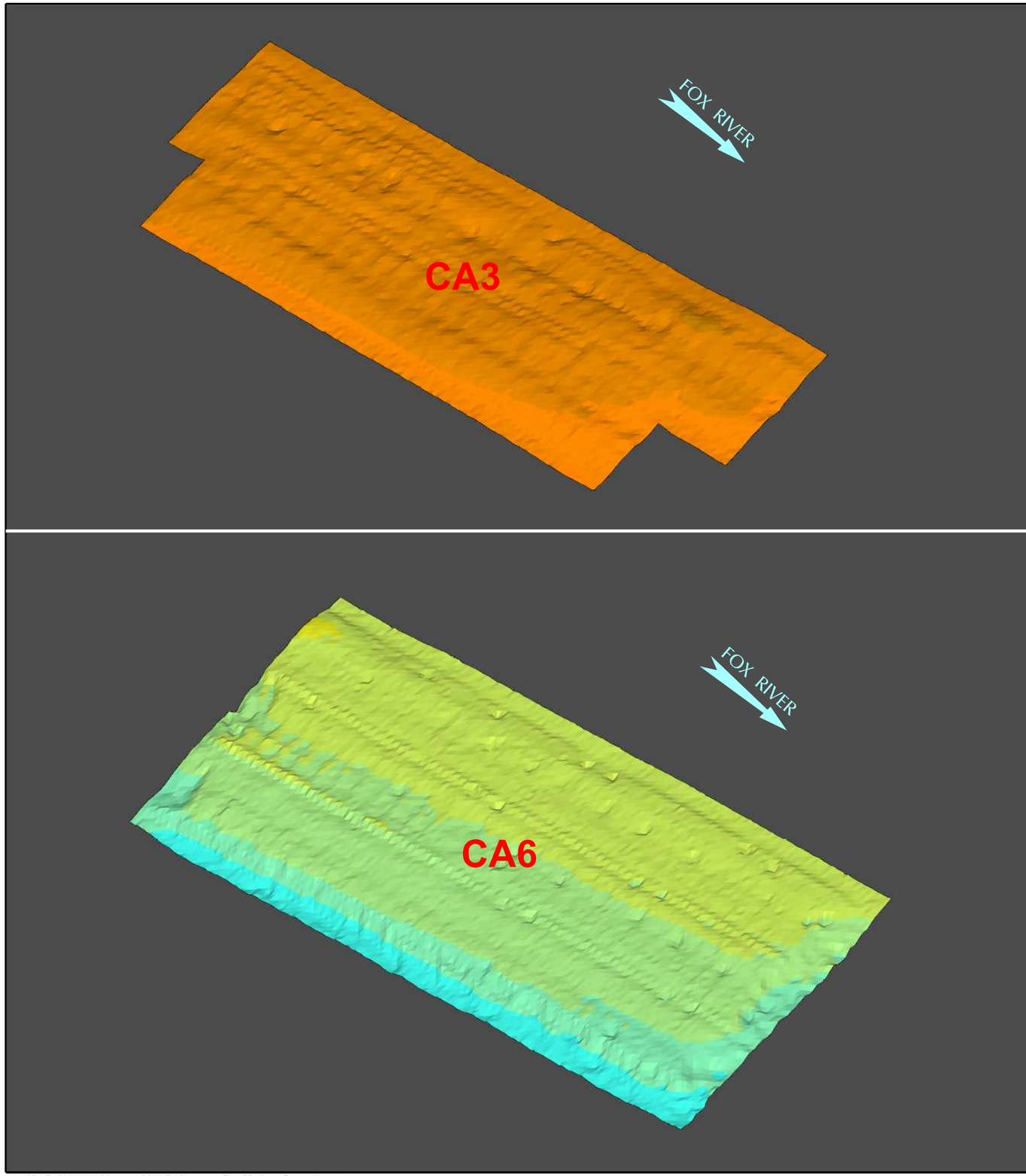
FIGURE 3A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-3 Cap Elevations.dgn
1/21/2012 jrb2



N

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

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FIGURE 3B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-3B Cap Elevations.dgn
1/21/2012 jrb2

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 – 586
- ELEVATION 584 – 585
- ELEVATION 583 – 584
- ELEVATION 582 – 583
- ELEVATION 581 – 582
- ELEVATION 580 – 581
- ELEVATION 579 – 580
- ELEVATION 578 – 579
- ELEVATION 577 – 578
- ELEVATION 576 – 577
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- ELEVATION 573 – 574
- ELEVATION 572 – 573
- ELEVATION 571 – 572
- ELEVATION 570 – 571
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0 25′ 50′
BAR SCALE

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FIGURE 4A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-4 Cap Elevations.dgn
1/20/2012 jrb2

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

ELEVATION 585 - 586
ELEVATION 584 - 585
ELEVATION 583 - 584
ELEVATION 582 - 583
ELEVATION 581 - 582
ELEVATION 580 - 581
ELEVATION 579 - 580
ELEVATION 578 - 579
ELEVATION 577 - 578
ELEVATION 576 - 577
ELEVATION 575 - 576
ELEVATION 574 - 575
ELEVATION 573 - 574
ELEVATION 572 - 573
ELEVATION 571 - 572
ELEVATION 570 - 571
ELEVATION 569 - 570
ELEVATION 568 - 569
ELEVATION 567 - 568
ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

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FIGURE 4B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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1/21/2012 jrb2

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

ELEVATION 585 - 586
ELEVATION 584 - 585
ELEVATION 583 - 584
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ELEVATION 580 - 581
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ELEVATION 572 - 573
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ELEVATION 570 - 571
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ELEVATION 568 - 569
ELEVATION 567 - 568
ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

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4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30' 60'
BAR SCALE

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FIGURE 5A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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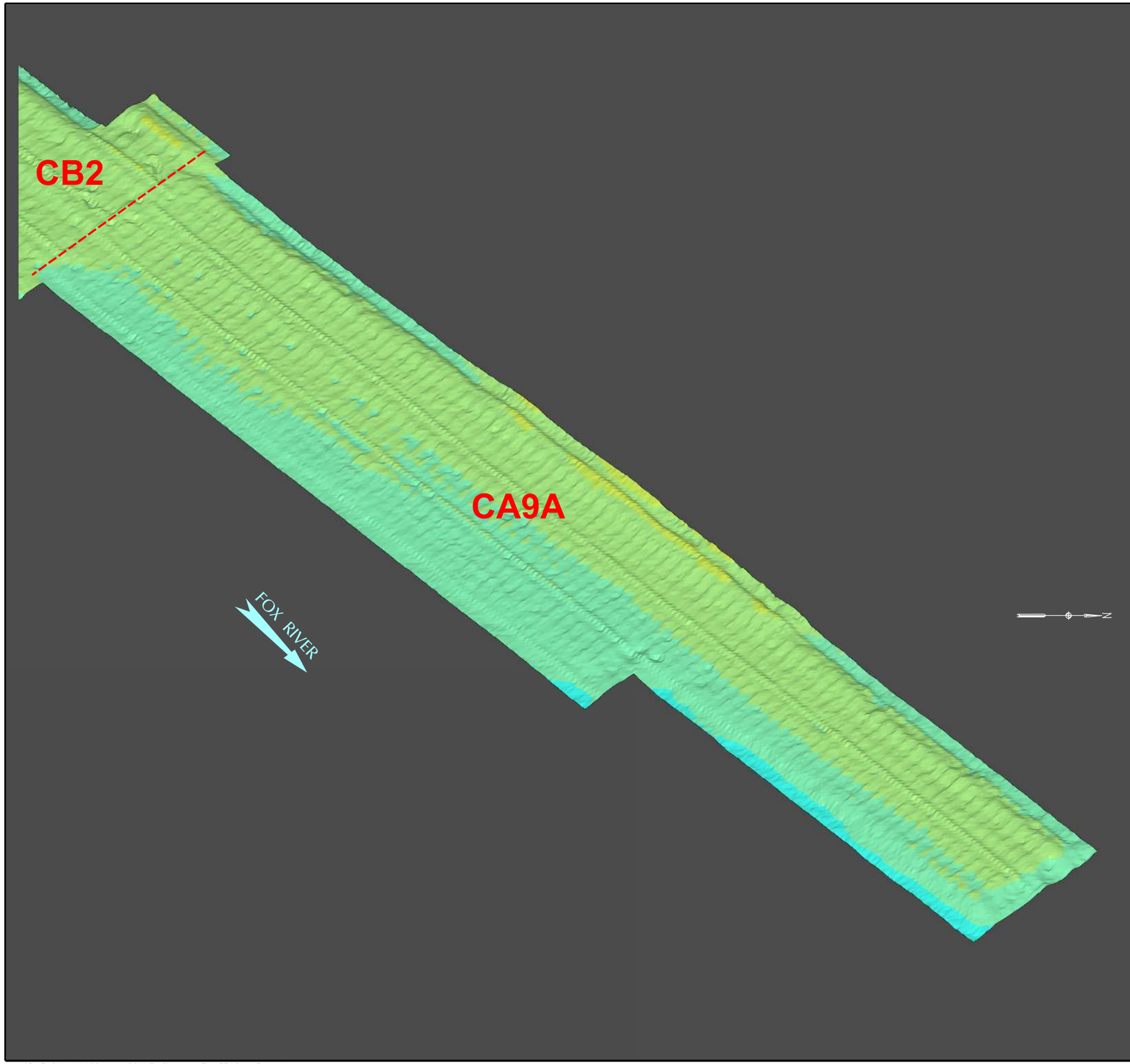
1/20/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
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- ELEVATION 571 - 572
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- ELEVATION 567 - 568
- ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

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FIGURE 5B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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1/21/2012 jrb2

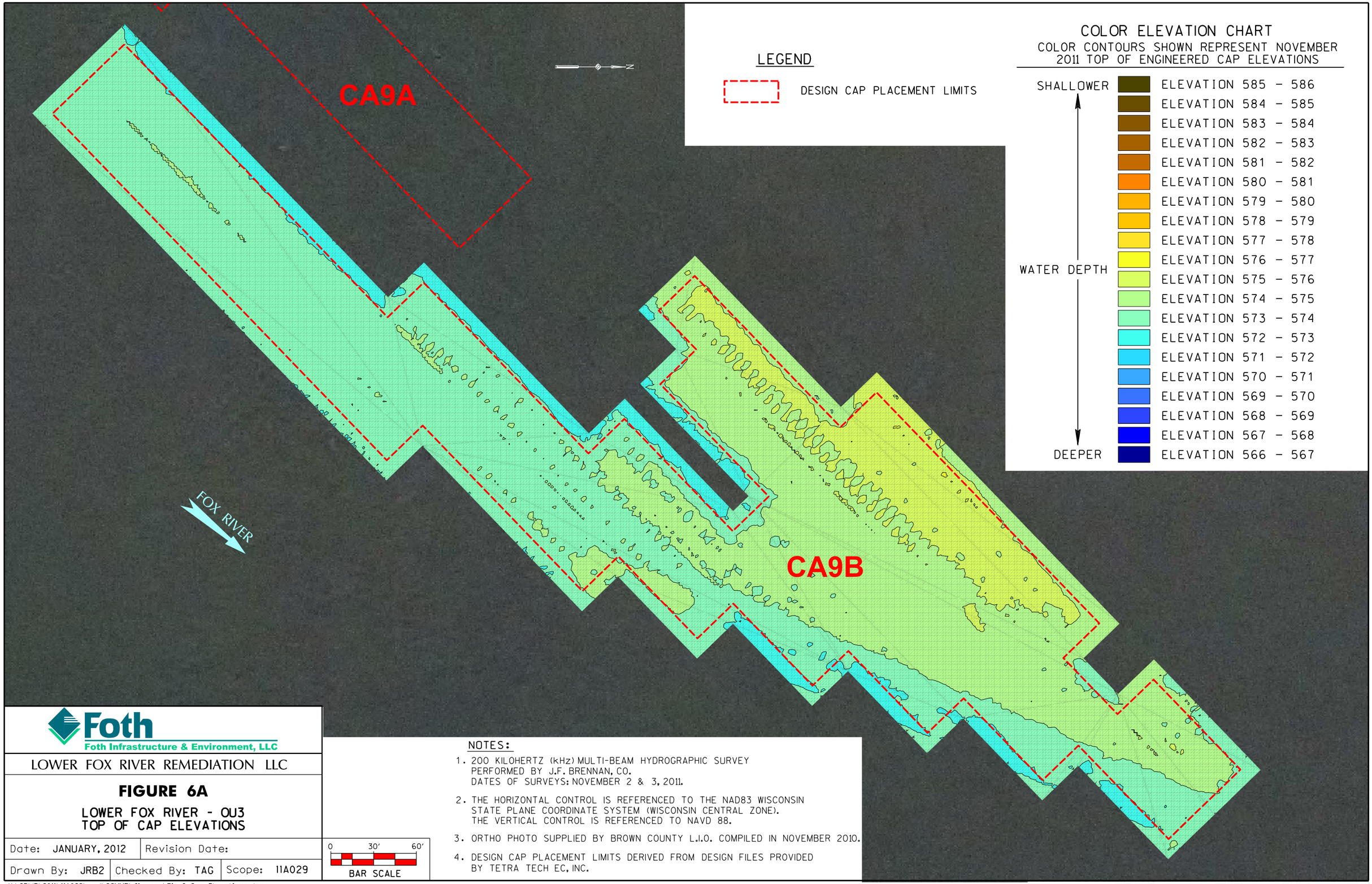

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FIGURE 6A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

NOTES:

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4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

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1/23/2012 jrb2

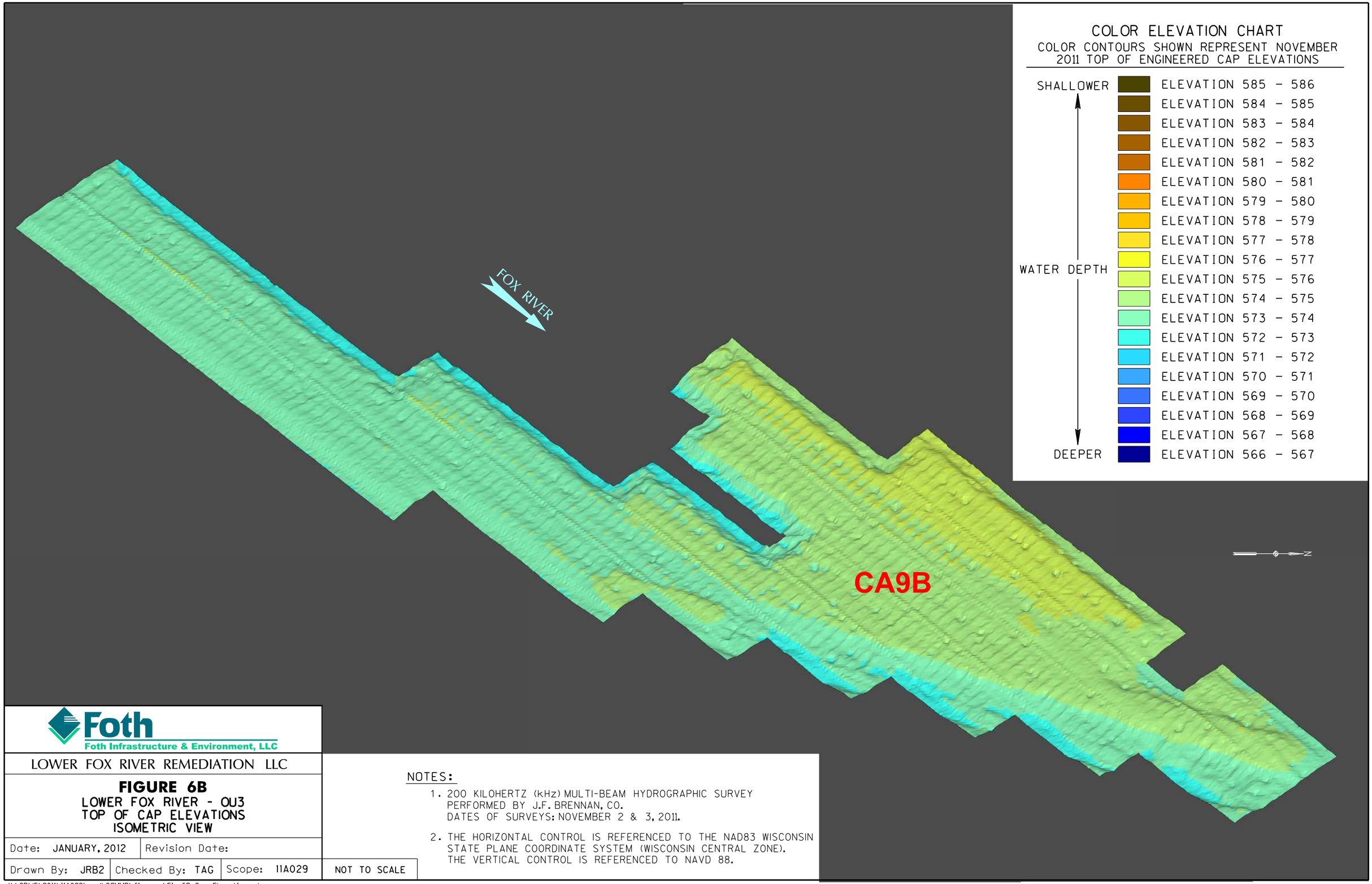

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FIGURE 6B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: JANUARY, 2012	Revision Date:		
Drawn By: JRB2	Checked By: TAG	Scope: 11A029	NOT TO SCALE

NOTES:

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1/21/2012 jrb2

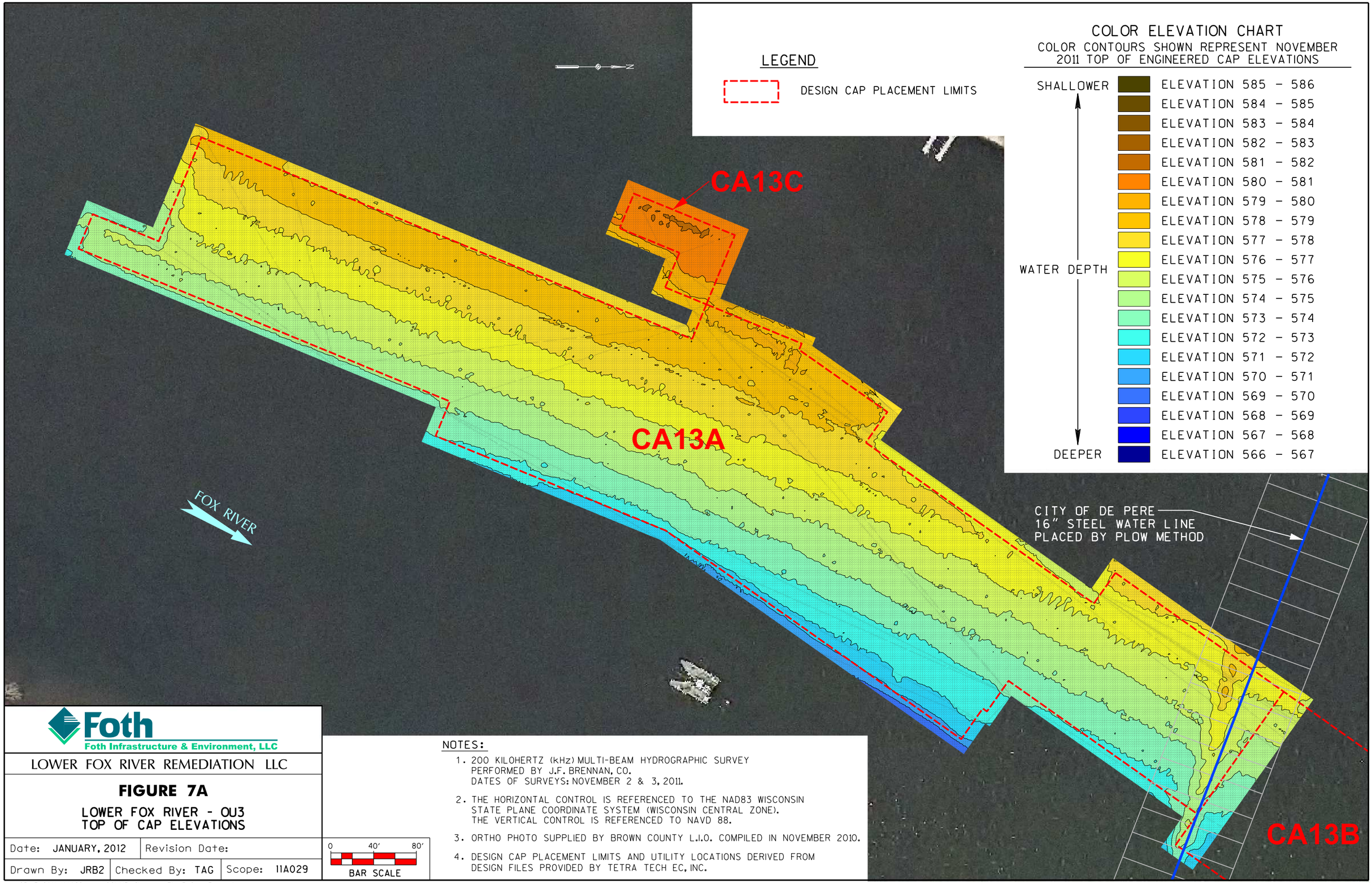

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FIGURE 7A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

0 40' 80'
BAR SCALE

NOTES:

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1/23/2012 jrb2

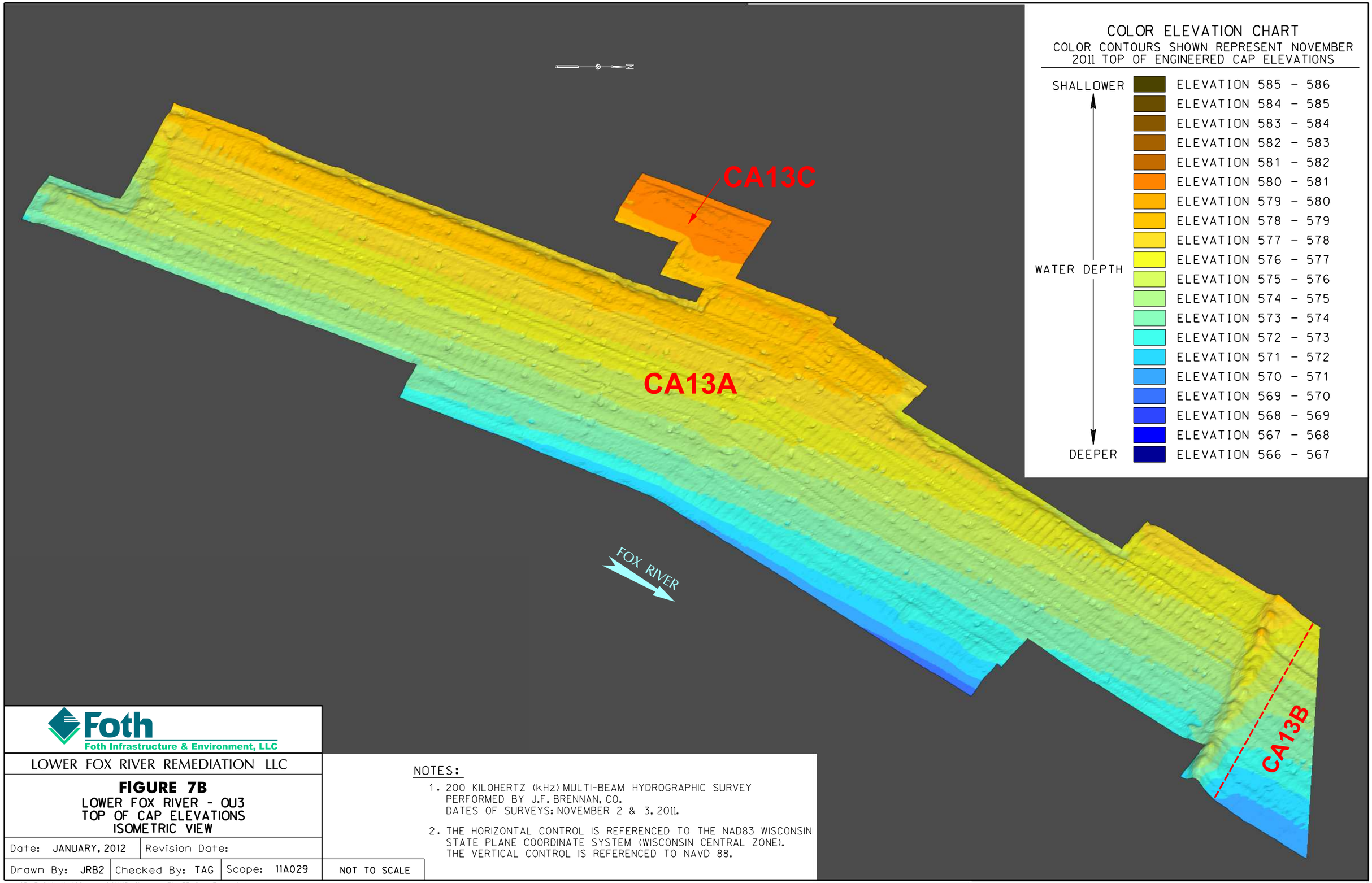

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FIGURE 7B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: JANUARY, 2012	Revision Date:		
Drawn By: JRB2	Checked By: TAG	Scope: 11A029	NOT TO SCALE

NOTES:

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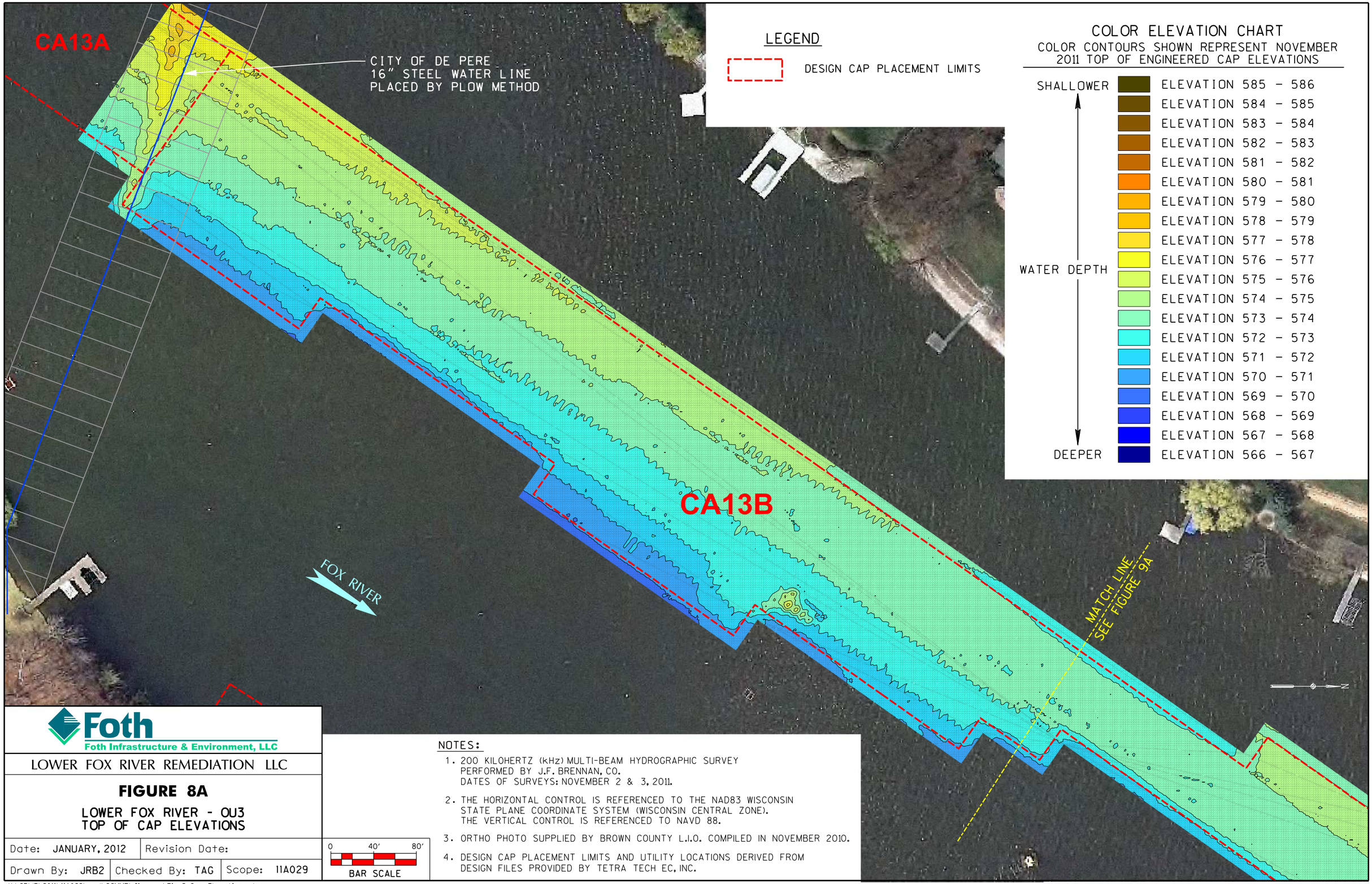
1/21/2012 jrb2



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Foth Infrastructure & Environment, LLC

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FIGURE 8A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

0 40' 80'
BAR SCALE

NOTES:

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3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-8 Cap Elevations.dgn
1/23/2012 jrb2

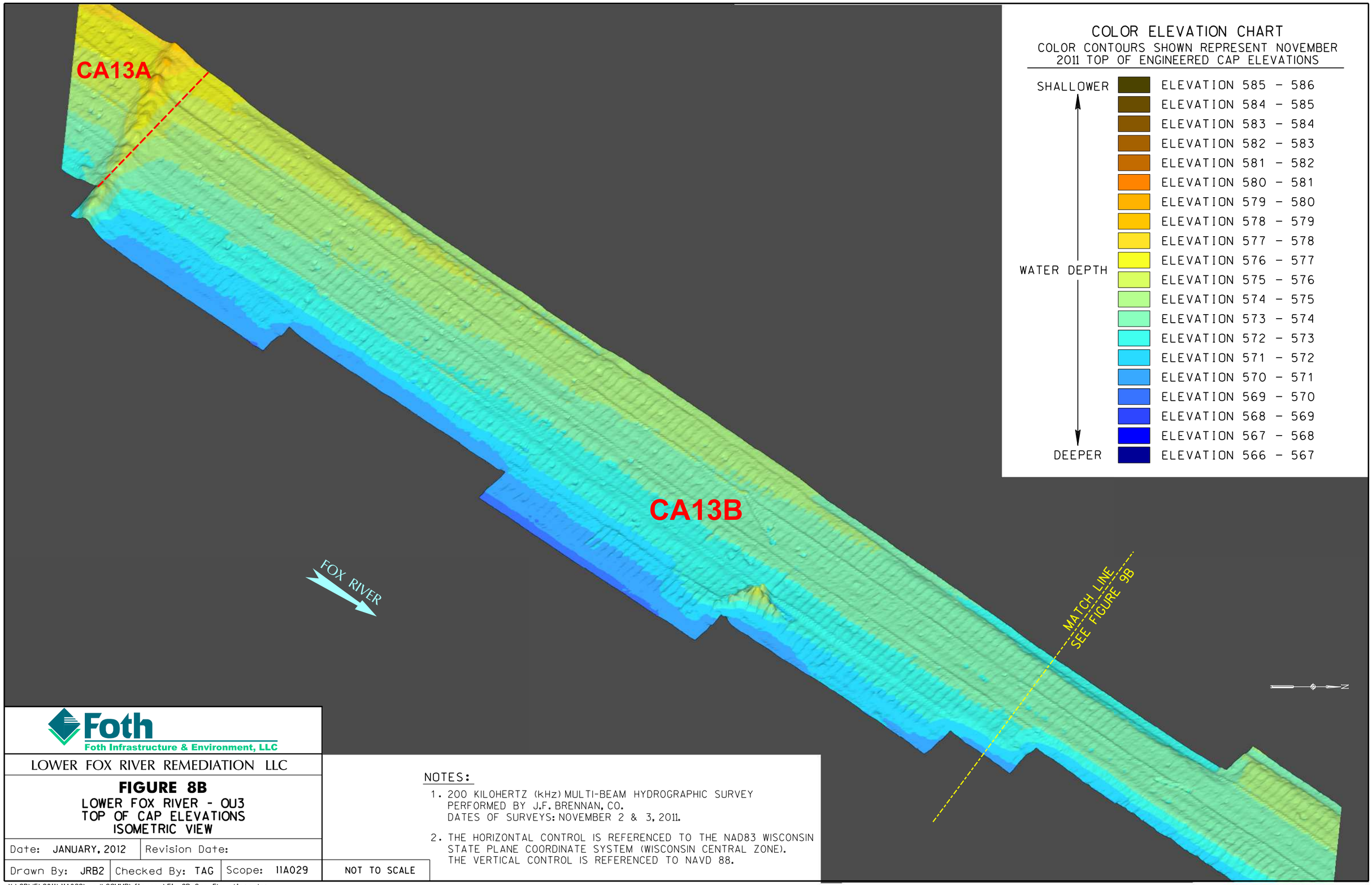

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FIGURE 8B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: JANUARY, 2012	Revision Date:		
Drawn By: JRB2	Checked By: TAG	Scope: 11A029	NOT TO SCALE

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-8B Cap Elevations.dgn
1/21/2012 jrb2

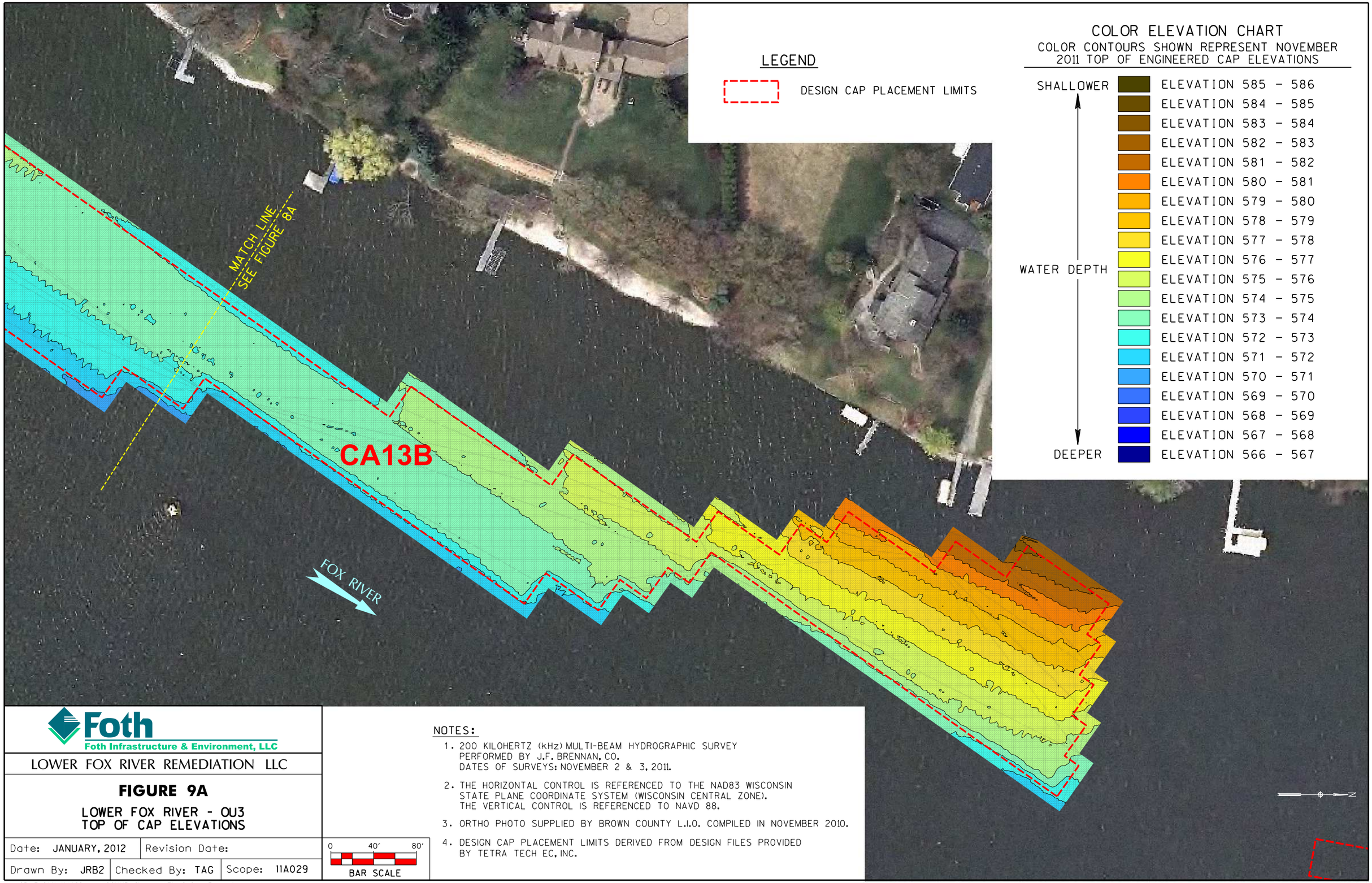

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FIGURE 9A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

0 40' 80'
BAR SCALE

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-9 Cap Elevations.dgn
1/23/2012 jrb2

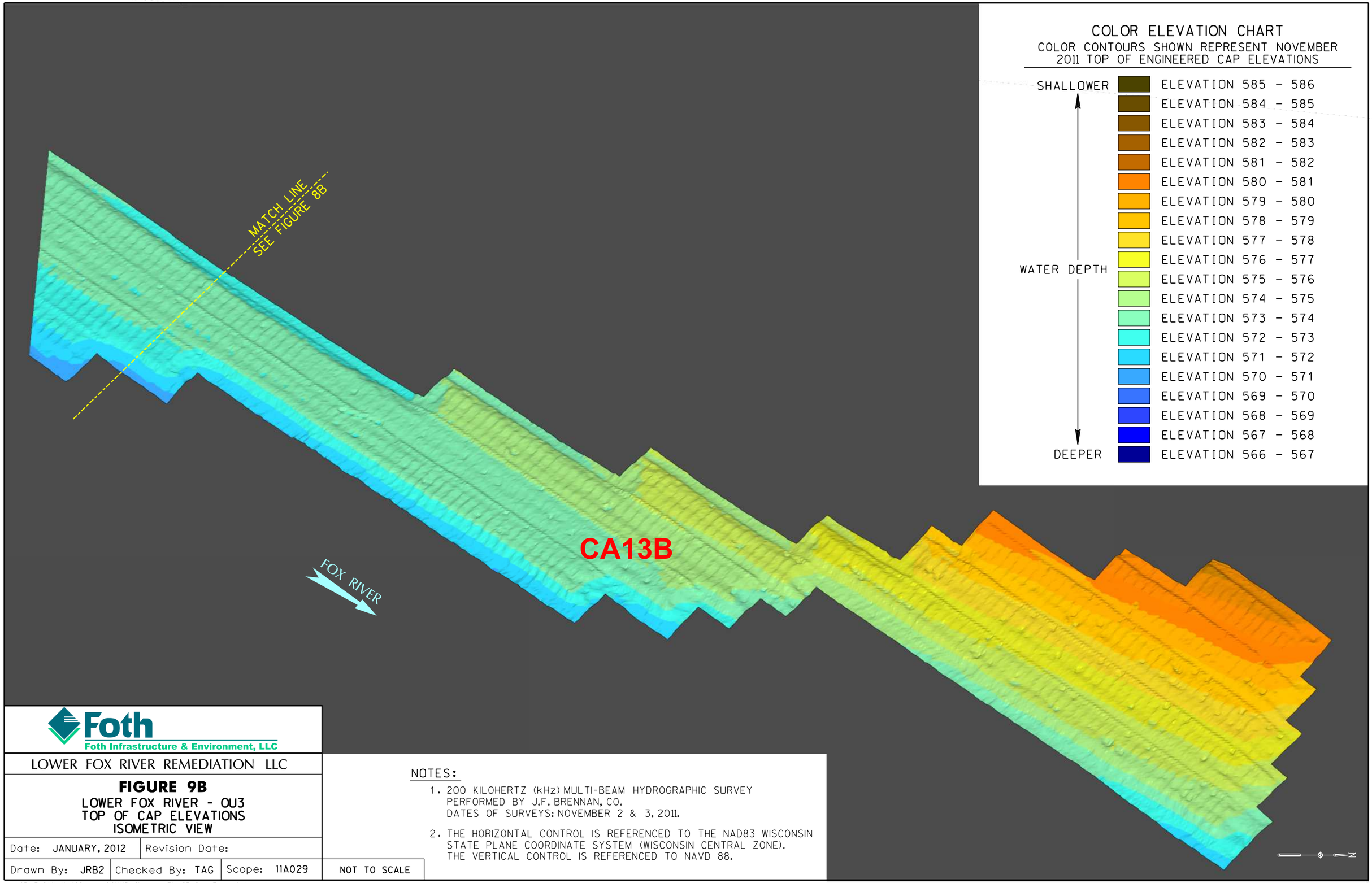

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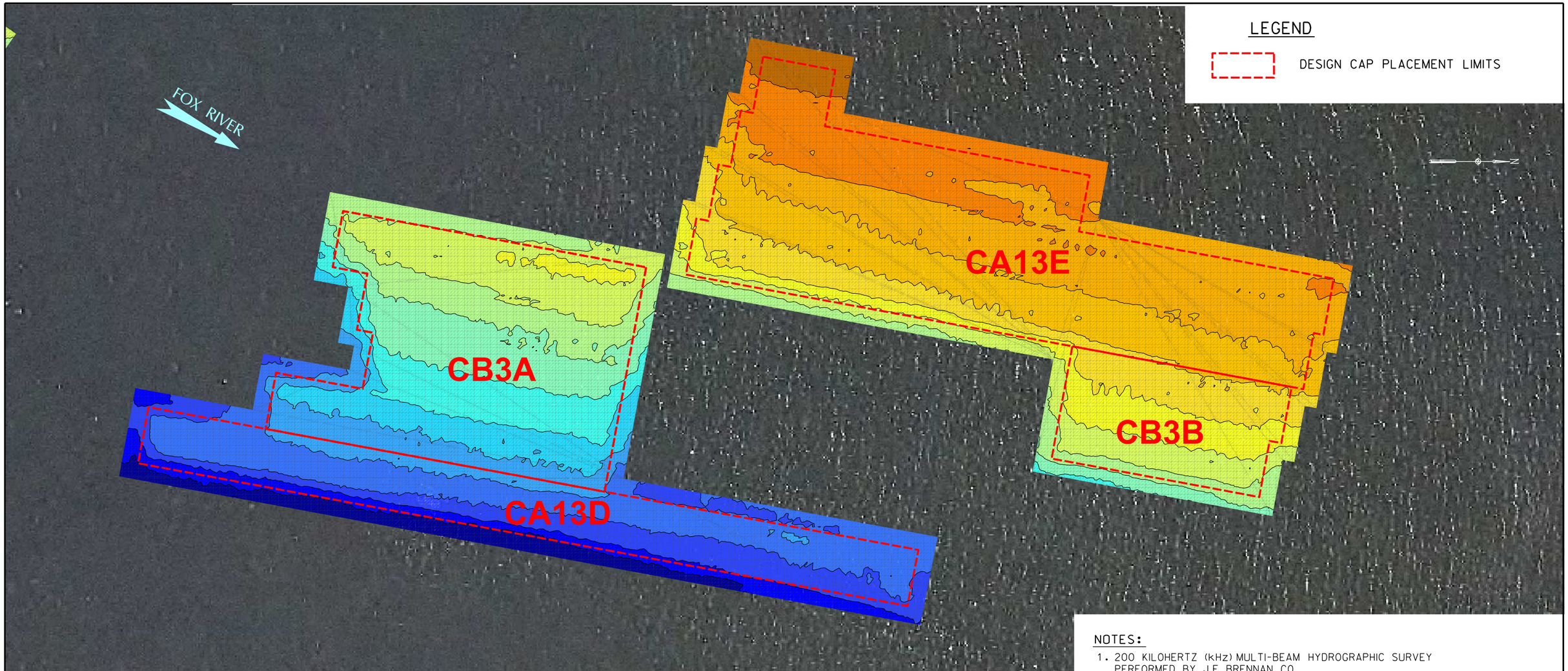
FIGURE 9B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

Date: JANUARY, 2012	Revision Date:		
Drawn By: JRB2	Checked By: TAG	Scope: 11A029	NOT TO SCALE

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE).
   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-9B Cap Elevations.dgn
1/21/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER ↑ WATER DEPTH

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577

WATER DEPTH ↓ DEEPER

- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30′ 60′
BAR SCALE

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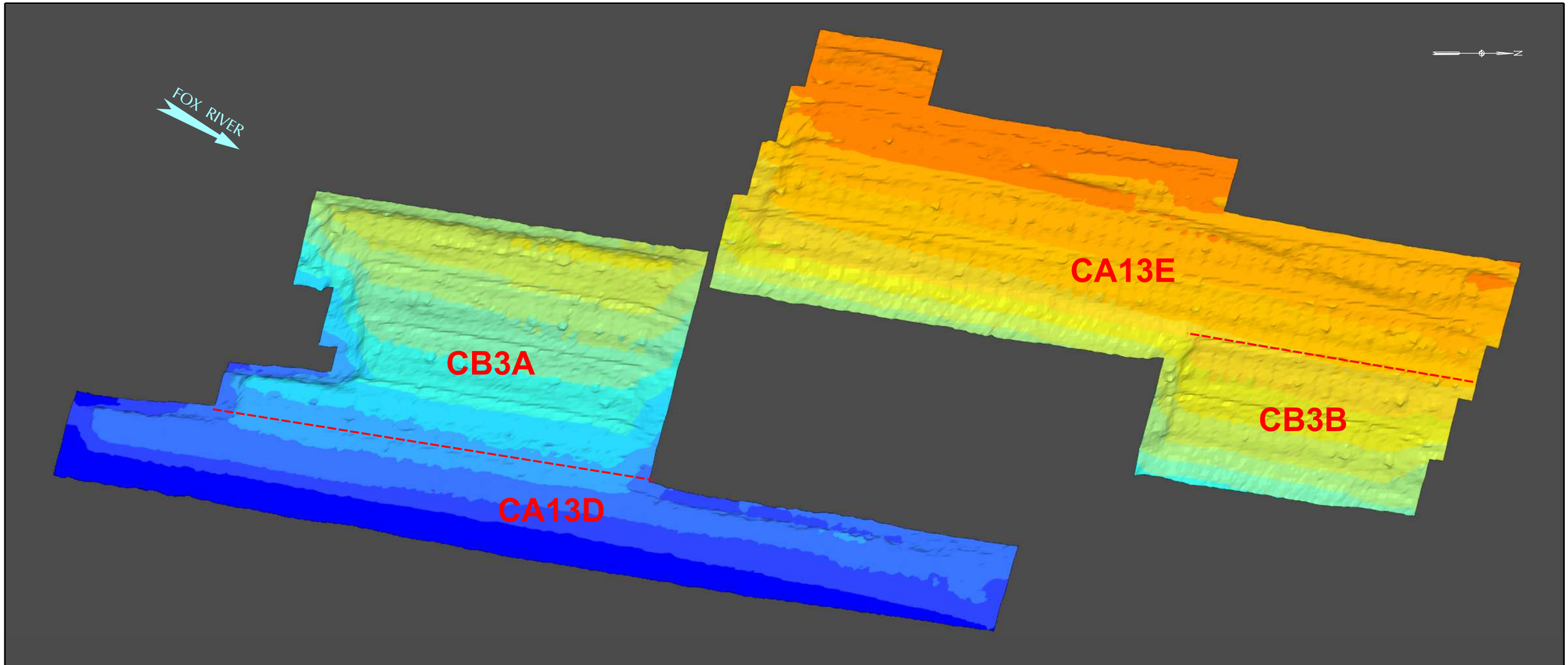
FIGURE 10A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-10 Cap Elevations.dgn
1/21/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER ↑ WATER DEPTH

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577

WATER DEPTH ↓ DEEPER

- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 10B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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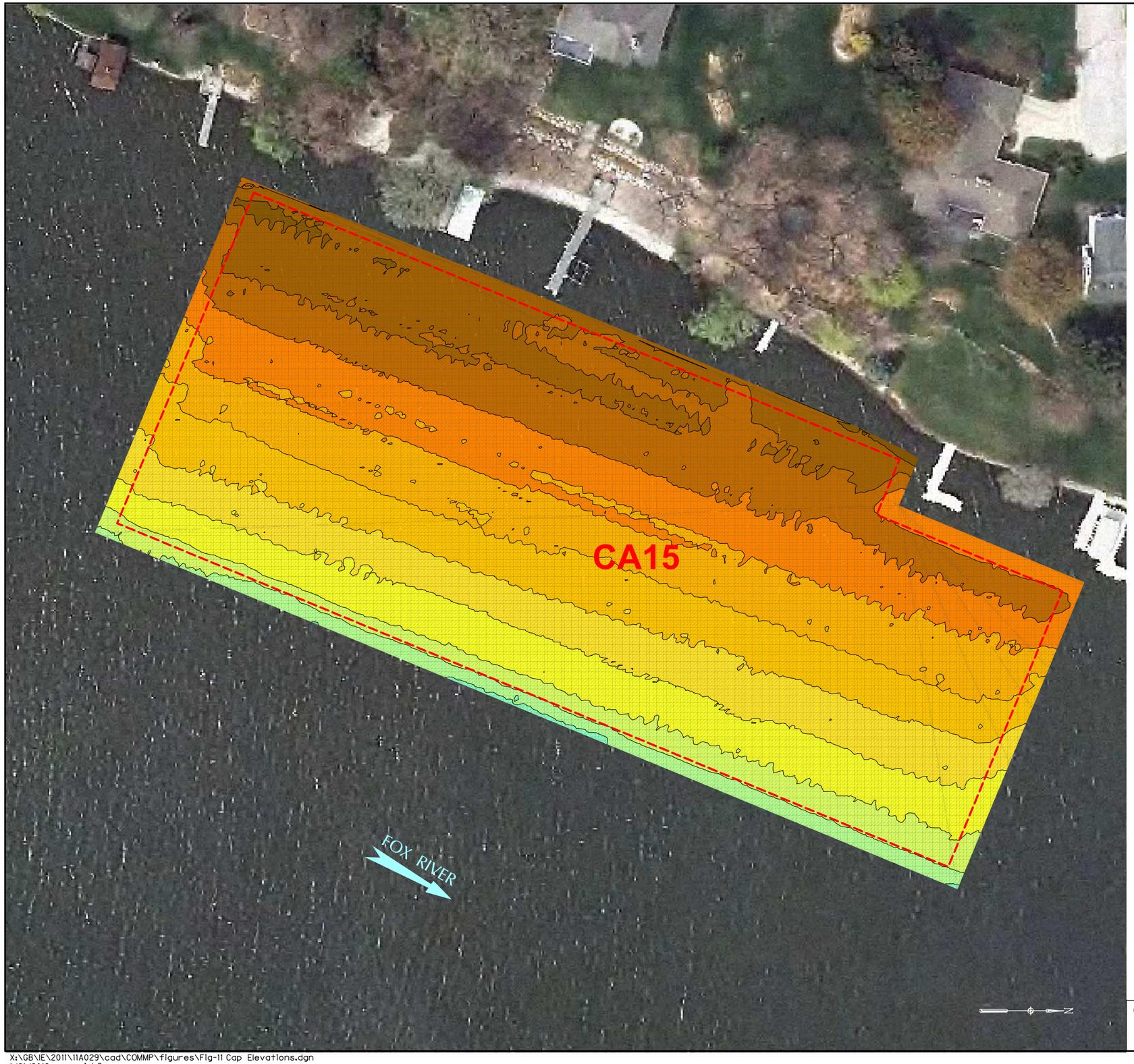
1/21/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

ELEVATION 585 – 586
ELEVATION 584 – 585
ELEVATION 583 – 584
ELEVATION 582 – 583
ELEVATION 581 – 582
ELEVATION 580 – 581
ELEVATION 579 – 580
ELEVATION 578 – 579
ELEVATION 577 – 578
ELEVATION 576 – 577
ELEVATION 575 – 576
ELEVATION 574 – 575
ELEVATION 573 – 574
ELEVATION 572 – 573
ELEVATION 571 – 572
ELEVATION 570 – 571
ELEVATION 569 – 570
ELEVATION 568 – 569
ELEVATION 567 – 568
ELEVATION 566 – 567

WATER DEPTH

DEEPER

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30' 60'
BAR SCALE

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FIGURE 11A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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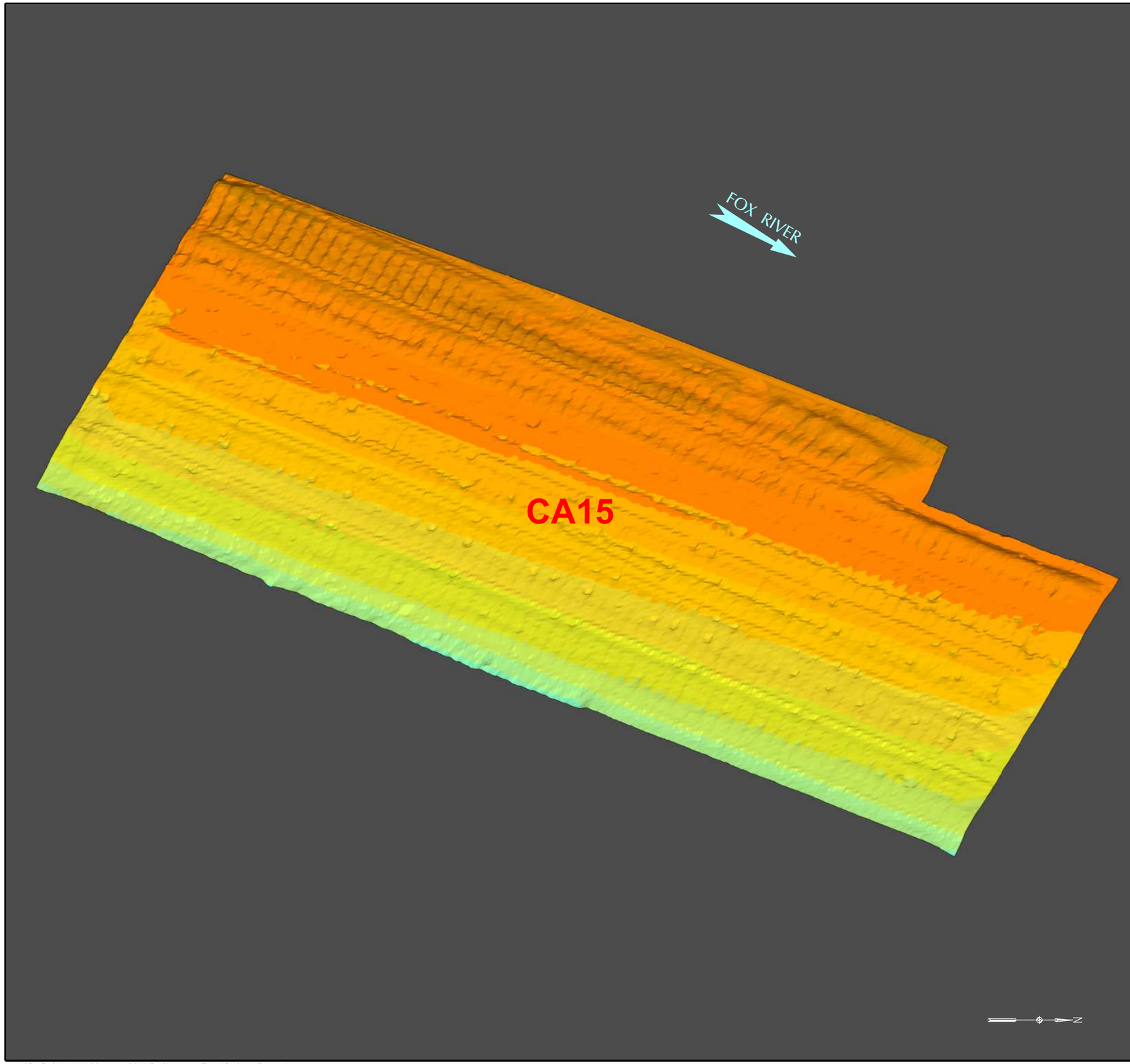
1/21/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 11B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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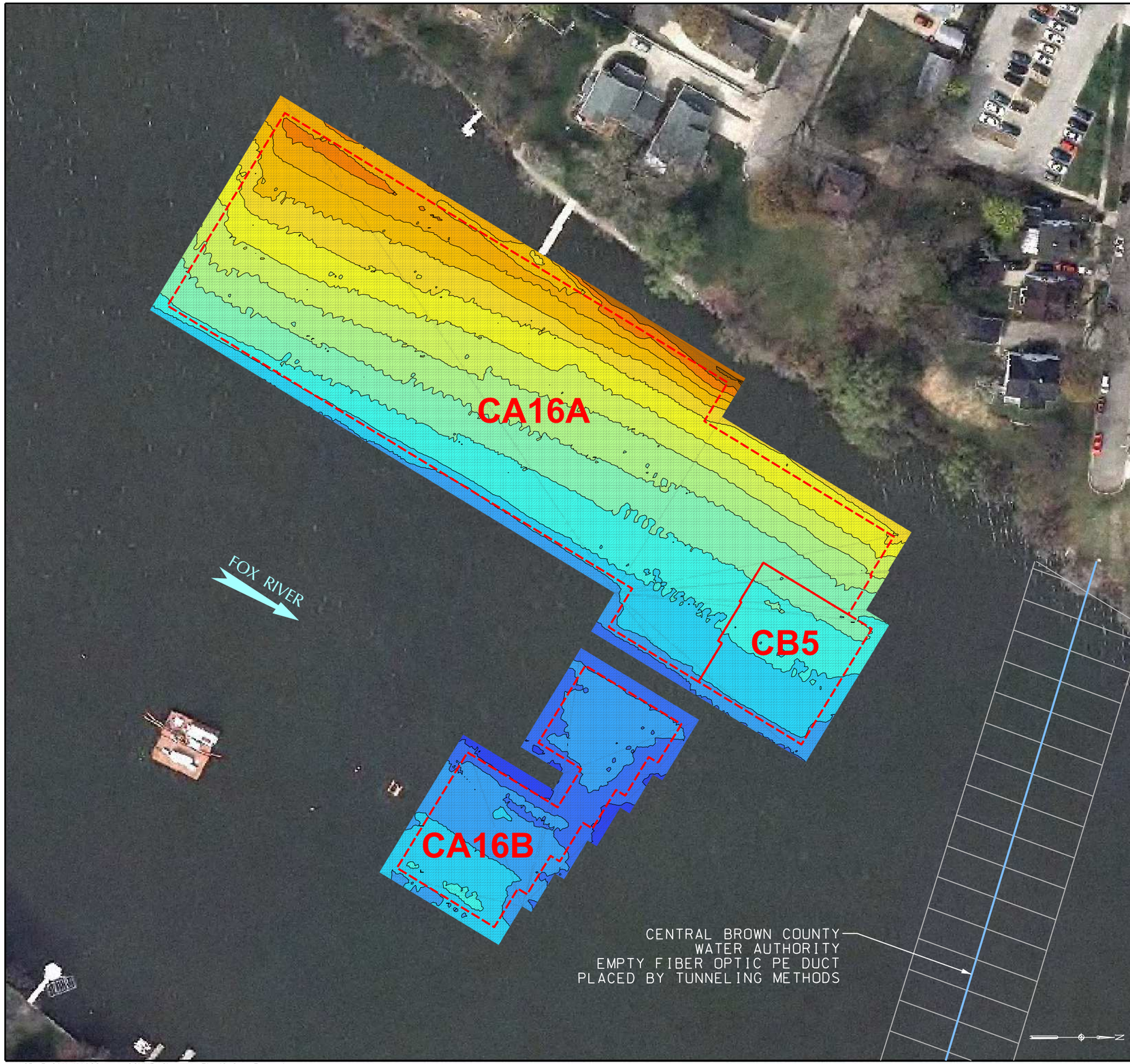
1/21/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

DEEPER

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 40' 80'

BAR SCALE

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FIGURE 12A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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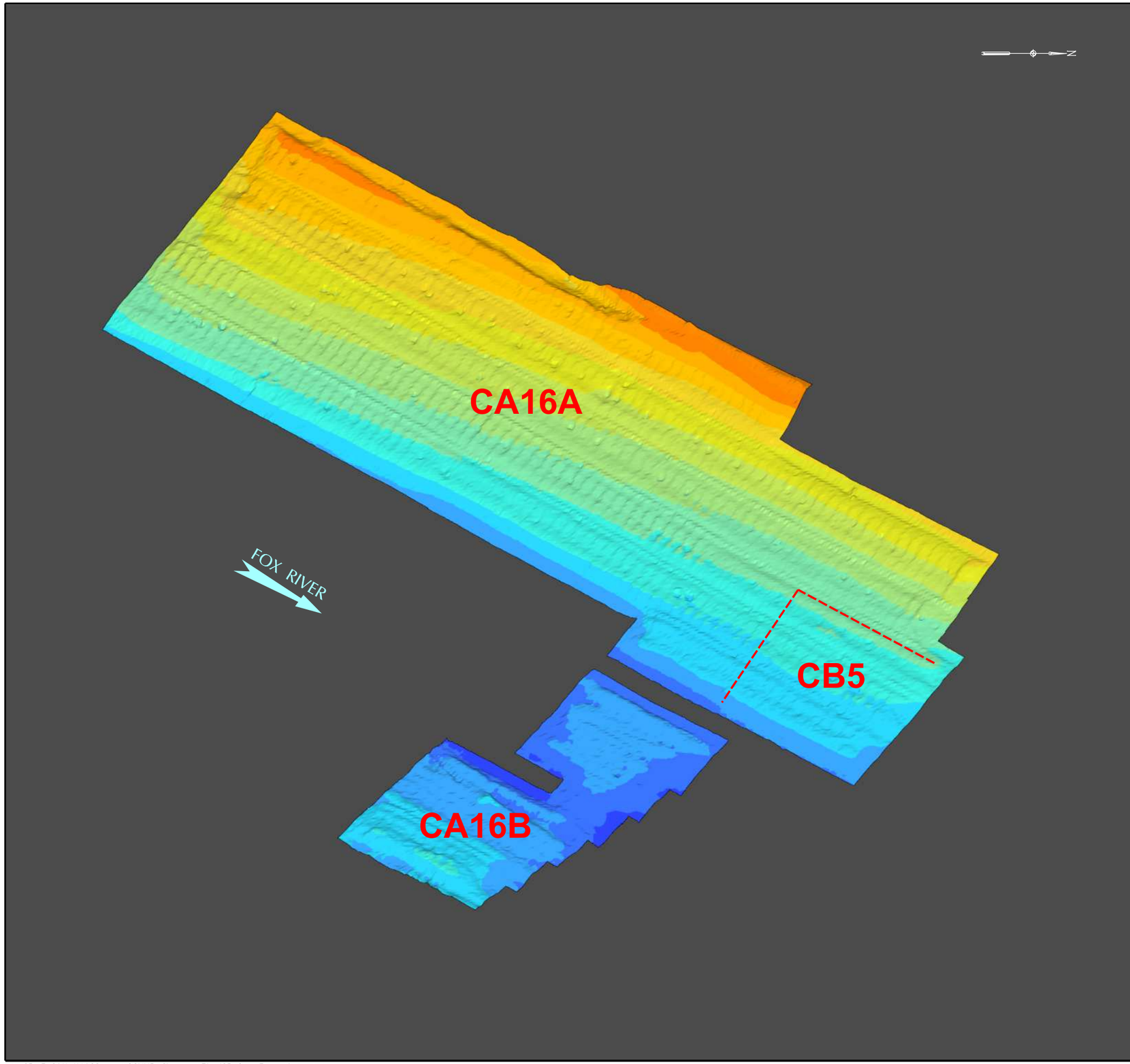
1/23/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE).
   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 12B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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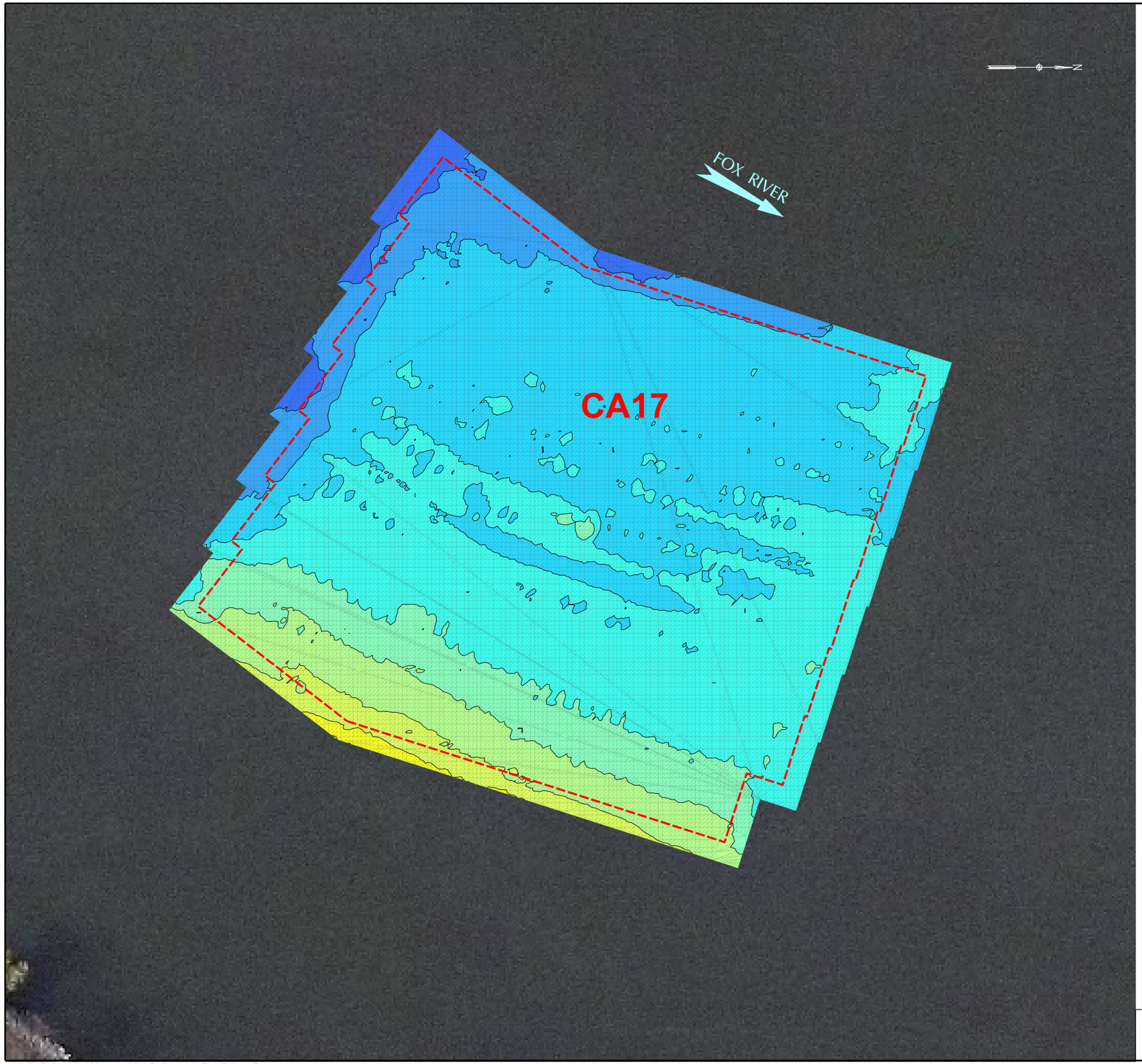
1/21/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

ELEVATION 585 - 586
ELEVATION 584 - 585
ELEVATION 583 - 584
ELEVATION 582 - 583
ELEVATION 581 - 582
ELEVATION 580 - 581
ELEVATION 579 - 580
ELEVATION 578 - 579
ELEVATION 577 - 578
ELEVATION 576 - 577
ELEVATION 575 - 576
ELEVATION 574 - 575
ELEVATION 573 - 574
ELEVATION 572 - 573
ELEVATION 571 - 572
ELEVATION 570 - 571
ELEVATION 569 - 570
ELEVATION 568 - 569
ELEVATION 567 - 568
ELEVATION 566 - 567

WATER DEPTH

DEEPER

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25' 50'
BAR SCALE

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FIGURE 13A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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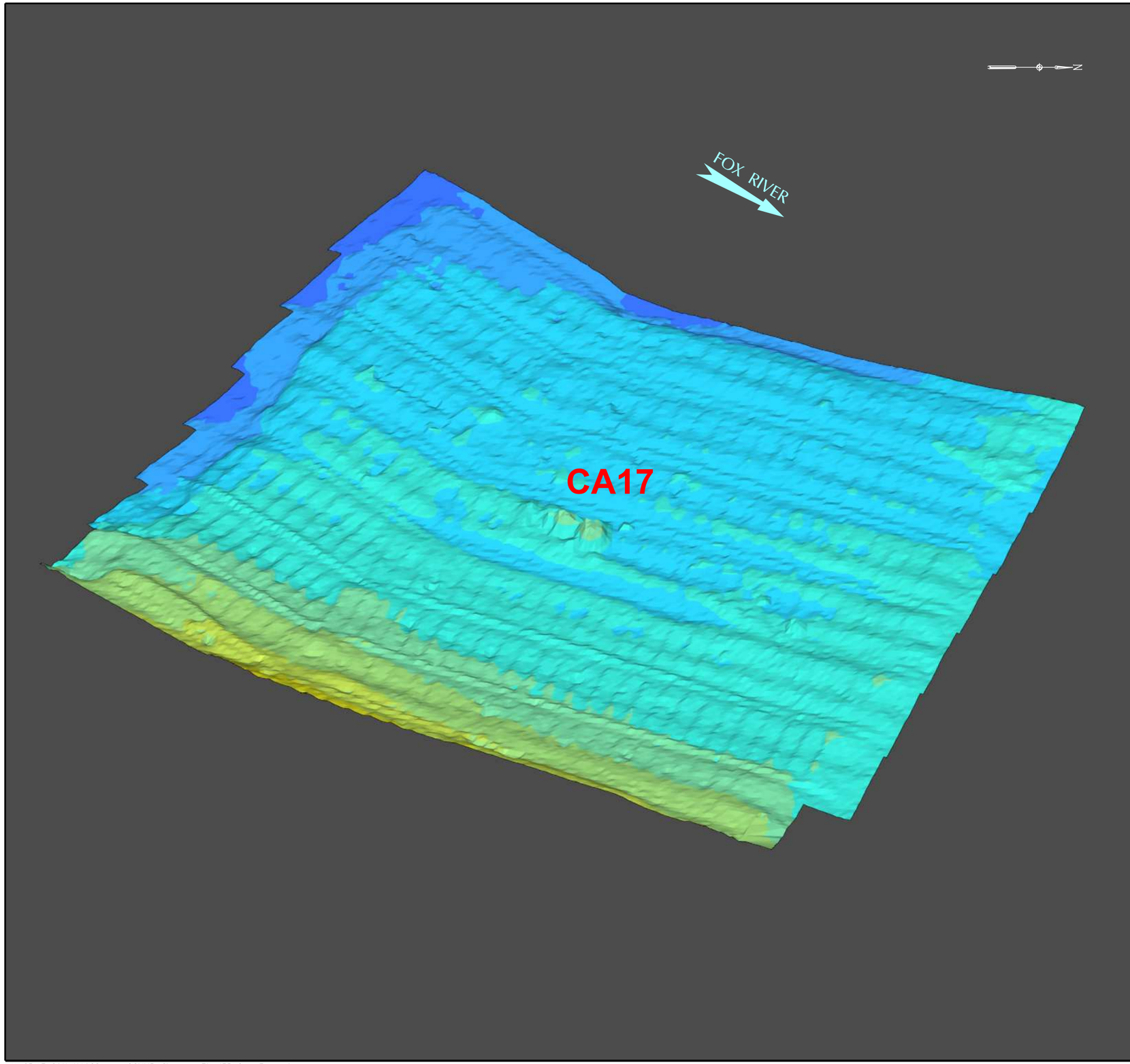
1/23/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO.
   DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE).
   THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 13B

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

	Date: JANUARY, 2012	Revision Date:	
NOT TO SCALE	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

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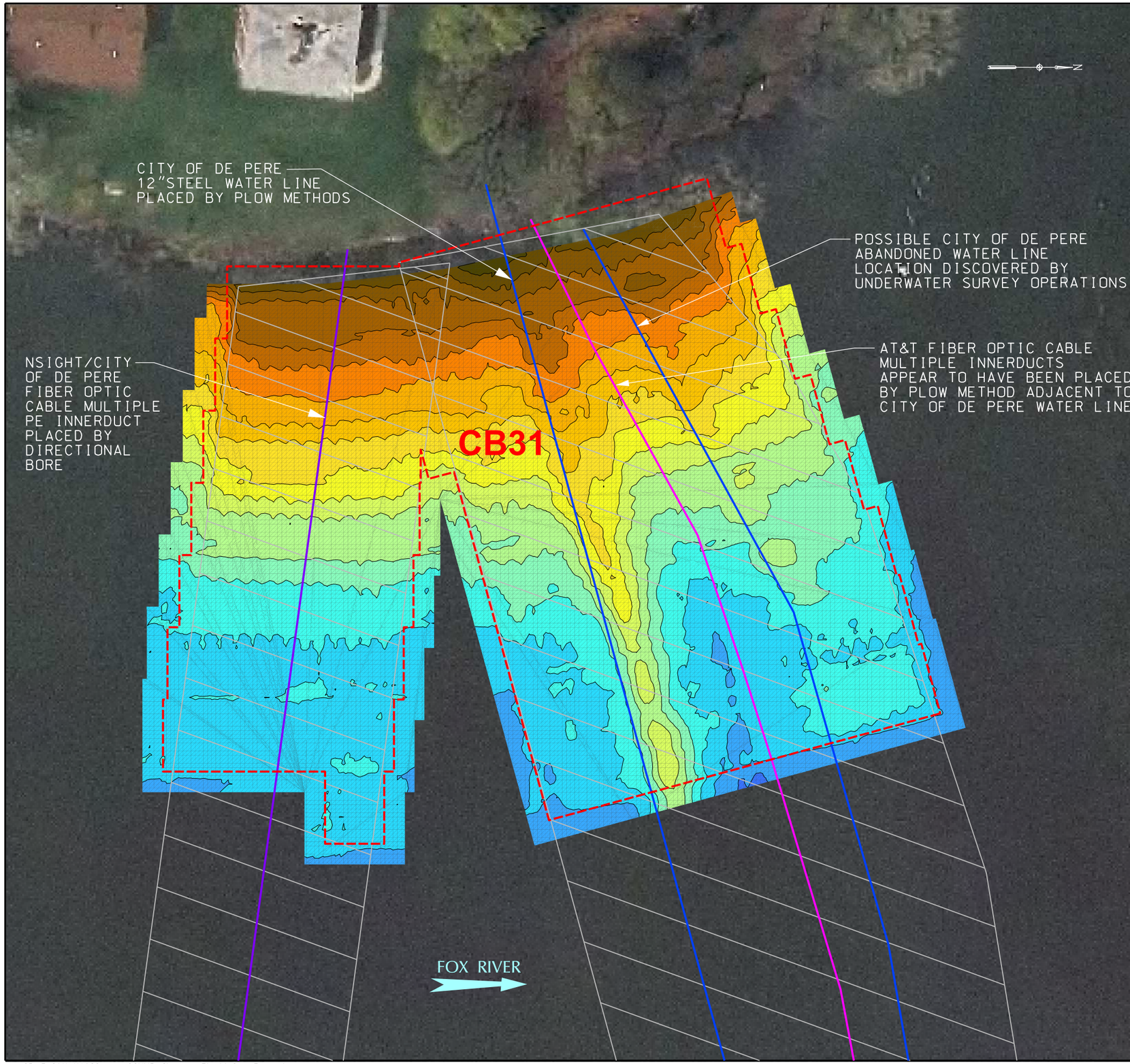
1/23/2012 jrb2



LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY ANCHOR QEA, L.L.C.. COMPILED IN NOVEMBER 2004.
4. DESIGN CAP PLACEMENT LIMITS AND UTILITY LOCATIONS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 25' 50'
BAR SCALE

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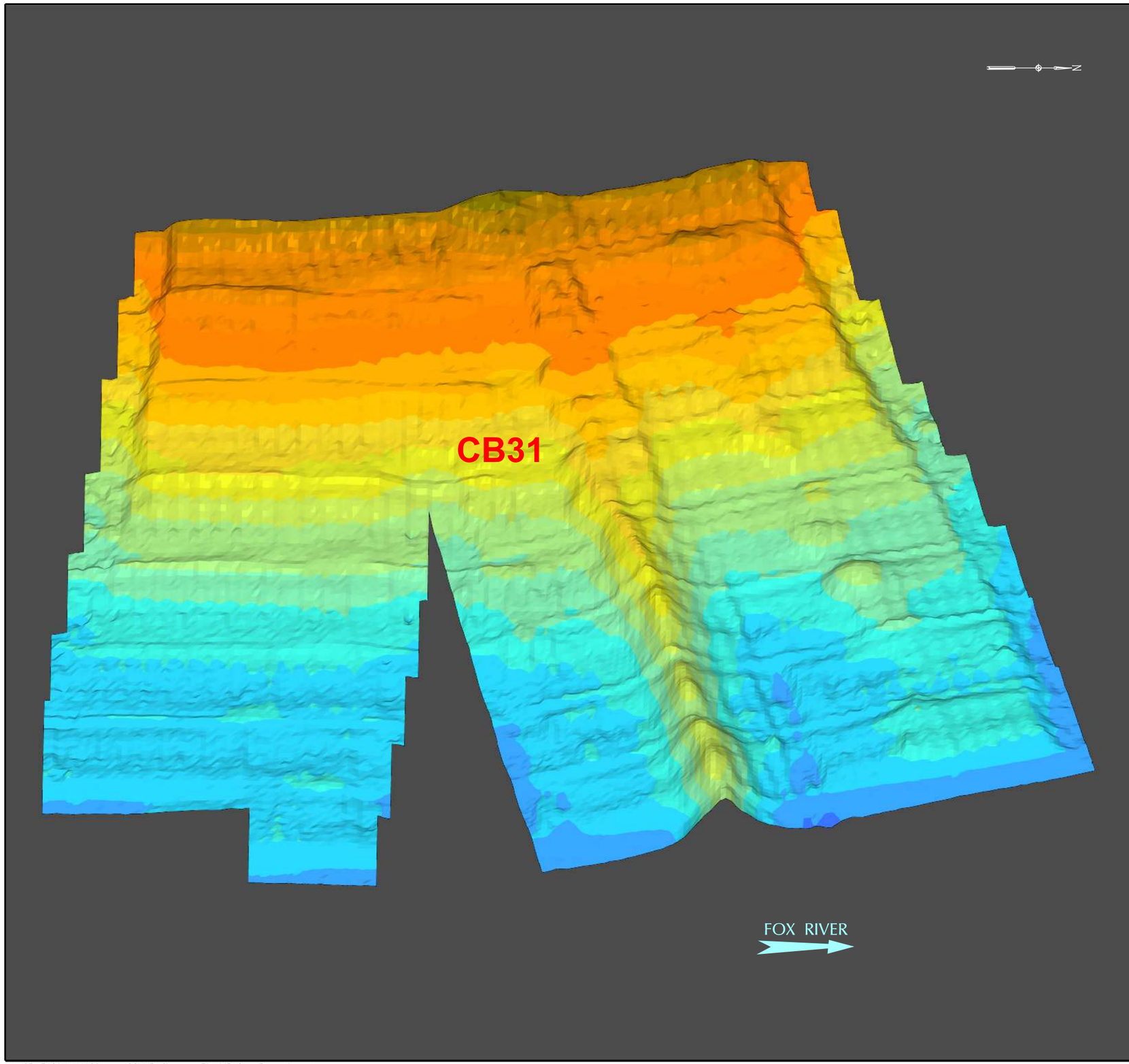
FIGURE 14A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-14 Cap Elevations.dgn
1/23/2012 jrb2



COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 585 - 586
- ELEVATION 584 - 585
- ELEVATION 583 - 584
- ELEVATION 582 - 583
- ELEVATION 581 - 582
- ELEVATION 580 - 581
- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 574 - 575
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEYS: NOVEMBER 2 & 3, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.

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FIGURE 14B
LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS
ISOMETRIC VIEW

NOT TO SCALE	Date: JANUARY, 2012	Revision Date:	
	Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-14B Cap Elevations.dgn
1/23/2012 jrb2

LEGEND

DESIGN CAP PLACEMENT LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT NOVEMBER 2011 TOP OF ENGINEERED CAP ELEVATIONS

SHALLOWER	ELEVATION 585 - 586
	ELEVATION 584 - 585
	ELEVATION 583 - 584
	ELEVATION 582 - 583
	ELEVATION 581 - 582
	ELEVATION 580 - 581
	ELEVATION 579 - 580
	ELEVATION 578 - 579
	ELEVATION 577 - 578
WATER DEPTH	ELEVATION 576 - 577
	ELEVATION 575 - 576
	ELEVATION 574 - 575
	ELEVATION 573 - 574
	ELEVATION 572 - 573
	ELEVATION 571 - 572
	ELEVATION 570 - 571
	ELEVATION 569 - 570
	ELEVATION 568 - 569
	ELEVATION 567 - 568
DEEPER	ELEVATION 566 - 567

NOTES:

1. 200 KILOHERTZ (kHZ) SINGLE BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN, CO. DATES OF SURVEY: NOVEMBER 2, 2011.
2. THE HORIZONTAL CONTROL IS REFERENCED TO THE NAD83 WISCONSIN STATE PLANE COORDINATE SYSTEM (WISCONSIN CENTRAL ZONE). THE VERTICAL CONTROL IS REFERENCED TO NAVD 88.
3. ORTHO PHOTO SUPPLIED BY BROWN COUNTY L.I.O. COMPILED IN NOVEMBER 2010.
4. DESIGN CAP PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

0 30' 60'
BAR SCALE

Foth
Foth Infrastructure & Environment, LLC

LOWER FOX RIVER REMEDIATION LLC

FIGURE 15A

LOWER FOX RIVER - OU3
TOP OF CAP ELEVATIONS

Date: JANUARY, 2012	Revision Date:	
Drawn By: JRB2	Checked By: TAG	Scope: 11A029

X:\GB\IE\2011\11A029\cad\COMMP\figures\Fig-15 Cap Elevations.dgn
1/23/2012 jrb2

Attachment 1

Notes from COMMP Meeting (June 29, 2011)
and
Approval of the Notes from the A/OT

Gawronski, Troy A

From:	George.Berken@boldt.com
Sent:	Thursday, August 04, 2011 8:47 AM
To:	Al Toma; Bryan Heath; Jeff Lawson; John Heyde; Paul Montney; Roger Kaminski; Bill Coleman; Bill Hartman; Clay Patmont; Roznowski, Denis M; George Willant; Greg Smith; Hutchison, Jim; Jason Thaxton; Kelly Krabbe; Kevan McCaslin; Paul LaRosa; Richard Feeney; Rudy Driessen; Terri Blackmar; Gawronski, Troy A; Vic Buhr
Cc:	AgenciesLFRTeam@boldt.com; LFR.OverSightTeam@boldt.com; jkern@KernStat.com; kernstat@gmail.com; Mike Palermo; Beth Olson
Subject:	87500 OU2-5 - Fw: Notes from COMMP Meeting held on 6/29/11
Attachments:	Meeting Notes from COMMP Meeting_AOT_072911.DOC; LFRR_11_0537_Meeting Notes for COMMP Mtg_AOT_072911.pdf

Terri, the notes for the COMMP Meeting held on 6/29/11 are acceptable.

Thanks,
George...

George A. Berken, PE
Engineering Project Manager
Technical Services

The Boldt Company
2525 N. Roemer Road
P.O. Box 419
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920-225-6141 Phone
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----- Forwarded by George Berken/Boldt on 08/04/2011 08:45 AM -----

"Blackmar, Terri" <Terri.Blackmar@tetratech.com>

07/29/2011 02:50 PM

To "AgenciesLFRTeam@boldt.com" <AgenciesLFRTeam@boldt.com>, "LFR.OverSightTeam@boldt.com" <LFR.OverSightTeam@boldt.com>, Mike Palermo <mike@mikepalermo.com>, "jkern@KernStat.com" <jkern@KernStat.com>, '"d0nal3a@gmail.com"' <d0nal3a@gmail.com>, '"donalea.dinsmore@wisconsin.gov"' <donalea.dinsmore@wisconsin.gov>

cc Jeffrey Lawson <JLawson@project-control.com>, "Heath, Bryan" <Bryan.Heath@ncr.com>, "Roznowski, Denis M" <Denis.Roznowski@Foth.com>, "Gawronski, Troy A" <Troy.Gawronski@Foth.com>, "Van Hoof, Tara M" <Tara.VanHoof@Foth.com>, "Coleman, Bill" <Bill.Coleman@tetratech.com>, "Willant, George" <George.Willant@tetratech.com>, "Feeney, Richard" <Richard.Feeney@tetratech.com>, "McCaslin, Kevan" <Kevan.McCaslin@tetratech.com>, "Krabbe, Kelly" <Kelly.Krabbe@tetratech.com>, "Thaxton, Jason" <Jason.Thaxton@tetratech.com>, Bill Hartman <BHartman@JFBrennan.Com>, Greg Smith <gsmith@jfbrennan.com>, Paul LaRosa <plarosa@anchorgea.com>

Fax to

Subject Notes from COMMP Meeting

George,

Attached are meeting notes from the 6/29 meeting on the COMMP. Please review these notes and let me know if you have any questions or comments.

Thanks,

Terri

Terri Blackmar, PE | Vice President, Great Lakes Operations
Direct: 630.470.4217
Terri.Blackmar@tetratech.com

Tetra Tech | Fox River Site
1611 State Street | Green Bay, WI 54304 | www.tetratech.com

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Think Green - Not every email needs to be printed.

TETRA TECH EC, INC.

Lower Fox River Remedial Action OUs 2-5

DOCUMENT CONTROL FORM

CONTRACTOR:	Tetra Tech EC Inc.
PROJECT NO.:	106-3876
PROJECT NAME:	Lower Fox River Remediation of OUs 2-5
DOCUMENT CONTROL NO.	LFRR-11-0537
WORK PHASE:	2B
DATE OF DOCUMENT:	July 29, 2011
DOCUMENT TITLE:	Notes from June 29, 2011 Meeting on the Cap Operations, Maintenance and Monitoring Plan
DOCUMENT RECIPIENT:	A/OT
DOCUMENT SENDER:	T. Blackmar
SPECIFICATION SECTION AND PARAGRAPH NO. OF REQUIREMENT:	n/a
SUBCONTRACTOR (IF APPLICABLE):	Name
	Address
	Phone
METHOD OF DELIVERY:	E-Mail
SUBMITTED MATERIALS:	Revised Work Group Meeting Notes
FILE NO.:	9.3.1 Work Group – Meeting Minutes

Do not remove this page from the attached document.
Any further reproduction of the document must include this page.

Lower Fox River Remedial Action OUs 2-5
Notes from June 29, 2011 Meeting on the Cap Operations, Maintenance and Monitoring Plan (COMMP) and Long Term Monitoring Plan (LTMP) Requirements
LFRR-11-0537
July 29, 2011

Attendees

Tetra Tech	
Richard Feeney	George Willant
Terri Blackmar	Eric Bauer
Kevan McCaslin	Jason Thaxton
Lower Fox River Remediation LLC	
Jeff Lawson , PCC	Sue O'Connell, PCC
Bryan Heath, NCR	
A/OT	
Rick Fox, NRT	Steve Jaeger, WDNR
Jay Grosskopf, Boldt	
Gary Kincaid, WDNR	
George Berken, Boldt	
Foth	
Denis Roznowski	
Troy Gawronski	
JF Brennan	
Bill Hartman	

Meeting Agenda

The following topics were discussed at this meeting held on June 29, 2011:

- Requirements of the COMMP with regard to baseline surveys
- Possible action that may be required during the 2011 season to prepare for future COMMP and LTMP activities
- Schedule for COMMP activities and EPA Guidelines for Long Term Monitoring Schedules (dated June 28, 2011)
- Updates needed to the COMMP document.

A summary of the discussion related to each topic is presented below.

COMMP Requirements

The requirements for determining baseline cap conditions were discussed. The text of the COMMP states the following:

In addition to the cap thickness measurements performed as part of the CQAPP, a geophysical sub - bottom profiler/seismic reflection survey will be performed to obtain a profiler 'response signature' of the armor layer within a designated CCU immediately following placement of the armor layer. This record will be compared to the response signature of a sub - bottom profiler survey of a portion of the capped area (one time pre - placement) as well as a designated area outside of the capping areas (i.e., area with no cap materials) to determine the appropriate baseline signature for future long - term monitoring surveys of the caps. During postconstruction cap surveys, the sub - bottom profiler records can be referenced to the baseline signatures to assess the cap conditions along with bathymetric survey data. These data will be used to determine areas of the CCU that may have been eroded. It should be noted that it is not the intent of the sub - bottom profiling to map the thickness of the armor layer, but instead to verify that armor material remains in place. The capped areas are anticipated to have a signature that is different from the native river bottom, due to the acoustic roughness of the gravel, to show enough difference in its signature to allow for monitoring cap integrity.

The need for a sub-bottom profiler/seismic reflection survey immediately following placement of the armor stone was discussed. The Agencies agreed that performing a post-cap baseline bathymetric survey (together with physical cap material thickness measurements at the time of placement) should be sufficient, along with pre-placement bathymetric survey information to establish initial cap thickness and integrity, and that the bathymetric surveys from one monitoring year to the next (e.g., year 0 to year 2) can be compared to determine if there are any obvious changes evident in the cap. The differences in bathymetry should allow identification of potential cap erosion, punch-through, and other disturbances that may affect the integrity of the cap. If an area appears to be disturbed, the sub-bottom profile/seismic reflection survey could be performed to better understand the mechanism(s) responsible for the disturbance. No baseline sub-

bottom profile survey should be needed as the response signature for the top and bottom of armor stone should be evident in the later survey. Alternatively, the area of suspected disturbance could be poled or investigated using other means, for example, inspection by divers. The COMMP will therefore be revised to indicate that there are alternative methods to bathymetry or sub-bottom profiling (e.g., poling, physical inspection, etc.) for evaluating caps during the long-term monitoring program should conditions warrant employing alternative methods.

Possible Actions to Prepare for Future COMMP Activities

As a follow-up to the previous discussion, the Agencies suggested that the LLC perform multi-beam surveys of final caps rather than single-beam surveys, since the multi-beam survey will provide a more detailed surface for comparison during cap monitoring activities. This would eliminate the need for two surveys after completion of the caps. This is the only action that should be needed for caps completed in 2011.

A multi-beam survey should be run before sand is placed, after the sand is placed, and again after the armor stone is placed. These surveys would tell us how much settlement has occurred.

Schedule for COMMP and LTMP Activities

George Berken summarized the schedule for monitoring activities described in the COMMP. He also distributed a modified monitoring schedule proposed by the agencies for long-term monitoring prior to the meeting (revised 6/28/11, attached) showing the relationship between COMMP-related bathymetric surveys and Long Term Monitoring Plan (LTMP) required monitoring. The modifications to the OU1 schedule were limited to: 1) adding the bathymetric surveys triggered by the 5-year recurrence flow rate to be performed in 2011; and 2) the LTM Year 2 survey to potentially be waived depending on the results of the 2011 survey. In OU1, fish, water and cap monitoring began in 2010 as part of the LTMP. Jim Hahnenberg requested that the schedule for COMMP and LTMP activities be coordinated to ensure that the monitoring is performed in time for the 5-year report. It was also suggested that COMMP and LTMP activities for OU1 and OUs 2-5 be coordinated to the extent possible. The next report is due in 2012. However, these surveys are for OU1, which is not part of this project.

Year 0 for cap monitoring purposes in OU2-5 is the year after installation of the caps. For OU2 and OU3, 2012 will be year 0. The schedule for COMMP monitoring is presented in the plan, and includes trigger events. A summary of the frequency of these monitoring requirements is as follows:

Planned events: Years 2, 4, and every 5 years thereafter for CCUs completed within the same year of construction.

Other events: Within one year following a 20-year flow and seiche discharge event, within one year following a river construction event (e.g., a new bridge), and within one year following an event in which the water level falls one foot below the design low water datum. Follow-on events are for the 100-year flow event and for a low water datum that falls 2 feet below the design low water datum.

It takes a while to line up staff and equipment, and about 3 days to obtain samples from each area, so that should be considered when planning for field work.

Updates Needed to the COMMP

Tetra Tech (Terri Blackmar) indicated that, in reviewing the COMMP before the meeting, it was evident that some updating was needed. George Berken agreed, and said he noticed some out-of-date references to the CQAPP Addendum, etc. Tetra Tech will update the document and clarify the information on the sub-bottom profiling and other surveys to indicate that these are options for cap investigation if a bathymetric survey comparison indicates a potential problem with a cap area.

Action Items

The following are action items for this meeting:

- Consider the use of multi-beam rather than single-beam surveys for all post-cap documentation (LLC)
- Review the schedule provided by the Agencies for COMMP and LTMP monitoring and provide feedback to the Agencies (LLC and Tetra Tech Team)
- Update the COMMP per the meeting discussion (Tetra Tech Team)

Attachment 2

Hydrographic Survey Observation Reports

Client: Lower Fox River Remediation LLC
Project: Lower Fox River OU 2-5 Hydrographic Survey
Prepared by: Brad Kussman
Checked by: Troy Gawronski

Project #: 11A029
Page: 1 of 2
Date: 11-2-11
Date: 3/6/12

Hydrographic Survey Observation Report

Location OU3-Cap Areas

WEATHER	Temp (° F)		Sky Cond.	Precip. (in.)			Wind	
	Low	High			Rain	Snow	Waves	Direction
	45	48	Cloudy				>1'	NNE @ 4 mph

Contractors on site *(include no. of personnel per contractor)*

Other personnel on site:	***Purpose***
Mike Wyatt - JF Brennan	Survey Boat Captain
Brad Kussman (BLK) - Foth	Auditor

Work observation report, comments:

0755 - BLK arrived at Bomier Boat Launch site.

0800 – Mike Wyatt arrived at launch with multi-beam Survey boat.

0815 – Mike Wyatt successfully checked in at survey control point OU3-07R for the post-cap multi-beam survey.
N 228500.356 Delta H = 0.032
E 2474907.625 Delta V =- 0.038
EL 594.845

0817 – Mike Wyatt obtained a tide elevation of 588.728' at the Bomier boat docks.

0819 – 0950 JF Brennan multi-beam survey vessel was starting up and configuring settings at Bomier boat dock.

0950 – Started Patch Test for multi-beam survey.

1000 – Mike Wyatt performed a speed of sound cast.

1100 – Mike Wyatt performed performance test and evaluated results.

1120-1630 - Performed OU3 cap survey.

1630-1710 – Pollings were performed (Min. 3 per survey area).

1730 - JF Brennan multi-beam survey vessel returned to Bomier boat dock.

1735 – Mike Wyatt obtained check-out tide elevation of 588.733' at Bomier Boat Launch.

1740 – Mike Wyatt performed the survey check-out at survey control point OU3-07R. BLK completed the survey check-out procedures.
N 228500.320 Delta H = 0.031
E 2474907.644 Delta V = 0.008
EL 594.891

Hydrographic Survey Observation Report

1750 - BLK departed the Bomier Street Boat Launch for the Foth office.

Client: Lower Fox River Remediation LLC
Project: Lower Fox River OU 2-5 Hydrographic Survey
Prepared by: Brad Kussman
Checked by: Troy Gawronski

Project #: 11A029
Page: 1 of 1
Date: 11-3-11
Date: 3/6/12

Hydrographic Survey Observation Report

Location OU3-Cap Areas

WEATHER	Temp (° F)		Sky Cond.	Precip. (in.)			Wind	
	Low	High			Rain	Snow	Waves	Direction
	45	48	Cloudy				>1'	NNE @ 4 mph

Contractors on site *(include no. of personnel per contractor)*

Other personnel on site:	***Purpose***
Mike Wyatt - JF Brennan	Survey Boat Captain
Brad Kussman (BLK) - Foth	Auditor

Work observation report, comments:

1350 - BLK arrived at Bomier Boat Launch site.

1350 – Mike Wyatt arrived at launch with multi-beam Survey boat.

1355 – Mike Wyatt successfully checked in at survey control point OU3-07R for the post-cap multi-beam survey.
N 228500.352 Delta H = 0.051
E 2474907.657 Delta V = 0.015
EL 594.898

1402 – Mike Wyatt obtained a tide elevation of 588.776' at the Bomier boat docks.

1405 - JF Brennan multi-beam survey vessel was starting up and configuring settings at Bomier boat dock.

1405 – Mike Wyatt performed a speed of sound cast.

1405-1424 – Mike Wyatt performed performance test and evaluated results.

1424-1450 - Performed OU3 cap survey.

1450-1455 – Pollings were performed.

1500 - JF Brennan multi-beam survey vessel returned to Bomier boat dock.

1500 – Mike Wyatt obtained check-out tide elevation of 588.694' at Bomier Boat Launch.

1510 – Mike Wyatt performed the survey check-out at survey control point OU3-07R. BLK completed the survey check-out procedures.
N 228500.351 Delta H = 0.025
E 2474907.617 Delta V = 0.002
EL 594.885

1530 - BLK departed the Bomier Street Boat Launch for another survey.

Attachment 3

Cap Thickness Verification Data
(prepared by Tetra Tech EC, Inc.)

Appendix M
Table M-1
Cover/Cap Sand Sampling Results

OU2-CA1-1-1											
Sample ID	Sample Date	Sand Thickness (inches)	Sand and Sediment Mix (inches)	Total Sand and Sediment Mix (inches)	Required Thickness (inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
						Northing	Easting	Northing	Easting	Northing	Easting
OU2-CA1-1-1-C1	8/31/2009	6.0	0.0	6.0	3	203966.63	2457997.96	203966.85	2457998.38	-0.22	-0.42
OU2-CA1-1-1-C2	8/28/2009	7.2	0.0	7.2	3	203875.32	2458058.24	203874.18	2458058.36	1.14	-0.12
OU2-CA1-1-1-C3	8/28/2009	3.6	0.0	3.6	3	203917.51	2458088.71	203917.01	2458087.99	0.50	0.72
OU2-CA1-1-1-C4	8/28/2009	4.8	0.0	4.8	3	203952.71	2458181.17	203952.75	2458181.30	-0.04	-0.13
OU2-CA1-1-1-C5	8/25/2009	4.8	0.0	4.8	3	204055.74	2458295.34	204055.97	2458296.56	-0.23	-1.23
Average		**5.3**	**0.0**	**5.3**							

OU2-CA1-1-2											
Sample ID	Sample Date	Sand Thickness (inches)	Sand and Sediment Mix (inches)	Total Sand and Sediment Mix (inches)	Required Thickness (inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
						Northing	Easting	Northing	Easting	Northing	Easting
OU2-CA1-1-2-C1	8/26/2009	6.0	0.0	6.0	3	204123.24	2458376.40	204121.82	2458375.99	1.42	0.41
OU2-CA1-1-2-C2	8/28/2009	7.2	0.0	7.2	3	204044.67	2458459.58	204045.09	2458460.01	-0.42	-0.43
OU2-CA1-1-2-C3	8/26/2009	3.6	0.0	3.6	3	204188.75	2458484.16	204188.68	2458481.63	0.08	2.52
OU2-CA1-1-2-C4	8/27/2009	4.8	0.0	4.8	3	204102.76	2458509.80	204101.04	2458510.59	1.72	-0.79
OU2-CA1-1-2-C5	8/26/2009	4.8	0.0	4.8	3	204276.83	2458612.24	204276.04	2458612.89	0.79	-0.65
OU2-CA1-1-2-C6	8/28/2009	6.0	0.0	6.0	3	204179.17	2458644.68	204178.43	2458644.82	0.74	-0.14
OU2-CA1-1-2-C7	8/26/2009	4.8	0.0	4.8	3	204315.73	2458730.32	204314.94	2458730.27	0.79	0.05
OU2-CA1-1-2-C8	8/28/2009	6.0	0.0	6.0	3	204231.84	2458729.62	204231.64	2458729.20	0.20	0.42
OU2-CA1-1-2-C9	8/28/2009	8.4	0.0	8.4	3	204271.79	2458806.63	204272.88	2458807.53	-1.09	-0.90
OU2-CA1-1-2-C10	8/26/2009	4.8	0.0	4.8	3	204384.06	2458815.07	204381.46	2458816.15	2.60	-1.08
OU2-CA1-1-2-C11	8/27/2009	4.8	0.0	4.8	3	204347.51	2458918.76	204347.56	2458919.48	-0.05	-0.72
OU2-CA1-1-2-C12	8/26/2009	1.2	0.2	1.4	3	204438.72	2458931.34	204438.37	2458929.57	0.35	1.77
OU2-CA1-1-2-C13	8/27/2009	6.0	0.0	6.0	3	204402.95	2459004.60	204401.15	2459005.00	1.80	-0.40
Average		**5.3**	**0.0**	**5.3**							

Appendix M
Table M-1
Cover/Cap Sand Sampling Results

OU2-CA1-1-3											
Sample ID	Sample Date	Sand Thickness (inches)	Sand and Sediment Mix (inches)	Total Sand and Sediment Mix (inches)	Required Thickness (inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
						Northing	Easting	Northing	Easting	Northing	Easting
OU2-CA1-1-3-C1	8/25/2009	6.0	0.0	6.0	3	204206.85	2458332.82	204207.87	2458334.11	-1.02	-1.29
OU2-CA1-1-3-C2	8/25/2009	7.2	0.0	7.2	3	204270.09	2458401.64	204271.02	2458401.75	-0.93	-0.11
OU2-CA1-1-3-C3	8/25/2009	6.0	0.0	6.0	3	204268.98	2458494.99	204267.70	2458495.45	1.28	-0.46
OU2-CA1-1-3-C4	8/25/2009	6.0	0.0	6.0	3	204325.69	2458504.98	204324.36	2458504.48	1.33	0.50
OU2-CA1-1-3-C5	8/25/2009	3.6	0.0	3.6	3	204384.31	2458595.57	204384.76	2458594.48	-0.45	1.09
OU2-CA1-1-3-C6	8/25/2009	4.8	0.0	4.8	3	204345.44	2458660.78	204346.45	2458662.59	-1.01	-1.81
OU2-CA1-1-3-C7	8/25/2009	6.0	0.0	6.0	3	204416.27	2458686.19	204415.59	2458686.35	0.68	-0.16
OU2-CA1-1-3-C8	8/25/2009	9.6	0.0	9.6	3	204472.79	2458696.33	204473.23	2458695.84	-0.44	0.49
OU2-CA1-1-3-C9	8/25/2009	7.2	0.0	7.2	3	204441.74	2458759.18	204440.08	2458760.23	1.66	-1.05
OU2-CA1-1-3-C10	8/25/2009	8.4	0.0	8.4	3	204556.73	2458760.50	204556.61	2458761.24	0.12	-0.74
OU2-CA1-1-3-C11	8/25/2009	7.2	0.0	7.2	3	204477.21	2458847.97	204477.10	2458846.66	0.11	1.31
OU2-CA1-1-3-C12	8/25/2009	8.4	0.0	8.4	3	204605.18	2458839.80	204604.58	2458840.98	0.60	-1.18
OU2-CA1-1-3-C13	8/25/2009	7.2	0.0	7.2	3	204544.50	2458886.04	204545.83	2458884.29	-1.33	1.75
OU2-CA1-1-3-C14	8/25/2009	8.4	0.0	8.4	3	204632.55	2458913.10	204633.57	2458912.42	-1.02	0.68
OU2-CA1-1-3-C15	8/25/2009	7.2	0.0	7.2	3	204568.59	2458966.79	204569.63	2458967.26	-1.04	-0.47
Average		**6.9**	**0.0**	**6.9**							

OU2-CB1-1-1											
Sample ID	Sample Date	Sand Thickness (inches)	Sand and Sediment Mix (inches)	Total Sand and Sediment Mix (inches)	Required Thickness (inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
						Northing	Easting	Northing	Easting	Northing	Easting
OU2-CB1-1-1-C1	8/31/2009	9.6	0.0	9.6	6	204120.19	2458253.26	204121.11	2458252.67	-0.92	0.59
OU2-CB1-1-1-C2	8/31/2009	9.6	0.0	9.6	6	204087.86	2458216.39	204088.52	2458215.84	-0.66	0.55
OU2-CB1-1-1-C3	8/31/2009	7.2	0.0	7.2	6	204089.39	2458249.78	204090.35	2458250.47	-0.96	-0.69
OU2-CB1-1-1-C4	8/25/2009	12.0	0.0	12.0	6	204099.53	2458282.58	204100.52	2458280.72	-0.99	1.86
OU2-CB1-1-1-C5	8/31/2009	6.0	0.0	6.0	6	204124.01	2458300.90	204125.03	2458300.20	-1.02	0.70
Average		**8.9**	**0.0**	**8.9**							

Appendix M
Table M-1
Cover/Cap Sand Sampling Results

OU3-CA3-1-1											
Sample ID	Sample Date	Sand Thickness (inches)	Sand and Sediment Mix (inches)	Total Sand and Sediment Mix (inches)	Required Thickness (inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
						Northing	Easting	Northing	Easting	Northing	Easting
OU3-CA3-1-2-C1	10/7/2009	5.00	0.75	5.75	3	209100.47	2461116.99	209103.07	2461119.94	-2.59	-2.95
OU3-CA3-1-2-C2	10/7/2009	8.25	0.50	8.75	3	209127.81	2461110.75	209127.79	2461115.12	0.02	-4.37
OU3-CA3-1-2-C3	10/7/2009	4.25	0.25	4.50	3	209123.15	2461169.21	209117.75	2461159.13	5.40	10.07
OU3-CA3-1-2-C4	10/7/2009	6.00	0.75	6.75	3	209144.50	2461139.93	209134.89	2461140.03	9.61	-0.10
OU3-CA3-1-2-C5	10/7/2009	4.50	0.75	5.25	3	209143.77	2461184.67	209138.09	2461187.15	5.68	-2.49
OU3-CA3-1-2-C6	10/7/2009	5.75	1.00	6.75	3	209164.38	2461145.63	209169.47	2461146.82	-5.09	-1.19
OU3-CA3-1-2-C7	10/7/2009	5.25	0.50	5.75	3	209166.87	2461193.17	209166.18	2461199.56	0.69	-6.39
OU3-CA3-1-2-C8	10/7/2009	4.50	0.50	5.00	3	209179.23	2461165.46	209182.27	2461172.32	-3.04	-6.86
OU3-CA3-1-2-C9	10/7/2009	4.00	0.25	4.25	3	209186.93	2461212.81	209191.23	2461207.96	-4.30	4.85
OU3-CA3-1-2-C10	10/7/2009	6.00	0.75	6.75	3	209214.40	2461187.35	209211.27	2461187.41	3.13	-0.06
OU3-CA3-1-2-C11	10/7/2009	5.75	0.00	5.75	3	209221.08	2461216.56	209217.74	2461221.19	3.35	-4.62
Average		**5.39**	**0.55**	**5.93**							

Appendix M
Table M-2
Armor Cap Sampling Results

OU2-CA1-1-1									
Sample ID	Sample Date	Gravel Thickness (inches)	Required Thickness (inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
				Northing	Easting	Northing	Easting	Northing	Easting
OU2-CA1-1-1-G1	9/21/2009	9.5	4	203966.63	2457997.96	203966.16	2457997.93	0.47	0.03
OU2-CA1-1-1-G2	9/21/2009	5.0	4	203875.32	2458058.24	203875.12	2458057.47	0.20	0.78
OU2-CA1-1-1-G3	9/21/2009	6.0	4	203917.51	2458088.71	203918.60	2458087.91	-1.08	0.80
OU2-CA1-1-1-G4	9/21/2009	5.0	4	203952.71	2458181.17	203952.65	2458180.46	0.06	0.72
OU2-CA1-1-1-G5	9/18/2009	5.0	4	204055.74	2458295.34	204056.90	2458296.18	-1.16	-0.84
Average		**6.1**							

OU2-CA1-1-2									
Sample ID	Sample Date	Gravel Thickness (Inches)	Required Thickness (Inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
				Northing	Easting	Northing	Easting	Northing	Easting
OU2-CA1-1-2-G1	8/26/2009	12.0	4	204123.24	2458376.40	204123.02	2458377.25	0.22	-0.85
OU2-CA1-1-2-G2	8/28/2009	12.0	4	204044.67	2458459.58	204045.04	2458458.17	-0.37	1.41
OU2-CA1-1-2-G3	8/26/2009	11.0	4	204188.75	2458484.16	204189.56	2458484.40	-0.81	-0.25
OU2-CA1-1-2-G4	8/27/2009	No Recovery	4	204102.76	2458509.80	204103.07	2458510.48	-0.31	-0.68
OU2-CA1-1-2-G5	8/26/2009	10.0	4	204276.83	2458612.24	204275.73	2458612.15	1.09	0.09
OU2-CA1-1-2-G6	8/28/2009	No Recovery	4	204179.17	2458644.68	204179.66	2458644.93	-0.48	-0.25
OU2-CA1-1-2-G6 (resample)	9/21/2009	8.0	4	204179.17	2458644.68	204179.66	2458644.93	-0.48	-0.25
OU2-CA1-1-2-G7	8/26/2009	8.5	4	204315.73	2458730.32	204316.65	2458730.80	-0.91	-0.48
OU2-CA1-1-2-G8	8/28/2009	No Recovery	4	204231.84	2458729.62	204230.99	2458730.36	0.85	-0.74
OU2-CA1-1-2-G9	8/28/2009	12.0	4	204271.79	2458806.63	204272.08	2458806.83	-0.29	-0.20
OU2-CA1-1-2-G10	8/26/2009	5.5	4	204384.06	2458815.07	204383.46	2458814.59	0.60	0.48
OU2-CA1-1-2-G11	8/27/2009	4.0	4	204347.51	2458918.76	204346.69	2458918.08	0.82	0.68
OU2-CA1-1-2-G12	8/26/2009	4.5	4	204438.72	2458931.34	204439.01	2458930.14	-0.28	1.20
OU2-CA1-1-2-G13	8/27/2009	6.0	4	204402.95	2459004.60	204401.98	2459003.61	0.97	0.99
Average		**8.5**							

Appendix M
Table M-2
Armor Cap Sampling Results

OU2-CA1-1-3									
Sample ID	Sample Date	Gravel Thickness (Inches)	Required Thickness (Inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
				Northing	Easting	Northing	Easting	Northing	Easting
OU2-CA1-1-3-G1	8/25/2009	No Recovery	4	204206.85	2458332.82	204206.68	2458332.62	0.17	0.19
OU2-CA1-1-3-G2	8/25/2009	10.5	4	204270.09	2458401.64	204270.27	2458402.01	-0.18	-0.37
OU2-CA1-1-3-G3	8/25/2009	8.0	4	204268.98	2458494.99	204268.32	2458495.55	0.66	-0.56
OU2-CA1-1-3-G4	8/25/2009	8.0	4	204325.69	2458504.98	204325.68	2458505.57	0.01	-0.59
OU2-CA1-1-3-G5	8/25/2009	No Recovery	4	204384.31	2458595.57	204383.61	2458595.13	0.71	0.45
OU2-CA1-1-3-G6	8/25/2009	14.4	4	204345.44	2458660.78	204346.56	2458666.25	-1.12	-5.47
OU2-CA1-1-3-G7	8/25/2009	9.0	4	204416.27	2458686.19	204416.20	2458687.11	0.07	-0.92
OU2-CA1-1-3-G8	8/25/2009	12.0	4	204472.79	2458696.33	204472.37	2458695.91	0.43	0.42
OU2-CA1-1-3-G9	8/25/2009	9.0	4	204441.74	2458759.18	204441.37	2458759.02	0.38	0.16
OU2-CA1-1-3-G10	8/25/2009	11.0	4	204556.73	2458760.50	204557.40	2458759.66	-0.67	0.83
OU2-CA1-1-3-G11	8/25/2009	7.0	4	204477.21	2458847.97	204479.27	2458851.71	-2.05	-3.75
OU2-CA1-1-3-G12	8/25/2009	10.0	4	204605.18	2458839.80	204605.77	2458840.26	-0.59	-0.46
OU2-CA1-1-3-G13	8/25/2009	12.0	4	204544.50	2458886.04	204544.09	2458886.93	0.41	-0.89
OU2-CA1-1-3-G14	8/25/2009	No Recovery	4	204632.55	2458913.10	204632.81	2458913.06	-0.27	0.04
OU2-CA1-1-3-G15	8/25/2009	8.0	4	204568.59	2458966.79	204573.26	2458967.11	-4.67	-0.32
Average		**9.9**							

OU2-CB1-1-1									
Sample ID	Sample Date	Gravel Thickness (Inches)	Required Thickness (Inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
				Northing	Easting	Northing	Easting	Northing	Easting
OU2-CB1-1-1-G1	9/21/2009	6.0	4	204120.19	2458253.26	204120.54	2458252.63	-0.35	0.64
OU2-CB1-1-1-G2	9/21/2009	4.0	4	204087.86	2458216.39	204087.07	2458215.51	0.79	0.88
OU2-CB1-1-1-G3	9/21/2009	12.0	4	204089.39	2458249.78	204088.57	2458248.89	0.83	0.89
OU2-CB1-1-1-G4	9/21/2009	No Recovery	4	204099.53	2458282.58	204100.36	2458282.64	-0.83	-0.06
OU2-CB1-1-1-G5	9/18/2009	12.0	4	204124.01	2458300.90	204124.41	2458301.88	-0.40	-0.98
Average		**8.5**							

Appendix M
Table M-2
Armor Cap Sampling Results

OU3-CA3-1-1									
Sample ID	Sample Date	Gravel Thickness (Inches)	Required Thickness (Inches)	Proposed		Actual		Offset (Proposed-Actual) (ft)	
				Northing	Easting	Northing	Easting	Northing	Easting
OU3-CA3-1-1-G1	10/13/2009	9.0	4	209103.23	2461120.88	209103.07	2461119.94	0.17	0.94
OU3-CA3-1-1-G2	10/13/2009	6.5	4	209130.34	2461115.52	209127.79	2461115.12	2.55	0.40
OU3-CA3-1-1-G3	10/13/2009	9.0	4	209116.64	2461166.59	209117.75	2461159.13	-1.11	7.46
OU3-CA3-1-1-G4	10/13/2009	7.0	4	209141.08	2461142.91	209134.89	2461140.03	6.19	2.88
OU3-CA3-1-1-G5	10/13/2009	7.0	4	209139.09	2461189.06	209138.09	2461187.15	1.00	1.91
OU3-CA3-1-1-G6	10/13/2009	7.0	4	209167.55	2461149.44	209169.47	2461146.82	-1.92	2.62
OU3-CA3-1-1-G7	10/13/2009	8.0	4	209164.96	2461199.80	209166.18	2461199.56	-1.22	0.24
OU3-CA3-1-1-G8	10/13/2009	7.0	4	209177.44	2461172.81	209182.27	2461172.32	-4.82	0.49
OU3-CA3-1-1-G9	10/13/2009	8.0	4	209194.06	2461210.86	209191.23	2461207.96	2.83	2.91
OU3-CA3-1-1-G10	10/13/2009	10.0	4	209218.48	2461185.73	209211.27	2461187.41	7.21	-1.68
OU3-CA3-1-1-G11*	10/13/2009	7.5	4	209220.76	2461218.60	209217.74	2461221.19	3.03	-2.59
Average		**7.8**							

**Bucket was dropped, but observed thickness between 7" & 8" before dropped.*

Appendix M-3

Sand Cover/Armor Cap Verification Results (2011)

OU3-CA6-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA6-1-1-C1	6/7/2011	3.0	4.0	0.0	4.00	218419.41	2467705.15	
OU3-CA6-1-1-C2	6/7/2011	3.0	4.5	0.0	4.50	218465.64	2467684.47	
OU3-CA6-1-1-C3	6/7/2011	3.0	3.5	0.0	3.50	218485.11	2467765.94	
OU3-CA6-1-1-C4	6/7/2011	3.0	5.0	0.0	5.00	218545.45	2467784.76	
OU3-CA6-1-1-C5	6/7/2011	3.0	3.5	0.0	3.50	218581.36	2467753.13	
Average			4.1	0.0	4.10			

OU3-CA6-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA6-1-1-G1	8/17/2011	4.0	6.0	218441.26	2467686.84	
OU3-CA6-1-1-G2	8/17/2011	4.0	7.5	218453.85	2467738.76	
OU3-CA6-1-1-G3	8/17/2011	4.0	9.0	218513.01	2467724.19	
OU3-CA6-1-1-G4	8/17/2011	4.0	9.0	218522.70	2467799.89	
OU3-CA6-1-1-G5	8/17/2011	4.0	8.5	218580.13	2467736.17	
OU3-CA6-1-1-G6	8/17/2011	4.0	7.0	218592.75	2467791.78	
Average			7.8			

OU3-CA9A-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA9A-1-1-C1	6/29/2011	3.0	3.0	0.5	3.25	220966.64	2469912.75	
OU3-CA9A-1-1-C2	6/29/2011	3.0	4.5	1.0	5.00	221069.09	2470010.89	
OU3-CA9A-1-1-C3	6/29/2011	3.0	4.5	0.5	4.75	221174.54	2470102.57	
OU3-CA9A-1-1-C4	6/29/2011	3.0	6.0	0.5	6.25	221138.95	2470190.09	
OU3-CA9A-1-1-C5	6/29/2011	3.0	4.0	1.0	4.50	221243.04	2470200.11	
OU3-CA9A-1-1-C6	6/29/2011	3.0	3.5	1.0	4.00	221296.53	2470287.72	
Average			4.3	0.8	4.63			

OU3-CA9A-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA9A-1-1-G1	8/18/2011	4.0	6.0	220900.64	2469918.60	
OU3-CA9A-1-1-G2	8/18/2011	4.0	6.0	220977.87	2469897.36	
OU3-CA9A-1-1-G3	8/18/2011	4.0	11.0	220996.09	2469999.15	
OU3-CA9A-1-1-G4	8/18/2011	4.0	5.0	221067.25	2469997.08	
OU3-CA9A-1-1-G5	8/18/2011	4.0	7.0	221084.46	2470072.49	
OU3-CA9A-1-1-G6	8/18/2011	4.0	7.5	221114.69	2470132.89	
OU3-CA9A-1-1-G7	8/18/2011	4.0	6.0	221172.62	2470100.26	
OU3-CA9A-1-1-G8	8/18/2011	4.0	7.0	221149.96	2470186.29	
OU3-CA9A-1-1-G9	8/18/2011	4.0	7.5	221239.42	2470208.04	
OU3-CA9A-1-1-G10	8/18/2011	4.0	7.5	221294.02	2470292.19	
OU3-CA9A-1-1-G11	8/18/2011	4.0	9.0	221379.37	2470315.64	
Average			7.2			

Appendix M-3

Sand Cover/Armor Cap Verification Results (2011)

OU3-CA9B-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA9B-1-1-C1	6/30/2011	3.0	5.0	0.5	5.25	221149.61	2470316.45	
OU3-CA9B-1-1-C2	6/30/2011	3.0	4.0	1.0	4.50	221238.29	2470429.28	
OU3-CA9B-1-1-C3	6/30/2011	3.0	3.5	0.5	3.75	221332.98	2470404.57	
OU3-CA9B-1-1-C4	6/30/2011	3.0	5.0	0.5	5.25	221528.39	2470437.83	
OU3-CA9B-1-1-C5	6/30/2011	3.0	5.0	0.5	5.25	221712.92	2470545.40	
OU3-CA9B-1-1-C6	6/30/2011	3.0	3.0	1.0	3.50	221649.00	2470639.64	
OU3-CA9B-1-1-C7	6/30/2011	3.0	4.5	0.5	4.75	221837.33	2470680.87	
OU3-CA9B-1-1-C8	6/30/2011	3.0	4.5	1.0	5.00	221862.42	2470758.20	
Average			4.3	0.7	4.66			

OU3-CA9B-1-1									
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		JFB Coordinates		JFB Average Stone Results (in)	Comments
				Northing	Easting	Northing	Easting		
OU3-CA9B-1-1-G1	8/19/2011	4.0	5.0	221115.03	2470249.08	NA	NA	NA	
OU3-CA9B-1-1-G2	8/19/2011	4.0	6.5	221145.27	2470319.47	NA	NA	NA	
OU3-CA9B-1-1-G3	8/19/2011	4.0	8.0	221217.32	2470340.73	NA	NA	NA	
OU3-CA9B-1-1-G4	8/19/2011	4.0	5.0	221241.36	2470427.74	NA	NA	NA	
OU3-CA9B-1-1-G5	8/19/2011	4.0	No Recovery	NA	NA	221336.60	2470426.00	5.2	Unable to locate Tt bucket. JFB QC bucket
OU3-CA9B-1-1-G6	8/19/2011	4.0	8.0	221307.52	2470468.98	NA	NA	NA	
OU3-CA9B-1-1-G7	8/19/2011	4.0	6.5	221410.73	2470500.06	NA	NA	NA	
OU3-CA9B-1-1-G8	8/19/2011	4.0	7.0	221528.65	2470438.30	NA	NA	NA	
OU3-CA9B-1-1-G9	8/19/2011	4.0	No Recovery	221675.15	2470569.38	221464.30	2470558.00	6.2	Tt QA bucket was moved approximately 200 ft. during stone placement, but showed 6.0" of stone, which is
OU3-CA9B-1-1-G10	8/19/2011	4.0	6.5	221586.96	2470492.04	NA	NA	NA	
OU3-CA9B-1-1-G11	8/19/2011	4.0	7.5	221561.06	2470598.00	NA	NA	NA	
OU3-CA9B-1-1-G12	8/19/2011	4.0	12.0	221636.76	2470553.86	NA	NA	NA	
OU3-CA9B-1-1-G13	8/19/2011	4.0	No Recovery	NA	NA	221704.00	2470555.00	7.2	Unable to locate Tt bucket. JFB bucket
OU3-CA9B-1-1-G14	8/19/2011	4.0	8.5	221650.31	2470638.25	NA	NA	NA	
OU3-CA9B-1-1-G15	8/19/2011	4.0	6.5	221717.28	2470678.88	NA	NA	NA	
OU3-CA9B-1-1-G16	8/19/2011	4.0	5.0	221772.05	2470622.71	NA	NA	NA	
OU3-CA9B-1-1-G17	8/19/2011	4.0	No Recovery	NA	NA	221848.20	2470704.00	7.3	Unable to locate Tt bucket. JFB bucket
OU3-CA9B-1-1-G18	8/19/2011	4.0	6.0	221863.08	2470760.66	NA	NA	NA	
Average			7.0						

Appendix M-3
Sand Cover/Armor Cap Verification Results (2011)

OU3-CA13A-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA13A-1-1-C1	8/1/2011	3.0	3.0	0.0	3.00	222426.80	2471001.13	
OU3-CA13A-1-1-C2	8/1/2011	3.0	6.0	0.0	6.00	222527.61	2471005.63	
OU3-CA13A-1-1-C3	8/1/2011	3.0	5.5	0.5	5.75	222652.82	2470994.86	
OU3-CA13A-1-1-C4	8/1/2011	3.0	7.0	0.5	7.25	222639.16	2471092.76	
OU3-CA13A-1-1-C5	8/1/2011	3.0	4.5	0.5	4.75	222751.72	2471088.06	
OU3-CA13A-1-1-C6	8/1/2011	3.0	7.0	0.5	7.25	222820.20	2471207.33	
OU3-CA13A-1-1-C7	8/9/2011	3.0	5.0	0.5	5.25	222943.24	2471187.52	
OU3-CA13A-1-1-C8	8/9/2011	3.0	5.5	1.0	6.00	223010.45	2471092.91	
OU3-CA13A-1-1-C9	8/9/2011	3.0	5.0	0.5	5.25	222961.24	2471265.77	
OU3-CA13A-1-1-C10	8/9/2011	3.0	5.0	1.0	5.50	223087.97	2471161.40	
OU3-CA13A-1-1-C11	8/9/2011	3.0	5.0	0.5	5.25	223108.61	2471282.53	
OU3-CA13A-1-1-C12	8/9/2011	3.0	4.5	1.0	5.00	223220.39	2471268.50	
OU3-CA13A-1-1-C13	8/9/2011	3.0	4.5	0.5	4.75	223169.41	2471383.58	
OU3-CA13A-1-1-C14	8/9/2011	3.0	5.5	0.5	5.75	223281.26	2471360.84	
OU3-CA13A-1-1-C15	8/9/2011	3.0	4.0	0.0	4.00	223488.67	2471432.76	
OU3-CA13A-1-1-C16	8/9/2011	3.0	3.5	0.0	3.50	223452.06	2471510.89	
Average			5.0	0.5	5.27			

OU3-CA13A-1-1									
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		JFB Coordinates		JFB Average Stone Results (in)	Comments
				Northing	Easting	Northing	Easting		
OU3-CA13A-1-1-G1	8/25/2011	4.0	8.0	222430.30	2470999.44	NA	NA	NA	
OU3-CA13A-1-1-G2	8/25/2011	4.0	8.5	222524.00	2471007.09	NA	NA	NA	
OU3-CA13A-1-1-G3	8/26/2011	4.0	5.5	222652.66	2470997.60	NA	NA	NA	
OU3-CA13A-1-1-G4	8/24/2011	4.0	No Recovery	NA	NA	222613.00	2471074.00	6.2	Unable to retrieve Tt bucket. JFB bucket measurements collected 31 ft. from proposed bucket location
OU3-CA13A-1-1-G5	8/24/2011	4.0	8.5	222776.02	2471093.68	222784.40	2471107.00	5.7	Bucket was displaced approximately 25 ft. from placed location. JFB bucket measurements collected 39 ft. from proposed bucket location. Results are for information only and not included in the average
OU3-CA13A-1-1-G6	8/24/2011	4.0	7.0	222823.87	2471207.24	NA	NA	NA	
OU3-CA13A-1-1-G7	8/24/2011	4.0	8.0	222862.33	2471107.26	NA	NA	NA	
OU3-CA13A-1-1-G8	8/24/2011	4.0	No Recovery	NA	NA	222917.60	2471161.00	5.5	Unable to retrieve Tt bucket. JFB bucket measurements collected 29 ft. from proposed bucket location
OU3-CA13A-1-1-G9	8/25/2011	4.0	No Recovery	NA	NA	223038.60	2471098.00	4.8	Unable to retrieve Tt bucket. JFB bucket measurements collected 28 ft. from proposed bucket location
OU3-CA13A-1-1-G10	8/24/2011	4.0	8.0	222969.26	2471266.19	NA	NA	NA	
OU3-CA13A-1-1-G11	8/26/2011	4.0	No Recovery	NA	NA	223101.80	2471180.00	4.3	Unable to retrieve Tt bucket. JFB bucket measurements collected 22 ft. from proposed bucket location
OU3-CA13A-1-1-G12	8/25/2011	4.0	See Comments	NA	NA	223112.50	2471273.00	5.2	Bucket was displaced approximately 200 ft. and filled with sand. JFB bucket measurements collected 11 ft. from proposed bucket location
OU3-CA13A-1-1-G13	8/26/2011	4.0	7.0	223219.84	2471267.66	NA	NA	NA	
OU3-CA13A-1-1-G14	8/24/2011	4.0	6.0	223165.81	2471379.83	NA	NA	NA	
OU3-CA13A-1-1-G15	8/25/2011	4.0	6.0	223281.02	2471363.95	NA	NA	NA	
OU3-CA13A-1-1-G16	8/25/2011	4.0	7.5	223375.01	2471425.68	NA	NA	NA	
OU3-CA13A-1-1-G17	8/26/2011	4.0	See Comments	NA	NA	223490.80	2471411.00	6.0	Brennan removed bucket due to navigational buoy interference. JFB bucket measurements collected 5 ft. from proposed bucket location
OU3-CA13A-1-1-G18	8/25/2011	4.0	10.5 See Comments	223062.68	2471202.10	223445.90	2471508.00	6.3	Bucket was displaced approximately 500 ft. from placed location with 10.5" of stone. The 10.5" was not included in the average. JFB bucket measurements collected 9 ft. from proposed bucket location
Average			7.3						

Appendix M-3
Sand Cover/Armor Cap Verification Results (2011)

OU3-CA13B-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA13B-1-1-C1	8/11/2011	3.0	5.5	1.0	6.00	223523.96	2471599.41	
OU3-CA13B-1-1-C2	8/11/2011	3.0	5.5	0.5	5.75	223671.36	2471553.71	
OU3-CA13B-1-1-C3	8/19/2011	3.0	4.5	0.5	4.75	223831.93	2471649.64	
OU3-CA13B-1-1-C4	8/11/2011	3.0	4.5	0.0	4.50	223945.60	2471789.23	
OU3-CA13B-1-1-C5	8/11/2011	3.0	5.5	0.5	5.75	224096.90	2471898.99	
OU3-CA13B-1-1-C6	8/19/2011	3.0	4.5	0.5	4.75	224210.49	2471915.02	
OU3-CA13B-1-1-C7	8/11/2011	3.0	6.5	0.0	6.50	224181.46	2472006.46	
OU3-CA13B-1-1-C8	8/31/2011	3.0	7.0	0.0	7.00	224326.37	2472025.37	
OU3-CA13B-1-1-C9	8/31/2011	3.0	6.0	0.0	6.00	224464.51	2472108.84	
OU3-CA13B-1-1-C10	8/31/2011	3.0	5.0	0.0	5.00	224565.47	2472212.27	
OU3-CA13B-1-1-C11	8/31/2011	3.0	5.5	0.0	5.50	224713.72	2472236.29	
OU3-CA13B-1-1-C12	9/2/2011	3.0	7.5	0.0	7.50	224898.81	2472235.21	
OU3-CA13B-1-1-C13	9/2/2011	3.0	6.5	0.0	6.50	224994.83	2472329.31	
OU3-CA13B-1-1-C14	9/2/2011	3.0	7.0	0.0	7.00	225117.16	2472328.48	
Average			5.8	0.2	5.89			

OU3-CA13B-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA13B-1-1-G1	8/26/2011	4.0	6.5	223524.48	2471453.54	
OU3-CA13B-1-1-G2	8/25/2011	4.0	8.0	223526.69	2471601.75	
OU3-CA13B-1-1-G3	8/26/2011	4.0	6.0	223671.73	2471558.54	
OU3-CA13B-1-1-G4	8/30/2011	4.0	7.0	223722.56	2471705.08	
OU3-CA13B-1-1-G5	8/30/2011	4.0	6.0	223830.62	2471649.96	
OU3-CA13B-1-1-G6	8/30/2011	4.0	6.0	223837.58	2471771.39	
OU3-CA13B-1-1-G7	8/30/2011	4.0	7.0	223947.65	2471790.10	
OU3-CA13B-1-1-G8	8/30/2011	4.0	No Recovery	NA	NA	Unable to locate bucket.
OU3-CA13B-1-1-G9	9/7/2011	4.0	6.0	224096.48	2471897.94	
OU3-CA13B-1-1-G10	9/7/2011	4.0	7.5	224217.41	2471915.58	
OU3-CA13B-1-1-G11	8/30/2011	4.0	7.0	224178.95	2472021.80	
OU3-CA13B-1-1-G12	9/8/2011	4.0	7.5	224323.10	2472030.46	
OU3-CA13B-1-1-G13	9/7/2011	4.0	6.5	224472.55	2472102.19	
OU3-CA13B-1-1-G14	9/8/2011	4.0	5.5	224565.86	2472216.49	
OU3-CA13B-1-1-G15	9/9/2011	4.0	6.5	224711.30	2472237.47	
OU3-CA13B-1-1-G16	9/8/2011	4.0	6.0	224896.79	2472226.77	
OU3-CA13B-1-1-G17	9/9/2011	4.0	7.0	224997.37	2472328.95	
OU3-CA13B-1-1-G18	9/8/2011	4.0	7.0	225113.24	2472327.09	
Average			6.6			

OU3-CA13C-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA13C-1-1-C1	8/9/2011	3.0	5.0	0.5	5.25	222934.65	2470986.42	
OU3-CA13C-1-1-C2	8/9/2011	3.0	4.5	0.5	4.75	222996.25	2470999.75	
Average			4.8	0.5	5.00			

OU3-CA13C-1-1									
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		JFB Coordinates		JFB Average Stone Results (in)	Comments
				Northing	Easting	Northing	Easting		
OU3-CA13C-1-1-G1	8/24/2011	4.0	7.5	222925.21	2470980.99	NA	NA	NA	
OU3-CA13C-1-1-G2	8/24/2011	4.0	No Recovery	NA	NA	222998.70	2471043.00	4.5	Unable to retrieve Tt bucket. JFB bucket
OU3-CA13C-1-1-G3	8/24/2011	4.0	7.0	223005.15	2470988.11	NA	NA	NA	Although the retrieval location was 11.1 ft. from the proposed coordinate location, and outside of the CCU foot print, the bucket placement location was 4.0 ft. from the proposed coordinate location. The 9.7 ft. drift from the placement to the retrieval location is attributed to the bucket being dragged
OU3-CA13C-1-1-G4	8/24/2011	4.0	7.5	223016.33	2471041.63	NA	NA	NA	Bucket placement was made within the tolerance criteria, however; the bucket placement was outside the CCU foot print.
Average			7.3						

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Sand Cover/Armor Cap Verification Results (2011)

OU3-CA13D-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA13D-1-1-C1	9/20/2011	3.0	5.5	0.0	5.50	225252.86	2472627.92	
OU3-CA13D-1-1-C2	9/20/2011	3.0	5.5	0.0	5.50	225407.64	2472666.91	
OU3-CA13D-1-1-C3	9/20/2011	3.0	9.0	0.0	9.00	225513.90	2472667.54	
OU3-CA13D-1-1-C4	9/20/2011	3.0	4.5	0.0	4.50	225606.10	2472699.19	
OU3-CA13D-1-1-C5	9/20/2011	3.0	5.5	0.0	5.50	225672.70	2472696.45	
Average			6.0	0.0	6.00			

OU3-CA13D-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA13D-1-1-G1	10/4/2011	4.0	7.5	225261.18	2472630.60	
OU3-CA13D-1-1-G2	10/4/2011	4.0	9.0	225409.58	2472669.63	
OU3-CA13D-1-1-G3	10/4/2011	4.0	7.0	225519.71	2472668.65	
OU3-CA13D-1-1-G4	10/4/2011	4.0	6.5	225677.34	2472695.88	
Average			7.5			

OU3-CA13E-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA13E-1-1-C1	9/22/2011	3.0	6.0	0.0	6.00	225588.70	2472523.67	
OU3-CA13E-1-1-C2	9/22/2011	3.0	5.5	0.0	5.50	225605.94	2472441.94	
OU3-CA13E-1-1-C3	9/22/2011	3.0	5.0	0.0	5.00	225726.30	2472491.97	
OU3-CA13E-1-1-C4	9/22/2011	3.0	5.0	0.0	5.00	225742.67	2472540.24	
OU3-CA13E-1-1-C5	9/22/2011	3.0	11.5	0.0	11.50	225807.49	2472487.54	
OU3-CA13E-1-1-C6	9/22/2011	3.0	5.0	0.0	5.00	225886.00	2472530.34	
OU3-CA13E-1-1-C7	9/22/2011	3.0	5.0	0.0	5.00	225899.59	2472575.37	
Average			6.1	0.0	6.14			

OU3-CA13E-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA13E-1-1-G1	10/5/2011	4.0	8.0	225587.57	2472525.94	
OU3-CA13E-1-1-G2	10/5/2011	4.0	6.0	225605.69	2472437.03	
OU3-CA13E-1-1-G3	10/5/2011	4.0	5.5	225645.62	2472502.63	
OU3-CA13E-1-1-G4	10/5/2011	4.0	8.0	225725.71	2472492.12	
OU3-CA13E-1-1-G5	10/5/2011	4.0	7.0	225806.84	2472486.53	
OU3-CA13E-1-1-G6	10/5/2011	4.0	10.0	225818.85	2472533.15	
OU3-CA13E-1-1-G7	10/5/2011	4.0	7.0	225885.90	2472534.63	
OU3-CA13E-1-1-G8	10/5/2011	4.0	5.0	225943.03	2472552.09	
Average			7.1			

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Sand Cover/Armor Cap Verification Results (2011)

OU3-CA15-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA15-1-1-C1	9/23/2011	3.0	10.0	0.0	10.00	226348.94	2472664.35	
OU3-CA15-1-1-C2	9/28/2011	3.0	5.0	0.0	5.00	226481.94	2472803.61	
OU3-CA15-1-1-C4	9/28/2011	3.0	5.5	0.0	5.50	226640.16	2472846.36	
OU3-CA15-1-1-C5	9/23/2011	3.0	5.5	0.0	5.50	226829.36	2472856.81	
Average			6.5	0.0	6.50			

OU3-CA15-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA15-1-1-G1	10/6/2011	4.0	6.0	226359.26	2472660.50	
OU3-CA15-1-1-G2	10/6/2011	4.0	7.5	226365.87	2472736.93	
OU3-CA15-1-1-G3	10/6/2011	4.0	5.5	226430.25	2472799.19	
OU3-CA15-1-1-G4	10/6/2011	4.0	7.0	226491.54	2472718.58	
OU3-CA15-1-1-G5	10/6/2011	4.0	6.5	226516.44	2472808.29	Offset due to pipeline with concurrance with all entities on boat
OU3-CA15-1-1-G6	10/6/2011	4.0	7.0	226575.71	2472717.62	
OU3-CA15-1-1-G7	10/6/2011	4.0	6.0	226631.55	2472867.42	Offset due to pipeline with concurrance with all entities on boat
OU3-CA15-1-1-G8	10/6/2011	4.0	8.0	226686.45	2472791.74	
OU3-CA15-1-1-G9	10/6/2011	4.0	6.0	226710.97	2472901.53	
OU3-CA15-1-1-G10	10/6/2011	4.0	7.5	226799.46	2472823.46	
OU3-CA15-1-1-G11	10/6/2011	4.0	6.0	226804.90	2472888.32	
Average			6.6			

OU3-CA15-1-2-C3								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA15-1-2-C3	9/28/2011	3.0	4.5	0.0	4.50	226541.56	2472662.11	
Average			4.5	0.0	4.50			

OU3-CA15-1-2						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA15-1-2-G1	10/31/2011	4.0	9.0	226393.27	2472599.58	
OU3-CA15-1-2-G2	10/31/2011	4.0	10.5	226473.36	2472647.09	
OU3-CA15-1-2-G3	10/31/2011	4.0	11.0	226575.98	2472643.08	
OU3-CA15-1-2-G4	10/31/2011	4.0	7.0	226649.24	2472707.81	
OU3-CA15-1-2-G5	10/31/2011	4.0	9.0	226729.55	2472763.62	
OU3-CA15-1-2-G6	10/31/2011	4.0	10.5	226830.31	2472797.23	
Average			9.5			

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Sand Cover/Armor Cap Verification Results (2011)

OU3-CA16A-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA16A-1-1-C1	10/3/2011	3.0	9.5	0.0	9.5	226994.70	2473062.31	
OU3-CA16A-1-1-C2	10/3/2011	3.0	6.5	0.0	6.5	227081.33	2472949.20	
OU3-CA16A-1-1-C3	10/3/2011	3.0	5.5	0.0	5.5	227204.67	2473038.15	
OU3-CA16A-1-1-C4	10/3/2011	3.0	5.0	0.0	5.0	227171.18	2473187.20	
OU3-CA16A-1-1-C5	10/3/2011	3.0	8.5	0.0	8.5	227330.73	2473091.12	
OU3-CA16A-1-1-C6	10/3/2011	3.0	5.5	0.0	5.5	227394.95	2473191.75	
OU3-CA16A-1-1-C7	10/3/2011	3.0	5.5	0.0	5.5	227386.38	2473329.06	
OU3-CA16A-1-1-C8	10/3/2011	3.0	5.0	0.0	5.0	227505.56	2473262.18	
Average			6.4	0.0	6.4			

OU3-CA16A-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA16A-1-1-G1	10/10/2011	4.0	7.0	226990.20	2473066.84	
OU3-CA16A-1-1-G2	10/7/2011	4.0	9.0	227089.82	2472947.97	
OU3-CA16A-1-1-G3	10/10/2011	4.0	7.0	227067.17	2473015.28	
OU3-CA16A-1-1-G4	10/7/2011	4.0	7.0	227140.72	2472989.07	
OU3-CA16A-1-1-G5	10/7/2011	4.0	7.5	227077.54	2473125.88	
OU3-CA16A-1-1-G6	10/10/2011	4.0	8.0	227126.39	2473073.99	
OU3-CA16A-1-1-G7	10/10/2011	4.0	7.0	227206.86	2473038.30	
OU3-CA16A-1-1-G8	10/10/2011	4.0	7.0	227201.42	2473134.06	
OU3-CA16A-1-1-G9	10/7/2011	4.0	6.5	227171.99	2473182.88	
OU3-CA16A-1-1-G10	10/10/2011	4.0	5.0	227252.42	2473089.34	
OU3-CA16A-1-1-G11	10/7/2011	4.0	6.0	227244.48	2473231.00	
OU3-CA16A-1-1-G12	10/10/2011	4.0	7.0	227304.72	2473147.59	
OU3-CA16A-1-1-G13	10/10/2011	4.0	6.0	227331.63	2473087.46	
OU3-CA16A-1-1-G14	10/10/2011	4.0	7.0	227347.98	2473238.30	
OU3-CA16A-1-1-G15	10/10/2011	4.0	7.0	227395.95	2473194.51	
OU3-CA16A-1-1-G16	10/10/2011	4.0	8.0	227383.31	2473326.35	
OU3-CA16A-1-1-G17	10/7/2011	4.0	8.5	227426.91	2473257.22	
OU3-CA16A-1-1-G18	10/7/2011	4.0	6.5	227507.81	2473266.62	
Average			7.1			

OU3-CA16B-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA16B-1-1-C1	10/3/2011	3.0	5.0	0.0	5.0	227189.56	2473501.64	
OU3-CA16B-1-1-C2	10/3/2011	3.0	5.0	0.0	5.0	227292.72	2473409.37	
Average			5.0	0.0	5.0			

OU3-CA16B-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA16B-1-1-G1	10/10/2011	4.0	6.5	227188.65	2473505.79	
OU3-CA16B-1-1-G2	10/10/2011	4.0	7.0	227289.97	2473410.11	
OU3-CA16B-1-1-G3	10/10/2011	4.0	6.5	227287.48	2473484.06	
OU3-CA16B-1-1-G4	10/10/2011	4.0	6.0	227360.19	2473405.07	
Average			6.5			

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Sand Cover/Armor Cap Verification Results (2011)

OU3-CA17-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA17-1-1-C1	10/21/2011	3.0	5.5	0.0	5.5	228375.08	2474243.94	
OU3-CA17-1-1-C2	10/21/2011	3.0	6.0	0.0	6.0	228345.14	2474331.54	
OU3-CA17-1-1-C3	10/21/2011	3.0	4.0	0.0	4.0	228446.19	2474178.28	
OU3-CA17-1-1-C4	10/21/2011	3.0	6.0	0.0	6.0	228474.16	2474378.05	
OU3-CA17-1-1-C5	10/21/2011	3.0	4.0	0.0	4.0	228515.45	2474311.01	
OU3-CA17-1-1-C6	10/21/2011	3.0	5.0	0.0	5.0	228568.95	2474230.36	
OU3-CA17-1-1-C7	10/21/2011	3.0	5.5	0.0	5.5	228608.16	2474317.17	
Average			5.1	0.0	5.1			

OU3-CA17-1-1									
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		JFB Coordinates		JFB Average Stone Results (in)	Comments
				Northing	Easting	Northing	Easting		
OU3-CA17-1-1-G1	10/27/2011	4.0	8.0	228375.22	2474244.16	NA	NA	NA	
OU3-CA17-1-1-G2	10/27/2011	4.0	6.5	228343.75	2474332.17	NA	NA	NA	
OU3-CA17-1-1-G3	10/31/2011	4.0	8.5	228447.19	2474177.29	NA	NA	NA	
OU3-CA17-1-1-G4	10/27/2011	4.0	9.0	228378.16	2474403.39	NA	NA	NA	
OU3-CA17-1-1-G5	10/27/2011	4.0	7.0	228445.01	2474308.66	NA	NA	NA	
OU3-CA17-1-1-G6	10/28/2011	4.0	8.5	228492.78	2474241.66	NA	NA	NA	
OU3-CA17-1-1-G7	10/27/2011	4.0	8.5	228473.79	2474378.90	NA	NA	NA	
OU3-CA17-1-1-G8	10/27/2011	4.0	6.5	228515.72	2474310.81	NA	NA	NA	
OU3-CA17-1-1-G9	10/28/2011	4.0	8.5	228568.69	2474231.65	NA	NA	NA	
OU3-CA17-1-1-G10	10/27/2011	4.0	8.5	228567.79	2474392.29	NA	NA	NA	
OU3-CA17-1-1-G11	10/28/2011	4.0	No Recovery	NA	NA	228556.70	2474303.00	4.8	Unable to retrieve Tt bucket. JFB QC bucket measurements collected 52 ft. from proposed Tt bucket location
Average			8.0						

OU3-CA69-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CA69-1-1-C1	9/16/2011	3.0	7.0	0.0	7.0	223558.99	2472071.36	
OU3-CA69-1-1-C2	9/16/2011	3.0	5.5	0.0	5.5	223640.47	2472104.08	
OU3-CA69-1-1-C3	9/16/2011	3.0	5.0	0.0	5.0	223871.00	2472282.61	
Average			5.8	0.0	5.8			

OU3-CA69-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CA69-1-1-G1	10/28/2011	6.0	12.0	223532.35	2472057.19	
OU3-CA69-1-1-G2	10/28/2011	6.0	12.0	223571.66	2472125.06	
OU3-CA69-1-1-G3	10/28/2011	6.0	10.5	223629.81	2472086.23	
OU3-CA69-1-1-G4	10/28/2011	6.0	11.0	223686.43	2472156.44	
OU3-CA69-1-1-G5	10/28/2011	6.0	12.0	223772.31	2472236.22	
OU3-CA69-1-1-G6	10/28/2011	6.0	11.0	223878.22	2472298.82	
Average			11.4			

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Sand Cover/Armor Cap Verification Results (2011)

OU3-CB2-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CB2-1-1-C1	6/24/2011	6.0	6.5	1.0	7.0	220575.88	2469726.94	
OU3-CB2-1-1-C2	6/24/2011	6.0	10.0	0.0	10.0	220638.51	2469700.53	
OU3-CB2-1-1-C3	6/24/2011	6.0	9.0	0.0	9.0	220708.39	2469780.95	
OU3-CB2-1-1-C4	6/24/2011	6.0	5.5	1.5	6.3	220679.55	2469844.27	
OU3-CB2-1-1-C5	6/24/2011	6.0	7.0	0.0	7.0	220778.71	2469727.09	
OU3-CB2-1-1-C6	6/24/2011	6.0	8.5	0.0	8.5	220848.97	2469785.07	
Average			7.8	0.4	8.0			

OU3-CB2-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CB2-1-1-G1	8/16/2011	4.0	11.0	220577.72	2469725.66	
OU3-CB2-1-1-G2	8/17/2011	4.0	7.5	220642.07	2469701.45	
OU3-CB2-1-1-G3	8/17/2011	4.0	12.0	220633.82	2469773.95	
OU3-CB2-1-1-G4	8/17/2011	4.0	6.5	220706.36	2469784.14	
OU3-CB2-1-1-G5	8/16/2011	4.0	9.0	220683.89	2469852.18	
OU3-CB2-1-1-G6	8/17/2011	4.0	6.0	220779.02	2469728.64	
OU3-CB2-1-1-G7	8/17/2011	4.0	8.5	220777.58	2469814.52	
OU3-CB2-1-1-G8	8/16/2011	4.0	9.5	220726.89	2469878.12	
OU3-CB2-1-1-G9	8/17/2011	4.0	7.0	220844.52	2469789.33	
OU3-CB2-1-1-G10	8/17/2011	4.0	7.5	220799.85	2469900.66	
OU3-CB2-1-1-G11	8/17/2011	4.0	7.0	220868.82	2469839.40	
Average			8.3			

OU3-CB3A-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CB3A-1-1-C1	9/20/2011	6.0	10.0	0.0	10.0	225377.50	2472516.59	
OU3-CB3A-1-1-C2	9/20/2011	6.0	9.5	0.0	9.5	225437.99	2472570.89	
OU3-CB3A-1-1-C3	9/20/2011	6.0	8.5	0.0	8.5	225524.26	2472532.88	
Average			9.3	0.0	9.3			

OU3-CB3A-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CB3A-1-1-G1	10/4/2011	4.0	8.0	225326.99	2472603.30	
OU3-CB3A-1-1-G2	10/4/2011	4.0	7.0	225382.62	2472514.95	
OU3-CB3A-1-1-G3	10/4/2011	4.0	7.0	225397.61	2472625.31	
OU3-CB3A-1-1-G4	10/4/2011	4.0	7.0	225441.72	2472567.30	
OU3-CB3A-1-1-G5	10/4/2011	4.0	10.0	225501.08	2472624.68	
OU3-CB3A-1-1-G6	10/4/2011	4.0	7.0	225526.54	2472528.17	
Average			7.7			

OU3-CB3B-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CB3B-1-1-C1	9/22/2011	6.0	9.5	0.0	9.5	225800.76	2472627.39	
OU3-CB3B-1-1-C2	9/22/2011	6.0	8.0	0.0	8.0	225841.02	2472644.48	
OU3-CB3B-1-1-C3	9/22/2011	6.0	10.5	0.0	10.5	225895.96	2472623.30	
Average			9.3	0.0	9.3			

OU3-CB3B-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CB3B-1-1-G1	10/5/2011	4.0	6.0	225800.02	2472625.86	
OU3-CB3B-1-1-G2	10/5/2011	4.0	8.0	225847.96	2472589.52	
OU3-CB3B-1-1-G3	10/5/2011	4.0	6.0	225894.12	2472622.80	
OU3-CB3B-1-1-G4	10/5/2011	4.0	7.5	225925.44	2472628.81	
Average			6.9			

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Sand Cover/Armor Cap Verification Results (2011)

OU3-CB5-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CB5-1-1-C1	10/3/2011	6.0	8.0	0.0	8.0	227506.59	2473352.40	
Average			8.0	0.0	8.0			

OU3-CB5-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CB5-1-1-G1	10/10/2011	4.0	7.0	227412.27	2473360.23	
OU3-CB5-1-1-G2	10/10/2011	4.0	6.0	227441.82	2473298.86	
OU3-CB5-1-1-G3	10/10/2011	4.0	6.5	227471.74	2473372.03	
OU3-CB5-1-1-G4	10/10/2011	4.0	6.5	227508.64	2473331.44	
Average			6.5			

OU3-CB31-1-1								
ID	Date Sampled	Sand Thickness Required (in)	Sand Results (in)	Sand/Sediment Mix (in)	Total Thickness Sand and Sediment Mix (in)	As-Built Sample Coordinates		Comments
						Northing	Easting	
OU3-CB31-1-1-C1	10/21/2011	6.0	9.5	0.0	9.5	229282.84	2474036.13	
OU3-CB31-1-1-C2	10/21/2011	6.0	9.0	0.0	9.0	229270.57	2474226.19	
OU3-CB31-1-1-C3	10/21/2011	6.0	9.5	0.0	9.5	229307.77	2474128.20	
OU3-CB31-1-1-C4*	10/21/2011	6.0	5.0	0.0	5.0	229371.45	2474081.50	Additional samples collected around the perimeter of the vessel to determine thickness
OU3-CB31-1-1-C4A	10/21/2011	NA	4.0	0.0	4.0	NA	NA	4.75 is the average of the original sample and the three additional samples
OU3-CB31-1-1-C4B	10/21/2011	NA	5.5	0.0	5.5	NA	NA	
OU3-CB31-1-1-C4C	10/21/2011	NA	4.5	0.0	4.5	NA	NA	
OU3-CB31-1-1-C5	10/21/2011	6.0	6.0	0.0	6.0	229419.55	2474220.04	
OU3-CB31-1-1-C6*	10/21/2011	6.0	5.0	0.0	5.0	229428.73	2473982.46	Additional samples collected around the perimeter of the vessel to determine thickness
OU3-CB31-1-1-C6A	10/21/2011	NA	4.0	0.0	4.0	NA	NA	5.88 is the average of the original sample and the three additional samples
OU3-CB31-1-1-C6B	10/21/2011	NA	7.0	0.0	7.0	NA	NA	
OU3-CB31-1-1-C6C	10/21/2011	NA	7.5	0.0	7.5	NA	NA	
OU3-CB31-1-1-C7	10/21/2011	6.0	8.0	0.0	8.0	229451.12	2474101.36	
OU3-CB31-1-1-C8	10/21/2011	6.0	9.0	0.0	9.0	229501.00	2474170.96	
OU3-CB31-1-1-C9	10/21/2011	6.0	9.0	0.0	9.0	229522.70	2474021.32	
OU3-CB31-1-1-C10	10/21/2011	6.0	9.0	0.0	9.0	229558.74	2474092.72	
OU3-CB31-1-1-C11	10/21/2011	6.0	7.5	0.0	7.5	229573.13	2474194.92	
Average			7.0	0.0	7.9			

OU3-CB31-1-1						
ID	Date Sampled	Stone Thickness Required (in)	Stone Thickness Results (in)	As-Built Sample Coordinates		Comments
				Northing	Easting	
OU3-CB31-1-1-G1	10/26/2011	4.0	8.5	229284.41	2474035.57	
OU3-CB31-1-1-G2	10/26/2011	4.0	7.5	229270.57	2474226.19	
OU3-CB31-1-1-G3	10/26/2011	4.0	10.0	229308.94	2474129.81	
OU3-CB31-1-1-G4	10/26/2011	4.0	9.5	229372.69	2474081.61	
OU3-CB31-1-1-G5	10/26/2011	4.0	11.5	229419.51	2474220.41	
OU3-CB31-1-1-G6	10/26/2011	4.0	11.0	229433.56	2474002.97	
OU3-CB31-1-1-G7	10/26/2011	4.0	7.5	229452.30	2474101.82	
OU3-CB31-1-1-G8	10/26/2011	4.0	9.0	229501.85	2474168.04	
OU3-CB31-1-1-G9	10/26/2011	4.0	7.0	229522.79	2474020.29	
OU3-CB31-1-1-G10	10/26/2011	4.0	7.5	229559.04	2474092.81	
OU3-CB31-1-1-G11	10/26/2011	4.0	7.0	229573.77	2474196.44	
Average			8.7			