



PNWS-AWWA ♦ 2014 Annual Conference
May 7-9, 2014 ♦ Eugene, Oregon

City of Sandy PWB Intertie Project

Challenges of adding a new water supply



Presented by:
Matt Hickey, P.E.
Lael Alderman, P.E.



PROJECT TEAM

- City of Sandy — Mike Walker, P.E.
- Prime Consultant — Murray, Smith and Associates
- Structural Engineer — Peterson Structural Engineers, Inc.
- Prime Contractor — Rotschy, Inc.
- Tank Contractor — Skaar Construction, Inc.



PRESENTATION OUTLINE

- Introduction
- Project Background
- Hydraulic Analysis to optimize operations
- Alternatives Assessment to save costs
- Design Challenges
- IGA & Coordinating with PWB
- Public Outreach
- Construction Challenges
- Sustainability
- Conclusion / Summary

PROJECT BACKGROUND

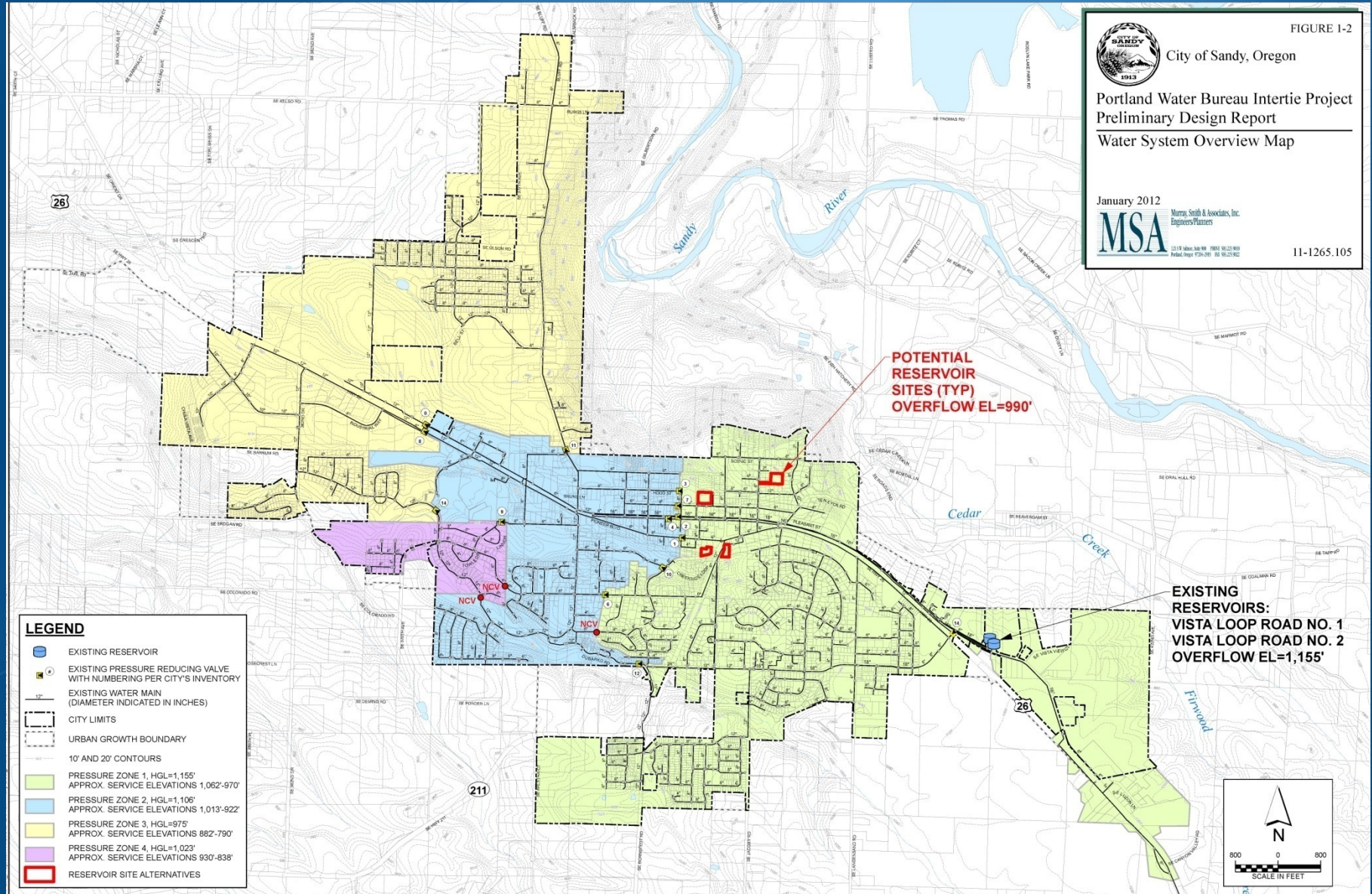









FIGURE 1-2


 City of Sandy, Oregon
 Portland Water Bureau Intertie Project
 Preliminary Design Report
 Water System Overview Map

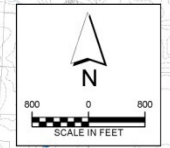
January 2012

 Murray, Smith & Associates, Inc.
 Engineers/Planners
 2219 Adams Lane NE, Portland, OR 97232-8000
 Phone: (503) 774-2000 Fax: (503) 774-2002

11-1265.105

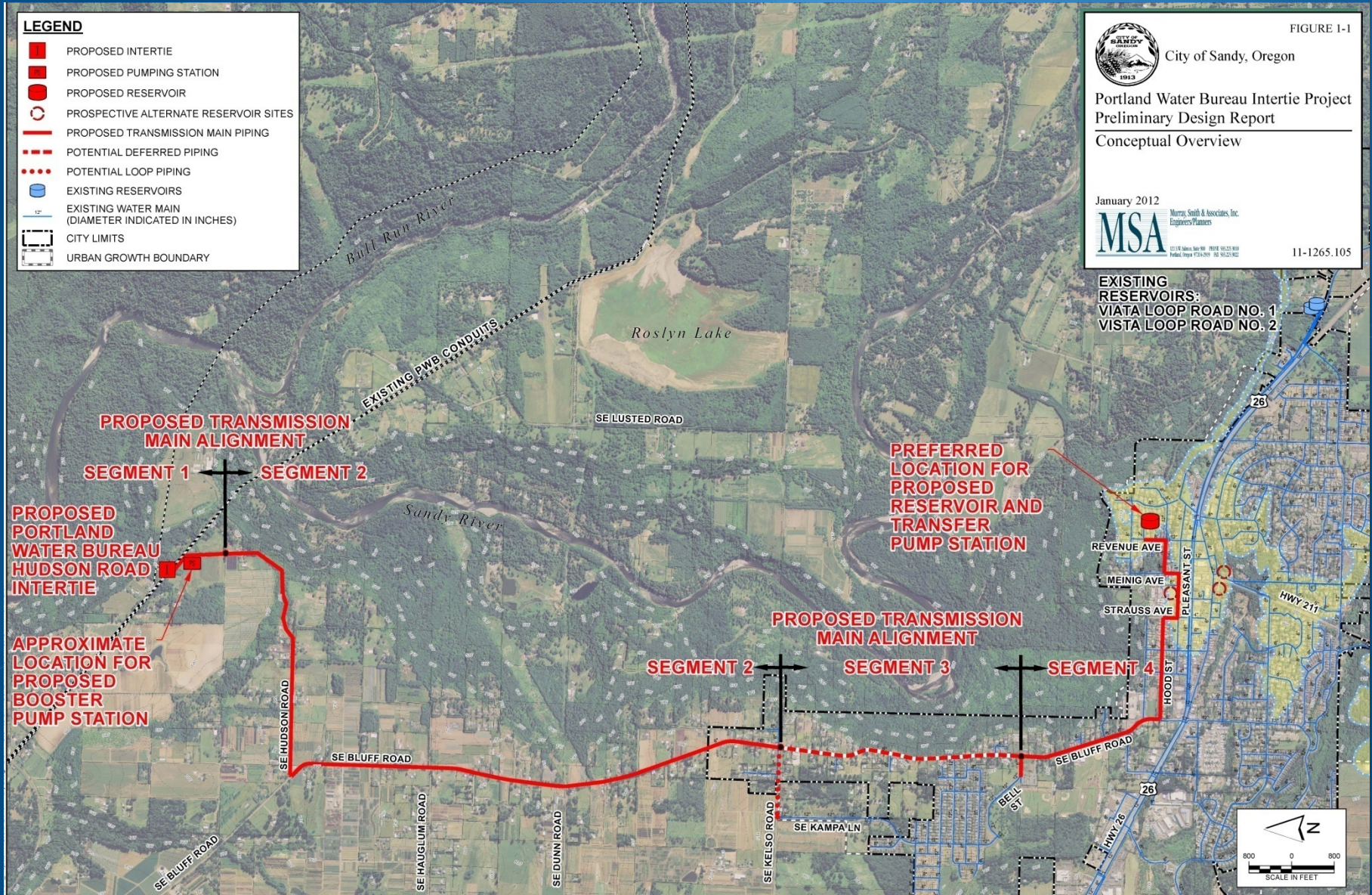
- LEGEND**
-  EXISTING RESERVOIR
 -  EXISTING PRESSURE REDUCING VALVE WITH NUMBERING PER CITY'S INVENTORY
 -  EXISTING WATER MAIN (DIAMETER INDICATED IN INCHES)
 -  CITY LIMITS
 -  URBAN GROWTH BOUNDARY
 -  10' AND 20' CONTOURS
 -  PRESSURE ZONE 1, HGL=1,155'
APPROX. SERVICE ELEVATIONS 1,062'-970'
 -  PRESSURE ZONE 2, HGL=1,106'
APPROX. SERVICE ELEVATIONS 1,013'-922'
 -  PRESSURE ZONE 3, HGL=975'
APPROX. SERVICE ELEVATIONS 882'-790'
 -  PRESSURE ZONE 4, HGL=1,023'
APPROX. SERVICE ELEVATIONS 930'-838'
 -  RESERVOIR SITE ALTERNATIVES

EXISTING RESERVOIRS:
 VISTA LOOP ROAD NO. 1
 VISTA LOOP ROAD NO. 2
 OVERFLOW EL=1,155'

**POTENTIAL RESERVOIR SITES (TYP)
 OVERFLOW EL=990'**



PROJECT DESCRIPTION



CONSIDERATIONS IN DEVELOPING A NEW WATER SUPPLY

- Developing IGA
- Mixing water sources
- Impacts to the existing system
- System expandability
- Operational needs
- Managing costs
- Public outreach
- Property acquisition



PRELIMINARY ANALYSIS & ALTERNATIVES ASSESSMENT

1. Integrated hydraulic analysis and element sizing to optimize the system operations
 - Water purchase agreement
 - Pump stations
 - Piping
 - Reservoir
2. Integrated alternatives analysis to save costs
 - Water system feature siting / routing
 - Materials and construction techniques

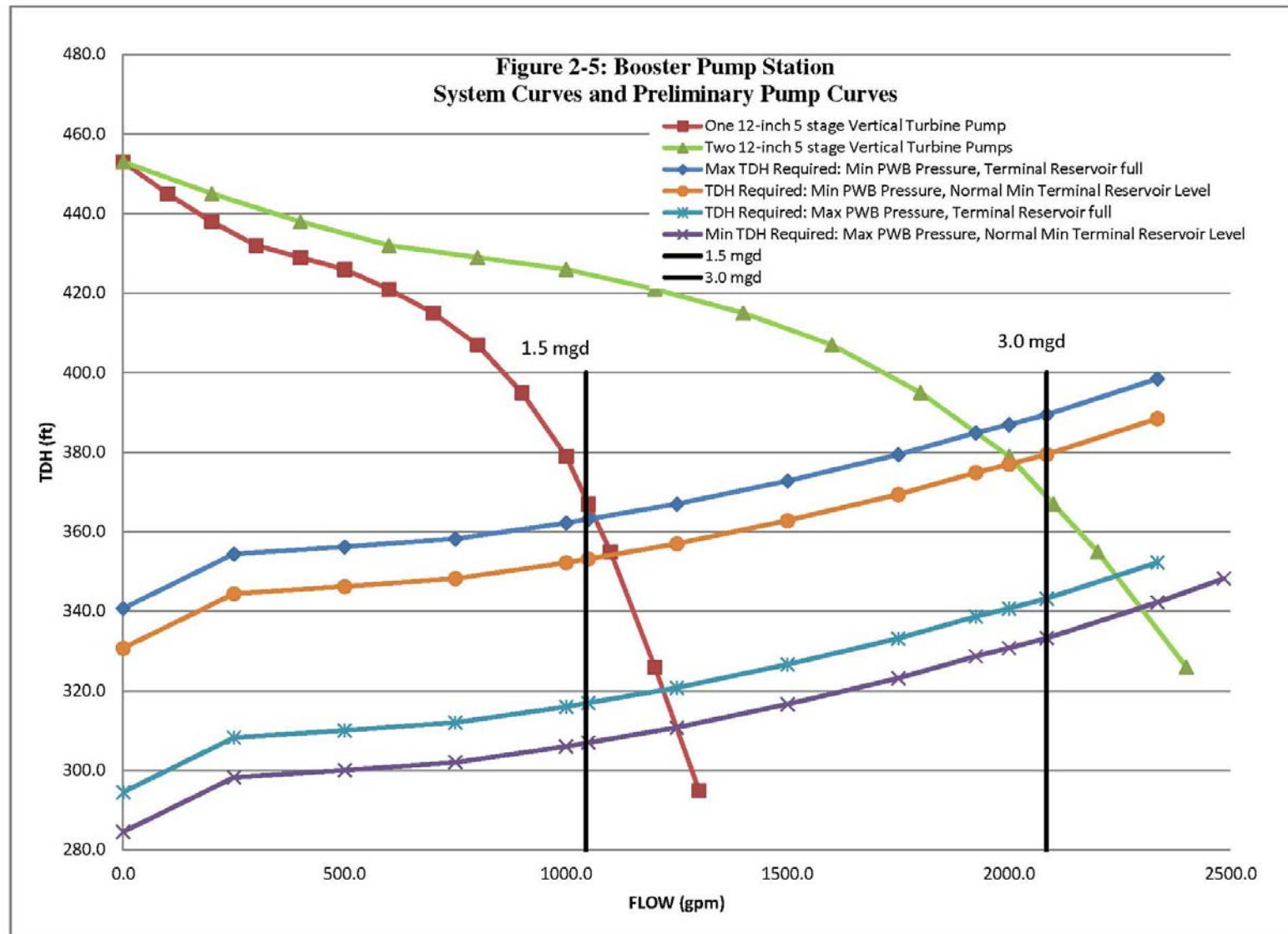
Hydraulic Analysis

General

- IGA Considerations
 - Current min flows -- 0.5 MGD min
 - Interim flow rates
 - 3.0 MGD
 - 6.5 MGD
 - Max flows -- 10 MGD max at buildout

HYDRAULIC ANALYSIS

Booster Pump Station



HYDRAULIC ANALYSIS

Booster Pump Station

- Varying flow and head conditions
 - 1.5 MGD current firm capacity
 - 3.0 MGD capacity
 - 6.5 MGD interim
 - 10.0 MGD max
- Pump selection
- Surge analysis
- Operational Considerations



HYDRAULIC ANALYSIS

Transfer Pump Station



1.1 MGD Current

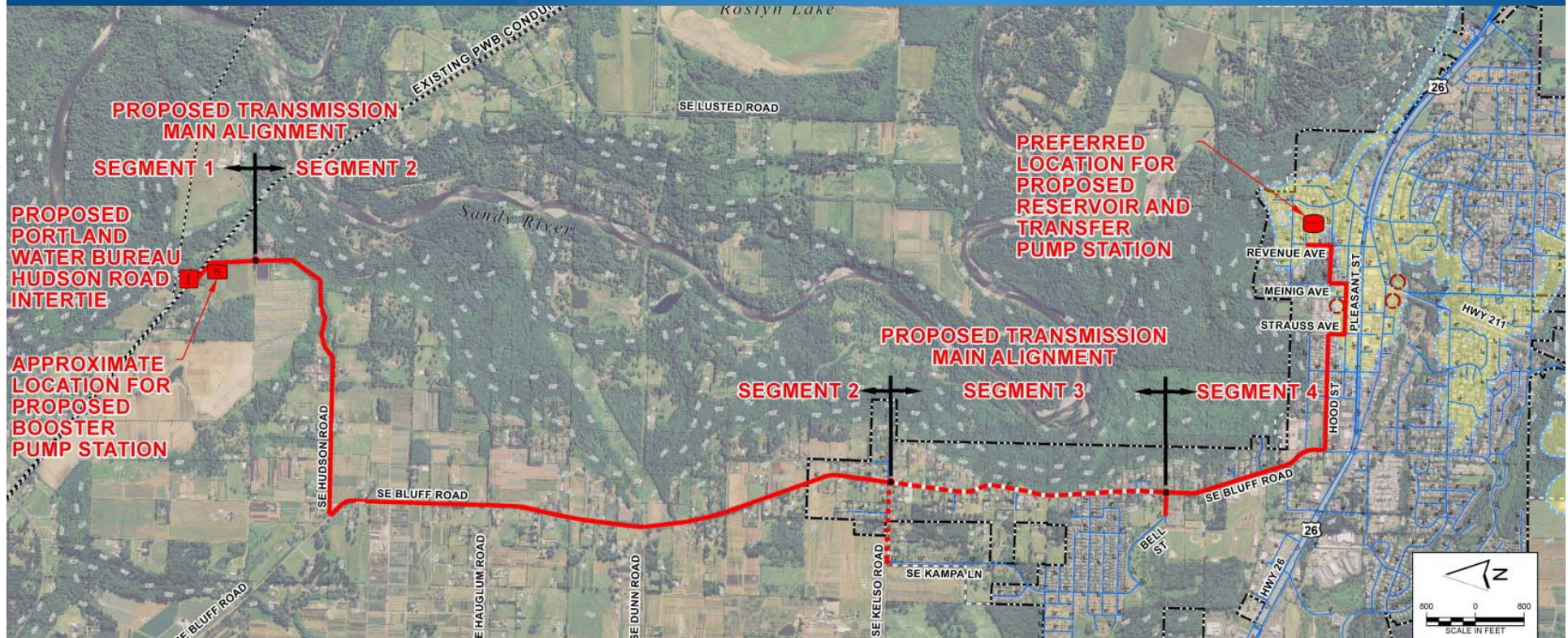
3.0 MGD 2-year

6.75 MGD Buildout

- Operational Considerations
- Pump Selection

HYDRAULIC ANALYSIS

Transmission Main



Pipeline

- Size pipe for now and future
- Use existing system – cost analysis
- Pipe sizing considerations



Optimized Sizing:

- 6.5 MGD capacity – 18"
- 10 MGD capacity – 24"

HYDRAULIC ANALYSIS

Reservoir


- Size for buildout
- Overflow elevation
- Coordinated with existing facility


 **FIGURE 1-2**
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Portland Water Bureau Intertie Project
Preliminary Design Report
Water System Overview Map
January 2012
 MSA
Murray, Smith & Associates, Inc.
Engineers/Planners
11-1265.105

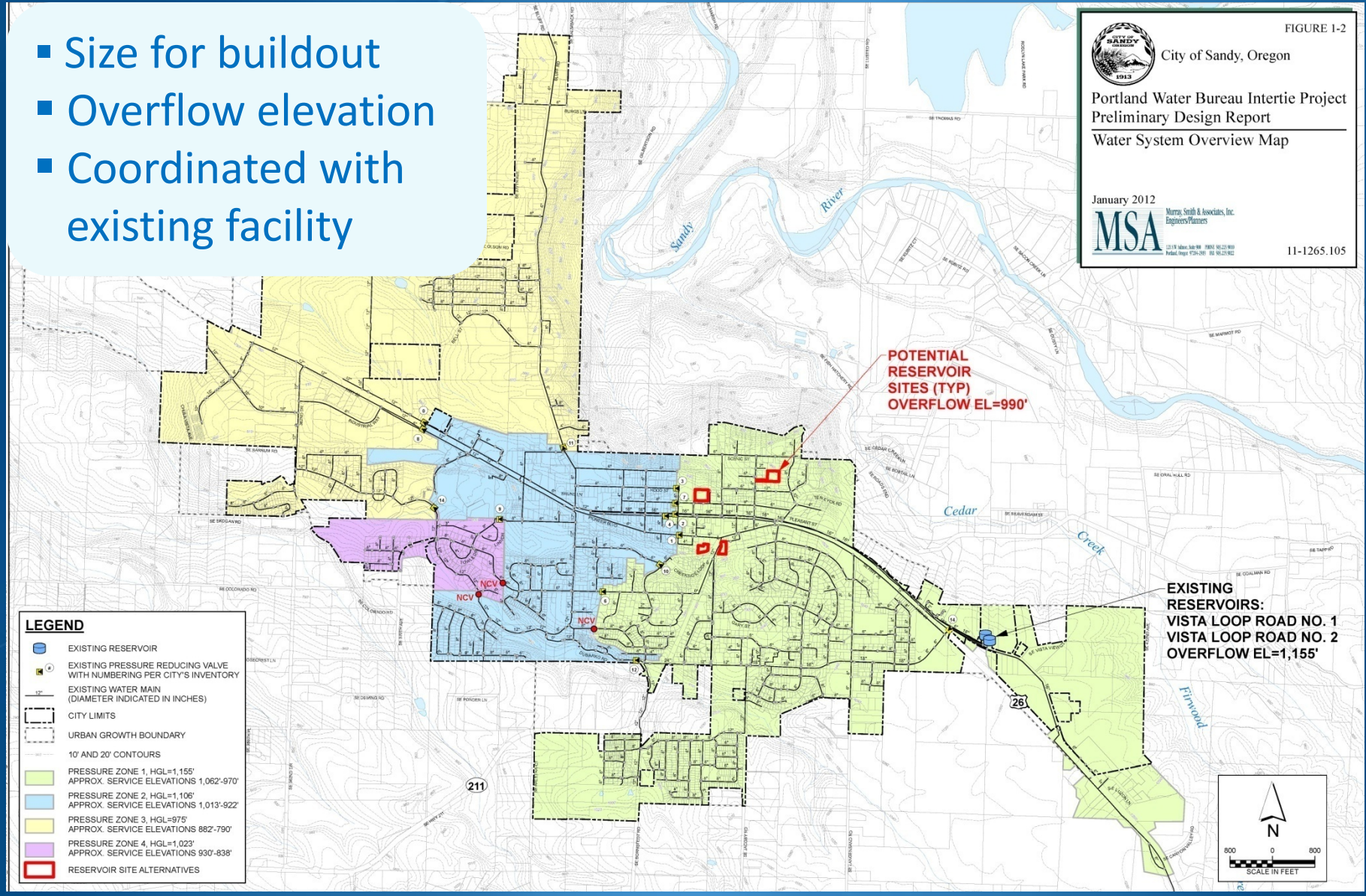
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RESERVOIR
SITES (TYP)
OVERFLOW EL=990'**

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800 0 800
SCALE IN FEET

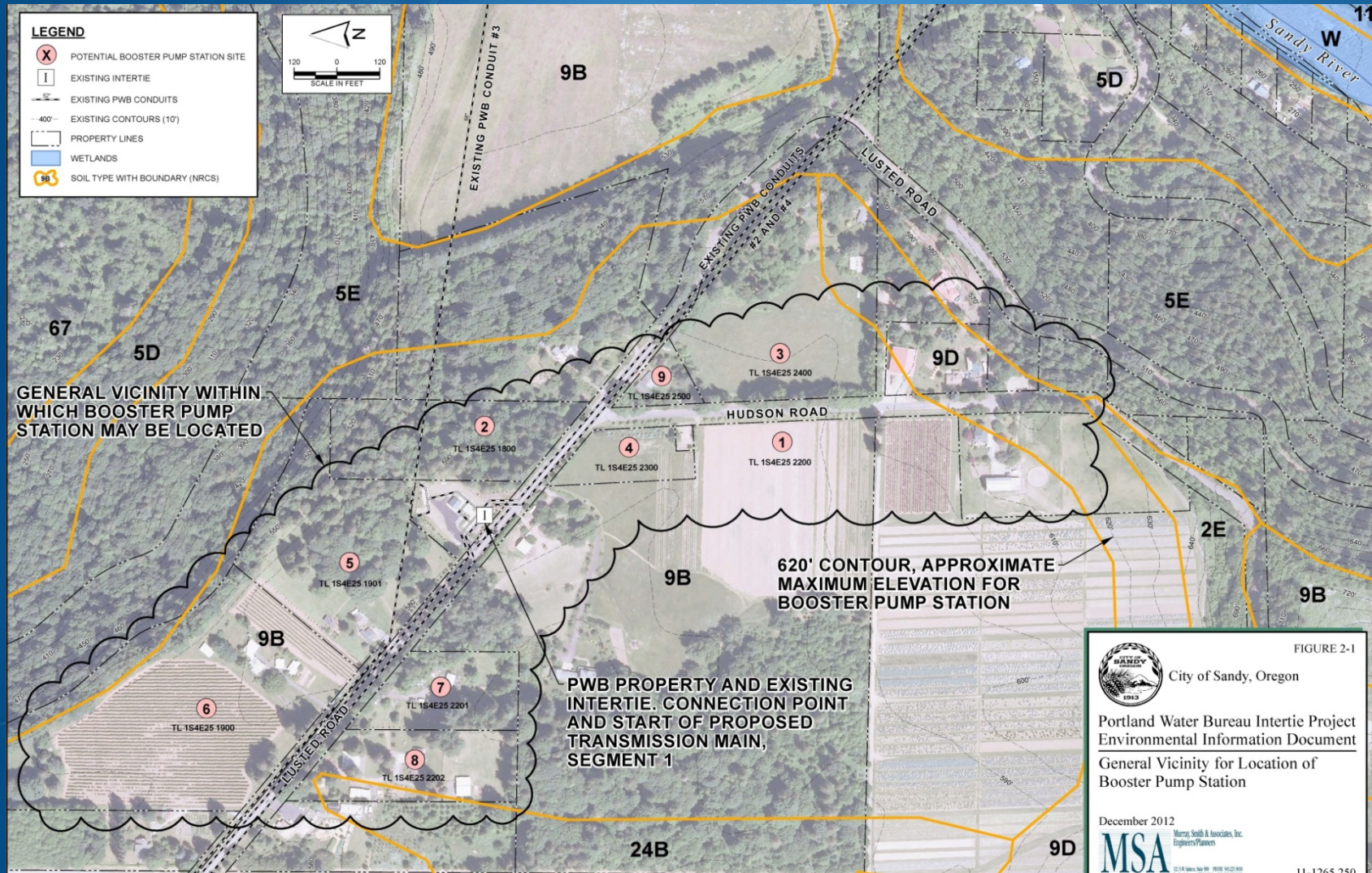


INTEGRATED ALTERNATIVES ANALYSIS = COST SAVINGS

- Save cost
- Expandable
- Optimize current and future operations



BOOSTER PUMP STATION SITING



- Property acquisition
- Visual impacts

- Optimize operations
- Available suction pressure

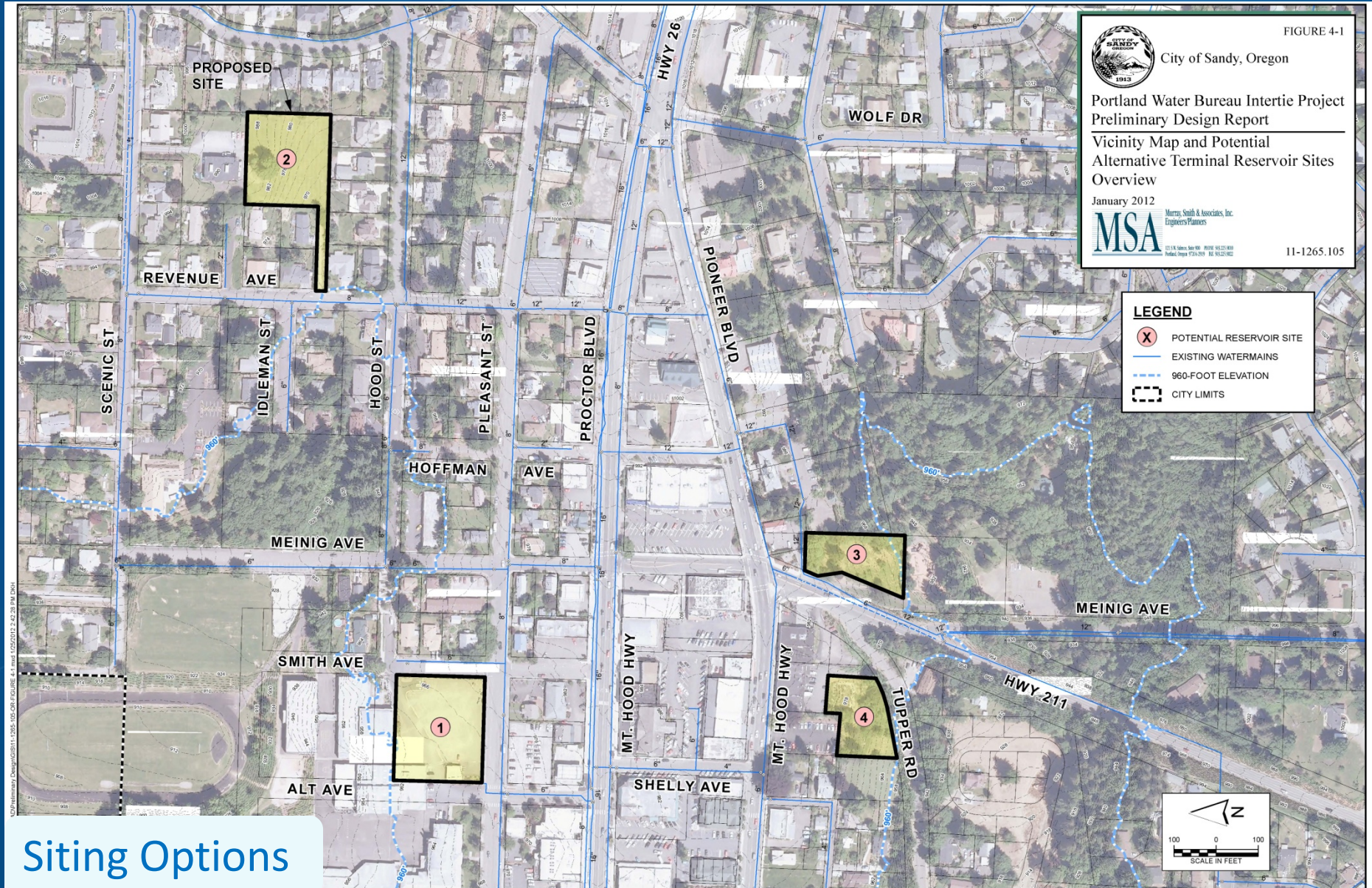
TRANSMISSION MAIN ROUTING



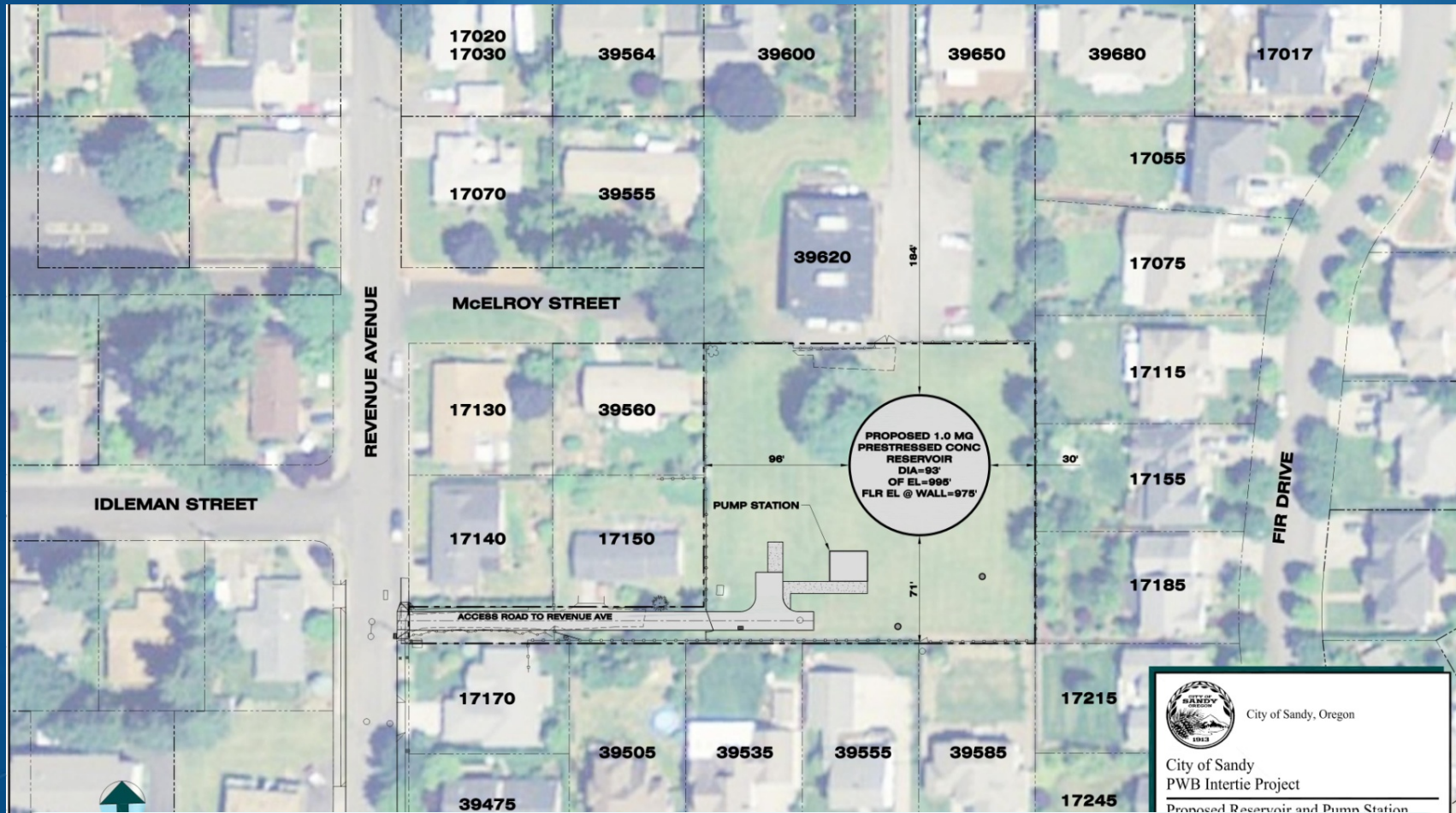
- Within or out of Roadway
- Out of Right-of-Way
- Roadway impacts
- Pavement provisions
- Use of existing piping



RESERVOIR SITING



RESERVOIR SITING



- Elevations
- Proximity to piping
- Land availability
- Access

- Siting for Transfer Pump Station
- Constructability
- Proximity to drainage facilities

ALTERNATIVE METHODS OF CONSTRUCTION



- Expandability
- Package versus Built-in-place



TRANSMISSION MAIN MATERIALS EVALUATION

PVC



HDPE



Ductile Iron



Welded Steel

TRANSMISSION MAIN MATERIAL SELECTION

- Pressure
- Cost
- Cathodic protection
- Constructability
- Surge impact



TRANSMISSION MAIN MATERIAL SELECTION



- Bid alternate materials
- Cost savings on Ductile Iron pipe

RESERVOIR TYPE SELECTION

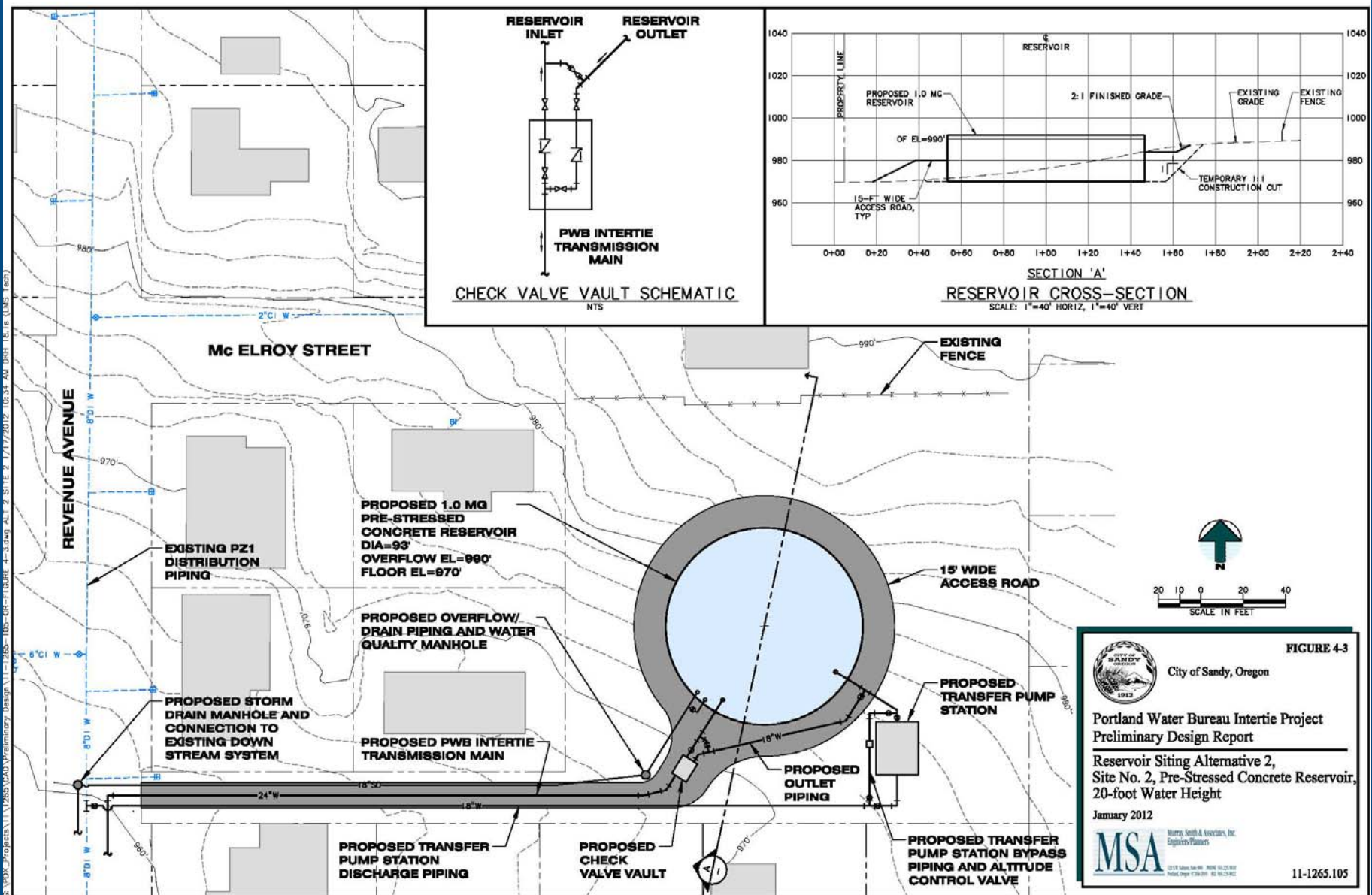
Steel Reservoir, Seaside, OR



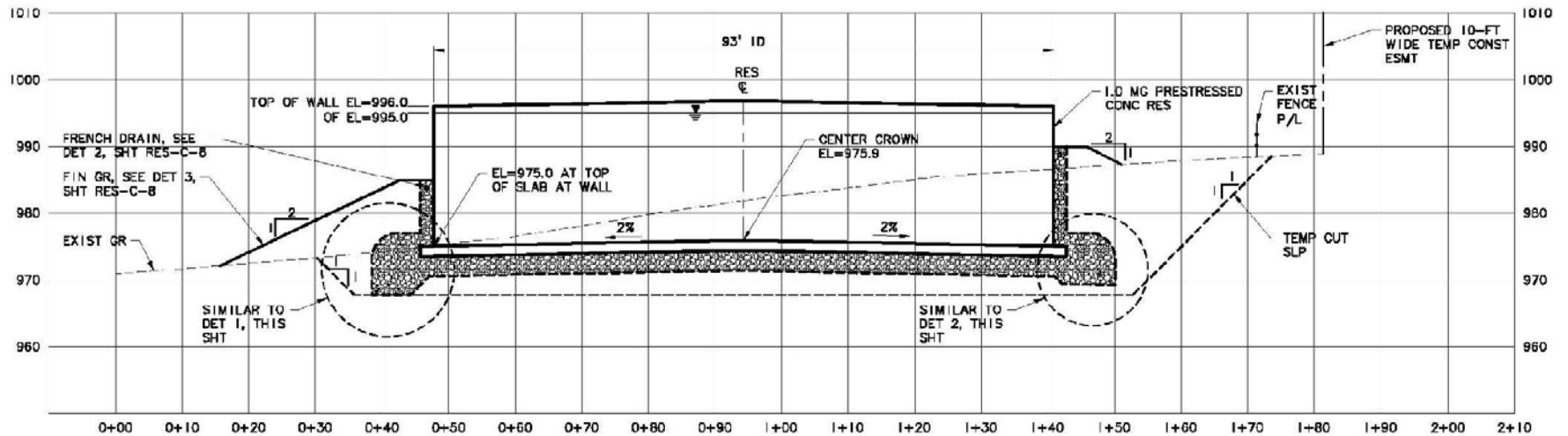
Concrete Reservoir, Tigard, OR

RESERVOIR SELECTION FACTORS

Site Conditions



RESERVOIR SITE CONDITIONS EVALUATION



Cost-effective solution

COMMUNICATION SYSTEM EVALUATION

- Radio
- Hardwire
- Sandy Net - Fiber



THOROUGH ALTERNATIVES ANALYSIS = COST SAVINGS



Saved \$3.0
million off
original
estimates.

DESIGN CHALLENGES

Reservoir – Site Conditions



DESIGN CHALLENGES

“Like a box of chocolates – you never know what you’re going to get.”



DESIGN CHALLENGES

Reservoir - Geopiers



DESIGN CHALLENGES

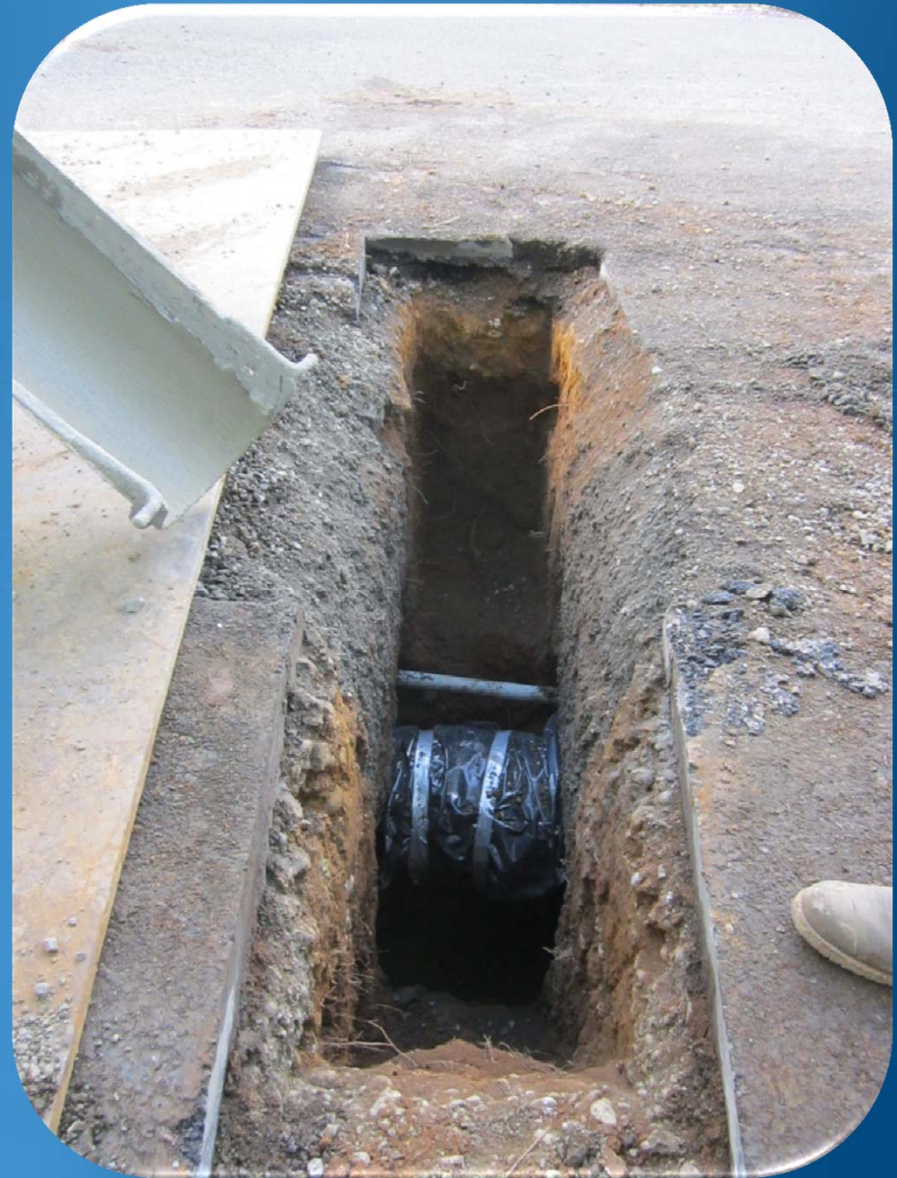
Reservoir - Water Quality

- Contact time
- Mixing water sources
- Mixing in reservoir
- Water age



DESIGN CHALLENGES

Transmission Main - Utility Coordination



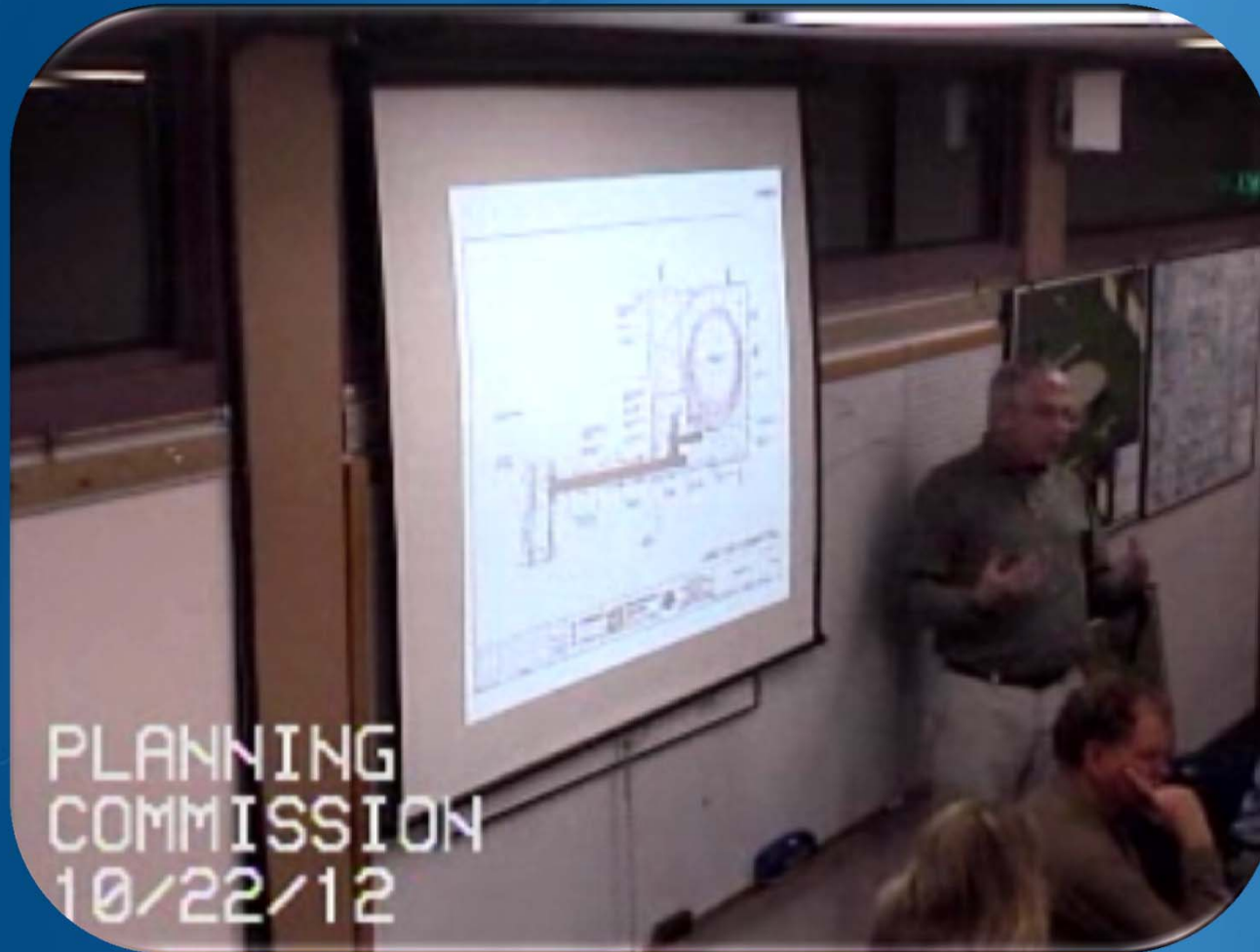
DESIGN CHALLENGES

Pump Stations - Expandability



PUBLIC OUTREACH

City of Sandy



- Neighborhood meetings
- Open house
- Communication during construction

PUBLIC OUTREACH



Rendering for Public Meetings

PUBLIC OUTREACH



Traffic impacts

PUBLIC OUTREACH



- Minimized visual impacts
- Improved aesthetics
- Integrated into neighborhood

IGA & COORDINATION WITH PWB



IGA & COORDINATION WITH PWB

Conduit Crossings



CONSTRUCTION CHALLENGES



“Does ‘high-rise’ refer to the building or the budget?”



Booster Pump Station



Slab for Booster Pump Station



Booster Pump Station Structure



Booster Pump Station



03/25/2013

Tight Utility Corridor



Water Transmission Main



Protect Landscaping



Boring under PWB conduits



Dewatering challenges



High Test Pressures



Transfer Pump Station Site



Transfer Pump Station Assembly



Transfer Pump Station Structure



Pump Installation



Transfer Pump Station Building



Transfer Pump Station



Reservoir Site



Site Excavation



Geopier installation



Geopier installation
Minimizing impact on neighbors



Confirm Site Layout



Underdrain System



- Floor Slab Reinforcing
- Mat foundation



Seismic cables: flexible wall floor joint



Multiple cast-in-place wall segments



Inspection of Wall Construction



Concrete placement for wall:
Consolidation is critical



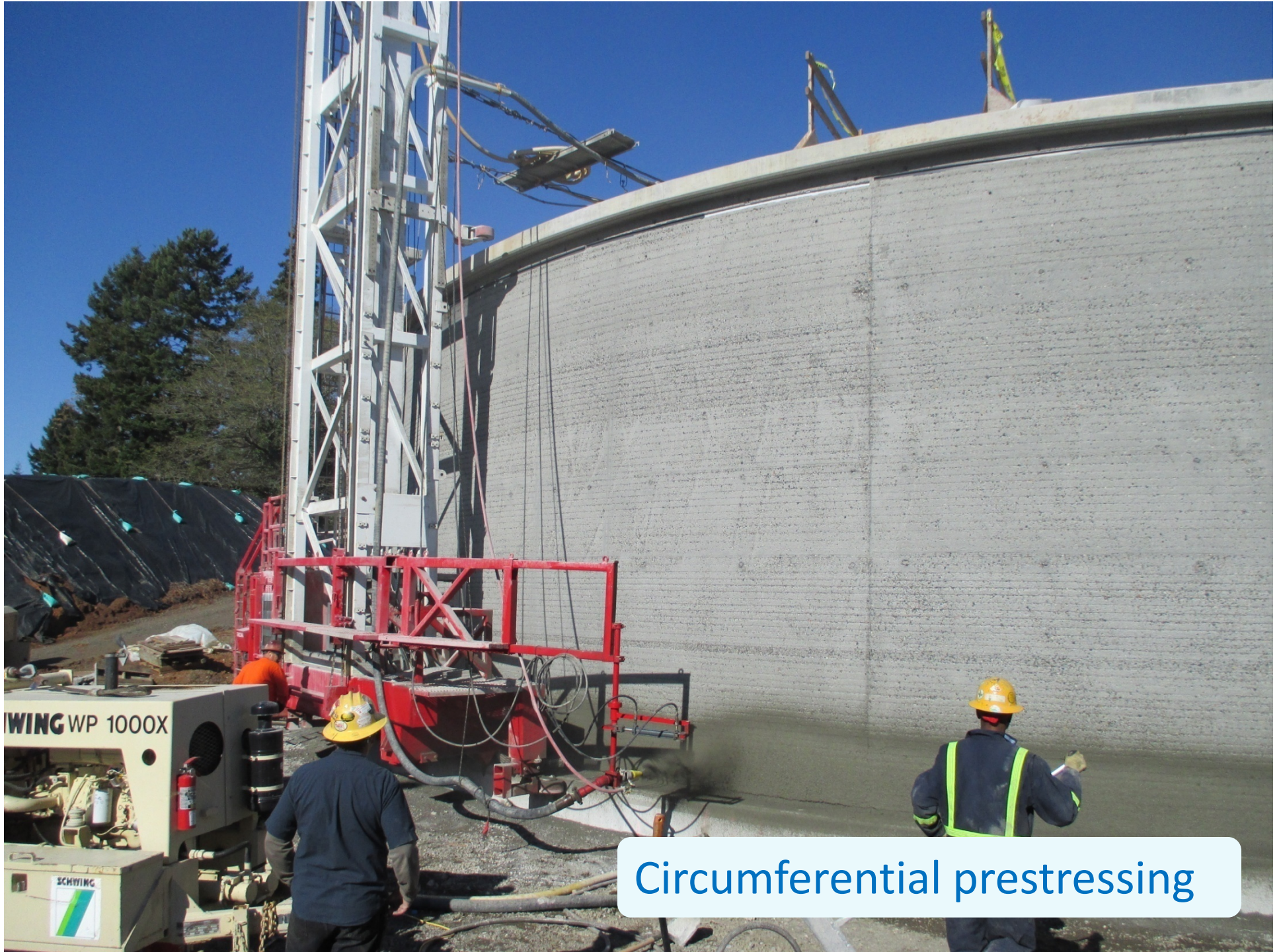
Wall construction: vertical thread bars



Walls Complete



Concrete placement for roof



Circumferential prestressing



Prestressing
wire



Reservoir Interior: Column-supported roof

Seismic Considerations: Flexible pipe connections



CONCLUSION/SUMMARY

- A number of factors to consider when developing a new water source
- Challenge to integrate new facilities with existing system
- Very successful project for the City
- Managing costs essential to successful project



QUESTIONS & ANSWERS

