Appendix F

Cheadle Lake Berm TM

Foundation Engineering, Inc.
Professional Geotechnical Services

Memorandum

Date: October 23, 2023

To: Mel Damewood, III, P.E., Principal Engineer I
West Yost Associates

From: David L. Running, P.E., G.E.
Senior Geotechnical Engineer

Subject: Cheadle Lake Berm Geotechnical Consultation

Project: Albany Water Master Plan
Project No.: 2221130

REGISTERED PROFESSIONAL ENGINEER
62647PE
DIGITALLY SIGNED 2024.03.23 10:33:56 -07'00'
OREGON
NOV. 9, 1999
DAVID L. RUNNING
RENEWS: 12-31-2024

We have completed the requested geotechnical consultation for the preliminary evaluation of the Cheadle Lake Berm. This memorandum includes a description of our work, a summary of our observations, and a discussion of geotechnical considerations.

There are numerous values in geotechnical investigations that are approximate, including calculated values and measured lengths, heights, depths, and elevations, and strength measurements. For brevity, the symbol "±" is used throughout this memorandum to represent the words "approximate" or "approximately" when discussing approximate values.

BACKGROUND

The City of Albany (City) is currently updating their Water Master Plan. The work includes a Seismic Risk Assessment and Mitigation Planning for the critical water supply and distribution facilities to comply with OAR 333-061-0060(J). The seismic evaluation is focused on resilience in the event of a moment magnitude (M_w) 9 Cascadia Subduction Zone (CSZ) earthquake. The seismic hazards associated with this event are outlined in Open-File Report 0-13-06 prepared by the Oregon Department of Geology and Mining Industries (DOGAMI).

The City is the project owner and West Yost Associates (West Yost) is the design lead. West Yost retained Foundation Engineering, Inc. to be the geotechnical consultant. Our work scope was outlined in Task Order 29, dated October 3, 2022.

The focus of the geotechnical work was to identify seismic hazards in Albany and provide parameters for evaluating the resilience of the critical water facilities that include an intake structure, pump stations (PS's), water treatment plants (WTP's), and reservoirs. Critical components also include selected backbone pipelines.

Our geotechnical evaluation of seismic hazards focused on sites in or near the City of Albany. However, at the City's request, we also conducted a brief site reconnaissance of the ±4,400-foot long berm that separates Cheadle Lake from the Santiam-Albany Canal in Lebanon, Oregon. The canal represents one of the City of Albany's water sources. The focus of the current work is to observe the condition of the berm and to provide a conceptual evaluation of the potential geotechnical and seismic hazards associated with that berm. The berm location is shown in the Google Earth aerial photo in Figure 1 (attached).

We previously conducted a reconnaissance of the Cheadle Lake berm with City staff in May of 2015. The work included using a boat and waders to traverse that section of the canal to observe the overall condition of the berm and to look at problem areas the City staff had identified in their inspection the previous year. We also developed surface cross-sections of the berm at five locations. The problem areas include the following conditions:

- Dead trees
- Downed trees
- Erosion
- Undercut banks

The findings of that work were summarized in a memorandum dated August 4, 2015. One of the recommendations from that work was to conduct supplemental geotechnical work to evaluate the overall stability of the berm. The supplemental geotechnical work would include exploratory drilling through the berm at five locations to investigate the composition and condition of the berm material and foundation soil. Using the findings of the exploratory drilling, slope stability and seepage analysis would be completed to evaluate the risk of slope instability and piping. The recommended supplemental work has not been completed to date.

SITE RECONNAISSANCE

Dave Running (Foundation Engineering) visited the site with Ryan Beathe, P.E. (City of Albany) on January 26, 2023. Prior to our site visit, the water level in the canal was lowered below the normal water level to facilitate maintenance work at the hydro plant downstream. The lower water level allowed observation of the lower slopes of the berm. We used a boat and waders to traverse the Cheadle Lake segment of the canal. We also walked on the top of the berm within this segment. The focus of the work was to observe the current condition of the berm.

SITE OBSERVATIONS

The berm has an ±8- to 10-foot-wide asphaltic concrete (AC) paved walking trail on top. Photos 1 through 3 (attached) show the typical conditions along the pathway on the eastern segment of the berm (to the east of Point C in Figure 1). The eastern segment is generally narrower than the western segment. The slopes along the canal side of the berm typically range from ±0.8(H):1(V) to ±1.4(H):1(V). Photos 4 and 5 show some of the steeper slopes. The side slopes are vegetated with grass, blackberries, weeds, and several small trees. Larger trees up to ±2 feet in diameter also grow on the berm in some areas. We noted stumps from trees that had been previously cut down. Photo 6 shows a typical tree stump. We also observed a number of leaning trees, which have not been cut down. Photos 7 and 8 show typical leaning trees. Photo 9 shows a tree that had recently been felled into the canal from the opposite bank.

Erosion and vertical slopes are common at the toe of the berm. Undercutting of the banks was also observed in several areas below the vegetation line. Photo 8 and Photos 10 and 11 show typical undercut banks. The soil exposed on the eroded slopes consists of silt and gravel.

At the time of our visit, the water level in Cheadle Lake was about 4 feet above the water level in the canal. We observed areas with wet soil conditions on the lower canal bank extending ±1 to 1.5 feet above the canal water level. The wet soil appears to be associated with seepage through the berm. However, we did not observe any signs of flowing water or piping. Based on our 2015 observations of the vegetation lines on the canal and Cheadle Lake sides of the berm, we anticipate the typical head difference between the canal and lake is ±2.8 feet.

CONCLUSIONS AND RECOMMENDATIONS

Our observations during the January 2023 site visit indicated conditions that were generally consistent with the conditions we observed during our previous reconnaissance visit in May of 2015. We observed no indications of active instability on the berm slopes. The current slope stability can be attributed, at least in part, to the dense vegetation. We observed scour at the toe of the berm (below the vegetation line). The scour has resulted in undercutting of the banks in some areas. The scour appears to have occurred over a period of several years. We saw no indication of any rapid scour.

The typical subsurface profile in this area includes silt and sandy silt over silty and sandy gravel and cobbles. Our observations on the berm side slopes indicate the berm was likely constructed using soil taken from the excavations for the canal or lake. The berm fill is comprised of a combination of silt, sand, and gravel. Based on our observations in the bottom of the canal and our previous investigations in the area, we anticipate silty to sandy gravel underlies the canal, Cheadle Lake, and the berm. The gravelly soils are typically relatively permeable. Therefore, seepage beneath the berm and through the lower portion of the berm is likely.

The Cheadle Lake berm is relatively narrow and has side slopes ranging from ±0.8(H):1(V) to ±1.4(H):1(V). While the slopes do not appear to be currently unstable, these slopes are steeper than would normally be constructed with silty and gravelly soils. Although we have not conducted detailed analysis of the berm stability, we anticipate there is a risk of berm slope instability and breaching during a M_w 9.0 CSZ earthquake. Breaching of the Cheadle Lake berm would release a large volume of water into the canal, which could lead to flooding downstream. We recommend conducting additional geotechnical work including exploratory drilling and analysis to evaluate the stability of the berm for both static and seismic loading conditions.

It has been a pleasure assisting you with this phase of your project. Please do not hesitate to contact us if you have any questions or if you require further assistance.

NOTES:
1. AERIAL IMAGE OBTAINED FROM GOOGLE EARTH PRO.
2. SEE MEMORANDUM FOR A DISCUSSION OF SITE CONDITIONS.

Foundation Engineering, Inc.
Professional Geotechnical Services

PROJECT NO.	DATE:	DRAWN BY:
2221130	OCT 2023	DLR

CHEADLE LAKE BERM SITE LAYOUT

ALBANY WATER MASTER PLAN
LINN COUNTY, OREGON

FIGURE NO.
1

Photo 1. View of the berm at Point A (Figure 1) facing northwest.

Photo 2. View of berm at Point B (Figure 1) facing southeast.

Photo 3. View of berm at Point C (Figure 1) facing southeast.

Photo 4. Typical steep berm slope along canal facing west.

Photo 5. Typical steep berm slope along the canal facing southeast.

Photo 6. Stump of cut down tree facing west.

Photo 7. View of a leaning tree facing northwest.

Photo 8. View of a leaning tree facing northwest.

Photo 9. Felled tree facing northwest.

Photo 10. Erosion at the toe of the berm facing northwest.

Photo 11. Erosion at the toe of the berm facing northwest.

Appendix G

Canal Ancillary Facilities TM

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TECHNICAL MEMORANDUM

DATE:	March 22, 2024	Project No.: 519-50-22-21 SENT VIA: EMAIL
TO:	Ryan Beathe, PE, City of Albany	
CC:	Ian Jaffe, Brown and Caldwell, PE 99388	
FROM:	Alan Peck, Brown and Caldwell, PE 16289 and Jon Harper, Brown and Caldwell, PE 70738	
REVIEWED BY:	Mel Damewood, West Yost, PE 13672	
SUBJECT:	Condition Assessments - Santiam Albany Canal Ancillary Facilities	

REGISTERED PROFESSIONAL ENGINEER
16289PE
Alan Wallace Peck
OREGON
December 01, 1992
ALAN WALLACE PECK
EXPIRES: 12/31/2024

APPROVED BY: Alan Peck
Alan Peck, Brown and Caldwell, PE 16289

EXECUTIVE SUMMARY

Condition Assessments of Ancillary Canal Structures

As part of the 2023 Water Master Plan project, the West Yost /Brown and Caldwell (BC) project team performed visual (Level 1) condition assessments of the ancillary structures and facilities associated with the Santiam-Albany Canal (Canal) – facilities that control water flow and diversions, and those that provide fish screening and debris screening. This work is separate from the assessment of the power plant itself, which is included in a separate TM and covers the assessment of hydroelectric turbine and its operational performance and offers recommended improvements related specifically to the operations and maintenance of the power plant.

Canal Description

The Canal carries water supply for the Vine Street water treatment plant and Albany Hydropower Project. It flows from its point of diversion on the South Santiam River through the City of Lebanon, unincorporated areas of Linn County, and the City of Albany, before discharging to the Calapooia River just downstream of the hydropower plant and Vine Street water treatment plant. Primary structures located on the Canal are the fish screens and head gate structure, inline control structures, several minor diversions to supplement flows in existing streams, and the intake for the hydropower project in Albany.

Summary of Findings

The structures and facilities covered under this report are in generally excellent to good condition. The major facilities have been upgraded within the last 18 years. All facilities are functioning well, except for a few minor subsystems. SCADA communication and control implementation is not complete for all facilities, which causes added operations labor burden. Some minor safety improvements could be made at a few facilities. Most of the needs identified in this TM can be accomplished through normal annual operation maintenance and replacement budgets.

Two potential capital projects are identified:

1. Possible removal of the Lebanon Flow Control Facility. Further details on this assessment are included in the Santiam-Albany Canal Bank Condition Assessment TM.
2. Installation of added security fencing and/or fall protection. The estimated budget for this work is $65,000 and the locations are as follows:
    a. Crown Zellerbach gates
    b. Albany Gates
    c. Periwinkle Creek Diversion
    d. 34th Avenue Debris Screen
    e. Vine Street intake bar screen

OVERVIEW AND PURPOSE

The subject of this Technical Memorandum (TM) is the ancillary facilities along the Canal. Ancillary structures and facilities along the Canal include those that facilitate control of water flow and diversions, and those that provide fish screening and debris screening. The location of these facilities on the Canal is shown in Figure 1.

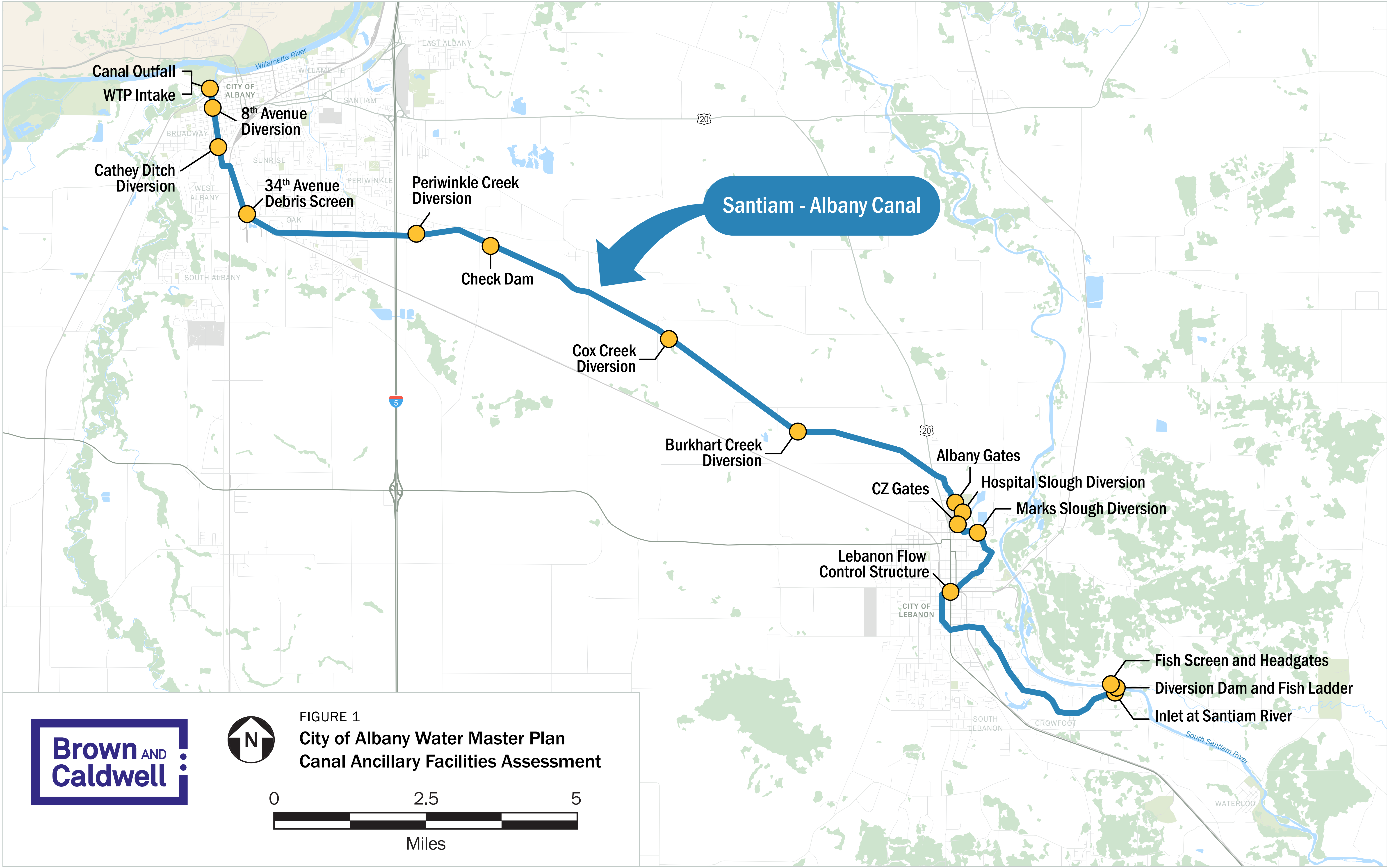
The Canal provides raw water supply to the Vine Street water treatment plant and water for the hydropower plant. The Vine Street water treatment plant provides slightly over half of the City's maximum water treatment capacity. The Canal also serves to supply water for a variety of non-municipal water rights.

The City of Albany has conducted regular studies and assessments of the Canal and associated facilities in accordance with Federal Energy Regulatory Commission (FERC) requirements. Various improvements have been implemented on the Canal and its ancillary facilities as well as the hydropower system in the years since the Water Facility Plan was last updated in 2004. With the initiation of the current effort to update the Water Master Plan, the City is updating condition assessments for all these facilities which are vital components of its water system.

Canal and Hydro Condition Assessments Scope

The 2022-2023 City of Albany Water Master Plan project includes Canal and hydropower facilities condition assessments, as follows:

1. Assessment of the ancillary facilities along the Canal.
2. Assessment of the slope stability along the Canal (completed under separate TM).
3. Assessment and review of the City's hydroelectric turbine generator and powerhouse equipment with an operations and maintenance review (completed under separate TM).



Brown AND Caldwell

FIGURE 1

City of Albany Water Master Plan
Canal Ancillary Facilities Assessment

The overall objectives of the condition assessments are:

- A clear and concise description of the existing state and condition of the related infrastructure.
- How the components of the canal, intakes and hydropower facilities meet existing regulatory requirements.
- Recommendations of upgrades or remedial work to bring the infrastructure into satisfactory condition and regulatory compliance.

Canal Description

The Canal carries water supply for the Vine Street water treatment plant and Albany Hydropower Project. The Canal is an 18-mile long, earthen canal that flows from its point of diversion on the South Santiam River through the City of Lebanon, unincorporated areas of Linn County, and the City of Albany, before discharging to the Calapooia River just downstream of the hydropower plant and Vine Street water treatment plant. The Canal also provides water for irrigation and agricultural activities. Primary structures located on the Canal are the fish screens and head gate structure located at the diversion from the South Santiam River, two inline control structures in Lebanon, several minor diversions to supplement flows in existing streams, and the intakes for the hydropower project in Albany.

ANALYSIS METHODOLOGY

The analysis was performed as follows, in accordance with the **Condition Assessment Work Plan** prepared by West Yost as part of this project (September 23, 2022.).

The BC team performed the following steps in these Assessments. This approach is consistent with a Level 1 Assessment methodology as required by the Scope of Services.

1. Reviewed existing information:
   a. 2004 Water Master Plan.
   b. Evaluations performed by the City to meet FERC requirements.
   c. Other studies on the Canal and its structures.
   d. As-built drawings of the upgrades to Canal structures built between 2004 and 2022.
2. Developed plan, schedule and forms for the visual Assessments.
   a. The Assessments of these facilities are limited to site-civil, process mechanical, and structural observations.
3. Performed the visual Assessments:
   a. Visit each site with City staff.
   b. Interview City staff about operation and functionality of facilities.
   c. Observe condition and functionality of civil, mechanical and structural components.
   d. Identify regulatory issues related to the facility, if applicable.
   e. Identify apparent deficiencies or issues requiring attention.

4. Score the facilities on a standard form:
    a. Assign ratings of 1 = excellent, to 5 = needs immediate attention and/or is non-functional, to each major component of the facility. The physical scoring criteria are more completely described in the **Condition Assessment Work Plan.**
    b. The standard assessment form was tailored for the Canal facilities which have many different components than the distribution system facilities.
5. Identify project needs and budgets that should be included in a Capital Improvement Program that will result from this Water Master Plan.

ANALYSIS RESULTS

A summary of the structures assessed is given below in Table 1. Figure 1 shows the locations along the Canal.

Table 1. Summary of Canal Structures Assessed

Structure	Primary Function	Secondary Function(s)	Year of most Recent Upgrade
South Santiam Diversion Dam	Control river level at diversion	Fish passage	2005
Canal Inlet	Control flow at diversion	Fish screening, fish passage	2005
Lebanon Flow Control Structure	Level control in canal, but may not be needed		2009
Marks Slough Diversion	Diversion from Canal	Fish exclusion	2017
Crown Zellerbach Gates	Level control in canal		2017
Hospital Slough Diversion	Diversion from Canal		2020
Albany Gates	Level control in canal		2009
Burkhart Creek Diversion	Diversion from Canal		2006
Cox Creek Diversion	Diversion from Canal		2006
Periwinkle Creek Diversion	Diversion from Canal		2006
34th Avenue Debris Screen	Screen debris from canal		2010
Cathey Ditch Diversion	Diversion from Canal		2008
8th Avenue Diversion	Diversion from Canal		2006
Vine Street WTP Intake and Canal Outfall	Diversion from Canal for drinking water and hydropower	Debris screening; Outfall into Calapooia River	2011

South Santiam River Diversion Dam and Canal Inlet

The South Santiam River Diversion Dam and the Canal Inlet were both extensively upgraded in 2005, and are in good condition, and functioning well.

Overall rating – 2 (See field assessment sheets for detailed ratings of each component).

- The hydropneumatics tank and pump system for washdown water is non-functional. Pumps keep burning out and the City staff is not using it.
- The fish screens meet NOAA criteria (See Figure 2). The baffles are adjusted every 5 years and a flow test performed. The screens function well.
- The gate actuators were recently replaced by Beck actuators and are considered very reliable.
- Concrete masonry building and cast-in-place structures present minor evidence of degradation, consistent with the age of the structures. This includes minor cracking at/around the concrete structures as well as rusting at bolt locations.

Figure 2. Fish Screens at Canal Inlet

Lebanon Flow Control Structure

The Lebanon Flow Control structure was used to control flow and level at the City of Lebanon's old water treatment plant (WTP). With the relocation of the Lebanon WTP this facility is not needed.

Overall Rating – 2 to 3

- Reinforced concrete structure, including diversion walls, elevated slabs and slabs-on-grade present minor/moderate evidence of degradation. Existing coatings at this location are failing. General maintenance and monitoring of cracks should be implemented if this facility is intended to be used for an extended period of time.

Marks Slough Diversion

The Marks Slough Diversion (see Figure 3) was upgraded in 2017 and is in good condition and functioning well.

Overall Rating – 2 to 3

- Slide gate, diversion weir, and access platform are in good condition.
- Fish upstream exclusion screen is in good condition and functions well.
- Access was limited for structural observation at this location. Reinforced concrete structure presents minor/moderate evidence of degradation. Minor cracking, general concrete erosion and rusting at select steel members was noted. The score range was extended to a 3 to account for general maintenance and monitoring of cracks that should be implemented if this facility is intended to be used for an extended period.

Figure 3. Mark’s Slough Diversion

Crown Zellerbach Gate

The Crown Zellerbach Gate structure was upgraded in 2017 and is in good condition and functioning well. Some minor concrete cracking and spalling observed.

Overall Rating – 2

- Very minor spalling of concrete at select locations at structure was noted. Structure noted to be in good condition besides these very minor observations.

Hospital Slough Diversion

The Hospital Slough Diversion was built over an old structure with concrete and steel in the wing walls and 2 piers that were cased and are over 50 years old. Minor repairs were completed in 2020 and City staff have commented that the facility functions well. It is very simple and robust and is entirely manually operated. It requires almost no O&M attention other than occasional debris removal.

Overall Rating - 2 to 3

- Aged but robust and functional. Potential exists for future upgrades just due to age of the majority of the structure.

Albany Gates

The Albany Gate flow control structure was upgraded in 2008 (see Figure 4).

Overall rating - 2 to 3

- The gate actuators are EIM. Spare parts are hard to obtain, according to City O&M staff.
- The gates cannot be controlled by SCADA system. Additional equipment is needed for remote control.
- Very minor spalling and cracking of concrete at select locations at structure was noted. Structure noted to be in good condition besides these very minor observations.

Figure 4. Albany Gates

Burkhart Creek, Cox Creek and Periwinkle Creek Diversions

The Burkhardt Creek, Cox Creek (See Figure 5) and Periwinkle Creek Diversions were constructed in 2013 and are small diversions that supplement flows in the respective streams. They are used seasonally. All operation is manual.

Overall rating 2 to 3

- SCADA links are not working so the O&M staff must visit the sites to collect flow data.
- The bar screens were intended to be cleaned manually, but the sites are too remote to make this feasible. The bar screens have been removed; however, they are not needed.
- The Periwinkle Creek flow diversion is adjacent to a suburban residential area. Fencing the area may help prevent damage and vandalism.

Figure 5. Cox Creek Diversion

34th Avenue Debris Screen

Constructed in 2010, the 34th Avenue Debris Screen structure is a large bar screen that collects trash and debris and is cleaned off by a small excavator left on-site.

Overall rating - 2

- O&M staff are very satisfied with the functionality of this facility.
- Although it is relatively remote, there is nothing to exclude public access. Fencing the area may be advisable as the is a side with no railing on the walkway at the top of the screen and there is an open water hazard.
- Very minor spalling and cracking of concrete at select locations at structure was noted. Structure noted to be in good condition besides these very minor observations.

Cathey Ditch Diversion

Cathey Ditch Diversion is a small, manually operated diversion that was constructed 2013.

Overall rating – 2

- Functioning adequately. Improvements could be made but are unlikely to justify the cost.

8th Avenue Diversion

8th Avenue Diversion is a very small diversion that incorporates parts of an old diversion structure. The flow is very low (1-2 cfs) and its relative importance is low.

Overall rating – 3

- Functioning adequately. Improvements could be made but are unlikely to justify the cost.

Vine Street WTP Intake and Outfall

Vine Street WTP Intake and Outfall to the Calapooia River date back to 1912 and have been upgraded over the years. The most recent upgrade added a traveling screen at the WTP intake (2011). The site is secured by fencing and all components are in good condition and functional.

Overall Rating – 2

- The outfall channel is concrete dating to 1912 but appears in good condition.
- The radial gate (see Figure 6) was structurally analyzed in 2016 and found to be satisfactory.
- There is an open water hazard where the bar screens are cleaned manually with a rake. Fall protection for this activity is recommended.
- Minor spalling, cracking and general degradation of concrete at select locations at structure was noted. Structure noted to be in good condition besides these very minor observations.

Figure 6. Vine Street Radial Gate Operator and Outfall

ANALYSIS FINDINGS AND CONCLUSIONS

Generally, all these structures are recently built, recently upgraded, or have been well maintained. There are no serious deficiencies, and all facilities are functional.

The following issues should be considered for inclusion in O&M or capital projects:

1. If Lebanon Flow Control Structure is found to be unnecessary through hydraulic analysis of the canal, then it could be abandoned or modified so that no active operation and no maintenance is required.
2. The following facilities could benefit from security fencing, or additions to existing fencing and site protection:
    a. Crown Zellerbach Gate Structure
    b. Albany Gates
    c. Periwinkle Creek Diversion
    d. 34th Ave. Debris Screen

3. The following facilities would benefit from completion of SCADA, remote control, and/or remote sensing implementation. This could reduce operating costs.
    a. Albany Gate Structure
    b. Burkhart, Cox and Periwinkle Creek Diversions
4. Fall protection should be considered for O&M staff in places where there is an open water hazard and no railings. The Vine Street bar screen is one such location.
5. The most troublesome issue at these structures appears to be the failure of electric slide gate actuators and inability to obtain spare parts for them. This would apply to Crown Zellerbach Gates and Albany Gates. The City should consider the replacement of these actuators if the failures persist and if spare parts remain unavailable.

CAPITAL IMPROVEMENTS AND COSTS

The addition of security fencing and fall protection for the sites noted above could be included in a capital project. The summary of needs and budgets is given in Table 2.

Table 2: Fencing and Fall Protection Capital Project for Canal Facilities: Budget

Location	Item	Amount	Budget, dollars
Crown Zellerbach Gate Structure	Chain link fence extension on canal bank	10 linear feet anchored to structure	2,000
Albany Gates	Chain link fence enclosure NE and SW banks of canal	130 feet, vehicle gate on NE side and personnel gate SW side	11,000
Periwinkle Creek Diversion Structure	Chain link fence enclosure north bank of canal surrounding the diversion structure	100 feet with vehicle gate	10,000
34th Avenue Debris Screen	Chain link fence enclosure NE and SW banks of canal	150 feet, vehicle gate on NE side and personnel gate SW side	12,000
Fall protection at Vine Street Intake bar screen	Stainless steel railing, removable if necessary, and tie-off points for safety harness	20 feet	5,000
		Construction Cost Total	**$40,000**
Engineering, administration, and legal allowance	Allowance for survey included	30 percent	12,000
Contingency		30 percent	12,000
		Capital Cost Total	**$64,000**

Appendix H

Hydropower Condition Assessment TM

WEST YOST
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Canyon Hydro

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TECHNICAL MEMORANDUM

DATE: March 19, 2024

Project No.: 519-50-22-21
SENT VIA: EMAIL

TO: Ryan Beathe, PE #76553, City of Albany

FROM: Matt Mueller, Canyon Hydro

REVIEWED BY: Brett Bauer, Canyon Hydro
Mel Damewood, PE #13672, West Yost

SUBJECT: City of Albany – Vine Street Hydroelectric Turbine Condition Assessment

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EXECUTIVE SUMMARY

Overview and Purpose

The City of Albany's (City) Vine Street hydroelectric turbine has been in operation for approximately 13 years. Only the limited maintenance recommended at the time of installation has been completed and no major maintenance or overhaul of the unit has been done. Canyon Hydro was contracted to perform an assessment of hydroelectric turbine and its operational performance and offer recommendations for future overhaul work and maintenance to ensure the unit is performing to its greatest potential, thus maximizing generation revenue for the City.

Analysis Methodology

Observations for the assessment were taken over the course of two trips. The initial trip consisted of a general inspection of the system, including components from the trash rack, downstream to the draft tube. Visual inspections of the major powerhouse systems were completed and documented though notes and photographs. Several operations staff from the City were on site during the initial assessment effort to offer their observations gathered from years of operating the unit.

Following the initial visit, the City contacted Canyon Hydro for further assessment and advice regarding observed binding and/or decreased operational range of the wicket gates. The operational fault in the wicket gate system was not allowing the wicket gates to fully open which was resulting in a reduction in power generation. A second site visit was conducted to further assess the condition of the wicket gates and to provide assistance and direction during an effort to employ a temporary solution to the problem and increase the operable flow range. This effort was largely successful, and the City was able to utilize the maximum allowable flow for power generation. During this visit, a closer look was taken at the possible root cause of the operational issues in the wicket gate system. Individual linkages within the wicket gate system were assessed for smooth and proper operation which helped to pinpoint the source of the binding. In the weeks that followed the second visit, the functioning of the wicket gates has decreased back to the limited condition that existing before the temporary fix allowed for full use of the available flow.

Analysis Results

The observations of the turbine's condition and operability generally indicate that the unit is not performing as it should for a turbine of its age. The primary issue affecting operability and turbine performance appears to be located within the wicket gate system. Specifically, this issue appears to originate from the material selection of the wicket gates themselves in combination with the greaseless design of the operating system. The wicket gates appear to be of carbon steel while the bushings appear to be of bronze with graphite inserts. The carbon steel wicket gates show signs of significant corrosion and scaling. Through years of use, it is thought that corrosion of the wicket gate journals, and possibly debris entry into the journals, has caused damage to bushings and/or journals. The result of this damage is increased torque required to operate the wicket gates and binding.

Through observations and assessment, it has been verified that the binding in the systems is likely occurring within the wicket gate bushings. It also appears that there is some contact and wear between the headcover and bottom ring facing plates or "cheek plates". The exact extent of the damage or wear within the system was unable to be verified as it would have required significant disassembly.

In addition to the major finding with the wicket gates, several other lesser issues were observed that, if addressed, may improve reliability, operability, and total yearly generation of the unit. These issues involve the ancillary systems of the turbine including the trash rack, flow meter, Hydraulic Power Unit (HPU) and controls system. Generally, each one of these components' functionality is compromised in some form or another which appears to lead to unnecessary down time or maintenance and therefore lost generation for the City. Each one of these components is discussed in detail in the proceeding assessment.

In addition to the physical assessment, a review of the operational data was performed to assess average turbine performance and utilization of water resources. Operational data was provided for a time period spanning approximately 7 years, beginning February 2016 and ending December 2023. In summary, the average system efficiency was found to be approximately 60 percent. This efficiency is significantly lower than should be expected. In general, hydroelectric systems of this size and output should show combined peak efficiencies (turbine and generator) of approximately 86.5 percent.

In addition to the combined efficiency analysis, the Turbine Utilization Rate and Turbine Flow utilization rate was calculated. The Turbine Utilization Rate was found to be approximately 82%. This value is a measure of instances in which the turbine can be operating, compared to when the turbine is in operation. The Turbine Flow Utilization rate was found to be approximately 58.8%. This value is a measure of total flow available to the turbine, compared to the total flow that has passed through the turbine. Optimizing system efficiency, turbine utilization and flow utilization has the potential to maximize revenue from hydro operations. Further details of this analysis can be found in the following section.

ANALYSIS FINDINGS AND CONCLUSIONS

Wicket Gates and Bushings

After performing the general assessment activities described above, the source of the binding in the wicket gate system was better estimated. The unit was partially disassembled to completely isolate each wicket gate from the operating mechanism. Upon individually actuating each wicket gate, restricted and difficult movement of the gate shaft was observed. Further investigation revealed contact between the wicket gates and the upper and lower cheek plates within the turbine, possibly caused by debris and/or scale on the surface of the gates. High pressure water was used to clean this area of debris as best as possible, however interference still remained. Overall, this effort helped to temporarily decrease the required wicket gate actuation torque a small amount, but as mentioned , subsequent attempts to generate power have found that the wicket gates are again now functioning at a severely reduce capacity.

Due to the apparent carbon steel construction of the wicket gate, it is likely that additional corrosion or scaling is present on the wicket gate bearing journals. Over time, the wicket gate bearing journals have corroded or become damaged by this scale or debris. This in turn can cause damage to the wicket gate bushings which results in binding and difficult actuation. Furthermore, this turbine is operated seasonally and spends extended periods of time in a de-watered condition, exposing the wetted components to atmosphere. It is probable that this extended dry period allows for further corrosion of the gate journals and gate ends, exacerbating the problem. Operators at the City have observed increased force required to move the gates following startup after an extended shutdown which indicates this to be true.

Several solutions exist to return the wicket gate system to a well-functioning system. The most robust solution would be to manufacture new wicket gates from a corrosion resistant alloy such as stainless steel, as well as manufacture new greaseless wicket gate bushings which contain a seal to better isolate debris from the system. Other solutions include installing stainless steel sleeves onto the existing wicket gate journals along with new greaseless wicket gate bushings. The sleeve technique comes with some risk due the decreased base metal diameter and related increased stress. Estimated costs for these options are provided below.

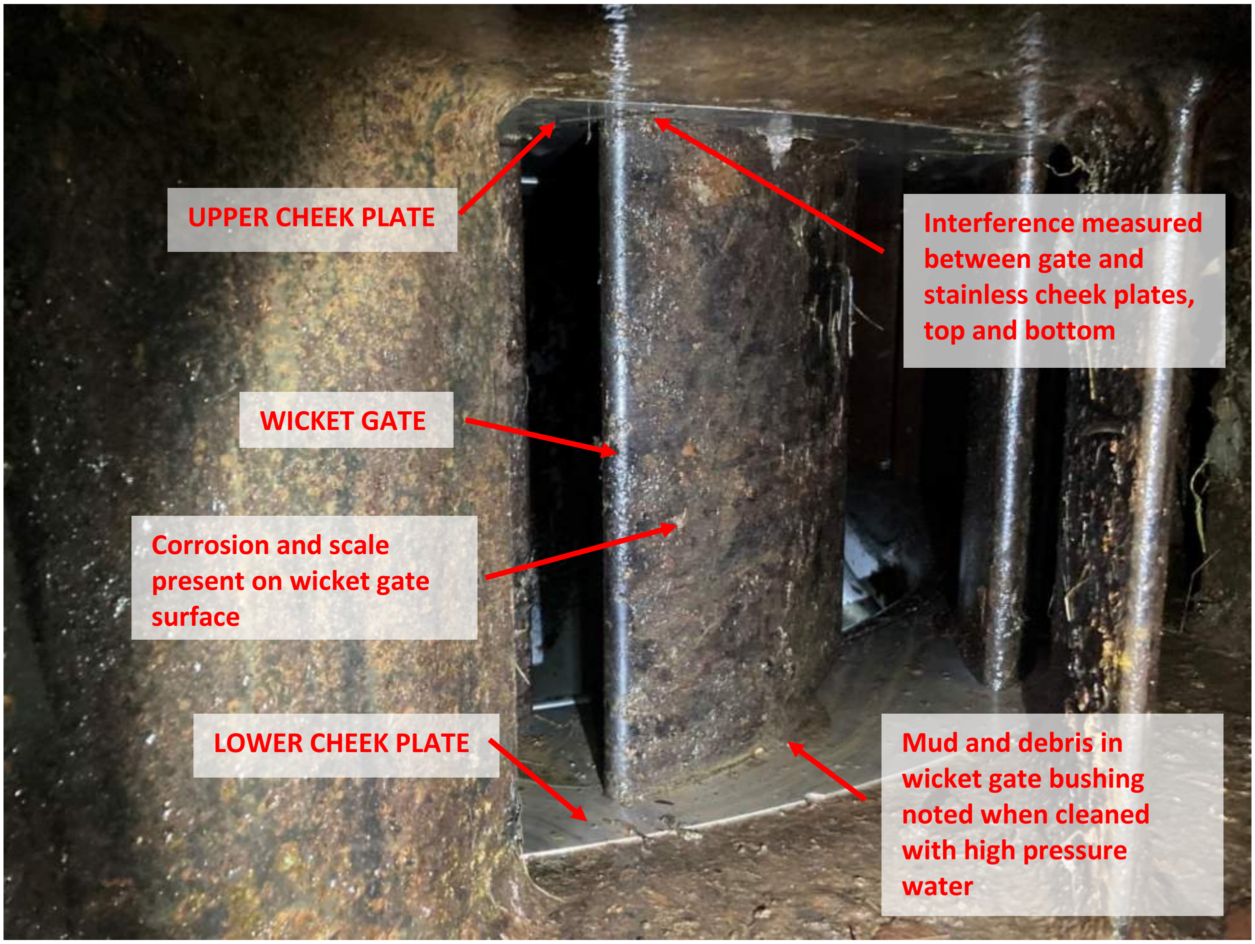

Figure 1. Typical View of the Wicket Gate Showing Corrosion on the Blade Surface and General Locations of Interference and Probable Binding

Trash Rack

Through observations within the turbine and conversations with the site operators, possible improvements may be considered for the trash rack in order to improve function, maintenance, and downtime. This discussion is outside of the original scope for this Technical Memorandum (TM).

First, heavy debris loading on the trash rack can result in unplanned unit shut down. Clearance between the trash rack screen and the concrete walkway immediately up stream can cause large pieces of debris to bind the mechanism and/or require unit shut down for maintenance. Secondly, the trash rack currently cycles on a timed basis. Occasionally debris loading on the trash rack is great enough to restrict flow through the screen before the next cleaning cycle and prompt a unit shut down due to low forebay head level. The direct result of both of these occurrences is lost generation and increased maintenance costs.

It is recommended that a cost benefit analysis be done to determine if moving the trash rack slightly down stream could be a viable solution to alleviate problems associated with removing large debris from the forebay. An alternate approach could involve installation of a finer screen upstream of the trash rack and/or a boom to direct large floating debris away from the turbine intake. Further, it is recommended that either the timing on the trash be adjusted to allow for more frequent cleaning, or that the trash rack be actuated by a signal from the controls based on forebay head level.

Figure 2. A View of the Upstream Side of the Trash Rack Showing Little Clearance for Large Debris Removal

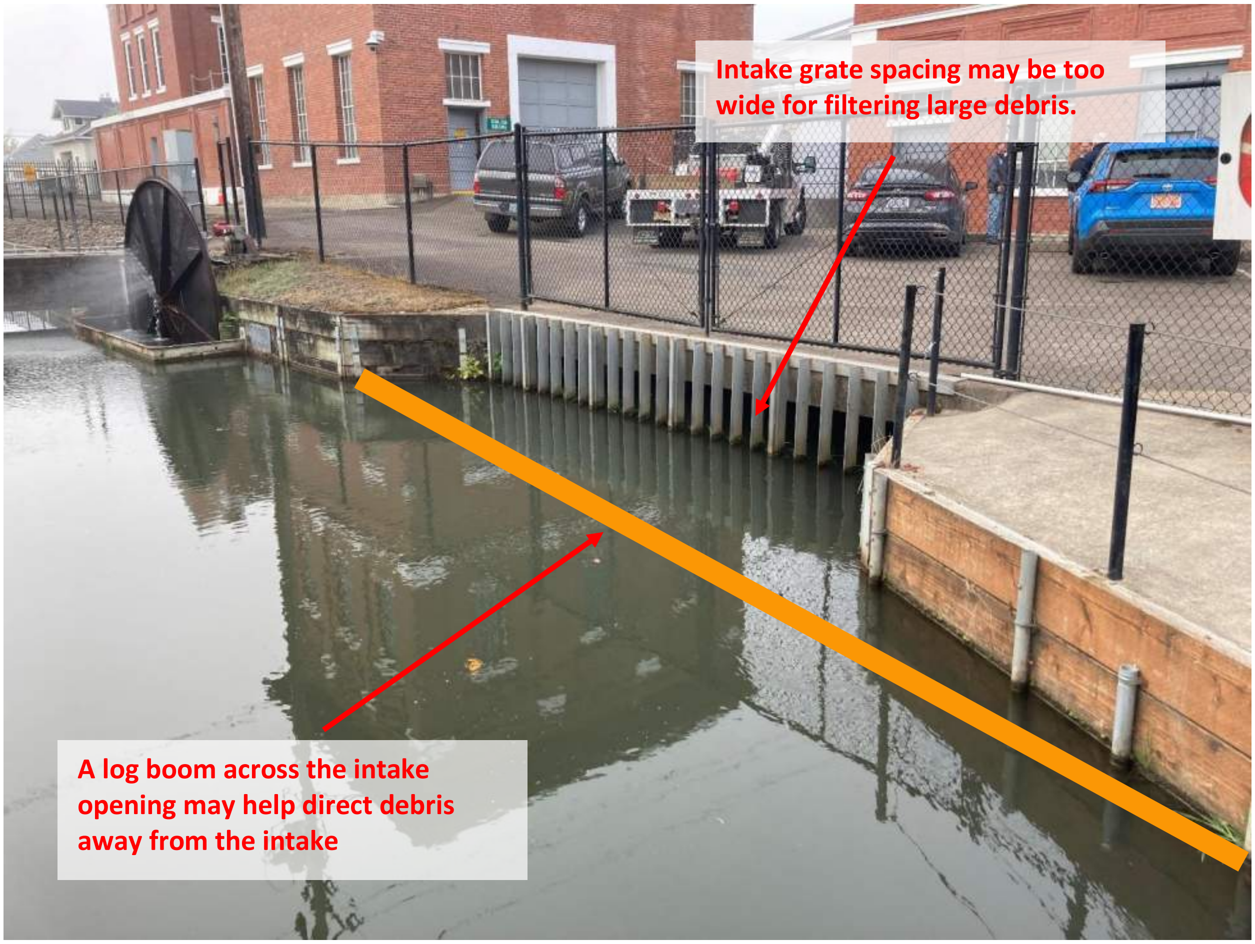

Figure 3. A Closer Intake Grate Spacing and/or Boom to Direct Large Debris Away from the Turbine Intake may Result in Fewer Outages Due to Required Trash Rack Maintenance

Flow Meter

Through reports by operations personnel, it is understood that the flow meter which is currently installed on the penstock has a tendency to foul quickly after unit re-start. When this occurs, flow measurements from the device are no longer reliable. Flow measurements are a useful tool to help determine turbine performance and ultimately optimal turbine settings that maximize generation. Different flow measurement technologies exist, such as ultrasonic flow meters, which may be better suited for this application. These types of meters attach to the exterior of the pipeline and are generally unaffected by occasional debris in the pipeline. It is recommended that a cost benefit analysis study be completed to determine is replacement of the current flow meter with one less prone to fouling would make sense for continued operation.

Turbine Inlet Valve (TIV)

The function of the turbine inlet valve did not appear to be compromised. Reports from City operators indicated that the TIV hydraulic cylinder has been recently re-furbished to mitigate oil leakage. Communication received after flow testing indicate that the TIV functions properly. There are no recommendations for improvements to the TIV at this time.

Turbine Spiral Case Cleanout

Observations taken in the spiral case indicate that quite a bit of debris passes through the turbine. It is apparent that cleaning the smallest portions of the turbine case of debris is problematic due to the small size of the piping in that area and cramped working conditions. It is recommended that a cleanout flange be installed in the spiral case to facilitate access to this area for removal of debris and inspection.

Figure 4. Approximate Location of the Recommended Cleanout Flange Location on the Spiral Case

Turbine Bearing Cooling Water Piping

Cooling water for the turbine bearing was observed to be discharging directly onto the turbine headcover. This condition appeared to be contributing to coating failure and corrosion of the headcover and surrounding components. It's possible this could also be contributing to corrosion of the wicket gates shaft in the upper wicket gate bushing journal and ultimately difficult operation of the wicket gates. It was recommended that the cooling water discharge be directed away from the turbine and to a properly configured drain to handle the process water. The City staff has since rerouted the cooling water away from the Turbine.

**Figure 5. Turbine Bearing Cooling Water Discharge Location.
Flooding of Turbine Headcover and Spiral Case is Visible**

Hydraulic Power Unit (HPU)

Observations of the HPU indicate some design/build characteristics which make it unintuitive to use and maintain. Easily identifiable labels and pressure gauges showing specific hydraulic circuit locations and pressure are not present on the machine. Presence of these features helps operators perform maintenance, testing and troubleshooting. Additionally, it is apparent that the hydraulic pump/s run continuously during operation of the turbine. Schematics document the motor rating at 5 kilowatts (kW), which is approximately 1 percent of total maximum rated output. Other common HPU designs include a control scheme where the electric motor/s only run when needed, thus saving a considerable amount of energy over the lifespan of the unit. It is recommended that the current HPU be replaced with one of newer design that includes these features.

Turbine Controls

In general, the controls system at the plant appears to be in working order. There are, however, several project specific peculiarities that make the human machine interface (HMI) un-intuitive to operate and appear to be sources of confusion. In general, a lack of specific knowledge relating to control system architecture and function was observed. Original project documents provided by the manufacturer can also be confusing and unintuitive to use. Both knowledge of the system details and clear documentation help during troubleshooting and maintenance to reduce downtime. It is recommended that the controls system be reviewed by a professional and that a training session be held to familiarize the users with the architecture and operation of the system. Specific details relating to the control scheme and turbine control optimization can be investigated at this time as well.

OPERATIONAL DATA ANALYSIS

Operational data was provided from the hydroelectric plant from February 2016 through December 2023. The dataset included several readings, including Santiam flow, canal flow, calculated turbine flow, net head, Calapooia level, and generator power output. Using these readings, the turbine performance and flow utilization was assessed over this time period.

Original specifications and OEM data indicate a rated turbine output of 500 kW at a rated net head and flow of 36 feet and 190 cubic feet per second (cfs), respectively. Minimum operable turbine flow is stated to be 75 cfs. At rated net head and flow, an expected turbine efficiency of approximately 86.5 percent was calculated. This turbine efficiency is approximately 4.5 percent lower than expected for a unit of this size and output.

Analyzing the operational data, the combined efficiency of the system was further assessed. Examining the relationship between recorded system output, net head and flow, an average combined system efficiency of approximately 60 percent was observed. Given the expected efficiency from the rated values above (86.5 percent) and an assumed generator efficiency of 95 percent, a combined turbine efficiency of approximately 82.2 percent is expected. As can be seen, the expected efficiency is much greater than the average measured efficiency. This indicates that either the turbine is incorrectly designed for the site conditions or that there is a discrepancy in the measured head, flow and power data that would result in inaccurate reporting of efficiency.

In addition to this analysis, a preliminary design of a new turbine runner and wicket gates was performed in an effort to estimate the performance increase that could be expected with these re-designed components. The preliminary analysis shows a peak estimated turbine efficiency of 91 percent. Again, assuming a generator efficiency of 95 percent, the combined peak efficiency with a newly designed runner and wicket gates was estimated at approximately 86.5 percent. In broad terms, this indicates that energy generation can be improved anywhere from 4.3 percent to 26.5 percent with a newly designed runner and wicket gates.

In addition to the above analysis, a Turbine Utilization rate and Turbine Flow Utilization Rate were calculated given the operating parameters of the turbine. Minimum flow for turbine operations on the Santiam was set at 1280 cfs, in correlation with the Headgate Operations Flow Control Scheme. The minimum and maximum tailwater levels (Calapooia Level) for operation were defined as 3 ft and 14 ft, respectively. Given these operating parameters, each data point was examined to determine if conditions were met for operation. Examining the dataset, the number of instances were identified where the Santiam flow and the Calapooia Level allowed for operation. During this same period of record, the number of instances where the turbine was indeed operating was further identified. Taking the number of instances where the turbine is operating, divided by the number of instances where conditions allow for turbine operation defines the Turbine Utilization Rate at approximately 82 percent.

To provide some additional resolution of the how the available flow is being utilized, further analysis was performed to estimate the Turbine Flow Utilization. For this part of the analysis, it was assumed that for all Santiam flows at or above 1340 cfs, the flow available to the turbine is 190 cfs. This assumption does not take into account the transient period where Santiam flows are between 1340 cfs and 1280 cfs and turbine flows are stepped down as the unit comes offline. It is estimated that the turbine operates under this control scheme less than 5 percent of the time, which represents a very small proportion of the total operating time. Additionally, it should be noted that the turbine flow value given in the dataset is a calculated value. This calculation was originally provided by C.F. Malm and continues to be used. It is reasonable to believe that the flow calculation is an estimate and error in the calculation has previously been noted by C.F. Malm. Without additional flow testing, the accuracy of the flow calculation cannot be verified. For the purposes of the TM, the calculated flow value was used as-is and has not attempted to make corrections to the recorded values. To calculate the Turbine Flow Utilization, the dataset was examined per the Santiam and Calapooia operating parameters described above and calculated the total flow through turbine during the period of record. The Turbine Flow Utilization Rate was calculated by taking this value, divided by the total flow available to the turbine and found to be approximately 61.6 percent.

Examining the utilization rates, it can be seen that it may be possible to make improvements to maximize turbine up time and take advantage of the flow available to the turbine. Maximizing the utilization rates will directly impact generation revenue. It is recommended that additional analysis be completed to determine the root causes of turbine down time and low turbine flow when the operating conditions would otherwise allow for increased generation.

CAPITAL IMPROVEMENTS AND COSTS

At this time, costs are provided associated with the capital improvements recommended in this technical memorandum as described in Table 1 below. Estimated costs below are in US Dollars (USD) as of March 2023. Costs associated with recommendations pertaining to the Trash Rack, addition of a debris deflection boom, or addition of an ultrasonic flow meter are not provided. These specific items fall outside of the typical scope of work and thus are not included. It is recommended to contact a civil contractor for cost estimates relating to modification/addition of this equipment.

OPERATIONS AND MAINTENANCE (O&M) COSTS

For operation and maintenance, it is assumed that the City operators will regularly check on the unit to monitor condition of bearings, seals, cooling system, etc. Personnel costs are not included in the subsequent discussion.

Once the recommended improvements are complete, it is suggested that the minimum effort should be an annual inspection. The intent is to track baseline conditions annually to predict upcoming maintenance. A budget estimate for an annual inspection and report is $20,000.

In addition to the operators’ regular checks and the annual inspection, the City may expect the unit to require approximately $15,000-$20,000 per year of service.

Table 1. Estimated Costs Associated with Capital Improvement Recommendations[a], dollars

Project Number	Project Name	Project Purpose and Description	Estimated Construction Costs, dollars	Total Capital Costs[b], dollars
N-H-1	Vine Street Hydropower Generator Inspection & Contingency	The generator requires inspection and should come before the utilization analysis to assess any further upgrades required for operation. This project includes the inspection, approximately $40,000, and contingency , approximately $400,000, for possible recommended upgrades.	NA	440,000
N-H-2	Vine Street Hydropower Operational Data and Turbine Utilization Analysis	Preliminary evaluation indicates that energy generation can be improved anywhere from 4.3 percent to 26.5 percent with a newly designed runner and wicket gates. Additionally, the turbine is running approximately 42 percent of the time at which enough flow is available for operation. Additional analysis is recommended to determine the root causes of turbine down time when canal flow would otherwise allow for generation.	NA	8,500
N-H-3	Vine Street Hydropower Combined Upgrades	The combined upgrades are grouped together because they all require the disassembly and reassembly of the turbine. Upgrades include wicket gate replacement, bearing replacement, and spiral case flange for cleaning. It also includes the inspection, blasting, and coating of the interior of the turbine and contingencies for welding repairs, approximately $100,000, and shop repairs, approximately $75,000.	1,120,000	1,790,000
N-H-4	Vine Street Hydropower Hydraulic Power Unit.	The HPU has some design/build characteristics which make it unintuitive to use and maintain. It is apparent that the hydraulic pump(s) run continuously during operation of the turbine while other HPU designs run only when needed, thus saving a considerable amount of energy over the lifespan of the unit. It is recommended that the current HPU be replaced with one of newer design.	163,000	261,000
N-H-5	Vine Street Hydropower Turbine Personnel Training	The controls system has several project specific peculiarities that make the human machine interface (HMI) un-intuitive to operate and appear to be sources of confusion. It is recommended that the controls system be reviewed by a professional and that a training session be held to familiarize the users with the architecture and operation of the system.	NA	8,500
N-H-6	Vine Street Hydropower Intake and Trash Rack Evaluation	It is recommended to perform further investigation of the hydropower intake and trash rack for the potential to improve generation time and decrease maintenance costs.	NA	15,000
		TOTAL	**$1,283,000**	**$2,523,000**

(a) Costs are based on March 2023 ENR CCI of 15,107 (Seattle).

(b) Capital Costs include a 30 percent contingency markup and a 30 percent engineering, legal and administrative markup.

Appendix I

Condition Assessment Findings TM

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Water. Engineered.

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TECHNICAL MEMORANDUM

DATE: April 9, 2024

Project No.:519-50-22-21
SENT VIA: EMAIL

TO: Ryan Beathe, PE, City of Albany

CC: Allan Goffe, ACE Engineering, PE #64239
Jim Cook, BC, PE #15467
Jon Harper, BC, PE #70738

FROM: Timothy Banyai, CA PE #60715

PREPARED BY: Noelle Drath, PE #94519

REVIEWED BY: Walt Meyer, PE #10945
Mel Damewood, PE #13672

SUBJECT: Albany Condition Assessment Findings Technical Memorandum

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15467PE
Jim Cook
OREGON
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EXPIRES: 12/31/2025

REGISTERED PROFESSIONAL ENGINEER
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Noelle Drath
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MAY 10, 2022
NOELLE E. DRATH
EXPIRES : 12/31/2025

EXECUTIVE SUMMARY

This condition assessment was completed for the City of Albany (City) to assess and score the condition of the existing water treatment plants, pump stations, and reservoirs included in the City's water system. The condition assessment informs the City of assets that need repair or replacement. Ultimately, the condition assessment will provide information to help build a list of capital improvements projects for the Water Master Plan.

The results of the condition assessment show that the City takes good care of its assets by performing routine maintenance and addressing performance concerns in a timely manner. The Albany Millersburg (AM) Water Treatment Plant (WTP) was installed in 2008 and is now 15 years old. Overall, it is in good condition without large concerns. The Vine St WTP, installed in 1912, is now over 110 years old and is considered a historic site. Vine Street WTP's equipment is typically in fair to poor condition. The main concerns at the Vine Street WTP are structural as multiple buildings are noncompliant for nearly all of the items on the ASCE/SEI 41-17 checklist for these building types. Seismic retrofits for multiple structures at Vine Street would be difficult to perform and not appropriate due to the age and type of essential facilities. Instead, replacement of structures to current seismic standards is recommended. The majority of the City's reservoirs and pump stations are in fair condition. The pump station that stands for significant recommended upgrades or replacement is the North Albany Pump Station. Its structure is not seismically stable and is recommended for replacement. The North Albany Pump Station is scored as having a major impact if failure occurred and there is not redundancy in pump capacity.

INTRODUCTION AND BACKGROUND

This section summarizes a brief history of the City of Albany water system, provides the purpose of the condition assessment, presents the condition assessment team, and outlines the meetings and site visits conducted for the condition assessment.

Background

In 1984, the City purchased the water system from Pacific Power and Light (PP&L) who had provided water service for the City of Albany, the City of Millersburg, and the North Albany County Service District (NACSD). The City of Albany acquired ownership of the NACSD in July 1991. In 2006, the Albany-Millersburg water treatment plant was brought online to supply water to the Cities of Albany and Millersburg. Millersburg continues to be responsible for its own water distribution system.

Purpose

Albany retained the West Yost team to complete a multidisciplinary condition assessment of the water facilities. The purpose of this Technical Memorandum (TM) is to document the findings of the condition assessment performed as part of the Water Master Plan Update. The condition assessment team evaluated the individual assets at the water system using a series of standardized scoring systems. The results of the condition assessment will be used to develop a list of maintenance and capital improvements projects for the water master plan to enhance compliance with regulations and to maintain public health and safety. This TM presents the following topics:

- Assessment methodology and procedures
- Condition and performance assessment
- Reliability and redundancy assessment
- Asset remaining useful life evaluation
- Risk assessment

Condition Assessment Team

The condition assessment team was led by West Yost. Specific portions of the assessment were carried out by the following team members:

- **West Yost** completed the civil/site and mechanical condition assessments, as well as the capacity and operational resiliency evaluations for the facilities.
- **ACE Engineering** completed the structural condition and seismic risk assessments.
- **Brown and Caldwell** completed the electrical and I&C condition assessments as well as assisting with the structural condition assessment.

Meetings and Site Visits

A kickoff meeting was held via Microsoft TEAMS on October 13, 2022, to review the condition assessment work plan. On-site condition assessments were conducted on October 19th and 20th, 2022. The on-site activities included discussions with Albany operations and maintenance staff to establish and understand operational histories and concerns.

ASSESSMENT METHODOLOGY AND PROCEDURES

The section describes the limits of the condition assessment effort and the methodology of the review. The condition assessment consisted of the following steps: (1) build an asset registry using the City Cartegraph asset database (2) review of existing drawings and other asset information; (3) visual inspection of assets; and (4) operational interviews with O&M and engineering staff. Additionally, a seismic risk assessment was conducted by ACE utilizing information collected during review of as-builts and the on-site inspection. Each of these steps is further described below.

Condition Assessment Limits

The condition assessment consisted primarily of visual inspections of the civil/site, structural, mechanical, electrical, and instrumentation and control (I&C) assets. Photos were used to document asset conditions of the City’s pump stations, reservoirs, and WTPs.

The assessment of the canal, canal structures, and hydroelectric turbine generators were performed separately. The distribution system was not analyzed as part of the conditions assessment, but the condition will be discussed in the master plan based on pipeline age, results from the hydraulic model, and City staff discussions and observations.

Asset Registry

In advance of on-site assessment activities, Albany provided access to their Cartegraph asset registries which include asset information (e.g., manufacturer, model, age) on Automation Hardware, Chemical Systems, Compressors, Cranes, Electrical Generators, Instruments, Motor Starters, Pressure Vessels, Water Facilities, Water Pumps, Water Storage Tanks, Water Treatment Plant (WTP) Valves, and WTP Tanks. An additional asset list was developed to for assets not yet accounted for in Cartegraph based on the field assessment. The city plans to include additional assets in their Cartegraph asset registry in the future. The final asset registry is provided in tabular format in Appendix A, Condition and Performance Scores.

Review of Existing Drawings and Asset Information

The following drawings and documents were received from Albany and reviewed as a part of the assessment:

- AM WTP
  - 90 percent AM WTP Seismic Valve Drawings
  - 90 percent AM WTP Intake Generator Drawings
  - AM Project Index & AM Summary of Changes
  - 2004 AM WTP Record Drawings
  - 2016 AM Pump Station Sand Removal Improvements Drawings
  - 2017 AM WTP Chemical Tank Replacement

- Pump Stations & Reservoirs
  - 34th PS & Reservoir
    - 1970 Yard Piping and Piping Details Drawings
    - 1970 & 1971 Drawings
    - Pump Curves & Name Plates
  - Gibson Hill PS - 1997 Improvements Drawings & Pump Curves
  - Maple Reservoir & PS
    - Vine Street Distribution System Schematics
    - 1950, 1953, 1960, 1962, 1964, 1959, 1965, 1975, 1986, 1987, 1999, 2011 Plans
    - Pump Curves
  - North Albany PS - 1997 Improvements Drawings & Pump Curves
  - Queen PS & Reservoir - 1955 Drawings & Pump Curves
  - Valley View PS & Reservoirs
    - 2011 Inspections
    - 1981 Phase 3 Drawings
    - 2008 Seismic Improvement Drawings
    - 2006 Zone 4 Pump Station Drawings
    - 2011 Seismic Improvements
    - 2019 Improvements
  - AM Reservoir - 2004 Foundation Plan
  - Broadway Reservoir - 1992 Drawings & 2011 Mixing Analysis
  - Wildwood Reservoir - 1997 Plans
- Vine Street WTP
  - 1910 – 2020 Plant Drawings (69 Total)
- Others
  - Water System Map
  - 2004 Water Facility Plan
  - 2006 Seismic Assessment
  - 2007 PS and LS Condition Assessment
  - 2008 Vine Street WTP Seismic Assess and Retrofit Strategy
  - 2008 Vine WTP Condition Assessment
  - Hydroelectric Plant Photos and Figures

The information gathered from the review of these sources was prioritized by publish year of the drawing or document.

Visual Inspections

Visual observations made during the on-site assessment were documented with photographs and accompanying notes taken by field staff. Visual Inspections followed the attachment forms provided as attachments to the Condition Assessment Work Plan TM.

Operational Interviews

Albany engineering, operations, and maintenance staff were interviewed during the on-site assessment by the condition assessment team to gain insight on the O&M history and routine upkeep of the facilities and assets. Topics discussed include the following:

- Maintenance and repair history.
- Routine maintenance activities and associated frequency (e.g., oil changes once per month).
- Landscaping and vegetation management efforts.
- Operation of critical assets including pumps (e.g., run pumps lead/lag via hour match).
- Satisfaction with the operational capabilities of various assets.
- Emergency response operations including bypass pumping and power supply during blackouts.
- Resources required for emergency operations.
- Concerns and history of threats including flooding, vandalism, and theft.

Seismic Risk Assessment

ACE completed a seismic risk assessment (ASTM E2026) and Tier 1 screening (ASCE/SEI 41) of the Albany Water Facilities. The Tier 1 procedure is used to identify potential seismic deficiencies in the structural lateral force-resisting system and non-structural building systems. The evaluation was completed primarily using record drawings in conjunction with a visual site inspection. The methods utilized for this evaluation, as well as their inherent limits, were documented in a technical memorandum included herein as Appendix B, Structural/Seismic Condition Assessment and ASCE/SEI 41 Evaluation.

CONDITION AND PERFORMANCE ASSESSMENT

This section summarizes the various criteria utilized to assess the physical condition and performance of Albany's water system assets and the resulting scores and recommendations.

Condition Scoring Criteria

The condition assessment team assigned a condition scoring to each asset based on field observations, notes from discussions with O&M and engineering staff, photographs, and videos. Numerical scores were selected from the standardized condition assessment scoring systems defined in Table 1 which are further described below.

Asset Condition

General asset condition scores are based primarily on visual inspection of the system as described in Table 1. This system uses numerical scores from 1 to 5 for each asset, with a 1 being Excellent and 5 requiring Immediate Attention.

Table 1. Physical Condition Scoring Criteria

Score	Grading Definition	Site/Civil	Structural	Mechanical	Electrical and I&C
1	Excellent	New condition	New condition	New condition	New condition
2	Good	Minor defects or deterioration	Minor structural impacts, cracking (e.g., < 1mm) deformation	Minor cosmetic surface abrasion or coating deterioration	Cosmetic surface defects with no impact on performance
3	Fair	Average wear and tear, minor cracking, and ponding of water	Average structural impacts, cracking (e.g., 1-2mm) deformation	Average surface or structural wear and tear	Average physical wear and tear
4	Poor	Above average wear and tear, some cracking of pavement	Moderate structural impacts, one to two locations of major cracking (e.g., > 2mm), exposed reinforcement, deformation	Moving parts show excessive wear and tear and require rehabilitation within two years or less	Above average wear and tear on the asset requiring replacement within two years or less
5	Immediate Attention	Condition is not at acceptable level, major cracking, severe ponding	Structural Condition is not at acceptable level and needs immediate replacement	Structural and physical condition is not at acceptable level and needs immediate replacement	Physical condition is not at acceptable level and needs immediate replacement

Facility Condition

The overall condition scoring for each facility was determined based on the structural condition of the structure. The condition scores for individual assets are provided in tabular format in Appendix A, Condition & Performance Scores.

Performance Scoring Criteria

The performance condition assessment is based on the Operations and Maintenance staff's knowledge and experience with issues unique to the asset. Table 2 indicates how performance condition criteria were measured.

Table 2. Performance Condition Scoring Criteria

Score	Grading Definition	Reliability	Operability	Capacity	Obsolescence
1	Excellent	Very reliable. No reported failures. Equipment is generally available >99 percent of the time.	Normal operator involvement during average and peak flow conditions.	Adequate capacity for average and peak flow conditions, margin for increased capacity	Technology Best Available/ State of the Art
2	Good	Good reliability. Infrequent breakdown. Equipment generally available 95-99 percent of the time.	Normal operator involvement during average flow conditions. Greater than normal operator involvement during peak flow conditions.	Adequate capacity for average and peak flow conditions. No margin for increased capacity for peak flow conditions.	Technology Industry Standard/ "Tried and True"
3	Fair	Average reliability. Occasional breakdowns. Equipment available generally available >85 percent of the time.	Greater than normal operator involvement during average flow conditions. Greater than normal operator involvement during peak flow conditions.	Maximum capacity for average and peak flow conditions, no margin for increase.	Technology Considered Appropriate
4	Poor	Poor reliability. Periodic (monthly) breakdowns with repeated repairs. Equipment available generally available >70 percent of the time.	Greater than normal operator involvement during normal flow conditions. Excessive operator involvement during peak conditions.	Maximum capacity for average flow conditions, no margin for increase. Overloaded for peak flow conditions, may impact other processes.	Technology Nearing Obsolescence
5	Immediate Attention	Very poor reliability. Continuous (weekly) recurrent breakdown. Equipment out of service for more than 70 percent of time.	Excessive operator involvement during normal conditions. Excessive operator involvement during peak conditions.	Overloaded for average and peak flow conditions, may impact other processes	Technology Obsolete/ Out of Date

Summary of Condition and Performance Scores

A summary of the condition scores and performance scores assigned to assets are included in Table 3. Overall, the majority of the assets were rated as good (2) or excellent (1). For both condition and performance, 21 percent of assets were scored fair (3) and 20 percent of assets were scored poor (4). Only 1 to 2 percent of assets were scored as a 5 needing immediate attention. The condition and performance scores for each individual asset are provided in tabular format in Appendix A, Condition & Performance Scores.

Table 3. Condition & Performance Score Summary

Grading Definition	Score	Condition Count	Condition Percentage	Performance Count	Performance Percentage
Excellent	1	11	2	10	2
Good	2	328	55	325	55
Fair	3	125	21	124	21
Poor	4	115	20	119	20
Immediate Attention	5	9	1	10	2

Condition and Performance Assessment Recommendations

The following subsections summarize the results and recommendations of the condition and performance assessment of the project according to asset discipline (e.g., civil, structural, mechanical, etc.). A condition/performance comment, recommended action, priority indication, and corresponding photo in Appendix C are given for each comment. The action priority is scored per Table 4 below.

Table 4 Action Priority

Action Priority	Description
Low	Perform in the next 10+ years
Medium	Perform Action in the next 5-10 years
High	Perform Action in the next 3-5 years
Severe	Perform Action in the 1-3 years or as soon as possible

Asset condition is defined as the current state of an asset and determines the probability of failure (POF), which is calculated based on two components – physical condition and performance condition.

The recommended actions based on condition and performance comments in the tables below were categorized by the City to be CIP projects or maintenance projects.

Civil/Site Assessment

For the purposes of this study, civil/site assessment includes:

- Each building and structure was assessed for condition and functionality of the space.
- Drainage and erosion around each structure and within the overall site
- Pavement condition evaluated for cracking and overall condition
- Site security such as fencing and cameras

A brief discussion of observed conditions and recommendations is provided in Table 5 below.

All civil projects that may come from recommended actions are classified as maintenance projects.

Table 5. Summary of Civil/Site Condition Assessment Results and Recommendations

Site	Condition Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
General Comments					
General	Some vaults were observed with standing water.	Check vault sump pump operation and float levels associated with sump pumps if warranted due to structural or corrosion damage.	Low	M	NA
Site Specific Comments					
34th Street	Rust observed on Flow Meter Vault Hatch	Replace Hatch	Low	M	4-2-1
34th Street	Standing Water in Flow Meter Vault	Check sump pump operation and float level if warranted due to structural or corrosion damage.	Low	M	4-2-2
Broadway Street	Valve Vault Hatch made of FRP	Replace Hatch	Low	M	4-2-3
Broadway Street	Standing Water in Flow Meter Vault	Check sump pump operation and float level if warranted due to structural or corrosion damage.	Low	M	4-2-4
Maple Street	Rust observed on hatch vault under reservoir	Replace Hatch	Low	M	4-2-5
Maple Street	Rust and damage on ladder for vault under reservoir	Repair or Replace Ladder	Low	M	4-2-5
North Albany	Valve Vault Hatch made of FRP	Replace Hatch	Low	M	4-2-6

Table 5. Summary of Civil/Site Condition Assessment Results and Recommendations

Site	Condition Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
North Albany	Mud of Floor, Staff said this is the first-time flow meter vault has been dry. Some cracks in wall	Check sump pump operation and float level if warranted due to structural or corrosion damage. Repair cracks in wall.	Low	M	4-2-7
WTP1 (Vine St)	Valve Vault outside RWPS has hatch/lid made wood.	Replace Hatch	Low	M	4-2-8
WTP1 (Vine St)	Meter Vault outside RWPS has standing water. Some concrete spalling at walls.	Check sump pump operation and float level if warranted due to structural or corrosion damage. Fix spalling as necessary.	Low	M	4-2-9
WTP1 (Vine St)	Valve Vault outside RWPS is made of CMU.	Replace Vault	Low	M	4-2-10
WTP2 (AM)	Albany Metering Vault has standing water in it.	Check sump pump operation and float level if warranted due to structural or corrosion damage. The city plans to move electronics above ground in the future.	Low	M	4-2-11
WTP2 (AM)	Millersburg Metering Vault has standing water in it. Leaking at pipe penetrations.	Check sump pump operation and float level if warranted due to structural or corrosion damage. Further seal pipe penetrations as possible.	Low	M	4-2-12
WTP2 (AM)	ACH and Flow Meter Vault has standing water. Small crack seen in vault.	Check sump pump operation and float level if warranted due to structural or corrosion damage. Seal cracks in vault.	Low	M	4-2-13

Structural Assessment

The structural condition of the City's assets was evaluated through non-destructive methods including visual observations relating to structural defects such as cracking, spalling, and coating failures. In addition, the consulting team performed the following, where accessible:

- Soundings to listen for discontinuities and delamination within concrete structures.
- Probing with hand tools to find depth to sound material.
- Completion of ASCE/SEI 41-17 Tier 1 Checklists applicable to each building or structure being evaluated.

A brief discussion of observed conditions and recommendations is provided in Table 6. More detailed discussion of the structural condition assessment techniques and findings is included in Appendix B (ASCE/SEI 41-17 Tier 1 Checklists).

Table 6. Summary of Structural Asset Condition Assessment Results and Recommendations

Site	Condition Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
General Comments					
General	Emergency and egress lighting, where existing, is anchored or braced.	Provide emergency and egress lighting at essential facilities. Brace or anchor essential lighting.	Low	M	4-3-1
General	Hazardous materials storage.	Containers that hold hazardous materials shall be restrained by latched doors, shelf lips, wires, or other methods.	Medium	M	4-3-2
General	Shutoff Valves	Piping containing hazardous materials, including natural gas, should have shut off valves installed.	Medium	M	4-3-3
General	Flexible Couplings	Piping containing hazardous materials, including natural gas, should have flexible couplings installed.	Medium	M	4-3-3
General	Piping between structures	Elevated piping and cable trays spatting between structures should have flexible connections installed.	Medium	M	4-3-4
General	Light Fixture Lensed Covers	Light fixtures in essential facilities should have safety devices for lens covers installed to prevent damage.	Medium	M	4-3-5
General	Industrial Storage Racks, Tall-Narrow Cabinets, Fall-Prone Content, Fall-Prone Equipment, Tall-Narrow Equipment, Heavy Equipment, Electrical Equipment	Tall narrow items should be anchored to the floor and braced to the wall or primary structure.	Medium	M	4-3-6
General	In-Line Equipment	Equipment in-line of conduit, ducts or piping should be braced independent of the conduit, duct, or piping system.	Medium	M	N/A
General	Conduit Couplings, Flexible Couplings, Conduit Fluid and Gas Piping	Conduit greater than 2.5 inches and fluid and gas piping should have flexible couplings. Fluid and gas piping should be anchored and braced.	Medium	M	4-3-3

Table 6. Summary of Structural Asset Condition Assessment Results and Recommendations

Site	Condition Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
Site Specific Comments					
WTP2 (AM)	Filter Building maintenance. Roof gutters overflow, CMU wall sealing	Clean roof gutters. Seal gutter leaks. Seal exterior face of CMU block. .	Medium	M	4-3-7
WTP2 (AM)	Filter Building maintenance. Rust and corrosion of structural members, pipe supports, base plate, etc.	Remove rust and corrosion on metal throughout and recoat or paint.	Medium	M	4-3-8
WTP2 (AM)	Neutralization Basin concrete wall has exposed aggregate near inlet and below the waterline.	Clean and provide a coating repair for the concrete with significant surface loss and exposed aggregate to prevent further loss of wall thickness.	High	CIP	4-3-9
WTP2 (AM) Reservoir	Minor cracking noted at perimeter of tank.	Monitor for potential future repairs as needed.	Low	M	4-3-38
WTP1 (Vine St)	The Raw Water Pump Station is noncompliant for nearly all of the items on the ASCE/SEI 41-17 Checklist for this building type.	Prepare for replacement of this structure. A seismic retrofit for a structure of this age and type is not appropriate for this essential facility.	Severe	CIP	4-3-10
WTP1 (Vine St)	The Hydroelectric Building is noncompliant for nearly all of the items on the ASCE/SEI 41-17 Checklist for this building type.	Prepare for replacement of this structure. A seismic retrofit for a structure of this age and type is not appropriate for this essential facility.	Severe	CIP	4-3-11
WTP1 (Vine St)	The Control Building/Chemical Storage Building reinforcing bar details do not comply with recommended standards.	A seismic retrofit to address the shortcomings identified by the ASCE/SEI 41-17 checklist would be very difficult to perform.	High	CIP	4-3-12

Table 6. Summary of Structural Asset Condition Assessment Results and Recommendations

Site	Condition Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
WTP1 (Vine St)	The perimeter columns below the exterior walls of Accelerator 1 create a vertical irregularity and weak lateral force resisting system at the base.	Infill between the existing columns with a concrete wall footing to eliminate the vertical irregularity. Tie the foundations together.	Medium	CIP	4-3-13
WTP1 (Vine St)	Accelerator 2 is not bolted to the foundation and relies on friction between the steel and concrete. Maintenance of steel wall is recommended.	Consider adding anchor bolts capable of resisting uplift and sliding seismic forces. Clean and remove moss, mold and rust then maintain tank coating.	Medium	CIP	4-3-14
WTP1 (Vine St)	The Soda Ash Building is noncompliant for nearly all of the items on the ASCE/SEI 41-17 Checklist for this building type.	Prepare for replacement of this structure. A seismic retrofit for a structure of this age and type is not appropriate for this essential facility.	Severe	CIP	4-3-15
WTP1 (Vine St)	The Filters 1-6 Building is noncompliant for nearly all of the items on the ASCE/SEI 41-17 Checklist for this building type.	Prepare for replacement of this structure. A seismic retrofit for a structure of this age and type is not appropriate for this essential facility.	Severe	CIP	4-3-16
WTP1 (Vine St)	The reinforcing bar details for the Filters 7-10 Building is unknown for the ASCE/SEI 41-17 Checklist for this building type. It is unlikely that any reinforcing bars are appropriately sized, spaced and placed.	Prepare for replacement of this structure. A seismic retrofit for a structure of this age and type is extremely difficult for this essential facility.	Severe	CIP	4-3-17
Maple Street Reservoir	The Reservoir is not bolted to the foundation and relies on friction between the steel & concrete. Maintenance of steel wall is recommended.	Consider adding anchor bolts capable of resisting uplift and sliding seismic forces. Clean and remove moss, mold and rust then maintain tank coating.	Medium	CIP	4-3-18
Maple Street Reservoir	Hatch bolts are corroded.	Add to future maintenance program. Clean and inspect bolts and nuts to determine extent of corrosion.	Low	M	4-3-36

Table 6. Summary of Structural Asset Condition Assessment Results and Recommendations

Site	Condition Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
Maple Street Pump Station	The roof to wall connection may not be adequate to resist all seismic forces.	During a maintenance re-roofing project for this building, upgrade the roof to wall connection.	Low	CIP	4-3-19
34th Street Reservoir	The Reservoir is not bolted to the foundation and relies on friction between the steel & concrete. Maintenance of steel wall is recommended.	Consider adding anchor bolts capable of resisting uplift and sliding seismic forces. Clean and remove moss, mold and rust then maintain tank coating.	Medium	CIP	4-3-20
34th Street Reservoir	Cracking at exterior vault at edge of hatch.	Repair in future maintenance program.	Low	M	4-3-37
Queen & Hill Reservoir	The Reservoir is not bolted to the foundation and relies on friction between the steel and concrete. Maintenance of steel wall is recommended.	Consider adding anchor bolts capable of resisting uplift and sliding seismic forces. Clean and remove moss, mold and rust then maintain tank coating.	Medium	CIP	4-3-21
Wildwood Reservoir	Tree debris appear to plug roof drains and may cause rainwater to pond on the roof and possibly overload the roof structure.	Periodically remove tree debris from roof. Consider trimming trees back to prevent build up. Enlarge roof drains or overflow openings.	Low	M	4-3-22
Wildwood Reservoir	Minor efflorescence and cracking noted at exterior of tank consistent with age of structure.	Monitor for potential future repairs as needed.	Low	M	4-3-35
34th Street Pump Station	The roof to wall connection of the Pump Station is non-compliant.	During a maintenance re-roofing project for this building, upgrade the roof to wall connection.	Medium	CIP	4-3-23
Gibson Hill Pump Station	Original documents were not available for the Pump Station. The details of the wall to foundation connection is unknown.	Either locate the original drawings and details for the structure to verify adequate connection were installed or remove finishes to verify or install anchor bolts and hold downs.	Low	M	4-3-24
Gibson Hill Pump Station	Diagonal cracking typical at exterior vault at corners of hatches.	Monitor to confirm size does not increase. Seal as part of maintenance program to prevent water intrusion.	Low	M	4-3-29

Table 6. Summary of Structural Asset Condition Assessment Results and Recommendations

Site	Condition Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
North Albany Pump Station	The Pump Station is noncompliant for nearly all of the items on the ASCE/SEI 41-17 Checklist for this building type.	Prepare for replacement of this structure.	Severe	CIP	4-3-25
North Albany Pump Station	Cracking at several locations at exterior of building walls.	See comment above. No action item.	Low	CIP	4-3-30
North Albany Pump Station	Corner of building structure appears to be rebuilt but not finished at interior of pump station.	See comment above. No action item.	Low	CIP	4-3-31
Queen & Hill Pump Station	The roof to wall connection of the Pump Station is non-compliant.	During a maintenance re-roofing project for this building, upgrade the roof to wall connection.	Medium	CIP	4-3-26
Valley View Reservoir	The Reservoir is not bolted to the foundation and relies on friction between the steel & concrete. Maintenance of steel wall is recommended.	Consider adding anchor bolts capable of resisting uplift & sliding seismic forces. Clean and remove moss, mold and rust then maintain tank coating.	Medium	CIP	4-3-27
Valley View Reservoir	Trees are growing into contact with tanks creating long term maintenance issues.	Trim trees clear of tanks.	Low	M	4-3-33
Valley View Reservoir	Hatch bolts are corroded.	Add to future maintenance program. Clean and inspect bolts and nuts to determine extent of corrosion.	Low	M	4-3-34
Valley View Pump Station	Original documents were not available for the Pump Station. The details of the wall to foundation connection is unknown.	Either locate the original drawings and details for the structure to verify adequate connection were installed or remove finishes to verify or install anchor bolts and hold downs.	Low	M	4-3-28
Broadway Reservoir	Minor efflorescence and cracking noted at exterior of tank consistent with age of structure.	Monitor for potential future repairs as needed.	Low	M	4-3-32

Mechanical Assessment

The mechanical condition of the City's pump stations, reservoirs, and WTPs was evaluated through a visual evaluation and discussion with O&M staff. All exposed and reasonably accessible mechanical equipment and components; including equipment, pump assemblies, motors, engines, gears, valves, piping, and appurtenances; were visually inspected. The following was also be evaluated during the assessment:

- Corrosion – metal corrosion and coating failure.
- Leakage – active and historic leaks.
- Supports – physical damage, failure, or breakage.

A brief discussion of observed conditions and recommendations is provided in Table 7.

Table 7. Summary of Mechanical Asset Condition Assessment Results and Recommendations

Site	Condition Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
General Comments					
General	Check piping wall thickness and dry film thickness (DFT) at all sites	If inadequate pipe wall thickness, replace pipe. If inadequate DFT, recoat pipe.	Medium	M	NA
General	Dissimilar Metals causing corrosion especially at AM	Replace bolts, valves, etc. as needed where dissimilar metals has caused corrosion	Medium	M	NA
Site Specific Comments					
34th Street	Pump station piping appears to need more pipe supports	Add pipe supports within two feet of changes of direction, where practical	High	M	4-4-1
34th Street	Flow Meter Vault piping has rust	Measure Pipe Thickness. Replace or Recoat	High	M	4-2-2
Broadway Street	Flow Meter Vault piping has rust	Measure Pipe Thickness. Replace or Recoat	High	M	4-2-4
Broadway Street	Valve Vault piping has rust	Measure Pipe Thickness. Replace or Recoat	High	M	4-4-2
Gibson Hill	Flow Meter Vault piping and bolts have rust	Measure Pipe Thickness. Replace or Recoat. Replace bolts.	High	M	4-4-3
Gibson Hill	Valve Vault piping and bolts have rust	Measure Pipe Thickness. Replace or Recoat	High	M	4-4-4
Maple Street	Pump #1 has rusted bolts	Replace or recoat bolts as needed	Medium	M	4-4-5
Maple Street	City can't pressure wash the existing coating because it can chip the coating and expose the orange coating underneath which may contain lead.	Recoat Reservoir	Medium	CIP	4-4-6

Table 7. Summary of Mechanical Asset Condition Assessment Results and Recommendations

Site	Condition Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
Maple Street	Valve Vault piping has rust	Measure Pipe Thickness. Replace or Recoat	High	M	4-4-7
North Albany	Pump Station exterior piping paint chipped	Measure Pipe Thickness. Replace or Recoat	High	M	4-4-8
North Albany	Flow Meter Vault piping has rust on piping at walls	Measure Pipe Thickness. Replace or Recoat	High	M	4-2-7
North Albany	Valve Vault piping has rust on piping and bolts	Measure Pipe Thickness. Replace or Recoat. Replace bolts.	High	M	4-4-9
North Albany	Valve Vault sump pump corroded	Replace Sump Pump	High	M	4-4-9
Queen Avenue	Reservoir paint chipping	Recoat Reservoir	High	CIP	4-4-10
Queen Avenue	Rust observed on outdoor piping	Measure Pipe Thickness. Replace or Recoat.	High	M	4-4-11
Wildwood	Valve Vault piping has chipped paint and some rust on bolts	Measure Pipe Thickness. Replace or Recoat. Replace bolts.	High	M	4-6-1
WTP1 (Vine St)	Accelerator 1 and 2 Launders have dirt and grime accumulating	Clean launder	High	M	4-4-12
WTP1 (Vine St)	RWPS pipe coating chipping	Recoat pipes	High	CIP	4-4-13
WTP1 (Vine St)	Backwash system appears to have no check valves	Add check valves if possible	High	CIP	4-4-14
WTP1 (Vine St)	Large backwash pump has cracked base	Repair coating. Confirm pump anchorage is secure	High	CIP	4-4-14
WTP1 (Vine St)	Raw Water Splitter (Diverter) is rusted	Recoat	High	CIP	4-4-15
WTP1 (Vine St)	Filter pipe gallery has rust and corrosion on piping. May need more pipe supports.	Replace pipe or Measure pipe thickness and Recoat pipes as necessary. Add pipe supports within 2 feet of changes of direction, where practical.	High	CIP	4-4-16, 4-4-17, 4-4-18, 4-4-19
WTP1 (Vine St)	Transfer PS piping has rust. Appears to have no check valves. May need more pipe supports including lateral supports, may need more dismantling joints	Replace pipe or Measure pipe thickness and recoat as necessary. Add pipe supports within 2 feet of changes of direction, where practical. Add check valves and dismantling joints where practical.	High	CIP	4-4-20
WTP1 (Vine St)	RWPS Flow Meter Vault piping has rust	Measure Pipe Thickness. Replace or Recoat.	High	CIP	4-2-9

Table 7. Summary of Mechanical Asset Condition Assessment Results and Recommendations

Site	Condition Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
WTP1 (Vine St)	RWPS some pumps missing check valves	Add check valves where practical	High	CIP	4-4-14
WTP1 (Vine St)	RWPS Valve Vault piping is rusted	Measure Pipe Thickness. Replace or Recoat.	High	CIP	4-2-10
WTP1 (Vine St)	RWPS Valve Vault valve is rusted. Staff doesn't think valve operates	Replace valve	High	CIP	4-2-10
WTP1 (Vine St)	RW Screen has rust	Replace RW intake screen	High	CIP	4-4-21
WTP1 (Vine St)	Chemical Injection Vault piping, bolts, and pipe supports have rust	Measure Pipe Thickness. Replace or Recoat. Replace bolts. Replace pipe supports as necessary.	High	CIP	4-4-22
WTP2 (AM)	AM Chemical Tanks appear to have no seismic straps	Consider adding seismic straps	High	CIP	NA
WTP2 (AM)	RW Intake Sand Classifier augers wear out	Replace auger wear bars as needed	High	M	4-4-23
WTP2 (AM)	Cell 1-4 Filtrate Flow Meter has chipping paint and rust	Recoat or replace flow meter	High	M	4-4-24
WTP2 (AM)	Albany Metering Vault piping has some rust spots	Measure Pipe Thickness. Replace or Recoat near vault walls.	High	M	4-4-25
WTP2 (AM)	Millersburg Metering Vault has rust on piping	Measure Pipe Thickness. Replace or Recoat near vault walls.	High	M	4-2-12
WTP2 (AM)	Some green coloring and slight rusting. Difficult to access at bottom of building.	Recoat	Medium	M	4-4-26
WTP2 (AM)	Strainers have rust on galvanized parts including bolts	Replace dissimilar metals/rusted components	High	M	4-4-27
WTP2 (AM)	ACH & Flow Meter Vault has bolt corrosion	Replace bolts	High	M	4-2-13

Electrical and I&C Assessment

The electrical and I&C condition including SCADA system of the City’s pump stations, reservoirs, and WTPs was evaluated through a visual evaluation and discussion with O&M staff. The following are electrical and I&C elements reviewed as part of the assessment.

- Motor control centers and other electrical panels
- Switchboards/switchgear

- Lighting panels
- Control panels
- SCADA equipment
- Standby power equipment
- Instrumentation elements such as pressure gauges, pressure switch, temperature switch, seal water, actuators, solenoid valves, pneumatic valves, and flow meters.
- Electrical power redundancy will be determined by reviewing record drawings and discussion with O&M staff
- Compatibility of the existing PLC/Communication system will be compared to the City's current standard operating system
- Presence of latest code compliant Arc Flash Labels

A brief discussion of observed conditions and recommended improvements is provided in Table 8. Thorough electrical site forms can be found in Appendix D.

All electrical projects that may come from recommended actions are classified as maintenance projects.

Table 8. Summary of Electrical & I&C Asset Condition Assessment Results and Recommendations

Site	Condition Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
General Comments					
General	Heat tracing pressure level transmitter pilot lines	Repair/replace heat tracing and insulate pilot lines for freeze protection or replace pressure transmitters with ultrasonic or radar level transmitters.	Medium	M	N/A
General	Some instruments are exposed to the weather need more protection.	Protect instruments from weather.	Medium	M	NA
Site Specific Comments					
Broadway Street	Hydrostatic tank level transmitter.	Replace pilot line heat trace and insulation. Or replace with ultrasonic or radar transmitter.	Medium	M	4-5-1
Broadway Street	Telemetry cabinet	Water quality and tank I/O cabinets should be added to asset list.	Medium	M	4-5-2
Broadway Street	Cabinet very corroded & disorganized	Replace enclosure	High	M	4-5-3
Queen Avenue	Hydrostatic tank level transmitter.	Replace pilot line heat trace and insulation. Or replace with ultrasonic or radar transmitter.	Medium	M	4-5-4
Queen Avenue	SCADAPack Vision (appears inoperative)	Remove, not needed, and cover hole in cabinet door.	Medium	M	4-5-5
Queen Avenue	MCC 1 NEMA 3 FVNR dates to mid-1950's	Replace very old motor starter	High	M	4-5-6

Table 8. Summary of Electrical & I&C Asset Condition Assessment Results and Recommendations

Site	Condition Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
Queen Avenue	MCC 2 NEMA 4 FVNR dates to mid-1950's	Replace very old motor starter with soft start	High	M	4-5-6
Queen Avenue	Utility service changed from original and the available fault current now available may be higher than the existing equipment ratings.	Consider a complete replacement of the PS electrical system as was done recently at 34th PS.	High	M	4-5-7
Valley View	Original 100A service needs to be completely removed for safety	Existing empty meter and panelboard boxes should be removed for safety	Medium	M	4-5-8
Valley View	Hydrostatic tank level transmitter	Replace pilot line heat trace and insulation. Or replace with ultrasonic or radar transmitter.	Medium	M	4-5-9
Wildwood	Level Sensor Transmitter is exposed to weather	Move inside control panel	Medium	M	4-5-10
Wildwood	SCADAPack 32 (Not compatible with other CoA PLCs)	Obsolescent controller is reaching end of life	Medium	M	4-5-11
WTP2 (AM)	Supernatant Wetwell Level Transmitters and pump LCP exposed to weather.	Recommend rain cover over outdoor transmitters and panels.	Medium	M	4-5-12

Performance Assessment

A tabular summary of performance scores can be found in Appendix A, Condition & Performance Scores. A summary of performance notes and recommended improvements is provided in Table 9.

Table 9. Summary of Performance Assessment Results and Recommendations

Site	Performance Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
Site Specific Comments					
Maple Street	Concerns about baffle tear inside reservoir	Perform further investigation of condition of baffle tear inside reservoir.	High	CIP	NA
North Albany	Pump Station has no redundant pumps. Both pumps run to meet demands.	Add another or larger pump. Could also replace PS.	High	CIP	NA

Table 9. Summary of Performance Assessment Results and Recommendations					
Site	Performance Comments	Recommended Actions	Action Priority	CIP or Maintenance (M)	Appendix C Photo
Valley View	Not observed. Staff think that anodes are probably entwined and shorted out by now.	Replace anodes	High	M	NA
Wildwood	Ultrasonic. Inconsistent readings. Rep said flow meter is not ideal next to all valves	Remove flow meter	Low	M	4-6-1
WTP1 (Vine St)	Liquid chemical tanks may need more anchorage. Check for MSDS on tanks.	Provide added tank anchorage as needed. Add MSDS on tanks as needed.	High	CIP	4-6-6
WTP2 (AM)	Clean-in-place Tank does not appear to have isolation valves.	Add isolation valves	High	M	4-6-7
WTP2 (AM)	There is only one existing clean-in-place pump.	Install a second pump for redundancy.	High	CIP	4-6-7
WTP2 (AM)	When doing maintenance, have to use blue plastic pool. Header pipe cracks easily, likely weak welds or too thin of steel pipe.	Install Cell #5. Consider replacing cell header pipe and replacing all the hoses to the headers as well.	Medium	CIP	4-6-3 & 4-6-5
WTP2 (AM)	Neutralization Pumps weren't covered outside and froze. Now insulated.	May need to service or replace pumps.	High	M	4-6-4
WTP2 (AM)	One of the valve is not sealing fully so can't isolate the wet well. Low level valves are also especially hard to isolate	Consider replacing all lowest level valves	High	CIP	4-6-2
WTP2 (AM)	Staff thinks strainer baskets need replacing.	Replace strainer baskets.	Medium	M	4-4-28
WTP2 (AM)	Staff thinks actuator programming should be changed.	Reprogram Strainer actuators to be based on pressure rather than timer.	High	M	NA
WTP2 (AM)	To improve availability of sodium hypochlorite, the City can consider on-site generation.	When the condition of the sodium hypochlorite and caustic tanks or piping requires improvements, the City can consider installing on-site sodium hypochlorite generation	Medium	CIP	NA

RELIABILITY AND REDUNDANCY ASSESSMENT

The City evaluated reliability and redundancy requirements at each site as a part of the Condition Assessment.

Reliability and Redundancy Assessment Guidelines

Typical guidelines for reliability and redundancy levels are described in the subsections below.

Mechanical Guidelines

- Pumps shall have n+1 redundancy
- Spare parts are readily available and located at or near the site
- Means to bypass the facility is available

Electrical Guidelines

- Two sources of power are available
- MCCs on alternate power sources
- Standby power with 24 hours of diesel fuel storage is available
- Quick plug-in connection for portable generator is available

Instrumentation & Controls Guidelines

- Two different types of wet well level control are available
- UPS or battery backup for PLC/communication system is available
- Backup float controls for pump operation

Reliability and Redundancy Assessment Results and Recommendations

In general, Albany has good redundancy and resilience (R&R) in their system. Table 10 summarizes R&R at each site for mechanical, electrical, and instrumentation. The R&R helps inform the probability and consequence of failure scores which influence risk because having limited redundancy can increase the probability of failure.

Table 10. Reliability and Redundancy at Each Site

Redundancy & Resilience Recommendations	WTP1 (Vine Street)	WTP2 (AM)	34th Street	Gibson Hill	Valley View	Queen Avenue	Broadway Street	Wildwood	Maple Street	North Albany
	Yes (Y) or No (N)									
Mechanical										
Pumps have n+1 redundancy	Y(a)	Y(b)	Y	Y	Y	Y	NA	NA	Y	N
Spare parts are readily available and located at or near the site	N	N	N	N(c)	N	N	N	N	N	N(c)
Means to bypass the facility is available	N	N	Y	Y	Y	Y	NA	NA	Y	N
Electrical										
Two sources of power are available	N	N	N	N	Y	N	N	N	N	N
MCCs on alternate power sources	N	Y	N	N	N	N	N	N	N	N

Table 10. Reliability and Redundancy at Each Site

Redundancy & Resilience Recommendations	WTP1 (Vine Street)	WTP2 (AM)	34th Street	Gibson Hill	Valley View	Queen Avenue	Broadway Street	Wildwood	Maple Street	North Albany
	Yes (Y) or No (N)									
Standby power with 24 hours of diesel fuel storage is available	N	N	N	N	Y	N	N	N	N	N
Quick plug-in connection for portable generator is available	N	N	Y	Y	N	Y	N	N	N	Y
Instrumentation										
Two different types of wet well level control are available	N	N	N	N	N	N	N	N	N	N
UPS or battery backup for PLC/communication system is available	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Backup float controls for pump operation	N	N	N	N	N	N	N	N	N	N

(a) Yes, for Vine St WTP raw water pumps and high service pumps. No for Vine St WTP transfer pumps.
(b) Yes, for AM WTP raw water pumps. No for AM WTP filtrate pumps which only have one pump per cell.
(c) Spare pump parts available, no spare motor.

The high priority redundancy concern identified during the Condition Assessment is the lack of pump redundancy at the North Albany Pump Station. The North Albany Pump Station uses both of its two pumps when filling the reservoir under normal conditions.

ASSET REMAINING USEFUL LIFE EVALUATION

Asset useful life is generally considered to be the duration of time that an asset provides valued service, after which it does not meet its intended service level. End of life is not necessarily indicative of catastrophic failure, and in most cases an asset can still hold functionality beyond the end of its useful life, however, its operation may result in increased maintenance costs. Asset remaining useful life (RUL) can be estimated by using condition data gathered in the condition assessment. The following subsections describe the process for estimating RUL, including establishment of typical useful life expectancies, calculation of time-based RUL_t projected asset decay rates, and the calculation of condition-based RUL_C by asset.

Typical Useful Life Expectancies

Municipal utility system assets vary by type, manufacturer, design, construction, and quality. They have different characteristics in how they operate and, consequently, will have different profiles of how they perform and ultimately fail. Standard useful life expectancies are documented by the American Water Works Association (AWWA), Water Environment Research Foundation (WERF), Environmental Protection Agency (EPA), and other industry associations. In Table 11 Useful life expectancies of common assets were developed using these industry association standards and the Condition Assessment Teams experience working with other agencies.

Table 11. Assets and Typical Useful Life

Equipment	Useful Years
Pump & Motors	25
Piping	40
Valves	20
Sump Pumps	15
Cranes/Hoists	20
Chemical Systems	15
Water Storage Tanks: Concrete & Steel(a)	50-75
WTP Tanks (includes chemical tanks)	15
Site Pavement	20
Switchgear(b)	15-75
Motor Control Centers	30
PLCs	15
Motor Starters	15
Electrical Generators	20
Instruments	15
Automation Hardware	15
Compressors	15
Pressure Vessels	15
Water Facilities	50

(a) Storage Tanks and Reservoirs typical life ranges from 50 to 75 years. An average useful life of 63 years was used for analysis purposes.

(b) Switchgears have been known to last for up to 75 years; however, technology and components can become outdated and obsolete and can result in useful life as low as 15 years when it becomes difficult to purchase replacement parts. An average useful life of 45 years was used for analysis purposes.

Time-Based Remaining Useful Life (RULt)

Where the installation date was provided by Albany, the age of an asset could be calculated. Then a RUL_t calculation was done by subtracting the age of the asset from the Typical Useful Life (Equation 1). The RUL_t can also be expressed as a percentage.

$$RUL_t = Useful\ Life_{Asset} - \ Age \qquad \text{Eqn. 1}$$

Asset Decay Projection

The RULt operates on the assumption that most items operate reliably for a period of time and then wear out. This assumption is simple & linear. However, modern equipment is far more complex than it has been in the past which has led to changes in patterns of failure. There is not always a linear connection between reliability and operating age. For this reason, Figure 1 illustrates a series of progression curves developed by WERF[1] for estimating asset degradation (decay) over an asset's life. These curves correlate to the typical patterns of high-early failure or high-late failure that may be experienced in water system assets.

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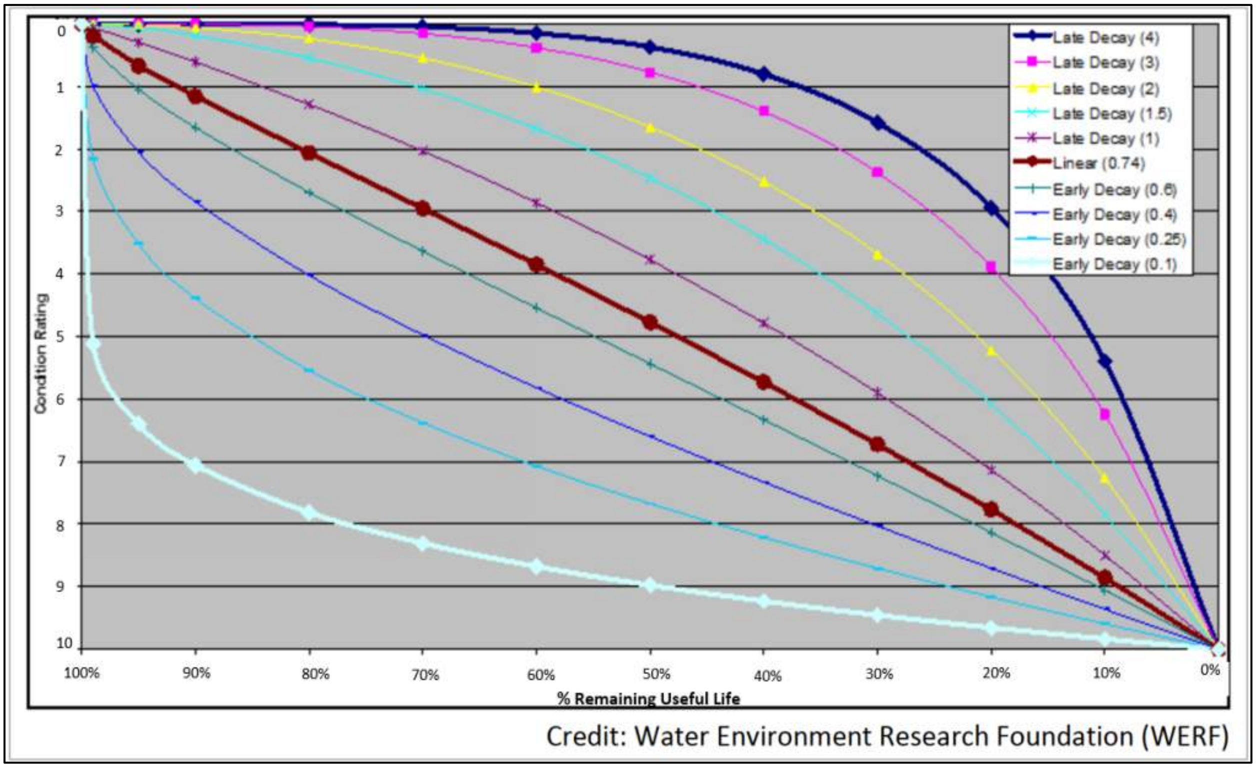
[1] WERF SIMPLE (Sustainable Infrastructure Management Program Learning)



Credit: Water Environment Research Foundation (WERF)

Figure 1. WERF RUL vs. Asset Condition Decay Curves

For the analysis of the Albany assets, “Late Decay Curve 1” was selected as the indicator to relate condition to asset effective life. This curve was selected based on the following assumptions:

- Once the assets are beyond the point of early failure, only a gradual decline in asset condition is expected to occur for much of the asset life. Assets experiencing early failure are typically due to construction issues or manufacturing flaws.
- Late Decay Curve 1 provides an approximate 50 percent reduction in asset condition for the first two-thirds of the asset life. This represents a suitable objective for water asset performance.
- Late Decay Curve 1 provides a progression that is not significantly steep in terms of asset degradation over the final remaining one-third of the lifecycle.

Condition-Based Remaining Useful Life (RULC)

The condition scorings developed by the condition assessment and Late Decay Curve 1 were used to determine the percent RUL_C. Table 12 presents the correlation of the asset condition scoring with the percent remaining useful life. The condition scoring scale indicated by the y-axis of the WERF curves in Figure 1 ranging from 0 to 10, was rescaled to fit the 1 to 5 scoring system used for this assessment. For example, the WERF scoring of 10 corresponds to a Project scoring of 5, and a WERF scoring of 7.5 corresponds to a scoring of 4, etc.

Table 12. Percent RUL_c by Condition Scoring

Condition Scoring	Percent RULC
1	98
2	65
3	38
4	18
5	0

After the percent RUL_C was determined, the RUL_C was calculated by multiplying the percent RUL_C by the asset's estimated useful life.(Equation 2).

$$RUL_C = Useful\ Life_{Asset}\ x\ Percent\ RUL_C \qquad \text{Eqn. 2}$$

Effective Remaining Useful Life (RUL)

The Effective Remaining Useful Life is calculated based the RUL_t and RUL_c. When the asset age is available, the RUL_t can be calculated, and accounts for 67 percent of the RUL and the RUL_c accounts 33 percent of the RUL Equation 3. The RUL_t accounts for a larger percentage of the RUL due to the diligent maintenance and care that the City takes of the assets and the age provides specific information about the asset.

$$RUL = 0.33\ x\ RUL_C + \ 0.67\ x\ RUL_t \qquad \text{Eqn. 3}$$

When asset age and RUL_t is not available, RUL_c accounts for 100% of the RUL. The Remaining Useful Life calculation for each asset can be found in Appendix A, Condition and Performance Scores.

Remaining Useful Life Results

Table 13 shows that the majority of City assets are in the late middle period of their remaining useful life. For example, an asset that has an expected useful life of 50 years with an RUL of 20-40 percent, is expected to have 10-20 years remaining of reliable service. The RUL for each individual asset can be found in Appendix A.

Table 13. Remaining Useful Life Percentage Summary

RUL Range, percentage	Count	Asset Percentage
0-20	93	16
20-40	169	29
40-60	163	28
60-80	120	20
80-100	43	7

RISK ASSESSMENT

This section describes the risk calculation used to score the risk of each asset as Low, Medium, High, or Severe. The risk scoring ultimately serves as a tool to help understand which assets are most at risk for failure. This information will help with project planning and prioritization performed for the Water Master Plan.

Risk Methodology

Asset risk assessment considers both the probability of failure (POF) and consequence of failure (COF) of an asset (component). The POF assesses the probability that a failure will occur, and the COF considers the impact a component's failure may have on the required level of service.

Asset risk is then calculated using equation 4:

$$Risk = POF\ x\ COF \qquad \text{Eqn. 4}$$

The asset risk score is typically plotted on a risk matrix using thresholds as shown in Table 14. The goal of this matrix is to determine when an asset needs replacement based on its POF and COF scores. The thresholds and risk levels (Low, Medium, High, Severe) are typically based on the risk tolerance.

Table 14. Risk Matrix

	Probability of Failure				
Consequence of Failure	Very Low 1	Low 2	Moderate 3	High 4	Very High 5
Severe 5	Medium	Medium	High	Severe	Severe
Major 4	Medium	Medium	High	Severe	Severe
Moderate 3	Low	Medium	Medium	High	High
Low 2	Low	Low	Medium	Medium	Medium
Negligible 1	Low	Low	Low	Low	Low

Probability of Failure (POF)

Probability of Failure is scored from 1 to 5 (Very Low to Very High) for each asset. The POF is based on the condition and performance scores of an asset as an asset in poor condition is more likely to fail.

Consequence of Failure (COF) / Asset Criticality

Asset criticality addresses the consequence of asset failure. The level of criticality is a relative measure of the asset COF based on objectives and criteria deemed important by an organization. The following COF criteria and scoring presented in Table 15 below will be reviewed as part of the criticality assessment:

- **Economic Consequence:** Considers repair costs and disruption to operations and maintenance, including effort to repair (time, cost, and need for outside expertise) and impact to operations (loss of redundancy, impacts to upstream and/or downstream processes) and overall product quality.

- **Environmental Consequence**: The criteria and measures for evaluating environmental impact consider timing and magnitude of consequence based on violations of state and federal regulations.
- **Social Consequence**: The criteria and measures for evaluating social impact consider timing and magnitude of consequence.
- **Health and Safety Consequence**: The criteria are based on severity of injury or illness to public or employees.
- **O&M Consequence**: The criteria are based on severity of service interruptions.

Table 15. Criticality/COF Scoring Criteria

Score	Economic	Environmental	Social	Health & Safety	O&M
1	Negligible to no impacts	Minimal to no impact	Minimal to no impacts	No adverse health effect on the public or employees	Minimal to no impacts
2	Low Impact/ Minor Consequence	Low impact, minor permit violations	Occasionally cannot meet customer requirements	Minor injury to public or employees; no illness among citizens	Disruption less than 3 hours duration
3	Moderate Impact/ Moderate Consequence	Moderate impact, significant permit violations	Frequently cannot meet requirements for localized area of customer base	Moderate injury to public or employees; no illness among citizens	Disruption between 3- and 12-hours duration
4	Major Impact/Significant Consequence	Significant impact, major permit violations	Significant impact for not meeting requirements for several areas of customer base	Severe injury or illness affecting a few citizens or employees	Disruption between 12- and 24-hours duration
5	Severe Impact/ Catastrophic Consequence	Major impact, permit violations may involve federal and state actions	Continuously cannot meet customer requirements	Any loss of life; severe injury or illness affecting numerous citizens or employees	Disruption over 24-hours duration

The criticality/consequence of failure score was selected with the City based on the criticality of each site, not based on each individual asset criticality as shown in Table 16 and Figure 2. Note that in some cases, the criticality/consequence of failure score was set specific to individual items so that the importance of the items was not overinflated as to its criticality of its effect on the function of the overall system.

Table 16. Criticality/COF by Site

Site	COF Score
WTP1 (Vine St)	4
WTP2 (AM)	5
34th Street	2
Gibson Hill	3
Valley View	3
Queen Avenue	2
Broadway Street	5
Wildwood	3
Maple Street	4
North Albany	4

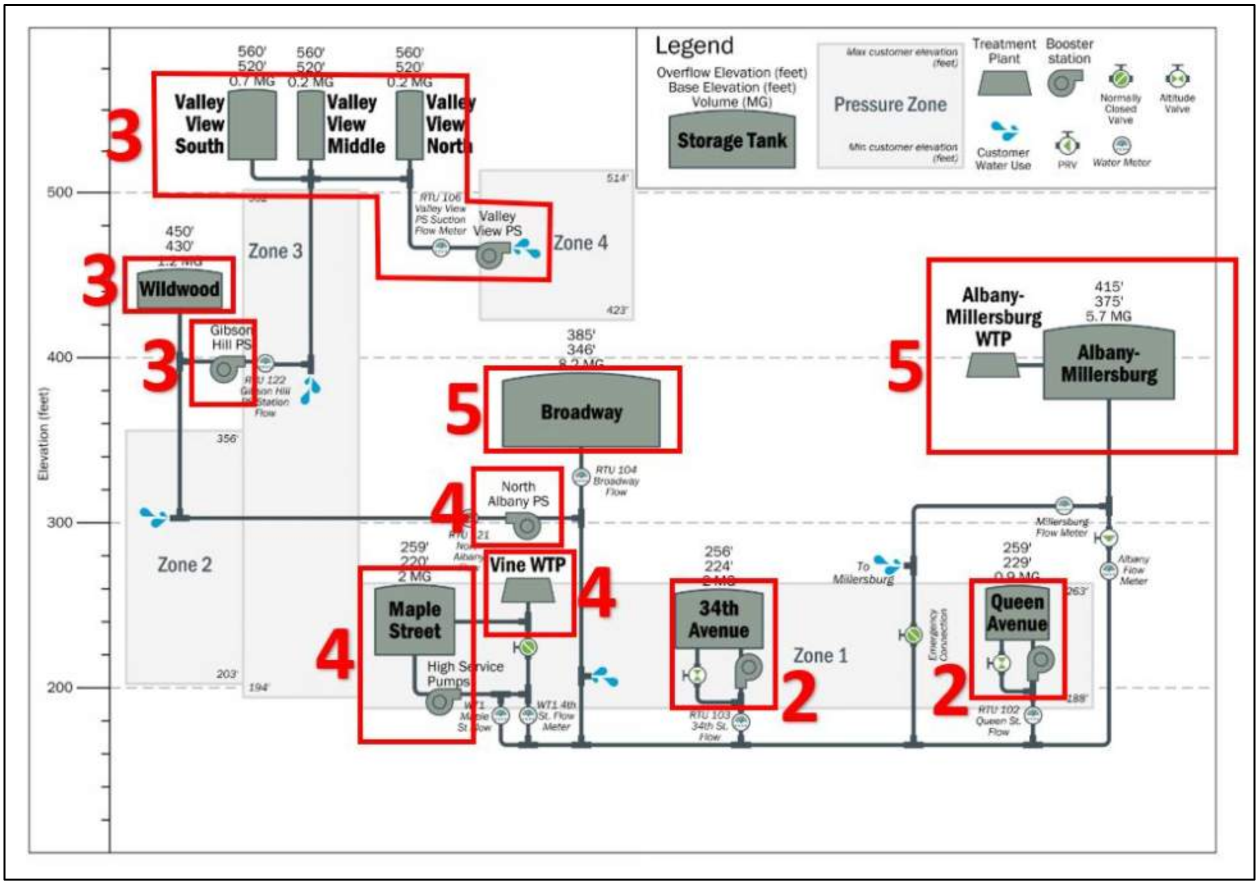


Figure 2. Criticality/COF by Site

In general, the different site COFs were selected based on the typical use and zone service as described below:

- The City has two WTPs, meaning that if one WTP failed, there is the other WTP to provide water to the City. With AM WTP was scored with a COF of 5, Severe, because it is a shared WTP with Millersburg and it is higher in elevation, meaning it can gravity flow to Zone 1 and partially fill the Broadway Reservoir. The AM WTP is also the more seismically resilient plant, in better, condition, with a longer design lifetime. If the AM WTP were to fail, the long-term and financial consequence to the City would be worse than if the Vine ST WTP failed. The AM Reservoir also uses the AM COF site score of 5. The Vine St WTP was scored as 4, high.
- Maple Street Reservoir was also scored as a 4, high, because it is connected to the Vine Street WTP which also scored a 4and water from Vine St WTP is dependent on the reservoir for Chlorine Contact Time.
- Queen Avenue and 34th Street sites are in Zone 1 and were scored as a 2, low, because the disruption of not having them is less than from other City assets. Energy used to pump water into Zone 1 is lost when the Queen and 34th reservoirs are filled. To use water in these reservoirs, it must be pumped again back to the Zone 1 pressure.
- Broadway was scored as a 5, severe, because it is the largest reservoir and it is at a mid-level elevation which assists the water getting pumped up to the higher zones and it is also able to reduce down in pressure to serve Zone 1.
- North Albany Pump Station was scored a 4, major, as it pumps water up to Zone 3 which ultimately helps water also be delivered to the Zone 4.
- Gibson Hill, Valley View, and Wildwood were all scored as a 3, moderate, because they serve the upper zones with fewer customers.

Risk Results

The risk scores were assigned for each asset. Table 17 shows the range of risk categories showing that the majority of assets are in the low to medium risk categories.

Table 17. Risk Summary

Risk Category	Count	Percentage of Assets
Low	219	37
Medium	225	38
High	94	16
Severe	50	9

The risk scores for individual assets are provided in tabular format in Appendix E, Risk Assessment. The assets receiving a severe risk score in the water system are found mostly at Maple St Pump Station & Reservoir, North Albany Pump Station, Vine St WTP. A few assets at Broadway Reservoir & AM WTP were also scored severe in risk score.

CONCLUSIONS

There are several recommendations for the immediate and long-term that would improve the City of Albany's water system's operational capabilities, resiliency to assessed threats, and extend the useful life of the water system. The Albany Millersburg (AM) Water Treatment Plant (WTP), installed in 2008, now 15 years, is overall in good condition without many large concerns. Key concerns are for the Vine St WTP which is now over 110 years old and the North Albany Pump Station. The largest concerns at Vine St are structural as multiple buildings are noncompliant for nearly all of the items on the ASCE/SEI 41-17 checklist for these building types. As seen in Table 6, seismic retrofit for multiple Vine St. structures would be very difficult to perform and not appropriate due to the age and type of the essential facilities. Instead, replacement of structures to current seismic standards is recommended. The North Albany Pump Station is scored as major impact if failure occurred and there is not redundancy in pump capacity. The North Albany PS structure is not seismically stable and is recommended for replacement. The rest of the City's reservoirs and pump stations are in fair condition and overall the City has performed timely and consistent maintenance of assets to prolong asset lifetime.

APPENDICES

The following appendices are included:

- Appendix A. Asset Registry with Condition and Performance Scores
- Appendix B. Structural/Seismic Condition Assessment and ASCE/SEI 41 Evaluation
- Appendix C. Condition Assessment Photos
- Appendix D. Condition Assessment Electrical Site Forms
- Appendix E. Risk Assessment

Appendix A

Asset Registry with Condition and Performance Scores

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	Discipline	Condition Score (1-5)	Condition Score Description	Performance SCore (1-5)	Performance Description	Useful Life	Installed or Replaced (Year)	Age	RULt	RULc Decay Curve %	RULc	Effective RUL (Years)
CARTEGRAPH ASSETS																			
A34019	34-PS-AHWR-TRAD-1	34th Street	Pump Station Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
15483	34-PS-INST-CLRN-1	34th Street	Pump Station Facility	Instrument	Chlorine	1	CHLORINE ANALYZER	Elec/I&C	2	Good	2	Good	15	2015	8	7	65%	10	8
15491	34-PS-INST-COND-1	34th Street	Pump Station Facility	Instrument	Conductivity	1	CONDUCTIVITY	Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
15482	34-PS-INST-FLM-1	34th Street	Pump Station Facility	Instrument	Flow Meter	1	FLOW	Elec/I&C	3	Fair	3	Fair	15	2019	4	11	38%	6	10
15490	34-PS-INST-ORP-1	34th Street	Pump Station Facility	Instrument	ORP	1		Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
15485	34-PS-INST-PH-1	34th Street	Pump Station Facility	Instrument	pH	1	PH - 34th St	Elec/I&C	2	Good	2	Good	15	2015	8	7	65%	10	8
15484	34-PS-INST-TRBD-1	34th Street	Pump Station Facility	Instrument	Turbidity	1	WTD - TURBIDITY - 34th St	Elec/I&C	2	Good	2	Good	15	2015	8	7	65%	10	8
15480	34-PS-MTST-MAG-1	34th Street	Pump Station Facility	MotorStarter	Magnetic	1	MCC 1	Elec/I&C	2	Good	2	Good	18	2011	12	6	65%	12	8
15473	34-PS-MTST-MAG-2	34th Street	Pump Station Facility	MotorStarter	Magnetic	2	MCC 2	Elec/I&C	3	Fair	3	Fair	18	2011	12	6	38%	7	7
15486	34-PS-MTST-SS-3	34th Street	Pump Station Facility	MotorStarter	Soft Start	3	MCC 3	Elec/I&C	3	Fair	3	Fair	18	2011	12	6	38%	7	7
WTD - Pump Station Facility - 34th Street	34-PS-FCLT-PS-1	34th Street	Pump Station Facility	Water Facility	Pump Station	1		Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
15482	34-PS-PUMP-CTFL-1	34th Street	Pump Station Facility	WaterPump	Centrifugal	1	PUMP #1(#41)(South)	Mechanical	3	Fair	3	Fair	25	2009	14	11	38%	10	11
15481	34-PS-PUMP-CTFL-2	34th Street	Pump Station Facility	WaterPump	Centrifugal	2	PUMP #2 (#42)(Middle)	Mechanical	3	Fair	3	Fair	25	1971	52	-27	38%	10	4
15475	34-PS-PUMP-RAD-3	34th Street	Pump Station Facility	WaterPump	Radial Flow	3	PUMP #3 (#43)(North) - WTD - 34th St	Mechanical	3	Fair	3	Fair	25	1971	52	-27	38%	10	4
A75160	34-RSVR-AHWR-LSEN-1	34th Street	Reservoir Facility	AutomationHardware	Level Sensor	1	Ultrasonic Level Measurement Device	Elec/I&C	3	Fair	3	Fair	15	2013	10	5	38%	6	6
WTD - 34Th Steet Reservoir	34-RSVR-RSVR-RESR-1	34th Street	Reservoir Facility	WaterStorageTank	Reservoir	1	Steel	Structural	3	Fair	3	Fair	63	1971	52	11	38%	24	16
16582	BDWY-PS-VALV-30"-1	Broadway Street	Pump Station Facility	WTP Valves	30" Valve	1	Seismic Valve Actuator	Mechanical	2	Good	2	Good	20	2017	6	14	65%	13	14
16	BDWY-RSVR-AHWR-FLM-1	Broadway Street	Reservoir Facility	AutomationHardware	Flow Meter	1	FLOW	Elec/I&C	2	Good	2	Good	15	2015	8	7	65%	10	8
A75133	BDWY-RSVR-AHWR-LSEN-1	Broadway Street	Reservoir Facility	AutomationHardware	Level Sensor	1	Ultrasonic Level Measurement Device	Elec/I&C	3	Fair	3	Fair	15	2012	11	4	38%	6	5
A75211	BDWY-RSVR-AHWR-TRAD-1	Broadway Street	Reservoir Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	Elec/I&C	2	Good	2	Good	15	2016	7	8	65%	10	9
A75152	BDWY-RSVR-AHWR-TRBD-1	Broadway Street	Reservoir Facility	AutomationHardware	Turbidity	1	Turbidimeter	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
16192	BDWY-RSVR-INST-CLRN-1	Broadway Street	Reservoir Facility	Instrument	Chlorine	1	CHLORINE	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
16193	BDWY-RSVR-INST-COND-1	Broadway Street	Reservoir Facility	Instrument	Conductivity	1	CONDUCTIVITY	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
INST-000080	BDWY-RSVR-INST-CTRL-1	Broadway Street	Reservoir Facility	Instrument	Control Cab	1	Broadway Reservoir Control Cab	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
16075	BDWY-RSVR-INST-PH-1	Broadway Street	Reservoir Facility	Instrument	pH	1		Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
15486	BDWY-RSVR-INST-TRBD-1	Broadway Street	Reservoir Facility	Instrument	Turbidity	1	WTD - TURBIDITY - Broadway	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
WTD - Broadway Reservoir	BDWY-RSVR-RSVR-RESR-1	Broadway Street	Reservoir Facility	WaterStorageTank	Reservoir	1	Concrete	Structural	3	Fair	3	Fair	63	1992	31	32	38%	24	30
2	GBHL-PS-AHWR-FLM-1	Gibson Hill	Pump Station Facility	AutomationHardware	Flow Meter	1	FLOW	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
1	GBHL-PS-AHWR-TRAD-1	Gibson Hill	Pump Station Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	Elec/I&C	2	Good	2	Good	15	2015	8	7	65%	10	8
CRN-22	GBHL-PS-CRN-CRN-1	Gibson Hill	Pump Station Facility	Crane	Crane	1	A-Frame (1.1 Ton)	Structural	3	Fair	3	Fair	20	UNK	UNK	UNK	38%	8	8
CRN-12	GBHL-PS-CRN-CRN-2	Gibson Hill	Pump Station Facility	Crane	Crane	2	Hoist (2 Ton) Trolley Rail (2 Ton)	Structural	3	Fair	3	Fair	20	UNK	UNK	UNK	38%	8	8
MSTR-000031-1	GBHL-PS-MTST-OTFC-1	Gibson Hill	Pump Station Facility	MotorStarter	Open Type	1	MCC 1 - Open Type Feed-Through Contactor	Elec/I&C	2	Good	2	Good	18	2021	2	16	65%	12	15
MSTR-000032-1	GBHL-PS-MTST-OTFC-2	Gibson Hill	Pump Station Facility	MotorStarter	Open Type	2	MCC 2 - Open Type Feed-Through Contactor	Elec/I&C	2	Good	2	Good	18	2021	2	16	65%	12	15
WTD - Pump Station Facility - Gibson HIll	GBHL-PS-FCLT-PS-1	Gibson Hill	Pump Station Facility	Water Facility	Pump Station	1		Structural	2	Good	2	Good	50	1999	24	26	65%	33	29
15240	GBHL-PS-PUMP-CTFL-1	Gibson Hill	Pump Station Facility	WaterPump	Centrifugal	1	Pump 1	Mechanical	3	Fair	3	Fair	25	1999	24	1	38%	10	4
15239	GBHL-PS-PUMP-CTFL-2	Gibson Hill	Pump Station Facility	WaterPump	Centrifugal	2	Pump 2	Mechanical	3	Fair	3	Fair	25	1999	24	1	38%	10	4
CRN-21	MPL-PS-CRN-CRN-1	Maple Street	Pump Station Facility	Crane	Crane	1	A-Frame (1.2 Ton)	Structural	3	Fair	3	Fair	20	UNK	UNK	UNK	38%	8	8
16191	MPL-PS-INST-CLRN-1	Maple Street	Pump Station Facility	Instrument	Chlorine	1	CHLORINE - WTP1 Finished Water	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
16206	MPL-PS-INST-FL-1	Maple Street	Pump Station Facility	Instrument	Fluoride	1	FLOURIDE - WTP1 Finished Water	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
16074	MPL-PS-INST-PH-1	Maple Street	Pump Station Facility	Instrument	pH	1	PH - WTP1 Finished Water	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
WTD - Pump Station Facility - Maple Street	MPL-PS-FCLT-PS-1	Maple Street	Pump Station Facility	Water Facility	Pump Station	1		Structural	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
13629	MPL-PS-PUMP-CTFL-1	Maple Street	Pump Station Facility	WaterPump	Centrifugal	1	PUMP - High Service #1	Mechanical	4	Poor	4	Poor	25	1960	63	-38	18%	5	2
13630	MPL-PS-PUMP-CTFL-2	Maple Street	Pump Station Facility	WaterPump	Centrifugal	2	PUMP - High Service #2	Mechanical	3	Fair	3	Fair	25	2002	21	4	38%	10	6
13631	MPL-PS-PUMP-CTFL-3	Maple Street	Pump Station Facility	WaterPump	Centrifugal	3	PUMP - High Service #3	Mechanical	3	Fair	3	Fair	25	1960	63	-38	38%	10	4
13632	MPL-PS-PUMP-CTFL-4	Maple Street	Pump Station Facility	WaterPump	Centrifugal	4	PUMP - High Service #4	Mechanical	3	Fair	3	Fair	25	1960	63	-38	38%	10	4
13633	MPL-PS-PUMP-CTFL-5	Maple Street	Pump Station Facility	WaterPump	Centrifugal	5	PUMP - High Service #5	Mechanical	3	Fair	3	Fair	25	1991	32	-7	38%	10	4
16320	MPL-PS-PUMP-JET-1	Maple Street	Pump Station Facility	WaterPump	Jet	1	PUMP - Sump (High Service Bldg)	Mechanical	3	Fair	3	Fair	25	2015	8	17	38%	10	15
13661	MPL-PS-VALV-24"-1	Maple Street	Pump Station Facility	WTP Valves	24" Valve	1	Discharge Header Valve	Mechanical	3	Fair	3	Fair	20	UNK	UNK	UNK	38%	8	8
WTD - Maple St Reservoir	MPL-RSVR-RSVR-RESR-1	Maple Street	Reservoir Facility	WaterStorageTank	Reservoir	1	Steel	Structural/Mech	4	Poor	4	Poor	63	1959	64	-1	18%	12	4
A75148	NALB-PS-AHWR-FLM-1	North Albany	Pump Station Facility	AutomationHardware	Flow Meter	1	FLOW	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
3	NALB-PS-AHWR-TRAD-1	North Albany	Pump Station Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	Elec/I&C	2	Good	2	Good	15	2018	5	10	65%	10	10
MSTR-000033	NALB-PS-MTST-MAG-1	North Albany	Pump Station Facility	MotorStarter	Magnetic	1	MCC 1	Elec/I&C	2	Good	2	Good	18	2018	5	13	65%	12	13
MSTR-000034	NALB-PS-MTST-MAG-2	North Albany	Pump Station Facility	MotorStarter	Magnetic	2	MCC 2	Elec/I&C	2	Good	2	Good	18	2018	5	13	65%	12	13

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	Discipline	Condition Score (1-5)	Condition Score Description	Performance SCore (1-5)	Performance Description	Useful Life	Installed or Replaced (Year)	Age	RULt	RULc Decay Curve %	RULc	Effective RUL (Years)
WTD - Pump Station Facility - North Albany	NALB-PS-FCLT-PS-1	North Albany	Pump Station Facility	Water Facility	Pump Station	1		Structural	4	Poor	4	Poor	50	1980	43	7	18%	9	8
15229	NALB-PS-PUMP-CTFL-2	North Albany	Pump Station Facility	WaterPump	Centrifugal	2	Pump 2	Mechanical	3	Fair	5	Immediate Action	25	1980	43	-18	38%	10	4
15230	NALB-PS-PUMP-RAD-1	North Albany	Pump Station Facility	WaterPump	Radial Flow	1	Pump 1	Mechanical	3	Fair	5	Immediate Action	25	1980	43	-18	38%	10	4
22	QN-PS-AHWR-FLM-1	Queen Avenue	Pump Station Facility	AutomationHardware	Flow Meter	1	FLOW	Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
A75159	QN-PS-AHWR-LSEN-1	Queen Avenue	Pump Station Facility	AutomationHardware	Level Sensor	1	Ultrasonic Level Measurement Device	Elec/I&C	3	Fair	3	Fair	15	2013	10	5	38%	6	6
21	QN-PS-AHWR-TRAD-1	Queen Avenue	Pump Station Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
15470	QN-PS-MTST-MAG-1	Queen Avenue	Pump Station Facility	MotorStarter	Magnetic	1	MCC 1	Elec/I&C	4	Poor	4	Poor	18	2011	12	6	18%	4	6
15460	QN-PS-MTST-MAG-2	Queen Avenue	Pump Station Facility	MotorStarter	Magnetic	2	MCC 2	Elec/I&C	4	Poor	4	Poor	18	2011	12	6	18%	4	6
WTD - Pump Station Facility - Queen Avenue	QN-PS-FCLT-PS-1	Queen Avenue	Pump Station Facility	Water Facility	Pump Station	1		Structural	3	Fair	3	Fair	50	2019	4	46	38%	19	38
15479	QN-PS-PUMP-CTFL-1	Queen Avenue	Pump Station Facility	WaterPump	Centrifugal	1	Pump 1	Mechanical	4	Poor	4	Poor	25	1955	68	-43	18%	5	2
15472	QN-PS-PUMP-CTFL-2	Queen Avenue	Pump Station Facility	WaterPump	Centrifugal	2	Pump 2	Mechanical	4	Poor	4	Poor	25	1955	68	-43	18%	5	2
WTD - Queen Ave Reservoir	QN-RSVR-RSVR-RESR-1	Queen Avenue	Reservoir Facility	WaterStorageTank	Reservoir	1	Steel	Structural/Mech	3	Fair	3	Fair	63	1955	68	-5	38%	24	8
5	VV-PS-AHWR-FLM-1	Valley View	Pump Station Facility	AutomationHardware	Flow Meter	1	FLOW	Elec/I&C	2	Good	2	Good	15	2007	16	-1	65%	10	4
10	VV-PS-AHWR-TRAD-1	Valley View	Pump Station Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	Elec/I&C	2	Good	2	Good	15	2015	8	7	65%	10	8
11	VV-PS-AHWR-TRAD-2	Valley View	Pump Station Facility	AutomationHardware	Telemetry Radio	2	REPEATER	Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
15221	VV-PS-GEN-DSL-1	Valley View	Pump Station Facility	ElectricalGenerator	Diesel	1	Valley View Emergency Generator	Elec/I&C	2	Good	2	Good	20	2007	16	4	65%	13	7
15217	VV-PS-INST-CLRN-1	Valley View	Pump Station Facility	Instrument	Chlorine	1	CHLORINE	Elec/I&C	2	Good	2	Good	15	2007	16	-1	65%	10	4
15489	VV-PS-INST-COND-1	Valley View	Pump Station Facility	Instrument	Conductivity	1	COND	Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
15222	VV-PS-INST-CTRL-1	Valley View	Pump Station Facility	Instrument	Control Cab	1	Valley View PS Control Cab	Elec/I&C	2	Good	2	Good	15	2007	16	-1	65%	10	4
15487	VV-PS-INST-ORP-1	Valley View	Pump Station Facility	Instrument	ORP	1		Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
15488	VV-PS-INST-PH-1	Valley View	Pump Station Facility	Instrument	pH	1	PH - Valley View	Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
15220	VV-PS-INST-TSMR-1	Valley View	Pump Station Facility	Instrument	Transmitter	1	WTD - Valley View WQ Monitor	Elec/I&C	2	Good	2	Good	15	2007	16	-1	65%	10	4
15219	VV-PS-INST-TRBD-1	Valley View	Pump Station Facility	Instrument	Turbidity	1	WTD - TURBIDITY - Valley View	Elec/I&C	2	Good	2	Good	15	2007	16	-1	65%	10	4
MSTR-000035	VV-PS-MTST-MAG-1	Valley View	Pump Station Facility	MotorStarter	Magnetic	1	MCC J	Elec/I&C	2	Good	2	Good	18	2007	16	2	65%	12	6
MSTR-000036	VV-PS-MTST-VFD-2	Valley View	Pump Station Facility	MotorStarter	VFD	2	MCC 2	Elec/I&C	2	Good	2	Good	18	2007	16	2	65%	12	6
MSTR-000037	VV-PS-MTST-VFD-3	Valley View	Pump Station Facility	MotorStarter	VFD	3	MCC 3	Elec/I&C	2	Good	2	Good	18	2007	16	2	65%	12	6
WTD - Pump Station Facility - Valley View	VV-PS-FCLT-PS-1	Valley View	Pump Station Facility	Water Facility	Pump Station	1		Structural	3	Fair	3	Fair	50	2007	16	34	38%	19	30
15218	VV-PS-PUMP-CTFL-1	Valley View	Pump Station Facility	WaterPump	Centrifugal	1	Jockey Pump	Mechanical	3	Fair	3	Fair	25	2007	16	9	38%	10	10
15213	VV-PS-PUMP-CTFL-2	Valley View	Pump Station Facility	WaterPump	Centrifugal	2	Pump 2	Mechanical	3	Fair	3	Fair	25	2007	16	9	38%	10	10
15212	VV-PS-PUMP-CTFL-3	Valley View	Pump Station Facility	WaterPump	Centrifugal	3	Pump 3	Mechanical	3	Fair	3	Fair	25	2007	16	9	38%	10	10
A75156	VV-RSVR-AHWR-LSEN-1	Valley View	Reservoir Facility	AutomationHardware	Level Sensor	1	Ultrasonic Level Measurement Device	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
A75157	VV-RSVR-AHWR-LSEN-2	Valley View	Reservoir Facility	AutomationHardware	Level Sensor	2	Ultrasonic Level Measurement Device	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
A75158	VV-RSVR-AHWR-LSEN-3	Valley View	Reservoir Facility	AutomationHardware	Level Sensor	3	Ultrasonic Level Measurement Device	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
16321	VV-RSVR-PUMP-JET-1	Valley View	Reservoir Facility	WaterPump	Jet	1	JET MIXER - North Tank	Mechanical	2	Good	2	Good	25	2020	3	22	65%	17	21
16322	VV-RSVR-PUMP-JET-2	Valley View	Reservoir Facility	WaterPump	Jet	2	JET MIXER - Middle Tank	Mechanical	2	Good	2	Good	25	2020	3	22	65%	17	21
16323	VV-RSVR-PUMP-JET-3	Valley View	Reservoir Facility	WaterPump	Jet	3	JET MIXER - South Tank	Mechanical	2	Good	2	Good	25	2020	3	22	65%	17	21
WTD - Valley View North Tank	VV-RSVR-RSVR-RESR-1	Valley View	Reservoir Facility	WaterStorageTank	Reservoir	1	Steel - North Tank	Structural	4	Poor	4	Poor	63	1963	60	3	18%	12	6
WTD - Valley View Middle Tank	VV-RSVR-RSVR-RESR-2	Valley View	Reservoir Facility	WaterStorageTank	Reservoir	2	Steel - Middle Tank	Structural	4	Poor	4	Poor	63	1963	60	3	18%	12	6
WTD - Valley View South Tank	VV-RSVR-RSVR-RESR-3	Valley View	Reservoir Facility	WaterStorageTank	Reservoir	3	Steel - South Tank	Structural	3	Fair	3	Fair	63	1982	41	22	38%	24	23
14	WWD-RSVR-AHWR-LSEN-1	Wildwood	Reservoir Facility	AutomationHardware	Level Sensor	1	Radar Level Measurement Device	Elec/I&C	3	Fair	3	Fair	15	2015	8	7	38%	6	7
12	WWD-RSVR-AHWR-TRAD-1	Wildwood	Reservoir Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	Elec/I&C	2	Good	2	Good	15	2015	8	7	65%	10	8
WTD - Wildwood Reservoir	WWD-RSVR-RSVR-RESR-1	Wildwood	Reservoir Facility	WaterStorageTank	Reservoir	1	Concrete	Structural	2	Good	2	Good	63	1998	25	38	65%	41	39
13615	VINE-ACC1-INST-FLM-1	WTP1 (Vine St)	Accelator #1	Instrument	Flow Meter	1	Raw Water flow meter	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
WTP1 - ACCELATOR #1	VINE-ACC1-FCLT-FCLT-1	WTP1 (Vine St)	Accelator #1	Water Facility	Facility	1		Structural/Mech	4	Poor	4	Poor	50	1946	77	-27	18%	9	3
13607	VINE-ACC1-PUMP-CTFL-1	WTP1 (Vine St)	Accelator #1	WaterPump	Centrifugal	1	PUMP - Raw Treated Sample #1	Mechanical	3	Fair	3	Fair	25	2017	6	19	38%	10	16
13608	VINE-ACC1-PUMP-CTFL-2	WTP1 (Vine St)	Accelator #1	WaterPump	Centrifugal	2	PUMP - Raw Treated Sample #2	Mechanical	4	Poor	4	Poor	25	UNK	UNK	UNK	18%	5	5
13603-1	VINE-ACC1-PUMP-MIX-1	WTP1 (Vine St)	Accelator #1	WaterPump	Mixer	1	MIXER - Accelator #1	Mechanical	2	Good	2	Good	25	2021	2	23	65%	17	21
WTP1 - ACCELATOR #2	VINE-ACC2-FCLT-FCLT-2	WTP1 (Vine St)	Accelator #2	Water Facility	Facility	2		Structural/Mech	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	Discipline	Condition Score (1-5)	Condition Score Description	Performance SCore (1-5)	Performance Description	Useful Life	Installed or Replaced (Year)	Age	RULt	RULc Decay Curve %	RULc	Effective RUL (Years)
13610-1	VINE-ACC2-PUMP-MIX-2	WTP1 (Vine St)	Accelator #2	WaterPump	Mixer	2	MIXER - Accelator #2	Mechanical	2	Good	2	Good	25	2021	2	23	65%	17	21
13702	VINE-BWSH-MTST-VFD-2	WTP1 (Vine St)	Backwash System	MotorStarter	VFD	2	Backwash Pump #2	Elec/I&C	2	Good	2	Good	18	2016	7	11	65%	12	12
PV-24	VINE-BWSH-PRSR-AIRF-2	WTP1 (Vine St)	Backwash System	Pressure Vessel	Air Filter	2	AIR FILTER (Left Side) - Backwash Settling Ponds	Mechanical	4	Poor	4	Poor	15	1960	63	-48	18%	3	1
PV-25	VINE-BWSH-PRSR-AIRF-3	WTP1 (Vine St)	Backwash System	Pressure Vessel	Air Filter	3	AIR FILTER (Right Side) - Backwash Settling Ponds	Mechanical	4	Poor	4	Poor	15	1960	63	-48	18%	3	1
PV-21	VINE-BWSH-PRSR-AIRR-1	WTP1 (Vine St)	Backwash System	Pressure Vessel	Air Receiver	1	AIR RECEIVER - Backwash Settling Ponds	Mechanical	4	Poor	4	Poor	15	1961	62	-47	18%	3	1
WTP1 - BACKWASH SETTLING PONDS	VINE-BWSH-FCLT-FCLT-1	WTP1 (Vine St)	Backwash System	Water Facility	Facility	1	Backwash Settling Ponds	Structural	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
13562	VINE-BWSH-PUMP-VTRB-5	WTP1 (Vine St)	Backwash System	WaterPump	Vertical Turbine	5	PUMP - Backwash - Small Filter	Mechanical	4	Poor	4	Poor	25	1960	63	-38	18%	5	2
13563	VINE-BWSH-PUMP-VTRB-6	WTP1 (Vine St)	Backwash System	WaterPump	Vertical Turbine	6	PUMP - Backwash - Large Filter	Mechanical	4	Poor	4	Poor	25	1965	58	-33	18%	5	2
13596-1	VINE-CHEM-CHEM-ACH-1	WTP1 (Vine St)	Chemical Facility	ChemSystem	ACH	1	ACH Metering Pump 1	Mechanical	2	Good	2	Good	15	2021	2	13	65%	10	12
13595	VINE-CHEM-CHEM-ACH-2	WTP1 (Vine St)	Chemical Facility	ChemSystem	ACH	2	ACH Metering Pump 2	Mechanical	4	Poor	4	Poor	15	2007	16	-1	18%	3	1
13599	VINE-CHEM-CHEM-FL-1	WTP1 (Vine St)	Chemical Facility	ChemSystem	Fluoride	1	Fluoride Dust Collector	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
13598	VINE-CHEM-CHEM-FL-2	WTP1 (Vine St)	Chemical Facility	ChemSystem	Fluoride	2	Flouride Feeder	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
13503	VINE-CHEM-CHEM-FL-3	WTP1 (Vine St)	Chemical Facility	ChemSystem	Fluoride	3	Flouride Feeder System	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
16320	VINE-CHEM-CHEM-POLY-1	WTP1 (Vine St)	Chemical Facility	ChemSystem	Polymer	1	Polymer Metering Pump 1	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
16321	VINE-CHEM-CHEM-POLY-2	WTP1 (Vine St)	Chemical Facility	ChemSystem	Polymer	2	Polymer Metering Pump 2	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
13594	VINE-CHEM-CHEM-POLY-3	WTP1 (Vine St)	Chemical Facility	ChemSystem	Polymer	3	Polymer System	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
13505	VINE-CHEM-CHEM-HYPO-1	WTP1 (Vine St)	Chemical Facility	ChemSystem	Sodium Hypochlorite	1	Sodium Hypochlorite Pump 1	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
13506	VINE-CHEM-CHEM-HYPO-2	WTP1 (Vine St)	Chemical Facility	ChemSystem	Sodium Hypochlorite	2	Sodium Hypochlorite Pump 2	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
13507	VINE-CHEM-CHEM-HYPO-3	WTP1 (Vine St)	Chemical Facility	ChemSystem	Sodium Hypochlorite	3	Sodium Hypochlorite Pump 3	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
13508	VINE-CHEM-CHEM-HYPO-4	WTP1 (Vine St)	Chemical Facility	ChemSystem	Sodium Hypochlorite	4	Sodium Hypochlorite Pump 4	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
INST-000138	VINE-CHEM-INST-LSEN-1	WTP1 (Vine St)	Chemical Facility	Instrument	Level Sensor	1	LEVEL - Tank - #1 - Hypochlorite - Radar	Elec/I&C	2	Good	2	Good	15	2021	2	13	65%	10	12
INST-000139	VINE-CHEM-INST-LSEN-2	WTP1 (Vine St)	Chemical Facility	Instrument	Level Sensor	2	LEVEL - Tank - #2 - Hypochlorite - Radar	Elec/I&C	2	Good	2	Good	15	2021	2	13	65%	10	12
INST-000140	VINE-CHEM-INST-LSEN-3	WTP1 (Vine St)	Chemical Facility	Instrument	Level Sensor	3	LEVEL - Tank - ACH - Radar	Elec/I&C	2	Good	2	Good	15	2021	2	13	65%	10	12
13609	VINE-CHEM-INST-PH-1	WTP1 (Vine St)	Chemical Facility	Instrument	pH	1	PH - Raw Water Treated	Elec/I&C	4	Poor	4	Poor	15	2015	8	7	18%	3	6
13601	VINE-CHEM-INST-sCM-1	WTP1 (Vine St)	Chemical Facility	Instrument	Streaming Current Monitor	1	WTP1 - SCM - Raw Water #1	Elec/I&C	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
13602	VINE-CHEM-INST-sCM-2	WTP1 (Vine St)	Chemical Facility	Instrument	Streaming Current Monitor	2	WTP1 - SCM - Raw Water #2	Elec/I&C	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
WTP1 - CHEMICAL FACILITY	VINE-CHEM-FCLT-FCLT-1	WTP1 (Vine St)	Chemical Facility	Water Facility	Facility	1		Structural/Mech	4	Poor	3	Immediate Action	50	UNK	UNK	UNK	18%	9	9
15454	VINE-CHEM-TANK-ACH-1	WTP1 (Vine St)	Chemical Facility	WTPTank	ACH	1	TANK - ACH	Mechanical	2	Good	4	Poor	63	2021	2	61	65%	41	55
15455	VINE-CHEM-TANK-CHEM-1	WTP1 (Vine St)	Chemical Facility	WTPTank	Chemical Storage	1	TANK - Hypochlorite #1	Mechanical	2	Good	4	Poor	63	2021	2	61	65%	41	55
15456	VINE-CHEM-TANK-CHEM-2	WTP1 (Vine St)	Chemical Facility	WTPTank	Chemical Storage	2	TANK - Hypochlorite #2	Mechanical	2	Good	4	Poor	63	2021	2	61	65%	41	55
13644	VINE-CTRL-INST-CLRN-1	WTP1 (Vine St)	Control Building	Instrument	Chlorine	1	CHLORINE - Mid	Elec/I&C	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
13604	VINE-CTRL-INST-FL-1	WTP1 (Vine St)	Control Building	Instrument	Fluoride	1	FLOURIDE - Lab	Elec/I&C	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
16267	VINE-CTRL-INST-PH-1	WTP1 (Vine St)	Control Building	Instrument	pH	1	PH - Multimeter (PH & Other) - Lab	Elec/I&C	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
16266	VINE-CTRL-INST-TITR-1	WTP1 (Vine St)	Control Building	Instrument	Titrator	1	WTP1 - TITRATOR - Lab	Elec/I&C	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
12628	VINE-CTRL-INST-TRBD-1	WTP1 (Vine St)	Control Building	Instrument	Turbidity	1	WTP1 - TURBIDITY - Desktop - Lab	Elec/I&C	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
WTP1 - CONTROL BLDG	VINE-CTRL-FCLT-FCLT-1	WTP1 (Vine St)	Control Building	Water Facility	Facility	1		Structural	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
INST-000109	VINE-OFLT-INST-DP-7	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Differential Pressure (DP)	7	Headloss(DPT) - #7 Filter	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
INST-000110	VINE-OFLT-INST-DP-8	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Differential Pressure (DP)	8	Headloss(DPT) - #8 Filter	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
INST-000111	VINE-OFLT-INST-DP-9	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Differential Pressure (DP)	9	Headloss(DPT) - #9 Filter	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
INST-000112	VINE-OFLT-INST-DP-10	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Differential Pressure (DP)	10	Headloss(DPT) - #10 Filter	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13592	VINE-OFLT-INST-FLM-1	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Flow Meter	1	Backwash Flow Meter (Filters 7-10)	Elec/I&C	3	Fair	3	Fair	15	2014	9	6	38%	6	6
13588	VINE-OFLT-INST-FLM-7	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Flow Meter	7	Filter 7 Flow	Elec/I&C	2	Good	2	Good	15	2011	12	3	65%	10	6
13589	VINE-OFLT-INST-FLM-8	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Flow Meter	8	Filter 8 Flow	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13590	VINE-OFLT-INST-FLM-9	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Flow Meter	9	Filter 9 Flow	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13591	VINE-OFLT-INST-FLM-10	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Flow Meter	10	Filter 10 Flow	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13627	VINE-OFLT-INST-PRSS-1	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Pressure Sensor	1	Flume Level (A)	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13628	VINE-OFLT-INST-PRSS-2	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Pressure Sensor	2	Flume Level (B)	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13564	VINE-OFLT-INST-TRBD-7	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Turbidity	7	WTP1 - TURBIDITY - Filter #7	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
13565	VINE-OFLT-INST-TRBD-8	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Turbidity	8	WTP1 - TURBIDITY - Filter #8	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
13566	VINE-OFLT-INST-TRBD-9	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Turbidity	9	WTP1 - TURBIDITY - Filter #9	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
13567	VINE-OFLT-INST-TRBD-10	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Turbidity	10	WTP1 - TURBIDITY - Filter #10	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
WTP1 - FILTER 7-10 FACILITY	VINE-OFLT-FCLT-FCLT-1	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Water Facility	Facility	1		Structural	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	Discipline	Condition Score (1-5)	Condition Score Description	Performance SCore (1-5)	Performance Description	Useful Life	Installed or Replaced (Year)	Age	RULt	RULc Decay Curve %	RULc	Effective RUL (Years)
13593	VINE-OFLT-PUMP-CTFL-1	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WaterPump	Centrifugal	1	PUMP - Surface Wash Booster	Mechanical	4	Poor	4	Poor	25	UNK	UNK	UNK	18%	5	5
13585	VINE-OFLT-VALV-20"-10B	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	10B	Filter 10 Backwash Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13584	VINE-OFLT-VALV-20"-10E	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	10E	Filter 10 Effluent Control Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13583	VINE-OFLT-VALV-20"-10I	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	10I	Filter 10 Influent Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13570	VINE-OFLT-VALV-20"-7B	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	7B	Filter 7 Backwash Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13569	VINE-OFLT-VALV-20"-7E	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	7E	Filter 7 Effluent Control Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13568	VINE-OFLT-VALV-20"-7I	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	7I	Filter 7 Influent Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13575	VINE-OFLT-VALV-20"-8B	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	8B	Filter 8 Backwash Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13574	VINE-OFLT-VALV-20"-8E	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	8E	Filter 8 Effluent Control Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13573	VINE-OFLT-VALV-20"-8I	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	8I	Filter 8 Influent Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13580	VINE-OFLT-VALV-20"-9B	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	9B	Filter 9 Backwash Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13579	VINE-OFLT-VALV-20"-9E	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	9E	Filter 9 Effluent Control Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13578	VINE-OFLT-VALV-20"-9I	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	9I	Filter 9 Influent Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13571	VINE-OFLT-VALV-24"-7	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	24" Valve	7	Filter 7 Waste Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13576	VINE-OFLT-VALV-24"-8	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	24" Valve	8	Filter 8 Waste Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13581	VINE-OFLT-VALV-24"-9	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	24" Valve	9	Filter 9 Waste Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
13586	VINE-OFLT-VALV-24"-10	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	24" Valve	10	Filter 10 Waste Valve	Mechanical	4	Poor	4	Poor	20	2014	9	11	18%	4	9
15449	VINE-OFLT-TANK-FLM-1	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTPTank	Flume	1	Flume	Mechanical	4	Poor	4	Poor	63	UNK	UNK	UNK	18%	12	12
13616	VINE-IFLT-CPSR-AIRC-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Compressor	Air Compressor	1	High Pressure Air Dryer	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
13524	VINE-IFLT-INST-CLRN-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Chlorine	1	CHLORINE - Clearwell	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
INST-000103	VINE-IFLT-INST-DP-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Differential Pressure (DP)	1	Headloss (DPT) - #1 Filter	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
INST-000104	VINE-IFLT-INST-DP-2	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Differential Pressure (DP)	2	Headloss(DPT) - #2 Filter	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
INST-000105	VINE-IFLT-INST-DP-3	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Differential Pressure (DP)	3	Headloss(DPT) - #3 Filter	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
INST-000106	VINE-IFLT-INST-DP-4	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Differential Pressure (DP)	4	Headloss(DPT) - #4 Filter	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
INST-000107	VINE-IFLT-INST-DP-5	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Differential Pressure (DP)	5	Headloss(DPT) - #5 Filter	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
INST-000108	VINE-IFLT-INST-DP-6	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Differential Pressure (DP)	6	Headloss(DPT) - #6 Filter	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13556	VINE-IFLT-INST-FLM-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	1	Filter 1 Flow	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13557	VINE-IFLT-INST-FLM-2	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	2	Filter 2 Flow	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13558	VINE-IFLT-INST-FLM-3	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	3	Filter 3 Flow	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13559	VINE-IFLT-INST-FLM-4	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	4	Filter 4 Flow	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13560	VINE-IFLT-INST-FLM-5	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	5	Filter 5 Flow	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13561	VINE-IFLT-INST-FLM-6	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	6	Filter 6 Flow	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13593	VINE-IFLT-INST-FLM-7	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	7	Backwash Flow Meter (Filters 1-6)	Elec/I&C	2	Good	2	Good	15	2014	9	6	65%	10	8
13525	VINE-IFLT-INST-PH-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	pH	1	PH - Clearwell	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
13517	VINE-IFLT-INST-TRBD-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	1	WTP1 - TURBIDITY - Filter #1	Elec/I&C	3	Fair	3	Fair	15	2013	10	5	38%	6	6
13518	VINE-IFLT-INST-TRBD-2	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	2	WTP1 - TURBIDITY - Filter #2	Elec/I&C	3	Fair	3	Fair	15	2013	10	5	38%	6	6
13519	VINE-IFLT-INST-TRBD-3	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	3	WTP1 - TURBIDITY - Filter #3	Elec/I&C	3	Fair	3	Fair	15	2013	10	5	38%	6	6
13520	VINE-IFLT-INST-TRBD-4	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	4	WTP1 - TURBIDITY - Filter #4	Elec/I&C	3	Fair	3	Fair	15	2013	10	5	38%	6	6
13521	VINE-IFLT-INST-TRBD-5	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	5	WTP1 - TURBIDITY - Filter #5	Elec/I&C	3	Fair	3	Fair	15	2013	10	5	38%	6	6
13522	VINE-IFLT-INST-TRBD-6	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	6	WTP1 - TURBIDITY - Filter #6	Elec/I&C	3	Fair	3	Fair	15	2013	10	5	38%	6	6
13523	VINE-IFLT-INST-TRBD-7	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	7	WTP1 - TURBIDITY - Clearwell	Elec/I&C	3	Fair	3	Fair	15	2013	10	5	38%	6	6
13703	VINE-IFLT-MTST-VFD-3	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	MotorStarter	VFD	3	Transfer Pump #3	Elec/I&C	2	Good	2	Good	18	2016	7	11	65%	12	12
13704	VINE-IFLT-MTST-VFD-4	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	MotorStarter	VFD	4	Transfer Pump #4	Elec/I&C	2	Good	2	Good	18	2016	7	11	65%	12	12
WTP1 - FILTERS 1-6 FACILITY	VINE-IFLT-FCLT-FCLT-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Water Facility	Facility	1		Structural	5	Immediate Action	5	Immediate Action	50	1910	113	-63	0%	0	0
16257	VINE-IFLT-PUMP-CTFL-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WaterPump	Centrifugal	1	PUMP - Clearwell Sample	Mechanical	3	Fair	3	Fair	25	2017	6	19	38%	10	16
13511	VINE-IFLT-PUMP-VTRB-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WaterPump	Vertical Turbine	1	PUMP - Transfer #1	Mechanical	4	Poor	4	Poor	25	1957	66	-41	18%	5	2
13512	VINE-IFLT-PUMP-VTRB-2	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WaterPump	Vertical Turbine	2	PUMP - Transfer #2	Mechanical	4	Poor	4	Poor	25	1965	58	-33	18%	5	2
13513	VINE-IFLT-PUMP-VTRB-3	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WaterPump	Vertical Turbine	3	PUMP - Transfer #3	Mechanical	4	Poor	4	Poor	25	1991	32	-7	18%	5	2
13514	VINE-IFLT-PUMP-VTRB-4	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WaterPump	Vertical Turbine	4	PUMP - Transfer #4	Mechanical	4	Poor	4	Poor	25	1991	32	-7	18%	5	2
16538	VINE-IFLT-VALV-16"-4	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WTP Valves	16" Valve	4	Valve (CHK), #4 Transfer Pump Discharge	Mechanical	4	Poor	4	Poor	20	2009	14	6	18%	4	6
13626	VINE-IFLT-VALV-16"-4I	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WTP Valves	16" Valve	4I	Valve (BFV), #4 Transfer Pump Discharge Isolation	Mechanical	4	Poor	4	Poor	20	2009	14	6	18%	4	6
13617	VINE-IFLT-TANK-AIRT-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WTPTank	Air Tank	1	Air Receiver	Mechanical	4	Poor	4	Poor	63	1961	62	1	18%	12	5
15446	VINE-IFLT-TANK-AIRT-2	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WTPTank	Air Tank	2	Air Duplex Filters	Mechanical	4	Poor	4	Poor	63	1960	63	0	18%	12	4
15451	VINE-IFLT-TANK-CLWL-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WTPTank	Clearwell	1	Clearwell	Mechanical	4	Poor	4	Poor	63	1912	111	-48	18%	12	4
CRN-08	VINE-RWPS-CRN-CRN-1	WTP1 (Vine St)	Raw Water Pump Station	Crane	Crane	1	Raw Water (1 Ton)(#8)	Structural	3	Fair	3	Fair	20	1998	25	-5	38%	8	3

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	Discipline	Condition Score (1-5)	Condition Score Description	Performance SCore (1-5)	Performance Description	Useful Life	Installed or Replaced (Year)	Age	RULt	RULc Decay Curve %	RULc	Effective RUL (Years)
13702	VINE-RWPS-INST-PH-1	WTP1 (Vine St)	Raw Water Pump Station	Instrument	pH	1	PH - Raw Water	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
13691	VINE-RWPS-INST-TRBD-1	WTP1 (Vine St)	Raw Water Pump Station	Instrument	Turbidity	1	WTP1 - TURBIDITY - Raw Water	Elec/I&C	3	Fair	3	Fair	15	UNK	UNK	UNK	38%	6	6
13701	VINE-RWPS-MTST-VFD-2	WTP1 (Vine St)	Raw Water Pump Station	MotorStarter	VFD	2	Raw Water Pump #2	Elec/I&C	2	Good	2	Good	18	2016	7	11	65%	12	12
WTP1 - RAW WATER PUMP FACILITY	VINE-RWPS-FCLT-FCLT-1	WTP1 (Vine St)	Raw Water Pump Station	Water Facility	Facility	1		Structural/Mech	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
13682	VINE-RWPS-PUMP-VTRB-1	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	1	PUMP - Raw Water #1	Mechanical	4	Poor	4	Poor	25	1972	51	-26	18%	5	2
13683	VINE-RWPS-PUMP-VTRB-2	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	2	PUMP - Raw Water #2	Mechanical	4	Poor	4	Poor	25	1972	51	-26	18%	5	2
13684	VINE-RWPS-PUMP-VTRB-3	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	3	PUMP - Raw Water #3	Mechanical	4	Poor	4	Poor	25	1991	32	-7	18%	5	2
13685	VINE-RWPS-PUMP-VTRB-4	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	4	PUMP - Raw Water #4	Mechanical	4	Poor	4	Poor	25	1965	58	-33	18%	5	2
13686	VINE-RWPS-PUMP-VTRB-5	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	5	PUMP - Raw Water #5	Mechanical	4	Poor	4	Poor	25	1972	51	-26	18%	5	2
13687	VINE-RWPS-PUMP-VTRB-6	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	6	PUMP - Raw Water #6	Mechanical	4	Poor	4	Poor	25	1972	51	-26	18%	5	2
13688	VINE-RWPS-PUMP-VTRB-7	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	7	PUMP - Raw Water #7	Mechanical	4	Poor	4	Poor	25	1965	58	-33	18%	5	2
13689	VINE-RWPS-PUMP-VTRB-8	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	8	PUMP - Raw Water #8	Mechanical	4	Poor	4	Poor	25	1991	32	-7	18%	5	2
15450	VINE-RWPS-TANK-FCLT-2	WTP1 (Vine St)	Raw Water Pump Station	WTPTank	Facility	2	Raw Water Splitter (Diverter)	Mechanical	4	Poor	4	Poor	63	UNK	UNK	UNK	18%	12	12
15457	VINE-RWPS-TANK-WW-1	WTP1 (Vine St)	Raw Water Pump Station	WTPTank	Wet Well	1	Raw Water Wet Well	Mechanical	4	Poor	4	Poor	63	1912	111	-48	18%	12	4
13501	VINE-SODA-CHEM-SODA-1	WTP1 (Vine St)	Soda Ash Facility	ChemSystem	Soda Ash	1	Soda Ash Feeder #1	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
13502	VINE-SODA-CHEM-SODA-2	WTP1 (Vine St)	Soda Ash Facility	ChemSystem	Soda Ash	2	Soda Ash Feeder #2	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
13510	VINE-SODA-CHEM-SODA-3	WTP1 (Vine St)	Soda Ash Facility	ChemSystem	Soda Ash	3	Soda Ash Feed System	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
13504	VINE-SODA-CPSR-AIRC-1	WTP1 (Vine St)	Soda Ash Facility	Compressor	Air Compressor	1	Air Compressor #1	Mechanical	4	Poor	4	Poor	15	2008	15	0	18%	3	1
13509	VINE-SODA-CPSR-AIRC-2	WTP1 (Vine St)	Soda Ash Facility	Compressor	Air Compressor	2	Air Compressor #2	Mechanical	4	Poor	4	Poor	15	1996	27	-12	18%	3	1
CRN-14	VINE-SODA-CRN-CRN-1	WTP1 (Vine St)	Soda Ash Facility	Crane	Crane	1	Soda Ash (2 Ton)(#14)	Structural	3	Fair	3	Fair	20	2012	11	9	38%	8	9
PV-22	VINE-SODA-PRSR-OIL-1	WTP1 (Vine St)	Soda Ash Facility	Pressure Vessel	Oil Separator	1	Oil Separator (#1 Compressor)	Mechanical	4	Poor	4	Poor	15	2008	15	0	18%	3	1
PV-23	VINE-SODA-PRSR-OIL-2	WTP1 (Vine St)	Soda Ash Facility	Pressure Vessel	Oil Separator	2	Oil Separator (#2 Compressor)	Mechanical	4	Poor	4	Poor	15	1996	27	-12	18%	3	1
WTP1 - SODA ASH FACILITY	VINE-SODA-FCLT-FCLT-1	WTP1 (Vine St)	Soda Ash Facility	Water Facility	Facility	1		Structural	5	Immediate Action	5	Immediate Action	50	1912	111	-61	0%	0	0
13870	A&M-AIR-CPSR-AIRC-1	WTP2 (A&M)	Air System	Compressor	Air Compressor	1	Air Compressor 1	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13872	A&M-AIR-CPSR-AIRC-2	WTP2 (A&M)	Air System	Compressor	Air Compressor	2	Air Compressor 2	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13877	A&M-AIR-INST-FLM-1	WTP2 (A&M)	Air System	Instrument	Flow Meter	1	Blower Discharge Air Flow Meter	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13879	A&M-AIR-INST-PRSS-1	WTP2 (A&M)	Air System	Instrument	Pressure Sensor	1	Blower Air Discharge Pressure Transmitter	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13880	A&M-AIR-INST-PRSS-2	WTP2 (A&M)	Air System	Instrument	Pressure Sensor	2	Control Air Receiver Tank Pressure Meter	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13881	A&M-AIR-INST-PRSS-3	WTP2 (A&M)	Air System	Instrument	Pressure Sensor	3	Test Air Receiver Tank Pressure Meter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13882	A&M-AIR-INST-PRSS-4	WTP2 (A&M)	Air System	Instrument	Pressure Sensor	4	Test Air Manifold Pressure Meter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13885	A&M-AIR-INST-TEMP-1	WTP2 (A&M)	Air System	Instrument	Temperature Sensor	1	Blower Air Discharge Temperature Transmitter	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13889	A&M-AIR-MTST-VFD-1	WTP2 (A&M)	Air System	MotorStarter	VFD	1	Blower 1 VFD	Elec/I&C	2	Good	2	Good	18	2010	13	5	65%	12	8
13890	A&M-AIR-MTST-VFD-2	WTP2 (A&M)	Air System	MotorStarter	VFD	2	Blower 2 VFD	Elec/I&C	2	Good	2	Good	18	2007	16	2	65%	12	6
13891-1	A&M-AIR-MTST-VFD-3	WTP2 (A&M)	Air System	MotorStarter	VFD	3	Blower 3 VFD	Elec/I&C	2	Good	2	Good	18	2020	3	15	65%	12	14
MSTR-000038	A&M-AIR-MTST-VFD-4	WTP2 (A&M)	Air System	MotorStarter	VFD	4	Blower 1 VFD	Elec/I&C	2	Good	2	Good	18	UNK	UNK	UNK	65%	12	12
MSTR-000039	A&M-AIR-MTST-VFD-5	WTP2 (A&M)	Air System	MotorStarter	VFD	5	Blower 2 VFD	Elec/I&C	2	Good	2	Good	18	UNK	UNK	UNK	65%	12	12
MSTR-000040	A&M-AIR-MTST-VFD-6	WTP2 (A&M)	Air System	MotorStarter	VFD	6	Blower 3 VFD	Elec/I&C	2	Good	2	Good	18	UNK	UNK	UNK	65%	12	12
PV-04	A&M-AIR-PRSR-AIRR-1	WTP2 (A&M)	Air System	Pressure Vessel	Air Receiver	1	AIR RECEIVER - TEST AIR	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
16478	A&M-AIR-PUMP-BWR-1	WTP2 (A&M)	Air System	WaterPump	Blower	1	Blower 1	Mechanical	2	Good	2	Good	25	2007	16	9	65%	17	12
16479	A&M-AIR-PUMP-BWR-2	WTP2 (A&M)	Air System	WaterPump	Blower	2	Blower 2	Mechanical	2	Good	2	Good	25	2007	16	9	65%	17	12
16480	A&M-AIR-PUMP-BWR-3	WTP2 (A&M)	Air System	WaterPump	Blower	3	Blower 3	Mechanical	2	Good	2	Good	25	2007	16	9	65%	17	12
13883	A&M-AIR-TANK-AIRT-1	WTP2 (A&M)	Air System	WTPTank	Air Tank	1	Control Air Receiver Tank	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
13884	A&M-AIR-TANK-AIRT-2	WTP2 (A&M)	Air System	WTPTank	Air Tank	2	Test Air Receiver Tank	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
A75120	A&M-AVLT-AHWR-TRAD-1	WTP2 (A&M)	Albany Metering Vault	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
16286	A&M-AVLT-INST-FLM-1	WTP2 (A&M)	Albany Metering Vault	Instrument	Flow Meter	1	Albany Flow Meter	Elec/I&C	3	Fair	3	Fair	15	2008	15	0	38%	6	2
16287	A&M-AVLT-INST-PRSS-1	WTP2 (A&M)	Albany Metering Vault	Instrument	Pressure Sensor	1	Albany Meter Upstream Pressure Indicator	Elec/I&C	3	Fair	3	Fair	15	2008	15	0	38%	6	2
16288	A&M-AVLT-INST-PRSS-2	WTP2 (A&M)	Albany Metering Vault	Instrument	Pressure Sensor	2	Albany Meter Downstream Pressure Indicator	Elec/I&C	3	Fair	3	Fair	15	2008	15	0	38%	6	2
WTP2 - Albany Metering Vault	A&M-AVLT-FCLT-VLT-1	WTP2 (A&M)	Albany Metering Vault	Water Facility	Vault	1		Structural	3	Fair	3	Fair	50	2008	15	35	38%	19	30
14000	A&M-AVLT-VALV-24"-1	WTP2 (A&M)	Albany Metering Vault	WTP Valves	24" Valve	1	Upstream Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
16283	A&M-AVLT-VALV-24"-2	WTP2 (A&M)	Albany Metering Vault	WTP Valves	24" Valve	2	Downstream Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
16285	A&M-AVLT-VALV-24"-3	WTP2 (A&M)	Albany Metering Vault	WTP Valves	24" Valve	3	Metering Control Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13856	A&M-BWSH-INST-FLM-1	WTP2 (A&M)	Backwash System	Instrument	Flow Meter	1	Backwash Flow Meter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13861	A&M-BWSH-INST-PRSS-1	WTP2 (A&M)	Backwash System	Instrument	Pressure Sensor	1	Backwash Pressure Transmitter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13866	A&M-BWSH-MTST-VFD-1	WTP2 (A&M)	Backwash System	MotorStarter	VFD	1	WTP2 - Backwash Pump 1 VFD	Elec/I&C	2	Good	2	Good	18	2019	4	14	65%	12	14
13867	A&M-BWSH-MTST-VFD-2	WTP2 (A&M)	Backwash System	MotorStarter	VFD	2	WTP2 - Backwash Pump 2 VFD	Elec/I&C	2	Good	2	Good	18	2019	4	14	65%	12	14
13859	A&M-BWSH-PUMP-CTFL-1	WTP2 (A&M)	Backwash System	WaterPump	Centrifugal	1	WTP2 - Backwash Pump 1	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
13860	A&M-BWSH-PUMP-CTFL-2	WTP2 (A&M)	Backwash System	WaterPump	Centrifugal	2	WTP2 - Backwash Pump 2	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
13862	A&M-BWSH-VALV-20"-1	WTP2 (A&M)	Backwash System	WTP Valves	20" Valve	1	Backwash Pump 1 Inlet Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13863	A&M-BWSH-VALV-20"-2	WTP2 (A&M)	Backwash System	WTP Valves	20" Valve	2	Backwash Pump 2 Inlet Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	Discipline	Condition Score (1-5)	Condition Score Description	Performance SCore (1-5)	Performance Description	Useful Life	Installed or Replaced (Year)	Age	RULt	RULc Decay Curve %	RULc	Effective RUL (Years)
16580	A&M-BWSH-VALV-20"-3	WTP2 (A&M)	Backwash System	WTP Valves	20" Valve	3	Cell 3 Backwash Supply Valve	Mechanical	2	Good	2	Good	20	2022	1	19	65%	13	18
13757	A&M-BWSH-VALV-20"-4	WTP2 (A&M)	Backwash System	WTP Valves	20" Valve	4	Finish Water Backwash Pumps Inlet Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
15410	A&M-BWSH-VALV-20"-5	WTP2 (A&M)	Backwash System	WTP Valves	20" Valve	5	Finish Water Backwash Pumps Isolation Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13857	A&M-BWSH-VALV-24"-1	WTP2 (A&M)	Backwash System	WTP Valves	24" Valve	1	Drain Valve To BW Settling Basins	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13932	A&M-CHEM-CHEM-ACH-1	WTP2 (A&M)	Chemical Facility	ChemSystem	ACH	1	ACH Metering Pump 1	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13934	A&M-CHEM-CHEM-ACH-2	WTP2 (A&M)	Chemical Facility	ChemSystem	ACH	2	ACH Metering Pump 2	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13902	A&M-CHEM-CHEM-CIP-1	WTP2 (A&M)	Chemical Facility	ChemSystem	CIP	1	CIP Storage Tank Heater	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
16297	A&M-CHEM-CHEM-CIT-1	WTP2 (A&M)	Chemical Facility	ChemSystem	Citric Acid	1	Citric Acid Metering Pump 1	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
15429	A&M-CHEM-CHEM-CIT-2	WTP2 (A&M)	Chemical Facility	ChemSystem	Citric Acid	2	Citric Acid Metering Pump 2	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13923	A&M-CHEM-CHEM-FL-1	WTP2 (A&M)	Chemical Facility	ChemSystem	Fluoride	1	Fluoride Storage/Loading System	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13926	A&M-CHEM-CHEM-FL-2	WTP2 (A&M)	Chemical Facility	ChemSystem	Fluoride	2	Fluoride Tank Mixer	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13925	A&M-CHEM-CHEM-FL-3	WTP2 (A&M)	Chemical Facility	ChemSystem	Fluoride	3	Fluoride Conveyor	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13924	A&M-CHEM-CHEM-FL-4	WTP2 (A&M)	Chemical Facility	ChemSystem	Fluoride	4	Fluoride Feeder Auger System Motor	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13938	A&M-CHEM-CHEM-BISF-1	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Bisulfite	1	Sodium Bisulfite Diaphragm Pump 1	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13939	A&M-CHEM-CHEM-BISF-2	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Bisulfite	2	Sodium Bisulfite Diaphragm Pump 2	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13945	A&M-CHEM-CHEM-HYDR-1	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hydroxide	1	Sodium Hydroxide Diaphragm Pump 1	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13946	A&M-CHEM-CHEM-HYDR-2	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hydroxide	2	Sodium Hydroxide Diaphragm Pump 2	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13949	A&M-CHEM-CHEM-HYDR-3	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hydroxide	3	Sodium Hydroxide Metering Pump #1	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13948	A&M-CHEM-CHEM-HYDR-4	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hydroxide	4	Sodium Hydroxide Metering Pump #2	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13917	A&M-CHEM-CHEM-HYPO-1	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hypochlorite	1	Sodium Hypchlorite Diaphragm Pump 1	Mechanical	2	Good	2	Good	15	2021	2	13	65%	10	12
13918	A&M-CHEM-CHEM-HYPO-2	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hypochlorite	2	Sodium Hypchlorite Diaphragm Pump 2	Mechanical	2	Good	2	Good	15	2020	3	12	65%	10	12
13919	A&M-CHEM-CHEM-HYPO-3	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hypochlorite	3	Sodium Hypochlorite Metering Pump 1	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13920	A&M-CHEM-CHEM-HYPO-4	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hypochlorite	4	Sodium Hypochlorite Metering Pump 2	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13921	A&M-CHEM-CHEM-HYPO-5	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hypochlorite	5	Sodium Hypochlorite Metering Pump 3	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
13791	A&M-CHEM-INST-CLRN-1	WTP2 (A&M)	Chemical Facility	Instrument	Chlorine	1	CHLORINE - Filtrate Wet Rack	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13976	A&M-CHEM-INST-CLRN-2	WTP2 (A&M)	Chemical Facility	Instrument	Chlorine	2	CHLORINE - Finish Water (Lab)	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13790	A&M-CHEM-INST-CLFL-1	WTP2 (A&M)	Chemical Facility	Instrument	CL & FL (Dual)	1	CL & FL (Dual) - Lab	Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
13895	A&M-CHEM-INST-FLM-1	WTP2 (A&M)	Chemical Facility	Instrument	Flow Meter	1	CIP Tank Fill Flow Meter	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13868	A&M-CHEM-INST-FLM-2	WTP2 (A&M)	Chemical Facility	Instrument	Flow Meter	2	CIP CL2 Metering Pump Flow Meter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13869	A&M-CHEM-INST-FLM-3	WTP2 (A&M)	Chemical Facility	Instrument	Flow Meter	3	CIP Citric Acid Metering Pump Flow Meter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13896	A&M-CHEM-INST-FLM-4	WTP2 (A&M)	Chemical Facility	Instrument	Flow Meter	4	CIP PUMP DISCHARGE FLOW METER	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13977	A&M-CHEM-INST-FL-1	WTP2 (A&M)	Chemical Facility	Instrument	Fluoride	1	FLOURIDE - Filtrate Water	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13903	A&M-CHEM-INST-LSEN-2	WTP2 (A&M)	Chemical Facility	Instrument	Level Sensor	2	Cip Storage Tank Level Transmitter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13918	A&M-CHEM-INST-LSEN-3	WTP2 (A&M)	Chemical Facility	Instrument	Level Sensor	3	Sodium Hypochlorite Tank Level Transmitter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13930	A&M-CHEM-INST-LSEN-4	WTP2 (A&M)	Chemical Facility	Instrument	Level Sensor	4	ACH Chlorohydrate Storage Tank Level	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13936	A&M-CHEM-INST-LSEN-5	WTP2 (A&M)	Chemical Facility	Instrument	Level Sensor	5	Citric Acid Storage Tank Level	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13944	A&M-CHEM-INST-LSEN-6	WTP2 (A&M)	Chemical Facility	Instrument	Level Sensor	6	Sodium Hydroxide Tank Level Transmitter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
15433	A&M-CHEM-INST-LSEN-7	WTP2 (A&M)	Chemical Facility	Instrument	Level Sensor	7	Sodium Bisulfite Storage Tank Level	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13906	A&M-CHEM-INST-TEMP-1	WTP2 (A&M)	Chemical Facility	Instrument	Temperature Sensor	1	WTP2 - Cip Tank Temperature Transmitter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13929	A&M-CHEM-INST-TSMR-1	WTP2 (A&M)	Chemical Facility	Instrument	Transmitter	1	WTP2 - FLOURIDE WEIGH SCALE	Elec/I&C	3	Fair	3	Fair	15	2008	15	0	38%	6	2
13904	A&M-CHEM-PUMP-CTFL-1	WTP2 (A&M)	Chemical Facility	WaterPump	Centrifugal	1	Cip Transfer/Recirculation Pump	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
13935	A&M-CHEM-TANK-ACH-1	WTP2 (A&M)	Chemical Facility	WTPTank	ACH	1	ACH Chlorohydrate Storage Tank	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
13905	A&M-CHEM-TANK-CIP-1	WTP2 (A&M)	Chemical Facility	WTPTank	CIP	1	CIP Storage Tank	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
13937	A&M-CHEM-TANK-CIT-1	WTP2 (A&M)	Chemical Facility	WTPTank	Citric Acid	1	Citric Acid Storage Tank	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
13928	A&M-CHEM-TANK-FL-1	WTP2 (A&M)	Chemical Facility	WTPTank	Fluoride	1	Fluoride Storage Tank	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
15445	A&M-CHEM-TANK-BISF-1	WTP2 (A&M)	Chemical Facility	WTPTank	Sodium Bisulfite	1	Sodium Bisulfite Tank	Mechanical	2	Good	2	Good	63	2017	6	57	65%	41	52
13943	A&M-CHEM-TANK-HYDR-1	WTP2 (A&M)	Chemical Facility	WTPTank	Sodium Hydroxide	1	Sodium Hydroxide Storage Tank	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
13922	A&M-CHEM-TANK-HYPO-1	WTP2 (A&M)	Chemical Facility	WTPTank	Sodium Hypochlorite	1	Sodium Hypochlorite Storage Tank	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
PV-05	A&M-COMP-PRSR-AIRR-1	WTP2 (A&M)	Compressor Room	Pressure Vessel	Air Receiver	1	AIR RECEIVER - CONTROL AIR	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
PV-06	A&M-COMP-PRSR-OIL-1	WTP2 (A&M)	Compressor Room	Pressure Vessel	Oil Separator	1	OIL SEPARATOR - COMPRESSOR #1	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
PV-07	A&M-COMP-PRSR-OIL-2	WTP2 (A&M)	Compressor Room	Pressure Vessel	Oil Separator	2	OIL SEPARATOR - COMPRESSOR #2	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
CRN-24	A&M-FILT-CRN-CRN-1	WTP2 (A&M)	Filter Facility	Crane	Crane	1	A-Frame (0.9 Tons)	Structural	2	Good	2	Good	20	UNK	UNK	UNK	65%	13	13
15432	A&M-FILT-GEN-DSL-1	WTP2 (A&M)	Filter Facility	ElectricalGenerator	Diesel	1	ENGINE - Fire Pump	Elec/I&C	2	Good	2	Good	20	2008	15	5	65%	13	8
15422	A&M-FILT-GEN-DSL-2	WTP2 (A&M)	Filter Facility	ElectricalGenerator	Diesel	2	WTP2 - Electrical Generator	Elec/I&C	2	Good	2	Good	20	2008	15	5	65%	13	8
105291	A&M-FILT-INST-DION-1	WTP2 (A&M)	Filter Facility	Instrument	Deionizer	1	DEIONIZER - Lab	Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
105292	A&M-FILT-INST-FLT-1	WTP2 (A&M)	Filter Facility	Instrument	Filter	1	FILTER - Organic (Lab)	Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
13806	A&M-FILT-INST-FLM-1	WTP2 (A&M)	Filter Facility	Instrument	Flow Meter	1	Filtrate Total Flow Meter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13993	A&M-FILT-INST-PRSS-1	WTP2 (A&M)	Filter Facility	Instrument	Pressure Sensor	1	W1 Booster Discharge Pressure Indicator	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
5293	A&M-FILT-INST-TITR-1	WTP2 (A&M)	Filter Facility	Instrument	Titrator	1	TITRATOR - Lab	Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
16296	A&M-FILT-INST-TRBD-1	WTP2 (A&M)	Filter Facility	Instrument	Turbidity	1	TURBIDITY - Lab	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	Discipline	Condition Score (1-5)	Condition Score Description	Performance SCore (1-5)	Performance Description	Useful Life	Installed or Replaced (Year)	Age	RULt	RULc Decay Curve %	RULc	Effective RUL (Years)
WTP2 - AM Water Treatment Filter Facility	A&M-FILT-FCLT-FCLT-1	WTP2 (A&M)	Filter Facility	Water Facility	Facility	1		Structural	2	Good	2	Good	50	2008	15	35	65%	33	35
13991	A&M-FILT-PUMP-CTFL-1	WTP2 (A&M)	Filter Facility	WaterPump	Centrifugal	1	Booster Pump 1	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
13989	A&M-FILT-PUMP-CTFL-2	WTP2 (A&M)	Filter Facility	WaterPump	Centrifugal	2	Booster Pump 2	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
16293	A&M-FILT-PUMP-HSC-3	WTP2 (A&M)	Filter Facility	WaterPump	Horizontal Split Case	3	Fire System Pump	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
16295	A&M-FILT-PUMP-VTRB-4	WTP2 (A&M)	Filter Facility	WaterPump	Vertical Turbine	4	Fire System Water Jockey Pump	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
13994	A&M-FILT-TANK-AIRT-1	WTP2 (A&M)	Filter Facility	WTPTank	Air Tank	1	W1 Booster System Hydropneumatic Tank 1	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
13995	A&M-FILT-TANK-AIRT-2	WTP2 (A&M)	Filter Facility	WTPTank	Air Tank	2	W1 Booster System Hydropneumatic Tank 2	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
13978	A&M-FW-INST-COND-1	WTP2 (A&M)	Finished Water System	Instrument	Conductivity	1	CONDUCTIVITY - Finished Water (Lab)	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13982	A&M-FW-INST-FLM-1	WTP2 (A&M)	Finished Water System	Instrument	Flow Meter	1	Finish Water Combined Flow Transmitter	Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
INST-000128	A&M-FW-INST-FLM-2	WTP2 (A&M)	Finished Water System	Instrument	Flow Meter	2	FLOW METER - Plant to Reservoir	Elec/I&C	2	Good	2	Good	15	2020	3	12	65%	10	12
INST-000101	A&M-FW-INST-LSEN-1	WTP2 (A&M)	Finished Water System	Instrument	Level Sensor	1	Reservoir Radar Level Transmitter A	Elec/I&C	2	Good	2	Good	15	2018	5	10	65%	10	10
INST-000102	A&M-FW-INST-LSEN-2	WTP2 (A&M)	Finished Water System	Instrument	Level Sensor	2	Reservoir Radar Level Transmitter B	Elec/I&C	2	Good	2	Good	15	2018	5	10	65%	10	10
13979	A&M-FW-INST-PH-1	WTP2 (A&M)	Finished Water System	Instrument	pH	1	PH - Finished Water (Lab)	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13988	A&M-FW-PUMP-TURB-1	WTP2 (A&M)	Finished Water System	WaterPump	Turbine	1	Finished Water Sample Pump	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
13981	A&M-FW-VALV-42"-1	WTP2 (A&M)	Finished Water System	WTP Valves	42" Valve	1	Finish Water Downstream Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
16570	A&M-FW-VALV-42"-2	WTP2 (A&M)	Finished Water System	WTP Valves	42" Valve	2	Finished Water Seismic Isolation Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13802	A&M-CELL-INST-FLM-1	WTP2 (A&M)	Membrane Cell	Instrument	Flow Meter	1	Cell 1 Fitlrate Flow Meter	Mechanical	3	Fair	3	Fair	15	2008	15	0	38%	6	2
13803	A&M-CELL-INST-FLM-2	WTP2 (A&M)	Membrane Cell	Instrument	Flow Meter	2	Cell 2 Filtrate Flow Meter	Mechanical	3	Fair	3	Fair	15	2017	6	9	38%	6	8
13804	A&M-CELL-INST-FLM-3	WTP2 (A&M)	Membrane Cell	Instrument	Flow Meter	3	Cell 3 Filtrate Flow Meter	Mechanical	3	Fair	3	Fair	15	2008	15	0	38%	6	2
13805	A&M-CELL-INST-FLM-4	WTP2 (A&M)	Membrane Cell	Instrument	Flow Meter	4	Cell 4 Filtrate Flow Meter	Mechanical	3	Fair	3	Fair	15	2017	6	9	38%	6	8
13835	A&M-CELL-INST-LSEN-1	WTP2 (A&M)	Membrane Cell	Instrument	Level Sensor	1	Cell 1 Level Transmitter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13836	A&M-CELL-INST-LSEN-2	WTP2 (A&M)	Membrane Cell	Instrument	Level Sensor	2	Cell 2 Level Transmitter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13837	A&M-CELL-INST-LSEN-3	WTP2 (A&M)	Membrane Cell	Instrument	Level Sensor	3	Cell 3 Level Transmitter	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13838	A&M-CELL-INST-LSEN-4	WTP2 (A&M)	Membrane Cell	Instrument	Level Sensor	4	Cell 4 Level Transmitter	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13793	A&M-CELL-INST-PH-1	WTP2 (A&M)	Membrane Cell	Instrument	pH	1	PH - Filtrate - Wet Rack	Elec/I&C	2	Good	2	Good	15	2022	1	14	65%	10	13
13794	A&M-CELL-INST-PRSS-1	WTP2 (A&M)	Membrane Cell	Instrument	Pressure Sensor	1	PRESSURE - Cell 1 Filtrate	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13795	A&M-CELL-INST-PRSS-2	WTP2 (A&M)	Membrane Cell	Instrument	Pressure Sensor	2	PRESSURE - Cell 2 Filtrate	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13796	A&M-CELL-INST-PRSS-3	WTP2 (A&M)	Membrane Cell	Instrument	Pressure Sensor	3	PRESSURE - Cell 3 Filtrate	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13797	A&M-CELL-INST-PRSS-4	WTP2 (A&M)	Membrane Cell	Instrument	Pressure Sensor	4	PRESSURE - Cell 4 Filtrate	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13847	A&M-CELL-INST-TEMP-1	WTP2 (A&M)	Membrane Cell	Instrument	Temperature Sensor	1	WTP2 - Cell 1 Filtrate Temperature Transmitter	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13848	A&M-CELL-INST-TEMP-2	WTP2 (A&M)	Membrane Cell	Instrument	Temperature Sensor	2	WTP2 - Cell 2 Filtrate Temperature Transmitter	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13849	A&M-CELL-INST-TEMP-3	WTP2 (A&M)	Membrane Cell	Instrument	Temperature Sensor	3	WTP2 - Cell 3 Filtrate Temperature Transmitter	Elec/I&C	2	Good	2	Good	15	2017	6	9	65%	10	10
13850	A&M-CELL-INST-TEMP-4	WTP2 (A&M)	Membrane Cell	Instrument	Temperature Sensor	4	WTP2 - Cell 4 Filtrate Temperature Transmitter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13783	A&M-CELL-INST-TRBD-1	WTP2 (A&M)	Membrane Cell	Instrument	Turbidity	1	WTP2 - TURBIDITY - Cell 1 Filtrate	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13784	A&M-CELL-INST-TRBD-2	WTP2 (A&M)	Membrane Cell	Instrument	Turbidity	2	WTP2 - TURBIDITY - Cell 2 Filtrate	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13785	A&M-CELL-INST-TRBD-3	WTP2 (A&M)	Membrane Cell	Instrument	Turbidity	3	WTP2 - TURBIDITY - Cell 3 Filtrate	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
13786-1	A&M-CELL-INST-TRBD-4	WTP2 (A&M)	Membrane Cell	Instrument	Turbidity	4	WTP2 - TURBIDITY - Cell 4 Filtrate	Elec/I&C	2	Good	2	Good	15	2020	3	12	65%	10	12
13792-1	A&M-CELL-INST-TRBD-5	WTP2 (A&M)	Membrane Cell	Instrument	Turbidity	5	TURBIDITY - Filtrate Turbidimeter(Comb) - Downstairs Wet Rack	Elec/I&C	2	Good	2	Good	15	2022	1	14	65%	10	13
MSTR-000065	A&M-CELL-MTST-VFD-1	WTP2 (A&M)	Membrane Cell	MotorStarter	VFD	1	WTP2 - Cell 1 Filtrate Pump VFD	Elec/I&C	2	Good	2	Good	18	2020	3	15	65%	12	14
13852	A&M-CELL-MTST-VFD-2	WTP2 (A&M)	Membrane Cell	MotorStarter	VFD	2	WTP2 - Cell 2 Filtrate Pump VFD	Elec/I&C	2	Good	2	Good	18	2018	5	13	65%	12	13
MSTR-000070	A&M-CELL-MTST-VFD-3	WTP2 (A&M)	Membrane Cell	MotorStarter	VFD	3	WTP2 - Cell 3 Filtrate Pump VFD	Elec/I&C	2	Good	2	Good	18	2022	1	17	65%	12	16
13854	A&M-CELL-MTST-VFD-4	WTP2 (A&M)	Membrane Cell	MotorStarter	VFD	4	WTP2 - Cell 4 Filtrate Pump VFD	Elec/I&C	2	Good	2	Good	18	2019	4	14	65%	12	14
13839	A&M-CELL-PUMP-CTFL-1	WTP2 (A&M)	Membrane Cell	WaterPump	Centrifugal	1	WTP2 - Cell 1 Filtrate Pump	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
13840	A&M-CELL-PUMP-CTFL-2	WTP2 (A&M)	Membrane Cell	WaterPump	Centrifugal	2	WTP2 - Cell 2 Filtrate Pump	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
13841	A&M-CELL-PUMP-CTFL-3	WTP2 (A&M)	Membrane Cell	WaterPump	Centrifugal	3	WTP2 - Cell 3 Filtrate Pump	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
13842	A&M-CELL-PUMP-CTFL-4	WTP2 (A&M)	Membrane Cell	WaterPump	Centrifugal	4	WTP2 - Cell 4 Filtrate Pump	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
13827	A&M-CELL-VALV-16"-1	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	1	Cell 1 Common Filtrate Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13828	A&M-CELL-VALV-16"-2	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	2	Cell 2 Common Filtrate Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13829	A&M-CELL-VALV-16"-3	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	3	Cell 3 Common Filtrate Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13830	A&M-CELL-VALV-16"-4	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	4	Cell 4 Common Filtrate Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13807	A&M-CELL-VALV-16"-1F	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	1F	Cell 1 Filtrate Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13808-1	A&M-CELL-VALV-16"-2F	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	2F	Cell 2 Filtrate Valve	Mechanical	2	Good	2	Good	20	2022	1	19	65%	13	18
13809	A&M-CELL-VALV-16"-3F	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	3F	Cell 3 Filtrate Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13810	A&M-CELL-VALV-16"-4F	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	4F	Cell 4 Filtrate Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13811	A&M-CELL-VALV-20"-1	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	1	Cell 1 Backwash Supply Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13812	A&M-CELL-VALV-20"-2	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	2	Cell 2 Backwash Supply Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
13813	A&M-CELL-VALV-20"-3	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	3	Cell 3 Backwash Supply Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-CELL-VALV-20"-4	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	4	Cell 4 Backwash Supply Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-CELL-VALV-20"-1I	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	1I	Cell 1 Raw Water Influent Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	Discipline	Condition Score (1-5)	Condition Score Description	Performance SCore (1-5)	Performance Description	Useful Life	Installed or Replaced (Year)	Age	RULt	RULc Decay Curve %	RULc	Effective RUL (Years)
	A&M-CELL-VALV-20"-2I	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	2I	Cell 2 Raw Water Influent Valve	Mechanical	2	Good	2	Good	20	2018	5	15	65%	13	15
	A&M-CELL-VALV-20"-3I	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	3I	Cell 3 Raw Water Influent Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-CELL-VALV-20"-4I	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	4I	Cell 4 Raw Water Influent Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-CELL-VALV-24"-1	WTP2 (A&M)	Membrane Cell	WTP Valves	24" Valve	1	Cell 1 Drain Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-CELL-VALV-24"-2	WTP2 (A&M)	Membrane Cell	WTP Valves	24" Valve	2	Cell 2 Drain Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-CELL-VALV-24"-3	WTP2 (A&M)	Membrane Cell	WTP Valves	24" Valve	3	Cell 3 Drain Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-CELL-VALV-24"-4	WTP2 (A&M)	Membrane Cell	WTP Valves	24" Valve	4	Cell 4 Drain Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-CELL-TANK-CELL-1	WTP2 (A&M)	Membrane Cell	WTPTank	Treatment Cell	1	Cell 1 Tank (Membrane filter tank)	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
	A&M-CELL-TANK-CELL-2	WTP2 (A&M)	Membrane Cell	WTPTank	Treatment Cell	2	Cell 2 Tank (Membrane filter tank)	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
	A&M-CELL-TANK-CELL-3	WTP2 (A&M)	Membrane Cell	WTPTank	Treatment Cell	3	Cell 3 Tank (Membrane filter tank)	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
	A&M-CELL-TANK-CELL-4	WTP2 (A&M)	Membrane Cell	WTPTank	Treatment Cell	4	WTP2 - Cell 4 Tank (Membrane filter tank)	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
	A&M-MVLT-INST-FLM-1	WTP2 (A&M)	Millersburg Metering Vault	Instrument	Flow Meter	1	Millersburg Flow Indicator Transmitter	Elec/I&C	2	Good	2	Good	15	2020	3	12	65%	10	12
	A&M-MVLT-INST-FLM-2	WTP2 (A&M)	Millersburg Metering Vault	Instrument	Flow Meter	2	Millersburg Flowmeter	Elec/I&C	2	Good	2	Good	15	2020	3	12	65%	10	12
	A&M-MVLT-FCLT-VLT-1	WTP2 (A&M)	Millersburg Metering Vault	Water Facility	Vault	1		Structural	2	Good	2	Good	50	2008	15	35	65%	33	35
	A&M-NB-INST-CLRN-1	WTP2 (A&M)	Neutralization Basin	Instrument	Chlorine	1	(INACTIVE)WTP2 - CHLORINE - Neutralization Basin(INACTIVE)	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-NB-INST-FLM-1	WTP2 (A&M)	Neutralization Basin	Instrument	Flow Meter	1	Sodium Hydroxide Flow Switch	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-NB-INST-FSWC-2	WTP2 (A&M)	Neutralization Basin	Instrument	Flow Switch	2	Sodium Bisulfite Flow Switch	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-NB-INST-ORP-1	WTP2 (A&M)	Neutralization Basin	Instrument	ORP	1		Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-NB-INST-PH-1	WTP2 (A&M)	Neutralization Basin	Instrument	pH	1	PH - Neutralization Basin	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-NB-FCLT-SB-1	WTP2 (A&M)	Neutralization Basin	Water Facility	Storage Basin	1		Structural	3	Fair	3	Fair	50	2008	15	35	38%	19	30
	A&M-NB-PUMP-VTRB-1	WTP2 (A&M)	Neutralization Basin	WaterPump	Vertical Turbine	1	NEUTRALIZATION PUMP 1	Mechanical	4	Poor	4	Poor	25	2008	15	10	18%	5	9
	A&M-NB-PUMP-VTRB-2	WTP2 (A&M)	Neutralization Basin	WaterPump	Vertical Turbine	2	NEUTRALIZATION PUMP 2	Mechanical	4	Poor	4	Poor	25	2008	15	10	18%	5	9
	A&M-RWPS-CHEM-SAND-1	WTP2 (A&M)	Raw Water Pump Station	ChemSystem	Sand Classifier	1	Raw Water Sand Classifier 1 (H2O)	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-RWPS-CHEM-SAND-2	WTP2 (A&M)	Raw Water Pump Station	ChemSystem	Sand Classifier	2	Raw Water Sand Classifier 2 (H2O)	Mechanical	2	Good	2	Good	15	2017	6	9	65%	10	10
	A&M-RWPS-CPSR-AIRC-1	WTP2 (A&M)	Raw Water Pump Station	Compressor	Air Compressor	1	Raw Water Air Burst Compressor	Mechanical	2	Good	2	Good	15	2018	5	10	65%	10	10
	A&M-RWPS-CRN-CRN-1	WTP2 (A&M)	Raw Water Pump Station	Crane	Crane	1	A-Frame (0.8Tons)	Structural	2	Good	2	Good	20	UNK	UNK	UNK	65%	13	13
	A&M-RWPS-GEN-DSL-1	WTP2 (A&M)	Raw Water Pump Station	ElectricalGenerator	Diesel	1	GENERATOR - Raw Water Pump Station	Elec/I&C	2	Good	2	Good	20	UNK	UNK	UNK	65%	13	13
	A&M-RWPS-INST-CTRL-1	WTP2 (A&M)	Raw Water Pump Station	Instrument	Control Cab	1	Main Pump Control Cab	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-RWPS-INST-LSEN-1	WTP2 (A&M)	Raw Water Pump Station	Instrument	Level Sensor	1	Raw Water Wetwell #1 Radar Level Transmitter	Elec/I&C	2	Good	2	Good	15	2019	4	11	65%	10	11
	A&M-RWPS-INST-LSEN-2	WTP2 (A&M)	Raw Water Pump Station	Instrument	Level Sensor	2	Raw Water Wetwell #2 Radar Level Transmitter	Elec/I&C	2	Good	2	Good	15	2019	4	11	65%	10	11
	A&M-RWPS-INST-PH-1	WTP2 (A&M)	Raw Water Pump Station	Instrument	pH	1	PH - Raw Water Pump Station (Sink)	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-RWPS-MTST-VFD-1	WTP2 (A&M)	Raw Water Pump Station	MotorStarter	VFD	1	Raw Water Pump 1 VFD	Elec/I&C	2	Good	2	Good	18	2022	1	17	65%	12	16
	A&M-RWPS-MTST-VFD-2	WTP2 (A&M)	Raw Water Pump Station	MotorStarter	VFD	2	Raw Water Pump 2 VFD-Unclear which S/N is in use	Elec/I&C	2	Good	2	Good	18	2022	1	17	65%	12	16
	A&M-RWPS-MTST-VFD-3	WTP2 (A&M)	Raw Water Pump Station	MotorStarter	VFD	3	Raw Water Pump 3 VFD	Elec/I&C	2	Good	2	Good	18	2022	1	17	65%	12	16
	A&M-RWPS-MTST-VFD-4	WTP2 (A&M)	Raw Water Pump Station	MotorStarter	VFD	4	Raw Water Pump 4 VFD	Elec/I&C	2	Good	2	Good	18	2008	15	3	65%	12	6
	A&M-RWPS-PRSR-AIRR-1	WTP2 (A&M)	Raw Water Pump Station	Pressure Vessel	Air Receiver	1	AIR RECEIVER - RWPS	Mechanical	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-RWPS-PRSR-AIRR-2	WTP2 (A&M)	Raw Water Pump Station	Pressure Vessel	Air Receiver	2	Air Receiver - RW Air Burst Compressor	Mechanical	2	Good	2	Good	15	2005	18	-3	65%	10	4
	A&M-RWPS-FCLT-PS-1	WTP2 (A&M)	Raw Water Pump Station	Water Facility	Pump Station	1		Structural	2	Good	2	Good	50	2008	15	35	65%	33	35
	A&M-RWPS-PUMP-EFF-1	WTP2 (A&M)	Raw Water Pump Station	WaterPump	Effluent	1	Raw Water Sand Pump 1	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
	A&M-RWPS-PUMP-EFF-2	WTP2 (A&M)	Raw Water Pump Station	WaterPump	Effluent	2	Raw Water Sand Pump 2	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
	A&M-RWPS-PUMP-VTRB-1	WTP2 (A&M)	Raw Water Pump Station	WaterPump	Vertical Turbine	1	Raw Water Pump 1	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
	A&M-RWPS-PUMP-VTRB-2	WTP2 (A&M)	Raw Water Pump Station	WaterPump	Vertical Turbine	2	Raw Water Pump 2	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
	A&M-RWPS-PUMP-VTRB-3	WTP2 (A&M)	Raw Water Pump Station	WaterPump	Vertical Turbine	3	Raw Water Pump 3	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
	A&M-RWPS-PUMP-VTRB-4	WTP2 (A&M)	Raw Water Pump Station	WaterPump	Vertical Turbine	4	Raw Water Pump 4	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
	A&M-RWPS-VALV-16"-1	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	1	CHECK VALVE - RW Pump #1 Discharge	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RWPS-VALV-16"-2	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	2	CHECK VALVE - RW Pump #2 Discharge	Mechanical	2	Good	2	Good	20	2020	3	17	65%	13	16
	A&M-RWPS-VALV-16"-3	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	3	CHECK VALVE - RW Pump #3 Discharge	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RWPS-VALV-16"-4	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	4	CHECK VALVE - RW Pump #4 Discharge	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RWPS-VALV-16"-1E	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	1E	Raw Water Pump 1 Effluent Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RWPS-VALV-16"-2E	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	2E	Raw Water Pump 2 Effluent Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RWPS-VALV-16"-3E	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	3E	Raw Water Pump 3 Effluent Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RWPS-VALV-16"-4E	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	4E	Raw Water Pump 4 Effluent Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RWPS-VALV-24"-1	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	24" Valve	1	Raw Water Intake 1 Return Line Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RWPS-VALV-24"-2	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	24" Valve	2	Raw Water Intake 2 Return Line Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RWPS-VALV-24"-3	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	24" Valve	3	Raw Water Intake 3 Return Line Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RWPS-VALV-24"-4	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	24" Valve	4	Raw Water Intake 4 Return Line Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RWPS-VALV-36"-1	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	36" Valve	1	Raw Water Main Pipeline Valve	Mechanical	2	Good	4	Poor	20	2008	15	5	65%	13	8
	A&M-RWPS-TANK-AIRT-1	WTP2 (A&M)	Raw Water Pump Station	WTPTank	Air Tank	1	Raw Water Air Compressor Tank	Mechanical	2	Good	2	Good	63	2008	15	48	65%	41	46
	A&M-RW-CRN-CRN-2	WTP2 (A&M)	Raw Water System	Crane	Crane	2	WTP2 - RW Filter (Trolley)(#16)	Structural	2	Good	2	Good	20	2007	16	4	65%	13	7
	A&M-RW-INST-FLM-1	WTP2 (A&M)	Raw Water System	Instrument	Flow Meter	1	Raw Water Flow Meter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	Discipline	Condition Score (1-5)	Condition Score Description	Performance SCore (1-5)	Performance Description	Useful Life	Installed or Replaced (Year)	Age	RULt	RULc Decay Curve %	RULc	Effective RUL (Years)
	A&M-RW-INST-LSEN-1	WTP2 (A&M)	Raw Water System	Instrument	Level Sensor	1	Raw Water Trough Intake Level Transmitter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-RW-INST-LSEN-2	WTP2 (A&M)	Raw Water System	Instrument	Level Sensor	2	Raw Water Trough Intake Level 2	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-RW-INST-PH-1	WTP2 (A&M)	Raw Water System	Instrument	pH	1	PH - Raw Water Influent to Plant	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-RW-INST-TEMP-1	WTP2 (A&M)	Raw Water System	Instrument	Temperature Sensor	1	WTP2 - Raw Water Temperature	Elec/I&C	2	Good	2	Good	15	2019	4	11	65%	10	11
	A&M-RW-INST-TRBD-1	WTP2 (A&M)	Raw Water System	Instrument	Turbidity	1	WTP2 - TURBIDITY - Strainers Raw Water (PRE)	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-RW-INST-TRBD-2	WTP2 (A&M)	Raw Water System	Instrument	Turbidity	2	WTP2 - TURBIDITY - Strainers Raw Water (POST)	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-RW-PUMP-TURB-1	WTP2 (A&M)	Raw Water System	WaterPump	Turbine	1	WTP2 - Raw Water Sample Pump	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
	A&M-RW-VALV-24"-1	WTP2 (A&M)	Raw Water System	WTP Valves	24" Valve	1	Raw Water Strainer 1 Effluent Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RW-VALV-24"-2	WTP2 (A&M)	Raw Water System	WTP Valves	24" Valve	2	Raw Water Strainer 2 Effluent Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RW-VALV-24"-1I	WTP2 (A&M)	Raw Water System	WTP Valves	24" Valve	1I	Raw Water Strainer 1 Influent Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RW-VALV-24"-2I	WTP2 (A&M)	Raw Water System	WTP Valves	24" Valve	2I	Raw Water Strainer 2 Influent Valve	Mechanical	2	Good	2	Good	20	2008	15	5	65%	13	8
	A&M-RW-VALV-36"-2	WTP2 (A&M)	Raw Water System	WTP Valves	36" Valve	2	AM Reservoir Influent Isolation Valve(NEW)	Mechanical	2	Good	2	Good	20	2020	3	17	65%	13	16
	A&M-RW-TANK-WT-1	WTP2 (A&M)	Raw Water System	WTPTank	Water Transfer	1	FILTER(West) - Raw Water at AM Plant	Mechanical	2	Good	2	Good	63	UNK	UNK	UNK	65%	41	41
	A&M-RW-TANK-WT-2	WTP2 (A&M)	Raw Water System	WTPTank	Water Transfer	2	FILTER(East) - Raw Water at AM Plant	Mechanical	2	Good	2	Good	63	UNK	UNK	UNK	65%	41	41
	A&M-RSVR-INST-CTRL-1	WTP2 (A&M)	Reservoir Facility	Instrument	Control Cab	1	AM Plant Reservoir Control Cab	Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
	A&M-RSVR-RSVR-RESR-1	WTP2 (A&M)	Reservoir Facility	WaterStorageTank	Reservoir	1	Concrete	Structural	2	Good	2	Good	63	2004	19	44	65%	41	43
	A&M-SODA-FCLT-FCLT-1	WTP2 (A&M)	Soda Ash Facility	Water Facility	Facility	1		Structural	2	Good	2	Good	50	2008	15	35	65%	33	35
	A&M-SPNT-INST-FLM-2	WTP2 (A&M)	Supernatant System	Instrument	Flow Meter	2	Supernatant Effluent Flow Transmitter	Elec/I&C	2	Good	2	Good	15	2008	15	0	65%	10	4
	A&M-SPNT-INST-LSEN-1	WTP2 (A&M)	Supernatant System	Instrument	Level Sensor	1	Supernatant Wetwell Level 1 Transmitter	Elec/I&C	3	Fair	3	Fair	15	2008	15	0	38%	6	2
	A&M-SPNT-INST-LSEN-2	WTP2 (A&M)	Supernatant System	Instrument	Level Sensor	2	Supernatant Wetwell Level 2 Transmitter	Elec/I&C	3	Fair	3	Fair	15	2008	15	0	38%	6	2
	A&M-SPNT-PUMP-SUBM-1	WTP2 (A&M)	Supernatant System	WaterPump	Submersible	1	Supernatant Pump 1	Mechanical	2	Good	2	Good	25	2021	2	23	65%	17	21
	A&M-SPNT-PUMP-SUBM-2	WTP2 (A&M)	Supernatant System	WaterPump	Submersible	2	Supernatant Pump 2	Mechanical	2	Good	2	Good	25	2008	15	10	65%	17	13
ADDED ASSETS																			
NA	MPL-PS-PIPE-GEN-1	Maple Street	Pump Station Facility	Piping	General	1		Mechanical	4	Poor	4	Poor	40	UNK	UNK	UNK	18%	7	7
NA	MPL-VLT-PIPE-VALV-1	Maple Street	Vault	Piping	Valve	1	Valve Vault Piping	Mechanical	4	Poor	4	Poor	40	UNK	UNK	UNK	18%	7	7
NA	NALB-PS-PIPE-PS-2	North Albany	Pump Station Facility	Piping	Pump Station	2	Pump Station Exterior Piping	Mechanical	4	Poor	4	Poor	40	UNK	UNK	UNK	18%	7	7
NA	NALB-VLT-PIPE-FLM-1	North Albany	Vault	Piping	Flow Meter	1	Flow Meter Vault Piping	Mechanical	4	Poor	4	Poor	40	UNK	UNK	UNK	18%	7	7
NA	VINE-BWSH-PIPE-PS-1	WTP1 (Vine St)	Backwash System	Piping	Pump Station	1	Backwash Pumping Station Piping	Mechanical	4	Poor	4	Poor	40	UNK	UNK	UNK	18%	7	7
NA	VINE-FILT-PIPE-GEN-2	WTP1 (Vine St)	Filter Facility	Piping	General	2	Pipe Gallery	Mechanical	4	Poor	4	Poor	40	UNK	UNK	UNK	18%	7	7
NA	VINE-TW-PIPE-GEN-1	WTP1 (Vine St)	Transfer Water System	Piping	General	1	Transfer Water Pipe Gallery (downstairs)	Mechanical	4	Poor	4	Poor	40	UNK	UNK	UNK	18%	7	7
NA	VINE-RW-PIPE-FLM-1	WTP1 (Vine St)	Raw Water System	Piping	Flow Meter	1	RW PS Meter Vault Piping	Mechanical	5	Immediate Action	4	Poor	40	UNK	UNK	UNK	0%	0	0
NA	VINE-RW-PIPE-VALV-1	WTP1 (Vine St)	Raw Water System	Piping	Valve	1	RW PS Valve Vault Piping	Mechanical	5	Immediate Action	5	Immediate Action	40	UNK	UNK	UNK	0%	0	0
NA	VINE-RW-VALV-VALV-1	WTP1 (Vine St)	Raw Water System	Valve	Valve	1	RW PS Valve Vault Valve	Mechanical	5	Immediate Action	5	Immediate Action	20	UNK	UNK	UNK	0%	0	0
NA	VINE-VLT-PIPE-CHEM-1	WTP1 (Vine St)	Vault	Piping	Chemical Facility	1	Chemical Injection Vault Piping	Mechanical	4	Poor	4	Poor	40	UNK	UNK	UNK	18%	7	7
NA	A&M-AVLT-PIPE-FLM-1	WTP2 (A&M)	Albany Metering Vault	Piping	Flow Meter	1	Flow Meter Vault to Albany Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	A&M-FILT-PIPE-GEN-1	WTP2 (A&M)	Filter Facility	Piping	General	1	Stainless Steel Pipe Stained from Caustic	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	A&M-FILT-PIPE-GEN-2	WTP2 (A&M)	Filter Facility	Piping	General	2	Filtrate Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	A&M-MVLT-PIPE-FLM-1	WTP2 (A&M)	Millersburg Metering Vault	Piping	Flow Meter	1	Flow Meter Vault to Millersburg Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	A&M-RWPS-PIPE-GEN-1	WTP2 (A&M)	Raw Water Pump Station	Piping	General	1	Pump Station Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	A&M-VLT-PIPE-ACH-1	WTP2 (A&M)	Vault	Piping	ACH	1	ACH & Flow Meter Vault Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	A&M-VLT-PIPE-VALV-1	WTP2 (A&M)	Vault	Piping	Valve	1	AM Reservoir Vault Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	34-PS-AHWR-PLC-1	34th Street	Pump Station Facility	AutomationHardware	PLC	1		Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
NA	34-PS-PIPE-GEN-1	34th Street	Pump Station Facility	Piping	General	1	Pump Station Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	34-PS-SITE-GEN-1	34th Street	Pump Station Facility	Site Conditions	General	1	Civil Site Conditions	Civil	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	BDWY-RSVR-SITE-GEN-1	Broadway Street	Reservoir Facility	Site Conditions	General	1	Site Conditions	Civil	2	Poor	2	Fair	50	UNK	UNK	UNK	65%	33	33
NA	BDWY-VLT-HTCH-FLM-1	Broadway Street	Vault	Hatch	Flow Meter	1	Flow Meter Vault Hatch	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	GBHL-PS-AHWR-PLC-1	Gibson Hill	Pump Station Facility	AutomationHardware	PLC	1		Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
NA	GBHL-PS-SITE-GEN-1	Gibson Hill	Pump Station Facility	Site Conditions	General	1	Site Conditions	Civil	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	GBHL-VLT-HTCH-FLM-1	Gibson Hill	Vault	Hatch	Flow Meter	1	Flow Meter Vault Hatch	Civil/Structural	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	GBHL-VLT-HTCH-VALV-1	Gibson Hill	Vault	Hatch	Valve	1	Valve Vault Hatch	Civil/Structural	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	MPL-PS-AHWR-PLC-1	Maple Street	Pump Station Facility	AutomationHardware	PLC	1		Elec/I&C	1	Excellent	1	Excellent	15	UNK	UNK	UNK	98%	15	15
NA	MPL-PS-MTST-UNK-1	Maple Street	Pump Station Facility	MotorStarter	Unknown	1		Elec/I&C	1	Excellent	1	Excellent	18	UNK	UNK	UNK	98%	18	18
NA	MPL-PS-MTST-UNK-2	Maple Street	Pump Station Facility	MotorStarter	Unknown	2		Elec/I&C	1	Excellent	1	Excellent	18	UNK	UNK	UNK	98%	18	18
NA	MPL-PS-MTST-UNK-3	Maple Street	Pump Station Facility	MotorStarter	Unknown	3		Elec/I&C	1	Excellent	1	Excellent	18	UNK	UNK	UNK	98%	18	18
NA	MPL-PS-MTST-UNK-4	Maple Street	Pump Station Facility	MotorStarter	Unknown	4		Elec/I&C	1	Excellent	1	Excellent	18	UNK	UNK	UNK	98%	18	18
NA	MPL-PS-MTST-UNK-5	Maple Street	Pump Station Facility	MotorStarter	Unknown	5		Elec/I&C	1	Excellent	1	Excellent	18	UNK	UNK	UNK	98%	18	18
NA	MPL-PS-VALV-ACTR-1	Maple Street	Pump Station Facility	WTP Valves	Actuator	1	Motor Operated Valve Pump 1 (11) Discharge	Elec/I&C	1	Excellent	1	Excellent	20	UNK	UNK	UNK	98%	20	20
NA	MPL-PS-VALV-ACTR-5	Maple Street	Pump Station Facility	WTP Valves	Actuator	5	Motor Operated Valve Pump 5 (15) Discharge	Elec/I&C	1	Excellent	1	Excellent	20	UNK	UNK	UNK	98%	20	20
NA	MPL-RSVR-SITE-GEN-1	Maple Street	Reservoir Facility	Site Conditions	General	1	Civil Site Conditions	Civil	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	Discipline	Condition Score (1-5)	Condition Score Description	Performance SCore (1-5)	Performance Description	Useful Life	Installed or Replaced (Year)	Age	RULt	RULc Decay Curve %	RULc	Effective RUL (Years)
NA	MPL-VLT-HTCH-PS-1	Maple Street	Vault	Hatch	Pump Station	1		Civil/Structural	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	MPL-VLT-VLT-PS-1	Maple Street	Vault	Vault	Pump Station	1		Civil/Structural	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	NALB-PS-SITE-GEN-1	North Albany	Pump Station Facility	Site Conditions	General	1	Civil Site Conditions	Civil	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	NALB-VLT-HTCH-VALV-1	North Albany	Vault	Hatch	Valve	1	Valve Vault Hatch	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	QN-PS-AHWR-PLC-1	Queen Avenue	Pump Station Facility	AutomationHardware	PLC	1		Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
NA	QN-PS-PIPE-GEN-1	Queen Avenue	Pump Station Facility	Piping	General	1		Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	QN-RSVR-SITE-GEN-1	Queen Avenue	Reservoir Facility	Site Conditions	General	1	Civil Site Conditions	Civil	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	VV-PS-AHWR-ITFC-1	Valley View	Pump Station Facility	AutomationHardware	Operator Interface	1		Elec/I&C	1	Excellent	2	Good	15	UNK	UNK	UNK	98%	15	15
NA	VV-PS-AHWR-PLC-1	Valley View	Pump Station Facility	AutomationHardware	PLC	1		Elec/I&C	1	Excellent	1	Excellent	15	UNK	UNK	UNK	98%	15	15
NA	VV-PS-SITE-GEN-1	Valley View	Pump Station Facility	Site Conditions	General	1	Civil Site Conditions	Civil	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	WWD-RSVR-SITE-GEN-1	Wildwood	Reservoir Facility	Site Conditions	General	1	Civil Site Conditions	Civil	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	WWD-VLT-HTCH-VALV-1	Wildwood	Vault	Hatch	Valve	1	Valve Vault Hatch	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	VINE-RW-HTCH-FLM-1	WTP1 (Vine St)	Raw Water System	Hatch	Flow Meter	1	RW PS Meter Vault Hatch	Civil	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	VINE-RW-SITE-GEN-1	WTP1 (Vine St)	Raw Water System	Site Conditions	General	1	Civil Site Conditions	Civil	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	VINE-VLT-HTCH-CHEM-1	WTP1 (Vine St)	Vault	Hatch	Chemical Facility	1	Chemical Injection Vault Hatch	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	A&M-AVLT-HTCH-FLM-1	WTP2 (A&M)	Albany Metering Vault	Hatch	Flow Meter	1	Flow Meter Vault to Albany Hatch	Civil	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	A&M-AVLT-SITE-GEN-1	WTP2 (A&M)	Albany Metering Vault	Site Conditions	General	1	Civil Site Conditions	Civil	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	A&M-FILT-SITE-GEN-2	WTP2 (A&M)	Filter Facility	Site Conditions	General	2	Civil Site Conditions	Civil	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	A&M-MVLT-HTCH-FLM-1	WTP2 (A&M)	Millersburg Metering Vault	Hatch	Flow Meter	1	Flow Meter Vault to Millersburg Hatch	Civil	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	A&M-MVLT-SITE-GEN-1	WTP2 (A&M)	Millersburg Metering Vault	Site Conditions	General	1	Civil Site Conditions	Civil	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	A&M-RWPS-AHWR-PLC-1	WTP2 (A&M)	Raw Water Pump Station	AutomationHardware	PLC	1		Elec/I&C	1	Excellent	1	Excellent	15	UNK	UNK	UNK	98%	15	15
NA	A&M-RWPS-SITE-GEN-1	WTP2 (A&M)	Raw Water Pump Station	Site Conditions	General	1	Civil Site Conditions	Civil	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	A&M-RSVR-SITE-GEN-2	WTP2 (A&M)	Reservoir Facility	Site Conditions	General	2	Civil Site Conditions	Civil	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	A&M-VLT-HTCH-ACH-1	WTP2 (A&M)	Vault	Hatch	ACH	1	ACH & Flow Meter Vault Hatch	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	A&M-VLT-HTCH-FLM-1	WTP2 (A&M)	Vault	Hatch	Flow Meter	1	Unknown Flow Meter Vault Near Neutralization Basin Hatch	Civil/Structural	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	A&M-VLT-HTCH-OF-2	WTP2 (A&M)	Vault	Hatch	Overflow	2	AM Reservoir Overflow Vault Hatch	Civil/Structural	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	A&M-VLT-HTCH-VALV-1	WTP2 (A&M)	Vault	Hatch	Valve	1	AM Reservoir Vault Hatch	Civil/Structural	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	A&M-VLT-VLT-FLM-1	WTP2 (A&M)	Vault	Vault	Flow Meter	1	Unknown Flow Meter Vault Near Neutralization Basin	Civil/Structural	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	A&M-VLT-VLT-OF-2	WTP2 (A&M)	Vault	Vault	Overflow	2	AM Reservoir Overflow Vault	Civil/Structural	2	Good	2	Good	50	UNK	UNK	UNK	65%	33	33
NA	34-VLT-HTCH-FLM-1	34th Street	Vault	Hatch	Flow Meter	1	Flow Meter Vault Hatch	Civil/Structural	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
NA	34-VLT-PIPE-FLM-1	34th Street	Vault	Piping	Flow Meter	1	Flow Meter Vault Piping	Mechanical	4	Poor	4	Poor	40	UNK	UNK	UNK	18%	7	7
NA	34-VLT-VLT-FLM-1	34th Street	Vault	Vault	Flow Meter	1	Flow Meter Vault	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	BDWY-RSVR-AHWR-PLC-1	Broadway Street	Reservoir Facility	AutomationHardware	PLC	1		Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
NA	QN-RSVR-INST-LSEN-1	Queen Avenue	Reservoir Facility	Instrument	Level Sensor	1	Tank Hydrostatic Pressure Level Transmitter	Elec/I&C	4	Poor	3	Fair	15	UNK	UNK	UNK	18%	3	3
NA	BDWY-VLT-HTCH-VALV-1	Broadway Street	Vault	Hatch	Valve	1	Valve Vault Hatch	Civil/Structural	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
NA	BDWY-VLT-VLT-FLM-1	Broadway Street	Vault	Vault	Flow Meter	1	Flow Meter Vault	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	BDWY-VLT-VLT-VALV-1	Broadway Street	Vault	Vault	Valve	1	Valve Vault	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	GBHL-PS-PIPE-GEN-1	Gibson Hill	Pump Station Facility	Piping	General	1	Pump Station Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	GBHL-VLT-PIPE-FLM-1	Gibson Hill	Vault	Piping	Flow Meter	1	Flow Meter Vault Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	GBHL-VLT-PIPE-VALV-1	Gibson Hill	Vault	Piping	Valve	1	Valve Vault Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	GBHL-VLT-VLT-FLM-1	Gibson Hill	Vault	Vault	Flow Meter	1	Flow Meter Vault	Civil/Structural	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
NA	GBHL-VLT-VLT-VALV-1	Gibson Hill	Vault	Vault	Valve	1	Valve Vault	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	MPL-RSVR-VALV-FLEX-1	Maple Street	Reservoir Facility	Valve	Flextend	1		Mechanical	2	Good	2	Good	20	UNK	UNK	UNK	65%	13	13
NA	MPL-RSVR-VALV-FLEX-2	Maple Street	Reservoir Facility	Valve	Flextend	2		Mechanical	2	Good	2	Good	20	UNK	UNK	UNK	65%	13	13
NA	MPL-VLT-HTCH-RESR-1	Maple Street	Vault	Hatch	Reservoir	1		Civil/Structural	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
NA	MPL-VLT-VLT-LDDR-1	Maple Street	Vault	Vault	Ladder	1		Civil/Structural	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
NA	MPL-VLT-VLT-RESR-1	Maple Street	Vault	Vault	Reservoir	1		Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	NALB-PS-AHWR-PLC-1	North Albany	Pump Station Facility	AutomationHardware	PLC	1	Programmable Logic Controller	Elec/I&C	2	Good	2	Good	15	UNK	UNK	UNK	65%	10	10
NA	NALB-PS-PIPE-GEN-1	North Albany	Pump Station Facility	Piping	General	1	Pump Station Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	NALB-VLT-HTCH-FLM-1	North Albany	Vault	Hatch	Flow Meter	1	Flow Meter Vault Hatch	Civil/Structural	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
NA	NALB-VLT-PIPE-VALV-1	North Albany	Vault	Piping	Valve	1	Valve Vault Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	NALB-VLT-VLT-FLM-1	North Albany	Vault	Vault	Flow Meter	1	Flow Meter Vault	Civil/Structural	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
NA	NALB-VLT-VLT-VALV-1	North Albany	Vault	Vault	Valve	1	Valve Vault	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	QN-PS-AHWR-ITFC-1	Queen Avenue	Pump Station Facility	AutomationHardware	Operator Interface	1		Elec/I&C	5	Immediate Action	5	Immediate Action	15	UNK	UNK	UNK	0%	0	0
NA	QN-RSVR-PIPE-GEN-1	Queen Avenue	Reservoir Facility	Piping	General	1		Mechanical	4	Poor	4	Poor	40	UNK	UNK	UNK	18%	7	7
NA	VV-PS-PIPE-GEN-1	Valley View	Pump Station Facility	Piping	General	1		Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	VV-PS-PRSR-NA-1	Valley View	Pump Station Facility	Pressure Vessel	Not Applicable	1	Pump Station Bladder Tank	Mechanical	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
NA	VV-RSVR-RSVR-ANOD-1	Valley View	Reservoir Facility	WaterStorageTank	Tank Anodes	1		Mechanical	5	Immediate Action	5	Immediate Action	63	UNK	UNK	UNK	0%	0	0

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	Discipline	Condition Score (1-5)	Condition Score Description	Performance SCore (1-5)	Performance Description	Useful Life	Installed or Replaced (Year)	Age	RULt	RULc Decay Curve %	RULc	Effective RUL (Years)
NA	WWD-RSVR-AHWR-PLC-1	Wildwood	Reservoir Facility	AutomationHardware	PLC	1		Elec/I&C	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
NA	WWD-RSVR-INST-FLM-1	Wildwood	Reservoir Facility	Instrument	Flow Meter	1		Mechanical	3	Fair	4	Poor	15	UNK	UNK	UNK	38%	6	6
NA	WWD-VLT-PIPE-VALV-1	Wildwood	Vault	Piping	Valve	1	Valve Vault Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	WWD-VLT-VLT-VALV-1	Wildwood	Vault	Vault	Valve	1	Valve Vault	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	VINE-CHEM-PIPE-CHEM-1	WTP1 (Vine St)	Chemical Facility	Piping	Chemical Facility	1	Chemical Liquid Room Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	VINE-CHEM-SITE-CHEM-1	WTP1 (Vine St)	Chemical Facility	Site Conditions	Chemical Facility	1	Chemical Liquid Room Floor	Structural	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
NA	VINE-RW-HTCH-VALV-1	WTP1 (Vine St)	Raw Water System	Hatch	Valve	1	RW PS Valve Vault Hatch	Civil	5	Immediate Action	5	Immediate Action	50	UNK	UNK	UNK	0%	0	0
NA	VINE-RW-PIPE-CNL-1	WTP1 (Vine St)	Raw Water System	Piping	Canal	1	Canal	Civil	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	VINE-RW-PIPE-PS-1	WTP1 (Vine St)	Raw Water System	Piping	Pump Station	1	RW Pump Station Piping	Mechanical	3	Fair	3	Fair	40	UNK	UNK	UNK	38%	16	15
NA	VINE-RW-VLT-FLM-1	WTP1 (Vine St)	Raw Water System	Vault	Flow Meter	1	RW PS Meter Vault	Civil/Structural	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
NA	VINE-RW-VLT-VALV-1	WTP1 (Vine St)	Raw Water System	Vault	Valve	1	RW PS Valve Vault	Civil/Structural	5	Immediate Action	5	Immediate Action	50	UNK	UNK	UNK	0%	0	0
NA	VINE-VLT-VLT-CHEM-1	WTP1 (Vine St)	Vault	Vault	Chemical Facility	1	Chemical Injection Vault	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	A&M-AVLT-VLT-FLM-1	WTP2 (A&M)	Albany Metering Vault	Vault	Flow Meter	1	Flow Meter Vault to Albany	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	A&M-BWSH-PIPE-GEN-1	WTP2 (A&M)	Backwash System	Piping	General	1	Backwash Piping	Mechanical	2	Good	2	Good	40	UNK	UNK	UNK	65%	26	26
NA	A&M-CHEM-PIPE-CIP-1	WTP2 (A&M)	Chemical Facility	Piping	CIP	1	CIP Piping	Mechanical	2	Good	2	Good	40	UNK	UNK	UNK	65%	26	26
NA	A&M-FILT-PIPE-CNL-1	WTP2 (A&M)	Filter Facility	Piping	Channel	1	Membrane Influent Channel	Mechanical	2	Good	2	Good	40	UNK	UNK	UNK	65%	26	26
NA	A&M-MVLT-VLT-FLM-1	WTP2 (A&M)	Millersburg Metering Vault	Vault	Flow Meter	1	Flow Meter Vault to Millersburg	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	A&M-RW-PIPE-GEN-1	WTP2 (A&M)	Raw Water System	Piping	General	1	RW Piping	Mechanical	2	Good	2	Good	40	UNK	UNK	UNK	65%	26	26
NA	A&M-VLT-PIPE-FLM-1	WTP2 (A&M)	Vault	Piping	Flow Meter	1	Unknown Flow Meter Vault Near Neutralization Basin Piping	Mechanical	2	Good	2	Good	40	UNK	UNK	UNK	65%	26	26
NA	A&M-VLT-VLT-ACH-1	WTP2 (A&M)	Vault	Vault	ACH	1	ACH & Flow Meter Vault	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	A&M-VLT-VLT-VALV-1	WTP2 (A&M)	Vault	Vault	Valve	1	AM Reservoir Vault	Civil/Structural	3	Fair	3	Fair	50	UNK	UNK	UNK	38%	19	19
NA	BDWY-RSVR-AHWR-CBNT-1	Broadway Street	Reservoir Facility	AutomationHardware	Cabinet	1	Water Quality Cabinet	Elec/I&C	4	Poor	4	Poor	15	UNK	UNK	UNK	18%	3	3
NA	BDWY-VLT-PIPE-FLM-1	Broadway Street	Vault	Piping	Flow Meter	1	Flow Meter Vault Piping	Mechanical	4	Poor	4	Poor	40	UNK	UNK	UNK	18%	7	7
NA	BDWY-VLT-PIPE-VALV-1	Broadway Street	Vault	Piping	Valve	1	Valve Vault Piping	Mechanical	4	Poor	4	Poor	40	UNK	UNK	UNK	18%	7	7
NA	VINE-PS-FCLT-TW-1	WTP1 (Vine St)	Pump Station Facility	Water Facility	Transfer Water System	1	Transfer Water Pump Station	Mechanical	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9
NA	VINE-RW-FCLT-SCRN-1	WTP1 (Vine St)	Raw Water System	Water Facility	Screen	1	RW Screen	Mechanical	4	Poor	4	Poor	50	UNK	UNK	UNK	18%	9	9

Appendix B

Structural/Seismic Condition Assessment and ASCE/SEI 41 Evaluation

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TECHNICAL MEMORANDUM

APPENDIX B

DATE: **June 14, 2023**

TO: **West Yost**

ATTENTION: **Noelle Drath**

PROJECT: **2022-09, City of Albany, Oregon, Water Master Plan**

SUBJECT: **STRUCTURAL/SEISMIC CONDITION ASSESSMENT AND ASCE/SEI 41-17 EVALUATION**

1.0 Introduction

The City of Albany, Oregon (City) is currently conducting a Water Master Plan (WMP) for their water treatment and distribution system. The City has retained West Yost to perform the WMP. West Yost retained ACE Engineering LLC to perform a Tier 1 Seismic Evaluation in accordance with ASCE/SEI 41-17 to be included with the WMP.

The primary purpose of the Tier 1 Seismic Evaluation of the WMP is to broadly identify the potential seismic deficiencies of each significant structure in the water treatment and distribution system. This memorandum presents the results of the Tier 1 Seismic Evaluation. The following tasks were completed as the seismic scope of work:

1. Review existing documentation of each structure that was made available by the City.
2. Review Seismic Hazards Evaluation prepared by Foundation Engineering, May 3, 2023.
3. Site observation of each significant structure in the water treatment and distribution system on October 19 and 20 of 2022.
4. Abbreviated description of the structural system of each significant structure in the water treatment and distribution system.
5. Complete ASCE/SEI 41-17 Tier 1 Checklists, Quick Checks, and Evaluations.
6. Abbreviated summary of findings and identification of shortcomings of each significant structure in the water treatment and distribution system.

2.0 Documentation Review

The City provided original design drawings for the majority of the significant structures in the water treatment and distribution system. The City did not have original design drawings for some of the significant structures.

The significant structures that had drawings available include:

1. Albany-Millersburg Raw Water Intake & Pump Station (2004)
2. Albany-Millersburg Water Treatment Plant – Filter Building (2004)
3. Albany-Millersburg Water Treatment Plant – Settling Basin (2004)
4. Albany-Millersburg Water Treatment Plant – Neutralization Basin (2004)
5. Albany-Millersburg Water Treatment Plant – Reservoir (2004)
6. Vine Street Water Treatment Plant – Raw Water Pump Station (1948)
7. Vine Street Water Treatment Plant – Hydroelectric Building (1924)
8. Vine Street WTP – Control Building / Chemical Storage Building (1963)

9. Vine Street Water Treatment Plant – Accelator 1 (1948)
10. Vine Street Water Treatment Plant – Accelator 2 (1977)
11. Vine Street Water Treatment Plant – Soda Ash Building (1910)
12. Vine Street Water Treatment Plant – Filters 1-6 (1911)
13. Vine Street Water Treatment Plant – Filters 7-10 (1911)
14. Maple Street – Reservoir (1959)
15. Maple Street – High Service Pump Station (1960)
16. 34th Street Reservoir (1970)
17. Broadway Reservoir (1992)
18. Queen & Hill Reservoir (1955)
19. Wildwood Reservoir (1998)
20. 34th Street Pump Station (1970)
21. Gibson Hill Pump Station (1998)
22. North Albany Pump Station (1979)
23. Queen & Hill Pump Station (1955)

The significant structures that did not have original drawings are:

24. Valley View Reservoirs (pre-1983)
25. Valley View Pump Station (post-1983)

A review of the structural drawings and details that were provided by the City was performed. The Geotechnical engineers at Foundation Engineering provided their Technical Memorandum for Seismic Hazards Evaluation for each site occupied by the water distribution system. A review of the Seismic Hazards Evaluation was performed.

3.0 Site Observation

Each significant structure of the water treatment and distribution system was observed on October 19 & 20 of 2022. Staff from the City of Albany, West Yost and Brown/Caldwell were present during most of the site observations. The existing structures were observed for compliance with the original design drawings and details. Deviations from the original design documents were noted. Signs for structural deficiencies or distress were a primary focus and any signs were noted.

4.0 Structure Summaries

4.1 Albany-Millersburg Raw Water Intake & Pump Station (2004)

The A-M Raw Water Intake & Pump Station structure is located just downstream of the confluence of the North & South Santiam Rivers. The intake structure consists of below grade concrete drywell and 8” CMU block walls supporting a steel truss framed roof with metal roof decking. The structure was designed in 2004 and is in good condition. An addition for an additional sedimentation conveyor was added to the west wall of the building in 2018.

4.2 Albany-Millersburg Water Treatment Plant – Filter Building (2004)

The Filter Building at the A-M WTP consists of a slab on grade with 12” CMU block walls supporting a concrete slab second floor and a steel truss framed roof with metal roof decking. Above the electrical room on the second floor is a third level used as a mechanical attic that is framed with steel beams with concrete on metal decking. The grade along the north side of the structure is approximately 16 feet above the grade along the south side. The north side contains the main entrance with parking area. The south side opens to grade at the top of the Settling Basin.

4.3 Albany-Millersburg Water Treatment Plant – Settling Basin (2004)

The Settling Basin is just South of the Filter Building. The Settling Basin is a below grade, concrete structure that was designed in 2004 and is in good condition.

The Tank at the Water Treatment Plant is a welded steel tank on a concrete foundation on grade that was designed in 1998. The steel tank rests on the concrete foundation and is held in place by friction between the steel base and the concrete foundation. No anchor bolts are present. There are a few areas of moss growth on the roof & walls. There are a few minor paint chips, flakes or scratches on the roof & walls. The structure is in good condition.

4.4 Albany-Millersburg Water Treatment Plant – Neutralization Basin (2004)

The Neutralization Basin is just West of the Settling Basin. The Neutralization Basin is a below grade, concrete structure that was designed in 2004. Below the waterline and near the inlet opening a surprising amount of aggregate is exposed inside the basin. Coating the inside of the basin to prevent further deterioration of the concrete is recommended. Otherwise, the concrete is in fine condition and does not pose a structural risk at this time.

4.5 Albany-Millersburg Water Treatment Plant – Reservoir (2004)

The Reservoir at the A-M Water Treatment Plant is a prestressed concrete tank with a reinforced concrete roof supported by interior concrete columns and the perimeter walls. The columns are supported by reinforced concrete spread footings and the perimeter walls are supported by a continuous perimeter foundation on grade. Horizontal cracks were observed about half way up the wall on the SW quadrant of the tank. Water transmission has occurred through the cracks. Apparently, the tank has leaked since original construction and remedies have been applied multiple times. Otherwise, the structure is in good condition.

4.6 Vine Street Water Treatment Plant – Raw Water Pump Station (1948)

The Raw Water Pump Station at the Vine Street WTP is an unreinforced brick building with a wood framed second floor that has been partially removed and a wood frame, site built truss roof supported by the unreinforced brick walls. The north wall is shared with the Hydroelectric Building. The roofing material was repaired & brick was repointed in 2004. The structure is in good condition for the age.

4.7 Vine Street Water Treatment Plant – Hydroelectric Building (1924)

The Hydroelectric Building at the Vine Street WTP is an unreinforced brick building with a steel framed truss roof with wood purlins and straight sheathing supported by the unreinforced brick walls. There was a remodel adding interior CMU block partition walls with a wood framed ceiling. The roofing material was repaired & brick was repointed in 2004. The structure is in good condition for the age.

4.8 Vine Street Water Treatment Plant – Control Building / Chemical Storage Building (1963)

This Building at the Vine Street WTP serves as a Chemical Storage Building for the two story, south portion of the building and the Control Building for the one story, north portion. The Building is an reinforced concrete building with metal deck on open web steel joists framing the roof and concrete on metal deck supported by steel beams framing the second floor. The concrete slab on grade and conventional reinforced concrete footings make up the foundation. There was an addition of a wood framed restroom & storage room done in 2009. At the same time a seismic upgrade was performed in 2009. The structure is in good condition for the age.

4.9 Vine Street Water Treatment Plant – Accelator 1 (1948)

Accelator 1 at the Vine Street WTP is a 19' tall by 28' diameter reinforced concrete tank supported by a reinforced concrete foundation on grade. The mechanism and walkways were replaced in 2018. The structure is in good condition for the age.

4.10 Vine Street Water Treatment Plant – Accelator 2 (1977)

Accelator 2 at the Vine Street WTP is a welded steel tank on a concrete foundation on grade that was designed in 1998. The steel tank rests on the concrete foundation and is held in place by friction between the steel base and the concrete foundation. No anchor bolts are present. There are a few areas of moss growth on the roof & walls. There are a few minor paint chips, flakes or scratches on the roof & walls. The structure is in good condition.

4.11 Vine Street Water Treatment Plant – Soda Ash Building (1910)

The Soda Ash Building is one of the oldest buildings at the Vine Street WTP. It is an unreinforced brick building with concrete on steel beams framing the second floor and roof. A significant portion of the second floor has been removed in the southeast corner of the building and infilled with wood framing. A steel spiral stair provides access to the second floor which seems to be unused. The roofing material was repaired & brick was repointed in 2004. The structure is in poor condition.

4.12 Vine Street Water Treatment Plant – Filters 1-6 (1911)

Filters 1-6 at the Vine Street WTP are elevated concrete tanks over a concrete basement containing pipes, valves and other infrastructure. The elevated concrete tanks are surrounded with unreinforced brick walls and covered by a flexible steel truss and wood framed roof.

4.13 Vine Street Water Treatment Plant – Filters 7-10 (1911)

Filters 7-10 at the Vine Street WTP are concrete chambers below grade and concrete basins above grade with unreinforced brick walls and wood framed roof two stories above the surrounding grade.

4.14 Maple Street – Reservoir (1959)

The Maple Street Reservoir is a cylindrical welded steel structure adjacent to the Vine Street WTP.

4.15 Maple Street – High Service Pump Station (1960)

The Maple Street High Service Pump Station is a single story CMU block building on a concrete foundation adjacent to the Vine Street WTP.

4.16 34th Street Reservoir (1970)

The 34th Street Reservoir is a cylindrical welded steel structure bearing on a concrete slab on grade foundation.

4.17 Broadway Reservoir (1992)

The Broadway Reservoir is a cylindrical reinforced concrete structure. The reinforced concrete roof bears on tapered prestressed concrete walls. There are interior concrete columns bearing on spread footings that are cast into a concrete slab on grade at their base.

4.18 Queen & Hill Reservoir (1955)

The Reservoir at Queen & Hill is a cylindrical welded steel structure bearing on a concrete slab on grade foundation.

4.19 Wildwood Reservoir (1998)

The Wildwood Reservoir is a cylindrical reinforced concrete structure. The reinforced concrete roof bears on slender prestressed concrete walls. There are interior concrete columns bearing on spread footings that are cast into a concrete slab on grade at their base. There is a perimeter concrete parapet cast into the roof with overflow drains.

4.20 34th Street Pump Station (1970)

The Pump Station at 34th Street is a single story CMU block building on a concrete foundation. The roof is framed with wood decking supported by open web steel joists spanning between the CMU block walls. No seismic retrofit work has been performed on this building.

4.21 Gibson Hill Pump Station (1998)

The Gibson Hill Pump Station a single story wood framed building on a concrete slab on grade foundation. A unique curved crane beam is supported from the exterior walls.

4.22 North Albany Pump Station (1979)

The North Albany Pump Station at 34th Street is a single story brick building with wood framed roof. Despite the original drawings showing reinforcing bars cast into the walls, no evidence could be found during the site visit. Flat wood roof beams span between unreinforced brick walls that bear on a concrete slab on grade foundation. The northeast corner of the building has been damaged and repaired. The building appears to have some distress.

4.23 Queen & Hill Pump Station (1955)

The Pump Station at Queen & Hill is a single story CMU block building. The cast in place concrete roof is supported by steel I beams that span between the exterior reinforced CMU block walls. There is a small steel crane beam suspended from the steel roof beams.

4.24 Valley View Reservoir (~1983)

There are three cylindrical welded steel reservoirs at the 34th Street site. The three reservoirs are rest on concrete foundations. All three reservoirs are slender and have been outfitted with overflow and controls to limit the height of water contained in the reservoirs in an effort to mitigate overturning during a seismic event.

4.25 Valley View Pump Station (~1983)

The Pump Station at Valley View is a single story wood framed building on a slab on grade. There is a bladder tank inside the pump station that is not bolted down to the slab or braced to the walls.

5.0 ASCE/SEI 41-17 Tier 1 Checklists, Quick Checks, and Evaluations

The Tier 1 level of the American Society of Civil Engineer's "Seismic Evaluation of Existing Buildings – ASCE 41-17" guideline was used to evaluate each structure. The purpose of a Tier 1 evaluation is to provide "Quick Checks" to evaluate a structure and determine deficiencies related to the lateral resisting elements.

It is the intent of the evaluation to determine the structural deficiencies of each structure as compared to current prescribed loading and detailing requirements for lateral (wind/seismic) loading to a performance level of "Immediate Occupancy" per ASCE 41-17 section 2.3.1.1. The level of performance is defined per ASCE 41-17 as:

"Structural Performance Level S-1, Immediate Occupancy, is defined as the postearthquake damage state in which a structure remains safe to occupy and essentially retains its preearthquake strength and stiffness."

The commentary to ASCE 41-17 section 2.3.1.1 describes the level of performance as:

"Only very limited structural damage has occurred. The basic vertical- and lateral-force-resisting systems of the building retain almost all of the preearthquake strength and stiffness. The risk of life-threatening injury as a result of structural damage is very low, and although some minor structural repairs might be appropriate, these repairs would generally not be required before reoccupancy. Continued use of the building is not limited by its structural condition but might be limited by damage or disruption to nonstructural elements of the building, furnishings, or equipment and availability of external utility services."

ASCE 41-17 requires that a seismic hazard level is determined. In order to obtain a performance level of "Immediate Occupancy" the seismic hazard shall be BSE-1E as defined in section 2.4.1.4 and C2.4.1.4. The BSE-1E hazard level earthquake has a 20% chance of recurring every 50 years. This design level earthquake has a similar rate of occurrence and magnitude as the current state adopted building codes. A 25% reduction in force is recommended by the State of Oregon for seismic rehabilitation grants. The City of Portland City Code for the evaluation and rehabilitation of existing buildings contains similar recommendations. It is likely that this level of earthquake hazard provides an appropriate level of performance for these facilities.

Lateral force resisting systems work in conjunction with gravity framing systems. The existing gravity framing system was also observed for structural distress during the site observation.

ASCE 41-17 requires that non-structural items retain their position during earthquake shaking for structures in order to obtain a performance level of "Immediate Occupancy". Non-structural items include utilities, fixtures, equipment, finishes and furnishings.

The ASCE 41-17 checklists immediately follow this document for reference.

6.0 Seismic Rehabilitation Recommendations

The following items summarize the findings and recommendations for structural improvements for each structure. The recommendations are required to resolve structural deficiencies and maintain the load bearing system of each structure. A complete load bearing system that is capable of resisting building code load combinations is important to the continuing performance of each structure.

6.1 Albany-Millersburg Raw Water Intake & Pump Station (2004)

The Raw Water Intake structure is considered a Reinforced Masonry Bearing Walls with Flexible Diaphragm (RM1) structure. No deficiencies were found in the checklists, document review and site observation for the structure.

6.2 Albany-Millersburg Water Treatment Plant – Filter Building (2004)

The Filter Building is considered a Reinforced Masonry Bearing Walls with Flexible Diaphragm (RM1) structure. The noncompliant items discovered in the site observation include:

- The roof gutters appear to leak or overflow. If left unmaintained the structure may be damaged and need to be repaired or replaced.
- Some rust and corrosion was observed on the galvanized platform. If left unmaintained the structure may be damaged. The rust should be removed, and properly coated to prevent further corrosion.

6.3 Albany-Millersburg Water Treatment Plant – Settling Basin (2004)

The Settling Basin is considered a Concrete Shear Wall (C2) structure. No deficiencies were found in the checklists, document review and site observation for the Settling Basin structure.

6.4 Albany-Millersburg Water Treatment Plant – Neutralization Basin (2004)

The Neutralization Basin is considered a Concrete Shear Wall (C2) structure. The noncompliant items discovered in the checklists, document review and site observation include:

- The surface of the concrete near the inlet pipe and below the waterline has worn away exposing aggregate. If left unmaintained the structure may be damaged and need to be repaired or replaced. An appropriate coating should be applied to protect the concrete.

6.5 Albany-Millersburg Water Treatment Plant – Reservoir (2004)

The Reservoir at the A-M Plant is considered a Concrete Shear Wall (C2) structure. The wall thickness of the structure was found to be deficient when going through the checklists, however the recent design & construction of the reservoir likely was approved by the engineer responsible for the design.

6.6 Vine Street Water Treatment Plant – Raw Water Pump Station (1948)

The Raw Water Intake structure is considered an Unreinforced Masonry Bearing Walls with Flexible Diaphragm (URM) structure.

- The Raw Water Pump Station Structure is noncompliant for nearly all of the items on the checklist. See Appendix B for the checklist.
- URM PARAPETS: There are several unreinforced parapets at the Vine Street WTP. The parapets should be removed or laterally braced for seismic & wind forces.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.

6.7 Vine Street Water Treatment Plant – Hydroelectric Building (1924)

The Hydroelectric Building is considered an Unreinforced Masonry Bearing Walls with Flexible Diaphragm (URM) structure.

- The Hydroelectric Building is noncompliant for nearly all of the items on the checklist. See Appendix B for the checklist.
- URM PARAPETS: There are several unreinforced parapets at the Vine Street WTP. The parapets should be removed or laterally braced for seismic & wind forces.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.

6.8 Vine Street Water Treatment Plant – Control Building / Chemical Storage Building (1963)

The Control Building / Chemical Storage Building is considered a Concrete Shear Wall (C2) structure.

- COUPLING BEAMS: The concrete lintel over the south door opening does not have adequate reinforcing bars to resist the loads that it may need to resist during a seismic event.
- CONFINEMENT REINFORCING: The existing reinforcing bars in the concrete walls from 1963 are not appropriately detailed at the narrow wall piers along the south wall.
- Chemical storage tanks should have clips bolted to the concrete slab to prevent lateral movement and overturning during a seismic event.

6.9 Vine Street Water Treatment Plant – Accelator 1 (1948)

Accelator 1 is considered a Concrete Shear Wall (C2) structure. The noncompliant items discovered in the checklists, document review and site observation include:

- WEAK STORY: The perimeter concrete walls of the structure are supported by a perimeter ring of concrete columns. The center of the accelator slopes to the center. It is recommended that concrete walls be infilled between the perimeter columns to provide a continuous load path for seismic forces.
- SOFT STORY: The perimeter concrete walls of the structure are supported by a perimeter ring of concrete columns. The center of the accelator slopes to the center. It is recommended that concrete walls be infilled between the perimeter columns to provide a continuous load path for seismic forces.
- VERTICAL IRREGULARITIES: The perimeter concrete walls of the structure are supported by a perimeter ring of concrete columns. The center of the accelator slopes to the center. It is recommended that concrete walls be infilled between the perimeter columns to provide a continuous load path for seismic forces.
- TIES BETWEEN FOUNDATION ELEMENTS: It is unclear if the foundations of the perimeter concrete columns are tied together and to the center of the accelator. It is recommended that concrete footings and walls be infilled between the perimeter columns and center foundation.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.

6.10 Vine Street Water Treatment Plant – Accelator 2 (1977)

Accelator 2 is considered a Steel Plate Shear Wall (S6) structure. No deficiencies were found in the checklists, document review. The only items observed during the site visit include:

- It is recommended that the steel tank be bolted to the concrete foundation to prevent sliding and overturning during a seismic event.
- Clean and remove any moss, mold, rust and corrosion. Then touch up paint any areas to prevent loss of steel thickness.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.

6.11 Vine Street Water Treatment Plant – Soda Ash Building (1910)

The Soda Ash Building is considered an Unreinforced Masonry Bearing Walls with Flexible Diaphragm (URM) structure.

- The building is noncompliant for nearly all of the items on the checklist. See Appendix B for the checklist.
- URM PARAPETS: There are several unreinforced parapets at the Vine Street WTP. The parapets should be removed or laterally braced for seismic & wind forces.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.
- Chemical storage tanks should have clips bolted to the concrete slab to prevent lateral movement and overturning during a seismic event.

6.12 Vine Street Water Treatment Plant – Filters 1-6 (1911)

The Filters 1-6 Building is considered an Unreinforced Masonry Bearing Walls with Flexible Diaphragm (URM) structure.

- The building is noncompliant for nearly all of the items on the checklist. See Appendix B for the checklist.
- URM PARAPETS: There are several unreinforced parapets at the Vine Street WTP. The parapets should be removed or laterally braced for seismic & wind forces.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.

6.13 Vine Street Water Treatment Plant – Filters 7-10 (1911)

The Filters 7-10 Building is considered is considered a Concrete Shear Wall (C2) structure.

- REINFORCING STEEL: The original documents for the Filters 7-10 building do not note or detail any steel reinforcing bars. The unknown condition is a concern for this structure to resist seismic forces.
- TRANSFER TO SHEAR WALLS: The lack of original details for this building cause concern for roof/floor to wall connections' ability to transfer seismic forces.
- FOUNDATION DOWELS: The lack of original details make it difficult to determine if the walls have adequate reinforcing bars doweled into the foundation elements.
- COUPLING BEAMS: The concrete lintels over the lower levels likely do not have adequate reinforcing bars to resist the loads that it may need to resist during a seismic event.
- CONFINEMENT REINFORCING: It is likely that any existing reinforcing bars in the concrete walls are not appropriately detailed at the narrow wall piers.
- WALL REINFORCING AT OPENINGS: It is likely that any existing reinforcing bars in the concrete walls are not appropriately detailed at openings.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.

6.14 Maple Street – Reservoir (1959)

The Reservoir at Maple Street is considered a Steel Plate Shear Wall (S6) structure. No deficiencies were found in the checklists, document review. The only items observed during the site visit include:

- It is recommended that the steel tank be bolted to the concrete foundation to prevent sliding and overturning during a seismic event.
- Clean and remove any moss, mold, rust and corrosion. Then touch up paint any areas to prevent loss of steel thickness.

6.15 Maple Street – High Service Pump Station (1960)

The Pump Station at Maple Street is considered a Reinforced Masonry Bearing Walls with Flexible Diaphragm (RM1) structure. A seismic retrofit has been completed for the roof to wall connections. The noncompliant items discovered in the site observation include:

- TRANSFER TO SHEAR WALLS: It is unknown if during the seismic retrofit if the roof diaphragm was properly connected to the perimeter walls to transfer in-plane seismic forces.

6.16 34th Street Reservoir (1970)

The Reservoir at 34th Street is considered a Steel Plate Shear Wall (S6) structure. No deficiencies were found in the checklists, document review. The only items observed during the site visit include:

- It is recommended that the steel tank be bolted to the concrete foundation to prevent sliding and overturning during a seismic event.
- Clean and remove any moss, mold, rust and corrosion. Then touch up paint any areas to prevent loss of steel thickness.

6.17 Broadway Reservoir (1992)

The Reservoir at Broadway is considered a Concrete Shear Wall (C2) structure. No deficiencies were found in the checklists, document review and site observation for the structure.

6.18 Queen & Hill Reservoir (1955)

The Reservoir at Queen & Hill is considered a Steel Plate Shear Wall (S6) structure. No deficiencies were found in the checklists, document review. The only items observed during the site visit include:

- It is recommended that the steel tank be bolted to the concrete foundation to prevent sliding and overturning during a seismic event.
- Clean and remove any moss, mold, rust and corrosion. Then touch up paint any areas to prevent loss of steel thickness.

6.19 Wildwood Reservoir (1998)

The Wildwood Reservoir is considered a Concrete Shear Wall (C2) structure. No deficiencies were found in the checklists, document review. The only items observed during the site visit include:

- Trees appear to plug the roof drains and may cause rainwater to pond on the roof. Ongoing maintenance is important to prevent overloading of the roof structure from ponding rainwater. Consider trimming trees back or enlarging roof drains to pass needles & leaves.

6.20 34th Street Pump Station (1970)

The Pump Station at 34th Street is considered a Reinforced Masonry Bearing Walls with Flexible Diaphragm (RM1) structure. The noncompliant items discovered in the checklists, document review and site observation include:

- WALL ANCHORAGE: The exterior masonry walls are not adequately connected to the roof diaphragm to transfer out-of-plane forces.
- WOOD LEDGERS: The connection between the walls and roof diaphragm puts the wood ledgers into cross-grain bending.
- TRANSFER TO SHEAR WALLS: The roof diaphragm needs to be properly connected to the perimeter walls to transfer in-plane seismic forces.
- CROSS TIES: Continuous cross ties between exterior walls or diaphragm chords are not present perpendicular to the roof joists.
- SPANS: The span of the wood decking roof diaphragm exceeds allowable limits.
- STIFFNESS OF WALL ANCHORS: The anchors connecting wood elements to the masonry walls are not stiff enough to remain within allowable limits.

6.21 Gibson Hill Pump Station (1998)

The Pump Station at Gibson Hill is considered a Wood Frame (W2) structure. The noncompliant items discovered in the checklists, document review and site observation include:

- HOLD DOWN ANCHORS: No documentation of the original design or construction has been provided. It is unknown if hold down anchors are installed without removal of finish material to verify.
- WOOD SILL BOLTS: No documentation of the original design or construction has been provided. It is unknown if sill bolts are installed without removal of finish material to verify.

6.22 North Albany Pump Station (1979)

The North Albany Pump Station is considered an Unreinforced Masonry Bearing Walls with Flexible Diaphragm (URM) structure.

- The building is noncompliant for nearly all of the items on the checklist. See Appendix B for the checklist.

6.23 Queen & Hill Pump Station (1955)

The Pump Station at Queen & Hill is considered a Reinforced Masonry Bearing Walls with Rigid Diaphragm (RM2) structure. The noncompliant items discovered in the checklists, document review and site observation include:

- WALL ANCHORAGE: It is unclear if the exterior masonry walls are adequately connected to the roof diaphragm to transfer out-of-plane forces.
- TRANSFER TO SHEAR WALLS: It is unclear if the roof diaphragm is properly connected to the perimeter walls to transfer in-plane seismic forces.

6.24 Valley View Reservoir (~1983)

The Reservoir at Valley View is considered a Steel Plate Shear Wall (S6) structure. No deficiencies were found in the checklists, document review. The only item to be addressed from the site observation is:

- It is recommended that the steel tank be bolted to the concrete foundation to prevent sliding and overturning during a seismic event.
- Clean and remove any moss, mold, rust and corrosion. Then touch up paint any areas to prevent loss of steel thickness.

6.25 Valley View Pump Station (~1983)

The Pump Station at Valley View is considered a Wood Frame (W2) structure. The noncompliant items discovered in the checklists, document review and site observation include:

- HOLD DOWN ANCHORS: No documentation of the original design or construction has been provided. It is unknown if hold down anchors are installed without removal of finish material to verify.
- WOOD SILL BOLTS: No documentation of the original design or construction has been provided. It is unknown if sill bolts are installed without removal of finish material to verify.

6.26 General nonstructural items.

It is recommended that City staff review the Nonstructural Checklist and consider the items at each facility for compliance with the best practices for storing items and equipment. Some conditions to consider include:

- EMERGENCY LIGHTING: Provide emergency and egress lighting. Anchor or brace emergency and egress lighting.
- HAZARDOUS MATERIAL STORAGE: Some chemicals used in the treatment process or used during regular cleaning and maintenance processes may be considered hazardous when spilled. Items storing these chemicals should be restrained to prevent displacement, tipping or falling.
- HAZARDOUS MATERIAL DISTRIBUTION: Piping containing hazardous materials, such as natural gas, should anchored or braced adequately to prevent damage that might allow the hazardous material to release.
- SHUTOFF VALVES: Piping containing hazardous material, including natural gas, should have shutoff valves or other devices to prevent spills or leaks.
- FLEXIBLE COUPLINGS: Hazardous material, ductwork and piping, including natural gas piping, should have flexible couplings.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures. This primarily occurs at the Vine Street WTP.
- LIGHT FIXTURES LENS COVERS: Make sure lens covers on light fixtures are attached with safety devices and add safety devices if necessary.
- INDUSTRIAL STORAGE RACKS: Industrial storage racks or similar items that are more than 12 feet high should be anchored to the floor.
- TALL NARROW CABINETS: Cabinets, lockers, bookshelves, etc. more than 6 feet high and with height-to-depth ratios exceeding 3:1 should anchored to the floor or wall.
- FALL-PRONE CONTENTS: Equipment, stored items weighing more than 20 pounds and more than 4 feet above the floor should be braced or restrained.
- FALL-PRONE EQUIPMENT: Equipment weighing more than 20 pounds and more than 4 feet above the floor should be braced or restrained.
- IN-LINE EQUIPMENT: Equipment installed in line with a duct or piping system, with an operating weight more than 75 pounds should be laterally braced independent of the duct or piping system.
- TALL NARROW EQUIPMENT: Equipment, tanks, etc. more than 6 feet high and with height-to-depth ratios exceeding 3:1 should anchored to the floor or wall.
- SUSPENDED EQUIPMENT: Equipment suspended without lateral bracing should be free to swing or move with the structure without damaging itself or adjoining components.
- HEAVY EQUIPMENT: Floor supported or platform supported equipment weighing more than 400 pounds should be anchored to the structure.
- ELECTRICAL EQUIPMENT: Electrical equipment should be laterally braced to the structure.
- CONDUIT COUPLINGS: Conduit greater than 2.5 inches should have flexible couplings.
- FLEXIBLE COUPLINGS: Fluid and gas piping should have flexible couplings.
- FLUID AND GAS PIPING: Fluid and gas piping should be anchored and braced to the structure to limit spills or leaks.
- C-CLAMPS: Restrain one-sided C-clamps that support piping or similar items larger than 2.5 inches in diameter.

Based on previous experience and observations at site the buildings may contain some form of hazardous material. These materials will need to be dealt with on a case-by-case basis as they are encountered during the project.

7.0 Conclusions

The majority of the Albany water treatment and distribution system is in reasonable structural condition. Maintenance and structural upgrades should be part of the City's operating plan. Replacement of aging structures should also be included in the City's long-term plan regardless of physical condition.

9.0 Limitations

This Structural Technical Memorandum has been prepared for the City of Albany Water Master Plan. The conclusions and recommendations in this memorandum were derived from the professional review of documentation that was provided by the City of Albany, West Yost, published literature and limited site observations. ACE Engineering is not responsible for errors and omissions that might exist in documents and construction performed by others.

This report has been completed within the limitation of the West Yost approved scope of work. The services provided have been performed in a manner consistent with the level of competency presently maintained by other practicing professional engineers in the same type of work in the community of the project for the professional and technical soundness, accuracy, and adequacy of the work. ACE Engineering is not responsible for the use of this report for anything other than the Albany Water Master Plan.

ACE ENGINEERING LLC

64239PE
JANUARY 14, 2003
ALLAN T GOFFE
EXPIRES 6/30/2025

Allan T Goffe, P.E., S.E.
Principle Engineer

Albany-Millersburg Raw Water Intake & Pump Station (2004)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than 0.6S_a.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Albany-Millersburg Water Treatment Plant (2004)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Albany-Millersburg Reservoir (2004)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Vine Street Water Treatment Plant (1910-2020)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
C [✓ NC] N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
C [✓ NC] N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
C [✓ NC] N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
C [✓ NC] N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
C [✓ NC] N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
C [✓ NC] N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
C [✓ NC] N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Maple Street Reservoir & Pump Station (1959-1960)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

34th Street Reservoir and Pump Station (1970)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Broadway Reservoir (1992)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Queen & Hill Reservoir and Pump Station (1955)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Wildwood Reservoir (1998)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Valley View Reservoir and Pump Station (1983)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Albany-Millersburg Raw Water Intake & Pump Station (2004)

Table 17-35. Immediate Occupancy Structural Checklist for Building Types RM1 and RM2

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2.	5.5.1.1	A.3.2.1.1
[✓ C] NC N/A U	SHEAR STRESS CHECK: The shear stress in the reinforced masonry shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than 70 lb/in.^{2} (4.83 MPa).	5.5.3.1.1	A.3.2.4.1
[✓ C] NC N/A U	REINFORCING STEEL: The total vertical and horizontal reinforcing steel ratio in reinforced masonry walls is greater than 0.002 of the wall with the minimum of 0.0007 in either of the two directions; the spacing of reinforcing steel is less than 48 in., and all vertical bars extend to the top of the walls.	5.5.3.1.3	A.3.2.4.2
Connections			
[✓ C] NC N/A U	WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1
[✓ C] NC N/A U	WOOD LEDGERS: The connection between the wall panels and the diaphragm does not induce cross-grain bending or tension in the wood ledgers.	5.7.1.3	A.5.1.2
[✓ C] NC N/A U	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of seismic forces to the shear walls, and the connections are able to develop the lesser of the shear strength of the walls or diaphragms.	5.7.2	A.5.2.1

continues

Table 17-35 ***(Continued)*****. Immediate Occupancy Structural Checklist for Building Types RM1 and RM2**

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation, and the dowels are able to develop the lesser of the strength of the walls or the uplift capacity of the foundation.	5.7.3.4	A.5.3.5
[✓ C] NC N/A U	GIRDER–COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support.	5.7.4.1	A.5.4.1
Stiff Diaphragms			
C NC [✓ N/A] U	TOPPING SLAB: Precast concrete diaphragm elements are interconnected by a continuous reinforced concrete topping slab.	5.6.4	A.4.5.1
C NC [✓ N/A] U	TOPPING SLAB TO WALLS OR FRAMES: Reinforced concrete topping slabs that interconnect the precast concrete diaphragm elements are doweled for transfer of forces into the shear wall or frame elements.	5.7.2	A.5.2.3
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil.		A.6.2.3
C [✓ NC] N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4
Low, Moderate, and High Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	REINFORCING AT WALL OPENINGS: All wall openings that interrupt rebar have trim reinforcing on all sides.	5.5.3.1.5	A.3.2.4.3
[✓ C] NC N/A U	PROPORTIONS: The height-to-thickness ratio of the shear walls at each story is less than 30.	5.5.3.1.2	A.3.2.4.4
Diaphragms (Stiff or Flexible)			
[✓ C] NC N/A U	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 15% of the wall length.	5.6.1.3	A.4.1.4
[✓ C] NC N/A U	OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls are not greater than 4 ft (1.2 m) long.	5.6.1.3	A.4.1.6
C [✓ NC] N/A U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
Flexible Diaphragms			
[✓ C] NC N/A U	CROSS TIES: There are continuous cross ties between diaphragm chords.	5.6.1.2	A.4.1.2
C NC [✓ N/A] U	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered.	5.6.2	A.4.2.1
[✓ C] NC N/A U	SPANS: All wood diaphragms with spans greater than 12 ft (3.6 m) consist of wood structural panels or diagonal sheathing.	5.6.2	A.4.2.2
[✓ C] NC N/A U	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft (9.2 m) and aspect ratios less than or equal to 3-to-1.	5.6.2	A.4.2.3
C NC [✓ N/A] U	NONCONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete consist of horizontal spans of less than 40 ft (12.2 m) and have aspect ratios less than 4-to-1.	5.6.3	A.4.3.1
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
[✓ C] NC N/A U	STIFFNESS OF WALL ANCHORS: Anchors of concrete or masonry walls to wood structural elements are installed taut and are stiff enough to limit the relative movement between the wall and the diaphragm to no greater than 1/8 in. before engagement of the anchors.	5.7.1.2	A.5.1.4

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Albany-Millersburg Water Treatment Plant (2004)

Table 17-35. Immediate Occupancy Structural Checklist for Building Types RM1 and RM2

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2.	5.5.1.1	A.3.2.1.1
[✓ C] NC N/A U	SHEAR STRESS CHECK: The shear stress in the reinforced masonry shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than 70 lb/in.^{2} (4.83 MPa).	5.5.3.1.1	A.3.2.4.1
[✓ C] NC N/A U	REINFORCING STEEL: The total vertical and horizontal reinforcing steel ratio in reinforced masonry walls is greater than 0.002 of the wall with the minimum of 0.0007 in either of the two directions; the spacing of reinforcing steel is less than 48 in., and all vertical bars extend to the top of the walls.	5.5.3.1.3	A.3.2.4.2
Connections			
[✓ C] NC N/A U	WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1
[✓ C] NC N/A U	WOOD LEDGERS: The connection between the wall panels and the diaphragm does not induce cross-grain bending or tension in the wood ledgers.	5.7.1.3	A.5.1.2
[✓ C] NC N/A U	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of seismic forces to the shear walls, and the connections are able to develop the lesser of the shear strength of the walls or diaphragms.	5.7.2	A.5.2.1

continues

Table 17-35 *(Continued)*. Immediate Occupancy Structural Checklist for Building Types RM1 and RM2

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation, and the dowels are able to develop the lesser of the strength of the walls or the uplift capacity of the foundation.	5.7.3.4	A.5.3.5
[✓ C] NC N/A U	GIRDER–COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support.	5.7.4.1	A.5.4.1
Stiff Diaphragms			
C NC [✓ N/A] U	TOPPING SLAB: Precast concrete diaphragm elements are interconnected by a continuous reinforced concrete topping slab.	5.6.4	A.4.5.1
C NC [✓ N/A] U	TOPPING SLAB TO WALLS OR FRAMES: Reinforced concrete topping slabs that interconnect the precast concrete diaphragm elements are doweled for transfer of forces into the shear wall or frame elements.	5.7.2	A.5.2.3
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil.		A.6.2.3
C [✓ NC] N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4
Low, Moderate, and High Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	REINFORCING AT WALL OPENINGS: All wall openings that interrupt rebar have trim reinforcing on all sides.	5.5.3.1.5	A.3.2.4.3
[✓ C] NC N/A U	PROPORTIONS: The height-to-thickness ratio of the shear walls at each story is less than 30.	5.5.3.1.2	A.3.2.4.4
Diaphragms (Stiff or Flexible)			
[✓ C] NC N/A U	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 15% of the wall length.	5.6.1.3	A.4.1.4
[✓ C] NC N/A U	OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls are not greater than 4 ft (1.2 m) long.	5.6.1.3	A.4.1.6
C NC [✓ N/A] U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
Flexible Diaphragms			
[✓ C] NC N/A U	CROSS TIES: There are continuous cross ties between diaphragm chords.	5.6.1.2	A.4.1.2
C NC [✓ N/A] U	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered.	5.6.2	A.4.2.1
[✓ C] NC N/A U	SPANS: All wood diaphragms with spans greater than 12 ft (3.6 m) consist of wood structural panels or diagonal sheathing.	5.6.2	A.4.2.2
[✓ C] NC N/A U	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft (9.2 m) and aspect ratios less than or equal to 3-to-1.	5.6.2	A.4.2.3
C NC [✓ N/A] U	NONCONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete consist of horizontal spans of less than 40 ft (12.2 m) and have aspect ratios less than 4-to-1.	5.6.3	A.4.3.1
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
[✓ C] NC N/A U	STIFFNESS OF WALL ANCHORS: Anchors of concrete or masonry walls to wood structural elements are installed taut and are stiff enough to limit the relative movement between the wall and the diaphragm to no greater than 1/8 in. before engagement of the anchors.	5.7.1.2	A.5.1.4

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Albany-Millersburg Reservoir (2004)

Table 17-25. Immediate Occupancy Structural Checklist for Building Types C2 and C2a

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	COMPLETE FRAMES: Steel or concrete frames classified as secondary components form a complete vertical-load-carrying system.	5.5.2.5.1	A.3.1.6.1
[✓ C] NC N/A U	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2.	5.5.1.1	A.3.2.1.1
[✓ C] NC N/A U	SHEAR STRESS CHECK: The shear stress in the concrete shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than the greater of 100 lb/in.^{2} (0.69 MPa) or $2\sqrt{f'_c}$.	5.5.3.1.1	A.3.2.2.1
[✓ C] NC N/A U	REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area is not less than 0.0012 in the vertical direction and 0.0020 in the horizontal direction. The spacing of reinforcing steel is equal to or less than 18 in. (457 mm).	5.5.3.1.3	A.3.2.2.2
Connections			
C NC [✓ N/A] U	WALL ANCHORAGE AT FLEXIBLE DIAPHRAGMS: Exterior concrete or masonry walls that are dependent on flexible diaphragms for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1
[✓ C] NC N/A U	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of loads to the shear walls, and the connections are able to develop the lesser of the shear strength of the walls or diaphragms.	5.7.2	A.5.2.1
[✓ C] NC N/A U	FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation, and the dowels are able to develop the lesser of the strength of the walls or the uplift capacity of the foundation.	5.7.3.4	A.5.3.5
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4
Low, Moderate, and High Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	DEFLECTION COMPATIBILITY: Secondary components have the shear capacity to develop the flexural strength of the components and are compliant with the following items in Table 17-23: COLUMN-BAR SPLICES, BEAM-BAR SPLICES, COLUMN-TIE SPACING, STIRRUP SPACING, and STIRRUP AND TIE HOOKS.	5.5.2.5.2	A.3.1.6.2
[✓ C] NC N/A U	FLAT SLABS: Flat slabs or plates not part of seismic-force-resisting system have continuous bottom steel through the column joints.	5.5.2.5.3	A.3.1.6.3
C NC [✓ N/A] U	COUPLING BEAMS: The ends of both walls to which the coupling beam is attached are supported at each end to resist vertical loads caused by overturning. Coupling beams have the capacity in shear to develop the uplift capacity of the adjacent wall.	5.5.3.2.1	A.3.2.2.3
[✓ C] NC N/A U	OVERTURNING: All shear walls have aspect ratios less than 4-to-1. Wall piers need not be considered.	5.5.3.1.4	A.3.2.2.4
C NC [✓ N/A] U	CONFINEMENT REINFORCING: For shear walls with aspect ratios greater than 2-to-1, the boundary elements are confined with spirals or ties with spacing less than $8d_b$.	5.5.3.2.2	A.3.2.2.5
[✓ C] NC N/A U	WALL REINFORCING AT OPENINGS: There is added trim reinforcement around all wall openings with a dimension greater than three times the thickness of the wall.	5.5.3.1.5	A.3.2.2.6
C [✓ NC] N/A U	WALL THICKNESS: Thicknesses of bearing walls are not less than 1/25 the unsupported height or length, whichever is shorter, nor less than 4 in. (101 mm).	5.5.3.1.2	A.3.2.2.7

continues

Table 17-25 ***(Continued)*****. Immediate Occupancy Structural Checklist for Building Types C2 and C2a**

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Diaphragms (Stiff or Flexible)			
[✓ C] NC N/A U	DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints.	5.6.1.1	A.4.1.1
[✓ C] NC N/A U	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 15% of the wall length.	5.6.1.3	A.4.1.4
C NC [✓ N/A] U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
Flexible Diaphragms			
C NC [✓ N/A] U	CROSS TIES: There are continuous cross ties between diaphragm chords.	5.6.1.2	A.4.1.2
C NC [✓ N/A] U	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered.	5.6.2	A.4.2.1
C NC [✓ N/A] U	SPANS: All wood diaphragms with spans greater than 12 ft (3.6 m) consist of wood structural panels or diagonal sheathing.	5.6.2	A.4.2.2
C NC [✓ N/A] U	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft (9.2 m) and aspect ratios less than or equal to 3-to-1.	5.6.2	A.4.2.3
C NC [✓ N/A] U	NONCONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete consist of horizontal spans of less than 40 ft (12.2 m) and have aspect ratios less than 4-to-1.	5.6.3	A.4.3.1
C NC [✓ N/A] U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
C NC [✓ N/A] U	UPLIFT AT PILE CAPS: Pile caps have top reinforcement, and piles are anchored to the pile caps; the pile cap reinforcement and pile anchorage are able to develop the tensile capacity of the piles.	5.7.3.5	A.5.3.8

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Vine Street Water Treatment Plant (1910-2020)

Table 17-37. Immediate Occupancy Structural Checklist for Building Types URM and URMa

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2.	5.5.1.1	A.3.2.1.1
C [✓ NC] N/A U	SHEAR STRESS CHECK: The shear stress in the unreinforced masonry shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than 30 lb/in.^{2} (0.21 MPa) for clay units and 70 lb/in.^{2} (0.48 MPa) for concrete units.	5.5.3.1.1	A.3.2.5.1
Connections			
C [✓ NC] N/A U	WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1
C [✓ NC] N/A U	WOOD LEDGERS: The connection between the wall panels and the diaphragm does not induce cross-grain bending or tension in the wood ledgers.	5.7.1.3	A.5.1.2
C [✓ NC] N/A U	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of seismic forces to the shear walls, and the connections are able to develop the lesser of the shear strength of the walls or diaphragms.	5.7.2	A.5.2.1
C [✓ NC] N/A U	GIRDER–COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support.	5.7.4.1	A.5.4.1
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil.		A.6.2.3
C [✓ NC] N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story high.		A.6.2.4

continues

Table 17-37 *(Continued)*. Immediate Occupancy Structural Checklist for Building Types URM and URMa

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Low, Moderate, and High Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Seismic-Force-Resisting System			
C [✓ NC] N/A U	PROPORTIONS: The height-to-thickness ratio of the shear walls at each story is less than the following: Top story of multi-story building 9 First story of multi-story building 15 All other conditions 13	5.5.3.1.2	A.3.2.5.2
C [✓ NC] N/A U	MASONRY LAYUP: Filled collar joints of multi-wythe masonry walls have negligible voids.	5.5.3.4.1	A.3.2.5.3
Diaphragms (Stiff or Flexible)			
[✓ C] NC N/A U	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 15% of the wall length.	5.6.1.3	A.4.1.4
[✓ C] NC N/A U	OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls are not greater than 4 ft (1.2 m) long.	5.6.1.3	A.4.1.6
C [✓ NC] N/A U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7
C [✓ NC] N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
Flexible Diaphragms			
C [✓ NC] N/A U	CROSS TIES: There are continuous cross ties between diaphragm chords.	5.6.1.2	A.4.1.2
C [✓ NC] N/A U	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered.	5.6.2	A.4.2.1
C [✓ NC] N/A U	SPANS: All wood diaphragms with spans greater than 12 ft (3.6 m) consist of wood structural panels or diagonal sheathing.	5.6.2	A.4.2.2
C [✓ NC] N/A U	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft (9.2 m) and aspect ratios less than or equal to 3-to-1.	5.6.2	A.4.2.3
C NC [✓ N/A] U	NONCONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete consist of horizontal spans of less than 40 ft (12.2 m) and have aspect ratios less than 4-to-1.	5.6.3	A.4.3.1
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
C [✓ NC] N/A U	STIFFNESS OF WALL ANCHORS: Anchors of concrete or masonry walls to wood structural elements are installed taut and are stiff enough to limit the relative movement between the wall and the diaphragm to no greater than 1/8 in. (3 mm) before engagement of the anchors.	5.7.1.2	A.5.1.4
C [✓ NC] N/A U	BEAM, GIRDER, AND TRUSS SUPPORTS: Beams, girders, and trusses supported by unreinforced masonry walls or pilasters have independent secondary columns for support of vertical loads.	5.7.4.4	A.5.4.5

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Maple Street Reservoir (1959)

Table 17-13. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low and Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	BRACE AXIAL STRESS CHECK: The axial stress in the diagonals, calculated using the Quick Check procedure of Section 4.4.3.4, is less than $0.50F_y$.	5.5.4.1	A.3.3.1.2
[✓ C] NC N/A U	FLEXURAL STRESS CHECK: The average flexural stress in the moment-frame columns and beams, calculated using the Quick Check procedure of Section 4.4.3.9, is less than F_y.	5.5.2.1.2	A.3.1.3.3
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames.	5.7.2	A.5.2.2
[✓ C] NC N/A U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation.	5.7.3.1	A.5.3.1
Moderate Seismicity (Complete the Following Items in Addition to the Items for Very Low and Low Seismicity)			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the elastic moment (F_yS) of the adjoining members.	5.5.2.2.1	A.3.1.3.4
Diaphragms			
[✓ C] NC N/A U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7

continues

Table 17-13 ***(Continued)*****. Immediate Occupancy Checklist for Building Type S3**

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
[✓ C] NC N/A U	ROOF PANELS: Where considered as diaphragm elements for lateral resistance, metal, plastic, or cementitious roof panels are positively attached to the roof framing to resist seismic forces.	5.7.5	A.5.5.1
[✓ C] NC N/A U	WALL PANELS: Where considered as shear elements for lateral resistance, metal, fiberglass, or cementitious wall panels are positively attached to the framing and foundation to resist seismic forces.	5.7.5	A.5.5.2
High Seismicity (Complete the Following Items in Addition to the Items for Low and Moderate Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the strength of the adjoining members or panel zones.	5.5.2.2.1	A.3.1.3.4
[✓ C] NC N/A U	COMPACT MEMBERS: All frame elements meet compact section requirements in accordance with AISC 360, Table B4.1.	5.5.2.2.4	A.3.1.3.8
[✓ C] NC N/A U	BEAM PENETRATIONS: All openings in frame-beam webs are less than one quarter of the beam depth and are located in the center half of the beams.	5.5.2.2.5	A.3.1.3.9
[✓ C] NC N/A U	OUT-OF-PLANE BRACING: Beam–column joints are braced out of plane.	5.5.2.2.7	A.3.1.3.11
C NC [✓ N/A] U	BOTTOM FLANGE BRACING: The bottom flanges of beams are braced out of plane.	5.5.2.2.8	A.3.1.3.12
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames, and the connections are able to develop the lesser of the strength of the frames or the diaphragms.	5.7.2	A.5.2.2
C NC [✓ N/A] U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation, and the anchorage is able to develop the least of the following: the tensile capacity of the column, the tensile capacity of the lowest level column splice (if any), or the uplift capacity of the foundation.	5.7.3.1	A.5.3.1
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the seismic forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

34th Street Reservoir (1970)

Table 17-13. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low and Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	BRACE AXIAL STRESS CHECK: The axial stress in the diagonals, calculated using the Quick Check procedure of Section 4.4.3.4, is less than $0.50F_y$.	5.5.4.1	A.3.3.1.2
[✓ C] NC N/A U	FLEXURAL STRESS CHECK: The average flexural stress in the moment-frame columns and beams, calculated using the Quick Check procedure of Section 4.4.3.9, is less than F_y.	5.5.2.1.2	A.3.1.3.3
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames.	5.7.2	A.5.2.2
[✓ C] NC N/A U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation.	5.7.3.1	A.5.3.1
Moderate Seismicity (Complete the Following Items in Addition to the Items for Very Low and Low Seismicity)			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the elastic moment (F_yS) of the adjoining members.	5.5.2.2.1	A.3.1.3.4
Diaphragms			
[✓ C] NC N/A U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7

continues

Table 17-13 *(Continued)*. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
[✓ C] NC N/A U	ROOF PANELS: Where considered as diaphragm elements for lateral resistance, metal, plastic, or cementitious roof panels are positively attached to the roof framing to resist seismic forces.	5.7.5	A.5.5.1
[✓ C] NC N/A U	WALL PANELS: Where considered as shear elements for lateral resistance, metal, fiberglass, or cementitious wall panels are positively attached to the framing and foundation to resist seismic forces.	5.7.5	A.5.5.2
High Seismicity (Complete the Following Items in Addition to the Items for Low and Moderate Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the strength of the adjoining members or panel zones.	5.5.2.2.1	A.3.1.3.4
[✓ C] NC N/A U	COMPACT MEMBERS: All frame elements meet compact section requirements in accordance with AISC 360, Table B4.1.	5.5.2.2.4	A.3.1.3.8
[✓ C] NC N/A U	BEAM PENETRATIONS: All openings in frame-beam webs are less than one quarter of the beam depth and are located in the center half of the beams.	5.5.2.2.5	A.3.1.3.9
[✓ C] NC N/A U	OUT-OF-PLANE BRACING: Beam–column joints are braced out of plane.	5.5.2.2.7	A.3.1.3.11
C NC [✓ N/A] U	BOTTOM FLANGE BRACING: The bottom flanges of beams are braced out of plane.	5.5.2.2.8	A.3.1.3.12
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames, and the connections are able to develop the lesser of the strength of the frames or the diaphragms.	5.7.2	A.5.2.2
C NC [✓ N/A] U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation, and the anchorage is able to develop the least of the following: the tensile capacity of the column, the tensile capacity of the lowest level column splice (if any), or the uplift capacity of the foundation.	5.7.3.1	A.5.3.1
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the seismic forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Broadway Reservoir (1992)

Table 17-25. Immediate Occupancy Structural Checklist for Building Types C2 and C2a

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	COMPLETE FRAMES: Steel or concrete frames classified as secondary components form a complete vertical-load-carrying system.	5.5.2.5.1	A.3.1.6.1
[✓ C] NC N/A U	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2.	5.5.1.1	A.3.2.1.1
[✓ C] NC N/A U	SHEAR STRESS CHECK: The shear stress in the concrete shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than the greater of 100 lb/in.^{2} (0.69 MPa) or $2\sqrt{f'_c}$.	5.5.3.1.1	A.3.2.2.1
[✓ C] NC N/A U	REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area is not less than 0.0012 in the vertical direction and 0.0020 in the horizontal direction. The spacing of reinforcing steel is equal to or less than 18 in. (457 mm).	5.5.3.1.3	A.3.2.2.2
Connections			
C NC [✓ N/A] U	WALL ANCHORAGE AT FLEXIBLE DIAPHRAGMS: Exterior concrete or masonry walls that are dependent on flexible diaphragms for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1
[✓ C] NC N/A U	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of loads to the shear walls, and the connections are able to develop the lesser of the shear strength of the walls or diaphragms.	5.7.2	A.5.2.1
[✓ C] NC N/A U	FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation, and the dowels are able to develop the lesser of the strength of the walls or the uplift capacity of the foundation.	5.7.3.4	A.5.3.5
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4
Low, Moderate, and High Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	DEFLECTION COMPATIBILITY: Secondary components have the shear capacity to develop the flexural strength of the components and are compliant with the following items in Table 17-23: COLUMN-BAR SPLICES, BEAM-BAR SPLICES, COLUMN-TIE SPACING, STIRRUP SPACING, and STIRRUP AND TIE HOOKS.	5.5.2.5.2	A.3.1.6.2
[✓ C] NC N/A U	FLAT SLABS: Flat slabs or plates not part of seismic-force-resisting system have continuous bottom steel through the column joints.	5.5.2.5.3	A.3.1.6.3
C NC [✓ N/A] U	COUPLING BEAMS: The ends of both walls to which the coupling beam is attached are supported at each end to resist vertical loads caused by overturning. Coupling beams have the capacity in shear to develop the uplift capacity of the adjacent wall.	5.5.3.2.1	A.3.2.2.3
[✓ C] NC N/A U	OVERTURNING: All shear walls have aspect ratios less than 4-to-1. Wall piers need not be considered.	5.5.3.1.4	A.3.2.2.4
C NC [✓ N/A] U	CONFINEMENT REINFORCING: For shear walls with aspect ratios greater than 2-to-1, the boundary elements are confined with spirals or ties with spacing less than $8d_b$.	5.5.3.2.2	A.3.2.2.5
[✓ C] NC N/A U	WALL REINFORCING AT OPENINGS: There is added trim reinforcement around all wall openings with a dimension greater than three times the thickness of the wall.	5.5.3.1.5	A.3.2.2.6
C [✓ NC] N/A U	WALL THICKNESS: Thicknesses of bearing walls are not less than 1/25 the unsupported height or length, whichever is shorter, nor less than 4 in. (101 mm).	5.5.3.1.2	A.3.2.2.7

continues

Table 17-25 *(Continued)*. Immediate Occupancy Structural Checklist for Building Types C2 and C2a

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Diaphragms (Stiff or Flexible)			
[✓ C] NC N/A U	DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints.	5.6.1.1	A.4.1.1
[✓ C] NC N/A U	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 15% of the wall length.	5.6.1.3	A.4.1.4
C NC [✓ N/A] U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
Flexible Diaphragms			
C NC [✓ N/A] U	CROSS TIES: There are continuous cross ties between diaphragm chords.	5.6.1.2	A.4.1.2
C NC [✓ N/A] U	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered.	5.6.2	A.4.2.1
C NC [✓ N/A] U	SPANS: All wood diaphragms with spans greater than 12 ft (3.6 m) consist of wood structural panels or diagonal sheathing.	5.6.2	A.4.2.2
C NC [✓ N/A] U	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft (9.2 m) and aspect ratios less than or equal to 3-to-1.	5.6.2	A.4.2.3
C NC [✓ N/A] U	NONCONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete consist of horizontal spans of less than 40 ft (12.2 m) and have aspect ratios less than 4-to-1.	5.6.3	A.4.3.1
C NC [✓ N/A] U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
C NC [✓ N/A] U	UPLIFT AT PILE CAPS: Pile caps have top reinforcement, and piles are anchored to the pile caps; the pile cap reinforcement and pile anchorage are able to develop the tensile capacity of the piles.	5.7.3.5	A.5.3.8

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Queen & Hill Reservoir (1955)

Table 17-13. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low and Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	BRACE AXIAL STRESS CHECK: The axial stress in the diagonals, calculated using the Quick Check procedure of Section 4.4.3.4, is less than $0.50F_y$.	5.5.4.1	A.3.3.1.2
[✓ C] NC N/A U	FLEXURAL STRESS CHECK: The average flexural stress in the moment-frame columns and beams, calculated using the Quick Check procedure of Section 4.4.3.9, is less than F_y.	5.5.2.1.2	A.3.1.3.3
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames.	5.7.2	A.5.2.2
[✓ C] NC N/A U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation.	5.7.3.1	A.5.3.1
Moderate Seismicity (Complete the Following Items in Addition to the Items for Very Low and Low Seismicity)			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the elastic moment (F_yS) of the adjoining members.	5.5.2.2.1	A.3.1.3.4
Diaphragms			
[✓ C] NC N/A U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7

continues

Table 17-13 *(Continued)*. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
[✓ C] NC N/A U	ROOF PANELS: Where considered as diaphragm elements for lateral resistance, metal, plastic, or cementitious roof panels are positively attached to the roof framing to resist seismic forces.	5.7.5	A.5.5.1
[✓ C] NC N/A U	WALL PANELS: Where considered as shear elements for lateral resistance, metal, fiberglass, or cementitious wall panels are positively attached to the framing and foundation to resist seismic forces.	5.7.5	A.5.5.2
High Seismicity (Complete the Following Items in Addition to the Items for Low and Moderate Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the strength of the adjoining members or panel zones.	5.5.2.2.1	A.3.1.3.4
[✓ C] NC N/A U	COMPACT MEMBERS: All frame elements meet compact section requirements in accordance with AISC 360, Table B4.1.	5.5.2.2.4	A.3.1.3.8
[✓ C] NC N/A U	BEAM PENETRATIONS: All openings in frame-beam webs are less than one quarter of the beam depth and are located in the center half of the beams.	5.5.2.2.5	A.3.1.3.9
[✓ C] NC N/A U	OUT-OF-PLANE BRACING: Beam–column joints are braced out of plane.	5.5.2.2.7	A.3.1.3.11
C NC [✓ N/A] U	BOTTOM FLANGE BRACING: The bottom flanges of beams are braced out of plane.	5.5.2.2.8	A.3.1.3.12
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames, and the connections are able to develop the lesser of the strength of the frames or the diaphragms.	5.7.2	A.5.2.2
C NC [✓ N/A] U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation, and the anchorage is able to develop the least of the following: the tensile capacity of the column, the tensile capacity of the lowest level column splice (if any), or the uplift capacity of the foundation.	5.7.3.1	A.5.3.1
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the seismic forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Wildwood Reservoir (1998)

Table 17-25. Immediate Occupancy Structural Checklist for Building Types C2 and C2a

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	COMPLETE FRAMES: Steel or concrete frames classified as secondary components form a complete vertical-load-carrying system.	5.5.2.5.1	A.3.1.6.1
[✓ C] NC N/A U	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2.	5.5.1.1	A.3.2.1.1
[✓ C] NC N/A U	SHEAR STRESS CHECK: The shear stress in the concrete shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than the greater of 100 lb/in.^{2} (0.69 MPa) or $2\sqrt{f'_c}$.	5.5.3.1.1	A.3.2.2.1
[✓ C] NC N/A U	REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area is not less than 0.0012 in the vertical direction and 0.0020 in the horizontal direction. The spacing of reinforcing steel is equal to or less than 18 in. (457 mm).	5.5.3.1.3	A.3.2.2.2
Connections			
C NC [✓ N/A] U	WALL ANCHORAGE AT FLEXIBLE DIAPHRAGMS: Exterior concrete or masonry walls that are dependent on flexible diaphragms for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1
[✓ C] NC N/A U	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of loads to the shear walls, and the connections are able to develop the lesser of the shear strength of the walls or diaphragms.	5.7.2	A.5.2.1
[✓ C] NC N/A U	FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation, and the dowels are able to develop the lesser of the strength of the walls or the uplift capacity of the foundation.	5.7.3.4	A.5.3.5
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4
Low, Moderate, and High Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	DEFLECTION COMPATIBILITY: Secondary components have the shear capacity to develop the flexural strength of the components and are compliant with the following items in Table 17-23: COLUMN-BAR SPLICES, BEAM-BAR SPLICES, COLUMN-TIE SPACING, STIRRUP SPACING, and STIRRUP AND TIE HOOKS.	5.5.2.5.2	A.3.1.6.2
[✓ C] NC N/A U	FLAT SLABS: Flat slabs or plates not part of seismic-force-resisting system have continuous bottom steel through the column joints.	5.5.2.5.3	A.3.1.6.3
C NC [✓ N/A] U	COUPLING BEAMS: The ends of both walls to which the coupling beam is attached are supported at each end to resist vertical loads caused by overturning. Coupling beams have the capacity in shear to develop the uplift capacity of the adjacent wall.	5.5.3.2.1	A.3.2.2.3
[✓ C] NC N/A U	OVERTURNING: All shear walls have aspect ratios less than 4-to-1. Wall piers need not be considered.	5.5.3.1.4	A.3.2.2.4
C NC [✓ N/A] U	CONFINEMENT REINFORCING: For shear walls with aspect ratios greater than 2-to-1, the boundary elements are confined with spirals or ties with spacing less than $8d_b$.	5.5.3.2.2	A.3.2.2.5
[✓ C] NC N/A U	WALL REINFORCING AT OPENINGS: There is added trim reinforcement around all wall openings with a dimension greater than three times the thickness of the wall.	5.5.3.1.5	A.3.2.2.6
[✓ C] NC N/A U	WALL THICKNESS: Thicknesses of bearing walls are not less than 1/25 the unsupported height or length, whichever is shorter, nor less than 4 in. (101 mm).	5.5.3.1.2	A.3.2.2.7

continues

Table 17-25 *(Continued)*. Immediate Occupancy Structural Checklist for Building Types C2 and C2a

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Diaphragms (Stiff or Flexible)			
[✓ C] NC N/A U	DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints.	5.6.1.1	A.4.1.1
[✓ C] NC N/A U	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 15% of the wall length.	5.6.1.3	A.4.1.4
C NC [✓ N/A] U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
Flexible Diaphragms			
C NC [✓ N/A] U	CROSS TIES: There are continuous cross ties between diaphragm chords.	5.6.1.2	A.4.1.2
C NC [✓ N/A] U	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered.	5.6.2	A.4.2.1
C NC [✓ N/A] U	SPANS: All wood diaphragms with spans greater than 12 ft (3.6 m) consist of wood structural panels or diagonal sheathing.	5.6.2	A.4.2.2
C NC [✓ N/A] U	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft (9.2 m) and aspect ratios less than or equal to 3-to-1.	5.6.2	A.4.2.3
C NC [✓ N/A] U	NONCONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete consist of horizontal spans of less than 40 ft (12.2 m) and have aspect ratios less than 4-to-1.	5.6.3	A.4.3.1
C NC [✓ N/A] U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
C NC [✓ N/A] U	UPLIFT AT PILE CAPS: Pile caps have top reinforcement, and piles are anchored to the pile caps; the pile cap reinforcement and pile anchorage are able to develop the tensile capacity of the piles.	5.7.3.5	A.5.3.8

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Valley View Reservoir (~1983)

Table 17-13. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low and Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	BRACE AXIAL STRESS CHECK: The axial stress in the diagonals, calculated using the Quick Check procedure of Section 4.4.3.4, is less than $0.50F_y$.	5.5.4.1	A.3.3.1.2
[✓ C] NC N/A U	FLEXURAL STRESS CHECK: The average flexural stress in the moment-frame columns and beams, calculated using the Quick Check procedure of Section 4.4.3.9, is less than F_y.	5.5.2.1.2	A.3.1.3.3
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames.	5.7.2	A.5.2.2
[✓ C] NC N/A U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation.	5.7.3.1	A.5.3.1
Moderate Seismicity (Complete the Following Items in Addition to the Items for Very Low and Low Seismicity)			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the elastic moment (F_yS) of the adjoining members.	5.5.2.2.1	A.3.1.3.4
Diaphragms			
[✓ C] NC N/A U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7

continues

Table 17-13 *(Continued)*. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
[✓ C] NC N/A U	ROOF PANELS: Where considered as diaphragm elements for lateral resistance, metal, plastic, or cementitious roof panels are positively attached to the roof framing to resist seismic forces.	5.7.5	A.5.5.1
[✓ C] NC N/A U	WALL PANELS: Where considered as shear elements for lateral resistance, metal, fiberglass, or cementitious wall panels are positively attached to the framing and foundation to resist seismic forces.	5.7.5	A.5.5.2
High Seismicity (Complete the Following Items in Addition to the Items for Low and Moderate Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the strength of the adjoining members or panel zones.	5.5.2.2.1	A.3.1.3.4
[✓ C] NC N/A U	COMPACT MEMBERS: All frame elements meet compact section requirements in accordance with AISC 360, Table B4.1.	5.5.2.2.4	A.3.1.3.8
[✓ C] NC N/A U	BEAM PENETRATIONS: All openings in frame-beam webs are less than one quarter of the beam depth and are located in the center half of the beams.	5.5.2.2.5	A.3.1.3.9
[✓ C] NC N/A U	OUT-OF-PLANE BRACING: Beam–column joints are braced out of plane.	5.5.2.2.7	A.3.1.3.11
C NC [✓ N/A] U	BOTTOM FLANGE BRACING: The bottom flanges of beams are braced out of plane.	5.5.2.2.8	A.3.1.3.12
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames, and the connections are able to develop the lesser of the strength of the frames or the diaphragms.	5.7.2	A.5.2.2
C NC [✓ N/A] U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation, and the anchorage is able to develop the least of the following: the tensile capacity of the column, the tensile capacity of the lowest level column splice (if any), or the uplift capacity of the foundation.	5.7.3.1	A.5.3.1
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the seismic forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Table 17-38. Nonstructural Checklist

Status	Evaluation Statement[a,b]	Tier 2 Reference	Commentary Reference
Life Safety Systems			
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. FIRE SUPPRESSION PIPING: Fire suppression piping is anchored and braced in accordance with NFPA-13.	13.7.4	A.7.13.1
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. FLEXIBLE COUPLINGS: Fire suppression piping has flexible couplings in accordance with NFPA-13.	13.7.4	A.7.13.2
[✓ C] NC N/A U	**HR—not required; LS—LMH; PR—LMH**. EMERGENCY POWER: Equipment used to power or control Life Safety systems is anchored or braced.	13.7.7	A.7.12.1
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. STAIR AND SMOKE DUCTS: Stair pressurization and smoke control ducts are braced and have flexible connections at seismic joints.	13.7.6	A.7.14.1
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—MH**. SPRINKLER CEILING CLEARANCE: Penetrations through panelized ceilings for fire suppression devices provide clearances in accordance with NFPA-13.	13.7.4	A.7.13.3
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—LMH**. EMERGENCY LIGHTING: Emergency and egress lighting equipment is anchored or braced.	13.7.9	A.7.3.1
Hazardous Materials			
C NC [✓ N/A] U	**HR—LMH; LS—LMH; PR—LMH**. HAZARDOUS MATERIAL EQUIPMENT: Equipment mounted on vibration isolators and containing hazardous material is equipped with restraints or snubbers.	13.7.1	A.7.12.2
C [✓ NC] N/A U	**HR—LMH; LS—LMH; PR—LMH**. HAZARDOUS MATERIAL STORAGE: Breakable containers that hold hazardous material, including gas cylinders, are restrained by latched doors, shelf lips, wires, or other methods.	13.8.3	A.7.15.1
C [✓ NC] N/A U	**HR—MH; LS—MH; PR—MH**. HAZARDOUS MATERIAL DISTRIBUTION: Piping or ductwork conveying hazardous materials is braced or otherwise protected from damage that would allow hazardous material release.	13.7.3 13.7.5	A.7.13.4
C [✓ NC] N/A U	**HR—MH; LS—MH; PR—MH**. SHUTOFF VALVES: Piping containing hazardous material, including natural gas, has shutoff valves or other devices to limit spills or leaks.	13.7.3 13.7.5	A.7.13.3
C [✓ NC] N/A U	**HR—LMH; LS—LMH; PR—LMH**. FLEXIBLE COUPLINGS: Hazardous material ductwork and piping, including natural gas piping, have flexible couplings.	13.7.3 13.7.5	A.7.15.4
C [✓ NC] N/A U	**HR—MH; LS—MH; PR—MH**. PIPING OR DUCTS CROSSING SEISMIC JOINTS: Piping or ductwork carrying hazardous material that either crosses seismic joints or isolation planes or is connected to independent structures has couplings or other details to accommodate the relative seismic displacements.	13.7.3 13.7.5 13.7.6	A.7.13.6
Partitions			
C [✓ NC] N/A U	**HR—LMH; LS—LMH; PR—LMH**. UNREINFORCED MASONRY: Unreinforced masonry or hollow-clay tile partitions are braced at a spacing of at most 10 ft (3.0 m) in Low or Moderate Seismicity, or at most 6 ft (1.8 m) in High Seismicity.	13.6.2	A.7.1.1
C [✓ NC] N/A U	**HR—LMH; LS—LMH; PR—LMH**. HEAVY PARTITIONS SUPPORTED BY CEILINGS: The tops of masonry or hollow-clay tile partitions are not laterally supported by an integrated ceiling system.	13.6.2	A.7.2.1
C [✓ NC] N/A U	**HR—not required; LS—MH; PR—MH**. DRIFT: Rigid cementitious partitions are detailed to accommodate the following drift ratios: in steel moment frame, concrete moment frame, and wood frame buildings, 0.02; in other buildings, 0.005.	13.6.2	A.7.1.2
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—MH**. LIGHT PARTITIONS SUPPORTED BY CEILINGS: The tops of gypsum board partitions are not laterally supported by an integrated ceiling system.	13.6.2	A.7.2.1
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. STRUCTURAL SEPARATIONS: Partitions that cross structural separations have seismic or control joints.	13.6.2	A.7.1.3

continues

Table 17-38 *(Continued)*. Nonstructural Checklist

Status	Evaluation Statement^{a,b}	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—MH**. TOPS: The tops of ceiling-high framed or panelized partitions have lateral bracing to the structure at a spacing equal to or less than 6 ft (1.8 m).	13.6.2	A.7.1.4
Ceilings			
C NC [✓ N/A] U	**HR—H; LS—MH; PR—LMH**. SUSPENDED LATH AND PLASTER: Suspended lath and plaster ceilings have attachments that resist seismic forces for every 12 ft^2 (1.1 m^2) of area.	13.6.4	A.7.2.3
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—LMH**. SUSPENDED GYPSUM BOARD: Suspended gypsum board ceilings have attachments that resist seismic forces for every 12 ft^2 (1.1 m^2) of area.	13.6.4	A.7.2.3
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—MH**. INTEGRATED CEILINGS: Integrated suspended ceilings with continuous areas greater than 144 ft^2 (13.4 m^2) and ceilings of smaller areas that are not surrounded by restraining partitions are laterally restrained at a spacing no greater than 12 ft (3.6 m) with members attached to the structure above. Each restraint location has a minimum of four diagonal wires and compression struts, or diagonal members capable of resisting compression.	13.6.4	A.7.2.2
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—MH**. EDGE CLEARANCE: The free edges of integrated suspended ceilings with continuous areas greater than 144 ft^2 (13.4 m^2) have clearances from the enclosing wall or partition of at least the following: in Moderate Seismicity, 1/2 in. (13 mm); in High Seismicity, 3/4 in. (19 mm).	13.6.4	A.7.2.4
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. CONTINUITY ACROSS STRUCTURE JOINTS: The ceiling system does not cross any seismic joint and is not attached to multiple independent structures.	13.6.4	A.7.2.5
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—H**. EDGE SUPPORT: The free edges of integrated suspended ceilings with continuous areas greater than 144 ft^2 (13.4 m^2) are supported by closure angles or channels not less than 2 in. (51 mm) wide.	13.6.4	A.7.2.6
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. SEISMIC JOINTS: Acoustical tile or lay-in panel ceilings have seismic separation joints such that each continuous portion of the ceiling is no more than 2,500 ft^2 (232.3 m^2) and has a ratio of long-to-short dimension no more than 4-to-1.	13.6.4	A.7.2.7
Light Fixtures			
[✓ C] NC N/A U	**HR—not required; LS—MH; PR—MH**. INDEPENDENT SUPPORT: Light fixtures that weigh more per square foot than the ceiling they penetrate are supported independent of the grid ceiling suspension system by a minimum of two wires at diagonally opposite corners of each fixture.	13.6.4 13.7.9	A.7.3.2
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—H**. PENDANT SUPPORTS: Light fixtures on pendant supports are attached at a spacing equal to or less than 6 ft. Unbraced suspended fixtures are free to allow a 360-degree range of motion at an angle not less than 45 degrees from horizontal without contacting adjacent components. Alternatively, if rigidly supported and/or braced, they are free to move with the structure to which they are attached without damaging adjoining components. Additionally, the connection to the structure is capable of accommodating the movement without failure.	13.7.9	A.7.3.3
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. LENS COVERS: Lens covers on light fixtures are attached with safety devices.	13.7.9	A.7.3.4
Cladding and Glazing			
C NC [✓ N/A] U	**HR—MH; LS—MH; PR—MH**. CLADDING ANCHORS: Cladding components weighing more than 10 lb/ft^2 (0.48 kN/m^2) are mechanically anchored to the structure at a spacing equal to or less than the following: for Life Safety in Moderate Seismicity, 6 ft (1.8 m); for Life Safety in High Seismicity and for Position Retention in any seismicity, 4 ft (1.2 m)	13.6.1	A.7.4.1

continues

Table 17-38 ***(Continued)*****. Nonstructural Checklist**

Status	Evaluation Statement^{a,b}	Tier 2 Reference	Commentary Reference
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—MH**. CLADDING ISOLATION: For steel or concrete moment-frame buildings, panel connections are detailed to accommodate a story drift ratio by the use of rods attached to framing with oversize holes or slotted holes of at least the following: for Life Safety in Moderate Seismicity, 0.01; for Life Safety in High Seismicity and for Position Retention in any seismicity, 0.02, and the rods have a length-to-diameter ratio of 4.0 or less.	13.6.1	A.7.4.3
C NC [✓ N/A] U	**HR—MH; LS—MH; PR—MH**. MULTI-STORY PANELS: For multi-story panels attached at more than one floor level, panel connections are detailed to accommodate a story drift ratio by the use of rods attached to framing with oversize holes or slotted holes of at least the following: for Life Safety in Moderate Seismicity, 0.01; for Life Safety in High Seismicity and for Position Retention in any seismicity, 0.02, and the rods have a length-to-diameter ratio of 4.0 or less.	13.6.1	A.7.4.4
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—MH**. THREADED RODS: Threaded rods for panel connections detailed to accommodate drift by bending of the rod have a length-to-diameter ratio greater than 0.06 times the story height in inches for Life Safety in Moderate Seismicity and 0.12 times the story height in inches for Life Safety in High Seismicity and Position Retention in any seismicity.	13.6.1	A.7.4.9
C NC [✓ N/A] U	**HR—MH; LS—MH; PR—MH**. PANEL CONNECTIONS: Cladding panels are anchored out of plane with a minimum number of connections for each wall panel, as follows: for Life Safety in Moderate Seismicity, 2 connections; for Life Safety in High Seismicity and for Position Retention in any seismicity, 4 connections.	13.6.1.4	A.7.4.5
C NC [✓ N/A] U	**HR—MH; LS—MH; PR—MH**. BEARING CONNECTIONS: Where bearing connections are used, there is a minimum of two bearing connections for each cladding panel.	13.6.1.4	A.7.4.6
C NC [✓ N/A] U	**HR—MH; LS—MH; PR—MH**. INSERTS: Where concrete cladding components use inserts, the inserts have positive anchorage or are anchored to reinforcing steel.	13.6.1.4	A.7.4.7
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—MH**. OVERHEAD GLAZING: Glazing panes of any size in curtain walls and individual interior or exterior panes more than 16 ft^2 (1.5 m^2) in area are laminated annealed or laminated heat-strengthened glass and are detailed to remain in the frame when cracked.	13.6.1.5	A.7.4.8
Masonry Veneer			
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. TIES: Masonry veneer is connected to the backup with corrosion-resistant ties. There is a minimum of one tie for every 2-2/3 ft^2 (0.25 m^2), and the ties have spacing no greater than the following: for Life Safety in Low or Moderate Seismicity, 36 in. (914 mm); for Life Safety in High Seismicity and for Position Retention in any seismicity, 24 in. (610 mm).	13.6.1.2	A.7.5.1
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. SHELF ANGLES: Masonry veneer is supported by shelf angles or other elements at each floor above the ground floor.	13.6.1.2	A.7.5.2
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. WEAKENED PLANES: Masonry veneer is anchored to the backup adjacent to weakened planes, such as at the locations of flashing.	13.6.1.2	A.7.5.3
C NC [✓ N/A] U	**HR—LMH; LS—LMH; PR—LMH**. UNREINFORCED MASONRY BACKUP: There is no unreinforced masonry backup.	13.6.1.1 13.6.1.2	A.7.7.2
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—MH**. STUD TRACKS: For veneer with cold-formed steel stud backup, stud tracks are fastened to the structure at a spacing equal to or less than 24 in. (610 mm) on center.	13.6.1.1 13.6.1.2	A.7.6.1

continues

Table 17-38 *(Continued)*. Nonstructural Checklist

Status	Evaluation Statement[a,b]	Tier 2 Reference	Commentary Reference
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—MH**. ANCHORAGE: For veneer with concrete block or masonry backup, the backup is positively anchored to the structure at a horizontal spacing equal to or less than 4 ft along the floors and roof.	13.6.1.1 13.6.1.2	A.7.7.1
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. WEEP HOLES: In veneer anchored to stud walls, the veneer has functioning weep holes and base flashing.	13.6.1.2	A.7.5.6
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. OPENINGS: For veneer with cold-formed-steel stud backup, steel studs frame window and door openings.	13.6.1.1 13.6.1.2	A.7.6.2
Parapets, Cornices, Ornamentation, and Appendages			
C [✓ NC] N/A U	**HR—LMH; LS—LMH; PR—LMH**. URM PARAPETS OR CORNICES: Laterally unsupported unreinforced masonry parapets or cornices have height-to-thickness ratios no greater than the following: for Life Safety in Low or Moderate Seismicity, 2.5; for Life Safety in High Seismicity and for Position Retention in any seismicity, 1.5.	13.6.5	A.7.8.1
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. CANOPIES: Canopies at building exits are anchored to the structure at a spacing no greater than the following: for Life Safety in Low or Moderate Seismicity, 10 ft (3.0 m); for Life Safety in High Seismicity and for Position Retention in any seismicity, 6 ft (1.8 m).	13.6.6	A.7.8.2
C NC [✓ N/A] U	**HR—H; LS—MH; PR—LMH**. CONCRETE PARAPETS: Concrete parapets with height-to-thickness ratios greater than 2.5 have vertical reinforcement.	13.6.5	A.7.8.3
C NC [✓ N/A] U	**HR—MH; LS—MH; PR—LMH**. APPENDAGES: Cornices, parapets, signs, and other ornamentation or appendages that extend above the highest point of anchorage to the structure or cantilever from components are reinforced and anchored to the structural system at a spacing equal to or less than 6 ft (1.8 m). This evaluation statement item does not apply to parapets or cornices covered by other evaluation statements.	13.6.6	A.7.8.4
Masonry Chimneys			
C NC [✓ N/A] U	**HR—LMH; LS—LMH; PR—LMH**. URM CHIMNEYS: Unreinforced masonry chimneys extend above the roof surface no more than the following: for Life Safety in Low or Moderate Seismicity, 3 times the least dimension of the chimney; for Life Safety in High Seismicity and for Position Retention in any seismicity, 2 times the least dimension of the chimney.	13.6.7	A.7.9.1
C NC [✓ N/A] U	**HR—LMH; LS—LMH; PR—LMH**. ANCHORAGE: Masonry chimneys are anchored at each floor level, at the topmost ceiling level, and at the roof.	13.6.7	A.7.9.2
Stairs			
C [✓ NC] N/A U	**HR—not required; LS—LMH; PR—LMH**. STAIR ENCLOSURES: Hollow-clay tile or unreinforced masonry walls around stair enclosures are restrained out of plane and have height-to-thickness ratios not greater than the following: for Life Safety in Low or Moderate Seismicity, 15-to-1; for Life Safety in High Seismicity and for Position Retention in any seismicity, 12-to-1.	13.6.2 13.6.8	A.7.10.1
[✓ C] NC N/A U	**HR—not required; LS—LMH; PR—LMH**. STAIR DETAILS: The connection between the stairs and the structure does not rely on post-installed anchors in concrete or masonry, and the stair details are capable of accommodating the drift calculated using the Quick Check procedure of Section 4.4.3.1 for moment-frame structures or 0.5 in. for all other structures without including any lateral stiffness contribution from the stairs.	13.6.8	A.7.10.2
Contents and Furnishings			
C [✓ NC] N/A U	**HR—LMH; LS—MH; PR—MH**. INDUSTRIAL STORAGE RACKS: Industrial storage racks or pallet racks more than 12 ft high meet the requirements of ANSI/RMI MH 16.1 as modified by ASCE 7, Chapter 15.	13.8.1	A.7.11.1

continues

Table 17-38 *(Continued)*. Nonstructural Checklist

Status	Evaluation Statement^{a,b}	Tier 2 Reference	Commentary Reference
C [✓ NC] N/A U	**HR—not required; LS—H; PR—MH**. TALL NARROW CONTENTS: Contents more than 6 ft (1.8 m) high with a height-to-depth or height-to-width ratio greater than 3-to-1 are anchored to the structure or to each other.	13.8.2	A.7.11.2
C [✓ NC] N/A U	**HR—not required; LS—H; PR—H**. FALL-PRONE CONTENTS: Equipment, stored items, or other contents weighing more than 20 lb (9.1 kg) whose center of mass is more than 4 ft (1.2 m) above the adjacent floor level are braced or otherwise restrained.	13.8.2	A.7.11.3
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. ACCESS FLOORS: Access floors more than 9 in. (229 mm) high are braced.	13.6.10	A.7.11.4
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. EQUIPMENT ON ACCESS FLOORS: Equipment and other contents supported by access floor systems are anchored or braced to the structure independent of the access floor.	13.7.7 13.6.10	A.7.11.5
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. SUSPENDED CONTENTS: Items suspended without lateral bracing are free to swing from or move with the structure from which they are suspended without damaging themselves or adjoining components.	13.8.2	A.7.11.6
Mechanical and Electrical Equipment			
C [✓ NC] N/A U	**HR—not required; LS—H; PR—H**. FALL-PRONE EQUIPMENT: Equipment weighing more than 20 lb (9.1 kg) whose center of mass is more than 4 ft (1.2 m) above the adjacent floor level, and which is not in-line equipment, is braced.	13.7.1 13.7.7	A.7.12.4
C [✓ NC] N/A U	**HR—not required; LS—H; PR—H**. IN-LINE EQUIPMENT: Equipment installed in line with a duct or piping system, with an operating weight more than 75 lb (34.0 kg), is supported and laterally braced independent of the duct or piping system.	13.7.1	A.7.12.5
C [✓ NC] N/A U	**HR—not required; LS—H; PR—MH**. TALL NARROW EQUIPMENT: Equipment more than 6 ft (1.8 m) high with a height-to-depth or height-to-width ratio greater than 3-to-1 is anchored to the floor slab or adjacent structural walls.	13.7.1 13.7.7	A.7.12.6
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. MECHANICAL DOORS: Mechanically operated doors are detailed to operate at a story drift ratio of 0.01.	13.6.9	A.7.12.7
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. SUSPENDED EQUIPMENT: Equipment suspended without lateral bracing is free to swing from or move with the structure from which it is suspended without damaging itself or adjoining components.	13.7.1 13.7.7	A.7.12.8
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. VIBRATION ISOLATORS: Equipment mounted on vibration isolators is equipped with horizontal restraints or snubbers and with vertical restraints to resist overturning.	13.7.1	A.7.12.9
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. HEAVY EQUIPMENT: Floor-supported or platform-supported equipment weighing more than 400 lb (181.4 kg) is anchored to the structure.	13.7.1 13.7.7	A.7.12.10
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. ELECTRICAL EQUIPMENT: Electrical equipment is laterally braced to the structure.	13.7.7	A.7.12.11
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. CONDUIT COUPLINGS: Conduit greater than 2.5 in. (64 mm) trade size that is attached to panels, cabinets, or other equipment and is subject to relative seismic displacement has flexible couplings or connections.	13.7.8	A.7.12.12
Piping			
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. FLEXIBLE COUPLINGS: Fluid and gas piping has flexible couplings.	13.7.3 13.7.5	A.7.13.2

continues

Table 17-38 *(Continued)*. Nonstructural Checklist

Status	Evaluation Statement^{a,b}	Tier 2 Reference	Commentary Reference
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. FLUID AND GAS PIPING: Fluid and gas piping is anchored and braced to the structure to limit spills or leaks.	13.7.3 13.7.5	A.7.13.4
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. C-CLAMPS: One-sided C-clamps that support piping larger than 2.5 in. (64 mm) in diameter are restrained.	13.7.3 13.7.5	A.7.13.5
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. PIPING CROSSING SEISMIC JOINTS: Piping that crosses seismic joints or isolation planes or is connected to independent structures has couplings or other details to accommodate the relative seismic displacements.	13.7.3 13.7.5	A.7.13.6
Ducts			
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—H**. DUCT BRACING: Rectangular ductwork larger than 6 ft^2 (0.56 m^2) in cross-sectional area and round ducts larger than 28 in. (711 mm) in diameter are braced. The maximum spacing of transverse bracing does not exceed 30 ft (9.2 m). The maximum spacing of longitudinal bracing does not exceed 60 ft (18.3 m).	13.7.6	A.7.14.2
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—H**. DUCT SUPPORT: Ducts are not supported by piping or electrical conduit.	13.7.6	A.7.14.3
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. DUCTS CROSSING SEISMIC JOINTS: Ducts that cross seismic joints or isolation planes or are connected to independent structures have couplings or other details to accommodate the relative seismic displacements.	13.7.6	A.7.14.4
Elevators			
C NC [✓ N/A] U	**HR—not required; LS—H; PR—H**. RETAINER GUARDS: Sheaves and drums have cable retainer guards.	13.7.11	A.7.16.1
C NC [✓ N/A] U	**HR—not required; LS—H; PR—H**. RETAINER PLATE: A retainer plate is present at the top and bottom of both car and counterweight.	13.7.11	A.7.16.2
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. ELEVATOR EQUIPMENT: Equipment, piping, and other components that are part of the elevator system are anchored.	13.7.11	A.7.16.3
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. SEISMIC SWITCH: Elevators capable of operating at speeds of 150 ft/min (0.30 m/min) or faster are equipped with seismic switches that meet the requirements of ASME A17.1 or have trigger levels set to 20% of the acceleration of gravity at the base of the structure and 50% of the acceleration of gravity in other locations.	13.7.11	A.7.16.4
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. SHAFT WALLS: Elevator shaft walls are anchored and reinforced to prevent toppling into the shaft during strong shaking.	13.7.11	A.7.16.5
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. COUNTERWEIGHT RAILS: All counterweight rails and divider beams are sized in accordance with ASME A17.1.	13.7.11	A.7.16.6
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. BRACKETS: The brackets that tie the car rails and the counterweight rail to the structure are sized in accordance with ASME A17.1.	13.7.11	A.7.16.7
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. SPREADER BRACKET: Spreader brackets are not used to resist seismic forces.	13.7.11	A.7.16.8
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. GO-SLOW ELEVATORS: The building has a go-slow elevator system.	13.7.11	A.7.16.9

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.
[a] Performance Level: HR = Hazards Reduced, LS = Life Safety, and PR = Position Retention.
[b] Level of Seismicity: L = Low, M = Moderate, and H = High.

Appendix C

Condition Assessment Photos

4.2 Condition Assessment – Civil Photos

	
Photo 4-2-1 **34th St - Flow Meter Vault – Hatch Corrosion**	**Photo 4-2-2** **34th St - Flow Meter Vault – Standing Water**
	
Photo 4-2-3 **Broadway – Valve Vault - FRP Hatch**	**Photo 4-2-4** **Broadway – Flow Meter Vault – Standing Water**

	
Photo 4-2-5 **Maple St – Reservoir Vault - Hatch & Ladder Corrosion**	**Photo 4-2-6** **North Albany – Valve Vault – FRP Hatch**
	
Photo 4-2-7 **North Albany - Flow Meter Vault – Mud on Floor**	**Photo 4-2-8** **Vine St - RWPS Valve Vault – Wood Lid**

	
Photo 4-2-9 **Vine St – RWPS Meter Vault – Standing Water**	**Photo 4-2-10** **Vine St – RWPS Valve Vault – Made of CMU**
	
	Photo 4-2-12 **A&M WTP – Millersburg Meter Vault – Standing Water**
	
Photo 4-2-11 **A&M WTP – Albany Meter Vault – Standing Water**	**Photo 4-2-13** **A&M WTP – ACH & Metering Vault – Standing Water**

4.3 Condition Assessment – Structural Photos

	
Photo 4-3-1 **General – Brace & Anchor Egress Lighting**	**Photo 4-3-2** **General – Brace/Secure Hazardous Materials**
	
Photo 4-3-3 **General – Provide Shut Off Valves & Flexible Couplings**	**Photo 4-3-4** **General – Provide Flexible Connections for Items Spanning Between Structures**
	
Photo 4-3-5 **General – Provide Lens Covers & Safety Clips**	**Photo 4-3-6** **General – Brace & Anchor Tall Narrow Equipment**

Photo 4-3-7

A&M WTP – Clear Gutters, Clean & Seal CMU Wall

Photo 4-3-8

A&M WTP – Remove Rust & Recoat Metal

Photo 4-3-9

A&M WTP – Coat Exposed Aggregate in Neutralization Basin

Photo 4-3-10

Vine WTP – Raw Water Intake Pump Station

Photo 4-3-11

Vine WTP – Raw Water Hydroelectric Building

Photo 4-3-12

Vine WTP – Control/ Chemical Storage Building

Photo 4-3-13

Vine WTP – Acceletor 1

Photo 4-3-14

Vine WTP – Acceletor 2

Photo 4-3-15

Vine WTP – Soda Ash Building

Photo 4-3-16

Vine WTP – Filters 1-6 Building

Photo 4-3-17

Vine WTP – Filters 1-10

Photo 4-3-18

Maple Reservoir

	
Photo 4-3-19 **Maple Pump Station**	**Photo 4-3-20** **34th Street Reservoir**
	
Photo 4-3-21 **Queen & Hill Reservoir**	**Photo 4-3-22** **Wildwood Reservoir**
	
Photo 4-3-23 **34th Street Pump Station**	**Photo 4-3-24** **Gibson Hill Pump Station**

	
Photo 4-3-25 **North Albany Pump Station**	**Photo 4-3-26** **Queen & Hill Pump Station**
	
Photo 4-3-27 **Valley View Reservoir**	**Photo 4-3-28** **Valley View Pump Station**
	
Photo 4-3-29 **Gibson Hill Pump Station Exterior Vault**	**Photo 4-3-30** **North Albany Pump Station**

	
Photo 4-3-31 **North Albany Pump Station**	**Photo 4-3-32** **Broadway Reservoir**
	
Photo 4-3-33 **Valley View Reservoir**	**Photo 4-3-34** **Valley View Reservoir**

	
Photo 4-3-35 **Wildwood Reservoir**	**Photo 4-3-36** **Maple Street Reservoir**
	
Photo 4-3-37 **34th Street Reservoir**	**Photo 4-3-38** **WPT2 (A&M) Reservoir**

4.4 Condition Assessment – Mechanical Photos

	
Photo 4-4-1 **34th St PS- Piping - Add Pipe Supports**	**Photo 4-4-2** **Broadway – Valve Vault – Rusty Piping**
	
Photo 4-4-3 **Gibson Hill – Flow Meter Vault – Rusty Piping**	**Photo 4-4-4** **Gibson Hill – Valve – Rust & Bolts**

	
Photo 4-4-5 **Maple PS – Pipe - Coating Damage**	**Photo 4-4-6** **Maple PS – Reservoir – Worn Coating**
	
Photo 4-4-7 **Maple – Valve Vault – Rusty Piping**	

Photo 4-4-8
North Albany – Exterior PS Piping – Chipped Coating

Photo 4-4-9
North Albany – Valve Vault – Rusty Piping

Photo 4-4-10
Queen Ave – Reservoir Paint Chipping

Photo 4-4-11
Queen Ave Reservoir – Rusty Piping

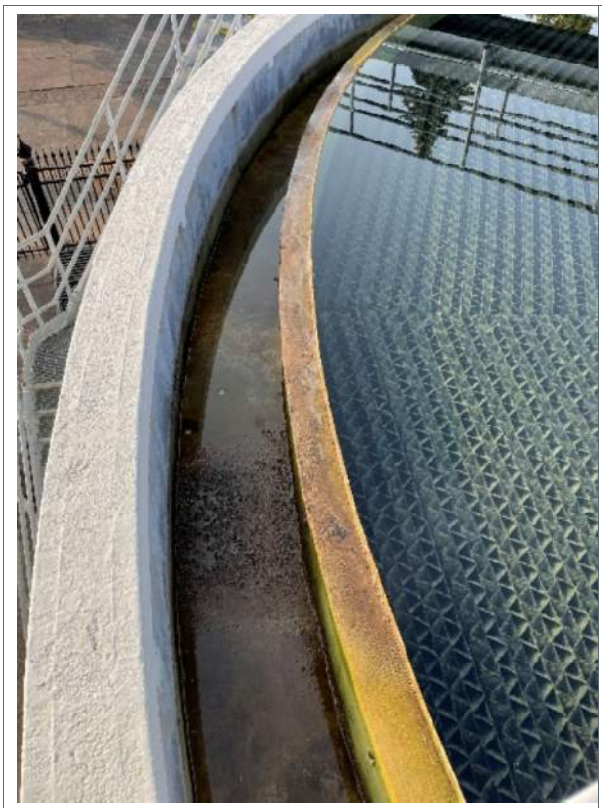


Photo 4-4-12
Vine St – Accelerator Launder

Photo 4-4-13
Vine St – RW Pump Station – Pipe Coating Aged

Photo 4-4-14
Vine St – Backwash Pump – Cracked Concrete Base

Photo 4-4-15
Vine St – Splitter Box - Rust

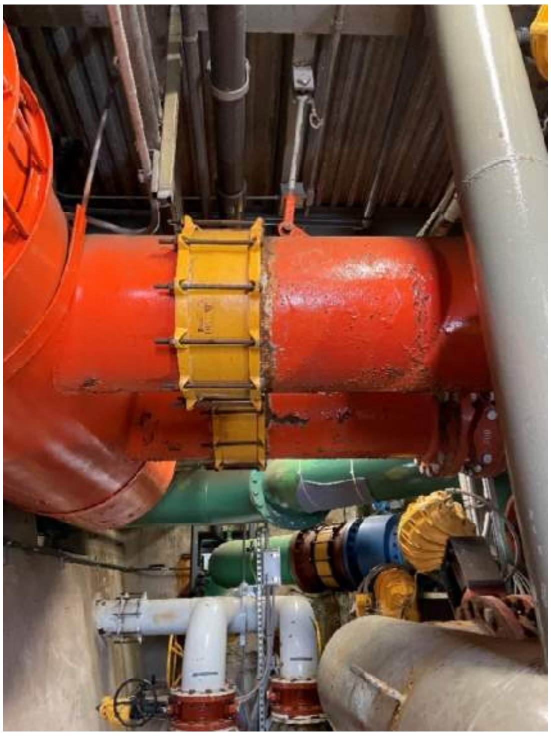
	
Photo 4-4-16 **Vine St – Pipe Gallery – Corrosion & Rust**	**Photo 4-4-17** **Vine St – Pipe Gallery – Corrosion & Rust**
	
Photo 4-4-18 **Vine St – Pipe Gallery – Corrosion & Rust**	**Photo 4-4-19** **Vine St – Pipe Gallery – Corrosion & Rust**

Photo 4-4-20
Vine St – FWPS Pipe Gallery – Corrosion & Rust

Photo 4-4-21
Vine St – RW Screen – Rust

Photo 4-4-22
Vine St –Chemical Injection Vault – Rusty Piping

Photo 4-4-23
A&M WTP – RW Intake – Sand Clasifier Augers

Photo 4-4-24

A&M WTP – Filtrate Flow Meter - Rust

Photo 4-4-25

A&M - Albany Metering Vault – Rusty Piping

Photo 4-4-26

A&M Intake Structure – Piping Discoloration

Photo 4-4-27

A&M WTP – Strainers – Rusty Disimilar Metals

4.5 Condition Assessment – Electrical & I&C Photos

Photo 4-5-1
Broadway - Ultrasonic Level Sensor

Photo 4-5-2
Broadway - Telemetry Panel

Photo 4-5-3
Broadway - Water Quality Panel

Photo 4-5-4
Queen Ave – Level Sensor Pilot Line

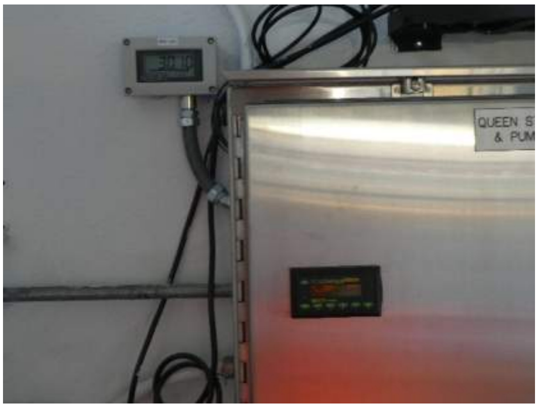


Photo 4-5-5
Queen Ave – SCADAPack Vision

Photo 4-5-6
Queen Ave – MCC NEMA 4

Photo 4-5-7
Queen Ave – Utility Service

Photo 4-5-8
Valley View – Original 100A Service

Photo 4-5-9

Valley View – Level Sensor without Heat Trace

Photo 4-5-10

Wildwood – Level Sensor Transmitter

Photo 4-5-11

Wildwood – SCADAPack 32

Photo 4-5-12

WTP(A&M) – Supernatant Wetwell Level Transmitters

4.6 Performance Assessment Photos

	
Photo 4-6-1 **Wildwood – Ultrasonic Flow Meter**	**Photo 4-6-2** **A&M Intake PS – Low Level Valve**
	
Photo 4-6-3 **A&M WTP – Membranes – Plast Blue Pools**	**Photo 4-6-4** **A&M WTP - Neutralization Basin – Outdoor Pumps**

	
Photo 4-6-5 **A&M WTP – Membrane - Hoses**	**Photo 4-6-6** **Vine St - Chemical Room – Add tank anchorage and MSDS**
	
Photo 4-6-7 **Valley View PS – Bladder Tank**	**Photo 4-6-8** **A&M WTP – CIP Tank**

Appendix D

Condition Assessment Electrical Site Forms

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Broadway Reservoir
Address	1501 Broadway St. NW
Date	10/20/22
Time	8:10 am
Consultant Staff	Banyai, Cook, Harper, Drath, Goffe
Owner Staff	Jeff, Scott, Dan
Year Constructed	1992

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer	Pole		
Pwr Provider	PacifiCorp		
Meter #	78 164 831		

Additional: Meter under weather cover.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
Panelboard			
	Voltage	Amps	AIC Rating
	240/120V	40A	10kAIC

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Generator

	Manufacturer	Serial No.	Job # / Date
Generator			
	Voltage	Amps	KW/KVA

Fuel: ☐ Gas/LP ☐ Diesel

☐ Size/Location:______________________________________

Main Breaker: ☐ Size:___________ ___________________________________

Load Bank Connection: ☐ Yes ☐ No

Type:____

Portable Connection: ☐ Yes ☐ No

Type:____

Arc Flash Label: ☐ Yes ☐ No

☐ Year Conducted:___________________________________

Additional: N/A

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Automatic Transfer Switch

	Manufacturer	Serial No.	Job # / Date
ATS			
	Amps	PM	SPD

Arc Flash Label: ☐ Yes ☐ No

Year Conducted:	
Company & Tel #:	

Additional: N/A

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
MCC			
	Sections		

Arc Flash Label: ☐ Yes ☐ No

Year Conducted:	
Company & Tel #:	

Additional: N/A

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Motor Starters

	Outlet MOV		
HP Size	Unknown		
Condition	Excellent		
Starter Type: VFD/SS/FS	FVR		
Amps/NEMA size:	~20A		
Install Date	Recent		
Other remarks	Beck Actuator		

Additional: Outlet valve actuator recently replaced.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Power Panel

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	It appears that the original panelboard was removed From the Power & RTU panel and replaced with DIN rail mounted circuit breakers when rebuilt. No record copies of the RTU panel rebuild were reviewed The rebuilt RTU panel looks neat and professional.
Panelboard Schedule accurate	☒ Y ☐ N	
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location		Inside Power and RTU panel.
XFMR Size	10kVA	Service transformer
Panelboard Size	40A	From original Power and RTU Panel design drawings.

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Additional: This panel is the ‘service entrance’. Arc flash labeling needed as required by OSHA §1910.269 Appendix E.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	UPS in bottom of panel
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	Allen-Bradley CompactLogix
Current OI	☐ Y ☐ N	N/A
Backup Controls	☐ Y ☒ N	
Copy of Drawings & Program	☐ Y ☒ N	
Telemetry	☒ Y ☐ N	Cal-Amp Viper SC+400 450MHz licensed data radio

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Water Quality Panels

Criteria		Comments
Standalone	☒ Y ☐ N	Two panels, side-by-side. One panel with the
Backup RTU Power	☐ Y ☒ N	Instruments, the other with the remote I/O.
Clean Installation	☐ Y ☒ N	See additional comments below
Current PLC	☒ Y ☐ N	Allen-Bradley Point I/O (Remote I/O rack)
Current OI	☐ Y ☒ N	
Backup Controls	☒ Y ☐ N	
Copy of Drawings & Program	☒ Y ☐ N	As-built of recent rebuild not provided by client.

Additional: Instrument enclosure is, frankly, a mess of spare parts, a loose squirrel cage fan, dangling cables and signs of extensive corrosion in the bottom of the panel. The I/O panel is neat and clean, also with a loose squirrel cage fan and moderate signs of corrosion at the bottom of the panel.

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☐ Y ☒ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	
Wires protected by OCPD	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	

Criteria		Comments
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☐ Y ☒ N	I did not see a ground wire connected to panel doors

Additional: Enclosures are all weather-sheltered. Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		Squirrel-cage fans loose in bottom of cabinets.
Local utility receptacle	☒ Y ☐ N	

Auxiliary Control Facilities – Sump Pumps - Electrical

Criteria		Comments
Padlockable disconnect	☐ Y ☒ N	Cord-and-Plug

Additional: N/A

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Instruments

	Manufacturer	Serial No.	Type
Level Xmtr A	Endress+Hauser		Hydrostatic Pressure
	Range	**Note**	**Tagname**
	0-40 ft	Xmtr in I/O panel	
Level Xmtr B	Siemens	030305170VU	Ultrasonic
	Range	**Note**	**Tagname**
	0-40 ft	MultiRanger 200	
Water Quality	Hach		
	Range	**Note**	**Tagname**

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

		Turb, pH, Cl, Cond	
Level Panel *			
	Range	**Note**	**Tagname**
Flow Xmtr	Endress+Hauser	HA010716000	Magnetic
	Range	**Note**	**Tagname**
		Xmtr in RTU panel	
Pressure Xmtr			
	Range	**Note**	**Tagname**
Level Switch	Float		LSH

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

<u>Facility Assessment – Electrical</u>

Security Systems: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Receptacles - Interior: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A
Receptacles - Exterior: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Interior Security Lighting: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Exterior Security Lighting ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A
Alarm Systems: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A Hatch/Door switches
Other: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A

<u>Safety Issues</u>

☐ Exposed Busing
☐ Unlanded wires
☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E
☐ Broken/Damaged equipment
☐ Inadequate working space
☐ Issues with rated equipment, panels, receptacles, lights, etc
☐ Disconnecting means
☐ Other Code issues
☐ Confined space/NFPA issues
☒ Other: Heat tracing/insulation in poor condition. Recommend permanent installation.

Other Electrical Issues: <u>No arc flash warning labels.</u>____

Comments:____
____
____

<u>Rating Criteria</u>

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Valley View Pump Station and Reservoir
Address	3240 Valley View Dr. NW
Date	10/20/22
Time	8:40am
Consultant Staff	Banyai, Cook, Harper, Drath, Goffe
Owner Staff	Jeff, Scott, Dan
Year Constructed	Tanks: Bef. 1982, Pump Station: 2006, Seismic: 2012

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer	Pole		<= 50kVA
Pwr Provider	PacifiCorp		
Meter #	78 171 756		

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
Service Disconnect	Square D		2006
	Voltage	Amps	AIC Rating
	120/240	400A	22kAIC

Arc Flash Label: ☐ Yes ☒ No

Year Conducted: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Company & Tel #:

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Generator

	Manufacturer	Serial No.	Job # / Date
Generator	Cummins DGCB	C070039846	2007
	Voltage	Amps	KW/KVA
	120/240	400A	60kW/75kVA

Fuel: ☐ Gas/LP ☒ Diesel

☐ Size/Location: Base tank

Main Breaker: ☒

Size: 400A

Load Bank Connection: ☒ Yes ☒ No

Type:

Portable Connection: ☐ Yes ☒ No

Type:

Arc Flash Label: ☐ Yes ☒ No

☐ Year Conducted: Labeling required by OSHA §1910.269 Appendix E

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Automatic Transfer Switch

	Manufacturer	Serial No.	Job # / Date
ATS	Thomson Tech		2006/2007
	Amps	PM	SPD
	400A		

Arc Flash Label: ☒ Yes ☐ No

Year Conducted:	Arc flash label out of date. Must be updated every 5 years per NFPA 70E
Company & Tel #:	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
Starters & Drives inside RTU panel	C-H / A-B		2007
	Sections		
	1 FVNR / 2 VFDs	CN15DN3/Powerflex 70	

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Motor Starters

	Jockey Pump	**Pump 2**	**Pump 3**
HP Size	3 hp	7.5 hp	7.5 hp
Condition	Excellent	Excellent	Excellent
Starter Type: VFD/SS/FS	FVNR C-H CN15DN3	VFD A-B PowerFlex 70	VFD A-B PowerFlex 70
Amps/NEMA size:	NEMA 1	NEMA 1	NEMA 1
Install Date			
Other remarks	Baldor	Baldor	Baldor

	Transfer Pump		
HP Size	1.5 hp		
Condition	Good		
Starter Type: VFD/SS/FS	FVNR		
Amps/NEMA size:	NEMA 1		
Install Date			
Other remarks			

Additional: Recommend investigating short-cycling of the jockey pump. The hydropneumatic tank empties too quickly during diurnal peak flow periods. Consider enlarging the tank or add a VFD to “soft-start” the motor to reduce pump wear.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	400A service disconnect breaker inside bldg
Panelboard Schedule accurate	☒ Y ☐ N	Updated Jun 2020 by EC
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location	Inside	
XFMR Size	Service	
Panelboard Size	400A	120/240V 1 phase 22kAIC

Additional: Panelboards have out-of-date arc flash labels. Labels must be updated every 5 years per NFPA 70E.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☐ Y ☒ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☒ Y ☐ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Pump Station RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	APC UPS inside RTU and standby generator
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	Allen-Bradley ControlLogix
Current OI	☒ Y ☐ N	Allen-Bradley PanelView Plus 1000
Backup Controls	☐ Y ☐ N	
Copy of Drawings & Program	☐ Y ☒ N	
Telemetry	☐ Y ☒ N	Radio in Reservoir RTU panel

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E. Portable table interferes with opening panel door.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Reservoir RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	APC UPS inside and standby generator
Clean Installation	☐ Y ☒ N	
Current PLC	☒ Y ☐ N	Allen-Bradley CompactLogix
Current OI	☐ Y ☒ N	
Backup Controls	☐ Y ☐ N	
Copy of Drawings & Program	☐ Y ☒ N	
Telemetry	☒ Y ☐ N	Cal-Amp Viper SC+400 450MHz licensed data radio

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E. Reservoir RTU cabinet is outside under a weather shelter. Interior wiring is not as neatly laid out as other RTU panels. Panduit covers missing. Loose cooling fan should be permanently mounted and thermostat controlled.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		Unit heater, exhaust fan and ceiling mounted cooler
Local utility receptacle	☒ Y ☐ N	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Auxiliary Control Facilities – Sump Pumps - Electrical

Criteria		Comments
Padlockable disconnect	☐ Y ☐ N	No sump pump at this site.

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Instruments

	Manufacturer	Serial No.	Type
Level Xmtr A	Rosemount 3051		Hydrostatic pressure
	Range	**Note**	**Tagname**
	0-35 ft		A75156
Level Xmtr B	Rosemount 3051		Hydrostatic pressure
	Range	**Note**	**Tagname**
	0-35 ft		A75157
Level Xmtr C	Rosemount 3051		Hydrostatic pressure
	Range	**Note**	**Tagname**
	0-35 ft		A75158
Water Quality	Hach		Hydrostatic pressure
	Range	**Note**	**Tagname**
		Cl, Turb, pH, ORP, Cond	
Flow Xmtr	Endress+Hauser	91026816000	Magnetic
	Range	**Note**	**Tagname**
	500 gpm		
Pressure Xmtr	Endress+Hauser		Pressure
	Range	**Note**	**Tagname**
		Suction/Discharge	
Level Switch			

Additional: Low suction, low-low and high-high discharge pressure switches. FIT/FE inside building.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A Access keypad
Receptacles - Interior: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A
Receptacles - Exterior: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ N/A
Interior Security Lighting: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Exterior Security Lighting ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ N/A
Alarm Systems ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A Door/Hatch Switches
Other: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A

Safety Issues

☐ Exposed Busing
☒ Unlanded wires: Old 100A meter and panelboard outside pump building with wires hanging out.
☒ No/Out of date Arc Flash Labels
☐ Broken/Damaged equipment
☐ Inadequate working space
☐ Issues with rated equipment, panels, receptacles, lights, etc

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

☐ Disconnecting means
☐ Other Code issues
☐ Confined space/NFPA issues
☐ Other: ____

Other Electrical Issues: Exposed ground conductor from handhole to tank. “Temporary” heat tracing around exterior valves and piping should be permanently installed and properly insulated. Over long extension cords from underground handhole receptacles, running open across the gravel to valves and piping is unsafe.

Comments: Recommend complete removal of original 100A meter base and service entrance panelboard if no longer in service. Exposed wiring removed and unused conduits capped rather than leaving unterminated conductors hanging out of open condulets and boxes without covers.

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Gibson Hill Pump Station
Address	3400 Gibson Hill Rd. NW
Date	10/20/22
Time	9:25am
Consultant Staff	Banyai, Cook, Harper, Drath, Goffe
Owner Staff	Jeff, Scott, Dan
Year Constructed	Originally: 1999

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Metering/Service

	Pole / Padmount	ID #	Size
Transformer	Pole		3@50kVA
Pwr Provider	PacifiCorp		
Meter #	74 364 690		

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
Disc. Switch	Siemens		
	Voltage	Amps	AIC Rating
	277Y/480V	400A	Unknown

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional: CT enclosure very weathered and rusty.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Generator

	Manufacturer	Serial No.	Job # / Date
Generator			
	Voltage	Amps	KW/KVA

Fuel: ☐ Gas/LP ☐ Diesel

☐ Size/Location:____________________________________

Main Breaker: ☐ Size:____

Load Bank Connection: ☐ Yes ☒ No

Type:____

Portable Connection: ☒ Yes ☐ No

Type: Meltric Type PF, 400A

Arc Flash Label: ☐ Yes ☒ No

☐ Year Conducted:__________________________________

Additional: Temporary generator connection.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Manual Transfer Switch

	Manufacturer	Serial No.	Job # / Date
MTS	Siemens		
	Amps	PM	SPD
	400A		

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
MCC	Allen-Bradley	SN F TFL634	
	Sections		
	4		

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional: 600A Horizonal bus, 300A Vertical bus.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Motor Starters

	Pump 1	**Pump 2**	
HP Size	75 hp	75 hp	
Condition	Excellent	Excellent	
Starter Type: VFD/SS/FS	SS 500F-EOD930	SS 500F-EOD930	
Amps/NEMA size:	NEMA 4	NEMA 4	
Install Date	1999	1999	
Other remarks	General Electric 5KE365AS215D20	General Electric 5KE365AS215D20	

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	
Panelboard Schedule accurate	☒ Y ☐ N	
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location	Building	
XFMR Size	10kVA	

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Criteria		Comments
Panelboard Size	100A	40A Main

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☐ Y ☒ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☐ Y ☒ N	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	APC UPS inside cabinet
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	Alle-Bradley CompactLogix
Current OI	☐ Y ☐ N	N/A
Backup Controls	☐ Y ☐ N	
Copy of Drawings & Program	☐ Y ☒ N	
Telemetry	☒ Y ☐ N	Cal-Amp Viper SC+400 450MHz licensed data radio

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Criteria		Comments
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		Small unit heater and exhaust fan in building.
Local utility receptacle	☒ Y ☐ N	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Auxiliary Control Facilities – Sump Pumps - Electrical

Criteria		Comments
Padlockable disconnect	☐ Y ☒ N	Cord and Plug

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Instruments

	Manufacturer	Serial No.	Type
Level Xmtr A			
	Range	**Note**	**Tagname**
Water Quality	Hach		
	Range	**Note**	**Tagname**
		pH, Cl, F	
Level Xmtr C			
	Range	**Note**	**Tagname**
Level Panel *			
	Range	**Note**	**Tagname**
Flow Xmtr	Endress+Hauser	L80BC719000	Magnetic
	Range	**Note**	**Tagname**
		Xmtr inside bldg	
Pressure Xmtr	Endress+Hauser		
	Range	**Note**	**Tagname**
		Pump disc. pressure	
Level Switch			

Additional: Discharge pressures and check valve positions monitored by RTU

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	Access keypad
Receptacles - Interior:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	
Receptacles - Exterior:	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A	
Interior Security Lighting:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A	
Exterior Security Lighting	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A	
Alarm Systems	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	Door/Hatch switches
Other:	☐ 1	☐ 2	☐ 3	☒ 4	☐ 5	☐ N/A	Smoke detector missing

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Safety Issues

- ☐ Exposed Busing
- ☐ Unlanded wires
- ☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E
- ☐ Broken/Damaged equipment
- ☐ Inadequate working space
- ☐ Issues with rated equipment, panels, receptacles, lights, etc
- ☐ Disconnecting means
- ☐ Other Code issues
- ☐ Confined space/NFPA issues
- ☐ Other: ____

Other Electrical Issues:

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Comments:

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Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	North Albany Pump Station
Address	1008 Gibson Hill Rd. NW
Date	10/20/22
Time	9:45am
Consultant Staff	Banyai, Cook, Harper, Drath, Goffe
Owner Staff	Jeff, Scott, Dan
Year Constructed	Originally: 1980, Refurbished: 2000

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Metering/Service

	Pole / Padmount	ID #	Size
Transformer	Pole		3@50kVA
Pwr Provider	PacifiCorp		
Meter #	74 364 691		

Additional: Service overhead from distribution transformer pole to very short riser pole then U/G to meter. Riser pole does not appear tall enough to meet NESC clearance requirements. No weather head or seal around riser conduit opening.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
Panelboard	General Electric	P2124849	US03 0151026919
	Voltage	Amps	AIC Rating
	277Y/480V	400A	25kAIC

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional: Excellent condition. Installed after 2000.

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Generator

	Manufacturer	Serial No.	Job # / Date
Generator			
	Voltage	Amps	KW/KVA

Fuel: ☐ Gas/LP ☐ Diesel

☐ Size/Location:______________________________

Main Breaker: ☐ Size:____________________________________

Load Bank Connection: ☐ Yes ☒ No

Type:____________________________________

Portable Connection: ☒ Yes ☐ No

Type: Meltric Type PF, 400A________________________

Arc Flash Label: ☐ Yes ☐ No

☐ Year Conducted:____________________________

Additional: Temporary generator connection added in 2000.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Manual Transfer Switch

	Manufacturer	Serial No.	Job # / Date
MTS	Siemens		
	Amps	PM	SPD
	400A		

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional: Exterior MTS added in 2000. Weathered enclosure. May need to be inspected inside.

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
Custom, wall mounted starters.	Allen-Bradley		Aft. 2000
	Sections		
	2 Starters	500F-EOD930	

Arc Flash Label: ☐ Yes ☒ No

Year Conducted: Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:

Additional: Unsafe to open enclosures without disconnection. Rating based on visual exterior condition.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Motor Starters

	Pump 51	**Pump 52**	**Pump 3**
HP Size	75	75	
Condition	Good	Good	
Starter Type: VFD/SS/FS	FVNR 500F-EOD930	FVNR 500F-EOD930	
Amps/NEMA size:	NEMA 4	NEMA 4	
Install Date	Aft. 2000	Aft. 2000	
Other remarks	GE Motor	GE Motor	

	Pump 4	**Pump 5**	**Pump 6**
HP Size			
Condition			
Starter Type: VFD/SS/FS			
Amps/NEMA size:			
Install Date			
Other remarks			

	Hoist 1	**Hoist 2**	
HP Size			
Condition			

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Starter Type: VFD/SS/FS			
Amps/NEMA size:			
Install Date			
Other remarks			

	Trash Rack 1	**Trash Rack 2**	
HP Size			
Condition			
Starter Type: VFD/SS/FS			
Amps/NEMA size:			
Install Date			
Other remarks			

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	60A
Panelboard Schedule accurate	☒ Y ☐ N	
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location	Inside bldg	
XFMR Size	25kVA	
Panelboard Size	100A	80A MCB

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☐ Y ☒ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Criteria		Comments
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☐ Y ☐ N	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	Allen-Bradley CompactLogix
Current OI	☐ Y ☐ N	
Backup Controls	☐ Y ☐ N	
Copy of Drawings & Program	☐ Y ☒ N	
Telemetry	☒ Y ☐ N	Cal-Amp Viper SC+400 450MHz licensed data radio

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		Room exhaust fan and small unit heater.
Local utility receptacle	☒ Y ☐ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Auxiliary Control Facilities – Sump Pumps - Electrical

Criteria		Comments
Padlockable disconnect	☐ Y ☒ N	Cord and plug

Additional: Sump pump appears to be working but in poor condition.

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Instruments

	Manufacturer	Serial No.	Type
Level Xmtr A			
	Range	**Note**	**Tagname**
Level Xmtr B			
	Range	**Note**	**Tagname**
Level Xmtr C			
	Range	**Note**	**Tagname**
Level Panel *			
	Range	**Note**	**Tagname**
Flow Xmtr	Endress+Hauser	KC026919000	Magnetic
	Range	**Note**	**Tagname**
		Xmtr in building	
Pressure Xmtr	Endress+Hauser		
	Range	**Note**	**Tagname**
		Pump disc. pressure	
Level Switch			

Additional: Discharge pressures and check valve positions monitored by RTU

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	Access keypad
Receptacles - Interior:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	
Receptacles - Exterior:	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A	
Interior Security Lighting:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A	
Exterior Security Lighting	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A	
Alarm Systems	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	Door/hatch switches
Other:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A	

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Safety Issues

- ☐ Exposed Busing
- ☐ Unlanded wires
- ☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E
- ☐ Broken/Damaged equipment
- ☐ Inadequate working space
- ☐ Issues with rated equipment, panels, receptacles, lights, etc
- ☐ Disconnecting means
- ☐ Other Code issues
- ☐ Confined space/NFPA issues
- ☐ Other: ____

Other Electrical Issues:

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Comments:

Generator receptacle and MTS added in 2000. Original Service Entrance MCC removed from service after 2000 and replaced with SE-rated panelboard, wall mounted starters, larger transformer and panelboard.

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Maple St. Pump Station & Reservoir
Address	817 4th Avenue SW
Date	10/20/22
Time	11:15am
Consultant Staff	Banyai, Cook, Harper, Drath, Goffe
Owner Staff	Jeff, Scott, Dan
Year Constructed	Original: 1960, Controls: 1972, Elec. Gear: 2015

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer			
Pwr Provider	PacifiCorp		
Meter #			

Additional: Supplied by Vine St. WTP.

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
Motor Control Center	Allen-Bradley		2015
	Voltage	Amps	AIC Rating
	480V	1000A	100kAIC

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional: Service equipment replaced in 2015. Excellent condition. Current OSHA regs require calculated arc flash energy labels. Generic labels are no longer acceptable.

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Generator

	Manufacturer	Serial No.	Job # / Date
Generator			
	Voltage	Amps	KW/KVA

Fuel: ☐ Gas/LP ☐ Diesel
☐ Size/Location:______________________________________

Main Breaker: ☐ Size:___________ ___________________________________

Load Bank Connection: ☐ Yes ☐ No
Type:____

Portable Connection: ☐ Yes ☐ No
Type:____

Arc Flash Label: ☐ Yes ☐ No
☐ Year Conducted:___________________________________

Additional: N/A

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Automatic Transfer Switch

	Manufacturer	Serial No.	Job # / Date
ATS			
	Amps	PM	SPD

Arc Flash Label: ☐ Yes ☐ No

Year Conducted:	
Company & Tel #:	

Additional: N/A

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
MCC	Allen-Bradley		2015
	Sections	Amps	AIC Rating
	5	1000A	100kAIC

Arc Flash Label: ☒ Yes ☐ No

Year Conducted: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Company & Tel #:

Additional: Excellent condition. Two sections appear to have been recently added to provide VFDs for Pumps 12 and 15.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Motor Starters

	Pump 1 (11)	**Pump 2 (12)**	**Pump 3 (13)**
HP Size	150	300	100 hp
Condition	Fair	Good	Fair
Starter Type: VFD/SS/FS	FVNR	VFD	FVNR
Amps/NEMA size:	NEMA 5	NEMA 6	NEMA 4
Install Date	1960	2016?	1960
Other remarks	Allis-Chalmers	US Motors	Allis-Chalmers

	Pump 4 (14)	**Pump 5 (15)**	**Jet Pump**
HP Size	200 hp	300 hp	< 5 hp
Condition	Fair	Good	Good
Starter Type: VFD/SS/FS	FVNR	VFD	FVNR
Amps/NEMA size:	NEMA 5	NEMA 6	NEMA 1
Install Date	1960	2016?	2015
Other remarks	Allis-Chalmers	US Motors	

	MOV 11	**MOV 15**	**Discharge MOV**
HP Size	< 5 hp	< 5 hp	< 5 hp

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Condition	Excellent	Excellent	Fair
Starter Type: VFD/SS/FS	Self-contained FVNR	Self-contained FVNR	Self-contained FVNR
Amps/NEMA size:			
Install Date	2022	2022	Unknown
Other remarks	Beck Actuators	Beck Actuators	Limitorque

Additional: Pumps 2 and 5 motors are TEFC, premium efficiency, inverter duty. Pumps 1, 3 and 4 are older open drip proof motors. Recommend reviewing ODP motor rebuild/rewind records. New Beck MOV actuators on 2 and 5 being installed during condition assessment.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	
Panelboard Schedule accurate	☒ Y ☐ N	
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location	Building	Wall mount
XFMR Size	45kVA	
Panelboard Size	225A	PBD-5A 60A sub-feed to AT-5 panel at tank

Additional: Excellent condition.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☐ Y ☒ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☐ Y ☐ N	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	Allen-Bradley ControlLogix
Current OI	☐ Y ☐ N	
Backup Controls	☐ Y ☐ N	
Copy of Drawings & Program	☐ Y ☐ N	
Telemetry	☒ Y ☐ N	Cal-Amp Viper SC+400 450MHz licensed data radio

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		Two unit heaters, two window-mounted exhaust fans
Local utility receptacle	☒ Y ☐ N	

Additional: Window fans cord and plug powered.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Auxiliary Control Facilities – Sump Pumps - Electrical

Criteria		Comments
Padlockable disconnect	☐ Y ☒ N	Cord and plug

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Instruments

	Manufacturer	Serial No.	Type
			Hydrostatic Pressure

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Level Xmtr A	**Range**	**Note**	**Tagname**
	0-40 ft		
Level Xmtr B			
	Range	**Note**	**Tagname**
Water Quality	Hach		
	Range	**Note**	**Tagname**
		pH, Cl, F	
Level Panel *			
	Range	**Note**	**Tagname**
Flow Xmtr	Endress+Hauser		Magnetic
	Range	**Note**	**Tagname**
Pressure Xmtr			
	Range	**Note**	**Tagname**
Level Switch			

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Receptacles - Interior: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A
Receptacles - Exterior: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ N/A
Interior Security Lighting: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Exterior Security Lighting ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ N/A
Alarm Systems ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Other: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A

Safety Issues

☐ Exposed Busing
☒ Unlanded wires: Installation of new valve actuators in progress. Pump motors disconnected.
☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E
☐ Broken/Damaged equipment
☐ Inadequate working space
☐ Issues with rated equipment, panels, receptacles, lights, etc
☐ Disconnecting means
☐ Other Code issues
☐ Confined space/NFPA issues
☐ Other: ____

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Other Electrical Issues:

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____

____

Comments:

____

____

____

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Wildwood Reservoir
Address	890 Edgewood Dr. NW
Date	10/20/22
Time	10:20am
Consultant Staff	Banyai, Cook, Harper, Drath, Goffe
Owner Staff	Jeff, Scott, Dan
Year Constructed	2000

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer	Pole		15kVA
Pwr Provider	PacifiCorp		
Meter #	78 164 585		

Additional: Exposed to weather, signs of corrosion, service disconnect switch is unsecured against accidental or intentional disconnection. Recommend repairing the hasp on the switch cover and a lock to secure the disconnect switch.

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
Meter Panel	Unknown		2000
	Voltage	Amps	AIC Rating
	240/120	Prob. 100A	Unknown

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional: 60A main breaker.

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	
Panelboard Schedule accurate	☐ Y ☒ N	Needs new circuit schedule
Correct Breaker Size	☒ Y ☐ N	
Wires protected by OCPD	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	Service disconnect at meter outside gate.
Location	Service	
XFMR Size	15kVA	
Panelboard Size	100A	60A Main Breaker

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☐ Y ☒ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☐ Y ☒ N	No ground wire to panel doors noted.

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	APC UPS in bottom of enclosure
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	Schneider SCADAPack 32
Current OI	☐ Y ☐ N	N/A
Backup Controls	☒ Y ☐ N	
Copy of Drawings & Program	☐ Y ☒ N	

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Telemetry	☒ Y ☐ N	Cal-Amp Viper SC+400 450MHz licensed data radio

Additional: Panel would benefit from having a weather shelter above the enclosure. Flow and level displays are mounted on the exterior of the control panel enclosure and are weathered. Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		
Local utility receptacle	☐ Y ☒ N	

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Auxiliary Control Facilities – Sump Pumps - Electrical

Criteria		Comments
Padlockable disconnect	☐ Y ☒ N	Cord & plug sump pump in valve vault.

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Instruments

	Manufacturer	Serial No.	Type
Level Xmtr A	Endress+Hauser	HC0BC0233F9	Radar
	Range	**Note**	**Tagname**
	0-20 ft		
Level Xmtr B			
	Range	**Note**	**Tagname**
Level Xmtr C			
	Range	**Note**	**Tagname**

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Level Panel *			
	Range	**Note**	**Tagname**
Flow Xmtr	Endress+Hauser		Ultrasonic
	Range	**Note**	**Tagname**
Pressure Xmtr			
	Range	**Note**	**Tagname**
Level Switch			

Additional: Strap-on type ultrasonic flow transmitter located too closely to isolation valves for laminar flow and installation known to be inaccurate. Not enough room in the vault for a mag flow tube.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	Keypad on control panel.
Receptacles - Interior:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	
Receptacles - Exterior:	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A	
Interior Security Lighting:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A	
Exterior Security Lighting	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A	See comments below
Alarm Systems:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	Hatch/Door switches
Other:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A	

Safety Issues

☐ Exposed Busing
☐ Unlanded wires
☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E
☐ Broken/Damaged equipment
☐ Inadequate working space
☒ Issues with rated equipment, panels, receptacles, lights, etc: Fixtures appeared damaged
☐ Disconnecting means
☐ Other Code issues
☐ Confined space/NFPA issues
☐ Other: ____

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Other Electrical Issues:

The exterior reservoir lighting showed signs of neglect and some may be inoperative. Reservoir is in a remote, heavily wooded area.

Comments:

____
____
____

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	34th St. Pump Station & Reservoir
Address	475 34th St. SW
Date	10/20/22
Time	11:50am
Consultant Staff	Banyai, Cook, Harper, Drath, Goffe
Owner Staff	Jeff, Scott, Dan
Year Constructed	1970

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer	Padmount	180280	<=500kVA
Pwr Provider	PacifiCorp		
Meter #	70 185 699		

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
Switchboard	Eaton	SPO1247103-001	4/8/2022
	Voltage	Amps	AIC Rating
	277Y/480V	600	Unknown

Arc Flash Label: ☒ Yes ☐ No

Year Conducted:	Generic arc flash label does not meet OSHA ¶(l)(8) §1910.269
Company & Tel #:	

Additional: Equipment installed 2022. Excellent condition.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Generator

	Manufacturer	Serial No.	Job # / Date
Generator			
	Voltage	Amps	KW/KVA

Fuel: ☐ Gas/LP ☐ Diesel

☐ Size/Location:______________________________________

Main Breaker: ☐ Size:______________________________________

Load Bank Connection: ☐ Yes ☐ No

Type:______________________________________

Portable Connection: ☐ Yes ☐ No

Type:______________________________________

Arc Flash Label: ☐ Yes ☐ No

☐ Year Conducted:______________________________

Additional: No generator. Recommend installation of temporary generator connector as used at other sites.

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Automatic Transfer Switch

	Manufacturer	Serial No.	Job # / Date
ATS			
	Amps	PM	SPD

Arc Flash Label: ☐ Yes ☐ No

Year Conducted:	
Company & Tel #:	

Additional: No ATS. Recommend installation of manual transfer switch for temporary generator connector as used at other sites.

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
Wall Mounted FVNR Starters	Allis-Chalmers		ca. 1970
	Sections		
	3 Starters		

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Generic arc flash label does not meet OSHA §1910.269 Appendix E
Company & Tel #:	

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Motor Starters

	Pump 1 (41)	**Pump 2 (42)**	**Pump 3 (43)**
HP Size	50 hp TEFC	100 hp ODP	125 hp ODP
Condition	Good	Fair	Fair
Starter Type: VFD/SS/FS	FVNR CR306E002	FVNR CR306F002	SS CR306G0
Amps/NEMA size:	NEMA 3	NEMA 4	NEMA 5
Install Date	2009	1971	1971
Other remarks	WEG Severe Duty	Allis-Chalmers	Allis-Chalmers

Additional: ODP motors appear to be more than 50 years old. Maintenance records should be checked for rebuild/rewind/service dates. Recommend upgrading motors to premium efficiency and replacement of all motor starters with soft starters (or VFDs, if appropriate).

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	
Panelboard Schedule accurate	☒ Y ☐ N	Should be rescheduled. Too many marks.
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location		Wall mounted inside building.

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Criteria		Comments
XFMR Size	7.5kVA	Westinghouse Type EP. Max FLA ~32A at 240V
Panelboard Size	100A MCB	Breaker oversized for 7.5kVA 240V transformer

Additional: 20A CB circuit 16 is tripped. Could be faulted/overloaded.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☐ Y ☒ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☐ Y ☐ N	Unsafe to open starters, etc. to check

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	APC UPS inside RTU cabinet
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	Allen-Bradley CompactLogix
Current OI	☐ Y ☒ N	
Backup Controls	☒ Y ☐ N	
Copy of Drawings & Program	☐ Y ☒ N	
Telemetry	☒ Y ☐ N	Cal-Amp Viper SC+400 450MHz licensed data radio

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Criteria		Comments
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		Two unit heaters, one building exhaust fan
Local utility receptacle	☒ Y ☐ N	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Auxiliary Control Facilities – Sump Pumps - Electrical

Criteria		Comments
Padlockable disconnect	☐ Y ☒ N	30A CB in panelboard 120V

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Instruments

	Manufacturer	Serial No.	Type
Level Xmtr A	Rosemount 3051		Static Pressure
	Range	**Note**	**Tagname**
	0-32 ft	LIT outside building	
Level Xmtr B			
	Range	**Note**	**Tagname**
Water Quality	Hach		
	Range	**Note**	**Tagname**
		Cl, Turb, pH, ORP, Cond	
Level Panel *			
	Range	**Note**	**Tagname**
Flow Xmtr	Endress+Hauser		N40C5919000
	Range	**Note**	**Tagname**
	5350 gpm max	If all pumps running	
Pressure Xmtr			
	Range	**Note**	**Tagname**
Level Switch	Float	LSH	Overflow

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Facility Assessment – Electrical

Security Systems:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	Access keypad
Receptacles - Interior:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	
Receptacles - Exterior:	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A	
Interior Security Lighting:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A	
Exterior Security Lighting	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	
Alarm Systems	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	Door/Hatch switches
Other:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A	

Safety Issues

☐ Exposed Busing
☐ Unlanded wires
☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E
☐ Broken/Damaged equipment
☐ Inadequate working space
☐ Issues with rated equipment, panels, receptacles, lights, etc
☐ Disconnecting means
☐ Other Code issues
☐ Confined space/NFPA issues
☐ Other: ____

Other Electrical Issues: Fault/arc flash study and labeling needed as required by OSHA §1910.269 Appendix E. Significant changes have been made to power distribution in this facility from original design.

Comments:
____
____
____

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Queen Ave. Pump Station & Reservoir
Address	950 Queen Ave. SE
Date	10/20/22
Time	12:10 pm
Consultant Staff	Banyai, Cook, Harper, Drath, Goffe
Owner Staff	Jeff, Scott, Dan
Year Constructed	Originally: 1957

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer	Pole		3/50kVA
Pwr Provider	PacifiCorp		
Meter #	74 364 544		

Additional: Service appears to have been upgraded from the original installation. Available fault current may have increased above equipment rating and a new fault/arc flash study needed.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
Service Disconnect	Square D		1957
	Voltage	Amps	AIC Rating
	240V 3ph	400	Unknown

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional: Fused disconnect switch. Unsafe to open to determine fuse rating.

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Generator

	Manufacturer	Serial No.	Job # / Date
Generator			
	Voltage	Amps	KW/KVA

Fuel: ☐ Gas/LP ☐ Diesel

☐ Size/Location:______________________________

Main Breaker: ☐ Size:____________________________________

Load Bank Connection: ☐ Yes ☐ No

Type:____

Portable Connection: ☐ Yes ☐ No

Type:____

Arc Flash Label: ☐ Yes ☐ No

☐ Year Conducted:_____________________________

Additional: No generator. Recommend installation of temporary generator connector as used at other sites.

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Automatic Transfer Switch

	Manufacturer	Serial No.	Job # / Date
ATS			
	Amps	PM	SPD

Arc Flash Label: ☐ Yes ☐ No

Year Conducted:	
Company & Tel #:	

Additional: No ATS. Recommend installation of manual transfer switch for temporary generator connector as used at other sites.

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
Wall-Mounted FVNR Starters	General Electric		
	Sections		
	2 Starters		

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional: Unsafe to open these custom-built starter cabinets for inspection. Recommend upgrading to soft starters (or VFDs, if appropriate).

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Motor Starters

	Pump 1 (21)	Pump 2 (22)	
HP Size	30 hp ODP	75 hp ODP	
Condition	Fair	Fair	
Starter Type: VFD/SS/FS	FVNR CR306E002	FVNR CR306GO	
Amps/NEMA size:	NEMA 3	NEMA 4	
Install Date	1955	1955	
Other remarks	Allis-Chalmers	Allis-Chalmers	

Additional: Open drip proof motors appear to be more than 50 years old. Maintenance records should be checked for rebuild/rewind/service dates. Upgrading to modern 480V 3ph, premium efficiency motors and soft starters (or VFDs) highly recommended.

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☐ Y ☒ N	Tapped from service bus bar gutter
Panelboard Schedule accurate	☒ Y ☐ N	
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Criteria		Comments
Disconnecting means identified	☒ Y ☐ N	
Location	Pole	
XFMR Size	Service	
Panelboard Size	100A	

Additional: If service upgraded to 480V 3 phase, a new transformer will be needed for this panelboard.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☐ Y ☒ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☐ Y ☐ N	Unable to open cabinets to check

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	APC UPS External to RTU panel
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	Allen-Bradley CompactLogix
Current OI	☐ Y ☒ N	SCADAPack Vision (appears inoperative)
Backup Controls	☒ Y ☐ N	
Copy of Drawings & Program	☐ Y ☒ N	
Telemetry	☒ Y ☐ N	Cal-Amp Viper SC+400 450MHz licensed data radio

Additional: Control panel recently upgraded. Arc flash labeling required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Criteria		Comments
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		Unit heater in building. No cooling or exhaust fan.
Local utility receptacle	☒ Y ☐ N	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Auxiliary Control Facilities – Sump Pumps - Electrical

Criteria		Comments
Padlockable disconnect	☐ Y ☐ N	

Additional: No sump pump at this site.

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Instruments

	Manufacturer	Serial No.	Type
Level Xmtr A	Rosemount 3051	1477542	Hydrostatic Pressure
	Range	**Note**	**Tagname**
	0-30 ft	LIT inside building	
Level Xmtr B			
	Range	**Note**	**Tagname**
Level Xmtr C			
	Range	**Note**	**Tagname**
Level Panel *			
	Range	**Note**	**Tagname**
Flow Xmtr	Endress+Hauser	K9069516000	Magnetic
	Range	**Note**	**Tagname**
	2000 gpm max	If all pumps running	
Pressure Xmtr			
	Range	**Note**	**Tagname**
Level Switch			

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Additional: Magnetic flowmeter replaced the original orifice differential pressure flow transmitters. Flow tube is not inside a vault as at other sites. Check valve position monitored by RTU. Note: Asset List incorrectly lists the Rosemount 3051 static pressure level transmitter as ultrasonic.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Facility Assessment – Electrical

Security Systems:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	Access Keypad
Receptacles - Interior:	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A	
Receptacles - Exterior:	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A	
Interior Security Lighting:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A	
Exterior Security Lighting	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A	
Alarm Systems	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A	Door/Hatch switches
Other:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A	

Safety Issues

☐ Exposed Busing
☐ Unlanded wires
☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E
☐ Broken/Damaged equipment
☐ Inadequate working space
☒ Issues with rated equipment, panels, receptacles, lights, etc: South yard light on during the day
☐ Disconnecting means
☐ Other Code issues
☐ Confined space/NFPA issues
☒ Other: Missing condulet/box covers, cord-and-plug “temporary” heat tracing for tank static pressure level piping from tank to building.

Other Electrical Issues: Service entrance conductors at weatherhead appear to be asbestos covered. Avoid disturbing or bending these conductors to prevent creating friable asbestos. Fault/arc flash study needs to be done. Power utility upgrades since 1957 may result in available fault current greater than the rating of the equipment inside the building. Safety issue.

Comments: Recommend the electrical system at this site be rebuilt per modern electrical system practices. Upgrading to 480V 3 phase, premium efficiency motors and replacing FVNR starters with soft starters or VFDs will reduce power consumption and greatly improve electrical safety. “Temporary” heat tracing should be permanently installed. Using a much longer than necessary extension cord is unsafe.

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Albany-Millersburg Reservoir
Address	33883 Berry Dr NE
Date	10/20/22
Time	12:45 pm
Consultant Staff	Banyai, Cook, Harper, Drath, Goffe
Owner Staff	Jeff, Scott
Year Constructed	Originally: 2005, Seismic Valve: 2022

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer			
Pwr Provider	PacifiCorp from WTP		
Meter #			

Additional: Serviced from WTP

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
Panelboard			
	Voltage	Amps	AIC Rating

Arc Flash Label: ☐ Yes ☐ No

Year Conducted:

Company & Tel #:

Additional: Serviced from WTP

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Generator

	Manufacturer	Serial No.	Job # / Date
Generator	Cummins		
	Voltage	Amps	KW/KVA
	480V	100A	Prob. 75 kA

Fuel: ☐ Gas/LP ☒ Diesel
☐ Size/Location:________________________________

Main Breaker: ☒
Size: 100A________________________________

Load Bank Connection: ☐ Yes ☒ No
Type:________________________________

Portable Connection: ☐ Yes ☒ No
Type:________________________________

Arc Flash Label: ☐ Yes ☒ No
☐ Year Conducted:________________________________

Additional: Generator added for 2022 seismic valve project. Did not receive electrical drawings for review. Based on the recent installation, assume this to be in excellent condition.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Automatic Transfer Switch

	Manufacturer	Serial No.	Job # / Date
ATS			
	Amps	PM	SPD

Arc Flash Label: ☐ Yes ☐ No

Year Conducted:	
Company & Tel #:	

Additional: ATS added for 2022 seismic valve project. Did not receive electrical drawings for review. Based on the recent installation, assume this to be in excellent condition.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
MCC			
	Sections		

Arc Flash Label: ☐ Yes ☐ No

Year Conducted:
Company & Tel #:

Additional: N/A

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Motor Starters

	Seismic Valve	**Pump 2**	**Pump 3**
HP Size	1 hp		
Condition	Excellent		
Starter Type: VFD/SS/FS	FVR		
Amps/NEMA size:	NEMA 1		
Install Date	2022		
Other remarks	F0FV0501		

	Pump 4	**Pump 5**	**Pump 6**
HP Size			
Condition			
Starter Type: VFD/SS/FS			
Amps/NEMA size:			
Install Date			
Other remarks			

	Hoist 1	**Hoist 2**	
HP Size			
Condition			

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Starter Type: VFD/SS/FS			
Amps/NEMA size:			
Install Date			
Other remarks			

	Trash Rack 1	**Trash Rack 2**	
HP Size			
Condition			
Starter Type: VFD/SS/FS			
Amps/NEMA size:			
Install Date			
Other remarks			

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	
Panelboard Schedule accurate	☒ Y ☐ N	
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location		Outside generator shelter
XFMR Size	15kVA	120/240V
Panelboard Size	125A	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☐ Y ☒ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	

Criteria		Comments
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☒ Y ☐ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	Allen-Bradley ControlLogix
Current OI	☐ Y ☒ N	
Backup Controls	☐ Y ☒ N	
Copy of Drawings & Program	☐ Y ☒ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		Unit heater in generator shelter
Local utility receptacle	☒ Y ☐ N	

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Auxiliary Control Facilities – Sump Pumps - Electrical

Criteria		Comments
Padlockable disconnect	☐ Y ☒ N	Two 1 hp sump pumps common control panel

Additional: In seismic valve vault

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Instruments

	Manufacturer	Serial No.	Type
Level Xmtr A			Ultrasonic
	Range	**Note**	**Tagname**
	0-42 ft		500LIT0401A
Level Xmtr B			Ultrasonic
	Range	**Note**	**Tagname**
	0-42		500LIT0401B
Level Xmtr C			
	Range	**Note**	**Tagname**
Level Panel *			
	Range	**Note**	**Tagname**
Flow Xmtr			
	Range	**Note**	**Tagname**
Pressure Xmtr			
	Range	**Note**	**Tagname**
			Float
Sump Level Switches		LSLL/LSL/LSH/LSHH	50LS5301

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Receptacles - Interior:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Receptacles - Exterior:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Interior Security Lighting:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Exterior Security Lighting	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Alarm Systems ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A Door/Hatch Switches

Other: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A

Safety Issues

☐ Exposed Busing

☐ Unlanded wires

☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E

☐ Broken/Damaged equipment

☐ Inadequate working space

☐ Issues with rated equipment, panels, receptacles, lights, etc

☐ Disconnecting means

☐ Other Code issues

☐ Confined space/NFPA issues

☐ Other: ____

Other Electrical Issues:

____

____

____

Comments:

____

____

____

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Albany-Millersburg Raw Water Intake
Address	Scravel Hill Rd NE
Date	10/20/22
Time	1:05 pm
Consultant Staff	Banyai, Cook, Drath, Goffe
Owner Staff	Jeff, Scott
Year Constructed	Originally: 2005

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer	Padmount	240683	1.5MVA
Pwr Provider	PacifiCorp		
Meter #	Closed and utility sealed metering enclosure.		

Additional: Slight weathering of transformer enclosure. Stainless steel metering enclosure.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
Switchboard	Siemens		2004
	Voltage	Amps	AIC Rating
	277Y/480V	2kA/2kA	

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Generator

	Manufacturer	Serial No.	Job # / Date
Generator	Cummins		Aft. 2005
	Voltage	Amps	KW/KVA
	277Y/480V	200A	Prob. 150kVA

Fuel: ☐ Gas/LP ☒ Diesel

☒ Size/Location: Base tank

Main Breaker: ☐ Size:

Load Bank Connection: ☐ Yes ☒ No

Type:

Portable Connection: ☐ Yes ☒ No

Type:

Arc Flash Label: ☐ Yes ☒ No Arc flash labeling needed as required by OSHA §1910.269 Appendix E

☐ Year Conducted:

Additional: Generator installed after 2005 installation. Control panel in location reserved for future electrical equipment. No record drawings of this installation to review.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Automatic Transfer Switch

	Manufacturer	Serial No.	Job # / Date
ATS	ASCO		2005
	Amps	PM	SPD
	200A		

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	No Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional: Originally designed to transfer from one 480V switchgear bus to the other to maintain power to panelboard RWP-DP01 in the event one bus or the other is disconnected for maintenance or fault However, this switch is probably now connected to the generator so that power is maintained to this panelboard in the event of a total loss of utility power.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Centers

	Manufacturer	Serial No.	Job # / Date
MCC	Allen-Bradley		2005
	Sections		
	N/A		

Arc Flash Label: ☐ Yes ☒ No

Year Conducted: No Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Company & Tel #:

Additional: Individual rack-mounted motor starters and cooled PowerFlex VFDs

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Motor Starters

	RW Pump 1	**RW Pump 2**	**RW Pump 3**
HP Size	350 hp	350 hp	350 hp
Condition	Excellent	Excellent	Excellent
Starter Type: VFD/SS/FS	VFD	VFD	VFD
Amps/NEMA size:	600A CB	600A CB	600A CB
Install Date	2005	2005	2005
Other remarks	Force Cooled	Force Cooled	Force Cooled

	RW Pump 4	**Air Compresssor**	**Sand Pump**
HP Size	350 hp	7.5 hp	15 hp
Condition	Excellent	Excellent	Excellent
Starter Type: VFD/SS/FS	VFD	FVNR	FVNR
Amps/NEMA size:	600A CB	30A CB	50A CB
Install Date	2005	2005	2005
Other remarks	Force Cooled		

	Dewatering 1	**Dewatering 2**	
HP Size	1.5 hp	1 hp	
Condition	Excellent	Excellent	

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Starter Type: VFD/SS/FS	FVNR	FVNR	
Amps/NEMA size:	20A CB	20A CB	
Install Date	2005	2016	
Other remarks			

	UL Supply Fan 1	**UL Supply Fan 2**	
HP Size	1.5 hp	1.5 hp	
Condition	Excellent	Excellent	
Starter Type: VFD/SS/FS	FVNR	FVNR	
Amps/NEMA size:	20A CB	20A CB	
Install Date	2005	2005	
Other remarks			

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Panelboard & Panelboard Transformers

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	
Panelboard Schedule accurate	☒ Y ☐ N	
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location		
XFMR Size	30 kVA	Tops of dry transformers should not be used to hold tools or spare parts!
Panelboard Sizes	225A 480V 225A 208Y	200A main breaker 100A main breaker

Additional: No Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☒ Y ☐ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☒ Y ☐ N	

Additional: No Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	UPS inside RTU and standby generator
Clean Installation	☐ Y ☒ N	See additional below
Current PLC	☒ Y ☐ N	Allen-Bradley ControlLogix
Current OI	☒ Y ☐ N	In network enclosure
Backup Controls	☐ Y ☐ N	
Copy of Drawings & Program	☐ Y ☒ N	

Additional: A bit of a rat's nest compared to the other control panels recently built by City. Covers missing from wireways, network cables adjacent to power conductors, et.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☐ N	
Dry Well Ventilation		Ducted ventilation in lower levels
Local utility receptacle	☒ Y ☐ N	
Dehumidification		
Local utility receptacle	☒ Y ☐ N	
Heating/Cooling		Unit Heaters/Cooling/Exhaust in upper level
Local utility receptacle	☒ Y ☐ N	

Additional: Two outdoor condensers, Trane HVAC controls, UL exhaust fans. LL ducted ventilation.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Auxiliary Control Facilities – Sump Pumps - Electrical

Criteria		Comments
Padlockable disconnect	☐ Y ☒ N	Two 1 hp pumps, common control panel

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Instruments

	Manufacturer	Serial No.	Type
Level Transmitters			
	Range	**Note**	**Tagname**
			11LIT0901/0902
Water Quality			
	Range	**Note**	**Tagname**
		pH/Temp/Cond.	11AIT2901/2801
Level Xmtr C			
	Range	**Note**	**Tagname**
Level Panel *			
	Range	**Note**	**Tagname**
Flow Xmtr			
	Range	**Note**	**Tagname**
Pressure Xmtr			
	Range	**Note**	**Tagname**
Level Switches		LSLL/LSL/LSH/LSHH	11LS2101

Additional: All installed 2005, excellent condition.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems:	☒ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A	Gate and access keypad
Receptacles - Interior:	☒ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A	
Receptacles - Exterior:	☒ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A	
Interior Security Lighting:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A	

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Exterior Security Lighting ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A
Alarm Systems ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A Intrusion switches
Other: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A Fire alarm

Safety Issues

☐ Exposed Busing
☐ Unlanded wires
☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E
☐ Broken/Damaged equipment
☐ Inadequate working space
☐ Issues with rated equipment, panels, receptacles, lights, etc
☐ Disconnecting means
☐ Other Code issues
☐ Confined space/NFPA issues
☐ Other: ____

Other Electrical Issues:
____
____
____

Comments:
____
____
____

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Vine St. WTP – Raw Water Pumping Station – Area 200
Address	300 Vine St. SW
Date	10/21/22
Time	8:10 am
Consultant Staff	Banyai, Cook, Drath, Goffe
Owner Staff	Jeff, Scott
Year Constructed	Originally: 1912

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer	Padmount		3@167 kVA
Pwr Provider	PacifiCorp Service No. 1		
Meter #			

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
MCC	Allen-Bradley		2016
	Voltage	Amps	AIC Rating
	480V 3-phase	400A / 400A	

Arc Flash Label: ☒ Yes ☐ No

Year Conducted: 2016

Company & Tel #: Taurus (503) 692-9004

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
MCC	Allen-Bradley		2016
	Sections		
	3 / 3		

Arc Flash Label: ☒ Yes ☐ No

Year Conducted: 2016

Company & Tel #: Taurus (503) 692-9004

Additional: Excellent condition

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Motor Starters

	Pump 1	**Pump 2**	**Pump 3**
HP Size	75 hp	100 hp	20 hp
Condition	Good	Good	Fair
Starter Type: VFD/SS/FS	VFD PowerFlex	VFD PowerFlex	FVNR
Amps/NEMA size:	NEMA 4	NEMA 4	NEMA 2
Install Date	Prob. 2003	Prob. 2003	1991
Other remarks	N. American Elec.	N. American Elec.	US Motors

	Pump 4	**Pump 5**	**Pump 6**
HP Size	30 hp	50 hp	50 hp
Condition	Out of Service	Fair	Fair
Starter Type: VFD/SS/FS	VFD	FVNR	FVNR
Amps/NEMA size:	NEMA 3	NEMA 3	NEMA 3
Install Date	1965	1972	1972
Other remarks	US Motors	US Motors	US Motors

	Pump 7	**Pump 8**	**Pump 9**
HP Size	50 hp	50 hp	50 hp
Condition	Fair	Fair	Out of Service

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Starter Type: VFD/SS/FS	FVNR	FVNR	FVNR
Amps/NEMA size:	NEMA 3	NEMA 3	NEMA 3
Install Date	1965/2001	1991	1991
Other remarks	US Motors	US Motors	US Motors

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Accelator/Sample Motor Starters Outside Raw Water MCC

	Mixer Accel 1	**Mixer Accel 2**	**Raw Sample 1**
HP Size	10 hp	10 hp	½ hp
Condition	Excellent	Excellent	Good
Starter Type: VFD/SS/FS	FVNR	FVNR	FVNR
Amps/NEMA size:	NEMA 3	NEMA 3	NEMA 1
Install Date	2021	2021	2017
Other remarks	US Motors	US Motors	US Motors

	Raw Sample 2		
HP Size	½ hp		
Condition	Fair		
Starter Type: VFD/SS/FS	FVNR		
Amps/NEMA size:	NEMA 1		
Install Date	Unknown		
Other remarks	US Motors		

Additional: Good to fair condition.

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	
Panelboard Schedule accurate	☒ Y ☐ N	

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Criteria		Comments
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location	Inside bldg	
XFMR Size	50 kVA	
Panelboard Size	100A 480V 200A 240V	

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☒ Y ☐ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☒ Y ☐ N	

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	Allen-Bradley ControlLogix
Current OI	☐ Y ☒ N	
Backup Controls	☐ Y ☒ N	
Copy of Drawings & Program	☐ Y ☒ N	

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		Unit heaters, exhaust fan
Local utility receptacle	☒ Y ☐ N	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Instruments

	Manufacturer	Serial No.	Type
Water Quality Xmtr	Hach		SC200
	Range	**Note**	**Tagname**
		pH/Turb.	
Flow Xmtr	Endress+Hauser		Magnetic
	Range	**Note**	**Tagname**
Level Switch		Raw Water Wet Well	Floats

Additional: Good condition. Raw water to Accelators flow meter in vault near Accelator 2

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Receptacles - Interior:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Receptacles - Exterior:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Interior Security Lighting:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Exterior Security Lighting	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Alarm Systems	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Other:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Safety Issues

☐ Exposed Busing
☐ Unlanded wires
☒ No/Out of date Arc Flash Labels required by OSHA §1910.269 Appendix E
☐ Broken/Damaged equipment
☐ Inadequate working space
☐ Issues with rated equipment, panels, receptacles, lights, etc
☐ Disconnecting means
☐ Other Code issues
☐ Confined space/NFPA issues
☐ Other: ____

Other Electrical Issues:
____
____
____

Comments:
____
____
____

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Vine St. Water Treatment Plant – Filtration Area 200/400
Address	300 Vine St. SW
Date	10/21/22
Time	8:10 am
Consultant Staff	Banyai, Cook, Drath, Goffe
Owner Staff	Jeff, Scott
Year Constructed	Originally: 1912

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer			3@167 kVA
Pwr Provider	PacifiCorp Service No. 1		
Meter #			

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
MCC	Allen-Bradley		2016
	Voltage	Amps	AIC Rating
	480V 3-phase	600A	

Arc Flash Label: ☒ Yes ☐ No

Year Conducted:	2016
Company & Tel #:	Taurus (503) 692-9004

Additional: MCC-A and MCC-B

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
MCC	Allen-Bradley		2016
	Sections		
	7		

Arc Flash Label: ☒ Yes ☐ No

Year Conducted: 2016
Company & Tel #: Taurus (503) 692-9004

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Motor Starters

	Backwash Pump 1	Backwash Pump 2	Surface Wash
HP Size	75 hp	75 hp	5 hp
Condition	Fair	Fair	Good
Starter Type: VFD/SS/FS	FVNR	VFD PowerFlex 755	
Amps/NEMA size:	NEMA 4	NEMA 4	NEMA 1
Install Date	1960	1965	Unknown
Other remarks	US Motors ODP	A-C ODP	Baldor

	Transfer Pump 1	Transfer Pump 2	Transfer Pump 3
HP Size	100 hp	125 hp	200 hp
Condition	Fair	Fair	Good
Starter Type: VFD/SS/FS	FVNR	FVNR	VFD PowerFlex 755
Amps/NEMA size:	NEMA 4	NEMA 5	NEMA 6
Install Date	1957	1965	1991
Other remarks	US Motors ODP	US Motors ODP	US Motors ODP

	Transfer Pump 4	Accelator S Mixer	Accelator N Mixer
HP Size	150 hp	12 hp	60 hp
Condition	Good	Good	Good

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Starter Type: VFD/SS/FS	VFD	FVNR	FVNR
Amps/NEMA size:	NEMA 5	NEMA 2	NEMA 4
Install Date	1991	2021	2021
Other remarks	US Motors TEFC	NIDEC TEFC	

	Acc. Sample 1	**Acc. Sample 2**	**Clearwell Sample**
HP Size	.75	.5 hp	.5 hp
Condition	Good	Good	Good
Starter Type: VFD/SS/FS	FVNR	FVNR	FVNR
Amps/NEMA size:	NEMA 1	NEMA 1	NEMA 1
Install Date	2017	Unknown	2017
Other remarks	Dayton	K-C	Marathon

Additional: Motors vary in vintage from very recent to very old. Recommend replacing all older motors with premium efficiency, inverter duty motors.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	
Panelboard Schedule accurate	☒ Y ☐ N	
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location	Inside bldg	
XFMR Size	50 kVA	
Panelboard Size	250A	225A main CB

Additional: Recently installed. Excellent condition.

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☒ Y ☐ N	
Conduits supported	☒ Y ☐ N	

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Criteria		Comments
Wires labeled	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☒ Y ☐ N	

Additional:

Condition Assessment Rating: ☒ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	
Current OI	☐ Y ☒ N	
Backup Controls	☐ Y ☒ N	
Copy of Drawings & Program	☐ Y ☒ N	

Additional: Control panel recently rebuilt. Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☐ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☐ N	
Dehumidification		
Local utility receptacle	☐ Y ☐ N	
Heating/Cooling		Unit heaters, exhaust fans, cooling (electrical area)
Local utility receptacle	☒ Y ☐ N	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Instruments

	Manufacturer	Serial No.	Type
Turbidity Xmtr (x11)	Hach		SC200
	Range	**Note**	**Tagname**
Chlorine Xmtr (x1)	Hach		SC200
	Range	**Note**	**Tagname**
Flume Level Xmtr (x2)			Pressure
	Range	**Note**	**Tagname**
	Rosemount		
Flow Xmtr (x13)	Endress+Hauser		Magnetic
	Range	**Note**	**Tagname**
Diff Pressure Xmtr (x10)	Rosemount		3051
	Range	**Note**	**Tagname**

Additional: 10 Filters total.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Receptacles - Interior:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Receptacles - Exterior:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Interior Security Lighting:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Exterior Security Lighting	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Alarm Systems	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Other:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A

Safety Issues

☐ Exposed Busing
☐ Unlanded wires
☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E
☐ Broken/Damaged equipment
☐ Inadequate working space
☐ Issues with rated equipment, panels, receptacles, lights, etc
☐ Disconnecting means
☐ Other Code issues

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

☐ Confined space/NFPA issues
☐ Other: ____

Other Electrical Issues:

____
____
____

Comments:

____
____
____

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Vine St. Water Treatment Plant – Chemical Bldg Area 600
Address	300 Vine St. SW
Date	10/21/22
Time	8:10 am
Consultant Staff	Banyai, Cook, Drath, Goffe
Owner Staff	Jeff, Scott
Year Constructed	Originally: 1912

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer			3@250kVA
Pwr Provider	PacifiCorp Service No. 2		
Meter #			

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
DS-6A1			
	Voltage	Amps	AIC Rating
	480V 3-phase	100A	

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
Packaged Controllers	Various		
	Sections		
	N/A		

Arc Flash Label: ☐ Yes ☒ No

Year Conducted: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Company & Tel #:

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Motor Starters

	ACH Pumps	**SHC Pumps**	**Polymer Pumps**
HP Size	½ hp		
Condition	Good / Fair	Packaged	Packaged
Starter Type: VFD/SS/FS	Controller	Controller	Controller
Amps/NEMA size:	10A		
Install Date	2021 / 2007		
Other remarks	Two Pumps	Four Pumps	Two Pumps

	Polymer Mixer	**Pump 5**	**Pump 6**
HP Size	¼ hp		
Condition	Poor		
Starter Type: VFD/SS/FS			
Amps/NEMA size:	6A		
Install Date			
Other remarks			

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☐ Y ☐ N	
Panelboard Schedule accurate	☒ Y ☐ N	Schedule should be cleaned up and up dated.
Correct Breaker Size	☐ Y ☐ N	
Wires protected by breaker	☐ Y ☐ N	
Labeled	☐ Y ☐ N	
Disconnecting means identified	☐ Y ☐ N	
Location		2nd Floor of Chemical Building
XFMR Size	75 kVA	480V-208Y/120V 3-phase
Panelboard Size	200A	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☐ Y ☒ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☐ Y ☒ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☐ Y ☒ N	
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	Allen-Bradley ControlLogix
Current OI	☐ Y ☒ N	
Backup Controls	☐ Y ☒ N	
Copy of Drawings & Program	☐ Y ☒ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Heading and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		Unit heaters and exhaust fans
Local utility receptacle	☒ Y ☐ N	

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Instruments

	Manufacturer	Serial No.	Type
Level Xmtr SHC Tanks 1 & 2	Endress+Hauser		Radar
	Range	**Note**	**Tagname**
		Good / Good	
Level Xmtr ACH Tank	Endress_Hauser		Ultrasonic
	Range	**Note**	**Tagname**
		Good	
SCM RW #1 & #2	ChemTrac/Hach		Streaming Current
	Range	**Note**	**Tagname**
		Poor / Poor	

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Receptacles - Interior:	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A
Receptacles - Exterior:	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A
Interior Security Lighting:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Exterior Security Lighting	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A
Alarm Systems	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Other:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Safety Issues

☐ Exposed Busing
☐ Unlanded wires
☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E
☐ Broken/Damaged equipment
☐ Inadequate working space
☐ Issues with rated equipment, panels, receptacles, lights, etc
☐ Disconnecting means
☐ Other Code issues
☐ Confined space/NFPA issues
☐ Other: ____

Other Electrical Issues:
____
____
____

Comments:
____
____
____

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Vine St. Water Treatment Plant – Soda Ash Bldg Area 700
Address	300 Vine St. SW
Date	10/21/22
Time	8:10 am
Consultant Staff	Banyai, Cook, Drath, Goffe
Owner Staff	Jeff, Scott
Year Constructed	Originally: 1912

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer			3@167kVA
Pwr Provider	PacifiCorp Service No. 1		
Meter #			

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
PBD-7A	General Electric		
	Voltage	Amps	AIC Rating
	480V 3-phase	200A	

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional: The generic label currently posted on PBD-7A is not acceptable per OSHA. Breakers should be relabeled.

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
Packaged Starters	Various		
	Sections		
	N/A		

Arc Flash Label: ☐ Yes ☒ No

Year Conducted: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Company & Tel #:

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	
Panelboard Schedule accurate	☒ Y ☐ N	
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location	Inside bldg	
XFMR Size		
Panelboard Size		

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☐ Y ☒ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☐ Y ☒ N	

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		Unite heaters, exhaust fans
Local utility receptacle	☒ Y ☐ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Receptacles - Interior:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Receptacles - Exterior:	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A
Interior Security Lighting:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Exterior Security Lighting	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A
Alarm Systems	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Other:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Safety Issues

- ☐ Exposed Busing
- ☐ Unlanded wires
- ☒ No/Out of date Arc Flash Labels needed as required by OSHA §1910.269 Appendix E
- ☐ Broken/Damaged equipment
- ☒ Inadequate working space Work bench blocking electrical panel near soda hoist.
- ☐ Issues with rated equipment, panels, receptacles, lights, etc
- ☐ Disconnecting means
- ☐ Other Code issues
- ☐ Confined space/NFPA issues
- ☐ Other: ____

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Other Electrical Issues:

____

____

____

Comments:

____

____

____

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Vine St. Water Treatment Plant – Hydropower Powerhouse
Address	300 Vine St. SW
Date	10/21/22
Time	8:10 am
Consultant Staff	Banyai, Cook, Drath, Goffe
Owner Staff	Jeff, Scott
Year Constructed	Originally: 1927, Rebuilt: 2008

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer	12kV-4160V		3@167 kVA
Pwr Provider	PacifiCorp		
Meter #			

Additional:

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
Switchgear	Controlled Power		2008
	Voltage	Amps	AIC Rating
	4160V		

Arc Flash Label: ☐ Yes ☒ No

Year Conducted: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Company & Tel #:

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Hydrogenerator

	Manufacturer	Serial No.	Job # / Date
Generator	Wuhan Changyuan		Rebuilt 2008
	Voltage	Amps	KW/KVA
	4160V	100A	500kW/600kVA

Fuel: ☐ Gas/LP ☐ Diesel

☐ Size/Location: Hydroelectric Powerhouse

Main Breaker: ☐ Size:______________________________________

Load Bank Connection: ☐ Yes ☒ No

Type:______________________________________

Portable Connection: ☐ Yes ☒ No

Type:______________________________________

Arc Flash Label: ☐ Yes ☒ No

☐ Year Conducted:

Additional: Lightly used since rebuild. Controls, etc. excellent condition. Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Hydrogenerator

	Manufacturer	Serial No.	Job # / Date
Generator	Westinghouse 29D180		Originally 1927
	Voltage	Amps	KW/KVA

Fuel: ☐ Gas/LP ☐ Diesel

☐ Size/Location: Hydroelectric Powerhouse

Main Breaker: ☐ Size:______________________________________

Load Bank Connection: ☐ Yes ☒ No

Type:______________________________________

Portable Connection: ☐ Yes ☒ No

Type:______________________________________

Arc Flash Label: ☐ Yes ☒ No

☐ Year Conducted:

Additional: Inoperative

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
MCC			
	Sections		

Arc Flash Label: ☐ Yes ☐ No

Year Conducted:

Company & Tel #:

Additional: N/A

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Motor Starters

	HPU Pump 1	**HPU Pump 2**	**Pump 3**
HP Size	5 hp	5 hp	
Condition	Good	Good	
Starter Type: VFD/SS/FS	FVNR	FVNR	
Amps/NEMA size:	NEMA 1	NEMA 1	
Install Date	2008	2008	
Other remarks	AC Motor	DC Motor	

	Pump 4	**Pump 5**	**Pump 6**
HP Size			
Condition			
Starter Type: VFD/SS/FS			
Amps/NEMA size:			
Install Date			
Other remarks			

	Hoist 1	**Hoist 2**	
HP Size			
Condition			

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Starter Type: VFD/SS/FS			
Amps/NEMA size:			
Install Date			
Other remarks			

	Trash Rack 1	**Trash Rack 2**	
HP Size			
Condition			
Starter Type: VFD/SS/FS			
Amps/NEMA size:			
Install Date			
Other remarks			

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	
Panelboard Schedule accurate	☒ Y ☐ N	
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location	Inside	
XFMR Size	45kVA	4160V/240V 1-phase
Panelboard Size		

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☒ Y ☐ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Criteria		Comments
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☒ Y ☐ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	Allen-Bradley
Current OI	☒ Y ☐ N	
Backup Controls	☐ Y ☒ N	
Copy of Drawings & Program	☐ Y ☒ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		Unit heaters, exhaust fans
Local utility receptacle	☒ Y ☐ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Receptacles - Interior: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A
Receptacles - Exterior: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ N/A
Interior Security Lighting: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Exterior Security Lighting ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ N/A
Alarm Systems ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Other: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Safety Issues

☐ Exposed Busing
☐ Unlanded wires
☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E
☐ Broken/Damaged equipment
☐ Inadequate working space
☐ Issues with rated equipment, panels, receptacles, lights, etc
☐ Disconnecting means
☐ Other Code issues
☐ Confined space/NFPA issues
☐ Other: ____

Other Electrical Issues:
____
____
____

Comments:
____
____
____

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Albany-Millersburg Water Treatment Plant
Address	33883 Berry Dr NE
Date	10/21/22
Time	11:10 am
Consultant Staff	Banyai, Cook, Drath, Goffe
Owner Staff	Jeff, Scott
Year Constructed	Originally: 2005

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer	Padmount		1500kVA
Pwr Provider	PacifiCorp 20.8kV-277Y/480V		
Meter #			

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
FLT-SWB01	Siemens		2008
	Voltage	Amps	AIC Rating
	480V	1600A	65kAIC

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Generator

	Manufacturer	Serial No.	Job # / Date
Generator	Cummins C25-D6	E15081210	After 2008
	Voltage	Amps	KW/KVA
			25kVA

Fuel: ☐ Gas/LP ☒ Diesel

☐ Size/Location: Belly tank

Main Breaker: ☐ Size:__________

Load Bank ☐ Yes ☒ No

Connection: Type:__________

Portable ☐ Yes ☒ No

Connection: Type:__________

Arc Flash Label: ☐ Yes ☒ No

☐ Year Conducted: Required by OSHA §1910.269 Appendix E

Additional: Not shown on plant electrical drawings. Probably used to power the 30kVA UPS transformer.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Automatic Transfer Switch

	Manufacturer	Serial No.	Job # / Date
ATS			After 2008
	Amps	PM	SPD
	60A?		

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional: Not shown on plant electrical drawings. Probably FLT-ATS02.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Motor Control Center

	Manufacturer	Serial No.	Job # / Date
MCC-001	Allen-Bradley		2008
	Sections		
	9	800A	

Arc Flash Label: ☐ Yes ☒ No

Year Conducted: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Company & Tel #:

Additional:

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Variable Frequency Drives – FLT-SWB01

	Filtrate Pump 1	**Filtrate Pump 2**	**Filtrate Pump 3**
HP Size	125 hp	125 hp	125 hp
Condition	Good	Good	Good
Starter Type: VFD/SS/FS	VFD PowerFlex 755	VFD PowerFlex 755	VFD PowerFlex 755
Amps/NEMA size:	NEMA 5	NEMA 5	NEMA 5
Install Date	2020	2018	2022
Other remarks	Goulds 3180	Goulds 3180	Goulds 3180

	Filtrate Pump 4	**BW Blower 1**	**BW Blower 2**
HP Size	125 hp	60 hp	60 hp
Condition	Good	Good	Good
Starter Type: VFD/SS/FS	VFD PowerFlex 755	VFD PowerFlex 700	VFD PowerFlex 700
Amps/NEMA size:	NEMA 5	NEMA 4	NEMA 4
Install Date	2019	2010	2007
Other remarks	Goulds 3180	Gardner Denver	Gardner Denver

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

	BW Blower 3	BW Pump 1	BW Pump 2
HP Size	60 hp	100 hp	100 hp
Condition	Good	Good	Good
Starter Type: VFD/SS/FS	VFD PowerFlex 755	VFD PowerFlex 755	VFD PowerFlex 755
Amps/NEMA size:	NEMA 4	NEMA 4	NEMA 4
Install Date	2020	2019	2019
Other remarks	Gardner Denver	Goulds 3180	Goulds 3180

Motor Starters – FLT-MCC01

	CIP Trans/Circ Pump	Neutral. Waste Tank Pump 1	Neutral. Waste Tank Pump 2
HP Size	15 hp	7.5 hp	7.5 hp
Condition	Good	Poor	Poor
Starter Type: VFD/SS/FS	FVNR	FVNR	FVNR
Amps/NEMA size:	NEMA 2	NEMA 1	NEMA 1
Install Date	2008	2008	2008
Other remarks		Pumps/motors outdoors under canopy but motors are rusty and weathered	

	Supernatant Pump 1	Supernatant Pump 2	Sump Pumps
HP Size	20 hp	20 hp	1 hp
Condition	Good	Good	Good
Starter Type: VFD/SS/FS	FVNR	FVNR	FVNR
Amps/NEMA size:	NEMA 2	NEMA 2	NEMA 1
Install Date	2021	2008	
Other remarks	Pumps/motors submerged. Control panels in fair condition, should have a weather cover.		

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

	Electrical Room Supply Fan	**Blower Room Supply Fan**	
HP Size	1.5 hp	1 hp	
Condition	Good	Good	
Starter Type: VFD/SS/FS	FVNR	FVNR	
Amps/NEMA size:	NEMA 1	NEMA 1	
Install Date			
Other remarks			

Additional: Generally, motor controllers are in excellent condition except for outdoor starters not protected by a cover, all motors in good condition except for Neutralization Pump motors in fair condition. Chemical system pumps and controllers provided by various vendors and powered from panelboard feeders. Generally in good condition.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	
Panelboard Schedule accurate	☒ Y ☐ N	
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location	Elec. Rm.	
XFMR Size	75kVA 30kVA	480-208Y/120V FLT-TX01 (From FLT-DP01) 480-208Y/120V FLT-TX01 (From ATS for UPS feeder)
Panelboard Size	225A 100A 225A 100A 100A	FLT-DP01 480V 3-Ph 225A CB FLT-LP11 208Y/120V 100A CB FLT-LP01208Y/120V 200A CB FLT-LP02 208Y/120V 100A CB FLT-ULP01 208Y/120V 100A CB

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☒ Y ☐ N	

Criteria		Comments
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☐ Y ☐ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	
Current OI	☒ Y ☐ N	
Backup Controls	☐ Y ☒ N	
Copy of Drawings & Program	☐ Y ☒ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Heating and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		Unit heaters / Exhaust Fans / Cooling where needed
Local utility receptacle	☒ Y ☐ N	

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Auxiliary Control Facilities – Sump Pumps - Electrical

Criteria		Comments
Padlockable disconnects	☒ Y ☐ N	Outdoor vault sump pump electrical panels are heavily weathered. Recommend a cover over these electrical panels and disconnect switches.

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5

Instruments

	Manufacturer	Serial No.	Type
Chlorine Transmitters	Hach		SC1000
	Range	**Note**	**Tagname**
	As Required	Good	Various
Flow Transmitters	Endress+Hauser		Magnetic
	Range	**Note**	**Tagname**
	As Required	Good, except for fair filtrate flow tubes.	Various
Fluoride Transmitter	Hach		Fluoride
	Range	**Note**	**Tagname**
	As Required	Good	A&M-CHEM-INST-FL-1
Level Transmitters	Rosemount Milltronics Pulsar Endress+Hauser Siemens	3051 Multiranger 200 Ultra 3 EI-1000 Promag 400	Hydrostatic pressure Ultrasonic Ultrasonic Radar Ultrasonic
	Range	**Note**	**Tagname**
	As Required	Good, except for outdoor transmitters not under cover	Various
ORP Transmitter	Endress+Hauser	7409A405G00	
	Range	**Note**	**Tagname**
			A&M-NB-INST-ORP-1
pH Transmitters	Hach Endress+Hauser		pH
	Range	**Note**	**Tagname**
	As Required	Good	Various

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Pressure Transmitters	Rosemount	3051	Pressure
	Range	**Note**	**Tagname**
	As Required	Good	Various
Temperature Transmitters	Rosemount	644	Temperature
	Range	**Note**	**Tagname**
	As Required	Good	Various
Turbidity Transmitters	Hach	SC1000	Turbidity
	Range	**Note**	**Tagname**
	As Required	Good	Various

Additional: Good, except outdoor transmitters not protected by a weather cover.

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Receptacles - Interior:	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Receptacles - Exterior:	☐ 1	☐ 2	☒ 3	☐ 4	☐ 5	☐ N/A
Interior Security Lighting:	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☒ N/A
Exterior Security Lighting	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Alarm Systems	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Other: Fire Alarm	☐ 1	☒ 2	☐ 3	☐ 4	☐ 5	☐ N/A

Additional:

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Safety Issues

☐ Exposed Busing
☐ Unlanded wires
☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E
☐ Broken/Damaged equipment
☐ Inadequate working space
☐ Issues with rated equipment, panels, receptacles, lights, etc
☐ Disconnecting means
☐ Other Code issues
☐ Confined space/NFPA issues
☐ Other: ____

Other Electrical Issues:

____

____

____

Comments:

____

____

____

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
3 – Fair	Is in service but maintenance or operational requirements are excessive
4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

City of Albany

Condition Assessment Work Plan

Electrical Assessment Form

Facility Name	Albany-Millersburg Metering Vaults
Address	Old Salem Rd. NE
Date	10/20/22
Time	12:45 pm
Consultant Staff	Banyai, Cook, Drath, Goffe
Owner Staff	Jeff, Scott
Year Constructed	Originally: 2005

Facility Status: ☒ Active ☐ Standby ☐ Inactive

Utility Service/Metering

	Pole / Padmount	ID #	Size
Transformer	Pole		15kVA
Pwr Provider	PacifiCorp		
Meter #			

Additional: Installed 2005

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Service Equipment

Type (SWBD, Ped, etc.)	Manufacturer	Serial No.	Job # / Date
Panelboard			2005
	Voltage	Amps	AIC Rating
	120/240V	100A	

Arc Flash Label: ☐ Yes ☒ No

Year Conducted:	Arc flash labeling needed as required by OSHA §1910.269 Appendix E
Company & Tel #:	

Additional: Installed 2005

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Panelboard & Panelboard Transformer

Criteria		Comments
Feed Breaker Size Correct	☒ Y ☐ N	
Panelboard Schedule accurate	☒ Y ☐ N	
Correct Breaker Size	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Labeled	☒ Y ☐ N	
Disconnecting means identified	☒ Y ☐ N	
Location	Pole	
XFMR Size	Service	
Panelboard Sizes	100A MVA 100A MVM	50A MCB 50A MCB

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

General Conduit & Wiring

Criteria		Comments
Conduits labeled	☐ Y ☒ N	
Conduits supported	☒ Y ☐ N	
Wires labeled	☒ Y ☐ N	
Wires protected by breaker	☒ Y ☐ N	
Free movement of wires	☒ Y ☐ N	
Adequate space in boxes	☒ Y ☐ N	
Panel doors grounded	☒ Y ☐ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

RTU Panel

Criteria		Comments
Standalone	☒ Y ☐ N	
Backup RTU Power	☒ Y ☐ N	
Clean Installation	☒ Y ☐ N	
Current PLC	☒ Y ☐ N	Allen-Bradley ControlLogix Remote I/O Panel
Current OI	☐ Y ☒ N	
Backup Controls	☐ Y ☒ N	
Copy of Drawings & Program	☐ Y ☒ N	

Additional: Arc flash labeling needed as required by OSHA §1910.269 Appendix E

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Condition Assessment Rating: ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Heading and Ventilation Equipment – Electrical Only

Criteria		Comments
Wet Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dry Well Ventilation		
Local utility receptacle	☐ Y ☒ N	
Dehumidification		
Local utility receptacle	☐ Y ☒ N	
Heating/Cooling		
Local utility receptacle	☐ Y ☒ N	

Additional: N/A

Condition Assessment Rating: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Auxiliary Control Facilities – Sump Pumps - Electrical

Criteria		Comments
Padlockable disconnect	☐ Y ☒ N	Two 2 hp sump pumps common control panel MVA Two 2 hp sump pumps common control panel MVM

Additional: In metering vaults

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Instruments

	Manufacturer	Serial No.	Type
Flow Xmtr MVA			Magnetic
	Range	**Note**	**Tagname**
			72FIT0301
Flow Xmtr MVM			Magnetic
	Range	**Note**	**Tagname**
			71FIT0301
Pressure Xmtrs			
	Range	**Note**	**Tagname**
			72PIT0901 72PIT1001
Sump Level Switches		LSLL/LSL/LSH/LSHH LSLL/LSL/LSH/LSHH	71LS1101 MVA 72LS5301 MVM

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Additional: Installed 2005

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Facility Assessment – Electrical

Security Systems: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Receptacles - Interior: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A Inside MVM-CP01
Receptacles - Exterior: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Interior Security Lighting: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Exterior Security Lighting ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☒ N/A
Alarm Systems ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A Door/Hatch Switches
Other: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ N/A

Additional: Installed 2005

Condition Assessment Rating: ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5

Safety Issues

☐ Exposed Busing
☐ Unlanded wires
☒ No/Out of date Arc Flash Labels as required by OSHA §1910.269 Appendix E
☐ Broken/Damaged equipment
☐ Inadequate working space
☐ Issues with rated equipment, panels, receptacles, lights, etc
☐ Disconnecting means
☐ Other Code issues
☐ Confined space/NFPA issues
☐ Other: ____

Other Electrical Issues:

____
____
____

Comments:

____
____
____

Rating Criteria

Conditional Assessment Rating

1 – Excellent	New or nearly-new structure or equipment
2 – Good	Well maintained, like-new condition of equipment or structure
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4 – Poor	Equipment integrity compromised by corrosion, wear or obsolescence. In service, but replacement should be schedule.
5 – Immediate Action	Equipment integrity severely compromised by corrosion or wear. Possible imminent failure. Health and Safety Issue.

1=Excellent 2=Good 3 = Fair 4=Poor 5=Immediate action

Appendix E

Risk Assessment

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	COF Score (1-5)	COF Description	POF Score (1-5)	POF Description	Risk Score
CARTEGRAPH ASSETS												
A34019	34-PS-AHWR-TRAD-1	34th Street	Pump Station Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	3	Moderate	2	Low	Medium
15483	34-PS-INST-CLRN-1	34th Street	Pump Station Facility	Instrument	Chlorine	1	CHLORINE ANALYZER	1	Negligible	2	Low	Low
15491	34-PS-INST-COND-1	34th Street	Pump Station Facility	Instrument	Conductivity	1	CONDUCTIVITY	1	Negligible	2	Low	Low
15482	34-PS-INST-FLM-1	34th Street	Pump Station Facility	Instrument	Flow Meter	1	FLOW	3	Moderate	3	Moderate	Medium
15490	34-PS-INST-ORP-1	34th Street	Pump Station Facility	Instrument	ORP	1		1	Negligible	2	Low	Low
15485	34-PS-INST-PH-1	34th Street	Pump Station Facility	Instrument	pH	1	PH - 34th St	1	Negligible	2	Low	Low
15484	34-PS-INST-TRBD-1	34th Street	Pump Station Facility	Instrument	Turbidity	1	WTD - TURBIDITY - 34th St	1	Negligible	2	Low	Low
15480	34-PS-MTST-MAG-1	34th Street	Pump Station Facility	MotorStarter	Magnetic	1	MCC 1	3	Moderate	2	Low	Medium
15473	34-PS-MTST-MAG-2	34th Street	Pump Station Facility	MotorStarter	Magnetic	2	MCC 2	3	Moderate	3	Moderate	Medium
15486	34-PS-MTST-SS-3	34th Street	Pump Station Facility	MotorStarter	Soft Start	3	MCC 3	1	Negligible	3	Moderate	Low
WTD - Pump Station Facility - 34th Street	34-PS-FCLT-PS-1	34th Street	Pump Station Facility	Water Facility	Pump Station	1		2	Low	3	Moderate	Medium
15482	34-PS-PUMP-CTFL-1	34th Street	Pump Station Facility	WaterPump	Centrifugal	1	PUMP #1(#41)(South)	3	Moderate	3	Moderate	Medium
15481	34-PS-PUMP-CTFL-2	34th Street	Pump Station Facility	WaterPump	Centrifugal	2	PUMP #2 (#42)(Middle)	3	Moderate	3	Moderate	Medium
15475	34-PS-PUMP-RAD-3	34th Street	Pump Station Facility	WaterPump	Radial Flow	3	PUMP #3 (#43)(North) - WTD - 34th St	1	Negligible	3	Moderate	Low
A75160	34-RSVR-AHWR-LSEN-1	34th Street	Reservoir Facility	AutomationHardware	Level Sensor	1	Ultrasonic Level Measurement Device	3	Moderate	3	Moderate	Medium
WTD - 34Th Steet Reservoir	34-RSVR-RSVR-RESR-1	34th Street	Reservoir Facility	WaterStorageTank	Reservoir	1	Steel	2	Low	3	Moderate	Medium
16582	BDWY-PS-VALV-30"-1	Broadway Street	Pump Station Facility	WTP Valves	30" Valve	1	Seismic Valve Actuator	5	Severe	2	Low	Medium
16	BDWY-RSVR-AHWR-FLM-1	Broadway Street	Reservoir Facility	AutomationHardware	Flow Meter	1	FLOW	5	Severe	2	Low	Medium
A75133	BDWY-RSVR-AHWR-LSEN-1	Broadway Street	Reservoir Facility	AutomationHardware	Level Sensor	1	Ultrasonic Level Measurement Device	5	Severe	3	Moderate	High
A75211	BDWY-RSVR-AHWR-TRAD-1	Broadway Street	Reservoir Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	5	Severe	2	Low	Medium
A75152	BDWY-RSVR-AHWR-TRBD-1	Broadway Street	Reservoir Facility	AutomationHardware	Turbidity	1	Turbidimeter	2	Low	3	Moderate	Medium
16192	BDWY-RSVR-INST-CLRN-1	Broadway Street	Reservoir Facility	Instrument	Chlorine	1	CHLORINE	2	Low	3	Moderate	Medium
16193	BDWY-RSVR-INST-COND-1	Broadway Street	Reservoir Facility	Instrument	Conductivity	1	CONDUCTIVITY	2	Low	3	Moderate	Medium
INST-000080	BDWY-RSVR-INST-CTRL-1	Broadway Street	Reservoir Facility	Instrument	Control Cab	1	Broadway Reservoir Control Cab	3	Moderate	2	Low	Medium
16075	BDWY-RSVR-INST-PH-1	Broadway Street	Reservoir Facility	Instrument	pH	1		1	Negligible	3	Moderate	Low
15486	BDWY-RSVR-INST-TRBD-1	Broadway Street	Reservoir Facility	Instrument	Turbidity	1	WTD - TURBIDITY - Broadway	1	Negligible	3	Moderate	Low
WTD - Broadway Reservoir	BDWY-RSVR-RSVR-RESR-1	Broadway Street	Reservoir Facility	WaterStorageTank	Reservoir	1	Concrete	5	Severe	3	Moderate	High
2	GBHL-PS-AHWR-FLM-1	Gibson Hill	Pump Station Facility	AutomationHardware	Flow Meter	1	FLOW	3	Moderate	2	Low	Medium
1	GBHL-PS-AHWR-TRAD-1	Gibson Hill	Pump Station Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	3	Moderate	2	Low	Medium
CRN-22	GBHL-PS-CRN-CRN-1	Gibson Hill	Pump Station Facility	Crane	Crane	1	A-Frame (1.1 Ton)	2	Low	3	Moderate	Medium
CRN-12	GBHL-PS-CRN-CRN-2	Gibson Hill	Pump Station Facility	Crane	Crane	2	Hoist (2 Ton) Trolley Rail (2 Ton)	2	Low	3	Moderate	Medium
MSTR-000031-1	GBHL-PS-MTST-OTFC-1	Gibson Hill	Pump Station Facility	MotorStarter	Open Type	1	MCC 1 - Open Type Feed-Through Contactor	3	Moderate	2	Low	Medium
MSTR-000032-1	GBHL-PS-MTST-OTFC-2	Gibson Hill	Pump Station Facility	MotorStarter	Open Type	2	MCC 2 - Open Type Feed-Through Contactor	3	Moderate	2	Low	Medium
WTD - Pump Station Facility - Gibson HIll	GBHL-PS-FCLT-PS-1	Gibson Hill	Pump Station Facility	Water Facility	Pump Station	1		3	Moderate	2	Low	Medium
15240	GBHL-PS-PUMP-CTFL-1	Gibson Hill	Pump Station Facility	WaterPump	Centrifugal	1	Pump 1	3	Moderate	3	Moderate	Medium
15239	GBHL-PS-PUMP-CTFL-2	Gibson Hill	Pump Station Facility	WaterPump	Centrifugal	2	Pump 2	3	Moderate	3	Moderate	Medium
CRN-21	MPL-PS-CRN-CRN-1	Maple Street	Pump Station Facility	Crane	Crane	1	A-Frame (1.2 Ton)	1	Negligible	1	Very Low	Low
16191	MPL-PS-INST-CLRN-1	Maple Street	Pump Station Facility	Instrument	Chlorine	1	CHLORINE - WTP1 Finished Water	2	Low	2	Low	Low
16206	MPL-PS-INST-FL-1	Maple Street	Pump Station Facility	Instrument	Fluoride	1	FLOURIDE - WTP1 Finished Water	2	Low	3	Moderate	Medium
16074	MPL-PS-INST-PH-1	Maple Street	Pump Station Facility	Instrument	pH	1	PH - WTP1 Finished Water	3	Moderate	1	Very Low	Low
WTD - Pump Station Facility - Maple Street	MPL-PS-FCLT-PS-1	Maple Street	Pump Station Facility	Water Facility	Pump Station	1		4	Major	4	High	Severe
13629	MPL-PS-PUMP-CTFL-1	Maple Street	Pump Station Facility	WaterPump	Centrifugal	1	PUMP - High Service #1	3	Moderate	2	Low	Medium
13630	MPL-PS-PUMP-CTFL-2	Maple Street	Pump Station Facility	WaterPump	Centrifugal	2	PUMP - High Service #2	2	Low	3	Moderate	Medium
13631	MPL-PS-PUMP-CTFL-3	Maple Street	Pump Station Facility	WaterPump	Centrifugal	3	PUMP - High Service #3	3	Moderate	2	Low	Medium
13632	MPL-PS-PUMP-CTFL-4	Maple Street	Pump Station Facility	WaterPump	Centrifugal	4	PUMP - High Service #4	3	Moderate	2	Low	Medium
13633	MPL-PS-PUMP-CTFL-5	Maple Street	Pump Station Facility	WaterPump	Centrifugal	5	PUMP - High Service #5	2	Low	3	Moderate	Medium
16320	MPL-PS-PUMP-JET-1	Maple Street	Pump Station Facility	WaterPump	Jet	1	PUMP - Sump (High Service Bldg)	1	Negligible	2	Low	Low
13661	MPL-PS-VALV-24"-1	Maple Street	Pump Station Facility	WTP Valves	24" Valve	1	Discharge Header Valve	2	Low	1	Very Low	Low
WTD - Maple St Reservoir	MPL-RSVR-RSVR-RESR-1	Maple Street	Reservoir Facility	WaterStorageTank	Reservoir	1	Steel	4	Major	4	High	Severe
A75148	NALB-PS-AHWR-FLM-1	North Albany	Pump Station Facility	AutomationHardware	Flow Meter	1	FLOW	4	Major	2	Low	Medium
3	NALB-PS-AHWR-TRAD-1	North Albany	Pump Station Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	4	Major	2	Low	Medium

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	COF Score (1-5)	COF Description	POF Score (1-5)	POF Description	Risk Score
MSTR-000033	NALB-PS-MTST-MAG-1	North Albany	Pump Station Facility	MotorStarter	Magnetic	1	MCC 1	4	Major	2	Low	Medium
MSTR-000034	NALB-PS-MTST-MAG-2	North Albany	Pump Station Facility	MotorStarter	Magnetic	2	MCC 2	4	Major	2	Low	Medium
WTD - Pump Station Facility - North Albany	NALB-PS-FCLT-PS-1	North Albany	Pump Station Facility	Water Facility	Pump Station	1		4	Major	4	High	Severe
15229	NALB-PS-PUMP-CTFL-2	North Albany	Pump Station Facility	WaterPump	Centrifugal	2	Pump 2	4	Major	4	High	Severe
15230	NALB-PS-PUMP-RAD-1	North Albany	Pump Station Facility	WaterPump	Radial Flow	1	Pump 1	4	Major	4	High	Severe
22	QN-PS-AHWR-FLM-1	Queen Avenue	Pump Station Facility	AutomationHardware	Flow Meter	1	FLOW	3	Moderate	2	Low	Medium
A75159	QN-PS-AHWR-LSEN-1	Queen Avenue	Pump Station Facility	AutomationHardware	Level Sensor	1	Ultrasonic Level Measurement Device	3	Moderate	3	Moderate	Medium
21	QN-PS-AHWR-TRAD-1	Queen Avenue	Pump Station Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	3	Moderate	2	Low	Medium
15470	QN-PS-MTST-MAG-1	Queen Avenue	Pump Station Facility	MotorStarter	Magnetic	1	MCC 1	3	Moderate	3	Moderate	Medium
15460	QN-PS-MTST-MAG-2	Queen Avenue	Pump Station Facility	MotorStarter	Magnetic	2	MCC 2	3	Moderate	3	Moderate	Medium
WTD - Pump Station Facility - Queen Avenue	QN-PS-FCLT-PS-1	Queen Avenue	Pump Station Facility	Water Facility	Pump Station	1		3	Moderate	3	Moderate	Medium
15479	QN-PS-PUMP-CTFL-1	Queen Avenue	Pump Station Facility	WaterPump	Centrifugal	1	Pump 1	3	Moderate	3	Moderate	Medium
15472	QN-PS-PUMP-CTFL-2	Queen Avenue	Pump Station Facility	WaterPump	Centrifugal	2	Pump 2	3	Moderate	3	Moderate	Medium
WTD - Queen Ave Reservoir	QN-RSVR-RSVR-RESR-1	Queen Avenue	Reservoir Facility	WaterStorageTank	Reservoir	1	Steel	2	Low	3	Moderate	Medium
5	VV-PS-AHWR-FLM-1	Valley View	Pump Station Facility	AutomationHardware	Flow Meter	1	FLOW	3	Moderate	2	Low	Medium
10	VV-PS-AHWR-TRAD-1	Valley View	Pump Station Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	3	Moderate	2	Low	Medium
11	VV-PS-AHWR-TRAD-2	Valley View	Pump Station Facility	AutomationHardware	Telemetry Radio	2	REPEATER	3	Moderate	2	Low	Medium
15221	VV-PS-GEN-DSL-1	Valley View	Pump Station Facility	ElectricalGenerator	Diesel	1	Valley View Emergency Generator	3	Moderate	2	Low	Medium
15217	VV-PS-INST-CLRN-1	Valley View	Pump Station Facility	Instrument	Chlorine	1	CHLORINE	1	Negligible	2	Low	Low
15489	VV-PS-INST-COND-1	Valley View	Pump Station Facility	Instrument	Conductivity	1	COND	1	Negligible	2	Low	Low
15222	VV-PS-INST-CTRL-1	Valley View	Pump Station Facility	Instrument	Control Cab	1	Valley View PS Control Cab	3	Moderate	2	Low	Medium
15487	VV-PS-INST-ORP-1	Valley View	Pump Station Facility	Instrument	ORP	1		1	Negligible	2	Low	Low
15488	VV-PS-INST-PH-1	Valley View	Pump Station Facility	Instrument	pH	1	PH - Valley View	1	Negligible	2	Low	Low
15220	VV-PS-INST-TSMR-1	Valley View	Pump Station Facility	Instrument	Transmitter	1	WTD - Valley View WQ Monitor	1	Negligible	2	Low	Low
15219	VV-PS-INST-TRBD-1	Valley View	Pump Station Facility	Instrument	Turbidity	1	WTD - TURBIDITY - Valley View	1	Negligible	2	Low	Low
MSTR-000035	VV-PS-MTST-MAG-1	Valley View	Pump Station Facility	MotorStarter	Magnetic	1	MCC J	3	Moderate	2	Low	Medium
MSTR-000036	VV-PS-MTST-VFD-2	Valley View	Pump Station Facility	MotorStarter	VFD	2	MCC 2	3	Moderate	2	Low	Medium
MSTR-000037	VV-PS-MTST-VFD-3	Valley View	Pump Station Facility	MotorStarter	VFD	3	MCC 3	3	Moderate	2	Low	Medium
WTD - Pump Station Facility - Valley View	VV-PS-FCLT-PS-1	Valley View	Pump Station Facility	Water Facility	Pump Station	1		3	Moderate	3	Moderate	Medium
15218	VV-PS-PUMP-CTFL-1	Valley View	Pump Station Facility	WaterPump	Centrifugal	1	Jockey Pump	3	Moderate	3	Moderate	Medium
15213	VV-PS-PUMP-CTFL-2	Valley View	Pump Station Facility	WaterPump	Centrifugal	2	Pump 2	2	Low	2	Low	Low
15212	VV-PS-PUMP-CTFL-3	Valley View	Pump Station Facility	WaterPump	Centrifugal	3	Pump 3	2	Low	2	Low	Low
A75156	VV-RSVR-AHWR-LSEN-1	Valley View	Reservoir Facility	AutomationHardware	Level Sensor	1	Ultrasonic Level Measurement Device	3	Moderate	2	Low	Medium
A75157	VV-RSVR-AHWR-LSEN-2	Valley View	Reservoir Facility	AutomationHardware	Level Sensor	2	Ultrasonic Level Measurement Device	3	Moderate	2	Low	Medium
A75158	VV-RSVR-AHWR-LSEN-3	Valley View	Reservoir Facility	AutomationHardware	Level Sensor	3	Ultrasonic Level Measurement Device	3	Moderate	2	Low	Medium
16321	VV-RSVR-PUMP-JET-1	Valley View	Reservoir Facility	WaterPump	Jet	1	JET MIXER - North Tank	2	Low	2	Low	Low
16322	VV-RSVR-PUMP-JET-2	Valley View	Reservoir Facility	WaterPump	Jet	2	JET MIXER - Middle Tank	2	Low	2	Low	Low
16323	VV-RSVR-PUMP-JET-3	Valley View	Reservoir Facility	WaterPump	Jet	3	JET MIXER - South Tank	2	Low	2	Low	Low
WTD - Valley View North Tank	VV-RSVR-RSVR-RESR-1	Valley View	Reservoir Facility	WaterStorageTank	Reservoir	1	Steel - North Tank	3	Moderate	4	High	High
WTD - Valley View Middle Tank	VV-RSVR-RSVR-RESR-2	Valley View	Reservoir Facility	WaterStorageTank	Reservoir	2	Steel - Middle Tank	3	Moderate	4	High	High
WTD - Valley View South Tank	VV-RSVR-RSVR-RESR-3	Valley View	Reservoir Facility	WaterStorageTank	Reservoir	3	Steel - South Tank	3	Moderate	3	Moderate	Medium
14	WWD-RSVR-AHWR-LSEN-1	Wildwood	Reservoir Facility	AutomationHardware	Level Sensor	1	Radar Level Measurement Device	3	Moderate	3	Moderate	Medium
12	WWD-RSVR-AHWR-TRAD-1	Wildwood	Reservoir Facility	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	3	Moderate	2	Low	Medium
WTD - Wildwood Reservoir	WWD-RSVR-RSVR-RESR-1	Wildwood	Reservoir Facility	WaterStorageTank	Reservoir	1	Concrete	3	Moderate	2	Low	Medium
13615	VINE-ACC1-INST-FLM-1	WTP1 (Vine St)	Accelator #1	Instrument	Flow Meter	1	Raw Water flow meter	3	Moderate	1	Very Low	Low
WTP1 - ACCELATOR #1	VINE-ACC1-FCLT-FCLT-1	WTP1 (Vine St)	Accelator #1	Water Facility	Facility	1		4	Major	4	High	Severe
13607	VINE-ACC1-PUMP-CTFL-1	WTP1 (Vine St)	Accelator #1	WaterPump	Centrifugal	1	PUMP - Raw Treated Sample #1	1	Negligible	2	Low	Low

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	COF Score (1-5)	COF Description	POF Score (1-5)	POF Description	Risk Score
13608	VINE-ACC1-PUMP-CTFL-2	WTP1 (Vine St)	Accelator #1	WaterPump	Centrifugal	2	PUMP - Raw Treated Sample #2	1	Negligible	2	Low	Low
13603-1	VINE-ACC1-PUMP-MIX-1	WTP1 (Vine St)	Accelator #1	WaterPump	Mixer	1	MIXER - Accelator #1	3	Moderate	2	Low	Medium
WTP1 - ACCELATOR #2	VINE-ACC2-FCLT-FCLT-2	WTP1 (Vine St)	Accelator #2	Water Facility	Facility	2		4	Major	3	Moderate	High
13610-1	VINE-ACC2-PUMP-MIX-2	WTP1 (Vine St)	Accelator #2	WaterPump	Mixer	2	MIXER - Accelator #2	3	Moderate	2	Low	Medium
13702	VINE-BWSH-MTST-VFD-2	WTP1 (Vine St)	Backwash System	MotorStarter	VFD	2	Backwash Pump #2	4	Major	2	Low	Medium
PV-24	VINE-BWSH-PRSR-AIRF-2	WTP1 (Vine St)	Backwash System	Pressure Vessel	Air Filter	2	AIR FILTER (Left Side) - Backwash Settling Ponds	1	Negligible	4	High	Medium
PV-25	VINE-BWSH-PRSR-AIRF-3	WTP1 (Vine St)	Backwash System	Pressure Vessel	Air Filter	3	AIR FILTER (Right Side) - Backwash Settling Ponds	1	Negligible	4	High	Medium
PV-21	VINE-BWSH-PRSR-AIRR-1	WTP1 (Vine St)	Backwash System	Pressure Vessel	Air Receiver	1	AIR RECEIVER - Backwash Settling Ponds	1	Negligible	4	High	Medium
WTP1 - BACKWASH SETTLING PONDS	VINE-BWSH-FCLT-FCLT-1	WTP1 (Vine St)	Backwash System	Water Facility	Facility	1	Backwash Settling Ponds	4	Major	4	High	Severe
13562	VINE-BWSH-PUMP-VTRB-5	WTP1 (Vine St)	Backwash System	WaterPump	Vertical Turbine	5	PUMP - Backwash - Small Filter	4	Major	2	Low	Medium
13563	VINE-BWSH-PUMP-VTRB-6	WTP1 (Vine St)	Backwash System	WaterPump	Vertical Turbine	6	PUMP - Backwash - Large Filter	4	Major	2	Low	Medium
13596-1	VINE-CHEM-CHEM-ACH-1	WTP1 (Vine St)	Chemical Facility	ChemSystem	ACH	1	ACH Metering Pump 1	1	Negligible	2	Low	Low
13595	VINE-CHEM-CHEM-ACH-2	WTP1 (Vine St)	Chemical Facility	ChemSystem	ACH	2	ACH Metering Pump 2	1	Negligible	2	Low	Low
13599	VINE-CHEM-CHEM-FL-1	WTP1 (Vine St)	Chemical Facility	ChemSystem	Fluoride	1	Fluoride Dust Collector	1	Negligible	2	Low	Low
13598	VINE-CHEM-CHEM-FL-2	WTP1 (Vine St)	Chemical Facility	ChemSystem	Fluoride	2	Flouride Feeder	1	Negligible	2	Low	Low
13503	VINE-CHEM-CHEM-FL-3	WTP1 (Vine St)	Chemical Facility	ChemSystem	Fluoride	3	Flouride Feeder System	1	Negligible	2	Low	Low
16320	VINE-CHEM-CHEM-POLY-1	WTP1 (Vine St)	Chemical Facility	ChemSystem	Polymer	1	Polymer Metering Pump 1	1	Negligible	2	Low	Low
16321	VINE-CHEM-CHEM-POLY-2	WTP1 (Vine St)	Chemical Facility	ChemSystem	Polymer	2	Polymer Metering Pump 2	1	Negligible	2	Low	Low
13594	VINE-CHEM-CHEM-POLY-3	WTP1 (Vine St)	Chemical Facility	ChemSystem	Polymer	3	Polymer System	4	Major	3	Moderate	High
13505	VINE-CHEM-CHEM-HYPO-1	WTP1 (Vine St)	Chemical Facility	ChemSystem	Sodium Hypochlorite	1	Sodium Hypochlorite Pump 1	1	Negligible	2	Low	Low
13506	VINE-CHEM-CHEM-HYPO-2	WTP1 (Vine St)	Chemical Facility	ChemSystem	Sodium Hypochlorite	2	Sodium Hypochlorite Pump 2	1	Negligible	2	Low	Low
13507	VINE-CHEM-CHEM-HYPO-3	WTP1 (Vine St)	Chemical Facility	ChemSystem	Sodium Hypochlorite	3	Sodium Hypochlorite Pump 3	1	Negligible	2	Low	Low
13508	VINE-CHEM-CHEM-HYPO-4	WTP1 (Vine St)	Chemical Facility	ChemSystem	Sodium Hypochlorite	4	Sodium Hypochlorite Pump 4	1	Negligible	2	Low	Low
INST-000138	VINE-CHEM-INST-LSEN-1	WTP1 (Vine St)	Chemical Facility	Instrument	Level Sensor	1	LEVEL - Tank - #1 - Hypochlorite - Radar	3	Moderate	1	Very Low	Low
INST-000139	VINE-CHEM-INST-LSEN-2	WTP1 (Vine St)	Chemical Facility	Instrument	Level Sensor	2	LEVEL - Tank - #2 - Hypochlorite - Radar	3	Moderate	1	Very Low	Low
INST-000140	VINE-CHEM-INST-LSEN-3	WTP1 (Vine St)	Chemical Facility	Instrument	Level Sensor	3	LEVEL - Tank - ACH - Radar	3	Moderate	1	Very Low	Low
13609	VINE-CHEM-INST-PH-1	WTP1 (Vine St)	Chemical Facility	Instrument	pH	1	PH - Raw Water Treated	3	Moderate	1	Very Low	Low
13601	VINE-CHEM-INST-sCM-1	WTP1 (Vine St)	Chemical Facility	Instrument	Streaming Current Monitor	1	WTP1 - SCM - Raw Water #1	2	Low	3	Moderate	Medium
13602	VINE-CHEM-INST-sCM-2	WTP1 (Vine St)	Chemical Facility	Instrument	Streaming Current Monitor	2	WTP1 - SCM - Raw Water #2	3	Moderate	2	Low	Medium
WTP1 - CHEMICAL FACILITY	VINE-CHEM-FCLT-FCLT-1	WTP1 (Vine St)	Chemical Facility	Water Facility	Facility	1		4	Major	5	Very High	Severe
15454	VINE-CHEM-TANK-ACH-1	WTP1 (Vine St)	Chemical Facility	WTPTank	ACH	1	TANK - ACH	1	Negligible	1	Very Low	Low
15455	VINE-CHEM-TANK-CHEM-1	WTP1 (Vine St)	Chemical Facility	WTPTank	Chemical Storage	1	TANK - Hypochlorite #1	1	Negligible	1	Very Low	Low
15456	VINE-CHEM-TANK-CHEM-2	WTP1 (Vine St)	Chemical Facility	WTPTank	Chemical Storage	2	TANK - Hypochlorite #2	1	Negligible	1	Very Low	Low
13644	VINE-CTRL-INST-CLRN-1	WTP1 (Vine St)	Control Building	Instrument	Chlorine	1	CHLORINE - Mid	2	Low	2	Low	Low
13604	VINE-CTRL-INST-FL-1	WTP1 (Vine St)	Control Building	Instrument	Fluoride	1	FLOURIDE - Lab	2	Low	2	Low	Low
16267	VINE-CTRL-INST-PH-1	WTP1 (Vine St)	Control Building	Instrument	pH	1	PH - Multimeter (PH & Other) - Lab	2	Low	1	Very Low	Low
16266	VINE-CTRL-INST-TITR-1	WTP1 (Vine St)	Control Building	Instrument	Titrator	1	WTP1 - TITRATOR - Lab	2	Low	2	Low	Low
12628	VINE-CTRL-INST-TRBD-1	WTP1 (Vine St)	Control Building	Instrument	Turbidity	1	WTP1 - TURBIDITY - Desktop - Lab	2	Low	1	Very Low	Low
WTP1 - CONTROL BLDG	VINE-CTRL-FCLT-FCLT-1	WTP1 (Vine St)	Control Building	Water Facility	Facility	1		4	Major	4	High	Severe
INST-000109	VINE-OFLT-INST-DP-7	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Differential Pressure (DP)	7	Headloss(DPT) - #7 Filter	2	Low	1	Very Low	Low
INST-000110	VINE-OFLT-INST-DP-8	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Differential Pressure (DP)	8	Headloss(DPT) - #8 Filter	2	Low	1	Very Low	Low
INST-000111	VINE-OFLT-INST-DP-9	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Differential Pressure (DP)	9	Headloss(DPT) - #9 Filter	2	Low	1	Very Low	Low
INST-000112	VINE-OFLT-INST-DP-10	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Differential Pressure (DP)	10	Headloss(DPT) - #10 Filter	2	Low	1	Very Low	Low
13592	VINE-OFLT-INST-FLM-1	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Flow Meter	1	Backwash Flow Meter (Filters 7-10)	3	Moderate	1	Very Low	Low
13588	VINE-OFLT-INST-FLM-7	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Flow Meter	7	Filter 7 Flow	2	Low	1	Very Low	Low
13589	VINE-OFLT-INST-FLM-8	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Flow Meter	8	Filter 8 Flow	2	Low	1	Very Low	Low
13590	VINE-OFLT-INST-FLM-9	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Flow Meter	9	Filter 9 Flow	2	Low	1	Very Low	Low
13591	VINE-OFLT-INST-FLM-10	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Flow Meter	10	Filter 10 Flow	2	Low	1	Very Low	Low
13627	VINE-OFLT-INST-PRSS-1	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Pressure Sensor	1	Flume Level (A)	2	Low	1	Very Low	Low
13628	VINE-OFLT-INST-PRSS-2	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Pressure Sensor	2	Flume Level (B)	2	Low	1	Very Low	Low
13564	VINE-OFLT-INST-TRBD-7	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Turbidity	7	WTP1 - TURBIDITY - Filter #7	3	Moderate	2	Low	Medium
13565	VINE-OFLT-INST-TRBD-8	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Turbidity	8	WTP1 - TURBIDITY - Filter #8	3	Moderate	2	Low	Medium
13566	VINE-OFLT-INST-TRBD-9	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Turbidity	9	WTP1 - TURBIDITY - Filter #9	3	Moderate	2	Low	Medium
13567	VINE-OFLT-INST-TRBD-10	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Instrument	Turbidity	10	WTP1 - TURBIDITY - Filter #10	3	Moderate	2	Low	Medium

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	COF Score (1-5)	COF Description	POF Score (1-5)	POF Description	Risk Score
WTP1 - FILTER 7-10 FACILITY	VINE-OFLT-FCLT-FCLT-1	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	Water Facility	Facility	1		4	Major	4	High	Severe
13593	VINE-OFLT-PUMP-CTFL-1	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WaterPump	Centrifugal	1	PUMP - Surface Wash Booster	4	Major	2	Low	Medium
13585	VINE-OFLT-VALV-20"-10B	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	10B	Filter 10 Backwash Valve	4	Major	2	Low	Medium
13584	VINE-OFLT-VALV-20"-10E	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	10E	Filter 10 Effluent Control Valve	4	Major	2	Low	Medium
13583	VINE-OFLT-VALV-20"-10I	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	10I	Filter 10 Influent Valve	3	Moderate	2	Low	Medium
13570	VINE-OFLT-VALV-20"-7B	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	7B	Filter 7 Backwash Valve	4	Major	2	Low	Medium
13569	VINE-OFLT-VALV-20"-7E	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	7E	Filter 7 Effluent Control Valve	4	Major	2	Low	Medium
13568	VINE-OFLT-VALV-20"-7I	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	7I	Filter 7 Influent Valve	3	Moderate	2	Low	Medium
13575	VINE-OFLT-VALV-20"-8B	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	8B	Filter 8 Backwash Valve	4	Major	2	Low	Medium
13574	VINE-OFLT-VALV-20"-8E	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	8E	Filter 8 Effluent Control Valve	4	Major	2	Low	Medium
13573	VINE-OFLT-VALV-20"-8I	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	8I	Filter 8 Influent Valve	3	Moderate	2	Low	Medium
13580	VINE-OFLT-VALV-20"-9B	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	9B	Filter 9 Backwash Valve	4	Major	2	Low	Medium
13579	VINE-OFLT-VALV-20"-9E	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	9E	Filter 9 Effluent Control Valve	4	Major	2	Low	Medium
13578	VINE-OFLT-VALV-20"-9I	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	20" Valve	9I	Filter 9 Influent Valve	3	Moderate	2	Low	Medium
13571	VINE-OFLT-VALV-24"-7	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	24" Valve	7	Filter 7 Waste Valve	3	Moderate	2	Low	Medium
13576	VINE-OFLT-VALV-24"-8	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	24" Valve	8	Filter 8 Waste Valve	3	Moderate	2	Low	Medium
13581	VINE-OFLT-VALV-24"-9	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	24" Valve	9	Filter 9 Waste Valve	3	Moderate	2	Low	Medium
13586	VINE-OFLT-VALV-24"-10	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTP Valves	24" Valve	10	Filter 10 Waste Valve	3	Moderate	2	Low	Medium
15449	VINE-OFLT-TANK-FLM-1	WTP1 (Vine St)	Filter 7-10 Facility (Outdoor)	WTPTank	Flume	1	Flume	5	Severe	2	Low	Medium
13616	VINE-IFLT-CPSR-AIRC-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Compressor	Air Compressor	1	High Pressure Air Dryer	2	Low	2	Low	Low
13524	VINE-IFLT-INST-CLRN-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Chlorine	1	CHLORINE - Clearwell	2	Low	2	Low	Low
INST-000103	VINE-IFLT-INST-DP-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Differential Pressure (DP)	1	Headloss (DPT) - #1 Filter	2	Low	1	Very Low	Low
INST-000104	VINE-IFLT-INST-DP-2	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Differential Pressure (DP)	2	Headloss(DPT) - #2 Filter	2	Low	1	Very Low	Low
INST-000105	VINE-IFLT-INST-DP-3	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Differential Pressure (DP)	3	Headloss(DPT) - #3 Filter	2	Low	1	Very Low	Low
INST-000106	VINE-IFLT-INST-DP-4	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Differential Pressure (DP)	4	Headloss(DPT) - #4 Filter	2	Low	1	Very Low	Low
INST-000107	VINE-IFLT-INST-DP-5	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Differential Pressure (DP)	5	Headloss(DPT) - #5 Filter	2	Low	1	Very Low	Low
INST-000108	VINE-IFLT-INST-DP-6	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Differential Pressure (DP)	6	Headloss(DPT) - #6 Filter	2	Low	1	Very Low	Low
13556	VINE-IFLT-INST-FLM-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	1	Filter 1 Flow	2	Low	1	Very Low	Low
13557	VINE-IFLT-INST-FLM-2	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	2	Filter 2 Flow	2	Low	1	Very Low	Low
13558	VINE-IFLT-INST-FLM-3	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	3	Filter 3 Flow	2	Low	1	Very Low	Low
13559	VINE-IFLT-INST-FLM-4	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	4	Filter 4 Flow	2	Low	1	Very Low	Low
13560	VINE-IFLT-INST-FLM-5	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	5	Filter 5 Flow	2	Low	1	Very Low	Low
13561	VINE-IFLT-INST-FLM-6	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	6	Filter 6 Flow	2	Low	1	Very Low	Low
13593	VINE-IFLT-INST-FLM-7	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Flow Meter	7	Backwash Flow Meter (Filters 1-6)	2	Low	1	Very Low	Low
13525	VINE-IFLT-INST-PH-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	pH	1	PH - Clearwell	3	Moderate	1	Very Low	Low
13517	VINE-IFLT-INST-TRBD-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	1	WTP1 - TURBIDITY - Filter #1	3	Moderate	2	Low	Medium
13518	VINE-IFLT-INST-TRBD-2	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	2	WTP1 - TURBIDITY - Filter #2	3	Moderate	2	Low	Medium
13519	VINE-IFLT-INST-TRBD-3	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	3	WTP1 - TURBIDITY - Filter #3	3	Moderate	2	Low	Medium
13520	VINE-IFLT-INST-TRBD-4	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	4	WTP1 - TURBIDITY - Filter #4	3	Moderate	2	Low	Medium
13521	VINE-IFLT-INST-TRBD-5	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	5	WTP1 - TURBIDITY - Filter #5	3	Moderate	2	Low	Medium
13522	VINE-IFLT-INST-TRBD-6	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	6	WTP1 - TURBIDITY - Filter #6	3	Moderate	2	Low	Medium
13523	VINE-IFLT-INST-TRBD-7	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Instrument	Turbidity	7	WTP1 - TURBIDITY - Clearwell	3	Moderate	2	Low	Medium
13703	VINE-IFLT-MTST-VFD-3	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	MotorStarter	VFD	3	Transfer Pump #3	3	Moderate	2	Low	Medium
13704	VINE-IFLT-MTST-VFD-4	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	MotorStarter	VFD	4	Transfer Pump #4	3	Moderate	2	Low	Medium
WTP1 - FILTERS 1-6 FACILITY	VINE-IFLT-FCLT-FCLT-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	Water Facility	Facility	1		4	Major	5	Very High	Severe
16257	VINE-IFLT-PUMP-CTFL-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WaterPump	Centrifugal	1	PUMP - Clearwell Sample	1	Negligible	1	Very Low	Low
13511	VINE-IFLT-PUMP-VTRB-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WaterPump	Vertical Turbine	1	PUMP - Transfer #1	4	Major	2	Low	Medium
13512	VINE-IFLT-PUMP-VTRB-2	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WaterPump	Vertical Turbine	2	PUMP - Transfer #2	4	Major	2	Low	Medium
13513	VINE-IFLT-PUMP-VTRB-3	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WaterPump	Vertical Turbine	3	PUMP - Transfer #3	4	Major	2	Low	Medium
13514	VINE-IFLT-PUMP-VTRB-4	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WaterPump	Vertical Turbine	4	PUMP - Transfer #4	4	Major	2	Low	Medium
16538	VINE-IFLT-VALV-16"-4	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WTP Valves	16" Valve	4	Valve (CHK), #4 Transfer Pump Discharge	3	Moderate	2	Low	Medium
13626	VINE-IFLT-VALV-16"-4I	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WTP Valves	16" Valve	4I	Valve (BFV), #4 Transfer Pump Discharge Isolation	3	Moderate	2	Low	Medium
13617	VINE-IFLT-TANK-AIRT-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WTPTank	Air Tank	1	Air Receiver	2	Low	1	Very Low	Low
15446	VINE-IFLT-TANK-AIRT-2	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WTPTank	Air Tank	2	Air Duplex Filters	2	Low	1	Very Low	Low
15451	VINE-IFLT-TANK-CLWL-1	WTP1 (Vine St)	Filters 1-6 Facility (Indoor)	WTPTank	Clearwell	1	Clearwell	5	Severe	2	Low	Medium
CRN-08	VINE-RWPS-CRN-CRN-1	WTP1 (Vine St)	Raw Water Pump Station	Crane	Crane	1	Raw Water (1 Ton)(#8)	1	Negligible	1	Very Low	Low
13702	VINE-RWPS-INST-PH-1	WTP1 (Vine St)	Raw Water Pump Station	Instrument	pH	1	PH - Raw Water	3	Moderate	1	Very Low	Low
13691	VINE-RWPS-INST-TRBD-1	WTP1 (Vine St)	Raw Water Pump Station	Instrument	Turbidity	1	WTP1 - TURBIDITY - Raw Water	2	Low	2	Low	Low
13701	VINE-RWPS-MTST-VFD-2	WTP1 (Vine St)	Raw Water Pump Station	MotorStarter	VFD	2	Raw Water Pump #2	3	Moderate	2	Low	Medium

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	COF Score (1-5)	COF Description	POF Score (1-5)	POF Description	Risk Score
WTP1 - RAW WATER PUMP FACILITY	VINE-RWPS-FCLT-FCLT-1	WTP1 (Vine St)	Raw Water Pump Station	Water Facility	Facility	1		4	Major	4	High	Severe
13682	VINE-RWPS-PUMP-VTRB-1	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	1	PUMP - Raw Water #1	3	Moderate	3	Moderate	Medium
13683	VINE-RWPS-PUMP-VTRB-2	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	2	PUMP - Raw Water #2	3	Moderate	3	Moderate	Medium
13684	VINE-RWPS-PUMP-VTRB-3	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	3	PUMP - Raw Water #3	2	Low	2	Low	Low
13685	VINE-RWPS-PUMP-VTRB-4	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	4	PUMP - Raw Water #4	2	Low	2	Low	Low
13686	VINE-RWPS-PUMP-VTRB-5	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	5	PUMP - Raw Water #5	2	Low	2	Low	Low
13687	VINE-RWPS-PUMP-VTRB-6	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	6	PUMP - Raw Water #6	2	Low	2	Low	Low
13688	VINE-RWPS-PUMP-VTRB-7	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	7	PUMP - Raw Water #7	3	Moderate	2	Low	Medium
13689	VINE-RWPS-PUMP-VTRB-8	WTP1 (Vine St)	Raw Water Pump Station	WaterPump	Vertical Turbine	8	PUMP - Raw Water #8	3	Moderate	2	Low	Medium
15450	VINE-RWPS-TANK-FCLT-2	WTP1 (Vine St)	Raw Water Pump Station	WTPTank	Facility	2	Raw Water Splitter (Diverter)	5	Severe	2	Low	Medium
15457	VINE-RWPS-TANK-WW-1	WTP1 (Vine St)	Raw Water Pump Station	WTPTank	Wet Well	1	Raw Water Wet Well	4	Major	4	High	Severe
13501	VINE-SODA-CHEM-SODA-1	WTP1 (Vine St)	Soda Ash Facility	ChemSystem	Soda Ash	1	Soda Ash Feeder #1	1	Negligible	3	Moderate	Low
13502	VINE-SODA-CHEM-SODA-2	WTP1 (Vine St)	Soda Ash Facility	ChemSystem	Soda Ash	2	Soda Ash Feeder #2	1	Negligible	3	Moderate	Low
13510	VINE-SODA-CHEM-SODA-3	WTP1 (Vine St)	Soda Ash Facility	ChemSystem	Soda Ash	3	Soda Ash Feed System	2	Low	3	Moderate	Medium
13504	VINE-SODA-CPSR-AIRC-1	WTP1 (Vine St)	Soda Ash Facility	Compressor	Air Compressor	1	Air Compressor #1	2	Low	3	Moderate	Medium
13509	VINE-SODA-CPSR-AIRC-2	WTP1 (Vine St)	Soda Ash Facility	Compressor	Air Compressor	2	Air Compressor #2	2	Low	3	Moderate	Medium
CRN-14	VINE-SODA-CRN-CRN-1	WTP1 (Vine St)	Soda Ash Facility	Crane	Crane	1	Soda Ash (2 Ton)(#14)	1	Negligible	1	Very Low	Low
PV-22	VINE-SODA-PRSR-OIL-1	WTP1 (Vine St)	Soda Ash Facility	Pressure Vessel	Oil Separator	1	Oil Separator (#1 Compressor)	1	Negligible	4	High	Medium
PV-23	VINE-SODA-PRSR-OIL-2	WTP1 (Vine St)	Soda Ash Facility	Pressure Vessel	Oil Separator	2	Oil Separator (#2 Compressor)	1	Negligible	4	High	Medium
WTP1 - SODA ASH FACILITY	VINE-SODA-FCLT-FCLT-1	WTP1 (Vine St)	Soda Ash Facility	Water Facility	Facility	1		4	Major	5	Very High	Severe
13870	A&M-AIR-CPSR-AIRC-1	WTP2 (A&M)	Air System	Compressor	Air Compressor	1	Air Compressor 1	4	Major	3	Moderate	High
13872	A&M-AIR-CPSR-AIRC-2	WTP2 (A&M)	Air System	Compressor	Air Compressor	2	Air Compressor 2	4	Major	3	Moderate	High
13877	A&M-AIR-INST-FLM-1	WTP2 (A&M)	Air System	Instrument	Flow Meter	1	Blower Discharge Air Flow Meter	3	Moderate	3	Moderate	Medium
13879	A&M-AIR-INST-PRSS-1	WTP2 (A&M)	Air System	Instrument	Pressure Sensor	1	Blower Air Discharge Pressure Transmitter	3	Moderate	3	Moderate	Medium
13880	A&M-AIR-INST-PRSS-2	WTP2 (A&M)	Air System	Instrument	Pressure Sensor	2	Control Air Receiver Tank Pressure Meter	3	Moderate	3	Moderate	Medium
13881	A&M-AIR-INST-PRSS-3	WTP2 (A&M)	Air System	Instrument	Pressure Sensor	3	Test Air Receiver Tank Pressure Meter	5	Severe	3	Moderate	High
13882	A&M-AIR-INST-PRSS-4	WTP2 (A&M)	Air System	Instrument	Pressure Sensor	4	Test Air Manifold Pressure Meter	5	Severe	3	Moderate	High
13885	A&M-AIR-INST-TEMP-1	WTP2 (A&M)	Air System	Instrument	Temperature Sensor	1	Blower Air Discharge Temperature Transmitter	3	Moderate	3	Moderate	Medium
13889	A&M-AIR-MTST-VFD-1	WTP2 (A&M)	Air System	MotorStarter	VFD	1	Blower 1 VFD	2	Low	3	Moderate	Medium
13890	A&M-AIR-MTST-VFD-2	WTP2 (A&M)	Air System	MotorStarter	VFD	2	Blower 2 VFD	2	Low	3	Moderate	Medium
13891-1	A&M-AIR-MTST-VFD-3	WTP2 (A&M)	Air System	MotorStarter	VFD	3	Blower 3 VFD	2	Low	3	Moderate	Medium
MSTR-000038	A&M-AIR-MTST-VFD-4	WTP2 (A&M)	Air System	MotorStarter	VFD	4	Blower 1 VFD	2	Low	2	Low	Low
MSTR-000039	A&M-AIR-MTST-VFD-5	WTP2 (A&M)	Air System	MotorStarter	VFD	5	Blower 2 VFD	2	Low	2	Low	Low
MSTR-000040	A&M-AIR-MTST-VFD-6	WTP2 (A&M)	Air System	MotorStarter	VFD	6	Blower 3 VFD	2	Low	2	Low	Low
PV-04	A&M-AIR-PRSR-AIRR-1	WTP2 (A&M)	Air System	Pressure Vessel	Air Receiver	1	AIR RECEIVER - TEST AIR	1	Negligible	2	Low	Low
16478	A&M-AIR-PUMP-BWR-1	WTP2 (A&M)	Air System	WaterPump	Blower	1	Blower 1	1	Negligible	1	Very Low	Low
16479	A&M-AIR-PUMP-BWR-2	WTP2 (A&M)	Air System	WaterPump	Blower	2	Blower 2	1	Negligible	1	Very Low	Low
16480	A&M-AIR-PUMP-BWR-3	WTP2 (A&M)	Air System	WaterPump	Blower	3	Blower 3	1	Negligible	1	Very Low	Low
13883	A&M-AIR-TANK-AIRT-1	WTP2 (A&M)	Air System	WTPTank	Air Tank	1	Control Air Receiver Tank	5	Severe	5	Very High	Severe
13884	A&M-AIR-TANK-AIRT-2	WTP2 (A&M)	Air System	WTPTank	Air Tank	2	Test Air Receiver Tank	5	Severe	5	Very High	Severe
A75120	A&M-AVLT-AHWR-TRAD-1	WTP2 (A&M)	Albany Metering Vault	AutomationHardware	Telemetry Radio	1	450MHz FCC licensed data radio	5	Severe	2	Low	Medium
16286	A&M-AVLT-INST-FLM-1	WTP2 (A&M)	Albany Metering Vault	Instrument	Flow Meter	1	Albany Flow Meter	3	Moderate	5	Very High	High
16287	A&M-AVLT-INST-PRSS-1	WTP2 (A&M)	Albany Metering Vault	Instrument	Pressure Sensor	1	Albany Meter Upstream Pressure Indicator	4	Major	3	Moderate	High
16288	A&M-AVLT-INST-PRSS-2	WTP2 (A&M)	Albany Metering Vault	Instrument	Pressure Sensor	2	Albany Meter Downstream Pressure Indicator	4	Major	3	Moderate	High
WTP2 - Albany Metering Vault	A&M-AVLT-FCLT-VLT-1	WTP2 (A&M)	Albany Metering Vault	Water Facility	Vault	1		5	Severe	3	Moderate	High
14000	A&M-AVLT-VALV-24"-1	WTP2 (A&M)	Albany Metering Vault	WTP Valves	24" Valve	1	Upstream Valve	5	Severe	3	Moderate	High
16283	A&M-AVLT-VALV-24"-2	WTP2 (A&M)	Albany Metering Vault	WTP Valves	24" Valve	2	Downstream Valve	5	Severe	3	Moderate	High
16285	A&M-AVLT-VALV-24"-3	WTP2 (A&M)	Albany Metering Vault	WTP Valves	24" Valve	3	Metering Control Valve	5	Severe	5	Very High	Severe
13856	A&M-BWSH-INST-FLM-1	WTP2 (A&M)	Backwash System	Instrument	Flow Meter	1	Backwash Flow Meter	3	Moderate	5	Very High	High
13861	A&M-BWSH-INST-PRSS-1	WTP2 (A&M)	Backwash System	Instrument	Pressure Sensor	1	Backwash Pressure Transmitter	5	Severe	2	Low	Medium
13866	A&M-BWSH-MTST-VFD-1	WTP2 (A&M)	Backwash System	MotorStarter	VFD	1	WTP2 - Backwash Pump 1 VFD	3	Moderate	3	Moderate	Medium
13867	A&M-BWSH-MTST-VFD-2	WTP2 (A&M)	Backwash System	MotorStarter	VFD	2	WTP2 - Backwash Pump 2 VFD	3	Moderate	3	Moderate	Medium
13859	A&M-BWSH-PUMP-CTFL-1	WTP2 (A&M)	Backwash System	WaterPump	Centrifugal	1	WTP2 - Backwash Pump 1	3	Moderate	1	Very Low	Low
13860	A&M-BWSH-PUMP-CTFL-2	WTP2 (A&M)	Backwash System	WaterPump	Centrifugal	2	WTP2 - Backwash Pump 2	3	Moderate	1	Very Low	Low
13862	A&M-BWSH-VALV-20"-1	WTP2 (A&M)	Backwash System	WTP Valves	20" Valve	1	Backwash Pump 1 Inlet Valve	1	Negligible	1	Very Low	Low
13863	A&M-BWSH-VALV-20"-2	WTP2 (A&M)	Backwash System	WTP Valves	20" Valve	2	Backwash Pump 2 Inlet Valve	1	Negligible	1	Very Low	Low
16580	A&M-BWSH-VALV-20"-3	WTP2 (A&M)	Backwash System	WTP Valves	20" Valve	3	Cell 3 Backwash Supply Valve	5	Severe	3	Moderate	High

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	COF Score (1-5)	COF Description	POF Score (1-5)	POF Description	Risk Score
13757	A&M-BWSH-VALV-20"-4	WTP2 (A&M)	Backwash System	WTP Valves	20" Valve	4	Finish Water Backwash Pumps Inlet Valve	5	Severe	2	Low	Medium
15410	A&M-BWSH-VALV-20"-5	WTP2 (A&M)	Backwash System	WTP Valves	20" Valve	5	Finish Water Backwash Pumps Isolation Valve	5	Severe	3	Moderate	High
13857	A&M-BWSH-VALV-24"-1	WTP2 (A&M)	Backwash System	WTP Valves	24" Valve	1	Drain Valve To BW Settling Basins	5	Severe	5	Very High	Severe
13932	A&M-CHEM-CHEM-ACH-1	WTP2 (A&M)	Chemical Facility	ChemSystem	ACH	1	ACH Metering Pump 1	1	Negligible	1	Very Low	Low
13934	A&M-CHEM-CHEM-ACH-2	WTP2 (A&M)	Chemical Facility	ChemSystem	ACH	2	ACH Metering Pump 2	1	Negligible	1	Very Low	Low
13902	A&M-CHEM-CHEM-CIP-1	WTP2 (A&M)	Chemical Facility	ChemSystem	CIP	1	CIP Storage Tank Heater	1	Negligible	5	Very High	Medium
16297	A&M-CHEM-CHEM-CIT-1	WTP2 (A&M)	Chemical Facility	ChemSystem	Citric Acid	1	Citric Acid Metering Pump 1	1	Negligible	1	Very Low	Low
15429	A&M-CHEM-CHEM-CIT-2	WTP2 (A&M)	Chemical Facility	ChemSystem	Citric Acid	2	Citric Acid Metering Pump 2	1	Negligible	1	Very Low	Low
13923	A&M-CHEM-CHEM-FL-1	WTP2 (A&M)	Chemical Facility	ChemSystem	Fluoride	1	Fluoride Storage/Loading System	1	Negligible	1	Very Low	Low
13926	A&M-CHEM-CHEM-FL-2	WTP2 (A&M)	Chemical Facility	ChemSystem	Fluoride	2	Fluoride Tank Mixer	1	Negligible	1	Very Low	Low
13925	A&M-CHEM-CHEM-FL-3	WTP2 (A&M)	Chemical Facility	ChemSystem	Fluoride	3	Fluoride Conveyor	1	Negligible	1	Very Low	Low
13924	A&M-CHEM-CHEM-FL-4	WTP2 (A&M)	Chemical Facility	ChemSystem	Fluoride	4	Fluoride Feeder Auger System Motor	1	Negligible	1	Very Low	Low
13938	A&M-CHEM-CHEM-BISF-1	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Bisulfite	1	Sodium Bisulfite Diaphragm Pump 1	1	Negligible	1	Very Low	Low
13939	A&M-CHEM-CHEM-BISF-2	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Bisulfite	2	Sodium Bisulfite Diaphragm Pump 2	1	Negligible	1	Very Low	Low
13945	A&M-CHEM-CHEM-HYDR-1	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hydroxide	1	Sodium Hydroxide Diaphragm Pump 1	1	Negligible	1	Very Low	Low
13946	A&M-CHEM-CHEM-HYDR-2	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hydroxide	2	Sodium Hydroxide Diaphragm Pump 2	1	Negligible	1	Very Low	Low
13949	A&M-CHEM-CHEM-HYDR-3	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hydroxide	3	Sodium Hydroxide Metering Pump #1	1	Negligible	1	Very Low	Low
13948	A&M-CHEM-CHEM-HYDR-4	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hydroxide	4	Sodium Hydroxide Metering Pump #2	1	Negligible	1	Very Low	Low
13917	A&M-CHEM-CHEM-HYPO-1	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hypochlorite	1	Sodium Hypchlorite Diaphragm Pump 1	3	Moderate	2	Low	Medium
13918	A&M-CHEM-CHEM-HYPO-2	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hypochlorite	2	Sodium Hypchlorite Diaphragm Pump 2	3	Moderate	2	Low	Medium
13919	A&M-CHEM-CHEM-HYPO-3	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hypochlorite	3	Sodium Hypochlorite Metering Pump 1	1	Negligible	1	Very Low	Low
13920	A&M-CHEM-CHEM-HYPO-4	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hypochlorite	4	Sodium Hypochlorite Metering Pump 2	1	Negligible	1	Very Low	Low
13921	A&M-CHEM-CHEM-HYPO-5	WTP2 (A&M)	Chemical Facility	ChemSystem	Sodium Hypochlorite	5	Sodium Hypochlorite Metering Pump 3	1	Negligible	1	Very Low	Low
13791	A&M-CHEM-INST-CLRN-1	WTP2 (A&M)	Chemical Facility	Instrument	Chlorine	1	CHLORINE - Filtrate Wet Rack	1	Negligible	3	Moderate	Low
13976	A&M-CHEM-INST-CLRN-2	WTP2 (A&M)	Chemical Facility	Instrument	Chlorine	2	CHLORINE - Finish Water (Lab)	5	Severe	3	Moderate	High
13790	A&M-CHEM-INST-CLFL-1	WTP2 (A&M)	Chemical Facility	Instrument	CL & FL (Dual)	1	CL & FL (Dual) - Lab	1	Negligible	1	Very Low	Low
13895	A&M-CHEM-INST-FLM-1	WTP2 (A&M)	Chemical Facility	Instrument	Flow Meter	1	CIP Tank Fill Flow Meter	1	Negligible	5	Very High	Medium
13868	A&M-CHEM-INST-FLM-2	WTP2 (A&M)	Chemical Facility	Instrument	Flow Meter	2	CIP CL2 Metering Pump Flow Meter	1	Negligible	3	Moderate	Low
13869	A&M-CHEM-INST-FLM-3	WTP2 (A&M)	Chemical Facility	Instrument	Flow Meter	3	CIP Citric Acid Metering Pump Flow Meter	1	Negligible	3	Moderate	Low
13896	A&M-CHEM-INST-FLM-4	WTP2 (A&M)	Chemical Facility	Instrument	Flow Meter	4	CIP PUMP DISCHARGE FLOW METER	1	Negligible	2	Low	Low
13977	A&M-CHEM-INST-FL-1	WTP2 (A&M)	Chemical Facility	Instrument	Fluoride	1	FLOURIDE - Filtrate Water	1	Negligible	3	Moderate	Low
13903	A&M-CHEM-INST-LSEN-2	WTP2 (A&M)	Chemical Facility	Instrument	Level Sensor	2	Cip Storage Tank Level Transmitter	1	Negligible	5	Very High	Medium
13918	A&M-CHEM-INST-LSEN-3	WTP2 (A&M)	Chemical Facility	Instrument	Level Sensor	3	Sodium Hypochlorite Tank Level Transmitter	1	Negligible	1	Very Low	Low
13930	A&M-CHEM-INST-LSEN-4	WTP2 (A&M)	Chemical Facility	Instrument	Level Sensor	4	ACH Chlorohydrate Storage Tank Level	2	Low	1	Very Low	Low
13936	A&M-CHEM-INST-LSEN-5	WTP2 (A&M)	Chemical Facility	Instrument	Level Sensor	5	Citric Acid Storage Tank Level	1	Negligible	1	Very Low	Low
13944	A&M-CHEM-INST-LSEN-6	WTP2 (A&M)	Chemical Facility	Instrument	Level Sensor	6	Sodium Hydroxide Tank Level Transmitter	1	Negligible	1	Very Low	Low
15433	A&M-CHEM-INST-LSEN-7	WTP2 (A&M)	Chemical Facility	Instrument	Level Sensor	7	Sodium Bisulfite Storage Tank Level	3	Moderate	2	Low	Medium
13906	A&M-CHEM-INST-TEMP-1	WTP2 (A&M)	Chemical Facility	Instrument	Temperature Sensor	1	WTP2 - Cip Tank Temperature Transmitter	1	Negligible	5	Very High	Medium
13929	A&M-CHEM-INST-TSMR-1	WTP2 (A&M)	Chemical Facility	Instrument	Transmitter	1	WTP2 - FLOURIDE WEIGH SCALE	1	Negligible	1	Very Low	Low
13904	A&M-CHEM-PUMP-CTFL-1	WTP2 (A&M)	Chemical Facility	WaterPump	Centrifugal	1	Cip Transfer/Recirculation Pump	1	Negligible	5	Very High	Medium
13935	A&M-CHEM-TANK-ACH-1	WTP2 (A&M)	Chemical Facility	WTPTank	ACH	1	ACH Chlorohydrate Storage Tank	1	Negligible	3	Moderate	Low
13905	A&M-CHEM-TANK-CIP-1	WTP2 (A&M)	Chemical Facility	WTPTank	CIP	1	CIP Storage Tank	1	Negligible	5	Very High	Medium
13937	A&M-CHEM-TANK-CIT-1	WTP2 (A&M)	Chemical Facility	WTPTank	Citric Acid	1	Citric Acid Storage Tank	1	Negligible	3	Moderate	Low
13928	A&M-CHEM-TANK-FL-1	WTP2 (A&M)	Chemical Facility	WTPTank	Fluoride	1	Fluoride Storage Tank	1	Negligible	1	Very Low	Low
15445	A&M-CHEM-TANK-BISF-1	WTP2 (A&M)	Chemical Facility	WTPTank	Sodium Bisulfite	1	Sodium Bisulfite Tank	1	Negligible	3	Moderate	Low
13943	A&M-CHEM-TANK-HYDR-1	WTP2 (A&M)	Chemical Facility	WTPTank	Sodium Hydroxide	1	Sodium Hydroxide Storage Tank	1	Negligible	3	Moderate	Low
13922	A&M-CHEM-TANK-HYPO-1	WTP2 (A&M)	Chemical Facility	WTPTank	Sodium Hypochlorite	1	Sodium Hypochlorite Storage Tank	1	Negligible	3	Moderate	Low
PV-05	A&M-COMP-PRSR-AIRR-1	WTP2 (A&M)	Compressor Room	Pressure Vessel	Air Receiver	1	AIR RECEIVER - CONTROL AIR	5	Severe	2	Low	Medium
PV-06	A&M-COMP-PRSR-OIL-1	WTP2 (A&M)	Compressor Room	Pressure Vessel	Oil Separator	1	OIL SEPARATOR - COMPRESSOR #1	2	Low	2	Low	Low
PV-07	A&M-COMP-PRSR-OIL-2	WTP2 (A&M)	Compressor Room	Pressure Vessel	Oil Separator	2	OIL SEPARATOR - COMPRESSOR #2	2	Low	2	Low	Low
CRN-24	A&M-FILT-CRN-CRN-1	WTP2 (A&M)	Filter Facility	Crane	Crane	1	A-Frame (0.9 Tons)	3	Moderate	2	Low	Medium
15432	A&M-FILT-GEN-DSL-1	WTP2 (A&M)	Filter Facility	ElectricalGenerator	Diesel	1	ENGINE - Fire Pump	5	Severe	5	Very High	Severe
15422	A&M-FILT-GEN-DSL-2	WTP2 (A&M)	Filter Facility	ElectricalGenerator	Diesel	2	WTP2 - Electrical Generator	1	Negligible	5	Very High	Medium
105291	A&M-FILT-INST-DION-1	WTP2 (A&M)	Filter Facility	Instrument	Deionizer	1	DEIONIZER - Lab	1	Negligible	1	Very Low	Low
105292	A&M-FILT-INST-FLT-1	WTP2 (A&M)	Filter Facility	Instrument	Filter	1	FILTER - Organic (Lab)	1	Negligible	1	Very Low	Low
13806	A&M-FILT-INST-FLM-1	WTP2 (A&M)	Filter Facility	Instrument	Flow Meter	1	Filtrate Total Flow Meter	1	Negligible	1	Very Low	Low
13993	A&M-FILT-INST-PRSS-1	WTP2 (A&M)	Filter Facility	Instrument	Pressure Sensor	1	W1 Booster Discharge Pressure Indicator	5	Severe	3	Moderate	High
5293	A&M-FILT-INST-TITR-1	WTP2 (A&M)	Filter Facility	Instrument	Titrator	1	TITRATOR - Lab	1	Negligible	1	Very Low	Low
16296	A&M-FILT-INST-TRBD-1	WTP2 (A&M)	Filter Facility	Instrument	Turbidity	1	TURBIDITY - Lab	1	Negligible	1	Very Low	Low

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	COF Score (1-5)	COF Description	POF Score (1-5)	POF Description	Risk Score
WTP2 - AM Water Treatment Filter Facility	A&M-FILT-FCLT-FCLT-1	WTP2 (A&M)	Filter Facility	Water Facility	Facility	1		5	Severe	2	Low	Medium
13991	A&M-FILT-PUMP-CTFL-1	WTP2 (A&M)	Filter Facility	WaterPump	Centrifugal	1	Booster Pump 1	4	Major	3	Moderate	High
13989	A&M-FILT-PUMP-CTFL-2	WTP2 (A&M)	Filter Facility	WaterPump	Centrifugal	2	Booster Pump 2	4	Major	3	Moderate	High
16293	A&M-FILT-PUMP-HSC-3	WTP2 (A&M)	Filter Facility	WaterPump	Horizontal Split Case	3	Fire System Pump	1	Negligible	1	Very Low	Low
16295	A&M-FILT-PUMP-VTRB-4	WTP2 (A&M)	Filter Facility	WaterPump	Vertical Turbine	4	Fire System Water Jockey Pump	1	Negligible	1	Very Low	Low
13994	A&M-FILT-TANK-AIRT-1	WTP2 (A&M)	Filter Facility	WTPTank	Air Tank	1	W1 Booster System Hydropneumatic Tank 1	1	Negligible	1	Very Low	Low
13995	A&M-FILT-TANK-AIRT-2	WTP2 (A&M)	Filter Facility	WTPTank	Air Tank	2	W1 Booster System Hydropneumatic Tank 2	1	Negligible	1	Very Low	Low
13978	A&M-FW-INST-COND-1	WTP2 (A&M)	Finished Water System	Instrument	Conductivity	1	CONDUCTIVITY - Finished Water (Lab)	5	Severe	3	Moderate	High
13982	A&M-FW-INST-FLM-1	WTP2 (A&M)	Finished Water System	Instrument	Flow Meter	1	Finish Water Combined Flow Transmitter	5	Severe	2	Low	Medium
INST-000128	A&M-FW-INST-FLM-2	WTP2 (A&M)	Finished Water System	Instrument	Flow Meter	2	FLOW METER - Plant to Reservoir	5	Severe	2	Low	Medium
INST-000101	A&M-FW-INST-LSEN-1	WTP2 (A&M)	Finished Water System	Instrument	Level Sensor	1	Reservoir Radar Level Transmitter A	3	Moderate	1	Very Low	Low
INST-000102	A&M-FW-INST-LSEN-2	WTP2 (A&M)	Finished Water System	Instrument	Level Sensor	2	Reservoir Radar Level Transmitter B	3	Moderate	1	Very Low	Low
13979	A&M-FW-INST-PH-1	WTP2 (A&M)	Finished Water System	Instrument	pH	1	PH - Finished Water (Lab)	5	Severe	3	Moderate	High
13988	A&M-FW-PUMP-TURB-1	WTP2 (A&M)	Finished Water System	WaterPump	Turbine	1	Finished Water Sample Pump	1	Negligible	1	Very Low	Low
13981	A&M-FW-VALV-42"-1	WTP2 (A&M)	Finished Water System	WTP Valves	42" Valve	1	Finish Water Downstream Valve	5	Severe	5	Very High	Severe
16570	A&M-FW-VALV-42"-2	WTP2 (A&M)	Finished Water System	WTP Valves	42" Valve	2	Finished Water Seismic Isolation Valve	5	Severe	5	Very High	Severe
13802	A&M-CELL-INST-FLM-1	WTP2 (A&M)	Membrane Cell	Instrument	Flow Meter	1	Cell 1 Fitlrate Flow Meter	4	Major	5	Very High	Severe
13803	A&M-CELL-INST-FLM-2	WTP2 (A&M)	Membrane Cell	Instrument	Flow Meter	2	Cell 2 Filtrate Flow Meter	4	Major	5	Very High	Severe
13804	A&M-CELL-INST-FLM-3	WTP2 (A&M)	Membrane Cell	Instrument	Flow Meter	3	Cell 3 Filtrate Flow Meter	4	Major	5	Very High	Severe
13805	A&M-CELL-INST-FLM-4	WTP2 (A&M)	Membrane Cell	Instrument	Flow Meter	4	Cell 4 Filtrate Flow Meter	4	Major	5	Very High	Severe
13835	A&M-CELL-INST-LSEN-1	WTP2 (A&M)	Membrane Cell	Instrument	Level Sensor	1	Cell 1 Level Transmitter	5	Severe	3	Moderate	High
13836	A&M-CELL-INST-LSEN-2	WTP2 (A&M)	Membrane Cell	Instrument	Level Sensor	2	Cell 2 Level Transmitter	5	Severe	3	Moderate	High
13837	A&M-CELL-INST-LSEN-3	WTP2 (A&M)	Membrane Cell	Instrument	Level Sensor	3	Cell 3 Level Transmitter	5	Severe	3	Moderate	High
13838	A&M-CELL-INST-LSEN-4	WTP2 (A&M)	Membrane Cell	Instrument	Level Sensor	4	Cell 4 Level Transmitter	5	Severe	3	Moderate	High
13793	A&M-CELL-INST-PH-1	WTP2 (A&M)	Membrane Cell	Instrument	pH	1	PH - Filtrate - Wet Rack	1	Negligible	3	Moderate	Low
13794	A&M-CELL-INST-PRSS-1	WTP2 (A&M)	Membrane Cell	Instrument	Pressure Sensor	1	PRESSURE - Cell 1 Filtrate	5	Severe	3	Moderate	High
13795	A&M-CELL-INST-PRSS-2	WTP2 (A&M)	Membrane Cell	Instrument	Pressure Sensor	2	PRESSURE - Cell 2 Filtrate	5	Severe	3	Moderate	High
13796	A&M-CELL-INST-PRSS-3	WTP2 (A&M)	Membrane Cell	Instrument	Pressure Sensor	3	PRESSURE - Cell 3 Filtrate	5	Severe	3	Moderate	High
13797	A&M-CELL-INST-PRSS-4	WTP2 (A&M)	Membrane Cell	Instrument	Pressure Sensor	4	PRESSURE - Cell 4 Filtrate	5	Severe	3	Moderate	High
13847	A&M-CELL-INST-TEMP-1	WTP2 (A&M)	Membrane Cell	Instrument	Temperature Sensor	1	WTP2 - Cell 1 Filtrate Temperature Transmitter	4	Major	2	Low	Medium
13848	A&M-CELL-INST-TEMP-2	WTP2 (A&M)	Membrane Cell	Instrument	Temperature Sensor	2	WTP2 - Cell 2 Filtrate Temperature Transmitter	4	Major	2	Low	Medium
13849	A&M-CELL-INST-TEMP-3	WTP2 (A&M)	Membrane Cell	Instrument	Temperature Sensor	3	WTP2 - Cell 3 Filtrate Temperature Transmitter	4	Major	2	Low	Medium
13850	A&M-CELL-INST-TEMP-4	WTP2 (A&M)	Membrane Cell	Instrument	Temperature Sensor	4	WTP2 - Cell 4 Filtrate Temperature Transmitter	4	Major	2	Low	Medium
13783	A&M-CELL-INST-TRBD-1	WTP2 (A&M)	Membrane Cell	Instrument	Turbidity	1	WTP2 - TURBIDITY - Cell 1 Filtrate	5	Severe	3	Moderate	High
13784	A&M-CELL-INST-TRBD-2	WTP2 (A&M)	Membrane Cell	Instrument	Turbidity	2	WTP2 - TURBIDITY - Cell 2 Filtrate	5	Severe	3	Moderate	High
13785	A&M-CELL-INST-TRBD-3	WTP2 (A&M)	Membrane Cell	Instrument	Turbidity	3	WTP2 - TURBIDITY - Cell 3 Filtrate	4	Major	5	Very High	Severe
13786-1	A&M-CELL-INST-TRBD-4	WTP2 (A&M)	Membrane Cell	Instrument	Turbidity	4	WTP2 - TURBIDITY - Cell 4 Filtrate	5	Severe	3	Moderate	High
13792-1	A&M-CELL-INST-TRBD-5	WTP2 (A&M)	Membrane Cell	Instrument	Turbidity	5	TURBIDITY - Filtrate Turbidimeter(Comb) - Downstairs Wet Rack	5	Severe	3	Moderate	High
MSTR-000065	A&M-CELL-MTST-VFD-1	WTP2 (A&M)	Membrane Cell	MotorStarter	VFD	1	WTP2 - Cell 1 Filtrate Pump VFD	4	Major	3	Moderate	High
13852	A&M-CELL-MTST-VFD-2	WTP2 (A&M)	Membrane Cell	MotorStarter	VFD	2	WTP2 - Cell 2 Filtrate Pump VFD	4	Major	3	Moderate	High
MSTR-000070	A&M-CELL-MTST-VFD-3	WTP2 (A&M)	Membrane Cell	MotorStarter	VFD	3	WTP2 - Cell 3 Filtrate Pump VFD	4	Major	3	Moderate	High
13854	A&M-CELL-MTST-VFD-4	WTP2 (A&M)	Membrane Cell	MotorStarter	VFD	4	WTP2 - Cell 4 Filtrate Pump VFD	4	Major	3	Moderate	High
13839	A&M-CELL-PUMP-CTFL-1	WTP2 (A&M)	Membrane Cell	WaterPump	Centrifugal	1	WTP2 - Cell 1 Filtrate Pump	5	Severe	3	Moderate	High
13840	A&M-CELL-PUMP-CTFL-2	WTP2 (A&M)	Membrane Cell	WaterPump	Centrifugal	2	WTP2 - Cell 2 Filtrate Pump	5	Severe	3	Moderate	High
13841	A&M-CELL-PUMP-CTFL-3	WTP2 (A&M)	Membrane Cell	WaterPump	Centrifugal	3	WTP2 - Cell 3 Filtrate Pump	5	Severe	3	Moderate	High
13842	A&M-CELL-PUMP-CTFL-4	WTP2 (A&M)	Membrane Cell	WaterPump	Centrifugal	4	WTP2 - Cell 4 Filtrate Pump	5	Severe	3	Moderate	High
13827	A&M-CELL-VALV-16"-1	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	1	Cell 1 Common Filtrate Valve	5	Severe	5	Very High	Severe
13828	A&M-CELL-VALV-16"-2	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	2	Cell 2 Common Filtrate Valve	5	Severe	5	Very High	Severe
13829	A&M-CELL-VALV-16"-3	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	3	Cell 3 Common Filtrate Valve	5	Severe	5	Very High	Severe
13830	A&M-CELL-VALV-16"-4	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	4	Cell 4 Common Filtrate Valve	5	Severe	5	Very High	Severe
13807	A&M-CELL-VALV-16"-1F	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	1F	Cell 1 Filtrate Valve	5	Severe	5	Very High	Severe
13808-1	A&M-CELL-VALV-16"-2F	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	2F	Cell 2 Filtrate Valve	5	Severe	5	Very High	Severe
13809	A&M-CELL-VALV-16"-3F	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	3F	Cell 3 Filtrate Valve	5	Severe	5	Very High	Severe
13810	A&M-CELL-VALV-16"-4F	WTP2 (A&M)	Membrane Cell	WTP Valves	16" Valve	4F	Cell 4 Filtrate Valve	5	Severe	5	Very High	Severe
13811	A&M-CELL-VALV-20"-1	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	1	Cell 1 Backwash Supply Valve	5	Severe	3	Moderate	High
13812	A&M-CELL-VALV-20"-2	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	2	Cell 2 Backwash Supply Valve	5	Severe	3	Moderate	High
13813	A&M-CELL-VALV-20"-3	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	3	Cell 3 Backwash Supply Valve	5	Severe	3	Moderate	High

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	COF Score (1-5)	COF Description	POF Score (1-5)	POF Description	Risk Score
13814	A&M-CELL-VALV-20"-4	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	4	Cell 4 Backwash Supply Valve	5	Severe	3	Moderate	High
13775	A&M-CELL-VALV-20"-1I	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	1I	Cell 1 Raw Water Influent Valve	5	Severe	3	Moderate	High
13776-1	A&M-CELL-VALV-20"-2I	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	2I	Cell 2 Raw Water Influent Valve	5	Severe	3	Moderate	High
13777	A&M-CELL-VALV-20"-3I	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	3I	Cell 3 Raw Water Influent Valve	5	Severe	3	Moderate	High
13778	A&M-CELL-VALV-20"-4I	WTP2 (A&M)	Membrane Cell	WTP Valves	20" Valve	4I	Cell 4 Raw Water Influent Valve	5	Severe	3	Moderate	High
13798	A&M-CELL-VALV-24"-1	WTP2 (A&M)	Membrane Cell	WTP Valves	24" Valve	1	Cell 1 Drain Valve	5	Severe	3	Moderate	High
13799	A&M-CELL-VALV-24"-2	WTP2 (A&M)	Membrane Cell	WTP Valves	24" Valve	2	Cell 2 Drain Valve	5	Severe	3	Moderate	High
13800	A&M-CELL-VALV-24"-3	WTP2 (A&M)	Membrane Cell	WTP Valves	24" Valve	3	Cell 3 Drain Valve	5	Severe	3	Moderate	High
13801	A&M-CELL-VALV-24"-4	WTP2 (A&M)	Membrane Cell	WTP Valves	24" Valve	4	Cell 4 Drain Valve	5	Severe	3	Moderate	High
13843	A&M-CELL-TANK-CELL-1	WTP2 (A&M)	Membrane Cell	WTPTank	Treatment Cell	1	Cell 1 Tank (Membrane filter tank)	4	Major	3	Moderate	High
13844	A&M-CELL-TANK-CELL-2	WTP2 (A&M)	Membrane Cell	WTPTank	Treatment Cell	2	Cell 2 Tank (Membrane filter tank)	4	Major	3	Moderate	High
13845	A&M-CELL-TANK-CELL-3	WTP2 (A&M)	Membrane Cell	WTPTank	Treatment Cell	3	Cell 3 Tank (Membrane filter tank)	4	Major	3	Moderate	High
13846	A&M-CELL-TANK-CELL-4	WTP2 (A&M)	Membrane Cell	WTPTank	Treatment Cell	4	WTP2 - Cell 4 Tank (Membrane filter tank)	4	Major	3	Moderate	High
13999-1	A&M-MVLT-INST-FLM-1	WTP2 (A&M)	Millersburg Metering Vault	Instrument	Flow Meter	1	Millersburg Flow Indicator Transmitter	3	Moderate	5	Very High	High
75150	A&M-MVLT-INST-FLM-2	WTP2 (A&M)	Millersburg Metering Vault	Instrument	Flow Meter	2	Millersburg Flowmeter	5	Severe	2	Low	Medium
WTP2 - Millersburg Metering Vault	A&M-MVLT-FCLT-VLT-1	WTP2 (A&M)	Millersburg Metering Vault	Water Facility	Vault	1		5	Severe	2	Low	Medium
INACTIVE-13907	A&M-NB-INST-CLRN-1	WTP2 (A&M)	Neutralization Basin	Instrument	Chlorine	1	(INACTIVE)WTP2 - CHLORINE - Neutralization Basin(INACTIVE)	1	Negligible	1	Very Low	Low
13947	A&M-NB-INST-FLM-1	WTP2 (A&M)	Neutralization Basin	Instrument	Flow Meter	1	Sodium Hydroxide Flow Switch	1	Negligible	1	Very Low	Low
13940	A&M-NB-INST-FSWC-2	WTP2 (A&M)	Neutralization Basin	Instrument	Flow Switch	2	Sodium Bisulfite Flow Switch	1	Negligible	1	Very Low	Low
13908	A&M-NB-INST-ORP-1	WTP2 (A&M)	Neutralization Basin	Instrument	ORP	1		1	Negligible	1	Very Low	Low
13909	A&M-NB-INST-PH-1	WTP2 (A&M)	Neutralization Basin	Instrument	pH	1	PH - Neutralization Basin	1	Negligible	1	Very Low	Low
WTP2 - AM Neutralization Basin	A&M-NB-FCLT-SB-1	WTP2 (A&M)	Neutralization Basin	Water Facility	Storage Basin	1		5	Severe	3	Moderate	High
13914	A&M-NB-PUMP-VTRB-1	WTP2 (A&M)	Neutralization Basin	WaterPump	Vertical Turbine	1	NEUTRALIZATION PUMP 1	1	Negligible	1	Very Low	Low
13915	A&M-NB-PUMP-VTRB-2	WTP2 (A&M)	Neutralization Basin	WaterPump	Vertical Turbine	2	NEUTRALIZATION PUMP 2	1	Negligible	1	Very Low	Low
16316	A&M-RWPS-CHEM-SAND-1	WTP2 (A&M)	Raw Water Pump Station	ChemSystem	Sand Classifier	1	Raw Water Sand Classifier 1 (H2O)	4	Major	3	Moderate	High
15203	A&M-RWPS-CHEM-SAND-2	WTP2 (A&M)	Raw Water Pump Station	ChemSystem	Sand Classifier	2	Raw Water Sand Classifier 2 (H2O)	4	Major	3	Moderate	High
13723-1	A&M-RWPS-CPSR-AIRC-1	WTP2 (A&M)	Raw Water Pump Station	Compressor	Air Compressor	1	Raw Water Air Burst Compressor	1	Negligible	5	Very High	Medium
CRN-25	A&M-RWPS-CRN-CRN-1	WTP2 (A&M)	Raw Water Pump Station	Crane	Crane	1	A-Frame (0.8Tons)	2	Low	2	Low	Low
GEN-000023	A&M-RWPS-GEN-DSL-1	WTP2 (A&M)	Raw Water Pump Station	ElectricalGenerator	Diesel	1	GENERATOR - Raw Water Pump Station	5	Severe	2	Low	Medium
15028	A&M-RWPS-INST-CTRL-1	WTP2 (A&M)	Raw Water Pump Station	Instrument	Control Cab	1	Main Pump Control Cab	5	Severe	5	Very High	Severe
13727-1	A&M-RWPS-INST-LSEN-1	WTP2 (A&M)	Raw Water Pump Station	Instrument	Level Sensor	1	Raw Water Wetwell #1 Radar Level Transmitter	5	Severe	1	Very Low	Low
13728-1	A&M-RWPS-INST-LSEN-2	WTP2 (A&M)	Raw Water Pump Station	Instrument	Level Sensor	2	Raw Water Wetwell #2 Radar Level Transmitter	5	Severe	1	Very Low	Low
13726	A&M-RWPS-INST-PH-1	WTP2 (A&M)	Raw Water Pump Station	Instrument	pH	1	PH - Raw Water Pump Station (Sink)	1	Negligible	3	Moderate	Low
MSTR-000068	A&M-RWPS-MTST-VFD-1	WTP2 (A&M)	Raw Water Pump Station	MotorStarter	VFD	1	Raw Water Pump 1 VFD	4	Major	4	High	Severe
MSTR-000072	A&M-RWPS-MTST-VFD-2	WTP2 (A&M)	Raw Water Pump Station	MotorStarter	VFD	2	Raw Water Pump 2 VFD-Unclear which S/N is in use	4	Major	4	High	Severe
MSTR-000069	A&M-RWPS-MTST-VFD-3	WTP2 (A&M)	Raw Water Pump Station	MotorStarter	VFD	3	Raw Water Pump 3 VFD	4	Major	4	High	Severe
15110	A&M-RWPS-MTST-VFD-4	WTP2 (A&M)	Raw Water Pump Station	MotorStarter	VFD	4	Raw Water Pump 4 VFD	4	Major	4	High	Severe
PV-20	A&M-RWPS-PRSR-AIRR-1	WTP2 (A&M)	Raw Water Pump Station	Pressure Vessel	Air Receiver	1	AIR RECEIVER - RWPS	5	Severe	2	Low	Medium
PV-26	A&M-RWPS-PRSR-AIRR-2	WTP2 (A&M)	Raw Water Pump Station	Pressure Vessel	Air Receiver	2	Air Receiver - RW Air Burst Compressor	5	Severe	2	Low	Medium
WTP2 - AM Raw Water Pump Station	A&M-RWPS-FCLT-PS-1	WTP2 (A&M)	Raw Water Pump Station	Water Facility	Pump Station	1		5	Severe	2	Low	Medium
13754	A&M-RWPS-PUMP-EFF-1	WTP2 (A&M)	Raw Water Pump Station	WaterPump	Effluent	1	Raw Water Sand Pump 1	3	Moderate	1	Very Low	Low
13755	A&M-RWPS-PUMP-EFF-2	WTP2 (A&M)	Raw Water Pump Station	WaterPump	Effluent	2	Raw Water Sand Pump 2	3	Moderate	1	Very Low	Low
13729	A&M-RWPS-PUMP-VTRB-1	WTP2 (A&M)	Raw Water Pump Station	WaterPump	Vertical Turbine	1	Raw Water Pump 1	4	Major	1	Very Low	Low
13730	A&M-RWPS-PUMP-VTRB-2	WTP2 (A&M)	Raw Water Pump Station	WaterPump	Vertical Turbine	2	Raw Water Pump 2	4	Major	1	Very Low	Low
13731	A&M-RWPS-PUMP-VTRB-3	WTP2 (A&M)	Raw Water Pump Station	WaterPump	Vertical Turbine	3	Raw Water Pump 3	4	Major	1	Very Low	Low
13732	A&M-RWPS-PUMP-VTRB-4	WTP2 (A&M)	Raw Water Pump Station	WaterPump	Vertical Turbine	4	Raw Water Pump 4	4	Major	1	Very Low	Low
16561	A&M-RWPS-VALV-16"-1	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	1	CHECK VALVE - RW Pump #1 Discharge	4	Major	2	Low	Medium
16565	A&M-RWPS-VALV-16"-2	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	2	CHECK VALVE - RW Pump #2 Discharge	4	Major	2	Low	Medium
16563	A&M-RWPS-VALV-16"-3	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	3	CHECK VALVE - RW Pump #3 Discharge	4	Major	2	Low	Medium
16564	A&M-RWPS-VALV-16"-4	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	4	CHECK VALVE - RW Pump #4 Discharge	4	Major	2	Low	Medium
13741	A&M-RWPS-VALV-16"-1E	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	1E	Raw Water Pump 1 Effluent Valve	3	Moderate	5	Very High	High
13742	A&M-RWPS-VALV-16"-2E	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	2E	Raw Water Pump 2 Effluent Valve	3	Moderate	5	Very High	High
13743	A&M-RWPS-VALV-16"-3E	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	3E	Raw Water Pump 3 Effluent Valve	3	Moderate	5	Very High	High
13744	A&M-RWPS-VALV-16"-4E	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	16" Valve	4E	Raw Water Pump 4 Effluent Valve	3	Moderate	5	Very High	High
13735	A&M-RWPS-VALV-24"-1	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	24" Valve	1	Raw Water Intake 1 Return Line Valve	5	Severe	5	Very High	Severe

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	COF Score (1-5)	COF Description	POF Score (1-5)	POF Description	Risk Score
13736	A&M-RWPS-VALV-24"-2	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	24" Valve	2	Raw Water Intake 2 Return Line Valve	5	Severe	5	Very High	Severe
13737	A&M-RWPS-VALV-24"-3	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	24" Valve	3	Raw Water Intake 3 Return Line Valve	5	Severe	5	Very High	Severe
13738	A&M-RWPS-VALV-24"-4	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	24" Valve	4	Raw Water Intake 4 Return Line Valve	5	Severe	5	Very High	Severe
13746	A&M-RWPS-VALV-36"-1	WTP2 (A&M)	Raw Water Pump Station	WTP Valves	36" Valve	1	Raw Water Main Pipeline Valve	4	Major	3	Moderate	High
13724	A&M-RWPS-TANK-AIRT-1	WTP2 (A&M)	Raw Water Pump Station	WTPTank	Air Tank	1	Raw Water Air Compressor Tank	1	Negligible	5	Very High	Medium
CRN-16	A&M-RW-CRN-CRN-2	WTP2 (A&M)	Raw Water System	Crane	Crane	2	WTP2 - RW Filter (Trolley)(#16)	2	Low	5	Very High	Medium
15434	A&M-RW-INST-FLM-1	WTP2 (A&M)	Raw Water System	Instrument	Flow Meter	1	Raw Water Flow Meter	5	Severe	2	Low	Medium
13763	A&M-RW-INST-LSEN-1	WTP2 (A&M)	Raw Water System	Instrument	Level Sensor	1	Raw Water Trough Intake Level Transmitter	4	Major	3	Moderate	High
13764	A&M-RW-INST-LSEN-2	WTP2 (A&M)	Raw Water System	Instrument	Level Sensor	2	Raw Water Trough Intake Level 2	4	Major	3	Moderate	High
13760	A&M-RW-INST-PH-1	WTP2 (A&M)	Raw Water System	Instrument	pH	1	PH - Raw Water Influent to Plant	5	Severe	3	Moderate	High
13761	A&M-RW-INST-TEMP-1	WTP2 (A&M)	Raw Water System	Instrument	Temperature Sensor	1	WTP2 - Raw Water Temperature	5	Severe	3	Moderate	High
13758	A&M-RW-INST-TRBD-1	WTP2 (A&M)	Raw Water System	Instrument	Turbidity	1	WTP2 - TURBIDITY - Strainers Raw Water (PRE)	5	Severe	3	Moderate	High
13759	A&M-RW-INST-TRBD-2	WTP2 (A&M)	Raw Water System	Instrument	Turbidity	2	WTP2 - TURBIDITY - Strainers Raw Water (POST)	5	Severe	3	Moderate	High
13986	A&M-RW-PUMP-TURB-1	WTP2 (A&M)	Raw Water System	WaterPump	Turbine	1	WTP2 - Raw Water Sample Pump	1	Negligible	1	Very Low	Low
13768	A&M-RW-VALV-24"-1	WTP2 (A&M)	Raw Water System	WTP Valves	24" Valve	1	Raw Water Strainer 1 Effluent Valve	4	Major	3	Moderate	High
13769	A&M-RW-VALV-24"-2	WTP2 (A&M)	Raw Water System	WTP Valves	24" Valve	2	Raw Water Strainer 2 Effluent Valve	4	Major	3	Moderate	High
13766	A&M-RW-VALV-24"-1I	WTP2 (A&M)	Raw Water System	WTP Valves	24" Valve	1I	Raw Water Strainer 1 Influent Valve	4	Major	3	Moderate	High
13767	A&M-RW-VALV-24"-2I	WTP2 (A&M)	Raw Water System	WTP Valves	24" Valve	2I	Raw Water Strainer 2 Influent Valve	4	Major	3	Moderate	High
16567	A&M-RW-VALV-36"-2	WTP2 (A&M)	Raw Water System	WTP Valves	36" Valve	2	AM Reservoir Influent Isolation Valve(NEW)	5	Severe	5	Very High	Severe
15452	A&M-RW-TANK-WT-1	WTP2 (A&M)	Raw Water System	WTPTank	Water Transfer	1	FILTER(West) - Raw Water at AM Plant	5	Severe	2	Low	Medium
15453	A&M-RW-TANK-WT-2	WTP2 (A&M)	Raw Water System	WTPTank	Water Transfer	2	FILTER(East) - Raw Water at AM Plant	5	Severe	2	Low	Medium
INST-000081	A&M-RSVR-INST-CTRL-1	WTP2 (A&M)	Reservoir Facility	Instrument	Control Cab	1	AM Plant Reservoir Control Cab	5	Severe	2	Low	Medium
WTD - AM Plant Reservoir	A&M-RSVR-RSVR-RESR-1	WTP2 (A&M)	Reservoir Facility	WaterStorageTank	Reservoir	1	Concrete	5	Severe	2	Low	Medium
WTP2 - AM Settling Basin	A&M-SODA-FCLT-FCLT-1	WTP2 (A&M)	Soda Ash Facility	Water Facility	Facility	1		5	Severe	2	Low	Medium
13950	A&M-SPNT-INST-FLM-2	WTP2 (A&M)	Supernatant System	Instrument	Flow Meter	2	Supernatant Effluent Flow Transmitter	1	Negligible	3	Moderate	Low
13962	A&M-SPNT-INST-LSEN-1	WTP2 (A&M)	Supernatant System	Instrument	Level Sensor	1	Supernatant Wetwell Level 1 Transmitter	1	Negligible	3	Moderate	Low
13963	A&M-SPNT-INST-LSEN-2	WTP2 (A&M)	Supernatant System	Instrument	Level Sensor	2	Supernatant Wetwell Level 2 Transmitter	1	Negligible	3	Moderate	Low
13965-1	A&M-SPNT-PUMP-SUBM-1	WTP2 (A&M)	Supernatant System	WaterPump	Submersible	1	Supernatant Pump 1	1	Negligible	3	Moderate	Low
13967	A&M-SPNT-PUMP-SUBM-2	WTP2 (A&M)	Supernatant System	WaterPump	Submersible	2	Supernatant Pump 2	1	Negligible	3	Moderate	Low
ADDED ASSETS												
NA	MPL-PS-PIPE-GEN-1	Maple Street	Pump Station Facility	Piping	General	1		3	Moderate	4	High	High
NA	MPL-VLT-PIPE-VALV-1	Maple Street	Vault	Piping	Valve	1	Valve Vault Piping	3	Moderate	4	High	High
NA	NALB-PS-PIPE-PS-2	North Albany	Pump Station Facility	Piping	Pump Station	2	Pump Station Exterior Piping	3	Moderate	4	High	High
NA	NALB-VLT-PIPE-FLM-1	North Albany	Vault	Piping	Flow Meter	1	Flow Meter Vault Piping	3	Moderate	4	High	High
NA	VINE-BWSH-PIPE-PS-1	WTP1 (Vine St)	Backwash System	Piping	Pump Station	1	Backwash Pumping Station Piping	4	Major	4	High	Severe
NA	VINE-FILT-PIPE-GEN-2	WTP1 (Vine St)	Filter Facility	Piping	General	2	Pipe Gallery	4	Major	4	High	Severe
NA	VINE-TW-PIPE-GEN-1	WTP1 (Vine St)	Transfer Water System	Piping	General	1	Transfer Water Pipe Gallery (downstairs)	4	Major	4	High	Severe
NA	VINE-RW-PIPE-FLM-1	WTP1 (Vine St)	Raw Water System	Piping	Flow Meter	1	RW PS Meter Vault Piping	4	Major	5	Very High	Severe
NA	VINE-RW-PIPE-VALV-1	WTP1 (Vine St)	Raw Water System	Piping	Valve	1	RW PS Valve Vault Piping	4	Major	5	Very High	Severe
NA	VINE-RW-VALV-VALV-1	WTP1 (Vine St)	Raw Water System	Valve	Valve	1	RW PS Valve Vault Valve	3	Moderate	5	Very High	High
NA	VINE-VLT-PIPE-CHEM-1	WTP1 (Vine St)	Vault	Piping	Chemical Facility	1	Chemical Injection Vault Piping	3	Moderate	4	High	High
NA	A&M-AVLT-PIPE-FLM-1	WTP2 (A&M)	Albany Metering Vault	Piping	Flow Meter	1	Flow Meter Vault to Albany Piping	4	Major	3	Moderate	High
NA	A&M-FILT-PIPE-GEN-1	WTP2 (A&M)	Filter Facility	Piping	General	1	Stainless Steel Pipe Stained from Caustic	3	Moderate	3	Moderate	Medium
NA	A&M-FILT-PIPE-GEN-2	WTP2 (A&M)	Filter Facility	Piping	General	2	Filtrate Piping	4	Major	3	Moderate	High
NA	A&M-MVLT-PIPE-FLM-1	WTP2 (A&M)	Millersburg Metering Vault	Piping	Flow Meter	1	Flow Meter Vault to Millersburg Piping	4	Major	3	Moderate	High
NA	A&M-RWPS-PIPE-GEN-1	WTP2 (A&M)	Raw Water Pump Station	Piping	General	1	Pump Station Piping	4	Major	3	Moderate	High
NA	A&M-VLT-PIPE-ACH-1	WTP2 (A&M)	Vault	Piping	ACH	1	ACH & Flow Meter Vault Piping	3	Moderate	3	Moderate	Medium
NA	A&M-VLT-PIPE-VALV-1	WTP2 (A&M)	Vault	Piping	Valve	1	AM Reservoir Vault Piping	3	Moderate	3	Moderate	Medium
NA	34-PS-AHWR-PLC-1	34th Street	Pump Station Facility	AutomationHardware	PLC	1		2	Low	2	Low	Low
NA	34-PS-PIPE-GEN-1	34th Street	Pump Station Facility	Piping	General	1	Pump Station Piping	2	Low	3	Moderate	Medium
NA	34-PS-SITE-GEN-1	34th Street	Pump Station Facility	Site Conditions	General	1	Civil Site Conditions	1	Negligible	2	Low	Low
NA	BDWY-RSVR-SITE-GEN-1	Broadway Street	Reservoir Facility	Site Conditions	General	1	Site Conditions	1	Negligible	2	Low	Low
NA	BDWY-VLT-HTCH-FLM-1	Broadway Street	Vault	Hatch	Flow Meter	1	Flow Meter Vault Hatch	1	Negligible	3	Moderate	Low
NA	GBHL-PS-AHWR-PLC-1	Gibson Hill	Pump Station Facility	AutomationHardware	PLC	1		2	Low	2	Low	Low
NA	GBHL-PS-SITE-GEN-1	Gibson Hill	Pump Station Facility	Site Conditions	General	1	Site Conditions	1	Negligible	2	Low	Low
NA	GBHL-VLT-HTCH-FLM-1	Gibson Hill	Vault	Hatch	Flow Meter	1	Flow Meter Vault Hatch	1	Negligible	2	Low	Low
NA	GBHL-VLT-HTCH-VALV-1	Gibson Hill	Vault	Hatch	Valve	1	Valve Vault Hatch	1	Negligible	2	Low	Low
NA	MPL-PS-AHWR-PLC-1	Maple Street	Pump Station Facility	AutomationHardware	PLC	1		3	Moderate	1	Very Low	Low
NA	MPL-PS-MTST-UNK-1	Maple Street	Pump Station Facility	MotorStarter	Unknown	1		4	Major	1	Very Low	Low

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	COF Score (1-5)	COF Description	POF Score (1-5)	POF Description	Risk Score
NA	MPL-PS-MTST-UNK-2	Maple Street	Pump Station Facility	MotorStarter	Unknown	2		4	Major	1	Very Low	Low
NA	MPL-PS-MTST-UNK-3	Maple Street	Pump Station Facility	MotorStarter	Unknown	3		4	Major	1	Very Low	Low
NA	MPL-PS-MTST-UNK-4	Maple Street	Pump Station Facility	MotorStarter	Unknown	4		4	Major	1	Very Low	Low
NA	MPL-PS-MTST-UNK-5	Maple Street	Pump Station Facility	MotorStarter	Unknown	5		4	Major	1	Very Low	Low
NA	MPL-PS-VALV-ACTR-1	Maple Street	Pump Station Facility	WTP Valves	Actuator	1	Motor Operated Valve Pump 1 (11) Discharge	2	Low	1	Very Low	Low
NA	MPL-PS-VALV-ACTR-5	Maple Street	Pump Station Facility	WTP Valves	Actuator	5	Motor Operated Valve Pump 5 (15) Discharge	2	Low	1	Very Low	Low
NA	MPL-RSVR-SITE-GEN-1	Maple Street	Reservoir Facility	Site Conditions	General	1	Civil Site Conditions	1	Negligible	3	Moderate	Low
NA	MPL-VLT-HTCH-PS-1	Maple Street	Vault	Hatch	Pump Station	1		1	Negligible	2	Low	Low
NA	MPL-VLT-VLT-PS-1	Maple Street	Vault	Vault	Pump Station	1		2	Low	2	Low	Low
NA	NALB-PS-SITE-GEN-1	North Albany	Pump Station Facility	Site Conditions	General	1	Civil Site Conditions	1	Negligible	3	Moderate	Low
NA	NALB-VLT-HTCH-VALV-1	North Albany	Vault	Hatch	Valve	1	Valve Vault Hatch	1	Negligible	3	Moderate	Low
NA	QN-PS-AHWR-PLC-1	Queen Avenue	Pump Station Facility	AutomationHardware	PLC	1		1	Negligible	2	Low	Low
NA	QN-PS-PIPE-GEN-1	Queen Avenue	Pump Station Facility	Piping	General	1		2	Low	3	Moderate	Medium
NA	QN-RSVR-SITE-GEN-1	Queen Avenue	Reservoir Facility	Site Conditions	General	1	Civil Site Conditions	1	Negligible	2	Low	Low
NA	VV-PS-AHWR-ITFC-1	Valley View	Pump Station Facility	AutomationHardware	Operator Interface	1		2	Low	2	Low	Low
NA	VV-PS-AHWR-PLC-1	Valley View	Pump Station Facility	AutomationHardware	PLC	1		2	Low	1	Very Low	Low
NA	VV-PS-SITE-GEN-1	Valley View	Pump Station Facility	Site Conditions	General	1	Civil Site Conditions	1	Negligible	3	Moderate	Low
NA	WWD-RSVR-SITE-GEN-1	Wildwood	Reservoir Facility	Site Conditions	General	1	Civil Site Conditions	1	Negligible	2	Low	Low
NA	WWD-VLT-HTCH-VALV-1	Wildwood	Vault	Hatch	Valve	1	Valve Vault Hatch	1	Negligible	3	Moderate	Low
NA	VINE-RW-HTCH-FLM-1	WTP1 (Vine St)	Raw Water System	Hatch	Flow Meter	1	RW PS Meter Vault Hatch	1	Negligible	3	Moderate	Low
NA	VINE-RW-SITE-GEN-1	WTP1 (Vine St)	Raw Water System	Site Conditions	General	1	Civil Site Conditions	1	Negligible	3	Moderate	Low
NA	VINE-VLT-HTCH-CHEM-1	WTP1 (Vine St)	Vault	Hatch	Chemical Facility	1	Chemical Injection Vault Hatch	1	Negligible	3	Moderate	Low
NA	A&M-AVLT-HTCH-FLM-1	WTP2 (A&M)	Albany Metering Vault	Hatch	Flow Meter	1	Flow Meter Vault to Albany Hatch	1	Negligible	3	Moderate	Low
NA	A&M-AVLT-SITE-GEN-1	WTP2 (A&M)	Albany Metering Vault	Site Conditions	General	1	Civil Site Conditions	1	Negligible	3	Moderate	Low
NA	A&M-FILT-SITE-GEN-2	WTP2 (A&M)	Filter Facility	Site Conditions	General	2	Civil Site Conditions	1	Negligible	2	Low	Low
NA	A&M-MVLT-HTCH-FLM-1	WTP2 (A&M)	Millersburg Metering Vault	Hatch	Flow Meter	1	Flow Meter Vault to Millersburg Hatch	1	Negligible	3	Moderate	Low
NA	A&M-MVLT-SITE-GEN-1	WTP2 (A&M)	Millersburg Metering Vault	Site Conditions	General	1	Civil Site Conditions	1	Negligible	3	Moderate	Low
NA	A&M-RWPS-AHWR-PLC-1	WTP2 (A&M)	Raw Water Pump Station	AutomationHardware	PLC	1		4	Major	1	Very Low	Low
NA	A&M-RWPS-SITE-GEN-1	WTP2 (A&M)	Raw Water Pump Station	Site Conditions	General	1	Civil Site Conditions	1	Negligible	2	Low	Low
NA	A&M-RSVR-SITE-GEN-2	WTP2 (A&M)	Reservoir Facility	Site Conditions	General	2	Civil Site Conditions	1	Negligible	3	Moderate	Low
NA	A&M-VLT-HTCH-ACH-1	WTP2 (A&M)	Vault	Hatch	ACH	1	ACH & Flow Meter Vault Hatch	1	Negligible	3	Moderate	Low
NA	A&M-VLT-HTCH-FLM-1	WTP2 (A&M)	Vault	Hatch	Flow Meter	1	Unknown Flow Meter Vault Near Neutralization Basin Hatch	1	Negligible	2	Low	Low
NA	A&M-VLT-HTCH-OF-2	WTP2 (A&M)	Vault	Hatch	Overflow	2	AM Reservoir Overflow Vault Hatch	1	Negligible	2	Low	Low
NA	A&M-VLT-HTCH-VALV-1	WTP2 (A&M)	Vault	Hatch	Valve	1	AM Reservoir Vault Hatch	1	Negligible	2	Low	Low
NA	A&M-VLT-VLT-FLM-1	WTP2 (A&M)	Vault	Vault	Flow Meter	1	Unknown Flow Meter Vault Near Neutralization Basin	2	Low	2	Low	Low
NA	A&M-VLT-VLT-OF-2	WTP2 (A&M)	Vault	Vault	Overflow	2	AM Reservoir Overflow Vault	2	Low	2	Low	Low
NA	34-VLT-HTCH-FLM-1	34th Street	Vault	Hatch	Flow Meter	1	Flow Meter Vault Hatch	1	Negligible	4	High	Medium
NA	34-VLT-PIPE-FLM-1	34th Street	Vault	Piping	Flow Meter	1	Flow Meter Vault Piping	2	Low	4	High	Medium
NA	34-VLT-VLT-FLM-1	34th Street	Vault	Vault	Flow Meter	1	Flow Meter Vault	2	Low	3	Moderate	Medium
NA	BDWY-RSVR-AHWR-PLC-1	Broadway Street	Reservoir Facility	AutomationHardware	PLC	1		4	Major	2	Low	Medium
NA	QN-RSVR-INST-LSEN-1	Queen Avenue	Reservoir Facility	Instrument	Level Sensor	1	Tank Hydrostatic Pressure Level Transmitter	1	Negligible	4	High	Medium
NA	BDWY-VLT-HTCH-VALV-1	Broadway Street	Vault	Hatch	Valve	1	Valve Vault Hatch	1	Negligible	4	High	Medium
NA	BDWY-VLT-VLT-FLM-1	Broadway Street	Vault	Vault	Flow Meter	1	Flow Meter Vault	2	Low	3	Moderate	Medium
NA	BDWY-VLT-VLT-VALV-1	Broadway Street	Vault	Vault	Valve	1	Valve Vault	2	Low	3	Moderate	Medium
NA	GBHL-PS-PIPE-GEN-1	Gibson Hill	Pump Station Facility	Piping	General	1	Pump Station Piping	3	Moderate	3	Moderate	Medium
NA	GBHL-VLT-PIPE-FLM-1	Gibson Hill	Vault	Piping	Flow Meter	1	Flow Meter Vault Piping	3	Moderate	3	Moderate	Medium
NA	GBHL-VLT-PIPE-VALV-1	Gibson Hill	Vault	Piping	Valve	1	Valve Vault Piping	3	Moderate	3	Moderate	Medium
NA	GBHL-VLT-VLT-FLM-1	Gibson Hill	Vault	Vault	Flow Meter	1	Flow Meter Vault	2	Low	4	High	Medium
NA	GBHL-VLT-VLT-VALV-1	Gibson Hill	Vault	Vault	Valve	1	Valve Vault	2	Low	3	Moderate	Medium
NA	MPL-RSVR-VALV-FLEX-1	Maple Street	Reservoir Facility	Valve	Flextend	1		3	Moderate	2	Low	Medium
NA	MPL-RSVR-VALV-FLEX-2	Maple Street	Reservoir Facility	Valve	Flextend	2		3	Moderate	2	Low	Medium
NA	MPL-VLT-HTCH-RESR-1	Maple Street	Vault	Hatch	Reservoir	1		1	Negligible	4	High	Medium
NA	MPL-VLT-VLT-LDDR-1	Maple Street	Vault	Vault	Ladder	1		2	Low	4	High	Medium
NA	MPL-VLT-VLT-RESR-1	Maple Street	Vault	Vault	Reservoir	1		2	Low	3	Moderate	Medium
NA	NALB-PS-AHWR-PLC-1	North Albany	Pump Station Facility	AutomationHardware	PLC	1	Programmable Logic Controller	3	Moderate	2	Low	Medium
NA	NALB-PS-PIPE-GEN-1	North Albany	Pump Station Facility	Piping	General	1	Pump Station Piping	3	Moderate	3	Moderate	Medium
NA	NALB-VLT-HTCH-FLM-1	North Albany	Vault	Hatch	Flow Meter	1	Flow Meter Vault Hatch	1	Negligible	4	High	Medium
NA	NALB-VLT-PIPE-VALV-1	North Albany	Vault	Piping	Valve	1	Valve Vault Piping	3	Moderate	3	Moderate	Medium
NA	NALB-VLT-VLT-FLM-1	North Albany	Vault	Vault	Flow Meter	1	Flow Meter Vault	2	Low	4	High	Medium
NA	NALB-VLT-VLT-VALV-1	North Albany	Vault	Vault	Valve	1	Valve Vault	2	Low	3	Moderate	Medium
NA	QN-PS-AHWR-ITFC-1	Queen Avenue	Pump Station Facility	AutomationHardware	Operator Interface	1		1	Negligible	5	Very High	Medium
NA	QN-RSVR-PIPE-GEN-1	Queen Avenue	Reservoir Facility	Piping	General	1		2	Low	4	High	Medium

Albany_ID	WY_ID	Site	Site Type	Asset Type	Type	Number	Equipment Description	COF Score (1-5)	COF Description	POF Score (1-5)	POF Description	Risk Score
NA	VV-PS-PIPE-GEN-1	Valley View	Pump Station Facility	Piping	General	1		3	Moderate	3	Moderate	Medium
NA	VV-PS-PRSR-NA-1	Valley View	Pump Station Facility	Pressure Vessel	Not Applicable	1	Pump Station Bladder Tank	2	Low	4	High	Medium
NA	VV-RSVR-RSVR-ANOD-1	Valley View	Reservoir Facility	WaterStorageTank	Tank Anodes	1		2	Low	5	Very High	Medium
NA	WWD-RSVR-AHWR-PLC-1	Wildwood	Reservoir Facility	AutomationHardware	PLC	1		2	Low	4	High	Medium
NA	WWD-RSVR-INST-FLM-1	Wildwood	Reservoir Facility	Instrument	Flow Meter	1		2	Low	4	High	Medium
NA	WWD-VLT-PIPE-VALV-1	Wildwood	Vault	Piping	Valve	1	Valve Vault Piping	3	Moderate	3	Moderate	Medium
NA	WWD-VLT-VLT-VALV-1	Wildwood	Vault	Vault	Valve	1	Valve Vault	2	Low	3	Moderate	Medium
NA	VINE-CHEM-PIPE-CHEM-1	WTP1 (Vine St)	Chemical Facility	Piping	Chemical Facility	1	Chemical Liquid Room Piping	3	Moderate	3	Moderate	Medium
NA	VINE-CHEM-SITE-CHEM-1	WTP1 (Vine St)	Chemical Facility	Site Conditions	Chemical Facility	1	Chemical Liquid Room Floor	1	Negligible	4	High	Medium
NA	VINE-RW-HTCH-VALV-1	WTP1 (Vine St)	Raw Water System	Hatch	Valve	1	RW PS Valve Vault Hatch	1	Negligible	5	Very High	Medium
NA	VINE-RW-PIPE-CNL-1	WTP1 (Vine St)	Raw Water System	Piping	Canal	1	Canal	3	Moderate	3	Moderate	Medium
NA	VINE-RW-PIPE-PS-1	WTP1 (Vine St)	Raw Water System	Piping	Pump Station	1	RW Pump Station Piping	3	Moderate	3	Moderate	Medium
NA	VINE-RW-VLT-FLM-1	WTP1 (Vine St)	Raw Water System	Vault	Flow Meter	1	RW PS Meter Vault	2	Low	4	High	Medium
NA	VINE-RW-VLT-VALV-1	WTP1 (Vine St)	Raw Water System	Vault	Valve	1	RW PS Valve Vault	2	Low	5	Very High	Medium
NA	VINE-VLT-VLT-CHEM-1	WTP1 (Vine St)	Vault	Vault	Chemical Facility	1	Chemical Injection Vault	2	Low	3	Moderate	Medium
NA	A&M-AVLT-VLT-FLM-1	WTP2 (A&M)	Albany Metering Vault	Vault	Flow Meter	1	Flow Meter Vault to Albany	3	Moderate	3	Moderate	Medium
NA	A&M-BWSH-PIPE-GEN-1	WTP2 (A&M)	Backwash System	Piping	General	1	Backwash Piping	4	Major	2	Low	Medium
NA	A&M-CHEM-PIPE-CIP-1	WTP2 (A&M)	Chemical Facility	Piping	CIP	1	CIP Piping	4	Major	2	Low	Medium
NA	A&M-FILT-PIPE-CNL-1	WTP2 (A&M)	Filter Facility	Piping	Channel	1	Membrane Influent Channel	4	Major	2	Low	Medium
NA	A&M-MVLT-VLT-FLM-1	WTP2 (A&M)	Millersburg Metering Vault	Vault	Flow Meter	1	Flow Meter Vault to Millersburg	3	Moderate	3	Moderate	Medium
NA	A&M-RW-PIPE-GEN-1	WTP2 (A&M)	Raw Water System	Piping	General	1	RW Piping	4	Major	2	Low	Medium
NA	A&M-VLT-PIPE-FLM-1	WTP2 (A&M)	Vault	Piping	Flow Meter	1	Unknown Flow Meter Vault Near Neutralization Basin Piping	4	Major	2	Low	Medium
NA	A&M-VLT-VLT-ACH-1	WTP2 (A&M)	Vault	Vault	ACH	1	ACH & Flow Meter Vault	2	Low	3	Moderate	Medium
NA	A&M-VLT-VLT-VALV-1	WTP2 (A&M)	Vault	Vault	Valve	1	AM Reservoir Vault	2	Low	3	Moderate	Medium
NA	BDWY-RSVR-AHWR-CBNT-1	Broadway Street	Reservoir Facility	AutomationHardware	Cabinet	1	Water Quality Cabinet	3	Moderate	4	High	High
NA	BDWY-VLT-PIPE-FLM-1	Broadway Street	Vault	Piping	Flow Meter	1	Flow Meter Vault Piping	3	Moderate	4	High	High
NA	BDWY-VLT-PIPE-VALV-1	Broadway Street	Vault	Piping	Valve	1	Valve Vault Piping	3	Moderate	4	High	High
NA	VINE-PS-FCLT-TW-1	WTP1 (Vine St)	Pump Station Facility	Water Facility	Transfer Water System	1	Transfer Water Pump Station	4	Major	4	High	Severe
NA	VINE-RW-FCLT-SCRN-1	WTP1 (Vine St)	Raw Water System	Water Facility	Screen	1	RW Screen	3	Moderate	4	High	High

Appendix J

Water System Mains Replacement Program TM

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TECHNICAL MEMORANDUM

DATE: March 21, 2024

Project No.: 519-50-22-21
SENT VIA: EMAIL

TO: Ryan Beathe
City of Albany

FROM: Chris O'Connor, PE, RCE #94625 (CA)
Ruby Lang Burnley

REVIEWED BY: Mel Damewood, PE, RCE #13672PE (OR)
Noelle Drath, PE, RCE #94519PE (OR)

SUBJECT: Water System Mains Replacement Program Projections

REGISTERED PROFESSIONAL ENGINEER
13672PE
OREGON
JUL. 16, 1987
MEL DAMEWOOD III
EXPIRES: 12/31/2025

This technical memorandum (TM) presents a study performed for the City of Albany (City) to assess the remaining useful life (RUL) of water system mains (water mains, pipes), and a recommended Replacement Program which will be incorporated into the overall capital improvement program recommendations. Major sections in this TM include:

- Existing Replacement Program
- Asset Registry
- Evaluating the Health of the Water System
- Existing Risk Framework
- Asset Remaining Useful Life (RUL) Assessment
- Replacement Prioritization
- 20-Year Replacement Program
- Replacement Cycle Management
- Actions for Future Consideration

EXISTING REPLACEMENT PROGRAM

Currently, the City of Albany utilizes an in-house, risk-based, methodology to prioritize pipe replacement (see the Existing Risk Framework section below). The City spends approximately $1.2 million per year on water main replacements. Where appropriate, the City currently aligns the water replacement project timing with sewer and road improvement projects to maximize the use of City funds.

Purpose

The purpose of this study is to improve the City's Replacement Program by identifying water mains that should be prioritized for replacement (i.e., high risk, expiring useful life, etc.), extract the City's institutional knowledge about different pipe materials/sizes that have chronic issues, and combine assets into a 20-year replacement forecast. The forecast should support the development of capital improvement projects that the City can strategically, and feasibly, implement over the next 20 years. An additional evaluation of the replacement cost and prioritization of replacements for the North Albany County Service District was also performed and is provided in Attachment A.

ASSET REGISTRY

The City provided a GIS database on June 21, 2023 that was used to create a master inventory of pipe segments within the City's water system (asset register). The asset register consists of 11,795 pipe segments (271.3 miles) and was established to create a centralized inventory of the City's water system mains and associated asset data (e.g., age, size, material, etc.). Table 1 presents a summary of the City's water mains by diameter. Table 2 presents a summary of the City's water mains by material. As described in the following sections, the asset register was used to develop RUL estimates and prepare an estimate of replacement cost for all assets.

Table 1. Water Main Summary, by Diameter

Diameter, inches	Length, miles	Count
≤ 2	5.9	175
3-4	19.0	764
6	50.2	2,016
8	100.8	5,010
10-12	56.9	2,619
16	14.7	482
18-24	16.0	600
30-42	7.8	129
Total	**271.3**	**11,795**

Table 2. Water Main Summary, by Material

Material	Length, miles	Count
Asbestos Cement (AC)	80.1	2,877
Brass (BRS)	< 0.0	4
Polyvinyl Chlorine (C900, PVC)	5.6	160
Cast Iron (CI)	13.5	470
Copper (Cu)	0.2	18
Ductile Iron (DI)	152.4	7,848
Galvanized Pipe	2.1	60
High Density Polyethylene (HDPE)	11.6	222
Steel (STL)	5.0	116
Unknown	0.5	13
Yelomine	0.3	7
Total	**271.3**	**11,795**

EVALUATING THE HEALTH OF THE WATER SYSTEM MAINLINES

This section summarizes two metrics that are useful to track the existing and future health of the water system mainlines: water loss and the replacement cycle.

Water Loss

Water loss is defined as the amount of water that has been "lost" between the production site (the water treatment plants) and the customer meter. Water loss can be expressed as a volume, or as a percent of total water production. Water loss can be attributed to:

- Main leaks and storage tank overflows.
- Unauthorized Use (theft and tampering).
- Unbilled consumption and meter inaccuracy.
- Unmetered consumption.

Water loss can be used to track the health of the water system over time; it provides insight on the efficacy of the existing operations and maintenance (O&M) methods, and if there has been enough capital investment into the water system in the past. High water loss corresponds to reactive maintenance practices and underinvestment in the water system, whereas low water loss is associated with preventative maintenance practices and adequate investment. The American Water Works Association recommends agencies aim for a maximum water loss of 10 percent. According to the Chapter 3 of the 2023 Water Master Plan, the water loss for the City ranges from 11.2 percent to 12.6 percent between 2018 and 2022. These numbers did not include estimates of unmetered demand and apparent losses such as metering inaccuracies or unauthorized consumption, which the City uses in its own calculations of water loss.

Replacement Cycle

Replacement costs represent the amount of money that the City would have to spend to replace all water mains with new, equivalent assets at current market prices. The replacement costs can be used as a benchmark against which the decision to repair, rehabilitate, or replace can be made. This information can also be used by the City for financial and managerial accounting purposes.

Unit costs developed in the Basis for Cost Estimating TM were used to estimate the replacement cost for each pipe segment. As summarized in Table 3, the cost for replacing all pipes within the distribution system totals $615,952,000.

Table 3. Water Main Replacement Cost by Diameter

Diameter, inches	Replacement Cost, 2023 Dollars
<u><</u>2	10,759,000
3-4	34,894,000
6	96,235,000
8	202,692,000
10-12	119,903,000
16	41,469,000
18-24	63,638,000
30-42	46,362,000
Total	**$615,952,000**

The replacement cycle of a water system is calculated by dividing the total replacement costs by the existing capital improvements budget (Equation 1). This metric can be evaluated against the expected useful life of water mains (discussed in following sections) to identify if the existing capital improvement budget is sufficient to replace assets at the rate in which they degrade. Using the current budget of approximately $1.2 million per year that the City spends on water main replacements, the current replacement cycle would be 513 years.

$$Replacement\ Cycle\ (Years) = \frac{Total\ Replacement\ Costs}{Existing\ Capital\ Improvement\ Budget} \qquad \textit{Eqn. 1}$$

EXISTING RISK FRAMEWORK

In addition to the GIS database, the City staff also provided a Risk Calculation Worksheet for Water Main Replacement (Risk Calculation Worksheet, Attachment B) and the associated input data and results for each water main. This data provides some of the primary metrics used in the replacement described in the following sections. Note that the risk assessment input data was not available for each main in the water system. These water mains were omitted from the risk-based evaluations described in the following sections.

The Risk Calculation Worksheet quantifies the probability of failure (POF) and consequence of failure (COF) for a given water main. POF is a function of the condition of the water main, while COF is a function of the criticality. The Risk Calculation Worksheet is programmed to generate scores for five POF factors and four COF factors based on pipe attributes (e.g., material) or location (e.g., adjacent to a railway):

- Probability of Failure Factors
  - Construction Year (e.g., 1960)
  - Pipe Size (e.g., 12 inches)
  - Pipe Material (e.g., PVC)
  - Number of Leaks (e.g., 4 leaks / 500 feet)
  - Type of Recorded Leak (e.g., longitudinal)
- Consequence of Failure Factors
  - Road Type (e.g., arterial)
  - Critical Location (e.g., railroad crossing)
  - Pipe Types Prone to Catastrophic Breaks (e.g., asbestos cement)
  - Pipe Size (e.g., 12 inches)

After each individual POF and COF factor is scored, a weighting is applied and a composite POF and COF score is generated by normalizing on a 1-10 scale based on the possible scoring range. A score of 1 is associated with the best condition (POF), lowest criticality (COF), lowest risk water mains, while a score of 10 is indicative of the worst condition, highest criticality, and highest risk water mains. The composite POF and COF scores are then averaged to create a composite Risk Index value that can be assigned to each water main (Equation 1).

$$Risk = \frac{Probability\ of\ Failure + Consequence\ of\ Failure}{2} \qquad \textit{Eqn. 2}$$

Risk Interpretation

Assigning risk metric levels to mains provides a high-level view of the health, performance, criticality, and overall risk of the water system. Furthermore, the risk metric levels can be used as an action catalyst within water main replacement prioritization logic. For example, if a water main is classified with a risk level of high, then it should be replaced sooner than a water main of medium risk. The existing risk framework, scoring mechanisms, and risk results that were provided by the City were thoroughly reviewed to develop distinct levels across the risk metrics (POF, COF, risk index). The risk metric levels and definitions include the following:

1. **Low.** An asset is performing well within the bounds of the risk metric. No action is required to mitigate characteristics associated with the evaluated risk metric.
2. **Medium.** An asset is performing adequately within the bounds of the risk metric. Immediate action is not required; however, a plan should be outlined for the eventual renewal or replacement of the asset.
3. **High.** An asset is performing poorly within the bounds of the risk metric. Action or increased oversight (e.g., increasing frequency of condition assessment) is required to mitigate characteristics associated with the evaluated risk metric.

The City's existing risk framework and scoring mechanisms were determined to be sufficient for the purposes of this study, however the City should continue recalibrating as more data is collected and priorities change. The following subsections describe the process of developing the scoring ranges for each risk metric level, and the distribution of the risk metric levels.

Development of Scoring Ranges for Risk Metric Levels

Scoring ranges were developed for each risk metric and the levels defined in the preceding section. This included the following steps:

- Review of the Risk Calculation Worksheet for Water Main Replacement to identify the spectrum of scores and weightings associated with each risk metric factor.
- Review of the scoring distribution for each risk metric.
- Review typical characteristics associated with various scores of risk metrics.
- Identify points within scoring ranges that where significant changes in risk interpretation occur (i.e., potential bounds of risk metric levels).
- Assign risk metric levels for scoring ranges using engineering judgement.
- Calibrate risk metric levels scoring ranges with City staff.

The scoring ranges for each risk metric level and typical characteristics associated with mains that score within the ranges are summarized in Table 4.

Table 4. Risk Metric Levels Scoring Ranges and Typical Characteristics

Risk Metric Level	Probability of Failure (1-10)	Consequence of Failure (1-10)	Risk Index (1-10)
Low	**Range: < 2.5** • Typically installed after 1990 • Material of DI, or HDPE • 8-inches ≤ Diameter ≤ 42-inches • No leakage history	**Range: < 4.0** • Material of DI, or HDPE • Diameter ≤ 8-inches • No location criticality • Located on a local or collector road	**Range: < 3.25** • Younger pipes of flexible material, no leakage history, and minimal interaction with high criticality infrastructure.
Medium	**Range: 2.5 – 3.5** • Installed before 1990 • Material = CIP, AC, or STL • 8-inches ≤ Diameter < 16-inches • No leakage history	**Range: 4.0 – 6.0** • Material of CIP, DI, HDPE, or STL • 8-inches < Diameter ≤ 16-inches • Highly critical location (e.g., backbone, critical customer, railroad crossing) • 21 percent chance of being located on an arterial street or highway	**Range: 3.25 – 4.75** • Pipes of varying material and age with no leakage history, and more likely to be closer to high criticality infrastructure.
High	**Range: > 3.5** • Installed before 1980 • Material of CIP, AC, or STL • Diameter ≤ 6-inches • 25 percent chance of having ≥ 1 leak • 7 percent chance of having ≥ 3 leaks / 500 feet	**Range: > 6.0** • Material of AC • 12-inches ≤ Diameter ≤ 24-inches • Highly critical location (e.g., backbone, critical customer, railroad crossing) • 56 percent chance of being located on an arterial street or highway	**Range: > 4.75** • Older pipes that either have leakage history or characteristics that are prone to elevated degradation rates, and are likely near high criticality infrastructure.

To better illustrate the complexity of the process for developing scoring ranges for each risk metric level, an example of a main (ID = 40361) on the border of medium and high risk metric levels is provided below:

- Probability of Failure Factors
  - Construction Year = 1964 → Unweighted POF factor score = 8.
  - Pipe Size = 6-inches → Unweighted POF factor score = 5.
  - Pipe Material = AC → Unweighted POF factor score = 10.
  - Number of Leaks = 0 leaks / 500 feet → Unweighted POF factor score = 0.
  - Type of Recorded Leak = Not Applicable → Unweighted POF factor score = 0.
- Consequence of Failure Factors
  - Road Type = Highway → Unweighted COF factor score = 10.
  - Critical Location = None → Unweighted COF factor score = 0.
  - Pipe Types Prone to Catastrophic Breaks = AC → Unweighted COF factor score = 10.
  - Pipe Size = 6-inches → Unweighted COF factor score = 3.

- Total Factor Scores & Levels
  - Probability of Failure = 3.8 → Level = High
  - Consequence of Failure = 6.1 → Level = High
  - Risk = 5.0 → Level = High

Despite the minimal leakage history for this main, other attributes are characteristic of degraded condition. Not only was the main installed nearly 60 years ago, but the material (asbestos-cement) is brittle and prone to shear in dry conditions and softening in saturated conditions. From a criticality standpoint, the main is located near or running through a highway and is prone to catastrophic breaks. If this main were to break it would cause significant social and economic impacts to the community. That said, the main is not a critical pipeline (e.g., backbone pipeline). Based on the review of the attributes associated with the condition and criticality of the main, this pipeline was used to help delineate the border between medium and high scoring ranges for each risk metric levels.

Distribution of Risk Metric Levels

The distribution of levels for each risk metric is shown on Figure 1. Note that 4 percent of the water system (10.2 miles) has not been evaluated using the City-provided data and risk criteria described in the previous sections. The risk metric levels that have the highest allocation of water mains by length include:

- A POF level of low (58 percent of the total system).
- A COF level of low (63 percent of the total system).
- A risk level of low (58 percent of the total system).

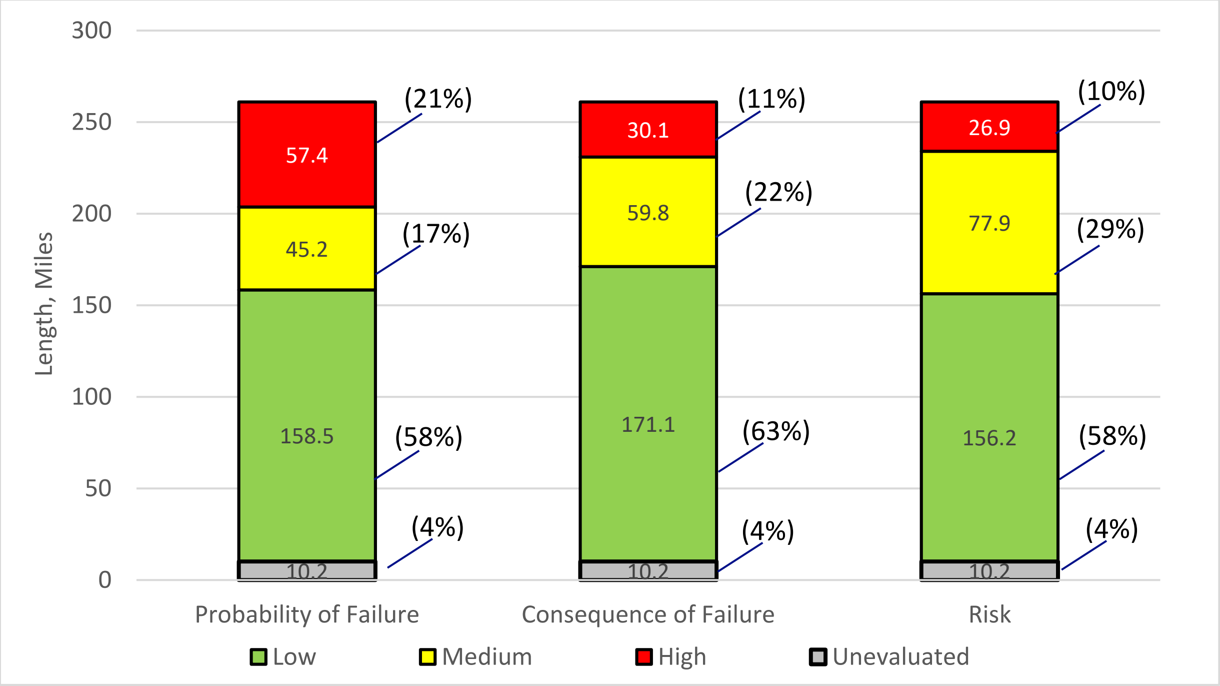


Figure 1. Water Main Risk Metric Distribution by Length and Percent of Total System

ASSET REMAINING USEFUL LIFE (RUL) ASSESSMENT

Asset useful life is generally considered to be the timeframe in which an asset provides its intended service. End of life is not necessarily indicative of catastrophic failure, and in most cases an asset can still hold functionality when it has reached the end of its useful life. In absence of condition or performance data, asset RUL can be estimated on a temporal basis by comparing the actual age of assets to a standardized values for useful life expectancy. When available, asset condition or performance data can be used to support or supersede time-based RUL estimates.

The following section presents the method used to estimate RUL of City water pipe segments using the time-based method.

Time-Based Remaining Useful Life (RUL_T)

The time-based remaining useful life (RUL_T) is calculated based on a linear decay of the asset's useful life expectancy. For example, an asset with a 50-year useful life that has been in service 35 years would have a RUL_T of 15 years.

Useful Life Expectancies

Municipal utility system assets vary by type, manufacture, design, construction, and quality. They have different characteristics in how they operate and, consequently, will have different profiles of how they perform and ultimately fail. Standard useful life expectancies are documented by the American Water Works Association, Water Environment Research Foundation, in addition to other industry associations. Useful life expectancies were developed using these industry standards.

Each pipe material and diameter within the City's water system was assigned a standard useful life. Modifiers were used as appropriate to account for pipe corrosion susceptibility and soil shrink-swell potential. Standard useful life expectancies are presented in Table 5. Once each pipe was assigned a standard useful life, the RUL_T of each of the City's water mains was calculated.

Table 5. Standard Useful Life of Buried Pipes

Material	Useful Life, years
Asbestos Cement < 6-inches[(a)]	30
Asbestos Cement ≥ 6-inches	90
Polyvinyl Chloride (PVC)	90
Brass	90
Cast Iron	95
Ductile Iron Pipe	95
High Density Polyethylene	90
Copper	95
Galvanized Pipe	95
Yelomine	90
Steel	95
Unknown	95

(a) Asbestos cement less than 6-inches in diameter has a lower useful life of pipes of the same material that are 6-inches or greater due to the brittle nature of the material. When exposed to clay soils with high shrink-swell potential, small diameter asbestos cement pipes are prone to breaks.

RUL_T Classification

Pipe RUL_T results were grouped into four classes for data visualization purposes. Classes range from: Class I, excellent, which includes newer assets in the first 25 percent of their useful life expectancy or assets that are expected to be in new or like new condition; to Class IV, poor, which includes assets in the last 25 percent of their useful life expectancy. Table 6 presents the percent RUL_T ranges, associated classification, and expected condition.

Table 6. RUL_T Class Ranges

Percent RUL_T	Class	Expected Condition
75 — 100	I	**Excellent**
50 — 75	II	**Good**
25 — 50	III	**Fair**
0 — 25	IV	**Poor**

Note:
Fill for the expected condition correlates to Figure 2.

Figure 2 presents a graphical representation of RUL_T class by length (miles of pipeline) and percent of total system length. For example, Class I (green bar) represents pipe segments between 75 and 100 percent RUL_T – the most common class within the water system. This information provides a snapshot view of the condition of the City's water pipe segments and where future replacement may be required. In general, the City's water system is in **excellent to good** condition based on the RUL_T estimation and classification.

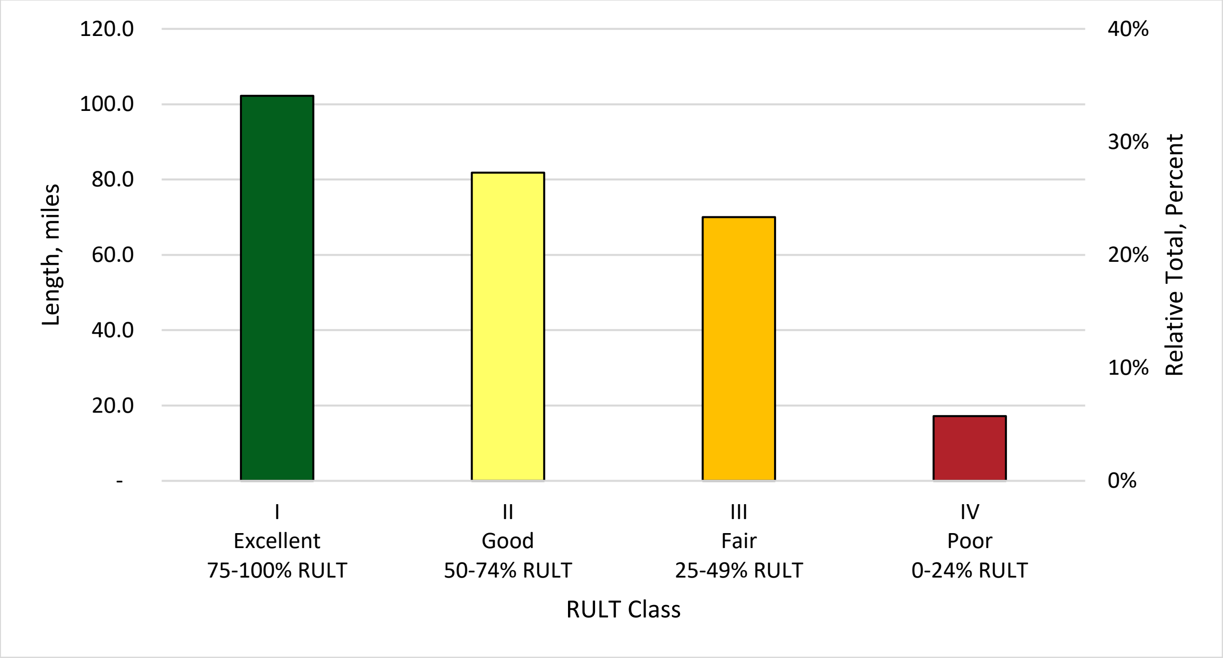


Figure 2. Water Pipe Segment RUL_T Class by Length (miles) and Percent of Total System Length

REPLACEMENT PRIORITIZATION

The risk and age-based pipe replacement methodologies described above were used to develop the Replacement Program (Program). The Program consists of eight replacement catalysts which are defined as metrics that indicate if a replacement action is justified. Replacement catalysts were developed based on the relative importance and source data efficacy, and include the following (from highest to lowest priority):

1. Extensive Leak History ($\geq$ 5 leaks / 500 feet);
2. Expired Useful Life (i.e., $RUL_T = 0$);
3. High Risk (Risk Score $\geq$ 6.0) and High POF (POF Score $\geq$ 3.5);
4. Medium-High Risk (6.0 > Risk Score $\geq$ 5.0) and High POF (POF Score $\geq$ 3.5);
5. Near-Term Expiring Useful Life (i.e., RUL_T = 1 – 10 years);
6. Medium Risk (5.0 > Risk Score $\geq$ 4.0) and High POF (POF Score $\geq$ 3.5);
7. Medium-Term Expiring Useful Life (i.e., RUL_T = 10 – 20 years);
8. Long-Term Expiring Useful Life (i.e., RUL_T > 20 years);

Table 7 summarizes the prioritized replacement groups, replacement costs for each group (2023 dollars), and associated length of pipeline. Figure 3 is a spatial representation of the prioritized replacement groups summarized in Table 7. Water mains with insufficient data to perform the risk-based prioritization were prioritized only within the age-based replacement groups.

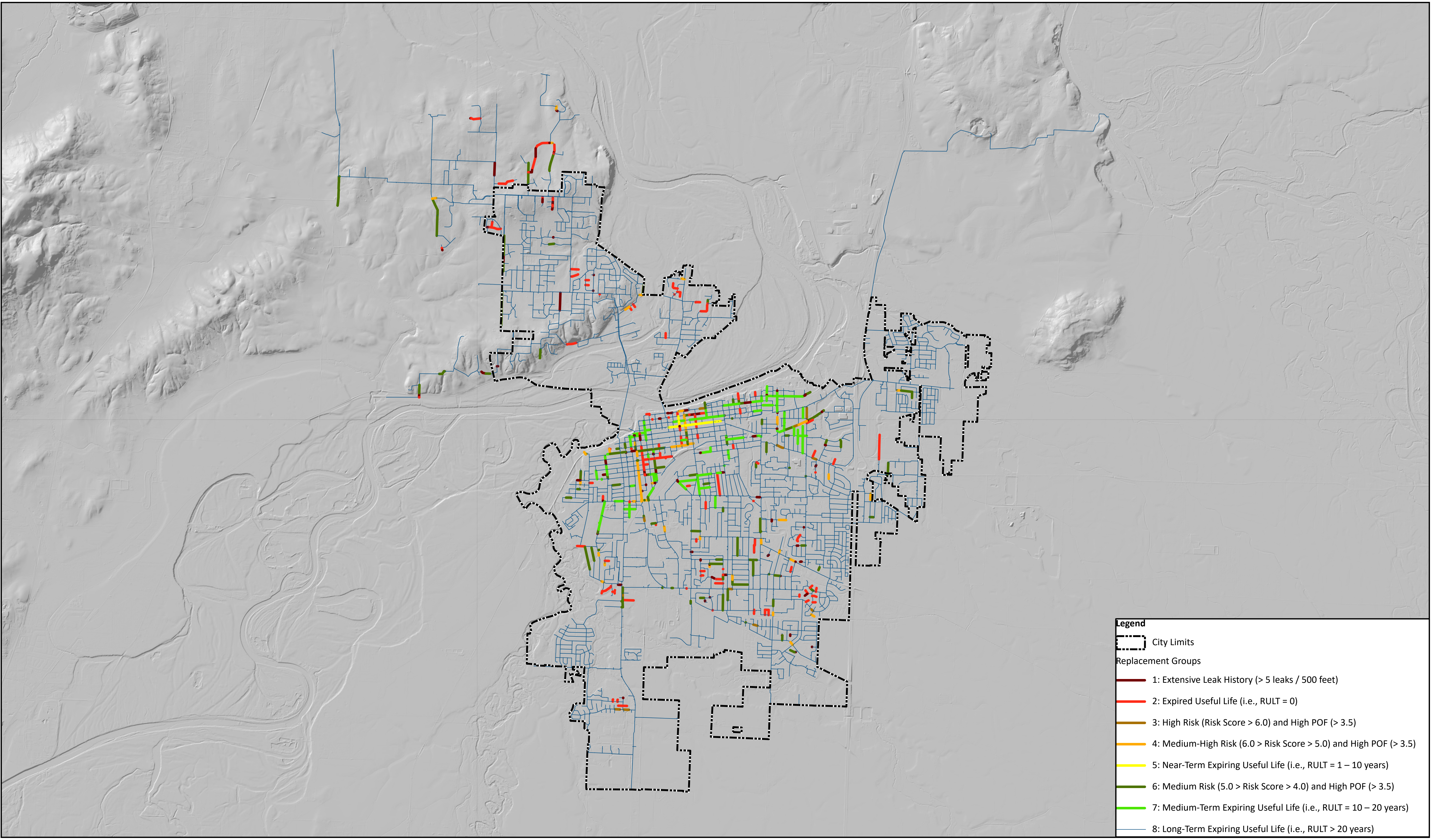
Table 7. Replacement Group Descriptions and Lengths[a]

Replacement Group	Replacement Catalyst Description	Replacement Category	Replacement Cost, 2023 Dollars[b] [c]	Length, miles
1	Extensive Leak History ($\geq$ 5 leaks / 500 feet)	Risk-based	4,148,000	2.13
2	Expired Useful Life (i.e., $RUL_T = 0$)	Age-based	10,808,000	5.88
3	High Risk (Risk Score $\geq$ 6.0) and High POF (POF Score $\geq$ 3.5)	Risk-based	1,484,000	0.68
4	Medium-High Risk (6.0 > Risk Score $\geq$ 5.0) and High POF (POF Score $\geq$ 3.5)	Risk-based	5,280,000	2.41
5	Near-Term Expiring Useful Life (i.e., RUL_T = 1 – 10 years)	Age-based	1,245,000	0.67
6	Medium Risk (5.0 > Risk Score $\geq$ 4.0) and High POF (POF Score $\geq$ 3.5)	Risk-based	15,523,000	7.92
7	Medium-Term Expiring Useful Life (i.e., RUL_T = 10 – 20 years)	Age-based	13,259,000	6.65
8	Long-Term Expiring Useful Life (i.e., RUL_T > 20 years)	Age-based	564,207,000	244.85

(a) Water mains with insufficient data to perform the risk-based prioritization were prioritized only within the age-based replacement groups.

(b) If a water main is categorized into a replacement group then it is ineligible for lower priority replacement groups. For example, if a water main has $\geq$ 5 leaks / 500 feet, then the replacement costs are allocated to Replacement Group 1, and are ineligible to be allocated to Replacement Groups 2 – 6.

(c) Replacement costs based on unit costs developed in Basis for Cost Estimating TM (i.e., not adjusted for inflation due to undetermined replacement year[s]).



R&R Figure 3: P:\Clients\519 City of Albany\50-22-21 Water Master Plan\GIS\Albany_WMP.aprx - rlangburnley - 12/7/2023

Prepared by:

WEST YOST

Prepared for:

City of Albany

Water System Mains
Replacement Groups

Figure 3

20-YEAR REPLACEMENT PROGRAM

Replacement planning is a forecast of planned effort and expenditures for replacement of the asset. This forecast may be used for fiscal planning and as a tool to prioritize further investigation of water mains via desktop assessments (e.g., review of field and maintenance records) or field assessments (e.g., condition assessment studies). A forecast of asset replacement was developed to establish a baseline order of magnitude estimate of asset replacement.

The two replacement groups presented above (e.g., risk-based, age-based) were assigned a year of action based on the following prioritization criteria or assumptions:

1. Risk-based replacements will occur based on the priority shown in Table 7 (i.e., Group 1 first).
2. Age-based replacements that are already beyond their useful life will occur in year 1 of the Replacement Program, or as soon as possible given budget constraints.
3. Age-based replacements that are expected to reach the end of their useful life after year 1 will occur on the year they reach $RUL_T = 0$.

The replacement prioritization logic is summarized on Figure 4 and details the various criteria and avenues that categorize a water main into a replacement group. Using this logic the 20-Year Replacement Program projections were developed, the results of which are presented in graphical and tabular format on Figure 5, and in Table 8, respectively. The projected costs associated with the various replacement groups is differentiated by color within Figure 5:

- The gray bars correspond to the age-based replacements which include pipes already beyond their useful life and pipes that reach $RUL_T = 0$ on that year.
- The blue bars indicate risk-based replacements.
- The solid dark gray line represents the projected 20-Year average replacement cost ($3.25M).

The recommended year of action is shown spatially on Figure 6.

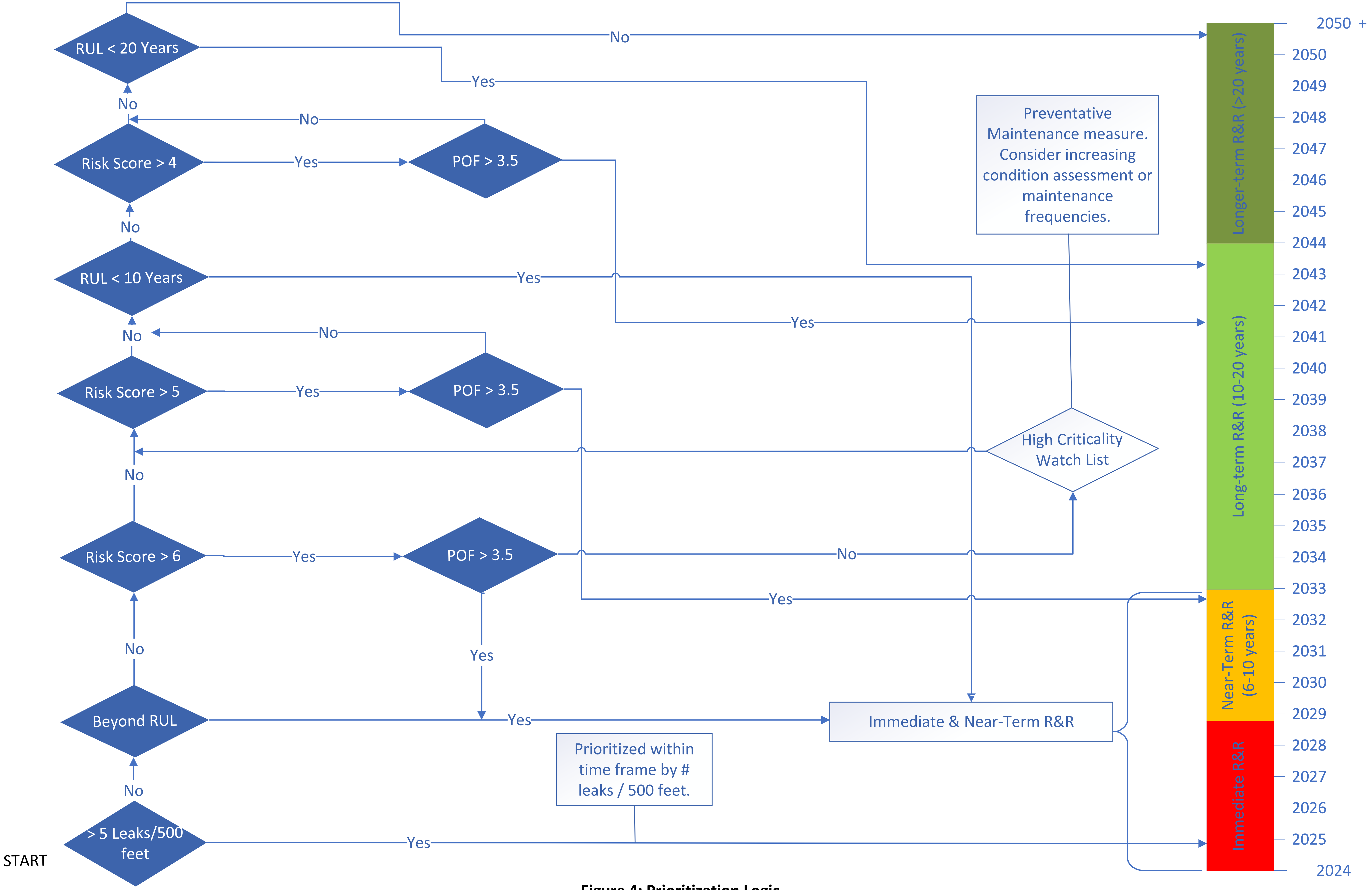
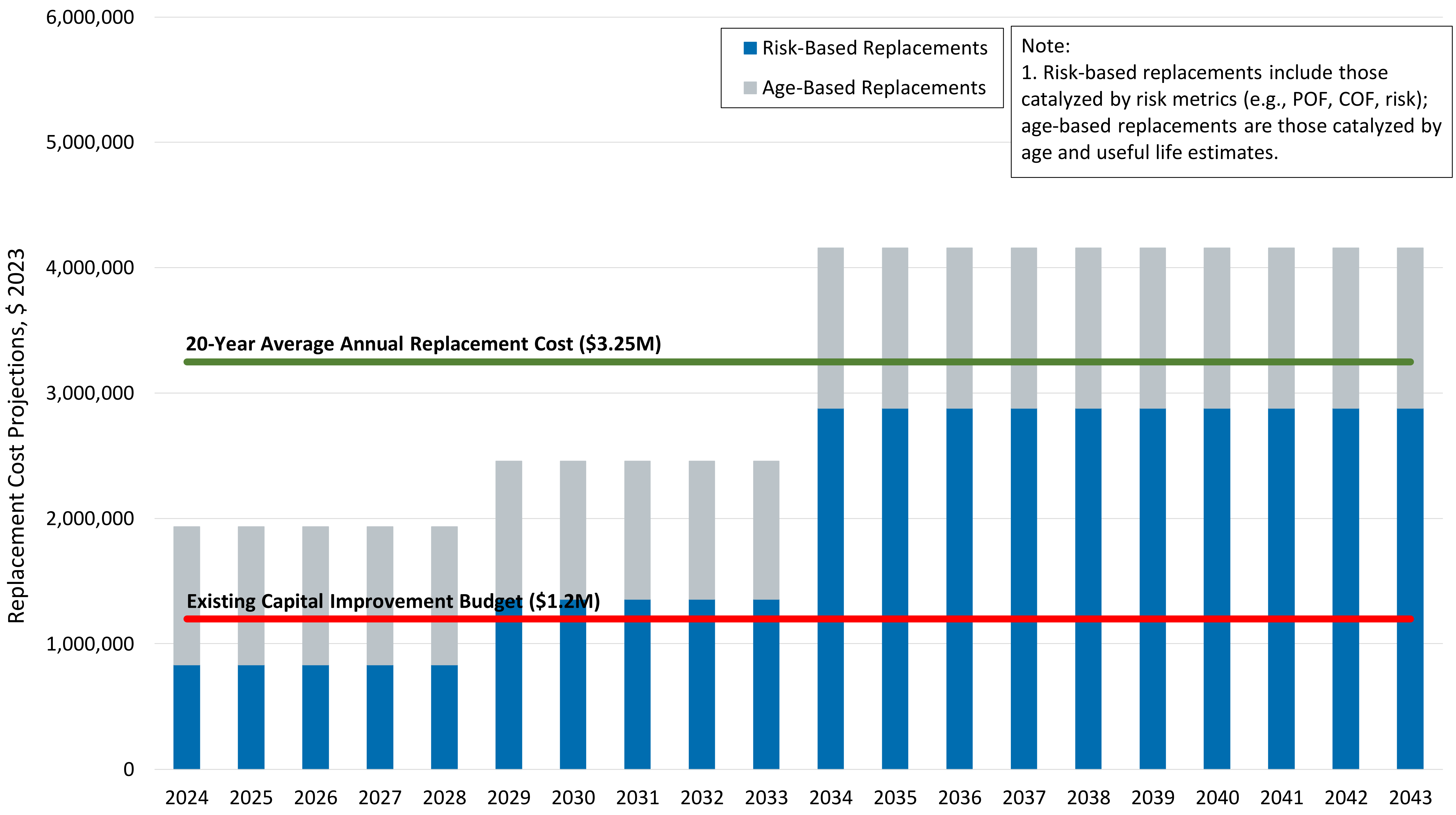


Figure 4: Prioritization Logic

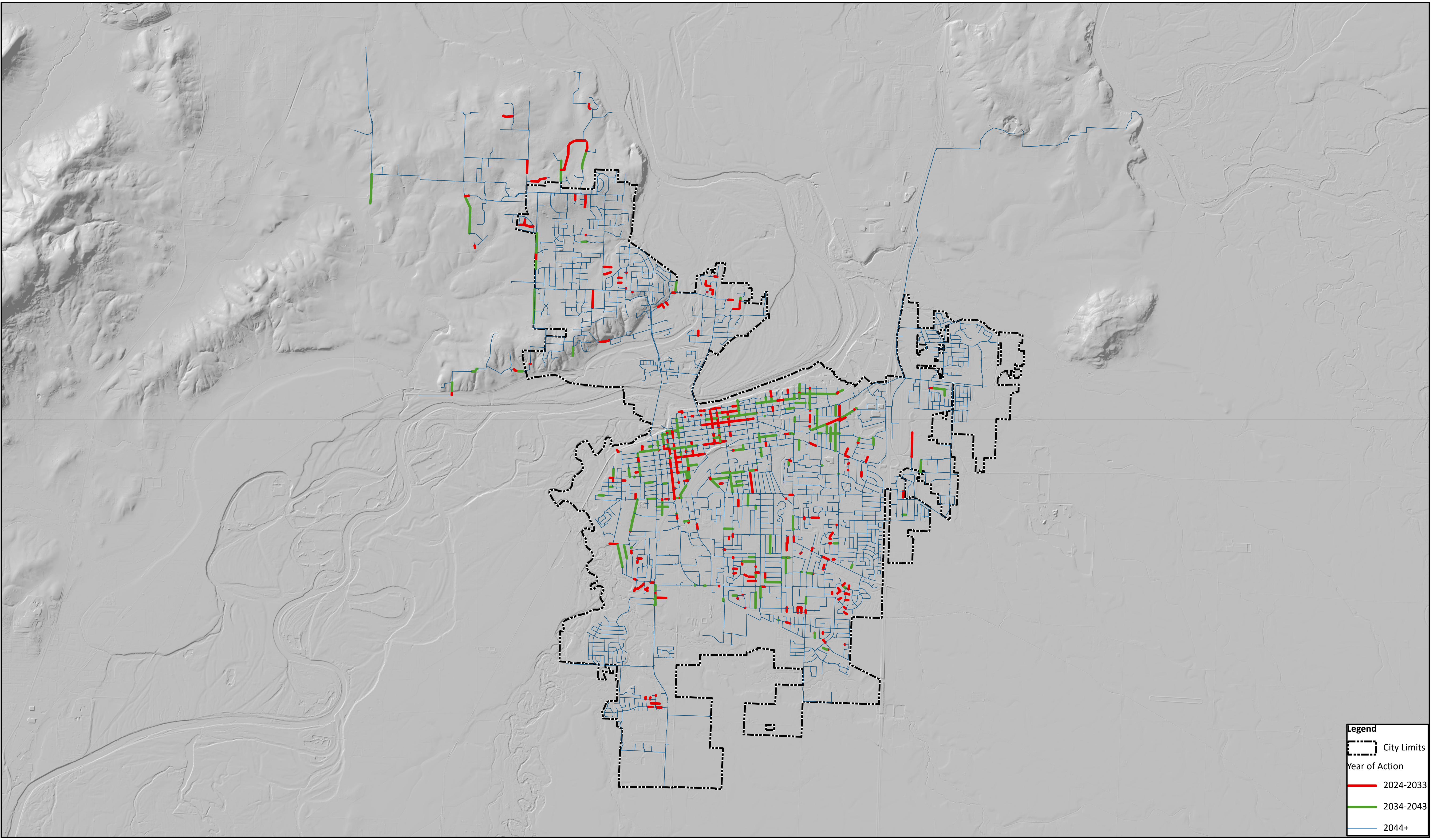
Figure 5. 20-Year Replacement Program Projections



Note:
1. Risk-based replacements include those catalyzed by risk metrics (e.g., POF, COF, risk); age-based replacements are those catalyzed by age and useful life estimates.

Table 8. 20-Year Replacement Program Projections

Year	Replacement Cost, 2023 Dollars		
	Risk-Based Replacements	Aged-Based Replacements	Total
2024	830,000	1,205,000	2,035,000
2025	830,000	1,205,000	2,035,000
2026	830,000	1,205,000	2,035,000
2027	830,000	1,205,000	2,035,000
2028	830,000	1,205,000	2,035,000
2029	1,353,000	1,205,000	2,558,000
2030	1,353,000	1,205,000	2,558,000
2031	1,353,000	1,205,000	2,558,000
2032	1,353,000	1,205,000	2,558,000
2033	1,353,000	1,205,000	2,558,000
2034	2,878,000	1,326,000	4,204,000
2035	2,878,000	1,326,000	4,204,000
2036	2,878,000	1,326,000	4,204,000
2037	2,878,000	1,326,000	4,204,000
2038	2,878,000	1,326,000	4,204,000
2039	2,878,000	1,326,000	4,204,000
2040	2,878,000	1,326,000	4,204,000
2041	2,878,000	1,326,000	4,204,000
2042	2,878,000	1,326,000	4,204,000
2043	2,878,000	1,326,000	4,204,000
		20-Year Average Annual Replacement Cost	**$3,250,000**



R&R Year of Action 1: P:\Clients\519 City of Albany\50-22-21 Water Master Plan\GIS\Albany_WMP.aprx - rlangburnley - 12/8/2023

Prepared by:

WEST YOST

Prepared for:

City of Albany

Water System Mains
Recommended Year of Action

Figure 6

REPLACEMENT CYCLE MANAGEMENT

Currently, each percent that the City increases rates yields an additional $150,000 that can be allocated for water main capital improvements on an annual basis, according to dialogue with City staff. Despite the linear increase in available funds with each percent increase, the replacement cycle follows a logarithmic trend. In essence, the replacement cycle follows the Law of Diminishing Returns[1]. The first 1-5 percent of rate increases would have a bigger impact on lowering the replacement cycled than the next 5 percent, and so on. This trend can be observed on Figure 7 is summarized in Table 9. Figure 7 and Table 9 can also be used to identify the required rate increase and capital improvement budget based on a target replacement cycle. Similarly, capital improvement budget and rate increase can be used as starting points to identify the other corresponding metrics.

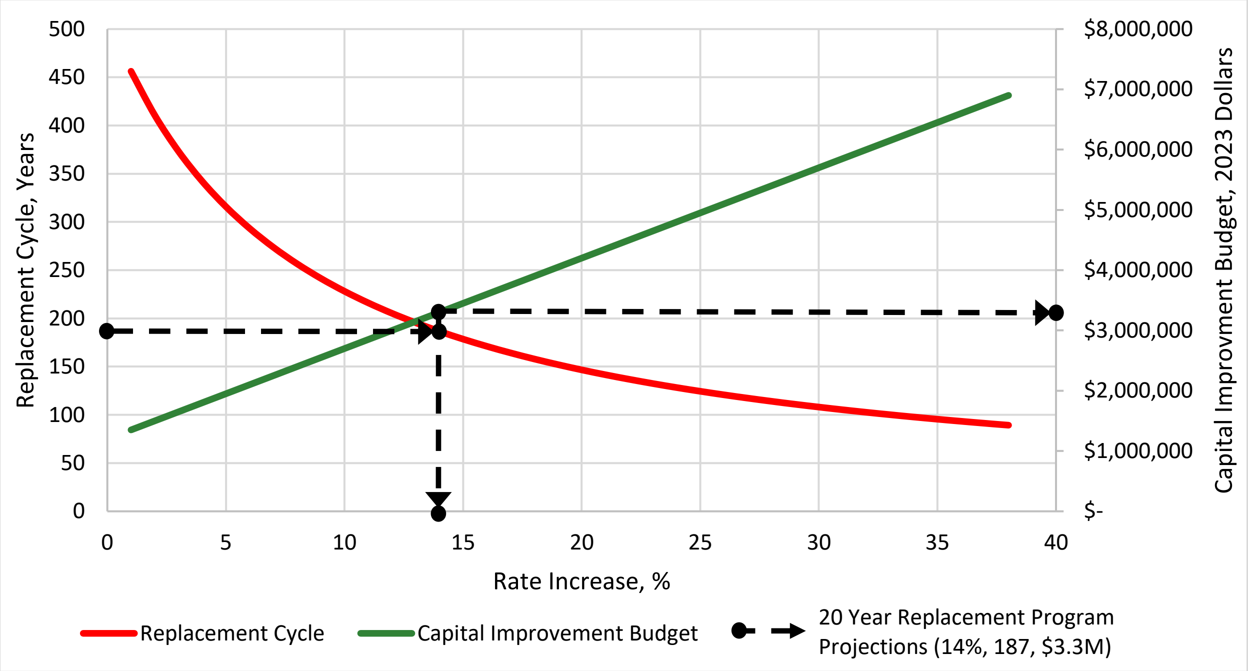


Figure 7. Rate Increase vs. Replacement Cycle Relationship

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[1] The principle stating that benefits gained from something will represent a proportionally smaller gain as more money is invested in it.

Table 9. Rate Increase vs. Replacement Cycle Relationship

Rate Increase, %	Replacement Cycle, Years	Capital Improvement Budget, 2023 Dollars
0	513	1,200,000
5	316	1,950,000
10	228	2,700,000
15	**179**	**3,450,000**
20	147	4,200,000
25	124	4,950,000
30	108	5,700,000
35	95	6,450,000

Note: **Bold red** text corresponds to the nearest interval to 20 Year Replacement Program Projections. Refer to Table 8.

Ultimately, the City should aim to lower the water system mains replacement cycle to as close to the standard useful life of water system mains as possible, pending financial constraints. This approach transitions the City from a reactive maintenance to a preventative maintenance policy and flattens the year over year curve of anticipated costs for replacement. Figure 7 shows that to achieve a replacement cycle that equates to the standard useful life of buried pipelines, annual spending would need to increase 35-37.5 percent and maintained at that point.

ACTIONS FOR FUTURE CONSIDERATION

This section presents actions for future consideration beyond the 20-year time horizon assessed in this study.

In addition to capital replacements, several other recommendations are provided in Table 10 which are based on best practices or discussions with City staff. These include:

- Maintain the current valve exercising program, which targets exercising of critical valves 1 time per year, and other valves 1 time per 3 years.
- Continue to expand the alignment of water replacement project timing with other utilities (i.e., storm, sewer, road, dry utilities) to maximize the use of City funds.
- Develop a condition assessment program for water mains.
    - Include visual inspections or various assessment methods including ground-penetrating radar and leak detection surveys to identify visible defects, weaknesses, and potential problems.
    - Include non-destructive testing (NDT) such as electromagnetic or acoustic techniques to assess the structural health of the pipes. NDT can identify corrosion, wall thickness, and other hidden issues without damaging the pipes.
    - The results of the program can be used to refine replacement priorities and more accurate fiscal planning.
- Develop a risk-based approach and calibrate risk assessment procedures to prioritize replacement.
    - Best practices support a risk-based approach to asset management.
    - The risk assessment results can be used to prioritize maintenance, inspection, condition assessment, and replacement activities.
- Update the Replacement Program projections every 3-5 years, or when significant work has been completed. This will allow for more accurate budgeting.
- Perform a rate study[2] to further evaluate an acceptable level of rate increases in an effort to bring the replacement cycle closer to the expected useful life of water mains (i.e., 90-95 years).

---

[2] A rate study is being performed as part of the 2023 Water System Master Plan.

Table 10. Actions for Future Consideration

Description	Replacement or Implementation Year(s)	Replacement or Implementation Cost, 2023 Dollars	Length, miles
Risk-Based Replacements			
Continue to use the Replacement Prioritization logic to facilitate risk-based replacements.	Ongoing	Variable	Variable
Age-Based Replacements(a)			
Replace pipes with expiring useful life on expiration year	Ongoing	Variable	Variable
Other Recommended Actions			
Valve Exercising Program	Ongoing	Variable(b)	—
Continue to align Water Replacement with other Utility work	Ongoing	—	—
Condition Assessment Program	2025	TBD(c)	—
Risk Assessment and Calibration	2025	TBD(c)	—
Update Replacement Program Projections	2026, Ongoing	—	—
Perform Rate Study(d)	2024	60,000	—

(a) Replacement costs based on unit costs developed in the Basis for Cost Estimating TM (i.e., not adjusted for inflation due to undetermined replacement year[s]).

(b) The City does not have a formal budget for the Valve Exercising Program.

(c) Cost of item depends on extent of program or service provided to the City.

(d) A rate study is being performed as part of the 2023 Water System Master Plan.

Attachment A

North Albany County Service District
Water Mains Replacement Costs

Attachment A

North Albany County Service District Water Mains Replacement Cost

Replacement costs represent the amount of money that an agency would have to spend to replace all water mains with new, equivalent assets at current market prices. The replacement costs can be used as a benchmark against which the decision to repair, rehabilitate, or replace can be made. This information can also be used by agencies for financial and managerial accounting purposes. This document provides details on the replacement cost of the water mains within North Albany County Service District (NACSD).

Methodology

The City provided a GIS shapefile on December 5, 2023 that was used to create a master inventory of pipe segments within NACSD (asset inventory). The asset inventory consists of 404 pipe segments (18.7 miles) which are a subset of the City of Albany's water main asset registry. Table A-1 presents a summary of NACSD's water mains by diameter. Table A-2 presents a summary of NACSD's water mains by material.

Table A-1. NACSD Water Main Summary, by Diameter

Diameter, inches	Length, miles	Count
≤ 2	3.0	48
3-4	3.6	59
6	7.0	171
8	2.5	47
10-12	2.6	78
16	< 0.0	1
Total	**18.7**	**404**

Table A-2. NACSD Water Main Summary, by Material

Material	Length, miles	Count
Asbestos Cement (AC)	5.5	117
Brass (BRS)	< 0.0	2
Polyvinyl Chlorine (C900, PVC)	3.2	75
Cast Iron (CI)	0.1	1
Ductile Iron (DI)	4.1	133
Galvanized Pipe	0.8	16
High Density Polyethylene (HDPE)	3.0	33
Steel (STL)	1.8	23
Unknown	< 0.0	1
Yelomine	0.2	3
Total	**18.7**	**404**

Unit costs developed in the Basis for Cost Estimating Technical Memorandum (TM) were used to estimate the replacement cost for each pipe segment. The replacement costs for each pipe were calculated using the following equation:

$$Replacement\ Cost = Unit\ Cost\ x\ Pipe\ Length \qquad \text{Eqn. A-1}$$

After replacement costs were calculated, the water mains were put into replacement groups using the methodology described in the replacement prioritization section of the TM. Refer to the TM for further detail on the existing risk framework, replacement prioritization, and replacement cycle management.

Results

As summarized in Table A-3, the cost for replacing all pipes within NACSD totals $36,016,000. The replacement groups and associated replacement timeline, cost, and length is summarized in Table A-4. Approximately 86% (16 miles) of the water mains within NACSD are projected to require replacement beyond 20 years. The remaining 14% (1.7 miles) of water mains is projected to require a total of $5.08M to replace over the next 20 years ($0.25M per year).

Table A-3. NACSD Water Main Replacement Cost by Diameter

Diameter, inches	Replacement Cost, 2023 Dollars
<u><</u>2	5,423,000
3-4	6,659,000
6	13,403,000
8	5,210,000
10-12	5,317,000
16	4,000
Total	**36,016,000**

Table A-4. NACSD Replacement Group Descriptions, Timeline, Cost, and Length[(a)]

Replacement Group	Replacement Catalyst Description	Replacement Category	Recommended Replacement Timeline, years	Replacement Cost, 2023 Dollars[(b) (c)]	Length, miles
1	Extensive Leak History (≥ 5 leaks / 500 feet)	Risk-based	1 – 10	855,000	0.45
2	Expired Useful Life (i.e., RUL_T = 0)	Age-based	1 – 5	1,380,000	0.75
3	High Risk (Risk Score ≥ 6.0) and High POF (POF Score ≥ 3.5)	Risk-based	6 – 10	-	-
4	Medium-High Risk (6.0 > Risk Score ≥ 5.0) and High POF (POF Score ≥ 3.5)	Risk-based	6 – 10	191,000	0.10
5	Near-Term Expiring Useful Life (i.e., RUL_T = 1 – 10 years)	Age-based	1 – 10	-	-
6	Medium Risk (5.0 > Risk Score ≥ 4.0) and High POF (POF Score ≥ 3.5)	Risk-based	10 – 20	2,654,000	1.38
7	Medium-Term Expiring Useful Life (i.e., RUL_T = 10 – 20 years)	Age-based	10 – 20	-	-
8	Long-Term Expiring Useful Life (i.e., RUL_T > 20 years)	Age-based	20+	30,936,000	16.00

(a) Water mains with insufficient data to perform the risk-based prioritization were prioritized only within the age-based replacement groups.

(b) If a water main is categorized into a replacement group then it is ineligible for lower priority replacement groups. For example, if a water main has ≥ 5 leaks / 500 feet, then the replacement costs are allocated to Replacement Group 1, and are ineligible to be allocated to Replacement Groups 2 – 6.

(c) Replacement costs based on unit costs developed in Basis for Cost Estimating TM (i.e., not adjusted for inflation due to undetermined replacement year[s]).

Attachment B

Risk Calculation Worksheet

Water Main Replacement: Risk Calculation Worksheet

Date:	8/26/2014	Calculated Risk Index (1-10)	8.1
Main ID:	Average Pipe	*(1 is lowest Risk and 10 is Highest Risk)*	
Description:	Average System Pipe		

Instructions: Enter Data in Yellow Cells to determine Risk Index

PROBABILITY OF FAILURE (1-10) 8.4

Category Weight	Factor	Factor Weight	Adjusted Weight (Category Wt x Factor Wt)
6	**Construction Year**		
Choose=>	**2) 1940 - 1950**	**8**	**48**
	1) < 1940	6	
	2) 1940 - 1950	8	
	3) 1951 - 1960	10	
	4)1961 - 1970	8	
	5)1971 - 1980	8	
	6) 1981 - 1990	6	
	7) 1991 - 2000	3	
	8) 2000-2010	1	
	9) >2010	0	
6	**Pipe Size**		
Choose=>	**2) 4 "**	**10**	**60**
	1) < 4 "	10	
	2) 4 "	10	
	3) 6 "	5	
	4) 8 "	3	
	5) 10 "	2	
	6)12 "	2	
	7)16 "	2	
	8) 20 "	1	
8	**Pipe Material**		
Choose=>	**1) AC**	**7**	**56**
	1) AC	7	
	2) CI	6	
	3) CU	1	
	4) DI	1	
	5) HDPE	1	
	6) IP	10	
	7) PVC	6	
	8) STL	8	
	10) UNK	10	
3	**System Pressure**		
Choose=>	**2) 40 - 80 PSI**	**5**	**15**
	1) Less than 40 PSI	1	
	2) 40 - 80 PSI	5	
	3) Over 80 PSI	10	
10	**Number of Leaks**		
Choose=>	**1) > 5 LEAKS/500FT**	**10**	**100**
	1) > 5 LEAKS/500FT	10	
	2) 4 LEAKS/500FT	8	
	3) 3 LEAKS/500FT	6	
	4) 2 LEAKS/500FT	4	
	5) 1 LEAK/500FT	2	
	6) 0 LEAK/500FT	0	
5	**Type of Recorded leak (choose highest rating)**		
Choose=>	**2) HOLE**	**8**	**40**
	1) CIRCUMFERENTIAL	3	
	2) HOLE	8	
	3) PINHOLE	6	
	4) LONGITUDINAL	10	
	5) n/a	0	
		Total Probability Points	319
		Possible Probability Points	380
		Normalized Probability Factor (out of 10)	8.4

7.7 CONSEQUENCE OF FAILURE (1-10)

Adjusted Weight (Category Wt x Factor Wt)	Factor	Factor Weight	Category Weight
	Road Type		**7**
70	**1) HIGHWAY & RAILWAY**	**10**	*<=Choose*
	1) HIGHWAY & RAILWAY	10	
	2) ARTERIAL	6	
	3) COLLECTOR	2	
	4) LOCAL	1	
	CRITICAL LOCATION		**5**
40	**3) BACKBONE**	**8**	*<=Choose*
	1) STRUCTURE/RR CROSSING	10	
	2) CRITICAL CUSTOMERS	8	
	3) BACKBONE	8	
	4) WATER FACILITY	5	
	5) WATERWAY PROXIMITY	2	
	6) OTHER	0	
	Pipe Types Prone to Catastrophic Breaks		**8**
80	**1) AC**	**10**	*<=Choose*
	1) AC	10	
	2) PVC	7	
	3) CI	6	
	Pipe Size		**9**
54	**3) 8 " - 11 "**	**6**	*<=Choose*
	1) < 4"	1	
	2) 4"- 6 "	3	
	3) 8 " - 11 "	6	
	4) 12 " - 20"	10	
	Pressure		**5**
19	**99**	**3.8**	*<=Entr Press*
	1) > 80 PSI	5	
263	Total Consequence Points		
340	Possible Consequence Points		
7.74	Normalized Consequence Factor (out of 10)		

Note: All weighting is done on a 1 to 10 scale with 1 being low importance and 10 being the highest importance. Data is entered in Yellow Cells. Probability and Consequence are rated equally in overall risk factor

Appendix K

Geotechnical Seismic Hazards Evaluation TM

Foundation Engineering, Inc.
Professional Geotechnical Services

Memorandum

Date: November 20, 2023

To: Mel Damewood, III, P.E.,
Principal Engineer I
West Yost Associates

From: David L. Running, P.E., G.E.
Mathew D. Mason, P.E., G.E.
Brooke K. Running, R.G., C.E.G.

Subject: Geotechnical Seismic Hazard Evaluation

Project: Albany Water Master Plan
Project No.: 2221130

REGISTERED PROFESSIONAL ENGINEER
62647PE
DIGITALLY SIGNED 2024.03.25 09:04:58 -07'00'
OREGON
NOV. 9, 1999
DAVID L. RUNNING
RENEWS: 12-31-2024

We have completed the requested geotechnical consultation for the above-referenced project. This memorandum includes a description of our work, a summary of the regional and local geology, anticipated subsurface conditions, and a discussion of geotechnical seismic hazards. A summary of recommended additional work is also provided.

There are numerous values in geotechnical investigations that are approximate, including calculated values, measured lengths and heights, soil and rock layer depths and elevations, and strength measurements. For brevity, the symbol "±" is used throughout this memorandum to represent the words "approximate" or "approximately" when discussing approximate values.

BACKGROUND

The City of Albany (City) is currently updating their Water Master Plan. The work includes a Seismic Risk Assessment and Mitigation Planning for the critical water supply and distribution facilities to comply with OAR 333-061-0060(J). The seismic evaluation is focused on resilience in the event of a moment magnitude (M_w) 9 Cascadia Subduction Zone (CSZ) earthquake. The seismic hazards associated with this event are outlined in Open-File Report 0-13-06 prepared by the Oregon Department of Geology and Mining Industries (DOGAMI) (Madin and Burns, 2013).

The City is the project owner and West Yost Associates (West Yost) is the design lead. Foundation Engineering, Inc. was retained by West Yost as the geotechnical consultant. Our work scope was outlined in Task Order 29, dated October 3, 2022.

The focus of the geotechnical work was to identify the seismic hazards and provide parameters for evaluating the resilience of the critical water facilities that include an intake structure, pump stations (PS's), water treatment plants (WTP's), and reservoirs. Critical components also include selected backbone pipelines. The City's pipeline system is divided into functional classes. The seismic hazard evaluation for backbone pipelines is focused on existing Functional Class III and IV pipelines and Future Functional Class IV pipelines. Figure 1A (attached) shows the locations of the ten critical facilities and the selected backbone pipelines.

The City's water supply system is divided into four pressure zones which are designated as Zones 1 through 4. The pressure zone locations are shown in Figure 1A. Zone 4 is located within the northern portion of Zone 3. The pressure zones correlate relatively well with the local geology. Therefore, we have organized our discussion of the subsurface conditions and seismic hazards by the pressure zone. Facilities located outside the pressure zones are addressed separately. The geotechnical work includes evaluating seismic hazards for the critical facilities and pipelines summarized in Table 1:

Table 1. Critical Facilities and Pipelines

Zone	Component
N/A	Albany-Millersburg (AM) Raw Water Intake Structure and Pump Station (PS)
N/A	AM Water Treatment Plant (WTP) and Reservoir
1	Vine Street WTP and Maple Street PS and Reservoir
	34th Street PS and Reservoir
	Queen Avenue PS and Reservoir
	Functional Class III Pipelines
	Future Functional Class IV Pipelines
2	Gibson Hill PS
3	Broadway Reservoir
	North Albany PS
	Wildwood Reservoir
	Valley View Reservoirs
1 through 4	Functional Class IV Pipelines

SCOPE OF WORK

The geotechnical work scope includes the following:

- Review local and regional geologic maps and publications.
- Review DOGAMI seismic hazard maps included in Open-File Report 0-13-06 and websites related to peak ground velocity (PGV), liquefaction potential, permanent ground deformation (PGD) due to lateral spread, and PGD due to seismic landslides.
- Conduct a literature search of available subsurface information in the vicinity of the critical facilities and pipelines. The available information includes logs of borings and test pits completed by Foundation Engineering and others and water well logs from the Oregon Water Resources Department website (OWRD, 2023).
- Utilize the available subsurface data to evaluate the seismic hazards and modify the seismic hazard maps accordingly.
- Prepare this memorandum summarizing the findings of the work.

DATA REVIEW

Geologic Maps and Publications and Seismic Hazard Maps

We reviewed available geologic and seismic hazard maps and publications to characterize the local and regional geology and to evaluate relative seismic hazards. The documents included:

The following Geologic reports and maps for the City of Albany and Benton and Linn Counties:

- DOGAMI Open-File Report O-13-06 (Madin and Burns, 2013)
- DOGAMI Open-File Report O-10-03 (McClaughry et al., 2010)
- DOGAMI Open-File Report O-09-05 (Wiley, 2009)
- DOGAMI Interpretive Map Series IMS-28 (Madin, 2009)
- USGS Professional Paper 1620 (O'Connor et al., 2001)
- USGS Professional Paper 1424-A (Gannett and Caldwell, 1998)
- USGS Professional Paper 1560 (Yeats et al., 1996)
- USGS Miscellaneous Investigations Map I-1893 (Walker and Duncan, 1989)
- DOGAMI Bulletin 98 (Bela, 1979)
- USGS Water-Supply Paper 2032 (Frank, 1974)
- DOGAMI Bulletin 84 (Beaulieu et al., 1974)
- DOGAMI Bulletin 37 (Allison, 1953)

The following seismic hazard studies for the City of Albany and Benton and Linn Counties:

- DOGAMI Open-File Report O-21-14 (Hairston-Porter et al., 2021)
- USGS Scientific Investigation Map 3028 (Barnett et al., 2009b)
- DOGAMI Interpretive Map Series 24 (Burns et al., 2008)
- DOGAMI Open-File Report O-01-05 (Wang et al., 2001)

Online seismic hazard information available from DOGAMI web-viewers:

- Oregon Geologic Data Compliation (OGDC), Release 7 (Franczyk et al., 2020)
- Oregon HazVu (DOGAMI, 2018)
- Light Detection and Ranging (Lidar) Data Viewer (DOGAMI, 2021a)
- Statewide Landslide Information Database for Oregon (SLIDO) (DOGAMI, 2021b)

Online seismic hazard information through the O-HELP (Oregon Hazard Explorer for Lifelines Program) website (Jung and Olsen, 2020)

Available Geotechnical Explorations

Foundation Engineering has completed geotechnical investigations for numerous projects throughout Albany and the surrounding areas. Those investigations typically involve exploratory borings and test pits. Additionally, we have information available from investigations by others in this area. We searched our files and reviewed projects which have subsurface information in the areas of interest. Figure 2A (attached) shows the approximate locations of selected relevant projects. The subsurface information from the explorations for those projects are summarized in Table 1A (attached). The projects listed in Table 1A are sorted consistent with the numbering shown on Figure 2A. We have also attached a key of common terms used describing soil and rock for reference.

Well Logs

We reviewed water well logs available on the OWRD website (OWRD, 2023) to collect additional subsurface information. Soil and rock descriptions found in well logs are provided by drillers and are commonly vague and can be incorrectly reported in some cases. Additionally, the descriptions typically do not include strength measurements. Therefore, the well logs are predominantly helpful to provide general soil types and to estimate bedrock depths and groundwater levels.

GEOLOGY AND SEISMIC SETTING

Regional Geology

Most of Oregon is geologically young, including areas west of the Cascade Mountain Range which are less than 50 million years old. At the western margin of Oregon is the CSZ, which is a converging, oblique plate boundary where the Juan de Fuca oceanic plate is being subducted beneath the western edge of the North American continental plate (Geomatrix Consultants, 1995). The CSZ extends from central Vancouver Island, in British Columbia, Canada, through Washington and Oregon to Northern California in the United States (Atwater, 1970).

Much of the western part of the State is formed as a result of CSZ movement. Volcanism, earthquakes, folding, faulting, creation of the volcanic arc, accumulation of marine sediments along the ocean floor including exotic terranes west of the subduction zone, uplift of oceanic and other sediments on the western margin of the North American plate, accretion, and erosion of these rocks have all helped form Western Oregon.

In the early Eocene (±55 million years ago), the present location of the Willamette Valley was part of a broad continental shelf extending west from the Western Cascades beyond the present coastline (Orr and Orr, 1999). Basement rock underlying most of the north-central portion of the Valley includes the Siletz River Volcanics, which erupted as part of a submarine oceanic island-arc in the early to middle Eocene (±58 to 50 million years ago) (Bela, 1979; Yeats et al., 1996).

The island-arc collided with and was accreted to the western margin of the converging North American Plate near the end of the early Eocene. Volcanism subsided and a fore arc basin was created, and the basin was infilled with marine sediments of the Tyee, Spencer, Yamhill, Eugene, and Keasey Formations throughout the late Eocene and Oligocene in the central Willamette Valley.

After emerging from a gradually shallowing ocean, the marine and volcanic formations were covered by the terrestrial Columbia River Basalt ±17 to 10 million years ago. The basalt poured through the Columbia River Gorge from northeastern Oregon and southeastern Washington, spreading as far south as Salem and Scio (Tolan et al., 2000) with some flows reaching the Pacific Ocean (Crenna et al., 1994). Mafic intrusions and basaltic andesite of Knox Butte intruded the sedimentary rocks of the Eugene and Keasey Formations. Uplift and tilting of the Coast Range and the Western Cascades during the late Miocene formed the trough-like configuration of the Willamette Valley.

In the Quaternary (i.e., within the last ±2.58 million years), deposits in the central Willamette Valley have been dominated by alluvium. Older alluvium consists of alluvial fans composed of Pleistocene glacial outwash deposits which include Lacomb, Leffler, and Linn Gravel deposits (Wiley, 2006). The fans originated from the east along the western Cascades, and the fans merged and thinned to the northwest. This mass of coarse material resulted in the westward shift of the Willamette River between Eugene and Corvallis (Orr and Orr, 1999; Wiley, 2006).

A series of alluvial catastrophic floods occurred during the upper Pleistocene (15,500 to 13,000 years ago). Deposits associated with those floods mantle the Willamette Valley floor as far south as Eugene (Allen et al., 2009). The deposits originated from a series of glacial-outburst floods that periodically drained Glacial Lake Missoula in western Montana. In the central to southern Willamette Valley, turbid floodwater eventually settled, depositing a relatively thick layer (±50 to 100 feet) of silt and clay which has been designated as Willamette Silt (Orr and Orr, 1999; Wiley, 2006).

More recent (Holocene) alluvial deposits are associated with receding floodwaters of the Willamette River and its tributaries. Willamette Silt and/or older alluvial fan/terrace deposits have been reworked by the migration of the Willamette River within the floodplain (Wiley, 2006). Floodplain and channel deposits of the Willamette River also suggest repeated fining-upward sequences and stratification due to channel migration (Wiley, 2006). Debris fans (Qf), alluvial fans, and landslide deposits are also mapped along the toe of steeper slopes, specifically north of the Willamette River.

Local Geology and Anticipated Subsurface Conditions

The City of Albany is located within the central Willamette Valley, which is a broad, north-south-trending basin separating the Coast Range to the west from the Cascade Range to the east. The Willamette River originates at the southern end of the valley and collects water runoff and tributaries as it flows north.

The Valley floor is typically mantled with alluvium that generally includes older alluvium (Pleistocene Qle, Qla, and Qli), Willamette Silt (upper Pleistocene Qws), and recent alluvial deposits associated with the Willamette River and its tributaries (Holocene Qal, Qf, Qnc, Qrs, and Qrg). The older alluvium is typically comprised of coarse-grained deposits including sand and gravel. Willamette Silt consists of silt, clayey silt, and silty clay. The more recent alluvium is comprised of stratified fine to coarse-grained material including clay to gravel-sized materials deposited by the Willamette River, reworked older alluvial deposits, and redeposited Willamette Silt.

Fine-grained blue-grey alluvium is encountered in numerous explorations throughout most of the central Willamette Valley. This unit extends deep below the older, coarse-grained alluvium and it is not exposed at the ground surface. Therefore, it is not mapped as a surficial geologic unit and is not shown on geologic maps.

Bedrock underlies the alluvial deposits on the valley floor at variable depths. Bedrock is also present at shallow depths in the hilly terrain in North Albany and in the hills northeast of Albany. Bedrock units in the project area include sandstone and siltstone of the Spencer Formation (Tes), marine sandstone and tuffaceous sandstone of the Eugene Formation (Teoe), marine siltstone and tuffaceous siltstone and mudstone of the Keasey Formation (Teok), basaltic andesite of Knox Butte (Tkb), and mafic intrustions (Ti). The upper bedrock is typically more weathered than the deeper bedrock. In some areas, the upper bedrock has decomposed to the consistency of soil. The decomposed material is referred to as residual soil.

Open-File Report O-13-06 includes the Oregon Geologic Data Compilation (OGDC) map, which is a generalized geologic map for the State of Oregon that was created by compiling numerous individual geologic maps. For visual reference, we have included the portion of the latest digital version of the OGDC (Release 7) that encompasses the project area (Franczyk et al., 2020) as Figure 3A (attached). Several of the geologic maps listed in the Data Review section of this memorandum contributed to the OGDC. For ease of describing the geologic units for this project, we have adjusted the unit names on Figure 3A slightly relative to those shown on the ODGC.

The geologic mapping of the Albany area correlates relatively well with the City's pressure distribution zones shown on Figure 1A. For simplicity, we have referenced those pressure zones in our discussion of the local geology and anticipated subsurface conditions in the following sections. The Albany-Millersburg Intake and WTP sites are located northeast of the City outside of the designated pressure zones. Therefore, those facilities and the associated pipelines are discussed separately.

Albany-Millersburg Intake and WTP. The Albany-Millersburg Intake and Pump Station facility is located adjacent to the Santiam River, just north of the confluence of the north and south forks. The terrain at the facility is generally flat. The terrain becomes steeper along the riverbank.

The geologic mapping and photographs taken during the construction of the Pump Station indicate the site is underlain by fine-grained alluvium (i.e., clay and/or silt) followed by coarse alluvium comprised of silty, sandy gravel. The fine-grained alluvium is likely recent alluvium (Qal), and the deeper, coarse-grained alluvium is likely older alluvium (Qla). The alluvium is underlain by extremely weak to very weak (R0 to R1) sandstone and sandy siltstone. The bedrock is assumed to be Eugene Formation (Teoe) based on geologic mapping. The plans for the facility indicate the pump station, intake structure, and the pipeline connecting those structures all bear directly on bedrock.

The WTP and Reservoir are located on Scravel Hill. The geologic mapping and the geotechnical design memorandum for the facility indicate prior to the development, the site was underlain by a thin mantle of soil over bedrock including sandstone of the Eugene Formation (Teoe) and basalt. The quarry immediate northwest of the facility was mined for basalt, which is consistent with the mafic intrusive unit (Ti) on the geologic map (Gray and Throop, 1981). The terrain at the WTP facility was graded into a series of relatively level benches that step down to the southeast with a maximum elevation change of ±28 feet across the facility. We anticipate the site grading removed most of the surficial soil and the entire facility is supported on bedrock.

The pipeline that connects the Pump Station to the WTP facility traverses relatively flat to moderately sloping terrain. Based on the available information, we anticipate the alignment is underlain by coarse- to fine-grained older alluvium (Qla) including silt and silty, sandy gravel over relatively shallow, extremely weak to very weak (R0 to R1) sandstone and sandy siltstone of the Eugene Formation. We anticipate similar subsurface conditions are present along the pipeline that extends from the WTP west (downslope) to approximately halfway to Interstate 5 (I-5). We anticipate the pipeline that extends further west to I-5 and then south along I-5 is underlain by Willamette Silt (Qws) followed by older, coarse- to fine-grained alluvium. The fine-grained alluvium (including Willamette Silt) is typically comprised of medium stiff to stiff, low to medium plasticity clay and silt and the coarse alluvium is typically comprised of medium dense to dense sandy or silty gravel.

Zone 1. Zone 1 includes all of the area south and east of the Willamette River and a portion of North Albany extending from the River to the toe of the slope north of Thornton Lake. The terrain in this zone is relatively level to gently sloping.

The geologic mapping and available subsurface information indicate this area is underlain by fine and coarse-grained alluvium. The fine-grained alluvium is typically medium stiff to stiff, low to medium plasticity clay and silt. The coarse-grained alluvium is typically medium dense to very dense, sandy and/or silty gravel. Sand lenses may be present in some areas, but the sand lenses are generally relatively thin and not widespread.

The shallow deposits adjacent to the active Willamette River channel are typically recent alluvium (Qal, Qf, Qnc, Qrs, and Qrg) and predominantly coarse-grained. The older alluvium (Qla, Qle, and Qli) is found farther from the active river channel. Deposits of Willamette Silt (Qws) are found at the surface farther south from River. Willamette Silt is composed typically of low to medium plasticity silt, clayey silt, and silty clay. It is typically medium stiff to stiff.

The depths of the alluvial deposits in Zone 1 vary with location. Alluvial depths in the available explorations range from as shallow as ±18 feet to more than 150 feet. In the deeper explorations, the coarse-grained alluvium is underlain by older fine-grained alluvium comprised of stiff, high plasticity clay and silty clay. Some variable fine- to coarse-grained deposits including alluvial fan and landslide deposits are found extending along the side slopes of drainages near the boundary with Zone 3.

The alluvium is underlain by bedrock typically comprised of sandstone and siltstone of the Spencer Formation (Tes). Bedrock depths vary with location. Generally, the bedrock is shallower, near the border with Zone 3 and at select locations along the Willamette River, especially near the east portion of downtown Albany.

In the available explorations, bedrock is as shallow as ±18 feet at the 5th Avenue Bridge over Albany Canal and greater than 150 feet deep at the Albany Multimodal Transit Center near the intersection of Pacific Boulevard and SW 9th Avenue. Bedrock is also mapped along the eastern extent of Zone 1 at Knox Butte. The bedrock in that area includes the Keasey Formation (Teok) siltstone and mudstone intruded by basaltic andesite of Knox Butte (Tbk). A layer of residual soil is possible above the bedrock at those locations.

The geologic map in Figure 3A shows bedrock of the Spencer Formation (Tes) at the surface within Zone 1 at the Queen Avenue Pump Station and Reservoir site and along the adjacent pipelines. However, we found three well logs in this area that extend to depths of ±15 to 83 feet and indicate clay and silt over gravel with no bedrock. Due to the absence of bedrock in the well logs, we suspect the Spencer Formation (Tes) shown in this area on Figure 3A was mapped in error. Other geologic maps for this area (Walker and Duncan, 1989; Wiley, 2006) show question marks at this location indicating there is uncertainty in the mapping.

Zone 2. Zone 2 includes the northeast to east-trending valley north of Gibson Hill Road. The terrain in this area is relatively level to gently sloping.

The geologic mapping and limited available subsurface information indicate this zone is underlain by alluvium comprised of primarily Willamette Silt (Qws) The Willamette Silt consists of low to medium plasticity silt, clayey silt, and silty clay. It is typically medium stiff to stiff. Isolated recent alluvial deposits (Qal) of fine-grained clay, silt, and sand are located at the east and western extents of the zone. These recent alluvial deposits are associated with low-lying drainages and the deposits are low to medium plasticity and soft to medium stiff.

The alluvium is underlain by sandstone and siltstone of the Spencer Formation (Tes). Subsurface information in this zone is limited and deeper information is isolated to well logs. Well logs west and south of Gibson Hill PS indicate bedrock depths ranging from ±15 to 39 feet. We anticipate rock is relatively shallow at the southeastern portion of this zone near the North Albany PS.

Zones 3 and 4. Zones 3 and 4 comprise the hilly terrain north and south of Zone 2. Zone 4 is located within the northern portion of Zone 3 near the intersection of NW Pineview Drive and NW Valley View Drive.

Geologic mapping and available subsurface information indicate these areas are underlain by residual soil followed by sandstone and siltstone of the Spencer Formation (Tes). The consistency of the residual soil varies with location and includes high plasticity clay, low to medium plasticity silt with some clay, and low to medium plasticity clayey silt and sandy silt with scattered rock fragments. The consistency of the residual soil ranges from medium stiff to very stiff.

Drilling at the Valley View Reservoir encountered sandstone decomposed to the consistency of medium dense silty sand to a depth of ±51.5 feet. The bedrock typically becomes less weathered and stronger with depth and ranges from extremely weak (R0) to medium strong (R3).

Seismic Setting

The City of Albany lies ±110 miles inland from the surface expression of the CSZ (Goldfinger et al., 1992). Available information indicates the CSZ is capable of generating earthquakes within the descending Juan de Fuca plate (intraplate), along the inclined interface between the two plates (interface or subduction zone), or within the overriding North American Plate (crustal) (Weaver and Shedlock, 1996). Western Oregon is located in an area of potentially high seismic activity due to its proximity to the CSZ.

The estimated maximum magnitude of a CSZ interface earthquake is a moment magnitude (M_w) 9.3 (Petersen et al., 2014). No significant interface (subduction zone) earthquakes have occurred on the CSZ in historic times. However, several large-magnitude or megathrust (>M ~8.0, M = unspecified magnitude scale) subduction zone earthquakes are thought to have occurred in the past few thousand years. This is evidenced by tsunami inundation deposits, combined with evidence for episodic subsidence along the Oregon and Washington coasts (Peterson et al., 1993; Atwater et al., 1995).

There is much debate and uncertainty regarding the size, rupture type, and frequency of CSZ earthquakes. Numerous detailed studies of coastal subsidence, tsunami, and turbidite deposits have been conducted to develop a better understanding of CSZ earthquakes. The studies include investigations of turbidite deposits in the offshore Cascadia Basin that were used to help develop a paleoseismic record for the CSZ and estimate recurrence intervals for interface earthquakes (Adams, 1990; Goldfinger et al., 2012). Study of offshore turbidites from the last ±10,000 years suggests the return period for interface earthquakes varies with location and rupture length. That study estimated an average recurrence interval of ±220 to 380 years for an interface earthquake on the southern portion of the CSZ, and an average recurrence interval of ±500 to 530 years for an interface earthquake extending the entire length of the CSZ (Goldfinger et al., 2012).

Older, deep-sea cores have been re-examined more recently, and the findings may indicate greater Holocene stratigraphy variability along the Washington coast (Atwater et al., 2014). Additional research by Goldfinger for the northern portion of the CSZ suggests a recurrence interval of ±340 years for the northern Oregon Coast (Goldfinger et al., 2016). The most recent CSZ interface earthquake occurred ±323 years ago (January 26, 1700) (Nelson et al., 1995; Satake et al., 1996).

Intraslab (Intraplate or Wadati-Benioff Zone) earthquakes occur within the Juan de Fuca plate at depths of ±21 to 43 miles (Petersen et al., 2014). The maximum estimated magnitude of an intraslab earthquake is about M_w 7.5 (Petersen et al., 2014). The available record for intraslab earthquakes in Oregon is limited. The available data indicates a M_b 4.6 (compressional body wave magnitude) event occurred in 1963, located ±23 miles east of Salem at a depth of ±29 miles (Barnett et al., 2009a). Based on its depth, this earthquake may be considered an intraslab event. The Puget Sound region of Washington State has experienced three intraslab events in the last ±74 years, including a surface wave magnitude (M_s) 7.1 event in 1949 (Olympia), a M_s 6.5 event in 1965 (Seattle/Tacoma) (Wong and Silva, 1998), and a M_w 6.8 event in 2001 (Nisqually) (Dewey et al., 2002).

Crustal earthquakes dominate Oregon's seismic history. Crustal earthquakes occur within the North American plate, typically at depths of ±6 to 12 miles. The estimated maximum magnitude of a crustal earthquake in the Willamette Valley and adjacent physiographic regions is about M_w 6.5 (Wang and Leonard, 1996; Wang et al., 1998; Wang et al., 2001). Only two major crustal events in Oregon have reached Richter local magnitude (M_L) 6 (the 1936 Milton-Freewater M_L 6.1 earthquake and the 1993 Klamath Falls M_L 6.0 earthquake) (Wong and Bott, 1995). The majority of Oregon's larger crustal earthquakes are in the M_L 4 to 5 range (Wong and Bott, 1995).

Local Faulting

The seismic evaluation is focused on a M_w 9 CSZ interface earthquake. However, for completeness, we have included a review of local crustal faults to evaluate the potential seismic hazards associated with surface fault rupture. This information will assist West Yost in screening the structures in accordance with Table 17-3 in ASCE 41-17.

Numerous concealed and inferred crustal faults have been mapped within ±10 miles of downtown Albany (Beaulieu et al., 1974; Yeats et al., 1996; Wiley, 2006). However, most of these faults are considered inactive. The only crustal fault in the vicinity of Albany that is considered potentially active is the Owl Creek fault (Wiley, 2006; USGS, 2017, 2020). That fault is located southwest of the City, outside the limits of the critical facilities and pipelines as shown in Figure 3A.

DISCUSSION OF GEOTECHNICAL SEISMIC HAZARDS

We have developed conclusions regarding the seismic hazards based on the available hazard maps, the soil and bedrock profiles encountered in previous geotechnical explorations and reported in local water well logs, and our knowledge of the local geology. Discussions of the seismic hazards and our seismic analyses are provided in the following sections.

Table 2A (attached) summarizes the anticipated subsurface conditions, seismic hazards, and mapped and recommended seismic design parameters for evaluating the critical structures. Notes regarding Table 2A are provided below:

- Columns 1 and 2 of the table list the facility and location.
- Column 3 summarizes the liquefaction, lateral spread and seismic landslide hazards based on the DOGAMI hazard maps referenced in Open-File Report 0-13-06. Column 3 also includes the Site Class, spectral accelerations, and peak ground velocities for each site based on the available seismic maps.
- Column 4 summarizes our assessment of the anticipated subsurface conditions and our conclusions regarding the seismic hazards based on the hazard maps and additional available subsurface information. Where appropriate, we have included recommendations for revised Site Class designations, spectral accelerations, and peak ground velocities.
- Columns 5 through 7 summarize the evaluation of hazards based on the criteria in ASCE 41-17 Table 17-3.

Peak Ground Velocity (PGV)

Ground shaking for the evaluation of pipelines is quantified using the peak ground velocity (PGV). Ground shaking can be affected by the soil type and consistency and the thickness of the soil deposits. Ground shaking can lead to the development of stresses and strains in pipelines that can damage the pipes or joints.

We evaluated the ground shaking hazard starting with a review of the PGV map prepared by DOGAMI. The map divides the estimated PGV values into the following ranges:

- 0 to 20 cm/s
- 20 to 40 cm/s
- 40 to 60 cm/s

Open File Report O-13-06 indicates DOGAMI calculated PGV values as a function of 1 second spectral acceleration adjusted for NEHRP Site Class (S_{M1}) using the following equation:

$$PGV = S_{M1} * 94.666 \text{ (cm/s)}$$

The mapping was based on assumptions regarding the Site Class. Some of the assumptions appear to be conservative and some appear to be unconservative. We revised the DOGAMI PGV map in some areas based on the available subsurface information and engineering judgement. The PGV values and map revisions are discussed in the following sections. The revised PGV map is shown in Figure 4A. In Table 2A, we have summarized the mapped PGV values at the critical facility locations obtained from the original DOGAMI map. We have also included recommended PGV values for the critical facility locations where we have concluded revisions to the Site Class are warranted.

Albany Millersburg Intake and WTP. A Site Class C is appropriate for the site conditions at the Albany-Millersburg intake and WTP sites. The DOGAMI map indicates a PGV range of 0 to 20 cm/s in this area. A Site Class C is also appropriate for the pipelines that connect these facilities and the pipeline that extends from the WTP to approximately halfway to I-5 as shown on Figure 4A. We recommend using a PGV of 19 cm/s for evaluating those sites. A Site Class D is appropriate for the pipelines further to the west extending to and along I-5. We recommend using a PGV of 26 cm/s for evaluating those pipelines.

Zone 1. The DOGAMI map indicates PGV values predominantly in the range of 20 to 40 cm/s in Zone 1 based on a Site Class D (stiff soil). There are some areas in Zone 1 that have been mapped as a Site Class C (dense soil and weak rock) with PGV values at the top end of the 0 to 20 cm/s range. Those areas were mapped as being underlain by shallow bedrock (as discussed in the Local Geology and Anticipated Subsurface Conditions section of this memorandum).

However, the available subsurface information in those areas indicates the subsurface conditions are not appreciably different from the surrounding areas. There are also areas along Pacific Blvd. between SW Ellsworth Street and SE 9th Avenue where Pacific Blvd. is elevated on an embankment. DOGAMI mapped the embankment fill as a Site Class E with PGV values in the range of 40 to 60 cm/s. However, the available subsurface information indicates the embankment fill and underlying soil is generally comprised of stiff or medium dense to dense soil and a Site Class D is appropriate for that location.

Based on the available subsurface information, we have concluded the subsurface profiles in Zone 1 range from a Site Class C to a Site Class D with the site class predominantly affected by the depth and density of the coarse alluvium and the depth to bedrock. For simplicity and to account for potential variability of the subsurface conditions within this zone, we revised the map to classify all of Zone 1 as a Site Class D with PGV values in the range of 20 to 40 cm/s as shown on Figure 4A. The seismic mapping indicates only modest changes in the spectral accelerations across this zone. Therefore, a single PGV value of 27 cm/s may be used to evaluate all pipelines in Zone 1. This PGV value is based on a Site Class D. Using this value will be conservative where denser soil is present corresponding to a Site Class C.

Zone 2. The DOGAMI map classifies the subsurface conditions in Zone 2 as Site Class C with PGV values at the top end of the 0 to 20 cm/s range. We anticipate the subsurface conditions in this zone vary with location and range from a Site Class C to a Site Class D. For simplicity and to account for potential variability of the subsurface conditions within this zone, we revised the mapping to classify all of Zone 2 as a Site Class D with PGV values in the range of 20 to 40 cm/s as shown on Figure 4A. The seismic mapping indicates only modest changes in the spectral accelerations across this zone. Therefore, a single PGV value of 27 cm/s may be used to evaluate all pipelines in Zone 2. This PGV value is based on a Site Class D. Using this value will be conservative where denser soil is present corresponding to a Site Class C.

Zones 3 and 4. The DOGAMI mapping uses Site Classes B and C for Zones 3 and 4 with PGV values in the 0 to 20 cm/s range. The Site Class B designation was selected due to the presence of shallow bedrock. However, bedrock is typically highly weathered, extremely weak to very weak (R0 to R1) sandstone and siltstone and is it commonly overlain by residual soil. Therefore, we have concluded a Site Class C is most appropriate.

We revised the map to classify Zones 3 and 4 as Site Class C as shown on Figure 4A. The seismic mapping indicates only modest changes in the spectral accelerations across these zones. Therefore, a single PGV value of 20 cm/s may be used to evaluate all pipelines in Zones 3 and 4. This value is based on a Site Class C. This PGV value will be conservative where harder, shallow bedrock is present.

Liquefaction and Seismically-Induced Settlement

Liquefaction occurs when loose, saturated cohesionless soil experiences a significant loss of strength during strong ground shaking. The strength loss is associated with rapid densification of the soil and corresponding development of high pore water pressure, which can lead to the soil behaving like a viscous fluid. Liquefiable soils typically consist of saturated, loose to medium dense sand and silty sand and non-plastic to low plasticity silt with a plasticity index less than 8.

We evaluated the liquefaction hazard starting with a review of the liquefaction hazard map prepared by DOGAMI. The map divides the liquefaction hazard into the following categories:

- Not Liquefiable
- Low (0 to 5% probability of liquefaction)
- Medium (5 to 15% probability of liquefaction)
- High (>15% probability of liquefaction)

Open File Report O-13-06 indicates the liquefaction hazard in the mapping was evaluated predominantly based on the type and age of the deposits. Some of the assumptions appear to be conservative (i.e., predicting a moderate to high risk of liquefaction where the risk is anticipated to be low). We revised the mapping based on the available subsurface information and engineering judgement. The revisions are discussed in the following sections. The revised map is shown in Figure 5A. The assessed liquefaction hazards at the critical facility locations are also summarized in Table 2A.

Albany-Millersburg Intake and WTP. The DOGAMI mapping indicates the there is no risk of liquefaction occurring in the vicinity of the Albany-Millersburg Intake facility. This assessment is confirmed based on the available information at the site. The available subsurface information indicates the intake facility site is underlain by alluvial silt and gravel followed by shallow sandstone. The intake structure and the original pump station structure are supported directly on bedrock. The sand filter addition to the pump station is supported on piles driven to bedrock. The raw water line that extends from the intake structure to the pump station is also supported on bedrock. Therefore, we have concluded there is no risk of liquefaction impacting the intake and pump station structures. The WTP is located on top of Scravel Hill and is underlain by bedrock. Therefore, there is also no risk of liquefaction at that site.

We anticipate the risk of liquefaction impacting the pipelines that connect the intake and WTP facilities and extend west to and along I-5 is low. In areas with a low probability of liquefaction, seismic settlement is anticipated to be less than 1 inch.

The DOGAMI liquefaction hazard map is generally consistent with our assessment at these sites. Therefore, we made no changes to the liquefaction hazard map in this area.

Zone 1. The DOGAMI mapping indicates the probability of liquefaction occurring in Zone 1 is predominantly high. Those locations appear to correspond to the areas classified as Site Class D and mapped as underlain by alluvium. There are some areas mapped as not liquefiable. Those locations correspond to the areas classified as Site Class C and mapped as underlain by shallow bedrock. The area along Oak Creek and the area south of Thornton Lake is designated as having low probability of liquefaction and the area north of Thornton Lake is mapped as having medium probability of liquefaction.

The available subsurface information indicates this Zone 1 is typically underlain by medium stiff to stiff, low to high plasticity silt and clay followed by relatively shallow, medium dense to very dense silty or sandy gravel. There may be loose to medium dense silty sand lenses at the transition between the fine-grained and coarse-grained alluvium in some areas, but those deposits are anticipated to be thin and not widespread. The sandy deposits are also likely to be above groundwater most of the year.

We anticipate the area along the north side of Thornton Lake, which is classified as having a medium probability of liquefaction is underlain by younger alluvium including loose to medium dense silty sand below the groundwater level. The loose to medium dense sand is up to 5 feet thick in the available borings. Therefore, there is an increased liquefaction hazard in that area.

Our previous work at the Vine Street WTP settling pond site, which is located adjacent to the Calapooia River encountered loose silty sand below the groundwater level. The loose to medium dense sand is ±3.5 to 9 feet thick in the available borings. Therefore, there is an increased liquefaction hazard in that area.

Based on the available information, we have concluded the risk of liquefaction in most of Zone 1 is low. We revised the mapping to designate most of Zone 1 as having a low probability of liquefaction. The subsurface conditions in the areas DOGAMI designated as not liquefiable are not expected to be appreciable different from the surrounding areas. Therefore, we have also revised the mapping of those areas to also show a low probability of liquefaction. In the areas with a low probability of liquefaction, seismic settlement is anticipated to be less than 1 inch.

The risk of liquefaction is higher in the sandy alluvium north of Thornton Lake. We did not change the DOGAMI mapping in that area and left the probability of liquefaction designation as medium. We also revised the map to show a medium probably of liquefaction at the Vine Street WTP settling ponds site. Seismic settlement in these areas may be up to 2 inches.

Zone 2. The DOGAMI map indicates the soil in Zone 2 is not liquefiable. Based on the geologic mapping and limited available subsurface information, we anticipate this area is underlain by medium stiff to stiff, low to medium plasticity Willamette Silt followed by bedrock. We concur the risk of liquefaction is negligible, and we did not revise the map in this area.

Zones 3 and 4. The DOGAMI map indicates the soil in Zones 3 and 4 is not liquefiable. The geologic mapping and available subsurface information indicate these areas are typically underlain by medium stiff to very stiff, low to medium plasticity residual soil followed by bedrock. We concur the risk of liquefaction is negligible, and we did not revise the map in these areas.

Lateral Spread Permanent Ground Deformation (PGD)

Lateral spread is a liquefaction-induced hazard, which occurs when soil or blocks of soil are displaced down slope or toward a free face (such as a riverbank or shoreline) along a liquefied layer. The potential for lateral spread and the displacement associated with lateral spread is a function of the liquefaction potential and post-liquefaction strength of the soil, the intensity and duration of the earthquake, and the site topography.

We evaluated the lateral spread PGD hazard starting with a review of the lateral spread PGD hazard map prepared by DOGAMI. The map divides the lateral spread hazard into the following categories:

- None
- Low (0 to 4 inches of deformation)
- Medium (4 to 12 inches of deformation)
- High (12 to 39 inches of deformation)
- Very High (>39 inches of deformation)

Open File Report O-13-06 indicates the lateral spread deformation was calculated as a function of the liquefaction susceptibility map, the peak ground acceleration (PGA) map, and an assumed threshold acceleration for lateral spread. The evaluation is highly dependent on the assumed liquefaction hazard, and it does not appear to take the topography into account. The mapping appears to be conservative in some areas (i.e., predicting moderate to high lateral spread deformation in areas where the risk of liquefaction is anticipated to be low and in areas with relatively level terrain). We revised the mapping based on the available subsurface information and engineering judgement. The revisions are discussed in the following sections. The revised map is shown in Figure 6A. The assessed lateral spread hazard at the critical facility locations is also summarized in Table 2A.

Albany-Millersburg Intake and WTP. The DOGAMI mapping indicates no lateral spread PGD at the intake and WTP sites due to the absence of a liquefaction hazard. We concur with this assessment, and we did not revise the mapping in this area. The risk of lateral spread is also negligible to low for the pipelines that connect the intake and WTP facilities and extend west to and along I-5. In the areas with a low lateral spread PGD, the lateral spread PGD (if any) is anticipated to be less than 1 inch. The lateral spread hazard, if any, is anticipated to be limited to creek crossings.

Zone 1. The DOGAMI mapping indicates high lateral spread PGD's across most of Zone 1. Those locations appear to correspond to the areas DOGAMI classified as Site Class D and mapped as having a high probability of liquefaction. There are some areas mapped with no lateral spread PGD. Those locations correspond to the areas classified as Site Class C, which DOGAMI mapped as underlain by shallow rock and not liquefiable. The area along Oak Creek was mapped as having medium lateral spread PGD and a low probability of liquefaction. The area south of Thornton Lake was mapped as having a low lateral spread PGD and a low probability of liquefaction. DOGAMI mapped the area north of Thornton Lake as having medium lateral spread PGD and a medium probability of liquefaction.

Based on the available information and our liquefaction hazard assessment described in the previous section, we have concluded the lateral spread PGD hazard in most of Zone 1 is low and it is essentially negligible where there is level ground. The only areas where a lateral spread PGD hazard may exist are along creek banks or riverbanks or in sloping terrain along the edges of Thornton Lake, where loose or medium dense sandy soil is present.

We revised the map to designate most of Zone 1 as having a low lateral spread PGD hazard. The risk of lateral spread is higher along the edges of Thornton Lake and at the Vine Street WTP settling pond site adjacent to the Calapooia River. Therefore, we did not change the DOGAMI mapping in these areas and left the lateral spread PGD hazard as medium.

In the areas with a low lateral spread PGD, the lateral spread PGD (if any) is anticipated to be less than 1 inch. The PGD may be up to 12 inches in the areas with a medium lateral spread PGD (i.e., north of Thornton Lake, along the north bank of the Willamette River, and along the bank of the Calapooia River adjacent to the Vine Street WTP settling ponds.

Zone 2. The DOGAMI mapping indicates no lateral spread PGD in Zone 2 due to the absence of a liquefaction hazard. We concur with this assessment, and we did not revise the mapping in this area.

Zones 3 and 4. The DOGAMI mapping indicates no lateral spread PGD in Zones 3 and 4 due to the absence of a liquefaction hazard. We concur with this assessment, and we did not revise the mapping in this area.

Earthquake-Induced Landslide Permanent Ground Deformation (PGD)

Earthquake-induced landslides can occur as a result of inertial forces that develop due to ground shaking. The potential for earthquake-induced landslides and the displacement associated with these slides is a function of the strength of the soil, groundwater conditions, the steepness of the terrain, and the intensity and duration of the earthquake. Such landslides have the potential for large displacements that can damage pipelines and other structures.

We evaluated the earthquake-induced landslide PGD hazard starting with a review of the hazard map prepared by DOGAMI. The map divides the earthquake-induced landslide PGD hazard into the following categories:

- None
- Low (0 to 4 inches of deformation)
- Medium (4 to 12 inches of deformation)
- High (12 to 39 inches of deformation)
- Very High (>39 inches of deformation)

Open-File Report O-13-06 indicates the earthquake-induced landslide PGD's were calculated as a function of the landslide susceptibility map, the PGA map, and an assumed critical acceleration for slope movement. The DOGAMI mapping limits the landslide hazard to the steep terrain and it generally appears to be reasonable. Therefore, we did not make any revisions to the map. The hazards are discussed in the following sections. The map is shown in Figure 7A. The assessed earthquake-induced landslide hazard at the critical facility locations is also summarized in Table 2A.

Albany-Millersburg Intake and WTP. The DOGAMI mapping indicates the earthquake-induced landslide hazard is limited to a low to high PGD hazard along the riverbank to the north and east of the intake facility. The earthquake-induced landslide hazard for the WTP is limited to a medium PGD hazard along the steeper slopes to the north and east of the facility. The mapped landslide hazards do not affect the structures which bear on bedrock. There is no landslide hazard for the pipelines that connect the facilities and extend west to and along I-5.

Zone 1. The DOGAMI mapping indicates no earthquake-induced landslide hazard across most of Zone 1. The exception is the elevated road embankment on Pacific Blvd. between SW Ellsworth Street and SE 9th Avenue which shows a medium hazard. Based on the condition of the fill and the slopes, we anticipate the landslide hazard at that location is also low.

It is not visible in Figure 7A, but the DOGAMI mapping indicates a medium to high earthquake-induced landslide hazard on the slope between the Vine Street WTP and the Calapooia River. DOGAMI Lidar imaging indicates an elevation change of up to 45 feet at that location with slopes typically steeper than 1.5H:1V. Based on our previous work in the vicinity, we anticipate the slope is predominantly underlain by dense silty or sandy gravel and cobbles. However, there is no site-specific subsurface information at that location to confirm the conditions. We believe this is an item that warrants additional study. With the possible exception of the Vine Street WTP, we have concluded there are no earthquake-induced PGD's that would affect the structures or selected backbone pipelines in Zone 1.

Zone 2. The DOGAMI mapping indicates no earthquake-induced landslide PGD hazard in Zone 2. We concur with this assessment, and we did not revise the mapping in this area.

Zones 3 and 4. The DOGAMI mapping indicates a low to high earthquake-induced landslide PGD hazard in the steep terrain north of Thornton Lake. There is also a low earthquake-induced landslide PGD hazard in the sloping terrain north of Zone 2. We concur with this assessment, and we did not revise the mapping in these areas. The hazards do not threaten the critical facilities or selected backbone pipelines.

Fault Rupture

There are no known active faults underlying the critical facilities or backbone pipelines. Therefore, we have concluded the potential for fault rupture impacting the City's water infrastructure is very low.

SUMMARY AND RECOMMENDATIONS FOR ADDITIONAL WORK

Based on the available information, we have concluded there is generally a low risk of seismic hazards associated with a M_w 9 CSZ interface impacting the critical facilities and selected backbone pipelines. There are a couple of items where additional work is recommended to refine the assessment as described below.

- We recommend completing an exploratory boring at the top of the slope adjacent to the Vine Street WTP, a site reconnaissance, and analysis to assess the risk of an earthquake-induced landslide developing in the sloping terrain between the WTP and the Calapooia River and to evaluate our current assessment of low liquefaction and lateral spread hazards at the site.
- We recommend reviewing the as-built plans for the existing pipelines at creek and river undercrossings. This information will allow better assessment of whether or not a lateral spread hazard could impact the pipelines.

VARIATION OF SUBSURFACE CONDITIONS, USE OF THIS INFORMATION, AND WARRANTY

Our evaluation of the seismic hazards presented in this memorandum is based on interpolation of widely-spaced subsurface explorations. Soil and groundwater conditions are likely to vary with location. Therefore, it should be understood there is some uncertainty in the evaluation.

This memorandum was prepared for the exclusive use of West Yost Associates for the Albany Water Master Plan project in Albany, Oregon. Information contained herein should not be used for other sites or for unanticipated construction without our written consent. Our services do not include any survey or assessment of potential surface contamination or contamination of the soil or groundwater by hazardous or toxic materials. We assume those services, if needed, have been completed by others.

Our work was done in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

We trust the above information meets your current needs. Please do not hesitate to call with any questions.

Attachments

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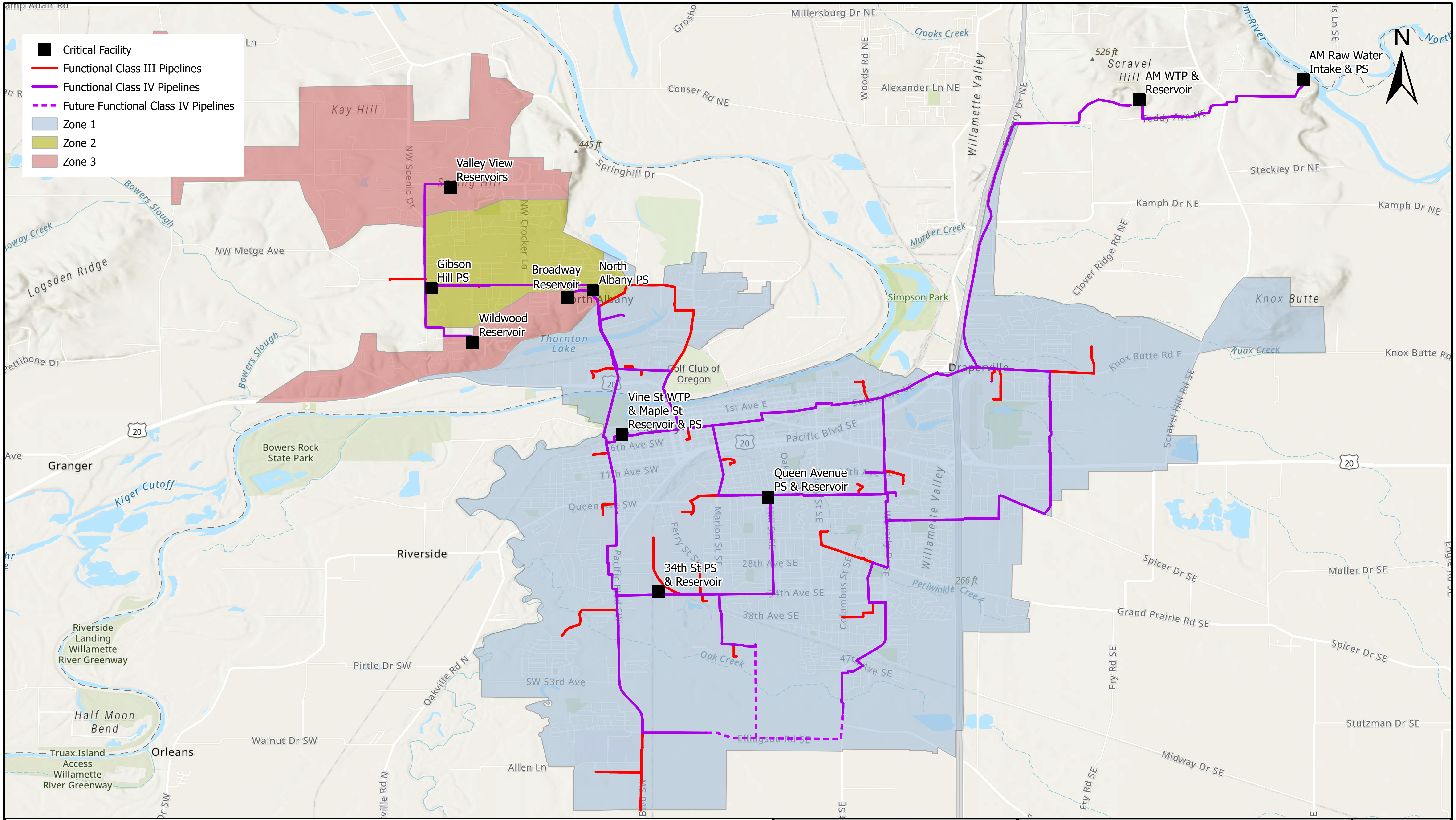

NOTES:
1. ZONE 4 IS LOCATED WITHIN ZONE 3, SEE MEMO FOR DISCUSSION AND SPECIFIC LOCATION.
2. BASE MAP PROVIDED BY ESRI.

SCALE: 1" = 5,000'

0 2,500 5,000 10,000

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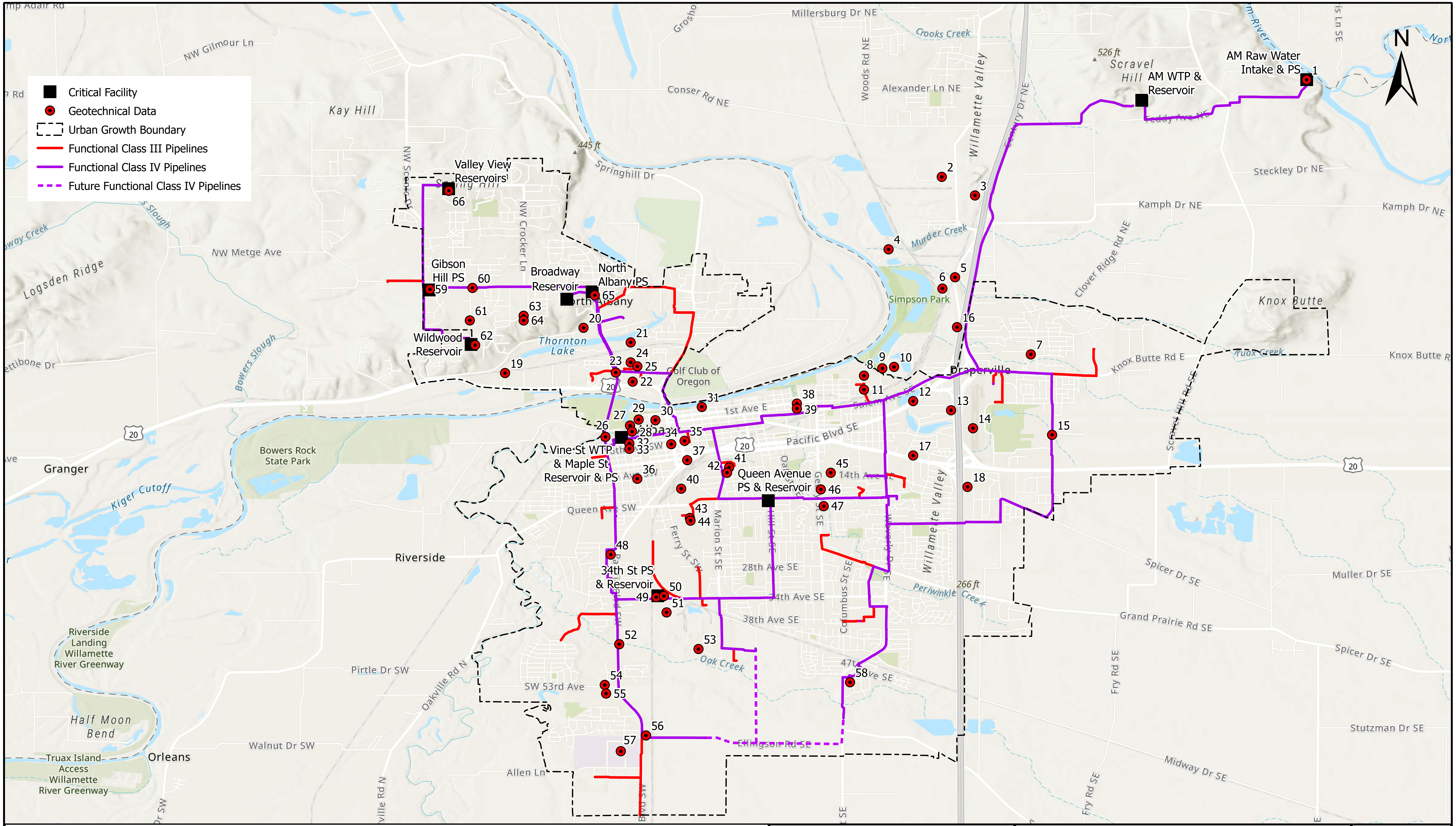
2221130	5/2/2023	MDM

CRITICAL COMPONENTS & PRESSURE ZONES

Albany Water Master System
Albany, Oregon

FIGURE NO.

1A



NOTES:
1. SEE TABLE 1A FOR A SUMMARY OF AVAILABLE SUBSURFACE INFORMATION.
2. BASE MAP PROVIDED BY ESRI.

SCALE: 1" = 5,000'

0 2,500 5,000 10,000

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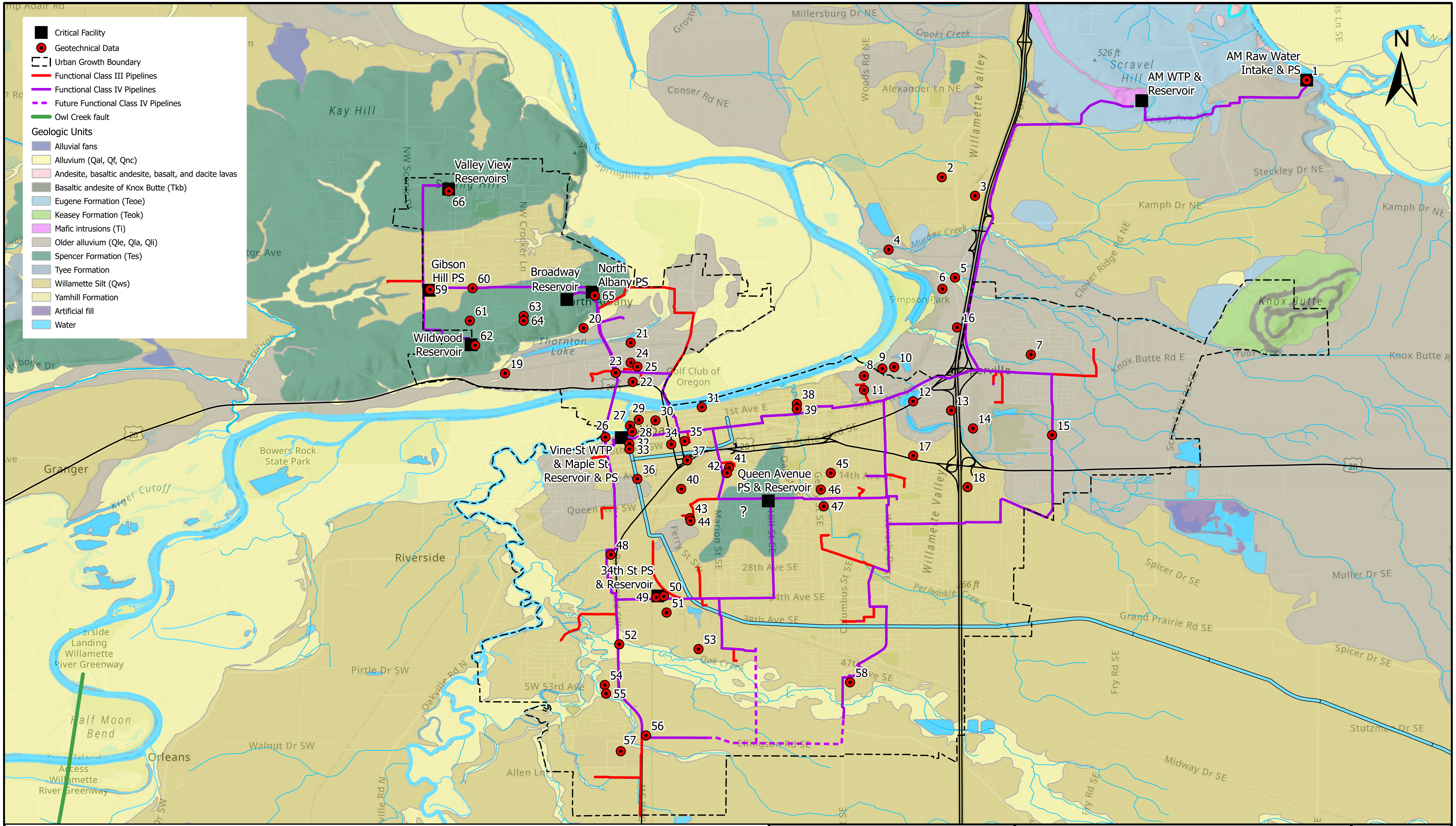
AVAILABLE EXPLORATIONS IN PROJECT AREA

Albany Water Master System
Albany, Oregon

FIGURE NO.

2A



NOTES:
1. GEOLOGIC MAPPING AND FAULTING BASED ON ODGC-7 DATA (FRANCZYK ET AL., 2020 AND USGS, 2017 AND 2020).
2. SEE TABLE 1A FOR A SUMMARY OF AVAILABLE SUBSURFACE INFORMATION.
3. BASE MAP PROVIDED BY ESRI.

SCALE: 1" = 5,000'

0 2,500 5,000 10,000

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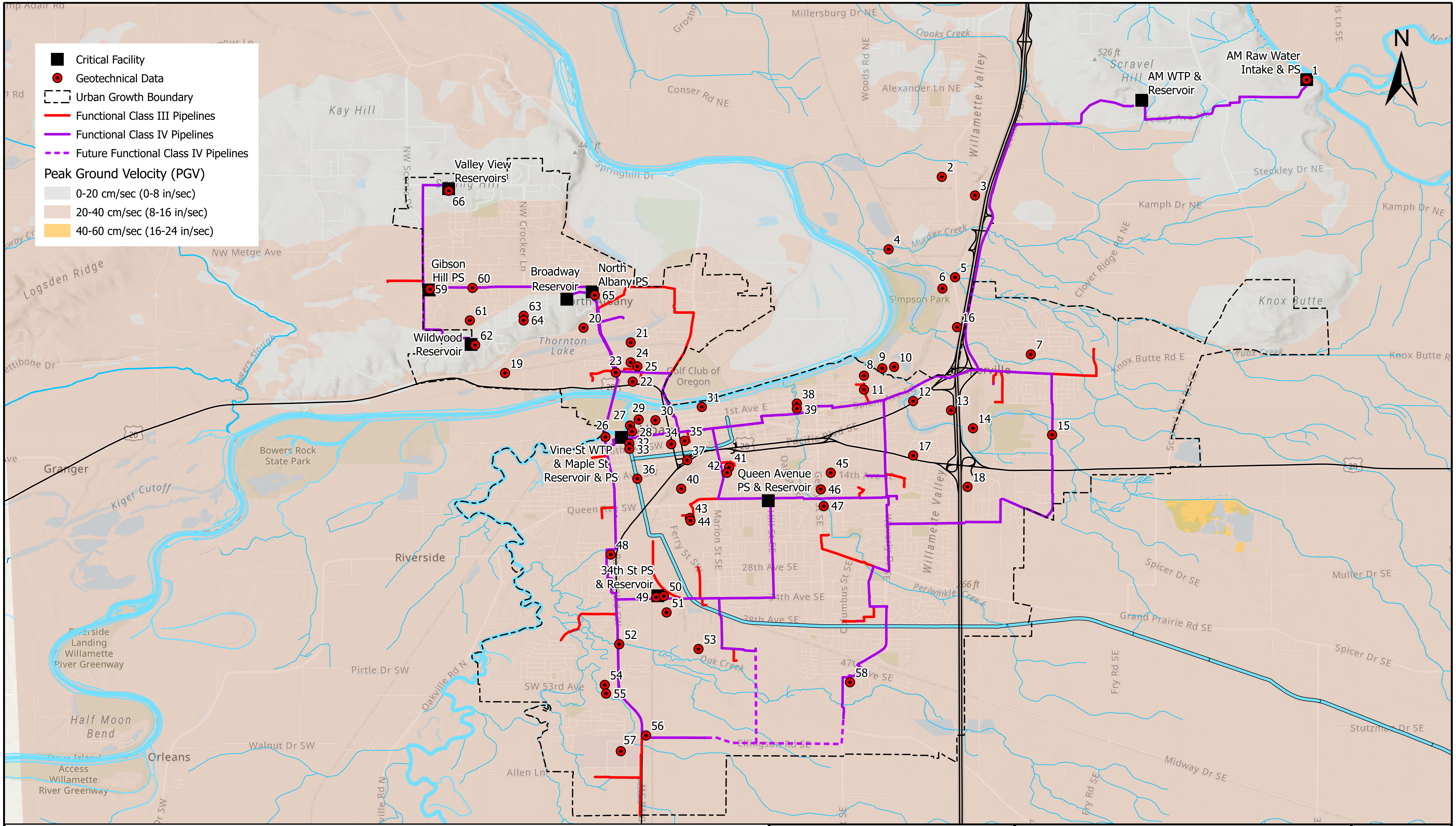
LOCAL GEOLOGIC MAP AND FAULTING

Albany Water Master System
Albany, Oregon

FIGURE NO.

3A



NOTES:
1. THE ESTIMATED PGV VALUES ARE ASSOCIATED WITH A M 9.0 CSZ EARTHQUAKE BASED ON DOGAMI 0-13-06 DATA. THE PGV VALUES WERE MODIFIED AT SELECT LOCATIONS WITHIN THE CITY OF ALBANY URBAN GROWTH BOUNDARY LIMITS BASED ON AVAILABLE SUBSURFACE INFORMATION.
2. SEE TABLE 1A FOR A SUMMARY OF AVAILABLE SUBSURFACE INFORMATION.
3. BASE MAP PROVIDED BY ESRI.

SCALE: 1" = 5,000'

0 2,500 5,000 10,000

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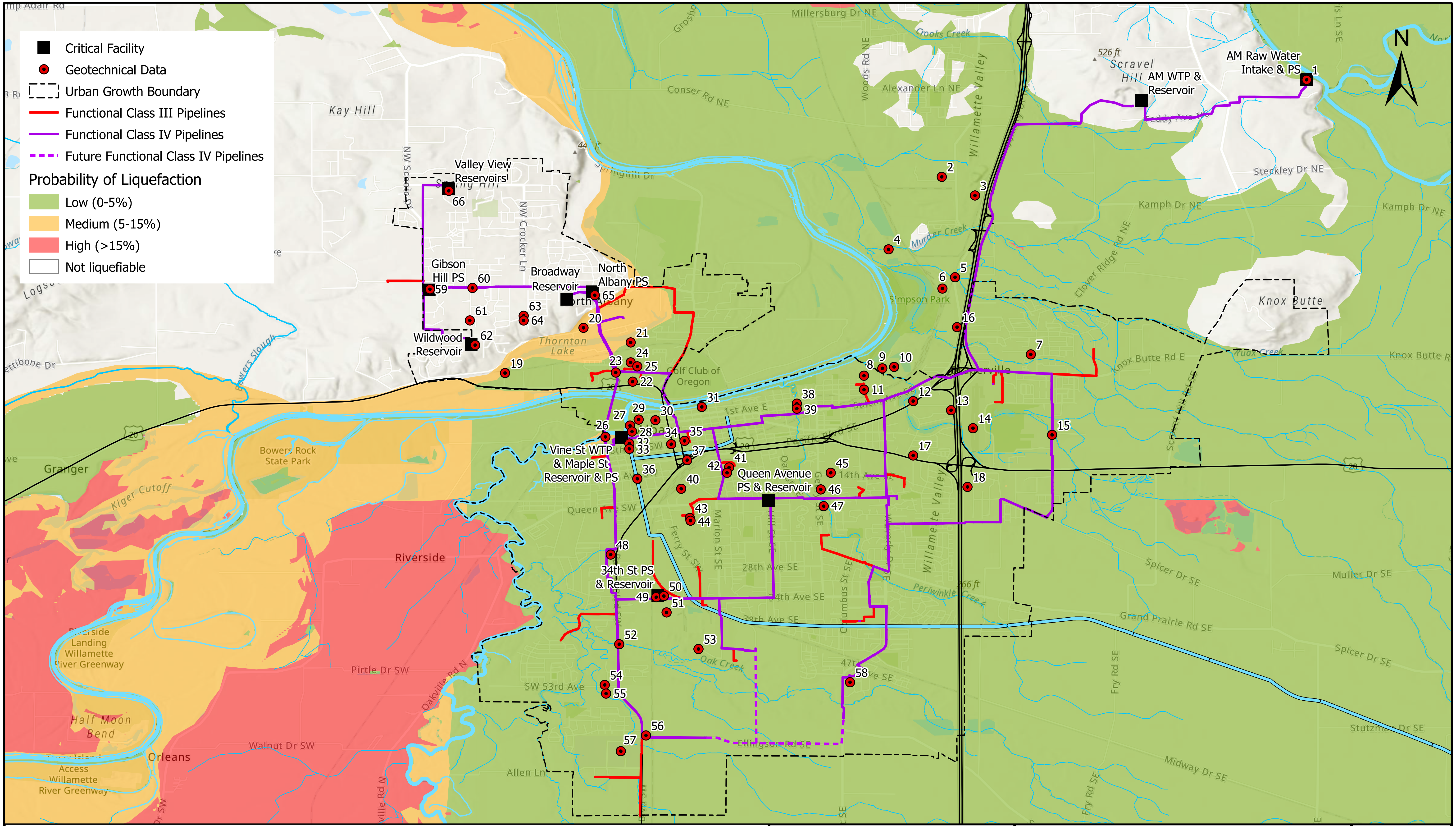
PEAK GROUND VELOCITY (PGV)

Albany Water Master System
Albany, Oregon

FIGURE NO.
4A



NOTES:
1. THE ESTIMATED PROBABILITY OF LIQUEFACTION IS ASSOCIATED WITH A M 9.0 CSZ EARTHQUAKE BASED ON DOGAMI 0-13-06 DATA. THE PROBABILITY VALUES WERE MODIFIED WITHIN THE CITY OF ALBANY URBAN GROWTH BOUNDARY LIMITS BASED ON THE AVAILABLE SUBSURFACE INFORMATION.
2. SEE TABLE 1A FOR A SUMMARY OF AVAILABLE SUBSURFACE INFORMATION.
3. BASE MAP PROVIDED BY ESRI.

SCALE: 1" = 5,000'

0 2,500 5,000 10,000

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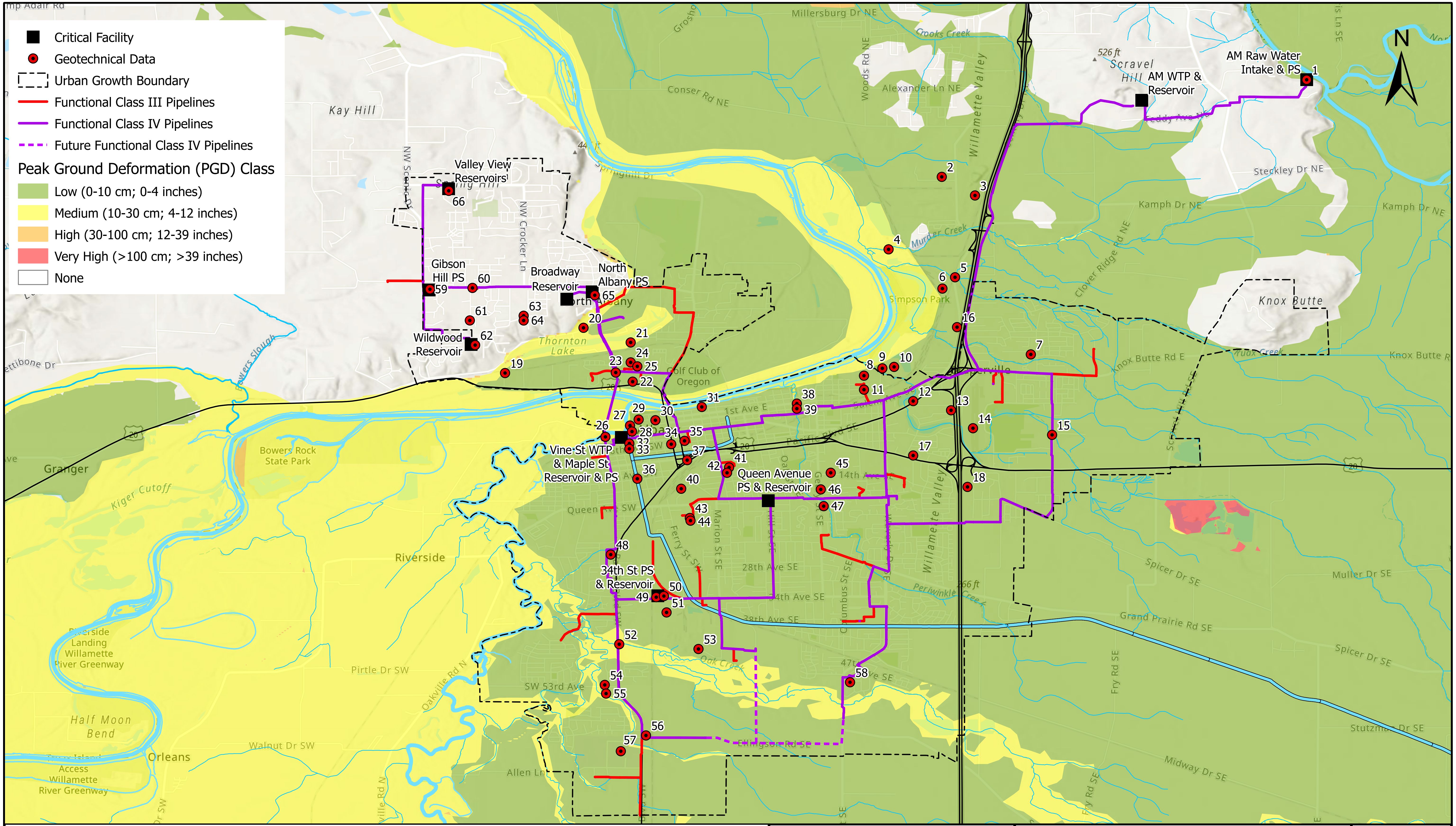
PROBABILITY OF LIQUEFACTION

Albany Water Master System
Albany, Oregon

FIGURE NO.
5A



NOTES:
1. THE ESTIMATED LATERAL SPREAD PGD IS ASSOCIATED WITH A M 9.0 CSZ EARTHQUAKE BASED ON DOGAMI 0-13-06 DATA. THE PGD VALUES WERE MODIFIED WITHIN THE CITY OF ALBANY URBAN GROWTH BOUNDARY LIMITS BASED ON THE AVAILABLE SUBSURFACE INFORMATION.
2. SEE TABLE 1A FOR A SUMMARY OF AVAILABLE SUBSURFACE INFORMATION.
3. BASE MAP PROVIDED BY ESRI.

SCALE: 1" = 5,000'

0 2,500 5,000 10,000

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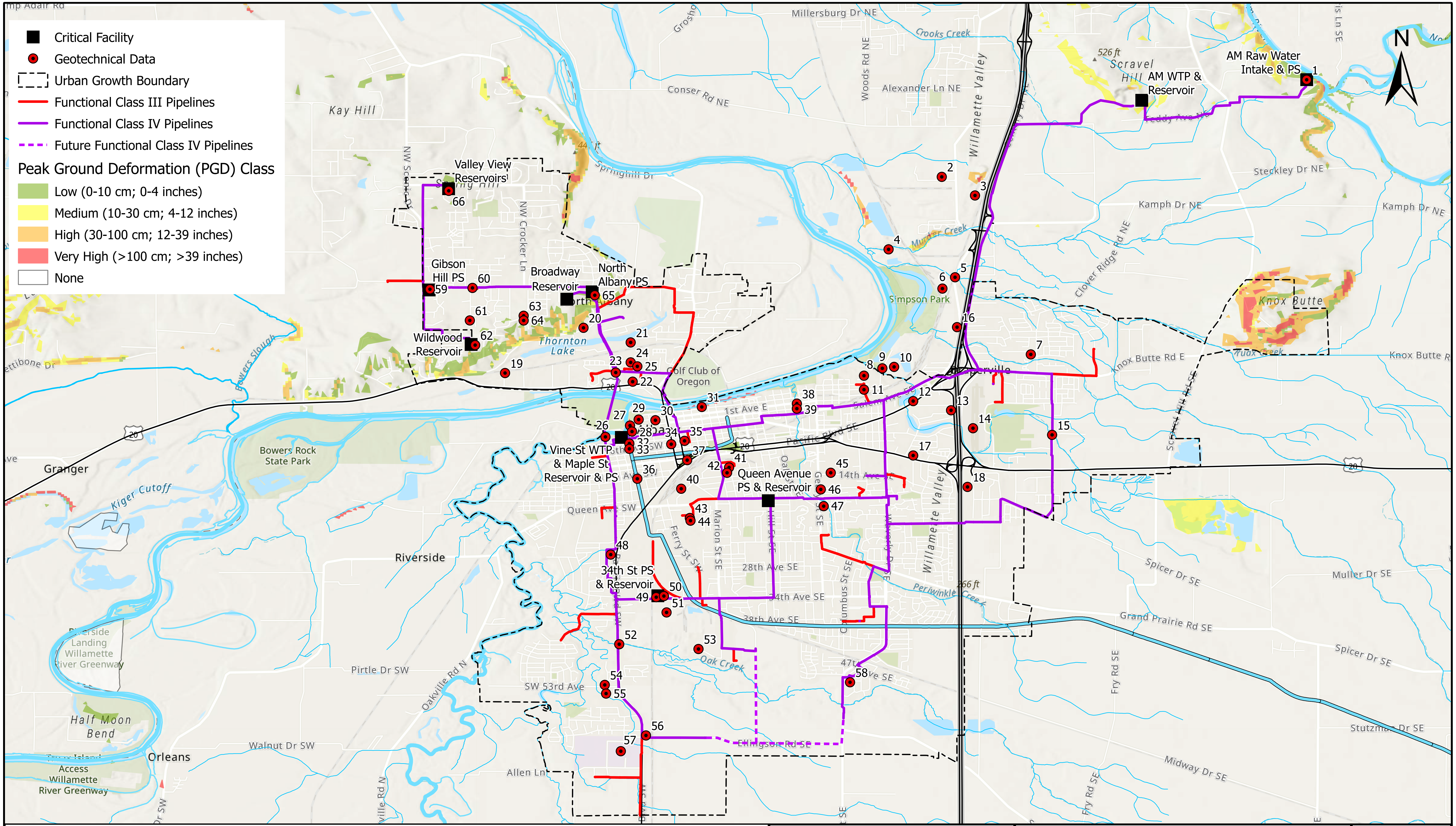
LATERAL SPREAD PGD

Albany Water Master System
Albany, Oregon

FIGURE NO.

6A



NOTES:
1. THE ESTIMATED SEISMIC LANDSLIDE PGD VALUES ASSOCIATED WITH A M 9.0 CSZ EARTHQUAKE ARE BASED ON DOGAMI 0-13-06 DATA.
2. SEE TABLE 1A FOR A SUMMARY OF AVAILABLE SUBSURFACE INFORMATION.
3. BASE MAP PROVIDED BY ESRI.

SCALE: 1" = 5,000'

0 2,500 5,000 10,000

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SEISMIC LANDSLIDE PGD

Albany Water Master System
Albany, Oregon

FIGURE NO.

7A

Explanation of Common Terms Used in Soil Descriptions

Field Identification	Cohesive Soils			Granular Soils	
	SPT*	S_u** (tsf)	Term	SPT*	Term
Easily penetrated several inches by fist.	0 - 2	< 0.125	Very Soft	0 - 4	Very Loose
Easily penetrated several inches by thumb.	2 - 4	0.125 - 0.25	Soft	4 - 10	Loose
Can be penetrated several inches by thumb with moderate effort.	4 - 8	0.25 - 0.50	Medium Stiff	10 - 30	Medium Dense
Readily indented by thumb but penetrated only with great effort.	8 - 15	0.50 - 1.0	Stiff	30 - 50	Dense
Readily indented by thumbnail.	15 - 30	1.0 - 2.0	Very Stiff	> 50	Very Dense
Indented with difficulty by thumbnail.	> 30	> 2.0	Hard		

* SPT N-value in blows per foot (bpf)

** Undrained shear strength

Term	Soil Moisture Field Description
Dry	Absence of moisture. Dusty. Dry to the touch.
Damp	Soil has moisture. Cohesive soils are below plastic limit and usually moldable.
Moist	Grains appear darkened, but no visible water. Silt/clay will clump. Sand will bulk. Soils are often at or near plastic limit.
Wet	Visible water on larger grain surfaces. Sand and cohesionless silt exhibit dilatancy. Cohesive soil can be readily remolded. Soil leaves wetness on the hand when squeezed. Soil is wetter than the optimum moisture content and above the plastic limit.

Term	PI	Plasticity Field Test
Non-plastic	0 - 3	Cannot be rolled into a thread at any moisture.
Low Plasticity	3 - 15	Can be rolled into a thread with some difficulty.
Medium Plasticity	15 - 30	Easily rolled into thread.
High Plasticity	> 30	Easily rolled and re-rolled into thread.

Term	Soil Structure Criteria
Stratified	Alternating layers at least ¼ inch thick.
Laminated	Alternating layers less than ¼ inch thick.
Fissured	Contains shears and partings along planes of weakness.
Slickensided	Partings appear glossy or striated.
Blocky	Breaks along surfaces into smaller lumps or blocks. Slickensides may be visible.
Lensed	Contains pockets of different soils.

Term	Soil Cementation Criteria
Weak	Breaks under light finger pressure.
Moderate	Breaks under hard finger pressure.
Strong	Will not break with finger pressure.

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EXPLORATION LOG KEY

COMMON SOIL DESCRIPTION TERMS

Explanation of Common Terms Used in Rock Descriptions

Field Identification		UCS (psi)	Strength	Hardness (ODOT)
Indented by thumbnail.	R0	< 100	Extremely Weak	Extremely Soft
Crumbles under firm blows with geological hammer. Can be peeled by a pocket knife.	R1	100 - 1,000	Very Weak	Very Soft
Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with geological hammer.	R2	1,000 - 4,000	Weak	Soft
Cannot be scraped or peeled with a pocket knife, specimen can be fractured with a single blow of geological hammer.	R3	4,000 - 8,000	Medium Strong	Medium Hard
Specimen requires more than one blow of geological hammer to fracture it.	R4	8,000 - 16,000	Strong	Hard
Specimen requires many blows of geological hammer to fracture it.	R5	> 16,000	Very Strong	Very Hard

Term (ODOT)	Weathering Field Identification
Fresh	Crystals are bright. Discontinuities may show some minor surface staining. No discoloration in rock fabric.
Slightly Weathered	Rock mass is generally fresh. Discontinuities are stained and may contain clay. Some discoloration in rock fabric.
Moderately Weathered	Significant portions of rock show discoloration and weathering effects. Crystals are dull and show visible chemical alteration. Discontinuities are stained and may contain secondary mineral deposits.
Highly Weathered (Predominately Decomposed)	Rock can be excavated with geologist's pick. All discontinuities exhibit secondary mineralization. Complete discoloration of rock fabric. Surface of core is friable and usually pitted due to washing out of highly altered minerals by drilling water.
Decomposed	Rock mass is completely decomposed. Original rock "fabric" may be evident (relict texture). May be reduced to soil with hand pressure.

Spacing (metric)	Spacing (imperial)	Spacing Term	Bedding/Foliation
< 6 cm	< 2 in	Very Close	Very Thin (Laminated)
6 cm - 30 cm	2 in - 1 ft	Close	Thin
30 cm - 90 cm	1 ft - 3 ft	Moderately Close	Medium
90 cm - 3.0 m	3 ft - 10 ft	Wide	Thick
> 3.0 m	> 10 ft	Very Wide	Very Thick (Massive)

Vesicle Term	Volume
Some vesicles	5 - 25%
Highly vesicular	25 - 50%
Scoriaceous	> 50%

Stratification Term	Description
Lamination	< 1 cm (0.4 in) thick beds
Fissile	Preferred break along laminations
Parting	Preferred break parallel to bedding
Foliation	Metamorpic layering and segregation of minerals

RQD %	Designation	RQD %	Designation
0 - 25	Very Poor	75 - 90	Good
25 - 50	Poor	90 - 100	Excellent
50 - 75	Fair		

Rock Quality Designation (RQD) is the cumulative length of intact rock core pieces 4 inches or longer (excluding breaks caused by drilling and handling) divided by run length, expressed as a percentage.

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EXPLORATION LOG KEY

COMMON ROCK DESCRIPTION TERMS

Table 1A. Summary of Available Subsurface Information

Project I.D.	Zone	Geotechnical Investigation	Explorations	Max Exploration Depth (feet)	General Subsurface Profile
1	N/A	Albany-Millersburg WTP Intake Sand Removal Improvements (FE, 2015)	2 BH	41	•Loose to medium dense sandy gravel with variable amounts of silt (fill) extends to depths of ±15 to 17 feet. •The fill is underlain by very stiff silt with some rock fragments (alluvium or residual soil) to ±20 feet. •Extremely weak to very weak (R0 to R1) sandstone was encountered from ±20 to 40 feet, followed by extremely weak (R0) sandy siltstone to ±41.4 feet. •Groundwater information was not available.
2	N/A	Aymium Millersburg (FE, 2022)	12 BH, 9 TP	60	•The site is covered with variable fill to depths of up to ±7.5 feet including asphaltic concrete (AC) pavement, gravel, construction debris, bark mulch, and wood debris. •The fill is underlain by fine-grained alluvium including stiff low plasticity silt and high plasticity clay with variable amounts of sand, gravel, and organics to ±15 to 40 feet. •The fine-grained alluvium is underlain by coarse-grained alluvium including layers of medium dense to dense sand and gravel to ±40 feet. The coarse-grained alluvium includes thin lenses (<5 feet) of loose silty sand at some locations. •The coarse-grained alluvium is underlain by fine-grained alluvium including stiff high plasticity clay and medium plasticity clayey silt. •Perched water was encountered in several of the test pits at depths ranging from ±2.5 to 7.5 feet in March 2022. A review of local water well logs suggests groundwater depths ranges from ±8 to 12 feet in the project vicinity.
3	1	Mid-Willamette Valley Intermodal Center (FE, 2019)	19 TP	9	•The site is covered with ±1 to 4 feet of fill. The fill is variable and includes gravel, quarry rock, and wood chips. •Fine-grained alluvium extends below the fill to a depth of at least ±9 feet. The alluvium is generally stiff to very stiff and includes low to medium plasticity silt, silty clay, and clayey silt, and high plasticity clay. •Perched water was encountered at select test pit locations at depths ranging from ±2.5 to 4 feet in October 2019. A review of local water well logs suggests groundwater depths ranging from ±4 to 8 feet in the project vicinity.
4	1	Albany Oxbows Crossings (FE, 2022)	2 BH	45.3	Murder Creek Crossing •Fill extends to ±7.5 feet including ±1 foot of dense crushed rock followed by medium stiff to stiff medium plasticity sandy clayey silt with some gravel. •The fill is underlain by fine-grained alluvium including medium stiff low plasticity organic sandy silt to ±10 feet and soft medium plasticity organic clayey silt from ±10 to 12.5 feet. •The fine-grained alluvium is underlain by coarse-grained alluvium from ±12.5 to 17.5 feet consisting of very loose silty sand. •Extremely weak (R0), slightly weathered sandstone was encountered from ±17.5 to 45.3 feet. •Groundwater depth was not available. Connector Channel Crossing •Very dense silty crushed rock (fill) extends to ±10.8 feet. •The fill is underlain by fine-grained alluvium including stiff low to medium plasticity silt with some clay to ±12.5 feet and very soft silty clay with trace sand from ±12.5 to 15 feet. •The fine-grained alluvium is underlain by coarse-grained alluvium including loose silty sand from ±15 to 25 feet and medium dense silty sandy gravel from ±25 to 30 feet. •Extremely weak to very weak (R0 to R1) siltstone was encountered from ±30 to 45.3 feet. •Groundwater depth was not available. The water level in the channel was ±8.2 feet below the road surface in November 2022.
5	1	Truax Creek Bridge Replacement (FE, 2016)	2 BH	66.5	•A pavement section and granular fill extends to depths of ±3.5 to 4.5 feet. •The fill is underlain by fine-grained alluvium including soft to medium stiff medium plasticity clayey silt to ±6.5 to 9.5 feet. •Coarse-grained alluvium consisting of dense sandy gravel with variable amounts of silt extends below the fine-grained alluvium to a depth of ±24 feet. •Very stiff high plasticity clay to clayey silt (fine-grained alluvium) was encountered from ±24 to 66.5 feet. •Groundwater depth was not available. Water level in Truax Creek was ±11 feet below the bridge deck in September 2015.
6	1	ATI Building 104 Replacement (FE, 2019)	2 BH	51.5	•Stiff to very stiff fine-grained alluvium extends to depths of ±6 to 10 feet. The fine-grained alluvium includes medium plasticity clayey silt and high plasticity clay. •Coarse-grained alluvium extends below the fine-grained alluvium to ±20 to 30 feet. The coarse-grained alluvium includes medium dense to very dense sand and gravel. •Stiff high plasticity silty clay to clay (fine-grained alluvium) extends below the coarse-grained alluvium to at least ±51.5 feet. •Groundwater was encountered at a depth of ±12.5 feet in one of the borings in January 2008.
7	1	Grace Point Nazarene Church (FE, 2012)	8 TP	8.5	•Topsoil extends to depths of ±1 to 2 feet followed by fine-grained alluvium to ±5 to 5.5 feet including stiff high plasticity clay and medium stiff, low plasticity clayey silt or silty clay with variable sand content. •The fine-grained alluvium is underlain by coarse-grained alluvium including layers of loose to dense sandy gravel, silty sand, and gravelly sand to ±8.5 feet. •Groundwater seepage was encountered at depths ranging from ±5.5 to 8 feet in several of the test pits in May 2012.
8	1	City of Albany's Biosolid Dewatering & Storage Facility (FE, 1999)	2 BH, 9 TP	58.6	•Fill comprised of medium dense sandy gravel with some silt and stiff, high plasticity sandy clay extends to depths of ±6.5 to 7.5 feet. •The fill is underlain by coarse-grained alluvium to depths of ±21.5 to 24 feet including alternating layers of medium dense to dense sand and gravel with variable amounts of silt. •Additional alluvium follows including very stiff medium to high plasticity clayey silt to ±43 feet, medium dense sand with some silt from ±43 to 54 feet, and stiff high plasticity clay from ±54 to 58.5 feet. •Groundwater was encountered during drilling at depths of ±16 and 20 feet in July 1999.

Notes:

1. BH = boring, TP = test pit, and CH = core hole.
2. See soil and rock key for definitions of soil and rock descriptions.

Table 1A. Summary of Available Subsurface Information (Cont.)

Project I.D.	Zone	Geotechnical Investigation	Explorations	Max Exploration Depth (feet)	General Subsurface Profile
9	1	Waverly Drive (Cox Creek) Bridge Replacement (FE, 2005)	2 BH	76.5	•Medium dense granular fill extends to ±12 to 14.5 feet. •The fill is underlain by very dense sandy gravel and scattered cobbles (coarse-grained alluvium) to ±18 feet in one boring. •Fine-grained alluvium extends below the granular fill and coarse-grained alluvium to at least ±76.5 feet. The fine-grained alluvium includes very stiff low to high plasticity silt and clayey silt with variable amounts of sand. •Groundwater information was not available.
10	1	Talking Water Gardens Geotechnical Evaluation (FE, 2021)	5 BH	76.5	•Fill extends to depths of ±2.5 to 7 feet and includes medium dense silty sandy gravel and crushed rock. •The fill is underlain by alluvium including loose to dense silty sandy gravel to depths of ±14.5 to 34 feet. Layers of medium dense to dense silty sand and very stiff to hard silt were also encountered in some of the borings. •Fine-grained alluvium extends below the sandy and gravelly alluvium at depths ranging from ±23 feet to greater than 40 feet. The fine-grained alluvium predominantly consists of very stiff to hard, high plasticity clayey silt and low plasticity sandy silt. •Residual soil was encountered in two borings below depths of ±35.8 feet and 41 feet. The residual soil is comprised of very stiff clayey silt and hard sandy silt. •Groundwater depths vary with location and are within ±8 to 26 feet of the ground surface.
11	1	Riverfront Interceptor Sewer Lift Station and Force Main (Shannon & Wilson, 2019)	3 BH	61.5	•Medium dense granular fill extends to ±4.5 to 7 feet. •The granular fill is underlain by fine and coarse-grained alluvium including very stiff to hard medium plasticity silty clay and medium dense to dense gravel with variable amounts of silt and sand to ±24 to 30.5 feet. •Stiff to very stiff high plasticity clay (fine-grained alluvium) follows to at least ±61.5 feet. •Piezometers were installed in each boring. The piezometric information suggests the static groundwater level ranges ±18 to 38 feet along the project alignment.
12	1	Cox Creek Sewer Interceptor (FE, 2019)	13 BH	31.5	•Project includes drilling at various locations. •The typical profile includes medium dense to very dense gravel with variable amounts of silt and sand (coarse-grained alluvium) to depths of ±16 to 30 feet. •At some locations, the gravel is underlain by very stiff to hard medium plasticity clayey silt (fine-grained alluvium) to ±31.5 feet. •Groundwater was encountered in the borings while drilling at depths ranging from ±6 to 20 feet in December 2018.
13	1	Jackson Subaru of Albany (FE, 2022)	3 BH	14	•AC and PCC pavement and gravel fill extends to ±0.8 to 3.5 feet. •The pavement and granular is fill is underlain by medium stiff silt with some clay, sand, gravel, and organics (fill and topsoil) to depths of ±3.5 to 4 feet at most locations. •The fill and topsoil is underlain by fine and coarse-grained alluvium to at least ±14 feet including medium dense silty sand and medium stiff to stiff medium to high plasticity clayey silt to depths of ±6 to 11 feet followed by dense sandy gravel with some silt. •Groundwater was encountered at a depth of ±12.5 feet in one of the borings.
14	1	Albany Municipal Airport Runway 16-34 Rehabilitation (FE, 2010)	7 CH, 11 TP	8	•Coring encountered pavement consisting of ±6 to 7 inches of AC over ±8 to 10 inches of base rock. •The pavement sections are underlain by stiff fine-grained alluvium including low to medium plasticity clay, silt, silty clay, and clayey silt with variable amounts of sand. •Slow seepage was encountered at a depth of ±7 feet in the deepest test pit in December 2009.
15	1	Goldfish Farm Road (Cox Creek) Bridge (FE, 2023)	2 BH	81.5	•Fine-grained alluvium extends to depths of ±12.5 to 13.5 feet. The fine-grained alluvium includes stiff high plasticity clay to ±7.5 feet, followed by medium stiff silt with some clay grading to soft to medium stiff sandy silt. •The fine-grained alluvium is underlain by coarse-grained alluvium including dense to very dense gravel with variable amounts of silt and sand to depths of ±40 to 42 feet, followed by medium dense to dense silty sand to ±81.5 feet. A ±3 to 7-foot-thick gravel layer was encountered in one boring from ±73 to 77 feet. •Groundwater information was not available. The water level in Cox Creek was ±9.2 feet below the bridge deck in August 2022.
16	1	Millersburg Mini Storage Pavement Design (FE, 2008)	4 TP	3.5	•Variable fill was encountered to depths of ±3.2 to 3.5 feet. The fill includes dense silty gravel and stiff silt and clayey silt with variable amounts of gravel. •Fine-grained alluvium consisting of hard low plasticity silt extends below the fill to at least ±3.5 feet. •No groundwater was encountered in the explorations.
17	1	Albany Les Schwab Tire Center Improvements (FE, 2013)	6 BH	11.5	•Pavement sections extend to depths of ±1.2 to 1.6 feet. •The pavement is underlain by fill to ±2 to 2.5 feet consisting of very soft to medium stiff silt with variable amounts of sand and gravel. •Fine-grained alluvium consisting of medium stiff to stiff low to medium plasticity silty clay follows to at least ±11.5 feet. •Groundwater was not encountered in the borings. A review of local well logs suggest groundwater depth ranges from depths of ±6 to 15 feet in the project vicinity.

Notes:

1. BH = boring, TP = test pit, and CH = core hole.
2. See soil and rock key for definitions of soil and rock descriptions.

Table 1A. Summary of Available Subsurface Information (Cont.)

Project I.D.	Zone	Geotechnical Investigation	Explorations	Max Exploration Depth (feet)	General Subsurface Profile
18	1	Jackson Hyundai of Albany (FE, 2022)	4 BH	21.5	•Pavement sections extend to depths of ±0.8 to 1.5 feet. •The pavement is underlain by fine-grained alluvium including medium stiff to stiff, low to medium plasticity silt and clayey silt to ±16 to 17.5 feet. •Coarse-grained alluvium follows to at least ±21.5 feet comprised of dense to very dense sandy gravel with some silt. •Groundwater was encountered in the borings at depths of ±11 to 14 feet in March 2022.
19	1	Corvallis to Albany Trail, Scenic Drive to Springhill (FE, 2019)	1 BH	39	•Soft, low plasticity silt (topsoil) extends to ±2 feet. •The topsoil is underlain by fine-grained alluvium including medium stiff medium plasticity clay to ±7.5 feet and medium stiff low plasticity sandy silt from ±7.5 to 19 feet. •Coarse-grained alluvium follows from ±19 to 24 feet comprised of dense sandy gravel with trace silt. •Weak (R2), fresh silty sandstone extends below the gravel from ±24 to 39 feet. •Groundwater information was not available.
20	1	North Albany Community Church (FE, 2007)	5 BH	25.2	•Fine-grained alluvium was encountered to depths of ±15 to 16 feet including medium stiff to stiff medium plasticity silty clay, low to medium plasticity clayey silt, and low plasticity silt. •Coarse-grained alluvium consisting of loose to medium dense sand follows to ±19 to 23 feet. •Extremely weak to very weak (R0 to R1), slightly weathered to fresh sandstone was encountered below ±19 to 23 feet. •Groundwater was encountered at a depth of ±6.3 feet in one of the borings in June 2007.
21	1	Thornton Lake Estates (FE, 2007)	16 TP	17.5	•Medium stiff clayey silt with trace organics (topsoil) extends to ±6 to 12 inches. •The topsoil is underlain by fine-grained alluvium to ±6 to 10 feet comprised of stiff medium to high plasticity silty clay. •Coarse-grained alluvium comprised of medium dense to dense sand with trace to some clay extends below the silty clay to at least ±17.5 feet in the deepest test pit. •Moderate to rapid seepage was encountered in some of the test pits at depths ranging from ±8 to 14.5 feet in March 2007.
22	1	North Albany Mini Storage (FE, 1995)	10 TP	14.5	•Variable fill extends to ±4 to 10 feet. The fill includes silt and loose to medium dense silty and sandy gravel with scattered construction debris (i.e., brick, AC, and concrete fragments). •The fill is underlain by fine and coarse-grained alluvium to at least ±14.5 feet including loose to medium dense silty sand, gravelly sand, and clayey sand. •Groundwater was not encountered at the time of the investigation in March 1995.
23	1	North Albany Vault Reinforcement (FE, 2012)	2 BH	21.5	<u>Intersection of NW Albany Rd and NW Hickory St</u> •Fill extends to ±10 feet and includes very stiff gravelly silt with some clay and stiff clayey silt with trace to some sand . •The fill is underlain by fine-grained alluvium including medium stiff to stiff, medium to high plasticity silty clay with scattered organics from ±10 to 18 feet and stiff sandy silt from ±18 to 21 feet. •No groundwater information was available. <u>Near the intersection of NW Albany Rd and the Railroad Crossing</u> •Fine-grained alluvium extends to ±13.5 feet including soft, low to medium plasticity sandy silt, clayey silt, and silt. •The fine-grained alluvium is underlain by coarse-grained alluvium including loose to medium dense sand from ±13.5 to 15.5 feet and medium dense to dense sandy gravel to gravelly sand from ±15.5 to 21.5 feet. •Groundwater was measured at a depth of ±16 feet in September 2012.
24	1	Sport & Spine North Albany Village (FE, 2019)	2 TP	9	•Medium stiff silt with scattered organics (topsoil) extends to ±6 inches. •The topsoil is underlain by medium stiff to stiff sandy silt and silt with some sand (fine-grained alluvium) to ±9 feet. •Groundwater was not encountered in the explorations in February 2019.
25	1	North Albany Samaritan Buildings 3 & 4 (FE, 2015)	14 TP	12	•The site is underlain by up to ±10 feet of variable fill. The upper ±2 to 4.5 feet of the fill includes stiff to very stiff silt and gravelly silt mixed with varying amounts of sand, rock, and construction debris. The lower fill material typically consists of stiff gravelly clay to clayey gravel. Most of the test pits terminated in the fill. •At two locations, the test pits encountered fine-grained alluvium extending below the fill. The alluvium includes stiff low plasticity sandy silt with some organics and soft to medium stiff low plasticity silt. •Groundwater was not encountered to the limits of the exploration in September 2015.
26	1	Albany WTP Calapooia River Bank Repair (FE, 2008)	3 BH	30.4	•Fine-grained alluvium extends to depths of ±11 to 18 feet. The fine-grained alluvium includes medium stiff to stiff low to medium plasticity clayey silt and silty clay with trace to some sand and gravel and very soft sandy silt. •Coarse-grained alluvium follows to a depth of ±22 feet including very loose silty sand and medium dense gravelly sand. •Very soft (R1), slightly weathered siltstone was encountered from ±22 to 30.4 feet. Medium hard sandstone was encountered below the siltstone in one boring at ±29.5 feet. •Piezometric information indicates groundwater at depths of ±9.5 to 15.5 feet. Groundwater depths closely correspond to the adjacent Calapooia River water surface.

Notes:
1. BH = boring, TP = test pit, and CH = core hole.
2. See soil and rock key for definitions of soil and rock descriptions.

Table 1A. Summary of Available Subsurface Information (Cont.)

Project I.D.	Zone	Geotechnical Investigation	Explorations	Max Exploration Depth (feet)	General Subsurface Profile
27	1	Calapooia Bluff Office Complex (FE, 1997)	7 TP	12	•Fill was encountered to ±1 to 3 feet including medium stiff clayey silt and medium dense sandy gravel. •The fill is underlain by medium stiff clayey silt and stiff silt (fine-grained alluvium) to ±4 to 9 feet. •The fine-grained alluvium is underlain by coarse grained alluvium consisting of medium dense to dense sandy silty gravel and gravelly sand. •Perched water was encountered at depths ranging from ±3 to 3.5 feet in December 1996.
28	1	Linn-Benton Housing Authority - New Office Building (FE, 2002)	3 TP	10.5	•Fill was encountered to ±2.5 to 3 feet including stiff high plasticity clay, stiff low to medium plasticity silt, stiff to very stiff sandy silt, and dense silty sand. •The fill is underlain by fine and coarse-grained alluvium including stiff to very stiff sandy silt and clayey silt, dense to very dense silty sand, and dense to very dense sandy gravel. •Groundwater was not encountered to the limits of the explorations.
29	1	Albany Carousel Museum (OGD Consulting, PC., 2016)	2 BH	20	•Fill was encountered to ±2.5 to 4.5 feet including loose clayey gravel and soft silt and clay with some organics. •The fill is underlain by medium stiff to stiff medium plasticity silty clay (fine-grained alluvium) to ±5.5 to 7 feet followed by dense to very dense silty sand with some gravel (coarse-grained alluvium) to ±8 to 14 feet. •The alluvium is underlain by bedrock. •No groundwater information was available.
30	1	300 West 1st (FE, 2021)	2 BH	31.5	•The site is underlain by AC over base rock and granular fill to ±3.5 to 4 feet. •The fill is underlain by fine-grained alluvium to ±7 to 8.5 feet including medium stiff, low to medium plasticity silt and clayey silt. •Coarse-grained alluvium follows including medium dense to dense silty sand with some clay and gravel to ±13.5 to 17 feet and dense to very dense sandy gravel to ±22.5 feet. •The sandy gravel is underlain by medium stiff to stiff high plasticity clay with some silt and scattered organics (fine-grained alluvium) to at least ±31.5 feet. •Visual observation of the soil samples suggests groundwater was at a depth of ±22 feet at the time of the investigation.
31	1	Wheelhouse Office Building (OGD Consulting, PC., 2007)	2 BH	51.5	•A pavement section extends to ±1.5 feet. •The pavement is underlain by fine-grained alluvium including medium stiff low plasticity silt with some sand and clay to ±8 feet. •Coarse-grained alluvium follows from ±8 to 31 feet consisting of dense to very dense sandy gravel with some silt. •The alluvial gravel is underlain by stiff high plasticity silty clay (residual soil) to ±51.5 feet. •No groundwater information was available.
32	1	Albany Canal (5th Ave.) Bridge (FE, 2002)	1 BH, 5 CH	48.6	•Fine-grained alluvium was encountered to ±6 feet comprised of medium stiff sandy silt. •Coarse-grained alluvium follows including medium dense silty sand with some gravel from ± 6 to 11.5 feet, and very dense sandy gravel with trace silt from ±11.5 to 18 feet. •Soft (R2) slightly weathered to fresh sandstone extends below the alluvium from ±18 to 48.6 feet. •Groundwater was encountered at a depth of ±7 feet at the time of drilling in June 2002.
33	1	Albany Canal (6th Ave.) Bridge (FE, 1997)	2 BH	40.4	•Pavement sections extend to ±1.6 to 2.6 feet. •The pavement is underlain by fine and coarse-grained alluvium including medium stiff sandy silt and medium dense silty sand to ± 10 to 17.1 feet, followed by dense to very dense sandy gravel with some silt to ±19 to 21 feet. •Bedrock including alternating layers of R1 to R2 mudstone, R2 sandy breccia, R2 sandstone, and R3 silty sandstone extends below the sandy gravel. •No groundwater information was available.
34	1	6th and Ellsworth Traffic Signals (FE, 2017)	2 BH	21.5	•A pavement section extends to ±2.5 feet •The pavement is underlain by fine and coarse-grained alluvium to ±5 feet including soft silt and very stiff gravelly silt with some sand. •Coarse-grained alluvium follows from ±5 to 21.5 feet consisting of medium dense grading to very dense sandy gravel with variable silt and sand content. •Groundwater information was not available. A review of local water well logs suggests the static water level ranges from ±8 to 18 feet in the project vicinity.
35	1	Albany Fire Station (FE, 2015)	10 BH	61.5	•Topsoil extends to ±12 inches. •The topsoil is underlain by coarse-grained alluvium including medium dense silty gravelly sand to ±5 feet, followed by dense to very dense gravelly sand and sandy and silty gravel to ±23.5 to 31 feet. •Fine-grained alluvium comprised of stiff to very stiff medium to high plasticity clay and sandy clay extends below the gravel to ±61.5 feet. •Groundwater information was not available. A review of local water well logs suggests the static water level ranges from ±8 to 18 feet in the project vicinity.
36	1	Albany Canal (12th Ave.) Bridge (FE, 1995)	1 BH	54.1	•Fine-grained alluvium comprised of soft low plasticity silt with scattered organics extends to ±5.9 feet. •Coarse-grained alluvium follows including dense silty to clayey gravel from ±5.9 to 9.8 feet, and very dense sandy gravel from ±9.8 to 59.9 feet. •Mudstone/siltstone extends below the alluvial gravel from ±24.7 to 51.6 feet. •Groundwater depth was not available. Water level in the canal was ±12 feet below the road surface in April 1995.

Notes:

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Table 1A. Summary of Available Subsurface Information (Cont.)

Project I.D.	Zone	Geotechnical Investigation	Explorations	Max Exploration Depth (feet)	General Subsurface Profile
37	1	Albany Multi-Modal Transit Center (FE, 2000)	7 BH, 15 TP	151.5	•Variable fill was encountered to ±5 to 18 feet including medium stiff to stiff clay and silt, stiff to hard gravelly silt, dense clayey sand, dense sandy gravel, and very dense silty gravel, •The fill is underlain by coarse-grained alluvium including dense to very dense gravelly sand and sandy gravel to depths of ±27.5 to 38 feet, followed by very stiff high plasticity clay and clayey silt (fine-grained alluvium). •Wood was encountered in the deepest boring from ±130 to 151.5 feet. •Groundwater was encountered in the borings while drilling at depths ranging from ±14 to 20 feet in August 2000.
38	1	Periwinkle Creek (1st Ave.) Bridge (FE, 1995)	1 BH	68.2	•Fine and coarse-grained alluvium extends to ±53.5 feet. The alluvium includes very loose to loose sand with silt and clay to ±7.5 feet, stiff medium to high plasticity silty clay with sand from ±7.5 to 12.5 feet, dense sandy gravel from ±12.5 to 22.6 feet, very stiff high plasticity clayey silt from ±22.6 to 36.1 feet, and very stiff medium to high plasticity silty clay from ±36.1 to 53.5 feet. •Very stiff to hard silty clay (decomposed siltstone or claystone) was encountered from ±53.5 to 71.5 feet. •A piezometer reading suggests a groundwater depth of ±15 feet in September 1995.
39	1	Periwinkle Creek (2nd Ave.) Bridge (FE, 2006)	2 BH	71.5	•Fill extends to ±7.5 to 10 feet and includes loose to medium dense sand with some silt and very soft to soft gravelly silt with some sand. •The fill is underlain by fine-grained alluvium to ±16 to 19 feet including medium stiff silt and clayey silt with some sand and gravel. •Coarse-grained alluvium follows to ±30 feet consisting of medium dense to very dense gravel with variable amounts of silt and sand. •Stiff to very stiff low plasticity silt and high plasticity clayey silt (fine-grained alluvium) extends below the gravel to ±71.5 feet. •Groundwater information was not available.
40	1	WR Grace Storage Buildings (FE, 2019)	8 BH	51.5	•Pavement and dense granular fill extends to ±1.5 to 2 feet. •The fill is underlain by fine-grained alluvium including medium stiff to stiff clay, silty clay, clayey silt, and sandy silt to ±5 to 7.5 feet. •Coarse-grained alluvium comprised of dense to very dense sandy gravel and lenses of silty sand and stiff silt extends below the fine-grained alluvium to ±37.5 to 40 feet. •Fine-grained alluvium comprised of stiff to hard medium to high plasticity clay with some silt extends below the coarse-grained alluvium to ±51.5 feet. •Groundwater was measured at a depth of ±11.5 feet in several borings in November 2015.
41	1	Linn County Jail (FE, 1987)	6 BH, 15 TP	35.5	•Pavement and variable fill extends to ±1 to 4 feet. •The fill is underlain by fine-grained alluvium including stiff, low to medium plasticity silt and high plasticity clay to ±10 to 17.5 feet •The fine-grained alluvium is underlain by coarse-grained alluvium to ±25 to 30 feet consisting of predominantly dense to very dense silty sandy gravel. •Weathered siltstone extends below the coarse-grained alluvium to a depth of at least ±35.5 feet. •Groundwater was encountered at depths ranging from ±5 to 27.5 feet in March 1987.
42	1	Albany Police Station (FE, 1987)	6 TP	15	•Fill was encountered to ±1 to 2.5 feet consisting of low plasticity silt or clay mixed with gravel and organics. •The fill is underlain by fine-grained alluvium including medium stiff to stiff low plasticity silt or silty clay to ±2.5 to 6 feet, followed by stiff to very stiff high plasticity clay with variable amounts of sand and gravel to ±11 to 14 feet. •The clay is underlain by silty sand (coarse-grained alluvium) to at least ±15 feet. •Perched water was encountered at depths of ±3 to 3.5 feet. Rapid seepage associated with the static groundwater level was encountered at a depth of ±13.5 feet in April 1987.
43	1	ATI Cast Products Shot Blast Machine (FE, 2015)	1 BH	46.5	•Pavement and granular fill including dense crushed rock and loose to medium dense sand and silty sand extends to ±7 feet. •The fill is underlain by fine and coarse-grained alluvium including medium dense sand with some silt and dense to very dense sandy gravel to ±15.5 feet, very stiff silt from ±15.5 to 21 feet, dense sand and very dense sandy gravel from ±21 to 35 feet, stiff clayey silt from ±35 to 40 feet and very stiff silty clay from ±40 to 46.5 feet. •Groundwater was encountered at a depth of ±10 feet in June 2015.
44	1	Pacific Cast Technologies Furnace Bldg. 4 (FE, 2008)	2 BH	61.5	•Concrete and granular fill extends to ±2 to 2.5 feet. •The fill is underlain by fine and coarse-grained alluvium including alternating layers of medium stiff to very stiff silty clay and clayey silt and very dense sandy gravel. •Groundwater information was not available.
45	1	Albany Chipotle (FE, 2020)	3 BH	16.5	•Pavement sections extend to ±0.5 to 1.2 feet. •The pavement is underlain by fine-grained alluvium including medium stiff to stiff medium to high plasticity clayey silt to ±1.5 to 2 feet, and medium stiff to stiff low plasticity silt (Willamette Silt) to depths of ±12 to 13.5 feet. •Coarse-grained alluvium consisting of very dense silty sandy gravel extends below the Willamette Silt to ±16.5 feet. •A static groundwater depth of ±12 feet was encountered during drilling in one of the borings in December 2018.
46	1	1645 Geary Street (FE, 2010)	6 TP	9	•Topsoil extends to ±9 to 15 inches. •The topsoil is underlain by fine-grained alluvium including stiff to very stiff medium plasticity silty clay and high plasticity clay to ±9 feet. •Groundwater was not encountered to the limits of the exploration in September 2010.
47	1	Creekside Meadows (FE, 2022)	8 TP	8	•Topsoil extends to ±5 to 11 inches. •The topsoil is underlain by fine-grained alluvium including stiff to very stiff high plasticity clay and medium plasticity silty clay with variable sand and gravel content. •Groundwater was not encountered in the explorations. A review of local water well logs suggests static groundwater depths range from ±6 to 15 feet in the project vicinity.

Notes:

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2. See soil and rock key for definitions of soil and rock descriptions.

Table 1A. Summary of Available Subsurface Information (Cont.)

Project I.D.	Zone	Geotechnical Investigation	Explorations	Max Exploration Depth (feet)	General Subsurface Profile
48	1	Albany Police Station (FE, 2015)	1 BH, 8 TP	51.5	•Topsoil extends to ±12 inches. •The topsoil is underlain by fine-grained alluvium including stiff high plasticity clay to depths of ±1.7 to 2.9 feet, followed by very stiff low plasticity silt to ±9.5 feet. •Coarse-grained alluvium extends below the silt from ±9.5 to 29 feet consisting of medium dense grading to very dense gravel with variable silt, clay, and sand content. •The gravel is underlain by fine and coarse-grained alluvium including hard low to medium plasticity silt from ±29 to 45 feet, dense silty sand from ±45 to 50 feet, and very stiff high plasticity clay from ±50 to 51.5 feet. •Groundwater information was not available. A review of local water well logs suggests static groundwater depths range from ±9 to 20 feet in the project vicinity.
49	1	34th Avenue Tank Seismic Study (FE, 2005)	1 BH	51	•The site is underlain by fill to ±2.5 feet including a thin layer of crushed gravel over very loose sand with trace silt and gravel. •The fill is underlain by fine-grained alluvium including soft to medium stiff low to medium plasticity clayey silt (Willamette Silt) to ±16.5 feet and medium stiff medium to high plasticity silty clay from ±16.5 to 20.5 feet. •Coarse-grained alluvium follows including medium dense clayey gravel to ±24 feet and very dense sandy gravel from ±24 to 51 feet. •Groundwater information was not available. A review of local water well logs suggests static groundwater depths range from ±15 to 28 feet in the project vicinity.
50	1	Albany Transit Operations Facility (FE, 2022)	4 BH	21.5	•The site is underlain by fine-grained alluvium including medium stiff to stiff low plasticity silt and medium plasticity clayey silt (Willamette Silt) to depths of ±14 to 19 feet. •Medium stiff to stiff low to medium plasticity silty clay (fine-grained alluvium) extends below the Willamette Silt to depths of ±16.5 to 20 feet in two of the borings. •The fine-grained soil alluvium in each of the borings is underlain by coarse alluvium including medium dense clayey sand, very dense silty sand with some gravel, and dense to very dense silty sandy gravel. •Groundwater was encountered in the borings at depths of ±12.5 to 15.5 feet in August 2022.
51	1	Allvac Buildings (FE, 2006)	12 BH, 9 TP	51.5	•The site is underlain by fine-grained alluvium including medium stiff to stiff medium to high plasticity clayey silt and silty clay and stiff to very stiff low to medium plasticity clayey silt (Willamette Silt) to ±17.5 to 23.5 feet. •The fine-grained alluvium is underlain by coarse-grained alluvium including medium dense sand and medium dense to very dense clayey and sandy gravel to ±51.5 feet. •Groundwater was measured at a depth of ±4 feet in two of the borings in March 2007.
52	1	Oak Creek Lift Station (FE, 2013)	1 BH	56.5	•Fill extends to ±15 feet consisting of medium dense gravel with some clay and sand. •The fill is underlain by fine and coarse-grained alluvium including very stiff low to medium plasticity clayey silt to ±19 feet, very dense sandy gravel and gravelly sand from ±19 to 22.5 feet, very stiff medium plasticity silty clay from ±22.5 to 25 feet, and dense to very dense gravelly sand and sandy gravel from ±25 to 56.5 feet. •Groundwater information was not available.
53	1	125 41st Avenue SE (FE, 2022)	4 TP	5	•Topsoil consisting of soft to medium stiff silt with some organics extends to ±1.2 to 1.5 feet. •The topsoil is underlain by fine-grained alluvium consisting of medium stiff to stiff low to medium plasticity silty clay to ±5 feet. •Slow seepage was encountered in the test pits at depths ranging from ±1.9 to 2.9 feet in March 2023.
54	1	Orchard Townhomes (FE, 2021)	8 TP	8	•Topsoil consisting of medium stiff low plasticity silt with scattered organics extends to ±6 to 15 inches. •The topsoil is underlain by fine-grained alluvium comprised of stiff low to medium plasticity silt with some clay (Willamette Silt) to ±8 feet. •Slow seepage was encountered in most of the test pits at depths ranging from ±2.5 to 6 feet in February 2021. The observed seepage likely represents a perched water condition. A review of local water well logs suggests static groundwater depths range from ±15 to 25 feet in the project vicinity.
55	1	53rd Avenue Mixed-Use Residential Development (FE, 2023)	4 BH, 10 TP	21.5	•Fill extends to depths of up to ±6 feet. The fill is variable and includes soft silt and clay with variable amounts of sand, gravel, and organics. In some locations, the fill consists of medium dense silty gravel or crushed rock •The fill is underlain by fine-grained alluvium to ±14 to 19 feet consisting of medium stiff to stiff medium to high plasticity clay. •The fine-grained alluvium is underlain by coarse-grained alluvium including medium dense to dense silty sand and gravel to ±21.5 feet. •Groundwater was encountered in the borings at a depth of ±10 feet in January 2023.
56	1	TGC Structural Headquarters (FE, 2022)	5 TP	7.5	•Topsoil consisting of soft to medium stiff silt with some clay and organics extends to ±1 to 1.3 feet. •The topsoil is underlain by fine-grained alluvium consisting of medium stiff to stiff low plasticity silt with some clay and trace to some sand to ±7.5 feet. •Slow to moderate seepage was encountered in the test pits at a depth of ±2 feet in March 2022.
57	1	LBCC Willamette Hall and Industrial A Bldg. (FE, 2019)	2 BH	95.3	•Pavement sections extend to ±2.5 to 3 feet. •The pavement is underlain by fine-grained alluvium including stiff low plasticity silt with trace sand (Willamette Silt) to ±17 to 20 feet. •The fine-grained alluvium is underlain by predominantly coarse-grained alluvium consisting of dense to very dense sandy gravel with scattered thin lenses of dense sand and silty sand and medium stiff to stiff silt. •Groundwater information was not available.

Notes:

1. BH = boring, TP = test pit, and CH = core hole.
2. See soil and rock key for definitions of soil and rock descriptions.

Table 1A. Summary of Available Subsurface Information (Cont.)

Project I.D.	Zone	Geotechnical Investigation	Explorations	Max Exploration Depth (feet)	General Subsurface Profile
58	1	Mennonite Village Bldg. Addition (OGD Consulting, PC., 2016)	4 TP	10.5	•Topsoil consisting of soft to medium stiff silt with some sand and organics extends to ±0.8 to 1.2 feet. •The topsoil is underlain by fine-grained alluvium including medium stiff low to medium plasticity silt with some clay and trace sand extending to ±4.8 to 9.5 feet. The silt typically becomes sandier with depth. •At some locations, medium dense silty sand (coarse-grained alluvium) was encountered below the silt at depths of ±4.8 to 9.5 feet. The sand extends to a depth of ±10.5 feet. •Slow seepage was encountered at depths of ±8 to 9 feet in June 2016.
59	2	N Albany PS (GRI, 1998)	1 TP	7	•Soft dark brown (heavily rooted) silt extends to ±1.75 feet, followed by soft silt with some clay and clayey silt from ±1.75' to 3 feet, and medium stiff silt with some clay from ±3 to 7 feet. • Slight seepage encountered at a depth of ±3 feet in May 1998.
60	2	Gibson Hill Road: Scenic Drive N Albany Road (FE, 2013)	2 TH	3.5	•Dense crushed rock (fill) extends to ±11 to 12 inches. •The fill is underlain by fine-grained alluvium comprised of medium stiff low to medium plasticity clayey silt to ±3.5 feet. •Groundwater was not encountered to the limits of the exploration.
61	3	Pulver Lane Subdivision (FE, 2022)	1 BH	21.5	•Topsoil consisting of soft low plasticity silt with some organics extends to ±1.5 feet. •The topsoil is underlain by decomposed siltstone to ±21.5 feet with the consistency of medium stiff grading to very stiff, low plasticity clayey silt with trace sand. •Groundwater information was not available.
62	3	N Albany 1.15 MG Reservoir (GRI, 1998)	3 BH	40	•Stiff to hard, reddish-brown silt with trace to some clay (weathered siltstone) extends to depths of ±10 to 18 feet. •Soft to medium soft (RH-1 to RH-2), highly weathered siltstone follows to depths of ±30 to 40 feet. Notes on the logs indicate the weathering decreases with depth. •The siltstone becomes medium hard to hard (RH-2 to RH-3) and fresh to slightly weathered (RH-2 to RH-3) below depths of ±25 to 33 feet. •Groundwater was measured at a depth of ±12 feet in a standpipe piezometer installed in B-3 (recorded in July 1998). Report suggests water perches on the bedrock.
63	3	Maier Lane Subdivision Tuttle Lots (FE, 2007)	6 TP	13	•Topsoil consisting of soft clayey silt extends to depths of ±6 to 12 inches. •The topsoil is underlain by residual soil to depths of ±5 to 12 feet consisting of stiff to very stiff high plasticity clay, low to medium plasticity silt with some clay, and hard low plasticity sandy silt. •Extremely weak (R0) decomposed to moderately weathered sandstone was encountered below the residual soil in three of the test pits at depths of ±5 to 6 feet. •Slow to moderated seepage was encountered in several of the test pits at depths ranging from ±1 to 3 feet in February 2007.
64	3	Maier Lane Subdivision Fabian Estates (FE, 2007)	8 TP	8	•Topsoil consisting of soft to medium stiff clayey silt extends to ±6 to 12 inches. •The topsoil is underlain by residual soil to depths of ±2 to 8.5 feet including stiff to hard low to medium plasticity clayey silt and sandy silt with scattered rock fragments and medium stiff to stiff high plasticity clay. •Extremely weak to weak (R0 to R2) decomposed to moderately weathered sandstone was encountered below the residual soil in most of the test pits at depths of ±2 to 5 feet. •Slow seepage was encountered in some of the test pits at depths ranging from ±2 to 4 feet in February 2007.
65	3	North Albany Rock Slope (FE, 2008)	n/a	n/a	•Observed rock cut that extends ±500 feet along the east side of NW Albany Road, ±300 feet south of the intersection with NW Gibson Hill Road. •The rock cut is near-vertical and has a maximum height of ±14 feet. •Exposed bedrock consists of moderately weathered to decomposed sandstone. The rock is very close to close jointed and predominantly extremely weak (R0). •Very weak (R1) sandstone was also observed in some areas.
66	4	Valley View Reservoir Seismic Upgrade (FE, 2008)	1 BH	51.5	•Dense crushed rock (fill) extends to ±1 foot. •The fill is underlain by residual soil consisting of stiff medium plasticity silty clay to ±5 feet. •Sandstone decomposed to the consistency of medium dense silty sand follows from ±5 to 51.5 feet. •Groundwater information was not available. Local water well logs indicate static groundwater depths range from ±16 to 88 feet in the project vicinity.

Notes:

1. BH = boring, TP = test pit, and CH = core hole.
2. See soil and rock key for definitions of soil and rock descriptions.

Table 2A. Seismic Hazard Assessment Summary

Facility	Latitude Longitude	Mapped Seismic Hazards and Seismic Design Parameters	Conclusions and Recommended Seismic Design Parameters	ASCE 41-17 Table 17-3 Eval. (C, NC, N/A, U)		
				Liquefaction	Slope Failure	Surface Fault Rupture
Albany-Millersburg (AM) Raw Water Intake Structure & Pump Station	44.6881 -123.0099	•No liquefaction hazard •No lateral spread hazard •No landslide hazard •Site Class C •MCE: PGA_M-0.43, S_{MS}-0.93, S_{M1}-0.61 •CSZ: PGA_M-0.18, S_{MS}-0.37, S_{M1}-0.20 •PGV: 19 cm/sec	•Available as-built plans and photos taken during construction indicate the subsurface conditions include fine-grained alluvium (clay or silt) underlain by silty gravel followed by sandstone and siltstone. The base of the pump station lies ±38 to 58 feet below the finish grade and was constructed on bedrock. •As-built plans indicate the intake structure and associated raw water pipeline were also constructed on bedrock. •The sand removal addition located adjacent to the pump station is supported on H-piles driven through fill with the pile tips seated in bedrock. •Based on available information, we have concluded the mapped Site Class and seismic design parameters are appropriate and there are no liquefaction, lateral spread, or landslide hazards that would affect the facility.	C	C	C
Albany-Millersburg (AM) WTP & Reservoir	44.6850 -123.0347	•No liquefaction hazard •No lateral spread hazard •No landslide hazard •Site Class C •MCE: PGA_M-0.44, S_{MS}-0.95, S_{M1}-0.61 •CSZ: PGA_M-0.18, S_{MS}-0.37, S_{M1}-0.20 •PGV: 19 cm/sec	•Based on available information, we anticipate the facility is underlain by shallow bedrock. •We have concluded the mapped Site Class and seismic design parameters are appropriate and there are no liquefaction, lateral spread, or landslide hazards that would affect the structures.	C	C	C
Vine St WTP & Maple St Reservoir & Pump Station	44.6343 -123.1130	•High liquefaction hazard •High lateral spread hazard •Medium to high landslide hazard •Site Class D •MCE: PGA_M-0.47, S_{MS}-0.95, S_{M1}-0.80 •CSZ: PGA_M-0.21, S_{MS}-0.39, S_{M1}-0.28 •PGV: 27 cm/sec	•Available subsurface information in the vicinity suggests the area is typically underlain by alluvium including medium stiff to stiff sandy silt, or medium stiff to stiff sandy silt grading to medium dense silty sand to depths of ±10 to 12 feet. •The upper silty and sandy alluvium is typically underlain by dense to very dense sandy gravel (coarse-grained alluvium) followed by sandstone or siltstone at depths of ±18 to 21 feet. •Based on available information, we have concluded the mapped Site Class and seismic design parameters are appropriate and are likely conservative. •We anticipate the liquefaction and lateral spread hazards are low, but exploratory drilling on site and analysis would be needed to confirm. •The mapped landslide hazard corresponds to the ±45-foot-tall steep slope (slope ≥ 1.5H:1V) between the facility and the Calapooia River. Exploratory drilling and analysis is recommended to confirm the subsurface conditions and evaluate the seismic-induced landslide hazard. Therefore, the liquefaction and slope failure site hazards are currently considered unknown (U).	U	U	C
34th St Pump Station & Reservoir	44.6105 -123.1075	•High liquefaction hazard •High lateral spread hazard •No landslide hazard •Site Class D •MCE: PGA_M-0.46, S_{MS}-0.95, S_{M1}-0.79 •CSZ: PGA_M-0.21, S_{MS}-0.45, S_{M1}-0.28 •PGV: 27 cm/sec	•Available subsurface information indicates the site is underlain by medium stiff medium to high plasticity clayey silt and silty clay to ±20.5 feet followed by predominantly dense to very dense sandy gravel to a depth of at least ±51.5 feet. •The fine-grained alluvium is not susceptible to liquefaction due to its plasticity and stiffness. The underlying gravel is also not susceptible to liquefaction due to its density. •Based on available information, we have concluded the mapped Site Class and seismic design parameters are appropriate and there are no liquefaction, lateral spread, or landslide hazards affecting the structures.	C	C	C
Queen Avenue Pump Station & Reservoir	44.6248 -123.0909	•No liquefaction hazard •No lateral spread hazard •No landslide hazard •Site Class C •MCE: PGA_M-0.45, S_{MS}-0.96, S_{M1}-0.63 •CSZ: PGA_M-0.19, S_{MS}-0.39, S_{M1}-0.21 •PGV: 20 cm/sec	•Available subsurface information and the mapped geology indicates the area is typically underlain by alternating layers of fine-grained and coarse-grained alluvium which is typically medium stiff to stiff and medium dense to very dense. •We have concluded the risk of liquefaction is low and there are no lateral spread or landslide hazards at the site due to the flat terrain. •DOGAMI evaluated the site response using a Site Class C (very dense soil) profile. •Based on the available information, we concluded a Site Class D (stiff soil) profile is more appropriate. •Ground motion parameters for a Site Class D are provided below: •MCE: PGA_M-0.46, S_{MS}-0.94, S_{M1}-0.79 •CSZ: PGA_M-0.21, S_{MS}-0.45, S_{M1}-0.28 •PGV: 27 cm/sec	C	C	C

Notes:

1. The Mapped Seismic Hazards and Seismic Design Parameters (Column 3) are based on DOGAMI hazard maps corresponding to Open-File Report 0-13-06.
2. See Column 4 for Foundation Engineering's assessment of the subsurface conditions and seismic hazards and recommended revisions to the seismic design parameters (where appropriate).
3. Adjusted CSZ PGA, S_{MS}, and S_{M1} values for Site Classes C and D (Columns 3 and 4) were calculated using mapped ground motions parameters on rock (Site Class B) and site coefficient factors based on Site Class.
4. MCE ground motions for the selected Site Classes (Columns 3 and 4) were obtained using the Applied Technology Council (ATC) Hazards Tool at https://hazards.atcouncil.org, with ASCE 7-16 selected as "Reference Document".
5. Site Class is based on the definitions outlined in ASCE 7-16 Table 20.3 1, which is based on the 2015 NEHRP Recommended Seismic Provisions. The Site Class definitions are also referenced in ASCE 41-17.
6. Fault information is based on USGS Interactive Fault Map, Albany and Lewisburg Geologic Quads (Owl Creek and Corvallis faults).
7. Available subsurface information is summarized in Table 1A.
8. For ASCE 41-17 Table 17-3 evaluation, C = compliant, NC = non-compliant, N/A = not applicable, and U = unknown.

Table 2A. Seismic Hazard Assessment Summary (Cont.)

Facility	Latitude Longitude	Mapped Seismic Hazards and Seismic Design Parameters	Conclusions and Recommended Seismic Design Parameters	ASCE 41-17 Table 17-3 Eval. (C, NC, N/A, U)		
				Liquefaction	Slope Failure	Surface Fault Rupture
Gibson Hill Pump Station	44.6565 -123.1419	•No liquefaction hazard •No lateral spread hazard •No landslide hazard •Site Class C •MCE: PGA_M-0.47, S_{MS}-1.00, S_{M1}-0.65 •CSZ: PGA_M-0.19, S_{MS}-0.40, S_{M1}-0.21 •PGV: 20 cm/sec	•Subsurface information on site is limited to a shallow test pit. Based on that information and a review of local well logs, we anticipate the site is underlain by fine-grained alluvium and residual soil over sandstone. •We have concluded there are no liquefaction, lateral spread, or landslide hazards at the site. •DOGAMI evaluated the site response using a Site Class C (very dense soil) profile. •Based on the available information, we have concluded a Site Class D (stiff soil) is more appropriate. •Ground motion parameters for a Site Class D are provided below: •MCE: PGA_M-0.47, S_{MS}-0.97, S_{M1}-0.81 •CSZ: PGA_M-0.22, S_{MS}-0.47, S_{M1}-0.29 •PGV: 27 cm/sec	C	C	C
Broadway Reservoir	44.6551 -123.1212	•No liquefaction hazard •No lateral spread hazard •No landslide hazard •Site Class B •MCE: PGA_M-0.35, S_{MS}-0.74, S_{M1}-0.35 •CSZ: PGA_M-0.17, S_{MS}-0.37, S_{M1}-0.16 •PGV: 15 cm/sec	Based on available information, we anticipate the site is underlain by residual soil over shallow siltstone or sandstone. •We have concluded there are no liquefaction, lateral spread, or landslide hazards at the site. •DOGAMI evaluated the site response using a Site Class B (rock) profile. •Based on the available information, we concluded a Site Class C (soft rock) profile is more appropriate. •Ground motion parameters for a Site Class C are provided below: •MCE: PGA_M-0.47, S_{MS}-0.99, S_{M1}-0.65 •CSZ: PGA_M-0.19, S_{MS}-0.40, S_{M1}-0.21 •PGV: 20 cm/sec	C	C	C
North Albany Pump Station	44.6562 -123.1174	•No liquefaction hazard •No lateral spread hazard •No landslide hazard •Site Class B •MCE: PGA_M-0.35, S_{MS}-0.74, S_{M1}-0.34 •CSZ: PGA_M-0.17, S_{MS}-0.37, S_{M1}-0.16 •PGV: 15 cm/sec	•No subsurface information is available on site. However, based on the mapped geology and our observation of a nearby rock cut, we anticipate the pump station is underlain by bedrock or residual soil over shallow bedrock. •We have concluded there are no liquefaction, lateral spread, or landslide hazards at the site. •DOGAMI evaluated the site response using a Site Class B (rock) profile. •Based on the available information, we concluded a Site Class C (soft rock) profile is more appropriate. •Ground motion parameters for a Site Class C are provided below: •MCE: PGA_M-0.46, S_{MS}-0.98, S_{M1}-0.64 •CSZ: PGA_M-0.19, S_{MS}-0.40, S_{M1}-0.21 •PGV: 20 cm/sec	C	C	C
Wildwood Reservoir	44.6483 -123.1356	•No liquefaction hazard •No lateral spread hazard •No landslide hazard •Site Class B •MCE: PGA_M-0.35, S_{MS}-0.74, S_{M1}-0.35 •CSZ: PGA_M-0.17, S_{MS}-0.38, S_{M1}-0.16 •PGV: 15 cm/sec	•Based on available subsurface information, we anticipate the site is underlain by residual soil followed by shallow sandstone or siltstone. •We have concluded there are no liquefaction, lateral spread, or landslide hazards at the site. •DOGAMI evaluated the site response using a Site Class B (rock) profile. •Based on the available information, we concluded a Site Class C (soft rock) profile is more appropriate. •Ground motion parameters for a Site Class C are provided below: •MCE: PGA_M-0.47, S_{MS}-0.99, S_{M1}-0.65 •CSZ: PGA_M-0.19, S_{MS}-0.40, S_{M1}-0.21 •PGV: 20 cm/sec	C	C	C
Valley View Reservoirs	44.6717 -123.1390	•No liquefaction hazard •No lateral spread hazard •No landslide hazard •Site Class B •MCE: PGA_M-0.35, S_{MS}-0.75, S_{M1}-0.35 •CSZ: PGA_M-0.17, S_{MS}-0.38, S_{M1}-0.16 •PGV: 15 cm/sec	•An available boring indicates the site is underlain by residual soil (decomposed sandstone) to at least ±50 feet. •We have concluded there are no liquefaction, lateral spread, or landslide hazards that would affect the structures. •DOGAMI evaluated the site response using a Site Class B (rock) profile. •Based on the available information, we concluded a Site Class D (stiff soil) profile is more appropriate. •Ground motion parameters for a Site Class D are provided below: •MCE: PGA_M-0.47, S_{MS}-0.97, S_{M1}-0.81 •CSZ: PGA_M-0.22, S_{MS}-0.46, S_{M1}-0.29 •PGV: 27 cm/sec	C	C	C

Notes:

1. The Mapped Seismic Hazards and Seismic Design Parameters (Column 3) are based on DOGAMI hazard maps corresponding to Open-File Report 0-13-06.
2. See Column 4 for Foundation Engineering's assessment of the subsurface conditions and seismic hazards and recommended revisions to the seismic design parameters (where appropriate).
3. Adjusted CSZ PGA, S_{MS}, and S_{M1} values for Site Classes C and D (Columns 3 and 4) were calculated using mapped ground motions parameters on rock (Site Class B) and site coefficient factors based on Site Class.
4. MCE ground motions for the selected Site Classes (Columns 3 and 4) were obtained using the Applied Technology Council (ATC) Hazards Tool at https://hazards.atcouncil.org, with ASCE 7-16 selected as "Reference Document".
5. Site Class is based on the definitions outlined in ASCE 7-16 Table 20.3 1, which is based on the 2015 NEHRP Recommended Seismic Provisions. The Site Class definitions are also referenced in ASCE 41-17.
6. Fault information is based on USGS Interactive Fault Map, Albany and Lewisburg Geologic Quads (Owl Creek and Corvallis faults).
7. Available subsurface information is summarized in Table 1A.
8. For ASCE 41-17 Table 17-3 evaluation, C = compliant, NC = non-compliant, N/A = not applicable, and U = unknown.

Appendix L

Structural/Seismic Condition Assessment and ASCE/SEI 41-17 Evaluation TM

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TECHNICAL MEMORANDUM

APPENDIX B

DATE: **June 14, 2023**

TO: **West Yost**

ATTENTION: **Noelle Drath**

PROJECT: **2022-09, City of Albany, Oregon, Water Master Plan**

SUBJECT: **STRUCTURAL/SEISMIC CONDITION ASSESSMENT AND ASCE/SEI 41-17 EVALUATION**

1.0 Introduction

The City of Albany, Oregon (City) is currently conducting a Water Master Plan (WMP) for their water treatment and distribution system. The City has retained West Yost to perform the WMP. West Yost retained ACE Engineering LLC to perform a Tier 1 Seismic Evaluation in accordance with ASCE/SEI 41-17 to be included with the WMP.

The primary purpose of the Tier 1 Seismic Evaluation of the WMP is to broadly identify the potential seismic deficiencies of each significant structure in the water treatment and distribution system. This memorandum presents the results of the Tier 1 Seismic Evaluation. The following tasks were completed as the seismic scope of work:

1. Review existing documentation of each structure that was made available by the City.
2. Review Seismic Hazards Evaluation prepared by Foundation Engineering, May 3, 2023.
3. Site observation of each significant structure in the water treatment and distribution system on October 19 and 20 of 2022.
4. Abbreviated description of the structural system of each significant structure in the water treatment and distribution system.
5. Complete ASCE/SEI 41-17 Tier 1 Checklists, Quick Checks, and Evaluations.
6. Abbreviated summary of findings and identification of shortcomings of each significant structure in the water treatment and distribution system.

2.0 Documentation Review

The City provided original design drawings for the majority of the significant structures in the water treatment and distribution system. The City did not have original design drawings for some of the significant structures.

The significant structures that had drawings available include:

1. Albany-Millersburg Raw Water Intake & Pump Station (2004)
2. Albany-Millersburg Water Treatment Plant – Filter Building (2004)
3. Albany-Millersburg Water Treatment Plant – Settling Basin (2004)
4. Albany-Millersburg Water Treatment Plant – Neutralization Basin (2004)
5. Albany-Millersburg Water Treatment Plant – Reservoir (2004)
6. Vine Street Water Treatment Plant – Raw Water Pump Station (1948)
7. Vine Street Water Treatment Plant – Hydroelectric Building (1924)
8. Vine Street WTP – Control Building / Chemical Storage Building (1963)

9. Vine Street Water Treatment Plant – Accelator 1 (1948)
10. Vine Street Water Treatment Plant – Accelator 2 (1977)
11. Vine Street Water Treatment Plant – Soda Ash Building (1910)
12. Vine Street Water Treatment Plant – Filters 1-6 (1911)
13. Vine Street Water Treatment Plant – Filters 7-10 (1911)
14. Maple Street – Reservoir (1959)
15. Maple Street – High Service Pump Station (1960)
16. 34th Street Reservoir (1970)
17. Broadway Reservoir (1992)
18. Queen & Hill Reservoir (1955)
19. Wildwood Reservoir (1998)
20. 34th Street Pump Station (1970)
21. Gibson Hill Pump Station (1998)
22. North Albany Pump Station (1979)
23. Queen & Hill Pump Station (1955)

The significant structures that did not have original drawings are:

24. Valley View Reservoirs (pre-1983)
25. Valley View Pump Station (post-1983)

A review of the structural drawings and details that were provided by the City was performed. The Geotechnical engineers at Foundation Engineering provided their Technical Memorandum for Seismic Hazards Evaluation for each site occupied by the water distribution system. A review of the Seismic Hazards Evaluation was performed.

3.0 Site Observation

Each significant structure of the water treatment and distribution system was observed on October 19 & 20 of 2022. Staff from the City of Albany, West Yost and Brown/Caldwell were present during most of the site observations. The existing structures were observed for compliance with the original design drawings and details. Deviations from the original design documents were noted. Signs for structural deficiencies or distress were a primary focus and any signs were noted.

4.0 Structure Summaries

4.1 Albany-Millersburg Raw Water Intake & Pump Station (2004)

The A-M Raw Water Intake & Pump Station structure is located just downstream of the confluence of the North & South Santiam Rivers. The intake structure consists of below grade concrete drywell and 8” CMU block walls supporting a steel truss framed roof with metal roof decking. The structure was designed in 2004 and is in good condition. An addition for an additional sedimentation conveyor was added to the west wall of the building in 2018.

4.2 Albany-Millersburg Water Treatment Plant – Filter Building (2004)

The Filter Building at the A-M WTP consists of a slab on grade with 12” CMU block walls supporting a concrete slab second floor and a steel truss framed roof with metal roof decking. Above the electrical room on the second floor is a third level used as a mechanical attic that is framed with steel beams with concrete on metal decking. The grade along the north side of the structure is approximately 16 feet above the grade along the south side. The north side contains the main entrance with parking area. The south side opens to grade at the top of the Settling Basin.

4.3 Albany-Millersburg Water Treatment Plant – Settling Basin (2004)

The Settling Basin is just South of the Filter Building. The Settling Basin is a below grade, concrete structure that was designed in 2004 and is in good condition.

The Tank at the Water Treatment Plant is a welded steel tank on a concrete foundation on grade that was designed in 1998. The steel tank rests on the concrete foundation and is held in place by friction between the steel base and the concrete foundation. No anchor bolts are present. There are a few areas of moss growth on the roof & walls. There are a few minor paint chips, flakes or scratches on the roof & walls. The structure is in good condition.

4.4 Albany-Millersburg Water Treatment Plant – Neutralization Basin (2004)

The Neutralization Basin is just West of the Settling Basin. The Neutralization Basin is a below grade, concrete structure that was designed in 2004. Below the waterline and near the inlet opening a surprising amount of aggregate is exposed inside the basin. Coating the inside of the basin to prevent further deterioration of the concrete is recommended. Otherwise, the concrete is in fine condition and does not pose a structural risk at this time.

4.5 Albany-Millersburg Water Treatment Plant – Reservoir (2004)

The Reservoir at the A-M Water Treatment Plant is a prestressed concrete tank with a reinforced concrete roof supported by interior concrete columns and the perimeter walls. The columns are supported by reinforced concrete spread footings and the perimeter walls are supported by a continuous perimeter foundation on grade. Horizontal cracks were observed about half way up the wall on the SW quadrant of the tank. Water transmission has occurred through the cracks. Apparently, the tank has leaked since original construction and remedies have been applied multiple times. Otherwise, the structure is in good condition.

4.6 Vine Street Water Treatment Plant – Raw Water Pump Station (1948)

The Raw Water Pump Station at the Vine Street WTP is an unreinforced brick building with a wood framed second floor that has been partially removed and a wood frame, site built truss roof supported by the unreinforced brick walls. The north wall is shared with the Hydroelectric Building. The roofing material was repaired & brick was repointed in 2004. The structure is in good condition for the age.

4.7 Vine Street Water Treatment Plant – Hydroelectric Building (1924)

The Hydroelectric Building at the Vine Street WTP is an unreinforced brick building with a steel framed truss roof with wood purlins and straight sheathing supported by the unreinforced brick walls. There was a remodel adding interior CMU block partition walls with a wood framed ceiling. The roofing material was repaired & brick was repointed in 2004. The structure is in good condition for the age.

4.8 Vine Street Water Treatment Plant – Control Building / Chemical Storage Building (1963)

This Building at the Vine Street WTP serves as a Chemical Storage Building for the two story, south portion of the building and the Control Building for the one story, north portion. The Building is an reinforced concrete building with metal deck on open web steel joists framing the roof and concrete on metal deck supported by steel beams framing the second floor. The concrete slab on grade and conventional reinforced concrete footings make up the foundation. There was an addition of a wood framed restroom & storage room done in 2009. At the same time a seismic upgrade was performed in 2009. The structure is in good condition for the age.

4.9 Vine Street Water Treatment Plant – Accelator 1 (1948)

Accelator 1 at the Vine Street WTP is a 19' tall by 28' diameter reinforced concrete tank supported by a reinforced concrete foundation on grade. The mechanism and walkways were replaced in 2018. The structure is in good condition for the age.

4.10 Vine Street Water Treatment Plant – Accelator 2 (1977)

Accelator 2 at the Vine Street WTP is a welded steel tank on a concrete foundation on grade that was designed in 1998. The steel tank rests on the concrete foundation and is held in place by friction between the steel base and the concrete foundation. No anchor bolts are present. There are a few areas of moss growth on the roof & walls. There are a few minor paint chips, flakes or scratches on the roof & walls. The structure is in good condition.

4.11 Vine Street Water Treatment Plant – Soda Ash Building (1910)

The Soda Ash Building is one of the oldest buildings at the Vine Street WTP. It is an unreinforced brick building with concrete on steel beams framing the second floor and roof. A significant portion of the second floor has been removed in the southeast corner of the building and infilled with wood framing. A steel spiral stair provides access to the second floor which seems to be unused. The roofing material was repaired & brick was repointed in 2004. The structure is in poor condition.

4.12 Vine Street Water Treatment Plant – Filters 1-6 (1911)

Filters 1-6 at the Vine Street WTP are elevated concrete tanks over a concrete basement containing pipes, valves and other infrastructure. The elevated concrete tanks are surrounded with unreinforced brick walls and covered by a flexible steel truss and wood framed roof.

4.13 Vine Street Water Treatment Plant – Filters 7-10 (1911)

Filters 7-10 at the Vine Street WTP are concrete chambers below grade and concrete basins above grade with unreinforced brick walls and wood framed roof two stories above the surrounding grade.

4.14 Maple Street – Reservoir (1959)

The Maple Street Reservoir is a cylindrical welded steel structure adjacent to the Vine Street WTP.

4.15 Maple Street – High Service Pump Station (1960)

The Maple Street High Service Pump Station is a single story CMU block building on a concrete foundation adjacent to the Vine Street WTP.

4.16 34th Street Reservoir (1970)

The 34th Street Reservoir is a cylindrical welded steel structure bearing on a concrete slab on grade foundation.

4.17 Broadway Reservoir (1992)

The Broadway Reservoir is a cylindrical reinforced concrete structure. The reinforced concrete roof bears on tapered prestressed concrete walls. There are interior concrete columns bearing on spread footings that are cast into a concrete slab on grade at their base.

4.18 Queen & Hill Reservoir (1955)

The Reservoir at Queen & Hill is a cylindrical welded steel structure bearing on a concrete slab on grade foundation.

4.19 Wildwood Reservoir (1998)

The Wildwood Reservoir is a cylindrical reinforced concrete structure. The reinforced concrete roof bears on slender prestressed concrete walls. There are interior concrete columns bearing on spread footings that are cast into a concrete slab on grade at their base. There is a perimeter concrete parapet cast into the roof with overflow drains.

4.20 34th Street Pump Station (1970)

The Pump Station at 34th Street is a single story CMU block building on a concrete foundation. The roof is framed with wood decking supported by open web steel joists spanning between the CMU block walls. No seismic retrofit work has been performed on this building.

4.21 Gibson Hill Pump Station (1998)

The Gibson Hill Pump Station a single story wood framed building on a concrete slab on grade foundation. A unique curved crane beam is supported from the exterior walls.

4.22 North Albany Pump Station (1979)

The North Albany Pump Station at 34th Street is a single story brick building with wood framed roof. Despite the original drawings showing reinforcing bars cast into the walls, no evidence could be found during the site visit. Flat wood roof beams span between unreinforced brick walls that bear on a concrete slab on grade foundation. The northeast corner of the building has been damaged and repaired. The building appears to have some distress.

4.23 Queen & Hill Pump Station (1955)

The Pump Station at Queen & Hill is a single story CMU block building. The cast in place concrete roof is supported by steel I beams that span between the exterior reinforced CMU block walls. There is a small steel crane beam suspended from the steel roof beams.

4.24 Valley View Reservoir (~1983)

There are three cylindrical welded steel reservoirs at the 34th Street site. The three reservoirs are rest on concrete foundations. All three reservoirs are slender and have been outfitted with overflow and controls to limit the height of water contained in the reservoirs in an effort to mitigate overturning during a seismic event.

4.25 Valley View Pump Station (~1983)

The Pump Station at Valley View is a single story wood framed building on a slab on grade. There is a bladder tank inside the pump station that is not bolted down to the slab or braced to the walls.

5.0 ASCE/SEI 41-17 Tier 1 Checklists, Quick Checks, and Evaluations

The Tier 1 level of the American Society of Civil Engineer's "Seismic Evaluation of Existing Buildings – ASCE 41-17" guideline was used to evaluate each structure. The purpose of a Tier 1 evaluation is to provide "Quick Checks" to evaluate a structure and determine deficiencies related to the lateral resisting elements.

It is the intent of the evaluation to determine the structural deficiencies of each structure as compared to current prescribed loading and detailing requirements for lateral (wind/seismic) loading to a performance level of "Immediate Occupancy" per ASCE 41-17 section 2.3.1.1. The level of performance is defined per ASCE 41-17 as:

"Structural Performance Level S-1, Immediate Occupancy, is defined as the postearthquake damage state in which a structure remains safe to occupy and essentially retains its preearthquake strength and stiffness."

The commentary to ASCE 41-17 section 2.3.1.1 describes the level of performance as:

"Only very limited structural damage has occurred. The basic vertical- and lateral-force-resisting systems of the building retain almost all of the preearthquake strength and stiffness. The risk of life-threatening injury as a result of structural damage is very low, and although some minor structural repairs might be appropriate, these repairs would generally not be required before reoccupancy. Continued use of the building is not limited by its structural condition but might be limited by damage or disruption to nonstructural elements of the building, furnishings, or equipment and availability of external utility services."

ASCE 41-17 requires that a seismic hazard level is determined. In order to obtain a performance level of "Immediate Occupancy" the seismic hazard shall be BSE-1E as defined in section 2.4.1.4 and C2.4.1.4. The BSE-1E hazard level earthquake has a 20% chance of recurring every 50 years. This design level earthquake has a similar rate of occurrence and magnitude as the current state adopted building codes. A 25% reduction in force is recommended by the State of Oregon for seismic rehabilitation grants. The City of Portland City Code for the evaluation and rehabilitation of existing buildings contains similar recommendations. It is likely that this level of earthquake hazard provides an appropriate level of performance for these facilities.

Lateral force resisting systems work in conjunction with gravity framing systems. The existing gravity framing system was also observed for structural distress during the site observation.

ASCE 41-17 requires that non-structural items retain their position during earthquake shaking for structures in order to obtain a performance level of “Immediate Occupancy”. Non-structural items include utilities, fixtures, equipment, finishes and furnishings.

The ASCE 41-17 checklists immediately follow this document for reference.

6.0 Seismic Rehabilitation Recommendations

The following items summarize the findings and recommendations for structural improvements for each structure. The recommendations are required to resolve structural deficiencies and maintain the load bearing system of each structure. A complete load bearing system that is capable of resisting building code load combinations is important to the continuing performance of each structure.

6.1 Albany-Millersburg Raw Water Intake & Pump Station (2004)

The Raw Water Intake structure is considered a Reinforced Masonry Bearing Walls with Flexible Diaphragm (RM1) structure. No deficiencies were found in the checklists, document review and site observation for the structure.

6.2 Albany-Millersburg Water Treatment Plant – Filter Building (2004)

The Filter Building is considered a Reinforced Masonry Bearing Walls with Flexible Diaphragm (RM1) structure. The noncompliant items discovered in the site observation include:

- The roof gutters appear to leak or overflow. If left unmaintained the structure may be damaged and need to be repaired or replaced.
- Some rust and corrosion was observed on the galvanized platform. If left unmaintained the structure may be damaged. The rust should be removed, and properly coated to prevent further corrosion.

6.3 Albany-Millersburg Water Treatment Plant – Settling Basin (2004)

The Settling Basin is considered a Concrete Shear Wall (C2) structure. No deficiencies were found in the checklists, document review and site observation for the Settling Basin structure.

6.4 Albany-Millersburg Water Treatment Plant – Neutralization Basin (2004)

The Neutralization Basin is considered a Concrete Shear Wall (C2) structure. The noncompliant items discovered in the checklists, document review and site observation include:

- The surface of the concrete near the inlet pipe and below the waterline has worn away exposing aggregate. If left unmaintained the structure may be damaged and need to be repaired or replaced. An appropriate coating should be applied to protect the concrete.

6.5 Albany-Millersburg Water Treatment Plant – Reservoir (2004)

The Reservoir at the A-M Plant is considered a Concrete Shear Wall (C2) structure. The wall thickness of the structure was found to be deficient when going through the checklists, however the recent design & construction of the reservoir likely was approved by the engineer responsible for the design.

6.6 Vine Street Water Treatment Plant – Raw Water Pump Station (1948)

The Raw Water Intake structure is considered an Unreinforced Masonry Bearing Walls with Flexible Diaphragm (URM) structure.

- The Raw Water Pump Station Structure is noncompliant for nearly all of the items on the checklist. See Appendix B for the checklist.
- URM PARAPETS: There are several unreinforced parapets at the Vine Street WTP. The parapets should be removed or laterally braced for seismic & wind forces.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.

6.7 Vine Street Water Treatment Plant – Hydroelectric Building (1924)

The Hydroelectric Building is considered an Unreinforced Masonry Bearing Walls with Flexible Diaphragm (URM) structure.

- The Hydroelectric Building is noncompliant for nearly all of the items on the checklist. See Appendix B for the checklist.
- URM PARAPETS: There are several unreinforced parapets at the Vine Street WTP. The parapets should be removed or laterally braced for seismic & wind forces.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.

6.8 Vine Street Water Treatment Plant – Control Building / Chemical Storage Building (1963)

The Control Building / Chemical Storage Building is considered a Concrete Shear Wall (C2) structure.

- COUPLING BEAMS: The concrete lintel over the south door opening does not have adequate reinforcing bars to resist the loads that it may need to resist during a seismic event.
- CONFINEMENT REINFORCING: The existing reinforcing bars in the concrete walls from 1963 are not appropriately detailed at the narrow wall piers along the south wall.
- Chemical storage tanks should have clips bolted to the concrete slab to prevent lateral movement and overturning during a seismic event.

6.9 Vine Street Water Treatment Plant – Accelator 1 (1948)

Accelator 1 is considered a Concrete Shear Wall (C2) structure. The noncompliant items discovered in the checklists, document review and site observation include:

- WEAK STORY: The perimeter concrete walls of the structure are supported by a perimeter ring of concrete columns. The center of the accelator slopes to the center. It is recommended that concrete walls be infilled between the perimeter columns to provide a continuous load path for seismic forces.
- SOFT STORY: The perimeter concrete walls of the structure are supported by a perimeter ring of concrete columns. The center of the accelator slopes to the center. It is recommended that concrete walls be infilled between the perimeter columns to provide a continuous load path for seismic forces.
- VERTICAL IRREGULARITIES: The perimeter concrete walls of the structure are supported by a perimeter ring of concrete columns. The center of the accelator slopes to the center. It is recommended that concrete walls be infilled between the perimeter columns to provide a continuous load path for seismic forces.
- TIES BETWEEN FOUNDATION ELEMENTS: It is unclear if the foundations of the perimeter concrete columns are tied together and to the center of the accelator. It is recommended that concrete footings and walls be infilled between the perimeter columns and center foundation.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.

6.10 Vine Street Water Treatment Plant – Accelator 2 (1977)

Accelator 2 is considered a Steel Plate Shear Wall (S6) structure. No deficiencies were found in the checklists, document review. The only items observed during the site visit include:

- It is recommended that the steel tank be bolted to the concrete foundation to prevent sliding and overturning during a seismic event.
- Clean and remove any moss, mold, rust and corrosion. Then touch up paint any areas to prevent loss of steel thickness.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.

6.11 Vine Street Water Treatment Plant – Soda Ash Building (1910)

The Soda Ash Building is considered an Unreinforced Masonry Bearing Walls with Flexible Diaphragm (URM) structure.

- The building is noncompliant for nearly all of the items on the checklist. See Appendix B for the checklist.
- URM PARAPETS: There are several unreinforced parapets at the Vine Street WTP. The parapets should be removed or laterally braced for seismic & wind forces.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.
- Chemical storage tanks should have clips bolted to the concrete slab to prevent lateral movement and overturning during a seismic event.

6.12 Vine Street Water Treatment Plant – Filters 1-6 (1911)

The Filters 1-6 Building is considered an Unreinforced Masonry Bearing Walls with Flexible Diaphragm (URM) structure.

- The building is noncompliant for nearly all of the items on the checklist. See Appendix B for the checklist.
- URM PARAPETS: There are several unreinforced parapets at the Vine Street WTP. The parapets should be removed or laterally braced for seismic & wind forces.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.

6.13 Vine Street Water Treatment Plant – Filters 7-10 (1911)

The Filters 7-10 Building is considered is considered a Concrete Shear Wall (C2) structure.

- REINFORCING STEEL: The original documents for the Filters 7-10 building do not note or detail any steel reinforcing bars. The unknown condition is a concern for this structure to resist seismic forces.
- TRANSFER TO SHEAR WALLS: The lack of original details for this building cause concern for roof/floor to wall connections’ ability to transfer seismic forces.
- FOUNDATION DOWELS: The lack of original details make it difficult to determine if the walls have adequate reinforcing bars doweled into the foundation elements.
- COUPLING BEAMS: The concrete lintels over the lower levels likely do not have adequate reinforcing bars to resist the loads that it may need to resist during a seismic event.
- CONFINEMENT REINFORCING: It is likely that any existing reinforcing bars in the concrete walls are not appropriately detailed at the narrow wall piers.
- WALL REINFORCING AT OPENINGS: It is likely that any existing reinforcing bars in the concrete walls are not appropriately detailed at openings.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures.

6.14 Maple Street – Reservoir (1959)

The Reservoir at Maple Street is considered a Steel Plate Shear Wall (S6) structure. No deficiencies were found in the checklists, document review. The only items observed during the site visit include:

- It is recommended that the steel tank be bolted to the concrete foundation to prevent sliding and overturning during a seismic event.
- Clean and remove any moss, mold, rust and corrosion. Then touch up paint any areas to prevent loss of steel thickness.

6.15 Maple Street – High Service Pump Station (1960)

The Pump Station at Maple Street is considered a Reinforced Masonry Bearing Walls with Flexible Diaphragm (RM1) structure. A seismic retrofit has been completed for the roof to wall connections. The noncompliant items discovered in the site observation include:

- TRANSFER TO SHEAR WALLS: It is unknown if during the seismic retrofit if the roof diaphragm was properly connected to the perimeter walls to transfer in-plane seismic forces.

6.16 34th Street Reservoir (1970)

The Reservoir at 34th Street is considered a Steel Plate Shear Wall (S6) structure. No deficiencies were found in the checklists, document review. The only items observed during the site visit include:

- It is recommended that the steel tank be bolted to the concrete foundation to prevent sliding and overturning during a seismic event.
- Clean and remove any moss, mold, rust and corrosion. Then touch up paint any areas to prevent loss of steel thickness.

6.17 Broadway Reservoir (1992)

The Reservoir at Broadway is considered a Concrete Shear Wall (C2) structure. No deficiencies were found in the checklists, document review and site observation for the structure.

6.18 Queen & Hill Reservoir (1955)

The Reservoir at Queen & Hill is considered a Steel Plate Shear Wall (S6) structure. No deficiencies were found in the checklists, document review. The only items observed during the site visit include:

- It is recommended that the steel tank be bolted to the concrete foundation to prevent sliding and overturning during a seismic event.
- Clean and remove any moss, mold, rust and corrosion. Then touch up paint any areas to prevent loss of steel thickness.

6.19 Wildwood Reservoir (1998)

The Wildwood Reservoir is considered a Concrete Shear Wall (C2) structure. No deficiencies were found in the checklists, document review. The only items observed during the site visit include:

- Trees appear to plug the roof drains and may cause rainwater to pond on the roof. Ongoing maintenance is important to prevent overloading of the roof structure from ponding rainwater. Consider trimming trees back or enlarging roof drains to pass needles & leaves.

6.20 34th Street Pump Station (1970)

The Pump Station at 34th Street is considered a Reinforced Masonry Bearing Walls with Flexible Diaphragm (RM1) structure. The noncompliant items discovered in the checklists, document review and site observation include:

- WALL ANCHORAGE: The exterior masonry walls are not adequately connected to the roof diaphragm to transfer out-of-plane forces.
- WOOD LEDGERS: The connection between the walls and roof diaphragm puts the wood ledgers into cross-grain bending.
- TRANSFER TO SHEAR WALLS: The roof diaphragm needs to be properly connected to the perimeter walls to transfer in-plane seismic forces.
- CROSS TIES: Continuous cross ties between exterior walls or diaphragm chords are not present perpendicular to the roof joists.
- SPANS: The span of the wood decking roof diaphragm exceeds allowable limits.
- STIFFNESS OF WALL ANCHORS: The anchors connecting wood elements to the masonry walls are not stiff enough to remain within allowable limits.

6.21 Gibson Hill Pump Station (1998)

The Pump Station at Gibson Hill is considered a Wood Frame (W2) structure. The noncompliant items discovered in the checklists, document review and site observation include:

- HOLD DOWN ANCHORS: No documentation of the original design or construction has been provided. It is unknown if hold down anchors are installed without removal of finish material to verify.
- WOOD SILL BOLTS: No documentation of the original design or construction has been provided. It is unknown if sill bolts are installed without removal of finish material to verify.

6.22 North Albany Pump Station (1979)

The North Albany Pump Station is considered an Unreinforced Masonry Bearing Walls with Flexible Diaphragm (URM) structure.

- The building is noncompliant for nearly all of the items on the checklist. See Appendix B for the checklist.

6.23 Queen & Hill Pump Station (1955)

The Pump Station at Queen & Hill is considered a Reinforced Masonry Bearing Walls with Rigid Diaphragm (RM2) structure. The noncompliant items discovered in the checklists, document review and site observation include:

- WALL ANCHORAGE: It is unclear if the exterior masonry walls are adequately connected to the roof diaphragm to transfer out-of-plane forces.
- TRANSFER TO SHEAR WALLS: It is unclear if the roof diaphragm is properly connected to the perimeter walls to transfer in-plane seismic forces.

6.24 Valley View Reservoir (~1983)

The Reservoir at Valley View is considered a Steel Plate Shear Wall (S6) structure. No deficiencies were found in the checklists, document review. The only item to be addressed from the site observation is:

- It is recommended that the steel tank be bolted to the concrete foundation to prevent sliding and overturning during a seismic event.
- Clean and remove any moss, mold, rust and corrosion. Then touch up paint any areas to prevent loss of steel thickness.

6.25 Valley View Pump Station (~1983)

The Pump Station at Valley View is considered a Wood Frame (W2) structure. The noncompliant items discovered in the checklists, document review and site observation include:

- HOLD DOWN ANCHORS: No documentation of the original design or construction has been provided. It is unknown if hold down anchors are installed without removal of finish material to verify.
- WOOD SILL BOLTS: No documentation of the original design or construction has been provided. It is unknown if sill bolts are installed without removal of finish material to verify.

6.26 General nonstructural items.

It is recommended that City staff review the Nonstructural Checklist and consider the items at each facility for compliance with the best practices for storing items and equipment. Some conditions to consider include:

- EMERGENCY LIGHTING: Provide emergency and egress lighting. Anchor or brace emergency and egress lighting.
- HAZARDOUS MATERIAL STORAGE: Some chemicals used in the treatment process or used during regular cleaning and maintenance processes may be considered hazardous when spilled. Items storing these chemicals should be restrained to prevent displacement, tipping or falling.
- HAZARDOUS MATERIAL DISTRIBUTION: Piping containing hazardous materials, such as natural gas, should anchored or braced adequately to prevent damage that might allow the hazardous material to release.
- SHUTOFF VALVES: Piping containing hazardous material, including natural gas, should have shutoff valves or other devices to prevent spills or leaks.
- FLEXIBLE COUPLINGS: Hazardous material, ductwork and piping, including natural gas piping, should have flexible couplings.
- PIPING OR DUCTS CROSSING SEISMIC JOINTS: There are several elevated pipes and cable trays spanning between different structures. This primarily occurs at the Vine Street WTP.
- LIGHT FIXTURES LENS COVERS: Make sure lens covers on light fixtures are attached with safety devices and add safety devices if necessary.
- INDUSTRIAL STORAGE RACKS: Industrial storage racks or similar items that are more than 12 feet high should be anchored to the floor.
- TALL NARROW CABINETS: Cabinets, lockers, bookshelves, etc. more than 6 feet high and with height-to-depth ratios exceeding 3:1 should anchored to the floor or wall.
- FALL-PRONE CONTENTS: Equipment, stored items weighing more than 20 pounds and more than 4 feet above the floor should be braced or restrained.
- FALL-PRONE EQUIPMENT: Equipment weighing more than 20 pounds and more than 4 feet above the floor should be braced or restrained.
- IN-LINE EQUIPMENT: Equipment installed in line with a duct or piping system, with an operating weight more than 75 pounds should be laterally braced independent of the duct or piping system.
- TALL NARROW EQUIPMENT: Equipment, tanks, etc. more than 6 feet high and with height-to-depth ratios exceeding 3:1 should anchored to the floor or wall.
- SUSPENDED EQUIPMENT: Equipment suspended without lateral bracing should be free to swing or move with the structure without damaging itself or adjoining components.
- HEAVY EQUIPMENT: Floor supported or platform supported equipment weighing more than 400 pounds should be anchored to the structure.
- ELECTRICAL EQUIPMENT: Electrical equipment should be laterally braced to the structure.
- CONDUIT COUPLINGS: Conduit greater than 2.5 inches should have flexible couplings.
- FLEXIBLE COUPLINGS: Fluid and gas piping should have flexible couplings.
- FLUID AND GAS PIPING: Fluid and gas piping should be anchored and braced to the structure to limit spills or leaks.
- C-CLAMPS: Restrain one-sided C-clamps that support piping or similar items larger than 2.5 inches in diameter.

Based on previous experience and observations at site the buildings may contain some form of hazardous material. These materials will need to be dealt with on a case-by-case basis as they are encountered during the project.

7.0 Conclusions

The majority of the Albany water treatment and distribution system is in reasonable structural condition. Maintenance and structural upgrades should be part of the City's operating plan. Replacement of aging structures should also be included in the City's long-term plan regardless of physical condition.

9.0 Limitations

This Structural Technical Memorandum has been prepared for the City of Albany Water Master Plan. The conclusions and recommendations in this memorandum were derived from the professional review of documentation that was provided by the City of Albany, West Yost, published literature and limited site observations. ACE Engineering is not responsible for errors and omissions that might exist in documents and construction performed by others.

This report has been completed within the limitation of the West Yost approved scope of work. The services provided have been performed in a manner consistent with the level of competency presently maintained by other practicing professional engineers in the same type of work in the community of the project for the professional and technical soundness, accuracy, and adequacy of the work. ACE Engineering is not responsible for the use of this report for anything other than the Albany Water Master Plan.

ACE ENGINEERING LLC

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REGISTERED PROFESSIONAL ENGINEER
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ALLAN T GOFFE
EXPIRES 6/30/2025

Allan T Goffe, P.E., S.E.
Principle Engineer

Albany-Millersburg Raw Water Intake & Pump Station (2004)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than 0.6S_a.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Albany-Millersburg Water Treatment Plant (2004)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Albany-Millersburg Reservoir (2004)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Vine Street Water Treatment Plant (1910-2020)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
C [✓ NC] N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
C [✓ NC] N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
C [✓ NC] N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
C [✓ NC] N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
C [✓ NC] N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
C [✓ NC] N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
C [✓ NC] N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Maple Street Reservoir & Pump Station (1959-1960)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

34th Street Reservoir and Pump Station (1970)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ **C**] **NC N/A U**	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ **C**] **NC N/A U**	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ **C**] **NC N/A U**	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ **C**] **NC N/A U**	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ **C**] **NC N/A U**	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ **C**] **NC N/A U**	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Broadway Reservoir (1992)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Queen & Hill Reservoir and Pump Station (1955)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Wildwood Reservoir (1998)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Valley View Reservoir and Pump Station (1983)

Table 17-3. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Building System—General			
[✓ C] NC N/A U	LOAD PATH: The structure contains a complete, well-defined load path, including structural elements and connections, that serves to transfer the inertial forces associated with the mass of all elements of the building to the foundation.	5.4.1.1	A.2.1.1
[✓ C] NC N/A U	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building is greater than 0.5% of the height of the shorter building in low seismicity, 1.0% in moderate seismicity, and 3.0% in high seismicity.	5.4.1.2	A.2.1.2
[✓ C] NC N/A U	MEZZANINES: Interior mezzanine levels are braced independently from the main structure or are anchored to the seismic-force-resisting elements of the main structure.	5.4.1.3	A.2.1.3
Building System—Building Configuration			
[✓ C] NC N/A U	WEAK STORY: The sum of the shear strengths of the seismic-force-resisting system in any story in each direction is not less than 80% of the strength in the adjacent story above.	5.4.2.1	A.2.2.2
[✓ C] NC N/A U	SOFT STORY: The stiffness of the seismic-force-resisting system in any story is not less than 70% of the seismic-force-resisting system stiffness in an adjacent story above or less than 80% of the average seismic-force-resisting system stiffness of the three stories above.	5.4.2.2	A.2.2.3
[✓ C] NC N/A U	VERTICAL IRREGULARITIES: All vertical elements in the seismic-force-resisting system are continuous to the foundation.	5.4.2.3	A.2.2.4
[✓ C] NC N/A U	GEOMETRY: There are no changes in the net horizontal dimension of the seismic-force-resisting system of more than 30% in a story relative to adjacent stories, excluding one-story penthouses and mezzanines.	5.4.2.4	A.2.2.5
[✓ C] NC N/A U	MASS: There is no change in effective mass of more than 50% from one story to the next. Light roofs, penthouses, and mezzanines need not be considered.	5.4.2.5	A.2.2.6

continues

Table 17-3 *(Continued)*. Immediate Occupancy Basic Configuration Checklist

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	TORSION: The estimated distance between the story center of mass and the story center of rigidity is less than 20% of the building width in either plan dimension.	5.4.2.6	A.2.2.7
Low Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Geologic Site Hazards			
[✓ C] NC N/A U	LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance do not exist in the foundation soils at depths within 50 ft (15.2 m) under the building.	5.4.3.1	A.6.1.1
[✓ C] NC N/A U	SLOPE FAILURE: The building site is located away from potential earthquake-induced slope failures or rockfalls so that it is unaffected by such failures or is capable of accommodating any predicted movements without failure.	5.4.3.1	A.6.1.2
[✓ C] NC N/A U	SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site are not anticipated.	5.4.3.1	A.6.1.3
Moderate and High Seismicity (Complete the Following Items in Addition to the Items for Low Seismicity)			
Foundation Configuration			
[✓ C] NC N/A U	OVERTURNING: The ratio of the least horizontal dimension of the seismic-force-resisting system at the foundation level to the building height (base/height) is greater than $0.6S_a$.	5.4.3.3	A.6.2.1
[✓ C] NC N/A U	TIES BETWEEN FOUNDATION ELEMENTS: The foundation has ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Site Class A, B, or C.	5.4.3.4	A.6.2.2

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Albany-Millersburg Raw Water Intake & Pump Station (2004)

Table 17-35. Immediate Occupancy Structural Checklist for Building Types RM1 and RM2

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2.	5.5.1.1	A.3.2.1.1
[✓ C] NC N/A U	SHEAR STRESS CHECK: The shear stress in the reinforced masonry shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than 70 lb/in.^{2} (4.83 MPa).	5.5.3.1.1	A.3.2.4.1
[✓ C] NC N/A U	REINFORCING STEEL: The total vertical and horizontal reinforcing steel ratio in reinforced masonry walls is greater than 0.002 of the wall with the minimum of 0.0007 in either of the two directions; the spacing of reinforcing steel is less than 48 in., and all vertical bars extend to the top of the walls.	5.5.3.1.3	A.3.2.4.2
Connections			
[✓ C] NC N/A U	WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1
[✓ C] NC N/A U	WOOD LEDGERS: The connection between the wall panels and the diaphragm does not induce cross-grain bending or tension in the wood ledgers.	5.7.1.3	A.5.1.2
[✓ C] NC N/A U	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of seismic forces to the shear walls, and the connections are able to develop the lesser of the shear strength of the walls or diaphragms.	5.7.2	A.5.2.1

continues

Table 17-35 *(Continued)*. Immediate Occupancy Structural Checklist for Building Types RM1 and RM2

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation, and the dowels are able to develop the lesser of the strength of the walls or the uplift capacity of the foundation.	5.7.3.4	A.5.3.5
[✓ C] NC N/A U	GIRDER–COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support.	5.7.4.1	A.5.4.1
Stiff Diaphragms			
C NC [✓ N/A] U	TOPPING SLAB: Precast concrete diaphragm elements are interconnected by a continuous reinforced concrete topping slab.	5.6.4	A.4.5.1
C NC [✓ N/A] U	TOPPING SLAB TO WALLS OR FRAMES: Reinforced concrete topping slabs that interconnect the precast concrete diaphragm elements are doweled for transfer of forces into the shear wall or frame elements.	5.7.2	A.5.2.3
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil.		A.6.2.3
C [✓ NC] N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4
Low, Moderate, and High Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	REINFORCING AT WALL OPENINGS: All wall openings that interrupt rebar have trim reinforcing on all sides.	5.5.3.1.5	A.3.2.4.3
[✓ C] NC N/A U	PROPORTIONS: The height-to-thickness ratio of the shear walls at each story is less than 30.	5.5.3.1.2	A.3.2.4.4
Diaphragms (Stiff or Flexible)			
[✓ C] NC N/A U	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 15% of the wall length.	5.6.1.3	A.4.1.4
[✓ C] NC N/A U	OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls are not greater than 4 ft (1.2 m) long.	5.6.1.3	A.4.1.6
C [✓ NC] N/A U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
Flexible Diaphragms			
[✓ C] NC N/A U	CROSS TIES: There are continuous cross ties between diaphragm chords.	5.6.1.2	A.4.1.2
C NC [✓ N/A] U	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered.	5.6.2	A.4.2.1
[✓ C] NC N/A U	SPANS: All wood diaphragms with spans greater than 12 ft (3.6 m) consist of wood structural panels or diagonal sheathing.	5.6.2	A.4.2.2
[✓ C] NC N/A U	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft (9.2 m) and aspect ratios less than or equal to 3-to-1.	5.6.2	A.4.2.3
C NC [✓ N/A] U	NONCONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete consist of horizontal spans of less than 40 ft (12.2 m) and have aspect ratios less than 4-to-1.	5.6.3	A.4.3.1
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
[✓ C] NC N/A U	STIFFNESS OF WALL ANCHORS: Anchors of concrete or masonry walls to wood structural elements are installed taut and are stiff enough to limit the relative movement between the wall and the diaphragm to no greater than 1/8 in. before engagement of the anchors.	5.7.1.2	A.5.1.4

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Albany-Millersburg Water Treatment Plant (2004)

Table 17-35. Immediate Occupancy Structural Checklist for Building Types RM1 and RM2

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2.	5.5.1.1	A.3.2.1.1
[✓ C] NC N/A U	SHEAR STRESS CHECK: The shear stress in the reinforced masonry shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than 70 lb/in.^{2} (4.83 MPa).	5.5.3.1.1	A.3.2.4.1
[✓ C] NC N/A U	REINFORCING STEEL: The total vertical and horizontal reinforcing steel ratio in reinforced masonry walls is greater than 0.002 of the wall with the minimum of 0.0007 in either of the two directions; the spacing of reinforcing steel is less than 48 in., and all vertical bars extend to the top of the walls.	5.5.3.1.3	A.3.2.4.2
Connections			
[✓ C] NC N/A U	WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1
[✓ C] NC N/A U	WOOD LEDGERS: The connection between the wall panels and the diaphragm does not induce cross-grain bending or tension in the wood ledgers.	5.7.1.3	A.5.1.2
[✓ C] NC N/A U	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of seismic forces to the shear walls, and the connections are able to develop the lesser of the shear strength of the walls or diaphragms.	5.7.2	A.5.2.1

continues

Table 17-35 *(Continued)*. Immediate Occupancy Structural Checklist for Building Types RM1 and RM2

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation, and the dowels are able to develop the lesser of the strength of the walls or the uplift capacity of the foundation.	5.7.3.4	A.5.3.5
[✓ C] NC N/A U	GIRDER–COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support.	5.7.4.1	A.5.4.1
Stiff Diaphragms			
C NC [✓ N/A] U	TOPPING SLAB: Precast concrete diaphragm elements are interconnected by a continuous reinforced concrete topping slab.	5.6.4	A.4.5.1
C NC [✓ N/A] U	TOPPING SLAB TO WALLS OR FRAMES: Reinforced concrete topping slabs that interconnect the precast concrete diaphragm elements are doweled for transfer of forces into the shear wall or frame elements.	5.7.2	A.5.2.3
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil.		A.6.2.3
C [✓ NC] N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4
Low, Moderate, and High Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	REINFORCING AT WALL OPENINGS: All wall openings that interrupt rebar have trim reinforcing on all sides.	5.5.3.1.5	A.3.2.4.3
[✓ C] NC N/A U	PROPORTIONS: The height-to-thickness ratio of the shear walls at each story is less than 30.	5.5.3.1.2	A.3.2.4.4
Diaphragms (Stiff or Flexible)			
[✓ C] NC N/A U	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 15% of the wall length.	5.6.1.3	A.4.1.4
[✓ C] NC N/A U	OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls are not greater than 4 ft (1.2 m) long.	5.6.1.3	A.4.1.6
C NC [✓ N/A] U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
Flexible Diaphragms			
[✓ C] NC N/A U	CROSS TIES: There are continuous cross ties between diaphragm chords.	5.6.1.2	A.4.1.2
C NC [✓ N/A] U	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered.	5.6.2	A.4.2.1
[✓ C] NC N/A U	SPANS: All wood diaphragms with spans greater than 12 ft (3.6 m) consist of wood structural panels or diagonal sheathing.	5.6.2	A.4.2.2
[✓ C] NC N/A U	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft (9.2 m) and aspect ratios less than or equal to 3-to-1.	5.6.2	A.4.2.3
C NC [✓ N/A] U	NONCONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete consist of horizontal spans of less than 40 ft (12.2 m) and have aspect ratios less than 4-to-1.	5.6.3	A.4.3.1
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
[✓ C] NC N/A U	STIFFNESS OF WALL ANCHORS: Anchors of concrete or masonry walls to wood structural elements are installed taut and are stiff enough to limit the relative movement between the wall and the diaphragm to no greater than 1/8 in. before engagement of the anchors.	5.7.1.2	A.5.1.4

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Albany-Millersburg Reservoir (2004)

Table 17-25. Immediate Occupancy Structural Checklist for Building Types C2 and C2a

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	COMPLETE FRAMES: Steel or concrete frames classified as secondary components form a complete vertical-load-carrying system.	5.5.2.5.1	A.3.1.6.1
[✓ C] NC N/A U	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2.	5.5.1.1	A.3.2.1.1
[✓ C] NC N/A U	SHEAR STRESS CHECK: The shear stress in the concrete shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than the greater of 100 lb/in.^{2} (0.69 MPa) or $2\sqrt{f'_c}$.	5.5.3.1.1	A.3.2.2.1
[✓ C] NC N/A U	REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area is not less than 0.0012 in the vertical direction and 0.0020 in the horizontal direction. The spacing of reinforcing steel is equal to or less than 18 in. (457 mm).	5.5.3.1.3	A.3.2.2.2
Connections			
C NC [✓ N/A] U	WALL ANCHORAGE AT FLEXIBLE DIAPHRAGMS: Exterior concrete or masonry walls that are dependent on flexible diaphragms for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1
[✓ C] NC N/A U	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of loads to the shear walls, and the connections are able to develop the lesser of the shear strength of the walls or diaphragms.	5.7.2	A.5.2.1
[✓ C] NC N/A U	FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation, and the dowels are able to develop the lesser of the strength of the walls or the uplift capacity of the foundation.	5.7.3.4	A.5.3.5
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4
Low, Moderate, and High Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	DEFLECTION COMPATIBILITY: Secondary components have the shear capacity to develop the flexural strength of the components and are compliant with the following items in Table 17-23: COLUMN-BAR SPLICES, BEAM-BAR SPLICES, COLUMN-TIE SPACING, STIRRUP SPACING, and STIRRUP AND TIE HOOKS.	5.5.2.5.2	A.3.1.6.2
[✓ C] NC N/A U	FLAT SLABS: Flat slabs or plates not part of seismic-force-resisting system have continuous bottom steel through the column joints.	5.5.2.5.3	A.3.1.6.3
C NC [✓ N/A] U	COUPLING BEAMS: The ends of both walls to which the coupling beam is attached are supported at each end to resist vertical loads caused by overturning. Coupling beams have the capacity in shear to develop the uplift capacity of the adjacent wall.	5.5.3.2.1	A.3.2.2.3
[✓ C] NC N/A U	OVERTURNING: All shear walls have aspect ratios less than 4-to-1. Wall piers need not be considered.	5.5.3.1.4	A.3.2.2.4
C NC [✓ N/A] U	CONFINEMENT REINFORCING: For shear walls with aspect ratios greater than 2-to-1, the boundary elements are confined with spirals or ties with spacing less than $8d_b$.	5.5.3.2.2	A.3.2.2.5
[✓ C] NC N/A U	WALL REINFORCING AT OPENINGS: There is added trim reinforcement around all wall openings with a dimension greater than three times the thickness of the wall.	5.5.3.1.5	A.3.2.2.6
C [✓ NC] N/A U	WALL THICKNESS: Thicknesses of bearing walls are not less than 1/25 the unsupported height or length, whichever is shorter, nor less than 4 in. (101 mm).	5.5.3.1.2	A.3.2.2.7

continues

Table 17-25 *(Continued)*. Immediate Occupancy Structural Checklist for Building Types C2 and C2a

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Diaphragms (Stiff or Flexible)			
[✓ C] NC N/A U	DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints.	5.6.1.1	A.4.1.1
[✓ C] NC N/A U	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 15% of the wall length.	5.6.1.3	A.4.1.4
C NC [✓ N/A] U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
Flexible Diaphragms			
C NC [✓ N/A] U	CROSS TIES: There are continuous cross ties between diaphragm chords.	5.6.1.2	A.4.1.2
C NC [✓ N/A] U	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered.	5.6.2	A.4.2.1
C NC [✓ N/A] U	SPANS: All wood diaphragms with spans greater than 12 ft (3.6 m) consist of wood structural panels or diagonal sheathing.	5.6.2	A.4.2.2
C NC [✓ N/A] U	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft (9.2 m) and aspect ratios less than or equal to 3-to-1.	5.6.2	A.4.2.3
C NC [✓ N/A] U	NONCONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete consist of horizontal spans of less than 40 ft (12.2 m) and have aspect ratios less than 4-to-1.	5.6.3	A.4.3.1
C NC [✓ N/A] U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
C NC [✓ N/A] U	UPLIFT AT PILE CAPS: Pile caps have top reinforcement, and piles are anchored to the pile caps; the pile cap reinforcement and pile anchorage are able to develop the tensile capacity of the piles.	5.7.3.5	A.5.3.8

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Vine Street Water Treatment Plant (1910-2020)

Table 17-37. Immediate Occupancy Structural Checklist for Building Types URM and URMa

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2.	5.5.1.1	A.3.2.1.1
C [✓ NC] N/A U	SHEAR STRESS CHECK: The shear stress in the unreinforced masonry shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than 30 lb/in.^{2} (0.21 MPa) for clay units and 70 lb/in.^{2} (0.48 MPa) for concrete units.	5.5.3.1.1	A.3.2.5.1
Connections			
C [✓ NC] N/A U	WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1
C [✓ NC] N/A U	WOOD LEDGERS: The connection between the wall panels and the diaphragm does not induce cross-grain bending or tension in the wood ledgers.	5.7.1.3	A.5.1.2
C [✓ NC] N/A U	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of seismic forces to the shear walls, and the connections are able to develop the lesser of the shear strength of the walls or diaphragms.	5.7.2	A.5.2.1
C [✓ NC] N/A U	GIRDER–COLUMN CONNECTION: There is a positive connection using plates, connection hardware, or straps between the girder and the column support.	5.7.4.1	A.5.4.1
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil.		A.6.2.3
C [✓ NC] N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story high.		A.6.2.4

continues

Table 17-37 *(Continued)*. Immediate Occupancy Structural Checklist for Building Types URM and URMa

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Low, Moderate, and High Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Seismic-Force-Resisting System			
C [✓ NC] N/A U	PROPORTIONS: The height-to-thickness ratio of the shear walls at each story is less than the following: Top story of multi-story building 9 First story of multi-story building 15 All other conditions 13	5.5.3.1.2	A.3.2.5.2
C [✓ NC] N/A U	MASONRY LAYUP: Filled collar joints of multi-wythe masonry walls have negligible voids.	5.5.3.4.1	A.3.2.5.3
Diaphragms (Stiff or Flexible)			
[✓ C] NC N/A U	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 15% of the wall length.	5.6.1.3	A.4.1.4
[✓ C] NC N/A U	OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls are not greater than 4 ft (1.2 m) long.	5.6.1.3	A.4.1.6
C [✓ NC] N/A U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7
C [✓ NC] N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
Flexible Diaphragms			
C [✓ NC] N/A U	CROSS TIES: There are continuous cross ties between diaphragm chords.	5.6.1.2	A.4.1.2
C [✓ NC] N/A U	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered.	5.6.2	A.4.2.1
C [✓ NC] N/A U	SPANS: All wood diaphragms with spans greater than 12 ft (3.6 m) consist of wood structural panels or diagonal sheathing.	5.6.2	A.4.2.2
C [✓ NC] N/A U	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft (9.2 m) and aspect ratios less than or equal to 3-to-1.	5.6.2	A.4.2.3
C NC [✓ N/A] U	NONCONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete consist of horizontal spans of less than 40 ft (12.2 m) and have aspect ratios less than 4-to-1.	5.6.3	A.4.3.1
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
C [✓ NC] N/A U	STIFFNESS OF WALL ANCHORS: Anchors of concrete or masonry walls to wood structural elements are installed taut and are stiff enough to limit the relative movement between the wall and the diaphragm to no greater than 1/8 in. (3 mm) before engagement of the anchors.	5.7.1.2	A.5.1.4
C [✓ NC] N/A U	BEAM, GIRDER, AND TRUSS SUPPORTS: Beams, girders, and trusses supported by unreinforced masonry walls or pilasters have independent secondary columns for support of vertical loads.	5.7.4.4	A.5.4.5

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Maple Street Reservoir (1959)

Table 17-13. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low and Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	BRACE AXIAL STRESS CHECK: The axial stress in the diagonals, calculated using the Quick Check procedure of Section 4.4.3.4, is less than $0.50F_y$.	5.5.4.1	A.3.3.1.2
[✓ C] NC N/A U	FLEXURAL STRESS CHECK: The average flexural stress in the moment-frame columns and beams, calculated using the Quick Check procedure of Section 4.4.3.9, is less than F_y.	5.5.2.1.2	A.3.1.3.3
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames.	5.7.2	A.5.2.2
[✓ C] NC N/A U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation.	5.7.3.1	A.5.3.1
Moderate Seismicity (Complete the Following Items in Addition to the Items for Very Low and Low Seismicity)			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the elastic moment (F_yS) of the adjoining members.	5.5.2.2.1	A.3.1.3.4
Diaphragms			
[✓ C] NC N/A U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7

continues

Table 17-13 *(Continued)*. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
[✓ C] NC N/A U	ROOF PANELS: Where considered as diaphragm elements for lateral resistance, metal, plastic, or cementitious roof panels are positively attached to the roof framing to resist seismic forces.	5.7.5	A.5.5.1
[✓ C] NC N/A U	WALL PANELS: Where considered as shear elements for lateral resistance, metal, fiberglass, or cementitious wall panels are positively attached to the framing and foundation to resist seismic forces.	5.7.5	A.5.5.2
High Seismicity (Complete the Following Items in Addition to the Items for Low and Moderate Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the strength of the adjoining members or panel zones.	5.5.2.2.1	A.3.1.3.4
[✓ C] NC N/A U	COMPACT MEMBERS: All frame elements meet compact section requirements in accordance with AISC 360, Table B4.1.	5.5.2.2.4	A.3.1.3.8
[✓ C] NC N/A U	BEAM PENETRATIONS: All openings in frame-beam webs are less than one quarter of the beam depth and are located in the center half of the beams.	5.5.2.2.5	A.3.1.3.9
[✓ C] NC N/A U	OUT-OF-PLANE BRACING: Beam–column joints are braced out of plane.	5.5.2.2.7	A.3.1.3.11
C NC [✓ N/A] U	BOTTOM FLANGE BRACING: The bottom flanges of beams are braced out of plane.	5.5.2.2.8	A.3.1.3.12
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames, and the connections are able to develop the lesser of the strength of the frames or the diaphragms.	5.7.2	A.5.2.2
C NC [✓ N/A] U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation, and the anchorage is able to develop the least of the following: the tensile capacity of the column, the tensile capacity of the lowest level column splice (if any), or the uplift capacity of the foundation.	5.7.3.1	A.5.3.1
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the seismic forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

34th Street Reservoir (1970)

Table 17-13. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low and Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	BRACE AXIAL STRESS CHECK: The axial stress in the diagonals, calculated using the Quick Check procedure of Section 4.4.3.4, is less than $0.50F_y$.	5.5.4.1	A.3.3.1.2
[✓ C] NC N/A U	FLEXURAL STRESS CHECK: The average flexural stress in the moment-frame columns and beams, calculated using the Quick Check procedure of Section 4.4.3.9, is less than F_y.	5.5.2.1.2	A.3.1.3.3
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames.	5.7.2	A.5.2.2
[✓ C] NC N/A U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation.	5.7.3.1	A.5.3.1
Moderate Seismicity (Complete the Following Items in Addition to the Items for Very Low and Low Seismicity)			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the elastic moment (F_yS) of the adjoining members.	5.5.2.2.1	A.3.1.3.4
Diaphragms			
[✓ C] NC N/A U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7

continues

Table 17-13 *(Continued)*. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
[✓ C] NC N/A U	ROOF PANELS: Where considered as diaphragm elements for lateral resistance, metal, plastic, or cementitious roof panels are positively attached to the roof framing to resist seismic forces.	5.7.5	A.5.5.1
[✓ C] NC N/A U	WALL PANELS: Where considered as shear elements for lateral resistance, metal, fiberglass, or cementitious wall panels are positively attached to the framing and foundation to resist seismic forces.	5.7.5	A.5.5.2
High Seismicity (Complete the Following Items in Addition to the Items for Low and Moderate Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the strength of the adjoining members or panel zones.	5.5.2.2.1	A.3.1.3.4
[✓ C] NC N/A U	COMPACT MEMBERS: All frame elements meet compact section requirements in accordance with AISC 360, Table B4.1.	5.5.2.2.4	A.3.1.3.8
[✓ C] NC N/A U	BEAM PENETRATIONS: All openings in frame-beam webs are less than one quarter of the beam depth and are located in the center half of the beams.	5.5.2.2.5	A.3.1.3.9
[✓ C] NC N/A U	OUT-OF-PLANE BRACING: Beam–column joints are braced out of plane.	5.5.2.2.7	A.3.1.3.11
C NC [✓ N/A] U	BOTTOM FLANGE BRACING: The bottom flanges of beams are braced out of plane.	5.5.2.2.8	A.3.1.3.12
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames, and the connections are able to develop the lesser of the strength of the frames or the diaphragms.	5.7.2	A.5.2.2
C NC [✓ N/A] U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation, and the anchorage is able to develop the least of the following: the tensile capacity of the column, the tensile capacity of the lowest level column splice (if any), or the uplift capacity of the foundation.	5.7.3.1	A.5.3.1
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the seismic forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Broadway Reservoir (1992)

Table 17-25. Immediate Occupancy Structural Checklist for Building Types C2 and C2a

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	COMPLETE FRAMES: Steel or concrete frames classified as secondary components form a complete vertical-load-carrying system.	5.5.2.5.1	A.3.1.6.1
[✓ C] NC N/A U	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2.	5.5.1.1	A.3.2.1.1
[✓ C] NC N/A U	SHEAR STRESS CHECK: The shear stress in the concrete shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than the greater of 100 lb/in.^{2} (0.69 MPa) or $2\sqrt{f'_c}$.	5.5.3.1.1	A.3.2.2.1
[✓ C] NC N/A U	REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area is not less than 0.0012 in the vertical direction and 0.0020 in the horizontal direction. The spacing of reinforcing steel is equal to or less than 18 in. (457 mm).	5.5.3.1.3	A.3.2.2.2
Connections			
C NC [✓ N/A] U	WALL ANCHORAGE AT FLEXIBLE DIAPHRAGMS: Exterior concrete or masonry walls that are dependent on flexible diaphragms for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1
[✓ C] NC N/A U	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of loads to the shear walls, and the connections are able to develop the lesser of the shear strength of the walls or diaphragms.	5.7.2	A.5.2.1
[✓ C] NC N/A U	FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation, and the dowels are able to develop the lesser of the strength of the walls or the uplift capacity of the foundation.	5.7.3.4	A.5.3.5
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4
Low, Moderate, and High Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	DEFLECTION COMPATIBILITY: Secondary components have the shear capacity to develop the flexural strength of the components and are compliant with the following items in Table 17-23: COLUMN-BAR SPLICES, BEAM-BAR SPLICES, COLUMN-TIE SPACING, STIRRUP SPACING, and STIRRUP AND TIE HOOKS.	5.5.2.5.2	A.3.1.6.2
[✓ C] NC N/A U	FLAT SLABS: Flat slabs or plates not part of seismic-force-resisting system have continuous bottom steel through the column joints.	5.5.2.5.3	A.3.1.6.3
C NC [✓ N/A] U	COUPLING BEAMS: The ends of both walls to which the coupling beam is attached are supported at each end to resist vertical loads caused by overturning. Coupling beams have the capacity in shear to develop the uplift capacity of the adjacent wall.	5.5.3.2.1	A.3.2.2.3
[✓ C] NC N/A U	OVERTURNING: All shear walls have aspect ratios less than 4-to-1. Wall piers need not be considered.	5.5.3.1.4	A.3.2.2.4
C NC [✓ N/A] U	CONFINEMENT REINFORCING: For shear walls with aspect ratios greater than 2-to-1, the boundary elements are confined with spirals or ties with spacing less than $8d_b$.	5.5.3.2.2	A.3.2.2.5
[✓ C] NC N/A U	WALL REINFORCING AT OPENINGS: There is added trim reinforcement around all wall openings with a dimension greater than three times the thickness of the wall.	5.5.3.1.5	A.3.2.2.6
C [✓ NC] N/A U	WALL THICKNESS: Thicknesses of bearing walls are not less than 1/25 the unsupported height or length, whichever is shorter, nor less than 4 in. (101 mm).	5.5.3.1.2	A.3.2.2.7

continues

Table 17-25 *(Continued)*. Immediate Occupancy Structural Checklist for Building Types C2 and C2a

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Diaphragms (Stiff or Flexible)			
[✓ C] NC N/A U	DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints.	5.6.1.1	A.4.1.1
[✓ C] NC N/A U	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 15% of the wall length.	5.6.1.3	A.4.1.4
C NC [✓ N/A] U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
Flexible Diaphragms			
C NC [✓ N/A] U	CROSS TIES: There are continuous cross ties between diaphragm chords.	5.6.1.2	A.4.1.2
C NC [✓ N/A] U	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered.	5.6.2	A.4.2.1
C NC [✓ N/A] U	SPANS: All wood diaphragms with spans greater than 12 ft (3.6 m) consist of wood structural panels or diagonal sheathing.	5.6.2	A.4.2.2
C NC [✓ N/A] U	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft (9.2 m) and aspect ratios less than or equal to 3-to-1.	5.6.2	A.4.2.3
C NC [✓ N/A] U	NONCONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete consist of horizontal spans of less than 40 ft (12.2 m) and have aspect ratios less than 4-to-1.	5.6.3	A.4.3.1
C NC [✓ N/A] U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
C NC [✓ N/A] U	UPLIFT AT PILE CAPS: Pile caps have top reinforcement, and piles are anchored to the pile caps; the pile cap reinforcement and pile anchorage are able to develop the tensile capacity of the piles.	5.7.3.5	A.5.3.8

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Queen & Hill Reservoir (1955)

Table 17-13. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low and Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	BRACE AXIAL STRESS CHECK: The axial stress in the diagonals, calculated using the Quick Check procedure of Section 4.4.3.4, is less than $0.50F_y$.	5.5.4.1	A.3.3.1.2
[✓ C] NC N/A U	FLEXURAL STRESS CHECK: The average flexural stress in the moment-frame columns and beams, calculated using the Quick Check procedure of Section 4.4.3.9, is less than F_y.	5.5.2.1.2	A.3.1.3.3
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames.	5.7.2	A.5.2.2
[✓ C] NC N/A U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation.	5.7.3.1	A.5.3.1
Moderate Seismicity (Complete the Following Items in Addition to the Items for Very Low and Low Seismicity)			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the elastic moment (F_yS) of the adjoining members.	5.5.2.2.1	A.3.1.3.4
Diaphragms			
[✓ C] NC N/A U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7

continues

Table 17-13 *(Continued)*. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
[✓ C] NC N/A U	ROOF PANELS: Where considered as diaphragm elements for lateral resistance, metal, plastic, or cementitious roof panels are positively attached to the roof framing to resist seismic forces.	5.7.5	A.5.5.1
[✓ C] NC N/A U	WALL PANELS: Where considered as shear elements for lateral resistance, metal, fiberglass, or cementitious wall panels are positively attached to the framing and foundation to resist seismic forces.	5.7.5	A.5.5.2
High Seismicity (Complete the Following Items in Addition to the Items for Low and Moderate Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the strength of the adjoining members or panel zones.	5.5.2.2.1	A.3.1.3.4
[✓ C] NC N/A U	COMPACT MEMBERS: All frame elements meet compact section requirements in accordance with AISC 360, Table B4.1.	5.5.2.2.4	A.3.1.3.8
[✓ C] NC N/A U	BEAM PENETRATIONS: All openings in frame-beam webs are less than one quarter of the beam depth and are located in the center half of the beams.	5.5.2.2.5	A.3.1.3.9
[✓ C] NC N/A U	OUT-OF-PLANE BRACING: Beam–column joints are braced out of plane.	5.5.2.2.7	A.3.1.3.11
C NC [✓ N/A] U	BOTTOM FLANGE BRACING: The bottom flanges of beams are braced out of plane.	5.5.2.2.8	A.3.1.3.12
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames, and the connections are able to develop the lesser of the strength of the frames or the diaphragms.	5.7.2	A.5.2.2
C NC [✓ N/A] U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation, and the anchorage is able to develop the least of the following: the tensile capacity of the column, the tensile capacity of the lowest level column splice (if any), or the uplift capacity of the foundation.	5.7.3.1	A.5.3.1
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the seismic forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Wildwood Reservoir (1998)

Table 17-25. Immediate Occupancy Structural Checklist for Building Types C2 and C2a

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	COMPLETE FRAMES: Steel or concrete frames classified as secondary components form a complete vertical-load-carrying system.	5.5.2.5.1	A.3.1.6.1
[✓ C] NC N/A U	REDUNDANCY: The number of lines of shear walls in each principal direction is greater than or equal to 2.	5.5.1.1	A.3.2.1.1
[✓ C] NC N/A U	SHEAR STRESS CHECK: The shear stress in the concrete shear walls, calculated using the Quick Check procedure of Section 4.4.3.3, is less than the greater of 100 lb/in.^{2} (0.69 MPa) or $2\sqrt{f'_c}$.	5.5.3.1.1	A.3.2.2.1
[✓ C] NC N/A U	REINFORCING STEEL: The ratio of reinforcing steel area to gross concrete area is not less than 0.0012 in the vertical direction and 0.0020 in the horizontal direction. The spacing of reinforcing steel is equal to or less than 18 in. (457 mm).	5.5.3.1.3	A.3.2.2.2
Connections			
C NC [✓ N/A] U	WALL ANCHORAGE AT FLEXIBLE DIAPHRAGMS: Exterior concrete or masonry walls that are dependent on flexible diaphragms for lateral support are anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections have strength to resist the connection force calculated in the Quick Check procedure of Section 4.4.3.7.	5.7.1.1	A.5.1.1
[✓ C] NC N/A U	TRANSFER TO SHEAR WALLS: Diaphragms are connected for transfer of loads to the shear walls, and the connections are able to develop the lesser of the shear strength of the walls or diaphragms.	5.7.2	A.5.2.1
[✓ C] NC N/A U	FOUNDATION DOWELS: Wall reinforcement is doweled into the foundation, and the dowels are able to develop the lesser of the strength of the walls or the uplift capacity of the foundation.	5.7.3.4	A.5.3.5
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the lateral forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4
Low, Moderate, and High Seismicity (Complete the Following Items in Addition to the Items for Very Low Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	DEFLECTION COMPATIBILITY: Secondary components have the shear capacity to develop the flexural strength of the components and are compliant with the following items in Table 17-23: COLUMN-BAR SPLICES, BEAM-BAR SPLICES, COLUMN-TIE SPACING, STIRRUP SPACING, and STIRRUP AND TIE HOOKS.	5.5.2.5.2	A.3.1.6.2
[✓ C] NC N/A U	FLAT SLABS: Flat slabs or plates not part of seismic-force-resisting system have continuous bottom steel through the column joints.	5.5.2.5.3	A.3.1.6.3
C NC [✓ N/A] U	COUPLING BEAMS: The ends of both walls to which the coupling beam is attached are supported at each end to resist vertical loads caused by overturning. Coupling beams have the capacity in shear to develop the uplift capacity of the adjacent wall.	5.5.3.2.1	A.3.2.2.3
[✓ C] NC N/A U	OVERTURNING: All shear walls have aspect ratios less than 4-to-1. Wall piers need not be considered.	5.5.3.1.4	A.3.2.2.4
C NC [✓ N/A] U	CONFINEMENT REINFORCING: For shear walls with aspect ratios greater than 2-to-1, the boundary elements are confined with spirals or ties with spacing less than 8d_b.	5.5.3.2.2	A.3.2.2.5
[✓ C] NC N/A U	WALL REINFORCING AT OPENINGS: There is added trim reinforcement around all wall openings with a dimension greater than three times the thickness of the wall.	5.5.3.1.5	A.3.2.2.6
[✓ C] NC N/A U	WALL THICKNESS: Thicknesses of bearing walls are not less than 1/25 the unsupported height or length, whichever is shorter, nor less than 4 in. (101 mm).	5.5.3.1.2	A.3.2.2.7

continues

Table 17-25 *(Continued)*. Immediate Occupancy Structural Checklist for Building Types C2 and C2a

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Diaphragms (Stiff or Flexible)			
[✓ C] NC N/A U	DIAPHRAGM CONTINUITY: The diaphragms are not composed of split-level floors and do not have expansion joints.	5.6.1.1	A.4.1.1
[✓ C] NC N/A U	OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls are less than 15% of the wall length.	5.6.1.3	A.4.1.4
C NC [✓ N/A] U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
Flexible Diaphragms			
C NC [✓ N/A] U	CROSS TIES: There are continuous cross ties between diaphragm chords.	5.6.1.2	A.4.1.2
C NC [✓ N/A] U	STRAIGHT SHEATHING: All straight-sheathed diaphragms have aspect ratios less than 1-to-1 in the direction being considered.	5.6.2	A.4.2.1
C NC [✓ N/A] U	SPANS: All wood diaphragms with spans greater than 12 ft (3.6 m) consist of wood structural panels or diagonal sheathing.	5.6.2	A.4.2.2
C NC [✓ N/A] U	DIAGONALLY SHEATHED AND UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms have horizontal spans less than 30 ft (9.2 m) and aspect ratios less than or equal to 3-to-1.	5.6.2	A.4.2.3
C NC [✓ N/A] U	NONCONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete consist of horizontal spans of less than 40 ft (12.2 m) and have aspect ratios less than 4-to-1.	5.6.3	A.4.3.1
C NC [✓ N/A] U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
C NC [✓ N/A] U	UPLIFT AT PILE CAPS: Pile caps have top reinforcement, and piles are anchored to the pile caps; the pile cap reinforcement and pile anchorage are able to develop the tensile capacity of the piles.	5.7.3.5	A.5.3.8

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Valley View Reservoir (~1983)

Table 17-13. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
Very Low and Low Seismicity			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	BRACE AXIAL STRESS CHECK: The axial stress in the diagonals, calculated using the Quick Check procedure of Section 4.4.3.4, is less than $0.50F_y$.	5.5.4.1	A.3.3.1.2
[✓ C] NC N/A U	FLEXURAL STRESS CHECK: The average flexural stress in the moment-frame columns and beams, calculated using the Quick Check procedure of Section 4.4.3.9, is less than F_y.	5.5.2.1.2	A.3.1.3.3
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames.	5.7.2	A.5.2.2
[✓ C] NC N/A U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation.	5.7.3.1	A.5.3.1
Moderate Seismicity (Complete the Following Items in Addition to the Items for Very Low and Low Seismicity)			
Seismic-Force-Resisting System			
C NC [✓ N/A] U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the elastic moment (F_yS) of the adjoining members.	5.5.2.2.1	A.3.1.3.4
Diaphragms			
[✓ C] NC N/A U	PLAN IRREGULARITIES: There is tensile capacity to develop the strength of the diaphragm at reentrant corners or other locations of plan irregularities.	5.6.1.4	A.4.1.7

continues

Table 17-13 *(Continued)*. Immediate Occupancy Checklist for Building Type S3

Status	Evaluation Statement	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	DIAPHRAGM REINFORCEMENT AT OPENINGS: There is reinforcing around all diaphragm openings larger than 50% of the building width in either major plan dimension.	5.6.1.5	A.4.1.8
[✓ C] NC N/A U	OTHER DIAPHRAGMS: Diaphragms do not consist of a system other than wood, metal deck, concrete, or horizontal bracing.	5.6.5	A.4.7.1
Connections			
[✓ C] NC N/A U	ROOF PANELS: Where considered as diaphragm elements for lateral resistance, metal, plastic, or cementitious roof panels are positively attached to the roof framing to resist seismic forces.	5.7.5	A.5.5.1
[✓ C] NC N/A U	WALL PANELS: Where considered as shear elements for lateral resistance, metal, fiberglass, or cementitious wall panels are positively attached to the framing and foundation to resist seismic forces.	5.7.5	A.5.5.2
High Seismicity (Complete the Following Items in Addition to the Items for Low and Moderate Seismicity)			
Seismic-Force-Resisting System			
[✓ C] NC N/A U	MOMENT-RESISTING CONNECTIONS: All moment connections are able to develop the strength of the adjoining members or panel zones.	5.5.2.2.1	A.3.1.3.4
[✓ C] NC N/A U	COMPACT MEMBERS: All frame elements meet compact section requirements in accordance with AISC 360, Table B4.1.	5.5.2.2.4	A.3.1.3.8
[✓ C] NC N/A U	BEAM PENETRATIONS: All openings in frame-beam webs are less than one quarter of the beam depth and are located in the center half of the beams.	5.5.2.2.5	A.3.1.3.9
[✓ C] NC N/A U	OUT-OF-PLANE BRACING: Beam–column joints are braced out of plane.	5.5.2.2.7	A.3.1.3.11
C NC [✓ N/A] U	BOTTOM FLANGE BRACING: The bottom flanges of beams are braced out of plane.	5.5.2.2.8	A.3.1.3.12
Connections			
[✓ C] NC N/A U	TRANSFER TO STEEL FRAMES: Diaphragms are connected for transfer of seismic forces to the steel moment frames, and the connections are able to develop the lesser of the strength of the frames or the diaphragms.	5.7.2	A.5.2.2
C NC [✓ N/A] U	STEEL COLUMNS: The columns in seismic-force-resisting frames are anchored to the building foundation, and the anchorage is able to develop the least of the following: the tensile capacity of the column, the tensile capacity of the lowest level column splice (if any), or the uplift capacity of the foundation.	5.7.3.1	A.5.3.1
Foundation System			
C NC [✓ N/A] U	DEEP FOUNDATIONS: Piles and piers are capable of transferring the seismic forces between the structure and the soil.		A.6.2.3
[✓ C] NC N/A U	SLOPING SITES: The difference in foundation embedment depth from one side of the building to another does not exceed one story.		A.6.2.4

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

Table 17-38. Nonstructural Checklist

Status	Evaluation Statement^{a,b}	Tier 2 Reference	Commentary Reference
Life Safety Systems			
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. FIRE SUPPRESSION PIPING: Fire suppression piping is anchored and braced in accordance with NFPA-13.	13.7.4	A.7.13.1
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. FLEXIBLE COUPLINGS: Fire suppression piping has flexible couplings in accordance with NFPA-13.	13.7.4	A.7.13.2
[✓ C] NC N/A U	**HR—not required; LS—LMH; PR—LMH**. EMERGENCY POWER: Equipment used to power or control Life Safety systems is anchored or braced.	13.7.7	A.7.12.1
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. STAIR AND SMOKE DUCTS: Stair pressurization and smoke control ducts are braced and have flexible connections at seismic joints.	13.7.6	A.7.14.1
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—MH**. SPRINKLER CEILING CLEARANCE: Penetrations through panelized ceilings for fire suppression devices provide clearances in accordance with NFPA-13.	13.7.4	A.7.13.3
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—LMH**. EMERGENCY LIGHTING: Emergency and egress lighting equipment is anchored or braced.	13.7.9	A.7.3.1
Hazardous Materials			
C NC [✓ N/A] U	**HR—LMH; LS—LMH; PR—LMH**. HAZARDOUS MATERIAL EQUIPMENT: Equipment mounted on vibration isolators and containing hazardous material is equipped with restraints or snubbers.	13.7.1	A.7.12.2
C [✓ NC] N/A U	**HR—LMH; LS—LMH; PR—LMH**. HAZARDOUS MATERIAL STORAGE: Breakable containers that hold hazardous material, including gas cylinders, are restrained by latched doors, shelf lips, wires, or other methods.	13.8.3	A.7.15.1
C [✓ NC] N/A U	**HR—MH; LS—MH; PR—MH**. HAZARDOUS MATERIAL DISTRIBUTION: Piping or ductwork conveying hazardous materials is braced or otherwise protected from damage that would allow hazardous material release.	13.7.3 13.7.5	A.7.13.4
C [✓ NC] N/A U	**HR—MH; LS—MH; PR—MH**. SHUTOFF VALVES: Piping containing hazardous material, including natural gas, has shutoff valves or other devices to limit spills or leaks.	13.7.3 13.7.5	A.7.13.3
C [✓ NC] N/A U	**HR—LMH; LS—LMH; PR—LMH**. FLEXIBLE COUPLINGS: Hazardous material ductwork and piping, including natural gas piping, have flexible couplings.	13.7.3 13.7.5	A.7.15.4
C [✓ NC] N/A U	**HR—MH; LS—MH; PR—MH**. PIPING OR DUCTS CROSSING SEISMIC JOINTS: Piping or ductwork carrying hazardous material that either crosses seismic joints or isolation planes or is connected to independent structures has couplings or other details to accommodate the relative seismic displacements.	13.7.3 13.7.5 13.7.6	A.7.13.6
Partitions			
C [✓ NC] N/A U	**HR—LMH; LS—LMH; PR—LMH**. UNREINFORCED MASONRY: Unreinforced masonry or hollow-clay tile partitions are braced at a spacing of at most 10 ft (3.0 m) in Low or Moderate Seismicity, or at most 6 ft (1.8 m) in High Seismicity.	13.6.2	A.7.1.1
C [✓ NC] N/A U	**HR—LMH; LS—LMH; PR—LMH**. HEAVY PARTITIONS SUPPORTED BY CEILINGS: The tops of masonry or hollow-clay tile partitions are not laterally supported by an integrated ceiling system.	13.6.2	A.7.2.1
C [✓ NC] N/A U	**HR—not required; LS—MH; PR—MH**. DRIFT: Rigid cementitious partitions are detailed to accommodate the following drift ratios: in steel moment frame, concrete moment frame, and wood frame buildings, 0.02; in other buildings, 0.005.	13.6.2	A.7.1.2
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—MH**. LIGHT PARTITIONS SUPPORTED BY CEILINGS: The tops of gypsum board partitions are not laterally supported by an integrated ceiling system.	13.6.2	A.7.2.1
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. STRUCTURAL SEPARATIONS: Partitions that cross structural separations have seismic or control joints.	13.6.2	A.7.1.3

continues

Table 17-38 *(Continued)*. Nonstructural Checklist

Status	Evaluation Statement[a,b]	Tier 2 Reference	Commentary Reference
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—MH**. TOPS: The tops of ceiling-high framed or panelized partitions have lateral bracing to the structure at a spacing equal to or less than 6 ft (1.8 m).	13.6.2	A.7.1.4
Ceilings			
C NC [✓ N/A] U	**HR—H; LS—MH; PR—LMH**. SUSPENDED LATH AND PLASTER: Suspended lath and plaster ceilings have attachments that resist seismic forces for every 12 ft^2 (1.1 m^2) of area.	13.6.4	A.7.2.3
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—LMH**. SUSPENDED GYPSUM BOARD: Suspended gypsum board ceilings have attachments that resist seismic forces for every 12 ft^2 (1.1 m^2) of area.	13.6.4	A.7.2.3
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—MH**. INTEGRATED CEILINGS: Integrated suspended ceilings with continuous areas greater than 144 ft^2 (13.4 m^2) and ceilings of smaller areas that are not surrounded by restraining partitions are laterally restrained at a spacing no greater than 12 ft (3.6 m) with members attached to the structure above. Each restraint location has a minimum of four diagonal wires and compression struts, or diagonal members capable of resisting compression.	13.6.4	A.7.2.2
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—MH**. EDGE CLEARANCE: The free edges of integrated suspended ceilings with continuous areas greater than 144 ft^2 (13.4 m^2) have clearances from the enclosing wall or partition of at least the following: in Moderate Seismicity, 1/2 in. (13 mm); in High Seismicity, 3/4 in. (19 mm).	13.6.4	A.7.2.4
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. CONTINUITY ACROSS STRUCTURE JOINTS: The ceiling system does not cross any seismic joint and is not attached to multiple independent structures.	13.6.4	A.7.2.5
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—H**. EDGE SUPPORT: The free edges of integrated suspended ceilings with continuous areas greater than 144 ft^2 (13.4 m^2) are supported by closure angles or channels not less than 2 in. (51 mm) wide.	13.6.4	A.7.2.6
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. SEISMIC JOINTS: Acoustical tile or lay-in panel ceilings have seismic separation joints such that each continuous portion of the ceiling is no more than 2,500 ft^2 (232.3 m^2) and has a ratio of long-to-short dimension no more than 4-to-1.	13.6.4	A.7.2.7
Light Fixtures			
[✓ C] NC N/A U	**HR—not required; LS—MH; PR—MH**. INDEPENDENT SUPPORT: Light fixtures that weigh more per square foot than the ceiling they penetrate are supported independent of the grid ceiling suspension system by a minimum of two wires at diagonally opposite corners of each fixture.	13.6.4 13.7.9	A.7.3.2
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—H**. PENDANT SUPPORTS: Light fixtures on pendant supports are attached at a spacing equal to or less than 6 ft. Unbraced suspended fixtures are free to allow a 360-degree range of motion at an angle not less than 45 degrees from horizontal without contacting adjacent components. Alternatively, if rigidly supported and/or braced, they are free to move with the structure to which they are attached without damaging adjoining components. Additionally, the connection to the structure is capable of accommodating the movement without failure.	13.7.9	A.7.3.3
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. LENS COVERS: Lens covers on light fixtures are attached with safety devices.	13.7.9	A.7.3.4
Cladding and Glazing			
C NC [✓ N/A] U	**HR—MH; LS—MH; PR—MH**. CLADDING ANCHORS: Cladding components weighing more than 10 lb/ft^2 (0.48 kN/m^2) are mechanically anchored to the structure at a spacing equal to or less than the following: for Life Safety in Moderate Seismicity, 6 ft (1.8 m); for Life Safety in High Seismicity and for Position Retention in any seismicity, 4 ft (1.2 m)	13.6.1	A.7.4.1

continues

Table 17-38 *(Continued)*. Nonstructural Checklist

Status	Evaluation Statement[a,b]	Tier 2 Reference	Commentary Reference
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—MH**. CLADDING ISOLATION: For steel or concrete moment-frame buildings, panel connections are detailed to accommodate a story drift ratio by the use of rods attached to framing with oversize holes or slotted holes of at least the following: for Life Safety in Moderate Seismicity, 0.01; for Life Safety in High Seismicity and for Position Retention in any seismicity, 0.02, and the rods have a length-to-diameter ratio of 4.0 or less.	13.6.1	A.7.4.3
C NC [✓ N/A] U	**HR—MH; LS—MH; PR—MH**. MULTI-STORY PANELS: For multi-story panels attached at more than one floor level, panel connections are detailed to accommodate a story drift ratio by the use of rods attached to framing with oversize holes or slotted holes of at least the following: for Life Safety in Moderate Seismicity, 0.01; for Life Safety in High Seismicity and for Position Retention in any seismicity, 0.02, and the rods have a length-to-diameter ratio of 4.0 or less.	13.6.1	A.7.4.4
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—MH**. THREADED RODS: Threaded rods for panel connections detailed to accommodate drift by bending of the rod have a length-to-diameter ratio greater than 0.06 times the story height in inches for Life Safety in Moderate Seismicity and 0.12 times the story height in inches for Life Safety in High Seismicity and Position Retention in any seismicity.	13.6.1	A.7.4.9
C NC [✓ N/A] U	**HR—MH; LS—MH; PR—MH**. PANEL CONNECTIONS: Cladding panels are anchored out of plane with a minimum number of connections for each wall panel, as follows: for Life Safety in Moderate Seismicity, 2 connections; for Life Safety in High Seismicity and for Position Retention in any seismicity, 4 connections.	13.6.1.4	A.7.4.5
C NC [✓ N/A] U	**HR—MH; LS—MH; PR—MH**. BEARING CONNECTIONS: Where bearing connections are used, there is a minimum of two bearing connections for each cladding panel.	13.6.1.4	A.7.4.6
C NC [✓ N/A] U	**HR—MH; LS—MH; PR—MH**. INSERTS: Where concrete cladding components use inserts, the inserts have positive anchorage or are anchored to reinforcing steel.	13.6.1.4	A.7.4.7
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—MH**. OVERHEAD GLAZING: Glazing panes of any size in curtain walls and individual interior or exterior panes more than 16 ft^2 (1.5 m^2) in area are laminated annealed or laminated heat-strengthened glass and are detailed to remain in the frame when cracked.	13.6.1.5	A.7.4.8
Masonry Veneer			
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. TIES: Masonry veneer is connected to the backup with corrosion-resistant ties. There is a minimum of one tie for every 2-2/3 ft^2 (0.25 m^2), and the ties have spacing no greater than the following: for Life Safety in Low or Moderate Seismicity, 36 in. (914 mm); for Life Safety in High Seismicity and for Position Retention in any seismicity, 24 in. (610 mm).	13.6.1.2	A.7.5.1
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. SHELF ANGLES: Masonry veneer is supported by shelf angles or other elements at each floor above the ground floor.	13.6.1.2	A.7.5.2
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. WEAKENED PLANES: Masonry veneer is anchored to the backup adjacent to weakened planes, such as at the locations of flashing.	13.6.1.2	A.7.5.3
C NC [✓ N/A] U	**HR—LMH; LS—LMH; PR—LMH**. UNREINFORCED MASONRY BACKUP: There is no unreinforced masonry backup.	13.6.1.1 13.6.1.2	A.7.7.2
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—MH**. STUD TRACKS: For veneer with cold-formed steel stud backup, stud tracks are fastened to the structure at a spacing equal to or less than 24 in. (610 mm) on center.	13.6.1.1 13.6.1.2	A.7.6.1

continues

Table 17-38 *(Continued)*. Nonstructural Checklist

Status	Evaluation Statement^{a,b}	Tier 2 Reference	Commentary Reference
C NC [✓ N/A] U	**HR—not required; LS—MH; PR—MH**. ANCHORAGE: For veneer with concrete block or masonry backup, the backup is positively anchored to the structure at a horizontal spacing equal to or less than 4 ft along the floors and roof.	13.6.1.1 13.6.1.2	A.7.7.1
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. WEEP HOLES: In veneer anchored to stud walls, the veneer has functioning weep holes and base flashing.	13.6.1.2	A.7.5.6
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. OPENINGS: For veneer with cold-formed-steel stud backup, steel studs frame window and door openings.	13.6.1.1 13.6.1.2	A.7.6.2
Parapets, Cornices, Ornamentation, and Appendages			
C [✓ NC] N/A U	**HR—LMH; LS—LMH; PR—LMH**. URM PARAPETS OR CORNICES: Laterally unsupported unreinforced masonry parapets or cornices have height-to-thickness ratios no greater than the following: for Life Safety in Low or Moderate Seismicity, 2.5; for Life Safety in High Seismicity and for Position Retention in any seismicity, 1.5.	13.6.5	A.7.8.1
C NC [✓ N/A] U	**HR—not required; LS—LMH; PR—LMH**. CANOPIES: Canopies at building exits are anchored to the structure at a spacing no greater than the following: for Life Safety in Low or Moderate Seismicity, 10 ft (3.0 m); for Life Safety in High Seismicity and for Position Retention in any seismicity, 6 ft (1.8 m).	13.6.6	A.7.8.2
C NC [✓ N/A] U	**HR—H; LS—MH; PR—LMH**. CONCRETE PARAPETS: Concrete parapets with height-to-thickness ratios greater than 2.5 have vertical reinforcement.	13.6.5	A.7.8.3
C NC [✓ N/A] U	**HR—MH; LS—MH; PR—LMH**. APPENDAGES: Cornices, parapets, signs, and other ornamentation or appendages that extend above the highest point of anchorage to the structure or cantilever from components are reinforced and anchored to the structural system at a spacing equal to or less than 6 ft (1.8 m). This evaluation statement item does not apply to parapets or cornices covered by other evaluation statements.	13.6.6	A.7.8.4
Masonry Chimneys			
C NC [✓ N/A] U	**HR—LMH; LS—LMH; PR—LMH**. URM CHIMNEYS: Unreinforced masonry chimneys extend above the roof surface no more than the following: for Life Safety in Low or Moderate Seismicity, 3 times the least dimension of the chimney; for Life Safety in High Seismicity and for Position Retention in any seismicity, 2 times the least dimension of the chimney.	13.6.7	A.7.9.1
C NC [✓ N/A] U	**HR—LMH; LS—LMH; PR—LMH**. ANCHORAGE: Masonry chimneys are anchored at each floor level, at the topmost ceiling level, and at the roof.	13.6.7	A.7.9.2
Stairs			
C [✓ NC] N/A U	**HR—not required; LS—LMH; PR—LMH**. STAIR ENCLOSURES: Hollow-clay tile or unreinforced masonry walls around stair enclosures are restrained out of plane and have height-to-thickness ratios not greater than the following: for Life Safety in Low or Moderate Seismicity, 15-to-1; for Life Safety in High Seismicity and for Position Retention in any seismicity, 12-to-1.	13.6.2 13.6.8	A.7.10.1
[✓ C] NC N/A U	**HR—not required; LS—LMH; PR—LMH**. STAIR DETAILS: The connection between the stairs and the structure does not rely on post-installed anchors in concrete or masonry, and the stair details are capable of accommodating the drift calculated using the Quick Check procedure of Section 4.4.3.1 for moment-frame structures or 0.5 in. for all other structures without including any lateral stiffness contribution from the stairs.	13.6.8	A.7.10.2
Contents and Furnishings			
C [✓ NC] N/A U	**HR—LMH; LS—MH; PR—MH**. INDUSTRIAL STORAGE RACKS: Industrial storage racks or pallet racks more than 12 ft high meet the requirements of ANSI/RMI MH 16.1 as modified by ASCE 7, Chapter 15.	13.8.1	A.7.11.1

continues

Table 17-38 *(Continued)*. Nonstructural Checklist

Status	Evaluation Statement[a,b]	Tier 2 Reference	Commentary Reference
C [✓ NC] N/A U	**HR—not required; LS—H; PR—MH**. TALL NARROW CONTENTS: Contents more than 6 ft (1.8 m) high with a height-to-depth or height-to-width ratio greater than 3-to-1 are anchored to the structure or to each other.	13.8.2	A.7.11.2
C [✓ NC] N/A U	**HR—not required; LS—H; PR—H**. FALL-PRONE CONTENTS: Equipment, stored items, or other contents weighing more than 20 lb (9.1 kg) whose center of mass is more than 4 ft (1.2 m) above the adjacent floor level are braced or otherwise restrained.	13.8.2	A.7.11.3
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. ACCESS FLOORS: Access floors more than 9 in. (229 mm) high are braced.	13.6.10	A.7.11.4
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. EQUIPMENT ON ACCESS FLOORS: Equipment and other contents supported by access floor systems are anchored or braced to the structure independent of the access floor.	13.7.7 13.6.10	A.7.11.5
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. SUSPENDED CONTENTS: Items suspended without lateral bracing are free to swing from or move with the structure from which they are suspended without damaging themselves or adjoining components.	13.8.2	A.7.11.6
Mechanical and Electrical Equipment			
C [✓ NC] N/A U	**HR—not required; LS—H; PR—H**. FALL-PRONE EQUIPMENT: Equipment weighing more than 20 lb (9.1 kg) whose center of mass is more than 4 ft (1.2 m) above the adjacent floor level, and which is not in-line equipment, is braced.	13.7.1 13.7.7	A.7.12.4
C [✓ NC] N/A U	**HR—not required; LS—H; PR—H**. IN-LINE EQUIPMENT: Equipment installed in line with a duct or piping system, with an operating weight more than 75 lb (34.0 kg), is supported and laterally braced independent of the duct or piping system.	13.7.1	A.7.12.5
C [✓ NC] N/A U	**HR—not required; LS—H; PR—MH**. TALL NARROW EQUIPMENT: Equipment more than 6 ft (1.8 m) high with a height-to-depth or height-to-width ratio greater than 3-to-1 is anchored to the floor slab or adjacent structural walls.	13.7.1 13.7.7	A.7.12.6
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—MH**. MECHANICAL DOORS: Mechanically operated doors are detailed to operate at a story drift ratio of 0.01.	13.6.9	A.7.12.7
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. SUSPENDED EQUIPMENT: Equipment suspended without lateral bracing is free to swing from or move with the structure from which it is suspended without damaging itself or adjoining components.	13.7.1 13.7.7	A.7.12.8
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. VIBRATION ISOLATORS: Equipment mounted on vibration isolators is equipped with horizontal restraints or snubbers and with vertical restraints to resist overturning.	13.7.1	A.7.12.9
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. HEAVY EQUIPMENT: Floor-supported or platform-supported equipment weighing more than 400 lb (181.4 kg) is anchored to the structure.	13.7.1 13.7.7	A.7.12.10
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. ELECTRICAL EQUIPMENT: Electrical equipment is laterally braced to the structure.	13.7.7	A.7.12.11
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. CONDUIT COUPLINGS: Conduit greater than 2.5 in. (64 mm) trade size that is attached to panels, cabinets, or other equipment and is subject to relative seismic displacement has flexible couplings or connections.	13.7.8	A.7.12.12
Piping			
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. FLEXIBLE COUPLINGS: Fluid and gas piping has flexible couplings.	13.7.3 13.7.5	A.7.13.2

continues

Table 17-38 ***(Continued).*** **Nonstructural Checklist**

Status	**Evaluation Statement**[a,b]	**Tier 2 Reference**	**Commentary Reference**
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. FLUID AND GAS PIPING: Fluid and gas piping is anchored and braced to the structure to limit spills or leaks.	13.7.3 13.7.5	A.7.13.4
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. C-CLAMPS: One-sided C-clamps that support piping larger than 2.5 in. (64 mm) in diameter are restrained.	13.7.3 13.7.5	A.7.13.5
C [✓ NC] N/A U	**HR—not required; LS—not required; PR—H**. PIPING CROSSING SEISMIC JOINTS: Piping that crosses seismic joints or isolation planes or is connected to independent structures has couplings or other details to accommodate the relative seismic displacements.	13.7.3 13.7.5	A.7.13.6
Ducts			
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—H**. DUCT BRACING: Rectangular ductwork larger than 6 ft^2 (0.56 m^2) in cross-sectional area and round ducts larger than 28 in. (711 mm) in diameter are braced. The maximum spacing of transverse bracing does not exceed 30 ft (9.2 m). The maximum spacing of longitudinal bracing does not exceed 60 ft (18.3 m).	13.7.6	A.7.14.2
[✓ C] NC N/A U	**HR—not required; LS—not required; PR—H**. DUCT SUPPORT: Ducts are not supported by piping or electrical conduit.	13.7.6	A.7.14.3
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. DUCTS CROSSING SEISMIC JOINTS: Ducts that cross seismic joints or isolation planes or are connected to independent structures have couplings or other details to accommodate the relative seismic displacements.	13.7.6	A.7.14.4
Elevators			
C NC [✓ N/A] U	**HR—not required; LS—H; PR—H**. RETAINER GUARDS: Sheaves and drums have cable retainer guards.	13.7.11	A.7.16.1
C NC [✓ N/A] U	**HR—not required; LS—H; PR—H**. RETAINER PLATE: A retainer plate is present at the top and bottom of both car and counterweight.	13.7.11	A.7.16.2
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. ELEVATOR EQUIPMENT: Equipment, piping, and other components that are part of the elevator system are anchored.	13.7.11	A.7.16.3
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. SEISMIC SWITCH: Elevators capable of operating at speeds of 150 ft/min (0.30 m/min) or faster are equipped with seismic switches that meet the requirements of ASME A17.1 or have trigger levels set to 20% of the acceleration of gravity at the base of the structure and 50% of the acceleration of gravity in other locations.	13.7.11	A.7.16.4
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. SHAFT WALLS: Elevator shaft walls are anchored and reinforced to prevent toppling into the shaft during strong shaking.	13.7.11	A.7.16.5
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. COUNTERWEIGHT RAILS: All counterweight rails and divider beams are sized in accordance with ASME A17.1.	13.7.11	A.7.16.6
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. BRACKETS: The brackets that tie the car rails and the counterweight rail to the structure are sized in accordance with ASME A17.1.	13.7.11	A.7.16.7
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. SPREADER BRACKET: Spreader brackets are not used to resist seismic forces.	13.7.11	A.7.16.8
C NC [✓ N/A] U	**HR—not required; LS—not required; PR—H**. GO-SLOW ELEVATORS: The building has a go-slow elevator system.	13.7.11	A.7.16.9

Note: C = Compliant, NC = Noncompliant, N/A = Not Applicable, and U = Unknown.

[a] Performance Level: HR = Hazards Reduced, LS = Life Safety, and PR = Position Retention.

[b] Level of Seismicity: L = Low, M = Moderate, and H = High.

Appendix M

Pipeline Fragility Analysis

Water System Name: **City of Albany**
All Pipe Classes
Earthquake Magnitude and Probability: **M 9.0 - USGS - 12% in 50 Years - .0024**

Max PGV 27 cm/s From Geotechn Lines up well with OHELP info *Per the Geotechnical Seismic Hazard Evaluation Report, most of the pipelines fall into zone 1 which was given a PGV of 27 cm/s (page 13). To be conservitive this is what was used in calculations
Min PGV 20 cm/s From Geotechnical Seismic Hazard Evaluation Report
Average PGV (inches) 1.4 in/s

Summary of water main length by material type | Calculations for Leaks and Breaks for Ground Shaking

Material	Joint Type	Diameter	Length (feet)	Length (miles)	% of Total Length	K1	PGV (Inch/sec)	PGV RR - per 1000 ft.	RR (PGV) for System	Breaks - 20%	Leaks - 80%
Asbestos Cement, Low	Rubber Gasket	Small	368,926	69.9	22.63%	1	10.6	0.019877953	7.33	1.47	5.87
Asbestos Cement, Medium	Rubber Gasket	Small	7,080	1.3	0.43%	1	10.6	0.019877953	0.14	0.03	0.11
Asbestos Cement, None	Rubber Gasket	Small	49,777	9.4	3.05%	1	10.6	0.019877953	0.99	0.20	0.79
Asbestos Cement, Low	Rubber Gasket	Large	8,390	1.6	0.51%	1	10.6	0.019877953	0.17	0.03	0.13
Brass, Low	Rubber Gasket	Small	5	0.0	0.00%	0.5	10.6	0.009938976	0.00	0.00	0.00
Brass, None	Rubber Gasket	Small	5	0.0	0.00%	0.5	10.6	0.009938976	0.00	0.00	0.00
Cast Iron, Low	Rubber Gasket	Small	71,195	13.5	4.37%	0.8	10.6	0.015902362	1.13	0.23	0.91
Copper, low	Weilded	small	1,122	0.2	0.07%	0.5	10.6	0.009938976	0.01	0.00	0.01
Copper, med	Weilded	small	27	0.0	0.00%	0.5	10.6	0.009938976	0.00	0.00	0.00
Ductile Iron, Low	Rubber Gasket	Small	607,446	115.0	37.26%	0.5	10.6	0.009938976	6.04	1.21	4.83
Ductile Iron, Medium	Rubber Gasket	Small	10,047	1.9	0.62%	0.5	10.6	0.009938976	0.10	0.02	0.08
Ductile Iron, None	Rubber Gasket	Small	196,438	37.2	12.05%	0.5	10.6	0.009938976	1.95	0.39	1.56
Ductile Iron, Low	Rubber Gasket	Large	97,219	18.4	5.96%	0.5	10.6	0.009938976	0.97	0.19	0.77
Ductile Iron, Medium	Rubber Gasket	Large	2,228	0.4	0.14%	0.5	10.6	0.009938976	0.02	0.00	0.02
Ductile Iron, None	Rubber Gasket	Large	19,734	3.7	1.21%	0.5	10.6	0.009938976	0.20	0.04	0.16
GI, Low	Rubber Gasket	Small	5,967	1.1	0.37%	0.5	10.6	0.009938976	0.06	0.01	0.05
GI, None	Rubber Gasket	Small	5,032	1.0	0.31%	0.5	10.6	0.009938976	0.05	0.01	0.04
High Density Polyethylene, Low	Weilded	Small	13,141	2.5	0.81%	0.15	10.6	0.002981693	0.04	0.01	0.03
High Density Polyethylene, None	Weilded	Small	25,952	4.9	1.59%	0.15	10.6	0.002981693	0.08	0.02	0.06
High Density Polyethylene, Low	Weilded	Large	5,191	1.0	0.32%	0.15	10.6	0.002981693	0.02	0.00	0.01
High Density Polyethylene, Medum	Weilded	Large	6,690	1.3	0.41%	0.15	10.6	0.002981693	0.02	0.00	0.02
High Density Polyethylene, None	Weilded	Large	10,318	2.0	0.63%	0.15	10.6	0.002981693	0.03	0.01	0.02
Polyvinyl Chloride, Low	Rubber Gasket	Small	3,300	0.6	0.20%	0.5	10.6	0.009938976	0.03	0.01	0.03
Polyvinyl Chloride, Medium	Rubber Gasket	Small	2,279	0.4	0.14%	0.5	10.6	0.009938976	0.02	0.00	0.02
Polyvinyl Chloride, None	Rubber Gasket	Small	24,875	4.7	1.53%	0.5	10.6	0.009938976	0.25	0.05	0.20
Steel, Low	Weilded	Small	7,484	1.4	0.46%	0.6	10.6	0.011926772	0.09	0.02	0.07
Steel, Medium	Weilded	Small	104	0.0	0.01%	0.6	10.6	0.011926772	0.00	0.00	0.00
Steel, None	Weilded	Small	17,462	3.3	1.07%	0.6	10.6	0.011926772	0.21	0.04	0.17
Steel, Low	Weilded	Large	610	0.1	0.04%	0.15	10.6	0.002981693	0.00	0.00	0.00
Steel, Medium	Weilded	Large	884	0.2	0.05%	0.15	10.6	0.002981693	0.00	0.00	0.00
Unknown, Low	Rubber Gasket	Small	4,532	0.9	0.28%	1	10.6	0.019877953	0.09	0.02	0.07
Unknown, Medium	Rubber Gasket	Small	5	0.0	0.00%	1	10.6	0.019877953	0.00	0.00	0.00
Unknown, None	Rubber Gasket	Small	180	0.0	0.01%	1	10.6	0.019877953	0.00	0.00	0.00
Total			1,573,647	298.0	96.51%				20.04	4.01	16.03

Notes - Small Diameter Pipe = 2 through 16 inch. Large Pipe is greater than 16 inch
Assume all soil conditions for sake of ease and generalizations

PGD MAX 12 Highest per Geotechnical Seismic Ha *per the Geotechnical Seismic Hazard Evaluation Report - the PGD may be up to 12 in in area with a medium lateral spread. This was considered in the calculations below. (Page 17)
PGD for Zone 1 (most of the pipes) 1 * per Geotechnical Seismic Hazard Evaluation Report , Zone 1 PGD is less than 1 inch (page 17)
Probability of Levels of Liquefaction: *Using the maps within the Geotechnical Seismic Hazard Evaluation Report, we made the following assumptions for Prob of Liquifaction

Very Low	1%	0.866466
Low	5%	0.016628
Moderate	15%	0.116906
High	25%	

Summary of water main length by material type | Calculations for leaks and breaks for Permanent Ground Deformation and Liquefaction Potential

Material	Joint Type	Diameter	Length (feet)	Length (miles)	% of Total Length	K2	PGD (inches)	Prob of Very Low Liquifaction (per 1000 ft)	Prob of Low Liquifaction	Prob of Moderate Liquifaction	Prob of High Liquifaction	Pipeline % in Very Low Liquifaction	Pipeline % in Low Liquifaction	Pipeline % in Moderate Liquifaction	Pipeline % in High Liquifaction	RR Very Low	RR Low	RR Moderate	RR High	Repairs in Very Low	Repairs in Low	Repairs in Moderate	Repairs in High	RR (PGD) for System	Breaks - 80%	Leaks - 20%
Asbestos Cement, Low	Rubber Gasket	Small	425,783	80.6	26.11%	0.8	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.04	0.13	0.21	0.00	18.05	0.00	0.00	18.05	14.44	3.61
Asbestos Cement, Medium	Rubber Gasket	Small	7,080	1.3	0.43%	0.8	1.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.01	0.04	0.13	0.21	0.00	0.00	0.90	0.00	0.90	0.72	0.18
Asbestos Cement, None	Rubber Gasket	Small	49,777	9.4	3.05%	0.8	12.0	0.01	0.05	0.15	0.25	0%	0%	0%	0%	0.02	0.09	0.28	0.47	0.00	0.00	0.00	0.00	-	-	-
Asbestos Cement, Low	Rubber Gasket	Large	8,390	1.6	0.51%	0.8	12.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.02	0.09	0.28	0.47	0.00	0.79	0.00	0.00	0.79	0.63	0.16
Brass, Low	Rubber Gasket	Small	5	0.0	0.00%	0.15	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.00	0.01	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Brass, None	Rubber Gasket	Small	5	0.0	0.00%	0.15	1.0	0.01	0.05	0.15	0.25	0%	0%	0%	0%	0.00	0.01	0.02	0.04	0.00	0.00	0.00	0.00	-	-	-
Cast Iron, Low	Rubber Gasket	Small	71,195	13.5	4.37%	0.8	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.04	0.13	0.21	0.00	3.02	0.00	0.00	3.02	2.41	0.60
Copper, Low	Weilded	small	1,122	0.2	0.07%	0.15	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.00	0.01	0.02	0.04	0.00	0.01	0.00	0.00	0.01	0.01	0.00
Copper, Medium	Weilded	small	27	0.0	0.00%	0.15	12.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.00	0.02	0.05	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ductile Iron, Low	Rubber Gasket	Small	607,446	115.0	37.26%	0.5	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.03	0.08	0.13	0.00	16.10	0.00	0.00	16.10	12.88	3.22
Ductile Iron, Medium	Rubber Gasket	Small	10,047	1.9	0.62%	0.5	1.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.01	0.03	0.08	0.13	0.00	0.00	0.80	0.00	0.80	0.64	0.16
Ductile Iron, None	Rubber Gasket	Small	196,438	37.2	12.05%	0.5	1.0	0.01	0.05	0.15	0.25	0%	0%	0%	0%	0.01	0.03	0.08	0.13	0.00	0.00	0.00	0.00	-	-	-
Ductile Iron, Low	Rubber Gasket	Large	97,219	18.4	5.96%	0.5	12.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.06	0.18	0.29	0.00	5.69	0.00	0.00	5.69	4.55	1.14
Ductile Iron, Medium	Rubber Gasket	Large	2,228	0.4	0.14%	0.5	1.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.01	0.03	0.08	0.13	0.00	0.00	0.18	0.00	0.18	0.14	0.04
Ductile Iron, None	Rubber Gasket	Large	19,734	3.7	1.21%	0.5	1.0	0.01	0.05	0.15	0.25	0%	0%	0%	0%	0.01	0.03	0.08	0.13	0.00	0.00	0.00	0.00	-	-	-
GI, Low	Rubber Gasket	Small	5,967	1.1	0.37%	0.5	12.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.06	0.18	0.29	0.00	0.35	0.00	0.00	0.35	0.28	0.07
GI, None	Rubber Gasket	Small	5,032	1.0	0.31%	0.5	1.0	0.01	0.05	0.15	0.25	0%	0%	0%	0%	0.01	0.03	0.08	0.13	0.00	0.00	0.00	0.00	-	-	-
High Density Polyethylene, Low	Weilded	Small	13,141	2.5	0.81%	0.15	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.00	0.01	0.02	0.04	0.00	0.10	0.00	0.00	0.10	0.08	0.02
High Density Polyethylene, None	Weilded	Small	25,952	4.9	1.59%	0.15	1.0	0.01	0.05	0.15	0.25	0%	0%	0%	0%	0.00	0.01	0.02	0.04	0.00	0.00	0.00	0.00	-	-	-
High Density Polyethylene, Low	Weilded	Large	5,191	1.0	0.32%	0.15	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.00	0.01	0.02	0.04	0.00	0.04	0.00	0.00	0.04	0.03	0.01
High Density Polyethylene, Medum	Weilded	Large	6,690	1.3	0.41%	0.15	1.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.00	0.01	0.02	0.04	0.00	0.00	0.16	0.00	0.16	0.13	0.03
High Density Polyethylene, None	Weilded	Large	10,318	2.0	0.63%	0.15	1.0	0.01	0.05	0.15	0.25	0%	0%	0%	0%	0.00	0.01	0.02	0.04	0.00	0.00	0.00	0.00	-	-	-
Polyvinyl Chloride, Low	Rubber Gasket	Small	3,300	0.6	0.20%	0.8	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.04	0.13	0.21	0.00	0.14	0.00	0.00	0.14	0.11	0.03
Polyvinyl Chloride, Medium	Rubber Gasket	Small	2,279	0.4	0.14%	0.8	1.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.01	0.04	0.13	0.21	0.00	0.00	0.29	0.00	0.29	0.23	0.06
Polyvinyl Chloride, None	Rubber Gasket	Small	24,875	4.7	1.53%	0.8	1.0	0.01	0.05	0.15	0.25	0%	0%	0%	0%	0.01	0.04	0.13	0.21	0.00	0.00	0.00	0.00	-	-	-
Steel, Low	Weilded	Small	7,484	1.4	0.46%	0.6	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.03	0.10	0.16	0.00	0.24	0.00	0.00	0.24	0.19	0.05
Steel, Medium	Weilded	Small	104	0.0	0.01%	0.6	12.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.01	0.07	0.21	0.35	0.00	0.00	0.02	0.00	0.02	0.02	0.00
Steel, None	Weilded	Small	17,462	3.3	1.07%	0.6	1.0	0.01	0.05	0.15	0.25	0%	0%	0%	0%	0.01	0.03	0.10	0.16	0.00	0.00	0.00	0.00	-	-	-
Steel, Low	Weilded	Large	610	0.1	0.04%	0.15	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.00	0.01	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Steel, Medium	Weilded	Large	884	0.2	0.05%	0.15	1.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.00	0.01	0.02	0.04	0.00	0.00	0.02	0.00	0.02	0.02	0.00
Unknown, Low	Rubber Gasket	Small	4,532	0.9	0.28%	1	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.05	0.16	0.27	0.00	0.24	0.00	0.00	0.24	0.19	0.05
Unknown, Medium	Rubber Gasket	Small	5	0.0	0.00%	1	12.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.02	0.12	0.35	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unknown, None	Rubber Gasket	Small	180	0.0	0.01%	1	1.0	0.01	0.05	0.15	0.25	0%	0%	0%	0%	0.01	0.05	0.16	0.27	0.00	0.00	0.00	0.00	-	-	-
Total			1,630,503	308.8	100.00%																			47.15	37.72	9.43

Summary of Total Leaks and Breaks

				Breaks	Leaks	Total
Ground Shaking				4.0	16.0	20.0
Ground Deformation and Liquification				38	9	47
TOTAL (Mains)				**42**	**25**	**67**
TOTAL (Services)				**83**	**51**	**134**
					% of total services	0.1%

Water System Name: **City of Albany**
Pipe Class III & IV
Earthquake Magnitude and Probability: **M 9.0 - USGS - 12% in 50 Years - .0024**

Max PGV 27 cm/s From Geotechni Lines up well with OHELP info *Per the Geotechnical Seismic Hazard Evaluation Report, most of the pipelines fall into zone 1 which was given a PGV of 27 cm/s (page 13). To be conservitive this is what was used in calculation
Min PGV 20 cm/s From Geotechnical Seismic Hazard Evaluation Report
Average PGV (inches) 1.4 in/s

Summary of water main length by material type | Calculations for Leaks and Breaks for Ground Shaking

Material	Joint Type	Diameter	Length (feet)	Length (miles)	% of Total Length	K1	PGV (Inch/sec)	PGV RR - per 1000 ft.	RR (PGV) for System	Breaks - 20%	Leaks - 80%
Asbestos Cement, IV, Low	Rubber Gasket	Small	32,072	6.1	14.27%	1	10.6	0.019877953	0.64	0.13	0.51
Asbestos Cement, III, Low	Rubber Gasket	Small	18,178	3.4	8.09%	1	10.6	0.019877953	0.36	0.07	0.29
Asbestos Cement, IV, medium	Rubber Gasket	Small	2,817	0.5	1.25%	1	10.6	0.019877953	0.06	0.01	0.04
Asbestos Cement, III, Medium	Rubber Gasket	Small	2,470	0.5	1.10%	1	10.6	0.019877953	0.05	0.01	0.04
Asbestos Cement, IV, Low	Rubber Gasket	Large	7,298	1.4	3.25%	1	10.6	0.019877953	0.15	0.03	0.12
Cast Iron, III, Low	Rubber Gasket	Small	554	0.1	0.25%	0.8	10.6	0.015902362	0.01	0.00	0.01
Cast Iron, IV, Low	Rubber Gasket	Small	317	0.1	0.14%	0.8	10.6	0.015902362	0.01	0.00	0.00
Ductile Iron, III, Low	Rubber Gasket	Small	25,110	4.8	11.17%	0.5	10.6	0.009938976	0.25	0.05	0.20
Ductile Iron, III, Medium	Rubber Gasket	Small	297	0.1	0.13%	0.5	10.6	0.009938976	0.00	0.00	0.00
Ductile Iron, III, None	Rubber Gasket	Small	1,525	0.3	0.68%	0.5	10.6	0.009938976	0.02	0.00	0.01
Ductile Iron, III, Low	Rubber Gasket	Large	1,853	0.4	0.82%	0.5	10.6	0.009938976	0.02	0.00	0.01
Ductile Iron, IV, Low	Rubber Gasket	Large	67,155	12.7	29.87%	0.5	10.6	0.009938976	0.67	0.13	0.53
Ductile Iron, IV, Medium	Rubber Gasket	Large	2,104	0.4	0.94%	0.5	10.6	0.009938976	0.02	0.00	0.02
Ductile Iron, IV, None	Rubber Gasket	Large	17,687	3.3	7.87%	0.5	10.6	0.009938976	0.18	0.04	0.14
Ductile Iron, IV, Low	Rubber Gasket	Small	15,214	2.9	6.77%	0.5	10.6	0.009938976	0.15	0.03	0.12
Ductile Iron, IV, Medium	Rubber Gasket	Small	1,207	0.2	0.54%	0.5	10.6	0.009938976	0.01	0.00	0.01
Ductile Iron, IV, None	Rubber Gasket	Small	7,107	1.3	3.16%	0.5	10.6	0.009938976	0.07	0.01	0.06
High Density Polyethylene, III, Low	Weilded	Small	11	0.0	0.01%	0.15	10.6	0.002981693	0.00	0.00	0.00
High Density Polyethylene, IV, Low	Weilded	Large	2,748	0.5	1.22%	0.15	10.6	0.002981693	0.01	0.00	0.01
High Density Polyethylene, IV, Medum	Weilded	Large	6,690	1.3	2.98%	0.15	10.6	0.002981693	0.02	0.00	0.02
High Density Polyethylene, IV, None	Weilded	Large	8,715	1.7	3.88%	0.15	10.6	0.002981693	0.03	0.01	0.02
Polyvinyl Chloride, IV, Low	Rubber Gasket	Small	1,013	0.2	0.45%	0.5	10.6	0.009938976	0.01	0.00	0.01
Steel, IV, Low	Weilded	Small	231	0.0	0.10%	0.6	10.6	0.011926772	0.00	0.00	0.00
Steel, IV, Low	Weilded	Large	1,493	0.3	0.66%	0.15	10.6	0.002981693	0.00	0.00	0.00
Steel, IV, Medium	Weilded	Large	884	0.2	0.39%	0.15	10.6	0.002981693	0.00	0.00	0.00
Unknown, III, Low	Rubber Gasket	Small	52	0.0	0.02%	1	10.6	0.019877953	0.00	0.00	0.00
Total			224,804	42.6	100.00%				2.72	0.54	2.18

Notes - Small Diameter Pipe = 2 through 16 inch. Large Pipe is greater than 16 inch
Assume all soil conditions for sake of ease and generalization:

PGD MAX 12 Highest per Geotechnical Seismic Ha *per the Geotechnical Seismic Hazard Evaluation Report - the PGD may be up to 12 in in area with a medium lateral spread. This was considered in the calculations below. (Page 17
PGD for Zone 1 (most of the pipes) 1 * per Geotechnical Seismic Hazard Evaluation Report , Zone 1 PGD is less than 1 inch (page 17
Probability of Levels of Liquefaction: *Using the maps within the Geotechnical Seismic Hazard Evaluation Report, we made the following assumptions for Prob of Liquifactior

Very Low	1%
Low	5%
Moderate	15%
High	25%

Summary of water main length by material type | Calculations for leaks and breaks for Permanent Ground Deformation and Liquefaction Potential

Material	Joint Type	Diameter	Length (feet)	Length (miles)	% of Total Length	K2	PGD (inches)	Prob of Very Low Liquifaction (per 1000 ft)	Prob of Low Liquifaction	Prob of Moderate Liquifaction	Prob of High Liquifaction	Pipeline % in Very Low Liquifaction	Pipeline % in Low Liquifaction	Pipeline % in Moderate Liquifaction	Pipeline % in High Liquifaction	RR Very Low	RR Low	RR Moderate	RR High	Repairs in Very Low	Repairs in Low	Repairs in Moderate	Repairs in High	RR (PGD) for System	Breaks - 80%	Leaks - 20%
Asbestos Cement, IV, Low	Rubber Gasket	Small	32,072	6.1	14.27%	1	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.05	0.16	0.27	0.00	1.70	0.00	0.00	1.70	1.36	0.34
Asbestos Cement, III, Low	Rubber Gasket	Small	18,178	3.4	8.09%	1	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.05	0.16	0.27	0.00	0.96	0.00	0.00	0.96	0.77	0.19
Asbestos Cement, IV, Medium	Rubber Gasket	Small	2,817	0.5	1.25%	1	12.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.02	0.12	0.35	0.59	0.00	0.00	0.99	0.00	0.99	0.79	0.20
Asbestos Cement, III, Medium	Rubber Gasket	Small	2,470	0.5	1.10%	1	12.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.02	0.12	0.35	0.59	0.00	0.00	0.87	0.00	0.87	0.69	0.17
Asbestos Cement, IV, Low	Rubber Gasket	Large	7,298	1.4	3.25%	1	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.05	0.16	0.27	0.00	0.39	0.00	0.00	0.39	0.31	0.08
Cast Iron, III, Low	Rubber Gasket	Small	554	0.1	0.25%	0.8	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.04	0.13	0.21	0.00	0.02	0.00	0.00	0.02	0.02	0.00
Cast Iron, IV, Low	Rubber Gasket	Small	317	0.1	0.14%	0.8	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.04	0.13	0.21	0.00	0.01	0.00	0.00	0.01	0.01	0.00
Ductile Iron, III, Low	Rubber Gasket	Small	25,110	4.8	11.17%	0.5	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.03	0.08	0.13	0.00	0.67	0.00	0.00	0.67	0.53	0.13
Ductile Iron, III, Medium	Rubber Gasket	Small	297	0.1	0.13%	0.5	12.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.01	0.06	0.18	0.29	0.00	0.00	0.05	0.00	0.05	0.04	0.01
Ductile Iron, III, None	Rubber Gasket	Small	1,525	0.3	0.68%	0.5	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.03	0.08	0.13	0.00	0.04	0.00	0.00	0.04	0.03	0.01
Ductile Iron, III, Low	Rubber Gasket	Large	1,853	0.4	0.82%	0.3	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.00	0.02	0.05	0.08	0.00	0.03	0.00	0.00	0.03	0.02	0.01
Ductile Iron, IV, Low	Rubber Gasket	Large	67,155	12.7	29.87%	0.3	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.00	0.02	0.05	0.08	0.00	1.07	0.00	0.00	1.07	0.85	0.21
Ductile Iron, IV, Medium	Rubber Gasket	Large	2,104	0.4	0.94%	0.3	12.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.01	0.04	0.11	0.18	0.00	0.00	0.22	0.00	0.22	0.18	0.04
Ductile Iron, IV, None	Rubber Gasket	Large	17,687	3.3	7.87%	0.3	1.0	0.01	0.05	0.15	0.25	0%	0%	0%	0%	0.00	0.02	0.05	0.08	0.00	0.00	0.00	0.00	-	-	-
Ductile Iron, IV, Low	Rubber Gasket	Small	15,214	2.9	6.77%	0.5	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.03	0.08	0.13	0.00	0.40	0.00	0.00	0.40	0.32	0.08
Ductile Iron, IV, Medium	Rubber Gasket	Small	1,207	0.2	0.54%	0.5	12.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.01	0.06	0.18	0.29	0.00	0.00	0.21	0.00	0.21	0.17	0.04
Ductile Iron, IV, None	Rubber Gasket	Small	7,107	1.3	3.16%	0.5	1.0	0.01	0.05	0.15	0.25	0%	0%	0%	0%	0.01	0.03	0.08	0.13	0.00	0.00	0.00	0.00	-	-	-
High Density Polyethylene, III, Low	Weilded	Small	11	0.0	0.01%	0.15	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.00	0.01	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
High Density Polyethylene, IV, Low	Weilded	Large	2,748	0.5	1.22%	0.15	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.00	0.01	0.02	0.04	0.00	0.02	0.00	0.00	0.02	0.02	0.00
High Density Polyethylene, IV, Medum	Weilded	Large	6,690	1.3	2.98%	0.15	12.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.00	0.02	0.05	0.09	0.00	0.00	0.35	0.00	0.35	0.28	0.07
High Density Polyethylene, IV, None	Weilded	Large	8,715	1.7	3.88%	0.15	1.0	0.01	0.05	0.15	0.25	0%	0%	0%	0%	0.00	0.01	0.02	0.04	0.00	0.00	0.00	0.00	-	-	-
Polyvinyl Chloride, IV, Low	Rubber Gasket	Small	1,013	0.2	0.45%	0.5	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.03	0.08	0.13	0.00	0.03	0.00	0.00	0.03	0.02	0.01
Steel, IV, Low	Weilded	Small	231	0.0	0.10%	0.6	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.03	0.10	0.16	0.00	0.01	0.00	0.00	0.01	0.01	0.00
Steel, IV, Low	Weilded	Large	1,493	0.3	0.66%	0.15	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.00	0.01	0.02	0.04	0.00	0.01	0.00	0.00	0.01	0.01	0.00
Steel, IV, Medium	Weilded	Large	884	0.2	0.39%	0.15	12.0	0.01	0.05	0.15	0.25	0%	0%	100%	0%	0.00	0.02	0.05	0.09	0.00	0.00	0.05	0.00	0.05	0.04	0.01
Unknown, III, Low	Rubber Gasket	Small	52	0.0	0.02%	1	1.0	0.01	0.05	0.15	0.25	0%	100%	0%	0%	0.01	0.05	0.16	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total			224,804	42.6	100.00%																			8.11	6.49	1.62

Summary of Total Leaks and Breaks

				Breaks	Leaks	Total
Ground Shaking				0.5	2.2	2.7
Ground Deformation and Liquification				6	2	8
TOTAL (Mains)				**7**	**4**	**11**
TOTAL (Services)				**14**	**8**	**22**
					% of total services	0.0%