



**KASA Redberg**

*Engineers & Technical Trainers*

# **Sewage Pump Station & Rising Main Design**

*A practical and interactive 2 day course*

# Sewage Pump Station & Rising Main Design

## Introduction

The primary focus of this two day course is to provide guidance in the design of the most common types of sewage pump stations and pressure mains. These pump stations include upgrades to traditional dry-well stations, the design of new submersible sewage pump stations or the design of lift stations which utilise self-priming pumps.

## Who Should Attend

Engineers and technicians who work in the municipal water/wastewater industry and would like to know how to size, select, troubleshoot, test, install, operate and maintain pumps, piping, dosing systems, electrical equipment and ancillary equipment found in sewage pump stations and pressure mains.

## Delegate Pre-Requisites

It is a requirement that each delegate has an understanding of engineering structures and mechanical components. A basic understanding (trade level or higher) engineering maths would also be a necessity. Ideally, each delegate should have a degree or diploma in a relevant technical field or a higher level trade qualification.

## Seminar Objectives

At the completion of this seminar, each delegate should be able to:

- Identify the most common sewage pump station types as well as the most common equipment (e.g. pump starters, control panels, dosing systems, odour control units etc) found in sewage pump stations.
- Understand pumps, associated components, hydraulics and terminology.
- Be competent in reading pump performance curves.
- Appreciate the different piping materials and valves available for valve pits and pressure mains.
- Understand the reasons behind standardisation of the design of pump stations and rising mains with due reference to WSAA codes.
- Understand how to correctly determine the static and total dynamic head in a sewage pump system.
- Troubleshoot pump operational problems
- Have a greater understanding of instrumentation used in sewage pumping systems.
- Appreciate the issues related to septicity and odour.

## Seminar Objectives Continued

- Identify good and bad wet well geometries and designs.
- Work within the constraints of piping runs and maintenance hole sizes when laying out a new pump station.
- Appreciate the various construction methods available for laying rising mains (e.g. trenching, jacking, directional drilling).
- Identify when a water hammer analysis is required and what the key remedies are for pressure surges.
- Better appreciate issues such as mine subsidence, future population increases and the effect on the asset, negotiating with stakeholders and power supply issues.
- Better appreciate the methods used to maintain pump stations and rising mains and how to design for safer and more efficient emergency maintenance action.

## Training Seminar Materials

All delegates receive:

- The **“Sewage Pump Station and Pressure Main Design” Training Manual** – a reference manual comprising theory, worked example problems, tables, charts and illustrations etc based on the seminar outline. This manual has been designed to be a valuable future resource for the office or plant.
- **Certificate of Attendance** – which states the number of hours of training and serves as documentary proof of attendance.

## In-House (Customised) Training

This training course can also be delivered as an in-house course. We have delivered courses to various water/wastewater agencies and water/wastewater infrastructure design consultancies around Australia since 2008.

The content of the course can be customised to suit the specific equipment makes/models that you use at your agency or organisation. Additional material can also be included or non-relevant material can be excluded. In this way, this course can be completely customised to suit your needs.

For an in-house presentation of this course, please contact us via phone or email to arrange a detailed proposal.



# Sewage Pump Station & Rising Main Design

## Seminar Synopsis

### DAY 1

#### INTRODUCTORY INFORMATION

- Terms and definitions
- Codes and standards
- Pump station and pressure main planning
- Traditional dry-well pump stations
- Wet-well (submersible) pump stations
- Lift-type pump stations (PD and centrifugal)

#### DETERMINING DESIGN HEAD CONDITIONS

- Head losses and friction in pipes, fittings and valves
- WSAA approved methods and traditional methods
- Hydraulic Grade Lines
- Determining hydrostatic test pressures

#### PRESSURE TRANSIENTS

- Pressure transients (aka "water hammer") theory
- When to conduct a transient analysis
- Mitigation methods

#### SEWAGE PUMPS

- Traditional end-suction centrifugal pumps
- Wet and dry mounted submersible pumps
- Self-priming centrifugal pumps
- Progressive cavity pumps
- Affinity Laws and Characteristic Curves
- Matching the System to the Pump
- System Curve Calculations
- Troubleshooting
- Installation and Operation

#### PIPING & PIPELINE SIZING

- The Present Value Method
- The Allowable Velocity Method

#### PIPES, FITTINGS & VALVES

- Common piping materials for pump stations
- Common pipe materials for pressure mains
- Pipe material selection criteria

### DAY 2

#### PIPES, FITTINGS & VALVES (CONTINUED)

- Common valve types
- A special focus on air valves and air-entrapment
- Pressure ratings and stresses in pipes
- Introduction to AS2566 Buried Flexible Pipelines
- Thrust blocks and trench stops

#### ELECTRICAL, INSTRUMENTATION & CONTROL

- Pump starters – DOL, VSD and soft starters
- Pump station instrumentation – level and flow
- Pump station control and monitoring systems
- Overview of a typical electrical supply system
- Electrical kiosks and switchrooms
- Lighting requirements
- Emergency power

#### CONSTRUCTION

- Maintenance holes, emergency storage chambers, valve chambers and wet-wells: pre-cast versus cast-in-situ
- Pipe-laying: trenching, jacking and directional drilling
- Packaged self-priming centrifugal pump stations
- Packaged submersible pump stations
- Packaged progressive cavity pump stations

#### MISCELLANEOUS TOPICS

- Septicity and odour control – dosing systems and odour control units
- Guidelines for Safety, Operations and Maintenance
- Early stakeholder engagement and approvals
- Designing for mine subsidence effects

#### COMMON DESIGN ISSUES

- Wet-wells
- Lift stations
- Buried station piping
- Clearances
- Power and communications
- Depths and gradients
- Level settings
- Access for maintenance and emergencies



## About KASA Redberg

KASA Redberg is a technical training and engineering consulting group.

We have core competencies in pumping systems, piping systems, pipelines, pressure vessels and slurry handling systems. We also act as independent HAZOP workshop facilitators and Safety-in-Design workshop facilitators.

Our portfolio of services includes:

- Tank and vessel design.
- Chemicals plant design.
- Water treatment plant design.
- Pumping and piping systems design.
- Pump station and pipeline design
- Mine dewatering and water supply systems design.
- Pipe stress analysis
- Pipeline hydraulic modelling
- Water hammer analysis
- Slurry piping systems design and slurry pump selection.
- On-site troubleshooting of pumps and piping systems.
- Operator training courses
- HAZOP workshop facilitation
- Safety-in-Design workshop facilitation

## Contact Details

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