From:	Colarusso, Phil
To:	John Bullard - NOAA Federal; Christine Vaccaro - NOAA Federal
Cc:	Bill White; Davis, Gary (DCR) (gary.davis@state.ma.us); Dierker, Carl; Stanley, Elaine; Catri, Cindy; Marsh, Michael; Williams, Ann; Chet Myers; Jay Borkland (jborkland@apexcos.com); Paul.diodati@state.ma.us; Ford, Kathryn (FWE)
Subject:	FW: Ammended EPA Blasting Request
Date:	Friday, September 06, 2013 3:41:45 PM
Attachments:	image001.jpg Amended Request for Addition of Blasting to Final Determination 8-28-13.pdf Attachments Except for F.pdf Attachment F - New Bedford 2013 - Blast Plan - 8-16-13.pdf

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John,

Attached is MassCEC's amended blasting request to EPA. In a separate email, I will send you their consultant's revised acoustic modeling report and EPA's letter reinitiating consultation under Endangered Species Act, Magnuson-Stevens Act and the Fish and Wildlife Coordination Act. Please let us know if you have any questions.

Thanks
Phil

From: Bill White [mailto:bwhite@MassCEC.com]
Sent: Wednesday, August 28, 2013 7:03 PM
To: Dierker, Carl; Catri, Cindy; Williams, Ann; Marsh, Michael; LeClair, Jacqueline; Stanley, Elaine; Tisa, Kimberly; Colarusso, Phil
Cc: Gregory Dolan (gdolan@apexcos.com); John McAllister; Christopher Morris; Christen Anton; Alicia Barton; cmyers@apexcos.com; jborkland@apexcos.com; Eric Hines (ehines@lemessurier.com)
Subject: Ammended EPA Blasting Request

Carl & Team EPA,

Please find attached amended blasting request from Team MassCEC. We expect to forward the GZA report tomorrow on the Hurricane Barrier Assessment and the revised JASCO report next week. Additionally, we have reached out to DEP on the ARARs request, and hope to hear back shortly.

Many thanks for all your attention and effort on this vital project.

Bill

Bill White
Director, Offshore Wind Sector Development
Massachusetts Clean Energy Center
55 Summer Street, 9th Floor, Boston, MA 02110
(617) 315-9330

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SDMS Doc ID 549035

********** ATTACHMENT NOT DELIVERED **********

This Email message contained an attachment named
  image001.jpg
which may be a computer program. This attached computer program could contain a computer virus which could cause harm to EPA's computers, network, and data. The attachment has been deleted.

This was done to limit the distribution of computer viruses introduced into the EPA network. EPA is deleting all computer program attachments sent from the Internet into the agency via Email.

If the message sender is known and the attachment was legitimate, you should contact the sender and request that they rename the file name extension and resend the Email with the renamed attachment. After receiving the revised Email, containing the renamed attachment, you can rename the file extension to its correct name.

For further information, please contact the EPA Call Center at (866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********** ATTACHMENT NOT DELIVERED **********

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August 28, 2013

Ms. Elaine Stanley
Remedial Project Manager
Office of Site Remediation and Restoration
EPA Region 1, Suite 100, OSRR 7-04
5 Post Office Square
Boston, MA 02176

Re: Amended Request for Addition of Blasting to the Final Determination, New Bedford South Terminal Project (New Bedford Marine Commerce Terminal (NBMCT Project)

Dear Ms. Stanley,

This letter is submitted in order to update USEPA with regard to new information received by the Massachusetts Clean Energy Center (MassCEC) during construction of the New Bedford Marine Commerce Terminal. The new information was generated during extensive pre-construction investigations by both MassCEC's contractor and MassCEC's engineering team and indicates the presence of approximately three times the previously estimated volume of rock within the dredge footprint adjacent to the new bulkhead. The additional rock is primarily manifested as an unanticipated increase in rock thickness. Because this new information requires alterations to the previously proposed method for implementing blasting in association with the project, this letter also serves as an amendment to MassCEC's May 20th, 2013 request to USEPA for the addition of blasting to the Final Determination for the New Bedford Marine Commerce Terminal project.

The format of this letter includes both a summary of the dialogue between EPA and MassCEC on this issue, a summary of the new information received, a formal request from MassCEC to EPA to increase the blast level, as well as a response to EPA questions regarding proposed alterations to the implementation of blasting.

Previous Dialogue Between EPA and MassCEC

The Commonwealth had previously outlined within a letter to EPA on October 4, 2012 that it intended to utilize blasting as a rock removal means of "last resort". MassCEC submitted an update request to EPA on May 20, 2013, which outlined in more detail MassCEC's request for the implementation of blasting prior to the removal of the overburden. On June 13, 2013, EPA issued a letter indicating that EPA was not aware of any information that would prevent EPA from approving MassCEC's May 20, 2013 request, subject to conditions contained within the letter (letter included as **Attachment A**). After some discussion between MassCEC and EPA regarding Condition 7 of EPA's June 13, 2013 letter, as well as the specifics of the use of successive charges utilizing "delays" to minimize the peak pressure and peak impulse, EPA

issued a letter on July 24, 2013, revising Condition 7, and allowing for use of successive charges, so long as the delay between charges was at least 25 milliseconds (letter included as **Attachment B**).

New Rock Elevation Information

As part of its due diligence during the design process, MassCEC advanced a number of borings into the subsurface both within the footprint of the future bulkhead, within the footprint of the proposed dredging, and into the upland of the proposed facility. In all, MassCEC advanced 32 borings within the proposed dredge footprint, and an additional twenty borings in the upland and bulkhead area. The detailed information on the borings, including boring locations and boring logs were included within the Commonwealth's January 18, 2012 submission to EPA. It was with this information that MassCEC estimated the volume of rock within the dredge footprint (approximately 7,500 cubic yards), and included such information within the specifications for the New Bedford Marine Commerce Terminal, submitted to EPA on December 15, 2012.

A diagram of the interpolated surface of bedrock utilizing the information available to MassCEC as of the promulgation of the bidding documents is included as **Attachment C**. As can be seen within this diagram, rock was anticipated to slope down gradually from west to east, and to increase in elevation as it moved to the south. Additionally, the borings, which were done at 100 foot interval spacing, indicated that the average anticipated thickness of rock was estimated at approximately 3 feet and the thickest anticipated section of rock was approximately 5 feet of rock above the target dredge elevation of -32 MLLW adjacent to the bulkhead.

MassCEC's rock interpolation can also be compared with the drawing (included as **Attachment D**) submitted within its May 20, 2013 submission to EPA, which indicated a slightly larger area anticipated to require blasting (this is the area anticipated at the time of bidding by MassCEC's Contractor to require blasting).

Although MassCEC believes that the number of borings was sufficient for design of the facility, it was understood that there was still a level of uncertainty with regard to the exact subsurface conditions at the time of bid. In order to keep this risk from interfering with installation of the proposed facility, additional investigations were required of the Contractor immediately prior to installation of the proposed facility. These investigations were required in order to confirm assumptions made during the design process, and to uncover any potential previously unknown conditions prior to the start of work. The investigations included the advancement of borings and other investigative methods at hundreds of locations, into the subsurface to confirm the condition and elevation of rock. It was during these investigations that rock elevations were found to be higher than previously anticipated.

Rather than slope along a plane between borings (as previously assumed), the rock has an extremely erratic surface, in some cases rising (and then falling) up to 10 feet in a very short distance moving west to east and north to south. MassCEC authorized several hundred additional locations for investigation in order to provide additional detail to the final elevations,

which have further delineated the area. The most recent and updated rock elevations are shown on an updated drawing included as **Attachment E**. Based on this data, MassCEC's current estimate of rock volume is approximately 23,200 cubic yards, approximately three times the volume previously anticipated. Although the area of blasting has not changed significantly, the average thickness of rock is now approximately 6 feet and the thickest layer of rock is approximately 15 feet.

Upon USEPA's suggestion, MassCEC is also commencing additional investigation in the two areas in the dredge channel north of the bulkhead area. However, we do not expect the rock elevation to exceed the abnormally high contours we have identified in the deep draft area.

Proposed Amendment to Request for Addition of Blasting

Although the areal extent of rock removal is not anticipated to have changed significantly, the unanticipated thickness of rock makes the 50 pounds per delay insufficient to remove 15 feet of rock. If the limitation of 50 pounds per delay were utilized by MassCEC (as outlined within EPA's June 13, 2013 and July 24, 2013 letters), blasting would be unable to dislodge the full thickness of rock during the first blast. In addition, removal of overburden would need to take place in order to assess the condition of the subsurface prior to the initiation of additional blasting. It is likely that approximately 1/3 (of the thickest portions of the rock) would be dislodged, and that the overburden would then need to be removed to complete the blasting. The result would mean that two or three additional blasts would be required to fully dislodge the rock to the required depth, and these blasts would take place with no overburden to reduce the blast energy.

As outlined within MassCEC's May 20, 2013 letter to EPA, acoustic modeling information indicates that blasting without the overburden in place is more impactful than blasting with the overburden in place.

MassCEC's engineers, in consultation with GZA, our blast consultant, and the contractor, have determined that a charge level of up to 150 pounds will be required in order to dislodge rock in the deep draft dredge area. Therefore, MassCEC requests that the upper limit on the size of charge per delay be raised to 150 pounds from its current limit of 50 pounds. MassCEC wants to be clear that the 150 pound level will be the maximum allowed charge, and that the contractor will utilize smaller charge levels in areas of less rock.

EPA Questions

MassCEC has received the following questions from EPA regarding this proposed change within an e-mail dated August 22, 2013:

a. *Data results of recent bedrock characterization and a plan showing the additional bedrock found and an estimated volume and areal increase;*

Two pre-construction interpretations and the most recent plan are included as **Attachments C, D, and E**. The pre-construction estimate for rock removal was 7,500 cubic yards, and the most updated estimate based on this new information is 23,200 cubic yards. The areal extent of blasting is not currently anticipated to have changed significantly.

b. Any increase in charge size, along with the rationale for such increase (if so, this will likely trigger the need for further consultation with NMFS on ESA and EFH resources since the original consultations were based on a maximum 50 pound charge);

A maximum charge size of 150 pounds is required in order to address the rock thicknesses identified within the dredge footprint. **Attachment E** provides estimates of these rock thicknesses as determined by borings (and other investigative means) at approximately 25 ft centers. Note that parameters for production blasting are set in such a way that the charge weight will vary according to the actual depth of rock encountered during blasting. Charges will be packed into holes drilled on a regular grid. All holes will be drilled to the same sub-drill elevation of minus 38 feet below MLLW. Charge material will be packed into rock with a length at the top of rock reserved for stemming (stemming directs the charge energy downward into the rock). Additionally, only so much explosive material will fit in each foot of drill hole length. Total charge size will therefore be determined as each hole is drilled based on total depth of rock plus sub-drill minus stemming, times the charge weight per foot. In areas where the depth of rock encountered during drilling is consistent with MassCEC's original expectations based on boring data, charge weights will be sized similar to their original expected weights. Additional information regarding methodology is included within the Contractor's blasting plan, included as **Attachment F**.

Note that it is not in the Contractor's interest, from the point of view of cost, schedule, performance, or safety, to drill deeper than the determined sub-drill or to pack charge above the top of rock. Therefore, for all practical purposes, the 150 pound charge limit will pertain only to a small percentage of charges on the entire project associated with the deepest rock. The weight of each charge and the extent to which charges must range up to 150 pounds will not be established with certainty until the hole for each charge has been drilled; thus, some flexibility on the part of the Contractor is required, in order to avoid a potential re-blasting scenario.

c. The proposed timing and location of any expanded blasting. Will it be required in more than 3 areas? Is the Commonwealth asking for continuous blasting beginning in mid-September, or is past agreement of blasting in one area in September followed by EPA evaluation to determine if more blasting can occur before November 15 still the path forward? Is the proposed expanded blasting anticipated to go beyond the allowed time window (i.e. past January 15)? If so, that will run into the time of year restrictions for winter flounder, and, depending on the duration, spring migration of sturgeon and other anadromous fish. Any of these changes may also require additional EFH and ESA consultation with NMFS;

The blasting will take place within the same areas previously contemplated by EPA. The size of the areas has not changed significantly.

MassCEC anticipates that the blasting could begin on September 15 as previously agreed, and still accepts the agreement previously stipulated with EPA that impacts following the first blasting area would be carefully evaluated before blasting could commence in the two areas to the north.

Due to the likely delays associated with increased drilling time (through thicker rock), MassCEC currently anticipates that the blasting would take two months, rather than one. Therefore, MassCEC envisions that the work would begin as close to September 15th as possible and end on November 15th. An updated schedule is included as **Attachment G**. MassCEC understands that blasting cannot take place after January 15th.

d. Any change to the delay time of 25 milli-seconds;

MassCEC does not anticipate requesting a change to the 25 millisecond delay scenario.

e. Will pre-split blasting be included? If so, a description of the pre-split blasting protocol;

MassCEC had discussed (on a preliminary basis) shortening the 25 millisecond delay in association with pre-split blasting (which is a line of lightly-loaded charges that run along the face of the bulkhead to minimize impacts to rock to the west). In good faith, MassCEC has investigated potential other alternatives to reducing the 25-millisecond delay, and has determined that line-drilling (i.e. drilling of closely spaced borings along the bulkhead face) may be utilized instead of pre-split blasting to minimize impacts to rock to the west. As a result, MassCEC currently anticipates that line-drilling will be utilized instead of pre-splitting, in order to prevent the previously discussed reduction in the delay times.

f. Approval from the U.S. Army Corps of Engineers Levee Safety Program addressing impacts of any proposed expanded blasting (and pre-split blasting, if included) on the hurricane barrier;

As EPA is aware, the Commonwealth employed GZA Geoenvironmental, Inc. (GZA) during the fall of 2012 (prior to the issuance of EPA's Final Determination) to conduct an assessment of potential blasting impacts to the New Bedford Hurricane Barrier. GZA produced a table outlining acceptable charge weights vs. distance to the Hurricane Barrier, and MassCEC included that table (with an additional reduction of ½ of the charge weight) into its specifications.

Due to the uncertainty regarding the implementation of blasting, the timing of construction, and the contractor to be hired by MassCEC (and its experience conducting blasting operations), both GZA and the Commonwealth were extremely conservative in their analysis of potential impacts to the Hurricane Barrier and the charge limits that were subsequently imposed. At the time of bidding, the very conservative nature of the charge limitations was not considered significant, due to the perceived quantity and thickness of rock anticipated to be within the dredge footprint.

Also, please note that the reason that JASCO's original model included a 50 pound charge as the upper limit was, in no small part, to the constraints already in place in association with the GZA analysis of impact to the Hurricane Barrier, which was, as previously stated, very conservative.

However, after reviewing the updated information regarding higher rock elevations and thicker layers of rock, MassCEC and GZA re-evaluated the available information and determined that the charge limitations were more than 10 times more conservative than what was necessary to adequately protect the New Bedford Hurricane Barrier. These limitations included both conservative assumptions on liquefaction and slope stability calculations, but also included conservative assumptions regarding the resulting accelerations applied to structures measured at distances from the blast locations. That is, the accelerations measured in real-time during blasting would have been almost an order of magnitude lower than what was originally projected in the GZA report, based on the recommended charge weights and distances.

On August 22, 2013, MassCEC and GZA met with USACE personnel to discuss the report and request that the report be revised to more accurately reflect existing needs for higher charge weights. USACE reviewed the updated technical information presented to them and agreed that the GZA report was conservative, and that higher charge weights should be acceptable. GZA will be resubmitting its report to USACE on Thursday, August 29, 2013, and MassCEC anticipates acceptance of the revised plan shortly thereafter. A copy of the revised plan, which will include a new table of acceptable charge weights, will be forwarded to EPA once it is available.

g. A written evaluation of the impacts to aquatic resources potentially caused by any proposed expanded blasting (and pre-split blasting) and associated mitigation measures and a demonstration that the modified blasting program will result in no adverse impacts to aquatic resources;

EPA has proposed, or has required, the following restrictions on blasting:

- Maximum charge size of 50 pounds; and.
- Overburden must remain in place during blasting.

As previously stated within MassCEC's May 20, 2013 letter to EPA, each of these restrictions is protective of the environment as follows:

- As the charge size increases, the impacts from peak pressure and impulse increase; and
- MassCEC has shown that the overburden absorbs some of the energy from charges, which reduces the peak pressure and impulse from the charge.

However, given the higher rock elevations found within the dredge footprint, these two conditions are now in conflict, because the limitation of the maximum charge size to be 50 pounds will prevent blasting from being successful, and (since subsequent second, third, or possibly fourth rounds of blasting could not take place until the overburden was removed to assess the existing conditions), the limitation that the overburden must remain in place during blasting would then eliminate the possibility that further blasting could take place at all.

Thus, it is necessary to consider an increased maximum charge weight up to 150 lbs in locations where there is the most rock. Therefore, the primary purpose of this section is to evaluate the options for successful implementation of blasting, and determine which is the Least Environmentally Damaging Practicable Alternative. These options are:

1. **Option 1: No Blasting.**

This alternative would eliminate blasting from consideration. As blasting is necessary to achieve the goals of the project, this alternative would halt construction of the project and is therefore not considered further as it is considered impracticable.

2. **Option 2: Blast with 50 pound charge maximum only, remove the overburden after initial blasting, blast one to two times more, clearing the overburden after each blast, until depths are achieved.**

This option would limit the size of the peak pressure and peak impulse impacts to those that have already been reviewed and approved by EPA for the first blast; however, this option would require EPA to rescind its proposed requirement that no blasting could occur after the overburden had been removed (as a maximum 50 pound charge will not be capable of removing all rock). The second (and third or possibly a fourth) charges would not be able to be set until the fractured rock surface were evaluated to determine how best to proceed. This could not take place without removing the overburden and blasted rock and performing a survey.

The second (and likely third, with a possibility of a fourth in some cases) blast(s) would therefore need to take place during the spring of 2014 without the overburden in place. As noted on page 6 of MassCEC's May 20, 2013 letter:

> "As the model results shown above indicate, compared to the "Buried at Depth" ("With Overburden") modeling scenario (which would have a 100% environmental impact within a 210 foot radius), the "In Water" ("No Overburden") scenario has a 345% ($390^2/210^2$) areal impact by comparison. Please note that this larger acoustical impact would be compounded further by the noise and turbidity impacts of extended mechanical rock removal efforts that would be required in a "last resort" scenario before blasting is attempted."

Therefore, in this situation, not only will there be a large percentage of locations where a second, third (and perhaps fourth in some cases) blast(s) take place, all but the first blast will

take place without the overburden in place, resulting in a 345% increase in impacts for each round of blasting from those second through fourth blasts. The minimum total impact of these additional two to three rounds would result in an increased impact of at least 689% [2 X 345%] to 1035% [3 X 345%], as compared to the blasting scenario envisioned prior to the receipt of this new subsurface data, with 50 pounds being the maximum charge weight in that scenario.

3. Option 3: Increase the maximum charge weight to 150 pounds

This option would increase the charge weight to the size necessary to complete the blasting at each location.

Based on the model and mathematics contained within the November 2012 JASCO report, the mitigated radius of influence of the impulse impact for a 150 foot charge would be approximately 480 feet (as compared to the 210 foot impulse radius calculated by JASCO in association with a maximum 50 pound charge). This would result in a 522% ($480^2/210^2$) increase in the overall impact in association with these maximum charges, as compared to the blasting scenario envisioned prior to the receipt of this new subsurface data, with 50 pounds being the maximum charge weight in that scenario. Please note that the maximum charges would only be used in the locations where the rock is the thickest.

In order to illustrate the overall impact of the increase in charge weight for the thickest rock, two diagrams have been prepared (included within **Attachments H and I**). These diagrams show the outline of the anticipated extent of impact prior to the new bedrock elevation information with 50 pounds as a maximum charge as a red or orange line, and the potential increased area of impact (from the maximum 150 pound charges) as purple or black circles, centered around the areas with the thickest rock. These diagrams indicate that even with the increase of charge size, the November 2012 JASCO model mathematics indicate that the increased impacts would be primarily to the southeast and south, and would not represent a significant increase in overall area.

Update to JASCO Model

As presented within its November 2012 report, JASCO's blast modeling consisted of calculations of impulse as a function of charge weight and distance based on the results of empirical equations of transmission of energy through the water column from an underwater explosive source (as derived from Swisdak 1978 and employed by the Underwater Calculator spreadsheet developed by Dzwilewski and Fenton in a 2003 paper).

These equations for pressure and impulse do not take into account the mitigating effects of bedrock confinement and overburden. In order to incorporate these factors, JASCO adjusted the effective weight of the charge with a coupling efficiency factor that was derived from Dzwilewski and Fenton (2003) which compared the explosive coupling efficiency for a charge buried in clay sediments and for a charge placed inside a steel pipe driven into clay sediments. At the time, JASCO was assuming that the charge inside the steel pipe would approximate a charge confined in rock and buried under the overburden.

After having discussed the presence of additional unanticipated rock within the dredge footprint with JASCO, and after JASCO reviewed the Contractor's blasting plan, JASCO has proposed an alteration to the coupling efficiency assumptions within the original November 2012 JASCO report. JASCO believes that the alteration to the coupling efficiency more accurately reflects the confined, high compressive strength rock, the 2 foot layer of stemming that will confine the blast within the rock, and the additional layer of overburden that will remain in place during blasting, all of which are anticipated to absorb a significantly greater degree of blast energy than a steel pipe driven into clay sediments. As a result, JASCO has calculated a much smaller radius of influence in association with all charge weights (JASCO's new analysis analyzes 30 pound charges to 150 pound charges). An executive summary of JASCO's updated findings are included as **Attachment J**.

The end result of JASCO's updated findings is that a 150 pound charge is now anticipated to have an unmitigated radius of impact for impulse of approximately 268 feet. JASCO does not cite a mitigated radius of impact, but it is anticipated that the use of bubble curtains would mitigate this radius to a smaller distance than the mitigated impulse radius of impact cited within the November 2012 JASCO report, which was 210 feet.

As a result of this analysis, MassCEC believes that the actual impacts in association with use of a maximum charge of 150 pounds would be below the previously-anticipated impacts in association with the use of a maximum charge size of 50 pounds as outlined within the November 2012 JASCO report, and as previously evaluated by EPA within its June 13, 2013 and July 24, 2013 letters.

Conclusion and Discussion

As stated in our August 27, 2013 meeting, MassCEC does not believe that the project can be completed as planned without the use of blasting. As noted above, when calculating impacts in accordance with JASCO's November 2012 report, as compared to the blasting scenario envisioned prior to the receipt of this new subsurface data, with 50 pounds being the maximum charge weight in that scenario, Option 2 would have significantly higher environmental impacts that Option 3. Based on the available options, MassCEC has determined that Option 3 is the Least Environmentally Damaging Practicable Alternative because the anticipated increased environmental impact for the use of a maximum charge of 150 pounds is lower than the alternative of conducting multiple 50 pound charges.

Additionally, JASCO has submitted an Executive Summary of an update to its November 2012 report. Within its summary, JASCO has indicated that the coupling efficiencies utilized to determine energy transmission between a blast within bedrock with overburden in place may be refined to more accurately reflect real-world conditions. The refinement of the model results in substantially more energy absorbed by rock, stemming and overburden than had previously been assumed, and therefore, smaller radii of influence in association with peak pressure and peak impulse. Using this better understanding, the incremental increases in impacts from use of a maximum 150 pound charge size are not anticipated to be significantly different than the

impacts anticipated from a the initial model results for a 50 pound charge size. As a result, it appears that there will not be a significant increase in impacts, in association with the use of a maximum 150 pound charge, as compared to the impacts which EPA based its previous position on.

Mitigation Measures

MassCEC has previously proposed a comprehensive list of mitigation measures in order to minimize impacts to marine resources and has similarly been receptive to proposals from EPA with regard to additional measures that could be additionally protective. Although these items have been detailed within MassCEC's prior submittals (most particularly within its May 20, 2013 submittal), they include:

> MassCEC understands that the EPA is concerned with the potential impact to fish communities due to blasting, primarily as a result of issues that were generated during blasting that was overseen by the USACE during 2007. MassCEC has reviewed a paper forwarded by EPA entitled "AFTER ACTION REPORT ON THE FISH KILLS RESULTING FROM BLASTING IN SUPPORT OF ROCK REMOVAL FROM THE FEDERAL NAVIGATION PROJECT -BOSTON HARBOR, MASSACHUSETTS- (FALL 2007), by the USACE, dated June 2008" (included as **Attachment K**).
>
> MassCEC is aware that communication problems between the fish observers and the contractors appear to have been a large source of the issues that resulted in large quantities of fish being killed within Boston Harbor during this project. MassCEC has discussed this issue with Cashman-Weeks NB, and the Contractor has prepared the following operation and communication plan (see **Attachment L**) that is intended to minimize the chance that such a miscommunication will take place in association with the South Terminal Project.
>
> Prior to blasting, MassCEC proposes to isolate the blast areas in a similar method as has previously been successful in association with the Fish Deterrent System. It is MassCEC's understanding that flatfish will not be as high a concern as during the conventional implementation of the Fish Deterrent System; therefore fish weirs will not be installed as part of this effort. Silt curtains will be installed to prevent fish from entering the potential blast areas. The acoustic modeling conducted to date clearly indicates the areas that have the greatest likelihood of being affected by the blasting (i.e. the radius as noted previously around each blast site), and therefore will also be the areas within which fish exclusion efforts will be focused. Prior to the initiation of blasting, a fish inspection (similar to those associated with the Fish Deterrent System) will be undertaken to determine if fish are present in the blast area. MassCEC will perform the fish inspection in compliance with Fish Deterrent System protocols. If necessary, "fish scaring" or "fish startling" will be used to clear the area of fish. The historic effectiveness of this methodology indicates that multiple "fish startling/scaring" efforts will not be

necessary. Subsequent to the clearing of the area, drilling and preparation of the area for blasting will begin.

Due to the human and public safety risk involved with placing explosives, the Contractor is constrained by a time limit with regard to how long the holes may stay open with explosives in place, prior to blasting. In order to make the most efficient use of this time, the Contractor proposes to work diligently to drill and install explosives in the shortest time possible, in order to leave sufficient time once the blast is prepared to monitoring for the presence of schools of fish. In addition, the Contractor has outlined its communication plans associated with the work to demonstrate how clear lines of communication will be maintained. The details of the Contractor's plan are included within **Attachment L**.

As outlined within MassCEC's specification section 02900 – BLASTING, a dedicated marine observer will be on hand to ensure that a concerted effort is being undertaken to inspect for the presence of schools of fish. This extra time will also allow for "fish scaring" should fish be observed prior to the actuation of any blasting. However, please note that worker safety will take precedence over inspection and scaring operations if necessary in the blasting area.

MassCEC believes that these measures will ensure that the impacts observed in Boston Harbor are not repeated on the South Terminal Project.

MassCEC would also like to repeat that Section 02900, Part 3.9.2.1, Subpart 8 of the specifications for the New Bedford Marine Commerce Terminal require the use of both silt curtains and bubble curtains to enclose blasting areas.

h. An updated JASCO model evaluating pressure and impulse impacts resulting from the proposed expanded blasting program;

MassCEC has been in contact with JASCO to communicate the new information. JASCO has conducted additional analysis and has presented its analysis within an executive summary included as **Attachment J**.

i. A written description of any additional impacts to the local community and how these communities will be protected. Also, a description of the Commonwealth's plan for informing the public of the proposed expanded blasting;

MassCEC and its Contractor are in the process of implementing a robust communication program to communicate the blasting program, which includes: direct communication with property and business owners within 1,500 feet of the blasting program, pre-blasting photographs and videos of existing conditions of structures within the 1,500 foot radius, public notification via local media, meetings with emergency services personnel from federal, state, and local agencies, two pre-blasting public meetings, and a hotline for blasting-related questions. Please note that this communication program has been in accordance with USACE

guidelines for any size blasting program. The plan for informing the public on the proposed blasting has not, to date, been specific with regard to charge sizes, hole spacing, or other particular information, nor is that a typical procedure with this type of blasting.

As the overall area of blasting has not changed, and modeling of the blast impact on adjacent structures (as projected from GZA's analysis of impacts to the Hurricane Barrier) was noted to be extremely conservative, the proposed changes in the blasting program are not anticipated to change the effect to the local community. MassCEC does not believe that the change in charge size represents a significant enough alteration in the program to warrant specific communication regarding these changes, particularly due to the fact that the changes are aspects of the program that have not previously (and would not typically) be communicated to the public.

j. A written description of how the proposed expanded blasting and pre-split blasting complies with state ARARs, including proximity to and any impacts on the paleosol areas and whether or not the Commonwealth will provide this information to the tribes for tribal consultation; and

The Commonwealth considered the implementation of blasting within its June 18, 2012 ARAR's letter contained within Appendix D to the Final Determination (blasting is noted on page 2 of that letter within the list of potential impacts). The Commonwealth has provided subsequent confirmation within its May 31, 2012 email (see **Attachment M**). The Commonwealth's confirmation was made prior to EPA's announcement of its intention to restrict the maximum charge size at 50 pounds (made within EPA's June 13, 2013 and July 24, 2013 letters); therefore, the increase in charge size does not appear to present new information that would require a separate re-evaluation of state ARARs.

The Commonwealth evaluated potential impacts to intertidal and sub-tidal paleosols within its June 25, 2012 communication to USEPA. The following was stated within that document:

> "The Commonwealth has compared the scope of its previous cultural resource investigations with the changes proposed within the Commonwealth's June 18, 2012 submittal and has determined that the actions will take place within areas that have previously been investigated and are significantly far from the existing delineated sub-tidal and/or intertidal paleosol areas that have been delineated as a result of investigations completed to date, and therefore will not adversely effect the subtidal or intertidal paleosol areas.
>
> The potential expansion of the deep draft area to the north and south, the potential blasting, and the potential expanded width of the navigational channel are all located on the northern portion of the eastern face of the proposed bulkhead. The anticipated maximum radius of impact of blasting will be approximately 50 feet. The nearest paleosol area is located on the southern face of the proposed bulkhead, which is a considerable distance from the proposed additional work."

As the overall area of blasting has not changed, and has not moved closer to the Paleosols (and, in fact, has moved further north, away from the Paleosol areas as a result of MassCEC's determination to abandon its pursuit of the expansion of the deep dredge footprint 100 feet to the south), and as the previously discussed modeling of the blast impact on adjacent structures (as projected from GZA's analysis of impacts to the Hurricane Barrier) was noted to be extremely conservative (and as a result, the subsequent increase in charge sizes will have no more impact than what was previously modeled), the proposed changes in the blasting program are not anticipated to increase or in any way change the impacts on the Paleosol areas.

k. An updated construction schedule.

An updated construction schedule is included within **Attachment G**.

MassCEC sincerely appreciates the extraordinary amount of time and attention EPA staff has committed to this vital and historic clean energy project, and respectfully requests once again your timely consideration of this very important matter. If you have any questions related to this proposed modification to the Final Determination, please do not hesitate to contact me at 617-315-9330.

Sincerely,

Bill White

Bill White
Director, Offshore Wind Sector Development

Attachment A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 1
5 Post Office Square, Suite 100
Boston, MA 02109-3912

June 13, 2013

Via electronic and first-class mail
bwhite@MassCEC.com

Bill White
Director, Offshore Wind Sector Development
Massachusetts Clean Energy Center
55 Summer Street, 9th Floor
Boston, MA 02110

RE: New Bedford Harbor State Enhanced Remedy – South Terminal Project
Blasting and CAD Cell 3

Dear Mr. White:

Thank you for the time you and your consultants have spent assisting us in better understanding the Commonwealth's requests for a modification of EPA's Final Determination ("FD") for the South Terminal Project to allow blasting for rock removal and to allow a change in the configuration of CAD Cell #3. We are continuing to process the Commonwealth's request for these and other modifications, and we are not yet in a position to render a formal decision on the requests. Based on the information provided by the Commonwealth, we can say, however, that at present, we see no impediment to our being able to approve the Commonwealth's request to implement its re-design of CAD Cell #3 to approximately 8.29 acres with a maximum depth of -60 MLLW instead of the originally approved design of 8.54 acres with a maximum depth of -45 MLLW.

With respect to blasting, we are not aware of any information that would prevent EPA from approving the request to allow blasting to occur in the three described locations as a method of "first resort," as long as there is compliance with specific conditions. Such conditions would likely include, but would not necessarily be limited to, those listed below, many of which were originally identified by the Commonwealth. In addition, we remain interested in knowing whether it would be possible to conduct some or all of the blasting this summer, before the onset of the fall migration period. If so, some of the conditions described below may be unnecessary.

1. No later than 30 days before blasting commences, the Commonwealth must develop and submit to EPA a final blasting plan that includes measures that will be taken to prevent community impacts and provisions to satisfy the conditions

set forth below. The plan must clearly articulate communications between the fisheries observer and the person who will conduct the blasting.

2. Blasting shall only be conducted in the three locations depicted on page 4 of the Commonwealth's May 20, 2013 letter to EPA. Blasting at the site closest to the bulkhead construction area may occur between September 15 and January 15. Blasting at the other two locations may occur between November 15 and January 15, and might also be able to occur earlier than November 15 if EPA specifically approves in writing an earlier start date for one or both sites following completion of the blasting at the bulkhead site and EPA's evaluation of the monitoring results (discussed further below).

3. For any blasting that occurs before November 15, a silt curtain must be erected north of the blast at an angle and length sufficient to deflect juvenile anadromous fish migrating from the Acushnet River to the ocean. The details of the location, length, and angle of the silt curtain must be identified in the final blasting plan.

4. There must be an adequate fish deterrent system (a combination of silt and bubble curtains and fish weirs) in place and properly functioning at least 24 hours prior to blasting, and such system shall remain in place for the duration of all blasting activities. (Note that NMFS specifically included fish weirs as one of the mitigation steps for Atlantic sturgeon protection in its May 6, 2013 letter to EPA completing the ESA consultation.)

5. Pre-blast monitoring for the presence of fish in the projected impact zone must be conducted immediately prior to the initiation of blasting. If fish are detected within the impact zone, the fish startle system must be deployed in an attempt to move fish out of the area.

6. After a blasting event is completed, the Commonwealth must monitor the area within and near the impact zone looking for fish that may have been injured or killed. Monitoring must commence immediately following the completion of each the blasting event and continue until no more bodies are recovered. Dead and injured fish must be enumerated and sorted by species and the information must be reported to EPA.

Within one week of receipt of the complete impact report related to the blasting at the bulkhead site, EPA will evaluate the impacts and determine whether blasting may proceed at the second location before November 15, 2013. If blasting at the second site is allowed to proceed before November 15, 2013, then within one week of receipt of the complete impact report related to the blasting at the second site, EPA will evaluate the impacts and determine whether blasting may proceed at the third location before November 15, 2013. Notwithstanding the foregoing, EPA reserves the right to require the Commonwealth to stop blasting either before or after November 15 if necessary to prevent an unacceptable level of fish mortality.

7. The blasting program must minimize the total weight of explosive charges per shot and the number of shots for the project, and in no case shall the total weight of explosive charges per shot exceed 50 lbs.

8. The Commonwealth must use angular stemming material of sufficient length in drill holes to reduce energy dispersal to the aquatic environment.

9. The Commonwealth must subdivide the charge, using detonating caps with delays or delay connectors with detonating cord, to reduce total pressure, and must avoid use of submerged detonation cord.

10. The Commonwealth must use decking when possible in lengthy drill holes to reduce total pressure.

11. For seismic exploration, the Commonwealth must use non-explosive sources when possible or use linear charges for open water shots or buried charges.

12. The Commonwealth must used shaped charges to focus the blast energy when the submerged surface charges are necessary, reducing energy released to the aquatic environment during demolition.

13. To protect the Hurricane Barrier, blasting must be conducted consistent with the Corps of Engineers' March 1, 2013 letter to the Commonwealth (as clarified by the Corps' March 8, 2013 email).

Very truly yours,

James T. Owens III
Director, Office of Site Remediation and Restoration

Cc: via email
Gary Davis gary.davis@state.ma.us
Carl Dierker, dierker.carl@epa.gov
Dave Lederer, lederer.dave@epa.gov
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Chet Myers, cmyers@apexcos.com
Jay Borkland, jborkland@apexcos.com

Attachment B

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
FIVE POST OFFICE SQUARE – SUITE 100
BOSTON, MASSACHUSETTS 02109-3912

July 24, 2013

Via electronic and first-class mail
bwhite@MassCEC.com

Bill White
Director, Offshore Wind Sector Development
Massachusetts Clean Energy Center
55 Summer Street, 9th Floor
Boston, MA 02110

RE: New Bedford Harbor State Enhanced Remedy - South Terminal Project Blasting

Dear Mr. White:

I am writing in response to your June 27, 2013 email regarding EPA's June 13, 2013 letter, in which EPA set forth the conditions on blasting for rock removal that would likely be included in any formal modification of the Final Determination for the South Terminal Project. You requested clarification of Condition 7, related to maximum explosive weights. As you know, EPA has been in technical discussions with the Commonwealth's engineering consultants, focused on the question of whether Condition 7 in our June 13, 2013 letter could be modified to require that the total weight of the explosive charge "per delay" (i.e., per delayed charge) be no more than 50 pounds, rather than limiting the total weight of all explosive charges per shot to no more than 50 pounds.

After detailed review and discussions of the JASCO acoustic modeling report and supporting studies, and in light of technical memoranda submitted last week to EPA from JASCO (dated 7/12/13) and Apex (dated 7/17/13), we have concluded that Condition 7 can be modified to specify that no more than 50 pounds of explosive per delayed charge with a minimum time delay of 25 milliseconds (ms) between charges be used. We believe this modified condition, coupled with the other conditions previously specified and discussed below, should assure no adverse pressure and impulse effects on fish.

The delay time between detonations is a critical factor in our determination that Condition 7 can be modified to limit the weight of explosives per delayed charge, rather than the total weight of explosives per shot. This is because the JASCO acoustical modeling study analyzing pressure and impulse impacts from blasting at South Terminal modeled the effects of a single explosive charge. The technical question under consideration was: at what length of delay time can we safely assume that the impacts of multiple, delayed charges become non-additive, and effectively result in impacts similar to discrete, single charges?

shall the total weight of explosive charges exceed 50 pounds per delayed charge, with a minimum time delay of 25 ms between charges. We also expect to add a condition not mentioned in the June 13, 2013 letter, to specify that all blasting must be conducted with the clean parent material left in place. These conditions would apply to both pre-split blasting and production blasting unless and until the Commonwealth provides justification, as previously described, for a change in the delay time for pre-split blasting.

We look forward to working with you to resolve any outstanding issues regarding the South Terminal project.

Sincerely,

James T. Owens, Director
Office of Site Remediation and Restoration

cc: via email

Gary Davis gary.davis@state.ma.us
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Dave Lederer, lederer.dave(a),epa.gov
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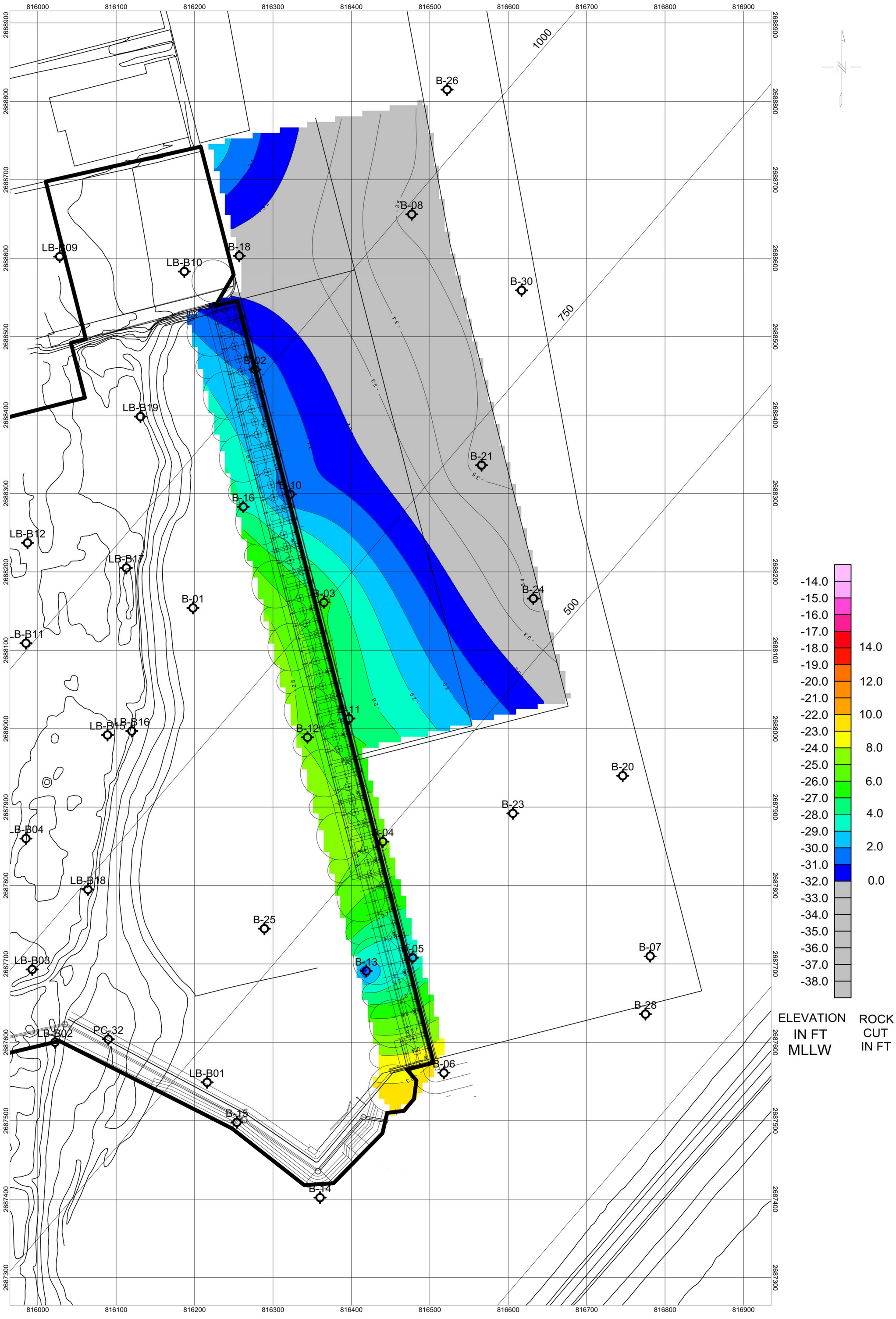
Bullard, J. K. 2012. RE: Route 52 Causeway Replacement & Somers Point Circle Elimination Contract B. Letter to Kostas Svarnas, U.S. Department of Transportation, New Jersey Division. 13 p.

Wright, D.G., and G.E. Hopky. 1998. Guidelines for the use of explosives in or near Canadian fisheries waters. Can. Tech. Rep. Fish. Aquat. Sci. 2107: iv + 34p. http://www.dfo-mpo.gc.ca/Library/232046.pdf

Attachment C



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US survey foot

NAD83 / Massachusetts Mainland (ftUS)

MASSACHUSETTS CLEAN ENERGY TECHNOLOGY CENTER

NEW BEDFORD MARINE COMMERCE TERMINAL
ELEVATION OF ROCK BY HISTORIC BORING DATA
NEW BEDFORD HARBOR

BORING DATA INCLUSIVE THRU 05/31/2011
APEX COMPANIES LLC
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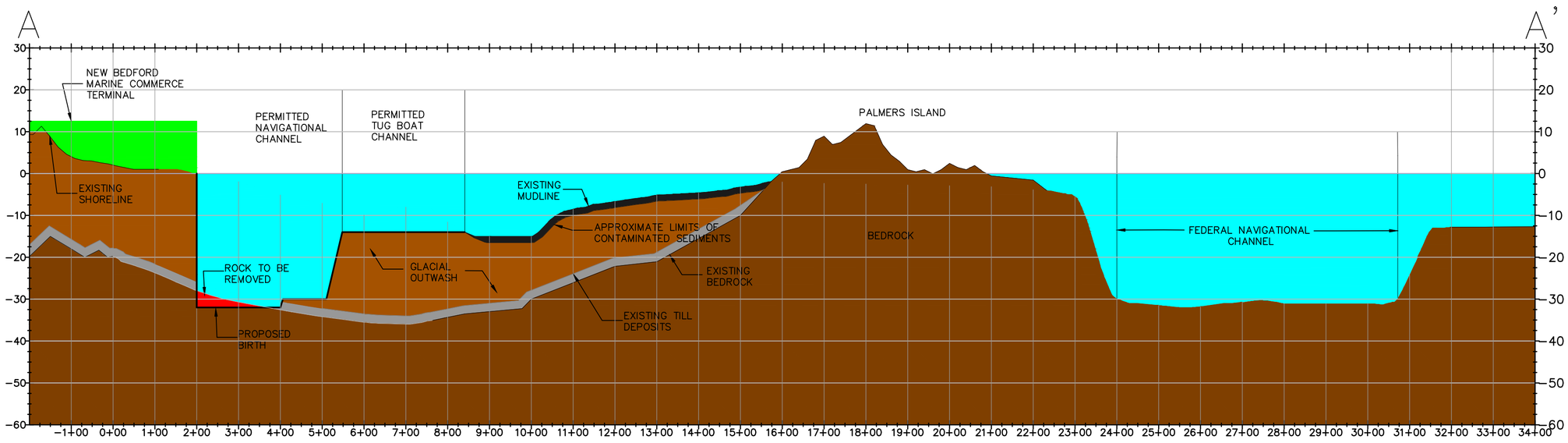
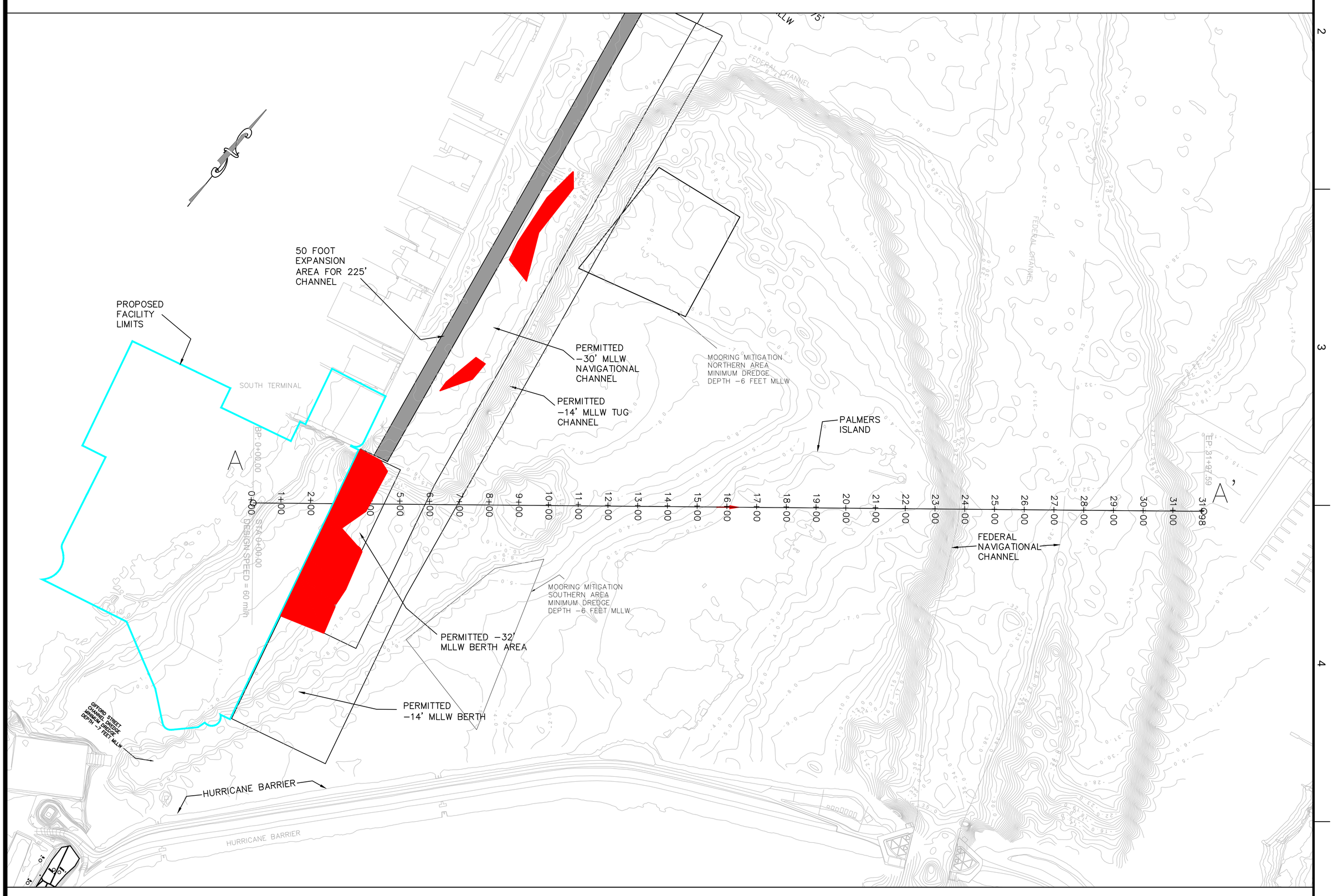
Attachment D

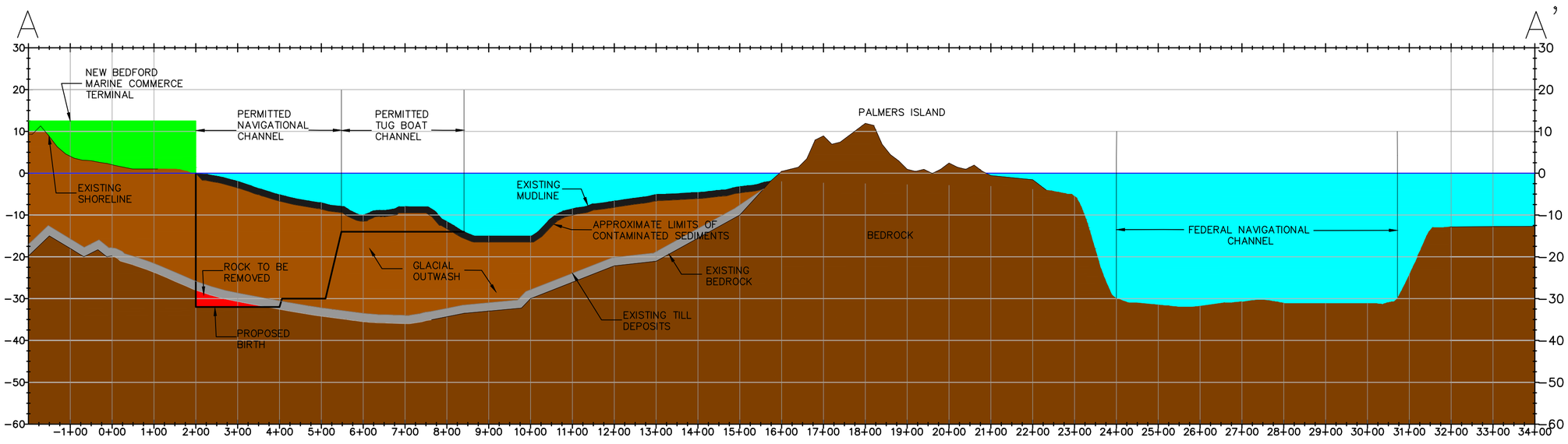
POST DREDGING BLASTING PROFILE



PROFILE ALIGNMENT A TO A'



PRE DREDGING BLASTING PROFILE



PROFILE ALIGNMENT A TO A'

APEX

ROCKVILLE, MD
SOUTH WINDSOR, CT - BOSTON, MA -
NEW BEDFORD, MA - HOLYOKE, MA

184 HIGH STREET, SUITE 502
BOSTON, MA 02210

58H CONNECTICUT AVENUE
SOUTH WINDSOR, CT

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DRAFT

PROJECT

NEW BEDFORD
MARINE COMMERCE
TERMINAL

OWNER

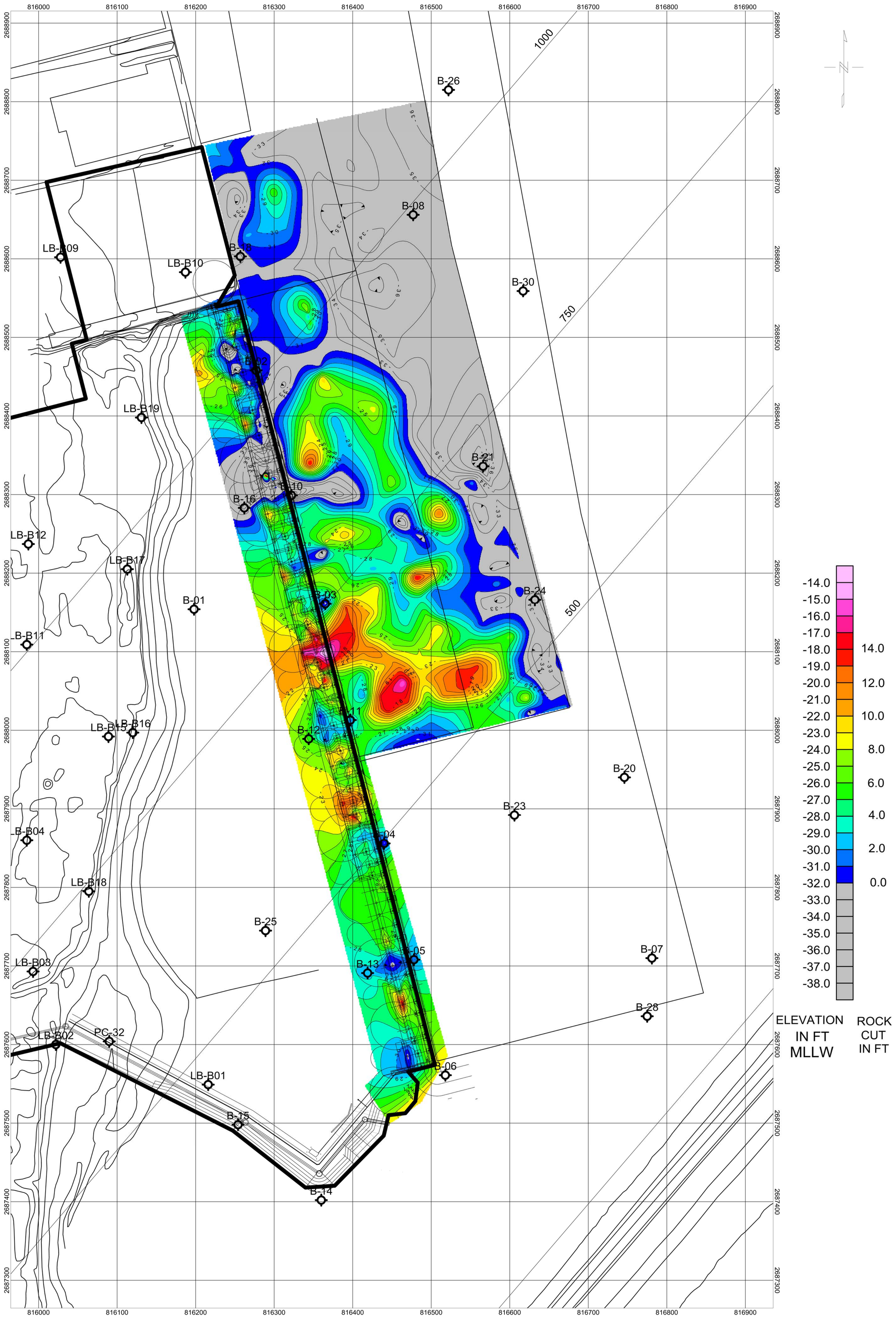
MASSACHUSETTS CLEAN ENERGY CENTER
55 SUMMER STREET, 9TH FLOOR
BOSTON, MASSACHUSETTS

NO.	DATE	DESCRIPTION	BY

PROJECT NO.	6690
CADD FILE	
DESIGNED BY	JER
DRAWN BY	JEF
CHECKED BY	
DATE	06/5/2012
DRAWING SCALE	1"=200'
GRAPHIC SCALE	SCALE: 1"=200' 0 100 200 400
SHEET TITLE	PRE DREDGE BLASTING AND POST DREDGE BLASTING COMPARISON
DRAWING NO.	V-5.4

1 OF 1

Attachment E



Scale 1:720

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US survey foot

NAD83 / Massachusetts Mainland (ftUS)

MASSACHUSETTS CLEAN ENERGY TECHNOLOGY CENTER

NEW BEDFORD MARINE COMMERCE TERMINAL
ELEVATION OF ROCK WITH PROBE DATA
NEW BEDFORD HARBOR

PROBE DATA INCLUSIVE THRU 8/19/2013
APEX COMPANIES LLC
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Attachment F

(Included as Separate File)

NEW BEDFORD MARINE COMMERCE TERMINAL

Contract No MACEC-FY13-001NB

OPERATIONAL BLASTING PLAN
August 2013

General Contractor:
Cashman Weeks NB

Blasting & Vibration Consultant:
Contract Drilling & Blasting LLC

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1 GENERAL

This Operational Blasting Plan (Blast Plan) for the New Bedford Marine Commerce Terminal project was developed from requirements for drilling and blasting in Contract number MACEC-FY13-001NB by applying the consultant's experience in executing underwater blasting projects in major navigational channels, harbors and other waterways. The plan incorporates the safety and health requirements from EM385-1-1 (2008).

The first section of the document contains the Scope of Work and definitions used in the Blast Plan, and list the members of the Project Team and their qualifications.

The necessary insurance documents are also referenced.

1.1 Scope of Work

The Massachusetts Clean Energy Center (MACEC) is managing the construction of the New Bedford Marine Commerce Terminal.

The MACEC awarded Contract number MACEC-FY13-001NB entitled "New Bedford Marine Commerce Terminal" to Cashman Weeks NB. This contract includes a provision for blasting of bedrock in the Port of New Bedford, which cannot be removed by means of mechanical dredging alone.

All drilling and blasting, including protection of existing structures, will be conducted in strict accordance with contract specifications and local, state and federal regulatory requirements and safety procedures. The entire work effort will be in the state of Massachusetts.

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1.2 Definitions

All Clear to Blast – Security patrol boats and other designated personnel let the Blaster-in-Charge know that there are no vessels or people in the blasting safety zone and that it is safe to proceed with the blasting countdown.

All Clear – The signal given by the Blaster-in-Charge after it has been determined that the blast fired successfully and that it is safe for project personnel and equipment to return to the blasting zone.

Blaster-in-Charge - The single designated and licensed person with complete responsibility and total authority over all decisions involving safe handling, use and on-site security of explosives.

Charge-per-Delay - For vibration control, any charges firing within any 8-millisecond time period are considered to have a cumulative effect on vibration and air-overpressure effects.

Controlled Drilling & Blasting - Excavation of rock using explosives, wherein the blast is carefully designed and controlled to provide a distribution of charge and confining stemming that will excavate the rock to the required limits but minimize overbreak, control rock movement, and assure that intensities of blast-induced vibration and water-overpressure do not exceed specified limits.

Drillboat – Dedicated barge equipped for drilling and blasting work effort, also referred to as the drilling and loading barge.

Impulse - Cumulative blast-induced force created by ambient pressure changes applied over time. Impulse is expressed in units of psi-milliseconds and can have a positive or negative value.

Line Drilling - drilling a series of closely spaced holes, at the perimeter of the cut, so as to break the rock along a line.

Magazine - secure & compliant storage for explosives and ammunition.

Peak Particle Velocity (PPV) - The maximum of the three ground vibration velocities measured in the vertical, longitudinal and transverse directions. PPV measurement units are expressed in inches-per-second (ips).

Perimeter Holes - The blast holes drilled along the final limit of the excavation.

Powder Factor – Amount of explosives in lbs per CY of rock used in blasting, calculated as the total lbs of explosives in the blast divided by the CY of rock.

Primary Initiation - The method used to initiate a blast(s) from a remote and safe location.

Production Holes - Blast holes in the main body of the rock mass being removed by drilling and blasting.

Scaled Distance - A calculated value describing relative vibration energy based on distance and charge-per-delay. For ground vibration control and prediction

purposes, Scaled Distance (Ds) is obtained by dividing the distance of concern (D) by the square root of the charge-per-delay (W).

Seismograph - An instrument used to record the intensity and frequency of ground vibrations measured with three mutually perpendicular geophones and a linear-scale microphone that measures air-overpressure.

Stemming - Crushed stone in compliance with contract requirements, placed in the unloaded collar area of blast holes for the purpose of confining explosive charges and limiting rock movement and air-overpressure (noise) and underwater overpressure.

Subdrilling - The portion of the blast hole that is drilled below or beyond the desired excavation depth or limit. Subdrilling is generally required to prevent the occurrence of high or tight areas of unfractured rock between blast holes.

Test Blast Program – When necessary, limited scale drilling and blasting is utilized to calibrate the environment in which blasting takes place and is called the Test Blast Program. Blast size is gradually increased from a very small blasting pattern to production scale blasting patterns, during which time ground vibration, air overpressure and underwater overpressure is monitored to ensure that these parameters remain within contract and regulatory limits.

Window of Opportunity - A two hour time window during which the blast event may occur.

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1.3 Project Team & Qualifications

The project team for the drilling and blasting work effort comprise the following members:

- ✧ MACEC / APEX — Project Owner
- ✧ Cashman Weeks NB — General Contractor
- ✧ Contract Drilling & Blasting LLC — Blasting & Vibration Consultant
- ✧ Explosives Supply, Inc. — Explosives Distributor
- ✧ Dyno Nobel, Inc. — Explosives Manufacturer

Key individuals in the participating organizations are indicated below.

MACEC / APEX	Project Owner
Chris Morris	MACEC Project Manager
Chet Myers	APEX Project Manager

Cashman Weeks NB	General Contractor
Shawn Wyatt	Project Manager
Stephen Tobin	Dredge / Drillboat Manager
Stewart Chandler	Site Safety & Health Officer
Paul Poirier	Project CQC Manager
David Norton	Drillboat Superintendent
Nathan Gilbert	Drillboat Superintendent

Contract Drilling & Blasting LLC	Blasting & Vibration Consultant
Albert vanNiekerk, PhD PE	President, Blasting & Vibration Consultant
Ralph Reese	Blasting & Vibration Consultant
Ken Tully	Blasting & Vibration Consultant
John Tognazzi	Blaster-in-Charge
Ed Dunn	Blasting Specialist
Linda Walker	Pre-Blast Survey Program Manager
Joseph Ghandour	Project Engineer
Connie Baldwin	Senior Vibration Control Technician
Ed Harvey	Vibration Control Technician
Cathy Mace	Vibration Control Technician

Explosives Supply, Inc. / Dyno Nobel	Explosives Distributor / Manufacturer
Ken Morris (Explosives Supply)	President
John Joseph (Explosives Supply)	CEO
Bob Combs (Dyno Nobel)	Technical Service

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1.3.1 Qualifications – Blaster-in-Charge

The Blaster-in-Charge for this project will be John Tognazzi. His resume follows below:

JOHN TOGNAZZI

Blaster-in-Charge

ACADEMIC QUALIFICATIONS

St. John's High School, Shrewsbury, Massachusetts

CERTIFICATIONS

Blasting Licenses: New York City, Massachusetts, Rhode Island

PROFESSIONAL EXPERIENCE

Contract Drilling & Blasting LLC (Florida) 2010 - Present
Business Development Manager

Responsible for managing sales process and managing criteria for selecting and pursuing potential opportunities. This includes collecting proposal information from stakeholders and assimilating the data into an established process for managing, executing and fulfilling proposal requests, tracking each stage of assigned projects assuring that proposals are executed efficiently. Contribute to the company marketing activities, including website, branding and promotional materials.

Impact Drilling and Blasting (New Hampshire) Aug. 2009 – Jan. 2010
Technical Services Consultant

Provided technical and shot services; provided shot design and layout services. Responsible for product selection and application of non-electric and electric detonators. Provided 3D Laser Profiling and Bore Tracking information and provided report generation.

A-1 Drilling and Blasting (Massachusetts) April 2009 – Aug. 2009
Technical Services Consultant

Managed the drilling and blasting operation for the Medway, MA wastewater project. Blaster-in-charge responsible for purchasing and storage of all explosives used on-site. Complied with local, state and federal requirements for permitting and ordinance handling. Responsible for seismic monitoring and report generation.

Austin Powder Company (Ohio) Jan. 1988 – July 2008
Technical Services Manager 2005 - 2008

Provided technical assistance in the application of explosives to key accounts, including MWRA water tunnel expansion projects and quarry operations. Responsible for planning, design, product selection, vendor negotiations and selection. Complied with local, state and federal authority's requirements for permitting and ordinance handling and inspections of product storage sites. Worked with site managers to meet all time lines, production goals and budgetary requirements. Responsible for product procurement, inventory management and distribution to various customer sites. Managed blasting crews and drilling contractors.

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Location Manager 1990 - 2005

Managed storage and distribution site with a weekly product turnover of $60,000.00 servicing customers in Massachusetts and Rhode Island. Responsible for scheduling services, inventory procurement, management and distribution. Responsible for fleet DOT compliance and site maintenance. Responsible to local, state and federal authorities for compliance of all mandated requirements of the permitting, storage, distribution and inventory of products on-site. Responsible for entire sales cycle: initial contact, quotes, negotiation and closing. Staffed, trained and managed blasting crews, drivers and laborers. Conducted MSHA and company required safety training. Managed all drilling contractors at various customer sites. Accounting function included AR, AP, cash flow and payroll processing.

Sales and Technical Representative, Massachusetts 1989 - 1990

Responsible for entire sales cycle: initial contact, quotes, negotiations, closing and management of accounts in Massachusetts and Rhode Island. Responsible for scheduling and managing blasting crew for stone quarries, site, sewer and underground tunneling contractors. Provided technical support to customers, including design services and product application. Complied with local, state and federal authority's requirements for permitting.

Senior Blaster 1988 - 1989

Provided blasting services in Massachusetts and Rhode Island. Provided conveyance of product to customer sites in accordance with local, state and federal regulations.

PRESENT & PAST PROJECTS

- Aggregate, Inc. Quarry Blasting, St. Croix, USVI
- Creamer - Sanzari JV, Court Street Bridge Removal, Hackensack, NJ
- DH Griffin, Explosives Demolition of the Imperial Sugar Plant, Sugarland, TX
- DH Griffin, Rte 25-70 Over French Broad River Bridge Demolition, Newport, TN
- Great Lakes Dredge & Dock Company, New York and New Jersey Harbor Channel Navigation Improvement 50 FT Project, Newark Bay Channels, Contract 4, S-NB-1, NJ
- Great Lakes Dredge & Dock Company, LLC, New York and New Jersey Harbor Channel Navigation Improvement 50 FT Project, Kill van Kull Channels, Contract 5, S-KVK-1, NY & NJ
- Hunter Roberts Construction Group, Willow Hotel, 120 W 57th St Rock Excavation, New York, NY
- J. D'Annunzio & Sons, Inc., MTA 86th St Station Open Excavation, Manhattan, NY
- J.H. Reid General Contractors, Route 36 Bridge At Shrewsbury River, Monmouth County, NJ
- Kiewit, Willis Avenue Bridge Replacement, Manhattan & The Bronx, NY
- Mayrich Construction, 57th Street Development, Manhattan, NY
- Northeast Dredging Equipment Company, LLC, New York & New Jersey Harbor, Channel Improvement 50 Ft Project, Newark Bay & Arthur Kill Channels, SNB2/SAK1, Contract 11, NY & NJ
- Northeast Dredging Equipment Company, LLC, New York & New Jersey Harbor, Channel Improvement 50 Ft Project, Arthur Kill Channel, SAK2, Contract 13, NY & NJ
- Omega Demolition Corporation, Holtwood Power Plant, Skimmer Wall Removal, Holtwood, PA
- RJ Corman Railroad Group, National Docks Bergen Tunnel Clearance, Jersey City, NJ
- SSK Constructors, 2nd Ave Subway, 72nd St Station, New York, NY

Resume – John Tognazzi *Page 2 of 2*

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1.3.2 Qualifications – Blasting & Vibration Control Consultant

Section 1 - Marine Drilling & Blasting

Contract Drilling & Blasting (CDB) participated in numerous major navigation channel and harbor expansion projects in locations from North America and the North Sea to Cape Horn, either as consultant, or through self-performing the drilling and blasting operations on a turn-key basis. As blasting and vibration consultant, CDB actively participated in the design and execution of the underwater drilling and blasting activities with our customers. Most of these projects were dependent upon the successful design and implementation by CDB of programs to mitigate the potential environmental effects of these projects, such as blast-induced vibration or underwater overpressure.

Project locations include the New York and New Jersey Harbor, the Columbia River in the Pacific Northwest, the Panama Canal in Panamá, the Port of Wilmington, the Port of San Juan in Puerto Rico, the Port of Freeport in the Grand Bahamas, and the Port of Miami, Port of Tampa and Port Manatee in Florida. Our customer list includes major international dredging companies, such as Great Lakes Dredge & Dock Company, Weeks Marine, Bean Stuyvesant, Boskalis, Van Oord Dredging and Marine Contractors and J.E. McAmis Inc. For a complete listing of projects, refer to the CDB Statement of Qualifications.

A selection of projects completed in recent years is shown below. Some of these projects also included monitoring of underwater overpressure as a result of blasting. A more complete list is available upon request.

1.1 NEW YORK AND NEW JERSEY HARBOR CHANNEL NAVIGATION IMPROVEMENT 50 FT PROJECT, ARTHUR KILL CHANNELS, PLUS KVK # BUOY & WESTERN 1,000 FT OF ELIZABETH CHANNEL, CONTRACT 15, S-AK-3, KVK #10 BUOY & WEST-ELIZ (CONTRACT # W912DS-13-C-0012)

1.1.1 Scope of Work

Blasting Consultant, Vibration Monitoring Consultant

1.1.2 Duration of Contract

March 2012 to Present

1.1.3 Place of Performance

Port of Newark, Kill van Kull Channel, Arthur Kill Channels, New York and New Jersey

1.1.4 Project Owner

The Port Authority of New York and New Jersey, and US Army Corps of Engineers

1.1.5 Customer

Great Lakes Dredge & Dock Company, LLC

1.1.6 Challenges and solutions

Because of several previous blasting projects within the Port of New York and New Jersey, there is extreme public sensitivity to this project. Very close cooperation is required with USACE consultants and other stakeholders and web-based management of blast data (BlastView™) has been implemented to facilitate information transfer near real-time. The blasting zones are within narrow ship channels with very busy ship traffic schedules. There are two historical bridge

structures within blasting impact zone, as well as also numerous residential and commercial properties which must be protected as the blast zone approaches to under 100 feet. A major challenge is that we are working immediately in front of the docks at several marine terminals. This requires very close coordination with the USACE, the Pilot Association, and Vessel Traffic of the USCG. The Port of New York and New Jersey is the busiest port on the East Coast, and one of the major ports in the country. Additional concerns are that blasting will be conducted within 70 feet of marine infrastructure severely damaged by hurricane Sandy. Extreme care must be exercised to not exacerbate damages.

1.1.7 References with Contact information

- Great Lakes Dredge & Dock Company, LLC
  - Steve Lawrence, Project Manager (630) 240-8393
- US Army Corps of Engineers (New York District)
  - Salvatore (Sam) Didato, Resident Engineer (201) 433-9232

1.2 NEW YORK AND NEW JERSEY HARBOR CHANNEL NAVIGATION IMPROVEMENT 50 FT PROJECT, ARTHUR KILL CHANNELS, CONTRACT 13, S-AK-2 (CONTRACT # W912DS-11-C-0018)

1.2.1 Scope of Work

Blasting Consultant, Vibration Monitoring Consultant

1.2.2 Duration of contract

February 2012 startup (ongoing)

1.2.3 Place of Performance

Port of New York and New Jersey / Elizabeth, NJ and Staten Island, NY

1.2.4 Project Owner

Port Authority of New York and New Jersey and the US Army Corps of Engineers

1.2.5 Customer

Northeast Dredging Equipment Company, LLC

1.2.6 Challenges and solutions

Because of several previous blasting projects within the Port of New York and New Jersey, there is extreme public sensitivity to this project. Very close cooperation is required with USACE consultants and other stakeholders and web-based management of blast data (BlastView™) has been implemented to facilitate information transfer near real-time. The blasting zone is within a narrow ship channel with a very busy ship traffic schedule. There are several historical structures within blasting impact zone, as well as also numerous residential and commercial properties which must be protected as the blast zone approaches to within 100 feet. The major challenges are three high pressure POL lines supplying one of the busiest airports in the area. These lines pass within 20 feet of the bottom of the subdrill in the bore-holes; therefore innovative solutions to control blast vibration were required to be developed. The pipeline company required near real time reporting of vibration levels after each blast.

1.2.7 References with Contact information

- Northeast Dredging Equipment Company, LLC

- Steve Tobin, Project Manager (617) 890-0600
- US Army Corps of Engineers (New York District)
  - Salvatore (Sam) Didato, Resident Engineer (201) 433-9232

1.3 NEW YORK AND NEW JERSEY HARBOR CHANNEL NAVIGATION IMPROVEMENT 50 FT PROJECT, NEWARK BAY AND ARTHUR KILL CHANNELS, S-NB-2 / S-AK-1 – CONTRACT 11 (CONTRACT # W912DS-10-C-0023)

1.3.1 Scope of Work

Blasting Consultant, Vibration Monitoring Consultant

1.3.2 Duration of contract

May 2011 startup (ongoing)

1.3.3 Place of Performance

Port of New York and New Jersey / Bayonne and Elizabeth, NJ and Staten Island, NY

1.3.4 Project Owner

The Port Authority of New York and New Jersey and the US Army Corps of Engineers

1.3.5 Customer

Northeast Dredging Equipment Company, LLC

1.3.6 Challenges and solutions

Because of several previous blasting projects within the Port of New York and New Jersey, there is extreme public sensitivity to this project. Very close cooperation is required with USACE consultants and other stakeholders and web-based management of blast data (BlastView™) has been implemented to facilitate information transfer near real-time. There are several historical structures within blasting impact zone that must be protected. The blasting zone abuts an active container terminal with a very busy ship traffic schedule. There are also numerous residential and commercial properties which must be protected from possible blast induced vibration.

The well-established explosives products selection used in the Port of New York and New Jersey for more than 20 years became obsolete with the closure of the manufacturing facility. A new, but equally robust and efficient, selection of explosives products and initiating systems will be implemented in consultation with a new explosives supplier and customer personnel. CDB will provide classroom and hands-on training as well as facilitate the transition to the new product combination.

1.3.7 References with Contact information

- Northeast Dredging Equipment Company, LLC
  - Steve Tobin, Project Manager (617) 890-0600
- US Army Corps of Engineers (New York District)
  - Salvatore (Sam) Didato, Resident Engineer (201) 433-9232

1.4 COLUMBIA RIVER CHANNEL IMPROVEMENT (CRCI) 2009, COLUMBIA RIVER, COLUMBIA COUNTY, SAINT HELENS, OREGON AND CLARK COUNTY, WASHINGTON (CONTRACT # W9127N-09-C-0026)

1.4.1 Scope of Work

Underwater Drilling & Blasting Contractor, Underwater Overpressure Monitoring Advisor

1.4.2 Duration of contract

November 2009 to February 2010

1.4.3 Place of Performance

Columbia River, Oregon / Washington

1.4.4 Project Owner

US Army Corps of Engineers

1.4.5 Customer

J.E. McAmis Inc.

1.4.6 Challenges and solutions

Because of the presence of several protected fish species, underwater drilling and blasting in the Columbia River is closely regulated by the Oregon department of Fish and Wildlife and other environmental agencies. As a result, numerous restrictions were placed on drilling and blasting activities. In addition to these environmental restrictions, the drillboat was operated in a very busy shipping channel with extreme tide variations and swift currents. The project was executed in the middle of winter, with additional challenges presented to the crew by the harsh operating environment.

Upon completion of the project, 550,000 sq ft of basalt was blasted for dredging by underwater drilling and blasting, with more than 4,000 holes drilled and blasted in 85 days. The blasting was completed well ahead of schedule and within the in-water work period, with no measureable impact on the environment.

1.4.7 References with Contact information

- J.E. McAmis Inc.
  - Scott Vandegrift, Contract Manager (530) 891-5081
- US Army Corps of Engineers (Portland District)
  - Karen Garmire, Resident Engineer

1.5 NEW YORK AND NEW JERSEY HARBOR IMPROVEMENT 50 FT PROJECT, KILL VAN KULL CHANNELS, CONTRACT 5, S-KVK-1 (CONTRACT # W912DS-08-C-0004)

1.5.1 Scope of Work

Blasting Consultant, Vibration Monitoring Consultant

1.5.2 Duration of contract

April 2009 to December 2010

1.5.3 Place of Performance

Port of New York and New Jersey, Staten Island, NY

1.5.4 Project Owner

The Port Authority of New York and New Jersey, and US Army Corps of Engineers

1.5.5 Customer

Great Lakes Dredge & Dock Company, LLC

1.5.6 Challenges and solutions

Because of several previous blasting projects in the Kill van Kull channel, there is extreme public sensitivity to this project. Very close cooperation is required with USACE consultants and other stakeholders and web-based management of blast data (BlastView™) has been implemented to facilitate information transfer near real-time. There are several historical structures within blasting impact zone, including a 9/11 Memorial and the Staten Island Ferry Terminal. There are also numerous residential and commercial properties which must be protected from possible blast induced vibration.

The well-established explosives products selection used in the Port of New York and New Jersey for more than 20 years became obsolete with the closure of the manufacturing facility. A new, but equally robust and efficient, selection of explosives products and initiating systems will be implemented in consultation with the explosives supplier and customer personnel. CDB will provide classroom and hands-on training as well as facilitate the transition to the new product combination.

1.5.7 References with Contact information

- Great Lakes Dredge & Dock Company, LLC
  - Chris Gunsten, Contract Manager (718) 981-2700
- US Army Corps of Engineers (New York District)
  - Salvatore (Sam) Didato, Resident Engineer (201) 433-9232

1.6 NEW YORK AND NEW JERSEY HARBOR CHANNEL NAVIGATION IMPROVEMENT 50 FT PROJECT, NEWARK BAY CHANNELS, CONTRACT 4, S-NB-1 (CONTRACT # W912DS-07-C-0015)

1.6.1 Scope of Work

Blasting Consultant, Vibration Monitoring Consultant

1.6.2 Duration of contract

May and June 2008, Fall & Winter of 2010

1.6.3 Place of Performance

Port of New York and New Jersey, Elizabeth & Newark, NJ

1.6.4 Project Owner

The Port Authority of New York and New Jersey, and US Army Corps of Engineers

1.6.5 Customer

Great Lakes Dredge & Dock Company, LLC

1.6.6 Challenges and solutions

Explosives products (Pourvex and Detaline) previously supplied by ETI for marine blasting projects on the East Coast became obsolete in the months leading up to the start of the project because the company was bought by Dyno Nobel and the manufacturing facility closed. Blasting had to be completed with a very limited inventory of blasting agents and initiating systems. Innovative blast designs were successfully implemented to achieve continued blasting production and control blast effect.

In the second phase of the project, drilling and blasting operations were successfully modified to accommodate a new range of explosives products and initiating systems.

Blasting took place within 100 ft of the docks of the Port of Newark and blasting activities had to be carefully coordinated with vessel control and maritime tenants.

1.6.7 References with Contact Information

- Great Lakes Dredge & Dock Company, LLC
  - Chris Gunsten, Contract Manager (718) 981-2700
- US Army Corps of Engineers (New York District)
  - Salvatore (Sam) Didato, Resident Engineer (201) 433-9232

1.7 KILL VAN KULL AND NEWARK BAY CHANNELS, NAVIGATION IMPROVEMENT 50 FT PROJECT – S-KVK-2 (CONTRACT # W912DS-05-C-0004)

1.7.1 Scope of Work

Blasting Consultant, Vibration Monitoring Consultant

1.7.2 Duration of contract

June 2005 to April 2007

1.7.3 Place of Performance

Port of New York and New Jersey, Staten Island, NY and Bayonne, NJ

1.7.4 Project Owner

The Port Authority of New York and New Jersey, and US Army Corps of Engineers

1.7.5 Customer

Bean Stuyvesant LLC

1.7.6 Challenges and solutions

S-KVK is amongst the busiest navigational channels in the world and close coordination with vessel traffic control was required. There were numerous residential and commercial properties, as well as historical structures within the blast impact zone, which had to be protected by a carefully managed Vibration Control Program.

1.7.7 References with Contact Information

- Bean Stuyvesant LLC
  - Frank Belesimo, Project Manager (504) 259-5390
- US Army Corps of Engineers (New York District)

- Salvatore (Sam) Didato, Resident Engineer (201) 433-9232

1.8 ARTHUR KILL CHANNEL NAVIGATION IMPROVEMENT PROJECT, CONTRACT 2 (CONTRACT W912DS-05-C-0003)

1.8.1 Scope of Work

Blasting Consultant, Vibration Monitoring Consultant

1.8.2 Duration of contract

April 2006

1.8.3 Place of Performance

Port of New York and New Jersey, Staten Island, NY and Bayonne, NJ

1.8.4 Project Owner

The Port Authority of New York and New Jersey, and US Army Corps of Engineers

1.8.5 Customer

Great Lakes Dredge & Dock Company, LLC / Bean Stuyvesant LLC

1.8.6 Challenges and solutions

This project was executed by a joint venture between two large dredging companies and close cooperation with multiple participants was required to successfully complete the project. As with all the other projects in the Port of New York and New Jersey, there were numerous residential and commercial properties, as well as historical structures, in blast impact zone.

1.8.7 References with Contact information

- Bean Stuyvesant LLC
  - Frank Belesimo, Project Manager (504) 259-5390
- US Army Corps of Engineers (New York District)
  - Salvatore (Sam) Didato, Resident Engineer (201) 433-9232

1.9 KILL VAN KULL AND NEWARK BAY CHANNELS, NAVIGATION IMPROVEMENT PROJECT, PHASE II, AREA 5, CONTRACT 5, NEW YORK HARBOR (CONTRACT # DACW51-02-C-0001)

1.9.1 Scope of Work

Blasting Consultant, Vibration Monitoring Consultant

1.9.2 Duration of contract

June 2002 to June 2005

1.9.3 Place of Performance

Port of New York and New Jersey, Staten Island, NY and Bayonne, NJ

1.9.4 Project Owner

The Port Authority of New York and New Jersey, and US Army Corps of Engineers

1.9.5 Customer

Bean Stuyvesant / Great Lakes Dredge & Dock Company Joint Venture

1.9.6 Challenges and solutions

This project was executed by a joint venture between two large dredging companies and close cooperation with multiple participants was required to successfully complete the project. As on all the other projects in the Port of New York and New Jersey, there were numerous residential and commercial properties, as well as historical structures, in blast impact zone.

The work effort continued through two winters, when the challenges of doing structure inspections and vibration monitoring in cold weather had to be overcome to complete the project successfully.

1.9.7 References with Contact information

- Bean Stuyvesant / GLDD JV
  - Frank Belesimo, Project Manager (504) 259-5390
- US Army Corps of Engineers (New York District)
  - Salvatore (Sam) Didato, Resident Engineer (201) 433-9232

1.10 CONSTRUCTION DREDGING, 42 FT PROJECT, FISHERMAN CHANNEL THROUGH LUMMUS ISLAND TURNING BASIN, MIAMI HARBOR, DADE COUNTY, FL (CONTRACT # W912EP-04-C-0024)

1.10.1 Scope of Work

Blasting Consultant, Vibration Monitoring Consultant, Underwater Pressure Monitoring Consultant

1.10.2 Duration of contract

March 2005 – October 2005

1.10.3 Place of Performance

Miami, FL

1.10.4 Project Owner

Port of Miami and US Army Corps of Engineers (Jacksonville District)

1.10.5 Customer

Great Lakes Dredge & Dock Company, LLC

1.10.6 Challenges and solutions

One of the main concerns on this project was protection of marine mammals and several protected marine wildlife species. The blasting program was completed with no harm to marine mammals or fish.

As a part of the marine mammal protection program, underwater pressure monitoring and interpretation of the resulting data were required.

Since this project was in the Port of Miami and in close proximity to the cruise ship terminal, drilling and blasting required very close coordination with vessel traffic control.

1.10.7 References with Contact information

- Great Lakes Dredge & Dock Company, LLC - drilling & blasting
  - Sam Morrison, Project Sponsor (630) 574-2920
- USACE (Jacksonville District) – Underwater pressure monitoring
  - Terri Jordan, Biologist - Environmental Branch (904) 232-1817

1.11 BOSTON HUBLINE PIPELINE PROJECT

1.11.1 Scope of Work

Drilling and Blasting Consultant, Vibration Monitoring Consultant, Underwater overpressure monitoring

1.11.2 Duration of contract

December 2002 to February 2003

1.11.3 Place of Performance

Salem, Beverly Harbor, Massachusetts Bay & Weymouth, MA

1.11.4 Project Owner

Algonquin Gas Transmission Company

1.11.5 Customer

Stolt Offshore / Great Lakes Dredge & Dock Company, LLC

1.11.6 Challenges and solutions

Because the project took place during the winter months, extreme ice conditions were encountered and made drilling and blasting difficult. The Port of Boston is a very busy port with plenty of maritime traffic and close cooperation with vessel traffic control was required. Protection of marine species was of primary importance for this project, thus the requirement for underwater pressure monitoring.

1.11.7 References with Contact information

- Great Lakes Dredge & Dock Company, LLC
  - Bill Hanson, Contract Manager (630) 574-3469

1.12 WILMINGTON TEST BLAST MITIGATION

1.12.1 Scope of Work

Blasting Consultant, Vibration Monitoring Consultant, Underwater Pressure Monitoring Consultant

1.12.2 Duration of contract

Winter of 1998/1999 (Phase I), winter of 1999/2000 (Phase II)

1.12.3 Place of Performance

Wilmington, NC

1.12.4 Project Owner

Port of Wilmington and US Army Corps of Engineers

1.12.5 Customer

Port of Wilmington and US Army Corps of Engineers (Phase I)

Local Towing Inc. (Phase II)

1.12.6 Challenges and solutions

Debris in the water was a constant challenge and had to be overcome. The sole purpose of Phase I of the project was to monitoring underwater overpressure as part of a study of the effect of underwater blasting on marine wildlife. During the subsequent deepening projects, protection of several endangered marine wildlife species would be of primary importance

1.12.7 References with Contact information

- USACE (Wilmington District)
  - John Caldwall (910) 251-4586

ALBERT P VANNIEKERK PhD PE

President / Blasting Consultant & Vibration Consultant

ACADEMIC QUALIFICATIONS

Doctor of Philosophy (Explosives Chemistry) 1993
New Mexico Institute of Mining and Technology, USA

Masters Degree (Chemical Engineering) 1991
University of Pretoria, South Africa

Bachelors Degree (Chemical Engineering) 1988
University of Pretoria, South Africa

CONTINUING EDUCATION

Program in Financial Management and Investments 1998
University of South Africa, South Africa

International High Tech Seminar on Blasting Technology 1997
Blasting Analysis International, Boston, MA

International High Tech Seminar on Blasting Technology 1995
Blasting Analysis International, Orlando, FL

Certificate in Industrial Marketing 1995
Rand Afrikaans University, South Africa

Short Course in Technological Innovation, University of South Africa 1994

Various Management Training Courses 1988 - 1999
Sasol Limited, South Africa

International Society of Explosives Engineers 1990 - 2012
Annual Conference & Technical Seminar

PROFESSIONAL QUALIFICATIONS

Professional Engineer (Registration # 20060162) 1991
Engineering Council of South Africa (ECSA)

CERTIFICATIONS

Bureau of Alcohol, Tobacco, Firearms and Explosives – Federal Explosives User Permit
New York City Fire Department (FDNY) – Unrestricted / All Purpose blasting license E10
US Small Business Administration – Small Business Owner
MSHA Surface Blasting

Resume – Albert P vanNiekerk PhD PE *Page 1 of 6*

AWARDS

USACE Certificate of Appreciation
Columbia River Channel Improvements Rock Removal 2009/10

USACE Construction Performance Evaluation (Outstanding):
Columbia River Channel Improvements Rock Removal (W9127N09C0026)
Drilling and Blasting subcontractor to J.E. McAmis, Inc. 2009/10

Western Dredging Association 2011 Navigation Dredging Environmental Excellence Award
Columbia River Channel Improvements Rock Removal
Drilling and Blasting subcontractor to J.E. McAmis, Inc. 2009/10

Western Dredging Association 2011 Annual Safety Award
Columbia River Channel Improvements Rock Removal
Drilling and Blasting subcontractor to J.E. McAmis, Inc. 2009/10

Outstanding Performance - Certificate in Industrial Marketing, Rand Afrikaans University 1995

PROFESSIONAL MEMBERSHIPS

American Institute of Chemical Engineers (AIChE) – Member	2012
Society of American Military Engineers (SAME) - Member	2012
American Chemical Society (ACS) – Member	2011
Society for Mining, Metallurgy & Exploration (SME) - Member	2000
South African Institute of Chemical Engineers (SAIChE) - Member	1987

PROFESSIONAL AFFILIATIONS

Western Dredging Association (WEDA)	2010
National Demolition Association (NDA)	2008
Florida Shore & Beach Preservation Association (FSBPA)	2007
American Shore & Beach Preservation Association (ASBPA)	2007
International Society of Explosives Engineers (ISEE)	1990

PRESENTATIONS & PUBLICATIONS

Panelist – ISEE Panel Discussion on Electronic Detonators	2004
Teacher – MSHA Training Seminar, Beckley, WV	2004
Speaker – 'Best in the West' ISEE Chapter Meeting	2004
Teacher – MSHA Training Seminar, Beckley, WV	2003
Speaker – 'Best in the West' ISEE Chapter Meeting	2003
Speaker – Great Lakes ISEE Chapter Meeting	2003
Speaker – Great Lakes ISEE Chapter Meeting	1999
Speaker – High Tech Explosives Seminar, Boston	1997
Speaker – Canadian Mining Conference	1997
Speaker – South African Institute of Mining Engineers Annual Conference	1996
Speaker – High Tech Explosives Seminar, Orlando	1995
Speaker – South African Institute of Chemical Engineers Annual Conference	1994

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Develop "Train-the-Trainer" program for UNI Tronic™ Electronic Blasting System
Master Trainer – UNI Tronic™ Electronic Blasting System
Trainer – "Explosives Chemistry 101"

vanNiekerk, A.P & Brower, K.R., "Decomposition of Composite Explosives Containing Ammonium Nitrate by transient adiabatic gas compression", Propellants, Explosives, Pyrotechnics, Volume 20 Issue 5, Pages 273 – 278 (2004)
Development of Graduate Degree level course content: "Explosives Physics & Chemistry"
M.Eng. Thesis: "Optimization of Emulsion Formation in CR-Mixer"
PhD Thesis: "A Study of the Reaction Products from Detonation and Rapid Thermolysis of Emulsion Explosives"

Poster Session presented at ISEE Conference	2004
Paper presented at ISEE Conference	1997
Paper presented at Canadian Mining Conference	1997
Paper presented at South African Institute of Mining Engineers Annual Conference	1996
Paper presented at South African Institute of Chemical Engineers Annual Conference	1994

PROFESSIONAL EXPERIENCE

Contract Drilling & Blasting LLC (Florida, USA) — 2007 to Present
President

BlasTech L.L.C. (Minnesota, USA) — 2004 to Present
President

Sasol North America Inc. (Minnesota, USA) — 1999 – 2004
General Manager Operations
Sasol Mining Initiators (Pty) Ltd — *2002 – 2004*
Sasol DHB Holdings Inc. (Viking Explosives & Supply, Inc.) — *1999 – 2002*
Sasol DHB Holdings Inc. (Continental Nitrogen & Resources Corporation) — *1999 – 2001*

Sasol Mining Explosives (Randburg, South Africa) — 1998 – 1999
Manager, Bulk & Nitrates Business

Sasol Mining Explosives (Secunda and Witbank, South Africa) — 1992 – 1998
Manager, Bulk Business / Manager, Bulk Operations

Center for Explosives Technology Research (CETR) (Socorro, New Mexico) — 1990 – 1992
Research Center for Energetic Materials (RCEM) (Socorro, New Mexico)
PhD Researcher

Sasol Mining Explosives (Secunda, South Africa) — 1988 – 1990
Process Engineer

PRESENT & PAST PROJECTS

Contract Drilling & Blasting LLC

- Advanced Blasting Services LLC, Route 5 over the Chickahominy River, Charles City & James City, VA
- BAE Systems SSY Jacksonville LLC, Explosives Launch Separation, Jacksonville, FL
- Barnhill Contracting, Wendell Falls Interchange, Wendell Falls, NC
- Creamer – Sanzari JV, Court Street Bridge Removal, Hackensack, NJ
- Dallas Demolition, Demolition of "Texas Chute Out" Parachute Ride, Six Flags Over Texas, Chico, TX
- Dallas Demolition, Thomas Building, Demolition of 9 story Building, Dallas, TX
- DH Griffin, Demolition of 125' Boiler Unit, Ft. Worth, TX
- DH Griffin, Rose Tower Demolition & Site Improvements, University of Alabama, Tuscaloosa, AL
- DH Griffin, Demolition of Boiler Unit, Birmingham, AL
- DH Griffin, Explosives Demolition of 160 Ft. Stack, Old FMC Corp Plant, Baltimore, MD
- DH Griffin, Explosives Demolition of Mass Concrete Slab - Mosaic Fertilizer, Mulberry, FL
- DH Griffin of Texas, Explosives Demolition of the Imperial Sugar Plant, Sugarland, TX
- DH Griffin, Rte 25-70 Over French Broad River Bridge Demolition, Newport, TN
- Environmental Operations, Carondelet Coke Plant Stack Demolition, St Louis, MO
- George Harms Construction Co. Inc., Route 70 Bridge Removal, Brick, NJ
- Great Lakes Dredge & Dock Company, LLC, 2009 Strathmere, Sea Isle City, Stone Harbor and North Wildwood Beachfill, Cape May County, NJ
- Great Lakes Dredge & Dock Company, LLC, 46' Project, Entrance Channel, Kings Bay, GA and Fernandina Harbor, FL
- Great Lakes Dredge & Dock Company, LLC, Beach Erosion Control Project, Duval County, FL
- Great Lakes Dredge & Dock Company, LLC, Beach Nourishment, Avalon, NJ
- Great Lakes Dredge & Dock Company, LLC, Beach Nourishment, Great Egg Harbor to Peck Beach, Ocean City, NJ
- Great Lakes Dredge & Dock Company, LLC, Maintenance Dredging, Kings Bay, GA and Fernandina Harbor, FL
- Great Lakes Dredge & Dock Company, LLC, New York and New Jersey Harbor Channel Navigation Improvement 50 FT Project, Arthur Kill Channels, Plus KVK #10 Buoy & Western 1,000 Ft of Elizabeth Channel, Contract 15, S-AK-3, KVK # 10 Buoy & WEST-ELIZ, NY & NJ
- Great Lakes Dredge & Dock Company, LLC, New York and New Jersey Harbor Channel Navigation Improvement 50 FT Project, Kill van Kull Channels, Contract 5, S-KVK-1, NY & NJ
- Great Lakes Dredge & Dock Company, LLC, New York and New Jersey Harbor Channel Navigation Improvement 50 FT Project, Newark Bay Channels, Contract 4, S-NB-1, NJ
- Great Lakes Dredge & Dock Company, LLC, Walton County / Destin Beach Restoration, Walton & Okaloosa Counties, FL
- Hayward Construction Group, Walls Duplex Pile Driving, Fernandina Beach, FL
- Hunter Roberts Construction Group, Willow Hotel, 120 W 57th St Rock Excavation, New York, NY
- Industrial Steel Products, LLC, Drilling & Blasting Smoke Stacks & Concrete Piers/Columns for Demolition, Giant Cement Plant, Harleyville, Dorchester County, SC

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- J. D'Annunzio & Sons, Inc., MTA 86th St Station Open Excavation, Manhattan, NY
- J.E. McAmis, Inc., Columbia River Channel Improvement Project, St Helens, OR
- J.H. Reid General Contractors, Route 36 Bridge At the Shrewsbury River, Monmouth County, NJ
- Kiewit, Willis Avenue Bridge Replacement, Manhattan & The Bronx, NY
- Leware Construction Co., Vibration Monitoring, SR21 Over Black Creek, Middleburg, FL
- Manson Construction Co., Ft. Pierce Shore Protection Project, St. Lucie County, FL
- Manson Construction Co., Palm Beach Harbor Maintenance Dredging, Palm Beach Harbor, FL
- Mariana Quarry, Quarry Drilling, Mariana, FL
- Marinex Construction, Inc., New River Inlet Channel Realignment and Beach Restoration, North Topsail Beach, NC
- Marinex Construction, Inc., St Johns County Shore Protection Project, St Augustine, FL
- Mayrich Construction, 57th Street Development, Manhattan, NY
- MECO Demolition, Explosives Demolition of 190 Ft. Stack, Old Harley Davidson Plant, York, PA
- Midwest Mole, Permars Run Relief Sewer, Steubenville, OH
- Midwest Wrecking, Demolition of 8 Story Children's Hospital, Ft Worth, TX
- Misener Marine, Isle of Palms Pile Driving, Isle of Palms, SC
- Misener Marine/Subaqueous Services, LLC, Jupiter Inlet Beach Fill Placement, Palm Beach County, FL
- NASDI, Orleans Bridge Demolition, Slidell, LA
- Norfolk Dredging Company, Beach Placement, Rockaway Beach, Queens County, New York City, NY
- Northeast Dredging Equipment Company, LLC, New York & New Jersey Harbor, Channel Improvement 50 Ft Project, Newark Bay & Arthur Kill Channels, S-NB2/SAK-1, Contract 11, NY & NJ
- Northeast Dredging Equipment Company, LLC, New York & New Jersey Harbor, Channel Improvement 50 Ft Project, Arthur Kill Channel, SAK-2, Contract 13, NY & NJ
- Olsen Associates, Inc., Technical Review – Port Everglades Sand Bypass, Port Everglades, FL
- Omega Demolition Corporation, Holtwood Power Plant, Skimmer Wall Removal, Holtwood, PA
- OTAK Group, Inc., Pablo Road Over Ponte Vedra Canal, Ponte Vedra Beach, St Johns County, FL
- Parsons Brinkerhoff Construction Services Inc., Fuller Warren Bridge Replacement Project, Jacksonville, FL
- PCL Civil Constructors Inc., Mathews Bridge Traffic Monitoring Project, Jacksonville, FL
- RJ Corman Railroad Group, National Docks Bergen Tunnel Clearance, Jersey City, NJ
- RW Harris, Inc., (H8) Del Utility Pole Project, Bentonville, AR
- RW Harris, Inc., Winnsboro Poleline Project, Blythewood, SC
- RW Harris, Inc., Jim Moore Road – Sharon Church 230KV Transmission Line, Auburn, GA
- Seaward Marine, Jordan Bridge, Gantry Truss Removal, Chesapeake, VA
- Soupcon Inc., Satellite Beach, FL
- Southwind Construction, Beach Erosion Control Project, Pinellas County, FL
- Southwind Construction, Maintenance Dredging (IWW), Volusia County, FL
- SSK Constructors, 2nd Ave Subway, 72nd St Station, New York, NY
- Superior Construction Co., Inc., Drilling Pier Caps & Installing Dowels, SR9A & SR 202 JTB Interchange, Duval County, FL
- Testa, Max Brewer Bridge, Drilling Bridge Piers, Titusville, FL

- Transwest Manufacturing, LLC, Cedar Hammock (Wares Creek) Flood Control Channel, Phase One – Construction Dredging, Manatee County, FL
- Tutor Perini Corporation, World Trade Center, Greenwich St Corridor Construction, New York, NY
- Van Oord Dredging and Marine Contractors, Blast and Vibration Consulting – Pacific Access Channels, Panama
- Weeks Marine, Inc., Beach Renourishment Pre & Post-Condition Video, Sandbridge, VA
- Weeks Marine, Inc., Shore Protection Project, Ft. Pierce Beach Renourishment 2009, St. Lucie County, FL
- Weeks Marine, Inc., Shore Protection Project, Nassau County, FL, Fernandina Beach Renourishment

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RALPH M. REESE, JR.

Blasting & Vibration Consultant

ACADEMIC QUALIFICATIONS

BSME with Minor in Kinematics and Mechanism Design, University of Florida
Numerous Management short courses
ISEE Annual Blaster Training Seminars

CERTIFICATIONS

American Welding Society Certified Welding Inspector, Certificate No. 86061141
Blasting Licenses: United States: New Jersey, Pennsylvania, Louisiana, West Virginia, Virginia, New York City, Florida, Georgia
International: Bahamas, Brazil, Dominican Republic, and Puerto Rico, Newfoundland

AWARDS

USACE Certificate of Appreciation
Columbia River Channel Improvements Rock Removal 2009/10

USACE Certificate of Appreciation
Columbia River Channel Improvements Rock Removal 2009/10

Western Dredging Association 2011 Navigation Dredging Environmental Excellence Award
Columbia River Channel Improvements Rock Removal
Drilling and Blasting subcontractor to J.E. McAmis, Inc. 2009/10

Western Dredging Association 2011 Annual Safety Award
Columbia River Channel Improvements Rock Removal
Drilling and Blasting subcontractor to J.E. McAmis, Inc. 2009/10

AGC Build America Award 1995
Structural inspection and Vibration Monitoring
Duval County, Florida, Beach Renourishment Project
Subcontractor for Gulf Coast Trailings Co., a division of T.L. James Co.

AGC Marvin M. Black Excellence in Partnering Award 1998
Clear Creek Phase II Box Culvert; and Environmental Center Phase III
City of Atlanta, Georgia
Drilling and Blasting Subcontractor for Western Summit Constructors, Inc.

HONORARY SOCIETY MEMBERSHIPS

Company of Military Historians
Orden del Mar Oceano
Council on America's Military Past

Resume - Ralph M. Reese, Jr. *Page 1 of 5*

PROFESSIONAL AFFILIATIONS

International Society of Explosive Engineers
American Welding Society
American Society of Mechanical Engineers
American Society for Non-Destructive Testing
American Society for Quality Control

PROFESSIONAL EXPERIENCE

Contract Drilling & Blasting LLC (Florida, USA) 2007 - Present
Mechanical Engineer, Blasting Consultant

Rubin Iron Works LLC (Jacksonville, Florida) 2005 – 2007
General Manager

Responsible for engineering, QC, sales, purchasing and administrative management of a steel fabrication and machine company specializing in the general fabrication of miscellaneous metals, tanks, etc. RIW is one of the oldest fab shops in Florida, and is a supplier of formed parts to most fab shops in the southeast.

Weeks Marine, Inc. (Camden, New Jersey) 2001 – 2005
Project Manager, Port Engineer

Supervised staff and coordinated all aspects of a dredging project. Coordinated operations with the Owner's Representative, and Owner's Technical Consultant.
Scheduled staff, dredge crew, and towing resources. Has worked on a variety of private, government, and U.S. Army Corps of Engineers Projects. Scheduled steel work on dredge while in shipyard for repairs, estimated work content and value, negotiated with shipyard concerning price, supervised work, oversaw quality control, prepared drawings for undocumented work for submission to regulatory body, and for shipyard to prepare quotation.

Contract Drilling and Blasting, Inc. (Jacksonville, Florida) 1991 – 2001
Blast Consultant, Vibration Consultant, Project Manager, Special Project Manager

Responsibilities included the design of various blasting projects including the day-to-day management of drilling and blasting crew, as well as the associated technical reports required by the owner and the governmental regulatory bodies. Managed teams of structural inspectors as related to pre and post condition inspections of structures to precluded damage claims in way of construction activities. Managed teams of Vibration Monitoring Specialists as related to the documentation of construction related vibration. Designed steelwork for drillboats required to accomplish marine blasting, prepared estimates, supervised steel fabrication.

North Florida Steel, Inc. (Jacksonville, Florida) 1989 – 1993
General Manager

Supervised the day-to-day management of a large steel fabrication and machine shop affiliated with North Florida Shipyards, Inc. North Florida Steel is a heavy fabricator specializing in the sales, purchasing and administrative management of a steel fabrication company support of a shipyard operations and the heavy marine construction industry. Typical projects ranged in the million plus dollar range, usually with extremely tight schedules.

Resume - Ralph M. Reese, Jr. *Page 2 of 5*

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Weeks Engineering, Inc. (Jacksonville, Florida) 1987 – 1989
Machine Design/Fabrication Engineer

Responsibilities included all aspects of Machine Design and Fabrication for this engineering design, fabrication and erection company specializing in the construction of chemical plants and process machinery mostly of exotic metals.

Synergetics, Inc. (Gainesville, Florida) 1984 – 1987
QC Manager, Customer Service Manager, Operations Manager

Responsible for Quality Control, customer service, and day-to-day operations for a $15 million per year manufacturer of highly specialized mobile medical equipment.

Intercoastal Fabricated Systems, Inc. (Palatka, Florida) 1980 – 1983
General Operations Manager

Responsible for engineering, QC, sales, purchasing and administrative management of a steel fabrication and machine company specializing in the construction of dam locks, gates, and valves.

Quality Fabrication and Machine Works, Inc. (Lake City, Florida) 1972 – 1980
Vice President-Engineering

Supervised an engineering department including design, drafting, QC, estimating, bills of material, and purchasing. Managed machine, fabrication shops, and outside erection/construction crews for a company designing and constructing forest product mills.

Prior to 1972 worked as an electrical engineer for Georgia Pacific Corp., as an electrical engineer for Thomas E. Gates and Sons, as a mechanical engineering designer for Reynolds Smith and Hills, Inc., and as a computer programmer for the University of Florida.

PRESENT & PAST PROJECTS

Contract Drilling & Blasting LLC

- Advanced Blasting Services LLC, Route 5 Bridge over the Chickahominy River, Charles City & James City, VA
- Atlantic Dry Dock, Rock Removal for Navy Dry Dock, Jacksonville, FL
- BAE Systems Jacksonville LLC, Explosives Launch Separation, Jacksonville, FL
- Balfour Beatty Constructor, Bridge Pier Demolition, Cape Many, NJ
- Bean Stuyvesant/GLDD/JV, Kill Van Kull and Newark Bay Channels, Navigation Improvement Project, Phase II, Area 5, Contract 5, Staten Island, N and Bayonne, NJ
- Bean Stuyvesant LLC, Kill Van Kull and Newark Bay Channels, Navigation Improvement 50 Ft Project, S-KVK-2, Staten Island, NY and Bayonne, NJ
- Carl Thomas Construction, Drilling, Groton, CT
- CBI Ltd. (Chicago Bridge and Iron) SPM (Single Point Mooring), St. Eustatia, Netherlands Antilles
- Citgo Petroleum, Concrete Removal, Lake Charles, LA
- Crowder Construction, Lake Gaston Water Intake, Lake Gaston, VA
- Demolition Dynamics., Veterans Memorial Coliseum, Jacksonville, FL
- DH Griffin, Explosives Demolition of Mass Concrete Slab – Mosaic Fertilizer, Mulberry, FL

Resume - Ralph M. Reese, Jr. *Page 3 of 5*

- DH Griffin, Rhode's Furniture Building Implosion, Jacksonville, FL
- DonJon Marine, Howland Hook Linedrilling, Staten Island, NY
- EBY Construction Co., Palm Valley Bridge Removal, Jacksonville, FL
- English Construction Co, CSO-1, City of Richmond, VA
- Fru-Con Construction Corp., Ft. Thomas, KY
- Fru-Con Construction Corp., Hogsett, WV
- G.L. Howard Co., CSO-2, City of Richmond, VA
- George Harms Construction Co., Inc., Route 70 Bridge Removal, Brick, NJ
- GLF Construction Corp, Bascule Bridge Pier Removal, Seabreeze Bridge, Daytona, FL
- Great Lakes Dredge & Dock Company, LLC, New York and New Jersey Harbor Channel Navigation Improvement 50 FT Project, Arthur Kill Channels, Plus KVK #10 Buoy & Western 1,000 FT of Elizabeth Channel, Contract 15, S-AK-3, KVK #10 Buoy & WEST-ELIZ, NY & NJ
- Great Lakes Dredge & Dock Company, LLC, New York and New Jersey Harbor Channel Navigation Improvement 50 FT Project, Newark Bay Channels, Contract 4, S-NB-1, NJ
- Great Lakes Dredge & Dock Company, LLC, 46' Project, Entrance Channel, Kings Bay, GA and Fernandina Harbor, FL
- Great Lakes Dredge & Dock Company, LLC, Beach Nourishment Project, Great Egg Harbor to Peck Beach, Ocean City, Cape May County, NJ
- Great Lakes Dredge & Dock Company, LLC, GBS Float Out and Towing Channels, Hibernia Development Project, Newfoundland
- Great Lakes dredge & Dock Company, LLC, New York and New Jersey Harbor Improvement 50 FT Project, Kill van Kull Channels, Contract 5, S-KVK-1, NY & NJ
- Great Lakes Dredge & Dock, Company, LLC, Central Boca Raton Nourishment, Boca Raton, FL
- Great Lakes Dredge & Dock, Company, LLC, Inner Harbor Spit Removal, Grand Bahamas
- J.E. McAmis, Inc., Columbia River Channel Improvement Project, St Helens, OR
- J.H. Reid General Contractors, Route 36 Bridge At Shrewsbury River, Monmouth County, NJ
- Kiewit Constructors Inc., CSO-3, City of Richmond, VA
- Kiewit/Tidewater, JV, Long Port Bridge, Ocean City, NJ
- Manson Construction Company, Ft. Pierce Shore Protection Project, St. Lucie County, FL
- Marianna Limestone LLC, Quarry Drilling, Marianna, FL
- Misener Marine, Freeport Container Port, Freeport, Grand Bahamas
- Misener Marine, Port Manatee Navigation Improvement, Port Manatee, FL
- Misener Marine/Subaqueous Services, LLC, Jupiter AIWW Maintenance Dredging Beach Fill Placement, Palm Beach County, FL
- Northeast Dredging Equipment Company, LLC, New York & New Jersey Harbor, Channel Improvement 50 Ft Project, Newark Bay & Arthur Kill Channels, S-NB-2/S-AK-1, Contract 11, NY & NJ
- Northeast Dredging Equipment Company, LLC, New York & New Jersey Harbor, Channel Improvement 50 Ft Project, Arthur Kill Channel, S-AK-2, Contract 13, NY & NJ
- Omega Demolition Corporation, Holtwood Power Plant, Skimmer Wall Removal, Holtwood, PA
- Parsons Brinkerhoff Construction Services, Fuller Warren Bridge Replacement Project, Jacksonville, FL – Vibration Monitoring
  Phase V, Newark, NJ and New York, NY
- Port of Miami, Miami Federal Harbor Blasting Project, Miami, FL

Resume - Ralph M. Reese, Jr. *Page 4 of 5*

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- RW Harris, Inc., (H8) Del Utility Pole Project, Bentonville, AR
- RW Harris, Inc., Jim Moore Road – Sharon Church 230KV Transmission Line, Auburn, GA
- RW Harris, Inc., Winnsboro Pole line Project, Blythewood, SC
- Soupcon, Inc., Drilling, Satelite Beach, FL
- Southwind Construction, Maintenance Dredging (IWW), Volusia County, FL
- Superior Construction Co., Inc., Drilling Pier Caps & Installing Dowels, SR9A & SR202 JTB Interchange, Duval County, FL
- Testa, Max Brewer Bridge, Drilling Bridge Piers, Titusville, FL
- Tidewater Construction Corp, Bent Removals, I95/St. Mary's Bridge, St. Mary's, GA
- Traylor Brother, Bridge Pier Demolition, Vilano, FL
- USACOE, Wilmington Test Blast Mitigation, Wilmington, NC
- W.L. Haley, Huguenot Water Main, Richmond, VA
- Weeks Marine, Channel Improvements KVK4B, Bayonne, NJ
- Weeks Marine, Inc., Beach Renourishment Pre & Post-Condition Video, Sandbridge, VA
- Weeks Marine, Inc., Shore Protection Project, Fernandina Beach Nourishment, Nassau County, FL
- Western Summit, Atlanta, GA

KENNETH L. TULLY

Blasting & Vibration Consultant

ACADEMIC QUALIFICATIONS

Saint Mary's University, Halifax, NS
Bachelor of Science Degree, Major in Geology

CERTIFICATIONS

Federal Explosives License, issued by the ATF
Explosives User's License, State of Florida
Licensed Blaster in the states of AL. AR. FL. SC. VA. NJ. PA. MO. NC. NYC. LA. MD. GA
Licensed Blaster in the province of BC.
(Licenses Previously Held in NS, WV, TN)

PROFESSIONAL AFFILIATIONS

International Society of Explosives Engineers, ISEE
National Demolition Association
Founder and 1st President of the first Canadian Chapter of the ISEE

PRESENTATIONS & PUBLICATIONS

Featured in a documentary by the Discovery Channel & in The Journal of Explosives Engineers
Seminar presentations on blasting vibrations and air concussion for Technical University of Nova Scotia
Consulted on the drafting of the current South Carolina blasters exams
Consulted on the drafting of municipal blasting by-laws in Nova Scotia
Drafted TMG Rock Contractors safety policy and manual for Drilling and Blasting Operations

PROFESSIONAL EXPERIENCE

Contract Drilling & Blasting LLC (Jacksonville, FL, USA) — Nov. 2008 - Present
Geologist / Blasting & Vibration Specialist / Drilling Consultant

Advanced Blasting Services (Mt. Pleasant, SC, USA) — Aug. 2005 – Nov. 2008
Geologist / Blasting & Vibration Specialist / Drilling Consultant

Independent Blasting Consultant (Parrsboro, NS) — Oct.1998 – July 2005

Advanced Blasting Technologies (Princeton, WV) — June 1997 – Sept 1998
Superintendent

TMG Rock Contractors Ltd. (Kingston, ON) — Nov. 1995 – June 1997
Atlantic Region Manager

Rockwork Construction (Dartmouth, NS) — April 1995 – Sept. 1995
Blaster in Charge

Resume – Kenneth L. Tully *Page 1 of 4*

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TMG Rock Contractors Ltd. (Nova Scotia Division) April 1994 – Feb.1995
Blaster in Charge

Risktech Consulting Services (NS) Sept.1989 – Jan.1992
VP, Manager of Seismic Operations

Seistech Blasting Consultants (Windsor, NS) Sept.1987 – Sept.1989
Owner / President

Atlantic Explosives Ltd. (Waverly, NS) Aug. 1984 –Sept.1987
Seismic Technician

Experience includes the development and drafting of Blast Plans and shot designs for projects requiring explosives use, management of drilling and blasting operations for demolition projects and rock excavation projects, planning project timelines and schedules, supervising and working hands-on in the loading of shots, compiling blast reports, procuring permits, pre-blast and post-blast inspections, seismograph operation, vibration prediction and analysis, water overpressure predictions, determination of Marine Mammal exclusion zones (including PTS and TTS zones) for underwater blasts. Projects have required extensive underwater drilling and blasting, controlled shooting of large concrete columns and footings in close proximity to new structures, explosives demolition of smoke stacks and steel bridges, industrial buildings, rock trenching and mass rock excavation (both in remote areas and in close proximity to existing structures), shafts and tunnels. Experienced in the operation of numerous types of rock drills including percussion, hydraulic, air track, and coring rigs.

Experienced in the use of conventional explosives, shaped charges, electric and non-electric detonators, conventional blasting machines and remote controlled blasting machines.

Experienced in designing and implementing bubble curtains for marine blasting projects.

EXAMPLES OF PROJECTS

Demolition / Underwater Projects
Cooper River Bridges & Piers Demolition, Charleston, SC – Testa Corp.
Fuller Warren Bridge Pier Demolition – Jacksonville, FL. – Cashman, Inc.
Combahee River Bridge Pier Demolition – United Constructors
Sanibel River Bridge Piers Demolition – Sanibel, FL. – Testa Corp.
Broad River Bridge & Piers Demolition – Gaffney, NC. – Rae Constructors
Genesee River Bridge Piers Demolition – Rochester, NY – Edward Kramer & Sons
Saskonnet River Train Bridge Piers – Tiverton, RI – Testa Corp
Titan America Smoke Stacks Demolition – Miami, FL. – Testa Corp.
Chickahominy Bridge – Charles City & James City, VA - Advanced Blasting Services LLC
Giant Cement Plant, Smoke Stack and Piers Demolition – Harleyville, SC – ISP Inc.
Mosaic Phosphates Sulphuric Cake Tanks Demolition – Green Bay, FL – DH Griffin
Route 36 Bridge Demolition - Highlands, NJ - JH Reid
Route 25/70 Bridge Demolition – Newport, TN – DH Griffin
Holtwood Power Plant Skimmer Wall Demolition – Holtwood, PA – PPL
Imperial Sugar Furnace Building & Pan House Demolition – Sugar Land, TX – DH Griffin
Carondelet Coke Plant Stack Demolition – St. Louis, MO – Environmental Operations Inc.
Max Brewer Bridge Demolition – Titusville, FL – Seaward Marine

Court Street Bridge Piers Demolition – Hackensack, NJ – Creamer/Sanzari
Willis Ave. Bridge Piers Demolition – New York, NY – Kiewit/Weeks JV
KAUT TV Tower Demolition – Oklahoma City, OK – Midwest Wrecking Co.
Harley Davidson Plant, Smokestack Demolition – York, PA - MECO Demolition
Gorgas Power Plant Boiler Bldg. Demolition – Parish, AL – DH Griffin Wrecking Co.
FMC Corp. Stack Demolition – Baltimore, MD – DH Griffin Wrecking Co.
Exelon Plant Boiler Bldg. Demolition – Fort Worth, TX – DH Griffin of Texas
University of Alabama, Rose Towers Dormitory Implosion – Tuscaloosa, AL – DH Griffin Co.
Jordan Bridge, Gantry Truss Emergency Removal – Chesapeake, VA – Seaward Marine
Holtwood Power Plant, New Pier Removals – Holtwood, PA – Walsh Construction
Cooke's Children's Hospital, Office Bldg. Demolition – Fort Worth, TX – Midwest Wrecking
Six Flags over Texas, Parachute Ride Demolition – Arlington, TX – Dallas Demolition II
Thomas Building Demolition - Dallas TX – Dallas Demolition II
NASA Test Stand 4696 – Huntsville AL – Britt Demolition

Underwater Rock Projects
Scott Paper Dock Expansion Project – Liverpool, NS, Canada – Scott Paper Ind.
Halifax Container Pier Expansion – Halifax, NS, Canada – City of Halifax
S-NB-2 Newark Bay – Newark, NJ – Northeast Dredging

Tunnel & Underground Projects
National Docks Bergen Tunnel Clearance - Jersey City, NJ - RJ Corman Railroad Group
Steubenville Deep Sewer Development – Steubenville, OH – Mid-West Mole Construction.
Bolt Mtn. Coal Mine Face-up – V & G Construction, Beckley, WV

Highways Projects
Wendell Interchange, Wendell, NC – Barnhill Construction
Highway 64 Development – Franklin, TN – TDOT
Staunton Bypass – Staunton, VA – Branch Highways
Highway 102 Widening – Mt. Uniacke, NS, Canada – Municipal Contractors
Superior Construction Co., Inc., Drilling Pier Caps & Installing Dowels, SR9A & SR202 JTB Interchange, Duval County, FL

Site Development Projects
Blasting Consultant - World Trade Center, NY – Tutor / Perini
Roanoke Sewer Treatment Plant Upgrade – City Of Roanoke, VA
LaVergne Industrial Park – Tennessee Excavators – LaVergne, TN
Bayers Lake Industrial Park – Halifax, NS, Canada – Municipal Contractors
Middle Tyger River Sewer Project – Lyman, SC. – Reynolds Construction
Fairview Sewer Upgrade Project – Fairview, NS, Canada, - Dexter Construction
Naval Base Sewer Upgrade & Expansion- CFB Halifax, NS, Canada – Municipal Contracting
Clayton Park Residential Housing – Halifax, NS, Canada – Shaw Group

Construction Vibration Monitoring Projects
Tobacco Bay Reverse Osmosis Plant – Bermuda – Bermuda Ministry of Health
Isle of Palms Marina Bulkhead Replacement – Isle of Palms, SC – Misener Marine
Strathmere / Sea Isle Beach Re-nourishment – Strathmere, NJ – GGLD

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Municipal Contracting Quarry Operations – Halifax, NS
Bayer's Lake Industrial Park – Halifax, NS
Barrington Passage Temporary Quarry – Barrington, NS

1.4 Certificates of Insurance

The Contractor is required to carry insurance coverage sufficient to meet the contract requirements for this project. A sample certificate of insurance is displayed below. A current certificate will be provided to the Project Director.

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 03/21/2013

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Aon Risk Services Northeast, Inc.
Boston, MA office
One Federal Street
Boston, MA 02110

CONTACT NAME
PHONE (A/C, No, Ext): (866) 283 7122 FAX (A/C, No): (847) 953-5390
E-MAIL ADDRESS
PRODUCER CUSTOMER ID #: 10781108

INSURED
Cashman – Weeks NB, A Joint Venture
549 South Street
Quincy, MA 02169 – USA

INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A:	NATIONAL UNION FIRE INS CO OF PITTSBURGH, PA	19445
INSURER B:	UNITED STATES FIRE INS CO	21113
INSURER C:	CATLIN SPECIALTY	
INSURER D:	COMMERCE & INDUSTRY	19410
INSURER E:	SFAIR INDEMNITY AND LIABILITY COMPANY	
INSURER F:		

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS. Limits shown are as requested

INSR LTR	TYPE OF INSURANCE	ADDL INSRD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY ■ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS MADE ■ OCCUR ☐ SUBLIMIT OF INSURANCE ☐ GEN'L AGGREGATE LIMIT APPLIES PER: ■ POLICY ☐ PRO-JECT ☐ LOC			0159184-66	04/15/2013	11/15/2014	EACH OCCURRENCE	$1,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	$300,000
							MED EXP (Any one person)	$10,000
							PERSONAL & ADV INJURY	$1,000,000
							GENERAL AGGREGATE	$2,000,000
							PRODUCTS – COMP/OP AGG	$1,000,000
B	AUTOMOBILE LIABILITY ☐ ANY AUTO ☐ ALL OWNED AUTOS ☐ SCHEDULED AUTOS ☒ HIRED AUTOS ☒ NON-OWNED AUTOS ☐ ☐			1037277-5	04/15/2013	10/1/2013	COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
							BODILY INJURY (Per person)	
							BODILY INJURY (Per accident)	
							PROPERTY DAMAGE (Per accident)	
E	UMBRELLA LIAB ■ OCCUR ☒ EXCESS LIAB ☐ CLAIMS MADE ☐ DEDUCTIBLE ☒ RETENTION $25,000			MASILBN00054613 EXCESS OL, AUTO, P&I, MEL & EL	04/15/2013	11/15/2014	EACH OCCURRENCE	$10,000,000
							AGGREGATE	$10,000,000
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y / N N		WC001613035 INCLUDES USL&H	04/15/2013	04/15/2014	☒ WC STATUTORY LIMITS ☐ OTHER	
							E.L. EACH ACCIDENT	$1,000,000
							E.L. DISEASE-EA EMPLOYEE	$1,000,000
							E.L. DISEASE-POLICY LIMIT	$1,000,000
A	Hull, P&I, Tender's Liability $1 INCLUDES JONES ACT FOR CREW			0159187BD INCLUDES MARITIME MEL COVERAGE	04/15/2013	11/15/2014	Hull	PER SCHEDULE
							Protection & Indemnity	$1,000,000
C	CONTRACTOR POLLUTION			CCIPTBD	04/15/2013	11/15/2014	Each Occurrence	$5,000,000
							Aggregate	$5,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES / (Attach ACORD 101, Additional Remarks Schedule, if more space is required)
New Bedford Marine Terminal

CERTIFICATE HOLDER

Massachusetts Clean Energy Center
55 Sumer Street, 9th Floor
Boston, MA 02110

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE
Aon Risk Services Northeast, Inc.

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Cashman-Weeks, NB, A Joint Venture
549 South Street
Quincy, MA 02169 – USA

Addendum 3.21. 2013

Massachusetts Clean Energy Center is included as additional insured for General Liability and Excess (Bumbershoot Liability) as required by a signed written contract or agreement with the (named) Insured.

The General Liability, Excess (Bumbershoot) Liability, Automobile Liability and Workers Compensation /Employers Liability policies include a waiver of subrogation in favor of Massachusetts Clean Energy Center on whose behalf the insured is required to obtain this waiver under a written contract or agreement executed prior to a loss.

The aforementioned insurance coverages completely comply with Article 5.04, Insurance Requirements, paragraphs A through J, except builders risk does not apply , inclusive, of Massachusetts Clean Energy Center Contract No. MACEC-FY13-001NB.

2 LICENSES, PERMITS & APPROVALS

Section 2 of this Blast Plan addresses the licenses, permits and other approvals required by the project specifications and / or the appropriate federal, state or local regulatory agencies.

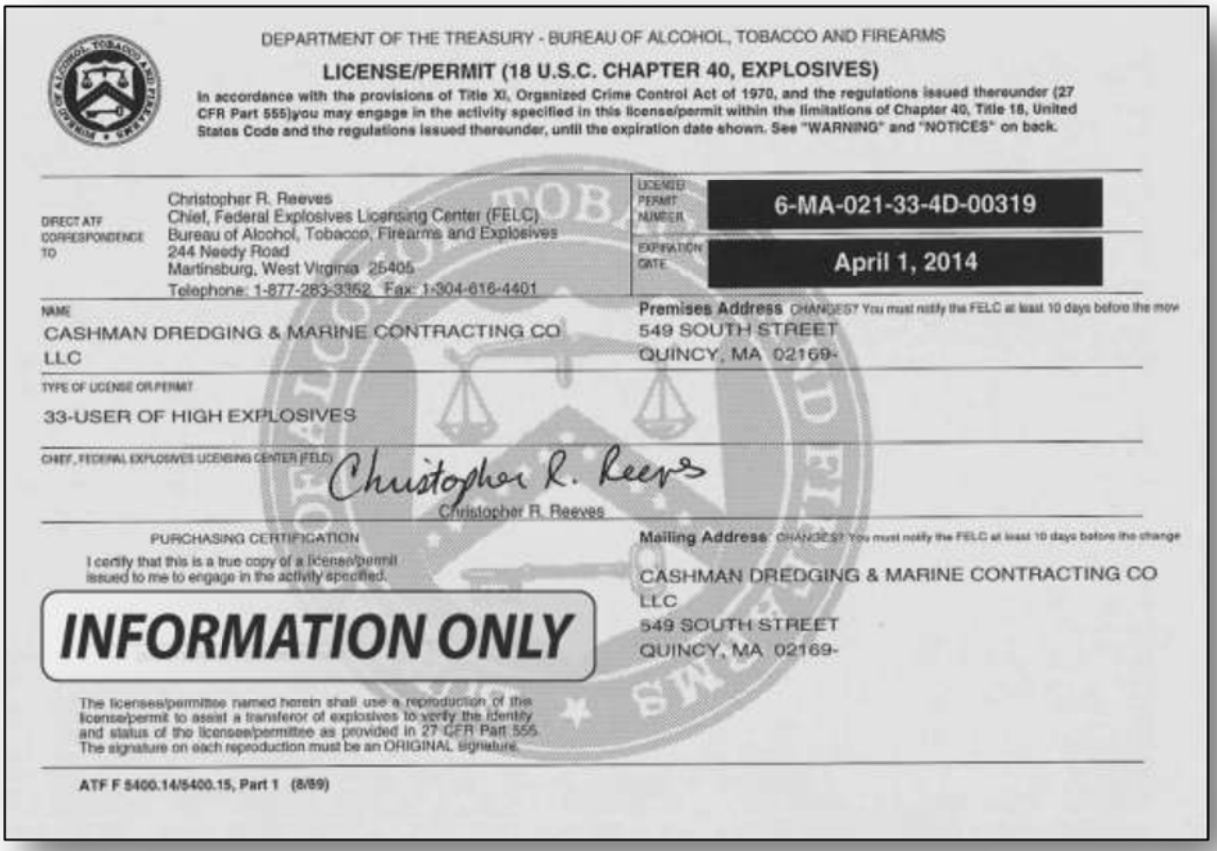
The licenses, permits and approvals required for the purchase, storage and use of explosives for blasting operations fall into one of two categories and are issued on the applicable federal, state or local level.

- Purchase, storage and use of explosives; and
- Transportation of explosives by land or by water.

2.1 Purchase, Storage & Use of Explosives

2.1.1 Federal Explosives User Permit

For this project, the holder of the permit to purchase and use high explosives as issued by the Bureau of Alcohol, Tobacco, Firearms & Explosives (BATF), the federal regulatory agency for commerce in explosives, is Cashman Dredging and Marine Contracting Co., LLC (Cashman). A copy of the Cashman ATF permit is shown below.



DEPARTMENT OF THE TREASURY - BUREAU OF ALCOHOL, TOBACCO AND FIREARMS

LICENSE/PERMIT (18 U.S.C. CHAPTER 40, EXPLOSIVES)

In accordance with the provisions of Title XI, Organized Crime Control Act of 1970, and the regulations issued thereunder (27 CFR Part 555) you may engage in the activity specified in this license/permit within the limitations of Chapter 40, Title 18, United States Code and the regulations issued thereunder, until the expiration date shown. See "WARNING" and "NOTICES" on back.

DIRECT ATF CORRESPONDENCE TO
Christopher R. Reeves
Chief, Federal Explosives Licensing Center (FELC)
Bureau of Alcohol, Tobacco, Firearms and Explosives
244 Needy Road
Martinsburg, West Virginia 25405
Telephone: 1-877-283-3362 Fax: 1-304-616-4401

LICENSE/PERMIT NUMBER: 6-MA-021-33-4D-00319

EXPIRATION DATE: April 1, 2014

NAME
CASHMAN DREDGING & MARINE CONTRACTING CO LLC

Premises Address CHANGES? You must notify the FELC at least 10 days before the mov
549 SOUTH STREET
QUINCY, MA 02169-

TYPE OF LICENSE OR PERMIT
33-USER OF HIGH EXPLOSIVES

CHIEF, FEDERAL EXPLOSIVES LICENSING CENTER (FELC)
Christopher R. Reeves
Christopher R. Reeves

PURCHASING CERTIFICATION
I certify that this is a true copy of a license/permit issued to me to engage in the activity specified.

Mailing Address CHANGES? You must notify the FELC at least 10 days before the change
CASHMAN DREDGING & MARINE CONTRACTING CO LLC
549 SOUTH STREET
QUINCY, MA 02169-

INFORMATION ONLY

The licensee/permittee named herein shall use a reproduction of this license/permit to assist a transferor of explosives to verify the identity and status of the licensee/permittee as provided in 27 CFR Part 555. The signature on each reproduction must be an ORIGINAL signature.

ATF F 5400.14/5400.15, Part 1 (8/89)

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2.1.2 Authorized Agents

The Cashman personnel authorized to act as 'agents' in the procurement of explosives materials are listed in the letter below.

CASHMAN DREDGING AND MARINE CONTRACTING

WEEKS MARINE

57 Cove Street
New Bedford, MA 02744

August 13, 2013

Mr. Ken Morris
Explosives Supply Inc.
695 Westbrook Road
Ringwood, NJ 07456

Reference: New Bedford Marine Commerce Terminal Construction
New Bedford, Massachusetts
Contract No. MACEC-FY13-001NB

Mr. Morris,

The following personnel are authorized to sign for, receive and use explosive products on the above referenced project.

Name	Title
Stephen Tobin	Dredge/Drillboat Manager
David Norton	Drillboat Superintendent
Nathan Gilbert	Drillboat Superintendent

Any additions or deletions to the authorized personnel will be confirmed in writing by the undersigned.

If you have any questions regarding this correspondence, please contact the undersigned at 504.259.5390.

Best regards,

Shawn Wyatt
Project Manager
Cashman Weeks NB

2.1.3 State of Massachusetts Permit to Store Explosives

The State of Massachusetts requires a blasting contractor to hold a Permit to Store Explosives in order to purchase explosives materials. This Permit is shown below.

Cashman Weeks NB has met with local Fire Officials. Following arrival of the drillboat Kraken to the jobsite, the Fire officials will inspect the magazines and will issue permits to store explosive material prior to transfer of materials to the drillboat. A copy of permits will be transmitted after receipt.

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2.1.4 State of Massachusetts Blasting Certificate of Competence

The Blaster-in-Charge, John Tognazzi, holds a Blasting Certificate of Competency from the State Fire Marshal, Massachusetts Department of Fire Safety.

Department of Fire Services

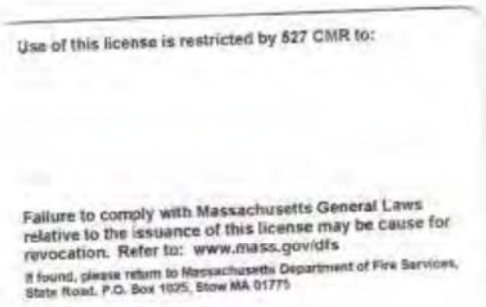
BL-003148

Blasting Certificate of Competency

John S Tognazzi
36 Chamberlain Road
Uxbridge MA 01569

Expiration Date
08/06/2014

State Fire Marshal



Use of this license is restricted by 527 CMR to:

Failure to comply with Massachusetts General Laws relative to the issuance of this license may be cause for revocation. Refer to: www.mass.gov/dfs

If found, please return to Massachusetts Department of Fire Services, State Road, P.O. Box 1025, Stow MA 01775

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2.2 Transportation of Explosives

2.2.1 US Department of Transportation

The explosives products will be transported by road from the manufacturing plant or from the local storage location to the area designated by the New Bedford Fire Department on Fish Island, where the materials will then be transferred to the Drillboat / transfer vessel.

The explosives distributor must be in possession of a Hazardous Material Safety Permit issued by the US DOT for road transportation of Hazardous Materials. A copy of the Certificate of Registration of Explosives Supply, Inc. and that of a related company, John Joseph, Inc., are included on the following pages.

Copies of Commercial Drivers Licenses with Hazmat endorsements for the drivers of vehicles transporting explosives to the transfer location are included in Section 4.1.1.

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION

HAZARDOUS MATERIALS
CERTIFICATE OF REGISTRATION
FOR REGISTRATION YEAR(S) 2010-2013

Registrant: EXPLOSIVES SUPPLY INC
Attn: KENNETH R MORRIS
695 WESTBROOK ROAD
RINGWOOD, NJ 07456

This certifies that the registrant is registered with the U.S. Department of Transportation as required by 49 CFR Part 107, Subpart G.

This certificate is issued under the authority of 49 U.S.C. 5108. It is unlawful to alter or falsify this document.

Reg. No: 061710 551 043SU Issued: 06/17/2010 Expires: 06/30/2013

Record Keeping Requirements for the Registration Program

The following must be maintained at the principal place of business for a period of three years from the date of issuance of this Certificate of Registration:

(1) A copy of the registration statement filed with PHMSA, and
(2) This Certificate of Registration

Each person subject to the registration requirement must furnish that person's Certificate of Registration (or a copy) and all other records and information pertaining to the information contained in the registration statement to an authorized representative or special agent of the U. S. Department of Transportation upon request.

Each motor carrier (private or for-hire) and each vessel operator subject to the registration requirement must keep a copy of the current Certificate of Registration or another document bearing the registration number identified as the "U.S. DOT Hazmat Reg. No." in each truck and truck tractor or vessel (trailers and semi-trailers not included) used to transport hazardous materials subject to the registration requirement. The Certificate of Registration or document bearing the registration number must be made available, upon request, to enforcement personnel.

For information, contact the Hazardous Materials Registration Manager, PHH-62, Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 1200 New Jersey Avenue, SE, Washington, DC 20590, telephone (202) 366-4109

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U.S. Department
of Transportation

**Federal Motor
Carrier Safety
Administration**

1200 New Jersey Ave., S.E.
Washington, DC 20590

May 11, 2011

In reply refer to:
USDOT Number: 216314

KENNETH R. MORRIS
PRESIDENT
EXPLOSIVES SUPPLY INC
695 WESTBROOK ROAD
RINGWOOD, NJ 07456

HAZARDOUS MATERIALS SAFETY PERMIT
HM Safety Permit ID: US-216314-NJ-HMSP
Effective Date: May 11, 2011

Dear KENNETH R. MORRIS:

The Hazardous Materials Safety Permit (HMSP) is verification of the motor carrier's permission to engage in the transportation of hazardous materials listed in 49 CFR 385.403 by motor vehicle in interstate, intrastate, or foreign commerce.

This HMSP will be effective beginning May 11, 2011 and remain effective through April 30, 2013 if your company maintains compliance with the requirements pertaining to the safe and secure movement of hazardous materials for the protection of the public (49 CFR 385 and other applicable Federal Motor Carrier Safety Regulations and Hazardous Material Regulations). Failure to maintain compliance will constitute sufficient grounds for suspension or revocation of this authority.

Willful and persistent noncompliance with applicable safety fitness regulations as evidenced by a Department of Transportation safety fitness rating less than "Satisfactory" or by other indicators, could result in a proceeding requiring the holder of this permit to show cause as to why this authority should not be suspended or revoked.

For questions regarding this document you may contact the FMCSA Hazardous Materials Division at 202-366-6121.

Sincerely,

John Van Steenburg
Director, Office of Enforcement and Compliance

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION

HAZARDOUS MATERIALS CERTIFICATE OF REGISTRATION FOR REGISTRATION YEAR(S) 2010-2013

Registrant: JOHN JOSEPH INC
Attn: KENNETH R MORRIS
695 WESTBROOK RD
RINGWOOD, NJ 07456

This certifies that the registrant is registered with the U.S. Department of Transportation as required by 49 CFR Part 107, Subpart G.

This certificate is issued under the authority of 49 U.S.C. 5108. It is unlawful to alter or falsify this document.

Reg. No: 061710 551 044SU Issued: 06/17/2010 Expires: 06/30/2013

Record Keeping Requirements for the Registration Program

The following must be maintained at the principal place of business for a period of three years from the date of issuance of this Certificate of Registration:

(1) A copy of the registration statement filed with PHMSA; and
(2) This Certificate of Registration

Each person subject to the registration requirement must furnish that person's Certificate of Registration (or a copy) and all other records and information pertaining to the information contained in the registration statement to an authorized representative or special agent of the U. S. Department of Transportation upon request.

Each motor carrier (private or for-hire) and each vessel operator subject to the registration requirement must keep a copy of the current Certificate of Registration or another document bearing the registration number identified as the "U.S. DOT Hazmat Reg. No." in each truck and truck tractor or vessel (trailers and semi-trailers not included) used to transport hazardous materials subject to the registration requirement. The Certificate of Registration or document bearing the registration number must be made available, upon request, to enforcement personnel.

For information, contact the Hazardous Materials Registration Manager, PHH-62, Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 1200 New Jersey Avenue, SE, Washington, DC 20590, telephone (202) 366-4109.

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U.S. Department
of Transportation

Federal Motor Carrier Safety Administration

1200 New Jersey Ave., S.E.
Washington, DC 20590

June 25, 2010

In reply refer to:
USDOT Number: 199366

JOHN P. JOSEPH
VICE PRESIDENT
JOHN JOSEPH INC
695 WESTBROOK ROAD
RINGWOOD, NJ 07456

HAZARDOUS MATERIALS SAFETY PERMIT
HM Safety Permit ID: US-199366-NJ-HMSP
Effective Date: June 25, 2010

Dear JOHN P. JOSEPH:

The Hazardous Materials Safety Permit (HMSP) is verification of the motor carrier's permission to engage in the transportation of hazardous materials listed in 49 CFR 385.403 by motor vehicle in interstate, intrastate, or foreign commerce.

This HMSP will be effective beginning June 25, 2010 and remain effective through June 30, 2012 if your company maintains compliance with the requirements pertaining to the safe and secure movement of hazardous materials for the protection of the public (49 CFR 385 and other applicable Federal Motor Carrier Safety Regulations and Hazardous Material Regulations). Failure to maintain compliance will constitute sufficient grounds for suspension or revocation of this authority.

Willful and persistent noncompliance with applicable safety fitness regulations as evidenced by a Department of Transportation safety fitness rating less than "Satisfactory" or by other indicators, could result in a proceeding requiring the holder of this permit to show cause as to why this authority should not be suspended or revoked.

For questions regarding this document you may contact the FMCSA Hazardous Materials Division at 202-366-6121.

Sincerely,

John Van Steenburg
Director, Office of Enforcement and Compliance

2.2.2 Port of New Bedford

Approval has been granted by the New Bedford Fire Department for the transfer of explosives from land to water at the Fish Island designated product transfer zone. The transfer procedure is described in more detail elsewhere in the Blast Plan.

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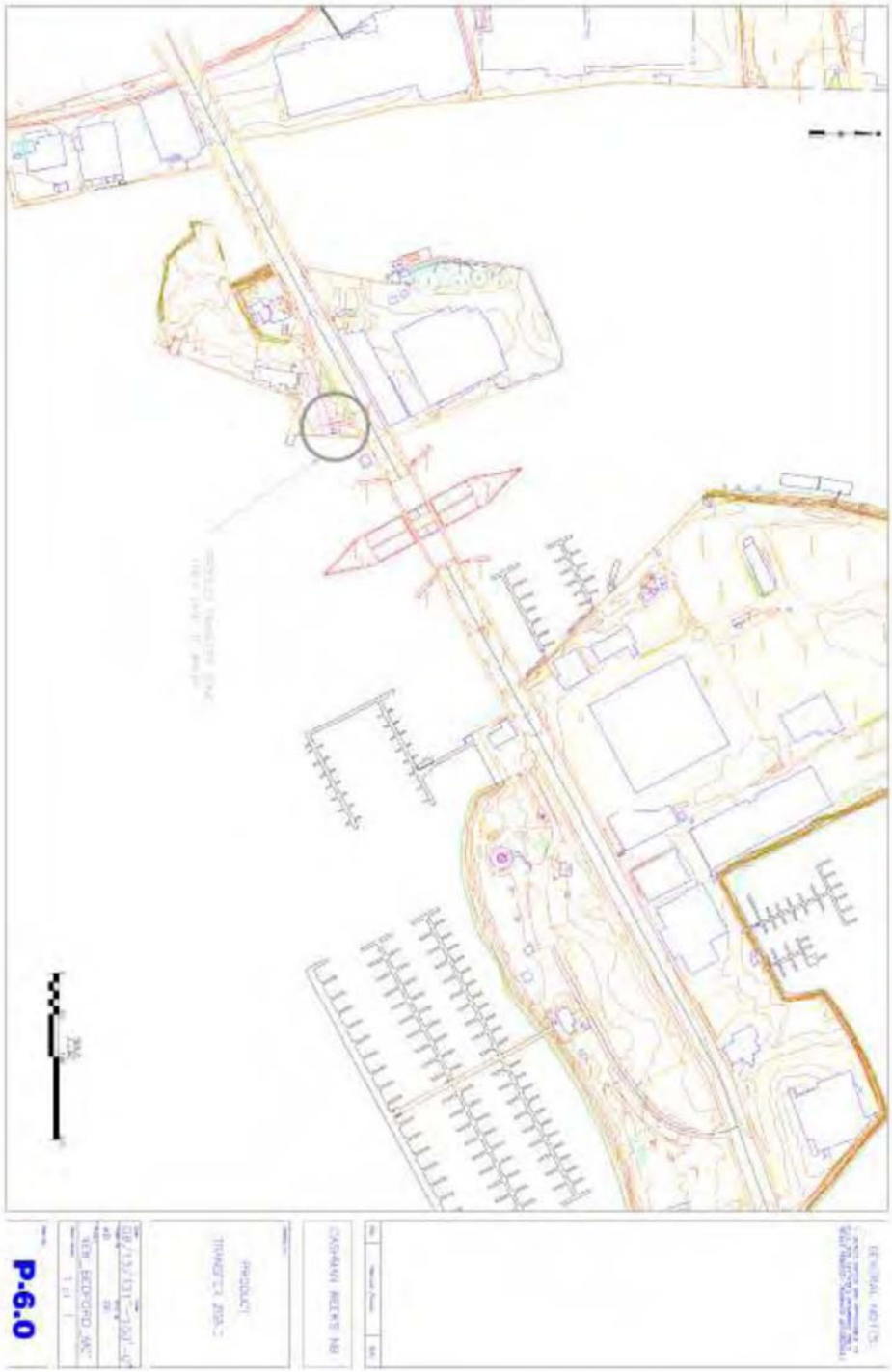
A map indicating the location of the Fish Island designated product transfer zone is show below.



2.2.3 US Coast Guard

Cashman will apply for a permit to handle hazardous materials from the US Coast Guard for each transfer of explosives at Fish Island. A copy of the Permit as issued will be provided to the Owner's Representative prior to the transfer of explosives.

A sample application form CG-4260 is shown on the next page.

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U.S. DEPARTMENT OF HOMELAND SECURITY U.S. COAST GUARD CG-4260 (Rev.08-04)	APPLICATION AND PERMIT TO HANDLE HAZARDOUS MATERIALS *(See Instructions on Page 2.)*	Form Approved OMB No. 1625-0005

TO CAPTAIN OF THE PORT U.S. COAST GUARD	Sector New York	FROM *(Name, Business address and zip code)* NE Dredging / Cashman 100 Central Ave, HILLSIDE NJ 07205

CARGO BY PROPER SHIPPING NAME			HAZARD CLASS OR DIVISION	STOWAGE (Vessel Only)	WEIGHT (Net Tons)
Explosives, Blasting, Type E	UN0332	II	1.5D	Contain	20.000
Boosters	UN0042	II	1.1D	Mag.	3.000
Detonator Assemblies, Non-electric	UN0361	II	1.4B	Mag.	0.002
				TOTAL →	23.0020

	VESSEL OR BARGE	WATERFRONT FACILITY
NAME AND LOCATION	Drillboat / Transfer Vessel PORT NEWARK, NJ	Berth 25 Port Newark/Elizabeth Marine Terminal
NAME, ADDRESS AND ZIP CODE OF OWNER	NE Dredging / Cashman 100 Central Ave HILLSIDE NJ 07205	
NAME, ADDRESS AND ZIP CODE OF AGENT OR CHARTERER	Attn: Stephen Tobin Project Manager	
DATE(S) AND TIME(S) OF OPERATION	April 15, 2011 0400 to 0800	

I UNDERSTAND and will comply with current safety laws, rules and regulations of the United States, the State, County, City and Port Authority while handling hazardous materials. *(See Page 2.)*

DATE	TITLE *(Authorized Company Representative)* Stephen Tobin Project Manager	SIGNATURE

PERMIT

THE ABOVE REQUEST IS:

☐ APPROVED ☐ APPROVED WITH THE FOLLOWING CONDITIONS ☐ DISAPPROVED

EXCEPTIONS/CONDITIONS

DATE	SIGNATURE *(Captain of the Port, U.S. Coast Guard)*

INSPECTION *(VESSEL LOADING ONLY)*

The stowage of the cargo listed above has been inspected and accepted as satisfactory.

DATE	SIGNATURE AND POSITION *(Master/Mate/Person in Charge of Vessel)*

PREVIOUS EDITION IS OBSOLETE

VESSEL COPY

3 SAFETY, HEALTH & ENVIRONMENTAL

This section of the Blast Plan specifically addresses safety and regulatory compliance matters as it pertains to the drilling and blasting work effort of the New Bedford Marine Commerce Terminal project.

Also included is a discussion of emergency actions on the Drillboat, listing the pertinent emergency contact information.

Standard safety procedures already in effect for this contract, such as Personal Health and Safety and Fire Prevention, are not referenced here.

Contingency Plans for drilling and blasting operations are discussed in a later Section in the Blast Plan, entitled 'Blasting Contingency Plans'.

Product information and safety data on explosives materials are included towards the end of the Blast Plan in the Section entitled – Explosives Materials Information.

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3.1 Marine Drilling and Blasting Safety

Those responsible for our Safety Program are the following:

Project Manager, Drillboat Superintendent, Blaster-in-Charge and other certified Blasters, Quality Control Manager and the Site Safety and Health Officer responsible for blasting operations.

The Drillboat Superintendent shall have responsibility for and authority over all aspects of safety related to the drilling and blasting program.

The Drillboat Superintendent interviews all new hires to determine their experience, knowledge, and suitability for the drilling and blasting environment. Upon application with Cashman all prospective employees must consent to an alcohol and drug screening test. During employment, employees are subject to random drug screening. All employees must receive clearance from the ATF for 'Employee Possessor' status.

All personnel will complete a Safety Orientation prior to the start of the any work.

Since the activities onboard the Drillboat are of a hazardous nature, appropriate personal conduct is important.

- ✧ No person is allowed to work by himself or herself.
- ✧ No active operation may be left without supervision.
- ✧ No smoking or hot work are allowed on the Drillboat.
- ✧ No firearms are allowed on the Drillboat.
- ✧ Nobody may take any action which may jeopardize the safety or health of any other person, or which may harm the environment.
- ✧ Horse-play is not allowed.
- ✧ Nobody is allowed to disable any safety system or fire protection system or alarm system.
- ✧ No person under the influence of non-prescription drugs and/or alcohol will be allowed on the job site.

The SSHO shall conduct monthly safety inspections on all equipment. Hazards observed are given to the Drillboat Superintendent or Blaster-in-Charge for corrective action.

Any person who observes anything that may pose a potential danger to any part of the operations, must report this situation at once to the Drillboat Superintendent or the Blaster-in-Charge.

The Drillboat Superintendent or Blaster-in-Charge shall conduct a weekly Safety Meeting.

The appropriate Personal Protective Equipment will be issued to all crew members and must be worn where applicable.

First-aid kits are available on the Drillboat.

All accidents are to be reported immediately to the Project Manager. The SSHO investigates loss of time injuries.

Housekeeping is a continuous day-to-day duty for all workers. The Blaster-in-Charge is responsible for correcting observed hazards and maintaining a safe working environment.

Toilet facilities are available on the Drillboat and should be kept clean and in good repair.

Visitors must complete the required Safety Orientation prior to boarding the Drillboat. All visitors must sign in the Visitor Log Book when boarding the Drillboat and must at all times be accompanied by a company employee. Visitors will be issued the appropriate Personal Protective Equipment. Visitors must also sign out of the register when leaving the Drillboat.

Any person who is supervising a trainee or a visitor, must at all times ensure that the trainee or visitor is aware of the any potential dangers that may exist in the work area or area being visited.

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3.2 Safety & Activity Hazard Analysis

A Safety and Activity Hazard Analysis of the work effort involving marine drilling and blasting follows on the next number of pages.

SAFETY AND ACTIVITY HAZARD ANALYSIS

Drilling and Blasting in a Subaqueous Environment

PRINCIPAL STEP	POTENTIAL HAZARD	RECOMMENDED CONTROLS
TRANSPORTATION OF EXPLOSIVE MATERIALS	Fire	Vehicles transporting explosive materials shall be equipped with one or more fire extinguishers of a type listed by a nationally recognized test laboratory.
	Fire	Persons engaged in the transportation, handling, or other use of explosive materials shall not smoke, carry matches, firearms, ammunitions, or flame producing devices in the vehicle(s).
	Poor Visibility	Display all placards, lettering, or numbering required by the U.S. Department of Transportation (USDOT).
	Premature Detonation	Explosives shall not be transported with any other materials, cargoes, or crewmembers.
	Premature Detonation	Blasting caps shall not be transported in the vehicle with other explosives unless the conditions of 49CFR 177-835(g) can be met.
	Premature Detonation	No other items shall be carried in the bed or body of any vehicle transporting explosive materials.
	Premature Detonation	Transportation of explosives from land to a watercraft shall be done in certified and approved magazines and shall be supervised by a certified explosives expert.
	Theft of Product	Vehicles transporting explosive materials shall not be left unattended.
	Vehicle Accident	In case of an accident, Notification Instructions and Procedures on Securing an Accident Scene will be kept in the vehicle at all times.
	Vehicle Failure	Vehicle shall not be loaded beyond rated capacity and the products shall be secured to prevent shifting.
	Vehicle Failure	Operators of the vehicles shall be physically fit, careful, reliable, and able to read, write, and understand instructions in the English language.

Page 1 of 9

PRINCIPAL STEP	POTENTIAL HAZARD	RECOMMENDED CONTROLS
TRANSPORTATION OF EXPLOSIVE MATERIALS (continued)	Vehicle Failure	Vehicles transporting explosive materials shall be in good repair.
	Vehicle Failure	Only the authorized driver and his/her helper shall be permitted to ride on any truck carrying explosive materials.
HANDLING OF EXPLOSIVE MATERIALS	Fire	Magazines used for the storage of **detonators** shall be separated from magazines storing other explosive materials by the Minimum Distance For Separation Of Magazines as specified in the Table of Distance or in an approved ATF combination magazine approved by the USCG.
	Fire	Smoking matches, firearms, open flames, or any flame producing device shall not be permitted within **100 feet** of any magazine.
	Fire	Smoking will be allowed only in a designated smoking area approved by the Drill Boat Captain, the USACE Safety Officer, and the USCG-MSO.
	Premature Detonation	Only authorized and qualified persons should be allowed to handle and use explosives.
	Premature Detonation	Containers shall be opened only with non-sparkling tools or instruments.
	Premature Detonation	Explosive materials shall be removed from containers only as they are needed for immediate use.
	Premature Detonation	Explosive materials and/or primers shall be separated and taken to the blasting area in their original containers.
	Premature Detonation	Primers shall not be made up in excess of immediate need for holes to be loaded.
	Premature Detonation	Primers should be made up at the "site specific" Drill Frame.

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PRINCIPAL STEP	POTENTIAL HAZARD	RECOMMENDED CONTROLS
HANDLING OF EXPLOSIVE MATERIALS (continued)	Premature Detonation	Detonators, primers, or other initiators shall not be stored in the same magazine with explosives, or blasting agents.
	Premature Detonation	Magazines in which explosive materials are stored shall not be used for any other purposes.
	Theft of Materials	After loading a blast, all excess explosive materials and detonators shall be returned to the magazine day storage box.
DAILY INVENTORY JUSTIFICATION	Theft of Materials	Explosive materials and related materials shall be stored in facilities required under the Alcohol, Tobacco, and Firearms Regulations contained in 27 CFR 55.
	Theft of Materials	Magazines are to be kept locked at all times and the keys in the possession of the Blaster(s).
DRILLING AND BLASTING	Drilling into Loaded Holes	Drilling and loading of holes shall not be carried on in the same immediate areas. Drilling shall be separated from loading by at least eight (8) feet.
	Personal Injury	Personnel unnecessary for the operation are not allowed in the **Blast Area**.
	Personal Injury	Drilling and loading shall be performed by trained individuals under the supervision of a qualified person.
	Personal Injury	Safety glasses and hearing protection shall be worn while in a drilling environment.
	Personal Injury	Personal flotation devices (PFD) shall be worn when on deck.
	Personal Injury	Personnel are not allowed on the drill tower while the drill is operating in a production mode.

PRINCIPAL STEP	POTENTIAL HAZARD	RECOMMENDED CONTROLS
DRILLING AND BLASTING (continued)	Personal Injury	The walking surface from the magazines to the **Blast Area** shall be free of trip hazards and obstructions.
	Personal Injury	Standard audible signals shall be used to warn of a blasting operation (see Warning Signs).
	Personal Injury	Explosive materials shall not be transported during crew changes.
	Personal Injury	In the event of a thunderstorm, loading of charges shall cease and the ***Lightning Present Procedure*** shall be followed.
	Premature Detonation	Explosive materials shall be removed from their containers for immediate intended use.
	Premature Detonation	Primers shall not be made up in or near magazines and shall be made up on an "as needed basis."
	Product Failure	All drill holes shall be of a greater diameter than the cartridges or the explosive loading devices (pump hose).
	Product Failure	Magazines shall be kept clean and dry at all times.
	Product Failure	Explosive materials shall be arranged so the oldest stock will be used first.
	Product Failure	Explosive materials shall be stored in their original containers lying flat.
LOADING FOR BLASTING	Personal Injury	Explosives will be delivered directly to the site for one day's use only (or as authorized by regulatory agencies).
	Personal Injury	The **Blast Area** shall be kept free of any equipment, operations, or persons not essential to the loading process.
	Personal Injury	Tamping shall be done with an approved non-sparking loading pole.

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PRINCIPAL STEP	POTENTIAL HAZARD	RECOMMENDED CONTROLS
LOADING FOR BLASTING (continued)	Personal Injury	Primers shall not be tamped.
	Personal Injury	Cartridges or boosters shall be primed only in the number required for a single round.
	Personal Injury	No detonator shall be inserted in explosive materials without a cap well or without first making a hole in the cartridge with a non-sparking tool of proper size.
	Personal Injury	No explosive material or loaded hole shall be left unattended on the Drill Boat.
	Personal Injury	No holes shall be loaded except those to be fired in the designated blast.
	Premature Detonation	Holes will not be loaded in the prospect of thunderstorms indicated by the Weather Bureau, Coast Guard, or static electricity detected by the lightning detector.
	Vibration Control	Loaded holes or charges shall be verified and documented on the Frame Log before firing.
	Vibration Control	Loaded holes shall be stemmed to the collar with non-combustible materials as designed.
FIRING	Misfire	The person attaching the noiseless lead-in connections shall **fire the shot**.
	Personal Injury	Prior to the firing of the shot, all persons in the **Blast Area** shall be warned of the blast.
	Personal Injury	The blast shall not be fired until it is certain that everyone has retreated to a safe position.

PRINCIPAL STEP	POTENTIAL HAZARD	RECOMMENDED CONTROLS
FIRING (continued)	Personal Injury	All blasting operations shall use signals as stated in the Method of Operation.
	Personal Injury	Prior to each shot, marine security shall be posted up and down channel at designated safety zone.
	Premature Detonation	Accidental detonation is avoided by strict adherence to the blast procedures and Method of Operation.
INSPECTION	Personal Injury	Immediately after the **blast has been fired**, the noiseless lead-in shall be disconnected from the shock tubing exploder.
	Personal Injury	An inspection shall be made by the blaster to determine that all charges have been detonated.
	Personal Injury	Other persons shall not be allowed to return to the **Blast Area** until an **All Clear** signal is given.
MISFIRE	Detonation Failure	Misfires shall be handled under the direction of the Blaster-In-Charge.
	Detonation Failure	No other work is to be done except that which is necessary to correct the hazard of the misfire.
	Detonation Failure	The trunk line and shot cable will be inspected to assure no misfires occurred.
	Detonation Failure	If a diver is used to correct a misfire, the dive team shall be briefed and have the proper qualifications in the use of explosives.
	Premature Detonation	Drilling shall not be permitted until all misfires have been detonated or the blaster authorizes work to proceed under the Misfire and Contingency Plan.

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PRINCIPAL STEP	POTENTIAL HAZARD	RECOMMENDED CONTROLS
TAGOUT/LOCKOUT	When a diver is required to assist in correcting a Misfire or a Contingency Plan, a Tagout/Lockout procedure must be implemented.	• At the "site-specific" Pre-Dive Meeting, the Blaster-in-Charge will receive a tagged lock and key to be placed on the shot initiator's Day Box. • The "Blaster-in-Charge" will then tag and lock the Day Box, returning the key back to the Dive Supervisor. • The Noiseless Lead-Ins are to stay locked in the cap magazine until the dive has been completed and the diver is back "on deck". • When the "Dive Supervisor" informs all parties that the dive has been completed, the Noiseless Lead-Ins may be connected to the Trunkline or Downlines for the shot to be re-fired. • The "Dive Supervisor" will then remove the tagout/lockout allowing the "Blaster-in-Charge" access to the initiator(s) for completion of the detonation.
SPEFICIC HAZARDS	Drowning	Personal flotation devices (PFD's) are to be worn when "on deck".
	Loss/Injury to Eyesight	Eye protection is available for grinding, brazing, welding and drilling operations.
	Loss/Injury to Hearing	Hearing protection shall be worn in identified noise hazard areas.
	Personal Injury	Eyewash/shower stations and proper protective gear will be available at all times.
	Personal Injury	Employees are required to wear hard hats, safety glasses, and PFD's at all times.
	Respiratory Failure	Respiratory protection is issued for specific hazards.

PRINCIPAL STEP	POTENTIAL HAZARD	RECOMMENDED CONTROLS
BOULDER BLASTING IN EXCAVATOR BUCKET	Personal Injury	Personal Fall Protection Equipment shall be worn at all times when working more than 6 feet above the deck surface.
	Personal Injury	Safety glasses, hearing protection, and respiratory protection shall be worn while hand drilling boulders.
	Personal Injury	Personal flotation devices shall be worn while on deck or working over water.
	Personal Injury	At no time shall any employee enter any area so that the shifting of the boulder could cause a pinch or crushing injury.
	Personal Injury	Suitable ladders or scaffolding shall be used to gain access to the upper surface of the boulder for drilling/loading operations
	Personal Injury	All holes in the boulder shall be drilled prior to loading any holes with explosives.
	Personal Injury	While loading explosives in a boulder, the area shall be kept clear of all unnecessary personnel.
	Premature Detonation	All sources of ignition or fire shall be controlled and restricted from the time that explosives are removed from the magazine, until the boulder blast is detonated and the "all Clear" is given by the blaster.
BOULDER BLASTING IN SCOW	Personal Injury	Personal Fall Protection Equipment shall be worn at all times when working more than 6 feet above the deck surface.
	Personal Injury	Safety glasses, hearing protection, and respiratory protection shall be worn while hand drilling boulders.

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PRINCIPAL STEP	POTENTIAL HAZARD	RECOMMENDED CONTROLS
BOULDER BLASTING IN SCOW (continued)	Personal Injury	Personal flotation devices shall be worn while on deck or working over water.
	Personal Injury	At no time shall any employee enter any area so that the shifting of the boulder could cause a pinch or crushing injury.
	Personal Injury	Suitable ladders or scaffolding shall be used to gain access to the upper surface of the boulder for drilling/loading operations.
	Personal Injury	All holes in the boulder shall be drilled prior to loading any holes with explosives.
	Personal Injury	While loading explosives in a boulder, the area shall be kept clear of all unnecessary personnel.
	Premature Detonation	All sources of ignition or fire shall be controlled and restricted from the time that explosives are removed from the magazine, until the boulder blast is detonated and the "all Clear" is given by the blaster.
	Misfire	Care shall be taken in the placement of the blasting mats to insure that the noiseless lead in line is not damaged.
	Personal Injury	While placing blasting mats over the boulder, adequate signaling personnel shall be utilized to adequately signal the crane operator.

CONCLUSION:
Hazards and preventative measures are not limited to this plan. Continuous efforts will be made to observe for hidden hazards and correct them with immediate and proper action.

3.3 Emergency Action Plan

An approved emergency action plan is already in effect for the project. Some elements specific to the marine drilling and blast work effort are addressed here.

3.3.1 Drillboat Emergency Alarms

The Drillboat shall maintain an alarm system with distinctive signals. When an emergency situation arises on the Drillboat, the general alarm will be sounded. Activation stations will be placed at strategic locations throughout the Drillboat, both on deck and below deck. A large electric bell will be utilized as the emergency alarm, and will be distinctive in sound from the blasting signals:

FIRE ALARM

continuous short rings

GENERAL QUARTERS

3 long rings, repeated

EVACUATION ALARM

continuous long rings

Immediately after the alarm was activated, the Drillboat Superintendent or the Blaster-in-Charge must be notified of the situation, so that the appropriate action can be taken. The person in either of these two positions who is notified first, must take charge of the situation take appropriate action.

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3.3.2 Emergency Plan – After Hours

Whenever blasting product(s) are present on the Drillboat, a valid Licensed Massachusetts Blaster will be on-board at all times. During non-work hours (Sundays and Holidays) each shift change will identify the person in charge or "on-call". The Blaster-in-Charge must check in with the person on-call every 4 hours to verify all is well.

In the event of sickness, injury, fire, or collision with another vessel, the following procedures will be followed:

- In the event of an EMERGENCY, the on-site Blaster-in-Charge shall notify the individual on-call by cellular phone. The EMERGENCY condition will be identified and a solution agreed upon.
- The Blaster-in-Charge shall not leave the Drillboat until a replacement arrives unless the condition is life threatening.
- Should the Blaster-in-Charge need to be replaced, a second vessel will be dispatched from the dock facility to relieve the sick or injured person.

In the event of a FIRE, the Blaster-in-Charge will notify the individual on-call, the USCG Marine Safety Officer (MSD New Bedford) and the New Bedford Harbor Development Commission of a fire condition and attempt to keep the fire away from the magazine area.

Should the fire condition become out of control, the Blaster-in-Charge will evacuate the barge and remain at a safe distance until help arrives to evaluate which safety measures need to be taken.

NOTE: DO NOT FIGHT EXPLOSIVE FIRES

In the event an unfamiliar or unidentified vessel approaches the drill boat, the tending vessel Boat Captain shall first notify the Blaster-in-Charge of an approaching vessel, then notify the vessel that it is approaching a secured area and should leave immediately. In case of an unauthorized entry on the drill boat, the Blaster in Charge shall notify the authorities of an UNAUTHORIZED ENTRY and advise the unauthorized person(s) that they have boarded a secured vessel and that authorities have been notified.

All keys to the magazines are in the possession of the Blaster-in-Charge.

GENERAL NOTES:

Cellular phones and marine radios will be on-board with backups at all times.

Prior to the end of the workday, emergency phone numbers will be verified and the person on-call will be identified to the Blaster-in-Charge.

Vessels will be at the “site location” and at the Cashman Weeks NB staging yard and available at all times.

3.3.3 Emergency Contact Information

A list of emergency contact telephone numbers for the drilling and blasting team and other stakeholders in the safety and security of the operation will be developed and the final document provided to the Project Director prior to the start of operations.

Information on the emergency contact list will be reviewed once a month to ensure that the contact information is correct by calling every name on the list to verify that the number is working and the person is still the appropriate contact for the organization listed.

Cashman Weeks NB

Stephen Tobin (Dredge & Drillboat Manager)	(508) 353-5202 (cell)
Nathan Gilbert (Drillboat Superintendent)	(857) 939-4229 (cell)
Cashman Weeks NB, New Bedford office	(774) 202-6018

Contract Drilling & Blasting LLC

Albert vanNiekerk (President)	(612) 819-5752 (cell)
Ralph Reese (Blasting Consultant)	(904) 501-5216 (cell)
John Tognazzi (Blaster-in-Charge)	(508) 341-0209 (cell)
Jacksonville, FL office	(904) 241-4015

Explosives Supply, Inc.

Ken Morris (President)	(201) 841-2198 (cell)
John Joseph (CEO)	(973) 390-8045 (cell)
Ringwood, NJ office	(973) 839-8030
Bob Combs (Dyno Nobel, Inc.)	(484) 824-5301 (cell)

US Coast Guard – MSD New Bedford	(508) 999-0072
Duty Officer	VHF CH16

Port of New Bedford Harbor Development Commission

Jeffrey D. Stieb (Executive Director)	(508) 961-3000
Edward Anthes-Washburn (Deputy Port Director)	(508) 961-3000

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New Bedford EMS

EMERGENCY	**911**

CHEMTREC (explosives products emergency helpline)

Maritime Callers	(703) 527-3887

State of Massachusetts Fire Marshall

Stephen D. Coan	(978) 567-3111
Emergency Access Telephone (24/7)	(978) 567-3110

New Bedford Fire Chief

Michael Gomes	(508) 991-6124

BATF Explosives Theft Hotline

8:00 a.m. – 5:00 p.m. EST	(800) 461-8841
After hours	(888) 283-2662

4 TRANSPORTATION & STORAGE OF EXPLOSIVES

In this section, the plan for transportation of explosives materials from the supplier factory or storage magazines to the job site, and in-use storage of these materials, are described:

- On-Shore transportation from the supplier site to an approved transfer dock;
- Transfer of Explosives
  - From the transfer dock onto the Drillboat or a transfer vessel
  - From the transfer vessel to the Drillboat (when applicable)
- Waterways Transportation
- In-use storage on the Drillboat

4.1 On-Shore Transportation

4.1.1 Documentation

Copies of Commercial Drivers Licenses with Hazmat endorsements for the drivers of vehicles transporting explosives to the transfer location will be provided.

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4.1.2 Explosives Transportation Routing

The transportation routing from the explosives supplier to Fish Island in the Port of New Bedford is shown below.

4.1.3 Inspection List of Trucks to be used for Explosives Deliveries

The inspection lists for the trucks to be used by Explosives, Supply, Inc. for the delivery of explosives are shown below.

DATE 11-25-11

D7888436

RECORD OF ANNUAL INSPECTION

(49 CFR, 396 17-23)

Prepare Separate Report for Each Vehicle Inspected

#9

COMPANY NAME: JOHN JOSEPH INC

STREET ADDRESS: 695 W. BROOK RD

CITY: RINGWOOD STATE: NJ ZIP: 07450

INSPECTOR'S NAME (Please Print):

VEHICLE TYPE: ☒ TRUCK ☒ TRACTOR ☐ TRAILER ☐ CONVERTER DOLLY

VEHICLE MAKE: PETE MODEL: YEAR: 99

VEHICLE IDENTIFICATION (Company No., State Tag No. or VIN): 495209

EMPLOYEE NO.:

REPORT OF CONDITION *(For Detailed Information on Inspection Procedures see FMCSR Section 396 Appendix G)*

	OK	REPAIR		OK	REPAIR		OK	REPAIR		OK	REPAIR
BRAKES			**EXHAUST**			**STEERING**			**FRAME**		
Adjustment	✓		Leaks	✓		Adjustment	✓		Members	✓	
Mechan. Compon.	✓		Placement	✓		Column/Gear	✓		Clearance	✓	
Drum/Rotor	✓		**LIGHTING**			Axle	✓				
Hose/Tubing	✓		Headlights	✓		Linkage	✓		**TIRES**		
Lining	✓		Tail/Stop	✓		Power Steering	✓		Tread	✓	
Low Air Warning	✓		Clearance/Marker	✓		Other			Inflation	✓	
Trailer Air Supply	✓		Identification	✓		**FUEL SYSTEM**			Damage	✓	
Compressor	✓		Reflectors	✓		Tank(s)	✓		Other		
Parking Brakes	✓		Other			Lines	✓				
Other									**WHEELS/RIM**		
			CAB/BODY			**SUSPENSION**			Fasteners	✓	
COUPLERS			Access	✓		Springs	✓		Disc/Spoke	✓	
Fifth-Wheel & Mount	✓		Eqpt./Load Secure			Attachments	✓				
Pin/Upper Plate			Tie-Downs			Sliders			**WINDSHIELD**	✓	
Pintle-Hook/Eye			Headerboard								
Safety Chain(s)			Other			**MIRRORS**		✓	**WINDSHLD. WIP.**	✓	

REMARKS:

This vehicle has been inspected and repaired as needed to comply with 49 CFR Part 396, Appendix G.

QUALIFIED INSPECTOR'S SIGNATURE: DATE 11-25-11

 © Contract Drilling & Blasting LLC

DATE 11-25-11

RECORD OF ANNUAL INSPECTION

(49 CFR, 396 17-23)

Prepare Separate Report for Each Vehicle Inspected

#18

D7828433

COMPANY NAME: JOHN JOSEPH INC

VEHICLE TYPE: X TRUCK ☐ TRACTOR ☐ TRAILER ☐ CONVERTER DOLLY

STREET ADDRESS: 645 WESTBROOK RD

VEHICLE MAKE: PETE MODEL: YEAR: 00

CITY: RAINWOOD STATE: NJ ZIP: 07456

VEHICLE IDENTIFICATION (Company No., State Tag No. or VIN): 541601

INSPECTOR'S NAME (Please Print):

EMPLOYEE NO.:

REPORT OF CONDITION (*For Detailed Information on Inspection Procedures see FMCSR Section 396, Appendix G*)

	OK	REPAIR		OK	REPAIR		OK	REPAIR		OK	REPAIR
BRAKES			**EXHAUST**			**STEERING**			**FRAME**		
Adjustment	✓		Leaks	✓		Adjustment	✓		Members	✓	
Mechan. Compon.	✓		Placement	✓		Column/Gear	✓		Clearance	✓	
Drum/Rotor	✓		**LIGHTING**			Axle	✓				
Hose/Tubing	✓		Headlights	✓		Linkage	✓		**TIRES**		
Lining	✓		Tail/Stop	✓		Power Steering	✓		Tread	✓	
Low Air Warning	✓		Clearance/Marker	✓		Other			Inflation	✓	
Trailer Air Supply	✓		Identification	✓		**FUEL SYSTEM**			Damage	✓	
Compressor	✓		Reflectors	✓		Tank(s)	✓		Other		
Parking Brakes	✓		Other			Lines	✓				
Other									**WHEELS/RIM**		
			CAB/BODY			**SUSPENSION**			Fasteners	✓	
COUPLERS			Access	✓		Springs	✓		Disc/Spoke	✓	
Fifth Wheel & Mount	✓		Egr./Load Secure			Attachments	✓				
Pin/Upper Plate			Tie-Downs			Sliders			**WINDSHIELD**		
Pintle Hook/Eye			Headerboard							✓	
Safety Chain(s)			Other			**MIRRORS**			**WINDSHLD. WIP.**	✓	
							✓				

REMARKS

This vehicle has been inspected and repaired as needed to comply with 49 CFR Part 396, Appendix G

QUALIFIED INSPECTOR'S SIGNATURE: DATE: 11-25-11

DATE 11-25-11

RECORD OF ANNUAL INSPECTION

(49 CFR, 396 17-23)

Prepare Separate Report for Each Vehicle Inspected

#20

D7828437

COMPANY NAME: JOHN JOSEPH INC	VEHICLE TYPE: ☒ TRUCK ☒ TRACTOR ☐ TRAILER ☐ CONVERTER DOLLY
STREET ADDRESS: 695 W. BROOK RD	VEHICLE MAKE: Pete MODEL: YEAR: 95
CITY: RINGWOOD STATE: NJ ZIP: 07456	VEHICLE IDENTIFICATION (Company No., State Tag No. or VIN): 377727
INSPECTOR'S NAME (Please Print):	EMPLOYEE NO.:

REPORT OF CONDITION *(For Detailed Information on Inspection Procedures see FMCSR Section 396, Appendix G)*

	OK	REPAIR		OK	REPAIR		OK	REPAIR		OK	REPAIR
BRAKES			**EXHAUST**			**STEERING**			**FRAME**		
Adjustment	✓		Leaks	✓		Adjustment	✓		Members	✓	
Mechan. Compon.	✓		Placement	✓		Column/Gear	✓		Clearance	✓	
Drum/Rotor	✓		**LIGHTING**			Axle	✓				
Hose/Tubing	✓		Headlights	✓		Linkage	✓		**TIRES**		
Lining	✓		Tail/Stop	✓		Power Steering	✓		Tread	✓	
Low Air Warning	✓		Clearance/Marker	✓		Other			Inflation	✓	
Trailer Air Supply	✓		Identification	✓		**FUEL SYSTEM**			Damage	✓	
Compressor	✓		Reflectors	✓		Tank(s)	✓		Other		
Parking Brakes	✓		Other			Lines	✓				
Other									**WHEELS/RIM**		
			CAB/BODY			**SUSPENSION**			Fasteners	✓	
COUPLERS			Access	✓		Springs	✓		Disc/Spoke	✓	
Fifth-Wheel & Mount	✓		Egot /Load Secure			Attachments	✓				
Pin/Upper Plate			Tie-Downs			Sliders			**WINDSHIELD**		
Pintle Hook/Eye			Headerboard							✓	
Safety Chain(s)			Other			**MIRRORS**			**WINDSHLD. WIP.**	✓	
							✓				

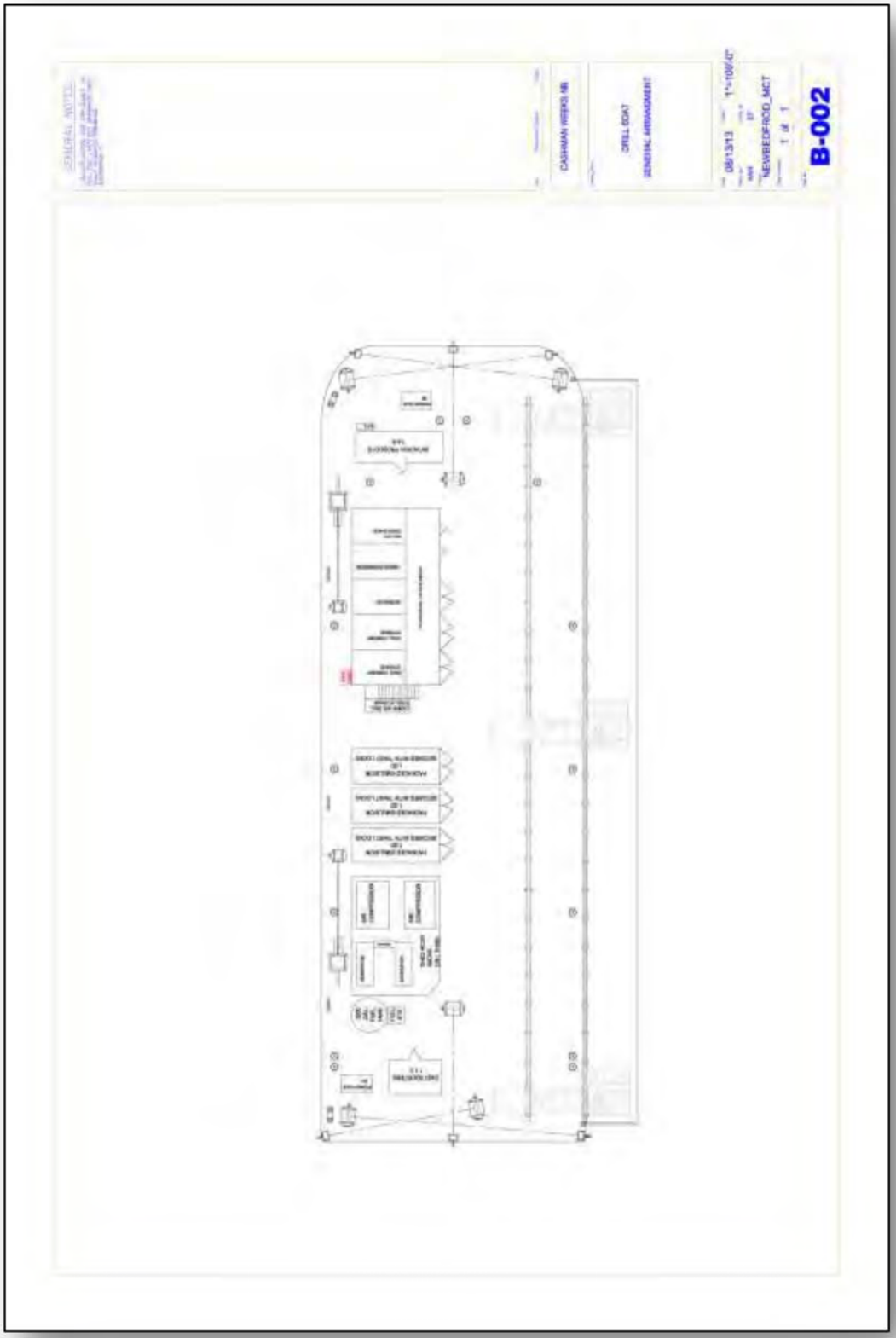
REMARKS

This vehicle has been inspected and repaired as needed to comply with 49 CFR Part 396, Appendix G.

QUALIFIED INSPECTOR'S SIGNATURE _____ DATE 11-25-11

4.2 Layout of Drillboat

The layout for the drillboat 'Kraken', showing the emergency escape routes, is depicted below. A larger format printout is included as in insert.



4.3 Transfer of Explosives

Notice must be given to the U.S. Coast Guard MSD New Bedford prior to the delivery of explosives, and confirmed 24 hours prior to delivery of explosives:

- Call Facilities Chief (US Coast Guard – MSD New Bedford)

The transfer of explosives from land to the Drillboat or to a transfer vessel, will be accomplished as described in the paragraphs below.

When explosives materials are transferred at the dock, the standard Explosives Supply, Inc. bill of lading will be used. The qualified person representing Explosives Supply, Inc. in the transfer of explosives and an Authorized Person (Authorized Agent) from Cashman, will both sign the delivery documentation upon completion of the transfer.

The Blaster-in-Charge will make the appropriate adjustments to the inventory on the Drillboat once the explosives materials have been taken on board and have been secured in the temporary storage-in-use facilities.

See elsewhere in this document a list of Authorized Agents who are authorized to sign for the delivery and acceptance of explosives materials and to take custody of these materials on behalf of the Contractor.

The dock where the transfer takes place is designated by the New Bedford Fire Department and will have the appropriate security measures in place to prevent access by unauthorized persons. For this project, Fish Island in the Port of New Bedford will be used as transfer dock.

The Blaster-in-Charge or a licensed blaster will directly supervise all transfer activities and ensure the security of the products under his her supervision.

When the Drillboat is not brought to the dock for the transfer, boosters and detonators may be transferred from the delivery dock to the Drillboat using a transfer vessel approved by the US Coast Guard for this purpose. Note that products must not be mixed: high explosives MUST be segregated from detonators.

4.3.1 Transfer of Packaged Blasting Agents

The packaged emulsion product will be of Blasting Agent 1.5 grade and will arrive from the explosives supplier in a container. A suitable crane will be utilized to transfer the container with its contents from the truck onto the Drillboat or transfer vessel. The blasting agents will be transferred first to the Drillboat or transfer vessel, and no other products will be transferred until this has been completed.

4.3.2 Transfer of Class A or 1.1D High Explosives

When the transfer of the packaged blasting agents has been completed, the transfer of the Class A and the 1.1D high explosive will commence.

Explosives will be loaded into a transfer box, segregating explosive by type, then transferred to the Drillboat or transfer vessel using a crane.

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After all high explosive products have been secured in their respective magazines, the transfer of detonators will begin, with detonators being loaded into a transfer box, which is then transferred to the Drillboat or transfer vessel using a suitable crane.

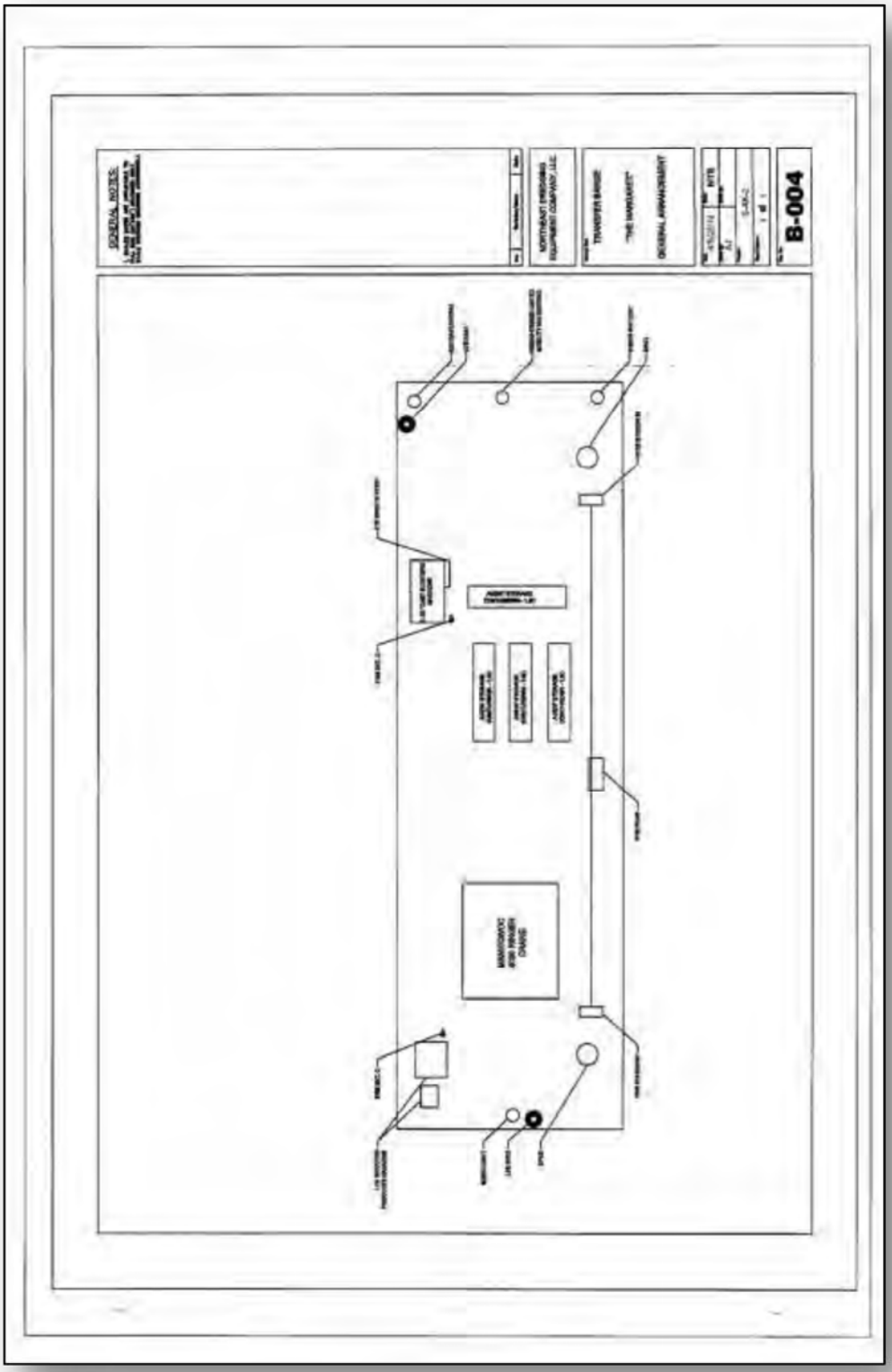
Note: The transfer of Class A or Class C Explosives will not take place until all packaged products have been transferred.

4.3.3 Transfer to Drillboat from Transfer Vessel (when applicable)

If a transfer vessel is used to transfer product to or from the Drillboat, the spuds must be down so that the Drillboat is steady prior to any transfer. All drilling and loading must be stopped before the transfer can occur. The same method is used for the transfer the explosives products from the transfer vessel to the Drillboat, as was used to transfer product from the dock onto the transfer vessel.

4.3.4 Transfer Vessel

The layout of the transfer barge 'The Margaret' is shown below. Cashman Weeks NB does not anticipate utilizing this vessel unless necessary.



4.4 Transportation over Water Safety Checklist

The following checklist will be used by the Blaster-in-Charge, or his designated certified Blaster, prior to transfer of explosives materials from land to water, and prior to transportation of explosives on regulated waterways to ensure compliance with the appropriate regulations.

4.4.1 Compliance with 33 CFR

33 CFR 6.12 Supervision and control of explosives or other dangerous cargoes.	
6.12-1 General Supervision & Control	
The Captain of the Port may supervise and control the transportation, handling, loading, discharging, stowage, or storage of hazmat on board vessels as covered by the regulations in 49 CFR Parts 170-189, 46 CFR 150-156, 46 CFR Parts 146-148 and the regulations governing tank vessels (46 CFR Parts 30-39)	☐
33 CFR 126.16 Conditions for Designating a "Facility of Particular Hazard"	
(a) BASIC REQUIREMENTS. The facility shall comply with all the conditions in 33 CFR 126.15 except where specifically waived by 33 CFR 126.11.	☐
(b) WARNING ALARMS. Warning alarms shall be installed at the waterside facility to warn approaching or transiting water traffic of immediate danger in the event of fire or cargo release. Warning alarms shall be of the siren type, or the emergency rotating flashing light type, and be sufficient intensity to be heard, or seen, a distance of 1 mile during normal facility working conditions. The alarm signal shall not conflict with local municipal prescription.	☐
33 CFR 126.19 Issuance of Permits for Handling Designated Dangerous Cargo	
Upon the application of the owners or operators of a designated waterfront facility or of their authorized representatives, the Captain of the Port is authorized to issue a permit for each transaction of handling, loading, discharging, or transporting designated dangerous cargo at such waterfront facility provided the following requirements are met:	
(a) The facility shall comply in all respect with the regulations in this subchapter.	☐
(b) The quantity of designated dangerous cargo, except Class 1 (explosive) shipped by or for the Armed Forces of the United States, on the waterfront facility and vessels moored thereto shall not exceed the limits as to maximum quantity, isolation and remoteness established by the Captain of the Port. Each permit issued under these conditions shall specify that the limits so established shall not be exceeded.	☐
33 CFR 151.59 Placards	

(b) The master of each ship shall ensure that one or more placards meeting the requirements of this section are displayed in prominent locations and in sufficient numbers so that they can be read by the crew and passengers.	☐
33 CFR 155.450 Placard	
(a) A ship, except a ship of less than 26 feet in length must have a placard of at least 5 by 8 inches made of a durable material, fixed in a conspicuous place in each machinery space or at the bilge and ballast pump control station stating the following "Discharge of Oil Prohibited"	☐
33 CFR 175.201 Ventilation	
No person shall operate a boat built after July 31, 1980, that has a gasoline engine for electrical generation, mechanical power, or propulsion unless it is equipped with an operable ventilation system that meets the requirements of 33 CFR 183.610 and 183.620	☐

4.4.2 Compliance with 46 CFR

46 CFR 25.25 Personal Floatation Devices	
(a) No person may operate a vessel to which this subpart applies unless it meets the requirements of this subpart.	☐
(b) Each vessel not carrying passengers for hire, less than 40 feet in length must have at least one life preserver (Type I PFD), buoyant vest (Type II), or marine buoyant intended to be worn (Type III PFD) for each person on board.	☐
(c) Each vessel carrying passengers for hire and each vessel 40 feet in length or longer not carrying passengers for hire must have at least one life preserver for each person aboard.	☐
46 CFR 25.30 Fire Extinguishing Equipment	
(a) The provisions of this subpart with the exception of 25.30-90, shall apply to all vessels contracted for on or after November 19, 1952. Vessels contracted for or prior to that date shall meet the requirements of 25.30-90.	☐
25.30-10	
(b) For the purpose of this Subchapter, all required hand portable and semi portable fire extinguishing systems shall be of the BRAVO type; i.e. suitable for fighting fires involving flammable liquids, grease, etc.	☐
25.30-15	
(a) When a fixed fire extinguishing system is installed, it must be a type approved or accepted by the Commandant (G-MSE) or by the Commanding Officer, U.S. Coast Guard Marine Safety Center.	☐
25.30-20	

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(b) MOTOR VESSELS. All motor vessels shall carry at least the minimum number of hand held portable extinguishers as set forth in Table 25.30-20 (b) (1).	☐
46 CFR 25.35-1 Backfire Flame Control	
(a) Every gasoline engine installed in a motorboat and motor vessel after April 25, 1940 shall be equipped with an acceptable means of backfire control.	☐
(b) Installations made before November 19, 1952 need not meet the requirements of this subpart and may be continued in use as long as they are servicable and in good condition.	☐

4.4.3 Compliance with 49 CFR

49 CFR 176.60 "No Smoking" Sign	
When smoking is prohibited during the loading, stowing, storing, transportation, or unloading of hazmat by this part, the carrier and the master of the vessel are jointly responsible for posting "No Smoking" signs in conspicuous locations.	☐
SUBPART G - Detailed Requirements for Explosives	
176.100 Permit for Divisions 1.1 and 1.2 (explosive) materials.	
Before Divisions 1.1 and 1.2 (explosive) materials may be discharged from, loaded on, handled or restowed on board a vessel at any place in the United States, the carrier must obtain a permit from the COTP in accordance with the procedures in 33 CFR 126.19. Exceptions to this permit requirement may be authorized by the COTP	☐
49 CFR 176.105 Loading and Unloading of Explosives	
Class A or Class B explosives (except special fireworks), may not be loaded on a vessel until all other cargo has been loaded on board a vessel. No explosives may be loaded or unloaded at the same time that other cargo is being handled.	☐
(a) Packages of Class 1 (explosive) materials may not be thrown, dropped, rolled, dragged, or slid over each other or over a deck.	☐
(b) When Class 1 (explosive) materials are stowed in a hold below one in which any cargo is being handled, the hatch in the deck dividing the two holds must have all covers securely in place.	☐
(c) Drafts of Class 1 (explosive) materials must be handled in accordance with the following:	☐
(1) A draft may not be raised, lowered, or stopped by sudden application of power or brake.	☐

(2) A draft may not be released by tripping or freeing one side of the cargo-handling equipment and tumbling the Class 1 (explosive) materials off.	☐
(3) All drafts, beams, shackles, bridles, slings, and hoods must be manually freed before the winch takes control.	☐
(4) Slings may not be dragged from under a draft by winching except for the topmost layer in the hold when power removal is the only practical method and when the cargo cannot be toppled.	☐
(5) Handles or brackets on packages in a draft may not be used for slinging purposes.	☐
(d) A combination woven rope and wire sling or a sling that is formed by use of an open hook may not be used in handling Class 1 (explosive) materials.	☐
(e) Only a safety hook or a hook that has been closed by wire may be used in handling drafts of Class 1 (explosive) materials.	☐
(f) Wire rope or wire rope assemblies, including splices and fittings, used in handling Class 1 (explosive) materials must be unpainted and kept bare to permit inspection of their safe working condition. A mechanical end fitting (pressed fitting) may be used in place of an eye splice, if the efficiency of the mechanical end fitting is at least equal to the efficiency of an eye splice prepared as prescribed in 29 CFR 1918.51(c)(1).	☐
(g) Packages of Division 1.1 and 1.2 materials that are not part of a palletized unit must be loaded and unloaded from a vessel using a chute, conveyor or a mechanical hoist and a pallet, skipboard, tray or pie plate fitted with a cargo net or sideboards.	☐
(h) Packages of Division 1.1 and 1.2 (explosive) materials must be loaded or unloaded in accordance with the following:	☐
(1) A cargo net with a pallet, skipboard, tray, or pie plate, must be loaded so that no more than a minimum displacement of packages occurs when it is lifted.	☐
(2) A cargo net must completely encompass the bottom and sides of the draft. The mesh of the cargo net must be of a size and strength that will prevent a package in the draft from passing through the net.	☐
(3) When a tray is used in handling packages, no package may extend more than one-third its vertical dimension above the sideboard of the tray.	☐
(i) A landing mat must be used when a draft of nonpalletized Division 1.1 or 1.2 (explosive) materials is deposited on deck. The landing mat must have dimensions of at least l m (3 feet) wide, 2 m (7 feet) long, and 10 cm (3.9 inches) thick, and be made of woven hemp, sisal, or similar fiber, or foam rubber, polyurethane or similar resilient material.	☐

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(j) In addition to the other requirements of this section, packages of Division 1.1 and 1.2 (explosive) materials must be handled in accordance with the following:	☐
(3) Packages may not be lifted over any hazardous materials.	☐
(4) The height of any structure, equipment, or load on a deck over which packages must be lifted may not be higher than the hatch coaming or bulwark, or 1 m (3 feet), whichever is greater.	☐
(k) Unpackaged explosive devices may not be handled by their lifting lugs or suspension lugs.	☐
(l) A chute may not be used when loading or unloading Class 1 (explosive) materials in compatibility group A or B.	☐
49 CFR 176.108 Supervision of Class 1 (explosive) materials during loading, unloading, handling and stowage.	
(a) During the loading, unloading, handling and stowage of Class 1 (explosive) materials, a responsible person shall be in constant attendance during the entire operation to direct the loading, unloading, handling and stowage of Class 1 (explosive) materials, including the preparation of the holds. The responsible person must be aware of the hazards involved and the steps to be taken in an emergency, and must maintain sufficient contact with the master to ensure proper steps are taken in an emergency.	☐
(b) Each person involved in the handling of Class 1 (explosive) materials on a vessel shall obey the orders of the responsible person.	☐
(c) The responsible person must inspect all cargo-handling equipment to determine that it is in safe operating condition before it is used to handle Class 1 (explosive) materials.	☐
49 CFR 176.120 Lightning protection.	
A lightning conductor grounded to the sea must be provided on any mast or similar structure on a vessel on which Class 1 (explosive) materials are stowed unless effective electrical bonding is provided between the sea and the mast or structure from its extremity and throughout to the main body of the hull structure. (Steel masts in ships of all welded construction comply with this requirement).	☐
49 CFR176.137 Portable magazine.	
(a) Each portable magazine used for the stowage of Class 1 (explosive) materials on board vessels must meet the following requirements:	☐
(1) It must be weather-tight, constructed of wood or metal lined with wood at least 2 cm (0.787 inch) thick, and with a capacity of no more than 3.1 cubic m (110 cubic feet).	☐

(2) All inner surfaces must be smooth and free of any protruding nails, screws or other projections.	☐
(4) When constructed of metal, the metal must be not less than 3.2 mm (0.126 inch) thick.	☐
(5) Runners, bearers, or skids must be provided to elevate the magazine at least 10 cm (3.9 inches) from the deck. Padeyes, ring bolts, or other suitable means must be provided for securing.	☐
(6) If the portable magazine has a door or hinged cover, the door or cover must have a strong hasp and padlock or equally effective means of securing.	☐
(7) The portable magazine must be marked on its top and four sides, in letters at least 8 cm (3 inches) high, as follows:	☐
EXPLOSIVES—HANDLE CAREFULLY—KEEP LIGHTS AND FIRE AWAY.	
(b) A portable magazine which meets the requirements for a type 2 or type 3 magazine under 27 CFR part 55 subpart K may be used for the stowage of Class 1 (explosive) materials on board vessels.	☐
(c) A portable magazine with a capacity exceeding 3.1 m3 (110 cubic feet) may be used for the stowage of Class 1 (explosive) materials under such construction, handling, and stowage requirements as the COTP approves.	☐
§ 176.150 Radio and radar.	
(b) During the loading or unloading of all explosive articles (except those in Division 1.4 [explosive]), no radio or radar transmitter may be used within 50 m (164 feet) of such articles except for VHF transmitters the power output of which does not exceed 25 watts and of which no part of the antenna system is within 2 m (7 feet) of the Class 1 (explosive) materials.	☐
§ 176.156 Defective packages.	
(a) No leaking, broken, or otherwise defective package containing Class 1 (explosive) materials, including packages which have been adversely affected by moisture, may be accepted for shipment. The master or person in charge of a vessel on which there is a defective package containing Class 1 (explosive) materials must seek advice from the shipper concerning withdrawal, repair, or replacement. No repair of damaged or defective package containing Class 1 (explosive) materials may be performed on board a vessel.	☐
(b) No Class 1 (explosive) material, which for any reason has deteriorated or undergone a change of condition that increases the hazard attendant upon its conveyance or handling, may be moved in the port area, except as directed by the COTP.	☐
(c) If any package of Class 1 (explosive) materials, or seal of a package of Class 1 (explosive) materials, appears to be damaged, that package must be set aside for examination and repair or otherwise legally disposed of as directed by the shipper.	☐

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(d) If any Class 1 (explosive) materials are spilled or released from a package, the responsible person must ensure that an appropriate emergency response is undertaken in accordance with the emergency response information required under §172.602 of this subchapter. The master of the vessel must report each incident involving spillage or release of Class 1 (explosive) materials to the COTP as soon as practicable.	☐
49 CFR 176.160 Protection against weather.	
Any person loading or unloading packages containing Class 1 (explosive) materials shall take adequate measures to prevent these packages from becoming wet.	☐
49 CFR 176.162 Security.	
A responsible person must be present at all times when the hatches of spaces containing Class 1 (explosive) materials are open. No unauthorized person may be permitted to access spaces in which Class 1 (explosive) materials are stowed. Magazines must be secured against unauthorized entry when loading has been completed, or when loading or unloading is stopped. Packages containing Class 1 (explosive) materials may not be opened on board ship.	☐
49 CFR 176.164 Fire precautions and firefighting.	
(a) Matches, lighters, fire, and other ignition sources are prohibited on and near any vessel on which Class 1 (explosive) materials are being loaded, unloaded, or handled except in places designated by the master or the COTP.	☐

4.5 Waterways Transportation

4.5.1 Procedure

The US Coast Guard will be notified within 4 hours of the time that any explosives materials are transported on regulated waterways. This is anticipated to happen after explosives materials have been transferred from land to a transfer vessel at an approved dock facility, in order to transport the explosives materials to the Drillboat at the rock removal area. The transportation might also be effected by loading the explosives materials directly onto the Drillboat itself and then moving the Drillboat to the work area.

Transfer procedures, transfer boxes and storage magazines are discussed in another Section in this document.

4.5.2 Documentation

Prior to any such transportation over regulated waterways, the US Coast Guard and the Captain of the Port will be provided with a completed copy of Form CG-4260 listing the types of explosives products and quantities of each product to be transported. A copy of the Permit as issued will be provided to the Project Director.

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4.5.3 Placards

The following placards will be used to designate the different explosives materials during transportation and for in-use storage on waterways.

Container (Packaged Blasting Agent)

Transfer Box or Magazine – Boosters (Cast Boosters)

Transfer Box or Magazine – Non-electric Detonators

4.5.4 Certified Blasters

The Blaster-in-Charge for the project will have full authority over the transportation and storage of explosives materials. He may assign a certified Blaster from his crew to accompany explosives materials during transportation.

4.6 In-Use Storage of Explosives on Drillboat

When explosives products are taken onboard the Drillboat at the jobsite, it is considered to be 'storage in use' (temporary storage while in use).

The following explosives products or equivalents will be considered to be 'in-use storage':

- Packaged Explosives Product (in an approved storage container):
  - BLASTEX® PLUS TX (Booster Sensitive Emulsion)
- Cast Booster (in an approved booster magazine):
  - TROJAN® SPARTAN®
- Initiation System (in an approved detonator magazine):
  - Nonel® Starter
  - NONEL® EZ DET® Nonelectric Blast Initiation System
  - NONEL® EZTL™ Non-Electric Trunkline Delay Detonators

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5 BLASTING PARAMETERS

In this section, the blast design criteria, selection of products and blasting methods for this project are discussed.

5.1 Site Plan

Analysis of core samples from the proposed blasting footprint showed compressive strengths in excess of 10,000 psi and high RQD values, and will have to be pre-treated by blasting for subsequent mechanical removal.

The 'blasting footprint' is defined as the area where rock was found higher than the contract elevation, which cannot be removed by mechanical means without pre-treatment by blasting.

The plan drawing on the next page shows the blasting footprint in the three identified areas, for which the Top of Rock was recently determined by means of probe testing.

The second plan drawing shows the project area closest to the Hurricane Barrier.

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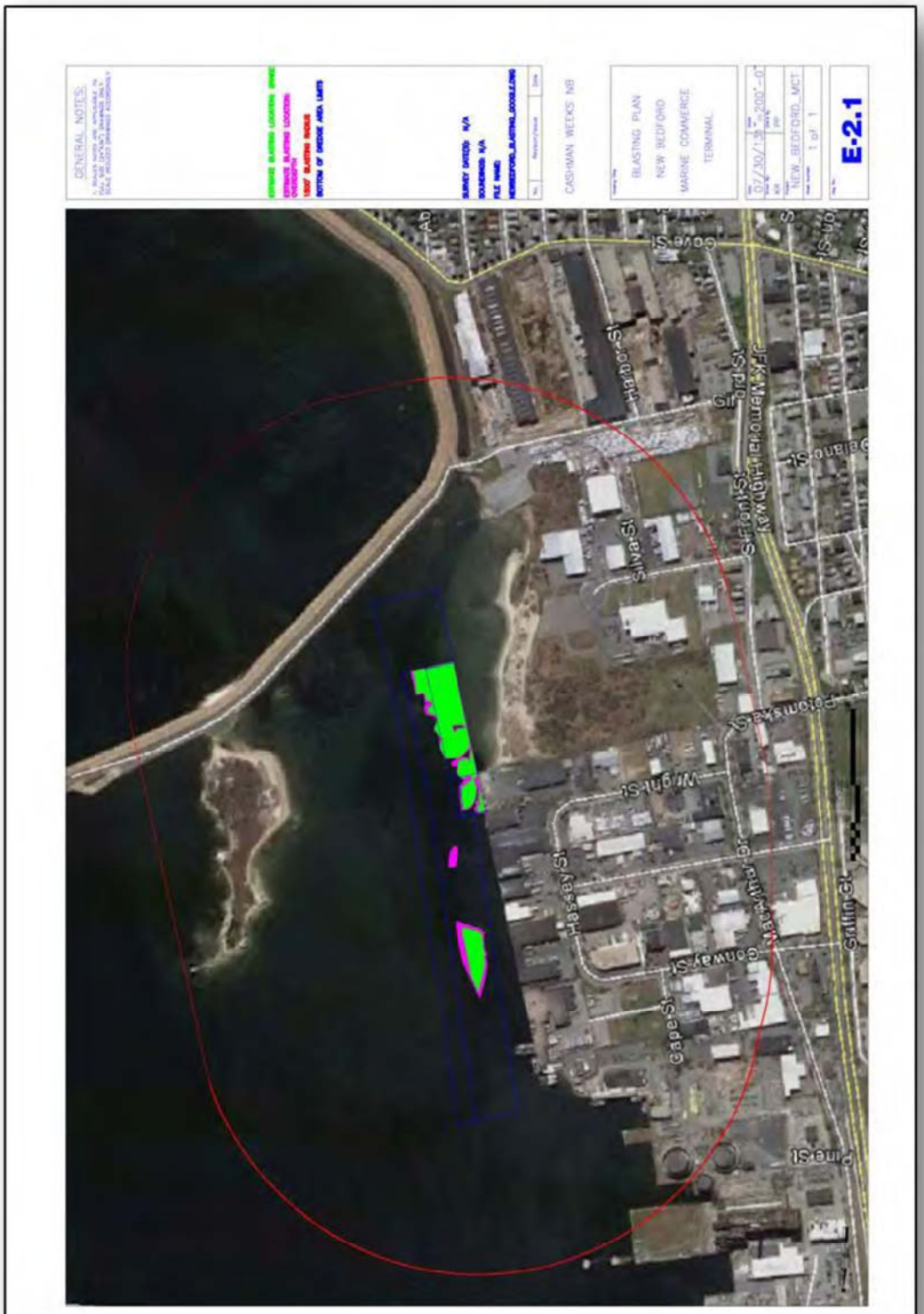
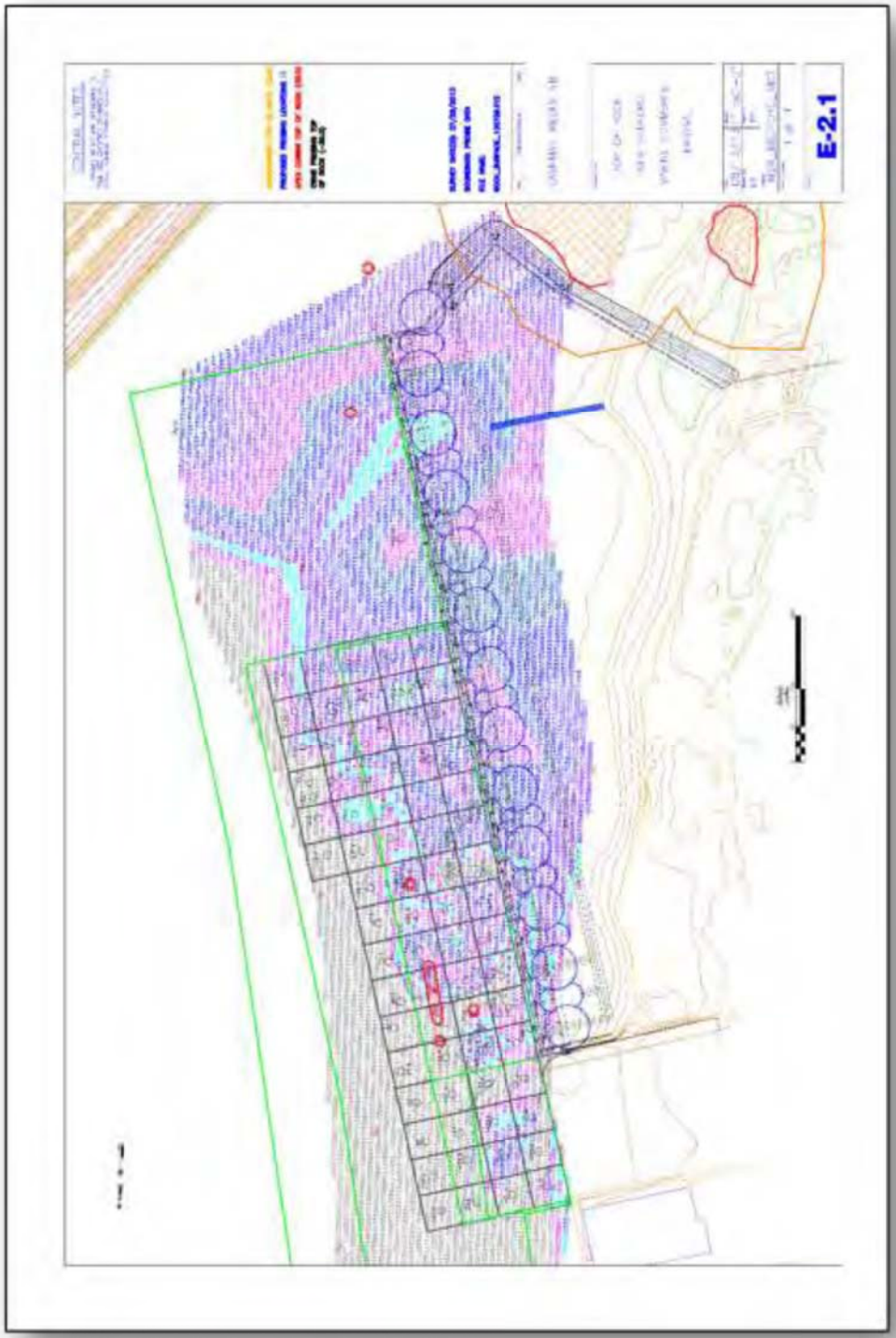

GENERAL NOTES:
CASHMAN WEEKS NB
BLASTING PLAN
NEW BEDFORD
MARINE COMMERCE
TERMINAL
07/30/13
NEW_BEDFORD_MCT
1 of 1
E-2.1
Pine St
Griffin Ct
Pulaski St
Wright St
Hassey St
Conway St
Cape St
Hathaway Rd
Silva St
Harbor St
Coggeshall St
Ford St
Front St
JFK Memorial Hwy
Belano St

Also see the same plan view showing Top of Rock elevations on the large-scale copy included with this document.



5.2 Blast Design Criteria

The following criteria were considered in the design of controlled drilling and blasting parameters for fragmentation of competent bedrock, in preparation of excavation of the rock to the contract elevation:

- Blasting environment (i.e. rock properties, thickness of overburden layer, depth of water, amount of relief available, etc.)
- Other limiting factors imposed by the contract requirements or by regulatory controls:
  - Ground vibration and air overpressure, as per project specification
  - The acceleration limit on the nearby Hurricane Barrier as implied by the table of maximum charge weight (as a function of frequency) vs distance in Item 8 of Bid Addendum #1 (January 4, 2013)
  - EPA conditions to blasting as set forth in letters dated June 13, 2013 and July 24, 2013
  - USACE Safety & Health Requirements Manual EM-385 (2008), Section 29 "Blasting"
- Equipment available to the contractor (drill boat and dredging equipment)

A controlled drilling and blasting program was designed to produce suitable rock fragmentation for subsequent excavation by mechanical means, while limiting the blast induced effects on the surroundings to the project specifications and regulatory limits and adhere to the additional limitations imposed on this project.

5.3 Control & Mitigation of Blast Induced Effects

Rock blasting, whether on land or under water, creates ground vibration which may affect physical structures or other human and wildlife activity in the surrounding area. Noise and air blast (air overpressure) could also be observed as a result of blasting. Also of concern is the acceleration resulting from blasting operations at the nearby hurricane barrier.

The science and engineering of controlling and mitigating these blast induced effects are well understood and will be employed on this project to minimize the effect of blasting on the surrounding areas and control blast induced effects to within the project specifications.

The procedure for Control & Monitoring of Blast-Induced Effects is described in more detail elsewhere in this Blast Plan.

5.3.1 Ground Vibration

Ground vibration will be minimized by employing suitable delays between initiation of blast holes, so that the larger blast event is effectively broken into smaller, individual events. During drilling and blasting activity, care will also be taken to ensure proper confinement of the explosives charges by only loading competent blast holes and utilizing the appropriate type and amount of stemming to confine the energy inside the rock.

The procedure for monitoring ground vibration is described in more detail elsewhere in this Blast Plan.

5.3.2 Air Overpressure

From our experience on similar projects, no significant air overpressure is expected because of the significant depth of water over the blast area. A negligible amount of noise will be produced by the lead-in line and initiation of surface delays. To minimize the noise from surface delays, they will be submerged into the water just before blasting.

The procedure for monitoring air overpressure is described in more detail elsewhere in this Blast Plan.

5.3.3 Acceleration at the Hurricane Barrier

The acceleration experienced by the hurricane barrier as a result of blasting is limited by the contract, by imposing the maximum charge weights per delay as shown in the revised table in Addendum #1.

The procedure for monitoring blast-induced acceleration at the hurricane barrier is described in more detail elsewhere in this Blast Plan.

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5.4 EPA Conditions for Protection of Marine Life

The EPA requires certain conditions to blasting activity as a method of 'first resort' in their letters dated June 13, 2013 and July 24, 2013:

- Submittal of a Blast Plan no later than 30 days before blasting commences
- Blasting at the site closest to the bulkhead construction area may occur between September 15 and January 15
- Blasting at the other two locations may occur between November 15 and January 15, except if specifically approved by the EPA for an earlier date
- For any blasting prior to November 15, a silt curtain must be installed
- A fish deterrent system must be in place at least 24 hours before blasting and remain in place for all the blasting activities
- Pre-blast monitoring for fish in the projected impact zone must be conducted immediately prior to blasting, and if fish are detected, a fish startle system must be deployed
- After the blasting event is completed, the area must be monitored for injured or killed fish and the observations reported
- Explosives charge weight is limited to 50 lbs per delay
- A minimum delay time between charges of 25 ms is required
- Clean parent substrate (overburden) must remain in place
- The use of angular stemming material of sufficient length is required
- The use of delay detonators to separate charges and reduce total pressure
- Decking must be used where possible to reduce total pressure

5.5 Selection of Explosives

The explosives product selected for this project is a packaged booster-sensitive emulsion specifically formulated for tough blasting conditions with high hydrostatic and dynamic shock pressures. It is manufactured by Dyno Nobel, Inc. and distributed by Explosives Supply, Inc.

From the Technical Information of Blastex Plus TX (Dyno Nobel):

"High strength microsphere density control ensures consistent explosive performance under increased hydrostatic pressures and in saturated ground conditions where the transmission of dynamic shock pressures from detonating blastholes would normally reduce the performance of standard cast booster sensitive explosives awaiting initiation in adjacent blastholes."

The initiation system of choice for controlled blasting is the well-proven and safe shock-tube based non-electric system. The blast design will fully incorporate the delay capability of these systems, to ensure detonation of individual blast holes to control blast induced effects and rock fragmentation. A cast booster will be used in conjunction with the delay detonators as primer for blast holes. Redundant initiating paths will always be employed.

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5.6 Blast Design

The thickness of the rock layer to be removed and the properties of the rock, the amount of overburden, performance properties of the selected explosives materials and all the restrictions and limitations of blast-induced effects on the environment surrounding the blasting area, and other limitations imposed by contract, were taken into account to develop a selection of blasting parameters.

In addition, restrictions are imposed on the placement of blast holes by the US Army Corps of Engineers Safety Manual EM-385 Section 29 "Blasting". One of the criteria which comes into play in our selection of blasting parameters is the minimum separation between a loaded hole and an adjacent hole being drilled of 8 ft. This implies a minimum burden and spacing of 8 ft x 8 ft available for the purpose of blast design. Because of other project constraints (such as the thickness of the overburden layer), these dimensions become limiting in almost the entire blasting footprint. Drill holes will be loaded after each hole is completed in accordance with safe industry standards procedures for controlled underwater rock blasting.

5.6.1 Production Blasting Zone

The production blasting zone comprise the areas in rows A through row E on the plan view with the 50 ft cells presented before.

Because of the thickness of the rock and corresponding overburden layer remaining in place when blasting, in combination with the maximum charge weights per delay imposed to protect the Hurricane Barrier, there is only a very limited area where blasting can performed within the constraints of the contract requirements.

The plan view of the project area on the next page illustrates in green shading the 'cells' of 50 ft x 50 ft on the blasting footprint which can be blasted while maintaining the maximum explosives charge weight from the Hurricane Barrier Table (Production Blasting Zone 1). In all these cells, the maximum individual charge weight is below the 50 lbs per delay limit imposed by the EPA.

Blasting will be performed working offshore to inshore to create relief and minimize dust effects at the wharf area.

In all the other cells in the blasting footprint (Production Blasting Zone 2 - shaded orange), between 2 decks and 10 decks per hole will have to be used to maintain the Hurricane Barrier charge weight limits if the rock is to be removed in a single lift (i.e. with the overburden remaining in place). The physical limitations on the placement of blast holes and the required size of the intermediate inert decks separating charges in the same blast hole, make it impossible to arrive at a blast design operating within the project constraints. We included a set of design parameters if the restrictions imposed by the USACE on the hurricane barrier as well as the charge weight limitations imposed by the EPA are relieved significantly.

The same plan view is included with this document as a large-scale copy.

Taking into consideration all the criteria discussed above, the selected blasting parameters for Production Blasting Zone 1 are shown below.

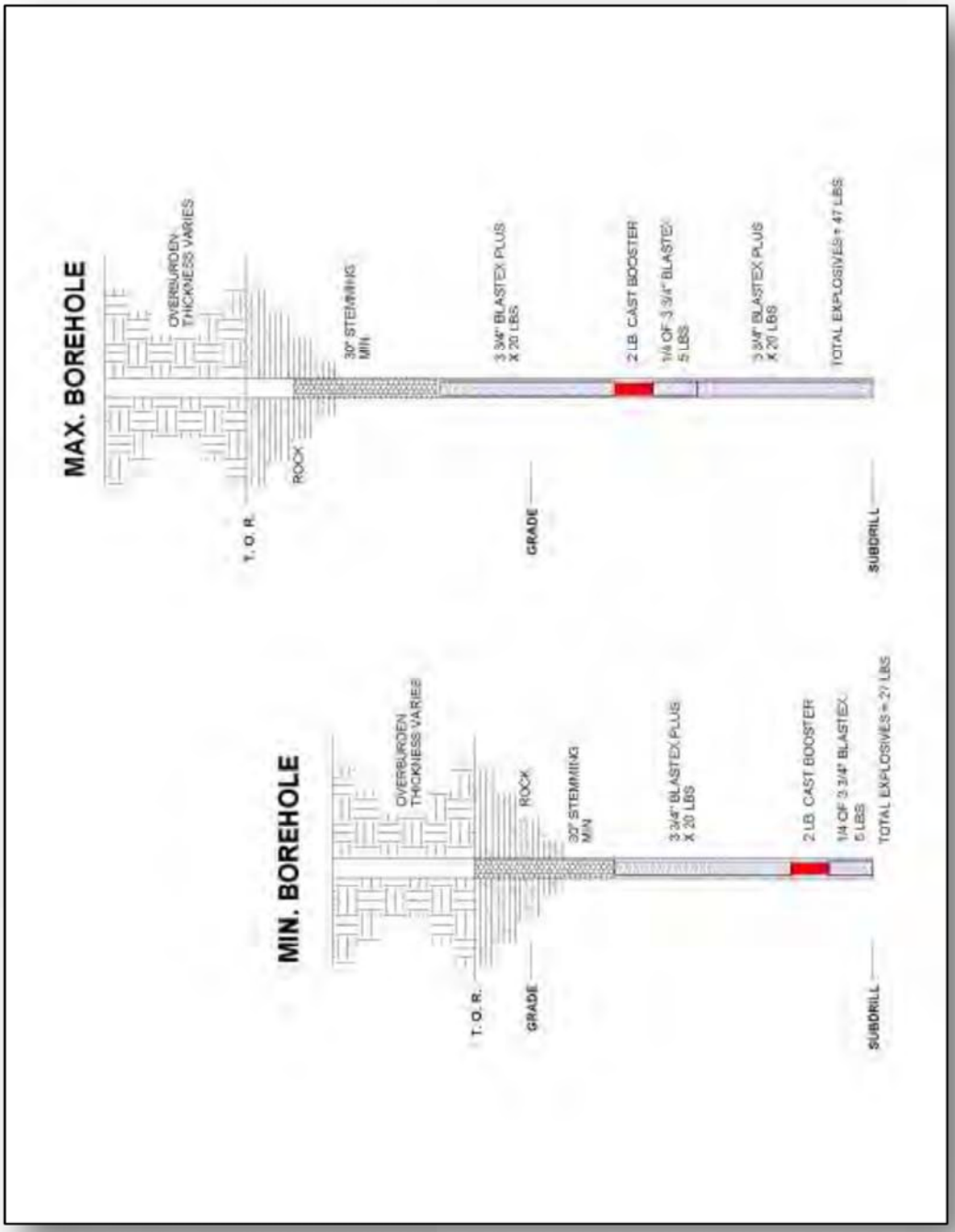
Spacing (between holes along a range)	8 ft
Burden (distance between ranges)	8 ft
Subdrill (below contract elevation)	6 ft
Typical blast area	2,560 sq ft (40 holes)
Typical Borehole diameter	4.5 in – 6.0 in (typ 5.0 in)
Typical Borehole depth	7 ft - 9 ft
Collar / Stemming	> 24 in
Maximum holes per range	18
Ranges per blasting event	1 – 4 (if short ranges)
Charge diameter	3.75 in - 4.5 in (typ 4.25 in)
lbs of explosives / ft of borehole	± 7.6 lbs/ft
Quantity of explosives per hole	38 lbs – 48 lbs

For Production Blasting Zone 2, the following range of blasting parameters are proposed. Specific parameters will depend on the specific location, as a function of rock depth and overburden thickness.

Spacing (between holes along a range)	8 ft
Burden (distance between ranges)	8 ft
Subdrill (below contract elevation)	6 ft
Typical blast area	2,560 sq ft (40 holes)
Typical Borehole diameter	4.5 in – 6.0 in
Typical Borehole depth	7 ft – 22.8 ft
Collar / Stemming	> 24 in
Maximum holes per range	18
Ranges per blasting event	1 – 4 (if short ranges)
Charge diameter	3.75 in - 5.5 in
lbs of explosives / ft of borehole	± 6 – 12.55 lbs/ft
Quantity of explosives per hole	49 lbs – 136 lbs

(a) Representative Bore Hole

A cross-section of a representative blast hole in Production Zone 1 is shown below.



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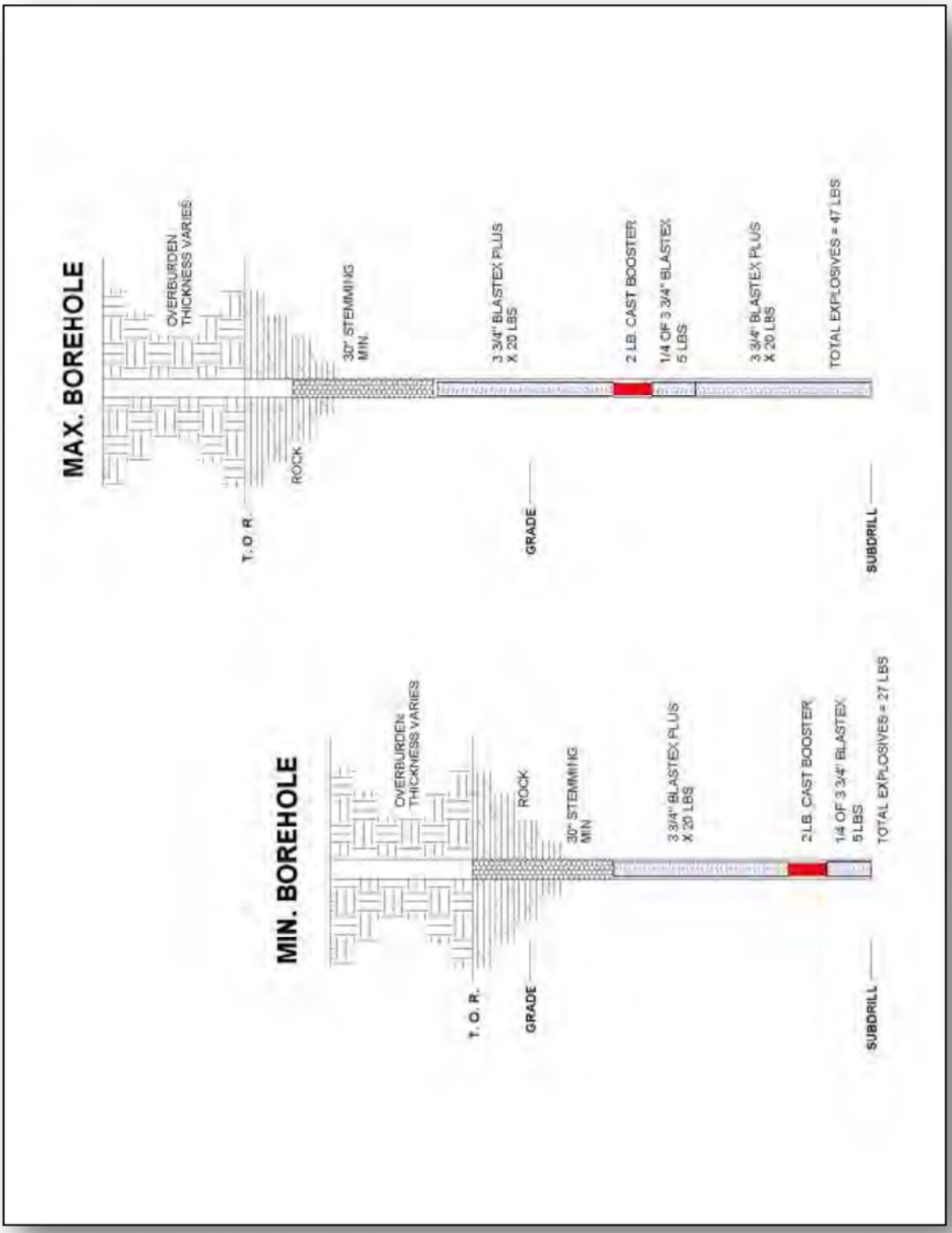
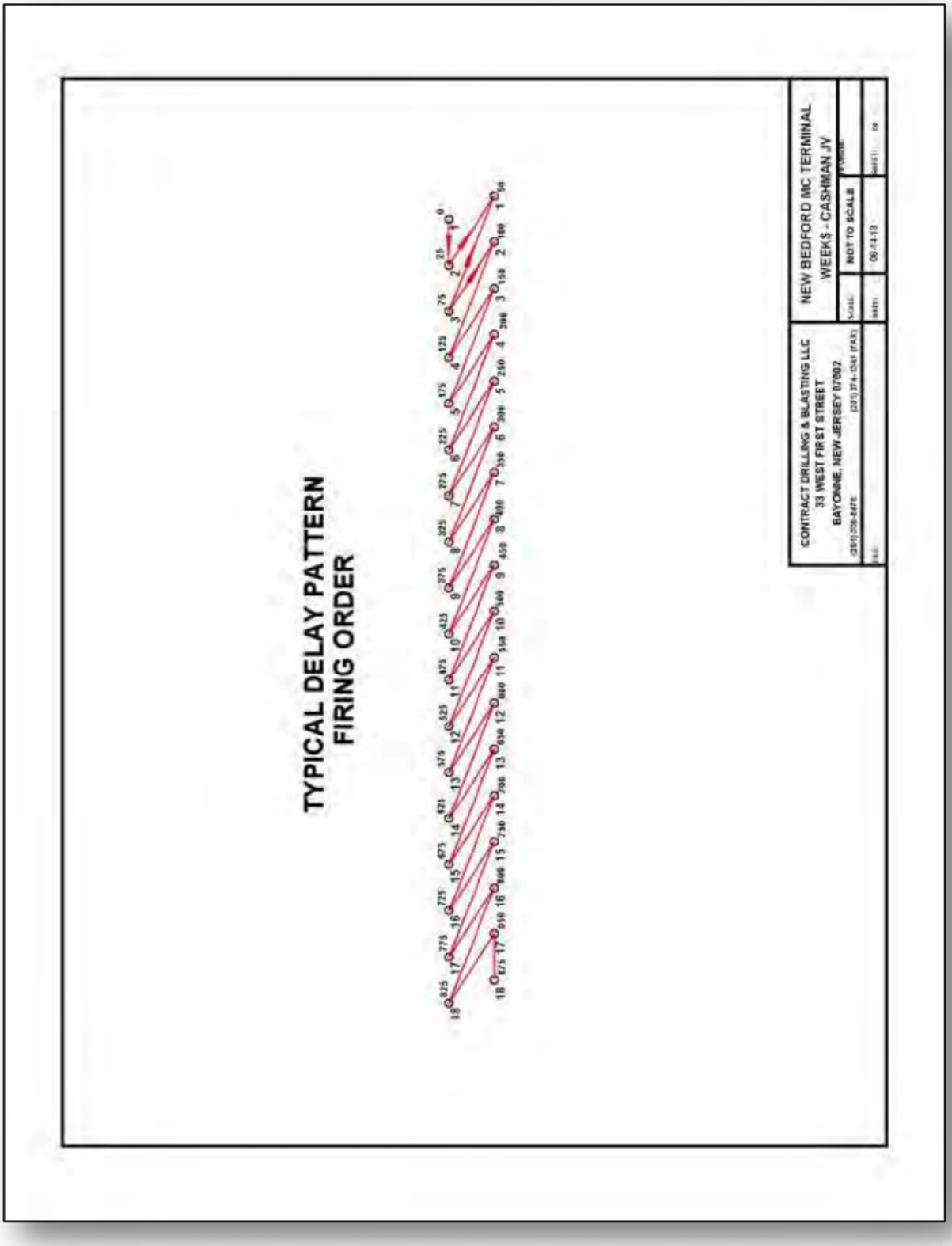
(b) Typical Hole Connection Diagram

A schematic of the typical connection of blast holes using the initiation system selected, is shown below.



(c) Typical Delay Pattern



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5.6.2 Buffer Zone

The blasting footprint represented by row A on the plan represents the area where blasting has to be performed in advance of cell construction or pile pipe advancement ('buffer zone'). In this area, blasting is restricted by the project specifications to lightly loaded holes. As for the production blast zone (rows B to E), the excessive amount of rock and overburden and limitation on physical configuration of blast holes and charges make it impossible to adhere to the blasting constraints in the contract. Some of the highest overall elevations of rock and overburden in the entire blasting footprint are present in this buffer zone (i.e. A3, A4, A8 and A9). Fully charged blast holes will have be utilized in this area and even with a good quality line-drill row of holes in place prior to the start of blasting in this buffer zone, it cannot be guaranteed that back-break will not occur.

5.6.3 Pre-Split

The proposed pre-split row of holes cannot be drilled and blasted because of the restriction from EM-385 on spacing between holes. Line Drilling will be performed using 4.5" - 6" holes on 18" – 30" centers (center on center).

6 TEST BLAST PROGRAM

Typically, a Test Blast Program consist of a number of blasting events leading up from very small in size and very conservative in design, to production scale blasting, in order to:

- Calibrate the specific project environment for attenuation of ground vibration and air overpressure
- Monitor the effects of blasting to ensure that all other project requirements are met
- Evaluate dredging productivity as a result of rock fragmentation from blasting

Such a Test Blast Program is carefully designed based on experience from previous underwater blasting projects, as well as from evaluation of the available scientific and engineering data as it pertains to ground vibration and air blast overpressure.

The main objective of a Test Blast Program is to find the site specific optimal conditions for controlled drilling and blasting, where blast-induced effects on the surrounding rock and water and on nearby vessels and structures are safely maintained within the project specifications, while at the same time striving to optimize dredging productivity so that blasting and excavation of rock can be completed in the shortest duration feasible. Production blasting parameters are selected based on the findings from the Test Blast Program.

However, given the project requirements and restrictions, a test blast program for this project would only address the blast-induced effects such as ground vibration and air-overpressure. Because of the restriction to leave the overburden in place until blasting is completed, it will not be possible to evaluate the digability of the blasted rock and resultant dredging efficiency, as a function of different blast designs. For this reason, blast design parameters will have to be more conservative than otherwise to ensure that the rock can be excavated at a later time and that the final contract elevation can be achieved. The excessive amount of overburden on top of rock also confines the rock movement during blasting and subsequently significantly higher powder factors will be needed to break the rock efficiently (i.e. more explosives per hole than without the overburden in place) than without the overburden.

Test Blasting in Production Blasting Zone 1 will give us the opportunity to evaluate the effect of blasting on the Hurricane Barrier, in order to compare the actual effect with the anticipated effect as represented in the project specifications.

6.1 Test Blast Plan

The following procedure will be used to prepare the engineered procedure for the Operational Blast Plan for Production Blasting.

- Prior to or during the drilling of Test Blast #1, all seismic stations will be verified as to the actual distance real to the waypoint of the Blast Zone using a handheld GPS in the field and the DGPS on the drillboat.

NOTE: The center of the closest range to the structures on the closest shore will be the waypoint.

After detonation, the following data will be used to perform a regression analysis resulting in a site-specific relationship for the attenuation of ground vibration and air blast overpressure:

- Distance
- Maximum Pounds Per Delay
- Peak Particle Velocity (PPV) & Blasting Frequencies
- Air Blast Overpressure

As each Test Blast is completed, the data will be accumulated in the regression analysis. By combining all data and not only specific stations, the regression analysis becomes extremely conservative and the results not dependent on the direction.

Test Blast #1 consists of a confined state whereas the remainder of the Test Blasts is buffered. Including data from confined and buffered blasts will also aid in the results of the regression analysis being conservative.

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6.2 Test Blast Location

Production Blasting Zone 1 (shaded in green) on the plan view below show the general location for the Test Blast Program. Exact coordinates for each Test Blast will be provided prior to the start of the program.

7 PRODUCTION BLASTING

This Section describes the method followed for production drilling and blasting, whereas a separate Section describes contingency measures for possible problem situations which may arise. The blast monitoring and mitigation procedures utilized to ensure compliance with project requirements and regulatory limits with regard to ground vibration and air overpressure are discussed in a Section dedicated to this subject.

7.1 Positioning of Drillboat

A RTK GPS system will be utilized in accurately positioning the Drillboat over the desired position for the Production Blast Plan, as well as for ongoing monitoring of the Drillboat location.

Survey data and a superimposed layout of the blast pattern will be displayed via navigation software on the monitor in the control room. A graphical depiction of the Drillboat and its location relative to the blast pattern will be shown in real time on the navigation display. Using a combination of spuds, anchors and tug support as needed, the first hole on deck on the Drillboat will be positioned over the first hole in the first range to be drilled.

Upon completion of the drilling and loading process on the first range, the Drillboat will be repositioned, again using a combination of spuds and anchors with tug support as needed, over the next range. This will be repeated until the entire Blast Plan has been completed.

Position tracking data will be stored for future reference.

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7.2 Method of Operation

It is anticipated that two or more blasts will be completed per day during production blasting, with the first blast early in the day whenever possible.

7.2.1 Preparation for Drilling & Blasting

- Using the approved transfer procedure, take on board the regulatory approved allowable product quantity for storage.
- The blasting engineer shall log in the coordinates and/or feet on deck for the site-specific range(s) of the holes and record on the Frame Logs.
- Position the Drillboat and verify tide, depth of water, overburden, and top of rock.
- When drilling near or adjacent to a loaded hole, drilling shall be limited to vertical holes only.
- Record the data on the Frame Log and proceed with drilling to "site specific" elevation (tide corrected) or as directed by the Blaster-in-Charge.
- Should competent rock exist above required grade elevation, proceed with drilling and loading in preparation for blasting.

7.2.2 Drilling Method

- Complete drilling and verify a loadable hole using a continuous monitoring Angle Indicator to assure the tower does not deviate during the drilling process.
- In no case will a hole be drilled within 8 feet of a loaded hole.
- If the drill steel can be extracted without encountering any obstacles, the loading procedures may begin.
- Should the hammer have to be rotated or used to extract the drill steel, additional cleaning of the hole by making additional drill passes will be used to assure a loadable hole.
- Once the drilling and cleaning of the hole has been completed, the boosters will be prepped while the drill steel is being removed from the hole and secured to the steel rack or tower frame.
- Primers and/or charges will not be removed from the dayboxes and taken out on the catwalk/drill platform until the hole is ready to load.

7.2.3 Loading Method

- Consult the applicable loading schedule for product vs feet of rock.
- Prepare the primer assembly for each booster location in the blasthole using the in-hole detonator and a Booster.
- Install the primer assemblies and the main explosives charge in the hole, using a measuring device to seat the explosives column and to verify the elevation of top-of-product.
- Install the stemming bag to seal the collar of the hole.
- Upon completion of loading of a blast hole, the 2 initiation downlines will be recovered and secured to the shot line. Downlines will be secured with adequate slack to compensate for tidal fluctuations and setbacks.

- Once charging of the entire range (row of holes) has been completed, the downlines will be connected using the appropriate surface delays between holes. All surface connections will be done in duplicate to ensure redundancy of the initiating sequence. Be aware of the directional initiation path and confirm that all surface delays are connected in the proper direction.
- Upon completion of the first range and with all connections made, the Drillboat will set back and be located with the first hole on deck located over the desired position in the second range.
- Holes will be drilled and loaded sequentially according to the Production Blast Plan.
- When charging of the second range has been completed, the same connection procedure as above will be followed. Connections between ranges (rows) will be made using the appropriate surface delay time as per the blast design, and also in a redundant pattern.

7.2.4 Preparing to Blast

- At a suitable time before the planned blasting time as determined by the Blaster-in-Charge, two lead-in assemblies will be connected to the appropriate position to initiate the blast. The shock tube section of this lead-in line will be secured to a rope.
- The lines will be lowered into the water and will be supported by buoys.
- The rope and lead-in lines will be paid out as the Drillboat retreats to its safe blasting position.

7.2.5 Clearance Prior to Blasting

- At the appropriate time, but no later than noontime on any given day, the 2-hour Notice to Blast will be given and the Window of Opportunity will commence (more detail on the Window of Opportunity follows below). Verify with the Fisheries Observer (approved by Massachusetts Division of Marine Fisheries and National Marine Fisheries Services) that no schools of fish are present.
- Verify with the Vibration Consultant that all seismic stations are online prior to tying in the lead-in line which will be utilized to initiate the blast.
- At the 1-hour Notice to Blast: Verify with the approved Fisheries Observer that no schools of fish are present.
- At the 15-minute Notice to Blast: Verify with the Fisheries Observer that no schools of fish are present. Receive "ok to blast" notification from approved Fisheries Observer. In the event that the Fisheries Observer notifies Cashman Weeks NB that schools of fish are present, the blasting procedure will be delayed until the schools of fish move from the area. Notifications will be made to the Pre-Blast Call List that the blast is delayed and will continue until the Fisheries Observer gives the "ok to blast" but at no time will exceed 4:00 pm of any day due to Project and Public safety.
- At the 15-minute Notice to Blast: the Drillboat must retreat to its safe position and the security patrol boats are positioned for enforcement of the Safety Zone.

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- Verify an All CLEAR TO BLAST of personnel working in the area from both land and marine safety stations.
- Proceed with the 5-minute warning with an ALL CLEAR TO BLAST from the security patrol boats.
- The last 10 seconds of the 1-minute warning will be broadcast on CH16 beginning with 10. Counts 3 and 2 will be silent with all radios un-keyed allowing any Safety Zones to "Abort" the blast.

SIGNAL and DETONATE

- All floats installed on the downlines are to be inspected and/or retrieved prior to giving the ALL CLEAR signal.

The Window of Opportunity is defined as follows:

- A two-hour notice of intent to blast with a thirty minute grace period before or after the two hours has passed.
- Should complications prevent blasting within the Window of Opportunity, the two-hour notice of intent must be updated.
- The necessary notifications within the Window of Opportunity are as follows:
  - 2 hour notice – (see Pre-Blast Call List)
  - 1 hour notice – (see Pre-Blast Call List)
  - 15 minute warning CH16, Drillboat Channel
  - 5 minute warning CH16, Drillboat Channel, Audible Blast Signal
  - 1 minute warning CH16, Drillboat Channel, Audible Blast Signal
  - Countdown – CH16,Drillboat Channel
  - ***Blast***
  - ALL CLEAR Drillboat Channel, Audible Blast Signal

Note 1: Because of the marine environment and potential intrusion of traffic into the safety zone, the 15-minute and 5-minute warning may be accelerated. However, the 1-minute warning must be completed.

Note 2: Throughout the drilling and loading procedure, constant monitoring of a fish schools shall be performed by the approved Fisheries Observer.

Note 3: Two copies of an accurate running inventory of all explosives and blasting agents stored at the project shall be maintained: one at the magazine and one in a facility which is at least 50 feet from the magazine.

7.3 Blast Signals

A horn with 120 dB minimum as measured at the perimeter of the blast area zone, will be utilized to produce blasting signals as below. The sound will be distinctly different from any emergency signal which may be utilized on board the Drillboat, as discussed in the Emergency Response Plan.

WARNING SIGNAL

1 minute series of long wails 5 minutes prior to blast signal

BLAST SIGNAL

A series of short yelps 1 minute prior to the shot

ALL CLEAR SIGNAL

A prolonged horn signal following the inspection of the blasting area

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7.4 Pre-Blast Call List

A list of contact information (Pre-Blast Call List) will be used for notification prior to a blasting event taking place. This list will be developed in preparation for the drilling and blasting work effort and the final version will be provided to the Project Director prior to the start of any blasting activity.

At a minimum, the following parties are anticipated to be contacted at the time required by each party prior to blasting:

- US Coast Guard
- New Bedford Police Department
- New Bedford Fire Department
- Fairhaven Police Department
- Fairhaven Fire Department
- New Bedford Harbor Development Commission
- US Army Corps of Engineers – Contracting Officer Representative
- Cashman Weeks NB project office
- Vibration Consultant
- Fisheries Observer
- Apex Companies

An example of the Pre-Blast Call List is shown on the next page.

Pre-Blast Call List

Drill Boat: Kraken

New York and New Jersey Harbor
Channel Improvement 50 FT Project
Arthur Kill Channel, Contract 13, S-AK-2
W912DS-11-C-0018

Caller _____ Day _____ Date _____ Sheet _____ of _____

	2 HOUR		1 HOUR		15 MIN		ALL CLEAR	
	NAME NOTIFIED	Callers Initials	NAME NOTIFIED	Callers Initials	NAME NOTIFIED	Callers Initials	NAME NOTIFIED	Callers Initials
USCG Activities New York (718) 354-4088 (718) 354-4096 (fax)					5 MIN (USCG only)		1 MIN (USCG only)	
Contract Drilling & Blasting LLC (201) 339-6470 Bayonne, NJ office								
US Army Corps of Engineers (201) 433-9232								
The Port Authority of NY & NJ Port Newark-Elizabeth P.A. General Manger Andrew Saporito (973) 690-3483								
Elizabeth Police Department (908) 558-2020								
Elizabeth Fire Department Fire Prevention Bureau (908) 820-2806								
Linden Fire Department (908) 298-3800								
NY City Police Precinct 120 (718) 876-8500								
Explosives Unit **City of New York Fire Dept.** James Lauer (718) 999-1595	First of Day Only						Last of Day Only	

2 Hour Warning Time: _____
1 Hour Warning Time: _____ <--Call Security Boats
15 Minute Warning Time: _____
5 Minute Warning Time: _____
Time of Blast: _____
Time of All Clear: _____

VTS Radio Calls on Ch 65 & 1
VTS Radio 15 Min: _____
VTS Radio 5 Min: _____
VTS Radio 1 Min: _____
Count Down: _____
VTS Radio All Clear: _____

DAYLIGHT WINDOW from: _____ to: _____

Blaster Name _____ Blaster License No. _____
Caller Signature _____ Date _____

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7.5 Drilling & Blasting Records

7.5.1 Frame Log

CASHMAN DREDGING AND MARINE CONTRACTING

WEEKS MARINE

FRAME LOG

DRILL BOAT

BLAST NO. _____ RANGE _____ DATE _____

FRAME A B C HOLE NO. _____

DRILL TIME FEET ON DECK _____

START: _____

END: _____ INHOLE DELAY _____

TOP OF OVERBURDEN: _____ SURFACE DELAY _____

TOP OF ROCK: _____

ROCK ELEVATION REDUCED _____

TIDE: _____

GRADE _____

LOADING TIME

START: _____ ROCK TO SUBGRADE _____

END: _____

STICKS or POUNDS: _____

Verify Top of Product

NUMBER of BOOSTERS: _____ * VERIFIED ☐ HIT @ _____

NUMBER of DELAYS: _____ * VERIFIED ☐ BY _____

COMMENTS:	FROM	TO
REPAIRS		
CLEAN OVERBURDEN		
WAIT, OTHER FRAMES		
MOVE, CHANGE BITS & BARS		
SET OUTER CASING		
WAIT BLASTER		
DRILL/CLEAN HOLE		
GREASE & TORQUE DRILL		
ADD & REMOVE CASING		

DRILLER: _____

BLASTER: _____

HELPER: _____

7.5.2 Drill Log and Blast Report

CASHMAN DREDGING AND MARINE CONTRACTING

WEEKS MARINE

DRILL LOG AND BLAST REPORT

New Bedford Marine Commerce Terminal
MACEC-FY13-001NB

Min. Lbs./ Loaded Hole		Total Lbs. Loaded	
Max. Lbs./ Loaded Hole		Total Drill Feet	
Max. Lbs./Delay		Total Delays	
Total Holes Loaded		Max./ Min. Hole Depth	

SAMPLE

Production X/R _____ to _____ **Date** _____
Range 1 L/R _____ **Blast No.** _____

Hole #	Start	Finish	Feet on Deck	Tide	Top of OB	Tide Correct OB	Top of Rock	OB Depth	Rock to -48	Rock to -57	Tape Check (ft/rock)	HDP-1	In-Hole Delay	Surface Starter	Pounds Loaded	Stem Collar	Total Collar	Real Time

X/R _____ to _____
Range 2 L/R _____

Hole #	Start	Finish	Feet on Deck	Tide	Top of OB	Tide Correct OB	Top of Rock	OB Depth	Rock to -48	Rock to -57	Tape Check (ft/rock)	HDP-1	In-Hole Delay	Surface Starter	Pounds Loaded	Stem Collar	Total Collar	Real Time

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7.5.3 Shot Report Summary

In compliance with federal, state and local laws and regulations, a summary blast report will be created for every blast. An example is shown below.

CASHMAN

SHOT REPORT SUMMARY

New Bedford Marine Commerce Terminal
MACEC-FY13-001NB

SAMPLE

Blast No.
Cut No.
Ranges
No. of Holes
Hole Diameter

Date
Day of Wk
Weather
Temperature
Time of Blast

Drill Time/ Date
Load Time/Date

	Min	Max
Depth		
Spacing		
Lbs/Loaded Hole		
Lbs/Borehole Ft		
Max Lbs/Hole		
Max Lbs/Delay	108	
Max Holes/Delay		
Lbs/Round		
Total Delays		
Powder Factor		

NOTIFICATIONS Time (Military)
2 Hour Notice to Blast
15 Min. Warning
1 Min. Warning
BLAST
ALL CLEAR

Max. PPV: **Station:** **Value:**
Max dB: **Station:** **Value:**

Seismic Monitor Locations

New Bedford, MA	Station 1	Station 2	Station 3	Station 4	Station 5
Location					
Instrument S.N.	TBD	TBD	TBD	TBD	TBD
Calibration Date					
Peak Overpressure (psi)					
Real Distance (ft)	1449	1078	896	1849	1512
Scale Distance	139	104	86	178	145
PVS (ips)					
PPV - Transverse (ips)					
PPV - Vertical (ips)					
PPV - Longitudinal (ips)					
PPV - Predicted	0.184	0.265	0.322	0.150	0.186

	Station 6	Station 7	Station 8	Station 9	Station 10
Location					
Instrument S.N.	TBD	TBD	TBD	TBD	TBD
Calibration Date					
Peak Overpressure (psi)					
Real Distance (ft)	2364	1205	696	620	1392
Scale Distance	227	116	67	60	134
PVS (ips)					
PPV - Transverse (ips)					
PPV - Vertical (ips)					
PPV - Longitudinal (ips)					
PPV - Predicted	0.116	0.236	0.420	0.474	0.203

Contractor's Representative / Date

Seismic Engineer / Date

7.5.4 527 CMR 13.09 Uniform Blasting Site Detail Check List

NEW BEDFORD MARINE COMMERCE TERMINAL

527 CMR 13.00 Uniform Blasting Site Detail Check List

Location: _____ Date: ___/___/____

Blaster's Name: _____ Cert. #: _____

Company Name: _____ Time of Blast: __:__

Check List	Ref. #	Violations?	YES	NO
Two Way Radio/Warning Signs ("Blasting Zone" "Turn off 2-way Radio")	CMR 13.09(1)(p)		☐	☐
Transport Vehicle(s) (Placards, Fire Marshal Magazine Permit, Attended)	CMR 13.06(2), 13.04(3)		☐	☐
Site Storage (Day Box) (Fire Marshal Magazine Permit, Attended)	CMR 13.04(3)		☐	☐
NO smoking or open flames (within 50ft of explosives)	CMR 13.09(1)(d) 2., 3.		☐	☐
NO unnecessary personnel on the blast site (while boreholes are being loaded or are loaded with explosives)	CMR 13.09(2)(a)		☐	☐
Prior to blasting, excess explosives returned to proper storage	CMR 13.09(2)(f)		☐	☐
Seismograph must be placed between 5&10 ft of nearest inhabited structure	CMR 13.09 (9)(f)		☐	☐
Explosives, persons & equipment must be at a safe distance prior to blast	CMR 13.09(3)(a), (h)		☐	☐
Warning signal (3 long blasts 5 min before blast) Blast Signal (2 blasts 1 min before blast) All Clear Signal (1 prolonged blast)	CMR 13.09(1)(m), (3)(h)(2)		☐	☐
Post Blast Inspection (blaster must inspect site prior to personnel returning)	CMR 13.09(4)		☐	☐
Trash (boxes, bags, non-electric) (shall be picked up and/or destroyed)	CMR 13.09(6)		☐	☐

Seismograph Readings:

PPV: H_____ V_____ R_____ (2.0 in/sec max)
HZ: H_____ V_____ R_____ Airblast: _____Db (133max)

Report any incident involving flyrock, whether or not was an injury or damage, to the Office of the State Fire Marshal at 978-567-3375.
FP-55 (Rev. May '10)

Contract No. MACEC-FY13-001NB BLASTING 02900 - 19

 © Contract Drilling & Blasting LLC

7.5.5 Inventory Control

ACQUISITION

New Bedford Marine Commerce Terminal, New Bedford, MA

DATE	PRODUCT INFORMATION							SUPPLIER	
	Manufacturer	Brand	Description	Size	Date Code	Quantity	Unit	Name	TEL

DISPOSITION

New Bedford Marine Commerce Terminal, New Bedford, MA

DATE	PRODUCT INFORMATION							CUSTOMER	
	Manufacturer	Brand	Description	Size	Date Code	Quantity	Unit	Name	FEL

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8 BLASTING CONTINGENCY PLANS

Contingency plans have been developed to deal with situations which may occur during ongoing Production Blasting. Out-of-the-normal situations which are anticipated are the following:

- Loss of a down-line
- Misfire of lead-in line, single hole or multiple holes
- High spots remaining after blasting
- Boulder remaining underwater after blasting
- Boulder lodged in dredging equipment
- Severe weather (lightning)
- Temporary demobilization of drill boat due to environmental or weather delays
- Intermediate demobilization of drill boat

A detailed procedure for each of these situations follows in the Sections below.

8.1 Loss of Down-line

In the unlikely event of accidental loss of a down-line or inadvertent extraction of the initiator from the explosives charge, the following procedure will be taken after notifying the Cashman Weeks NB Project Manager, Owner's Representative and the US Coast Guard.

Possible conditions causing loss of a down-line include the following:

- Both down lines are cut or lost when the casing pipe is extracted.
- Floating debris breaks or lodges in the loaded range(s).
- One or more down lines are damaged at the surface when the barge is preparing to relocate for drilling of a new range or to blast.

All conditions will use the following procedure:

The typical borehole or loading procedure requires two down-lines extending out of the blast hole to the surface. If the blaster notices a down line has been cut or is no longer in the borehole, the procedure is as follows:

- Reposition the drill barge three (3) feet from the last range and call for a diver to perform an underwater inspection. A dive plan specific to the situation will be filed with the USACE at this time.
- The same procedure is followed whether a down-line has been cut and is still in position, or whether the down-line is completely missing.
- Set a drill casing at the problem area to allow the diver to position himself on the bottom in the immediate area.
- The diver will remove any excess stemming from the top of the blast hole and remove the stemming bag from the top of the blast hole.
- If necessary, the diver will use a blow-pipe to clean the hole to the top of the product first, before placing a replacement primer.
- A new primer will be assembled on surface by the blaster. The replacement primer will consist of a booster primed with the down-hole delay detonators from two new down-lines.
- The diver will insert the replacement primer into the blast hole on top of the packaged product and ensure the primer is in close contact with it.
- The diver will then replace the stemming bag or place a new stemming bag in the top of the hole.
- The blaster will connect the two new down-lines to the appropriate surface delay(s) and a new lead-in line, if necessary.
- Only after the tag-out procedure in the dive plan has been completed to ensure the safety of the diver and the diver recovered to the surface, will the blast be allowed to follow the standard procedure for initiation.

The entire contingency plan for a lost down-line must be completed prior to giving an ALL CLEAR for the blast.

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After correcting the condition, notify the Cashman Weeks NB Project Manager, Owner's Representative and the U.S. Coast Guard upon giving the ALL CLEAR signal.

8.2 Misfires

In the unlikely event of a misfire, the Blaster-In-Charge will notify the Cashman Weeks NB Project Manager, Owner's Representative and the US Coast Guard of the situation. It is important to note Owner's Representative that the basis of design for the initiation system is redundancy in all connections and means of initiation, to minimize the possibility of a misfire.

Possible misfire situations:

- Misfire of the lead-in line itself
- Misfire of the detonator on a lead-in line
- Misfire of a surface connector between holes

The Blaster-In-Charge and/or the blaster will exclude all employees except those necessary from the activities required to correct the situation. Using a small boat, the lead-in-line will be traced to the point of initiation and all portions of the surface delay hookup inspected.

- Should the inspection indicate that only the lead-in-line itself misfired, two new lead-in lines will be installed on the shot-line and the shot fired.
- Should the inspection indicate that the detonator of a lead-in line misfired, two new lead-in lines will be installed on the shot-line and the shot re-fired.
- If the inspection indicates that one or more surface connectors between holes misfired and interrupted completion of the shot, the following procedure will be followed:
  - If all shock tube down-lines are intact where the surface connector failed to fire, two new lead-in lines will be connected to maintain redundancy and the shot refired.
  - If any down-line shock tubes are cut, broken, or missing, the contingency plan for lost down-lines will be followed.

When the misfire has been corrected, notify the Cashman Weeks NB Project Manager, Owner's Representative and the U.S. Coast Guard of an ALL CLEAR.

Should re-drilling of a hole be required, the distance between a loaded hole and the new hole to be drilled must be NO CLOSER THAN 8 Feet, unless a variance is obtained.

The entire contingency plan for a misfire must be completed prior to giving an ALL CLEAR for the blast.

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8.3 Severe Weather – Lightning

A non-electric (shock tube) initiating system has been selected for all blasting activities because it is not affected by stray or static electricity. The only threat from lightning is a "direct hit" and therefore this contingency plan will be implemented as follows when lightning is observed at the 50 and 25 mile warning distances:

- When the lightning detector device indicates a lightning threat at a distance of 50 miles
  - Notify the Cashman Project Manager, Project Director and the US Coast Guard of the potential hazard and precautions to be taken.
  - Clear buoyed area of all unnecessary vessels and personnel.
  - Be prepared to terminate the loading of holes and return any unused explosives to the day storage area should the 25-mile warning signal occur.
- When the lightning detector device indicates a lightning threat at a distance of 25 miles
  - Stop drilling and loading of holes as soon as possible and in a safe manner and return any unused explosives to the day storage area.
  - Lower the connection board / shot-line into the water so as not to expose the surface shock tube and surface connectors or lead-in line to the elements.
  - Allow enough slack in the shot-line to set off the blast should lightning continue into the WINDOW OF OPPORTUNITY.
  - Evacuate the drill boat until the lightning hazard has passed.
  - Whenever possible, the safest plan will be to proceed to an Accelerated Blasting Procedure. All concerned parties will be notified of lightning present, and our desire to initiate the blast immediately. Upon securing permission to blast, the Drillboat will retreat from the blast zone, give a 15 minute warning. Upon an all clear from security patrol boats and the Seismic monitoring team, the shot will be detonated. Normal evacuation of the Drillboat will proceed from this point.
  - The portable lightning detector shall be taken off the drill boat with the last evacuation vessel and continuous monitoring maintained until the danger has passed. The Contractor's vessels shall monitor the blast area to prevent any boat or vessel from inadvertently entering the blast area for the duration of the lightning hazard. The Blaster-in-Charge will remain with the Contractors vessel in order to keep the Drillboat in sight.
  - When the lightning hazard dissipates, notify the Cashman Weeks NB Project Manager, Owner's Representative and the US Coast Guard that drilling and loading will commence again.

8.4 Temporary Demobilization of Drillboat due to Severe Environment

Certain environmental conditions may lead to a temporary demobilization of the Drillboat from the active blast area.

- High winds / Hurricane
  - In the event that very high winds or a hurricane is predicted, the Drillboat may be temporarily relocated to its designated safe haven at the discretion of the Blaster-in-Charge and in cooperation with the US Coast Guard.

The drill boat will be demobilized as follows:

- All explosives material on-deck in temporary onboard day storage will be returned to land-based magazine facilities approved by the appropriate regulatory agencies, using the reverse procedure for receiving explosives materials.
- Inventory of explosives materials will be completed as per the required procedures upon temporary demobilization.
- Other equipment utilized in drilling and blasting operations will be temporarily decommissioned.
- All personnel will be demobilized.
- Remobilization will be in accordance with the initial mobilization procedure.

- Excessive debris
  - In the event that an excessive and potentially damaging amount of debris in the water is predicted, blasting operations will cease until it is deemed safe to start again by the Blaster-in-Charge.
- Excessive icing
  - In the event that excessive icing is experienced on-deck and the safety of personnel during drilling and loading operations are deemed to be at risk, operations will be temporarily suspended but the drill boat will remain in the active blast area with the required minimum supervisory personnel, including a licensed blaster, remaining on duty.

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8.5 Standby Demobilization of Drillboat

This contingency plan provides for the event of government directed standby. If the anticipated duration of standby will exceed one week, drilling and blasting operations will be ceased and the drill boat will be demobilized in accordance with the procedure below. If the duration is less than one week, non-essential personnel will be demobilized from the drill boat but the required minimum supervisory personnel, including a licensed blaster, will remain on duty.

The drill boat will be demobilized as follows:

- All explosives material on-deck in temporary onboard day storage will be returned to land-based magazine facilities approved by the appropriate regulatory agencies, using the reverse procedure for receiving explosives materials.
- Inventory of explosives materials will be completed as per the required procedures upon temporary demobilization.
- Other equipment utilized in drilling and blasting operations will be temporary decommissioned.
- All personnel will be demobilized.

Remobilization will be in accordance with the initial mobilization procedure.

8.6 Return of Explosives

In the event of demobilization, explosives materials will be returned to the supplier. An acceptance letter from Explosives Supply, Inc. is shown below.

EXPLOSIVES SUPPLY INC.

695 WESTBROOK RD., RINGWOOD, NEW JERSEY 07456 • TEL. 973.839.8030 • FAX 973.839.7837

To whom it my concern:

Explosives Supply Inc will remove all products from the barge if needed for safety or any other reason that may arise. We have adequate storage at our site to handle the product on board as well as what we may have in stock.

Ken Morris
President
Explosives Supply Inc

 © Contract Drilling & Blasting LLC

9 MONITORING PLAN FOR VIBRATION & AIR OVERPRESSURE

Blast design engineers will work closely with the Vibration Consultant and its team to ensure that ground vibrations and air overpressure remain well below the safe limits determined for existing structures.

9.1 Potential Impact Zone for Vibration & Air Overpressure

The following utilities may exist within 1,500 feet of the Blasting Zones:

- Electrical
- Water and Sewer
- Phone Utilities
- High Pressure Gas
- Docking Facilities
- Public Highways

Location of the utilities will be determined and their proximity considered in the Blast Plan Design for Vibration Control.

The zone of potential impact is a 1,500-ft distance from outer limit of the contract footprint. Because of the anticipated location of blasting, several commercial structures and a few residential structures in New Bedford, MA fall within this radius (see aerial view on the next page, showing the 1,500 ft distance).

An overview of the entire project area and the 1,500 ft zone of potential impact is included in Section 5.1.

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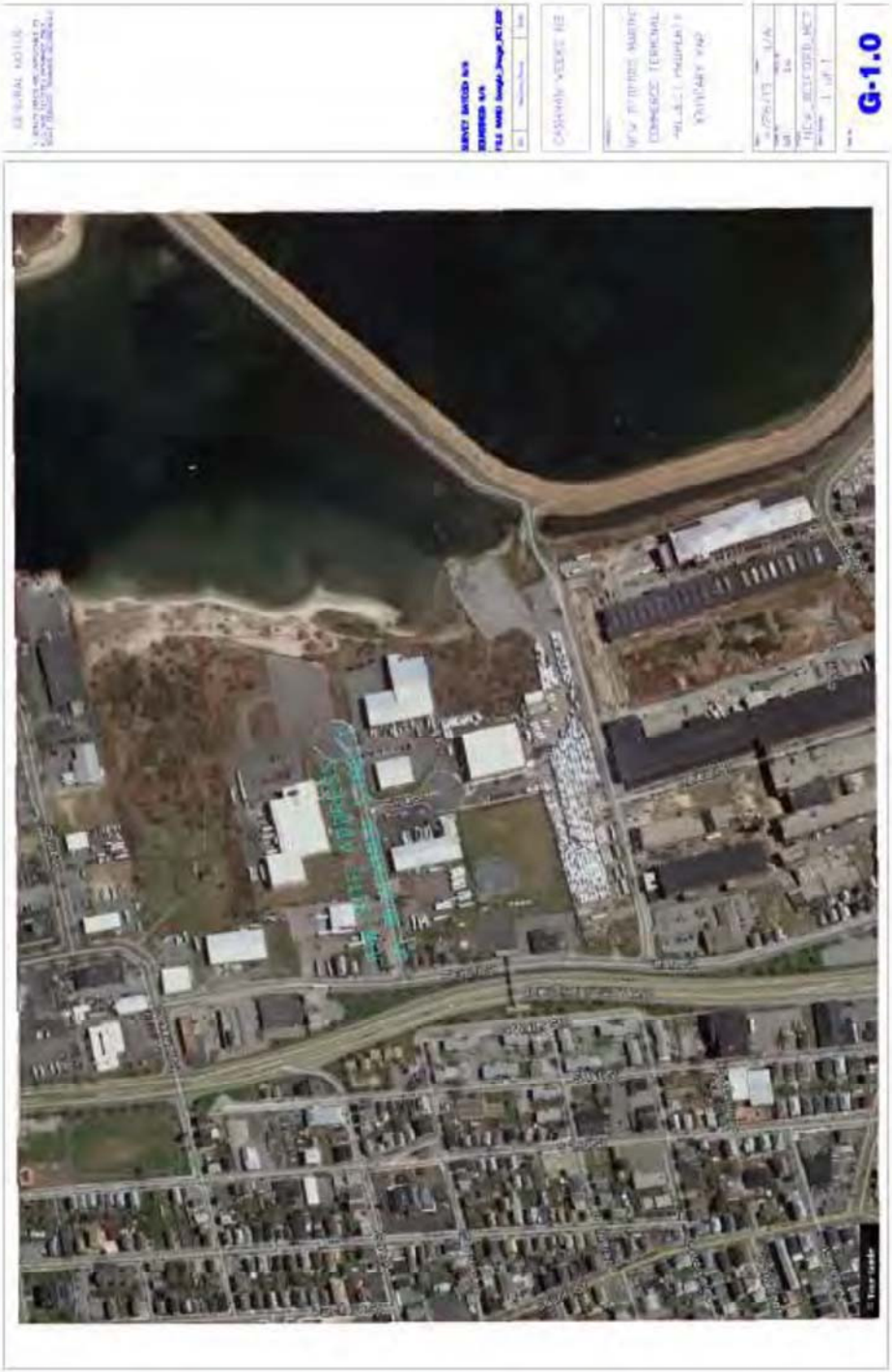
G-1.0

9.1.1 Historical Structures

Historical Structures will be monitored and evaluated for sensitivity to vibration. Once the rock area(s) have been identified, additional critical structures within the 1,500 foot blast zones will be identified.

9.1.2 Vibration Limitations

The contract limitations for blast-induced ground vibration are the following:

- Historical / Sensitive Structures PPV <0.5 ips
- Residential Structures in Massachusetts PPV < 0.8 ips
  - (USBM Frequency Dependent Chart)
- Other Structures PPV <2.0 ips

9.1.3 Air Blast Limitations

The contract specifications limit the air blast or air overpressure to 129 dB.

9.1.4 Vessel Traffic

Hydraulic shock generated by detonation, and the rapid gas expansion in the "work process" of the explosives, creates a large gas bubble which in turn creates wave propagation. Hydraulic shock and wave propagation is the primary threat to vessel traffic.

A relationship for safe vessel mooring can be determined based on results from previous Production Blasting and evaluation of the condition of the vessel(s).

Results of the Blasting Program will confirm a safe vessel mooring distance from the Blast Zone based upon the evaluation of the vessel condition.

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9.2 Pre-Blast Notifications

The pre-blast notification program involves door hangers placed at and mailing letters to, property owners in the vicinity of blasting operations to inform them of the impending blasting operations and offer pre-blast property inspections (see aerial view in Section 9.1).

The sequence of notification will be to distribute door hangers, followed by a request by fist class mail, sent to property owners for pre-blast property inspections.

A second request will be by certified letter sent approximately 10 days later to those owners who do not respond to the first letter.

Where there has been no response to second requests, the property owners will be notified by certified mail that they have not responded to both requests and blasting is commencing. This 2nd certified letter will be sent approximately 10 days after the first certified letter has been sent.

Samples of the four communications are attached below.

9.2.1 Door Hangers

Door hangers will be placed at property owners in the vicinity of blasting operations to inform them of the impending blasting operations and offer pre-blast property inspections. A sample is shown below.

 © Contract Drilling & Blasting LLC

New Bedford Marine Commerce Terminal Construction
New Bedford, Massachusetts
Contract No. MACEC-FY13-001NB

NOTE: BLASTING OPERATIONS GENERATE SMALL AIR PULSES THAT MAY CAUSE LOOSE WINDOWS AND LOOSE DOORS TO RATTLE ENOUGH TO BE HEARD IF YOU ARE STANDING NEARBY. ALSO, GROUND VIBRATIONS WILL SOMETIMES BE HEARD OR FELT IF YOU LIVE NEAR THE WORK AREA. THESE EFFECTS WILL BE MONITORED AND RECORDED, AND THESE EFFECTS WILL BE KEPT WELL BELOW THE SAFE GUIDELINES RECOMMENDED BY THE CITY, STATE, AND FEDERAL GOVERNMENT FOR OCCUPIED RESIDENCES.

For Additional Information:
If you have additional questions, please call us at:

PROJECT HOTLINE
201.339.6470

As part of the overall *Vibration Monitoring Program*, Contract Drilling & Blasting LLC has been contracted by **Cashman Weeks NB** as an independent consultant to perform *Pre-Blast Structural Condition Surveys* and conduct the *Vibration Monitoring Program* for this contract. They will be offering the surveys for residential and commercial structures within 1500 feet of the Blast Areas. Your home/business is eligible for this survey and the survey is at no cost to you or the property owner. We encourage you to consider participating in the survey program.

If you wish to have a survey of your property, please call *Contract Drilling & Blasting LLC* at:

201.339.6470

to arrange a convenient time and to discuss any questions you may have.

NOTICE OF BLASTING

Contract # MACEC-FY13-001NB

WHERE	New Bedford Harbor, Along New Bedford Marine Commerce Terminal 16 Blackmer St
WHEN	Mid-September through October 2013
DAYS	Monday through Friday
HOURS	9:00am to 4:00pm

New Bedford Marine Commerce Terminal Construction
New Bedford, Massachusetts
Contract No. MACEC-FY13-001NB

IS MY HOME SAFE FROM BLASTING?
Vibrations accompanied by sound effects (noises, rattles, etc.) seem far stronger than those that make no noise. If someone comes into your house and slams a door, it may startle you, but you would not expect it to damage the house (although it may cause a picture hanging nearby to fall). Many, many tests have proven that these types of activities in the home have more potential for damage than the blasting that will take place in your area. Environmental and humidity changes, which make no noise, are constant and are much more likely to cause structural damage than would underwater blasting.

WHAT TO KNOW
Blasting is used daily in construction throughout the world. It is the most cost-effective method of breaking rock. Rock excavation by blasting takes only a fraction of the time required by mechanical methods, and in most cases, mechanical tools are unable to excavate rock. Blasting greatly reduces the time taken to accomplish dredging in rock and will minimize the disturbance to area residences and businesses.

DOES LOUDER MEAN STRONGER?
There is no direct relationship between the noises you hear around your house and the potential for damage. Contrary to the low frequencies of earthquakes, ground vibrations from blasting have high frequencies and are heard very easily. They are also easier to feel than the slow motions of mild earthquakes. The levels you can hear and feel are far below those needed to cause damage. These pulses also seem stronger because they come rather suddenly and unannounced.

WHERE CAN I LEARN MORE ABOUT THE PROJECT?
The Massachusetts Clean Energy Center hosts monthly public informational meetings on the first Tuesday of each month. Upcoming meetings are on August 6 and Sept. 3 at the New Bedford Public Library at 6:00 PM.

HOW ARE VIBRATIONS AND SOUND MEASURED?
Portable seismographs will be used to measure and record the ground vibrations and air overpressures. The specialist who does this work will analyze the recordings and keep updated information available at all times to the project owner, to authorized agencies, and to concerned citizens. The companies that make the instruments must adhere to government regulations on the accuracy of the instruments. That information is also available and will be part of the project files.

WHO REGULATES BLASTING?
There are federal, state, and local government agencies that impose restrictions and laws pertaining to ground vibrations and air pressures from underwater blasting. These limits are based on extensive research conducted by many agencies and specialists throughout the world. One of the leading - and most restrictive - of these agencies was the former US Bureau of Mines. The limitations imposed on this project are far more restrictive than those the Bureau recommended for occupied residences in its Bulletin RI-8507.

HOW IS THE CITY OF NEW BEDFORD AND THE STATE OF MASSACHUSETTS INVOLVED?
The Massachusetts Clean Energy Center is overseeing the construction of the New Bedford Marine Commerce Terminal. The City of New Bedford is a strong advocate of the project and has been closely consulted on the project. Cashman Weeks NB is the lead contractor for the project and must adhere to all federal, state and local requirements before and during underwater blasting.

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9.2.2 Letter to Property Owners

Property owners within a 1500 ft radius will be notified about the underwater blasting project in the letter offering pre-blast surveys of structures. Property owners will be briefed on project start date and proposed duration. This first notification is by first class mail.

CASHMAN DREDGING AND MARINE CONTRACTING

WEEKS MARINE

Date: August 2, 2013 RE: NS Gifford Street

To: Property Owners

From: Cashman Weeks NB

Subject: New Bedford Marine Commerce Terminal Construction
New Bedford, Massachusetts
Contract No. MACEC-FY13-001NB

The Massachusetts Clean Energy Center (MassCEC) is managing the construction of the New Bedford Marine Commerce Terminal, located at 16 Blackmer Street. Once constructed, the New Bedford Marine Commerce Terminal will be the first facility in the nation designed to support the construction, assembly, and deployment of offshore wind projects. The work is being performed on behalf of the MassCEC by Cashman Weeks NB. As part of the construction, the project includes maintenance and improvement dredging adjacent to the terminal. Some areas of the channel to be dredged in the immediate vicinity of the proposed terminal contain solid rock and will require underwater blasting. The underwater blasting requires drilling into the rock and subsequent placement and controlled detonation of explosives within the rock. Normal dredging activities then will remove the resultant fractured rock.

Requirements for the project stipulate that vibrations from the underwater blasts must be maintained within established federal and state guidelines to ensure that your property is not adversely affected by this activity. An extensive monitoring program will be in place to guarantee strict adherence to these requirements.

As part of the overall *Vibration Monitoring Program* for this project, Contract Drilling & Blasting LLC has been contracted by Cashman Weeks NB as an independent consultant to perform pre-blast property surveys. All residential and commercial structures within 1,500 feet of the blasting areas are eligible for a survey at no cost to the property owner.

If you wish to have a survey of your property, please call *Contract Drilling & Blasting LLC* at 508-858-0595 within ten (10) days from receiving this letter, to arrange a convenient time for the survey.

Sincerely,

Cashman Weeks NB

9.2.3 1st Certified Letter

Where there has been no response to the first request, a second request will be sent to property owners by certified mail.

Contract Drilling & Blasting LLC

PO Box 51468
JACKSONVILLE, FL 32240-1468
☎ (508) 858-0595 ★ (904) 249-3292 🖷

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

August 6, 2013

Jose Saraiva "Trustee" / Lisa Saraiva "Trustee"
156 Durfee Street
New Bedford, MA 02740

Subject: New Bedford Marine Commerce Terminal Construction
New Bedford, Massachusetts
Contract No. MACEC-FY13-001NB

Regarding Property at: 74 Conway Street, New Bedford, MA

Dear Jose Saraiva "Trustee" / Lisa Saraiva "Trustee":

The Massachusetts Clean Energy Center (MassCEC) is managing the construction of the New Bedford Marine Commerce Terminal, located at 18 Blackmer Street. Once constructed, the New Bedford Marine Commerce Terminal will be the first facility in the nation designed to support the construction, assembly, and deployment of offshore wind projects. The work is being performed on behalf of the MassCEC by Cashman Weeks NB. As part of the construction, the project includes maintenance and improvement dredging adjacent to the terminal. Some areas of the channel to be dredged in the immediate vicinity of the proposed terminal contain solid rock and will require underwater blasting. The underwater blasting requires drilling into the rock and subsequent placement and controlled detonation of explosives within the rock. Normal dredging activities then will remove the resultant fractured rock.

As part of the overall Vibration Monitoring Program, Contract Drilling & Blasting LLC has been contracted by Cashman Weeks NB, as an independent consultant to perform pre-blast property surveys. On behalf of the project owner, CDB is offering these surveys to property owners of residential and commercial structures within 1,500 feet of the blasting areas. Your home/business is eligible for a survey and the survey is at no cost to the property owner.

Work on this project will begin soon. Please call us no later than August 23rd, 2013, at 508-858-0595 if you wish to have your property surveyed prior to commencement of work in your area.

Thank you for your cooperation,

CONTRACT DRILLING & BLASTING LLC

Page 1 of 1

Blasting and Seismic Specialists in Environmentally Sensitive Areas

An Equal Opportunity Employer

9.2.4 2nd Certified Letter

Where there has been no response to the second request, a second certified letter will be mail to the property owners informing them that they have not responded to both requests for inspection and blasting is commencing.

Contract Drilling & Blasting LLC

PO Box 51468
JACKSONVILLE, FL 32240-1468
☎ (508) 858-0595 ★ (904) 249-3292 🖷

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

August 13, 2013

Streetside Realty LLC
16 Hassey Street
New Bedford, MA 02740

Subject: New Bedford Marine Commerce Terminal Construction
New Bedford, Massachusetts
Contract No. MACEC-FY13-001NB

Regarding Property at: 75 MacArthur Drive, New Bedford, MA

Dear Streetside Realty LLC :

The Massachusetts Clean Energy Center (MassCEC) is managing the construction of the New Bedford Marine Commerce Terminal, located at 16 Blackmer Street. Once constructed, the New Bedford Marine Commerce Terminal will be the first facility in the nation designed to support the construction, assembly, and deployment of offshore wind projects. The work is being performed on behalf of the MassCEC by Cashman Weeks NB. As part of the construction, the project includes maintenance and improvement dredging adjacent to the terminal. Some areas of the channel to be dredged in the immediate vicinity of the proposed terminal contain solid rock and will require underwater blasting. The underwater blasting requires drilling into the rock and subsequent placement and controlled detonation of explosives within the rock. Normal dredging activities then will remove the resultant fractured rock.

As part of the overall Vibration Monitoring Program, Contract Drilling & Blasting LLC has been contracted by Cashman Weeks NB, as an independent consultant to perform pre-blast property surveys. On behalf of the project owner, CDB is offering these surveys to property owners of residential and commercial structures within 1,500 feet of the blasting areas. Your home/business is eligible for a survey and the survey is at no cost to the property owner.

Work on this project will begin soon. Please call us no later than August 23rd, 2013, at 508-858-0595. If you wish to have your property inspected prior to commencement of work in your area.

We have distributed door hangers at the property and sent two letters (included in this mailing) for a request for property surveys. You have not responded to these requests therefore this notice will serve as our final attempt to schedule a survey at this location and to inform you that blasting is commencing September 2013.

Thank you for your cooperation,

CONTRACT DRILLING & BLASTING LLC

Page 1 of 1

Blasting and Seismic Specialists in Environmentally Sensitive Areas

An Equal Opportunity Employer

9.3 Pre-Blast Surveys

Documentation of exiting, pre-blast conditions will include the use of high-resolution digital videotaping and / or digital photography. The interior and exterior of structures will be documented with emphasis on existing cracks and other defects.

The forms displayed on the following pages describe the method for documenting Pre-Blast Survey results which is utilized by the Blasting Vibration Consultant and its team.

 © Contract Drilling & Blasting LLC

9.3.1 Geographical Order of Inspection

GEOGRAPHICAL ORDER OF INSPECTION

Contractor: **Cashman Weeks NB**
Project: New Bedford Marine Commerce Terminal Construction
New Bedford, Massachusetts
Contract: MACEC-FY13-001NB

FILE #	Address	Name	Structure Type
101			
102			
103			
104			
105			
106			
107			
108			
109			
110			
111			
112			
113			
114			
115			
116			
117			
118			
119			
120			
121			
122			
123			
124			
125			
126			
127			
128			
129			
130			

CONTRACT DRILLING BLASTING LLC - SEISMIC SPECIALISTS *Page 1 of 10*

9.3.2 Pre-Blast Structural Survey

PRE-BLAST CONDITION SURVEY

Cashman Weeks NB
New Bedford Marine Commerce Terminal Construction
New Bedford, Massachusetts

Contract No. MACEC-FY13-001NB

File: _____
Photos: _____
Sheet: _____ of _____

STRUCTURE INSPECTED

Name: _____ Ph: _____ **Type of Structure**
Street: _____
City: _____
Contact: _____ Ph: _____

Sketch of Property (Show Photo Location)

Notes: _____ Ext File: _____

Technician: _____ Date: _____
Senior Technician: _____ Date: _____

***Contract Drilling & Blasting LLC* - Seismic Specialists**

9.3.3 Photo Log – Pre-Blast Structural Survey

MACEC-FY13-001NB *Pre-Blast Condition Survey*

Contractor: Cashman Weeks NB **Contract No:** MACEC-FY13-001NB

Project: New Bedford Marine Commerce Terminal Construction **Location:** New Bedford, MA

File					
Address					
Other					
Name					
Photo Number					
_0001					
_0002					
_0003					
_0004					
_0005					
_0006					
_0007					
_0008					
_0009					
_0010					
_0011					
_0012					
_0013					
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_0039					
_0040					

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9.4 Monitoring of Ground Vibration & Air Overpressure

The vibration monitoring device consists of a BlastMate Series III or Minimate Plus Seismograph as manufactured by Instantel Inc. of Ontario, Canada (see product data literature). Components of the seismograph are: an external microphone for measuring air blast/overpressure and a geophone for measuring vibration as Peak Particle Velocity (PPV).

The anchoring device to be employed at various monitoring locations may be selected from the following, as required by site-specific conditions:

- Underwater Geophone on a metal leveling baseplate
- Standard Geophone/Leveling Plate
- Sand Bagged
- Buried
- Wall Anchor Brackets
- Concrete Anchors
- Epoxy Glue
- Spiked

The type and method used to anchor the geophone will be site-specific based on the local conditions at the measurement location. The methods selected for this project is shown in the table on the following page.

Northings and Eastings for monitoring locations in this table are estimated locations. Accurate coordinates will be determined for each monitoring point once the instruments have been installed and prior to the start of Blasting. These coordinates are used to calculate the distance from the blast and is reported on the Blast of the Day form along with the vibration measurements for each monitoring point. Approximate Northings and Eastings are shown in the table above for each monitoring location. Entries in red depict stations monitoring historical structures.

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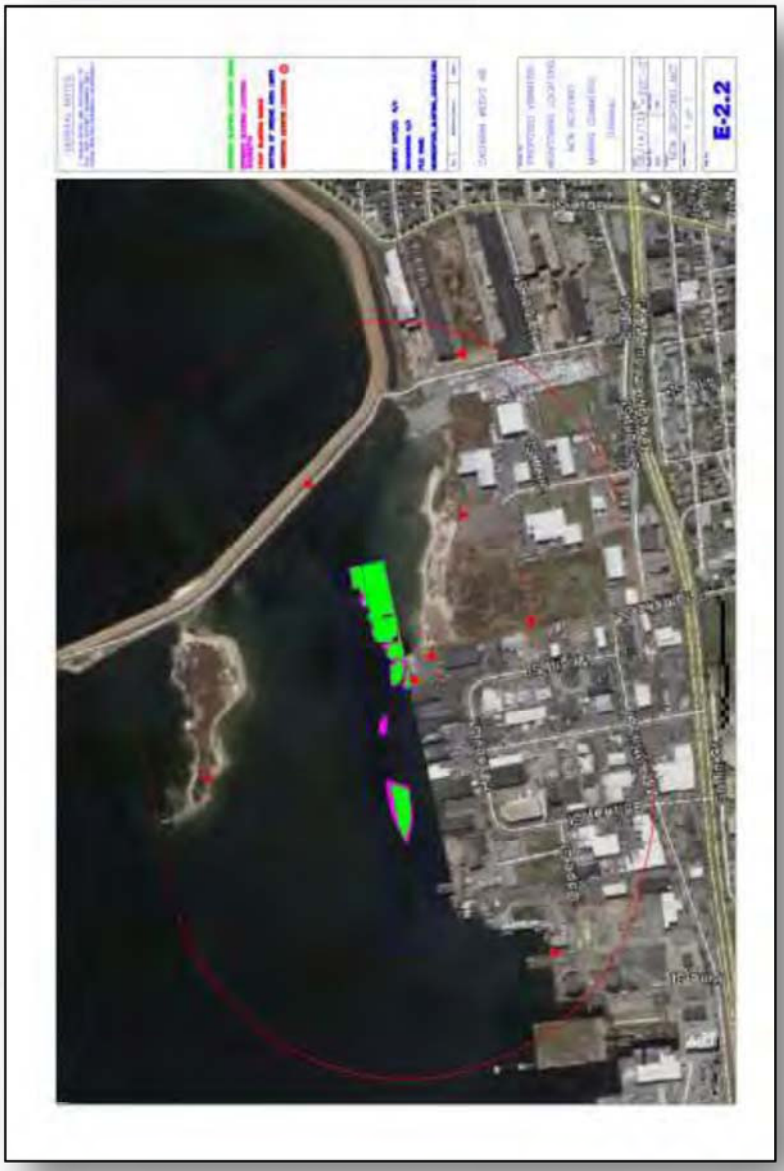
9.4.1 Monitoring Locations for Vibration & Air Overpressure

The locations of seismographs installed to measure blast-induced ground vibration and air blast in relation to the blasting footprint, are shown below.



9.4.2 Monitoring Equipment Location Form

The monitoring location will be documented with a digital image and/or sketch on the Monitoring Equipment Location Form for each site, shown below.

MONITORING EQUIPMENT LOCATION

Contractor: Cashman Weeks NB Contract No: MACEC-FY13-001NB
Project: New Bedford Marine Commerce Terminal Phase / Area: _____
Location: New Bedford, MA _____

Address				File No.	
Date Placed		RASS Box No.		Photo No.	
Date Removed		Equipment S/N		Northing	
IP Address		Station No.		Easting	
Contact Name		Phone No.			

Equipment Location Sketch

Technician: _____ Date: _____

***Contract Drilling & Blasting LLC* - Seismic Specialists**

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9.5 Reporting of Vibration & Air Overpressure

A sample report summarizing the results of land-based attenuation measurements for blasts and on-going reporting subsequent to blasting are shown below. Land-based monitoring results in the form of a short report will be made available within 24 hours after each blast.

9.5.1 Blast of the Day

BLAST OF THE DAY

Cashman Weeks NB
New Bedford Marine Commerce Terminal
MACEC-FY13-001NB

Date:
Blast No.

Blasting Coordinate:	Northing	Easting
	660,183.8	579,545.0

Seismograph Serial #	MP #	Description of Location	Northing	Easting	Distance From Blast
New Bedford, MA					
BE10406	MP2				
BA10248	MP4				
BE8940	MP5				
BA9925	MP6				
BE8938	MP7				
BE10391	MP8				
BE10390	MP9				

Legend:
Black or Green MP: Standard Monitoring Point
Red MP: Monitoring Point for Historic Structure

Blast Design Criteria for Vibration Control	Distance (ft)	Max lbs per delay ppv 0.5	Max lbs per delay ppv 1.0	Max lbs per delay ppv 2.0
	0 ft	0.0	0.0	0.0
	0 ft	0.0	0.0	0.0
	0 ft	0.0	0.0	0.0

Design Criteria:

Historical Structures	*0.5 IPS x 67% = 0.33 IPS*
Residential	*0.8 IPS x 67% = 0.67 IPS*
Other Structures	*2.0 IPS x 67% = 1.33 IPS*

9.6 Post-Blast Structure Surveys

Upon completion of the blasting program, all structures for which pre-blast surveys were conducted will be surveyed again and photographed. Special attention will be paid to cosmetic or threshold-type surface cracking in above-ground structures. Pre-blast and post-blast images will be compared to determine any significant changes in pre-existing cracks that could possibly be blast-related only if ground vibrations exceed limits placed on the project. A summary report of findings will be provided.

 © Contract Drilling & Blasting LLC

9.6.1 Post-Blast Structural Survey

POST-BLAST CONDITION SURVEY

Cashman Weeks NB
New Bedford Marine Commerce Terminal Construction
New Bedford, Massachusetts

Contract No. MACEC-FY13-001NB

File: _____
Photos: _____
Sheet: _____ of _____

STRUCTURE INSPECTED

Name: _____ Ph: _____ **Type of Structure** _____
Street: _____ _____
City: _____ _____
Contact: _____ Ph: _____ _____

Sketch of Property (Show Photo Location)

Notes: _____ Ext File: _____

Technician: _____ Date: _____
Senior Technician: _____ Date: _____

Contract Drilling & Blasting LLC **- Seismic Specialists**

9.6.2 Photo Log - Post-Blast Structural Survey

MACEC-FY13-001NB *Post-Blast Condition Survey*

Contractor: Cashman Weeks NB **Contract No:** MACEC-FY13-001NB

Project: New Bedford Marine Commerce Terminal Construction **Location:** New Bedford, MA

File					
Address					
Other					
Name					
Photo Number					
_0361					
_0362					
_0363					
_0364					
_0365					
_0366					
_0367					
_0368					
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_0370					
_0371					
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_0389					
_0390					
_0391					
_0392					
_0393					
_0394					
_0395					
_0396					
_0397					
_0398					
_0399					
_0400					

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9.7 Property Damage Claims

In the event blast-related complaints are received by the Contractor or its Vibration Specialist, protocols for receiving information and resolving these concerns or complaints will be in place prior to the start of the blasting in accordance with the project specifications.

Written logs and tracking forms will be establish for individual complaints along with a master complaint log to monitor the status of each complaint. Complaints of alleged damage to structures, should they occur, will be investigated by inspection within 5 days of initial contact and a response letter will be generated to the complainant.

A final letter of determination shall be sent to the complainant within 90 days along with supporting documentation as per the project specifications.

9.7.1 Vibration Complaint Form

FP-296

The Commonwealth of Massachusetts
Executive Office of Public Safety and Security
Department of Fire Services
P.O. Box 1025 ~ State Road
Stow, Massachusetts 01775
(978) 567 - 3100 Fax: (978) 567 - 3199

STEPHEN D. COAN
STATE FIRE MARSHAL

BLASTING DAMAGE COMPLAINT FORM

(To be completed by complainant or property owner and returned to the head of the fire department within 30 days of the alleged incident; please print clearly)

Date of Incident: _____ **Time of Incident:** _____ **Location of Incident:** _____ (City / Town)

Type of Structure: _____ (residential / commercial / other) **Address of Structure:** _____ (Street)

Property Owner's Name: _____ **Phone Number:** _____

Property Owner's Address: _____ Street Address City State Zip

Complainant's Name If Different: _____ **Phone Number:** _____

Complainant's Address If Different: _____ Street Address City State Zip

Was a Pre-Blast Survey done on this property prior to the start of blasting? **YES** **NO**

DESCRIPTION OF ITEM OR AREA OF ALLEGED DAMAGE

_____

_____

_____

Note to Property Owner: when you have signed and dated this form, submit it to the local fire department for review and completion. Do not submit the Blasting Damage Complaint Form directly to the Office of the State Fire Marshal.

CERTIFICATION OF DAMAGE – *PLEASE READ* AND SIGN

I declare under the penalty of perjury that the statements and information provided herein are true as of the date of this complaint. I am aware that there are significant penalties for submitting false information including possible fines, civil penalties and imprisonment.

Signature of Property Owner: _____ **Date Signed:** _____

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(to be completed by Fire Department)

BLASTING COMPANY AND FIRE DEPARTMENT INFORMATION

Date received by the head of the fire department _____

Name of Fire Department: _____ **Address of Blast:** _____

Name of Blasting Company Use and Handling [Permit to Blast] Issued to: _____

Blasting Company Phone Number: _____ **Explosives User's Certificate Number:** _____

Name of Pre-Blast Survey Company: _____ **Survey Company Phone Number:** _____

Name of Liability Insurance Carrier: _____ **Insurance Carrier Phone Number:** _____

Blaster's Name: _____ **Certificate of Competency Number:** _____

Blaster's Work Phone Number: _____

Blaster's Signature: _____ **Date:** _____

REPORT OF FIRE DEPARTMENT INQUIRY AND VIOLATION(S) FOUND

_____

_____

_____

Were the Blasting Logs reviewed as a result of this complaint?:	**YES**	**NO**
Were violation(s) found as a result of the review of this complaint?:	**YES**	**NO**
If yes, has a Notice of Violation been issued by your department? (If yes, attach copy):	**YES**	**NO**

Signature of Fire Department Officer: _____ **Date:** _____

After review of this complaint, please send copies of this form, blasting log(s), seismograph record(s) and Notice(s) of Violation to the Office of the State Fire Marshal. Incomplete complaints will be returned to the department.

---------- *State Fire Marshal Use Only* ----------

Reviewed by: _____ Date: _____

Logs Attached: Yes No **Violations: Yes No**

Comments/Notes: _____

_____

_____

FP– 296 Revised 08/23/2012

10 Explosives Materials Information

The Technical Information and Material Safety Data Sheets (MSDS) for the following explosives materials selected for this project are included on the next several pages:

- Packaged Explosives Products:
  - BLASTEX® PLUS TX (Booster Sensitive Emulsion)
- Cast Boosters:
  - TROJAN® SPARTAN®
- Initiation Systems:
  - Nonel® Starter
  - NONEL® EZ DET® Nonelectric Blast Initiation System
  - NONEL® EZTL™ Non-Electric Trunkline Delay Detonators

10.1 Packaged Explosives Products

BLASTEX® TX

Technical Information

PACKAGED EXPLOSIVES

Small Diameter Cast Booster Sensitive Emulsion

Product Description

BLASTEX TX and BLASTEX PLUS TX are booster sensitive, water resistant, packaged emulsion explosive specifically formulated to provide increased resistance to hydrostatic and/or dynamic transitory shock pressures which can result when used in wet and/or water saturated geologies. High strength microsphere density control ensures consistent explosive performance under increased hydrostatic pressures and in saturated ground conditions where the transmission of dynamic shock pressures from detonating blastholes would normally reduce the performance of standard cast booster sensitive explosives awaiting initiation in adjacent blastholes.

BLASTEX TX and BLASTEX PLUS TX are cost effective alternatives to most detonator sensitive, water resistant, packaged emulsion explosives and is available in easy-to-load Valeron plastic chub cartridges. BLASTEX TX and BLASTEX PLUS TX are available in two grades with increasing energy levels for each.

Application Recommendations

- Package diameter and type affect product density. Use cartridge count to determine actual explosive charge weight.
- Ensure continuous column loading. For column lengths in excess of 6 m (20 ft) or whenever column separation is suspected, multiple priming is recommended.
- ALWAYS use a cast booster as a primer for BLASTEX TX and BLASTEX PLUS TX to ensure maximum performance.
- ALWAYS use a 340 g (12 oz) or larger cast booster with BLASTEX TX and BLASTEX PLUS TX at internal product temperatures higher than -18° C (0° F). At internal product temperatures below -18° C (0° F) and higher than -34° C (-30° F) use a 454 g (16 oz) or larger cast booster.

Properties

MSDS #1063

	BLASTEX TX	BLASTEX PLUS TX
Density (g/cc) Avg	1.26	1.26
Energy[a] (cal/g)	722	808
(cal/cc)	910	1010
Relative Weight Strength[a]	0.82	92
Relative Bulk Strength[a,b]	1. 26	1.40
Velocity[c] (m/s)	4,700	4,600
(ft/s)	15,400	15,100
Detonation Pressure[a] (Kbars)	71	67
Gas Volume[a] (moles/kg)	42.6	38
Fume Class	IME1	
Shelf Life Maximum	1 year (from date of production)	
Maximum Water Depth	45 m (150 ft)	
Water Resistance	Excellent	

[a] All Dyno Nobel Inc. energy and gas volume values are calculated using PRODET™ the computer code developed by Dyno Nobel Inc. for its exclusive use. Other computer codes may give different values.
[b] ANFO = 1.00 @ 0.82 g/cc
[c] Unconfined @ 75 mm (3 in) diameter

Hazardous Shipping Description
Explosive, Blasting, Type E, 1.5D, UN 0332 II

1.5 D

P-10A-01-19-11

See Product Disclaimer on page 2

DYNO
Dyno Nobel
Groundbreaking Performance

© Contract Drilling & Blasting LLC

BLASTEX® TX

Technical Information

PACKAGED EXPLOSIVES

- NEVER use BLASTEX TX or BLASTEX PLUS TX at internal product temperatures below -34° C (-30° F). At internal product temperatures below -34° C (-30° F), adequate product warm-up time must be allowed after loading into boreholes and before initiation.
- Use with detonating cord is not recommended.

Transportation, Storage and Handling

- BLASTEX TX or BLASTEX PLUS TX must be transported, stored, handled and used in conformity with all applicable federal, state, provincial and local laws and regulations.
- Packaged emulsions have a shelf life of one (1) year when stored at temperatures between -18° C and 38° C (0° F and 100° F). Explosive inventory should be rotated. Avoid using new materials before the old. For recommended good practices in transporting, storing, handling and using this product, see the booklet "Prevention of Accidents in the Use of Explosive Materials" packed inside each case ad the Safety

Packaging

Diameter x Length		Case Quantity	Case Weight		Net Explosive Weight	
mm	in		kg	lbs	kg	lbs
50 x 400	2 x 16	18	19.0	42	1.00	2.20
57 x 400	2 1/4 x 16	14	18.6	41	1.26	2.78
65 x 400	2 1/2 x 16	12	19.0	42	1.51	3.33
70 x 400	2 3/4 x 16	9	18.0	40	1.92	4.23
75 x 400	3 x 16	8	19.0	42	2.27	5.00
89 x 400	3 1/2 x 16	6	17.7	39	2.77	6.11

- Package diameter and type affect product density. Use cartridge count to determine actual explosive charge weight. All weights are approximate.
- BLASTEX TX or BLASTEX PLUS TX are available in a wide variety of sizes. Custom sizes are subject to surcharge and may require longer than usual lead times.
- Check with your Dyno Nobel representative should you have any questions.

Case Dimensions

44 x 35 x 20 cm 17.25 x 13.875 x 7.7514

Product Disclaimer Dyno Nobel Inc. and its subsidiaries disclaim any warranties with respect to this product, the safety or suitability thereof, or the results to be obtained, whether express or implied, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND/OR OTHER WARRANTY. Buyers and users assume all risk, responsibility and liability whatsoever from any and all injuries (including death), losses, or damages to persons or property arising from the use of this product. Under no circumstances shall Dyno Nobel Inc. or any of its subsidiaries be liable for special, consequential or incidental damages or for anticipated loss of profits.

Dyno Nobel Inc.
2795 East Cottonwood Parkway, Suite 500, Salt Lake City, Utah 84121 USA
Phone 800-732-7534 Fax 801-328-8452 Web www.dynonobel.com

DYNO
Dyno Nobel
Groundbreaking Performance

Material Safety Data Sheet

Dyno Nobel Inc.
2795 East Cottonwood Parkway, Suite 500
Salt Lake City, Utah 84121
Phone: 801-364-4800 Fax: 801-321-6703
E-Mail: dnna.hse@am.dynonobel.com
FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666

MSDS # 1063
Date 09/16/10

Supercedes
MSDS # 1063 10/30/08

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):

BLASTEX®	DYNO® 1.5 SB
BLASTEX® PLUS	DYNO® 1.5 SBC
BLASTEX® PLUS HD	DYNO® 1.5 SB30
BLASTEX® TX	DYNO® 900
BLASTEX® TX PLUS	DYNO® 1300
BLASTGEL® 1000	DYNO® 1500
BLASTGEL® 1070	DYNO® 1520
SUPER BLASTEX®	DYNO® 1540
SUPER BLASTEX® TX	DYNOTEX
SUPER BLASTEX® TX	DX-2011
	DX-2012

Product Class: Emulsion Explosives, Packaged

Product Appearance & Odor: White or pink opaque semi-solid, which will appear gray if product contains aluminum. Little or no odor. Packaged in cylindrical cartridges of paper or plastic film

DOT Hazard Shipping Description: **UN0332** Explosive, blasting, type E 1.5D II

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

			Occupational Exposure Limits	
Ingredients:	**CAS#**	**% (Range)**	**ACGIH TLV-TWA**	**OSHA PEL-TWA**
Ammonium Nitrate	6484-52-2	60-85	None	None
Sodium Nitrate	7631-99-4	0-12	None	None
Methylamine Nitrate*	22133-87-7	0-3	None	None
Aluminum	7429-90-5	0-10	10 mg/m^3 (dust)	15 mg/m^3 (total)
Mineral Oil	64742-35-4	0-6	5 mg/m^3 (mist)	None
Kerosene	8008-20-6	0-6	None	None

* This ingredient may be used only in products produced at the Paige Plant.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

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Material Safety Data Sheet

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable
Vapor Density: (Air = 1) Not Applicable
Percent Volatile by Volume: <20 (water)

Evaporation Rate (Butyl Acetate = 1): <1

Vapor Pressure: Not Applicable
Density: 1.15-1.35 g/cc
Solubility in Water: Product partially dissolves very slowly in water.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: >100°C
Flammable Limits: Not Applicable
Extinguishing Media: (See Special Fire Fighting Procedures section.)
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions.
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

Eyes: May cause irritation, redness and tearing.
Skin: Prolonged contact may cause irritation.
Ingestion: Large amounts may be harmful if swallowed.
Inhalation: Not a likely route of exposure.
Systemic or Other Effects: None known.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least 15 minutes. If irritation persists seek medical attention.
Skin: Remove contaminated clothing. Wash with soap and water.
Ingestion: Seek medical attention.
Inhalation: If irritation occurs, remove to fresh air.
Special Considerations: None.

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.
Conditions to Avoid: Keep away from heat, flame, ignition sources and strong shock.
Materials to Avoid (Incompatibility): Corrosives (strong acids and strong bases or alkalis)
Hazardous Decomposition Products: Nitrogen Oxides (NO_x), Carbon Monoxide (CO)
Hazardous Polymerization: Will not occur

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DYNO
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Material Safety Data Sheet

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements.
Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Not required for normal handling.
Respiratory Protection: None normally required.
Protective Clothing: Gloves and work clothing that reduce skin contact are suggested.
Eye Protection: Safety glasses are recommended.
Other Precautions Required: None

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State and local regulations. Keep away from heat, flame, ignition sources and strong shock.
Precautions to be taken during use: Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

SECTION X - SPECIAL INFORMATION

The reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372 may become applicable if the physical state of this product is changed to an aqueous solution. If an aqueous solution of this product is manufactured, processed, or otherwise used, the nitrate compounds category and ammonia listing of the previously referenced regulation should be reviewed.

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Groundbreaking Performance

10.2 Boosters

TROJAN® SPARTAN®

Technical Information

BOOSTERS - CORDS

Cast Booster

Product Description
TROJAN SPARTAN cast boosters are detonator sensitive, high density, high energy molecular explosives available in various sizes designed to optimize initiation of all booster sensitive explosives. All TROJAN SPARTAN boosters are manufactured with an internal through-tunnel and detonator well for easy application with either electric, electronic or nonelectric detonators or 10.6 g/m (50 gr/ft) minimum strength detonating cord. TROJAN SPARTAN boosters are formulated from the highest quality PETN and other high explosive materials ensuring reliability, consistency and durability in all blasting environments. The fluorescent green container makes the TROJAN SPARTAN booster more visible on the blast site and reduces the possibility of misplaced charges.

Application Recommendations
- NEVER force the detonator into the through-tunnel, the detonator-well or otherwise attempt to clear these areas if obstructed. If the through-tunnel or detonator-well does not accommodate the detonator, do not use the booster. Notify your Dyno Nobel representative
- ALWAYS use detonating cord with a coreload of 10.6 g/m (50 gr/ft) or higher when initiating the TROJAN SPARTAN booster with detonating cord

Properties

MSDS #1106

Density	(g/cc) Avg	1.65
Velocity	(m/sec)	7,550
	(ft/s)	24,800
Detonation Pressure (Kbars)		235
Water Resistance		6 months with no loss of sensitivity
Shelf Life Maximum		5 years (from date of production)
Maximum Usage Temperature		60°C (150°F)

All Dyno Nobel Inc. energy and gas volume values except Velocity and Detonation Pressure are calculated using PRODET™ the computer code developed by Dyno Nobel Inc. for its exclusive use. Other computer codes may give different values.

Velocity and Detonation Pressure are the result of empirical methods during May 2009.

Hazardous Shipping Description
UN 0042 Boosters, 1.1D PG II

C-07-09-02-10

See Product Disclaimer on page 2.

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Groundbreaking Performance

TROJAN® SPARTAN®

Technical Information

Application Recommendations (continued)

- Minimum detonator is No. 8 strength for temperatures above -40° C (-40° F). A high strength detonator is recommended for temperatures below -40° C (-40° F).
- Extremely low temperatures do not affect the performance of cast boosters with commercial detonators. Low temperatures do affect detonators and detonating cord. Be certain your initiation system is suitable for your application in extremely low temperatures. Cast boosters are more susceptible to breakage during handling in extremely cold temperatures.

Transportation, Storage and Handling

- Dyno Nobel cast boosters must be transported, stored, handled and used in conformity with all federal, state, provincial and local laws and regulations.
- For maximum shelf life (5 years), Dyno Nobel cast boosters must be stored in a cool, dry, well ventilated magazine. Explosive inventory should be rotated. Avoid using new materials before the old.

Packaging

Unit Weight		Unit Dimensions				Case Quantity	Gross Weight/ Case	
		Length		Diameter				
g	oz	cm	in	cm	in		kg	lbs
90	3.2	11.9	4.7	2.7	1.1	150	14.0	30.8
150	5.5	11.9	4.7	3.6	1.4	95	16.7	36.7
200	7	11.7	4.6	4.1	1.6	72	16.5	36.4
350	12	11.9	4.7	5.0	2.0	49	17.9	39.5
400	14	11.9	4.7	5.5	2.2	40	17.8	38.8
450	16	11.9	4.7	5.8	2.3	36	17.8	39.2
900	32	12.9	5.1	7.9	3.1	18	17.8	39.2

Note: All weights and dimensions are approximate.

Case Dimensions

42 x 33 x 14 cm 16 ½ x 13 x 5 ½ in

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DYNO Dyno Nobel
Groundbreaking Performance

Material Safety Data Sheet

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FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666

MSDS # 1108
Date 09/16/10

Supersedes
MSDS # 1108 08/05/08

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):

DYNO® CORD SENSITIVE BOOSTERS - CS35, CS45, CS90, CS135
TROJAN® SPARTAN®
TROJAN® SPARTAN® Slider
TROJAN® Stinger
TROJAN® NB
TROJAN® NB UNIVERSAL
TROJAN® Twinplex

Product Class: Cast Boosters

Product Appearance & Odor: Tan to brown solid with no odor. May also be silvery gray. Packaged in paper or plastic tube.

DOT Hazard Shipping Description: Booster 1.1D UN0042 II

NFPA Hazard Classification: Not Available (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

Ingredients:	CAS#	% (Range)	Occupational Exposure Limits ACGIH TLV-TWA	OSHA PEL-TWA
Pentaerythritol Tetranitrate (PETN)	78-11-5	35-70	None Established	None Established
Trinitrotoluene	118-96-7	30-50	0.1 mg/m^3 (skin)	1.5 mg/m^3 (skin)
RDX	121-82-4	0-25	0.5 mg/m^3 (skin)	1.5 mg/m^3 (skin)
HMX	2691-41-0	0-5	None Established	None Established
Aluminum	7429-90-5	0-15	10 mg/m^3 (dust)	15 mg/m^3 (total)

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

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Groundbreaking Performance

Material Safety Data Sheet

SECTION III - PHYSICAL DATA

Melting Point: 176° F (80° C) (TNT)
Vapor Density: Not applicable
Percent Volatile by Volume: Not applicable
Evaporation Rate (Butyl Acetate = 1): Not applicable

Vapor Pressure: 0.042mm Hg at 80° C (TNT)
Density: 1.55 - 1.65 g/cc
Solubility in Water: < 0.01%

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not applicable
Flammable Limits: Not applicable
Extinguishing Media: (See Special Fire Fighting Procedures section)
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions.
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

Eyes: Particulates in the eye may cause irritation, redness, and tearing. Prolonged or repeated contact may cause cataracts, optic neuritis, blurred vision or amblyopia.
Skin: Prolonged contact may cause irritation, severe eczema and sensitization dermatitis. TNT may be absorbed through the skin, which may be indicated by orange staining on exposed skin. See systemic effects below.
Ingestion: Harmful if swallowed. See systemic effects below.
Inhalation: Inhalation of dusts may cause irritation, sneezing or coughing. See systemic effects below.
Systemic or Other Effects: TNT is an irritant, neurotoxin, hepatotoxin, nephrotoxin and bone marrow depressant. Although exposure is unlikely, acute or chronic exposure may cause sensitization dermatitis, headache, dizziness, jaundice, lethargy, or problems with the liver or blood such as toxic nephritis, aplastic anemia, hemolytic anemia or methemoglobin formation. **PETN** is a known coronary vasodilator, and ingestion or inhalation may result in a lowering of blood pressure, headache or faintness, and a decreased tolerance for grain alcohol. Repeated over-exposure may result in chest pains in the absence of exposure.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Remove contaminated clothing. Wash skin thoroughly with soap and water.
Ingestion: Seek medical attention.
Inhalation: In case of irritation, remove to fresh air. Seek medical attention if chronic symptoms occur.
Special Considerations: None.

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.
Conditions to Avoid: Keep away from heat, flame, friction, impact, ignition sources and strong shock.
Materials to Avoid (Incompatibility): Corrosives (strong acids and bases or alkalis).
Hazardous Decomposition Products: Nitrogen Oxides (NO_x), Carbon Monoxide (CO).
Hazardous Polymerization: Will not occur.

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Material Safety Data Sheet

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State and local spill reporting requirements.

Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste; it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Not required for normal handling.
Respiratory Protection: None normally required.
Protective Clothing: Non-permeable gloves and work clothing that reduce skin contact are recommended.
Eye Protection: Safety glasses are recommended.
Other Precautions Required: None

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry location. Store in compliance with all Federal, State and local regulations. Keep away from heat, flame, ignition sources or strong shock.
Precautions to be taken during use: Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
Other Precautions: It is recommended that users of explosives material be familiar with the Institute of Makers of Explosives Safety Library publications.

SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number	% By Weight
None Applicable		

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Accomplishing Performance

10.3 Initiation System

A non electric initiation system based on shock tube has been selected for use on this project, due to its inherent safety to static and stray electricity. The initiation system comprises the following components manufactured by Dyno Nobel, Inc. and distributed by Explosives Supply, Inc.

- Nonel® Starter (lead-in line to initiate the first hole in a shock tube blast pattern)
- NONEL® EZ DET® Nonelectric Blast Initiation System (down-hole delay detonator and surface delay detonator combined in a single unit)
- NONEL® EZTL™ Non-Electric Trunkline Delay Detonators (surface delay detonators for connecting blast holes or rows together with the appropriate amount of delay between each)

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10.3.1 Lead-In Lines

NONEL® Starter

Technical Information

INITIATION SYSTEMS

Nonelectric Shock Tube & Detonator Assembly

Product Description
NONEL STARTER is a nonelectric detonator consisting of a spooled length of yellow shock tube with a Standard (#8) detonator attached to one end and the other end sealed. The detonator is housed in a plastic bunch block which facilitates easy connection to both shock tube and detonating cord.

NONEL STARTER is designed to provide controlled, nonelectric initiation of surface and underground blast rounds.

Application Recommendations
For detailed application recommendations, ALWAYS request a copy of Dyno Nobel's *Product Manual: NONEL® and PRIMACORD®* from your Dyno Nobel representative.

- **ALWAYS** trim excess lengths of detonating cord from bunch block. Detonating cord tails lying across outgoing trunkline can interfere with normal function.
- **ALWAYS** use NONEL Lead Line to splice onto the NONEL Starter unit to make up a custom length nonelectric starter assembly whenever the length of NONEL STARTER unit is not sufficient to position the blaster safely.
- **ALWAYS** use the plastic connector sleeves packaged in each NONEL Lead Line case to make a reliable splice connection to NONEL STARTER unit.

Properties

MSDS #1122

Net Explosive Content per 100 units	0.0570 kg 0.1254 lbs

Hazardous Shipping Description
Detonator Assemblies nonelectric, 1.4B,
UN 0361 PG II

I-34-03-29-07

See Product Disclaimer on page 2.

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Groundbreaking Performance

NONEL® Starter

Technical Information

Application Recommendations (continued)

- ALWAYS hook the NONEL STARTER bunch block to the blast round after all equipment and non-essential personnel are clear of the blast area.
- ALWAYS unspool NONEL STARTER unit by hand if the bunch block has been attached to the blast round.
- ALWAYS place the bunch block so the lid is face down and cover the bunch block with drill cuttings or other inert material to help prevent shrapnel cut-off after attaching the bunch block to detonating cord or shock tube.
- NEVER attempt to initiate more than eight (8) NONEL shock tubes or one (1) detonating cord trunkline with the bunch block. Misfires may result.
- NEVER place detonating cord and shock tube in the same NONEL STARTER bunch block. Misfires may result.
- NEVER attach the NONEL Starter bunch block to the blast round until after the NONEL STARTER shock tube deployment is complete whenever a NONEL STARTER unit is to be unspooled by any method other than by hand.
- NEVER run over NONEL STARTER detonators with equipment. This may damage the shock tube and may cause a misfire. ALWAYS replace the NONEL STARTER if it is damaged.
- When using NONEL STARTER detonators with a detonating cord trunkline, ALWAYS place the detonating cord in the bunch block parallel to the detonator with the detonator pointing in the desired direction of initiation.

Transportation, Storage and Handling

- NONEL STARTER must be transported, stored, handled and used in conformity with all federal, state, provincial and local laws and regulations.
- For maximum shelf life (3 years), NONEL STARTER must be stored in a cool, dry, well ventilated magazine. Explosive inventory should be rotated. Avoid using new materials before the old. For recommended good practices in transporting, storing, handling and using this product, see the booklet "Prevention of Accidents in the Use of Explosive Materials" packed inside each case and the Safety Library Publications of the Institute of Makers of Explosives.

Packaging

Length		Case Type	Spools / Case	Weight / Case	
m*	ft			kg	lbs
61	200	N	8	5	10
153	500	NL	8	10	21
305	1000	NL	4	9	19

* Length rounded to nearest one-half meter.

Case Dimensions

N	27 x 27 x 25 cm	10 ¾ x 10 ¾ x 9 ¾ in
NL	43 x 43 x 18 cm	17 x 17 x 7 ½ in

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Material Safety Data Sheet

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CANUTEC (CANADA) 613-996-6666

MSDS # 1122
Date 09/16/10

Supercedes
MSDS # 1122 01/22/09

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):
NONEL® MS
NONEL® MS ARCTIC
NONEL® LP
NONEL® SL
NONEL® TD
NONEL® MS CONNECTOR
NONEL® TWINPLEX™
NONEL® STARTER
NONEL® EZ DET®
NONEL® EZTL™
NONEL® EZ DRIFTER ®

Product Class: NONEL® Non-electric Delay Detonators

Product Appearance & Odor: Aluminum cylindrical shell with varying length and diameter of attached colored plastic tubing. The detonator may be enclosed in a plastic housing, and an assembly may contain two detonators. Odorless.

DOT Hazard Shipping Description: UN0029 Detonators, non-electric 1.1B II
-or- UN0360 Detonator assemblies, non-electric 1.1B II
-or- UN0361 Detonator assemblies, non-electric 1.4B II

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

Ingredients	CAS#	Occupational Exposure Limits OSHA PEL-TWA	ACGIH TLV-TWA
Pentaerythritol Tetranitrate (PETN)	78-11-5	None[1]	None[2]
Lead Azide	13424-46-9	0.05 mg (Pb)/m^3	0.05 mg (Pb)/m^3
Lead	7439-92-1	0.05 mg (Pb)/m^3	0.05 mg (Pb)/m^3
Silicon	7440-21-3	15 mg / m^3 (total dust) 5 mg / m^3 (respirable fraction)	10 mg / m^3
Selenium	7782-49-2	0.2 mg/m^3	0.2 mg/m^3
Red Lead (Lead tetroxide)	1314-41-6	0.05 mg (Pb)/m^3	0.05 mg (Pb)/m^3
Titanium dioxide	13463-67-7	15 mg/m^3	10 mg/m^3
Barium Chromate	10294-40-3	1 mg (CrO_3)/10m^3 (ceiling) 0.5 mg (Ba)/m^3	0.01 mg (Cr)/m^3 0.5 mg (Ba)/m^3
Lead Chromate	7758-97-6	0.05 mg (Pb)/m^3 1 mg (CrO_3)/10m^3 (ceiling)	0.15 mg (Pb)/m^3 0.012 mg (Cr)/m^3
Barium Sulfate	7727-43-7	0.5 mg (Ba)/m^3	10 mg/m^3
Potassium Perchlorate[3]	7778-74-7	None[1]	None[2]
Silica (crystalline)	61790-53-2	See Note Below	0.05 mg/m^3 (resp frac)

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Molybdenum	7439-98-7	None[1]	None[2]
Tungsten	7440-33-7	None[1]	5 mg/m^3 (TWA) 10 mg/m^3 (STEL)
Aluminum	7429-90-5	15 mg/m^3 (total dust) 5 mg/m^3 (respirable fraction)	5 mg/m^3
Antimony	7440-36-0	0.5 mg/m^3	0.5 mg/m^3
Cyclotetramethylene Tetranitramine (HMX)	2691-41-0	None[1]	None[2]

[1] Use limit for particulates not otherwise regulated (PNOR): Total dust, 15 mg/m^3 ; respirable fraction, 5 mg/m^3
[2] Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m^3 , respirable part , 3 mg/m^3
Note: The OSHA PEL for crystalline silica is calculated as follows:
Quartz, respirable: 10 mg/m$^{3\,6}$ / % SiO_2 + 2 Quartz, total dust: 30 mg/m^3 / % SiO_2 + 2
[3] Not all delay periods contain perchlorate. Those that do contain between from about 4 to a maximum of about 60 mg perchlorate per detonator

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable
Vapor Density: Not Applicable
Percent Volatile by Volume: Not Applicable
Evaporation Rate (Butyl Acetate = 1): Not Applicable
Vapor Pressure: Not Applicable
Density: Not Applicable
Solubility in Water: Not Applicable

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not Applicable **Flammable Limits:** Not Applicable
Extinguishing Media: (See Special Fire Fighting Procedures section.)
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe, distant location. Allow fire to burn unless it can be fought remotely or with fixed extinguishing systems (sprinklers).
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

This is a packaged product that will not result in exposure to the explosive material under normal conditions of use. Exposure concerns are primarily with post-detonation reaction products, particularly heavy metal compounds.

Eyes: No exposure to chemical hazards anticipated with normal handling procedures. Particulates in the eye may cause irritation, redness, swelling, itching, pain and tearing.
Skin: No exposure to chemical hazards anticipated with normal handling procedures. Exposure to post-detonation reaction products may cause irritation.
Ingestion: No exposure to chemical hazards anticipated with normal handling procedures. Post-detonation reaction product residue is toxic by ingestion. Symptoms may include gastroenteritis with abdominal pain, nausea, vomiting and diarrhea. See systemic effects below.

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Groundbreaking Performance

Material Safety Data Sheet

Inhalation: Not a likely route of exposure. See systemic effects below.
Systemic or Other Effects: None anticipated with normal handling procedures. Repeated inhalation or ingestion of post-detonation reaction products may lead to systemic effects such as respiratory tract irritation, ringing of the ears, dizziness, elevated blood pressure, blurred vision and tremors. Heavy metal (lead) poisoning can occur.
Carcinogenicity: ACGIH classifies Lead as a "Suspected Human Carcinogen" and insoluble Chromium VI as "Confirmed Human Carcinogen". NTP, OSHA, and IARC consider components contained in this detonator carcinogenic.

Perchlorate: Perchlorate can potentially inhibit iodide uptake by the thyroid and result in a decrease in thyroid hormone. The National Academy of Sciences (NAS) has reviewed the toxicity of perchlorate and has concluded that even the most sensitive populations could ingest up to 0.7 microgram perchlorate per kilogram of body weight per day without adversely affecting health. The USEPA must establish a maximum contaminant level (MCL) for perchlorate in drinking water by 2007, and this study by NAS may result in a recommendation of about 20 ppb for the MCL.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Wash with soap and water.
Ingestion: Seek medical attention.
Inhalation: Not applicable.
Special Considerations: None

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact.
Conditions to Avoid: Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock. Do not attempt to disassemble.
Materials to Avoid (Incompatibility): Corrosives (acids and bases or alkalis).
Hazardous Decomposition Products: Carbon Monoxide (CO), Nitrous Oxides (NO_x), Sulfides, Chromates, Lead (Pb), Antimony (Sb) and various oxides and complex oxides of metals.
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate all personnel to a safe distant area and allow to burn or fight fire remotely. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. If loose explosive powder is spilled, such as from a broken detonator, only properly qualified and authorized personnel should be involved with handling and clean-up activities. Spilled explosive powder is extremely sensitive to initiation and may detonate. Follow applicable Federal, State, and local spill reporting requirements.

Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

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Material Safety Data Sheet

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: None required for normal handling. Provide enhanced ventilation after use if in underground mines or other enclosed areas.

Respiratory Protection: None required for normal handling.

Protective Clothing: Cotton gloves are recommended.

Eye Protection: Safety glasses are recommended.

Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State, and local regulations. Only properly qualified and authorized personnel should handle and use explosives. Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock.

Precautions to be taken during use: Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death. Avoid breathing the fumes or gases from detonation of explosives. Detonation in confined or unventilated areas may result in exposure to hazardous fumes or oxygen deficiency.

Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

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ECTION X - SPECIAL INFORMATION

These products contain the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number	Max. lbs/1000 units
Lead	7439-92-1	39.4
	(Use Toxic Chemical Category Code)	
Lead Compounds	N420	2.0
Barium Compounds	N040	1.8
Chromium Compounds	N090	1.9

Range* of Section 313 Chemicals in each product

Product	lb Pb per 1000 detonators	lb Pb compounds per 1000 detonators	lb Ba compounds per 1000 detonators	lb Cr compounds per 1000 detonators
NONEL® MS	0 - 27	0.3 – 1.5	0 – 0.9	0 – 0.9
NONEL® LP	0 - 30	0.3 – 2.0	0 - 1.8	0 - 1.9
NONEL® SL	7 - 27	0.3 – 1.5	0	0
NONEL® TD	0 - 18	0.3 – 0.7	0	0
NONEL® MS Connector	5 - 16	0.3 – 0.4	0	0
NONEL® TWINPLEX™	5 - 15	0.3 – 0.7	0	0
NONEL® STARTER	0	0.3	0	0
NONEL® EZ DET®	22 - 36	2.0	0	0
NONEL® EZTL™	5 - 15	0.5 – 0.7	0	0
NONEL® EZ DRIFTER	39.4	1.3	1.2	1.3

*** The exact quantity and weight percent of Section 313 Chemicals in each delay period and tubing length for each product is available upon request.**

Disclaimer

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10.3.2 In-hole and Surface Delay Detonator Combinations

NONEL® EZ DET® 1.4B

Technical Information

INITIATION SYSTEMS loop

Nonelectric Blast Initiation System

Product Description
NONEL® nonelectric delay detonator EZ DET® 1.4B units consist of a length of orange shock tube with a surface detonator attached to one end and a Standard (#8) in-hole detonator on the other. The surface detonator is inside a color-coded plastic EZ™ Connector block to facilitate easy connections to shock tube leads. This block can hold up to 6 shock tube leads. Easy-to-read, color-coded delay tags display the delay number and nominal firing time prominently.

NONEL EZ DET units can be easily connected to one another to satisfy basic blast design requirements in construction, mining, and quarry operations. They can also be used in combination with NONEL MS, NONEL EZTL™ and/or NONEL TD detonators to satisfy complex blast design requirements and minimize inventory of initiation system components.

Application Recommendations
For detailed application recommendations, ALWAYS request a copy of Dyno Nobel's *Product Manual: NONEL® and PRIMACORD®* from your Dyno Nobel representative.
- ALWAYS select a NONEL EZ DET unit having more than enough tubing length to extend from the planned primer location in the borehole to the collar of the next hole.

Properties

MSDS #1122

Net Explosive Content per 100 units 0.0810 kg
0.1782 lbs

This product is only available in the United States

Nominal Time (msec)	Nominal Time (msec)	Nominal Time (msec)	Connector Block Color
17 / 350	17 / 500	17 / 700	Yellow
25 / 350	25 / 500	25 / 700	Red
42 / 350	42 / 500	42 / 700	White
25 / 375			Red

Hazardous Shipping Description
Detonator assemblies nonelectric,
1.4B, UN 0361 PG II

1.4
B
1

I-33-01-21-08

See Product Disclaimer on page 2

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NONEL® EZ DET® 1.4B

Technical Information

INITIATION SYSTEMS loop

Application Recommendations (continued)

- ALWAYS protect the plastic EZ Connector block and all shock tube leads from impact or damage during the loading and stemming operations. Use care when placing blasting mats and cover material on top of the blasting circuit. The EZ Connector block contains a detonator and is subject to detonation caused by abuse such as impact. Shock tube which has been cut, ruptured or damaged may cause misfires.
- ALWAYS be sure that the shock tube(s) are securely inserted, one at a time, into the EZ Connector block. The head of the EZ Connector block should rise to accept the shock tube and return to a closed position with an audible click.
- ALWAYS ensure that individual shock tubes remain aligned side by side in the connector channel and do not cross one over the another on insertion.
- NEVER use NONEL EZ DET units with detonating cord. The low strength surface detonator will not initiate detonating cord and may cause misfires.
- NEVER attempt to disassemble the delay detonator from the plastic EZ Connector block or use the detonator without the connector.
- NEVER place more than 6 shock tube leads into the plastic EZ Connector block. Misfires may result.
- NEVER pull, stretch, kink or put tension on shock tube such that the tube could break.
- NEVER splice NONEL EZ DET shock tube together to extend between holes.
- NEVER connect NONEL EZ DET units together until all holes have been primed, loaded and stemmed and the blast site has been cleared.

Transportation, Storage and Handling

- NONEL EZ DET must be transported, stored, handled and used in conformity with all federal, state, provincial and local laws and regulations.
- For maximum shelf life (3 years), NONEL EZ DET must be stored in a cool, dry, well ventilated magazine. Explosive inventory should be rotated. Avoid using new materials before the old. For recommended good practices in transporting, storing, handling and using this product, see the booklet "Prevention of Accidents in the Use of Explosive Materials" packed inside each case and the Safety Library Publications of the Institute of Makers of Explosives.

Packaging

Length		Case Type	Quantity / Case	
m	ft		case	subpack
3.5	12	D	160	90
4.5	16	D	120	60
7	24	D	120	60
9	30	D	80	40
12	40	D	60	30
15	50	D	60	30
18	60	D	50	25
24	80	DC	50	—
30	100	DC	40	—
37	120	DC	30	—

- Length rounded to nearest one-half meter.
- Case weight varies by length & delay; see case label for exact weight.

Note: This product is also available with a High Strength cap. For more information, please contact your local Dyno Nobel sales representative.

Case Dimensions

Detpak Case (DC)	48 x 45 x 26 cm	18¾ x 17¾ x 10¼ in
Detpak (D)		
subpack	44 x 22 x 25 cm	17 ½ x 8 ¾ x 10 in
strapped case	44 x 45 x 25 cm	17 ½ x 17 ¾ x 10 in

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10.3.3 Surface Connectors

NONEL® EZTL™

Technical Information

INITIATION SYSTEMS

Nonelectric Trunkline Delay Detonators

Product Description
NONEL® nonelectric delay detonator EZTL™ units consist of a length of yellow shock tube, with a surface detonator attached to one end and the other end sealed. The detonator is housed in a plastic EZ Connector block which facilitates easy connection to shock tube. A white J-hook is affixed near the sealed end. Easy-to-read, color-coded delay tags display the delay number and nominal firing time prominently.

EZTL detonators are designed for use with NONEL MS and EZ DET® units to provide effective and accurate surface timing between blastholes and/or rows of blastholes in surface and underground blasting designs.

Application Recommendations
For detailed application recommendations, ALWAYS request a copy of Dyno Nobel's *Product Manual: NONEL® and PRIMACORD®* from your Dyno Nobel representative.

- ALWAYS be sure that the shock tube(s) are securely inserted, one at a time, into the plastic EZ connector. The head of the connector block should rise to accept the tube, and return to a closed position with an audible click.
- ALWAYS ensure that the individual shock tubes remain aligned side by side in the EZ connector channel and do not cross over one another during insertion.
- ALWAYS protect the plastic EZ connector and all shock tube leads from impact or

Properties

MSDS #1122

Net Explosive Content per 100 units 0.0240 kg
0.0529 lbs

Delay Time (msec)	Connector Block Color
9	Green
17	Yellow
25	Red
33	Green
42	White
67	Blue
100	Black
109	Black

Hazardous Shipping Description
Detonator assemblies nonelectric.
1.4B, UN 0361 PG II

I-29-01-21-08

See Product Disclaimer on page 2

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NONEL® EZTL™

Technical Information

Application Recommendations (continued)

damage. Use care when placing blasting mats and cover material on top of the blasting circuit. The EZ connector contains a detonator and is subject to detonation caused by abuse such as impact. Shock tube which has been cut, ruptured or damaged may cause misfires.

- **NEVER** use NONEL EZTL detonators with detonating cord. The low strength surface detonator will not initiate detonating cord.
- **NEVER** attempt to disassemble the delay detonator from the EZ connector block or use the detonator without the connector.
- **NEVER** place more than 6 shock tube leads into an EZ connector block. Misfires may result.
- **NEVER** tie-in NONEL EZTL units until all holes have been primed, loaded, stemmed and the blast site has been cleared.

Transportation, Storage and Handling

- NONEL EZTL must be transported, stored, handled and used in conformity with all federal, state, provincial and local laws and regulations.
- For maximum shelf life (3 years), NONEL EZTL must be stored in a cool, dry, well ventilated magazine. Explosive inventory should be rotated. Avoid using new materials before the old. For recommended good practices in transporting, storing, handling and using this product, see the booklet "Prevention of Accidents in the Use of Explosive Materials" packed inside each case and the Safety Library Publications of the Institute of Makers of Explosives.

Packaging

Length		Case Type	Quantity / Case	
m	ft		case	subpack
2.5	10	D	180	90
3.5	12	D	180	90
6	20	D	150	75
9	30	D	120	60
12	40	D	100	50
15	50	D	90	45
18	60	D	70	35

- Length rounded to nearest one-half meter.
- Case weight varies by length & delay; see case label for exact weight.

Case Dimensions

Detpak (D)

subpack	44 x 22 x 25 cm	17½ x 8¾ x 10 in
strapped case	44 x 45 x 25 cm	17½ x 17⅞ x 10 in

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11 EQUIPMENT

Product information on special equipment is shown in this section:

- Shot-firing Device
- Lightning Detector
- Blast Monitoring Equipment
  - Seismographs
  - Geophones

Sample calibration certificates are shown in this document. Once specific equipment has been selected for use on this project, updated calibration certificates will be provided to the Cashman Project Manager and the Project Director.

11.1 Shot-Firing Device

HR88 DUAL LINE STARTER

Length/Diameter: 7.5"L x .5"Diam
Weight: 4 oz.
Body: Derlin
Flashguard: Nylon
Operation: Mechanical Spring-Operated Steel Firing Pin
Energy Source: #209 Shotgun Shell Primer

The HR-88 will allow for the simultaneous initiation of multiple non-electric sytems.

Classified by ATF as "NON-FIREARMS" permitting
unrestricted transportation and shipment
Practical and economical. Made of super-tough delrin and nylon with all steel firing mechanism. Well made yet thrifty tool.

The Scorpion "HR" models are mechanical initiators designed for initiation of non-electric blasting systems.

Utilizing the energy release of the Remington #209 shotgun shell primer which is readily loaded into the HR's breech block, it can be readied for operation in just a few seconds. After cocking and loading, with the flashguard in place to protect the blaster, non-electric tubing is inserted into the barrel of the nozzle and the device is ready to initiate the blast by simply flipping the trigger from its cocked position.

TO INITIATE:

1. Pull back and align Cock Pin so that is seats in the locked position as shown above
2. Remove Safety Pin from Through Hole in Flash Guard.
3. Slide Flash Guard toward Cock Pin so as to expose the Nozzle.
4. While twisting clockwise pull Nozzle away from fork (not shown)
5. Place shotgun shell primer in base of Nozzle.
6. Replace Nozzle onto forks until snug and seated properly.
7. Slide Flash Guard forward toward Nozzle.
8. Place Safety Pin into Safety Pin Hole.
9. String Non-Electric firing line through Through Hole and up and around into Nozzle.
10. When blast site is secured and free of people remove Safety Pin from Safety Pin Hole.
11. Apply backward pressure to Cock Pin and while holding it stationary rotate it into Firing Pin Track.
12. Release pressure on Cock Pin so as to let it freely move along Firing Pin Track.

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TO SECURE:

1. Remove spent Non-Electric line from Nozzle and Through Holes.
2. Repeat step under "TO INITIATE" so as to re-cock the Cock Pin.
3. Slide Flash Guard down toward Cock Pin.
4. While twisting clockwise pull Nozzle away from Forks.
5. Remove spent shotgun shell primer from base of Nozzle.
6. Clean as necessary and replace Nozzle to Forks until snug and seated properly.
7. Slide Flash Guard forward toward Nozzle.
8. Rotate Cock Pin into Firing Pin Track and gently guide forward until it stops.
9. Place Safety Pin into Through Holes.

11.2 Lightning Detector

THUNDERBOLT STORM DETECTOR

Utility Model 310 Series
PRODUCT SPECIFICATION DATA SHEET
(RELEASE APR 2008)

ELECTRONIC SPECIFICATIONS	Operating Life - 45,000 hours Operating Temperature - 0 - 115° F Operating Voltage - 9V DC Detection Frequency - 10kHz
STORM DETECTION RANGE	75 MILES
ACCURACY	STORM DETECTION 100% within 5 minutes APPROACH SPEED- PLUS/MINUS 10% STORM RANGE - PLUS/MINUS 1% at 10 miles 5% at 40 miles 7 % at 75 miles
AUTOMATICALLY DISPLAYS	STORM RANGE & APPROACH SPEED E.T.A. at User Location TIME TO CLEAR at User Location
COMPUTER ANALYSIS AND DETECTION	SQUALL LINES SEVERE STORM CELLS MULTIPLE STORMS
BACKGROUND EMI DETECTION and SUPPRESSION	User-Selectable Noise Detection and Mapping from main menu. Automatic update of noise sampling during operation.
WARNING MODES	OVER 50 TEXT MESSAGES via 2 X 16 LCD RED LED WARNING LIGHT AUDIBLE TONE
USER SELECTABLE	WARNING MODES ALARM FREQUENCIES
POWER SUPPLY	ONE 9V BATTERY (75 HOURS +) 220VAC (Low-Noise adapter included)
SIZE	6.4" X 3.4" X 1.5"
WEIGHT	14 oz.
WARRANTY	Three years (Utility), two years (PRO)

All specifications subject to change without notice.

PRODUCT DATA SHEET - Utility TB-U3 / TB-U18
Model 310 Series
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THUNDERBOLT STORM DETECTOR
www.spectrumthunderbolt.com

11.3 Blast Monitoring Equipment

11.3.1 Seismographs – Instantel BlastMate III

Blastmate III™

Full-Featured, Advanced Vibration and Overpressure Monitor

Range of Applications:

- Blast-monitoring for compliance
- Near-field blast analysis
- Pile driving
- Construction activity
- Demolition activity
- Heavy transportation
- Bridge monitoring
- Structural analysis
- Underwater blast monitoring
- 4 or 8 channel data aquistion
- Remote monitoring – Auto Call Home™

Consultants, engineers and contractors the world over recognize the **Instantel® Blastmate III™** vibration and overpressure monitor as the most versatile and most reliable full featured monitor available. It provides all of the industry-leading features of the **Instantel Minimate Plus™** monitor, conveniently packaged with a full keyboard and a high-resolution printer. This allows you to setup, add notes and print complete event reports in the field, without a computer.

Versatile

With standard features like the **Instantel Histogram Combo™** monitoring mode, zero dead-time between events, and flexible sample rates up to 65,536 S/s, the **Blastmate III** system provides you with control and confidence to monitor reliably in any situation. For added versatility, you have the option to add 4 more channels and extra memory, providing two complete standard monitors in a single package.

For more demanding monitoring applications, the **Instantel Blastware® Advanced Module** software provides the capability to monitor a broad selection of vibration and overpressure sensors, as well as sensors for related structural and environmental measurements. Monitor vibration, ambient environmental conditions, and the movement of structural cracks, all at the same time, all using the same **Blastmate III** monitor.

Easy to use

The features and versatility of the **Blastmate III** monitor set it apart; but the fact that it is also easy to use makes it truly revolutionary. The dedicated single use function keys, backlit LCD and simple menu-driven operation make setup and operation quick and easy, even for inexperienced personnel.

Tough

The **Blastmate III** monitor has been built to survive, with a fully sealed top panel, non-corrosive industrial grade connectors and sealed electronics, all packed in a rugged, water-resistant case.

Blastmate III - Reliability and versatility for any monitoring application.

Key Features

- Fast high-resolution thermal printer for event reports in the field without the need for a computer
- Full keyboard simplifies entry of job-specific notes and information
- Dedicated function keys and intuitive menu-driven operation enable quick and easy setup
- **Histogram Combo** mode allows capture of full waveform records while recording in histogram mode
- Sample rates from 1,024 to 16,384 S/s per channel - up to 65,536 S/s available on a single channel
- Available 8-channel option allows for 2 standard triaxial geophones and 2 microphones to be used on a single **Blastmate III** monitor
- Continuous monitoring means zero dead time even while the unit is processing.
- Any channel can be matched to a wide variety of sensors - geophones, accelerometers, or hydrophones

Instantel

The World's Most Trusted Vibration Monitors www.instantel.com

Blastmate III™

General Specifications	Blastmate III
Channels	Microphone and Triaxial Geophone or 4 independent user-configurable channels (two Microphones and two Triaxial Geophones or 8 independent channels with optional 8-channel upgrade)
Vibration Monitoring (with Standard Triaxial Geophone)	
Range	Up to 254 mm/s (10 in/s)
Resolution	0.127 mm/s (0.005 in/s) or 0.0159 mm/s (0.000625 in/s) with built-in preamp
Accuracy (ISEE / DIN)	+/- 5% or 0.5 mm/s (0.02 in/s), whichever is larger, between 4 and 125 Hz / DIN 45669-1 standard
Transducer Density	2.13 g/cc (133 lbs/ft³)
Frequency Range (ISEE / DIN)	2 to 250 Hz, within zero to -3 dB of an ideal flat response / 1 to 315 Hz
Maximum Cable Length (ISEE / DIN)	75 m (250 ft) / 1,000 m (3,280 ft)
Air Overpressure Monitoring	
Weighting Scales	Linear or A-weight
Linear Range	88 to 148 dB (500 Pa (0.072 PSI) Peak)
Linear Resolution	0.25 Pa (0.0000363 PSI)
Linear Accuracy	+/- 10% or +/- 1 dB, whichever is larger, between 8 and 125 Hz
Linear Frequency Response	2 to 250 Hz between -3 dB roll off points
A-weight Range	50 to 110 dBA
A-weight Resolution	0.1 dBA
Waveform Recording	
Record Modes	Manual, Single-shot, Continuous
Seismic Trigger	0.125 to 254 mm/s (0.005 to 10 in/s)
Acoustic Triggers	
Linear	100 to 148 dB
A-weight	55 to 110 dBA
Sample Rate	1,024 to 16,384 S/s per channel (independent of record time), up to 65,536 S/s in single-channel mode with advanced software (maximum 8,192 S/s per channel for 8 channels)
Record Stop Mode	Fixed record time, **Instantel's AutoRecord™** record stop mode
Record Time	1 to 100 seconds (programmable in one-second steps) or 500 seconds plus 0.25 seconds pre-trigger
AutoRecord Time	Auto window programmable from 1 to 9 seconds, plus a 0.25 second pre-trigger. Event is recorded until activity remains below trigger level for duration of auto window, or until available memory is filled
Cycle Time	Recording uninterrupted by event processing - No dead time
Storage Capacity	
Full Waveform Events	300 one-second events at 1,024 S/s sample rate (1,500 event capacity with optional memory upgrade)
Event Summaries	1,750 (8,750 event capacity with optional memory upgrade)
Histogram Recording	
Record Modes	Histogram and **Instantel Histogram Combo™** (monitor captures triggered waveforms while recording in Histogram mode)
Recording Interval	2, 5 or 15 seconds; 1, 5 or 15 minutes
Storage Capacity	46,656 intervals - 3 days at 5-second intervals or 102 days at 15 minute intervals (with memory upgrade - 15 days at 5-second intervals or 540 days at 15 minute intervals)
Physical Specifications	
Dimensions	269 x 355 x 165 mm (10.6 x 14.0 x 6.5 in)
Weight	6.4 kg (14 lbs)
Battery	Rechargeable 6 V sealed gel cell - capacity for 30 days of continuous monitoring
User Interface	63 domed tactile keys including full keyboard and dedicated keys for common functions
Display	4-line x 20 character, high contrast, backlit LCD with online help
Printer	High resolution thermal plotter
PC Interface	RS-232
Auxiliary Inputs and Outputs	External Trigger, Remote Alarm, coordinate download from GPS
Environmental	
Printer/LCD Operating Temperature	-10 to 50°C (14 to 122°F)
Electronics Operating Temperature	-20 to 60°C (-4 to 140°F)
Remote Communications	Compatible with Telephone, GSM, Cellular, RF, Satellite, Short-haul modems, and Ethernet® device servers. Automatically transfers events when they occur through **Instantel Auto Call Home™** feature.
Additional Features	Monitor start/stop timer

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Instantel

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The World's Most Trusted Vibration Monitors CERTIFIED TO THE ISO 9001 QUALITY STANDARD

11.3.2 Seismographs – Instantel MiniMate Plus

Minimate Plus™

Advanced Vibration and Overpressure Monitor

Range of Applications:

- Blast-monitoring for compliance
- Near-field blast analysis
- Pile driving
- Construction activity
- Demolition activity
- Heavy Transportation
- Bridge monitoring
- Structural analysis
- Underwater blast monitoring
- 4 or 8 channel data acquisition
- Remote monitoring - Auto Call Home™
- Structural monitoring - Flex™

When we asked what you wanted in a vibration monitor, you said "Everything." So, we designed the **Instantel® Minimate Plus™** vibration and overpressure monitor. Ever since, it has become a favourite of contractors, consultants, engineers and blasters, because it offers unrivalled features and versatility in a rugged and easy-to-use package.

Versatile

Use the **Minimate Plus** monitor with an **Instantel Standard Triaxial Geophone** (ISEE or DIN version) and an overpressure microphone (Linear or A Weight) to provide a rugged, reliable compliance monitoring system. Add the **Instantel 8-Channel** option and a single monitor may be used with two triaxial geophones and two microphones.

For more demanding monitoring applications, the **Instantel Blastware® Advanced Module** software provides the capability to monitor a broad selection of vibration and overpressure sensors, as well as sensors for structural and environmental measurements. Monitor vibration, ambient environmental conditions, and the movement of structural cracks, all at the same time, all using the same **Minimate Plus** monitor.

Intelligent

For remote installations, the **Instantel Auto Call Home™** feature will automatically transfer event files from field to office as they are recorded using a variety of wired or wireless modems. From there, the **Blastware Mail** feature of the **Blastware** software automatically distributes files or summary information to multiple e-mail or text messaging addresses.

Easy to use

Even with all of these features, the **Minimate Plus** system is still easy for anyone to use. A high-contrast LCD, eight-key tactile keypad, coupled with simple menu-driven operations, provides complete control and confidence.

Minimate Plus - everything you need and more.

Key Features

- **Instantel Histogram Combo™** mode allows capture of full waveform records while recording in histogram mode.
- **Auto Call Home** feature automates remote monitoring applications.
- Sample rates from 1,024 to 16,000 S/s, per channel with up to 65,000 S/s available on a single channel.
- Available **Instantel 8-channel** option allows for two standard geophones and two microphones to be operated from one **Minimate Plus** monitor.
- Non-volatile memory with standard 300-event storage capacity (optional 1,500-event capacity).
- Records waveform events up to 100 seconds long with standard setup, or up to 500 seconds with advanced setup.
- Continuous monitoring means zero dead time, even while the unit is processing.
- Any channel can be matched to a wide variety of sensors - geophones, accelerometers, or hydrophones.

Instantel

The World's Most Trusted Vibration Monitors www.instantel.com

Minimate Plus™

General Specifications	Minimate Plus
Channels	Microphone and Triaxial Geophone or 4 independent user-configurable channels (two Microphones and two Triaxial Geophones or 8 independent channels with optional 8-channel upgrade)
Vibration Monitoring (with Standard Triaxial Geophone)	
Range	Up to 254 mm/s (10 in/s)
Resolution	0.127 mm/s (0.005 in/s) or 0.0159 mm/s (0.000625 in/s) with built-in preamp
Accuracy (ISEE / DIN)	+/- 5% or 0.5 mm/s (0.02 in/s), whichever is larger, between 4 and 125 Hz / DIN 45669-1 standard
Transducer Density	2.13 g/cc (133 lbs/ft³)
Frequency Range (ISEE / DIN)	2 to 250 Hz, within zero to -3 dB of an ideal flat response / 1 to 315 Hz
Maximum Cable Length (ISEE / DIN)	75 m (250 ft) / 1,000 m (3,280 ft)
Air Overpressure Monitoring	
Weighting Scales	Linear or A-weight
Linear Range	88 to 148 dB (500 Pa (0.072 PSI) Peak)
Linear Resolution	0.25 Pa (0.0000363 PSI)
Linear Accuracy	+/- 10% or +/- 1 dB, whichever is larger, between 4 and 125 Hz
Linear Frequency Response	2 to 250 Hz between -3 dB roll off points
A-weight Range	50 to 110 dBA
A-weight Resolution	0.1 dBA
Waveform Recording	
Record Modes	Manual, Single-shot, Continuous
Seismic Trigger	0.125 to 254 mm/s (0.005 to 10 in/s)
Acoustic Triggers	
Linear	100 to 148 dB
A-weight	55 to 110 dBA
Sample Rate	1,024 to 16,384 S/s per channel (independent of record time), up to 65,536 S/s in single-channel mode with advanced software (max 8,192 S/s per channel for 8 channels)
Record Stop Mode	Fixed record time, **Instantel® AutoRecord™** record stop mode
Record Time	1 to 100 seconds (programmable in one-second steps) or 500 seconds plus 0.25 seconds pre-trigger
AutoRecord Time	Auto window programmable from 1 to 9 seconds, plus a 0.25 second pre-trigger. Event is recorded until activity remains below trigger level for duration of auto window, or until available memory is filled
Cycle Time	Recording uninterrupted by event processing - no dead time
Storage Capacity	
Full Waveform Events	800 one-second events at 1,024 S/s sample rate (1,500 event capacity with optional memory upgrade)
Event Summaries	1,750 (8,750 event capacity with optional memory upgrade)
Histogram Recording	
Record Modes	Histogram and **Instantel Histogram Combo™** (monitor captures triggered waveforms while recording in Histogram mode)
Recording Interval	2, 5 or 15 seconds; 1, 5 or 15 minutes
Storage Capacity	46,656 intervals - 3 days at 5-second intervals or 102 days at 15-minute intervals (with memory upgrade - 15 days at 5-second intervals or 540 days at 15-minute intervals)
Physical Specifications	
Dimensions	81 x 91 x 160 mm (3.2 x 3.6 x 6.3 in)
Weight	1.4 kg (3 lbs)
Battery	Rechargeable 6 V sealed gel cell - capacity for 210 hours of continuous monitoring
User Interface	8-key keypad with domed tactile keys
Display	4-line x 20-character, high-contrast, backlit LCD
PC Interface	RS-232
Auxiliary Inputs and Outputs	External Trigger, Remote Alarm, coordinate download from GPS
Environmental	
LCD Operating Temperature	-10 to 50°C (14 to 122°F)
Electronics Operating Temperature	-20 to 60°C (-4 to 140°F)
Remote Communications	Compatible with Telephone, GSM, Cellular, RF, Satellite, Short-haul modems and Ethernet® device servers. Automatically transfers events when they occur through the **Instantel Auto Call Home™** feature.
Additional Features	Monitor start/stop timer

Corporate Office:
[illegible]
Ottawa, Ontario K2E 7K3
Canada

US Office:
[illegible]
Orchard Park, New York 14127
USA

Toll Free: (800) 267 9111
Telephone: (613) 592 4942
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Instantel

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The World's Most Trusted Vibration Monitors CERTIFIED TO THE ISO 9001 QUALITY STANDARD

11.3.3 Calibration Certificates

INFORMATION ONLY

Calibration Certificate

Part Number: 716A0403
Description: MINIMATE PLUS W/EXT. GEO
Serial Number: BE10405
Calibration Date: May 16, 2008
Calibration Equipment: 718A1501

Instantel certifies that the above product was calibrated in accordance with the applicable Instantel procedures. These procedures are part of a quality system that is certified to the ISO9001:2000 quality standard, and are designed to assure that the product listed above meets or exceeds Instantel specifications.

Instantel further certifies that the measurement instruments used during the calibration of this product are traceable to the National Institute of Standards and Technology, or National Research Council of Canada. Evidence of traceability is on file at Instantel and is available upon request.

The environment in which this product was calibrated is maintained within the operating specifications of the instrument.

Please note that the sensor check function is intended to check that the sensors are connected to the unit, installed in the proper orientation and sufficiently level to operate properly. This function should not be confused with a formal calibration, which requires the sensors be checked against a reference that is traceable to a known standard. Instantel recommends that products be returned to Instantel or an authorized service and calibration facility for annual calibration.

Calibrated By: Mark Benoit

Instantel

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INFORMATION ONLY

Calibration Certificate

Part Number: 714A9701
Description: TRIAXIAL GEOPHONE (ISEE)
Serial Number: BG9635
Calibration Date: May 16, 2008
Calibration Equipment: 714J7401

Instantel certifies that the above product was calibrated in accordance with the applicable Instantel procedures. These procedures are part of a quality system that is certified to the ISO9001:2000 quality standard, and are designed to assure that the product listed above meets or exceeds Instantel specifications.

Instantel further certifies that the measurement instruments used during the calibration of this product are traceable to the National Institute of Standards and Technology, or National Research Council of Canada. Evidence of traceability is on file at Instantel and is available upon request.

The environment in which this product was calibrated is maintained within the operating specifications of the instrument.

Please note that the sensor check function is intended to check that the sensors are connected to the unit, installed in the proper orientation and sufficiently level to operate properly. This function should not be confused with a formal calibration, which requires the sensors be checked against a reference that is traceable to a known standard. Instantel recommends that products be returned to Instantel or an authorized service and calibration facility for annual calibration.

Calibrated By: _____
Mark Benoit

Instantel

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12 REFERENCE MATERIALS

The following documentation is included as reference materials:

- Project Specifications
- Codes, Regulations & Ordinances
  - Board of Fire Prevention Regulations, Code of Massachusetts Regulations, Title 527, Section 13
  - USACE EM385-1-1 (Sep-08) – Section 29 "Blasting

In addition to the documents above, the following documentation was also referenced as applicable in the preparation of this Blast Plan:

- US Occupational Health and Safety Administration
  - Federal Occupational Safety & Health Act of 1970 and the Construction Safety Act of 1969, as amended; 29 CFR 1926, Safety and Health Regulations for Construction
- CFR 27, US Department of Justice, Alcohol, Tobacco, Firearms and Explosives Division (ATF), 27 CFR Part 555, Implementation of the Safe Explosives Act, Title XI, Subtitle C of Public Law 107-296; Interim Final Rule
- Organized Crime Control Act of 1970, Title XI, Public Law 91-452, approved October 15, 1970, as amended
- US Department of Transportation
  - CFR 49, Parts 100-177 (DOT RSPA); 301-399 (DOT FHA)
- US Department of Homeland Security
  - Coast Guard Rules, 46 CFR Ch 1-40
- Institute of Makers of Explosives (IME) Safety Publications

12.1 Project Specifications

NEW BEDFORD MARINE COMMERCE TERMINAL

SECTION 02900

BLASTING

PART 1 GENERAL

1.1 BLASTING REGULATIONS, CONTROLS AND RESPONSIBILITIES

1.1.1 General

In general, the Contractor shall assume that no blasting is allowed in association with the New Bedford Marine Commerce Terminal project, that rock removal in association with the Work must take place utilizing non-blasting methods as outlined within Section 02482 DREDGING, and shall bid the Work accordingly; however, should Optional Bid Item No. 0005 be approved by the Owner, blasting will be allowed in association with the Work, subject to the conditions of Section 02900 BLASTING, the USEPA Final Determination (and subsequent amendments, as applicable), the Performance Standards, as well as other conditions of the Plans and Specifications including, but not limited to, conditions within Section 02482 DREDGING, Section 02470 DRILLED ROCK SOCKETS, Section 02458 CONCRETE FILLED STEEL PIPE PILES, Section 02488 STEEL SHEET PILING, and Section 01135 WATER QUALITY MONITORING AND CONTROL.

When the nature of the material to be dredged requires blasting, the Contractor's blasting progress and methods shall be those necessary to accomplish the excavation shown on the Contract Drawings in accordance with the procedures specified herein. The Contractor shall note that an Operational Blasting Plan shall be submitted for review by the Owner, Owner's Representative, as well as regulatory oversight authorities as noted in Part 3.9 of this Section. The Contractor will be required to make necessary plans, examinations, surveys, and test blasts to determine the quantity of explosives that can be fired without damaging property, and to thereafter control the quantity of explosives fired in any one blast to prevent injuries to persons or damage to structures, homes, utilities, vehicles, vessels moored or underway, or any property. The Contractor's blasting program shall abide by all Federal, State and Local laws and regulations, which include, but are not limited to, the following applicable codes and regulations:

- Title 29 Code of Federal Regulations Part 1926, Safety and Health Regulations for Construction.
- Federal Occupation Safety and Health Act of 1970.
- Army Corps of Engineers EM-385-1-1, Safety and Health Requirements Manual.
- Institute of Makers of Explosives (IME); Safety Publications.
- Board of Fire Prevention Regulations, Code of Massachusetts Regulations, Title 527, Section 13

1.1.2 Liabilities

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The Contractor's attention is called to Article 5 of Section 00700 of the General Conditions entitled "Laws to be Observed", which defines the Contractor's responsibilities relative to the references listed in paragraph 1.1.1. The Contractor shall assume all liability and hold and save the Owner, its representatives, officers, agents, and employees harmless for any and all claims for personal injuries, property damages, or other claims arising out of, or in connection with, the transportation, storage, and use of explosives under the contract.

1.1.3 The Contractor shall, in addition, process any and all claims of private citizens arising out of said use of explosives promptly in an acceptable time period set by the Owner's Representative; in particular, all property damage claims shall be acknowledged by the Contractor, or his representative, and be submitted immediately as directed by the Owner's Representative providing name of claimant, location, time and description of alleged damage, and estimated value. The claimed damage shall be inspected by the Blasting Vibration Consultant (see paragraph 3.7.3) within 48 hours following initial notification, and processed to a conclusion (honored, denied, or compromised) within 90 days after cessation of all blasting on the contract; but, in no case shall the claims remain unresolved for a period exceeding 6 months (180 calendar days). The Contractor shall submit inspection results and actions taken to the Owner's Representative on a weekly basis.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TRANSPORTATION, STORAGE, AND USE OF EXPLOSIVES

The Contractor will be held responsible to perform the work in compliance with all applicable Federal, State, and local codes and regulations, including, but not limited to, those cited above in paragraph 1.1.1. The Contractor shall have available the documents for inspection at all times, which will pertain to the blasting operation. In case of conflict between codes and regulations, the more stringent will apply.

3.1.1 Daily Summary

The Contractor shall keep a daily record of transactions, to be maintained at each storage magazine. The inventory records shall be updated at close of business each day and furnished to the Owner's Representative on a weekly basis. Records shall show class and quantities received and issued, and total remaining on hand at end of each day. The remaining stock shall be checked each day, and any discrepancies that would indicate a theft or loss of explosive materials shall be reported immediately. The daily summary shall be done in accordance with the applicable regulations cited in paragraph 1.1.1. Copies of the daily inventory records shall be furnished to the Owner's Representative.

3.1.2 Report of Loss

Should a loss or theft of explosives occur, all circumstances and details of the loss/theft will be immediately reported to the nearest office of the

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Alcohol, Tobacco, Firearms and Explosives (ATF), as well as to the local and State law enforcement authorities and the Owner's Representative.

ATF Boston Field Office
10 Causeway Street, Room 791
Boston, Massachusetts 02222
Telephone: 617-557-1200

The New Bedford Fire Department should be contacted at the following address:

New Bedford Fire Department
868 Pleasant Street
New Bedford, Massachusetts 02740
Telephone: 508-991-6105, 508-991-6124.

3.2 RESPONSIBILITY

The Contractor shall be responsible for obtaining all licenses, permits, any and all fees, and the keeping of accounts and records, as well as arranging the transportation and protection of all explosives on the contract, and notifying the relevant local, state and federal authorities of its work. Should the Contractor fail to comply with above requirements, the Owner's Representative may order a suspension of that part of work involved until the deficiencies are corrected. The Contractor's attention is also directed to subparagraph 1.1.2 "Liabilities" for additional specific liability to be assumed by the Contractor. The Contractor must supply to the Owner's Representative all permits, licenses and approvals which are necessary for this contract as required by the regulations cited in paragraph 1.1.1.

3.3 PREBLAST PUBLIC INFORMATION MEETINGS

3.3.1 The Contractor shall schedule, publicize, coordinate, secure adequate facilities for, and conduct two Preblast Public Information Meetings prior to finalizing his Operational Blasting Plan. The meeting shall be held in New Bedford, Massachusetts. As a minimum, the meetings shall be publicized in advertisements in local newspapers, including the Standard Times, not less than two weeks prior to the scheduled meeting for a period of not less than one week. State and local agencies likely to express an interest in the project shall be contacted in writing directly, including law enforcement, fire prevention, and environmental authorities. The Owner's Representative will solicit interest from appropriate Federal agencies. In addition, all property owners whose properties border a portion of the contract limits shall be contacted in writing directly. A post test blast public information meeting shall be conducted at the above location, if requested by the Owner's Representative.

3.3.2 The contents of the advertisements shall be approved by the Owner's Representative prior to advertisement. Copies of all correspondence publicizing the meetings shall be furnished to the Owner's Representative.

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3.3.3 The purpose of the meetings is to disseminate basic project information to interested members of the public, to solicit comments from the public and evaluate proposed blasting methods in light of any valid concerns, and to identify key representatives of the Contractor and Owner's Representative who may be contacted for current project information or to report complaints. The Contractor, in conjunction with the Owner's Representative, shall prepare an agenda for each meeting to address these purposes. A public question-and-answer period shall be held at the conclusion of the public presentation if required by the Owner's Representative.

3.3.4 The Owner's Representative will participate in each meeting, and will provide reasonable assistance in planning, scheduling, and coordination with the public.

3.3.5 The proceedings of each meeting shall be recorded verbatim by the Contractor, and transcripts thereof shall be provided to the Owner's Representative. The Owner's Representative will review the transcripts, as well as any written comments that may be received, with the Contractor, and may require the Contractor to address specific comments in his Operational Blasting Plan prior to submission.

3.4 PROTECTION FOR ADMINISTRATION OF DRILLING AND BLASTING COMPLAINTS

3.5 PREBLAST SURVEY

The Contractor shall provide one person from his organization and his specialist on vibration control (Seismic specialist, see paragraph 3.7.3) to work as a team with a representative of the Owner's Representative in making a preblast structural survey. A preblast survey of the interior and exterior of all structures shall be made within a one thousand five hundred (1500) foot radius from the production blasting areas. The Contractor must notify the property owners near the blasting areas of the preblast survey as defined below. All structures that may be affected by the blasting, as well as those enumerated in paragraph 3.7.3, will be inspected and their condition documented. Any existing outstanding architectural defects such as broken or fallen plaster or broken windows shall be photographically documented by digital video and with a minimum 7 mega-pixel digital camera with zoom capabilities. The Contractor shall provide methodology to be used in conducting the preblast survey and listing of structures, determined from the survey to be sensitive, with reasons for these structures being sensitive, within 1500 feet from the blasting areas. Photographs will be taken of all the surveyed structures. The Contractor will determine the elevation of all piers and record with photographs all floating vessels that are in the vicinity and that are vulnerable to wave propagation.

The Contractor shall certify that the survey was prepared prior to the start of any blasting under this contract. A copy of the Preblast survey shall be submitted for the Owner's Representative's approval in conjunction with the Operational Blasting Plan.

3.5.1 Prior to test blast program and Blasting activities, the following actions regarding property owners located within 1,500 feet of proposed blasting locations are required:

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A. Newspaper Advertisements-Advertisements in the local newspapers informing the public about the location, date and time of the Public Information Meetings.

B. Public Information Meetings

C. Door hangers providing information about the blasting and the request for pre-blast property inspection surveys to the property owners residing within 1,500 ft from the blast site.

D. Requests by first class mail to all property owners for pre-blast property inspections within the 1,500 foot radius of blasting

E. Where there has been no response to first requests, second requests by certified letter for pre-blast property inspections.

F. Where there has been no response to second requests, the Contractor shall inform the property owner by certified mail that he has not responded to both requests for inspections and will provide the date and time that blasting will be commencing .

3.5.2 During blasting activities, the process for addressing citizens complaints will be as follows:

A. Citizen complaints will be received through the Contractor.

B. The caller's name, address, phone number, and pertinent information will be recorded in a master complaint log to be maintained by the Contractor.

C. Contractor shall schedule and perform an inspection of the complainant's property within five calendar days of the date of the complaint.

D. The Contractor shall issue an acknowledgement letter not later than seven days from the inspection date as a follow up to the inspection and update the complainant as to the status of the final determination of the inspection results.

E. The Contractor shall provide to the complainant a final determination letter honoring, denying the claim within 90 days after cessation of all blasting on the contract. In no case shall the claims remain unresolved for a period exceeding 180 calendar days.

F. Inspection results, actions taken and all correspondence regarding the complaints shall be furnished to the Owner's Representative.

3.6 SAFETY

3.6.1 Drill Boat or Barge Safety

3.6.1.1 All onboard magazines shall be permanently secured to the deck as required by the Coast Guard.

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3.6.1.2 No high explosives shall be stored on the boat or barge deck in the open except for the one case that is to be loaded immediately into the bore holes. Any explosives remaining on deck shall be returned to the day magazine prior to the firing of any blast.

3.6.1.3 The firing line reel or spool shall be mounted on the rig in a manner that it cannot be lost overboard. An approved blasting machine shall be used for detonation regardless of the number of caps used. An electric blasting system shall not be used.

3.6.1.4 The amount of explosives permitted aboard the drill boat at any one time will be subject to the approval of the 'Owner's Representative, but in no case shall such amount exceed the amount permitted by appropriate codes and regulations.

3.6.1.5 The Contractor shall make necessary arrangements to prevent damage to any vessel, moored or underway, building or structure and preserve the crew or occupants thereon from exposure to injury as a result of the Contractor's operations. The Owner's Representative may require additional arrangements.

3.6.1.6 The Contractor shall have a certified marine survey of all floating plant proposed for underwater blasting work on this contract performed prior to starting any work, and shall provide the results to the Owner's Representative.

3.6.1.7 Automatic fire extinguishers of an appropriate type shall be installed on air compressors and in all engine compartments aboard vessels (drill boats, barges) where explosives are stored, handled, and used.

3.6.1.8 Remote fuel shut-offs and fire signaling devices shall be provided aboard the drill boats.

3.6.1.9 Loading of tubes and casings of dissimilar metals shall not be used because of possible transient electric currents from galvanic action of the metals and water.

3.6.1.10 Only water resistant blasting caps and detonating cords shall be used for all marine blasting. Loading shall be done through a non-sparking metal loading tube when a tube is necessary.

3.6.1.11 No blast shall be fired while any vessel under way is closer than 1,500 feet from the blast area. Those on board vessels or craft moored or anchored within 1,500 feet shall be notified before a blast is fired.

3.6.1.12 No blast shall be fired while any swimming or diving operations are in progress in the vicinity of the blasting area. If such operations are in progress, signals and arrangements shall be agreed upon to assure that no blast shall be fired while any person is in the water.

3.6.1.13 A red blasting flag, 18 inches by 30 inches with the word "EXPLOSIVES" thereon in white letters, at least six inches in height, shall be readily visible in all directions.

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NEW BEDFORD MARINE COMMERCE TERMINAL

3.6.1.14 The storage of explosive material shall be in accordance with 527 CMR 13.05(4).

3.6.1.15 When more than one charge is placed in under water, a float device shall be attached to an element of each charge in such a manner that it will b released by firing. Misfires shall be handled in accordance with 527 CMR 13.09(5).

3.6.2 Lightning

The Contractor shall furnish, maintain, and operate lightning-detection equipment during the entire period of blasting operations and during the periods that explosives are stored at the site. The equipment shall be installed where approved by the Owner's Representative. A lightning detector shall be operated at all times to detect lightning within a 50 mile radius. When the lightning-detection device indicates a blasting hazard potential, the Contractor shall perform the following:

A. Notify the Coast Guard and the Owner's Representative of the potential hazard.

B. Clear the buoyed area of all vessels and personnel.

C. Terminate all loading of holes and return unused explosives to the day storage area/day magazine.

D. Monitor the blast area to prevent any boat or vessels from inadvertently entering the blasting area during the lightning hazard.

E. Remove the lightning detector from the drill barge with the last evacuation vessel and continuously monitor the potential hazard until the danger has passed.

F. After sounding the All Clear Signal, notify the Coast guard and the Owner's Representative that the potential hazard has passed.

G. Resume operations only after all potential of hazard has passed.

3.6.3 All other applicable safety requirements shall be implemented in addition to that required above.

3.6.4 Navigation Control during Drilling, Loading, and Blasting Operations

3.6.4.1 The Contractor shall buoy the area with warning signs. The warning signs shall be legible from a distance of 200 feet and shall contain the message "DANGER - EXPLOSIVES IN USE" visible on either side of the sign. The Contractor shall operate two or more patrol boats during blasting operations equipped with a visible yellow flashing light, audible horn, and radio with a hailer, whose sole function shall be to monitor and maintain security in the blast area. Patrol boats shall be stationed at the drill barge and remain in the blasting area during all blasting operations. Land oriented access control and visual observation locations should be determined and approved by the Owner's Representative. The Contractor shall inspect and ensure there is no boat traffic within the buoyed work area prior to the firing of the blasting caps and until such time as the

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Contractor has sounded the "All Clear Signal". The Contractor shall establish and maintain a warning system as required by the Corps of Engineers Safety Manual. The Contractor shall equip and maintain his floating plant with radio equipment capable of communications with the Coast Guard. The Contractor, after each blast, upon inspecting the area, shall immediately notify the Coast Guard and the Owner's Representative if all clear or misfire is noted.

3.6.4.2 Coordination with the U.S. Coast Guard.

The Contractor shall notify the Coast Guard 24 hours prior to a scheduled shot and 2 hours prior to the actual shot. The channel must be kept open to vessel traffic at all times except as permitted by the Coast Guard and the Owner's Representative. Contact should be made with:

US Coast Guard New Bedford Marine Safety Unit
New Bedford, Massachusetts
Telephone: 508-999-0072

3.6.5 Contingency Plan in Case of Misfire, Inadvertent Initiator Extraction, or Accidental Loss of Down Lines

All loading of blasting holes shall be done early enough each day to allow time, in case of a misfire, inadvertent initiator extraction, or accidental loss of down lines, to implement a contingency plan for removing or detonating the explosives before dark. The Contractor shall submit a contingency plan to the Coast Guard and Owner's Representative prior to initiation of any blasting and shall notify both parties in the event of a misfire, inadvertent initiator extraction, or accidental loss of down lines. All undetonated explosives due to misfire, inadvertent initiator extraction, or accidental loss of down lines must be detonated. The Contractor shall immediately notify the Coast Guard upon giving the "All Clear Signal" after correcting the misfire, inadvertent initiator extraction, or accidental loss of down lines.

3.6.6 The Contractor shall notify the public at least 24 hours prior to any scheduled blast, and at least 2 hours prior to an actual blast. As a minimum, the following shall be notified:

New Bedford Police Department
871 Rockdale Avenue
New Bedford, Massachusetts 02740
Tel. (508) 991-6300

New Bedford Fire Department
868 Pleasant Street
New Bedford, Massachusetts 02740
Tel. (508) 991-6124

Fairhaven Police Department
1 Bryant Lane
Fairhaven, Massachusetts 02719
Tel. (508) 997-7421

Fairhaven Fire Department
146 Washington Street
Fairhaven, Massachusttes 02719

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Tel: (508) 994-1428

3.6.7 Bulk Product Specifications

A. Bulk blasting agents or explosives delivered to the work area shall be weighed by a certified weigh master at the transfer location nearest the work area to determine the actual quantity of explosives delivered each day.

B. Bulk storage tanks or vessels on barges shall be permanently attached to the barge and electrically grounded. A containment dike shall be erected to contain the maximum rated capacity of the storage vessel and all associated pumps and hoses for transfer operations. Pumps, hoses and valves containing bulk product after transfer operations shall be stored in a locked magazine.

C. All access ports, valves, vents and drains shall be secured to prevent vandalism or theft of the explosive product.

A flow metering device capable of measuring the quantity of explosives to within 0.5% of the actual quantity in pounds shall be utilized for all bulk transfer to or from the bulk storage vessel.

D. The delivery system to load holes on each drill frame shall be designed to load each hole to within 0.5% of the design quantity required for each drill hole.

E. Each drill frame shall measure the quantity of explosives loaded in all holes with weigh scales or flow metering devices to within 0.5% of the design quantity for each hole. The total of all loaded holes shall be checked with the total quantity delivered prior to subsequent bulk deliveries. Should the bulk quantity delivered vary from the recorded quantity loaded and detonated, all measuring devices and or meters shall be recalibrated to within the specified accuracy.

F. Each hole loaded with emulsions or slurry shall be initiated with two separate downlines, caps, boosters and starters. At least one booster shall be secured in the hole with a mechanical lock-in system or spider to prevent extraction of the booster or priming charge.

G. As a minimum the top elevation of the emulsion or slurry product shall be measured to check for voids and actual quantity loaded.

H. The blast plan shall include manufacturer's catalog cuts, data sheets and detailed plans and specifications for the bulk storage vessel and transfer system, drill frame delivery system associated loading tubes and reel systems and measuring devices.

I. All loading tubes or hoses shall be equipped to be retracted from the bottom of the hole to the top of the product as the emulsion or slurry is loaded in the hole. The system shall in effect place the product in each hole in a tremie method.

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3.6.8 Surface Blasting

Doby, or Surface Blasting, will not be allowed for the fragmentation of bedrock. Doby blasting is an allowable option for fragmenting boulders or large blast rubble when water depths are at least 30 feet.

3.7 BLASTING CONTROL

3.7.1 General

The blasting program and methods shall be those developed by the test blasting program and procedure to accomplish the excavation shown on the contract drawings in accordance with the procedures specified herein.

3.7.2 Blasting

Blasting shall be confined to daylight hours during the period from 2 hours after sunrise to 1 hour before sunset, but shall not be conducted before 9:00 A.M. or after 4:00 P.M. on the day of blasting. Blasting shall not be conducted when temperature inversions or heavy, low-level cloud cover exists. **Blasting will be prohibited on Saturdays, Sundays and Federal holidays.**

3.7.3 Vibration Control

Where blasting is necessary, the Contractor shall employ a specialist qualified in vibration control methods capable of analyzing results obtained from seismograph readings. A minimum of 30 days prior to commencement of blasting operations, the Contractor shall provide the Owner's Representative such bona fides of the seismic specialist to include, but not limited to, past experience, training, and education, and have working a knowledge of State and local laws and regulations which pertain to blasting. The acceptability of the specialist is subject to the approval of the Owner's Representative. The Contractor's seismic specialist shall place vibration monitors on any identified historic structures and shall determine the placement of at least 8 additional vibration monitoring machines per blast area (minimum 4 per shore) with approval of the Owner's Representative and shall be retained for loss control should contract blasting operations result in claims or complaints. The vibration monitoring plan shall identify the type of anchoring devices to be employed at various monitoring sites. Structures that should have monitoring machines include, at least, bulkheads, hazardous materials storage areas and buried utilities. At least one vibration monitoring machine must be placed between the blast and the nearest structure on a natural ground surface. This may require utilizing underwater locations. The other machines must be secured in the ground near identified sensitive structures. Blasting shall be controlled in such a manner that the maximum vibration level at any vessel or structure which is vulnerable to damage should not exceed the peak particle velocity of the appropriate municipality and geographical jurisdictions, or be subject to an unacceptable vibration frequency. A written and a telephone report on vibration intensity shall be submitted within 24 hours when specifically requested by the Owner's Representative or, without request, when such intensity exceeds a peak particle velocity of 2.0 inches per second for any one of the 3 perpendicular planes of motion. Peak Particle Velocity of 2.0 inches per second should not become the basis of design. Refer to 527 CMR

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13.09 chart (a)for assistance. The Contractor will perform a test blast (paragraph 4) which will determine a safe peak particle velocity (PPV) for all structures within the blast area. If historic structures are to be monitored, they shall be evaluated for sensitivity to vibration and monitored during blasting operations. The Contractor shall follow the following vibration limits for the structures listed below:

Historic Structures PPV<0.5 in/sec
Residential Structures in Massachusetts PPV<0.8 in/sec
Other Structures PPV<2.0 in/sec

The Contractor shall submit a copy of the record in tabular form for each blast to the Owner's Representative no later than 24 hours after each blast, with a written report on velocity and vibration effects. This should also include location of blast, size, spacing, number, top and bottom elevations of holes, type of explosives, amount of explosives and stemming per hole and delay, type of delays, sequence and pattern, distance from the blast to the vibration monitoring machine, and any other pertinent information.

3.7.3.1 The Contractor is advised to evaluate the vibration and airblast factors affecting structures and vessels in the vicinity of the blast area as determined in the preblast survey. It is recommended that the Contractor use a blast design that produces the maximum amount of relief practicable. The amount of explosives to be used will be determined during the test blast operation to meet all proper safety and environmental requirements. The Contractor is responsible that the fragmentation resulting from the blasting operation is of suitable size to allow for easy excavation by the Contractor's equipment. The Contractor shall also check water wave propagation to insure that shoreline structures and moored vessels within the blasting area will not be affected during blasting.

3.7.4 All blasting shall be monitored by the Contractor to determine air blast effects using an instrument approved by the Owner's Representative, operated by an experienced person with a minimum of 3 years of related experience with the type of equipment to be used throughout the project construction and all data furnished to the Owner's Representative. The instrumentation will be located at seismic station locations as determined in paragraph 3.7.3 and other locations as directed by the Owner's Representative with at least three (3) monitors located in the area closest to the blast site. Airblast equipment shall record waveform data. Recorded airblast data shall be submitted in conjunction with vibration intensity data as specified in paragraph 3.7.3, within 24 hours of each blast. The maximum allowable airblast shall not exceed 129 decibels.

3.7.5 If the Government decides to have a supplemental blasting monitoring program, under no circumstances will this relieve the Contractor of monitoring and controlling the blasting as specified in this Section or any other requirements.

3.8 TEST BLAST PROGRAM

3.8.1 Purpose

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The purpose of the test program is to allow the Contractor to establish safe limits of vibration and airblast overpressure, demonstrate the satisfactory performance of the drill boats and develop an operational blasting plan. The type of explosives and firing systems shall adhere to all applicable codes and regulations including, but not limited to, those cited in paragraph 1.1.1.

3.8.2 Test Blast Plan

3.8.2.1 The Contractor shall submit fifteen (15) copies of the Test Blast Plan for review. The Owner's Representative shall have 35 days for review after receipt. The Contractor may be required to revise and resubmit the plan. The 'Owner's Representative shall have 21 days review of the revised plan. Concurrence with the revised plan will not relieve the Contractor of his responsibility to produce safe and satisfactory results as set forth by these specifications. The test plan shall include as a minimum all pertinent information listed in paragraphs 3.8.4, 3.9.2 and 3.9.4.

3.8.2.2 Test blast programs shall be conducted by the Contractor for each area of rock such as discontinuity of rock contours and areas and as directed by the Owner's Representative. An optional test blast program for the glacial till shall be planned if determined by the Owner's Representative to be necessary. Each blast program shall involve all drill boats that will be used for any portion of the contract. No drill boat shall be used for the contract that has not participated in a test blast program.

3.8.2.3 The Contractor shall notify the Owner's Representative sufficiently in advance of each test blast in order for the Owner's Representative to be present during the test blasts. The Contractor shall also invite representatives of the Fire Departments from New Bedford and Fairhaven to the test blasts. The test blasts shall begin with a small number of charges and extend upward to the maximum yield to be used. The final test event shall simulate as close as practicable the explosives charge type, size, overlying water depth, charge configuration, charge separation, initiation methods, and emplacement conditions anticipated for the operational blasting program. During each blast the Contractor will analyze the effect of wave propagation on structures, vessels, etc., and take the appropriate actions to prevent damages.

3.8.2.4 The Contractor shall note additional conditions of the Test Blast Program as noted within Part 3.11 of this Section.

3.8.3 Post Blast Evaluation

3.8.3.1 After each test blast, the Contractor shall examine the structures of the preblast survey that were inspected and documented, to establish whether damage was caused to the structures. All damage resulting from the test blasting shall be reported in detail to the Owner's Representative, including photographs.

3.8.3.2 After each test shot the Contractor will excavate the fractured material to evaluate breakage, toe and top of cut. This information will be documented and provided to the Owner's Representative.

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3.8.4 Data Recording and Evaluation

The test blast program shall be conducted and reported in strict accordance with procedures outlined in the sections of these specifications covering vibration control and air blast control. The Contractor shall submit the blasting plans showing the location(s) and extent of the blasted areas. The blasting plans shall include the blasting patterns and the locations of patterns shall be drawn on plan sheet(s)(maps) in scale by providing coordinates of at least four (4) corners of the blasted area. Include information as to the number of holes, bottom and top elevations of holes, coordinates of each hole, amount of explosives and stemming per hole, type of delay in holes, sequence and pattern of delays, maximum peak particle velocity from each instrument, and peak overpressure reading in pounds per square inch and decibels from each airblast sensor. Information provided should also include a written analysis of each blast, including the maximum particle velocity in each plane, associated frequency in each plane and peak true vector sum of particle motion. In addition to the submission of an initial test blast plan, the Contractor is required to submit a documentation of each blast prior to proceeding forward the next blast test. The documentation shall include, but not limited to a written analysis of each blast, all observed test blasting data, examination of structures of the preblast surveys that were inspected, and information about excavation of fractured materials. Four copies of the record of each blast performed shall be submitted no later than 24 hours after completion of each test blast until the test blast program is completed. It is expected that the initial test blast will be used to develop knowledge of ground conditions, propagation characteristics, etc. At the conclusion of the test blast program, the Contractor shall examine all reports, surveys, test data, and other pertinent information. Conclusions reached shall be the basis for developing a completely engineered procedure for blasting. Five copies of the Test Blast Plan and results shall be provided to the Owner's Representative. In no event shall the operational blasting proceed until the review of the developed procedure for blasting has been completed and the procedures approved.

3.9 OPERATIONAL BLASTING PLAN

3.9.1 The Contractor shall submit to the Owner's Representative ten (10) copies of the Proposed Operational Blasting Plan for review. The Owner's Representative shall have 35 days for review after receipt. The Contractor may be required to revise and resubmit the plan. The Owner's Representative shall have 21 days review of the revised plan. Concurrence with the revised plan will not relieve the Contractor of his responsibility to produce safe and satisfactory results as set forth by these specifications.

3.9.2 Environmental Impact of Blasting

3.9.2.1 The Contractor shall follow the following guidelines and incorporate the following measures when preparing its Operational Blasting Plan and shall use the following measures to minimize its impact to the aquatic environment to the extent possible. These measures include:

1. Evaluate the need to use explosives. If practical alternatives are available and not excessively expensive to remove rock without blasting, the Contractor shall utilize those methods.

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2. Plan the blasting program to minimize the total weight of explosive charges per shot and the number of shots for the project.
3. Use angular stemming material of sufficient length in drill holes to reduce energy dispersal to the aquatic environment.
4. Subdivide the charge, using detonating caps with delays or delay connectors with detonating cord, to reduce total pressure. The Contractor shall not use submerged detonation cord unless the Contractor can show that no other method is practicable.
5. The Contractor shall use decking when possible in lengthy drill holes to reduce total pressure.
6. For seismic exploration use non-explosive sources when possible or use linear charges for open water shots or buried charges.
7. Use shaped charges to focus the blast energy when submerged surface charges are necessary, reducing energy released to the aquatic environment during demolition.
8. Contractor shall enclose blast areas with silt curtains and bubble curtains to keep fish species away from the blast area and minimize the pressure wave and turbidity generated from blasting.
9. Contractor shall use non-explosive noise techniques to move fish and marine mammals from the immediate blast zone.
10. All blasting shall be conducted using inserted delays of a fraction of a second per hole.
11. Stemming, in which rock is placed into the top of the borehole to damp the shock wave reaching the water column, thereby reducing fish mortalities from blasting, shall be utilized.
12. All blasting operations shall take place utilizing sonar to identify fish schools and with a fisheries observer (hired by the Contractor) who is approved by the Massachusetts Division of Marine Fisheries (and National Marine Fisheries Services) in attendance. The fisheries observer shall observe for fish mortality. If excessive mortalities (hundreds of fish/event) occur, then additional technologies, bubble curtains shall be considered for use.
13. There shall be no blasting during the passage of schools of fish or when a marine mammal is present as determined by the fisheries observer (as required in item 12 above).
14. Blasting shall be conducted with a fish startle system.

3.9.3 No drilling shall be started before the Owner's Representative reviews and concurs with the final blasting plan or any revisions to that plan.

3.9.3.1 Any changes to the Contractor's blasting or monitoring procedures, equipment, plant, products or personnel must be reflected in a revised Operational Blasting Plan or supplement and must be approved by the Owner's Representative prior to implementation.

3.9.4 The Blasting Plan shall include as minimum requirements the following:

1. Proposed method of transportation, storage, and handling of explosives.

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2. Plan showing layout of drill hole pattern, timing and sequence, anticipated burden dimensions and depth of subdrilling.

3. Plan for the fragmentation of large boulders and blast rubble.

4. Type of explosives and method of loading and detonating.

5. Type of blasting machine to be used and when last tested.

6. Specific gravity of explosives and manufacturer's technical literature.

7. Initiation system to be used and explosive loading in pounds of explosive per delay.

8. Indication as to whether decking or boosters will be used and the depths of required stemming.

9. Type and number of drilling rigs, including drill hole diameter, and expected production rates/day.

10. Type of instrumentation to be used, manufacturer, and when last calibrated and certified.

11. Procedure for monitoring the blast operations.

12. List of permits and clearances required, when applied for, and date of approval or anticipated approval.

13. A format for maintaining a record of individual blasts throughout the life of the job designed to record pertinent data before, during, and after the blasting operation. Pertinent information shall include, but not limited to, number of holes, bottom and top elevations of holes, coordinates of each hole, amount of explosives and stemming per hole, type of delay in holes, and sequence and pattern of delays.

14. Names and qualifications of specialists for vibration control analysis and airblast over- pressure measurements (refer to paragraph 3.7.3 for exacting requirements).

15. Location plan, manufacturer's literature, and parameters to be used in site selection for seismic instrumentation.

16. Plan showing location of warning signs and signals and the Contractor's land and marine spotters.

17. Name and address of Contractor's representative to which any claims for damage due to blasting should be addressed.

18. The plan, signed off by the Contractor's jobsite authorized representative.

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19. The location of monitoring equipment, based on information from the preblast survey.

20. Contingency Plan for Lightning Hazard

21. The 527 CMR 13.00 Uniform Blasting Site Detail Check List - (Attached at the end of this Section).

22. Complete Project Team Organization with duties, responsibilities and authorities clearly defined. This organizational outline shall also include a listing of all personnel authorized to sign for, receive and use explosives on this contract.

23. Complete list of floating plant involved in production blasting operations.

24. Provide analysis and control of potential hazard due to possibility of undetonated Pourvex remaining from previous deepening.

The Contractor shall submit the blasting plans showing the location(s) and extent of the blasted areas. The blasting plans shall include the blasting patterns and the locations of patterns shall be drawn on the maps in scale by providing coordinates of at least four (4) corners of blasted areas.

3.9.4 If drilling and blasting is required outside the buoyed areas, the Contractor shall submit a plan to maintain **the previous authorized depth**, as part of the Operational Blast Plan. This plan shall include areas where the buoy cannot be removed.

3.10 DRILL LOG AND BLAST REPORT

The Contractor shall prepare and complete drill logs and report for each blast is completed. Information provided on the logs shall include, at a minimum:

1. Name, signature, and Certificate of Competencey Number of the blaster in charge.
2. Blast location, address, city description.
3. Drill rig type, construction of rig, name of driller in charge, location of borehole in Massachusetts State Plane coordinates.
4. Depth of boring in MLLW. Position within borehole of explosives at time of detonation.
5. Date and time of blast.
6. Type of material blasted.
7. Distance in feet, to the nearest inhabited building or structure, neither owned or leased by holder or holder client of the Explosives User Certificate issued by State Fire Marshall.
8. Scaled distance or alternative option used to determine blast design.
9. Type of matting or cover over blast, if applicable.
10. Weather conditions, including temperature, cloud cover, wind direction.

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11. Blast plan and sketch showing blast hole diameter, delay, delay patter, and types of detonators, spacing, depth of blast hole, hole pattern and number of holes.
12. Explosive material type, size, total weights of each explosive by hole.
13. Type of initiation system (Methods of firing and type of circuit).
14. Feet of overburden, depth and type of stemming.
15. Maximum weight of explosives detonated within any eight millisecond period.
16. The seismograph(s) location(s) including distance and direction from the seismograph to the closest borehole and from the seismograph to the closest structure.
17. Seismograph readings including peak particle velocity, frequency and airblast.
18. Type of seismograph, instrument make, model serial number, calibration date and sensitivity settings.
19. Name of person taking the seismograph reading. The name and firm analyzing the seismograph record, if applicable.
20. Complaints or comments following blast.

3.11 POTENTIAL IMPACT TO HURRICANE BARRIER

A study regarding the potential impacts to the New Bedford Hurricane Barrier was completed in response to requests from the U.S. Army Corps of Engineers, in order to determine the potential impact to the Hurricane Barrier associated with blasting for this project, and is included within the "Data Report - New Bedford Marine Commerce Terminal", attached to Section 00800 of the Contract Documents. The study resulted in a determination of the maximum charge weights per delay as a function of distance from the Hurricane Barrier, which were subsequently halved in order to provide an additional factor of safety of 2.

During completion of the Contractor's Test Blast program, as outlined within Part 3.8 of this Section, the Contractor shall measure particle velocity as a function of distance from the Hurricane Barrier. The Contractor shall advance all borings or other subsurface investigations, as necessary, to collect this data. Portable seismographs capable of measuring peak particle velocity in three mutually perpendicular directions and frequency shall be utilized for this work. After having collected this data, the Contractor shall forward the data to the Owner's Representative for interpretation.

The Owner's Representative will generate a site specific graph of scaled distance versus peak particle velocity on a log-log plot. In this context, the scaled distance is the distance in feet from the blast divided by the square root of the weight of the charge per delay in pounds. The data from the test program will be analyzed by fitting a best-fit regression line to provide the site specific values of velocity intercept and slope factor. The frequency of the blast vibrations will also be reviewed and compared to assumed values from the Hurricane Barrier study. The site specific values will be used to determine the final allowable blasting criteria for production blasting at the site. ***If the final allowable blasting criteria are determined to be lower than the values in the table listed below, the Contractor shall use the lower of the two values.***

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As a result, the maximum charge weight per delay as a function of distance from the nearest point of the New Bedford-Fairhaven Hurricane Barrier shall not exceed the lower of either the values calculated by the Owner's Representative during the Test Blast Program (as determined above) or the following tabulated values:

Distance from Hurricane Barrier (ft)	60 to 90 Hz	10 to 60 Hz
	Charge Weight per delay (lbs)	Charge Weight per delay (lbs)
250	2.5	4.2
300	3.6	6.0
350	4.9	8.2
400	6.4	10.7
450	8.1	13.6
500	10.0	16.8
550	12.1	20.3
600	14.4	24.2
700	19.7	32.9
800	25.7	43.0
900	32.5	54.4
1000	40.2	67.2
1100	48.6	81.4
1200	57.9	96.8

- End of Section -

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12.2 Codes, Regulations & Ordinances

12.2.1 Code of Massachusetts Regulations, Title 527, Section 13

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12.2.2 EM385-1-1 (2008) - Section 29 "Blasting"

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SECTION 29

BLASTING

29.A GENERAL

29.A.01 Prerequisites.

a. Permission in writing shall be obtained from the GDA before explosive materials are brought onto the job site. Periodic replenishment of approved supplies does not require written approval.

b. Prior to bringing explosives on site, the contractor shall develop a blasting safety plan. As a minimum, this plan shall be accepted by the GDA and include the following:

(1) List the names, qualifications, and responsibilities of personnel involved with explosives;

(2) The Contractor's requirements for handling, transportation, and storage of explosives; employee training programs and certifications; types of explosives; schedule of activities and loading procedures; detailed blasting schedule; explosives transportation route; safety signals methods and locations; danger area clearance; methods for securing the site; seismograph, vibration and damage control; test shots, post-blast inspection and misfire procedures; provisions for disposal of explosives, blasting agents, unused and associated material; and post-blast ventilation requirements;

(3) Public relations requirements before and after blasting (e.g.; community communication, protection of structures and personnel).

c. If work is performed with military explosives, the blasting plan is required to be submitted (throughout the chain of command,

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ref. EM 385-1-97, Chapter IV.C) to DDESB upon request. (DoD 6055.09-STD, paragraph C1.3.1 and EM 385-1-97).

29.A.02 The transporting, handling, storage, and use of explosives, blasting agents, and blasting equipment shall be directed and supervised by a person of proven experience and ability in blasting operations in accordance with ANSI A10.7; 29 CFR 1910.109; 29 CFR 1926, Subpart U; 27 CFR 555; the manufacturers, the Institute of Makers of Explosives (IME), and, where applicable, DoD 6055.9-STD. ***> See 26.J.***

29.A.03 All persons working with explosives shall be in good physical condition and be able to understand and give written and verbal orders.

29.A.04 Warning signs shall be provided at points of access to blasting area.

29.A.05 Operations involving the handling or use of explosive materials shall be discontinued and personnel moved to a safe area during the approach or progress of a thunderstorm or dust storm; controls will be established to prevent accidental discharge of electric blasting caps from extraneous electricity.

29.A.06 Blasting operations near overhead power lines, communications lines, utility services, or other structures shall not be carried on until the operators and/or owners have been notified and measures for safe control have been taken.

29.A.07 All loading and firing shall be directed and supervised by one designated person.

29.A.08 A positive system to detect and measure the probability of lightning or massive static electrical discharges shall be used.

29.A.09 Before adopting any system of electrical firing, a thorough survey shall be made for extraneous currents and all dangerous currents shall be eliminated before any holes are loaded.

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29.A.10 Blasts using electric detonators shall be fired with an electric blasting machine or a properly designed power source.

a. Blasts using non-electric detonators shall be fired by a blasting machine or starting device prescribed by the manufacturer.

b. When blasting near radar or radio transmission facilities or near electrical energy sources where testing has shown that RF energy or stray electrical current may present a hazard to electrical blasting, an approved non-electrical initiation system shall be employed.

c. When electric detonators are used, leg wires shall be short circuited (shunted) until connected into the circuit for firing.

29.A.11 Detonating cord shall be initiated by non-electric detonator (cap and fuse), electric detonator, shock tube detonator or gas initiated detonator in accordance with the manufacturer's recommendation.

29.A.12 Delay electric detonators, non-electric delay detonators, detonating cord connectors, or sequential blasting machines shall be used for all delayed blasts; the practice shall conform to the manufacturer's recommendations.

29.A.13 Blasting machines.

a. Blasting machines shall be operated, maintained, tested, and inspected as prescribed by the manufacturer.

b. Blasting machines shall be tested prior to use and periodically thereafter as prescribed by the manufacturer.

c. Blasting machines shall be secured and accessible only to the blaster; only the blaster shall connect the leading wire to the machine.

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29.A.14 When energy for blasting is taken from power circuits, the voltage shall not exceed 550 volts. The wiring controlling arrangements shall conform to the following (see Figures 29-1 and 29-2):

FIGURE 29-1

POWER FIRING SYSTEMS FOR SERIES AND PARALLEL SERIES FIRING (NO ARCONTROLLER)

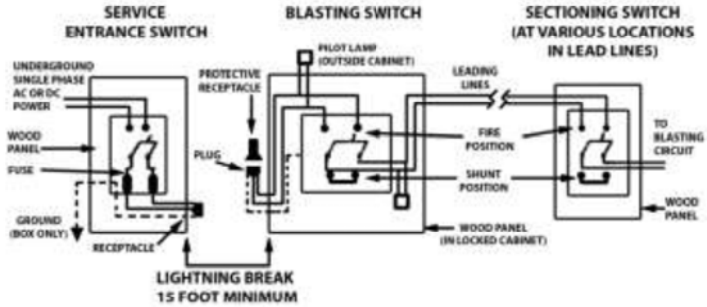
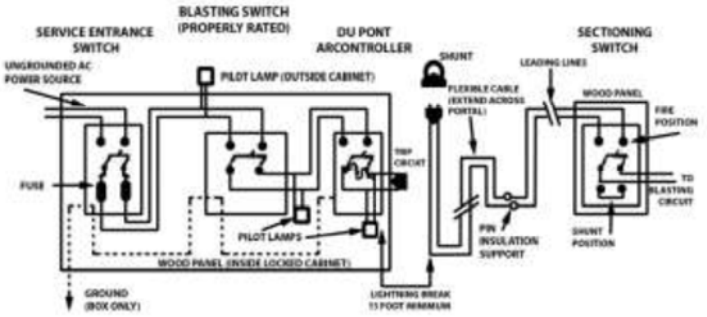


FIGURE 29-2

RECOMMENDED INSTALLATION OF SHOOTING STATION AND ACCESSORY ARRANGEMENT FOR USING ARCONTROLLER



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a. The blasting switch shall be an ungrounded UL (or other nationally-recognized testing laboratory) listed, enclosed, externally operated double-pole double-throw switch that, when locked in the open position, will shunt the firing lines.

b. A grounded switch shall be installed between the blasting switch and the power circuit at a distance not less than 15 ft (4.5 m) from the blasting switch.

c. A lightning gap of at least 15 ft (4.5 m) shall be provided between the two switches; the gap connection shall be made by cable, plug, and receptacle.

29.A.15 The cable between switches shall be disconnected and both switches shall be locked in the open position immediately after firing the shot.

29.A.16 Keys to the switches shall remain in the possession of the blaster at all times.

29.A.17 Insulated solid core wires of an appropriate gage in good condition shall be used for all lines.

29.A.18 Sufficient firing line shall be provided to permit the blaster to be located at a safe distance from the blast.

29.A.19 Mechanized equipment (including drills) shall not be operated within 50 ft (15.2 m) of a loaded hole. **EXCEPTION:** Mechanized equipment may be permitted to operate within 50 ft (15.2 m) of a loaded hole when placing blasting mats or back covering.

29.A.20 The use of black powder shall be prohibited.

29.A.21 All refuse from explosive loading such as empty boxes, paper, and fiber packing shall not be used again for any purpose, but shall be destroyed by burning at an approved location.

29.A.22 Storage of explosives.

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a. The storage of explosives shall be in accordance with requirements of the Bureau of Alcohol, Tobacco, and Firearms (as outlined in 27 CFR 555, Subpart K) or the State in which they are stored.

b. An accurate running inventory of all explosives and blasting agents stored at the project shall be maintained: two copies shall be maintained - one at the magazine and one in a facility which is at least 50 ft (15.2 m) from the magazine.

29.A.23 Security of Explosives.

a. Area shall be guarded to control access to the explosives and ensure no tapping with explosives during non-working times.

b. Explosive materials shall not be abandoned.

29.B TRANSPORTATION OF EXPLOSIVE MATERIALS

29.B.01 Transportation of explosives by the following modes shall be in accordance with the prescribed federal regulations and the applicable state requirements.

a. Transportation of explosive materials over public highways shall be in accordance with DOT requirements.

b. Marine transportation of explosive materials shall be in accordance with USCG requirements.

c. Transportation of explosive materials by aircraft shall be in accordance with FAA requirements.

29.B.02 Vehicles used for transportation of explosive materials shall not be loaded beyond their rated capacity and the explosive materials shall be secured to prevent shifting of load or dislodgment from the vehicle; when explosive materials are transported by a

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vehicle with an open body, a magazine or closed container shall be securely mounted on the bed to contain the cargo.

29.B.03 Vehicles transporting explosive materials shall display all placards, lettering, and/or numbering required by DOT.

29.B.04 Explosive materials and blasting supplies shall not be transported with other materials or cargoes. Blasting caps (including electric) shall not be transported in the vehicle or conveyance with other explosives unless the conditions of 49 CFR 177.835(g) are met.

29.B.05 Personnel.

a. Vehicles for transportation of explosive materials shall be in the charge of and operated by a person who is physically fit, careful, reliable, able to read and understand safety instructions, and not under the influence of intoxicants or narcotics.

b. Only the authorized driver and a properly trained helper shall be permitted to ride on any conveyance transporting explosive materials or detonators.

29.B.06 Vehicles used in the transportation of explosives shall be substantially constructed, in good repair, and shall have tight beds to prevent explosives from falling from the vehicle. The ends and sides of vehicles shall be high enough to prevent containers from falling off.

29.B.07 Explosives shall not be exposed to sparking metal during transportation. When steel or part steel bodies are used, non-sparking cushioning materials shall separate the containers of explosives from the metal.

29.B.08 No spark-producing tools, carbides, oils, matches, firearms, electric storage batteries, flammable substances, acids, or oxidizing or corrosive compounds shall be carried in the bed or body of any vehicle transporting explosive materials.

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29.B.09 Vehicles transporting explosive materials shall be equipped with one or more fire extinguishers having a rating of 10-B:C and placed at strategic points.

a. The extinguishers shall be of a type listed by a nationally-recognized testing laboratory and shall be ready for use.

b. The driver will be trained in the use of the extinguisher.

29.B.10 A vehicle containing explosive materials shall not be taken into a garage or repair shop, parked in congested areas, or stored at any time in a public garage or similar building.

29.B.11 Vehicles transporting explosive materials shall be operated with extreme care. Full stops shall be made at approaches to all railroad crossings and main highways, and the vehicles shall not proceed until it is known that the way is clear.

29.B.12 No vehicle shall be refueled while explosive materials are on the motor vehicle except in an emergency.

29.B.13 Persons employed in the transportation, handling, or other use of explosive materials shall not smoke or carry on their persons or in the vehicle, matches, firearms, ammunition, or flame-producing devices.

29.B.14 Provision shall be made for safe transfer of explosive materials to magazine vessels including substantial ramps or walkways free of tripping hazards.

29.B.15 Vehicles transporting explosive materials shall not be left unattended.

29.B.16 The hoist operator shall be notified before explosive materials are transported in a shaft conveyance.

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29.B.17 Explosive materials shall be hoisted, lowered, or conveyed in a powder car. No other materials, supplies or equipment shall be transported in the same conveyance at the same time.

29.B.18 No person shall ride in any shaft conveyance transporting explosive materials. Loading and unloading shall be accomplished only when the conveyance is stationary.

29.B.19 No explosive materials shall be transported on any locomotive. At least two car lengths shall separate the locomotive from the powder car.

29.B.20 No explosive materials shall be transported on a man haul trip.

29.B.21 The car or conveyance containing explosive materials shall be pulled, not pushed, whenever possible.

29.B.22 The powder car or conveyance built for transporting explosive materials shall bear a reflectorized sign with a sharply contrasting background on each side with the word **"EXPLOSIVES"** in letters not less than 4 in (10.1 cm) in height.

29.C HANDLING OF EXPLOSIVE MATERIALS

29.C.01 There shall be no smoking, open lights, or fire of any kind within 50 ft (15.2 m) of any area where explosives are being handled. No source of ignition, except necessary means to light fuses or fire electric detonators, shall be permitted in an area containing loaded holes.

29.C.02 Containers of explosive materials shall be opened only with non-sparking tools or instruments. Metal cutters may be used for opening fiberboard boxes, paper bags or plastic tubes.

29.C.03 Explosive materials shall be removed from containers only as they are needed for immediate use.

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29.C.04 Explosive materials and detonators or primers shall be separated and taken to the blasting area in original containers, Type 3 Magazines, or containers prescribed by 49 CFR 177.835.

29.C.05 Primers shall not be made up in excess of immediate need for holes to be loaded.

29.C.06 Primers shall not be made up in or near magazines or excessive quantities of explosive materials.

29.C.07 After loading of a blast is completed, all excess explosive materials and detonators shall be removed to a safe location or returned at once to the storage magazines, observing the same rules as when being conveyed to the blasting area.

29.C.08 The quantity of explosive materials taken to an underground loading area shall not exceed the amount estimated to be necessary for the blast.

29.C.09 Detonators and explosive materials shall be taken separately into pressure working chambers.

29.D ELECTROMAGNETIC RADIATION

29.D.01 Blasting operations or storage of electrical detonators shall be prohibited in vicinity of operating RF transmitters or other RF producing devices except where the clearances in ANSI C95.4 can be maintained.

29.D.02 When necessary to perform blasting operations at a distance less than those shown in ANSI C95.4 tables, an approved non-electric initiation system shall be used.

29.D.03 Mobile radio transmitters, which are less than 100 ft (30.4 m) away from electric blasting caps in other than original containers, shall be de-energized and effectively locked, except in blasting areas where a non-electric initiation system as described in 29.A.11 is used.

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29.E VIBRATION AND DAMAGE CONTROL

29.E.01 Blasting operations in or adjacent to cofferdams, piers, underwater structures, buildings, structures, or other facilities shall be carefully planned with full consideration for all forces and conditions involved.

29.E.02 Prior to initiation of vibration controlled blasting operations, a written plan for monitoring the operations shall be established.

29.E.03 When appropriate, owners, occupants, and the public shall be notified of the nature of blasting operations to be undertaken and controls to be established.

29.E.04 Where vibration damage may occur, energy ratios and peak particle velocities shall be limited in accordance with state requirements or the requirements in Table 29-1, whichever is more stringent. When any recording indicates either the energy ratio or peak particle velocity limits have been exceeded, blasting shall be suspended and the designated authority (Government and Contractor) shall be immediately notified; blasting shall not be resumed until the probable cause has been determined and corrective measures taken.

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TABLE 29-1

ENERGY RATIO AND PEAK PARTICLE VELOCITY FORMULA

The maximum total energy ratio (ER) shall be limited to 1.0, calculated as follows: $ER = (3.29FA)^2$ where: F = frequency in cycles per second A = amplitude in inches The total energy ratio is equal to the arithmetic sum of the energy ratios in the 3 mutually perpendicular planes of motion in the vertical and horizontal directions at any one instant of time.
The maximum total peak particle velocity (PV) shall be limited to 1.92, calculated as follows: $PV = A/t$ where: A = amplitude in inches t = time in seconds The total peak particle velocity is equal to the vector sum of the particle velocities in the 3 mutually perpendicular planes of motion in the vertical and horizontal directions at any one instant of time.

29.E.05 Where required by State regulations, scaled distances shall be determined before each shot and included in the records. Scaled distances shall not exceed limitations set by the State.

29.E.06 Air blast pressure exerted on structures resulting from blasting shall not exceed 133 dB (0.013 psi).

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29.E.07 The monitoring, recording, and interpreting of vibrations shall be by qualified personnel. Records and interpretations shall be furnished to the GDA.

29.F DRILLING AND LOADING

29.F.01 All drill holes shall be sufficiently large enough to freely allow for the insertion of the explosives.

29.F.02 Drilling shall not be done in an area already blasted until remaining "bootlegs" are examined for unexploded charges and the total area has been examined to make sure that there are no unexploded charges remaining.

a. Never insert a drill, pick, or bar into bootlegs even if examination fails to disclose explosives.

b. When misfires have occurred and drilling must be done in an area where undetonated holes may exist, holes shall not be drilled where there is danger of intersecting a misfired hole.

c. All drilling necessary to neutralize misfires must be done under the supervision of a competent person who has a working knowledge of the explosive materials involved and is familiar with the conditions under which the misfired holes were drilled, loaded, primed, and initiated, and is familiar with the drilling equipment capabilities that will be used during the neutralization.

29.F.03 Drilling and loading operations shall not be carried on in the same area. Drilling shall be separated from loaded holes by at least the depth of the loaded hole but in no case less than 50 ft (15.2 m).

29.F.04 No person shall be allowed to deepen drill holes that have contained explosives or blasting agents.

29.F.05 Holes shall not be drilled so that they disturb or intersect a loaded hole.

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29.F.06 See Section 18.H for earth drilling requirements.

29.F.07 The loading or loaded area shall be kept free of any equipment, operations, or persons not essential to loading; no vehicle traffic shall be permitted over loaded holes; the blast site shall be guarded or barricaded and posted with danger signs to restrict unauthorized entry.

29.F.08 No holes shall be loaded except those to be fired in the next round of blasting; after loading, all remaining explosive materials and detonators shall be immediately returned to an authorized magazine; no explosive materials or loaded holes shall be left unattended at the blast site at any time.

29.F.09 Loading of sprung or jet-pierced holes shall be prohibited until it is established that the hole has cooled sufficiently to allow loading.

29.F.10 No explosive shall be loaded or used underground in the presence of combustible gases or combustible dusts unless the conditions of use have been thoroughly identified and accepted, in writing, as safe by a competent person qualified by a thorough knowledge of the factors to be evaluated or by the written permission of the authority having jurisdiction where an authority exercises jurisdiction.

29.F.11 Cartridges shall be primed only in the number required for a single round of blasting.

29.F.12 No detonator shall be inserted in explosive materials which do not have a cap well without first making a hole in the cartridge with a non-sparking punch of proper size, or the appropriate pointed handle of a cap crimper.

29.F.13 Cartridges shall be seated by even steady pressure only.

29.F.14 Tamping shall be done with wood rods without exposed metal parts. Non-sparking metal connectors may be used for joint poles. An approved plastic tamping pole may also be used.

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29.F.15 Springing boreholes.

a. A borehole shall never be sprung when it is adjacent to or near a hole that is loaded.

b. Flashlight batteries shall never be used as a power source to replace a blasting machine when springing boreholes.

29.F.16 Use of detonating cord.

a. Detonating cord shall be handled and used with the same respect and care given other explosives. Care shall be made to avoid damaging or severing cord during and after loading and hooking-up.

b. When using a detonating cord down line, after the primer is loaded in the hole, the detonating cord shall be cut from the supply reel before loading the rest of the charge.

c. Detonating cord connections shall be positive in accordance with recommended methods. Knot or other cord-to-cord connections shall be made only with detonating cord in which the explosive core is dry.

d. All detonating cord trunk lines and branch lines shall be free of loops, sharp kinks, or angles that direct the cord back toward the oncoming line of detonation.

e. When connecting a detonator to detonating cord, the detonators shall be taped or otherwise attached securely along the side or the end of the detonating cord, with the end of the detonator containing the explosive charge pointing in the direction in which the detonation is to proceed.

f. Detonators for firing the trunk line shall not be brought to the loading area nor attached to the detonating cord until everything else is in ready for the blast.

29.F.17 The blaster shall keep an accurate, up-to-date record of explosives, blasting agents, and blasting supplies used in a blast.

29.F.18 Loaded holes shall be stemmed to the collar with non-combustible material.

29.F.19 All loaded holes or charges shall be checked and located and all detonating cord connections shall be inspected before firing the blast.

29.F.20 All charges shall be covered with blasting mats or back covered before firing where blasting may cause injury or damage by flying rock or debris. Where mats are used, care shall be taken to protect electric blasting circuits.

29.G WIRING

29.G.01 In any blast using electric detonators, all blasting caps shall be from the same manufacturer.

29.G.02 Wiring.

a. Bus wires shall be single solid wires of sufficient current carrying capacity.

b. The insulation on all firing lines shall be adequate and in good condition.

29.G.03 The number of electric blasting caps in a circuit shall not exceed the capacity of blasting machine or power source.

29.G.04 A power circuit used for firing electric detonators shall not be grounded.

29.G.05 Whenever the possibility exists that a leading wire might be thrown onto a live power source by the force of the explosion, care shall be taken to see that the total length of wires is kept too short to contact the source or that the wires are securely anchored

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to the ground. Alternatively, de-energize the live power until it is certain during the post blast inspection that the lines have not crossed. If these requirements cannot be met, a non-electric system shall be used.

29.G.06 The manufacturer's shunt shall not be removed from the cap leg wires until the cap is connected to the lead line or to another cap in preparation for the assembly of two or more caps into a series circuit or when the cap is to be tested.

29.G.07 No lead wire shall be connected to the circuit until it has been grounded to dissipate any static charge.

29.G.08 The circuit, including all caps, shall be tested with an approved blasting instrument (blasting galvanometer, blasting ohmmeter, blaster's ohmmeter, or blaster's multimeter) before being connected to a firing line.

29.G.09 No firing line shall be connected to a blasting machine or other power source until the shot is to be fired. The firing line shall be checked with an approved blasting instrument before being connected to the blasting machine or other power source.

29.G.10 When a single series of caps is to be fired, or a number of series of caps is to be fired as a series-in-parallel circuit, the resistance of the circuit shall be checked with an approved blasting instrument.

29.G.11 For series-in-parallel circuits, each series shall have the same resistance.

29.G.12 Each series circuit shall be separately tested for two readings:

a. To ensure that the series is complete; and

b. To ensure that each series shows the same resistance and that this resistance is as close to the calculated resistance for such a series of caps as the testing instrument will read. If the

first reading shows a series to be incomplete, the faulty cap or connection shall be located and corrected. If the second reading shows incorrect resistance, the cause shall be found and corrected.

29.H FIRING

29.H.01 Prior to the firing of a shot, all persons in the danger area shall be warned of the blast and ordered to a safe distance from the area. Blasts shall not be fired until it is certain that every person has retreated to a safe distance and no one remains in a dangerous location.

29.H.02 Prior to the firing of a shot, a competent flag person shall be posted at all access points to danger areas.

29.H.03 Prior to the firing of a shot, drill boats and other vessels shall be moved a safe distance from the danger area.

a. Prior to and while the drill boat or vessel is being moved from the danger area, a series of short signals by horn or whistle similar to the usual navigation warning signals shall be given.

b. No blast shall be fired while any vessel under way is closer than 1,500 ft (457.2 m) to the underwater blasting area. Those on board vessels or craft moored or anchored within 1,500 ft must be notified before a blast is fired.

c. No blast shall be fired closer than 250 ft (76.2 m) to a boat or vessel containing an explosive magazine; personnel engaged in drilling operations on another drill boat within 500 ft (152.4 m) shall leave the drill frames for cover if any holes have been loaded.

d. No blast shall be fired while any swimming or diving is in progress near the blasting area.

e. Whenever a drill boat is moved from the drilling setting, all loaded under water holes shall be fired.

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29.I POST-BLAST PROCEDURES

29.I.01 Immediately after blast has been fired, the firing line shall be disconnected from the blasting machine or power source. Power switches shall be locked open. Atmospheres in confined areas shall be tested and/or ventilated after blast.

29.I.02 An inspection shall be made by the blaster to determine that all charges have been exploded. All wires shall be traced and search made for unexploded cartridges.

29.I.03 Other persons shall not be allowed to return to the area of the blast until an "all clear" signal is given.

29.I.04 Loose pieces of rock and other debris shall be scaled down from the sides of the face of excavation and the area made safe before proceeding with the work.

29.I.05 Misfires.

a. Misfires shall be handled under the direction of the blaster. The blaster shall determine the safest method for handling the hazards of misfires (some misfires may require consultation with the supplier or manufacturer of the explosive material).

b. When a misfire is declared, the blaster shall wait 1-hour before inspecting the site and provide proper safeguards for excluding all employees, except those necessary to do the work, from the danger zone.

c. No other work shall be done except that necessary to remove the hazard of the misfire. Only those employees necessary to do the work shall remain in the danger zone.

d. No drilling, digging, or picking shall be permitted until all misfire holes have been detonated or the blaster has approved that work can proceed.

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e. Based on contractor experience, a secondary/dual initiation system to prevent misfires should be considered.

29.J UNDERWATER BLASTING

29.J.01 A blaster shall conduct all blasting operations. No shot shall be fired without his approval.

29.J.02 Loading tubes and casings of dissimilar metals shall not be used because of possible electric transient currents from galvanic action of the metals and water.

29.J.03 Only water-resistant blasting caps and detonating cords shall be used for all marine blasting. Loading shall be done through a non-sparking metal loading tube when necessary.

29.J.04 Blasting flags shall be displayed.

29.J.05 The storage and handling of explosive materials aboard vessels used in underwater blasting operations shall be according to provisions in 29.A and 29.C.

29.J.06 When more than one hole is loaded to be fired underwater, a steel shot line shall be anchored and floated over the row of loaded holes.

a. The detonation down line from each loaded hole shall be tied to the steel line and the loose end shall be tied to the detonation trunk line.

b. After the trunk line fires, the steel shot line shall be inspected for misfires. Misfires shall be handled in accordance with the requirements of 29.I.05.

29.J.07 When drilling near or adjacent to a loaded hole, drilling shall be limited to vertical holes only. Drilling shall be separated from loaded holes by the depth of water plus the depth of the loaded hole.

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a. If a solid casing or drill mast - vertically plumbed with an inclinometer - is extended from the barge and firmly seated on bedrock, the distance between a loaded hole and one being drilled shall be 1/3 the depth of the hole, with a minimum of 8 ft (2.4 m) between the loaded hole and the one being drilled.

b. Drilling shall be halted to check alignment with an inclinometer every 4 ft (1.2 m) of hole depth.

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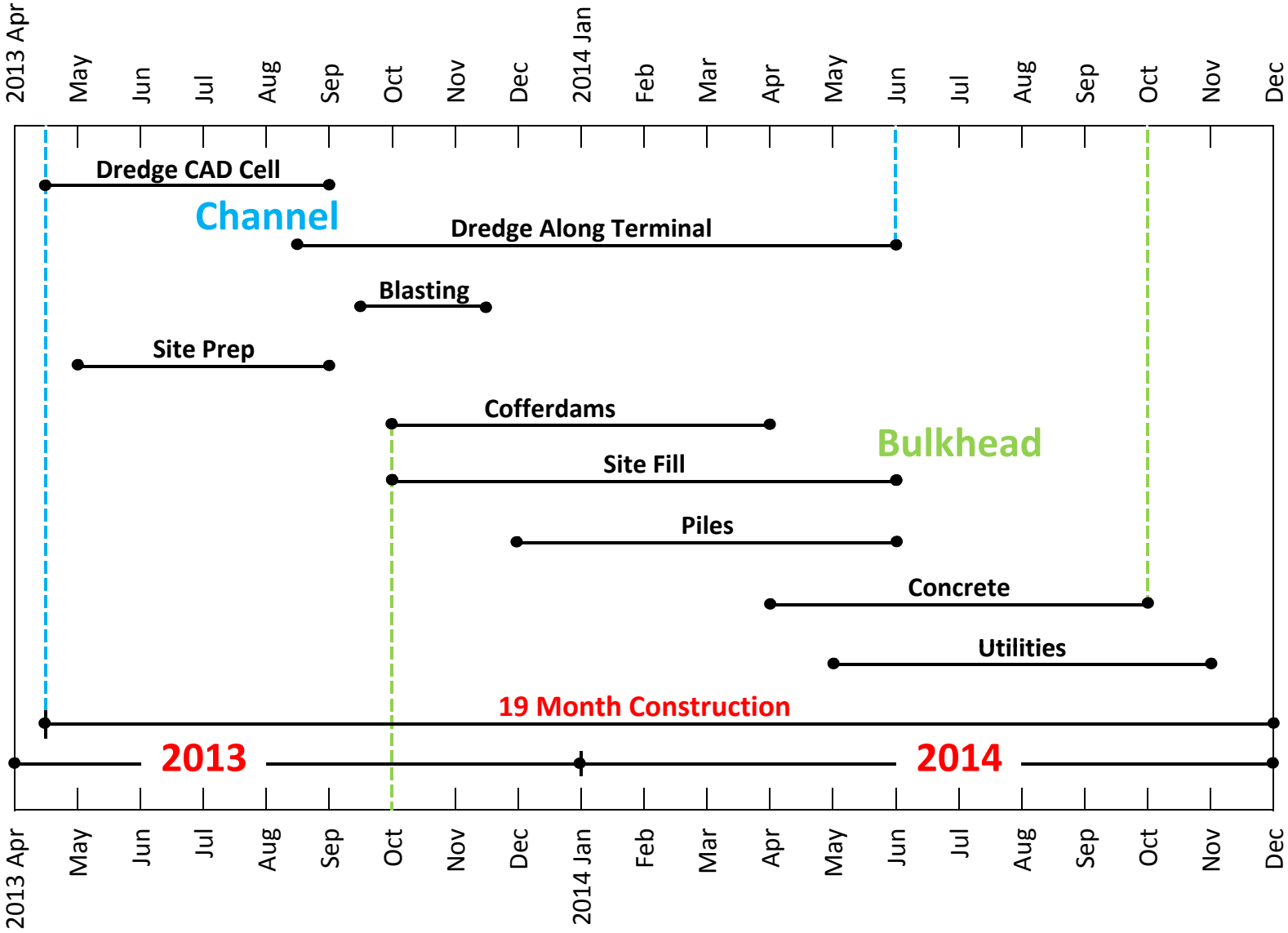
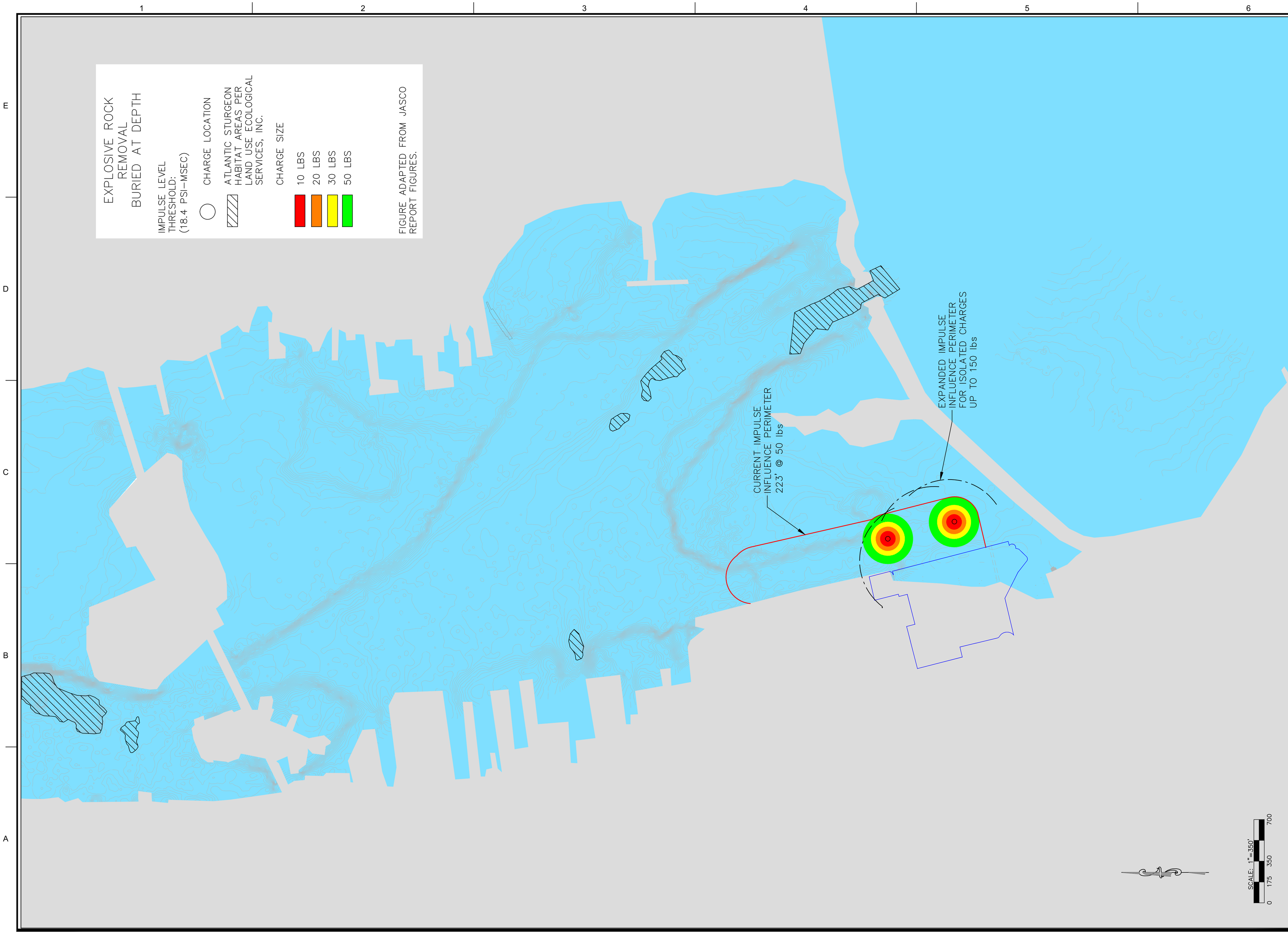
Attachment G

New Bedford Marine Commerce Terminal
Construction Schedule
(Rev. 8-23-2013)



Attachment H



APEX

ROCKVILLE, MD
SOUTH WINDSOR, CT - BOSTON, MA - NEW BEDFORD, MA - HOLYOKE, MA

184 HIGH STREET, SUITE 502
BOSTON, MA 02210

58H CONNECTICUT AVENUE
SOUTH WINDSOR, CT

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PROJECT

NEW BEDFORD MARINE COMMERCE TERMINAL

OWNER

MASSACHUSETTS CLEAN ENERGY CENTER
55 SUMMER STREET, 9TH FLOOR
BOSTON, MA

NO.	DATE	DESCRIPTION	BY

PROJECT NO.	6690
CADD FILE	GIFFORD_ST
DESIGNED BY	BAY
DRAWN BY	BAY
CHECKED BY	GCD
DATE	8-21-13
DRAWING SCALE	1"=350'

GRAPHIC SCALE

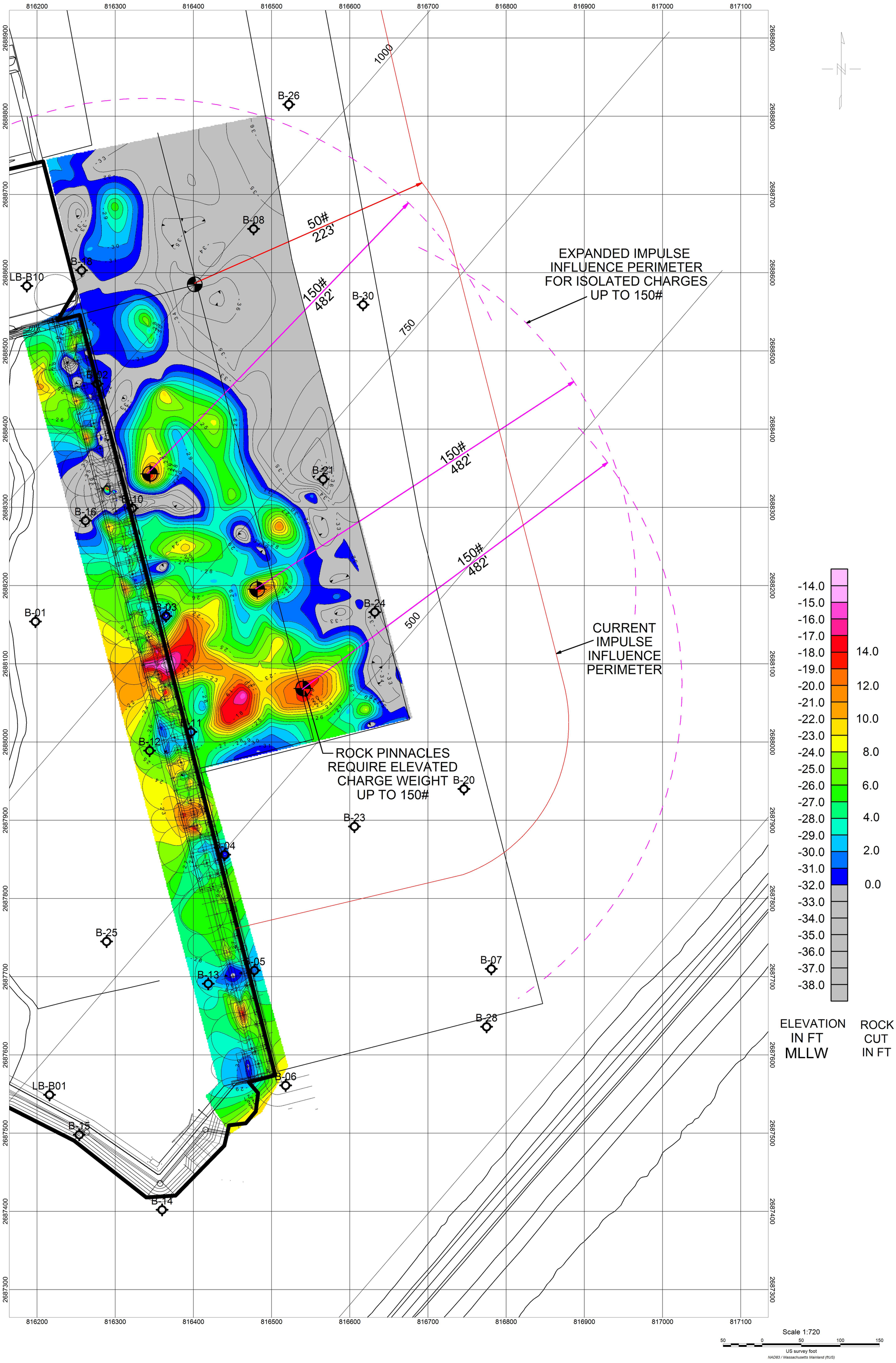
SHEET TITLE

NEW BEDFORD MARINE COMMERCE TERMINAL EXPLOSIVE ROCK REMOVAL IMPULSE

DRAWING NO.

A-E

Attachment I



MASSACHUSETTS CLEAN ENERGY TECHNOLOGY CENTER

NEW BEDFORD MARINE COMMERCE TERMINAL
ELEVATION OF ROCK WITH PROBE DATA
NEW BEDFORD HARBOR

PROBE DATA INCLUSIVE THRU 8/19/2013
APEX COMPANIES LLC
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I_CWNB_PROBE&BORING_PROG.map

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Attachment J

Chet Myers

From: David Hannay [David.Hannay@jasco.com]
Sent: Monday, August 26, 2013 11:51 PM
To: Chet Myers; Hines, Eric (ehines@lemessurier.com)
Cc: Roberto Racca; Marie-Noel Matthews
Subject: Updated pressure and impulse results

Dear Eric and Chet,

We have updated the pressure and impulse model results for rock removal blasting near the proposed Marine Commerce Terminal (South Terminal) in New Bedford. The revisions take into account the detailed blasting scenario information received recently in the Operational Blasting Plan.

The revised distances are also based on improved estimates of the source efficiency parameter that is incorporated in the Dzwilewski and Fenton model. This parameter accounts for reductions of in-water blast pressures due to explosive detonations beneath the seabed; the blast pressure waves are attenuated by propagation in the ground before reaching the seabed interface and as they transmit into the water. The efficiency values of the original modeling study were based on measurements of explosives detonated inside steel pilings during piling removal. Pilings provide less isolation of blast detonations from water than in-ground detonations. The new efficiency parameters were determined using a semi-empirical buried charge model (ConWep) that accounts for pressure attenuation due to propagation through the seabed. ConWep also accounts for lengthening of the shock pulse as a result of partial confinement of gaseous explosive by-products in the bedrock after detonation. This approach has shown that original efficiency values were too large; in-ground detonation efficiencies should be in the 2-5% range instead of the 40-50% range of detonations inside pilings. The selection of efficiency parameters in the revised modeling is based on a conservative estimation of pulse pressure waveforms produced by ConWep.

The original and adjusted Dzwilewski and Fenton model results for peak pressure and impulse are given in the two following tables. We note that the adjusted peak pressure results are likely very conservative as they still quite substantially exceed the ConWep model estimates. Still, for all charges except the 30 lb size, the impulse criterion distance exceeds the peak pressure criterion.

Distances in feet to peak pressure injury criterion of 75.6 psi

Charge Weight (lbs)	Original (ft)	ConWep (ft)	Adjusted (ft)	Efficiency Coefficient
30	346	46	176	5%
50	418	53	194	4%
100	552	65	209	2.5%
130	617	70	211	2%
150	659	73	222	2%

Distances in feet to impulse injury criterion of 18.6 psi-msec.

Charge Weight (lbs)	Original (ft)	ConWep (ft)	Adjusted (ft)	Efficiency Coefficient
30	681	137	165	5%
50	1017	160	202	4%
100	1820	196	236	2.5%
130	2304	212	242	2%
150	2631	220	268	2%

Regards,

Dave Hannay

David Hannay, M.Sc.
Chief Science Officer
_____
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Attachment K

DRAFT

AFTER ACTION REPORT

ON THE FISH KILLS RESULTING FROM BLASTING IN SUPPORT OF ROCK REMOVAL FROM THE FEDERAL NAVIGATION PROJECT -BOSTON HARBOR, MASSACHUSETTS- (FALL 2007)

PREPARED BY:

U.S. Army Corps of Engineers
New England District

JUNE 2008

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AFTER ACTION REPORT

I. Introduction

A. Purpose of the Report

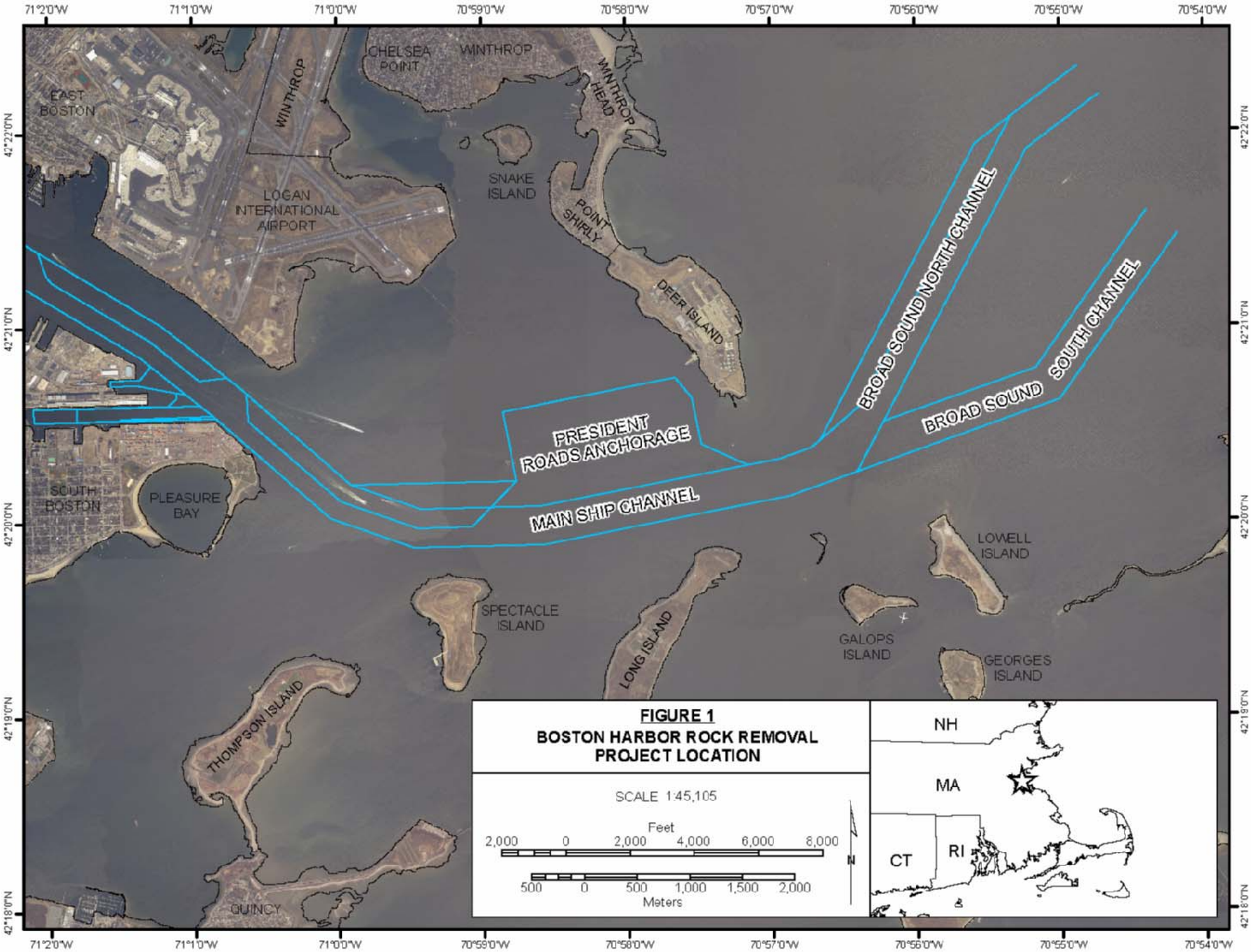
The purpose of this After Action Report (AAR) is to (1) document the project activities that resulted in fish kills, (2) the follow-up actions taken, and (3) the lessons learned during rock removal operations from the Federal channel and anchorage area in Boston Harbor, Boston, Massachusetts during 2007. The lessons learned from these blast events will be used to prepare a comprehensive blast plan for the upcoming Boston Harbor Deep Draft Navigation Improvement Project. In addition to the lessons learned from the events described in this AAR, a comprehensive blast plan to be developed for the Boston Harbor Deep Draft Project will also incorporate pertinent information obtained through literature reviews, advice from technical experts, lessons learned from other dredging/rock removal projects, results of resource agency coordination, and input from the project technical working group (TWG) sub-committee established specifically for this effort.

B. Project Description

It was discovered during maintenance dredging of the Boston Harbor Federal navigation channels in 2004 and 2005 that several areas of rock extended above the authorized navigation channel depths. These rock areas were located in the Main Ship Channel, President Roads Anchorage, and in the Broad Sound North Channel (see Figure 1). To eliminate this hazard to navigation and achieve authorized depths, it was necessary to remove this rock through blasting. A contract to remove the rock was awarded on March 15, 2007 to RDA Construction Corp. of Quincy, Massachusetts. RDA Construction began work in Boston Harbor in September 2007. They began to drill and blast in the President Roads Anchorage the week of October 1, 2007 and continued work until December 23, 2007 when operations were suspended in the Broad Sound North Channel due to safety concerns resulting from rough winter weather conditions. RDA Construction resumed work in April 2008. A hydraulic ram was used in the Broad Sound North Channel to remove the remaining rock material in the spring and summer of 2008. Table 1 provides the location, volumes of material removed, dates, and rock removal methods from the three locations containing the rock in the harbor.

Table 1. Information on Rock Removed From Each Section in Boston Harbor

Location	Amount (cy)	Dates	Method of Removal
President Roads Anchorage	1,029	Oct-Nov 2007	Blast
Main Ship Channel	235	November 2007	Blast
Broad Sound North Channel	42 XX	December 2007 April–June 2008	Blast Hydraulic Ram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71°1'0"W
71°0'0"W
70°59'0"W
70°58'0"W
70°57'0"W
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70°55'0"W
70°54'0"W
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42°21'0"N
42°20'0"N
42°19'0"N
42°18'0"N
EAST BOSTON
WINTHROP
CHELSEA POINT
WINTHROP
WINTHROP HEAD
LOGAN INTERNATIONAL AIRPORT
SNAKE ISLAND
POINT SHIRLY
DEER ISLAND
BROAD SOUND NORTH CHANNEL
BROAD SOUND SOUTH CHANNEL
BROAD SOUND
PRESIDENT ROADS ANCHORAGE
MAIN SHIP CHANNEL
SOUTH BOSTON
PLEASURE BAY
LOWELL ISLAND
SPECTACLE ISLAND
LONG ISLAND
GALOPS ISLAND
GEORGES ISLAND
THOMPSON ISLAND
QUINCY
FIGURE 1
BOSTON HARBOR ROCK REMOVAL PROJECT LOCATION
SCALE 1:45,105
Feet
2,000 0 2,000 4,000 6,000 8,000
500 0 500 1,000 1,500 2,000
Meters
N
NH
MA
CT
RI

C. Operational and Construction Measures to Reduce Fish Impacts From Underwater Blasting

Blasting generates underwater shock waves which radiate from the point of the blast. These shock waves can injure or kill fish that transit or inhabit the impact area. Injuries can result either directly from the blast or when air bladders of the fish are impaired. To reduce the potential for fishery impacts, blast procedures were established for this project and approved by regulatory agencies prior to construction. These procedures seek to reduce shock waves in the overlying water column and deter schools of fish from the area at the time of blasting. Construction procedures implemented to reduce the shock wave included using inserted delays of a fraction of a second and stemming. Stemming is a method used to deaden the shock wave reaching the over-laying water column by placing stone or similar material into the top of the borehole. Operational procedures implemented to reduce potential impacts to fisheries in the areas of blasting included the use of side scan sonar to detect and avoid passing schools of fish during blasting, a fish startle system to deter fish of the Clupeid family (i.e. blueback herring and alewife) from entering the blast area, and a fish observer to oversee and coordinate these efforts and determine the appropriate blast time to avoid fishery impacts. The credentials of the fish observer, Eric Rydbeck of Normandeau Associates, were approved by the National Marine Fisheries Service (NMFS) on September 25, 2007 and MA Division of Marine Fisheries (MA DMF) on September 28, 2007.

The fish observer used hydroacoustic monitoring (i.e. side-scan sonar) prior to any blasting event to determine that schools of fish were not located within or transiting the blast zone area. In addition to the side-scan sonar, a fish startle system (Sonalysts, Inc.) was employed which is capable of deterring fish from the Clupeid family using high amplitude sound at specific frequencies.

The established procedure implemented by the fish observer during blast events was to first deploy the side scan equipment off a support vessel that navigated around the blast site to check for the presence of fish in the area. However, the presence of blast cords in the water column limited the ability of the vessel to completely circle around the area. As a result, only approximately 320° to 340° around the blast site could be monitored using this technique. The side scan sonar covers 150 feet on either side of the vessel. The fish observer made as many passes around the blast site as needed to feel confident there were no fish in the area. A minimum of two passes with no observed fish were conducted prior to approving the initiation of the blasting procedure.

The fish startle system was deployed prior to each blast event, regardless of whether fish were observed in the area, and removed from the water approximately five minutes before the blast for all events regardless if fish were observed in the area. The fish startle system was located on the blast barge and was deployed in the area of blasting to a depth of 10 feet off the seafloor, consistent with operating procedures described in the manufacture's manual. The fish startle system was removed from the water prior to the blast. The manufacturer of the fish startle system indicated that the fish startle system

can be removed from the water column up to 10 minutes before the blast and still be effective.

D. Blasting Specifications, Procedures and Safety Plan

Explosive products manufactured by Orica, USA were 2 or 2 ½" by 16", 40% gelatin charges. Non-electric delay blasting caps manufactured by Orica, USA were used. The bore holes were a minimum three inches in diameter, spaced a minimum of five feet apart, with a minimum five foot overburden. The average drill depth of the hole was eight feet with a minimum of three feet of stemming utilizing 1/8" peastone.

Drilling was conducted from the barge with a Joy Mini-mustang equipped with a drilling nose to center the drill bit on the channel floor. The drilling nose was advanced to the floor via cable and winch on a drill. The drill steel was advanced to the nose. The diver guided the bit and still into the nose. The diver then surfaced and then the borehole was dug to the proper depth. The diver returned to the floor with a section of a PVC pipe, the nose was lifted and the PVC pipe inserted into the drill hole to keep the hole open and free from bottom silt. This was repeated until the area was completely drilled.

Packages of explosives and cap were assembled on the deck of the barge using 80 foot Nonel caps. Those packages were then lowered to the diver via a tag line weighted to the bottom. The diver inserted the package into the open hole through the PVC sleeve. The peastone was then lowered via a tag line and the hole stemmed. The Blaster marked and secured the surface delay on the deck of the barge. The process was repeated until the shot was fully loaded and stemmed. The circuit was "snapped" together on the deck of the barge in proper sequence to a "shock tube" lead-in-line. Surface delays were attached to plastic jugs with the lead line shock tube beading back to the barge for initiation by the Blaster. After clearing the vessel traffic and barge personnel, the whistle system described below was sounded and the blast fired. There was no drilling during loading operations. Each operation is completed prior to the next operation. The line was run out to a safe distance from the blast site to the Blaster.

Prior to initiating the blast, a whistle signal system was sounded at which time all equipment and personnel were moved from the danger zone. The whistle system began with warning signal of a one-minute series of long whistles five minutes prior to the blast. The second blast signals were identified by a series of short whistles which were sounded one minute to the blast. After the second set of signals and before initiation, the Blaster visually checked with each guard to obtain the final all-clear. The all-clear signal was sounded with one prolonged whistle once the blast was made and the inspection finalized.

After the blast, the Blaster inspected for misfires and then sounded the all-clear. If a misfire was noted, the following OSHA recommendations were followed:

- If a misfire was found, the Blaster provided proper safeguards for excluding all employees from the danger zone.

- No other work began except those necessary to remove the hazard of the misfire and the employees necessary to do the work remained in the danger zone.
- No attempt was made to extract explosives from any charged or misfired hole; a new primer would be installed and the hole reblasted.
- If there were any misfires while using cap and fuse, all employees would remain away from the charge for at least one hour. Misfires were to be handled under the direction of the Blaster. All wires would be carefully traced and a search made for unexploded charges.
- No drilling, digging, or picking was permitted until all missed holes were detonated or the authorized representative has approved that work could proceed.

No blasting occurred between sunset and sunrise. All blasting was required to be completed 45minutes before sunset. Once blasting was completed for the day, the explosives were returned to the truck and transported back to permanent storage at Orica USA in Templeton, MA. No explosives were stored on site overnight.

II. Information on Blasting in Boston Harbor Fall 2007

Blasting was initiated on October 5, 2007 to remove rock from Boston Harbor. No fish kills were experienced through the first seven blasts in the President Roads Anchorage area. A total of 14 blast events occurred in the fall of 2007 in Boston Harbor, of which four resulted in a fish kill of varying magnitude. The first fish kill event occurred during the eighth blast event on October 24, 2007. Table 2 below provides the location, dates, tidal conditions, and other pertinent information for all blast events. Figure 2 shows the blasting locations and the dates for each location.

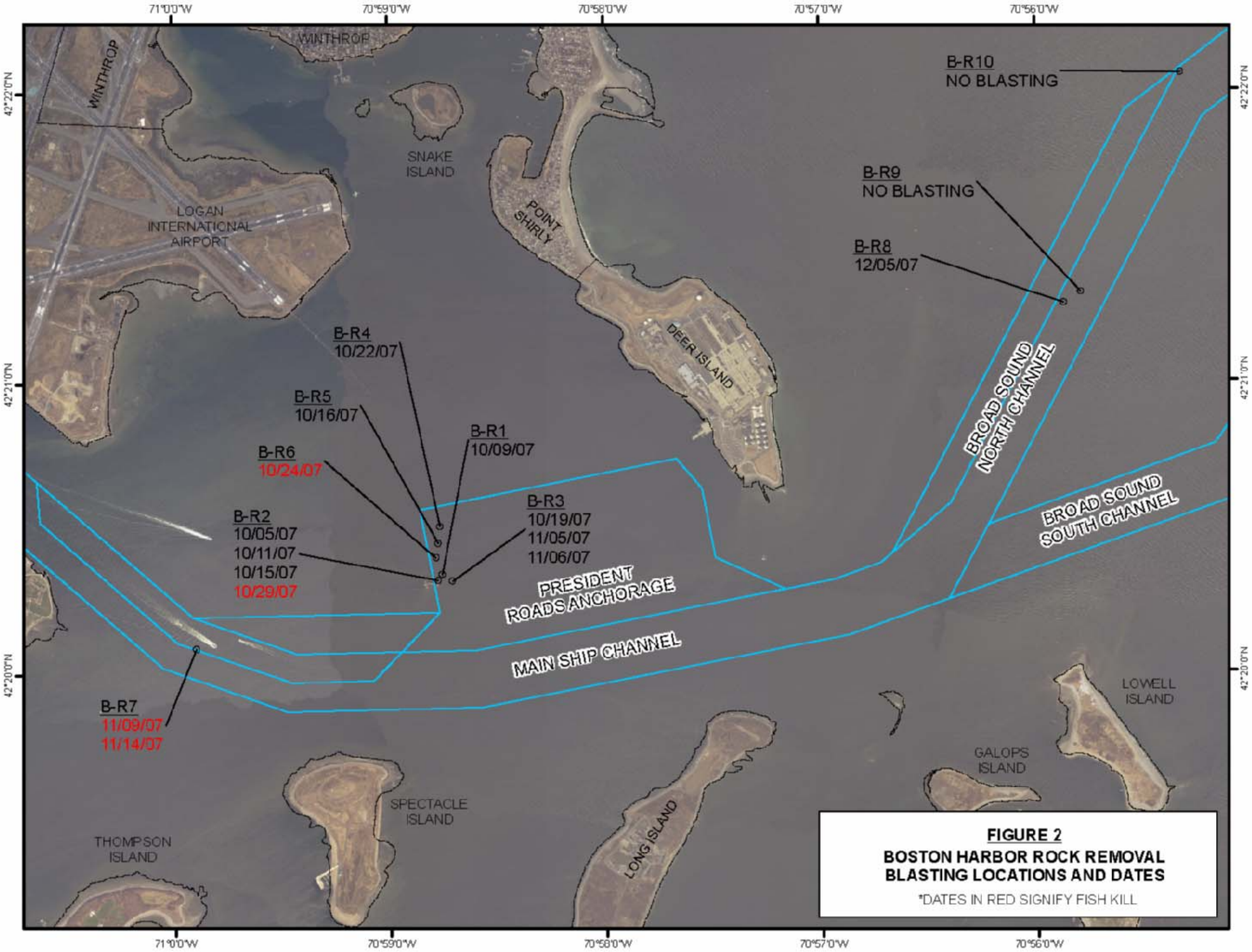

FIGURE 2

BOSTON HARBOR ROCK REMOVAL BLASTING LOCATIONS AND DATES

*DATES IN RED SIGNIFY FISH KILL

Table 2. Information on Each Blast Event

Date (2007)	Location*	Weather Low/High/Rain (^{0}F/inches)	Tide	Time of Blast (PM)	Current Speed (mph)	No. of Bore Holes	Explosive (pounds)	Fish Kill
October 5	PR Anchorage	67/75	2h03m after high tide	3:18	5	34	819	No
October 9	PR Anchorage	52/61	30m before high tide	4:25	15	25	624	No
October 11	PR Anchorage	52/63/.50”	1h21m after high tide	1.23	10	36	897	No
October 15	PR Anchorage	52/66	33m after high tide	2:59	10	34	836	No
October 16	PR Anchorage	52/70	1h08m before high tide	2:00	12	29	702	No
October 19	PR Anchorage	65/70/.50”	2h58m before high tide	2:45	7	30	819	No
October 22	PR Anchorage	65/72	34m before low tide	1:52	10	28	819	No
October 24	PR Anchorage	56/64	3h20m before low tide	12:54	7	14	351	Yes
October 29	PR Anchorage	37/65	12m after high tide	2:17	10	31	858	Yes
November 5	PR Anchorage	40/55/.62”	2h08m after low tide	4:05	10	32	858	No
November 6	PR Anchorage	37/51	59m after low tide	3:46	15	34	854.1	No
November 9	Main Ship Channel	32/43	45m before low tide	4:05	5	29	819	Yes
November 14	Main Ship Channel	37/60	3h39m after low tide	1:49	15/20	8	214.5	Yes
December 5	North Channel	24/32	55m after low tide	3:11	10	22	565.5	No

*PR Anchorage=President Roads Anchorage

III. Fish Kill Events During Blasting

Despite the construction and operational fish avoidance procedures implemented, as described above in Section C, four fish mortality events were experienced over a three-week period during blast operations in the President Roads Anchorage and Main Ship Channel areas. Table 3 below provides the dates, locations, and information on approximate number of fish observed killed from each blast event. Appendix A provides the number of dead fish species collected for each fish kill event. The length and weight for individuals collected and recorded for three of the four blast events are presented in Appendix B. Length and weights for fish collected during the first blast event, October 24, 2007, were not available. The details for each fish kill event are described below.

Table 3. Date, Location, and Approximate Number of Fish Killed

Date	Location	Approximate Number of Observed Fish Killed
October 24, 2007	President Roads Anchorage	150
October 29, 2007	President Roads Anchorage	1,000
November 9, 2007	Main Ship Channel	900-1,000
November 14, 2007	Main Ship Channel	300

A. Fish Kill Number 1

1. Event Specifics

The first fish kill event occurred on October 24, 2007. The fish observer made two passes on a support vessel with the side scan sonar around the blast zone. The initial sweep identified what was believed to be a school of fish near the surface within the blast area. A second sweep was conducted and no schools of fish were observed. The startle system was removed and the blast sequence initiated. See Section C above. The blast was detonated at 12:54 pm.

After blasting occurred approximately 150 dead or injured fish were observed floating at the surface. The fish observer collected the floating fish, which he counted and identified to species. For this event, 124 rainbow smelt (*Osmerus mordax*), two alewife (*Alosa pseudoharengus*), 23 cunner (*Tautogolabrus adspersus*), three red hake (*Urophycis chuss*), and one butterfish (*Peprilus triacanthus*) were collected.

2. Discussion of a Possible Cause and Corrective Action(s) Taken

The Corps contract specification for rock removal activities required that "If at any time during the implementation of the project, a significant fish kill or significant water quality problem occurs, and can be attributed to the project, all site activities impacting the water shall cease until the source of the problem is identified. Adequate mitigating measures shall be followed as outlined in the contingency plan or upon discussion with the appropriate state and local agencies." Upon observation of the fish kill, the Corps resident engineer directed that all blasting activity cease until a mitigation/contingency

plan could be developed through coordination with affected resource agencies (NMFS, MA DMF, and the MA Department of Environmental Protection (MA DEP)). Based on the information received, NMFS stated that they considered this a significant fish kill.

As a follow-up corrective action, the Corps performed a system review to ensure that all equipment was working properly, calibration and monitoring protocols were implemented correctly, and identify corrective measures, if any, to minimize the potential for reoccurrence of a similar event. To verify that the equipment was working properly, a technician from Sonalysts (fish startle system) checked the equipment and confirmed that the system was in fact fully operational and functioning properly.

The fish startle system was located on the blast barge, deployed to a depth of 10 feet off the bottom, and removed from the water approximately one minute prior to the blast, as also outlined in the manufacturer's procedures.

After confirmation that all equipment was properly functioning and that all operational procedures had been followed, it was determined that the fish kill was most likely due to the movement of fish into the blast area after it had been scanned and cleared by the sonar system. Although two passes were made around the blast area and no fish were observed in the second pass, it is probable that fish had moved into the area through a previously scanned and cleared zone while the vessel was completing its sweeping activity of another section of the blast perimeter.

The side scan sonar projects from the vessel down to the bottom at an angle. This could result in a small "inverted cone" of the water column not being scanned as the vessel transits the perimeter of the blast site. To increase the field of vision within the water column, a modified scanning procedure was to be implemented for all future blast events. The fish observer on the sonar vessel was instructed to begin screening for schools of fish as close as possible to the blast center. He then was to move out in a spiral to capture nearly the entire water column from the surface to the bottom throughout the blast area. It was thought that this technique would minimize the potential for fish schools to enter the blast zone undetected.

B. Fish Kill Number 2

1. Event Specifics

The second fish kill occurred during the ninth blast event on October 29, 2007. At approximately 12:30 pm the loading of the charges was completed. At 12:50 pm the fish startle system was deployed from the blast support barge located within the blasting zone. At 1:00 pm the side scan sonar was deployed and activated off a support vessel that moved along the perimeter of the blast zone monitoring for schools of fish. The side scan sonar vessel traversed the majority of the blast zone circumference but avoided that portion of the area where the down tubes are located which could result in severed lines and unexploded charges. The fish observer identified schools of fish transiting the area and subsequently performed additional sweeps (approximately 20) which showed varying

amounts of fish within and transiting the area. The fish observer observed and noted that there were unusually high numbers of fish in the area. The side scan sonar had indicated that fish were rapidly moving in and out of the blast area.

As the day progressed, less fish were observed transiting through the area. The fish observer, Contractor and the Corps construction representatives evaluated the situation to try and determine what if any operational conditions might potentially be attracting fish to the blast area and what steps could be taken to discourage fish from entering the project area. Based on the sonar observations it was speculated that the fish were potentially being attracted to the shadow projecting from the barge within the water column. It was also possible that suspended organic debris in the blast area resulting from a nearby dredging operation removing rock from earlier blasts could also be attracting fish to the area. It was generally concluded that moving the barge back from the blast zone as an implementable measure that may serve to reduce fish in the area.

At 2:02 pm the barge started to pull back from the blast zone. Once this was accomplished, the Contractor assumed that it was necessary to commit to initiating the blast sequence within 10 minutes since the fish startle system was relocated beyond the range of effectiveness for the entire blast zone. Vendor specifications state that the startle system should be deployed until 10 minutes before the blast since fish would not return to the area until 15 minutes after deactivation.

In the event blasting does not occur, the barge can not be moved back into the blast area due to the presence of the down tubes that run from the barge to the charges set along the bottom. Moving the blast barge into the area after it is "backed out" would likely entangle the down tubes which could result in an incomplete blast posing a significant safety hazard to both the crew and other vessels.

The charges were set off at approximately 2:17 pm and dead fish were observed floating in the blast zone. The fish observer estimated that approximately 1,000 small bait fish floated to the surface after the blast. He began to collect the fish for analysis and identification. Seagulls were feeding on some of the floating fish during the collection. The fish collected post-blast included 103 alewife, 18 blueback herring (*Alosa aestivalis*), 30 menhaden (*Brevoortia tyrannus*), 38 Atlantic herring (*Clupea harengus harengus*), 16 rainbow smelt, five cunner, and four red hake. The fish were then delivered to MA Division of Marine Fisheries (Ms. Tay Evans). Fish lengths and weights were also recorded and are included in Appendix B.

2. Discussion of a Possible Cause and Corrective Action(s) Taken

The resulting fish kill appears to be the result of a miscommunication between the fish observer and the Contractor who believed he needed to execute the blast within 10 minutes of the removal of the fish startle system from the area and not wait for an “all clear” from the fish observer. As a result of this blast event, the following changes to blast protocols were instituted to minimize the potential for additional fish kills:

- Fish Startle System: The Contractor is to deploy the fish startle system on an alternate and more mobile vessel instead of on the blast barge. This is to allow the fish startle system to remain operational and mobile in the blast area while the blast barge is being pulled back from the area to minimize potential "attraction" to the barge shadow. It will also allow the startle system to be redeployed to the area in the event blasting is not initiated since it will have the ability to enter the area so as to not impact down tubes.
- Dredging at Adjacent Areas: Dredging at adjacent areas will be curtailed if it is determined that it is the source of any detrital plumes impacting the blast area which could potentially be acting as an attractant to fish. Dredging would be allowed to continue only during portions of a tidal cycle that results in a plume trajectory away from the blast zone.
- Improved Communication: All parties will be clearly informed of communication pathways and roles and responsibilities relative to fish observance and blast initiation. It will be emphasized that it is the sole responsibility of the fish observer to give the “all clear” signal to initiate the blasting sequence based on fish observations. The fish observer would not signal for initiation of the blast sequence until he determined, through use of the side scan sonar and any other observations that there were no schools of fish present in the blast area. The only overriding condition would be the need to initiate the blast sequence for safety reasons as directed by the safety officer. One example would be when it would be necessary to initiate a blast sequence to comply with the “45minutes prior to sunset” provision. At this point blasting must be initiated due to safety considerations and to comply with safety regulations. All involved parties are to be made aware of these protocols and the need for clear and constant communication between the fish observer and the blast barge personnel.

It is also noted that the blasting safety officer reserves the right to override the fish observer in the event that a situation develops which could jeopardize human safety. The safety officer would communicate the reasons for the override to the fish observer prior to the initiation of the blast sequence which would be documented in both the blast report and the fish observer report. An additional overriding safety requirement is that once the blast sequence is initiated with the first five minute warning blast, the blast must continue according to safety regulations.

C. Fish Kill Number 3

1. Event Specifics

The third fish kill was observed after the 12th blast event on November 9, 2007. Normal sequencing protocols were followed which incorporated the corrective actions identified after the second fish kill event. The fish startle system was deployed at 3:38 pm and removed at 4:02 pm. Schools of fish were observed sporadically on the side scan sonar transiting through the area. The barge was moved 250 feet outside the blast area. Once it was determined that no fish were in the area, an “all clear” signal was given by the fish observer and the blasting sequence was initiated. Blasting occurred at 4:05pm,

approximately 45 minutes before sunset. The corrective actions implemented after fish kill #2 were implemented for this blast event.

After the blast, approximately 900 to 1,000 fish were observed floating on the surface. Less than 100 fish were collected with a dip net until no more fish were observed at the surface. As in previous events seagulls fed on the floating fish. The majority of the fish collected were blueback herring (80) and menhaden (14). The length, weight, and species of fish collected were recorded.

2. Discussion of a Possible Cause and Corrective Action(s) Taken

For safety reasons, blasting needed to be initiated 45 minutes before sunset. Although no fish were observed when the "all clear" signal was given by the fish observer, it is possible that because fish had been previously seen sporadically transiting the project area on the side scan, that some of these fish moved into the blast area after the "all clear" signal was given.

D. Fish Kill Number 4

1. Event Specifics

The fourth and last fish kill event occurred after the 13th blast event on November 14, 2007. Approximately 300 fish were observed floating or being eaten by the seagulls, far less fish than the last fish kill event. About one-fourth the amount of explosives was used for the third fish kill than was used for this blast event. Only six fish were collected, mainly due to gusty winds and wave action which carried the fish out of the area. All the fish collected were menhaden. Lengths and weights were recorded and presented in Appendix B.

2. Discussion of a Possible Cause and Corrective Action(s) Taken

As in Event #3, the corrective actions recommended after Fish Kill Event Number 2 were implemented during this event. The fish startle system was located on a separate boat, no dredge plume from adjacent dredging operations were observed in the area, and the blasting sequence was not initiated until after the fish observer has swept the area and had given an "all clear" signal.

After this event it was agreed that the Corps agreed would prepare an "After Action Report" to document the blasting operations and fish kill events to discuss lessons learned and possible recommendations for consideration in the development of a comprehensive blasting plan for the upcoming Boston Harbor Deep Draft Project.

E. Note

After the last blast event on December 5, 2007, it was noted that one fish, a menhaden (97 mm long and weighing 8 grams), was observed floating at the surface in the Broad

Sound North Channel. There were no other fish observed floating at the surface after the blast.

IV. Lessons Learned and Corrective Actions to be Instituted for Future Blast Events

Based on the events that occurred in 2007 during rock removal operations, the following recommendations should be considered for implementation for future blasting events.

A. Communication Plans

1. Fish Observer/Contractor Communication Plan

The contract specification on fish protection will clearly identify, with the exception of an overriding safety issue as identified in the previous sections, that it is the sole responsibility of the fish observer to determine when conditions are favorable for the blasting sequence to be initiated based on fishery observations. The fish observer will give approval for initiation of the blast sequence until s/he has determined, through use of appropriate technology, that no schools of fish are present in the blast area. However, it is recognized that the on-site safety officer has the authority and responsibility to override the fish observer's determination at those times when either safety concerns or regulatory compliance becomes an issue. The specifications will outline required protocol and the need for clear and constant communication between the fish observer and the blast barge personnel.

2. Fish Observer Reports

The fish observer will prepare an after action report for all blast events monitored, regardless of whether the event resulted in a fish kill. The report should include the date and time monitoring was initiated, deployment and retrieval of the fish startle system, the time of the blast, current speed and direction, tidal conditions, and weather observations throughout the day, and other pertinent observations. The fish observer will note if fish were observed in the project area prior to blasting and if there were any dead or injured fish after the blast. The fish observer must record the number of fish killed or injured, and species including representative sizes and weights. Any equipment or operational issues that may have contributed to the fish kill will also be noted.

The fish observer will report his/her findings to the Resident Engineer for each day of blasting. The Resident Engineer will compile the previous week's reports and forward to the Project Manager or Study Manager and the Environmental Resources Team Member. If a fish kill is observed, the Resident Engineer will notify the Project Manager or Study Manager and the Environmental Resources Team Member immediately. Pertinent information along with the fish observer's report will be forwarded to the above parties as soon as possible. Based on the fish observer's report, the Project Manager, or Study Manager, will convene a meeting with the Resident Engineer and appropriate personnel

to discuss events and to determine what, if any, corrective actions can be taken to reduce the changes of further fish kills.

3. External Communication Plan

In the event of a fish kill, the Project Manager or Environmental Team Member will notify the appropriate resource agencies as soon as possible after the event. Additional communication will occur as soon as all pertinent facts and issues surrounding the event have been determined. In the case of the Boston Harbor Deep Draft Project, the NMFS, U.S. EPA, MA DEP, MA DMF, MA Coastal Zone Management Office, and Massport will receive a copy of the fish observers report along with other factual information. If determined necessary, a meeting and/or conference call will be scheduled between the Corps, Massport, and the resource agencies to discuss and identify potential corrective measures. These measures will then be forwarded along with the fish observer report to the agencies.

B. Operational Changes to Minimize Potential for Fisheries Impact

The Contractor will deploy the fish startle system on an alternate vessel instead of the blast barge to allow greater coverage of the blast area and extend duration of the systems deterrence action just prior to blasting. This will allow the fish startle system to stay deployed in the blast area while allowing the blast barge to be pulled back from the area to minimize potential fish "attraction" to the barge shadow in the water column.

It is possible that a dredging plume may serve as an attractant to the fish towards the blast zone. Consequently, it is recommended that any dredging activities adjacent to the area of blasting occur when tidal conditions allow for the transport of resuspended material to move any residual plumes away from the blast area(s).

Additional conversation among the Corps, their blasting contractor, and the fish observer resulted in identifying some additional operational steps that could potentially be taken for future blasting events to help deter the presence of fish in the blast area. These included the use of setting off small charges in the blast area to "scare" the fish from the area or perhaps using bait to attract the fish to another area. After further discussion with the blasting contractor the use of small charges as a deterrent was dismissed since the blast is set off through a percussion process. Small charges could prematurely set of the blast for a percussion process which would constitute a significant safety hazard. Small charges can only be used when electric charges are used.

"Baiting" was another suggestion to draw fish away from the blast zone. However, it would likely act as an attractant for other fish and could make the situation worse. Also, since the target species (herring) are primarily planktonic feeders, appropriate bait was questionable.

V. Discussions for Development of a Blast Plan

In order to move the development of a formal blast plan for both the upcoming Boston Harbor Deep Draft Project and other similar type Corps projects forward, scheduled meetings should be held with the blast subgroup of the Technical Working Group for the Boston Harbor Deep Draft Project. This subgroup would identify blast issues that require further discussion, research, and resolution for incorporation into the plan. At a minimum, the following items should be included for discussion:

- Significance – What constitutes a significant fish kill and what would determine the need for corrective actions, and mitigative measures?
- Mitigation Measures and Operational Approaches – What are the available mitigation measures that can be incorporated into the blast plan? What approaches should be considered and incorporated into the dredge plan to minimize impacts to fisheries?
- Time of Year and Sequencing – Time of year and sequencing approaches based on the presence of fish resources should be explored with the resource agencies as a mitigative tool to minimize blasting impact to fishery resources.

Discussion with the resource agencies should occur to determine, based on the species of concern prevalent in the harbor, and the amount of rock to be blasted in the various harbor locations, what time of year blasting should occur in the harbor and in which location or tributaries.

C. Plan of Action for Fish in the Blast Zone

A discussion of alternatives, if any, should be considered for those times when the side scan sonar survey indicates large numbers of fish are in the blast zone throughout the day and the charges have been set. According to the fish observer (personal communication June 17, 2008), no fish were observed on the side scan sonar during the non-fish kill events. (The exception to this is the first fish kill; during this event, no smelt were observed on the sonar.) This would indicate that, in general, the sonar can and did detect schools of fish in the blast area. There may be days when a suitable time to initiate blasting is not available due to the presence of fish observed in the blast area. Alternatives, if available, should be explored when this condition arises. Safety may dictate that blasting will need to be initiated, even if there are schools of fish in the area.

APPENDIX A

Table A-1. Number and Fish Species Collected By Blast Date

Common Name	Latin Name	Fish Kill Dates (2007)			
		October 24	**October 29**	**November 9**	**November 14**
Alewife	*Alosa pseudoharengus*	2	103		
Atlantic Herring	*Clupea harengus harengus*		38		
Blueback Herring	*Alosa aestivalis*		18	80	
Butterfish	*Peprilus triacanthus*	1			
Cunner	*Tautogolabrus adspersus*	23	5		
Menhaden	*Brevoortia tyrannus*		30	14	6
Rainbow Smelt	*Osmerus mordax*	124	16		
Red Hake	*Urophycis chuss*	3	4		
Total Number of Fish Collected		**153**	**214**	**94**	**6**

APPENDIX B

Table B-1. Length and Weight of Fish Species Collected October 28, 2007

Alewife		Atlantic Herring		Blueback Herring		Cunner		Menhaden		Rainbow Smelt		Red Hake	
L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)
135	18	138	20	123	17	58	3	98	8	103	5	92	4
157	28	118	11	139	19	55	2	99	9	105	6	80	3
145	26	136	18	155	27	75	8	100	9	125	10	72	2
142	22	158	25	143	22	53	2	102	7	135	14	62	1
137	20	143	22	127	14	38	1	100	11	117	8		
167	37	160	30	120	12			99	10	105	6		
138	19	140	20	125	13			92	7	111	8		
153	29	156	30	137	18			82	5	120	8		
167	38	140	21	143	17			83	7	92	4		
226	94	150	22	120	12			95	7	123	11		
146	23	152	22	119	11			92	8	100	5		
147	24	152	28	117	12			102	11	127	11		
194	70	150	26	137	19			95	7	130	12		
135	19	170	40	141	20			100	9	115	9		
146	26	182	43	120	13			100	9	111	7		
1X*	17	160	30	132	18			81	7	112	7		
167	40	143	23	139	20			85	5				
150	26	152	24	120	13			100	9				
156	27	136	20	122	13			98	8				
148	26	169	33					85	6				
130	17	150	24					110	13				
145	25	134	27					92	7				
145	25	138	20					93	8				
139	20	177	41					113	13				
132	18	162	33					89	6				
150	23	165	34					88	7				
150	26	140	18					100	10				
160	32	130	17					92	7				
145	30	145	21					93	7				
169	39	148	24					100	9				
144	23	140	20										

*1X = No Tail

Table B-1 (cont.). Length and Weight of Fish Species Collected October 28, 2007

Alewife		Atlantic Herring		Blueback Herring		Cunner		Menhaden		Rainbow Smelt		Red Hake	
L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)
155	27	141	20										
150	27	142	22										
135	20	158	30										
145	22	138	20										
138	19	144	24										
153	28	150	25										
153	32	128	16										
152	28												
177	40												
138	20												
157	32												
148	24												
162	32												
130	17												
133	19												
165	36												
145	23												
158	30												
135	18												
135	20												
157	32												
142	21												
134	18												
150	26												
157	29												
136	20												
156	27												
155	30												
141	20												
155	29												
137	19												
158	34												

Table B-1 (cont.). Length and Weight of Fish Species Collected October 28, 2007

Alewife		Atlantic Herring		Blueback Herring		Cunner		Menhaden		Rainbow Smelt		Red Hake	
L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)
149	25												
142	23												
171	38												
149	23												
158	31												
143	23												
138	22												
129	17												
151	27												
156	29												
155	29												
155	29												
135	20												
168	37												
139	20												
135	17												
156	27												
177	45												
138	20												
157	28												
140	22												
129	16												
161	31												
161	35												
152	28												
130	17												
167	36												
139	20												
147	24												
147	25												
148	24												
145	23												

Table B-1 (cont.). Length and Weight of Fish Species Collected October 28, 2007

Alewife		Atlantic Herring		Blueback Herring		Cunner		Menhaden		Rainbow Smelt		Red Hake	
L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)	L (mm)	W (g)
145	24												
150	25												
166	33												
149	25												
173	40												
150	26												
142	21												
128	16												

Table B-2. Length and Weight of Fish Species Collected November 9, 2007

Blueback Herring				Menhaden	
Length (mm)	Weight (g)	Length (mm)	Weight (g)	Length (mm)	Weight (g)
99	7	102	8	75	4
100	7	94	6	108	12
89	5	93	6	96	9
93	6	88	5	83	6
98	7	98	6	70	4
90	5	94	6	61	2
95	6	100	7	70	3
103	8	97	7	64	2
93	6	92	6	81	5
94	6	93	6	54	2
97	8	97	7	80	5
95	8	97	7	60	2
113	11	90	6	59	2
105	9	93	6	57	2
96	8	97	7		
101	9	96	6		
108	10	106	9		
90	6	87	5		
98	7	104	9		
103	9	92	6		
96	6	88	5		
99	7	104	8		
104	8	94	7		
85	5	98	7		
95	7	96	7		
93	6	99	7		
103	8	100	8		
101	7	90	6		
113	10	91	5		
94	6	90	5		
94	6	97	7		
96	7	94	5		
108	9	90	6		
92	6	91	6		
96	7	85	5		
90	6	99	7		
100	7	96	7		
92	6	99	7		
91	6	110	9		
90	6	99	7		

Table B-3. Length and Weight of Fish Species Collected November 14, 2007

Menhaden	
Length (mm)	**Weight (g)**
90	6
62	2
50	1
61	2
51	1
65	3

Attachment L

Method of Operation and Communication

The following is a generic blasting sequence to give a general idea of the procedures associated with drilling and blasting. The information below should not be considered the blasting plan for the New Bedford Marine Commerce Terminal. Actual methods and sequences will be outlined in the Blasting Plan that will be submitted in accordance with Specification Section 02900.

Preparation for Drilling & Blasting

- Using the approved transfer procedure, take on board the regulatory approved allowable product quantity for storage.
- The blasting engineer shall log in the coordinates and/or feet on deck for the site specific range(s) of the holes and record on the Frame Logs.
- Position the Drillboat and verify tide, depth of water, overburden, and top of rock.
- When drilling near or adjacent to a loaded hole, drilling shall be limited to vertical holes only.
- Record the data on the Frame Log and proceed with drilling to "site specific" elevation (tide corrected) or as directed by the Blaster-in-Charge.
- Should competent rock exist above required grade elevation, proceed with drilling and loading in preparation for blasting.

Drilling Method

- Complete drilling and verify a loadable hole using a continuous monitoring Angle Indicator to assure the tower does not deviate during the drilling process.
- If the drill steel can be extracted without encountering any obstacles, the loading procedures may begin.
- Should the hammer have to be rotated or used to extract the drill steel, additional cleaning of the hole by making additional drill passes will be used to assure a loadable hole.
- Once the drilling and cleaning of the hole has been completed, the boosters will be prepped while the drill steel is being removed from the hole and secured to the steel rack or tower frame.
- Primers and/or charges will not be removed from the day boxes and taken out on the catwalk/drill platform until the hole is ready to load.

Loading Method

- Consult the applicable loading schedule for product versus feet of rock.
- Prepare the primer assembly for each booster location in the blast hole using the in-hole detonator and a Booster.
- Install the primer assemblies and the main explosives charge in the hole, using a measuring device to seat the explosives column and to verify the elevation of top of product.
- Install the stemming bag to seal the collar of the hole.
- Upon completion of loading of a blast hole, the initiation down lines will be recovered and secured to the shot line. Down lines will be secured with adequate slack to compensate for tidal fluctuations and setbacks. Once charging of the entire range (row of holes) has been completed, the down lines will be connected using the appropriate surface delays between holes. All surface connections will be done in duplicate to ensure

redundancy of the initiating sequence. Be aware of the directional initiation path and confirm that all surface delays are connected in the proper direction.

- Upon completion of the first range and with all connections made, the Drill boat will set back and be located with the first hole on deck located over the desired position in the second range.
- Holes will be drilled and loaded sequentially according to the Production Blast Plan.
- When charging of the second range has been completed, the same connection procedure as above will be followed. Connections between ranges (rows) will be made using the appropriate surface delay time as per the blast design.

Preparing to Blast

- At a suitable time before the planned blasting time as determined by the Blaster in-Charge, two lead-in assemblies will be connected to the appropriate position to initiate the blast. The shock tube section of this lead-in line will be secured to a rope.
- The lines will be lowered into the water and will be supported by buoys.
- The rope and lead-in lines will be paid out as the Drillboat retreats to its safe blasting position.

Clearance Prior to Blasting

- At the appropriate time, but no later than noontime on any given day, the 2-hour Notice to Blast will be given and the Window of Opportunity will commence (more detail on the Window of Opportunity follows below). Verify with the Fisheries Observer (approved by Massachusetts Division of Marine Fisheries and National Marine Fisheries Services) that no schools of fish are present.
- Verify with the Vibration Consultant that all seismic stations are online prior to tying in the lead-in line which will be utilized to initiate the blast.
- At the 1-hour Notice to Blast: Verify with the approved Fisheries Observer that no schools of fish are present.
- At the 15-minute Notice to Blast: Verify with the Fisheries Observer that no schools of fish are present. Receive "ok to blast" notification from approved Fisheries Observer. In the event that the Fisheries Observer notifies Cashman Weeks NB that schools of fish or are present, the blasting procedure will be delayed until the schools of fish move from the area. Notifications will be made to the Pre-Blast Call List that the blast is delayed and the notification procedure will restart with the 1-hour Notice to Blast. This procedure will continue until the Fisheries Observer gives the "ok to blast" but at no time will exceed 4:00 pm of any day due to Project and Public safety.
- At the 15-minute Notice to Blast: the Drillboat must retreat to its safe position and the security patrol boats are positioned for enforcement of the Safety Zone.
- Verify an All CLEAR TO BLAST of personnel working in the area from both land and marine safety stations.
- Proceed with the 5-minute warning with an ALL CLEAR TO BLAST from the security patrol boats.
- The last 10 seconds of the 1-minute warning will be broadcast on CH16 beginning with 10. Counts 3 and 2 will be silent with all radios un-keyed allowing any Safety Zones to "Abort" the blast.
- ***SIGNAL and DETONATE***

- Give ALL CLEAR signal.

The Window of Opportunity is defined as follows:

- A two-hour notice of intent to blast with a thirty minute grace period before or after the two hours has passed.
- Should complications prevent blasting within the Window of Opportunity, the two-hour notice of intent must be updated.
- The necessary notifications within the Window of Opportunity are as follows:
- 2 hour notice – (see Pre-Blast Call List)
- 1 hour notice – (see Pre-Blast Call List)
- 15 minute warning CH16, Drillboat Channel
- 5 minute warning CH16, Drillboat Channel, Audible Blast Signal
- 1 minute warning VTS, CH16, Drillboat Channel, Audible Blast Signal
- Countdown – CH16, Drillboat Channel
- ***Blast***
- ALL CLEAR Drillboat Channel, Audible Blast Signal

Note 1: Because of the marine environment and potential intrusion of traffic into the safety zone, the 15-minute and 5-minute warning may be accelerated. However, the 1-minute warning must be completed.

Note 2: Throughout the drilling and loading procedure, constant monitoring of fish schools shall be performed by an approved Fisheries Observer.

Note 3: There shall be no blasting during the passage of schools of fish are present as determined by the approved Fisheries Observer unless it is determined that there is a threat to Project and Public safety.

Blast Signals

A horn with 120 dB minimum as measured at the perimeter of the blast area zone will be utilized to produce blasting signals as below. The sound will be distinctly different from any emergency signal which may be utilized on board the Drillboat.

<u>WARNING SIGNAL</u>

1 minute series of long wails 5 minutes prior to blast signal.

<u>BLAST SIGNAL</u>

A series of short yelps 1 minute prior to the shot.

<u>ALL CLEAR SIGNAL</u>

A prolonged horn signal following the inspection of the blasting area.

Pre-Blast Call List

A list of contact information (Pre-Blast Call List) will be used for notification prior to a blasting event taking place. This list will be developed in preparation for the drilling and blasting work effort and the final version will be provided to the Owner's Representative prior to the start of any blasting activity.

The following parties (not a comprehensive list) are anticipated to be contacted or request to be contacted at the time required by each party prior to blasting:

- US Coast Guard
- New Bedford Police Department
- Fairhaven Police Department
- US Army Corps of Engineers
- Owner Representative's project office
- Vibration Consultant
- Fisheries Observer

An example of the Pre-Blast Call List used on a US Army Corp of Engineers is shown on the next page.

Pre-Blast Call List

Blast No.: _____ **Drill Boat:** **Kraken**

New York and New Jersey Harbor
Channel Navigation Improvement
S-NB-2 / S-AK-1 - Contract 11
W912DS-10-C-0023

Caller: _____ Day: _____ Date: _____ Sheet: _____ of _____

	2 HOUR		1 HOUR		15 MIN		ALL CLEAR	
	NAME NOTIFIED	Callers Initials	NAME NOTIFIED	Callers Initials	NAME NOTIFIED	Callers Initials	NAME NOTIFIED	Callers Initials
USCG Activities New York (718) 354-4088 (718) 354-4096 (fax)								
					5 MIN (USCG only)		**1 MIN (USCG only)**	
US Army Corps of Engineers (201) 433-9232								
The Port Authority of NY & NJ Port Newark Operations (OCC) (973) 578-2192								
Bayonne Police & Fire Depts. (201) 858-6900								
Newark Fire Department (973) 733-7400								
Elizabeth Fire Department (908) 820-2800								
Staten Island Fire Departmen (718) 494-4296								
Mike V. (Diving Contractor) (856) 207-4952 **Divers Clear At:**								
Contract Drilliing & Blasting LLC (201) 339-6470			**2 Hour and All Clear Only**					
Randive, Inc (732) 324-1144			**2 Hour and All Clear Only**					
Richard Nolen-Hoeksena (203) 907-8586 (E4 Sciences)			**2 Hour and All Clear Only**					
snb_vibrations@e4sciences.com	**Blast Number, Blast Time, Northing, Easting**							

2 Hour Warning Time: _____

1 Hour Warning Time: _____ **<--Call Security Boats**

15 Minute Warning Time: _____

5 Minute Warning Time: _____

Time of Blast: _____

Time of All Clear: _____

Number of Holes: _____

Security Calls on Ch 13 & 78

Radio 2 Hour: _____

Radio 1 Hour: _____

Radio 15 Min: _____

Radio 5 Min: _____

Radio 1 Min: _____

Count Down: _____

All Clear: _____

BLAST WINDOW **from:** _____ **to:** _____

Blaster Name: _____ Blaster License No. _____

Caller Signature: Date:

Attachment M

Chet Myers

From: Weinberg, Philip (DEP) [philip.weinberg@state.ma.us]
Sent: Friday, May 31, 2013 12:15 PM
To: Davis, Gary (DCR); Chet Myers
Cc: Ericson, Benjamin (DEP); Craffey, Paul (DEP)
Subject: South Terminal-Proposed Project Modification and DEP ARARs

After consultation with the BWSC project manager and wetlands technical staff, I have concluded that the applicable ARARs set out in the memoranda included in Appendix D of the Determination do not need to be revised or supplemented to address the proposed project modifications that would allow blasting to facilitate constructing the sheet pile bulkhead, widening by 50' and deepening to 200' the navigation channels and not deploying silt curtains in areas that might result in navigational interference in the federal channel. The potential impact from those activities are already adequately addressed through the standards described in these memoranda.

If you need this determination memorialized in a different format, let me know.

Phil Weinberg
Regional Director
MassDEP-Southeast Regional Office
Twenty Riverside Drive
Lakeville, MA 02347
508-946-2712

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