

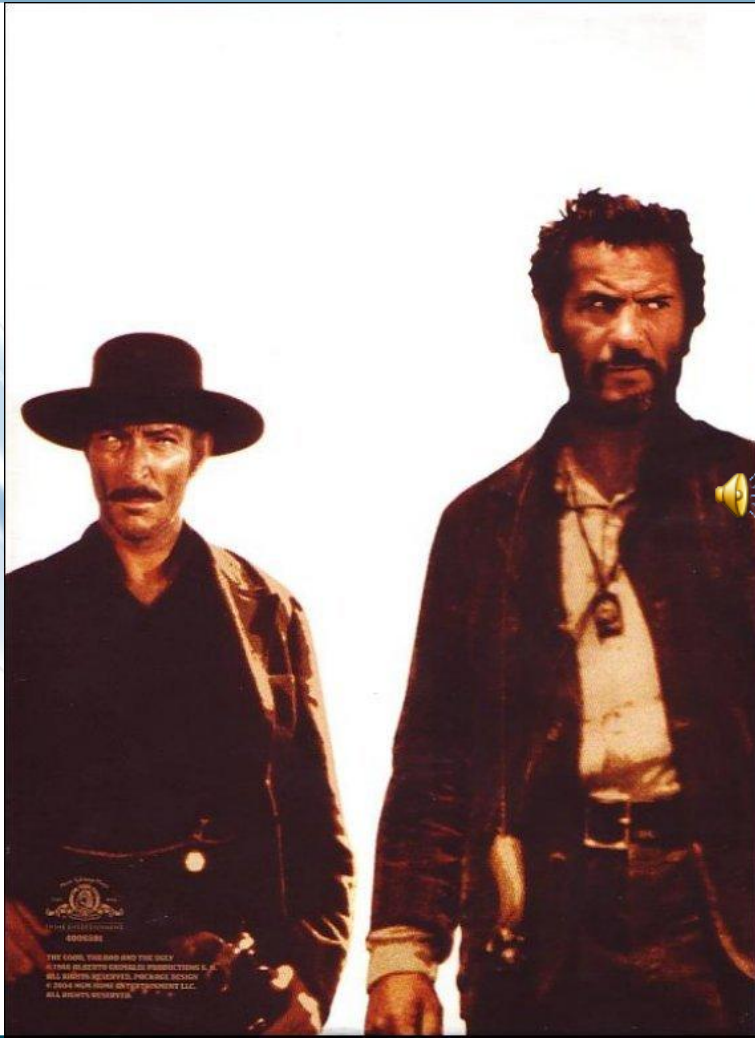
SMALL SYSTEMS – EARLY BIRD SESSION

WELL PUMP HOUSE RETROFITS – THE GOOD, THE BAD, AND THE UGLY

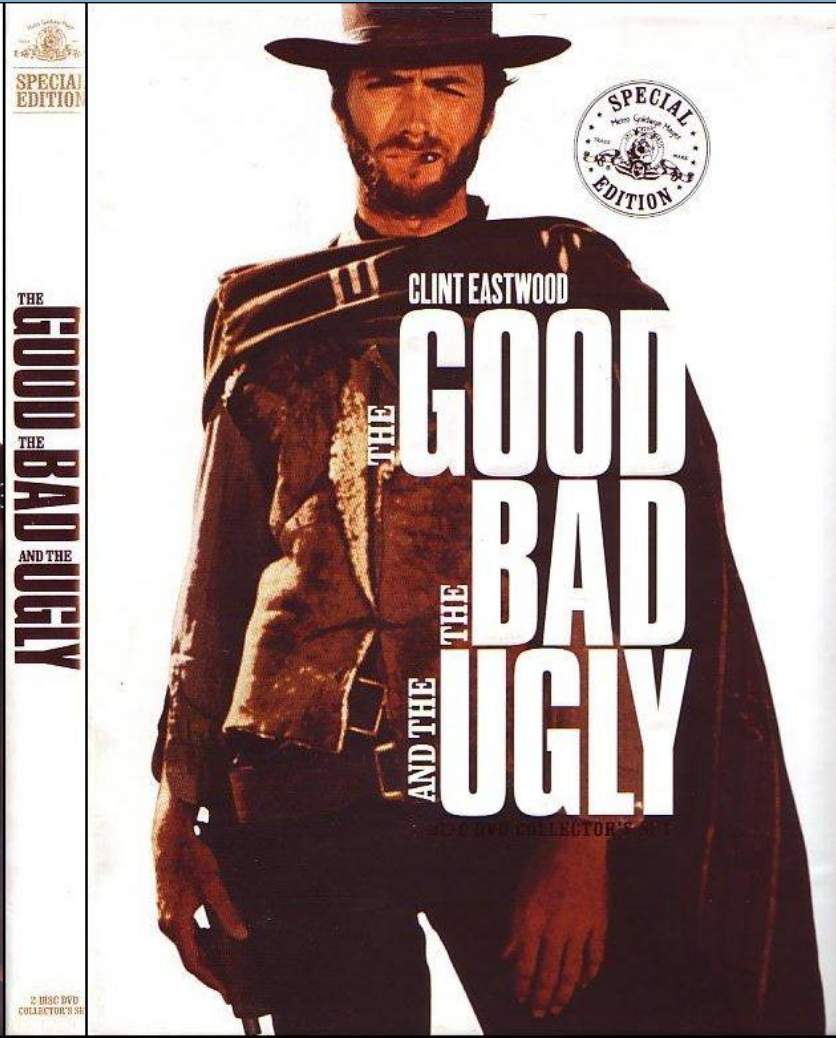
**Presented by:
Dennis Galinato, P.E.
Murray, Smith & Associates, Inc.**



May 5, 2011



MSA



Overview

Project Overview

- The Bad – System Configuration
- The Ugly – Existing Conditions
- From Bad and Ugly to Good!
- The Good – The Final Product

PROJECT OVERVIEW

Shilo Well House Retrofit

- **City of Bend, Oregon**
- **City Project Manager: Heidi Lansdowne, P.E.**
- **Design Completed: December 31, 2009**
- **Construction Completed: 2011**
- **ARRA Funded Project**

SYSTEM CONFIGURATION



The Bad

SYSTEM CONFIGURATION

Pressure Zones:

Zone 2

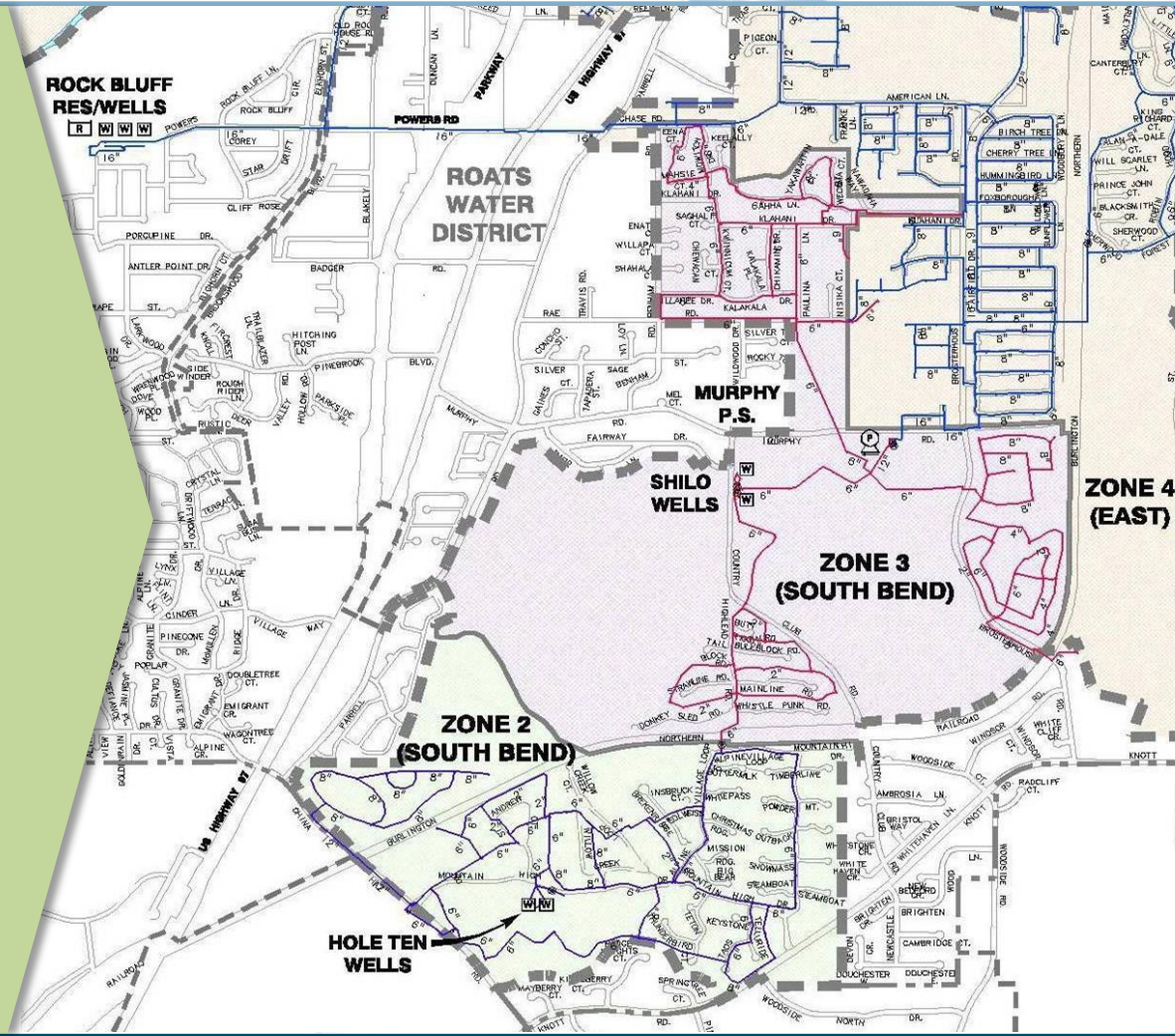
HGL = 4010'

Zone 3

HGL = 3930'

Zone 4

HGL = 3880'



The Bad

SYSTEM CONFIGURATION

Water Sources:

Zone 2

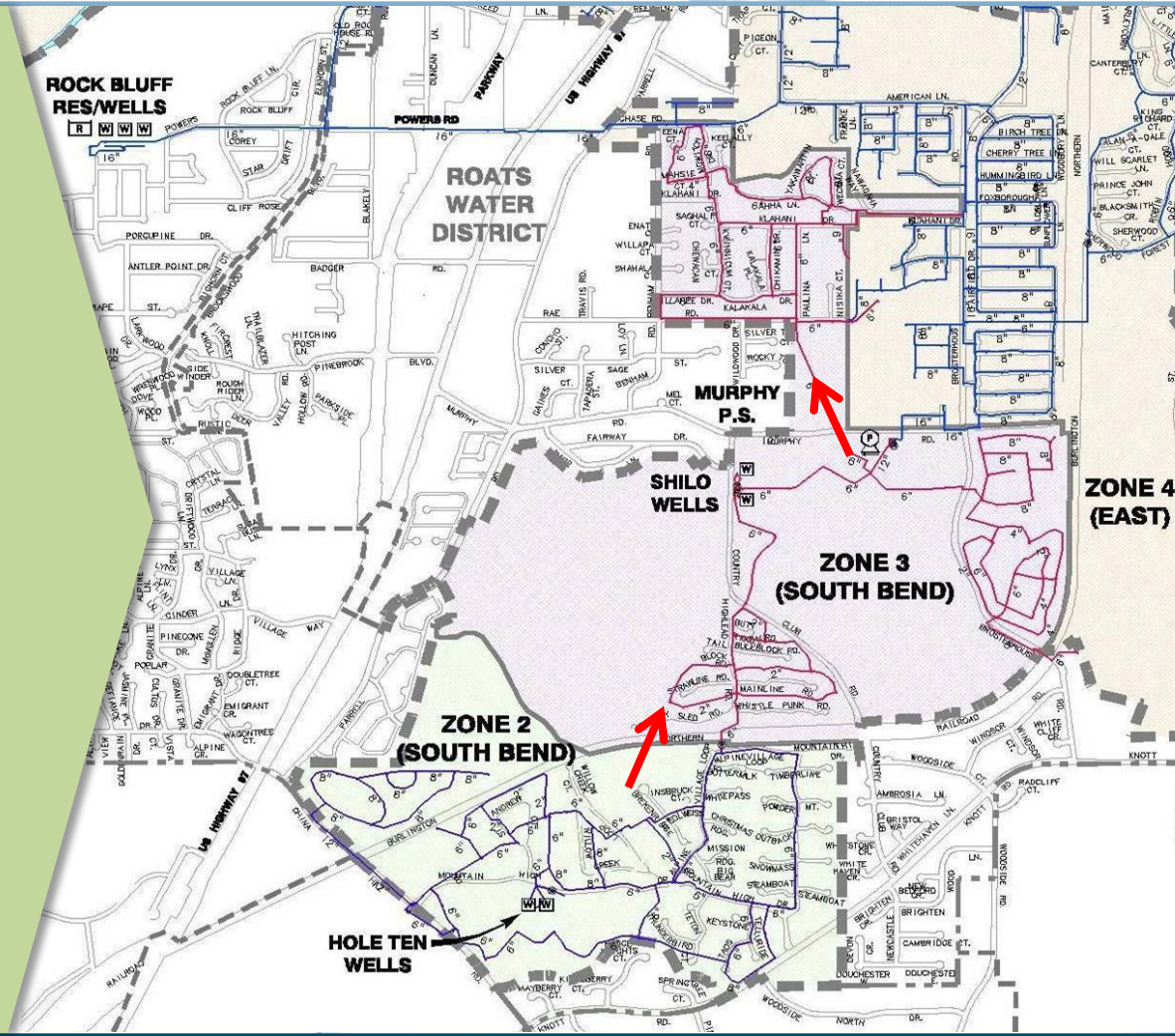
Hole 10 Wells

Zone 3

From Zone 2, Shilo Well & Murphy P.S.

Zone 4

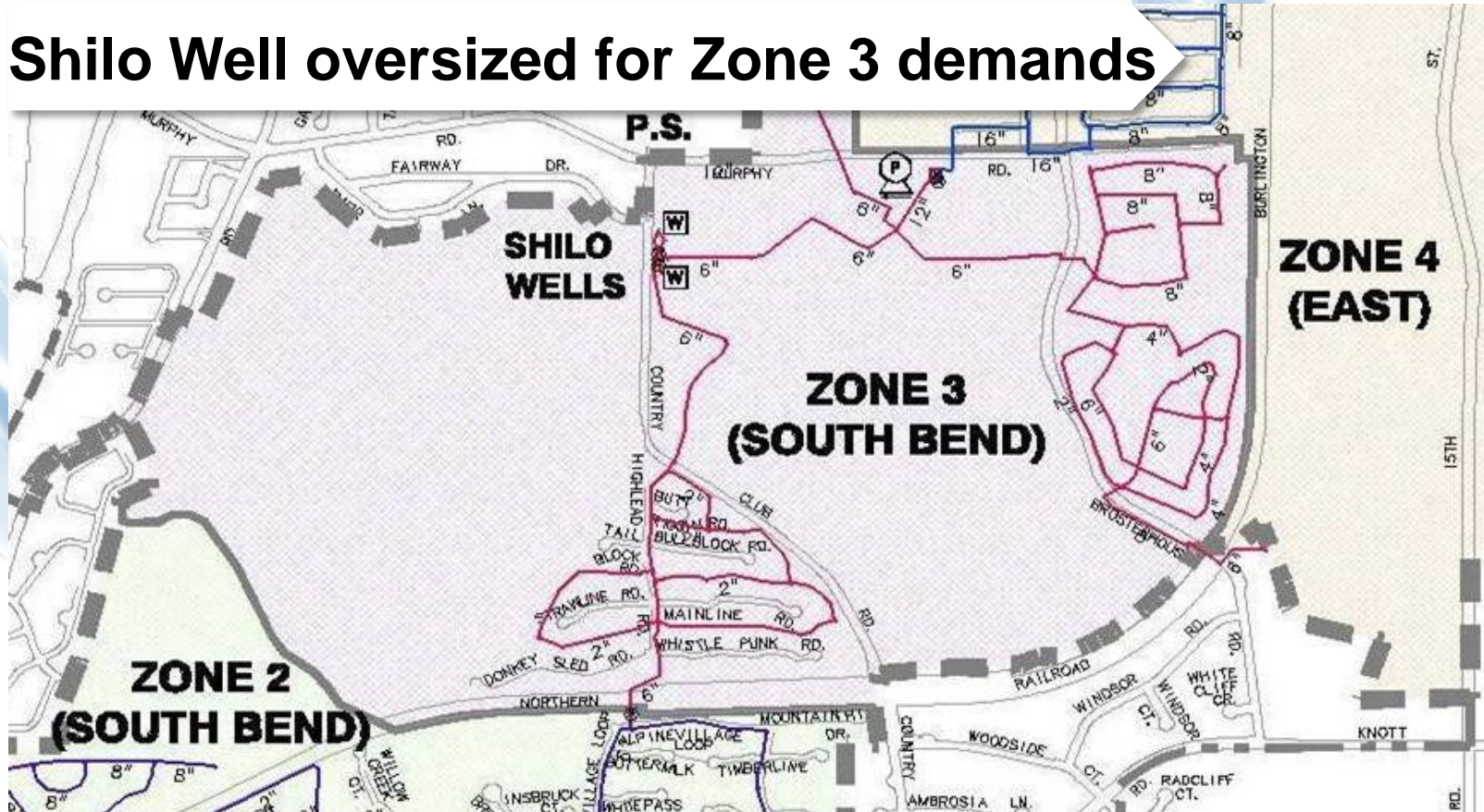
Rock Bluff Res., From Zone 3



The Bad

SYSTEM CONFIGURATION

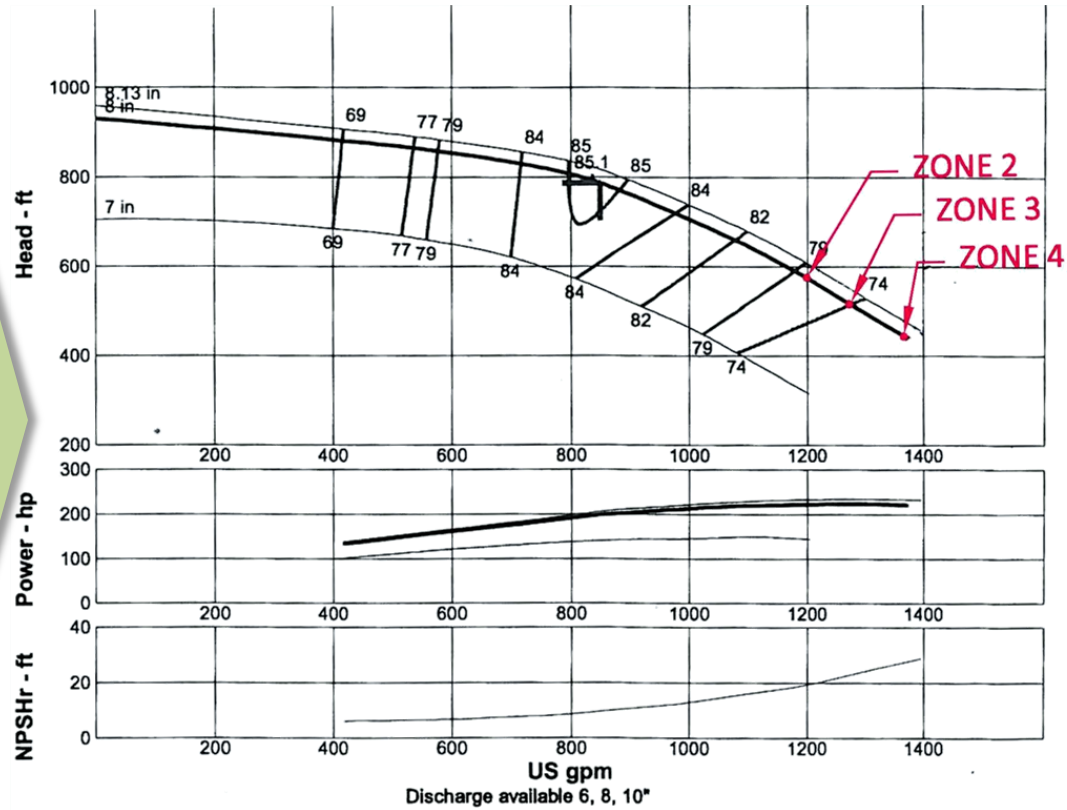
Shilo Well oversized for Zone 3 demands



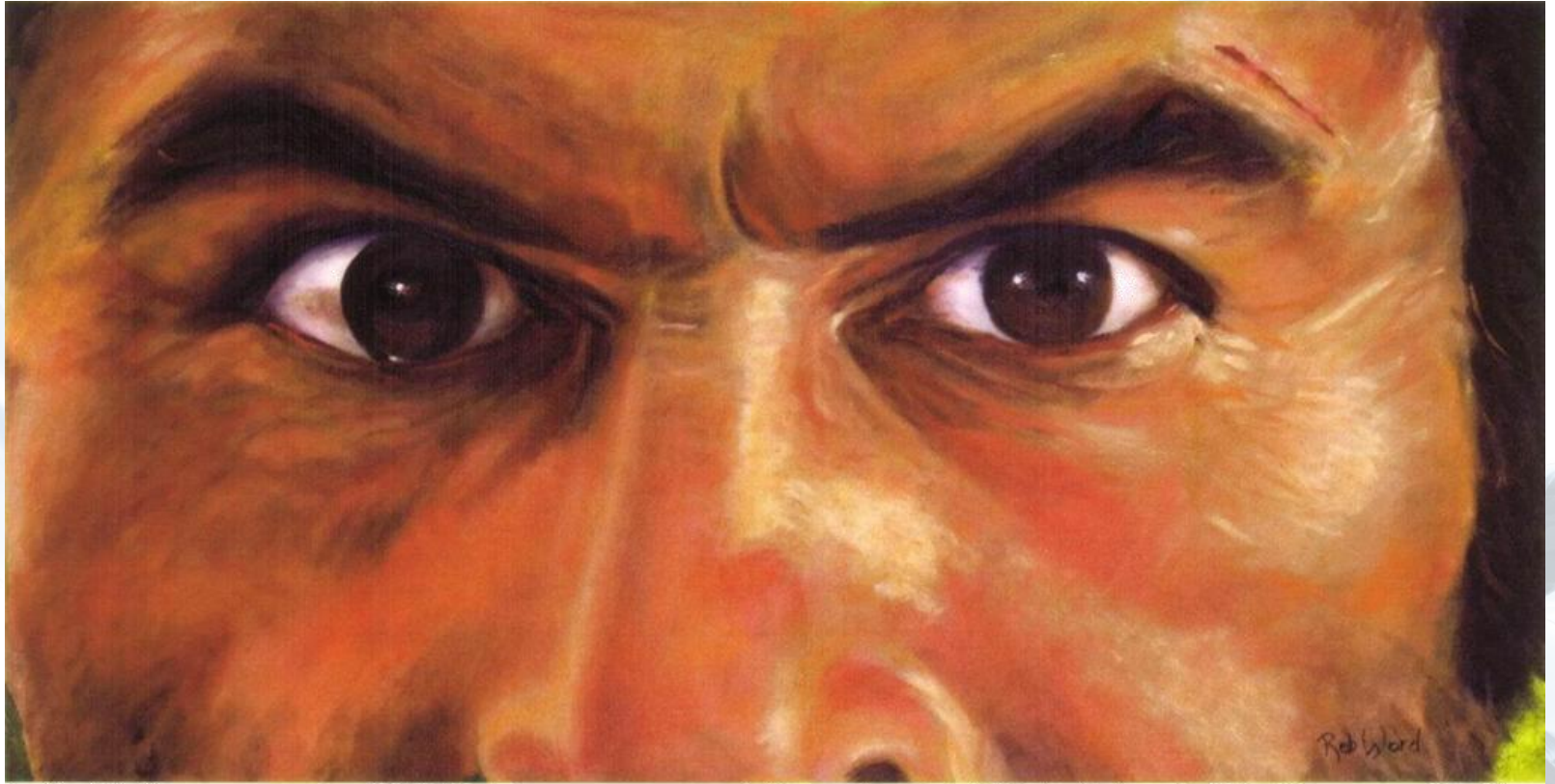
SYSTEM CONFIGURATION

The Bad

Pump not properly designed to serve any pressure zones



EXISTING CONDITIONS



The Ugly

EXISTING CONDITIONS

Existing well house



EXISTING CONDITIONS

Existing well house



The Ugly

SYSTEM CONFIGURATION

Existing pipe material not built to AWWA or City standards



EXISTING CONDITIONS

Material storage area



EXISTING CONDITIONS

Material storage area



The Ugly

EXISTING CONDITIONS

The Ugly

Domestic & irrigation system piping, pumping system controls, and material storage



EXISTING CONDITIONS

The Ugly

Domestic & irrigation system piping, pumping system controls, disinfection system, and material storage



EXISTING CONDITIONS

The Ugly



Level transducer



Pump to waste

Overview

- ❑ **Project Overview**
- ❑ **The Bad – System Configuration**
- ❑ **The Ugly – Existing Conditions**
- ❑ **From Bad and Ugly to Good!**
- ❑ **The Good – The Final Product**

FROM BAD AND UGLY TO GOOD!

Pre-Design

Design

Construction

FROM BAD AND UGLY TO GOOD!

Meet ARRA Funding requirements:

- Design done December 31, 2009
- Bid Award by Mid February 2010
- Complete construction by Spring 2012
- All construction to be contained within the existing site
- No runoff allowed off-site
- American Made Products



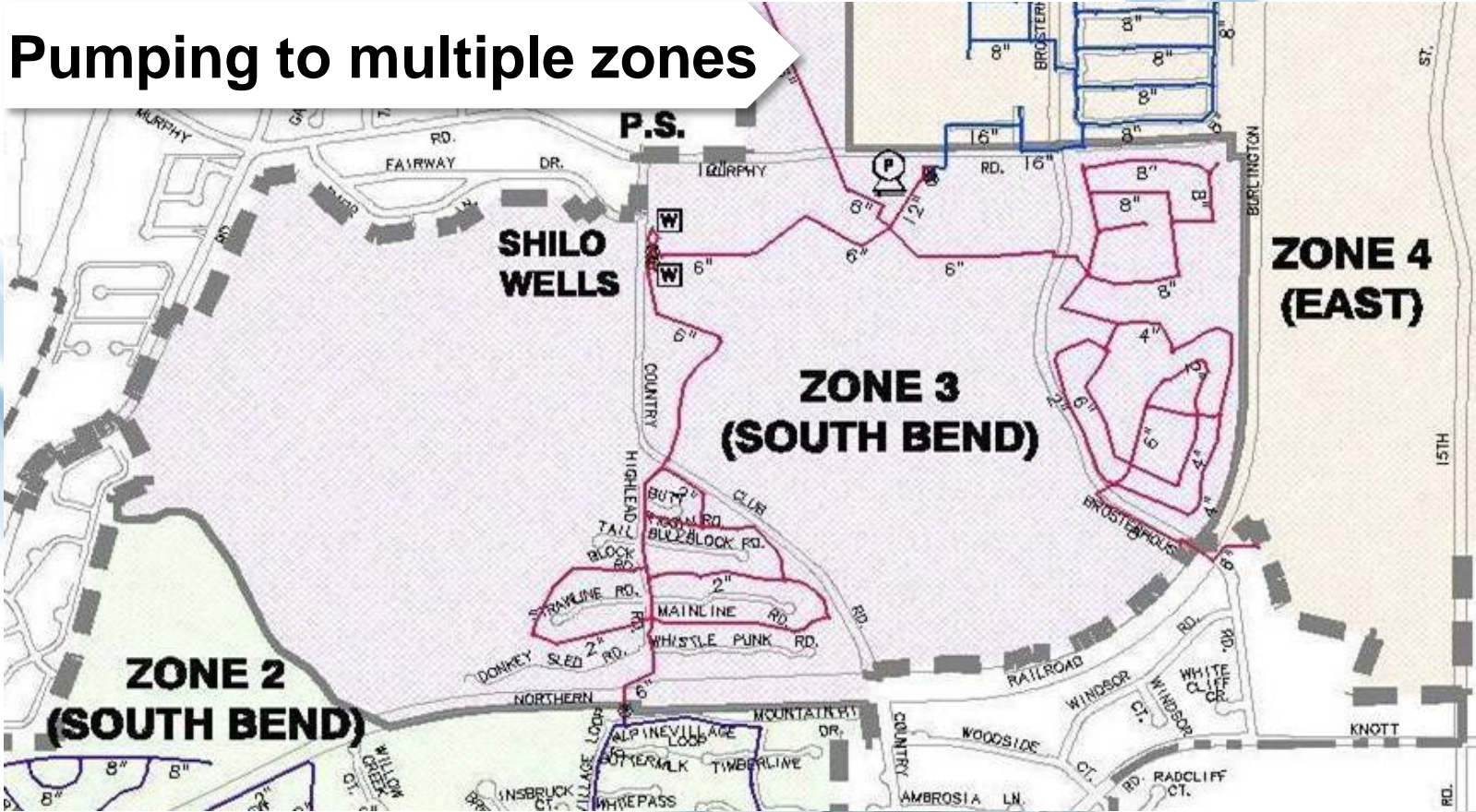
FROM BAD AND UGLY TO GOOD!

Pumping

- Reuse existing pump
- Pump to multiples zones
- Design system so pump operates closer to BEP
- Configure well house for multiple water sources

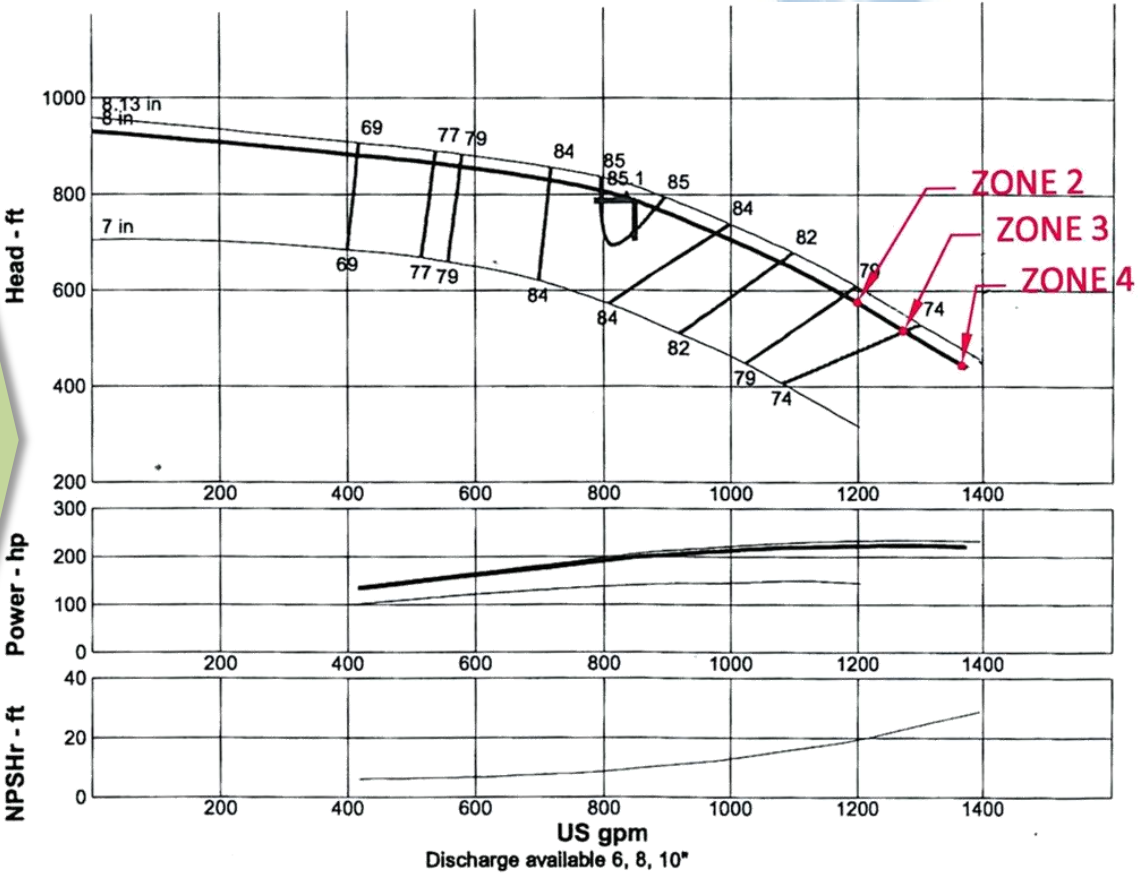
FROM BAD AND UGLY TO GOOD!

Pumping to multiple zones



FROM BAD AND UGLY TO GOOD!

Operate closer to BEP



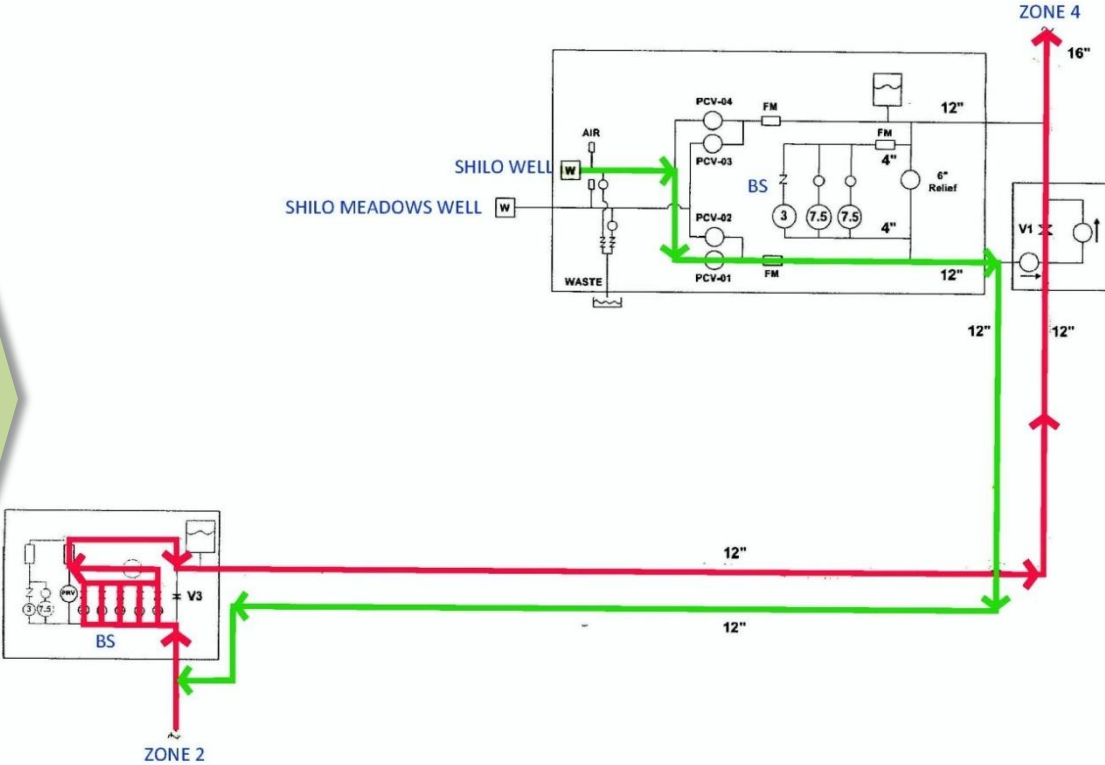
FROM BAD AND UGLY TO GOOD!

Design for multiple sources

- Shilo Well No. 3
- Shilo Well No. 2
- Shilo Meadows
- Booster pumps using Zone No. 4 water

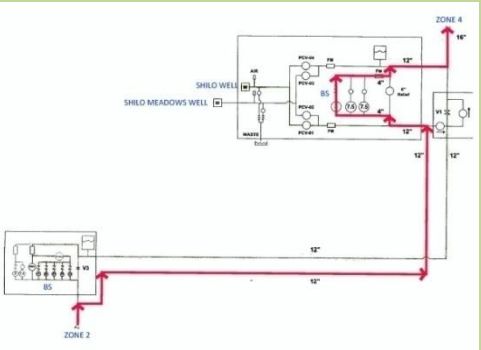
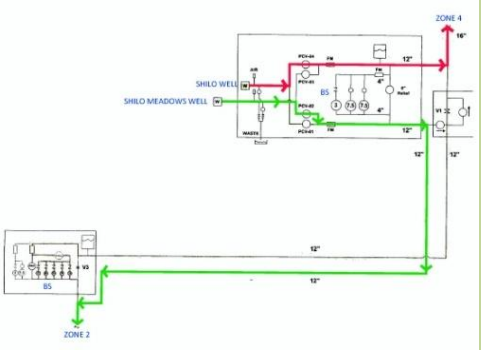
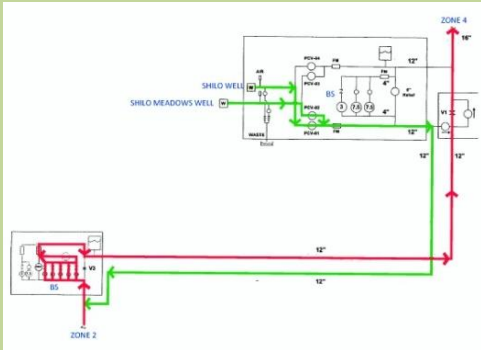
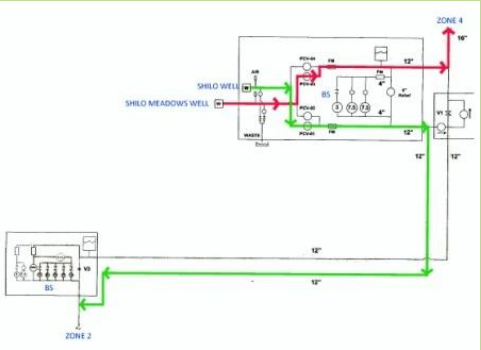
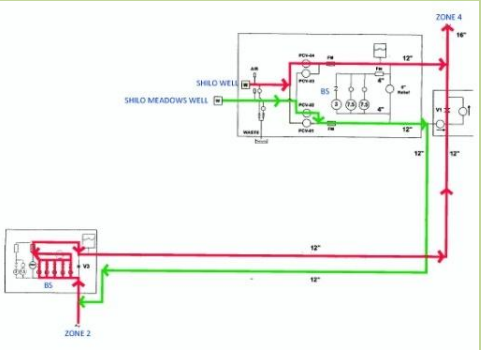
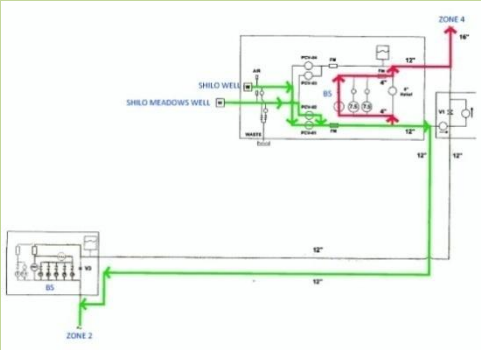
FROM BAD AND UGLY TO GOOD!

Example pumping scenario



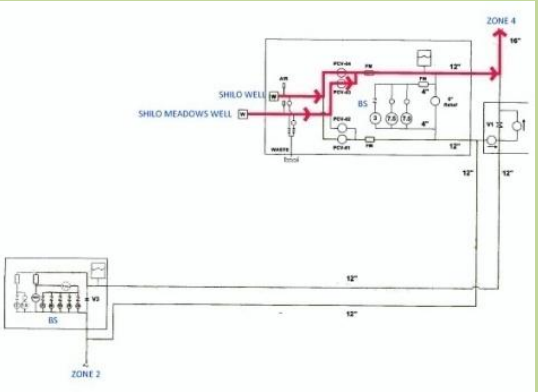
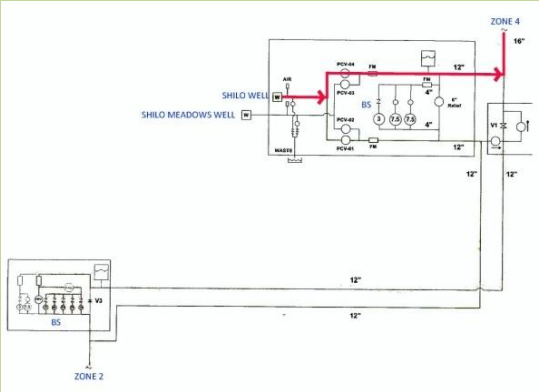
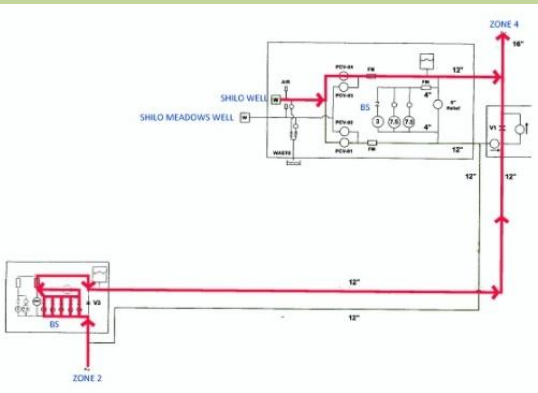
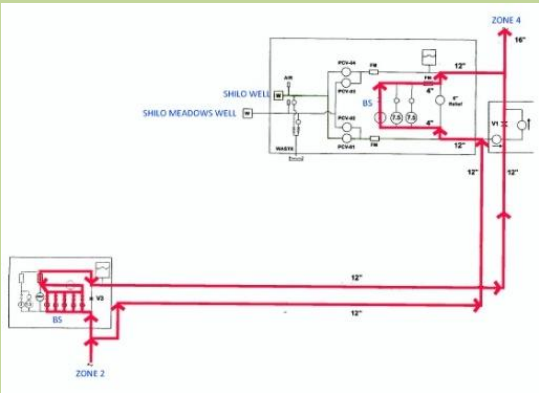
FROM BAD AND UGLY TO GOOD!

Multiple pumping scenarios



FROM BAD AND UGLY TO GOOD!

More
pumping
scenarios

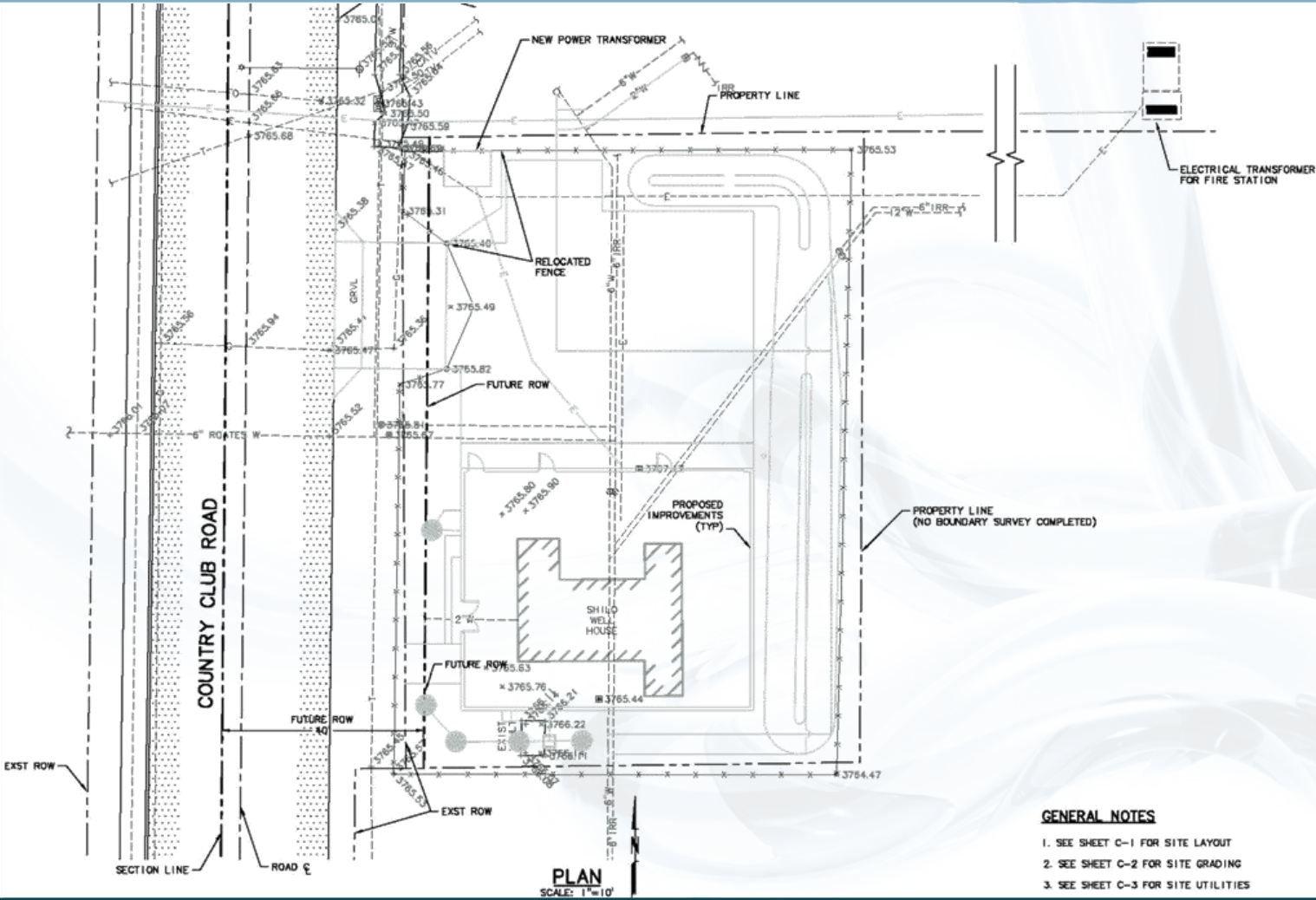


FROM BAD AND UGLY TO GOOD!

Coordination with existing system and other system improvements

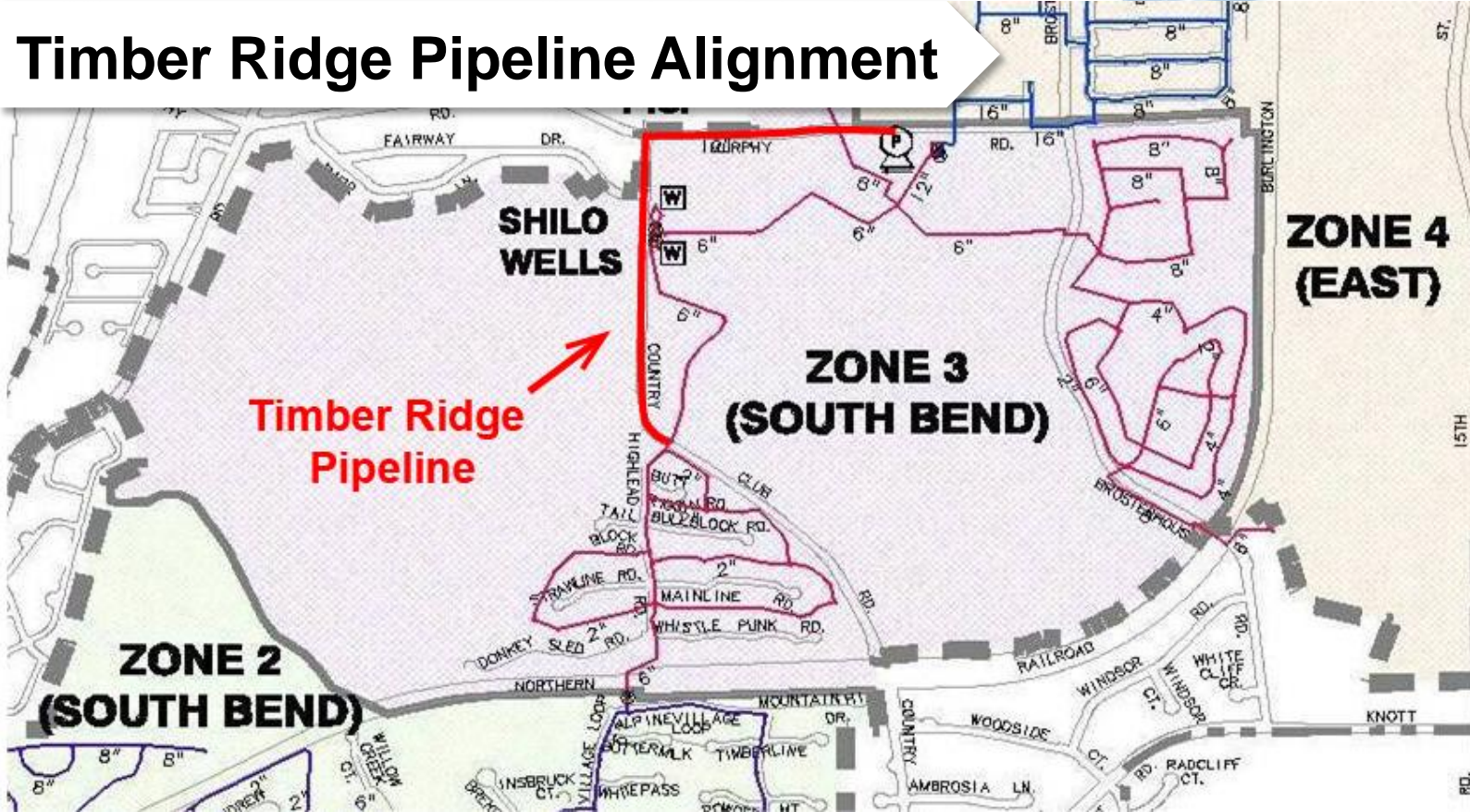
- **Keep existing piping and hydrant on-line during construction**
- **Coordinate with Timber Ridge Pipeline construction**

FROM BAD AND UGLY TO GOOD!



FROM BAD AND UGLY TO GOOD!

Timber Ridge Pipeline Alignment



FROM BAD AND UGLY TO GOOD!

Other design requirements

- **Inside equipment storage**
- **Maintenance area for vehicles**
- **Pole for SCADA antenna**

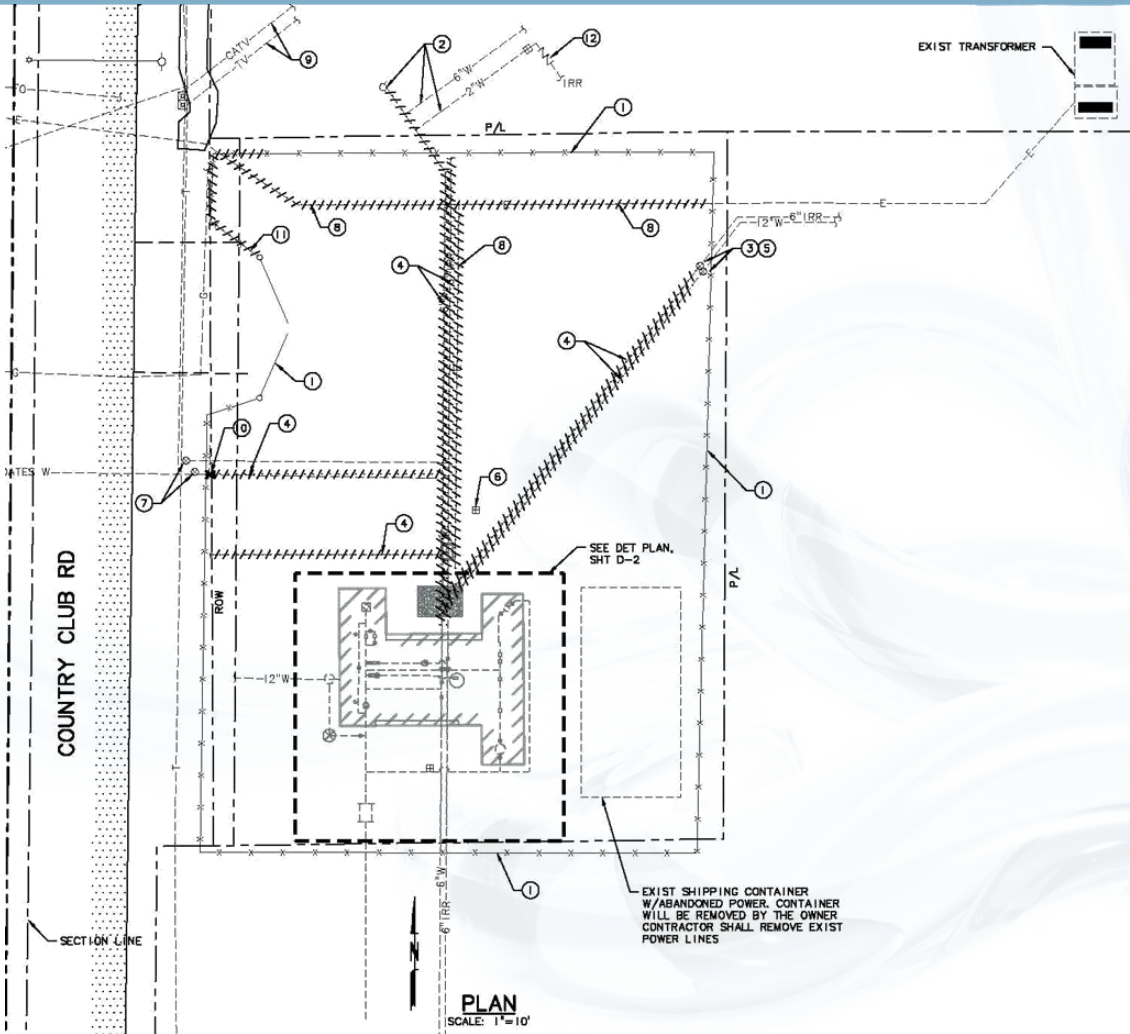
FROM BAD AND UGLY TO GOOD!

Pre-Design

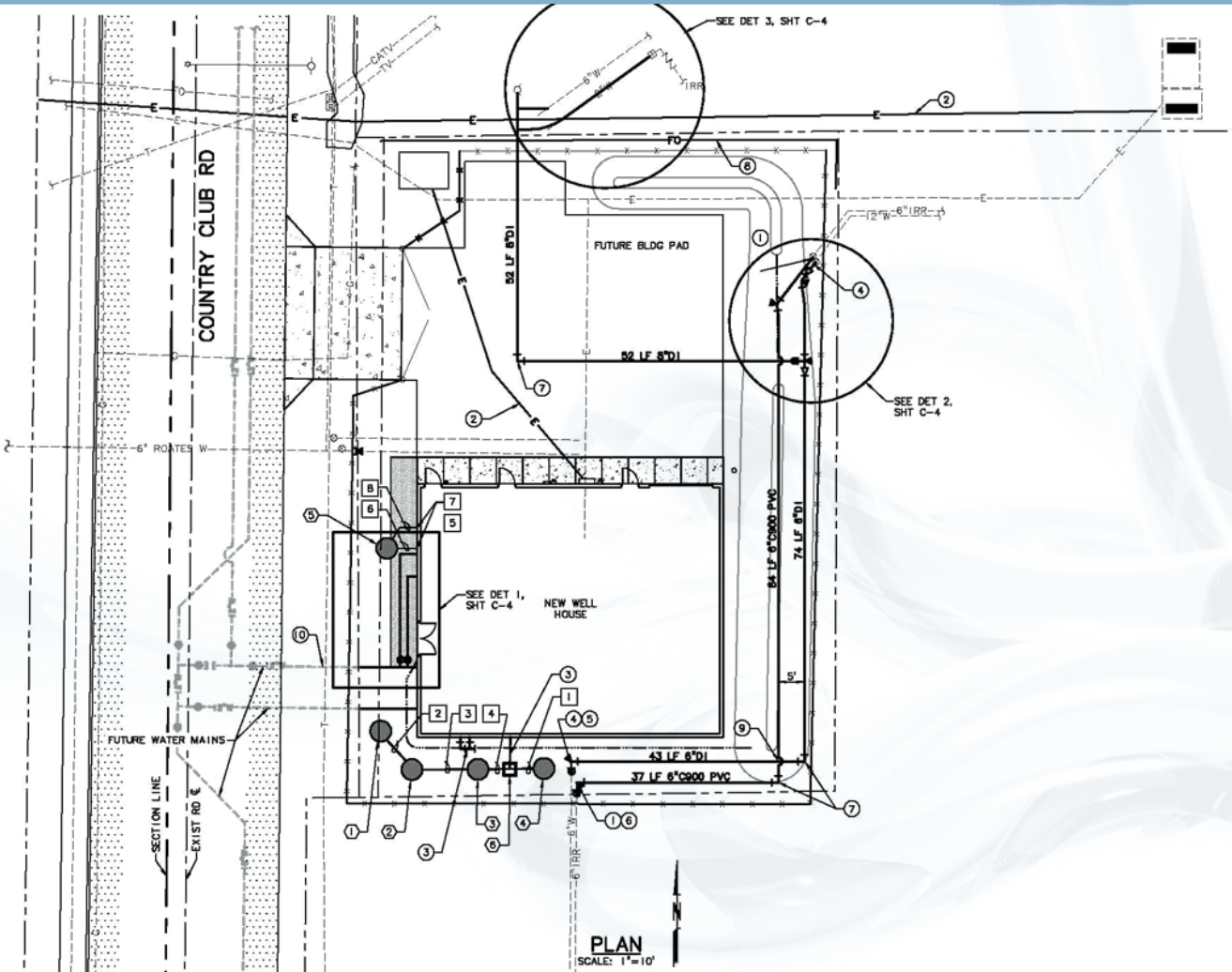
Design

Construction

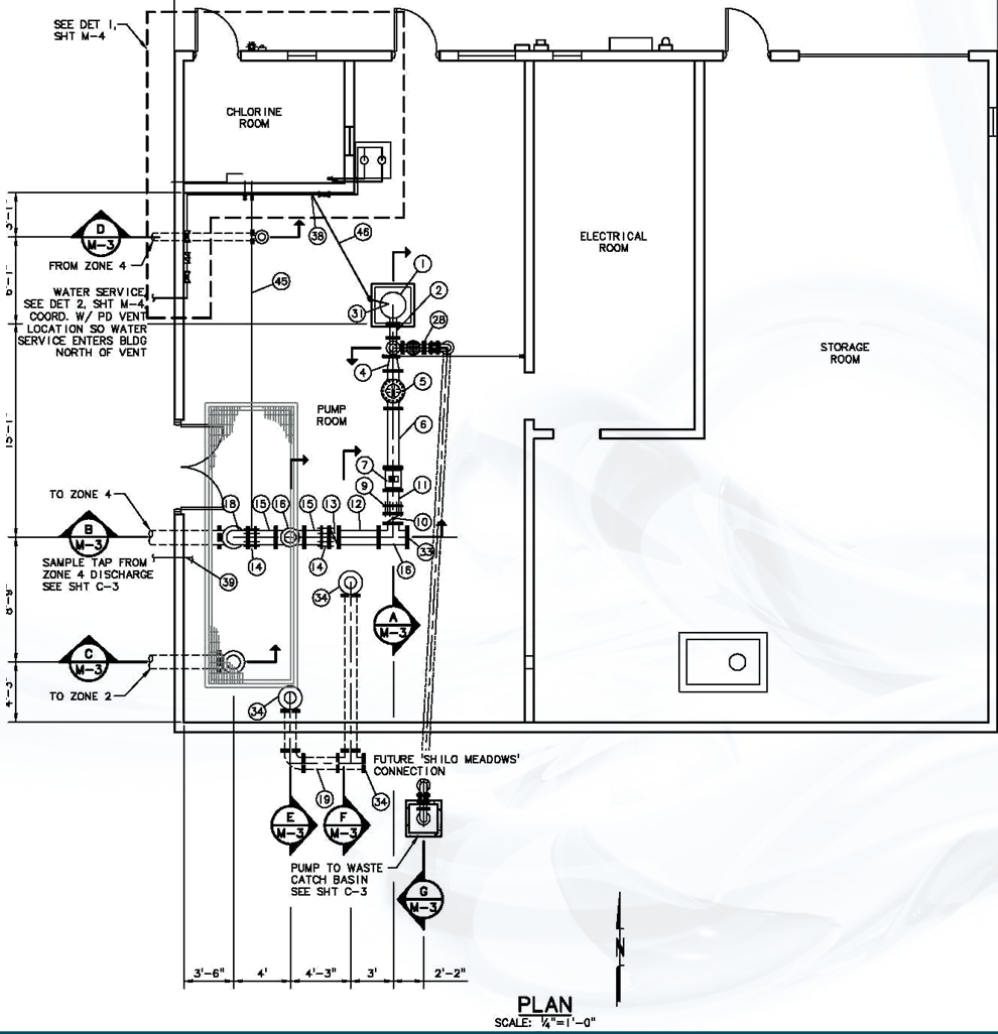
FROM BAD AND UGLY TO GOOD!



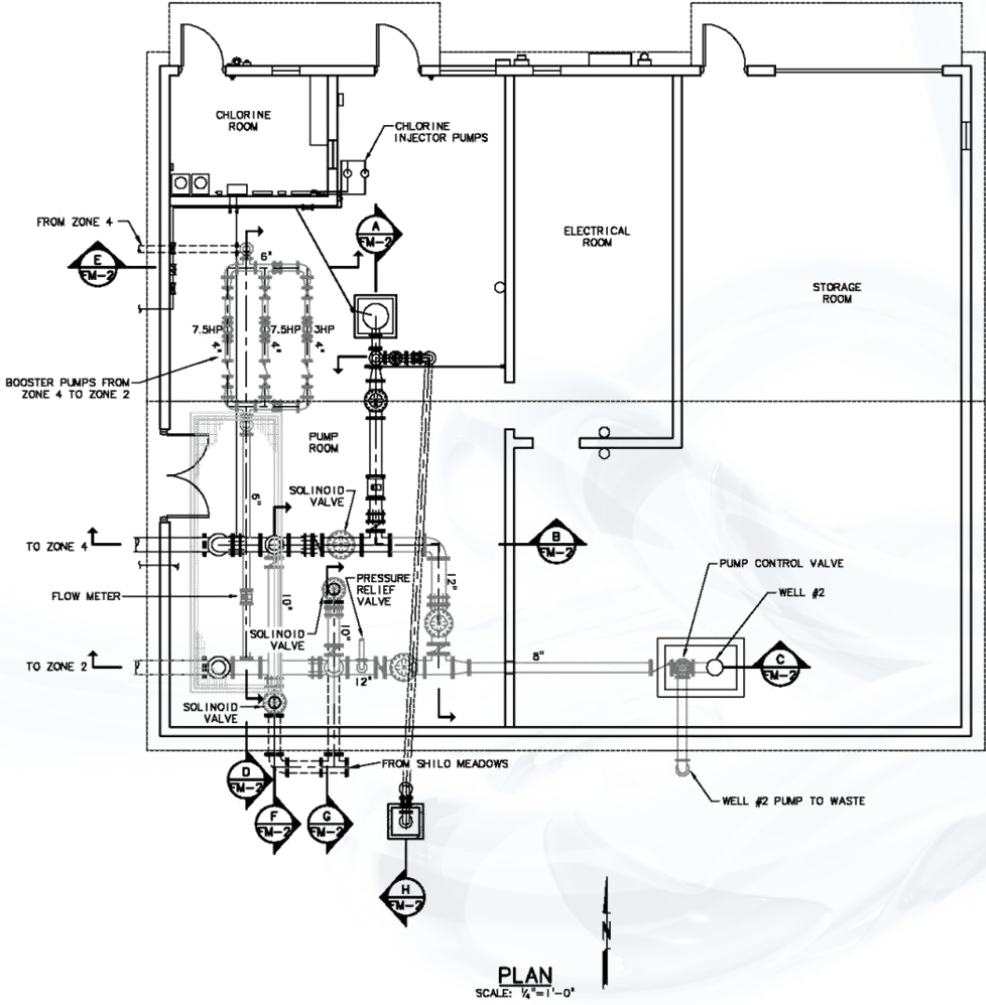
FROM BAD AND UGLY TO GOOD!



FROM BAD AND UGLY TO GOOD!



FROM BAD AND UGLY TO GOOD!



FROM BAD AND UGLY TO GOOD!

Pre-Design

Design

Construction

FROM BAD AND UGLY TO GOOD!

Rock excavation



FROM BAD AND UGLY TO GOOD!

UIC – Original Construction



FROM BAD AND UGLY TO GOOD!

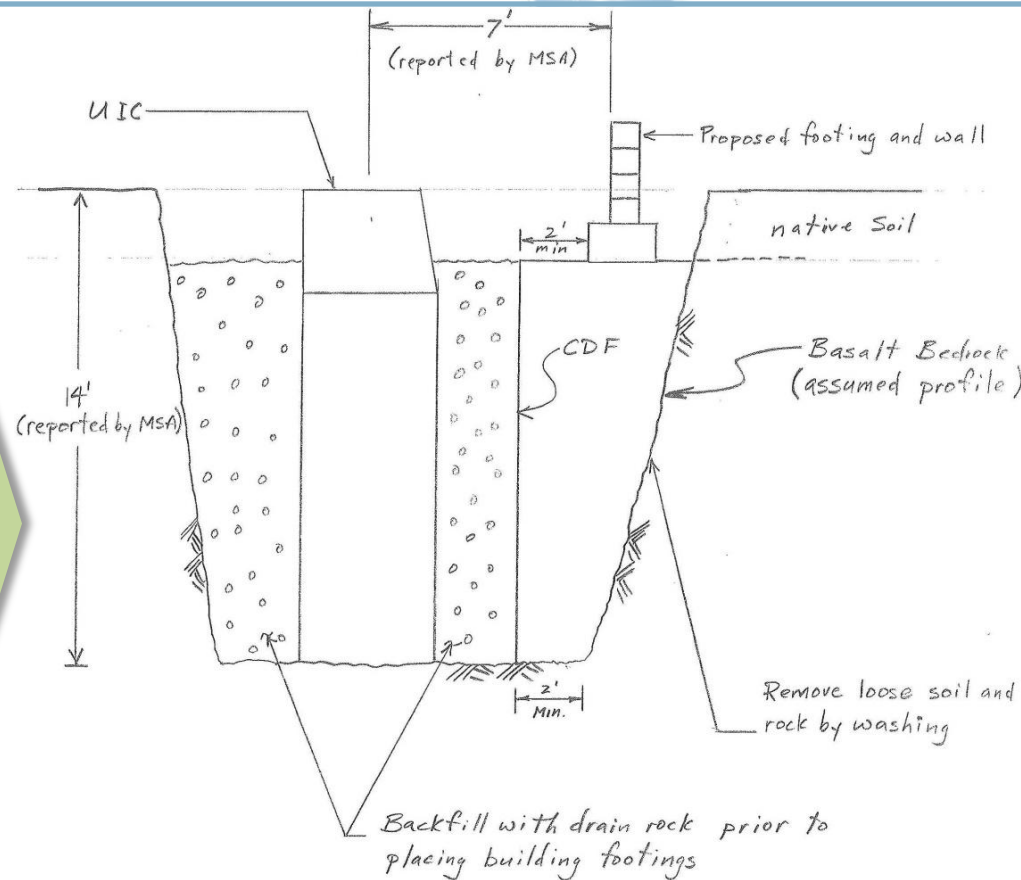
UIC – Original Construction



FROM BAD AND UGLY TO GOOD!

UIC – Redesign Options:

- Pin pile
- Helical Anchor
- Revised foundation/flood design
- CDF backfill



CDF Foundation Support

FROM BAD AND UGLY TO GOOD!

UIC – Retrofit



FROM BAD AND UGLY TO GOOD!

Planned for new pedestal, but allowed contractor to keep the existing pump pedestal

- Existing concrete pad isolated from concrete floor
- Vents built into the original pump pedestal



FROM BAD AND UGLY TO GOOD!

Well No. 1 Decommissioning

- Design called for well to be abandoned
- Concern about slurry migrating through fractured basalt
- OWRD does not allow “surface seal” to abandon wells
- Final solution: abandon above grade

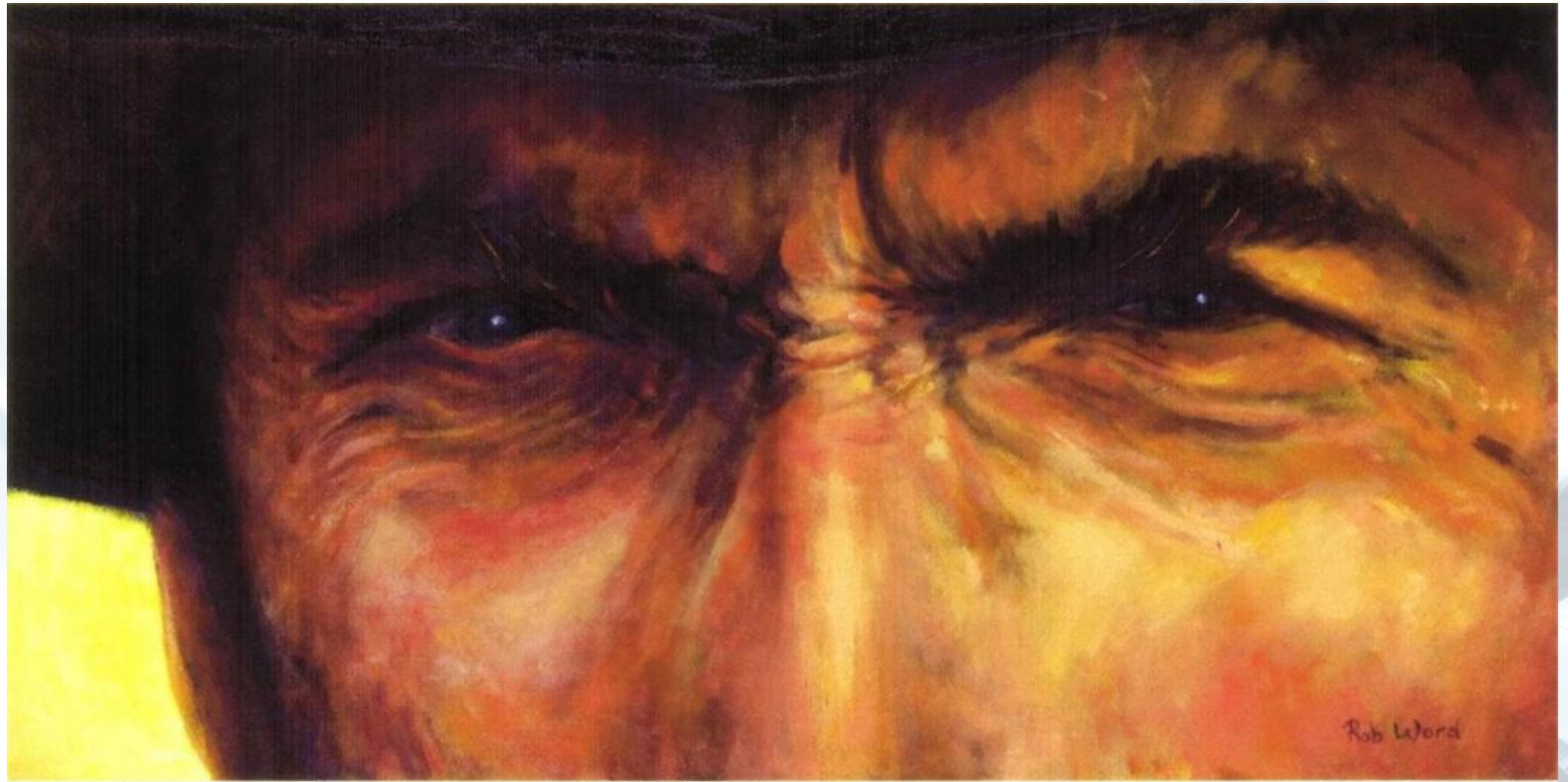


FROM BAD AND UGLY TO GOOD!



Building construction – off and running!

THE FINAL PRODUCT



The Good

THE FINAL PRODUCT

The Good



THE FINAL PRODUCT

The Good



MSA

THE FINAL PRODUCT

The Good



THE FINAL PRODUCT

The Good



THE FINAL PRODUCT



The Good

THE FINAL PRODUCT

The Good



THE FINAL PRODUCT

The Good

