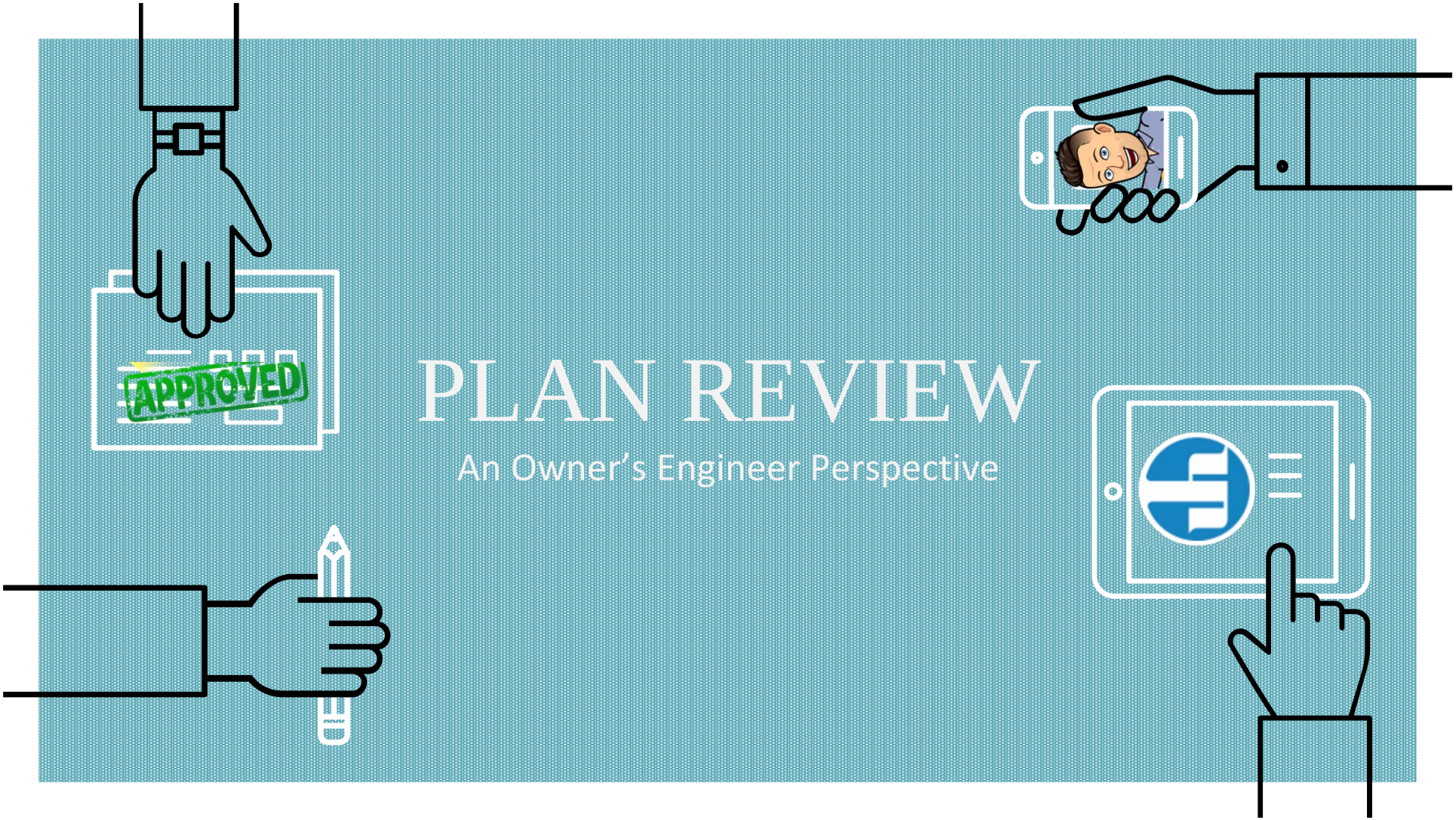

PLAN REVIEW

An Owner's Engineer Perspective

HELLO!

I am Ted Bennett

Today's Topic:

Plan Review For Owner's Engineers

You can connect to me at
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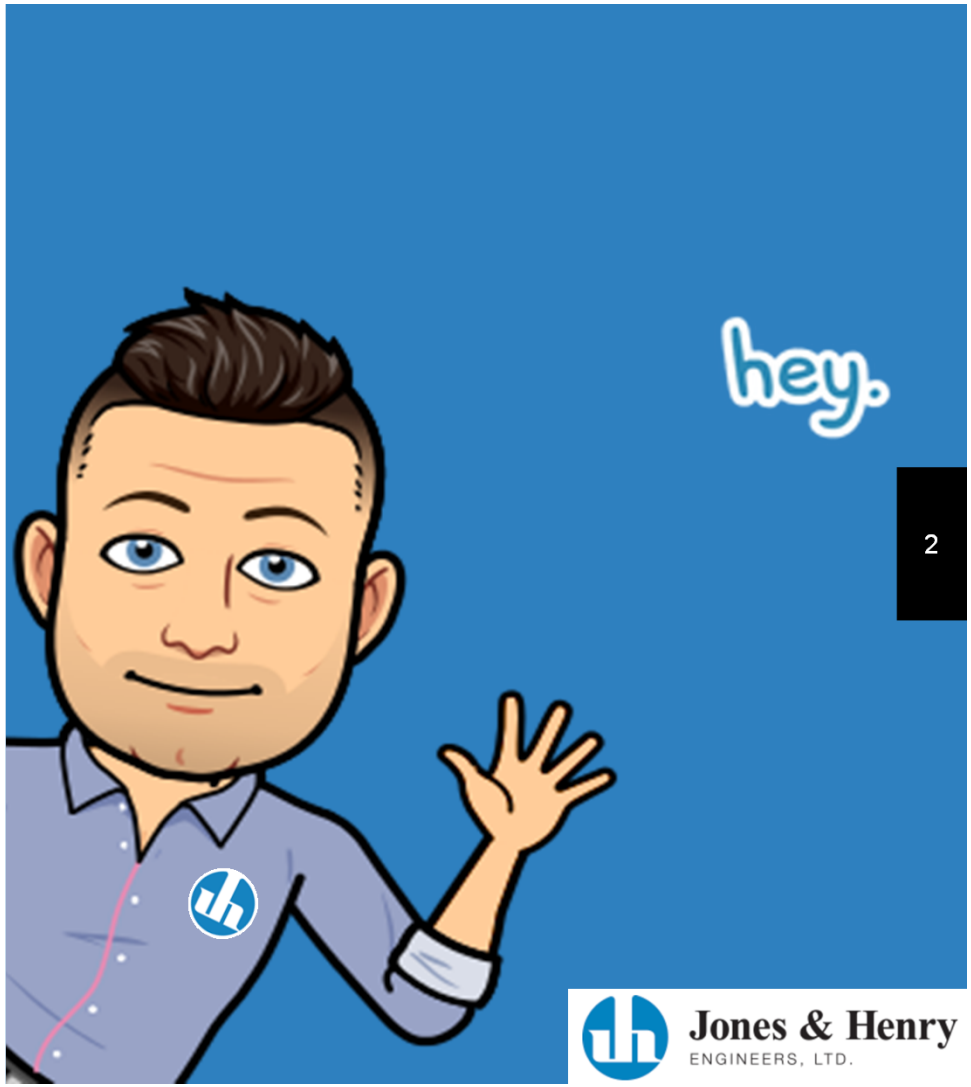
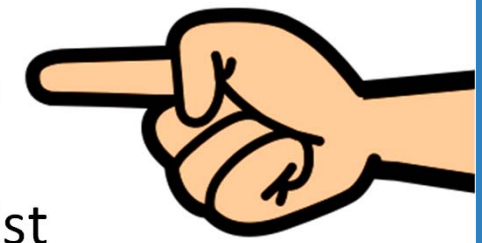
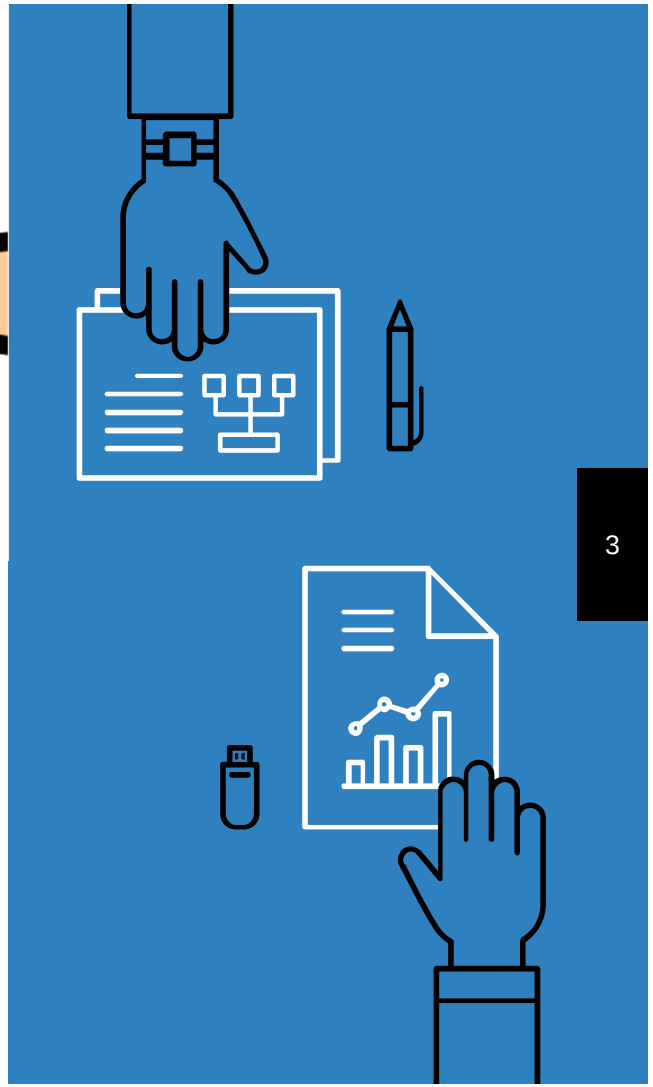


KEY TAKEAWAYS

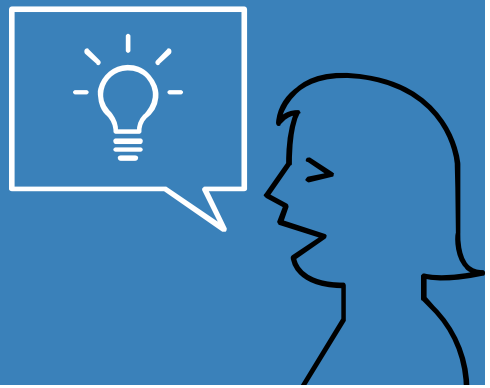


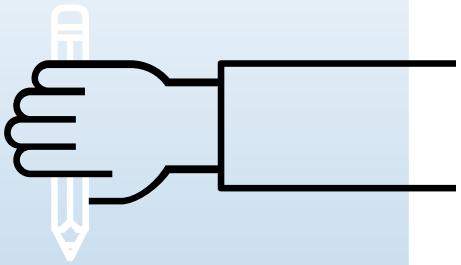
- Water & Sewer Checklist
- No Time?
- Dealing With **BAD** work.
- We’re all working TOGETHER.



“If you don’t make any mistakes, you’re probably not doing anything...”

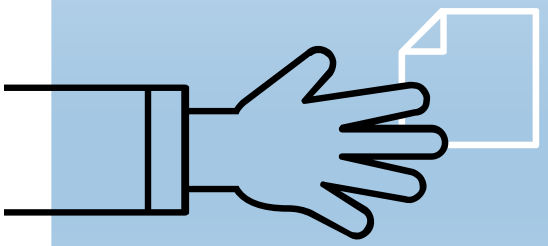
Think About It…





Why Do You Check Plans?

The purposes of the review…



The Whys?

Constructability

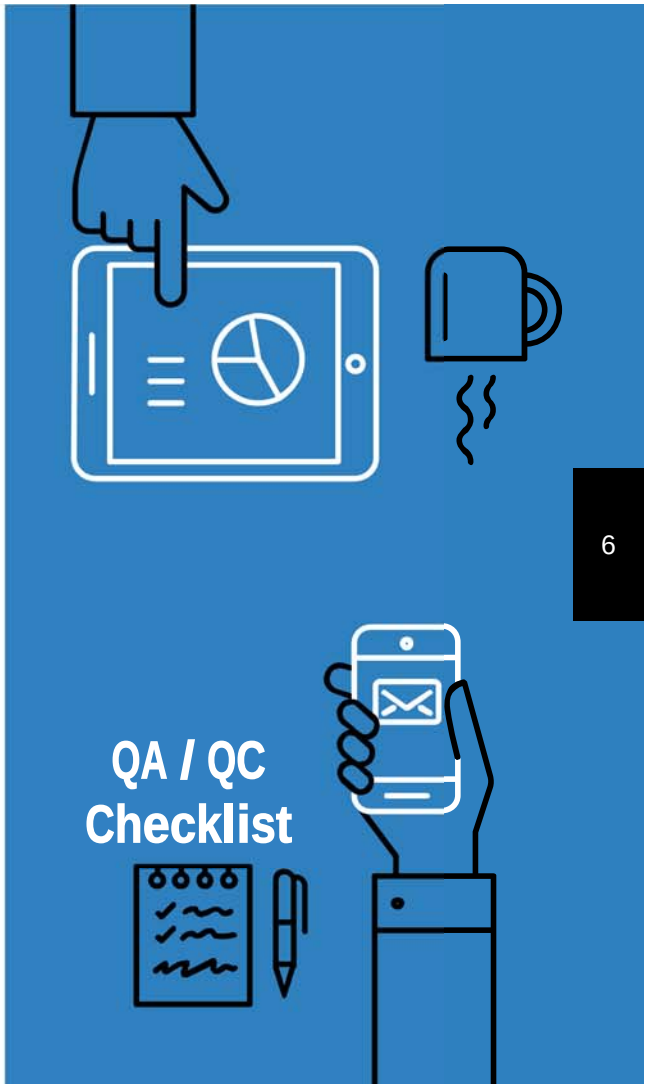
- Can it be Built?
- Is there a Better Way?
- Challenges Defined?

Design Standards

- Where?
- What size?
- How much?

Agency Policy

- Follow the Rules?
- Design Guide?
- Industry Standards?



CONSTRUCTABILITY

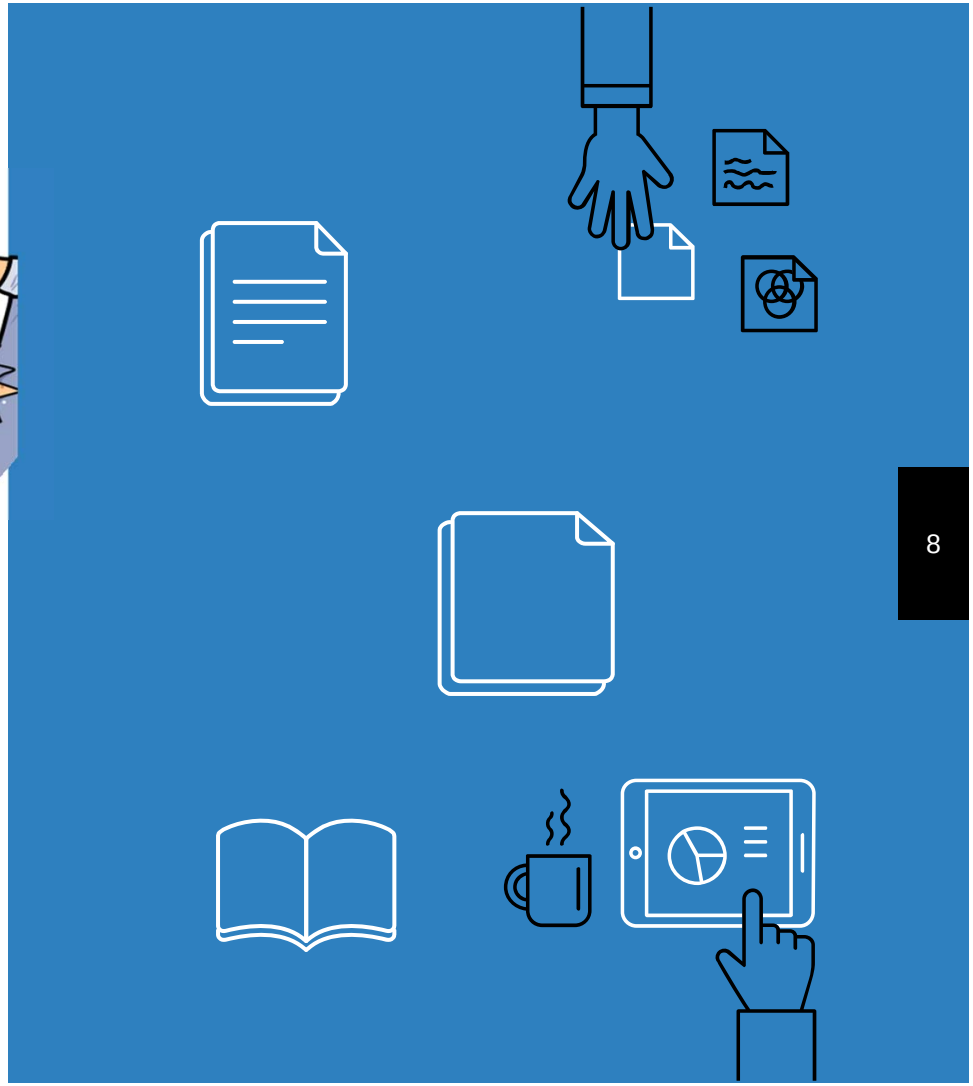
- Existing Conditions Shown Correctly
- Worker & Equipment Access
- Maintenance of Traffic
- Temporary Services
- Laydown / Staging Areas
- Are Easements Needed
- All Aspects of the Work Described

GOALS

- MINIMIZE RISK
- Receive Fixed Pricing
- Avoid Change Orders
- Ensure the Final Product is Acceptable

DESIGN STANDARDS

- What Standards Govern?
- Do the Plans Conform?
- Are EXCEPTIONS needed?
- Competing Standards
  - Dual Agency Review
  - Federal / State / Local



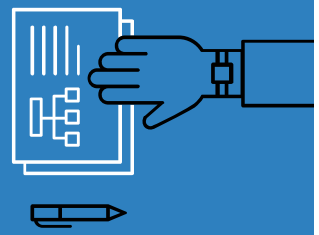
GOALS

- Uniform Equipment
- Simplified Maintenance
- Intended Operation

GENERAL CHECKING

- Cover Page with Approvals
- All Sheets Included
- Legend
- Overall Concept
- Hydraulic Profile
- SWPPP
- Drafting Standards
- Correct Types of Sheets Included
- Layout / Staking

- ✓ Plan & Profile
  - ✓ Crossing Pipes Shown in Profile
  - ✓ 10 States Standards
  - ✓ Match Lines
- ✓ Cross Sections
  - ✓ Typical Section
  - ✓ Cut / Fill
  - ✓ R/W Coordination
- ✓ Site Plans
  - ✓ Grades
  - ✓ Access / Geometry
- ✓ Uniform Elevations & Stationing



WATER MAIN DESIGN REVIEW

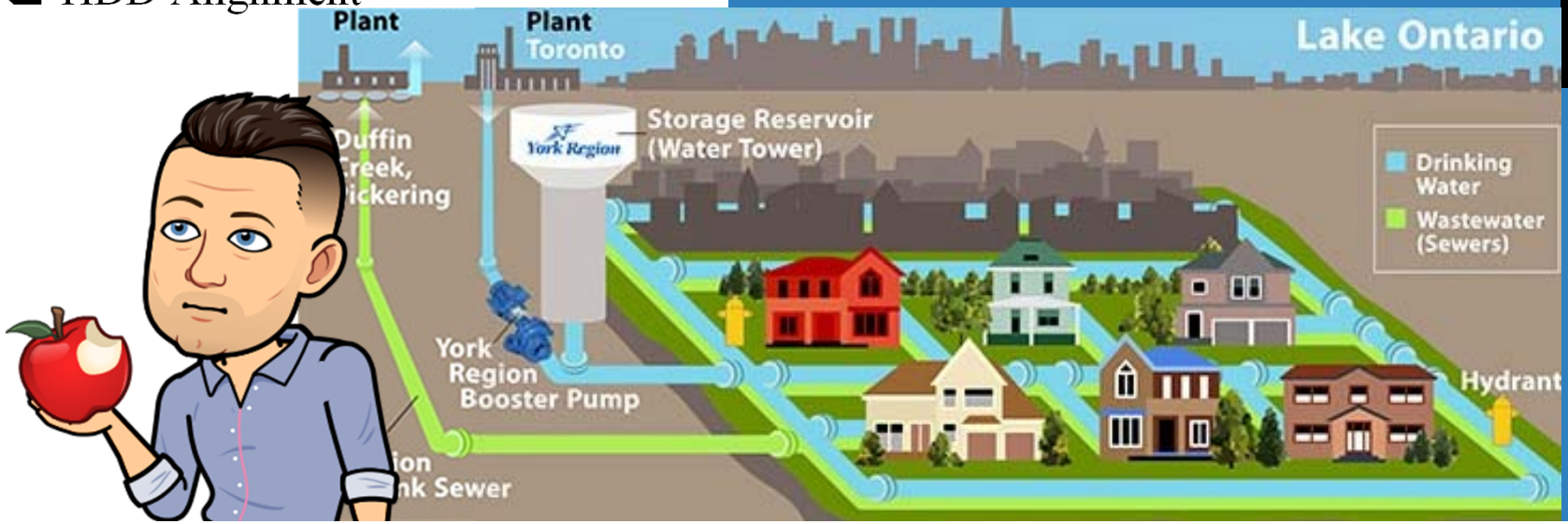
- Adequate Valves
  - Can the System Be Isolated?
  - 3 at an Intersection
  - Valve Spacing

- Pipe Sizes Match Master Plan
- Hydrant Spacing
- Testing / Startup
- Service to All Properties
- Joint Restraint Table

WATER MAIN DESIGN REVIEW

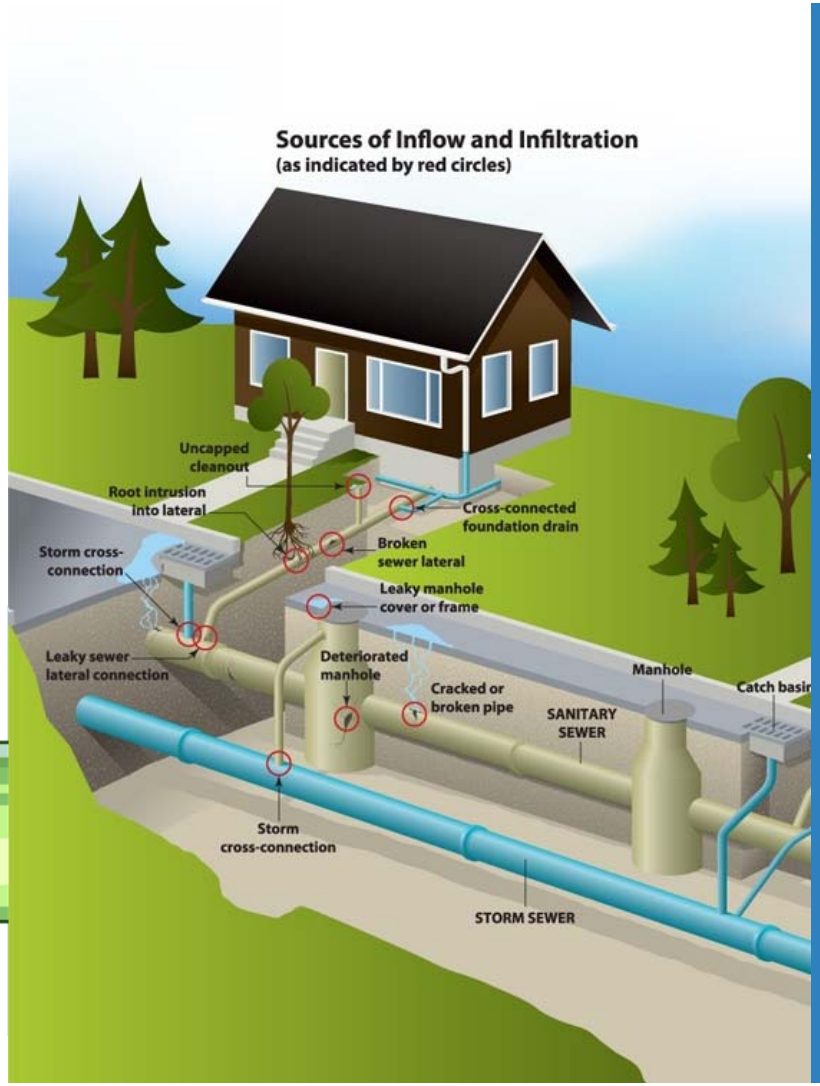
- ❑ Looping Opportunities
- ❑ Trenchless Construction
  - ❑ Bore / Receiving Pits
  - ❑ HDD Alignment

- ✓ Bends / Fittings Shown
- ✓ Details Cover All Work



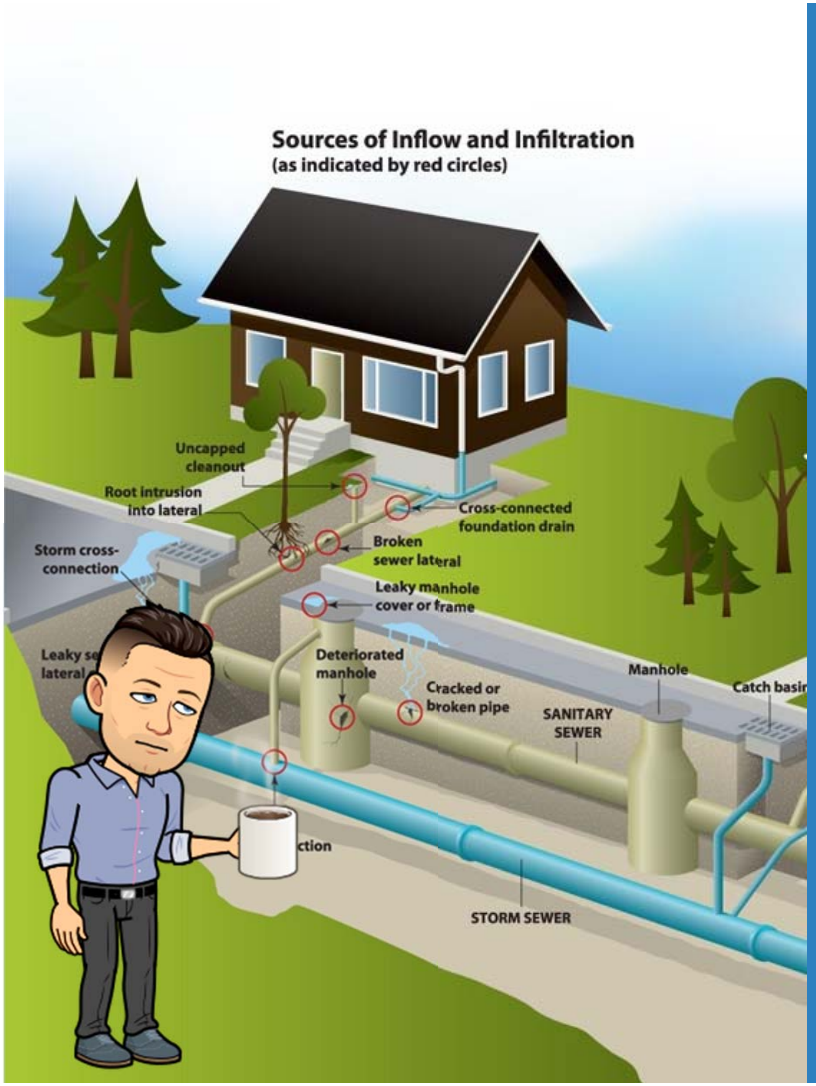
SEWER DESIGN REVIEW

- Manhole Spacing
- Manholes at all Changes in Direction
- Minimum Grades
- Check Invert Elevations
- Casting Elevations Provided

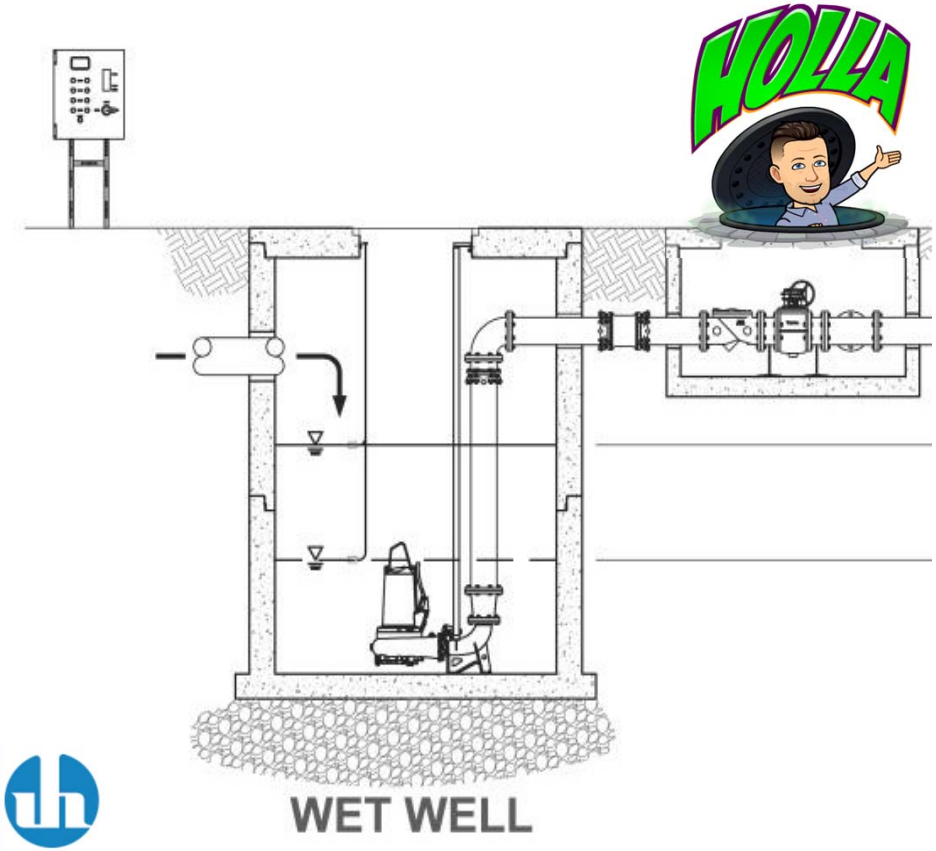


SEWER DESIGN REVIEW

- Service Provided to Each Property
- Lateral Sewers Clear Adjacent Utilities
- Depth to Avoid Future Pump Station
- Details Cover All Work



SEWER PUMP STATION DESIGN REVIEW

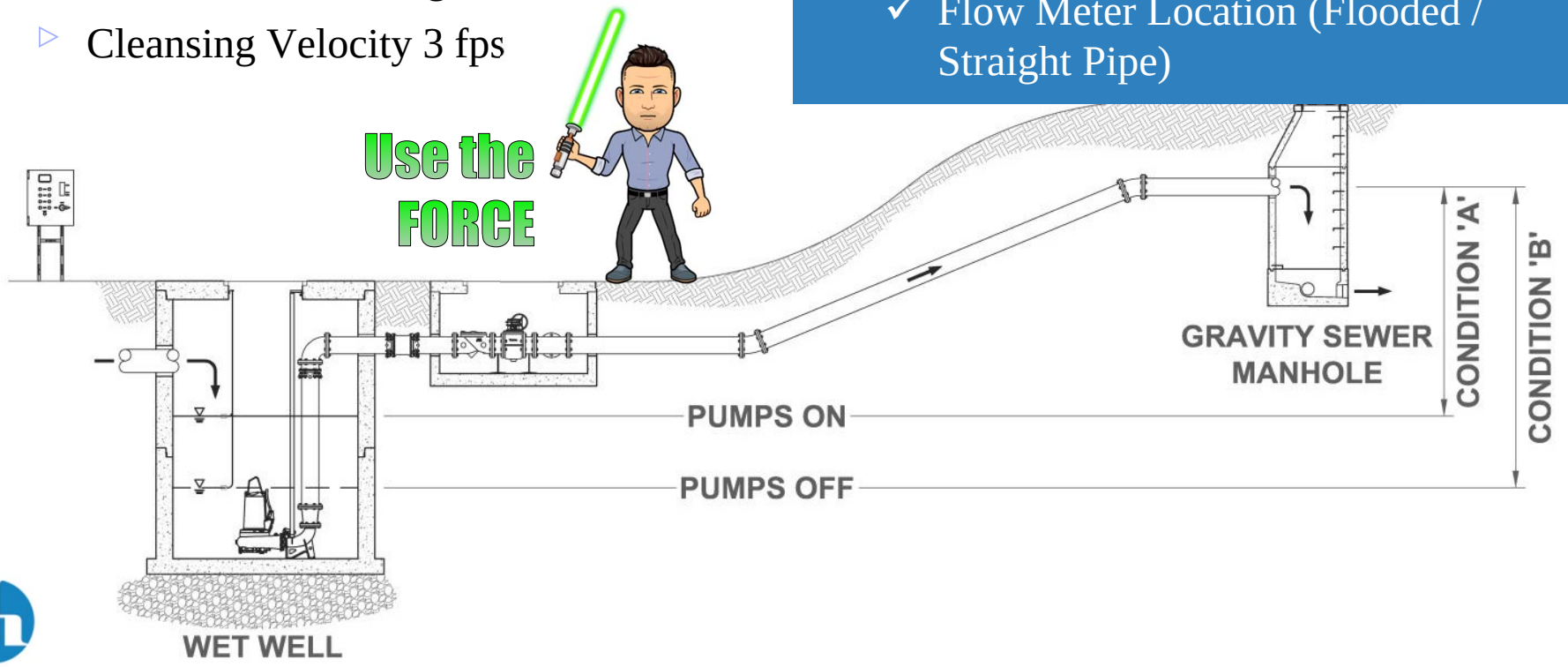


- ✓ Standard Details
- ✓ System Curve vs. Pump Performance
- ✓ Pump Cycle Time vs. Wet Well Volume
- ✓ Level Controls – Dual?
- ✓ Inlet Configuration
- ✓ Gauges for Testing
- ✓ Valve Chamber
- ✓ Can Pumps Pass Through Access Hatch
- ✓ SCADA Interface
- ✓ Emergency Operation

SEWER FORCE MAIN DESIGN REVIEW

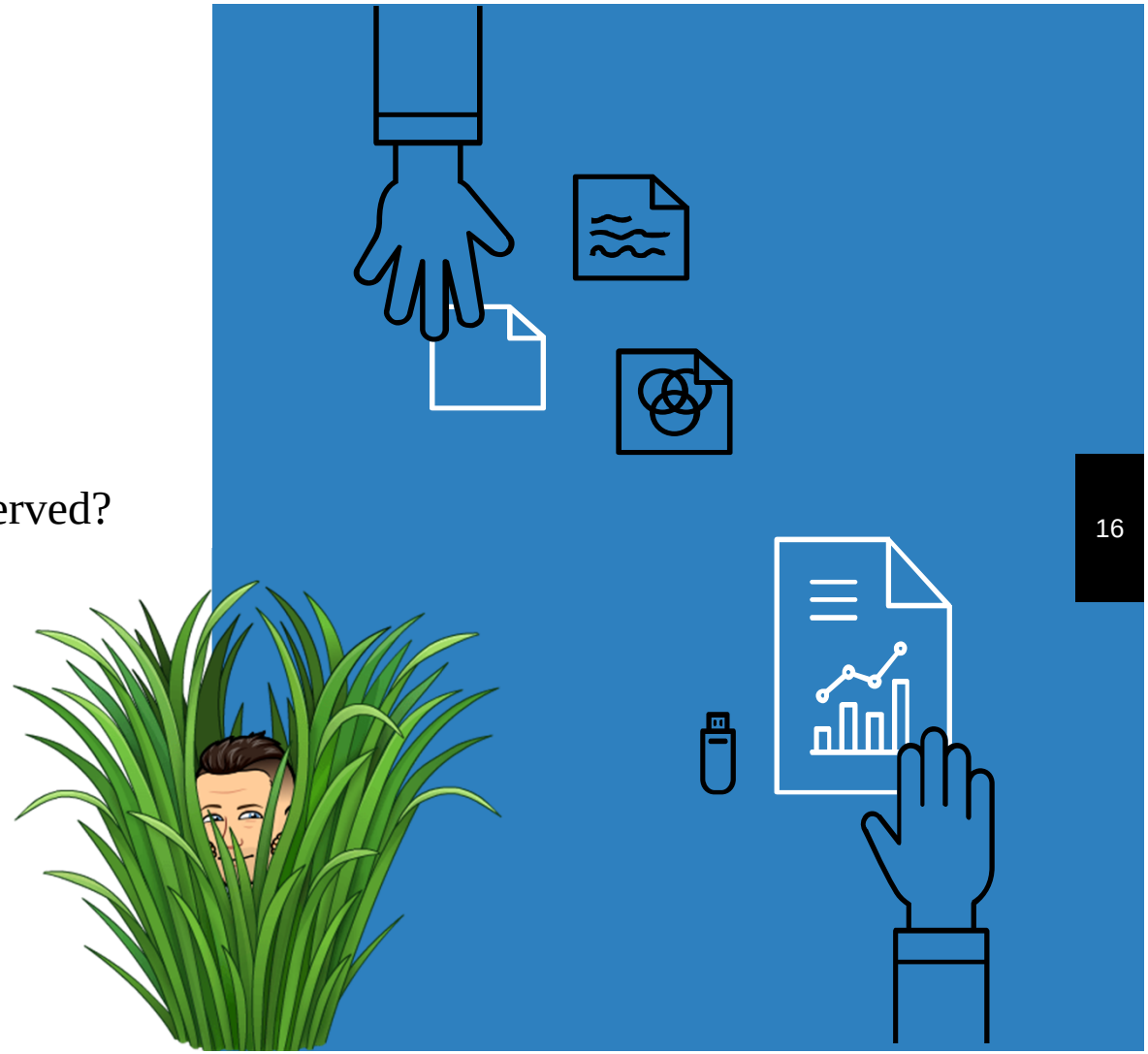
- Review Profile – High Points
- Cleansing Velocity 3 fps

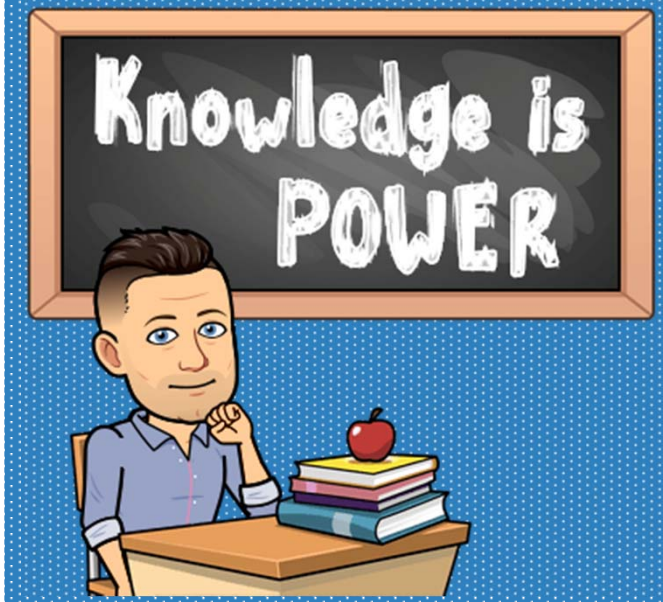
- ✓ Air Releases at High Points
- ✓ Outlet Conditions
- ✓ Partially Full Pipes?
- ✓ Check Length vs. Odor Control
- ✓ Flow Meter Location (Flooded / Straight Pipe)

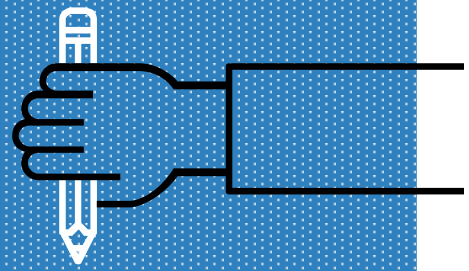


POLICY CHECK

- Public Extension Required?
- Public Cost Sharing?
- Development Agreement?
- Service Area Boundaries Observed?
  - Contract Limits
  - CWA 208 Areas
- Capacity Issues?
- Who will have to connect?
- Design Calculations Provided

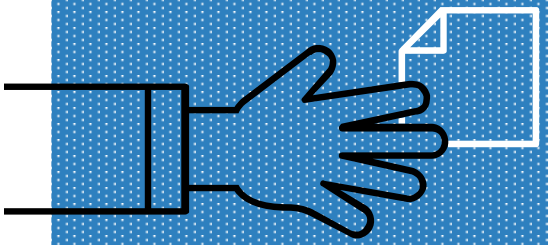






TIPS

And some things to look for…



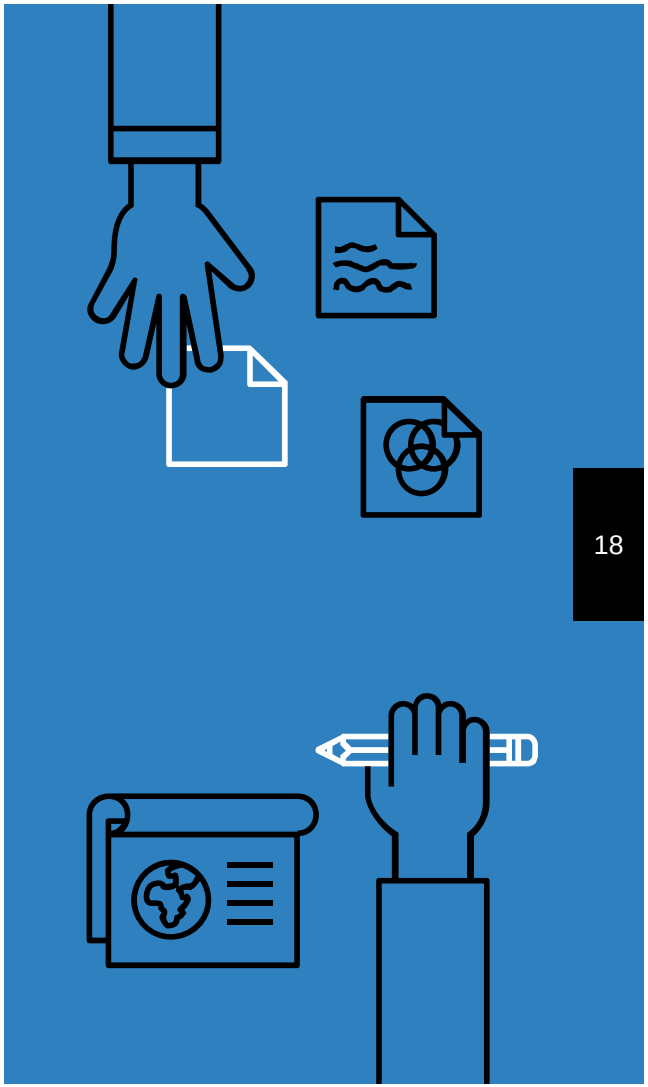
Avoid the 95% Review Trap

Review in Stages

- Kickoff - Concept
- 30% - Basis of Design
- 60% - Pre-Final
- 100% Final for Bid

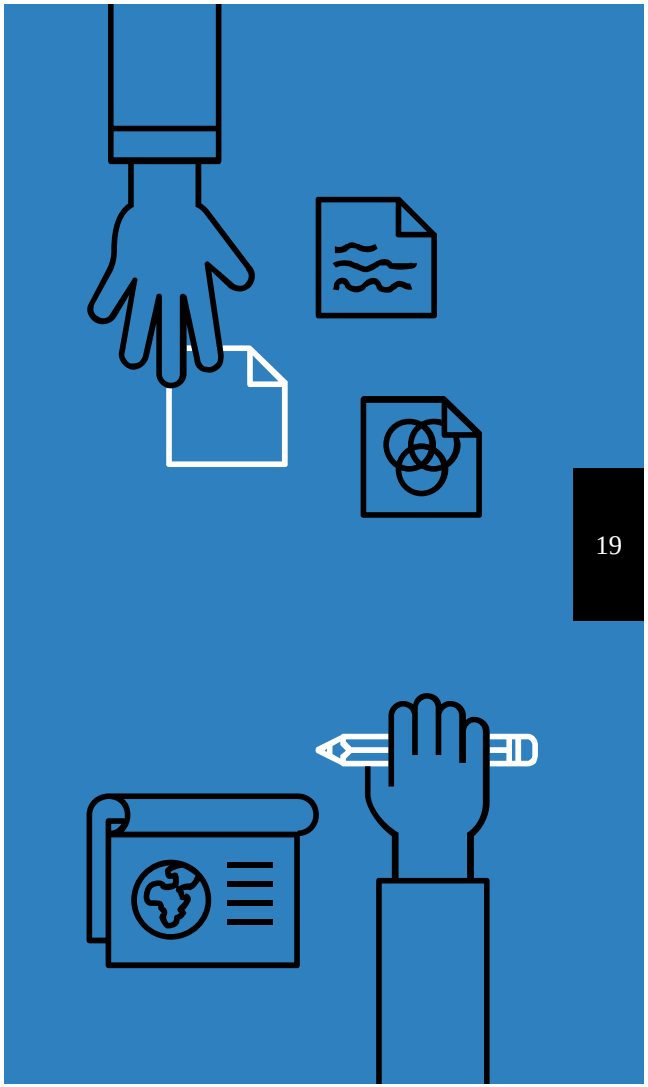
Advantages

- Catch Errors Early
- Avoids Rework
- Reviewer Involved in Design



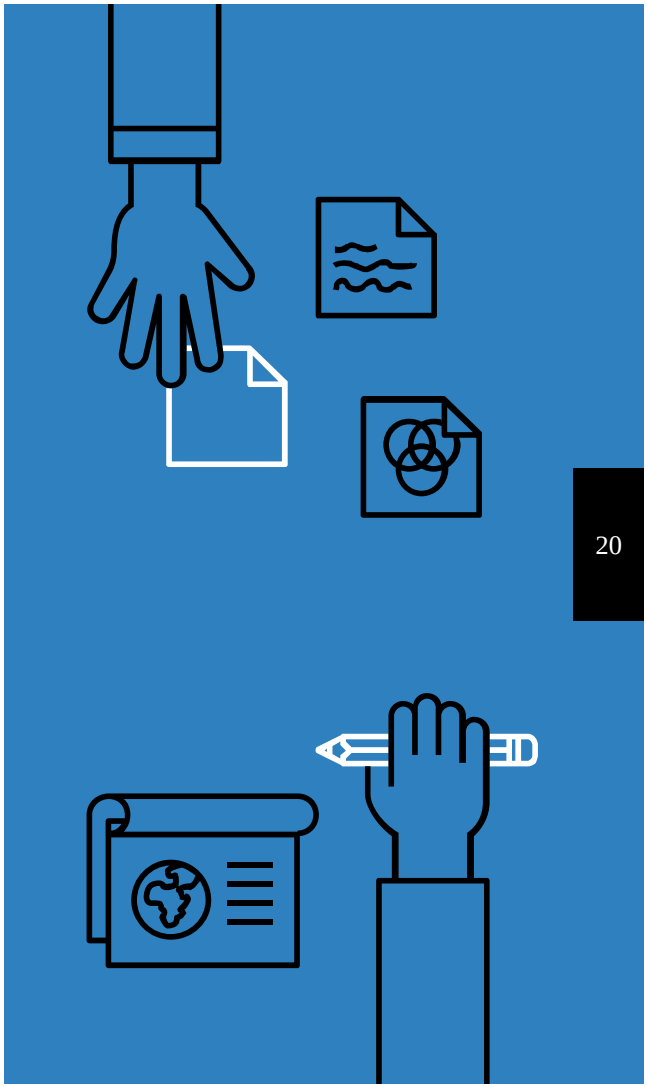
BAD Work?
When do I Give it Back?

- Distinguish Sloppy from Inexperience / Unqualified
- Don’t do the work fo
- Provide guidance.
  - Examples
  - Review Concep
  - Engineering Pri
  - Suggest Mentor



Sneaky Developers

- Changing Plans after approval.
- Splitting parcels to avoid extensions.
- Not showing other side of street – avoid 208 Area / Tap Requirements.
- Trying to build Pipes Smaller than Master Plans require.
- Cheating on Oversizing Costs.
- Pumping vs. Gravity.
- Shallowing Sewer to save $.



TIME IS LIMITED…

Big Picture

- ❑ Is this the Project I Want?
- ❑ Will it Work?
- ❑ Does it Meet Specs?
- ❑ Does it Follow Standards?

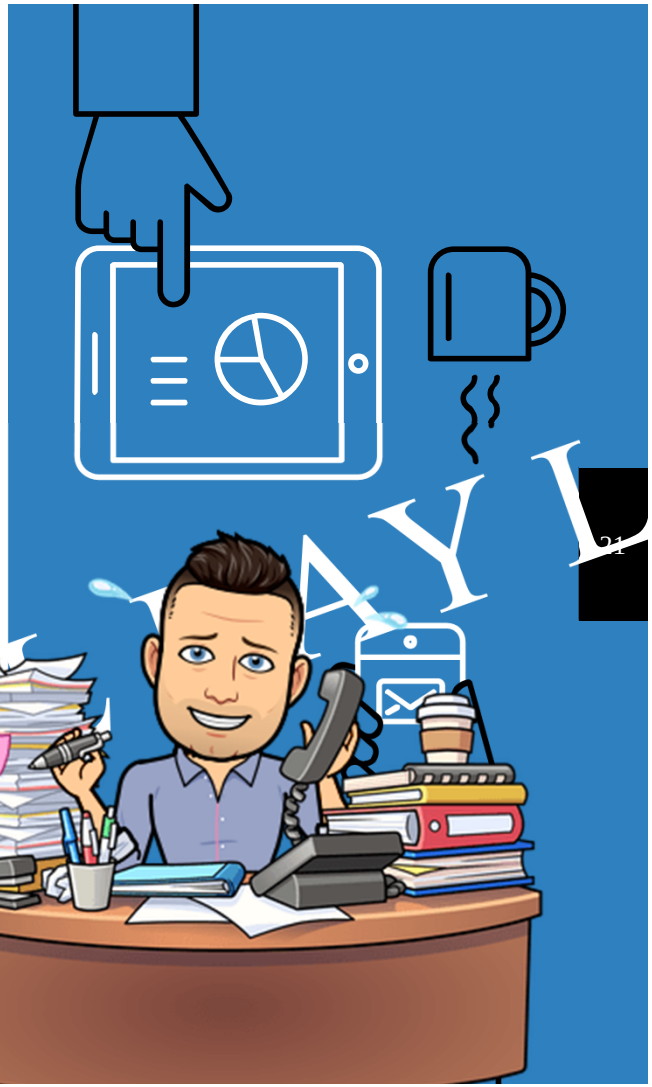
Important Details

- ❑ Capacity
- ❑ Is all the work included?
- ❑ What is the most important aspect for success?

Still Not Sure

- ❑ Get Help
- ❑ Ask For More Time
- ❑ More Detailed Review

I'M BUSY A



The Non-Technical Keys

- ✓ Add Value
  - ✓ Avoid being TOO Picky
  - ✓ Constructive Comments
- ✓ Open Communication
  - ✓ Ask Questions / Offer Suggestions
  - ✓ CLEAR expectations
  - ✓ Meet
- ✓ Accuracy
  - ✓ Write Legibly / Electronic Format
  - ✓ Double Check Markups
- ✓ Its OKAY to be Wrong!

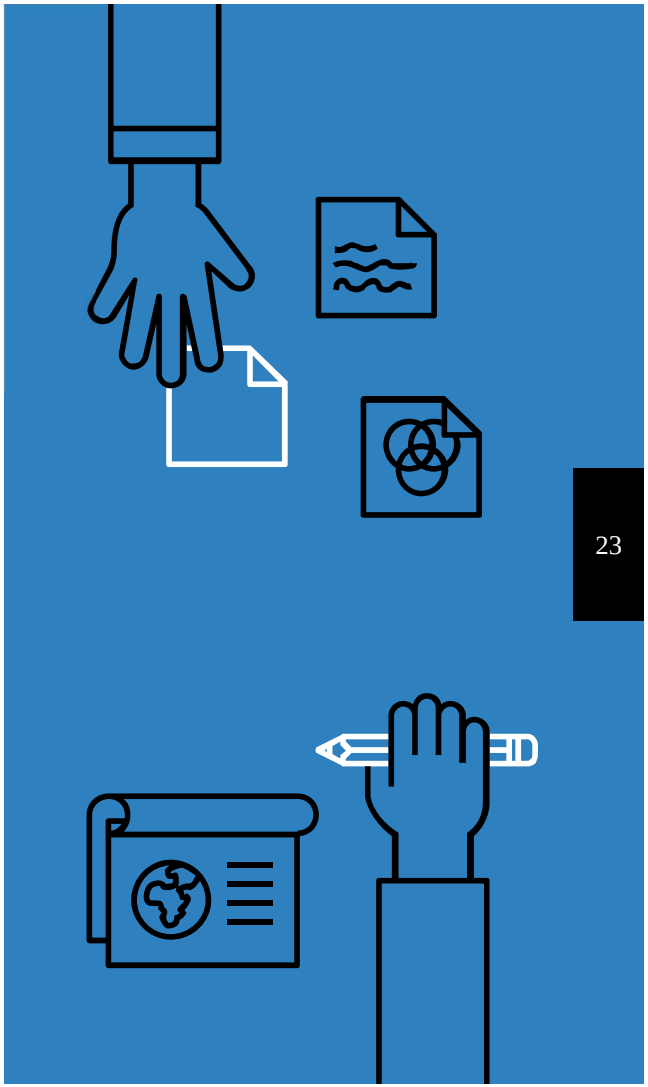
CHECKLISTS

Standards

- Steps for Review
- Items to Check
- Permit Requirements

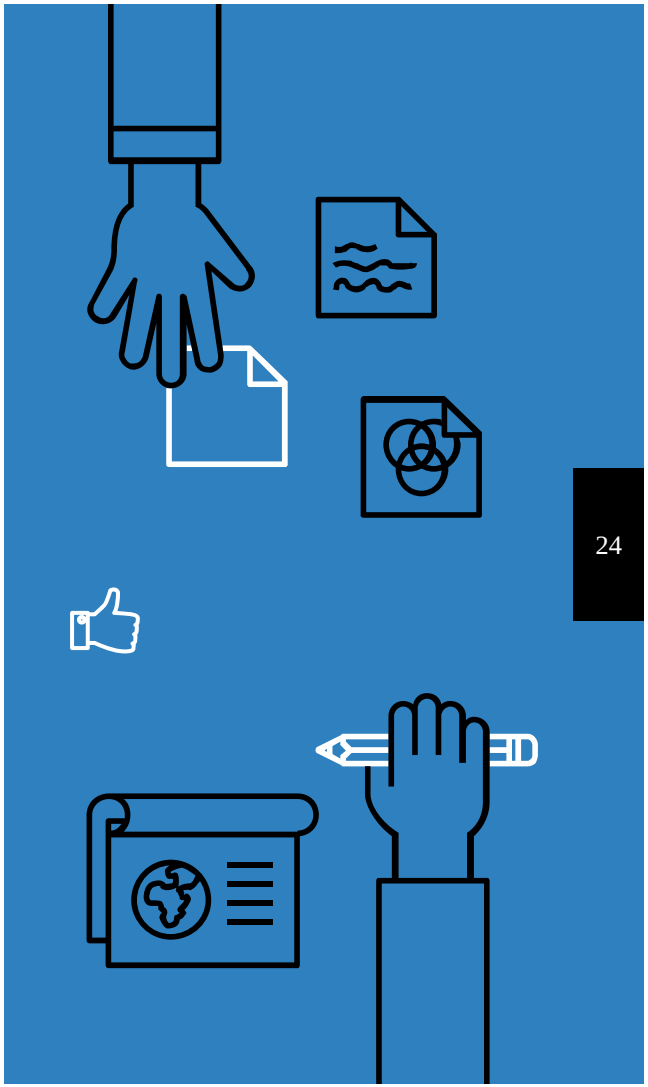
Personal Preferences

- From experience
  - Failures
  - Mistakes to Avoid
- Your Expertise Area



FINAL TH

- Review
- Wor
- marks



References:

PLAN REVIEW LOG

Jones & Henry Engineers Infrastructure Group

WATER SYSTEM DIAGRAM:

Image Source: City of Markam, Ontario Water System,
https://www.markham.ca/wps/wcm/connect/markhampublic/6481e82e-ea96-4a84-b2f9-c88e931f9237/5/MkmWaterSystemIllustration.jpg?MOD=AJPERES&CACHEID=6481e82e-ea96-4a84-b2f9-c88e931f9237/5

SEWER COLLECTION SYSTEM DIAGRAM

Image Source: Town of Whiteland, Indiana, Sewer Department

http://townofwhiteland.com/wp-content/uploads/ii_sourcediagram.jpg

SEWER PUMP STATION DIAGRAM

Image Source: Jenson Engineered Systems, Design Guide 2nd Edition

http://www.jensenengineeredsystems.com/wp-content/uploads/2015/06/Pump-Station-Design-Guidelines-2nd-Edition.pdf

THANKS!

Any questions?

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