



BETWEEN A
TANK
AND A
HARD PLACE

Squeezing in efficiency, reliability, and provisions for solar power generation at the
**City of Tigard's
10 MG Reservoir Improvements
and Transfer Pump Station**

Presented by:
Matt Hickey, P.E.

MSA Murray, Smith & Associates, Inc.
Engineers/Planners

INTRODUCTION

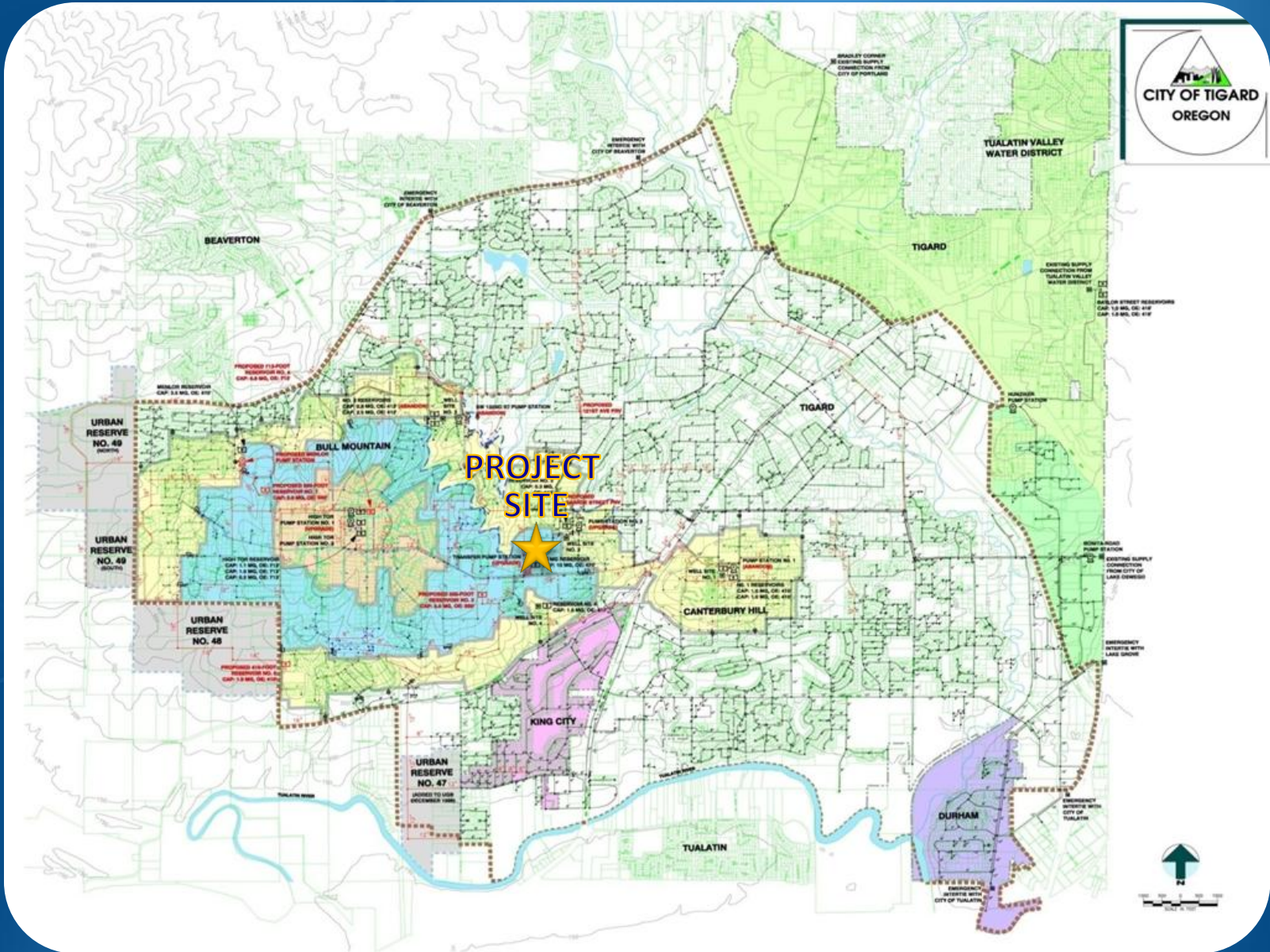
Background on Matt:

- Over 18 years at MSA
- Specializes in water system planning, design and construction
- Over 25 reservoir and pump station projects in last 19 years

PRESENTATION OUTLINE

- Project Background
- Design Challenges
- Construction Challenges
- Sustainable Solutions
- Public Outreach
- Critical Facility Improvements
- ARRA Funding
- Conclusion/Summary
- Questions & Answers

PROJECT BACKGROUND



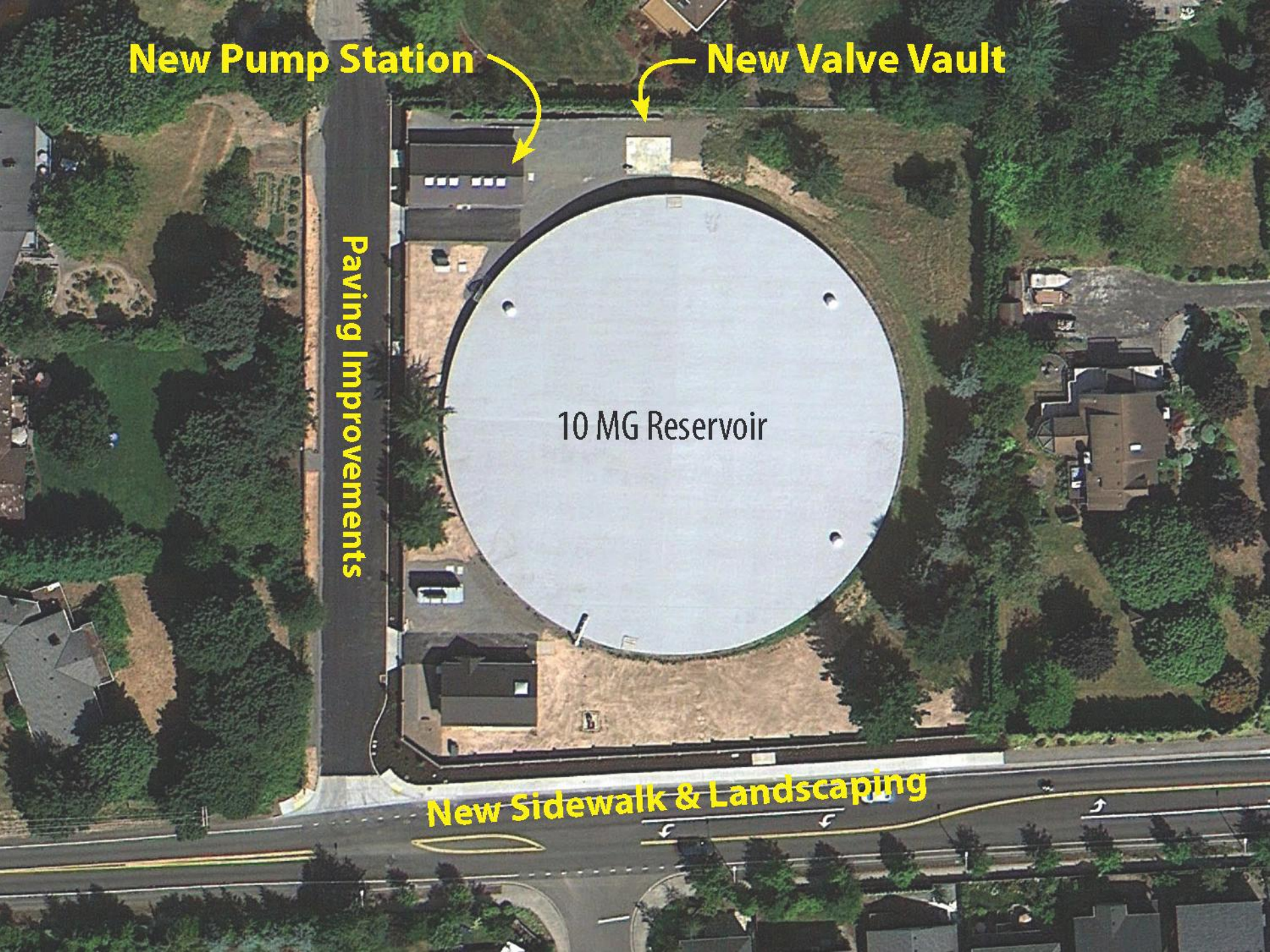
New Pump Station

New Valve Vault

Paving Improvements

10 MG Reservoir

New Sidewalk & Landscaping





10 MG TERMINAL RESERVOIR BUILT IN MID-1970s



VENTS PRESENT SECURITY ISSUES



IMPROPER PIPING CONFIGURATION FOR MIXING



FLOOR CRACKS AND FAILING JOINTS



ROOF CRACKING AND SAGGING ALLOWED RAIN WATER TO ENTER RESERVOIR

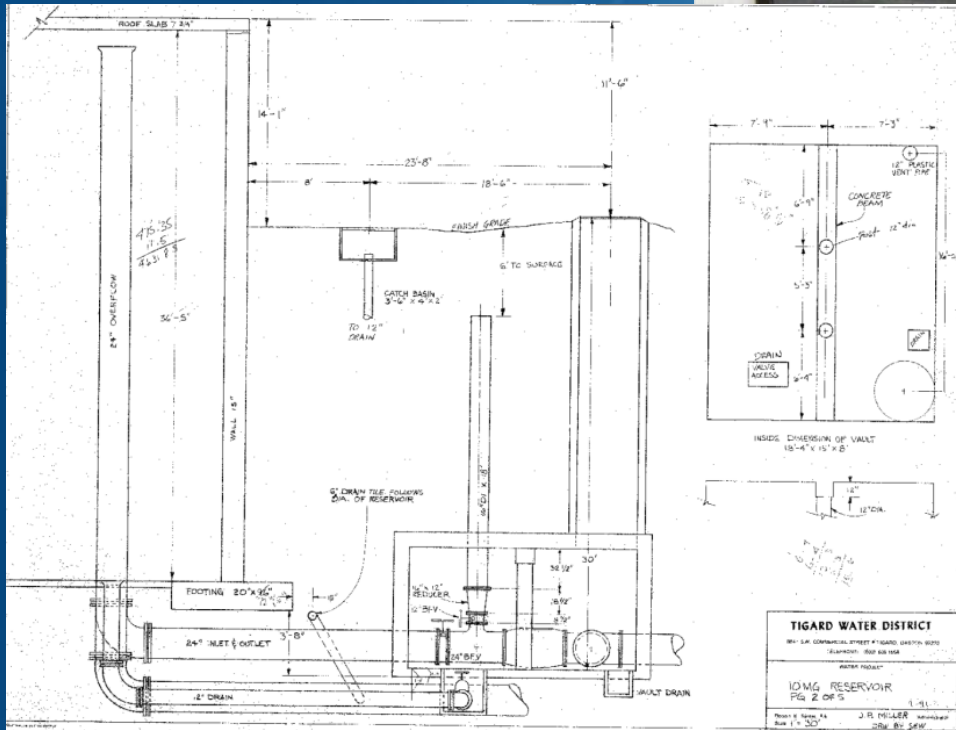


EXISTING PUMP STATION – CHALLENGING ACCESS



EXISTING TRANSFER STATION ONE PUMP INSTALLED EARLY 1990s

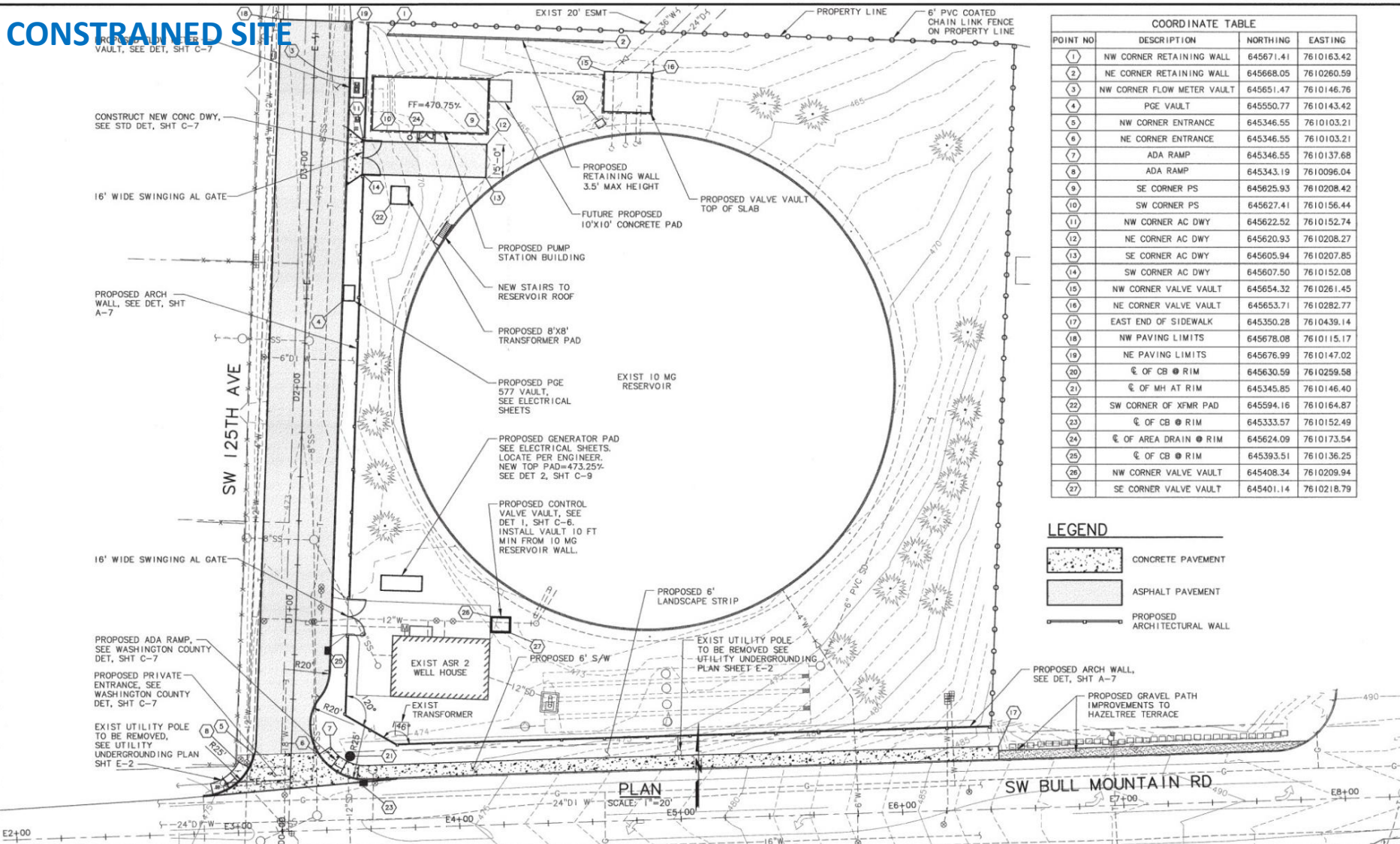
- INEFFICIENT
- LACKS REDUNDANCY
- LIMITED CAPACITY
- NO BACK-UP POWER



EXISTING PUMP STATION AND VALVE VAULT

DESIGN CHALLENGES

CONSTRAINED SITE



COORDINATE TABLE			
POINT NO	DESCRIPTION	NORTHING	EASTING
1	NW CORNER RETAINING WALL	645671.41	7610163.42
2	NE CORNER RETAINING WALL	645668.05	7610260.59
3	NW CORNER FLOW METER VAULT	645651.47	7610146.76
4	PGE VAULT	645550.77	7610143.42
5	NW CORNER ENTRANCE	645346.55	7610103.21
6	NE CORNER ENTRANCE	645346.55	7610103.21
7	ADA RAMP	645346.55	7610137.68
8	ADA RAMP	645343.19	7610096.04
9	SE CORNER PS	645625.93	7610208.42
10	SW CORNER PS	645627.41	7610156.44
11	NW CORNER AC DWY	645622.52	7610152.74
12	NE CORNER AC DWY	645620.93	7610208.27
13	SE CORNER AC DWY	645605.94	7610207.85
14	SW CORNER AC DWY	645607.50	7610152.08
15	NW CORNER VALVE VAULT	645654.32	7610261.45
16	NE CORNER VALVE VAULT	645653.71	7610282.77
17	EAST END OF SIDEWALK	645350.28	7610439.14
18	NW PAVING LIMITS	645678.08	7610115.17
19	NE PAVING LIMITS	645676.99	7610147.02
20	☉ OF CB @ RIM	645630.59	7610259.58
21	☉ OF MH AT RIM	645345.85	7610146.40
22	SW CORNER OF XFMR PAD	645594.16	7610164.87
23	☉ OF CB @ RIM	645333.57	7610152.49
24	☉ OF AREA DRAIN @ RIM	645624.09	7610173.54
25	☉ OF CB @ RIM	645393.51	7610136.25
26	NW CORNER VALVE VAULT	645408.34	7610209.94
27	SE CORNER VALVE VAULT	645401.14	7610218.79

LEGEND	
	CONCRETE PAVEMENT
	ASPHALT PAVEMENT
	PROPOSED ARCHITECTURAL WALL

NO.	DATE	BY	REVISION

NOTICE
 0 1/2 1
 IF THIS BAR DOES NOT MEASURE, THEN DRAWING IS NOT TO SCALE.
 REVISIONS 12-31-10

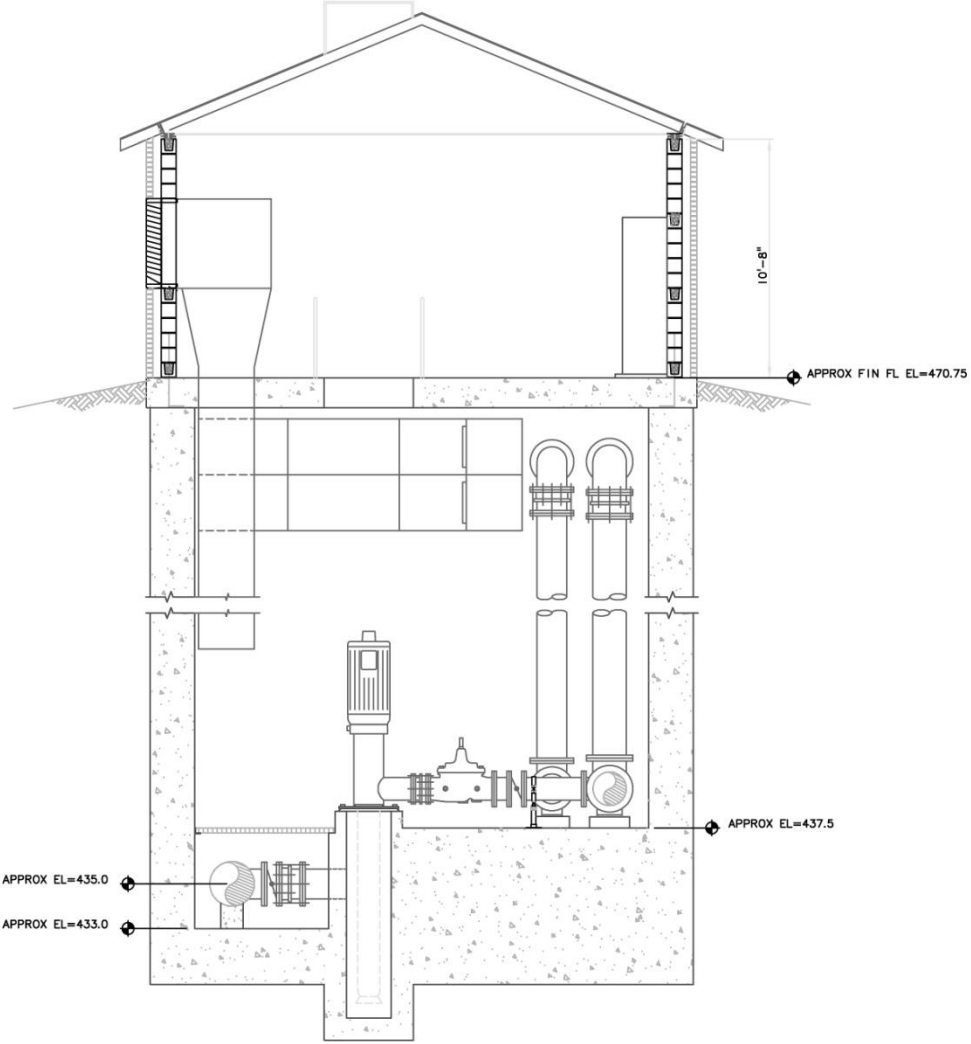


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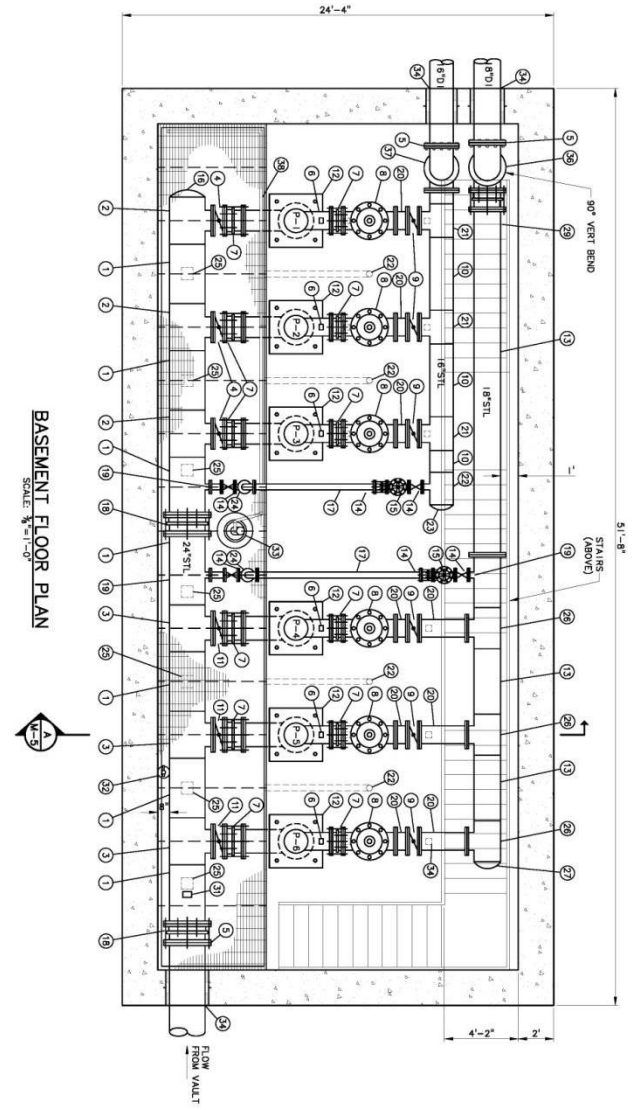


CITY OF TIGARD
 10 MG RESERVOIR IMPROVEMENTS AND TRANSFER PUMP STATION

SITE PLAN AND PAVING PLAN
 PROJECT NO.: 08-0985.212 SCALE: 1"=20' DATE: NOVEMBER 2009



SECTION
SCALE: 3/8"=1'-0"
A
M-3



BASEMENT FLOOR PLAN
SCALE: 3/8"=1'-0"

NO.	DATE	BY	REVISION

NOTICE
0 1/8"
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DAM
DESIGNED
MBE
DRAWN
MLH
CHECKED

PRELIMINARY ONLY
DO NOT USE FOR CONSTRUCTION
APRIL 2009
GENERAL OVERSIGHT ENGINEERING, INC.
Engineers/Planners



Murray Smith & Associates, Inc.
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121 S.W. Salmon, Suite 800 PORTLAND, OREGON 97204
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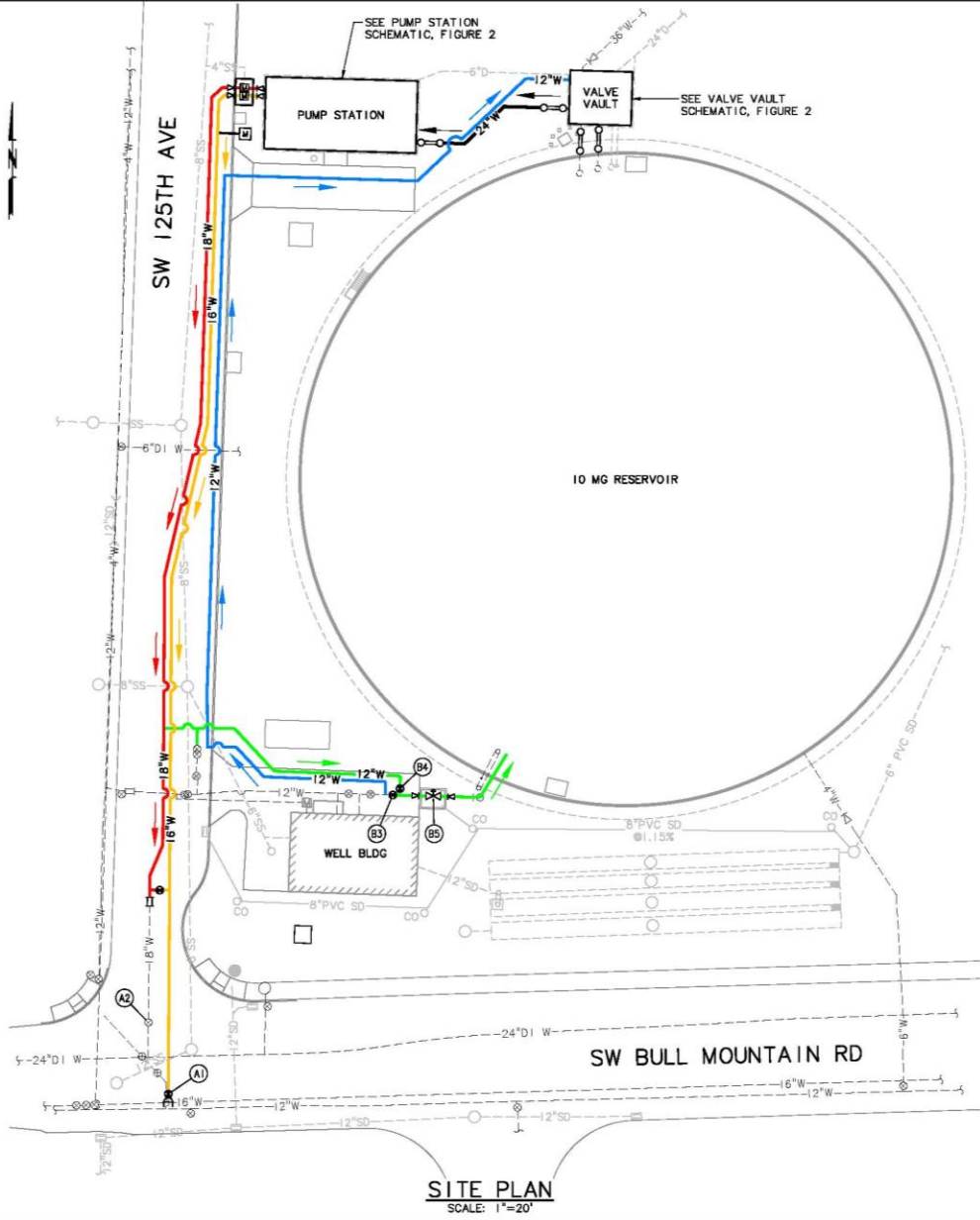
CITY OF TIGARD
10 MG RESERVOIR
IMPROVEMENTS AND
TRANSFER PUMP STATION

PUMP STATION SECTION VIEW
PROJECT NO.: 08-0985.212 | SCALE: AS SHOWN | DATE: APRIL 2009

SHEET
M-5

PUMP STATION CONFIGURATIONS

G:\PDX_Projects\08_0985\305 - Record Drawings And O&M Manuals\CAD\08-09-0985-305-OP-OPERATION MODES.dwg FIGURE 1 9/13/2011 2:55 PM DAK (LMS Tech)



MODE 1B:
ASR-2 DISCHARGE PIPING TO SUPPLY 10 MG
RESERVOIR AT 410 FT PRESSURE



INTEGRATION WITH ASR FACILITIES AND OTHER SYSTEM OPERATIONS



CONTRACTOR PREQUALIFICATIONS

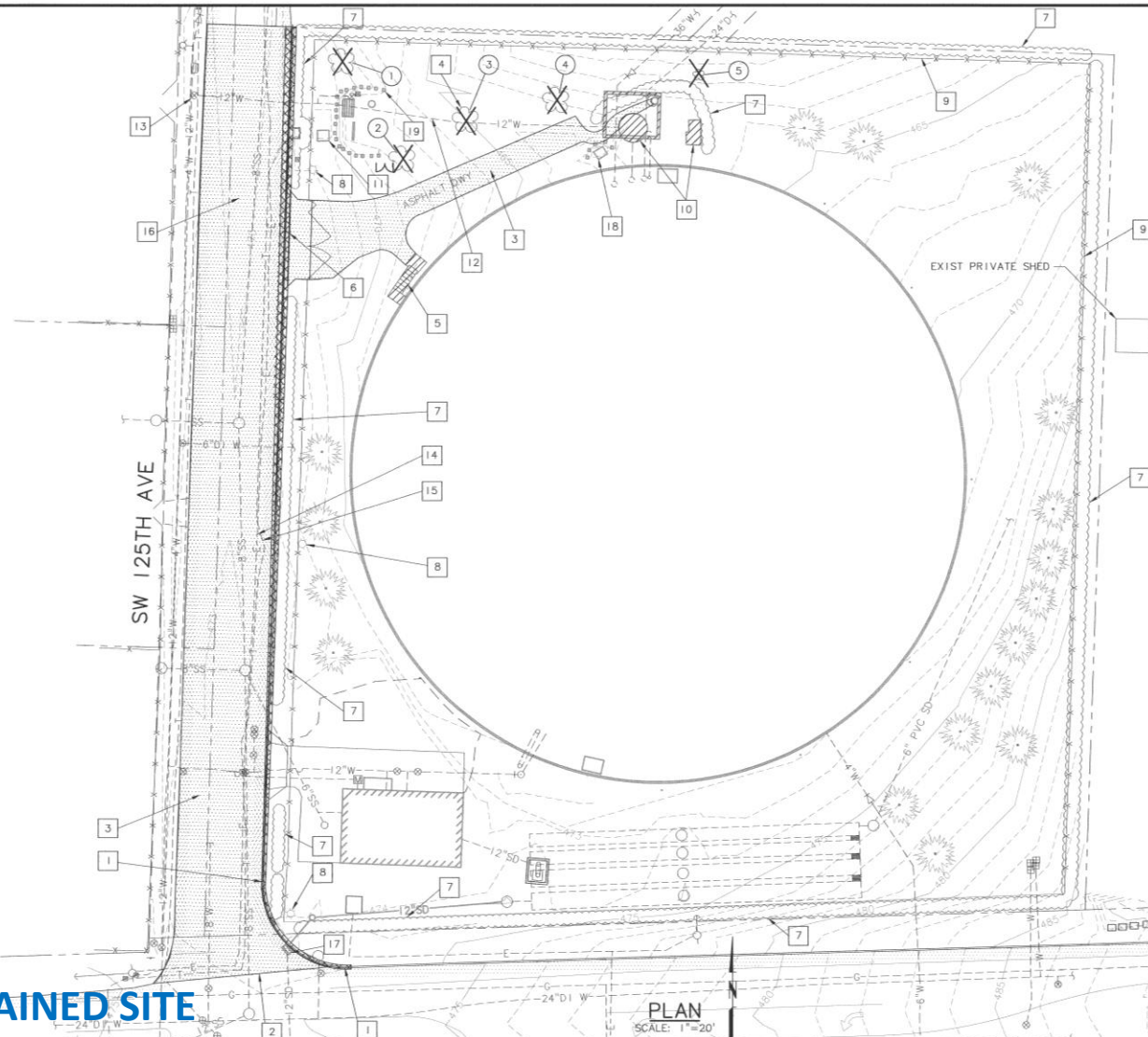
- EXCAVATION
- SHORING
- PUMP STATION
INSTALLER
- COATING APPLICATORS



CONSTRUCTION CHALLENGES

TREE REMOVAL

NO.	SIZE	TYPE
1	10"	ORNAMENTAL
2	6"	ORNAMENTAL
3	6"	ORNAMENTAL
4	6"	ORNAMENTAL
5	6"	ORNAMENTAL



LEGEND

- EXIST CONTOUR LINE
- EXIST WATER LINE
- REMOVE EXIST PAVEMENT FULL DEPTH
- SAWCUT & REMOVE CURB
- REMOVE TREE/SHRUB

NOTE: SEE SPECIFICATIONS FOR PROJECT SEQUENCING AND DEMOLITION SEQUENCING

DEMOLITION NOTES

- 1 SAWCUT EXIST CURB FULL DEPTH, REMOVE, AND DISPOSE FOR CONSTRUCTION OF ADA RAMP AND DRIVEWAY
- 2 SAWCUT PAVEMENT FULL DEPTH FOR NEW PRIVATE DRIVE APRON. SEE PRIVATE ROAD ENTRANCE DETAIL ON SHEET C-7.
- 3 REMOVE PAVEMENT FULL DEPTH.
- 4 REMOVE SMALL TREE/SHRUB (TYP)
- 5 REMOVE AND DISPOSE OF STAIRS AND REPLACE PER DETAIL SHEET SR-5
- 6 REMOVE EXIST CURB ALONG EAST SIDE OF SW 125TH AVE
- 7 REMOVE VEGETATIVE HEDGE
- 8 REMOVE AND DISPOSE OF EXIST LIGHT
- 9 REMOVE EXIST FENCE AS REQUIRED AND RELOCATE TO PROPERTY LINE AROUND SITE PERIMETER
- 10 REMOVE EXIST PUMP STATION, FAN, PLENUM AND BURIED VALVE VAULT
- 11 EXIST TRANSFORMER TO BE REMOVED BY PGE. CONTRACTOR SHALL REMOVE THE TRANSFORMER PAD AND ASSOCIATED CONDUITS, SEE ELECTRICAL SITE PLAN
- 12 REMOVE EXIST 12" W
- 13 CITY TO SHUT VALVE PRIOR TO WATER LINE REMOVAL
- 14 RELOCATE EXIST E PER PGE
- 15 RELOCATE EXIST T PER VERIZON
- 16 DEMO EXIST ASPHALT/BASE ROCK TO ACCOMMODATE NEW ROAD SECTION
- 17 EXIST CB TO BE REMOVED AND REPLACED. SEE SHEETS C4 AND C5 FOR NEW CATCH BASIN LOCATION.
- 18 AREA DRAIN TO BE REPLACED FOLLOWING CONSTRUCTION OF VAULT REMOVE EXIST RETAINING WALL.
- 19 REMOVE BLOCK RETAINING WALL, AND ELECTRICAL PANEL. SEE ELECTRICAL PLAN FOR SEQUENCING, ETC.

CONSTRAINED SITE

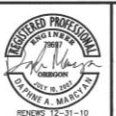
PLAN
SCALE: 1"=20'

G:\08\0985\212 - Element 1.2 Detailed Plans And Specifications\CAD\08-0985-212-OR-C-2.dwg C-2 10/23/2009 12:05 PM MLM 17.0s (LMS Tech)

NO.	DATE	BY	REVISION

NOTICE
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DAM DESIGNED
MLM DRAWN
MLH CHECKED



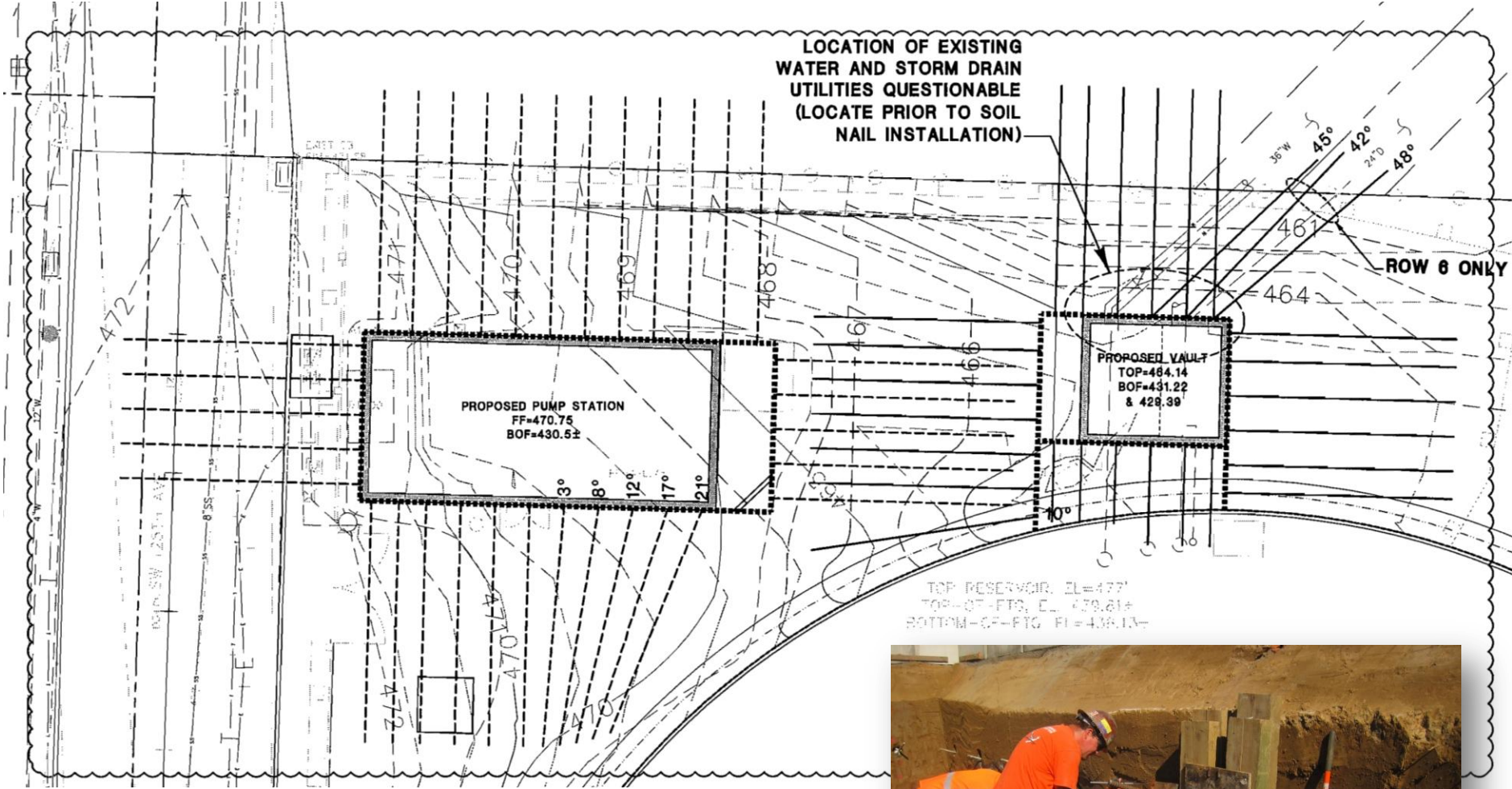
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TIGARD
CITY OF TIGARD
10 MG RESERVOIR IMPROVEMENTS AND TRANSFER PUMP STATION

DEMOLITION PLAN AND TREE REMOVAL PLAN
PROJECT NO.: 08-0985.212 SCALE: 1"=20' DATE: NOVEMBER 2009



DEEP EXCAVATION AND SHORING ISSUES



SOIL NAIL PLAN

- POTENTIAL IMPACTS TO RESERVOIR
- POTENTIAL IMPACTS TO EXISTING PIPING
- RECEIVED AN EASEMENT



LACK OF SPACE FOR EQUIPMENT





CONCRETE FORMING

- SHORING WALL USED AS OUTSIDE FORM
- SPECIAL FORM TIES
- RESTRICTED PLACEMENT RATE



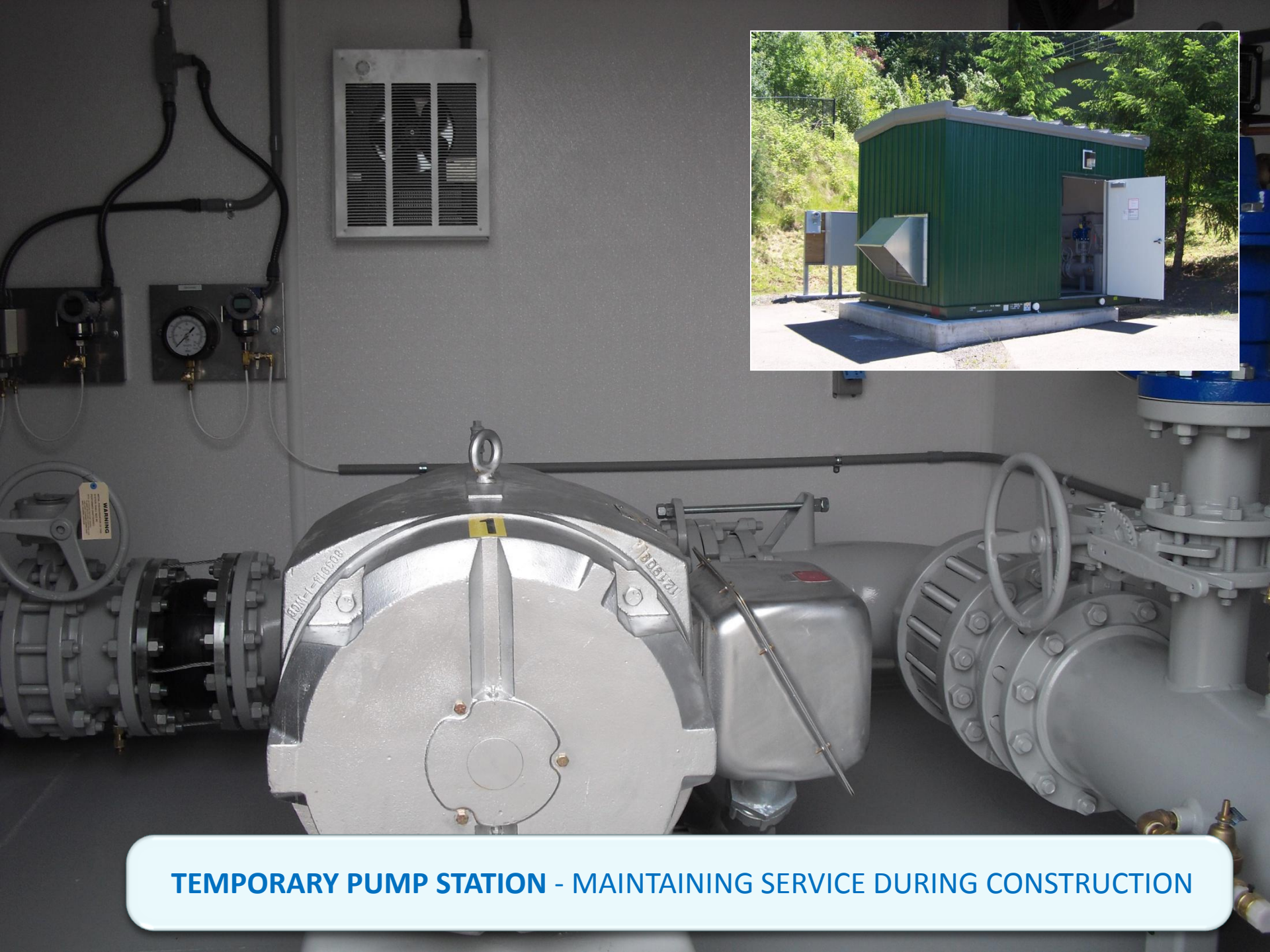
WATERPROOFING



SUBSURFACE DRAINAGE



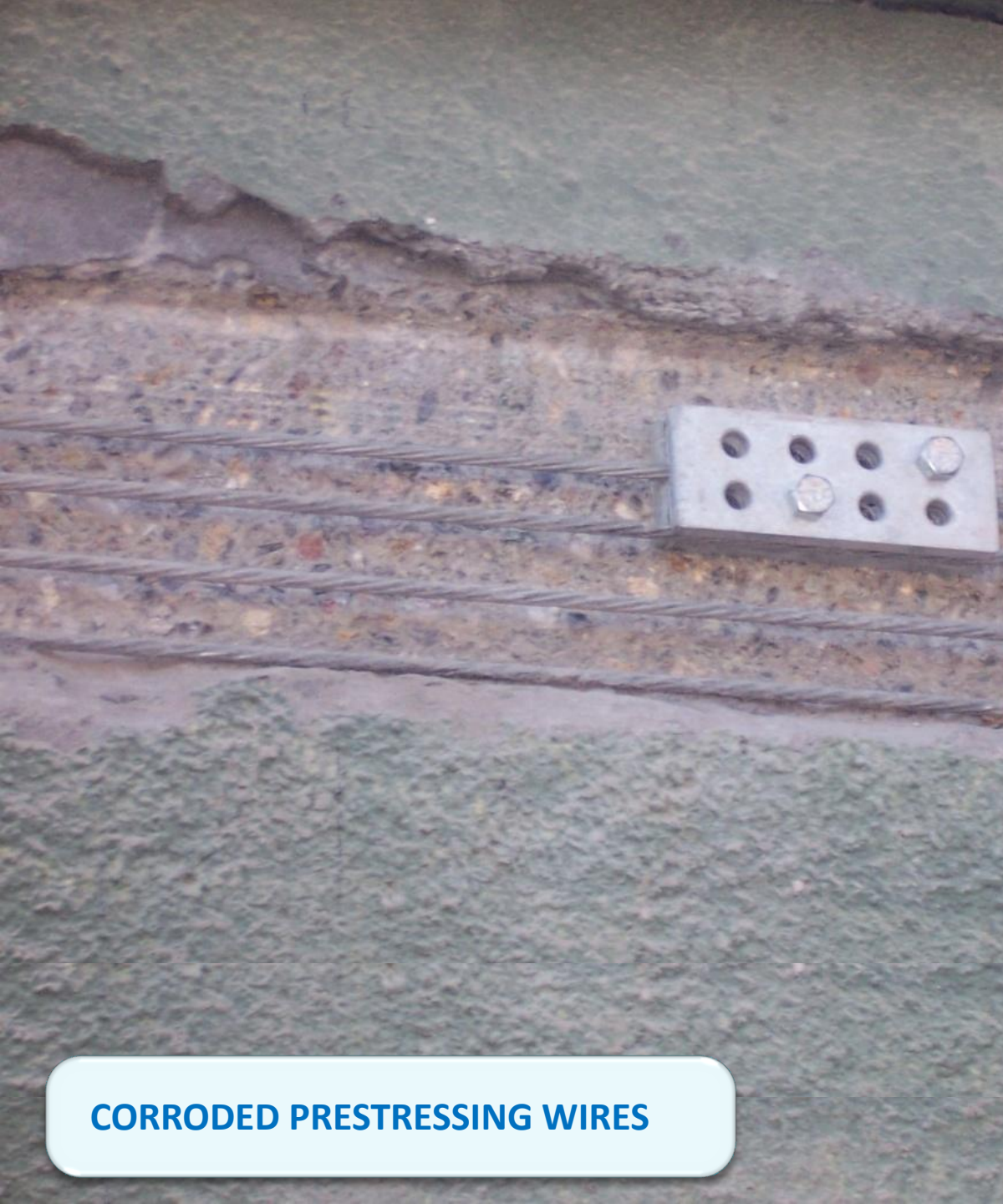
EXCAVATION CHALLENGES DUE TO SCHEDULE DELAY DUE TO FUNDING



TEMPORARY PUMP STATION - MAINTAINING SERVICE DURING CONSTRUCTION



DELAMINATED SHOTCRETE AND DAMAGED CORE WALL



CORRODED PRESTRESSING WIRES

BEFORE



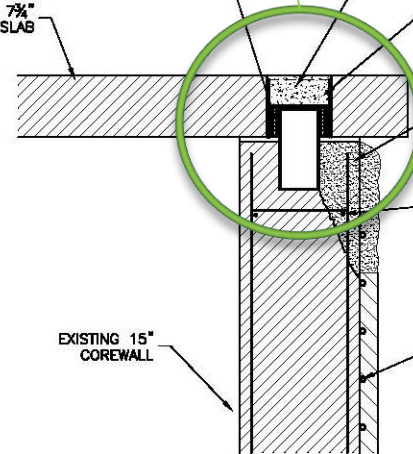
AFTER



Shear Can

WHERE COREWALL SPALLING EXISTS EITHER REMOVE CONCRETE MATERIAL FROM THE VOID BETWEEN INNER AND OUTER CANS OR, WHERE OUTER CAN IS MISLOCATED, SAWCUT INNER VOID TO CREATE A MINIMUM OF 2" CLEAR BETWEEN INNER CAN AND CUT FACE.

EXISTING 7 1/2" ROOF SLAB



AFTER EITHER CLEANING CAN VOID OR CUTTING BACK REQUIRED GAP REPLACE AND SEAL RUBATEX PAD. INSTALL NEW DRYPACK MATERIAL FLUSH WITH ROOF SURFACE.

EXISTING ROOF SHEAR CAN FILLED WITH DRYPACK IN DESIGNATED AREAS REMOVE DRYPACK AS DEMONSTRATED BY THE ENGINEER OF RECORD.

REMOVE SPALLED CONCRETE FROM EXTERIOR COREWALL INSTALL NS GROUT FOR SHOTCRETE REPAIR PER NOTES THIS SHEET

DO NOT CUT OR REMOVE EXISTING STRANDS OR EMBEDDED MILD STEEL REINFORCING

EXISTING 3/8" PRESTRESSING STRANDS

EXISTING 15" COREWALL

SHEAR CAN/COREWALL REPAIR SECTION

1/2" = 1'-0"



IMPROPERLY INSTALLED SHEAR CANS

I NEVER NOTICED THIS BEFORE...
"DANGER-KEEPING LID CLOSED IS
WAY SERIOUS SAFETY VIOLATION."



Mark
PARISI



SAFETY CONCERNS

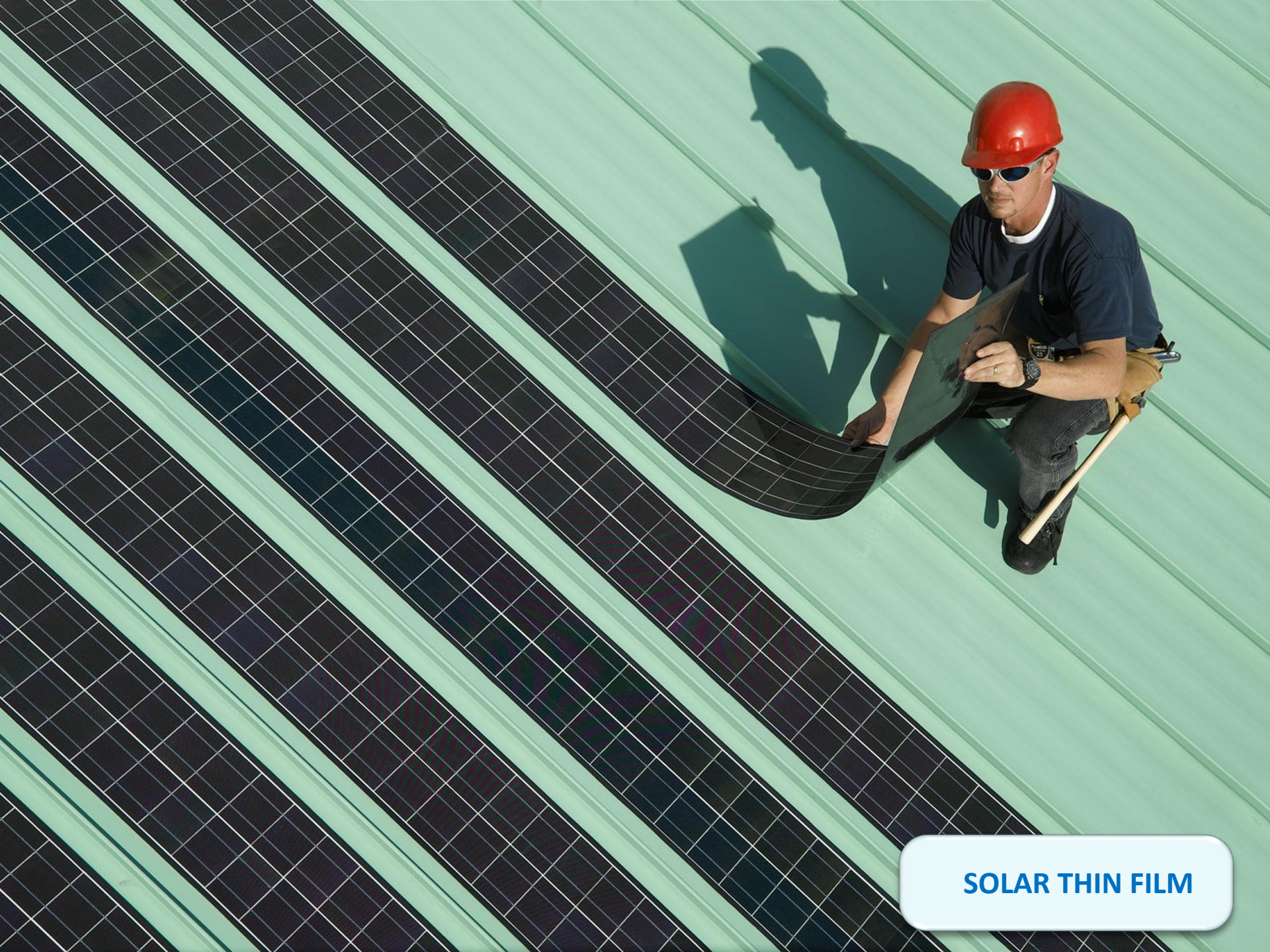


PUMP INSTALLATION - INSTALLING PUMPS, PIPING AND VALVES 40 FEET DOWN

SUSTAINABLE SOLUTIONS

SOLAR PANELS





SOLAR THIN FILM



IMPROVED EFFICIENCY



IMPROVED OPERATIONS - VARIABLE FREQUENCY DRIVES IMPROVE OPERATIONS & EFFICIENCY



REDUCE WATER LOSS AND IMPROVE WATER QUALITY

- FLOOR COATING REDUCED WATER LOSS
- MIXING UPGRADES IMPROVED WATER QUALITY



EXTEND FACILITY LIFE PROTECT WATER QUALITY

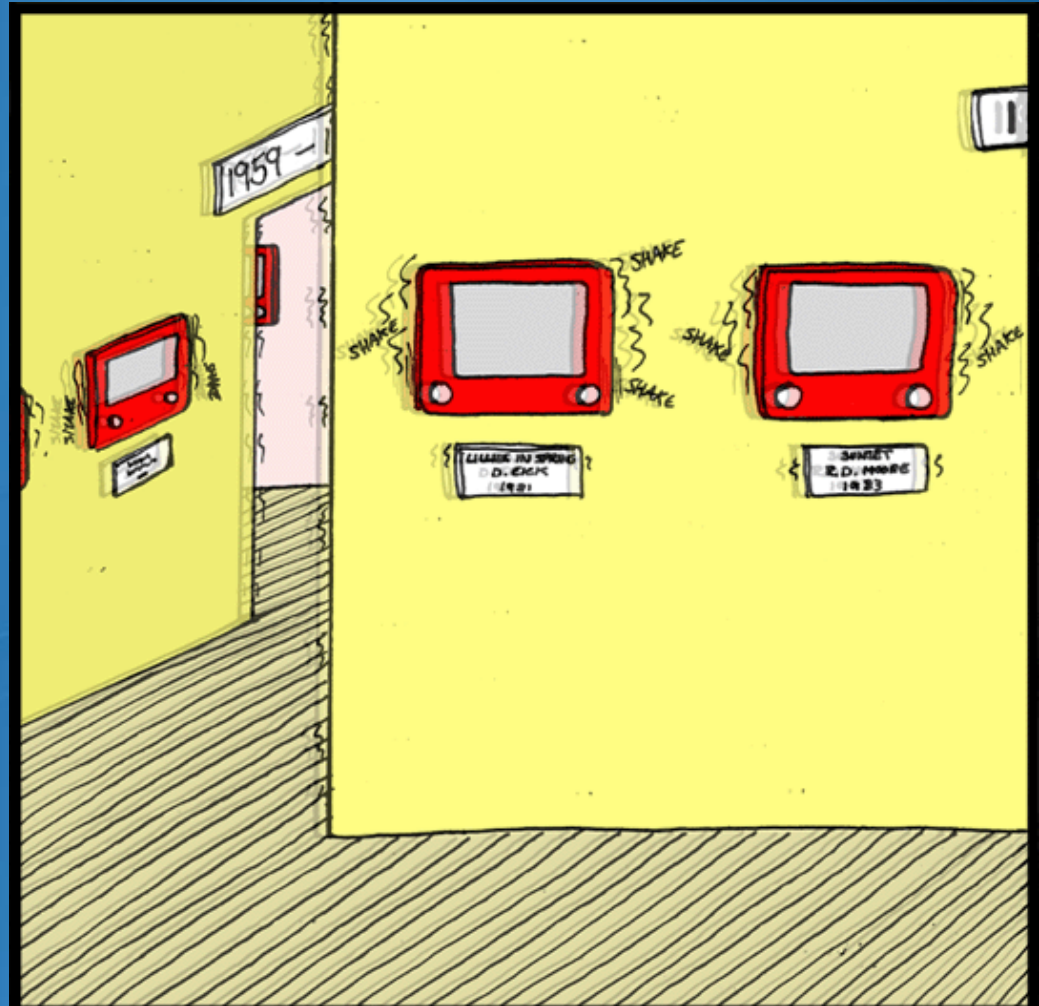
- ROOF COATING:
- PROTECTS CONCRETE
 - PREVENTS WATER INTRUSION



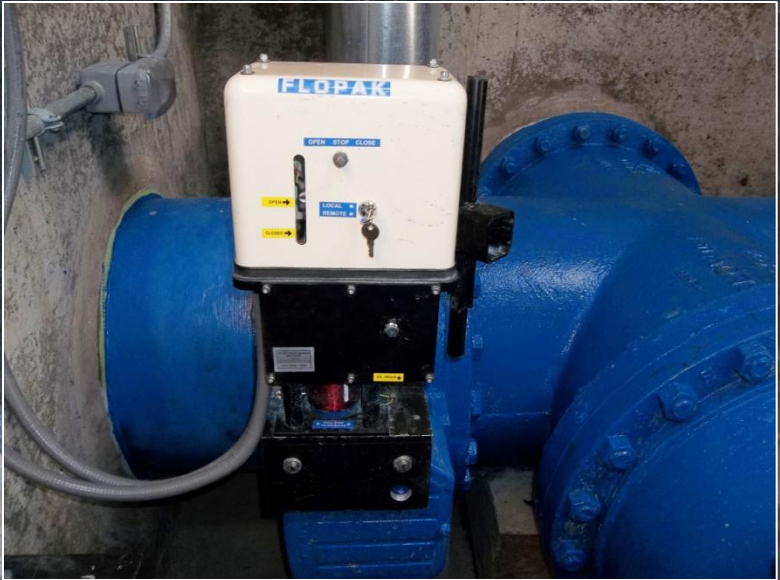
IMPROVED SURFACE WATER AND STORMWATER MANAGEMENT

CRITICAL FACILITY IMPROVEMENTS

- SEISMIC UPGRADES
- RELIABILITY
- REDUNDANCY
- OPERATIONS



IT WAS ONLY A MINOR EARTHQUAKE, BUT THE ETCH-A-SKETCH GALLERY WAS RUINED



SEISMIC UPGRADES



IMPROVED RELIABILITY - POWER GENERATION FOR BOTH PUMP STATION AND ASR

**IMPROVED OPERATIONS –
UPGRADED ACCESS AND ENVIRONMENTAL CONTROLS**



PUBLIC OUTREACH



- NEIGHBORHOOD MEETINGS
- OPEN HOUSE
- COMMUNICATION DURING CONSTRUCTION



BEFORE



AFTER



NEIGHBORHOOD FRIENDLY

- IMPROVED AESTHETICS
- HALF STREET IMPROVEMENTS
- UTILITY UNDERGROUNDING
- SOUND ATTENUATION
- INTEGRATED INTO NEIGHBORHOOD

ARRA FUNDING



CONCLUSION/SUMMARY



- CRITICAL FACILITIES UPGRADED
- TEAMWORK TO OVERCOME CHALLENGES
- COMMUNITY BENEFITS
- SUSTAINABLE APPROACH
- VERY SUCCESSFUL PROJECT

QUESTIONS & ANSWERS

