

Subject: RE: Steel in SeaQuest
From: Kurt J Krempetz <krempetz@fnal.gov>
Date: 3/5/12 11:20 AM
To: Leo Bellantoni <bellanto@fnal.gov>
CC: David C Christian <dcc@fnal.gov>, Paul E Reimer <reimer@anl.gov>

Hi Leo,

I've reviewed the information Paul has sent. Typically we consider a structures which can withstand .1g force in any direction as an acceptable criteria. Paul used .15g's in his calculations and showed the wall was stable. This .1g number is derived from an older version of ASCE/SEI 7-10 Minimum Design Loads for Buildings and other Structures.

I hope this helps, if you have any other questions please let me know.

Cheers,

Kurt

-----Original Message-----

From: Paul E. Reimer [<mailto:reimer@anl.gov>]
Sent: Monday, March 05, 2012 8:58 AM
To: Leo Bellantoni
Cc: Kurt J Krempetz; David C Christian
Subject: Re: Steel in SeaQuest

Hello Kurt,

Over the weekend, I had a few of my people think about this. Below is there response.

Paul

Hi Guys!

OK, here's what I came up with for stability of the iron wall under seismic loading. I attached a PDF. See what you think...

Looking at the force vector from the Iron Wall Center of Gravity the line of force is within the Iron Wall...so it should be stable...

Kevin

Good Afternoon Kevin and Paul,

I agree with your analysis Kevin. It should be stable under such a load but I have two comments:

I think your method implies a solid wall instead of the individual iron blocks. However, the individual blocks are of such a geometry that individual seismic loads will produce the same line of force. This line is within the blocks too so there is no chance of tipping over. They would slide before they tipped which brings me to my second comment.

These blocks are not secured to the floor or to each other so someone might wonder if the seismic load could result in slipping between blocks or between the blocks and the concrete floor. The assumed load is 15% of the weight so if the coefficient of friction is less than 0.15 (either between iron/iron or iron/concrete) then slippage may occur. I did some casual searching and found an iron/iron coefficient 1.0 so thats not a problem. I couldn't find anything for iron/cement but i bet it's high enough too. As an example, nylon/nylon has a coefficient of about 0.15, which seems quite slippery by comparison. I don't think we need to change Kevin's analysis unless this comes up in your discussions and they ask for more details.

Any thoughts?

CU,
Tom

On 3/5/12 8:52 AM, Leo Bellantoni wrote:

Dear Kurt,

There is a wall of iron in SeaQuest, called "The Iron Wall" between stations 3& 4. We would like to get this experiment an ORD PDQ. Will The Iron Wall need a seismic stability study? The experimenters have some rough calculations -

I distinctly remember discussion from my days in KTeV that a seismic stability study had to be done for the KTeV steel; that is not an issue.

Leo

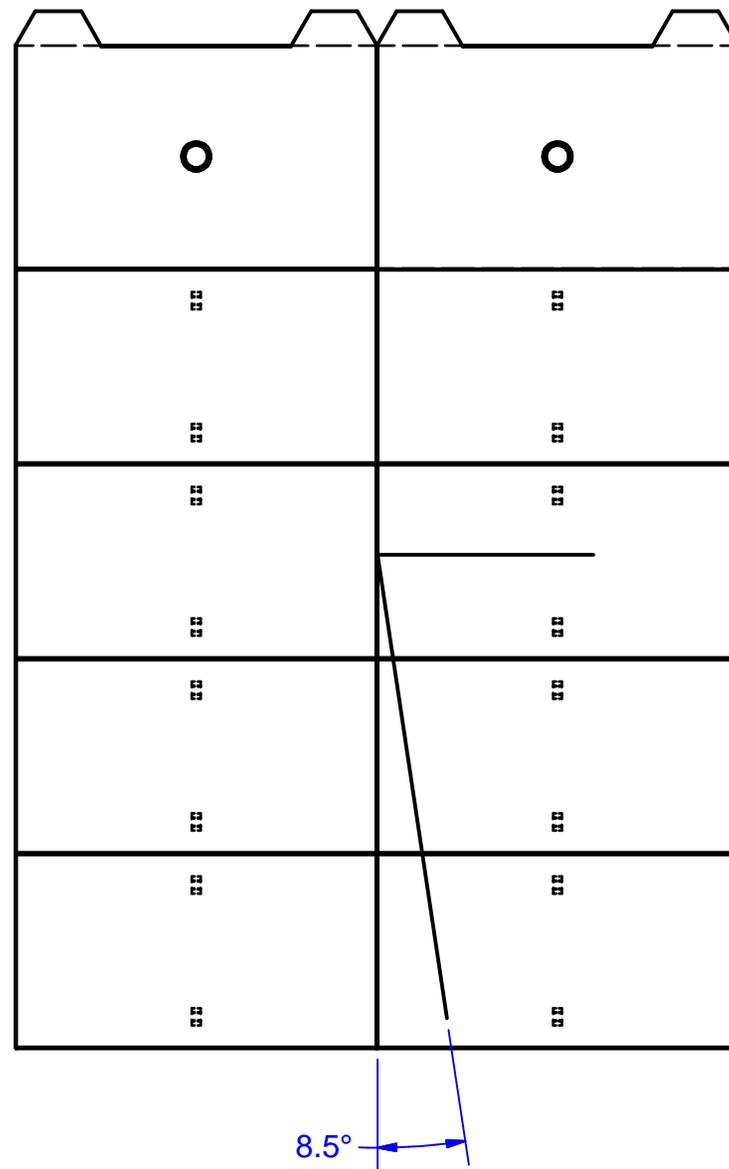
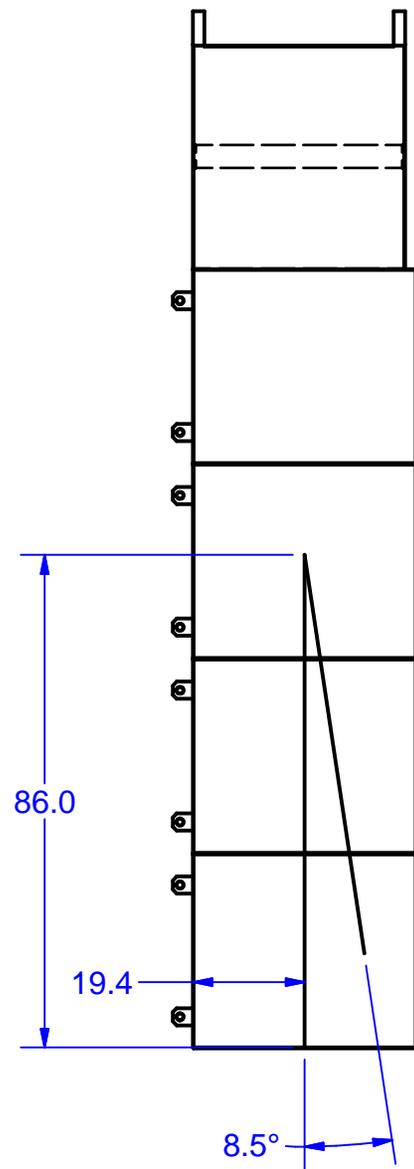
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USA www.phy.anl.gov/mep/staff/Reimer_P_E.html

—Attachments:—

winmail.dat

5.8 KB



Physical Properties for Station 3 Iron Blocks

General Properties:

Material: {Ductile Iron}

Density: 7.100 g/cm³

Mass: 218145.442 lbmass (Relative Error = 0.000000%)

Area: 70192.791 in² (Relative Error = 0.000000%)

Volume: 850457.105 in³ (Relative Error = 0.000000%)

Center of Gravity:

X: 0.000 in (Relative Error = 0.000000%)

Y: 19.281 in (Relative Error = 0.000000%)

Z: 86.751 in (Relative Error = 0.000000%)

SEISMIC FORCE OF 15% = 32722lbs

FORCE ACTING ON CENTER OF GRAVITY

WEIGHT = 218145lbs

SEISMIC = 32722lbs

ARCTAN(32722/218145) 8.5°

LINE OF FORCE IS WITHING THE IRON WALL
IRON WALL IS STABLE UNDER THESE SEISMIC FORCES