Welcome

Endorsed Consultants Forum

Tuesday 10 May 2016
Agenda

Safety and confined space awareness, Ron Hyde

Responsibilities of an Engineer, Dr Peter Ho

Tea break

Easements, Kylie Prideaux

Firefighting design requirements, Ben Wilson and Toby Turner

Discussion
Safety Share

Visit https://www.youtube.com/watch?v=QqYa37idFMA#action=share
Confined space awareness

Ron Hyde
Queenland Urban Utilities
Purpose of WHSQ

Assists in improving workplace health and safety in Queensland and helping Reduce the Risk to workers and others from being killed or injured on whilst working.
Queensland Fatalities July to December 2014

The charts and graphs in this summary report provide fatality data for the period July to December 2014.

**Fatalities by industry**

<table>
<thead>
<tr>
<th>Industry</th>
<th>Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td></td>
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<tr>
<td>Transport, postal and warehousing</td>
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<tr>
<td>Agriculture, forestry and fishing</td>
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<tr>
<td>Arts and recreation services</td>
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<tr>
<td>Rental, hiring and real estate services</td>
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<tr>
<td>Health care and social assistance</td>
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<tr>
<td>Administrative and support services</td>
<td></td>
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</tbody>
</table>

**Total: 28**
Enforcement

• An inspector can:
  – enter a workplace
  – inspect, examine and make inquiries or seize things (including documents)
  – copy documents (e.g. training or employee records)
  – require a person to answer questions
  – issue notices
    • Improvement notice
    • Prohibition notice
    • Infringement notice
  – exercise any compliance power that is reasonably necessary.
Legislation/ WHS Law

• **Work Health and Safety Act 2011:**
  – Identifies the responsible persons, safety duties, offences and penalties

• **Work Health and Safety Regulations 2011:**
  – Identifies specific hazards to health and safety in the workplace and what **MUST** be done to eliminate or minimise their impact

• **Codes of Practice:**
  – These provide ‘best practice’ examples of how to control hazards for specific areas under the regulations
Due Diligence (S.27)

Take reasonable steps to:

- **Acquire knowledge** of WHS matters
- **Understand** the **nature** of the **workplace** and its associated **hazards and risks**
- Ensure **resources / processes** are there to **eliminate or minimise** risks
- **Ensure** processes are there for receiving and considering information about WHS incidents, hazards and risks in a **timely way**
- **Ensure** processes are there for **complying with** WHS duties
- **Ensure** processes are there to **Verify** compliance
High Risk Construction Work & SWMS

Asbestos, Confined Space and Excavation

(d) involves, or is likely to involve, the disturbance of asbestos; or
(f) is carried out in or near a confined space; or
(g) is carried out in or near—
   (i) a shaft or trench with an excavated depth greater than 1.5m; or
   (ii) a tunnel; or
Safe Work Method Statement

The aim of a SWMS is to:

- Describe the activity or task to be undertaken
- Identify the resources, manpower and skills associated with the task
- Assess and select control measures (as appropriate)
- Systematically plan the activity so it can be completed efficiently and effectively.
- The primary purpose of a SWMS is to help supervisors, workers and any other persons at the workplace to understand the requirements that have been established to carry out the high risk construction work in a safe and healthy manner.
Confined spaces
Confined spaces
Contents

FOREWORD

1. INTRODUCTION
   1.1 What is a confined space? ......... 5
   1.2 Who has health and safety duties in relation to a confined space? ............. 6
   1.3 What is required in managing risks? ........................................ 8
   1.4 How to determine whether a space is a confined space ............. 8

2. ROLE OF DESIGNERS, MANUFACTURERS AND SUPPLIERS.......................... 10
   2.1 Eliminating or minimising the need to enter a confined space .......... 10
   2.2 Entry and exit .......... 10

3. HOW TO IDENTIFY THE HAZARDS ........................................ 11
   3.1 What hazards are associated with a confined space? .......... 11
   3.2 Other hazards .......... 13

4. HOW TO ASSESS THE RISKS ........................................ 15

5. HOW TO CONTROL THE RISKS ........................................ 17
   5.1 The hierarchy of risk control ........................................ 17
   5.2 Eliminate the need to enter a confined space .......... 18
   5.3 Minimise the risks .......... 18
   5.4 Entry permits .......... 19
   5.5 Isolation .......... 20
   5.6 Atmosphere .......... 23
   5.7 Communication and safety monitoring .......... 25
   5.8 Entry and exit procedures .......... 26
   5.9 Signs and barricades .......... 26
   5.10 Information, instruction and training .......... 28
   5.11 Maintenance of control measures .......... 27

6. EMERGENCY PROCEDURES ........................................ 27

7. HOW TO REVIEW CONTROL MEASURES ........................................ 29

APPENDIX A – CONFINED SPACE CRITERIA ........................................ 30
APPENDIX B – SAMPLE CONFINED SPACE ENTRY PERMIT ........................................ 31
Confined spaces

- conditions that could impede entry and exit or the conduct of the tasks in the confined space, for example, plant layout, dimensions, manual handling and ergonomic aspects of the task activity.

Atmospheric testing and monitoring

Testing and monitoring the atmosphere in a confined space is a routine part of determining appropriate control measures.

Regulation 59: A person conducting a business or undertaking must ensure that air monitoring is carried out to determine the airborne concentration of a substance or mixture to which an exposure standard applies.
- there is uncertainty whether or not the airborne concentration of the substance or mixture exceeds the relevant exposure standard, or
- monitoring is necessary to determine whether there is a risk to health.

Any air monitoring in a confined space should be carried out by a competent person using a suitable, correctly calibrated gas detector. It may be necessary to test the atmosphere for:
- oxygen content
- airborne concentration of flammable contaminants
- airborne concentration of potentially harmful contaminants (for example, hydrogen sulphide and carbon monoxide).

A person’s senses should never be used to determine if the air in a confined space is safe. Many toxic or flammable gases and unsafe oxygen levels cannot be detected using one’s senses.

Initial testing should be done from outside the confined space by inserting a sample probe and/or a portable gas detection device at appropriately selected access holes, nozzles and openings. Because contaminants can settle at different levels, each part of the confined space should be tested – side to side and top to bottom (see Figure 2).

For example, some gases (such as hydrogen sulphide) are heavier than air and in unventilated areas will settle to the bottom of the space, while other gases (such as methane) are lighter than air and will collect at the top of the space. Testing should be carried out on a sufficient number of points to accurately reflect areas of the space that is likely to be accessed.

Figure 2: Atmospheric testing of remote regions and different levels within the confined space.

Lighter gases may be vented into the breathing zone of the person conducting the tests. Some gases may be dissolved in liquids and released when the liquid is disturbed or a crust over the liquid is broken and it may therefore be necessary to agitate liquids before monitoring.

If it is necessary to enter the space to test remote regions away from entrances or access holes, then air-supplied respiratory equipment should be worn and the entry must be undertaken in accordance with the WHS Regulation using a confined space entry permit.

Is the space enclosed or partially enclosed?
The risks of confined spaces are associated with how much of the space is enclosed, rather than the size of the space.

Is the space not designed or intended to be occupied by a person?
Spaces with poor ventilation, inadequate lighting and restricted means of entry or exit are generally not designed for human occupancy. The entry or exit to the space could be restricted if the size of the opening and/or its location makes it physically difficult to get in and out of and difficult to remove an injured or unconscious person from the space.

Is the space designed or intended to be at normal atmospheric pressure while a person is in the space?
Where a space is not normally at atmospheric pressure (for example a boiler) it must be brought to atmospheric pressure before a person enters the space, as part of the risk control process.

Is the space likely to pose a risk to health and safety from one or more of the following:
- an atmosphere that does not have a safe oxygen level (a safe oxygen level means an oxygen content in air of between 19.5% – 23.5%)
- contaminants, for example airborne gases, vapours and dusts, that may cause injury from fire or explosion
- harmful concentrations of any airborne contaminant (if the contaminants are present at a concentration above the relevant exposure standard or if they are likely to cause impairment, loss of consciousness or asphyxiation)
- engulfment, for example:
  - any liquid including oil or water in which a person can drown,
  - any solid including fly ash, grain, sawdust and sand that can flow and form a temporary cavity or bridge, which may collapse and surround a person, cutting off their air supply.

Confined Space

Not a Confined Space
Hazard area - incident
Important messages from WHSQ

- If you spot a hazard - report it
- If someone brings it to your attention – take action
- Don’t condone at risk behaviour - walking by and ignoring issues may result in an incident or fatality
- Productivity vs Safety (there will be no productivity if an incident occurs)
- Importance of communications
- Importance of following established processes
Finally....

What is the most important reason to work safe?
Questions?
Vision

Engineers Australia is the trusted voice of the profession.

We are the global home for engineering professionals renowned as leaders in shaping a sustainable world.
Requirements of an Engineer

- Responsibility
- Professional Ethics
- Legal Liabilities
- Sustainability
Responsibility

- Public Safety
- Welfare of the public
- Whole-of-life issue
- Fitness for purpose
- “Gold-plating” of industry documentation
Professional Ethics

- Demonstrate Integrity
- Practise Competently
- Exercise Leadership
- Promote Sustainability
Legal Liabilities

- Professional Engineers Act 2002
- BPEQ - RPEQ
- Case studies via BPEQ Newsletter
- Personal liability
Sustainability

- Objectively apply engineering knowledge to enhance both natural and social capital
- Maintain up-to-date knowledge
- Seek outcomes that deliver fairness
- Think holistically and innovatively
- Be proactive in addressing risk to environment, society and the economy
- Share community value
Policy Work in Queensland

• Infrastructure;

• Energy;

• Water Management;

• Consequences of De-engineering of the Public Sector;

• Groups/Regional Groups.
Advocacy Work in Queensland

- Engineers in Parliament;
- Infrastructure Planning and Delivery (Building Qld);
- Government as an Informed Buyer/Whole of Government Procurement;
- Non-conforming Products;
- Innovation in the Construction Sector through ConstructionQ.
Easements

Kylie Prideaux
Deputy General Counsel
Queensland Urban Utilities
Part A. Easement General Facts

Part B. Easement Issues
Part A: Easements

Why does QUU require easements?

- Access to **existing** and **newly built infrastructure** (manholes and pump stations) is secured

- Protection of **existing infrastructure** (usually manholes) and **newly built infrastructure**

- Where infrastructure (trunk or non-trunk) is built on **public land** (State land, leases or Council freehold or reserves)
Easements

How does QUU access and protect its infrastructure without an easement?

• QUU has restricted statutory rights of access and protection under the *Water Supply (Safety and Reliability)* Act 2008 (WSSR Act) (i.e. 14 day notice periods except in the case of an emergency). Section 192 of the WSSR Act states that it is an offence to build over or interfere with QUU’s infrastructure without QUU’s consent (maximum penalty -1000 penalty units).

• QUU accesses existing infrastructure transferred by the Councils to QUU when QUU was created on 1 July 2010 under section 89 of the *South-East Queensland Water (Distribution and Retail Restructuring)* Act 2009 (where the Councils retained control or ownership of the land).

• Statutory rights of protection and access are limited and do not guarantee practical access for QUU vehicles and employees.
Easements

Where are QUU’s easement requirements stated

- **SEQ Design and Construction Code (newly built infrastructure)**
  - Surface easements are required over trunk sewers only, plus easements for access purposes are required for any maintenance structures (ie including Maintenance Holes, Maintenance Shafts and Terminal Entry Points) on private property. Access easements are required to run from the street frontage to AND INCLUDING the maintenance structure (lid + wall width of maintenance structure)
  - Queensland Urban Utilities previously reviewed its requirements for easements over gravity sewers, and has decided not to require easements on gravity sewers of 300 mm diameter (DN 315 PE) or less, effective 1 December 2013
  - Easements required over all water mains.

- **Queensland Development Code (MP 1.4 Building over or near relevant infrastructure)**
  - Access from the street frontage to maintenance structures must be preserved by registration of an easement (1 metre wide).

- **For State Land – Land Act 1994**
Easements

Width Requirements - Sewer

• Greater than 300mm less than or equal to 600mm
  - 6 metre wide for sewer depth less than or equal to 3 metres
  - 6 metre wide for sewer depth greater than 3 metres and less or equal to 5 metres
  - 10 metre wide for sewer depth greater than 5 metres

• Greater than 600mm
  - 10 metre wide for sewer

• Maintenance structure
  - where maintenance structure within a lot, a 1-metre wide access easement from front boundary to maintenance structure (inclusive of the maintenance structure lid + wall width – no longer require 2m x 3m easement)

• Rising Mains
  - 10 metre wide for sewer
Easements

Width Requirements - Water

• **Private Property**
  - 6 metre wide easement for temporary mains or mains less than or equal to 300m
  - 10 metre wide minimum easement for temporary mains more than 300mm

• **State Land**
  - 6 metre wide minimum less than or equal to 300mm
  - 10 metre wide minimum for greater than 300mm
Easements

What does our easement terms say?

- Form 9 (land information and purpose of easement) and Form 20 (schedule of terms and conditions) with nil consideration

- Restrictions on building over or performing certain actions digging, vegetation planting etc over the infrastructure in the easement areas **BUT** Landowner can seek consent from QUU to build over the easement area

- Oblige the landowner to maintain unfettered and unrestricted access for QUU

- Costs of preparing remain with Developer (QUU’s charges fee to progress easement application)

- Volumetric and Surface
Easements

When is the easement processed?

- In all cases of existing and newly built infrastructure the developer must apply and submit documentation for review.

- For newly built infrastructure – when the developer has constructed the new infrastructure and QUU technical teams’ review of “as cons”, the original design approval, DA/WA conditions and survey plan has occurred and is acceptable.

- QUU has settled agreeable terms and conditions where developer or QUU has sought to negotiate alternative technical solutions.

- QUU has executed easement prior to construction with additional conditions (related to uncompleted works).
Part B.

Easement Issues

We were not allowed to build anything permanent in the storm water easement.
Easement Issues

What are some of the issues we deal with easements?

1. Access to Infrastructure- i.e. maintenance structures, property connections and infrastructure to be accessible from the street frontage at all times
Easement Issues

Example 1 - Access Easement to Maintenance hole

- Access easements along the property boundary to existing QUU maintenance structures
- QUU maintenance structure located near property boundary
- Straight forward access easement along property boundary

ACCEPTABLE DESIGN
Easement Issues

Example 2 - Easement Requiring Modification

- QUU maintenance structure located in rear of property
- Council D.A authorised boundary to boundary development
- Proposed Access Easement through the building wall

UNACCEPTABLE DESIGN
Easement Issues

Example 2 (Cont’d/..)

Solution
Negotiated creation of Volumetric Easement through Basement in Common Property to maintenance structure at rear of development
Easement Issues

Example 3 - Easement Requiring Modification

- Proposed easement along driveway and located either side of a brick wall
- QUU required redesign of easement

Solution

- Owner granted QUU an easement Over whole of Common Property Area

UNACCEPTABLE DESIGN
Easement Issues

What are some of the issues we deal with easements (Cont’d/….)

2. **Not all requested documentation provided** to progress the easement (example, out of date title searches, wrong future landowner or body corporate details, design approvals, as-constructed plans not provided, evidence of water approval (or development approval)

3. **Survey plans presented in draft or unsigned format** (high risk of changing plan when registered or presented to plan sealing if unsigned)

4. **Reconfiguration of Lot plans** to register easements when the infrastructure has not been constructed. QUU will require Uncompleted Works approval or other conditions to be met which may include bank guarantees and indemnities.
Thank You!
Building Fire Systems
Design Requirements

Ben Wilson &
Toby Turner

Queensland Urban Utilities
Building Fire Hydrant Systems
General Arrangement

- **Booster Assembly**
  - Feed Hydrants supply Pumper Truck “Appliance”
  - Appliance “boosts” flow/pressure into boost/inlet hydrants

- **Remote Attack Hydrant used with Attack Hose(s)**
• Street Hydrant supplies Pumper Truck “Appliance”

• Building Feed Hydrant supplies Pumper Truck “Appliance”
Legislation Framework

Queensland Building Act 1975

- **ABCB National Construction Code (BCA + PCA)**
  - Refers to Standards Australia (SA): Technical Standards
  - Current “Deemed-To-Satisfy” Technical Standards:
    - Fire Hydrant Systems AS2419.1
    - Fire Sprinkler Systems AS2118
    - Fire Hose Reels AS2441

- **Queensland Development Code**
  - Additional Queensland Standards that extends BCA:
    - MP2.1: Budget Accommodation Buildings (eg. Hostels)
    - MP2.2 and MP2.3: Residential Care Buildings (eg. Nursing Homes)
    - **MP6.1: Mandatory Building Fire System Maintenance (AS1851-2012)**
# Utility vs Building Standards

<table>
<thead>
<tr>
<th></th>
<th>Utility Water Network Construction Standards</th>
<th>Building Performance Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Legislation</strong></td>
<td>South-East Queensland Water (Distribution and Retail Restructuring) Act 2009</td>
<td>Building Act 1975</td>
</tr>
<tr>
<td><strong>Technical Standard(s)</strong></td>
<td>SEQ Water &amp; Wastewater Design and Construction Code</td>
<td>• National Construction Code (NCC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Queensland Development Code (QDC)</td>
</tr>
<tr>
<td><strong>Key Performance Outcomes</strong></td>
<td>Desirable/Aspirational: • Minimum Water Main Sizes for domestic supply • Minimum Water Main Sizes and Street Hydrant Access to operationally support Qld Fire Service</td>
<td>Mandatory: • Internal Minimum Hydrant Outlet Flows and Pressures for Building Compliance</td>
</tr>
<tr>
<td><strong>Design Flow Path</strong></td>
<td>• Water Approval Process (WAP) • Connection/network design by Civil contractor/engineer • Desktop level design verification • No hydraulic field test verification</td>
<td>• Building Design/Architecture Process • Hydraulic Services Consultant • Design compliance by: • Building Certifier to Building Code • Technical Design Standard requires physical Commissioning (ie. Proving) Test</td>
</tr>
<tr>
<td><strong>Regulator</strong></td>
<td>Dept of Energy and Water Supply (DEWS)</td>
<td>Dept of Housing and Public Works (HPW)</td>
</tr>
</tbody>
</table>
SEQ Water and Wastewater Design and Construction Code

SEQ Code: Function Confusion

SEQ Water and Sewerage D and C Code vs National Construction Code/AS2419.1

6.1.4 Private Building Fire Systems
The water services businesses do not evaluate the performance of private fire systems, nor aim to ensure their compliance with the relevant building codes and standards...
AS2419.1 Compliant Water Supply

Acceptable Water Sources
- Tank(s)
- Town Mains
- River, Lakes, Dams, Bores, Seawater

Tanks must be used where Town Mains cannot provide Flow or Volume (AS2419.1 Cl 4.3)

Acceptable Water Supply
Must be capable or providing Min flows and pressure. Designer to select from:
- Tanks + Pumps (Default)
- Town Mains + Pumps
- Town Mains
- Etc.
AS2419.1 Critical Hydraulic Performance Criteria

“Feed” Hydrants

- Provide Feeds to Fire Service Pumper Truck (“Appliance”)
- **Min Flow**
  - \( N \times 10 \text{ L/s} \) Min per simultaneously flowing hydrant outlet
  - Typically 1 or 2 Simultaneous Hydrant Outlets:
    - Ie. Typically 10 L/s or 20 L/s, depending Building Classification + Fire Compartment Area
- **Min Pressure**
  - 200 kPa Min outlet pressure (“Residual”)
AS2419.1 Critical Hydraulic Performance Criteria

“Attack” Hydrants

Provides flow and pressure to Attack Fire Hose Nozzle “Branches”

- Designed to receive flow/pressure from Fire Service Pumper Truck

Initial Attack

AS2419.1 requires building fire system to provide Initial Attack pressures to attack hydrants

- Before Pumper Truck coupled to booster assembly (!)
- AS2419.1 reasons: In some situations fire-fighters may use attack hydrants before Pumper Truck coupled up to booster assembly
- Leads to common building design requirement:
  - Install on-site fire pumps which may get used during a fire for Initial Attack
AS2419.1 Critical Hydraulic Performance Criteria

“Attack” Hydrants

Min Flow
- \( N \times 10 \text{ L/s} \) Min per simultaneously flowing hydrant

Initial Attack - Min Pressure
- 700 kPa Outlet Residual if building design uses on-site pump
- 350 kPa “compromise” (ie. Half of 700 kPa) if building can achieve using town mains pressure only ie. Delete on-site fire pump
  - QUU does not recommend. Unreliable building compliance.
  - Drinking water mains designed to be used as source for fire pumpers not to be used for pressurising attack hydrants!

On Boost from Fire Appliance - Min Pressure
- 700 kPa Outlet Residual
AS2419.1 On-site Fire Pumps

Permanent Building Fire-Pumps (Parallel Configuration)

FIGURE 7.5 GENERAL ARRANGEMENT OF BOOSTER ASSEMBLY IN PARALLEL WITH PUMPS
AS2419.1 Critical Hydraulic Performance Criteria

On-Site Fire Pumps

Two Types

- **Parallel** to Booster Assembly (Most common)
  - For Initial Attack Flows/Pressures
- **In-line** with Booster Assembly
  - Eg. Very Tall High Rise/High Lift

Min Flow – Parallel to Booster Assembly/Initial Attack Pumps

Min Duty Flow

- \( N \times 5 \text{ L/s} \) Min per simultaneously flowing attack hydrant
  - **Only** when being supplied from on-site pump **when** used for Initial Attack
  - “Compromise” Cost vs Benefit:
    - Duty Flow Req’d = Half of System Design Flow
    - Theoretically reduces cost of fire pump (?):

Pump Hydraulic Characteristic Requirements

However, pump curve must be compliant with separate standard **AS2941**:

- Requires pump to be capable of >130% of duty flow with >80% duty head
- Requires pump to have shut-off head <140% of duty head
AS2419.1 Design Flow/Pressure

Raw Mains Test Pressures **cannot** be used as Design Pressures

- Not accepted by AS2419.1 as design method
- AS2419.1 dictates **Minimum** available pressure = Design Pressure
- AS2419.1 recognises that water mains pressures **Vary** with time
- Clause 2.3.3 “Most Appropriate” method:
  - a) Water Agency Hydraulic Modelling (95th percentile). Preferred by AS2419.1
  - b) Water Agency Pressure Records (95th percentile) + Extra Calculated Losses
  - c) System Reference Point (95th percentile) + Extra Calculated Losses to Connection
  - d) Testing Method Approved by Water Agency

**Sandgate Network Background Pressures**
Feb-Mar 2011

- More people at home weekend: Use more water over day = less pressure than weekday
- 40 kPa current variance
- Higher variance in future years with:
  - a) More development
  - b) More garden watering

- Before work: Showering demand = lower pressures
- Weekend = Get up later: Showering times later/more variable
- Watering Gardens! 3:30 - 4:15 pm
- High load on network = lower pressures

**Long-Term Pressure Example**
Indooroopilly / St Lucia / Chapel Hill / Fig Tree Pocket

- Under “normal” demands: Avg ~640 kPa Min ~560 kPa
- Drought = Lower Demands: Avg ~720 kPa Min ~640 kPa
- 95th percentile: 8 years ~650 kPa
- 95th percentile: 3 years ~690 kPa
- 95th percentile: October 2010 ~715 kPa
- 95th percentile: 5 years ~660 kPa
- Network designed to operate at minimum: 560 kPa
QDC – Fire Hydrant/Sprinkler Testing Procedure

Purpose
• “This procedure is made under Queensland Development Code (QDC) Mandatory Part (MP) 6.1. It is unlawful not to follow this procedure.”
• Mandatory from January 1, 2012 to address inconsistent fire testing industry practices

Fire hydrant and sprinkler system commissioning and periodic maintenance procedure
1 July 2014

Use of Street Hydrants as “Deemed-to-Satisfy” Building Hydrants
“While street hydrants may be used to provide coverage in system design, most water agencies do not design their systems to cater for individual property firefighting flow and pressure requirements.

AS2419.1 is not applicable to water agency street hydrants. If street hydrants are deemed sufficient for a particular property, it is the building owner/occupier’s responsibility to have such hydrants maintained in accordance with AS1851-2012. Permission from water agencies must be gained before testing street hydrants.”
Common Design Issues

Selection of Non-Compliant Water Supply
Town Mains may only be used as AS2419.1 Water Supply only if:
- Have Available Flow
- Have Available Pressure
- Have Available Volume (4 hours)

Hydraulic Designer’s responsibility to ensure Building Design installs a compliant water supply that provides enough pressure eg:
- On-Site Fire Tanks / Pumps
- High Flow/High Capacity Town Main Network and Connection
Common Design Issues

Inappropriate Design Methodology

- Non-compliant / Miscalculated Town Mains Available Flow/Pressure
- Non-standard Hydraulic Calculations
- Hydraulic Theory Knowledge / Training Gaps
- Misinterpretation of Verification Field Test Results

**SAMPLE FIELD TEST**

**Test 1: Flowing Fire Hydrant #1 + Residual Fire Hydrant #2**

<table>
<thead>
<tr>
<th>Flow Rate &amp; Pressure at Fire Hydrant #1</th>
<th>Pressure at Residual Hydrant #2</th>
<th>Total Flow</th>
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<tbody>
<tr>
<td>(l/s)</td>
<td>(kPa)</td>
<td>(l/s)</td>
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<tr>
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<td>550</td>
<td>0</td>
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<td>15</td>
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<tr>
<td>*17.5</td>
<td>60</td>
<td>*17.5</td>
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<td></td>
<td>350</td>
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</tbody>
</table>
Common Design Issues

Connection Design

High Hydraulic Loss Connection Design

• Eg. Undersizing of Retic Mains/Service Pipework
  » Artificially Limit On-Site Available Flows/Pressures
  » Selection of Mains, Connection Point, Metering Arrangement, Bends, Length of Pipework etc.:
    Significant impact on Building Code Compliance

Connection Civil Designer vs Building Hydraulics Consultant

• Hydraulic Consultant engaged late in Building Design process
• Insufficient Building Hydraulic Design Parameters @ Time of Connection Design
• Unclear Project Responsibilities for achieving Fire System Design Compliance
  » Who? Doing what?
• Time/cost penalty risks of non-compliant Fire System design not identified
  » Identify need to install Fire Tank or Fire Pump to Building after been built and no allowance in Building Plans / Project Costs?
  » Pre-Design / Design Due-Diligence processes not carried out
  » Pre-Commissioning / Design testing left too late eg. 1-2 weeks before handover
  » Loose Fire System design performance warranties
Resolution
Design Non-Performance

Who Resolves Performance Non-Compliances?

- Hydraulic Services Designer/Installer
- “Town Mains Available Flow/Pressure Too Low”:
  - Not Valid
  - Design failure to specify a Connection Design, Pumps or Tanks etc. to provide required Building Flows/Pressures to meet Building Code

Hydraulic Non-Performance Investigation/Resolution Support

- Building Industry Lead:
  - Specialist Investigative/Diagnostic Hydraulic Consultants
  - Specialist Private Field Testing Services
- QUU Services Advice Notices / QUU Engineering Support
- Requests for QUU Network Optimisations (Case-by-case)
Services Advice Notices (SANs)

Min Available Pressure and Flow Advice
- Conforms to AS2419.1 Calculation Methodology

Engineering Advice
- Concept Design Advice
- Hydraulic Advice
Endorsed Consultant Roles

Endorsed Consultant Expectations and Roles

- Connection Design?
- Building Design?
Discussion and Q&As