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We have all seen it: the leaking joint in a dam that is the telltale sign that a waterstop was not installed properly or has failed prematurely. Waterstops are paramount to the integrity of concrete components of dams and other water-retaining structures. Not only does an improper joint design or waterstop installation look bad aesthetically, it can also corrode critical reinforcement members or provide a pathway for piping, thereby, jeopardizing the integrity of the dam.

It is essential for joint design and waterstop selection to be based on the site constraints, installation techniques, and complexity of concrete placement. This paper/presentation will focus on the primary ways we have evolved our waterstop design and construction oversight process to greatly enhance waterstop performance. Detailed explanations regarding the following will be included:

- The importance of involvement from a waterstop manufacturer to assist with selection of the proper waterstop profile based on the amount of expected joint movement, design heads, and maximum aggregate sizes.
- Testing and construction practices to eliminate waterstop defects.
- How to present installation and handling procedures for construction.
- Why limiting field welds to only butt-welds and requiring all tees, ells, and crosses to be pre-fabricated by the waterstop manufacturer will reduce potential waterstop failures at welds.
- The importance of requiring the manufacturer's technician to provide waterstop installation training and certification for personnel who will be performing field-welds.
- The value of scaled details for constructability of intricate concrete layouts or complex joints to ensure all clearances to reinforcement and exposed concrete.
- The benefit of 3D modeling software that includes all structural members, planned joints, and pre-fabricated waterstops during design to determine if additional joint or waterstop details are required on the construction documents.

The audience will benefit through examples illustrating the following:

- Improper versus proper welds and welding techniques
- Incorrect versus correct waterstop placement
- Inadequate versus adequate detailing in the Contract Drawings
- Dual waterstop approach (PVC and hydrophilic waterstop)
- Example of 3D modeling of complex joints