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Efficiency
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A STATUS REPORT:
Reduced Flows in Building Drains

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The Need for Research on Drainline Transport

- The Good News: New water efficient technologies are being developed
  - Demand generated by: utility rebate programs, green building rating systems, green consumerism
- The Not-So-Good News: In some areas we lack data to ensure continued:
  - Health and Safety
  - Systemic Efficacy
  - Code Compliance
- Drainline transport concerns are inhibiting the use of High Efficiency Toilets
- The US EPA is delaying the development of WaterSense™ specification for commercial HETs pending research

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AS-Flow Update -2010

Australasian Scientific Review of Reduction of Flows on Plumbing and Drainage Systems

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Industry concerns – ASFlow Committee established

- Implications of flow reductions in sanitary plumbing and drainage systems

  - Development of more efficient sanitary drainline systems.
  - Optimise the transportation of waste discharge from sanitary fixtures.

- Reduction in flows impact on black water transportation.

  - Potential implications on the transportation of black water within drainline systems.

- To compare systems internationally.

  - Europe and the USA.

- Feasibility of ultra low WC discharge volumes

  - Implications for lower flush volumes on drainage systems complying with AS/NZS 3500.2.
  - Explore the limits.

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Research Studies – ASFlow Committee

ASFlow research studies conducted:

1 **Waterless urinals**

- Study the implications of waterless urinals on the drainage systems.

2 **90° sweep junctions**

- Study the implications on WC drainline performance of 90° sweep junctions installed onto a horizontal drainline.

3 **Horizontal junctions**

- Study the implications on WC drainline performance of junctions installed in horizontal drainlines.

- **Results to date have brought about Code changes**

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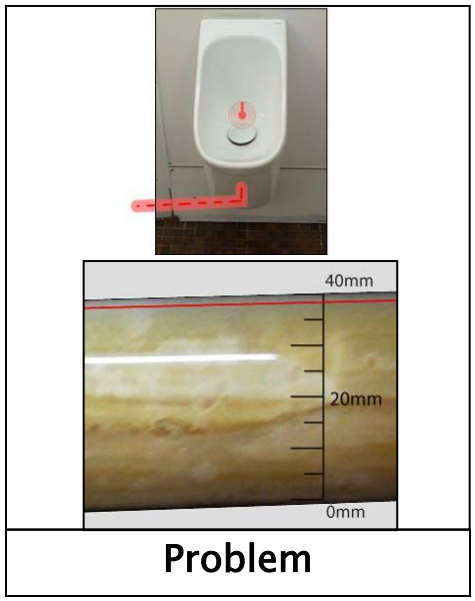
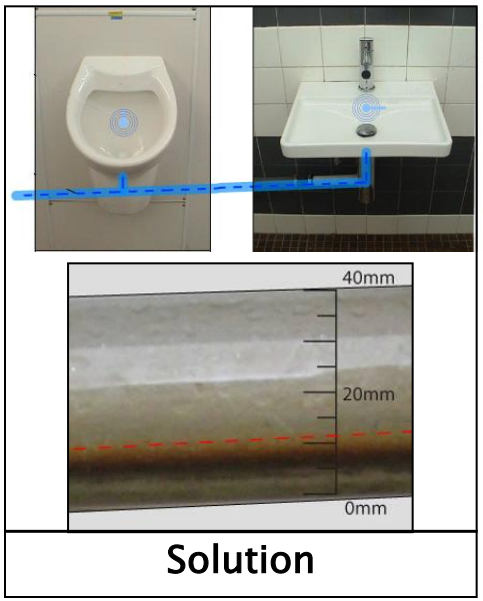
Study 1

Waterless Urinal Study – Struvite blockage after 21842 uses / 39 months



Problem



Solution

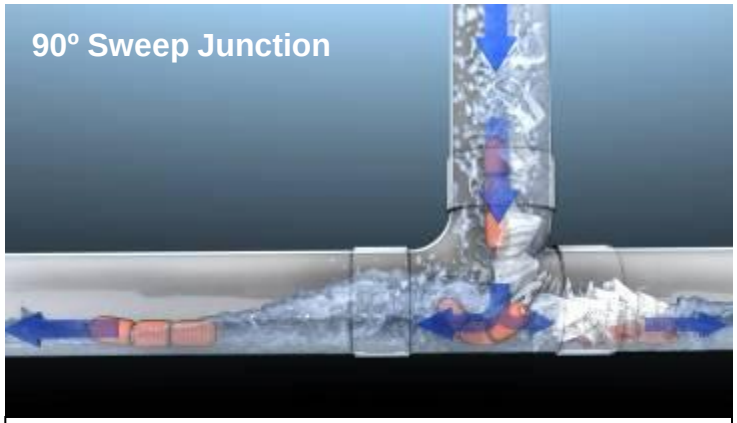
Plumbing and drainage Part 2: Sanitary plumbing and drainage – amendment

11.24.2.3 Non-flushing (waterless) wall-hung urinals

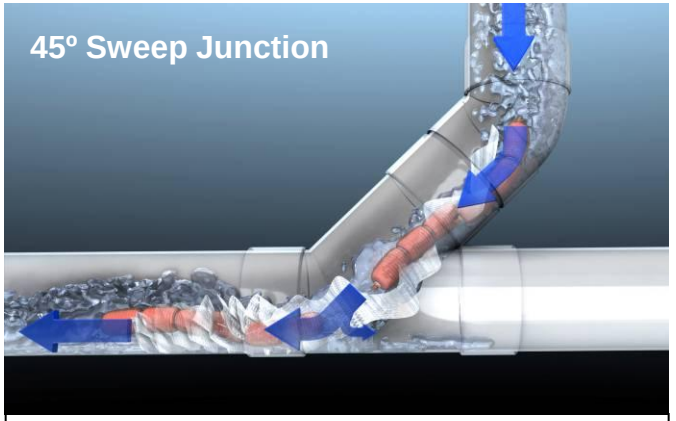
Each waterless urinal shall be installed only where at least **2 fixture units**, are connected upstream of the connection of the waterless urinal to the discharge pipe.

Study 2

90° Sweep Junctions – WC Drainline performance compatibility



Problem



Solution

As a result of this research the following amendments have been prepared forAS/NZS 3500 Part 2:

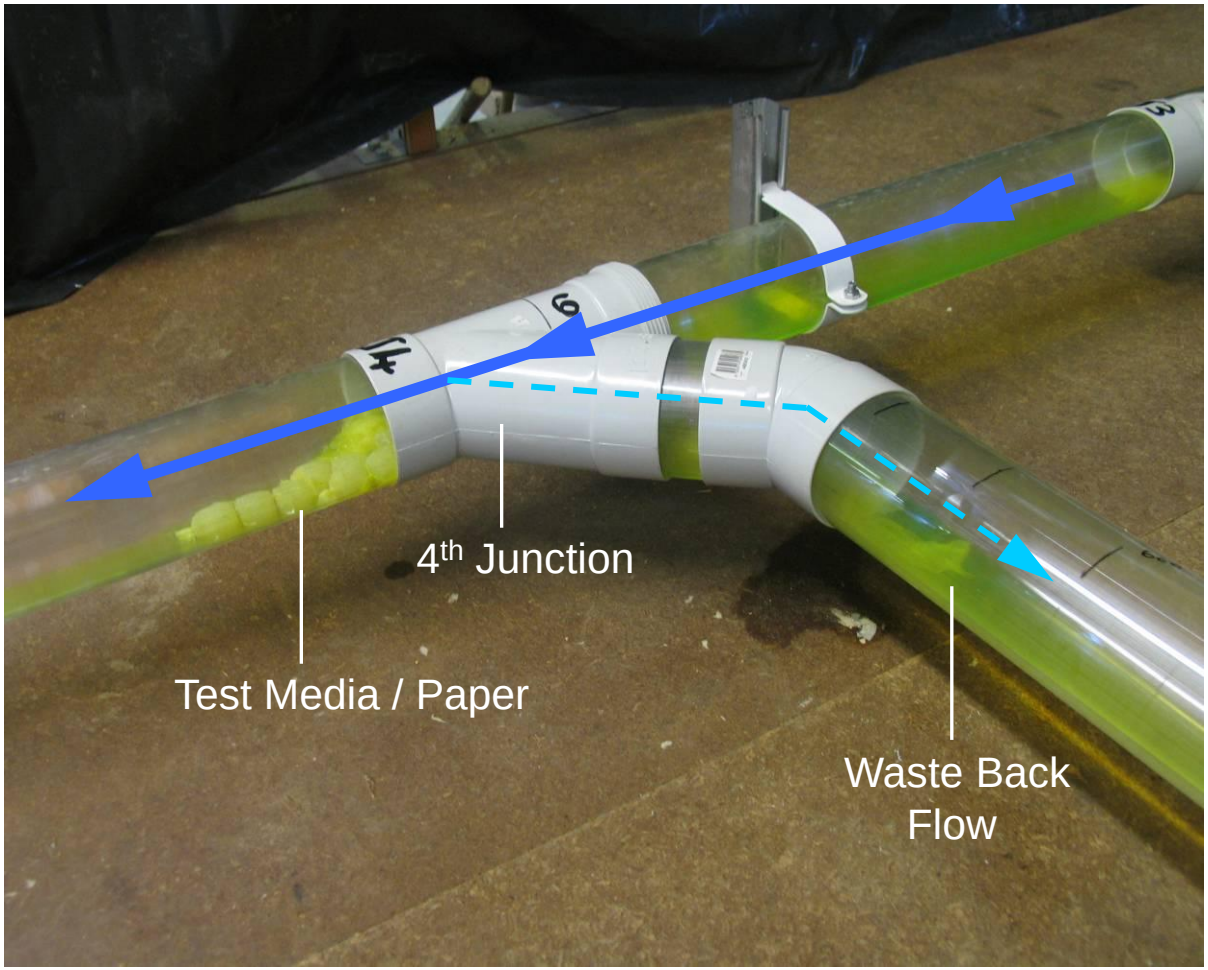
1) Junction installed on a vertical line

Junctions installed in a vertical plane shall not be used for connection of stacks. Sweep and 45° junctions may be laid in the vertical plane for the connection of a single discharge pipe or a drain, provided:

a) A 45° junction shall only be used for the connection of a water closet pan.

Study 3

Horizontal Junctions – CIT WC Drainline transportation performance testing



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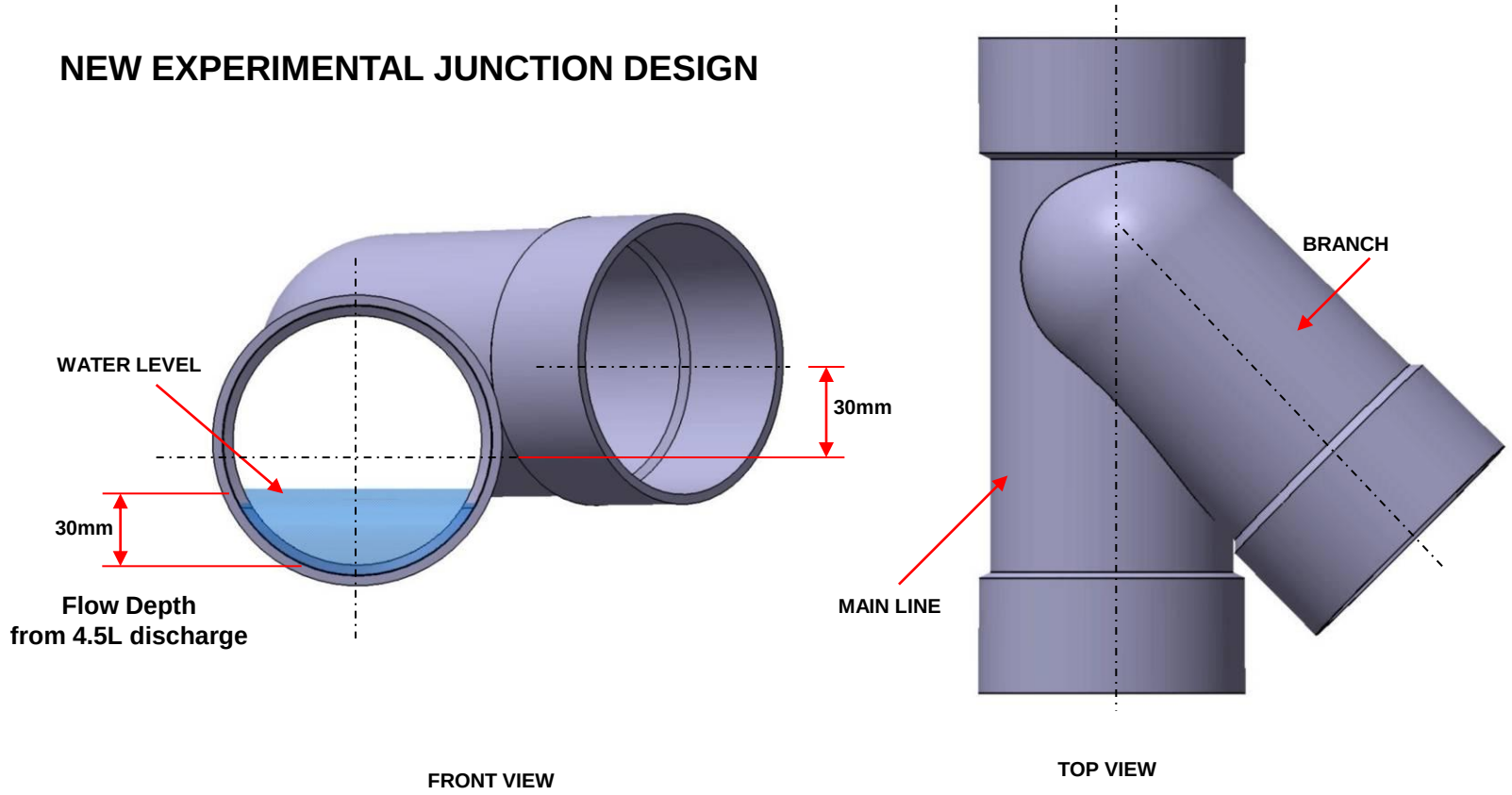
Study 3

Horizontal Junctions – Alternative junction configurations developed



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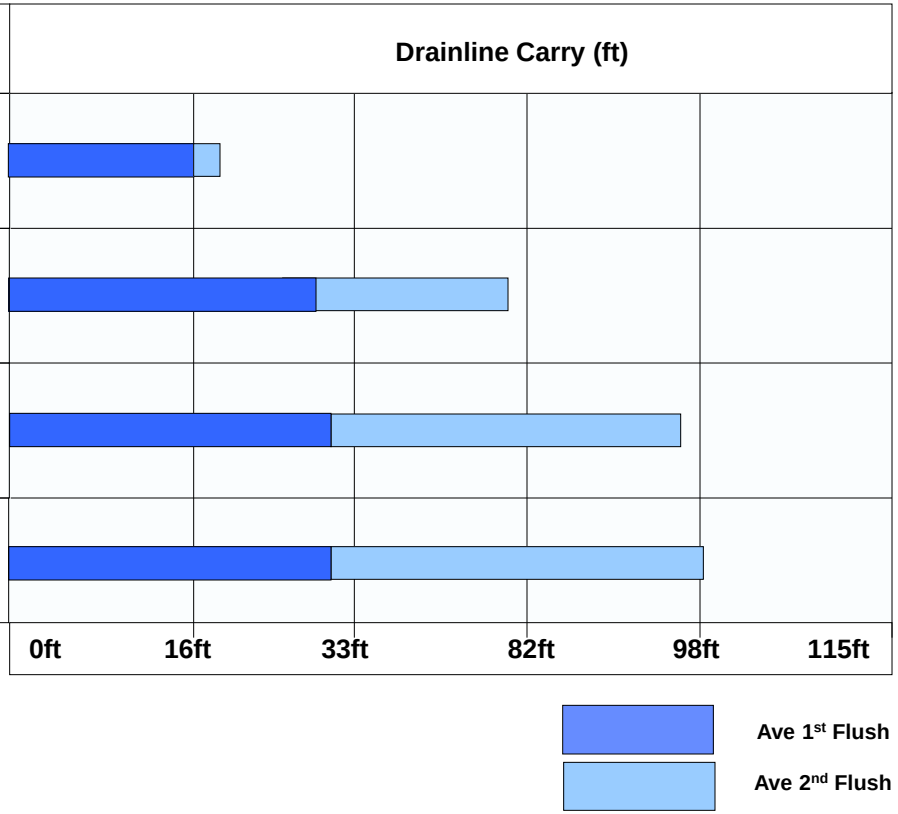
Study 3

Horizontal Junctions – Alternative junction configurations – Drainline Test Results

Flush V.	Junction Configuration	Test Media	Drainline Carry (ft)
1.2gal (4.5L)	4 Standard Junctions	Aus 250g	
1.2gal (4.5L)	4 Junctions UPWARDS 90°	Aus 250g	
1.2gal (4.5L)	4 Alternative Junction Design	Aus 250g	
1.2gal (4.5L)	4 Junction - DIN 1986 Standard	Aus 250g	



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Study 3

Horizontal Junctions – CIT WC Drainline transportation performance testing

Key Findings –

- Waste transportation performance of horizontal junctions is adversely affected by waste water back flow.
- Horizontal junctions configurations – probable cause of drainline blockage in Western Australia.
- Alternative junction design provided a significant improvement in drainline transportation.
- German DIN standard 1986 requirements need to be considered for adoption into AS/NZS 3500.2.

Note: Research will be conducted into other failure installations

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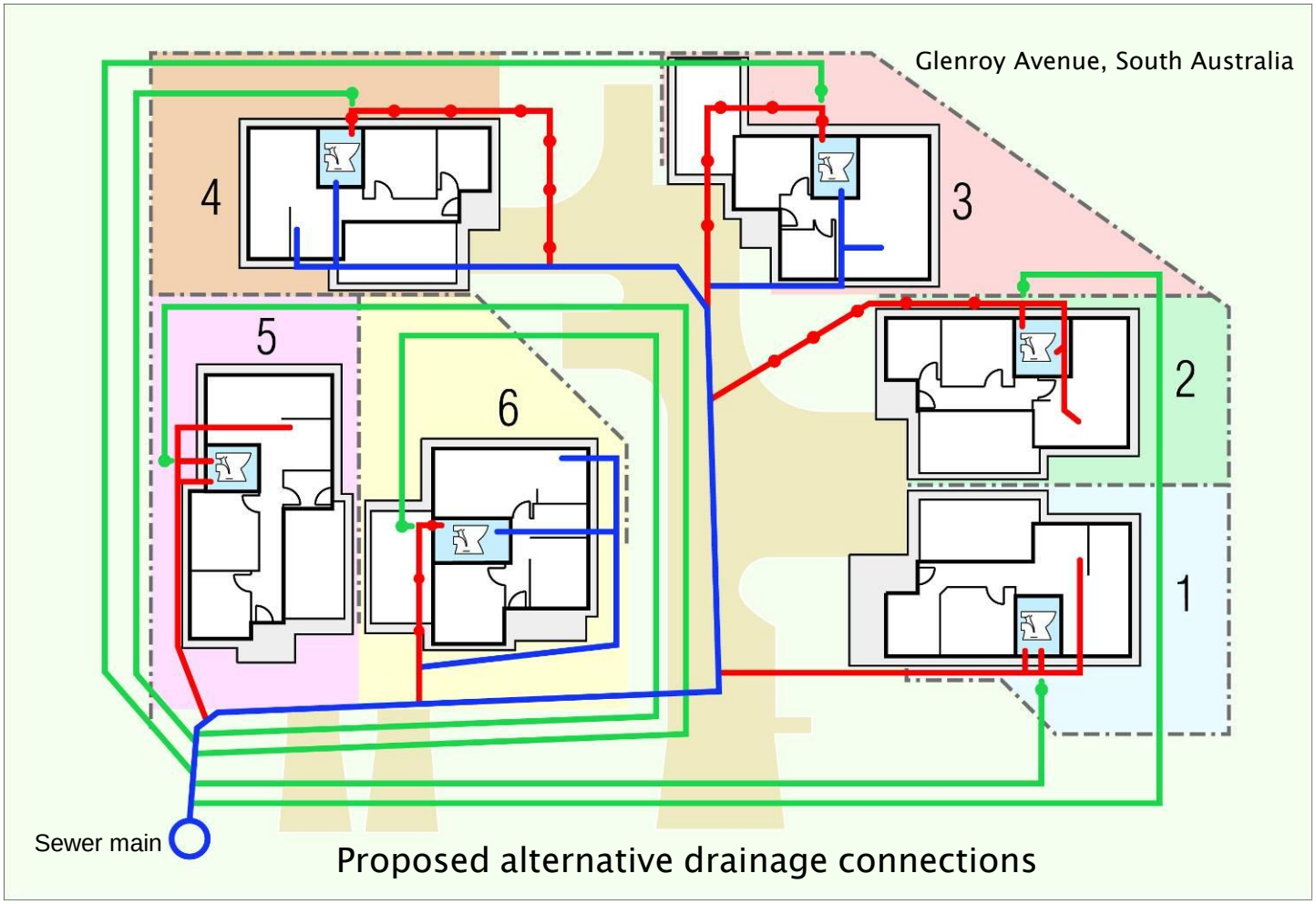
Future directions – Progressing with detailed studies in new installations



Proposed alternative drainage connections

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PERC Update –2010

- Funding for drainline research has yet to be received
- PERC original scope of work – presented at WSI in 2009 – was comprised of three independent components
  - Laboratory
  - Computer modeling
  - Field study
- Cost of this program was ~ $1.5M
- A decision to revise the scope of work in order to lower the cost was made in January 2010

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PERC Update -2010

- Revised scope of work completed in September
- Focus of revised scope:
  1. Evaluation of a potential low cost solution to avoid drainline blockage occurrences
  2. Determination of the importance of the design of the toilet in drainline transport relative to other plumbing system design considerations
- A designed experiment (multi-factorial DOE) developed that will allow for discrete ranking of variables

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PERC Update –2010

- Low cost solution: Use of electronic flushometer valves or other plumbing components
  - Designed to inject intermittent surges of water to clear drains
  - Will not significantly increase water consumption
- Significance of toilet design: Multi-flush designed experiment
  - First of kind
  - 100 flush test runs using MaP / WaterSense™ test media

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PERC Update -2010

- Lab based testing
  - 300 foot drainline apparatus, location TBD
  - 4 inch diameter pipe (most common, worst case)
  - System variables: pitch and flush volume
  - Toilet design variables: percent flush water training solids and flow rate
  - Analysis of data will rank significance of these variables and determine interactions
  - Intermittent “clearing flush” at 1% and 2% frequency
- Cost using revised scope of work - $170K
- Yes, we still need funding!

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Memorandum of Understanding

- 2010: AS-Flow and PERC agree to develop MoU
  - First ever international MoU focusing on plumbing research
  - Objective – "…research collaboration…for studying the sanitary flow and addressing any consequences of reduced water usage from water conservation measures, reduction in water usage by plumbing fixtures, and other drivers to reduce household and commercial water usage."

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Memorandum of Understanding

- Goals of MoU
  - Investigate current Australian, US and overseas research activities to avoid duplication of research
  - Review current knowledge on impacts of reduced flows on sanitary plumbing and drainage systems
  - Identify and quantify knowledge gaps
  - Compare installation and design practices

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Memorandum of Understanding

- Goals of MoU (continued)
  - Conduct testing pertaining to known plumbing system failures
  - Fixture testing for new water efficient fixtures, i.e. low flush WC's
  - Undertake field-based testing of variations to current design practices
  - Communicate with overseas research groups on research methodologies

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Q & A

- Questions?

THANK YOU!

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