

# PENITENCIA DELIVERY MAIN AND PENITENCIA FORCE MAIN SEISMIC RETROFIT PROJECT

Notice of Completion of Construction Contract

July 10, 2018



# Agenda

## Penitencia Delivery Main and Force Main Seismic Retrofit Project

- ▶ Project Location and Overview
- ▶ Earthquake Resistant Ductile Iron Pipe
- ▶ Pipeline Installation
- ▶ Construction Challenges
- ▶ Additional Project Features
- ▶ Public Relations



# Project Location and Overview

## Penitencia Delivery Main and Force Main Seismic Retrofit Project



# Project Location and Overview

## Penitencia Delivery Main and Force Main Seismic Retrofit Project

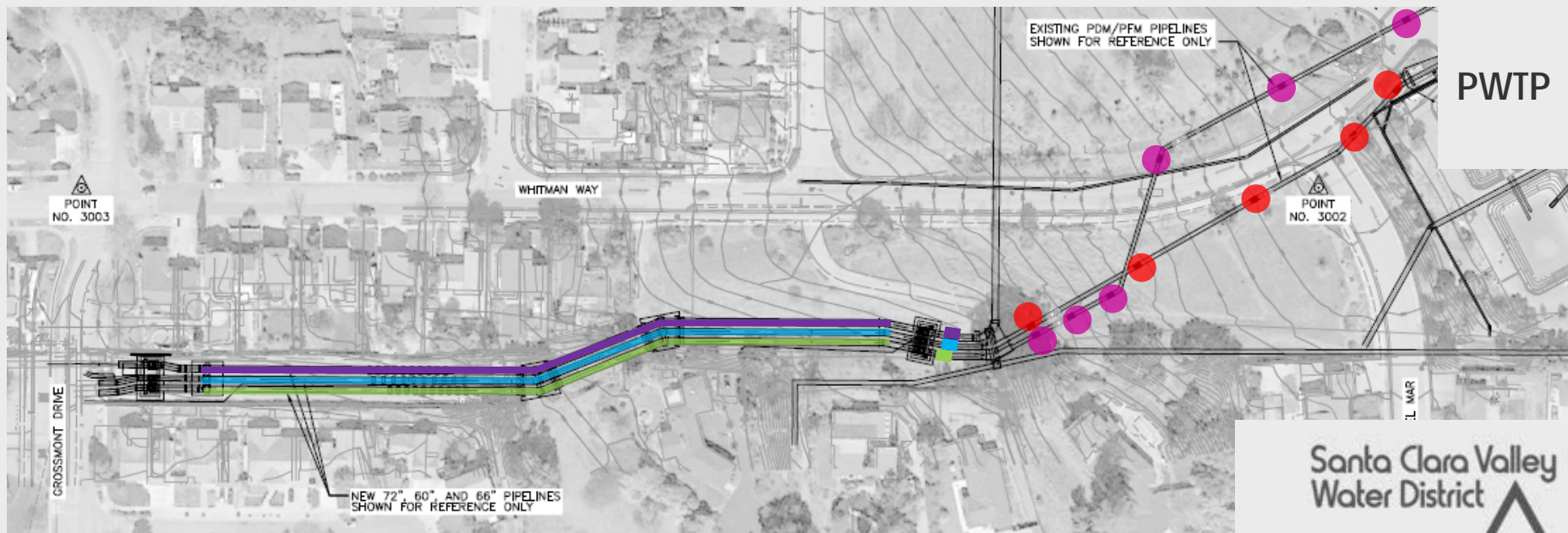
### ▶ Earthquake Resistant Ductile Iron Pipe (ERDIP)

#### ▶ Pipelines:

- ▶ 72" South Bay Aqueduct (SBA)
- ▶ 60" Penitencia Delivery Main (PDM)
- ▶ 66" Penitencia Force Main (PFM)

#### Single Collar Joint:

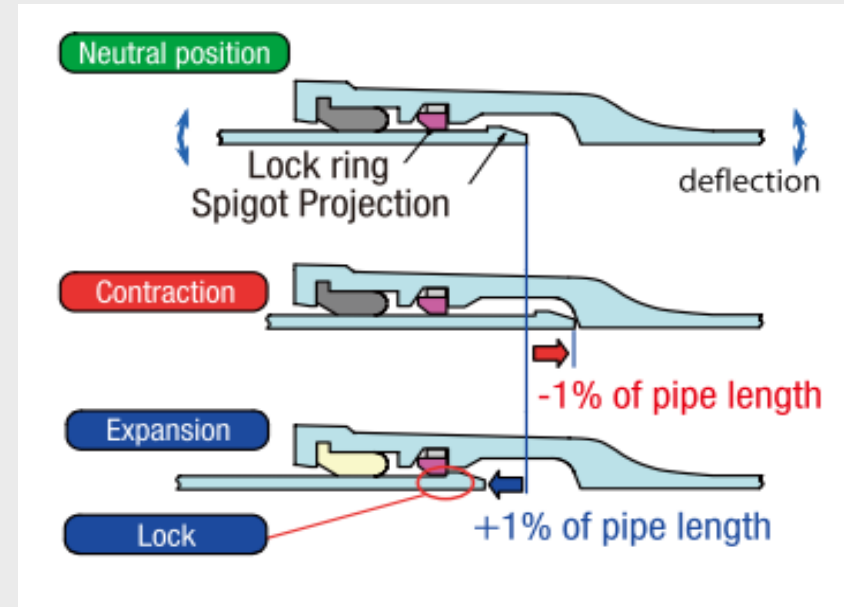
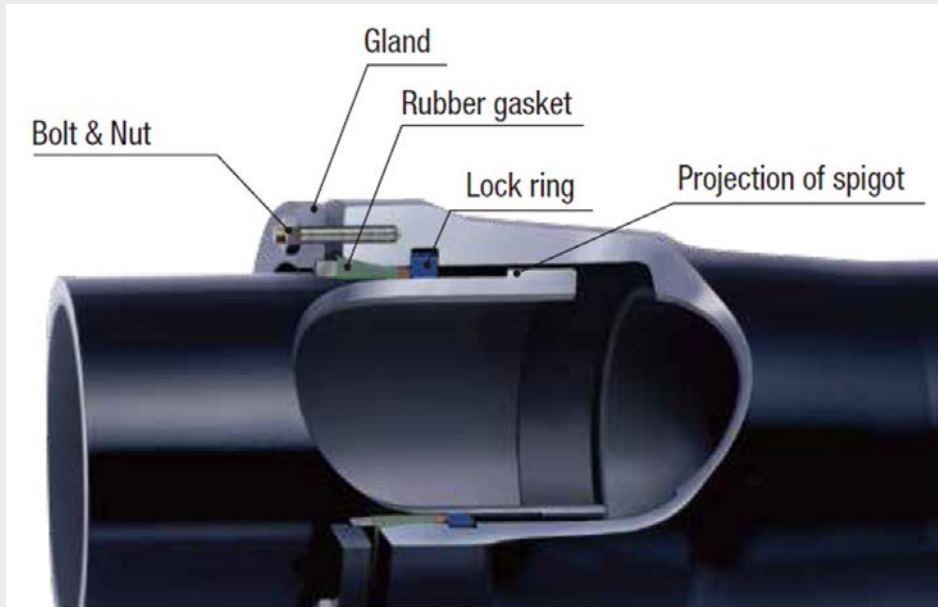
- 44" Collar ●
- 48" Collar ●



# Earthquake Resistant Ductile Iron Pipe (ERDIP)

Penitencia Delivery Main and Force Main Seismic Retrofit Project

## ► ERDIP S-TYPE PIPE



# Pipeline Installation

Penitencia Delivery Main and Force Main Seismic Retrofit Project

- ▶ Main pipelines (72" SBA, 60" PDM, 66" PFM)



# Pipeline Installation

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- ▶ Main pipelines (72" SBA, 60" PDM, 66" PFM)



# Pipeline Installation

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## ► ERDIP Collars





# Construction Challenges

Penitencia Delivery Main and Force Main Seismic Retrofit Project

## ► Material Procurement, Delivery and Staging



# Construction Challenges

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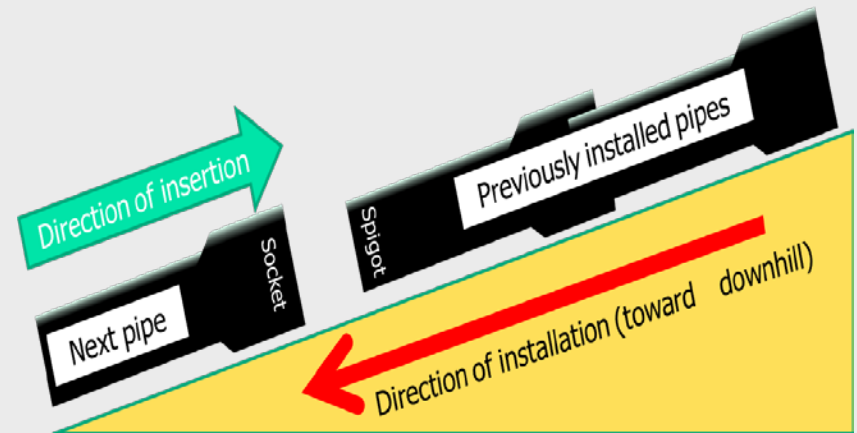
## ► Nesting Raptor (Red-tailed Hawk)



# Construction Challenges

Penitencia Delivery Main and Force Main Seismic Retrofit Project

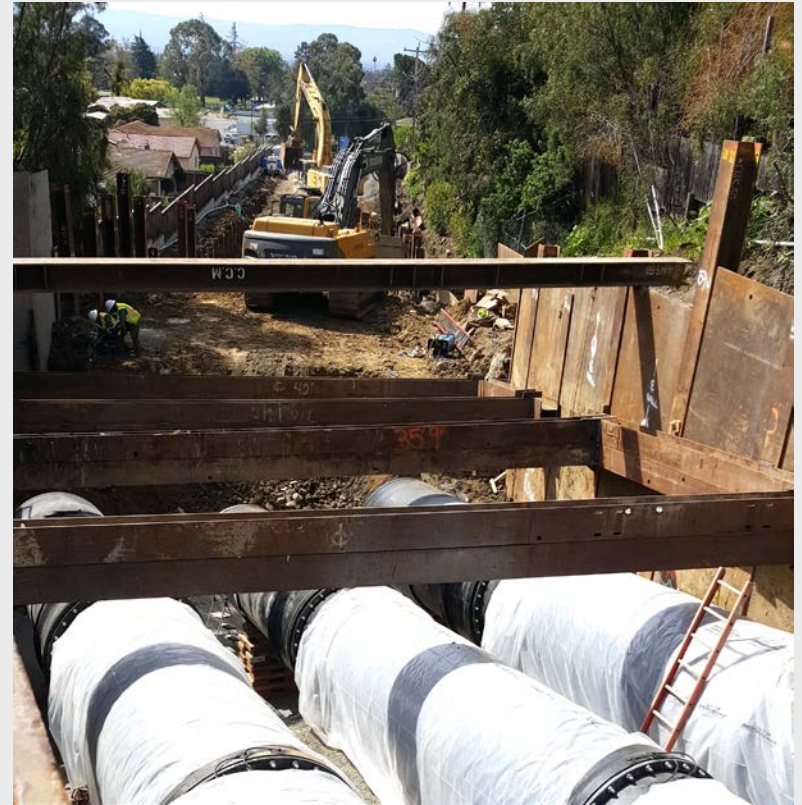
## ► Reverse Installation Sequence



# Construction Challenges

Penitencia Delivery Main and Force Main Seismic Retrofit Project

## ► Access Constraints



# Construction Challenges

Penitencia Delivery Main and Force Main Seismic Retrofit Project

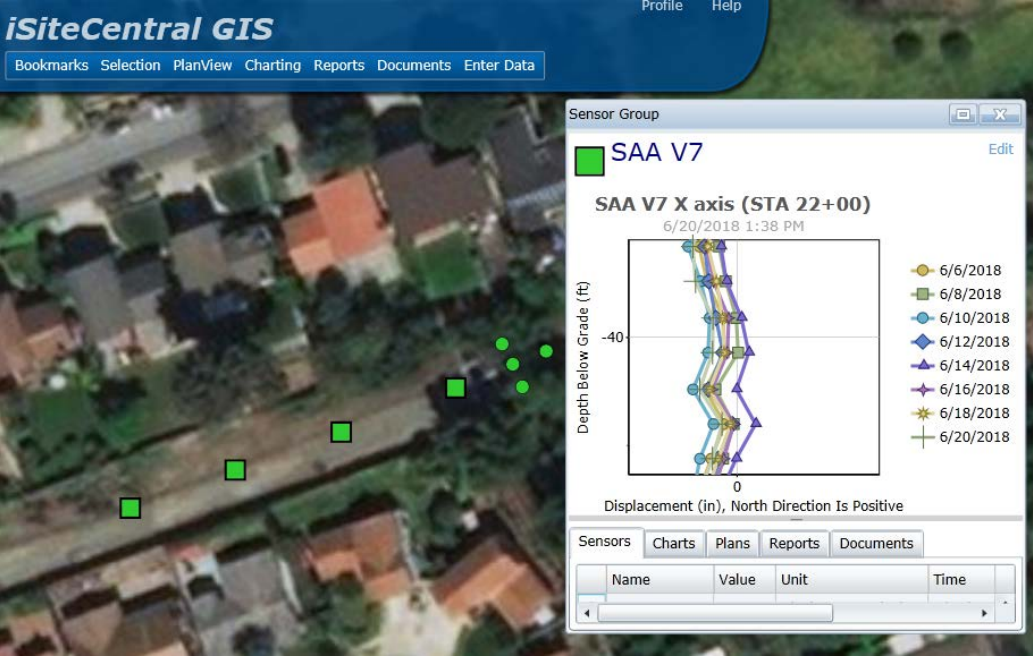
## ► Weather Impacts - 2016 El Niño Season



# Additional Project Features – Earthquake Monitoring

Penitencia Delivery Main and Force Main Seismic Retrofit Project

## ▶ Deflection Monitoring



## ▶ Seismic Switch



# Additional Project Feature – Bypass Vaults

Penitencia Delivery Main and Force Main Seismic Retrofit Project

## ► Emergency Bypass Vaults



- ▶ Neighborhood Meetings
  - ▶ Conducted six neighborhood meetings.
  
- ▶ External Agency Visits and Tours
  - ▶ San Francisco Public Utilities Commission
  - ▶ East Bay Municipal Utility District
  - ▶ Metropolitan Water District of Southern California
  - ▶ Los Angeles Department of Water and Power





# Public Relations

## Penitencia Delivery Main and Force Main Seismic Retrofit Project

### ► Ribbon Cutting Ceremony



# Public Relation - ASCE Publication

*To improve the seismic reliability of three critical pipelines, California's Santa Clara Valley Water District installed what is believed to be the first large-diameter earthquake-resistant ductile iron pipe in the United States. By hardening the pipelines where they cross an active landslide, the project increases system resilience and improves public safety in the event of an earthquake.*

♦ ♦ ♦ ♦

**BY DARREN BAUNE,  
P.E., AND EMMANUEL  
ARYEE, P.E., M.ASCE**

**L**OOKING TO IMPROVE the seismic reliability of its 40 mgd Penitencia Water Treatment Plant (WTP), the Santa Clara Valley Water District, in San Jose, California, recently upgraded three critical pipelines that serve the facility. The pipelines required hardening along a short stretch near the WTP where they cross an active landslide.

To this end, the project entailed what is believed to be the first installation of large-diameter earthquake-resistant ductile iron pipe (ERDIP) in the United States. Located quite close to a densely populated residential neighborhood and an elementary school, the \$21.3-million project improved



ty. Even closer to home, the Penitencia WTP is located on the Penitencia Creek Landslide, a 240-acre active landslide. Three pipelines cross from a stable geologic zone onto the landslide near the Penitencia WTP: the 60 in. diameter Penitencia Delivery Main (PDM), the 66 in. diameter Penitencia

- ▶ Featured in February 2018 ASCE Magazine Article under Pipeline Protection

# PENITENCIA DELIVERY MAIN AND PENITENCIA FORCE MAIN SEISMIC RETROFIT PROJECT



**For Earth, For Life**  
**Kubota**



**RANGER  
PIPELINES, INC.**

Utility & General Engineering Contractors

**Santa Clara Valley  
Water District**



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