


Let's Be Practical!

Tips, Tricks and Ideas to Make Field Investigations Better




American Concrete Institute®
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Means and Methods of Evaluating Reinforced Concrete Structures


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ACI WEB SESSIONS



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Brief Speaker Bio

- Lead Structural Engineer for Black & Veatch
- BSCE 2000 from University of MO – Rolla
- MSCE 2001 from University of MO – Rolla
- Has performed numerous field investigations on all sorts of structures (conc, steel, etc)
- Confined Space and Work at Heights Trained
- Serves on 12 ACI International Committees
- Serves on Board of ACI-Kansas Chapter
- Past-President of ACI-Missouri Chapter

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Agenda

- Field Investigation Basics
- Think About Safety
- Preparation in the Office
- Your Inspection Bag
- Improving Your Access
- Picture & Video Tips & Tricks
- Keep Your Investigation Organized
- Documenting Your Findings
- Working with Others On Site



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Introduction

- This is a pretty broad topic
- Presentation attempts to give my view of it – others may do things differently, and that's ok
- Hopefully if you are a well seasoned field investigator, you will pick up a few things
- If you are new to getting out of the office and performing field investigations, hopefully you will get a lot out of this presentation
- Presentation covers existing structures but some aspects are applicable to construction

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Field Investigation Basics

- Ahh, isn't it great to get out of the office!
- But your freedom doesn't come free
- Time constraints, budget constraints and other factors often create stress – be aware
- Bring your problem solving skills with you
 - Detective work and puzzles await you outside
- Be able to recognize and accept limitations
- Remember – you are often the focus of attention while on site – act accordingly

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Think About Safety

- Perhaps one of the THE most critical aspects of a field investigation!
- Everyone wants you to be safe – gone are the days of being reckless and unsafe
- Proper PPE is important
 - Check with the site to see what special precautions are needed for that site
- Get the training you need first
- Use fall protection and other safety equipment when needed – don't be foolish

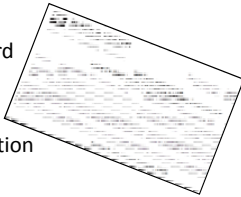



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Checklists and Permits

- Pre-planning checklists are an important safety and planning tool
 - Complete ahead of time
 - Usually includes a Job Hazard Analysis
 - Helps you identify hazards
 - Promotes good communication within the team and others
 - Identifies rescue plan
 - Helps identify gaps in knowledge

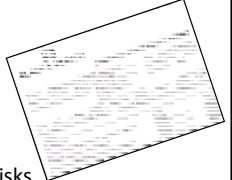


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Checklists and Permits

- Use permits such as confined space or rope access permits
 - Required in some situations
 - Usually requires training
 - DO NOT just jump into a hole
 - Permit helps identify danger points and mitigation of the risks
 - Permits generally focus on a specific area or risk
- Lock Out/Tag Out procedures are a form of permits and require training




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Lock Out/Tag Out

- Plan ahead to keep your investigation on schedule and avoid delays
- Understand your company and your client's policies and required training
- LO/TO helps to keep you safe but is often overlooked by inspectors and clients alike
- Don't feel bad about asking questions
 - It is your life and safety on the line
- If you place a lock or tag – DO NOT forget to remove it when you are done

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Preparation in the Office

- A successful investigation begins in the office
- Gather drawings, pictures, previous reports
- Don't forget to search the web for pictures
- Work with managers for realistic expectations of schedule and budget - are often limited
- Assemble the right team of people
- Don't forget that pre-planning checklist!
- Understand the end goal of the investigation
 - Rehab construction work? Or just a report?

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Preparation in the Office

- In some cases, perform some basic analysis of the situation in the office to arrive prepared
- Gather equipment that you will need and also that you might reasonably need
 - Be aware of items you need to ship or order from somewhere else, such as air meters or NDT equip.
- If needed, meet with your team ahead of time
 - Discuss both the project work and logistics
- Communicate with your client and the site
 - Address access issues, point of contact, etc

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Your Inspection Bag

- Few things ruin an investigation more than missing or inappropriate tools
- Experience does help but thinking the investigation through is smart
- Make sure you have fresh batteries and your equipment is functioning
- If driving to a site – pack extra stuff just in case
- If flying and checking luggage – be aware of airline limits and regulations (weight matters)
 - You may have to buy items when you get there



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Your Inspection Bag

- Keep a bag packed with the common tools, supplement with specialized tools

• First aid kit	• Compass	
• Camera	• Masons hammer	
• Quality flashlight	• Water	
• Notepads	• Snacks/lunch	
• Pens/pencils	• Lock out tags/locks (if appropriate)	
• Tape measure	• Your PPE (hard hat, safety glasses, dust mask, hi-vis vest, ear plugs)	
• Short ruler		
• Sharpie markers		
• Conc crack gauge		
• Inspection mirror		

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Improving Your Access

- Some areas are just plain tough to get to
- Try to plan ahead of time using site pictures and drawings
 - Sometimes a small change makes a big difference, such as an extra plank or a Davit base for a jib
- Request ladders or bring your own if needed
- Boom lifts are great when available – cost on larger jobs pays for itself in time savings
- Understand, sometimes you only need to get a mirror or a camera to the right spot


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My “Camera on a Stick” Trick

- You get to stay clean and safe, let the camera do the dirty work in that nasty hole!
- Most cameras use a 1/4”-20 thread for the tripod mount on the bottom
- Simply use a short piece of all-thread (or a bolt with the head cut off) and a hose clamp to attach the camera to a pole or stick
 - Broom handles, shovels, pieces of rebar, etc
- Don’t forget the screwdriver in your tool box!
- Set your timer and auto flash and snap away

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My “Camera on a Stick” Trick




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Picture Taking Tips

- Your camera is a valuable tool
 - Not only used for showing what you are seeing, also good for documentation and notes
- Always get the big picture shots and then zoom in close for the details
- When looking at repetitive things, use your hands to show left/right or numbers
- Auto-focus and auto-flash generally work well but not always – adjust if needed
- Use landscape vs portrait for better report pics



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Picture Taking Tips

- Know how to use your camera – practice
- Consider multiple cameras on larger or more remote locations. Each person gets their own.
- Use a short, easily read, ruler in your shot for easy scaling later
- Avoid oblique angles if you want to scale later
- Photograph equipment name plates
- Digital is free and storage is cheap – you can never have too many pics – snap away!
- Bring fully charged batteries and extra ones

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Using Video Documentation

- Use video to supplement your pictures
- Helpful to jog your memory later or look at spots you missed getting pictures there
- Long videos should be avoided, take several shorter ones instead
- Uses lots of memory so show some restraint
- Be careful what you say in the video – just the facts! Lawyers love videos.
- Can be useful when you can't take notes

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Keep Your Investigation Organized

- Make life easier on yourself
- Prior to getting deep into your investigation, take a minute to plan your path and stick to it
- Wondering around snapping random pictures makes it tough later to document your work
- Include in your notes your rough path
- Note key observations on drawings or sketches in your notes
- Clean up your notes shortly after you finish the field work



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Develop a Simple Inspection Form

STRUCTURAL CONDITION ASSESSMENT FOR CITY OF OLATHE, KS HAROLD ST WWTP

ASSET DETAILS

Asset Name: Digester Supernate Box Date(s) of Inspection: September 1, 2011
 Asset Type: Concrete Box Inspector(s): Larry Taber & Tavnee Phattarak
 Approx Asset Age: 39 years Approx Asset Size: 3 ft x 10 ft

OVERALL ASSET CONDITION GRADE (check one which best describes the assets overall current condition):

1 Excellent Condition (minimal to no defects, safety concerns, or adverse impacts to operations; requires normal maintenance only)
 2 Good Condition (minor defects, safety concerns, or impacts to operations requiring minor repairs, slight impact to normal operations)
 3 Satisfactory Condition (defects as expected for asset age; some minimal impact to normal operations; asset repair required to prevent secondary damage, mitigate safety concern and/or permit normal operations)
 4 Unsatisfactory Condition (significant defects, safety concerns, or adverse impacts to operations; asset requires immediate repairs to prevent accelerated secondary damage, significant impact to operations and/or safety incident)
 5 Severely Deteriorated Condition (significant defects or safety concerns which have caused or could cause significant damage or a safety incident; asset is causing loss of service which is breaching regulatory or internal quality standards; immediate repair required)

General remarks on overall asset condition:
 Structure is exhibiting hydrogen sulfide deterioration and cracking. It is approaching enough section loss to start exposing reinforcement. Continued exposure without remediation will cause accelerated damage and will require more expensive repairs. Unsound concrete should be removed and repaired and lined to prevent H2S damage in the future. Additionally, cracks should be repaired. Cracks at digesters walls need repaired with foam.


List defects, safety concerns, impacts to operations, code compliance concerns, etc. (see below for legend of action codes):

ITEM DESCRIPTION	SUGGEST CORRECTIVE ACTION	ACTION PRIORITY	ACTION BENEFITS
1 Hydrogen sulfide deterioration on inside wall surfaces, deterioration around 1'-1 1/2' throughout box, no exposed steel at this time	Remove unsound concrete, repair to original thickness and coat	High	1
Cracks in walls (Note: cracks at intersection with digester are due to)	Repair using standard crack		

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Documenting Your Findings

- The best field work is worthless if you can't communicate your finding to others
- Don't forget your audience!
- Make sure you understand the expectations of your client prior to performing investigation
 - Documentation is different if they want a large report versus if a simple memo is expected
- Be careful and confident when reporting your findings, especially when writing them down
 - Answer the question asked but don't overstep



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Working with Others On Site

- Have a contact on site and expect delays
- Leave any bad attitudes at the gate
- Understand the roles others play on site
 - Contractors, Owners, etc see things differently
- Be aware of other work being performed and coordinate – you may have to alter your plans
- Be careful of what you say regarding your findings if you aren't positive yet
 - Everyone seems to remember what the Engineer said while on site and don't always see the report

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Good Communication is Important

- Communicate....
 - Before you get on site with the client, etc
 - When you first get on site to catch any last minute changes or problems
 - During your investigation with those around you
 - With your team to be safe and correctly document the investigation
 - Hold a wrap-up meeting prior to leaving site with client
 - During the documentation phase to avoid disappointment



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Some Concluding Thoughts

- Field investigations can be fun hard work
- Safety is a priority for many reasons!
- What you do in the office ahead of time directly impacts your field work
- Your tool bag should have some consistent items in it along with some specialized ones
- Good access will help you see the issue up close so think of ways to safely improve it
- Good pictures and videos help documentation

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Some More Concluding Thoughts

- Keep your investigation organized for efficiency and so you don't miss something big
- Know what kind of reporting you need to do before you start your field work
- Use pictures and video documentation to help you later remember the fine details of a trip
- Keep a professional but fun attitude while on site – it will help
- A good site investigation can lead to more work, a bad one could mean disaster

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Thanks!
Any Quick Questions?

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