



Mott MacDonald Florida LLC  
10245 Centurion Parkway North Suite 320  
Jacksonville, Florida 32256  
904-203-1090

May 23, 2017

Larry Newsom  
Flagler Beach City Manager  
105 South 2<sup>nd</sup> Street  
Flagler Beach, Florida 32136

RE: Fishing Pier Emergency Repairs

Dear Mr. Newsom,

The City of Flagler Beach requested to set-up and perform their annual July 4<sup>th</sup> firework event from the end of the repaired pier on Tuesday, July 4, 2017. At the time of the firework event, the temporary pier repairs are scheduled to be completed with the pier back open for public access. However due to public safety, it is Mott MacDonald's understanding the entire pier will be closed to public access during the firework display.

The set-up by Fireworks by Santore, Inc. will encompass the last 100'-0" of the pier (refer to page 1 of the attachment) and will be uniformly placed across the 100'-0" x 20'-0" area. Fireworks by Santore, Inc., will utilize various size firework racks and cakes (refer to pages 2-10 of the attachment). The racks and cakes will be hauled to the end of the pier with an all-terrain vehicle such as a John Deere Gator. The existing structure was analyzed for the following loading conditions due to this firework event:

- John Deere Gator: (2,700 lb) (Vehicle, cargo and (2) personnel)
- Racks (approximate firework rack weights are included page 11 of the attachment):
  - Wood racks are independent standing frames not sand filled boxes per Fireworks by Santore, Inc.
  - (50) 3" racks (28 lbs each) (1,400 lb total)
  - (48) 4" racks (40 lbs each) (1,920 lb total)
  - (48) 5" racks (42 lbs each) (2,016 lb total)
  - (28) 6" racks (60 lbs each) (1,680 lb total)
- Cakes:
  - (50) cakes (10 lbs each) (500 lbs total)
- Note: During logistical operations, fireworks shall be unloaded from the all-terrain vehicle and placed uniformly over the staging area so as not to stockpile the fireworks adjacent to the all-terrain vehicle.
- Note: Simultaneous all-terrain vehicle live loading and stockpiled firework live loading from the set-up were not combined in the analysis of the pier.

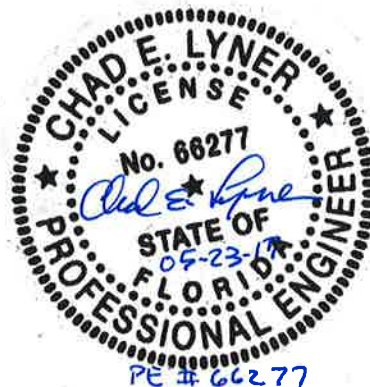
The all-terrain vehicle live load and the fire work set-up loading are less than the design superimposed live loads used for the design of this project. Mott MacDonald has no exception for the July 4<sup>th</sup> Fireworks event at the eastern end of the existing pier.

Please do not hesitate to call should you have any questions or need any additional information concerning this issue.

Sincerely,  
MOTT MACDONALD

Chad E. Lyner, P.E.  
Senior Project Engineer

Attachment  
Refer to included attachment

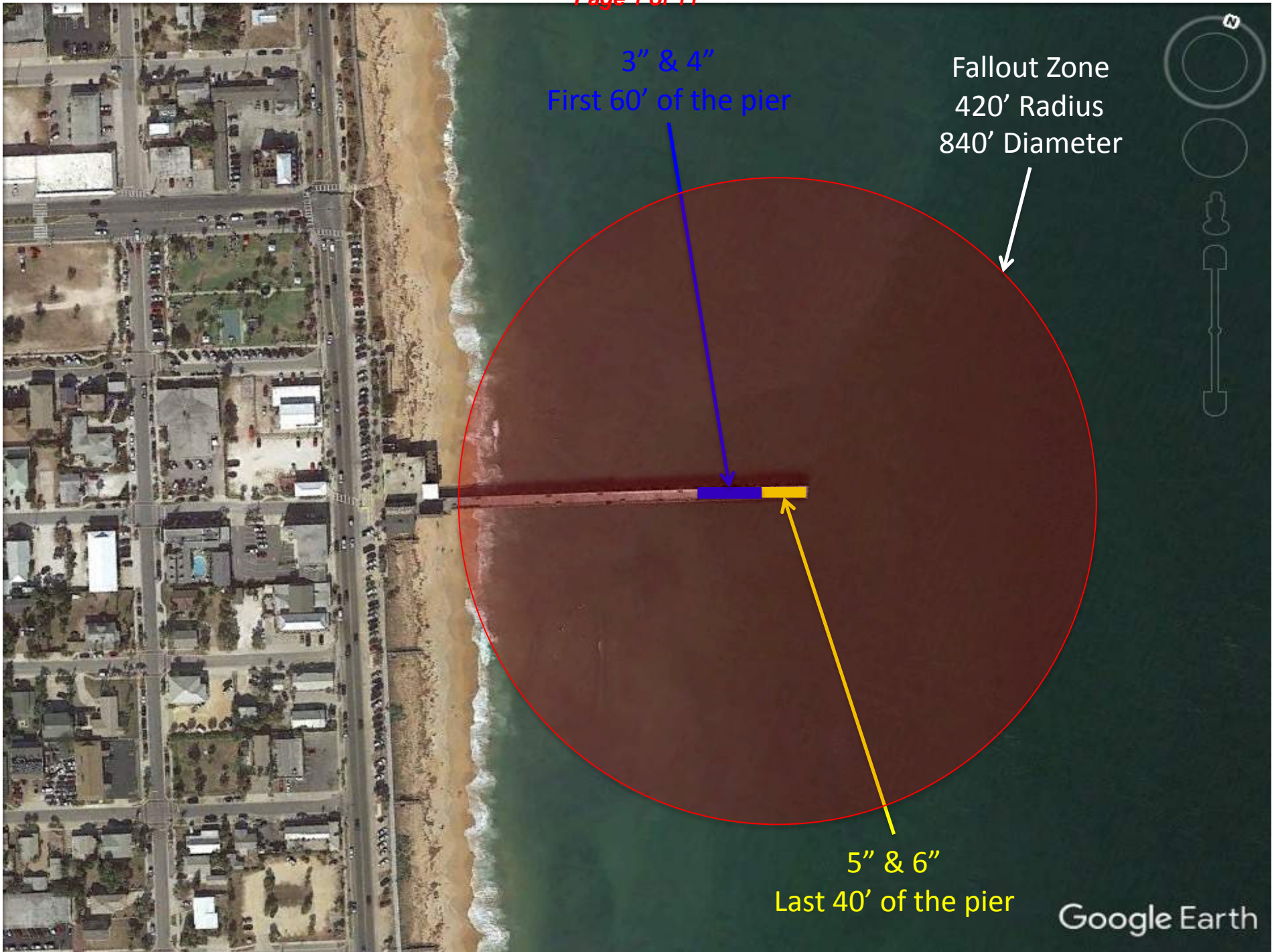


# **APPENDIX A: ATTACHMENTS**

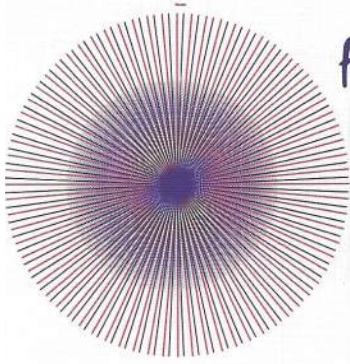
3" & 4"  
First 60' of the pier

Fallout Zone  
420' Radius  
840' Diameter

5" & 6"  
Last 40' of the pier







Fireworks By

# SANTORE

INTO OUR THIRD SPECTACULAR CENTURY

## SINCE 1890

**Anthony Santore, Jr.**  
PRESIDENT

### SPORTING EVENTS

Daytona International Speedway  
Miami Homestead Speedway  
World Golf Village  
Jacksonville Jaguars  
Jacksonville Suns  
Citrus Bowl  
Orange Bowl  
Gator Bowl

### CORPORATE EVENTS

Nationwide Insurance  
Lincoln Mercury  
Dunkin' Donuts  
Applebee's  
KFC  
Sheraton  
Pepsi  
Jaguar Motors  
Pontiac  
Nabisco Foods  
John Deere Corporation  
Burger King  
Winn Dixie  
Mobile Oil  
Aetna Insurance  
Anheuser-Busch  
Coors Brewery  
Miller Brewing Company  
IBM Company  
General Electric  
ITT Corporation  
Texaco  
Harley Davidson  
Vitamin Shoppe

### THEME PARKS

Sea World of Florida  
Sea World of Texas  
Busch Gardens Williamsburg  
Busch Gardens Tampa  
Walt Disney World  
Sesame Place  
Wild Adventures

### SPECIAL EVENTS

Dr. Martin Luther King Day, Atlanta  
Miss Universe Pageant, Inc.  
Salute To Liberty  
Bermuda Department of Tourism  
Presidential Ball, Guyana  
Las Fiesta De Quito, Quito, Ecuador

### HOTELS

Ginn Development Company  
Resorts International  
Grand Hotel, Bahamas  
Cable Beach Hotel, Bahamas  
Marriot World Center  
Hyatt Grand Cypress  
Walt Disney World Dolphin  
Boca Raton Hotel & Beach Club  
Super Clubs, Jamaica, W.I.  
El Conquistador, Puerto Rico  
Grande Lakes Resort  
Omni Resort, Champions Gate

### CONCERTS

Jackson Victory Tour  
Michael Jackson History Tour  
Van Halen  
KISS  
Jacksonville Symphony Orchestra  
Whitney Houston  
Lynyrd Skynyrd  
Luciano Pavarotti

## Display Permit Information

### Flagler Beach July 4, 2017

Display operator	John Krol	16 years' experience
Display assistant	TBD	years' experience
	TBD	years' experience
	TBD	years' experience
Display monitors	Pier will be closed	
Display location	City Pier Flagler Beach (See attached)	
Display date and duration:	July 4, 2017	18 minutes
Display time	9:00 pm/sunset Please allow for + or - 10 minutes	
Site location	Flagler Beach / City Pier	

**Product type** Articles Pyrotechnics 1.4G Explosive UN#0431  
Fireworks UN0336, 1.4G Explosive  
Fireworks UN0335, 1.3G Explosive

**Product Amounts** 50 - Repeaters  
288 - 3" Single Fire Display Shells  
30 - 3" Finale Chains of 10 (300 Shells total)  
288 - 4" Single Fire Display Shells  
10 - 4" Finale Chains of 5 (80 Shells total)  
198 - 5" Single Fire Display Shells  
10 - 5" Finale Chains of 3 (30 Shells total)  
80 - 6" Single Fire Display Shells  
10 - 6" Finale Chain of 3 (30 Shells total)

**FIREWORKS BY SANTORE, INC.**

PO BOX 351517 • PALM COAST, FL 32135 • 386 246 4345 • FAX 386 246 4370 • WWW.FIREWORKSBYSANTORE.COM

**Lyner, Chad E**

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**From:** Lyner, Chad E  
**Sent:** Tuesday, May 16, 2017 9:33 PM  
**To:** Tugwell, Michael J  
**Subject:** FW: 378452-Flagler Beach Fireworks  
**Attachments:** Flagler Pier Fireworks Layout Fallout Zone.pdf; FBS Display Info Flagler Beach 2017.pdf

**From:** Office FireworksbySantore [mailto:fbsantoreoffice@gmail.com]  
**Sent:** Wednesday, April 19, 2017 2:41 PM  
**To:** Lyner, Chad E <Chad.Lyner@mottmac.com>  
**Subject:** Re: 378452-Flagler Beach Fireworks

Chad,

Please see attached and below rack count if you need anything else please let me know I will do my best to get it for you.

We will be using approximately.

50 – 3” Racks  
48 – 4” Racks  
48 – 5” Racks  
28 – 6” Racks

50 Cakes

*Cindy Guldenschuh*  
*Administrative Supervisor*

***Fireworks by Santore, Inc.***

*18 Hargrove Grade Unit 105*

*Palm Coast, FL 32137*

*[\(386\) 246-4370](tel:(386)246-4370) office*

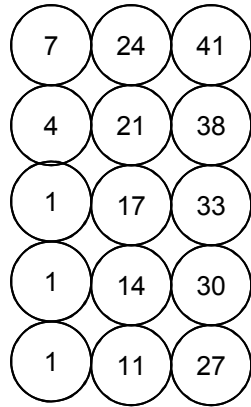
*[\(386\) 264-5648](tel:(386)264-5648) cell*

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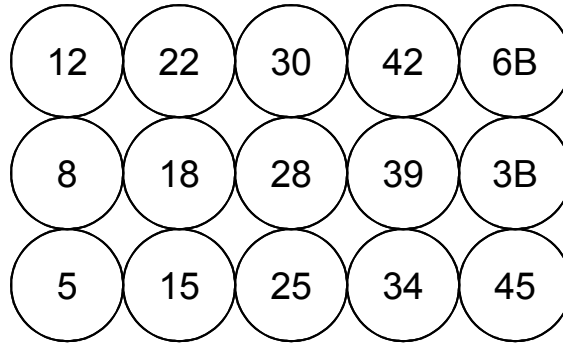
On Wed, Apr 19, 2017 at 2:46 PM, Lyner, Chad E <[Chad.Lyner@mottmac.com](mailto:Chad.Lyner@mottmac.com)> wrote:

Gary,

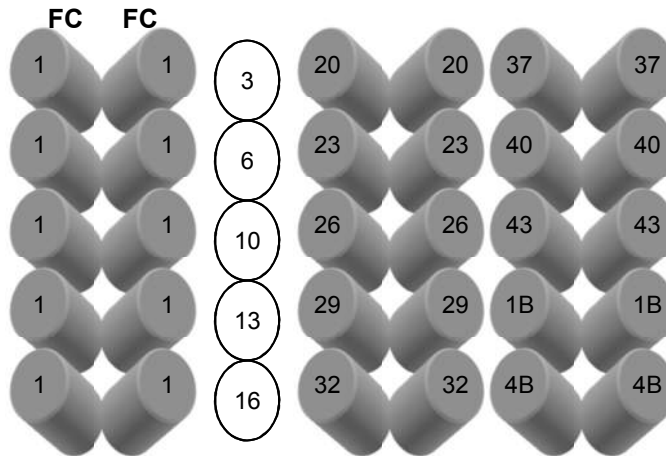
# Flagler Beach July 4, 2016 Box A



FC



A

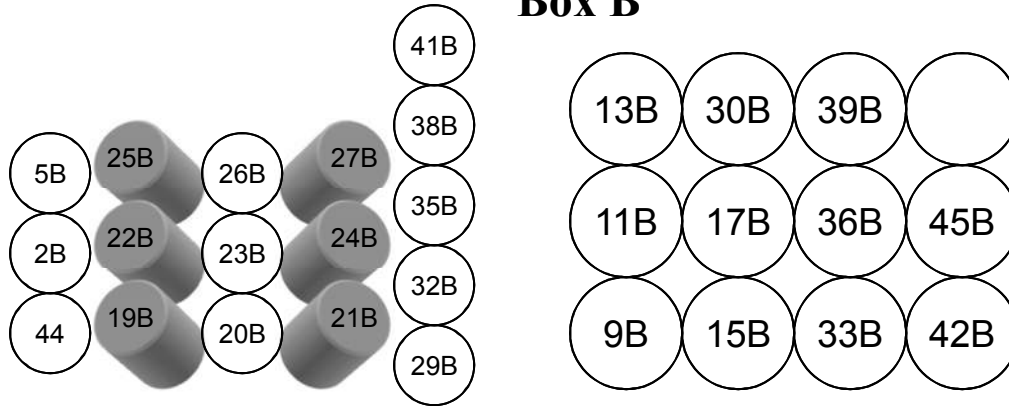


2 Cake	9 Cake	19 Cake	36 Cake
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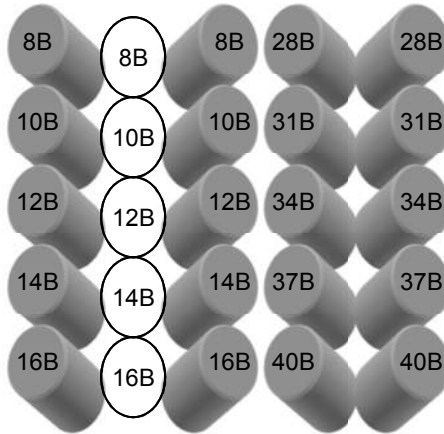
# Flagler Beach

July 4, 2015

## Box B

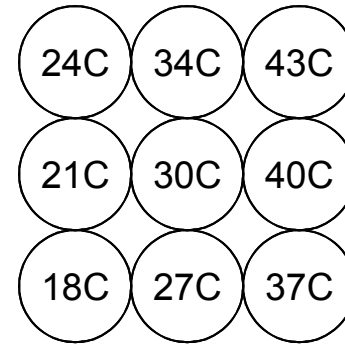
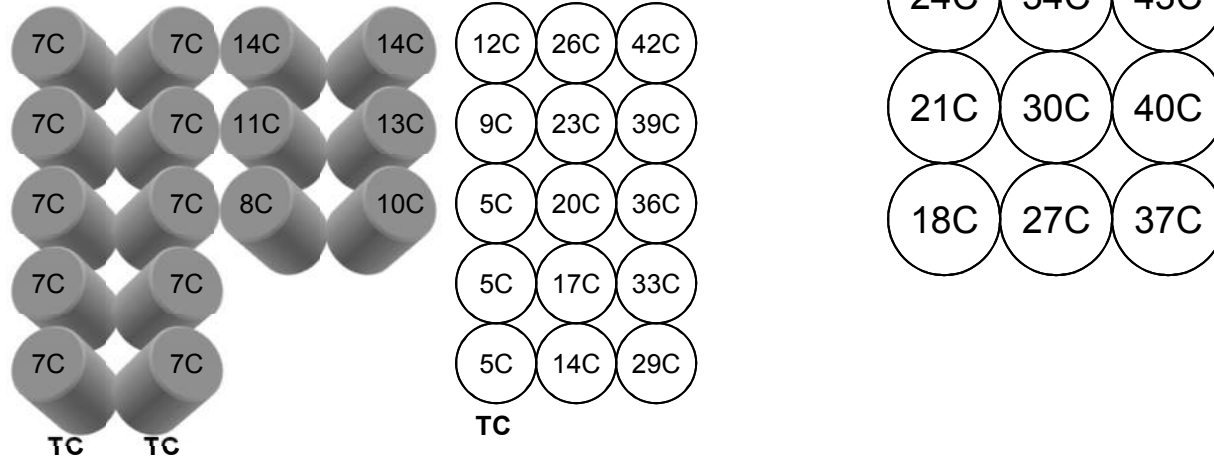


B

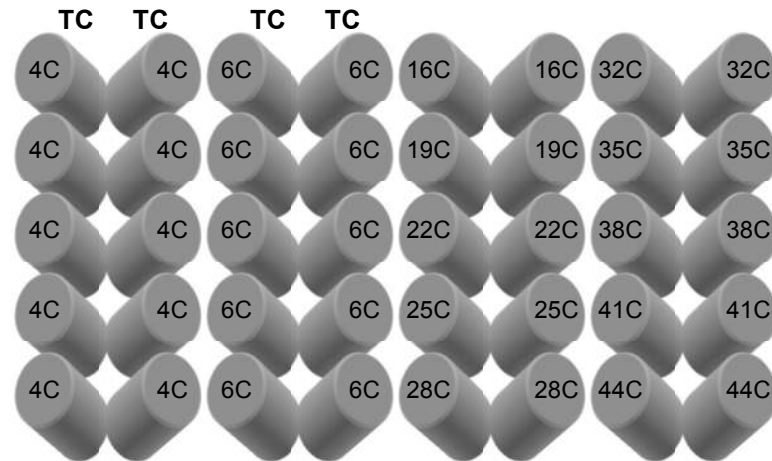


7B Cake	43B Cake	44B Cake
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*Page 6 of 11*  
**Flagler Beach**  
**July 4, 2016**  
**Box C**



C



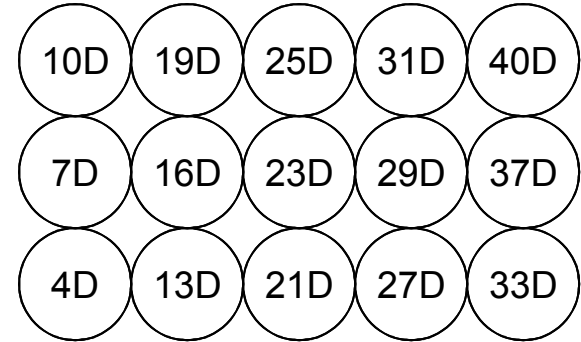
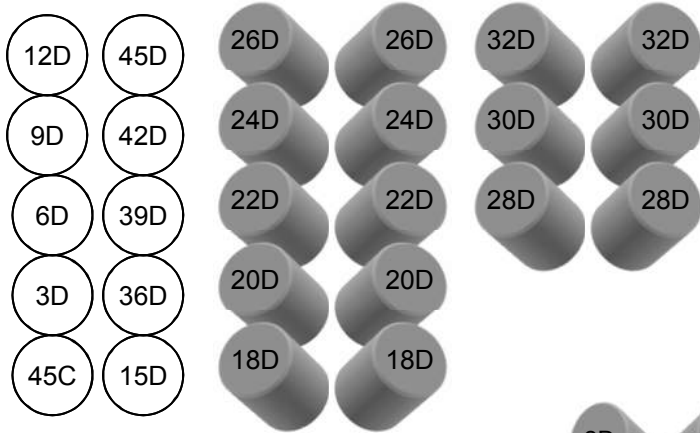
2C Strobes	3C Cakes	15C Cake	31C Cake
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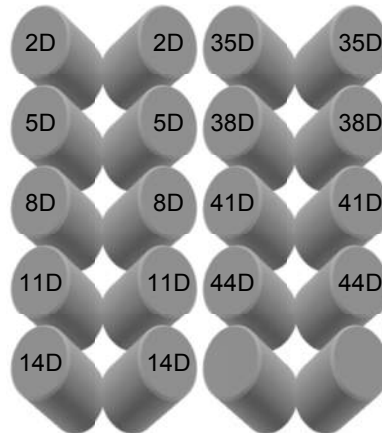
# Flagler Beach

July 4, 2016

## Box D



D



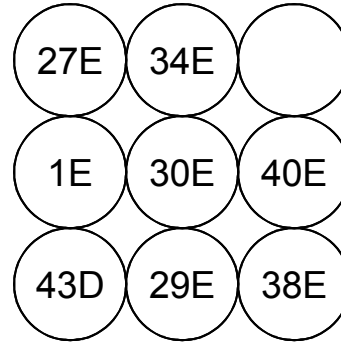
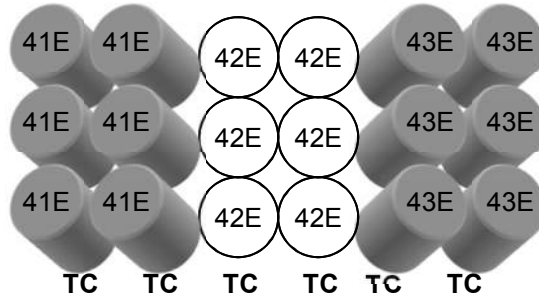
34D  
Cake

# Flagler Beach

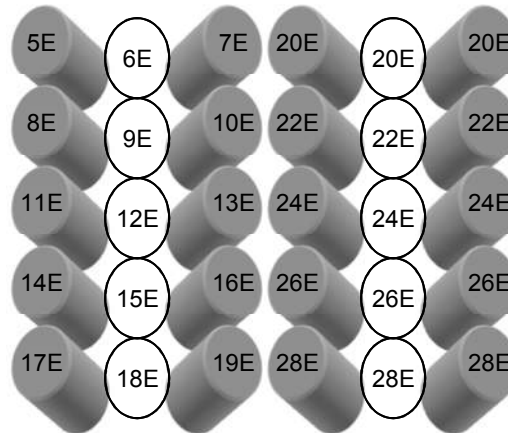
July 4, 2016

## Box E

36E  
32E  
25E  
23E  
21E



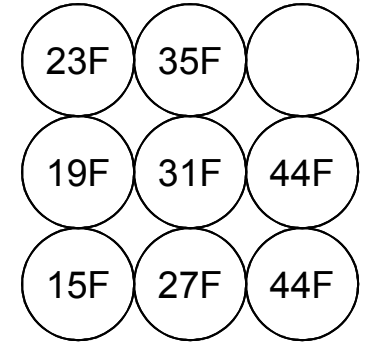
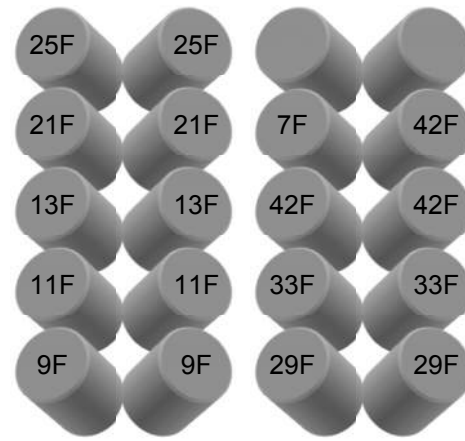
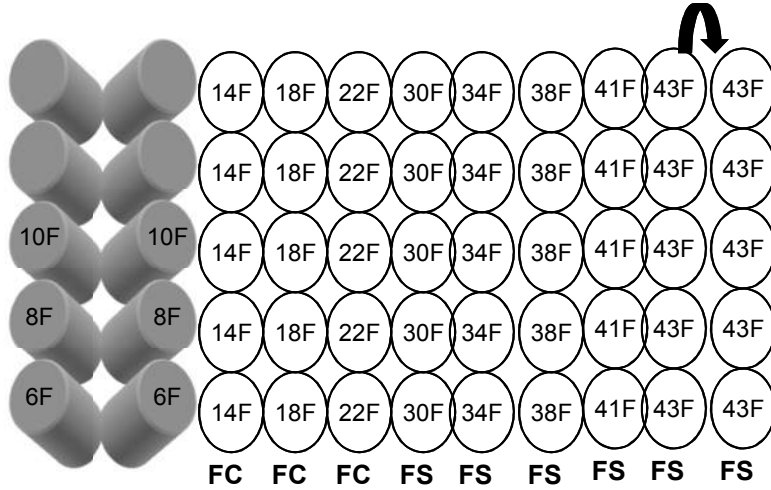
E



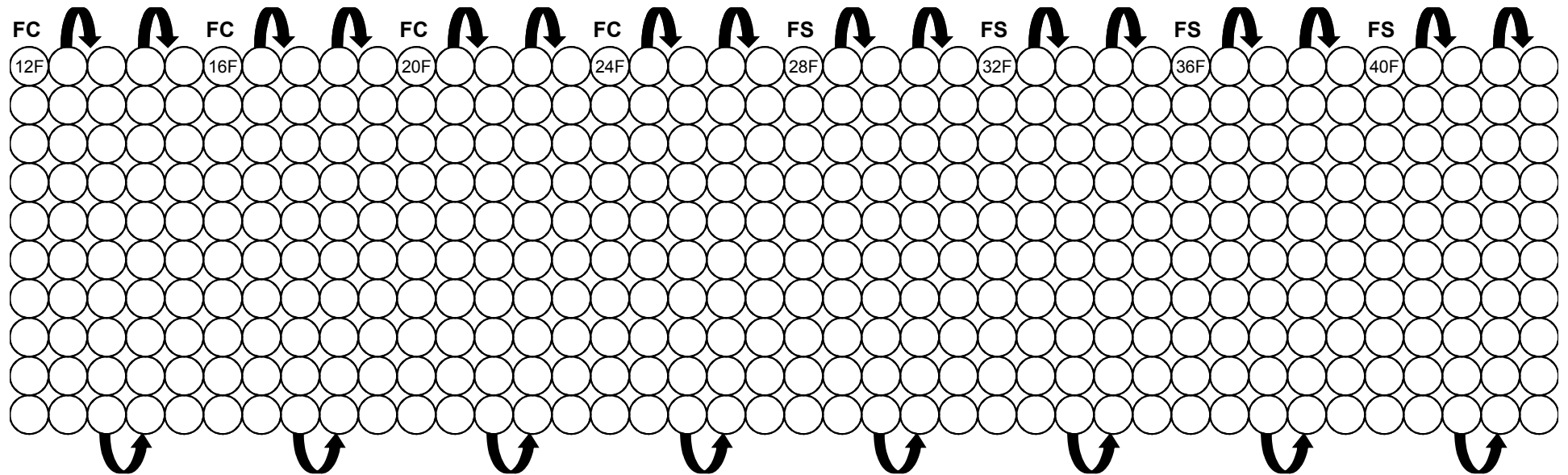
31E Cake	33E Cake	35E Cake	37E Cake	39E Cake
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*Page 9 of 11*  
**Flagler Beach**  
**July 4, 2016**

**Box F**



F

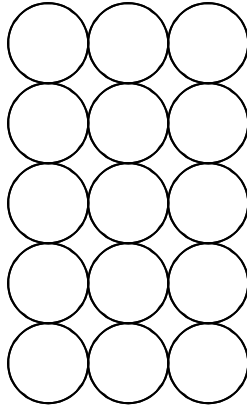


- |            |            |            |            |            |
|------------|------------|------------|------------|------------|
| 1F<br>Cake | 2F<br>Cake | 3F<br>Cake | 4F<br>Cake | 5f<br>Cake |
|------------|------------|------------|------------|------------|

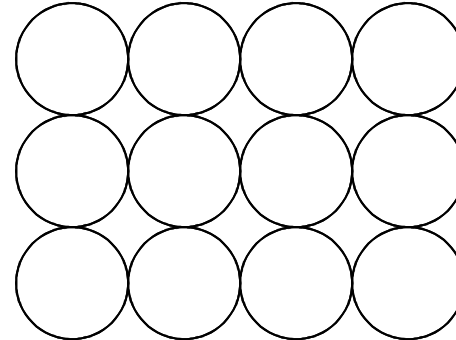
# Flagler Beach

July 4, 2016

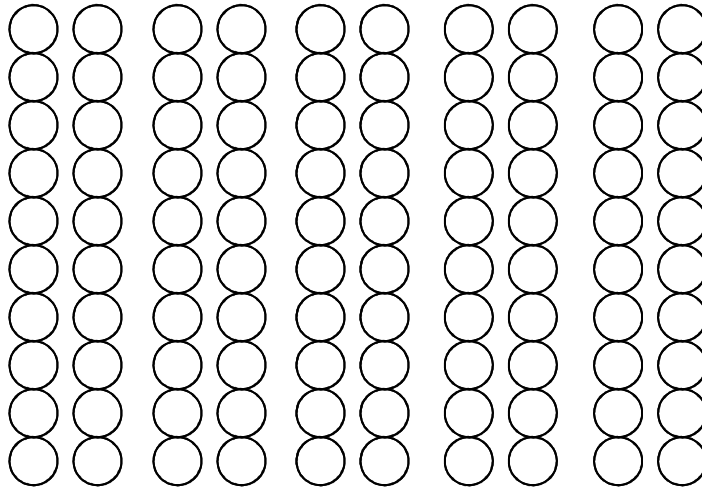
## Extra Box



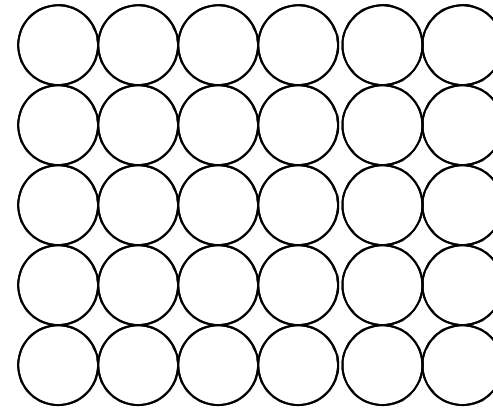
TC TC TC TC  
RWB RWB Gold Gold



TC TC TC TC  
RWB RWB Gold Gold



TC TC TC TC TC TC FC FC FC FC TC TC TC TC TC TC  
RWB RWB RWB RWB Gold Gold Color Color Salute Salute RWB RWB ASS ASS Gold Gold



Extra  
Box

500 gram  
consumer fan cake

500 gram  
consumer fan cake

500 gram  
consumer 2" Cake

500 gram  
consumer 2" Cake

1.3g cake 10 x 10

1.3g cake 10 x 10

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## The Basics of Fireworks Rack Setup

### Fireworks Racks

#### What is a fireworks rack?

A fireworks rack, contains a given number of aerial mortar tubes (aka "guns") of a given size. The racks are constructed from wood. The mortars are typically constructed out of one of three materials, namely HDPE (High Density PolyEthylene), paper, or steel. HDPE becoming the most common. Racks can only contain paper or HDPE tubes. Steel tubes must be buried 2/3 of their length. HDPE is used instead of say PVC or ABS due to its special **energy absorption properties**. The energy from a tube [detonation](#) goes into expanding and splitting the HDPE material, in contrast to PVC which would splinter and fragment throwing shrapnel and therefore be unsafe to use unburied in a rack.

The number of mortars per rack and total weight depends on the size (diameter) of the gun. Each rack has only one mortar size. Here is a table for rack size and weight for HDPE mortars:

Mortar Diamter	Number of Mortars per Rack	Total Rack Weight
2"	5	14 lbs
67mm	5	19 lbs
3"	5	28 lbs
4"	5	40 lbs
5"	3	42 lbs
6"	3	60 lbs
8"	3	120 lbs



#### How do you organize mortar racks for a show?

In general, because of the way the racks are secured together, you must group racks of the same caliber.

If your shooting a [Pyrodigital](#) (PD) show using a computerized firing system, all the racks of the same caliber can be grouped together and the computer picks and chooses which group to shoot from. This makes setup much easier. Racks can then be grouped in sets of 4 or 5, which saves time of not having to clear each individual rack (although there are other methods to minimize this).

For safety reasons, we limit the number of guns that can exist in any given group of racks, and leave working space between these groups. You will never have the need to group more than 5 racks together for any part of your display. This way, if a shell malfunctions in the mortar and blows the rack apart, it minimizes the number of other loaded guns which can be damaged in the explosion.

#### How do you secure the mortar racks for the show?

We secure racks by "cleating" them together. What the heck is cleating?! It's quite simple actually. It involves taking a few pieces of wood (cleats) and nailing them to the racks. The name of the game is **make the racks stable**. If you have ever seen one of the [videos of the mortars firing](#) during a show, a finale in particular, you can see its extremely violent. So your cleating job has to ensure that the racks will not tip over or come apart while their jumping around. If your cleating an individual rack, or even two of them together, you will take one cleat across the bottom of the rack, making sure it is sitting firmly on the ground, and place two nails (in each rack if more than one are being cleated together) and then one cleat across the top (if more than one are being put together), with one nail in each rack. So, **two nails in the bottom of each rack and one in the top of each rack**. We use duplex nails (nail with two heads) so that we can pull the nails out with ease at the end of the show during cleanup. Finale racks are slightly different since they are usually cleated together at an angle (like a fan) so that you get a good spread and fill the whole sky. Same cleating method applies (two nails in the bottom, one in the top), with the one difference of fanning.

After all the racks are built, and BEFORE you layout or load your aerial shells, you must clean all the guns to ensure no debris would prevent a shell from sitting all the way at the bottom of the gun, otherwise, your shell may not lift high enough before breaking, giving you a "low break." Be sure to watch the training videos above.

## Training Videos!

[Building Racks](#)

[Finale Rack Setup](#)

[Cleaning Mortars](#)