**UNIVERSITY OF NEW HAVEN**
**Tagliatela College of Engineering**

September 10, 2013

TO: EASC 1107 Students

FROM: EASC 1107 Instructor

SUBJECT: Writing a Technical Memorandum - Form and Content

## Why You Need to Write Memos

In late 2012 the college surveyed its alumni and employers of its graduates concerning the importance of technical communication skills in preparation for an engineering career. That survey revealed that over 97% of those responding believed that letters and memos were "Critically Important" (46.9%) or "Somewhat Important" (50.6%) technical communication products in engineering. The importance of memos is also reflected in the way TCoE faculty have coordinated assignments across the engineering programs. At this point seven different PITCH-designated engineering courses formally require technical memos as part of required course assignments. That total is likely to rise even further over time.

These results should surprise no one. At least since the early part of the 20$^{th}$ Century, memos have become a standard mode of communication within organizations of all types. The memorandum was originally a reminder letter that people wrote to themselves. As Figure 1 demonstrates, it evolved to become primarily an internal communication for organizations. Technical communications scholar Linda Driskill (1992) from Rice University summarized two important points about the modern memo.

> As the origins of the memo point out, the purpose of internal communication is efficiency, cooperation, and productivity in the organization. The memo format is intended to accomplish those purposes. The lean system of headings helps orient readers to the situation. *The body of the memo is organized according to the management purpose it serves.* (Italics added)

So beyond the conventional heading material such as you see at the top of this memo, the information that follows depends on the different purposes and situations that writers of the memo encounter. Driskill goes on to say that "Memos vary in tone, length, and style to reflect these differences."

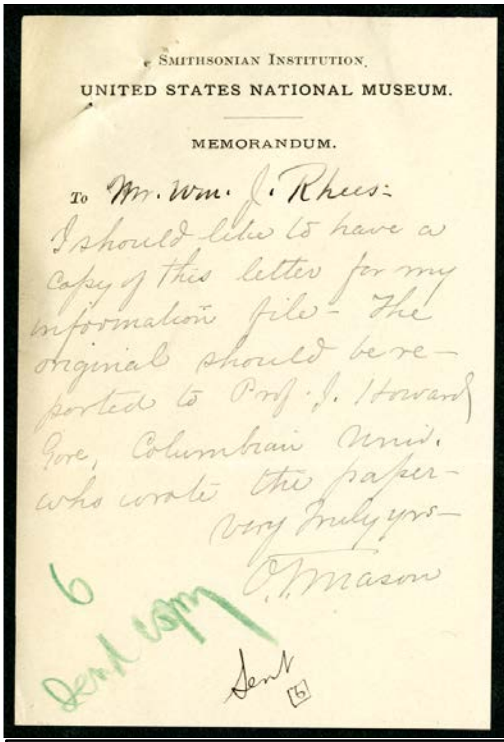
So one can say that the modern memo has two essential features:

- A conventional heading structure at the top that records basic information about the memo;
- Content that reflects the arrangement of information, level of detail and style that best work to achieve the writer's purpose.

The rest of this handout presents a brief history of the memo followed by two examples of the kind of memo you will need to write in your engineering courses.

## Memos: a Little History

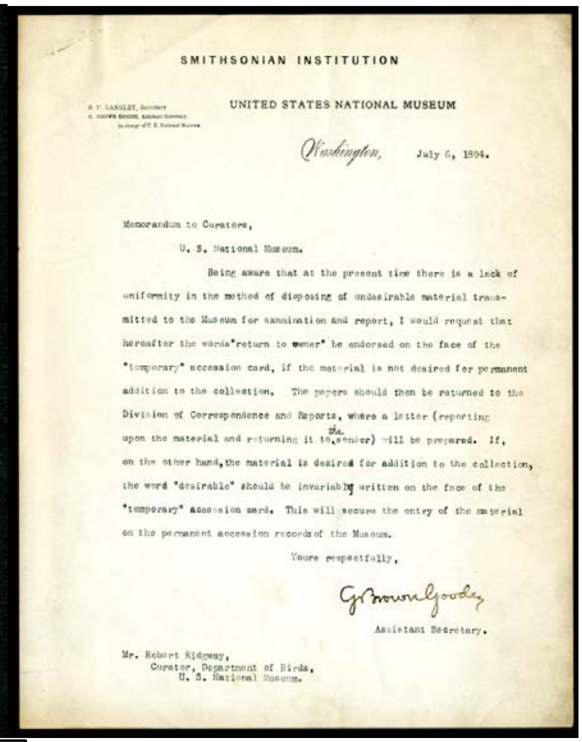
The three slides below provide a capsule view of how the memo has changed over time.



SMITHSONIAN INSTITUTION,
UNITED STATES NATIONAL MUSEUM.

MEMORANDUM.

To Mr. Wm. J. Rhees:
I should like to have a copy of this letter for my information file – The original should be reported to Prof. J. Howard Gore, Columbian Univ. who wrote the paper –
Very truly yrs –
O. T. Mason



SMITHSONIAN INSTITUTION

A. P. LANGLEY, Secretary

UNITED STATES NATIONAL MUSEUM

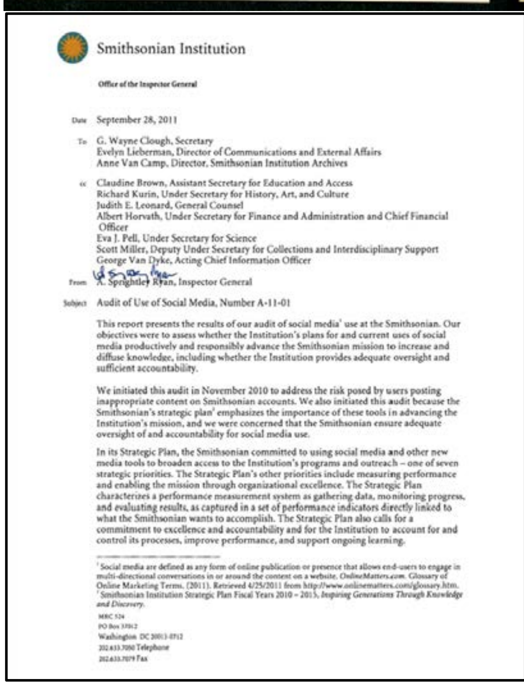
Washington, July 6, 1894.

Memorandum to Curators,
U. S. National Museum.

Being aware that at the present time there is a lack of uniformity in the method of disposing of undesirable material transmitted to the Museum for examination and report, I would request that hereafter the words "return to owner" be endorsed on the face of the "temporary" accession card, if the material is not desired for permanent addition to the collection. The papers should then be returned to the Division of Correspondence and Reports, where a letter (reporting upon the material and returning it to the sender) will be prepared. If, on the other hand, the material is desired for addition to the collection, the word "desirable" should be invariably written on the face of the "temporary" accession card. This will secure the entry of the material on the permanent accession records of the Museum.

Yours respectfully,
G. Brown Goode
Assistant Secretary.

Mr. Robert Ridgway,
Curator, Department of Birds,
U. S. National Museum.



Smithsonian Institution

Office of the Inspector General

Date September 28, 2011

To G. Wayne Clough, Secretary
Evelyn Lieberman, Director of Communications and External Affairs
Anne Van Camp, Director, Smithsonian Institution Archives

cc Claudine Brown, Assistant Secretary for Education and Access
Richard Kurin, Under Secretary for History, Art, and Culture
Judith E. Leonard, General Counsel
Albert Horvath, Under Secretary for Finance and Administration and Chief Financial Officer
Eva J. Pell, Under Secretary for Science
Scott Miller, Deputy Under Secretary for Collections and Interdisciplinary Support
George Van Dyke, Acting Chief Information Officer

From A. Sprightley Ryan, Inspector General

Subject Audit of Use of Social Media, Number A-11-01

This report presents the results of our audit of social media[1] use at the Smithsonian. Our objectives were to assess whether the Institution's plans for and current uses of social media productively and responsibly advance the Smithsonian mission to increase and diffuse knowledge, including whether the Institution provides adequate oversight and sufficient accountability.

We initiated this audit in November 2010 to address the risk posed by users posting inappropriate content on Smithsonian accounts. We also initiated this audit because the Smithsonian's strategic plan[2] emphasizes the importance of these tools in advancing the Institution's mission, and we were concerned that the Smithsonian ensure adequate oversight of and accountability for social media use.

In its Strategic Plan, the Smithsonian committed to using social media and other new media tools to broaden access to the Institution's programs and outreach – one of seven strategic priorities. The Strategic Plan's other priorities include measuring performance and enabling the mission through organizational excellence. The Strategic Plan characterizes a performance measurement system as gathering data, monitoring progress, and evaluating results, as captured in a set of performance indicators directly linked to what the Smithsonian wants to accomplish. The Strategic Plan also calls for a commitment to excellence and accountability and for the Institution to account for and control its processes, improve performance, and support ongoing learning.

[1] Social media are defined as any form of online publication or presence that allows end-users to engage in multi-directional conversations in or around the content on a website. OnlineMatters.com. Glossary of Online Marketing Terms. (2011). Retrieved 4/25/2011 from http://www.onlinematters.com/glossary.htm.
[2] Smithsonian Institution Strategic Plan Fiscal Years 2010 – 2015, *Inspiring Generations Through Knowledge and Discovery*.

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Drawn from the archives of the Smithsonian Institution, this sequence shows the evolution of the memorandum from the mid-19th Century through its modern format of today. *Upper left*: Memo to William Jones Rhess from O.T. Wilson. 1888. *Upper right:* Memorandum to curators. July 6, 1894. *Left:* Memorandum from A. Sprightly Ryan regarding the use of social media at the Smithsonian. Sept. 28, 2011.

Note the trend from a handwritten document to the formal heading and block paragraphs common in 2013.

(http://siarchives.si.edu/blog/evolution-memo. Retrieved September 2, 2013.

**Figure 1. Three Examples Illustrating the Evolution of the Memo.**

The main point is to show how the memo evolved from a handwritten reminder (sort of a professional diary entry) to the common format and purpose that people recognize in 2013.

## Two Annotated Examples of Brief Technical Memos

Attached you will see two examples of the type of brief technical memos required in EASC 1107. Please remember that the exact length and level of detail in your memos will depend upon the situation you are given in your assignment sheet. You will notice three overall trends:

- Placing the most important information first in a direct style that does not waste words;
- Choosing words with care so that the language precisely matches the data;
- Providing data to support conclusions or recommendations, summarized in the text of the memo and detailed in an attachment.

## Works Cited

1. L. Driskill, J. Ferril & M. Steffy. 1992. *Business & Managerial Communication: New Perspectives*. P. 257. Harcourt Brace Jovanovich. Orlando, FL.

2. Smithsonian Institution. 2011. *The Evolution of the Memo*. Washington, D.C. Retrieved from (http://siarchives.si.edu/blog/evolution-memo September 2, 2013.

# UNIVERSITY OF NEW HAVEN
# Tagliatela College of Engineering

**To:** Laboratory Staff 9/4/2013

**From:** Mike Rufalo, Laboratory Manager

**Subject:** Homestead Industrial Project: Wood Variability

*Here is the assignment sheet for the sample memo that follows. Note the specific instructions.*

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## Request for Information

Homestead Industrial, Inc. has asked us to verify the strength of weathered white pine boards previously used for siding on homes. They would like to reuse the material and are concerned about the strength. Since wood is such a highly variable material, thirty samples will have to be tested to failure in compression. The resulting maximum strengths should then be analyzed statistically and compared to an existing standard. This comparison is important in addressing Homestead's concern.

Please perform the testing and analysis detailed in the assignment below and write a company memo to me. I am familiar with the standard lab practices but will not be aware of your specific results. I will rework your memo into a more formal letter to Homestead Industrial. Please keep the memo short and to the point!

## Your Assignment – a memo report to the project manager

Perform the compressive testing as detailed in our standard laboratory practices (on the web site) and provide the following **results.**

- Provide the minimum and maximum (range), mean, standard deviation and coefficient of variation of the failure strengths. I would like these values presented in a table.
- Include a histogram plot of the failure strengths.

Your memo should answer the following **questions**.

1. The National Design Specification (NDS) for Wood (1997) lists the allowable design strength for No. 2 white pine as 675 psi. Using the test data, what is the probability that the strength of a sample will be larger than the published value *p* (sample data > 675 psi)? Assume a normal distribution as detailed in our lab manual.
2. On a percentage basis, how much larger (or smaller) is the mean failure strength than the published value of 675 psi? For example, you could state, "The mean strength from the test data is [(mean – 675 psi) / 675 psi] percent higher than the published value for No. 2 white pine as listed in the National Design Specification for Wood (1997)."

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## Reference:

American Forest and Paper Association. 1997. Supplement NDS National Design Specification for Wood Construction. American Wood Council. pp 25 - 27.

UNIVERSITY OF NEW HAVEN
Tagliatela College of Engineering

**To:** Mike Rufalo, Laboratory Manager  **Date:** 9/14/2013

**From:** Juliette Coblenz, Laboratory Technician
**Subject:** Homestead Industrial Project: Results of Test on Weathered White Pine Boards

*Notice that the very first sentence answers the basic question and is clearly linked to the subject line and the heading; there is no beating around the bush*

## The Test Results You Requested

Our laboratory tests confirmed that sample of No. 2 white pine submitted by Homestead Industrial maintains a compressive strength far beyond the 675 psi specified by The National Design Specification (NDS) for Wood (1997). All 30 specimens were tested to failure and the results analyzed. The mean compressive strength of those 30 specimens tested was 4475.18 psi, a figure 563% greater than the listed NDS value. Assuming a normal distribution, the probability that the strength of a specimen will be larger than the published value is 99.28%. Below I have included the mean, minimum and maximum compressive strengths and the standard deviation and coefficient of variation of those strengths, as well as the histogram you requested.. Please contact me if you have any questions.

Table 1. Homestead Wood Products Test Values

| | |
|---|---|
| Mean compressive strength | 4475.18 psi |
| Minimum compres strength | 2189.01 psi |
| Maximum compres strength | 6611.83 psi |
| Mean compressive strength | 4475.18 psi |
| Standard deviation | 1373.35 psi |
| Coefficient of variation | .3068 |

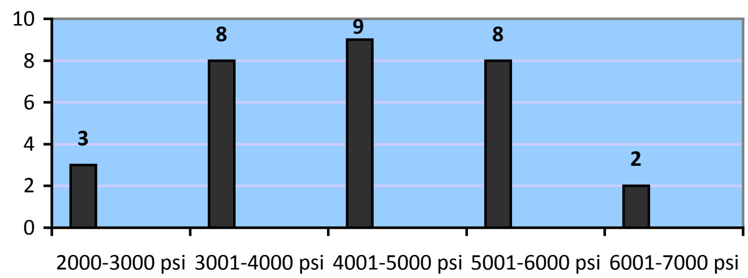


**Figure 1. Distribution of Test Results: Homestead No. 2 White Pine--Compressive Strength of 30 Samples Tested to Failure.**

*Not all memos will be this brief, but in this case a simple request only required one paragraph of text, plus a table and attached graph. Two things to note:*

- *"Assuming a normal distribution" is a precise and necessary qualifying statement here.*
- *The order of mean, minimum and maximum compressive strengths is the same in both the text and the table. That sort of consistency really helps the reader.*
- *This summary graph is simple and direct, as well as easy to read, although there might have been titles for each axis. Notice that the title is properly placed* ***beneath*** *the graph and contains enough detail to make the content clear at first glance. You could also imagine a detailed table listing the results for each specimen, but that was not requested here. In most settings, you should also expect to see attached a sheet of your calculations, as appears in the next example.*

SES/ *Soltan Entropy Systems, Inc.*
3365 Chadwick Dr.
Monet, MI 48703
517/368-9001

September 1, 2013

*This sample assignment is followed by a sample memo.*

**To:** Laboratory Staff
**From**: Jim Corcoran
**Subject**: Hydrostatic Equations and new Wilson tank design

## Request for information

Sarah Chen is manager of Contracts & Specifications from at our Memphis Office. One of her clients, Wilson Hydraulic Systems, has received an RFP (request for proposal) for a new line of ultra-light tanks. These tanks will be used in an experiment that determines how high a jet of buoyant fluid will rise through a static fluid that is stratified (fluid density increases with depth). She knows we have run experiments to determine the forces and pressures acting on the walls an earlier line of smaller Wilson tanks, tanks using fresh water. She wants to know whether the equations we used in those experiments would also be appropriate in determining the forces and pressures acting on the walls of their new tanks.

These tanks are to be 5 ft (l) x 3 ft (w) x 5 ft (h). In this experiment the tank is filled with salt water. The water's specific gravity varies linearly over the 5 ft depth from 1.025 at the bottom of the tank to 1.000 at the surface.

## Work Assignment

Using this company standard format, please draft a memo to Ms. Chen that addresses the following:

1. Would it be appropriate to use the equations for force and pressure employed in our current experiments in the new design as well? Explain why or why not. If not, can you suggest an alternative. In either case, determine whether this new situation presents conditions that violate assumptions made in development of the equations you have been using and explain the significance of any such violation.
2. Remember that Ms. Chen is not an engineer and she prefers brief correspondence (1 page maximum) in plain, correct English. Nonetheless, make sure your information is technically sound. She *will* have it checked. Remember the flak we took for those sloppy calculations we sent her last year; they caused a two-week delay in completing a proposal.

SES/ *Soltan Entropy Systems, Inc.*
3365 Chadwick Dr.
Monet, MI 48703
517/368-9001

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*Note the standard format at the top of the memo, but especially the use of a very specific subject line.*

# Memorandum

September 4, 2013

**To:** Sarah Chen, Manager Contracts & Specifications, Memphis
**From:** Jim, Corcoran, P.E., Laboratory Manager, Monet
**Subject:** Application of the hydrostatic equations to Wilson Hydraulic Systems tank design

*The answer in this case is not a straight "yes" or "no" because the engineering reality dictates a more complex answer. Nonetheless, the writer properly gets right to the point and uses the bulleted list to detail the explanation.*

## Your request for information

The equations we used in the earlier experiments for predicting the forces and pressures on submerged planar surfaces *might or might not* satisfy Wilson's current requirements. Sound use of these equations depends upon precise differences between the system proposed and the setup we have used in our laboratory here, as well as the degree of accuracy required. The issue is two-fold:

- Our equations for predicting pressure (pc = pgH) and force (F = pcA) depend on the fluid having a constant density, which was the case in our freshwater system. The proposed system uses salt water, which introduces linearly varying density. This varying density (in Wilson's system from 1.025 to 1.000) might cause an error of ~2%. By using the maximum density of the salt water, we can calculate the force acting on each tank face. Please note that these numbers will be slightly larger than the actual forces on each face.

- The equations used in our laboratory assumed a static system. Wilson's system may not be truly static since it involves a jet that may produce fluid movement and acceleration in the previously static layers of salt water. If such movement occurs, then the system could violate a key assumption used in our equations, and these equations may no longer be accurate predictors. In addition, the precise effect of the jet remains unclear since we do not know its size or position in the tank. If the jet in Wilson's system is quite small, or is localized, then our equations might still yield a useful estimate of the pressures and forces the new tanks will experience.

The attached calculations support these conclusions.

*Attaching the simple calculations page allows the reader to "check" the data in relation to the conclusion.*

A more definitive answer would require us to perform specific experiments based on Wilson's detailed design. Please contact me if you wish further information.

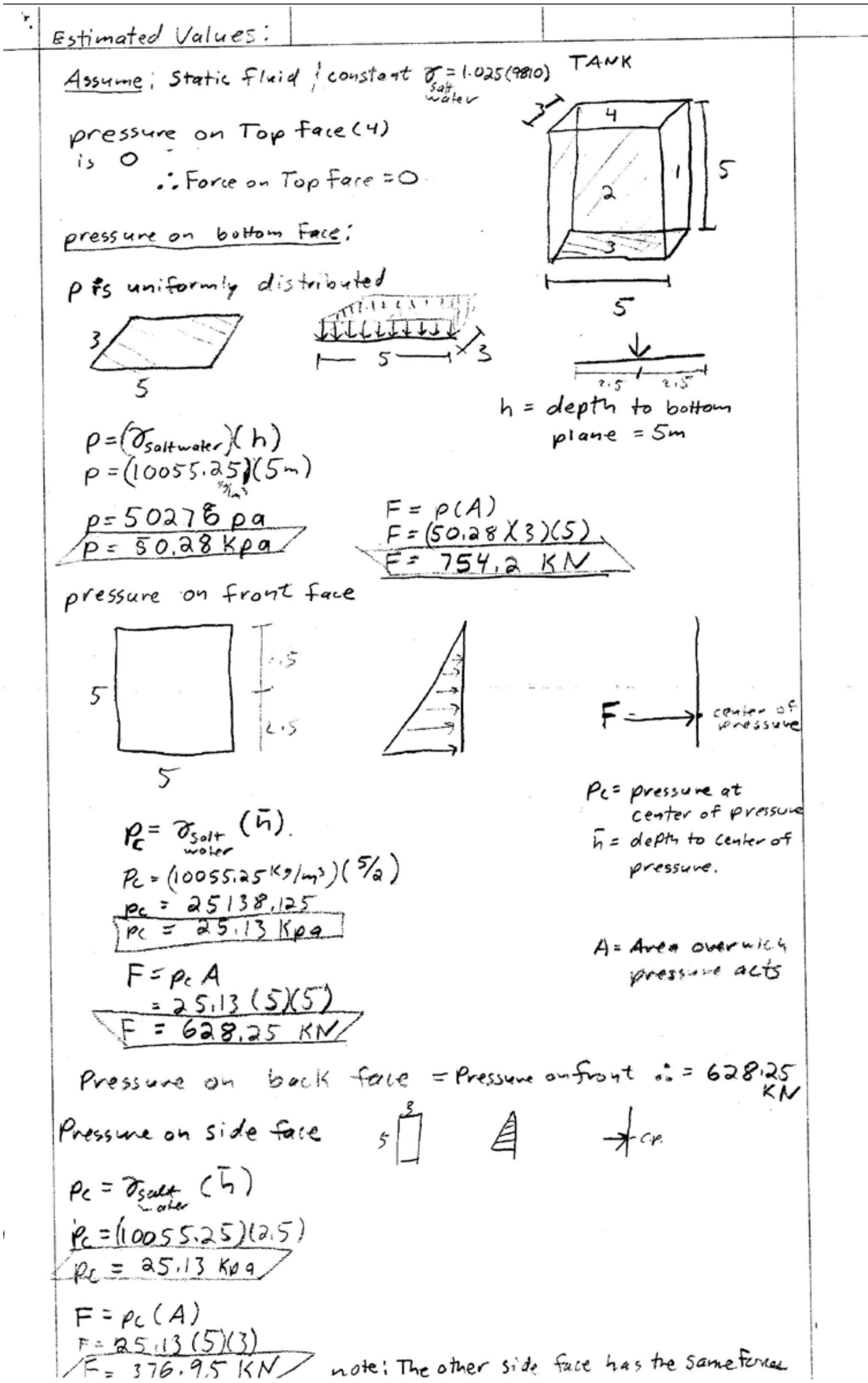
Encl. Calculations page

SES/ *Soltan Entropy Systems, Inc.*

3365 Chadwick Dr.

Monet, MI 48703

517/368-9001

Estimated Values:

Assume: Static fluid ; constant $\gamma_{salt\ water} = 1.025(9810)$

TANK

pressure on Top face (4) is 0

∴ Force on Top face = 0

pressure on bottom face:

p is uniformly distributed

h = depth to bottom plane = 5m

$p = (\gamma_{saltwater})(h)$

$p = (10055.25)(5m)$

p = 50278 pa

p = 50.28 Kpa

$F = p(A)$

$F = (50.28)(3)(5)$

F = 754.2 KN

pressure on front face

$p_c$ = pressure at center of pressure

$\bar{h}$ = depth to center of pressure.

A = Area over which pressure acts

$p_c = \gamma_{salt\ water}(\bar{h})$

$p_c = (10055.25\ kg/m^3)(5/2)$

$p_c = 25138.125$

$p_c = 25.13$ Kpa

$F = p_c A$

$= 25.13(5)(5)$

F = 628.25 KN

Pressure on back face = Pressure on front ∴ = 628.25 KN

Pressure on side face

$p_c = \gamma_{salt\ water}(\bar{h})$

$p_c = (10055.25)(2.5)$

$p_c = 25.13$ Kpa

$F = p_c(A)$

$F = 25.13(5)(3)$

F = 376.95 KN

note: The other side face has the same forces

Figure 1. Sample Calculations on Force & Pressure. WHS Tanks.