

A Tale of Two Tanks

Construction and Assessment of New and Existing
Steel Reservoirs



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May 1, 2019

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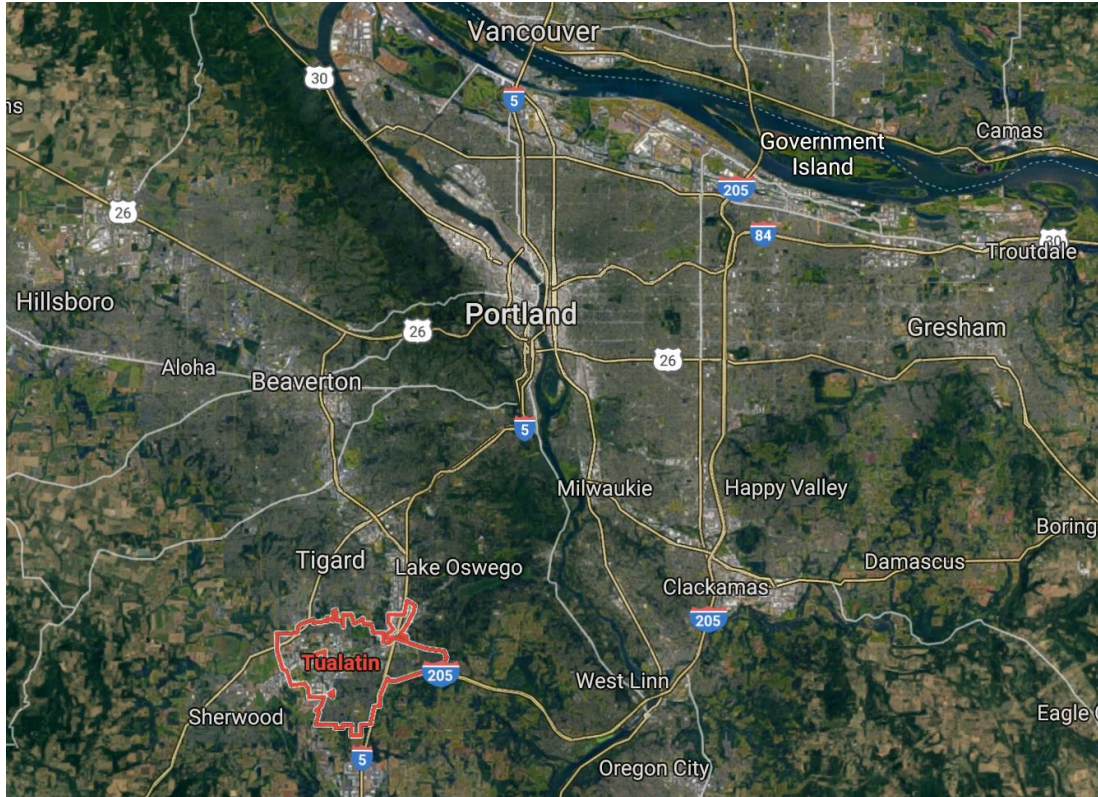
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Agenda

- **City of Tualatin and Project Background**
- C-2 Reservoir
- C-1 Reservoir
- Conclusion / Lessons Learned

Background

City of Tualatin, Oregon



Source: Google Maps

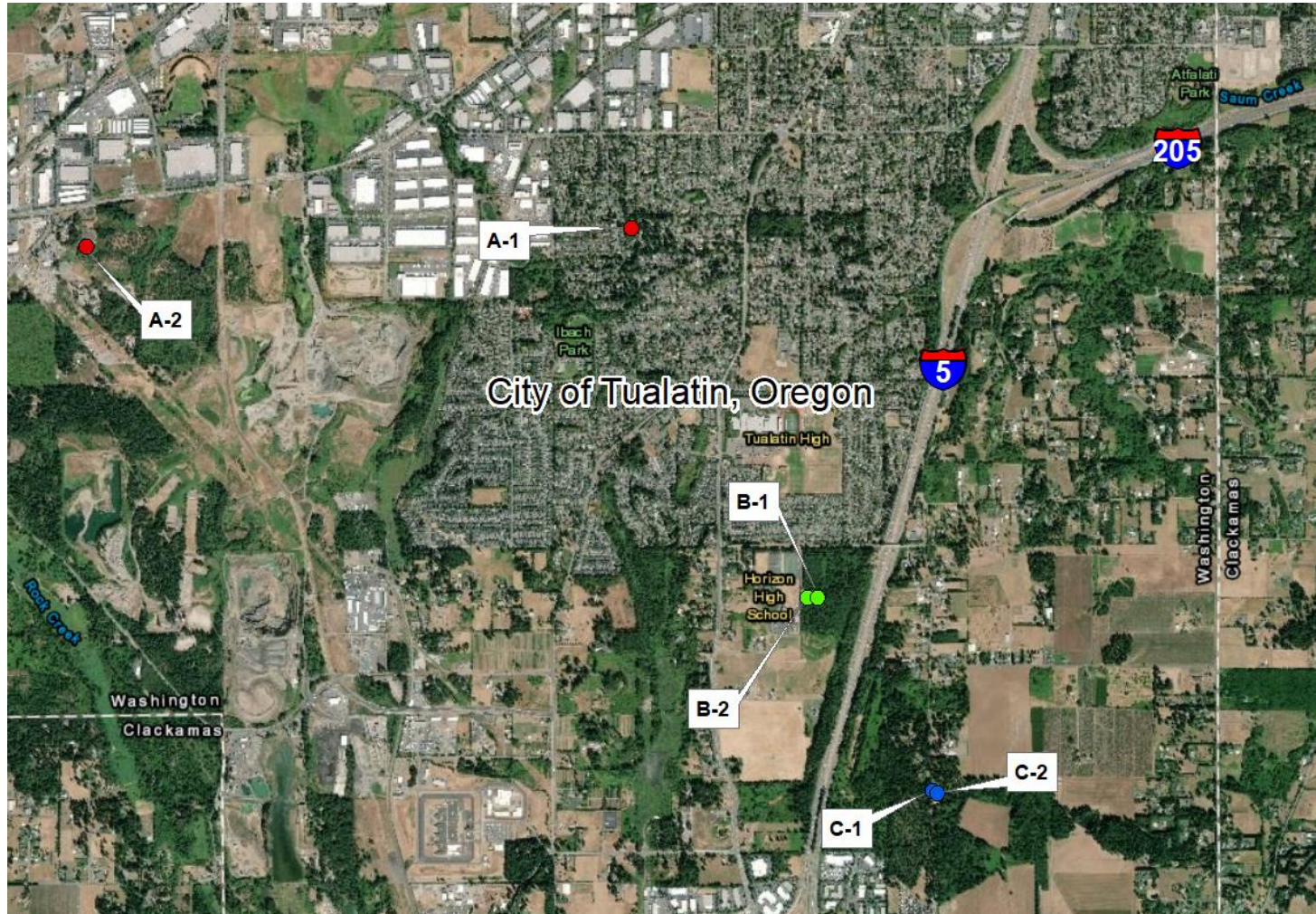
Population of 27,000

ADD: 4.3 MGD

MDD: 9.5 MGD

Water Distribution System

A, B and C zones



C-Zone Reservoir Background

- C-1 – 1982, Seismic retrofit 2005
- C-2 - 2015

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C-2

Tank size – 800,000 gallons

Construction features:

- ASTM A516 grade 70 pressure vessel quality steel per ASTM A20
- Seismic code requirements of ASCE 7-10 and IBC 2012 in addition to OSSC 2010
- Site seismic concerns:

Mapped Risk-Targeted Spectral Response:

S_S : 0.938g

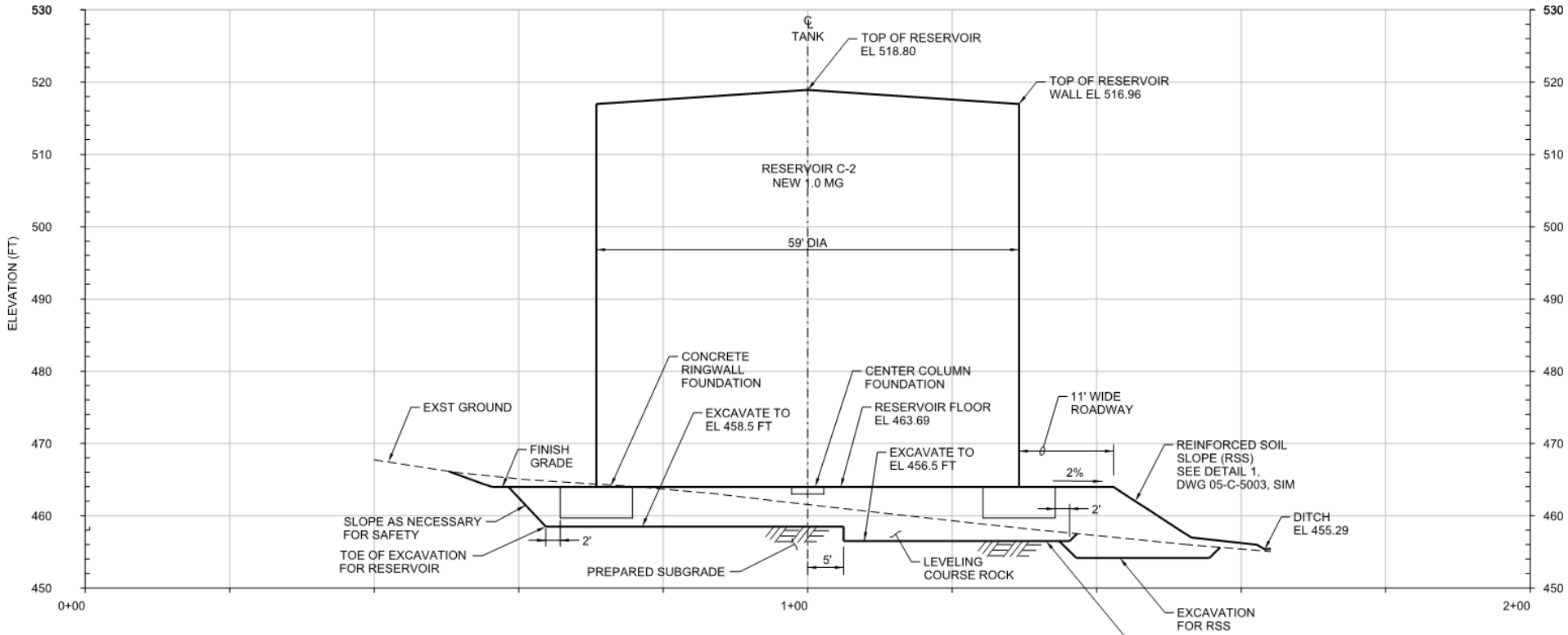
S_1 : 0.412g

Site Specific Spectral Response:

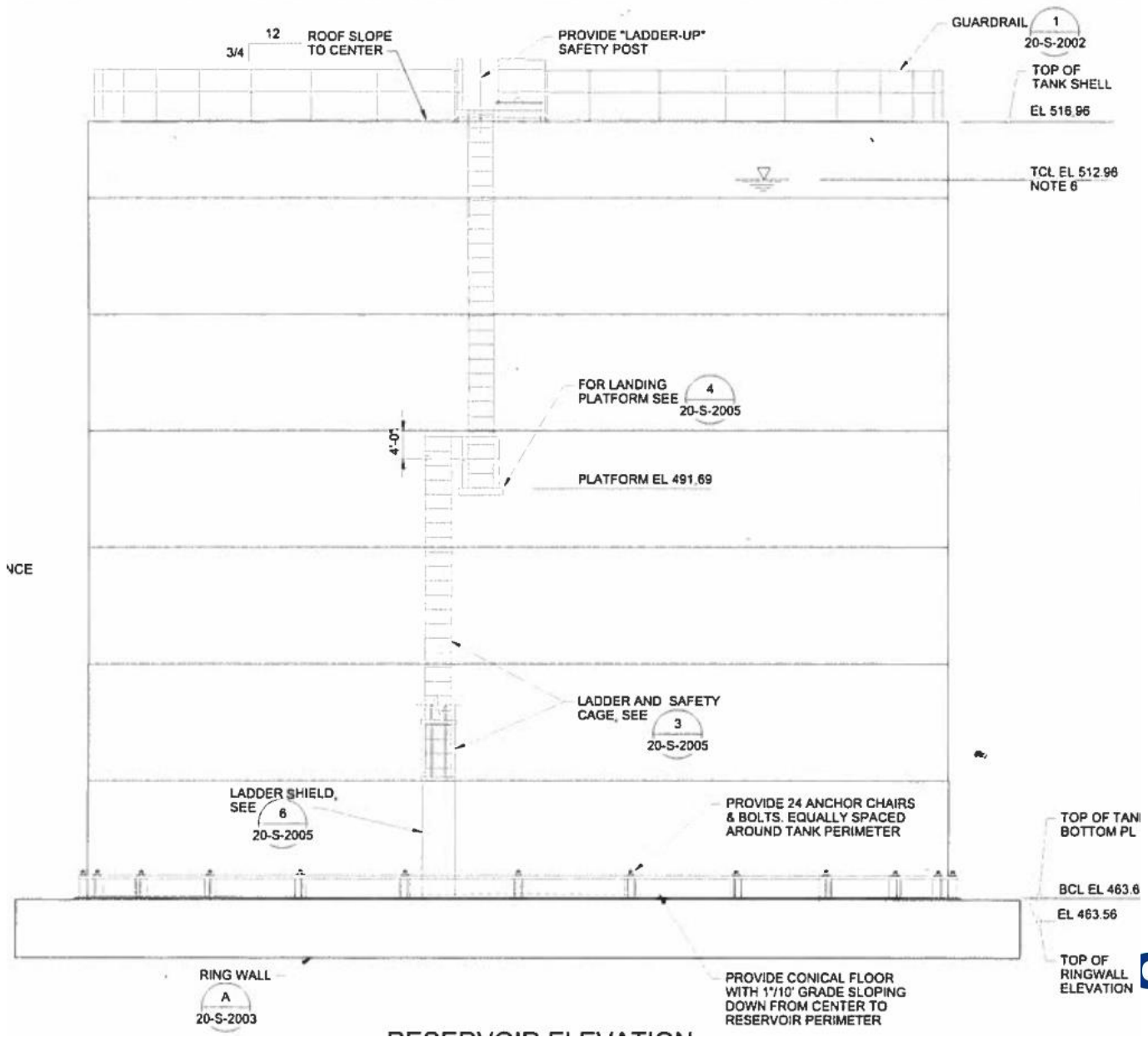
S_{ds} : 1.37g

S_{d1} : 0.35g

C-2 Design

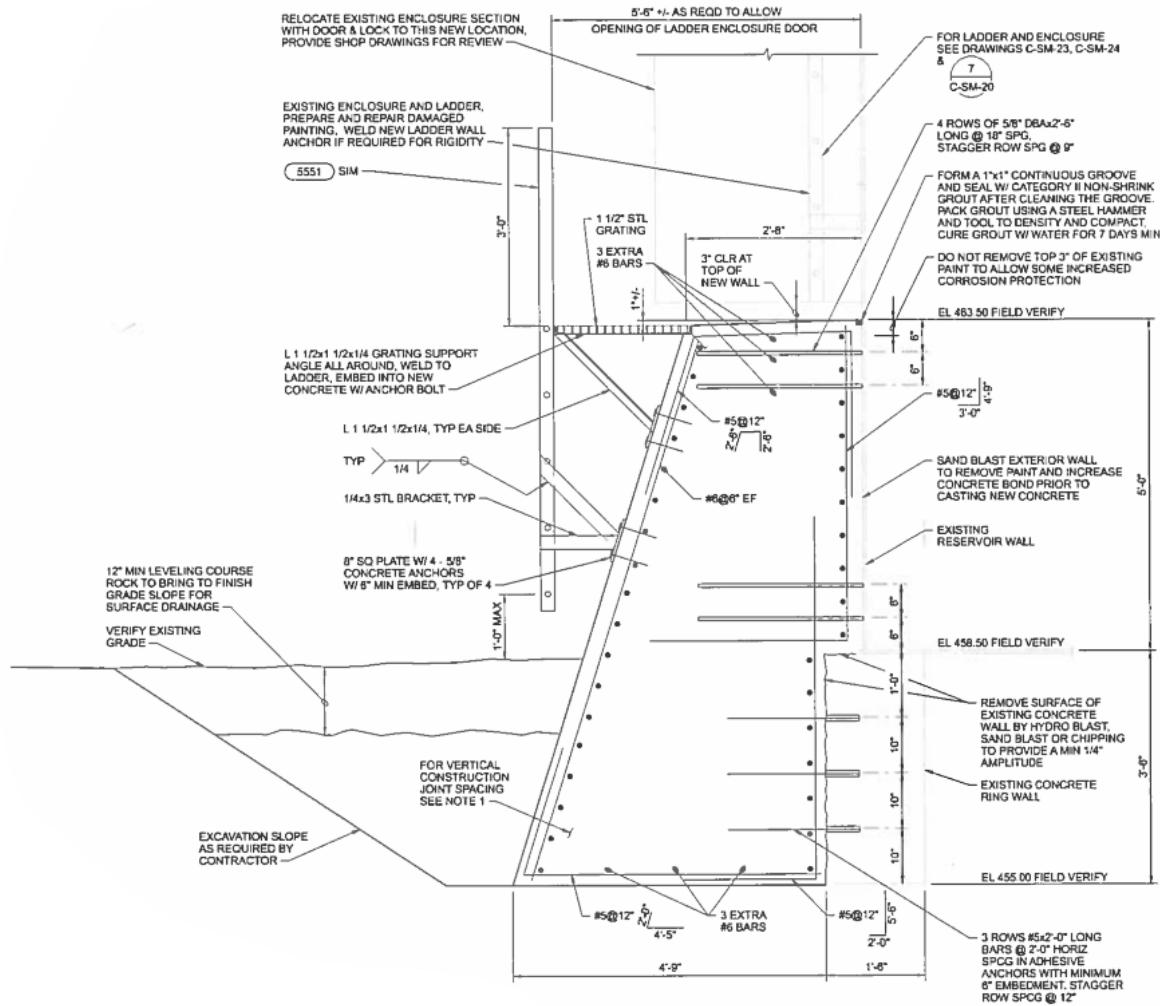


C-2 Design





C-1 Seismic Retrofit

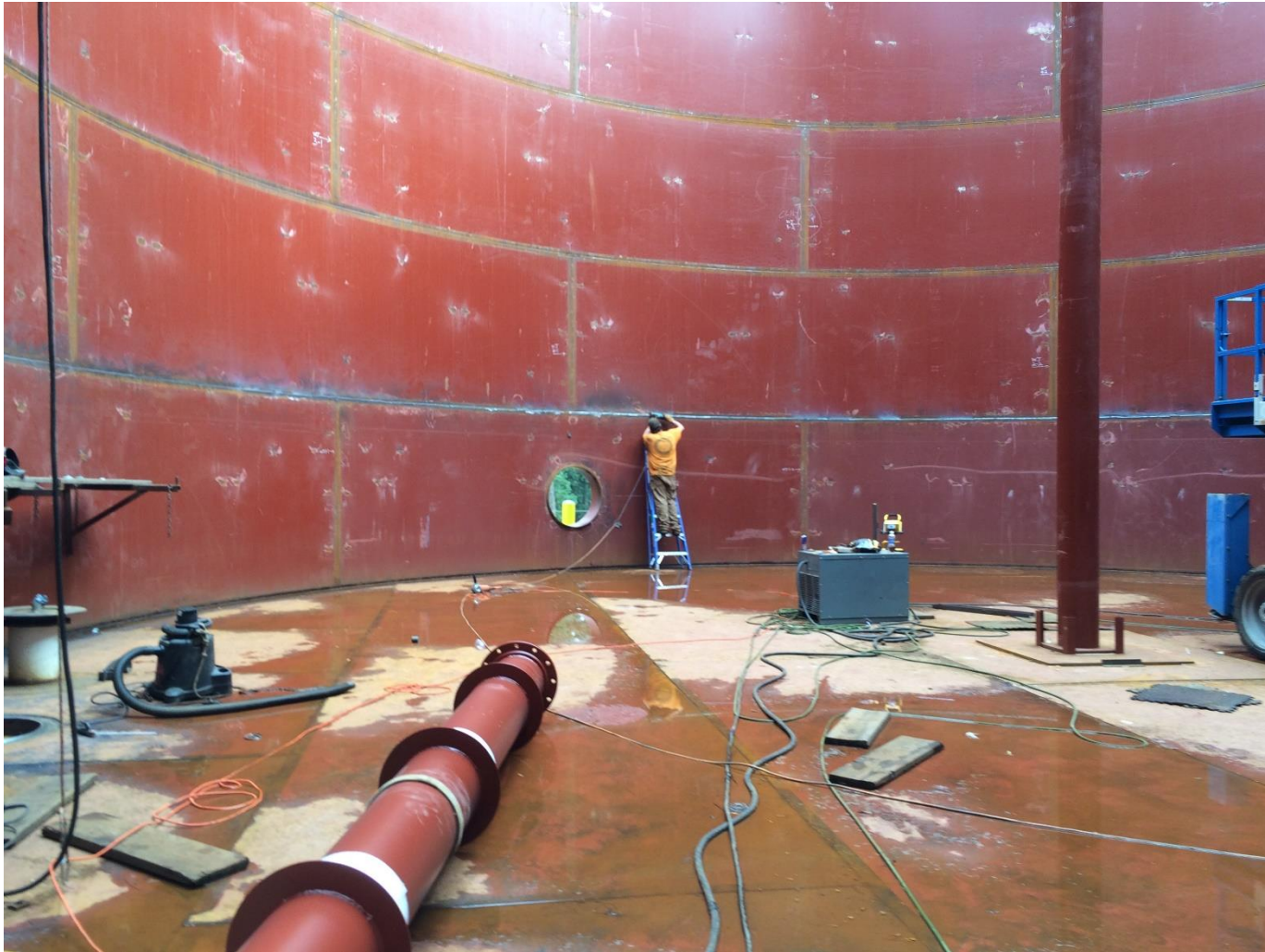


C-2 Utility Construction













C-2 Completion

Tank put online at the end of 2016.



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C-1 Reservoir

C-1 exterior coating project







C-1 Reservoir Inspection

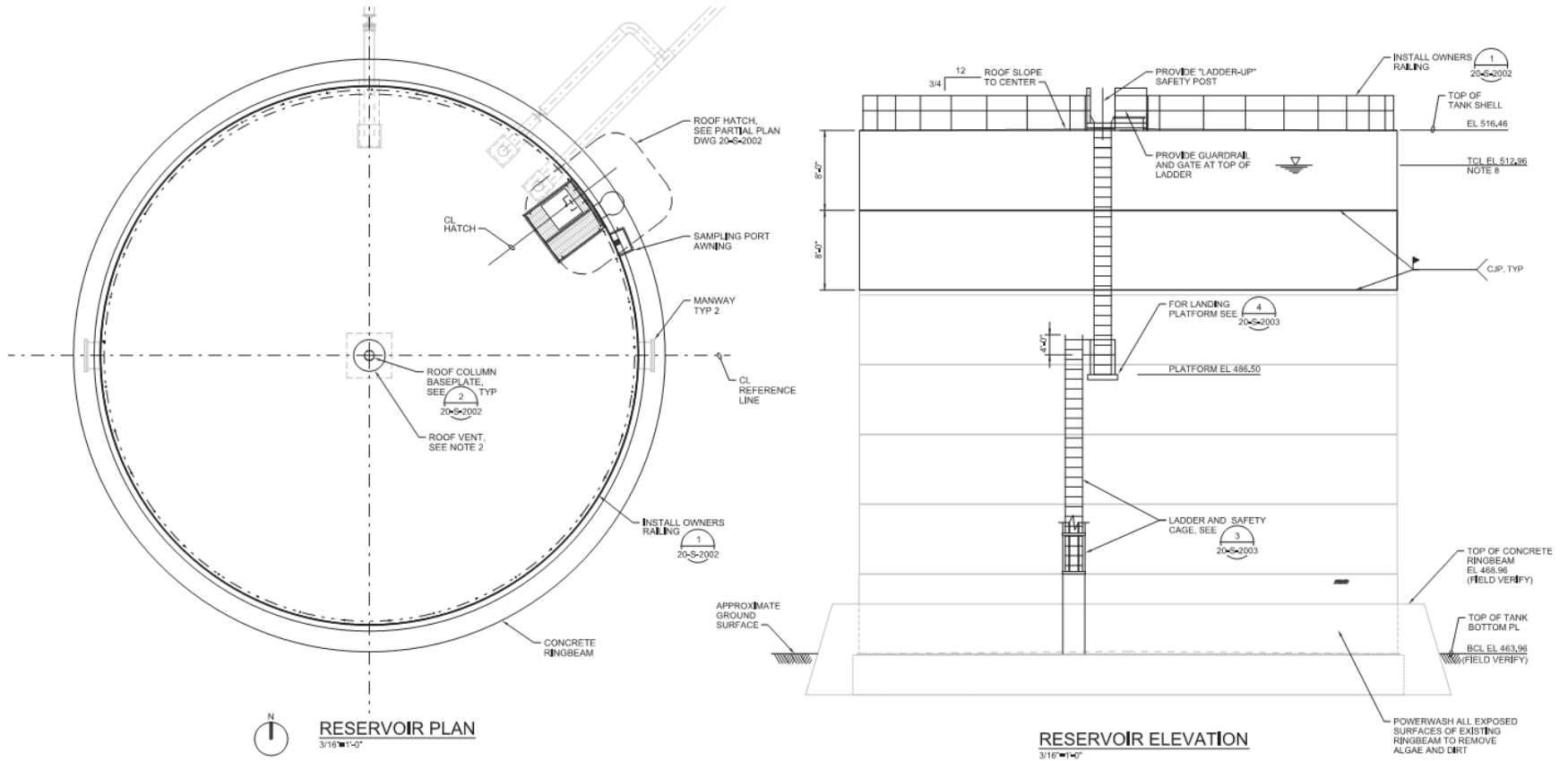
City was able to fully drain C-1 once C-2 was online, and CH2M staff was able to inspect and document all findings.







C-1 Design



C-1

- Bidding
- Pre qualify GCs and specialty tank firm
- Separate pre-qual prior to bid
- Suggested criteria

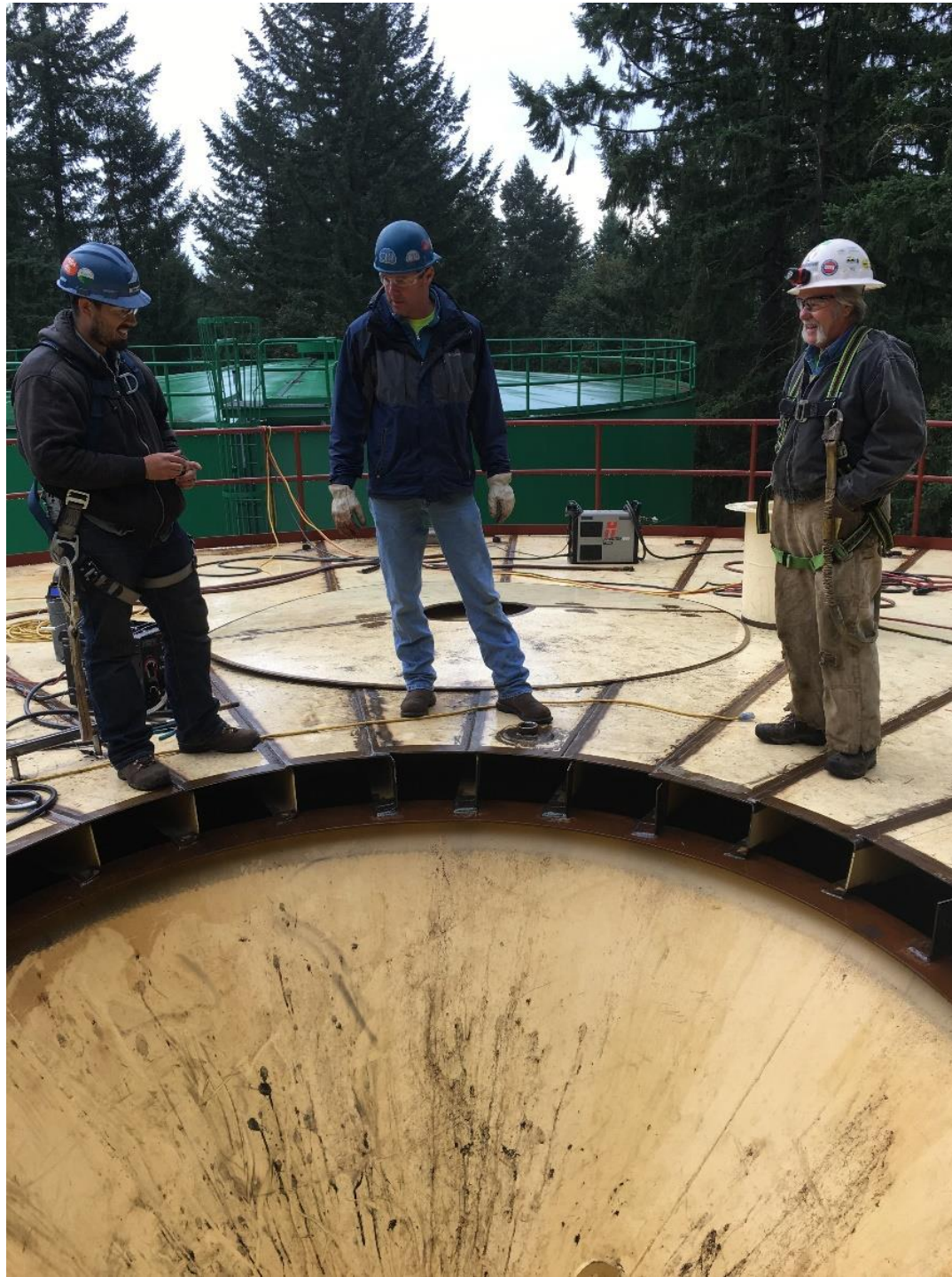
C-1 Construction

Spring 2018















C-1 Construction Hurdles

- Schedule
- Ensuring sufficient welding was performed

C-1 Permitting

Washington County Building Permit Handrail Calculation

C-1 Summary

- Coating life expectancy: 30+ years
- Allows for additional capacity for the increasing population of the C-zone

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C-1, C-2 Lessons Learned

- Recommend regular inspections be schedule
- Recommend cathodic protection for steel tanks
- Monitor regularly to ensure anode health
- Pre quals to ensure experienced contractors
- Enlist a structural engineer with expertise in current structural steel codes and welding

Credits

Thank you to:

- City of Tualatin project managers, operations and maintenance staff
- All contractors, subcontractors, inspectors and specialists involved with the C-1 and C-2 projects

Conclusion

- Questions?



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