

## E101 – Introduction to Engineering and Problem Solving

Dr. Bill Hunt, PE

Sections 002 & 003

Monday, October 27, 2008



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## Agenda – 27Oct08

- Student Q&A – Announcements
  - Team Presentation Feedback
  - Remainder of Semester Schedule
- Problem Solving
- Teamwork
- Guest Lecturer: Robert Bright
  - Chemical Engineering & Teamwork
- Final Thoughts/ Reminders

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## Team Presentation Feedback

- Between sections 002 and 003 all but 5 grades were over 90. Very good job!
- Best presentations were well rehearsed. No “freelancing”
- Remember:
  - minimum font size of 28 is recommended (24 is allowable)
  - Black on White or Yellow on Dark Blue color scheme
  - Use pictures/figures

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## A Look Ahead to your Final Presentation

- You will have **NO MORE** than 5 minutes to present. 4-5 minutes is ideal.
- You only need 2 people from your group to present.
- All presentations will be on December 1, 2008. This serves as your final exam.
- Imperative at least 1 team member (with presentation in hand) arrive 10 minutes before class starts on 12/01/08.

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## Remaining Semester Calendar

- 10/27 – Problem Solving & Teamwork
- 11/3 – Discipline Synopsis & Engineering Ethics
- 11/10 – Engineering Ethics & Team Work Session for FEDD
- 11/17 – Mid-term Exam
- 11/25 (Tuesday) – FEDD
- 12/01 – Final Presentations

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## Random Thoughts on Teamwork



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## Dr. Hunt's Thoughts on Teamwork

- Well functioning Teams can accomplish A LOT.
- Poorly functioning Teams are awful.
- Every Team needs an agreed upon leader.
  - Leader “controversy” stymies a team’s potential
- Teams need a well-defined mission
- Listen to all team members

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## Dr. Hunt's Teamwork Thoughts

- Accentuate member's strengths & Minimize weaknesses
- Not every member of the team contributes an equal share to success
  - In long run, these folks don't get promoted/ raises/ recommendations
- Teams WILL happen. Problems are too complex for 1-2 individuals.
- Both (1) Majority engineer teams & (2) Non engineer teams common

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## Example Problem Requiring Teamwork to Solve: Neuse



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## Some of the causes included

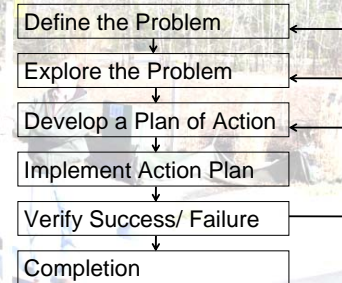


## You tell me..

- What type of Team Members Needed?

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## Problem Solving Steps



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## Riparian Buffers & Runoff



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## Riparian Buffers & Runoff

- Riparian means waterside, or streamside
- Buffer Implies Vegetation
- In parts of the state of NC, the government (NC DENR) requires at least 50 feet of Riparian Buffer along any creek
  - Since late 1990's

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## Riparian Buffer Benefits

- Water is filtered by Vegetation
- Nutrients are removed
  - Why do we care about nutrients?
- Runoff volumes are reduced
  - Why is that good?



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## Riparian Buffers & Runoff

- Stormwater Runoff has traditionally been “straight piped” to creeks
- Do you think Riparian Buffers can treat this water?



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## Riparian Buffers & Runoff

- A solution? The level spreader



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## (In Theory) A Level Spreader...

- Evenly distributes flow across the length of a riparian buffer
- Some early examples...



## Early Designs

- Earthen, Rock (Rip Rap), and Wood were typical
  - Why?
- After 5 years, there was some concern
  - Were they working?
- NC DENR hired NCSU-BAE to survey existing Level Spreaders/ Riparian Buffers

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## This is what NCSU-BAE found:



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## An effective Level Spreader?



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## An effective Level Spreader?



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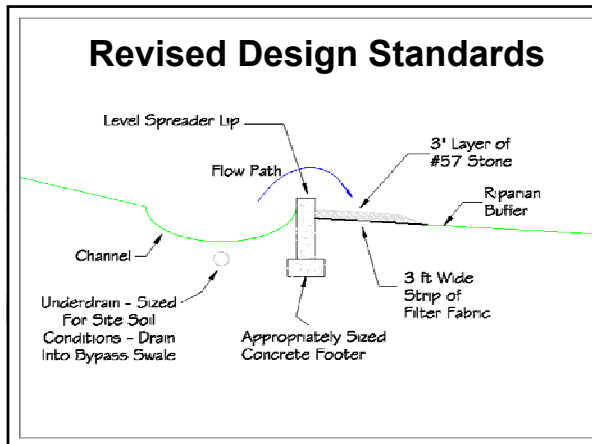
## An effective Level Spreader?



## NCSU-BAE Report to NC DENR

- What would you have told NC DENR?
  - The designs you allow don't work!
- What should be done to help solve the problem?
  - Ban level spreaders? Does that solve the larger problem?
  - Do nothing & pretend the study didn't happen?
  - Revise Design Standards? YES!

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## Publication: Let the World Know

### Field Evaluation of Level Spreaders in the Piedmont of North Carolina

J. M. Hathaway<sup>1</sup> and W. F. Hunt<sup>2</sup>

**Abstract:** Level spreaders are commonly used in combination with riparian buffers as a stormwater best management practice in many parts of the United States. These systems have not been extensively studied in urbanized environments to determine if they can provide a long-term water quality benefit. In winter 2005, 24 level spreaders were evaluated in the Piedmont of North Carolina. Detailed observations were made at 20 of these locations. The results of the study indicate that level spreaders may not be the versatile structure they are perceived to be. No level spreader-riparian buffer system was able to provide diffuse flow through the riparian buffer from the level spreader to the stream. Common causes for failure to maintain diffuse flow included: lack of maintenance (12 cases), poor design (11), riparian topography/content (11), level spreader lip not level (seven), built with easily eroded materials (six), poor construction methods (three), and human interference (two). This field evaluation indicates that level spreader systems may need design revisions, construction guidance, and maintenance requirements before they continue to be used *en masse*.

DOI: 10.1061/(ASCE)0733-9437(2008)134:4(538)

CE Database subject headings: Stormwater management; Water quality; Best management practice; North Carolina.

Introduction sizes level spreaders according to the 10-year peak discharge of

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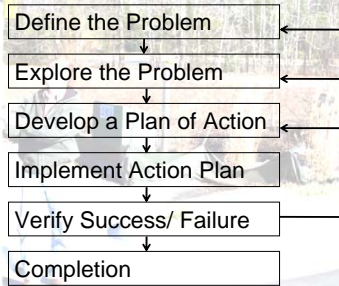
## Does New Design Standard Work?

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## Now, We're Studying That

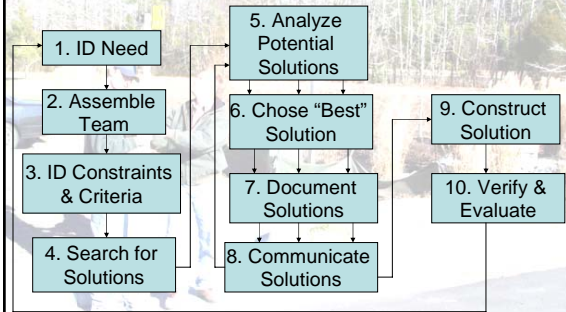
## NCSU-BAE Level Spreader Study

### How does the above Example relate to these Problem Solving Steps?



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### Engineering Design Method



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### Final Reminders

- **Remember: Attend a Co-op Session if you haven't already:**
  - [http://www.ncsu.edu/co-op\\_ed/considering/applying/schedule.php](http://www.ncsu.edu/co-op_ed/considering/applying/schedule.php)
- **FEDD is only 4 weeks away!**
  - Dr. Hunt's Opinion: you should start construction of your FIRST design by week's end. First ≠ Final.

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