Memorandum

Green Bay Location

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RE: Lower Fox River OU4 *COMMP* Year 0 Cap Integrity Assessment – Caps Completed 2015-2017

Background

The revised *Lower Fox River Remedial Design Cap Operations, Maintenance, and Monitoring Plan* (*COMMP*) for the Lower Fox River (LFR) Operable Units (OU) 2-5 (Appendix H, of the *100 Percent Design Report of 2010 and Beyond Remedial Actions, Volume 2 of 2*) (Anchor QEA and Tetra Tech EC [TtEC], 2012) (*2012 100 Percent Design Report)*, which was approved by the Agencies Oversight Team (A/OT) on October 26, 2012, 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* requires that routine monitoring of all cap areas be conducted by geophysical methods (including sub-bottom profiling and/or hydrographic survey), and states that the first routine monitoring (Year 0) of completed engineered caps shall be completed at the end of the year when cap construction is completed, to establish baseline conditions as a point of comparison for future *COMMP* events. For Upper (OU4A) and Lower OU4 (OU4B) Fox River segments, the A/OT have grouped the caps whose construction were completed over the timeframe of 2015-2017 into a single Year 0 event to streamline the *COMMP* cap integrity assessment process.

P.H. Glatfelter (Glatfelter) and Georgia Pacific (GP) retained Foth Infrastructure & Environment, LLC (Foth) to document the methodology employed for and the results of the Year 0 Cap Integrity Assessment for caps placed over the timeframe of 2015-2017 using hydrographic surveys to analyze the top of engineered cap elevations to establish baseline

conditions for these caps as a point of comparison for future *COMMP* events. This memorandum presents the methods utilized and the results of the Year 0 survey for caps placed in 2015 through 2017 in OU4.

Methods

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 conducting a survey of each cap completed in 2015 through 2017 in OU4 (Figure 1). The survey documenting the baseline conditions has been termed the "Year 0" survey.

On October 16, 17, and 20, 2017, multi-beam hydrographic surveys (surveys using multi-beam echo sounders, MBESs) (400 kilohertz [kHZ]) were completed over approximately 55.8 acres of engineered caps completed 2015 through 2017 in Upper and Lower OU4. The division between Upper and Lower OU4 is shown on Figure 1. The small portion of cap CB28A that lies on the upstream side of the Upper/Lower OU4 division line is included in the Lower OU4 evaluations. The MBES surveys provide a high degree of accuracy and coverage in these areas. Cap areas with water depths less than 3 feet could not be surveyed using MBES methods; therefore, single beam hydrographic surveys (surveys using single beam echo sounder, SBESs) (200 kHZ) were completed. These surveys were completed on October 17 and 20, 2017 and December 7, 2017. Additionally, for cap areas along the shoreline that protruded from the water, an unmanned aircraft system (UAS, or drone) survey was completed on October 17, 2017. Approximately 1.7 acres of cap area were surveyed using SBES and UAS, which included portions of SHC100, SHC101/CC101(M), CBD35U South-1, CBD35U South-2, CBD35U South-3, CCD35U South-1, CCD35U South-2, CBD34-2, and CCD34-2. Note that the contractor missed cap area CAFIK-065 (approximately 0.2 acres) during the Year 0 surveys and river conditions no longer allowed for performing the survey after this omission was discovered; therefore, it was surveyed using MBES on March 19, 2018 during pre-Remedial Action (RA) survey work by the contractor.

The survey work was conducted by J.F. Brennan Company (Brennan) and audited by Foth. The hydrographic survey audit forms are provided in Attachment 1. The survey work was carried out in compliance with the project specifications, as provided in Appendix C of the *2012 100 Percent Design Report,* and standard operating procedures, as provided in the LFR *Quality Assurance Project Plan* (TtEC, et al., 2016) and the *Construction Quality Assurance Project Plan* (*CQAPP*), which is Appendix F of the *2012 100 Percent Design Report* (TtEC, 2012). Foth obtained raw survey files and gridded survey files (2 feet x 2 feet) from Brennan, to be processed and plotted for visual review of the top of cap surface, to identify any irregularities indicating potential failing or damaged cap areas. Where irregularities were seen or it was difficult to make an evaluation (e.g., shoreline cap areas surveyed using single beam methods), the Year 0 survey (fall 2017) was compared to the most recent single-beam post-dredge or pre-cap placement bathymetry, as well as, in some cases, the single-beam 2016 post-cap bathymetry, to further evaluate the areas in question. Note that single-beam results are collected on 15-foot transects with crosslines collected at 5 percent of the number of transects, whereas the multi-beam surveys provide complete coverage. These two methods and the potential for additional consolidation of the underlying sediment

account for some of the discrepancy seen in top of cap elevations (i.e., top of cap elevation appears higher or lower than expected), especially in sloped areas.

Results

Upon completion of the surveys, the data were processed and top of cap contours were created. For each cap, Foth produced a figure set to show top of cap elevations (Figures 2A and 2B through Figures 10A and 10B). Each figure set includes an "A" figure, which depicts the top of cap elevations in two dimensional plan view, and a "B" figure, which depicts the top of cap elevations in a three-dimensional isometric view, which better depicts surface irregularities as compared to the two dimensional views. For some cap areas, "C" and "D" series figures were added to offer cross sections to better depict conditions.

To supplement the survey information provided in this Year 0 Cap Integrity Assessment reporting memorandum, we have also attached cap thickness verification data prepared by TtEC (Attachment 2). These data establish that when applying A/OT approved statistical procedures (i.e., summary statistics), the minimum cap aggregate thicknesses were achieved in all cases.

It is important to note that this Year 0 cap integrity assessment focuses on the visual or surficial cap contours to identify irregularities such as gullies in, or slumping of, the cap surface, or areas of differential settlement. Uniform consolidation of the soft sediment below the caps is expected (Foth, 2010) and where cross sections have been cut to evaluate surface irregularities, some areas of cap settlement due to consolidation are evident. This Year 0 evaluation draws attention to these areas, which will be focus areas of the Year 1 cap integrity assessment planned for fall 2018. The subsequent *COMMP* years' cap integrity assessments will use current year hydrographic survey information and may use poling and probing of sediment thickness above the caps to statistically assess changes in cap elevations over time.

<u>Upper OU4</u>

In viewing the capped areas placed in Upper OU4, there are several areas of interest as described below:

- CC14 is a cap area. The top of cap elevations for CC14 indicate lower elevations (a depression) along the eastern edge of the area, more specifically in the south eastern corner (Figure 2B). To further evaluate these lower elevations, a cross-section (A-A') was cut through the area (Figure 2C); and the 2017 top of cap elevations were compared to the single-beam 2014 bathymetry. The two surveys follow a similar profile indicating a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.

- CC2E South-1 is a dredge and cap area. A depression area is visible in the surface elevations east of the bridge pillar area near the south end of CC2E South-1 (Figure 3B). To further evaluate the depression, a cross-section (B-B') was cut through the area (Figure 3C), and the 2017 top of cap elevations were compared to

the single-beam 2014 post-dredge bathymetry. The two surveys follow a similar profile indicating a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.

- CC2E South-2 is a dredge and cap area. Three features of interest were evaluated in CC2E South-2, as follows:

    1. A large depression area is visible in the surface elevations along the west edge of CC2E South-2 (Figure 3B). To further evaluate this depression area, a cross-section (C-C') was cut through the area (Figure 3C), and the 2017 top of cap elevations were compared to the single-beam 2014 post-dredge bathymetry. The depression area in question aligns with areas of deeper dredge grades, and the two surveys follow a similar profile indicating that the depressed area is a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.

    2. Because 2017 top of cap elevations on the eastern side of the cap area were lower than expected, as compared to the single-beam 2014 post-dredge bathymetry, the 2017 top of cap elevations were compared to the single-beam 2016 post top of cap bathymetry (cross section C-C'). Some consolidation of the underlying sediment (approximately 3 inches) occurred on the eastern side of the cap area, as evident from the comparison of the 2016 and 2017 surveys. **This area will be reviewed again in the Year 1 *COMMP* cap integrity assessment (fall 2018) for signs of erosion (cap presence/cap thinning).**

    3. Also of interest on cross section C-C' is the increase in top of cap elevations seen in the depression along the west edge of cap CC2E S-2 (Station 1+00 on cross section C-C'). In river systems with a depression formed from dredging, it is common to see several inches to feet of deposition over a short period of time. During the subsequent COMMP years cap integrity assessments, poling and probing, or other geophysical methods to assess deposition above capped areas, is routinely conducted as part of the cap integrity assessment process following Year 0. The Year 0 MBES serves as the baseline for all cap integrity assessments, including analysis of deposition rates.

No areas of interest were noted in CC2E-1A, CC2E South-3, CC2E South-4, and CC2E South-5. An accounting of evaluations and recommendations made during each post-cap monitoring event for each cap area in Upper OU4 (a living history) is provided in Table 1.

Lower OU4

The Lower OU4 area represents the most complex capping segment of the LFR and Green Bay Site. Steep slopes, shoreline caps, and the Fort Howard turning basin contribute to the complex assortment of caps that have been installed. In viewing the capped areas placed in Lower OU4, there are several areas of interest as described below:

- CC2E North-3 is a dredge and cap area. To assess if depressed top of cap elevations for CC2E North-3 (Figure 6B) are due to dredging prior to capping, cross-sections (D-D', E-E', and F-F') were cut through the area (Figures 6C and 6D) and the top of cap elevations were compared to the single-beam 2015 pre-cap placement bathymetry. The two surveys mirror each other well, both in profile and elevation, indicating that the depressed top of cap elevations are a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.

- CA28C is a dredge and cap area. Two features of interest were evaluated in CA28C, as follows:

  1. A small mound is visible in the surface elevations near the north side of CA28C, along the southern edge of CB54 (Figure 6B). To further evaluate this area, a cross-section (F-F') was cut through the area (Figure 6D), and the 2017 top of cap elevations were compared to the single-beam 2015 pre-cap placement bathymetry. The mound was not observed in the 2015 bathymetry indicating that it is a feature that developed/appeared between the two surveys. Because no other irregularities are seen in the top of cap elevations and in the cross-section, it is not expected to diminish cap integrity. The source of the mound may be additional capping material left behind during placement, as it is present in both the 2016 and 2017 post-top of cap surveys.

  2. Because 2017 top of cap elevations across the central portion of the area were lower than expected, as compared to the single-beam 2015 pre-cap placement bathymetry, the 2017 top of cap elevations were compared to the single-beam 2016 post top of cap bathymetry (cross sections D-D' and E-E' on Figure 6C). Some consolidation of the underlying sediment (at least an inch or more) occurred over much of the cap area, as evident from the comparison of the 2016 and 2017 surveys. The central portion of the CA28C cap area was not dredged prior to capping, and soft sediment thickness may be substantial, leading to more significant settlement of the cap due to consolidation of the underlying soft sediment. Such settlement would not be reflected in the 2015 survey. Future consolidation would be expected to be minimal based on consolidation evaluations performed in other LFR locations (i.e. OU1) (Foth, 2010). The cross-sections and isometric view do not indicate scouring. **This area will be reviewed again in the Year 1 *COMMP* cap integrity assessment (fall 2018) for signs of erosion (cap presence/cap thinning).**

- CA30A is a cap area. A gully feature is visible in the surface elevations in the southern portion of the area (Figure 6B). To further evaluate this feature, a cross-section (G-G') was cut across the area (Figure 6D), and the 2017 top of cap elevations were compared to the 2015 pre-cap placement bathymetry. The two surveys follow a similar profile indicating that the gully and depressed areas are a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.

Because 2017 top of cap elevations on the top of the eastern slope of the gully feature were lower than expected as compared to the 2015 pre-cap placement bathymetry, the 2017 top of cap elevations were compared to the single-beam 2016 post top of cap bathymetry (cross section G-G'). Some consolidation of the underlying sediment occurred over much of the cap area, as evident from the comparison of the 2016 and 2017 surveys. Dredging did not occur prior to capping so soft sediment thickness and consolidation may be significant, which would not be reflected in the 2015 survey. Future consolidation would be expected to be minimal based on consolidation evaluations performed in other LFR locations (i.e., OU1). **This area will be reviewed again in the Year 1 *COMMP* cap integrity assessment (fall 2018) for signs of erosion (cap presence/cap thinning).**

- CB50 has portions that are dredge and cap areas and portions that are just capped areas. Two features of interest were evaluated in CB50, as follows:

  1. To assess depressed top of cap elevations along the east side and central area of CB50 (Figure 7B), a cross-section (H-H') was cut through the area (Figure 7C) and the top of cap elevations were compared to the single-beam 2014 post-dredge and pre-cap placement bathymetry. The two surveys mirror each other well, both in profile and elevation, indicating that the depressed area is a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.

  2. 2017 top of cap elevations near the top of the slope on either side of the channel (including CA30C-1) were lower than expected as compared to the single-beam 2014 post-dredge and pre-cap placement bathymetry (cross section H-H'). Dredging did not occur prior to capping so soft sediment thickness and consolidation may be significant, which would not be reflected in the 2014 survey. Future consolidation would be expected to be minimal based on consolidation evaluations performed in other LFR locations (i.e., OU1). **This area will be reviewed again in the Year 1 *COMMP* cap integrity assessment (fall 2018) for signs of erosion (cap presence/cap thinning).**

- CB20-1, near the edge of the Fort Howard turning basin, is a dredge and cap area. Three features of interest were evaluated in CB20-1, as follows:

  1. To assess if the depressed top of cap elevations in the southern portion of CB20-1 (Figures 8B and 9B) are due to dredging prior to capping, cross-sections (I-I' and L-L', respectively) were cut through the area (Figures 8C and 9D) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. The two surveys follow a similar profile indicating a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.

2. To assess the steep slope along the north/east side of the area (Figure 9B), a cross-section (K-K') was cut through the area (Figure 9C) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. There appears to be a sufficient thickness of cap over the slope, and the two surveys mirror each other well, both in profile and elevation, indicating that cap integrity has not been diminished.

3. To assess the ridge area that runs through the northwest section of CB20-1 (Figure 9B), a cross-section (K-K') was cut through the area (Figures 9C) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. It appears that the ridge is caused by the transition from a B1 cap type (12-inch minimum required thickness) to a B3 with Q(M1) cap type (22-inch minimum required thickness).

- CB20-2 is a dredge and cap area. Two features of interest were evaluated in CB20-2, as follows:

  1. To assess depressed top of cap elevations in the north and central portions of CB20-2 (Figure 9B), cross-section (J-J' and L-L') were cut through the area (Figures 9C and 9D, respectively) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. The two surveys mirror each other well, both in profile and elevation, indicating that the depressed areas are a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.

  2. To assess the ridge area that runs through the southeast corner of CB20-2 (Figure 9B), a cross-section (L-L') was cut through the area (Figure 9D) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. It appears that the ridge is caused by a combination of change in pre-cap river bottom topography and transition from a B1 cap type (12-inch minimum required thickness) to a B3 with Q(M1) cap type (22-inch minimum required thickness).

- CBD35A-8B is a dredge and cap area. To assess depressed top of cap elevations over much of CBD35A-8B (Figure 9B), a cross-section (J-J') was cut through the area (Figure 9C) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. The two surveys mirror each other well, both in profile and elevation, indicating that the depressed areas are a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.

- SHC100/CC100 are dredge and cap areas. Due to the steep elevation changes shown in the top of cap elevations in the SHC100 and CC100 caps (Figure 9B), a cross-section (L-L') was cut to evaluate cap integrity (Figure 9D), and the top of cap elevations were compared to the single-beam 2016 post-dredge bathymetry. There appears to be a sufficient thickness of cap over the slopes of SHC100 and CC100,

and the two surveys mirror each other relatively well, indicating that cap integrity has not been diminished.

- CA34-1 is a dredge and cap area. Three features of interest were evaluated in CA34-1, as follows:

  1. To assess the ridge area that runs through the southwest corner of CA34-1 (Figure 9B), a cross-section (J-J') was cut through the area (Figure 9C) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. It appears that the ridge is caused by a transition from a B1 cap type (12-inch minimum required thickness) to a B3 with Q(M1) cap type (22-inch minimum required thickness).

  2. Due to the steep elevation changes shown in the top of cap elevations on the north end of the area (Figure 9B), a cross-section (J-J') was cut to evaluate cap integrity (Figure 9C), and the top of cap elevations were compared to the single-beam 2016 post-dredge bathymetry. There appears to be a sufficient thickness of cap over the slope, and the two surveys mirror each other relatively well, indicating that cap integrity has not been diminished.

  3. 2017 top of cap elevations near the slopes in the southwestern corner (border with CB20-2) were lower than expected, as compared to the single-beam 2014 post-dredge and pre-cap placement bathymetry (cross section J-J'). It is expected that some consolidation of the underlying sediment occurred after placement of the cap, which would not be reflected in the 2016 survey. **This area will be reviewed again in the Year 1 *COMMP* cap integrity assessment (fall 2018) for signs of erosion (cap presence/cap thinning).**

  Note that CA34-2 has similar features to CA34-1.

- SHC101 and CB34 are dredge and cap areas. Due to the steep slope shown in the top of cap elevations in the SHC101 and CB34 caps (Figure 9B), a cross-section (M-M') was cut to evaluate cap integrity (Figure 9D), and the top of cap elevations were compared to the single-beam 2016 post-dredge bathymetry. There appears to be a sufficient thickness of cap over the slopes of SHC101 and CB34, and the two surveys mirror each other relatively well, indicating that cap integrity has not been diminished.

- CBD34-2 is a dredge and cap area. Due to the steep slope shown in the top of cap elevations along the GP shoreline (Figures 10B1 and 10B2), a cross-section (N-N') was cut through CBD34-2 as a representative area to evaluate cap integrity (Figure 10C), and the top of cap elevations were compared to the single-beam 2016 post-dredge bathymetry. There appears to be a sufficient thickness of cap over these areas, and the two surveys mirror each other well, both in profile and elevation, indicating that cap integrity has not been diminished. Note that cap thickness (see

Attachment 2) was calculated on a volumetric basis for this area versus measured thickness; section N-N' substantiates cap thickness is adequate.

- CBD35U South-1 is a dredge and cap area. Due to the mound visible in the top of cap elevations near the toe of slope near the center of CBD35U South-1 (Figure 10B1), a cross-section (O-O') was cut through the area to evaluate cap integrity (Figure 10C), and the top of cap elevations were compared to the single-beam 2015 post-dredge bathymetry. The mound appears in both surveys indicating a reflection of the river bottom topography and cap integrity has not been compromised. Note that cap thickness (see Attachment 2) was calculated on a volumetric basis for this area versus measured thickness; section O-O' substantiates cap thickness is adequate.

No areas of interest were noted in CB28A, CB46, CC2E North-1, CC2E North-2, CB47, CB54, CBD148, CC2E North-4, CC2E North-5, CA30B, CB52, CBD144, CC2E North-6, CA30C-2, CAFIK-065, CC101(M), CBD35U North Micro 102, CCD34-2, CCD35U South-1, CCD35U South-2, CBD35U South-2, CBD35U South-3, CB33A, and CC17. An accounting of evaluations and recommendations made during each post-cap monitoring event for each cap area in Lower OU4 (a living history) is provided in Table 2.

Conclusions

The top of cap elevations obtained during the Year 0 survey, performed on October 16, 17, and 20; December 7, 2017; and March 19, 2018, for caps completed in 2015 through 2017 in OU4, were evaluated to establish a baseline for future *COMMP* cap integrity assessments. Additionally any potentially failing or damaged cap areas, based on a review of top of cap contours generated with hydrographic survey information, were further evaluated. Top of cap elevations indicating irregularities, such as gullies, slumping or differential settlement, were further evaluated by comparing the 2017 post-cap placement bathymetry to the most recent single-beam post-dredge or pre-cap bathymetry, as well as, in some cases, the single-beam 2016 post-cap bathymetry. Results showed that depression areas were a reflection of the river bottom topography, of consolidation of underlying settlement, rather than the cap having been eroded, or having experienced significant differential settlement. Areas of uniform lowering of cap elevation, based on pre- and post-cap placement surveys several years apart, are to be expected due to consolidation of underlying sediment, typical of other caps placed in the LFR over areas with significant soft sediment thickness. Additionally, the use of two different methods (single and multi-beam) account for some of the discrepancy seen in top of cap elevations, and interpolation between single-beam survey lines can result in inaccuracies, especially on sloped surfaces.

The hydrographic survey data collected for this Year 0 Cap Integrity Assessment substantiates that the cap material in place meets the performance standards set forth in the *Lower Fox River Remedial Design 100 Percent Design Reports, Volumes 1 and 2* (TtEC et al., 2009a and 2009b) and the *COMMP*. The Year 0 survey will serve as the baseline for future surveys to assess long-term performance of engineered caps completed in 2015 through 2017 in OU4.

The next OU4 post-cap monitoring event for caps placed in 2015-2017 will be completed fall of 2018 (*COMMP* Year 1 event). At that time, another hydrographic survey will be completed over the engineered caps completed in 2015 through 2017 in OU4 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. For future planned routine monitoring events, refer to the Draft LFR USEPA Cap Monitoring Schedule, dated November 30, 2017.

References

Anchor QEA, LLC and Tetra Tech EC, Inc., 2012. *Lower Fox River Remedial Design 100 Percent Design Report for 2010 and Beyond Remedial Actions,* Volume 2 of 2, Appendix H, *Lower Fox River Remedial Design Cap Operations, Maintenance, and Monitoring Plan* and Appendix F, *Construction Quality Assurance Project Plan*. Prepared for Lower Fox River Remediation LLC. October 2012.

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Tables

Table 1
Upper OU4 COMMP Cap Integrity Assessment History

Location	Area (Acres)	Year Cap Completed	Routine Monitoring Event	Evaluation	Recommendation	Follow-up Action
CC14	0.62	2015	Year 0 (2017)	CC14 is a cap area. The top of cap elevations for CC14 indicate lower elevations (a depression) along the eastern edge of the area, more specifically in the south eastern corner (Figure 2B). To further evaluate these lower elevations, a cross section (A-A') was cut through the area (Figure 2C); and the 2017 top of cap elevations were compared to the single-beam 2014 bathymetry. The two surveys follow a similar profile indicating a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.	Cap maintenance not required.	N/A
			Year 1 (2018)			
			Year 5 (2022)			
			Year 10 (2027)			
CC2E South-1	2.96	2015	Year 0 (2017)	CC2E South-1 is a dredge and cap area. A depression area is visible in the surface elevations east of the bridge pillar area near the south end of CC2E South-1 (Figure 3B). To further evaluate the depression, a cross-section (B-B') was cut through the area (Figure 3C), and the 2017 top of cap elevations were compared to the single-beam 2014 post-dredge bathymetry. The two surveys follow a similar profile indicating a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.	Cap maintenance not required.	N/A
CC2E South-2	3.23	2015	Year 0 (2017)	A large depression area is visible in the surface elevations along the west edge of CC2E South-2 (Figure 3B). To further evaluate this depression area, a cross-section (C-C') was cut through the area (Figure 3C), and the 2017 top of cap elevations were compared to the single-beam 2014 post-dredge bathymetry. The depression area in question aligns with areas of deeper dredge grades, and the two surveys follow a similar profile indicating that the depressed area is a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.	Cap maintenance not required.	N/A
				Because 2017 top of cap elevations on the eastern side of the cap area were lower than expected as compared to the single-beam 2014 post-dredge bathymetry, the 2017 top of cap elevations were compared to the single-beam 2016 post top of cap bathymetry (cross section C-C'). Some consolidation of the underlying sediment (approximately 3 inches) occurred on the eastern side of the cap area, as evident from the comparison of the 2016 and 2017 surveys.	Cap maintenance not required.	This area will be reviewed again in the Year 1 COMMP cap integrity assessment (fall 2018) for signs of erosion (cap presence/cap thinning).
				Also of interest on cross section C-C' is the increase in top of cap elevations seen in the depression along the west edge of cap CC2E S-2 (Station 1+00 on cross section C-C'). In river systems with a depression formed from dredging, it is common to see several inches to feet of deposition over a short period of time.	Cap maintenance not required.	During the subsequent COMMP years cap integrity assessments, poling and probing , or other geophysical methods to assess deposition above capped areas, is routinely conducted as part of the cap integrity assessment process following Year 0.
CC2E-South-3	1.95	2016	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CC2E-1A	0.39	2016	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CC2E-South-4	3.56	2016	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CC2E-South-5	3.39	2016	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
Upper OU4	16.10					

N/A - Not Applicable

Prepared by: TMK1
Checked by: KMO

Table 2
Lower OU4 COMMP Cap Integrity Assessment History

Location	Area (Acres)	Year Cap Completed	Routine Monitoring Event	Evaluation	Recommendation	Follow-up Action
CB28A	0.99	2015	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
			Year 1 (2018)			
			Year 5 (2022)			
			Year 10 (2027)			
CB46	0.37	2015	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CC2E-North-1	2.33	2016	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CC2E-North-2	2.45	2016	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CC2E-North-3	3.00	2016	Year 0 (2017)	CC2E North-3 is a dredge and cap area. To assess if depressed top of cap elevations for CC2E North-3 (Figure 6B) are due to dredging prior to capping, cross-sections (D-D', E-E', and F-F') were cut through the area (Figures 6C and 6D) and the top of cap elevations were compared to the single-beam 2015 pre-cap placement bathymetry. The two surveys mirror each other well, both in profile and elevation, indicating that the depressed top of cap elevations are a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.	Cap maintenance not required.	N/A
CA28C	2.08	2015	Year 0 (2017)	A small mound is visible in the surface elevations near the north side of CA28C, along the southern edge of CB54 (Figure 6B). To further evaluate this area, a cross-section (F-F') was cut through the area (Figure 6D), and the 2017 top of cap elevations were compared to the single-beam 2015 pre-cap placement bathymetry. The mound was not observed in the 2015 bathymetry indicating that it is a feature that developed/appeared between the two surveys. Because no other irregularities are seen in the top of cap elevations and in the cross-section, it is not expected to diminish cap integrity. The source of the mound may be additional capping material left behind during placement, as it is present in both the 2016 and 2017 post-top of cap surveys.	Cap maintenance not required.	N/A
				Because 2017 top of cap elevations across the central portion of the area were lower than expected as compared to the single-beam 2015 pre-cap placement bathymetry, the 2017 top of cap elevations were compared to the single-beam 2016 post top of cap bathymetry (cross sections D-D' and E-E' on Figure 6C). Some consolidation of the underlying sediment (at least an inch or more) occurred over much of the cap area, as evident from the comparison of the 2016 and 2017 surveys. The central portion of the CA28C cap area was not dredged prior to capping, and soft sediment thickness may be substantial, leading to more significant settlement of the cap due to consolidation of the underlying soft sediment. Such settlement would not be reflected in the 2015 survey. Future consolidation would be expected to be minimal based on consolidation evaluations performed in other Lower Fox River locations (i.e. OU1) (Foth, 2010). The cross-sections and isometric view do not indicate scouring.	Cap maintenance not required.	This area will be reviewed again in the Year 1 COMMP cap integrity assessment (fall 2018) for signs of erosion (cap presence/cap thinning).
CB47	0.41	2015	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CB54	0.15	2015	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CBD148	0.63	2015	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CC2E-North-4	3.00	2016	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CC2E-North-5	3.00	2016	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A

Table 2
Lower OU4 COMMP Cap Integrity Assessment History

Location	Area (Acres)	Year Cap Completed	Routine Monitoring Event	Evaluation	Recommendation	Follow-up Action
CA30A	1.61	2015	Year 0 (2017)	CA30A is a cap area. A gully feature is visible in the surface elevations in the southern portion of the area (Figure 6B). To further evaluate this feature, a cross-section (G-G') was cut across the area (Figure 6D), and the 2017 top of cap elevations were compared to the 2015 pre-cap placement bathymetry. The two surveys follow a similar profile indicating that the gully and depressed areas are a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement. Because 2017 top of cap elevations on the top of the eastern slope of the gully feature were lower than expected as compared to the 2015 pre-cap placement bathymetry, the 2017 top of cap elevations were compared to the single-beam 2016 post top of cap bathymetry (cross section G-G'). Some consolidation of the underlying sediment occurred over much of the cap area, as evident from the comparison of the 2016 and 2017 surveys. Dredging did not occur prior to capping so soft sediment thickness and consolidation may be significant, which would not be reflected in the 2015 survey. Future consolidation would be expected to be minimal based on consolidation evaluations performed in other Lower Fox River locations (i.e. OU1).	Cap maintenance not required.	This area will be reviewed again in the Year 1 COMMP cap integrity assessment (fall 2018) for signs of erosion (cap presence/cap thinning).
CA30B	0.18	2015	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CB52	0.53	2015	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CBD144	0.25	2015	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CC2E-North-6	2.99	2016	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CB50	3.50	2015	Year 0 (2017)	To assess depressed top of cap elevations along the east side and central area of CB50 (Figure 7B), a cross-section (H-H') was cut through the area (Figure 7C) and the top of cap elevations were compared to the single-beam 2014 post-dredge and pre-cap placement bathymetry. The two surveys mirror each other well, both in profile and elevation, indicating that the depressed area is a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.	Cap maintenance not required.	N/A
				2017 top of cap elevations near the top of the slope on either side of the channel (including CA30C-1) were lower than expected as compared to the single-beam 2014 post-dredge and pre-cap placement bathymetry (cross section H-H'). Dredging did not occur prior to capping so soft sediment thickness and consolidation may be significant, which would not be reflected in the 2014 survey. Future consolidation would be expected to be minimal based on consolidation evaluations performed in other Lower Fox River locations (i.e. OU1).	Cap maintenance not required.	This area will be reviewed again in the Year 1 COMMP cap integrity assessment (fall 2018) for signs of erosion (cap presence/cap thinning).
CA30C-1	2.28	2015	Year 0 (2017)	See evaluation results above for CB50.	Cap maintenance not required.	N/A
CA30C-2	1.05	2017	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CAFIK-065	0.23	2016	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CBD34-2	0.23	2016	Year 0 (2017)	CBD34-2 is a dredge and cap area. Due to the steep slope shown in the top of cap elevations along the GP shoreline (Figures 10B1 and 10B2), a cross-section (N-N') was cut through CBD34-2 as a representative area to evaluate cap integrity (Figure 10C), and the top of cap elevations were compared to the single-beam 2016 post-dredge bathymetry. There appears to be a sufficient thickness of cap over these areas, and the two surveys mirror each other well, both in profile and elevation, indicating that cap integrity has not been diminished. Note that cap thickness (see Attachment 2) was calculated on a volumetric basis for this area versus measured thickness; section N-N' substantiates cap thickness is adequate.	Cap maintenance not required.	N/A
CCD34-2	0.04	2016	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A

Table 2
Lower OU4 COMMP Cap Integrity Assessment History

Location	Area (Acres)	Year Cap Completed	Routine Monitoring Event	Evaluation	Recommendation	Follow-up Action
CBD35U South-1	0.34	2015	Year 0 (2017)	CBD35U South-1 is a dredge and cap area. Due to the mound visible in the top of cap elevations near the toe of slope near the center of CBD35U South-1 (Figure 10B1), a cross-section (O-O') was cut through the area to evaluate cap integrity (Figure 10C), and the top of cap elevations were compared to the single-beam 2015 post-dredge bathymetry. The mound appears in both surveys indicating a reflection of the river bottom topography and cap integrity has not been compromised. Note that cap thickness (see Attachment 2) was calculated on a volumetric basis for this area versus measured thickness; section O-O' substantiates cap thickness is adequate.	Cap maintenance not required.	N/A
CCD35U South-1	0.10	2015	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CBD35U South-2	0.08	2015	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CCD35U South-2	0.09	2015	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CBD35U South-3	0.50	2015	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CB33A	0.77	2016	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
CB20-1	1.73	2017	Year 0 (2017)	To assess if the depressed top of cap elevations in the southern portion of CB20-1 (Figures 8B and 9B) are due to dredging prior to capping, cross-sections (I-I' and L-L', respectively) were cut through the area (Figures 8C and 9D) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. The two surveys follow a similar profile indicating a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.	Cap maintenance not required.	N/A
				To assess the steep slope along the north/east side of the area (Figure 9B), a cross-section (K-K') was cut through the area (Figure 9C) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. There appears to be a sufficient thickness of cap over the slope, and the two surveys mirror each other well, both in profile and elevation, indicating that cap integrity has not been diminished.	Cap maintenance not required.	N/A
				To assess the ridge area that runs through the northwest section of CB20-1 (Figure 9B), a cross-section (K-K') was cut through the area (Figures 9C) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. It appears that the ridge is caused by the transition from a B1 cap type (12-inch minimum required thickness) to a B3 with Q(M1) cap type (22-inch minimum required thickness).	Cap maintenance not required.	N/A
CB20-2	1.77	2017	Year 0 (2017)	To assess depressed top of cap elevations in the north and central portions of CB20-2 (Figure 9B), cross-section (J-J' and L-L') were cut through the area (Figures 9C and 9D, respectively) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. The two surveys mirror each other well, both in profile and elevation, indicating that the depressed areas are a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.	Cap maintenance not required.	N/A
				To assess the ridge area that runs through the southeast corner of CB20-2 (Figure 9B), a cross-section (L-L') was cut through the area (Figure 9D) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. It appears that the ridge is caused by a combination of change in pre-cap river bottom topography and transition from a B1 cap type (12-inch minimum required thickness) to a B3 with Q(M1) cap type (22-inch minimum required thickness).		
CBD35A-8B	0.34	2016	Year 0 (2017)	CBD35A-8B is a dredge and cap area. To assess depressed top of cap elevations over much of CBD35A-8B (Figure 9B), a cross-section (J-J') was cut through the area (Figure 9C) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. The two surveys mirror each other well, both in profile and elevation, indicating that the depressed areas are a reflection of the river bottom topography rather than the cap having been eroded or undergone significant differential settlement.	Cap maintenance not required.	N/A
CBD35U North Micro 102	0.05	2016	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A

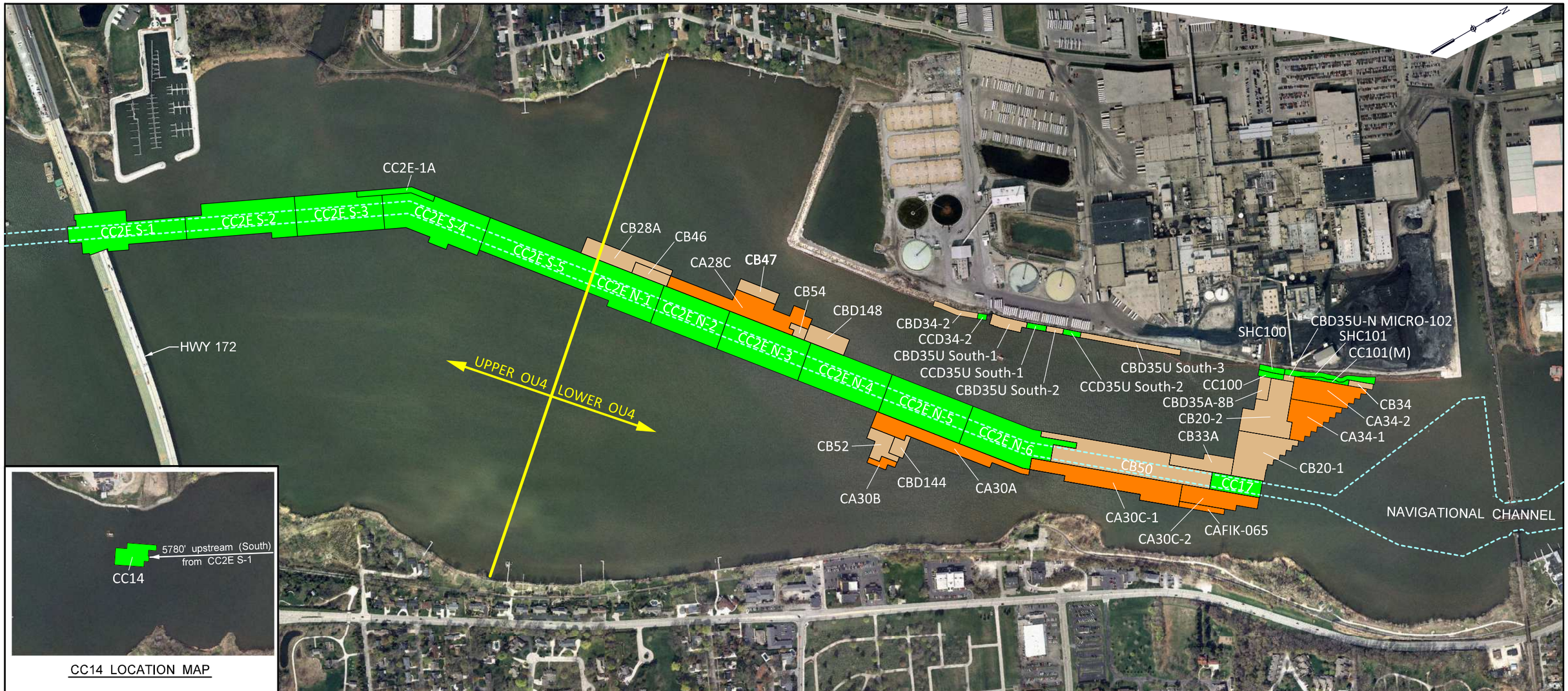
Table 2
Lower OU4 COMMP Cap Integrity Assessment History

Location	Area (Acres)	Year Cap Completed	Routine Monitoring Event	Evaluation	Recommendation	Follow-up Action
SHC100/CC100/Berm	0.30	2016	Year 0 (2017)	SHC100/CC100 are dredge and cap areas. Due to the steep elevation changes shown in the top of cap elevations in the SHC100 and CC100 caps (Figure 9B), a cross-section (L-L') was cut to evaluate cap integrity (Figure 9D), and the top of cap elevations were compared to the single-beam 2016 post-dredge bathymetry. There appears to be a sufficient thickness of cap over the slopes of SHC100 and CC100, and the two surveys mirror each other relatively well, indicating that cap integrity has not been diminished.	Cap maintenance not required.	N/A
CA34-1	1.17	2017	Year 0 (2017)	To assess the ridge area that runs through the southwest corner of CA34-1 (Figure 9B), a cross-section (J-J') was cut through the area (Figure 9C) and the top of cap elevations were compared to the single-beam 2016 pre-cap placement bathymetry. It appears that the ridge is caused by a transition from a B1 cap type (12-inch minimum required thickness) to a B3 with Q(M1) cap type (22-inch minimum required thickness).	Cap maintenance not required.	N/A
				Due to the steep elevation changes shown in the top of cap elevations on the north end of the area (Figure 9B), a cross-section (J-J') was cut to evaluate cap integrity (Figure 9C), and the top of cap elevations were compared to the single-beam 2016 post-dredge bathymetry. There appears to be a sufficient thickness of cap over the slope, and the two surveys mirror each other relatively well, indicating that cap integrity has not been diminished.	Cap maintenance not required.	N/A
				2017 top of cap elevations near the slopes in the southwestern corner (border with CB20-2) were lower than expected as compared to the single-beam 2014 post-dredge and pre-cap placement bathymetry (cross section J-J'). It is expected that some consolidation of the underlying sediment occurred after placement of the cap, which would not be reflected in the 2016 survey.	Cap maintenance not required.	This area will be reviewed again in the Year 1 COMMP cap integrity assessment (fall 2018) for signs of erosion (cap presence/cap thinning).
CA34-2	1.29	2017	Year 0 (2017)	CA34-2 has similar features to CA34-1, see evaluation above.	Cap maintenance not required.	N/A
CB34	0.12	2017	Year 0 (2017)	SHC101 and CB34 are dredge and cap areas. Due to the steep slope shown in the top of cap elevations in the SHC101 and CB34 caps (Figure 9B), a cross-section (M-M') was cut to evaluate cap integrity (Figure 9D), and the top of cap elevations were compared to the single-beam 2016 post-dredge bathymetry. There appears to be a sufficient thickness of cap over the slopes of SHC101 and CB34, and the two surveys mirror each other relatively well, indicating that cap integrity has not been diminished.	Cap maintenance not required.	N/A
CC17	0.75	2017	Year 0 (2017)	No irregularities noted.	Cap maintenance not required.	N/A
SHC101/CC101(M)	0.53	2017	Year 0 (2017)	SHC101 and CB34 are dredge and cap areas. Due to the steep slope shown in the top of cap elevations in the SHC101 and CB34 caps (Figure 9B), a cross-section (M-M') was cut to evaluate cap integrity (Figure 9D), and the top of cap elevations were compared to the single-beam 2016 post-dredge bathymetry. There appears to be a sufficient thickness of cap over the slopes of SHC101 and CB34, and the two surveys mirror each other relatively well, indicating that cap integrity has not been diminished.	Cap maintenance not required.	N/A
Lower OU4 Total	**41.23**					

N/A - Not Applicable

Prepared by: TMK1
Checked by: KMO

Figures



LEGEND

CA30A	"A" CAP DESIGN LOCATION AND IDENTIFICATION
CB52	"B" CAP DESIGN LOCATION AND IDENTIFICATION
CC2E N2	"C" CAP DESIGN 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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
3. CAP DESIGN PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0' 300' 600'
BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 1
LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
CAP AREA LOCATIONS

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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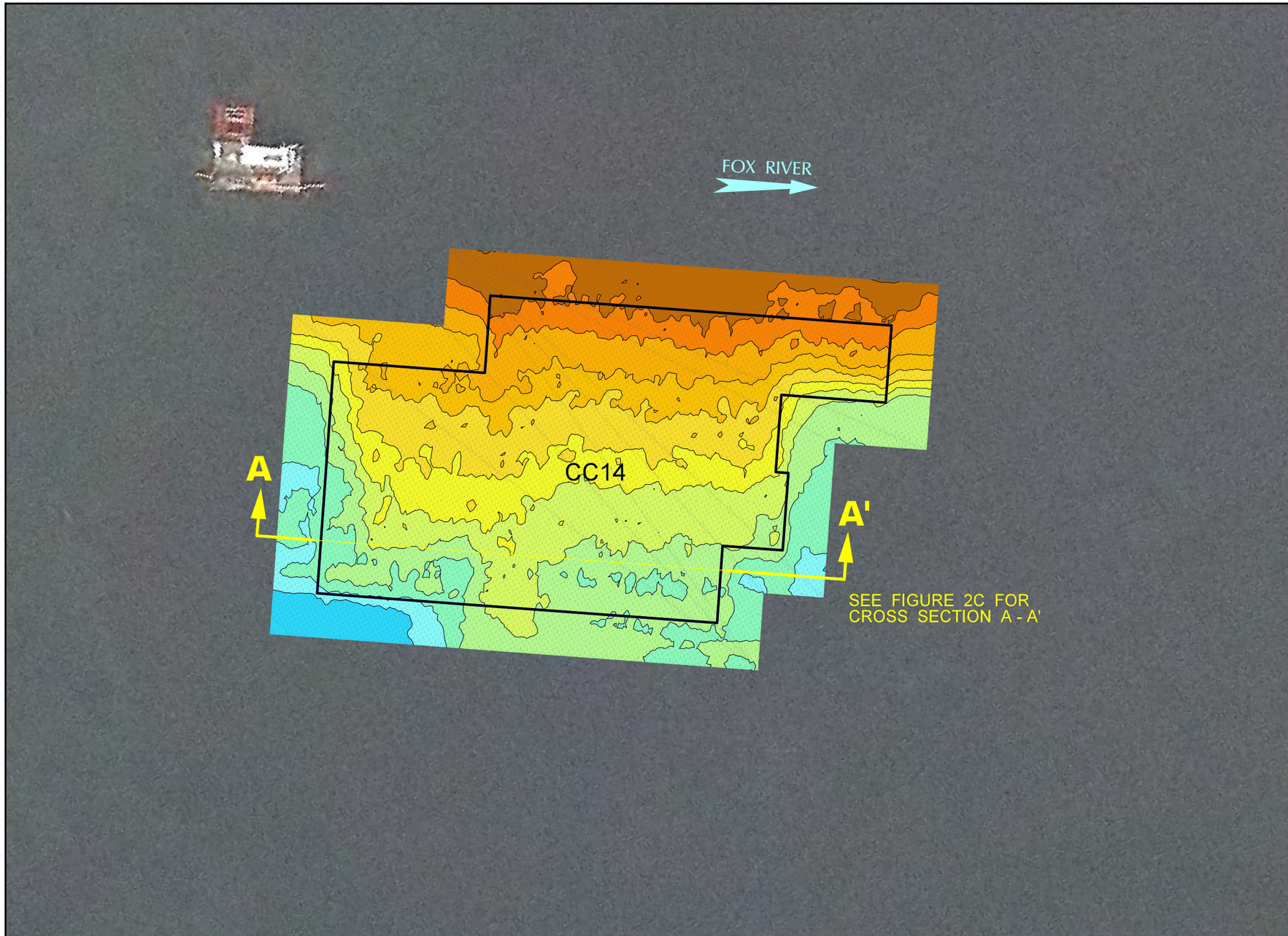

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE OCTOBER 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 566 - 567
- ELEVATION 565 - 566
- ELEVATION 564 - 565
- ELEVATION 563 - 564
- ELEVATION 562 - 563
- ELEVATION 561 - 562
- ELEVATION 560 - 561
- ELEVATION 559 - 560
- ELEVATION 558 - 559
- ELEVATION 557 - 558
- ELEVATION 556 - 557

LEGEND

CAP DESIGN PLACEMENT LIMITS

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, LLC.. DATE OF SURVEY: OCTOBER, 2017.
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

0 25' 50'

BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 2A

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATION - PLAN VIEW

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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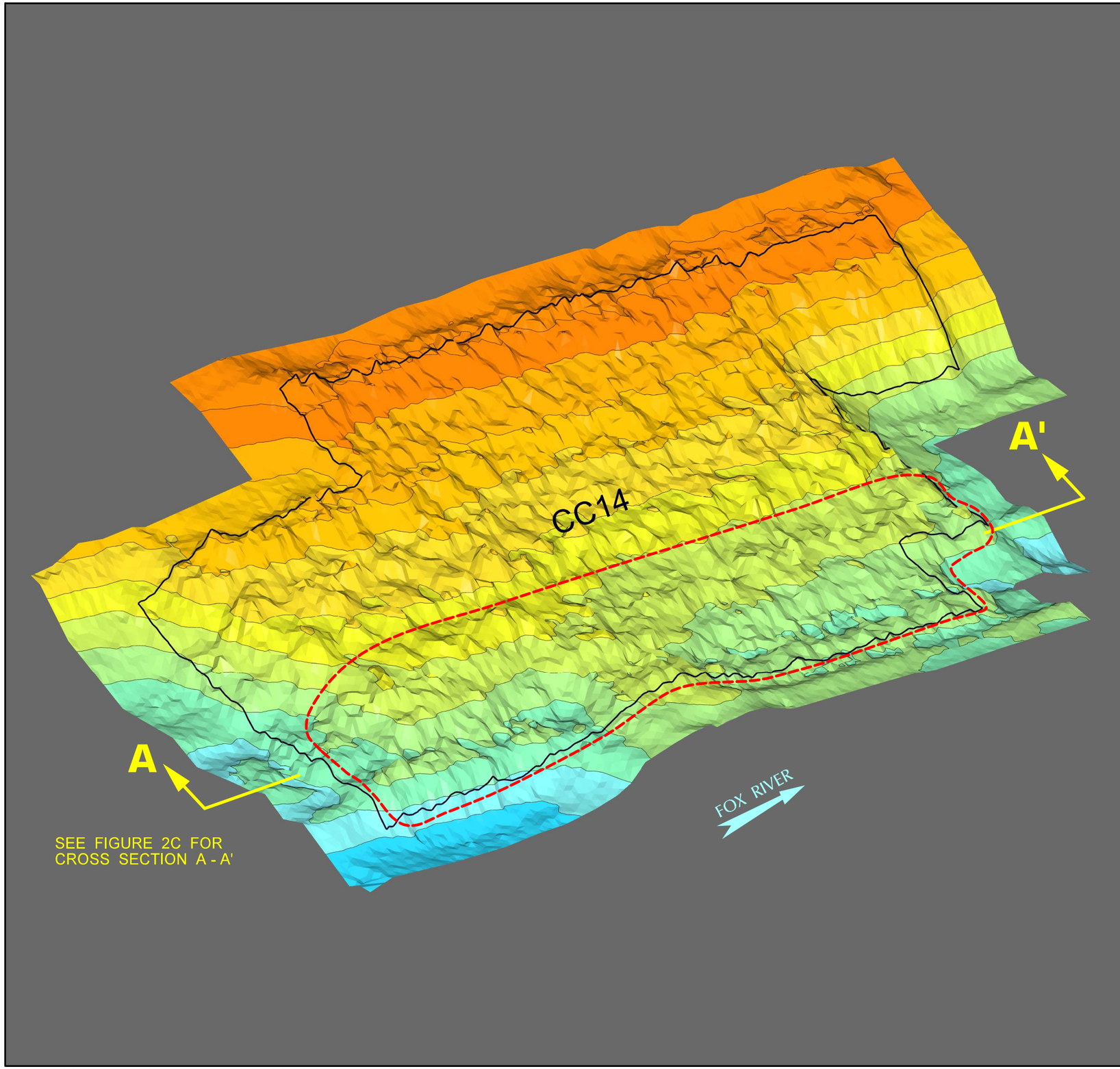

N

LEGEND

CAP DESIGN PLACEMENT LIMITS

AREA OF INTEREST

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE OCTOBER 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 566 - 567
- ELEVATION 565 - 566
- ELEVATION 564 - 565
- ELEVATION 563 - 564
- ELEVATION 562 - 563
- ELEVATION 561 - 562
- ELEVATION 560 - 561
- ELEVATION 559 - 560
- ELEVATION 558 - 559
- ELEVATION 557 - 558
- ELEVATION 556 - 557

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN, COMAPNY, INC. DATE OF SURVEY: OCTOBER, 2017.
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. CAP DESIGN PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

GLATFELTER / GEORGIA PACIFIC

FIGURE 2B

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - ISOMETRIC VIEW

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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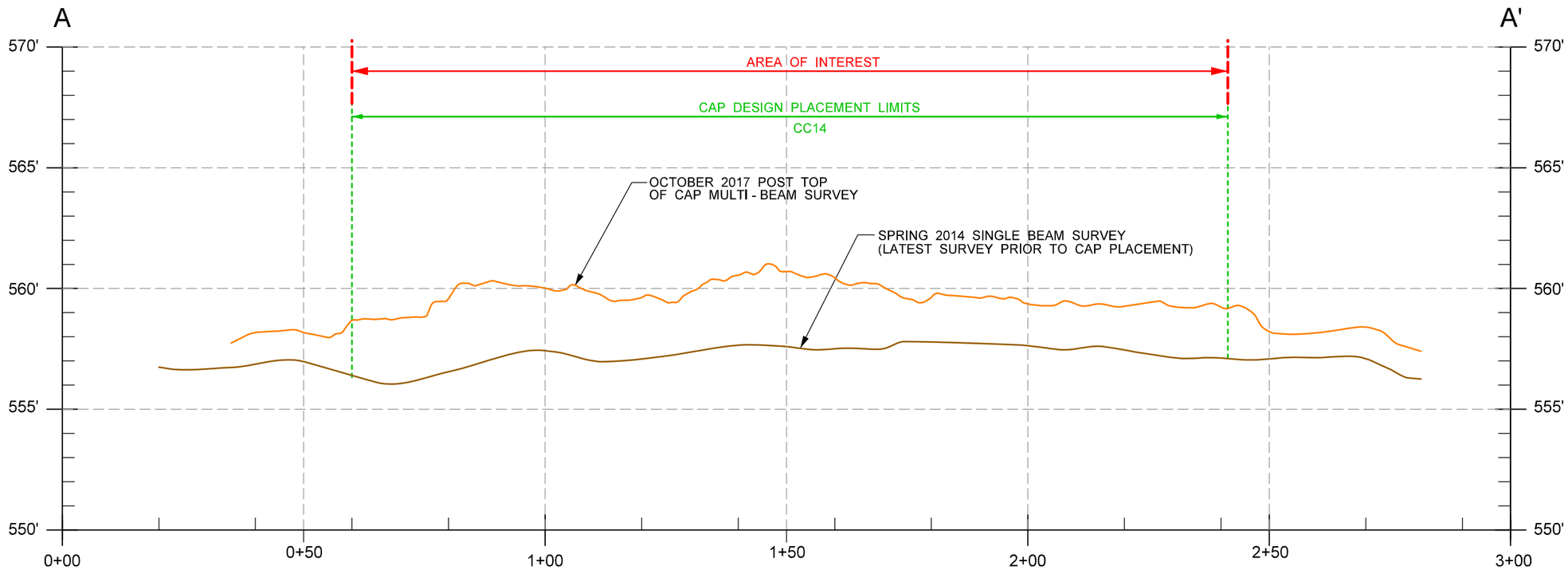
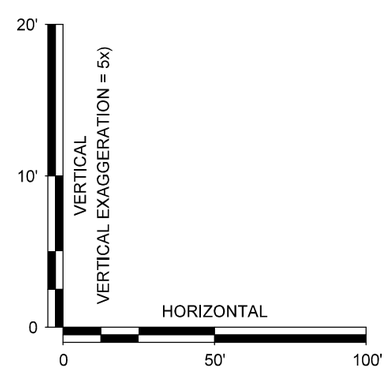


SECTION A - A'



SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC.
   DATE OF SURVEY: OCTOBER, 2017.
2. CAP DESIGN PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
3. SEE FIGURES 2A & 2B FOR CROSS SECTION LOCATION.

Foth

SEE BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 2C

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - CROSS SECTIONS

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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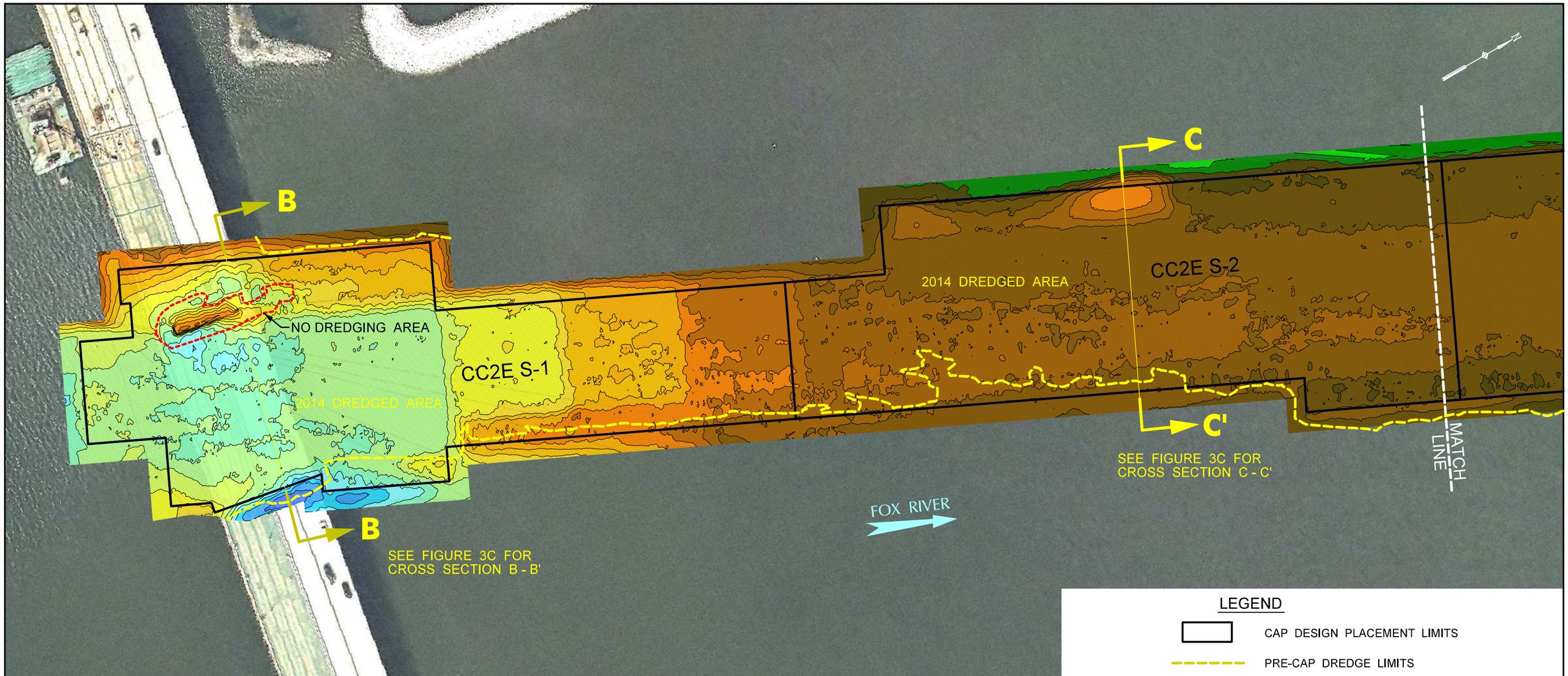

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE OCTOBER 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567
- ELEVATION 565 - 566
- ELEVATION 564 - 565
- ELEVATION 563 - 564

WATER DEPTH ↓ DEEPER

- ELEVATION 562 - 563
- ELEVATION 561 - 562
- ELEVATION 560 - 561
- ELEVATION 559 - 560
- ELEVATION 558 - 559
- ELEVATION 557 - 558
- ELEVATION 556 - 557
- ELEVATION 555 - 556
- ELEVATION 554 - 555

LEGEND

- CAP DESIGN PLACEMENT LIMITS
- PRE-CAP DREDGE LIMITS

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

0' 50' 100'
BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 3A

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - PLAN VIEW

Date: FEBRUARY 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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4/25/2018 12:54:09 PM JRB2

COLOR ELEVATION CHART

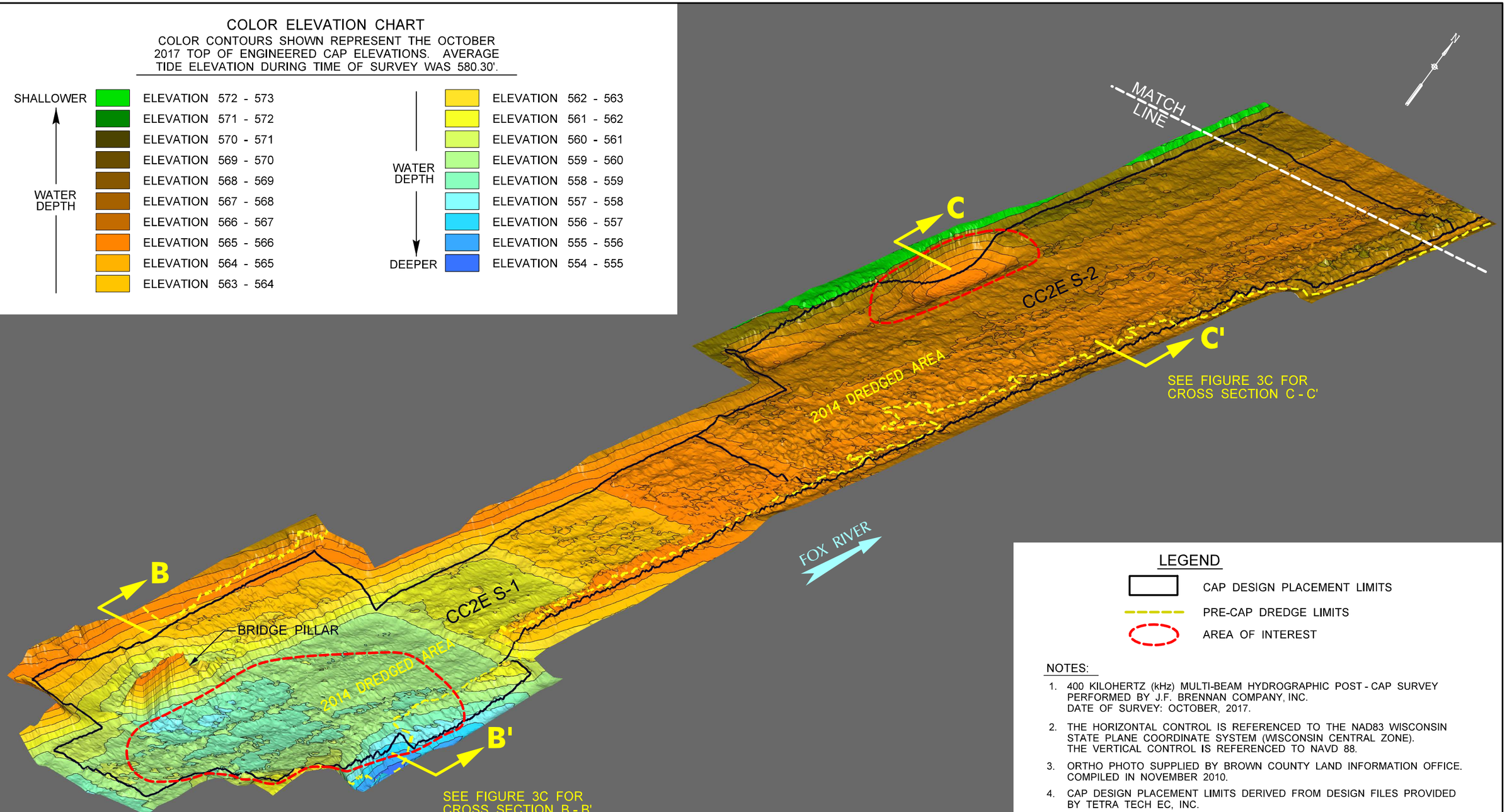
COLOR CONTOURS SHOWN REPRESENT THE OCTOBER 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567
- ELEVATION 565 - 566
- ELEVATION 564 - 565
- ELEVATION 563 - 564

WATER DEPTH ↓ DEEPER

- ELEVATION 562 - 563
- ELEVATION 561 - 562
- ELEVATION 560 - 561
- ELEVATION 559 - 560
- ELEVATION 558 - 559
- ELEVATION 557 - 558
- ELEVATION 556 - 557
- ELEVATION 555 - 556
- ELEVATION 554 - 555



LEGEND

- CAP DESIGN PLACEMENT LIMITS
- PRE-CAP DREDGE LIMITS
- AREA OF INTEREST

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

GLATFELTER / GEORGIA PACIFIC

FIGURE 3B

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - ISOMETRIC VIEW

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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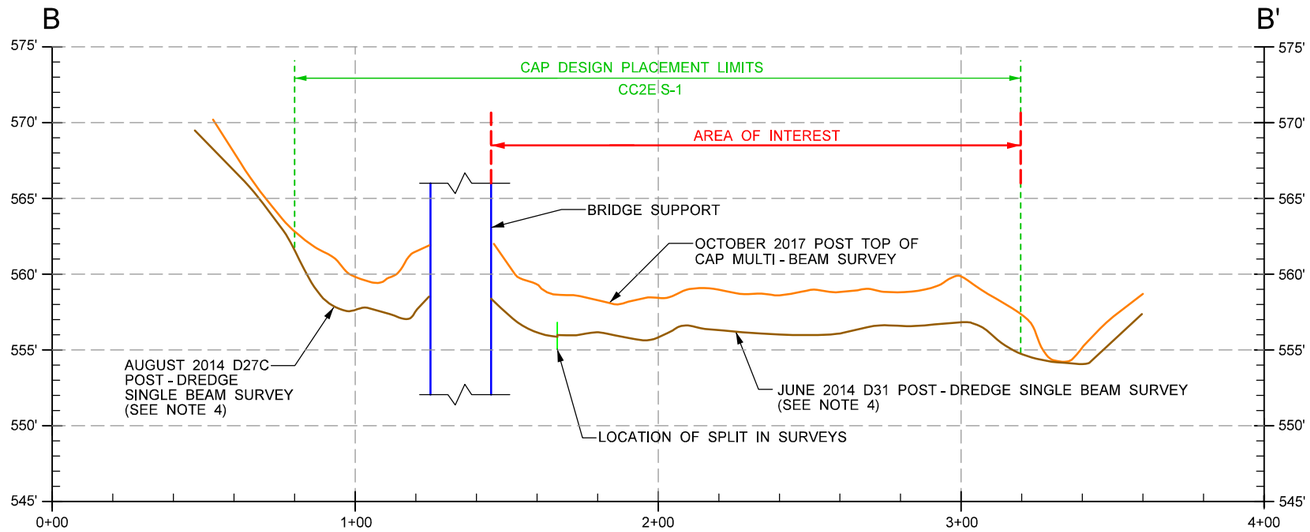
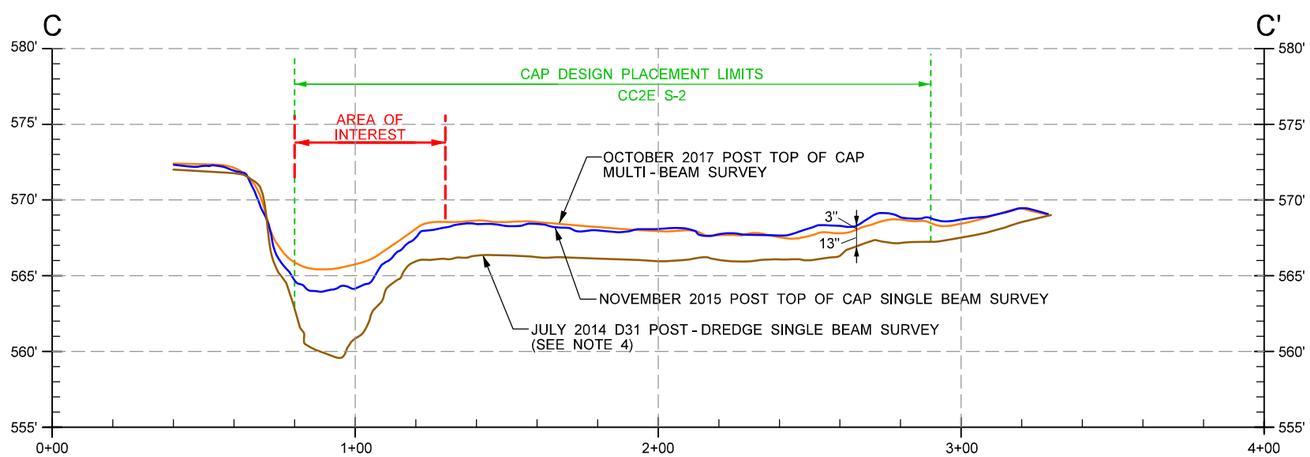
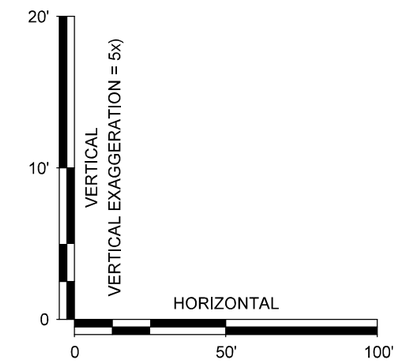
4/25/2018 2:12:07 PM JRB2



SECTION B - B'



SECTION C - C'



SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST CAP - SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
2. CAP DESIGN PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
3. SEE FIGURES 3A & 3B FOR CROSS SECTION LOCATION.
4. THIS SURVEY WAS THE LATEST SURVEY PERFORMED PRIOR TO THE CAP BEING PLACED.

Foth

SEE BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 3C

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - CROSS SECTIONS

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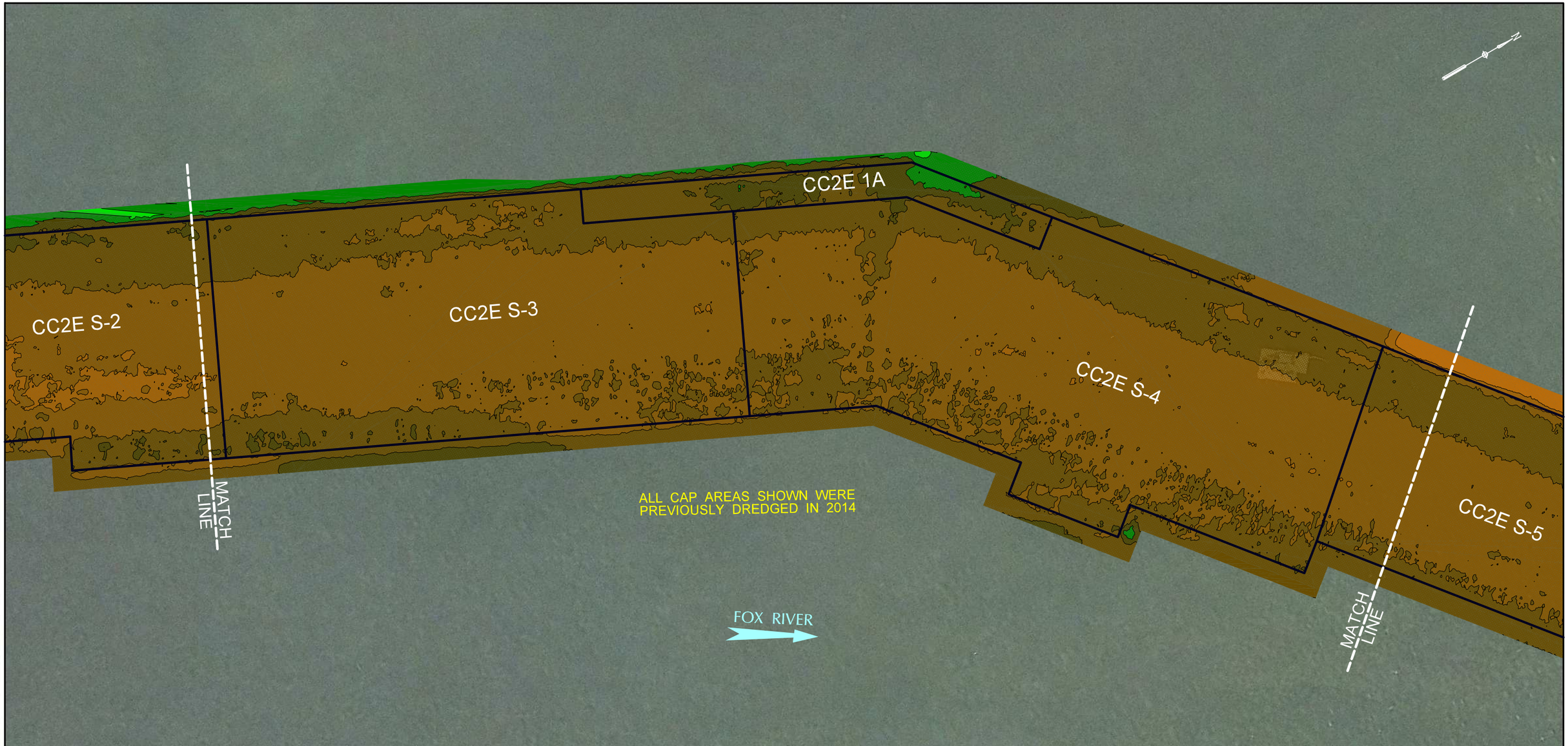

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE OCTOBER, 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER	ELEVATION 572 - 573
	ELEVATION 571 - 572
	ELEVATION 570 - 571
WATER DEPTH	ELEVATION 569 - 570
	ELEVATION 568 - 569
	ELEVATION 567 - 568
DEEPER	ELEVATION 566 - 567

LEGEND

CAP DESIGN PLACEMENT LIMITS

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST-CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

0' 50' 100'
BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 4A

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - PLAN VIEW

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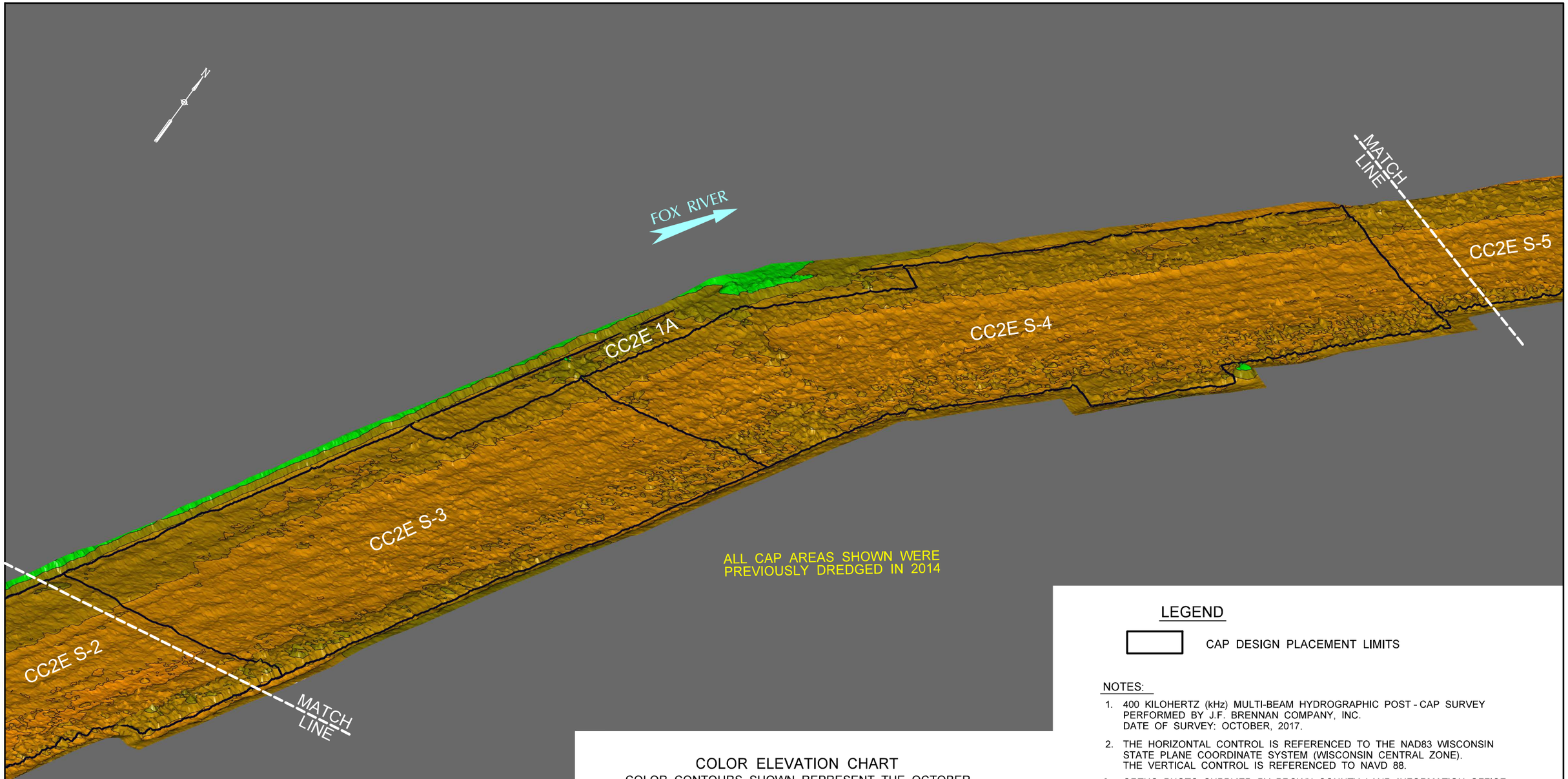

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE OCTOBER 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER		ELEVATION 572 - 573
↑		ELEVATION 571 - 572
		ELEVATION 570 - 571
WATER DEPTH		ELEVATION 569 - 570
		ELEVATION 568 - 569
↓		ELEVATION 567 - 568
DEEPER		ELEVATION 566 - 567

LEGEND

CAP DESIGN PLACEMENT LIMITS

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

GLATFELTER / GEORGIA PACIFIC

FIGURE 4B

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - ISOMETRIC VIEW

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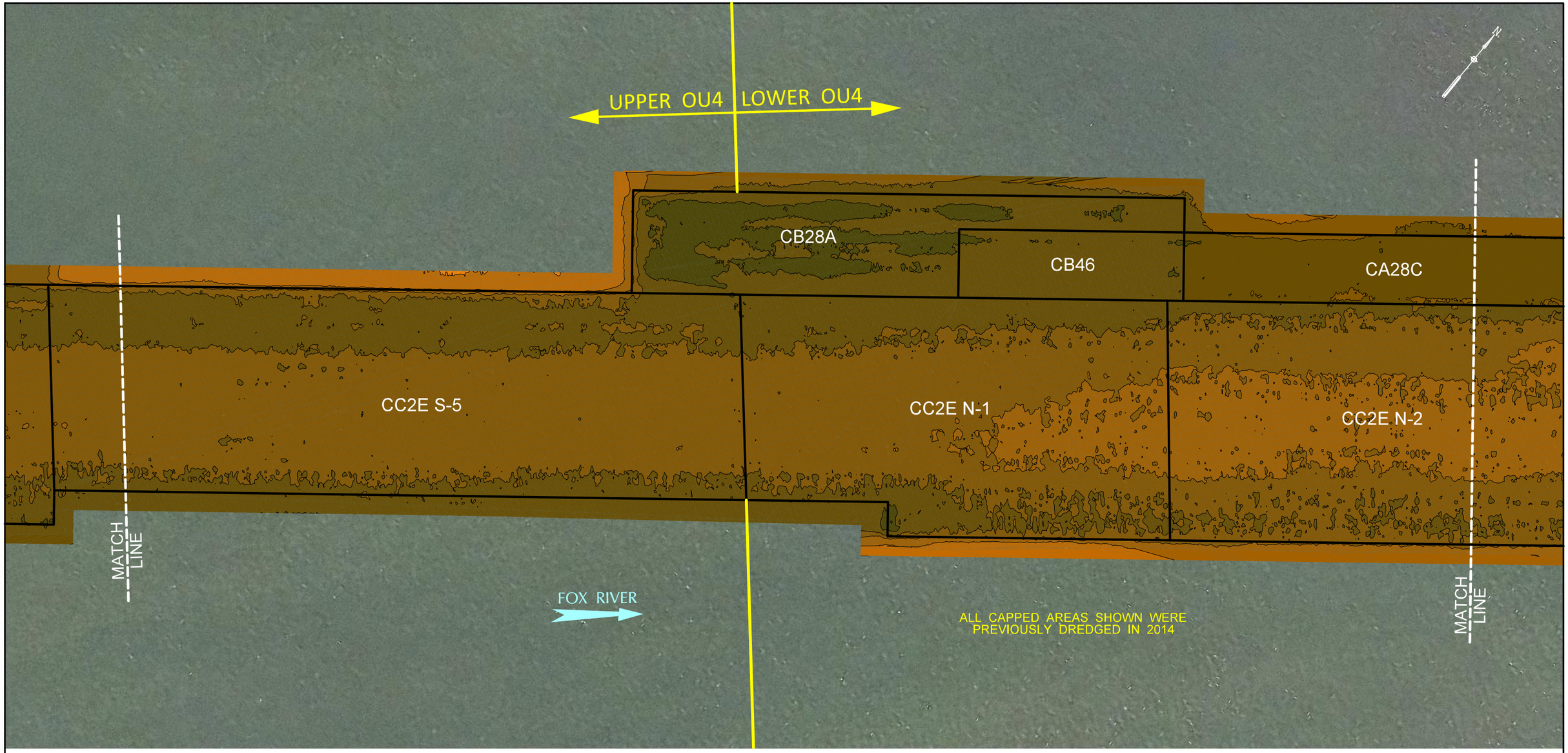

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE OCTOBER 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER ↑ WATER DEPTH ↓ DEEPER

- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567
- ELEVATION 565 - 566

LEGEND

CAP DESIGN PLACEMENT LIMITS

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST-CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

0' 50' 100'
BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 5A

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - PLAN VIEW

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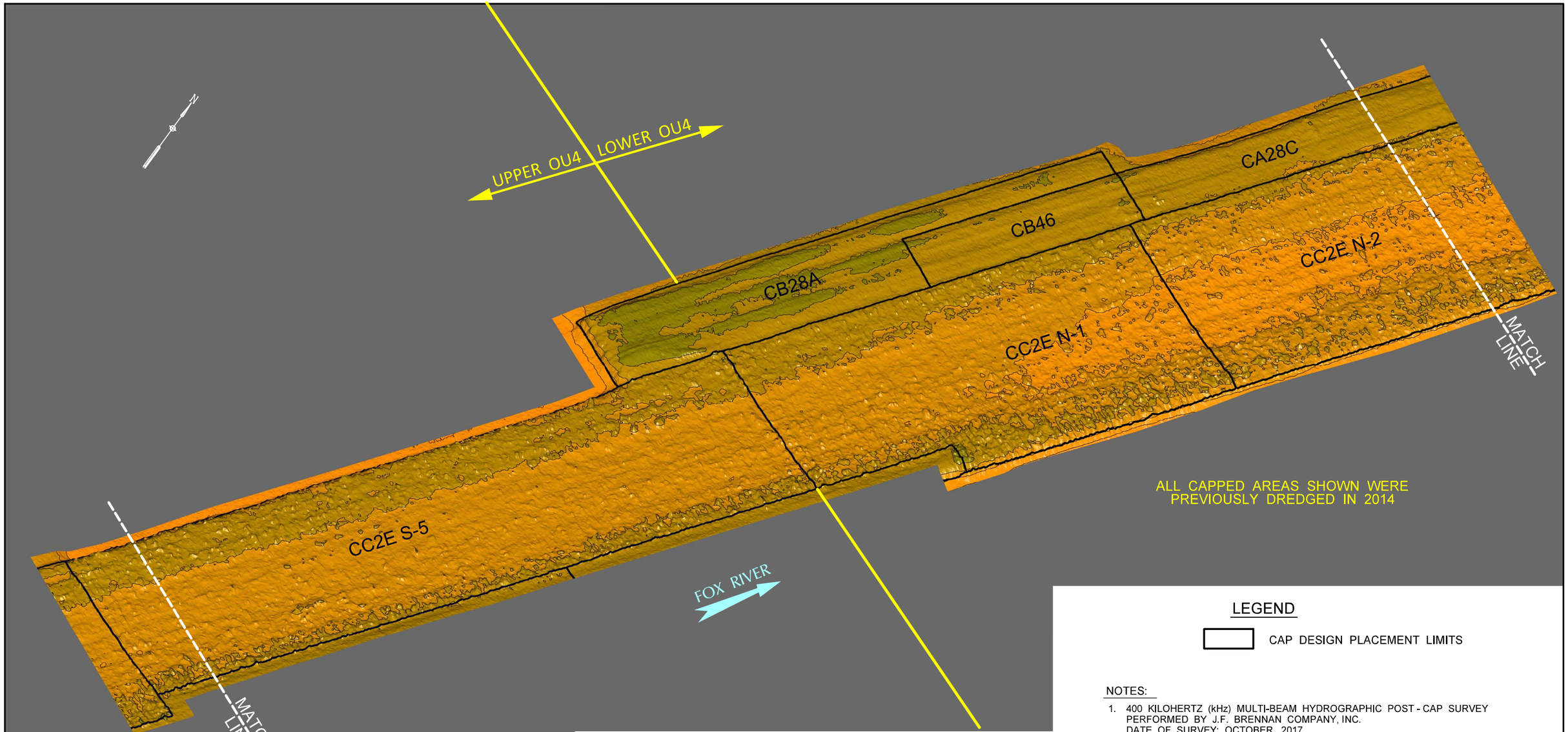

LEGEND

CAP DESIGN PLACEMENT LIMITS

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE OCTOBER 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER		ELEVATION 572 - 573
↑		ELEVATION 571 - 572
		ELEVATION 570 - 571
WATER DEPTH		ELEVATION 569 - 570
		ELEVATION 568 - 569
		ELEVATION 567 - 568
↓		ELEVATION 566 - 567
DEEPER		

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

GLATFELTER / GEORGIA PACIFIC

FIGURE 5B

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - ISOMETRIC VIEW

Date: FEBRUARY, 2018	Revision Date:	
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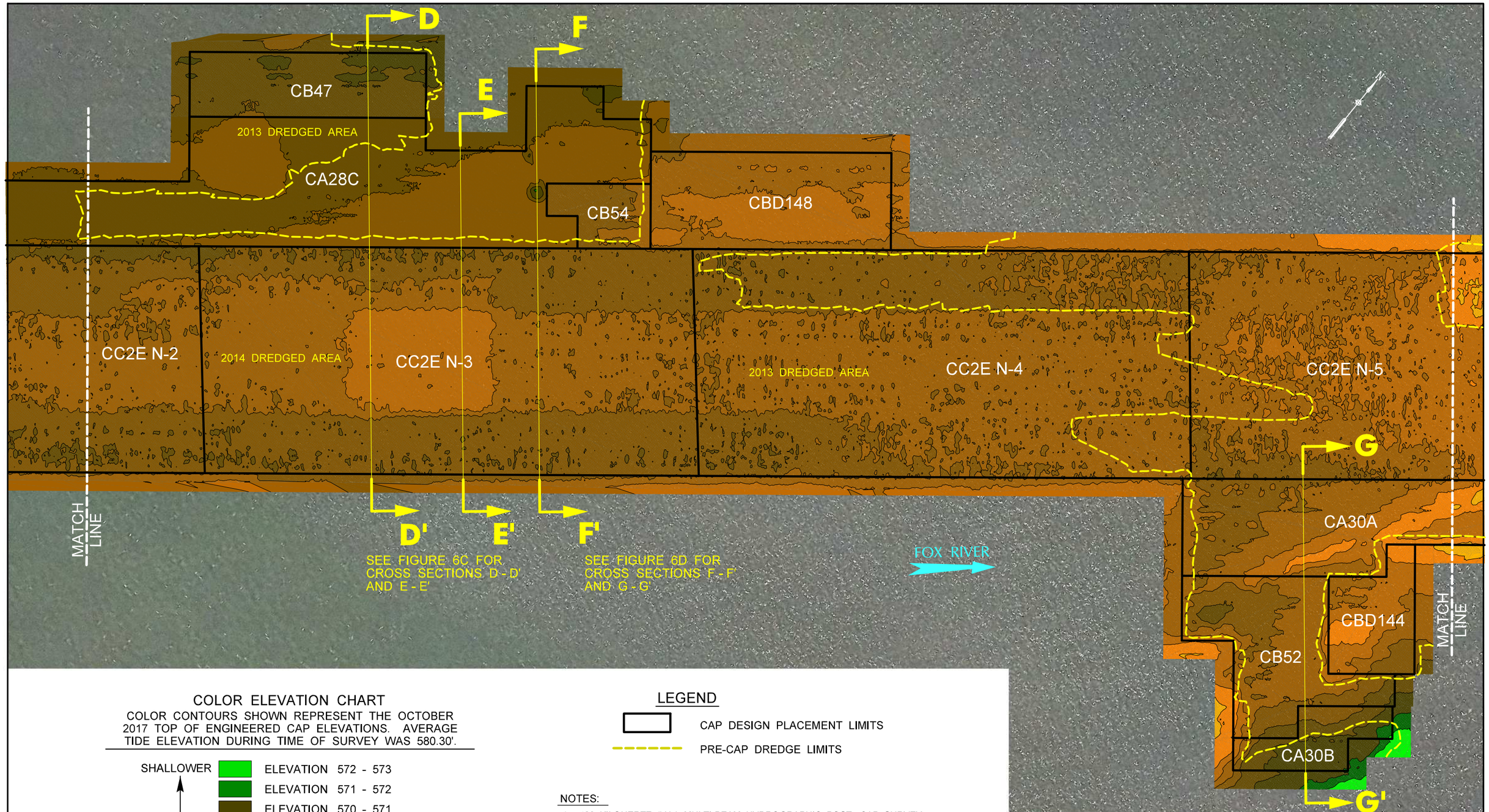

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE OCTOBER 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER

WATER DEPTH

DEEPER

- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567
- ELEVATION 565 - 566
- ELEVATION 564 - 565

LEGEND

- CAP DESIGN PLACEMENT LIMITS
- PRE-CAP DREDGE LIMITS

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

0' 50' 100'

BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 6A

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - PLAN VIEW

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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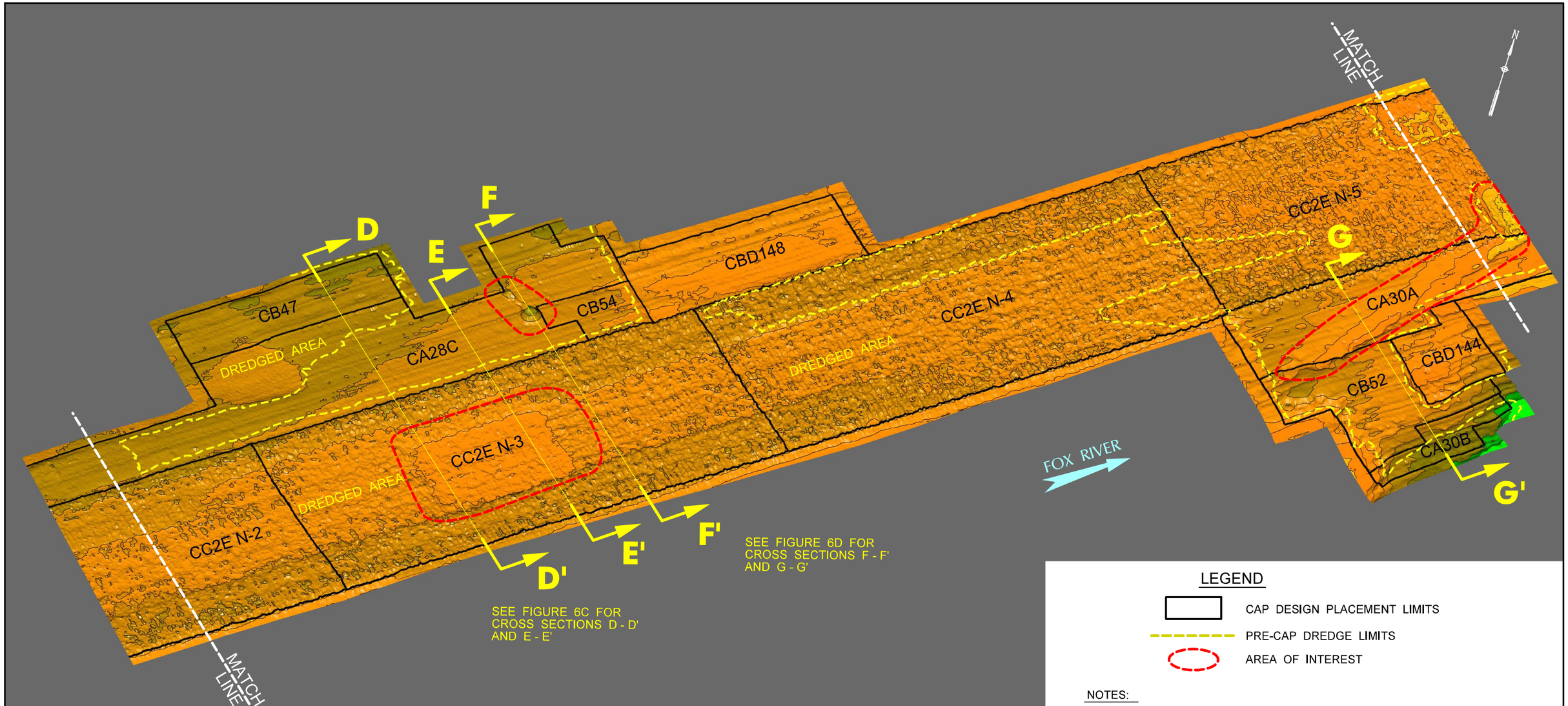

LEGEND

- CAP DESIGN PLACEMENT LIMITS
- PRE-CAP DREDGE LIMITS
- AREA OF INTEREST

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE OCTOBER 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER		ELEVATION 572 - 573
		ELEVATION 571 - 572
		ELEVATION 570 - 571
		ELEVATION 569 - 570
WATER DEPTH		ELEVATION 568 - 569
		ELEVATION 567 - 568
		ELEVATION 566 - 567
		ELEVATION 565 - 566
DEEPER		ELEVATION 564 - 565

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

GLATFELTER / GEORGIA PACIFIC

FIGURE 6B

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - ISOMETRIC VIEW

Date: FEBRUARY, 2018	Revision Date:	
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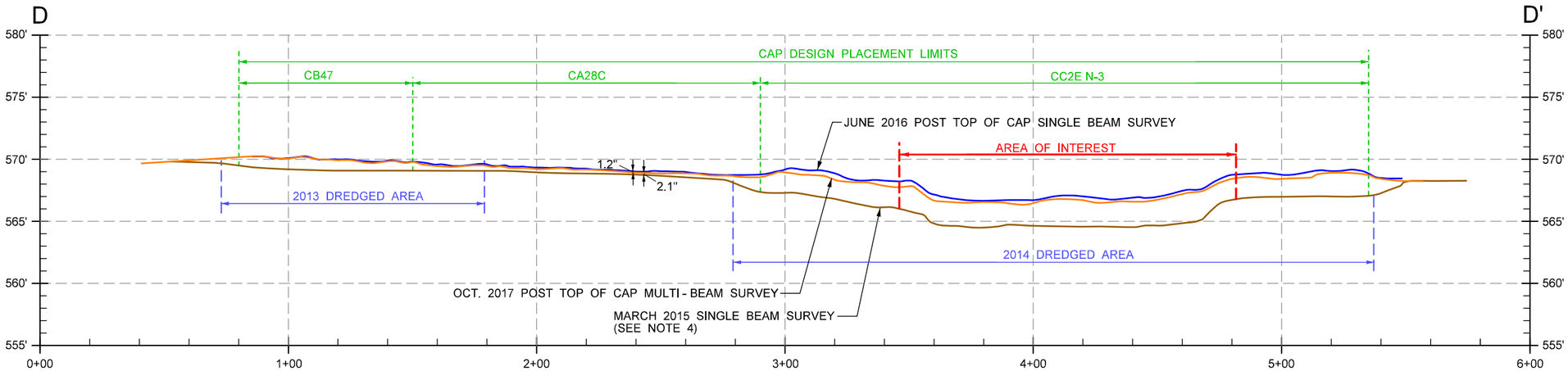
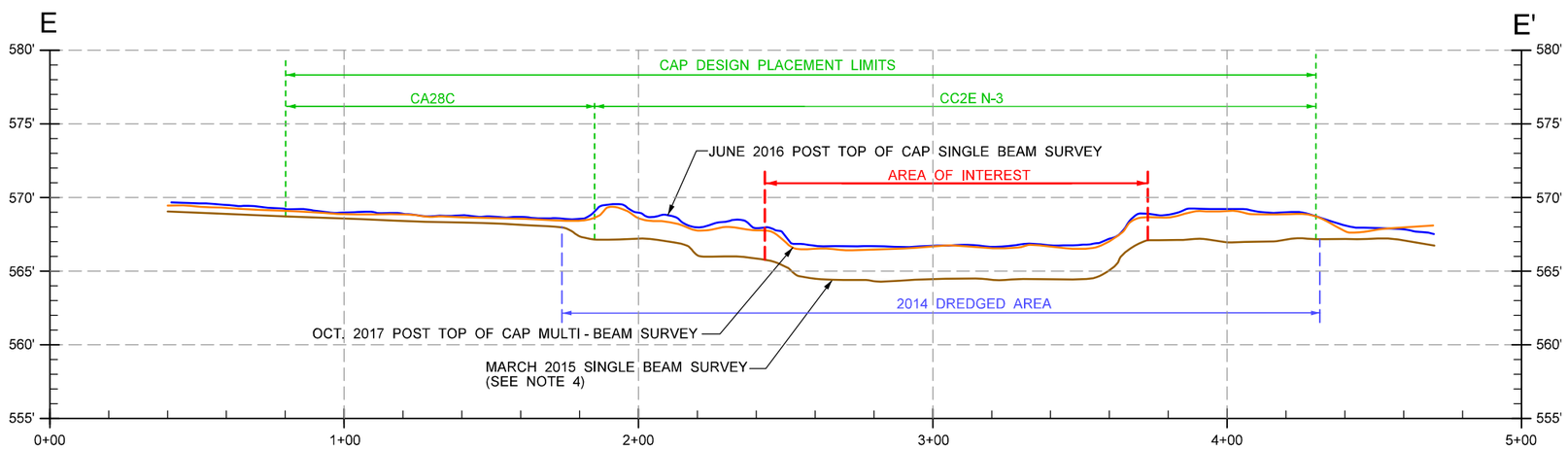
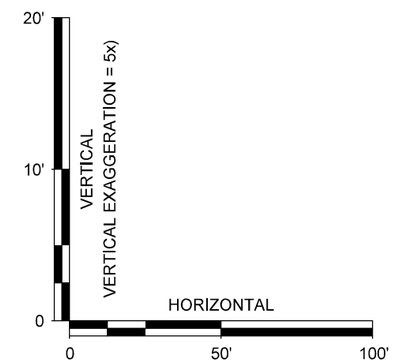


SECTION D - D'



SEETION E - E'



SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
2. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
3. SEE FIGURES 6A & 6B FOR CROSS SECTION LOCATIONS.
4. THIS SURVEY WAS THE LATEST SURVEY PERFORMED PRIOR TO THE CAP BEING PLACED.

Foth

SEE BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 6C

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - CROSS SECTIONS

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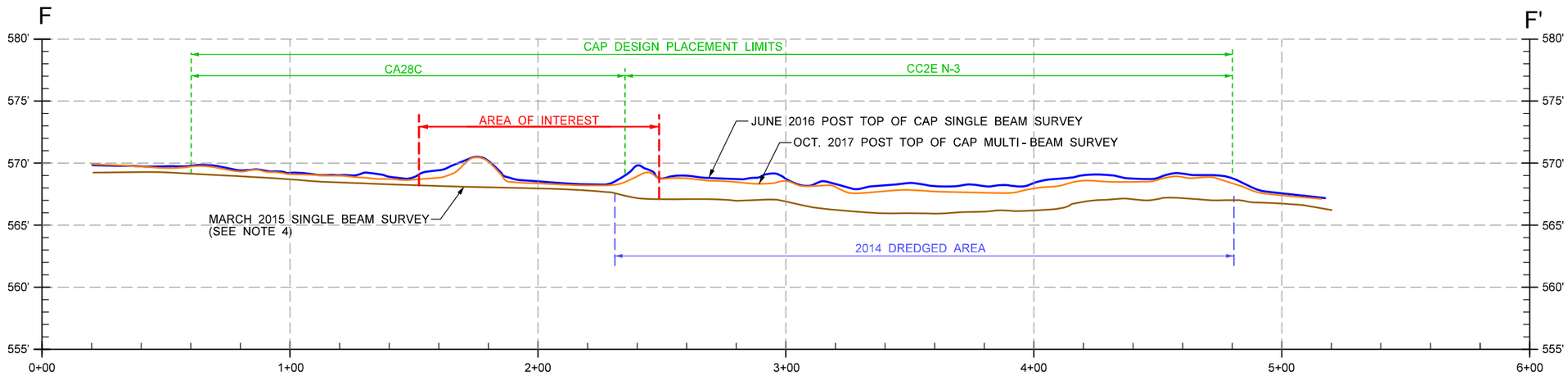
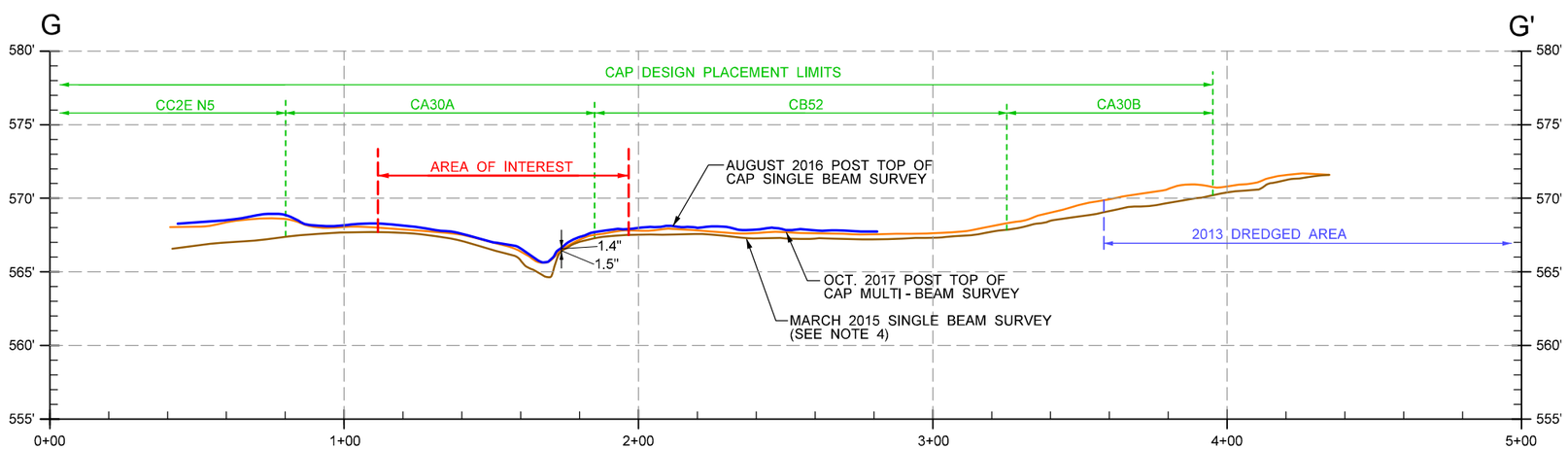
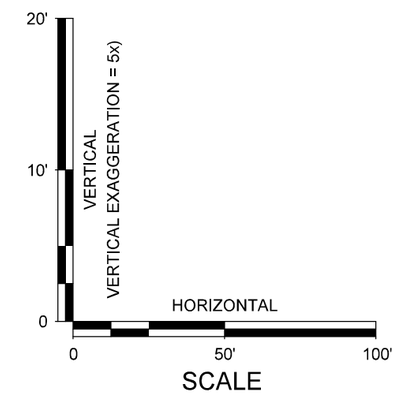


SECTION F - F'



SGGTION G - G'



SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
2. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
3. SEE FIGURES 6A & 6B FOR CROSS SECTION LOCATIONS.
4. THIS SURVEY WAS THE LATEST SURVEY PERFORMED PRIOR TO THE CAP BEING PLACED.

Foth

SEE BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 6D

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - CROSS SECTIONS

Date: FEBRUARY, 2018	Revision Date:	
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COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE OCTOBER 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567
- ELEVATION 565 - 566

WATER DEPTH ↓ DEEPER

- ELEVATION 564 - 565
- ELEVATION 563 - 564
- ELEVATION 562 - 563
- ELEVATION 561 - 562
- ELEVATION 560 - 561
- ELEVATION 559 - 560
- ELEVATION 558 - 559
- ELEVATION 557 - 558

LEGEND

- CAP DESIGN PLACEMENT LIMITS
- PRE-CAP DREDGE LIMITS

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN, COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

0' 50' 100'
BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 7A

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - PLAN VIEW

Date: FEBRUARY, 2018	Revision Date:	
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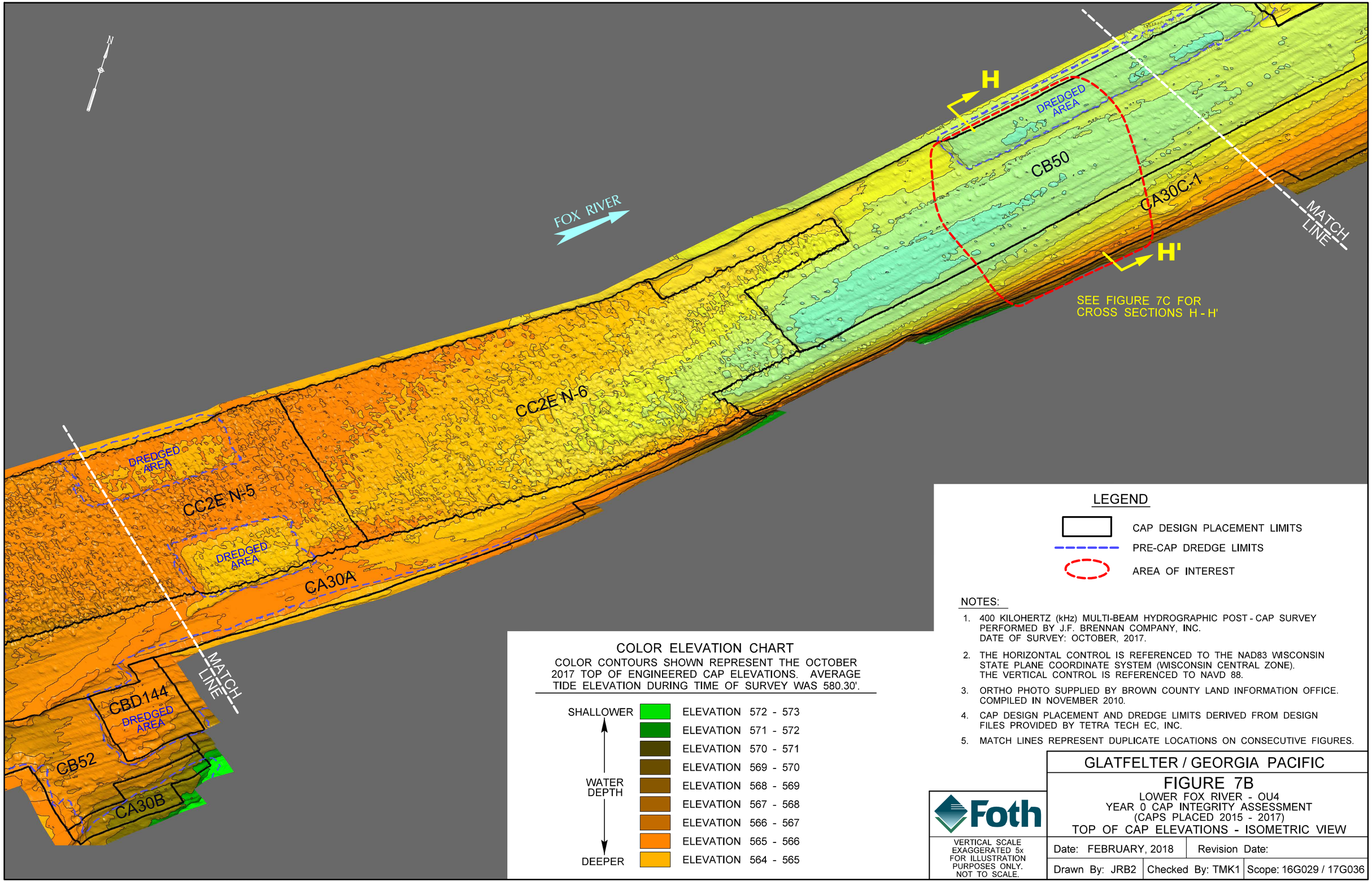

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

GLATFELTER / GEORGIA PACIFIC

FIGURE 7B

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - ISOMETRIC VIEW

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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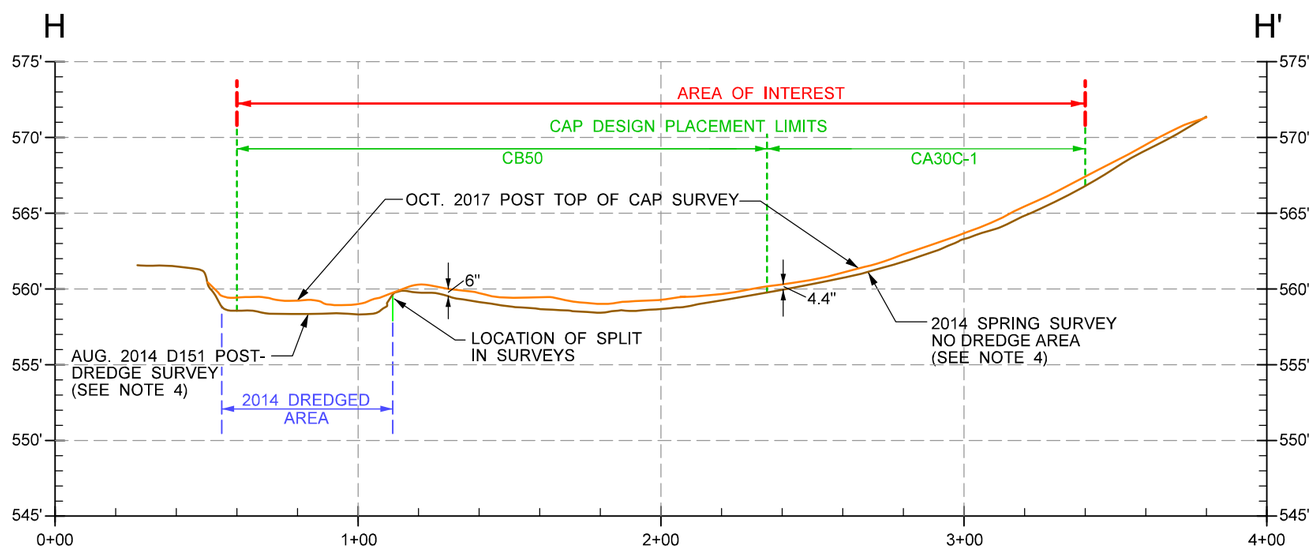
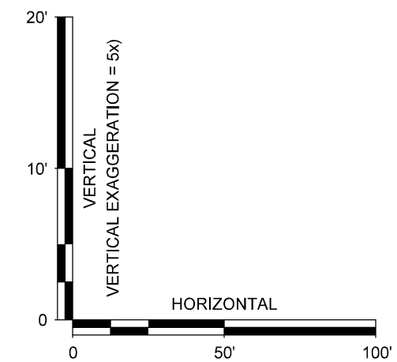


SECTION H - H'



SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.
2. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
3. SEE FIGURES 6A & 6B FOR CROSS SECTION LOCATIONS.
4. THIS SURVEY WAS THE LATEST SURVEY PERFORMED PRIOR TO THE CAP BEING PLACED.

Foth

SEE BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 7C

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - CROSS SECTIONS

Date: FEBRUARY, 2018	Revision Date:	
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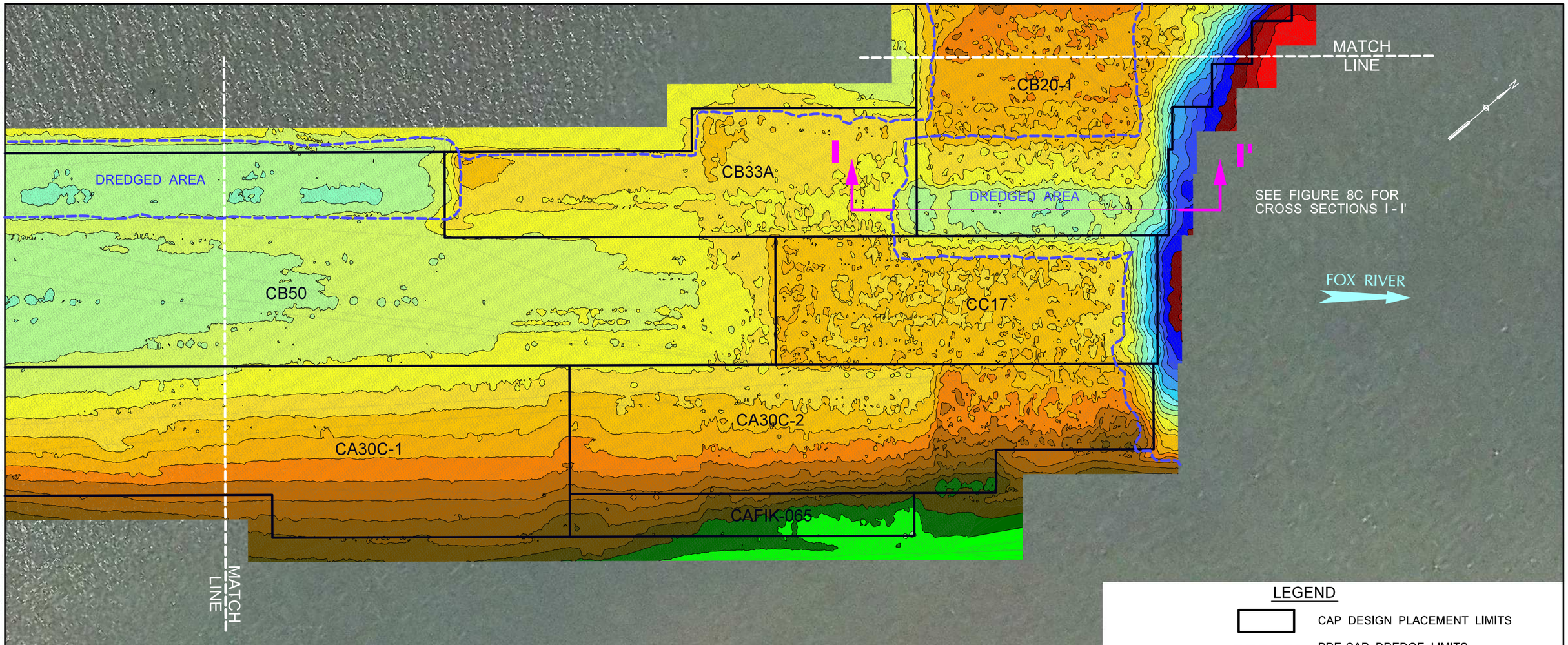

LEGEND

CAP DESIGN PLACEMENT LIMITS

PRE-CAP DREDGE LIMITS

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE OCTOBER 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567
- ELEVATION 565 - 566
- ELEVATION 564 - 565
- ELEVATION 563 - 564
- ELEVATION 562 - 563
- ELEVATION 561 - 562

WATER DEPTH ↓ DEEPER

- ELEVATION 560 - 561
- ELEVATION 559 - 560
- ELEVATION 558 - 559
- ELEVATION 557 - 558
- ELEVATION 556 - 557
- ELEVATION 555 - 556
- ELEVATION 554 - 555
- ELEVATION 553 - 554
- ELEVATION 552 - 553
- ELEVATION 551 - 552
- ELEVATION 550 - 551
- ELEVATION 549 - 550

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017. CAFIK-065 SURVEYED ON MARCH 19, 2018
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

0' 40' 80'
BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 8A

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - PLAN VIEW

Date: MARCH, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE OCTOBER 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572
- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567
- ELEVATION 565 - 566
- ELEVATION 564 - 565
- ELEVATION 563 - 564
- ELEVATION 562 - 563
- ELEVATION 561 - 562

WATER DEPTH ↓ DEEPER

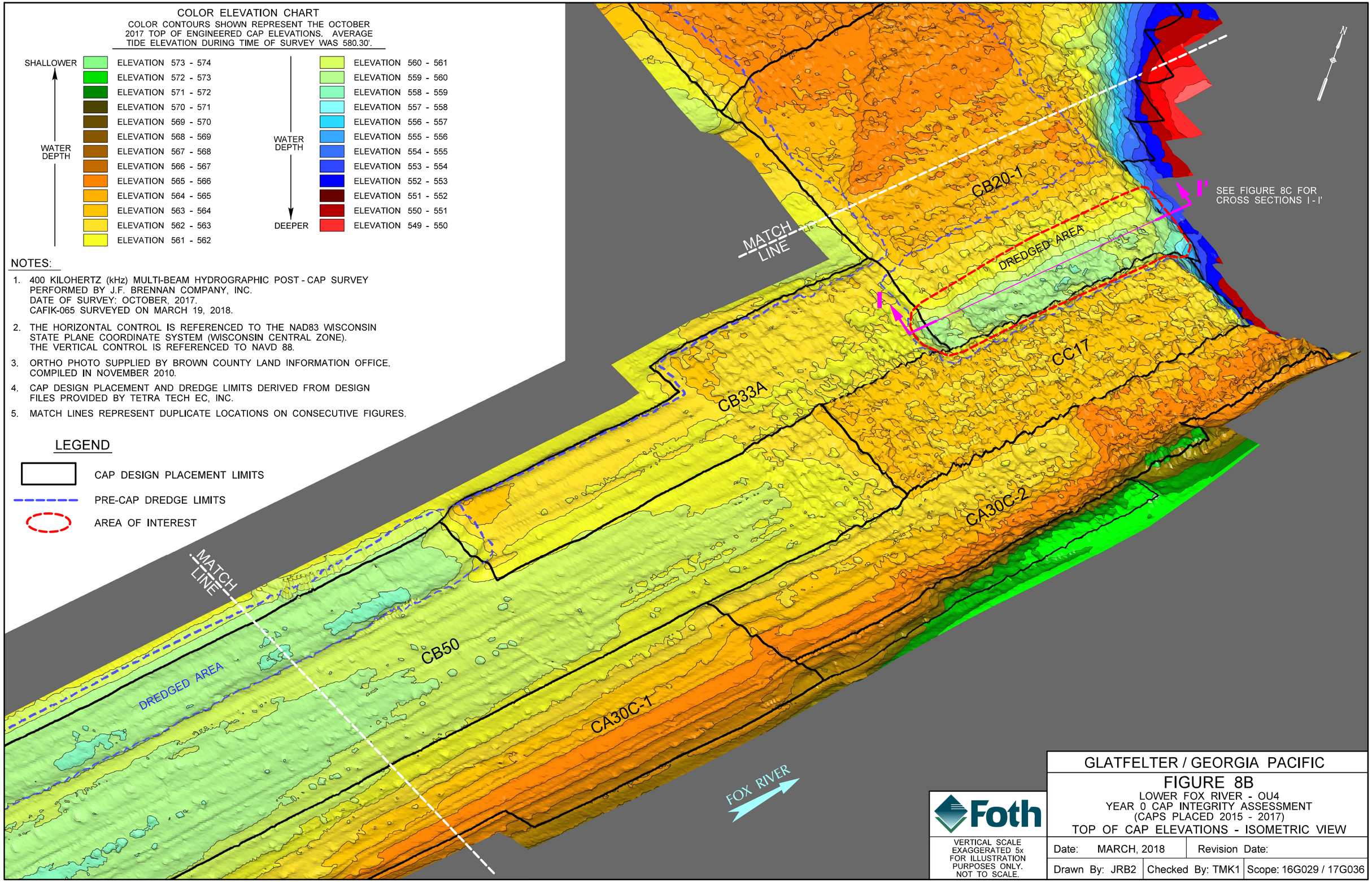
- ELEVATION 560 - 561
- ELEVATION 559 - 560
- ELEVATION 558 - 559
- ELEVATION 557 - 558
- ELEVATION 556 - 557
- ELEVATION 555 - 556
- ELEVATION 554 - 555
- ELEVATION 553 - 554
- ELEVATION 552 - 553
- ELEVATION 551 - 552
- ELEVATION 550 - 551
- ELEVATION 549 - 550

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC.
   DATE OF SURVEY: OCTOBER, 2017.
   CAFIK-065 SURVEYED ON MARCH 19, 2018.
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

LEGEND

- CAP DESIGN PLACEMENT LIMITS
- PRE-CAP DREDGE LIMITS
- AREA OF INTEREST



Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

GLATFELTER / GEORGIA PACIFIC

FIGURE 8B

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - ISOMETRIC VIEW

Date: MARCH, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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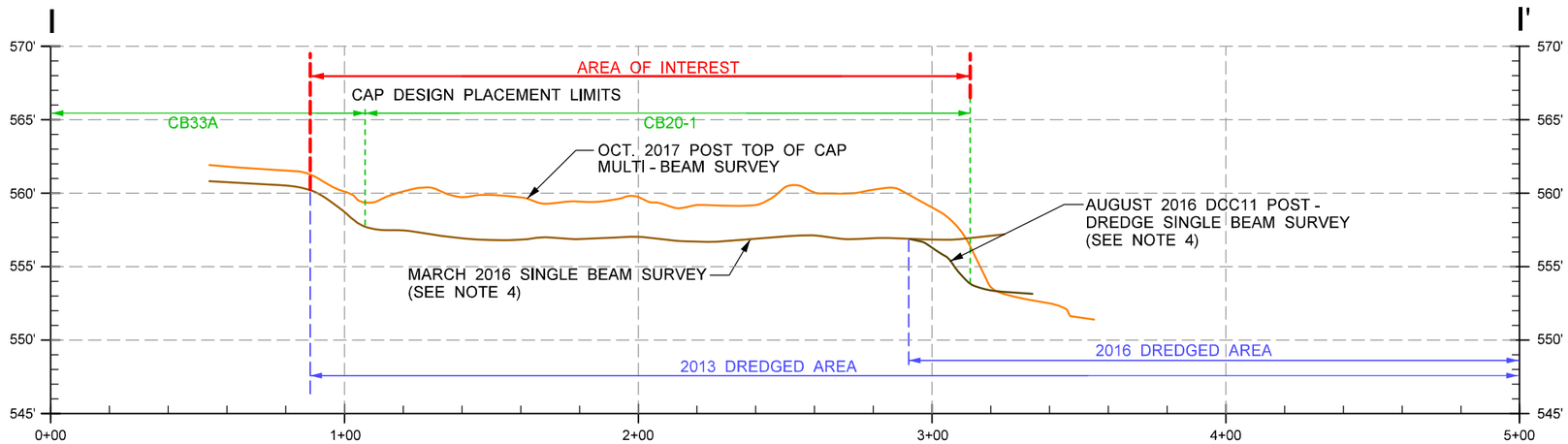
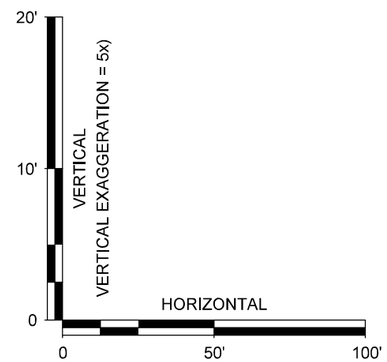


SECTION I - I'



SCALE

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN COMAPNY, INC. DATE OF SURVEY: OCTOBER, 2017.
2. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
3. SEE FIGURE 7A AND 7B FOR CROSS SECTION LOCATION.
4. THIS SURVEY WAS THE LATEST SURVEY PERFORMED PRIOR TO THE CAP BEING PLACED.

Foth

SEE BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 8C

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - CROSS SECTIONS

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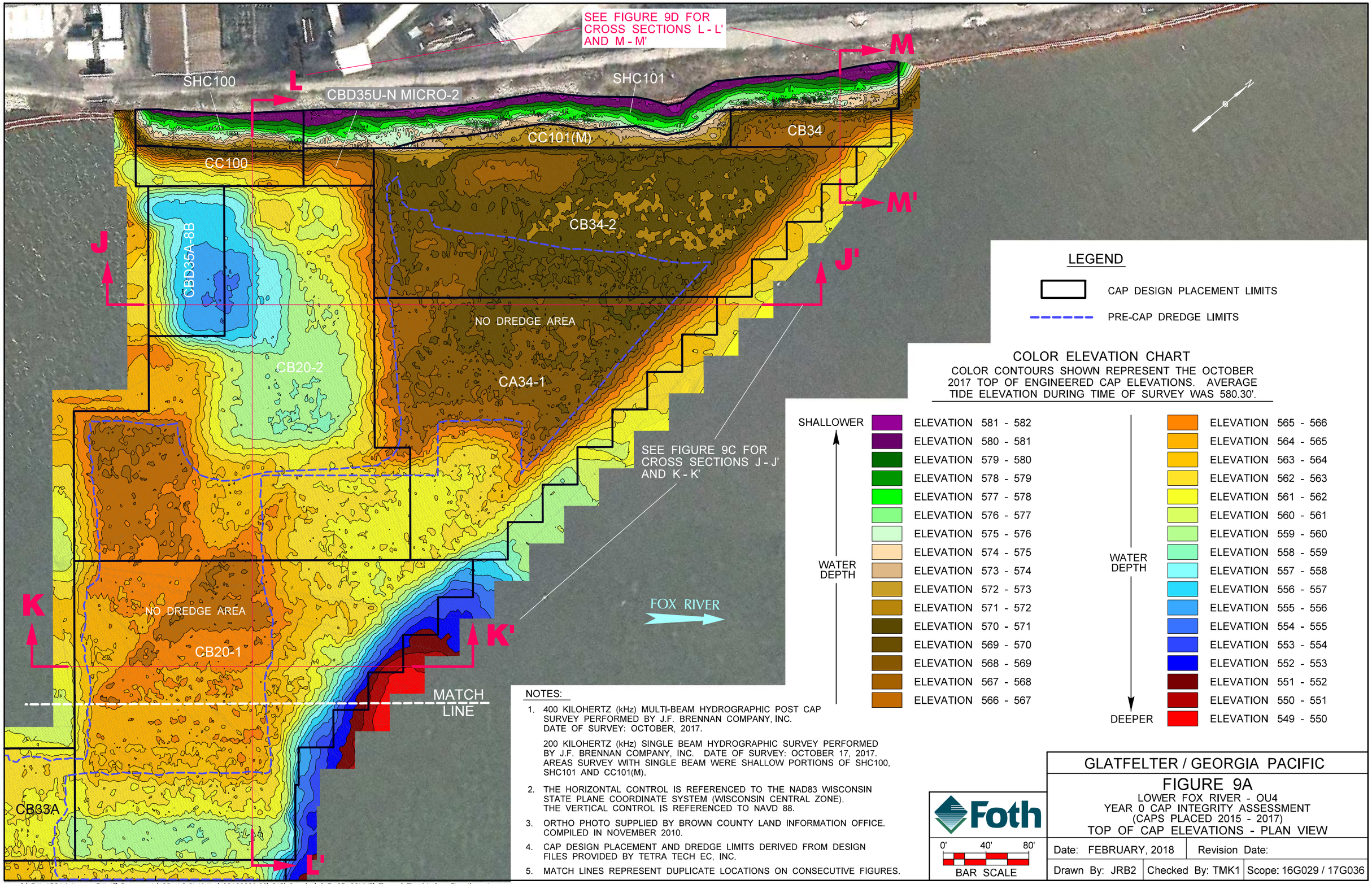

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.

   200 KILOHERTZ (kHz) SINGLE BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER 17, 2017. AREAS SURVEY WITH SINGLE BEAM WERE SHALLOW PORTIONS OF SHC100, SHC101 AND CC101(M).
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

0' 40' 80'
BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 9A
LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - PLAN VIEW

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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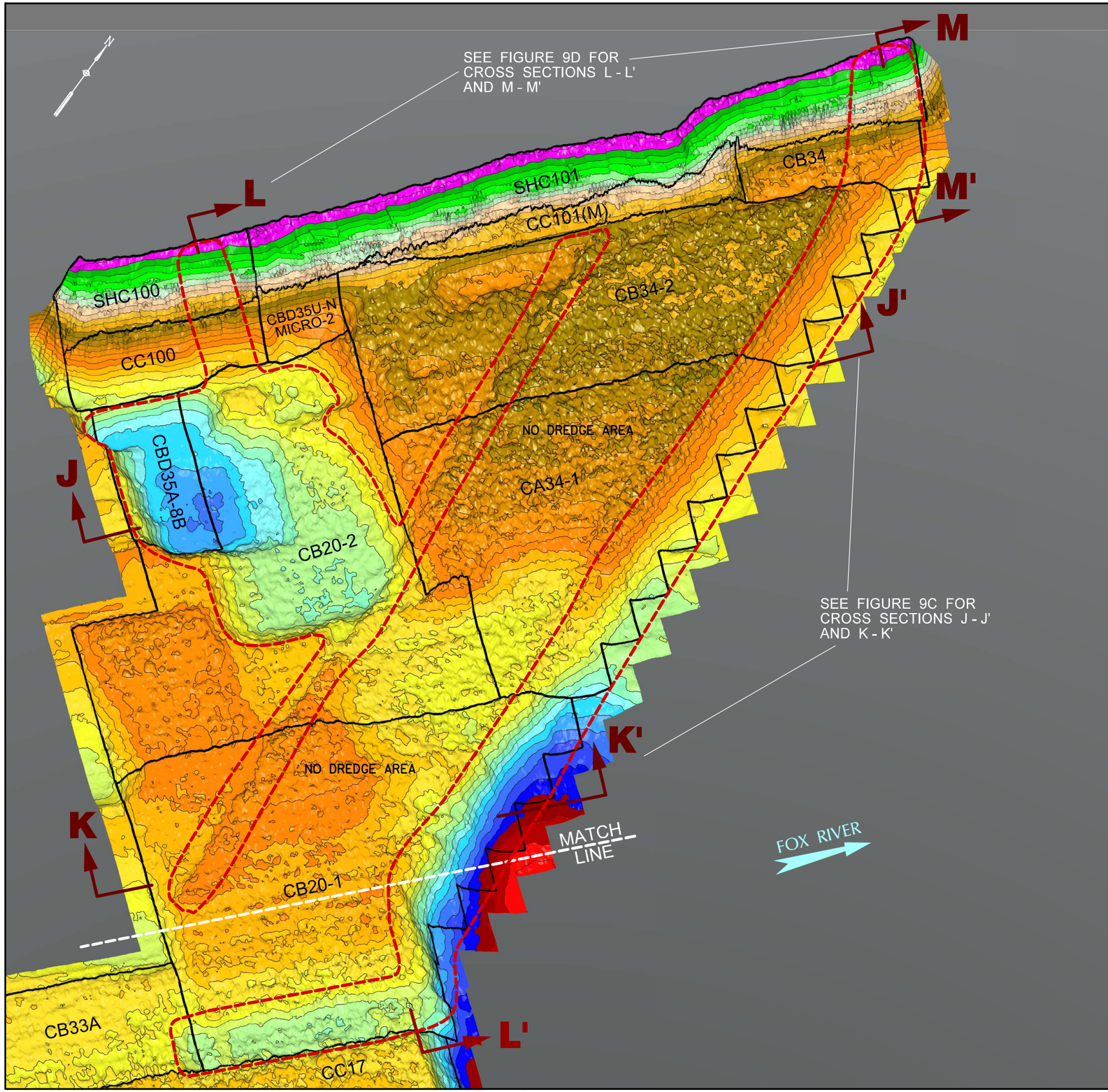

LEGEND

- CAP DESIGN PLACEMENT LIMITS
- PRE-CAP DREDGE LIMITS
- AREA OF INTEREST

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE OCTOBER 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER ↑ WATER DEPTH

- 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

- ELEVATION 565 - 566
- ELEVATION 564 - 565
- ELEVATION 563 - 564
- ELEVATION 562 - 563
- ELEVATION 561 - 562
- ELEVATION 560 - 561
- ELEVATION 559 - 560
- ELEVATION 558 - 559
- ELEVATION 557 - 558
- ELEVATION 556 - 557
- ELEVATION 555 - 556
- ELEVATION 554 - 555
- ELEVATION 553 - 554
- ELEVATION 552 - 553
- ELEVATION 551 - 552
- ELEVATION 550 - 551
- ELEVATION 549 - 550

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.

   200 KILOHERTZ (kHz) SINGLE BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER 17, 2017. AREAS SURVEY WITH SINGLE BEAM WERE SHALLOW PORTIONS OF SHC100, SHC101 AND CC101(M).
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

VERTICAL SCALE EXAGGERATED 5x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

GLATFELTER / GEORGIA PACIFIC

FIGURE 9B

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - ISOMETRIC VIEW

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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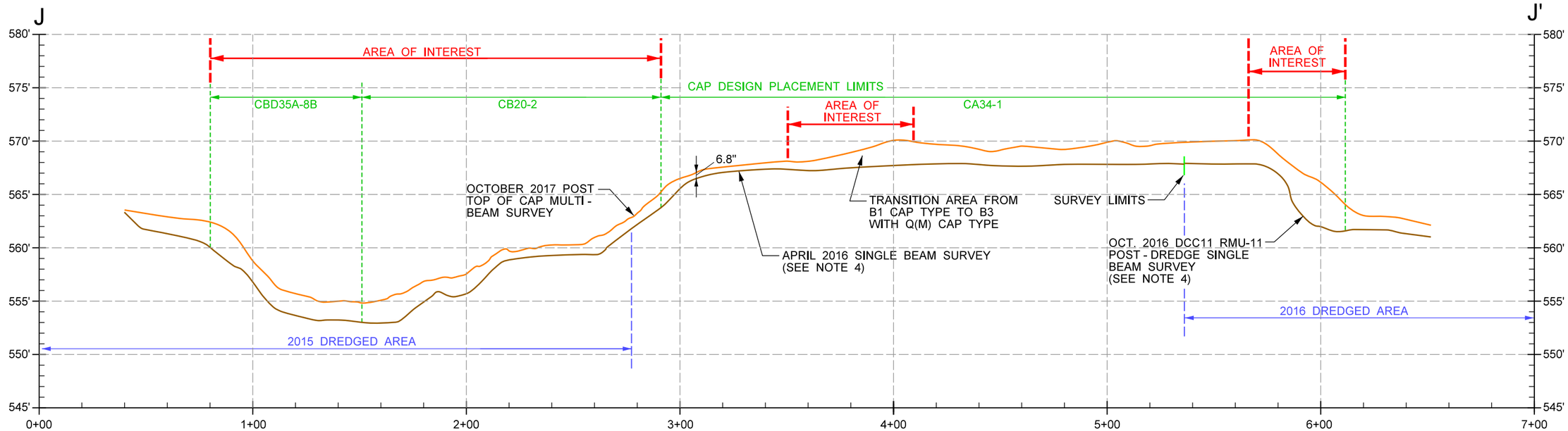
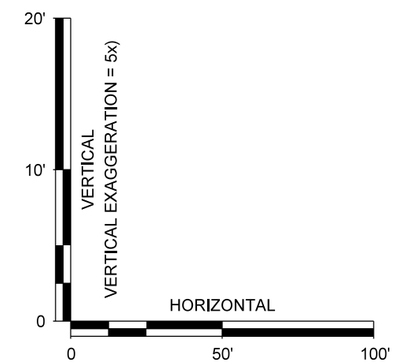
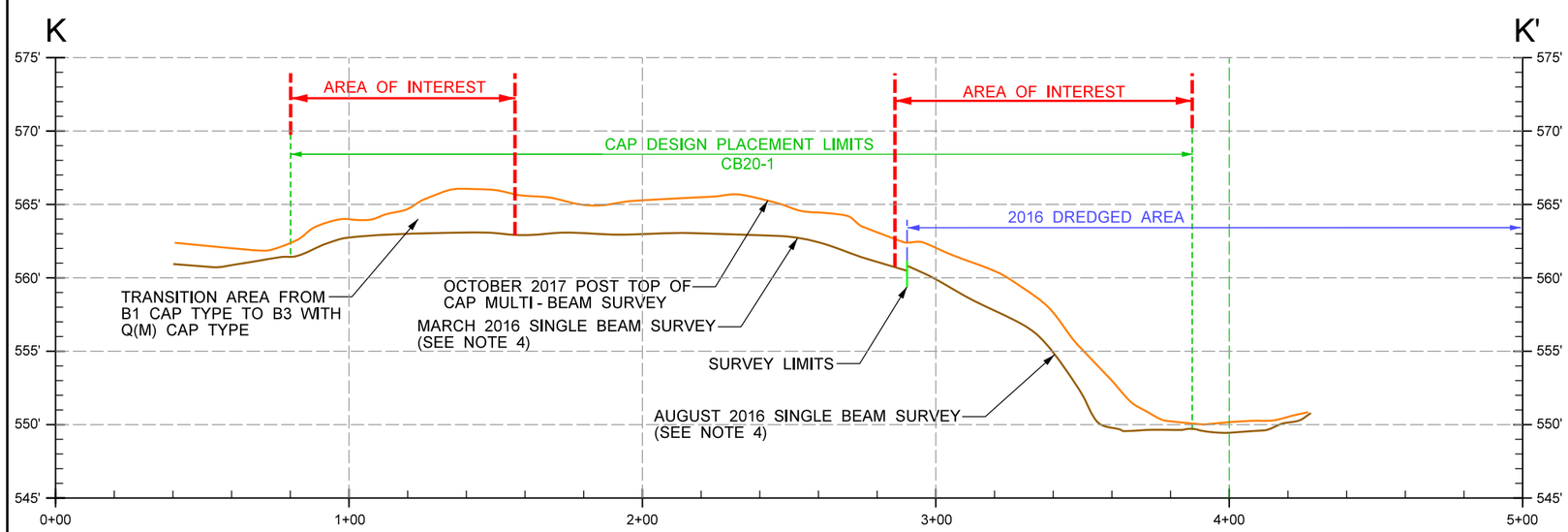


SECTION J - J'



SCALE



SECTION K - K'

NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN, CO. DATE OF SURVEY: OCTOBER 2017.
2. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
3. SEE FIGURES 9A & 9B FOR CROSS SECTION LOCATIONS.
4. THIS SURVEY WAS THE LATEST SURVEY PERFORMED PRIOR TO THE CAP BEING PLACED.

Foth

SEE BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 9C

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - CROSS SECTIONS

Date: FEBRUARY, 2018	Revision Date:	
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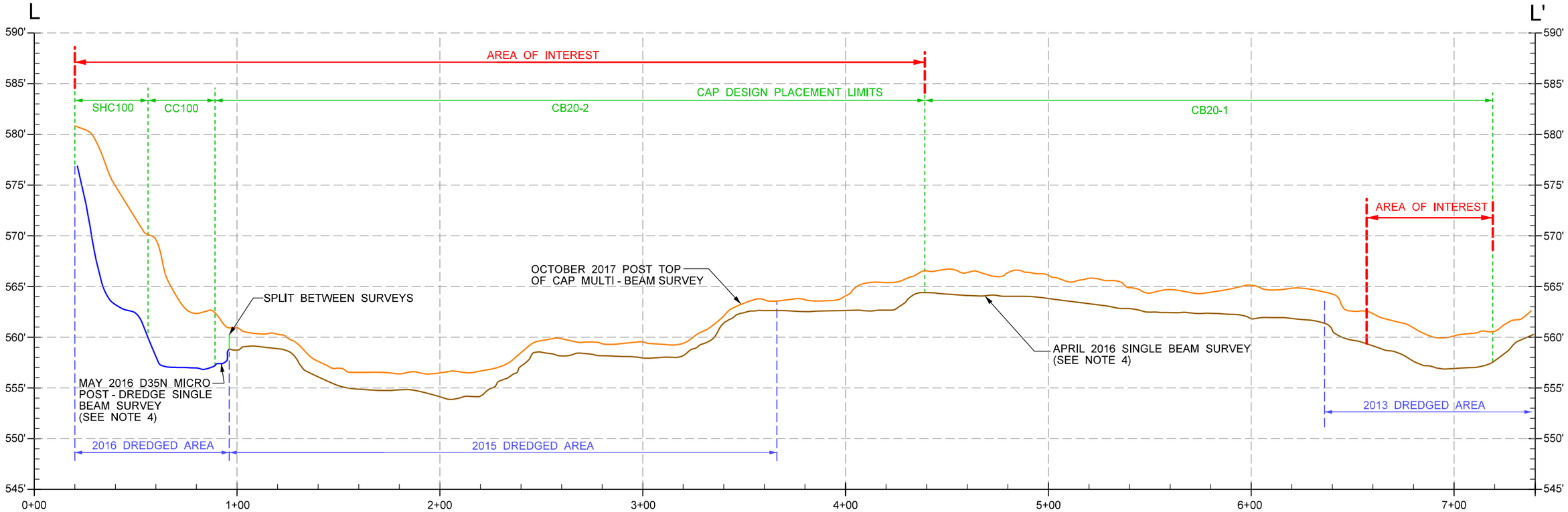
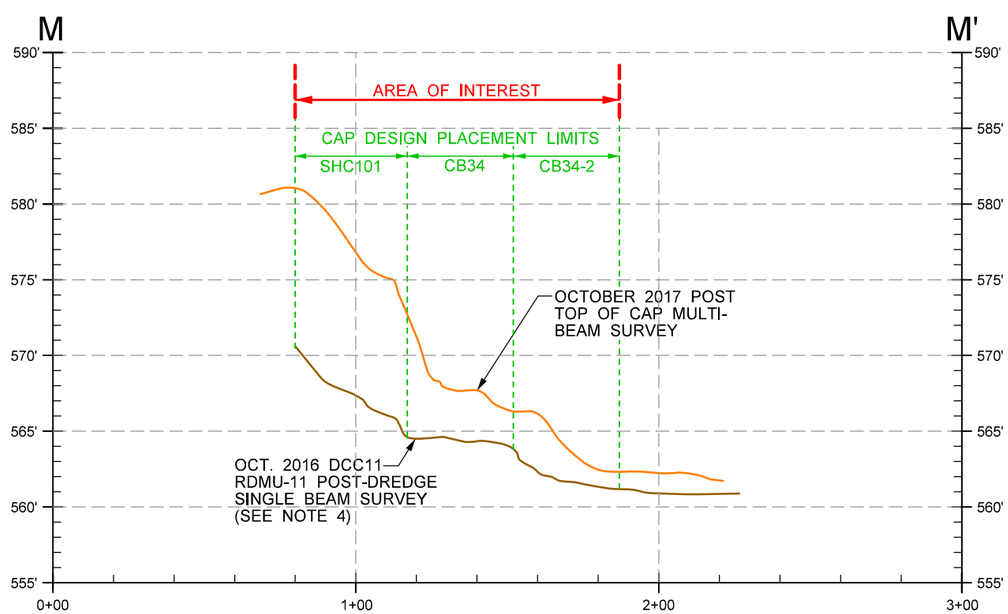
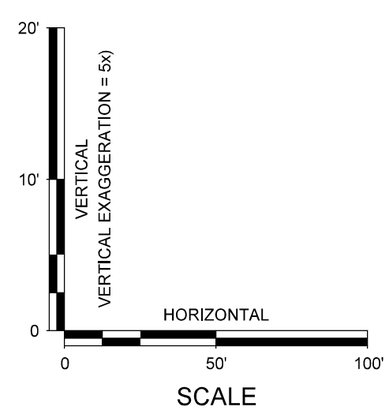


SECTION L - L'



SECTION M - M'



NOTES:

1. 400 KILOHERTZ (kHz) MULTI-BEAM HYDROGRAPHIC MULTI - BEAM SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER, 2017.

   200 KILOHERTZ (kHz) SINGLE BEAM HYDROGRAPHIC SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATE OF SURVEY: OCTOBER 17, 2017. AREA SURVEYED WITH SINGLE BEAM WERE SHALLOW PORTIONS OF SHC100, SHC101 & CC101(M). DRONE SURVEY OF CAP PLACED ON SHORELINE PERFORMED 10-17-17 FOR SHC101.
2. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
3. SEE FIGURES 9A & 9B FOR CROSS SECTION LOCATIONS.
4. THIS SURVEY WAS THE LATEST SURVEY PERFORMED PRIOR TO THE CAP BEING PLACED.

Foth

SEE BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 9D

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - CROSS SECTIONS

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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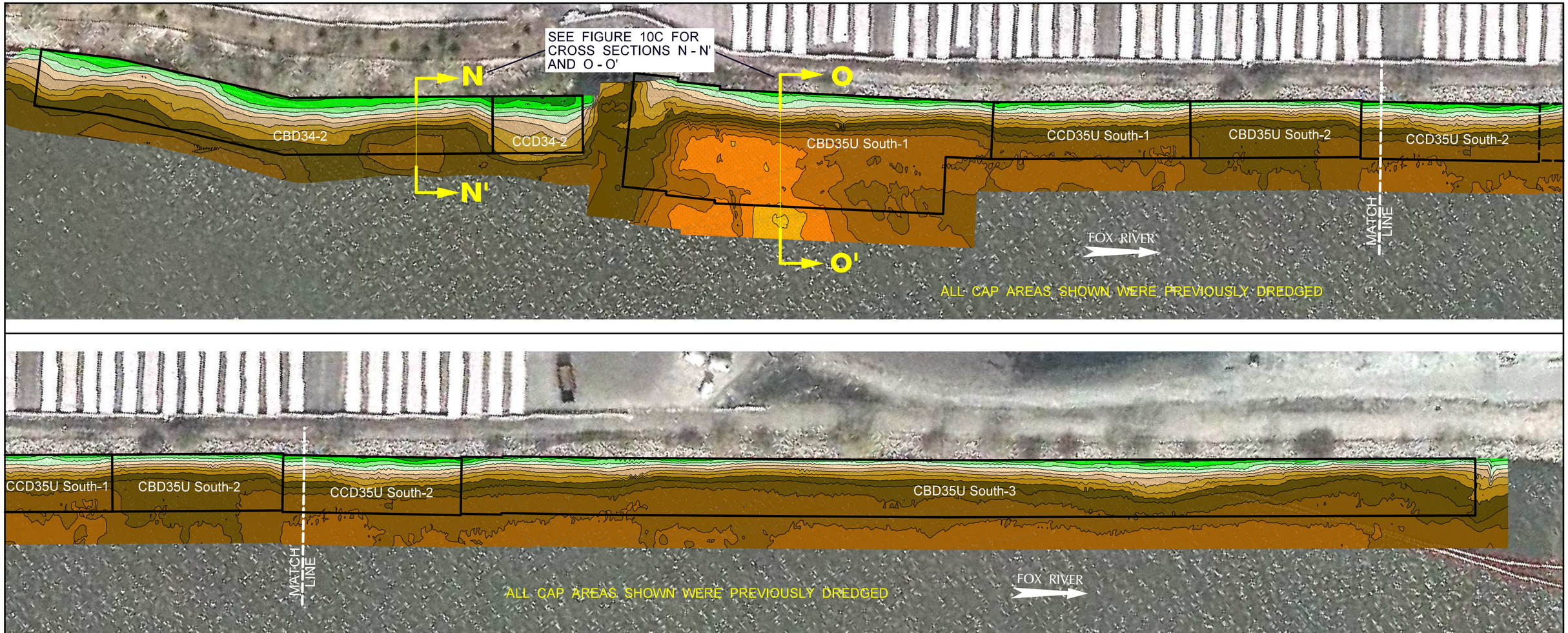

COLOR ELEVATION CHART

COLOR CONTOURS SHOWN REPRESENT THE 10-20-17 & 12-7-17 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572

WATER DEPTH ↓ DEEPER

- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567
- ELEVATION 565 - 566
- ELEVATION 564 - 565
- ELEVATION 563 - 564

LEGEND

CAP DESIGN PLACEMENT LIMITS

NOTES:

1. 200 KILOHERTZ (kHz) SINGLE BEAM HYDROGRAPHIC POST-CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATES OF SURVEYS: OCTOBER 20 AND DECEMBER 7, 2017. ALL CAP AREAS SHOWN WERE SURVEYED USING SINGLE BEAM.
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 LAND INFORMATION OFFICE. COMPILED IN NOVEMBER 2010.
4. CAP DESIGN PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
5. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

0' 30' 60'
BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 10A
LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - PLAN VIEW

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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LEGEND

CAP DESIGN PLACEMENT LIMITS

AREA OF INTEREST

COLOR ELEVATION CHART

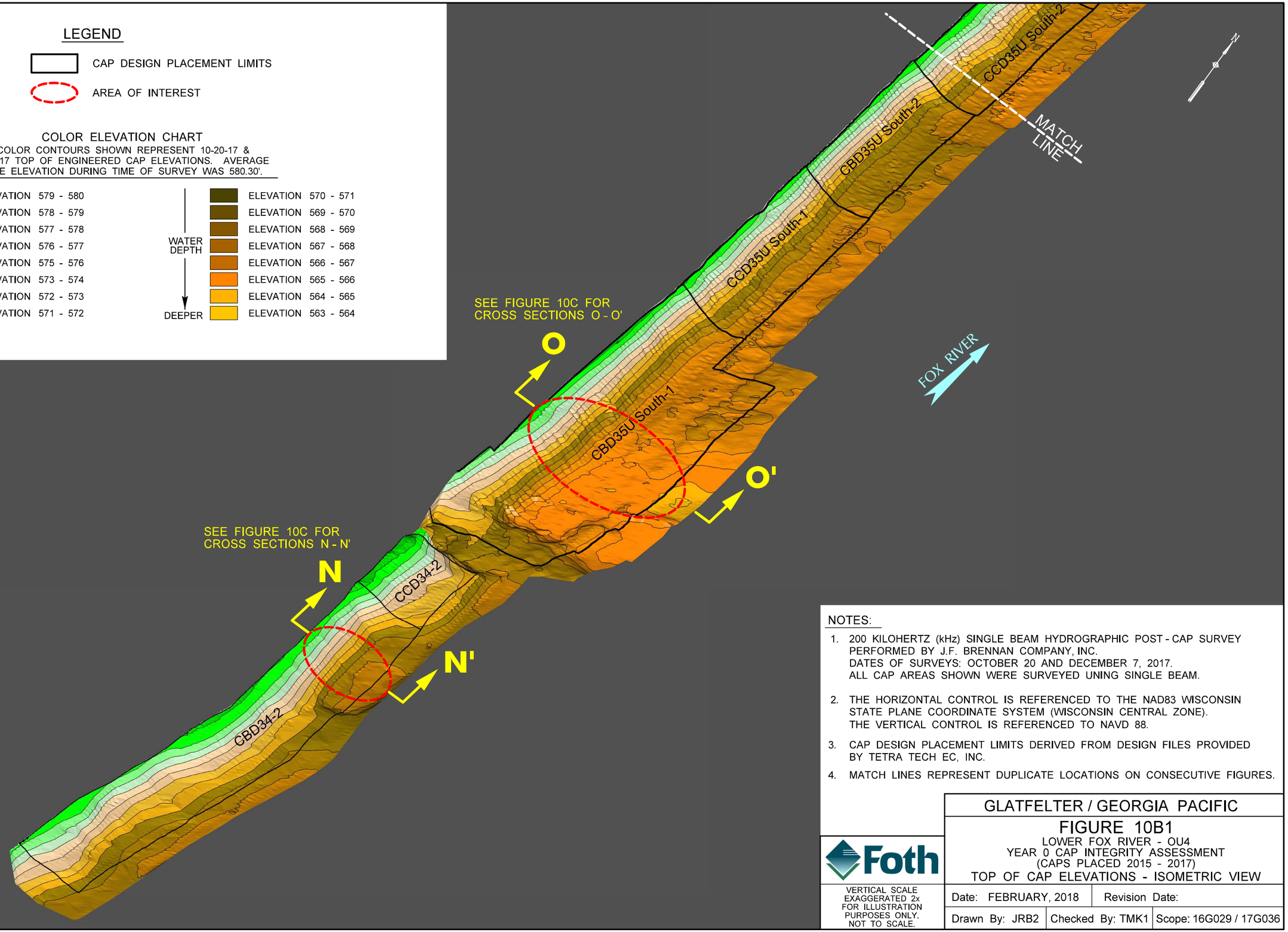
COLOR CONTOURS SHOWN REPRESENT 10-20-17 & 12-7-17 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572

WATER DEPTH ↓ DEEPER

- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567
- ELEVATION 565 - 566
- ELEVATION 564 - 565
- ELEVATION 563 - 564



NOTES:

1. 200 KILOHERTZ (kHz) SINGLE BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC.
   DATES OF SURVEYS: OCTOBER 20 AND DECEMBER 7, 2017.
   ALL CAP AREAS SHOWN WERE SURVEYED UNING SINGLE BEAM.
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. CAP DESIGN PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
4. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

VERTICAL SCALE EXAGGERATED 2x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

GLATFELTER / GEORGIA PACIFIC

FIGURE 10B1

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - ISOMETRIC VIEW

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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4/25/2018 3:31:08 PM JRB2

LEGEND

CAP DESIGN PLACEMENT LIMITS

COLOR ELEVATION CHART

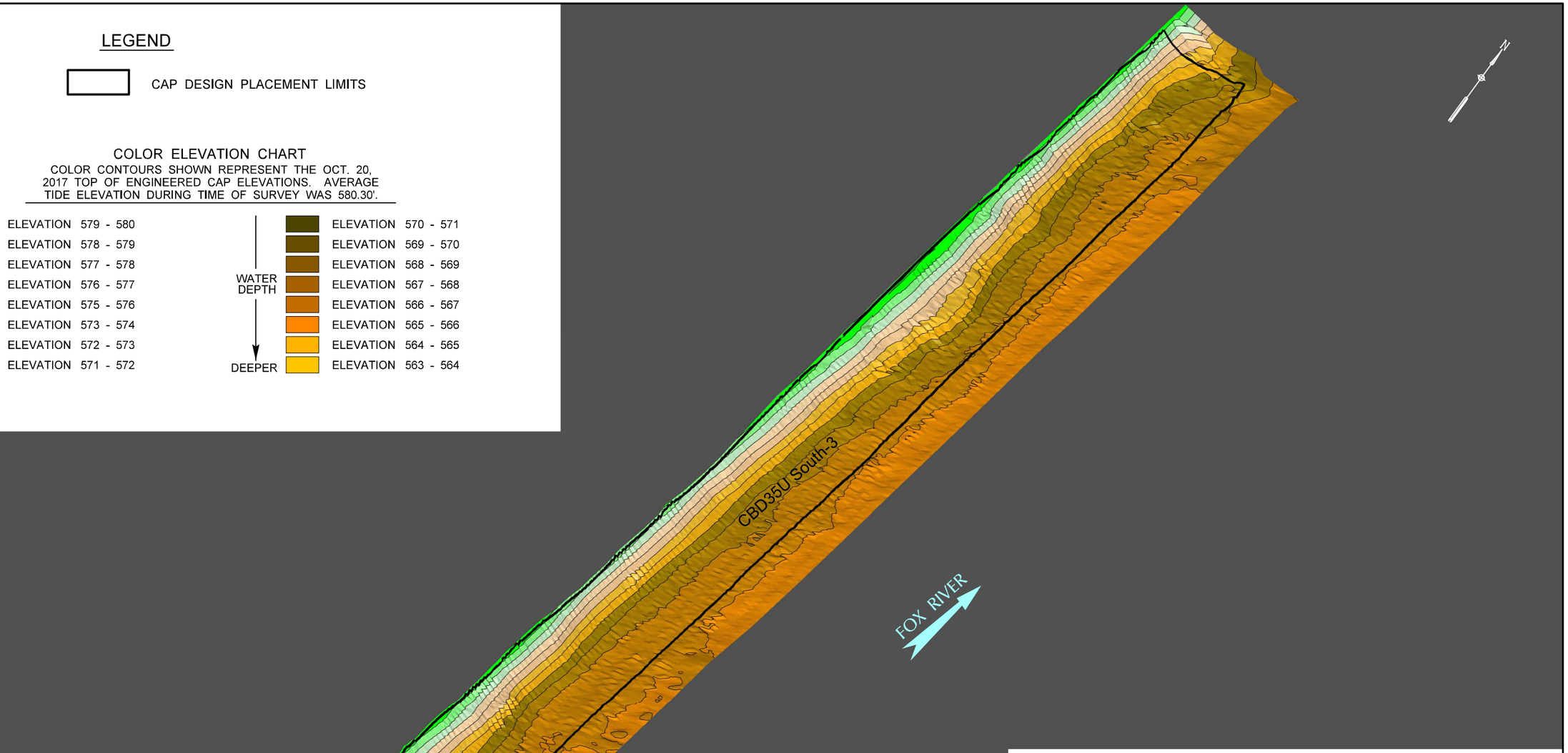
COLOR CONTOURS SHOWN REPRESENT THE OCT. 20, 2017 TOP OF ENGINEERED CAP ELEVATIONS. AVERAGE TIDE ELEVATION DURING TIME OF SURVEY WAS 580.30'.

SHALLOWER ↑ WATER DEPTH

- ELEVATION 579 - 580
- ELEVATION 578 - 579
- ELEVATION 577 - 578
- ELEVATION 576 - 577
- ELEVATION 575 - 576
- ELEVATION 573 - 574
- ELEVATION 572 - 573
- ELEVATION 571 - 572

WATER DEPTH ↓ DEEPER

- ELEVATION 570 - 571
- ELEVATION 569 - 570
- ELEVATION 568 - 569
- ELEVATION 567 - 568
- ELEVATION 566 - 567
- ELEVATION 565 - 566
- ELEVATION 564 - 565
- ELEVATION 563 - 564



NOTES:

1. 200 KILOHERTZ (kHz) SINGLE BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC.
   DATES OF SURVEY: OCTOBER 20, 2017.
   ALL CAP AREAS SHOWN WERE SURVEYED UNING SINGLE BEAM.
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. CAP DESIGN PLACEMENT LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
4. MATCH LINES REPRESENT DUPLICATE LOCATIONS ON CONSECUTIVE FIGURES.

Foth

VERTICAL SCALE EXAGGERATED 2x FOR ILLUSTRATION PURPOSES ONLY. NOT TO SCALE.

GLATFELTER / GEORGIA PACIFIC

FIGURE 10B2

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - ISOMETRIC VIEW

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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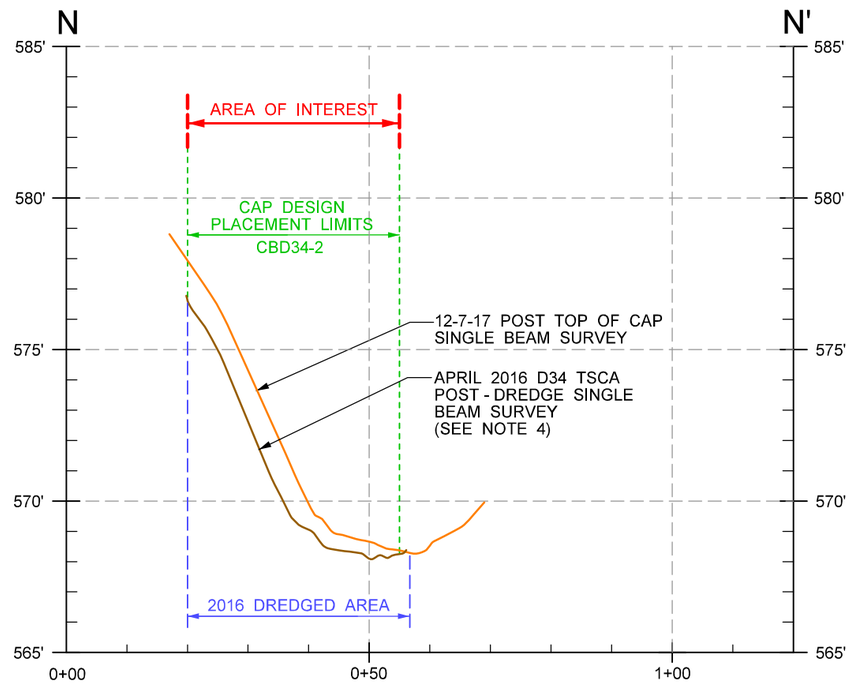
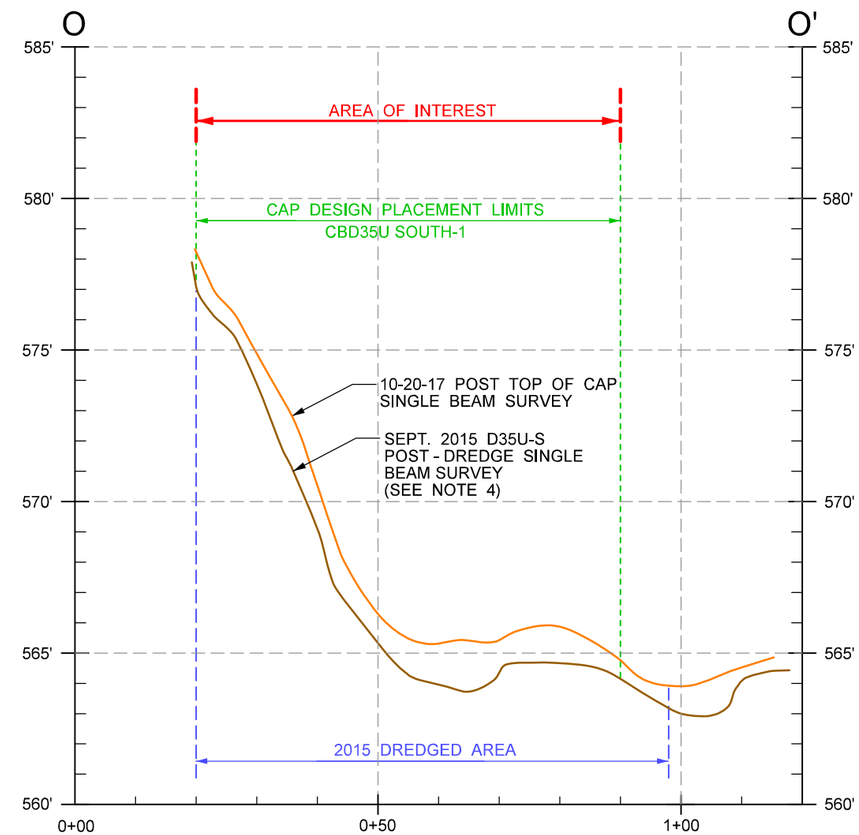
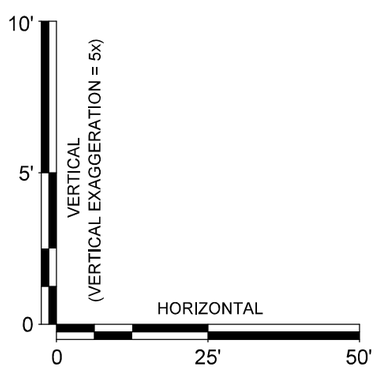


SECTION N - N'



SECTION O - O'



SCALE

NOTES:

1. 200 KILOHERTZ (kHz) SINGLE BEAM HYDROGRAPHIC POST - CAP SURVEY PERFORMED BY J.F. BRENNAN COMPANY, INC. DATES OF SURVEYS: OCTOBER 20 AND DECEMBER 7, 2017.
2. CAP DESIGN PLACEMENT AND DREDGE LIMITS DERIVED FROM DESIGN FILES PROVIDED BY TETRA TECH EC, INC.
3. SEE FIGURES 10A, 10B1 & 10B2 FOR CROSS SECTION LOCATIONS.
4. THIS SURVEY WAS THE LATEST SURVEY PERFORMED PRIOR TO THE CAP BEING PLACED.

Foth

SEE BAR SCALE

GLATFELTER / GEORGIA PACIFIC

FIGURE 10C

LOWER FOX RIVER - OU4
YEAR 0 CAP INTEGRITY ASSESSMENT
(CAPS PLACED 2015 - 2017)
TOP OF CAP ELEVATIONS - CROSS SECTIONS

Date: FEBRUARY, 2018	Revision Date:	
Drawn By: JRB2	Checked By: TMK1	Scope: 16G029 / 17G036

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Attachment 1

Hydrographic Survey Observation Reports

Owner: Glatfelter/GP/ Lower Fox River Remediation LLC
Project: Year 0 COMMP and 1-Year Warranty Survey
Prepared by: Nick Atanasoff
Checked by: Jim Buchberger

Project #: 16G029/17G036/17L029
Date: 10/16/2017
Date: 12/15/2017

Hydrographic Survey Audit Form

Date of Survey: 10/16/2017

HYPACK Project Name: LFR OU4 COMMP Multi-beam Survey of Caps Placed in 2015-2017 (Year 0)

Area(s) Surveyed:

Captain: Ryan Sands

Technicians: Nick Atanasoff

Boat Name: 7749

Trimble RTK GPS Equipment: Trimble R5

Type of Survey:

- [ ] Pre-Dredge
- [ ] Pre-Sand/Cap
- [ ] Post-Dredge
- [x] Post-Sand/Cap

Weather Conditions				
Time	Wave Heights	Wind Spd/Dir	Temp °F	Cloud Cover
09:00	0-1'	5-10 SW	48	Clear

Control Data			
Pt. Name	Northing	Easting	Elevation
OU4-05A	247914.039	2482665.348	591.122
OU4-05A	247914.007	2482665.336	591.110

Minimum of 2 control points to be checked at both Start and End.	Check IN (at start)	Check OUT (at end)
Time	08:26	17:27
Point Name	OU4-05A	OU4-05A
Δ Horizontal:	0.003	0.028
V. Vertical:	0.004	-0.016
Vertical and Horizontal within 0.13 ft. of published value		
Tide Elevation:	581.02	580.921
Time:	08:33	17:25

Sonic Sounder Calibration/Bar Check Information
Sounder # 2020
Transducer at 400 Hz

Latency: 0	**Date:** 10/16/2017
Vertical Offset: NA	**Draft:** 1.6

Plan Lines for Cross Lines: [x] **(check when added)**

	Bar Check			
	(at start)		(at end)	
	Bar at	Fatho-meter (0.1 ft)	Bar at	Fatho-meter (0.1 ft)
Min. 2 ft below transducer (ft)	2	2	2	2
Min. 5 ft below transducer (ft)	5	5	5	5
Min 10 ft below transducer (ft)	10	10	10	10
Min 15 ft below transducer (ft)				
Min 20 ft below transducer (ft)				
Nearest ft. to bottom (ft)				
Speed of Sound Velocity Reading (ft/sec)	4803		4803	
Time when bar check made (hrs)	08:45		17:10	

Polings

Poling points to be evenly distributed within the area of survey.

Pre-Dredge Surveys – Min. 1 poling per hour

Post-Dredge Surveys - Min. of 3 polings required per certification unit or per day or more depending on specific project requirements.

Area:

Pt. #	Pole Depth (0.1 ft)	Fathometer
1	10	10
2	9.6	9.6
3	9.5	9.5
4	9.6	9.6
5	11.1	11.2
6	10.8	10.9
7	11.5	11.6
8		
9		

Additional Notes:

Owner: Glatfelter/GP
Project: Year 0 COMMP and 1-Year Warranty Survey
Prepared by: Nick Atanasoff
Prepared by: Jim Buchberger

Project #: 16G029/17G036
Date: 10/17/2017
Date: 12/15/2017

Hydrographic Survey Audit Form

Date of Survey: 10/17/2017

HYPACK Project Name: LFR OU4 COMMP Multi-beam Survey of Caps Placed in 2015-2017 (Year 0)

Area(s) Surveyed:

Captain: Taylor Blumestein

Technicians: Nick Atanasoff

Boat Name: 7749

Trimble RTK GPS Equipment: Trimble R5

Type of Survey:

- [ ] Pre-Dredge
- [ ] Pre-Sand/Cap
- [ ] Post-Dredge
- [x] Post-Sand/Cap

Weather Conditions				
Time	**Wave Heights**	**Wind Spd/Dir**	**Temp °F**	**Cloud Cover**
12:45	**0-1'**	**5-10 WSW**	**66**	**Clear**

Control Data			
Pt. Name	**Northing**	**Easting**	**Elevation**
OU4-05A	247914.035	2482665.380	591.114
OU4-05A	247914.004	2482665.328	591.092

Minimum of 2 control points to be checked at both Start and End.	**Check IN (at start)**	**Check OUT (at end)**
Time	12:22	16:54
Point Name	OU4-05A	OU4-05A
Δ Horizontal:	0.060	0.027
V. Vertical:	0.012	-0.034
Vertical and Horizontal within 0.13 ft. of published value		
Tide Elevation:	580.686	580.194
Time:	12:28	16:50

Sonic Sounder Calibration/Bar Check Information
Sounder # 2020
Transducer at 400 Hz

Latency: 0	**Date:** 10/17/2017
Vertical Offset: NA	**Draft:** 1.6

Plan Lines for Cross Lines: [x] **(check when added)**

	Bar Check			
	(at start)		(at end)	
	Bar at	**Fatho-meter (0.1 ft)**	**Bar at**	**Fatho-meter (0.1 ft)**
Min. 2 ft below transducer (ft)	2	2	2	2
Min. 5 ft below transducer (ft)	5	5	5	5
Min 10 ft below transducer (ft)	10	10	10	10
Min 15 ft below transducer (ft)				
Min 20 ft below transducer (ft)				
Nearest ft. to bottom (ft)				
Speed of Sound Velocity Reading (ft/sec)	4800		4800	
Time when bar check made (hrs)	13:00		15:00	

Polings			
Poling points to be evenly distributed within the area of survey.	**Area:**		
	Pt. #	**Pole Depth (0.1 ft)**	**Fathometer**
Pre-Dredge Surveys – Min. 1 poling per hour	1	10.7	10.8
	2	11.0	11.1
Post-Dredge Surveys - Min. of 3 polings required per certification unit or per day or more depending on specific project requirements.	3	10.4	10.5
	4	10.6	10.6
	5		
	6		
	7		
	8		
	9		

Additional Notes:

Owner: Lower Fox River Remediation LLC/GP
Project: Year 0 COMMP and 1-Year Warranty Survey
Prepared by: Nick Atanasoff
Checked by: Jim Buchberger

Project #: 17L029/17G036
Date: 10/17/2017
Date: 10/17/2017

Hydrographic Survey Audit Form

Date of Survey: 10/17/2017

HYPACK Project Name: LFR OU4 COMMP Single Beam Survey of Caps Placed in 2015-2017 (Year 0) GP Shoreline Fill In

Area(s) Surveyed:

Captain: Taylor Blumestein
Technicians: Nick Atanasoff
Boat Name: 7749
Trimble RTK GPS Equipment: Trimble R5

Type of Survey:

- [ ] Pre-Dredge
- [ ] Pre-Sand/Cap
- [ ] Post-Dredge
- [x] Post-Sand/Cap

Weather Conditions				
Time	Wave Heights	Wind Spd/Dir	Temp °F	Cloud Cover
12:45	0-1'	5-10 WSW	66	Clear

Control Data			
Pt. Name	Northing	Easting	Elevation
OU4-05A	247914.035	2482665.380	591.114
OU4-05A	247914.004	2482665.328	591.092

Minimum of 2 control points to be checked at both Start and End.	Check IN (at start)	Check OUT (at end)
Time	12:22	16:54
Point Name	OU4-05A	OU4-05A
Δ Horizontal:	0.060	0.027
V. Vertical:	0.012	-0.034
Vertical and Horizontal within 0.13 ft. of published value		
Tide Elevation:	580.686	580.194
Time:	12:28	16:50

Sonic Sounder Calibration/Bar Check Information
Sounder # 320
Transducer at 200/20 Hz

Latency: 0 **Date:** 10/17/2017
Vertical Offset: 8.15 **Draft:** 0.5

Plan Lines for Cross Lines: [x] **(check when added)**

	Bar Check			
	(at start)		(at end)	
	Bar at	Fatho-meter (0.1 ft)	Bar at	Fatho-meter (0.1 ft)
Min. 2 ft below transducer (ft)	2	2	2	2
Min. 5 ft below transducer (ft)	5	5	5	5
Min 10 ft below transducer (ft)	10	10	10	10
Min 15 ft below transducer (ft)				
Min 20 ft below transducer (ft)				
Nearest ft. to bottom (ft)				
Speed of Sound Velocity Reading (ft/sec)	4800		4800	
Time when bar check made (hrs)	15:35		16:45	

Polings			
Poling points to be evenly distributed within the area of survey.	Area:		
	Pt. #	Pole Depth (0.1 ft)	Fathometer
Pre-Dredge Surveys – Min. 1 poling per hour	1	5.4	5.5
	2	4.3	4.3
Post-Dredge Surveys - Min. of 3 polings required per certification unit or per day or more depending on specific project requirements.	3	2.0	2.0
	4		
	5		
	6		
	7		
	8		
	9		

Additional Notes:

Foth

Owner: Glatfelter/GP
Project: Year 0 COMMP and 1-Year Warranty Survey
Prepared by: MMG
Checked by: BJW1

Project #: 16G029/17G036
Date: 10/20/17
Date: 11/30/17

Hydrographic Survey Audit Form

Date of Survey: 10/20/17
HYPACK Project Name: 171020 7749 LTM MBES QA
Area(s) Surveyed: LTM MBES QA

Captain: Taylor Blumenstein
Technicians: ↓
Boat Name: 7749
Trimble RTK GPS Equipment: R5
Type of Survey:

- [ ] Pre-Dredge
- [ ] Pre-Sand/Cap
- [ ] Post-Dredge
- [x] Post-Sand/Cap

Weather Conditions				
Time	Wave Heights	Wind Spd/Dir	Temp °F	Cloud Cover
1239	0-1	SW/7-12	75°	CLEAR
1600	SAME	SAME	SAME	SAME

Control Data			
Pt. Name	Northing	Easting	Elevation
QU4-05A	247914.023	2482665.342	591.099
↓	247914.015	2482665.316	591.115

Minimum of 2 control points to be checked at both Start and End.	Check IN (at start)	Check OUT (at end)
Time	1227	1609
Point Name	QU4-05A	QU4-05A
Δ Horizontal:	-0.027	-0.011
V. Vertical:	0.023	0.015
Vertical and Horizontal within 0.13 ft. of published value		
Tide Elevation:	580.481	580.282
Time:	1238	1604

Sonic Sounder Calibration/Bar Check Information
Sounder # 320
Transducer at 200/20 Hz w/ beam width of 9.0°

Latency: —	**Date:** 10/20/17
Vertical Offset:	**Draft:** 1.6

Plan Lines for Cross Lines: [ ] (check when added)

	Bar Check			
	(at start)		(at end)	
	Bar at	Fathometer (0.1 ft)	Bar at	Fathometer (0.1 ft)
Min. 2 ft below transducer (ft)	2	2	2	2
Min. 5 ft below transducer (ft)				
Min 10 ft below transducer (ft)				
Min 15 ft below transducer (ft)				
Min 20 ft below transducer (ft)				
Nearest ft. to bottom (ft)	10	10	10	10
Speed of Sound Velocity Reading (ft/sec)	4806		4806	
Time when bar check made (hrs)				

Polings			
Poling points to be evenly distributed within the area of survey.	Area:		
	Pt. #	Pole Depth (0.1 ft)	Fathometer
Pre-Dredge Surveys – Min. 1 poling per hour	1		
	2		
Post-Dredge Surveys - Min. of 3 polings required per certification unit or per day or more depending on specific project requirements.	3		
	4		
	5		
	6		
	7		
	8		
	9		

Additional Notes:

Foth

Owner: GP
Project: Year 0 COMMP Survey
Prepared by: MMG1
Checked by: BJW1

Project #: 17G036
Date: 10/20/17
Date: 11/30/17

Hydrographic Survey Audit Form

Date of Survey: 10/20/17
HYPACK Project Name: 171020 7749 LTM SBES QA
Area(s) Surveyed: LTM SBES QA

Captain: Taylor Blumenstein
Technicians: ↓
Boat Name: JFB 7749
Trimble RTK GPS Equipment: R5
Type of Survey:

- [ ] Pre-Dredge
- [ ] Pre-Sand/Cap
- [ ] Post-Dredge
- [x] Post-Sand/Cap

Weather Conditions				
Time	Wave Heights	Wind Spd/Dir	Temp °F	Cloud Cover
1239	0-1	SW/7-12	75°	Clear
1600	SAME	SAME	SAME	SAME

Control Data			
Pt. Name	Northing	Easting	Elevation
04-05A	247914.023	2482665.342	591.099
↓	247914.015	2482665.316	591.115

Minimum of 2 control points to be checked at both Start and End.	Check IN (at start)	Check OUT (at end)
Time	1227	1609
Point Name	04-05A	04-05A
Δ Horizontal:	-0.027	-0.011
V. Vertical:	0.023	0.015
Vertical and Horizontal within 0.13 ft. of published value		
Tide Elevation:	580.481	580.282
Time:	1238	1604

Sonic Sounder Calibration/Bar Check Information
Sounder # 320
Transducer at 200/20 Hz w/ beam width of 9.0°

Latency:	—	**Date:**	10/20/17
Vertical Offset:	8.15	**Draft:**	0.5

Plan Lines for Cross Lines: [x] (check when added)

	Bar Check (at start)		Bar Check (at end)	
	Bar at	Fathometer (0.1 ft)	Bar at	Fathometer (0.1 ft)
Min. 2 ft below transducer (ft)	2	2	2	2
Min. 5 ft below transducer (ft)	5	5	5	5
Min 10 ft below transducer (ft)	10	10	10	10
Min 15 ft below transducer (ft)				
Min 20 ft below transducer (ft)				
Nearest ft. to bottom (ft)	15	15	15	15
Speed of Sound Velocity Reading (ft/sec)	4800		4800	
Time when bar check made (hrs)	1244		1555	

Polings

Poling points to be evenly distributed within the area of survey.

Pre-Dredge Surveys – Min. 1 poling per hour

Post-Dredge Surveys - Min. of 3 polings required per certification unit or per day or more depending on specific project requirements.

Area:

Pt. #	Pole Depth (0.1 ft)	Fathometer
1	7.1	7.2
2	11.1	11.1
3	9.3	9.2
4		
5		
6		
7		
8		
9		

Additional Notes:

Foth

Owner: Lower Fox River Remediation LLC/GP
Project: Year 0 COMMP and 1-Year Warranty Survey
Prepared by: Troy Gawronski
Checked by: Jim Buchberger

Project #: 17L029/17G036
Date: 12/7/17
Date: 12/12/17

Hydrographic Survey Audit Form

Date of Survey: 12/7/17
HYPACK Project Name: 171207 7749 CBD34 CCD34 LTM
Area(s) Surveyed: CBD34 CCD34

Captain: Ryan Sands (JFB)
Technicians: —
Boat Name: 7749
Trimble RTK GPS Equipment: Trimble R5
Type of Survey: ☒ LTM

☐ Pre-Dredge ☐ Post-Dredge
☐ Pre-Sand/Cap ☒ Post-Sand/Cap

Weather Conditions				
Time	Wave Heights	Wind Spd/Dir	Temp °F	Cloud Cover
0900	<1'	W 16	16	Partly

Control Data			
Pt. Name	Northing	Easting	Elevation
SA	247914.004	248265.335	591.118
SA	247914.015	248265.349	591.124

Minimum of 2 control points to be checked at both Start and End.	Check IN (at start)	Check OUT (at end)
Time	0845	1025
Point Name	004 SA	004 SA
Δ Horizontal:	0.030	0.015
V. Vertical:	0.008	0.000
Vertical and Horizontal within 0.13 ft. of published value		
Tide Elevation:	580.124	580.050
Time:	0850	1020

Sonic Sounder Calibration/Bar Check Information
Sounder # 320
Transducer at 200/20 Hz w/ beam width of 9.0°

Latency:	0	Date:	12/7/17
Vertical Offset:	8.13	Draft:	0.60

Plan Lines for Cross Lines: ☐ (check when added)

	Bar Check (at start)		Bar Check (at end)	
	Bar at	Fathometer (0.1 ft)	Bar at	Fathometer (0.1 ft)
Min. 2 ft below transducer (ft)	2	2	2	2
Min. 5 ft below transducer (ft)	5	5	5	5
Min 10 ft below transducer (ft)	10	10	10	10
Min 15 ft below transducer (ft)				
Min 20 ft below transducer (ft)				
Nearest ft. to bottom (ft)				
Speed of Sound Velocity Reading (ft/sec)	4620			
Time when bar check made (hrs)	0945		0950	

Polings

Poling points to be evenly distributed within the area of survey.

Pre-Dredge Surveys – Min. 1 poling per hour

Post-Dredge Surveys - Min. of 3 polings required per certification unit or per day or more depending on specific project requirements.

Area:

Pt. #	Pole Depth (0.1 ft)	Fathometer
1	5.4	5.4
2	5.4	5.4
3	6.8	6.8
4	8.7	8.8
5	5.4	5.5
6	6.5	6.4
7		
8		
9		

Additional Notes:

Foth

Owner: Lower Fox River Remediation LLC
Project: Lower Fox River OU2-5 RA
Prepared by: BRAD KUSSMAN
Checked by: Jim Buchberger

Project #: 17L029
Date: 3-19-18
Date: 3-27-18

Hydrographic Survey Audit Form

Date of Survey: 3-19-18
HYPACK Project Name: 180319 multibeam CF1K-65
Area(s) Surveyed: CF1K-65

Captain: RYAN SANDS
Technicians: BRAD KUSSMAN
Boat Name: 7150
Trimble RTK GPS Equipment: R5
Type of Survey:

- [ ] Pre-Dredge
- [ ] Pre-Sand/Cap
- [ ] Post-Dredge
- [ ] Post-Sand/Cap

Weather Conditions				
Time	Wave Heights	Wind Spd/Dir	Temp °F	Cloud Cover
1000	0.5'	7-15 N	2°	Clear

Control Data			
Pt. Name	Northing	Easting	Elevation
OU4-05A	247914.048	2482665.326	591.019
OU4-05A	247914.050	2482665.324	591.125

Minimum of 2 control points to be checked at both Start and End.	Check IN (at start)	Check OUT (at end)
Time	10:25	13:03
Point Name	OU4-05A	OU4-05A
Δ Horizontal:	0.019	0.021
V. Vertical:	0.007	0.001
Vertical and Horizontal within 0.13 ft. of published value		
Tide Elevation:	580.711	580.711
Time:	10:30	1300

Sonic Sounder Calibration/Bar Check Information
Sounder # 320
Transducer at 200/20 Hz w/ beam width of 9.0°

Latency: 0	**Date:** 3-19-18
Vertical Offset: -8.37	**Draft:** 1.1

Plan Lines for Cross Lines: [✓] (check when added)

	Bar Check			
	(at start)		(at end)	
	Bar at	Fatho-meter (0.1 ft)	Bar at	Fatho-meter (0.1 ft)
Min. 2 ft below transducer (ft)	4	4	4	4
Min. 5 ft below transducer (ft)	6	6	6	6
Min 10 ft below transducer (ft)	8	8	8	8
Min 15 ft below transducer (ft)	10	10	10	10
Min 20 ft below transducer (ft)				
Nearest ft. to bottom (ft)				
Speed of Sound Velocity Reading (ft/sec)	4681		4681	
Time when bar check made (hrs)	1047		1112	

Polings			
Poling points to be evenly distributed within the area of survey.	Area:		
	Pt. #	Pole Depth (0.1 ft)	Fathometer
Pre-Dredge Surveys – Min. 1 poling per hour	1	11.9	11.9
	2	8.7	8.7
Post-Dredge Surveys - Min. of 3 polings required per certification unit or per day or more depending on specific project requirements.	3	8.8	8.8
	4		
	5		
	6		
	7		
	8		
	9		

Additional Notes: 1221 FINISH PERFORMANCE TEST
MEAN DIFF -0.05 ST DEV 0.16 COMPARISON Between Single + multi

Attachment 2

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

OU4-CA28C-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CA28C-1-C1	5/14/2015	5.5	0.0	5.5	3.0	569.03	243337.58	2480278.82	243336.83	2480277.52	
CA28C-1-C2	5/14/2015	4.5	0.0	4.5	3.0	569.24	243481.10	2480457.71	243481.22	2480452.85	
CA28C-1-C3	5/28/2015	4.0	0.0	4.0	3.0	568.91	243646.25	2480666.05	243645.77	2480664.41	
CA28C-1-C4	5/28/2015	5.5	0.0	5.5	3.0	568.09	243820.86	2480884.13	243818.43	2480879.63	
CA28C-1-C5	5/29/2015	4.5	0.0	4.5	3.0	568.59	243817.22	2480824.20	243818.74	2480825.17	
CA28C-1-C6	5/29/2015	4.0	0.0	4.0	3.0	569.12	243720.30	2480703.29	243719.71	2480705.05	
CA28C-1-C7	5/28/2015	6.0	0.0	6.0	3.0	569.60	243599.03	2480548.69	243597.83	2480547.71	
CA28C-1-C8	5/15/2015	4.0	0.0	4.0	3.0	569.42	243407.54	2480311.26	243410.34	2480312.94	
CA28C-1-C9	5/29/2015	6.5	0.0	6.5	3.0	568.80	243953.07	2480880.21	243951.56	2480879.01	
CA28C-1-C10	5/29/2015	4.0	0.0	4.0	3.0	568.27	243663.98	2480576.91	243660.73	2480576.52	
CA28C-1-C11	5/29/2015	5.0	0.0	5.0	3.0	569.04	243801.94	2480750.42	243799.63	2480744.70	
CA28C-1-C12	5/29/2015	5.5	0.0	5.5	3.0	568.62	243907.78	2480876.04	243908.41	2480876.53	
CA28C-1-C13	5/29/2015	5.0	0.0	5.0	3.0	568.86	243896.40	2480809.90	243898.07	2480813.01	
CA28C-1-C14	5/29/2015	6.0	0.0	6.0	3.0	569.40	243947.93	2480820.41	243947.94	2480819.39	
CA28C-1-C15	5/29/2015	4.5	0.0	4.5	3.0	569.40	243924.66	2480787.78	243924.00	2480789.57	
CA28C-1-C16	5/29/2015	5.0	0.0	5.0	3.0	569.35	243796.13	2480685.33	243795.87	2480683.73	
CA28C-1-C17	5/29/2015	4.5	0.0	4.5	3.0	569.60	243735.54	2480608.75	243736.72	2480603.76	
CA28C-1-C18	5/29/2015	4.5	0.0	4.5	3.0	568.71	243665.85	2480523.37	243669.74	2480522.98	

Average	4.92	0.00	4.92
Median	4.75	0.00	4.75
Standard Deviation	0.77	0.00	0.77

Recommended Path Forward:

Verification samples were collected in 18 locations within OU4-CA28C-1. 18 of 18 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HWK Date: 6/1/2015 Reviewed by: BSW Date: 6/1/2015

A/OT Acceptance: Date: 6/1/15

OU4-CA28C-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CA28C-1-G1	9/9/2015	6.5	A3	4.0	569.3	243370.35	2480315.65	243367.86	2480309.76	
CA28C-1-G2	9/9/2015	5.0	A3	4.0	569.5	243569.34	2480569.22	243563.45	2480568.60	
CA28C-1-G3	9/9/2015	6.5	A3	4.0	568.8	243706.42	2480742.77	243702.38	2480743.44	
CA28C-1-G4	9/9/2015	5.0	A3	4.0	568.5	243806.85	2480870.37	243804.42	2480870.24	
CA28C-1-G5	9/10/2015	2.0	A3	4.0	569.1	243797.49	2480796.41	243801.81	2480791.01	
CA28C-1-G6	9/10/2015	4.0	A3	4.0	569.4	243687.56	2480661.57	243685.22	2480659.71	
CA28C-1-G7	9/9/2015	4.0	A3	4.0	569.9	243544.34	2480479.65	243540.71	2480473.95	
CA28C-1-G8	9/9/2015	4.5	A3	4.0	569.8	243357.28	2480247.29	243355.27	2480243.26	
CA28C-1-G9	9/10/2015	4.5	A3	4.0	568.3	243650.18	2480556.80	243646.61	2480559.71	
CA28C-1-G10	9/10/2015	4.5	A3	4.0	568.9	243753.70	2480688.16	243753.62	2480688.91	
CA28C-1-G11	9/11/2015	5.5	A3	4.0	568.7	243904.93	2480873.03	243914.30	2480866.84	Bucket displaced during spreading
CA28C-1-G12	9/11/2015	7.0	A3	4.0	569.5	243954.36	2480880.32	243962.94	2480878.54	
CA28C-1-G13	9/11/2015	6.5	A3	4.0	569.4	243893.29	2480806.41	243889.46	2480811.70	
CA28C-1-G14	9/11/2015	6.0	A3	4.0	569.9	243933.87	2480797.55	243933.61	2480789.79	
CA28C-1-G15	9/11/2015	5.5	A3	4.0	569.8	243799.61	2480688.55	243803.67	2480684.13	
CA28C-1-G16	9/11/2015	6.5	A3	4.0	569.8	243740.29	2480616.16	243746.05	2480611.21	
CA28C-1-G17	9/11/2015	5.0	A3	4.0	568.3	243682.00	2480544.80	243684.04	2480544.36	
CA28C-1-G18	9/10/2015	5.0	A3	4.0	569.0	243838.59	2480793.38	243837.34	2480789.45	

Average	5.19
Median	5.00
Standard Deviation	1.23

Recommended Path Forward:

Verification samples were collected in 18 locations within OU4-CA28C-1. 17 of 18 samples meet or exceed the minimum thickness requirement of 4-inches, therefore, no further action is required according to Table 5-2 in the CQAPP.

Prepared by: HNK Date: 9/14/2015 Reviewed by: BSW Date: 9/14/2015

A/OT Acceptance: Date: 9/15/15

OU4-CA30A-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CA30A-1-C1	8/21/2015	5.5	0.0	5.5	3.0	567.93	243990.55	2481653.76	243988.61	2481654.26	
CA30A-1-C2	8/21/2015	4.5	0.0	4.5	3.0	566.65	244035.00	2481711.30	244036.62	2481709.46	
CA30A-1-C3	8/21/2015	4.0	0.0	4.0	3.0	566.40	244094.84	2481785.57	244097.47	2481785.34	
CA30A-1-C4	8/24/2015	6.0	0.0	6.0	3.0	568.14	244011.65	2481623.33	244007.30	2481625.73	
CA30A-1-C5	8/24/2015	3.5	0.0	3.5	3.0	567.66	244066.47	2481694.59	244064.72	2481695.73	
CA30A-1-C6	8/24/2015	4.5	0.0	4.5	3.0	565.97	244157.50	2481809.73	244153.41	2481806.93	
CA30A-1-C7	8/24/2015	3.0	0.0	3.0	3.0	565.52	244253.91	2481931.22	244256.29	2481933.04	
CA30A-1-C8	8/24/2015	5.0	0.0	5.0	3.0	564.91	244348.00	2482046.71	244351.36	2482046.55	
CA30A-1-C9	8/24/2015	4.5	0.0	4.5	3.0	564.93	244412.26	2482128.38	244409.91	2482129.61	
CA30A-1-C10	8/24/2015	4.0	0.0	4.0	3.0	565.76	244467.41	2482194.62	244472.69	2482194.50	
CA30A-1-C11	9/1/2015	4.5	0.0	4.5	3.0	567.34	244643.77	2482349.26	244643.21	2482344.76	
CA30A-1-C12	9/1/2015	3.5	0.0	3.5	3.0	566.61	244600.31	2482306.43	244598.71	2482305.72	
CA30A-1-C13	9/1/2015	5.0	0.0	5.0	3.0	563.54	244527.31	2482213.05	244533.83	2482209.96	
CA30A-1-C14	9/1/2015	5.5	0.0	5.5	3.0	563.34	244465.06	2482134.05	244467.86	2482131.54	
CA30A-1-C15	8/25/2015	5.5	0.0	5.5	3.0	565.08	244344.58	2481984.77	244346.69	2481983.37	
CA30A-1-C16	8/25/2015	4.0	0.0	4.0	3.0	564.77	244236.79	2481849.88	244237.73	2481854.39	
CA30A-1-C17	8/25/2015	3.5	0.0	3.5	3.0	568.06	244059.77	2481625.63	244058.59	2481624.78	
CA30A-1-C18	8/25/2015	4.5	0.0	4.5	3.0	567.22	244141.53	2481731.03	244139.24	2481735.03	

Average	4.47	0.00	4.47
Median	4.50	0.00	4.50
Standard Deviation	0.83	0.00	0.83

Recommended Path Forward:

Verification samples were collected in 18 locations within OU4-CA30A-1. 18 of 18 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: MK Date: 9/2/2015 Reviewed by: BSW Date: 9/2/2015

A/OT Acceptance: Date: 9/2/15

OU4-CA30A-1										
ID	Date Sampled	Stone Result (inches)	Cap Type	Required Thickness (inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CA30A-1-G1	9/16/2015	5.0	A3	4.0	567.7	243999.72	2481667.45	244008.44	2481672.26	
CA30A-1-G2	9/16/2015	4.0	A3	4.0	566.2	244044.82	2481722.29	244050.18	2481726.85	
CA30A-1-G3	9/16/2015	8.0	A3	4.0	567.6	244084.58	2481773.45	244084.82	2481781.35	
CA30A-1-G4	9/22/2015	5.5	A3	4.0	568.0	244008.07	2481619.29	244005.85	2481618.66	
CA30A-1-G5	9/22/2015	6.5	A3	4.0	565.7	244309.79	2481996.63	244313.28	2482005.32	
CA30A-1-G6	9/22/2015	6.5	A3	4.0	565.6	244433.55	2482150.51	244436.43	2482154.46	
CA30A-1-G7	9/25/2015	5.5	A3	4.0	567.9	244636.27	2482344.21	244640.24	2482347.63	
CA30A-1-G8	9/25/2015	5.5	A3	4.0	566.8	244577.80	2482276.33	244581.92	2482284.79	
CA30A-1-G9	9/25/2015	5.5	A3	4.0	564.1	244498.81	2482177.95	244499.18	2482180.28	
CA30A-1-G10	9/25/2015	6.0	A3	4.0	564.4	244404.81	2482059.84	244406.73	2482065.64	
CA30A-1-G11	9/23/2015	6.0	A3	4.0	566.0	244302.43	2481932.71	244305.20	2481939.78	
CA30A-1-G12	9/23/2015	6.5	A3	4.0	568.4	244077.58	2481652.36	244086.29	2481655.32	
CA30A-1-G13	9/23/2015	6.5	A3	4.0	568.5	244035.48	2481600.86	244043.14	2481603.54	
CA30A-1-G14	9/22/2015	5.0	A3	4.0	568.1	244055.61	2481680.99	244058.27	2481681.96	
CA30A-1-G15	9/22/2015	6.0	A3	4.0	567.1	244101.71	2481739.84	244100.25	2481742.18	
CA30A-1-G16	9/22/2015	5.5	A3	4.0	566.6	244179.65	2481834.18	244181.47	2481839.93	
CA30A-1-G17	9/23/2015	6.5	A3	4.0	566.8	244186.12	2481788.25	244191.07	2481792.71	
CA30A-1-G18	9/23/2015	6.5	A3	4.0	568.3	244120.89	2481706.07	244122.33	2481710.40	

Average 5.92
Median 6.00
Standard Deviation 0.86

Recommended Path Forward:

Verification samples were collected in 18 locations within OU4-CA30A-1. 18 of 18 samples meet or exceed the minimum thickness requirement of 4-inches, therefore, no further action is required.

Prepared by: HNK Date: 9/28/2015 Reviewed by: BSW Date: 9/28/2015

A/OT Acceptance: Date: 9/28/15

OU4-CA30B-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CA30B-1-C1	8/19/2015	3.0	0.0	3.0	3.0	570.05	243828.88	2481843.83	243830.42	2481843.48	
CA30B-1-C2	8/19/2015	4.5	0.0	4.5	3.0	571.27	243873.11	2481899.36	243874.41	2481898.57	
CA30B-1-C3	8/19/2015	4.5	0.0	4.5	3.0	569.74	243877.39	2481851.24	243883.52	2481848.91	
CA30B-1-C4	8/19/2015	5.5	0.0	5.5	3.0	570.46	243926.06	2481913.44	243928.47	2481918.20	
CA30B-1-C5	8/19/2015	5.5	0.0	5.5	3.0	569.29	243928.66	2481861.93	243922.11	2481860.72	
CA30B-1-C6	8/19/2015	5.0	0.0	5.0	3.0	569.93	243965.68	2481902.70	243959.94	2481899.80	

Average	4.67	0.00	4.67
Median	4.75	0.00	4.75
Standard Deviation	0.93	0.00	0.93

Recommended Path Forward:

Verification samples were collected in 6 locations within OU4-CA30B-1. 6 of 6 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: BNK Date: 8/20/2015 Reviewed by: BSW Date: 8/20/2015

A/OT Acceptance: Date: 8/24/15

OU4-CA30B-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CA30B-1-G1	9/18/2015	6.0	A2	4.0	569.8	243861.82	2481828.12	243859.78	2481832.74	
CA30B-1-G2	9/18/2015	4.5	A2	4.0	570.5	243901.48	2481878.19	243901.34	2481877.19	
CA30B-1-G3	9/18/2015	5.5	A2	4.0	569.2	243920.98	2481847.71	243928.57	2481851.46	
CA30B-1-G4	9/18/2015	5.0	A2	4.0	569.9	243957.32	2481893.58	243955.44	2481891.98	

Average 5.25
Median 5.25
Standard Deviation 0.65

Recommended Path Forward:

Verification samples were collected in 4 locations within OU4-CA30B-1. 4 of 4 samples meet or exceed the minimum thickness requirement of 4-inches, therefore, no further action is required.

Prepared by: HNK Date: 9/22/2015 Reviewed by: BSW Date: 9/22/2015

A/OT Acceptance: Date: 9/22/15

OU4-CA30C-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CA30C-1-C1	10/1/2015	5.0	0.0	5.0	3.0	567.65	245333.03	2482970.33	245330.52	2482964.27	
CA30C-1-C2	10/1/2015	6.5	0.0	6.5	3.0	567.85	245268.56	2482915.78	245268.91	2482913.23	
CA30C-1-C3	10/1/2015	5.5	0.0	5.5	3.0	568.03	245213.15	2482869.53	245207.11	2482870.17	
CA30C-1-C4	10/2/2015	4.0	0.0	4.0	3.0	565.05	245173.05	2482790.46	245174.98	2482793.33	
CA30C-1-C5	10/1/2015	5.5	0.0	5.5	3.0	565.87	245278.10	2482877.99	245272.45	2482876.99	
CA30C-1-C6	10/1/2015	5.0	0.0	5.0	3.0	565.83	245368.45	2482954.09	245368.30	2482955.71	
CA30C-1-C7	9/30/2015	5.5	0.0	5.5	3.0	568.58	245366.25	2482907.14	245361.95	2482904.89	
CA30C-1-C8	10/1/2015	4.5	0.0	4.5	3.0	563.56	245278.21	2482832.52	245278.69	2482832.83	
CA30C-1-C9	10/2/2015	4.0	0.0	4.0	3.0	563.25	245163.86	2482738.03	245165.86	2482741.78	
CA30C-1-C10	10/2/2015	3.5	0.0	3.5	3.0	562.75	245065.73	2482655.22	245061.80	2482659.61	
CA30C-1-C11	10/2/2015	4.0	0.0	4.0	3.0	562.00	244958.22	2482565.95	244956.99	2482564.64	
CA30C-1-C12	10/2/2015	4.0	0.0	4.0	3.0	562.11	244877.77	2482497.24	244876.56	2482497.90	
CA30C-1-C13	10/2/2015	4.0	0.0	4.0	3.0	562.71	244784.08	2482421.70	244782.89	2482422.75	
CA30C-1-C14	10/2/2015	5.0	0.0	5.0	3.0	562.56	244718.00	2482366.39	244717.37	2482366.95	
CA30C-1-C15	10/2/2015	8.0	0.0	8.0	3.0	560.41	244720.56	2482323.50	244717.48	2482319.65	
CA30C-1-C16	10/2/2015	4.0	0.0	4.0	3.0	559.46	244837.98	2482420.37	244837.37	2482421.05	
CA30C-1-C17	10/2/2015	4.0	0.0	4.0	3.0	559.86	244946.16	2482511.37	244945.87	2482512.52	
CA30C-1-C18	10/2/2015	4.0	0.0	4.0	3.0	560.75	245063.98	2482610.11	245063.04	2482610.87	
CA30C-1-C19	10/5/2015	5.5	0.0	5.5	3.0	561.90	245212.23	2482736.35	245208.56	2482733.76	
CA30C-1-C20	9/30/2015	4.0	0.0	4.0	3.0	562.17	245328.22	2482831.05	245328.41	2482832.79	
CA30C-1-C21	9/30/2015	5.5	0.0	5.5	3.0	562.71	245412.09	2482900.05	245410.89	2482904.23	
CA30C-1-C22	10/1/2015	4.5	0.0	4.5	3.0	564.46	245094.21	2482724.48	245096.13	2482722.88	
CA30C-1-C23	10/1/2015	4.0	0.0	4.0	3.0	565.62	244979.90	2482631.61	244980.79	2482631.46	
CA30C-1-C24	10/1/2015	3.5	0.0	3.5	3.0	566.66	244917.32	2482581.51	244917.61	2482583.26	
CA30C-1-C25	10/1/2015	4.5	0.0	4.5	3.0	567.87	244842.75	2482517.83	244842.25	2482520.51	

Average	4.70	0.00	4.70
Median	4.50	0.00	4.50
Standard Deviation	1.03	0.00	1.03

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CA30C-1. 25 of 25 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HNK Date: 10/6/2015 Reviewed by: BSW Date: 10/6/2015

A/OT Acceptance: Date: 10/7/15

OU4-CA30C-1										
ID	Date Sampled	Stone Result (inches)	Cap Type	Required Thickness (inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CA30C-1-G1	10/16/2015	4.5	A3	4.0	567.1	245327.27	2482965.33	245325.56	2482967.85	
CA30C-1-G2	N/A	N/A	A3	4.0	N/A	245268.68	2482916.07	N/A	N/A	Bucket could not be located during retrieval
CA30C-1-G3	N/A	N/A	A3	4.0	N/A	245185.48	2482848.05	N/A	N/A	Bucket could not be located during retrieval
CA30C-1-G4	10/13/2015	6.5	A3	4.0	566.0	245158.01	2482778.83	245157.04	2482778.18	
CA30C-1-G5	N/A	N/A	A3	4.0	N/A	245275.71	2482878.54	N/A	N/A	Bucket could not be located during retrieval
CA30C-1-G6	10/16/2015	5.0	A3	4.0	566.1	245368.28	2482954.19	245366.86	2482954.26	
CA30C-1-G7	10/16/2015	5.5	A3	4.0	564.1	245357.39	2482900.78	245355.53	2482900.05	
CA30C-1-G8	10/16/2015	6.0	A3	4.0	564.8	245275.71	2482835.15	245276.39	2482833.66	
CA30C-1-G9	10/16/2015	6.0	A3	4.0	563.8	245187.03	2482759.42	245186.48	2482760.15	
CA30C-1-G10	10/14/2015	6.0	A3	4.0	562.7	245076.72	2482666.71	245075.67	2482666.58	
CA30C-1-G11	10/14/2015	6.5	A3	4.0	562.8	244991.76	2482594.58	244992.93	2482592.82	
CA30C-1-G12	10/14/2015	6.5	A3	4.0	563.0	244896.26	2482516.58	244891.49	2482516.04	
CA30C-1-G13	10/14/2015	6.0	A3	4.0	563.3	244799.26	2482434.97	244797.47	2482433.99	
CA30C-1-G14	10/13/2015	6.5	A3	4.0	563.2	244715.65	2482365.46	244717.10	2482364.37	
CA30C-1-G15	10/14/2015	7.5	A3	4.0	560.8	244719.00	2482320.04	244720.22	2482321.12	
CA30C-1-G16	10/14/2015	5.0	A3	4.0	561.1	244777.59	2482371.05	244777.63	2482370.87	
CA30C-1-G17	10/16/2015	6.0	A3	4.0	560.5	244884.43	2482458.48	244882.83	2482458.92	
CA30C-1-G18	10/16/2015	6.0	A3	4.0	560.6	244980.52	2482541.75	244976.73	2482539.76	
CA30C-1-G19	10/16/2015	5.5	A3	4.0	561.3	245151.86	2482686.10	245155.76	2482685.74	
CA30C-1-G20	10/16/2015	5.0	A3	4.0	562.2	245262.25	2482774.13	245260.56	2482773.55	
CA30C-1-G21	10/20/2015	5.5	A3	4.0	562.9	245353.11	2482849.77	245352.09	2482851.27	
CA30C-1-G22	10/20/2015	5.5	A3	4.0	562.7	245412.87	2482900.20	245414.78	2482899.09	
CA30C-1-G23	10/13/2015	5.0	A3	4.0	566.1	245039.13	2482679.68	245038.89	2482683.36	
CA30C-1-G24	10/13/2015	7.5	A3	4.0	567.0	244941.25	2482596.90	244939.60	2482598.34	
CA30C-1-G25	10/13/2015	8.0	A3	4.0	568.9	244848.68	2482523.01	244847.50	2482526.25	
CA30C-1-E2	10/20/2015	6.5	A3	4.0	563.0	245029.31	2482626.01	245031.57	2482627.32	Bucket G3 could not be located therefore the E2 bucket measurement is used in its place.
CA30C-1-E3	10/20/2015	8.5	A3	4.0	563.9	245231.37	2482794.59	245232.63	2482791.89	Bucket G5 could not be located therefore the E3 bucket measurement is used in its place.
CA30C-1-E4	10/20/2015	6.5	A3	4.0	566.7	245313.48	2482923.31	245313.32	2482922.54	Bucket G2 could not be located therefore the E4 bucket measurement is used in its place.

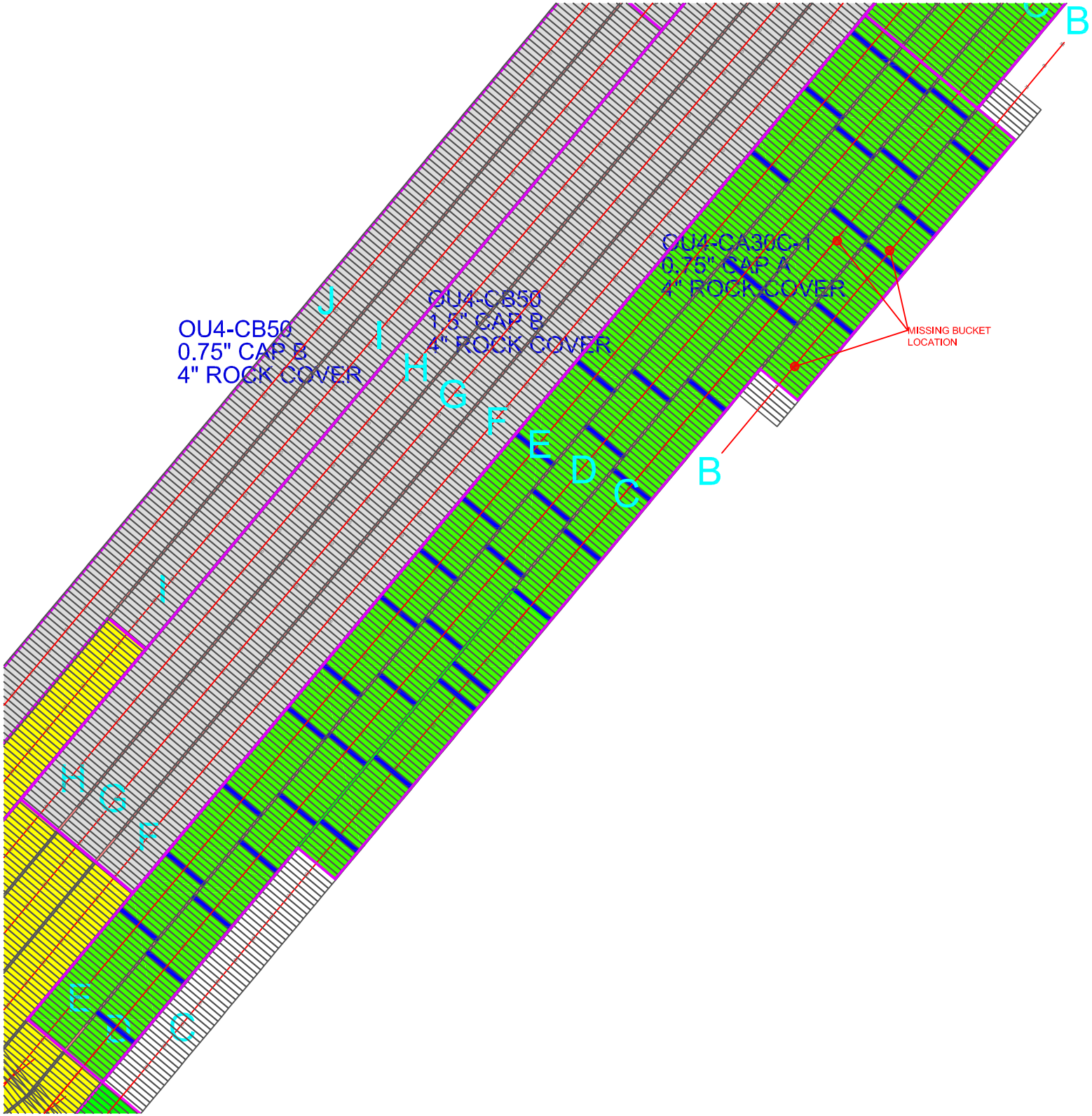
Average	6.12
Median	6.00
Standard Deviation	0.98

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CA30C-1. 25 of 25 samples meet or exceed the minimum thickness requirement of 4-inches, therefore, no further action is required.

Prepared by: HNK Date: 10/21/2015 Reviewed by: BSW Date: 10/21/2015

A/OT Acceptance: Date: 10/21/15


OU4-CB50
0.75" CAP B
4" ROCK COVER
OU4-CB50
1.5" CAP B
4" ROCK COVER
OU4-CA30C-1
0.75" CAP A
4" ROCK COVER
MISSING BUCKET
LOCATION
B
B
C
D
E
F
G
H
I
J

CA30C QC SAMPLE DATA

Date/Time	SMU/CMU	Lane	Step	Port	Port/Center	Center	Stbd/Center	Stbd
10/14/2015 12:02	CA30C	B	22	0.00	0.00	5.00	0.00	0.00
10/14/2015 11:33	CA30C	B	36	4.50	0.00	5.00	0.00	0.00
10/14/2015 11:15	CA30C	B	45	0.00	0.00	0.00	5.00	0.00
10/14/2015 10:43	CA30C	B	60	4.50	0.00	5.00	0.00	4.50
10/9/2015 4:28:45 PM	CA30C	C	111	0.00	7.00	7.00	7.00	0.00
10/9/2015 3:56:39 PM	CA30C	C	107	4.00	0.00	6.00	0.00	0.00
10/9/2015 3:11:23 PM	CA30C	C	89	4.00	0.00	4.00	0.00	4.00
10/9/2015 2:32:18 PM	CA30C	C	74	5.00	0.00	5.00	0.00	5.00
10/14/2015 9:45	CA30C	C	197	4.00	0.00	5.00	0.00	0.00
10/14/2015 9:03	CA30C	C	217	0.00	0.00	5.00	0.00	4.00
10/14/2015 8:34	CA30C	C	231	4.00	0.00	5.00	0.00	0.00
10/14/2015 8:05	CA30C	c	245	0.00	0.00	6.00	5.00	0.00
10/12/2015 9:28	CA30C	C	177	4.00	0.00	5.00	0.00	4.00
10/12/2015 8:43	CA30C	C	156	4.00	0.00	6.00	0.00	4.00
10/12/2015 8:14	CA30C	C	142	0.00	5.00	5.00	0.00	4.00
10/12/2015 7:37	CA30C	C	128	4.00	0.00	5.00	0.00	0.00
10/14/2015 7:00	CA30C	D	197	4.00	0.00	4.00	0.00	0.00
10/13/2015 16:47	CA30C	D	228	4.50	0.00	5.50	5.50	0.00
10/13/2015 16:19	CA30C	D	243	0.00	5.00	5.50	0.00	4.00
10/12/2015 16:34	CA30C	D	171	4.00	0.00	5.00	5.00	0.00
10/12/2015 16:06	CA30C	D	158	4.50	0.00	4.50	0.00	4.00
10/12/2015 15:34	CA30C	D	143	0.00	4.50	5.00	5.00	0.00
10/12/2015 15:05	CA30C	D	130	4.00	0.00	5.00	0.00	4.00
10/12/2015 14:27	CA30C	D	113	4.00	0.00	5.00	0.00	4.00
10/12/2015 13:59	CA30C	D	100	4.00	0.00	4.50	5.00	0.00
10/12/2015 13:29	CA30C	D	86	4.00	0.00	5.00	6.00	0.00
10/12/2015 13:00	CA30C	D	72	4.00	5.00	5.00	0.00	0.00
10/12/2015 12:34	CA30C	D	61	0.00	5.00	5.00	0.00	4.00
10/12/2015 11:15	CA30C	D	48	0.00	6.00	5.00	0.00	4.00
10/12/2015 10:47	CA30C	D	35	0.00	0.00	5.00	5.00	4.00
10/12/2015 10:19	CA30C	D	21	4.00	0.00	6.00	5.50	0.00
10/13/2015 14:46	CA30C	E	214	4.00	0.00	5.00	5.00	0.00
10/13/2015 14:15	CA30C	E	229	0.00	6.00	6.00	0.00	4.00
10/13/2015 13:43	CA30C	E	242	4.00	0.00	5.00	0.00	0.00
10/13/2015 12:06	CA30C	E	165	0.00	5.00	6.00	0.00	0.00
10/13/2015 11:28	CA30C	E	148	0.00	5.00	5.00	0.00	4.00
10/13/2015 10:58	CA30C	E	133	4.50	0.00	4.00	0.00	4.00
10/13/2015 10:32	CA30C	E	121	4.00	0.00	4.00	0.00	0.00
10/13/2015 9:53	CA30C	E	110	0.00	6.00	5.00	6.00	0.00
10/13/2015 9:17	CA30C	E	94	4.00	0.00	4.50	0.00	4.00
10/13/2015 8:56	CA30C	E	84	0.00	5.00	5.00	0.00	0.00
10/13/2015 8:13	CA30C	E	66	4.00	0.00	5.00	0.00	0.00
10/13/2015 7:35	CA30C	E	50	0.00	5.00	4.50	0.00	4.00
10/13/2015 6:59	CA30C	E	37	4.00	0.00	5.00	0.00	4.00

OU4-CA30C-2											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CA30C-2-C1	10/10/2016	8.5	0.0	8.5	3.0	566.37	245394.52	2482977.02	245396.06	2482982.37	
CA30C-2-C2	10/10/2016	5.0	0.0	5.0	3.0	565.59	245506.03	2483071.17	245511.86	2483070.98	
CA30C-2-C3	10/10/2016	5.0	0.0	5.0	3.0	567.19	245627.03	2483171.65	245629.44	2483171.20	
CA30C-2-C4	10/27/2016	7.0	0.0	7.0	3.0	563.74	245754.36	2483230.99	245759.32	2483228.72	
CA30C-2-C5	10/10/2016	4.5	0.0	4.5	3.0	563.75	245683.18	2483171.65	245683.18	2483171.36	
CA30C-2-C6	10/10/2016	4.5	0.0	4.5	3.0	563.59	245581.95	2483090.16	245587.63	2483091.75	
CA30C-2-C7	10/10/2016	4.5	0.0	4.5	3.0	564.13	245466.49	2482993.64	245465.87	2482996.65	
CA30C-2-C8	10/10/2016	6.0	0.0	6.0	3.0	562.45	245448.30	2482925.60	245449.60	2482928.73	
CA30C-2-C9	10/10/2016	4.0	0.0	4.0	3.0	562.03	245546.36	2483009.46	245551.87	2483011.26	
CA30C-2-C10	10/10/2016	3.5	0.0	3.5	3.0	561.95	245657.87	2483107.57	245661.15	2483107.94	
CA30C-2-C11	10/27/2016	9.0	0.0	9.0	3.0	561.95	245744.08	2483177.19	245749.77	2483174.03	

Average	5.59	0.00	5.59
Median	5.00	0.00	5.00
Standard Deviation	1.83	0.00	1.83

Recommended Path Forward:

Verification samples were collected in 11 locations within OU4-CA30C-2. 11 of 11 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HNK Date: 10/28/2016 Reviewed by: BSW Date: 10/28/2016

A/OT Acceptance: Date: 10/31/14

Armor Stone Thickness Verification and Approval Form

OU4-CA30C-2 (Bathymetric Survey)		
Area (acres)	Bathymetric Survey Thickness (inches)	Required Thickness (inches)
0.45	9.1	6.0

OU4-CA30C-2 (A1 Cap Type)										
ID	Date Sampled	Stone Result (inches)	Cap Type	Required Thickness (inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CA30C-2-A1-G1	10/18/2016	8.8	A1	6.0	566.4	245487.22	2483054.09	245491.41	2483050.98	
CA30C-2-A1-G2	10/18/2016	7.7	A1	6.0	567.2	245574.49	2483126.21	245575.24	2483127.10	
CA30C-2-A1-G3	10/18/2016	10.4	A1	6.0	564.7	245618.71	2483116.25	245617.32	2483120.98	
CA30C-2-A1-G4	10/18/2016	9.3	A1	6.0	564.4	245541.64	2483052.98	245540.58	2483050.06	
CA30C-2-A1-G5	10/18/2016	9.7	A1	6.0	563.0	245526.52	2482995.80	245531.41	2482994.14	
CA30C-2-A1-G6	10/18/2016	6.9	A1	6.0	563.0	245600.17	2483058.71	245599.13	2483062.25	

Average	8.80
Median	9.04
Standard Deviation	1.31

OU4-CA30C-2 (A2 & A3 Cap Types)										
ID	Date Sampled	Stone Result (inches)	Cap Type	Required Thickness (inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CA30C-2-A2-G1	10/31/2016	3.5	A2	4.0	566.3	245420.36	2482999.19	245426.08	2483001.41	
CA30C-2-A2-G2	10/31/2016	6.0	A2	4.0	564.4	245419.25	2482951.38	245418.02	2482953.58	
CA30C-2-A2-G3	10/31/2016	5.0	A2	4.0	564.7	245467.57	2482991.45	245465.95	2482994.07	
CA30C-2-A2-G4	10/31/2016	11.0	A2	4.0	563.8	245476.13	2482951.93	245473.81	2482957.12	
CA30C-2-A3-G1	10/31/2016	4.0	A3	4.0	568.6	245630.39	2483173.41	245631.77	2483172.46	
CA30C-2-A3-G2	10/31/2016	4.5	A3	4.0	564.0	245710.34	2483195.48	245716.29	2483196.22	
CA30C-2-A3-G3	10/31/2016	4.5	A3	4.0	561.3	245676.00	2483120.14	245683.84	2483127.34	Bucket displaced during spreading
CA30C-2-A3-G4	10/31/2016	4.5	A3	4.0	561.1	245775.93	2483201.21	245782.23	2483201.48	

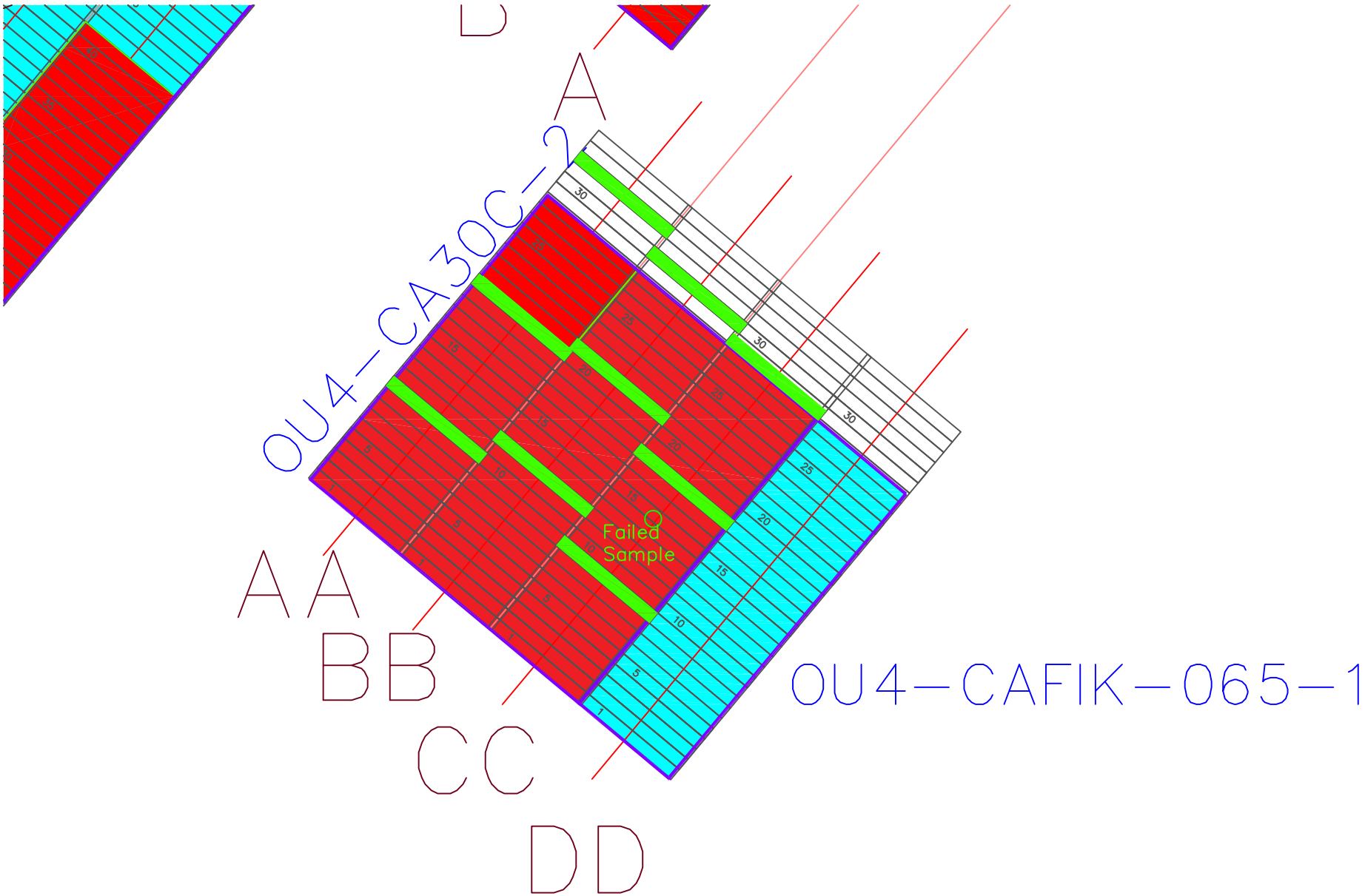
Average	5.38
Median	4.50
Standard Deviation	2.39

Recommended Path Forward:

Verification samples were collected at 14 locations within OU4-CA30C-2. 6 of 6 samples in the A1 Cap Type meet or exceed the minimum thickness requirement of 6-inches. 7 of 8 samples in the in the A2 and A3 Cap Type meet or exceed the minimum thickness requirement of 4-inches resulting in a total 13 out of 14 samples passing within OU4-CA30C-2. Tetra Tech recommends utilizing the J. F. Brennan QC data to accept this area on an exception basis.

Prepared by: HNK Date: 5/9/2017 Reviewed by: BSW Date: 5/9/2017

A/OT Acceptance: Date: 5/10/17 on an exception Basis


OU4-CA30C-2
OU4-CAFIK-065-1
Failed Sample
A
A
AA
BB
CC
DD

QC Sample Log for Spreading Operations - Part 2

Date	Time	Area	SMU/CMU	Lane	Step	Port	Port/Center	Center	Stbd/Center	Stbd	Notes
10/27/2016	15:27:19	ou4	CA30C-2	CC	9		5.50		7.00		
10/27/2016	15:53:58	ou4	CA30C-2	CC	18			4.00		6.50	slow stbt spinners
10/27/2016	16:22:59	ou4	CA30C-2	CC	29	5.00				4.50	
10/27/2016	17:12:12	ou4	CA30C-2	BB	12			4.00	7.00		stbt shoe up 2 turns
10/27/2016	17:39:52	ou4	CA30C-2	BB	21	3.00				2.50	
10/27/2016	18:04:11	ou4	CA30C-2	BB	30			4.50	6.50		
10/27/2016	18:53:56	ou4	CA30C-2	AA	10	3.00				5.00	
10/27/2016	19:18:50	ou4	CA30C-2	AA	20			4.50	6.00		
10/28/2016	08:53:50	ou4	CA30C-2	AA	33		8.00		8.00		

* Brennan is only capable of collecting 2 buckets per location

BRENNAN

CA30C-2 Post 3" Cap Placement

Average Thickness

Operational Unit 4

QA Survey

Date: 11/08/16

CA30C-2 Post Cap

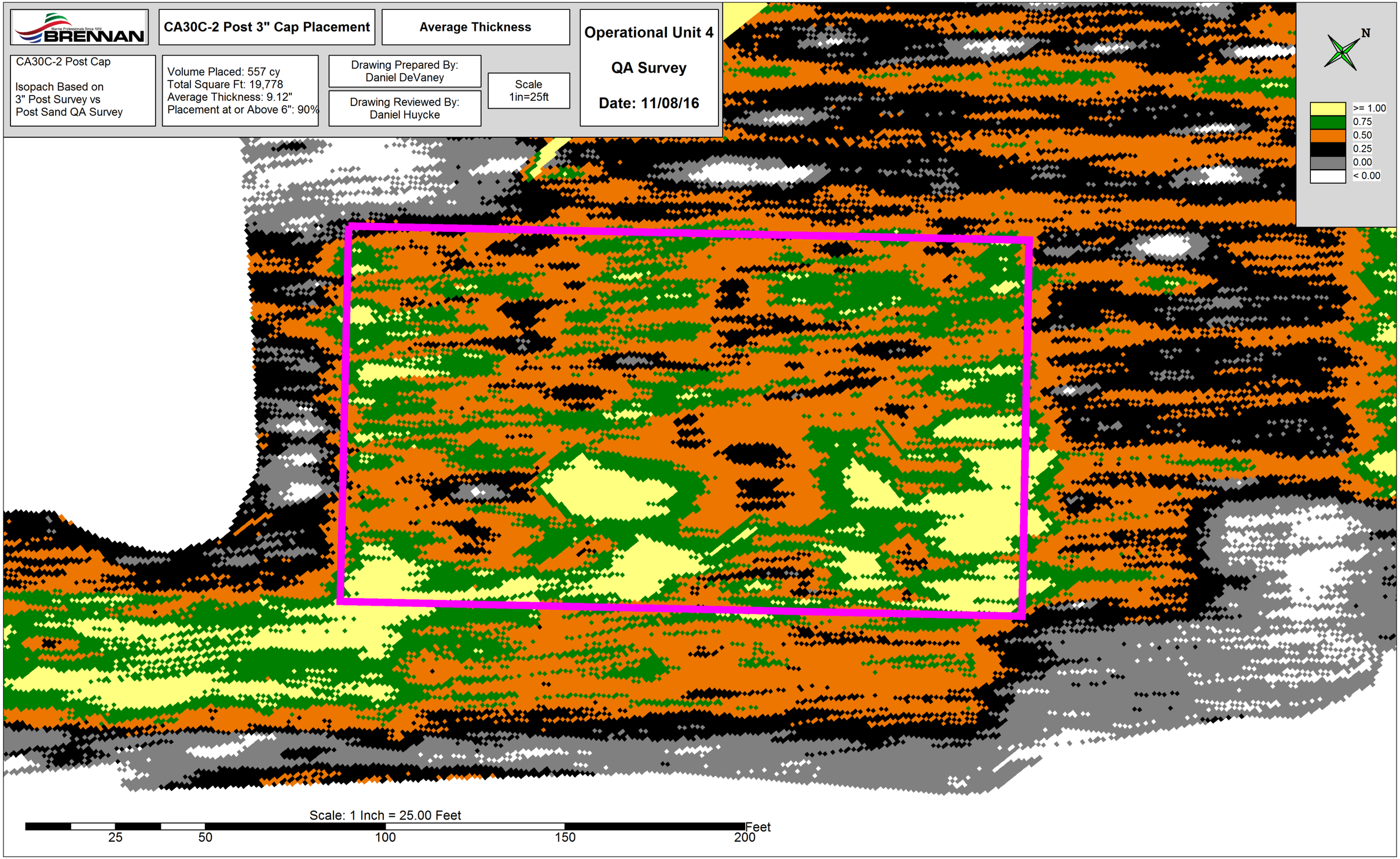
Isopach Based on
3" Post Survey vs
Post Sand QA Survey

Volume Placed: 557 cy
Total Square Ft: 19,778
Average Thickness: 9.12"
Placement at or Above 6": 90%

Drawing Prepared By:
Daniel DeVaney

Drawing Reviewed By:
Daniel Huycke

Scale
1in=25ft



Quarry Spall Placement Thickness Verification and Approval Form

Bathymetric Survey Data			
Area	Area (acres)	Bathymetric Survey Thickness (inches)	Required Thickness (inches)
CA30C-2	-	24.88	16.0
CB20-1	-	23.76	16.0
CA34-1	-	21.36	16.0
CA34-2	-	21.12	16.0
CB34-1	-	24.60	16.0

OU4-CA30C-2, OU4-CB20-1, OU4-CA34-1, OU4-CA34-2, & OU4-CB34-1 (D50=8")										
ID	Date Sampled	Quarry Thickness (inches)	Average Thickness (inches)	Required Thickness (inches)	Mudline	Pre-Placement Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CA30C-2-Q4-1	6/22/2017		29.0	16.0	566.7	245744.24	2483216.11	245744.49	2483216.80	
CA30C-2-Q4-2	6/22/2017		23.8	16.0	566.1	245680.05	2483168.79	245680.73	2483171.43	
CA30C-2-Q4-3	6/22/2017		50.2	16.0	566.3	245669.58	2483113.96	245670.17	2483112.50	
CA30C-2-Q4-4	6/22/2017		24.7	16.0	564.3	245724.97	2483161.35	245728.18	2483159.95	
CA30C-2-Q4-5	6/22/2017		28.1	16.0	564.0	245782.01	2483197.41	245781.12	2483199.05	
CB20-1-Q4-6	6/1/2017		25.1	16.0	560.3	245875.35	2483095.82	245875.39	2483100.29	
CB20-1-Q4-7	6/1/2017		35.6	16.0	558.7	245909.18	2483087.04	245908.89	2483086.59	
CB20-1-Q4-8	6/1/2017		18.7	16.0	563.8	245914.98	2483045.74	245916.68	2483044.94	
CB20-1-Q4-9	6/1/2017		30.9	16.0	562.8	245950.01	2483030.62	245952.39	2483028.06	
CB20-1-Q4-10	6/1/2017		27.4	16.0	561.0	245992.92	2483023.55	245996.20	2483022.57	
CB20-1-Q4-11	6/1/2017		28.5	16.0	559.8	246040.62	2483020.21	246042.22	2483017.44	
CB20-1-Q4-12A	6/1/2017	16.8		16.0	559.5	246088.76	2483010.67	246093.16	2483011.93	
CB20-1-Q4-12B	6/1/2017	7.2		16.0						
CB20-1-Q4-12C	6/1/2017	12.0	12.0	16.0						
CB20-1-Q4-12D	6/1/2017	16.8		16.0						
CB20-1-Q4-12E	6/1/2017	7.2		16.0						
CB20-1-Q4-13	6/1/2017		32.2	16.0	561.8	246133.53	2483003.00	246130.33	2483002.37	
CA34-1-Q4-14	5/15/2017		17.4	16.0	562.2	246183.93	2482997.16	246185.75	2482997.75	
CA34-1-Q4-15	5/15/2017		17.6	16.0	562.5	246232.06	2482999.06	246234.66	2483001.46	
CA34-1-Q4-16	5/15/2017		19.2	16.0	565.6	246276.27	2482989.69	246275.71	2482991.80	
CA34-1-Q4-17	5/15/2017		22.7	16.0	566.9	246329.54	2482987.63	246327.54	2482989.00	
CA34-1-Q4-18	5/15/2017		22.6	16.0	568.9	246374.83	2482975.17	246373.76	2482975.49	
CA34-1-Q4-19A	5/15/2017	19.5		16.0	567.3	246428.16	2482975.20	246425.30	2482979.48	
CA34-1-Q4-19B	5/15/2017	12.3		16.0						
CA34-1-Q4-19C	5/15/2017	5.1	14.9	16.0						
CA34-1-Q4-19D	5/15/2017	21.9		16.0						
CA34-1-Q4-19E	5/15/2017	15.9		16.0						
CA34-1-Q4-20	5/15/2017		28.6	16.0	570.0	246464.01	2482965.80	246465.50	2482965.30	
CA34-2-Q4-21A	5/15/2017	3.3		16.0	569.5	246526.13	2482957.57	246524.64	2482959.96	
CA34-2-Q4-21B	5/15/2017	6.9		16.0						
CA34-2-Q4-21C	5/15/2017	10.5	7.8	16.0						
CA34-2-Q4-21D	5/15/2017	9.3		16.0						
CA34-2-Q4-21E	5/15/2017	9.3		16.0						
CA34-2-Q4-22	5/15/2017		17.0	16.0	571.0	246564.09	2482949.47	246561.17	2482952.71	
CA34-2-Q4-23	5/15/2017		31.3	16.0	570.1	246611.53	2482950.89	246606.49	2482948.77	
CA34-2-Q4-24	5/15/2017		18.7	16.0	570.7	246655.63	2482931.83	246652.13	2482932.24	
CB34-1-Q4-25	5/15/2017		22.4	16.0	567.6	246710.37	2482932.54	246710.12	2482927.85	

Average	24.26
Median	23.76
Standard Deviation	8.64

Recommended Path Forward:

Quarry spall (D50=8") was placed and surveyed within OU4-CA30C-2, OU4-CB20-1, OU4-CA34-1, OU4-CA34-2, and OU4-CB34-1. The quarry spall thicknesses based on bathymetric survey meet or exceed the minimum thickness requirement of 16-inches. Furthermore, thickness verification poling was conducted at 25 locations. 5 of 5 samples in OU4-CA30C-2 meet or exceed the minimum thickness requirement of 16-inches. 7 of 8 samples in OU4-CB20-1 meet or exceed the minimum thickness requirement of 16-inches. 6 of 7 samples in OU4-CA34-1 meet or exceed the minimum thickness requirement of 16-inches. 3 of 4 samples in OU4-CA34-2 meet or exceed the minimum thickness requirement of 16-inches. 1 of 1 sample in OU4-CB34-1 meet or exceed the minimum thickness requirement of 16-inches resulting in a total of 22 of 25 passing within all five areas. Therefore, no further action is required.

Prepared by: HNK Date: 6/28/2017

Reviewed by: BSW Date: 6/28/2017

A/OT Approval: Date: 7/10/17 on an exception Basis

BRENNAN

CA30C-2 8" Quarry Spall

Scale
1in=15ft

Percent Complete
CA30C-2: 94% at or Above
16" Minimum Thickness

Volume Placed:
CA30C-2: 346.10 cy

Avg. Placement Height
CB20-2: 24.88"

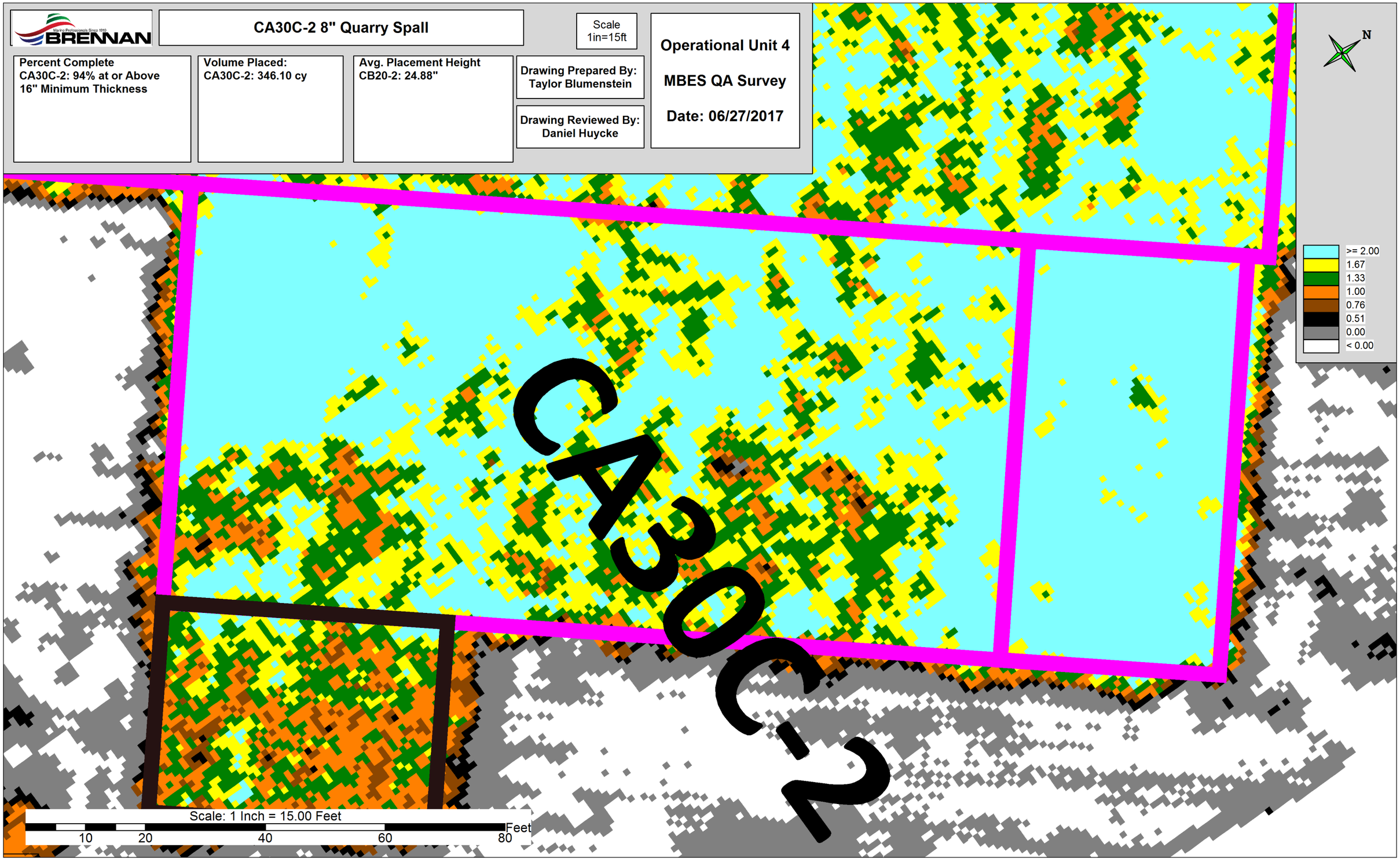
Drawing Prepared By:
Taylor Blumenstein

Drawing Reviewed By:
Daniel Huycke

Operational Unit 4

MBES QA Survey

Date: 06/27/2017



BRENNAN

CB20-1 8" Quarry Spall

Scale
1in=30ft

Percent Complete
CB20-1: 98% at or Above
16" Minimum Thickness

Volume Placed
CB20-1: 452.50 cy

Avg. Placement Height
CB20-1: 23.76"

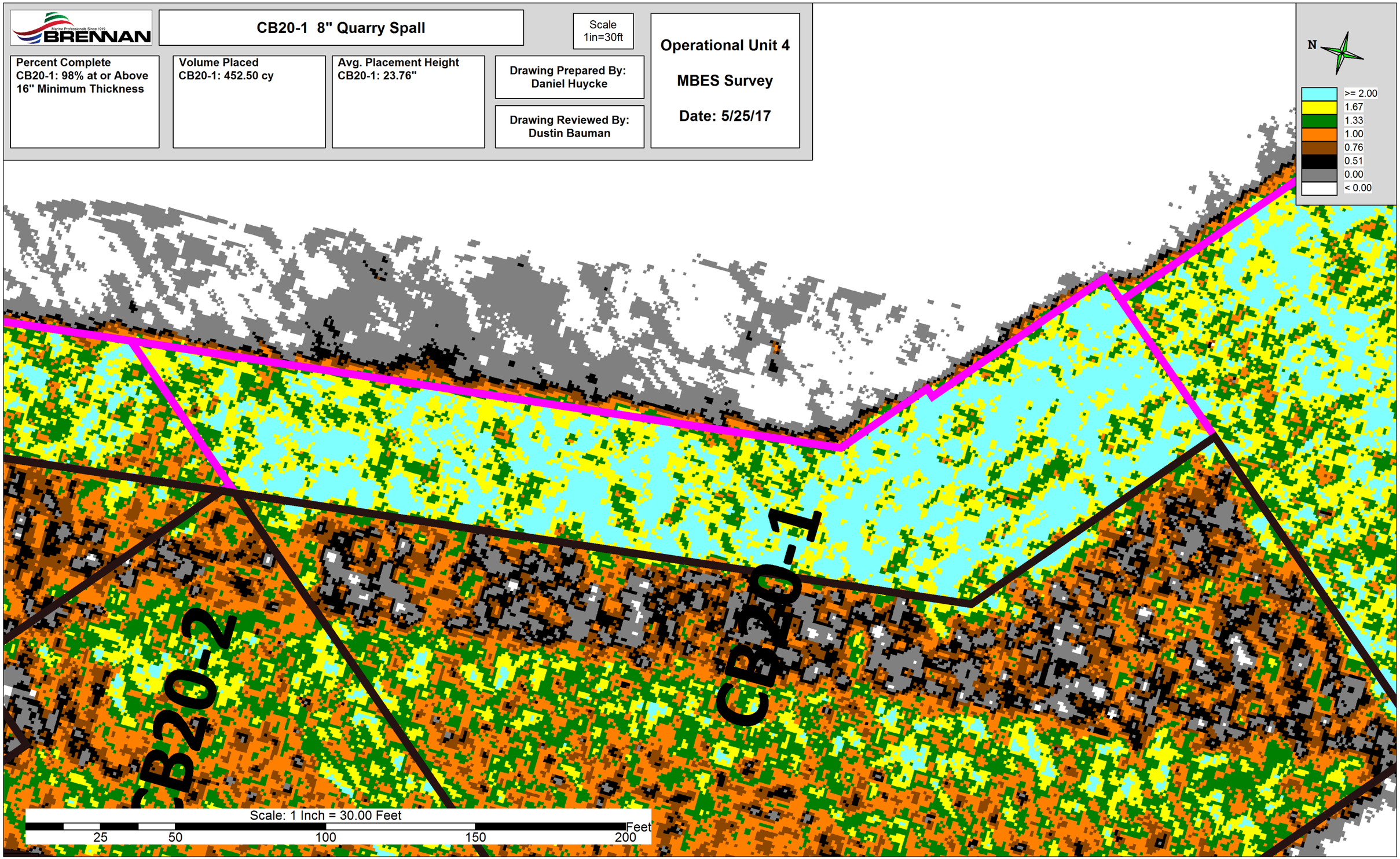
Drawing Prepared By:
Daniel Huycke

Drawing Reviewed By:
Dustin Bauman

Operational Unit 4

MBES Survey

Date: 5/25/17



BRENNAN

CA34-1 8" Quarry Spall

Scale
1in=30ft

Percent Complete
CA34-1: 93% at or Above
16" Minimum Thickness

Volume Placed
CA34-1: 302.30 cy

Avg. Placement Height
CA34-1: 21.36"

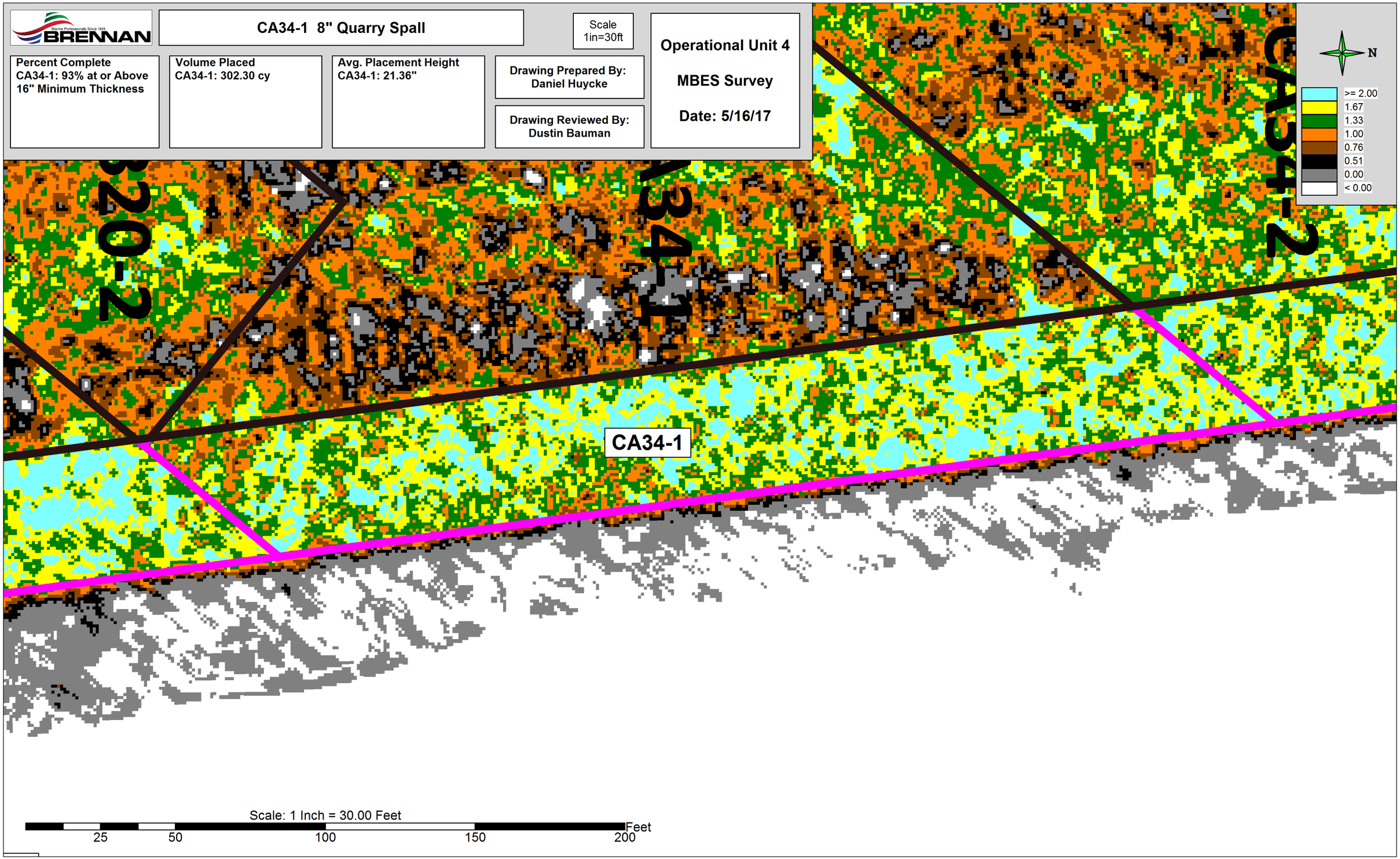
Drawing Prepared By:
Daniel Huycke

Drawing Reviewed By:
Dustin Bauman

Operational Unit 4

MBES Survey

Date: 5/16/17



BRENNAN

Marine Professionals Since 1919

CA34-2 8" Quarry Spall

Scale
1in=20ft

Operational Unit 4

MBES Survey

Date: 5/16/17

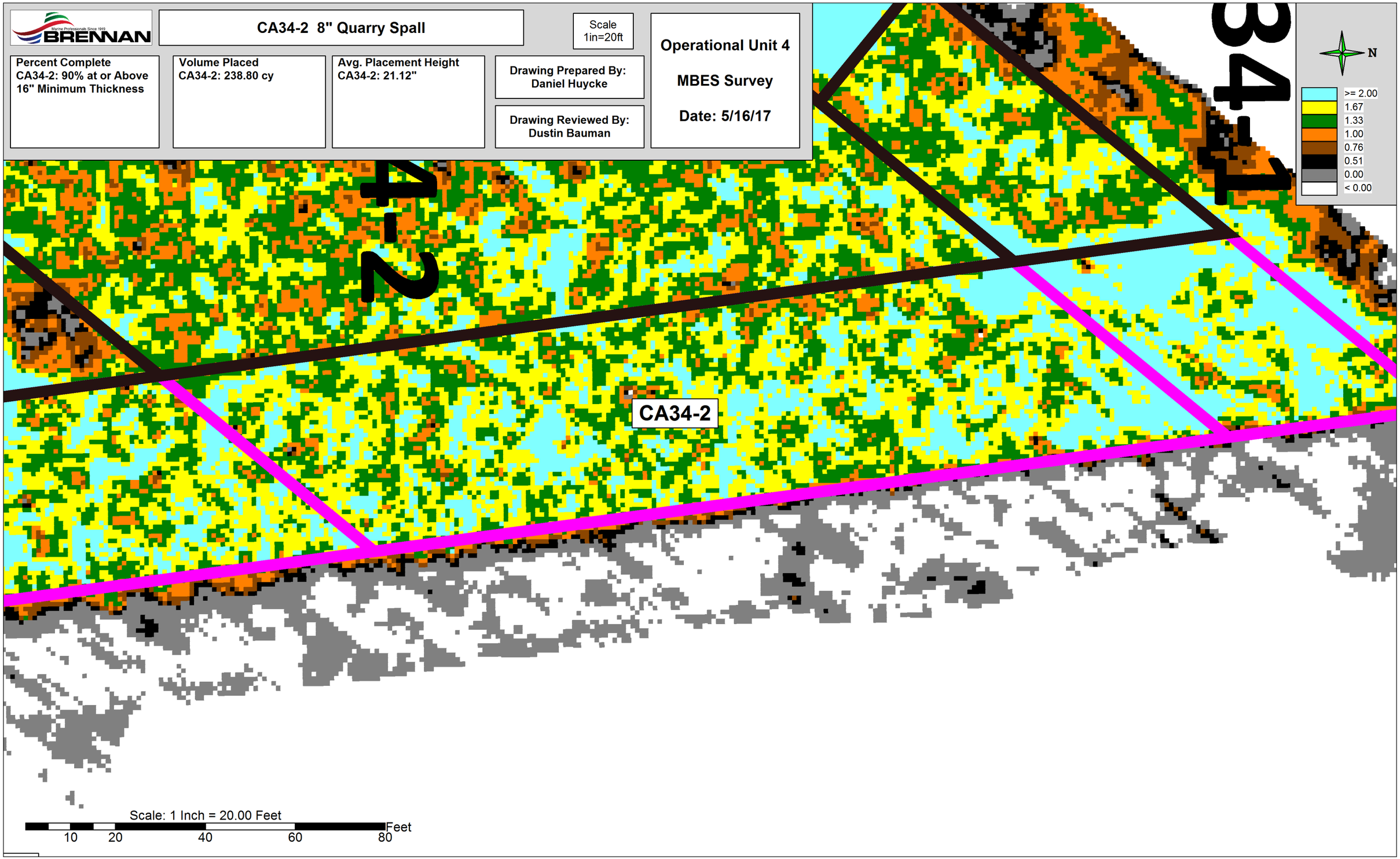
Percent Complete
CA34-2: 90% at or Above
16" Minimum Thickness

Volume Placed
CA34-2: 238.80 cy

Avg. Placement Height
CA34-2: 21.12"

Drawing Prepared By:
Daniel Huycke

Drawing Reviewed By:
Dustin Bauman



BRENNAN

CB34-1 8" Quarry Spall

Scale 1in=15ft

Percent Complete
CB34-1: 94% at or Above 16" Minimum Thickness

Volume Placed
CB34-1: 12.90 cy

Avg. Placement Height
CB34-1: 24.60"

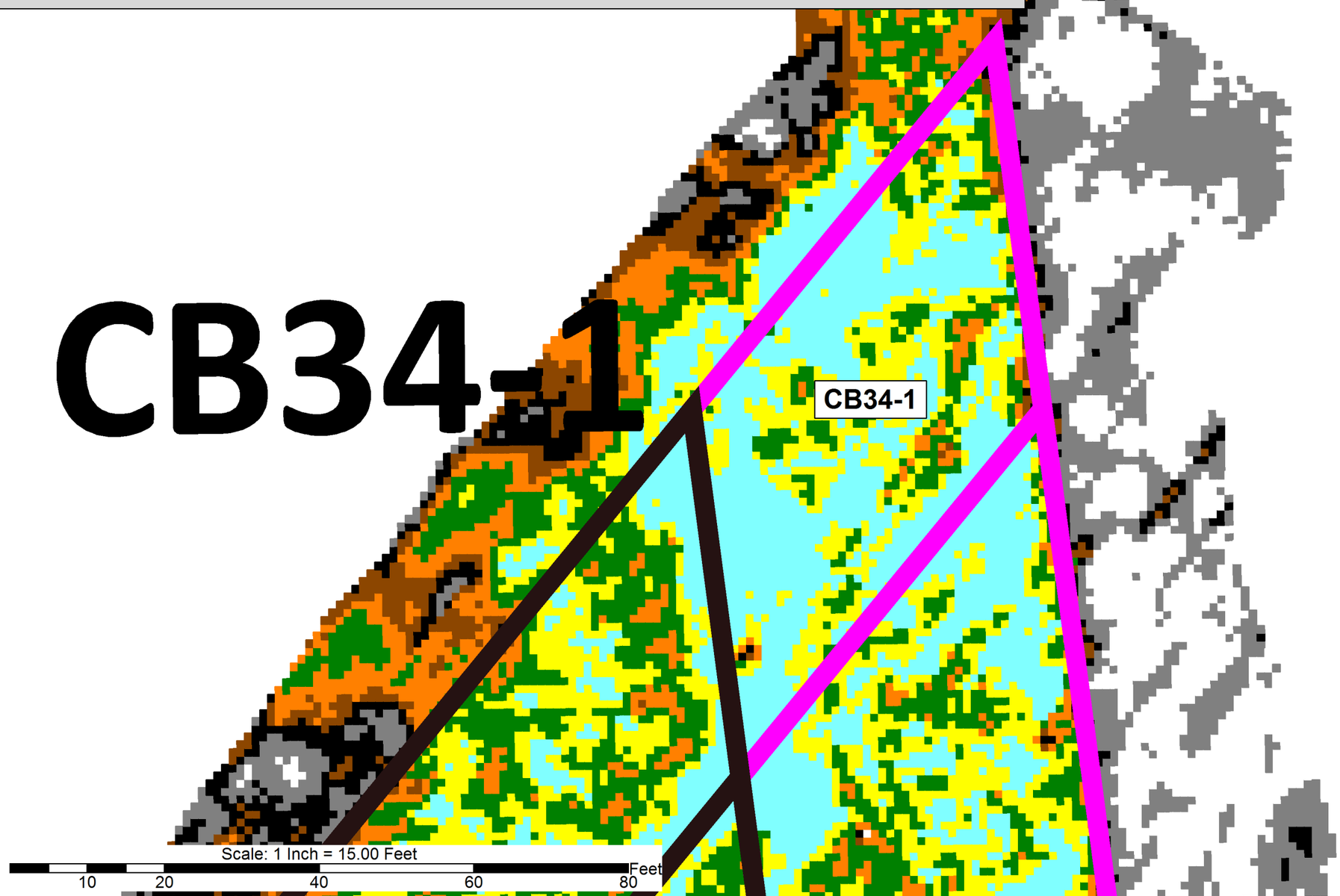
Drawing Prepared By: Daniel Huycke

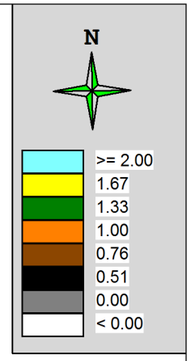
Drawing Reviewed By: Dustin Bauman

Operational Unit 4

MBES Survey

Date: 5/16/17





Quarry Spall Placement Thickness Verification and Approval Form

Bathymetric Survey Data			
Area	Area (acres)	Bathymetric Survey Thickness (inches)	Required Thickness (inches)
CA30C-2	-	16.69	12.0
CB20-1	-	17.02	12.0
CB20-2	-	17.74	12.0

OU4-CA30C-2, OU4-CB20-1, & OU4-CB20-2 (D50=6")										
ID	Date Sampled	Quarry Thickness (Inches)	Average Thickness (Inches)	Required Thickness (Inches)	Mudline	Pre-Placement Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CA30C-2-Q2-1A	6/29/2017	12.6		12.0	569.8	245628.57	2483178.11	245631.17	2483179.19	
CA30C-2-Q2-1B	6/29/2017	9.0		12.0						
CA30C-2-Q2-1C	6/29/2017	8.9	10.6	12.0						
CA30C-2-Q2-1D	6/29/2017	10.2		12.0						
CA30C-2-Q2-1E	6/29/2017	12.6		12.0						
CB20-1-Q2-2	6/30/2017		18.9	12.0	559.7	245764.93	2483010.56	245763.67	2483013.98	
CB20-1-Q2-3	6/30/2017		15.4	12.0	559.2	245823.88	2483060.74	245823.35	2483066.27	
CB20-1-Q2-4	6/30/2017		17.4	12.0	561.4	245848.96	2483038.31	245852.94	2483040.53	
CB20-1-Q2-5	6/30/2017		23.2	12.0	562.6	245811.64	2483000.08	245812.98	2483000.82	
CB20-1-Q2-6	6/30/2017		17.8	12.0	564.1	245803.06	2482954.55	245803.61	2482950.90	
CB20-1-Q2-7	6/30/2017		18.6	12.0	563.8	245849.26	2482992.79	245850.47	2482989.69	
CB20-1-Q2-8	6/30/2017		12.6	12.0	564.2	245839.89	2482939.39	245843.13	2482937.87	
CB20-1-Q2-9	6/30/2017		16.1	12.0	564.8	245903.34	2482978.00	245906.65	2482978.40	
CB20-1-Q2-10A	6/30/2017	8.8		12.0	564.6	245954.68	2482995.47	245957.15	2482993.25	
CB20-1-Q2-10B	6/30/2017	13.6		12.0						
CB20-1-Q2-10C	6/30/2017	12.4	11.2	12.0						
CB20-1-Q2-10D	6/30/2017	12.4		12.0						
CB20-1-Q2-10E	6/30/2017	8.8		12.0						
CB20-1-Q2-11A	6/30/2017	10.4		12.0	565.2	245879.04	2482915.36	245882.66	2482917.34	
CB20-1-Q2-11B	6/30/2017	10.4		12.0						
CB20-1-Q2-11C	6/30/2017	11.6	11.6	12.0						
CB20-1-Q2-11D	6/30/2017	9.2		12.0						
CB20-1-Q2-11E	6/30/2017	16.4		12.0						
CB20-1-Q2-12	6/30/2017		23.1	12.0	566.0	245927.30	2482920.98	245928.84	2482919.87	
CB20-1-Q2-13	6/30/2017		19.4	12.0	565.6	245979.78	2482965.32	245983.75	2482963.96	
CB20-1-Q2-14	6/30/2017		12.1	12.0	563.1	246043.92	2482967.50	246047.37	2482966.82	
CB20-1-Q2-15	6/30/2017		15.8	12.0	566.6	245964.84	2482901.05	245966.52	2482902.58	
CB20-1-Q2-16	6/30/2017		14.5	12.0	566.2	246021.08	2482904.99	246026.16	2482905.94	
CB20-1-Q2-17	6/30/2017		23.3	12.0	563.2	246070.04	2482946.11	246071.71	2482945.75	
CB20-1-Q2-18	6/30/2017		12.7	12.0	561.2	246100.42	2482974.11	246103.34	2482972.51	
CB20-2-Q2-19	6/30/2017		14.7	12.0	562.0	246135.39	2482954.26	246133.51	2482953.76	
CB20-2-Q2-20A	6/30/2017	5.4		12.0	563.9	246058.48	2482894.14	246060.66	2482890.81	
CB20-2-Q2-20B	6/30/2017	4.2		12.0						
CB20-2-Q2-20C	6/30/2017	6.6	8.5	12.0						
CB20-2-Q2-20D	6/30/2017	10.2		12.0						
CB20-2-Q2-20E	6/30/2017	16.2		12.0						
CB20-2-Q2-21	6/30/2017		13.8	12.0	562.7	246100.99	2482884.63	246098.37	2482881.94	
CB20-2-Q2-22	6/30/2017		17.6	12.0	562.0	246148.42	2482922.88	246147.39	2482918.85	
CB20-2-Q2-23	6/30/2017		12.5	12.0	562.6	246132.34	2482869.55	246133.68	2482869.34	
CB20-2-Q2-24A	6/30/2017	11.6		12.0	563.1	246177.12	2482899.30	246175.47	2482904.84	
CB20-2-Q2-24B	6/30/2017	20.0		12.0						
CB20-2-Q2-24C	6/30/2017	3.2	10.9	12.0						
CB20-2-Q2-24D	6/30/2017	2.0		12.0						
CB20-2-Q2-24E	6/30/2017	17.6		12.0						
CB20-2-Q2-25A	6/30/2017	4.1		12.0	561.5	246175.95	2482865.29	246171.99	2482861.03	
CB20-2-Q2-25B	6/30/2017	5.3		12.0						
CB20-2-Q2-25C	6/30/2017	1.7	5.3	12.0						
CB20-2-Q2-25D	6/30/2017	7.7		12.0						
CB20-2-Q2-25E	6/30/2017	7.7		12.0						

Average	15.10
Median	14.71
Standard Deviation	4.54

Recommended Path Forward:

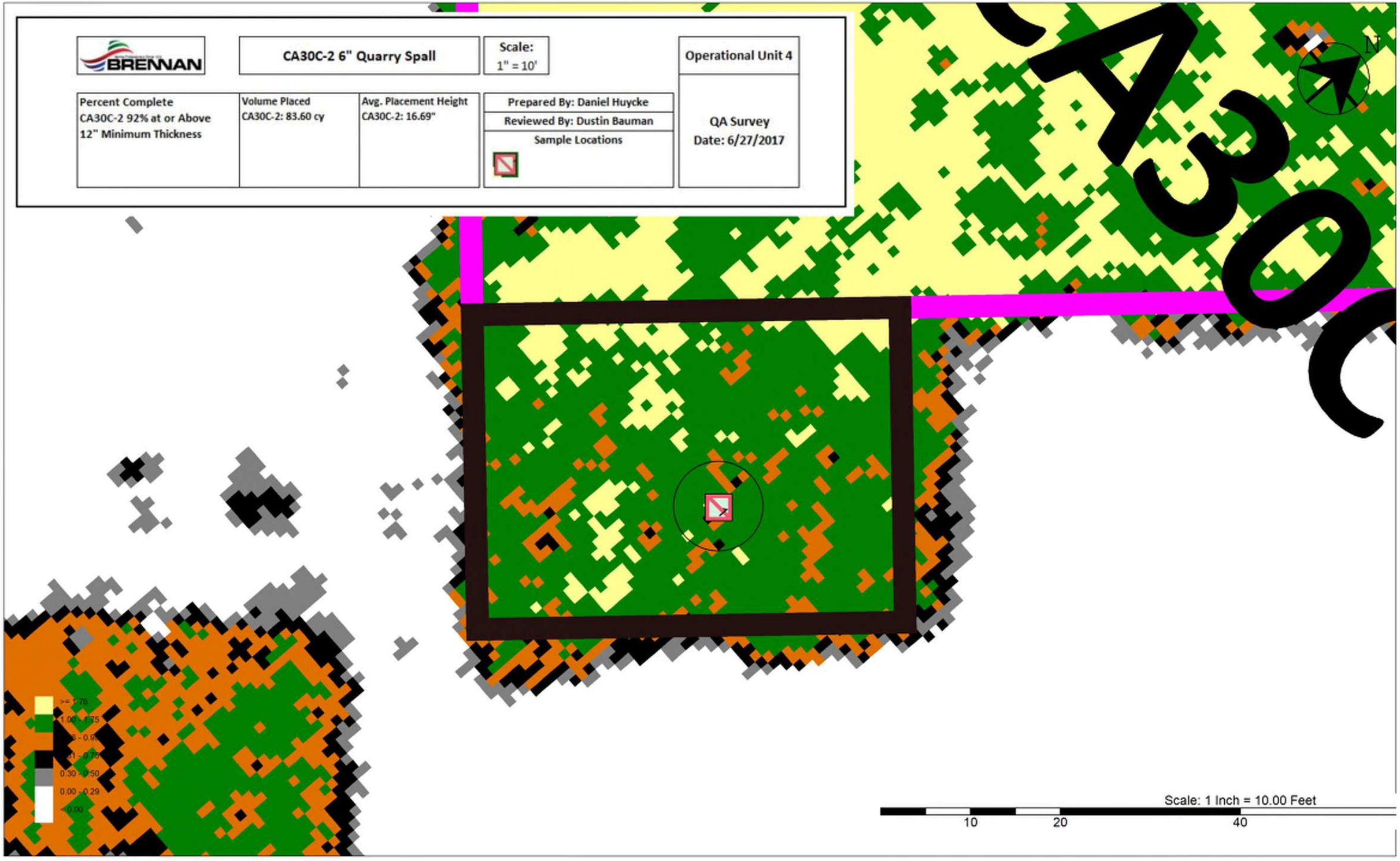
Quarry spall (D50=6") was placed and surveyed within OU4-CA30C-2, OU4-CB20-1, and OU4-CB20-2. The quarry spall thicknesses based on bathymetric survey meet or exceed the minimum thickness requirement of 12-inches. Furthermore, thickness verification poling was conducted at 25 locations. 0 of 1 sample in OU4-CA30C-2 meet or exceed the minimum thickness requirement of 12-inches. 15 of 17 samples in OU4-CB20-1 meet or exceed the minimum thickness requirement of 12-inches. 4 of 7 samples in OU4-CB0-2 meet or exceed the minimum thickness requirement of 12-inches resulting in a total of 19 of 25 passing within all three areas. Tetra Tech recommends use of the J.F. Brennan QC data to accept this area on an exception basis.

Prepared by: HNK Date: 7/5/2017

Reviewed by: ASW Date: 7/25/2017

A/OT Acceptance: Date: 7/31/17 on an exception Basis

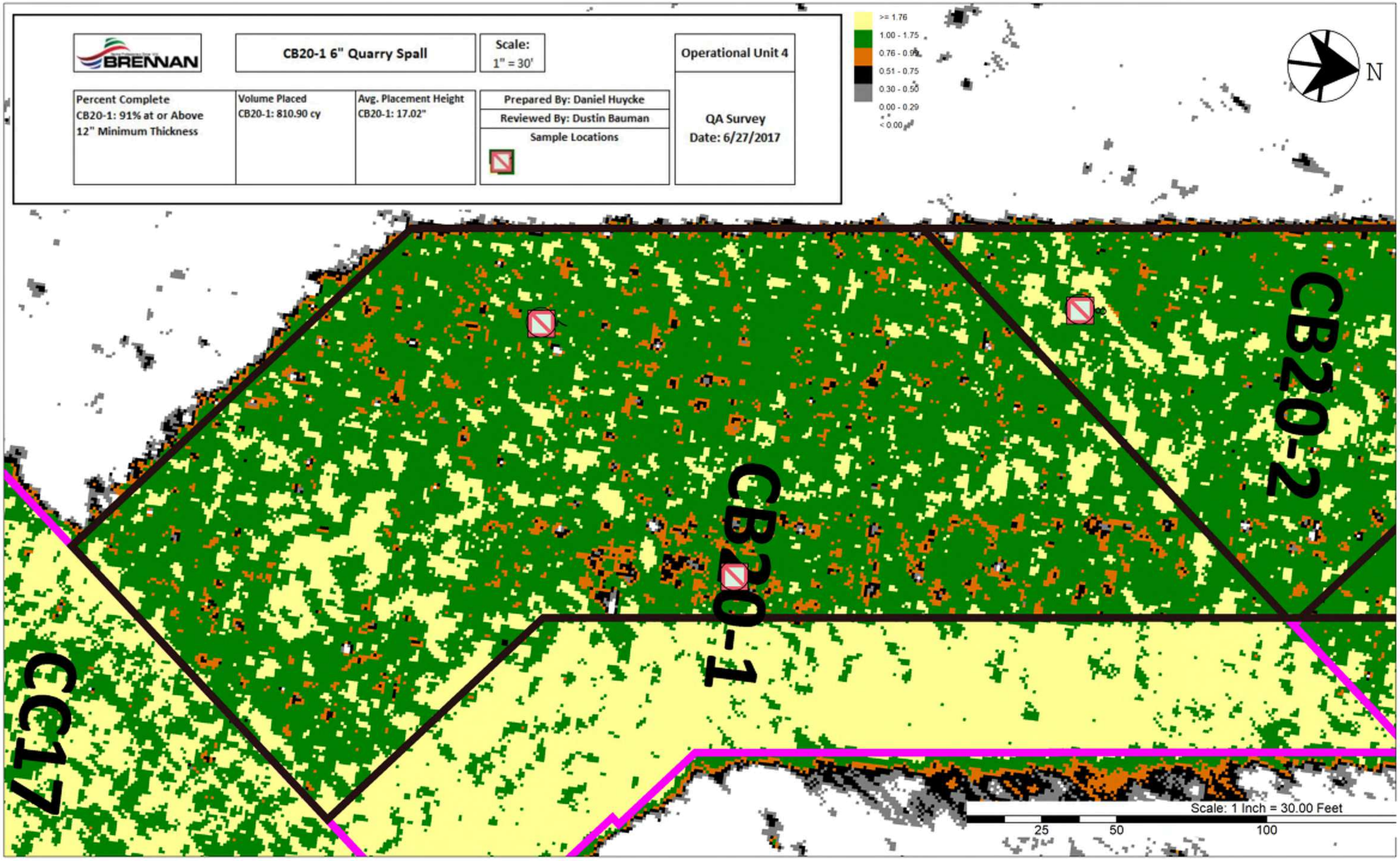
BRENNAN	CA30C-2 6" Quarry Spall	Scale: 1" = 10'		Operational Unit 4
Percent Complete CA30C-2 92% at or Above 12" Minimum Thickness	Volume Placed CA30C-2: 83.60 cy	Avg. Placement Height CA30C-2: 16.69"	Prepared By: Daniel Huycke Reviewed By: Dustin Bauman Sample Locations	QA Survey Date: 6/27/2017



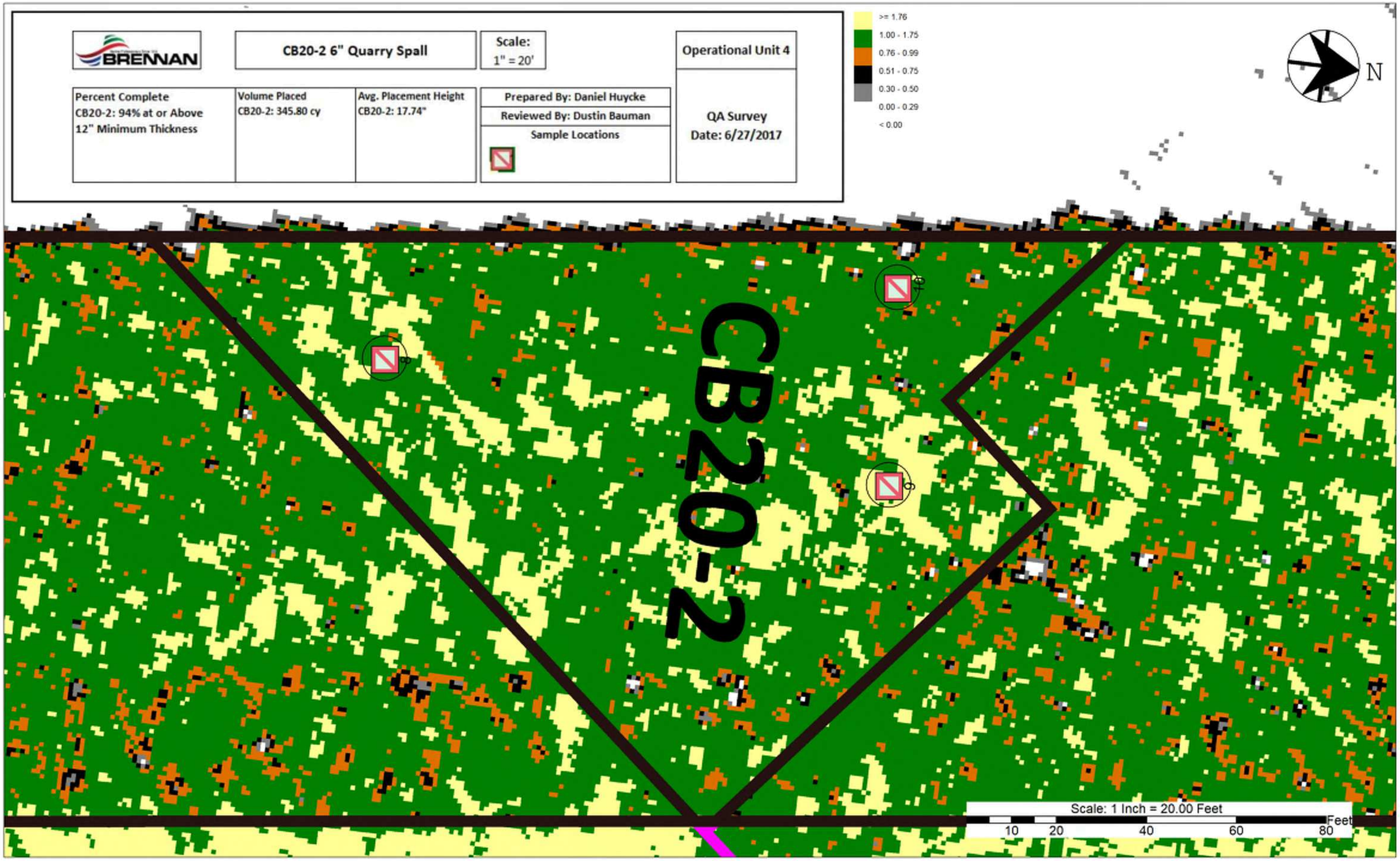
BRENNAN	CB20-1 6" Quarry Spall	Scale: 1" = 30'	Operational Unit 4

Percent Complete	Volume Placed	Avg. Placement Height	Prepared By: Daniel Huycke
CB20-1: 91% at or Above 12" Minimum Thickness	CB20-1: 810.90 cy	CB20-1: 17.02"	Reviewed By: Dustin Bauman
			Sample Locations

QA Survey
Date: 6/27/2017



BRENNAN	CB20-2 6" Quarry Spall	Scale: 1" = 20'		Operational Unit 4
Percent Complete CB20-2: 94% at or Above 12" Minimum Thickness	Volume Placed CB20-2: 345.80 cy	Avg. Placement Height CB20-2: 17.74"	Prepared By: Daniel Huycke Reviewed By: Dustin Bauman Sample Locations	QA Survey Date: 6/27/2017



OU4-CA34-1											
ID	Date Sampled	Sand Result (inches)	Sand/Sediment Mix (inches)	Total Thickness Sand and Sediment Mix (inches)	Required Thickness (inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CA34-1-C1	10/27/2016	6.0	0.0	6.0	3.0	560.00	246190.53	2483003.63	246188.76	2483005.00	
CA34-1-C2	10/27/2016	6.5	0.0	6.5	3.0	559.94	246193.87	2482961.34	246195.89	2482967.74	
CA34-1-C3	10/27/2016	5.0	0.0	5.0	3.0	560.40	246245.85	2483000.85	246243.32	2483002.42	
CA34-1-C4	10/27/2016	8.5	0.0	8.5	3.0	560.66	246244.24	2482958.00	246244.66	2482962.09	
CA34-1-C5	10/31/2016	7.5	0.0	7.5	3.0	560.19	246299.01	2483000.30	246301.87	2483001.76	
CA34-1-C6	10/17/2016	4.5	0.0	4.5	3.0	565.23	246213.94	2482884.27	246213.30	2482888.59	
CA34-1-C7	10/31/2016	9.0	0.0	9.0	3.0	563.80	246278.72	2482940.75	246274.14	2482940.39	
CA34-1-C8	10/31/2016	4.0	0.0	4.0	3.0	562.19	246346.07	2482996.39	246344.92	2482993.20	
CA34-1-C9	10/17/2016	5.0	0.0	5.0	3.0	566.66	246266.24	2482883.14	246265.64	2482885.02	
CA34-1-C10	10/31/2016	10.0	0.0	10.0	3.0	567.08	246334.35	2482940.73	246333.88	2482942.85	
CA34-1-C11	10/31/2016	11.5	0.0	11.5	3.0	562.20	246396.47	2482990.55	246393.65	2482990.62	
CA34-1-C12	10/17/2016	4.0	0.0	4.0	3.0	566.63	246264.35	2482838.04	246262.43	2482838.61	
CA34-1-C13	10/17/2016	7.0	0.0	7.0	3.0	567.44	246335.24	2482897.03	246335.07	2482896.62	
CA34-1-C14	10/31/2016	8.0	0.0	8.0	3.0	567.46	246392.00	2482943.30	246392.69	2482941.35	
CA34-1-C15	10/17/2016	4.5	0.0	4.5	3.0	566.72	246279.00	2482803.94	246280.36	2482802.19	
CA34-1-C16	10/17/2016	5.0	0.0	5.0	3.0	567.80	246356.17	2482867.18	246357.32	2482868.79	
CA34-1-C17	10/31/2016	5.5	0.0	5.5	3.0	567.69	246433.36	2482928.57	246435.51	2482932.69	
CA34-1-C18	10/31/2016	5.5	0.0	5.5	3.0	561.99	246492.95	2482980.63	246497.43	2482985.97	

Average	6.50	0.00	6.50
Median	5.75	0.00	5.75
Standard Deviation	2.18	0.00	2.18

Recommended Path Forward:

Verification samples were collected in 18 locations within OU4-CA34-1. 18 of 18 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: TINK Date: 11/1/2016 Reviewed by: BSW Date: 11/1/2016

A/OT Acceptance: Date: 11/1/16

11

Armor Stone Thickness Verification and Approval Form

OU4-CA34-1 (A1 Cap Type Data)								
Area (acres)	Required Thickness (inches)	Average Poling Thickness (inches)	Post-Placement Bathymetric Survey Thickness (inches)	Calculated Average Thickness with Consolidation	Cubic Yards Required (CY)	5% Over Placement Factor (CY)	Volume Placed with Consolidation (CY)	Calculated Theoretical Volume (CY)
0.12	6.0	12.75	9.73	11.57	199.26	209.22	180.86	215.66

OU4-CA34-1 (A1 Cap Type)											
ID	Pre-Placement Poling Date	Date Sampled (Post Placement)	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CA34-1-A1-G1	10/17/2016	7/24/2017	16.7	A1	6.0	564.2	246226.54	2482849.08	246218.63	2482844.52	
CA34-1-A1-G2	10/17/2016	7/24/2017	15.2	A1	6.0	567.9	246263.83	2482835.23	246268.63	2482834.45	
CA34-1-A1-G3	10/17/2016	7/24/2017	7.9	A1	6.0	567.2	246277.67	2482799.83	246281.76	2482797.18	
CA34-1-A1-G4	10/17/2016	7/24/2017	11.1	A1	6.0	568.2	246311.12	2482828.69	246305.37	2482825.92	

Average	12.75
Median	13.17
Standard Deviation	3.99

OU4-CA34-1 (A3 Cap Type)											
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CA34-1-A3-G1	11/3/2016	5.5	A3	4.0	560.4	246186.57	2482999.70	246187.05	2482998.99	
CA34-1-A3-G2	11/3/2016	8.0	A3	4.0	560.8	246225.11	2482984.51	246224.45	2482983.90	
CA34-1-A3-G3	11/3/2016	6.0	A3	4.0	561.3	246261.59	2482971.83	246259.58	2482975.36	
CA34-1-A3-G4	11/3/2016	8.0	A3	4.0	564.7	246239.36	2482905.80	246236.37	2482915.86	Bucket displaced during spreading
CA34-1-A3-G5	11/3/2016	7.5	A3	4.0	566.4	246315.84	2482972.24	246313.20	2482980.16	
CA34-1-A3-G6	11/3/2016	6.0	A3	4.0	567.0	246292.48	2482905.17	246289.21	2482906.47	
CA34-1-A3-G7	11/3/2016	9.0	A3	4.0	561.8	246386.54	2482987.01	246386.70	2482990.23	
CA34-1-A3-G8	11/3/2016	6.5	A3	4.0	567.4	246365.75	2482926.10	246362.90	2482933.79	
CA34-1-A3-G9	11/3/2016	7.0	A3	4.0	562.2	246440.75	2482986.40	246440.87	2482990.73	
CA34-1-A3-G10	11/3/2016	6.0	A3	4.0	567.9	246355.55	2482865.51	246356.12	2482871.84	
CA34-1-A3-G11	11/3/2016	6.0	A3	4.0	568.0	246445.05	2482943.33	246446.80	2482942.01	

Average	6.86
Median	6.50
Standard Deviation	1.12

Recommended Path Forward:

Verification samples were collected in 15 locations within OU4-CA34-1. 4 of 4 samples in the A1 Cap Type meet or exceed the minimum thickness requirement of 6-inches. 11 of 11 samples in the A3 Cap Type meet or exceed the minimum thickness requirement of 4-inches resulting in a total of 15 of 15 samples passing in OU4-CA34-1, therefore, no further action is required.

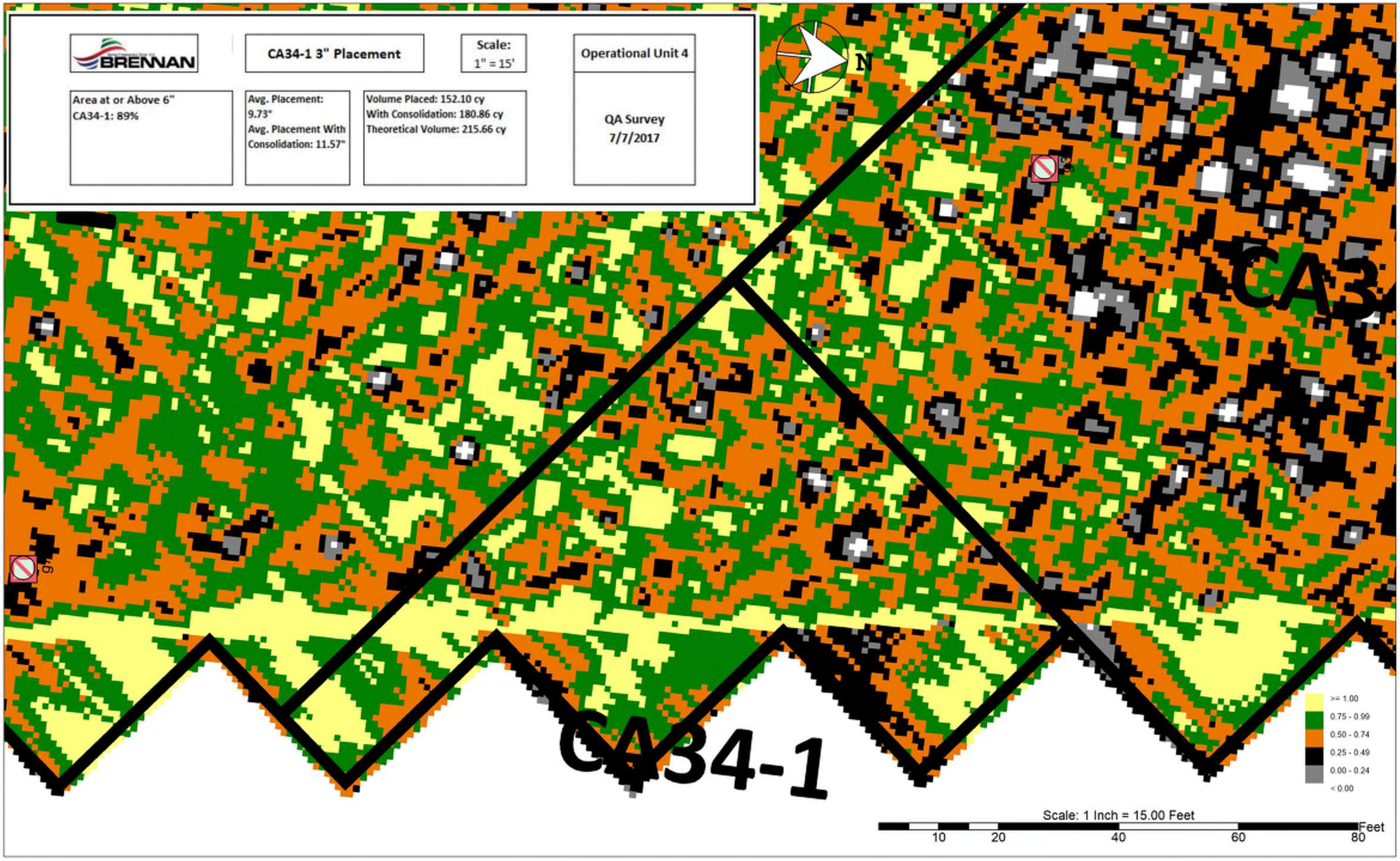
Prepared by: HNK Date: 9/5/2017 Reviewed by: BSW Date: 9/5/2017

A/OT Acceptance: Date: 12/6/17

BRENNAN

CA34-1 3" Placement	Scale: 1" = 15'	Operational Unit 4

Area at or Above 6"	Avg. Placement:	Volume Placed: 152.10 cy	QA Survey
CA34-1: 89%	9.73"	With Consolidation: 180.86 cy	7/7/2017
	Avg. Placement With Consolidation: 11.57"	Theoretical Volume: 215.66 cy	



Quarry Spall Placement Thickness Verification and Approval Form

Bathymetric Survey Data			
Area	Area (acres)	Bathymetric Survey Thickness (inches)	Required Thickness (inches)
CA34-1	-	16.63	12.0
CA34-2	-	17.52	12.0
CB34-1	-	20.28	12.0

OU4-CA34-1, OU4-CA34-2, & OU4-CB34-1 (D50=6")										
ID	Date Sampled	Quarry Thickness (inches)	Average Thickness (inches)	Required Thickness (inches)	Mudline	Pre-Placement Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CA34-1-Q3-1A	8/1/2017	12.5	11.3	12.0	562.4	246206.56	2482925.22	246205.11	2482923.80	
CA34-1-Q3-1B	8/1/2017	10.1		12.0						
CA34-1-Q3-1C	8/1/2017	6.5		12.0						
CA34-1-Q3-1D	8/1/2017	8.9		12.0						
CA34-1-Q3-1E	8/1/2017	18.5		12.0						
CA34-1-Q3-2	8/1/2017		23.2	12.0	567.4	246215.08	2482884.75	246215.80	2482883.79	
CA34-1-Q3-3	8/1/2017		14.2	12.0	565.6	246241.70	2482913.97	246242.96	2482915.59	
CA34-1-Q3-4	8/1/2017		16.4	12.0	568.2	246254.14	2482875.04	246254.03	2482872.68	
CA34-1-Q3-5	8/1/2017		21.6	12.0	568.9	246319.59	2482921.17	246322.50	2482919.92	
CA34-1-Q3-6	8/1/2017		15.2	12.0	568.8	246349.87	2482902.31	246348.43	2482898.78	
CA34-1-Q3-7	8/1/2017		22.0	12.0	569.4	246320.87	2482881.38	246320.33	2482878.72	
CA34-1-Q3-8	8/1/2017		22.0	12.0	569.6	246335.94	2482846.50	246335.33	2482842.19	
CA34-1-Q3-9	8/1/2017		16.0	12.0	569.6	246401.74	2482896.51	246399.05	2482893.65	
CA34-2-Q3-10	6/1/2017		19.5	12.0	570.08	246458.32	2482910.05	246456.01	2482910.04	
CA34-2-Q3-11	6/1/2017		25.6	12.0	570.62	246394.57	2482846.01	246393.24	2482842.50	
CA34-2-Q3-12	6/1/2017		16.3	12.0	570.84	246464.84	2482864.47	246465.05	2482861.07	
CA34-2-Q3-13	6/1/2017		22.4	12.0	571.42	246524.39	2482917.60	246526.51	2482918.41	
CA34-2-Q3-14	6/1/2017		14.3	12.0	571.02	246534.95	2482881.97	246531.57	2482885.54	
CA34-2-Q3-15	6/1/2017		22.6	12.0	571.55	246477.67	2482824.63	246476.11	2482822.96	
CA34-2-Q3-16	6/1/2017		20.0	12.0	570.06	246542.84	2482837.93	246540.03	2482839.21	
CA34-2-Q3-17	6/1/2017		23.6	12.0	570.80	246613.99	2482893.16	246612.88	2482895.90	
CB34-1-Q3-18	6/1/2017		29.5	12.0	568.42	246657.69	2482893.06	246654.92	2482895.15	

Average	19.77
Median	20.84
Standard Deviation	4.69

Recommended Path Forward:

Quarry spall (D50=6") was placed and surveyed within OU4-CA34-1, OU4-CA34-2, and OU4-CB34-1. The quarry spall thicknesses based on bathymetric survey meet or exceed the minimum thickness requirement of 12-inches. Furthermore, thickness verification poling was conducted in 18 locations. 8 of 9 samples in OU4-CA34-1 meet or exceed the minimum thickness requirement of 12-inches. 8 of 8 samples in OU4-CA34-2 meet or exceed the minimum thickness requirement of 12-inches. 1 of 1 sample in OU4-CB34-1 meet or exceed the minimum thickness requirement of 12-inches resulting in a total of 17 of 18 passing with in all three areas. Therefore, no further action is required.

Prepared by: HNK Date: 8/2/2017

Reviewed by: BSW Date: 8/24/2017

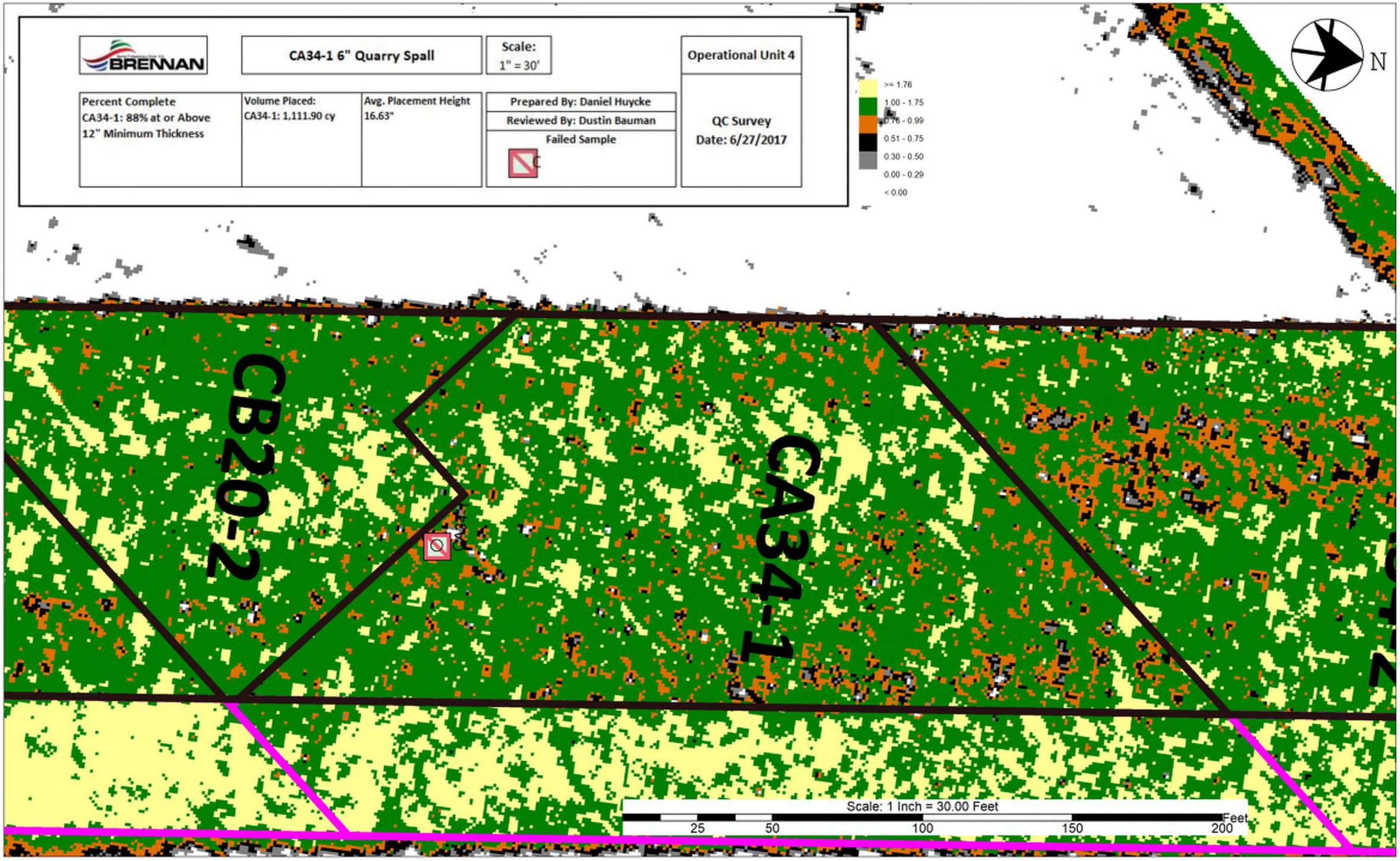
A/OT Acceptance: [signature] Date: 8/28/17

BRENNAN

CA34-1 6" Quarry Spall	Scale: 1" = 30'	Operational Unit 4

Percent Complete	Volume Placed:	Avg. Placement Height	Prepared By: Daniel Huycke
CA34-1: 88% at or Above 12" Minimum Thickness	CA34-1: 1,111.90 cy	16.63"	Reviewed By: Dustin Bauman Failed Sample

QC Survey
Date: 6/27/2017



BRENNAN

CA34-2 6" Quarry Spall

Scale 1in=30ft

Percent Complete
CA34-2: 93% at or Above 12" Minimum Thickness

Volume Placed
CA34-2: 1,065.40 cy

Avg. Placement Height
CA34-2: 17.52"

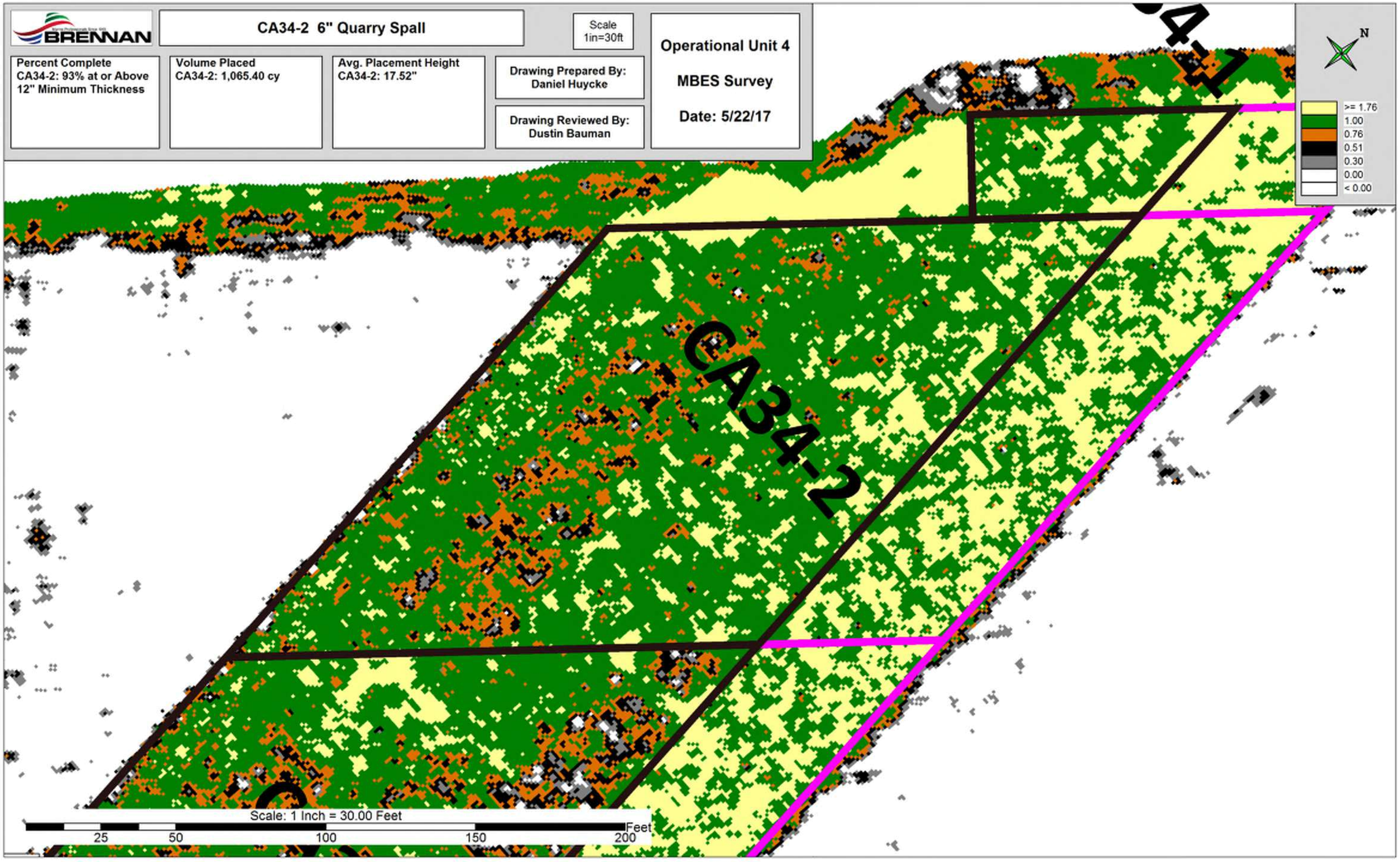
Drawing Prepared By: Daniel Huycke

Drawing Reviewed By: Dustin Bauman

Operational Unit 4

MBES Survey

Date: 5/22/17



BRENNAN

CB34-1 6" Quarry Spall

Scale 1in=20ft

Percent Complete
CB34-1: 98% at or Above 12" Minimum Thickness

Volume Placed
CB34-1: 54.60 cy

Avg. Placement Height
CB34-1: 20.28"

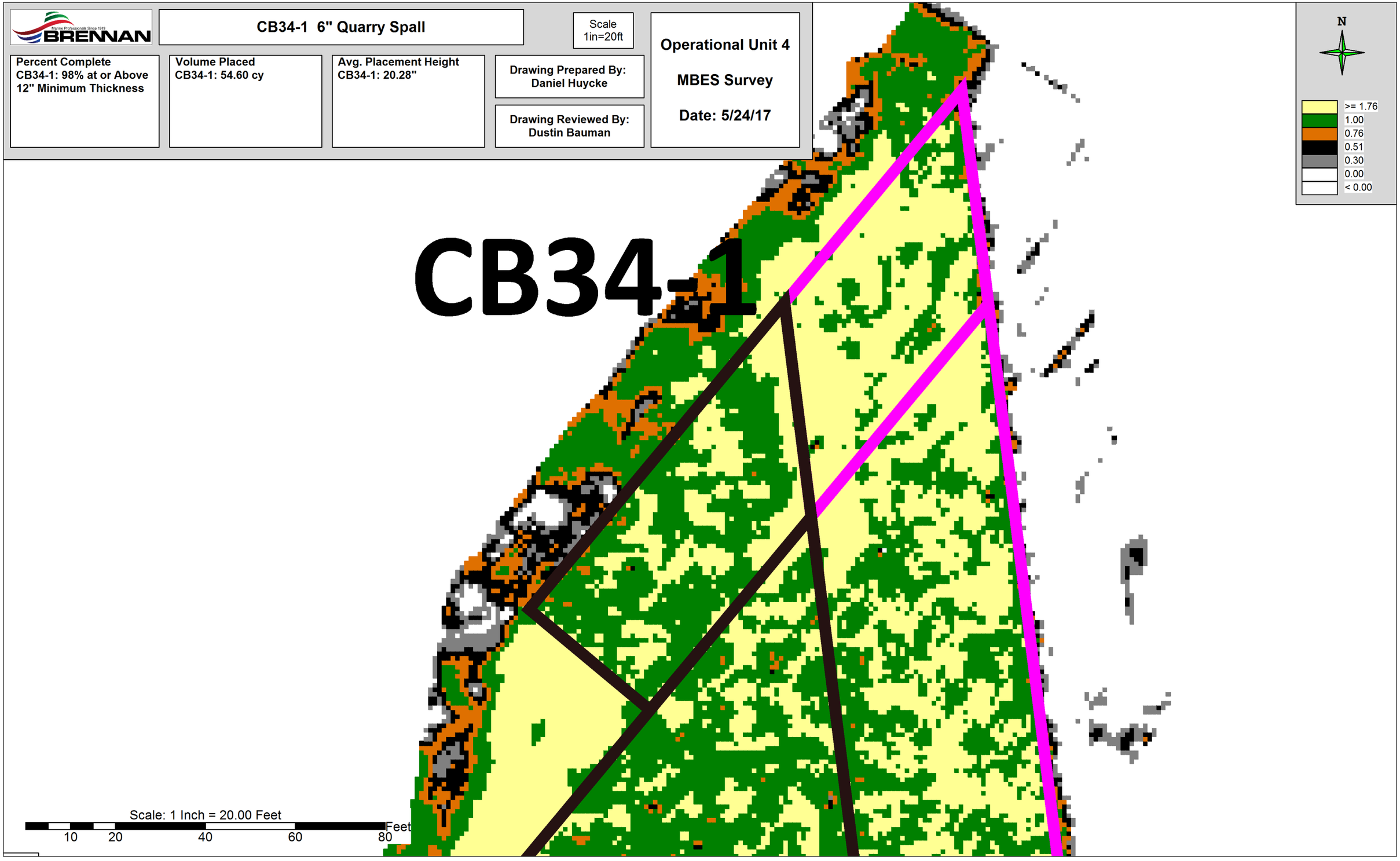
Drawing Prepared By: Daniel Huycke

Drawing Reviewed By: Dustin Bauman

Operational Unit 4

MBES Survey

Date: 5/24/17



OU4-CA34-2											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CA34-2-C1	10/17/2016	6.5	0.0	6.5	3.0	568.06	246324.43	2482797.45	246322.15	2482801.27	
CA34-2-C2	10/17/2016	5.0	0.0	5.0	3.0	568.22	246402.63	2482862.38	246404.18	2482865.53	
CA34-2-C3	10/31/2016	4.5	0.0	4.5	3.0	568.36	246488.70	2482930.44	246490.58	2482933.78	
CA34-2-C4	10/31/2016	5.0	0.0	5.0	3.0	562.30	246536.94	2482974.06	246535.72	2482979.20	
CA34-2-C5	10/31/2016	3.5	0.0	3.5	3.0	564.68	246585.81	2482967.83	246585.05	2482960.79	
CA34-2-C6	10/31/2016	5.5	0.0	5.5	3.0	569.11	246479.37	2482878.89	246481.18	2482879.93	
CA34-2-C7	10/18/2016	5.0	0.0	5.0	3.0	568.69	246390.69	2482807.71	246391.88	2482809.10	
CA34-2-C8	10/18/2016	7.5	0.0	7.5	3.0	568.92	246320.34	2482748.96	246319.74	2482753.01	
CA34-2-C9	10/20/2016	3.5	0.0	3.5	3.0	569.41	246380.32	2482752.52	246380.85	2482751.70	
CA34-2-C10	10/20/2016	4.0	0.0	4.0	3.0	569.26	246454.01	2482813.53	246453.94	2482814.15	
CA34-2-C11	10/31/2016	5.5	0.0	5.5	3.0	569.00	246540.25	2482882.88	246540.08	2482883.65	
CA34-2-C12	10/31/2016	7.5	0.0	7.5	3.0	562.02	246635.20	2482963.82	246635.67	2482964.64	
CA34-2-C13	10/20/2016	6.5	0.0	6.5	3.0	569.40	246367.08	2482693.82	246367.47	2482690.44	
CA34-2-C14	10/20/2016	3.5	0.0	3.5	3.0	567.16	246441.83	2482755.01	246439.77	2482755.34	
CA34-2-C15	10/31/2016	9.5	0.0	9.5	3.0	567.62	246523.69	2482825.57	246522.51	2482825.43	
CA34-2-C16	10/31/2016	6.5	0.0	6.5	3.0	569.70	246620.76	2482912.08	246614.42	2482914.09	
CA34-2-C17	10/31/2016	5.0	0.0	5.0	3.0	569.08	246584.68	2482905.99	246584.42	2482905.46	
CA34-2-C18	10/31/2016	5.0	0.0	5.0	3.0	562.18	246685.00	2482958.50	246680.56	2482963.86	

Average	5.50	0.00	5.50
Median	5.00	0.00	5.00
Standard Deviation	1.60	0.00	1.60

Recommended Path Forward:

Verification samples were collected in 18 locations within OU4-CA34-2. 18 of 18 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HJR Date: 11/1/2016 Reviewed by: BSW Date: 11/1/2016

A/OT Acceptance: Date: 11/1/16

Armor Stone Thickness Verification and Approval Form

OU4-CA34-2 (A1 Cap Type Data)								
Area (acres)	Required Thickness (inches)	Average Poling Thickness (inches)	Post-Placement Bathymetric Survey Thickness (inches)	Calculated Average Thickness with Consolidation	Cubic Yards Required (CY)	5% Over Placement Factor (CY)	Volume Placed with Consolidation (CY)	Calculated Theoretical Volume (CY)
0.52	6.0	8.68	8.40	10.92	610.29	640.80	765.97	970.27

OU4-CA34-2 (A1 Cap Type)											
ID	Pre-Placement Poling Date	Date Sampled (Post Placement)	Stone Result (inches)	Cap Type	Required Thickness (inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CA34-2-A1-G1	10/24/2016	7/24/2017	10.6	A1	6.0	568.6	246321.84	2482793.10	246320.20	2482797.85	
CA34-2-A1-G2	10/24/2016	7/24/2017	11.2	A1	6.0	568.7	246361.73	2482823.82	246351.25	2482824.81	
CA34-2-A1-G3	10/24/2016	7/24/2017	4.8	A1	6.0	569.5	246324.52	2482750.86	246325.53	2482752.99	
CA34-2-A1-G4	10/24/2016	7/24/2017	8.9	A1	6.0	569.3	246381.84	2482795.25	246376.24	2482803.38	
CA34-2-A1-G5	10/24/2016	7/24/2017	9.3	A1	6.0	569.7	246364.03	2482737.04	246360.51	2482739.87	
CA34-2-A1-G6	10/24/2016	7/24/2017	10.2	A1	6.0	570.2	246431.17	2482795.02	246435.78	2482794.73	
CA34-2-A1-G7	10/24/2016	7/24/2017	4.8	A1	6.0	570.2	246404.03	2482726.30	246401.22	2482725.23	
CA34-2-A1-G8	10/24/2016	7/24/2017	9.7	A1	6.0	568.5	246489.19	2482794.26	246482.40	2482798.76	

Average	8.68
Median	9.51
Standard Deviation	2.50

OU4-CA34-2 (A3 Cap Type)											
ID	Date Sampled	Stone Result (inches)	Cap Type	Required Thickness (inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CA34-2-A3-G1	11/4/2016	5.0	A3	4.0	568.3	246431.53	2482883.35	246433.33	2482889.91	
CA34-2-A3-G2	11/4/2016	5.0	A3	4.0	566.6	246519.81	2482958.82	246521.59	2482965.10	
CA34-2-A3-G3	11/4/2016	7.0	A3	4.0	569.2	246436.44	2482840.40	246432.75	2482843.17	
CA34-2-A3-G4	11/4/2016	5.5	A3	4.0	568.1	246563.33	2482949.00	246563.14	2482954.56	
CA34-2-A3-G5	11/4/2016	7.0	A3	4.0	569.4	246532.04	2482883.55	246531.53	2482889.52	
CA34-2-A3-G6	11/4/2016	5.5	A3	4.0	563.7	246630.15	2482960.05	246626.01	2482962.43	
CA34-2-A3-G7	11/4/2016	5.5	A3	4.0	569.6	246542.49	2482840.40	246541.36	2482843.81	
CA34-2-A3-G8	11/4/2016	8.0	A3	4.0	568.9	246606.01	2482893.27	246613.61	2482888.97	
CA34-2-A3-G9	11/4/2016	10.0	A3	4.0	563.0	246680.55	2482956.99	246677.06	2482961.45	
CA34-2-A3-G10	11/4/2016	6.5	A3	4.0	569.7	246488.52	2482840.13	246486.83	2482845.49	
CA34-2-A3-G11	11/4/2016	5.0	A3	4.0	569.0	246495.14	2482904.52	246495.48	2482908.67	

Average	6.36
Median	5.50
Standard Deviation	1.57

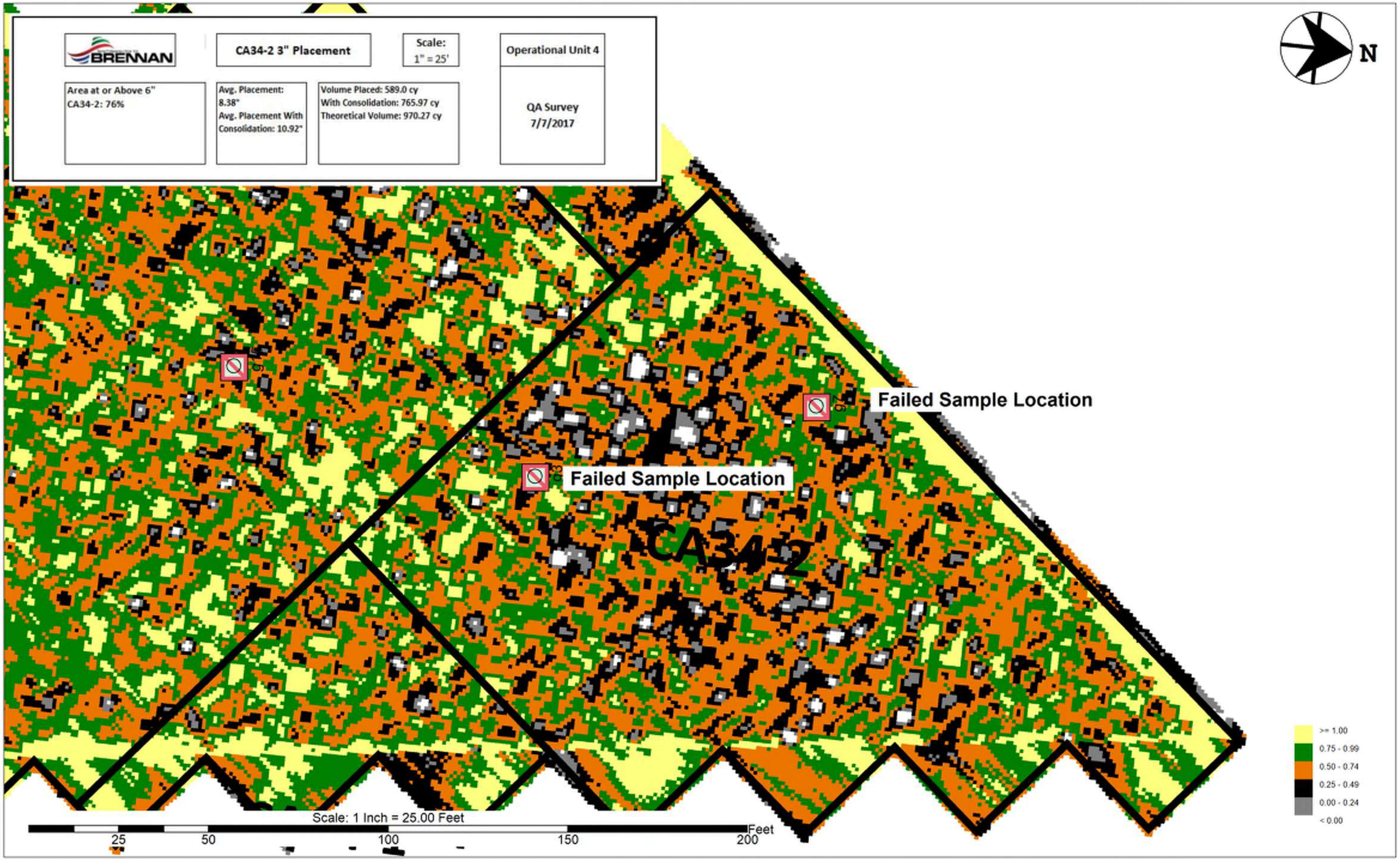
Recommended Path Forward:

Verification samples were collected in 19 locations within OU4-CA34-2. 6 of 8 samples in the A1 Cap Type meet or exceed the minimum thickness requirement of 6-inches. 11 of 11 samples in the A3 Cap Type meet or exceed the minimum thickness requirement of 4-inches resulting in 17 of 19 samples passing within OU4-CA34-2. Tetra Tech recommends use of the J.F. Brennan survey data to accept this area on an exception basis.

Prepared by: HSR Date: 9/5/2017 Reviewed by: BSW Date: 9/5/2017

A/OT Acceptance: Date: 12/6/17 On an exception Basis

BRENNAN	CA34-2 3" Placement	Scale: 1" = 25'	Operational Unit 4
Area at or Above 6" CA34-2: 76%	Avg. Placement: 8.38" Avg. Placement With Consolidation: 10.92"	Volume Placed: 589.0 cy With Consolidation: 765.97 cy Theoretical Volume: 970.27 cy	QA Survey 7/7/2017



OU4-CAFIK-065-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CAFIK-065-1-C1	11/2/2016	7.0	0.0	7.0	3.0	567.81	245391.92	2483019.42	245389.59	2483016.63	
CAFIK-065-1-C2	11/2/2016	6.5	0.0	6.5	3.0	568.83	245448.42	2483066.60	245444.14	2483062.72	
CAFIK-065-1-C3	11/2/2016	5.5	0.0	5.5	3.0	570.57	245501.34	2483111.38	245495.23	2483109.03	
CAFIK-065-1-C4	11/2/2016	4.0	0.0	4.0	3.0	570.53	245547.18	2483147.86	245542.29	2483146.59	

Average	5.75	0.00	5.75
Median	6.00	0.00	6.00
Standard Deviation	1.32	0.00	1.32

Recommended Path Forward:

Verification samples were collected in 4 locations within OU4-CAFIK-065-1. 4 of 4 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HNR Date: 11/3/2016 Reviewed by: BSW Date: 11/3/2016

A/OT Acceptance: Date: 11/7/16

Armor Stone Thickness Verification and Approval Form

OU4-CAFIK-065-1 (Bathymetric Survey)		
Area (acres)	Bathymetric Survey Thickness (inches)	Required Thickness (inches)
0.22	9.16	6.0

OU4-CAFIK-065-1 (A1 Cap Type)										
ID	Date Sampled	Stone Result (inches)	Cap Type	Required Thickness (inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CAFIK-065-1-A1-G1	12/8/2016	9.7	A1	6.0	570.9	245485.24	2483095.27	245481.79	2483097.67	
CAFIK-065-1-A1-G2	12/8/2016	12.0	A1	6.0	571.8	245550.90	2483151.34	245545.34	2483152.28	

Average	10.88
Median	10.88
Standard Deviation	1.65

OU4-CAFIK-065-1 (A2 Cap Type)										
ID	Date Sampled	Stone Result (inches)	Cap Type	Required Thickness (inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CAFIK-065-1-A2-G1	11/4/2016	6.0	A2	4.0	569.9	245375.71	2483006.16	245368.93	2483008.43	
CAFIK-065-1-A2-G2	11/4/2016	5.0	A2	4.0	569.9	245417.64	2483042.55	245415.06	2483044.34	

Average	5.50
Median	5.50
Standard Deviation	0.71

Recommended Path Forward:

Verification samples were collected in 4 locations within OU4-CAFIK-065-1. 2 of 2 samples in the A1 Cap Type meet or exceed the minimum thickness requirement of 6-inches. 2 of 2 samples in the A2 Cap Type meet or exceed the minimum thickness requirement of 4-inches resulting in a total of 4 out of 4 samples passing within OU4-CAFIK-065-1. Therefore, no further action is required.

Prepared by: HNK Date: 5/9/2017 Reviewed by: BSW Date: 5/10/2017

A/OT Acceptance: Date: 5/15/17

BRENNAN

CAFIK-065-1 Post 3" Cap Placement

Average Thickness

Operational Unit 4

QA Survey

Date: 11/08/16

CAFIK-065-1 Post Cap

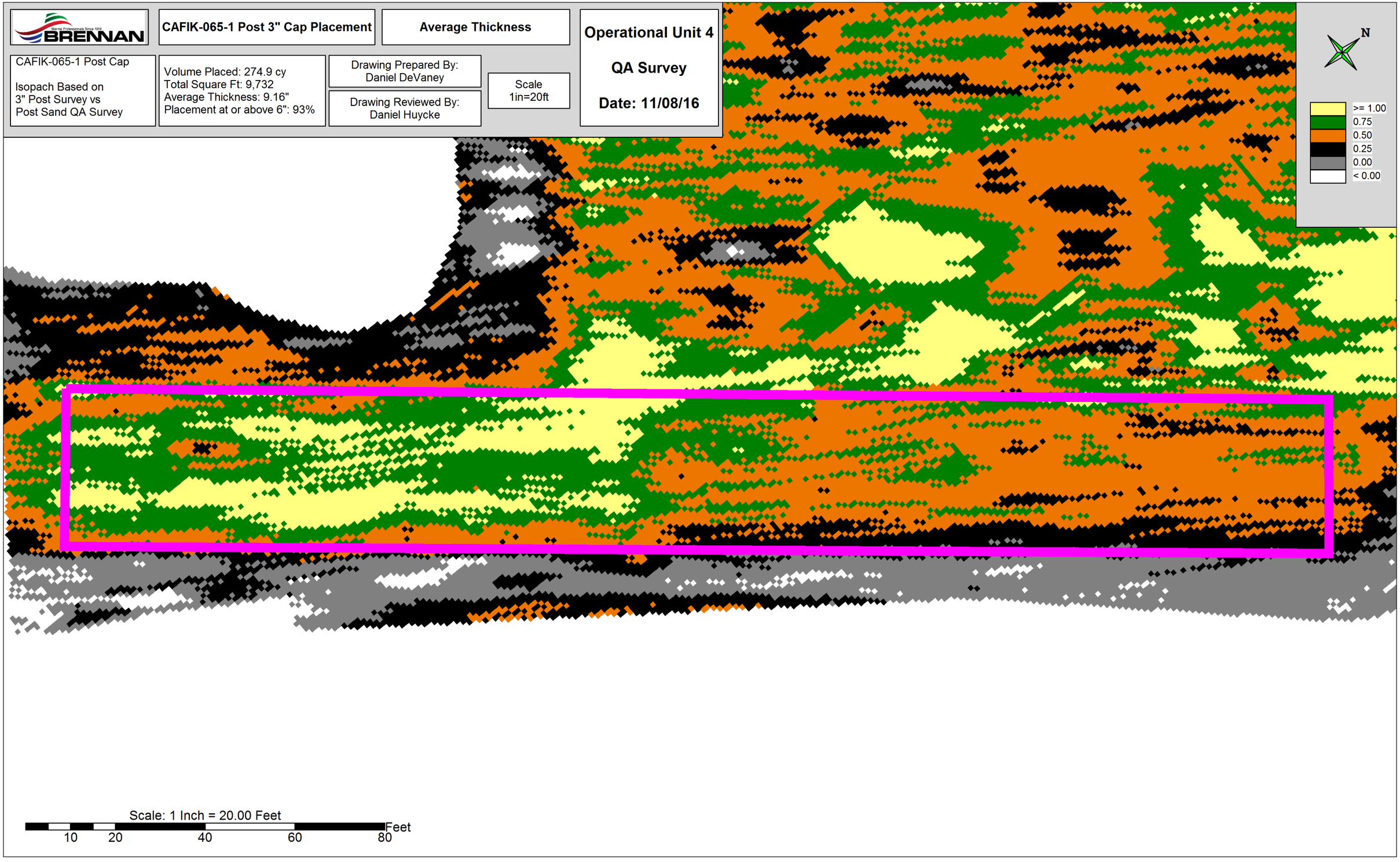
Isopach Based on
3" Post Survey vs
Post Sand QA Survey

Volume Placed: 274.9 cy
Total Square Ft: 9,732
Average Thickness: 9.16"
Placement at or above 6": 93%

Drawing Prepared By:
Daniel DeVaney

Drawing Reviewed By:
Daniel Huycke

Scale
1in=20ft



OU4-CB20-1												
ID	Date Sampled	Sand Result (inches)	Sand/Sediment Mix (inches)	Total Thickness Sand and Sediment Mix (inches)		Required Thickness (inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
								Northing	Easting	Northing	Easting	
CB20-1-C1	10/10/2016	8.5	0.0	8.5	8.5	6.0	557.84	245767.46	2483013.91	245773.71	2483015.73	
CB20-1-C2	10/27/2016	6.5	0.0	6.5	6.5	6.0	557.40	245818.88	2483055.35	245823.01	2483060.05	
CB20-1-C3	10/27/2016	7.5	0.0	7.5	7.5	6.0	556.78	245877.75	2483104.22	245882.02	2483108.80	
CB20-1-C4	10/27/2016	7.5	0.0	7.5	7.5	6.0	559.78	245883.92	2483063.73	245888.49	2483068.17	
CB20-1-C5	10/27/2016	7.5	0.0	7.5	7.5	6.0	559.76	245830.07	2483020.72	245831.97	2483023.49	
CB20-1-C6	10/10/2016	8.5	0.0	8.5	8.5	6.0	559.98	245769.16	2482969.32	245775.17	2482969.00	
CB20-1-C7	10/10/2016	9.5	0.0	9.5	9.5	6.0	562.42	245806.61	2482955.08	245805.18	2482952.99	
CB20-1-C8	10/27/2016	6.5	0.0	6.5	6.5	6.0	561.61	245864.41	2483004.79	245866.06	2483005.57	
CB20-1-C9	10/27/2016	7.0	0.0	7.0	7.0	6.0	559.10	245925.05	2483052.27	245926.99	2483055.48	
CB20-1-C10	10/27/2016	11.5	0.0	11.5	11.5	6.0	555.13	245965.53	2483040.54	245969.89	2483044.89	
CB20-1-C11	10/27/2016	8.5	0.0	8.5	8.5	6.0	562.81	245894.84	2482981.86	245898.41	2482986.65	
CB20-1-C12	10/10/2016	9.0	0.0	9.0	9.0	6.0	562.57	245815.25	2482916.79	245819.69	2482911.23	
CB20-1-C13	10/10/2016	11.0	0.0	11.0	11.0	6.0	563.53	245866.41	2482914.24	245867.34	2482915.12	
CB20-1-C14	10/27/2016	6.0	0.0	6.0	6.0	6.0	562.90	245947.60	2482979.88	245953.36	2482982.41	
CB20-1-C15	10/27/2016	6.0	0.0	6.0	6.0	6.0	555.91	246011.89	2483033.93	246007.80	2483033.21	
CB20-1-C16	10/27/2016	4.0	0.0		4.0	6.0	556.26	246055.81	2483023.85	246054.59	2483021.43	Thickness is an open core measurement
CB20-1-C16A	10/27/2016	4.5	0.0		4.5	6.0	556.46			246048.69	2483021.28	Step-out location
CB20-1-C16B	10/27/2016	3.0	0.0	3.3	3.0	6.0	557.52			246057.19	2483016.47	Step-out location
CB20-1-C16C	10/27/2016	2.5	0.0		2.5	6.0	554.48			246061.02	2483023.38	Step-out location
CB20-1-C16D	10/27/2016	2.5	0.0		2.5	6.0	554.51			246053.61	2483028.17	Step-out location
CB20-1-C17	10/10/2016	6.0	0.0	6.0	6.0	6.0	563.61	245951.20	2482940.32	245949.71	2482944.89	
CB20-1-C18	10/10/2016	7.5	0.0	7.5	7.5	6.0	563.54	245860.35	2482863.93	245861.48	2482863.93	
CB20-1-C19	10/10/2016	7.5	0.0	7.5	7.5	6.0	563.54	245921.25	2482869.46	245921.01	2482873.98	
CB20-1-C20	10/10/2016	7.0	0.0	7.0	7.0	6.0	562.60	246023.65	2482952.48	246022.49	2482957.52	
CB20-1-C21	10/27/2016	7.0	0.0	7.0	7.0	6.0	553.32	246106.51	2483025.47	246106.86	2483022.82	
CB20-1-C22	10/27/2016	15.5	0.0	15.5	15.5	6.0	554.46	246158.67	2483000.56	246152.24	2483018.85	
CB20-1-C23	10/27/2016	8.5	0.0	8.5	8.5	6.0	560.45	246076.04	2482949.89	246030.57	2482952.04	
CB20-1-C24	10/10/2016	6.5	0.0	6.5	6.5	6.0	565.16	245977.08	2482869.71	245977.50	2482870.27	
CB20-1-C25	10/10/2016	11.5	0.0	11.5	11.5	6.0	564.48	245905.75	2482810.37	245910.60	2482810.64	

Average	7.4	0.0	8.1	7.4
Median	7.5	0.0	7.5	7.5
Standard Deviation	2.8	0.0	2.4	2.8

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CB20-1. 24 of 25 samples meet or exceed the minimum thickness requirement of 6-inches. However, 1 location did not meet the requirements. Additional step-outs were collected resulting in 24 out of 25 locations passing within the area. Therefore, no further action is required according to Table 5-2 in the CQAPP.

Prepared by: HNK Date: 10/28/2016 Reviewed by: BSW Date: 10/28/2016

A/OT Acceptance: Date: 10/31/16

Armor Stone Thickness Verification and Approval Form

OU4-CB20-1 (Bathymetric Survey)		
Area (acres)	Bathymetric Survey Thickness (inches)	Required Thickness (inches)
0.32	10.06	6.0

OU4-CB20-1 (B1 Cap Type)										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CB20-1-B1-G1	10/18/2016	8.2	B1	6.0	559.4	245740.56	2482992.44	245746.54	2482986.22	
CB20-1-B1-G2	10/18/2016	7.3	B1	6.0	562.8	245786.01	2482938.44	245784.66	2482931.15	
CB20-1-B1-G3	10/18/2016	13.2	B1	6.0	563.1	245809.77	2482911.43	245814.90	2482909.69	
CB20-1-B1-G4	10/18/2016	12.1	B1	6.0	563.7	245838.59	2482889.75	245833.71	2482884.05	
CB20-1-B1-G5	10/18/2016	13.5	B1	6.0	565.0	245869.41	2482871.59	245871.34	2482866.56	
CB20-1-B1-G6	10/18/2016	11.1	B1	6.0	565.4	245913.21	2482860.91	245911.40	2482861.84	
CB20-1-B1-G7	10/18/2016	10.0	B1	6.0	565.7	245910.33	2482814.12	245907.16	2482817.22	
CB20-1-B1-G8	10/18/2016	9.1	B1	6.0	565.8	245969.37	2482860.08	245966.73	2482860.17	

Average	10.55
Median	10.58
Standard Deviation	2.30

OU4-CB20-1 (B3 Cap Type)										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CB20-1-B3-G1	11/1/2016	7.0	B3	4.0	558.3	245783.24	2483029.72	245783.13	2483026.97	
CB20-1-B3-G2	11/1/2016	7.5	B3	4.0	558.1	245851.87	2483088.59	245856.50	2483089.79	
CB20-1-B3-G3	11/1/2016	4.5	B3	4.0	559.7	245900.89	2483081.59	245902.94	2483079.09	
CB20-1-B3-G4	11/1/2016	6.0	B3	4.0	560.0	245830.86	2483022.71	245829.74	2483021.53	
CB20-1-B3-G5	11/1/2016	7.0	B3	4.0	562.1	245816.15	2482966.64	245815.49	2482965.09	
CB20-1-B3-G6	11/1/2016	7.0	B3	4.0	562.9	245895.28	2483032.52	245891.89	2483030.80	
CB20-1-B3-G7	11/1/2016	5.5	B3	4.0	560.1	245960.41	2483036.73	245960.86	2483033.72	
CB20-1-B3-G8	11/1/2016	11.0	B3	4.0	563.5	245867.27	2482963.84	245863.10	2482964.31	
CB20-1-B3-G9	11/1/2016	7.5	B3	4.0	563.7	245918.65	2482960.97	245915.80	2482957.59	
CB20-1-B3-G10	N/A	N/A	B3	4.0	N/A	246014.53	2483038.04	N/A	N/A	Bucket could not be located during retrieval
CB20-1-B3-G11	11/1/2016	6.5	B3	4.0	564.0	245931.70	2482923.88	245929.93	2482919.90	
CB20-1-B3-G12	11/1/2016	8.5	B3	4.0	562.4	246012.30	2482989.47	246009.63	2482984.82	
CB20-1-B3-G13	N/A	N/A	B3	4.0	N/A	246039.88	2482967.05	N/A	N/A	Bucket could not be located during retrieval
CB20-1-B3-G14	11/1/2016	7.5	B3	4.0	565.6	245975.43	2482913.85	245970.63	2482908.90	
CB20-1-B3-G15	11/1/2016	6.0	B3	4.0	551.3	246112.71	2483028.65	246111.35	2483028.23	
CB20-1-B3-G16	11/1/2016	7.0	B3	4.0	555.3	246157.36	2483020.61	246162.16	2483022.31	
CB20-1-B3-G17	11/1/2016	7.5	B3	4.0	561.0	246088.45	2482962.67	246084.20	2482963.94	
CB20-1-B3-G18	N/A	N/A	B3	4.0	N/A	246009.78	2482897.73	N/A	N/A	Bucket could not be located during retrieval
CB20-1-B3-E1	11/1/2016	5.5	B3	4.0	560.8	245861.46	2483029.53	245858.95	2483030.56	Bucket B3-G10 could not be located therefore the B3-E1 bucket measurement is used in its place.
CB20-1-B3-E3	11/1/2016	5.5	B3	4.0	563.4	246011.61	2482959.79	246015.00	2482961.96	Bucket B3-G18 could not be located therefore the B3-E3 bucket measurement is used in its place.
CB20-1-B3-E4	11/1/2016	2.0	B3	4.0	559.6	246098.47	2482990.83	246098.86	2482990.32	Bucket B3-G13 could not be located therefore the B3-E4 bucket measurement is used in its place.

Average	6.61
Median	7.00
Standard Deviation	1.83

Recommended Path Forward:

Verification samples were collected in 26 locations within OU4-CB20-1. 8 of 8 samples in the B1 Cap Type meet or exceed the minimum thickness requirement of 6-inches. 17 of 18 samples in the B3 Cap Type meet or exceed the minimum thickness requirement of 4-inches resulting in a total of 25 out of 26 samples passing within OU4-CB20-1. Therefore, no further action is required.

Prepared by: HNK Date: 5/9/2017 Reviewed by: BSW Date: 5/10/2017

A/OT Acceptance: Date: 5/15/17

BRENNAN

CB20-1 Post Cap 3" Placement

Average Thickness

CB20-1 Post Cap

Isopach Based on
3" Post Survey vs
Post Sand QA Survey

Volume Placed: 436.9 cy
Total Square Ft: 14,065
Average Thickness: 10.06"
Placement at or above 6": 92%

Drawing Prepared By:
Daniel DeVaney

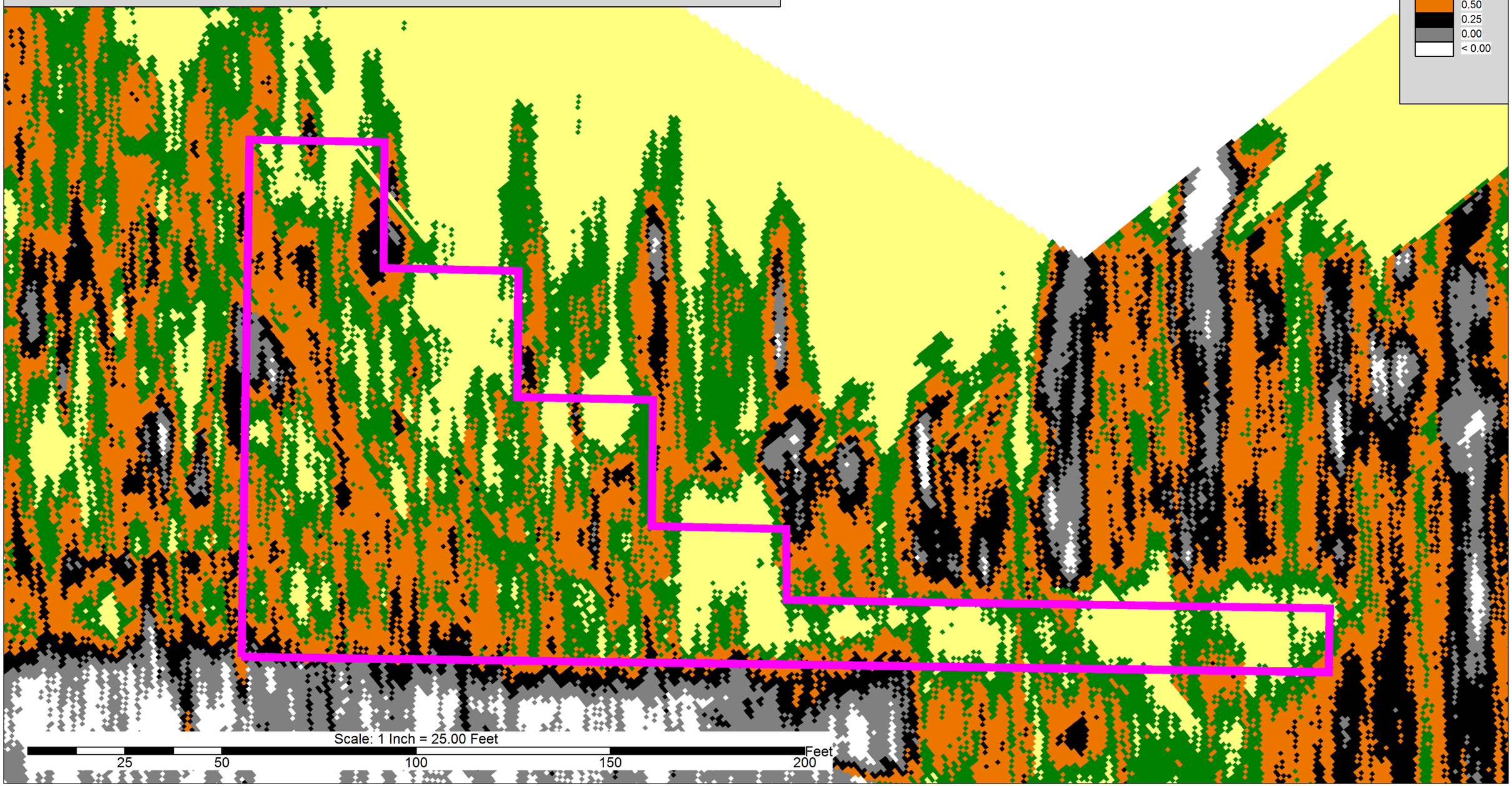
Drawing Reviewed By:
Daniel Huycke

Scale
1in=25ft

Operational Unit 4

QA Survey

Date: 11/08/16



OU4-CB20-2 & CBD35U North Micro-102											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CB20-2-C1	10/17/2016	7.5	0.0	7.5	6.0	565.44	245963.24	2482812.28	245961.03	2482813.40	
CB20-2-C2	10/17/2016	7.5	0.0	7.5	6.0	563.26	246048.05	2482884.53	246046.55	2482885.56	
CB20-2-C3	10/27/2016	7.0	0.0	7.0	6.0	560.19	246136.82	2482960.35	246139.66	2482963.84	
CB20-2-C4	10/14/2016	9.0	0.0	9.0	6.0	560.72	246127.47	2482904.18	246127.51	2482905.29	
CB20-2-C5	10/17/2016	9.0	0.0	9.0	6.0	563.56	246043.19	2482832.38	246050.08	2482828.82	
CB20-2-C6	10/17/2016	7.5	0.0	7.5	6.0	564.73	245945.21	2482755.27	245952.88	2482754.60	
CB20-2-C7	10/14/2016	9.0	0.0	9.0	6.0	566.34	246004.24	2482756.59	246003.76	2482756.79	
CB20-2-C8	10/17/2016	7.0	0.0	7.0	6.0	563.13	246099.76	2482836.40	246098.77	2482843.24	
CB20-2-C9	10/14/2016	7.0	0.0	7.0	6.0	561.70	246181.82	2482903.26	246182.95	2482904.70	
CB20-2-C10	10/17/2016	9.0	0.0	9.0	6.0	558.85	246172.89	2482848.38	246174.21	2482847.68	
CB20-2-C11	10/17/2016	8.0	0.0	8.0	6.0	558.76	246111.08	2482792.67	246113.28	2482794.10	
CB20-2-C12	10/17/2016	9.5	0.0	9.5	6.0	566.75	245996.43	2482703.49	245999.87	2482702.18	
CB20-2-C13	10/14/2016	13.0	0.0	13.0	6.0	564.40	246072.73	2482724.46	246065.90	2482726.68	
CB20-2-C14	10/17/2016	9.0	0.0	9.0	6.0	558.87	246196.63	2482825.18	246199.12	2482826.73	
CB20-2-C15	10/17/2016	9.0	0.0	9.0	6.0	558.90	246175.27	2482765.48	246176.37	2482767.84	
CB20-2-C16	10/17/2016	7.0	0.0	7.0	6.0	561.15	246115.70	2482711.99	246118.93	2482716.70	
CB20-2-C17	10/17/2016	7.0	0.0	7.0	6.0	554.86	246170.92	2482712.54	246174.51	2482712.35	
CB20-2-C18	10/17/2016	6.0	0.0	6.0	6.0	559.53	246229.13	2482759.89	246226.21	2482760.78	
CB20-2-C19	10/17/2016	11.0	0.0	11.0	6.0	561.19	246265.97	2482745.40	246264.31	2482746.85	
CB20-2-C20	10/14/2016	6.5	0.0	6.5	6.0	557.12	246211.07	2482701.67	246208.83	2482702.06	
CB20-2-C21	10/18/2016	6.5	0.0	6.5	6.0	555.97	246215.02	2482659.06	246217.87	2482656.65	
CB20-2-C22	10/18/2016	7.5	0.0	7.5	6.0	560.86	246268.31	2482701.44	246274.67	2482705.07	
CB20-2-C23	10/18/2016	6.5	0.0	6.5	6.0	562.75	246318.46	2482699.68	246315.25	2482700.56	
CB20-2-C24	10/18/2016	7.0	0.0	7.0	6.0	562.03	246253.16	2482644.46	246247.86	2482647.97	
CBD35U N MICRO-102-C1	10/18/2016	6.0	0.0	6.0	6.0	565.20	246326.42	2482657.25	246326.36	2482656.89	

Average	7.96	0.00	7.96
Median	7.50	0.00	7.50
Standard Deviation	1.63	1.63	1.63

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CB20-2 & CBD35U North Micro-102. 25 of 25 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: HMK Date: 10/28/2016 Reviewed by: BSW Date: 10/28/2016

A/OT Acceptance: Date: 10/31/16

Armor Stone Thickness Verification and Approval Form

OU4-CB20-2 & CBD35U North Micro-102 (B1 Cap Type Data)								
Area (acres)	Required Thickness (Inches)	Average Poling Thickness (Inches)	Post-Placement Bathymetric Survey Thickness (Inches)	Calculated Average Thickness with Consolidation	Cubic Yards Required (CY)	5% Over Placement Factor (CY)	Volume Placed with Consolidation (CY)	Calculated Theoretical Volume (CY)
1.46	6.0	7.94	9.36	11.55	1176.98	1235.83	2265.30	2707.07

OU4-CB20-2 & CBD35U North Micro-102 (B1 Cap Type)											
ID	Pre-Placement Poling Date	Date Sampled (Post Placement)	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CB20-2-B1-G1	10/17/2016	7/24/2017	7.9	B1	6.0	566.2	245965.15	2482814.38	245966.91	2482808.92	
CB20-2-B1-G2	10/17/2016	7/24/2017	11.3	B1	6.0	564.7	246020.27	2482858.52	246017.50	2482858.72	
CB20-2-B1-G3	10/17/2016	7/24/2017	11.7	B1	6.0	566.7	245961.30	2482764.49	245963.61	2482763.21	
CB20-2-B1-G4	10/17/2016	7/24/2017	8.3	B1	6.0	563.9	246060.77	2482848.28	246056.03	2482845.59	
CB20-2-B1-G5	10/17/2016	7/24/2017	11.8	B1	6.0	567.3	246040.66	2482785.99	246034.75	2482787.96	
CB20-2-B1-G6	10/17/2016	7/24/2017	3.7	B1	6.0	563.4	246098.00	2482835.34	246104.44	2482836.49	
CB20-2-B1-G7	10/17/2016	7/24/2017	0.5	B1	6.0	558.6	246167.22	2482844.97	246163.25	2482837.87	
CB20-2-B1-G8	10/17/2016	7/24/2017	12.1	B1	6.0	560.3	246092.51	2482781.86	246099.12	2482779.61	
CB20-2-B1-G9	10/17/2016	7/24/2017	4.9	B1	6.0	567.1	246012.85	2482718.74	246016.26	2482718.97	
CB20-2-B1-G10	10/17/2016	7/24/2017	12.1	B1	6.0	564.7	246081.58	2482728.47	246074.89	2482724.37	
CB20-2-B1-G11	10/17/2016	7/24/2017	8.4	B1	6.0	559.2	246157.61	2482793.81	246157.29	2482801.13	
CB20-2-B1-G12	10/17/2016	7/24/2017	9.8	B1	6.0	561.3	246125.18	2482720.53	246124.33	2482724.51	
CB20-2-B1-G13	10/17/2016	7/24/2017	11.0	B1	6.0	560.0	246213.31	2482794.16	246220.03	2482795.81	
CB20-2-B1-G14	10/17/2016	7/24/2017	10.4	B1	6.0	557.8	246197.41	2482729.90	246187.90	2482729.18	
CB20-2-B1-G15	10/17/2016	7/24/2017	5.0	B1	6.0	560.7	246245.60	2482728.23	246238.93	2482731.63	
CB20-2-B1-G16	10/24/2016	7/24/2017	4.9	B1	6.0	560.1	246244.23	2482679.30	246237.08	2482673.28	
CB20-2-B1-G17	10/24/2016	7/24/2017	1.9	B1	6.0	560.7	246283.32	2482667.73	246282.18	2482666.82	
CBD35U N MICRO-102-B1-G1	10/24/2016	12/8/2016	7.3	B1	6.0	566.0	246332.62	2482662.51	246331.00	2482660.64	

Average	7.94
Median	8.33
Standard Deviation	3.69

OU4-CB20-2 & CBD35U North Micro-102 (B2 and B3 Cap Types)											
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CB20-2-B2-G1	10/28/2016	4.0	B2	4.0	557.4	246234.73	2482629.07	246233.63	2482633.13	
CB20-2-B3-G1	11/3/2016	6.5	B3	4.0	562.7	246069.97	2482902.45	246064.02	2482898.33	
CB20-2-B3-G2	11/3/2016	6.0	B3	4.0	560.6	246137.13	2482958.47	246133.89	2482960.36	
CB20-2-B3-G3	11/3/2016	5.5	B3	4.0	561.2	246121.04	2482901.75	248119.74	2482900.31	
CB20-2-B3-G4	11/3/2016	5.5	B3	4.0	562.2	246172.12	2482890.54	246167.56	2482892.44	

Average	5.50
Median	5.50
Standard Deviation	0.94

Recommended Path Forward:

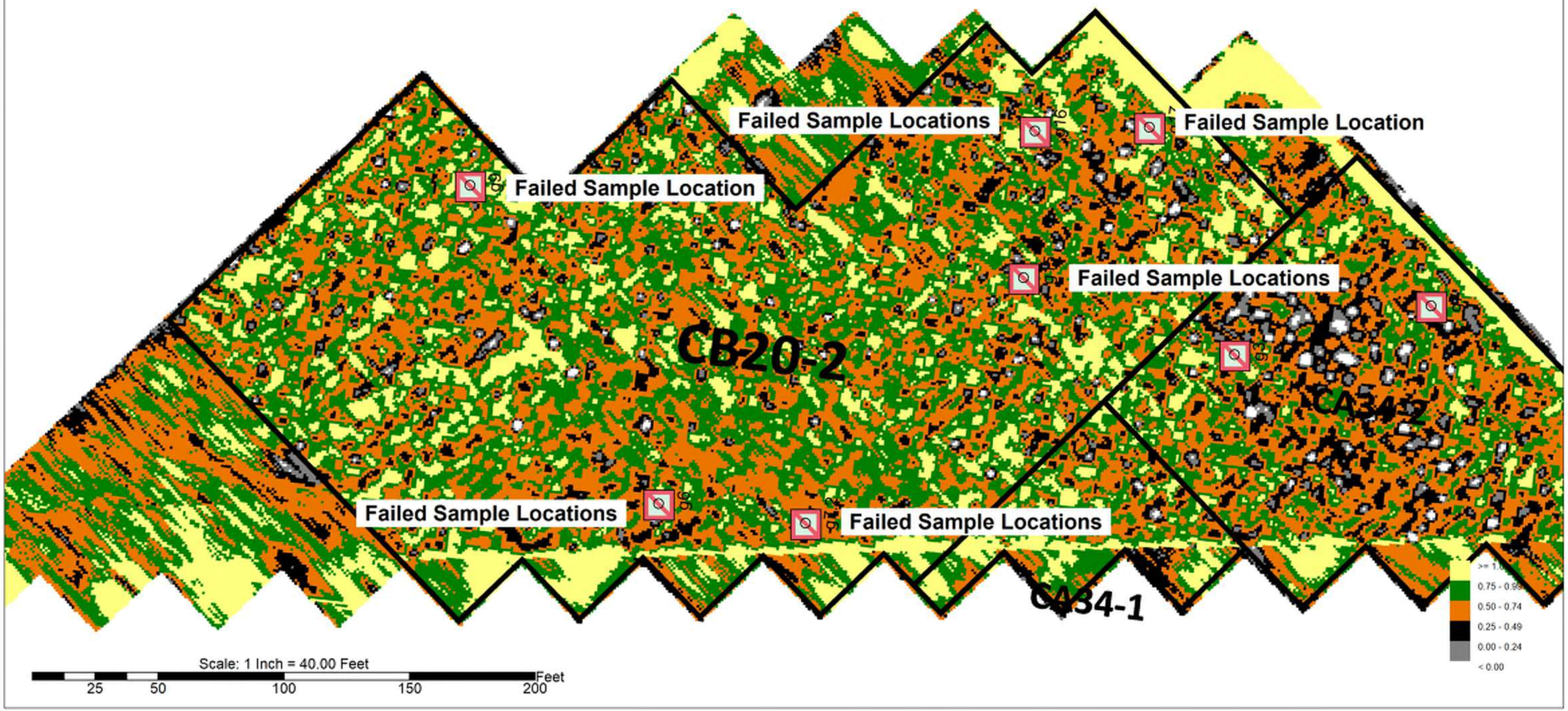
Verification samples were collected in 23 locations within OU4-CB20-2 & CBD35U North Micro-102. 11 of 17 samples within OU4-CB20-2 in the B1 Cap Type meet or exceed the minimum thickness requirement of 6-inches. 1 of 1 samples within CBD35U North Micro-102 in the B1 Cap Type meet or exceed the minimum thickness requirement of 6-inches. 5 of 5 samples within OU4-CB20-2 in the B2 and B3 Cap Types meet or exceed the minimum thickness requirement of 4-inches resulting in a total of 17 out of 23 samples passing within OU4-CB20-2 & CBD35U North Micro-102. Tetra Tech recommends use of the J.F. Brennan survey data to accept this area on an exception basis.

Prepared by: HNK Date: 7/25/2017 Reviewed by: BSW Date: 7/26/2017

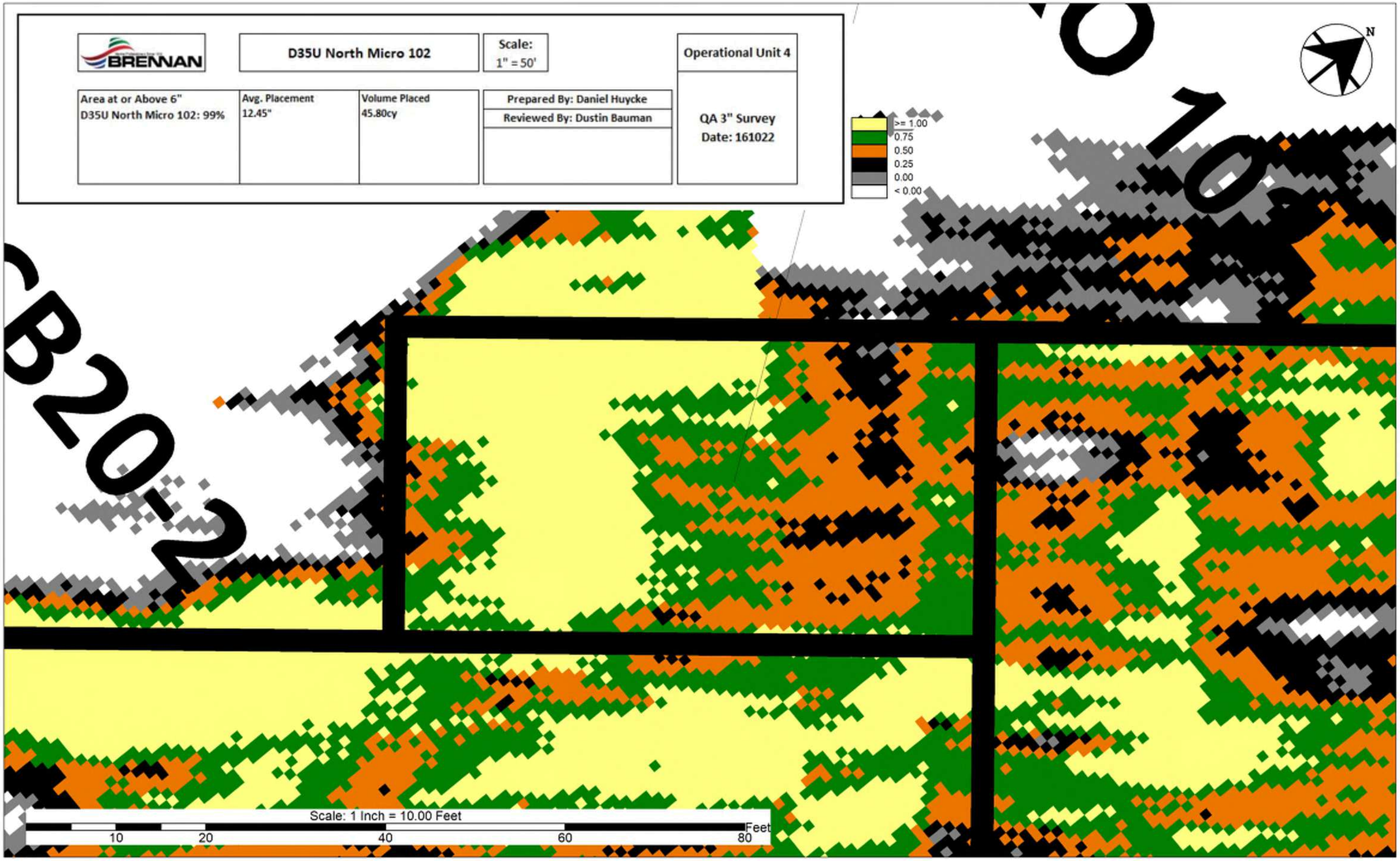
A/OT Acceptance: [signature] Date: 12/6/17

On the exception basis, Identify This cap as a sentinel cap (reference The COMMP for definition of a sentinel cap)

BRENNAN	CB20-2 3" Placement	Scale: 1" = 40'	Operational Unit 4
Area at or Above 6" CB20-2: 89%	Avg. Placement: 9.36" Avg. Placement With Consolidation: 11.55"	Volume Placed: 1,835.70 cy With Consolidation: 2,265.30 cy Theoretical Volume: 2,707.07 cy	QA Survey 7/7/2017



BRENNAN	D35U North Micro 102	Scale: 1" = 50'		Operational Unit 4
Area at or Above 6" D35U North Micro 102: 99%	Avg. Placement 12.45"	Volume Placed 45.80cy	Prepared By: Daniel Huycke Reviewed By: Dustin Bauman	QA 3" Survey Date: 161022



OU4-CB28A-1												
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)		Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
								Northing	Easting	Northing	Easting	
CB28A-1-C1	5/14/2015	6.5	0.0	6.5	6.5	6.0	569.62	243163.10	2480060.28	243166.93	2480061.63	
CB28A-1-C2	5/14/2015	7.0	0.0	7.0	7.0	6.0	569.97	243093.28	2479969.38	243092.10	2479968.74	
CB28A-1-C3	5/14/2015	5.5	0.0		5.5	6.0	569.68	242996.82	2479858.44	242992.24	2479853.79	
CB28A-1-C3A	5/14/2015	5.0	0.0		5.0	6.0	569.20			242989.63	2479860.43	Step-out Core
CB28A-1-C3B	5/14/2015	5.5	0.0	5.2	5.5	6.0	569.15			242983.49	2479853.21	Step-out Core
CB28A-1-C3C	5/14/2015	5.5	0.0		5.5	6.0	570.10			242991.01	2479846.87	Step-out Core
CB28A-1-C3D	5/14/2015	4.5	0.0		4.5	6.0	570.14			242996.82	2479854.85	Step-out Core
CB28A-1-C4	5/14/2015	6.5	0.0	6.5	6.5	6.0	569.56	243004.43	2479807.63	243001.93	2479805.04	
CB28A-1-C5	5/15/2015	6.5	0.0	6.5	6.5	6.0	569.66	243077.20	2479892.32	243076.69	2479893.29	
CB28A-1-C6	5/15/2015	7.0	0.0	7.0	7.0	6.0	570.06	243164.35	2480010.88	243164.82	2480009.36	
CB28A-1-C7	5/15/2015	6.0	0.0	6.0	6.0	6.0	569.72	243062.81	2479821.18	243064.60	2479827.19	
CB28A-1-C8	5/15/2015	11.0	0.0	11.0	11.0	6.0	570.09	243138.97	2479916.03	243141.81	2479920.06	
CB28A-1-C9	5/15/2015	5.0	0.0		5.0	6.0	569.53	243207.50	2480005.80	243210.05	2480008.95	
CB28A-1-C9A	5/15/2015	6.0	0.0		6.0	6.0	569.67			243219.07	2480011.08	Step-out Core
CB28A-1-C9B	5/15/2015	5.0	0.0	5.4	5.0	6.0	569.59			243210.94	2480016.30	Step-out Core
CB28A-1-C9C	5/15/2015	5.0	0.0		5.0	6.0	569.50			243205.53	2480008.58	Step-out Core
CB28A-1-C9D	5/15/2015	6.0	0.0		6.0	6.0	569.69			243214.07	2480003.73	Step-out Core
CB28A-1-C10	5/15/2015	6.0	0.0	6.0	6.0	6.0	569.54	243270.12	2480082.86	243269.94	2480084.76	
CB28A-1-C11	5/15/2015	16.0	0.0	16.0	16.0	6.0	569.48	243350.50	2480186.18	243350.23	2480190.69	

Average	6.6	0.0	7.6	6.6
Median	6.0	0.0	6.5	6.0
Standard Deviation	2.7	0.0	3.2	2.7

Recommended Path Forward:

Verification samples were collected in 11 locations within OU4-CB28A-1. 9 of 11 samples meet or exceed the minimum thickness requirement of 6-inches. However, 2 locations did not meet the requirements. Additional step-outs were collected resulting in 9 out of 11 locations passing within the area. Tetra tech recommends use of J.F. Brennan QC data to accept this area on an exception basis.

Prepared by: MJM Date: 5/18/2015 Reviewed by: BSW Date: 5/18/2015

A/OT Acceptance: Date: 5/19/15 On an exception Basis

OU4-CB28A-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CB28A-1-G1	6/4/2015	5.0	B2	4.0	570.0	242977.01	2479829.15	242974.47	2479830.32	
CB28A-1-G2	N/A	N/A	B2	4.0	N/A	243044.78	2479917.41	N/A	N/A	Bucket could not be located during retrieval
CB28A-1-G3	6/4/2015	4.0	B2	4.0	569.8	243159.91	2480057.98	243166.02	2480063.54	
CB28A-1-G4	6/4/2015	4.5	B2	4.0	570.0	243106.02	2479932.94	243106.74	2479932.42	
CB28A-1-G5	6/4/2015	4.5	B2	4.0	570.2	243030.08	2479840.59	243032.56	2479839.40	
CB28A-1-G6	6/4/2015	7.5	B2	4.0	570.3	243034.98	2479790.74	243029.91	2479788.37	
CB28A-1-G7	6/4/2015	8.0	B2	4.0	570.6	243097.04	2479867.56	243093.24	2479861.54	
CB28A-1-G8	6/4/2015	7.0	B2	4.0	570.1	243190.34	2479979.58	243182.08	2479978.24	
CB28A-1-G9	6/4/2015	6.0	B2	4.0	570.5	243174.01	2480016.35	243172.42	2480016.39	
CB28A-1-G10	6/4/2015	8.0	B2	4.0	569.9	243267.91	2480077.65	243261.96	2480078.04	
CB28A-1-G11	6/4/2015	5.5	B2	4.0	569.9	243347.93	2480183.07	243350.98	2480185.14	
CB28A-1-E1	6/4/2015	7.5	B2	4.0	570.2	243050.57	2479874.58	243050.36	2479876.09	Bucket G2 could not be located therefore the E1 bucket measurement is used in its place.

Average 6.14
Median 6.00
Standard Deviation 1.52

Recommended Path Forward:

Verification samples were collected in 11 locations within OU4-CB28A-1. 11 of 11 samples meet or exceed the minimum thickness requirement of 4-inches, therefore, no further action is required.

Prepared by: HNK Date: 6/5/2015 Reviewed by: BSW Date: 6/8/2015

A/OT Acceptance: Date: 6/9/15

OU4-CB33A-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CB33A-1-C1	10/4/2016	8.5	0.0	8.5	6.0	562.17	245463.24	2482760.00	245465.70	2482757.45	
CB33A-1-C2	10/4/2016	9.0	0.0	9.0	6.0	561.87	245549.85	2482831.19	245552.27	2482827.63	
CB33A-1-C3	10/4/2016	6.0	0.0	6.0	6.0	561.50	245641.67	2482912.46	245643.06	2482913.18	
CB33A-1-C4	10/4/2016	7.0	0.0	7.0	6.0	560.67	245718.12	2482973.51	245721.53	2482972.65	
CB33A-1-C5	10/4/2016	7.0	0.0	7.0	6.0	561.30	245721.09	2482927.26	245725.53	2482927.36	
CB33A-1-C6	10/4/2016	8.0	0.0	8.0	6.0	561.64	245658.28	2482877.44	245659.81	2482875.76	
CB33A-1-C7	10/4/2016	9.0	0.0	9.0	6.0	561.70	245593.18	2482822.02	245598.30	2482825.84	
CB33A-1-C8	10/4/2016	7.5	0.0	7.5	6.0	562.05	245520.23	2482762.99	245524.73	2482761.61	
CB33A-1-C9	10/4/2016	8.5	0.0	8.5	6.0	562.28	245652.46	2482825.87	245654.65	2482826.42	
CB33A-1-C10	10/4/2016	7.0	0.0	7.0	6.0	561.70	245705.19	2482871.53	245710.38	2482870.62	
CB33A-1-C11	10/4/2016	8.0	0.0	8.0	6.0	562.23	245765.03	2482920.75	245764.94	2482923.78	

Average	7.77	0.00	7.77
Median	8.00	0.00	8.00
Standard Deviation	0.96	0.00	0.96

Recommended Path Forward:

Verification samples were collected in 11 locations within OU4-CB33A-1. 11 of 11 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: RJK Date: 10/6/2016 Reviewed by: BSW Date: 10/6/2016

A/OT Acceptance: Date: 10/10/16

Armor Stone Thickness Verification and Approval Form

OU4-CB33A-1 (Bathymetric Survey)		
Area (acres)	Bathymetric Survey Thickness (inches)	Required Thickness (inches)
0.42	9.19	6.0

OU4-CB33A-1 (B1 Cap Type)										
ID	Date Sampled	Stone Result (inches)	Cap Type	Required Thickness (inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CB33A-1-B1-G1	10/18/2016	9.9	B1	6.0	562.5	245616.33	2482885.35	245617.91	2482893.99	
CB33A-1-B1-G2	10/18/2016	12.8	B1	6.0	562.5	245691.35	2482950.34	245700.33	2482949.91	
CB33A-1-B1-G3	10/18/2016	6.8	B1	6.0	562.2	245742.24	2482945.94	245743.13	2482948.12	
CB33A-1-B1-G4	10/18/2016	8.7	B1	6.0	562.9	245661.52	2482881.83	245660.09	2482881.95	
CB33A-1-B1-G5	10/18/2016	8.1	B1	6.0	563.1	245659.76	2482831.77	245664.31	2482829.26	
CB33A-1-B1-G6	10/18/2016	5.8	B1	6.0	562.8	245732.59	2482893.25	245736.98	2482893.55	

Average	8.69
Median	8.41
Standard Deviation	2.49

OU4-CB33A-1 (B2 Cap Type)										
ID	Date Sampled	Stone Result (inches)	Cap Type	Required Thickness (inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CB33A-1-B2-G1	11/4/2016	5.5	B2	4.0	562.4	245461.74	2482755.36	245459.80	2482754.95	
CB33A-1-B2-G2	11/4/2016	4.0	B2	4.0	562.1	245542.23	2482828.11	245549.75	2482832.90	
CB33A-1-B2-G3	11/4/2016	0.5	B2	4.0	562.9	245527.11	2482766.78	245532.79	2482764.99	Bucket was on side upon retrieval; Location will not be used
CB33A-1-B2-G4	11/4/2016	5.0	B2	4.0	562.6	245598.40	2482825.91	245590.71	2482826.92	
CB33A-1-B2-E2	11/4/2016	5.0	B2	4.0	562.4	245555.55	2482799.62	245554.96	2482800.17	Bucket B2-G3 was on its side upon retrieval and will not be used; therefore the B2-E2 bucket measurement is used in its place.

Note: Location highlighted in red was not included for calculations due to bucket being on its side upon retrieval.

Average	4.88
Median	5.00
Standard Deviation	0.63

Recommended Path Forward:

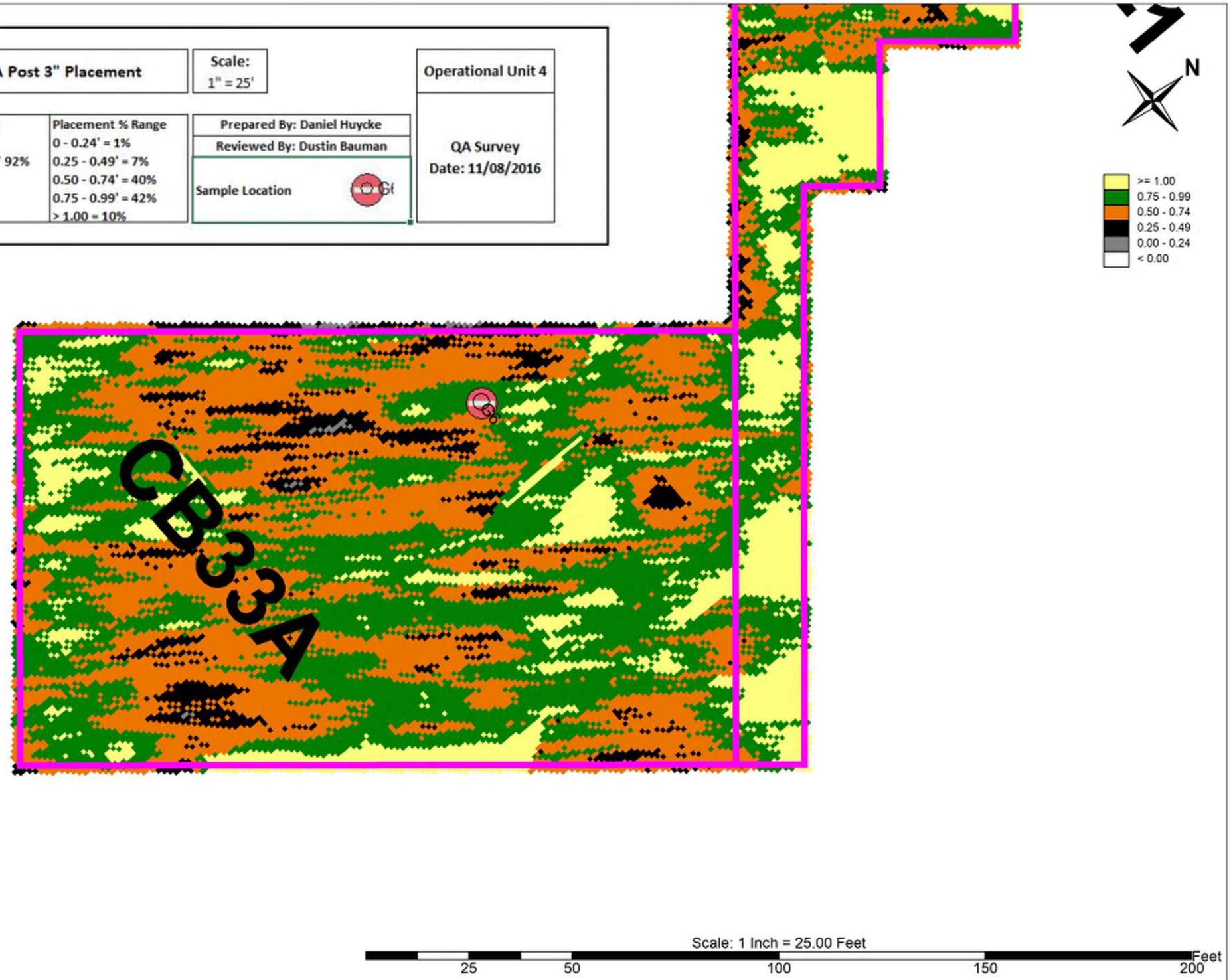
Verification samples were collected in 10 locations within OU4-CB33A-1. 5 of 6 samples in the B1 Cap Type meet or exceed the minimum thickness requirement of 6-inches. 4 of 4 samples in the B2 Cap Type meet or exceed the minimum thickness requirement of 4-inches resulting in a total of 9 out of 10 samples passing within OU4-CB33A-1. Tetra Tech recommends use of the J.F. Brennan survey data to accept this area on an exception basis.

Prepared by: HNK Date: 5/9/2017 Reviewed by: BSW Date: 5/10/2017

A/OT Acceptance: Date: 7/12/17 on an exception basis

BRENNAN	CB33A Post 3" Placement	Scale: 1" = 25'	Operational Unit 4

CB33A Post Cap Placement Isopach Based on 3" Post Survey vs Post Sand	Percentage of Placement at or Above 6" 92%	Placement % Range 0 - 0.24' = 1% 0.25 - 0.49' = 7% 0.50 - 0.74' = 40% 0.75 - 0.99' = 42% > 1.00 = 10%	Prepared By: Daniel Huycke Reviewed By: Dustin Bauman Sample Location	QA Survey Date: 11/08/2016



OU4-CB34-1											
ID	Date Sampled	Sand Result (inches)	Sand/Sediment Mix (inches)	Total Thickness Sand and Sediment Mix (inches)	Required Thickness (inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CB34-1-C1	11/1/2016	9.5	0.0	9.5	6.0	565.42	246644.62	2482878.63	246642.35	2482878.83	
CB34-1-C2	11/1/2016	10.0	0.0	10.0	6.0	565.62	246676.05	2482904.91	246672.76	2482901.68	
CB34-1-C3	11/1/2016	7.0	0.0	7.0	6.0	564.79	246707.86	2482930.82	246705.31	2482931.78	
CB34-1-C4	11/1/2016	7.0	0.0	7.0	6.0	563.39	246737.81	2482955.24	246734.61	2482952.30	

Average	8.38	0.00	8.38
Median	8.25	0.00	8.25
Standard Deviation	1.60	0.00	1.60

Recommended Path Forward:

Verification samples were collected in 4 locations within OU4-CB34-1. 4 of 4 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: KJK Date: 11/2/2016 Reviewed by: BSW Date: 11/2/2016

A/OT Acceptance: Date: 11/7/16

OU4-CB34-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CB34-1-G1	11/3/2016	6.0	B3	4.0	566.3	246642.49	2482878.54	246641.47	2482879.20	
CB34-1-G2	11/3/2016	5.0	B3	4.0	565.9	246673.52	2482904.05	246668.50	2482902.10	
CB34-1-G3	11/3/2016	5.0	B3	4.0	565.4	246707.87	2482931.04	246708.22	2482934.75	
CB34-1-G4	11/3/2016	7.0	B3	4.0	563.0	246737.43	2482955.44	246732.38	2482959.30	

Average 5.75
Median 5.50
Standard Deviation 0.96

Recommended Path Forward:

Verification samples were collected at 4 locations within OU4-CB34-1. 4 of 4 samples meet or exceed the minimum thickness requirement of 4-inches, therefore, no further action is required.

Prepared by: HNK Date: 11/4/2016 Reviewed by: BSW Date: 11/7/2016

A/OT Acceptance: Date: 11/8/16

OU4-CB46-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CB46-1-C1	5/14/2015	6.0	0.0	6.0	6.0	569.41	243200.02	2480106.53	243197.15	2480107.30	
CB46-1-C2	5/14/2015	7.0	0.0	7.0	6.0	569.57	243236.23	2480149.78	243239.13	2480145.22	
CB46-1-C3	5/14/2015	7.5	0.0	7.5	6.0	569.21	243304.44	2480235.52	243305.47	2480236.46	
CB46-1-C4	5/15/2015	7.0	0.0	7.0	6.0	569.62	243320.30	2480200.59	243318.09	2480198.67	
CB46-1-C5	5/15/2015	8.0	0.0	8.0	6.0	569.50	243284.35	2480155.60	243282.30	2480157.52	
CB46-1-C6	5/15/2015	6.0	0.0	6.0	6.0	569.44	243208.29	2480064.75	243207.87	2480064.19	

Average	6.92	0.00	6.92
Median	7.00	0.00	7.00
Standard Deviation	0.80	0.00	0.80

Recommended Path Forward:

Verification samples were collected in 6 locations within OU4-CB46-1. 6 of 6 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: MMM Date: 5/18/2015 Reviewed by: BSW Date: 5/18/2015

A/OT Acceptance: Date: 5/19/18

OU4-CB46-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CB46-1-G1	6/4/2015	6.0	B3	4.0	570.1	243219.06	2480075.04	243218.14	2480074.03	
CB46-1-G2	6/4/2015	5.0	B3	4.0	569.6	243201.52	2480108.56	243199.87	2480107.03	
CB46-1-G3	6/4/2015	6.0	B3	4.0	569.3	243263.53	2480186.74	243263.49	2480186.43	
CB46-1-G4	6/4/2015	7.5	B3	4.0	572.4	243254.78	2480118.77	243257.54	2480116.83	
CB46-1-G5	6/4/2015	N/A	B3	4.0	569.6	243323.85	2480206.06	243326.80	2480206.06	Bucket was crushed and unusable upon retrieval.
CB46-1-G6	6/4/2015	6.0	B3	4.0	569.5	243305.59	2480242.20	243307.64	2480240.48	
CB46-1-E2	6/4/2015	3.0	B3	4.0	569.8	243313.87	2480166.40	243313.93	2480167.23	Bucket G5 was crushed and unusable upon retrieval therefore the E2 bucket measurement is used in its place.

Average 5.58
Median 6.00
Standard Deviation 1.50

Recommended Path Forward:

Verification samples were collected in 6 locations within OU4-CB46-1. 5 of 6 samples meet or exceed the minimum thickness requirement of 4-inches. Tetra Tech recommends use of the J.F. Brennan QC data to accept this area on an exception basis.

Prepared by: HNK Date: 6/5/2015 Reviewed by: BSW Date: 6/8/2015

A/OT Acceptance: Date: 6/9/15 on an exception Basis

OU4-CB47-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CB47-1-C1	5/29/2015	9.0	0.0	9.0	6.0	569.68	243813.95	2480647.80	243812.91	2480648.46	
CB47-1-C2	5/29/2015	7.0	0.0	7.0	6.0	569.92	243745.29	2480563.07	243748.00	2480561.82	
CB47-1-C3	5/29/2015	7.5	0.0	7.5	6.0	568.85	243690.33	2480496.38	243688.95	2480495.87	
CB47-1-C4	5/29/2015	8.0	0.0	8.0	6.0	569.24	243736.33	2480497.42	243732.22	2480497.01	
CB47-1-C5	5/29/2015	9.5	0.0	9.5	6.0	570.09	243802.19	2480579.56	243800.65	2480575.13	
CB47-1-C6	5/29/2015	8.0	0.0	8.0	6.0	569.86	243849.23	2480638.15	243849.65	2480638.24	

Average	8.17	0.00	8.17
Median	8.00	0.00	8.00
Standard Deviation	0.93	0.00	0.93

Recommended Path Forward:

Verification samples were collected in 6 locations within OU4-CB47-1. 6 of 6 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: JNK Date: 6/1/2015 Reviewed by: BSW Date: 6/1/2015

A/OT Acceptance: Date: 6/1/15

OU4-CB47-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CB47-1-G1	9/11/2015	5.0	B3	4.0	569.3	243709.08	2480523.17	243711.92	2480525.53	
CB47-1-G2	9/11/2015	4.0	B3	4.0	570.0	243769.19	2480599.55	243775.79	2480599.44	
CB47-1-G3	9/11/2015	4.5	B3	4.0	570.3	243831.91	2480674.36	243826.01	2480669.63	
CB47-1-G4	9/11/2015	5.0	B3	4.0	570.4	243835.57	2480624.14	243834.11	2480617.38	
CB47-1-G5	9/11/2015	4.5	B3	4.0	570.0	243772.32	2480546.71	243771.22	2480546.57	
CB47-1-G6	9/11/2015	4.5	B3	4.0	569.7	243716.40	2480474.52	243717.65	2480477.80	

Average 4.58
Median 4.50
Standard Deviation 0.38

Recommended Path Forward:

Verification samples were collected in 6 locations within OU4-CB47-1. 6 of 6 samples meet or exceed the minimum thickness requirement of 4-inches, therefore, no further action is required.

Prepared by: FNK Date: 9/14/2015 Reviewed by: BSW Date: 9/14/2015

A/OT Acceptance: Date: 9/17/15

OU4-CB50-1												
ID	Date Sampled	Sand Result (inches)	Sand/Sediment Mix (inches)	Total Thickness Sand and Sediment Mix (inches)		Required Thickness (inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
								Northing	Easting	Northing	Easting	
CB50-1-C1	10/5/2015	6.0	0.0	6.0	6.0	6.0	558.69	244871.11	2482402.45	244870.69	2482402.92	
CB50-1-C2	10/5/2015	6.5	0.0	6.5	6.5	6.0	559.19	245004.41	2482514.04	245002.90	2482513.39	
CB50-1-C3	10/6/2015	7.0	0.0	7.0	7.0	6.0	560.23	245213.58	2482687.62	245216.14	2482683.06	
CB50-1-C4	10/7/2015	5.5	0.0		5.5	6.0	561.04	245399.69	2482844.01	245398.36	2482840.35	Sand thickness measurement is an open core measurement.
CB50-1-C4A	10/7/2015	4.0	0.0		4.0	6.0	561.15			245391.35	2482836.85	Step-out Core
CB50-1-C4B	10/7/2015	5.5	0.0	4.3	5.5	6.0	560.90			245396.16	2482830.38	Step-out Core
CB50-1-C4C	10/7/2015	6.0	0.0		6.0	6.0	560.88			245403.54	2482836.35	Step-out Core
CB50-1-C4D	10/7/2015	0.5	0.0		0.5	6.0	561.19			245397.81	2482842.75	Step-out Core
CB50-1-C5	10/7/2015	8.0	0.0	8.0	8.0	6.0	561.67	245549.81	2482968.80	245549.24	2482967.65	
CB50-1-C6	10/7/2015	8.0	0.0	8.0	8.0	6.0	561.28	245543.31	2482917.21	245539.47	2482916.00	
CB50-1-C7	10/8/2015	6.5	0.0	6.5	6.5	6.0	560.49	245373.66	2482777.79	245370.39	2482777.79	
CB50-1-C8	10/8/2015	7.0	0.0	7.0	7.0	6.0	559.40	245167.77	2482605.83	245170.00	2482605.77	
CB50-1-C9	10/7/2015	6.0	0.0	6.0	6.0	6.0	558.44	245003.95	2482468.49	245002.33	2482464.55	
CB50-1-C10	10/7/2015	8.0	0.0	8.0	8.0	6.0	559.07	244859.42	2482349.28	244861.34	2482350.37	
CB50-1-C11	10/7/2015	6.5	0.0	6.5	6.5	6.0	560.01	244916.80	2482350.91	244914.45	2482354.54	
CB50-1-C12	10/8/2015	7.0	0.0	7.0	7.0	6.0	559.51	245067.18	2482477.55	245066.24	2482477.03	
CB50-1-C13	10/8/2015	7.0	0.0	7.0	7.0	6.0	559.70	245228.22	2482609.54	245227.24	2482612.56	
CB50-1-C14	10/8/2015	6.5	0.0	6.5	6.5	6.0	560.18	245322.10	2482689.71	245320.65	2482689.77	
CB50-1-C15	10/7/2015	8.5	0.0	8.5	8.5	6.0	560.43	245478.93	2482819.14	245477.09	2482818.35	
CB50-1-C16	10/6/2015	9.0	0.0	9.0	9.0	6.0	561.62	245604.89	2482924.17	245606.41	2482925.52	
CB50-1-C17	10/9/2015	6.0	0.0	6.0	6.0	6.0	560.26	245419.89	2482723.86	245417.48	2482723.80	
CB50-1-C18	10/9/2015	4.5	0.0		4.5	6.0	560.03	245309.74	2482632.54	245309.40	2482633.49	
CB50-1-C18A	10/9/2015	4.5	0.0		4.5	6.0	560.29			245302.41	2482634.99	Step-out Core
CB50-1-C18B	10/9/2015	3.0	0.0	4.2	3.0	6.0	559.49			245304.99	2482627.21	Step-out Core
CB50-1-C18C	10/9/2015	4.5	0.0		4.5	6.0	559.09			245315.29	2482629.95	Step-out Core
CB50-1-C18D	10/9/2015	4.5	0.0		4.5	6.0	560.05			245312.62	2482637.80	Step-out Core
CB50-1-C19	10/9/2015	6.0	0.0	6.0	6.0	6.0	560.19	245164.04	2482512.16	245162.80	2482513.41	
CB50-1-C20	10/9/2015	7.5	0.0	7.5	7.5	6.0	561.09	245016.77	2482388.32	245016.12	2482389.94	
CB50-1-C21	10/9/2015	8.0	0.0	8.0	8.0	6.0	562.50	244864.83	2482214.51	244864.66	2482214.22	
CB50-1-C22	10/9/2015	6.5	0.0	6.5	6.5	6.0	562.16	244978.15	2482309.53	244972.48	2482312.40	
CB50-1-C23	10/9/2015	7.5	0.0	7.5	7.5	6.0	561.60	245132.24	2482438.97	245131.01	2482441.78	
CB50-1-C24	10/9/2015	11.0	0.0	11.0	11.0	6.0	559.48	245285.61	2482567.01	245283.61	2482568.93	
CB50-1-C25	10/9/2015	6.0	0.0	6.0	6.0	6.0	558.89	245397.14	2482659.03	245397.34	2482659.52	
Average		6.3	0.0	7.0	6.3							
Median		6.5	0.0	7.0	6.5							
Standard Deviation		1.9	0.0	1.4	1.9							

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CB50-1. 23 of 25 samples meet or exceed the minimum thickness requirement of 6 inches. However, 2 locations did not meet the requirements. Additional step-outs were collected resulting in 23 out of 25 locations passing within the area. Therefore, no further action is required according to Table 5-2 in the CQAPP.

Prepared by: HNK Date: 10/12/2015 Reviewed by: MNM Date: 10/12/2015

A/QC Acceptance: Date: 10/13/15

OU4-CB50-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CB50-1-G1	10/20/2015	4.5	B2	4.0	559.6	244894.06	2482422.78	244895.74	2482420.30	
CB50-1-G2	10/20/2015	3.5	B2	4.0	559.5	245040.92	2482545.54	245043.56	2482547.84	
CB50-1-G3	10/20/2015	4.0	B2	4.0	561.0	245297.50	2482759.45	245300.73	2482763.13	
CB50-1-G4	10/20/2015	5.0	B2	4.0	561.9	245443.64	2482880.63	245443.11	2482884.04	
CB50-1-G5	10/20/2015	5.5	B2	4.0	561.7	245532.73	2482955.06	245537.42	2482952.40	
CB50-1-G6	10/20/2015	4.0	B2	4.0	561.3	245585.83	2482952.74	245585.63	2482952.94	
CB50-1-G7	10/20/2015	5.5	B2	4.0	561.1	245481.34	2482866.84	245481.02	2482866.69	
CB50-1-G8	10/21/2015	4.5	B2	4.0	559.7	245263.80	2482686.01	245258.92	2482682.07	
CB50-1-G9	N/A	N/A	B2	4.0	N/A	2482566.58	245120.44	N/A	N/A	Bucket could not be located during retrieval
CB50-1-G10	N/A	N/A	B2	4.0	N/A	2482427.55	244954.40	N/A	N/A	Bucket could not be located during retrieval
CB50-1-G11	10/20/2015	6.0	B2	4.0	560.1	244875.90	2482361.38	244884.67	2482361.84	
CB50-1-G12	10/20/2015	5.0	B2	4.0	561.2	244880.12	2482320.02	244882.61	2482319.78	
CB50-1-G13	10/21/2015	5.0	B2	4.0	559.6	245057.47	2482468.19	245060.00	2482473.41	
CB50-1-G14	10/21/2015	3.5	B2	4.0	560.1	245223.11	2482608.25	245225.74	2482608.68	
CB50-1-G15	10/21/2015	2.5	B2	4.0	560.6	245358.75	2482719.69	245355.79	2482718.99	
CB50-1-G16	10/20/2015	5.0	B2	4.0	561.5	245562.78	2482889.33	245563.80	2482889.95	
CB50-1-G17	10/21/2015	3.5	B3	4.0	560.8	245410.55	2482716.48	245412.71	2482716.06	
CB50-1-G18	10/21/2015	5.5	B3	4.0	560.7	245281.24	2482610.55	245286.98	2482610.63	
CB50-1-G19	N/A	N/A	B3	4.0	N/A	2482535.81	245193.42	N/A	N/A	Bucket could not be located during retrieval
CB50-1-G20	10/21/2015	4.0	B3	4.0	560.7	245037.27	2482405.64	245037.49	2482409.01	
CB50-1-G21	10/21/2015	6.0	B3	4.0	563.2	244876.64	2482224.10	244877.17	2482219.17	
CB50-1-G22	10/21/2015	5.0	B3	4.0	562.5	244998.81	2482327.41	244998.54	2482328.78	
CB50-1-G23	10/21/2015	5.5	B3	4.0	559.9	245150.77	2482455.56	245158.97	2482458.32	
CB50-1-G24	10/21/2015	5.0	B3	4.0	559.3	245353.07	2482623.76	245354.86	2482626.07	
CB50-1-G25	10/21/2015	5.5	B3	4.0	559.2	245445.80	2482699.65	245445.96	2482700.17	
CB50-1-E1	10/22/2015	6.5	B2	4.0	559.2	245008.80	2482486.48	245009.25	2482487.34	Bucket G10 could not be located therefore the E1 bucket measurement is used in its place.
CB50-1-E2	10/22/2015	8.0	B3	4.0	562.2	245109.03	2482428.63	245108.84	2482428.19	Bucket G19 could not be located therefore the E2 bucket measurement is used in its place.
CB50-1-E3	10/22/2015	6.5	B2	4.0	559.4	245209.15	2482627.04	245208.80	2482627.22	Bucket G9 could not be located therefore the E3 bucket measurement is used in its place.

Average 4.98
Median 5.00
Standard Deviation 1.18

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CB50-1. 21 of 25 samples meet or exceed the minimum thickness requirement of 4-inches. Part of OU4-CB50-1 was respread as directed by the A/OT. Tetra Tech recommends approval of this area utilizing J.F. Brennan's respread QC data.

Prepared by: HNK Date: 10/23/2015 Reviewed by: BSW Date: 12/2/2015

A/OT Acceptance: Date: 12/2/15

Based on Brennan Respread QC Data

OU4-CB50-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CB50-1-G1	10/20/2015	4.5	B2	4.0	559.6	244894.06	2482422.78	244895.74	2482420.30	
CB50-1-G2	10/20/2015	3.5	B2	4.0	559.5	245040.92	2482545.54	245043.56	2482547.84	
CB50-1-G3	10/20/2015	4.0	B2	4.0	561.0	245297.50	2482759.45	245300.73	2482763.13	
CB50-1-G4	10/20/2015	5.0	B2	4.0	561.9	245443.64	2482880.63	245443.11	2482884.04	
CB50-1-G5	10/20/2015	5.5	B2	4.0	561.7	245532.73	2482955.06	245537.42	2482952.40	
CB50-1-G6	10/20/2015	4.0	B2	4.0	561.3	245585.83	2482952.74	245585.63	2482952.94	
CB50-1-G7	10/20/2015	5.5	B2	4.0	561.1	245481.34	2482866.84	245481.02	2482866.69	
CB50-1-G8	10/21/2015	4.5	B2	4.0	559.7	245263.80	2482686.01	245258.92	2482682.07	
CB50-1-G9	N/A	N/A	B2	4.0	N/A	2482566.58	245120.44	N/A	N/A	Bucket could not be located during retrieval
CB50-1-G10	N/A	N/A	B2	4.0	N/A	2482427.55	244954.40	N/A	N/A	Bucket could not be located during retrieval
CB50-1-G11	10/20/2015	6.0	B2	4.0	560.1	244875.90	2482361.38	244884.67	2482361.84	
CB50-1-G12	10/20/2015	5.0	B2	4.0	561.2	244880.12	2482320.02	244882.61	2482319.78	
CB50-1-G13	10/21/2015	5.0	B2	4.0	559.6	245057.47	2482468.19	245060.00	2482473.41	
CB50-1-G14	10/21/2015	3.5	B2	4.0	560.1	245223.11	2482608.25	245225.74	2482608.68	
CB50-1-G15	10/21/2015	2.5	B2	4.0	560.6	245358.75	2482719.69	245355.79	2482718.99	
CB50-1-G16	10/20/2015	5.0	B2	4.0	561.5	245562.78	2482889.33	245563.80	2482889.95	
CB50-1-G17	10/21/2015	3.5	B3	4.0	560.8	245410.55	2482716.48	245412.71	2482716.06	
CB50-1-G18	10/21/2015	5.5	B3	4.0	560.7	245281.24	2482610.55	245286.98	2482610.63	
CB50-1-G19	N/A	N/A	B3	4.0	N/A	2482535.81	245193.42	N/A	N/A	Bucket could not be located during retrieval
CB50-1-G20	10/21/2015	4.0	B3	4.0	560.7	245037.27	2482405.64	245037.49	2482409.01	
CB50-1-G21	10/21/2015	6.0	B3	4.0	563.2	244876.64	2482224.10	244877.17	2482219.17	
CB50-1-G22	10/21/2015	5.0	B3	4.0	562.5	244998.81	2482327.41	244998.54	2482328.78	
CB50-1-G23	10/21/2015	5.5	B3	4.0	559.9	245150.77	2482455.56	245158.97	2482458.32	
CB50-1-G24	10/21/2015	5.0	B3	4.0	559.3	245353.07	2482623.76	245354.86	2482626.07	
CB50-1-G25	10/21/2015	5.5	B3	4.0	559.2	245445.80	2482699.65	245445.96	2482700.17	
CB50-1-E1	10/22/2015	6.5	B2	4.0	559.2	245008.80	2482486.48	245009.25	2482487.34	Bucket G10 could not be located therefore the E1 bucket measurement is used in its place.
CB50-1-E2	10/22/2015	8.0	B3	4.0	562.2	245109.03	2482428.63	245108.84	2482428.19	Bucket G19 could not be located therefore the E2 bucket measurement is used in its place.
CB50-1-E3	10/22/2015	6.5	B2	4.0	559.4	245209.15	2482627.04	245208.80	2482627.22	Bucket G9 could not be located therefore the E3 bucket measurement is used in its place.

Average 4.98
Median 5.00
Standard Deviation 1.18

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CB50-1. 21 of 25 samples meet or exceed the minimum thickness requirement of 4-inches. Part of OU4-CB50-1 was respread as directed by the A/OT. Tetra Tech recommends approval of this area utilizing J.F. Brennan's respread QC data.

Prepared by: HNK Date: 10/23/2015 Reviewed by: BSW Date: 12/2/2015

A/OT Acceptance: Date: 12/2/15

Based on Brennan Respread QC Data

CB50 ARMOR STONE RESPREAD STEP DETAIL

Step Start	Area	SMU/CMU	Lane	Step Number	Duration (min)	Northing	Easting	Density (#/cu.ft.)	Length (ft)	Width (ft)	Height (in)	Weight (tons)	Cubic Yards	Inches/Step
11/13/2015 11:33:18 AM	OU4	CB50	I	216	4.38	245438.28	2482739.49	105.00	4.00	35.00	5.00	3.00	2.12	4.91
11/13/2015 11:38:12 AM	OU4	CB50	I	215	0.63	245433.28	2482736.35	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 11:39:21 AM	OU4	CB50	I	214	0.60	245430.16	2482734.03	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/13/2015 11:40:28 AM	OU4	CB50	I	213	1.97	245427.57	2482731.91	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 11:42:57 AM	OU4	CB50	I	212	0.57	245424.19	2482729.17	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/13/2015 11:44:02 AM	OU4	CB50	I	211	2.30	245420.79	2482726.58	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 11:46:50 AM	OU4	CB50	I	210	1.12	245418.12	2482724.31	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/13/2015 11:48:28 AM	OU4	CB50	I	209	0.82	245415.22	2482722.02	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 11:49:48 AM	OU4	CB50	I	208	0.68	245411.59	2482719.20	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/13/2015 11:50:59 AM	OU4	CB50	I	207	2.25	245408.83	2482717.10	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 11:53:45 AM	OU4	CB50	I	206	0.65	245405.21	2482714.14	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 11:54:54 AM	OU4	CB50	I	205	0.92	245403.25	2482712.04	105.00	4.00	35.00	2.50	2.10	1.48	3.43
11/13/2015 11:56:20 AM	OU4	CB50	I	204	0.67	245400.30	2482708.00	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 11:57:45 AM	OU4	CB50	I	203	0.45	245396.39	2482705.74	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 11:58:43 AM	OU4	CB50	I	202	0.52	245392.93	2482703.06	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/13/2015 11:59:45 AM	OU4	CB50	I	201	0.58	245390.38	2482700.94	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/13/2015 12:00:50 PM	OU4	CB50	I	200	1.42	245387.07	2482698.09	105.00	4.00	35.00	2.50	2.90	2.05	4.74
11/13/2015 12:02:45 PM	OU4	CB50	I	199	0.62	245383.18	2482696.75	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:03:53 PM	OU4	CB50	I	198	0.70	245380.55	2482694.59	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:05:06 PM	OU4	CB50	I	197	0.63	245377.34	2482691.98	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:06:14 PM	OU4	CB50	I	196	0.63	245374.30	2482688.71	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:07:22 PM	OU4	CB50	I	195	0.48	245372.14	2482685.40	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:08:22 PM	OU4	CB50	I	194	0.43	245369.28	2482683.40	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:09:18 PM	OU4	CB50	I	193	0.47	245366.11	2482680.83	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:10:16 PM	OU4	CB50	I	192	0.43	245362.95	2482678.22	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:11:13 PM	OU4	CB50	I	191	0.45	245359.44	2482675.33	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:12:26 PM	OU4	CB50	I	190	0.27	245356.54	2482672.84	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:13:12 PM	OU4	CB50	I	189	0.48	245353.59	2482670.19	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:14:11 PM	OU4	CB50	I	188	0.48	245350.66	2482667.57	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:15:11 PM	OU4	CB50	I	187	0.48	245347.43	2482664.95	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:16:10 PM	OU4	CB50	I	186	0.45	245344.62	2482662.76	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:17:08 PM	OU4	CB50	I	185	0.48	245341.24	2482659.84	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:18:07 PM	OU4	CB50	I	184	0.68	245338.11	2482657.27	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:19:19 PM	OU4	CB50	I	183	1.18	245334.72	2482654.49	105.00	4.00	35.00	2.50	2.40	1.69	3.91
11/13/2015 12:21:01 PM	OU4	CB50	I	182	0.65	245331.51	2482652.49	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:22:10 PM	OU4	CB50	I	181	0.68	245328.79	2482650.23	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:23:21 PM	OU4	CB50	I	180	0.52	245325.10	2482648.36	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:24:23 PM	OU4	CB50	I	179	0.45	245322.84	2482644.30	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 12:25:20 PM	OU4	CB50	I	178	0.55	245319.80	2482641.87	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 12:26:23 PM	OU4	CB50	I	177	0.58	245316.87	2482639.38	105.00	4.00	35.00	2.50	2.00	1.41	3.26

CB50 ARMOR STONE RESPREAD STEP DETAIL

Step Start	Area	SMU/CMU	Lane	Step Number	Duration (min)	Northing	Easting	Density (#/cu.ft.)	Length (ft)	Width (ft)	Height (in)	Weight (tons)	Cubic Yards	Inches/Step
11/13/2015 12:27:29 PM	OU4	CB50	I	176	0.50	245313.47	2482636.94	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:28:30 PM	OU4	CB50	I	175	0.45	245310.43	2482634.47	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 12:29:27 PM	OU4	CB50	I	174	0.45	245307.30	2482631.64	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:30:25 PM	OU4	CB50	I	173	0.48	245304.44	2482629.45	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 12:31:25 PM	OU4	CB50	I	172	0.53	245301.37	2482626.89	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 12:32:28 PM	OU4	CB50	I	171	0.43	245298.22	2482624.11	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:33:40 PM	OU4	CB50	I	170	0.20	245294.93	2482621.51	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:34:22 PM	OU4	CB50	I	169	0.53	245292.32	2482619.21	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:35:24 PM	OU4	CB50	I	168	0.60	245289.07	2482616.35	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:41:48 PM	OU4	CB50	H	263	0.07	245563.10	2482890.56	105.00	4.00	35.00	2.50	0.10	0.07	0.16
11/13/2015 12:42:37 PM	OU4	CB50	H	262	0.32	245555.48	2482883.82	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:42:58 PM	OU4	CB50	H	261	0.93	245555.69	2482882.99	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:44:24 PM	OU4	CB50	H	260	1.20	245552.84	2482880.82	105.00	4.00	35.00	2.50	2.90	2.05	4.74
11/13/2015 12:46:07 PM	OU4	CB50	H	259	0.42	245549.54	2482879.17	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:47:03 PM	OU4	CB50	H	258	0.43	245545.82	2482876.21	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:48:00 PM	OU4	CB50	H	257	0.42	245543.17	2482874.40	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:48:56 PM	OU4	CB50	H	256	0.32	245539.83	2482871.94	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:50:01 PM	OU4	CB50	H	255	0.38	245539.84	2482871.16	105.00	4.00	35.00	2.50	2.30	1.62	3.75
11/13/2015 12:50:55 PM	OU4	CB50	H	254	0.50	245538.34	2482868.14	105.00	4.00	35.00	2.50	2.00	1.41	3.26
11/13/2015 12:51:55 PM	OU4	CB50	H	253	0.57	245535.35	2482865.43	105.00	4.00	35.00	2.50	2.00	1.41	3.26
11/13/2015 12:52:59 PM	OU4	CB50	H	252	0.38	245532.24	2482862.92	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:53:52 PM	OU4	CB50	H	251	0.43	245529.42	2482860.57	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:55:04 PM	OU4	CB50	H	250	0.28	245525.98	2482857.24	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 12:55:51 PM	OU4	CB50	H	249	0.48	245522.94	2482854.59	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:56:51 PM	OU4	CB50	H	248	0.53	245519.70	2482852.17	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:58:08 PM	OU4	CB50	H	247	0.27	245516.78	2482849.60	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 12:58:54 PM	OU4	CB50	H	246	0.53	245513.51	2482846.80	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 12:59:57 PM	OU4	CB50	H	245	0.35	245511.03	2482844.42	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:00:48 PM	OU4	CB50	H	244	0.30	245508.01	2482841.96	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:01:36 PM	OU4	CB50	H	243	0.35	245505.36	2482839.83	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:02:28 PM	OU4	CB50	H	242	1.33	245501.74	2482836.78	105.00	4.00	35.00	2.50	3.20	2.26	5.23
11/13/2015 1:04:19 PM	OU4	CB50	H	241	0.62	245497.46	2482835.48	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 1:05:42 PM	OU4	CB50	H	240	0.87	245494.10	2482832.83	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/13/2015 1:07:05 PM	OU4	CB50	H	239	1.20	245491.65	2482830.56	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:08:47 PM	OU4	CB50	H	238	0.53	245488.29	2482827.91	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 1:10:04 PM	OU4	CB50	H	237	0.22	245484.77	2482825.58	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:10:47 PM	OU4	CB50	H	236	0.43	245481.60	2482823.07	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:11:59 PM	OU4	CB50	H	235	0.20	245478.26	2482820.42	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:12:42 PM	OU4	CB50	H	234	0.50	245475.28	2482818.06	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:13:42 PM	OU4	CB50	H	233	0.47	245472.16	2482815.45	105.00	4.00	35.00	2.50	1.80	1.27	2.94

CB50 ARMOR STONE RESPREAD STEP DETAIL

Step Start	Area	SMU/CMU	Lane	Step Number	Duration (min)	Northing	Easting	Density (#/cu.ft.)	Length (ft)	Width (ft)	Height (in)	Weight (tons)	Cubic Yards	Inches/Step
11/13/2015 1:14:41 PM	OU4	CB50	H	232	0.55	245468.68	2482812.94	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 1:15:44 PM	OU4	CB50	H	231	0.43	245465.73	2482810.77	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:16:55 PM	OU4	CB50	H	230	0.32	245462.26	2482808.65	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 1:17:45 PM	OU4	CB50	H	229	0.55	245459.17	2482805.48	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:18:48 PM	OU4	CB50	H	228	0.62	245456.79	2482803.23	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:19:56 PM	OU4	CB50	H	227	0.58	245454.04	2482800.72	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:21:02 PM	OU4	CB50	H	226	0.62	245450.34	2482797.80	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:22:09 PM	OU4	CB50	H	225	1.28	245447.21	2482795.40	105.00	4.00	35.00	2.50	2.80	1.98	4.58
11/13/2015 1:23:57 PM	OU4	CB50	H	224	0.67	245443.79	2482794.07	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:25:08 PM	OU4	CB50	H	223	0.60	245440.54	2482791.39	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 1:26:44 PM	OU4	CB50	H	222	0.27	245434.85	2482797.67	105.00	4.00	35.00	2.50	2.10	1.48	3.43
11/13/2015 1:28:31 PM	OU4	CB50	H	221	0.35	245440.77	2482784.65	105.00	4.00	35.00	2.50	2.90	2.05	4.74
11/13/2015 1:29:23 PM	OU4	CB50	H	220	0.52	245435.40	2482785.88	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 1:30:40 PM	OU4	CB50	H	219	0.38	245433.68	2482780.01	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 1:31:33 PM	OU4	CB50	H	218	0.58	245431.06	2482778.31	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:32:54 PM	OU4	CB50	H	217	0.38	245427.68	2482775.92	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:34:17 PM	OU4	CB50	H	216	0.18	245423.95	2482772.94	105.00	4.00	35.00	2.50	2.00	1.41	3.26
11/13/2015 1:34:59 PM	OU4	CB50	H	215	0.63	245420.87	2482770.89	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 1:36:07 PM	OU4	CB50	H	214	0.60	245417.59	2482768.68	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:37:29 PM	OU4	CB50	H	213	0.42	245414.53	2482766.05	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:38:55 PM	OU4	CB50	H	212	0.20	245410.89	2482763.37	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 1:39:38 PM	OU4	CB50	H	211	0.65	245408.06	2482761.22	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:40:48 PM	OU4	CB50	H	210	0.62	245405.68	2482759.16	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 1:42:10 PM	OU4	CB50	H	209	0.43	245401.79	2482756.11	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 1:43:07 PM	OU4	CB50	H	208	0.63	245398.96	2482754.12	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:44:30 PM	OU4	CB50	H	207	0.38	245395.77	2482751.44	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:45:23 PM	OU4	CB50	H	206	1.47	245392.98	2482748.97	105.00	4.00	35.00	2.50	3.10	2.19	5.07
11/13/2015 1:47:36 PM	OU4	CB50	H	205	0.48	245388.81	2482746.58	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 1:48:51 PM	OU4	CB50	H	204	0.33	245385.72	2482744.37	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:49:41 PM	OU4	CB50	H	203	0.63	245382.75	2482742.02	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 1:50:50 PM	OU4	CB50	H	202	0.58	245379.78	2482739.85	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:52:11 PM	OU4	CB50	H	201	0.35	245376.26	2482736.83	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:53:33 PM	OU4	CB50	H	200	0.38	245375.21	2482733.18	105.00	4.00	35.00	2.50	2.20	1.55	3.59
11/13/2015 1:54:27 PM	OU4	CB50	H	199	0.58	245371.87	2482730.05	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:55:32 PM	OU4	CB50	H	198	1.28	245368.75	2482727.81	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:57:19 PM	OU4	CB50	H	197	0.72	245365.57	2482724.96	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:58:33 PM	OU4	CB50	H	196	0.60	245362.01	2482722.86	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 1:59:40 PM	OU4	CB50	H	195	0.57	245358.75	2482720.27	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:00:59 PM	OU4	CB50	H	194	0.32	245355.59	2482718.14	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:02:04 PM	OU4	CB50	H	193	0.32	245352.52	2482715.12	105.00	4.00	35.00	2.50	1.70	1.20	2.78

CB50 ARMOR STONE RESPREAD STEP DETAIL

Step Start	Area	SMU/CMU	Lane	Step Number	Duration (min)	Northing	Easting	Density (#/cu.ft.)	Length (ft)	Width (ft)	Height (in)	Weight (tons)	Cubic Yards	Inches/Step
11/13/2015 2:02:54 PM	OU4	CB50	H	192	0.63	245349.63	2482712.79	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:04:02 PM	OU4	CB50	H	191	0.57	245346.72	2482710.15	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:05:22 PM	OU4	CB50	H	190	0.32	245343.81	2482707.55	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:06:12 PM	OU4	CB50	H	189	1.70	245341.29	2482705.27	105.00	4.00	35.00	2.50	3.50	2.47	5.72
11/13/2015 2:08:24 PM	OU4	CB50	H	188	0.65	245336.37	2482703.21	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 2:09:48 PM	OU4	CB50	H	187	0.47	245333.42	2482700.88	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 2:10:47 PM	OU4	CB50	H	186	0.73	245330.96	2482698.02	105.00	4.00	35.00	2.50	2.00	1.41	3.26
11/13/2015 2:12:17 PM	OU4	CB50	H	185	0.37	245328.80	2482693.87	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:13:10 PM	OU4	CB50	H	184	0.60	245324.87	2482691.20	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:14:31 PM	OU4	CB50	H	183	0.40	245322.10	2482689.58	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:15:25 PM	OU4	CB50	H	182	0.62	245318.27	2482686.98	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:16:48 PM	OU4	CB50	H	181	0.28	245315.74	2482684.67	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:18:05 PM	OU4	CB50	H	180	0.18	245312.52	2482682.10	105.00	4.00	35.00	2.50	2.00	1.41	3.26
11/13/2015 2:18:46 PM	OU4	CB50	H	179	0.57	245309.98	2482679.40	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:20:06 PM	OU4	CB50	H	178	0.27	245306.58	2482676.74	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:20:53 PM	OU4	CB50	H	177	0.55	245303.27	2482673.80	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:21:57 PM	OU4	CB50	H	176	0.45	245300.94	2482672.00	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:22:55 PM	OU4	CB50	H	175	0.50	245297.34	2482669.38	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:23:55 PM	OU4	CB50	H	174	0.47	245294.14	2482666.52	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:24:54 PM	OU4	CB50	H	173	0.45	245291.29	2482664.46	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:25:51 PM	OU4	CB50	H	172	1.05	245288.48	2482661.81	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:27:25 PM	OU4	CB50	H	171	1.77	245285.10	2482658.83	105.00	4.00	35.00	2.50	3.60	2.54	5.88
11/13/2015 2:29:41 PM	OU4	CB50	H	170	0.60	245281.63	2482657.48	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:30:48 PM	OU4	CB50	H	169	0.50	245278.07	2482654.92	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:32:04 PM	OU4	CB50	H	168	0.22	245274.89	2482652.32	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:32:47 PM	OU4	CB50	H	167	0.57	245272.25	2482649.93	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:33:52 PM	OU4	CB50	H	166	0.63	245268.62	2482647.21	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:35:00 PM	OU4	CB50	H	165	1.15	245265.74	2482645.09	105.00	4.00	35.00	2.50	2.80	1.98	4.58
11/13/2015 2:38:55 PM	OU4	CB50	G	245	0.18	245504.65	2482868.15	105.00	4.00	35.00	2.50	1.30	0.92	2.13
11/13/2015 2:40:46 PM	OU4	CB50	G	244	0.03	245489.02	2482872.68	105.00	4.00	35.00	2.50	0.10	0.07	0.16
11/13/2015 2:41:48 PM	OU4	CB50	G	245	0.17	245476.25	2482861.92	105.00	4.00	35.00	2.50	2.70	1.90	4.40
11/13/2015 2:42:29 PM	OU4	CB50	G	244	0.50	245472.44	2482859.32	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:43:29 PM	OU4	CB50	G	243	0.47	245469.29	2482856.51	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:44:43 PM	OU4	CB50	G	242	0.25	245466.20	2482854.11	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:45:29 PM	OU4	CB50	G	241	0.52	245463.62	2482851.65	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:46:30 PM	OU4	CB50	G	240	0.47	245460.69	2482848.95	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:47:28 PM	OU4	CB50	G	239	0.47	245458.50	2482846.93	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:48:26 PM	OU4	CB50	G	238	1.78	245455.00	2482844.23	105.00	4.00	35.00	2.50	2.10	1.48	3.43
11/13/2015 2:50:44 PM	OU4	CB50	G	237	0.52	245450.95	2482841.78	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:51:45 PM	OU4	CB50	G	236	0.53	245448.01	2482839.33	105.00	4.00	35.00	2.50	1.80	1.27	2.94

CB50 ARMOR STONE RESPREAD STEP DETAIL

Step Start	Area	SMU/CMU	Lane	Step Number	Duration (min)	Northing	Easting	Density (#/cu.ft.)	Length (ft)	Width (ft)	Height (in)	Weight (tons)	Cubic Yards	Inches/Step
11/13/2015 2:53:02 PM	OU4	CB50	G	235	0.28	245445.00	2482836.64	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:53:49 PM	OU4	CB50	G	234	0.48	245441.74	2482834.03	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:55:04 PM	OU4	CB50	G	233	0.28	245438.97	2482832.07	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:55:51 PM	OU4	CB50	G	232	0.48	245435.77	2482829.42	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:57:06 PM	OU4	CB50	G	231	0.23	245432.09	2482826.49	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 2:58:06 PM	OU4	CB50	G	230	0.22	245428.60	2482824.29	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 2:58:49 PM	OU4	CB50	G	229	1.23	245425.44	2482821.78	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:00:34 PM	OU4	CB50	G	228	0.52	245421.69	2482818.99	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:01:50 PM	OU4	CB50	G	227	0.30	245419.14	2482817.10	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:02:39 PM	OU4	CB50	G	226	0.60	245416.06	2482814.49	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:03:45 PM	OU4	CB50	G	225	0.62	245412.93	2482812.35	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 3:05:08 PM	OU4	CB50	G	224	0.28	245410.02	2482809.88	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:05:56 PM	OU4	CB50	G	223	0.55	245407.09	2482807.19	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:06:59 PM	OU4	CB50	G	222	0.57	245404.33	2482804.43	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:08:04 PM	OU4	CB50	G	221	1.58	245401.13	2482801.65	105.00	4.00	35.00	2.50	2.50	1.76	4.07
11/13/2015 3:10:09 PM	OU4	CB50	G	220	0.68	245397.60	2482799.00	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:11:36 PM	OU4	CB50	G	219	0.30	245394.24	2482796.51	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:12:25 PM	OU4	CB50	G	218	0.62	245391.71	2482794.14	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:13:32 PM	OU4	CB50	G	217	0.58	245389.05	2482791.80	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:14:38 PM	OU4	CB50	G	216	0.55	245385.51	2482789.08	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:15:42 PM	OU4	CB50	G	215	0.32	245382.70	2482786.69	105.00	4.00	35.00	2.50	1.30	0.92	2.13
11/13/2015 3:16:31 PM	OU4	CB50	G	214	0.60	245382.66	2482786.56	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:17:37 PM	OU4	CB50	G	213	0.78	245380.56	2482783.66	105.00	4.00	35.00	2.50	2.10	1.48	3.43
11/13/2015 3:19:09 PM	OU4	CB50	G	212	0.40	245377.09	2482780.59	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 3:20:04 PM	OU4	CB50	G	211	0.60	245374.06	2482777.92	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:21:10 PM	OU4	CB50	G	210	0.52	245370.71	2482774.91	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:22:12 PM	OU4	CB50	G	209	0.10	245368.51	2482773.35	105.00	4.00	35.00	2.50	1.10	0.78	1.81
11/13/2015 3:22:49 PM	OU4	CB50	G	208	0.55	245367.40	2482772.63	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:23:53 PM	OU4	CB50	G	207	0.63	245365.26	2482770.66	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:25:01 PM	OU4	CB50	G	206	0.47	245362.40	2482768.43	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/13/2015 3:26:15 PM	OU4	CB50	G	205	0.35	245359.07	2482765.36	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:27:07 PM	OU4	CB50	G	204	0.53	245356.00	2482762.38	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:28:25 PM	OU4	CB50	G	203	0.32	245353.00	2482759.68	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:29:14 PM	OU4	CB50	G	202	1.00	245350.12	2482757.26	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:30:45 PM	OU4	CB50	G	201	1.45	245346.81	2482754.24	105.00	4.00	35.00	2.50	3.10	2.19	5.07
11/13/2015 3:32:42 PM	OU4	CB50	G	200	0.52	245343.28	2482752.38	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:33:44 PM	OU4	CB50	G	199	0.58	245340.52	2482749.99	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:35:05 PM	OU4	CB50	G	198	0.35	245337.66	2482747.35	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:36:26 PM	OU4	CB50	G	197	0.17	245333.87	2482744.59	105.00	4.00	35.00	2.50	2.00	1.41	3.26
11/13/2015 3:37:07 PM	OU4	CB50	G	196	0.58	245331.15	2482742.80	105.00	4.00	35.00	2.50	1.70	1.20	2.78

CB50 ARMOR STONE RESPREAD STEP DETAIL

Step Start	Area	SMU/CMU	Lane	Step Number	Duration (min)	Northing	Easting	Density (#/cu.ft.)	Length (ft)	Width (ft)	Height (in)	Weight (tons)	Cubic Yards	Inches/Step
11/13/2015 3:38:13 PM	OU4	CB50	G	195	0.55	245327.68	2482739.33	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:39:16 PM	OU4	CB50	G	194	0.52	245324.80	2482737.25	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:40:18 PM	OU4	CB50	G	193	0.53	245322.05	2482734.92	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:41:35 PM	OU4	CB50	G	192	0.32	245318.75	2482732.19	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:42:24 PM	OU4	CB50	G	191	0.57	245315.16	2482729.02	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/13/2015 3:43:29 PM	OU4	CB50	G	190	1.05	245312.76	2482727.15	105.00	4.00	35.00	2.50	2.40	1.69	3.91
11/13/2015 3:46:17 PM	OU4	CB50	G	189	0.83	245284.40	2482751.41	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/13/2015 3:47:22 PM	OU4	CB50	F	192	0.80	245287.77	2482750.84	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:48:56 PM	OU4	CB50	F	191	0.32	245284.92	2482748.67	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:49:45 PM	OU4	CB50	F	190	0.58	245282.11	2482746.68	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:50:51 PM	OU4	CB50	F	189	0.57	245279.24	2482744.14	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:51:56 PM	OU4	CB50	F	188	0.57	245275.93	2482741.50	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 3:53:01 PM	OU4	CB50	F	187	0.62	245272.21	2482738.54	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 3:54:08 PM	OU4	CB50	F	186	0.57	245269.55	2482736.36	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:55:28 PM	OU4	CB50	F	185	0.33	245265.93	2482733.59	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:56:19 PM	OU4	CB50	F	184	1.60	245262.58	2482730.89	105.00	4.00	35.00	2.50	3.40	2.40	5.55
11/13/2015 3:58:25 PM	OU4	CB50	F	183	0.53	245259.98	2482729.24	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 3:59:27 PM	OU4	CB50	F	182	0.53	245256.45	2482726.46	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:00:30 PM	OU4	CB50	F	181	0.58	245253.27	2482723.87	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:01:35 PM	OU4	CB50	F	180	0.50	245249.80	2482721.21	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:02:36 PM	OU4	CB50	F	179	0.53	245247.07	2482718.98	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:03:38 PM	OU4	CB50	F	178	0.55	245243.87	2482716.41	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:04:42 PM	OU4	CB50	F	177	0.55	245241.00	2482714.09	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:05:46 PM	OU4	CB50	F	176	0.65	245237.61	2482711.50	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 4:06:55 PM	OU4	CB50	F	175	0.52	245234.00	2482708.58	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:07:56 PM	OU4	CB50	F	174	0.45	245231.63	2482706.45	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:08:54 PM	OU4	CB50	F	173	0.48	245227.88	2482703.46	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:09:54 PM	OU4	CB50	F	172	0.98	245225.08	2482701.25	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:11:23 PM	OU4	CB50	F	171	0.53	245222.42	2482699.10	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:12:25 PM	OU4	CB50	F	170	0.60	245219.19	2482696.48	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:13:32 PM	OU4	CB50	F	169	0.55	245215.70	2482693.41	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:14:35 PM	OU4	CB50	F	168	0.77	245212.87	2482691.32	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/13/2015 4:16:07 PM	OU4	CB50	F	167	0.65	245209.30	2482688.53	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:17:17 PM	OU4	CB50	F	166	1.72	245206.78	2482686.48	105.00	4.00	35.00	2.50	3.70	2.61	6.04
11/13/2015 4:19:45 PM	OU4	CB50	F	165	0.37	245202.84	2482683.95	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:21:07 PM	OU4	CB50	F	164	0.25	245199.95	2482681.43	105.00	4.00	35.00	2.50	2.10	1.48	3.43
11/13/2015 4:21:53 PM	OU4	CB50	F	163	0.58	245196.96	2482678.80	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:22:59 PM	OU4	CB50	F	162	0.55	245195.16	2482675.33	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:24:17 PM	OU4	CB50	F	161	0.27	245193.35	2482673.66	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:25:04 PM	OU4	CB50	F	160	0.52	245188.98	2482670.05	105.00	4.00	35.00	2.50	1.80	1.27	2.94

CB50 ARMOR STONE RESPREAD STEP DETAIL

Step Start	Area	SMU/CMU	Lane	Step Number	Duration (min)	Northing	Easting	Density (#/cu.ft.)	Length (ft)	Width (ft)	Height (in)	Weight (tons)	Cubic Yards	Inches/Step
11/13/2015 4:26:05 PM	OU4	CB50	F	159	0.55	245185.51	2482667.25	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:26:53 PM	OU4	CB50	F	158	0.17	245183.55	2482665.62	105.00	4.00	35.00	2.50	0.70	0.49	1.13
11/13/2015 4:27:19 PM	OU4	CB50	F	157	0.78	245182.26	2482664.47	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:28:36 PM	OU4	CB50	F	156	0.53	245179.72	2482662.16	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:29:39 PM	OU4	CB50	F	155	1.22	245176.56	2482659.65	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:31:23 PM	OU4	CB50	F	154	0.53	245173.58	2482657.08	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:32:40 PM	OU4	CB50	F	153	0.28	245170.11	2482653.98	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:33:12 PM	OU4	CB50	F	152	0.12	245168.29	2482652.62	105.00	4.00	35.00	2.50	0.60	0.42	0.97
11/13/2015 4:33:50 PM	OU4	CB50	F	151	0.55	245167.44	2482651.62	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:35:09 PM	OU4	CB50	F	150	0.33	245164.70	2482649.06	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:35:59 PM	OU4	CB50	F	149	0.55	245161.85	2482646.35	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:37:18 PM	OU4	CB50	F	148	1.67	245158.43	2482643.63	105.00	4.00	35.00	2.50	4.00	2.82	6.53
11/13/2015 4:40:43 PM	OU4	CB50	F	147	0.67	245160.98	2482664.95	105.00	4.00	35.00	2.50	4.00	2.82	6.53
11/13/2015 4:44:11 PM	OU4	CB50	F	146	0.27	245153.80	2482637.65	105.00	4.00	35.00	2.50	2.60	1.83	4.24
11/13/2015 4:44:58 PM	OU4	CB50	F	145	2.78	245158.69	2482642.06	105.00	4.00	35.00	2.50	2.20	1.55	3.59
11/13/2015 4:48:15 PM	OU4	CB50	F	149	0.28	245156.42	2482640.04	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 4:49:03 PM	OU4	CB50	F	148	0.37	245153.75	2482637.99	105.00	4.00	35.00	2.50	2.10	1.48	3.43
11/13/2015 4:50:10 PM	OU4	CB50	F	147	0.22	245150.29	2482635.25	105.00	4.00	35.00	2.50	2.30	1.62	3.75
11/13/2015 4:50:54 PM	OU4	CB50	F	146	0.28	245147.18	2482632.88	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:51:41 PM	OU4	CB50	F	145	1.17	245143.19	2482629.75	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:53:22 PM	OU4	CB50	F	144	0.62	245140.90	2482627.89	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:54:30 PM	OU4	CB50	F	143	0.52	245137.57	2482625.39	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:55:32 PM	OU4	CB50	F	142	0.53	245134.16	2482622.38	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 4:56:34 PM	OU4	CB50	F	141	0.58	245131.52	2482620.59	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:57:39 PM	OU4	CB50	F	140	0.60	245127.62	2482617.36	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:58:46 PM	OU4	CB50	F	139	0.58	245124.23	2482614.90	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 4:59:51 PM	OU4	CB50	F	138	0.57	245121.40	2482612.37	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 5:00:55 PM	OU4	CB50	F	137	0.60	245117.98	2482609.75	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:02:02 PM	OU4	CB50	F	136	0.53	245115.02	2482607.56	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 5:03:04 PM	OU4	CB50	F	135	0.62	245112.11	2482605.22	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 5:04:12 PM	OU4	CB50	F	134	0.60	245108.96	2482602.86	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 5:05:18 PM	OU4	CB50	F	133	2.45	245105.73	2482600.36	105.00	4.00	35.00	2.50	4.90	3.46	8.01
11/13/2015 5:08:16 PM	OU4	CB50	F	132	0.52	245102.86	2482598.47	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:09:18 PM	OU4	CB50	F	131	0.55	245100.09	2482596.33	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:10:21 PM	OU4	CB50	F	130	0.57	245096.78	2482593.99	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 5:11:26 PM	OU4	CB50	F	129	1.48	245094.37	2482592.31	105.00	4.00	35.00	2.50	2.20	1.55	3.59
11/13/2015 5:13:11 PM	OU4	CB50	F	128	0.75	245092.75	2482591.44	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:14:27 PM	OU4	CB50	F	127	0.50	245089.62	2482589.14	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:15:28 PM	OU4	CB50	F	126	0.55	245086.16	2482586.72	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:16:32 PM	OU4	CB50	F	125	0.58	245083.50	2482584.53	105.00	4.00	35.00	2.50	1.80	1.27	2.94

CB50 ARMOR STONE RESPREAD STEP DETAIL

Step Start	Area	SMU/CMU	Lane	Step Number	Duration (min)	Northing	Easting	Density (#/cu.ft.)	Length (ft)	Width (ft)	Height (in)	Weight (tons)	Cubic Yards	Inches/Step
11/13/2015 5:17:23 PM	OU4	CB50	F	124	0.25	245081.48	2482583.05	105.00	4.00	35.00	2.50	0.80	0.56	1.30
11/13/2015 5:17:53 PM	OU4	CB50	F	123	0.78	245079.83	2482581.76	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:19:11 PM	OU4	CB50	F	122	0.55	245076.61	2482579.28	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 5:20:15 PM	OU4	CB50	F	121	0.53	245073.70	2482576.98	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:21:32 PM	OU4	CB50	F	120	0.62	245068.23	2482571.14	105.00	4.00	35.00	2.50	2.30	1.62	3.75
11/13/2015 5:23:09 PM	OU4	CB50	F	119	0.27	245063.03	2482573.15	105.00	4.00	35.00	2.50	2.10	1.48	3.43
11/13/2015 5:24:11 PM	OU4	CB50	F	118	0.30	245058.47	2482569.70	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:24:59 PM	OU4	CB50	F	117	0.32	245056.43	2482560.10	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/13/2015 5:25:48 PM	OU4	CB50	F	116	0.58	245059.63	2482562.16	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 5:26:54 PM	OU4	CB50	F	115	0.67	245055.60	2482559.96	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/13/2015 5:28:04 PM	OU4	CB50	F	114	1.92	245052.51	2482557.83	105.00	4.00	35.00	2.50	2.90	2.05	4.74
11/13/2015 5:30:29 PM	OU4	CB50	F	113	0.72	245049.56	2482555.75	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:31:43 PM	OU4	CB50	F	112	0.15	245046.64	2482552.36	105.00	4.00	35.00	2.50	0.90	0.63	1.46
11/13/2015 5:32:08 PM	OU4	CB50	F	111	1.17	245047.29	2482548.70	105.00	4.00	35.00	2.50	2.10	1.48	3.43
11/13/2015 5:33:33 PM	OU4	CB50	F	110	1.00	245044.92	2482548.15	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:35:03 PM	OU4	CB50	F	109	0.68	245041.35	2482545.10	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:36:00 PM	OU4	CB50	F	108	0.90	245039.35	2482543.74	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:37:25 PM	OU4	CB50	F	107	0.67	245035.48	2482540.90	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:38:35 PM	OU4	CB50	F	106	0.67	245032.21	2482538.22	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:39:46 PM	OU4	CB50	F	105	0.67	245029.59	2482536.19	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 5:40:57 PM	OU4	CB50	F	107	0.68	245026.34	2482533.76	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 5:42:08 PM	OU4	CB50	F	106	0.75	245022.64	2482530.84	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 5:43:24 PM	OU4	CB50	F	105	0.62	245019.36	2482528.47	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:44:31 PM	OU4	CB50	F	104	0.70	245016.14	2482526.02	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 5:45:58 PM	OU4	CB50	F	103	0.33	245013.21	2482523.61	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:47:04 PM	OU4	CB50	F	102	0.42	245010.94	2482521.72	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 5:48:15 PM	OU4	CB50	F	101	0.47	245007.12	2482519.26	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/13/2015 5:49:29 PM	OU4	CB50	F	100	0.47	245003.97	2482516.81	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:50:28 PM	OU4	CB50	F	99	0.68	245000.95	2482514.44	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:51:39 PM	OU4	CB50	F	98	0.60	244997.34	2482511.49	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/13/2015 5:55:46 PM	OU4	CB50	F	97	0.15	245032.28	2482444.45	105.00	4.00	35.00	2.50	2.80	1.98	4.58
11/13/2015 5:58:25 PM	OU4	CB50	F	96	0.02	245034.38	2482446.00	105.00	4.00	35.00	2.50	0.00	0.00	0.00
11/14/2015 7:01:43 AM	ou4	CB50	H	95	4.00	245063.85	2482473.58	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/14/2015 7:06:13 AM	ou4	CB50	H	96	0.65	245061.24	2482471.32	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/14/2015 7:07:23 AM	ou4	CB50	H	97	0.62	245058.25	2482469.03	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/14/2015 7:08:30 AM	ou4	CB50	H	98	0.67	245055.21	2482466.72	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/14/2015 7:10:41 AM	ou4	CB50	H	99	0.25	245067.27	2482476.66	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/14/2015 7:11:27 AM	ou4	CB50	H	100	1.47	245070.45	2482479.48	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/14/2015 7:13:40 AM	ou4	CB50	H	101	2.57	245073.82	2482482.18	105.00	4.00	35.00	2.50	2.00	1.41	3.26
11/14/2015 7:16:45 AM	ou4	CB50	H	102	1.63	245076.47	2482484.20	105.00	4.00	35.00	2.50	1.80	1.27	2.94

CB50 ARMOR STONE RESPREAD STEP DETAIL

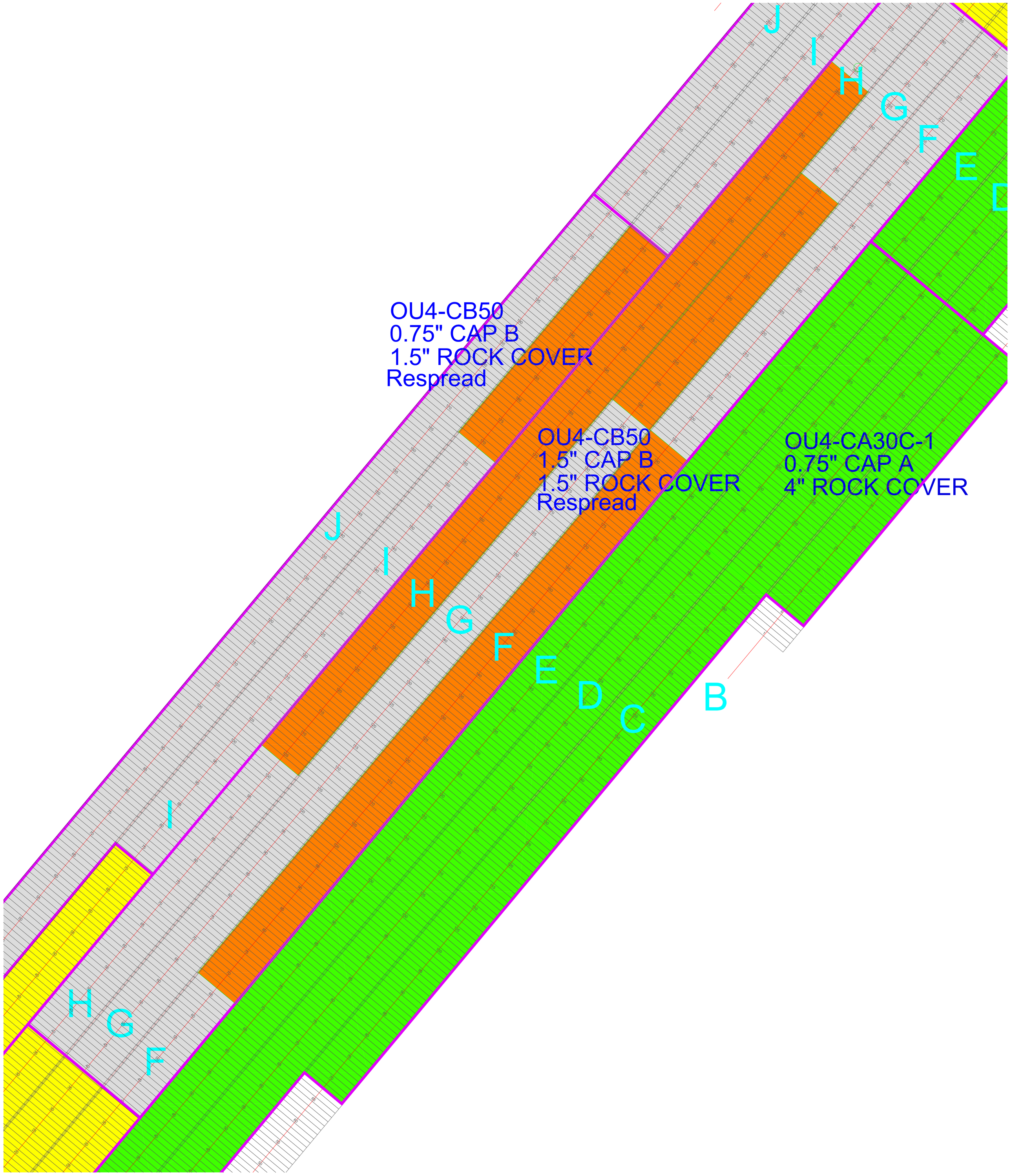
Step Start	Area	SMU/CMU	Lane	Step Number	Duration (min)	Northing	Easting	Density (#/cu.ft.)	Length (ft)	Width (ft)	Height (in)	Weight (tons)	Cubic Yards	Inches/Step
11/14/2015 7:19:24 AM	ou4	CB50	H	103	0.20	245079.73	2482486.96	105.00	4.00	35.00	2.50	2.10	1.48	3.43
11/14/2015 7:20:21 AM	ou4	CB50	H	104	3.90	245082.86	2482489.61	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 7:25:15 AM	ou4	CB50	H	105	1.77	245085.99	2482491.92	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/14/2015 7:27:47 AM	ou4	CB50	H	106	1.10	245089.19	2482494.60	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/14/2015 7:29:39 AM	ou4	CB50	H	107	1.12	245092.17	2482497.57	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/14/2015 7:31:17 AM	ou4	CB50	H	108	1.22	245094.98	2482500.09	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/14/2015 7:33:01 AM	ou4	CB50	H	109	1.38	245098.17	2482503.19	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/14/2015 7:35:10 AM	ou4	CB50	H	110	0.93	245101.40	2482505.49	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/14/2015 7:36:52 AM	ou4	CB50	H	111	0.80	245104.10	2482507.83	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/14/2015 7:38:25 AM	ou4	CB50	H	112	1.45	245107.34	2482510.49	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/14/2015 7:40:38 AM	ou4	CB50	H	113	0.98	245110.25	2482512.46	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/14/2015 7:42:22 AM	ou4	CB50	H	114	0.80	245113.56	2482515.34	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/14/2015 7:43:56 AM	ou4	CB50	H	115	0.78	245116.75	2482517.87	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/14/2015 7:45:28 AM	ou4	CB50	H	116	0.85	245119.76	2482520.15	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/14/2015 7:46:50 AM	ou4	CB50	H	117	1.05	245122.23	2482522.03	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/14/2015 7:48:24 AM	ou4	CB50	H	118	1.07	245126.02	2482525.28	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/14/2015 7:50:14 AM	ou4	CB50	H	119	0.80	245129.36	2482528.23	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/14/2015 7:51:32 AM	ou4	CB50	H	120	0.97	245132.18	2482530.71	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/14/2015 7:53:00 AM	ou4	CB50	H	121	1.08	245135.08	2482533.10	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/14/2015 7:54:36 AM	ou4	CB50	H	122	1.28	245137.64	2482535.29	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/14/2015 7:56:39 AM	ou4	CB50	H	123	1.52	245141.55	2482538.07	105.00	4.00	35.00	2.50	2.30	1.62	3.75
11/14/2015 7:58:41 AM	ou4	CB50	H	124	1.10	245145.06	2482540.89	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/14/2015 8:00:17 AM	ou4	CB50	H	125	0.97	245147.90	2482543.13	105.00	4.00	35.00	2.50	2.20	1.55	3.59
11/14/2015 8:01:46 AM	ou4	CB50	H	126	0.47	245151.62	2482546.25	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:02:44 AM	ou4	CB50	H	127	0.42	245154.19	2482548.19	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:03:40 AM	ou4	CB50	H	128	0.42	245159.42	2482552.31	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:04:36 AM	ou4	CB50	H	129	0.43	245164.13	2482555.98	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:05:32 AM	ou4	CB50	H	130	0.42	245166.89	2482558.26	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:06:28 AM	ou4	CB50	H	131	0.45	245168.87	2482560.89	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:07:40 AM	ou4	CB50	H	132	0.18	245171.72	2482563.39	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:08:22 AM	ou4	CB50	H	133	0.42	245175.41	2482566.46	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:09:32 AM	ou4	CB50	H	134	0.18	245178.54	2482568.99	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:10:14 AM	ou4	CB50	H	135	0.45	245181.79	2482571.65	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:11:27 AM	ou4	CB50	H	136	0.22	245184.83	2482573.87	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:12:10 AM	ou4	CB50	H	137	0.38	245187.30	2482575.78	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:13:04 AM	ou4	CB50	H	138	0.43	245190.90	2482578.61	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:14:15 AM	ou4	CB50	H	139	0.20	245194.07	2482581.08	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:14:57 AM	ou4	CB50	H	140	0.50	245197.06	2482583.78	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:15:58 AM	ou4	CB50	H	141	1.60	245200.27	2482586.14	105.00	4.00	35.00	2.50	3.40	2.40	5.55
11/14/2015 8:18:05 AM	ou4	CB50	H	142	0.47	245203.52	2482588.83	105.00	4.00	35.00	2.50	1.50	1.06	2.45

CB50 ARMOR STONE RESPREAD STEP DETAIL

Step Start	Area	SMU/CMU	Lane	Step Number	Duration (min)	Northing	Easting	Density (#/cu.ft.)	Length (ft)	Width (ft)	Height (in)	Weight (tons)	Cubic Yards	Inches/Step
11/14/2015 8:19:18 AM	ou4	CB50	H	143	0.32	245206.39	2482591.15	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/14/2015 8:20:23 AM	ou4	CB50	H	144	0.35	245209.88	2482594.53	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/14/2015 8:21:00 AM	ou4	CB50	H	145	0.63	245211.72	2482595.82	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:22:24 AM	ou4	CB50	H	146	0.20	245215.76	2482599.24	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:23:06 AM	ou4	CB50	H	147	0.47	245218.44	2482601.34	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:24:20 AM	ou4	CB50	H	148	0.15	245221.75	2482603.84	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:25:00 AM	ou4	CB50	H	149	0.45	245225.54	2482606.83	105.00	4.00	35.00	2.50	1.60	1.13	2.62
11/14/2015 8:25:58 AM	ou4	CB50	H	150	0.72	245227.73	2482609.52	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/14/2015 8:27:26 AM	ou4	CB50	H	151	0.17	245230.52	2482611.79	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:28:22 AM	ou4	CB50	H	152	0.22	245234.03	2482614.82	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:29:05 AM	ou4	CB50	H	153	0.40	245237.07	2482617.26	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:30:14 AM	ou4	CB50	H	154	0.18	245239.77	2482619.57	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:30:56 AM	ou4	CB50	H	155	0.38	245242.93	2482622.35	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:31:50 AM	ou4	CB50	H	156	0.45	245246.26	2482625.49	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:32:47 AM	ou4	CB50	H	157	0.42	245249.13	2482627.67	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:33:43 AM	ou4	CB50	H	158	0.47	245251.87	2482629.97	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:34:56 AM	ou4	CB50	H	159	0.18	245254.92	2482632.57	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:35:37 AM	ou4	CB50	H	160	1.20	245258.35	2482635.54	105.00	4.00	35.00	2.50	2.60	1.83	4.24
11/14/2015 8:37:20 AM	ou4	CB50	H	161	0.43	245260.66	2482637.96	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 8:38:17 AM	ou4	CB50	H	162	0.48	245263.46	2482640.47	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:39:32 AM	ou4	CB50	H	163	0.37	245266.48	2482642.92	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/14/2015 8:40:24 AM	ou4	CB50	H	164	1.22	245270.34	2482646.29	105.00	4.00	35.00	2.50	2.70	1.90	4.40
11/14/2015 8:47:31 AM	ou4	CB50	F	95	0.60	244995.37	2482507.95	105.00	4.00	35.00	2.50	4.40	3.10	7.17
11/14/2015 8:48:37 AM	ou4	CB50	F	96	0.55	244999.28	2482508.99	105.00	4.00	35.00	2.50	1.70	1.20	2.78
11/14/2015 8:49:41 AM	ou4	CB50	F	97	0.58	244993.23	2482505.02	105.00	4.00	35.00	2.50	1.80	1.27	2.94
11/14/2015 8:50:46 AM	ou4	CB50	F	98	0.35	244990.19	2482502.68	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:51:38 AM	ou4	CB50	F	99	0.38	244987.03	2482500.12	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:52:32 AM	ou4	CB50	F	100	0.87	244983.35	2482497.04	105.00	4.00	35.00	2.50	2.20	1.55	3.59
11/14/2015 8:54:10 AM	ou4	CB50	F	101	0.45	244985.84	2482497.98	105.00	4.00	35.00	2.50	1.90	1.34	3.10
11/14/2015 8:54:52 AM	ou4	CB50	F	102	1.00	244983.98	2482496.38	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:56:23 AM	ou4	CB50	F	94	0.35	244981.08	2482493.67	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:57:15 AM	ou4	CB50	F	95	0.42	244977.89	2482491.12	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 8:59:11 AM	ou4	CB50	F	96	0.22	244971.58	2482486.13	105.00	4.00	35.00	2.50	2.70	1.90	4.40
11/14/2015 8:59:54 AM	ou4	CB50	F	97	0.43	244968.95	2482484.07	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 9:00:51 AM	ou4	CB50	F	98	0.45	244965.46	2482481.38	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 9:01:48 AM	ou4	CB50	F	99	0.45	244962.77	2482479.45	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 9:02:46 AM	ou4	CB50	F	100	0.48	244958.71	2482476.44	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 9:03:45 AM	ou4	CB50	F	101	0.47	244955.77	2482474.15	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 9:04:59 AM	ou4	CB50	F	102	0.27	244952.62	2482471.41	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 9:05:45 AM	ou4	CB50	F	103	0.50	244949.78	2482469.37	105.00	4.00	35.00	2.50	1.50	1.06	2.45

CB50 ARMOR STONE RESPREAD STEP DETAIL

Step Start	Area	SMU/CMU	Lane	Step Number	Duration (min)	Northing	Easting	Density (#/cu.ft.)	Length (ft)	Width (ft)	Height (in)	Weight (tons)	Cubic Yards	Inches/Step
11/14/2015 9:07:00 AM	ou4	CB50	F	104	0.95	244946.66	2482466.88	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 9:08:42 AM	ou4	CB50	F	105	0.23	244943.28	2482464.48	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 9:09:42 AM	ou4	CB50	F	106	0.27	244940.26	2482462.25	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 9:11:59 AM	ou4	CB50	F	107	1.42	244930.82	2482455.33	105.00	4.00	35.00	2.50	5.30	3.74	8.66
11/14/2015 9:13:39 AM	ou4	CB50	F	108	21.55	244932.99	2482455.92	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 9:35:27 AM	ou4	CB50	F	109	0.62	244931.22	2482454.47	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 9:36:35 AM	ou4	CB50	F	110	0.38	244928.36	2482452.17	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 9:37:43 AM	ou4	CB50	F	111	0.25	244924.79	2482449.43	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 9:38:28 AM	ou4	CB50	F	112	0.62	244921.53	2482447.00	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 9:39:36 AM	ou4	CB50	F	113	0.38	244917.88	2482444.14	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 9:40:29 AM	ou4	CB50	F	114	0.40	244914.96	2482441.87	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 9:41:24 AM	ou4	CB50	F	115	0.62	244912.26	2482439.94	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 9:42:32 AM	ou4	CB50	F	116	0.58	244908.75	2482437.31	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 9:43:52 AM	ou4	CB50	F	117	0.10	244906.15	2482434.95	105.00	4.00	35.00	2.50	1.50	1.06	2.45
11/14/2015 9:44:44 AM	ou4	CB50	F	118	0.07	244902.25	2482432.49	105.00	4.00	35.00	2.50	1.40	0.99	2.29
11/14/2015 9:45:33 AM	ou4	CB50	F	119	21.62	244899.63	2482429.94	105.00	4.00	35.00	2.50	3.50	2.47	5.72
11/14/2015 10:15:10 AM	ou4	CB50	F	120	1.03	245893.43	2482679.40	105.00	4.00	35.00	2.50	0.00	0.00	0.00
11/14/2015 10:17:58 AM	ou4	CB50	F	121	0.25	245964.34	2482582.98	105.00	4.00	35.00	2.50	0.00	0.00	0.00
11/14/2015 10:19:29 AM	ou4	CB50	F	122	48.10	245982.83	2482578.99	105.00	4.00	35.00	2.50	0.00	0.00	0.00


OU4-CB50
0.75" CAP B
1.5" ROCK COVER
Respread
OU4-CB50
1.5" CAP B
1.5" ROCK COVER
Respread
OU4-CA30C-1
0.75" CAP A
4" ROCK COVER
J
I
H
G
F
E
D
C
B

11

Armor Stone Thickness Verification and Approval Form

OU4-CB50-1 (A1 Cap Type Data)				
Area (acres)	Required Thickness (inches)	Average Poling Thickness (inches)	Post-Placement Bathymetric Survey Thickness (inches)	Calculated Average Thickness with Consolidation
0.14	6.0	9.89	15.71	N/A

OU4-CB50-1 (B1 Cap Type)											
ID	Pre-Placement Poling Date	Date Sampled (Post Placement)	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CB50-B1-G1	10/25/2016	12/8/2016	8.6	B1	6.0	562.1	245597.59	2482914.57	245592.30	2482910.16	
CB50-B1-G2	10/25/2016	12/8/2016	13.5	B1	6.0	562.1	245582.11	2482950.19	245578.85	2482954.53	
CB50-B1-G3	10/25/2016	12/8/2016	5.0	B1	6.0	561.8	245551.23	2482968.84	245551.22	2482970.39	
CB50-B1-G4	10/25/2016	12/8/2016	12.5	B1	6.0	561.9	245566.14	2482936.49	245565.45	2482935.77	

Average 9.89
Median 10.52
Standard Deviation 3.89

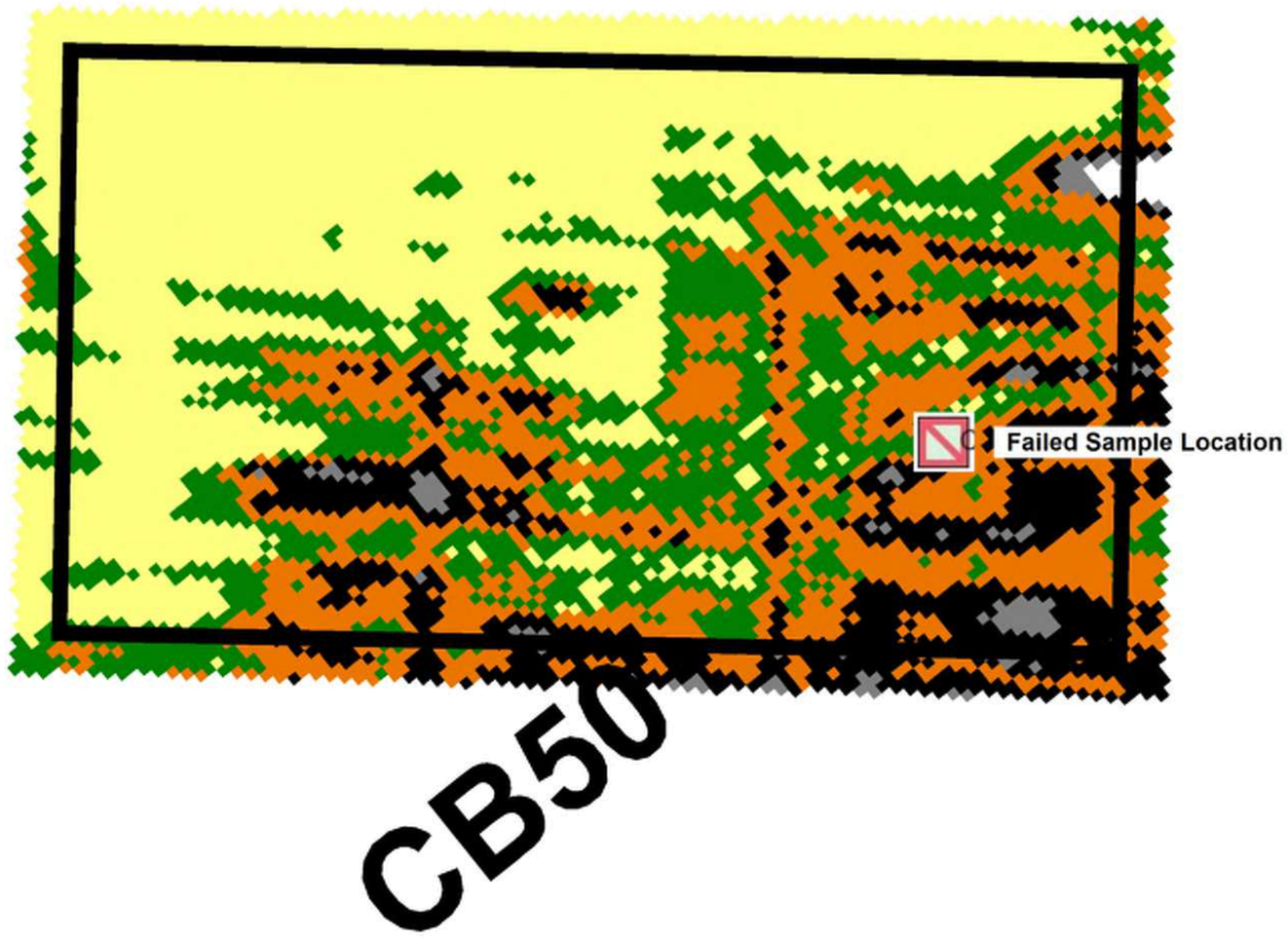
Recommended Path Forward:
Verification samples were collected in 4 locations within OU4-CB50-1. 3 of 4 samples meet or exceed the minimum thickness requirement of 6-inches. Tetra Tech recommends use of the J.F. Brennan survey data to accept this area on an exception basis.

Prepared by: HNK Date: 12/8/2016 Reviewed by: BSW Date: 7/26/2017

A/OT Acceptance: Date: 12/6/17 on an exception Basis

BRENNAN	CB50 3" Post Placement	Scale: 1" = 15'	Operational Unit 4
Area at or Above 6" CB50: 82%	Avg. Placement CB50: 15.71"	Volume Placed CB50: 293.70 cy Theoretical Volume CB50: 193.55	QA Survey 12/7/2016

N



>= 1.00
0.75 - 0.99
0.50 - 0.74
0.25 - 0.49
0.00 - 0.24
< 0.00

Scale: 1 Inch = 15.00 Feet

10 20 40 60 80 Feet

OU4-CB52-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CB52-1-C1	8/19/2015	6.5	0.0	6.5	6.0	568.25	243890.43	2481810.54	243892.68	2481809.38	
CB52-1-C2	8/19/2015	8.0	0.0	8.0	6.0	567.81	243909.30	2481777.95	243907.03	2481778.75	
CB52-1-C3	8/19/2015	6.0	0.0	6.0	6.0	567.84	243950.75	2481826.10	243948.11	2481826.34	
CB52-1-C4	8/19/2015	6.0	0.0	6.0	6.0	568.74	243991.80	2481882.03	243993.26	2481882.88	
CB52-1-C5	8/19/2015	7.5	0.0	7.5	6.0	567.91	243964.07	2481788.32	243964.90	2481787.11	
CB52-1-C6	8/20/2015	7.0	0.0	7.0	6.0	567.61	244000.71	2481781.65	244001.55	2481783.95	
CB52-1-C7	8/20/2015	8.0	0.0	8.0	6.0	568.59	243959.26	2481725.72	243960.35	2481725.88	
CB52-1-C8	8/20/2015	10.0	0.0	10.0	6.0	568.78	243930.39	2481689.42	243930.28	2481686.57	
CB52-1-C9	8/21/2015	7.0	0.0	7.0	6.0	568.15	243968.51	2481682.39	243969.07	2481680.00	
CB52-1-C10	8/21/2015	6.5	0.0	6.5	6.0	568.49	244005.15	2481727.20	244004.16	2481726.37	
CB52-1-C11	8/21/2015	6.0	0.0	6.0	6.0	567.65	244031.43	2481763.13	244033.26	2481758.73	

Average	7.14	0.00	7.14
Median	7.00	0.00	7.00
Standard Deviation	1.21	0.00	1.21

Recommended Path Forward:

Verification samples were collected in 11 locations within OU4-CB52-1. 11 of 11 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: HNC Date: 8/24/2015 Reviewed by: BSW Date: 8/24/2015

A/OT Acceptance: Date: 8/26/15

OU4-CB52-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CB52-1-G1	9/18/2015	6.0	B3	4.0	569.4	243898.21	2481819.05	243899.66	2481817.75	
CB52-1-G2	9/18/2015	7.5	B3	4.0	568.0	243922.27	2481793.87	243920.29	2481799.08	
CB52-1-G3	9/18/2015	4.5	B3	4.0	568.3	243959.27	2481838.69	243961.94	2481838.46	
CB52-1-G4	9/18/2015	4.0	B3	4.0	568.6	243982.59	2481872.02	243979.76	2481869.32	
CB52-1-G5	9/14/2015	1.0	B3	4.0	568.0	243940.77	2481763.12	243942.10	2481765.53	
CB52-1-G6	9/14/2015	5.0	B3	4.0	568.1	243991.10	2481774.61	243995.58	2481772.51	
CB52-1-G7	9/14/2015	6.0	B3	4.0	569.0	243939.66	2481704.23	243942.56	2481705.31	
CB52-1-G8	9/14/2015	6.0	B3	4.0	568.3	243955.57	2481665.34	243958.94	2481663.34	
CB52-1-G9	9/14/2015	4.5	B3	4.0	568.8	243987.03	2481707.93	243990.74	2481709.85	
CB52-1-G10	9/14/2015	5.0	B3	4.0	568.4	244024.64	2481753.11	244023.11	2481750.91	
CB52-1-G11	9/14/2015	5.0	B3	4.0	568.8	243967.04	2481736.83	243967.46	2481737.11	

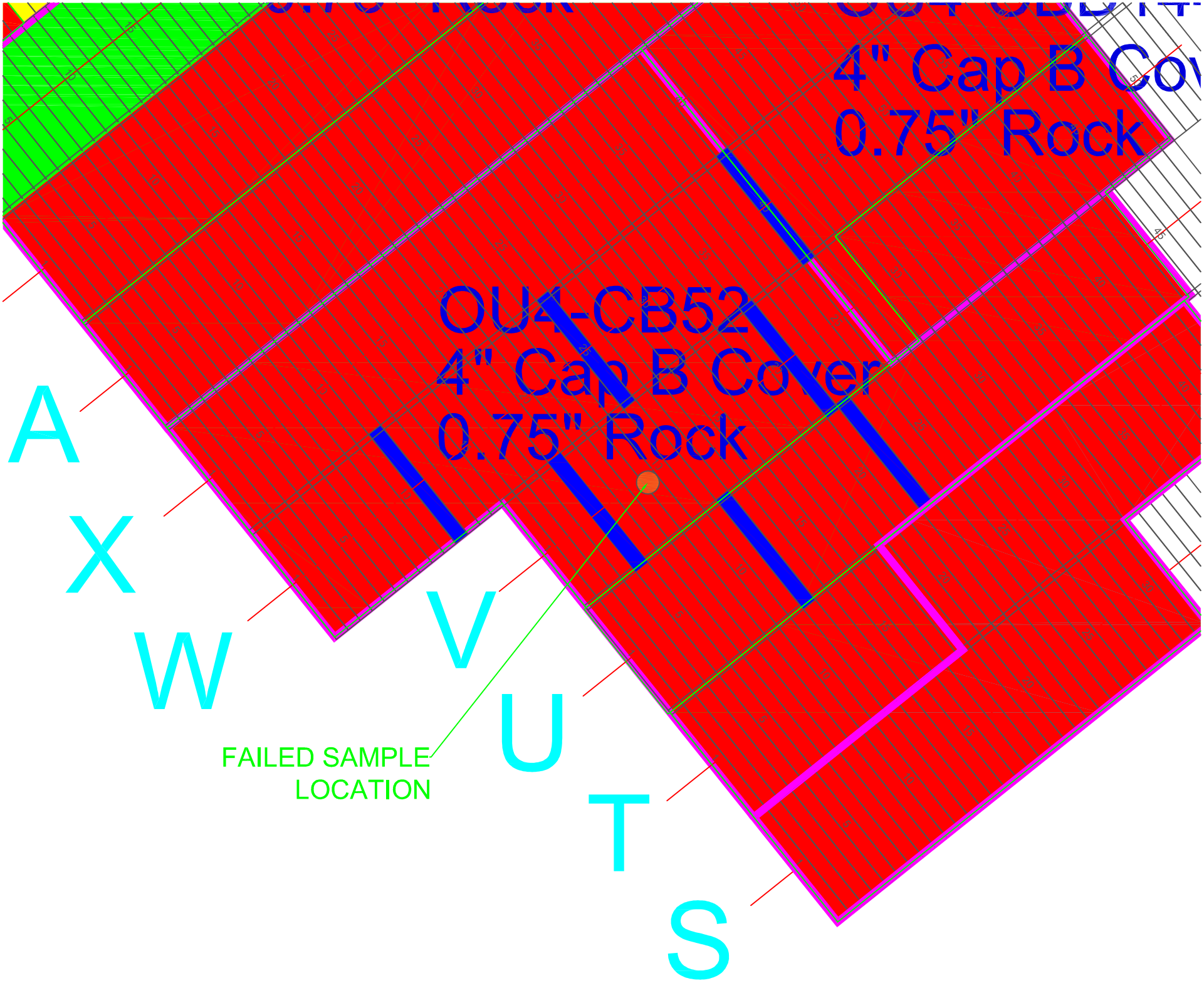
Average	4.95
Median	5.00
Standard Deviation	1.63

Recommended Path Forward:

Verification samples were collected in 11 locations within OU4-CB52-1. 10 of 11 samples meet or exceed the minimum thickness requirement of 4-inches. Tetra Tech recommends use of J.F. Brennan QC data to accept this area on an exception basis.

Prepared by: HNK Date: 9/22/2015 Reviewed by: BSW Date: 9/22/2015

A/OT Acceptance: Date: 9/22/15 on an exception basis


4" Cap B Cov
0.75" Rock
OU4-CB52
4" Cap B Cover
0.75" Rock
A
X
W
V
U
T
S
FAILED SAMPLE
LOCATION

CB52 QC SAMPLE LOG

	Area	Lane	Step	Port	Port/Center	Center	Stbd/Center	Stbd
9/11/2015	CB52	V	5	4	0	4	0	4
9/11/2015	CB52	V	21	3	0	4.5	0	4
9/10/2015	CB52	U	12	4	0	4	0	4
9/10/2015	CB52	U	22	4.5	0	4	7.5	0
9/11/2015	CB52	W	11	4	0	4.5	5.5	0
9/11/2015	CB52	W	25	4	0	5	5	0
9/11/2015	CB52	W	40	4	0	5	0	4

150921 QC STEP DETAIL CB52-1

Step Start	Area	SMU/CMU	Lane	Step Number	Duration (min)	Northing	Easting	Density (#/cu.ft.)	Length (ft)	Width (ft)	Height (in)	Weight (tons)	Cubic Yards	Inches/Step	Remarks
9/11/2015 6:57:09 AM	ou4	CB52	V	25	0.85	243978.77	2481816.86	105.00	4.00	35.00	4.90	0.90	0.63	1.46	
9/11/2015 6:58:16 AM	ou4	CB52	V	24	0.50	243972.69	2481823.84	105.00	4.00	35.00	4.90	1.10	0.78	1.81	
9/11/2015 6:59:46 AM	ou4	CB52	V	23	1.57	243983.62	2481812.84	105.00	4.00	35.00	4.90	4.40	3.10	7.17	
9/11/2015 7:01:51 AM	ou4	CB52	V	22	1.53	243981.04	2481810.33	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:03:53 AM	ou4	CB52	V	21	1.47	243978.09	2481806.92	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:05:52 AM	ou4	CB52	V	20	1.50	243975.58	2481803.98	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:07:53 AM	ou4	CB52	V	19	1.48	243972.97	2481800.92	105.00	4.00	35.00	4.90	3.40	2.40	5.55	
9/11/2015 7:09:52 AM	ou4	CB52	V	18	1.42	243970.47	2481797.70	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:12:03 AM	ou4	CB52	V	17	1.07	243967.93	2481794.67	105.00	4.00	35.00	4.90	3.30	2.33	5.39	
9/11/2015 7:13:37 AM	ou4	CB52	V	16	2.38	243965.37	2481791.46	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:16:31 AM	ou4	CB52	V	15	2.30	243962.90	2481788.54	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:19:20 AM	ou4	CB52	V	14	2.08	243960.36	2481785.24	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:21:56 AM	ou4	CB52	V	13	1.53	243957.98	2481782.35	105.00	4.00	35.00	4.90	3.40	2.40	5.55	
9/11/2015 7:23:59 AM	ou4	CB52	V	12	2.23	243955.49	2481779.04	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:26:44 AM	ou4	CB52	V	11	1.48	243953.04	2481775.73	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:28:44 AM	ou4	CB52	V	10	1.58	243950.63	2481772.72	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:31:04 AM	ou4	CB52	V	9	1.28	243948.08	2481769.57	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:32:52 AM	ou4	CB52	V	8	2.08	243945.63	2481766.49	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:35:27 AM	ou4	CB52	V	7	1.62	243942.92	2481763.42	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:37:35 AM	ou4	CB52	V	6	1.55	243940.41	2481760.44	105.00	4.00	35.00	4.90	3.40	2.40	5.55	
9/11/2015 7:39:39 AM	ou4	CB52	V	5	1.75	243938.04	2481757.40	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 7:41:54 AM	ou4	CB52	V	4	34.35	243935.19	2481753.91	105.00	4.00	35.00	4.90	3.50	2.47	5.72	
9/11/2015 8:17:00 AM	ou4	CB52	V	3	1.65	243932.77	2481750.88	105.00	4.00	35.00	4.90	3.70	2.61	6.04	
9/11/2015 8:19:25 AM	ou4	CB52	V	2	1.50	243930.52	2481747.80	105.00	4.00	35.00	4.90	3.60	2.54	5.88	
9/11/2015 8:21:55 AM	ou4	CB52	V	1	1.22	243927.58	2481744.51	105.00	4.00	35.00	4.90	3.70	2.61	6.04	
9/11/2015 8:23:39 AM	ou4	CB52	V	0	1.70	243925.16	2481741.64	105.00	4.00	35.00	4.90	3.60	2.54	5.88	

OU4-CBS4-1											
ID	Date Sampled	Sand Result (inches)	Sand/Sediment Mix (inches)	Total Thickness Sand and Sediment Mix (inches)	Required Thickness (inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CBS4-1-C1	5/28/2015	6.5	0.0	6.5	6.0	567.90	243870.83	2480947.89	243870.95	2480945.57	
CBS4-1-C2	5/28/2015	6.5	0.0	6.5	6.0	568.08	243847.20	2480913.03	243843.78	2480912.29	
CBS4-1-C3	5/29/2015	7.0	0.0	7.0	6.0	568.29	243889.77	2480913.64	243892.31	2480918.82	
CBS4-1-C4	5/29/2015	9.5	0.0	9.5	6.0	568.74	243853.72	2480865.12	243853.61	2480863.19	

Average	7.38	0.00	7.38
Median	6.75	0.00	6.75
Standard Deviation	1.44	0.00	1.44

Recommended Path Forward:

Verification samples were collected in 4 locations within OU4-CBS4-1. 4 of 4 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: MNK Date: 6/1/2015 Reviewed by: BSW Date: 6/1/2015

A/OT Acceptance: Date: 6/1/15

OU4-CB54-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CB54-1-G1	9/9/2015	5.0	B3	4.0	568.0	243866.08	2480941.04	243868.00	2480941.63	
CB54-1-G2	9/9/2015	4.5	B3	4.0	568.3	243843.44	2480909.61	243840.16	2480904.93	
CB54-1-G3	9/10/2015	4.5	B3	4.0	568.8	243858.74	2480874.38	243860.96	2480872.62	
CB54-1-G4	9/10/2015	4.5	B3	4.0	568.2	243899.07	2480925.55	243903.47	2480930.26	

Average 4.63
Median 4.50
Standard Deviation 0.25

Recommended Path Forward:

Verification samples were collected in 4 locations within OU4-CB54-1. 4 of 4 samples meet or exceed the minimum thickness requirement of 4-inches, therefore, no further action is required.

Prepared by: HNK Date: 9/11/2015 Reviewed by: BSW Date: 9/11/2015

A/OT Acceptance: Date: 9/16/15

Van Hoof, Tara M

From: George Berken <George.Berken@boldt.com>
Sent: Monday, September 26, 2016 8:30 AM
To: Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Kaminski, Roger; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Roznowski, Denis M; ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Van Hoof, Tara M; Blackmar, Terri; Gawronski, Troy A; dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc: AgenciesLFRTeam; LFR.OverSightTeam
Subject: 87500 OU2-5 - FW: LFRR-16-0113 Final Sand Thickness Verification Results SCD34-2, CBD34-2 and CCD34-2
Attachments: OU4-SCD34-2_09-19-16 Final Table.pdf; SCD34 SCMU 2 - Progress Complete.pdf; OU4 CBD 34-2_CCD34-2 Post Placement QA Results.pdf; 160922 Sand Volume Calcs for Submittal REV 4.pdf; 160922 Sand Volume Calcs for Submittal REV 4.xlsx; OU4-SCD34-2 _09-19-16 Final Table BERKEN.pdf

Brandon, on behalf of the Agencies, the signed acceptance for SCD34-2 is attached and the volumetric sand placement, per your email submittal below for CBD34-2 & CCD34-2, are also acceptable.

Thanks,
George…

George A. Berken | Engineering Project Manager
P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

boldt.com

SafeThinking: Our Crusade to Eliminate Accidents

From: Weston, Brandon [mailto:Brandon.Weston@tetratech.com]
Sent: Friday, September 23, 2016 10:29 AM
To: George Berken ; Jay Grosskopf ; Kincaid, Gary W - DNR (Gary.Kincaid@Wisconsin.gov) ; Larry DeBruin ; Ava Grosskopf ; Philip R. Brochocki (pbrochocki@naturalrt.com) ; Coleman, Bill ; Willant, George ; Blackmar, Terri ; Feeney, Richard ; Bauer, Eric ; Kinnard, Hugh ; Gifford, Ricky ; Lysne, Bjorn ; ECI.LFRR Project Correspondence ; Miller, Michelle ; Keon, Kendra ; 'Jeffrey Lawson' (JLawson@project-control.com) ; 'Susan O'Connell' (SOConnell@project-control.com) ; 'Bryan Heath' ; Paul Montney ; Kaminski, Roger (GBY) ; Gawronski, Troy A (Troy.Gawronski@Foth.com) ; Dustin Bauman (dbauman@JFBRENNAN.COM) ; Matt Dorow
Subject: LFRR-16-0113 Final Sand Thickness Verification Results SCD34-2, CBD34-2 and CCD34-2

All,

Please find the attached final result table, corresponding progress map, and J.F. Brennan Isopach and volumetric data for your review. The map is provided as a reference only for the proposed sample locations for the following areas:

- SCD34-2
- CBD34-2
- CCD34-2

Below is the link to SharePoint site where the results are available for review:

https://sites.tetratech.com/projects/106-lowerfoxriver/default.aspx?RootFolder=%2Fprojects%2F106%2Dlowerfoxriver%2FSharedDocuments%2F2016%2FCap%20and%20Cover%2FCover&FolderCTID=0x01200056916E5249BC0440B41F789C9281BE08&View={B4DA9CDD-CA02-4C44-B591-B2824CC14A8A}

Regards,

Brandon Weston | Sample Department Lead
Office: 920.445.0743
Mobile: 906.204.5324
brandon.weston@tetratech.com

Tetra Tech | RCM
1611 State Street | Green Bay, WI 54304| www.tetratech.com

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appropriate to rely upon this E-Mail in the same manner as hardcopy materials bearing the author's original signature or seal.

BRENNAN

Mechanical Placement

Area(s): CBD34-2, CCD34-2 & SCD34-2

Operational Unit 4

QA Survey

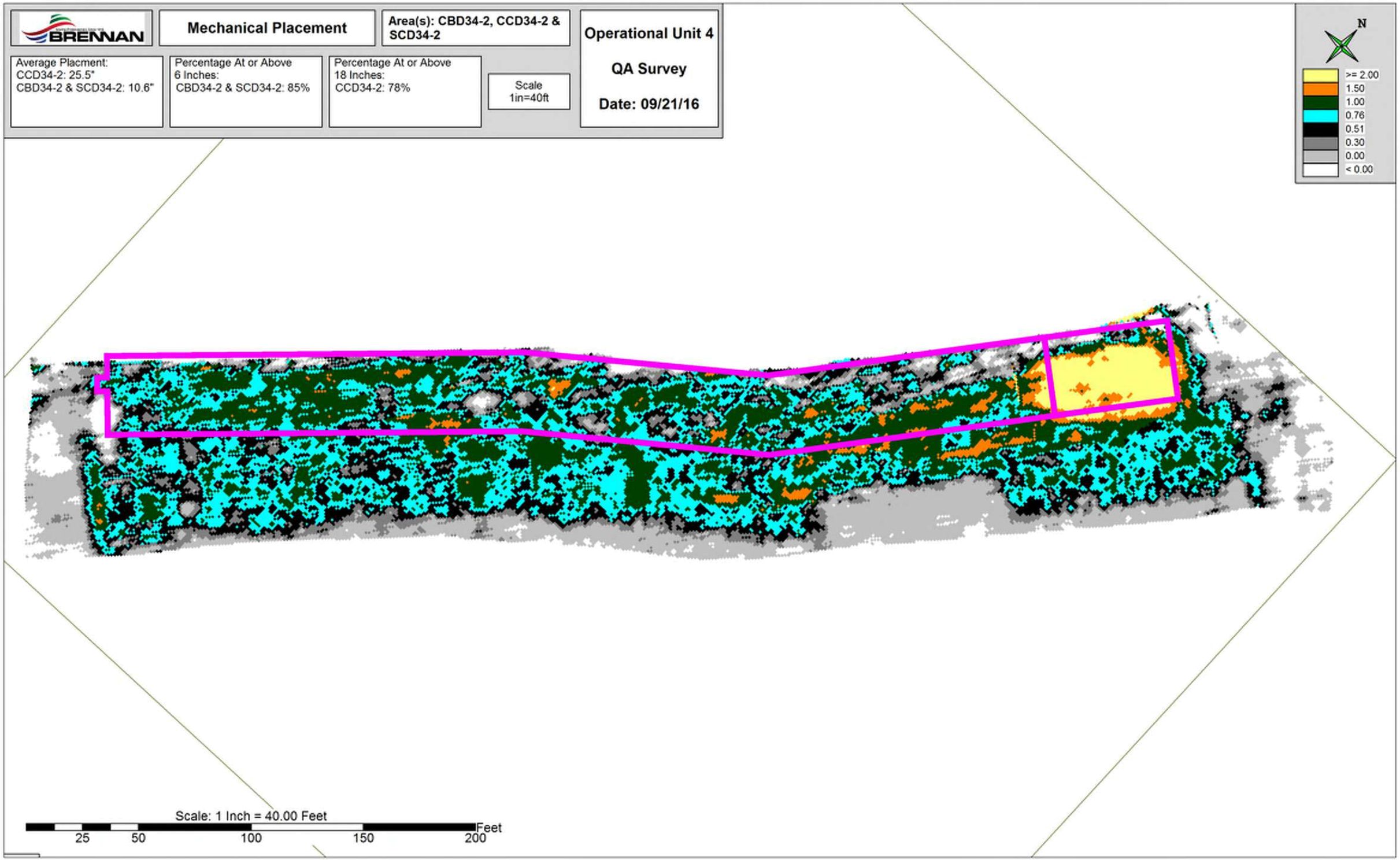
Date: 09/21/16

Average Placment:
CCD34-2: 25.5"
CBD34-2 & SCD34-2: 10.6"

Percentage At or Above
6 Inches:
CBD34-2 & SCD34-2: 85%

Percentage At or Above
18 Inches:
CCD34-2: 78%

Scale
1in=40ft



Mechanical Placement Results of SCD34-2, CBD34-2, CCD34-2

Created By: MMD
Date: 9/19/2016

Rev 1: 9/20/16
Rev 2: 9/21/16
Rev 3: 9/21/16
Rev 4: 9/22/16

	Design Area (SF)		(Based on Uniform Placement of 6-inches)	
CCD34-2	1,934	5.8%	of total area	
CBD34-2	9,875	29.6%	of total area	
SCD34-2	4,897	14.7%	of total area	(Volumetric Portion of SCD34-2)
Total	16,706	50.0%	of total area	

Total Area Placed Mechanically = 33,412 SF

Barge Survey Results (cy)

	Barge 1	Barge 2	
9/14/2016	273	256	
9/15/2016	279	262	
9/16/2016	118.5	-	
Sub-Total	1,188.5		(Volume Placed to the Uniform 6-inches)
9/20/2016	158	-	(Barge Loaded to Achieve 18-inches in CCD34-2)
9/21/2016	-18	-	(Volume Remaining on the Barge, Post-Placement)
Total	1,328.5		

Volume Placed by Area as a Function of Barge Survey Results			
First Lift (6 inches) (9/14 - 9/16/16)	**Avg. Placement Height for First Lift**	**With Second Lift (+18 inches) (9/20 - 9/21/16)**	**Avg. Placement Height for First and Second Lift**
68.8 cy	11.5 in	208.8 cy	35.0 in
351.3 cy	11.5 in	351.3 cy	11.5 in
174.2 cy	11.5 in	174.2 cy	11.5 in
594.3 cy		**734.3 cy**	

Van Hoof, Tara M

From: George Berken <George.Berken@boldt.com>
Sent: Monday, September 26, 2016 8:34 AM
To: Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Kaminski, Roger; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Roznowski, Denis M; ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Van Hoof, Tara M; Blackmar, Terri; Gawronski, Troy A; dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc: AgenciesLFRTeam; LFR.OverSightTeam
Subject: 87500 OU2-5 - FW: LFRR-16-0112 Volumetric Armor Stone Thickness Verification Results CBD34-2 and CCD34-2
Attachments: 160922 OU4 CBD 34-2 & CCD34-2 Post Rock Placement QA Results.pdf

Brandon, on behalf of the Agencies, the volumetric armor stone thicknesses, submitted in your email below for CBD34-2 and CCD34-2, are acceptable.

Thanks,
George…

George A. Berken | Engineering Project Manager
P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

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SafeThinking: Our Crusade to Eliminate Accidents

From: Weston, Brandon [mailto:Brandon.Weston@tetratech.com]
Sent: Friday, September 23, 2016 10:45 AM
To: George Berken ; Jay Grosskopf ; Kincaid, Gary W - DNR (Gary.Kincaid@Wisconsin.gov) ; Larry DeBruin ; Ava Grosskopf ; Philip R. Brochocki (pbrochocki@naturalrt.com) ; Coleman, Bill ; Willant, George ; Blackmar, Terri ; Feeney, Richard ; Bauer, Eric ; Kinnard, Hugh ; Gifford, Ricky ; Lysne, Bjorn ; ECI.LFRR Project Correspondence ; Miller, Michelle ; Keon, Kendra ; 'Jeffrey Lawson' (JLawson@project-control.com) ; 'Susan O'Connell' (SOConnell@project-control.com) ; 'Bryan Heath' ; Paul Montney ; Kaminski, Roger (GBY) ; Gawronski, Troy A (Troy.Gawronski@Foth.com) ; Dustin Bauman (dbauman@JFBRENNAN.COM) ; Matt Dorow
Subject: LFRR-16-0112 Volumetric Armor Stone Thickness Verification Results CBD34-2 and CCD34-2

All,

Please find the attached J.F. Brennan Isopach containing volumetric data for your review. The Isopach is provided for the following areas:

- CBD34-2
- CCD34-2

Below is the link to SharePoint site where the results are available for review:

https://sites.tetratech.com/projects/106-lowerfoxriver/default.aspx?RootFolder=%2Fprojects%2F106%2Dlowerfoxriver%2FSharedDocuments%2F2016%2FCap%20and%20Cover%2FCap&FolderCTID=0x01200056916E5249BC0440B41F789C9281BE08&View={B4DA9CDD-CA02-4C44-B591-B2824CC14A8A}&InitialTabId=Ribbon%2EDocument&VisibilityContext=WSSTabPersistence

Regards,

Brandon Weston | Sample Department Lead
Office: 920.445.0743
Mobile: 906.204.5324
brandon.weston@tetratech.com

Tetra Tech | RCM
1611 State Street | Green Bay, WI 54304| www.tetratech.com

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BRENNAN

Mechanical Placement

Area(s): CBD34-2, &CCD34-2
1.5" D50 Stone Placement

Operational Unit 4

QA Survey

Date: 09/22/16

Average Placement by Survey Data:
CCD34-2: 6.5"
CBD 34-2: 7.8"

Percentage of Design Area at or Above Required Placement Height of 4-inches: 89.3%

Barge Survey Data:
Barge 1: 161 cy
Barge 2: 169 cy
Avg. Placement: 7.9"

Scale
1in=30ft

N

>= 0.33
0.00
< 0.00

Van Hoof, Tara M

From: George Berken <George.Berken@boldt.com>
Sent: Tuesday, September 27, 2016 2:06 PM
To: Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Kaminski, Roger; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Roznowski, Denis M; ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Van Hoof, Tara M; Blackmar, Terri; Gawronski, Troy A; dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc: AgenciesLFRTeam; LFR.OverSightTeam
Subject: 87500 OU2-5 - FW: LFRR-16-0114 Quarry Spall Thickness Results CCD34-2
Attachments: 160923 CCD34 Quarry Spall Post Placement QA.PDF

Brandon, on behalf of the Agencies, the quarry spall thickness result, submitted in your email below for CCD34-2, is acceptable.

Thanks,
George…

George A. Berken | Engineering Project Manager
P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

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SafeThinking: Our Crusade to Eliminate Accidents

From: Weston, Brandon [mailto:Brandon.Weston@tetratech.com]
Sent: Tuesday, September 27, 2016 11:53 AM
To: George Berken ; Jay Grosskopf ; Kincaid, Gary W - DNR (Gary.Kincaid@Wisconsin.gov) ; Larry DeBruin ; Ava Grosskopf ; Philip R. Brochocki (pbrochocki@naturalrt.com) ; Coleman, Bill ; Willant, George ; Blackmar, Terri ; Feeney, Richard ; Bauer, Eric ; Kinnard, Hugh ; Gifford, Ricky ; Lysne, Bjorn ; ECI.LFRR Project Correspondence ; Miller, Michelle ; Keon, Kendra ; 'Jeffrey Lawson' (JLawson@project-control.com) ; 'Susan O'Connell' (SOConnell@project-control.com) ; 'Bryan Heath' ; Paul Montney ; Kaminski, Roger (GBY) ; Gawronski, Troy A (Troy.Gawronski@Foth.com) ; Dustin Bauman (dbauman@JFBRENNAN.COM) ; Matt Dorow
Subject: LFRR-16-0114 Quarry Spall Thickness Results CCD34-2

All,

Please find the attached J.F. Brennan volumetric Isopach data for your review. The Isopach is provided for the following area:

- CCD34-2

Below is the link to SharePoint site where the results are available for review:

https://sites.tetratech.com/projects/106-lowerfoxriver/default.aspx?RootFolder=%2Fprojects%2F106%2Dlowerfoxriver%2FSharedDocuments%2F2016%2FCap%20and%20Cover%2FQuarry%20Spall&FolderCTID=0x01200056916E5249BC0440B41F789C9281BE08&View={B4DA9CDD-CA02-4C44-B591-B2824CC14A8A}&InitialTabId=Ribbon%2EDocument&VisibilityContext=WSSTabPersistence

Regards,

Brandon Weston | Sample Department Lead
Office: 920.445.0743
Mobile: 906.204.5324
brandon.weston@tetratech.com

Tetra Tech | RCM
1611 State Street | Green Bay, WI 54304| www.tetratech.com

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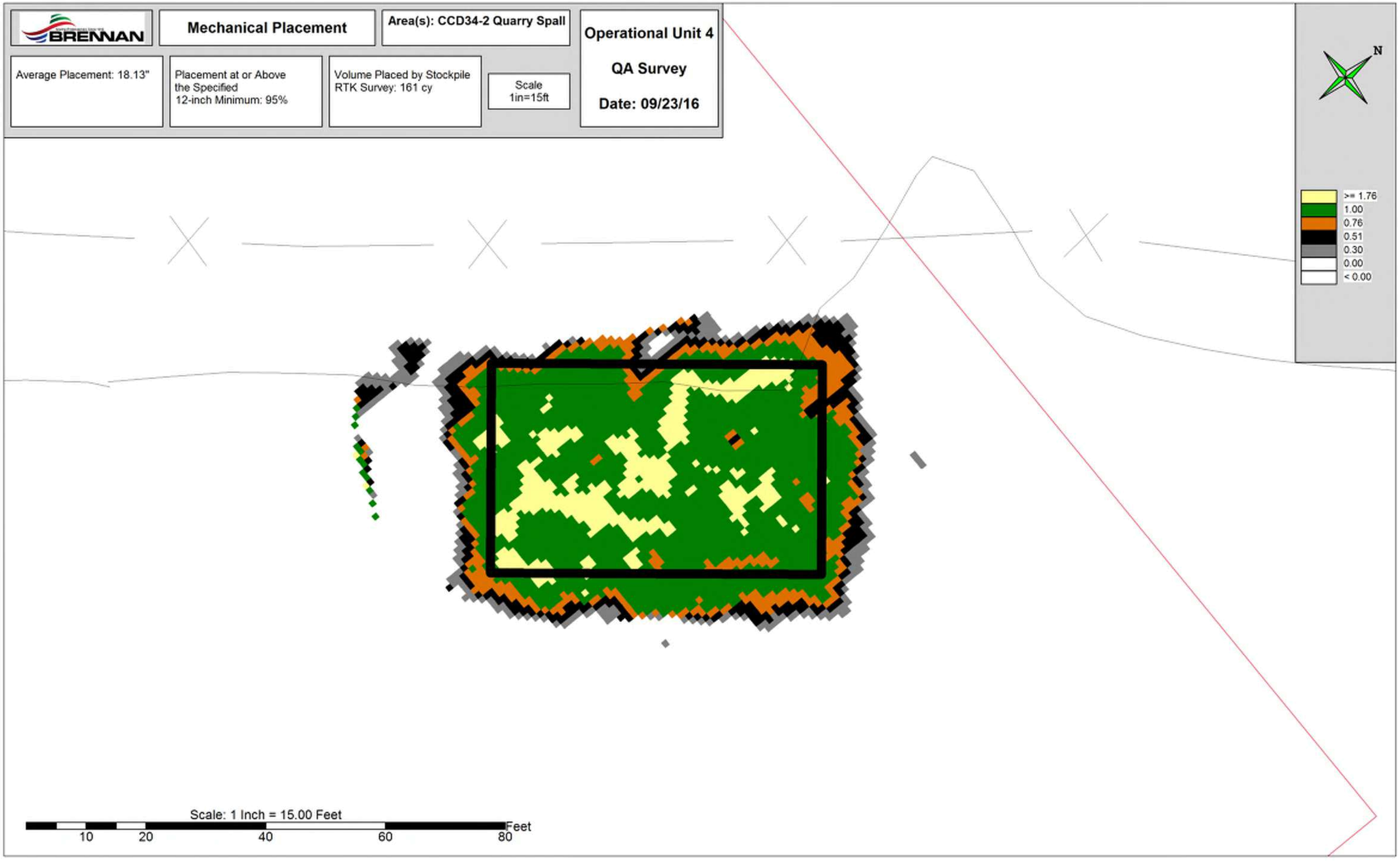
BRENNAN	Mechanical Placement	Area(s): CCD34-2 Quarry Spall	Operational Unit 4 QA Survey Date: 09/23/16
Average Placement: 18.13"	Placement at or Above the Specified 12-inch Minimum: 95%	Volume Placed by Stockpile RTK Survey: 161 cy	Scale 1in=15ft



OU4-CBD35A-8B											
ID	Date Sampled	Sand Result (inches)	Sand/Sediment Mix (inches)	Total Thickness Sand and Sediment Mix (inches)	Required Thickness (inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CBD35A-8B-C1	10/18/2016	10.5	0.0	10.5	6.0	562.96	246154.41	2482562.98	246159.38	2482560.73	
CBD35A-8B-C2	10/18/2016	8.0	0.0	8.0	6.0	556.59	246208.84	2482609.16	246208.85	2482607.12	
CBD35A-8B-C3	10/18/2016	10.5	0.0	10.5	6.0	557.87	246163.64	2482615.21	246167.19	2482611.63	
CBD35A-8B-C4	10/17/2016	11.5	0.0	11.5	6.0	562.56	246112.07	2482617.76	246111.59	2482617.91	
CBD35A-8B-C5	10/14/2016	7.0	0.0	7.0	6.0	554.67	246163.32	2482661.39	246163.93	2482667.08	
CBD35A-8B-C6	10/14/2016	6.5	0.0	6.5	6.0	557.31	246114.93	2482670.30	246114.86	2482671.58	

Average	9.00	0.00	9.00
Median	9.25	0.00	9.25
Standard Deviation	2.10	0.00	2.10

Recommended Path Forward:

Verification samples were collected in 6 locations within OU4-CBD35A-8B. 6 of 6 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: HNK Date: 10/18/2016 Reviewed by: BSW Date: 10/19/2016

A/OT Acceptance: Date: 10/20/16

Armor Stone Thickness Verification and Approval Form

OU4-CBD35A-8B (Bathymetric Survey)		
Area (acres)	Bathymetric Survey Thickness (Inches)	Required Thickness (Inches)
0.09	9.99	6.0

OU4-CBD35A-8B (B1 Cap Type)										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CBD35A-8B-B1-G1	11/1/2016	8.5	B1	6.0	557.6	246117.72	2482667.17	246119.94	2482669.39	
CBD35A-8B-B1-G2	11/1/2016	13.1	B1	6.0	555.5	246144.54	2482689.35	246142.96	2482688.45	
CBD35A-8B-B1-G3	11/1/2016	14.5	B1	6.0	555.7	246164.10	2482661.63	246159.70	2482660.56	
CBD35A-8B-B1-G4	11/1/2016	17.1	B1	6.0	557.4	246200.72	2482643.77	246201.40	2482647.48	

Average	13.29
Median	13.77
Standard Deviation	3.58

OU4-CBD35A-8B (B2 Cap Type)										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CBD35A-8B-B2-G1	10/31/2016	6.5	B2	4.0	562.9	246088.77	2482643.36	246096.38	2482641.89	
CBD35A-8B-B2-G2	10/31/2016	5.0	B2	4.0	561.4	246131.29	2482633.16	246130.04	2482636.85	
CBD35A-8B-B2-G3	10/31/2016	6.0	B2	4.0	564.6	246136.17	2482589.72	246142.03	2482588.95	
CBD35A-8B-B2-G4	10/31/2016	5.0	B2	4.0	556.3	246175.64	2482623.26	246181.91	2482629.12	
CBD35A-8B-B2-G5	N/A	N/A	B2	4.0	N/A	246165.65	2482574.34	N/A	N/A	Bucket could not be located during retrieval
CBD35A-8B-B2-G6	10/28/2016	4.5	B2	4.0	557.2	246210.53	2482606.91	246211.45	2482603.26	
CBD35A-8B-B2-E1	10/31/2016	9.5	B2	4.0	556.5	246157.36	2482628.15	246160.28	2482630.35	Bucket B2-G5 could not be located therefore the B2-E1 bucket measurement is used in its place.

Average	6.08
Median	5.50
Standard Deviation	1.83

Recommended Path Forward:

Verification samples were collected in 10 locations within OU4-CBD35A-8B. 4 of 4 samples in the B1 Cap Type meet or exceed the minimum thickness requirement of 6-inches. 6 of 6 samples in the B2 Cap Type meet or exceed the minimum thickness requirement of 4-inches resulting in a total of 10 out of 10 samples passing within OU4-CBD35A-8B. Therefore, no further action is required.

Prepared by: HNK Date: 5/9/2017 Reviewed by: BSW Date: 5/9/2017

A/OT Acceptance: Date: 5/15/17

OU4-CBD144-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CBD144-1-C1	8/20/2015	8.0	0.0	8.0	6.0	567.67	244028.86	2481868.28	244033.33	2481867.62	
CBD144-1-C2	8/20/2015	6.0	0.0	6.0	6.0	565.89	244034.07	2481818.90	244039.78	2481822.11	
CBD144-1-C3	8/21/2015	6.5	0.0	6.5	6.0	566.96	244070.58	2481810.58	244072.53	2481809.40	
CBD144-1-C4	8/21/2015	7.0	0.0	7.0	6.0	565.72	244118.56	2481808.24	244118.04	2481806.86	
CBD144-1-C5	8/20/2015	9.5	0.0	9.5	6.0	567.60	244059.59	2481854.55	244061.89	2481855.57	
CBD144-1-C6	8/20/2015	7.0	0.0	7.0	6.0	566.39	243995.22	2481828.59	243996.12	2481830.29	

Average	7.33	0.00	7.33
Median	7.00	0.00	7.00
Standard Deviation	1.25	0.00	1.25

Recommended Path Forward:

Verification samples were collected in 6 locations within OU4-CBD144-1. 6 of 6 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: HNK Date: 8/24/2015 Reviewed by: BSW Date: 8/24/2015

A/OT Acceptance: Date: 8/26/15

OU4-CBD144-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CBD144-1-G1	9/14/2015	4.5	B3	4.0	567.3	244006.37	2481841.46	244007.74	2481841.53	
CBD144-1-G2	9/14/2015	5.5	B3	4.0	567.2	244052.21	2481845.47	244048.89	2481844.40	
CBD144-1-G3	9/14/2015	5.0	B3	4.0	567.4	244058.03	2481795.22	244060.92	2481798.60	
CBD144-1-G4	9/14/2015	5.0	B3	4.0	566.0	244118.08	2481816.27	244125.54	2481816.47	

Average 5.00
Median 5.00
Standard Deviation 0.41

Recommended Path Forward:

Verification samples were collected in 4 locations within OU4-CBD144-1. 4 of 4 samples meet or exceed the minimum thickness requirement of 4-inches, therefore, no further action is required.

Prepared by: HNK Date: 9/15/2015 Reviewed by: BSW Date: 9/15/2015

A/OT Acceptance: Date: 9/17/15

OU4-CBD148-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CBD148-1-C1	5/28/2015	9.0	0.0	9.0	6.0	566.52	243927.97	2481018.78	243926.85	2481018.13	
CBD148-1-C2	5/28/2015	6.0	0.0	6.0	6.0	566.28	243975.92	2481077.88	243974.04	2481076.79	
CBD148-1-C3	5/28/2015	7.5	0.0	7.5	6.0	567.03	244029.75	2481145.37	244030.12	2481144.77	
CBD148-1-C4	5/29/2015	7.5	0.0	7.5	6.0	566.81	244032.20	2481088.50	244033.19	2481091.72	
CBD148-1-C5	5/29/2015	7.0	0.0	7.0	6.0	567.04	243971.13	2481014.23	243970.10	2481013.90	
CBD148-1-C6	5/29/2015	6.0	0.0	6.0	6.0	566.96	243922.17	2480952.15	243922.09	2480955.95	
CBD148-1-C7	5/29/2015	8.5	0.0	8.5	6.0	567.32	243975.31	2480961.02	243977.52	2480960.34	
CBD148-1-C8	5/29/2015	9.0	0.0	9.0	6.0	566.65	244076.81	2481089.42	244078.80	2481094.29	

Average	7.56	0.00	7.56
Median	7.50	0.00	7.50
Standard Deviation	1.21	0.00	1.21

Recommended Path Forward:

Verification samples were collected in 8 locations within OU4-CBD148-1. 8 of 8 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: JNK Date: 6/1/2015 Reviewed by: BSW Date: 6/1/2015

A/OT Acceptance: Date: 6/1/15

OU4-CBD148-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CBD148-1-G1	9/9/2015	5.5	B3	4.0	566.9	243898.13	2480979.26	243898.28	2480973.16	
CBD148-1-G2	9/9/2015	5.0	B3	4.0	566.5	243993.22	2481100.75	243991.69	2481100.08	
CBD148-1-G3	9/10/2015	6.0	B3	4.0	567.0	244052.84	2481114.94	244048.28	2481119.84	
CBD148-1-G4	9/10/2015	5.5	B3	4.0	567.5	243948.13	2480982.84	243955.27	2480983.11	
CBD148-1-G5	9/10/2015	5.5	B3	4.0	567.7	243954.67	2480938.08	243958.17	2480938.26	
CBD148-1-G6	9/10/2015	6.0	B3	4.0	567.3	244074.30	2481087.28	244076.90	2481084.10	
CBD148-1-G7	9/10/2015	4.0	B3	4.0	567.1	244028.85	2481028.33	244029.59	2481031.06	
CBD148-1-G8	9/10/2015	5.0	B3	4.0	567.0	243992.22	2481039.17	243993.93	2481039.60	

Average 5.31
Median 5.50
Standard Deviation 0.65

Recommended Path Forward:

Verification samples were collected in 8 locations within OU4-CBD148-1. 8 of 8 samples meet or exceed the minimum thickness requirement of 4-inches, therefore, no further action is required.

Prepared by: HNK Date: 9/11/2015 Reviewed by: BSW Date: 9/11/2015

A/OT Acceptance: Date: 9/16/15

OU4-CC2E-1A											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)		Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CC2E-1A-C1	10/2/2014	12.5	0.0	12.5	12.5	12.0	241976.86	2478841.36	241981.62	2478838.47	
CC2E-1A-C2	10/2/2014	18.0	0.0	18.0	18.0	12.0	242045.01	2478872.61	242047.08	2478871.37	
CC2E-1A-C3	10/6/2014	7.5	0.0		7.5	12.0	242124.74	2478913.39	242121.02	2478916.74	
CC2E-1A-C3A	10/6/2014	10.0	0.0		10.0	12.0			242115.17	2478918.03	Step-out Core
CC2E-1A-C3B	10/6/2014	12.5	0.0	10.8	12.5	12.0			242120.04	2478911.82	Step-out Core
CC2E-1A-C3C	10/6/2014	11.5	0.0		11.5	12.0			242126.47	2478917.21	Step-out Core
CC2E-1A-C3D	10/6/2014	12.5	0.0		12.5	12.0			242122.02	2478923.81	Step-out Core
CC2E-1A-C3RVT	10/8/2014	12.0	0.0	12.0	12.0	12.0	242121.02	2478916.74	242118.82	2478915.28	Revisit Core for re-spread
CC2E-1A-C4	10/6/2014	13.0	0.0	13.0	13.0	12.0	242192.13	2478943.88	242189.87	2478945.51	
CC2E-1A-C5	10/6/2014	12.5	0.0	12.5	12.5	12.0	242243.65	2478969.42	242248.19	2478968.59	
CC2E-1A-C6	10/6/2014	19.0	0.0	19.0	19.0	12.0	242308.83	2479050.23	242309.02	2479054.17	
CC2E-1A-C7	10/8/2014	19.0	0.0	19.0	19.0	12.0			242114.24	2478900.49	Locaiton added for re-spread
CC2E-1A-C8	10/8/2014	15.0	0.0	15.0	15.0	12.0			242124.94	2478931.80	Locaiton added for re-spread

Average	15.6	0.0	15.6	15.6
Median	14.0	0.0	14.0	14.0
Standard Deviation	3.1	0.0	3.1	3.1

Recommended Path Forward:

Verification samples were collected in 8 locations within OU4-CC2E-1A. 8 of 8 samples meet or exceed the minimum thickness requirement of 12-inches. An areas of the SCMU was re-spread due to the area not meeting the minimum thickness requirement. Locations C3RVT, C7, and C8 were sampled after the SCMU area was re-spread. Thickness measurements for C3, C3A, C3B, C3C, and C3D were not used for calculations since these measurements were taken before the re-spread. Therefore, no further action is required.

Prepared by: HNK Date: 10/9/2014 Reviewed by: BSW Date: 10/9/2014

A/OT Acceptance: Date: 10/10/14

OU4-CC2E-1A									
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
					Northing	Easting	Northing	Easting	
CC2E-1A-G1	10/13/2014	5.5	A3	3.0	241979.41	2478843.87	241987.14	2478847.13	
CC2E-1A-G2	10/13/2014	5.0	A3	3.0	242064.71	2478883.51	242066.49	2478888.98	
CC2E-1A-G3	10/13/2014	5.0	A3	3.0	242144.07	2478921.93	242148.00	2478926.55	
CC2E-1A-G4	10/13/2014	9.5	A3	3.0	242228.78	2478961.66	242232.76	2478963.71	
CC2E-1A-G5	10/13/2014	7.0	A3	3.0	242272.20	2479001.18	242276.03	2479002.57	
CC2E-1A-G6	10/13/2014	4.5	A3	3.0	242322.60	2479069.51	242326.98	2479076.22	

Average	6.08
Median	5.25
Standard Deviation	1.88

Recommended Path Forward:

Verification samples were collected in 6 locations within OU4-CC2E-1A. 6 of 6 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HNK Date: 10/14/2014 Reviewed by: BSW Date: 10/14/2014

A/OT Acceptance: Date: 10/14/14

P.H. Glatfelter Company

Operable Unit 4

2016 Quarry Spall Thickness Verification Results - CC2E-1A

Location	Remedial Action Area	OU	Pre-Placement Collection Date	Pre-Placement Actual X (WSPC NAD83, ft)	Pre-Placement Actual Y (WSPC NAD83, ft)	Post-Placement Collection Date	Post-Placement Actual X (WSPC NAD83, ft)	Post-Placement Actual Y (WSPC NAD83, ft)	Pre- and Post-Placement Location Offset (ft)	Pre-Placement Average Bottom Elevation (ft msl)	Post-Placement Average Bottom Elevation (ft msl)	Average Measured Quarry Spall Thickness[1] (inches)	Required Quarry Spall Thickness (inches)
CC2E-1A-R1	CC2E-1A	OU4	4/15/16 10:42	2478837.55	241969.08	5/31/16 13:09	2478837.15	241968.55	0.66	568.47	569.89	17.0	12.0
CC2E-1A-R2	CC2E-1A	OU4	4/15/16 10:48	2478884.97	242065.34	5/31/16 13:14	2478884.83	242064.8	0.56	568.96	570.44	17.8	12.0
CC2E-1A-R3	CC2E-1A	OU4	4/15/16 10:52	2478936.14	242175.52	6/6/16 13:26	2478936.61	242175.18	0.58	568.99	570.14	13.8	12.0
CC2E-1A-R4	CC2E-1A	OU4	4/15/16 10:58	2478961.57	242229.14	6/6/16 13:37	2478961.93	242228.76	0.52	570.09	570.68	7.1	6-9
CC2E-1A-R5	CC2E-1A	OU4	4/15/16 11:01	2479001.68	242272.14	6/6/16 13:40	2479002.17	242271.69	0.67	570.36	571.09	8.8	6-9
CC2E-1A-R6	CC2E-1A	OU4	4/15/16 11:06	2479069.75	242324.17	6/6/16 13:43	2479069.96	242323.87	0.37	568.72	570.11	16.7	12.0

1. All field data recorded in units of feet. Values presented have been converted from feet to inches.

Average	13.5
Median	15.2
Standard Deviation	4.6
Minimum	7.1
Maximum	17.8

Recommended Path Forward:

Quarry spall was placed within OU4-CC2E-1A. Thickness verification poling was conducted at 6 locations. All poled thicknesses meet or exceed the minimum thicknesses requirement of 6-9-inches or 12-inches as specified. Included with this table are the post-placement bathymetry and isopach maps prepared by Brennan. In addition, a mass balance sheet, which shows several volumetric tracking methods, has been included for all areas receiving quarry spall. Based on the information presented Foth recommends A/OT acceptance of this area.

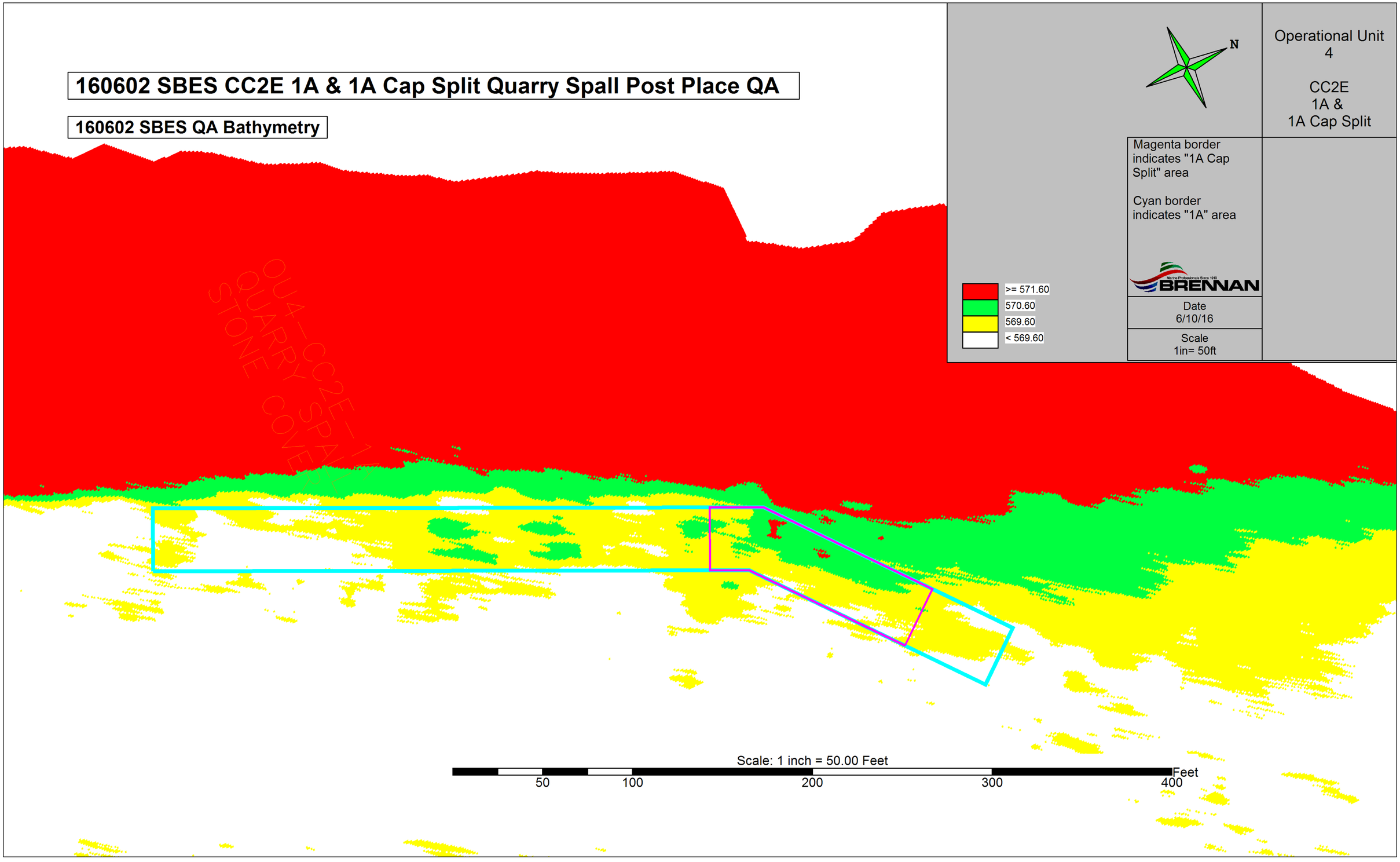
Prepared by: MCC2 Date: 6/6/2016

Reviewed by: SVF Date: 6/21/2016

A/OT Acceptance: Date: 6/22/16

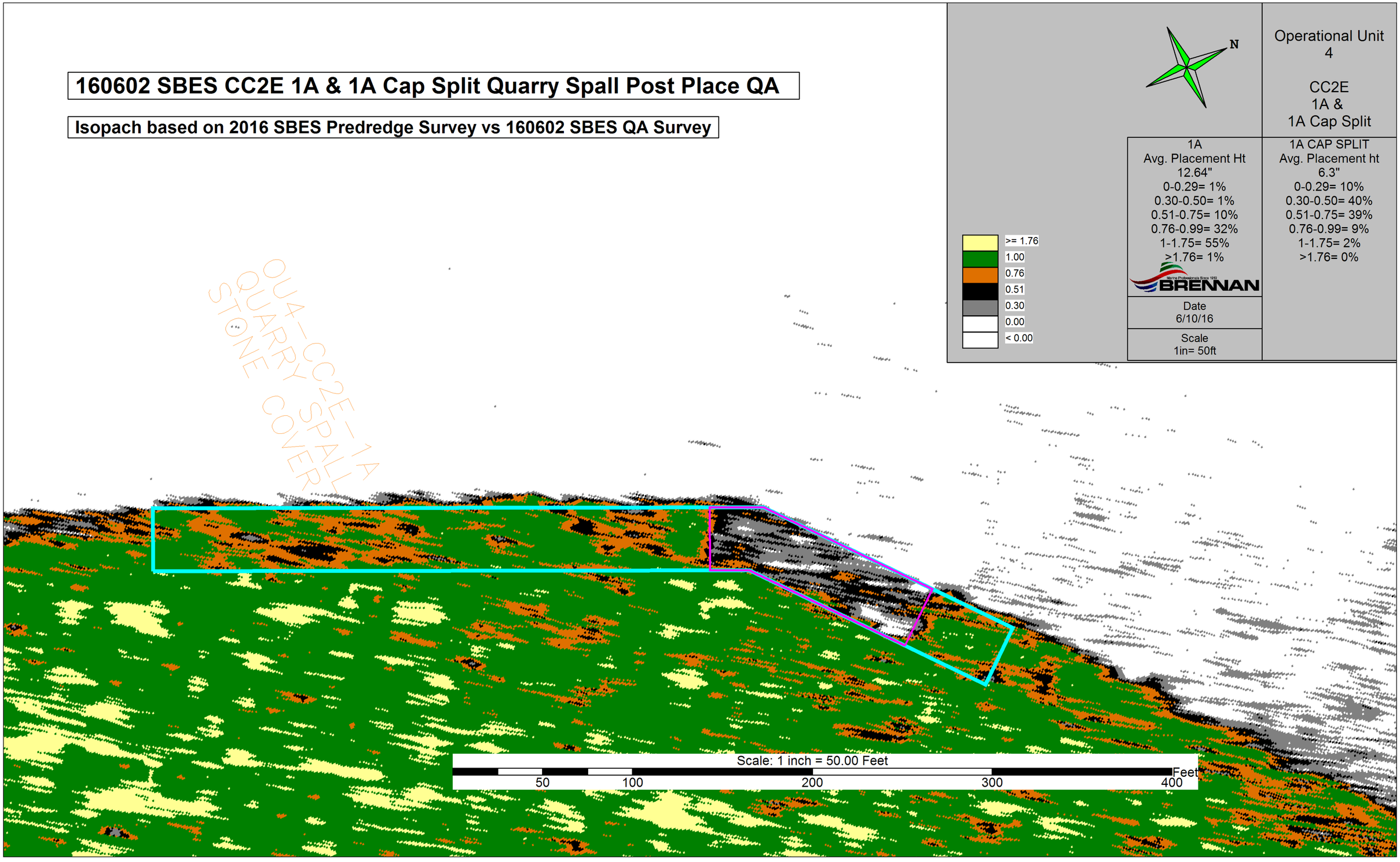
160602 SBES CC2E 1A & 1A Cap Split Quarry Spall Post Place QA

160602 SBES QA Bathymetry



160602 SBES CC2E 1A & 1A Cap Split Quarry Spall Post Place QA

Isopach based on 2016 SBES Predredge Survey vs 160602 SBES QA Survey



P.H. Glatfelter Company

Operable Unit 4

2016 Quarry Spall Thickness Verification Results - CC2E N-1

Location	Remedial Action Area	OU	Pre-Placement Collection Date	Pre-Placement Actual X (WSPC NAD83, ft)	Pre-Placement Actual Y (WSPC NAD83, ft)	Post-Placement Collection Date	Post-Placement Actual X (WSPC NAD83, ft)	Post-Placement Actual Y (WSPC NAD83, ft)	Pre- and Post-Placement Location Offset (ft)	Pre-Placement Average Bottom Elevation (ft msl)	Post-Placement Average Bottom Elevation (ft msl)	Average Measured Quarry Spall Thickness[1] (inches)	Required Quarry Spall Thickness (inches)
CC2E N-1-Q1	CC2E N-1	OU4	4/21/16 12:57	2480202.06	242961.03	5/20/16 10:10	2480200.87	242961.40	0.42	568.67	570.02	16.2	12.0
CC2E N-1-Q2	CC2E N-1	OU4	4/21/16 13:05	2480293.28	243035.24	5/20/16 10:21	2480292.83	243034.60	0.78	568.33	569.89	18.7	12.0
CC2E N-1-Q3	CC2E N-1	OU4	4/21/16 13:13	2480374.40	243098.61	5/20/16 10:25	2480374.52	243098.86	0.28	568.30	569.51	14.5	12.0
CC2E N-1-Q4	CC2E N-1	OU4	4/21/16 13:10	2480298.88	243083.69	5/24/16 9:47	2480298.17	243083.55	0.72	568.15	569.62	17.6	12.0
CC2E N-1-Q5	CC2E N-1	OU4	4/21/16 13:02	2480211.35	243014.86	5/24/16 9:39	2480212.02	243015.34	0.82	568.00	569.84	22.1	12.0
CC2E N-1-Q6	CC2E N-1	OU4	4/21/16 12:19	2480088.13	242914.42	5/24/16 9:22	2480088.63	242914.89	0.69	568.15	569.62	17.6	12.0
CC2E N-1-Q7	CC2E N-1	OU4	4/21/16 12:23	2480034.66	242917.30	5/24/16 9:35	2480035.31	242917.23	0.65	567.30	569.12	21.8	12.0
CC2E N-1-Q8	CC2E N-1	OU4	4/21/16 12:37	2480118.95	242983.60	5/24/16 9:30	2480119.90	242983.69	0.95	567.40	569.44	24.5	12.0
CC2E N-1-Q9	CC2E N-1	OU4	4/21/16 13:17	2480241.21	243081.08	5/24/16 9:42	2480240.17	243081.05	1.04	567.25	568.53	15.4	12.0
CC2E N-1-Q10	CC2E N-1	OU4	4/21/16 13:43	2480338.56	243159.85	5/24/16 9:51	2480338.41	243159.09	0.77	566.92	568.36	17.3	12.0
CC2E N-1-Q11	CC2E N-1	OU4	4/21/16 13:39	2480289.60	243166.32	5/24/16 9:55	2480289.40	243167.34	1.04	566.64	568.27	19.6	12.0
CC2E N-1-Q12	CC2E N-1	OU4	4/21/16 13:20	2480218.17	243111.24	5/25/16 16:11	2480217.51	243110.99	0.71	566.93	568.66	20.8	12.0
CC2E N-1-Q13	CC2E N-1	OU4	4/21/16 12:40	2480123.08	243032.10	5/24/16 9:44	2480123.37	243032.63	0.60	567.57	568.82	15.0	12.0
CC2E N-1-Q14	CC2E N-1	OU4	4/21/16 12:33	2480052.90	242976.71	5/24/16 9:26	2480052.12	242976.74	0.78	567.32	568.67	16.2	12.0
CC2E N-1-Q15	CC2E N-1	OU4	4/21/16 12:26	2479982.52	242967.75	5/25/16 15:47	2479981.84	242967.56	0.71	567.53	569.26	20.8	12.0
CC2E N-1-Q16	CC2E N-1	OU4	4/21/16 12:43	2480119.76	243076.97	5/25/16 13:55	2480119.77	243076.47	0.50	567.33	568.66	16.0	12.0
CC2E N-1-Q17	CC2E N-1	OU4	4/21/16 13:23	2480212.63	243149.08	5/25/16 16:00	2480212.31	243148.93	0.35	567.37	568.76	16.7	12.0
CC2E N-1-Q18	CC2E N-1	OU4	4/21/16 13:37	2480291.95	243212.87	5/25/16 16:05	2480291.36	243212.53	0.68	567.16	568.56	16.8	12.0
CC2E N-1-Q19	CC2E N-1	OU4	4/21/16 13:34	2480224.30	243204.70	5/25/16 16:26	2480223.43	243204.22	0.99	568.20	569.47	15.2	12.0
CC2E N-1-Q20	CC2E N-1	OU4	4/21/16 12:53	2480118.21	243117.84	5/25/16 16:21	2480118.05	243117.48	0.39	568.09	569.35	15.1	12.0
CC2E N-1-Q21	CC2E N-1	OU4	4/21/16 12:46	2480036.28	243055.15	5/25/16 16:17	2480036.72	243055.29	0.46	568.32	569.73	16.9	12.0
CC2E N-1-Q22	CC2E N-1	OU4	4/21/16 12:30	2479940.75	243025.13	6/6/16 14:14	2479940.29	243024.49	0.79	568.30	569.88	19.0	12.0
CC2E N-1-Q23	CC2E N-1	OU4	4/21/16 12:49	2480041.37	243103.70	6/6/16 14:17	2480041.34	243103.92	0.22	568.50	569.71	14.5	12.0
CC2E N-1-Q24	CC2E N-1	OU4	4/21/16 13:27	2480141.90	243184.51	6/6/16 14:21	2480141.27	243184.29	0.67	568.35	569.33	11.8	12.0
CC2E N-1-Q25	CC2E N-1	OU4	4/21/16 13:30	2480245.01	243266.20	6/6/16 14:25	2480245.22	243266.45	0.33	568.55	569.45	10.8	12.0

1. All field data recorded in units of feet. Values presented have been converted from feet to inches.

Average	17.2
Median	16.8
Standard Deviation	3.2
Minimum	10.8
Maximum	24.5

Recommended Path Forward:

Quarry spall was placed within OU4-CC2E-North-1. Thickness verification poling was conducted at 25 locations. 23 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches. Included with this table are the post-placement bathymetry and isopach maps prepared by Brennan. In addition, a mass balance sheet, which shows several volumetric tracking methods, has been included for all areas receiving quarry spall. Based on the information presented Foth recommends A/OT acceptance of this area.

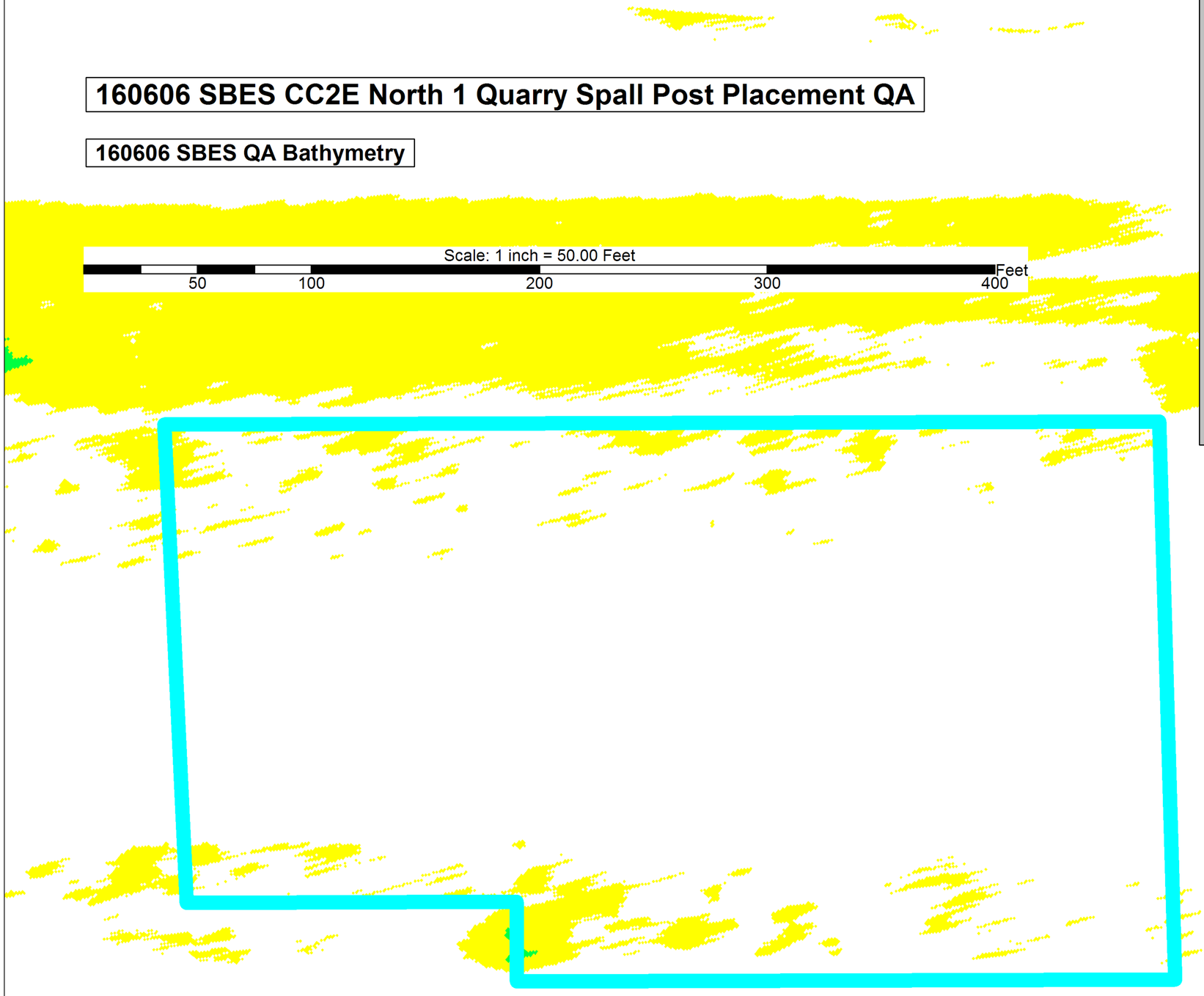
Prepared by: MCC2 Date: 6/6/2016

Reviewed by: SVF Date: 6/21/2016

A/OT Acceptance: Date: 6/22/16

160606 SBES CC2E North 1 Quarry Spall Post Placement QA

160606 SBES QA Bathymetry



N

>= 571.60
570.60
569.60
< 569.60

Operational Unit 4

CC2E North 1

Cyan border indicates "North 1" area

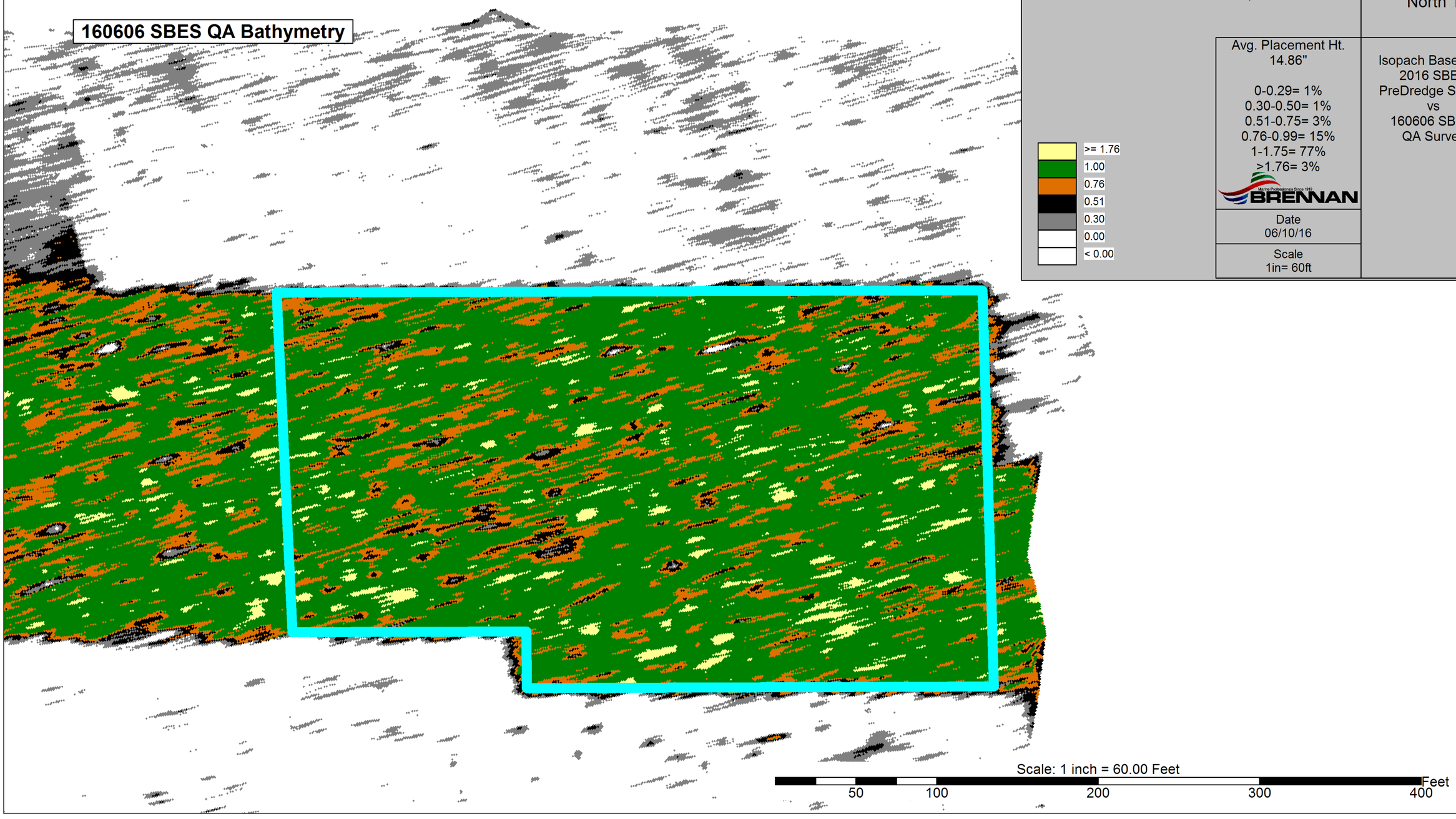
BRENNAN

Date 6/10/16

Scale 1in= 50ft

160606 SBES CC2E North 1 Quarry Spall Post Placement QA

160606 SBES QA Bathymetry



Operational Unit 4

CC2E North 1

Avg. Placement Ht. 14.86"

0-0.29= 1%
0.30-0.50= 1%
0.51-0.75= 3%
0.76-0.99= 15%
1-1.75= 77%
>1.76= 3%

BRENNAN

Date 06/10/16

Scale 1in= 60ft

Isopach Based on 2016 SBES PreDredge Survey vs 160606 SBES QA Survey

OU4-CC2E-North-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CC2E-N-1-C1	5/6/2015	9.0	0.0	9.0	6.0	568.27	242962.72	2480202.81	242967.49	2480203.17	
CC2E-N-1-C2	5/6/2015	7.5	0.0	7.5	6.0	568.05	243031.23	2480286.69	243030.66	2480284.92	
CC2E-N-1-C3	5/6/2015	7.5	0.0	7.5	6.0	567.64	243108.30	2480387.09	243107.34	2480386.02	
CC2E-N-1-C4	5/7/2015	8.5	0.0	8.5	6.0	567.64	243105.85	2480325.87	243110.28	2480325.05	
CC2E-N-1-C5	5/7/2015	8.0	0.0	8.0	6.0	567.79	243011.04	2480206.49	243014.61	2480206.70	
CC2E-N-1-C6	5/7/2015	7.0	0.0	7.0	6.0	567.95	242909.51	2480080.38	242908.73	2480079.03	
CC2E-N-1-C7	5/8/2015	8.0	0.0	8.0	6.0	567.11	242915.62	2480031.40	242914.25	2480031.52	
CC2E-N-1-C8	5/8/2015	7.0	0.0	7.0	6.0	567.01	243041.01	2480191.80	243043.29	2480193.23	
CC2E-N-1-C9	5/8/2015	8.0	0.0	8.0	6.0	566.52	243148.15	2480322.27	243147.78	2480322.85	
CC2E-N-1-C10	5/12/2015	7.0	0.0	7.0	6.0	566.75	243189.02	2480318.68	243186.57	2480320.12	
CC2E-N-1-C11	5/12/2015	11.0	0.0	11.0	6.0	567.38	243011.04	2480098.13	243009.68	2480097.57	
CC2E-N-1-C12	5/12/2015	9.0	0.0	9.0	6.0	567.02	242947.43	2480017.32	242950.55	2480019.44	
CC2E-N-1-C13	5/12/2015	9.0	0.0	9.0	6.0	567.19	242971.28	2479989.77	242971.88	2479986.42	
CC2E-N-1-C14	5/12/2015	7.5	0.0	7.5	6.0	567.02	243075.88	2480119.56	243077.76	2480124.71	
CC2E-N-1-C15	5/12/2015	8.0	0.0	8.0	6.0	567.20	243143.16	2480206.49	243142.04	2480215.02	
CC2E-N-1-C16	5/12/2015	6.0	0.0	6.0	6.0	567.85	243242.86	2480273.83	243242.91	2480276.88	
CC2E-N-1-C17	5/12/2015	7.5	0.0	7.5	6.0	568.03	243167.63	2480180.16	243165.45	2480182.11	
CC2E-N-1-C18	5/12/2015	7.5	0.0	7.5	6.0	567.89	243097.29	2480094.46	243098.01	2480092.15	
CC2E-N-1-C19	5/12/2015	8.0	0.0	8.0	6.0	567.93	243014.10	2479992.83	243019.88	2479997.14	
CC2E-N-1-C20	5/13/2015	9.0	0.0	9.0	6.0	568.55	243014.71	2479935.29	243013.38	2479935.53	3" sand layer, 3" armor stone layer, 3" sand layer
CC2E-N-1-C20A	5/13/2015	6.0	0.0	6.0	6.0	568.47			243019.14	2479943.55	6" sand layer over armor stone layer
CC2E-N-1-C21	5/13/2015	7.5	0.0	7.5	6.0	568.30	243092.39	2480028.34	243090.58	2480026.87	
CC2E-N-1-C22	5/13/2015	7.5	0.0	7.5	6.0	568.32	243158.59	2480112.21	243157.75	2480106.26	
CC2E-N-1-C23	5/13/2015	7.5	0.0	7.5	6.0	568.41	243235.05	2480205.26	243232.48	2480203.44	
CC2E-N-1-C24	5/12/2015	8.5	0.0	8.5	6.0	566.58	243099.32	2480203.59	243100.96	2480204.93	
CC2E-N-1-C25	5/12/2015	7.0	0.0	7.0	6.0	567.23	243202.40	2480275.87	243200.31	2480275.87	

Note: Locations highlighted in red were not included for calculations.

Average	7.80	0.00	7.80
Median	7.50	0.00	7.50
Standard Deviation	1.03	0.00	1.03

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-North-1. 25 of 25 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further is action required. OU4-CC2E-South-5 is adjacent to OU4-CC2E-North-1. OU4-CC2E-South-5 sand and armor stone were placed in October 2014. Thickness measurement for C20 is not used for calculations as the sample included overspread sand and armor layers from OU4-CC2E-South-5. C20A measurements will be used in place of C20 for average, median, and standard deviation calculations.

Prepared by: HNE Date: 5/14/2015 Reviewed by: BSW Date: 5/14/2015

A/OT Acceptance: Date: 5/18/15

OU4-CC2E-North-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC2E-N-1-G1	6/1/2015	6.5	C1	3.0	568.4	242962.41	2480202.12	242965.26	2480207.62	
CC2E-N-1-G2	6/1/2015	7.0	C1	3.0	568.3	243023.38	2480282.06	243023.62	2480284.68	
CC2E-N-1-G3	6/1/2015	8.0	C1	3.0	567.9	243098.37	2480372.98	243096.35	2480377.40	
CC2E-N-1-G4	6/1/2015	4.5	C1	3.0	568.0	243113.12	2480335.77	243110.76	2480330.10	
CC2E-N-1-G5	6/1/2015	7.5	C1	3.0	568.4	243030.81	2480233.86	243027.03	2480234.09	
CC2E-N-1-G6	6/1/2015	5.5	C1	3.0	568.2	242914.79	2480088.62	242914.04	2480087.43	
CC2E-N-1-G7	6/1/2015	5.5	C1	3.0	567.6	242916.62	2480034.31	242911.76	2480029.27	
CC2E-N-1-G8	6/1/2015	4.5	C1	3.0	567.2	243024.53	2480168.55	243025.61	2480171.41	
CC2E-N-1-G9	6/1/2015	5.0	C1	3.0	567.1	243106.99	2480272.92	243106.66	2480274.32	
CC2E-N-1-G10	6/1/2015	6.0	C1	3.0	567.2	243160.03	2480339.43	243165.33	2480338.20	
CC2E-N-1-G11	6/2/2015	4.0	C1	3.0	566.9	243167.34	2480290.00	243164.23	2480287.89	
CC2E-N-1-G12	6/2/2015	5.0	C1	3.0	566.9	243109.42	2480220.44	243107.04	2480216.92	
CC2E-N-1-G13	6/2/2015	4.5	C1	3.0	567.7	243028.34	2480117.92	243028.45	2480110.61	
CC2E-N-1-G14	N/A	N/A	C1	3.0	N/A	242965.54	2480040.42	N/A	N/A	Bucket could not be located during retrieval
CC2E-N-1-G15	6/2/2015	5.5	C1	3.0	567.5	242966.15	2479983.67	242962.24	2479980.09	
CC2E-N-1-G16	6/2/2015	5.5	C1	3.0	567.3	243035.04	2480070.93	243032.77	2480071.20	
CC2E-N-1-G17	6/2/2015	5.5	C1	3.0	567.3	243157.59	2480224.71	243157.95	2480222.58	
CC2E-N-1-G18	6/3/2015	4.0	C1	3.0	567.1	243212.59	2480291.20	243212.27	2480294.81	
CC2E-N-1-G19	6/3/2015	5.5	C1	3.0	568.3	243185.76	2480203.94	243191.98	2480205.21	
CC2E-N-1-G20	6/3/2015	5.0	C1	3.0	568.1	243116.74	2480117.89	243122.24	2480117.95	
CC2E-N-1-G21	6/3/2015	5.5	C1	3.0	568.4	243008.21	2479982.42	243014.63	2479979.94	
CC2E-N-1-G22	6/3/2015	4.5	C1	3.0	567.9	243023.46	2479942.76	243024.55	2479942.52	
CC2E-N-1-G23	6/3/2015	4.5	C1	3.0	568.3	243106.37	2480050.15	243104.84	2480048.19	
CC2E-N-1-G24	6/3/2015	6.0	C1	3.0	568.6	243183.97	2480144.76	243180.50	2480139.86	
CC2E-N-1-G25	6/3/2015	4.0	C1	3.0	568.0	243265.06	2480246.66	243262.33	2480243.65	
CC2E-N-1-E2	6/3/2015	6.0	C1	3.0	567.4	243005.32	2480125.86	243006.42	2480127.25	Bucket G14 could not be located therefore the E2 bucket measurement is used in its place.

Average 5.40
Median 5.50
Standard Deviation 1.05

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-North-1. 25 of 25 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HWK Date: 6/4/2015 Reviewed by: BSW Date: 6/4/2015

A/OT Acceptance: Date: 6/8/15

P.H. Glatfelter Company

Operable Unit 4

2016 Quarry Spall Thickness Verification Results - CC2E N-2

Location	Remedial Action Area	OU	Pre-Placement Collection Date	Pre-Placement Actual X (WSPC NAD83, ft)	Pre-Placement Actual Y (WSPC NAD83, ft)	Post-Placement Collection Date	Post-Placement Actual X (WSPC NAD83, ft)	Post-Placement Actual Y (WSPC NAD83, ft)	Pre- and Post-Placement Location Offset (ft)	Pre-Placement Average Bottom Elevation (ft msl)	Post-Placement Average Bottom Elevation (ft msl)	Average Measured Quarry Spall Thickness[1] (inches)	Required Quarry Spall Thickness (inches)
CC2E N-2-Q1	CC2E N-2	OU4	4/21/16 14:05	2480414.39	243130.54	5/31/16 13:28	2480414.14	243130.93	0.46	568.49	569.70	14.5	12.0
CC2E N-2-Q2	CC2E N-2	OU4	4/21/16 14:29	2480506.04	243206.47	5/31/16 13:45	2480505.30	243206.12	0.82	568.14	569.35	14.5	12.0
CC2E N-2-Q3	CC2E N-2	OU4	4/25/16 9:27	2480595.88	243277.50	5/31/16 14:03	2480595.72	243277.16	0.38	568.27	569.78	18.1	12.0
CC2E N-2-Q4	CC2E N-2	OU4	4/25/16 9:59	2480709.59	243367.94	5/31/16 14:16	2480710.34	243368.20	0.79	568.44	569.35	10.9 •	12.0
CC2E N-2-Q5	CC2E N-2	OU4	4/25/16 9:33	2480638.77	243356.66	5/31/16 14:11	2480638.66	243357.19	0.54	568.10	569.10	12.0	12.0
CC2E N-2-Q6	CC2E N-2	OU4	4/21/16 14:32	2480512.40	243255.06	5/31/16 13:48	2480512.24	243255.59	0.55	568.06	569.37	15.7	12.0
CC2E N-2-Q7	CC2E N-2	OU4	4/21/16 14:09	2480394.13	243162.64	5/31/16 13:33	2480394.41	243162.78	0.31	567.65	569.39	20.9	12.0
CC2E N-2-Q8	CC2E N-2	OU4	4/21/16 14:35	2480491.30	243281.36	5/31/16 13:54	2480491.51	243281.00	0.42	567.06	568.28	14.6	12.0
CC2E N-2-Q9	CC2E N-2	OU4	4/21/16 14:25	2480434.15	243236.79	5/31/16 13:38	2480434.23	243236.77	0.08	567.00	568.35	16.2	12.0
CC2E N-2-Q10	CC2E N-2	OU4	4/25/16 9:37	2480563.43	243344.63	5/31/16 14:08	2480563.44	243344.46	0.17	567.07	568.38	15.7	12.0
CC2E N-2-Q11	CC2E N-2	OU4	4/25/16 9:55	2480666.41	243424.00	5/31/16 14:22	2480665.81	243423.46	0.81	567.13	567.95	9.8 •	12.0
CC2E N-2-Q12	CC2E N-2	OU4	4/25/16 9:46	2480603.67	243417.68	6/10/16 9:30	2480603.43	243417.81	0.27	567.11	568.02	10.9 •	12.0
CC2E N-2-Q13	CC2E N-2	OU4	4/21/16 14:37	2480487.58	243324.71	6/10/16 9:13	2480487.34	243325.09	0.43	567.04	568.08	12.5	12.0
CC2E N-2-Q14	CC2E N-2	OU4	4/21/16 14:13	2480348.87	243211.25	6/10/16 8:49	2480348.26	243211.74	0.78	566.84	567.89	12.6	12.0
CC2E N-2-Q15	CC2E N-2	OU4	4/25/16 10:22	2480486.14	243459.34	6/10/16 9:46	2480485.85	243459.00	0.45	568.43	569.47	12.0	12.0
CC2E N-2-Q16	CC2E N-2	OU4	4/21/16 14:16	2480345.91	243257.89	6/10/16 8:54	2480346.24	243258.32	0.54	567.19	568.16	11.6 •	12.0
CC2E N-2-Q17	CC2E N-2	OU4	4/25/16 9:51	2480527.90	243399.60	6/10/16 9:25	2480528.19	243400.19	0.66	567.34	568.47	13.6	12.0
CC2E N-2-Q18	CC2E N-2	OU4	4/25/16 10:13	2480631.97	243485.13	6/10/16 9:36	2480631.59	243484.97	0.41	567.32	568.32	12.0	12.0
CC2E N-2-Q19	CC2E N-2	OU4	4/25/16 10:18	2480565.09	243475.87	6/10/16 9:42	2480565.26	243476.08	0.27	567.31	568.57	15.1	12.0
CC2E N-2-Q20	CC2E N-2	OU4	4/21/16 14:41	2480448.10	243381.02	6/10/16 9:16	2480447.86	243381.06	0.24	567.61	568.96	16.2	12.0
CC2E N-2-Q21	CC2E N-2	OU4	4/21/16 14:43	2480380.23	243325.61	6/10/16 9:05	2480380.30	243325.79	0.19	567.77	569.37	19.2	12.0
CC2E N-2-Q22	CC2E N-2	OU4	4/21/16 14:18	2480299.51	243264.44	6/10/16 8:58	2480299.93	243264.60	0.45	567.90	569.19	15.5	12.0
CC2E N-2-Q23	CC2E N-2	OU4	4/21/16 14:20	2480297.06	243304.17	6/10/16 9:01	2480297.06	243304.01	0.16	568.00	569.65	19.8	12.0
CC2E N-2-Q24	CC2E N-2	OU4	4/21/16 14:46	2480378.67	243371.65	6/10/16 9:21	2480378.85	243371.77	0.22	568.04	569.41	16.4	12.0
CC2E N-2-Q25	CC2E N-2	OU4	4/25/16 10:27	2480579.41	243534.25	6/10/16 9:51	2480579.20	243533.78	0.51	568.32	569.79	17.6	12.0

1. All field data recorded in units of feet. Values presented have been converted from feet to inches.

Average	14.7
Median	14.6
Standard Deviation	3.0
Minimum	9.8
Maximum	20.9

Recommended Path Forward:

Quarry spall was placed within OU4-CC2E-North-2. Thickness verification poling was conducted at 25 locations. 21 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches. Included with this table are the post-placement bathymetry and isopach maps prepared by Brennan. In addition, a mass balance sheet, which shows several volumetric tracking methods, has been included for all areas receiving quarry spall. Based on the information presented Foth recommends A/OT acceptance of this area.

Prepared by: MCC2 Date: 6/10/2016

Reviewed by: SVF Date: 6/21/2016

A/OT Acceptance: [illegible] Date: 6/22/16

exception basis

[illegible]

160613 SBES CC2E North 2 Quarry Spall Post Placement QA

160613 SBES QA Bathymetry

Scale: 1 Inch = 60.00 Feet

50 100 200 300 400 Feet

N

Operational Unit 4

CC2E North 2

Cyan Border Indicates "South 5" area

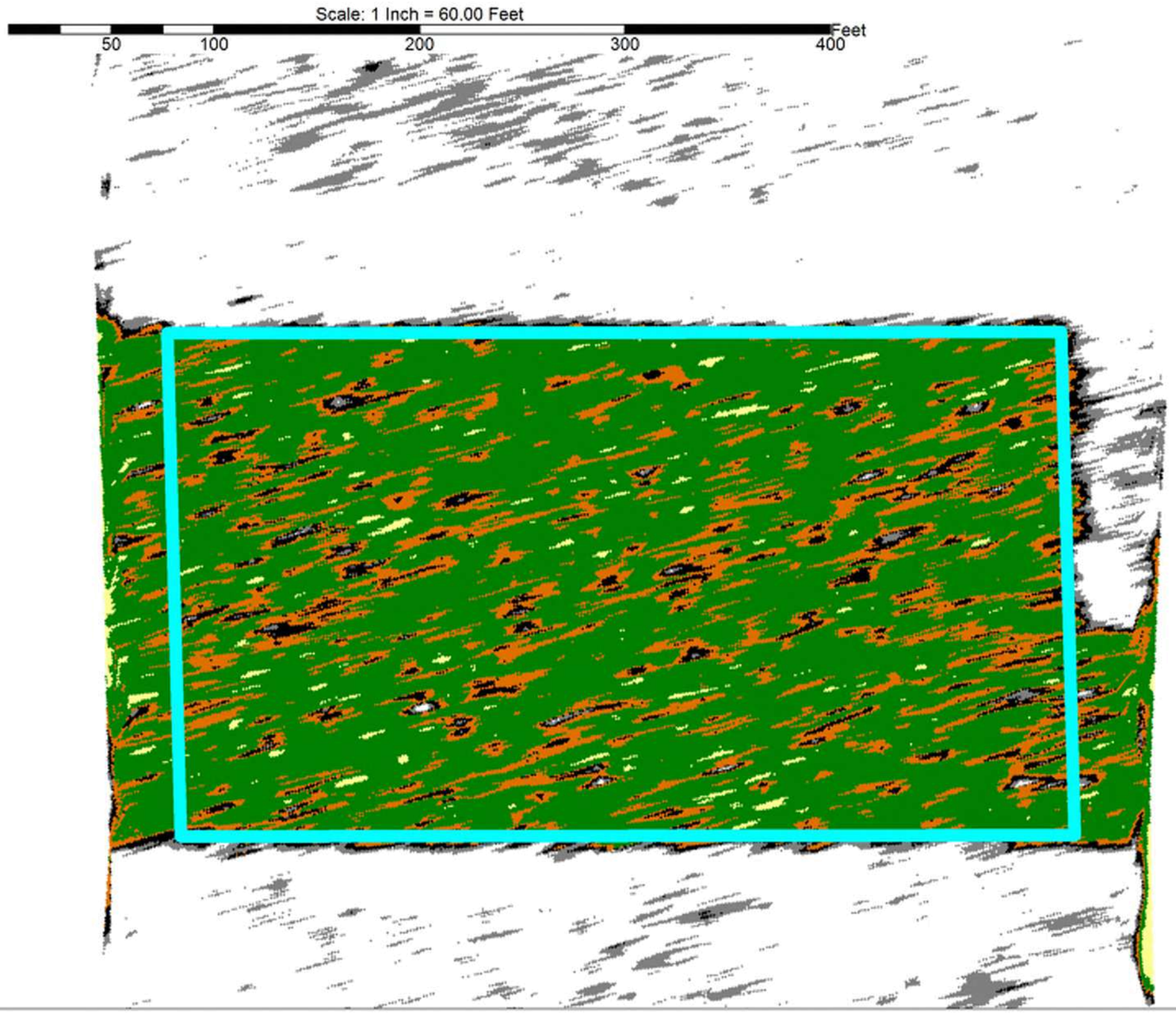
BRENNAN

>= 571.60	
570.60	
569.60	
< 569.60	

Date 6/13/16

Scale 1in= 60ft

160613 SBES CC2E North 2 Quarry Spall Post Placement QA



N

Operational Unit
4

CC2E
North 2

BRENNAN

>= 1.76
1.00
0.76
0.51
0.30
0.00
< 0.00

Avg. Placement HT
14.04"
0-0.29= 1%
0.3-0.5= 1%
0.51-0.75= 4%
0.76-0.99= 19%
1-1.75= 74%
>1.76= 1%

Date
6/13/16

Scale
1in= 60ft

Isopach Based on
2016 SBES
PreDredge Survey
VS
160606 SBES QA Survey

OU4-CC2E-North-2											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CC2E-N-2-C1	5/6/2015	7.5	0.0	7.5	6.0	567.81	243171.54	2480465.93	243171.10	2480465.95	
CC2E-N-2-C2	5/6/2015	7.5	0.0	7.5	6.0	568.17	243300.80	2480624.64	243298.25	2480623.53	
CC2E-N-2-C3	5/6/2015	7.5	0.0	7.5	6.0	567.82	243370.26	2480714.31	243366.94	2480710.66	
CC2E-N-2-C4	5/7/2015	6.5	0.0	6.5	6.0	567.51	243380.96	2480669.33	243384.59	2480667.03	
CC2E-N-2-C5	5/7/2015	10.0	0.0	10.0	6.0	567.80	243231.02	2480484.27	243234.38	2480484.97	
CC2E-N-2-C6	5/7/2015	8.0	0.0	8.0	6.0	567.58	243315.81	2480587.93	243317.41	2480591.69	
CC2E-N-2-C7	5/7/2015	7.0	0.0	7.0	6.0	567.37	243157.90	2480387.90	243161.94	2480391.70	
CC2E-N-2-C8	5/8/2015	7.0	0.0	7.0	6.0	566.56	243190.18	2480376.95	243186.84	2480375.00	
CC2E-N-2-C9	5/8/2015	8.0	0.0	8.0	6.0	566.71	243291.41	2480501.90	243288.21	2480497.45	
CC2E-N-2-C10	5/8/2015	7.5	0.0	7.5	6.0	566.77	243429.82	2480679.05	243427.91	2480678.59	
CC2E-N-2-C11	5/12/2015	8.0	0.0	8.0	6.0	566.39	243432.33	2480625.31	243432.92	2480629.71	
CC2E-N-2-C12	5/12/2015	8.5	0.0	8.5	6.0	566.73	243376.69	2480552.74	243373.77	2480552.34	
CC2E-N-2-C13	5/12/2015	8.5	0.0	8.5	6.0	566.76	243288.93	2480444.19	243286.20	2480441.10	
CC2E-N-2-C14	5/12/2015	7.5	0.0	7.5	6.0	566.78	243229.73	2480370.56	243231.54	2480368.65	
CC2E-N-2-C15	5/12/2015	7.5	0.0	7.5	6.0	566.91	243231.86	2480316.36	243235.55	2480317.91	
CC2E-N-2-C16	5/12/2015	8.0	0.0	8.0	6.0	566.87	243330.84	2480443.13	243329.38	2480441.81	
CC2E-N-2-C17	5/12/2015	8.0	0.0	8.0	6.0	567.09	243423.11	2480557.31	243421.56	2480558.43	
CC2E-N-2-C18	5/13/2015	7.5	0.0	7.5	6.0	567.16	243516.22	2480616.08	243514.87	2480613.12	
CC2E-N-2-C19	5/12/2015	8.5	0.0	8.5	6.0	567.73	243433.17	2480514.50	243433.52	2480517.11	
CC2E-N-2-C20	5/13/2015	8.5	0.0	8.5	6.0	567.67	243336.71	2480391.08	243331.63	2480391.02	
CC2E-N-2-C21	5/13/2015	8.0	0.0	8.0	6.0	567.89	243268.89	2480305.44	243268.74	2480302.28	
CC2E-N-2-C22	5/13/2015	8.0	0.0	8.0	6.0	568.04	243293.97	2480283.58	243296.48	2480282.89	
CC2E-N-2-C23	5/13/2015	6.5	0.0	6.5	6.0	567.84	243330.00	2480328.96	243327.16	2480325.79	
CC2E-N-2-C24	5/14/2015	6.5	0.0	6.5	6.0	567.79	243420.59	2480442.29	243420.93	2480443.14	
CC2E-N-2-C25	5/14/2015	6.5	0.0	6.5	6.0	568.03	243516.40	2480560.71	243520.36	2480559.71	

Average	7.70	0.00	7.70
Median	7.50	0.00	7.50
Standard Deviation	0.80	0.00	0.80

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-North-2. 25 of 25 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: HNK Date: 5/15/2015 Reviewed by: BSW Date: 5/15/2015

A/OT Acceptance: Date: 5/18/15

OU4-CC2E-North-2										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC2E-N-2-G1	6/1/2015	7.0	C1	3.0	568.3	243130.69	2480415.66	243134.85	2480419.32	
CC2E-N-2-G2	6/1/2015	7.5	C1	3.0	568.2	243206.44	2480506.79	243211.97	2480507.58	
CC2E-N-2-G3	6/1/2015	6.0	C1	3.0	568.3	243277.11	2480595.35	243279.26	2480593.28	
CC2E-N-2-G4	6/1/2015	6.5	C1	3.0	568.0	243367.27	2480710.20	243369.17	2480712.63	
CC2E-N-2-G5	6/1/2015	7.0	C1	3.0	568.3	243365.63	2480649.49	243366.02	2480646.53	
CC2E-N-2-G6	6/1/2015	4.5	C1	3.0	567.4	243255.80	2480511.67	243253.01	2480505.86	
CC2E-N-2-G7	6/1/2015	5.0	C1	3.0	567.7	243162.77	2480393.83	243158.15	2480393.01	
CC2E-N-2-G8	6/2/2015	5.5	C1	3.0	567.0	243281.72	2480491.76	243281.32	2480488.65	
CC2E-N-2-G9	6/1/2015	5.0	C1	3.0	567.1	243236.12	2480434.55	243235.59	2480433.34	
CC2E-N-2-G10	6/2/2015	6.0	C1	3.0	567.1	243350.06	2480568.27	243355.31	2480568.70	
CC2E-N-2-G11	6/2/2015	5.0	C1	3.0	566.9	243424.65	2480665.90	243428.03	2480670.55	
CC2E-N-2-G12	6/2/2015	4.5	C1	3.0	567.0	243418.09	2480604.37	243417.31	2480601.98	
CC2E-N-2-G13	6/2/2015	7.0	C1	3.0	567.2	243324.65	2480488.70	243325.63	2480484.99	
CC2E-N-2-G14	6/2/2015	5.0	C1	3.0	566.7	243211.11	2480349.11	243213.18	2480344.52	
CC2E-N-2-G15	6/3/2015	5.0	C1	3.0	568.1	243459.04	2480486.03	243459.76	2480487.84	
CC2E-N-2-G16	6/3/2015	5.0	C1	3.0	567.4	243257.92	2480346.86	243257.86	2480352.10	
CC2E-N-2-G17	6/3/2015	6.0	C1	3.0	567.5	243382.02	2480505.93	243377.94	2480505.51	
CC2E-N-2-G18	6/3/2015	5.0	C1	3.0	567.4	243484.48	2480633.08	243484.34	2480632.88	
CC2E-N-2-G19	6/3/2015	5.5	C1	3.0	567.1	243491.13	2480586.27	243492.15	2480587.02	
CC2E-N-2-G20	6/3/2015	5.0	C1	3.0	567.9	243380.48	2480447.63	243384.32	2480450.72	
CC2E-N-2-G21	6/3/2015	5.5	C1	3.0	568.1	243324.74	2480381.18	243325.24	2480380.11	
CC2E-N-2-G22	6/3/2015	4.5	C1	3.0	567.9	243265.68	2480299.11	243270.31	2480302.85	
CC2E-N-2-G23	6/3/2015	3.0	C1	3.0	568.1	243304.87	2480296.22	243303.47	2480294.43	
CC2E-N-2-G24	6/3/2015	6.0	C1	3.0	568.3	243375.56	2480386.10	243369.86	2480381.56	
CC2E-N-2-G25	6/3/2015	4.5	C1	3.0	567.9	243534.32	2480580.21	243531.35	2480577.95	

Average 5.46
Median 5.00
Standard Deviation 1.02

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-North-2. 25 of 25 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HNK Date: 6/4/2015 Reviewed by: BSW Date: 6/4/2015

A/OT Acceptance: Date: 6/8/15

P.H. Glatfelter Company

Operable Unit 4

2016 Quarry Spall Thickness Verification Results - CC2E N-3

Location	Remedial Action Area	OU	Pre-Placement Collection Date	Pre-Placement Actual X (WSPC NAD83, ft)	Pre-Placement Actual Y (WSPC NAD83, ft)	Post-Placement Collection Date	Post-Placement Actual X (WSPC NAD83, ft)	Post-Placement Actual Y (WSPC NAD83, ft)	Pre- and Post-Placement Location Offset (ft)	Pre-Placement Average Bottom Elevation (ft msl)	Post-Placement Average Bottom Elevation (ft msl)	Average Measured Quarry Spall Thickness[1] (inches)	Required Quarry Spall Thickness (inches)
CC2E N-3-Q1	CC2E N-3	OU4	4/25/16 10:53	2480794.09	243435.93	6/14/16 8:45	2480794.22	243435.89	0.14	568.17	569.54	16.4	12.0
CC2E N-3-Q2	CC2E N-3	OU4	4/25/16 10:58	2480813.83	243498.37	6/14/16 8:54	2480813.88	243498.18	0.20	567.74	568.90	13.9	12.0
CC2E N-3-Q3	CC2E N-3	OU4	4/25/16 10:48	2480718.97	243464.17	6/14/16 8:49	2480718.91	243464.13	0.07	567.04	568.52	17.8	12.0
CC2E N-3-Q4	CC2E N-3	OU4	4/25/16 10:44	2480727.30	243514.33	6/21/16 9:00	2480726.85	243514.53	0.49	566.90	568.15	15.0	12.0
CC2E N-3-Q5	CC2E N-3	OU4	4/25/16 10:40	2480721.32	243554.97	6/21/16 9:05	2480721.81	243554.43	0.73	566.71	568.09	16.6	12.0
CC2E N-3-Q6	CC2E N-3	OU4	4/25/16 10:35	2480652.01	243547.47	6/24/16 8:53	2480651.61	243547.32	0.43	567.37	568.14	11.6	12.0
CC2E N-3-Q7	CC2E N-3	OU4	5/2/16 8:54	2480676.05	243610.01	6/24/16 8:57	2480676.53	243610.45	0.65	568.07	569.41	16.1	12.0
CC2E N-3-Q8	CC2E N-3	OU4	5/2/16 11:46	2480809.46	243720.25	6/24/16 9:02	2480809.01	243720.46	0.50	568.06	569.23	14.0	12.0
CC2E N-3-Q9	CC2E N-3	OU4	5/2/16 9:01	2480756.37	243626.05	6/21/16 9:13	2480756.55	243626.17	0.22	567.00	568.73	20.8	12.0
CC2E N-3-Q10	CC2E N-3	OU4	5/2/16 9:05	2480836.80	243651.57	6/21/16 9:16	2480837.07	243651.14	0.51	565.70	567.24	18.5	12.0
CC2E N-3-Q11	CC2E N-3	OU4	5/2/16 11:28	2480791.65	243568.33	6/21/16 9:09	2480792.42	243568.46	0.78	566.25	567.84	19.1	12.0
CC2E N-3-Q12	CC2E N-3	OU4	4/25/16 11:11	2480881.41	243593.04	6/14/16 9:39	2480881.51	243592.76	0.30	565.85	567.31	17.5	12.0
CC2E N-3-Q13	CC2E N-3	OU4	5/2/16 11:33	2480963.75	243612.03	6/14/16 9:04	2480964.04	243612.00	0.29	568.16	569.44	15.4	12.0
CC2E N-3-Q14	CC2E N-3	OU4	4/25/16 11:03	2480892.58	243514.74	6/14/16 8:58	2480892.29	243514.85	0.31	568.24	569.35	13.3	12.0
CC2E N-3-Q15	CC2E N-3	OU4	5/2/16 11:38	2481049.93	243638.95	6/14/16 9:09	2481049.76	243639.05	0.20	568.01	569.65	19.7	12.0
CC2E N-3-Q16	CC2E N-3	OU4	5/2/16 12:15	2481069.03	243703.88	6/21/16 9:43	2481068.59	243704.08	0.48	567.77	569.08	15.7	12.0
CC2E N-3-Q17	CC2E N-3	OU4	5/2/16 11:41	2480974.33	243669.28	6/21/16 9:24	2480973.86	243669.15	0.49	566.88	568.44	18.7	12.0
CC2E N-3-Q18	CC2E N-3	OU4	5/2/16 9:09	2480911.26	243665.89	6/21/16 9:20	2480911.11	243665.6	0.33	566.00	567.86	22.3	12.0
CC2E N-3-Q19	CC2E N-3	OU4	5/2/16 12:02	2480956.25	243740.31	6/21/16 9:28	2480956.00	243740.69	0.45	567.31	568.67	16.3	12.0
CC2E N-3-Q20	CC2E N-3	OU4	5/2/16 11:59	2480978.03	243806.76	6/21/16 9:31	2480977.59	243806.66	0.45	568.21	569.60	16.7	12.0
CC2E N-3-Q21	CC2E N-3	OU4	5/2/16 11:50	2480887.49	243782.45	6/24/16 9:08	2480887.78	243782.44	0.29	567.82	569.34	18.2	12.0
CC2E N-3-Q22	CC2E N-3	OU4	5/2/16 11:53	2481000.57	243866.76	6/24/16 9:13	2481000.39	243866.49	0.32	567.94	569.38	17.3	12.0
CC2E N-3-Q23	CC2E N-3	OU4	5/2/16 12:07	2481036.62	243765.00	6/21/16 9:35	2481036.31	243765.35	0.47	566.91	568.43	18.2	12.0
CC2E N-3-Q24	CC2E N-3	OU4	5/2/16 12:18	2481131.93	243708.47	6/14/16 9:46	2481131.85	243708.28	0.21	568.28	569.59	15.7	12.0
CC2E N-3-Q25	CC2E N-3	OU4	5/2/16 12:11	2481083.43	243756.42	6/21/16 9:40	2481083.14	243756.4	0.29	567.24	568.49	15.0	12.0

1. All field data recorded in units of feet. Values presented have been converted from feet to inches.

Average	16.8
Median	16.6
Standard Deviation	2.4
Minimum	11.6
Maximum	22.3

Recommended Path Forward:

Quarry spall was placed within OU4-CC2E-North-3. Thickness verification poling was conducted at 25 locations. 24 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches. Included with this table are the post-placement bathymetry and isopach maps prepared by Brennan. In addition, a mass balance sheet, which shows several volumetric tracking methods, has been included for these areas. Based on the information presented Foth recommends A/OT acceptance of this area.

Prepared by: MCC2 Date: 6/24/2016

Reviewed by: SVP Date: 7/26/2016

A/OT Acceptance: Date: 8/4/16

Quarry Spall Mass Balance by Area

Report Generated on:
Friday, July 22, 2016

Project Code: 185016

Client: Glatfelter

Project: Lower Fox River

2016 Quarry Spall Placement Totals															
Area	Date			Hours		Volume Placed (CY)				Realized	Average Placement Height (in)				
Covered	Start	Complete	Days Worked	NOH	GOH	Load Cell	SBES QA	Design	Stockpile***	Coverage (SF)	Load Cell	SBES QA	Design	QA Verification	Stockpile Usage
CC2EN-3	6/9/2016	6/22/2016	9	70.50	108.00	8,063	5,630	4,991	7,306	134,757	19.39	13.54	12.00	15.70	17.57
CC2EN-4	6/22/2016	7/11/2016	8	82.50	108.00	8,999	5,898	4,991	8,721	134,757	21.64	14.18	12.00	15.00	20.97

*Design volume is based on the realized area at a thickness of the 12" minimum

**Portions of CC2E 1A and South CMU 3 were placed to specific heights approved by the A/OT.

***Stockpile value is an estimation based on a combination of stockpile data and load cell data. This estimation is necessary as the transitions to and from CC2E North CMU 4 occurred mid-week.

Load Cell: Sum of barge weights converted to volume using 1.26 ton/cy for weeks 3 to 4 and 1.25 ton/cy after that point

SBES QA: Volume based on single-beam survey vessel QA findings compared to single-beam pre-placement survey findings

QA Verification: values reflect Foth's poling verification results

Stockpile: the sum of all "pile" volumes from the weekly mass balance when placement occurred in the listed area covered. Some load cell data from the weekly mass balance is included to account for pile data covering multiple areas through the week.

P.H. Glatfelter Company
Operable Unit 4
2016 Quarry Spall Thickness Verification Tracking Table - DRAFT

Area	CMU	Required Thickness (inches)	Average Thickness (inches)	Minimum Thickness (Inches)	Maximum Thickness (Inches)	Cap Type	Acres	Pre-Placement Poling Start	Pre-Placement Poling Complete	Brennan Start	Brennan Completion	Verification Start	Verification Completion	Results	Comments
CC2E-South	3	12	19.5	12.1	24.8	C1	2.87	10/22/2015	4/15/2016	10/23/2015	5/27/2016	4/21/2016	5/31/2016	pass	2016 Brennan start date was April 19. Quarry spall was placed within OU4-CC2E-South-3. Thickness verification poling was conducted at 25 locations. All poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches.
CC2E-South	4	12	20.5	11.6	26.0	C1	3.56	4/15/2016	4/15/2016	4/26/2016	6/1/2016	4/29/2016	6/6/2016	pass	Quarry spall was placed within OU4-CC2E-South-4. Thickness verification poling was conducted at 25 locations. 24 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches
CC2E-South	5	12	18.6	11.9	27.6	C1	3.39	4/21/2016	4/21/2016	5/10/2016	6/2/2016	5/13/2016	6/6/2016	pass	Quarry spall was placed within OU4-CC2E-South-5. Thickness verification poling was conducted at 25 locations. 24 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches.
CC2E-North	1	12	17.2	10.8	24.5	C1	2.33	4/21/2016	4/21/2016	5/18/2016	6/3/2016	5/20/2016	6/6/2016	pass	Quarry spall was placed within OU4-CC2E-North-1. Thickness verification poling was conducted at 25 locations. 23 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches.
CC2E-North	2	12	14.7	9.8	20.9	C1	2.45	4/21/2016	4/25/2016	5/24/2016	6/9/2016	5/31/2016	6/10/2016	pass	Quarry spall was placed within OU4-CC2E-North-2. Thickness verification poling was conducted at 25 locations. 21 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches.
CC2E-North	3	12	16.8	11.6	22.3	C1	3.00	4/25/2016	5/2/2016	6/9/2016	6/22/2016	6/14/2016	6/23/2016	Review in progress.	Quarry spall was placed within OU4-CC2E-North-3. Thickness verification poling was conducted at 25 locations. 24 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches.
CC2E-North	4	12	15	9.2	20.6	C1	3.00	5/2/2016	5/2/2016	6/22/2016	7/11/2016	6/23/2016	7/13/2016	Review in progress.	Quarry spall was placed within OU4-CC2E-North-4. Thickness verification poling was conducted at 25 locations. 21 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches.

160623 SBES CC2E North 3 Quarry Spall Post Placement QA

160623 SBES QA Bathymetry

Scale: 1 Inch = 50.00 Feet

50 100 200 300 400 Feet

BRENNAN

N

Operational Unit
4
CC2E
North 3

QA Survey

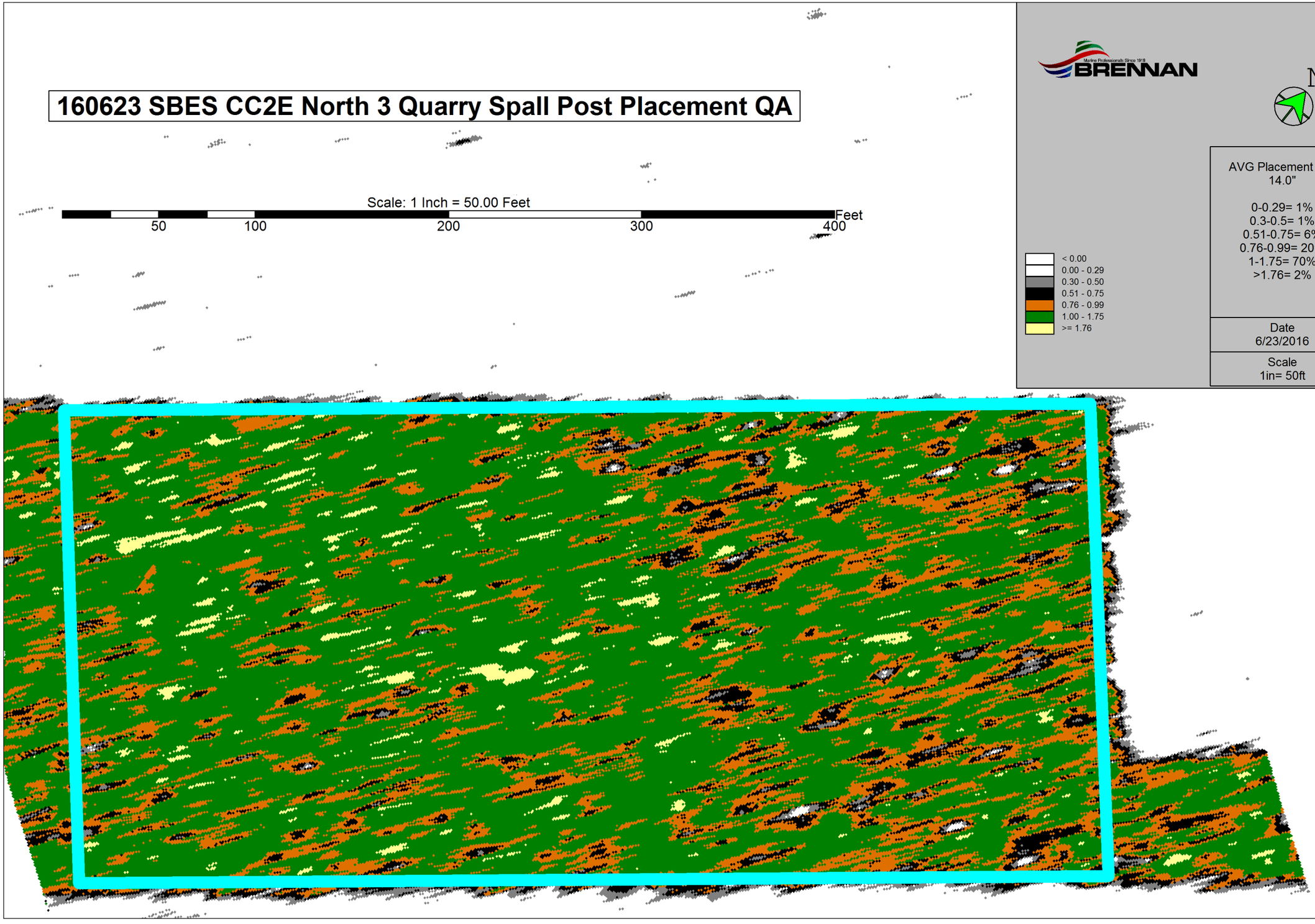
Cyan Border
Indicates "North 3" area

< 569.60
569.60 - 570.59
570.60 - 571.59
>= 571.60

Date
6/23/2016

Scale
1in= 50ft

160623 SBES CC2E North 3 Quarry Spall Post Placement QA



BRENNAN

Operational Unit
4
CC2E
North 3

QA Survey

AVG Placement HT:
14.0"

0-0.29= 1%
0.3-0.5= 1%
0.51-0.75= 6%
0.76-0.99= 20%
1-1.75= 70%
>1.76= 2%

Isopach Based on
2016 SBES
Predredge Survey
vs
160623 SBES
QC Survey

Date
6/23/2016

Scale
1in= 50ft

OU4-CC2E-North-3											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CC2E-N-3-C1	5/19/2015	7.0	0.0	7.0	6.0	567.74	243434.71	2480796.67	243434.18	2480796.77	
CC2E-N-3-C2	5/19/2015	6.0	0.0	6.0	6.0	567.59	243552.91	2480941.03	243555.82	2480946.48	
CC2E-N-3-C3	5/19/2015	7.5	0.0	7.5	6.0	567.72	243699.12	2481123.39	243698.44	2481119.93	
CC2E-N-3-C4	5/20/2015	7.5	0.0	7.5	6.0	567.98	243678.20	2481039.64	243677.67	2481038.06	
CC2E-N-3-C5	5/19/2015	7.0	0.0	7.0	6.0	567.65	243563.81	2480899.90	243565.20	2480900.81	
CC2E-N-3-C6	5/19/2015	8.5	0.0	8.5	6.0	567.72	243488.32	2480803.35	243487.77	2480805.96	
CC2E-N-3-C7	5/19/2015	10.5	0.0	10.5	6.0	568.21	243425.41	2480725.27	243424.91	2480724.60	
CC2E-N-3-C8	5/20/2015	12.5	0.0	12.5	6.0	566.48	243487.48	2480743.74	243486.69	2480743.13	
CC2E-N-3-C9	5/20/2015	9.0	0.0	9.0	6.0	565.39	243629.99	2480923.89	243630.63	2480917.72	
CC2E-N-3-C10	5/21/2015	7.5	0.0	7.5	6.0	567.19	243762.61	2481094.67	243762.93	2481096.62	
CC2E-N-3-C11	5/22/2015	9.0	0.0	9.0	6.0	566.49	243758.74	2481032.32	243760.73	2481032.94	
CC2E-N-3-C12	5/22/2015	9.5	0.0	9.5	6.0	566.78	243692.15	2480951.11	243692.56	2480953.93	
CC2E-N-3-C13	5/22/2015	9.0	0.0	9.0	6.0	565.45	243595.48	2480821.82	243591.25	2480823.25	
CC2E-N-3-C14	5/21/2015	9.0	0.0	9.0	6.0	566.88	243489.16	2480693.37	243492.50	2480695.30	
CC2E-N-3-C15	5/26/2015	8.5	0.0	8.5	6.0	566.25	243570.84	2480741.17	243570.29	2480738.68	
CC2E-N-3-C16	5/26/2015	8.0	0.0	8.0	6.0	565.33	243663.63	2480858.76	243664.73	2480854.72	
CC2E-N-3-C17	5/26/2015	8.0	0.0	8.0	6.0	567.05	243752.46	2480967.94	243756.22	2480967.29	
CC2E-N-3-C18	5/27/2015	9.0	0.0	9.0	6.0	568.17	243849.01	2481031.70	243847.11	2481032.73	
CC2E-N-3-C19	5/27/2015	8.0	0.0	8.0	6.0	567.75	243771.29	2480934.44	243769.74	2480937.31	
CC2E-N-3-C20	5/27/2015	7.5	0.0	7.5	6.0	567.04	243669.50	2480806.71	243666.93	2480805.47	
CC2E-N-3-C21	5/27/2015	8.5	0.0	8.5	6.0	566.68	243547.88	2480655.59	243546.08	2480658.26	
CC2E-N-3-C22	5/28/2015	7.5	0.0	7.5	6.0	567.76	243603.24	2480669.86	243606.09	2480670.95	
CC2E-N-3-C23	5/28/2015	9.0	0.0	9.0	6.0	568.34	243662.79	2480744.58	243661.62	2480742.76	
CC2E-N-3-C24	5/28/2015	8.0	0.0	8.0	6.0	567.57	243753.38	2480857.92	243754.81	2480861.44	
CC2E-N-3-C25	5/28/2015	7.0	0.0	7.0	6.0	567.26	243849.19	2480976.33	243852.40	2480976.49	

Average	8.34	0.00	8.34
Median	8.00	0.00	8.00
Standard Deviation	1.30	0.00	1.30

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-North-3. 25 of 25 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: HNK Date: 5/29/2015 Reviewed by: BSW Date: 5/29/2015

A/OT Acceptance: Date: 6/1/15

OU4-CC2E-North-3										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC2E-N-3-G1	6/5/2015	6.5	C1	3.0	568.5	243435.93	2480793.73	243439.39	2480791.25	
CC2E-N-3-G2	6/5/2015	6.5	C1	3.0	567.9	243497.36	2480813.40	243501.95	2480817.08	
CC2E-N-3-G3	6/5/2015	6.0	C1	3.0	567.1	243471.15	2480728.14	243469.91	2480731.00	
CC2E-N-3-G4	6/5/2015	4.5	C1	3.0	568.1	243485.08	2480687.15	243487.51	2480690.96	
CC2E-N-3-G5	6/5/2015	7.0	C1	3.0	566.5	243555.52	2480721.58	243554.43	2480726.35	
CC2E-N-3-G6	6/5/2015	5.5	C1	3.0	567.0	243552.24	2480658.46	243552.97	2480661.97	
CC2E-N-3-G7	6/5/2015	5.5	C1	3.0	568.2	243563.71	2480617.47	243565.44	2480619.82	
CC2E-N-3-G8	6/8/2015	5.5	C1	3.0	568.2	243674.29	2480756.02	243675.95	2480755.30	
CC2E-N-3-G9	N/A	N/A	C1	3.0	N/A	243626.78	2480756.84	N/A	N/A	Bucket could not be located during retrieval
CC2E-N-3-G10	6/5/2015	6.5	C1	3.0	565.6	243626.78	2480812.58	243626.04	2480816.69	
CC2E-N-3-G11	6/5/2015	8.0	C1	3.0	566.3	243568.62	2480792.09	243571.94	2480790.83	
CC2E-N-3-G12	6/5/2015	5.5	C1	3.0	565.7	243594.02	2480880.63	243591.73	2480883.77	
CC2E-N-3-G13	6/5/2015	6.5	C1	3.0	568.4	243612.86	2480964.25	243614.11	2480964.19	
CC2E-N-3-G14	6/5/2015	6.5	C1	3.0	568.1	243514.57	2480893.74	243514.50	2480892.53	
CC2E-N-3-G15	6/5/2015	6.5	C1	3.0	568.1	243639.07	2481049.51	243638.61	2481050.82	
CC2E-N-3-G16	6/5/2015	5.5	C1	3.0	568.3	243703.15	2481069.85	243705.14	2481068.37	
CC2E-N-3-G17	6/5/2015	5.5	C1	3.0	566.8	243680.84	2480983.10	243683.93	2480987.77	
CC2E-N-3-G18	6/5/2015	8.0	C1	3.0	567.2	243676.74	2480924.08	243676.90	2480921.26	
CC2E-N-3-G19	6/5/2015	8.0	C1	3.0	567.4	243740.63	2480956.05	243739.82	2480957.82	
CC2E-N-3-G20	6/8/2015	6.0	C1	3.0	568.3	243795.77	2480961.03	243796.73	2480963.68	
CC2E-N-3-G21	6/8/2015	6.0	C1	3.0	567.9	243781.85	2480888.07	243777.58	2480890.22	
CC2E-N-3-G22	6/8/2015	6.0	C1	3.0	567.9	243866.21	2480999.56	243863.34	2481001.33	
CC2E-N-3-G23	6/5/2015	6.5	C1	3.0	567.0	243765.46	2481036.45	243763.00	2481040.33	
CC2E-N-3-G24	6/5/2015	6.5	C1	3.0	568.2	243708.90	2481132.41	243709.86	2481134.44	
CC2E-N-3-G25	6/5/2015	6.0	C1	3.0	566.9	243757.09	2481083.14	243757.87	2481086.91	
CC2E-N-3-E2	6/9/2015	3.5	C1	3.0	566.6	243596.85	2480742.89	243596.93	2480743.15	Bucket G9 could not be located therefore the E2 bucket measurement is used in its place.

Average 6.16
Median 6.00
Standard Deviation 1.01

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-North-3. 25 of 25 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HJK Date: 6/10/2015 Reviewed by: BSW Date: 6/10/2015

A/OT Acceptance: Date: 6/15/15

P.H. Glatfelter Company

Operable Unit 4

2016 Quarry Spall Thickness Verification Results - CC2E N-4

Location	Remedial Action Area	OU	Pre-Placement Collection Date	Pre-Placement Actual X (WSPC NAD83, ft)	Pre-Placement Actual Y (WSPC NAD83, ft)	Post-Placement Collection Date	Post-Placement Actual X (WSPC NAD83, ft)	Post-Placement Actual Y (WSPC NAD83, ft)	Pre- and Post-Placement Location Offset (ft)	Pre-Placement Average Bottom Elevation (ft msl)	Post-Placement Average Bottom Elevation (ft msl)	Average Measured Quarry Spall Thickness[1] (inches)	Required Quarry Spall Thickness (inches)
CC2E N-4-Q1	CC2E N-4	OU4	5/2/16 12:26	2481224.24	243779.05	6/24/16 9:24	2481224.4	243778.48	0.59	568.18	569.29	13.3	12.0
CC2E N-4-Q2	CC2E N-4	OU4	5/2/16 12:22	2481155.52	243769.64	6/24/16 9:18	2481155.57	243769.9	0.26	568.20	569.30	13.2	12.0
CC2E N-4-Q3	CC2E N-4	OU4	5/2/16 12:29	2481166.46	243825.84	7/1/16 14:27	2481166.95	243825.4	0.66	567.18	568.47	15.5	12.0
CC2E N-4-Q4	CC2E N-4	OU4	5/2/16 12:54	2481188.85	243887.60	7/1/16 14:30	2481188.43	243887.64	0.42	566.88	568.37	17.9	12.0
CC2E N-4-Q5	CC2E N-4	OU4	5/2/16 12:33	2481078.69	243845.12	7/1/16 14:22	2481078.86	243845.22	0.20	567.43	568.66	14.8	12.0
CC2E N-4-Q6	CC2E N-4	OU4	5/2/16 12:37	2481088.34	243896.11	7/1/16 14:18	2481088.48	243896.04	0.16	568.31	569.65	16.1	12.0
CC2E N-4-Q7	CC2E N-4	OU4	5/2/16 12:40	2481094.08	243947.97	7/1/16 14:15	2481093.52	243948.03	0.56	567.87	569.49	19.4	12.0
CC2E N-4-Q8	CC2E N-4	OU4	5/2/16 13:19	2481190.71	244021.37	7/1/16 14:58	2481190.12	244021.6	0.63	567.66	569.38	20.6	12.0
CC2E N-4-Q9	CC2E N-4	OU4	5/2/16 12:44	2481165.35	243955.55	7/1/16 14:01	2481164.71	243955.57	0.64	568.14	569.51	16.4	12.0
CC2E N-4-Q10	CC2E N-4	OU4	5/2/16 12:48	2481229.20	243963.56	7/1/16 14:05	2481229.12	243963.22	0.35	567.10	568.71	19.3	12.0
CC2E N-4-Q11	CC2E N-4	OU4	5/2/16 13:10	2481318.49	243943.64	7/1/16 14:10	2481318.05	243943.56	0.45	567.37	568.43	12.7	12.0
CC2E N-4-Q12	CC2E N-4	OU4	5/2/16 13:03	2481280.27	243868.62	6/24/16 9:28	2481280.11	243868.93	0.35	567.51	568.51	12.0	12.0
CC2E N-4-Q13	CC2E N-4	OU4	5/2/16 13:06	2481366.66	243891.89	6/24/16 9:32	2481366.22	243891.68	0.49	567.27	568.04	9.2	12.0
CC2E N-4-Q14	CC2E N-4	OU4	5/2/16 13:39	2481438.60	243952.13	6/24/16 9:37	2481438.03	243951.85	0.64	567.25	568.16	10.9	12.0
CC2E N-4-Q15	CC2E N-4	OU4	5/2/16 13:43	2481425.56	243985.69	7/1/16 13:51	2481425.06	243985.76	0.50	567.28	568.17	10.7	12.0
CC2E N-4-Q16	CC2E N-4	OU4	5/2/16 13:46	2481431.93	244036.57	7/1/16 13:55	2481431.96	244036.39	0.18	567.20	568.36	13.9	12.0
CC2E N-4-Q17	CC2E N-4	OU4	5/2/16 13:14	2481326.49	244000.65	7/1/16 13:11	2481326.49	244000.62	0.03	567.06	568.63	18.8	12.0
CC2E N-4-Q18	CC2E N-4	OU4	5/2/16 14:16	2481444.01	244092.16	7/1/16 13:34	2481443.48	244092.47	0.61	567.16	568.52	16.3	12.0
CC2E N-4-Q19	CC2E N-4	OU4	5/2/16 13:59	2481368.65	244075.27	7/1/16 12:52	2481368.33	244075.2	0.33	567.15	568.04	10.7	12.0
CC2E N-4-Q20	CC2E N-4	OU4	5/2/16 13:22	2481297.02	244063.79	7/1/16 13:07	2481296.8	244063.55	0.33	567.85	569.26	16.9	12.0
CC2E N-4-Q21	CC2E N-4	OU4	5/2/16 14:04	2481355.05	244156.48	7/13/16 8:02	2481354.57	244156.6	0.49	567.40	568.59	14.3	12.0
CC2E N-4-Q22	CC2E N-4	OU4	5/2/16 14:07	2481443.20	244179.74	7/1/16 13:22	2481443.02	244179.36	0.42	567.46	568.68	14.6	12.0
CC2E N-4-Q23	CC2E N-4	OU4	5/2/16 14:11	2481450.75	244142.11	7/1/16 13:30	2481450.76	244141.43	0.68	567.15	568.40	15.0	12.0
CC2E N-4-Q24	CC2E N-4	OU4	5/2/16 13:50	2481534.44	244027.00	7/1/16 13:44	2481534.65	244026.56	0.49	567.05	568.60	18.6	12.0
CC2E N-4-Q25	CC2E N-4	OU4	5/2/16 13:54	2481508.82	244054.31	7/1/16 13:41	2481508.36	244054.52	0.51	567.09	568.14	12.6	12.0

1. All field data recorded in units of feet. Values presented have been converted from feet to inches.

Average	15.0
Median	14.8
Standard Deviation	3.1
Minimum	9.2
Maximum	20.6

Recommended Path Forward:

Quarry spall was placed within OU4-CC2E-North-4. Thickness verification poling was conducted at 25 locations. 21 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches. Included with this table are the post-placement bathymetry and isopach maps prepared by Brennan. In addition, a mass balance sheet, which shows several volumetric tracking methods, has been included for these areas. Based on the information presented Foth recommends A/OT acceptance of this area.

Prepared by: MCC2 Date: 7/13/2016

Reviewed by: SVF Date: 7/26/2016

A/OT Acceptance: [signature] Date: 8/4/16

On an exception basis.

Quarry Spall Mass Balance by Area

Report Generated on:
Friday, July 22, 2016

Project Code: 185016

Client: Glatfelter

Project: Lower Fox River

2016 Quarry Spall Placement Totals															
Area	Date			Hours		Volume Placed (CY)				Realized	Average Placement Height (in)				
Covered	Start	Complete	Days Worked	NOH	GOH	Load Cell	SBES QA	Design	Stockpile***	Coverage (SF)	Load Cell	SBES QA	Design	QA Verification	Stockpile Usage
CC2EN-3	6/9/2016	6/22/2016	9	70.50	108.00	8,063	5,630	4,991	7,306	134,757	19.39	13.54	12.00	15.70	17.57
CC2EN-4	6/22/2016	7/11/2016	8	82.50	108.00	8,999	5,898	4,991	8,721	134,757	21.64	14.18	12.00	15.00	20.97

*Design volume is based on the realized area at a thickness of the 12" minimum

**Portions of CC2E 1A and South CMU 3 were placed to specific heights approved by the A/OT.

***Stockpile value is an estimation based on a combination of stockpile data and load cell data. This estimation is necessary as the transitions to and from CC2E North CMU 4 occurred mid-week.

Load Cell: Sum of barge weights converted to volume using 1.26 ton/cy for weeks 3 to 4 and 1.25 ton/cy after that point

SBES QA: Volume based on single-beam survey vessel QA findings compared to single-beam pre-placement survey findings

QA Verification: values reflect Foth's poling verification results

Stockpile: the sum of all "pile" volumes from the weekly mass balance when placement occurred in the listed area covered. Some load cell data from the weekly mass balance is included to account for pile data covering multiple areas through the week.

P.H. Glatfelter Company
Operable Unit 4
2016 Quarry Spall Thickness Verification Tracking Table - DRAFT

Area	CMU	Required Thickness (inches)	Average Thickness (inches)	Minimum Thickness (Inches)	Maximum Thickness (Inches)	Cap Type	Acres	Pre-Placement Poling Start	Pre-Placement Poling Complete	Brennan Start	Brennan Completion	Verification Start	Verification Completion	Results	Comments
CC2E-South	3	12	19.5	12.1	24.8	C1	2.87	10/22/2015	4/15/2016	10/23/2015	5/27/2016	4/21/2016	5/31/2016	pass	2016 Brennan start date was April 19. Quarry spall was placed within OU4-CC2E-South-3. Thickness verification poling was conducted at 25 locations. All poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches.
CC2E-South	4	12	20.5	11.6	26.0	C1	3.56	4/15/2016	4/15/2016	4/26/2016	6/1/2016	4/29/2016	6/6/2016	pass	Quarry spall was placed within OU4-CC2E-South-4. Thickness verification poling was conducted at 25 locations. 24 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches
CC2E-South	5	12	18.6	11.9	27.6	C1	3.39	4/21/2016	4/21/2016	5/10/2016	6/2/2016	5/13/2016	6/6/2016	pass	Quarry spall was placed within OU4-CC2E-South-5. Thickness verification poling was conducted at 25 locations. 24 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches.
CC2E-North	1	12	17.2	10.8	24.5	C1	2.33	4/21/2016	4/21/2016	5/18/2016	6/3/2016	5/20/2016	6/6/2016	pass	Quarry spall was placed within OU4-CC2E-North-1. Thickness verification poling was conducted at 25 locations. 23 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches.
CC2E-North	2	12	14.7	9.8	20.9	C1	2.45	4/21/2016	4/25/2016	5/24/2016	6/9/2016	5/31/2016	6/10/2016	pass	Quarry spall was placed within OU4-CC2E-North-2. Thickness verification poling was conducted at 25 locations. 21 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches.
CC2E-North	3	12	16.8	11.6	22.3	C1	3.00	4/25/2016	5/2/2016	6/9/2016	6/22/2016	6/14/2016	6/23/2016	Review in progress.	Quarry spall was placed within OU4-CC2E-North-3. Thickness verification poling was conducted at 25 locations. 24 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches.
CC2E-North	4	12	15	9.2	20.6	C1	3.00	5/2/2016	5/2/2016	6/22/2016	7/11/2016	6/23/2016	7/13/2016	Review in progress.	Quarry spall was placed within OU4-CC2E-North-4. Thickness verification poling was conducted at 25 locations. 21 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches.

7/20/2016 SBES CC2E North 4 Quarry Spall Post Placement QA

Scale: 1 inch = 50.00 Feet

50 100 200 300 400 Feet

N

Operational Unit
4
CC2E
North CMU 4

QA Survey

Cyan Border Indicates "North 4" Area

Isopach Based on
2016 SBES
PreDredge Survey
VS
160720 SBES
QA Survey

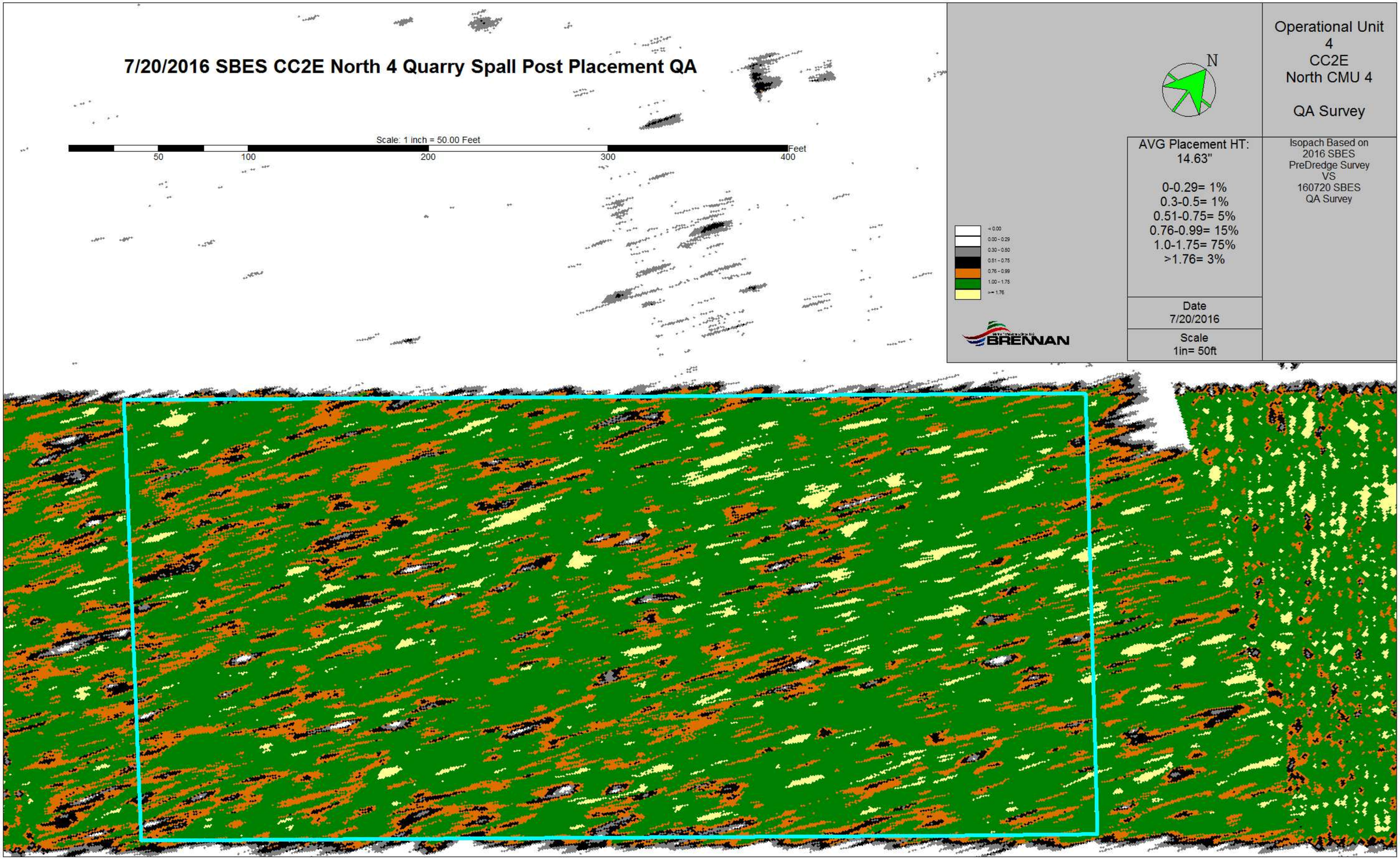
< 569.60
569.60 - 570.59
570.60 - 571.59
>= 571.60

BRENNAN

Date
7/20/2016

Scale
1in= 50ft

7/20/2016 SBES CC2E North 4 Quarry Spall Post Placement QA



Operational Unit
4
CC2E
North CMU 4

QA Survey

AVG Placement HT:
14.63"

0-0.29= 1%
0.3-0.5= 1%
0.51-0.75= 5%
0.76-0.99= 15%
1.0-1.75= 75%
>1.76= 3%

Isopach Based on
2016 SBES
PreDredge Survey
VS
160720 SBES
QA Survey

Date
7/20/2016

Scale
1in= 50ft

OU4-CC2E-North-4											
ID	Date Sampled	Sand Result (inches)	Sand/Sediment Mix (inches)	Total Thickness Sand and Sediment Mix (inches)	Required Thickness (inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CC2E-N-4-C1	5/19/2015	7.5	0.0	7.5	6.0	568.05	243766.91	2481205.74	243763.11	2481208.65	
CC2E-N-4-C2	5/19/2015	6.0	0.0	6.0	6.0	566.74	243931.49	2481412.48	243933.23	2481414.00	
CC2E-N-4-C3	5/19/2015	8.0	0.0	8.0	6.0	566.57	244035.33	2481544.91	244031.85	2481547.40	
CC2E-N-4-C4	5/20/2015	9.5	0.0	9.5	6.0	566.95	244016.88	2481460.96	244016.88	2481461.58	
CC2E-N-4-C5	5/20/2015	7.5	0.0	7.5	6.0	567.19	243896.09	2481314.88	243892.04	2481312.18	
CC2E-N-4-C6	5/20/2015	9.0	0.0	9.0	6.0	567.74	243820.60	2481218.33	243822.65	2481217.92	
CC2E-N-4-C7	5/20/2015	7.5	0.0	7.5	6.0	567.94	243757.69	2481140.25	243755.62	2481138.45	
CC2E-N-4-C8	5/21/2015	8.5	0.0	8.5	6.0	567.06	243819.76	2481158.72	243816.52	2481164.95	
CC2E-N-4-C9	5/21/2015	8.5	0.0	8.5	6.0	566.81	243941.59	2481315.60	243940.91	2481317.78	
CC2E-N-4-C10	5/21/2015	9.5	0.0	9.5	6.0	567.25	244094.89	2481509.65	244096.65	2481511.24	
CC2E-N-4-C11	5/22/2015	9.0	0.0	9.0	6.0	566.98	244097.40	2481455.92	244103.94	2481455.40	
CC2E-N-4-C12	5/21/2015	7.5	0.0	7.5	6.0	566.97	244010.18	2481390.65	244005.64	2481387.95	
CC2E-N-4-C13	5/22/2015	6.0	0.0	6.0	6.0	566.86	243919.58	2481232.60	243920.47	2481232.56	
CC2E-N-4-C14	5/22/2015	9.5	0.0	9.5	6.0	567.07	243821.44	2481108.35	243823.75	2481108.63	
CC2E-N-4-C15	5/26/2015	8.0	0.0	8.0	6.0	566.82	243896.93	2481146.97	243901.74	2481146.99	
CC2E-N-4-C16	5/26/2015	8.0	0.0	8.0	6.0	566.90	243986.11	2481262.19	243985.64	2481257.28	
CC2E-N-4-C17	5/27/2015	9.0	0.0	9.0	6.0	566.82	244088.18	2481387.92	244089.24	2481389.80	
CC2E-N-4-C18	5/27/2015	10.0	0.0	10.0	6.0	567.37	244181.28	2481446.69	244183.82	2481447.45	
CC2E-N-4-C19	5/27/2015	7.0	0.0	7.0	6.0	567.30	244098.24	2481345.10	244097.68	2481347.12	
CC2E-N-4-C20	5/27/2015	7.5	0.0	7.5	6.0	567.98	243975.60	2481197.09	243971.88	2481195.97	
CC2E-N-4-C21	5/27/2015	9.0	0.0	9.0	6.0	568.04	243880.15	2481070.57	243876.00	2481069.87	
CC2E-N-4-C22	5/27/2015	8.0	0.0	8.0	6.0	568.06	243913.73	2481056.29	243910.78	2481051.58	
CC2E-N-4-C23	5/27/2015	6.5	0.0	6.5	6.0	568.06	243968.78	2481135.50	243964.30	2481130.47	
CC2E-N-4-C24	5/27/2015	8.0	0.0	8.0	6.0	567.52	244059.65	2481244.24	244059.52	2481244.65	
CC2E-N-4-C25	5/27/2015	8.0	0.0	8.0	6.0	567.21	244185.59	2481398.75	244185.71	2481400.33	

Average	8.10	0.00	8.10
Median	8.00	0.00	8.00
Standard Deviation	1.07	0.00	1.07

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-North-4. 25 of 25 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: HNK Date: 5/28/2015 Reviewed by: BSW Date: 5/29/2015

A/OT Acceptance: Date: 6/1/15

OU4-CC2E-North-4										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC2E-N-4-G1	6/9/2015	5.0	C1	3.0	568.2	243779.89	2481224.63	243777.80	2481225.29	
CC2E-N-4-G2	6/9/2015	8.5	C1	3.0	568.5	243777.44	2481165.64	243774.38	2481169.60	
CC2E-N-4-G3	6/9/2015	6.0	C1	3.0	567.1	243829.29	2481170.99	243830.76	2481173.30	
CC2E-N-4-G4	6/9/2015	6.0	C1	3.0	567.4	243883.34	2481186.35	243883.80	2481186.05	
CC2E-N-4-G5	6/9/2015	10.5	C1	3.0	567.4	243839.91	2481087.70	243839.72	2481087.27	
CC2E-N-4-G6	6/9/2015	6.5	C1	3.0	568.5	243872.39	2481062.40	243873.38	2481059.59	
CC2E-N-4-G7	6/9/2015	5.0	C1	3.0	568.1	243941.16	2481092.72	243945.38	2481089.10	
CC2E-N-4-G8	6/9/2015	8.0	C1	3.0	568.1	244036.11	2481212.34	244036.80	2481214.27	
CC2E-N-4-G9	6/9/2015	7.0	C1	3.0	568.5	243956.71	2481169.73	243954.09	2481167.64	
CC2E-N-4-G10	6/9/2015	8.5	C1	3.0	567.3	243980.45	2481257.40	243981.12	2481258.01	
CC2E-N-4-G11	6/9/2015	11.0	C1	3.0	567.6	243947.70	2481326.22	243947.77	2481325.44	
CC2E-N-4-G12	6/9/2015	6.0	C1	3.0	567.6	243878.12	2481293.45	243878.77	2481295.13	
CC2E-N-4-G13	6/9/2015	6.0	C1	3.0	567.3	243892.04	2481371.28	243891.43	2481374.56	
CC2E-N-4-G14	6/9/2015	4.5	C1	3.0	567.4	243951.93	2481445.89	243947.61	2481450.74	
CC2E-N-4-G15	6/9/2015	5.5	C1	3.0	567.2	243960.94	2481401.65	243963.94	2481404.56	
CC2E-N-4-G16	6/9/2015	6.5	C1	3.0	567.5	244027.24	2481421.31	244029.49	2481423.82	
CC2E-N-4-G17	6/9/2015	6.0	C1	3.0	567.3	243992.86	2481319.72	243994.39	2481323.46	
CC2E-N-4-G18	6/9/2015	6.5	C1	3.0	567.1	244083.73	2481433.60	244082.22	2481435.82	
CC2E-N-4-G19	6/9/2015	6.0	C1	3.0	567.2	244069.81	2481362.32	244072.67	2481364.53	
CC2E-N-4-G20	6/9/2015	9.0	C1	3.0	567.9	244067.35	2481300.88	244067.73	2481300.83	
CC2E-N-4-G21	6/9/2015	6.0	C1	3.0	567.2	244157.40	2481358.23	244157.79	2481358.07	
CC2E-N-4-G22	6/9/2015	7.0	C1	3.0	567.7	244178.68	2481445.89	244177.03	2481447.18	
CC2E-N-4-G23	6/9/2015	5.0	C1	3.0	567.3	244142.66	2481452.45	244141.41	2481454.95	
CC2E-N-4-G24	6/9/2015	5.5	C1	3.0	566.7	244045.25	2481556.50	244047.65	2481556.78	
CC2E-N-4-G25	6/9/2015	6.0	C1	3.0	567.0	244055.08	2481508.98	244058.52	2481511.27	

Average 6.70
Median 6.00
Standard Deviation 1.67

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-North-4. 25 of 25 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HNK Date: 6/10/2015 Reviewed by: BSW Date: 6/10/2015

A/OT Acceptance: Date: 6/15/15

OU4-CC2E-North-5											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CC2E-N-S-C1	8/25/2015	9.0	0.0	9.0	6.0	567.40	244101.00	2481622.98	244101.16	2481623.83	
CC2E-N-S-C2	8/25/2015	7.0	0.0	7.0	6.0	566.82	244219.27	2481773.26	244219.06	2481777.77	
CC2E-N-S-C3	8/25/2015	6.0	0.0	6.0	6.0	562.33	244326.34	2481910.64	244324.84	2481913.38	
CC2E-N-S-C4	8/26/2015	9.0	0.0	9.0	6.0	562.97	244350.96	2481878.20	244351.08	2481876.47	
CC2E-N-S-C5	8/26/2015	9.0	0.0	9.0	6.0	566.09	244230.18	2481732.12	244227.72	2481735.16	
CC2E-N-S-C6	8/26/2015	7.0	0.0	7.0	6.0	566.68	244154.68	2481635.57	244153.08	2481638.94	
CC2E-N-S-C7	8/26/2015	10.0	0.0	10.0	6.0	567.39	244091.77	2481557.50	244094.27	2481559.01	
CC2E-N-S-C8	8/26/2015	8.0	0.0	8.0	6.0	566.39	244191.51	2481616.84	244190.19	2481615.79	
CC2E-N-S-C9	8/26/2015	7.5	0.0	7.5	6.0	565.72	244290.57	2481749.75	244290.10	2481750.97	
CC2E-N-S-C10	8/26/2015	6.0	0.0	6.0	6.0	564.43	244428.97	2481926.90	244431.56	2481927.40	
CC2E-N-S-C11	8/28/2015	7.5	0.0	7.5	6.0	564.98	244431.49	2481873.16	244433.08	2481870.24	
CC2E-N-S-C12	8/27/2015	7.5	0.0	7.5	6.0	565.66	244358.51	2481783.33	244356.88	2481783.25	
CC2E-N-S-C13	8/27/2015	7.0	0.0	7.0	6.0	566.23	244253.66	2481649.85	244254.28	2481649.21	
CC2E-N-S-C14	8/26/2015	8.0	0.0	8.0	6.0	566.69	244155.52	2481525.59	244150.26	2481528.73	
CC2E-N-S-C15	8/27/2015	6.5	0.0	6.5	6.0	566.45	244178.42	2481500.58	244178.53	2481500.57	
CC2E-N-S-C16	8/28/2015	8.0	0.0	8.0	6.0	565.80	244329.99	2481690.98	244331.33	2481690.97	
CC2E-N-S-C17	8/28/2015	7.0	0.0	7.0	6.0	565.18	244422.26	2481805.16	244424.78	2481804.29	
CC2E-N-S-C18	8/31/2015	6.5	0.0	6.5	6.0	564.87	244515.37	2481863.93	244514.40	2481868.44	
CC2E-N-S-C19	8/31/2015	7.0	0.0	7.0	6.0	564.67	244432.33	2481762.35	244434.56	2481764.65	
CC2E-N-S-C20	8/31/2015	8.0	0.0	8.0	6.0	566.41	244335.87	2481638.93	244340.10	2481638.87	
CC2E-N-S-C21	8/31/2015	6.0	0.0	6.0	6.0	566.54	244214.24	2481487.81	244219.00	2481489.33	
CC2E-N-S-C22	8/31/2015	6.5	0.0	6.5	6.0	566.53	244269.60	2481502.09	244271.08	2481501.32	
CC2E-N-S-C23	8/28/2015	7.0	0.0	7.0	6.0	566.38	244265.94	2481609.26	244265.41	2481609.49	
CC2E-N-S-C24	8/31/2015	7.0	0.0	7.0	6.0	564.18	244419.75	2481690.14	244418.80	2481693.36	
CC2E-N-S-C25	8/31/2015	7.5	0.0	7.5	6.0	565.45	244515.55	2481808.56	244514.57	2481812.54	

Average	7.42	0.00	7.42
Median	7.00	0.00	7.00
Standard Deviation	1.03	0.00	1.03

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-North-5. 25 of 25 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: JNK Date: 9/1/2015 Reviewed by: BSW Date: 9/1/2015

A/OT Acceptance: Date: 9/2/15

OU4-CC2E-North-6										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC2E-N-5-G1	9/23/2015	6.0	C1	3.0	568.2	244093.39	2481618.96	244085.84	2481617.97	
CC2E-N-5-G2	9/23/2015	5.5	C1	3.0	567.4	244189.93	2481733.60	244189.25	2481730.43	
CC2E-N-5-G3	9/23/2015	6.0	C1	3.0	567.2	244139.20	2481618.14	244139.66	2481615.69	
CC2E-N-5-G4	9/23/2015	4.0	C1	3.0	567.2	244120.39	2481539.53	244125.77	2481537.41	
CC2E-N-5-G5	9/18/2015	4.0	C1	3.0	566.5	244167.84	2481543.63	244172.47	2481545.20	
CC2E-N-5-G6	9/17/2015	4.0	C1	3.0	566.5	244216.92	2481549.36	244223.36	2481551.13	
CC2E-N-5-G7	9/17/2015	4.5	C1	3.0	567.7	244216.11	2481493.68	244217.88	2481493.69	
CC2E-N-5-G8	9/17/2015	5.0	C1	3.0	567.9	244226.74	2481446.18	244233.97	2481446.26	
CC2E-N-5-G9	9/17/2015	5.0	C1	3.0	566.7	244324.92	2481564.92	244329.58	2481568.21	
CC2E-N-5-G10	9/17/2015	5.0	C1	3.0	566.3	244335.55	2481638.61	244339.87	2481643.16	
CC2E-N-5-G11	9/17/2015	4.0	C1	3.0	566.6	244278.28	2481625.51	244278.11	2481625.52	
CC2E-N-5-G12	9/18/2015	4.5	C1	3.0	566.2	244284.83	2481686.92	244287.30	2481689.38	
CC2E-N-5-G13	9/23/2015	4.5	C1	3.0	566.6	244204.65	2481645.16	244204.69	2481642.32	
CC2E-N-5-G14	9/23/2015	4.0	C1	3.0	566.4	244232.47	2481735.24	244232.20	2481734.74	
CC2E-N-5-G15	9/23/2015	5.5	C1	3.0	563.2	244275.54	2481844.83	244274.46	2481843.98	
CC2E-N-5-G16	9/23/2015	4.5	C1	3.0	563.0	244334.15	2481864.69	244331.31	2481862.56	
CC2E-N-5-G17	9/18/2015	7.0	C1	3.0	565.9	244331.69	2481799.18	244338.46	2481794.62	
CC2E-N-5-G18	9/18/2015	4.0	C1	3.0	565.6	244382.42	2481809.01	244386.86	2481814.73	
CC2E-N-5-G19	9/17/2015	4.0	C1	3.0	565.9	244361.15	2481728.76	244365.11	2481723.86	
CC2E-N-5-G20	9/18/2015	4.5	C1	3.0	564.1	244429.05	2481754.14	244435.28	2481756.49	
CC2E-N-5-G21	9/17/2015	5.0	C1	3.0	564.6	244404.51	2481670.62	244414.93	2481670.94	Bucket displaced during spreading
CC2E-N-5-G22	9/24/2015	8.5	C1	3.0	566.2	244519.04	2481808.19	244525.03	2481812.96	
CC2E-N-5-G23	9/24/2015	9.0	C1	3.0	565.6	244479.77	2481871.24	244486.53	2481871.94	
CC2E-N-5-G24	9/23/2015	5.5	C1	3.0	564.8	244424.96	2481919.55	244428.33	2481918.57	
CC2E-N-5-G25	9/23/2015	4.5	C1	3.0	564.8	244372.60	2481966.22	244376.77	2481963.64	

Average 5.12
Median 4.50
Standard Deviation 1.34

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-North-5. 25 of 25 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HNK Date: 9/25/2015 Reviewed by: BSW Date: 9/25/2015

A/OT Acceptance: Date: 9/28/15

P.H. Glatfelter Company

Operable Unit 4

2016 Quarry Spall Thickness Verification Results - CC2E N-4

Location	Remedial Action Area	OU	Pre-Placement Collection Date	Pre-Placement Actual X (WSPC NAD83, ft)	Pre-Placement Actual Y (WSPC NAD83, ft)	Post-Placement Collection Date	Post-Placement Actual X (WSPC NAD83, ft)	Post-Placement Actual Y (WSPC NAD83, ft)	Pre- and Post-Placement Location Offset (ft)	Pre-Placement Average Bottom Elevation (ft msl)	Post-Placement Average Bottom Elevation (ft msl)	Average Measured Quarry Spall Thickness[1] (inches)	Required Quarry Spall Thickness (inches)
CC2E N-4-Q1	CC2E N-4	OU4	5/2/16 12:26	2481224.24	243779.05	6/24/16 9:24	2481224.4	243778.48	0.59	568.18	569.29	13.3	12.0
CC2E N-4-Q2	CC2E N-4	OU4	5/2/16 12:22	2481155.52	243769.64	6/24/16 9:18	2481155.57	243769.9	0.26	568.20	569.30	13.2	12.0
CC2E N-4-Q3	CC2E N-4	OU4	5/2/16 12:29	2481166.46	243825.84	7/1/16 14:27	2481166.95	243825.4	0.66	567.18	568.47	15.5	12.0
CC2E N-4-Q4	CC2E N-4	OU4	5/2/16 12:54	2481188.85	243887.60	7/1/16 14:30	2481188.43	243887.64	0.42	566.88	568.37	17.9	12.0
CC2E N-4-Q5	CC2E N-4	OU4	5/2/16 12:33	2481078.69	243845.12	7/1/16 14:22	2481078.86	243845.22	0.20	567.43	568.66	14.8	12.0
CC2E N-4-Q6	CC2E N-4	OU4	5/2/16 12:37	2481088.34	243896.11	7/1/16 14:18	2481088.48	243896.04	0.16	568.31	569.65	16.1	12.0
CC2E N-4-Q7	CC2E N-4	OU4	5/2/16 12:40	2481094.08	243947.97	7/1/16 14:15	2481093.52	243948.03	0.56	567.87	569.49	19.4	12.0
CC2E N-4-Q8	CC2E N-4	OU4	5/2/16 13:19	2481190.71	244021.37	7/1/16 14:58	2481190.12	244021.6	0.63	567.66	569.38	20.6	12.0
CC2E N-4-Q9	CC2E N-4	OU4	5/2/16 12:44	2481165.35	243955.55	7/1/16 14:01	2481164.71	243955.57	0.64	568.14	569.51	16.4	12.0
CC2E N-4-Q10	CC2E N-4	OU4	5/2/16 12:48	2481229.20	243963.56	7/1/16 14:05	2481229.12	243963.22	0.35	567.10	568.71	19.3	12.0
CC2E N-4-Q11	CC2E N-4	OU4	5/2/16 13:10	2481318.49	243943.64	7/1/16 14:10	2481318.05	243943.56	0.45	567.37	568.43	12.7	12.0
CC2E N-4-Q12	CC2E N-4	OU4	5/2/16 13:03	2481280.27	243868.62	6/24/16 9:28	2481280.11	243868.93	0.35	567.51	568.51	12.0	12.0
CC2E N-4-Q13	CC2E N-4	OU4	5/2/16 13:06	2481366.66	243891.89	6/24/16 9:32	2481366.22	243891.68	0.49	567.27	568.04	9.2	12.0
CC2E N-4-Q14	CC2E N-4	OU4	5/2/16 13:39	2481438.60	243952.13	6/24/16 9:37	2481438.03	243951.85	0.64	567.25	568.16	10.9	12.0
CC2E N-4-Q15	CC2E N-4	OU4	5/2/16 13:43	2481425.56	243985.69	7/1/16 13:51	2481425.06	243985.76	0.50	567.28	568.17	10.7	12.0
CC2E N-4-Q16	CC2E N-4	OU4	5/2/16 13:46	2481431.93	244036.57	7/1/16 13:55	2481431.96	244036.39	0.18	567.20	568.36	13.9	12.0
CC2E N-4-Q17	CC2E N-4	OU4	5/2/16 13:14	2481326.49	244000.65	7/1/16 13:11	2481326.49	244000.62	0.03	567.06	568.63	18.8	12.0
CC2E N-4-Q18	CC2E N-4	OU4	5/2/16 14:16	2481444.01	244092.16	7/1/16 13:34	2481443.48	244092.47	0.61	567.16	568.52	16.3	12.0
CC2E N-4-Q19	CC2E N-4	OU4	5/2/16 13:59	2481368.65	244075.27	7/1/16 12:52	2481368.33	244075.2	0.33	567.15	568.04	10.7	12.0
CC2E N-4-Q20	CC2E N-4	OU4	5/2/16 13:22	2481297.02	244063.79	7/1/16 13:07	2481296.8	244063.55	0.33	567.85	569.26	16.9	12.0
CC2E N-4-Q21	CC2E N-4	OU4	5/2/16 14:04	2481355.05	244156.48	7/13/16 8:02	2481354.57	244156.6	0.49	567.40	568.59	14.3	12.0
CC2E N-4-Q22	CC2E N-4	OU4	5/2/16 14:07	2481443.20	244179.74	7/1/16 13:22	2481443.02	244179.36	0.42	567.46	568.68	14.6	12.0
CC2E N-4-Q23	CC2E N-4	OU4	5/2/16 14:11	2481450.75	244142.11	7/1/16 13:30	2481450.76	244141.43	0.68	567.15	568.40	15.0	12.0
CC2E N-4-Q24	CC2E N-4	OU4	5/2/16 13:50	2481534.44	244027.00	7/1/16 13:44	2481534.65	244026.56	0.49	567.05	568.60	18.6	12.0
CC2E N-4-Q25	CC2E N-4	OU4	5/2/16 13:54	2481508.82	244054.31	7/1/16 13:41	2481508.36	244054.52	0.51	567.09	568.14	12.6	12.0

1. All field data recorded in units of feet. Values presented have been converted from feet to inches.

Average	15.0
Median	14.8
Standard Deviation	3.1
Minimum	9.2
Maximum	20.6

Recommended Path Forward:

Quarry spall was placed within OU4-CC2E-North-4. Thickness verification poling was conducted at 25 locations. 21 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches. Included with this table are the post-placement bathymetry and isopach maps prepared by Brennan. In addition, a mass balance sheet, which shows several volumetric tracking methods, has been included for these areas. Based on the information presented Foth recommends A/OT acceptance of this area.

Prepared by: MCC2 Date: 7/13/2016

Reviewed by: SVF Date: 7/26/2016

A/OT Acceptance: [signature] Date: 8/4/16

On an exception basis.

Quarry Spall Mass Balance by Area

Report Generated on:
Friday, August 12, 2016

Project Code: 185016

Client: Glatfelter

Project: Lower Fox River

2016 Quarry Spall Placement Totals															
Area	Date			Hours		Volume Placed (CY)				Realized	Average Placement Height (in)				
Covered	Start	Complete	Days Worked	NOH	GOH	Load Cell	SBES QA	Design	Stockpile	Coverage (SF)	Load Cell	SBES QA	Design	QA Verification	Stockpile Usage
CC2EN-5	7/12/2016	7/21/2016	8	73.25	96.00	8,094	5,639	4,796	7,359	129,479	20.25	14.11	12.00	14.80	18.41
CC2EN-6	7/22/2016	8/1/2016	7	66.50	84.00	8,193	5,908	4,876	7,371	131,648	20.16	14.54	12.00	15.00	18.14

*Design volume is based on the realized area at a thickness of the 12" minimum

**Portions of CC2E 1A and South CMU 3 were placed to specific heights approved by the A/OT.

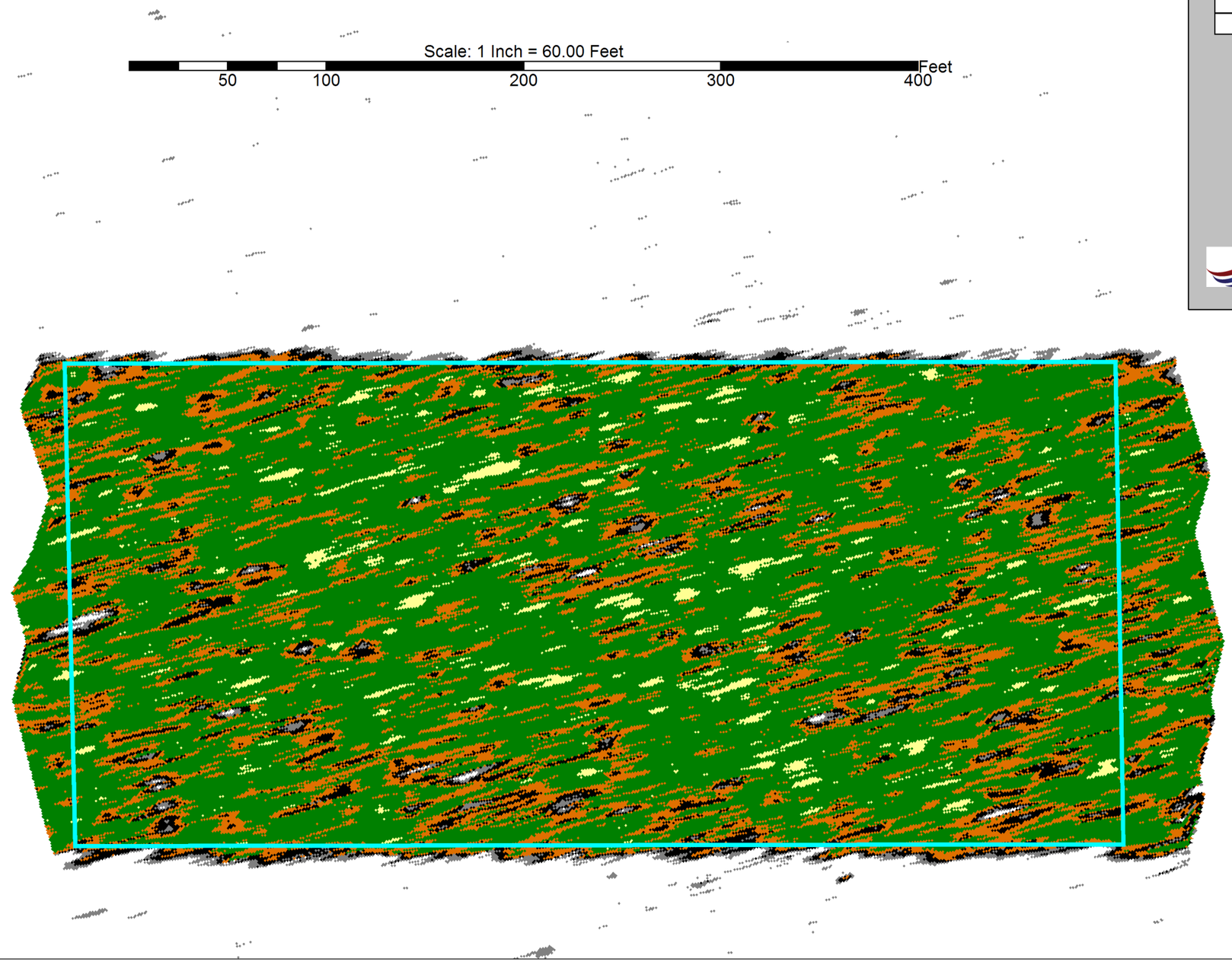
Load Cell: Sum of barge weights converted to volume using 1.26 ton/cy for weeks 3 to 4 and 1.25 ton/cy after that point

SBES QA: Volume based on single-beam survey vessel QA findings compared to single-beam pre-placement survey findings

QA Verification: values reflect Foth's poling verification results

Stockpile: the sum of all "pile" volumes from the weekly mass balance when placement occurred in the listed area covered. Some load cell data from the weekly mass balance is included to account for pile data covering multiple areas through the week.

08/01/2016 SBES CC2E North 5 Quarry Spall Post Placement QA



>= 1.76	
1.00	
0.76	
0.51	
0.30	
0.00	
< 0.00	

N

Operational Unit
4
CC2E
North CMU 5

QA Survey

AVG. Placement HT:
14.11"

0-0.29= 1%
0.30-0.50= 1%
0.51-0.75= 5%
0.76-0.99= 19%
1-1.75= 71%
>1.76= 3%

Isopach Based on
2016 SBES
PreDredge Survey
VS
160801 SBES
QA Survey

Date
08/01/16

Scale
1in= 60ft

BRENNAN

BRENNAN

160801 Quarry Spall Post Placement QA

Area:CC2E North CMU 5

Operational Unit 4

QA Submittal

Date: 8/1/16

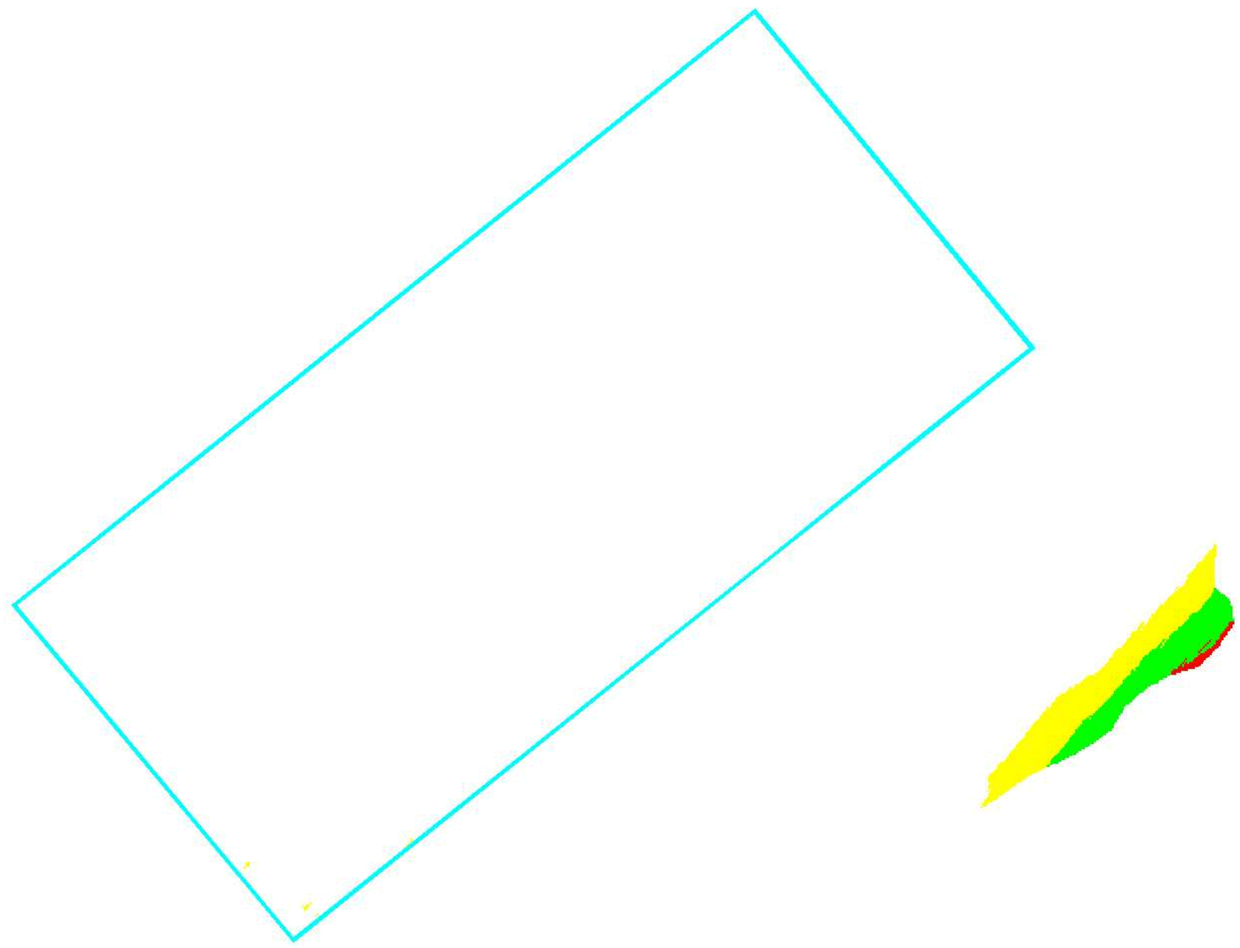
N

160801 SBES QA Bathymmetry

Cyan Border Indicates "North 5" Area

>= 571.60
570.60 - 571.59
569.60 - 570.59
< 569.60

Scale
1in=80ft



Scale: 1 inch = 80.00 Feet

50 100 200 300 400 Feet

OU4-CC2E-North-6												
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)		Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
								Northing	Easting	Northing	Easting	
CC2E-N-6-C1	9/1/2015	6.5	0.0	6.5	6.5	6.0	564.06	244420.32	2482023.80	244424.16	2482026.34	
CC2E-N-6-C2	9/1/2015	6.0	0.0	6.0	6.0	6.0	562.20	244521.33	2482152.46	244522.25	2482155.67	
CC2E-N-6-C3	9/2/2015	7.5	0.0	7.5	7.5	6.0	562.79	244666.57	2482326.24	244669.24	2482324.58	
CC2E-N-6-C4	9/2/2015	8.5	0.0	8.5	8.5	6.0	560.08	244663.23	2482274.44	244668.31	2482272.08	
CC2E-N-6-C5	9/2/2015	7.0	0.0	7.0	7.0	6.0	562.38	244532.18	2482109.85	244530.79	2482114.51	
CC2E-N-6-C6	9/2/2015	7.5	0.0	7.5	7.5	6.0	563.36	244425.33	2481982.02	244424.03	2481978.31	
CC2E-N-6-C7	9/3/2015	6.0	0.0	6.0	6.0	6.0	562.88	244516.32	2482029.64	244516.65	2482032.20	
CC2E-N-6-C8	9/3/2015	7.0	0.0	7.0	7.0	6.0	560.98	244645.70	2482191.73	244648.08	2482193.10	
CC2E-N-6-C9	9/3/2015	6.0	0.0	6.0	6.0	6.0	578.17	244796.79	2482340.44	244800.05	2482340.28	
CC2E-N-6-C10	9/3/2015	6.5	0.0	6.5	6.5	6.0	560.71	244709.24	2482223.43	244707.99	2482222.73	
CC2E-N-6-C11	9/3/2015	6.0	0.0	6.0	6.0	6.0	562.86	244585.60	2482063.06	244583.47	2482063.27	
CC2E-N-6-C12	9/3/2015	7.0	0.0	7.0	7.0	6.0	566.53	244486.27	2481940.25	244488.47	2481936.33	
CC2E-N-6-C13	9/3/2015	7.0	0.0	7.0	7.0	6.0	564.41	244545.53	2481954.45	244543.36	2481953.60	
CC2E-N-6-C14	9/3/2015	5.0	0.0		5.0	6.0	562.30	244670.75	2482110.69	244670.55	2482109.68	
CC2E-N-6-C14A	9/3/2015	6.5	0.0		6.5	6.0	562.67			244677.71	2482109.00	Step-out Core
CC2E-N-6-C14B	9/3/2015	5.0	0.0	5.3	5.0	6.0	562.47			244670.91	2482114.73	Step-out Core
CC2E-N-6-C14C	9/3/2015	4.0	0.0		4.0	6.0	562.42			244664.62	2482107.90	Step-out Core
CC2E-N-6-C14D	9/3/2015	6.0	0.0		6.0	6.0	562.82			244672.09	2482101.06	Step-out Core
CC2E-N-6-C14RVT	9/18/2015	8.0	0.0	8.0	8.0	6.0	562.89	244670.75	2482110.69	244671.69	2482112.53	Revisit Core after respread
CC2E-N-6-C15	9/3/2015	3.0	0.0		3.0	6.0	561.48	244756.73	2482220.05	244755.60	2482215.40	
CC2E-N-6-C15A	9/3/2015	4.0	0.0		4.0	6.0	561.33			244761.56	2482217.49	Step-out Core
CC2E-N-6-C15B	9/3/2015	4.5	0.0	3.5	4.5	6.0	561.01			244755.01	2482223.45	Step-out Core
CC2E-N-6-C15C	9/3/2015	3.5	0.0		3.5	6.0	561.21			244749.59	2482216.47	Step-out Core
CC2E-N-6-C15D	9/3/2015	2.5	0.0		2.5	6.0	561.53			244756.02	2482211.05	Step-out Core
CC2E-N-6-C15RVT	9/18/2015	8.5	0.0	8.5	8.5	6.0	561.85	244756.73	2482220.05	244758.77	2482221.42	Revisit Core after respread
CC2E-N-6-C16	9/3/2015	4.0	0.0		4.0	6.0	560.27	244844.37	2482292.82	244837.40	2482292.20	
CC2E-N-6-C16A	9/3/2015	4.5	0.0		4.5	6.0	560.49			244843.47	2482293.59	Step-out Core
CC2E-N-6-C16B	9/3/2015	4.5	0.0	4.4	4.5	6.0	559.86			244838.05	2482299.95	Step-out Core
CC2E-N-6-C16C	9/3/2015	5.0	0.0		5.0	6.0	560.13			244830.69	2482293.84	Step-out Core
CC2E-N-6-C16D	9/3/2015	4.0	0.0		4.0	6.0	560.52			244837.31	2482287.08	Step-out Core
CC2E-N-6-C16RVT	9/18/2015	8.0	0.0	8.0	8.0	6.0	560.78	244844.37	2482292.82	244845.21	2482293.38	Revisit Core after respread
CC2E-N-6-C17	8/31/2015	6.5	0.0	6.5	6.5	6.0	561.10	244967.39	2482346.28	244969.49	2482344.22	
CC2E-N-6-C18	9/3/2015	6.0	0.0	6.0	6.0	6.0	561.92	244825.48	2482228.47	244821.14	2482229.80	
CC2E-N-6-C19	9/3/2015	7.5	0.0	7.5	7.5	6.0	562.54	244738.67	2482142.42	244732.43	2482138.06	
CC2E-N-6-C20	9/3/2015	8.0	0.0	8.0	8.0	6.0	563.79	244638.20	2482016.19	244636.05	2482018.22	
CC2E-N-6-C21	8/31/2015	7.0	0.0	7.0	7.0	6.0	564.77	244552.22	2481910.09	244553.02	2481908.98	
CC2E-N-6-C22	8/31/2015	7.0	0.0	7.0	7.0	6.0	565.17	244562.23	2481865.81	244558.05	2481865.18	
CC2E-N-6-C23	9/3/2015	7.0	0.0	7.0	7.0	6.0	560.29	244787.71	2482286.93	244790.00	2482279.26	
CC2E-N-6-C24	9/1/2015	7.5	0.0	7.5	7.5	6.0	564.01	244697.56	2482034.61	244699.88	2482038.30	
CC2E-N-6-C25	9/1/2015	7.0	0.0	7.0	7.0	6.0	562.77	244822.67	2482180.78	244830.32	2482183.65	

Note: Locations highlighted in red were not included for calculations due to respread.

Average	7.1	0.0	7.1	7.1
Median	7.0	0.0	7.0	7.0
Standard Deviation	0.8	0.0	0.8	0.8

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-North-6. 25 of 25 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required. Locations C14, C14A, C14B, C14C, C14D, C15, C15A, C15B, C15C, C15D, C16, C16A, C16B, C16C, and C16D were excluded from the final average, median, and standard deviation calculations because they were a part of a respread lane. Locations C14RVT, C15RVT, and C16RVT were collected after the respread and are included in the final average, median, and standard deviation calculations.

Prepared by: HSW Date: 9/21/2015 Reviewed by: BSW Date: 9/21/2015

A/OT Acceptance: Date: 9/22/15

OU4-CC2E-North-6										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC2E-N-6-G1	9/25/2015	4.5	C1	3.0	562.9	244655.45	2482315.20	244660.64	2482312.01	
CC2E-N-6-G2	9/25/2015	4.5	C1	3.0	562.7	244563.35	2482206.22	244562.48	2482206.95	
CC2E-N-6-G3	9/25/2015	5.0	C1	3.0	564.3	244437.41	2482047.44	244437.21	2482050.22	
CC2E-N-6-G4	9/25/2015	5.0	C1	3.0	563.6	244425.97	2481974.59	244429.45	2481973.01	
CC2E-N-6-G5	9/28/2015	4.5	C1	3.0	563.0	244512.65	2482088.36	244515.28	2482084.12	
CC2E-N-6-G6	9/28/2015	4.5	C1	3.0	560.6	244653.31	2482261.88	244656.63	2482259.17	
CC2E-N-6-G7	9/28/2015	4.0	C1	3.0	559.2	244799.90	2482343.79	244798.75	2482342.85	
CC2E-N-6-G8	9/28/2015	4.0	C1	3.0	560.2	244708.42	2482269.59	244712.73	2482266.38	
CC2E-N-6-G9	9/28/2015	4.5	C1	3.0	562.4	244583.71	2482116.97	244585.98	2482120.50	
CC2E-N-6-G10	9/28/2015	4.0	C1	3.0	563.7	244491.30	2482003.20	244492.55	2482003.50	
CC2E-N-6-G11	9/28/2015	4.0	C1	3.0	564.5	244494.57	2481951.63	244497.50	2481951.51	
CC2E-N-6-G12	9/28/2015	4.0	C1	3.0	564.3	244552.63	2481968.00	244556.66	2481970.43	
CC2E-N-6-G13	9/24/2015	4.5	C1	3.0	565.2	244529.74	2481883.70	244526.77	2481881.85	
CC2E-N-6-G14	9/24/2015	4.5	C1	3.0	565.2	244620.51	2481935.26	244619.30	2481942.33	
CC2E-N-6-G15	9/24/2015	4.0	C1	3.0	564.2	244712.24	2482063.85	244719.14	2482064.63	
CC2E-N-6-G16	9/28/2015	5.0	C1	3.0	564.2	244633.74	2482014.74	244635.40	2482016.33	
CC2E-N-6-G17	9/28/2015	4.0	C1	3.0	563.4	244660.72	2482106.41	244656.82	2482103.45	
CC2E-N-6-G18	9/28/2015	4.5	C1	3.0	563.2	244581.54	2482063.07	244581.00	2482058.98	
CC2E-N-6-G19	9/28/2015	4.0	C1	3.0	561.6	244687.27	2482190.73	244690.72	2482185.68	
CC2E-N-6-G20	9/28/2015	4.5	C1	3.0	560.7	244847.32	2482296.34	244849.08	2482298.32	
CC2E-N-6-G21	9/24/2015	5.0	C1	3.0	563.1	244821.28	2482186.67	244822.55	2482184.86	
CC2E-N-6-G22	9/28/2015	7.0	C1	3.0	562.7	244763.22	2482174.40	244764.74	2482174.70	
CC2E-N-6-G23	9/28/2015	4.0	C1	3.0	560.3	244796.61	2482299.60	244800.25	2482295.86	
CC2E-N-6-G24	9/28/2015	4.5	C1	3.0	562.4	244860.61	2482257.90	244862.80	2482255.66	
CC2E-N-6-G25	9/24/2015	4.5	C1	3.0	561.2	244969.38	2482348.75	244970.84	2482347.04	

Average 4.50
Median 4.50
Standard Deviation 0.63

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-North-6. 25 of 25 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HNK Date: 9/29/2015 Reviewed by: BSW Date: 9/29/2015

A/OT Acceptance: Date: 9/30/15

P.H. Glatfelter Company
Operable Unit 4
2016 Quarry Spall Thickness Verification Results - CC2E N-6

Location	Remedial Action Area	OU	Pre-Placement Collection Date	Pre-Placement Actual X (WSPC NAD83, ft)	Pre-Placement Actual Y (WSPC NAD83, ft)	Post-Placement Collection Date	Post-Placement Actual X (WSPC NAD83, ft)	Post-Placement Actual Y (WSPC NAD83, ft)	Pre- and Post-Placement Location Offset (ft)	Pre-Placement Average Bottom Elevation (ft msl)	Post-Placement Average Bottom Elevation (ft msl)	Average Measured Quarry Spall Thickness[1] (inches)	Required Quarry Spall Thickness (inches)
CC2E N-6-Q1	CC2E N-6	OU4	5/3/16 12:57	2482322.11	244664.45	7/29/16 10:10	2482322.37	244664.39	0.27	563.11	564.28	14.0	12.0
CC2E N-6-Q2	CC2E N-6	OU4	5/3/16 12:48	2482197.15	244558.09	7/29/16 9:38	2482197.09	244558.15	0.08	562.59	563.64	12.6	12.0
CC2E N-6-Q3	CC2E N-6	OU4	5/3/16 12:13	2482041.47	244435.87	7/29/16 9:03	2482041.89	244435.9	0.42	563.87	565.06	14.3	12.0
CC2E N-6-Q4	CC2E N-6	OU4	5/3/16 12:10	2481976.23	244428.42	7/29/16 8:56	2481975.9	244428.54	0.35	563.52	564.20	8.2	12.0
CC2E N-6-Q5	CC2E N-6	OU4	5/3/16 12:44	2482106.53	244531.15	7/29/16 9:33	2482106.57	244531.41	0.26	562.94	563.96	12.2	12.0
CC2E N-6-Q6	CC2E N-6	OU4	5/3/16 12:53	2482250.18	244644.68	7/29/16 10:05	2482250.15	244644.51	0.17	560.94	562.23	15.5	12.0
CC2E N-6-Q7	CC2E N-6	OU4	5/3/16 13:32	2482345.69	244800.37	7/29/16 10:23	2482345.43	244800.22	0.30	559.75	561.46	20.5	12.0
CC2E N-6-Q8	CC2E N-6	OU4	5/3/16 13:14	2482273.92	244712.89	7/29/16 10:13	2482274.02	244712.6	0.31	560.21	561.39	14.2	12.0
CC2E N-6-Q9	CC2E N-6	OU4	5/3/16 12:41	2482131.59	244595.69	7/29/16 9:44	2482131.08	244595.49	0.55	562.36	563.32	11.5	12.0
CC2E N-6-Q10	CC2E N-6	OU4	5/3/16 12:05	2481988.43	244481.98	7/29/16 9:08	2481987.84	244482.25	0.65	564.11	565.55	17.3	12.0
CC2E N-6-Q11	CC2E N-6	OU4	5/3/16 12:02	2481936.85	244483.76	7/29/16 9:13	2481937.04	244483.78	0.19	564.84	565.77	11.2	12.0
CC2E N-6-Q12	CC2E N-6	OU4	5/3/16 11:59	2481957.39	244544.95	7/29/16 9:17	2481957.2	244544.45	0.53	564.67	565.83	13.9	12.0
CC2E N-6-Q13	CC2E N-6	OU4	5/3/16 11:54	2481891.12	244537.04	7/29/16 9:22	2481890.58	244537.68	0.84	565.22	566.31	13.1	12.0
CC2E N-6-Q14	CC2E N-6	OU4	5/3/16 12:18	2481949.03	244632.09	8/2/16 9:03	2481949.1	244631.76	0.34	565.06	566.70	19.7	12.0
CC2E N-6-Q15	CC2E N-6	OU4	5/3/16 13:02	2482083.27	244734.95	8/2/16 9:09	2482083.36	244735.28	0.34	564.04	565.84	21.6	12.0
CC2E N-6-Q16	CC2E N-6	OU4	5/3/16 12:22	2482031.45	244649.94	7/29/16 9:52	2482031.81	244649.78	0.39	564.17	565.21	12.5	12.0
CC2E N-6-Q17	CC2E N-6	OU4	5/3/16 12:28	2482110.27	244664.36	7/29/16 9:57	2482110.49	244664.72	0.42	563.12	564.48	16.3	12.0
CC2E N-6-Q18	CC2E N-6	OU4	5/3/16 12:33	2482050.00	244578.26	7/29/16 9:28	2482050.4	244578.57	0.51	563.47	564.64	14.0	12.0
CC2E N-6-Q19	CC2E N-6	OU4	5/3/16 13:10	2482216.46	244707.39	7/29/16 10:18	2482216.54	244707.12	0.28	561.16	562.78	19.4	12.0
CC2E N-6-Q20	CC2E N-6	OU4	5/3/16 13:23	2482235.84	244779.86	8/2/16 9:21	2482235.7	244780.42	0.58	562.42	563.82	16.8	12.0
CC2E N-6-Q21	CC2E N-6	OU4	5/3/16 13:18	2482180.27	244825.26	8/2/16 9:32	2482179.8	244825.76	0.69	563.38	564.52	13.7	12.0
CC2E N-6-Q22	CC2E N-6	OU4	5/3/16 13:06	2482155.46	244746.43	8/2/16 9:16	2482156.08	244746.35	0.63	562.53	563.89	16.3	12.0
CC2E N-6-Q23	CC2E N-6	OU4	5/3/16 13:26	2482290.02	244791.01	8/2/16 9:26	2482290.39	244791.35	0.50	560.21	561.31	13.2	12.0
CC2E N-6-Q24	CC2E N-6	OU4	5/3/16 13:36	2482271.19	244874.73	8/2/16 9:37	2482270.91	244875	0.39	561.95	563.35	16.8	12.0
CC2E N-6-Q25	CC2E N-6	OU4	5/3/16 13:40	2482330.64	244947.29	8/2/16 9:41	2482330.81	244947.23	0.18	561.41	562.72	15.7	12.0

1. All field data recorded in units of feet. Values presented have been converted from feet to inches.

Average	15.0
Median	14.2
Standard Deviation	3.1
Minimum	8.2
Maximum	21.6

Recommended Path Forward:

Quarry spall was placed within OU4-CC2E-North-6. Thickness verification poling was conducted at 25 locations. 22 of 25 poled thicknesses meet or exceed the minimum thickness requirement of 12-inches. Included with this table are the post-placement bathymetry and isopach maps prepared by Brennan. In addition, a mass balance sheet, which shows several volumetric tracking methods, has been included for there areas. Based on the information presented Foth recommends A/OT acceptance of this area.

Prepared by: MCC2 Date: 8/2/2016
Reviewed by: SVF Date: 8/15/2016
A/OT Acceptance: [signature] Date: 8/19/16
On an exception basis.

Quarry Spall Mass Balance by Area

Report Generated on:
Friday, August 12, 2016

Project Code: 185016

Client: Glatfelter

Project: Lower Fox River

2016 Quarry Spall Placement Totals															
Area	Date			Hours		Volume Placed (CY)				Realized	Average Placement Height (in)				
Covered	Start	Complete	Days Worked	NOH	GOH	Load Cell	SBES QA	Design	Stockpile	Coverage (SF)	Load Cell	SBES QA	Design	QA Verification	Stockpile Usage
CC2EN-5	7/12/2016	7/21/2016	8	73.25	96.00	8,094	5,639	4,796	7,359	129,479	20.25	14.11	12.00	14.80	18.41
CC2EN-6	7/22/2016	8/1/2016	7	66.50	84.00	8,193	5,908	4,876	7,371	131,648	20.16	14.54	12.00	15.00	18.14

*Design volume is based on the realized area at a thickness of the 12" minimum

**Portions of CC2E 1A and South CMU 3 were placed to specific heights approved by the A/OT.

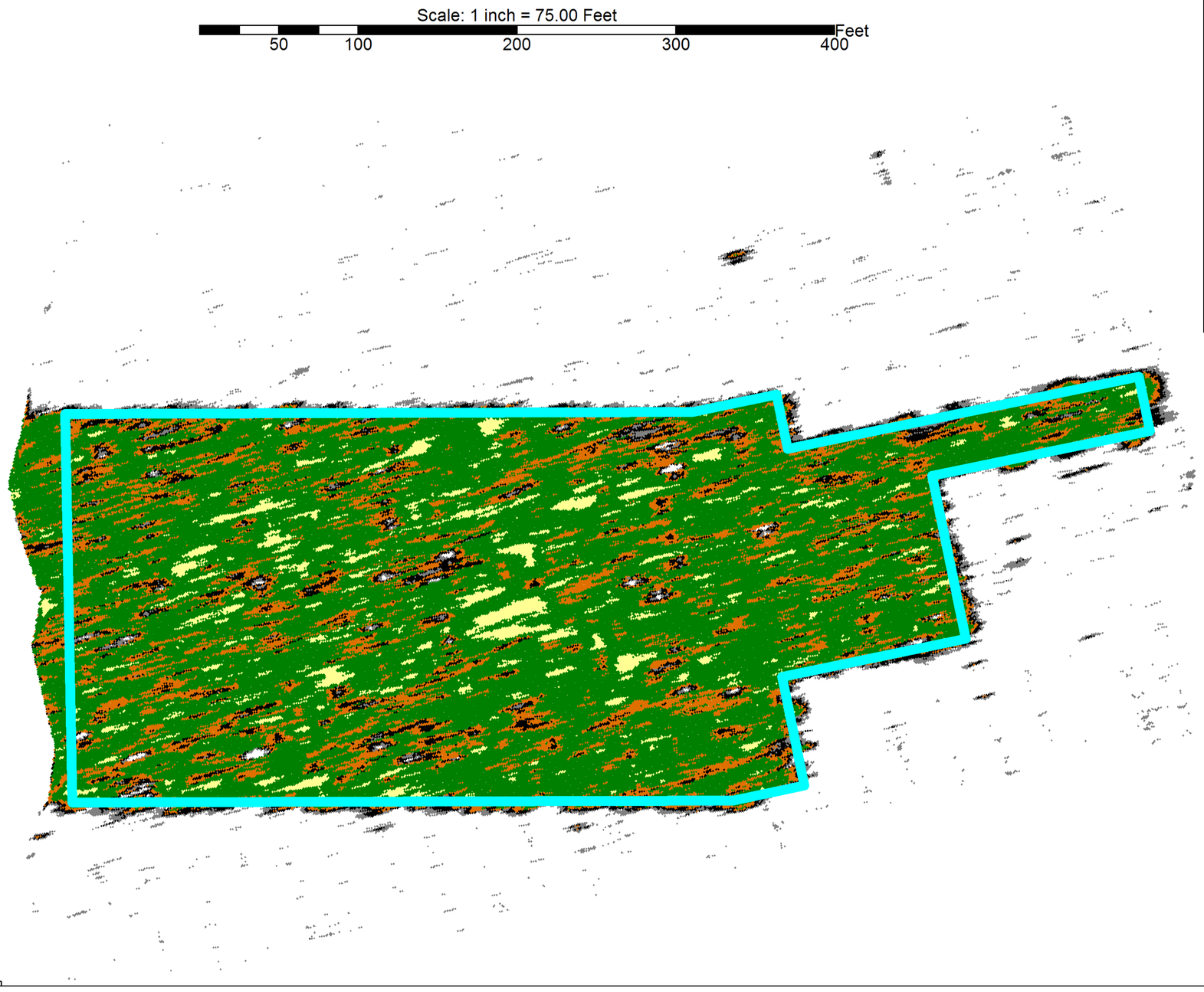
Load Cell: Sum of barge weights converted to volume using 1.26 ton/cy for weeks 3 to 4 and 1.25 ton/cy after that point

SBES QA: Volume based on single-beam survey vessel QA findings compared to single-beam pre-placement survey findings

QA Verification: values reflect Foth's poling verification results

Stockpile: the sum of all "pile" volumes from the weekly mass balance when placement occurred in the listed area covered. Some load cell data from the weekly mass balance is included to account for pile data covering multiple areas through the week.

08/02/2016 SBES CC2E North 6 Quarry Spall Post Placement QA



N

Operational Unit
4
CC2E
North CMU 6

QA Survey

>= 1.76	
1.00	
0.76	
0.51	
0.30	
0.00	
< 0.00	

AVG Placement HT:
14.54"

0-0.29= 1%
0.3-0.5= 1%
0.51-0.75= 6%
0.76-0.99= 17%
1-1.75= 70%
>1.76= 5%

BRENNAN

Date
08/02/16

Scale
1in= 75ft

Isopach Based on
2016 SBES
PrePlacement Survey
vs
160802 MBES
QA Survey

BRENNAN

160802 Quarry Spall Post Placement QA

Area:CC2E North
CMU 6

Operational Unit 4

QA Submittal

Date: 8/2/16

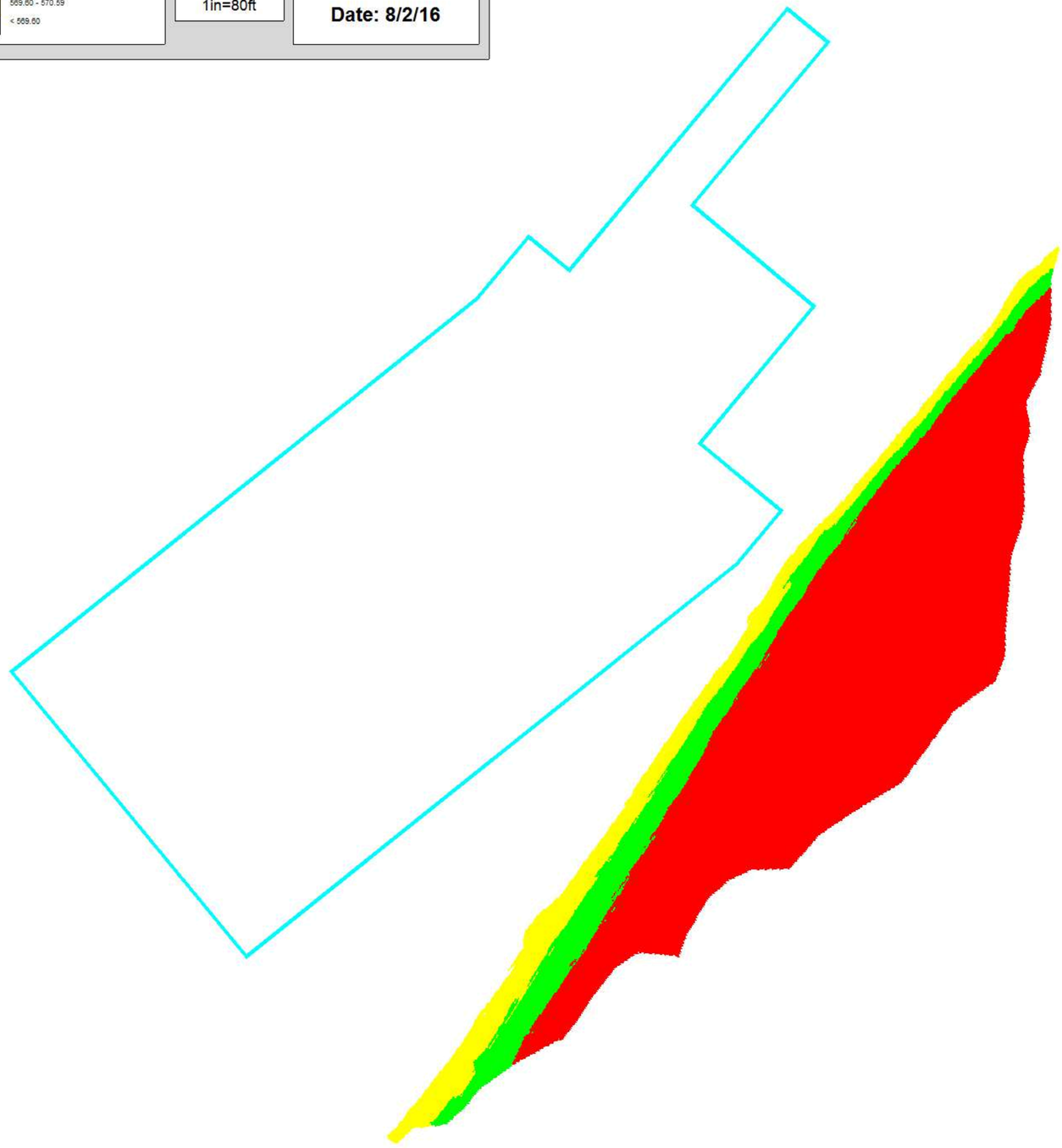
N

160802 SBES QA Bathymmetry

Cyan Border Indicates "South 6" Area

>= 571.60
570.60 - 571.59
569.60 - 570.59
< 569.60

Scale
1in=80ft



Scale: 1 inch = 80.00 Feet

50 100 200 300 400 Feet

OU4-CC2E-S-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)		Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CC2E-S-1-C1	9/19/2014	13.0	0.0	13.0	13.0	6.0	240407.47	2478325.97	240407.60	2478324.33	
CC2E-S-1-C2	9/22/2014	9.0	0.0	9.0	9.0	6.0	240525.21	2478385.68	240524.57	2478385.91	
CC2E-S-1-C3	9/19/2014	7.5	0.0	7.5	7.5	6.0	240379.05	2478283.07	240377.64	2478284.67	
CC2E-S-1-C4	9/22/2014	3.5	0.0		3.5	6.0	240599.70	2478387.09	240600.83	2478380.77	
CC2E-S-1-C4A	9/22/2014	6.0	0.0		6.0	6.0			240605.37	2478377.04	Step-out Core
CC2E-S-1-C4B	9/22/2014	6.0	0.0	4.6	6.0	6.0			240602.63	2478384.88	Step-out Core
CC2E-S-1-C4C	9/22/2014	3.5	0.0		3.5	6.0			240596.53	2478383.16	Step-out Core
CC2E-S-1-C4D	9/22/2014	4.0	0.0		4.0	6.0			240599.73	2478375.27	Step-out Core
CC2E-S-1-C5	9/22/2014	6.5	0.0	6.5	6.5	6.0	240876.01	2478514.94	240877.33	2478518.14	
CC2E-S-1-C6	9/22/2014	6.5	0.0	6.5	6.5	6.0	240836.83	2478458.66	240837.59	2478456.49	
CC2E-S-1-C7	9/22/2014	8.0	0.0	8.0	8.0	6.0	240632.89	2478362.30	240633.77	2478367.06	
CC2E-S-1-C8	9/22/2014	9.5	0.0	9.5	9.5	6.0	240496.97	2478295.62	240489.72	2478299.25	
CC2E-S-1-C9	9/19/2014	11.0	0.0	11.0	11.0	6.0	240285.30	2478198.58	240291.07	2478201.31	
CC2E-S-1-C10	9/19/2014	8.0	0.0	8.0	8.0	6.0	240357.71	2478195.17	240354.48	2478194.57	
CC2E-S-1-C11	9/22/2014	12.0	0.0	12.0	12.0	6.0	240540.88	2478279.59	240541.89	2478280.56	
CC2E-S-1-C12	9/22/2014	8.0	0.0	8.0	8.0	6.0	240772.77	2478391.83	240774.23	2478391.08	
CC2E-S-1-C13	9/22/2014	6.0	0.0	6.0	6.0	6.0	240917.73	2478459.56	240918.70	2478460.58	
CC2E-S-1-C14	9/22/2014	10.0	0.0	10.0	10.0	6.0	240879.30	2478399.46	240879.31	2478399.28	
CC2E-S-1-C15	9/22/2014	9.0	0.0	9.0	9.0	6.0	240675.78	2478306.08	240674.99	2478307.44	
CC2E-S-1-C16	9/19/2014	10.5	0.0	10.5	10.5	6.0	240332.90	2478294.65	240331.90	2478289.26	
CC2E-S-1-C17	9/19/2014	10.0	0.0	10.0	10.0	6.0	240447.28	2478201.17	240451.02	2478199.93	
CC2E-S-1-C18	9/19/2014	10.0	0.0	10.0	10.0	6.0	240315.85	2478138.00	240317.53	2478138.07	
CC2E-S-1-C19	9/19/2014	13.0	0.0	13.0	13.0	6.0	240376.34	2478126.06	240378.37	2478126.18	
CC2E-S-1-C20	9/22/2014	7.5	0.0	7.5	7.5	6.0	240525.79	2478194.92	240528.60	2478194.66	
CC2E-S-1-C21	9/22/2014	6.0	0.0	6.0	6.0	6.0	240614.88	2478239.47	240618.86	2478240.06	
CC2E-S-1-C22	9/22/2014	8.0	0.0	8.0	8.0	6.0	240593.58	2478187.45	240593.04	2478189.30	
CC2E-S-1-C23	9/22/2014	11.5	0.0	11.5	11.5	6.0	240498.16	2478148.23	240496.28	2478147.81	
CC2E-S-1-C24	9/19/2014	11.0	0.0	11.0	11.0	6.0	240389.97	2478093.66	240395.04	2478089.75	
CC2E-S-1-C25	9/22/2014	9.5	0.0	9.5	9.5	6.0	240721.80	2478441.22	240723.09	2478441.32	

Average	8.4	0.0	9.0	8.4
Median	8.0	0.0	9.0	8.0
Standard Deviation	2.6	0.0	2.2	2.6

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-S-1. 24 of 25 samples meet or exceed the minimum thickness requirement of 6-inches. However, 1 location did not meet the requirements. Additional step-outs were collected resulting in 24 out of 25 locations passing within the area. Therefore, no further action is required according to Table 5-2 in the CQAPP. **Note:** Name of area changed from CC2E-1 to CC2E-S-1 on 9/24/2014.

Prepared by: HNK Date: 9/24/2014 Reviewed by: BSW Date: 9/24/2014

A/OT Acceptance: Date: 9/25/14

OU4-CC2E-South-1									
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
					Northing	Easting	Northing	Easting	
CC2E S-1-G1	10/2/2014	4.5	C1	3.0	240327.54	2478292.86	240327.01	2478293.49	
CC2E S-1-G2	10/7/2014	5.0	C1	3.0	240394.41	2478322.89	240391.14	2478326.64	
CC2E S-1-G3	10/2/2014	7.0	C1	3.0	240530.34	2478386.55	240534.42	2478385.62	
CC2E S-1-G4	10/1/2014	6.0	C1	3.0	240391.17	2478286.61	240394.23	2478284.29	
CC2E S-1-G5	10/2/2014	5.5	C1	3.0	240563.02	2478364.24	240566.41	2478363.17	
CC2E S-1-G6	9/29/2014	5.5	C1	3.0	240720.14	2478440.25	240721.99	2478443.80	
CC2E S-1-G7	9/29/2014	5.5	C1	3.0	240863.59	2478510.60	240863.77	2478514.99	
CC2E S-1-G8	9/26/2014	5.5	C1	3.0	240348.11	2478223.82	240347.96	2478224.42	
CC2E S-1-G9	9/25/2014	5.0	C1	3.0	240540.31	2478314.23	240540.53	2478313.94	
CC2E S-1-G10	9/29/2014	6.5	C1	3.0	240719.71	2478403.45	240718.65	2478400.43	
CC2E S-1-G11	9/29/2014	7.0	C1	3.0	240859.27	2478466.23	240858.55	2478465.01	
CC2E S-1-G12	9/26/2014	5.5	C1	3.0	240330.80	2478176.87	240331.23	2478176.66	
CC2E S-1-G13	9/25/2014	7.5	C1	3.0	240508.80	2478267.46	240509.64	2478268.16	
CC2E S-1-G14	10/2/2014	6.5	C1	3.0	240695.91	2478352.57	240696.44	2478350.08	
CC2E S-1-G15	10/2/2014	6.0	C1	3.0	240845.20	2478427.26	240846.16	2478427.83	
CC2E S-1-G16	10/1/2014	12.0	C1	3.0	240426.53	2478184.80	240429.36	2478184.45	
CC2E S-1-G17	9/25/2014	6.5	C1	3.0	240607.77	2478273.31	240609.15	2478274.15	
CC2E S-1-G18	10/2/2014	6.5	C1	3.0	240774.88	2478354.74	240776.04	2478353.34	
CC2E S-1-G19	10/2/2014	7.0	C1	3.0	240918.77	2478419.68	240924.49	2478424.67	
CC2E S-1-G20	10/1/2014	5.0	C1	3.0	240378.93	2478125.27	240380.29	2478124.70	
CC2E S-1-G21	9/29/2014	6.0	C1	3.0	240508.75	2478189.13	240505.66	2478191.54	
CC2E S-1-G22	9/29/2014	7.0	C1	3.0	240610.44	2478232.43	240610.00	2478232.73	
CC2E S-1-G23	10/1/2014	12.5	C1	3.0	240415.71	2478104.71	240415.05	2478109.27	
CC2E S-1-G24	10/1/2014	8.0	C1	3.0	240504.42	2478145.84	240507.42	2478143.97	
CC2E S-1-G25	9/29/2014	6.0	C1	3.0	240607.20	2478191.30	240605.66	2478190.18	

Average 6.60
Median 6.00
Standard Deviation 1.90

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-South-1. 25 of 25 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HNK Date: 10/8/2014 Reviewed by: BSW Date: 10/8/2014

A/OT Acceptance: Date: 10/9/14

Quarry Spall Placement Thickness Verification and Approval Form

OU4-CC2E-South-1 (Survey Comparisons)				
Area (acres)	Surveyed Volume Placed (cubic yards)	Calculated Thickness (inches)	Bathymetric Survey Thickness (inches)	Required Thickness (inches)
2.96	6,931	16.61	14.41	12

OU4-CC2E-South-1									
ID	Date Sampled	Quarry Thickness (inches)	Average Thickness (inches)	Required Thickness (inches)	Pre-Placement Coordinates.		Survey Coordinates		Comments
					Northing	Easting	Northing	Easting	
CC2E S-1-Q1	11/3/2015		13.7	12.0	240329.78	2478293.39	240330.12	2478291.95	
CC2E S-1-Q2	11/10/2015		18.2	12.0	240418.44	2478327.39	240418.17	2478324.31	
CC2E S-1-Q3	11/10/2015		15.6	12.0	240507.93	2478376.59	240508.30	2478376.14	
CC2E S-1-Q4	11/10/2015		17.7	12.0	240389.68	2478285.28	240389.70	2478285.42	
CC2E S-1-Q5	10/9/2015		13.5	12.0	240601.96	2478383.83	240601.84	2478384.17	
CC2E S-1-Q6	10/9/2015		16.1	12.0	240768.31	2478465.69	240768.52	2478466.26	
CC2E S-1-Q7	10/9/2015		21.1	12.0	240878.25	2478515.65	240878.05	2478515.77	
CC2E S-1-Q8	11/10/2015		16.1	12.0	240350.62	2478225.29	240349.11	2478226.32	
CC2E S-1-Q9A	11/10/2015	11.79		12.0	240564.04	2478329.02	240564.09	2478329.44	
CC2E S-1-Q9B	11/10/2015	12.99		12.0					
CC2E S-1-Q9C	11/10/2015	15.39	11.8	12.0					
CC2E S-1-Q9D	11/10/2015	9.39		12.0					
CC2E S-1-Q9E	11/10/2015	9.39		12.0					
CC2E S-1-Q10	10/9/2015		17.5	12.0	240720.44	2478401.38	240721.46	2478402.69	
CC2E S-1-Q11	10/9/2015		18.5	12.0	240860.06	2478468.17	240859.63	2478467.76	
CC2E S-1-Q12	11/3/2015		17.5	12.0	240309.62	2478166.64	240308.86	2478167.39	
CC2E S-1-Q13	11/10/2015		18.3	12.0	240488.27	2478254.32	240488.41	2478255.49	
CC2E S-1-Q14	10/9/2015		14.8	12.0	240659.54	2478334.62	240660.07	2478335.66	
CC2E S-1-Q15A	10/9/2015	12.31		12.0	240832.79	2478418.96	240832.18	2478419.07	
CC2E S-1-Q15B	10/9/2015	8.71		12.0					
CC2E S-1-Q15C	10/9/2015	9.91	10.4	12.0					
CC2E S-1-Q15D	10/9/2015	13.51		12.0					
CC2E S-1-Q15E	10/9/2015	7.51		12.0					
CC2E S-1-Q16	11/10/2015		12.2	12.0	240424.18	2478181.70	240425.54	2478185.02	
CC2E S-1-Q17A	11/10/2015	3.59		12.0	240568.96	2478253.30	240568.49	2478253.52	
CC2E S-1-Q17B	11/10/2015	10.79		12.0					
CC2E S-1-Q17C	11/10/2015	13.19	9.3	12.0					
CC2E S-1-Q17D	11/10/2015	11.99		12.0					
CC2E S-1-Q17E	11/10/2015	7.19		12.0					
CC2E S-1-Q18	10/16/2015		12.8	12.0	240773.86	2478353.56	240773.17	2478353.45	
CC2E S-1-Q19A	10/16/2015	16.19		12.0	240921.77	2478417.55	240922.21	2478417.56	
CC2E S-1-Q19B	10/16/2015	6.59		12.0					
CC2E S-1-Q19C	10/16/2015	4.19	10.7	12.0					
CC2E S-1-Q19D	10/16/2015	14.99		12.0					
CC2E S-1-Q19E	10/16/2015	11.39		12.0					
CC2E S-1-Q20	11/10/2015		13.0	12.0	240376.48	2478121.32	240378.26	2478124.46	
CC2E S-1-Q21	11/10/2015		14.0	12.0	240508.86	2478185.09	240508.52	2478184.81	
CC2E S-1-Q22	11/10/2015		16.6	12.0	240616.16	2478236.26	240615.85	2478236.65	
CC2E S-1-Q23	11/10/2015		13.9	12.0	240415.72	2478103.56	240413.92	2478102.91	
CC2E S-1-Q24	11/10/2015		17.1	12.0	240484.05	2478133.24	240484.38	2478134.86	
CC2E S-1-Q25A	11/10/2015	13.15		12.0	240580.97	2478177.23	240580.47	2478177.35	
CC2E S-1-Q25B	11/10/2015	8.35		12.0					
CC2E S-1-Q25C	11/10/2015	13.15	11.2	12.0					
CC2E S-1-Q25D	11/10/2015	10.75		12.0					
CC2E S-1-Q25E	11/10/2015	10.75		12.0					

Average	14.87
Median	14.83
Standard Deviation	3.02

Recommended Path Forward:

Quarry spall was placed within OU4-CC2E-South-1. Thickness verification poling was conducted in 25 locations. 20 of 25 samples meet or exceed the minimum thickness requirement of 12-inches. Tetra Tech recommends use of the the J.F. Brennan calculated thickness and bathymetric survey to accept OU4-CC2E-South-1 on an exception basis.

Prepared by: HNK Date: 12/3/2015

Reviewed by: BSW Date: 12/3/2015

A/OT Acceptance: George Berken Date: 4/19/16

On an exception basis per email from George Berken to Bill Hartman dated 4/19/16

OU4-CC2E-South-2										
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC2E-S-2-C1	9/25/2014	9.5	0.0	9.5	6.0	241453.02	2478827.92	241457.30	2478827.36	
CC2E-S-2-C2	9/25/2014	8.5	0.0	8.5	6.0	241388.97	2478798.41	241390.73	2478799.15	
CC2E-S-2-C3	9/25/2014	6.5	0.0	6.5	6.0	241289.02	2478710.43	241289.47	2478711.35	
CC2E-S-2-C4	9/22/2014	10.0	0.0	10.0	6.0	241082.21	2478612.43	241084.00	2478606.11	
CC2E-S-2-C5	9/22/2014	8.0	0.0	8.0	6.0	240922.70	2478535.60	240922.48	2478538.74	
CC2E-S-2-C6	9/22/2014	6.0	0.0	6.0	6.0	240965.75	2478518.70	240965.99	2478517.84	
CC2E-S-2-C7	9/22/2014	6.0	0.0	6.0	6.0	241121.08	2478591.37	241122.62	2478592.50	
CC2E-S-2-C8	9/26/2014	7.5	0.0	7.5	6.0	241252.70	2478656.32	241258.21	2478657.50	
CC2E-S-2-C9	9/26/2014	9.0	0.0	9.0	6.0	241479.09	2478762.82	241484.23	2478763.42	
CC2E-S-2-C10	9/26/2014	8.0	0.0	8.0	6.0	241528.68	2478746.82	241533.95	2478749.10	
CC2E-S-2-C11	9/26/2014	6.5	0.0	6.5	6.0	241370.95	2478675.77	241369.94	2478675.13	
CC2E-S-2-C12	9/22/2014	7.0	0.0	7.0	6.0	241117.52	2478552.37	241118.82	2478553.80	
CC2E-S-2-C13	9/22/2014	6.5	0.0	6.5	6.0	240946.24	2478471.39	240947.39	2478471.75	
CC2E-S-2-C14	9/23/2014	8.0	0.0	8.0	6.0	241012.35	2478463.91	241012.85	2478462.46	
CC2E-S-2-C15	9/25/2014	8.5	0.0	8.5	6.0	241218.35	2478563.62	241223.10	2478561.47	
CC2E-S-2-C16	9/26/2014	8.5	0.0	8.5	6.0	241436.24	2478664.16	241436.14	2478664.49	
CC2E-S-2-C17	9/26/2014	7.5	0.0	7.5	6.0	241520.94	2478704.46	241525.01	2478705.27	
CC2E-S-2-C18	9/26/2014	8.5	0.0	8.5	6.0	241524.09	2478667.45	241528.38	2478662.50	
CC2E-S-2-C19	9/25/2014	8.5	0.0	8.5	6.0	241345.13	2478582.11	241344.14	2478578.45	
CC2E-S-2-C20	9/26/2014	7.0	0.0	7.0	6.0	241192.96	2478513.75	241192.86	2478515.15	
CC2E-S-2-C21	9/26/2014	7.0	0.0	7.0	6.0	241084.04	2478455.35	241086.32	2478460.07	
CC2E-S-2-C22	9/26/2014	8.5	0.0	8.5	6.0	241170.25	2478458.80	241171.62	2478457.81	
CC2E-S-2-C23	9/25/2014	9.0	0.0	9.0	6.0	241469.32	2478601.56	241465.20	2478601.62	
CC2E-S-2-C24	9/26/2014	7.0	0.0	7.0	6.0	241569.78	2478650.56	241571.49	2478650.52	
CC2E-S-2-C25	9/25/2014	7.5	0.0	7.5	6.0	241488.47	2478803.42	241489.19	2478806.81	

Average	7.78	0.00	7.78
Median	8.00	0.00	8.00
Standard Deviation	1.08	0.00	1.08

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-South-2. 25 of 25 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: HNK Date: 9/29/2014 Reviewed by: BSW Date: 9/30/2014

A/OT Acceptance: Date: 9/30/14

OU4-CC2E-South-2									
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
					Northing	Easting	Northing	Easting	
CC2E S-2-G1	10/6/2014	4.5	C1	3.0	241390.81	2478798.06	241394.68	2478797.46	
CC2E S-2-G2	10/6/2014	5.0	C1	3.0	241458.47	2478831.27	241461.44	2478832.37	
CC2E S-2-G3	10/3/2014	7.0	C1	3.0	240982.28	2478563.04	240984.72	2478563.78	
CC2E S-2-G4	10/3/2014	6.0	C1	3.0	241161.01	2478648.61	241162.23	2478653.45	
CC2E S-2-G5	10/3/2014	5.0	C1	3.0	241338.46	2478730.36	241338.50	2478733.70	
CC2E S-2-G6	10/7/2014	5.0	C1	3.0	241450.81	2478784.01	241450.78	2478787.06	
CC2E S-2-G7	10/3/2014	5.5	C1	3.0	240955.48	2478513.22	240958.25	2478516.43	
CC2E S-2-G8	10/3/2014	7.5	C1	3.0	241123.99	2478589.86	241128.06	2478588.50	
CC2E S-2-G9	N/A	N/A	C1	3.0	241301.44	2478675.44			Bucket could not be located during retrieval
CC2E S-2-G10	10/7/2014	5.5	C1	3.0	241484.00	2478763.57	241485.60	2478769.96	
CC2E S-2-G11	10/3/2014	5.5	C1	3.0	241029.52	2478510.67	241028.01	2478509.90	
CC2E S-2-G12	10/3/2014	6.0	C1	3.0	241213.35	2478594.97	241214.16	2478595.28	
CC2E S-2-G13	10/6/2014	5.0	C1	3.0	241351.23	2478661.39	241354.42	2478662.11	
CC2E S-2-G14	10/7/2014	7.0	C1	3.0	241518.47	2478740.58	241520.70	2478736.81	
CC2E S-2-G15	10/3/2014	5.5	C1	3.0	241010.37	2478462.13	241011.65	2478462.21	
CC2E S-2-G16	10/6/2014	5.5	C1	3.0	241150.80	2478527.27	241152.75	2478533.39	
CC2E S-2-G17	10/6/2014	5.5	C1	3.0	241324.42	2478610.30	241325.76	2478609.75	
CC2E S-2-G18	10/8/2014	5.0	C1	3.0	241462.29	2478677.41	241459.02	2478678.22	
CC2E S-2-G19	10/6/2014	6.5	C1	3.0	241117.61	2478471.07	241117.06	2478472.52	
CC2E S-2-G20	10/6/2014	7.0	C1	3.0	241273.36	2478545.15	241279.06	2478543.67	
CC2E S-2-G21	10/6/2014	6.0	C1	3.0	241399.74	2478606.46	241401.14	2478605.07	
CC2E S-2-G22	10/8/2014	5.0	C1	3.0	241536.34	2478670.33	241534.55	2478671.65	
CC2E S-2-G23	10/6/2014	7.0	C1	3.0	241095.09	2478422.79	241093.12	2478421.50	
CC2E S-2-G24	10/6/2014	6.0	C1	3.0	241341.19	2478540.25	241345.36	2478539.97	
CC2E S-2-G25	10/8/2014	6.5	C1	3.0	241503.80	2478618.47	241504.43	2478617.19	
CC2E S-2-E2	10/8/2014	6.0	C1	3.0	241331.62	2478655.19	241331.59	2478656.79	Bucket G9 could not be located therefore the E2 bucket measurement is used in its place.

Average	5.84
Median	5.50
Standard Deviation	0.81

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-South-2. 25 of 25 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HNK Date: 10/9/2014 Reviewed by: BSW Date: 10/9/2014

A/OT Acceptance: Date: 10/14/14

Quarry Spall Placement Thickness Verification and Approval Form

OU4-CC2E-South-2 (Survey Comparisons)				
Area (acres)	Surveyed Volume Placed (cubic yards)	Calculated Thickness (inches)	Bathymetric Survey Thickness (inches)	Required Thickness (inches)
3.23	7,260	16.47	14.47	12

OU4-CC2E-South-2									
ID	Date Sampled	Quarry Thickness (inches)	Average Thickness (inches)	Required Thickness (inches)	Pre-Placement Coordinates		Survey Coordinates		Comments
					Northing	Easting	Northing	Easting	
CC2E S-2-Q1	10/16/2015		17.9	12.0	241387.54	2478797.73	241388.20	2478797.21	
CC2E S-2-Q2	10/16/2015		18.4	12.0	241466.92	2478832.07	241467.33	2478832.44	
CC2E S-2-Q3	10/16/2015		15.4	12.0	240984.37	2478563.83	240984.23	2478563.38	
CC2E S-2-Q4A	10/16/2015	11.0		12.0	241157.16	2478646.48	241156.37	2478646.07	
CC2E S-2-Q4B	10/16/2015	14.6		12.0					
CC2E S-2-Q4C	10/16/2015	8.6	11.0	12.0					
CC2E S-2-Q4D	10/16/2015	8.6		12.0					
CC2E S-2-Q4E	10/16/2015	12.2		12.0					
CC2E S-2-Q5	10/21/2015		13.3	12.0	241336.37	2478729.54	241335.64	2478729.06	
CC2E S-2-Q6	10/21/2015		18.9	12.0	241440.83	2478781.17	241440.18	2478780.61	
CC2E S-2-Q7	10/16/2015		14.6	12.0	240952.72	2478512.46	240952.29	2478512.71	
CC2E S-2-Q8	10/16/2015		21.4	12.0	241125.37	2478594.91	241124.78	2478595.55	
CC2E S-2-Q9	10/16/2015		12.8	12.0	241297.88	2478674.71	241298.69	2478675.01	
CC2E S-2-Q10A	10/21/2015	8.2		12.0	241411.20	2478727.89	241410.95	2478728.51	
CC2E S-2-Q10B	10/21/2015	11.8		12.0					
CC2E S-2-Q10C	10/21/2015	10.6	9.9	12.0					
CC2E S-2-Q10D	10/21/2015	11.8		12.0					
CC2E S-2-Q10E	10/21/2015	7.0		12.0					
CC2E S-2-Q11	10/21/2015		18.3	12.0	241054.18	2478520.28	241053.61	2478520.93	
CC2E S-2-Q12	10/21/2015		18.7	12.0	241210.13	2478593.70	241209.78	2478594.00	
CC2E S-2-Q13	10/21/2015		15.8	12.0	241351.99	2478662.66	241351.54	2478662.32	
CC2E S-2-Q14	10/23/2015		17.4	12.0	241517.32	2478739.99	241517.74	2478740.36	
CC2E S-2-Q15	10/21/2015		16.8	12.0	241016.91	2478466.33	241016.28	2478466.56	
CC2E S-2-Q16	10/21/2015		17.4	12.0	241118.54	2478511.94	241118.73	2478512.23	
CC2E S-2-Q17	10/21/2015		19.0	12.0	241330.69	2478610.72	241331.10	2478610.38	
CC2E S-2-Q18A	10/23/2015	8.6		12.0	241466.50	2478678.85	241466.08	2478678.02	
CC2E S-2-Q18B	10/23/2015	11.0		12.0					
CC2E S-2-Q18C	10/23/2015	9.8	10.3	12.0					
CC2E S-2-Q18D	10/23/2015	13.4		12.0					
CC2E S-2-Q18E	10/23/2015	8.6		12.0					
CC2E S-2-Q19	10/23/2015		15.6	12.0	241152.77	2478491.54	241152.57	2478491.71	
CC2E S-2-Q20A	10/23/2015	9.3		12.0	241273.81	2478543.55	241273.87	2478544.15	
CC2E S-2-Q20B	10/23/2015	9.3		12.0					
CC2E S-2-Q20C	10/23/2015	9.3	9.1	12.0					
CC2E S-2-Q20D	10/23/2015	10.5		12.0					
CC2E S-2-Q20E	10/23/2015	6.9		12.0					
CC2E S-2-Q21	10/23/2015		13.5	12.0	241399.19	2478605.97	241399.09	2478606.19	
CC2E S-2-Q22	10/23/2015		19.0	12.0	241536.20	2478672.06	241536.85	2478671.83	
CC2E S-2-Q23	10/23/2015		21.5	12.0	241094.62	2478421.24	241094.01	2478421.03	
CC2E S-2-Q24	10/23/2015		20.1	12.0	241327.35	2478534.61	241326.59	2478534.28	
CC2E S-2-Q25	10/23/2015		31.7	12.0	241502.98	2478616.98	241502.92	2478616.04	

Average	16.71
Median	17.40
Standard Deviation	4.70

Recommended Path Forward:

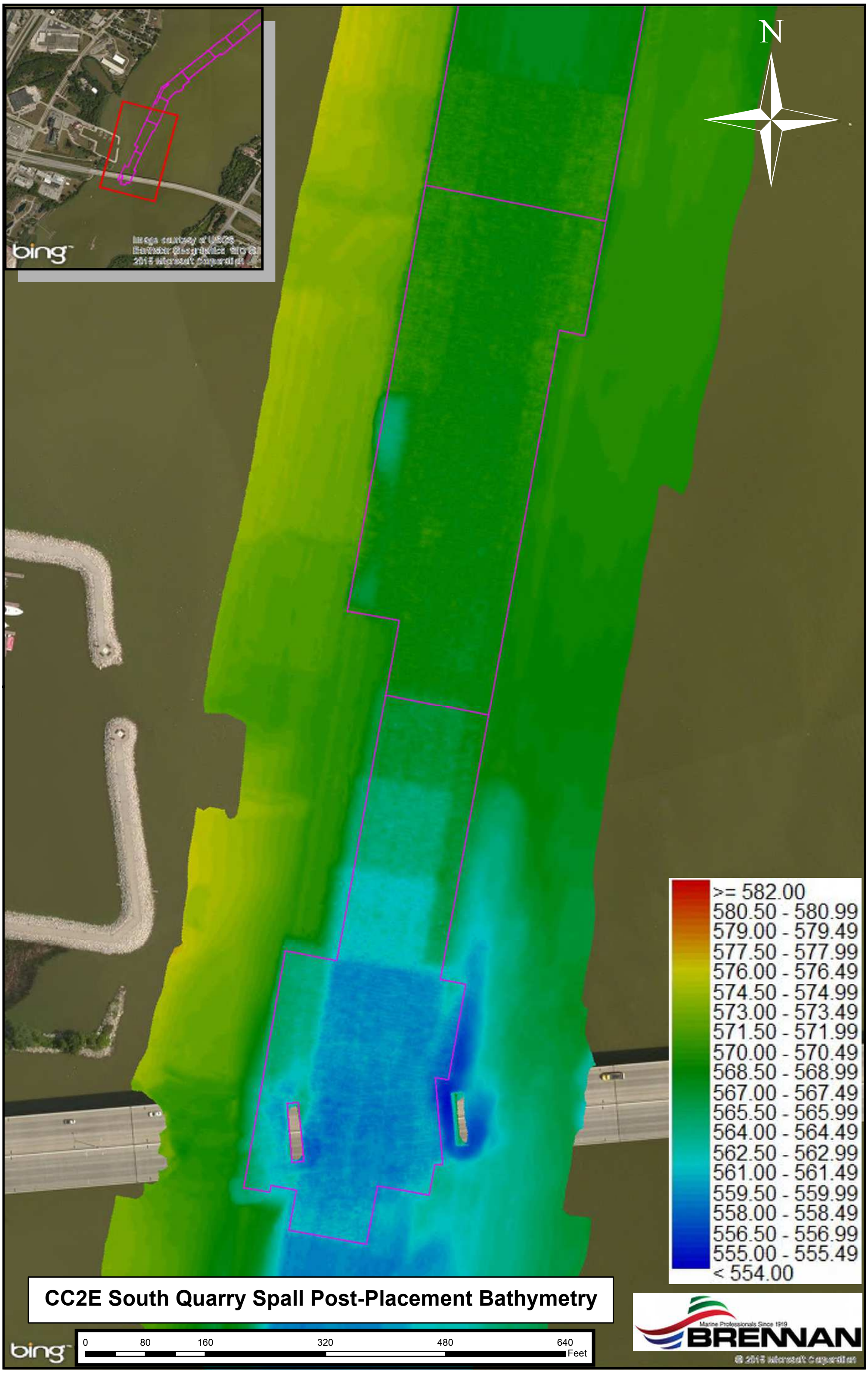
Quarry spall was placed within OU4-CC2E-South-2. Thickness verification poling was conducted in 25 locations. 21 of 25 samples meet or exceed the minimum thickness requirement of 12-inches. Tetra Tech recommends use of J.F. Brennan survey data to accept this area on an exception basis.

Prepared by: HNK Date: 10/27/2015

Reviewed by: BSW Date: 11/5/2015

A/OT Acceptance: George Berken Date: 4/19/16

On an exception basis per email from George Berken to Bill Hartman dated 4/18/16.



CC2E South Quarry Spall Post-Placement Bathymetry

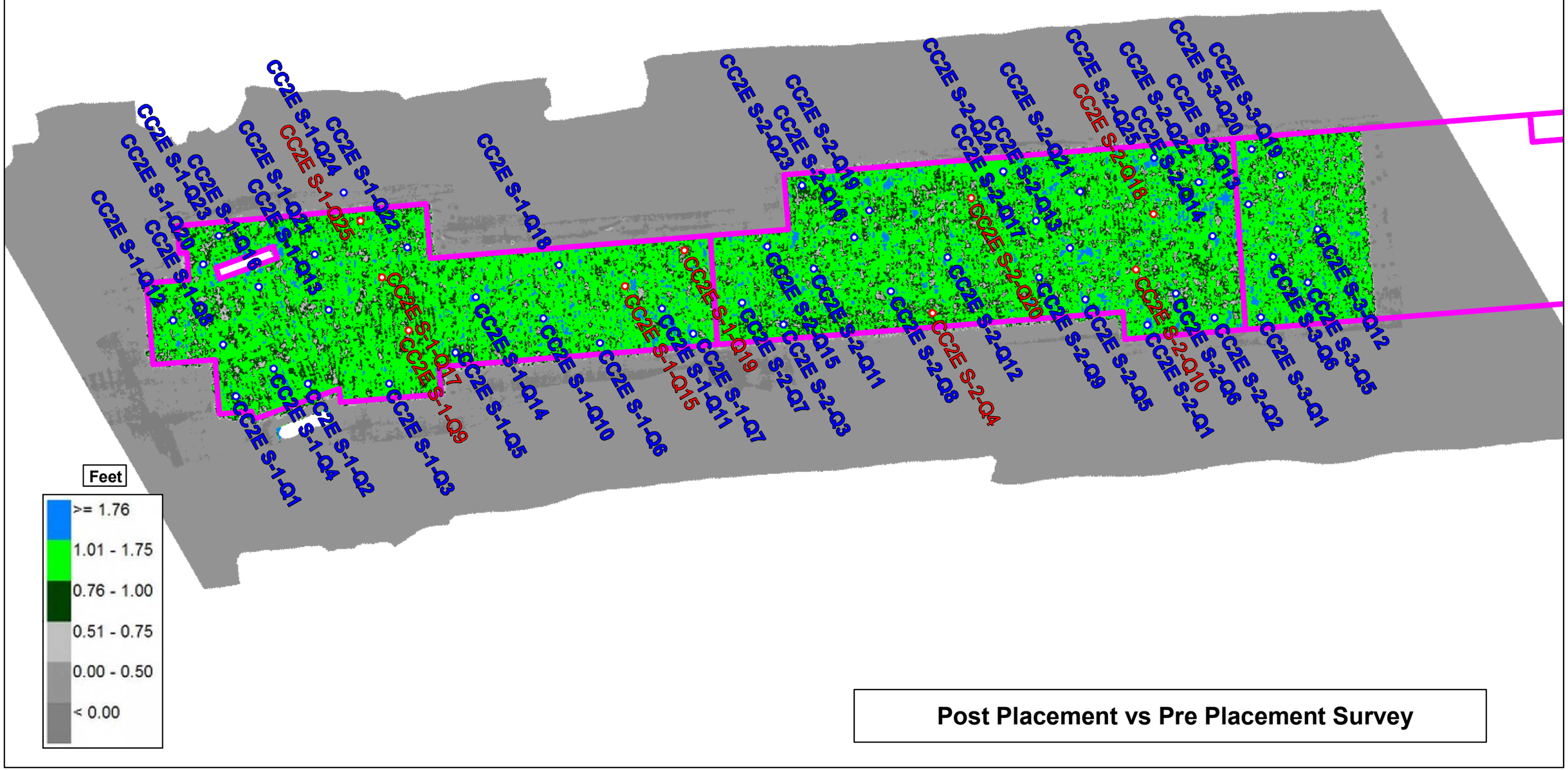
2015 OU2-5 Fox River Environmental Remediation CC2E Cap Thickness Verification Samples

1"=125'

0 62.5 125 250 375 500 Feet

Passed Sample Locations

Failed Sample Locations

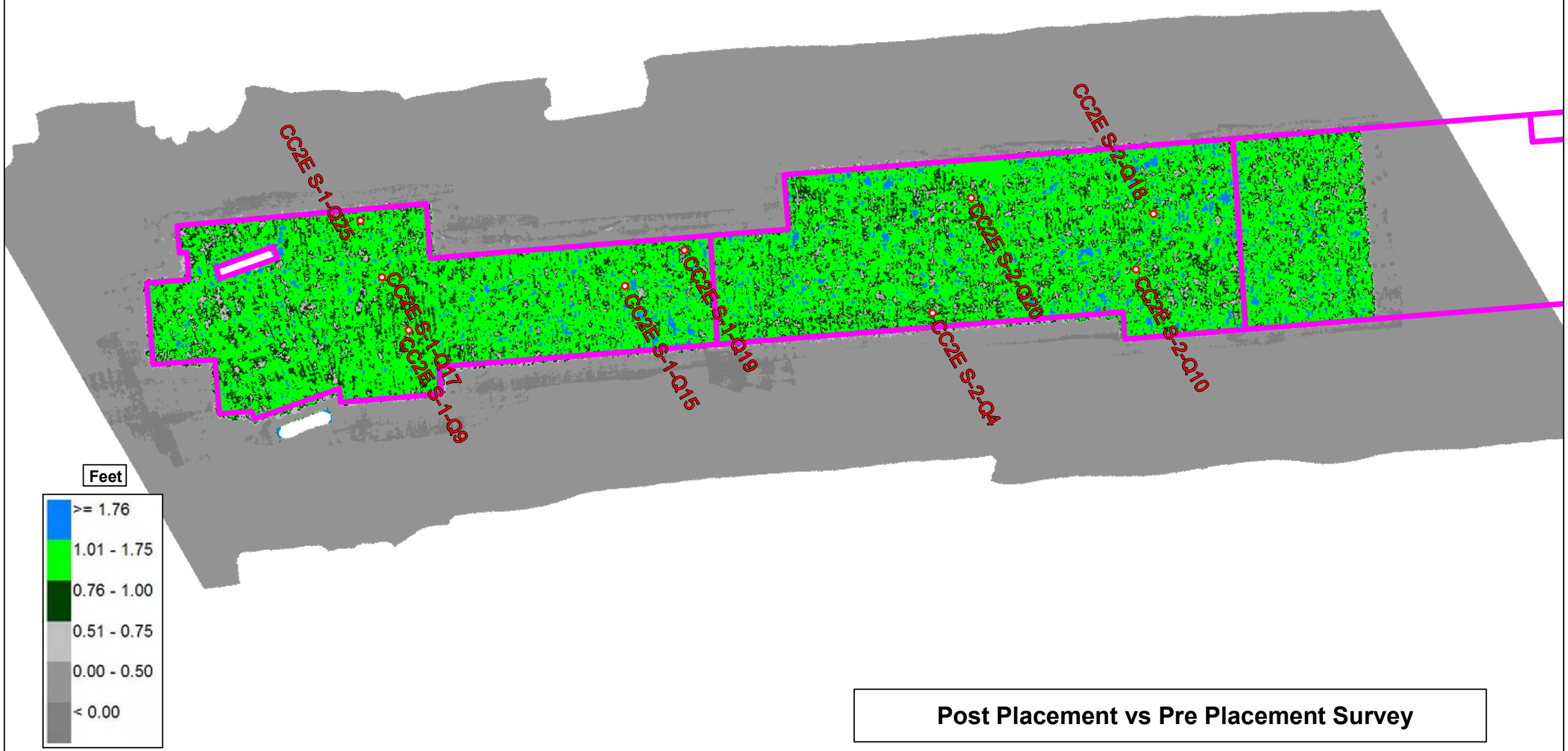


Post Placement vs Pre Placement Survey

2015 OU2-5 Fox River Environmental Remediation CC2E
Failed Cap Thickness Verification Samples

1"=125'

0 62.5 125 250 375 500 Feet



Post Placement vs Pre Placement Survey

Kinnard, Hugh

From:	George Berken <George.Berken@boldt.com>
Sent:	Monday, April 18, 2016 8:52 AM
To:	Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Roger.Kaminski@GaPac.com; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Denis Roznowski (Denis.Roznowski@Foth.com); ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Stewart, Lynna; Tara Van Hoof (Tara.VanHoof@Foth.com); Blackmar, Terri; Troy Gawronski (TGawronski@foth.com); dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc:	AgenciesLFRTeam; LFR.OverSightTeam
Subject:	87500 OU2-5 - FW: Request for Acceptance of Areas Receiving Quarry Spall Placement in 2015
Attachments:	LFRR-16-0114 Quarry Spall Verification
Follow Up Flag:	Follow up
Flag Status:	Completed

Bill H., on behalf of the Agencies and on exceptional bases, the thickness of the quarry spall placed in; CC14, three CMUs in CC2E-S (1 – 3), a small area along the GP shoreline (CCD35US), CC14, CC2E-S-1, CC2E-S-2, CCD35US and a portion of CC2E-S-3 that were completed in 2015 are acceptable. These exceptions are based on your email submitted below that documents the thicknesses for these areas along with Glatfelter's commitment (from your email below) to implement the following:

"…as we discussed, in an effort to minimize or eliminate the possibility of this type of occurrence this year, we have requested that Brennan provide, on a daily basis, a survey of the area that had just received the spall. This will allow an evaluation of the placement on a daily basis and "real time" corrective efforts. In addition, we have directed Brennan to begin this season using an increased amount of material per placement event."

Thanks,
George…

George A. Berken | Engineering Project Manager
P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

boldt.com

SafeThinking: Our Crusade to Eliminate Accidents

From: Hartman, William A. [mailto:William.Hartman@glatfelter.com]
Sent: Thursday, April 14, 2016 4:11 PM
To: George Berken <George.Berken@boldt.com>; Gary Kincaid (gary.kincaid@wisconsin.gov) <gary.kincaid@wisconsin.gov>; Larry DeBruin <Larry.Debruin@Boldt.com>; Jay Grosskopf <Jay.Grosskopf@Boldt.com>
Cc: Gawronski, Troy A <Troy.Gawronski@Foth.com>; Jeffrey Lawson <jlawson@project-control.com>; Paul LaRosa <plarosa@anchorqea.com>; Heath, Bryan <Bryan.Heath@ncr.com>; PAMontne@GaPac.com; Roger.Kaminski@GaPac.com; Coleman, Bill <Bill.Coleman@tetratech.com>; Blackmar, Terri

<Terri.Blackmar@tetratech.com>; AgenciesLFRTeam <AgenciesLFRTeam@boldt.com>; LFR.OverSightTeam <LFR.OverSightTeam@boldt.com>; Dustin Bauman <dbauman@JFBRENNAN.COM>; Weston, Brandon <Brandon.Weston@tetratech.com>
Subject: Request for Acceptance of Areas Receiving Quarry Spall Placement in 2015

Gents,

During the 2015 remedial season JF Brennan placed quarry spall for Glatfelter in several locations. The locations included CC14, three CMUs in CC2E-S (1 – 3) and a small area along the GP shoreline (CCD35US). CC14, CC2E-S-1, CC2E-S-2 and CCD35US were completed, but only a portion of CC2E-S-3 received quarry spall. CC2E-S-3 is planned to be completed this season, along with the remainder of the CMUs in CC2E-S and CC2E-N.

The results of the quarry spall placement performed in 2015 were presented to the A/OT on March 2, 2016 (see attached email) and we have discussed these results several times. During the 2015 season, there were numerous methods used to determine the thickness of the quarry spall that was placed. These methods included poling, bathymetric survey, and a volumetric determination using both surveys of the amount of quarry spall placed upon the placement barge and values obtained from the load cell of the excavator used by Brennan for placement.

As has been noted, the minimum thickness of 12" was met at all sample locations in CC14, by all methods used to determine thickness. This was not the case in either CC2E-S-1 or CC2E-S-2, where quarry spall was determined to be present at each individual sample location but the 12" minimum was not met at each, via the poling method. Post placement bathymetric surveys supported the poling determinations. However, based upon each of the methods used, the overall average thickness for each specific area was determined to meet the 12" minimum value. These results indicate that the quarry spall, as placed, fulfill the requirement to serve as a marker layer for potential future dredging. Also, the area where the spall was placed in 2015, and is to be placed in 2016, is in the caretaker portion of the river, so that it will not be exposed to potential disturbances caused by large ships. On an exception basis, Glatfelter requests that these areas be determined to be complete.
Please be aware, as we discussed, in an effort to minimize or eliminate the possibility of this type of occurrence this year, we have requested that Brennan provide, on a daily basis, a survey of the area that had just received the spall. This will allow an evaluation of the placement on a daily basis and "real time" corrective efforts. In addition, we have directed Brennan to begin this season using an increased amount of material per placement event. Finally, as you are aware, we have recently switched quarry spall suppliers and believe that this new material may "lay" more evenly due to the decreased presence of elongated pieces, which was observed in the spall used previously.

Please feel free to stop by to discuss if you have any questions or concerns. Thanks,

Bill Hartman
Project Manager
Glatfelter & GW Partners, LLC
920-209-2016 (Cell)
920-445-0746 (Office)

NOTICE: This message, and anything transmitted with it, may be confidential and is solely for the intended recipient(s). If you are not the intended recipient or have received this message in error, (1) immediately notify the sender, (2) permanently delete this message from your system, and (3) do not use, disclose, forward, print or copy the information contained in this message or any attachments. Glatfelter does not accept liability for any damage caused by the transmission of this message.

OU4-CC2E-South-3										
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC2E-S-3-C1	9/29/2014	8.0	0.0	8.0	6.0	241519.40	2478858.36	241522.18	2478861.51	
CC2E-S-3-C2	9/29/2014	7.0	0.0	7.0	6.0	241636.56	2478914.04	241636.22	2478918.07	
CC2E-S-3-C3	9/29/2014	8.0	0.0	8.0	6.0	241798.70	2478990.00	241799.52	2478989.52	
CC2E-S-3-C4	9/29/2014	8.0	0.0	8.0	6.0	241966.43	2479070.14	241967.94	2479072.01	
CC2E-S-3-C5	9/29/2014	8.5	0.0	8.5	6.0	241921.76	2479006.88	241921.63	2479013.13	
CC2E-S-3-C6	9/29/2014	6.5	0.0	6.5	6.0	241723.33	2478915.74	241721.31	2478915.13	
CC2E-S-3-C7	9/29/2014	6.5	0.0	6.5	6.0	241582.58	2478851.63	241582.91	2478851.85	
CC2E-S-3-C8	9/29/2014	10.0	0.0	10.0	6.0	241553.92	2478796.79	241551.50	2478797.94	
CC2E-S-3-C9	9/30/2014	8.0	0.0	8.0	6.0	241828.02	2478930.11	241833.08	2478927.15	
CC2E-S-3-C10	9/30/2014	10.0	0.0	10.0	6.0	241988.36	2479003.51	241991.21	2478997.40	
CC2E-S-3-C11	9/30/2014	8.0	0.0	8.0	6.0	241949.31	2478947.29	241954.42	2478950.47	
CC2E-S-3-C12	9/30/2014	6.0	0.0	6.0	6.0	241713.26	2478835.54	241715.53	2478835.52	
CC2E-S-3-C13	9/30/2014	7.0	0.0	7.0	6.0	241615.69	2478788.54	241612.03	2478791.58	
CC2E-S-3-C14	9/30/2014	9.5	0.0	9.5	6.0	241580.93	2478732.62	241585.27	2478727.89	
CC2E-S-3-C15	9/30/2014	7.0	0.0	7.0	6.0	241821.11	2478847.20	241822.24	2478851.53	
CC2E-S-3-C16	9/30/2014	7.5	0.0	7.5	6.0	241854.94	2478893.30	241854.84	2478897.01	
CC2E-S-3-C17	9/30/2014	9.0	0.0	9.0	6.0	242031.33	2478946.10	242033.04	2478945.26	
CC2E-S-3-C18	9/30/2014	6.5	0.0	6.5	6.0	241999.87	2478894.99	242003.71	2478897.23	
CC2E-S-3-C19	9/30/2014	8.5	0.0	8.5	6.0	241908.03	2478852.82	241908.28	2478854.53	
CC2E-S-3-C20	9/30/2014	7.5	0.0	7.5	6.0	241773.27	2478784.88	241773.08	2478784.71	
CC2E-S-3-C21	9/30/2014	7.5	0.0	7.5	6.0	241654.21	2478729.46	241653.09	2478731.78	
CC2E-S-3-C22	9/29/2014	6.0	0.0	6.0	6.0	241608.92	2478669.31	241603.74	2478665.90	
CC2E-S-3-C23	9/30/2014	7.0	0.0	7.0	6.0	241729.44	2478724.99	241730.23	2478729.58	
CC2E-S-3-C24	9/30/2014	7.5	0.0	7.5	6.0	241864.30	2478784.88	241865.06	2478789.03	
CC2E-S-3-C25	9/30/2014	7.0	0.0	7.0	6.0	241682.73	2478860.34	241683.51	2478865.20	

Average	7.68	0.00	7.68
Median	7.50	0.00	7.50
Standard Deviation	1.12	0.00	1.12

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-South-3. 25 of 25 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: HMK Date: 10/1/2014 Reviewed by: BSW Date: 10/1/2014

A/OT Acceptance: Date: 10/2/14

OU4-CC2E-South-3									
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
					Northing	Easting	Northing	Easting	
CC2E S-3-G1	10/7/2014	5.5	C1	3.0	241539.54	2478868.18	241543.74	2478870.42	
CC2E S-3-G2	10/7/2014	6.5	C1	3.0	241717.12	2478948.49	241718.93	2478951.40	
CC2E S-3-G3	10/7/2014	5.5	C1	3.0	241953.89	2479066.98	241958.41	2479067.93	
CC2E S-3-G4	10/7/2014	5.0	C1	3.0	241902.59	2479002.47	241899.40	2479001.99	
CC2E S-3-G5	10/7/2014	5.5	C1	3.0	241613.20	2478864.23	241613.95	2478867.64	
CC2E S-3-G6	10/7/2014	5.0	C1	3.0	241572.43	2478806.30	241572.58	2478809.76	
CC2E S-3-G7	10/7/2014	5.5	C1	3.0	241735.54	2478881.35	241738.05	2478881.68	
CC2E S-3-G8	10/7/2014	5.5	C1	3.0	241817.09	2478924.79	241821.92	2478927.38	
CC2E S-3-G9	10/7/2014	5.5	C1	3.0	241994.67	2479007.74	241995.57	2479010.30	
CC2E S-3-G10	N/A	N/A	C1	3.0	241963.10	2478949.81			Bucket could not be located during retrieval
CC2E S-3-G11	10/8/2014	5.5	C1	3.0	241884.18	2478916.90	241884.84	2478918.26	
CC2E S-3-G12	10/8/2014	5.0	C1	3.0	241656.61	2478806.30	241659.31	2478808.01	
CC2E S-3-G13	10/8/2014	5.5	C1	3.0	241590.84	2478735.21	241590.01	2478738.27	
CC2E S-3-G14	10/8/2014	6.5	C1	3.0	241732.91	2478802.36	241731.16	2478801.20	
CC2E S-3-G15	10/8/2014	5.0	C1	3.0	241861.81	2478868.18	241865.29	2478870.39	
CC2E S-3-G16	10/8/2014	5.5	C1	3.0	242013.09	2478937.96	242013.15	2478939.84	
CC2E S-3-G17	10/13/2014	6.0	C1	3.0	241951.26	2478872.13	241954.62	2478869.27	
CC2E S-3-G18	10/8/2014	6.0	C1	3.0	241834.19	2478812.89	241837.44	2478813.38	
CC2E S-3-G19	10/8/2014	5.0	C1	3.0	241671.08	2478737.84	241675.22	2478740.53	
CC2E S-3-G20	10/8/2014	4.5	C1	3.0	241617.15	2478673.33	241616.67	2478677.39	
CC2E S-3-G21	10/8/2014	5.0	C1	3.0	241734.22	2478729.94	241735.59	2478729.69	
CC2E S-3-G22	10/8/2014	7.0	C1	3.0	241886.81	2478799.72	241885.91	2478795.85	
CC2E S-3-G23	10/13/2014	6.0	C1	3.0	242043.83	2478913.83	242041.70	2478909.15	
CC2E S-3-G24	10/7/2014	6.0	C1	3.0	241777.63	2478941.91	241779.82	2478940.57	
CC2E S-3-G25	10/7/2014	5.5	C1	3.0	241848.63	2479010.61	241852.60	2479013.98	
CC2E S-3-E4	10/8/2014	5.0	C1	3.0	241948.10	2478984.41	241947.67	2478985.13	Bucket G10 could not be located therefore the E4 bucket measurement is used in its place.

Average	5.54
Median	5.50
Standard Deviation	0.58

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-South-3. 25 of 25 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: LRK Date: 10/14/2014 Reviewed by: BSW Date: 10/14/2014

A/OT Acceptance: Date: 10/14/14

P.H. Glatfelter Company

Operable Unit 4

2016 Quarry Spall Thickness Verification Results - CC2E S-3

Location	Remedial Action Area	OU	Pre-Placement Collection Date	Pre-Placement Actual X (WSPC NAD83, ft)	Pre-Placement Actual Y (WSPC NAD83, ft)	Post-Placement Collection Date	Post-Placement Actual X (WSPC NAD83, ft)	Post-Placement Actual Y (WSPC NAD83, ft)	Pre- and Post-Placement Location Offset (ft)	Pre-Placement Average Bottom Elevation (ft msl)	Post-Placement Average Bottom Elevation (ft msl)	Average Measured Quarry Spall Thickness[1] (inches)	Required Quarry Spall Thickness (inches)
CC2E S-3-Q1[2]	CC2E S-3	OU4	10/22/2015	2478860.69	241520.72	10/27/2015	2478861.53	241519.23	1.71	568.30	569.69	16.7	12.0
CC2E S-3-Q2	CC2E S-3	OU4	4/15/16 10:16	2478928.77	241671.14	4/21/16 10:54	2478928.34	241670.79	0.55	568.61	570.32	20.5	12.0
CC2E S-3-Q3	CC2E S-3	OU4	4/15/16 11:19	2479065.60	241953.28	4/21/16 11:03	2479065.08	241953.59	0.61	567.58	569.53	23.4	12.0
CC2E S-3-Q4	CC2E S-3	OU4	4/15/16 11:13	2479011.49	241926.79	4/21/16 12:05	2479001.51	241926.87	0.08	567.73	569.35	19.4	12.0
CC2E S-3-Q5[2]	CC2E S-3	OU4	10/22/2015	2478854.16	241593.90	10/27/2015	2478852.97	241593.53	1.24	567.67	569.03	16.3	12.0
CC2E S-3-Q6[2]	CC2E S-3	OU4	10/22/2015	2478802.31	241573.00	10/27/2015	2478802.34	241571.44	1.56	567.22	568.64	17.0	12.0
CC2E S-3-Q7	CC2E S-3	OU4	4/15/16 10:11	2478883.59	241736.44	4/25/16 8:57	2478882.98	241736.01	0.75	567.25	568.90	19.8	12.0
CC2E S-3-Q8	CC2E S-3	OU4	4/15/16 10:29	2478953.69	241886.55	4/25/16 9:14	2478953.18	241886.94	0.64	566.58	568.55	23.6	12.0
CC2E S-3-Q9	CC2E S-3	OU4	4/15/16 12:19	2479006.39	241997.16	4/27/16 9:12	2479005.85	241997.23	0.54	566.70	568.77	24.8	12.0
CC2E S-3-Q10	CC2E S-3	OU4	4/15/16 11:23	2478946.26	241952.64	4/27/16 9:15	2478945.77	241952.52	0.50	567.08	568.90	21.8	12.0
CC2E S-3-Q11	CC2E S-3	OU4	4/15/16 10:06	2478871.64	241795.36	4/25/16 9:02	2478870.90	241795.39	0.74	567.00	568.95	23.4	12.0
CC2E S-3-Q12[2]	CC2E S-3	OU4	10/22/2015	2478800.24	241637.95	10/27/2015	2478799.99	241638.58	0.68	566.99	568.42	17.2	12.0
CC2E S-3-Q13[2]	CC2E S-3	OU4	10/22/2015	2478729.74	241578.06	10/27/2015	2478728.13	241577.76	1.64	566.88	568.24	16.4	12.0
CC2E S-3-Q14	CC2E S-3	OU4	4/15/16 9:42	2478797.59	241718.30	4/27/16 8:43	2478797.49	241718.02	0.30	567.63	569.30	20.0	12.0
CC2E S-3-Q15	CC2E S-3	OU4	4/15/16 9:58	2478867.12	241862.70	4/27/16 9:05	2478866.59	241863.07	0.65	567.20	568.95	21.0	12.0
CC2E S-3-Q16	CC2E S-3	OU4	4/15/16 12:29	2478942.65	242029.71	4/29/16 8:52	2478942.83	242029.15	0.59	567.20	569.01	21.7	12.0
CC2E S-3-Q17	CC2E S-3	OU4	4/15/16 10:39	2478854.77	241919.97	4/27/16 9:26	2478854.51	241920.14	0.31	567.98	570.02	24.5	12.0
CC2E S-3-Q18	CC2E S-3	OU4	4/15/16 9:48	2478793.06	241790.76	4/27/16 8:57	2478792.70	241790.78	0.36	567.74	569.39	19.8	12.0
CC2E S-3-Q19[2]	CC2E S-3	OU4	10/22/2015	2478715.81	241632.04	10/27/2015	2478716.59	241632.25	0.80	567.67	569.23	18.8	12.0
CC2E S-3-Q20[2]	CC2E S-3	OU4	10/22/2015	2478668.88	241617.20	10/27/2015	2478669.28	241616.70	0.64	568.44	569.45	12.1	12.0
CC2E S-3-Q21	CC2E S-3	OU4	4/15/16 9:53	2478739.72	241763.77	5/31/16 12:58	2478739.71	241763.53	0.24	568.43	569.44	12.1	12.0
CC2E S-3-Q22	CC2E S-3	OU4	4/15/16 10:35	2478800.10	241887.64	5/31/16 13:04	2478799.68	241887.80	0.45	568.00	569.15	13.8	12.0
CC2E S-3-Q23	CC2E S-3	OU4	4/15/16 12:40	2478893.56	242005.68	4/29/16 8:46	2478893.08	242005.15	0.72	568.01	569.82	21.7	12.0
CC2E S-3-Q24	CC2E S-3	OU4	4/15/16 10:21	2478957.58	241812.64	4/21/16 12:00	2478957.50	241812.95	0.32	567.97	569.88	22.9	12.0
CC2E S-3-Q25	CC2E S-3	OU4	4/15/16 10:25	2479012.02	241850.21	4/21/16 11:56	2479012.05	241849.79	0.42	567.98	569.55	18.8	12.0

1. All field data recorded in units of feet. Values presented have been converted from feet to inches.
2. Pre- and post-placement data collected by TtEC in 2015. Data was transmitted to Glatfelter and Foth on 4/19/2016 by TtEC.

Average	19.5
Median	19.8
Standard Deviation	3.6
Minimum	12.1
Maximum	24.8

Recommended Path Forward:

Quarry spall was placed within OU4-CC2E-South-3. Thickness verification poling was conducted at 25 locations. All poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches. Included with this table are the post-placement bathymetry and isopach maps prepared by Brennan. In addition, a mass balance sheet, which shows several volumetric tracking methods, has been included for all areas receiving quarry spall. Based on the information presented Foth recommends A/OT acceptance of this area.

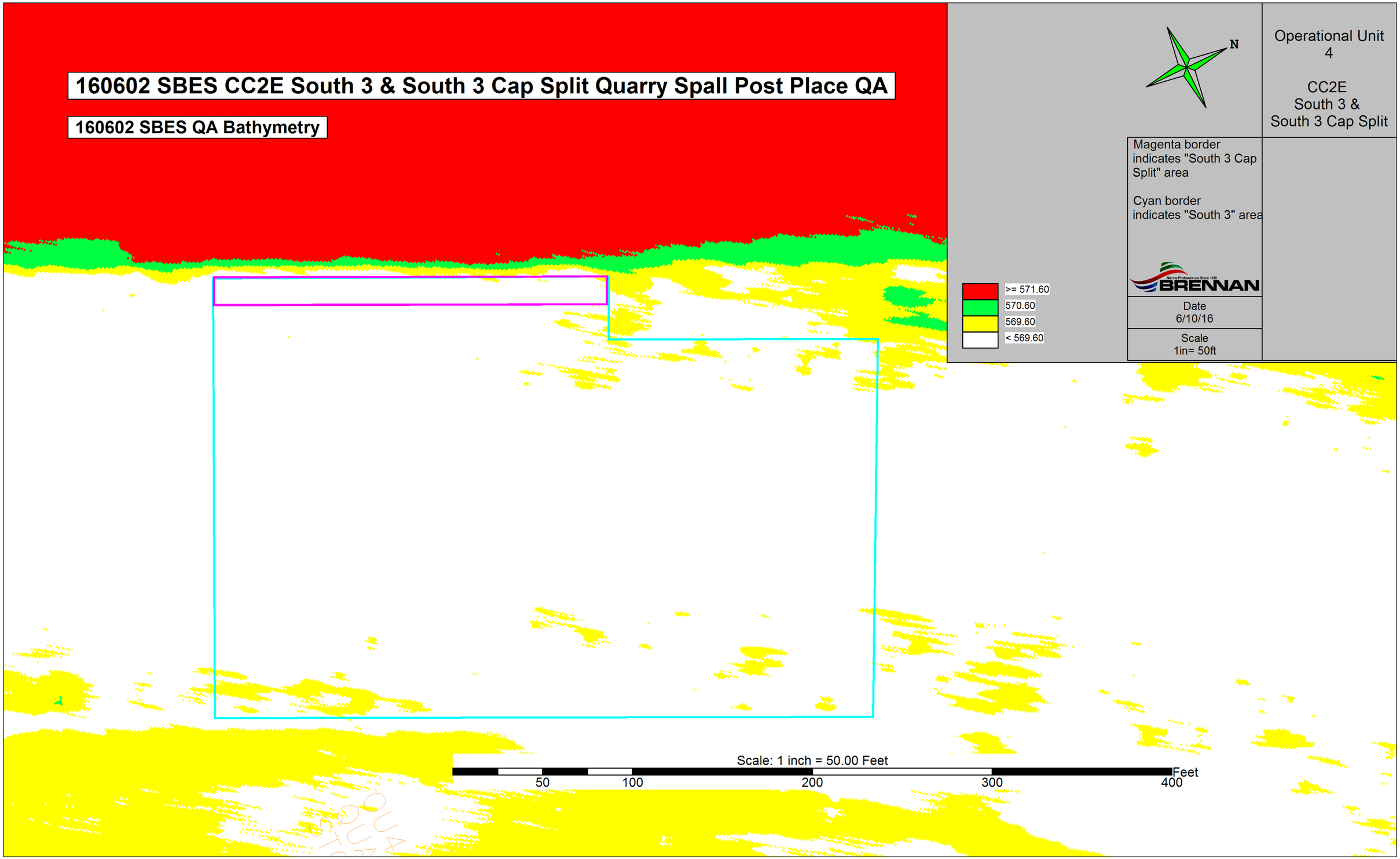
Prepared by: MCC2 Date: 5/31/2016

Reviewed by: SVF Date: 6/21/2016

A/OT Acceptance: Date: 6/22/16

160602 SBES CC2E South 3 & South 3 Cap Split Quarry Spall Post Place QA

160602 SBES QA Bathymetry



Operational Unit 4

CC2E South 3 & South 3 Cap Split

Magenta border indicates "South 3 Cap Split" area

Cyan border indicates "South 3" area

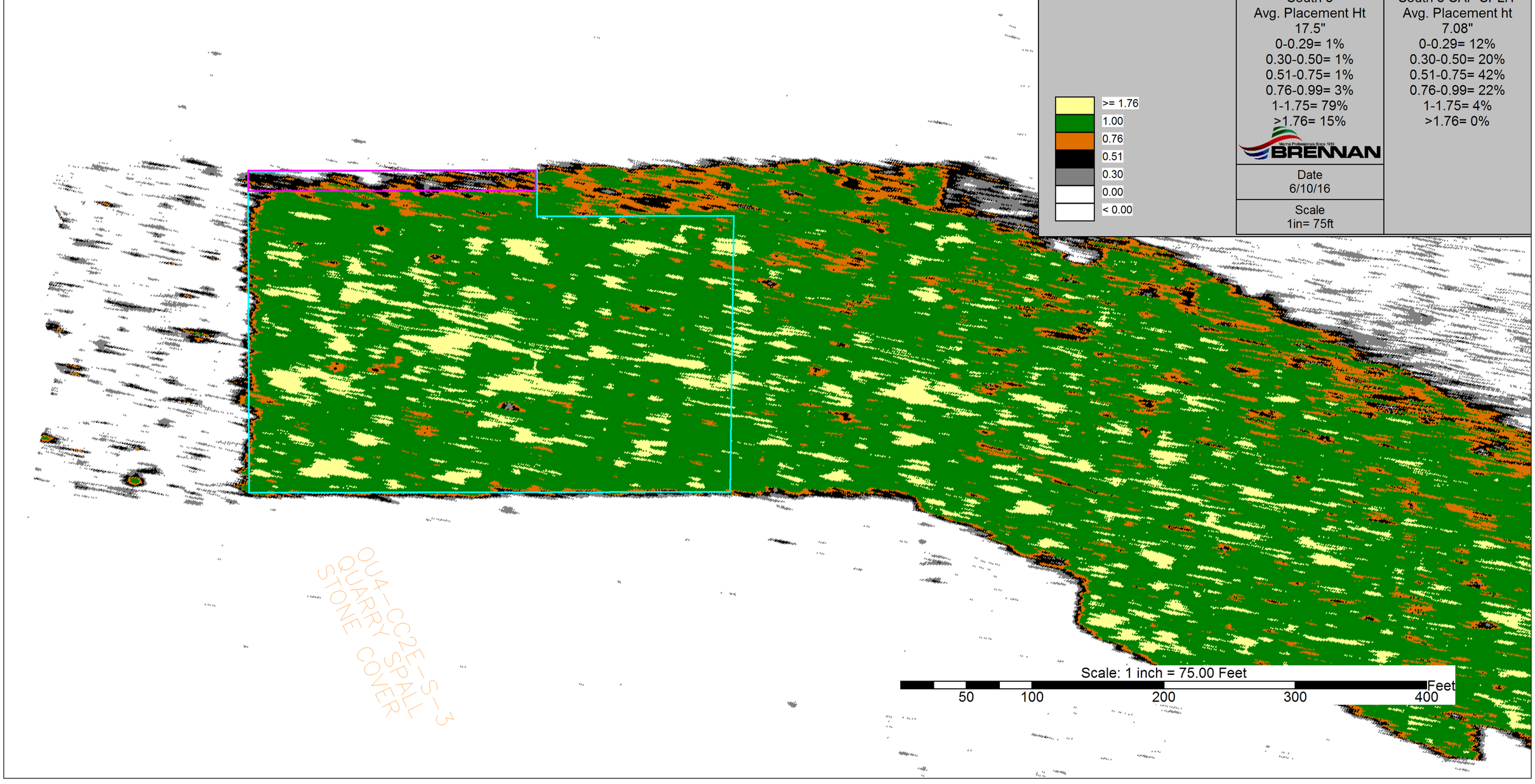
BRENNAN

Date 6/10/16

Scale 1in= 50ft

160602 SBES CC2E South 3 & South 3 Cap Split Quarry Spall Post Place QA

Isopach based on 2016 SBES Predredge Survey vs 160602 SBES QA Survey



Operational Unit 4

CC2E
South 3 &
South 3 Cap Split

South 3	South 3 CAP SPLIT
Avg. Placement Ht	Avg. Placement ht
17.5"	7.08"
0-0.29= 1%	0-0.29= 12%
0.30-0.50= 1%	0.30-0.50= 20%
0.51-0.75= 1%	0.51-0.75= 42%
0.76-0.99= 3%	0.76-0.99= 22%
1-1.75= 79%	1-1.75= 4%
>1.76= 15%	>1.76= 0%

BRENNAN

Date
6/10/16

Scale
1in= 75ft

OU4-CC2E-South-4										
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC2E S-4-C1	10/3/2014	8.0	0.0	8.0	6.0	242241.63	2479356.39	242242.03	2479356.85	
CC2E S-4-C2	10/3/2014	6.0	0.0	6.0	6.0	242350.51	2479438.37	242348.88	2479436.68	
CC2E S-4-C3	10/3/2014	6.5	0.0	6.5	6.0	242151.59	2479187.81	242151.02	2479190.46	
CC2E S-4-C4	10/3/2014	9.5	0.0	9.5	6.0	242034.42	2479102.46	242035.10	2479101.65	
CC2E S-4-C5	10/3/2014	9.0	0.0	9.0	6.0	242024.60	2479059.48	242024.99	2479060.36	
CC2E S-4-C6	10/3/2014	7.5	0.0	7.5	6.0	242134.41	2479113.52	242125.62	2479113.04	
CC2E S-4-C7	10/3/2014	7.5	0.0	7.5	6.0	242410.17	2479458.99	242408.33	2479458.34	
CC2E S-4-C8	10/3/2014	7.0	0.0	7.0	6.0	242361.10	2479336.19	242357.95	2479331.99	
CC2E S-4-C9	10/3/2014	12.5	0.0	12.5	6.0	242090.23	2479050.80	242089.06	2479050.26	
CC2E S-4-C10	10/3/2014	11.5	0.0	11.5	6.0	242050.37	2478994.11	242049.44	2478992.24	
CC2E S-4-C11	10/3/2014	7.5	0.0	7.5	6.0	242142.38	2478998.40	242141.43	2479001.38	
CC2E S-4-C12	10/6/2014	13.0	0.0	13.0	6.0	242082.60	2478930.98	242082.19	2478931.71	
CC2E S-4-C13	10/6/2014	8.5	0.0	8.5	6.0	242236.31	2479013.10	242234.92	2479013.69	
CC2E S-4-C14	10/3/2014	8.0	0.0	8.0	6.0	242207.05	2479091.77	242208.82	2479090.40	
CC2E S-4-C15	10/3/2014	6.5	0.0	6.5	6.0	242312.56	2479221.32	242312.61	2479218.46	
CC2E S-4-C16	10/3/2014	7.5	0.0	7.5	6.0	242424.37	2479365.64	242426.44	2479367.32	
CC2E S-4-C17	10/6/2014	6.0	0.0	6.0	6.0	242497.98	2479397.56	242497.76	2479397.50	
CC2E S-4-C18	10/6/2014	6.5	0.0	6.5	6.0	242374.68	2479241.61	242377.27	2479247.51	
CC2E S-4-C19	10/6/2014	6.0	0.0	6.0	6.0	242325.51	2479129.24	242325.88	2479130.18	
CC2E S-4-C20	10/6/2014	8.0	0.0	8.0	6.0	242382.56	2479140.90	242383.16	2479143.86	
CC2E S-4-C21	10/6/2014	7.5	0.0	7.5	6.0	242538.54	2479334.95	242538.55	2479334.70	
CC2E S-4-C22	10/6/2014	9.0	0.0	9.0	6.0	242459.41	2479292.58	242461.94	2479293.15	
CC2E S-4-C23	10/3/2014	6.0	0.0	6.0	6.0	242259.83	2479266.19	242260.56	2479262.01	
CC2E S-4-C24	10/6/2014	9.0	0.0	9.0	6.0	242174.48	2478974.48	242175.40	2478974.03	
CC2E S-4-C25	10/3/2014	7.0	0.0	7.0	6.0	242237.72	2479185.41	242239.21	2479181.69	

Average	8.04	0.00	8.04
Median	7.50	0.00	7.50
Standard Deviation	1.93	0.00	1.93

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-South-4. 25 of 25 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: HNK Date: 10/7/2014 Reviewed by: BSW Date: 10/7/2014

A/OT Acceptance: Date: 10/8/14

OU4-CC2E-South-4									
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
					Northing	Easting	Northing	Easting	
CC2E S-4-G1	10/9/2014	6.0	C1	3.0	242013.95	2479091.09	242018.13	2479095.53	
CC2E S-4-G2	10/9/2014	5.0	C1	3.0	242099.37	2479130.79	242101.29	2479136.04	
CC2E S-4-G3	10/9/2014	5.0	C1	3.0	242231.33	2479347.02	242230.40	2479348.07	
CC2E S-4-G4	N/A	N/A	C1	3.0	242360.20	2479450.25			Bucket could not be located during retrieval
CC2E S-4-G5	10/9/2014	6.5	C1	3.0	242225.21	2479279.22	242229.59	2479280.24	
CC2E S-4-G6	10/10/2014	5.0	C1	3.0	242417.50	2479466.71	242418.38	2479465.88	
CC2E S-4-G7	10/10/2014	6.0	C1	3.0	242288.57	2479307.30	242286.80	2479313.76	
CC2E S-4-G8	10/10/2014	7.0	C1	3.0	242156.35	2479068.51	242153.98	2479070.94	
CC2E S-4-G9	10/10/2014	4.5	C1	3.0	242353.97	2479331.75	242351.73	2479334.05	
CC2E S-4-G10	10/13/2014	5.5	C1	3.0	242471.28	2479422.14	242472.81	2479417.90	
CC2E S-4-G11	10/10/2014	5.0	C1	3.0	242394.27	2479327.46	242393.63	2479329.76	
CC2E S-4-G12	10/10/2014	5.0	C1	3.0	242283.83	2479190.05	242282.51	2479188.39	
CC2E S-4-G13	10/13/2014	5.0	C1	3.0	242211.03	2479039.15	242209.90	2479041.39	
CC2E S-4-G14	10/13/2014	4.5	C1	3.0	242373.66	2479244.41	242371.69	2479245.70	
CC2E S-4-G15	10/13/2014	5.0	C1	3.0	242501.79	2479404.41	242500.41	2479405.06	
CC2E S-4-G16	10/13/2014	6.0	C1	3.0	242498.13	2479345.18	242499.49	2479344.79	
CC2E S-4-G17	10/13/2014	6.0	C1	3.0	242339.49	2479146.71	242339.04	2479145.50	
CC2E S-4-G18	10/13/2014	5.0	C1	3.0	242393.79	2479155.87	242393.31	2479156.68	
CC2E S-4-G19	10/13/2014	7.0	C1	3.0	242554.97	2479358.01	242555.99	2479352.38	
CC2E S-4-G20	10/13/2014	7.5	C1	3.0	242187.84	2478981.75	242187.73	2478978.49	
CC2E S-4-G21	10/13/2014	5.0	C1	3.0	242098.76	2478938.39	242096.93	2478938.75	
CC2E S-4-G22	10/10/2014	4.0	C1	3.0	242060.93	2478960.99	242059.32	2478960.61	
CC2E S-4-G23	10/10/2014	5.0	C1	3.0	242101.02	2479018.12	242101.74	2479021.51	
CC2E S-4-G24	10/9/2014	5.5	C1	3.0	242042.63	2479035.49	242040.82	2479034.63	
CC2E S-4-G25	10/9/2014	8.0	C1	3.0	242063.98	2479077.02	242064.18	2479077.08	
CC2E S-4-E3	10/13/2014	7.0	C1	3.0	242381.10	2479411.51	242380.29	2479410.58	Bucket G4 could not be located therefore the E3 bucket measurement is used in its place.

Average	5.64
Median	5.00
Standard Deviation	1.03

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-South-4. 25 of 25 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HNK Date: 10/14/2014 Reviewed by: BSW Date: 10/14/2014

A/OT Acceptance: Date: 10/14/14

P.H. Glatfelter Company

Operable Unit 4

2016 Quarry Spall Thickness Verification Results - CC2E S-4

Location	Remedial Action Area	OU	Pre-Placement Collection Date	Pre-Placement Actual X (WSPC NAD83, ft)	Pre-Placement Actual Y (WSPC NAD83, ft)	Post-Placement Collection Date	Post-Placement Actual X (WSPC NAD83, ft)	Post-Placement Actual Y (WSPC NAD83, ft)	Pre- and Post-Placement Location Offset (ft)	Pre-Placement Average Bottom Elevation (ft msl)	Post-Placement Average Bottom Elevation (ft msl)	Average Measured Quarry Spall Thickness[1] (inches)	Required Quarry Spall Thickness (inches)
CC2E S-4-Q1	CC2E S-4	OU4	4/15/16 13:06	2479101.67	242030.12	4/29/16 9:25	2479100.69	242030.54	0.42	567.90	569.49	19.1	12.0
CC2E S-4-Q2	CC2E S-4	OU4	4/15/16 13:10	2479152.76	242122.59	5/3/16 8:46	2479152.50	242123.22	0.68	567.98	569.40	17.0	12.0
CC2E S-4-Q3	CC2E S-4	OU4	4/15/16 13:59	2479330.69	242221.09	5/3/16 8:55	2479331.09	242221.56	0.62	568.00	569.70	20.4	12.0
CC2E S-4-Q4	CC2E S-4	OU4	4/15/16 14:36	2479471.58	242376.88	5/3/16 9:04	2479471.27	242376.58	0.43	568.29	570.40	25.3	12.0
CC2E S-4-Q5	CC2E S-4	OU4	4/15/16 13:53	2479342.46	242274.26	5/3/16 9:00	2479342.48	242274.61	0.35	567.40	569.20	21.6	12.0
CC2E S-4-Q6	CC2E S-4	OU4	4/15/16 14:30	2479393.40	242361.14	5/6/16 9:09	2479393.20	242361.08	0.21	568.02	569.62	19.2	12.0
CC2E S-4-Q7	CC2E S-4	OU4	4/15/16 13:31	2479211.79	242213.63	5/6/16 8:48	2479211.98	242213.65	0.19	567.86	569.69	22.0	12.0
CC2E S-4-Q8	CC2E S-4	OU4	4/15/16 13:16	2479108.44	242176.32	5/6/16 8:38	2479108.67	242176.45	0.26	566.95	569.00	24.6	12.0
CC2E S-4-Q9	CC2E S-4	OU4	4/15/16 14:03	2479286.97	242321.80	5/6/16 8:51	2479286.70	242321.96	0.31	566.80	568.46	19.9	12.0
CC2E S-4-Q10	CC2E S-4	OU4	4/15/16 14:42	2479417.37	242466.58	5/6/16 9:05	2479417.63	242466.53	0.26	566.62	568.53	22.9	12.0
CC2E S-4-Q11	CC2E S-4	OU4	4/15/16 14:24	2479326.50	242394.79	5/6/16 8:59	2479326.94	242394.92	0.46	566.72	568.61	22.7	12.0
CC2E S-4-Q12	CC2E S-4	OU4	4/15/16 13:39	2479147.55	242251.88	5/6/16 8:43	2479147.39	242252.13	0.30	566.96	568.51	18.6	12.0
CC2E S-4-Q13	CC2E S-4	OU4	4/15/16 13:21	2479037.55	242211.82	5/10/16 8:39	2479037.11	242211.70	0.46	567.41	568.79	16.6	12.0
CC2E S-4-Q14	CC2E S-4	OU4	4/15/16 14:11	2479241.59	242372.39	5/10/16 8:51	2479241.05	242372.73	0.64	566.72	568.89	26.0	12.0
CC2E S-4-Q15	CC2E S-4	OU4	4/15/16 14:48	2479403.13	242501.61	5/10/16 8:57	2479402.89	242501.34	0.36	567.02	568.61	19.1	12.0
CC2E S-4-Q16	CC2E S-4	OU4	4/15/16 14:53	2479317.50	242477.02	5/13/16 9:26	2479317.26	242476.82	0.31	567.80	569.36	18.7	12.0
CC2E S-4-Q17	CC2E S-4	OU4	4/15/16 13:44	2479145.81	242339.86	5/10/16 8:45	2479145.78	242340.07	0.21	567.96	569.80	22.1	12.0
CC2E S-4-Q18	CC2E S-4	OU4	4/15/16 14:17	2479156.18	242394.21	6/6/16 13:47	2479156.47	242393.73	0.56	568.24	569.21	11.6	12.0
CC2E S-4-Q19	CC2E S-4	OU4	4/15/16 14:58	2479337.33	242537.89	6/6/16 13:52	2479336.74	242537.63	0.64	567.98	569.02	12.5	12.0
CC2E S-4-Q20	CC2E S-4	OU4	4/15/16 13:25	2478982.05	242190.71	4/29/16 9:05	2478981.52	242190.40	0.61	568.31	570.00	20.3	12.0
CC2E S-4-Q21	CC2E S-4	OU4	4/15/16 12:46	2478929.90	242087.35	4/29/16 8:56	2478928.90	242087.53	1.02	568.48	570.37	22.7	12.0
CC2E S-4-Q22	CC2E S-4	OU4	4/15/16 12:50	2478980.71	242106.93	4/29/16 9:01	2478980.27	242106.93	0.44	567.37	569.08	20.5	12.0
CC2E S-4-Q23	CC2E S-4	OU4	4/15/16 12:33	2479002.48	242064.89	4/29/16 9:10	2479001.99	242064.60	0.57	566.96	568.95	23.9	12.0
CC2E S-4-Q24	CC2E S-4	OU4	4/15/16 12:55	2479061.04	242102.89	4/29/16 9:15	2479060.78	242102.75	0.30	567.55	569.35	21.6	12.0
CC2E S-4-Q25	CC2E S-4	OU4	4/15/16 13:00	2479055.26	242018.81	4/29/16 9:20	2479055.31	242018.76	0.07	568.37	570.26	22.7	12.0

1. All field data recorded in units of feet. Values presented have been converted from feet to inches

Average	20.5
Median	20.5
Standard Deviation	3.5
Minimum	11.6
Maximum	26.0

Recommended Path Forward:

Quarry spall was placed within OU4-CC2E-South-4. Thickness verification poling was conducted at 25 locations. 24 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches. Included with this table are the post-placement bathymetry and isopach maps prepared by Brennan. In addition, a mass balance sheet, which shows several volumetric tracking methods, has been included for all areas receiving quarry spall. Based on the information presented Feth recommends A/OT acceptance of this area.

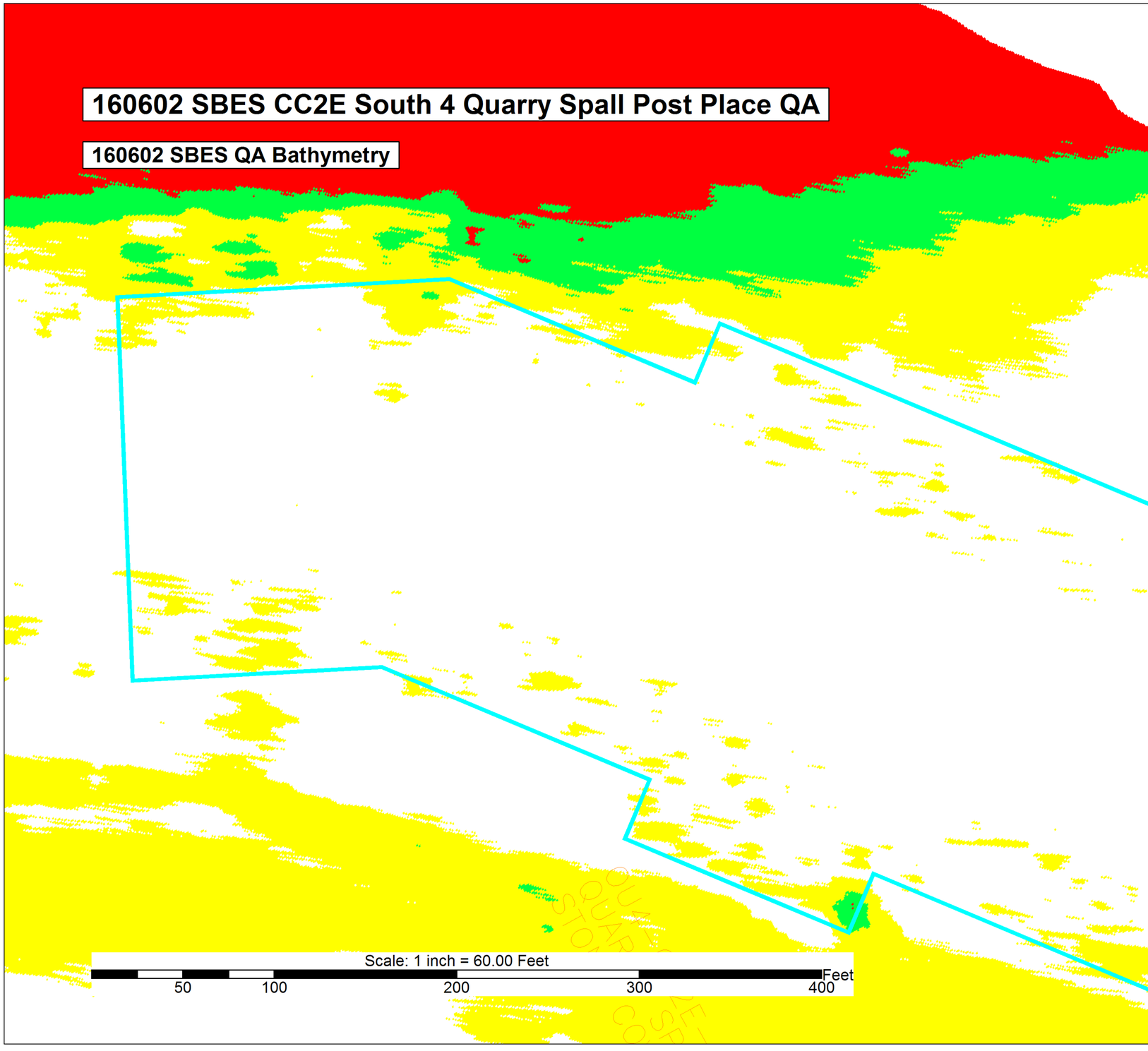
Prepared by: MCC2 Date: 6/6/2016

Reviewed by: SVF Date: 6/21/2016

A/OT Acceptance: Date: 6/22/16

160602 SBES CC2E South 4 Quarry Spall Post Place QA

160602 SBES QA Bathymetry



N

>= 571.60	
570.60	
569.60	
< 569.60	

Operational Unit 4

CC2E South 4

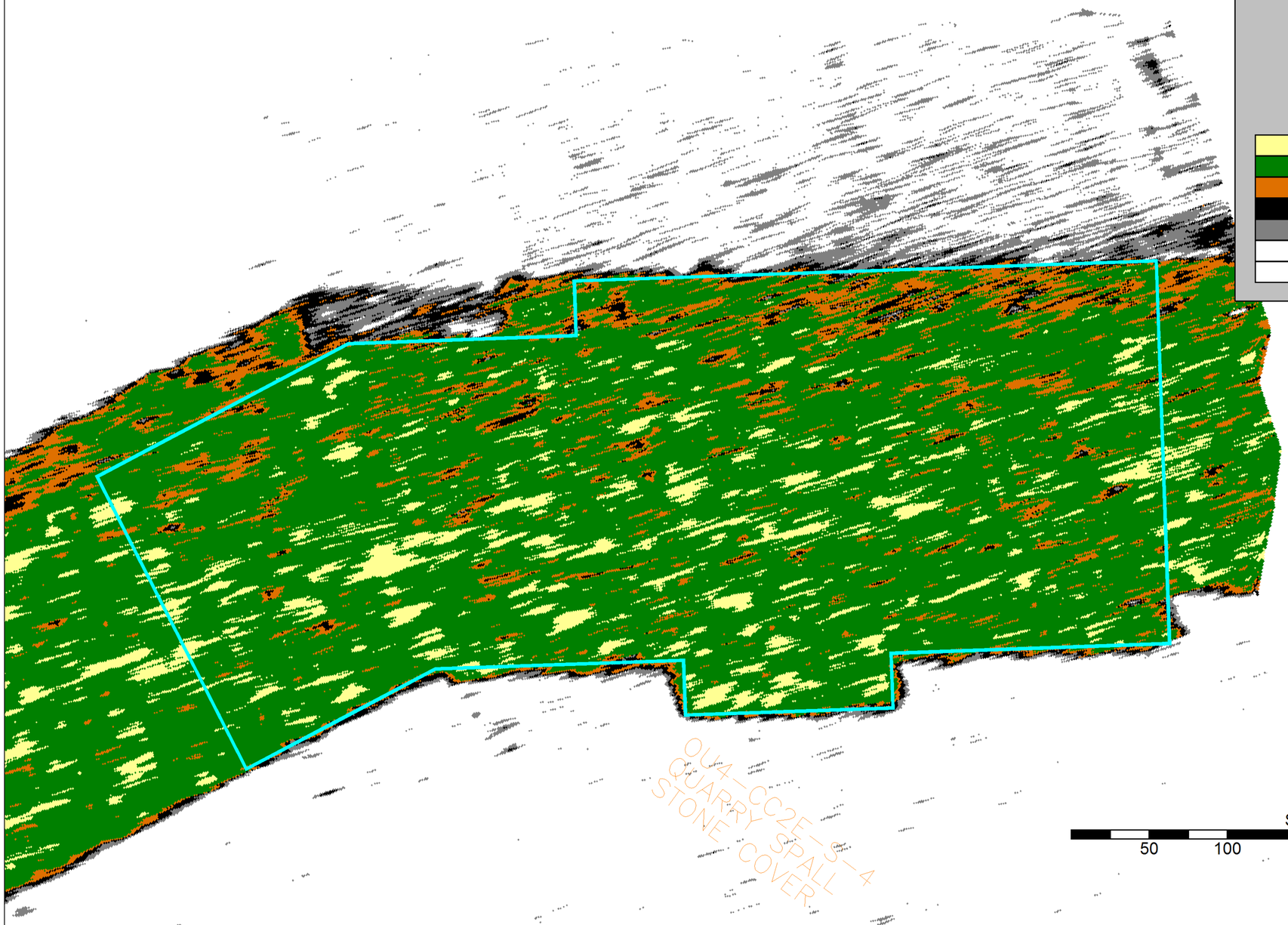
Cyan border indicates "South 4" area

BRENNAN

Date 6/10/16

Scale 1in= 60ft

160602 SBES CC2E South 4 Quarry Spall Post Placement QA



>= 1.76
1.00
0.76
0.51
0.30
0.00
< 0.00

N

Operational Unit
4

CC2E
South 4

Avg. Placement HT
16.44"
0-0.29= 1%
0.30-0.50= 1%
0.51-0.75= 2%
0.76-0.99= 8%
1-1.75= 79%
>1.76= 9%

Isopach Based on
2016 SBES
PreDredge Survey
VS
160602 SBES QA Survey

BRENNAN

Date
6/10/16

Scale
1in= 75ft

Scale: 1 inch = 75.00 Feet

50 100 200 300 400 Feet

OU4-CC2E-South-5										
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC2E S-5-C1	10/7/2014	9.5	0.0	9.5	6.0	242460.52	2479520.09	242462.60	2479523.78	
CC2E S-5-C2	10/8/2014	9.5	0.0	9.5	6.0	242503.65	2479518.13	242503.63	2479516.68	
CC2E S-5-C3	10/8/2014	8.0	0.0	8.0	6.0	242499.73	2479457.31	242497.10	2479461.57	
CC2E S-5-C4	10/8/2014	8.5	0.0	8.5	6.0	242552.66	2479468.10	242549.20	2479469.80	
CC2E S-5-C5	10/9/2014	7.5	0.0	7.5	6.0	242557.56	2479425.91	242561.60	2479428.46	
CC2E S-5-C6	10/9/2014	9.5	0.0	9.5	6.0	242608.53	2479427.87	242608.73	2479430.58	
CC2E S-5-C7	10/9/2014	9.0	0.0	9.0	6.0	242637.94	2479523.04	242638.19	2479529.64	
CC2E S-5-C8	10/9/2014	8.0	0.0	8.0	6.0	242642.84	2479580.92	242643.90	2479583.75	
CC2E S-5-C9	10/8/2014	7.5	0.0	7.5	6.0	242594.81	2479576.02	242588.78	2479575.76	
CC2E S-5-C10	10/8/2014	8.0	0.0	8.0	6.0	242587.95	2479628.99	242586.64	2479623.83	
CC2E S-5-C11	10/7/2014	8.0	0.0	8.0	6.0	242544.82	2479625.07	242546.18	2479627.15	
CC2E S-5-C12	10/7/2014	7.0	0.0	7.0	6.0	242668.33	2479776.16	242669.79	2479773.83	
CC2E S-5-C13	10/8/2014	8.0	0.0	8.0	6.0	242711.99	2479778.59	242712.89	2479781.20	
CC2E S-5-C14	10/8/2014	8.5	0.0	8.5	6.0	242742.82	2479763.40	242738.82	2479765.95	
CC2E S-5-C15	10/9/2014	8.5	0.0	8.5	6.0	242726.16	2479684.92	242724.47	2479685.50	
CC2E S-5-C16	10/9/2014	7.5	0.0	7.5	6.0	242774.19	2479687.86	242778.72	2479689.45	
CC2E S-5-C17	10/9/2014	7.5	0.0	7.5	6.0	242744.72	2479597.65	242744.39	2479599.95	
CC2E S-5-C18	10/9/2014	8.5	0.0	8.5	6.0	242944.75	2479845.81	242944.10	2479851.09	
CC2E S-5-C19	10/9/2014	9.0	0.0	9.0	6.0	242950.63	2479915.47	242952.78	2479917.11	
CC2E S-5-C20	10/9/2014	7.5	0.0	7.5	6.0	242903.58	2479905.66	242902.59	2479910.52	
CC2E S-5-C21	10/8/2014	8.0	0.0	8.0	6.0	242908.48	2479967.47	242906.40	2479967.02	
CC2E S-5-C22	10/8/2014	6.5	0.0	6.5	6.0	242841.83	2479943.92	242844.73	2479945.09	
CC2E S-5-C23	10/7/2014	8.0	0.0	8.0	6.0	242849.67	2480006.71	242847.11	2480004.58	
CC2E S-5-C24	10/9/2014	9.0	0.0	9.0	6.0	242867.42	2479797.85	242870.95	2479801.93	
CC2E S-5-C25	10/7/2014	9.5	0.0	9.5	6.0	242768.41	2479898.90	242769.33	2479896.89	

Average	8.24	0.00	8.24
Median	8.00	0.00	8.00
Standard Deviation	0.82	0.00	0.82

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-South-5. 25 of 25 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: HNK Date: 10/9/2014 Reviewed by: BSW Date: 10/9/2014

A/OT Acceptance: Date: 10/10/14

OU4-CC2E-South-5										
ID	Date Sampled	Stone Result (Inches)	Bucket Number	Cap Type	Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC2E S-5-G1	10/14/2014	5.5	107.0	C1	3.0	242468.12	2479529.58	242469.93	2479529.47	
CC2E S-5-G2	10/14/2014	5.0	220.0	C1	3.0	242574.45	2479659.43	242568.63	2479662.14	
CC2E S-5-G3	10/14/2014	5.5	72.0	C1	3.0	242712.00	2479835.18	242712.08	2479839.36	
CC2E S-5-G4	10/14/2014	5.0	216.0	C1	3.0	242855.39	2480011.90	242854.53	2480011.56	
CC2E S-5-G5	10/14/2014	7.0	110.0	C1	3.0	242837.84	2479936.72	242839.16	2479930.41	
CC2E S-5-G6	10/14/2014	5.0	3.0	C1	3.0	242704.19	2479769.76	242698.29	2479765.28	
CC2E S-5-G7	10/14/2014	5.5	122.0	C1	3.0	242634.93	2479679.94	242634.67	2479678.26	
CC2E S-5-G8	10/14/2014	6.0	522.0	C1	3.0	242473.00	2479482.71	242471.03	2479481.92	
CC2E S-5-G9	10/14/2014	5.0	2.0	C1	3.0	242524.70	2479491.50	242524.74	2479489.55	
CC2E S-5-G10	10/14/2014	7.0	70.0	C1	3.0	242615.42	2479599.88	242615.98	2479595.49	
CC2E S-5-G11	10/16/2014	6.0	214.0	C1	3.0	242808.57	2479847.87	242805.01	2479851.33	
CC2E S-5-G12	10/16/2014	5.0	69.0	C1	3.0	242914.13	2479968.93	242916.31	2479974.75	
CC2E S-5-G13	10/16/2014	5.0	200.0	C1	3.0	242896.98	2479898.84	242893.32	2479891.61	
CC2E S-5-G14	10/16/2014	6.0	614.0	C1	3.0	242789.27	2479761.94	242788.99	2479757.12	
CC2E S-5-G15	10/16/2014	4.0	101.0	C1	3.0	242682.94	2479629.16	242679.78	2479631.39	
CC2E S-5-G16	10/16/2014	5.0	128.0	C1	3.0	242570.40	2479492.39	242569.72	2479491.51	
CC2E S-5-G17	10/16/2014	3.5	1.0	C1	3.0	242554.79	2479415.25	242556.28	2479413.85	
CC2E S-5-G18	10/16/2014	5.0	219.0	C1	3.0	242728.67	2479634.01	242729.81	2479633.71	
CC2E S-5-G19	10/16/2014	5.0	10.0	C1	3.0	242826.84	2479754.05	242822.47	2479753.12	
CC2E S-5-G20	10/16/2014	4.5	221.0	C1	3.0	242935.48	2479893.72	242935.26	2479894.52	
CC2E S-5-G21	10/16/2014	6.5	206.0	C1	3.0	242987.18	2479897.62	242978.85	2479898.93	
CC2E S-5-G22	10/16/2014	5.0	616.0	C1	3.0	242897.43	2479786.32	242894.25	2479784.39	
CC2E S-5-G23	10/16/2014	4.5	209.0	C1	3.0	242785.11	2479647.64	242787.74	2479646.96	
CC2E S-5-G24	10/16/2014	5.5	100.0	C1	3.0	242634.89	2479457.25	242634.36	2479453.94	
CC2E S-5-G25	10/14/2014	5.0	21.0	C1	3.0	242728.62	2479745.35	242731.38	2479746.77	

Average	5.28
Median	5.00
Standard Deviation	0.82

Recommended Path Forward:

Verification samples were collected in 25 locations within OU4-CC2E-South-5. 25 of 25 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: MNM Date: 10/17/2014 Reviewed by: BSW Date: 10/17/2014

A/OT Acceptance: Date: 10/20/14

P.H. Glatfelter Company

Operable Unit 4

2016 Quarry Spall Thickness Verification Results - CC2E S-5

Location	Remedial Action Area	OU	Pre-Placement Collection Date	Pre-Placement Actual X (WSPC NAD83, ft)	Pre-Placement Actual Y (WSPC NAD83, ft)	Post-Placement Collection Date	Post-Placement Actual X (WSPC NAD83, ft)	Post-Placement Actual Y (WSPC NAD83, ft)	Pre- and Post-Placement Location Offset (ft)	Pre-Placement Average Bottom Elevation (ft msl)	Post-Placement Average Bottom Elevation (ft msl)	Average Measured Quarry Spall Thickness[1] (inches)	Required Quarry Spall Thickness (inches)
CC2E S-5-Q1	CC2E S-5	OU4	4/21/16 8:52	2479530.63	242468.79	5/13/16 9:41	2479530.98	242469.01	0.41	568.55	570.11	18.7	12.0
CC2E S-5-Q2	CC2E S-5	OU4	4/21/16 9:12	2479661.10	242573.35	5/13/16 9:51	2479660.62	242572.87	0.68	568.30	569.88	19.0	12.0
CC2E S-5-Q3	CC2E S-5	OU4	4/21/16 9:41	2479834.96	242713.11	5/13/16 9:59	2479834.79	242713.28	0.24	568.28	569.62	16.1	12.0
CC2E S-5-Q4	CC2E S-5	OU4	4/21/16 10:04	2480011.24	242854.67	5/17/16 13:32	2480010.61	242854.73	0.63	568.36	570.04	20.2	12.0
CC2E S-5-Q5	CC2E S-5	OU4	4/21/16 10:01	2479936.65	242839.07	5/17/16 13:27	2479936.35	242838.67	0.50	567.13	568.72	19.1	12.0
CC2E S-5-Q6	CC2E S-5	OU4	4/21/16 9:37	2479771.43	242705.15	5/13/16 9:55	2479771.47	242705.42	0.27	567.27	569.20	23.2	12.0
CC2E S-5-Q7	CC2E S-5	OU4	4/21/16 9:30	2479680.14	242633.25	5/13/16 9:48	2479680.02	242632.82	0.45	567.21	569.10	22.7	12.0
CC2E S-5-Q8	CC2E S-5	OU4	4/21/16 8:57	2479479.52	242473.14	5/13/16 9:33	2479479.47	242473.23	0.09	567.34	569.18	22.1	12.0
CC2E S-5-Q9	CC2E S-5	OU4	4/21/16 9:03	2479487.88	242525.06	5/13/16 9:30	2479487.33	242525.03	0.55	567.00	569.30	27.6	12.0
CC2E S-5-Q10	CC2E S-5	OU4	4/21/16 9:33	2479597.27	242612.83	5/13/16 9:44	2479597.47	242613.18	0.40	567.20	568.93	20.8	12.0
CC2E S-5-Q11	CC2E S-5	OU4	4/21/16 9:58	2479855.87	242818.24	5/20/16 9:42	2479855.48	242818.60	0.53	567.18	568.54	16.3	12.0
CC2E S-5-Q12	CC2E S-5	OU4	4/21/16 10:07	2479968.93	242914.20	5/13/16 13:37	2479969.28	242913.73	0.59	567.12	568.48	16.3	12.0
CC2E S-5-Q13	CC2E S-5	OU4	4/21/16 10:10	2479897.83	242896.79	5/20/16 10:01	2479898.34	242896.80	0.51	566.88	568.52	19.7	12.0
CC2E S-5-Q14	CC2E S-5	OU4	4/21/16 9:51	2479760.19	242789.72	5/20/16 9:47	2479760.00	242789.26	0.50	567.50	568.60	13.2	12.0
CC2E S-5-Q15	CC2E S-5	OU4	4/21/16 9:27	2479648.48	242698.08	5/17/16 13:21	2479647.96	242697.65	0.67	567.53	569.08	18.6	12.0
CC2E S-5-Q16	CC2E S-5	OU4	4/21/16 9:16	2479494.63	242572.96	5/17/16 13:15	2479494.92	242573.18	0.36	567.35	568.92	18.8	12.0
CC2E S-5-Q17	CC2E S-5	OU4	4/21/16 9:07	2479413.55	242554.94	5/17/16 12:50	2479413.27	242554.62	0.43	568.12	569.45	16.0	12.0
CC2E S-5-Q18	CC2E S-5	OU4	4/21/16 9:24	2479570.95	242680.98	5/20/16 9:56	2479570.50	242680.63	0.57	568.25	570.11	22.3	12.0
CC2E S-5-Q19	CC2E S-5	OU4	4/21/16 9:54	2479753.38	242827.27	5/20/16 9:51	2479752.98	242827.60	0.52	568.39	569.78	16.7	12.0
CC2E S-5-Q20	CC2E S-5	OU4	4/21/16 10:17	2479891.97	242936.40	5/20/16 10:05	2479891.97	242936.62	0.22	568.10	569.64	18.5	12.0
CC2E S-5-Q21	CC2E S-5	OU4	4/21/16 10:20	2479896.79	242986.48	6/6/16 14:10	2479896.48	242985.92	0.64	568.24	569.49	15.0	12.0
CC2E S-5-Q22	CC2E S-5	OU4	4/21/16 10:13	2479784.57	242896.97	6/6/16 14:06	2479785.49	242895.55	1.69	568.27	569.31	12.5	12.0
CC2E S-5-Q23	CC2E S-5	OU4	4/21/16 9:47	2479635.03	242778.29	6/6/16 14:01	2479634.47	242777.79	0.75	568.27	569.26	11.9	12.0
CC2E S-5-Q24	CC2E S-5	OU4	4/21/16 9:20	2479454.69	242634.58	6/6/16 13:55	2479455.08	242634.59	0.39	568.57	569.95	16.6	12.0
CC2E S-5-Q25	CC2E S-5	OU4	4/21/16 9:44	2479757.89	242741.13	5/17/16 13:44	2479758.29	242740.53	0.69	567.10	569.04	23.3	12.0

1. All field data recorded in units of feet. Values presented have been converted from feet to inches.

Average	18.6
Median	18.7
Standard Deviation	3.7
Minimum	11.9
Maximum	27.6

Recommended Path Forward:

Quarry spall was placed within OU4-CC2E-South-5. Thickness verification poling was conducted at 25 locations. 24 of 25 poled thicknesses meet or exceed the minimum thicknesses requirement of 12-inches. Included with this table are the post-placement bathymetry and isopach maps prepared by Brennan. In addition, a mass balance sheet, which shows several volumetric tracking methods, has been included for all areas receiving quarry spall. Based on the information presented Foth recommends A/OT acceptance of this area.

Prepared by: MCC2 Date: 6/6/2016

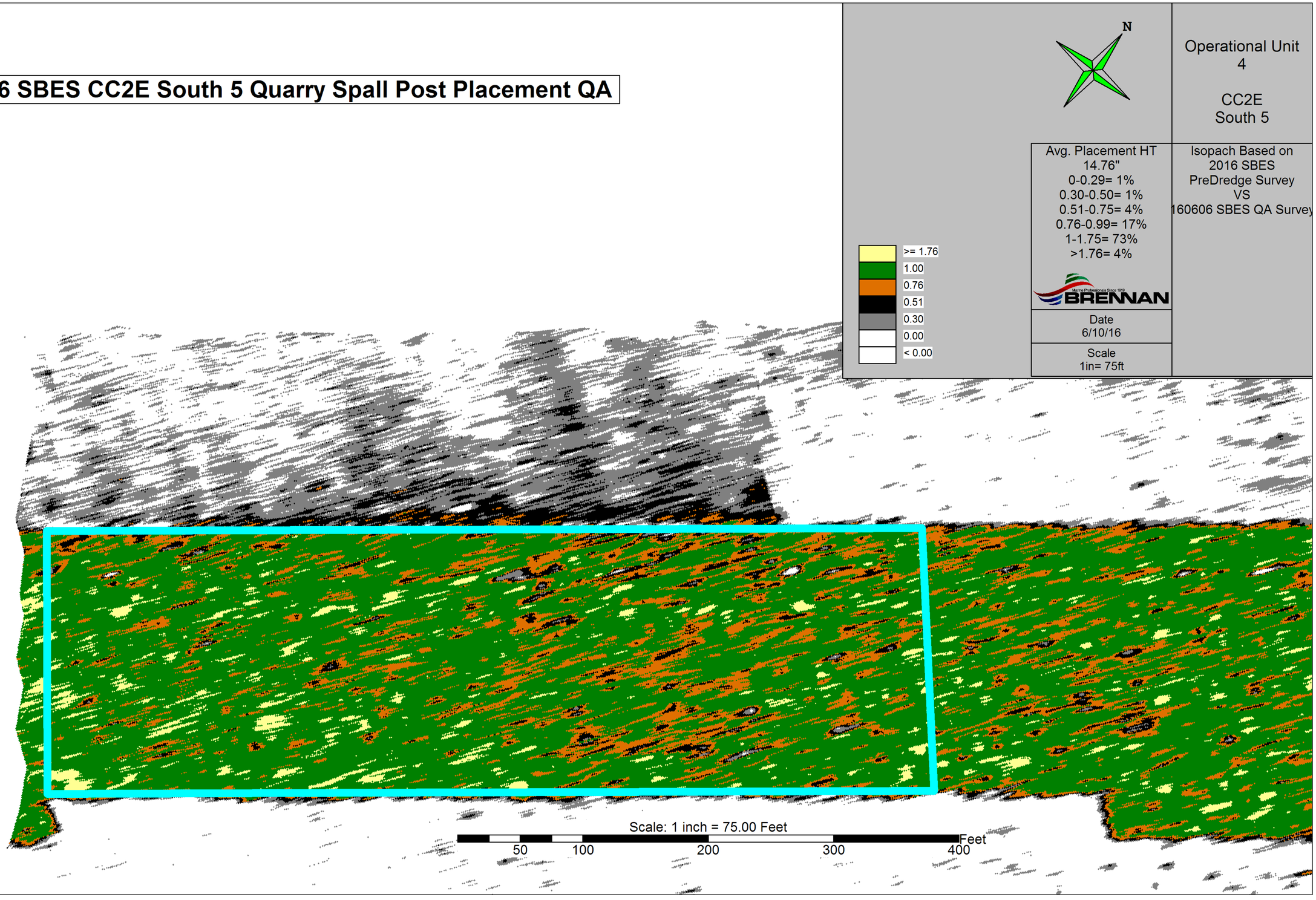
Reviewed by: SVF Date: 6/21/2016

A/OT Acceptance: Date: 6/22/16

160606 SBES CC2E South 5 Quarry Spall Post Placement QA

160606 SBES QA Bathymetry

160606 SBES CC2E South 5 Quarry Spall Post Placement QA



Operational Unit
4

CC2E
South 5

Avg. Placement HT
14.76"
0-0.29= 1%
0.30-0.50= 1%
0.51-0.75= 4%
0.76-0.99= 17%
1-1.75= 73%
>1.76= 4%

Isopach Based on
2016 SBES
PreDredge Survey
VS
160606 SBES QA Survey

BRENNAN

Date
6/10/16

Scale
1in= 75ft

OU4-CC14-1										
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC14-1-C1	6/13/2014	8.0	0.0	8.0	6.0	235237.11	2475344.67	235242.77	2475349.24	
CC14-1-C2	6/13/2014	13.0	0.0	13.0	6.0	235162.29	2475296.11	235159.63	2475291.66	
CC14-1-C3	6/12/2014	8.0	0.0	8.0	6.0	235110.63	2475263.59	235111.62	2475265.21	
CC14-1-C4	6/12/2014	9.0	0.0	9.0	6.0	235137.35	2475308.14	235138.20	2475310.83	
CC14-1-C5	6/10/2014	7.5	0.0	7.5	6.0	235150.71	2475378.97	235147.55	2475380.20	
CC14-1-C6	6/10/2014	6.0	0.0	6.0	6.0	235102.17	2475381.20	235101.50	2475380.25	
CC14-1-C7	6/10/2014	6.0	0.0	6.0	6.0	235051.40	2475352.24	235056.06	2475355.26	
CC14-1-C8	6/10/2014	9.5	0.0	9.5	6.0	235090.14	2475350.46	235087.34	2475355.44	
CC14-1-C9	6/12/2014	11.0	0.0	11.0	6.0	235084.80	2475290.76	235088.33	2475293.17	
CC14-1-C10	6/10/2014	9.0	0.0	9.0	6.0	235061.64	2475325.96	235059.79	2475330.57	
CC14-1-C11	6/12/2014	10.5	0.0	10.5	6.0	235059.42	2475278.73	235063.11	2475280.36	
CC14-1-C12	6/13/2014	11.0	0.0	11.0	6.0	235028.69	2475323.28	235026.71	2475328.51	
CC14-1-C13	6/13/2014	9.0	0.0	9.0	6.0	234989.05	2475313.48	234988.73	2475310.75	
CC14-1-C14	6/13/2014	11.0	0.0	11.0	6.0	235030.02	2475288.54	235028.32	2475289.14	
CC14-1-C15	6/12/2014	7.5	0.0	7.5	6.0	235024.68	2475253.34	235027.44	2475254.08	
CC14-1-C16	6/13/2014	8.0	0.0	8.0	6.0	235210.39	2475333.08	235209.54	2475331.29	
CC14-1-C17	6/10/2014	9.5	0.0	9.5	6.0	235120.87	2475382.98	235121.61	2475382.46	
CC14-1-C18	6/13/2014	13.5	0.0	13.5	6.0	235169.42	2475323.28	235166.86	2475323.98	

Average	9.28	0.00	9.28
Median	9.00	0.00	9.00
Standard Deviation	2.10	0.00	2.10

Recommended Path Forward:

Verification samples were collected in 18 locations within OU4-CC14-1. 18 of 18 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further is action required.

Prepared by: MNM Date: 6/16/2014 Reviewed by: BSW Date: 6/17/2014

A/OT Acceptance: Date: 6-17-14

OU4-CC14-1									
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Proposed Coordinates		Survey Coordinates		Comments
					Northing	Easting	Northing	Easting	
CC14-1-G1	8/20/2014	12.0	C1	3.0	235034.47	2475289.39	235031.82	2475290.50	
CC14-1-G2	8/20/2014	7.5	C1	3.0	235053.04	2475358.39	235053.59	2475364.37	
CC14-1-G3	8/20/2014	5.0	C1	3.0	235045.48	2475264.37	235050.03	2475269.69	
CC14-1-G4	8/21/2014	6.0	C1	3.0	235129.72	2475364.88	235137.81	2475367.87	
CC14-1-G5	8/21/2014	7.0	C1	3.0	235152.94	2475337.86	235156.49	2475340.83	
CC14-1-G6	8/22/2014	7.0	C1	3.0	235209.44	2475332.71	235210.14	2475333.06	
CC14-1-G7	8/21/2014	7.0	C1	3.0	235137.74	2475282.57	235136.67	2475282.47	

Average	7.36
Median	7.00
Standard Deviation	2.21

Recommended Path Forward:

Verification samples were collected in 7 locations within OU4-CC14-1. 7 of 7 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Prepared by: HNK Date: 8/25/2014 Reviewed by: BSW Date: 8/25/2014

A/OT Acceptance: Date: 8/27/14

Quarry Spall Placement Thickness Verification and Approval Form

OU4-CC14-1 (Survey Comparisons)				
Area (acres)	Surveyed Volume Placed (cubic yards)	Calculated Thickness (inches)	Bathymetric Survey Thickness (inches)	Required Thickness (inches)
0.62	1,677	16.98	13.93	12

OU4-CC14-1									
ID	Date Sampled	Quarry Thickness (inches)	Average Thickness (inches)	Required Thickness (inches)	Pre-Placement Coordinates		Survey Coordinates		Comments
					Northing	Easting	Northing	Easting	
CC14-1-Q1	11/2/2015		14.9	12.0	235015.97	2475330.63	235016.80	2475330.46	
CC14-1-Q2	11/2/2015		19.4	12.0	235098.94	2475383.92	235100.29	2475383.71	
CC14-1-Q3	11/2/2015		18.5	12.0	235012.77	2475282.90	235013.45	2475281.30	
CC14-1-Q4	11/2/2015		15.1	12.0	235091.81	2475340.50	235092.97	2475339.73	
CC14-1-Q5	11/2/2015		15.9	12.0	235151.68	2475377.04	235151.90	2475377.07	
CC14-1-Q6	11/2/2015		20.1	12.0	235147.38	2475331.87	235148.66	2475333.07	
CC14-1-Q7	11/2/2015		13.7	12.0	235084.17	2475291.16	235084.02	2475289.85	
CC14-1-Q8	11/2/2015		19.9	12.0	235034.52	2475258.70	235034.56	2475258.43	
CC14-1-Q9	11/2/2015		15.6	12.0	235122.23	2475273.94	235121.34	2475274.27	
CC14-1-Q10	11/2/2015		17.3	12.0	235178.66	2475313.53	235178.03	2475314.29	
CC14-1-Q11	11/2/2015		17.5	12.0	235226.49	2475345.37	235226.80	2475346.38	

Average	17.07
Median	17.26
Standard Deviation	2.21

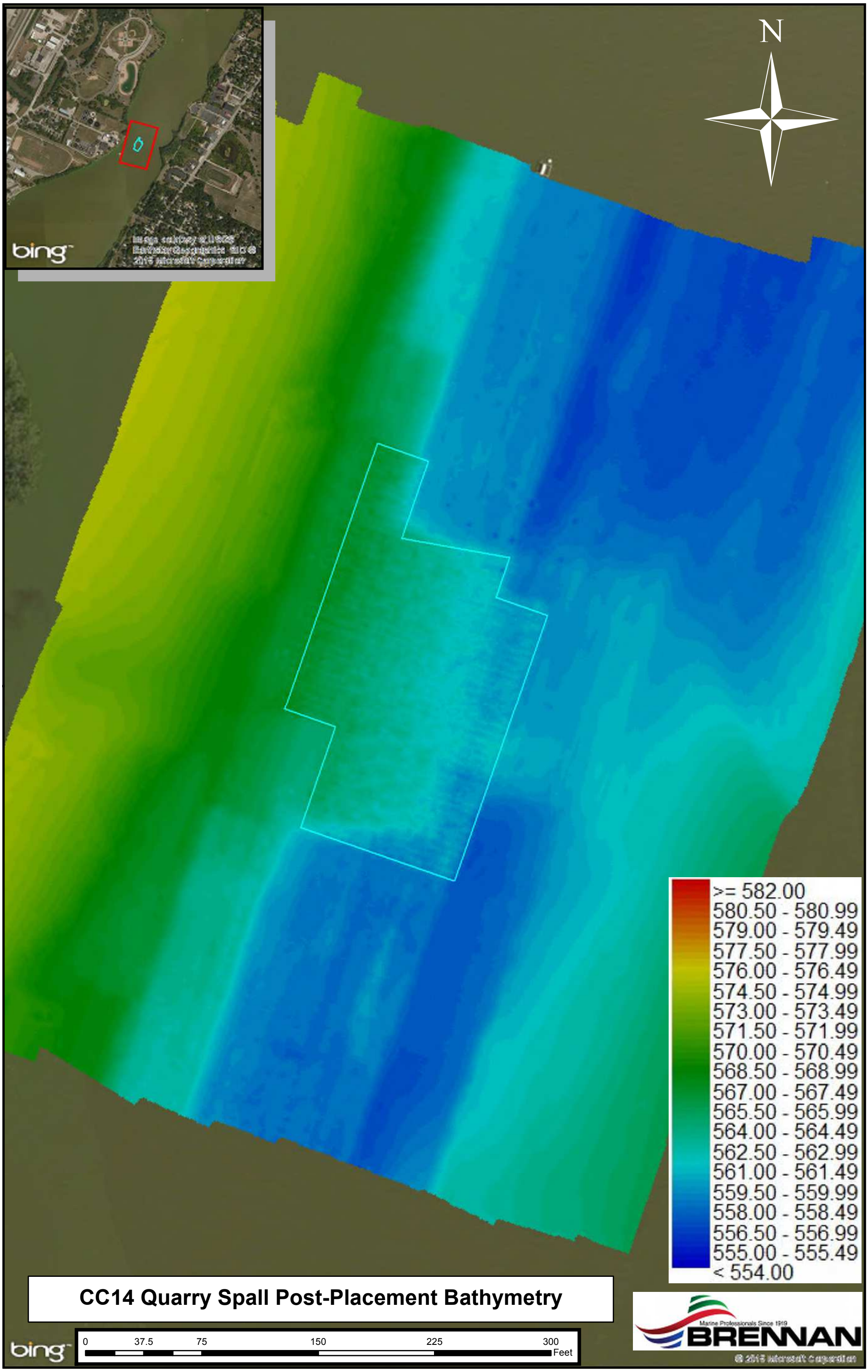
Recommended Path Forward:

Quarry spall was placed within OU4-CC14-1. Thickness verification poling was conducted in 11 locations. 11 of 11 samples meet or exceed the minimum thickness requirement of 12-inches, therefore, no further action is required.

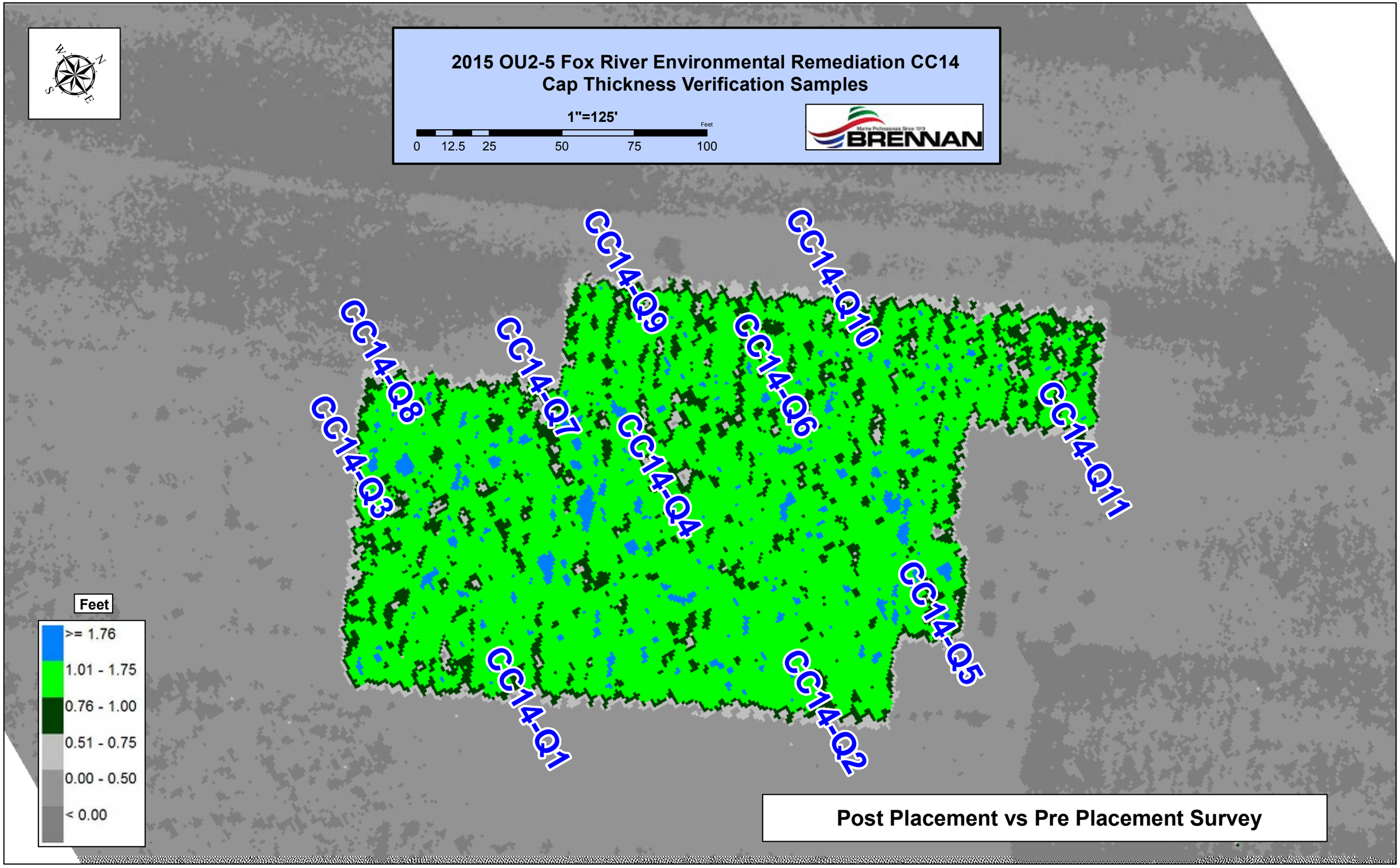
Prepared by: HNK Date: 11/5/2015

Reviewed by: BSW Date: 11/5/2015

A/OT Acceptance: Jenny Beaken Date: 4/19/16



CC14 Quarry Spall Post-Placement Bathymetry


2015 OU2-5 Fox River Environmental Remediation CC14
Cap Thickness Verification Samples
1"=125'
Feet
0 12.5 25 50 75 100
BRENNAN
CC14-Q1
CC14-Q2
CC14-Q3
CC14-Q4
CC14-Q5
CC14-Q6
CC14-Q7
CC14-Q8
CC14-Q9
CC14-Q10
CC14-Q11
Feet
>= 1.76
1.01 - 1.75
0.76 - 1.00
0.51 - 0.75
0.00 - 0.50
< 0.00
Post Placement vs Pre Placement Survey

OU4-CC17-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CC17-1-C1	10/10/2016	10.5	0.0	10.5	6.0	561.55	245596.49	2483009.28	245600.41	2483011.20	
CC17-1-C2	10/10/2016	8.0	0.0	8.0	6.0	561.25	245666.43	2483066.05	245669.90	2483063.66	
CC17-1-C3	10/27/2016	9.5	0.0	9.5	6.0	561.31	245740.03	2483128.22	245738.32	2483131.02	
CC17-1-C4	10/27/2016	9.0	0.0	9.0	6.0	555.31	245803.61	2483179.41	245809.68	2483179.00	
CC17-1-C5	10/27/2016	6.5	0.0	6.5	6.0	560.88	245799.49	2483133.18	245801.31	2483126.19	
CC17-1-C6	10/10/2016	6.5	0.0	6.5	6.0	561.20	245717.41	2483061.63	245720.89	2483066.05	
CC17-1-C7	10/10/2016	8.0	0.0	8.0	6.0	560.98	245647.24	2483004.61	245653.41	2482999.87	
CC17-1-C8	10/10/2016	6.0	0.0	6.0	6.0	561.40	245638.05	2482951.94	245642.98	2482948.83	
CC17-1-C9	10/10/2016	7.5	0.0	7.5	6.0	560.44	245705.74	2483005.90	245712.71	2483002.68	
CC17-1-C10	10/27/2016	11.5	0.0	11.5	6.0	560.79	245795.70	2483081.87	245796.67	2483080.90	
CC17-1-C11	10/27/2016	10.5	0.0	10.5	6.0	555.44	245852.12	2483129.87	245852.65	2483133.26	

Average	8.50	0.00	8.50
Median	8.00	0.00	8.00
Standard Deviation	1.84	0.00	1.84

Recommended Path Forward:

Verification samples were collected in 11 locations within OU4-CC17-1. 11 of 11 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required.

Prepared by: HMK Date: 10/28/2016 Reviewed by: BSW Date: 10/28/2016

A/OT Acceptance: Date: 10/31/16

OU4-CC17-1										
ID	Date Sampled	Stone Result (Inches)	Cap Type	Required Thickness (Inches)	Mudline	Proposed Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC17-1-G1	10/31/2016	4.0	C1	3.0	561.6	245598.77	2483009.91	245604.94	2483013.49	
CC17-1-G2	10/31/2016	4.5	C1	3.0	561.7	245647.98	2483051.24	245650.90	2483051.87	
CC17-1-G3	10/31/2016	5.0	C1	3.0	561.4	245704.21	2483098.29	245710.93	2483101.87	
CC17-1-G4	10/31/2016	5.5	C(M1)	3.0	559.1	245795.15	2483173.92	245799.57	2483177.29	
CC17-1-G5	10/31/2016	5.0	C1	3.0	561.7	245790.03	2483124.19	245794.24	2483129.63	
CC17-1-G6	10/31/2016	6.0	C1	3.0	561.4	245712.56	2483059.60	245713.94	2483061.24	
CC17-1-G7	10/31/2016	8.5	C1	3.0	560.8	245647.54	2483009.47	245646.94	2483015.77	
CC17-1-G8	10/31/2016	6.0	C1	3.0	562.1	245639.63	2482950.55	245642.23	2482952.44	
CC17-1-G9	10/31/2016	5.5	C1	3.0	561.3	245709.48	2483009.47	245708.56	2483014.07	
CC17-1-G10	10/31/2016	6.0	C1	3.0	560.9	245765.72	2483056.96	245768.76	2483064.50	
CC17-1-G11	10/31/2016	6.0	C(M1)	3.0	553.1	245849.72	2483128.20	245851.76	2483133.80	

Average	5.64
Median	5.50
Standard Deviation	1.16

Recommended Path Forward:

Verification samples were collected in 11 locations within OU4-CC17-1. 11 of 11 samples meet or exceed the minimum thickness requirement of 3-inches, therefore, no further action is required.

Note: M1 Cap Type is a modification of quarry spall from 6-inch to 8-inch stone size.

Prepared by: HNK Date: 11/1/2016 Reviewed by: BSW Date: 11/1/2016

A/OT Acceptance: Date: 11/2/16

Quarry Spall Placement Thickness Verification and Approval Form

OU4-CC17-1 (Bathymetric Survey)		
Area (acres)	Bathymetric Survey Thickness (inches)	Required Thickness (inches)
0.75	22.08	16.0

OU4-CC17-1 (D50=8")										
ID	Date Sampled	Quarry Thickness (inches)	Average Thickness (inches)	Required Thickness (inches)	Mudline	Pre-Placement Coordinates		Survey Coordinates		Comments
						Northing	Easting	Northing	Easting	
CC17-1-Q1-1	6/1/2017		22.9	16.0	563.8	245602.99	2483007.49	245601.44	2483007.88	
CC17-1-Q1-2	6/1/2017		25.3	16.0	563.7	245671.89	2483069.26	245674.59	2483067.82	
CC17-1-Q1-3	6/1/2017		28.5	16.0	564.1	245737.67	2483125.09	245737.65	2483127.21	
CC17-1-Q1-4	6/1/2017		24.1	16.0	561.1	245804.80	2483177.02	245807.54	2483176.60	
CC17-1-Q1-5	6/1/2017		24.2	16.0	563.2	245805.05	2483140.34	245806.29	2483140.45	
CC17-1-Q1-6	6/1/2017		23.0	16.0	563.6	245748.17	2483092.87	245748.64	2483092.47	
CC17-1-Q1-7	6/1/2017		23.4	16.0	563.3	245648.98	2483005.16	245650.21	2483004.54	
CC17-1-Q1-8	6/1/2017		22.5	16.0	563.8	245640.78	2482952.61	245639.18	2482954.53	
CC17-1-Q1-9	6/1/2017		24.7	16.0	563.8	245715.57	2483024.26	245717.15	2483022.00	
CC17-1-Q1-10	6/1/2017		23.1	16.0	563.0	245800.10	2483086.84	245800.16	2483084.25	
CC17-1-Q1-11A	6/1/2017	4.1		16.0	554.0	245860.37	2483132.83	245864.15	2483135.66	
CC17-1-Q1-11B	6/1/2017	-0.7		16.0						
CC17-1-Q1-11C	6/1/2017	0.5	6.3	16.0						
CC17-1-Q1-11D	6/1/2017	19.7		16.0						
CC17-1-Q1-11E	6/1/2017	7.7		16.0						

Average	22.56
Median	23.45
Standard Deviation	5.64

Recommended Path Forward:

Quarry spall (D50=8") was placed and surveyed within OU4-CC17-1. The quarry spall thicknesses based on bathymetric survey meet or exceed the minimum thickness requirement of 16-inches. Furthermore, thickness verification poling was conducted in 11 locations. 10 of 11 samples meet or exceed the minimum thickness requirement of 16-inches, therefore, no further action is required.

Prepared by: HNK Date: 6/14/2017

Reviewed by: BSW Date: 6/14/2017

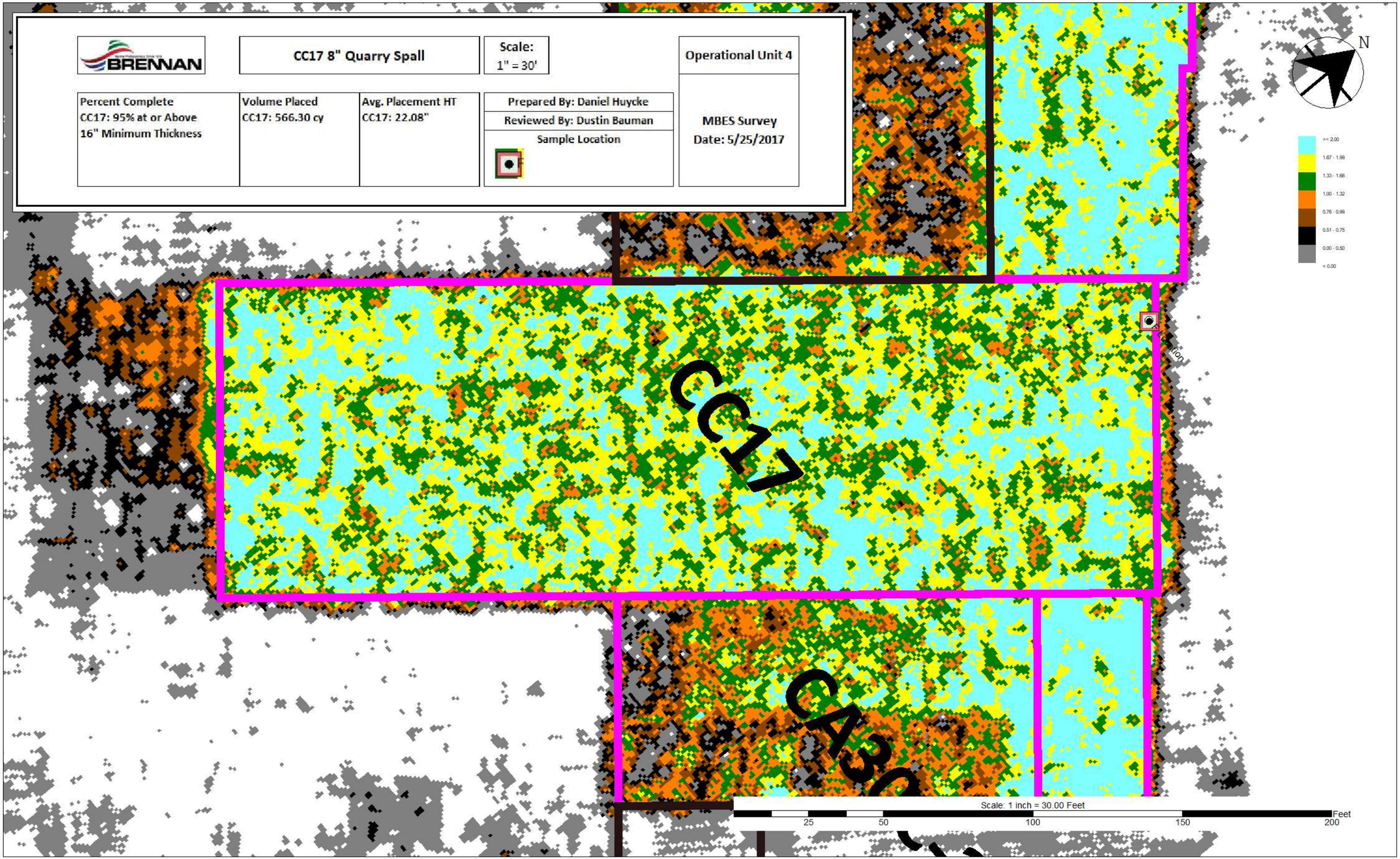
A/OT Acceptance: Date: 6/15/17

BRENNAN

CC17 8" Quarry Spall	Scale: 1" = 30'	Operational Unit 4

Percent Complete	Volume Placed	Avg. Placement HT	Prepared By: Daniel Huycke
CC17: 95% at or Above	CC17: 566.30 cy	CC17: 22.08"	Reviewed By: Dustin Bauman
16" Minimum Thickness			Sample Location

MBES Survey
Date: 5/25/2017



Van Hoof, Tara M

From: George Berken <George.Berken@boldt.com>
Sent: Monday, April 18, 2016 8:52 AM
To: Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Kaminski, Roger; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Roznowski, Denis M; ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Stewart, Lynna; Van Hoof, Tara M; Blackmar, Terri; Gawronski, Troy A; dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc: AgenciesLFRTeam; LFR.OverSightTeam
Subject: 87500 OU2-5 - FW: Request for Acceptance of Areas Receiving Quarry Spall Placement in 2015
Attachments: LFRR-16-0114 Quarry Spall Verification

Bill H., on behalf of the Agencies and on exceptional bases, the thickness of the quarry spall placed in; CC14, three CMUs in CC2E-S (1 – 3), a small area along the GP shoreline (CCD35US), CC14, CC2E-S-1, CC2E-S-2, CCD35US and a portion of CC2E-S-3 that were completed in 2015 are acceptable. These exceptions are based on your email submitted below that documents the thicknesses for these areas along with Glatfelter's commitment (from your email below) to implement the following:

"*…as we discussed, in an effort to minimize or eliminate the possibility of this type of occurrence this year, we have requested that Brennan provide, on a daily basis, a survey of the area that had just received the spall. This will allow an evaluation of the placement on a daily basis and "real time" corrective efforts. In addition, we have directed Brennan to begin this season using an increased amount of material per placement event.*"

Thanks,
George…

George A. Berken | Engineering Project Manager
P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

boldt.com

SafeThinking: Our Crusade to Eliminate Accidents

From: Hartman, William A. [mailto:William.Hartman@glatfelter.com]
Sent: Thursday, April 14, 2016 4:11 PM
To: George Berken ; Gary Kincaid (gary.kincaid@wisconsin.gov) ; Larry DeBruin ; Jay Grosskopf
Cc: Gawronski, Troy A ; Jeffrey Lawson ; Paul LaRosa ; Heath, Bryan ; PAMontne@GaPac.com;

Roger.Kaminski@GaPac.com; Coleman, Bill ; Blackmar, Terri ; AgenciesLFRTeam ; LFR.OverSightTeam ; Dustin Bauman ; Weston, Brandon
Subject: Request for Acceptance of Areas Receiving Quarry Spall Placement in 2015

Gents,

During the 2015 remedial season JF Brennan placed quarry spall for Glatfelter in several locations. The locations included CC14, three CMUs in CC2E-S (1 – 3) and a small area along the GP shoreline (CCD35US). CC14, CC2E-S-1, CC2E-S-2 and CCD35US were completed, but only a portion of CC2E-S-3 received quarry spall. CC2E-S-3 is planned to be completed this season, along with the remainder of the CMUs in CC2E-S and CC2E-N.

The results of the quarry spall placement performed in 2015 were presented to the A/OT on March 2, 2016 (see attached email) and we have discussed these results several times. During the 2015 season, there were numerous methods used to determine the thickness of the quarry spall that was placed. These methods included poling, bathymetric survey, and a volumetric determination using both surveys of the amount of quarry spall placed upon the placement barge and values obtained from the load cell of the excavator used by Brennan for placement.

As has been noted, the minimum thickness of 12" was met at all sample locations in CC14, by all methods used to determine thickness. This was not the case in either CC2E-S-1 or CC2E-S-2, where quarry spall was determined to be present at each individual sample location but the 12" minimum was not met at each, via the poling method. Post placement bathymetric surveys supported the poling determinations. However, based upon each of the methods used, the overall average thickness for each specific area was determined to meet the 12" minimum value. These results indicate that the quarry spall, as placed, fulfill the requirement to serve as a marker layer for potential future dredging. Also, the area where the spall was placed in 2015, and is to be placed in 2016, is in the caretaker portion of the river, so that it will not be exposed to potential disturbances caused by large ships. On an exception basis, Glatfelter requests that these areas be determined to be complete.
Please be aware, as we discussed, in an effort to minimize or eliminate the possibility of this type of occurrence this year, we have requested that Brennan provide, on a daily basis, a survey of the area that had just received the spall. This will allow an evaluation of the placement on a daily basis and "real time" corrective efforts. In addition, we have directed Brennan to begin this season using an increased amount of material per placement event. Finally, as you are aware, we have recently switched quarry spall suppliers and believe that this new material may "lay" more evenly due to the decreased presence of elongated pieces, which was observed in the spall used previously.

Please feel free to stop by to discuss if you have any questions or concerns. Thanks,

Bill Hartman
Project Manager
Glatfelter & GW Partners, LLC
920-209-2016 (Cell)
920-445-0746 (Office)

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Quarry Spall Mass Balance by Area

Report Generated on:
Thursday, December 03, 2015

Project Code: 185015

Client: Glatfelter

Project: Lower Fox River

2015 Quarry Spall Placement Totals														
Area	Date			Hours		Volume Placed (CY)				Realized	Average Placement Height (in)			
Covered	Start	Complete	Days Worked	NOH	GOH	Barge Survey	Load Cell	MBES	Design	Square Footage	Barge Survey	Load Cell	MBES	Design
CC14	10/27/2015	10/29/2015	3	22.25	36.00	1,677	1,893	1,375	1,185	31,997	16.98	19.17	13.93	12.00
CC2ES-1	10/5/2015	11/5/2015	28	81.00	120.50	6,931	7,518	6,013	5,006	135,172	16.61	18.02	14.41	12.00
CC2ES-2	10/9/2015	10/23/2015	13	65.50	126.00	7,260	8,365	6,378	5,291	142,849	16.47	18.97	14.47	12.00
CC2ES-3	10/23/2015	10/26/2015	3	21.00	36.00	2,304	2,385	1,833	1,620	43,740	17.07	17.66	13.57	12.00
CCD35US	11/16/2015	11/16/2015	01	04.25	06.00	362	362	241	257	6,943	16.90	16.90	11.22	12.00
Totals			**48**	**194.00**	**324.50**	**18,534**	**20,523**	**15,839**	**13,359**	**360,701**	**16.65**	**18.43**	**14.23**	**12.00**

*Design volume is based on the realized area at a thickness of the 12" minimum
** The unit weight for material varies based on AET's weekly analysis
*** MBES volume data is based on the design area, not the actual area covered.

Pile: Volume calculated using both the tons in and the weekly rock stockpile survey
Load Cell: Volume calculated using the bucket load cell data with the unit weight from AET's weekly analysis.

	Volume (CY)/Gross Hour			
Area	**Barge Survey**	**Load Cell**	**MBES**	**Design**
CC14	47	53	38	33
CC2ES-1	58	62	50	42
CC2ES-2	58	66	51	42
CC2ES-3	64	66	51	45
CCD35US	60	60	40	43
Totals	**57**	**63**	**49**	**41**

	Volume (CY)/Net Hour			
Area	**Barge Survey**	**Load Cell**	**MBES**	**Design**
CC14	75	85	62	53
CC2ES-1	86	93	74	62
CC2ES-2	111	128	97	81
CC2ES-3	110	114	87	77
CCD35US	85	85	57	61
Totals	**96**	**106**	**82**	**69**

Van Hoof, Tara M

From: Feeney, Richard <Richard.Feeney@tetratech.com>
Sent: Friday, September 09, 2016 1:04 PM
To: Jeffrey Lawson
Cc: Susan O'Connell; Bryan Heath (Bryan.Heath@ncr.com); Gawronski, Troy A; PAMontne@GaPac.Com; Kaminski, Roger; Coleman, Bill; Willant, George; Dustin Bauman (dbauman@JFBRENNAN.COM); Lysne, Bjorn; Blackmar, Terri; Weston, Brandon
Subject: Volumetric Placement of Caps and Covers
Attachments: 87500 OU2-5 - FW: spreader barge settings for sand and rock placement in D35U South; FW: 87500 OU2-5 - FW: LFRR 16-0017 Request for A/OT acceptance of Temporary Sand layout to be installed over hot spots at D35U North

Hi Jeff,

Troy told me you were looking for documentation concerning the A/OT's acceptance of volumetric caps or covers. One of the key aspects is that no layer thickness verification measurements are performed after installation.

To the best of my knowledge there is no formal SOP on this issue. It is mentioned in the 2015 RA Summary Report with a very brief explanation for where a volumetric cap was installed at D35U South last year.

Documentation of the A/OT's acceptance of this practice is in the form of the two attached emails. The first concerns use of the spreader, the second for mechanical placement applications.

Please let us know if you have any questions or need anything else on this subject.

Richard J. Feeney, P.E. | Vice President, Project Engineering National Environmental Engineering Discipline Lead
Direct: 973.630.8092 | Fax: 973.630.8025 | Cell: 201.650.1006 Fox River Green Bay, WI Project Office | Direct: 920.445.0732 | Fax: 920.445.0719 Richard.Feeney@tetratech.com

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Van Hoof, Tara M

From: George Berken <George.Berken@boldt.com>
Sent: Monday, November 09, 2015 4:08 PM
To: Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Kaminski, Roger; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Roznowski, Denis M; ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Van Hoof, Tara M; Blackmar, Terri; Gawronski, Troy A; dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; polander@JFBRENNAN.COM; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc: AgenciesLFRTeam; LFR.OverSightTeam
Subject: 87500 OU2-5 - FW: spreader barge settings for sand and rock placement in D35U South
Attachments: image001.gif; image002.gif; image003.gif; image004.gif; image005.gif; Volumetric Sand Placement; Volumetric Stone Placement

Bill, on behalf of the Agencies, the approach outlined in your and Dustin's emails below are acceptable.

Thanks,
George...

George A. Berken | Engineering Project Manager
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From: Coleman, Bill [mailto:Bill.Coleman@tetratech.com]
Sent: Monday, November 09, 2015 3:10 PM
To: Kincaid, Gary W - DNR (Gary.Kincaid@Wisconsin.gov)
Cc: Larry DeBruin; Jay Grosskopf; George Berken; Ava Grosskopf; Jeffrey Lawson; Susan O'Connell; Heath, Bryan; Troy Gawronski (troy.gawronski@foth.com); ECI.LFRR Project Correspondence; Dustin Bauman (dbauman@JFBRENNAN.COM); Willant, George; Lysne, Bjorn; Weston, Brandon; Feeney, Richard; Blackmar, Terri; Gifford, Ricky
Subject: spreader barge settings for sand and rock placement in D35U South

Hi Gary,

Dustin, Troy and I met with you last Wednesday afternoon to discuss the manual input information that JFB enters into the spreader barge computer.
The most critical input is the estimated spread height.
Dustin provided a spreadsheet that showed all of the recorded settings entered this year for LLC areas that required a minimum sand cover of 6.0 inches and compared it to TTECI's Average QC thicknesses for the same areas.
The result showed JFB had an average input setting of 9 inches which correlated to an average placement thickness of 7.5 inches.
Dustin did not bring the information for the rock spreading to the meeting.

The attachments are the recommended settings JFB would like to use on their spreader for Cap sand and rock in D35U South.

Please advise if the settings shown in the attachments are acceptable to the A/OT for use in D35U South.

Thank you,

Bill

Bill Coleman | Project Manager
Direct: 920.445.0721 | Main: 920.445.0720 Ext: 101 | Fax: 920.445.0719 | Cell: 720.291.1577
bill.coleman@tetratech.com <mailto:bill.coleman@tetratech.com>

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Van Hoof, Tara M

From: Dustin Bauman <dbauman@JFBRENNAN.COM>
Sent: Thursday, November 05, 2015 9:10 AM
To: Coleman, Bill; Willant, George
Cc: Travis Tipler; Feeney, Richard; Greg Smith
Subject: Volumetric Sand Placement
Attachments: image001.png

Bill,

As discussed with the A/OT yesterday Brennan was going to determine the average spread height used for LLC 6" areas. Over areas CB28A, CB46, CB47, CB54, CBD148, CC2E-1-4 and 6 the average spread height was 9.02 inches. This spread height resulted in an average QA sand verification of 7.57 inches. I would propose for D35U South we enter in 9.00 inches on the spreader. Please let me know if this is acceptable.

Thanks,

Dustin Bauman

cell 608.406.1813

<mailto:dbauman@jfbrennan.com> dbauman@jfbrennan.com

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818 Bainbridge St., La Crosse, WI 54603

<http://www.jfbrennan.com/> www.jfbrennan.com

Van Hoof, Tara M

From: Dustin Bauman <dbauman@JFBRENNAN.COM>
Sent: Thursday, November 05, 2015 5:20 PM
To: Coleman, Bill; Willant, George
Cc: Feeney, Richard; Tabatabai, Morey; Blackmar, Terri; Greg Smith; Travis Tipler
Subject: Volumetric Stone Placement
Attachments: image001.png

Bill,

As with the sand spread height number the Agencies also requested our average spread height for 1.5" rock. During the year while spreading for the LLC we realized a 4.91" average for the spread height. Brennan would propose setting the spread height to 5" during the volumetric rock placement of D35U south.

Thanks,

Dustin Bauman

cell 608.406.1813

<mailto:dbauman@jfbrennan.com> dbauman@jfbrennan.com

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818 Bainbridge St., La Crosse, WI 54603

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Van Hoof, Tara M

From: George Berken <George.Berken@boldt.com>
Sent: Friday, August 05, 2016 9:40 AM
To: Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Kaminski, Roger; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Roznowski, Denis M; ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Riley, KarenAnne; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Van Hoof, Tara M; Blackmar, Terri; Gawronski, Troy A; dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc: AgenciesLFRTeam; LFR.OverSightTeam
Subject: FW: 87500 OU2-5 - FW: LFRR 16-0017 Request for A/OT acceptance of Temporary Sand layout to be installed over hot spots at D35U North

Richard, on behalf of the Agencies, the confirmation method proposed by J.F. Brennan in this email is acceptable for temporary sand in D35U North.

Thanks,
George…

George A. Berken | Engineering Project Manager
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E: George.Berken@Boldt.Com
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From: Feeney, Richard [mailto:Richard.Feeney@tetratech.com]
Sent: Friday, August 05, 2016 9:06 AM
To: George Berken <George.Berken@boldt.com>; Bill Hartman <william.hartman@glatfelter.com>; bryan.heath@ncr.com; JLawson@project-control.com; PAMontne@GaPac.Com; Roger.Kaminski@GaPac.com; soconnell@project-control.com; Hendron, Ben <Ben.Hendron@tetratech.com>; Coleman, Bill <Bill.Coleman@tetratech.com>; Lysne, Bjorn <Bjorn.Lysne@tetratech.com>; Weston, Brandon <Brandon.Weston@tetratech.com>; Dan Binkney (dbinkney@anchorqea.com) <dbinkney@anchorqea.com>; ECI.LFRR Project Correspondence <ECI.LFRRPC@tetratech.com>; Willant, George <George.Willant@tetratech.com>; Kinnard, Hugh <Hugh.Kinnard@tetratech.com>; Jenkins, Jimmy <Jimmy.Jenkins@tetratech.com>; Francis, Joe <Joe.Francis@tetratech.com>; Van Deuren, Julie <Julie.VanDeuren@tetratech.com>; Riley, KarenAnne <KarenAnne.Riley@tetratech.com>; Tabatabai, Morey <Morey.Tabatabai@tetratech.com>; Paul LaRosa (plarosa@anchorqea.com) <plarosa@anchorqea.com>; Gifford, Ricky <ricky.gifford@tetratech.com>; Tara Van Hoof (Tara.VanHoof@Foth.com) <Tara.VanHoof@Foth.com>; Blackmar, Terri <Terri.Blackmar@tetratech.com>; Troy

Gawronski (TGawronski@foth.com) <TGawronski@foth.com>; dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com
Cc: AgenciesLFRTeam <AgenciesLFRTeam@boldt.com>; LFR.OverSightTeam <LFR.OverSightTeam@boldt.com>
Subject: RE: 87500 OU2-5 - FW: LFRR 16-0017 Request for A/OT acceptance of Temporary Sand layout to be installed over hot spots at D35U North

Hi George,

As you may recall, a few of us discussed your request for an OTS meeting on this issue (highlighted below) at the recent Weekly QC Meeting. The outcome of the discussion was that, instead of having an OTS meeting, Brennan should propose a method to be used for mechanically placing sand for volumetric applications, such as the temporary sand at D35U North. Following is the method proposed by JF Brennan:

> Unlike the volumetric cap installed at D35U South, the sand for the D35U North hot spots will be placed mechanically. Due to this Brennan proposes targeting an approximate 11" layer versus the 9" layer typically targeted when sand is installed with the spreader. Brennan has tested this placement metric and determined that a bucket weight of 3,200 lbs. produces an 11" average sand layer. If this is acceptable to the A/OT, the bucket weight data would be presented to the A/OT for final acceptance just like the step detail provided to the A/OT last year, when sand was placed volumetrically with the spreader.
>
> Please let us know if this procedure is acceptable or if the A/OT would like to discuss this proposal.

Thanks

Richard J. Feeney, P.E. | **Vice President, Project Engineering**
National Environmental Engineering Discipline Lead
Direct: 973.630.8092 | Fax: 973.630.8025 | Cell: 201.650.1006
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From: George Berken [mailto:George.Berken@boldt.com]
Sent: Tuesday, August 02, 2016 3:54 PM
To: Bill Hartman <william.hartman@glatfelter.com>; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com) <DGMassen@gapac.com>; jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY) <MELISSA.MROTEK@GAPAC.com>; PAMontne@GaPac.Com; Roger.Kaminski@GaPac.com; soconnell@project-control.com; Hendron, Ben <Ben.Hendron@tetratech.com>; Coleman, Bill <Bill.Coleman@tetratech.com>; Lysne, Bjorn <Bjorn.Lysne@tetratech.com>; Weston, Brandon <Brandon.Weston@tetratech.com>; Jones, Cynthia <Cynthia.Jones@tetratech.com>; Dan Binkney (dbinkney@anchorqea.com) <dbinkney@anchorqea.com>; Denis Roznowski (Denis.Roznowski@Foth.com) <Denis.Roznowski@Foth.com>; ECI.LFRR Project Correspondence <ECI.LFRRPC@tetratech.com>; Swed, Frederick <Frederick.Swed@tetratech.com>; Willant, George <George.Willant@tetratech.com>; Kinnard, Hugh <Hugh.Kinnard@tetratech.com>; Jenkins, Jimmy <Jimmy.Jenkins@tetratech.com>; Francis, Joe <Joe.Francis@tetratech.com>; Van Deuren, Julie <Julie.VanDeuren@tetratech.com>; Riley, KarenAnne <KarenAnne.Riley@tetratech.com>; Miller, Michelle <Michelle.Miller@tetratech.com>; Tabatabai, Morey <Morey.Tabatabai@tetratech.com>; Paul LaRosa (plarosa@anchorqea.com) <plarosa@anchorqea.com>; Feeney, Richard <Richard.Feeney@tetratech.com>; Gifford, Ricky <ricky.gifford@tetratech.com>; Tara Van Hoof (Tara.VanHoof@Foth.com) <Tara.VanHoof@Foth.com>; Blackmar, Terri <Terri.Blackmar@tetratech.com>; Troy Gawronski (TGawronski@foth.com) <TGawronski@foth.com>; dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl;

vbuhr@jfbrennan.com
Cc: AgenciesLFRTeam <AgenciesLFRTeam@boldt.com>; LFR.OverSightTeam <LFR.OverSightTeam@boldt.com>
Subject: 87500 OU2-5 - FW: LFRR 16-0017 Request for A/OT acceptance of Temporary Sand layout for D35U N

Ricky, on behalf of the Agencies, the proposed temporary spreader areas for D35U North submitted in your email below is acceptable except for the LEGEND that states:

TEMPORARY 9" VOLUMETRIC SAND
(EQUIVALENT TO 6")

This statement is not accepted at this time. This statement is valid if the area was being sand covered with the spreader system but is not valid for mechanical sand spreading at this time. Arrange an OTS work group meeting to discuss what metric(s) will be acceptable for mechanical spreading of sand (minimum 6 inches).

Thanks,
George…

George A. Berken | Engineering Project Manager
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E: George.Berken@Boldt.Com
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From: Gifford, Ricky [mailto:ricky.gifford@tetratech.com]
Sent: Friday, July 29, 2016 4:17 PM
To: George Berken <George.Berken@boldt.com>; 'Kincaid, Gary W - DNR' <Gary.Kincaid@wisconsin.gov>; Jay Grosskopf <Jay.Grosskopf@Boldt.com>; Ava Grosskopf <Ava.Grosskopf@boldt.com>; Larry DeBruin <Larry.Debruin@Boldt.com>
Cc: 'Jeffrey Lawson' (JLawson@project-control.com) <JLawson@project-control.com>; 'Susan O'Connell' (SOConnell@project-control.com) <SOConnell@project-control.com>; Paul Montney <PAMontne@GaPac.Com>; DGMassen@gapac.com; Coleman, Bill <Bill.Coleman@tetratech.com>; Willant, George <George.Willant@tetratech.com>; Stewart, Lynna <Lyn.Stewart@tetratech.com>; Blackmar, Terri <Terri.Blackmar@tetratech.com>; Feeney, Richard <Richard.Feeney@tetratech.com>; Van Deuren, Julie <Julie.VanDeuren@tetratech.com>; Tabatabai, Morey <Morey.Tabatabai@tetratech.com>; Nelson, Shane <Shane.Nelson@tetratech.com>; Van Hoof, Tara M (Tara.VanHoof@Foth.com) <Tara.VanHoof@Foth.com>; Kussman, Bradley L (Bradley.Kussman@Foth.com) <Bradley.Kussman@Foth.com>; Buchberger, Jim (Jim.Buchberger@Foth.com) <Jim.Buchberger@Foth.com>; Gawronski, Troy A (Troy.Gawronski@Foth.com) <Troy.Gawronski@Foth.com>; ECI.LFRR Project Correspondence <ECI.LFRRPC@tetratech.com>; Roger.Kaminski@GaPac.com; Bill Hartman <william.hartman@glatfelter.com>
Subject: LFRR 16-0017 Request for A/OT acceptance of Temporary Sand layout for D35U N

Mr. Berken,

The proposed temporary spreader areas for the above named area has been posted to Sharepoint for A/OT review and acceptance. You can view the PDFs using the following link:

https://sites.tetratech.com/projects/106-lowerfoxriver/SharedDocuments/2016%20Requested%20Design%20Documents%20for%20the%20AOT/Spreader%20Cover%20Exception%20Maps/OU4-D35U%20N%20Temporary%20Sand%20(Layout).pdf

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Van Hoof, Tara M

From: Feeney, Richard <Richard.Feeney@tetratech.com>
Sent: Thursday, June 30, 2016 6:26 PM
To: Gifford, Ricky
Cc: Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Blackmar, Terri; Willant, George; Coleman, Bill; Gawronski, Troy A; 'Jeffrey Lawson'; 'Susan O'Connell'; Bryan Heath (Bryan.Heath@ncr.com); Kaminski, Roger; 'PAMontne@GaPac.Com'; Riley, KarenAnne; Dustin Bauman (dbauman@JFBRENNAN.COM); Riley, KarenAnne
Subject: FW: D35U South Comparison Package
Attachments: image001.png; 2016 vs 2015 D35U South Package.pdf

Hi Ricky,

Troy, Dustin and I met with Gary and Larry today to review the attached multi-beam bathymetric survey results for D35U South. The latest survey was performed last weekend and we left them a hard copy. Roger Kaminski was also at the OTS meeting.

As you know last week Morey and I met with the A/OT last week about the residual design for D34 RDMU2 which involves Type B and Type C residual volumetric caps on the slope. At the time George Berken told us to size armor stone for the volumetric cap based on vessel wave action. Subsequent discussion with Paul LaRosa indicated that this would result in a very large rock size (such as D50 = 15+-inches) compared to the D50 = 1.5-inch stone and quarry spall used for the residual volumetric caps at D35U South.

At today's meeting we reviewed the attached pre and post placement multi-beam bathymetric figures for D35U South. Both Gary and Larry agreed that the volumetric caps have held up well so far and so they will accept the use of D50 = 1.5-inch stone for volumetric caps at D34 RDMU.

Gary requested that, when you submit the residual design for D34 RDMU2 that you include the attached multi-beam survey figures for D35U South and reference them as the basis for incorporating the normal armor stone sizes for the volumetric B and C caps, D50 = 1.5-inch and quarry spall. When they approve the D34 RDMU volumetric caps Gary said the A/OT will request that we do a multi-beam volumetric survey down the road.

Thanks

Richard J. Feeney, P.E. | Vice President, Project Engineering
Direct: 973.630.8092 | Fax: 973.630.8025 | Cell: 201.650.1006 Fox River Green Bay, WI Project Office | Direct: 920.445.0732 | Fax: 920.445.0719 Richard.Feeney@tetratech.com

Tetra Tech, Inc. | Engineering
1000 The American Rd | Morris Plains, NJ 07950 | www.tteci.com | www.tetratech.com
1611 State Street | Green Bay, WI 54304
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P Think Green - Not every email needs to be printed.

From: Dustin Bauman [mailto:dbauman@JFBRENNAN.COM]
Sent: Thursday, June 30, 2016 11:36 AM

To: Feeney, Richard <Richard.Feeney@tetratech.com>
Cc: Coleman, Bill <Bill.Coleman@tetratech.com>; Willant, George <George.Willant@tetratech.com>; Tabatabai, Morey <Morey.Tabatabai@tetratech.com>; Blackmar, Terri <Terri.Blackmar@tetratech.com>; Greg Smith <gsmith@JFBRENNAN.COM>; Dan McCauley <dmccauley@JFBRENNAN.COM>
Subject: D35U South Comparison Package

Rich,

Please see the attached file. Let me know when you would like to discuss and meet with Gary to discuss.

Thanks,

Dustin Bauman
cell 608.406.1813
dbauman@jfbrennan.com

J.F. Brennan Company, Inc.
818 Bainbridge St., La Crosse, WI 54603
www.jfbrennan.com

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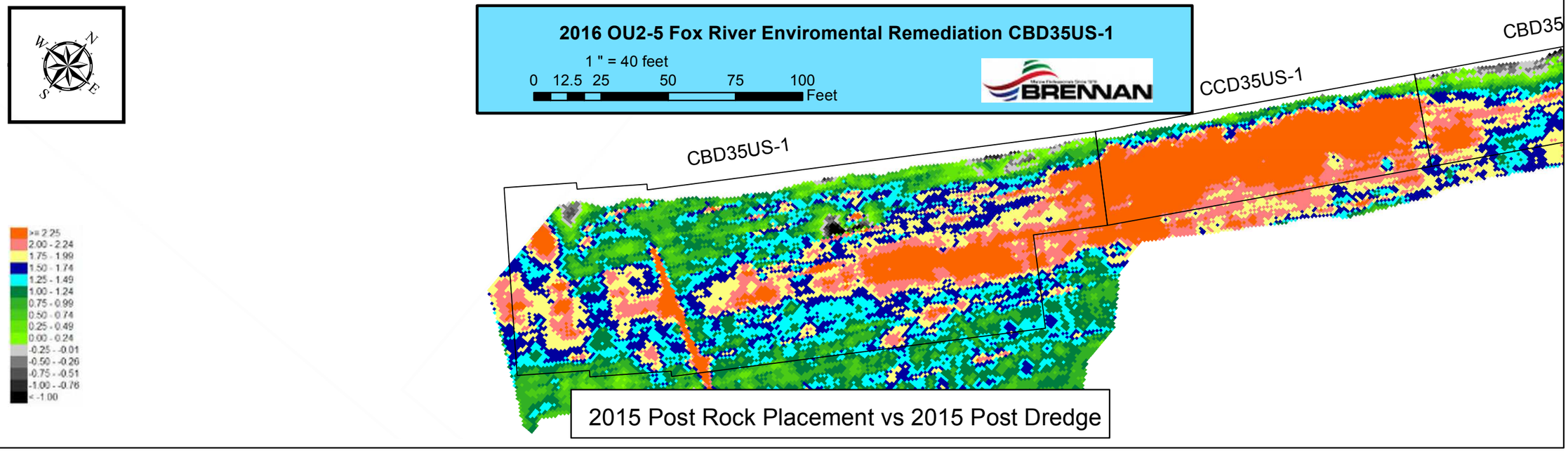
2016 OU2-5 Fox River Enviromental Remediation CBD35US-1

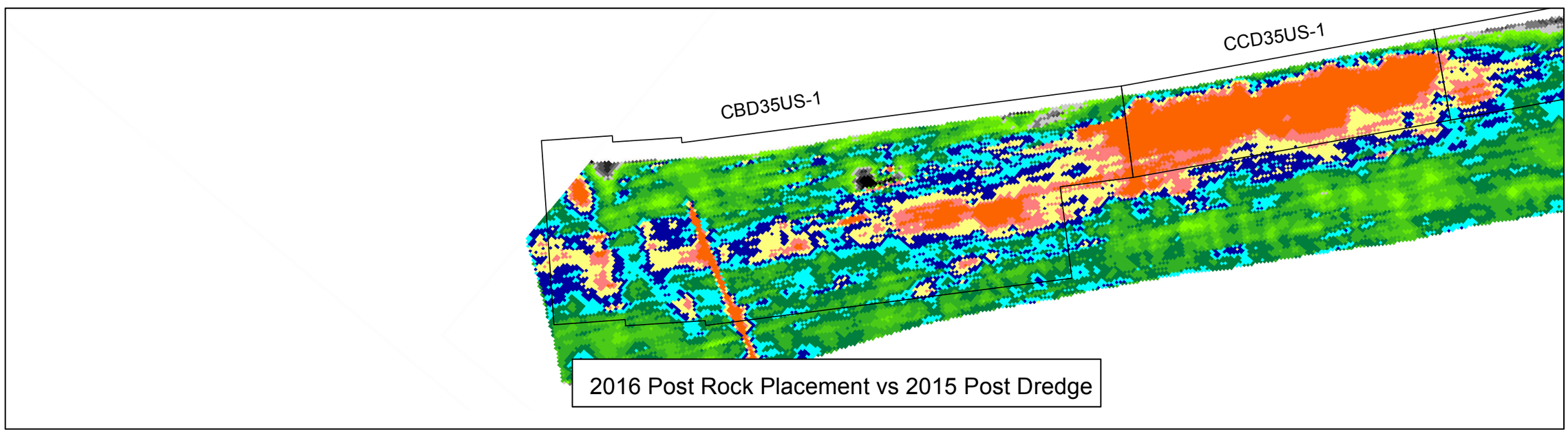
1 " = 40 feet

0 12.5 25 50 75 100 Feet

BRENNAN



2015 Post Rock Placement vs 2015 Post Dredge

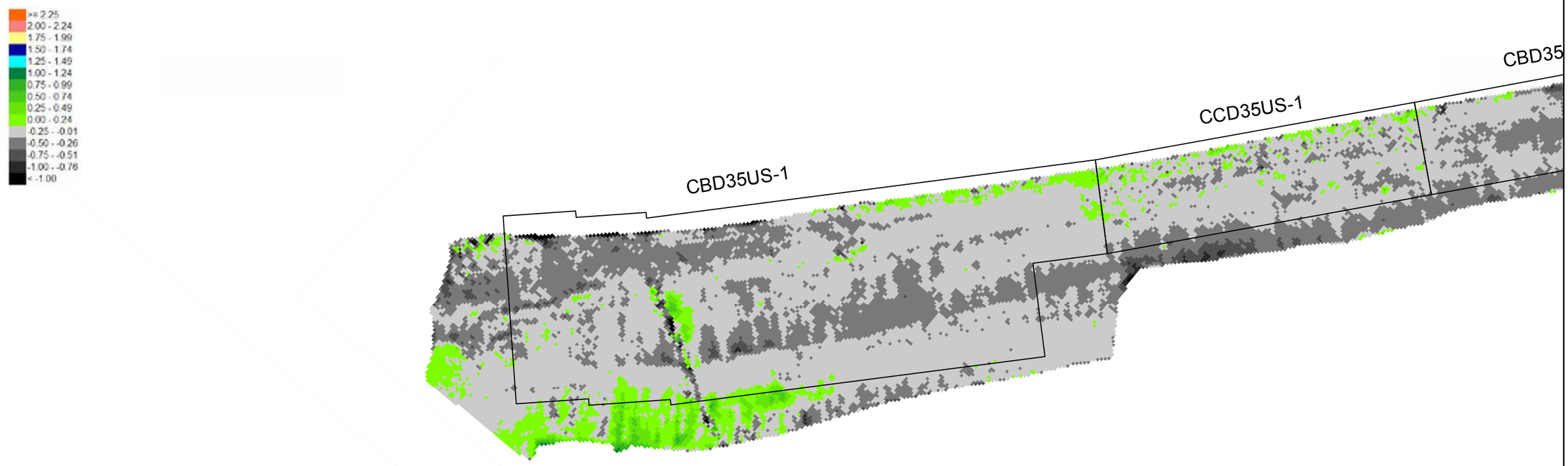


2016 Post Rock Placement vs 2015 Post Dredge

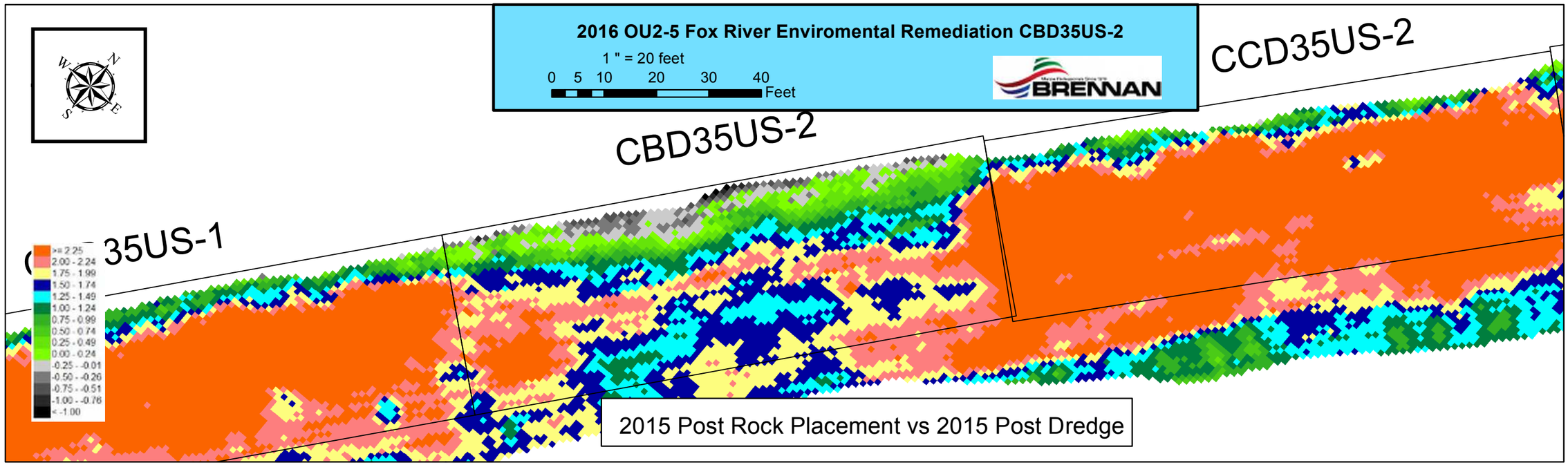
2016 OU2-5 Fox River Enviromental Remediation CBD35US-1

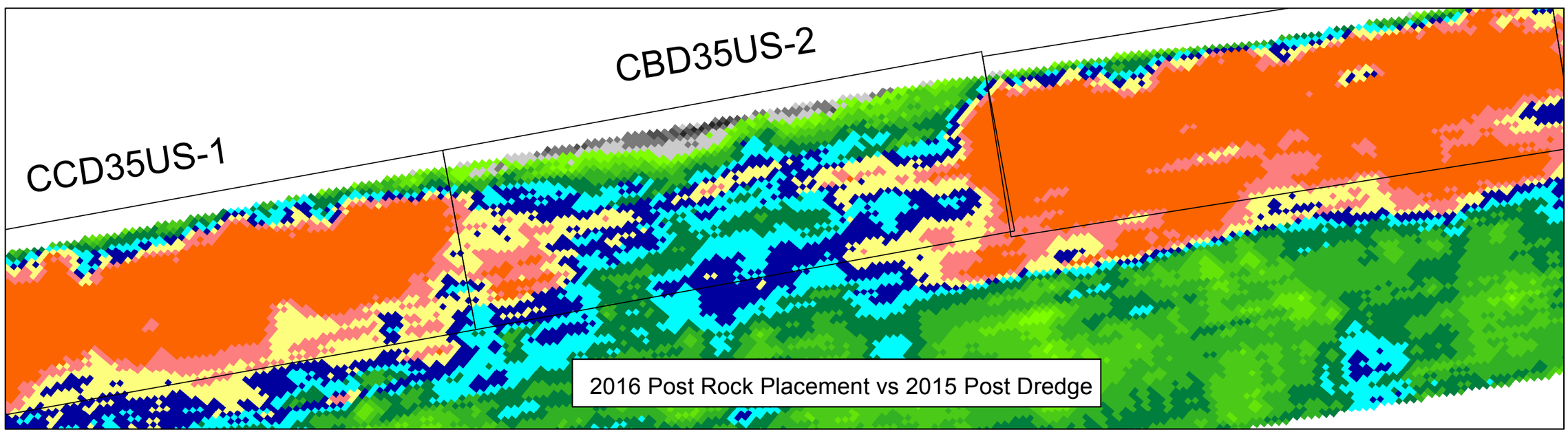
1 " = 40 feet

0 12.5 25 50 75 100 Feet



2016 Post Rock Placement vs 2015 Post Rock Placement

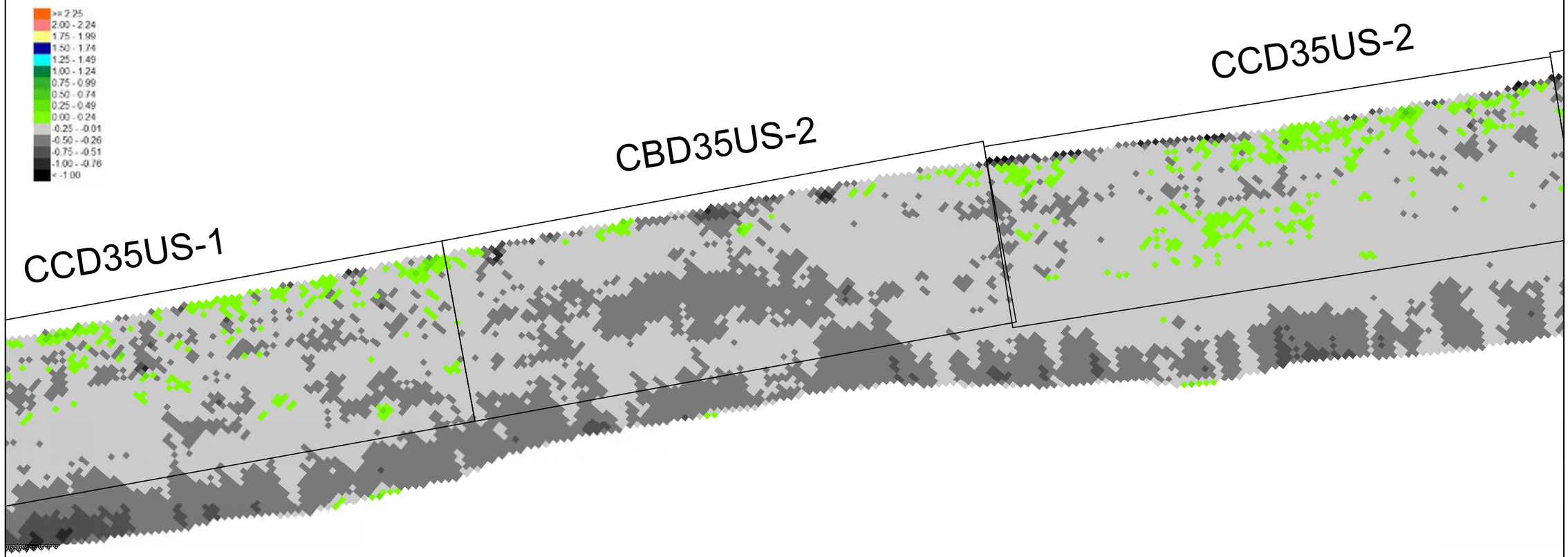

2016 OU2-5 Fox River Enviromental Remediation CBD35US-2
1 " = 20 feet
0 5 10 20 30 40
Feet
BRENNAN
CCD35US-2
CBD35US-2
35US-1
>= 2.25
2.00 - 2.24
1.75 - 1.99
1.50 - 1.74
1.25 - 1.49
1.00 - 1.24
0.75 - 0.99
0.50 - 0.74
0.25 - 0.49
0.00 - 0.24
-0.25 - -0.01
-0.50 - -0.26
-0.75 - -0.51
-1.00 - -0.76
< -1.00
2015 Post Rock Placement vs 2015 Post Dredge


CBD35US-2
CCD35US-1
2016 Post Rock Placement vs 2015 Post Dredge

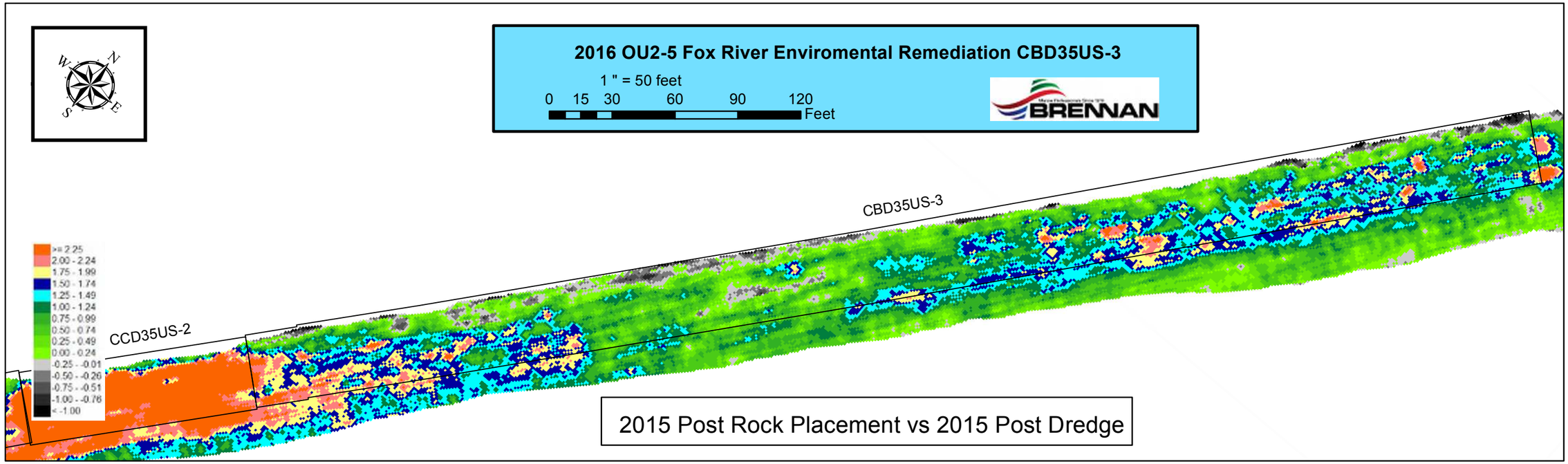
2016 OU2-5 Fox River Enviromental Remediation CBD35US-2

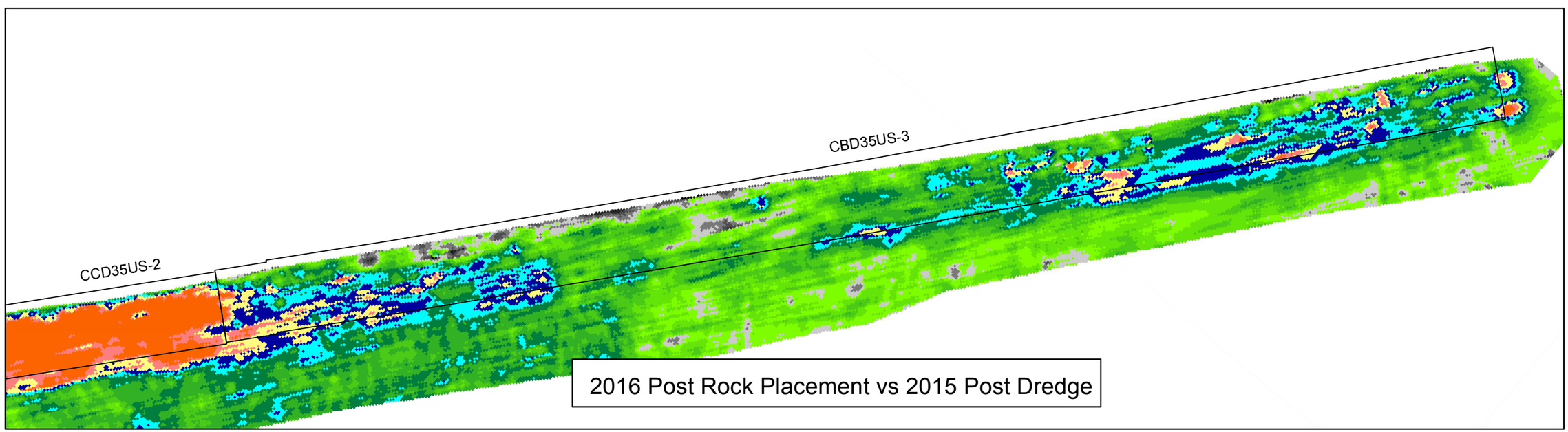
1 " = 20 feet

0 5 10 20 30 40 Feet



2016 Post Rock Placement vs 2015 Post Rock Placement

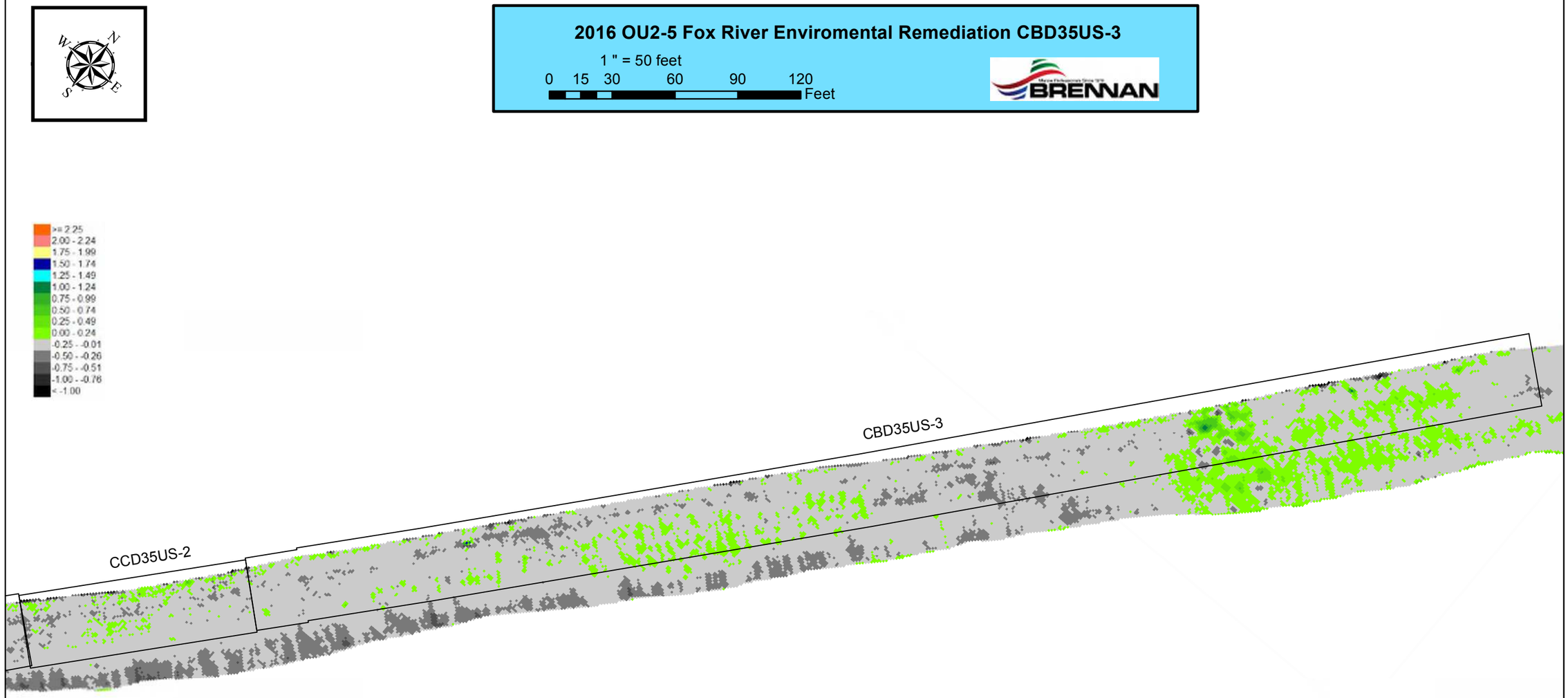

2016 OU2-5 Fox River Enviromental Remediation CBD35US-3
1 " = 50 feet
0 15 30 60 90 120
Feet
BRENNAN
CBD35US-3
CCD35US-2
>= 2.25
2.00 - 2.24
1.75 - 1.99
1.50 - 1.74
1.25 - 1.49
1.00 - 1.24
0.75 - 0.99
0.50 - 0.74
0.25 - 0.49
0.00 - 0.24
-0.25 - -0.01
-0.50 - -0.26
-0.75 - -0.51
-1.00 - -0.76
< -1.00
2015 Post Rock Placement vs 2015 Post Dredge


CBD35US-3
CCD35US-2
2016 Post Rock Placement vs 2015 Post Dredge

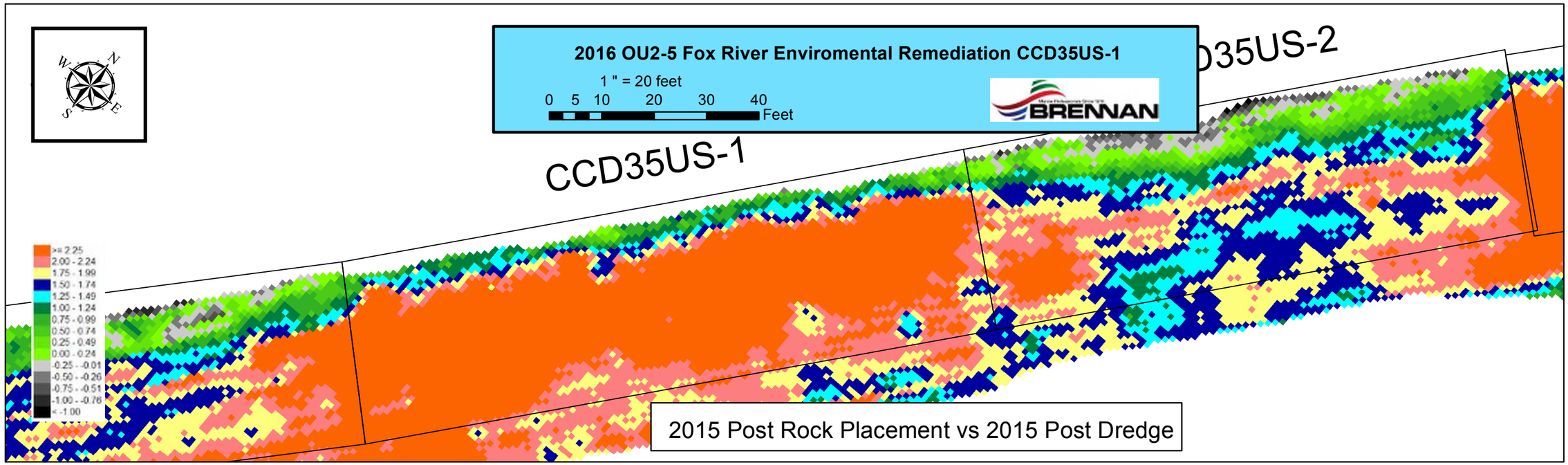
2016 OU2-5 Fox River Enviromental Remediation CBD35US-3

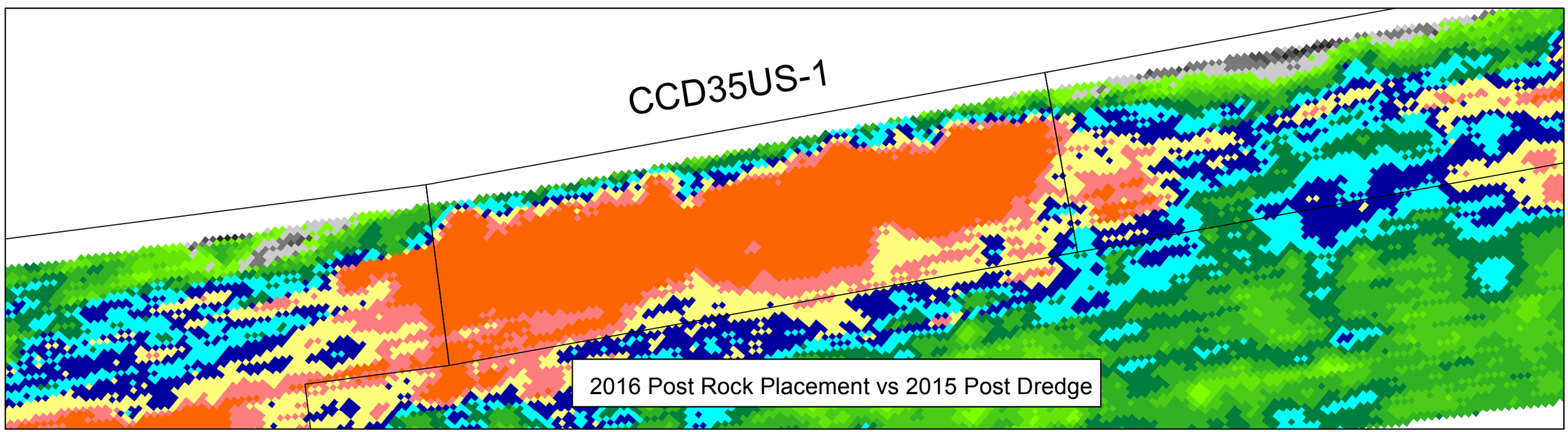
1 " = 50 feet

0 15 30 60 90 120 Feet



2016 Post Rock Placement vs 2015 Post Rock Placement

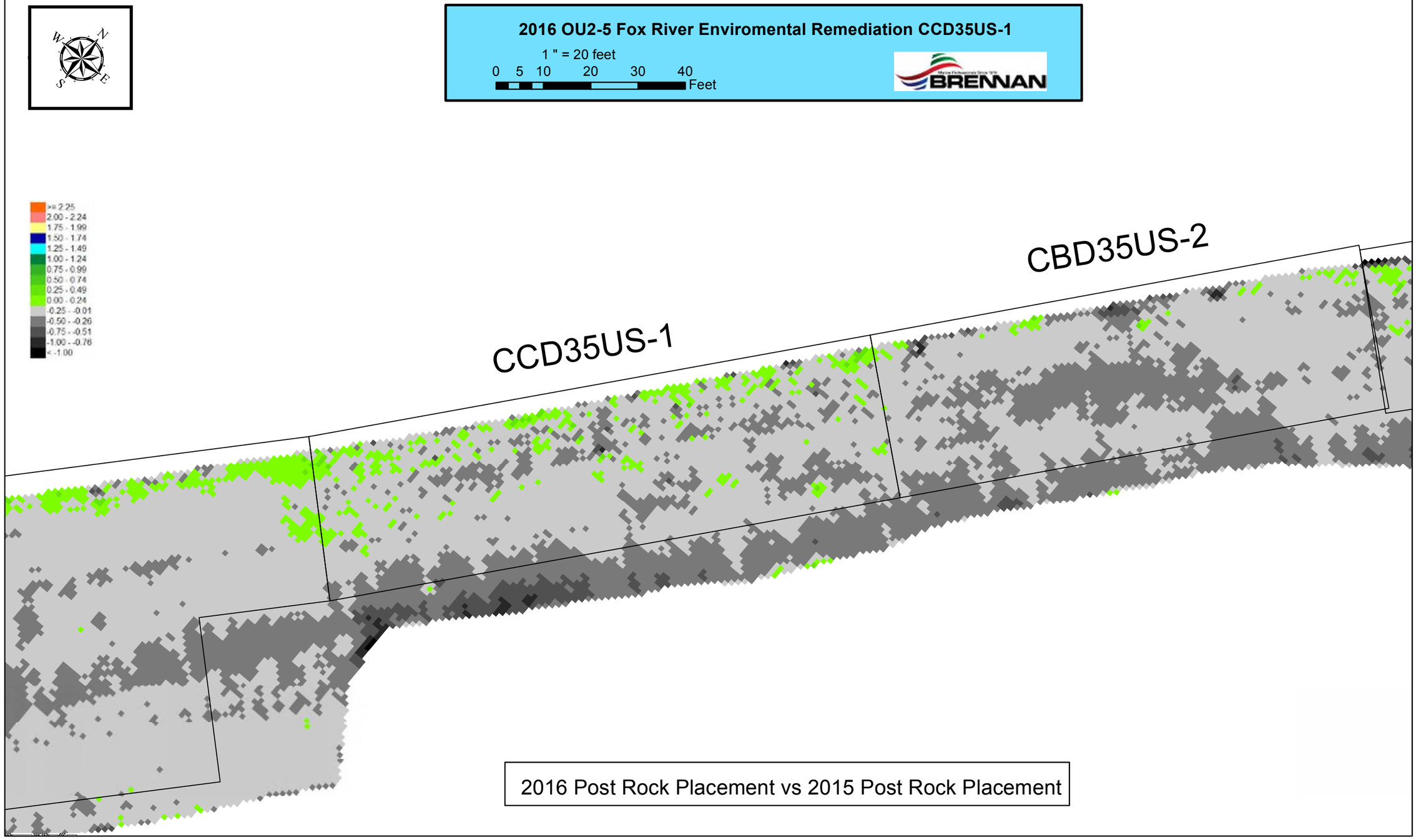

2016 OU2-5 Fox River Enviromental Remediation CCD35US-1
1 " = 20 feet
0 5 10 20 30 40
Feet
BRENNAN
CCD35US-1
D35US-2
>= 2.25
2.00 - 2.24
1.75 - 1.99
1.50 - 1.74
1.25 - 1.49
1.00 - 1.24
0.75 - 0.99
0.50 - 0.74
0.25 - 0.49
0.00 - 0.24
-0.25 - -0.01
-0.50 - -0.26
-0.75 - -0.51
-1.00 - -0.76
< -1.00
2015 Post Rock Placement vs 2015 Post Dredge


CCD35US-1
2016 Post Rock Placement vs 2015 Post Dredge

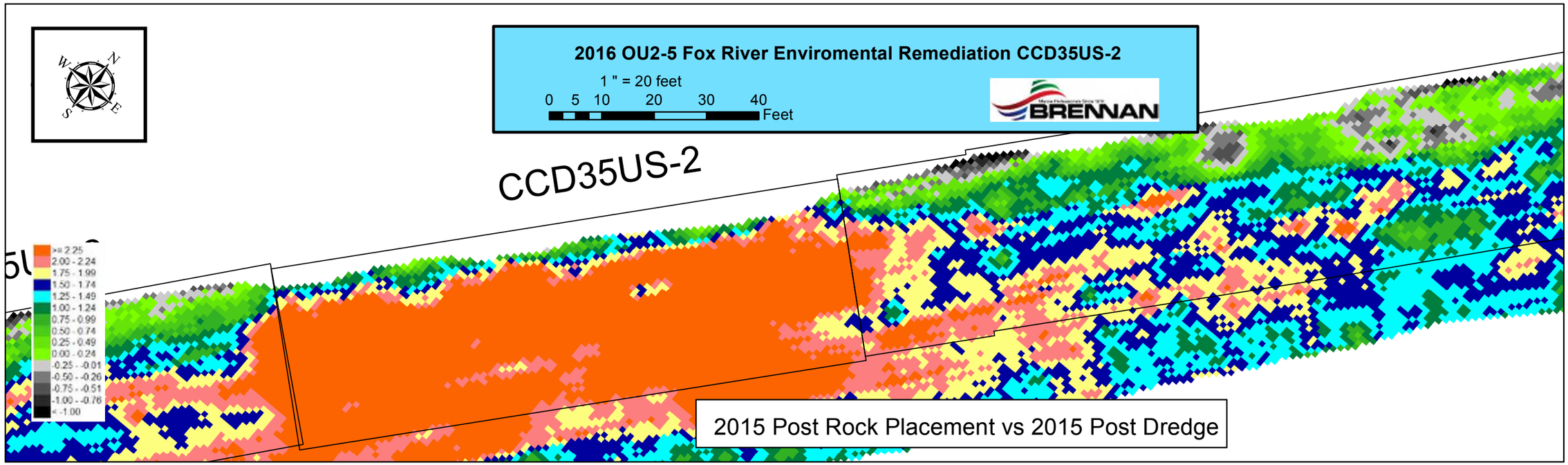
2016 OU2-5 Fox River Enviromental Remediation CCD35US-1

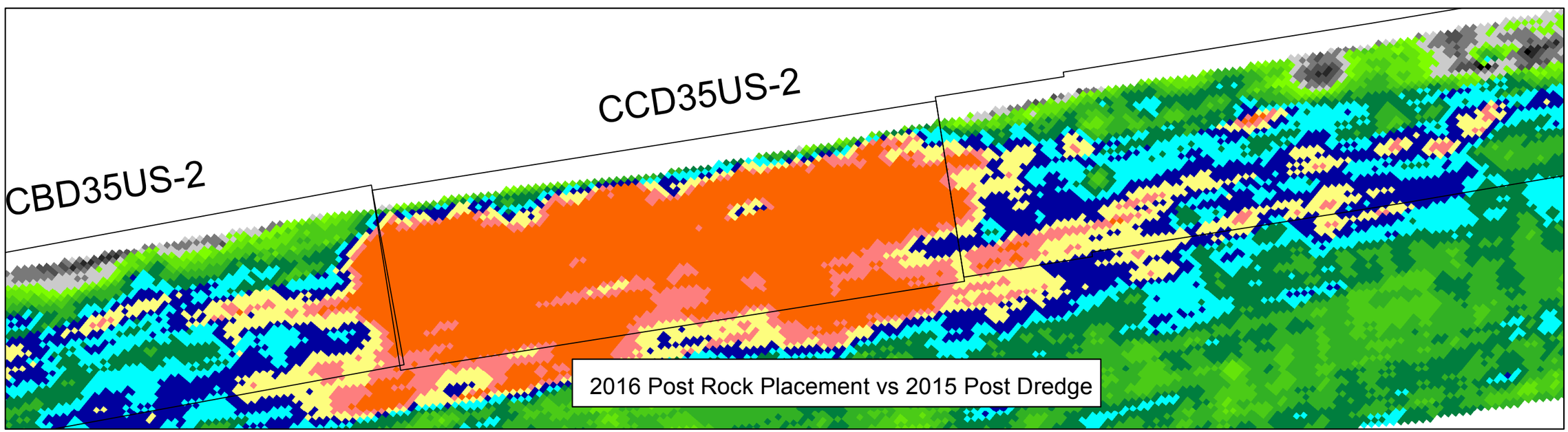
1 " = 20 feet

0 5 10 20 30 40 Feet



2016 Post Rock Placement vs 2015 Post Rock Placement


2016 OU2-5 Fox River Enviromental Remediation CCD35US-2
1 " = 20 feet
0 5 10 20 30 40
Feet
BRENNAN
CCD35US-2
>= 2.25
2.00 - 2.24
1.75 - 1.99
1.50 - 1.74
1.25 - 1.49
1.00 - 1.24
0.75 - 0.99
0.50 - 0.74
0.25 - 0.49
0.00 - 0.24
-0.25 - -0.01
-0.50 - -0.26
-0.75 - -0.51
-1.00 - -0.76
< -1.00
2015 Post Rock Placement vs 2015 Post Dredge

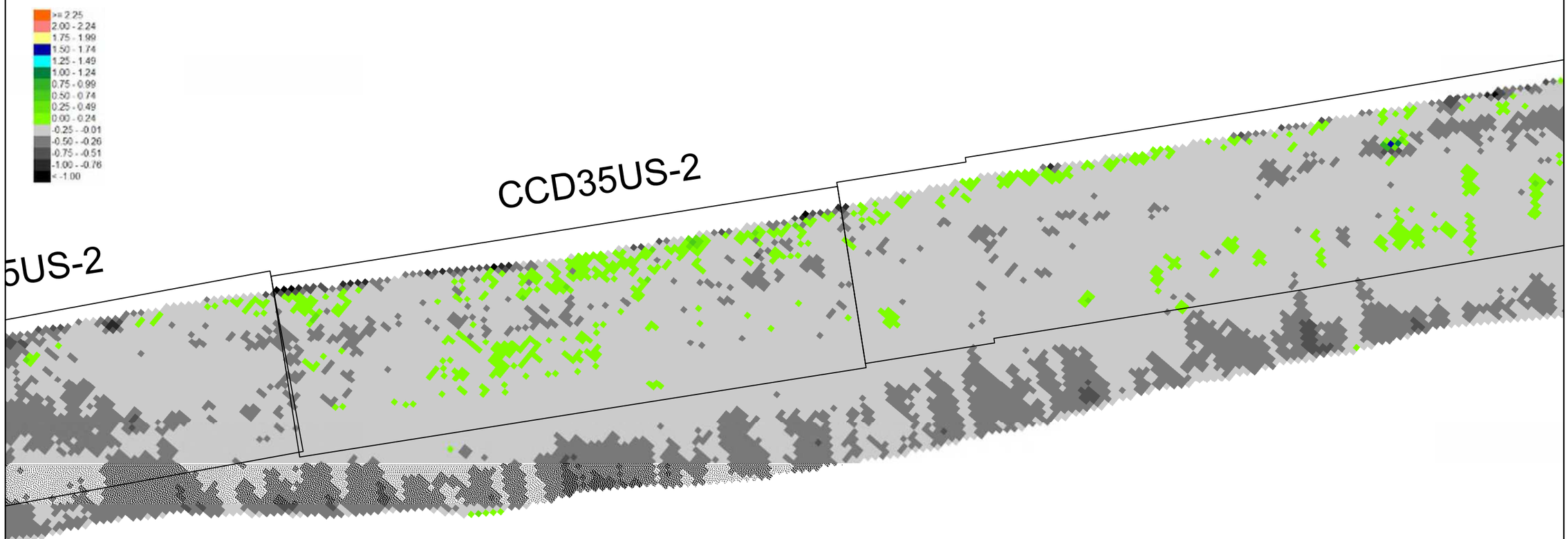

CCD35US-2
CBD35US-2
2016 Post Rock Placement vs 2015 Post Dredge

2016 OU2-5 Fox River Enviromental Remediation CCD35US-2

1 " = 20 feet

0 5 10 20 30 40 Feet

BRENNAN



2016 Post Rock Placement vs 2015 Post Rock Placement

Kinnard, Hugh

From:	Larry DeBruin <Larry.Debruin@Boldt.com>
Sent:	Thursday, August 04, 2016 3:51 PM
To:	Weston, Brandon; George Berken; Jay Grosskopf; Kincaid, Gary W - DNR (Gary.Kincaid@Wisconsin.gov); Ava Grosskopf; Philip R. Brochocki (pbrochocki@naturalrt.com); Coleman, Bill; Willant, George; Blackmar, Terri; Feeney, Richard; Bauer, Eric; Kinnard, Hugh; Gifford, Ricky; Lysne, Bjorn; ECI.LFRR Project Correspondence; Miller, Michelle; Keon, Kendra; 'Jeffrey Lawson' (JLawson@project-control.com); 'Susan O'Connell' (SOConnell@project-control.com); 'Bryan Heath'; Paul Montney; DGMassen@gapac.com; Kaminski, Roger (GBY); Gawronski, Troy A (Troy.Gawronski@Foth.com)
Cc:	LFR.OverSightTeam; AgenciesLFRTeam
Subject:	RE: LFRR-16-0113 Final Sand Thickness Verification Results SHC100-Berm
Attachments:	OU4-SHC100-BERM_08-04-16 Final Table BERKEN.pdf

Brandon, On behalf of the Agencies, the sand thickness verification results for the areas listed are acceptable. Signed results table are attached

Larry J. DeBruin | Sr. Project Engineer
P: 920-225-6118 // **C:** 920-427-6011
E: larry.debruin@boldt.com
2525 N. Roemer Road // PO Box 419 // Appleton, WI 54912-0419

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From: Weston, Brandon [mailto:Brandon.Weston@tetratech.com]
Sent: Thursday, August 04, 2016 3:24 PM
To: George Berken <George.Berken@boldt.com>; Jay Grosskopf <Jay.Grosskopf@Boldt.com>; Kincaid, Gary W - DNR (Gary.Kincaid@Wisconsin.gov) <Gary.Kincaid@Wisconsin.gov>; Larry DeBruin <Larry.Debruin@Boldt.com>; Ava Grosskopf <Ava.Grosskopf@boldt.com>; Philip R. Brochocki (pbrochocki@naturalrt.com) <pbrochocki@naturalrt.com>; Coleman, Bill <Bill.Coleman@tetratech.com>; Willant, George <George.Willant@tetratech.com>; Blackmar, Terri <Terri.Blackmar@tetratech.com>; Feeney, Richard <Richard.Feeney@tetratech.com>; Bauer, Eric <Eric.Bauer@tetratech.com>; Kinnard, Hugh <Hugh.Kinnard@tetratech.com>; Gifford, Ricky <ricky.gifford@tetratech.com>; Lysne, Bjorn <Bjorn.Lysne@tetratech.com>; ECI.LFRR Project Correspondence <ECI.LFRRPC@tetratech.com>; Miller, Michelle <Michelle.Miller@tetratech.com>; Keon, Kendra <Kendra.Keon@tetratech.com>; 'Jeffrey Lawson' (JLawson@project-control.com) <JLawson@project-control.com>; 'Susan O'Connell' (SOConnell@project-control.com) <SOConnell@project-control.com>; 'Bryan Heath' <bryan.heath@ncr.com>; Paul Montney <PAMontne@GaPac.Com>; DGMassen@gapac.com; Kaminski, Roger (GBY) <ROGER.KAMINSKI@GAPAC.com>; Gawronski, Troy A (Troy.Gawronski@Foth.com) <Troy.Gawronski@Foth.com>
Subject: LFRR-16-0113 Final Sand Thickness Verification Results SHC100-Berm

All,

Please find the attached final result table for your review.

- SHC100-Berm

Below is the link to the SharePoint site where the table is available for review:

https://sites.tetratech.com/projects/106-lowerfoxriver/default.aspx?RootFolder=%2Fprojects%2F106%2Dlowerfoxriver%2FSharedDocuments%2F2016%2FCap%20and%20Cover%2FCover&FolderCTID=0x01200056916E5249BC0440B41F789C9281BE08&View={B4DA9CDD-CA02-4C44-B591-B2824CC14A8A}

Regards,

Brandon Weston | **Sample Department Lead**
Office: 920.445.0743
Mobile: 906.204.5324
brandon.weston@tetratech.com

Tetra Tech | RCM
1611 State Street | Green Bay, WI 54304| www.tetratech.com

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OU4-SHC100-BERM												
ID	Date Sampled	Sand Result (inches)	Sand/Sediment Mix (inches)	Total Thickness Sand and Sediment Mix (inches)		Required Thickness (inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
								Northing	Easting	Northing	Easting	
SCH100-BERM-C1	8/3/2016	5.5	0.0	6.0	5.5	11.0	559.23	246202.23	2482496.21	246201.87	2482496.91	
SCH100-BERM-C1A	8/3/2016	4.5	0.0		4.5	11.0	562.26			246209.15	2482497.61	Step-out location
SCH100-BERM-C1B	8/3/2016	10.0	0.0		10.0	11.0	558.98			246204.20	2482503.69	Step-out location
SCH100-BERM-C1C	8/3/2016	9.0	0.0		9.0	11.0	557.34			246195.75	2482498.69	Step-out location
SCH100-BERM-C1D	8/3/2016	1.0	0.0		1.0	11.0	558.67			246200.31	2482491.52	Step-out location; Thickness is an open core measurement
SCH100-BERM-C1RVT	8/4/2016	11.0	0.0	11.0	11.0	11.0	559.37	246202.23	2482496.21	246202.61	2482495.17	Revisit location after respread
SCH100-BERM-C2	8/3/2016	11.5	0.0	11.5	11.5	11.0	557.88	246197.97	2482506.87	246199.32	2482506.61	
SCH100-BERM-C2RVT	8/4/2016	12.5	0.0	12.5	12.5	11.0	557.83	246197.97	2482506.87	246196.85	2482506.23	Revisit location after respread
SCH100-BERM-C3	8/3/2016	10.0	0.0	11.3	10.0	11.0	556.95	246189.30	2482519.26	246190.19	2482520.31	
SCH100-BERM-C3A	8/3/2016	5.0	0.0		5.0	11.0	556.90			246191.62	2482521.69	Step-out location
SCH100-BERM-C3B	8/3/2016	12.0	0.0		12.0	11.0	556.73			246190.04	2482522.62	Step-out location
SCH100-BERM-C3C	8/3/2016	15.0	0.0		15.0	11.0	556.70			246189.13	2482521.70	Step-out location
SCH100-BERM-C3D	8/3/2016	14.5	0.0		14.5	11.0	556.83			246190.60	2482519.58	Step-out location
SCH100-BERM-C3RVT	8/4/2016	15.0	0.0	15.0	15.0	11.0	557.36	246189.30	2482519.26	246188.31	2482520.04	Revisit location after respread

Note: Locations highlighted in red were not included for calculations due to respread.

Average	12.8	0.0	12.8	12.8
Median	12.5	0.0	12.5	12.5
Standard Deviation	2.0	0.0	2.0	2.0

Recommended Path Forward:

Verification samples were collected in 3 locations within OU4-SHC100-BERM. 3 of 3 samples meet or exceed the minimum thickness requirement of 11 inches, therefore, no further action is required. Locations C1, C1A, C1B, C1C, C1D, C2, C2A, C2B, C2C, C2D, C3, C3A, C3B, C3C, and C3D were excluded from the final average, median, and standard deviation calculations because they were a part of a respread. Locations C1RVT, C2RVT, and C3RVT were collected after the respread and are included in the final average, median, and standard deviation calculations.

Prepared by: NK Date: 8/4/2016 Reviewed by: BSW Date: 8/4/2016

A/OI Acceptance: Date: 8/4/16

Kinnard, Hugh

From: George Berken <George.Berken@boldt.com>
Sent: Tuesday, August 09, 2016 12:36 PM
To: Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Roger.Kaminski@GaPac.com; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Denis Roznowski (Denis.Roznowski@Foth.com); ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Riley, KarenAnne; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Tara Van Hoof (Tara.VanHoof@Foth.com); Blackmar, Terri; Troy Gawronski (TGawronski@foth.com); dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc: AgenciesLFRTeam; LFR.OverSightTeam
Subject: 87500 OU2-5 - FW: Layer 2 - Toe Berm Filter Layer Verification
Attachments: 160808 SCH100 Toe Berm Layer 2 Verification.pdf

Dustin, on behalf of the Agencies, the Layer 2 (Toe Berm Filter) Verification maps submitted in your email below are acceptable.

Thanks,
George…

George A. Berken | Engineering Project Manager
P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

boldt.com

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From: Dustin Bauman [mailto:dbauman@JFBRENNAN.COM]
Sent: Tuesday, August 09, 2016 12:06 PM
To: George Berken <George.Berken@boldt.com>; gary.kincaid@wisconsin.gov; Larry DeBruin <Larry.Debruin@Boldt.com>; Jay Grosskopf <Jay.Grosskopf@Boldt.com>; 'Gawronski, Troy A' (Troy.Gawronski@Foth.com) <Troy.Gawronski@Foth.com>; Jeff Lawson (JLawson@project-control.com) <JLawson@project-control.com>; Susan OConnell (soconnell@project-control.com) <soconnell@project-control.com>; Bryan Heath (Bryan.Heath@ncr.com) <Bryan.Heath@ncr.com>
Cc: 'Willant, George' <George.Willant@tetratech.com>; Coleman, Bill <Bill.Coleman@tetratech.com>; Greg Smith <gsmith@JFBRENNAN.COM>; Daniel Huycke <dhuycke@JFBRENNAN.COM>; Matt Dorow <mdorow@JFBRENNAN.COM>; Zack Meyers <zmeyers@JFBRENNAN.COM>; Lysne, Bjorn (Bjorn.Lysne@tetratech.com) <Bjorn.Lysne@tetratech.com>; terri.blackmar@tetratech.com; Feeney, Richard (Richard.Feeney@tetratech.com) <Richard.Feeney@tetratech.com>; Tabatabai, Morey (Morey.Tabatabai@tetratech.com) <Morey.Tabatabai@tetratech.com>; shane.nelson@tetratech.com; Ricky.Gifford@tetratech.com; Ryan Sands <rsands@JFBRENNAN.COM>; Rusty Misencik <rmisencik@JFBRENNAN.COM>; Brian Heuker <bheuker@JFBRENNAN.COM>; Weston, Brandon (Brandon.Weston@tetratech.com) <Brandon.Weston@tetratech.com>; Kinnard, Hugh <Hugh.Kinnard@tetratech.com>; Karenanne Riley (karenanne.riley@tetratech.com) <karenanne.riley@tetratech.com>
Subject: Layer 2 - Toe Berm Filter Layer Verification

George,

Please see attached document with iso-pack charts comparing post sand to post filter layer surveys. As you will notice 95% of the area meets or exceeds the 6” design criteria. Please confirm from our OTS that this is acceptable. Brennan will then proceed to layer 3 installation.

Thanks,

Dustin Bauman
cell 608.406.1813
dbauman@jfbrennan.com

J.F. Brennan Company, Inc.
818 Bainbridge St., La Crosse, WI 54603
www.jfbrennan.com

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GP-P1

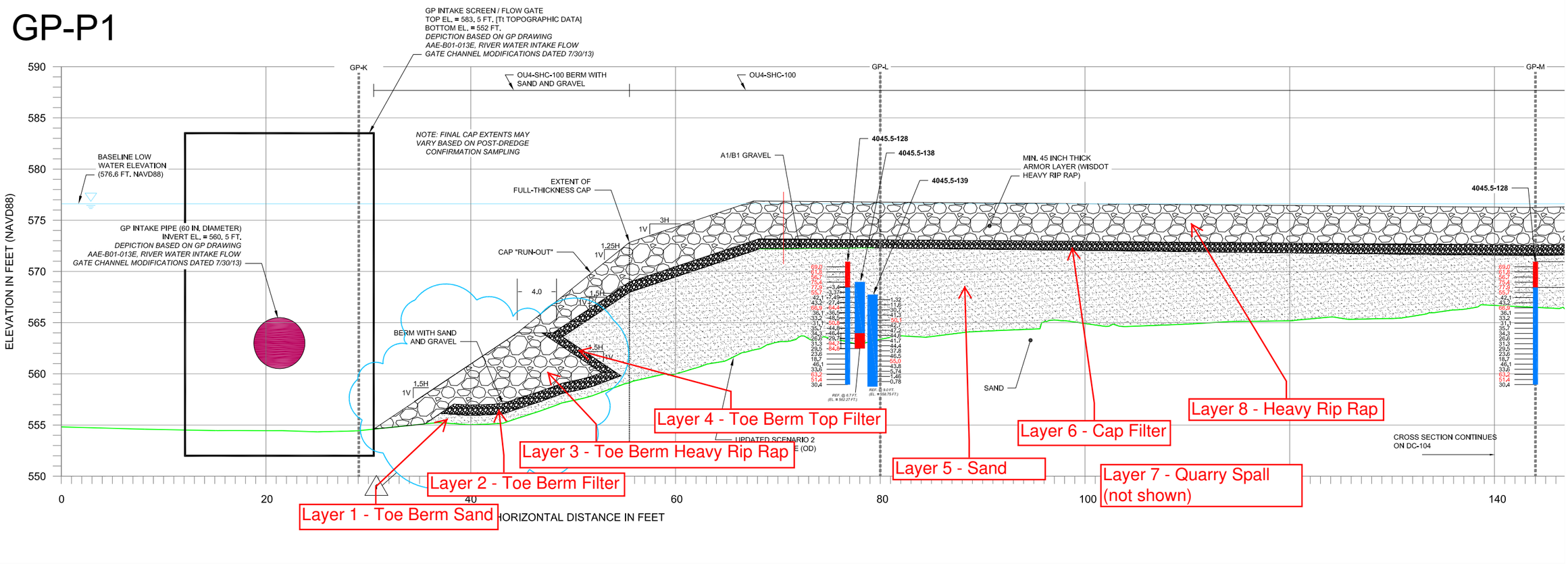


TABLE 1
SUMMARY OF CAP DESIGNS FOR D35U NORTH

CAP TYPE	MEDIAN DIAMETER OF ARMOR, D_{50} (INCHES)	MINIMUM LAYER THICKNESS [a] (INCHES)			CUMULATIVE LAYER THICKNESS [c] (INCHES)	AVERAGE PLACED LAYER THICKNESS [d] (INCHES)			PLACED TOTAL CAP THICKNESS [b] (INCHES)
		SAND	GRAVEL	ROCK ARMOR		SAND	GRAVEL	ROCK ARMOR	
MODIFIED CAP C	6 TO 9 [c]	11	6	12	29	14	9	18	41
SHORELINE CAP	15 [c]	11	12	45	68	14	15	60	89

GRAIN SIZE RATIOS	D_{15} : D_{85}
MODIFIED CAP C (D_{15} QUARRY SPALLS : D_{85} AQ/B1 FILTER)	1.4 OR LESS
MODIFIED CAP C (D_{15} A1/B1 FILTER : D_{85} SAND)	3.2 OR LESS
SHORELINE CAP (D_{15} HEAVY RIP RAP : D_{85} A1/B1/ FILTER)	1.5 TO 3.2

NOTES:
a. MINIMUM REQUIRED THICKNESS BASED ON USEPA/USACE DESIGN GUIDANCE. NOTE THAT FOR THE MODIFIED CAP C, THE 3-INCH GRAVEL LAYER IS A FILTER LAYER, NOT GRAVEL ARMOR.
b. THE CONTRACTOR WILL BE REQUIRED TO PLACE ENOUGH MATERIAL (AS MEASURED BY PLACEMENT LOGS) TO ACHIEVE TARGET THICKNESSES THAT ARE CONSISTENT WITH THE ROD AMENDMENT AND THE SIGNED EXPLANATION OF SIGNIFICANT DIFFERENCES DATED FEBRUARY 2010 (SEE CQAPP FOR ADDITIONAL DETAILS OF THICKNESS VERIFICATION).
c. ROCK ARMOR SIZE BASED ON SITE-SPECIFIC EROSION ANALYSIS.
d. THE HIGHEST POTENTIALLY REMAINING PCB CONCENTRATION WITHIN THE D35U NORTH CAP AREA IS 215 PPM. CHEMICAL ISOLATION MODELING CONDUCTED CONSISTENT WITH THE 100 PERCENT DESIGN INDICATES THAT A 17.8 CM (7 INCH) CHEMICAL ISOLATION LAYER WOULD PROVIDE ADEQUATE PROTECTION FOR PCB CONCENTRATIONS UP TO 250 PPM.

WISDOT HEAVY RIPRAP SPECIFICATION

606.2.1 Riprap Stone

(1) Furnish durable field or quarry stone that is sound, hard, dense, resistant to the action of air and water, and free of seams, cracks, or other structural defects. Use stone pieces with a length and width no more than twice the thickness. Do not place material without the engineer's approval of the stone quality, size, and shape.

(2) The department will determine the average dimension of stone pieces by averaging measurements of thickness, width, and length. Furnish stones conforming to the size requirements for the riprap grade the plans show. Size requirements are expressed as the percent of the gross in-place riprap volume occupied by stones within average dimension size ranges for each riprap grade as follows:

AVERAGE DIMENSION RANGES FOR EACH RIPRAP GRADE				FRACTION OF GROSS
LIGHT RIPRAP inches	MEDIUM RIPRAP inches	HEAVY RIPRAP inches	EXTRA-HEAVY RIPRAP inches	IN-PLACE RIPRAP VOLUME OCCUPIED BY STONES
>16	>20	>25	>30	0%
11 - 13	14 - 16	18 - 20	22 - 25	10% - 14%
9 - 11	11 - 14	14 - 18	18 - 22	15% - 21%
4 - 9	5 - 11	6.5 - 14	8 - 18	20% - 28%
<4	<5	<6.5	<8	5% - 7%
<1	<1	<1	<1	2% or less

NOTES:

1. THIS DOCUMENT IS IN PREPARATION FOR REVIEW BY USEPA AND ITS FEDERAL AND STATE PARTNERS AND IS SUBJECT TO CHANGE.
2. ALL NOTES ON GENERAL NOTES SHEET T-3 APPLY.

SOURCE:

1. AERIAL SURVEY AND MAPPING WORK PERFORMED FOR THE WDNR BY THE RETEC GROUP CIRCA 2004.
2. DEPICTED BATHYMETRY REPRESENTS 2015 POST-CONSTRUCTION CONDITIONS WHERE APPLICABLE, BASED ON SURVEYS PERFORMED BY J.F. BRENNAN IN 2015. WHERE 2015 DATA IS NOT AVAILABLE, THE MOST RECENT SURVEY DATA WAS USED, INCLUDING 2015 PRE-SEASON BATHYMETRY AND POST-2011 BATHYMETRY.
3. DEPICTED BATHYMETRY AND DESIGN REFLECT CONDITIONS AT CROSS SECTION L. CONDITIONS MAY VARY AT OTHER CROSS SECTION LOCATIONS.
4. CAP LAYER THICKNESS SHOWN ARE MINIMUM REQUIRED THICKNESS. TARGET THICKNESS WITH OVER-PLACEMENT ARE SHOWN IN TABLE 1.
5. HORIZONTAL DATUM: WISCONSIN STATE PLANE - CENTRAL ZONE NAD83, U.S. SURVEY FEET.
6. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88), FEET.

LEGEND:

UPDATED SCENARIO 2 DREDGE PROFILE (OD) FROM PHASE 2

2015 POST-CONSTRUCTION BATHYMETRY

SEDIMENT CORE

CORE 4004-07 CORE ID

0 5' 10'
HORIZONTAL SCALE

1X VERTICAL EXAGGERATION

Figure 1

ANCHOR QEA

TETRA TECH EC, INC.
1611 STATE STREET
GREEN BAY, WI 54304
TEL: (920) 445-0720 FAX: (920) 445-0719

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION
1	07/19/16	MJC	TLB	SHC-100 AND CC-100 REVISED BASED ON PRE CAP RESULTS.

DESIGNED BY: P. LAROSA / D.BINKNEY
DRAWN BY: D.BINKNEY / M.CARLINO
CHECKED BY: P. LAROSA / T. BLACKMAR
APPROVED BY: T. BLACKMAR
SCALE: AS SHOWN
DATE: MARCH 24, 2016

LOWER FOX RIVER REMEDIAL DESIGN
PHASE 2B WORK PLAN
FOR 2016 REMEDIAL ACTION

OU 4B TYPICAL DREDGE AND CAP SECTIONS

DC-103

SHEET NO. 117 OF 122

Jul 26, 2016 1:12pm dbinkney ACAD • Boston/PROJECTS/080295-03 - FOX RIVER/2016_2016 RAWP/11 REV SHEETS - 06 - GP/120295-01-020-DC-SERIES-2016_RAWP-071316_Toe Berm_Rev6.dwg DC-103 GP-P1

BRENNAN

Fox River GP Shoreline Cap

Layer 2 - Filter Stone

Operational Unit 4

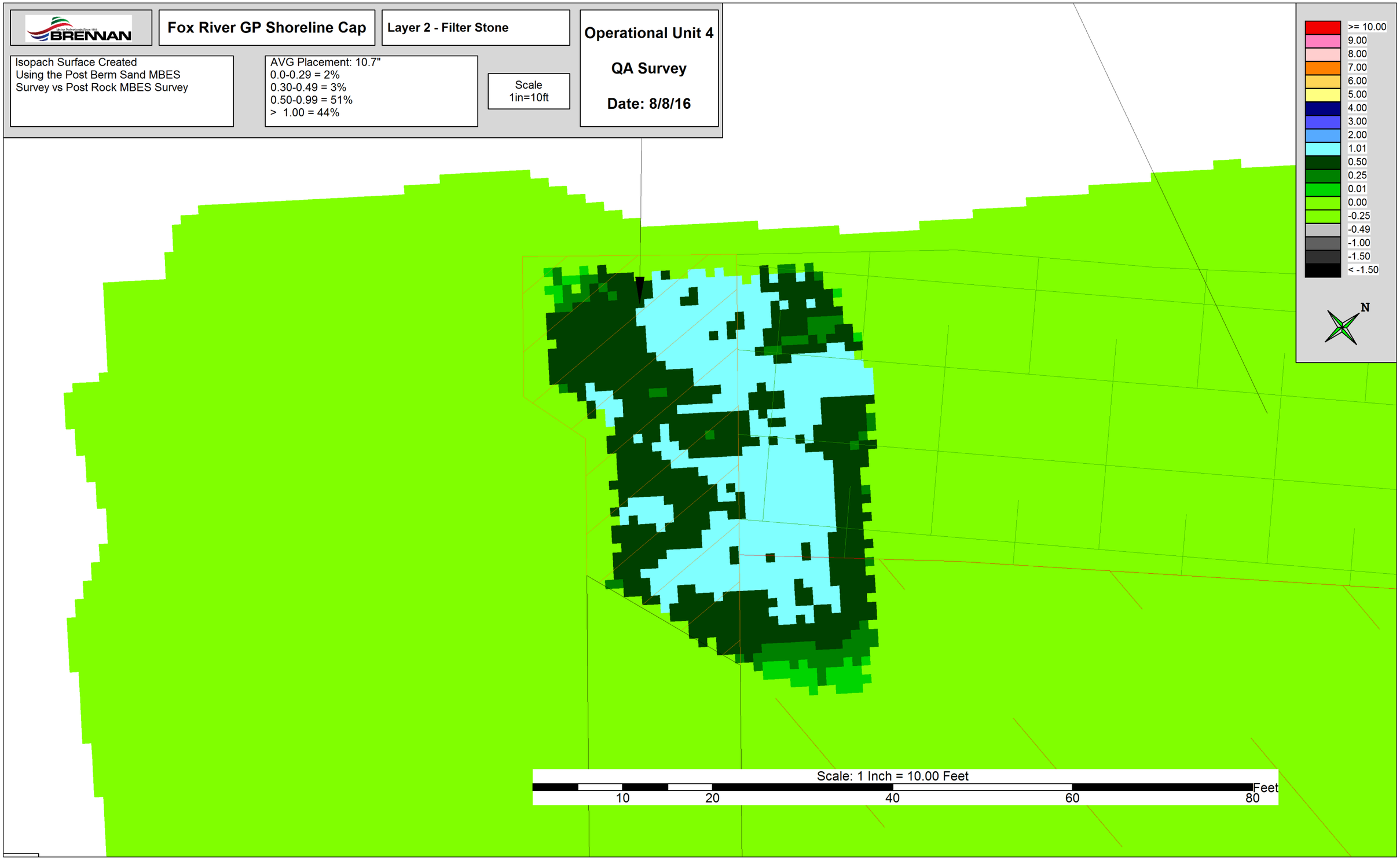
QA Survey

Date: 8/8/16

Isopach Surface Created
Using the Post Berm Sand MBES
Survey vs Post Rock MBES Survey

AVG Placement: 10.7"
0.0-0.29 = 2%
0.30-0.49 = 3%
0.50-0.99 = 51%
> 1.00 = 44%

Scale
1in=10ft



Kinnard, Hugh

From: George Berken <George.Berken@boldt.com>
Sent: Wednesday, August 10, 2016 4:55 PM
To: Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Roger.Kaminski@GaPac.com; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Denis Roznowski (Denis.Roznowski@Foth.com); ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Riley, KarenAnne; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Tara Van Hoof (Tara.VanHoof@Foth.com); Blackmar, Terri; Troy Gawronski (TGawronski@foth.com); dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc: AgenciesLFRTeam; LFR.OverSightTeam
Subject: 87500 OU2-5 - FW: Layer - 3 Heavy Rip Rap Toe Berm Verification
Attachments: 160810 Layer 3 Heavy Rip Rap Toe Berm Verification.pdf

Dustin, on behalf of the Agencies and on an exception basis, the attached verification package (submitted below in your email) for Layer 3 "Heavy Rip Rap Toe Berm" for the cap at D35U North cross section L, M, and N is acceptable because the primary function of this berm is to provide support for the chemical isolation and buttress sand.

Thanks,
George…

George A. Berken | Engineering Project Manager
P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

boldt.com

SafeThinking: Our Crusade to Eliminate Accidents

From: Dustin Bauman [mailto:dbauman@JFBRENNAN.COM]
Sent: Wednesday, August 10, 2016 4:05 PM
To: George Berken <George.Berken@boldt.com>; Larry DeBruin <Larry.Debruin@Boldt.com>; gary.kincaid@wisconsin.gov; Jay Grosskopf <Jay.Grosskopf@Boldt.com>; Ava Grosskopf <Ava.Grosskopf@boldt.com>
Cc: Bryan Heath (Bryan.Heath@ncr.com) <Bryan.Heath@ncr.com>; Jeff Lawson (JLawson@project-control.com) <JLawson@project-control.com>; Susan OConnell (soconnell@project-control.com) <soconnell@project-control.com>; 'Gawronski, Troy A' (Troy.Gawronski@Foth.com) <Troy.Gawronski@Foth.com>; (bill.coleman@tetratech.com) (bill.coleman@tetratech.com) <bill.coleman@tetratech.com>; 'George Willant (George.Willant@tetratech.com) <George.Willant@tetratech.com>; Feeney, Richard (Richard.Feeney@tetratech.com) <Richard.Feeney@tetratech.com>; Tabatabai, Morey (Morey.Tabatabai@tetratech.com) <Morey.Tabatabai@tetratech.com>; terri.blackmar@tetratech.com; Karenanne Riley (karenanne.riley@tetratech.com) <karenanne.riley@tetratech.com>; Lysne, Bjorn (Bjorn.Lysne@tetratech.com) <Bjorn.Lysne@tetratech.com>; Weston, Brandon (Brandon.Weston@tetratech.com) <Brandon.Weston@tetratech.com>; Kinnard, Hugh <Hugh.Kinnard@tetratech.com>; Greg Smith <gsmith@JFBRENNAN.COM>; Vic Buhr <vbuhr@JFBRENNAN.COM>; Daniel Huycke <dhuycke@JFBRENNAN.COM>; Dan McCauley <dmccauley@JFBRENNAN.COM>; Ryan Sands <rsands@JFBRENNAN.COM>; Brian Heuker <bheuker@JFBRENNAN.COM>; Gregory Cisar <gcisar@JFBRENNAN.COM>; Matt Dorow <mdorow@JFBRENNAN.COM>; Zack Meyers <zmeyers@JFBRENNAN.COM>; Stacey Schroeder <sschroeder@JFBRENNAN.COM>
Subject: Layer - 3 Heavy Rip Rap Toe Berm Verification

George,

See attached verification package for Layer 3 “Heavy Rip Rap Toe Berm” for the cap at D35U North cross section L,M, and N. The comparison drawing using the average point multibeam survey shows 85.5% target attainment. Tetra Tech/Brennan believes this percentage attained is acceptable as the purpose of the “Toe Berm” is to provide support for the chemical isolation and buttress sand that needs to be placed to the north of the berm. Additionally, this area will receive more heavy rip rap during the placement of Layer 8. Please let me know if it is acceptable to proceed forward.

Thanks,

Dustin Bauman
cell 608.406.1813
dbauman@jfbrennan.com

J.F. Brennan Company, Inc.
818 Bainbridge St., La Crosse, WI 54603
www.jfbrennan.com

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GP-P1

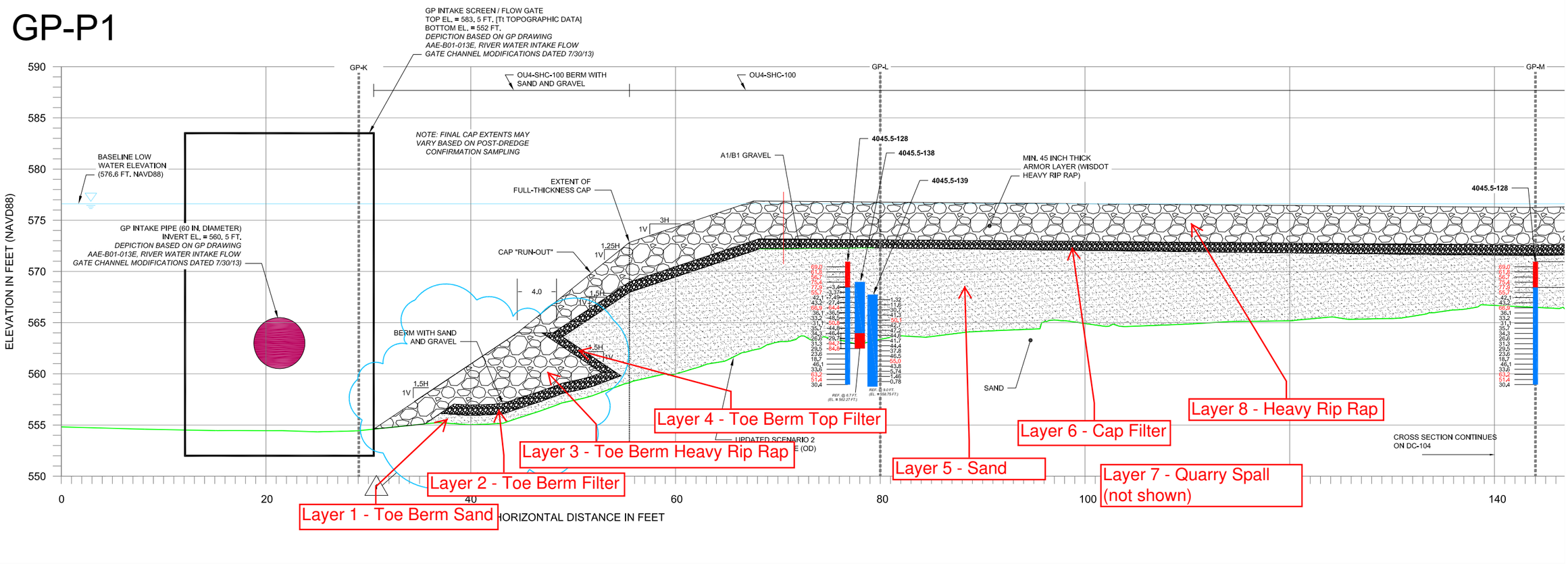

TABLE 1
SUMMARY OF CAP DESIGNS FOR D35U NORTH

CAP TYPE	MEDIAN DIAMETER OF ARMOR, D_{50} (INCHES)	MINIMUM LAYER THICKNESS [a] (INCHES)			CUMULATIVE LAYER THICKNESS [c] (INCHES)	AVERAGE PLACED LAYER THICKNESS [d] (INCHES)			PLACED TOTAL CAP THICKNESS [b] (INCHES)
		SAND	GRAVEL	ROCK ARMOR		SAND	GRAVEL	ROCK ARMOR	
MODIFIED CAP C	6 TO 9 [c]	11	6	12	29	14	9	18	41
SHORELINE CAP	15 [c]	11	12	45	68	14	15	60	89

GRAIN SIZE RATIOS	D_{15} : D_{85}
MODIFIED CAP C (D_{15} QUARRY SPALLS : D_{85} AQ/B1 FILTER)	1.4 OR LESS
MODIFIED CAP C (D_{15} A1/B1 FILTER : D_{85} SAND)	3.2 OR LESS
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NOTES:
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WISDOT HEAVY RIPRAP SPECIFICATION

606.2.1 Riprap Stone

(1) Furnish durable field or quarry stone that is sound, hard, dense, resistant to the action of air and water, and free of seams, cracks, or other structural defects. Use stone pieces with a length and width no more than twice the thickness. Do not place material without the engineer's approval of the stone quality, size, and shape.

(2) The department will determine the average dimension of stone pieces by averaging measurements of thickness, width, and length. Furnish stones conforming to the size requirements for the riprap grade the plans show. Size requirements are expressed as the percent of the gross in-place riprap volume occupied by stones within average dimension size ranges for each riprap grade as follows:

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>16	>20	>25	>30	0%
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9 - 11	11 - 14	14 - 18	18 - 22	15% - 21%
4 - 9	5 - 11	6.5 - 14	8 - 18	20% - 28%
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NOTES:

1. THIS DOCUMENT IS IN PREPARATION FOR REVIEW BY USEPA AND ITS FEDERAL AND STATE PARTNERS AND IS SUBJECT TO CHANGE.
2. ALL NOTES ON GENERAL NOTES SHEET T-3 APPLY.

SOURCE:

1. AERIAL SURVEY AND MAPPING WORK PERFORMED FOR THE WDNR BY THE RETEC GROUP CIRCA 2004.
2. DEPICTED BATHYMETRY REPRESENTS 2015 POST-CONSTRUCTION CONDITIONS WHERE APPLICABLE, BASED ON SURVEYS PERFORMED BY J.F. BRENNAN IN 2015. WHERE 2015 DATA IS NOT AVAILABLE, THE MOST RECENT SURVEY DATA WAS USED, INCLUDING 2015 PRE-SEASON BATHYMETRY AND POST-2011 BATHYMETRY.
3. DEPICTED BATHYMETRY AND DESIGN REFLECT CONDITIONS AT CROSS SECTION L. CONDITIONS MAY VARY AT OTHER CROSS SECTION LOCATIONS.
4. CAP LAYER THICKNESS SHOWN ARE MINIMUM REQUIRED THICKNESS. TARGET THICKNESS WITH OVER-PLACEMENT ARE SHOWN IN TABLE 1.
5. HORIZONTAL DATUM: WISCONSIN STATE PLANE - CENTRAL ZONE NAD83, U.S. SURVEY FEET.
6. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88), FEET.

LEGEND:

UPDATED SCENARIO 2 DREDGE PROFILE (OD) FROM PHASE 2

2015 POST-CONSTRUCTION BATHYMETRY

SEDIMENT CORE

CORE 4004-07 CORE ID

0 5' 10'
HORIZONTAL SCALE

1X VERTICAL EXAGGERATION

Figure 1

ANCHOR QEA

TETRA TECH EC, INC.
1611 STATE STREET
GREEN BAY, WI 54304
TEL: (920) 445-0720 FAX: (920) 445-0719

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION
1	07/19/16	MJC	TLB	SHC-100 AND CC-100 REVISED BASED ON PRE CAP RESULTS.

DESIGNED BY: P. LAROSA / D.BINKNEY
DRAWN BY: D.BINKNEY / M.CARLINO
CHECKED BY: P. LAROSA / T. BLACKMAR
APPROVED BY: T. BLACKMAR
SCALE: AS SHOWN
DATE: MARCH 24, 2016

LOWER FOX RIVER REMEDIAL DESIGN
PHASE 2B WORK PLAN
FOR 2016 REMEDIAL ACTION

OU 4B TYPICAL DREDGE AND CAP SECTIONS

DC-103

SHEET NO. 117 OF 122

Jul 26, 2016 1:12pm dbinkney ACAD • Boston/PROJECTS/080295-03 - FOX RIVER/2016_2016 RAWP/11 REV SHEETS - 06 - GP/120295-01-020-DC-SERIES-2016_RAWP-071316_Toe Berm_Rev6.dwg DC-103 GP-P1

BRENNAN

Fox River GP Shoreline Cap

Layer 3 - Toe Berm RipRap

Operational Unit 4

QA Survey

Date: 8/10/16

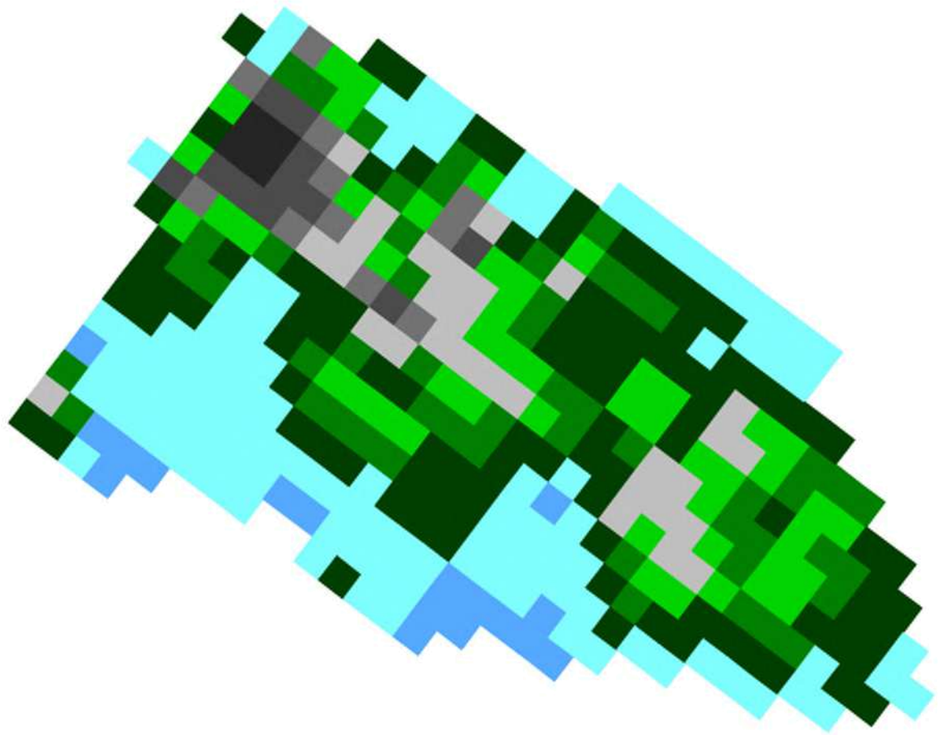
Isopach Surface Created Using the Post Berm RipRap MBES Survey vs Step 3 Toe Berm RipRap Design

Completion by SQ. Ft.: 85.5%

Survey Values were Computed as an average from the Multibeam QA survey

Values Below Design are Gray/Black and all other Colors Represent Placement that is Above Design

Scale 1in=5ft

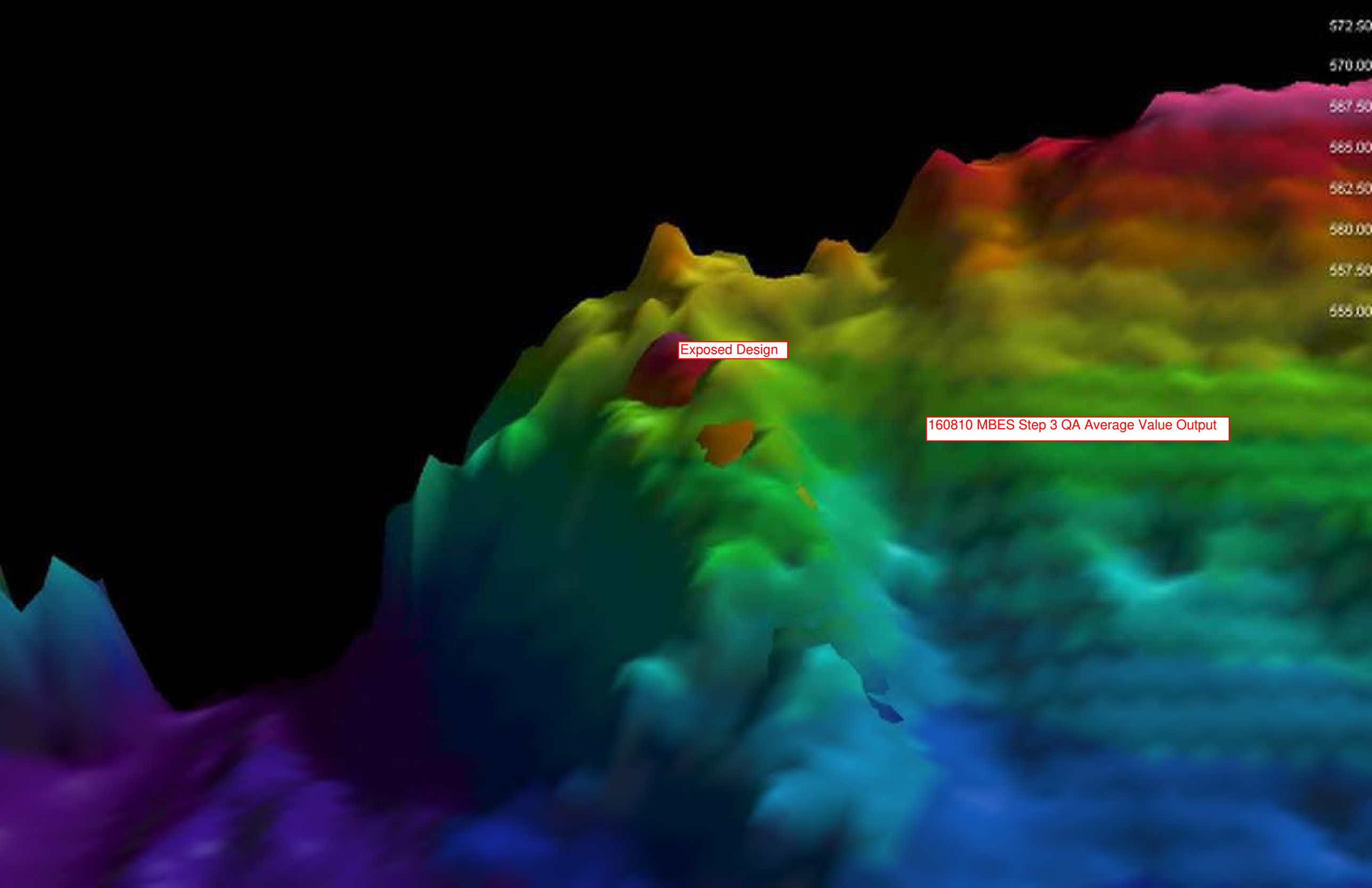


- >= 10.00
- 9.00 - 9.99
- 8.00 - 8.99
- 7.00 - 7.99
- 6.00 - 6.99
- 5.00 - 5.99
- 4.00 - 4.99
- 3.00 - 3.99
- 2.00 - 2.99
- 1.01 - 1.99
- 0.50 - 1.00
- 0.25 - 0.49
- 0.01 - 0.24
- 0.00 - 0.00
- -0.25 - -0.01
- -0.49 - -0.26
- -1.00 - -0.50
- -1.50 - -1.01
- < -1.50

N

Scale: 1 Inch = 5.00 Feet

5 10 20 30 40 Feet


572.50
570.00
567.50
565.00
562.50
560.00
557.50
555.00
Exposed Design
160810 MBES Step 3 QA Average Value Output

Kinnard, Hugh

From:	George Berken <George.Berken@boldt.com>
Sent:	Thursday, August 11, 2016 12:12 PM
To:	Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Roger.Kaminski@GaPac.com; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Denis Roznowski (Denis.Roznowski@Foth.com); ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Riley, KarenAnne; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Tara Van Hoof (Tara.VanHoof@Foth.com); Blackmar, Terri; Troy Gawronski (TGawronski@foth.com); dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc:	AgenciesLFRTeam; LFR.OverSightTeam
Subject:	87500 OU2-5 - FW: Layer- 4 Filter Layer Verification
Attachments:	160811 Layer 4 Filter Layer Berm Verification.pdf

Dustin, on behalf of the Agencies, the layer 4 filter layer for the SHC-100/CC-100 caps submitted in your email below is acceptable.

Thanks,
George…

George A. Berken | Engineering Project Manager

P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

boldt.com

SafeThinking: Our Crusade to Eliminate Accidents

From: Dustin Bauman [mailto:dbauman@JFBRENNAN.COM]
Sent: Thursday, August 11, 2016 11:54 AM
To: George Berken <George.Berken@boldt.com>; Larry DeBruin <Larry.Debruin@Boldt.com>; gary.kincaid@wisconsin.gov; Jay Grosskopf <Jay.Grosskopf@Boldt.com>; Ava Grosskopf <Ava.Grosskopf@boldt.com>
Cc: Bryan Heath (Bryan.Heath@ncr.com) <Bryan.Heath@ncr.com>; Jeff Lawson (JLawson@project-control.com) <JLawson@project-control.com>; Susan OConnell (soconnell@project-control.com) <soconnell@project-control.com>; 'Gawronski, Troy A' (Troy.Gawronski@Foth.com) <Troy.Gawronski@Foth.com>; (bill.coleman@tetratech.com) (bill.coleman@tetratech.com) <bill.coleman@tetratech.com>; 'George Willant (George.Willant@tetratech.com) <George.Willant@tetratech.com>; Feeney, Richard (Richard.Feeney@tetratech.com) <Richard.Feeney@tetratech.com>; Tabatabai, Morey (Morey.Tabatabai@tetratech.com) <Morey.Tabatabai@tetratech.com>; terri.blackmar@tetratech.com; Karenanne Riley (karenanne.riley@tetratech.com) <karenanne.riley@tetratech.com>; Lysne, Bjorn (Bjorn.Lysne@tetratech.com) <Bjorn.Lysne@tetratech.com>; Weston, Brandon (Brandon.Weston@tetratech.com) <Brandon.Weston@tetratech.com>; Kinnard, Hugh <Hugh.Kinnard@tetratech.com>; Greg Smith <gsmith@JFBRENNAN.COM>; Vic Buhr <vbuhr@JFBRENNAN.COM>; Daniel Huycke <dhuycke@JFBRENNAN.COM>; Dan McCauley <dmccauley@JFBRENNAN.COM>; Ryan Sands <rsands@JFBRENNAN.COM>; Brian Heuker <bheuker@JFBRENNAN.COM>; Gregory Cisar <gcisar@JFBRENNAN.COM>; Matt Dorow <mdorow@JFBRENNAN.COM>; Zack Meyers <zmeyers@JFBRENNAN.COM>; Stacey Schroeder <sschroeder@JFBRENNAN.COM>; Paul Montney (PAMontne@GaPac.Com) <PAMontne@GaPac.Com>
Subject: Layer- 4 Filter Layer Verification

George,

Please see attached package for layer 4 “Filter Layer” verification. 97% of the area either meets or exceeds the minimum requirement of 6 inches, which meets the 90% attainment goal. Please confirm this is acceptable.

Thanks,

Dustin Bauman
cell 608.406.1813
dbauman@jfbrennan.com

J.F. Brennan Company, Inc.
818 Bainbridge St., La Crosse, WI 54603
www.jfbrennan.com

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GP-P1

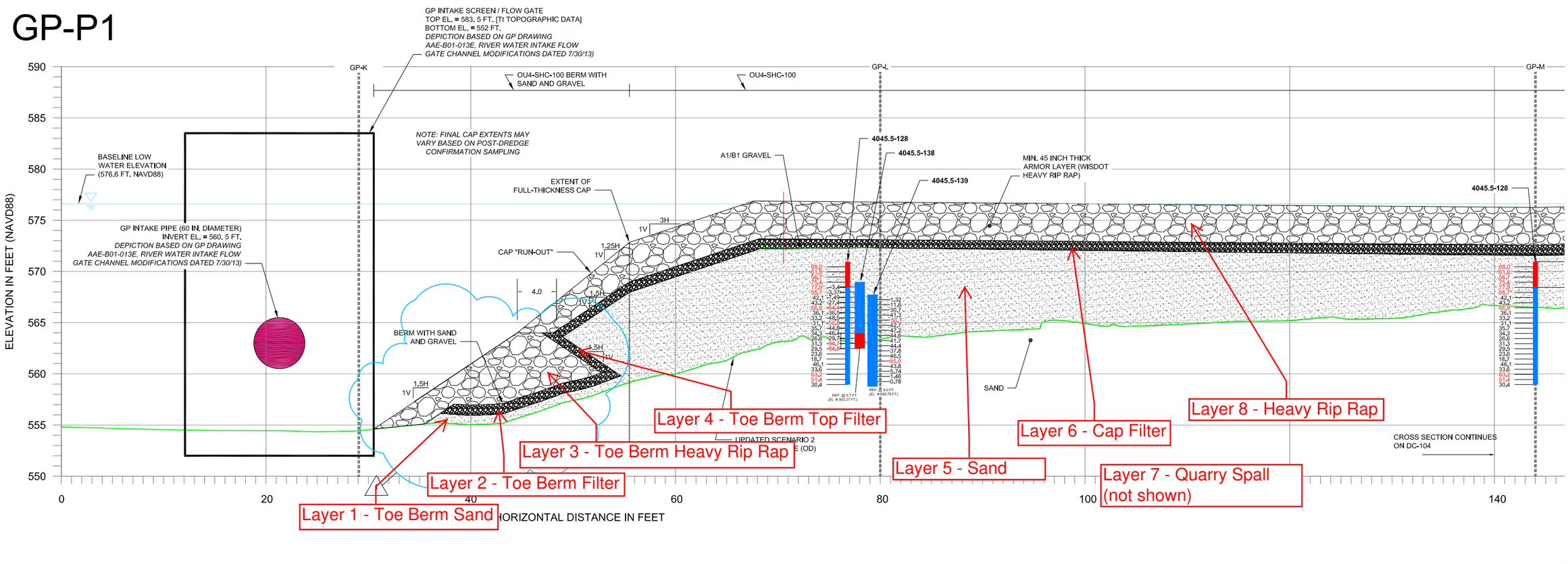


TABLE 1
SUMMARY OF CAP DESIGNS FOR D35U NORTH

CAP TYPE	MEDIAN DIAMETER OF ARMOR, D_{50} (INCHES)	MINIMUM LAYER THICKNESS [a] (INCHES)			CUMULATIVE LAYER THICKNESS [c] (INCHES)	AVERAGE PLACED LAYER THICKNESS [d] (INCHES)			PLACED TOTAL CAP THICKNESS [b] (INCHES)
		SAND	GRAVEL	ROCK ARMOR		SAND	GRAVEL	ROCK ARMOR	
MODIFIED CAP C	6 TO 9 [c]	11	6	12	29	14	9	18	41
SHORELINE CAP	15 [c]	11	12	45	68	14	15	60	89

GRAIN SIZE RATIOS	D_{15} : D_{85}
MODIFIED CAP C (D_{15} QUARRY SPALLS : D_{85} AQ/B1 FILTER)	1.4 OR LESS
MODIFIED CAP C (D_{15} A1/B1 FILTER : D_{85} SAND)	3.2 OR LESS
SHORELINE CAP (D_{15} HEAVY RIP RAP : D_{85} A1/B1/ FILTER)	1.5 TO 3.2

NOTES:
a. MINIMUM REQUIRED THICKNESS BASED ON USEPA/USACE DESIGN GUIDANCE. NOTE THAT FOR THE MODIFIED CAP C, THE 3-INCH GRAVEL LAYER IS A FILTER LAYER, NOT GRAVEL ARMOR.
b. THE CONTRACTOR WILL BE REQUIRED TO PLACE ENOUGH MATERIAL (AS MEASURED BY PLACEMENT LOGS) TO ACHIEVE TARGET THICKNESSES THAT ARE CONSISTENT WITH THE ROD AMENDMENT AND THE SIGNED EXPLANATION OF SIGNIFICANT DIFFERENCES DATED FEBRUARY 2010 (SEE CQAPP FOR ADDITIONAL DETAILS OF THICKNESS VERIFICATION).
c. ROCK ARMOR SIZE BASED ON SITE-SPECIFIC EROSION ANALYSIS.
d. THE HIGHEST POTENTIALLY REMAINING PCB CONCENTRATION WITHIN THE D35U NORTH CAP AREA IS 215 PPM. CHEMICAL ISOLATION MODELING CONDUCTED CONSISTENT WITH THE 100 PERCENT DESIGN INDICATES THAT A 17.8 CM (7 INCH) CHEMICAL ISOLATION LAYER WOULD PROVIDE ADEQUATE PROTECTION FOR PCB CONCENTRATIONS UP TO 250 PPM.

WISDOT HEAVY RIPRAP SPECIFICATION

606.2.1 Riprap Stone

(1) Furnish durable field or quarry stone that is sound, hard, dense, resistant to the action of air and water, and free of seams, cracks, or other structural defects. Use stone pieces with a length and width no more than twice the thickness. Do not place material without the engineer's approval of the stone quality, size, and shape.

(2) The department will determine the average dimension of stone pieces by averaging measurements of thickness, width, and length. Furnish stones conforming to the size requirements for the riprap grade the plans show. Size requirements are expressed as the percent of the gross in-place riprap volume occupied by stones within average dimension size ranges for each riprap grade as follows:

AVERAGE DIMENSION RANGES FOR EACH RIPRAP GRADE				FRACTION OF GROSS
LIGHT RIPRAP inches	MEDIUM RIPRAP inches	HEAVY RIPRAP inches	EXTRA-HEAVY RIPRAP inches	IN-PLACE RIPRAP VOLUME OCCUPIED BY STONES
>16	>20	>25	>30	0%
11 - 13	14 - 16	18 - 20	22 - 25	10% - 14%
9 - 11	11 - 14	14 - 18	18 - 22	15% - 21%
4 - 9	5 - 11	6.5 - 14	8 - 18	20% - 28%
<4	<5	<6.5	<8	5% - 7%
<1	<1	<1	<1	2% or less

NOTES:

1. THIS DOCUMENT IS IN PREPARATION FOR REVIEW BY USEPA AND ITS FEDERAL AND STATE PARTNERS AND IS SUBJECT TO CHANGE.
2. ALL NOTES ON GENERAL NOTES SHEET T-3 APPLY.

SOURCE:

1. AERIAL SURVEY AND MAPPING WORK PERFORMED FOR THE WDNR BY THE RETEC GROUP CIRCA 2004.
2. DEPICTED BATHYMETRY REPRESENTS 2015 POST-CONSTRUCTION CONDITIONS WHERE APPLICABLE, BASED ON SURVEYS PERFORMED BY J.F. BRENNAN IN 2015. WHERE 2015 DATA IS NOT AVAILABLE, THE MOST RECENT SURVEY DATA WAS USED, INCLUDING 2015 PRE-SEASON BATHYMETRY AND POST-2011 BATHYMETRY.
3. DEPICTED BATHYMETRY AND DESIGN REFLECT CONDITIONS AT CROSS SECTION L. CONDITIONS MAY VARY AT OTHER CROSS SECTION LOCATIONS.
4. CAP LAYER THICKNESS SHOWN ARE MINIMUM REQUIRED THICKNESS. TARGET THICKNESS WITH OVER-PLACEMENT ARE SHOWN IN TABLE 1.
5. HORIZONTAL DATUM: WISCONSIN STATE PLANE - CENTRAL ZONE NAD83, U.S. SURVEY FEET.
6. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88), FEET.

LEGEND:

UPDATED SCENARIO 2 DREDGE PROFILE (OD) FROM PHASE 2

2015 POST-CONSTRUCTION BATHYMETRY

SEDIMENT CORE

CORE 4004-07 CORE ID

0 5' 10'
HORIZONTAL SCALE

1X VERTICAL EXAGGERATION

Figure 1

ANCHOR QEA

TETRA TECH EC, INC.
1611 STATE STREET
GREEN BAY, WI 54304
TEL: (920) 445-0720 FAX: (920) 445-0719

REVISIONS

REV	DATE	BY	APP'D	DESCRIPTION
1	07/19/16	MJC	TLB	SHC-100 AND CC-100 REVISED BASED ON PRE CAP RESULTS.

DESIGNED BY: P. LAROSA / D.BINKNEY
DRAWN BY: D.BINKNEY / M.CARLINO
CHECKED BY: P. LAROSA / T. BLACKMAR
APPROVED BY: T. BLACKMAR
SCALE: AS SHOWN
DATE: MARCH 24, 2016

LOWER FOX RIVER REMEDIAL DESIGN
PHASE 2B WORK PLAN
FOR 2016 REMEDIAL ACTION

OU 4B TYPICAL DREDGE AND CAP SECTIONS

DC-103

SHEET NO. 117 OF 122

Jul 26, 2016 1:12pm dbinkney ACAD • Boston/PROJECTS/080295-03 - FOX RIVER/2016_2016 RAWP/11 REV SHEETS - 06 - GP/120295-01-020-DC-SERIES-2016_RAWP-071316_Toe Berm_Rev6.dwg DC-103 GP-P1

BRENNAN

Fox River GP Shoreline Cap

Layer 4-Berm Type 1 Rock Top

Isopach Surface Created Using the Post Berm Type 1 Rock MBES Survey vs Post Berm RipRap MBES Survey

Percent of Type 1 Rock Placement above 6 inches: 97.9%

Survey Values were Computed as an average from the Multibeam QA

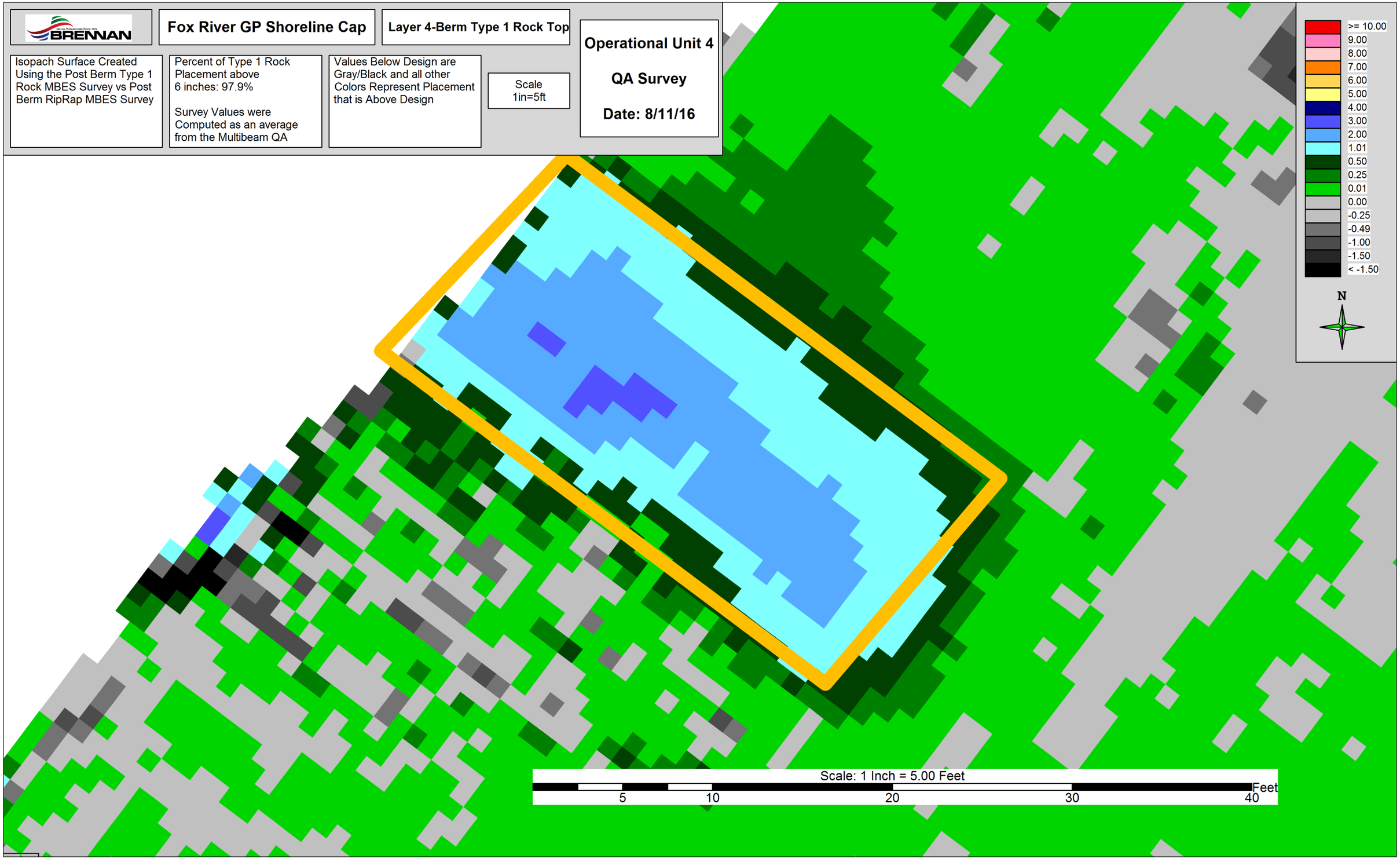
Values Below Design are Gray/Black and all other Colors Represent Placement that is Above Design

Scale 1in=5ft

Operational Unit 4

QA Survey

Date: 8/11/16



Kinnard, Hugh

From: Larry DeBruin <Larry.Debruin@Boldt.com>
Sent: Thursday, August 25, 2016 10:16 AM
To: Weston, Brandon; George Berken; Jay Grosskopf; Kincaid, Gary W - DNR (Gary.Kincaid@Wisconsin.gov); Ava Grosskopf; Philip R. Brochocki (pbrochocki@naturalrt.com); Coleman, Bill; Willant, George; Blackmar, Terri; Feeney, Richard; Bauer, Eric; Kinnard, Hugh; Gifford, Ricky; Lysne, Bjorn; ECI.LFRR Project Correspondence; Miller, Michelle; Keon, Kendra; 'Jeffrey Lawson' (JLawson@project-control.com); 'Susan O'Connell' (SOConnell@project-control.com); 'Bryan Heath'; Paul Montney; Kaminski, Roger (GBY); Gawronski, Troy A (Troy.Gawronski@Foth.com)
Subject: RE: LFRR-16-0113 Final Sand Thickness Verification Results SHC100-CC100 Layer 5
Attachments: OU4-SHC100-CC100_08-24-16 Final Table BERKEN.pdf

Brandon, On behalf of the Agencies, the sand thickness verification results for the area listed below is acceptable. Signed results table are attached

Larry J. DeBruin | Sr. Project Engineer
P: 920-225-6118 // **C:** 920-427-6011
E: larry.debruin@boldt.com
2525 N. Roemer Road // PO Box 419 // Appleton, WI 54912-0419

boldt.com

SafeThinking: Our Crusade to Eliminate Accidents

From: Weston, Brandon [mailto:Brandon.Weston@tetratech.com]
Sent: Thursday, August 25, 2016 9:42 AM
To: George Berken <George.Berken@boldt.com>; Jay Grosskopf <Jay.Grosskopf@Boldt.com>; Kincaid, Gary W - DNR (Gary.Kincaid@Wisconsin.gov) <Gary.Kincaid@Wisconsin.gov>; Larry DeBruin <Larry.Debruin@Boldt.com>; Ava Grosskopf <Ava.Grosskopf@boldt.com>; Philip R. Brochocki (pbrochocki@naturalrt.com) <pbrochocki@naturalrt.com>; Coleman, Bill <Bill.Coleman@tetratech.com>; Willant, George <George.Willant@tetratech.com>; Blackmar, Terri <Terri.Blackmar@tetratech.com>; Feeney, Richard <Richard.Feeney@tetratech.com>; Bauer, Eric <Eric.Bauer@tetratech.com>; Kinnard, Hugh <Hugh.Kinnard@tetratech.com>; Gifford, Ricky <ricky.gifford@tetratech.com>; Lysne, Bjorn <Bjorn.Lysne@tetratech.com>; ECI.LFRR Project Correspondence <ECI.LFRRPC@tetratech.com>; Miller, Michelle <Michelle.Miller@tetratech.com>; Keon, Kendra <Kendra.Keon@tetratech.com>; 'Jeffrey Lawson' (JLawson@project-control.com) <JLawson@project-control.com>; 'Susan O'Connell' (SOConnell@project-control.com) <SOConnell@project-control.com>; 'Bryan Heath' <bryan.heath@ncr.com>; Paul Montney <PAMontne@GaPac.Com>; Kaminski, Roger (GBY) <ROGER.KAMINSKI@GAPAC.com>; Gawronski, Troy A (Troy.Gawronski@Foth.com) <Troy.Gawronski@Foth.com>
Subject: LFRR-16-0113 Final Sand Thickness Verification Results SHC100-CC100 Layer 5

All,

Please find the attached final result table, corresponding progress map, and J.F. Brennan Isopach for your review. The map is provided as a reference only for the proposed sample locations for the following area:

- SHC100-CC100 Layer 5

Below is the link to SharePoint site where the results are available for review:

https://sites.tetratech.com/projects/106-lowerfoxriver/default.aspx?RootFolder=%2Fprojects%2F106%2Dlowerfoxriver%2FSharedDocuments%2F2016%2FCap%20and%20Cover%2FCover&FolderCTID=0x01200056916E5249BC0440B41F789C9281BE08&View={B4DA9CDD-CA02-4C44-B591-B2824CC14A8A}

Regards,

Brandon Weston | **Sample Department Lead**
Office: 920.445.0743
Mobile: 906.204.5324
brandon.weston@tetratech.com

Tetra Tech | RCM
1611 State Street | Green Bay, WI 54304| www.tetratech.com

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OU4-SHC100-CC100											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CC100-C1	8/24/2016	11.0	0.0	11.0	11.0	557.50	246175.95	2482552.57	246179.54	2482553.03	
CC100-C2	8/24/2016	22.5	0.0	22.5	11.0	558.21	246200.88	2482573.84	246197.37	2482570.72	Sediment plug not achieved
CC100-C3R	8/24/2016	14.5	0.0	14.5	11.0	557.87	246229.59	2482599.13	246228.78	2482598.64	
CC100-C4	8/24/2016	21.5	0.0	21.5	11.0	558.88	246258.83	2482621.30	246259.34	2482623.06	
CC100-C5	8/24/2016	21.0	0.0	21.0	11.0	560.18	246277.54	2482632.77	246276.96	2482634.01	Sediment plug not achieved
CC100-C6	8/24/2016	20.5	0.0	20.5	11.0	559.68	246291.98	2482648.86	246290.75	2482645.26	Sediment plug not achieved

Average	18.50	0.00	18.50
Median	20.75	0.00	20.75
Standard Deviation	4.64	0.00	4.64

Recommended Path Forward:

Verification samples were collected in 6 locations within OU4-SHC100-CC100. 6 of 6 samples meet or exceed the minimum thickness requirement of 11-inches, therefore, no further is action required. Location C3 was recorded 4.2' from proposed location which started to encroach the eastern boundary limits. The sample vessel was repositioned closer to the proposed location and recollected as location C3R.

Prepared by: HNK Date: 8/24/2016 Reviewed by: BSW Date: 8/24/2016

A/OT Acceptance: Date: 8/25/16

Kinnard, Hugh

From: George Berken <George.Berken@boldt.com>
Sent: Monday, August 29, 2016 1:26 PM
To: Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Roger.Kaminski@GaPac.com; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Denis Roznowski (Denis.Roznowski@Foth.com); ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Tara Van Hoof (Tara.VanHoof@Foth.com); Blackmar, Terri; Troy Gawronski (TGawronski@foth.com); dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc: AgenciesLFRTeam; LFR.OverSightTeam
Subject: 87500 OU2-5 - FW: Layer- 6 Filter Layer Verification
Attachments: 160826 Layer 6 Verification.pdf

Dustin, on behalf of the Agencies, the submittal, in your email below for layer 6 (filter layer), is acceptable.

Thanks,
George…

George A. Berken | Engineering Project Manager
P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

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SafeThinking: Our Crusade to Eliminate Accidents

From: Dustin Bauman [mailto:dbauman@JFBRENNAN.COM]
Sent: Monday, August 29, 2016 11:40 AM
To: Gawronski, Troy A <Troy.Gawronski@Foth.com>; Matt Dorow <mdorow@JFBRENNAN.COM>; Bryan Heath (Bryan.Heath@ncr.com) <Bryan.Heath@ncr.com>; Jeff Lawson (JLawson@project-control.com) <JLawson@project-control.com>; Susan OConnell (soconnell@project-control.com) <soconnell@project-control.com>; George Berken <George.Berken@boldt.com>; Larry DeBruin <Larry.Debruin@Boldt.com>; gary.kincaid@wisconsin.gov; Jay Grosskopf <Jay.Grosskopf@Boldt.com>; Ava Grosskopf <Ava.Grosskopf@boldt.com>
Cc: (bill.coleman@tetratech.com) (bill.coleman@tetratech.com) <bill.coleman@tetratech.com>; 'George Willant (George.Willant@tetratech.com) <George.Willant@tetratech.com>; Feeney, Richard (Richard.Feeney@tetratech.com) <Richard.Feeney@tetratech.com>; Tabatabai, Morey (Morey.Tabatabai@tetratech.com) <Morey.Tabatabai@tetratech.com>; terri.blackmar@tetratech.com; Karenanne Riley (karenanne.riley@tetratech.com) <karenanne.riley@tetratech.com>; Lysne, Bjorn (Bjorn.Lysne@tetratech.com) <Bjorn.Lysne@tetratech.com>; Weston, Brandon (Brandon.Weston@tetratech.com) <Brandon.Weston@tetratech.com>; Kinnard, Hugh <Hugh.Kinnard@tetratech.com>; shane.nelson@tetratech.com; Greg Smith <gsmith@JFBRENNAN.COM>; Vic Buhr <vbuhr@JFBRENNAN.COM>; Daniel Huycke <dhuycke@JFBRENNAN.COM>; Dan McCauley <dmccauley@JFBRENNAN.COM>; Ryan Sands <rsands@JFBRENNAN.COM>; Brian Heuker <bheuker@JFBRENNAN.COM>; Gregory Cisar <gcisar@JFBRENNAN.COM>; Zack Meyers <zmeyers@JFBRENNAN.COM>; Stacey Schroeder <sschroeder@JFBRENNAN.COM>; Paul Montney (PAMontne@GaPac.Com) <PAMontne@GaPac.Com>
Subject: Layer- 6 Filter Layer Verification

George,

Per our OTS earlier with the Agencies, Foth, Tetra Tech and Brennan attached is the submittal for layer 6 filter layer approval. As discussed in the OTS 90.3% of the area meets or exceeds the 6 inch minimum thickness. It is understood that after the placement of CB20 and cap extensions to the north, further filter layer will be required to meet the extents of CC100.

Thanks,

Dustin Bauman
cell 608.406.1813
dbauman@jfbrennan.com

J.F. Brennan Company, Inc.
818 Bainbridge St., La Crosse, WI 54603
www.jfbrennan.com

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BRENNAN

CC100-SCH100-Filter Layer 6

Post Step 6 Placement vs Post Step 5 Placement

Operational Unit 4

QA Survey

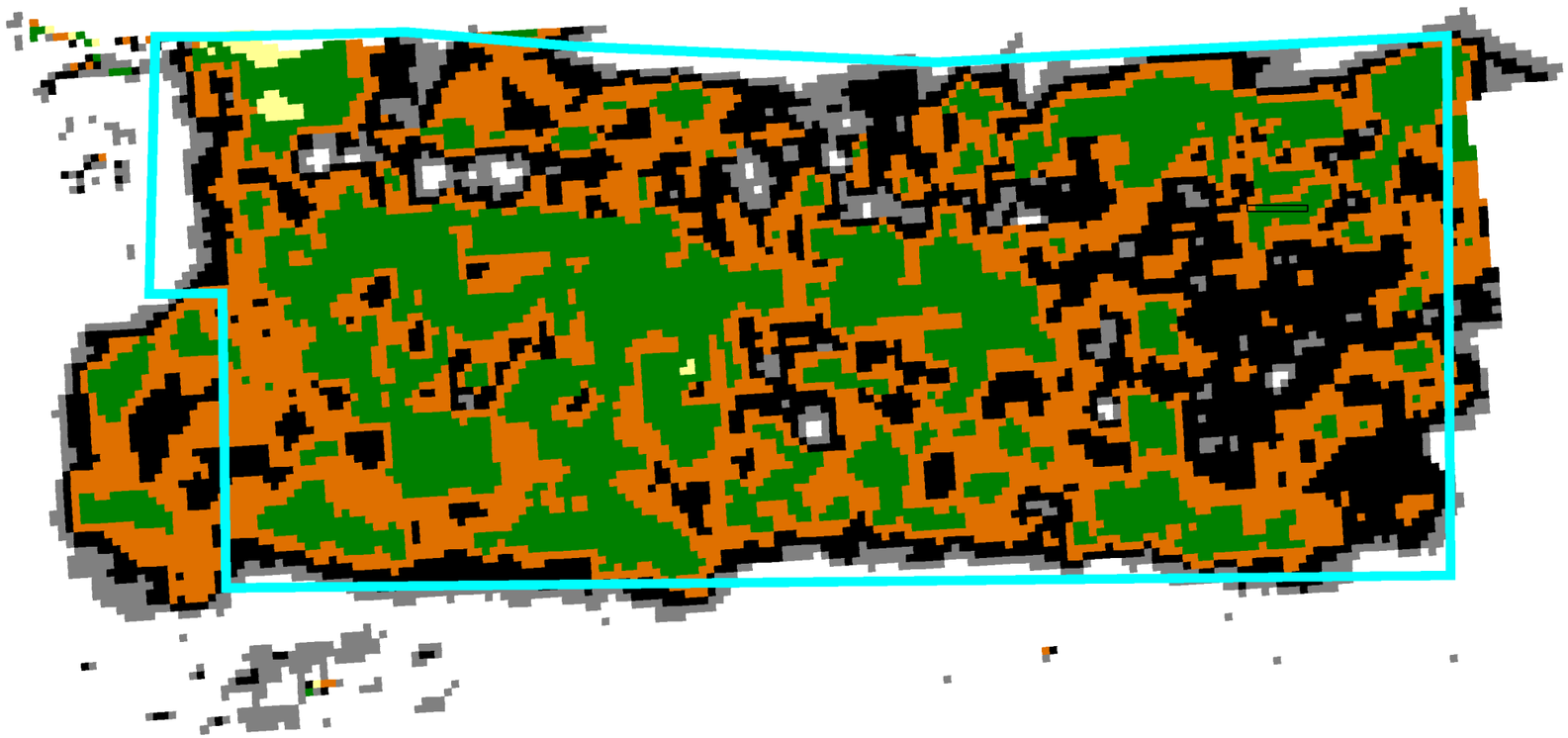
Date: 08/26/16

CC100-SHC100
Step 6 Filter Rock Layer
Isopach Based on
160826 MBES QA Survey
vs 160824 MBES QA Survey

Percent Complete within Placement area that is at or above 6 Inches: 90.3%

Cyan Border Represents Layer 6 Placement Limits

Scale
1in=20ft



- >= 1.76
- 1.00 - 1.75
- 0.76 - 0.99
- 0.51 - 0.75
- 0.30 - 0.50
- 0.00 - 0.29
- < 0.00

N

Scale: 1 Inch = 20.00 Feet

10 20 40 60 80 Feet

Kinnard, Hugh

From:	George Berken <George.Berken@boldt.com>
Sent:	Tuesday, August 30, 2016 3:47 PM
To:	Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Roger.Kaminski@GaPac.com; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Denis Roznowski (Denis.Roznowski@Foth.com); ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Tara Van Hoof (Tara.VanHoof@Foth.com); Blackmar, Terri; Troy Gawronski (TGawronski@foth.com); dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc:	AgenciesLFRTeam; LFR.OverSightTeam
Subject:	87500 OU2-5 - FW: Layer- 7 Quarry Spall Verification
Attachments:	160830 SHC100_CC100 Post Step 7 vs Post Step 6.pdf

Matt, on behalf of the Agencies, the isopach map submitted below in your email for layer 7 is acceptable.

Thanks,
George…

George A. Berken | Engineering Project Manager

P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

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SafeThinking: Our Crusade to Eliminate Accidents

From: Matt Dorow [mailto:mdorow@JFBRENNAN.COM]
Sent: Tuesday, August 30, 2016 3:08 PM
To: Dustin Bauman <dbauman@JFBRENNAN.COM>; Gawronski, Troy A <Troy.Gawronski@Foth.com>; Bryan Heath (Bryan.Heath@ncr.com) <Bryan.Heath@ncr.com>; Jeff Lawson (JLawson@project-control.com) <JLawson@project-control.com>; Susan OConnell (soconnell@project-control.com) <soconnell@project-control.com>; George Berken <George.Berken@boldt.com>; Larry DeBruin <Larry.Debruin@Boldt.com>; gary.kincaid@wisconsin.gov; Jay Grosskopf <Jay.Grosskopf@Boldt.com>; Ava Grosskopf <Ava.Grosskopf@boldt.com>
Cc: (bill.coleman@tetratech.com) (bill.coleman@tetratech.com) <bill.coleman@tetratech.com>; 'George Willant (George.Willant@tetratech.com) <George.Willant@tetratech.com>; Feeney, Richard (Richard.Feeney@tetratech.com) <Richard.Feeney@tetratech.com>; Tabatabai, Morey (Morey.Tabatabai@tetratech.com) <Morey.Tabatabai@tetratech.com>; terri.blackmar@tetratech.com; Karenanne Riley (karenanne.riley@tetratech.com) <karenanne.riley@tetratech.com>; Lysne, Bjorn (Bjorn.Lysne@tetratech.com) <Bjorn.Lysne@tetratech.com>; Weston, Brandon (Brandon.Weston@tetratech.com) <Brandon.Weston@tetratech.com>; Kinnard, Hugh <Hugh.Kinnard@tetratech.com>; shane.nelson@tetratech.com; Greg Smith <gsmith@JFBRENNAN.COM>; Vic Buhr <vbuhr@JFBRENNAN.COM>; Daniel Huycke <dhuycke@JFBRENNAN.COM>; Dan McCauley <dmccauley@JFBRENNAN.COM>; Ryan Sands <rsands@JFBRENNAN.COM>; Brian Heuker <bheuker@JFBRENNAN.COM>; Gregory Cisar <gcisar@JFBRENNAN.COM>; Zack Meyers <zmeyers@JFBRENNAN.COM>; Stacey Schroeder <sschroeder@JFBRENNAN.COM>; Paul Montney (PAMontne@GaPac.Com) <PAMontne@GaPac.Com>
Subject: Layer- 7 Quarry Spall Verification

George,

Per our OTS earlier with the Agencies, Foth, Tetra Tech and Brennan attached is the submittal for approval of placement of layer 7 quarry spall. As discussed in the OTS 86% of the area meets or exceeds the 12 inch minimum thickness. It is understood that after the placement of CB20 and cap extensions to the north, further quarry spall will be required to meet the extents of CC100.

Regards,

Matthew Dorow
Project Engineer
Cell: (608) 780-0471

J.F. Brennan Company, Inc.
818 Bainbridge St., La Crosse, WI 54603
www.jfbrennan.com

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BRENNAN	CC100-SHC100- Layer 7	Post Layer 7 Placement vs Post Layer 6 Placement	Operational Unit 4 QA Survey Date: 8/30/16

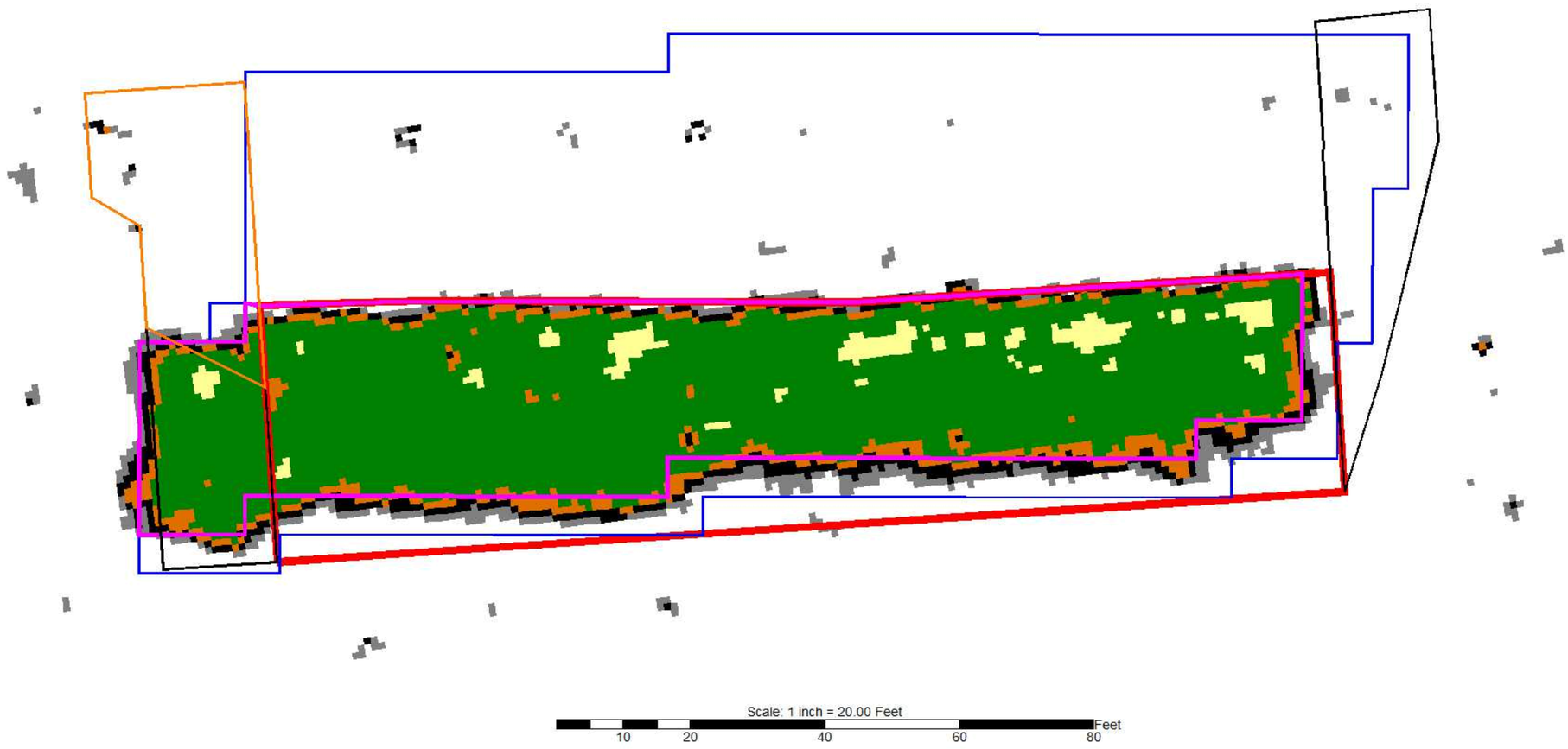
SHC100-CC100
Layer 7 Quarry Spall
Isopach Based on
160830 MBES QA Survey vs.
160826 MBES QA Survey

Target Placement Height
Between 12" and 18"

Percent Complete
above 12": 86%

Magenta Border:
Placement Extents
Red Border: Design Extents
Blue Border: Filter Rock
Placement Extents

Scale
1in=20ft



Kinnard, Hugh

From:	George Berken <George.Berken@boldt.com>
Sent:	Wednesday, September 07, 2016 9:04 AM
To:	Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Roger.Kaminski@GaPac.com; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Denis Roznowski (Denis.Roznowski@Foth.com); ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Tara Van Hoof (Tara.VanHoof@Foth.com); Blackmar, Terri; Troy Gawronski (TGawronski@foth.com); dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc:	AgenciesLFRTeam; LFR.OverSightTeam
Subject:	87500 OU2-5 - FW: Layer- 8 Rip Rap Verification
Attachments:	160902 Post Step 8 vs Post Step 7.pdf

Matt, on behalf of the Agencies, the layer 8 partial submittal in your email below is acceptable.

Thanks,
George…

George A. Berken | Engineering Project Manager

P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

boldt.com

SafeThinking: Our Crusade to Eliminate Accidents

From: Matt Dorow [mailto:mdorow@JFBRENNAN.COM]
Sent: Wednesday, September 07, 2016 8:51 AM
To: Dustin Bauman <dbauman@JFBRENNAN.COM>; Gawronski, Troy A <Troy.Gawronski@Foth.com>; Bryan Heath (Bryan.Heath@ncr.com) <Bryan.Heath@ncr.com>; Jeff Lawson (JLawson@project-control.com) <JLawson@project-control.com>; Susan OConnell (soconnell@project-control.com) <soconnell@project-control.com>; George Berken <George.Berken@boldt.com>; Larry DeBruin <Larry.Debruin@Boldt.com>; gary.kincaid@wisconsin.gov; Jay Grosskopf <Jay.Grosskopf@Boldt.com>; Ava Grosskopf <Ava.Grosskopf@boldt.com>
Cc: (bill.coleman@tetratech.com) (bill.coleman@tetratech.com) <bill.coleman@tetratech.com>; 'George Willant (George.Willant@tetratech.com) <George.Willant@tetratech.com>; Feeney, Richard (Richard.Feeney@tetratech.com) <Richard.Feeney@tetratech.com>; Tabatabai, Morey (Morey.Tabatabai@tetratech.com) <Morey.Tabatabai@tetratech.com>; terri.blackmar@tetratech.com; Karenanne Riley (karenanne.riley@tetratech.com) <karenanne.riley@tetratech.com>; Lysne, Bjorn (Bjorn.Lysne@tetratech.com) <Bjorn.Lysne@tetratech.com>; Weston, Brandon (Brandon.Weston@tetratech.com) <Brandon.Weston@tetratech.com>; Kinnard, Hugh <Hugh.Kinnard@tetratech.com>; shane.nelson@tetratech.com; Greg Smith <gsmith@JFBRENNAN.COM>; Vic Buhr <vbuhr@JFBRENNAN.COM>; Daniel Huycke <dhuycke@JFBRENNAN.COM>; Dan McCauley <dmccauley@JFBRENNAN.COM>; Ryan Sands <rsands@JFBRENNAN.COM>; Brian Heuker <bheuker@JFBRENNAN.COM>; Gregory Cisar <gcisar@JFBRENNAN.COM>; Zack Meyers <zmeyers@JFBRENNAN.COM>; Stacey Schroeder <sschroeder@JFBRENNAN.COM>; Paul Montney (PAMontne@GaPac.Com) <PAMontne@GaPac.Com>
Subject: Layer- 8 Rip Rap Verification

George,

Per our OTS earlier today with the Agencies, Foth, Tetra Tech and Brennan, attached is the submittal for approval of placement of layer 8 rip rap. As discussed in the OTS 86% of the area meets or exceeds the 26 inch minimum thickness. It is understood that after the placement of CB20 and cap extensions to the north, further rip rap will be required to meet the extents of SHC100.

Regards,

Matthew Dorow
Project Engineer
Cell: (608) 780-0471

J.F. Brennan Company, Inc.
818 Bainbridge St., La Crosse, WI 54603
www.jfbrennan.com

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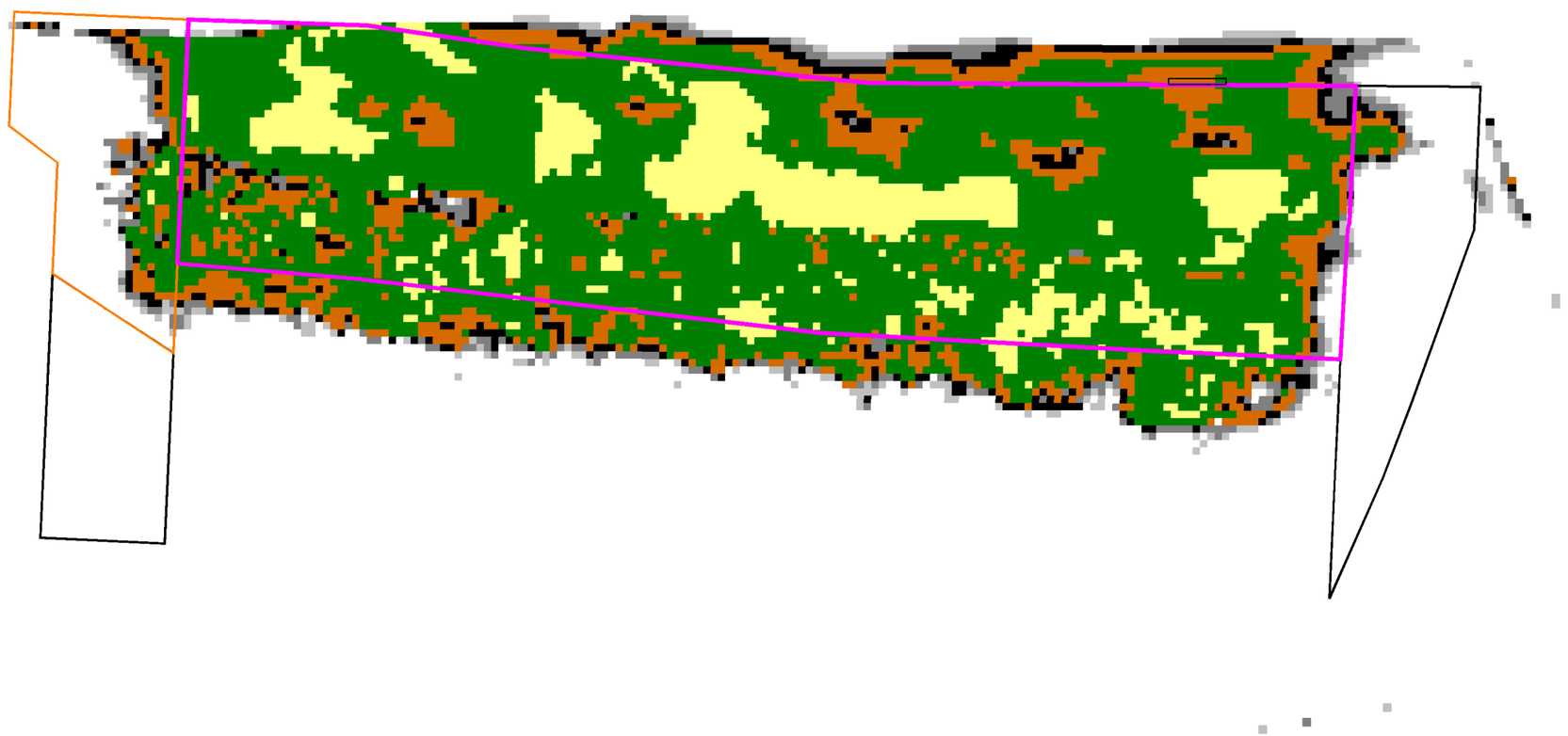
BRENNAN	CC100-SHC100-Layer 8	Post Layer 8 Placement vs Post Layer 7 Placement	Operational Unit 4
SHC100-CC100 Layer 8 Rip Rap Isopach Based on Post Layer 7 Survey vs. 160902 MBES Post Layer 8	Percentage of Placement Above 26": 86%	Placement Extents shown in Magenta	QA Survey Date: 09/2/16

Scale
1in=20ft



Van Hoof, Tara M

From: Larry DeBruin <Larry.Debruin@Boldt.com>
Sent: Thursday, November 10, 2016 8:34 AM
To: Hendron, Ben; Coleman, Bill; Bill Hartman (william.hartman@glatfelter.com); Lysne, Bjorn; Weston, Brandon; Bryan Heath; David Massengill; dbauman@JFBRENNAN.COM; dbinkney@anchorqea.com; Roznowski, Denis M; ECI.LFRR Project Correspondence; Bauer, Eric; Swed, Frederick; Willant, George; Greg Smith; Kinnard, Hugh; Jeff Lawson; Jenkins, Jimmy; Francis, Joe; John Heyde; Jones, Cynthia; Keon, Kendra; Matt Dorow; Melissa Mrotek; Miller, Michelle; Tabatabai, Morey; Paul LaRosa; Paul Montney; Feeney, Richard; Gifford, Ricky; Kaminski, Roger; Rudy Driessen; Susan OConnell; Blackmar, Terri; Gawronski, Troy A; Van Deuren, Julie; Van Hoof, Tara M; Vic Buhr
Cc: AgenciesLFRTeam; LFR.OverSightTeam
Subject: FW: LFRR-16-0113 Final Sand Thickness Verification Results SHC101-1, CC101-1
Attachments: OU4-CC101-1 & SC115-1_11-08-16 Temporary Final Table DeBruin.pdf; OU4-SHC101-1 _11-08-16 Final Table DeBruin.pdf

Brandon, On behalf of the Agencies, the sand thickness verification results for the areas listed below are acceptable. Signed results table are attached

Larry J. DeBruin | Sr. Project Engineer
P: 920-225-6118 // **C:** 920-427-6011
E: larry.debruin@boldt.com
2525 N. Roemer Road // PO Box 419 // Appleton, WI 54912-0419

boldt.com

SafeThinking: Our Crusade to Eliminate Accidents

From: Weston, Brandon [mailto:Brandon.Weston@tetratech.com]
Sent: Tuesday, November 08, 2016 9:41 AM
To: George Berken ; Jay Grosskopf ; Kincaid, Gary W - DNR (Gary.Kincaid@Wisconsin.gov) ; Larry DeBruin ; Ava Grosskopf ; Philip R. Brochocki (pbrochocki@naturalrt.com) ; Coleman, Bill ; Willant, George ; Blackmar, Terri ; Feeney, Richard ; Bauer, Eric ; Kinnard, Hugh ; Gifford, Ricky ; Lysne, Bjorn ; ECI.LFRR Project Correspondence ; Miller, Michelle ; Keon, Kendra ; 'Jeffrey Lawson' (JLawson@project-control.com) ; 'Susan O'Connell' (SOConnell@project-control.com) ; 'Bryan Heath' ; Paul Montney ; Kaminski, Roger (GBY) ; Gawronski, Troy A (Troy.Gawronski@Foth.com) ; Dustin Bauman (dbauman@JFBRENNAN.COM)
Subject: LFRR-16-0113 Final Sand Thickness Verification Results SHC101-1, CC101-1

All,

SHC101 and CC101 contain a lane in which volumetric data is required for verification. It also contains areas in which Tetra Tech conducted sand verification.

Please find the attached final result tables, J.F. Brennan QC and volumetric data, and corresponding progress map for your review. The map is provided as a reference only for the proposed sample locations for the following areas:

- SHC101-1
- CC101-1

Below is the link to SharePoint site where the table is available for review:

https://sites.tetratech.com/projects/106-lowerfoxriver/default.aspx?RootFolder=%2Fprojects%2F106%2Dlowerfoxriver%2FSharedDocuments%2F2016%2FCap%20and%20Cover%2FCover&FolderCTID=0x01200056916E5249BC0440B41F789C9281BE08&View={B4DA9CDD-CA02-4C44-B591-B2824CC14A8A}

Regards,

Brandon Weston | Sample Department Lead
Office: 920.445.0743
Mobile: 906.204.5324
brandon.weston@tetratech.com

Tetra Tech | RCM
1611 State Street | Green Bay, WI 54304| www.tetratech.com

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OU4-CC101-1 & SC115-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
CC101-1-C1	10/20/2016	17.5	0.0	17.5	6.0	570.06	246424.56	2482712.33	246420.42	2482710.64	No Sediment Plug
CC101-1-C2	10/20/2016	19.0	0.0	19.0	6.0	569.79	246463.62	2482739.92	246464.12	2482741.13	No Sediment Plug
CC101-1-C3	10/20/2016	7.5	0.0	7.5	6.0	569.83	246497.60	2482766.94	246500.63	2482766.18	
CC101-1-C4	11/7/2016	20.0	0.0	20.0	6.0	570.23	246555.73	2482816.74	246554.68	2482816.05	
CC101-1-C5	11/7/2016	13.0	0.0	13.0	6.0	570.48	246620.07	2482862.39	246621.80	2482860.00	No Sediment Plug

Average	15.40	0.00	15.40
Median	17.50	0.00	17.50
Standard Deviation	5.16	0.00	5.16

Recommended Path Forward:

Verification samples were collected in 5 locations within OU4-CC101-1 & SC115-1. 5 of 5 samples meet or exceed the minimum thickness requirement of 6-inches, therefore, no further action is required. The statistical sampling density for OU4-CC101-1 is shared with OU4-SC115-1, therefore, the results in this table are for only OU4-CC101-1 at this time.

Prepared by: HNK Date: 11/8/2016 Reviewed by: BSW Date: 11/8/2016

A/OT Acceptance: Date: 11/8/16

OU4-SHC101-1											
ID	Date Sampled	Sand Result (Inches)	Sand/Sediment Mix (Inches)	Total Thickness Sand and Sediment Mix (Inches)	Required Thickness (Inches)	Mudline Elevation	Proposed Coordinates		Survey Coordinates		Comments
							Northing	Easting	Northing	Easting	
SHC101-1-C1	10/20/2016	33.0	0.0	33.0	11.0	571.18	246347.84	2482642.74	246350.26	2482643.71	No Sediment Plug
SHC101-1-C2	10/20/2016	23.0	0.0	23.0	11.0	571.48	246378.31	2482671.92	246375.66	2482676.45	
SHC101-1-C3	11/7/2016	14.0	0.0	14.0	11.0	575.74	246592.30	2482818.62	246591.81	2482820.12	No Sediment Plug
SHC101-1-C4	11/7/2016	26.0	0.0	26.0	11.0	573.25	246603.24	2482838.03	246600.09	2482838.12	No Sediment Plug
SHC101-1-C5	11/7/2016	11.5	0.0	11.5	11.0	568.53	246740.22	2482930.24	246742.89	2482929.16	No Sediment Plug
SHC101-1-C6	11/7/2016	17.5	0.0	17.5	11.0	567.86	246763.52	2482944.82	246761.64	2482942.77	No Sediment Plug

Average	20.83	0.00	20.83
Median	20.25	0.00	20.25
Standard Deviation	8.05	0.00	8.05

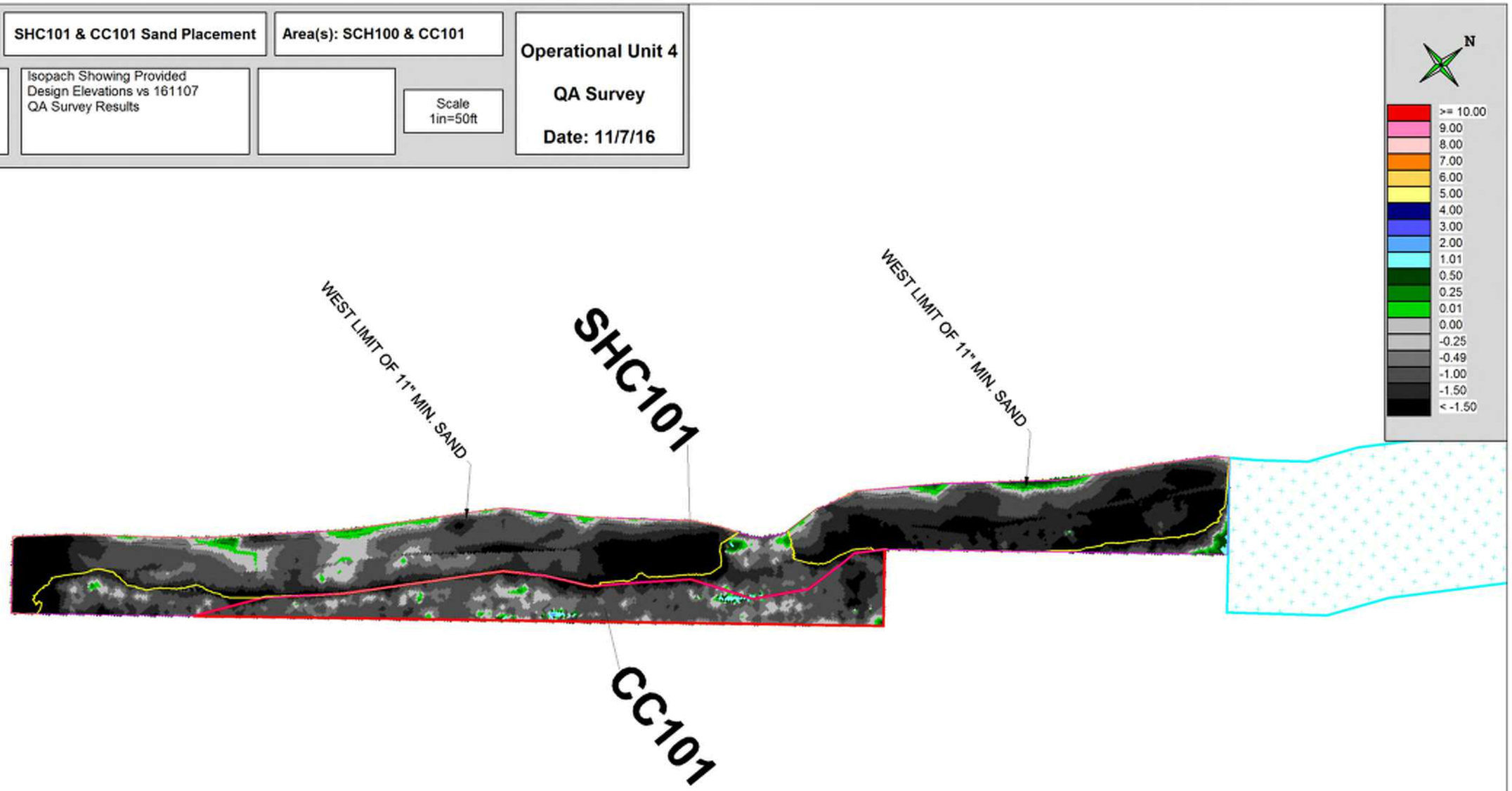
Recommended Path Forward:

Verification samples were collected at 6 locations within OU4-SHC101-1. 6 of 6 samples meet or exceed the minimum thickness requirement of 11-inches, therefore, no further action is required.

Prepared by: HKK Date: 11/8/2016 Reviewed by: BSW Date: 11/8/2016

A/OT Acceptance: Date: 11/8/16

BRENNAN	SHC101 & CC101 Sand Placement	Area(s): SCH100 & CC101	Operational Unit 4 QA Survey Date: 11/7/16
Percent of Placement at or Above Design: 96%	Isopach Showing Provided Design Elevations vs 161107 QA Survey Results	Scale 1in=50ft	



Scale: 1 Inch = 50.00 Feet

50 100 200 300 400 Feet

Van Hoof, Tara M

From: George Berken <George.Berken@boldt.com>
Sent: Thursday, December 08, 2016 11:36 AM
To: Bill Hartman; bryan.heath@ncr.com; David Massengill (DGMassen@gapac.com); jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Kaminski, Roger; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Jones, Cynthia; Dan Binkney (dbinkney@anchorqea.com); Roznowski, Denis M; ECI.LFRR Project Correspondence; Swed, Frederick; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Miller, Michelle; Tabatabai, Morey; Paul LaRosa (plarosa@anchorqea.com); Feeney, Richard; Gifford, Ricky; Van Hoof, Tara M; Blackmar, Terri; Gawronski, Troy A; dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; vbuhr@jfbrennan.com
Cc: Ava Grosskopf; LFR.OverSightTeam
Subject: 87500 OU2-5 - FW: LFRR-16-0112 Armor Stone Thickness Verification Results SHC101-1 and CC101-1 Layer 2
Attachments: 161205 SHC101 and CC101 Layer 2 Submittal.pdf

Brandon, on behalf of the Agencies, the layer 2 armor stone thickness (3.0" D50 stone), submitted in your email below for SHC101-1 and CC101-1, are acceptable.

Thanks,
George…

George A. Berken | Engineering Project Manager
P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

boldt.com

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From: Weston, Brandon [mailto:Brandon.Weston@tetratech.com]
Sent: Wednesday, December 07, 2016 11:52 AM
To: George Berken ; Jay Grosskopf ; Kincaid, Gary W - DNR (Gary.Kincaid@Wisconsin.gov) ; Larry DeBruin ; Ava Grosskopf ; Philip R. Brochocki (pbrochocki@naturalrt.com) ; Coleman, Bill ; Willant, George ; Blackmar, Terri ; Feeney, Richard ; Bauer, Eric ; Kinnard, Hugh ; Gifford, Ricky ; Lysne, Bjorn ; ECI.LFRR Project Correspondence ; Miller, Michelle ; Keon, Kendra ; 'Jeffrey Lawson' (JLawson@project-control.com) ; 'Susan O'Connell' (SOConnell@project-control.com) ; 'Bryan Heath' ; Paul Montney ; Kaminski, Roger (GBY) ; Gawronski, Troy A (Troy.Gawronski@Foth.com) ; Dustin Bauman (dbauman@JFBRENNAN.COM)
Subject: LFRR-16-0112 Armor Stone Thickness Verification Results SHC101-1 and CC101-1 Layer 2

All,

SHC101-1 and CC101-1 Layer 2 requires volumetric data for verification.

Please find the attached J.F. Brennan QC data for your review.

- SHC101-1
- CC101-1

Below is the link to SharePoint site where the results are available for review:

https://sites.tetratech.com/projects/106-lowerfoxriver/default.aspx?RootFolder=%2Fprojects%2F106%2Dlowerfoxriver%2FSharedDocuments%2F2016%2FCap%20and%20Cover%2FCap&FolderCTID=0x01200056916E5249BC0440B41F789C9281BE08&View={B4DA9CDD-CA02-4C44-B591-B2824CC14A8A}&InitialTabId=Ribbon%2EDocument&VisibilityContext=WSSTabPersistence

Regards,

Brandon Weston | Sample Department Lead
Office: 920.445.0743
Mobile: 906.204.5324
brandon.weston@tetratech.com

Tetra Tech | RCM
1611 State Street | Green Bay, WI 54304| www.tetratech.com

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BRENNAN

SHC101 & CC101 Post 3" Placement

Scale
1in=50ft

SHC101
% Placed at or Above 6": 94%

CC101
% Placed at or Above 6": 95%

SHC101 & CC101
Volume Placed by Bathymetric Survey: 1,055 cy

SHC101 Average Thickness by Survey: 12.72"

CC101 Average Thickness by Survey: 12.75"

*Isopach Represents Post Placement Bathymetry vs Pre Placement Bathymetry

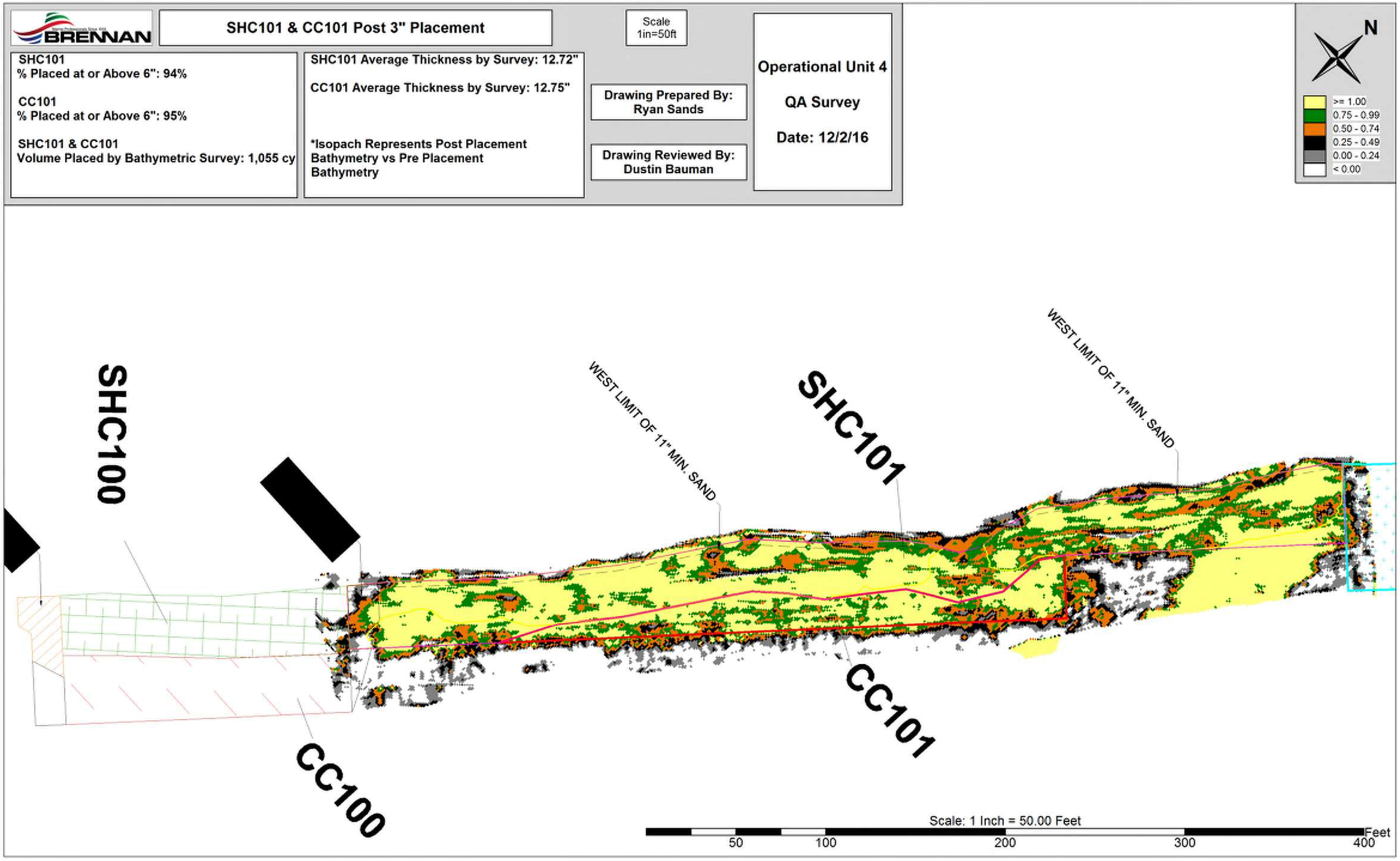
Drawing Prepared By:
Ryan Sands

Drawing Reviewed By:
Dustin Bauman

Operational Unit 4

QA Survey

Date: 12/2/16



BRENNAN

SHC101 CC101 3" Rock Placement Bucket File Locations

Scale
1in=50ft

Individual Bucket File

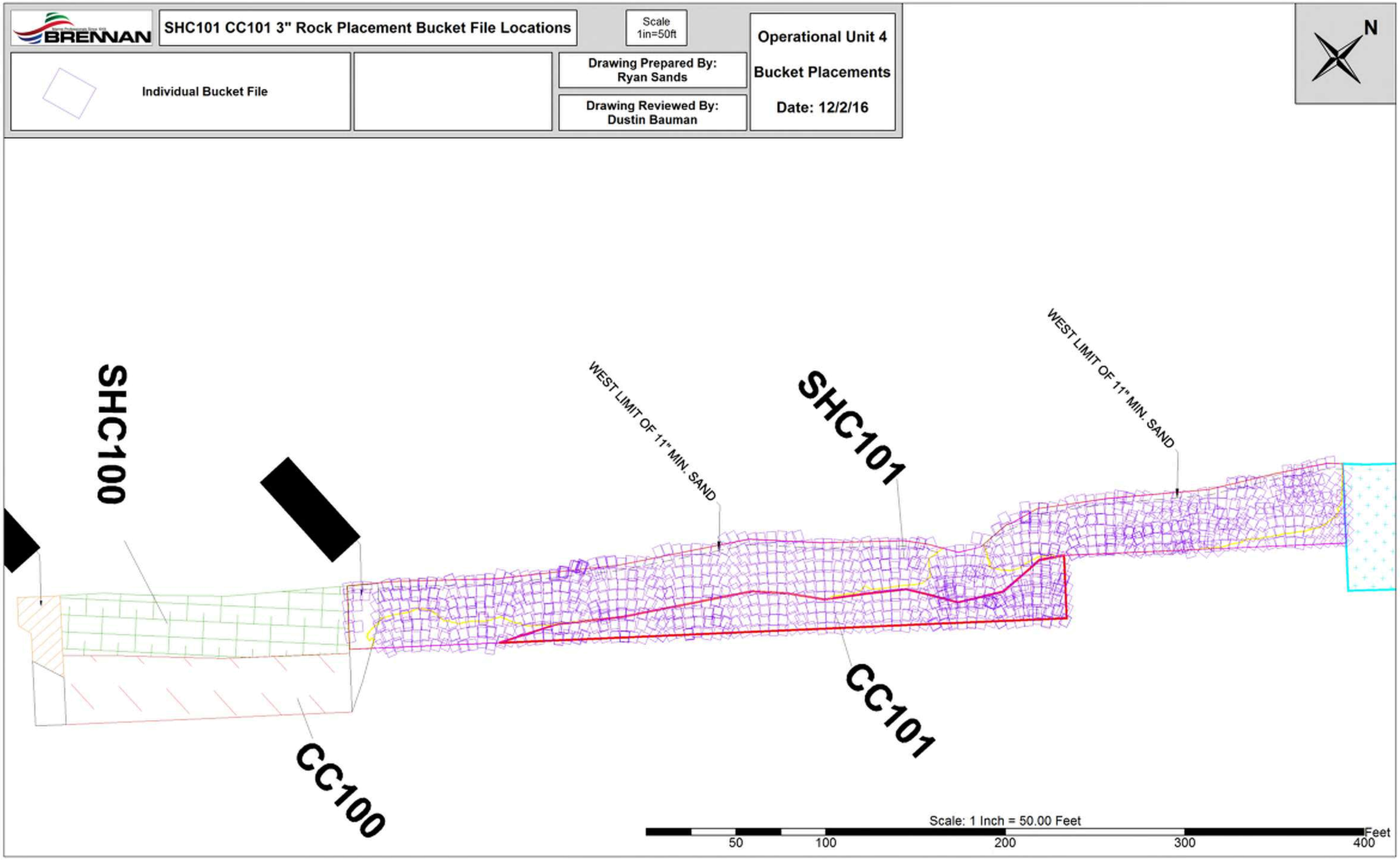
Drawing Prepared By:
Ryan Sands

Drawing Reviewed By:
Dustin Bauman

Operational Unit 4

Bucket Placements

Date: 12/2/16



Van Hoof, Tara M

From: George Berken <George.Berken@boldt.com>
Sent: Monday, June 26, 2017 1:34 PM
To: Bill Hartman; bryan.heath@ncr.com; jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Kaminski, Roger; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Wagner, Corey; Jones, Cynthia; Dan Binkney; Roznowski, Denis M; ECI.LFRR Project Correspondence; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Miller, Michelle; Tabatabai, Morey; Paul LaRosa; Feeney, Richard; Gifford, Ricky; Van Hoof, Tara M; Blackmar, Terri; Gawronski, Troy A; dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; Hausen Ed (ehausen@jfbrennan.com); Huycke Dan (dhuycke@jfbrennan.com); m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; Rosemore Bethany (brosemore@jfbrennan.com); Scott Derrick (dscott@jfbrennan.com)
Cc: AgenciesLFRTeam; LFR.OverSightTeam
Subject: 87500 OU2-5 - FW: LFRR-17-0114 Volumetric Quarry Spall Thickness Verification Results CC101
Attachments: 170622 CC101 6-9 in Post Placement QA Survey.pdf

Brandon, on behalf of the Agencies, the volumetric quarry spall thickness verification results, submitted in your email below for CC101, are acceptable.

Thanks,
George…

BOLDT

George A. Berken | Engineering Project Manager
P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

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From: Weston, Brandon [mailto:Brandon.Weston@tetratech.com]
Sent: Friday, June 23, 2017 1:21 PM
To: George Berken <George.Berken@boldt.com>; Jay Grosskopf <Jay.Grosskopf@Boldt.com>; Kincaid, Gary W - DNR (Gary.Kincaid@Wisconsin.gov) <Gary.Kincaid@Wisconsin.gov>; Larry DeBruin <Larry.Debruin@Boldt.com>; Ava Grosskopf <Ava.Grosskopf@boldt.com>; Coleman, Bill <Bill.Coleman@tetratech.com>; Willant, George <George.Willant@tetratech.com>; Blackmar, Terri <Terri.Blackmar@tetratech.com>; Feeney, Richard <Richard.Feeney@tetratech.com>; Bauer, Eric <Eric.Bauer@tetratech.com>; Kinnard, Hugh <Hugh.Kinnard@tetratech.com>; Gifford, Ricky <ricky.gifford@tetratech.com>; Lysne, Bjorn <Bjorn.Lysne@tetratech.com>; ECI.LFRR Project Correspondence <ECI.LFRRPC@tetratech.com>; Keon, Kendra <Kendra.Keon@tetratech.com>; 'Jeffrey Lawson' (JLawson@project-control.com) <JLawson@project-control.com>; 'Susan O'Connell' (SOConnell@project-control.com) <SOConnell@project-control.com>; 'Bryan Heath'

<bryan.heath@ncr.com>; Paul Montney <PAMontne@GaPac.Com>; Kaminski, Roger (GBY) <ROGER.KAMINSKI@GAPAC.com>; Gawronski, Troy A (Troy.Gawronski@Foth.com) <Troy.Gawronski@Foth.com>; Dustin Bauman (dbauman@JFBRENNAN.COM) <dbauman@JFBRENNAN.COM>; phil.brochocki@obg.com
Subject: LFRR-17-0114 Volumetric Quarry Spall Thickness Verification Results CC101

All,

Please find the attached J.F. Brennan Isopach containing volumetric data for your review. The Isopach is provided for the following area:

- CC101

Below is the link to SharePoint where the Isopach is available for review:

https://sites.tetratech.com/projects/106-lowerfoxriver/SharedDocuments/Forms/AllItems.aspx?RootFolder=%2Fprojects%2F106%2Dlowerfoxriver%2FSharedDocuments%2F2017%2FCap%20and%20Cover%2FQuarry%20Spall&FolderCTID=0x01200056916E5249BC0440B41F789C9281BE08&View=%7B44622A35%2DFE8B%2D4770%2DA03D%2D78BC0705F2E0%7D&InitialTabId=Ribbon%2EDocument&VisibilityContext=WSSTabPersistence

Regards,

Brandon Weston | **Sample Department Lead**
Office: 920.445.0743
Mobile: 906.204.5324
brandon.weston@tetratech.com

Tetra Tech | EC
1611 State Street | Green Bay, WI 54304| www.tetratech.com

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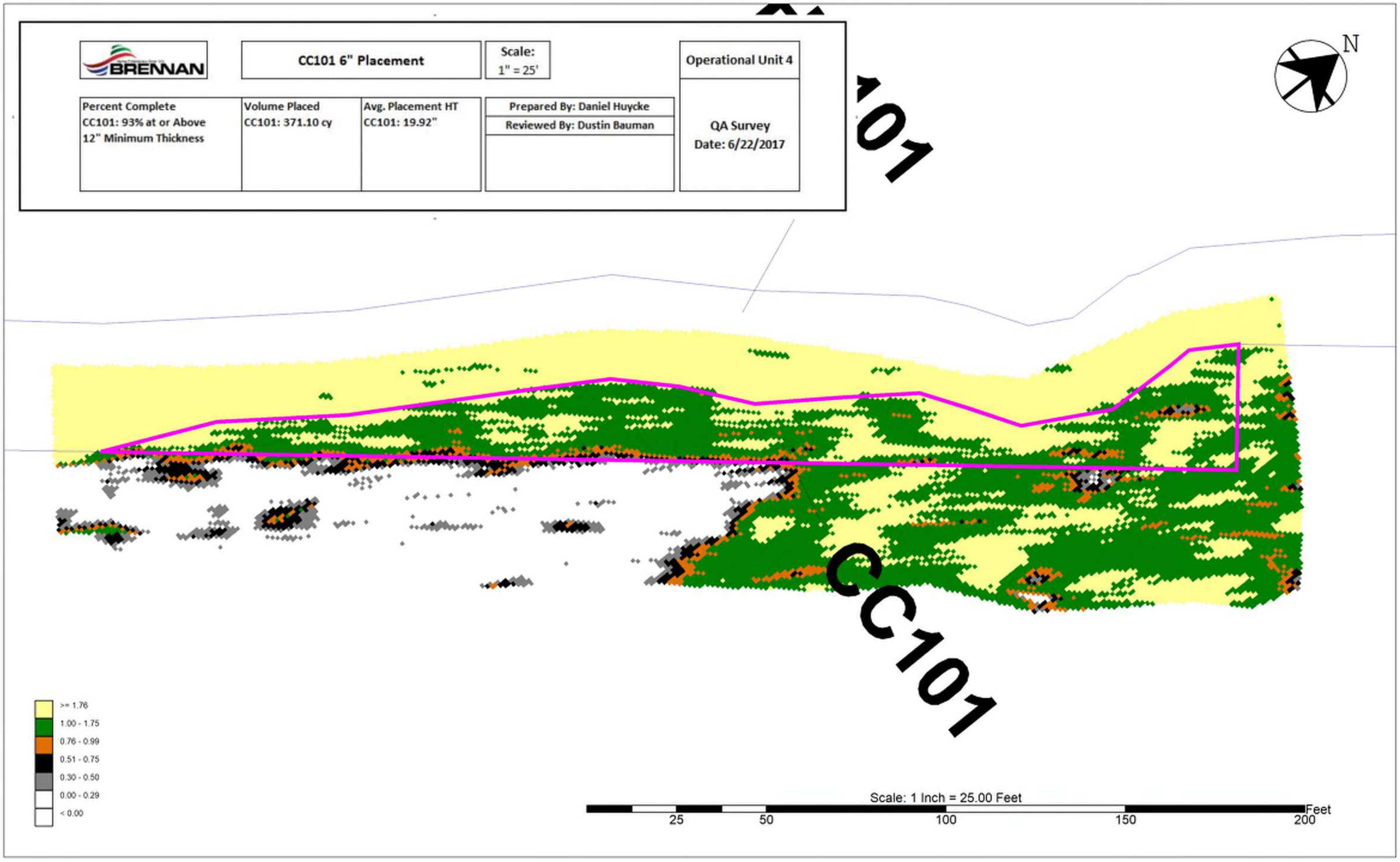
BRENNAN	CC101 6" Placement	Scale: 1" = 25'		Operational Unit 4
Percent Complete CC101: 93% at or Above 12" Minimum Thickness	Volume Placed CC101: 371.10 cy	Avg. Placement HT CC101: 19.92"	Prepared By: Daniel Huycke Reviewed By: Dustin Bauman	QA Survey Date: 6/22/2017



Van Hoof, Tara M

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Sent: Monday, June 26, 2017 1:35 PM
To: Bill Hartman; bryan.heath@ncr.com; jheyde@Sidley.com; JLawson@project-control.com; Mrotek, Melissa (GBY); PAMontne@GaPac.Com; Kaminski, Roger; soconnell@project-control.com; Hendron, Ben; Coleman, Bill; Lysne, Bjorn; Weston, Brandon; Wagner, Corey; Jones, Cynthia; Dan Binkney; Roznowski, Denis M; ECI.LFRR Project Correspondence; Willant, George; Kinnard, Hugh; Jenkins, Jimmy; Francis, Joe; Van Deuren, Julie; Miller, Michelle; Tabatabai, Morey; Paul LaRosa; Feeney, Richard; Gifford, Ricky; Van Hoof, Tara M; Blackmar, Terri; Gawronski, Troy A; dbauman@JFBRENNAN.COM; gsmith@jfbrennan.com; Hausen Ed (ehausen@jfbrennan.com); Huycke Dan (dhuycke@jfbrennan.com); m.j.Luth@Boskalis.nl; r.driessen@Boskalis.nl; Rosemore Bethany (brosemore@jfbrennan.com); Scott Derrick (dscott@jfbrennan.com)
Cc: AgenciesLFRTeam; LFR.OverSightTeam
Subject: 87500 OU2-5 - FW: LFRR-17-0179 Volumetric Heavy Riprap Thickness Verification Results SHC101
Attachments: 170620 SHC101 Heavy Rip Rap QA Survey vs Pre Placement.pdf

Brandon, on behalf of the Agencies, the volumetric heavy riprap thickness verification results, submitted in your email below for SCH101, are acceptable.

Thanks,
George…

George A. Berken | Engineering Project Manager
P: 920-225-6141 // **C:** 920-858-5449 // **F:** 920-225-6307
E: George.Berken@Boldt.Com
2525 N. Roemer Road // P.O. Box 419 // Appleton, WI 54912-0419

boldt.com

SafeThinking: Our Crusade to Eliminate Accidents

From: Weston, Brandon [mailto:Brandon.Weston@tetratech.com]
Sent: Friday, June 23, 2017 1:17 PM
To: George Berken ; Jay Grosskopf ; Kincaid, Gary W - DNR (Gary.Kincaid@Wisconsin.gov) ; Larry DeBruin ; Ava Grosskopf ; Coleman, Bill ; Willant, George ; Blackmar, Terri ; Feeney, Richard ; Bauer, Eric ; Kinnard, Hugh ; Gifford, Ricky ; Lysne, Bjorn ; ECI.LFRR Project Correspondence ; Keon, Kendra ; 'Jeffrey Lawson' (JLawson@project-control.com) ; 'Susan O'Connell' (SOConnell@project-control.com) ; 'Bryan Heath' ; Paul Montney ; Kaminski, Roger (GBY) ; Gawronski, Troy A (Troy.Gawronski@Foth.com) ; Dustin Bauman (dbauman@JFBRENNAN.COM) ; phil.brochocki@obg.com
Subject: LFRR-17-0179 Volumetric Heavy Riprap Thickness Verification Results SHC101

All,

Please find the attached J.F. Brennan Isopach containing volumetric data for your review. The Isopach is provided for the following area:

- SHC101 (Heavy Riprap)

Below is the link to SharePoint where the Isopach is available for review:

https://sites.tetratech.com/projects/106-lowerfoxriver/default.aspx?RootFolder=%2Fprojects%2F106%2Dlowerfoxriver%2FSharedDocuments%2F2017%2FCap%20and%20Cover%2FHeavy%20Riprap&FolderCTID=0x01200056916E5249BC0440B41F789C9281BE08&View={B4DA9CDD-CA02-4C44-B591-B2824CC14A8A}&InitialTabId=Ribbon%2EDocument&VisibilityContext=WSSTabPersistence

Regards,

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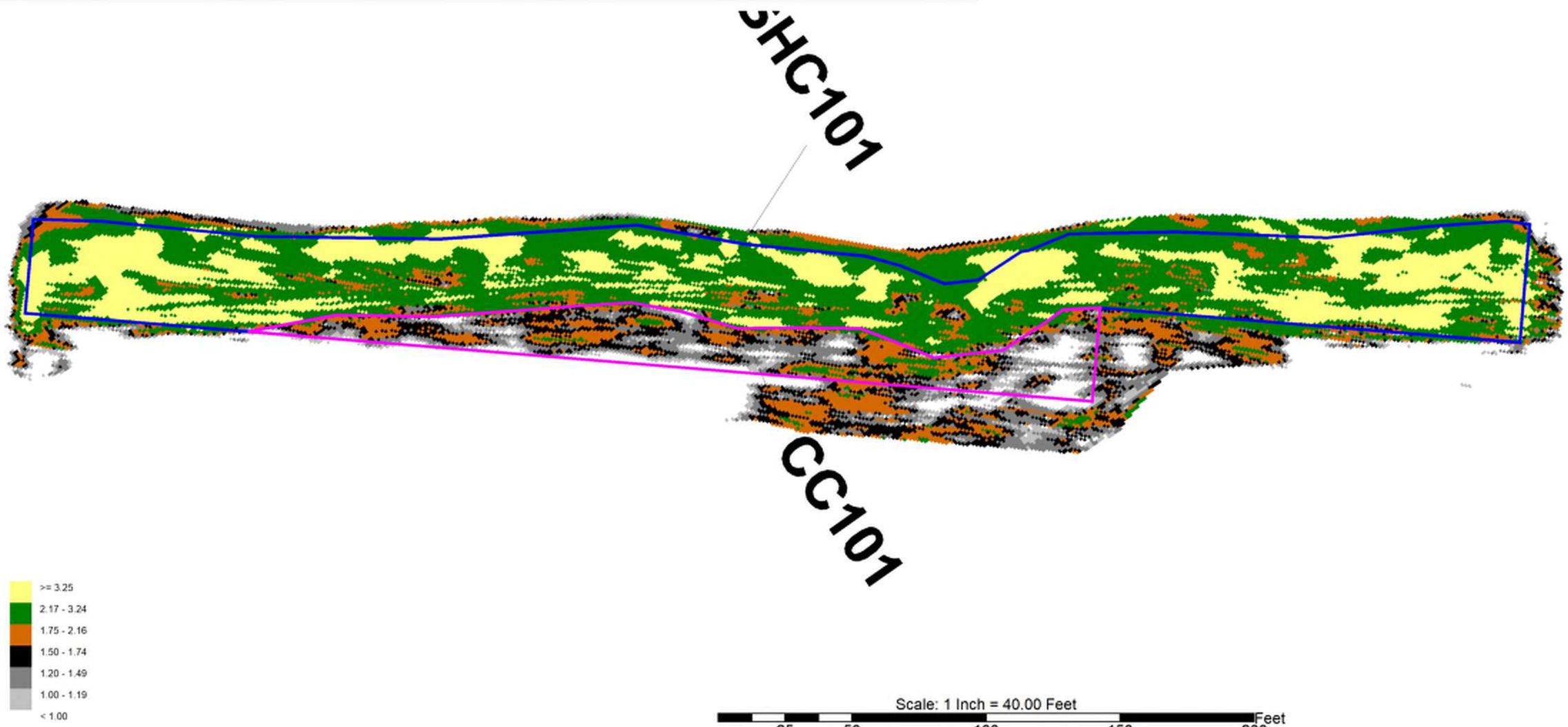
BRENNAN	SHC101 Heavy Rip Rap Placement		Scale: 1" = 40'	Operational Unit 4
Percent Complete SHC101: 93% at or Above 26" Minimum Thickness	Volume Placed SHC101: 2,022.70 cy	Avg. Placement Ht SHC101: 36.72"	Prepared By: Daniel Huycke Reviewed By: Dustin Bauman	QA Survey Date: 6/20/2017